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Digitized Automation for a Changing World

AS Series Module Manual





AS Series Module Manual

Revision History

Version	Revision	Date
1 st	The first version was published.	2016/11/30
2 nd	 Chapter 1: Added information concerning new models AS08AD-B and AS08AD-C. Chapter 2: Added information concerning new models AS08AD-B andAS08AD-C. 	
	 Chapter 3: Updated information concerning CR#23-24 and software new screenshots. 	
	 Chapter 4: Updated information concerning CR#35- 54/CR#210-225 and software new screenshots. Chapter 5: Updated information concerning CR#1- 	2017/07/07
	 4/CR#210-217 and software new screenshots. 6. Chapter 6: Updated information concerning CR#210- 217 and software new screenshots. 	
	 Chapter 7: Updated information concerning theoretical calibration and software new screenshots Chapter 8: Updated information concerning new FW2.0. 	
	 Chapter 1: Added information concerning new models AS06RTD-A and AS08TC-A and installation information updated in section 1.3.1. 	
3 rd	 Chapter 5: Added information concerning new model AS06RTD-A. Chapter 6: Added information concerning new models 	2018/02/09
	AS08TC-A.	
	 Chapter 1: Added information concerning ambient air temperature-barometric pressure-altitude. 	
	 Chapter 2: Added information concerning filter average, cable length and resistance. Updated section 2.2.4 CR#23-38 and section 2.2.5 CR#43-74. 	
	3. Chapter 3: Added information concerning cable length and resistance. Updated section 3.2.1 analog to digital conversion range, output impedance and section 3.2.4	
	 CR17-20 and CR#21-36. 4. Chapter 4: Added information concerning filter average, cable length and resistance. Updated section 4.2.1 analog to digital conversion range, output impedance 	
4 th	 and 4.2.4 CR#31-21. 5. Chapter 5: Updated section 5.2.1 JPt100 range, section 5.2.4-5.2.5 added notes on CR, updated section 5.2.6 PID information, revised section 5.2.7 control mode. 	2018/11/26
	 Chapter 6: Section 6.2.1 revised type B range, added a note, section 6.2.4-6.2.5 added notes on CR, revised CR# for the records, updated section 6.2.6 PID 	
	 information and revised section 6.2.7 control mode. 7. Chapter 7: Section 7.2.4 added notes on CR. 8. Chapter 8: New functions in new FW2.02. 	
	 Chapter 9: Updated section 9.2.5 output impedance information and added sections 9.2.7.1-9.2.7.9 for new functions added and operational examples. 	
5 th	 Chapter 7: Revised contents of CR#0 and #59 in section 7.2.4. Chapter 8: Deleted a note in section 8.6.4. 	2019/1/29
6 th	1. Chapter 5: Updated wiring information in section 5.2.8.	2019/5/10

Version	Revision	Date
7 th	 Chapter 1: Added model information including AS02PU- A, AS04PU-A, AS02HC-A, AS04SIL-A and AS-FPFN02 Chapter 2: Updated section 2.2.1 specification, 2.2.4 and 2.2.5 CR table, and 2.4 adding a new error code. Chapter 3: Updated section 3.2.4 CR table and 3.4 adding a new error code. Chapter 4: Updated section 4.2 specification, 4.2.4 CR table and 4.4 adding a new error code. Chapter 5: Updated section 5.2 specification, 5.2.4 and 5.2.5 CR table, and 5.4 adding a new error code. Chapter 6: Updated section 6.2.4 and 6.2.5 CR table. Added DMPID instruction supporting firmware versions and section 6.4 adding a new error code. Chapter 7: Updated section 7.2.4 and 7.2.5 CR table and 7.5 adding a new error code. Chapter 8: Added a new error code in section 8.7.2.2. Chapter 9: Updated AS-F2AD specifications in sections 9.2.4 and 9.2.5. Deleted SM1110 and SR1540 in section 9.2.7. Added AS-FPFN02 information in sections 9.2.8 and 9.3.5. Chapter 11: New chapter introducing positioning modules AS02PU-A and AS04PU-A. 	2019/11/29
8 th	 Chapter 1: Updated section 1.1 to include software information for new AX series PLC, updated AS02HC-A specifications and added AS-FOPC02 information. Added an installation note in section 1.3.4. Chapter 2: New chapter introducing digital input/output modules. Chapter 3 - 7: Added DIADesigner+ and Hardware Configuration information. Chapter 8: Updated CR#120 default value and input values 100 to 105 of CR200 command set in section 8.2.4. Chapter 9: Added AS-FPEN02 and AS04SIL-A information, added LED indicator information of EtherNet/IP in section 9.4.2, and added error LED indicator information of AS00SCM-A in section 9.7.2.2. Chapter 10: Updated software images in section 10.2.7 and 10.2.7.2, updated section 10.2.7.7, added AS- FPFN02 installed on AS00SCM-A information in section 10.2.8, added AS-FOPC02 product information in sections 10.2.9 and 10.3.6, updated LED indicator information of AS-FEN02 in section 10.3.4. Chapter 12: Updated response time and input isolation specifications in section 12.2.1. Chapter 13: New chapter introducing IO link communication module, AS04SIL-A. Chapter 14: New chapter introducing high speed 	2020/04/30
9 th	 counter modules AS02PU and AS04PU. Chapter 1: Updated AS02/04PU-A module descriptions Chapter 3-8: Added DIADesigner-AX software operation Chapter 9: Updated sections 9.7.2.2 and 9.7.2.3 AS00SCM Error LED Indicators Chapter 10: Deleted EtherNet/IP Adapter information in section 10.2.9. 	2020/10/30

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	5. Chapter 13: Added filter time in section 13.2.1 and	
	added 13.3.2.5 Application-specific API for Communications of IO-Link Devices.	
	6. Chapter 14: Added the process images of the Timing to	
	Count in section 14.2.5 Pulse Input Counting.	
	1. Chapter 1: Added new product information for AS02ADH-A and AS-FFTP01.	
	2. Chapter 6: Added Maximum Measurable Range in functional specifications and Conversion Details in section 6.21. Added a label description in profile in section 6.2.2.	
	 Chapter 7: Added more applicable sensor types in, including C, U, L and TXK. Added Conversion Details in section 7.2.1. Added a label description in Profile in section 7.2.2 Added compatible firmware versions and more descriptions on control mode in section 7.2.7. Chapter 8: Added Weight in functional specifications in 	
	 4. Chapter 8. Added weight in functional specifications in section 8.2.1. Added a label description in Profile in section 8.2.2. Added new CRs, CR#400 to #479 in section 8.2.4. Added a new illustration for zero point tracking in section 8.2.5. Updated the software images in section 8.3.2, 8.3.3 and 8.4. Added troubleshooting for diver board failure in section 8.6.2. 	
10 th	5. Chapter 9: Updated Introduction and added applicable PLC CPU for AS00SCM-A in RTU mode in section 9.1. Updated Knob Function in section 9.2.3. Updated Modbus information and added software images in sections 9.3.1, 9.3.1.1 and 9.3.1.2. Updated UD Link information, added software images in section 9.3.2, and added new description for SCMSoft in section 9.3.2.2. Added more descriptions and example for applications of AS00SCM-A in RTU mode in section 9.4.2. Deleted software image from manufacturer R in section 9.4.2.6. Added Network Security information in section 9.4.2.7. Added error code 16#1304 in section 9.7.2.1, updated error codes 16#1506 in section 9.7.2.2 and updated 16#1502 in section 9.7.2.1.	2021/08/20
	6. Chapter 10: Updated supported firmware and software versions in section 10.2.7.1. Updated Features in section 10.2.7.2. Added a new section for IP Setting in section 10.2.7.4. Updated information in Data Mapping through EtherNet/IP Adapter in section 10.2.7.6. Updated software images (from manufacturer R) and descriptions in Example of Connecting to 3 rd Party PLC Scanner through EIP Builder in section 10.2.7.7. Updated supported firmware and software versions in section 10.2.8.1. Updated Features in section 10.2.8.2. Updated	

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	information in Configuring the Data Length for I/O	
	Module (Works with AS300) in section 10.2.8.4. Updated	
	applicable modules in section 10.2.8.6. Updated	
	software images (from manufacturer S) and PROFINET	
	Device Example (Adapter) in section 10.2.8.8. Updated	
	features for AS-FOPC02 in section 10.2.9.2. Added	
	Modbus TCP Specifications and OPC UA Specifications	
	in section 10.2.9.3. Added SR information for AS300 in	
	section 10.2.9.4. Added Setting UTC Time in OPC UA	
	Slave information in section 10.2.9.6. Added Network	
	Security information in section 10.2.9.7. Added The	
	Copyright Information about the Used External Software	
	Sources in 10.2.9.8. Added a new section 10.2.10 for	
	AS-FFTP01. Updated AS-FPFN02 LED information in	
	section 10.3.5.	
	7. Chapter 12: Updated information in Special Features in	
	section 12.2.4. Updated software images in section 12.3.	
	8. Chapter 13: Updated AS PLC CPU firmware version in	
	section 13.1. Updated application-specific API	
	information in section 13.3.2.5. Updated 16#FF21~	
	16#FF25 in IO-Link Event Code table in section 13.5.	
	9. Chapter 14: Updated the receiving data length to 32 bits	
	in section 14.1.1. Move the input/output information to	
	section 14.3. Updated software images in section 14.4.	
	10.Chapter 15: Added a new chapter for High-speed analog	
	module AS02ADH.	
	1. Chapter 1: Added new product information for AS-FECAT.	
	Added information about DIADesigner software. Added	
	supported firmware versions for AS04AD-A, AS08AD-B,	
	AS08AD-C, AS06XA-A, AS04RTD-A and AS06RTD-A.	
	2. Chapter 2: Updated information for specifications of	
	input/output isolation voltage.	
	3. Chapter 3: Added information about DIADesigner	
	software. Added Built-in moving average and	
	proportional filter function in section 3.1.1. Added	
1 1 th	supported firmware versions and updated information for	2022/05/16
11 th	specifications of conversion time as well as isolation in	2022/05/16
	section 3.2.	
	4. Chapter 4: Added information about DIADesigner	
	software. Updated information for specifications of	
	isolation in section 4.2.	
	5. Chapter 5: Added information about DIADesigner	
	software. Added supported firmware versions and	
	updated information for specifications of conversion time	
	as well as isolation in section 5.2.	
	6. Chapter 6: Added information about DIADesigner	

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	software and Ni120. Added supported firmware versions and updated information for specifications of conversion time as well as isolation in section 6.2.	
	 Chapter 7: Added information about DIADesigner software. Updated information for specifications of resolution, isolation and maximum measurable range in section 7.2. 	
	 8. Chapter 8: Added information about DIADesigner software. Updated information for specifications of maximum filter and average weights in section 8.2.1. Updated the contents of CR8 and CR67 in section 8.2.4. Updated the contents of filtering function in section 8.2.5. 	
	 Chapter 9: Added information about DIADesigner software. Updated information for CANopen mode (AS- FCOPM) in section 9.4.1. 	
	 10. Chapter 10: Update isolation information. Updated IOPS/IOCS information in section 10.2.8.4. Added supported firmware version for AS-FOPC02 in section 10.2.9.1 and updated contents in sections 10.2.9.5, 10.2.9.6, and 10.2.10.4, where the descriptions of OPC UA Client should be OPC UA Server instead. Added log section for AS-FFTP01 and updated contents (OPC UA, FTP, Log, Web, and MQTT) in section 10.2.10. Added new product information for AS-FECAT in section 10.2.11. 	
	11. Chapter 11: Updated information for specifications of isolation in section 11.1.2.	
	12. Chapter 12: Added information about DIADesigner software. Updated information for specifications of input/output isolation voltage in section 12.2.	
	13. Chapter 13: Updated information for specifications of isolation in section 13.2.1.	
	14. Chapter 14: Added information about DIADesigner software. Updated information for specifications of input/output isolation voltage in section 14.2.	
	15. Chapter 15: Added information about DIADesigner software. Updated information for specifications of isolation in section 15.2.	

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* All the Windows screenshots are used with permission from Microsoft.

Chapter 1 Introduction

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1.1 Overview

This manual introduces the use of special modules. The special modules are the analog input/output modules, temperature measurement modules, load cell modules, and network modules. For software operation, ISPSoft, DIADesigner or DIADesigner-AX is what you need. If you are using AS Series PLC CPU, refer to ISPSoft User Manual or DIADesigner Manual for more information. The new software DIADesigner-AX only supports AX Series PLC CPU and AS Series modules now, refer to AX-3 User Manual for more information on software operation.

The following table shows the module descriptions.

Classification	Model Name	Description
	AS04AD-A	4-channel analog input module Hardware resolution: 16 bits 0–10 V, 0/1–5 V, -5 to +5 V, -10 to +10 V, 0/4–20 mA, -20 to +20 mA Conversion time: 2 ms/channel (FW V1.02 or later: 1 ms/channel)
	AS08AD-B	8-channel analog input module Hardware resolution: 16 bits 0–10 V, 0/1–5 V, -5 to +5 V, -10 to +10 V Conversion time: 2 ms/channel (FW V1.02 or later: 1 ms/channel)
	AS08AD-C	8-channel analog input module Hardware resolution: 16 bits 0/4–20 mA, -20 to +20 mA Conversion time: 2 ms/channel (FW V1.02 or later: 1 ms/channel)
Analog input/output	AS04DA-A	4-channel analog input module Hardware resolution: 12 bits -10 to +10 V, 0–20 mA, 4–20 mA Conversion time: 2 ms/channel
module	AS06XA-A	4-channel analog input module Hardware resolution: 16 bits 0–10 V, 0/1–5 V, -5 to +5 V, -10 to +10 V, 0/4–20 mA, -20 to +20 mA Conversion time: 2 ms/channel (FW V1.02 or later: 1 ms/channel) 2-channel analog input module Hardware resolution: 12 bits -10 to +10 V, 0–20 mA, 4–20 mA Conversion time: 2 ms/channel
	AS02ADH-A	2-channel analog input module Hardware resolution: 16 bits 0–10 V, 0/1–5 V, -5 to +5 V, -10 to +10 V, 0/4–20 mA, -20 to +20 mA High-speed conversion time: 2 μs Full isolation (the analog channels are isolated from one another.) Logging function enable/disable: 2000 data per channel, peak records Filtering: Low-pass filter, band-pass filter
Temperature measurement	AS04RTD-A	4-channel, 2-wire/3-wire RTD Sensor type: Pt100 / Ni100 / Pt1000 / Ni1000 / JPt100 / LG-Ni1000 / Cu50 / Cu100 / 0–300 Ω / 0–3000 Ω input impedance and Ni120 (FW V1.06 or later) Resolution: 0.1°C/0.1°F (16 bits) Conversion time: 200 ms/channel
module	AS06RTD-A	6-channel, 2-wire/3-wire RTD Sensor type: Pt100 / Ni100 / Pt1000 / Ni1000 / JPt100 / LG-Ni1000 / Cu50 / Cu100 / 0–300Ω / 0–3000Ω input impedance and Ni120 (FW V1.06 or later)

Classification	Model Name	Description
		Resolution: 0.1°C/0.1°F (16 bits)
		Conversion time: 200 ms/channel
		4-channel thermocouple
	AS04TC-A	Sensor type: J, K, R, S, T, E, N, B, and -100 to +100 mV
	A30410-A	Resolution: 0.1°C/0.1°F (24 bits)
		Conversion time: 200 ms/channel
		8-channel thermocouple
	AS08TC-A	Sensor type: J, K, R, S, T, E, N, B, and -100 to +100 mV
		Resolution: 0.1°C/0.1°F (24 bits)
		Conversion time: 200 ms/channel
		2-channel, 4-wire/6-wire load cell sensor
Load cell		Eigenvalue applicable to a load cell: 1, 2, 4, 6, 20, 40, 80 mV/V
module	AS02LC-A	Highest accuracy: 0.04% of full-scale ADC Resolution : 24 bits
		Conversion time: 2.5–400 ms (nine options to choose from)
		2-axis positioning control
		5-24 VDC, 1 (A/B/Z phase) differential input, hardware maximum
		bandwidth for input: 200 kHz;
	AS02PU-A	24 VDC, 5 mA, 5 external inputs, hardware maximum bandwidth for
		input: 1 kHz;
		5 VDC, 2-axis (4 points) high-speed differential outputs, maximum
		bandwidth for output: 200 kHz;
Positioning /		4-axis positioning control
counter	AS04PU-A	24 VDC, 5mA, 6 inputs, hardware maximum bandwidth for input: 1 kHz;
module		5-30 VDC, 0.1A, 4-axis (8 points) NPN output, maximum bandwidth for
		output: 100 kHz;
		2-channel high-speed counters
		Input methods for the 2-channel are pulse-input (max. at 200 kHz) and
	AS02HC-A	SSI communication interface input (max. at 1.25 MHz)
		Incrementing / decrementing encoder input
		4-point high-speed open collector output, 5-30 VDC, 0.1A, work with high speed differential output
		Serial communication module, 2x communication ports, applicable to
Network	AS00SCM-A	communication cards, supporting MODBUS protocols
module	AS01DNET-A	DeviceNet communication port, functioning as master or slave
	AS04SIL-A	IO-Link module, built-in with 4 IO-Link communication ports
	AS00SCM-A	· · · · · ·
	+	Network module with AS-FCOPM function cards
	AS-FCOPM	
Remote I/O	AS00SCM-A	
module	+	Network module with AS-FEN02 function cards
module	AS-FEN02	
	AS01DNET-A	DeviceNet remote IO slave, its right side connects with AS Series
	(RTU)	extension modules, including digital modules, analog modules,
		temperature modules, etc.
	AS-F232	Serial communication port, RS232, functioning as master or slave
	AS-F422	Serial communication port, RS422, functioning as master or slave
	AS-F485	Serial communication port, RS485, functioning as master or slave
Function	AS-FCOPM	CANopen communication port, supporting DS301, AS series remote
cards		modules, and Delta servo systems
	AS-F2AD	2-channel analog input, 0–10 V (12 bits), 4–20 mA (11 bits),
		Conversion time: 3 ms/channel 2-channel analog input, 0–10 V, 4–20 mA (12 bits),
	AS-F2DA	Conversion time: 2 ms/channel

Classification	Model Name	Description
	AS-FEN02	2x Ethernet ports, supporting data exchange, supporting MODBUS TCP, EtherNet/IP Adapter, AS Series remote control, and DLR function
	AS-FPFN02	2x Ethernet ports, supporting data exchange, supporting PROFINET Device (adapter)
	AS-FOPC02	2x Ethernet ports, supporting data exchange, supporting OPC UA Server, only available for AS300 Series PLC CPU
	AS-FFTP01	1x Ethernet ports, supporting FTP Server, OPC UA Server, MQTT Client, Web Server, Data log, only available for AS300 Series PLC CPU
	AS-FECAT	2x Ethernet ports, supporting data exchange (before EtherCAT Master enabled), MODBUS TCP Server (1 connection), EtherCAT Master 16- axes point-to-point positioning control (only available for Delta drive), only available for AS 300 Series PLC CPU

1.2 Specifications

1.2.1 General Specifications

ltem	Specifications
Operating temperature	-20 to +60°C
Storage temperature	-40 to +80°C
Operating humidity	5–95%
Operating humidity	No condensation
Storage humidity	5–95%
	No condensation
Work environment	No corrosive gas
Installation location	In a control box
Pollution degree	2
Ingress protection	1000
(IP ratings)	IP20
EMC (electromagnetic compatibility)	Refer to Chapter 7 for more information.
	Tested with:
	5 Hz \leq f \leq 8.4 Hz, constant amplitude 3.5 mm
Vibration resistance	8.4 Hz \leq f \leq 150 Hz, constant acceleration 1 g
	Duration of oscillation: 10 sweep cycles per axis on each direction of the three
	mutually perpendicular axes International Standard IEC 61131-2 & IEC 60068-2-6 (TEST Fc)
	Tested with:
	Half-sine wave
Shock resistance	Strength of shock: 15 g peak value, 11 ms duration
Onock resistance	Shock direction: The shocks on each direction per axis, of the three mutually
	perpendicular axes (for a total of 18 shocks) International Standard IEC 61131-2 & IEC 60068-2-27 (TEST Ea)
Safety	Conforms to IEC 61131-2, UL508
Ambient air	Operating: 1080 ~ 795hPa (-1000 ~ 2000 m)
temperature-barometric pressure-altitude	Storage:1080 ~ 660hPa (-1000 ~ 3500 m)

1.2.2 EMS Standards

1.2.2.1 EMI

1

Port	Frequency Range	Level (Normative)	Reference Standard	
Enclosure port	30-230 MHz	40 dB (μV/m) quasi-peak		
(radiated)				
(measured at a	000 4000 MUL-			
distance of 10	230-1000 MHz	47 dB (μV/m) quasi-peak		
meters)			IEC 61000-6-4	
		79 dB (μV) quasi-peak		
AC power port	0.15-0.5 MHz	66 dB (μV) average		
(conducted)	0.5-30 MHz	73 dB (μV) quasi-peak		
	0.5-30 MHZ	60 dB (μV) average		

1.2.2.2 EMS

Environmental Phenomenon	Reference Standard	Test		Test Level
Electrostatic	IEC 61000-4-2	Cor	ntact	±4 kV
Discharge	120 01000-4-2	Δ	vir	±8 kV
Radio Frequency	IEC 61000-4-3	80% AM, 1 kHz sinusoidal	2.0-2.7 GHz	1 V/m
Electromagnetic Field			1.4-2.0 GHz	3 V/m
Amplitude Modulated			80-1000 MHz	10 V/m
Power Frequency		60	Hz	30 A/m
Magnetic Field	IEC 61000-4-8	50	Hz	30 A/m

Environment	tal Phenomenon	Fast Transient Burst	High Energy Surge	Radio Frequency Interference
Referen	ce Standard	IEC 61000-4-4	IEC 61000-4-5	IEC 61000-4-6
Interface/Port Specific Interface/Port		Test Level	Test Level	Test Level
	Shielded cable	1 kV	1 kV CM	10 V
Data communication	Unshielded cable	1 kV	1 kV CM	10 V
		2 14/	2 kV CM	10 V
	AC I/O (unshielded)	2 kV	1 kV DM	10 V
Digital and analog I/O	Analog or DC I/O (unshielded)	1 kV	1 kV CM	10 V
	All shielded lines (earth)	1 kV	1 kV CM	10 V
C avriance at a surray	AC power	2 kV	2 kV CM 1 kV DM	10 V
Equipment power	DC power	2 kV	0.5 kV CM 0.5 kV DM	10 V
I/O power and	AC I/O and AC auxiliary power	2 kV	2 kV CM 1 kV DM	10 V
auxiliary power output	DC I/O and DC auxiliary power	2 kV	0.5 kV CM 0.5 kV DM	10 V

1.2.2.3 Conducted Immunity Test

1.3 Installation

1.3.1 Installing a Module

- 1. Push the clip rings if they are out as the image 1 shown. Push the module to the desire position until you hear a click to finish installation.
- 2. Link the I/O modules on the right side of the PLC and make sure they are hooked together. Push the modules into the DIN rail until you hear a click.
- 3. After you installed the module, fasten the screws on the modules to secure the module on the DIN rail.



If there is a vibration source near the installation site, install anti-vibration baffles on the sides of the AS Series modules for better stabilization, such as the gray baffles show below.



• Install the baffles:

1. Hook the baffle onto the DIN rail and press it down as the directional arrow shows below.



2. Use screws to secure the baffle.



3. The completed baffle installation is as shown below.



1.3.2 Installing a Removable Terminal Block

Install a removable terminal block on the module as illustrated below.

Installation

1

Align the terminal block at the port, and press it into the CPU.



Removal

Push the clips inward as the arrow 1 shown to release the terminal block and then pull it up as the arrow 2 shown.



1.3.3 Changing a Module

1. Take the removable terminal block out of the module, and then pull the clip out from the DIN rail as shown below.



- 2. Remove the module.
- 3. Slide the new module in as shown below.



1.3.4 Installing and Removing an Extension Card

Installation

Push the extension card into the extension card slot until you hear a click.

Note: before the installation begin, you need to check if the pin arrangement and appearance are normal. If there is any bent or missing pin, you need to change to a new card. You should also check the PLC card slot to make sure everything is ok.



Removal

Press the tab labeled PUSH to release the extension card, and then remove the extension card.



1.3.5 Installing a Wiring Module

Connect a communication cable to the port on a CPU module, and make sure that the connector of the cable is properly seated in the port.

Installation

- 1. Firmly seat one side of the wiring module first.
- Press the driver board in the direction indicated by arrow 1, and make sure that the groove is attached to the DIN rail.



Removal

- 1. Push the wiring module in the direction indicated by arrow 1.
- 2. Pull the wiring module in the direction indicated by arrow 2.



MEMO



Chapter 2 Digital Input/Output Modules

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2.1 Digital Input/Output Module Specifications

2.1.1 General Specifications

• Electrical specifications for the inputs on digital input/output modules (The signals passing through the inputs are 24 VDC signals.)

The signals p	<u> </u>	•	16AM10N	32AM10N	64AM10N	16AP11R	16AP11T	16AP11P		
Module name		-A	-A	-A	-A	A	-A	-A		
Number of in	puts	8	16	32	64	8	8	8		
Connector ty	pe	Removable terminal MIL co			onnector	Removable terminal block				
Input type					Digital inpu	t				
Input form				Direct curre	ent (sinking	or sourcing	j)			
Input voltage	/ current	24	4 VDC · 5 r	mA	24 VDC 3.2 mA	2	4 VDC · 5 r	nA		
Input impeda	nce		4.7 k Ω		7.5k Ω		4.7 k Ω			
Action level	OFF→ON	>15 VDC								
Action level	ON→OFF	<5 VDC								
Response	OFF→ON	< 20 us								
time	ON→OFF	< 200 us								
Software filte	r time	Setting range: 0 ~ 25 ms; default: 10 ms								
Maximum inp frequency	out	Varies according to the filter time; for example when the filter is 1 ms, the maximum input frequency is 500 Hz, when 2 ms, 250 Hz. Note: CPU scan time also affects the maximum input frequency.								
Input signal		Voltage input Sinking: The inputs are NPN transistors whose collectors are open collectors. Sourcing: The inputs are PNP transistors whose collectors are open collectors.								
Input isolatio	n voltage	500 VAC								
Input display		When the optocoupler is driven, the input LED indicator is ON.								
Weight		100 g	117 g	100 g	140 g	138 g	120 g	120 g		

• Electrical specifications for the outputs on a digital input/output module

	Model	08AN01	16AN01	16AP11	08AN01	16AN01	16AP11	08AN01	16AN01	16AP11
Item		R-A	R-A	R-A	T-A	T-A	T-A	P-A	P-A	P-A
Number of	outputs	8	16	8	8	16	8	8	16	8
Connector	type				Remova	able term	inal block	ĸ		
Output type)				D	igital out	put			
Output forn	n		Relay-R		Trans	istor-T (s	inking)	Transistor-P (sourcing)		
Voltage/ cu	rrent	240	VAC/24	VDC 5–30 VDC		0	5-30 VDC			
Leakage cu	rrent		0uA		<10uA		<250uA (@V1.00A0) <10uA (@V1.00A1)		, ,	
	Resistance	2A/ou	utput, 8A/	COM	0.5A/output, 4A/COM		0.5A/output, 4A/CON		√СОМ	
Maximum	Maximum Inductance		Life cycle curve ^{*2}		12 W (24 VDC)		12 W (24 VDC)			
load	Bulb		20 W (24 VDC) 100 W (230 VAC)		2 W (24 VDC)		2 W (24 VDC)			
Maximum	Resistance		1 Hz			100 Hz			100 Hz	

	Model	08AN01	16AN01	16AP11	08AN01	16AN01	16AP11	08AN01	16AN01	16AP11
Item		R-A	R-A	R-A	T-A	T-A	T-A	P-A	P-A	P-A
output	Inductance		0.5 Hz			0.5 Hz			0.5 Hz	
frequency ^{*1} Bulb		1 Hz			10 Hz			10 Hz		
	OFF→ON	10 ms		0.5 ms			0.5 ms			
Maximum Response time	ON→OFF	10 ms			0.5 ms			0.5 ms		
Output isolation voltage		1500 VAC		500 VAC						
Weight		120 g	158 g	138 g	100 g	122 g	120 g	100 g	123 g	120 g

Model		32AN02T-A	64AN02T-A				
Number of o	outputs	32	64				
Connector t	уре	MIL co	nnector				
Output type		Digital	output				
Output form	ı	Transistor-	T (sinking)				
Output volta	age	5–30	VDC				
Leadage cu	rrent	<10	JuA				
	Resistance	0.1A/output	, 3.2A/COM				
Maximum load	Inductance	N/A					
IUdu	Bulb	N/A					
Maximum	Resistance	100 Hz					
output	Inductance	N/A					
frequency*1	Bulb	N/A					
Maximum	OFF→ON						
Response time	ON→OFF	0.5 ms					
Output isola	ation voltage	500 VAC					
Weight		100 g	142 g				

*1: The scan cycle affects the frequency.

*2: The life cycle curve is shown below.



2

2.1.2 Digital Input/Output Module Profiles

• AS08AM10N-A/AS08AN01P-A/AS08AN01R-A/AS08AN01T-A



Unit: mm

Number	Name	Description
1	Model name	Model name of the module
2	Input/output LED indicator	If there is an input signal, the input LED indicator is ON. If there is an output signal, the output LED indicator is ON.
3	Removable terminal block	The inputs are connected to sensors. The outputs are connected to loads to be driven.
4	Arrangement of the input/output terminals	Arrangement of the terminals
5	Terminal block clip	Secures the terminal block
6	DIN rail clip	Secures the DIN rail
7	External module port	Connects the modules
8	Label	Nameplate


AS16AM10N-A/AS16AN01P-A/AS16AN01R-A/AS16AN01T-A/AS16AP11P-A/AS16AP11R-A/ AS16AP11T-A



Number	Name	Description
1	Model name	Model name of the module
2	Input/Output LED indicator	If there is an input signal, the input LED indicator is ON. If there is an output signal, the output LED indicator is ON.
3	Removable terminal block	The inputs are connected to sensors. The outputs are connected to loads to be driven.
4	Arrangement of the input/output terminals	Arrangement of the terminals
5	Terminal block clip	Secures the terminal block
6	DIN rail clip	Secures the DIN rail
7	External module port	Connects the modules
8	Label	Nameplate

2-5

AS32AM10N-A

2



Number	Name	Description
1	Model name	Model name of the module
2	X0/X1 LED Indicator switch	Switches the LED indicators to their represented inputs.
3	ML connector	For the external I/O connecting cables UC-ET010-24B, UC-ET020-24B, UC-ET030-24B
4	Power LED indicator	Indicates the power status of the module
5	Input LED indicator	LED indicator is ON during input.
6	DIN rail clip	Secures the DIN rail
7	External module port	Connects the modules
8	Label	Nameplate

• AS32AN02T-A



Number	Name	Description
1	Model name	Model name of the module
2	Y0/Y1 LED indicator switch	Switches the LED indicators to their represented outputs.
3	ML connector	For the external I/O connecting cables UC-ET010-24D, UC-ET020-24D, UC-ET030-24D
4	Power LED indicator	Indicates the power status of the module
5	Output LED indicator	LED indicator is ON during output.
6	DIN rail clip	Secures the DIN rail
7	External module port	Connects the modules
8	Label	Nameplate

• AS64AM10N-A



Number	Name	Description
1	Model name	Model name of the module
2	LED indicator switch 1	Switches the LED indicators to their represented inputs.
3	LED indicator switch 2	Switches the LED indicators to their represented inputs.
4	ML connector	For the external I/O connecting cables UC-ET010-24B, UC-ET020-24B, UC-ET030-24B
5	Power LED indicator	Indicates the power status of the module
6	Input LED indicator	If there is an input signal, the input LED indicator is ON.
7	DIN rail clip	Secures the DIN rail
8	External module port	Connects the modules
9	Label	Nameplate

• AS64AN02T-A



Number	Name	Description
1	Model name	Model name of the module
2	LED indicator switch 1	Switches the LED indicators to their represented outputs.
3	LED indicator switch 2	Switches the LED indicators to their represented outputs.
4	ML connector	For the external I/O connecting cables UC-ET010-24D, UC-ET020-24D, UC-ET030-24D
5	Power LED indicator	Indicates the power status of the module
6	Output LED indicator	If there is an output signal, the output LED indicator is ON.
7	DIN rail clip	Secures the DIN rail
8	External module port	Connects the modules
9	Label	Nameplate

• ML connector, extension cable, and wiring modules

1. Extension Cable UC-ET010-24D (1M) / UC-ET020-24D (2M) / UC-ET030-24D (3M)



Unit: mm

Number	Name	Description					
1	IDC 40-pin terminal	Connects a digital input/output module and an external terminal module.					
2	IDC 20-pin terminal	Connects the external terminal modules UB-10-ID16A/UB-10- OR16A/UB-10-OR16B					

2. I/O connecting cables UC-ET010-24B (1M) / UC-ET020-24B (2M) / UC-ET030-24B (3M)



Number	Name	Description
1	IDC 40-pin terminal	Connects an external terminal module and a wiring module UB-10-ID32A, and UB-10-OT32A

3. AS32AM10N-A/AS64AM10N-A and the external terminal modules UB-10-ID16A, UB-10-ID32A



UB-10-ID32A



Unit: mm

Number	Name	Description
1	UB-10-ID16A: 20-pin ML connector UB-10-ID32A: 40-pin ML connector	Connects the external terminal module and a wiring module
2	Terminals	Input/Output terminals for wiring
3	Clip	Hangs the external terminal module on a DIN rail
4	Set screw	Fixes the base

4. AS332T-A/AS64AN02T-A and the external terminal modules UB-10-ID16A, UB-10-OR16A, and UB-10-OT32A.





Unit: mm



Unit: mm

Number	Name	Description
1	UB-10- ID16A /OR16A: 20- pin ML connector UB-10-OT32A: 40-pin ML connector	Connects the external terminal module and a wiring module
2	Terminals	Input/Output terminals for wiring
3	2-pin power input terminal	Power input terminal for wiring
4	Output LED indicator	LED indicator is ON during output.
5	Relay output	Relay output
6	Clip	Hangs the external terminal module on a DIN rail
7	Set screw	Fixes the base

• Spring clamp/MIL connector terminal block UB-10-IO32D for AS32AM10N-A/AS32AN02T-A



Number	Name	Description
1	Terminal block for output	Terminal block
2	40-pin MIL connector	Connects the module and the wiring module



2.1.3 Digital Input/Output Module Terminals







2-15

• ML connector and the wiring module

- 1. AS32AM10N-A/AS64AM10N-A
 - The wiring module: UB-10-ID16A



AS32AM10N-A/ AS64AM10N-A													
#2	TB1	X0.0	X0.2	X0.4	X0.6	X0.8	X0.10	X0.12	X0.14	S/S	-		
#2	TB2	X0.1	X0.3	X0.5	X0.7	X0.9	X0.11	X0.13	X0.15	S/S	-		

• The wiring module: UB-10-ID32A



AS series terminals:

Upper row	X0.0	X0.2	X0.4	X0.6	X0.8	X0.10	X0.12	X0.14	X1.0	X1.2	X1.4	X1.6	X1.8	X1.10	X1.12	X1.14	S/S	S/S
Lower row	X0.1	X0.3	X0.5	X0.7	X0.9	X0.11	X0.13	X0.15	X1.1	X1.3	X1.5	X1.7	X1.9	X1.11	X1.13	X1.15	S/S	S/S

- 2. AS32AN02T-A/AS64AN02T-A and the wiring modules:
 - UB-10-ID16A



					AS3	32T-A					
#1	TB1	Y0.0	Y0.2	Y0.4	Y0.6	Y0.8	Y0.10	Y0.12	Y0.14	C0	-
#1	TB2	Y0.1	Y0.3	Y0.5	Y0.7	Y0.9	Y0.11	Y0.13	Y0.15	C0	-

UB-10-OT32A



AS series terminals:

Upper row	Y0.0	Y0.2	Y0.4	Y0.6	Y0.8	Y0.10	Y0.12	Y0.14	Y1.0	Y1.2	Y1.4	Y1.6	Y1.8	Y1.10	Y1.12	Y1.14	•	•
Lower row	Y0.1	Y0.3	Y0.5	Y0.7	Y0.9	Y0.11	Y0.13	Y0.15	Y1.1	Y1.3	Y1.5	Y1.7	Y1.9	Y1.11	Y1.13	Y1.15	C0	C0

UB-10-OR16A





Terminals:

																			V
C0	Y0	Y1	Y2	Y3	C1	Y4	Y5	Y6	Y7	C2	Y10	Y11	Y12	Y13	C3	Y14	Y15	Y16	Y17

AS series terminals:

GND +24V

GND +24

2

C0 Y0.0 Y0.1 Y0.2 Y0.3 C1 Y0.4 Y0.5 Y0.6 Y0.7 C2 Y0.8 Y0.9 Y0.10 Y0.11 C3 Y0.12 Y0.13 Y0.14 Y0.15

- 3. AS32AM10N-A/AS32AN02T-A and the wiring modules:
 - ♦ UB-10-IO32D

Q





Chapter 3 Analog Input Module AS04/08AD

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3.1 Overview

This chapter describes the specifications for analog-to-digital modules, their operation, and their programming. In this chapter, "module" refers to the analog-to-digital modules AS04AD-A, AS08AD-B, and AS08AD-C. For software operation, ISPSoft, DIADesigner or DIADesigner-AX is what you need. If you are using AS Series PLC CPU, refer to ISPSoft User Manual or DIADesigner Manual for more information. The new software DIADesigner-AX only supports AX Series PLC CPU and AS Series modules now, refer to AX-3 User Manual for more information on software operation.

3.1.1 Characteristics

(1) Select a module based on its practical application.

AS04AD-A: Has four channels. A channel can receive either voltage or current input.

AS08AD-B: Has eight channels. A channel can receive voltage input.

AS08AD-C: Has eight channels. A channel can receive current input.

(2) High-speed conversion

Analog signals are converted to digital signals at a rate of 2 ms per channel. (FW V1.02 or later: 1 ms/channel)

(3) High accuracy

Conversion accuracy: The error range for both voltage input and current input is ±0.2% at ambient temperature of 25° C. The number of voltage/current inputs that are averaged is 100.

(4) Use the utility software to configure the module.

The HWCONFIG utility software is built into ISPSoft. You can set modes and parameters directly in HWCONFIG of ISPSoft or Hardware Configuration of DIADesigner without spending time writing programs to set registers to manage functions.

(5) Built-in moving average and proportional filter function.

3.2 Specifications and Functions

3.2.1 Specifications

• Electrical specifications

Module Name	AS04AD-A	AS08AD-B	AS08AD-C				
Number of Inputs	4	8	8				
Analog-to-Digital Conversion	Voltage input/Current input	Voltage input	Current input				
Supply Voltage	24 VDC (20.4 VDC-28.8 VDC) (-15% to +20%)						
Connector Type	Removable terminal block						
Conversion Time	2 ms/chanr	nel (FW V1.02 or later: 1 n	ns/channel)				
Isolation	optocoupler, but the an Isolation betwee Isolation betwee	ed from a digital circuit by halog channels are not isol en a digital circuit and a gi n an analog circuit and a gi an analog circuit and a dig een the 24 VDC and a gro	round: 500 VAC ground: 500 VAC gital circuit: 500 VC				
Weight		145g					

• Functional specifications

Analog-to-Digital Conversion			Voltage Input		
Rated Input Range	-10 V ~ +10 V	0 V ~ 10 V	±5 V	0 V ~ 5 V	1 V ~ 5 V
Rated Conversion	K-32000 ~	K0 ~	K-32000 ~	K0 ~	K0 ~
Range	K32000	K32000	K32000	K32000	K32000
Hardware Input Limit*1	-10.12V ~ 10.12V	-0.12V ~ 10.12V	-5.06V ~ 5.06V	-0.06V ~ 5.06V	0.95∨ ~ 5.05∨
Conversion Limit* ²	K-32384 ~ K32384	K-384 ~ K32384	K-32384 ~ K32384	K-384 ~ K32384	K-384 ~ K32384
Error Rate	Room	n Temperature: ±	0.2% ; Full Tem	perature Range:	±0.5%
Hardware Resolution			16 bits		
Input Impedance			2ΜΩ		
Absolute Input Range ^{*3}			±15 V		

*1: If the input signal exceeds the hardware input limit, the module only shows the maximum value. If the input signal is below the lower limit, it only shows the minimum value.

*2: If the input signal exceeds the hardware input limit, it also exceeds the digital conversion limit and a conversion limit error appears. For example in the voltage input mode (-10 V to +10 V), when the input signal is 10.15 V, exceeding the hardware upper limit, it also exceeds the conversion upper limit. The module uses the upper limit value (32387) as the input signal and a conversion limit error appears.

*3: If an input signal exceeds the absolute range, it might damage the channel.

Analog-to-Digital Conversion		Current Input	
Rated Input Range	±20 mA	0 mA–20 mA	4 mA–20 mA
Rated Conversion Range	K-32000 ~ K+2000	К0 ~ К32000	К0 ~ К32000
Hardware Input Limit ^{*1}	-20.24 mA ~ 20.24 mA	-0.24 mA ~ 20.24 mA	3.81 mA ~ 20.19 mA
Conversion Limit*2	K-32384 ~ K32384	K-384 ~ K32384	K-384 ~ K32384
Error Rate	Room Temperat	ure: ±0.2% ; Full Temperatu	ire Range: ±0.5%
Hardware Resolution		16 bits	
Input Impedance		250Ω	
Absolute Input Range ^{*3}		±32 mA	

*1: If the input signal exceeds the hardware input limit, the module only shows the maximum value. If the input signal is below the lower limit, it only shows the minimum value.

*2: If the input signal exceeds the hardware input limit, it also exceeds the digital conversion limit and a conversion limit error appears. For example in the voltage input mode (4 mA to 20 mA), when the input signal is 0 mA, exceeding the hardware upper limit, it also exceeds the conversion upper limit. The module uses the upper limit value (-384) as the input signal and a conversion limit error appears.

*3: If an input signal exceeds the absolute range, it might damage the channel.

3.2.2 Profile

• AS04AD-A



Number	Name	Description
1	Model Name	Model name of the module
		Status of the power supply
	POWER LED Indicator	ON: the power is on.
		OFF: the power is off.
		Error status of the module
2	ERROR LED Indicator	ON: a serious error exists in the module.
		OFF: the module is operating normally.
		Blinking: A minor error exists in the module.
	Applag to Digital	Analog-to-digital conversion status
	Analog to Digital Conversion Indicator	Blinking: conversion is in process.
		OFF: conversion has stopped.
3	Removable Terminal	Inputs are connected to sensors.
3	Block	Outputs are connected to loads to be driven.
4	Arrangement of the	Arrangement of the terminals
	Input/Output Terminals	
5	Terminal Block Clip	For removing the terminal block
6	DIN Rail Clip	Secures the module onto the DIN rail
7	Module Connecting Set	Connects the modules
8	Ground Clip	
9	Label	Nameplate

3_



3.2.3 Arrangement of Terminals

3.2.4 AS04AD Control Register

*If you use HWCONFIG to set values in CRs, once the set value is downloaded, the values can be retained in the module; however if you use TO instruction to write data into CRs, the values CANNOT be retained, after power failure or after transition of the CPU from STOP to RUN.

CR#	Name	Description	Atr.	Defaults
0	Format Setup	0: integer format	R	0
	Tomat Setup	1: floating point format		
1	Channel 1 mode setup	0: closed		
		1: -10 V to +10 V		
2	Channel 2 mode setup	2: 0 V–10 V		
		3: -5 V to +5 V	R/W	1
3	Channel 3 mode setup	4: 0 V–5 V	17,44	
		5: 1 V–5 V		
	Channel 4 mode setup	6: 0 mA–20 mA		
4		7: 4 mA–20 mA		

Note: The attribute of the CR must be W (write) to use TO instruction.

Chapter	3	Analog	Input	Module	AS04/08AD-A
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Image: Section A to +20 mAImage: Section A to +20 mAImage: Section A to +20 mAImage: Section A to +20 mA5Channel 1 offsetArge: Section A to +20 mAProvide A to +20 mAProvide A to +20 mA7Channel 2 offsetArge: Section A to +32768 to +32767Provide A to +20 mAProvide A to +20 mA9Channel 1 gainArge: Section A to +32768 to +32767Provide A to +20 mAProvide A to +20 mA10Channel 1 gainArge: Section A to +32768 to +32767Provide A to +20 mAProvide A to +20 mA11Channel 1 gainArge: Section A to +32768 to +32767Provide A to +20 mAProvide A to +20 mA12Channel 1 gainArge: Section A to +32768 to +32767Provide A to +20 mAProvide A to +20 mA13Channel 1 gainArge: Section A to +20 mAProvide A to +20 mAProvide A to +20 mA14Channel 1 average timesArge: 1-100Provide A to +20 mAProvide A to +20 mA15Channel 1 filter average percentageArge: 0-3 Unit: ±10%Provide A to +20 mAProvide A to +20 mA17Channel 1 filter average percentageArge: 0-3 Unit: ±10%Provide A to +20 mAProvide A to +20 mA18Channel 1 filter average percentageSection A to +20 mAProvide A to +20 mAProvide A to +20 mA21Channel 4 filter average percentageSection A to +20 mASection A to +20 mAProvide A to +20 mA21Channel 4 filter average percentageSection A to +20 mASection A to +20 mAProvide A to +20 mA<	CR#	Name	Description	Atr.	Defaults
6Channel 2 offset Channel 3 offsetRange: -32768 to +32767R/W07Channel 3 offsetRange: -32768 to +32767R/W09Channel 4 offsetRange: -32768 to +32767R/W010Channel 2 gainRange: -32768 to +32767R/W100011Channel 3 gainRange: -32768 to +32767R/W100012Channel 4 gainRange: -32768 to +32767R/W100013Channel 1 average timesRange: -32768 to +32767R/W100014Channel 2 average timesRange: -100R/W100015Channel 3 average timesRange: 1-100R/W100016Channel 4 average timesRange: 0-3 Unit: ±10%R/W100017Channel 2 filter average percentageRange: 0-3 Unit: ±10%R/W100018Channel 2 filter average percentageRange: 0-3 Unit: ±10%R/W119Channel 3 filter average percentageRange: 0-3 Unit: ±10%R/W120Channel 4 filter average percentage0: 2 ms 1: 4 ms 2: 10 ms 3: 15 ms 4: 20 msR/WR/W1			8: -20 mA to +20 mA		
6Channel 2 offset Channel 3 offsetRange: -32768 to +32767R/W07Channel 3 offsetRange: -32768 to +32767R/W09Channel 4 offsetRange: -32768 to +32767R/W010Channel 2 gainRange: -32768 to +32767R/W100011Channel 3 gainRange: -32768 to +32767R/W100012Channel 4 gainRange: -32768 to +32767R/W100013Channel 1 average timesRange: -32768 to +32767R/W100014Channel 2 average timesRange: -100R/W100015Channel 3 average timesRange: 1-100R/W100016Channel 4 average timesRange: 0-3 Unit: ±10%R/W100017Channel 2 filter average percentageRange: 0-3 Unit: ±10%R/W100018Channel 2 filter average percentageRange: 0-3 Unit: ±10%R/W119Channel 3 filter average percentageRange: 0-3 Unit: ±10%R/W120Channel 4 filter average percentage0: 2 ms 1: 4 ms 2: 10 ms 3: 15 ms 4: 20 msR/WR/W1					
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7Channel 3 offset8Channel 4 offset9Channel 1 gain10Channel 2 gain11Channel 3 gain12Channel 4 gain13Channel 1 average times14Channel 2 average times15Channel 3 average times16Channel 1 filter average percentage18Channel 1 filter average percentage19Channel 4 filter average percentage20Channel 4 filter average percentage19Channel 4 filter average percentage20Channel 4 filter average percentage21Channel 4 filter average percentage21Channel 4 filter average percentage22Channel 4 filter average percentage23Channel 3 filter average percentage24Channel 3 filter average percentage25Channel 4 filter average percentage26Channel 3 filter average percentage27Channel 4 filter average percentage28Channel 3 filter average percentage29Channel 4 filter average percentage20Channel 3 filter average percentage21Channel 4 filter average percentage22Channel 3 filter average percentage23Channel 4 filter average	6	Channel 2 offset	Range: -32768 to +32767	R/W	0
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17Channel 1 filter average percentageRange: 0-3 Unit: ±10% 1: ±10% 2: ±20% 3: ±30%R/WP20Channel 4 filter average percentage0: 2 ms 1: 4 ms 2: 10 ms 1: 4 ms 2: 10 ms 3: 15 ms 4: 20 msR/WP	16	Channel 4 average			
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Range: 0-3 Unit: ±10% average percentageRange: 0-3 Unit: ±10% 1: ±10% 2: ±20% 3: ±30%R/W119Channel 3 filter average percentage1: ±10% 2: ±20% 3: ±30%R/W120Channel 4 filter average percentage0: 2 ms 1: 4 msR/W121Channel sampling (sampling/integration time)1: 4 ms 3: 15 ms 4: 20 msR/W0	17				
18average percentageUnit: ±10% 1: ±10%R/W119Channel 3 filter average percentage1: ±10% 2: ±20% 3: ±30%R/W120Channel 4 filter average percentage0: 2 msR/W121Channel sampling cycle (sampling/integration time)1: 4 ms 3: 15 ms 4: 20 msR/W0		average percentage	Range: 0–3		
10Channel 3 filter average percentage1: ±10% 2: ±20% 3: ±30%R/W120Channel 4 filter average percentage2: ±20% 3: ±30%3: ±30%120Channel 4 filter average percentage0: 2 ms121Channel sampling (sampling/integration time)1: 4 msR/W1	18		Unit: ±10%		
19average percentage2: ±20% 3: ±30%20Channel 4 filter average percentage0: 2 ms21Channel sampling cycle (sampling/integration time)0: 2 ms21R/W0			- 1: ±10%	R/W	1
20Channel 4 filter average percentage3: ±30%Image: Channel 4 filter average percentage21Channel 4 filter average percentage0: 2 msImage: Channel sampling 1: 4 msImage: Channel sampling 2: 10 msImage: Channel sampling 3: 15 msImage: Channel sa	19		2: ±20%		
20 average percentage0: 2 ms0: 2 ms21Channel sampling cycle (sampling/integration time)1: 4 ms 2: 10 ms 3: 15 ms 4: 20 msR/W			- 3: ±30%		
210: 2 ms Channel sampling cycle0: 2 ms 1: 4 ms 2: 10 ms 3: 15 ms 4: 20 msR/W0	20				
Channel sampling1: 4 msProvideProvi		average percentage	0:2 ma		
21cycle (sampling/integration time)2: 10 ms 3: 15 ms 4: 20 msR/W0					
21 (sampling/integration time) 3: 15 ms R/W 0 4: 20 ms 4: 20 ms 0		_			
time) 4: 20 ms	21			R/W	0
			5: 30 ms		

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CR#	Name	Description	Atr.	Defaults
		6: 40 ms		
		7: 50 ms		
		8: 60 ms		
		9: 70 ms		
		10: 80 ms		
		11: 90 ms		
		12: 100 ms		
		0: open channel alarm		
		1: close channel alarm		
		bit0: channel 1		
		bit1: channel 2		
		bit2: channel 3		
		bit3: channel 4	544	0
22	Channel Alarm Setup		R/W	0
		0: warning		
		1: alarm		
		bit8: error in the power supply		
		bit9: error in the module hardware		
		bit10: error in calibration		
23	The minimum scale	When the format is set to integer in HWCONFIG,		-10.0
24	range for channel 1	the scale range is invalid.		-10.0
25	The minimum scale	For analog-digital modules, it is much more		-10.0
26	range for channel 2	convenient if the system can convert digital values		-10.0
27	The minimum scale	to floating-point values for earier understanding.		-10.0
28	range for channel 3	Here you can set the minimum and maximum scale		
29	The minimum scale	ranges of corresponding floating-point values for	R	-10.0
30	range for channel 4	channels.		
31	The maximum scale	For example, if the scale range for an analog to		10.0
32	range for channel 1	digital input channel is ± 10.0 V, it indicates the		
33	The maximum scale	maximum value is +10.0 V and the minimum value		10.0
34	range for channel 2	is -10.0 V.		
35	The maximum scale	If the scale range for an analog to digital input		10.0
36	range for channel 3	channel is 4 mA ~ 20 mA. It indicates the maximum		

CR#	Name	Description	Atr.	Defaults
37		value is 20 mA and the minimum value is 4 mA.		
	The maximum scale	Note: You can use PLC instruction DSCLP		10.0
38	range for channel 4	(API0217) and set SM685 to ON to use floating-point		10.0
		operations when a conversion range needs to edit.		
		Instructions for peak values		
		16#0101: record the peak value again for channel		
		1		
		16#0102: record the peak value again for channel		
		2		
		16#0104: record the peak value again for channel		
		3		
		16#0108: record the peak value again for channel		
		4		
		16#010F: record the peak values again for		
	Instruction Set	channels 1-4		
201		16#0201: enable recording for channel 1	W	0
		16#0202: enable recording for channel 2		
		16#0204: enable recording for channel 3		
		16#0208: enable recording for channel 4		
		16#020F: enable recording for channels 1-4		
		16#0211: disable recording for channel 1		
		16#0212: disable recording for channel 2		
		16#0214: disable recording for channel 3		
		16#0218: disable recording for channel 4		
		16#021F: disable recording for channels 1–4		
		16#0502: restore default settings		
	The maximum peak			
210	value for channel 1			0
	The maximum peak			<u> </u>
211	value for channel 2	Integer format; the maximum peak value for analog	-	0
0.15	The maximum peak	inputs	R	
212	value for channel 3			0
040	The maximum peak			0
213	value for channel 4			0

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CR#	Name	Description	Atr.	Defaults
214	The minimum peak value for channel 1	Integer format; the minimum peak value for analog		0
215	The minimum peak value for channel 2		R	0
216	The minimum peak value for channel 3	inputs	ĸ	0
217	The minimum peak value for channel 4			0
222	The time to record for channel 1	Unit: 10 ms Range: 1–100 R/W Time to record the digital value for the channel		1
223	The time to record for channel 2		R/M	1
224	The time to record for channel 3			1
225	The time to record for channel 4		1	
240	The number of records for channel 1	Range: 0–500, display the current records		0
241	The number of records for channel 2		P	0
242	The number of records for channel 3			0
243	The number of records for channel 4		0	
4000~ 4499	Records for channel 1	500 records for channel 1	R	
4500~ 4999	Records for channel 2	500 records for channel 2	R	
5000~ 5499	Records for channel 3	500 records for channel 3	R	
5500~ 5999	Records for channel 4	500 records for channel 4	R	

3.2.5 AS08AD Control Registers

*If you use HWCONFIG to set values in CRs, once the set value is downloaded, the values can be retained in the module; however if you use TO instruction to write data into CRs, the values CANNOT be retained, after power failure or after transition of the CPU from STOP to RUN.

CR#	Name	Description	Atr.	Defaults
0	Format Setup	0: integer format 1: floating point format	R	0
1	Channel 1 mode setup			
2	Channel 2 mode setup	AS08AD-B 0: closed		
3	Channel 3 mode setup	1: -10 V to +10 V 2: 0 V–10 V 3: -5 V to +5 V		
4	Channel 4 mode setup	4: 0 V–5 V 5: 1 V–5 V	R/W	1
5	Channel 5 mode setup	AS08AD-C		
6	Channel 6 mode setup	0: closed 1: -20 mA to +20 mA		
7	Channel 7 mode setup	2: 0 mA–20 mA 3: 4 mA–20 mA		
8	Channel 8 mode setup			
9	Channel 1 offset			
10	Channel 2 offset			
11	Channel 3 offset			
12	Channel 4 offset	Range: -32768 to +32767	R/W	0
13	Channel 5 offset	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		U
14	Channel 6 offset			
15	Channel 7 offset			
16	Channel 8 offset			

Note: The attribute of the CR must be W (write) to use TO instruction.

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17Channel 1 gain18Channel 2 gain19Channel 3 gain20Channel 4 gain21Channel 5 gain22Channel 6 gain23Channel 7 gain24Channel 7 gain25Channel 1 average times26Channel 1 average times27Channel 3 average times28Channel 4 average times29Channel 4 average times20Channel 6 average times30Channel 7 average times31Channel 7 average times32Channel 7 average times33Channel 7 average times34Channel 7 average times35Channel 7 average times36Channel 7 average times37Channel 3 filter average percentage38Channel 4 filter average percentage37Channel 5 filter average percentage38Channel 5 filter average percentage39Channel 6 filter average percentage39Channel 7 filter average percentage40Channel 6 filter average percentage	CR#	Name	Description	Atr.	Defaults
19Channel 3 gain19Channel 3 gain20Channel 4 gain21Channel 5 gain22Channel 6 gain23Channel 7 gain24Channel 8 gain25Channel 1 average times26Channel 2 average times27Channel 3 average times28Channel 4 average times29Channel 7 average times30Channel 7 average times31Channel 7 average times32Channel 1 filter average33Channel 2 filter average6Channel 3 filter average34Channel 3 filter average35Channel 4 filter average36Channel 5 filter average37Channel 5 filter average38Channel 5 filter average39Channel 5 filter average31Channel 1 filter average32Channel 1 filter average33Channel 1 filter average34Channel 3 filter average35Channel 1 filter average36Channel 5 filter average37Channel 5 filter average38Channel 1 filter average39Channel 1 filter average31Channel 1 filter average32Channel 1 filter average33Channel 1 filter average34Channel 1 filter average35Channel 1 filter average36Channel 1 filter average37Channel 1 filter average38Channel 1 filter average<	17	Channel 1 gain			
20Channel 4 gainRange: -32768 to +32767RW100021Channel 5 gain	18	Channel 2 gain			
21Channel 5 gainRange: -32768 to +32767RW100021Channel 5 gain22Channel 7 gain23Channel 7 gain24Channel 8 gain25Channel 1 average times26Channel 2 average times27Channel 3 average times28Channel 4 average times30Channel 5 average times31Channel 6 average times32Channel 7 average times33Channel 7 average times34Channel 1 filter average percentage35Channel 2 filter average percentage36Channel 5 filter average percentage37Channel 5 filter average percentage38Channel 6 filter average percentage39Channel 7 filter average percentage31Channel 7 filter average percentage32Channel 7 filter average percentage33Chan	19	Channel 3 gain			
21Channel 5 gainChannel 5 gainChannel 5 gainChannel 6 gain22Channel 7 gainChannel 8 gainChannel 8 gain24Channel 1 average timesChannel 1 average timesRW25Channel 1 average timesRW1026Channel 3 average timesRange: 1–100RW29Channel 6 average timesP1030Channel 7 average timesP1031Channel 7 average timesP1032Channel 7 average timesP1033Channel 7 average timesP1034Channel 1 filter average percentagePRange: 0–336Channel 5 filter average percentageUnit: ±10%1: ±10%37Channel 5 filter average percentage2: ±20%3: ±30%38Channel 6 filter average percentage2: ±20%3: ±30%39Channel 7 filter average percentage2: ±20%39Channel 7 filter average percentage2: ±20%31Channel 7 filter average percentage3: ±30%	20	Channel 4 gain	Range: -32768 to +32767	R/M	1000
23Channel 7 gain23Channel 7 gain24Channel 8 gain25Channel 1 average times26Channel 2 average times27Channel 3 average times28Channel 4 average times29Channel 5 average times30Channel 6 average times31Channel 7 average times32Channel 7 average times33Channel 7 average times34Channel 1 filter average percentage35Channel 2 filter average percentage36Channel 3 filter average percentage37Channel 5 filter average percentage38Channel 6 filter average percentage39Channel 7 filter average percentage31Channel 7 filter average percentage33Channel 7 filter average percentage34Channel 7 filter average percentage35Channel 7 filter average percentage36Channel 7 filter average percentage37Channel 7 filter average percentage38Channel 7 filter average percentage39Channel 7 filter average percentage31Channel 7 filter average percentage32Channel 7 filter average percentage33 <td>21</td> <td>Channel 5 gain</td> <td></td> <td></td> <td>1000</td>	21	Channel 5 gain			1000
24Channel 8 gain25Channel 1 average times26Channel 2 average times27Channel 3 average times28Channel 4 average times29Channel 5 average times30Channel 6 average times31Channel 7 average times32Channel 7 average times33Channel 1 filter average percentage34Channel 2 filter average percentage35Channel 3 filter average percentage36Channel 4 filter average percentage37Channel 5 filter average percentage38Channel 6 filter average percentage39Channel 6 filter average percentage39Channel 7 filter average percentage31Channel 7 filter average percentage32Channel 7 filter average percentage33Channel 7 filter average percentage34Channel 7 filter average percentage35Channel 7 filter average percentage <t< td=""><td>22</td><td>Channel 6 gain</td><td></td><td></td><td></td></t<>	22	Channel 6 gain			
25Channel 1 average timesReverage	23	Channel 7 gain			
26Channel 2 average timesRW1027Channel 3 average timesRange: 1-100RW1028Channel 4 average timesRange: 1-100RW1029Channel 5 average timesRW101030Channel 7 average timesRW101031Channel 7 average timesRR1032Channel 7 average timesRR1033Channel 1 filter average percentageRange: 0-3Range: 0-3Range: 0-334Channel 3 filter average percentageUnit: ±10% 1: ±10%RW137Channel 5 filter average percentage2: ±20% 3: ±30%RW1	24	Channel 8 gain			
27Channel 3 average timesRW1028Channel 4 average timesPange: 1-100RW1029Channel 5 average timesPange: 1-100RW1030Channel 6 average timesPange: 1-100Pange: 1-100Pange: 1-10031Channel 7 average timesPange: 1-100Pange: 1-100Pange: 1-10032Channel 7 average timesPange: 1-100Pange: 1-100Pange: 1-10033Channel 7 average timesPange: 1-100Pange: 1-100Pange: 1-10034Channel 2 filter average percentagePange: 0-3Pange: 0-3Pange: 0-336Channel 3 filter average percentageUnit: ±10%Pange: 0-3Pange: 0-337Channel 5 filter average percentagePange: 0-3Pange: 0-3Pange: 0-338Channel 5 filter average percentagePange: 0-3Pange: 0-3Pange: 0-339Channel 7 filter average percentagePange: 0-3Pange: 0-3Pange: 0-331Channel 7 filter average percentage<	25	Channel 1 average times			
28Channel 4 average timesRame: 1-100RW1029Channel 5 average times1Channel 6 average times11030Channel 7 average times1Channel 7 average times1132Channel 8 average times111133Channel 1 filter average percentage111134Channel 2 filter average percentage111135Channel 3 filter average percentage111136Channel 5 filter average percentage111137Channel 6 filter average percentage222138Channel 7 filter average percentage222138Channel 7 filter average percentage222139Channel 7 filter average percentage22139Channel 7 filter average percentage22139Channel 7 filter average percentage22139Channel 7 filter average percentage22139Channel 7 filter average percentage33130Channel 7 filter average percentage33131Channel 7 filter average percentage31132Channel 7 filter average percentage31133Channel 7 filter average percentage31134Channel 7 filter average perce	26	Channel 2 average times			
29Channel 5 average timesRange: 1-100R/W1029Channel 5 average times10101030Channel 7 average times101031Channel 7 average times101032Channel 8 average times101033Channel 1 filter average percentage101034Channel 2 filter average percentage8836Channel 3 filter average percentage1037Channel 5 filter average percentage11 ± 10%38Channel 6 filter average percentage12 ± 20%38Channel 7 filter average percentage21 ± 20%39Channel 7 filter average percentage11 ± 10%39Channel 7 filter average percentage11 ± 10%39Channel 7 filter average percentage1039Channel 7 filter average percentage1030Channel 7 filter average percentage1031Channel 7 filter average percentage11 ± 10%32Channel 7 filter average percentage11 ± 10%33Channel 7 filter average percentage11 ± 10%34Channel 7 filter average percentage11 ± 10%35Channel 7 filter average percentage11 ± 10%36Channel 7 filter average percentage11 ± 10%37Channel 7 filter average percentage11 ± 10%38Channel 7 filter average percentage11 ± 10%39Channel 7 filter average percentage11 ± 10%31Channel 7 fi	27	Channel 3 average times			
29Channel 5 average times30Channel 6 average times31Channel 7 average times32Channel 8 average times33Channel 1 filter average percentage34Channel 2 filter average percentage35Channel 3 filter average percentage36Channel 4 filter average percentage37Channel 5 filter average percentage38Channel 6 filter average percentage39Channel 7 filter average percentage	28	Channel 4 average times			
31Channel 7 average times32Channel 8 average times33Channel 1 filter average percentage34Channel 2 filter average percentage35Channel 3 filter average percentage36Channel 4 filter average percentage37Channel 5 filter average percentage38Channel 6 filter average percentage39Channel 7 filter average percentage	29	Channel 5 average times	- Range: 1–100	R/W	10
32Channel 8 average times133Channel 1 filter average percentage34Channel 2 filter average percentage35Channel 3 filter average percentageRange: 0-336Channel 4 filter average percentageUnit: ±10% 1: ±10%37Channel 5 filter average percentageRifter average 1: ±10%38Channel 6 filter average percentageX39Channel 7 filter average percentage	30	Channel 6 average times	-		
33Channel 1 filter average percentageImage: 0-3Image: 0-334Channel 2 filter average percentageRange: 0-3Image: 0-336Channel 4 filter average percentageImage: 0-3Image: 0-336Channel 4 filter average percentageImage: 0-3Image: 0-337Channel 5 filter average percentageImage: 0-3Image: 0-338Channel 6 filter average percentageImage: 0-3Image: 0-338Channel 6 filter average percentageImage: 0-3Image: 0-338Channel 7 filter average percentageImage: 0-3Image: 0-339Channel 7 filter average percentageImage: 0-3Image: 0-331Channel 7 filter average percentageImage: 0-3Image: 0-331Channel 7 filter average percentageImage: 0-3Image: 0-332Channel 7 filter average percentageImage: 0-3Image: 0-333Channel 7 filter average percentageImage: 0-3Image: 0-334Channel 7 filter average percentageImage: 0-3Image: 0-335Channel 7 filter average percentageImage: 0-3Image: 0-336Image: 0-3Image: 0-3Image: 0-337Channel 6 filter average perce	31	Channel 7 average times			
33percentage34Channel 2 filter average percentage35Channel 3 filter average percentage36Channel 4 filter average percentage37Channel 5 filter average percentage38Channel 6 filter average percentage39Channel 7 filter average percentage	32	Channel 8 average times			
34 percentageChannel 3 filter average percentageRange: 0-336Channel 4 filter average percentageUnit: ±10% 1: ±10%37Channel 5 filter average percentage2: ±20% 3: ±30%38Channel 6 filter average percentage3: ±30%39Channel 7 filter average percentage	33				
35percentageRange: 0-336Channel 4 filter average percentageUnit: ±10%37Channel 5 filter average percentage1: ±10%37Channel 5 filter average percentage2: ±20%38Channel 6 filter average percentage3: ±30%39Channel 7 filter average percentage	34	_			
36percentage1: ±10%R/W137Channel 5 filter average percentage2: ±20%3: ±30%IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	35		Range: 0–3		
37Shamber of more developed percentage3: ±30%38Channel 6 filter average percentage	36	_		R/W	1
38 percentage 39 Channel 7 filter average percentage	37				
39 percentage	38				
40 Channel 8 filter average	39				
	40	Channel 8 filter average	-		

	Chapter 3 Analog Input Modu	ule AS(04/08AD-A
Name	Description	Atr.	Defaults
percentage			
	0: 2 ms		
	1: 4 ms		
	2: 10 ms		
	3: 15 ms		
	4: 20 ms		
Channel Sampling Cycle	5: 30 ms		
(Sampling/Integration	6: 40 ms	R/W	0
Time)	7: 50 ms		
	8: 60 ms		
	9: 70 ms		
	10: 80 ms		
	11: 90 ms		

12: 100 ms

bit0: channel 1 bit1: channel 2 bit2: channel 3

bit3: channel 4 bit4: channel 5 bit5: channel 6

bit6: channel 7 bit7: channel 8

0: warning 1: alarm

bit8: error in the power supply bit9: error in the module hardware

When the format is set to integer in

For analog-digital modules, it is much more

HWCONFIG, the scale range is invalid.

bit10: error in calibration

0: open channel alarm 1: close channel alarm

CR#

41

42

43

44

45

Channel Alarm Setup

The minimum scale range

The minimum scale range

for channel 1

3

-10.0

R/W

R

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46for channel 2convenient if the system can comvalues to floating-point values47The minimum scale rangevalues to floating-point values48for channel 3understanding. Here you can set the and maximum scale ranges of corr floating-point values for channels.49The minimum scale range for channel 4For example, if the scale range for to digital input channel is ±10.0 V,51The minimum scale range for channel 5For example, if the scale range for to digital input channel is ±10.0 V,53The minimum scale range for channel 6If the scale range for an analog to co channel is 4 mA ~ 20 mA. It inco55The minimum scale rangeIf the scale range for an analog to co channel is 4 mA ~ 20 mA. It inco	for earier e minimum responding an analog it indicates	
47The minimum scale range48for channel 3understanding. Here you can set the and maximum scale ranges of corr floating-point values for channels.49The minimum scale rangeand maximum scale ranges of corr floating-point values for channels.50for channel 4For example, if the scale range for to digital input channel is ±10.0 V, the maximum value is +10.0 V51The minimum scale rangethe maximum value is +10.0 V, minimum value is -10.0 V.53The minimum scale rangeIf the scale range for an analog to c channel is 4 mA ~ 20 mA. It income	e minimum responding ⁻ an analog it indicates	
48for channel 0and maximum scale ranges of corr49The minimum scale range for channel 4and maximum scale ranges of corr floating-point values for channels. For example, if the scale range for to digital input channel is ±10.0 V, f the maximum value is +10.0 V51The minimum scale range for channel 5For example, if the scale range for to digital input channel is ±10.0 V, f the maximum value is +10.0 V53The minimum scale range for channel 6If the scale range for an analog to c 	responding [.] an analog it indicates	
49The minimum scale range for channel 4floating-point values for channels.50for channel 4For example, if the scale range for to digital input channel is ±10.0 V, f51The minimum scale range for channel 5the maximum value is ±10.0 V, f52for channel 5the maximum value is ±10.0 V.53The minimum scale range for channel 6If the scale range for an analog to c54for channel 6If the scale range for an analog to c55The minimum scale rangechannel is 4 mA ~ 20 mA. It inc	an analog it indicates	
50for channel 4For example, if the scale range for51The minimum scale rangeFor example, if the scale range for52for channel 5the maximum value is ±10.0 V,53The minimum scale rangeminimum value is -10.0 V.54for channel 6If the scale range for an analog to c55The minimum scale rangechannel is 4 mA ~ 20 mA. It inc	it indicates	
51The minimum scale rangeto digital input channel is ±10.0 V, f52for channel 5the maximum value is ±10.0 V, f53The minimum scale rangeminimum value is ±10.0 V.54for channel 6If the scale range for an analog to c55The minimum scale rangechannel is 4 mA ~ 20 mA. It inc	it indicates	
53The minimum scale rangeminimum value is +10.0 V53The minimum scale rangeminimum value is -10.0 V.54for channel 6If the scale range for an analog to c55The minimum scale rangechannel is 4 mA ~ 20 mA. It inc	/ and the	
54for channel 6If the scale range for an analog to c55The minimum scale rangechannel is 4 mA ~ 20 mA. It inc		
55The minimum scale rangechannel is 4 mA ~ 20 mA. It inc		
35 The minimum scale range	digital input	
56 for channel 7 maximum value is 20 mA and the value is 4 mA.	e minimum	
57 The minimum scale range		
58 for channel 8 Note: You can use PLC instruction	on DSCLP	
59 The maximum scale range (API0217) and set SM685 to C		
60 for channel 1 floating-point operations when a conve	ersion range	
61 The maximum scale range needs to edit.		
62 for channel 2		
63 The maximum scale range		
64 for channel 3		
65 The maximum scale range		
66 for channel 4	R	10.0
67 The maximum scale range		10.0
68 for channel 5		
69 The maximum scale range		
70 for channel 6		
71 The maximum scale range		
72 for channel 7		
73 The maximum scale range		
74 for channel 8		

CR#	Name	Description	Atr.	Defaults
		Instructions for peak values 16#0101: record the peak value again for		
		channel 1 16#0102: record the peak value again for channel 2		
		16#0104: record the peak value again for channel 3 16#0108: record the peak value again for		
		channel 4 16#010F: record the peak values again for channels 1-4		
201	Instruction Set	16#0201: enable recording for channel 1 16#0202: enable recording for channel 2 16#0204: enable recording for channel 3	W	0
		16#0208: enable recording for channel 4 16#020F: enable recording for channels 1–4		
		16#0211: disable recording for channel 1 16#0212: disable recording for channel 2 16#0214: disable recording for channel 3		
		16#0218: disable recording for channel 4 16#021F: disable recording for channels 1–4		
210	The maximum peak value for channel 1	16#0502: restore default settings		0
211	The maximum peak value for channel 2			0
212	The maximum peak value for channel 3 The maximum peak value for channel 4 The maximum peak value for channel 5 The maximum peak value for channel 6	Integer format; the maximum peak value for analog inputs	R	0
213				0
214				0
215				0

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CR#	Name	Description	Atr.	Defaults
216	The maximum peak value for channel 7			0
217	The maximum peak value for channel 8			0
218	The minimum peak value for channel 1	Integer format; the minimum peak value for analog inputs		0
219	The minimum peak value for channel 2			0
220	The minimum peak value for channel 3		R	0
221	The minimum peak value for channel 4			0
222	The minimum peak value for channel 5			0
223	The minimum peak value for channel 6			0
224	The minimum peak value for channel 7			0
225	The minimum peak value for channel 8			0
222	The time to record for channel 1			1
223	The time to record for channel 2	Unit: 10 ms Range: 1–100 Time to record the digital value for the channels		1
224	The time to record for channel 3		R	1
225	The time to record for channel 4			1

Item	Function	Description
1	Enable/Disable a	1. Enable or disable a channel.
1	Channel	2. If a channel is disabled, the total conversion time decreases.
2	Calibration	Calibrate a linear curve.
3	Average	Conversion values are averaged and filtered.
4	Disconnection Detection	Disconnection detection only operates when the analog range is 4 mA– 20 mA or 1 V–5 V.
5	Channel Detect and Alarm	If an input signal exceeds the range of inputs that the hardware can receive, the module produces an alarm or a warning. You can disable this function.
6	The Limit Detections for Channels	Save the maximum/minimum values for channels.
7	Records for Channels (Applicable for AS04AD)	Save the analog curves for channels
8	Scale Range	When the format is floating-point, you can set the scale range.

3.2.6 Functions

1. Enable/Disable a channel

An analog signal is converted into a digital signal at a rate of 2 ms per channel. The total conversion time is 2 ms X (the number of channels). For firmware V1.02 or later, an analog signal is converted into a digital signal at a rate of 1 ms per channel. The total conversion time is 1 ms X (the number of channels). If a channel is not used, you can disable it to decrease the total conversion time.

2. Calibration

To make a curve meet specific needs, calibrate the curve by changing the offset and the gain. The calibration range depends on the range of inputs that the hardware can receive. The formula is:

$$Output = \frac{(Input \times Gain)}{1000} + Offset$$

Example:

A channel receives voltage inputs between -10.0 V to +10.0 V. The gain is 1000, and the offset is 0. The corresponding value for the original signal -10.0 V to +10.0 V is -32000 to +32000. If you change the offset to -100, the calibrated value for the original signal -10.0 V to +10.0 V becomes -31900 to +32100.



3. Average

This function is achived by moving average. You can set the average times can be set between 1–100. It is a steady value obtained from the sum of the recorded values. If the recorded values include an acute pulse due to unavoidable external factors, however, you may observe violent changes in the average value. Use the filtering function to exclude acute pulses from the sum-up and equalization, so that the computed average value is not affected by the acute recorded values. Set the filter percentage to the range 0–3, where the unit is 10%. If you set the filter range to 0, the system sums up all the recorded values and divides them to obtain the average value, but if you set the filter range to 1, for example, the system excludes the bottom 10% and top 10% of the values and averages only the remaining values to obtain the average value. For instantance, set the average value to 100 and set the filter percentage to 3. When there are 100 pieces of data collected, the system arranges the collected data according to their values from large to small and then excludes the bottom 30% and top 30% of the values (60 pieces of data) and averages only the remaining values (40 pieces of data) to obtain the average value.



4. Disconnection detection

Disconnection detection only operates when the analog range is 4–20 mA or 1–5 V. If a module that can receive inputs between 4–20 mA or from 1–5 V is disconnected, the input signal exceeds the range of allowable inputs, so the module produces an alarm or a warning.

5. Channel detection

If an input signal exceeds the allowable range of inputs, an error message appears. You can disable this function so that the module does not produce an alarm or a warning when the input signal exceeds the input range.

6. Limit detections for channels

This function saves the maximum and minimum values for channels so that you can determine the peak to peak values.



7. Records for channels (applicable for AS04AD)

Record the input values of the cyclic sampling for each channel. The system saves up to 500 data points and the recording time is 10 ms.



8. Scale range

You can set the scale range when the format is floating-point. The analog output mode of a channel has a corresponding digital range. Digital values correspond to analog outputs sent by the module. For example, if the analog range is -10 V to +10 V, the digital range is -10.0 to +10.0, the HSP scale is 10.0, and the LSP scale is -10.0. The digital values -10.0 to +10.0 correspond to the analog values -10 V to +10 V, as the example below shows.



3.2.7 Wiring

Precautions

To ensure the analog-to-digital module functions well and reliably, the external wiring must prevent noise. Before you install the cables, follow the precautions below.

- To prevent a surge and induction, the AC cable and the input signal cables that are connected to the module must be separate cables.
- (2) Do not install the cable near a main circuit, a high-voltage cable, or a cable connected to a load that is not a PLC. In addition, the cable must not be bound to a main circuit, a high-voltage cable, or a cable connected to a load which is not a PLC.
- (3) Ground shielded cables and hermetically sealed cables separately.
- (4) Terminals with insulation sleeves cannot be arranged as a terminal block, so you should cover the terminals with insulation tubes.
- (5) Use single-core cables or twin-core cables in a diameter of 24 AWG–22 AWG with pin-type connectors smaller than 1 mm. Use only copper conducting wires that can resist temperatures above 60° C-75° C.



- (6) Notes on two-wire, three-wire, and four-wire connections:
 - Two-wire connection/three-wire connection (passive transducer): connect the transducer and the analog input module to the same power circuit.
 - Four-wire connection (active transducer): the transducer uses an independent power supply so do not connect it to the same power circuit as the analog input module.
- (7) Note: use cables with the same length (less than 200 m) and use wire resistance of less than 100 ohm.

AS04AD-A External wiring



*1. Use shielded cables to isolate the analog input signal cable from other power cables.

*2. If the module is connected to a current signal, the terminals Vn and In+ (n=1-4) must be short-circuited.

*3. If variability in the input voltage results in interference within the wiring, connect the module to a capacitor with a capacitance between 0.1–0.47 µF and a working voltage of 25 V.

- *4. Connect the shielded cable to the terminal FE.
- *5. Connect the terminal to the ground terminal.
- *6. Every channel can operate with the wiring presented above.

• AS08AD-B External wiring



*1. Use shielded cables to isolate the analog input signal cable from other power cables.

*2. If variability in the input voltage results in interference within the wiring, connect the module to a capacitor with a capacitance between $0.1-0.47 \ \mu$ F and a working voltage of 25 V.

*3. Connect the shielded cable to the terminal FE.

*4. Connect the terminal 1 to the ground terminal.

*5. Every channel can operate with the wiring presented above.
AS08AD-C External wiring



- *1. Use shielded cables to isolate the analog input signal cable from other power cables.
- *2. Connect the shielded cable to the terminal FE.
- *3. Connect the terminal to the ground terminal.
- *4. Every channel can operate with the wiring presented above.

3-23

3

3.2.8 LED Indicators

Number	Name	Description
		Operating status of the module
1	RUN LED Indicator	ON: the module is running.
		OFF: the module is not running.
		Error status of the module
2	ERROR LED	ON: a serious error exists in the module.
2	Indicator	OFF: the module is operating normally.
		Blink: a minor error exists in the module.
	Analog to Digital	Analog-to-digital conversion status
3	Conversion	Blinking: conversion is in process.
	Indicator	OFF: conversion has stopped.

3.3 HWCONFIG in ISPSoft

The following example uses the AS04AD-A module.

3.3.1 Initial Setting

(1) Start ISPSoft and double-click **HWCONFIG**.



(2) Select a module and drag it to the working area.

File Edit Q Image: State of the state	Jule dule	•	-t-	04 A0	-	_ # ×
Product List AS300 Digital I/O Mod AS04AD AS04AD AS04DA AS06XA Specification	jule dule	•	ele a	04 +		
 AS300 Digital I/O Mod Analog I/O Mod AS04AD AS04DA AS06XA Specification 	dule	-	4.	04 A0		
Digital I/O Mod Analog I/O Mod AS04AD AS04DA AS06XA Specification	dule	-	-)- (04 A0		
4 channels 16 bi -10~+10V, 0~10 0/1~5V, 0/4~20 mA conversion t 2ms/channel	mA,, -20mA~		-	×		
Extension No	Туре	Module Name		Input Device R	Output Dovice	Comment
Power Module	Type	Module ridine		inputbevice rt	Output Device	Comment
E CPU Module Cl	PU Module	AS332T	01.00.00	×0.0 ~ ×0.15	Y0.0 ~ Y0.15	
Function Ce Function Ce						
Module Inform A	nalog I/O Modu	AS04AD-A	00.50.00	D28000 ~ D2801		
			1			

(3) Double-click the module in the working area to open the Device Setting page.

🚝 Eile Edit	Option Help	3 3 4				_ 8 3
Product List						
 ■ AS300 ● Digital I/O M ■ Analog I/O M AS04AD AS04DA AS06XA 			-)	AP +		
	bits analog inpu 10V, -5~+5V,	#: 🔺				
	20 mA,, -20mA~	-20				
0/1~5V, 0/4~2 mA conversio 2ms/channel	20 mA,, -20mA~	~20 •	î	v		
0/1~5V, 0/4~2 mA conversio	20 mA,, -20mA~ n time =	-20	DDF Versi	Input Device R	Output Device	Comment
0/1~5V, 0/4~2 mA conversio 2ms/channel	20 mA,, -20mA~ n time = Type	•	DDF Versi	Input Device R	Output Device	Comment
0/1~5V, 0/4~2 mA conversion 2ms/channel CPU Group Extension No Power Module CPU Module Function Ca	20 mA,, -20mA~ n time = Type CPU Module	•	DDF Versi 01.00.00	Input Device R X0.0 ~ X0.15	Output Device Y0.0 ~ Y0.15	Comment
0/1~5V, 0/4~2 mA conversion 2ms/channel CPU Group Extension No Power Module CPU Module Function Ca	20 mA,, -20mA~ n time = Type CPU Module	Module Name	01.00.00	×0.0 ~ ×0.15	Y0.0 ~ Y0.15	Comment
0/1~5V, 0/4~2 mA conversio 2ms/channel CPU Group Extension No Power Module CPU Module Function Ca	20 mA,, -20mA~ n time = Type CPU Module	Module Name			Y0.0 ~ Y0.15	Comment

E AS04AD-A	Device Informatio	n Normal Exchange Area	
 format CH1[~]CH4 Mode setting CH1[~]CH4 Calibration 	Device Name	AS04AD-A	
- average filter - sampling time - Channel Detect and Alarr	Description	4 channels 16 bits analog input : -10~+10V, 0~10V, -5~ +5V, 0/1~5V, 0/4~20 mA, -20mA~20 mA conversion time = 2ms/channel Module current consumption:(Internal)50mA.(External)	
	Comment		
	DDF Version	00.50.00	
	Firmware Version	(off-line)	
	Hardware Version		
i <u>i</u>			
Default Import	Export	Jundane 1	
			ОК

(4) Choose a parameter, set the values, and click **OK**.

E AS04AD-A	average filter								
format CH1~CH4 Mode setting	Parameter name	Value	e	Unit	Default	Minimum	Maximum		
CH1~CH4 Calibration	CH1 average times	10			10	1	100		
average filter	CH2 average times	10			10	1	100		
- sampling time	CH3 average times	10			10	1	100		
Channel Detect	CH4 average times	10			10	1	100		
	CH1 filter Propartion	10%	*		10%		-		
	CH2 filter Proportion	10%	•		10%				
	CH3 filter Proportion	10%	•		10%	-			
	CH4 filter Proportion	10%			10%	*	+		

(5) Click **Download** on the toolbar to download the parameters. Note that you cannot download the parameters while the CPU module is running.



3.3.2 Checking the Version of a Module

(1) On the **Option** menu, click **Online Mode**.



(2) Double-click the module to open the Device Setting page. The versions of both the firmware and the hardware are displayed.



AS04AD-A format	Device Information	Normal Exchange Area	
- CH1~CH4 Mode setting	Device Name	AS04AD-A	
 CH1[~]CH4 Calibration average filter sampling time Channel Detect and Alarr 	Description	4 channels 16 bits analog input :-10~+10V, 0~10V, -5~ +5V, 0/1~5V, 0/4~20 mA, -20mA~20 mA conversion time = 2ms/channel Module current consumption:(internal)50mA (External)	
	Comment		
	DDFVersion	00,50.00	
	Firmware Version	01.00.00	
	Hardware Version	00.00.00.00	12
Delaut Ingar	Esport U	lpdate	

3.3.3 Online Mode

(1) Click Online Mode on the toolbar.



(2) Right-click the module and click Module Status.



(3) View the module status.

AS04AD-A		×
Channel	Value (32 bits)	Data Type
Error code	6145	DECIMAL
CH1 Input	0	DECIMAL
CH2 Input	0	DECIMAL
CH3 Input	0	DECIMAL
CH4 Input	0	DECIMAL

3.3.4 Importing/Exporting a Parameter File

(1) Click **Export** in the Device Settings dialog box to save the current parameters as a CSV file (.csv).





(2) Click Import in the Device Settings dialog box and select a CSV file to import saved parameters.

Default	Import Export
Open	28
Look in: 🔲 My Documents	- 🖬 🐴 🖬 -
My Music My Pictures	
File name:	Open

3.3.5 Parameters

(1) The input formats of the channels

Device Setting Options						
AS04AD-A Grms -CH1~CH4 Mode setting -CH1~CH4 Calibration -average filter -sampling time -Channel Detect and Alarr	format Parameter name format	Value Integer format	Unit	Default Integer format	-	Maximum -
DefaultImport	Export Update					OK

(2) The CH1–CH4 (channel 1–channel 4) mode settings

Device Setting Options						
⊡-AS04AD-A format	CH1~CH4 Mode setting Parameter name	Value	Unit	Default	Minimum	Maximum
<mark>CH1~CH4 Mode setting</mark> CH1~CH4 Calibration average filter	CH1 mode setting CH2 mode setting	-10V~+10V - -10V~+10V -	•	-10V~+10V - -10V~+10V -		-
- sampling time - Channel Detect and Alarr	- CH3 mode setting - CH4 mode setting	-10V~+10V <		-10V~+10V -10V~+10V	-	-
Default Import	Export Update					OK

(3) The CH1-CH4 calibration settings

AS04AD-A	CH1~CH4 Calibration					
	Parameter name	Value	Unit	Default	Minimum	Maximum
- CH1~CH4 Calibration	CH1 Cal. Offset (V/mA)	0		0	-32768	32767
average filter	- CH2 Cal. Offset (V/mA)	0		0	-32768	32767
- sampling time	- CH3 Cal. Offset (V/mA)	0		0	-32768	32767
- Channel Detect and Alarr	- CH4 Cal. Offset (V/mA)	0		0	-32768	32767
	- CH1 Cal. Gain	1000		1000	-32768	32767
	CH2 Cal. Gain	1000		1000	-32768	32767
	- CH3 Cal. Gain	1000		1000	-32768	32767
	CH4 Cal. Gain	1000		1000	-32768	32767
Default Import	Export Update					ок

(4) The average filter settings

Options -AS04AD-A format	average filter						
- CH1~CH4 Mode setting	Parameter name	Value	Value U		Default	Minimum	Maximum
<u>CH1~CH4 Ca</u> libration	CH1 average times	10			10		100
<mark>a∨erage filter</mark>	CH2 average times	10			10	1	100
– sampling time – Channel Detect and Alarr	CH3 average times	10			10	1	100
- Channel Detect and Alarr	CH4 average times	10			10	1	100
	CH1 filter Proportion	10%	-		10%	-	-
	CH2 filter Proportion	10%	-		10%	-	-
	CH3 filter Proportion	10%	-		10%	-	-
	CH4 filter Proportion	10%	-		10%	-	-
Default Import	Export Update						ОК

(5) The sampling time settings

Device Setting					
Options - AS04AD-A - format - CH1~CH4 Mode setting - CH1~CH4 Calibration - average filter - sampling time - Channel Detect and Alarr	sampling time Parameter name Sampling time	Value 2ms 🔽	Unit Default 2ms	Minimum	Maximum
Default Import	Export Update				ОК

(6) The channel detection settings

Options	Channel Detect and Alarm setting	S				
format CH1~CH4 Mode setting	Parameter name	Value	Unit	Default	Minimu	m Maximum
CH1~CH4 Calibration	CH1 overrage Detect	📃 Disable		📃 Disable	-	-
- average filter	CH2 overrage Detect	📃 Disable		📃 Disable	-	-
- sampling time	- CH3 overrage Detect	📃 Disable		📃 Disable	-	-
Channel Detect and Alarr	CH4 overrage Detect	📃 Disable		📃 Disable	-	-
	- External power supply error	📃 Alarm		🗌 Alarm	-	-
	Hardware error	📃 Alarm		🗌 Alarm	-	-
	adjustment error	📃 Alarm		🗌 Alarm	-	-
Default Import	Export					ОК

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3.4 DIADesigner-AX (Hardware Configuration)

The following example uses AS04AD-A.

3.4.1 Initial Setting

(1) Start DIADesigner-AX, click New Project, and then Project+Device to create a new project.



- (2) Add modules in:
 - ① Double-click Hardware Configuration
 - ② Select the + section and drag and drop the module that you want to add from the Product List to the + section.

or ③ Right-click **Delta_Localbus Master** to see the context meun and then double-click **Add Device** to add devices manually or double-click **Scan for Devices**.



(3) Select modules:

① Double-click the module name in the **Hardware Configuration** area. or ② Double-click the module name shown in the node.



S04AD-A Parameters	Parameter	Туре	Value	Defa	Unit	Description	
	👘 🖗 Format	Enumeration of UINT	Integer	Integer			
S04AD-A I/O Mapping	□						
atus	···· 🔷 CH1 Mode Setting	Enumeration of WORD	-10V~	-10V~			
atus	CH2 Mode Setting	Enumeration of WORD	-10V~	-10V~			
formation	CH3 Mode Setting	Enumeration of WORD	-10V~	-10V~			
	CH4 Mode Setting	Enumeration of WORD	-10V~	-10V~			
	CH1~CH4 Calibration						
	CH1 Cal. Offset (V/mA)	INT(-3276832767)	0	0			
	CH2 Cal. Offset (V/mA)	INT(-3276832767)	0	0			
	CH3 Cal. Offset (V/mA)	INT(-3276832767)	0	0			
	CH4 Cal. Offset (V/mA)	INT(-3276832767)	0	0			
	🖤 🖗 CH1 Cal. Gain	INT(-3276832767)	1000	1000			
	🖤 🖗 CH2 Cal. Gain	INT(-3276832767)	1000	1000			
	🖤 🖗 CH3 Cal. Gain	INT(-3276832767)	1000	1000			
	CH4 Cal. Gain	INT(-3276832767)	1000	1000			
	🗐 🛛 🖗 Average Filter						
	CH1 Average Times	WORD(1100)	10	10			
	CH2 Average Times	WORD(1100)	10	10			
	CH3 Average Times	WORD(1100)	10	10			
	CH4 Average Times	WORD(1100)	10	10			
	CH1 Filter Proportion	Enumeration of WORD	10%	10%			
	CH2 Filter Proportion	Enumeration of WORD	10%	10%			
	CH3 Filter Proportion	Enumeration of WORD	10%	10%			
	CH4 Filter Proportion	Enumeration of WORD	10%	10%			
	🚊 🛛 🔌 Sampling Time						
	sampling time	Enumeration of WORD	2ms	2ms			
	🗐 🖉 🖗 Channel Detect and Alarm Settings	WORD	0				
	CH1 Overrage Detect	BOOL	FALSE	FALSE			
	CH2 Overrage Detect	BOOL	FALSE	FALSE			
	CH3 Overrage Detect	BOOL	FALSE	FALSE			
	CH4 Overrage Detect	BOOL	FALSE	FALSE			
	··· 🖗 Reserved	BOOL	FALSE	FALSE			
	···· 🕸 Reserved	BOOL	FALSE	FALSE			
	Reserved	BOOL	FALSE	FALSE			

(4) Module parameter setting page:

3

(5) After setting is complete, select the module and click **Login** on the tool bar to download the settings to the modules.



3.4.2 Checking the Version of a Module

(1) Select the module and click the Information tab to see the module information.

AS04AD-A Parameters	General
AS04AD-A I/O Mapping	Name: AS04AD-A Vendor: Delta Electronics,Inc.
Status	Categories: Type: 40000 ID: 167 8301
Information	Version: 1.0.0.6 Order Number: AS04AD-A
	Description: 4 channels 16 bits analog input : -10~+10V, 0~10V, -5~+5V, 0/1~5V, 0/4~20 mA,, -20mA~20 mA conversion time = 2ms/channel

(2) Select the module and click **Login** on the tool bar to go to Online Mode. You can find the Module Revision from the Parameters tab.

File Edit View Project Build O	nline Debug Tools Window	Help		T
🎦 🚅 🔲 🎒 🗠 🗠 🐇 🛍 🛍 🗙 🕼	A 😘 🐴 🌿 📕 🤋 🦄 🦄 🛱	🋅 - 📑 🎬 🥰 💕 🕨	- N CE ME ME N 4	
Devices 👻 🕂 🗙	AS04AD_A X			•
🖃 🛅 Untitled20 💌				
😑 😏 👔 Device [connected] (AX-308EA0MA1	AS04AD-A Parameters			
Hardware Configuration	AS04AD-A I/O Mapping	Parameter	Туре	Current Value Prepa
LetherCAT Filter		🕐 🖗 Format	Enumeration of UINT	Integer
	Status	😟 🔌 CH1~CH4 Mode Setting	9	
Application [stop]		😐 🖗 CH1~CH4 Calibration		
Library Manager	Information	😟 🖗 Average Filter		
PLC_PRG (PRG)		😟 🖗 Sampling Time		
Task Configuration		😟 🖗 Channel Detect and Ala	arm Settings WORD	16#0000
😔 🍪 EtherCAT_Task		🖗 Module Revision	DWORD	16#00010000
🖻 😚 🍪 MainTask				
PLC_PRG				
🖶 🧐 BuiltIn_IO (BuiltIn_IO)				
DIO (DIO)				
🖹 🧐 🔟 Delta_LocalBus_Master (Delta Lo		<		
EtherCAT_Master_SoftMotion (E				
🔄 🚱 🚡 SoftMotion General Axis Pool	<			>
	Messages - Total 0 error(s), 0 warning(s)	, 7 message(s)		→ ‡ X
	Build	- 🔾 0 e	rror(s) 😗 0 warning(s) 🟮 7 mes	sage(s) 🗙 💥
< >	Description		Project Object	t Position 🗘
😹 Devices 🗋 POUs	Messages - Total 0 error(s), 0 warning	(s), 7 message(s) 🔛 Watch 1	🔊 Breakpoints	
Device user: Anonymous Last build: 😲 0 🤇	🔊 0 Precompile 🧹 🎦 STOP	Program loaded	Program unchanged	Project user: (nobody)

3.4.3 Online Mode

(1) Select the module and click Login on the tool bar to go to Online Mode. You can monitor all configuration parameters. Vaules in the column of Prepared Value are configurable online. After editing the values in the Prepared Value column, click Write Parameter to confirm the change.



Device user: An mous

You can monitor the values, status, error codes in each channel from the I/O Mapping tab. (2)

AS04AD-A Parameters	Find		Filter Show	all			Add FB for IO Char	nnel ¯	Go to Inst
AS04AD-A I/O Mapping	Variable	Mapping	Channel	Address	Туре	Current Value	Prepared Value	Unit	Descriptio
	🖃 🍫		AS04ADIN	%ID1					
Status	🍫		Error code	%ID1	DWORD	0			
	- *		CH1 Input	%ID2	DINT	-6			
Information	🍗		CH2 Input	%ID3	DINT	-8			
	- *		CH3 Input	%ID4	DINT	152			
			CH4 Input	%ID5	DINT	-6			

(3) You can monitor the current status and error codes from the Status tab.

Devices 👻 🕂 🗙	Device AS04AD_A X				
🖃 🎒 Untitled20 🔹					
😑 😏 🔟 Device [connected] (AX-308EA0N	AS04AD-A Parameters	AS04AD-A	:	Running	
Hardware Configuration	AS04AD-A I/O Mapping	Last Diagnostic Messag	je		Acknowledge
e 🗐 PLC Logic	Status	Diagnosis Message:	'Config'		
Library Manager	Information				
Task Configuration					
□ · 😳 🕸 MainTask - 🕮 PLC_PRG					
BuiltIn_IO (BuiltIn_IO)					
K <empty></empty>					
Oelta_LocalBus_Master (Delt Southard Asouthard					
EtherCAT_Master_SoftMotion					
😔 🍐 SoftMotion General Axis Pool					

3.4.4 Parameters

(1) You can set up the value format to Integer or Floating for Channel 1 to 4.

Parameter	Туре	Value	Default Value	Unit	Description
🔹 🖗 Format	Enumeration of UINT	Integer V	Integer		
OH1~CH4 Mode Setting		Integer			
CH1 Mode Setting	Enumeration of WORD		nteger V~+10V		
CH2 Mode Setting	Enumeration of WORD	-10V~+10	Floating V~+10V		
CH3 Mode Setting	Enumeration of WORD	-10V~+10V	-10V~+10V		
CH4 Mode Setting	Enumeration of WORD	-10V~+10V	-10V~+10V		

(2) You can set up the values for Channel 1 to 4.

Parameter	Туре	Value	Default Value	Unit	Description
r 🖤 🖗 Format	Enumeration of UINT	Integer	Integer		
🗧 🛯 🖗 CH1~CH4 Mode Setting					
CH1 Mode Setting	Enumeration of WORD	-10V~+10V 🗸 🗸	-10V~+10V		
CH2 Mode Setting	Enumeration of WORD	Close	-10V~+10V		
CH3 Mode Setting	Enumeration of WORD	-10V~+10V 0V~+10V	-10V~+10V		
CH4 Mode Setting	Enumeration of WORD	-5V~+5V	-10V~+10V		
CH1~CH4 Calibration		0V~+5V 1V~+5V			
CH1 Cal. Offset (V/mA)	INT(-3276832767)	0mA~20mA	0		
CH2 Cal. Offset (V/mA)	INT(-3276832767)	4mA~20mA -20mA~20mA	0		
CH3 Cal. Offset (V/mA)	INT(-3276832767)	-2011A~2011A	0		

(3) You can set up the calibrations for for Channel 1 to 4.

CH1~CH4 Calibration				
CH1 Cal. Offset (V/mA)	INT(-3276832767)	0	0	
🖤 🖗 CH2 Cal. Offset (V/mA)	INT(-3276832767)	0	0	
CH3 Cal. Offset (V/mA)	INT(-3276832767)	0	0	
🖤 < CH4 Cal. Offset (V/mA)	INT(-3276832767)	0	0	
🖤 🖗 CH1 Cal. Gain	INT(-3276832767)	1000	1000	
🖤 🖗 CH2 Cal. Gain	INT(-3276832767)	1000	1000	
🖤 < CH3 Cal. Gain	INT(-3276832767)	1000	1000	
🖗 CH4 Cal. Gain	INT(-3276832767)	1000	1000	

(4) You can set up the average filtering for Channel 1 to 4.

• -	Average Filter				
	CH1 Average Times	WORD(1100)	10	10	
	CH2 Average Times	WORD(1100)	10	10	
	CH3 Average Times	WORD(1100)	10	10	
	CH4 Average Times	WORD(1100)	10	10	
	CH1 Filter Proportion	Enumeration of WORD	10%	10%	
	CH2 Filter Proportion	Enumeration of WORD	10%	10%	
	CH3 Filter Proportion	Enumeration of WORD	10%	10%	
	CH4 Filter Proportion	Enumeration of WORD	10%	10%	

(5) You can set up the sampling time.

👾 🖗 Sampling Time				
sampling time	Enumeration of WORD	2ms	2ms	
🗐 🖗 Channel Detect and Alarm Settings	WORD	0		
CH1 Overrage Detect	BOOL	FALSE	FALSE	
CH2 Overrage Detect	BOOL	FALSE	FALSE	
CH3 Overrage Detect	BOOL	FALSE	FALSE	
CH4 Overrage Detect	BOOL	FALSE	FALSE	
🖤 🖗 Reserved	BOOL	FALSE	FALSE	
🖤 🖗 Reserved	BOOL	FALSE	FALSE	
🗝 🖗 Reserved	BOOL	FALSE	FALSE	

(6) You can set up the channel detect and alarm settings.

· · ·				
Channel Detect and Alarm Settings	WORD	0		
CH1 Overrage Detect	BOOL	FALSE	FALSE	
🖤 < CH2 Overrage Detect	BOOL	FALSE	FALSE	
CH3 Overrage Detect	BOOL	FALSE	FALSE	
🖤 < CH4 Overrage Detect	BOOL	FALSE	FALSE	
Reserved	BOOL	FALSE	FALSE	
🖗 Reserved	BOOL	FALSE	FALSE	
🖤 🖗 Reserved	BOOL	FALSE	FALSE	
🖉 🕸 Reserved	BOOL	FALSE	FALSE	
External Power Supply Error	BOOL	FALSE	FALSE	
🖤 🖗 Hardware Error	BOOL	FALSE	FALSE	
Adjustment Error	BOOL	FALSE	FALSE	

3.5 Troubleshooting

3.5.1 Error Codes

Error Code	Description	A → D LED Indicator	ERROR LED
16#1605	Hardware failure	OFF	ON
16#1607	The external voltage is abnormal.	OFF	ON
16#1608	The factory calibration is abnormal.	OFF	ON
16#1801	The external voltage is abnormal.	OFF	Blinking
16#1802	Hardware failure	OFF	Blinking
16#1804	The factory calibration is abnormal.	OFF	Blinking
16#1808	The signal received by channel 1 exceeds the range of inputs that the hardware can receive.		
16#1809	The signal received by channel 2 exceeds the range of inputs that the hardware can receive.		
16#180A	The signal received by channel 3 exceeds the range of inputs that the hardware can receive.		
16#180B	The signal received by channel 4 exceeds the range of inputs that the hardware can receive.	Run: blinking	Blinking
16#180C	The signal received by channel 5 exceeds the range of inputs that the hardware can receive.	Stop: OFF	
16#180D	The signal received by channel 6 exceeds the range of inputs that the hardware can receive.		
16#180E	The signal received by channel 7 exceeds the range of inputs that the hardware can receive.		
16#180F	The signal received by channel 8 exceeds the range of inputs that		
10#1001	the hardware can receive.		
-	When power-on, the module is not detected by CPU module.	OFF	Blinking once or twice and after 2 seconds, it blinks
			repeatedly

3.5.2 Troubleshooting Procedure

Description	Procedure			
The external voltage is abnormal.	Ensure the external 24 V power supply to the module is			
	functioning normally.			
Hardware failure	Return the module to the factory for repair.			
Internal error	Contact the factory.			
The factory calibration is abnormal.				
The signal received by channel 1 exceeds the	Check the signal received by channel 1			
range of inputs that the hardware can receive.				
The signal received by channel 2 exceeds the	Check the signal received by channel 2.			
range of inputs that the hardware can receive.				
The signal received by channel 3 exceeds the	Check the signal received by channel 3.			
range of inputs that the hardware can receive.				
The signal received by channel 4 exceeds the	Check the signal received by channel 4.			
range of inputs that the hardware can receive.				
The signal received by channel 5 exceeds the	Check the signal received by channel 5.			
range of inputs that the hardware can receive.				
The signal received by channel 6 exceeds the	Check the signal received by channel 6.			
range of inputs that the hardware can receive.				
The signal received by channel 7 exceeds the	Check the signal received by channel 7.			
range of inputs that the hardware can receive.				
The signal received by channel 8 exceeds the	Check the signal received by channel 8.			
range of inputs that the hardware can receive.				
When power-on, the module is not detected by	Check if the connection between module and CPU			
CPU module.	module is working. If not, connect again.			

4

Chapter 4 Analog Output Module AS04DA

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4.1 Overview

An analog output module receives four 12-bit blocks of digital data from a CPU module. The module converts the digital data into analog signals (voltage or current). For software operation, ISPSoft, DIADesigner or DIADesigner-AX is what you need. If you are using AS Series PLC CPU, refer to ISPSoft User Manual or DIADesigner Manual for more information. The new software DIADesigner-AX only supports AX Series PLC CPU and AS Series modules now, refer to AX-3 User Manual for more information on software operation.

4.1.1 Characteristics

(1) Select a module based on its practical application.

AS04DA-A: Has four channels. A channel can send either voltage or current output.

(2) High-speed conversion

Digital signals are converted to analog signals at a rate of 2 ms per channel.

(3) High accuracy

Conversion accuracy: The error range for both voltage output and current output is ±0.2% at ambient temperature of 25° C.

(4) Use the utility software to configure the module.

The HWCONFIG utility software is built into ISPSoft. You can set modes and parameters directly in HWCONFIG of ISPSoft or Hardware Configuration of DIADesigner without spending time writing programs to set registers to manage functions.

4.2 Specifications and Functions

4.2.1 Specifications

Electrical specifications

Module Name	AS04DA-A
Number of Outputs	4
Digital-to-Analog Conversion	Voltage input/Current input
Supply Voltage	24 VDC (20.4 VDC-28.8 VDC) (-15% to +20%)
Connector Type Removable terminal block	
Conversion Time	2 ms/channel
Isolation	An analog circuit is isolated from a digital circuit by a digital integrated circuit/ optocoupler, but the analog channels are not isolated from one another. Isolation between a digital circuit and a ground: 500 VAC Isolation between an analog circuit and a ground: 500 VAC Isolation between an analog circuit and a digital circuit: 500 VAC Isolation between the 24 VDC and a ground: 500 VAC
Weight	145 g

• Functional specifications

Digital-to-Analog Conversion			Voltage Output	t	
Rated Output Range	±10 V	0 V~10 V	±5 V	0 V~5 V	1 V~5 V
Conversion Range	K-32000 ~ K32000	K0~K32000	K-32000 ~ K32000	K0 ~ K32000	K0 ~ K32000
Hardware Output Range	-10.1V~10.1V	-0.1V~10.1V	-5.05V~5.05V	-0.05V~5.05V	0.95V~5.05V
Error Rate (Room Temperature)			±0.2%		
Error Rate (Full Temperature Range)			±0. 5%		
Linearity error (Room Temperature)			±0.05%		
Linearity error (Full Temperature Range)			±0.05%		
Hardware Resolution			12 bits		

Digital-to-Analog Conversion	Voltage Output	
Output Impedance	≧1 kΩ	≧500 Ω

Digital-to-Analog Conversion	Current Output		
Rated Output Range	0 mA–20 mA	4 mA–20 mA	
Conversion Range	K0 ~ K32000		
Hardware Output Range	-0.2 mA to +20.2 mA	3.8 mA–20.2 mA	
Error Rate (Room Temperature)	±0.2%		
Error Rate (Full Temperature Range)	±0.5%		
Linearity Error (Room Temperature)	±0.03%		
Linearity error (Full Temperature Range)	±0.03%		
Hardware Resolution	12 bits ≦550 Ω		
Output Impedance			

4.2.2 Profile



unit: mm

Number	Name	Description
1	Model Name	Model name of the module
		Status of the power supply
	POWER LED Indicator	ON: the power is on.
		OFF: the power is off.
		Error status of the module
2	ERROR LED Indicator	ON: a serious error exists in the module.
2		OFF: the module is operating normally.
		Blinking: a minor error exists in the module.
	Digital-to-Analog conversion Indicator	Digital-to-Analog conversion status
		Blinking: conversion is in process.
		OFF: conversion has stopped.
3	Removable Terminal	Outputs are connected to loads to be driven.
	Block	
4	Arrangement of the	Arrangement of the terminals
· ·	Input/Output Terminals	
5	Terminal Block Clip	For removing the terminal block
6	DIN Rail Clip	Secures the module onto the DIN rail
7	Module Connecting Set	Connects the modules
8	Ground Clip	
9	Label	Nameplate

4.2.3 Arrangement of Terminals



4.2.4 Control Registers

*If you use HWCONFIG to set values in CRs, once the set value is downloaded, the values can be retained in the module; however if you use TO instruction to write data into CRs, the values CANNOT be retained, after power failure or after transition of the CPU from STOP to RUN.

CR#	Name	Description	Atr.	Defaults	
0	Format Setup	0: integer format	R	0	
U	Format Setup	1: floating-point format	IX.	0	
1	Channel 1 mode setup	0: closed	R/W		
		1: -10 V to +10 V (default)			
2	Channel 2 mode setup	2: 0 V–10 V	R/W		
		3: -5 V to +5 V		1	
3	Channel 3 mode setup	4: 0 V–5 V	R/W		
		5: 1 V–5 V			
4	Channel 4 mode setup	6: 0 mA–20 mA	R/W		
		7: 4 mA–20 mA			
5	Channel 1 offset	Range: -32768 to +32767	R/W	0	

Note: The attribute of the CR must be W (write) to use TO instruction.

CR#	Name	Description	Atr.	Defaults
6	Channel 2 offset			
7	Channel 3 offset			
8	Channel 4 offset			
9	Channel 1 gain			
10	Channel 2 gain	Dec		4000
11	Channel 3 gain	Range: -32768 to +32767	R/W	1000
12	Channel 4 gain			
13	Retaining an output sent by channel 1			
14	Retaining an output sent by channel 2	is reset to 0.	0	
15	Retaining an output sent by channel 3	1: when the PLC stops, the value of the analog output is retained.	R/W	0
16	Retaining an output sent by channel 4			
17	Refreshing the time for an output sent by channel 1			0
18	Refreshing the time for an output sent by channel 2	Range: 10–3200 (100 ms–32000 ms) Unit: 10 ms		0
19	Refreshing the time for an output sent by channel 3	Any value less than 10 is processed as 0. Any value larger than 3200 is processed as 3200. Set the value to 0 to disable this function.	R/W	0
20	Refreshing the time for an output sent by channel 4			0
21	The minimum scale	When the format is set to integer in HWCONFIG, the	R	-10.0
22	range for channel 1	scale range is invalid.	R	
23	The minimum scale	For analog-digital modules, it is much more convenient	R	-10.0
24	range for channel 2	if the system can convert digital values to floating-point	R	
25	The minimum scale	values for earier understanding. Here you can set the	R	-10.0
26	range for channel 3	minimum and maximum scale ranges of corresponding	R	
27	The minimum scale	floating-point values for channels.	R	-10.0

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CR#	Name	Description	Atr.	Defaults
28	range for channel 4	For example, if the scale range for an analog to digital	R	
29	The maximum scale	input channel is ±10.0 V, it indicates the maximum	R	10.0
30	range for channel 1	value is +10.0 V and the minimum value is -10.0 V.	R	10.0
31	The maximum scale	If the scale range for an analog to digital input channel	R	10.0
32	range for channel 2	is 4 mA ~ 20 mA. It indicates the maximum value is 20	R	10.0
33	The maximum scale	mA and the minimum value is 4 mA.	R	
34	range for channel 3	Note: You can use PLC instruction DSCLP (API0217)	R	10.0
35	The maximum scale	and set SM685 to ON to use floating-point operations when	R	
36	range for channel 4	a conversion range needs to edit.	R	10.0
37	Channel alarm setup	0: warning 1: alarm bit0: error in the power supply bit1: error in the module hardware bit2: error in calibration	R/W	0

4.2.5 Functions

Item	Function	Description
1	Enable/Disable a	1. Enable or disable a channel.
	Channel	2. If a channel is disabled, the total conversion time decreases.
2	Calibration	Calibrate a linear curve.
3	Retain an Output	When a module stops running, the system can retain the signal sent by the module.
4	Refresh Time for an	Refresh the analog output value according to the value of the fixed slope.
4	Output	
5	Scale Range	You can set the scale range when the format is floating-point.

1. Enable/Disable a Channel

An analog signal is converted into a digital signal at a rate of 2 ms per channel. The total conversion time is 2 ms X (the number of channels). If a channel is not used, you can disable it to decrease the total conversion time.

2. Calibration

To make a curve meet specific needs, calibrate the curve by changing the offset and the gain. The calibration range depends on the range of inputs that the hardware can receive. The formula is:

$$Output = \frac{(Input \times Gain)}{1000} + Offset$$

Example:

A channel receives voltage inputs between -10.0 V to +10.0 V. The gain is 1000, and the offset is 0. The corresponding value for the original signal -10.0 V to +10.0 V is -32000 to +32000. If you change the offset to -100, the calibrated value for the original signal -10.0 V to +10.0 V becomes -31900 to +32100.



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3. Retain an Output

When a module stops running, the system can retain the signal sent by the module.

The output is retained:



The output is not retained:



4. Refresh time for an Output

Set the refresh time for an output and the system updates the value of the slope (m) accordingly.



When the analog output signal changes, the system updates the value of the analog output according to the value set in the slope, as shown in the image below.



5. Scale Range

You can set the scale range when the format is floating-point. The analog output mode of a channel has a corresponding digital range. Digital values correspond to analog outputs sent by the module. For example, if the analog range is -10 V to +10 V, the digital range is -10.0 to +10.0, the HSP scale is 10.0, and the LSP scale is -10.0. The digital values -10.0 to +10.0 correspond to the analog values -10 V to +10 V, as the example below shows.



4.2.6 Wiring

Precautions

To ensure the digital-to-analog module functions well and reliably, the external wiring must prevent noise.

- To prevent a surge and induction, the AC cable and the output signal cables that are connected to the AS04DA-A must be separate cables.
- (2) Do not install or bound the cable to a main circuit, a high-voltage cable, or a cable connected to a load that is not a PLC.
- (3) Ground shielded cables and hermetically sealed cables separately.
- (4) Terminals with insulation sleeves cannot be arranged as a terminal block, so you should cover the terminals with insulation tubes.
- (5) Connect 24 to 22 AWG (1 mm) wires to the input/output terminals. The plastic jackets that are removed from the cables should be 8 mm to 10 mm long. The specifications for the terminals and the wiring of the terminals are shown below. Use only copper leads that can resist temperatures above 60° C /75° C.



(6) Note: use cables with the same length (less than 200 m) and use wire resistance of less than 100 ohm.

External wiring



- *1. Use shielded cables to isolate the analog input signal cable from other power cables.
- *2. If variability in the input voltage results in interference within the wiring, connect the module to a capacitor having a capacitance between 0.1–0.47 μF and a working voltage of 25 V.
- *3. Connect the SLD to FE, and connect both the FE and the terminal to the ground terminal.
- *4. Every channel can operate with the wiring presented above.

4.2.7 LED Indicators

Number	Name	Description			
1	RUN LED Indicator	Operating status of the module ON: the module is running. OFF: the module is not running.			
2	ERROR LED Indicator	Error status of the module ON: a serious error exists in the module. OFF: the module is operating normally. Blink: a minor error exists in the module.			
3	Digital to Analog Conversion Indicator	Digital-to-analog conversion status Blinking: conversion is in process. OFF: conversion has stopped.			

4.3 HWCONFIG in ISPSoft

4.3.1 Initial Setting

(1) Start ISPSoft and double-click **HWCONFIG**.



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(2) Select a module and drag it to the working area.



(3) Double-click the module in the working area to open the Device Setting page.



 CH1[~]CH4 Mode setting Device CH1[~]CH4 Calibration 	e Name	AS04DA-A	
- OutPut Setting Descri - Alarm settings	iption	4 channels 12 bits analog output :-10~+10V, 0~10V, -5~ +5V, 0/1~5V, 0/4~20 mA, conversion time = 2ms/channel Module current consumption:(Internal)50mA.(External) 110mA	
Camm	ient		
DDFV	/ersion	01.00.00	
Firmwe	are Version	(off-line)	
Hardw	are Version	(off-line)	

(4) Choose a parameter, set the values, and click **OK**.

Device Setting Options								
- AS04DA-A	CH1 [~] CH4 Mode setting							
CH1~CH4 Mode setting	Parameter name	Value		Unit Default	Minimum	Maximum		
	CH1 Output mode setting	-10V~+10V	-	-10V~+10V	-	-		
OutPut Setting	CH2 Output mode setting	-10V~+10V	•	-10V~+10V	-	-		
Alarm settings	- CH3 Output mode setting	-10V~+10V	•	-10V~+10V	-	-		
	CH4 Output mode setting	-10V~+10V	•	-10V~+10V	-	-		
Default Import	Export Update					ОК		
(5) Click **Download** on the toolbar to download the parameters. Note you cannot download the parameters cannot be downloaded.



4.3.2 Checking the Version of a Module

(1) On the **Option** menu, click **Online Mode**.



(2) Double-click the module to open the Device Setting page. The versions of both the firmware and the hardware are displayed.



E AS04DA-A	Device Information	Normal Exchange Area	
- CH1~CH4 Mode setting	Device Name	AS04DA-A	
 CH1°CH4 Calibration OutPut Setting Alarm settings 	Description	4 channels 12 bits analog output: -10~+10V, 0~10V, -5~ +5V, 0/1~5V, 0/4~20 mÅ, conversion time = 2ms/channel Module current consumption:(Internal)50mÅ,(External) 110mÅ	
	Comment	[
	DDFVersion	01.00.00	
	Firmware Version	01.00.00	S. 12
	Hardware Version	00.00.00	
Default Import	Export U	Ipdate	
			ок

4.3.3 Online Mode

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(1) On the **Option** menu, click **Online Mode**.



(2) Right-click the module and click on **Module Status**.

R		
	Module Status	Ctrl+Alt+S
	🌉 Diagnosis	Ctrl+Alt+D

(3) View the module status.

AS04DA-A		— ×		
Channel	Value (32 bits)			
Error code		DECIMAL		
CH1 Output	0	DECIMAL		
CH2 Output	0	DECIMAL		
CH3 Output	0	DECIMAL		
CH4 Output	0	DECIMAL		

4.3.4 Importing/Exporting a Parameter File

(1) Click **Export** in the Device Settings dialog box to save the current parameters as a CSV file (.csv).

ive As	
Save in: 📋 My Documents	- 🗈 💣 💷 -
📸 My Music 🥶 My Pictures	
WinCHM Projects	



(2) Click Import in the Device Settings dialog box and select a CSV file to import save parameters.

	Default	Import		Export	
Open					? 🔀
Look in:			*		
File name: Files of type:	CSV File (*.csv)	i			Open Cancel

4.3.5 Parameters

(1) The output formats of the channels

Device Setting Options				
- AS04DA-A - Grme - CH1~CH4 Mode setting - CH1~CH4 Calibration - OutPut Setting - Alarm settings	format Parameter name format	Value Unit Integerformat ▼	Default Minimum Integer format	-
Default Import	Export Update			ОК

(2) The CH1–CH4 (channel 1–channel 4) mode settings

Device Setting					
Options AS04DA-A format OH1"CH4 Mode setting Oth CH1"CH4 Calibration OutPut Setting Alarm settings	CH1 [~] CH4 Mode setting Parameter name CH1 Output mode setting CH2 Output mode setting CH3 Output mode setting CH4 Output mode setting	Value -10V~+10V -10V~+10V -10V~+10V -10V~+10V	Unit Default -10V~*+10V -10V~*10V -10V~*10V -10V~*10V	Minimum - - -	Maximum - - -
DefaultImport	Export Update				ОК

(3) The CH1–CH4 calibration settings

E-AS04DA-A	CH1 [~] CH4 Calibration							
format CH1~CH4 Mode setting	Parameter name	Value	Unit	Default	Minimum	Maximum		
	CH1 Cal. Offset (V/mA)	0		0	-32768	32767		
OutPut Setting	- CH2 Cal. Offset (V/mA)	0		0	-32768	32767		
Alarm settings	- CH3 Cal. Offset (V/mA)	0		0	-32768	32767		
	CH4 Cal. Offset (V/mA)	0		0	-32768	32767		
	CH1 Cal. Gain	1000		1000	-32768	32767		
	CH2 Cal. Gain	1000		1000	-32768	32767		
	- CH3 Cal. Gain	1000		1000	-32768	32767		
	CH4 Cal. Gain	1000		1000	-32768	32767		
Default Import	Export Update					ОК		

(4) The output settings

Device Setting Options						
AS04DA-A format CH1 ~CH4 Mode setting CH1 ~CH4 Calibration OutPut Setting Alarm settings	OutPut Setting Parameter name CH1 output Hold CH2 output Hold CH3 output Hold CH4 output Hold CH4 output Setting time(10ms) CH2 output Setting time(10ms) CH3 output Setting time(10ms) CH4 output Setting time(10ms)	Value Clear Clear Clear Clear 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Unit Unit Unit	Default Clear Clear Clear 0 0 0 0 0	Minimum	Maximum - - 3200 3200 3200 3200
Default Import	Export Update					OK

(5) The alarm settings

4

Device Setting Options				
- AS04DA-A - format - CH1°CH4 Mode setting - CH1°CH4 Calibration - OutPut Setting - Alarm settings	Alarm settings Parameter name External power supply error Hardware error adjustment error	Value Alarm Alarm Alarm	Unit Default Alarm - Alarm - Alarm - Alarm -	-
Default Import	Export Update			OK

4.4 DIADesigner-AX (Hardware Configuration)

The following example uses AS04DA-A.

4.4.1 Initial Setting

(1) Start DIADesigner-AX, click New Project, and then Project+Device to create a new project.



(2) Add modules in:

- ① Double-click Hardware Configuration
- ③ Select the + section and drag and drop the module that you want to add from the Product List to the + section.

or ③ Right-click **Delta_Localbus Master** to see the context meun and then double-click **Add Device** to add devices manually or double-click **Scan for Devices**.



(3) Select modules:

0 Double-click the module name in the Hardware Configuration area.

or $\ensuremath{@}$ Double-click the module name shown in the node.



(4) Module parameter setting page:

AS04DA-A Parameters	Parameter	Туре	Value	Defa	Unit	Description
	💮 🖗 Format	Enumeration of UINT	Integer	Integer		
AS04DA-A I/O Mapping	CH1~CH4 Mode Setting					
Status	CH1 Mode Setting	Enumeration of WORD	-10V~	-10V~		
status	CH2 Mode Setting	Enumeration of WORD	-10V~	-10V~		
Information	···· 🔷 CH3 Mode Setting	Enumeration of WORD	-10V~	-10V~		
	CH4 Mode Setting	Enumeration of WORD	-10V~	-10V~		
	CH1~CH4 Calibration					
	CH1 Cal. Offset (V/mA)	INT(-3276832767)	0	0		
	CH2 Cal. Offset (V/mA)	INT(-3276832767)	0	0		
	CH3 Cal. Offset (V/mA)	INT(-3276832767)	0	0		
	CH4 Cal. Offset (V/mA)	INT(-3276832767)	0	0		
	🖤 🔌 CH1 Cal. Gain	INT(-3276832767)	1000	1000		
	🖤 🔌 CH2 Cal. Gain	INT(-3276832767)	1000	1000		
	🖤 🔌 CH3 Cal. Gain	INT(-3276832767)	1000	1000		
	🖤 🕸 CH4 Cal. Gain	INT(-3276832767)	1000	1000		
	Output Setting					
	🖤 🔌 CH1 Output Hold	Enumeration of WORD	Clear	Clear		
	🖤 🔌 CH2 Output Hold	Enumeration of WORD	Clear	Clear		
	🖤 < CH3 Output Hold	Enumeration of WORD	Clear	Clear		
	🖤 🔌 CH4 Output Hold	Enumeration of WORD	Clear	Clear		
	CH1 Output Setting Time(10ms)	INT(03200)	0	0		
	 Output Setting Time(10ms) 	INT(03200)	0	0		
	 Output Setting Time(10ms) 	INT(03200)	0	0		
	CH4 Output Setting Time(10ms)	INT(03200)	0	0		
	🗏 🖤 🖗 Alarm Settings	WORD	0			
	External Power Supply Error	BOOL	FALSE	FALSE		
	🖤 🖗 Hardware Error	BOOL	FALSE	FALSE		
	Adjustment Error	BOOL	FALSE	FALSE		
	Module Revision	DWORD	0	0		Module Firmware Revisi

(5) After setting is complete, select the module and click **Login** on the tool bar to download the settings to the modules.

s 🗸 🕂 🗙	A504DA_A 🗙	Login (Alt+F8					
Untitled22 Untitled22 Untitled22 Untitled22	AS04DA-A Parameters	Parameter	Туре	Value	Defa	Unit	Description
🔏 Hardware Configuration		🖉 🖗 Format	Enumeration of UINT	Integer	Integer		
🗏 🙏 Network Configuration	AS04DA-A I/O Mapping	🗐 🛛 🖗 CH1~CH4 Mode Setting					
A EtherCAT Filter	Status	CH1 Mode Setting	Enumeration of WORD	-10V~	-10V~		
PLC Logic	Status	CH2 Mode Setting	Enumeration of WORD	-10V~	-10V~		
- 💮 Application	Information	CH3 Mode Setting	Enumeration of WORD	-10V~	-10V~		
👘 Library Manager		CH4 Mode Setting	Enumeration of WORD	-10V~	-10V~		
PLC_PRG (PRG)		Grid CH1~CH4 Calibration					
🖻 💹 Task Configuration		CH1 Cal. Offset (V/mA)	INT(-3276832767)	0	0		
😸 EtherCAT_Task		CH2 Cal. Offset (V/mA)	INT(-3276832767)	0	0		
😑 🍪 MainTask		CH3 Cal. Offset (V/mA)	INT(-3276832767)	0	0		
PLC_PRG		CH4 Cal. Offset (V/mA)	INT(-3276832767)	0	0		
🖷 📆 BuiltIn_IO (BuiltIn_IO)		🖤 🧳 CH1 Cal. Gain	INT(-3276832767)	1000	1000		
DIO (DIO)		CH2 Cal. Gain	INT(-3276832767)	1000	1000		
🖶 📆 Delta_LocalBus_Master (Delta		🖤 🧳 CH3 Cal. Gain	INT(-3276832767)	1000	1000		
AS04DA_A (AS04DA-A)		CH4 Cal. Gain	INT(-3276832767)	1000	1000		
EtherCAT_Master_SoftMotion		🔍 🖗 Output Setting					
SoftMotion General Axis Pool		CH1 Output Hold	Enumeration of WORD	Clear	Clear		
		CH2 Output Hold	Enumeration of WORD	Clear	Clear		
		CH3 Output Hold	Enumeration of WORD	Clear	Clear		
>							

4

4.4.2 Checking the Version of a Module

(1) Select the module and click the Information tab to see the module information.

AS04DA-A Parameters	General
AS04DA-A I/O Mapping	Name: AS04DA-A Vendor: Delta Electronics,Inc.
	Categories:
Status	Type: 40000
	ID: 16F7 8305
Information	Version: 1.0.0.7
	Order Number: ASO4DA-A
	Description: 4 channels 12 bits analog output : -10~+10V, 0~10V, -5~+5V, 0/1~5V, 0/4~20 mA, conversion time = 2ms/channel

(2) Select the module and click **Login** on the tool bar to go to Online Mode. You can find the Module Revision from the Parameters tab.

File Edit View Project Build Onli	ne Debug Tools Window	Help				
						1
🖹 🖆 📕 御 🗠 🗠 🎽 🚰	[44] 🐴 🌿 🎵 🧐 🦄 🎼	∃ `@=' [`` @ <mark> %</mark> Ø ▶ = % [[표명 학 전 응 수 📈	1 2/		
Devices 👻 🕂 🗙	Device AS04DA	A X PLC_PRG	Master_SoftMotion			•
□ □ Untitled20						_
Constant of the second se	AS04DA-A Parameters					W
Hardware Configuration						
A Network Configuration	AS04DA-A I/O Mapping	Parameter	Туре	Current Value	Prepared Value	
PLC Logic		🕐 Format	Enumeration of UINT	Integer		
E O Application [stop]	Status	CH1~CH4 Mode Setting				
Library Manager		CH1~CH4 Calibration				
PLC_PRG (PRG)	Information	🗉 🛛 🤌 Output Setting				
Task Configuration		Alarm Settings	WORD	16#0000		
G EtherCAT_Task		Module Revision	DWORD	16#00010000		
⊟ 😳 🇐 MainTask						
PLC_PRG						
BuiltIn_IO (BuiltIn_IO)						
DIO (DIO)						
K <empty></empty>						
😑 😏 🛐 Delta_LocalBus_Master (Delta Lo						
		<				
A GE CHART MARK CAMPER /						
	1	L				_
Sevices POUs	<					>
Messages - Total 0 error(s), 0 warning(s), 7 mes	ssage(s) 💹 Watch 1 Ӣ Breakpoir	nts				
Device user: Anonymous Last build: 😳 0	🕐 0 Precompile 🗸 🚹 STC	P Program loaded	Program unchanged	Proje	ect user: (nobody)	1

4

4.4.3 Online Mode

 Select the module and click Login on the tool bar to go to Online Mode. You can monitor all configuration parameters. Vaules in the column of Prepared Value are configurable online. After editing the values in



(2) You can monitor the values, status, error codes in each channel from the I/O Mapping tab. You can also set a new value in the colum of Prepared Value and press Ctrol+F7 on the keyboard to write the new values in.

AS04DA-A Parameters	Find	Find Filter Show all				 Add FB for IO Channel Go to Inst 				
AS04DA-A I/O Mapping	Variable	Mapping	Channel AS04DAIN	Address %ID1	Туре	Current Value	Prepared Value	Unit	Description	
Status	-*		Error code	%ID1	DWORD	0				
	8-70		AS04DAOUT	%QD1						
Information	- **		CH1 Output	%QD1	DINT	10000				
	- **		CH2 Output	%QD2	DINT	32000		-	-	
	- *>		CH3 Output	%QD3	DINT	0	32000 <			
			CH4 Output	%QD4	DINT	0	32000			

(3) You can monitor the current status and error codes from the Status tab.

AS04DA-A Parameters	AS04DA-A	:	Running	
AS04DA-A I/O Mapping	Last Diagnostic Messag	je		 Acknowledge
Status	Diagnosis Message:	'Config'		
Information				

4.4.4 Parameters

(1) You can set up the value format to Integer or Floating for Channel 1 to 4.

Туре	Value	Default Value	Unit	Description
Enumeration of UINT	Integer 🗸 🗸	Integer		
	Integer			
Enumeration of WORD	104-110			
Enumeration of WORD	-10V~+10	loating V~+10V		
Enumeration of WORD	-10V~+10V	-10V~+10V		
Enumeration of WORD	-10V~+10V	-10V~+10V		
	Enumeration of UINT Enumeration of WORD Enumeration of WORD Enumeration of WORD	Enumeration of UINT Integer Enumeration of WORD Floating Enumeration of WORD -10V~+10 Enumeration of WORD -10V~+10V	Enumeration of UINT Integer Integer Enumeration of WORD Floating nteger Enumeration of WORD -10V~+10 Floating Enumeration of WORD -10V~+10 -10V~+10V	Enumeration of UINT Integer Integer Enumeration of WORD Floating v~+10V Enumeration of WORD -10V~+10I Floating Enumeration of WORD -10V~+10V -10V~+10V

(2) You can set up the values for Channel 1 to 4.

Parameter	Туре	Value	Default Value	Unit	Description
💬 🖗 Format	Enumeration of UINT	Integer	Integer		
🗏 🛛 🖗 CH1~CH4 Mode Setting					
CH1 Mode Setting	Enumeration of WORD	-10V~+10V 🗸 🗸	-10V~+10V		
🖤 🌵 CH2 Mode Setting	Enumeration of WORD	Close	-10V~+10V		
CH3 Mode Setting	Enumeration of WORD	-10V~+10V 0V~+10V	-10V~+10V		
CH4 Mode Setting	Enumeration of WORD	-5V~+5V	-10V~+10V		
CH1~CH4 Calibration		0V~+5V 1V~+5V			
🖤 < CH1 Cal. Offset (V/mA)	INT(-3276832767)	0mA~20mA	0		
CH2 Cal. Offset (V/mA)	INT(-3276832767)	4mA~20mA -20mA~20mA	0		
CH3 Cal. Offset (V/mA)	INT(-3276832767)	-20ma~20ma	0		

(3) You can set up the calibrations for for Channel 1 to 4.

CH1~CH4 Calibration				
CH1 Cal. Offset (V/mA)	INT(-3276832767)	0	0	
🖤 🖗 CH2 Cal. Offset (V/mA)	INT(-3276832767)	0	0	
CH3 Cal. Offset (V/mA)	INT(-3276832767)	0	0	
CH4 Cal. Offset (V/mA)	INT(-3276832767)	0	0	
🖤 🖗 CH1 Cal. Gain	INT(-3276832767)	1000	1000	
🖤 🖗 CH2 Cal. Gain	INT(-3276832767)	1000	1000	
🖤 🖗 CH3 Cal. Gain	INT(-3276832767)	1000	1000	
🖗 CH4 Cal. Gain	INT(-3276832767)	1000	1000	

(4) You can set up the average filtering for Channel 1 to 4.

🚽 🖗 Average Filter				
CH1 Average Times	WORD(1100)	10	10	
CH2 Average Times	WORD(1100)	10	10	
🖤 🏟 CH3 Average Times	WORD(1100)	10	10	
CH4 Average Times	WORD(1100)	10	10	
🖤 🌵 CH1 Filter Proportion	Enumeration of WORD	10%	10%	
CH2 Filter Proportion	Enumeration of WORD	10%	10%	
CH3 Filter Proportion	Enumeration of WORD	10%	10%	
CH4 Filter Proportion	Enumeration of WORD	10%	10%	

🖤 🖗 Sampling Time				
🖤 sampling time	Enumeration of WORD	2ms	2ms	
	WORD	0		
CH1 Overrage Detect	BOOL	FALSE	FALSE	
CH2 Overrage Detect	BOOL	FALSE	FALSE	
CH3 Overrage Detect	BOOL	FALSE	FALSE	
CH4 Overrage Detect	BOOL	FALSE	FALSE	
🖗 Reserved	BOOL	FALSE	FALSE	
🖤 🖗 Reserved	BOOL	FALSE	FALSE	
🖤 🖗 Reserved	BOOL	FALSE	FALSE	

(5) You can set up the sampling time.

(6) You can set up the channel detect and alarm settings.

		-		
Channel Detect and Alarm Settings	WORD	0		
CH1 Overrage Detect	BOOL	FALSE	FALSE	
🖤 🖗 CH2 Overrage Detect	BOOL	FALSE	FALSE	
🖤 🖗 CH3 Overrage Detect	BOOL	FALSE	FALSE	
🖤 🖗 CH4 Overrage Detect	BOOL	FALSE	FALSE	
🖗 Reserved	BOOL	FALSE	FALSE	
🖤 🖗 Reserved	BOOL	FALSE	FALSE	
🖗 Reserved	BOOL	FALSE	FALSE	
🖤 🕸 Reserved	BOOL	FALSE	FALSE	
🖤 🖗 External Power Supply Error	BOOL	FALSE	FALSE	
🖤 🖗 Hardware Error	BOOL	FALSE	FALSE	
Adjustment Error	BOOL	FALSE	FALSE	

4.5 Troubleshooting

4.5.1 Error Codes

Error Code	Description	D → A LED Indicator	ERROR LED Indicator
16#1605	Hardware failure	OFF	ON
16#1607	The external voltage is abnormal.	OFF	ON
16#1608	The factory calibration is abnormal.	OFF	ON
16#1801	The external voltage is abnormal.	OFF	Blinking
16#1802	Hardware failure	OFF	Blinking
16#1804	The factory calibration is abnormal.	OFF	Blinking
-	When power-on, the module is not detected by CPU module.	OFF	Blinking once or twice and after 2 seconds, it blinks repeatedly

4.5.2 Troubleshooting Procedure

Description	Procedure
The external voltage is abnormal.	Ensure the external 24 V power supply to the module is functioning normally.
Hardware failure	Return the module to the factory for repair.
Internal error	Contact the factory.
The factory calibration is abnormal.	
When power-on, the module is not detected by	Check if the connection between module and CPU
CPU module.	module is working. If not, connect again.



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5.1 Overview

This chapter describes the specifications for the analog input/output module, its operation, and its programming. On the analog input/output module, four channels receive analog signals (voltage or current), and converts those signals into 16-bit digital signals. In addition, the analog input/output module receives two blocks of 16-bit digital data from a CPU module, and converts the digital data into analog signals (voltage or current). The analog input/output module sends the analog signals by two channels. For software operation, ISPSoft, DIADesigner or DIADesigner-AX is what you need. If you are using AS Series PLC CPU, refer to ISPSoft User Manual or DIADesigner Manual for more information. The new software DIADesigner-AX only supports AX Series PLC CPU and AS Series modules now, refer to AX-3 User Manual for more information on software operation.

5.1.1 Characteristics

(1) Use the AS06XA-A analog input/output module, based on its practical application.

CH1–CH4: A channel can receive either voltage or current inputs.

CH5-CH6: A channel can send either voltage or current outputs.

(2) High-speed conversion

The conversion rate is 2 ms per channel. (For FW V1.02 or later, upgraded to 1 ms/channel)

(3) High accuracy

Conversion accuracy: At ambient temperature of 25° C.

Input: The error range for both voltage and current input is ±0.2%.

Output: The error range for both voltage and current output is $\pm 0.02\%$.

(4) Use the utility software to configure the module.

The HWCONFIG utility software is built into ISPSoft. You can set modes and parameters directly in HWCONFIG of ISPSoft or Hardware Configuration of DIADesigner without spending time writing programs to set registers to manage functions.

5.2 Specifications and Functions

5.2.1 Specifications

Electrical specifications

Module Name	AS06XA-A
Number of Analog	4 inputs
Inputs/Outputs	2 outputs
Analog-to-Digital Conversion	Voltage input/Current input/Voltage output/Current output
Supply Voltage	24 VDC (20.4–28.8 VDC) (-15% to +20%)
Connector Type	Removable terminal block
Conversion Time	2ms/channel (FW V1.02 or later, upgraded to 1ms/channel)
Isolation	An analog circuit is isolated from a digital circuit by a digital integrated circuit/ optocoupler, but the analog channels are not isolated from one another. Isolation between a digital circuit and the ground: 500 VAC Isolation between an analog circuit and the ground: 500 VAC Isolation between an analog circuit and a digital circuit: 500 VAC Isolation between the 24 VDC and the ground: 500 VAC
Weight	145 g

• Functional specifications for the analog-to-digital conversion

Analog-to-Digital Conversion	Voltage Input					
Rated Input Range	-10 V ~ +10 V	0 V ~ 10 V	±5 V	0 V ~ 5 V	1 V ~ 5 V	
Rated Conversion Range	K-32000 ~ K32000	K0 ~ K32000	K-32000 ~ K32000	K0 ~ K32000	K0 ~ K32000	
Hardware Input Limit*1	-10.12V ~ 10.12V	-0.12V ~ 10.12V	-5.06V ~ 5.06V	-0.06V ~ 5.06V	0.95V ~ 5.05V	
Conversion Limit*2	K-32384 ~ K32384	K-384 ~ K32384	K-32384 ~ K32384	K-384 ~ K32384	K-384 ~ K32384	
Error Rate	Room Temperature: ±0.2% ; Full Temperature Range: ±0.5%					
Hardware Resolution	16 bits					
Input Impedance	2ΜΩ					
Absolute Input Range*3 ±15 V						

*1: If the input signal exceeds the hardware input limit, the module only shows the maximum value. If the input signal is below the lower limit, it only shows the minimum value.

*2: If the input signal exceeds the hardware input limit, it also exceeds the conversion limit and a conversion limit error appears. For example in the voltage input mode (-10 V to +10 V), when the input signal is 10.15 V, exceeding the hardware upper limit, it also exceeds the conversion upper limit. The module uses the upper limit value (32384) as the input signal and a conversion limit error appears.

*3: If an input signal exceeds the absolute range, it might damage the channel.

Analog-to-Digital Conversion		Current Input		
Rated Input Range	±20 mA	0 mA–20 mA	4 mA–20 mA	
Rated Conversion Range	K-32000 ~ K+2000	K0 ~ K32000	K0 ~ K32000	
Hardware Input Limit ^{*1}	-20.24 mA ~ 20.24 mA	-0.24 mA ~ 20.24 mA	3.81 mA ~ 20.19 mA	
Conversion Limit* ²	K-32384 ~ K32384	K-384 ~ K32384	K-384 ~ K32384	
Error Rate	Room Temperature: ±0.2% ; Full Temperature Range: ±0.5%			
Hardware Resolution	16 bits			
Input Impedance		250Ω		
Absolute Input Range* ³		±32 mA		

*1: If the input signal exceeds the hardware input limit, the module only shows the maximum value. If the input signal is below the lower limit, it only shows the minimum value.

*2: If the input signal exceeds the hardware input limit, it also exceeds the conversion limit and a conversion limit error appears. For example in the voltage input mode (4 mA to 20 mA), when the input signal is 0 mA, exceeding the hardware upper limit, it also exceeds the conversion upper limit. The module uses the upper limit value (-384) as the input signal and a conversion limit error appears.

*3: If an input signal exceeds the absolute range, it might damage the channel.

Digital-to-Analog Conversion	Voltage Output					
Rated Output Range	±10 V 0~10 V ±5 V 0~5 V 1~5 V				1 ~ 5 V	
Conversion Range	K-32000 ~ K32000	K0 ~ K32000	K-32000 ~ K32000	K0 ~ K32000	K0 ~ K32000	
Hardware Output Range	-10.1 V ~ +10.1 V	-0.1 V ~ 10.1 V	-5.05 V ~ +5.05 V	-0.05 V ~ +5.05 V	0.95 ~ 5.05 V	
Error Rate (Room Temperature)	±0.2%					
Error Range (Full temperature range)	±0.5%					
Linearity Error (Room Temperature)	±0.05%					
Linearity Error (Full Temperature Range)	±0.05%					
Hardware Resolution	12 bits					
Permissible load impedance	≧1kΩ ≧500Ω					

• Functional specifications for the digital-to-analog conversion

Digital-to-Analog Conversion	Current Output		
Rated Output Range	0–20 mA	4–20 mA	
Conversion Range	K0 ~ K32000	K0 ~ K32000	
Hardware Output Range	-0.2 mA to 20.2 mA	3.8–20.2 mA	
Error Range (Room Temperature)	±0.2%		
Error Range (Full Temperature Range)	±0.5%		
Linearity Error (Room Temperature)	±0.03%		
Linearity Error	±0.10%		

(Full Temperature Range)	
Hardware Resolution	12 bits
Permissible Load Impedance	≦550 Ω

5.2.2 Profile



Unit: mm

Number	Name	Description
1	Model Name	Model name of the module
	RUN LED Indicator	Operating status of the module ON: the module is running. OFF: the module is not running.
2	ERROR LED Indicator	Error status of the module ON: a serious error exists in the module. OFF: the module is operating normally. Blink: a minor error exists in the module.
	Analog-to-Digital Conversion Indicator	Conversion status Blinking: conversion is in process. OFF: conversion has stopped.
3	Removable Terminal Block	Inputs are connected to transducers. Outputs are connected to loads to be driven.
4	Arrangement of the Input/Output Terminals	Arrangement of the terminals

Number	Name	Description
5	Clip	For removing the terminal block
6	DIN Rail Clip	Secures the module onto the DIN rail
7	Module Connecting Set	Connects the modules
8	Ground Clip	
9	Label	Nameplate

5.2.3 Arrangement of Terminals



5.2.4 Control Registers

*If you use HWCONFIG to set values in CRs, once the set value is downloaded, the values can be retained in the module; however if you use TO instruction to write data into CRs, the values CANNOT be retained, after power failure or after transition of the CPU from STOP to RUN.

CR#	Name	Description	Atr.	Defaults
0	Format Setup	0: integer format 1: floating point format	R	0
1	Input channel 1 mode setup	0: closed 1: -10 V to +10 V (default)		
2	Input channel 2 mode setup	2: 0–10 V 3: -5 to +5 V	DAA	
3	Input channel 3 mode setup	4: 0–5 V 5: 1–5 V	R/W	1
4	Input channel 4 mode setup	6: 0–20 mA 7: 4–20 mA 8: -20 mA to +20 mA		
5	Input channel 1 offset			
6	Input channel 2 offset	Depage 22769 to 122767	R/W	0
7	Input channel 3 offset	Range: -32768 to +32767		0
8	Input channel 4 offset			
9	Input channel 1 gain			
10	Input channel 2 gain	D 00700 / 00707	D 44/	4000
11	Input channel 3 gain	Range: -32768 to +32767	R/W	1000
12	Input channel 4 gain			
13	Input channel 1 average times			
14	Input channel 2 average times	Papao: 1, 100	R/W	10
15	Input channel 3 average times	Range: 1–100	Γ./ VV	ĨŬ
16	Input channel 4 average times			
17	Input channel 1 filter		R/W	1

Note: The attribute of the CR must be W (write) to use TO instruction.

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CR#	Name	Description	Atr.	Defaults
	average percentage			
18	Input channel 2 filter	Range: 0–3		
	average percentage	Unit: ±10%		
19	Input channel 3 filter	1: ±10%		
	average percentage	2: ±20%		
20	Input channel 4 filter	3: ±30%		
	average percentage			
		0: 2 ms		
		1: 4 ms		
		2: 10 ms		
		3: 15 ms		
		4: 20 ms		
	Input channel sampling	5: 30 ms		
21	cycle (sampling/integration time)	6: 40 ms	R/W	0
		7: 50 ms		
		8: 60 ms		
		9: 70 ms		
		10: 80 ms		
		11: 90 ms		
		12: 100 ms		
		0: open channel alarm		
		1: close channel alarm		
		bit0: channel 1		
		bit1: channel 2		
		bit2: channel 3		
22	Input channel alarm setup	bit3: channel 4	R/W	0
		0: warning		
		1: alarm		
		bit8: error in the power supply		
		bit9: error in the module hardware		
		bit10: error in calibration		

CR#	Name	Description	Atr.	Defaults
23	Output channel 1 mode setup	0: closed 1: -10 V to +10 V (default) 2: 0–10 V 3: -5 V to +5 V	R/W	
24	Output channel 2 mode setup	4: 0–5 V 5: 1–5 V 6: 0–20 mA 7: 4–20 mA	R/W	1
25	Output channel 1 offset	D 00700 / 00707	DAA	
26	Output channel 2 offset	Range: -32768 to +32767	R/W	0
27	Output channel 1 gain		R/W	1000
28	Output channel 2 gain	Range: -32768 to +32767		
29	Retain the output sent by channel 1	0: When the PLC stops, the value of the analog output is reset to 0.	R/W	0
30	Retain the output sent by channel 2	1: When the PLC stops, the value of the analog output is retained.		
31	Refresh the time for output sent by channel 1	Range: 10–3200 (100 ms–32000 ms) Unit: 10 ms	R/W	0
32	Refreshing the time for an output sent by channel 2	Any value less than 10 is read as 0. Any value larger than 3200 is read as 3200. Set the value to 0 to disable this function.	R/W	0
33	The minimum scale range	When the format is set to integer in		10.0
34	for input channel 1	HWCONFIG, the scale range is invalid.		-10.0
35	The minimum scale range	For analog-digital modules, it is much more		-10.0
36	for input channel 2	convenient if the system can convert digital		
37	The minimum scale range	values to floating-point values for earier		-10.0
38	for input channel 3	understanding. Here you can set the minimum	R	
39 40	for input channel 4	and maximum scale ranges of corresponding floating-point values for channels.		-10.0
41	The minimum scale range	For example, if the scale range for an analog		
42	for output channel 1	to digital input channel is ± 10.0 V, it indicates		-10.0
43	The minimum scale range	the maximum value is +10.0 V and the		-10.0
44	for output channel 2	minimum value is -10.0 V.		10.0

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CR#	Name	Description	Atr.	Defaults
45 46	The maximum scale range for input channel 1	If the scale range for an analog to digital input channel is 4 mA \sim 20 mA. It indicates the		10.0
47	The maximum scale range for input channel 2	maximum value is 20 mA and the minimum value is 4 mA.		10.0
49 50	The maximum scale range for input channel 3	Note: You can use PLC instruction DSCLP (API0217) and set SM685 to ON to use		10.0
51 52	The maximum scale range for input channel 4	floating-point operations when a conversion range needs to edit.		10.0
53 54	The maximum scale range for output channel 1			10.0
55 56	The maximum scale range for output channel 2			10.0
201	Instruction Set	Instructions for peak values 16#0101: record the peak value again for channel 1 16#0102: record the peak value again for channel 2 16#0104: record the peak value again for channel 3 16#0108: record the peak value again for channel 4 16#010F: record the peak values again for channels 1–4 16#0201: enable recording for channel 1 16#0202: enable recording for channel 2 16#0204: enable recording for channel 3 16#0208: enable recording for channel 4 16#020F: enable recording for channel 4 16#020F: enable recording for channel 1 16#0211: disable recording for channel 1 16#0212: disable recording for channel 4 16#0211: disable recording for channel 3	w	0

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CR#	Name	Description	Atr.	Defaults
210	The maximum peak value for channel 1	Integer format; the maximum peak value for		
211	The maximum peak value for channel 2			
212	The maximum peak value for channel 3	analog inputs	R	-
213	The maximum peak value for channel 4			
214	The minimum peak value for channel 1			
215	The minimum peak value for channel 2	Integer format; the minimum peak value for		
216	The minimum peak value for channel 3	analog inputs	R	
217	The minimum peak value for channel 4			
222	The time to record for channel 1			
223	The time to record for channel 2	Unit: 10 ms Range: 1–100	R/W	1
224	The time to record for channel 3	Time to record the digital value for the channels	10,00	
225	The time to record for channel 4			
240	The number of records for channel 1			
241	The number of records for channel 2			
242	The number of records for channel 3	Range: 0–500, display the current records	R	0
243	The number of records for channel 4			
4000 ~4499	Records for channel 1	500 records for channel 1		
4500 ~4999	Records for channel 2	500 records for channel 2	R	-

CR#	Name	Description	Atr.	Defaults
5000 ~5499	Records for channel 3	500 records for channel 3		
5500 ~5999	Records for channel 4	500 records for channel 4		

5.2.5 Functions

Set modes of operation and parameters with HWCONFIG utility software built into ISPSoft.

•	Analog	input

Item	Function	Description
1	Enable/Disable a Channel	 Enable or disable a channel. If a channel is disabled, the total conversion time decreases.
2	Calibration	Calibrate a linear curve.
3	Average	Conversion values are averaged and filtered.
4	Disconnection Detection	Disconnection detection only operates when the analog range is 4–20 mA or 1–5 V.
5	Channel Detect and Alarm	If an input signal exceeds the range of inputs that the hardware can receive, the module produces an alarm or a warning. You can disable this function.
6	Limit Detections for Channels	Save the maximum/minimum values for channels
7	Records for Channels	Save the analog curves for channels.
8	Scale Range	When the format is floating-point, you can set the scale range.

1. Enable/Disable a Channel

An analog signal is converted into a digital signal at a rate of 2 ms per channel. The total conversion time is 2 ms X (the number of channels). For firmware V1.02 or later, an analog signal is converted into a digital signal at a rate of 1 ms per channel. The total conversion time is 1 ms X (the number of channels). If a channel is not used, you can disable it to decrease the total conversion time.

2. Calibration

To make a curve meet specific needs, calibrate the curve by changing the offset and the gain. The calibration range depends on the range of inputs which can be received by the hardware. The formula is:

$$Output = \frac{(Input \times Gain)}{1000} + Offset$$

Example:

A channel receives voltage inputs between -10.0 V to +10.0 V. The gain is 1000, and the offset is 0. The corresponding value for the original signal -10.0 V to +10.0 V is -32000 to +32000. If you change the offset to -100, the calibrated value for the original signal -10.0 V to +10.0 V becomes -31900 to +32100. When the input voltage is 0 V, the digital value becomes -100. When the input voltage is 10.0 V, the digital value becomes -100. When the input voltage is 10.0 V, the digital value becomes -100.

Gain = 1000, Offset = -100



3. Average

You can set the average value between 1–100. It is a steady value obtained from the sum of the recorded values. If the recorded values include an acute pulse due to unavoidable external factors, however, you may observe violent changes in the average value. Use the filtering function to exclude acute pulses from the sum-up and equalization, so the computed average value is not affected by the acute recorded values. Set the filter percentage to the range 0–3, where the unit is 10%. If you set the filter range to 0, the system sums up all the recorded values and divides them to obtain the average value, but if you set the filter range to 1, for example, the system excludes the bottom 10% and the top 10% of the values and averages only the remaining values to get the average value. For instantance, set the average value to 100 and set the filter percentage to 3. When there are 100 pieces of data collected, the system arranges the collected data according to their values from large to small and then excludes the bottom 30% and top 30% of the values (60 pieces of data) and averages only the remaining values (40 pieces of data) to obtain the average value.



4. Disconnection detection

Disconnection detection only operates when the analog range is 4–20 mA or 1–5 V. If a module which can receive inputs between 4–20 mA or between 1–5 V is disconnected, the input signal exceeds the range of allowable inputs, so the module produces an alarm or a warning.

5. Channel Detection

If an input signal exceeds the allowable range of inputs, an error message appears. You can disable this function so that the module does not produce an alarm or a warning when the input signal exceeds the input range.

6. Limit detections for channels

This function saves the maximum and minimum values for channels so that you can determine the peak to peak values.



7. Records for Channels

Record the input values of the cyclic sampling for each channel. The system saves up to 500 data points and the recording time is 10 ms.



8. Scale range

When the format is floating-point, you can set the scale range. The analog output mode of a channel has a corresponding digital range. Digital values correspond to analog outputs sent by the module. For example, if the analog range is -10 V to +10 V, the digital range is -10.0 to +10.0, the HSP scale is 10.0, and the LSP scale is -10.0. The digital values -10.0 to +10.0 correspond to the analog values -10 V to +10 V, as the example below shows.



Analog Output

Item	Function	Description
1	Enable/Disable a	1. Enable or disable a channel.
	Channel	2. If a channel is disabled, the total conversion time decreases.
2	Calibration	Calibrate a linear curve.
3	Retain an Output	When a module stops running, the system retains the signal sent by the
		module.
	Refresh Time for an	Refresh the analog output value according to the value of the fixed slope.
(4)	Output	
5	Scale Range	You can set the scale range when the format is floating-point.

1 Enable/Disable a Channel

An analog signal is converted into a digital signal at a rate of 2 ms per channel. The total conversion time is 2 ms X (the number of channels). For firmware V1.02 or later, an analog signal is converted into a digital signal at a rate of 1 ms per channel. The total conversion time is 1 ms X (the number of channels). If a channel is not used, you can disable it to decrease the total conversion time.

2 Calibration

To make a curve meet specific needs, calibrate the curve by changing the offset and the gain. The calibration range depends on the range of inputs which can be received by the hardware. The formula is:

$$Output = \frac{(Input \times Gain)}{1000} + Offset$$

Example:

A channel receives voltage inputs between -10.0 V to +10.0 V. The gain is 1000, and the offset is 0. The corresponding value for the original signal -10.0 V to +10.0 V is -32000 to +32000. If you change the offset to 200 and the gain to 1000, the calibrated value for the original signal -10.0 V to +10.0 V to +10.0 V is -31800 to +32200.



③ Retain an Output

When a module stops running, the system retains the signal sent by the module.

The output is not retained:



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$\textcircled{4} \quad \text{Refresh Time for an Output}$

Set the refresh time for an output and the system updates the value of the slope (m) accordingly.



When the analog output signal changes, the system updates the value of the analog output according to the value set in the slope, as shown in the image below.



*The output conversion time and the input channel sampling cycle are the same.

(5) Scale Range

You can set the scale range when the format is floating-point. The analog output mode of a channel has a corresponding digital range. Digital values correspond to analog outputs sent by the module. For example, if the analog range is -10 V to +10 V, the digital range is -10.0 to +10.0, the HSP scale is 10.0, and the LSP scale is -10.0. The digital values -10.0 to +10.0 correspond to the analog values -10 V to +10 V, as the example below shows.



5.2.6 Wiring

• Precautions

To ensure the analog-to-digital module functions well and reliably, the external wiring must prevent noise. Before you install the cables, follow the precautions below.

- To prevent a surge and induction, the AC cable and the input signal cables that are connected to the AS06XA-A must be separate cables.
- (2) Do not install the cable near a main circuit, a high-voltage cable, or a cable connected to a load that is not a PLC. In addition, the cable must not be bound to a main circuit, a high-voltage cable, or a cable connected to a load which is not a PLC.
- (3) Ground shielded cables and hermetically sealed cables separately.
- (4) Terminals with insulation sleeves cannot be arranged as a terminal block, so you should cover the terminals with insulation tubes.
- (5) Use single-core cables or twin-core cables with a diameter of 24–22 AWG and with pin-type connectors smaller than 1 mm. Only use copper conducting wires which can withstand temperatures of 60° C /75° C or higher.



- (6) Note: use cables with the same length (less than 200 m) and use wire resistance of less than 100 ohm.
- (7) Notes on two-wire, three-wire, and four-wire connections:
 - Two-wire connection/three-wire connection (passive transducer): connect the transducer and the analog input module to the same power circuit.
 - Four-wire connection (active transducer): the transducer uses an independent power supply, so do not connect it to the same power circuit as the analog input module.

External wiring

(1) AS06XA-A



- *1. Use shielded cables to isolate the analog input signal cable from other power cables.
- *2. If the module is connected to a current signal, the terminals Vn and In+ (n=1-4) must be short-circuited.
- *3. If variability in the input voltage results in interference within the wiring, connect the module to a capacitor having a capacitance between 0.1–0.47 μ F and a working voltage of 25 V.

5

- *4. Connect the shielded cable to the terminal FE and to the ground terminal.
- *5. Connect the terminal 1 to the ground terminal.
- *6. The wording "CHX-I" indicates that you can use those five wiring methods for every input channel. The wording "CHX-O" indicates that you can use those two wiring methods for every output channel.

5.2.7 LED Indicators

Number	Name	Description
1	RUN LED Indicator	Operating status of the module ON: the module is running. OFF: the module is not running.
2	ERROR LED Indicator	Error status of the module ON: a serious error exists in the module. OFF: the module is operating normally. Blink: a minor error exists in the module.
3	Analog-to-Digital Conversion Indicator	Conversion status Blinking: conversion is in process. OFF: conversion has stopped.
5.3 HWCONFIG in ISPSoft

5.3.1 Initial Setting

(1) Start ISPSoft and double-click **HWCONFIG**.



(2) Select a module and drag it to the working area.

File Edit Option Help	
E X D D 3 3 5 9	9 X X 0
Product List	
 A\$300 Digital I/O Module Analog I/O Module A\$04AD A\$04DA A\$04DA A\$04RTD A\$04RTD A\$04TC A\$02LC Potwork Module Powver Module 	
Specification	1-
4 channels 16 bits analog input ,2 channels 12 bits analog output :- 10~+10V, 0~10V, -5~+5V, 0/1~5V, 0/4~20 mA _{et} , -20mA~20 mA conversion time = 2ms/channel	
	x

(3) Double-click the module in the working area to open the Device Setting page.



(4) Choose the parameter, set the values, and click **OK**.

∃- AS06XA-A	Input CH1~CH4 Mode setting				
format Input CH1 ~ CH4 Mode se	Parameter name	Value	Unit Default	Minimum	Maximum
- Input CH1~CH4 Calibratic	Input CH1 mode setting	-10V~+10V 💌	-10V~+10V	-	-
– Input average filter	Input CH2 mode setting	-10V~+10V 💌	-10V~+10V	-	-
 Input sampling time Input Channel Detect and 	Input CH3 mode setting	-10V~+10V 💌	-10V~+10V	-	-
 Input Channel Detect and Output CH1[~]CH2 Mode s 	Input CH4 mode setting	-10V~+10V 💌	-10V~+10V	-	-
- OutPut Setting					
Default Import	Export Update				ОК

(5) Click **Download** on the toolbar to download the parameters. Note that you cannot download the parameters while the CPU module is running.



5.3.2 Checking the Version of a Module

(1) On the **Option** menu, click **Online Mode**.



(2) Double-click the module to open the Device Setting page. The versions of both the firmware and the hardware are displayed.



Options			
E AS06XA-A	Device Informatio	n Normal Exchange Area	
- format - Input CH1~CH4 Mode se - Input CH1~CH4 Calibratic	Device Name	AS06XA-A	
 Input average filter Input sampling time Input Channel Detect and Output CH1~CH2 Mode s 	Description	4 channels 16 bits analog input, 2 channels 12 bits analog output: -10~+10V, 0~10V, -5~+5V, 0/1~5V, 0/4~20 mA, - 20mA~20 mA conversion time = 2ms/channel Module current consumption.(Internal)50mA.(External)	
 Output CH1~CH2 Calibra OutPut Setting 	Comment		
	DDF Version	00.40.00	
	Firmware Version	01.00.00	
	Hardware Version	00.00.00.00	
			-
Delani Ingat	Esport L	Jpdate	7
		OK	

5.3.3 Online Mode

(1) On the **Option** menu, click **Online Mode**.



(2) Right-click the module and click Module Status.



(3) View the module status.

AS06XA-A		×
Channel	Value (32 bits)	Data Type
Error code	6145	DECIMAL
CH1 Input	0	DECIMAL
CH2 Input	0	DECIMAL
CH3 Input	0	DECIMAL
CH4 Input	0	DECIMAL
CH1 Output	0	DECIMAL
CH2 Output	0	DECIMAL

5.3.4 Importing/Exporting a Parameter File

(1) Click **Export** in the Device Settings dialog box to save the current parameters as a CSV file (.csv).

Default	Import	Export N
Save As		2 🛛
Save in: 🔁 My Documents		- E 🗳 🖬 -
🗃 My Music 🗃 My Pictures 🍋 WinCHM Projects		
File name: Save as type: CSV File (*.csv)		Save Cancel



(2) Click **Import** in the Device Settings dialog box and select a CSV file to import saved parameters.

Default

)pen	2
Look in: 🔲 My Documents	
🕍 My Music 🛃 My Pictures 🦳 WinCHM Projects	
File name:	Open

Import

N

Export

5.3.5 Parameters

(1) The input modes of the channels

Device Setting					
Options					
⊡- AS06XA-A format	format				
- Input CH1~CH4 Mode se	Parameter name	Value	Unit Default	Minimum Maximum	l
- Input CH1 ~ CH4 Calibratic	format	Integer format 💌	Integer format		
Input average filter Input sampling time					
Input Channel Detect and					
Output CH1~CH2 Mode s Output CH1~CH2 Calibra					
OutPut Setting					
	1				
Default Import	Export Update				
				OK	
				-	_

(2) Input CH1–CH4 (channel 1–channel 4) mode settings

Device Setting Options							
⊡- AS06XA-A format	Input CH1~CH4 Mode setting						
Input CH1~CH4 Mode set	Parameter name	Value		Unit	Default	Minimum	Maximum
Input CH1~CH4 Calibratic Input average filter	Input CH1 mode setting	-10V~+10V	-		-10V~+10V	-	-
	Input CH2 mode setting	-10V~+10V	-		-10V~+10V	-	-
Input sampling time	Input CH3 mode setting	-10V~+10V	-		-10V~+10V	-	-
 Input Channel Detect and Output CH1[~]CH2 Mode s 	Input CH4 mode setting	-10V~+10V	-		-10V~+10V	-	-
└─ OutPut Setting							
Default Import	Export Update						ОК

(3) Input CH1–CH4 calibration

S06XA-A	Input CH1~CH4 Calibration				
- Input CH1~CH4 Mode se	Parameter name	Value	Unit Default	Minimum	Maximum
Input CH1~CH4 Calibratic	m Input CH1 Cal. Offset (V/mA)	0	0	-32768	32767
– Input average filter	Input CH2 Cal. Offset (V/mA)	0	0	-32768	32767
- Input sampling time	Input CH3 Cal. Offset (V/mA)	0	0	-32768	32767
Input Channel Detect and Output CH1 [~] CH2 Mode s	Input CH4 Cal. Offset (V/mA)	0	0	-32768	32767
- Output CH1~CH2 Calibra	Input CH1 Cal. Gain	1000	1000	-32768	32767
OutPut Setting	Input CH2 Cal. Gain	1000	1000	-32768	32767
-	Input CH3 Cal. Gain	1000	1000	-32768	32767
	Input CH4 Cal. Gain	1000	1000	-32768	32767
Default Import	Export Update				ОК

(4) Input average filter

Device Setting					
Options					
- AS06XA-A - format - Input CH1~CH4 Mode se	Input average filter				
	Parameter name	Value	Unit I	Default Minir	mum Maximum
-Input CH1~CH4 Calibratic	Input CH1 average times	10	10	1	100
- <mark>Input average filter</mark>	Input CH2 average times	10	10	1	100
- Input sampling time	Input CH3 average times	10	10	1	100
— Input Channel Detect and — Output CH1~CH2 Mode s	Input CH4 average times	10	10	1	100
- Output CH1~CH2 Calibra	Input CH1 filter Proportion	10% 💌	10%	. –	-
- OutPut Setting	Input CH2 filter Proportion	10% 💌	10%	. –	-
	Input CH3 filter Proportion	10% 💌	10%	. –	-
	Input CH4 filter Proportion	10% 💌	10%		-
Default Import	Export Update				OK

(5) Input sampling time

Device Setting					
Options - AS06XA-A - format - Input CH1~CH4 Mode set - Input CH1~CH4 Calibratic - Input average filter - Input Sempling time - Input Channel Detect and - Output CH1~CH2 Mode s - Output CH1~CH2 Calibrat - OutPut Setting	Input sampling time Parameter name Input sampling time	Value 2ms 🔽	Unit Default 2ms	Minimum Mexir	num
Default Import	Export Update			OK	

(6) Input channel detection and alarm settings

Options - AS06XA-A	Input Channel Detect and Alarm s	ettings				
format Input CH1 ~ CH4 Mode se Input CH1 ~ CH4 Calibratic	Parameter name	Value	Unit	Default	Minimum	Maximum
- Input CH1~CH4 Calibratic	Input CH1 overrage Detect	Disable	· ·	📃 Disable	-	-
- Input average filter	Input CH2 overrage Detect	📃 Disable		📃 Disable	-	-
- Input sampling time	Input CH3 overrage Detect	📃 Disable		🗌 Disable	-	-
Input Channel Detect and Output CH1~CH2 Mode s	Input CH4 overrage Detect	📃 Disable		📃 Disable	-	-
- Output CH1 CH2 Mode's - Output CH1 ~ CH2 Calibra - OutPut Setting	External power supply error	📃 Alarm		🗌 Alarm	-	-
	Hardware error	📃 Alarm		📃 Alarm	-	-
	adjustment error	📃 Alarm		🗌 Alarm	-	-
Default Import	Export Update					OK

5-31

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(7) Output CH1-CH2 mode settings

Device Setting						
Options						
⊡-AS06XA-A	Output CH1~CH2 Mode setting					
format Input CH1~CH4 Mode se	Parameter name	Value	Unit	Default	Minimum	Maximum
- Input CH1~CH4 Calibratic	Output CH1 mode setting			-10V~+10V	-	-
Input average filter Input sampling time	Output CH2 mode setting	-10V~+10V	•	-10V~+10V	-	-
- Input Channel Detect and						
 Output CH1[~]CH2 Mode s Output CH1[~]CH2 Calibra 						
OutPut Setting						
Default Import	Export Update					
						ок
					_	
DefaultImport	Export Update				1	<u>OK</u>

(8) Output CH1-2 calibration

Device Setting					
Options					
⊡- AS06XA-A format	Output CH1~CH2 Calibration				
- Input CH1~CH4 Mode se	Parameter name	Value	Unit Default	Minimum	Maximum
- Input CH1~CH4 Calibratic	Output CH1 Cal. Offset (V/mA)			-32768	32767
Input average filter	Output CH2 Cal. Offset (V/mA)	0	0	-32768	32767
Input sampling time	Output CH1 Cal. Gain	1000	1000	-32768	32767
 Input Channel Detect and Output CH1~CH2 Mode s 	Output CH2 Cal. Gain	1000	1000	-32768	32767
Output CH1~CH2 Celibra OutPut Setting					
Default Import	Export Update				ОК

(9) Output Settings

Options	OutPut Setting					
Input CH1~CH4 Mode se	Parameter name	Value	Unit	Default	Minimum	Maximum
- Input CH1~CH4 Calibratic	Output CH1 output Hold	Clear 🚽		Clear	-	-
- Input average filter	Output CH2 output Hold	Clear 🗸	•	Clear	-	-
Input sampling time Input Channel Detect and	Output CH1 Setting time(10ms)	0		0	0	3200
- Output CH1~CH2 Mode s	Output CH2 Setting time(10ms)	0		0	0	3200
Default Import	Export Update				I	OK

5_

5.4 DIADesigner-AX (Hardware Configuration)

The following example uses AS06XA-A.

5.4.1 Initial Setting

(1) Start DIADesigner-AX, click New Project, and then Project+Device to create a new project.



- (2) Add modules in:
 - ① Double-click Hardware Configuration
 - Select the + section and drag and drop the module that you want to add from the Product List to the + section.

or ③ Right-click **Delta_Localbus Master** to see the context meun and then double-click **Add Device** to add devices manually or double-click **Scan for Devices**.



(3) Select modules:

0 Double-click the module name in the Hardware Configuration area.

or $\ensuremath{\textcircled{O}}$ Double-click the module name shown in the node.



(4) Module parameter setting page:

06XA-A Parameters	Parameter	Туре	Val	De	Unit	Description	
	👘 🖗 Format	Enumeration of UINT	Int	Int			
06XA-A I/O Mapping	Input CH1~CH4 Mode Setting						
atus	Input CH1 Mode Setting	Enumeration of WORD	-10	-10			
atus	🖗 Input CH2 Mode Setting	Enumeration of WORD	-10	-10			
formation	Input CH3 Mode Setting	Enumeration of WORD	-10	-10			
	Input CH4 Mode Setting	Enumeration of WORD	-10	-10			
	🖃 🛛 🖗 Input CH1~CH4 Calibration						
	Input CH1 Cal. Offset	INT(-3276832767)	0	0			
	Input CH2 Cal. Offset	INT(-3276832767)	0	0			
	Input CH3 Cal. Offset	INT(-3276832767)	0	0			
	🖗 Input CH4 Cal. Offset	INT(-3276832767)	0	0			
	🖤 < Input CH1 Cal. Gain	INT(-3276832767)	1000	1000			
	🖤 🌵 Input CH2 Cal. Gain	INT(-3276832767)	1000	1000			
	Input CH3 Cal. Gain	INT(-3276832767)	1000	1000			
	Input CH4 Cal. Gain	INT(-3276832767)	1000	1000			
	🗐 🛛 🖗 Input Average Filter						
	Input CH1 Average Times	WORD(1100)	10	10			
	Input CH2 Average Times	WORD(1100)	10	10			
	Input CH3 Average Times	WORD(1100)	10	10			
	Input CH4 Average Times	WORD(1100)	10	10			
	Input CH1 Filter Proportion	Enumeration of WORD	10%	10%			
	Input CH2 Filter Proportion	Enumeration of WORD	10%	10%			
	🖗 Input CH3 Filter Proportion	Enumeration of WORD	10%	10%			
	Input CH4 Filter Proportion	Enumeration of WORD	10%	10%			
	🗐 🖤 🖗 Input Sampling Time						
	Input sampling time	Enumeration of WORD	2ms	2ms			
	Input Channel Detect and Alarm Settings	WORD	0				
	Input CH1 Overrage Detect	BOOL	FALSE	FALSE			
	Input CH2 Overrage Detect	BOOL	FALSE	FALSE			
	Input CH3 Overrage Detect	BOOL	FALSE	FALSE			
	Input CH4 Overrage Detect	BOOL	FALSE	FALSE			
	Reserved	BOOL	FALSE	FALSE			
	Preserved	BOOL	FALSE	FALSE			
	Reserved	BOOL	FALSE	FALSE			
	Reserved	BOOL	FALSE	FALSE			
	External Power Supply Error	BOOL	FALSE	FALSE			
	Hardware Error	BOOL		FALSE			
	Adjustment Error	BOOL	FALSE	FALSE			
	Output Ch1~Ch2 Mode Setting						
	Output CH1 Mode Setting	Enumeration of WORD	-10	-10			
		5 11 5110000	40				

(5) After setting is complete, select the module and click **Login** on the tool bar to download the settings to the modules.

es 🗸 🕂 🗙	A506XA_A X	Login (Alt+F8)					
Untitled22 I Untitled22 (AX-308EA0MA1T)	AS06XA-A Parameters	Parameter	Туре	Val	De	Linit D	Description	
Hardware Configuration	Abbolict Artainineterb		1 P.			Unit L	Jeschphon	
Ratuware Configuration	AS06XA-A I/O Mapping	Format	Enumeration of UINT	Int	Int			
LetherCAT Filter		Input CH1~CH4 Mode Setting Input CH1 Mode Setting	Enumeration of WORD	-10	-10			
	Status	Input CH1 Mode Setting Input CH2 Mode Setting	Enumeration of WORD	-10	-10			
Application		Input CH2 Mode Setting Input CH3 Mode Setting	Enumeration of WORD	-10				
Library Manager	Information	Input CH3 Mode Setting Input CH4 Mode Setting	Enumeration of WORD		-10			
PLC PRG (PRG)		P Input CH4 Mode Setting P Input CH1~CH4 Calibration	Enumeration of WORD	-10	-10			
E - W Task Configuration		Input CH1~CH4 Calibration Input CH1 Cal. Offset	1977(20200, 20202)					
EtherCAT_Task		 Input CHI Cal. Offset Input CH2 Cal. Offset 	INT(-3276832767) INT(-3276832767)	0	0			
EvierCAT_Task		 Input CH2 Cal. Offset Input CH3 Cal. Offset 		0	0			
PLC_PRG		 Input CH3 Cal. Offset Input CH4 Cal. Offset 	INT(-3276832767) INT(-3276832767)	0	0			
BuiltIn_IO (BuiltIn_IO)		 Input CH4 Cal. Onset Input CH1 Cal. Gain 	INT(-3276832767)	-	1000			
		 Input CHI Cal. Gain Input CH2 Cal. Gain 	INT(-32/6832/67)	1000	1000			
Delta_LocalBus_Master (Delta		 Input CH2 Cal. Gain Input CH3 Cal. Gain 		1000	1000			
AS06XA_A (AS06XA-A)		 Input CH3 Cal. Gain Input CH4 Cal. Gain 	INT(-3276832767) INT(-3276832767)	1000	1000			
EtherCAT Master SoftMotion		P Input CH4 Cal. Gain P Input Average Filter	1N1(-32/6832/67)	1000	1000			
SoftMotion General Axis Pool		Input Average Filter Input CH1 Average Times	WORD(1100)					
Sofuriouon General Axis Pool		Input CH1 Average Times Input CH2 Average Times	WORD(1100) WORD(1100)	10	10			
				10	10			
		Input CH3 Average Times	WORD(1100)	10	10			
		A Input CH4 Average Times	WODD/1 100)	10	10			

5.4.2 Checking the Version of a Module

(1) Select the module and click the Information tab to see the module information.

AS06XA-A Parameters	General
AS06XA-A I/O Mapping	Name: AS06XA-A Vendor: Delta Electronics, Inc.
Status	Categories: Type: 40000
Information	ID: 16F7 8309 Version: 1.0.0.6
	Order Number: AS06XA-A Description: 4 channels 16 bits analog input ,2 channels 12 bits analog output : -10~+10V, 0~10V, -5~+5V, 0/1~5V, 0/4~20 mA,, -20mA~20 mA conversion time = 2ms/channel

(2) Select the module and click **Login** on the tool bar to go to Online Mode. You can find the Module Revision from the Parameters tab.

	ASO6XA_A X						
Untitled15 Unitted15 Official Device [connected] (AX-308EA0MA1T)	AS06XA-A Parameters					Write Paramete	rs
Hardware Configuration A testuck Configuration A testuck Configuration A testuck Configuration A testuck Configuration B there AT Filter B RC Loge C B Application funi C B testuck Configuration C B te	ASOSXA-A 1/O Mapping Status Information	Parameter Pornat Pornat Pornat Pornat Pornat Port Ch1-CH4 Mode Setting Port Average Filter Port Avera	Type Enumeration of UNIT WORD DWORD	Current Value Integer 16#0000 16#00010000	Prepared Value	Value Integer 16#0000	>
	Watch 1					- 4	
	Expression	Application Type	Value	Prepared value Exect	ution point		4
>	16						3
Devices POUs	Watch 1 Breakpoints						

5.4.3 Online Mode

(1) Select the module and click Login on the tool bar to go to Online Mode. You can monitor all configuration parameters. Vaules in the column of Prepared Value are configurable online. After editing the values in the Prepared Value column, click Write Parameter to confirm the change.

evices 👻	4 X AS06XA_A X						
Untitled15 Untitled15 Signature [connected] (AX-308EA0MA11	T) AS06XA-A Parameters						Write Paramet
Hardware Configuration A Network Configuration A LetherCAT Filter Bill PLC Logic	AS06XA-A 1/0 Mapping Status		ørneter Ø Format Ø Input CH1∼CH4 Mode Setting	Type Enumeration of UINT	Current Value Integer	Prepare e	Value Integer
Application [run] Application [run] Lorary Manager PLC_PRG (PRG) Zet Configuration Configuration Configuration	Information		Input CH1 Mode Setting Input CH2 Mode Setting Input CH3 Mode Setting Input CH3 Mode Setting Input CH4 Mode Setting	Enumeration of WORD Enumeration of WORD Enumeration of WORD Enumeration of WORD	-10V~+10V -10V~+10V -10V~+10V -10V~+10V	Close 0V~+5V	-10V~+10V -10V~+10V -10V~+10V -10V~+10V
G Sk EtherCAT_Task = G Sk EtherCAT_Task = G Sk ManTask = G			Input CH1-CH4 Californian Input CH1 Cal, Offset Input CH1 Cal, Offset Input CH3 Cal, Offset Input CH3 Cal, Offset Input CH3 Cal, Offset Input CH1 Cal, Gan Input CH3 Cal, Gan Input CH3 Cal, Gan	INT(-3276832767) INT(-3276832767) INT(-3276832767) INT(-3276832767) INT(-3276832767) INT(-3276832767) INT(-3276832767) INT(-3276832767)	16#0000 16#0000 16#0000 16#03E8 16#03E8 16#03E8 16#03E8		0 0 1000 1000 1000 1000
SoftMotion General Axis Pool		8	Input CH1CB. Cash Input CH1CB. Cash Input CH1 Average Times Input CH2 Average Times Input CH3 Average Times Input CH4 Average Times	WORD(1100) WORD(1100) WORD(1100) WORD(1100)	15#000A 15#000A 16#000A 16#000A		1000 10 10 10

(2) You can monitor the values, status, error codes in each channel from the I/O Mapping tab. You can also set a new value in the colum of Prepared Value and press Ctrol+F7 on the keyboard to write the new values in.

AS06XA-A Parameters	4	The bus is not i	running. The shown val	ues are perhaps	not actual					
AS06XA-A I/O Mapping	Fin	d		Filter Show a	II		A	dd FB for IO Chanr	el →	Go to Instand
Status		ariable *	Mapping	Channel AS06XAIN	Address %ID1	Туре	Current Value	Prepared Value	Unit	Description
Information				Error code	%ID1	DWORD	6145			
		- **		CH1 Input	%ID2	DINT	0			
		- *0		CH2 Input	%ID3	DINT	0			
		- *		CH3 Input	%ID4	DINT	0			
				CH4 Input	%ID5	DINT	0			
	G	50		AS06XAOUT	%QD1		1			
		···· **		CH1 Output	%QD1	DINT	10000	1		Ш.
		- **		CH2 Output	%QD2	DINT	0	32000		

(3) You can monitor the current status and error codes from the Status tab.

AS06XA-A Parameters	AS06XA-A	:	Module reports an error	
AS06XA-A I/O Mapping	Last Diagnostic Messag	e	Acknowl	ledge
Status	Diagnosis Message:	'Error in IO Driver: 0 ErrorCode: 0x1801'		
Information				

5.4.4 Parameters

(1) You can set up the value format to Integer or Floating for Channel 1 to	(1)	You can set up the value	format to Integer or Floating	g for Channel 1 to 4.
---	-----	--------------------------	-------------------------------	-----------------------

Parameter	Туре	Value	Default Value	Unit	Description
🔹 🖗 Format	Enumeration of UINT	Integer V	Integer		
CH1~CH4 Mode Setting		Integer			
🖤 🖗 CH1 Mode Setting	Enumeration of WORD	Floating	nteger V~+10V		
CH2 Mode Setting	Enumeration of WORD	-10V~+10	Floating V~+10V		
CH3 Mode Setting	Enumeration of WORD	-10V~+10V	-10V~+10V		
CH4 Mode Setting	Enumeration of WORD	-10V~+10V	-10V~+10V		

(2) You can set up the values for Channel 1 to 4.

Parameter	Туре	Value	Default Value	Unit	Description
r 🖤 🖗 Format	Enumeration of UINT	Integer	Integer		
🗏 🛛 🖗 CH1~CH4 Mode Setting					
🖤 🖗 CH1 Mode Setting	Enumeration of WORD	-10V~+10V 🗸 🗸	-10V~+10V		
🖤 🌵 CH2 Mode Setting	Enumeration of WORD	Close -10V~+10V 0V~+10V -5V~+5V	-10V~+10V		
🖤 🖗 CH3 Mode Setting	Enumeration of WORD		-10V~+10V		
CH4 Mode Setting	Enumeration of WORD		-10V~+10V		
CH1~CH4 Calibration		0V~+5V 1V~+5V			
CH1 Cal. Offset (V/mA)	INT(-3276832767)	0mA~20mA 4mA~20mA -20mA~20mA	0		
🖤 < CH2 Cal. Offset (V/mA)	INT(-3276832767)		0		
CH3 Cal. Offset (V/mA)	INT(-3276832767)	-20mA~20mA	0		

(3) You can set up the calibrations for for Channel 1 to 4.

CH1~CH4 Calibration				
CH1 Cal. Offset (V/mA)	INT(-3276832767)	0	0	
🖤 🖗 CH2 Cal. Offset (V/mA)	INT(-3276832767)	0	0	
🖤 🖗 CH3 Cal. Offset (V/mA)	INT(-3276832767)	0	0	
🖤 🖗 CH4 Cal. Offset (V/mA)	INT(-3276832767)	0	0	
🖤 🖗 CH1 Cal. Gain	INT(-3276832767)	1000	1000	
🖤 🖗 CH2 Cal. Gain	INT(-3276832767)	1000	1000	
🖤 🖗 CH3 Cal. Gain	INT(-3276832767)	1000	1000	
🖗 CH4 Cal. Gain	INT(-3276832767)	1000	1000	

(4) You can set up the average filtering for Channel 1 to 4.

🔍 🖗 Average Filter				
CH1 Average Times	WORD(1100)	10	10	
CH2 Average Times	WORD(1100)	10	10	
CH3 Average Times	WORD(1100)	10	10	
CH4 Average Times	WORD(1100)	10	10	
CH1 Filter Proportion	Enumeration of WORD	10%	10%	
CH2 Filter Proportion	Enumeration of WORD	10%	10%	
CH3 Filter Proportion	Enumeration of WORD	10%	10%	
CH4 Filter Proportion	Enumeration of WORD	10%	10%	

(5) You can set up the sampling time.

🚔 🛛 🖗 Sampling Time				
sampling time	Enumeration of WORD	2ms	2ms	
🖃 🖗 Channel Detect and Alarm Settings	WORD	0		
CH1 Overrage Detect	BOOL	FALSE	FALSE	
CH2 Overrage Detect	BOOL	FALSE	FALSE	
CH3 Overrage Detect	BOOL	FALSE	FALSE	
CH4 Overrage Detect	BOOL	FALSE	FALSE	
🖉 🕸 Reserved	BOOL	FALSE	FALSE	
🖗 Reserved	BOOL	FALSE	FALSE	
🗝 🖗 Reserved	BOOL	FALSE	FALSE	

(6) You can set up the channel detect and alarm settings.

Channel Detect and Alarm Settings	WORD	0		
CH1 Overrage Detect	BOOL	FALSE	FALSE	
CH2 Overrage Detect	BOOL	FALSE	FALSE	
CH3 Overrage Detect	BOOL	FALSE	FALSE	
🖤 🖗 CH4 Overrage Detect	BOOL	FALSE	FALSE	
🖗 Reserved	BOOL	FALSE	FALSE	
🖗 Reserved	BOOL	FALSE	FALSE	
🖗 Reserved	BOOL	FALSE	FALSE	
🖗 Reserved	BOOL	FALSE	FALSE	
External Power Supply Error	BOOL	FALSE	FALSE	
🖤 🖗 Hardware Error	BOOL	FALSE	FALSE	
🖗 Adjustment Error	BOOL	FALSE	FALSE	

(7) You can set up the output channel mode for Channel 1 and 2.

Output Ch1~Ch2 Mode Setting				
Output CH1 Mode Setting	Enumeration of WORD	-10V~+10V	-10V~+10V	
Output CH2 Mode Setting	Enumeration of WORD	-10V~+10V	-10V~+10V	
± .				

(8) You can set up the calibrations for output Channel 1 and 2.

	Output Ch1~Ch2 Calibration				
	Output CH1 Cal. Offset	INT(-3276832767)	0	0	
	🖤 🖗 Output CH2 Cal. Offset	INT(-3276832767)	0	0	
	🖗 Øutput CH1 Cal. Gain	INT(-3276832767)	1000	1000	
	Output CH2 Cal. Gain	INT(-3276832767)	1000	1000	
-					

(9) You can set up the output settings for output Channel 1 and 2.

🗏 🔍 🖉 Output Setting				
🖤 🔌 Output CH1 Output Hold	Enumeration of WORD	Clear	Clear	
Output CH2 Output Hold	Enumeration of WORD	Clear	Clear	
Output CH1 Setting Time(10ms)	INT(03200)	0	0	
Output CH2 Setting Time(10ms)	INT(03200)	0	0	

5.5 Troubleshooting

5.5.1 Error Codes

Error Code	Description	A↔ D LED indicator	ERROR LED indicator
16#1605	Hardware failure	OFF	ON
16#1607	The external voltage is abnormal.	OFF	ON
16#1608	The factory calibration is abnormal.	OFF	ON
16#1801	The external voltage is abnormal.	OFF	Blinking
16#1802	Hardware failure	OFF	Blinking
16#1804	The factory calibration is abnormal.	OFF	Blinking
16#1808	The signal received by channel 1 exceeds the range of inputs that the hardware can receive.		
16#1809	The signal received by channel 2 exceeds the range of inputs that the hardware can receive.	Run: blinking	Blinking
16#180A	The signal received by channel 3 exceeds the range of inputs that the hardware can receive.	Stop: OFF	Dimining
16#180B	The signal received by channel 4 exceeds the range of inputs that		
	the hardware can receive.		
			Blinking once
			or twice and
	When power-on, the module is not detected by CPU module.	OFF	after 2
		ULL	seconds, it
			blinks
			repeatedly

5.5.2 Troubleshooting Procedure

Description	Procedure
The external voltage is abnormal.	Ensure the external 24 V power supply to the module is functioning normally.
Hardware failure	Return the module to the factory for repair.
Internal error The factory calibration is abnormal.	Contact the factory.
The signal received by channel 1 exceeds the range of inputs that the hardware can receive.	Check the signal received by channel 1
The signal received by channel 2 exceeds the range of inputs that the hardware can receive.	Check the signal received by channel 2.
The signal received by channel 3 exceeds the range of inputs that the hardware can receive.	Check the signal received by channel 3.
The signal received by channel 4 exceeds the range of inputs that the hardware can receive.	Check the signal received by channel 4.
When power-on, the module is not detected by CPU module.	Check if the connection between module and CPU module is working. If not, connect again.

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Chapter 6 Temperature Measurement Module AS04/06RTD

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6.1 Overview

This section describes the specifications for temperature measurement modules, their operation, and their programming. The AS04/06RTD is a temperature measurement module that converts the temperatures received from four/six thermocouples into digital signals. You can select either Celsius or Fahrenheit as the unit of measurement. For software operation, ISPSoft, DIADesigner or DIADesigner-AX is what you need. If you are using AS Series PLC CPU, refer to ISPSoft User Manual or DIADesigner Manual for more information. The new software DIADesigner-AX only supports AX Series PLC CPU and AS Series modules now, refer to AX-3 User Manual for more information on software operation.

6.1.1 Characteristics

(1) Select a sensor based on its practical application.

Pt100/Ni100/Pt1000/Ni1000/JPt100/LG-Ni1000/Cu50/Cu100/0–300 Ω /0–3000 Ω sensor and for FW V1.06, Ni120 is also available.

(2) High-speed conversion

Two-wire/Three-wire configuration: 200 ms/channel

(3) High accuracy

Conversion accuracy: The error range of the input is ±0.1% at ambient temperature of 25° ±5° C.)

(4) Disconnection detection

When a sensor is disconnected, the AS04RTD produces an alarm or a warning.

(5) PID control

An object's temperature can be maintained through PID control actions.

(6) Use the utility software to configure the module.

The HWCONFIG utility software is built into ISPSoft. You can set modes and parameters directly in HWCONFIG of ISPSoft or Hardware Configuration of DIADesigner without spending time writing programs to set registers to manage functions.

6.2 Specifications and Functions

6.2.1 Specifications

• Electrical specifications

Module	AS04RTD-A	AS06RTD-A				
Number of Analog Inputs	4	6				
	2-Wire & 3-Wire:					
	Pt100: DIN 43760-1980 JIS C1604-1989; 100 Ω 3850 PPM/°C					
	Pt1000 : DIN EN60751; 1 kΩ 3850 PPM/°	С				
Applicable Sensor	Ni100/Ni1000: DIN 43760					
	JPt100: JIS C1604-1989					
	LG-Ni1000					
	Cu50/Cu100					
Supply Voltage	24 VDC (20.4–28.8 VDC) (-15% to +20%))				
Connector Type	Removable terminal block					
	Pt100/Ni100/Ni120/Pt1000/Ni1000/JPt100 25° C/77° F: The allowed error range is ±0.1% of full scale.					
	-20° C to 60° C/-4° F to 140° F: The allowed error range is $\pm 0.5\%$ of full scale.					
Overall Accuracy	LG-Ni1000; 25° C/77° F: The allowed error range is ±0.1% of full scale.					
	Cu50; 25° C/77° F: The allowed error range is $\pm 4\%$ of full scale.					
	Cu100; 25° C/77° F: The allowed error ra	nge is ±2% of full scale.				
Resolution	0.1°C / 0.1°F					
Conversion Time	Two-wire/Three-wire configuration: 200 m	s/channel				
	An analog circuit is isolated from a digital	circuit by a digital integrated circuit/				
	optocoupler, and the analog channels are	isolated from one another by				
	optocouplers.					
Isolation	Isolation between a digital circuit and the	ground: 500 VAC				
	Isolation between an analog circuit and th	e ground: 500 VAC				
	Isolation between an analog circuit and the digital circuit: 500 VAC					
	Isolation between the 24 VDC and the gro	bund: 500 VAC				
Weight	115 g 125 g					

• Functional specifications

Analog-to-Digital Conversion	Centigrade (°C)	Fahrenheit (°F)	Input Impedance
Rated Measurement Range ^{∗1}	Pt100: -180° C to +800° C Ni100: -80° C to +170° C Ni120: -80° C to +320° C Pt1000: -180° C to +800° C Ni1000: -80° C to +170° C JPt100: -180° C to +500° C LG-Ni1000: -50° C to +180° C Cu50: -50° C to +150° C	Pt100: -292° F to +1,472° F Ni100: -112° F to +338° F Ni120: -112° F to +608° F Pt1000: -292° F to +1,472° F Ni1000: -112° F to +338° F JPt100: -292° F to +932° F LG-Ni1000: -58° F to +302° F Cu50: -58° F to +302° F	0–300 Ω 0–3000 Ω
Maximum Measurable Range ^{*2}	Pt100: -200°C to 850°C Ni100: -100°C to 180°C Ni120: -80° C to +320° C Pt1000: -200°C to 850°C Ni1000: -100°C to 180°C JPt100: -200°C to 510°C LG-Ni1000: -60°C to 200°C Cu50: -50°C to 150°C Cu100: -50°C to 150°C	Pt100 : -328°F to 1,562°F Ni100: -148°F to 356°F Ni120: -112° F to +608° F Pt1000 : -328°F to 1,562°F Ni1000 : -148°F to 356°F JPt100 : -328°F to 950°F LG-Ni1000 : -76°F to 392°F Cu50 : -58°F to 302°F Cu100 : -58°F to 302°F	0–320 Ω 0–3200 Ω
Average function Self-diagnosis	Range: 1-100 Disconnection detection		

 * 1: If any of these limits are exceeded, device functionality should not be assumed, damage may occur and

reliability may be affected.

*2: If the to be measured temperature exceeds the upper/lower limit, it only shows the maximum / minimum value.

Conversion details

	Centigrade (°C)				
Sonsor typo	Maximum measurable	Integer value range	Floating point value range		
Sensor type	range	after digital conversion	after digital conversion		
Pt100	-200°C ~ 850°C	K-2000 ~ K8500	-200.0 ~ 850.0		
Ni100	-100°C ~ 180°C	K-1000 ~ K1800	-100.0 ~ 180.0		
Ni120	-80°C ~ 320°C	K-800 ~ K3200	-80.0 ~ 320.0		
Pt1000	-200°C ~ 850°C	K-2000 ~ K8500	-200.0 ~ 850.0		
Ni1000	-100°C ~ 180°C	K-1000 ~ K1800	-100.0 ~ 180.0		
JPt100	-200°C ~ 510°C	K-2000 ~ K5100	-200.0 ~ 510.0		
LG-Ni1000	-60°C ~ 200°C	K-600 ~ K2000	-60.0 ~ 200.0		
Cu50	-50°C ~150°C	K-500 ~ K1500	-50.0 ~ 150.0		
Cu100	-50°C ~ 150°C	K-500 ~ K1500	-50.0 ~ 150.0		
0~300Ω	0 ~ 320Ω	K0 ~ K32000	0.0 ~ 320.00		
0~3000Ω	0 ~ 3200Ω	K0 ~ K32000	0.0 ~ 3200.0		

	Fahrenheit (°F)				
Soncortuna	Maximum measurable	Integer value range	Floating point value range		
Sensor type	range	after digital conversion	after digital conversion		
Pt100	-328°F ~ 1,562°F	K-3280 ~ K15620	-328.0 ~ 1562.0		
Ni100	-148°F ~ 356°F	K-1480 ~ K3560	-148.0 ~ 356.0		
Ni120	-112°C ~ 608°C	K-1120 ~ K6080	-112.0 ~ 608.0		
Pt1000	-328°F ~ 1,562°F	K-3280 ~ K15620	-328.0 ~ 1562.0		
Ni1000	-148°F ~ 356°F	K-1480 ~ K3560	-148.0 ~ 356.0		
JPt100	-328°F ~ 950°F	K-3280 ~ K9500	-328.0 ~ 950.0		
LG-Ni1000	-76°F ~ 392°F	K-760 ~ K3920	-76.0 ~ 392.0		
Cu50	-58°F ~ 302°F	K-580 ~ K3020	-58.0 ~ 302.0		
Cu100	-58°F ~ 302°F	K-580 ~ K3020	-58.0 ~ 302.0		
0 ~ 300Ω	0 ~ 320Ω	K0 ~ K32000	0.0 ~ 320.00		
0 ~ 3000Ω	0 ~ 3200Ω	K0 ~ K32000	0.0 ~ 3200.0		

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6.2.2 Profile



Unit: mm

Number	Name	Description
1	Model Name	Model name of the module
		Operating status of the module
	RUN LED Indicator	ON: the module is running.
		OFF: the module is not running.
		Error status of the module
2	ERROR LED Indicator	ON: a serious error exists in the module.
2		OFF: the module is operating normally.
		Blink: a minor error exists in the module.
	Analog-to-Digital	Conversion status
		Blinking: conversion is in process.
		OFF: conversion has stopped.
3	Removable Terminal Block	The inputs are connected to transducers.
5		The outputs are connected to loads to be driven.
4	Arrangement of the Input/Output Yerminals	Arrangement of the terminals
5	Clip	For removing the terminal block
6	DIN Rail Clip	Secures the module onto the DIN rail
7	Module Connecting Set	Connects the modules
8	Ground Clip	
9	Label	Name plate



6.2.3 Arrangement of Terminals

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6.2.4 AS04RTD Control Registers

*If you use HWCONFIG to set values in CRs, once the set value is downloaded, the values can be retained in the module; however if you use TO instruction to write data into CRs, the values CANNOT be retained, after power failure or after transition of the CPU from STOP to RUN.

CR#	Name	Description	Atr.	Defaults
0	Format Setup	0: integer format	R	0
	Format Setup	1: floating point format		0
		0: closed		
1	Channel 1 mode setup	1: 0–300 Ω (default)		
		2: 0–3000 Ω		
2		3: Pt100		
2	Channel 2 mode setup	4: JPt100		
		- 5: Pt1000	R/W	1
3	Channel 3 mode setup	6: Ni100		
		7: Ni1000		
		8: LG-Ni1000		
		9: Cu50		
4	4 Channel 4 mode setup	10: Cu100		
		11: Ni120 (FW V1.06 or later)		
5	Channel 1 offset		R/W	0
6	Channel 2 offset	Pange: 22769 to 122767		
7	Channel 3 offset	Range: -32768 to +32767		
8	Channel 4 offset			
9	Channel 1 gain			
10	Channel 2 gain	Pange: 22769 to 122767	R/W	1000
11	Channel 3 gain	Range: -32768 to +32767		1000
12	Channel 4 gain	-		
13	Channel 1 average times			
14	Channel 2 average times	- Range: 1–100	D/\//	10
15	Channel 3 average times		R/W	10
16	Channel 4 average times			
17	Channel 1 filter average percentage	Range: 0–3	R/W	1

Note: The attribute of the CR must be W (write) to use TO instruction.

CR#	Name	Description	Atr.	Defaults
18	Channel 2 filter average percentage	Unit: ±10%		
19	Channel 3 filter average percentage	-		
20	Channel 4 filter average percentage	_		
		0: Fahrenheit		
21	Units of temperature	1: Celsius	R/W	0
		0: open channel alarm		
	Channel alarm setup	1: close channel alarm		
		bit0: channel 1		
		bit1: channel 2		
		bit2: channel 3		
		bit3: channel 4		
22			R/W	0
		0: warning		
		1: alarm		
		bit8: error in the power supply		
		bit9: error in the module hardware		
		bit10: error in calibration		
		16#0101: record the peak value		
		again for channel 1		
		16#0102: record the peak value		
		again for channel 2		
		16#0104: record the peak value		
		again for channel 3		
		16#0108: record the peak value		
201	Instruction set	again for channel 4	w	0
201		16#010F: record the peak values		Ū
		again for channels 1–4		
		16#0201: enable recording for		
		channel 1		
		16#0202: enable recording for		
		channel 2		
		16#0204: enable recording for		
		channel 3		

CR#	Name	Description	Atr.	Defaults
		16#0208: enable recording for		
		channel 4		
		16#020F: enable recording for		
		channels 1-4		
		16#0211: disable recording for		
		channel 1		
		16#0212: disable recording for		
		channel 2		
		16#0214: disable recording for		
		channel 3		
		16#0218: disable recording for		
		channel 4		
		16#021F: disable recording for		
		channels 1–4		
		16#0502: restore default settings		
210	The maximum peak value for channel 1		R	-
211	The maximum peak value for channel 2	Integer format; the maximum		-
212	The maximum peak value for channel 3	peak value for analog inputs		-
213	The maximum peak value for channel 4			-
214	The minimum peak value for channel 1			-
215	The minimum peak value for channel 2	Integer format; the minimum peak		-
216	The minimum peak value for channel 3	value for analog inputs	R	-
217	The minimum peak value for channel 4	•		-
222	The time to record for channel 1	Unit: 10 ms		1
223	The time to record for channel 2	Range: 1–100	D 44/	1
224	The time to record for channel 3	The time to record the digital	R/W	1
225	The time to record for channel 4	value for the channels		1
240	The number of records for channel 1			0
241	The number of records for channel 2	Range: 0–500, display the current		0
242	The number of records for channel 3	records	R	0
243	The number of records for channel 4			0
4000-	Paparda far abannal 1	E00 records for shares! 4	R	
4499	Records for channel 1	500 records for channel 1	ĸ	

CR#	Name	Description	Atr.	Defaults
4500-	Records for channel 2	FOO records for showed 2		
4999		500 records for channel 2	R	
5000-				
5499	Records for channel 3	500 records for channel 3	R	
5500-			R	
5999	Records for channel 4	500 records for channel 4	К	

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6.2.5 AS06RTD Control Registers

*If you use HWCONFIG to set values in CRs, once the set value is downloaded, the values can be retained in the module; however if you use TO instruction to write data into CRs, the values CANNOT be retained, after power failure or after transition of the CPU from STOP to RUN.

CR#	Name	Description	Atr.	Defaults
0	Format Catura	0: integer format	R	0
0	Format Setup	1: floating point format		0
1	Channel 1 mode setup	0: closed		
		1: 0–300 Ω (default)		
2	Channel 2 mode setup	2: 0–3000 Ω		
		3: Pt100		1
3	Channel 3 mode setup	4: JPt100		
		5: Pt1000	R/W	
4	Channel 4 mode setup	6: Ni100		
5	Channel 5 mode setup	7: Ni1000		
		8: LG-Ni1000		
		9: Cu50		
6	Channel 6 mode setup	10: Cu100		
		11: Ni120 (FW V1.06 or later)		
7	Channel 1 offset			
8	Channel 2 offset			
9	Channel 3 offset	Range: -32768 to +32767	R/W	0
10	Channel 4 offset			
11	Channel 5 offset			
12	Channel 6 offset			
13	Channel 1 gain			
14	Channel 2 gain			
15	Channel 3 gain	Range: -32768 to +32767	R/W	1000
16	Channel 4 gain			1000
17	Channel 5gain			
18	Channel 6 gain			
19	Channel 1 average times	Range: 1–100	R/W	10

Note: The attribute of the CR must be W (write) to use TO instruction.

CR#	Name	Description	Atr.	Defaults
20	Channel 2 average times			
21	Channel 3 average times			
22	Channel 4 average times			
23	Channel 5 average times			
24	Channel 6 average times			
25	Channel 1 filter average percentage			
26	Channel 2 filter average percentage			
27	Channel 3 filter average percentage	Range: 0–3	R/W	
28	Channel 4 filter average percentage	Unit: ±10%	K/VV	1
29	Channel 5 filter average percentage			
30	Channel 6 filter average percentage			
31	Units of temperature	0: Fahrenheit 1: Celsius	R/W	0
32	Channel alarm setup	0: open channel alarm 1: close channel alarm bit0: channel 1 bit1: channel 2 bit2: channel 3 bit3: channel 4 bit4: channel 5 bit5: channel 6 0: warning 1: alarm bit8: error in the power supply bit9: error in the module hardware	R/W	0

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CR#	Name	Description	Atr.	Defaults
		bit10: error in calibration		
		16#0101: record the peak value again for		
		channel 1		
		16#0102: record the peak value again for		
		channel 2		
		16#0104: record the peak value again for		
		channel 3		
		16#0108: record the peak value again for		
		channel 4		
		16#110: record the peak values again for		
		channels 5		
		16#120: record the peak values again for		
		channels 6		
		16#013: record the peak values again for		
		channels 1-6		
		16#0201: enable recording for channel 1		
201	Instruction set	16#0202: enable recording for channel 2	W	0
		16#0204: enable recording for channel 3		
		16#0208: enable recording for channel 4		
		16#0210: enable recording for channels 5		
		16#0220: enable recording for channels 6		
		16#023F: enable recording for channels 1-6		
		16#0301: disable recording for channel 1		
		16#0302: disable recording for channel 2		
		16#0304: disable recording for channel 3		
		16#0308: disable recording for channel 4		
		16#0310: disable recording for channel 5		
		16#0320: disable recording for channel 6		
		16#033F: disable recording for channel1-6		
		16#0501: restore default settings, clear		
		setting values in the Flash		
		16#0502: restore default settings, do not		

CR#	Name	Description	Atr.	Defaults
		clear setting values in the Flash		
210	The maximum peak value for channel 1			-
211	The maximum peak value for channel 2	-		-
212	The maximum peak value for channel 3	Integer format; the maximum peak value for analog inputs	R	-
213	The maximum peak value for channel 4			-
214	The maximum peak value for channel 5			-
215	The maximum peak value for channel 6			-
216	The minimum peak value for channel 1	Integer format; the minimum peak value for		-
217	The minimum peak value for channel 2			-
218	The minimum peak value for channel 3			-
219	The minimum peak value for channel 4	analog inputs	R	-
220	The minimum peak value for channel 5			-
221	The minimum peak value for channel 6			-
222	The time to record for channel 1			1
223	The time to record for channel 2	Unit: 100 ms		1
224	The time to record for channel 3	Range: 1–100	R/W	1
225	The time to record for channel 4	The time to record the digital value for the		1
226	The time to record for channel 5	channels		1
227	The time to record for channel 6			1
240	The number of records for channel 1	Range: 0–200, display the current records	R	0

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CR#	Name	Description	Atr.	Defaults
241	The number of records for			0
	channel 2			
242	The number of records for			0
	channel 3			
243	The number of records for			0
	channel 4			
244	The number of records for			0
	channel 5			
245	The number of records for			0
	channel 6			
4000				
-	Records for channel 1	200 records for channel 1	R	-
4199				
4500				
-	Records for channel 2	200 records for channel 2	R	-
4699				
5000				
-	Records for channel 3	200 records for channel 3	R	-
5199				
5500				
-	Records for channel 4	200 records for channel 4	R	-
5699				
6000				
-	Records for channel 4	200 records for channel 5	R	-
6199				
6500				
-	Records for channel 4	200 records for channel 6	R	-
6699				
6.2.6 Functions

Use the HWCONFIG utility software built into ISPSoft to set modes of operation and parameters.

Analog input

Item	Function	Description
1	Enable/Disable a Channel	 Enable or disable a channel. If a channel is disabled, the total conversion time decreases.
2	Unit of Measurement	Select the unit of measurement: Fahrenheit or Celsius.
3	Calibration	Calibrate a linear curve.
4	Average	Conversion values are averaged and filtered.
5	Disconnection Detection	If the channel is open, the module can detect when it is disconnected. If the input is open-circuited, the module produces an alarm or a warning.
6	Channel Detection and Alarm	If an input signal exceeds the range of inputs that the hardware can receive, the module produces an alarm or a warning. You can disable this function.
7	Limit Detections for Channels	Save the maximum/minimum values for channels.
8	Records for Channels	Save the analog curves for channels.
9	PID Algorithm	PID control modes

1. Enable/Disable a Channel

An analog signal is converted into a digital signal at a rate of 200 ms per channel. If a channel is not used, you can disable it to decrease the total conversion time.

2. Unit of Measurement

Select the unit of measurement, Fahrenheit or Celsius, according to your needs.

3. Calibration

• To make a curve meet specific needs, calibrate the curve by changing the offset and the gain. The calibration range depends on the range of inputs that the hardware can receive. The formula is:

$$Output = \frac{(Input \times Gain)}{1000} + Offset$$

Example:

If the gain is 1000 and the offset is 0, the corresponding value for the original signal 0° C to 100° C is 0–1000. If you change the offset to 100, the calibrated value for the original signal 0° C to 100° C becomes 100–1100.



4. Average

You can set the average value between 1–100. It is a steady value obtained from the sum of the recorded values. If the recorded values include an acute pulse due to unavoidable external factors, however, you may observe violent changes in the average value. Use the filtering function to exclude the acute pulses from the sum-up and equalization, so the computed average value is not affected by the acute recorded values. Set the filter percentage to the range 0–3, where the unit is 10%. If you set the filter range to 0, the system sums up all the recorded values and divides them to obtain the average value, but if you set the filter range to 1, for example, the system excludes the bottom 10% and the top 10% of the values and averages only the remaining values to obtain the average value.



5. Disconnection Detection

If the channel is open, the module can detect when it is disconnected. If the input is open-circuited, the module produces an alarm or a warning.

6. Channel Detection

If an input signal exceeds the allowable range of inputs, an error message appears. You can disable this function so that the module does not produce an alarm or a warning when the input signal exceeds the input range.

7. Limit Detections for Channels

This function saves the maximum and minimum values for channels so that you can determine the peak to peak values.



8. Records for Channels

Record the input values of the cyclic sampling for each channel. The system saves up to 500 data points for AS04RTD-A and up to 200 data points for AS06RTD-A and the recording time is 100 ms. The following uses AS04RTD-A as an example to demonstrate.



9. PID control

PID algorithm is available for every channel. With its auto tuning function, parameters such as Kp, Ki, Kd and more can be calculated and therefore temperature control can be achieved. You can also use DMPID instruction to calculate relative parameters by entering the parameters in the endpoints of corresponding instruction image and you can then obtain the output values from the output endpoints. Note: DMPID instruction is available for AS04RTD-A (V1.04 or later), AS06RTD-A (V1.00 or later), AS Series PLC (V1.06 or later) and AS-SCM (V2.04 or later).

6.2.7 Control Mode

- 1. Refer to section 7.2.7 for more details on how to use DMPID instruction.
- 2. When using PID parameters to set up control registers: PID control registers of AS04RTD-A are retainable; however PID control registers of AS06RTD-A are not retainable.

6.2.8 Wiring

Precautions

To ensure the analog-to-digital module functions well and reliably, the external wiring must prevent noise. Before you install the cables, follow the precautions below.

- To prevent a surge and induction, the AC cable and the input signal cables that are connected to the ASRTD Series must be separate cables.
- (2) Do not install the cable near a main circuit, a high-voltage cable, or a cable connected to a load which is not a PLC. In addition, the cable must not be bound to a main circuit, a high-voltage cable, or a cable connected to a load which is not a PLC.
- (3) Ground shielded cables and hermetically sealed cables separately.
- (4) Terminals with insulation sleeves cannot be arranged as a terminal block, so you should cover the terminals with insulation tubes.
- (5) Note: use cables with the same length (less than 200 m) and use wire resistance of less than 20 ohm.

External wiring

(1) AS04RTD-A



- *1. Use shielded twisted pair cables for temperature sensors, and keep them away from power cables and other cables that generate noise.
- *2. If using two-wire temperature sensors, Ln- and In- must be short-circuited (where n is between 1-4).
- *3. There are two different internal excitation currents. If you are using a Ni100 temperature sensor, a Pt100 sensor, a JPt100, a Cu50/Cu100, or a 0~300 Ω resistance sensor, the internal excitation current is 1.5 mA. If you are using a Ni1000 temperature sensor, a Pt1000 temperature sensor, a LG-Ni1000 sensor, or a 0~3000 Ω resistance sensor, the internal excitation current is 0.2 mA.
- Note: When using a three-wire temperature sensor, the cables should be the same length (less than 200 meter) and with a resistor less than 20 ohm.

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(2) AS06RTD-A



- *1. Use shielded twisted pair cables for temperature sensors and keep them away from power cables and other cables that generate noise.
- *2. Terminal "I12-" indicates " I1- & I2-", terminal "I34-" indicates " I3- & I4-", and terminal "I56-" indicates
 " I5- & I6-". If you use two-wire temperature sensors, Ln- and In- must be short-circuited (where n is between 1–6).
- *3. There are two different internal excitation currents. If you are using a Ni100 temperature sensor, a Pt100 sensor, a JPt100, a Cu50/Cu100, or a 0~300 Ω resistance sensor, the internal excitation current is 1.0 mA. If you are using a Ni1000 temperature sensor, a Pt1000 temperature sensor, a LG-Ni1000 sensor, or a 0~3000 Ω resistance sensor, the internal excitation current is 0.2 mA.
- Note: When using a three-wire temperature sensor, the cables should be the same length (less than 200 meter) and with a resistor less than 20 ohm.

Number	Name	Description
		Operating status of the module
1	RUN LED Indicator	ON: the module is running.
		OFF: the module is not running.
		Error status of the module
2	ERROR LED	ON: a serious error exists in the module.
2	Indicator	OFF: the module is operating normally.
		Blink: a minor error exists in the module.
	Analog-to-Digital	Conversion status
3	Conversion	Blinking: conversion is in process.
	Indicator	OFF: conversion has stopped.

6.2.9 LED Indicators

6.3. HWCONFIG in ISPSoft

6.3.1 Initial Setting

The following users AS04RTD-A as an example to demonstrate.

(1) Start ISPSoft and double-click HWCONFIG.



(2) Select a module and drag it to the working area.



(3) Double-click the module in the working area to open the Device Setting page.



AS04RTD-A	Device Information	Normal Exchange Area	
format CH1~CH4 Mode setting	Device Name	AS04RTD-A	
 CH1[~]CH4 Calibration average filter Temperature measureme Channel Detect and Alarr 	Description	4 channels RTD analog intput: 0~300ohm, 0~3000ohm, Pt100, JPt100, Pt1000, Ni100, Ni1000, LGNi1000 conversion time = 200ms/channel Module current consumption:(Internal)50mA,(External)	
	Comment		
	DDF Version	00.40.00	
	Firmware Version	(off-line)	
	Hardware Version	(off-line)	
<u> </u>			
Default Import	Export U	ndare	

(4) Choose the parameter, set the values, and click **OK**.

Device Setting							
Options							
⊡- AS04RTD-A	CH1~CH4 Mode setting						
- CH1 ~ CH4 Mode setting	Parameter name	Value		Unit	Default	Minim	um Maximum
CH1~CH4 Calibration	CH1 mode setting	0~300ohm	-		0~300ohm	-	-
- average filter	CH2 mode setting	0~300ohm	-		0~300ohm	-	-
Temperature measureme Channel Detect and Alarr	CH3 mode setting	0~300ohm	-		0~300ohm	-	-
Channel Detect and Alarr	CH4 mode setting	0~300ohm	-		0~300ohm	-	-
4							
Default Import	Export Update						OK

(5) Click **Download** on the toolbar to download the parameters. Note that you cannot download the parameters while the CPU module is running.



6.3.2 Checking the Version of a Module

(1) On the **Option** menu, click **Online Mode**.



(2) Double-click the module to open the Device Setting page. The versions of both the firmware and the hardware are displayed.



AS04RTD-A	Device Informatio	n Normal Exchange Area		
- format - CH1 ~ CH4 Mode setting	Device Name	ASII4RTD-A	-	
- CH1~CH4 Calibration - average filter - Temperature measurems - Channel Detect and Alarr	Description	Pt100, JPt100, Pt1000,Ni100, Ni1000,LGNi1000 conversion time = 200ms/channel		
	Comment			
	DDF Version	00.40.00	- 11	
	Firmware Version	01.00.00		1
	Hardware Version	00.00.00	-	
Delault Imgod		Testing 1		
Default Ingod	Export	Jpdate		ок

6.3.3 Online Mode

(1) On the **Option** menu, click **Online Mode**.



(2) Right-click the module and click Module Status.



(3) View the module status.

Channel	Value (32 bits)	Data Type
Error code	6145	DECIMAL
CH1 Input	0	DECIMAL
CH2 Input	0	DECIMAL
CH3 Input	0	DECIMAL
CH4 Input	0	DECIMAL

6.3.4 Importing/Exporting a Parameter File

(1) Click Export in the Device Setting dialog box to save the current parameters as a CSV file (.csv).

Save in: Any Documents	- È 🕈 🖩
File name: Save as type: CSV File (*.csv)	Save Cancel

(2) Click Import in the Device Setting dialog box and select a CSV file to import saved parameters.

)pen				?
Look in: 🚺	My Documents	-	-	I 🖆 🎟 •
My Music My Picturi WinCHM F				
File name:	1			Open

6.3.5 Parameters

(1) The input modes of the channels

Device Setting					
Options - AS04RTD-A - CH1°CH4 Mode setting - CH1°CH4 Calibration - average filter - Temperature measureme - Channel Detect and Alarr	format Parameter name format	Value	Unit Default Integer format	Minimum t -	-
Default Import	Export Update				OK

(2) Input CH1–CH4 (channel 1–channel 4) mode settings

Device Setting						
Options						
⊡- AS04RTD-A	CH1~CH4 Mode setting					
- CH1~CH4 Mode setting	Parameter name	Value	Unit	Default	Minimum	Maximum
CH1~CH4 Calibration	CH1 mode setting	0~300ohm 🚽		0~300ohm		-
- average filter	CH2 mode setting	0~300ohm 🔻		0~300ohm	-	-
- Temperature measureme - Channel Detect and Alarr	CH3 mode setting	0~300ohm 💌		0~300ohm	-	-
Channel Delect and Alan	CH4 mode setting	0~300ohm 🗨		0~300ohm	-	-
4 b						
Default Import	Export Update					OK

(3) Input CH1-CH4 calibration

AS04RTD-A	CH1~CH4 Calibration				
- CH1~CH4 Mode setting	Parameter name	Value	Unit Defaul	t Minimum	Maximum
	CH1 Cal. Offset (V/mA)	0	0	-32768	32767
- average filter	- CH2 Cal. Offset (V/mA)	0	0	-32768	32767
- Temperature measureme	- CH3 Cal. Offset (V/mA)	0	0	-32768	32767
- Channel Detect and Alarr	- CH4 Cal. Offset (V/mA)	0	0	-32768	32767
	- CH1 Cal. Gain	1000	1000	-32768	32767
	- CH2 Cal. Gain	1000	1000	-32768	32767
	- CH3 Cal. Gain	1000	1000	-32768	32767
	CH4 Cal. Gain	1000	1000	-32768	32767
>	((() _ ((() _ ((() _ (())))				

(4) Input average filter

um Maximum 100	Minimum	1				average filter	AS04RTD-A
100		Default	Unit	/alue		Parameter name	- CH1~CH4 Mode setting
		10			10	CH1 average times	CH1~CH4 Calibration
100	1	10			10	CH2 average times	average filter
100	1	10			10	CH3 average times	- Temperature measureme
100	1	10			10	CH4 average times	- Channel Detect and Alarr
-	-	10%		•	10%	CH1 filter Proportion	
-	-	10%		•	10%	CH2 filter Proportion	
-	-	10%		•	10%	CH3 filter Proportion	
-	-	10%		-	10%	CH4 filter Proportion	
)
)

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(5) Temperature measurement

Device Setting				
Options				
⊡- AS04RTD-A format	Temperature measurement units			
- CH1~CH4 Mode setting	Parameter name	Value	Unit Default	Minimum Maximum
CH1~CH4 Calibration	Temperature measurement units	°C 🔽	°C	
- average filter - Temperature measureme - Channel Detect and Alarr				
4				
Default Import	Export Update			OK

(6) Input channel detection and alarm settings

Device Setting				
Options				
⊡- AS04RTD-A format	Channel Detect and Alarm settings			
CH1~CH4 Mode setting	Parameter name	Value	Unit Default Minimu	ım Maximum
	CH1 overrage Detect	📃 Disable	📃 Disable –	-
average filter	CH2 overrage Detect	📃 Disable	Disable -	-
- Temperature measureme	CH3 overrage Detect	📃 Disable	Disable -	-
Channel Detect and Alarr	CH4 overrage Detect	📃 Disable	Disable -	-
	External power supply error	📃 Alarm	Alarm -	-
	Hardware error	📃 Alarm	🗌 Alarm -	-
	adjustment error	📃 Alarm	🗌 Alarm -	-
۲				
Default Import	Export Update			OK

6.4 DIADesigner-AX (Hardware Configuration)

The following example uses AS04DTD-A.

6.4.1 Initial Setting

(1) Start DIADesigner-AX, click New Project, and then Project+Device to create a new project.



- (2) Add modules in:
 - ① Double-click Hardware Configuration
 - ③ Select the + section and drag and drop the module that you want to add from the Product List to the + section.
 - or ③ Right-click Delta_Localbus Master to see the context meun and then double-click Add Device to



(3) Select modules:

① Double-click the module name in the Hardware Configuration area.

or $\ensuremath{\textcircled{O}}$ Double-click the module name shown in the node.





(4) Module parameter setting page:

Status

(5) After setting is complete, select the module and click **Login** on the tool bar to download the settings to the modules

rices 👻 🕈 🗙	AS04RTD_A X	Login (Alt+F8)	1				
Untitled22 Untitled22 Device (AX-308EA0MA1T)	AS04RTD-A Parameters	Parameter	Туре	Value	Default Value U	nit Description	-
Betrice (vit bocchain 11) Betrice (vit bocchain 11)		- Pormat	Enumeration of UINT	Integer	Integer		
Service Configuration	AS04RTD-A I/O Mapping	O CH1~CH4 Mode Setting	Endineration of oave	Integer	anciger		
A EtherCAT Filter		CH1 Mode Setting	Enumeration of WORD	0~300ohm	0~300ohm		
PLC Logic	Status	CH2 Mode Setting	Enumeration of WORD	0~300ohm	0~300ohm		
Application	Information	CH3 Mode Setting	Enumeration of WORD	0~300ohm	0~300ohm		
Library Manager	Information	CH4 Mode Setting	Enumeration of WORD	0~300ohm	0~300ohm		
PLC_PRG (PRG)		CH1~CH4 Calibration					
E Task Configuration		CH1 Cal, Offset (V/mA)	INT(-3276832767)	0	0		
EtherCAT_Task		CH2 Cal. Offset (V/mA)	INT(-3276832767)	Ö	0		
🖻 🥩 MainTask		CH3 Cal. Offset (V/mA)	INT(-3276832767)	0	0		
PLC_PRG		CH4 Cal. Offset (V/mA)	INT(-3276832767)	0	0		
BuiltIn_IO (BuiltIn_IO)		CH1 Cal. Gain	INT(-3276832767)	1000	1000		
DIO (DIO)		CH2 Cal. Gain	INT(-3276832767)	1000	1000		
🖶 📆 Delta_LocalBus_Master (Delta		🖤 🖗 CH3 Cal. Gain	INT(-3276832767)	1000	1000		
AS04RTD_A (AS04RTD-A)		CH4 Cal. Gain	INT(-3276832767)	1000	1000		
EtherCAT_Master_SoftMotion		🖹 🖗 Average Filter					
🔓 SoftMotion General Axis Pool		CH1 Average Times	WORD(1100)	10	10		
		CH2 Average Times	WORD(1100)	10	10		
		CH3 Average Times	WORD(1100)	10	10		
>		<					>

6.4.2 Checking the Version of a Module

(1) Select the module and click the Information tab to see the module information.

AS04RTD-A Parameters	General
	Name: AS04RTD-A
AS04RTD-A I/O Mapping	Vendor: Delta Electronics, Inc.
Personal and a second second	Categories:
Status	Type: 40000
and the second s	ID: 16F7 8310
Information	Version: 1.0.0.5
A CONTRACTOR	Order Number: AS04RTD-A
	Description: 4 channels RTD analog intput: 0~300ohm, 0~3000ohm, Pt100, JPt100, Pt1000,Ni100, Ni1000,LGNi1000 conversion time =
	200ms/channel

(2) Select the module and click **Login** on the tool bar to go to Online Mode. You can find the Module Revision from the Parameters tab.



6.4.3 Online Mode

(1) Select the module and click Login on the tool bar to go to Online Mode. You can monitor all configuration parameters. Vaules in the column of Prepared Value are configurable online. After editing the values in the Prepared Value column, click Write Parameter to confirm the change.



(2) You can monitor the values, status, error codes in each channel from the I/O Mapping tab.

		running. The shown valu	ies are pernaps	s not actual					
AS04RTD-A I/O Mapping	Find	-	Filter Show a	II		- 🖶 A	dd F8 for IO Chan	nel	
Status	Variable	Mapping	Channel AS04RTDIN	Address %ID1	Туре	Current Value	Prepared Value	Unit	Des
Information	- *>		Error code	%ID1	DWORD	16#00001808			
			CH1 Input	%ID2	DINT	16#00007D00			
	- **		CH2 Input	%ID3	DINT	16#00007D00			
	*		CH3 Input	%ID4	DINT	16#00007D00			
			CH4 Input	%ID5	DINT	16#00007D00			

(3) You can monitor the current status and error codes from the Status tab.

AS04RTD-A Parameters	AS04RTD-A :	Module reports an error	
AS04RTD-A I/O Mapping	Last Diagnostic Message		Acknowledge
Status	Diagnosis Message: 'Error in	IO Driver: 0 ErrorCode: 0x1808'	
Information			

6.4.4 Parameters

(1) You can set up the value format to Integer or Floating for Channel 1 to 4.

Parameter	Туре	Value	Default Value	Unit	Description
🗝 🖗 Format	Enumeration of UINT	Integer 🗸 🗸	Integer		
CH1~CH4 Mode Setting		Integer			
CH1 Mode Setting	Enumeration of WORD	Floating	nteger V~+10V		
CH2 Mode Setting	Enumeration of WORD	-10V~+10	loating V~+10V		
CH3 Mode Setting	Enumeration of WORD	-10V~+10V	-10V~+10V		
CH4 Mode Setting	Enumeration of WORD	-10V~+10V	-10V~+10V		

(2) You can set up the values for Channel 1 to 4.

CH1~CH4 Mode Setting				
CH1 Mode Setting	Enumeration of WORD	0~300ohm ~	0~300	ohm
CH2 Mode Setting	Enumeration of WORD	Close	0~300qhm	
CH3 Mode Setting	Enumeration of WORD	0~300ohm 0~3000ohm	Close 0~300ohm	hm
CH4 Mode Setting	Enumeration of WORD	Pt100	0~3000nm	hm
CH1~CH4 Calibration	ibration Pt1000		Pt100	
CH1 Cal. Offset (V/mA)			JPt100	0
CH2 Cal. Offset (V/mA)	INT(-3276832767)	Ni 1000 LGNi 1000	Pt1000 Ni100 Ni1000	0
CH3 Cal. Offset (V/mA)	INT(-3276832767)	Cu50		0
CH4 Cal. Offset (V/mA)	INT(-3276832767)	Cu100	LGNi1000	0
🖤 🖗 CH1 Cal. Gain	INT(-3276832767)	100		000
CH2 Cal Gain	INT/-32768 32767)	100	Cu100	100

(3) You can set up the calibrations for for Channel 1 to 4.

CH1~CH4 Calibration				
CH1 Cal. Offset (V/mA)	INT(-3276832767)	0	0	
CH2 Cal. Offset (V/mA)	INT(-3276832767)	0	0	
CH3 Cal. Offset (V/mA)	INT(-3276832767)	0	0	
CH4 Cal. Offset (V/mA)	INT(-3276832767)	0	0	
🖤 🖗 CH1 Cal. Gain	INT(-3276832767)	1000	1000	
🖗 CH2 Cal. Gain	INT(-3276832767)	1000	1000	
🖤 🖗 CH3 Cal. Gain	INT(-3276832767)	1000	1000	
🔤 🖗 CH4 Cal. Gain	INT(-3276832767)	1000	1000	

(4) You can set up the average filtering for Channel 1 to 4.

📮 🛯 🖗 Average Filter				
CH1 Average Times	WORD(1100)	10	10	
CH2 Average Times	WORD(1100)	10	10	
CH3 Average Times	WORD(1100)	10	10	
CH4 Average Times	WORD(1100)	10	10	
CH1 Filter Proportion	Enumeration of WORD	10%	10%	
CH2 Filter Proportion	Enumeration of WORD	10%	10%	
CH3 Filter Proportion	Enumeration of WORD	10%	10%	
CH4 Filter Proportion	Enumeration of WORD	10%	10%	

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(5) You can set up the temperature measurement units.

B.	Temperature Measurement Units				
	Temperature measurement units	Enumeration of WORD	°C	٩C	
9-	Channel Detect and Alarm Settings	WORD	16#0000		
ŧ	Module Revision	DWORD	0	0	

(6) You can set up the channel detect and alarm settings.

🗠 🖗 Channel Detect and Alarm Settings	WORD	0		
CH1 Overrage Detect	BOOL	FALSE	FALSE	
🖤 🖗 CH2 Overrage Detect	BOOL	FALSE	FALSE	
🖤 🖗 CH3 Overrage Detect	BOOL	FALSE	FALSE	
🖤 🖗 CH4 Overrage Detect	BOOL	FALSE	FALSE	
🗠 🖗 Reserved	BOOL	FALSE	FALSE	
🖤 🖗 Reserved	BOOL	FALSE	FALSE	
🗝 🏟 Reserved	BOOL	FALSE	FALSE	
🗝 🖗 Reserved	BOOL	FALSE	FALSE	
External Power Supply Error	BOOL	FALSE	FALSE	
🖤 🖗 Hardware Error	BOOL	FALSE	FALSE	
🖤 🖗 Adjustment Error	BOOL	FALSE	FALSE	

6.5 Troubleshooting

6.5.1 Error Codes

Error Code	Description	A↔ D LED Indicator	ERROR LED Indicator	
16#1605	Hardware failure	OFF	ON	
16#1607	The external voltage is abnormal.	OFF	ON	
16#1608	The factory calibration is abnormal.	OFF	ON	
16#1801	The external voltage is abnormal.	OFF	Blinking	
16#1802	Hardware failure	OFF	Blinking	
16#1804	The factory calibration is abnormal.	OFF	Blinking	
16#1808	The signal received by channel 1 exceeds the range of inputs that the hardware can receive.			
16#1809	The signal received by channel 2 exceeds the range of inputs that the hardware can receive.		Blinking	
16#180A	The signal received by channel 3 exceeds the range of inputs that the hardware can receive.	Run: blinking		
16#180B	The signal received by channel 4 exceeds the range of inputs that the hardware can receive.	Stop: OFF		
16#180C	The signal received by channel 5 exceeds the range of inputs that the hardware can receive.			
16#180D	The signal received by channel 6 exceeds the range of inputs that the hardware can receive.			
-	When power-on, the module is not detected by CPU module.	OFF	Blinking once or twice and after 2 seconds, it blinks	

6.5.2 Troubleshooting Procedure

Description	Procedure
The external voltage is abnormal.	Ensure the external 24 V power supply to the module is functioning normally.
Hardware failure	Return the module to the factory for repair.
Internal error The factory calibration is abnormal.	Contact the factory.
The signal received by channel 1 exceeds the range of inputs that the hardware can receive.	Check the signal received by channel 1.
The signal received by channel 2 exceeds the range of inputs that the hardware can receive.	Check the signal received by channel 2.
The signal received by channel 3 exceeds the range of inputs that the hardware can receive.	Check the signal received by channel 3.
The signal received by channel 4 exceeds the range of inputs that the hardware can receive.	Check the signal received by channel 4.
The signal received by channel 5 exceeds the range of inputs that the hardware can receive.	Check the signal received by channel 5.
The signal received by channel 6 exceeds the range of inputs that the hardware can receive.	Check the signal received by channel 6.
When power-on, the module is not detected by CPU module.	Check if the connection between module and CPU module is working. If not, connect again.

6.5.3 State of the Connection

State of connection		on	Ohannahuahua	
L+	L-	I-	Channel value	
•	•	•	Maximum value for the channel	
•	•		Maximum value for the channel	
•		•	Maximum value for the channel	
•			Maximum value for the channel	
	•	•	Maximum value for the channel	
	•		Maximum value for the channel	
		•	Minimum value for the channel*1	
•: Disconnection	on	<u>.</u>	·	
*1: for AS06RT	D Series: in t	he modes of ()-300Ω and 0-3000Ω, it cannot detect I- state of connection.	

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MEMO

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Chapter 7 Temperature Measurement Module AS04/08TC

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7.1 Overview

This chapter describes the specifications for the ASTC-A module, its operation, and its programming. The AS04TC-A is a temperature measurement module that converts temperatures received from thermocouples (type J, K, R, S, T, E, N, B, C, U, L, or TXK with ±100 mV voltage inputs) into digital signals. You can select either Celsius (resolution: 0.1° C) or Fahrenheit (resolution: 0.1° F) as the unit of measurement. For software operation, ISPSoft, DIADesigner or DIADesigner-AX is what you need. If you are using AS Series PLC CPU, refer to ISPSoft User Manual or DIADesigner Manual for more information. The new software DIADesigner-AX only supports AX Series PLC CPU and AS Series modules now, refer to AX-3 User Manual for more information on software operation.

An introduction to thermocouples

A thermocouple uses the Seebeck effect to measure differences in temperature. Generally speaking, a thermocouple consists of two conductors of different materials that produce a voltage at the point where the two conductors contact. The voltage produced depends on the difference of temperature between the junctions with other parts of those conductors, and it ranges from several dozen microvolts to several thousand microvolts. Because the voltage is so low, it needs to be amplified.

Differential operations are used to eliminate external noise. Thermocouples are more stable than thermistors, resistance thermometers, and thermal resistors, so thermocouples are widely used in industrial applications.

A thermocouple consists of a circuit having two wires of different metals or metal alloys welded together or joined at both ends. One of the junctions—normally the cold junction—is maintained at a known reference temperature, and the other junction is at the temperature to be sensed. A temperature gradient across the junction of the wires gives rise to an electric potential according to the Seebeck effect. The voltage produced is proportional to the difference of temperature between the junctions with other parts of those conductors.

The voltage can be derived from the following equation.

$$V = \int_{T_1}^{T_2} (Q_A - Q_B) dT \tag{A}$$

where Q_A and Q_B are the thermopowers (Seebeck coefficient) of the metals A and B, and T₁ and T₂ are the temperatures of the two junctions.



Principle of operation

Because Q_A and Q_B are almost unrelated to temperature, formula (A) above can be approximated as in equation (B).

 $V = \alpha(T_2 - T_1)$ (B)

There are two types of thermocouple thermometers: wrapped thermocouples and bare thermocouples. A wrapped thermocouple is wrapped in protective metal, and is similar to an electric spoon in appearance. Wrapped thermocouples are used to measure temperature of liquid, and bare thermocouples are used to measure temperature of liquid, and bare thermocouples are used to measure temperature of gas.

7.1.1 Characteristics

(1) Select a sensor based on its practical application.

Type J, K, R, S, T, E, N, B, C, U, L, or TXK thermocouples, with ±100 mV voltage inputs.

(2) Select a module based on its practical application.

AS04TC-A: Has four channels. Inputs received by a channel are temperatures.

AS08TC-A: Has eight channels. Inputs received by a channel are temperatures.

(3) High-speed conversion

A temperature is converted into a digital signal at a speed of 200 ms per channel.

(4) High accuracy

Conversion accuracy: the error range is ±0.5% of the input at ambient temperature of 25° C ±5° C.

(5) **Disconnection detection**

When a sensor is disconnected, the module produces an alarm or a warning.

(6) PID control

An object's temperature can be maintained through PID control actions.

(7) Use the utility software to configure the module.

The HWCONFIG utility software is built into ISPSoft. You can set modes and parameters directly in HWCONFIG of ISPSoft or Hardware Configuration of DIADesigner without spending time writing programs to set registers to manage functions.

7.2 Specifications and Functions

7.2.1 Specifications

• Electrical specifications

Module Name	AS04TC-A	AS08TC-A	
Number of Analog Inputs	4	8	
Applicable Sensor	Type J, K, R, S, T, E, N, B, C, U, L, or TXK with ±100 mV voltage inputs		
Supply Voltage	24 VDC (20.4–28.8 VDC) (-15% to +20%)		
Connector Type	Removable terminal block		
Overall Accuracy	25° C/77° F: The error range allowed is $\pm 0.5\%$ of full scale. -20° C to +60° C/-4° F to +140° F: the error range allowed is $\pm 1\%$ of full scale.		
Resolution	0.1°C / 0.1°F		
Conversion Time	200 ms/channel		
Isolation	An analog circuit is isolated from a digital circuit by a digital integrated circuit/ optocoupler, and the analog channels are isolated from one another by optocouplers. Isolation between a digital circuit and the ground: 500 VAC Isolation between an analog circuit and the ground: 500 VAC Isolation between an analog circuit and a digital circuit: 500 VAC		
	Isolation between the 24 VDC and the ground: 500 VAC Isolation between analog channels: 120 VAC		
Weight	115g 125g		

• Functional specifications

Analog-to-Digital Conversion		Fahrenheit (°F)	Voltage Input
Rated Input Range ^{∗1}	Type J: -100° C to +1,200° C Type K: -100° C to +1,350° C Type R: 0° C to 1,750° C Type S: 0° C to 1,750° C Type T: -150° C to +400° C Type E: -150° C to +980° C Type N: -150° C to +1,300° C Type B: 200° C to +1,300° C Type B: 200° C to 2,320° C Type U: -200° C to 600° C Type L: -200° C to 900° C Type TXK: -200° C~800° C	Type J: -148° F to +2,192° F Type K: -148° F to +2,462° F Type R: 32° F to 3,182° F Type S: 32° F to 3,182° F Type T: -238° F to +734° F Type E: -238° F to +1,796° F Type N: -238° F to +2,372° F Type B: 392°F to 3,272°F Type B: 392°F to 3,272°F Type C: NA Type U: -328°F~1,112°F Type L: -328°F~1,652°F Type TXK: -328°F~1,472°F	±100 mV
Maximum Type I: -210° C to +1,200° C Measurable Range*2 Type J: -210° C to +1,200° C Type K: -250° C to +1,350° C Type K: -250° C to +1,350° C Type R: -50° C to 1,760° C Type S: -50° C to 1,760° C Type T: -250° C to +400° C Type E: -250° C to +400° C Type B: -250° C to +1000° C Type N: -250° C to +1,300° C Type B: 20° C to +1,800° C Type B: 20° C to 2,320° C Type U: -200° C to 600° C Type L: -200° C to 900° C Type TXK: -200° C ~800° C Type TXK: -200° C ~800° C		Type J: -346° F to +2,192° F Type K: -418° F to +2,462° F Type R: -58° F to 3,200° F Type S: -25° F to 3,200° F Type T: -418° F to +752° F Type E: -418° F to +2,372° F Type N: -418° F to +2,372° F Type N: -418° F to +2,372° F Type B: 68°F to 3,272° F Type B: 68°F to 3,272° F Type C: NA Type U: -328°F~1,112°F Type L: -328°F~1,652°F Type TXK: -328°F~1,472°F	±100 mV
Average Function	Range: 1-100		
Self-Diagnosis	Disconnection detection		

*1 If the measured temperature exceeds the upper limit, it only shows the maximum value. If the measured temperature is below the lower limit, it only shows the minimum value.

Conversion details

Centigrade (°C)				
Sensor type	Rated input range	Integer value range after digital conversion	Floating point value range after digital conversion	
	400%0 4000%0		-	
J	-100°C ~ 1200°C	K-1000 ~ K12000	-100.0 ~ 1200.0	
K	-100°C ~ 1,350°C	K-1000 ~ K13500	-100.0 ~ 1350.0	
R	0°C ~ 1,750°C	K0 ~ K17500	0.0 ~ 1750.0	
S	0°C ~ 1,750°C	K0 ~ K17500	0.0 ~ 1750.0	
Т	-150°C ~ 400°C	K-1500 ~ K4000	-150.0 ~ 400.0	
E	-150°C ~ 980°C	K-1500 ~ K9800	-150.0 ~ 980.0	
N	-150°C ~ 1,300°C	K-1500 ~ K13000	-150.0 ~ 1300.0	
В	200°C ~ 1,800°C	K2000 ~ K18000	200.0 ~ 1800.0	
С	0°C ~ 2320°C	K0 ~ K23200	0.0 ~ 2320.0	
U	-200°C ~ 600°C	K-2000 ~ K6000	-200.0 ~ 600.0	
L	-200°C ~ 900°C	K-2000 ~ K9000	-200.0 ~ 900.0	
ТХК	-200°C ~ 800°C	K-2000 ~ K8000	-200.0 ~ 800.0	
±100mV	-100mV ~ 100mV	K-10000 ~ K10000	-100.00 ~ 100.00	

Fahrenheit (°F)				
Sensor	Rated input range	Integer value range	Floating point value range	
type	Rated input range	after digital conversion	after digital conversion	
J	-148°F ~ 2,192°F	K-1480 ~ K21920	-148.0 ~ 2192.0	
К	-148°F ~ 2,462°F	K-1480 ~ K24620	-148.0 ~ 2462.0	
R	32°F ~ 3,182°F	K320 ~ K31820	32.0 ~ 3182.0	
S	32°F ~ 3,182°F	K320 ~ K31820	32.0 ~ 3182.0	
Т	-238°F ~ 752°F	K-2380 ~ K7520	-238.0 ~ 752.0	
E	-238°F ~ 1,796°F	K-2380 ~ K17960	-238.0 ~ 1796.0	
N	-238°F ~ 2,372°F	K-2380 ~ K23720	-238.0 ~ 2372.0	
В	392°F ~ 3,272°F	K3920 ~ K32720	392.0 ~ 3272.0	
С	NA	NA	NA	
U	-328°F ~ 1112°F	K-3280 ~ K11120	-328.0 ~ 1112.0	
L	-328°F ~ 1652°F	K-3280 ~ K16520	-328.0 ~ 1652.0	
ТХК	-328°F ~ 1472°F	K-3280 ~ K14720	-328.0 ~ 1472.0	
±100mV	-100mV ~ 100mV	K-10000 ~ K10000	-100.00 ~ 100.00	

7.2.2 Profile



Unit: mm

Number	Name	Description
1	Model Name	Model name of the module
		Operating status of the module
	RUN LED Indicator	ON: the module is running.
		OFF: the module is not running.
		Error status of the module
2	ERROR LED Indicator	ON: a serious error exists in the module.
2	ERROR LED INDICATO	OFF: the module is operating normally.
		Blink: a minor error exists in the module.
	Analog-to-Digital Conversion Indicator	Conversion status
		Blinking: conversion is in process.
		OFF: conversion has stopped.
3	Removable Terminal Block	The inputs are connected to transducers.
5		The outputs are connected to loads to be driven.
4	Arrangement of the	Arrangement of the terminals
	Input/Output Terminals	
5	Clip	For removing the terminal block
6	DIN rail clip	Secures the module onto the DIN rail
7	Module connecting set	Connects the modules
8	Ground clip	
9	Label	Nameplate

7.2.3 Arrangement of Terminals



7.2.4 AS04TC Control Registers

*If you use HWCONFIG to set values in CRs, once the set value is downloaded, the values can be retained in the module; however if you use TO instruction to write data into CRs, the values CANNOT be retained, after power failure or after transition of the CPU from STOP to RUN.

CR#	Name	Description	Atr.	Defaults
0	Formet Ceture	0: integer format	R	
0	Format Setup	1: floating point format	ĸ	0
		0: closed		
1	Channel 1 mode setup	1: -100 mV to +100 mV		
		2: Ј-Туре		
2	Channel 2 mode setup	3: К-Туре		
		4: R-Type		
		5: S-Type		
3	Channel 3 mode setup	6: Т-Туре	R/W	
		7: Е-Туре	R/W	1
		8: N-Type		
	Channel 4 mode setup	9: В-Туре		
4		10: С-Туре		
		11: U-Туре		
		12: L-Туре		
		13: ТХК-Туре		

CR#	Name	Description	Atr.	Defaults
5	Channel 1 offset			
6	Channel 2 offset			
7	Channel 3 offset	Range: -32768 to +32767	R/W	0
8	Channel 4 offset			
9	Channel 1 gain		R/W	
10	Channel 2 gain	Range: -32768 to +32767	R/W	1000
11	Channel 3 gain		R/W	
12	Channel 4 gain		R/W	
13	Channel 1 average times			
14	Channel 2 average times	- Range: 1–100	R/W	10
15	Channel 3 average times	Kange. 1–100		
16	Channel 4 average times			
17	Channel 1 filter average percentage			
18	Channel 2 filter average percentage	Range: 0–3	R/W	1
19	Channel 3 filter average percentage	Unit: ±10%		
	Channel 4 filter average			
20	percentage			
21	Units of temperature	0: Fahrenheit 1: Celsius	R/W	0
22	Channel alarm setup	0: open channel alarm 1: close channel alarm bit0: channel 1 bit1: channel 2 bit2: channel 3 bit3: channel 4	R/W	0
		0: warning 1: alarm		

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CR#	Name	Description	Atr.	Defaults
		bit8: error in the power supply		
		bit9: error in the module hardware		
		bit10: error in calibration		
		bit11: error in CJC temperature		
201	Instruction set	16#0101: record the peak value again for	W	
		channel 1		
		16#0102: record the peak value again for		
		channel 2		0
		16#0104: record the peak value again for		
		channel 3		
		16#0108: record the peak value again for		
		channel 4		
		16#010F: record the peak values again for		
		channels 1–4		
		16#0201: enable recording for channel 1		
		16#0202: enable recording for channel 2		
		16#0204: enable recording for channel 3		
		16#0208: enable recording for channel 4		
		16#020F: enable recording for channels 1-4		
		16#0211: disable recording for channel 1		
		16#0212: disable recording for channel 2		
		16#0214: disable recording for channel 3		
		16#0218: disable recording for channel 4		
		16#021F: disable recording for channels 1-4		
		16#0502: restore default settings		
210	The maximum peak			_
	value for channel 1	_		
211	The maximum peak			_
	value for channel 2	Integer format; the maximum peak value for	R	
212	The maximum peak	analog inputs		-
	value for channel 3			
213	The maximum peak			
	value for channel 4			-
214	The minimum peak	Integer format: the minimum peak value for		_
	value for channel 1	Integer format; the minimum peak value for analog inputs	R	
215	The minimum peak			-
CR#	Name	Description	Atr.	Defaults
-------	------------------------	--	-------	----------
	value for channel 2			
216	The minimum peak			
210	value for channel 3			-
217	The minimum peak			_
217	value for channel 4			_
222	The time to record for			1
	channel 1	-		
223	The time to record for	Unit: 100 ms		1
225	channel 2	Range: 1–100	R/W	1
224	The time to record for	The time to record the digital value for the	11/10	1
224	channel 3	channels		1
225	The time to record for			1
225	channel 4			1
240	The number of records			0
240	for channel 1	-		
241	The number of records			0
271	for channel 2	Range: 0-500, display the current records	R	
242	The number of records	Kange. 0-500, display the current records		0
242	for channel 3	-		0
243	The number of records			0
243	for channel 4			0
4000	Records for channel 1	500 records for channel 1	R	_
~4499				_
4500	Records for channel 2	500 records for channel 2	R	_
~4999				_
5000	Records for channel 3	500 records for channel 3	R	_
~5499				-
5500	Records for channel 4	500 records for channel 4	R	
~5999				-

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7.2.5 AS08TC Control Registers

*If you use HWCONFIG to set values in CRs, once the set value is downloaded, the values can be retained in the module; however if you use TO instruction to write data into CRs, the values CANNOT be retained, after power failure or after transition of the CPU from STOP to RUN.

CR#	Name	Description	Atr.	Defaults
0	Format Satur	0: integer format	Р	0
0	Format Setup	1: floating point format	R	0
1	Channel 1 mode setup	0: closed		
2	Channel 2 mode setup	1: -100 mV to +100 mV		
3	Channel 3 mode setup	2: J-Type		
4	· · · · · · · · · · · · · · · · · · ·	3: K-Type 4: R-Type		
4	Channel 4 mode setup	5: S-Type		
5	Channel 5 mode setup	6: T-Type		
6	Channel 6 mode setup	7: E-Type	R/W	1
7	Channel 7 mode setup	8: N-Type		
		9: B-Type		
	Channel 8 mode setup	10: С-Туре		
8		11: U-Туре		
		12: L-Туре		
		13: ТХК-Туре		
9	Channel 1 offset			
10	Channel 2 offset			
11	Channel 3 offset			
12	Channel 4 offset	Range: -32768 to +32767	R/W	0
13	Channel 5 offset	Kange32700 to +32707		0
14	Channel 6 offset			
15	Channel 7 offset			
16	Channel 8 offset			
17	Channel 1 gain			
18	Channel 2 gain			
19	Channel 3 gain	Range: -32768 to +32767	R/W	1000
20	Channel 4 gain	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1		1000
21	Channel 5 gain			
22	Channel 6 gain			

Note: The attribute of the CR must be W (write) to use TO instruction.

CR#	Name	Description	Atr.	Defaults		
23	Channel 7 gain					
24	Channel 8 gain					
25	Channel 1 average times					
26	Channel 2 average times					
27	Channel 3 average times					
28	Channel 4 average times	Range: 1–100	R/W	10		
29	Channel 5 average times	Kange. 1–100				
30	Channel 6 average times					
31	Channel 7 average times					
32	Channel 8 average times					
33	Channel 1 filter average		R/W			
	percentage					
34	Channel 2 filter average		R/W			
54	percentage					
35	Channel 3 filter average		R/W			
	percentage					
36	Channel 4 filter average		R/W			
	percentage	Range: 0–3		1		
37	Channel 5 filter average	Unit: ±10%	R/W			
	percentage	-				
38	Channel 6 filter average		R/W			
	percentage					
39	Channel 7 filter average		R/W			
	percentage					
40	Channel 8 filter average		R/W			
	percentage					
41	Units of temperature	0: Fahrenheit	R/W	0		
		1: Celsius				
		0: open channel alarm				
		1: close channel alarm				
		bit0: channel 1 bit1: channel 2				
42	Channel alarm setup	bit2: channel 3	R/W	0		
		bit3: channel 4				
		bit4: channel 5				
		bit5: channel 6				
	<u> </u>					

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CR#	Name	Description	Atr.	Defaults
		bit6: channel 7		
		bit7: channel 8		
		0: warning		
		1: alarm		
		bit8: error in the power supply		
		bit9: error in the module hardware		
		bit10: error in calibration		
		bit11: error in CJC temperature		
		16#0101: record the peak value again for		
		channel 1		
		16#0102: record the peak value again for		
		channel 2		
		16#0104: record the peak value again for		
		channel 3		
		16#0108: record the peak value again for		
		channel 4		
		16#0110: record the peak value again for		
		channel 5		
		16#0120: record the peak value again for		
		channel 6		
		16#0140: record the peak value again for		
201	Instruction set	channel 7	W	0
		16#0180: record the peak value again for		
		channel 8		
		16#01FF: record the peak value again for		
		channels 1-8		
		16#0201: enable recording for channel 1		
		16#0202: enable recording for channel 2		
		16#0204: enable recording for channel 3		
		16#0208: enable recording for channel 4		
		16#0210: enable recording for channel 5		
		16#0220: enable recording for channel 6		
		16#0240: enable recording for channel 7		
		16#0280: enable recording for channel 8		

CR#	Name	Description	Atr.	Defaults
		16#02FF: enable recording for channels 1-8		
		16#0301: disable recording for channel 1		
		16#0302: disable recording for channel 2		
		16#0304: disable recording for channel 3		
		16#0308: disable recording for channel 4		
		16#0310: disable recording for channel 5		
		16#0320: disable recording for channel 6		
		16#0340: disable recording for channel 7		
		16#0380: disable recording for channel 8		
		16#03FF: disable recording for channels 1-8		
		16#0501: restore default settings, clear setting		
		values in the Flash		
		16#0502: restore default settings, do not clear		
		setting values in the Flash		
210	The maximum peak value			_
	for channel 1			
211	The maximum peak value			_
	for channel 2			
212	The maximum peak value			_
	for channel 3			
213	The maximum peak value			_
	for channel 4	Integer format; the maximum peak value for	R	
214	The maximum peak value	analog inputs		-
	for channel 5			
215	The maximum peak value			-
	for channel 6			
216	The maximum peak value			-
	for channel 7			
217	The maximum peak value			_
	for channel 8			
218	The minimum peak value			_
	for channel 1	Integer format; the minimum peak value for	R	
219	The minimum peak value	analog inputs		_
	for channel 2			

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CR#	Name	Description	Atr.	Defaults
000	The minimum peak value			
220	for channel 3			-
221	The minimum peak value			
221	for channel 4			-
222	The minimum peak value			_
222	for channel 5			-
223	The minimum peak value			_
225	for channel 6			
224	The minimum peak value			_
227	for channel 7			
225	The minimum peak value			_
220	for channel 8			
226	The time to record for		R/W	1
220	channel 1			
227	The time to record for		R/W	1
	channel 2			
228	The time to record for		R/W	1
220	channel 3			
229	The time to record for	Unit: 100 ms	R/W	1
220	channel 4	Range: 1–100		
230	The time to record for	The time to record the digital value for the	R/W	1
200	channel 5	channels		
231	The time to record for		R/W	1
201	channel 6			
232	The time to record for		R/W	1
202	channel 7			
233	The time to record for		R/W	1
	channel 8			
240	The number of records for			
	channel 1	-		
241	The number of records for			
	channel 2	Range: 0-100, display the current records	R	0
242	The number of records for			_
	channel 3	-		
243	The number of records for			
-	channel 4			

CR#	Name	Description	Atr.	Defaults
244	The number of records for			
244	channel 5			
245	The number of records for			
240	channel 6			
246	The number of records for			
240	channel 7			
247	The number of records for			
247	channel 8			
4000	Records for channel 1	100 records for channel 1	R	_
~4099				
4500	Records for channel 2	100 records for channel 2	R	_
~4599				
5000	Records for channel 3	ords for channel 3 100 records for channel 3	R	_
~5099				
5500	Records for channel 4	100 records for channel 4	R	_
~5599				
6000	Records for channel 5	100 records for channel 5	R	_
~6099				
6500	Records for channel 6	100 records for channel 6	R	_
~6599				
7000	Records for channel 7	100 records for channel 7	R	_
~7099				
7500	Records for channel 8	100 records for channel 8	R	_
~7599				

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7.2.6 Functions

Item	Function	Description
1	Enable/Disable a	1. Enable or disable a channel.
	Channel	2. If a channel is disabled, the total conversion time decreases.
2	Unit of Measurement	Select the unit of measurement: Fahrenheit or Celsius.
3	Calibration	Calibrate a linear curve.
4	Average	Conversion values are averaged and filtered.
5	Disconnection Detection	If the channel is open, the module can detect when it is disconnected. If the input is open-circuited, the module produces an alarm or a warning.
6	Channel Detection and Alarm	If an input signal exceeds the range of inputs that the hardware can receive, the module produces an alarm or a warning. You can disable this function.
7	Limit Detections for Channels	Save the maximum/minimum values for channels.
8	Records for	Save the analog curves for channels.
	Channels	
9	PID Algorithm	PID control modes

1. Enable/Disable a Channel

An analog signal is converted into a digital signal at a rate of 200 ms per channel. If a channel is not used, you can disable it to decrease the total conversion time.

2. Unit of Measurement

Select the unit of measurement, Fahrenheit or Celsius, according to your needs.

3. Calibration

To make a curve meet specific needs, calibrate the curve by changing the offset and the gain. The calibration range depends on the range of inputs that the hardware can receive. The formula is:

$$Output = \frac{(Input \times Gain)}{1000} + Offset$$

Example:

If the gain is 1000 and the offset is 0, the corresponding value for the original signal 0° C to 100° C is 0–1000. If you change the offset to 100, the calibrated value for the original signal 0° C to 100° C becomes 100–1100.

Gain = 1000, Offset = 0



4. Average

You can set the average value between 1–100. It is a steady value obtained from the sum of the recorded values. If the recorded values include an acute pulse due to unavoidable external factors, however, you may observe violent changes in the average value. Use the filtering function to exclude the acute pulses from the sum-up and equalization, so the computed average value is not affected by the acute recorded values. Set the filter percentage to the range of 0–3, where the unit is 10%. If you set the filter range to 0, for example, the system sums up all the recorded values and divides them to obtain the average value, but if you set the filter range to 1, the system excludes the bottom 10% and the top 10% of the values and averages only the remaining values to obtain the average value.



5. Disconnection Detection

If the channel is open, the module can detect when it is disconnected. If the input is open-circuited, the module produces an alarm or a warning.

6. Channel Detection

If an input signal exceeds the allowable range of inputs that the hardware can receive, an error message appears and the Error LED blinks. You can disable this function so that the module does not produce an alarm or warning and the Error LED also does not blink when the input signal exceeds the input range.

7. Limit Detections for Channels

This function saves the maximum and minimum values for channels so that you can determine the peak to peak values.



8. Records for channels

Record the input values of the cyclic sampling for each channel. For AS04TC-A, the system saves up to 500 data points and the recording time is 10 ms. For example, if the conversion time is 2 ms and 4 channels are open, the recording time is 8 ms x 500 data points = 4 seconds in total. And the system saves up to 100 data points for AS08TC-A and the recording time is 100 ms. The following uses AS04TC-A as an example to demonstrate.



9. PID control

PID algorithm is available for every channel. With its auto tuning function, parameters such as Kp, Ki, Kd and more can be calculated and therefore temperature control can be achieved. You can also use DMPID instruction to calculate relative parameters by entering the parameters in the endpoints of the corresponding instruction image and then you can then obtain the output values from the output endpoints. Note: DMPID instruction is available for AS04TC-A (V1.04 or later), AS08TC-A (V1.00 or later), AS Series PLC (V1.06 or later) and AS-SCM (V2.04 or later).

7.2.7 Control Mode

- You can use DMPID (API1417) to execute PID control. The applicable models and FW are AS04TC-A (V1.04 or later), AS08TC-A (V1.00 or later), AS Series PLC (V1.06 or later) and AS-SCM (V2.04 or later). Refer to AS Series Programming Manual for more details.
- If the device you have does NOT support DMPID instruction, you can use the following PID parameter to execute PID control.

	CR#							Onenend	Function	Description	Defaulte
CH1	CH2	СНЗ	CH4	CH5	СН6	СН7	CH8	Operand	Function	Description	Defaults
600	630	660	690	720	750	780	810	PID_RUN	Enable the PID algorithm	 the PID algorithm is implemented. the output value (MV) is reset to algorithm is not algorithm is not 	0
601	631	661	691	721	751	781	811	SV	SV	Target value	0
602	632	662	692	722	752	782	812	PID_MODE	PID control mode	0: automatic control When PID_MAN is switched from 1 to 0, the output value (MV) is included in the automatic algorithm. 1: the parameters are tuned automatically for the temperature control. When the tuning is	0

	CR#							Operand Function		Description	Defendite
CH1	СН2	СНЗ	СН4	СН5	СН6	СН7	СН8	Operand	Function	Description	Defaults
										complete, the device is automatically reset to 0, and the parameters Kc_Kp, Ti_K _i , Td_K _d , and Tf are set appropriately.	
603	633	663	693	723	753	783	813	PID_MAN	PID A/M mode	0: auto; the MV is output based on the PID algorithm. 1: manual; the MV is output based on the MOUT. When PID_MODE is also set to 1, this setting is ineffective.	0
604	634	664	694	724	754	784	814	MOUT_AUTO	MOUT automatic change mode	0: normal; the MOUT does not vary with the MV. 1: auto; the MOUT varies with the MV.	0
605	635	665	695	725	755	785	815	Auto DBWA	Auto tuning non-action zone	Range: 0–32000, used when SV is in the ±dead band in auto tuning mode.	0

	CR#							On small	F (i	Description	Defection
CH1	CH2	СНЗ	CH4	CH5	СН6	CH7	СН8	Operand	Function	Description	Defaults
606 607	636 637	666 667	696 697	726 727	756 757	786 787	816 817	Кс_Кр	Calculated proportional coefficient (Kc or Kp)	Kc_Kp are floating-point numbers. If the P coefficient is less than 0, the Kc_Kp is 0. Independently, if Kc_Kp is 0, it is not controlled by P.	3.846
608 609	638 639	668 669	698 699	728 729	758 759	788 789	818 819	Ti_Ki	Integral coefficient (Ti or Ki)	Ti_Ki are floating- point numbers. If the calculated coefficient I is less than 0, Ti_Ki is 0. If Ti_Ki is 0, it is not controlled by I.	0.013
610 611	640 641	670 671	700 701	730 731	760 761	790 791	820 821	Td_Kd	Derivative coefficient (Td or K _d)	Td_Kd are floating-point numbers. If the calculated coefficient D is less than 0, Td_Kd is 0. If Ti_Ki is 0, it is not controlled by D.	190.078
612 613	642 643			732 733	762 763	792 793	822 823	Tf	Derivate-action time constant	If the derivate- action time constant is less than 0, Tf is 0 and it is not controlled by the derivate- action time constant.	4.941

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			CI	R#				Onerrord	Function	Description	Default
CH1	CH2	СНЗ	CH4	CH5	СН6	CH7	СН8	Operand	Function	Description	Defaults
614	644	674	704	734	764	794	824	PID_EQ	PID formula types	0: independent formula 1: dependent formula	0
615	645	675	705	735	765	795	825	PID_DE	The calculation of the PID derivative error	 0: use the variations in the error (E) to calculate the control value of the derivative (derivative of E). 1: use the variations in the PV to calculate the control value of the derivative (derivative of PV). 	0
616	646	676	706	736	766	796	826	PID_DIR	PID forward/ reverse direction	0: heating action (E=SV-PV) 1: cooling action (E=PV-SV)	0
617	647	677	707	737	767	797	827	ERR_DBW	Range within which the error value is counted as 0	The error value (E) is the difference between the SV and the PV. When this setting is 0, the function is not enabled. When this setting is enabled, the CPU module checks	0

			CF	R #				0	-		
CH1	CH2	СНЗ	CH4	СН5	СН6	СН7	СН8	Operand	Function	Description	Defaults
										whether thepresent differenceis less than theabsolute value ofERR_DBW, and itchecks whetherthe presentdifference meetsthe cross statuscondition. If thepresent differenceis less than theabsolute value ofERR_DBW and itmeets the crossstatus condition,the present error iscounted as 0, andthe PID algorithmis implemented.Otherwise thepresent error isbrought into thePID algorithmnormally.	
618	648	678	708	738	768	798	828	α value	Integral sum	Range: 0–100	31
619	649	679	709	739	769	799	829	β value	Integral sum	Unit: 0.01	0
620	650	680	710	740	770	800	830	MOUT	Manual output value (MOUT)	When PID_MAN is set to 1, the MV value is output as this manual MOUT value, between MV_MAX and MV_MIN.	0

			CI	R#				0	-		
CH1	CH2	СНЗ	CH4	CH5	СН6	СН7	СН8	Operand	Function	Description	Defaults
										Range: 0–1000 (0%–100%)	
621	651	681	711	741	771	801	831	BIAS	Feedforward output value	Feedforward output value, used for the PID feedforward	0
622 623		682 683	712 713				832 833	MV	Output value (MV)	A floating-point number Range: 0–100 Unit: %	
624 625		684 685	714 715		774 775		834 835	I_MV	Accumulated integral value	Floating-point format. The accumulated integral value is temporarily stored for reference. When the MV is out of the range 0%–100%, the accumulated integral value in I_MV is unchanged.	
626	656	686	716	746	776	806	836	CYCLE	Sampling time (T _S)	When this instruction is read, the PID algorithm is implemented according to the sampling time, and the MV is refreshed. If T _S is less than 1, it is read as 1. If T _S is larger than	1

	CR#							0	-		
CH1	CH2	СНЗ	CH4	CH5	CH6	CH7	CH8	Operand	Function	Description	Defaults
										1,000, it is read as	
										1,000.	
										Unit: 100 ms	

Note: PID control registers of AS04TC-A and RTD-A are retainable; however PID control registers of AS06RTD-A and AS08TC-A are not retainable. But you can use the data registers that are retainable to store the set PID parameters so that the PID parameters can be retainable.

PID formula:

- 1. When the PID_MODE is set to 0, the mode is set to auto:
 - Independent Formula & Derivative of E (PID_EQ=False & PID_DE=False)

$$MV = K_{P}E + Ki \int_{0}^{t} Edt + K_{d} * \frac{dE}{dt} + BIAS \quad (E = SV - PV \quad \text{or} \quad E = PV - SV)$$

• Independent Formula & Derivative of PV (PID_EQ=False & PID_DE=True)

$$MV = K_{P}E + Ki \int_{0}^{t} Edt - K_{d} * \frac{dPV}{dt} + BIAS \quad (E = SV - PV)$$

Or
$$MV = K_{P}E + Ki \int_{0}^{t} Edt + K_{d} * \frac{dPV}{dt} + BIAS \quad (E = PV - SV)$$

• Dependent Formula & Derivative of E (PID_EQ=True & PID_DE=False)

$$MV = K_c \left[E + \frac{1}{T_i} \int_0^t E dt + T_d * \frac{dE}{dt} \right] + BIAS \quad (E = SV - PV \quad \text{or} \quad E = PV - SV)$$

• Dependent Formula & Derivative of PV (PID_EQ=True & PID_DE=True)

$$MV = K_c \left[E + \frac{1}{T_i} \int_0^t E dt - T_d * \frac{dE}{dt} \right] + BIAS \quad (E = SV - PV)$$

Or
$$MV = K_c \left[E + \frac{1}{T_i} \int_0^t E dt + T_d * \frac{dE}{dt} \right] + BIAS \quad (E = PV - SV)$$

 When you set the PID_MODE to 1, auto tuning mode is enabled. When auto tuning is complete, the value becomes 0 and switches off the auto tuning mode automatically.

PID Control Block Diagram:



PID Block Diagram (Dependent)





ERR_DBW

When the PV (present value) is in the range of **ERR_DBW**, at the beginning, the present error is brought into the PID algorithm according to the normal processing, and then the CPU module checks whether the present error meets the cross status condition: PV (present value) goes beyond the SV (target value). Once the condition is met, the present error is counted as 0 when applying the PID algorithm. After the PV (present value) is out of the **ERR_DBW** range, the present error is brought into the PID algorithm again. If PID_DE is true, that means it uses the variations in the PV to calculate the control value of the derivative, and after the cross status condition is met, the PLC treats Δ **PV** as 0 to apply the PID algorithm. (Δ **PV**= current **PV** – previous **PV**). In the following example, the present error or Δ **PV** is counted as 0 to apply the PID algorithm in the section B.



$\alpha \cdot \beta$ Value

To reduce overshoot, you can use parameters of ALPHA or BETA in the beginning of the PID operation or while SV (target value) varies to compensate initial value of integral calculus (for heating up or cooling down). See the images below. Use ALPHA parameter to reduce overshoot while the temperature is climbing up. Use BETA parameter to reduce overshoot while the temperature is dropping.



Formula of the output cycle:

Pulse output width = MV (%) x output cycle

Execute the general pulse with modulation instruction (GPWM) to set pulse output width and output cycle sampling time to manage the cycle.

Example:

If the output cycle is 2000 ms, then the output value is 50% after the PID algorithm is implemented.

Pulse output width = 50% × 2000 ms = 1000 ms

In other words, the GWPM instruction can be set to pulse output width = 1000 and output cycle = 2000.



Note:

- 1. When tuning the parameters Kc_Kp, Ti_Ki, and Td_Kd (PID_MODE=0), set the Kc_Kp value first, and then set the Ti_Ki and Td_Kd values to 0. In a controlled environment, you can increase the values of Ti_Ki (from smaller to bigger) and Td_Kd (from bigger to smaller). When the value of Kc_Kp is 1, the proportional gain is 100%. That is, the error values increase by a factor of one. When the proportional gain is less than 100%, the error values decrease. When the proportional gain is greater than 100%, the error values decrease.
- 2. The parameters which have been automatically tuned are not necessarily suitable for every controlled environment. You can, therefore, further modify the automatically-tuned parameters, but it is recommended that you only modify the values of Ti_Ki or Td_Kd.
- 3. The operand CYCLE is to set the sampling time to use the PID algorithm and refresh MV.
- 4. When the number of the channel for measurement is changed, the time to refresh the measured value also changes. For example, the measured value is refreshed every 200 ms when there is only 1 channel for measurement. The measured value is refreshed every 800 ms when there are 4 channels for measurement. The Kc_Kp, Ti_Ki, Td_Kd parameters may differ when the number of channel for measure is different.

7.2.8 Wiring

Precautions

To ensure the analog-to-digital module functions well and reliably, the external wiring must prevent noise. Before you install the cables, follow the precautions below.

- (1) To prevent a surge and induction, the AC cable and the input signal cables that are connected to the ASTC-A Series must be separate cables.
- (2) Do not install the cable near a main circuit, a high-voltage cable, or a cable connected to a load which is not a PLC. In addition, the cable must not be bound to a main circuit, a high-voltage cable, or a cable connected to a load which is not a PLC.
- (3) Ground shielded cables and hermetically sealed cables separately.
- (4) Terminals with insulation sleeves cannot be arranged as a terminal block, so you should cover the terminals with insulation tubes.
- (5) Note1: do not wire empty terminals.
- (6) Note2: only use copper conducting wires with a temperature rating of 60/75°C and the length must be less than 50 m.
- (7) Note3: TC modules must run for 30 minutes before they start to take any temperature measurement.

External wiring



*1. Use shielded twisted pair cables for Type J, K, R, S, T, E, N, B, C, U, L and TXK thermocouples, and keep them separate from power cables and other cables which generate noise.

7.2.9 LED Indicators

Number	Name	Description
		Operating status of the module
1	RUN LED Indicator	ON: the module is running.
		OFF: the module is not running.
		Error status of the module
2	ERROR LED	ON: a serious error exists in the module.
2	Indicator	OFF: the module is operating normally.
		Blink: a minor error exists in the module.
	Analog-to-Digital	Conversion status
3	Conversion	Blinking: conversion is in process.
	Indicator	OFF: conversion has stopped.

7.3 HWCONFIG in ISPSoft

7.3.1 Initial Setting

The following uses AS04TC-A as an example to demonstrate.

(1) Start ISPSoft and double-click HWCONFIG.

	· · · · · · · · · · · · · · · · · · ·	• 0
roject 4 :	Local Symbols	Delta Library, Preview 4 >
Project [C.\ProgramData Device Comment.	I Class Identifiers Address Type Initial Value (A Identifier Comment	Delta Library
HWCONFIG CARD Unity AS322P (Unitide Dut y Dut y Dut y Dut y Pogot prog Pogot progot prog Pogot prog Pogot progot prog Pogo	Network 1	🖻 🥎 Delta Library
		Delta Library User Defi
		Preview
4 117		
N		

(2) Select a module and drag it to the working area.



(3) Double-click the module in the working area to open the Device Setting page.

File Edit Option Help	
🖩 X 🖻 🖨 🦻 🖉 😡	I I I I I I I I I I I I I I I I I I I
Product List	
AS300 Digital I/O Module Analog I/O Module AS04AD AS04DA AS06XA AS06XA AS04RTD AS04TC AS02LC Network Module Power Module	
Specification	
AS04TC-A	
4 channels thermocouple input : - 100mV~100mV;H,K,R,S,T,E,N,B conversion time = 200ms/channel	

Device Setting Options			
 ⇒ AS04TC-A – format – CH1"CH4 Mode setting – CH1"CH4 Calibration – average filter – Temperature measureme – Channel Detect and Alarr 	Device Name Description Comment DDF Version Firmware Version	Normal Exchange Area AS04TC-A 4 channels thermocouple input :- 100m/V*100m/ H,K,R,S,T,E,N,B conversion time = 200ms/channel Module current consumption (Internal)50mA (External) 00.40.00(off-line)(off-line)	
Default Import	Export	(ostene]	ОК

(4) Choose the parameter, set the values, and click **OK**.

Device Setting Options					
E-AS04TC-A	CH1~CH4 Mode setting			1	
CH1~CH4 Mode setting	Parameter name	Value	Unit Default	Minimum	Maximum
	CH1 mode setting	-100mV~100m ^v ▼	-100mV~100m		-
– average filter – Temperature measureme	CH2 mode setting	-100mV~100m' ▼	-100mV~100m		-
Channel Detect and Alarr	CH3 mode setting	-100mV~100m' ▼	-100mV~100m		-
	CH4 mode setting	-100mV~100m' 💌	-100mV~100m	-	-
Default Import	Export Update				ОК

(5) Click **Download** on the toolbar to download the parameters. Note that you cannot download the parameters while the CPU module is running.

HWCONFIG	
🚰 File Edit Option Help	
E X D D = 5 9	Q 3 1 7 4
Product List	Download (Ctrl+F8)
 A\$300 Digital I/O Module Analog I/O Module A\$04AD A\$04DA A\$06XA A\$06XA A\$04RTD A\$04TC A\$02LC Network Module Power Module 	
Specification	
AS04TC-A	-
4 channels thermocouple input : - 100mV~100mV,H,K,R,S,T,E,N,B conversion time = 200ms/channel	

7.3.2 Checking the Version of a Module

(1) On the **Option** menu, click **Online Mode**.



(2) Double-click the module to open the Device Setting page. The versions of both the firmware and the hardware are displayed.

R	-	
E		04
		I C

B AS04TC-A	Device Informatio	n Normal Exchange Area	
- format - CH1~CH4 Mode setting	Device Name	AS04TC-A	
- CH1~CH4 Calibration - average filter - Temperature measurems - Channel Detect and Alarr	Description	4 channels thermocouple input : - 100mV~100mV.H.K.R.S.T.E.N.B conversion time = 200ms/channel Module current consumption:(internal)50mA.(External)	
	Comment		
	DDF Version	00.40.00	
	Firmware Version	01.00.00	× 3
	Hardware Version	00.00.00.00	
<u> </u>			
Default Ingon	Espan L	Jpdate	
			ОК

7.3.3 Online Mode

(1) On the **Option** menu, click **Online Mode**.



(2) Right-click the module and click Module Status.



(3) View the module status.

Channel	Value (32 bits)	Data Type
Error code	6145	DECIMAL
CH1 Input	0	DECIMAL
CH2 Input	0	DECIMAL
CH3 Input	0	DECIMAL
CH4 Input	0	DECIMAL

7.3.4 Importing/Exporting a Parameter File

(1) Click Export in the Device Setting dialog box to save the current parameters as a CSV file (.csv).

Default	Import	Ex	port _C
ave As			?
Save in: 📋 My Documents		7 - 1	-10 10
My Music My Pictures			
WinCHM Projects			
	*		
file name:		_	Save
Save as type: CSV File (*.csv)		-	Cancel



(2) Click Import in the Device Setting dialog box, and select a CSV file to import saved parameters.

_	Default	[Import]	Export	
Open				? 🔀
Look in:	es			* ==-
File name: Files of type:	CSV File (*.csv	ĵ	1	Open Cancel

7.3.5 Parameters

(1) The input modes of the channels

Device Setting Options				
- AS04TC-A - format - CH1~CH4 Mode setting - CH1~CH4 Calibration - average filter	format Parameter name format	Value	Unit Default Integer format	Minimum Maximum
Channel Detect and Alarr				
Default Import	Export Update			ОК

(2) Input CH1-CH4 (channel 1-channel 4) mode settings

Device Setting Options				
AS04TC-A format GH1"CH4 Mode setting - CH1"CH4 Calibration - average filter - Temperature measureme Channel Detect and Alarr	CH1 [~] CH4 Mode setting Parameter name CH1 mode setting CH2 mode setting CH3 mode setting CH4 mode setting	Value -100mV**100m' ▼ -100mV**100m' ▼ -100mV**100m' ▼ -100mV**100m' ▼	Unit Default Minimur -100mV~100m - -100mV~100m - -100mV~100m - -100mV~100m -	m Maximum - - -
Default Import	Export Update			ОК

(3) Input CH1-CH4 calibration

AS04TC-A	CH1~CH4 Calibration					
format CH1~CH4 Mode setting	Parameter name	Value	Unit	Default	Minimum	Maximum
	CH1 Cal. Offset (V/mA)	0		0	-32768	32767
– average filter	- CH2 Cal. Offset (V/mA)	0		0	-32768	32767
- Temperature measureme	CH3 Cal. Offset (V/mA)	0		0	-32768	32767
Channel Detect and Alarr	- CH4 Cal. Offset (V/mA)	0		0	-32768	32767
	CH1 Cal. Gain	1000		1000	-32768	32767
	CH2 Cal. Gain	1000		1000	-32768	32767
	CH3 Cal. Gain	1000		1000	-32768	32767
	CH4 Cal. Gain	1000		1000	-32768	32767
Default Import	Export Update					OK

(4) Input average filter

Options □-AS04TC-A 	average filter						
- CH1~CH4 Mode setting	Parameter name	Value		Unit	Default	Minimum	Maximum
	CH1 average times	10			10		100
average filter	CH2 average times	10			10	1	100
— Temperature measureme — Channel Detect and Alarr	CH3 average times	10			10	1	100
Channel Detect and Alarr	CH4 average times	10			10	1	100
	CH1 filter Proportion	10%	-		10%	-	-
	CH2 filter Proportion	10%	-		10%	-	-
	CH3 filter Proportion	10%	-		10%	-	-
	CH4 filter Proportion	10%	-		10%	-	-
Default Import	Export Update						ОК

(5) Temperature measurement

Device Setting Options				
- AS04TC-A - format - CH1~CH4 Mode setting - CH1~CH4 Calibration - average filter - Temperature measureme - Channel Detect and Alarr	Temperature measurement units Parameter name Temperature measurement units	Value ℃ ▼	Unit Default ℃	Minimum Maximum
Default Import	Export Update			ОК

(6) Input channel detect and alarm settings

AS04TC-A	Channel Detect and Alarm setting	S			
- CH1~CH4 Mode setting	Parameter name	Value	Unit Default	Minimum	Maximum
CH1~CH4 Calibration	CH1 overrage Detect	📃 Disable	📃 Disable	-	-
- average filter	- CH2 overrage Detect	📃 Disable	📃 Disable	-	-
Temperature measureme <mark>Channel Detect and Alarr</mark>	CH3 overrage Detect	📃 Disable	📃 Disable	-	-
	CH4 overrage Detect	📃 Disable	📃 Disable	-	-
	External power supply error	📃 Alarm	🗌 Alarm	-	-
	Hardware error	📃 Alarm	📃 Alarm	-	-
	adjustment error	📃 Alarm	🗌 Alarm	-	-
	Cold junction compensation Error	📃 Alarm	🗌 Alarm	-	-
Default Import	Export Update				ОК

7.4 DIADesigner-AX (Hardware Configuration)

The following example uses AS04TC-A.

7.4.1 Initial Setting

(1) Start DIADesigner-AX, click New Project, and then Project+Device to create a new project.



Last bulle: O 0 🖲 0 Precomple 🗸 😭 Project user: (nobody) 🦁

- (2) Add modules in:
 - ① Double-click Hardware Configuration
 - ② Select the + section and drag and drop the module that you want to add from the Product List to the + section.

or ③ Right-click **Delta_Localbus Master** to see the context meun and then double-click **Add Device** to add devices manually or double-click **Scan for Devices**.



(3) Select modules:

① Double-click the module name in the Hardware Configuration area.

or ② Double-click the module name shown in the node.



(4) Module parameter setting page:

AS04TC-A Parameters	Parameter	Туре	Value	Default Value	Unit	Description	
	Pormat 🖉	Enumeration of UINT	Integer	Integer			
AS04TC-A I/O Mapping	😑 🔮 CH1~CH4 Mode Setting						
Status	CH1 Mode setting	Enumeration of WORD	~100mV~100mV	-100mV~100mV			
Colub	 	Enumeration of WORD	-100mV~100mV	-100mV~100mV			
formation	 	Enumeration of WORD	-100mV~100mV	-100mV~100mV			
	CH4 Mode Setting	Enumeration of WORD	-100mV~100mV	-100mV~100mV			
	😑 🔮 CH1~CH4 Calibration						
	CH1 Cal. Offset (V/mA)	INT(-3276832767)	0	0			
	 	INT(-3276832767)	0	0			
	CH3 Cal. Offset (V/mA)	INT(-3276832767)	0	0			
	CH4 Cal. Offset (V/mA)	INT(-3276832767)	0	0			
	CH1Cal. Gain	INT(-3276832767)	1000	1000			
	CH2 Cal. Gain	INT(-3276832767)	1000	1000			
	- 🖗 CH3 Cal. Gain	INT(-3276832767)	1000	1000			
	CH4 Cal. Gain	INT(-3276832767)	1000	1000			
	😑 🖉 Average Filter						
	CH1 Average Times	WORD(1100)	10	10			
	CH2 Average Times	WORD(1100)	10	10			
	CH3 Average Times	WORD(1100)	10	10			
	CH4 Average Times	WORD(1100)	10	10			
	CH1 Filter Proportion	Enumeration of WORD	10%	10%			
	 	Enumeration of WORD	10%	10%			
	<						.>

(5) After setting is complete, select the module and click **Login** on the tool bar to download the settings to the modules.

Unbled15 Device (AX-308EA0MA1T) Berger And Antiparation A Network Configuration	AS04TC-A Parameters	Parameter					
			Туре	Value	Default Value Uni	t Description	
Network Configuration	a manager a selected at the selected	Format	Enumeration of UINT	Integer	Integer		
A Network Configuration A EtherCAT Filter Declop: Application Declop: Application Declop: De	AS04TC-A I/O Mapping	OH1~OH4 Mode Setting					
	Status	OH1 Mode setting	Enumeration of WORD	K-type	-100mV~100mV		
	Information	CH2 Mode Setting	Enumeration of WORD	-100m//~100m/	-100mV~100mV		
		CH3 Mode Setting	Enumeration of WORD	C-type	-100mV~100mV		
		CH4 Mode Setting	Enumeration of WORD	TXK-type	-100mV~100mV		
		Ø CH1~CH4 Calibration					
		CH1 Cal. Offset (V/mA)	INT(-3276832767)	0	0		
		OH2 Cal. Offset (V/mA)	INT(-3276832767)	0	0		
		OH3 Cal. Offset (V/mA)	INT(-3276832767)	0	0		
DLC_PRG		OH4 Cal. Offset (V/mA)	INT(-3276832767)	0	0		
Builtin_IO (Builtin_IO)		OH1 Cal. Gain	INT(-3276832767)	1000	1000		
010 (DIO)		OH2 Cal. Gain	INT(-3276832767)	1000	1000		
= 💮 Delta_LocalBus_Master (Delta LocalBus Mas	ce .	OH3 Cal. Gain	INT(-3276832767)	1000	1000		
ASO4TC_A (ASO4TC-A)		P CH4 Cal. Gain	INT(-3276832767)	1000	1000		
EtherCAT_Master_SoftMotion (EtherCAT Ma	25	Average Filter					
SoftMotion General Axis Pool		OH1 Average Times	WORD(1100)	10	10		
		CH2 Average Times	WORD(1100)	10	10		
		CH3 Average Times	WORD(1100)	10	10		
		OH4 Average Times	WORD(1100)	10	10		
		OH1 Filter Proportion	Enumeration of WORD	10%	10%		
		CH2 Filter Proportion	Enumeration of WORD	10%	10%		

7.4.2 Checking the Version of a Module

(1) Select the module and click the Information tab to see the module information.

AS04TC-A Parameters	General
AS04TC-A I/O Mapping	Name: AS04TC-A Vendor: Delta Electronics,Inc.
	Categories:
Status	Type: 40000
	ID: 16F7 8315
Information	Version: 1.0.0.5
	Order Number: ASO4TC-A
	Description: 4 channels thermocouple input : -100mV~100mV,H,K,R,S,T,E,N,B conversion time = 200ms/channel

(2) Select the module and click **Login** on the tool bar to go to Online Mode. You can find the Module Revision from the Parameters tab.



7.4.3 Online Mode

(1) Select the module and click Login on the tool bar to go to Online Mode. You can monitor all configuration parameters. Vaules in the column of Prepared Value are configurable online. After editing the values in the Prepared Value column, click Write Parameter to confirm the change.

D Unbtled 15	Concernant of the second se						The second se	
= 😏 🗊 Device [connected] (AX-308EA0MA1T)	AS04TC-A Parameters						Write P	arameters
Bardware Configuration	AS04TC-A I/O Mapping	Pa	rameter	Туре	Current Value	Prepared Value	Value	Defa
A Network Configuration	Appricial to Happing	14	Format	Enumeration of UINT	Integer	Trepared Talde	Integer	e.e.a.
A EtherCAT Filter	Status	14	OH1~CH4 Mode Setting	Entries appril of D141	tuceder		triteger	
E III PLC Logic		1.0	CH1 Mode setting	Enumeration of WORD	K-type	5-type	K-type	-100m
= () Application [run]	Information		CH1 Mode Setting	Enumeration of WORD	-100mV~100mV	B-type	-100mV~100mV	-100n
Library Manager			CH3 Mode Setting	Enumeration of WORD	C-type	-100mV~100mV	C-type	-1000
PLC_PRG (PRG)			CH3 Mode Setting CH4 Mode Setting	Enumeration of WORD	TXK-type	Close		-100m
😑 🧱 Task Configuration		-	OH1~OH4 Calibration	Enumeration of WORD	TAK-type	ciuse	TXK-type	-1004
- C EtherCAT_Task		10	CH1 Cal. Offset (V/mA)	INT(-3276832767)	16#0000		0	
= 🖸 🍪 MainTask			CH2 Cal. Offset (V/mA)	INT(-3276832767)	16#0000		0	
DIC_PRG			CH3 Cal. Offset (V/mA)	INT(-3276832767)	16#0000		0	
= 😏 🛐 BuiltIn_IO (BuiltIn_IO)			CH3 Cal. Offset (V/mA) Offset (V/mA)	INT(-3276832767)	16#0000		0	
- 🖸 🛐 DIO (DIO)			CH1 Cal, Gain	INT(-3276832767)	16#03E8		1000	
🛎 😳 🔢 Delta_LocalBus_Master (Delta LocalBus Ma			CH2 Cal. Gain	INT(-3276832767)	16#03E8		1000	
ASO4TC_A (ASO4TC-A)			CH2 Cal. Gain CH3 Cal. Gain	and the second se	16#03E8		1000	
EtherCAT_Master_SoftMotion (EtherCAT)			CH4 Cal, Gain	INT(-3276832767)	16#03E8			
5 SoftMotion General Axis Pool		1.2		INT(-3276832767)	10#0328	-	1000	
			Average Filter	unanate sant	16#000A			
			CH1 Average Times CH2 Average Times	WORD(1., 100) WORD(1., 100)	16#000A	-	10	
					16#000A			
			CH3 Average Times	WORD(1 100)	16#000A	-	10	
		1.25	CH4 Average Times	WORD(1100)	16#000A		10	
		<						>
-								
Devices POUs		1						

(2) You can monitor the values, status, error codes in each channel from the I/O Mapping tab.

AS04TC-A I/O Mapping	Find		Filter Show	all			Add FB for IO Char	nel	
Status	Variable	Mapping	Channel AS04TCIN	Address %ID1	Туре	Current Value	Prepared Value	Unit	Descrip
Information	*		Error code	%ID1	DWORD	6152			
	- 🍬		CH1 Input	%ID2	DINT	13500			
	- **		CH2 Input	%ID3	DINT	10000			
	-*>		CH3 Input	%ID4	DINT	23200			
			CH4 Input	%ID5	DINT	8000			

(3) You can monitor the current status and error codes from the Status tab.

Diagnostic Message		Acknowledge
gnosis Message: 'Error in IO Driver: 01	ErrorCode: 0x1808'	
7.4.4 Parameters

(1) You can set up the value format to Integer or Floating for Channel 1 to 4.

Parameter	Туре	Value	Default Value	Unit	Description
🕐 🖗 Format	Enumeration of UINT	Integer 🗸 🗸	Integer		
CH1~CH4 Mode Setting		Integer			
CH1 Mode Setting	Enumeration of WORD	Floating	nteger V~+10V		
CH2 Mode Setting	Enumeration of WORD	-10V~+10	Floating V~+10V		
CH3 Mode Setting	Enumeration of WORD	-10V~+10V	-10V~+10V		
CH4 Mode Setting	Enumeration of WORD	-10V~+10V	-10V~+10V		

(2) You can set up the values for Channel 1 to 4.

Parameter	Type Enumeration of UINT	Value	Default Value	Unit	Description
	Enumeration of Utivi	Integer	Integer		
t ent entrible betang					
CH1 Mode setting	Enumeration of WORD	K-type 🗸	-100mV~100mV		
CH2 Mode Setting	Enumeration of WORD	Close	-100mV~100mV		
CH3 Mode Setting	Enumeration of WORD	-100mV~100mV J-type	-100mV~100mV		
CH4 Mode Setting	Enumeration of WORD	K-type	-100mV~100mV		
CH1~CH4 Calibration		R-type S-type			
CH1 Cal. Offset (V/mA)	INT(-3276832767)	T-type	0		
CH2 Cal. Offset (V/mA)	INT(-3276832767)	E-type N-type	0		
CH3 Cal. Offset (V/mA)	INT(-3276832767)	B-type	0		
CH4 Cal. Offset (V/mA)	INT(-3276832767)	C-type	0		
🖤 🖗 CH1 Cal. Gain	INT(-3276832767)	U-type L-type	1000		
CH2 Cal. Gain	INT(-3276832767)	TXK-type	1000		

(3) You can set up the calibrations for for Channel 1 to 4.

CH1~CH4 Calibration				
🖤 < CH1 Cal. Offset (V/mA)	INT(-3276832767)	0	0	
🖤 🖗 CH2 Cal. Offset (V/mA)	INT(-3276832767)	0	0	
🖤 < CH3 Cal. Offset (V/mA)	INT(-3276832767)	0	0	
🖤 < CH4 Cal. Offset (V/mA)	INT(-3276832767)	0	0	
🖤 < CH1 Cal. Gain	INT(-3276832767)	1000	1000	
🖤 < CH2 Cal. Gain	INT(-3276832767)	1000	1000	
🖤 < CH3 Cal. Gain	INT(-3276832767)	1000	1000	
🔍 🔌 CH4 Cal. Gain	INT(-3276832767)	1000	1000	

(4) You can set up the average filtering for Channel 1 to 4.

📮 💚 Average Filter				
CH1 Average Times	WORD(1100)	10	10	
CH2 Average Times	WORD(1100)	10	10	
CH3 Average Times	WORD(1100)	10	10	
CH4 Average Times	WORD(1100)	10	10	
CH1 Filter Proportion	Enumeration of WORD	10%	10%	
CH2 Filter Proportion	Enumeration of WORD	10%	10%	
CH3 Filter Proportion	Enumeration of WORD	10%	10%	
CH4 Filter Proportion	Enumeration of WORD	10%	10%	

(5) You can set up the temperature measurement units Channel 1 to 4.

-	4	Temperature Measurement Units					
	and a	Temperature measurement units	Enumeration of WORD	°C	~	°C	
1.	4	Channel Detect and Alarm Settings	WORD	°C			
		CH1 Overrage Detect	BOOL	٩F		FALSE	
	in the second	CH2 Overrage Detect	BOOL		FALS	FALSE	
		CH3 Overrage Detect	BOOL		FALSE	FALSE	
	and the	CH4 Overrage Detect	BOOL		FALSE	FALSE	

(6) You can set up the channel detect and alarm settings.

Channel Detect and Alarm Settings	WORD	0		
CH1 Overrage Detect	BOOL	FALSE	FALSE	
CH2 Overrage Detect	BOOL	FALSE	FALSE	
CH3 Overrage Detect	BOOL	FALSE	FALSE	
CH4 Overrage Detect	BOOL	FALSE	FALSE	
🖗 Reserved	BOOL	FALSE	FALSE	
🖗 Reserved	BOOL	FALSE	FALSE	
🖉 Reserved	BOOL	FALSE	FALSE	
Reserved	BOOL	FALSE	FALSE	
External Power Supply Error	BOOL	FALSE	FALSE	
🖗 Hardware Error	BOOL	FALSE	FALSE	
🖗 Adjustment Error	BOOL	FALSE	FALSE	

7.5 Troubleshooting

7.5.1 Error Codes

Error Code	Description	A↔ D LED Indicator	ERROR LED Indicator	
16#1605	Hardware failure	OFF	ON	
16#1607	The external voltage is abnormal.	OFF	ON	
16#1608	The factory calibration is abnormal.	OFF	ON	
16#1801	The external voltage is abnormal.	OFF	Blinking	
16#1802	Hardware failure	OFF	Blinking	
16#1804	The factory calibration is abnormal.	OFF	Blinking	
16#1808	The signal received by channel 1 exceeds the range of inputs that the hardware can receive.			
16#1809	The signal received by channel 2 exceeds the range of inputs that the hardware can receive.			
16#180A	The signal received by channel 3 exceeds the range of inputs that the hardware can receive.			
16#180B	The signal received by channel 4 exceeds the range of inputs that the hardware can receive.	Run: blinking	Blinking	
16#180C	The signal received by channel 5 exceeds the range of inputs that the hardware can receive.	Stop: OFF		
16#180D	The signal received by channel 6 exceeds the range of inputs that the hardware can receive.			
16#180E	The signal received by channel 7 exceeds the range of inputs that the hardware can receive.			
16#180F	The signal received by channel 8 exceeds the range of inputs that			
10#1001	the hardware can receive.			
-	When power-on, the module is not detected by CPU module.	OFF	Blinking once or twice and after 2 seconds, it blinks	
			repeatedly	

7.5.2 Troubleshooting Procedure

Description	Procedure
The external voltage is abnormal.	Ensure the external 24 V power supply to the module is
	functioning normally.
Hardware failure	Return the module to the factory for repair.
Internal error	Contact the factory
The factory calibration is abnormal.	Contact the factory.
The signal received by channel 1 exceeds the	Check the signal received by channel 1.
range of inputs that the hardware can receive.	
The signal received by channel 2 exceeds the	Check the signal received by channel 2.
range of inputs that the hardware can receive.	
The signal received by channel 3 exceeds the	Check the signal received by channel 3.
range of inputs that the hardware can receive.	
The signal received by channel 4 exceeds the	Check the signal received by channel 4.
range of inputs that the hardware can receive.	
The signal received by channel 5 exceeds the	Check the signal received by channel 5.
range of inputs that the hardware can receive.	
The signal received by channel 6 exceeds the	Check the signal received by channel 6.
range of inputs that the hardware can receive.	
The signal received by channel 7 exceeds the	Check the signal received by channel 7.
range of inputs that the hardware can receive.	
The signal received by channel 8 exceeds the	Check the signal received by channel 8.
range of inputs that the hardware can receive.	
When power-on, the module is not detected by	Check if the connection between module and CPU
CPU module.	module is working. If not, connect again.



Chapter 8 Load Cell Module AS02LC

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8.1 Overview

This chapter describes the specifications for load cell modules, their operation, and their programming. You can use the AS02LC load cell module with four-wire or six-wire load cells with various eigenvalues, so you can adjust its response time according to your requirements. In addition, the AS02LC-A can read and write data via the AS Series PLC units using the FROM/TO instructions.

To ensure that the product is correctly installed and operated, read the manual carefully before use. This manual provides functional specifications, and it also introduces installation, basic operation, and settings. Refer to load cell related literature for more details on the principles of operating load cells.

For software operation, ISPSoft, DIADesigner or DIADesigner-AX is what you need. If you are using AS Series PLC CPU, refer to ISPSoft User Manual or DIADesigner Manual for more information. The new software DIADesigner-AX only supports AX Series PLC CPU and AS Series modules now, refer to AX-3 User Manual for more information on software operation.

8.2 Specifications

8.2.1 Specifications

ltem	Description
Rated Supply Voltage/Power Consumption	24 VDC (-15% to +20%) / 3 W
Minimum/Maximum Voltage	18–31.2 VDC
Maximum Current Consumption	150 mA
Input Signal Range	±40 mVDC
Sensibility	+5 VDC +/-10%
Highest Accuracy	0.04 % of full scale
Communication Interface	RS-232, RS-485
Applicable Sensor Type	4-wire or 6-wire load cell
Expanding a Temperature Coefficient	≤ ±50 ppm/K v. E
Reducing a Temperature Coefficient to Zero	≤ ±0.4 µV/K
Linearity Error	≤0.02%
Response Time	2.5, 10, 16, 20, 50, 60, 100, 200, and 400 ms
Eigenvalue Applicable to a Load Cell	0–1, 0–2, 0–4, 0–6, 0–20, 0–40 and 0–80 mV/V
Maximum Distance for Connecting a Load Cell	100 meters
Maximum Output Current	5 VDC x 160 mA
Allowable Load	40–4010 Ω

ltem	Description
Common-mode Rejection Ratio (CMRR @50/60 Hz)	≥100 dB
Maximum Filter	0~8
Average Weights	1–100 (FM V1.04: supports 1-400)
Isolation	Between a digital circuit and the ground: 500 VAC Between an analog circuit and the ground: 500 VAC Between an analog circuit and a digital circuit: 500 VAC
Weight	147 g

8.2.2 Profile



Unit: mm

Number	Name	Description
1	Model Name	Model name of the module
	RUN LED Indicator	Operating status of the module ON: the module is running. OFF: the module is not running.
2	ERROR LED Indicator	Error status of the module ON: a serious error exists in the module. OFF: the module is operating normally. Blink: a minor error exists in the module.
	Analog-to-Digital Conversion Indicator	Conversion status Blinking: conversion is in process. OFF: conversion has stopped.
3	Removable Terminal Block	The inputs are connected to transducers. The outputs are connected to loads to be driven.

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Number	Name	Description	
4	Arrangement of the Input/Output Terminals	Arrangement of the terminals	
5	Clip	For removing the terminal block	
6	DIN Rail Clip	Secures the module onto the DIN rail	
7	Module Connecting Set	Connects the modules	
8	Ground Clip		
9	Label	Nameplate	

8.2.3 Arrangement of Terminals



8.2.4 Control Registers

*If you use HWCONFIG to set values in CRs, once the set value is downloaded, the values can be retained in the module; however if you use TO instruction to write data into CRs, the values CANNOT be retained, after power failure or after transition of the CPU from STOP to RUN.

CR#	Name	Description	Att.	Default
		0: disabled		
0	Display options for	1: gross weight	R/W	1
	CH1	2: net weight		I
		3: raw data		
		0: 1 mV/V		
		1: 2 mV/V		
		2: 4 mV/V		
1	Eigenvalue for CH1	3: 6 mV/V	R/W	1
		4: 20 mV/V		
		5: 40 mV/V		
		6: 80 mV/V		
		0: 2.5ms		
		1: 10ms		
		2: 16ms		
		3: 20ms		
2	Sampling cycle for CH1	4: 50ms	R/W	4
		5: 60ms		
		6: 100ms		
		7: 200ms		
		8: 400ms		
3	Weight measured times in a	Range: 1–500	R/W	5
5	stability range for CH1	Range. 1-500		5
4	Stability range for CH1	Floating-point format		10
5		Range: 0–100000		10
		Floating-point format		
6	Maximum weight for CH1	Maximum measuring weight; when the	R/W	100,000

Note: The attribute of the CR must be W (write) to use TO instruction.

CR#	Name	Description	Att.	Default
		weight measured exceeds the limit, an		
7		alarm is triggered. The value should be		
		greater than 1.		
		0: no filter (default)		
		1: maximum filter mode		
8	Filter mode for CH1	2: average filter mode	R/W	0
o		Note: FW V1.06 or later: low-pass filter is		0
		available; refer to section 8.2.5 for more		
		information.		
		Range: 0–8; the bigger the number the	D 444	
9	Maximum filter for CH1	stronger the filter	R/W	1
	Average weight measured	Range: 1–100		
10	times for CH1	(for FW V1.04: 1–400 is available)	R/W	10
11	Upper limit of the zero return	Floating-point format		
	for CH1	Determines the current weight as the zero	R/W	10
12		point in the upper/lower range; when the		
13	Lower limit of the zero return	lower range is larger than the upper range,		
14	for CH1	the lower range is read as the upper range	R/W	-10
14		and vice versa.		
15	Zero point tracking time for	ro point tracking time for Range: 5–500		10
	CH1	Unit: 100 ms		
16	Zero point tracking range for	Floating-point format	R/W	0
17	CH1	Range: 0–10000; 0: disabled		
18	Calibration points for CH1	Range: 2–20	R/W	2
		Floating-point format		
19–58	Calibrated weight for CH1	Calibrated weight of the calibration points	R/W	-
		1–20		
		0: disabled 1: gross weight		
FO	Display options for CH2			1
59	Display options for CH2	2: net weight	R/W	1
		3: raw data		
60	Eigenvalue for CH2	0 : 1 mV/V	R/W	1

CR#	Name	Description	Att.	Default
		1 : 2 mV/V		
		2 : 4 mV/V		
		3 : 6 mV/V		
		4 : 20 mV/V		
		5 : 40 mV/V		
		6 : 80 mV/V		
		0 : 2.5 ms		
		1 : 10 ms		
		2 : 16 ms		
		3 : 20 ms		
61	Sampling cycle for CH2	4 : 50 ms	R/W	4
		5 : 60 ms		
		6 : 100 ms		
		7 : 200 ms		
		8 : 400 ms		
	Weight measured times in a		R/W	
62	stability range for CH2	Range: 1–500		5
63		Floating-point format		
64	 Stability range for CH2 	Range: 0–100000		10
		Floating-point format		
65		Maximum measuring weight; when the		
	Maximum weight for CH2	weight measured exceeds the limit, an	R/W	100,000
66		alarm is triggered. The value should be		
		greater than 1.		
		0: no filter (default)		
		1: maximum filter mode		0
67	Filter mode for CH2	2: average filter mode	R/W	
07		Note: FW V1.06 or later: low-pass filter is		
		available; refer to section 8.2.5 for more		
		information.		
68	Maximum filter for CH2	Range: 0-8; the bigger the number the	R/W	1
00		stronger the filter		
69	Average weight measured	Range: 1–100	R/W	10

CR#	Name	Description	Att.	Default
	times for CH2	(for FW V1.04: 1–400 is available)		
70	Upper limit of the zero return	Floating-point format	R/W	10
71	for CH2	Determines the current weight as the zero	K/VV	10
72		point in the upper/lower range; when the		
	Lower limit of the zero return	lower range is larger than the upper range,	R/W	-10
73	for CH2	the lower range is read as the upper range		
		and vice versa.		
74	Zero point tracking time for CH2	Range: 5–500	R/W	10
		Unit: 100 ms		
75	Zero point tracking range for	Floating-point format	R/W	0
76	CH2	Range: 0–10000; 0: disabled		
77	Calibration points for CH2	Range: 2–20	R/W	2
		Floating-point format		
78–117	Calibrated weight for CH2	Calibrated weight of the calibration points	R/W	-
		1–20		
118	Decimal place for CH1	Range: 0–4	R/W	1
119	Decimal place for CH2	Range: 0–4		1
		0: warning		
		1: alarm		
120	Alarm	Bit0: error in the power supply	R/W	1
		Bit1: error in the module hardware		
		Bit2: error in the driver board		
200	State register	Refer to the explanation below.	R/W	-
201	Command set	Refer to the explanation below.	W	0
210	The maximum peak value for	Floating-point format	R	
211	CH1	Maximum peak value for CH1	-	
212	The maximum peak value for	Floating-point format	R	
213	CH2	Maximum peak value for CH2		
214	The minimum peak value for	Floating-point format		
215	СН1	Minimum peak value for CH1	R	
216	The minimum peak value for	Floating-point format		
217	CH2	Minimum peak value for CH2	R	-

CR#	Name	Description	Att.	Default
222	The time to record for CH1	Unit: 1 ms		50
223	The time to record for CH2	Range: 1–100 (1 ms–1 s) Time to record the digital value for the channels	R/W	50
240	The number of records for CH1			-
241	The number of records for CH2	Range: 0–500; display the current records	R	-
400~ 439	Calibration of the raw data for CH1	Here displays the 20 piece of raw data in DWORD format for channel 1 and 2; the values will be loaded automatically during calibration. You can copy the values to other load cell modules of the same model number and with similar parameter settngs	R/W	-
440~ 479	Calibration of the raw data for CH2	for a quick commioning without calibration. Note: By copying the calibration of the raw data to other modules, some errors or deviation may occur in in the weighted values for different applications.	R/W	-
604	- Tare weight measured by CH1	Display the tare weight measured by CH1	R/W	-
605		Display the tale weight measured by Citri		-
606	 Tare weight measured by CH2 	Display the tare weight measured by CH2	R/W	-
607		Display the tale weight measured by CH2		-
700– 739	Theoretical calibration for CH1	Floating-point format Output voltage unit: mV Floating-point format Output voltage unit: mV		0
740– 779	Theoretical calibration for CH2			0
4000 4999	Records for CH1	Floating-point format 500 records for CH1		-
5000 5999	Records for CH2	Floating-point format 500 records for CH2		-

Normal Exchange Area

Explanation

You can view the error code, the channel value, and the state code, as well as the data registers that correspond to their commands under the Normal Exchange Area tab of the Device Setting dialog box in the HWCONFIG utility in ISPSoft.

Edit Area				- ×
				Hardware Configuration
General				
- AS02LC-A	Device Information Normal Exchange Area			1
Please use LC Wizard Setting	Description	Address	Identifier	Identifier Comment
	+ - Input			
	Error code	D28000 - D28001		1
	CH1 Input	D28002 - D28003		
	CH2 Input	D28004 - D28005		
	Status Code	D28006		
	- Output			
	Command	D28007		
Default Import Expo	rt Jonaise			

CR#200: Codes for the state register

Explanation

Bit	Code	Definition	Bit	Code	Definition
b0	16#0001	Error exists in the power supply.	b1	16#0002	Error exists in the module hardware.
b2	16#0004	Error exists in the driver board.	b3	16#0008	Calibration disabled
b4	16#0010	Reserved	b5	16#0020	Reserved
b6	16#0040	The weight measured by CH1 exceeds the maximum weight that can be measured, or the voltage of SEN is incorrect.	b7	16#0080	The weight measured by CH2 exceeds the maximum weight that can be measured, or the voltage of SEN is incorrect.
b8	16#0100	The weight measured by CH1 exceeds the maximum weight that can be measured.	b9	16#0200	The weight measured by CH2 exceeds the maximum weight that can be measured.
b10	16#0400	CH1 has been adjusted incorrectly.	b11	16#0800	CH2 has been adjusted incorrectly.
b12	16#1000	CH1 is not measuring any weight.	b13	16#2000	CH2 is not measuring any weight.
b14	16#4000	The weight measured by CH1 is in	b15	16#8000	The weight measured by CH2 is in

Bit	Code	Definition	Bit	Code	Definition
the stability range specified. the stability range specified.				the stability range specified.	
	Note: The state is determined by the corresponding bit and it is possible to have more than 2 states at the same time.				

CR#201: Command set

Explanation

Input value	Description	Input value	Description
0	No action	16#0101	Start a new recording of the peak value for CH1.
1–20	Commands for calibrating the calibration points 1–20 on CH1	16#0102	Start a new recording of the peak value for CH2.
21–40	Commands for calibrating the calibration points 1–20 on CH2	16#010F	Start a new recording of the peak value for CH1 - CH2.
98	Activate the weight calibration.	16#0201	Start a new recording for CH1.
99	Deactivate the weight calibration.	16#0202	Start a new recording for CH2.
100	Subtract the weight on CH1. Use the subtracted weight as the tare weight and store it in CR604 and CR605 (DWORD).	16#020F	Start a new recording for CH1 - CH2.
101	Restore the tare weight stored in CR604 and CR605 to CH1.	16#0211	Stop recording for CH1.
102	Clear the weight measured by CH1 to zero. You might need to execute this command after each power-off.	16#0212	Stop recording for CH2.
103	Subtract the weight on CH2. Use the subtracted weight as the tare weight and store it in CR606 and CR607 (DWORD).	16#021F	Stop recording for CH1 - CH2.
104	Restore the tare weight stored in CR606 and CR607 to CH2.	16#0301	Start a theoretical calibration for CH1.
105	Clear the weight measured by CH2 to zero. You might need to execute this	16#0302	Start a theoretical calibration for CH2.

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Input value	Description	Input value	Description
	command after each power-off.		
16#030F	Start a theoretical calibration for CH1 - CH2.	16#0501	Restore default settings and clear settings in Flash.
16#0502	Restore default settings and settings in Flash stay intact.	16#6000	Read the current settings from Flash
16#6001	Write the current settings into Flash		

Item	Function	Description	
1	Measuring net weight	Various measuring modes to choose from	
2	Stability check	When an object is put on a load cell, you can check whether the present weight of the object is in a specified stability range.	
3	Determining zero point	int If an object is removed from the load cell, no weight is measured.	
4	Filter out weights	Filter out the maximum or minimum weight measured or use an average weight for a more accurate value.	
5	Multi-point adjustment	There are as many as 20 points for adjustment	
6	Theoretical calibration	Calibration based on the output value of the sensor instead of the real weight calibration	
7	Zero point tracking	Zero point tracking	
8	Limit detections for channels	Save the maximum and minimum values for channels.	
9	Records for channels	Save the analog curves for channels.	

8.2.5 Functions

1. Measuring net weight

You can choose to measure either the net weight or the gross weight of an object. Net weight is the actual weight of a product without its package. The weight of a package is the tare weight. Gross weight is the total weight: net weight plus tare weight.

- Tare weight: the weight of a package
- Net weight: the weight of a product, that is, the actual weight of a product without its package
- Gross weight: the total weight, that is, the net weight of a product plus the tare weight of its package
- Gross weight=Net weight+Tare weight

Example: a product weighs 10 kg, and the carton in which the product is packed weighs 0.2 kg. The gross weight is 10.2 kg.

Net weight = 10 kg

Tare weight = 0.2 kg

Gross weight = 10.2 kg

2. Checking stability

When an object is placed on a load cell, you can check whether the present weight of the object is in a specified stability range.

- If the weight measured is in the specified stability range, the corresponding bit is set to 1.
- If the weight measured exceeds the specified stability range, the corresponding bit is set to 0 until the number of objects weighed in the stability range reaches the setting.

Example: the measurement time set is 10 ms, the number of weights measured in a stability range is 10, and the stability range is 1000 g. If a variation exceeds 1000 g, the corresponding bit is set to 0. If the variations within 100 ms (10×10 ms) are within 1000 g, the corresponding bit is set to 1. You should determine whether the present weight measured is in the stability range before you perform control actions.



3. Determining zero point

If an object is removed from the load cell, the corresponding bit is set to 1, and you can perform the next control action. If a weight measured is in the specified zero range, the corresponding bit is also set to 1.





4. Filtering

There are three methods to filter

- Filtering out the maximum/minimum weight measured: If there is a maximum weight or a minimum weight, you can filter out the maximum weight or the minimum weight. The larger the value, the more weights are filtered out. Range: K0–K8
- Averaging weights: The values recorded are averaged so that a steady value is obtained. There may be peak values due to unavoidable external factors, and the average value obtained may change accordingly. A maximum of 100 values can be averaged.
- Low-pass filter (available for FWV1.06)
 Work with the function block MLPF to set up different filtering ranges. Refert to MLPF instruction (API1430) from AS Series Programming Manual for more information.

5. Making multi-point adjustments

Make adjustments to get the weight measured by a cell to correspond to the digital value displayed by the load cell module. Generally, two points are adjusted. After a system is set up, put no load on the scale. The weight measured is 0 grams when there is no load. Then place an object of a given weight on the scale, and set a digital value corresponding to the weight. At that point, two points have been adjusted. For example, if you have a load cell sensor which can measure a maximum weight of 10 kg, and if 1 kg corresponds to K1000, the curve is like the one shown below.



In addition to this two-point adjustment, the load cell also supports adjustments of up to 20 points. A characteristic curve is shown below.



6. Determining theoretical calibration

Theoretical calibration is determined according to the sensor specification in order to input the voltage values corresponding to various weights. The registers for storing the voltage values are CR#700–739 for CH1 and CR#740–779 for CH2. After entering the voltage values into the registers, you can use the command set 16#301–302 to execute the calibration.

Example: the sensor specification is 10 kg and its eigenvalue is 2 mV/V. When the sensor is loaded with a 10 kg weight, the output is 10 mV. The theoretical calibration steps are:

Step 1: set the eigenvalue.

Device Setting						
Options						
G AS02LC-A — CH1 Setting	CH1 Setting					
- CH1 Adjustment Setting	Parameter name	Value	Unit	Default	Minimum	Maximum 📤
	CH1 gross/net setting	gross	·	gross	-	-
- CH2 Adjustment Setting	- CH1 Characteristic value	2mV/V 🚽	·	2mV/V		-
Alarm Setting	- CH1 sampling time	50ms -	•	50ms	-	-

Step 2: set the 2-point adjustment; when the sensor is loaded with a 1 kg weight, set the value to 1000.

	Setting vtions					
• ••	AS02LC-A CH1 Setting	CH1 Adjustment Setting				
	- CH1 Adjustment Setting	Parameter name	Value	Unit Default	Minimum	Maximum
	- CH2 Setting	CH1 Adjustment number	2	2	2	20
	- CH2 Adjustment Setting	- CH1 weight of Adjustment point 1(Zero)	0	0	0	0
	- Alarm Setting	CH1 weight of Adjustment point 2	1000	1000	-	-

Step 3: set the voltage calibration for the zero point to 0 (0 mV) in the CR#700/701 registers, and to 1.0 (1 mV) in the CR702/703 registers.

Step 4: enable the calibration function and enter 98 into the command set CR#201.

Step 5: enter 16#0301 into the command set CR#201 to execute a theoretical calibration for channels 1.

Step 6: do not put any load on the sensor and enter 16#102 into the command set CR#201 to reset the value to 0 for CH1.

Step 7: disable the calibration function to prevent inappropriate changes. To complete the theoretical calibration, enter 99 into the command set CR#201. Put a 1 kg weight on the sensor and the load cell should show 1000.



Step 8: write 16#6001 in CR#201 to disable the calibration function to write the current settings into Flash and have the settings in the latched area.

7. Zero point tracking

Zero point tracking refers to resetting the current value to 0. You can reset the value to 0 within a certain duration or at a certain weight. This is especially useful when the sensor is no longer as accurate as it was before.



8. Limit detections for channels

Save the maximum and minimum values for channels so you can determine the peak to peak values.



9. Recording channels

Record the input values of the cyclic sampling for each channel. The system saves up to 500 data points and the recording time is 10 ms.



8.2.6 Wiring

External wiring



Multiple load cells connected in parallel are connected to a single load cell module.



Note 1: Please connect () on the power supply module and () on the load cell module to a system ground, and then ground the system ground or connect the system ground to a distribution box.

Note 2: If multiple load cells are connected in parallel, the total impedance should be greater than 40 Ω .

8.3 Making Adjustments

Make adjustments to get the weight measured by a cell to correspond to the digital value displayed by the load cell module. You can make adjustments by following the commands below or by setting up the theoretical calibration (refer to section 8.2.5 for more details).

8.3.1 Steps to adjust points



8.3.2 Parameter settings in LC Wizard

Step 1: Open LC Wizard from HWCONFIG.

Reset Configuration Show Informatic Remarks:		9-	*	a Resize 🖕
		CPU Grou	ıp	
		Module	Module Name	Input Devi
		CPU	AS332T-A	X0.0 - X0.1
			Function Card	NONE
+ 22	+		Function Card	NONE
	Communication Software	*	LC Wizard)28000 - D
	Hardware Configuration	•		-
	Copy(C) (Ctrl + C		
	Cut(X) C	trl + X		
	Delete(D)	Del		
	Replace(R)	- F		

Step 2: Set the eigenvalue.

🖁 LCWizard		- ×
Online	Channel 1 N/A Channel 2 N/A	Import Export
- AS02LC-A	Channel 1 Channel 2 Alarm Setting	
Parameter Setting	Parameter Setting	Measurement Setting
Calibration	🕽 Default 🕐 Upload 🕢 Download	
Monitor	Parameter Name Value Default Minimum Maximum	Tare Weight
	CH1 gross/net setting gross	N/A
	ℓ CH1 Characteristic value 2mV/V - -	Subtracting Tare
	CH1 sampling time 50ms	

Step 3: Set the number of adjustments and their corresponding values. The example below shows a 2-point adjustment in which point 1 = 0 and point 2 = 1000, corresponding to 1 kg.

- A	AS02LC-A	Cł	annel 1 Channel 2					
	Parameter Setting	C	alibration					
	Calibration	ŧ	🕽 Default 🕐 Upload W Download					
	Monitor	Г	Parameter Name	Value	Default	Minimum	Maximum	
			CH1 Adjustment number	2	2	2	20	
			CH1 weight of Adjustment point 1	0	0	0	0	Start Calibration
		I	CH1 weight of Adjustment point 2	1000	1000	-3.40282	3.402823	

LCWizard									-
Online		C	nannel 1	N/A	Channel 2	N/A		Imp	ort Export
- AS02LC-A	Char	inel 1	Channel 2						
Parameter Setting	Calit	pration							
Calibration	5	Default	🚯 Upload	🕑 Download	ł				
Monitor			Parameter N	lame	Value	Default	Minimum	Maximum	
	+ (CH1 Adj	ustment num	per	2	2	2	20	
	(CH1 we	ight of Adjustr	ment point 1	0	0	0	0	Start Calibration
	(H1 we	ight of Adjustr	ment point 2	1000	1000	-3.40282	3.402823	

Step 4: After the configuration is complete, download the parameters to the module.

Step 5: Start calibration.

🕌 LCWizard									_ ×
Online		Ch	nannel 1	N/A	Channel 2	N/A		Imp	ort Export
- AS02LC-A	Ch	annel 1	Channel 2						
Parameter Setting	C	alibration							
Calibration	5) Default	🕥 Upload	Download	I				
Monitor			Parameter N	Name	Value	Default	Minimum	Maximum	
		CH1 Adj	ustment num	ber	2	2	2	20	
	•	CH1 wei	ight of Adjust	ment point 1	0	0	0	0	Start Calibration
		CH1 wei	ight of Adjust	ment point 2	1000	1000	-3.40282	3.402823	

Step 6: Leave no load on the load cell (adjustment point 1) and click Next Step to proceed.

Parameter Setting	Calibration
Calibration Monitor	Adjustment Point 1
	Weight 0
	Stable Measurement
	Information
	Please keep it empty, press the next step when the measured value is stable.

Step 7: Put a load on the load cell (adjustment point 2). For multi-point adjustment, repeat this step. This example uses a 1 kg weight.

S02LC-A	Channel 1 Channel 2	2	
Parameter Setting	Calibration		
Calibration Monitor	Adjustment Point	2	
	Weight	1000	
	Stable Measurement	•	
	Information		
	the next step whe	ights that match the set value, press * en the measured value is stable.	
	76	Ξ.	

Step 8: The calibration is complete.

AS02LC-A	Channel 1 Channel 2
Parameter Setting	Calibration
Calibration	Adjustment Point
Monitor	
	Weight
	Stable Measurement
	Information
	All calibration processes have been completed.
	76

A characteristic curve is shown below.



8.3.3 Adjustment Settings / Calibrational Commands

🔏 LCWizard x Online N/A Channel 2 N/A Import Export Channel 1 - AS02LC-A Channel 1 Channel 2 Alarm Setting Parameter Setting Parameter Setting Calibration 🕤 Default 🕐 Upload W Download Monitor Parameter Name Value Default Minimum Maximum N/A CH1 gross/net setting gross + gross _ A CH1 Characteristic value 2mV/V CH1 sampling time 50ms - 50ms

Step 1: Set the eigenvalue in LCWizard.

Step 2: Set the number of adjustments and their corresponding values. The example below shows a 2-point adjustment where point 1 = 0 and point 2 = 1000, corresponding to 1 kg.

- AS02LC-A	Ch	annel 1 Channel 2					
Parameter Setting	С	alibration					
Calibration	1	🕽 Default 🕐 Upload 🕑 Download					
Monitor		Parameter Name	Value	Default	Minimum	Maximum	
		CH1 Adjustment number	2	2	2	20	
		CH1 weight of Adjustment point 1	0	0	0	0	Start Calibration
	I	CH1 weight of Adjustment point 2	1000	1000	-3.40282	3.402823	

LCWizard									-
Online		Ch	annel 1	N/A	Channel 2	N/A		Imp	ort Export
- AS02LC-A	Cha	innel 1	Channel 2						
Parameter Setting	Ca	libration							
Calibration	5	Default	ด Upload	🕑 Download	ł				
Monitor			Parameter N	ame	Value	Default	Minimum	Maximum	
	•	CH1 Adj	ustment numb	er	2	2	2	20	
		CH1 wei	ight of Adjustr	nent point 1	0	0	0	0	Start Calibration
		CH1 wei	ght of Adjustr	nent point 2	1000	1000	-3.40282	3.402823	

Step 3: After the configuration is complete, download the parameters to the module.

Step 4: Double-click on the module to see the settings and verify that the corresponding address the command is D28007 in the Normal Exchange Area.



						Hardware Configurati
ieneral						
AS02LC-A	Dev	/ice Information	Normal Exchange Area			
Please use LC Wizard Setting			Description	Address	Identifier	Identifier Comment
	× -	Input				
		Error code		D28000 - D28001		
		CH1 Input		D28002 - D28003		
		CH2 Input		D28004 - D28005		
		Status Cor	de .	D28006		
		Output				
		Command		D28007		

Step 5: Enter the command for activating the weight calibration 98 into D28007.

Step 6: Leave no load on the load cell (adjustment point 1) and enter 1 into D28007. 1 represents CH1 and 2 represents CH2.



Eile Edit View	Compile PLC Tools V	Wizard Window Help				
			, , , <u>e</u>	138 = 1% (Pri	1	X 🖻 🖻 🥑 🔍 💱
Object	Identifiers	Device Name	Status	Data Type	Value (16bits)	Value (32bits)

Step 7: Put a load on the load cell (adjustment point 2). For multi-point adjustment, repeat this step. This example uses a 1 kg weight.



Step 8: to complete the adjustment, enter the command for deactivating the weight calibration 99 into D28007.

A characteristic curve is shown below.



Number	Name	Description
		Operating status of the module
1	RUN LED Indicator	ON: the module is running.
		OFF: the module is not running.
		Error status of the module
2	ERROR LED	ON: a serious error exists in the module.
2	Indicator	OFF: the module is operating normally.
		Blink: a minor error exists in the module.
	Analog-to-Digital	Conversion status
3	Conversion	Blinking: conversion is in process.
	Indicator	OFF: conversion has stopped.

8.3.4 LED Indicators

8.4 HWCONFIG in ISPSoft

8.4.1 Initial Setting

(1) Start ISPSoft and double-click HWCONFIG.



(2) Select a module and drag it to the working area.





(3) Right-click on the module and then click LC Wizard to go to the settting page.

(4) Set the setting values.

Online		Channel 1 N/A	Channel 2	N/A			Import	Export
AS02LC-A	(Channel 1 Channel 2 Alarm Setting	1					
Parameter Setting		Parameter Setting					Measurem	ent Setting
Calibration		🕤 Default 🕐 Upload 🕑 Download	ł					
Monitor		Parameter Name	Value	Default	Minimum	Maximum	Tare Weigh	t
		CH1 gross/net setting	gross -	gross	-	-	N	I/A
		CH1 Characteristic value	2mV/V -	2mV/V	-	-	Subtrac	cting Tare
		CH1 sampling time	50ms -	50ms	-	-		
		I CH1 standstill times	6	5	1	500	Clear Subt	tracting Tare
		CH1 standstill Range	10	10	0	100000		
		Ch1 Max weight	100000	100000	1	3.40282	Z	lero.
		CH1 Filter mode setting	Disable 👻	Disable	-	-		
		CH1 Filter ratio	1 -	1	-	-		
		CH1 Filter average times	10	10	1	400		
		Ch1 Zero upper range	10	10	0	100000		
		Ch1 Zero lower range	-10	-10	-100000	0		
		CH1 Zero tracking timer	10	10	5	500		
		CH1 Zero tracking range	0	0	0	10000		
		CH1 Decimal point	1	1	0	4		

(5) Click **Download** on the toolbar to download the parameters in HWCONFIG. Note that you cannot download the parameters while the CPU module is running.)

Doromotor Cattin								
Parameter Settin	g	Ра	arameter Setting	Measurement Setting				
Calibration		5) Default \land Upload 🕑 Download					
Monitor			Parameter Name Value Default Minimum Maximum			Tare Weight		
		×	CH1 gross/net setting	gross 🔹	gross	-	-	N/A
			CH1 Characteristic value	2mV/V -	2mV/V	-	-	Subtracting Tare
			CH1 sampling time	50ms -	50ms	-	-	
			CH1 standstill times	6	5	1	500	Clear Subtracting Tare
	~		CH1 standstill Range	10	10	0	100000	
	8		Ch1 Max weight	100000	100000	1	3.40282	Zero
			CH1 Filter mode setting	Disable -	Disable	-	-	
			CH1 Filter ratio	1 -	1	-	-	
			CH1 Filter average times	10	10	1	400	
			Ch1 Zero upper range	10	10	0	100000	
			Ch1 Zero lower range	-10	-10	-100000	0	
			CH1 Zero tracking timer	10	10	5	500	
			CH1 Zero tracking range	0	0	0	10000	
			CH1 Decimal point	1	1	0	4	

8.4.2 Checking the Version of a Module

(1) Click On-line Mode.



(2) Double-click the module to open the Device Setting page. The versions of both the firmware and the hardware are displayed.



General Diagnosis			Hardware Configuration
- AS02LC-A	Device Information	Notmal Exchange Area	
Please use LC Wikard Setting	Device Name Description	AS02LC-A 2 d'hannels Load cell nput Modue (under: Consumption: (internal)50mA, (external)150mA Modue (under: 30mm	•
	DDF Version	(0) 04.00	
	Firmware Version	01.04.00	
	Hardware Version	00.00.00	

8.4.3 Online Mode

(1) In the **On-line Mode**.



(2) Right-click the module and click Module Status.



(3) View the module state.

AS02LC-A		x
Channel	Value (Decimal)	Value (Float)
Error code	0	0.000
CH1 Input	1120534528	101.000
CH2 Input	0	0.000
Status Code	16392	0.000
Command	0	0.000
8.4.4 Importing/Exporting a Parameter File

(1) Click Export in the Device Settings dialog box to save the current parameters as a dep file (.dep).

			Import	Ex	port			
着 Save As								
↑圓	> This PC ⇒ L	ocal Disk (C:) → Users	> Walson.kuo → D	ocuments		~ 0	Search Documents	Q
Organize 🕶 Nev	w folder						100	· • 0
	^ Name	^	Da	te modified	Туре	Śize		
> 📌 Quick access	DIA	Installer	10,	14/2020 12:00	File folder			
🖌 💻 This PC	DN	IS Log Files	12/	6/2018 11:39 AM	File folder			
> 🧊 3D Objects	Fax		9/1	7/2018 9:58 AM	File folder			
) 📃 Desktop	Hy	perSnap б	4/1	0/2018 9:56 AM	File folder			
> 💮 Documents	SAI				File folder			
> 👃 Downloads		nned Documents		7/2018 9:58 AM	File folder			
> Music	AS	02LC-A.dep	10/	14/2020 1:18 PM	DEP File	.24	1 KB	
> E Pictures								
> 🖪 Videos								
V Local Disk (C:)								
0								
ELC2-PE_v10	4							
File name	AS02LC-A.dep							
Save as type:								
pave as type:	rues (.dep)							-
∧ Hide Folders							Save	Cancel



(2) Click Import in the Device Settings dialog box and select a dep file to import saved parameters.

Open		10 F. 20 1				
1 🗄 > This	s PC 🔹 Local Disk (C:) 🔹 Users 🔋 Walson.	kuo ≯ Documents ≯		~ 0	Search Documents	P
Organize 👻 New folder						
^	Name	Date modified	Туре	Size		
🖈 Quick access	DIAInstaller	10/14/2020 12:00	File folder			
This PC	DMS Log Files		File folder			
3D Objects	Fax	9/17/2018 9:58 AM	File folder			
Desktop	HyperSnap 6	4/10/2018 9:56 AM	File folder			
Documents	SAP	3/13/2018 9:39 AM	File folder			
L Downloads	Scanned Documents	and the second second	File folder			
Music	AS02LC-A.dep	10/14/2020 1:18 PM	DEP File	24	КВ	
Pictures						
Videos						
Local Disk (C:)						
ELC2-PE_v104						
ELC2-PE_V104						
ELC2-PE_VIU0						

8.4.5 Parameters

(1) Settings for CH1

Online		Channel 1 N/A	Channel 2	N/A		L	Import	Export
AS02LC-A	C	hannel 1 Channel 2 Alarm Setting						
Parameter Setting		Parameter Setting					Measurem	ent Setting
Calibration		🕤 Default 🕐 Upload W Download						
Monitor		Parameter Name	Value	Default	Minimum	Maximum	Tare Weigh	t
		CH1 gross/net setting	gross -	gross	-	-	N	I/A
		CH1 Characteristic value	2mV/V -	2mV/V	-	-	Subtra	cting Tare
		CH1 sampling time	50ms -	50ms	-	-		
		CH1 standstill times	5	5	1	500	Clear Subt	tracting Tare
	~	CH1 standstill Range	10	10	0	100000		
	8	Ch1 Max weight	100000	100000	1	3.40282	Z	lero
		CH1 Filter mode setting	Disable 👻	Disable	-	-		
		CH1 Filter ratio	1 -	1	-	-		
		CH1 Filter average times	10	10	1	400		
		Ch1 Zero upper range	10	10	0	100000		
		Ch1 Zero lower range	-10	-10	-100000	0		
		CH1 Zero tracking timer	10	10	5	500		
		CH1 Zero tracking range	0	0	0	10000		
		CH1 Decimal point	1	1	0	4		

(2) Adjustment for CH1

AS02LC-A	Ch	annel 1 Channel 2					
Parameter Setting	C	alibration					
Calibration	5) Default ด Upload WDownload					
Monitor		Parameter Name	Value	Default	Minimum	Maximum	
		CH1 Adjustment number	2	2	2	20	
		CH1 weight of Adjustment point 1	0	0	0	0	Start Calibration
	I	CH1 weight of Adjustment point 2	1000	1000	-3.40282	3.402823	

(3) Settings for CH2

Online		Channel 1 N/A	Channel 2	N/A			Import Export
AS02LC-A	C	hannel 1 Channel 2 Alarm Setting					
Parameter Setting		Parameter Setting					Measurement Setting
Calibration		🕽 Default ด Upload W Download					
Monitor	Г	Parameter Name	Value	Default	Minimum	Maximum	Tare Weight
		CH2 gross/net setting	Disable 👻	gross	-	-	N/A
		CH2 Characteristic value	2mV/V -	2mV/V	-	-	Subtracting Tare
		CH2 sampling time	50ms -	50ms	-	-	
		CH2 standstill times	5	5	1	500	Clear Subtracting Tar
		CH2 standstill Range	10	10	0	100000	
	3	Ch2 Max weight	100000	100000	1	3.40282	Zero
		CH2 Filter mode setting	Disable -	Disable	-	-	
		CH2 Filter ratio	1 -	1	-	-	
		CH2 Filter average times	10	10	1	400	
		Ch2 Zero upper range	10	10	0	100000	
		Ch2 Zero lower range	-10	-10	-100000	0	
		CH2 Zero tracking timer	10	10	5	500	
		CH2 Zero tracking range	0	0	0	10000	

(4) Adjustment for CH2

AS02LC-A	Ch	annel 1 Channel 2					
Parameter Setting	С	Calibration					
Calibration	ŧ) Default 🕐 Upload 🕑 Download					
Monitor		Parameter Name	Value	Default	Minimum	Maximum	
	•	CH1 Adjustment number	2	2	2	20	
		CH1 weight of Adjustment point 1	0	0	0	0	Start Calibrat
		CH1 weight of Adjustment point 2	100	1000	-3.40282	3.402823	

(5) Alarm settings

 Default (Upload) Download Parameter Name External power supply error Hardware error Driver borad error 	Value	Default	Minimum - -	Maximum - -
External power supply error Hardware error			-	-
Hardware error			-	-
Driver borad error			-	-
		1		1

8.5 Basic Operation on DIADesigner-AX

DIADesigner-AX is an open platform for PLC development system and industrial automation. The adaptable DIADesigner-AX provides an easy way to create professional engineering of IEC 61131-3 automation projects. Based on the IEC 61131-3 data structure and the high-level language programming, DIADesigner-AX is strong in functionality, easy to develop, reliable, extendable and open for development. Integrated with components such as visualization and Safety solution, DIADesigner-AX offers a variety of user-friendly engineering functions for your professional applications in controller development system sectors including PLC and motion control. In DIADesigner-AX, you can customize the user interface by arranging the window layout and the appearance of menus, toolbars and commands according to your requirements.

8.5.1 Creating a New Project

Double-click the DIADesigner-AX icon to open DIADesigner-AX. Click **New Project** on the Start Page or select *File > New Project (Ctrl+N)* to create a new project.



Next you will see a window with two sections, Categories and Templates. Click **Projects** in the Categories section and click **Standard project** in the Templates section. After that create a Name and specify a location for the project and then click **OK**.

ategories		Templates
Prole	ies. cts	Project Project AX-308E AX-8xxE
	ontaining one device, one appli	ication, and an empty implementation for PLC_PRG
project c ame	Untitled1 C:\Documents\AX308E	

And a Standard Project dialog appears. You can select the device and the programming language from the drop-down list. Click **OK**, the system generates a cyclic task with a default PLC_PRG.

Standard	Project			\times
		it to create a new standard p n this project:	project. This wizard will create the fo	ollowing
	- A program F - A cyclic tasl	mmable device as specified b PLC_PRG in the language spe k which calls PLC_PRG to the newest version of th		1.
	Device	AX-308EA0MA1T (Delta El	ectronics, Inc.)	\sim
	PLC_PRG in	Ladder Logic Diagram (LD)		~
			ОК	Cancel
		↓		
Ladder Log	ic Diagram (LD))	×.	
Continuous	ock Diagram (F	t (CFC) - page-oriented		
	ic Diagram (LD	·		
Sequential Structured	Function Chart Text (ST)	(SFC)		

After a new project is successfully created, you can see a project management area in the left side of the window. All the options are listed in nodes. *Click View -> Devices (Alt+0)* on the tool bar, if nothing appears in the project management area.

Deklos • • • × ->>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>	Toolilox • • •
CALIGNE Clark Logic Library Manager Clark Configuration Clark Configuration Clark Configuration Clark Configuration Clark Logic District Collect Localibus Master) District Collect Localibus Master) Clark Logic Collect Localibus Master) AX_308_Series_EtherCAT_Master_SoftMotion (AX-308 SoftMotion General Adds Pool	

8.5.2 Adding a Module

Method 1

With AX-3 Series PLC backplaneless design, the extension module can install on the right-side of AX-3 Series PLC directly. Double-click or drag and drop the extension module that you'd like to add from the Product List. Newly added extension modules will apper on the right-side of the AX-3 Series PLC. And the device names will also show up on the left-side under Delta_LocalBus_Master.



• Method 2

If the AX-3 Series PLC and its connected extension module are powered on and the gateway is correctly set,

you can use the icon 🔌 to scan and add the modules in. Newly added extension modules will apper on

the right-side of the AX-3 Series PLC. And the device names will also show up on the left-side under

Delta_LocalBus_Master.





8.5.3 Parameters - Configuring the Module

Two methods to open the parameter setting page.

Method 1

Find and double-click **Hardwre Configuration** in the tree view to open the Hardware Configuration. Double-click the image of the module you'd like to configure to open the parameter setting page.

Method 2

Find and double-click the module you'd like to configure under Delta_LocalBus_Master (Delta LocalBus Master) in the tree view to open the parameter setting page.



Check and set the configurations on the parameter setting page.

AS02LC-A Parameters	Parameter	Туре	Value	Default Value	Unit	Description
	CH1 Gross/Net Setting	Enumeration of WORD	Gross weight	Gross weight		
AS02LC-A I/O Mapping	CH1 Characteristic Value	Enumeration of WORD	2mV/V	2mV/V		
Status	CH1 Sampling Time	Enumeration of WORD	50ms	50ms		
Status	CH1 Standstill Times	INT(1500)	5	5		
Information	CH1 Standstill Range	REAL(0100000)	10	10		
	CH1 Max Weight	REAL(13.4028235E38)	100000	100000		
	🖤 🖗 CH1 Filter Mode	Enumeration of WORD	Disabled	Disabled		
	CH1 Filter Ratio	INT(08)	1	1		
	CH1 Filter Average Times	INT(1400)	10	10		
	CH1 Zero Upper Range	REAL(0100000)	10	10		
	CH1 Zero Lower Range	REAL(-1000000)	-10	-10		
	CH1 Zero Tracking Time	INT(5500)	10	10		
	CH1 Zero Tracking Range	REAL(0100000)	0	0		
	CH1 Calibration Point Number	INT(220)	2	2		
	😑 🛛 🧶 CH1 Weight of Calibration Point					
	CH1 Weight of Calibration Point 1	REAL(00)	0	0		
	CH1 Weight of Calibration Point 2	REAL(3.4028235E-383.4028235E38)	1000	1000		
	CH1 Weight of Calibration Point 3	REAL(3.4028235E-383.4028235E38)	2000	2000		
	CH1 Weight of Calibration Point 4	REAL(3.4028235E-383.4028235E38)	3000	3000		
	CH1 Weight of Calibration Point 5	REAL(3.4028235E-383.4028235E38)	4000	4000		
	CH1 Weight of Calibration Point 6	REAL(3.4028235E-383.4028235E38)	5000	5000		
	CH1 Weight of Calibration Point 7	REAL(3.4028235E-383.4028235E38)	6000	6000		
	CH1 Weight of Calibration Point 8	REAL(3.4028235E-383.4028235E38)	7000	7000		
	CH1 Weight of Calibration Point 9	REAL(3.4028235E-383.4028235E38)	8000	8000		
	CH1 Weight of Calibration Point 10	REAL(3.4028235E-383.4028235E38)	9000	9000		
	CH1 Weight of Calibration Point 11	REAL(3.4028235E-383.4028235E38)	10000	10000		
	CH1 Weight of Calibration Point 12	REAL(3.4028235E-383.4028235E38)	11000	11000		
	CH1 Weight of Calibration Point 13	REAL(3.4028235E-383.4028235E38)	12000	12000		
	CH1 Weight of Calibration Point 14	REAL(3.4028235E-383.4028235E38)	13000	13000		
	CH1 Weight of Calibration Point 15	REAL(3.4028235E-383.4028235E38)	14000	14000		
	CH1 Weight of Calibration Point 16	REAL(3.4028235E-383.4028235E38)	15000	15000		
	CH1 Weight of Calibration Point 17	REAL(3.4028235E-383.4028235E38)	16000	16000		
	CH1 Weight of Calibration Point 18	REAL(3.4028235E-383.4028235E38)	17000	17000		
	CH1 Weight of Calibration Point 19	REAL(3.4028235E-383.4028235E38)	18000	18000		

8.5.3.1 Channel 1 and Channel 2 Settings

You can set up Gross/Net setting, Characteristic Value, Sampling Time, Standstill Times, Standstill Range, Max Weight, Filter Mode, Filter Ratio, Filter Average Times, Zero Upper Range, Zero Lower Range, Zero Tracking Time and Zero Tracking Range for channel 1 and channel 2.

Channel 1:

Parameter	Туре	Value	Default V	Unit	Description
🖗 CH1 Gross/Net Setting	Enumeration of WORD	Gross weight	Gross weight		
CH1 Characteristic Value	Enumeration of WORD	2mV/V	2mV/V		
CH1 Sampling Time	Enumeration of WORD	50ms	50ms		
🖤 < CH1 Standstill Times	INT(1500)	5	5		
🖤 🖗 CH1 Standstill Range	REAL(0100000)	10	10		
🖤 🖗 CH1 Max Weight	REAL(13.4028235E38)	100000	100000		
🖤 🖗 CH1 Filter Mode	Enumeration of WORD	Disabled	Disabled		
🖤 🖗 CH1 Filter Ratio	INT(08)	1	1		
CH1 Filter Average Times	INT(1400)	10	10		
🖤 🖗 CH1 Zero Upper Range	REAL(0100000)	10	10		
🖤 🖗 CH1 Zero Lower Range	REAL(-1000000)	-10	-10		
CH1 Zero Tracking Time	INT(5500)	10	10		
CH1 Zero Tracking Range	REAL(0100000)	0	0		

Channel 2:

Parameter	Туре	Value	Default V	Unit	Description
CH2 Gross/Net Setting	Enumeration of WORD	Gross weight	Gross weight		
CH2 Characteristic Value	Enumeration of WORD	2mV/V	2mV/V		
CH2 Sampling Time	Enumeration of WORD	50ms	50ms		
CH2 Standstill Times	INT(1500)	5	5		
🖤 🖗 CH2 Standstill Range	REAL(0100000)	10	10		
CH2 Max Weight	REAL(13.4028235E38)	100000	100000		
CH2 Filter Mode	Enumeration of WORD	Disabled	Disabled		
CH2 Filter Ratio	INT(08)	1	1		
CH2 Filter Average Times	INT(1400)	10	10		
CH2 Zero Upper Range	REAL(0100000)	10	10		
CH2 Zero Lower Range	REAL(-1000000)	-10	-10		
CH2 Zero Tracking Time	INT(5500)	10	10		
CH2 Zero Tracking Range	REAL(0100000)	0	0		

8.5.3.2 Channel Calibration Settings

You can set up Weight of Calibration Points for channel 1 and channel 2.

Channel 1:

Parameter	Туре	Value	Default V	Unit	Description
CH1 Calibration Point Number	INT(220)	2	2		
CH1 Weight of Calibration Point					
CH1 Weight of Calibration Point 1	REAL(00)	0	0		
CH1 Weight of Calibration Point 2	REAL(3.4028235E-383.4028235E38)	1000	1000		
CH1 Weight of Calibration Point 3	REAL(3.4028235E-383.4028235E38)	2000	2000		
CH1 Weight of Calibration Point 4	REAL(3.4028235E-383.4028235E38)	3000	3000		
CH1 Weight of Calibration Point 5	REAL(3.4028235E-383.4028235E38)	4000	4000		
CH1 Weight of Calibration Point 6	REAL(3.4028235E-383.4028235E38)	5000	5000		
CH1 Weight of Calibration Point 7	REAL(3.4028235E-383.4028235E38)	6000	6000		
CH1 Weight of Calibration Point 8	REAL(3.4028235E-383.4028235E38)	7000	7000		
CH1 Weight of Calibration Point 9	REAL(3.4028235E-383.4028235E38)	8000	8000		
CH1 Weight of Calibration Point 10	REAL(3.4028235E-383.4028235E38)	9000	9000		
CH1 Weight of Calibration Point 11	REAL(3.4028235E-383.4028235E38)	10000	10000		
CH1 Weight of Calibration Point 12	REAL(3.4028235E-383.4028235E38)	11000	11000		
CH1 Weight of Calibration Point 13	REAL(3.4028235E-383.4028235E38)	12000	12000		
CH1 Weight of Calibration Point 14	REAL(3.4028235E-383.4028235E38)	13000	13000		
CH1 Weight of Calibration Point 15	REAL(3.4028235E-383.4028235E38)	14000	14000		
CH1 Weight of Calibration Point 16	REAL(3.4028235E-383.4028235E38)	15000	15000		
CH1 Weight of Calibration Point 17	REAL(3.4028235E-383.4028235E38)	16000	16000		
CH1 Weight of Calibration Point 18	REAL(3.4028235E-383.4028235E38)	17000	17000		
CH1 Weight of Calibration Point 19	REAL(3.4028235E-383.4028235E38)	18000	18000		
CH1 Weight of Calibration Point 20	REAL(3.4028235E-383.4028235E38)	19000	19000		

Channel 2:

Parameter	Туре	Value	Default V	Unit	Description
CH2 Calibration Point Number	INT(220)	2	2		
CH2 Weight of Calibration Point					
CH2 Weight of Calibration Point 1	REAL(00)	0	0		
CH2 Weight of Calibration Point 2	REAL(3.4028235E-383.4028235E38)	1000	1000		
CH2 Weight of Calibration Point 3	REAL(3.4028235E-383.4028235E38)	2000	2000		
CH2 Weight of Calibration Point 4	REAL(3.4028235E-383.4028235E38)	3000	3000		
CH2 Weight of Calibration Point 5	REAL(3.4028235E-383.4028235E38)	4000	4000		
CH2 Weight of Calibration Point 6	REAL(3.4028235E-383.4028235E38)	5000	5000		
CH2 Weight of Calibration Point 7	REAL(3.4028235E-383.4028235E38)	6000	6000		
CH2 Weight of Calibration Point 8	REAL(3.4028235E-383.4028235E38)	7000	7000		
CH2 Weight of Calibration Point 9	REAL(3.4028235E-383.4028235E38)	8000	8000		
CH2 Weight of Calibration Point 10	REAL(3.4028235E-383.4028235E38)	9000	9000		
CH2 Weight of Calibration Point 11	REAL(3.4028235E-383.4028235E38)	10000	10000		
CH2 Weight of Calibration Point 12	REAL(3.4028235E-383.4028235E38)	11000	11000		
CH2 Weight of Calibration Point 13	REAL(3.4028235E-383.4028235E38)	12000	12000		
CH2 Weight of Calibration Point 14	REAL(3.4028235E-383.4028235E38)	13000	13000		
CH2 Weight of Calibration Point 15	REAL(3.4028235E-383.4028235E38)	14000	14000		
CH2 Weight of Calibration Point 16	REAL(3.4028235E-383.4028235E38)	15000	15000		
CH2 Weight of Calibration Point 17	REAL(3.4028235E-383.4028235E38)	16000	16000		
CH2 Weight of Calibration Point 18	REAL(3.4028235E-383.4028235E38)	17000	17000		
CH2 Weight of Calibration Point 19	REAL(3.4028235E-383.4028235E38)	18000	18000		
CH2 Weight of Calibration Point 20	REAL(3.4028235E-383.4028235E38)	19000	19000		

8.5.3.3 Alarm Settings

You can set up alarm settings for External Power Supply Error, Hardware Error and Driver Board Error.

🚔 🛛 🖗 Alarm Setting	WORD	1		
External Power Supply Error	BOOL	TRUE	TRUE	
🖉 🖗 Hardware Error	BOOL	FALSE	FALSE	
Driver Board Error	BOOL	FALSE	FALSE	

8.5.3.4 Online Mode

After the configuration is complete, click the **Login** button on the toolbar to go to the Online Mode and also download the parameter to the PLC module. You can read the parameter status and the Module Revsion under the Parameter Tab when the system is in the Online Mode, but editing is NOT accessible in the Online Mode.

File Edit View Project Build Online 🗎 🗃 🖬 🚭 🗠 여 🐰 🗈 💼 🗙 🏘 한	-	Help 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	4 8 0 8	
Devices 🗸 🗸 🗙	A502LC_A X	Login (Alt+F8)		
Untitled4 View (AX-308EA0MA1T)	AS02LC-A Parameters	Parameter	Туре	Value
Hardware Configuration A Network Configuration	AS02LC-A I/O Mapping	CH1 Gross/Net Setting CH1 Characteristic Value	Enumeration of WORD	Gross weigh
LtherCAT Filter	Status	CH1 Sampling Time CH1 Standstill Times	Enumeration of WORD INT(1500)	50m
Application	Information	CH1 Standstill Range	REAL(0100000)	1
Library Manager		CH1 Max Weight CH1 Filter Mode	REAL(13.4028235E38) Enumeration of WORD	10000 Disable
Task Configuration		🖉 🖗 CH1 Filter Ratio	INT(08)	
EtherCAT_Task		CH1 Filter Average Times CH1 Zero Upper Range	INT(1400) REAL(0100000)	1
PLC_PRG		 CH1 Zero Lower Range 	REAL(-1000000)	-1
BuiltIn_IO (BuiltIn_IO)		CH1 Zero Tracking Time CH1 Zero Tracking Range	INT(5500) REAL(0100000)	1
Delta_LocalBus_Master (Delta LocalBus		CH12Ero Hacking Range P CH12Ero Hacking Range P CH12Ero Hacking Range	INT(220)	
ASO2LC_A (ASO2LC-A)		CH1 Weight of Calibration Point		
EtherCAT_Master_SoftMotion (AX-308		 CH1 Weight of Calibration Point 1 CH1 Weight of Calibration Point 2 	REAL(00) REAL(3.4028235E-383.4028235E38)	100
-		CH1 Weight of Calibration Point 3	REAL(3.4028235E-383.4028235E38)	200
		CH1 Weight of Calibration Point 4	REAL(3.4028235E-383.4028235E38)	300
		CH1 Weight of Calibration Point 5	REAL(3.4028235E-383.4028235E38)	400
		CH1 Weight of Calibration Point 6	REAL(3.4028235E-383.4028235E38)	500

8.5.4 I/O Mapping

You can read/write values, status, error codes of each channel under the I/O Mapping Tab.

AS02LC-A Parameters	Find		Filter Show	all			- 🕂 Ad
AS02LC-A I/O Mapping	Variable	Mapping	Channel AS02LCIN	Address %ID1	Туре	Unit	Description
Status	*		Error code	%IW2	WORD		
			CH1 Input	%ID2	REAL		
Information	Mp		CH2 Input	%ID3	REAL		

8.5.5 Status

You can monitor the status and error message of the module under the Status Tab.

AS02LC-A Parameters	AS02LC-A :	Module reports an error
AS02LC-A I/O Mapping	Last Diagnostic Message	Acknowled
Status	Diagnosis Message: 'Error in IO Driver: 0 E	rrorCode: 0x1607'
Information		

8.5.6 Information

You can check the module information, including Name, Vendoro, Categories, Type, ID, Version, Order Number and Description under the Information Tab.

Ļ	AS02LC_A X	
	AS02LC-A Parameters	General
	AS02LC-A I/O Mapping	Name: AS02LC-A Vendor: Delta Electronics,Inc.
	Status	Categories: Type: 40000
	Information	ID: 16F7 8320 Version: 0.5.0.0
	Information	Order Number: AS02LC-A
		Description: 2 channels 24 bits load cell input, conversion time = 400ms2.5ms

8.6 Troubleshooting

8.6.1 Error Codes

Error Code	Description	A↔ D LED indicator	ERROR LED indicator
16#1605	Hardware failure	OFF	ON
16#1607	The external voltage is abnormal.	OFF	ON
16#1801	The external voltage is abnormal.	OFF	Blinking
16#1802	Hardware failure	OFF	Blinking
16#1807	Diver board failure	OFF	Blinking
16#1808	The signal received by channel 1 exceeds the range of analog inputs or the SEN voltage is abnormal.		
16#1809	The signal received by channel 1 exceeds the weight limit.		Blinking
16#180A	The factory calibration in channel 1 is incorrect.	Run: blinking	
16#180B	The signal received by channel 2 exceeds the range of analog inputs or the SEN voltage is abnormal.	Stop: OFF	
16#180C	The signal received by channel 2 exceeds the weight limit.		
16#180D	The factory calibration in channel 2 is incorrect.		
			Blinking once
			or twice and
_	Upon power-on, the module does NOT receive any detecting	OFF	after 2
	request from the PLC CPU.		seconds, it
			blinks
			repeatedly

Description	Procedure
The external voltage is abnormal.	Check the power supply.
Hardware failure	If the problem persists, contact the local authorized distributors.
Diver board failure	Check if the terminals is affected by any interference or is short-circuit (check EXC+ and EXC-). If the problem persists, contact the local authorized distributors.
The signal received by channel 1 exceeds the range of analog inputs or the SEN voltage is abnormal.	Check the signal received by channel 1 and the cable connections.
The signal received by channel 1 exceeds the weight limit.	Check the value input to channel 1 and the maximum weight setting.
The factory calibration in channel 1 is incorrect.	Check the weight calibration in channel 1.
The signal received by channel 2 exceeds the range of analog inputs or the SEN voltage is abnormal.	Check the signal received by channel 2 and the cable connections.
The signal received by channel 2 exceeds the weight limit.	Check the value input to channel 2 and the maximum weight setting.
The factory calibration in channel 2 is incorrect.	Check the weight calibration in channel 1.
Upon power-on, the module does NOT receive any detecting request from the PLC CPU.	Check the connection between the CPU and the module or reconnect them again.

8.6.2 Troubleshooting Procedure

MEMO



Chapter 9 Serial Communication Module ASOOSCM

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9.1 Introduction

Thank you for using the AS00SCM-A, a serial communication module. To ensure that your AS00SCM-A is installed and operated correctly, read this manual carefully before using the module.

The AS00SCM-A is a serial communication module, supporting AS series communication extension modules (COM) as well as the remote modules (RTU) and the followings:

- COM mode (AS series communication extension modules installed on the right side of the AS CPU and no
 external power supply)
 - Serial communication cards: AS-F232, AS-F422, and AS-F485 support Modbus and UD Link (user-defined format).
 - AS00SCM-A with serial communication card installed can be used only in COM mode.
 - AS00SCM-A with CANopen communication card (AS-FCOPM) installed can be used in COM mode.
- RTU mode (remote modules, independent power supply)
 - CANopen communication card (AS-FCOPM) supports AS remote mode and CANopen DS301 (Slave).
 - AS00SCM-A with CANopen communication card (AS-FCOPM) installed can be used in RTU mode (without connecting to AS CPU).
 - Ethernet communication card (AS-FEN02) supports EtherNet/IP Adapter.
 - AS00SCM-A with Ethernet communication card (AS-FEN02) installed ca be used only in RTU mode.
 - PROFINET communication card (AS-FPFN02) supports PROFINET devices.
 - AS00SCM-A with PROFINET communication card (AS-FPFN02) installed ca be used only in RTU mode. Refer to Chapter 10 of AS Module Manual for more information.

AS00SCM	COM	Node		RTU Mo	de	_
Version and its supporting functions	MODBUS UD Link	CANopen DS301 (Slave)	AS Remote Communication, Delta Special Driver & AS Remote Mode	CANopen DS301 (Slave)	EtherNet/IP Adapter	PROFINET Device
Card	AS-F232 AS-F485 AS-F422	AS-FCOPM	AS-FCOPM		AF-FEN02 (V1.02 or later)	AS- FPFN02 (V2.00 or later
Card Slot	Card 1 / Card 2	Card 2	Card 2		Card 1 ar	nd Card 2
V1.00	V	-	-	-	-	-
V2.00	V	V	V	-	-	-
V2.02	V	V	V	V	V	-
V2.06	V	V	V	V	V	V

When AS00SCM-A acts as a CANopen remote module, the followings are supported.					
	AS08AM10N-A, AS16AM10N-A, AS32AM10N-A, AS64AM10N-A, AS08AN01P-A,				
Digital Module	AS08AN01R-A, AS08AN01T-A, AS16AN01P-A, AS16AN01R-A, AS16AN01T-A,				
	AS32AN02T-A , AS64AN02T-A , AS16AP11P-A, AS16AP11R-A, AS16AP11T-A				
Analog Madula	AS04AD-A, AS08AD-B, AS08AD-C, AS02ADH-A, AS04RTD-A, AS06RTD-A, AS04TC-A,				
Analog Module	AS08TC-A, AS04DA-A, AS06XA-A, AS02LC-A				
Network Module	AS04SIL-A (for AS00SCM-A FW V2.06 or later)				

When AS00SCM-A is used as a remote module, its right side supports the followings AS Series IO modules.

When AS00SCM-A acts as an EtherNet/IP remote module, the followings are supported.					
	AS08AM10N-A, AS16AM10N-A, AS32AM10N-A, AS64AM10N-A, AS08AN01P-A,				
Digital Module	AS08AN01R-A, AS08AN01T-A, AS16AN01P-A, AS16AN01R-A, AS16AN01T-A,				
	AS32AN02T-A , AS64AN02T-A , AS16AP11P-A, AS16AP11R-A, AS16AP11T-A				
Analog Module	AS04AD-A, AS08AD-B, AS08AD-C, AS02ADH-A, AS04RTD-A, AS06RTD-A, AS04TC-A,				
	AS08TC-A, AS04DA-A, AS06XA-A, AS02LC-A				

When AS00SCM-A acts as a PROFINET remote module, the followings are supported.					
	AS08AM10N-A, AS16AM10N-A, AS32AM10N-A, AS64AM10N-A, AS08AN01P-A,				
Digital Module	AS08AN01R-A, AS08AN01T-A, AS16AN01P-A, AS16AN01R-A, AS16AN01T-A,				
	AS32AN02T-A , AS64AN02T-A , AS16AP11P-A, AS16AP11R-A, AS16AP11T-A				
Analog Module	AS04AD-A, AS08AD-B, AS08AD-C, AS04RTD-A, AS06RTD-A, AS04TC-A, AS08TC-A,				
	AS04DA-A, AS06XA-A				

- When AS00SCM-A acts as a serial communication extension module or a CANopen remote module, it should work with AS PLC CPU for configuration. Download ISPSoft V3.13 or later versions from Delta's official website to configure AS00SCM-A. You can also use DIADesigner to configure AS00SCM-A. Download DIADesigner and refer to section 6.1.1.12 from DIADesigner software user manual for more information.
- If you use UD Link, configure it through SCMSoft, which is embedded in HWCONFIG of DCISoft. Download DCISoft V1.24 or later from Delta's official website. You can also use DIADesigner to call SCMSoft. Download DIADesigner and refer to section 6.1.1.12 from DIADesigner software user manual for more information.
- When AS00SCM-A acts as an Ethernet remote module, you can set up the EtherNet/IP via EIP Builder and HWCONFIG of ISPSoft. Download ISPSoft V3.13 or later versions and EIP Builder V1.08 or later from Delta's official website. You can also use DIADesigner. Download DIADesigner and refer to DIADesigner software user manual for more information.
- The following contents use ISPSoft to demonstrate. For DIADesigner examples, please refer to DIADesigner software user manual for more information.

9.2 Specification, Function and Wiring

9.2.1 The functional specifications

■ RS-485/RS-422 communication interface

Item	Specifications					
Connector type	5- pin European-style terminal block, spring-clip connector					
Transmission speed	300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 76800 115200 and 230400 bps					
Communication format	Stop bit: 1 bit and 2 bits Parity bit: none, an odd parity bit, and an even parity bit Data bit: 7 bits and 8 bits					
Communication protocol	Modbus ASCII/RTU UD Link					

■ CANopen communication interface

Item	Specifications					
Connector type	ctor type RJ45*2					
Transmission speed	smission speed 10k, 20k, 50k, 125k, 250k, 500k, and 1000k bps					
Communication AS remote mode (RTU mode)						
protocol	CANopen (firmware V2.00 or later)					

Ethernet communication interface

Item	Specifications					
Connector type	RJ45*2					
Transmission speed	10M, 100Mbps					
Communication protocol	EtherNet/IP (firmware V2.02 or later), PROFINET (firmware V2.06 or later)					

Electrical specifications

ltem	Specifications					
Supply voltage	24 VDC					
Electric energy consumption	0.6 W					
Weight	Approximately 169 g					



9.2.2 Dimensions and Profile

Number	Name	Description				
1	Model Name	Model name of the module				
	RUN LED Indicator (blue)	Operating status of the module ON: the module is running. OFF: the module has low voltage or no power.				
2	ERROR LED Indicator (red)	Error status of the module ON: there is a hardware error. OFF: the module is operating normally. Blink: an error has occurred or occurs on the module; refer to section 9.7 for more information.				
	Function card 1 Indicator (orange)	Blink: data is being transmitted to function card 1. OFF: there is no data transmission to function card 1.				
	Function card 2 Indicator (orange)	Blink: data is being transmitted to function card 2. OFF: there is no data transmission to function card 2.				
3	Knob for the Node ID and Format	2 sets, one for function card 1 and the other for function card 2				
	Function Card 1 Slot	COM Mode: for AS-F232, AS-F422, AS-F485				
4	Function Card 2 Slot	COM Mode: for AS-F232, AS-F422, AS-F485, AS-FCOPM RTU Mode: for AS-FCOPM, AS-FEN02, AS-FPFN02				
5	Knob for the Work Mode	COM Mode: serial communication extension mode RTU Mode: remote module mode				
6	DIN Rail Clip	Secures the module onto the DIN rail				
7	Module Connecting Set	Connects the modules				
8	Ground Clip					
9	Label	Nameplate				
10	RTU Power Input	Supplies power to the RTU module for RTU Mode only				

9.2.3 Knob Functions

9.2.3.1 Restore Default Settings

For all communication cards and work mode, you can cut the device power off and turn the knobs to the position F, and resupply the power. The AS00SCM-A module restores back to default settings once it is resupplied with power. Cut the power off again and turn the knobs to set the new values and then resupply the power. After that the ASSCCM00-A is set with new settings.

9.2.3.2 Modbus Parameter Settings (AS-F232/AS-F422/AS-F485)

Modbus communication (AS-F232/AS-F422/AS-F485) can be installed in Card 1 and Card 2 (in COM mode only).

- 1. When the setting range is 0x01–0x0F, you can use the knob to set the node ID1 and ID2. (The settings in the ISPSoft is ignored here.)
- When the setting range is NOT between 0x01–0x0F, you can turn the knob to 0 and use ISPSoft (HWCONFIG) to set up the node ID. Follow the descriptions shown on the HWCONFIG for node ID setting range.

ID Setup (AS-F232/AS-F485) in COM mode							
ID1/ID2 Node ID Setup ID1/ID2 Node ID Setup							
0	Use ISPSoft (HWCONFIG)	1-F	Manual Setting				

- 3. When the FORMAT knob is NOT set to 0, use the FORMAT1 AND FORMAT2 knobs to set the communication mode. Refer to the following table. (The settings in the ISPSoft is ignored here.)
- 4. When the FORMAT knob is set to 0, you can use ISPSoft (HWCONFIG) to set up the communication mode.

COM. RTU	

	Modbus (AS-F232/AS-F422/AS-F485) in COM mode										
FORMAT 1/2	Baud rate (bps)	Data (bits)	Parity	Stop (bits)	ASCII/ RTU	FORMAT 1/2	Baud rate (bps)	Data (bits)	Parity	Stop (bits)	ASCII/ RTU
0		Sof	tware set	ting		8	38400	8	None	2	RTU
1	9600	7	Even	1	ASCII	9	38400	8	None	1	RTU
2	9600	8	Even	1	RTU	А	38400	7	Even	1	ASCII
3	9600	7	None	2	ASCII	В	57600	8	None	1	ASCII
4	9600	8	None	1	RTU	С	76800	8	None	1	RTU
5	19200	7	Even	1	ASCII	D	115200	7	None	1	ASCII
6	19200	8	None	1	RTU	E	115200	8	Even	1	RTU
7	19200	8	Odd	2	RTU	F	115200	7	None	2	ASCII

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For UD Link function, you can turn the FORMAT knob to 0 and use ISPSoft (HWCONFIG) to set up the communication mode. Refer to section 9.3.2 for more details.

9.2.3.3 CANopen Parameter Settings (AS-FCOPM)

CANopen (AS-FCOPM) can only be installed in Card 2 for COM mode or RTU mode.

- 1. When the setting range is 0x01–0x0F, you can use the knob to set the node ID1 and ID2. (The settings in the ISPSoft is ignored here.)
- When the setting range is NOT between 0x01–0x0F, you can turn the knob to 0 and use ISPSoft (HWCONFIG) to set up the node ID. Follow the descriptions shown on the HWCONFIG for node ID setting range.
- 3. When in RTU mode, the setting varies according to different CANopen communication mode; refer to section 9.4.1 for more details.

COM. RTU									
	ID Setup (AS-FCOPM in COM mode) in COM mode								
ID2	ID2 Node ID Setup ID2 Node ID Setup								
0	Use ISPSoft (HWCONFIG)	1-F	Manual Setting						

4. COM and RTU Mode:

Refer to the following table and use FORMAT 2 knob to set up the communication. You can NOT use ISPSoft (HWCONFIG) to set up the communication mode in this format.

CANopen (AS-FCOPM) in COM Mode and RTU Mode									
FORMAT 2	1	2	3	4	5	6	7	8-F	
Bit rates (bps)	10K	20K	50K	125K	250K	500K	1000K	NA	
Distance (m)	5000	2500	1000	500	250	100	25	NA	

9.2.3.4 EtherNet/IP (AS-FEN02)

EtherNet/IP (AS-FEN02) can only be installed in Card 2 and both slots of Card 1 and Card 2 will be used for RTU mode.

When using the communication card AS-FEN02, you need to set ID1 and FORMAT1 to 0. Refer to the following methods to edit the IP address and settings of AS-FEN02.

- When both knobs ID2 and FORMAT 2 are set to 0, IP address is set through EIP Builder (ISPSoft -> HWCONFIG).
 - Open EIP Builder and add AS00SCM (RTU) + AS-FEN02 to your network. Double-click HWCONFIG to set up.
 - Open EIP Builder and select **IP Setting Tool** from the **Tool** on the tool bar to scan for the device IP address for setup.
- When both ID2 and FORMAT 2 are set to F, IP setting mode is in DHCP mode. After setting is complete, you
 need to turn the power OFF and then ON to make sure the modules are sending DHCP requests. Check the
 sticker on the AS-FEN02 communication card for the MAC address. After that open EIP Builder and select IP
 Manager from the Tool on the tool bar and click Start the Server to set up the correspondences between MAC
 address and IP address.
- When either ID2 or FORMAT 2 is Neither 0 nor F, IP address is set by knobs ID2 and FORMAT 2. Hexadecimal format is used and ID2 corresponds to x16¹ and FORMAT 2 to x16⁰. The possible IP address is 192.168.1.x, x=1~FE (1~254).

IP Address Setup (AS-FEN02) in RTU Mode							
ID1	0						
FORMAT 1	0						
ID2	0	F	Other combination	x16 ¹			
FORMAT 2	0	F	Other combination	x16 ⁰			
IP Address	Use ISPSoft	DHCD	IP Address				
Setup	(HWCONFIG)	DHCP	192.168.1.x · x=1~FE(1~254)				

Note: The parameters of AS-FEN02 are stored in AS300 PLC or AS00SCM-A. Thus you need to use the knobs to set up the IP address for AS-FEN02 or use COMMGR or IP Setup tool to scan and check for the IP address of AS-FEN02. Refer to section 9.4.2 for more information.

9.2.3.5 PROFINET (AS-FPFN02)

You can use the knob to restore back to default settings.

9.2.4 Wiring

9.2.4.1 ASOOSCM-A Power Wiring

COM mode: Serial communication extension mode

Turn the work mode to COM. Install the module on the right hand side of the AS Series CPU. To avoid problems, do not use an external power supply for AS00SCM-A.

• RTU mode: Remote module mode

Turn the work mode to RTU. This module is equipped with an independent DC power connecter.

To ensure the serial communication module functions well and reliably, the external wiring must prevent noise. Before you install cables, follow the precautions below.

(1) To prevent a surge and induction, the DC cable and other power cables that are connected to the AS00SCM-A must be separate cables. An independent power supply is recommended for the AS00SCM-A.





- (2) The 24 VDC cable should be twisted pair, and the shorter end should be connected to the module.
- (3) The cable (110 VAC, 220 VAC, and 24 VDC) must not be installed near a main circuit, a high-voltage cable, or a cable connected to a load that is not a PLC. In addition, the cable must not be bound to a main circuit, a high-voltage cable, or a cable connected to a load that is not a PLC. All the cables should be wired at least 100 mm apart.
- (4) Ground the power supply using a 14 AWG wire.
- (5) Connect 20–14 AWG (1 mm) wires to the input/output terminals. Use only copper leads that can resist temperatures above 60° C /75° C.

9.2.4.2 AS00SCM-A Communication Interface

• COM mode: Serial communication extension mode

This module comes with two function card slots, supporting AS-F232, AS-F422, and AS-F485 communication cards. The Card 2 slot also supports the AS-FCOPM communication card (firmware V2.00 or later). Refer to Chapter 10 for more information on wiring the cards.

• RTU mode: Remote module mode

The Card 2 slot supports the AS-FCOPM communication card (firmware V2.00 or later), AS-FEN02 (firmware V2.02 or later) and AS-FPFN02 (firmware V2.06 or later). Refer to Chapter 10 for more information on wiring the cards.

9.3 COM mode

This section introduces communication modes of AS00SCM-A module (firmware V2.00) when the communication protocol is Modbus, UD Link or CANopen.

9.3.1 Modbus

The AS00SCM-A supports standard communication protocols such as Modbus RS232, RS422, and RS485. Once you create a data exchange table, you can exchange data with slave modules.

- You can set up communication format and node ID via HWCONFIG. Refer to section 9.2.3 for more details.
- Refer to section 9.6.1 for more details on operational examples.

9.3.1.1 Modbus Master

• When AS00SCM-A acts as scanner/master, you can create a data exchange table and exchange data with slave modules. To initialize Modbus communication: Open ISPSoft. -> HWCONFIG -> AS00SCM-A. Be sure to check if the DDF version is the same as the actual firmware before setting up.

Edit Area				
General Data Exchange				
- AS00SCM-A	Device Information	Normal Exchange	Area	
Function Card1 Setting	Device Name		AS00SCM-A	
Function Card 2 Setting	Description		Module Current Con	nodule, MODBUS, UD Link protocol (COM. mode), Remote IO control(RTU mode) sumption: (internal)22mA, (external)0mA nt Consumption: [Slot 1]20mA, [Slot 2]20mA
	Comment			
	DDF Version		02.06.00	

- Set up the node ID and communication format. Go to Edit Area -> Function Card1 / Card 2 Setting.
 - Retry times: set the times for the AS00SCM to retry communication. If no response after the set retry times, a slave timeout alarm will be triggered.
 - Received Data Timeout Alarm Enable: available for FW V2.06 or later, you can enable this function so that if a timeout occurs, an alarm will be triggered. Default: disable.

General Data Exchange				
- AS00SCM-A	Fu	nction Card1 Setting		
Function Card1 Setting		Name	Setting Value	
_		Function Card Type	AS-F485	
Function Card 2 Setting	_	Protocol	MODBUS ASCII	
		Data Exchange Enable	✓	
		ID	1	
	-	Baud Rate	9600	
		Format	7E1	
		Delay time to Reply	5	
		Retry times	5	
		Received Data Timeout Alarm E	nable	

 Select a mode to start. Go to Data Exchange -> Function Card1 / Function Card 2 -> Mode (Program Control, PLC Run, or Always Enable)

Edit Area						
-						
General	Data Exchange					
- Functio	n Card		Mode:	Program Control 🔻	₽+	Add
Fun	iction Card 1			Program Control PLC Run		
Fun	ction Card 2			Always Enable		

Program Control: PLC decides whether the set data exchange is performed. Function Card 1 and Function Card 2 are independent; you can set them up differently.

eneral Data Exchange			
AS00SCM-A	Device Information Normal Exchange Area		
Function Card1 Setting	Description	Address	
Function Card 2 Setting	Card 1 Data Exchange State (item 1~32) (0:no	D28002 - D28003	
runcuun caru z setung	Card 2 Data Exchange State (item 1~32) (0:no	D28006 - D28007	
	Card 1 UD Link State (0:none/processing, 1:fins	D28010	
	Card 2 UD Link State (0:none/processing, 1:fins	D28011	
	- Output		
	Card 1 Data Exchange Mode Control (0:none, 1	. D28020	
	Card 2 Data Exchange Mode Control (0:none, 1	. D28021	
	Card 1 Data Exchange Trigger (item1~32) (0:n	D28022 - D28023	
	Card 2 Data Exchange Trigger (itme1~32) (0:n	D28026 - D28027	
	Card 1 UD Link Group ID Trigger	D28030	
	Card 2 UD Link Group ID Trigger	D28031	

- PLC Run: The set data exchange will be executed automatically when PLC is in RUN state. If the PLC is in STOP state, the communication will stop.
- Always Enable: The data exchange will be executed constantly after PLC is powered on.

• Create a Data Exchange table: Tick the option Enable first.

着 Data Exchange Setting			×
Local Device Setting	Remote Device Setting		
Enable	Slave Address	1	*
The Shortest Update Cycle (ms) 50 🗘 Apply to all	IP Address		
Connection Timeouts (ms) 100 🗘 🗸 Apply to all	Remote Device Type	AS Series	
Support Read/Write Synchronization (Function Code: 0x17)			
Read			
Local Start Address D26000 - D26099	Remote Start Address D0 - D	29999	Quantity (Word)
D Register	•	0.0	1 *
- Write			
Local Start Address D26100 - D26199	Remote Start Address D0 - D2	29999	Quantity (Word)
D Register ▼ 26100 0 → D Register	• • •	0.0	1 *
		ОК	Cancel

- Select the **Slave Address** and the **Remote Device Type** from their drop-down list.
- The Shortest Update Cycle (ms): You can set the shortest update cycle in ms. If a timeout error occurs too often, you can increase the value here, 10 ms as a unit to find out the best setting value.
- Connection Timeouts (ms): You can set the connection timeout time in ms. If for a period of time that you have set, there is no response from the slave device, this is considered as a timeout. The value here cannot be set too large, otherwise the PLC will need to wait for the time set for the slave device to

respond, and this will affect and prolong the data exchange time.

- Support Read/Write Synchronization (Function Code: 0x17): the master PLC CPU can use MODBUS function code to complete read and write synchronization at one operation. However you need to make sure all the devices support MODBUS function codes; otherwise, the slaves devices may NOT recognize the function code and fail to complete read/write synchronization.
- After the setting is done, click Download. And you can find the Address of Card 1 / 2 Data Exchange State under the tab of Normal Exchange Area. If the address value is 1 here, it indicates the data exchange is a success one.
- Note: When you use HWCONFIG to scan the modules, the data exchange table of AS00SCM-A can NOT be copied back to HWCONIG. If you need the data exchange table of AS00SCM-A, you can use **Upload** on the tool bar to send the data exchange table of AS00SCM-A back to HWCONFIG.

9.3.1.2 Modbus Slave

When AS00SCM acts as adapter/slave, it provides a communication channel for AS series PLC to read and write.

Addresses and corresponding registers for function card 1 / 2

Funciton cards	Address for data to be written	Length (character)	Address for data to be read	Length (character)	
Function card 1	16#0000	100	16#0100	100	
Function card 2	16#0200	100	16#0300	100	

You can find the corresponding registers in HWCONFIG, after setting up AS00SCM-A as the right-side module of AS CPU. As the image shown below, you can see the input device range (to write) for Card 1 is from D26000 to D26099 and the output device range (to read) is from D26100 to D26199.

CPU	Group			
Mod	ule	Module Name	Input Device Range	Output Device Range
C	CPU	AS332T-A	X0.0 - X0.15	Y0.0 - Y0.15
		AS-F485	NONE	NONE
		AS-F485	NONE	NONE
	1	AS00SCM-A	D28000 - D28019	D28020 - D28039
		AS-F485	D26000 - D26099	D26100 - D26199
		AS-F485	D26200 - D26299	D26300 - D26399

Function Code	Attribute	Supporting addresses
		16#0000~16#0063
0x03	Read	16#0100~16#0163
0x04	Reau	16#0200~16#0263
		16#0300~16#0363
0x06	Write	16#0000~16#0063
0x10	white	16#0200~16#0263
		16#0000~16#0063
	Read	16#0100~16#0163
0.47	Read	16#0200~16#0263
0x17		16#0300~16#0363
	Write	16#0000~16#0063
	vvnie	16#0200~16#0263

Supporting function codes and addresses are shown below.

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9.3.2 UD Link

The UD Link provides communications with devices that communicate via RS232, RS422 or RS485. You can edit a packet according to its communication format to send and receive packets. This section introduces the use of UD Link communications in COM mode.

Notes:

- 1. Make sure the knob of SCM module is turned to 0 before operation.
- 2. SCMSoft is embedded in DCISoft. Go to www.deltaww.com to download the last version of DCISoft.
- 3. Make sure you are using the last version of COMMGR.
- 4. Make sure you are an administrator to run ISPSoft.

9.3.2.1 Steps to Create an UD Link Protocol Communication

1. Setting up in HWCONFIG

Set up the function card. -> Set the communication protocol to UD Link. -> Set up the communication format and baud rate. -> Download to HWCONFIG. -> Use data length 8 byte as the communication format, 8E1, 8N1, 8O2 and so forth to ensure a complete transmission. After setting, you need to download HWCONFIG parameters.



2. Opening SCMSoft

Right-click any AS00SCM module if there is more than one AS00SCM module to see the context menu, click Communication Software and then double-click SCMSoft to open it.

Hardware Configuration (Device 0) * × EtherNet/IP (Device	e 0)		
🛱 Reset Configuration 📔 Show Information 🐵 Input/Ou	tput Device Rearrange 🔲 Sh	IN HWCONFIG	Table 📄 SCMSof
Remarks:			
	+		
	Communication Software		SCMSoft
	Hardware Configuration		
	Cut(X)	Ctrl + X	
	Copy(C)	Ctrl + C	
	Delete(D)	Del	
	Replace(R)		

AS00SCM modules can upload UD Link parameters through SCMSoft. Select one slot as one SCM module and one AS00SCM module at one time.

9.3.2.2 SCMSoft

COM PORT Settings: Here is the parameters set in HWCONFIG and it is a read-only page. If you need to edit the parameters, close SCMSoft first and then go to HWCONFIG to edit.

SCMSoft							- 🗆 ×
Eile Edit View Tools Window Help							_ @ ×
🗎 📾 🖬 🕼 🗐 🗐 🗐 🛊 🕴 Ŧ ± 🛙	7						
AS300 AS300 COM PORT Setting Group List Group List		SCM No. 1 2	Name SCM Device1 SCM Device2	Slot 1 2	SCM Type AS00SCM-A AS00SCM-A	Firmware Version 02.06.00 02.06.00	
Project							
Ready					Driver1 ,[E	thernet]	ASCPU300 Series

Upload the module parameters to UD Link. -> Right-click Group List to create a group list. -> Double-click the Group List 1 to set up the slot number on the editing window on the right -> Right-click the created group list on the node to create groups for data mapping. -> Define the Group ID and Group Name on the editing window on the right.

Group List: One group list corresponds to one slot, do NOT use the same group list on other slots repeatedly. The slot number in the group list is the actual placement order of AS00SCM-A on the right-side of the PLC. For example, the slot number 2 in the group list corresponds to the second module on the right-side of the PLC. Once the group list is assigned to a certain slot, the CARD 1 and CARD 2 of its corresponding module can trigger the group list of the selected slot.

SCMSoft						- 🗆 ×
Eile Edit View Tools Window Help						×
🗎 🖬 🖬 🖬 🗐 😨 🖳 🕇 🕂 🗄 🗎	07					
	1. 1 K	No. 1 2	Group List Name Group List1 Group List2	Slot 1 2	Remain Size 288/30720 Bytes 134/30720 Bytes	
Project						
Ready					Driver1 ,[Ethernet]	ASCPU300 Series

	No.	Group List Name	Slot	Remain Size
	1	Group List1	Group List1 1	
8	2	Group List2	2	134/30720 Bytes
F	dit			
		Laure I		
	Group Li	ist Name Group L	ist1	
	Slat	1	~	
	Slot	1	~	
	Slot	1	~	
	Slot	1 1 2	~	
	Slot	1 1 2		Cancel

Group List under the Group List: Every group has its Group ID and this number will be used in PLC program as AS00SCM uses to call for the group to take orders.

SCMSoft				- 🗆 ×
Eile Edit View Tools Window Help				X
■# # • • • • • • • • • • • • • • • • • • •	1			
COM PORT Setting COM PORT Setting COM PORT Setting Compute Compute		Group Name Group1 Group2	Command Count 2 1	
Project				
Ready			Driver1 ,[Ethernet]	ASCPU300 Series

Group: Right-click anywhere on the blank area of the Group to create commands. When the Group ID is called, AS00SCM executes the commands in their numerical order of the called Group ID.

SCMSoft							-		×
Eile Edit View Tools Window Help								2	a x
📗 📾 🔜 🖓 🗐 🗐 🛢 🛊 🕂 🗄									
AS300 COM PORT Setting Group List Group		and No. Command Type 1 Send 2 Receive	Send Packet TX Packet1	Recv Packet	Success End End	Fail Abort Abort	Retry 0 0	Repeat 0 0	Sen
Project	<						-		>
Ready				Driver1 .[Etherne	¢]	A	SCPU300 S	eries	

After the group list is created, you can edit packets for transmission.

- Send packet / Receive packet: use the packets to be sent or to be received but they can only be used in the group where they belong. Commands can be used to execute all kinds of packets.
 - Send: to send packets

Receive: to receive packets

Send & Receive: to send packets and to receive packets

 COM PORT History: Right-click this node to upload the COM Port History. You can obtain the data stored in the communication port by selecting the slot (CARD 1 indicating COM 1 and CARD 2 indicating COM2). The data here include TX and RX packets and the data is included not only AS00SCM data but also other kinds of data as long as they are from the same communication port. Refer to the next section for the settings on packets and commands. After the setting is done, download the parameters from SCMSoft to PLC. And once a group number is trigger, the function card starts to send and receive packets according to the command order. Make sure you add the group number in the UD Link group address in the Normal Exchange area. Refer to section 9.6.2 for more details on operation.



9.3.2.3 TX Packets and RX Packets

You can create several TX and RX packets in a group. A packet includes messages, an address, a length, and a checksum.

Packet Edit		
Packet Name Packet View Packet Segment Edit		
No. Class	Format	Segment View Up Down
Message Constant	Variable Checksum Add	Address Constant Variable No. 0 ♀ ~ No. 0 ♀
		OK Cancel

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- Packet Name: enter the packet name.
- Packet View: shows the packet contents.
- Packet Segment Edit: adjust the sequence of segments and add or delete segments.

No.: the segment number. You can create no more than 64 segments.
Class: the segment class. The available classes are Message, Address, Length, and Checksum.

Format: the data format of the segment. The available data formats are Hex (hexadecimal), ASCII, and Code.

Segment View: the contents of the segment

- **Message**: a message may be either Constant or Variable. Messages can be applied to a header segment, a start bit segment, an end bit segment, and a data segment. There can be several messages in a packet.
- Address: an address may be either Constant or Variable. There can be only one address segment in a packet.
- Length: enter the length of a packet. There can be only one length segment in a packet.

Class: 1 byte or 2 byes

Format: select a format for the length, Hex or ASCII

Value: enter a value for the length according to the format; unit: byte

• Checksum: edit the checksum. There can be only one checksum segment in a packet.

Class: select a Class.

Format: select the Format for the checksum.

Initial value: set the initial value for the checksum.

Reverse: the high byte of a one-word checksum is calculated, and the high byte (word) and low byte (byte) of the checksum are reversed.

Format	Hex 💉	
Value	Hex ASCII	
	Code	

• Constant: enter a constant.

Format: Select Hex, ASCII, or Code in the Format box. If you select Code, the data is a control code.

Value: enter a constant .

Message Yariable Edit						
Format Variable Value	Nul (Variable , Length)					
Variable Property Function	Read R()					
Mapping Regist	er DRegister 🖌 0					
Length Property – Function Mapping Registe Constant	er Base + Offset 1					
	OK Cancel					

- Variable: a variable data to read or write. Specify either an internal register in AH10SCM-A or a register in a CPU module.
- Format: select the format for the data.

Null: data is not processed.

- Hex: ASCII data is converted into hexadecimal data. ASCII data that cannot be converted into hexadecimal data is converted into 0.
- ASCII: Hexadecimal data is converted into ASCII data. Hexadecimal data that cannot be converted into ASCII data is converted into 0.
- **Reverse**: the high byte of a one-word checksum which is calculated, and the low byte of the checksum are reversed.
- Variable Property:
 - Function: for a TX packet, select Read R() for the Function. For an RX packet, select Read R(), Write W(), or * for the Function.

Mapping Register: select a register in the PLC.

Length Property:

Function: It is suggested to select to determine the length (*) automatically. The data length can be specified between the packet interval (around 4 character time length) and should receive all data. Select Read R () for a variable. And then you can select its corresponding register. The value here is the length. Select Constant and then you can define the data length.

For a TX packet, you can select the variable and the constant length. For a RX packet, you can select a variable, constant and determine the length (*) automatically.

9.3.2.4 Command

After creating several TX and RX packets, create commands to select packets to be sent and packets to be received. Also create a sequence to execute the commands.

Command Edit	
Command No.	1
Command Type	Send & Receive 🗸 🗸
Send Packet	TX Packetl 🗸
Recv Packet	RX Packet2 🗸
Success	Goto 🔽 2
Fail	Goto 🗸 5
Retry	0 (0 - 255)
Repeat	0 (0 - 255)
Send Wait	0 (0 - 65535 ms)
Timeout	50 (50 - 65535 ms)
	OK Cancel

- **Command No.**: every command has a number. The Command Number indicates the execution order. You can also use this Command Number to appoint a certain packet for transmission when using Goto function.
- Command Type: select Send, Receive, or Send & Receive for the Command Type. Once the type Send is selected, when the packet is sent, the transmission is considered successful. Once the type Send & Receive is selected, AS00SCM-A checks if the received data met the definition of RX packet. When they are matched, the transmission is considered successful.
- Send Packet: select a packet to send.
- **Receive Packet**: select a packet to receive.
- Success: specify the action to follow the successful execution of the command: Next, Goto, or End.
 - Next: the next command is executed based on Command Number. If the command that is being executed is command 1, the next command that will be executed is command 2.
 - **Goto**: specify a later command to be executed based on its Command Number.
 - **End**: end the sequence of commands.
 - Fail: specify the action to follow the failure of the command: Next, Goto, or Abort.
 - Next: the next command is executed based on Command Number. If the command that is being executed is command 1, the next command that will be executed is command 2.
 - Goto: specify a later command to be executed based on its Command Number.
 - Abort: end the sequence of commands.
- **Retry:** set the number of times the command will be retried after a failure.
- Repeat: set the number of times the command will be repeated after successful execution.
- Send Wait: set an interval in milliseconds for the sequence to wait between commands. The default is 0 milliseconds, which causes the next command to be executed immediately after a reply is received.
- Timeout: set the amount of time in milliseconds for the system to wait for the command to be executed before the system reports a communication timeout. The default is 50 milliseconds. When it is set to 0, there is no timeout message and the module is at the status of waiting to receive.

9.3.2.5 Return to Default

Select **Tools** in SCMSoft and select **Return to Default**. Select the slot (module) you need to reset and clear all the saved settings in UD Link mode. After that turn off and then turn on AS00SCM-A so that UD Link mode can work again.



9.3.3 CANopen Mode

The installed on the right side of AS Series PLC CPU, AS00SCM-A (firmware V2.00 or later) can be connected to an AS-FCOPM module through the Card 2 slot. It can then be used as a slave for other modules in the CANopen network environment.

9.3.3.1 Features

When using the AS00SCM-A as a slave module, it has the following features:

- Complies with CANopen DS301 V4.02
- Supports NMT Slave
- Error-controlled; supports Heartbeat and Node-Guarding Protocols
- Supports PDO; up to 8 TxPDO and 8 RxPDO can be configured for every slave.
- Supports SDO: Server: 1 User: 0 Supports SDO (expedited SDO) transmission mode
- Supports Emergency Protocol

9.3.3.2 Corresponding Input / Output Device Range

When the AS00SCM-A module acts as a CANopen slave, the CPU PLC assigns the input/output device ranges according to the placement of the AS00SCM-A. The corresponding input/output device ranges from the right hand side of the CPU PLC are shown in the example below from the HWCONFIG utility. The red box below is the data exchange section for AS00SCM-A, when the AS00SCM-A acting as a CANopen slave.



9.4 RTU Mode

Here you can find the introductions on the communication through CANopen and EtherNet/IP remote mode. For PROFINET remote mode, refer to Chapter 10.

9.4.1 CANopen Mode (AS-FCOPM)

When the function card AS-FCOPM works with an AS series PLC, it supports three kinds of RTU modes, including AS Remote Communication, CANopen DS301 Mode and Delta Special Driver & AS Remote Mode. Use the knob FORMAT 1 to turn among three RTU modes.

A. RTU Communication Mode Setup Knob "FORMAT 1"

FORMAT1	Description
0	AS Remote Communication
4	CANopen DS301
8	Delta Special Driver & AS Remote Mode

- B. Node ID Setup Knob "ID1/ID2"
 - ID1: 0 (recommended)
 - ID2: 0 (the knob is no function; set up through ISPSoft); see the table below for the knob setting range.

RTU mode	FORMAT1	ID2 setting range
AS Remote Communication	0	1~F (by the number of remote slaves and set in a consecutive order)
CANopen DS301	4	1~F (by the number of DS301 slaves) 16-64 (if the knob is at 0, the setting range is set by HWCONFIG)
Delta Special Driver & AS Remote Mode	8	9~F (by the number of remote slaves and set in a consecutive order)
Compound modes: AS Remote	4	16-20 and 29-64 (by the number of DS301 slaves)
Communication and CANopen DS301	8	9~F (by the number of remote slaves and set in a consecutive order)

C. RTU Communication Speed Setup Knob "FORMAT 2"

Use the knob for setting. You cannot use ISPSoft (HWCONFIG) to set up the communication mode in this format.

FORMAT2	1	2	3	4	5	6	7	8-F
Byte (bps)	10K	20K	50K	125K	250K	500K	1000K	NA
Distance (m)	5000	2500	1000	500	250	100	25	NA

9.4.1.1 AS Remote Communication Mode

Double-click the AS Series PLC, then in Device Setting click Function Card 2 Setting and set the function card 2 to AS-FCOPM, set to working mode to AS Remote Communication Mode, enter the number of the AS remote module and set up the baud rate. After the setting is done, download the parameters.

Parameter name	Value		Unit	Default	Minimum	Maximum 🔺
Card 2 Detect mode	Manual	-		Auto Detect	-	-
Manual Select Card	AS-FCOPM Ca	-		None	-	-
- Card 2 ID No.	1			1	1	254
Protocol Setup Opportunity	Stop -> Run	•		Stop -> Run	-	-
Baud Rate	9600	•	bps	9600	-	-
Data bit	7	•	bit	7	-	-
- Parity bit	Even	•		E∨en	-	-
Stop bit	1	•	bit	1	-	-
MODBUS mode	ASCII	•		ASCII	-	-
Delay time to Reply	0		ms	0	0	3000
- Received Data Timeout	200		ms	200	0	3000
F2AD Analog Input mode	0~10V	•		0~10∨	-	- •
F2DA Analog Output mode	0~10V ·	•		0~10V	-	-
F2AD Sampling Time	3		ms	3	3	15
F2AD Average Times	10			10	1	15
AS-FCOPM Working mode	AS Remote Co	-		AS Remote Co	-	-
AS-FCOPM node ID	1			1	1	254
AS Remote module No.	1		unit	1	1	15
Select Run mode after detect remote mc	Run connectec	•		Run connecter	-	-

Turn the FORMAT1 knob to 0 and it is in AS Remote Communication Mode. In AS Remote Communication mode, an AS series CPU PLC can connect to as many as 15 AS00SCM-A modules, as long as they are all in RTU mode. The RTU station number should be set from 1 to 15 in numerical order. RTU mode and baud rate cannot be set via ISPSoft (HWCONFIG). Use the knob ID2 to set up Node ID and use the knob FORMAT2 to set up the baud rate. (The baud rate should be the same as the PLC's baud rate.)



FORMAT1: $0x0_h$ ID2: $0x1_h \sim 0xF_h$ FORMAT2: $0x1_h \sim 0x7_h$

Steps for a quick setup

- 1. Set up the PLC: AS Remote Communication mode, number of the device: 1; baud rate: 1000kbps; download the parameters.
- 2. Set up AS00SCM-A; set the ID1 knob to 0 and FORMAT1 to 0; ID2 knob to 1 and FORMAT2 to 7.
- 3. Supply power to AS00SCM-A and connect AS00SCM-A to the PLC with a CANopen cable.
- 4. Resupply power to the PLC and the indicator of CARD2 should keep blinking. That indicates AS00SCM-A and the PLC are connected. The PLC error indicator should be blinking too, since the setting is not done yet.
- 5. Use HWCONFIG to scan the connected devices to see if AS00SCM-A is connected.
- 6. Download the parameters and check if the PLC error indicator has stopped blinking. Then the setting of one RTU device is complete.

9.4.1.2 Delta Special Driver & AS Remote Mode

• Double-click the AS Series PLC, then in Device Setting click **Function Card 2 Setting** and set the function card 2 to AS-FCOPM, set to working mode to Delta Special Driver & AS Remote Mode and enter the number of the AS remote module and set up the baud rate. After the setting is done, download the parameters.

Parameter name	Value		Unit	Default	Minimum	Maximum
Card 2 Detect mode	Manual	•		Auto Detect	-	-
Manual Select Card	AS-FCOPM Care	¥		None	-	-
Card 2 ID No.	1			1	1	254
Protocol Setup Opportunity	Stop> Run	Ŧ		Stop> Run	-	-
Baud Rate	9600	▼	bps	9600	-	-
Data bit	7	▼	bit	7	-	-
Parity bit	Even	▼		Even	-	-
Stop bit	1	▼	bit	1	-	-
MODBUS mode	ASCII	▼		ASCII	-	-
Delay time to Reply	0		ms	0	0	3000
Received Data Timeout	200		ms	200	0	3000
F2AD Analog Input mode	0~10V	▼		0~10V	-	-
		1				
F2DA Analog Output mode	0~10V	▼		0~10V	-	-
F2AD Sampling Time	3		ms	3	3	15
F2AD Average Times	10			10	1	15
AS-FCOPM Working mode	Delta Special Dri	▼		AS Remote Com	i -	-
AS-FCOPM node ID	1			1	1	254
Number of remote module for ASDA	1			0	0	7
Select Run mode after detect remote module	Run connected r	▼		Run connected	1 -	-
AS CPU module keep or Stop when slave no	Only Show Error	Ŧ		Only Show Erro	1 -	-
Remote Communication time out	100		ms	100	0	3000
Re-connected Retry number after time out	60			60	0	255
Auto Retry connection after Disconnected	60		sec	60	0	255
AS-FCOPM Bit Rate	1000k	•	bps	125k	-	-

Turn the FORMAT1 knob to 8, and it is in Delta Special Driver & AS Remote Mode. In this mode, an AS series CPU PLC can connect to as many as 7 AS00SCM-A modules, as long as they are all in RTU mode. The RTU station number should be set from 9 to 15 in numerical order. RTU mode and baud rate cannot be set via ISPSoft (HWCONFIG). Use the knob ID2 to set up Node ID and use the knob FORMAT2 to set up the baud rate. (The baud rate should be the same as the PLC's baud rate.)



FORMAT1: $0x8_h$ ID2: $0x9_h \sim 0xF_h$ FORMAT2: $0x1_h \sim 0x7_h$

Steps for a quick setup

- 1. Set up the PLC: Delta Special Driver & AS Remote Modern mode, number of the device: 1; baud rate: 1000kbps; download the parameters.
- 2. Set up AS00SCM-A; set the ID1 knob to 0 and FORMAT1 to 8; ID2 knob to 9 and FORMAT2 to 7.
- 3. Supply power to AS00SCM-A and connect AS00SCM-A to the PLC with a CANopen cable.
- 4. Resupply power to the PLC and the indicator of CARD2 should keep blinking. That indicates AS00SCM-A and the PLC are connected. The PLC error indicator should be blinking too, since the setting is not done yet.
- 5. Use HWCONFIG to scan the connected devices to see if AS00SCM-A is connected.
- 6. Download the parameters and check if the PLC error indicator has stopped blinking. Then the setting of one RTU device is complete.

9.4.1.3 CANopen DS301 Mode

- This mode supports AS Series PLC acts as the CPU and the 3rd party CANopen DS301 devices (non-AS series devices and non-Delta PLC). When using Delta PLC as the CPU, you need to use CANopen Builder to set up.
- Before using a 3rd party PLC, use AS Series PLC as the CPU and select the AS Remote Communication Mode.
- Before connecting to CANopen DS301, turn the AS00SCM-A FORMAT1 knob to 4, and the adjustable range for station knob ID2 becomes 0x1h~0xFh. This mode is used to communicate with a Master PLC from other brand. See the detail in section 9.6.3. when the PDO data is mapped, AS00SCM-A can control the IO modules from its right side.
- Double-click the AS Series PLC, then in Device Setting click Function Card 2 Setting and set the function card 2 to AS-FCOPM, set to working mode to CANopen DS301.



FORMAT1: $0x4_h$ ID2: $0x1_h \sim 0xF_h$ FORMAT2: $0x1_h \sim 0x7_h$

Steps for a quick setup

- 1. Set up the PLC: in AS Remote Communication Mode, connect AS series PLC to AS00SCM-A, refer to section 9.4.1.1 for more details.
- Use AS series PLC to scan the I/O modules installed on the right-side of AS00SCM-A and download the parameters.
- If using HWCONFIG to set up the node ID, you can use COM mode to connect AS00SCM-A to the right-side of AS series PLC directly and no I/O module behind it. Use AS series PLC's HWCONFIG to scan and add AS00SCM-A in and then double-click the module to set up its node ID and then download the parameters. After that, knob ID2 to 0.
- 4. Install the I/O module to the right side of AS00SCM-A and turn the working mode to RTU.
- 5. Turn FORMAT1 to 4 and use the CANopen cable to connect to the PLC, and then supply power to AS series PLC.
- 6. Follow master's CANopen setting method to install the slaves.

Refer to section 9.6.3 PDO examples, if you are using AH10COPM-5A as the CPU.

9.4.2 EtherNet/IP Mode

AS-FEN02 can be installed on AS00SCM-A (firmware V2.02 or later). However AS00SCM-A+AS-FEN02 can only be used in RTU mode. That means this set can NOT be installed on the right-side of AS/AH PLC CPU; AS00SCM-A+AS-FEN02 can connect to AS PLC CPU via internet connection. You can use Delta PLC or the 3rd party EtherNet/IP device to control the right-side modules of the AS00SCM-A.

	AS-FEN02	AS00SCM-A
Compatible firmware versions	V1.00	V2.02
	V1.02	V2.04
	V1.03	V2.06

It is suggested to use ISPSoft V3.13 or later versions when AS00SCM-A+AS-FEN02 is used in remote mode with AS or AH PLC CPU. Use HWCONFIG V4.0 to set up EtherNet/IP for AS PLC CPU and use EIP Builder to set up EtherNet/IP for AH PLC CPU.

When AS00SCM-A+AS-FEN02 is used with the 3rd party EtherNet/IP Scanner, you need to set up the remote IO modules in EIP Builder (V1.06 or later). Go to Delta Official Website <u>Delta | Download Center (deltaww.com)</u> (steps: Select Product Category: Industrial Automation; Select Product Sub-Category: PLC- Programmable Logic Controllers; Select Series: AS Series; Filter: Electrical Parameter and click Submit and then find the EtherNet/IP EDS File: AS00SCM-RTU (AS-FEN02)) to download the EDS file and then install the downloaded EDS file in the EtherNet/IP software. Refer to the user manual of the 3rd party EtherNet/IP Scanner for more information.

Refer to section 10.2.7 for more details on the operations of AS-FEN02 installed on AS Series PLC.

9.4.2.1 LED Indicators

• AS00SCM-A acting as a remote module

LED Indicator	Description
CARD 1 LED indicator	Orange light blinking: when AS-FEN02 sends data to AS00SCM-A
CARD 2 LED indicator	Orange light blinking: when AS00SCM-A sends data to AS-FEN02
Error LED indicator (red)	Indicates if there is any error on the module OFF: the module is operating normally Blinking: an error has occurred or occurs on the module; refer to section 9.7 for more information.

AS-FEN02 installed on AS00SCM-A

LED Indicator	Description
	Indicates the status of the communication card
	Green light ON: the operation is normal
MS indicator	Green light Blinking: the setting is not complete
MS Indicator	Red light ON: internal communication failure, NOT being able to recover
	Red light Blinking: internal communication timeout
	OFF: no power
	Indicates the status of Ethernet connection
	Green light ON: a CIP connection is established
NS indicator	Green light Blinking: a CIP connection is not established
	Red light ON: duplicated IP address, after fixing this issue, resupply the
	power

LED Indicator	Description
	Red light Blinking: communication timeout / CIP connection is established after power-on / IP address change
	OFF: no power / network cable is not connected
	Indicates the status of Ethernet connection
LINK indicator X1/X2	Green light ON: a network connection is established
	OFF: a network connection is not established
	Indicates the status of Ethernet communication
ACT indicator X1/X2	Orange BLINKING: data transmission
	OFF: no data transmission

9.4.2.2 IP Setting Tool

AS-FEN02 can be installed on AS00SCM-A (firmware V2.02 or later) so that AS00SCM-A can act as a remote module. When the knob is set to 0, the IP address is 192.168.1.3 by default. If there are more than one AS00SCM-A in the system, you need to set up the IP addresses for them. Three methods for you to set up the IP addresses for AS-FEN02 installed on AS00SCM-A.

- Using knobs: Highly suggested. You can use ID2 and FORMAT2 knobs to set up the IP address.
 Hexadecimal format is used and ID2 corresponds to x16¹ and FORMAT 2 to x16⁰. The possible IP address is 192.168.1.x, x=1~FE (1~254).
- Using IP Manager Tool: You can find IP Manager Tool in HWCONFIG (V4.0 or later). If you need to use an IP address that is NOT part of 192.168.1.x, you can use IP Manager Tool to set up the IP address. This tool uses MAC address to recognize the identities of different devices and thus the IP duplication is allowed. It is very useful when you need to edit the IP addresses of multiple devices at the same time, as long as you know the MAC address of each device. Check the sticker on the AS-FEN02 communication card for the MAC address.
 - 1. Open EIP Builder and add AS00SCM (RTU) + AS-FEN02 to your network. Make sure all four knobs on the AS00SCM-A (remote module) are turned to 0. And then connect to your computer via Ethernet.
 - AS-FEN02 (FW V1.02.40 or later) supports IP Manager Tool from the Tool on the tool bar to scan for the device for IP address setup. You can also edit the devices in different network segments. For example, the IP address of the device by default is 192.168.1.3 but the IP address of the computer is 192.168.10.5. You can use IP Setting Tool to edit the device IP address.



3. If you are using a non Delta EtherNet/IP device as a scanner (master), you need to use EIP Builder. Open EIP Builder and select **IP Manager** from the **Tool** on the tool bar.



4. Select the adapter type and click **IP Search** or **Broadcast Search** and then you can edit the parameters. After the editing is complete, select the device you'd like to download and then click **Download**.

ype: 1 Ethernet dapter: Intel(R) Ethernet Connection (2) I219-LM Communication Setting	Count 4 Broadcast Searc
ommunication Setting	
IP Address Description Device Passwo_ IP Configuration Netmask Gateway MAC Address Progress	Result
Image: Page 188.1.5 AS-FEN02 AS-FEN02 Static + 255.255.255.0 192.168.1.1 00:18.23:3D:4_ 0%	
☑ 192.168.1.107 CMC-EIPO2 Unknown Device(
✓ 192.168.1.108 AS-FEN02 Static ~ 255.255.255.0 192.168.1.1 00.18:23:3D:4_ 0%	
✓ 192.168.1.106 CMM-EIP03 Unknown Device(

5. Using **IP Setting Tool** to change the IP setting mode to DHCP. And after that you can go to **IP Manager** to set up the correspondences between the specific MAC address and specific IP address. Follow the steps below for DHCP setup.

- Using DHCP: Besides using **IP Manager Tool** to set the IP setting mode to DHCP mode, you can also use knob to set the mode to DHCP.
 - 1. When both ID1 and FORMAT 1 are set to 0 and both ID2 and FORMAT 2 are set to F, IP setting mode is in DHCP mode. And then use Ethernet to connect to your computer.
 - 2. Open EIP Builder and select IP Manager from the Tool on the tool bar.
 - 3. Click **Stop the Server** and then select a suitable **Network Interface**. Click **Start the Server** to complete the setting. After that, you need to turn the power OFF and then ON so that the devices will send DHCP requests to the computer.

IP Manager			—		×
Stop the Server	Network Interface	Intel(R) Ethernet Connection (2) I219-LM	Л		
		169.254.121.198	Net	twork Sett	ings
Table of Requesting Device	s				
Clear List					

4. Check the device in the DHCP request form to assign the IP address to its corresponding MAC address. You can also export the corresponding table. After the assignment is complete, you can see the result in the status section.

Туре	MAC Address	Status
DHCP	001823451278	IP assign success, IP : 192.168

5. After IP setting is complete, you can decide whether to disable DHCP function or not. If the system is in the absence of a DHCP server (or use IP Setting Tool only for once), it is suggested to use IP Setting Tool to change the IP setting mode to static mode. If the system includes a DHCP server, it is suggested to keep the IP setting mode in DHCP mode. Whenever the power of the remote module is OFF, the system clears all the IP parameters and sends DHCP request out whenever the power of the remote module is ON to make sure the DHCP server is working.

9.4.2.3 Connecting to Delta PLC Scanner through ISPSoft

Through EIP Builder, an AS Series PLC (when acting as a scanner) can create an EtherNet/IP connection to AS00SCM-A when AS-FEN02 is installed (AS00SCM-A + AS-FEN02 = ASRTU). Below shows an example of AS Series PLC acting as a scanner to create an EIP connection via ISPSoft V3.13. It is suggested to use ISPSoft V3.13 or later or you can use EIP Builder to set up. Refer to section 9.6.4 for more information on Remote IO Applications (AS-FEN02).

- 1. Connect your AS PLC CPU, ASRTU and computer through EtherNet/IP. Set up the IP addresses for AS PLC CPU and ASRTU and make sure they are in the same network.
- 2. Open Project: Open HWCONFIG through ISPSoft and click AS PLC CPU to see the EtherNet/IP setting option. Click it to open the setting page.

Hardware Configuration (Device 0) # ×
💼 Reset Configuration 🚦 Show Information 💩 Input/Output Device Rearrange 🛄 Show HWCONFIG Table 📑 EtherNet/IP
Remarks:

3. Scan the network to add ASRTU in EIP Builder.



4. Establish a connection: Right-click anywhere on the blank area to see the Fast Connect option and then click it to open the setting page. Click OK to connect. When ASRTU is connected to AS PLC CPU, its right side IO modules are also connected.

Etherive		📅 Fast Connect	*
	Unined	⊴ Select Al	Connect to Network_0 *
	A\$332P-A	Station Name	Comment
	192.168.1.13	Port No.0 (192.168.1.13)	Already connected to Networ
Network_0		- ≥ Dev_0 * -Port №.0 (192.168.1.108)	
	192.168,1.100		
	Dev_0 (RTU Configuration 😻	1	OK Canoel



 Set up module: Go back to HWCONFIG and Click ASRTU to see the RTU Configuration (Dev_0) option and then click it to open the setting page for the right-side modules, ASRTU and the handlings after the connection lost. Refer to section 9.4.3 for more information on Remote Module Setting.



6. Data Exchange: Go to EtherNet/IP setting page and click Show Data Exchange option to see the setting page.

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- 7. Download: Use the function button **Download** under the **Communication** tab in EtherNet/IP setting page to download the EtherNet/IP parameters. Make sure you are in the setting page of EtherNet/IP.
- Check the connection: Click the function button On-line Mode under the Communication tab in EtherNet/IP setting to check the EtherNet/IP connection status.
- HWCONFIG Table Synchronization: After setting is complete, you can synchronize the devices used by ASRTU with ISPSoft.

1) Open HWCONfIG Table.

2) You can edit the identifier one by one or click Set All Identifiers to set all identifiers at one time.

Description	Data Type	Device Range	Identifie
Hardware Configuration			
+ CPU Group			
EtherNet/IP			
- Dev_0 (192.168.1.108)			
- Module:1 Device: AS005CM-A			
RTU Error Code	WORD	D29000	NIO_Dev_0_1_0_RTU_Error_Code
IO Module Error Code	ARRAY [8] OF WORD	D29001 - D29008	NIO_Dev_0_1_0_IO_Module_Error_Code
RTU Operation Status	WORD	D29009	NIO_Dev_0_1_0_RTU_Operation_Status
- Module:2 Device: AS08AN01R-A			
CH0 ~ 7 Output status	ARRAY [8] OF BOOL	Y1.0 - Y1.7	DIO_Dev_0_1_1_CH0_7_Output_status
- Module:3 Device: AS04DA-A			
Error code	ARRAY [2] OF WORD	D29040 - D29041	AIO_Dev_0_1_2_Error_code
CH1 Output	ARRAY [2] OF WORD	D29042 - D29043	AIO_Dev_0_1_2_CH1_Output
CH2 Output	ARRAY [2] OF WORD	D29044 - D29045	AIO_Dev_0_1_2_CH2_Output
CH3 Output	ARRAY [2] OF WORD	D29046 - D29047	AIO_Dev_0_1_2_CH3_Output
CH4 Output	ARRAY [2] OF WORD	D29048 - D29049	AIO_Dev_0_1_2_CH4_Output
- Module:4 Device: AS06XA-A			
Error code	ARRAY [2] OF WORD	D29060 - D29061	AIO_Dev_0_1_3_Error_code
CH1 Input	ARRAY [2] OF WORD	D29062 - D29063	AIO_Dev_0_1_3_CH1_Input
CH2 Input	ARRAY [2] OF WORD	D29064 - D29065	AIO_Dev_0_1_3_CH2_Input
CH3 Input	ARRAY [2] OF WORD	D29066 - D29067	AIO_Dev_0_1_3_CH3_Input
CH4 Input	ARRAY [2] OF WORD	D29068 - D29069	AIO_Dev_0_1_3_CH4_Input
CH1 Output	ARRAY [2] OF WORD	D29070 - D29071	AIO_Dev_0_1_3_CH1_Output

3) Go to ISPSoft -> Global Symbols -> HWCONFIG Table: right-click anywhere on the blank area to see and click the option **Synchronize with HWCONFIG**. After the synchronization is complete, ASRTU devices are shown in array and available to be used in PLC program.

9.4.2.4 Parameters Used in Data Exchange

You can use parameters including RPI and Timeout to ensure a stabilized communication.

- **RPI (Requested Packet Interval):** The value here is to set how often to renew the data between the Scanner and Adapter cyclically and thus increase the value here can lower the risk of EtherNet/IP Scanner network overload. Whenever a connection lost error occurs, you can edit the setting here to troubleshoot.
- **Timeout:** Set the timeout time according to the RPI or the multiple of RPI (RPI*X). This is used to determine if the connection between the scanner/adapter and the remote device is lost. Increase the value here can longer the waiting time for the remote device to respond. It is useful when the remote device is busy. But by increasing the value here can NOT solve the problem of network overload.

9.4.2.5 Connecting to Delta AH PLC Scanner through ISPSoft

Through EIP Builder, an AH Series PLC (when acting as a scanner) can create an EtherNet/IP connection to AS00SCM-A when AS-FEN02 is installed (AS00SCM-A + AS-FEN02 = ASRTU). Below shows an example of AH Series PLC acting as a scanner to create an EIP connection via ISPSoft V3.13. It is suggested to use ISPSoft V3.13 or later or you can use EIP Builder to set up. Refer to section 9.6.4 for more information on Remote IO Applications (AS-FEN02).

- 1. Connect your AH PLC CPU, ASRTU and computer through EtherNet/IP. Set up the IP addresses for AH PLC CPU and ASRTU and make sure they are in the same network.
- 2. Open Project: Open HWCONFIG through ISPSoft and click AH PLC CPU to see the EtherNet/IP setting option. Click it to open the setting page.

Hardware Config	juration (Device 0) 😕 🛪
🛱 Reset Config	guration 🚦 Show Information 🐵 Input/Output Device Rearrange 📑 EIP Builder 📑 Firmware Update Tool
Remarks:	

3. Scan the network to add ASRTU in EIP Builder. Drag the red block and drag it to the same network (Network_0) as the AH Series PLC does. Double-click ASRTU to open HWCONFIG and set the parameters for ASRTU.

Project Tree 🏾 🕈	Network View # × Network_0									
AH500	Linnas	🕌 <u>F</u> ile	1 (AS00SCM(R Edit Option	Help						
Dev_1 (AS00SC	-EN			919	97 3 8	To Can	ner: Untitled (P	(0)		_
- Not Connected		Product List								
	Network_0	🕀 Digi	ies tal I/O Module log I/O Module				04 06 DA XA	+		
Untitled (AHCPL Dev_1 (AS00SC Not Connected Work List Water State			U							
	A5005C3 3.TU (A5-									
		CPU Group			-	L.		*		-
		Extension	Type	Module	DDF V	Input Devi	Output De	RPI (ms)	Multicast	Ti
		Power	M					-	-	-
		S E Remote	el Function C	AS00SCM	02.02.00	D0~D29	$D30 \sim D49$	10	Point-to-Po	RP
		Fun								

9-40

4. Data Mapping

etwork View 😐 🛪	Network_0
	AHCRU331 -EN
	Delete the Station
Network_0	Data Mapping
	A5009036 RTU(AS-FE
	i a

5. You can drag and drop ASRTU from the Product List on the right to add it into the Network View even when it is in off-line mode.



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- 6. After the settings are complete, click the **Downloader** icon and then select the parameters that you'd like to download. Parameters include:
- RTU parameters: all the parameters set in RTU-HWCONFIG in the previous step
- Data Exchange: data mapped from the RTU right-side modules of AS00SCM-A to the PLC

iect Tree P	Net	work View # X Network_0			
AH500	1 P	roject Downloader			Σ
Kode Connected HCPL Mode		Select All			3
Dev_1 (AS00SC		Name	Status	Comment	
Not Connected	•	✓ ✓ Untitled			
		✓ ✓ Network_0			
		✓ ☑ Dev_1 (AS00SCM-RTU(AS-FEN0			
		✓ ✓ RTU Parameters			
		RTU Settings			
		Ethernet-Basic			
		Ethernet-Advance			
		✓ ☑ Data exchange			
	Ī	Untitled (P0)			
		✓ Unttied (P0)			
		✓ Unttled (P0)			5 3

9.4.2.6 Connecting to 3rd Party PLC Scanner through EIP Builder

Through EIP Builder, a 3rd party PLC (when acting as a scanner) can create an EtherNet/IP connection to AS00SCM-A (when AS-FEN02 is installed). Use the 3rd party PLC to connect to the computer and open EIP Builder to edit the right side modules of AS00SCM-A.

- Editing via EIP Builder:
- 1. You can manually or scan the network to add the AS00SCM (RTU) + AS-FEN02 to the network. Click the remote module to open RTU-HWCONFIG to scan and download the parameters of the right side modules of AS00SCM-



🕌 Dev_1 (AS00SC	M(RTU) + FEN02)	RTU HWCONFIG		_		×
<u>File Edit Option</u>	n <u>H</u> elp				- é	5 ×
🔳 🗶 🗈 🧿	🍠 💀 😨 🎇 🏗	¢				
Product List						
Specification Conversion time = 2ms/ct	;input:		+			
CPU Group						
Extension No	Type	Module Name	DDF Version	Comment		
Power Module						
Remote Module	Function Card	AS00SCM(RTU) + AS-	F. 02.02.00			
Function Card1						
Function Card2						
Module Information1	Digital I/O Module	AS16AP11P-A	01.00.00			
Module Information2	Analog I/O Module	AS04DA-A	01.00.00			
Module Information3	Analog I/O Module	AS04AD-A	01.00.00			
		Offline U	indefined Driver			

2. Write down the information in Normal Exchange Area. This is the working order for the 3rd party device to perform the data exchange. Use AS04DA-A as an example, the first input value is the error code. (all of the module error codes are the input values; the exchange direction is from remote module inputs to scanner) the 1st value is the value in channel 1; the 2nd value is the value in channel 2 and so forth. The unit is the length of 2 words.

- AS04DA-A	Device Information Normal Exchange A	Irea	
CH1~CH4 Mode setting CH1~CH4 Calibration	Description	Address	
	▶ Error code	D40~D41	
OutPut Setting	CH1 Output	D42 ~ D43	
Alarm settings	CH2 Output	D44 ~ D45	
	CH3 Output	D46 ~ D47	
	CH4 Output	D48 ~ D49	
Default Import	Export Update		
		OK	

- Before you begin, you need to go to <u>www.deltaww.com</u> to download EDS file.
 - 1. Use EDS Hardware Installation Tool to install the EDS file of ASCPU (AS-FEN02).
 - 2. Right-click **Ethernet** to see the context menu and click **New Module** to add a new device in. After that, you can set up the parameters, including instance for input and output, data length and more. For AS-FEN02 with firmware V1.03 or later, you can open the ASRTU webpage to check the data.

	I/O Connection	Input	Output
	Instance	101	100
	Total size (INT)	54	- 39
Extension No.	Module name	Input offset	Output offset
RTU module	AS00SCM-A	0 - 29	0 - 19
- Function card	AS-FEN02		
Module 1	AS08AM10N-A	30 - 30	
Module 2	AS16AP11R-A	31 ~ 31	20 ~ 20
Module 3	AS04AD-A	32 - 51	
Module 4	AS04DA-A	52 - 53	21~38

3. After the setting is complete, you can use the module data according to the offset values shown in the webpage. Input data 0-29 and output data 0-19 are the parameters of AS00SCM-A. Refer to the Normal Data Exchange area from RTU-HWCONFIG for more corresponding data information.

9.4.2.7 Network Security

To enhance security and performance of the system, it is suggested to use closed network or LAN with firewall protection to prevent cyber-attacks.

9.4.3 Remote Module Setting

- Double-click AS00SCM-A -> AS remote module in Device Setting and click AS Serial Remote Module. To set up the remote module in RTU mode, set the function card type 2 to AS-FCOPM, AS-FEN02 or AS-FPFN02.
- 2. For AS00SCM-A with firmware V2.04 or previous versions, parameter-downloading for ASRTU is connection lost. If the handling of lost connection is all the I/O modules stop running (default), you need to turn the power off and then on again after downloading is complete.

- AS00SCM-A	AS Serial Remote Module Setting						
AS Serial Remote Module S	Parameter name	Value		Unit	Default	Minimum	Maximum
	Master Disconnected Handling	IO Module STOP	-		IO Module STO) -	-
	Master Reconnected Handling	IO Module STOP	•		IO Module STO) -	-
	IO Module Alarm Handling	IO Module STOP	•		IO Module STO) -	-
	IO Module timeout Handling	IO Module STOP	•		IO Module STO) -	-
	Setting delay time to detect IO module	15		0.1sec	15	15	200
	د						>

For the following four situations, you can either stop I/O module (all I/O modules stop running) or keep I/O module running (all I/O modules keep the same state).

- 1) When a Scanner (Master) connection is lost
 - I/O modules stop running: all I/O modules stop running
 - I/O modules keep the same state: all modules keep running
- 2) When a Scanner has reconnected after the connection lost
 - I/O modules stop running: all I/O modules stop running
 - I/O modules keep the same state: all modules keep running
- 3) When an alarm occurs in an I/O module
 - I/O modules stop running: all I/O modules stop running (after resupply power to resume running)
 - I/O modules keep the same state: all modules keep running
- 4) When an I/O connection is lost
 - I/O modules stop running: all I/O modules stop running (after resupply power to resume running)
 - I/O modules keep the same state: all modules keep running

AS Series Module Manual

Procedure	Settings (RTU)	Digital & Analog Input Modules	Digital Output Modules	Analog Output Module (I/O Module Settings)		
					Keep	
Master connection	I/O module stops running	Cannot update data on the master	Output value = 0	Output value = 0	No change to the output value	
lost	I/O module keeps the same state		No change to the output value			
Master has reconnected after	I/O module stops running	Keep updating data on the master	Output value = 0	Output value = 0	No change to the output value	
connection lost.	I/O module keeps the same state		Output value = output value of the master			
Alarm in I/O	I/O module stops running	No change to the output value	Output value = 0 Output value = 0		No change to the output value	
module (Ex. module is broken)	I/O module keeps the same state	Other functional modules: keep updating data on the master	Other functional modules: output value = output value of the master			
I/O connection	I/O module stops running	No change to the output value	Output value = 0	Output value = 0	No change to the output value	
lost (Ex. unstable connection)	I/O module keeps the same state	Other functional modules: keep updating data on the master		functional modul		

• Module configurations: refer to Section 9.1.2 in the AS Series Operation Manual.

• Module setups: refer to other chapters in the AS Series Module Manual.

9.5 Normal Exchange Area

1) COM mode

neral Data Exchange						
AS00SCM-A	Device Information	Normal Exchange Area				
Function Card1 Setting		Description	Address			
Function Card 2 Setting	+ - Input					
	Error Coo	e	D28000			
	Reserved		D28001			
	Card 1 D	ata Exchange State (item 1~32) (0:none/fail, 1:success)	D28002 - D28003			
	Card 2 D	ata Exchange State (item 1~32) (0:none/fai, 1:success)	D28006 - D28007			
	Card 1 U	D Link State (0:none/processing, 1:finshed)	D28010			
	Card 2 U	D Link State (0:none/processing, 1:finshed)	D28011			
	- Output	- Output				
	Card 1 D	ata Exchange Mode Control (0:none, 1:once, 2:always)	D28020			
	Card 2 D	ata Exchange Mode Control (0:none, 1:once, 2:always)	D28021			
	Card 1 D	ata Exchange Trigger (item1~32) (0:no trigger, 1:trigger)	D28022 - D28023			
	Card 2 D	ata Exchange Trigger (itme1~32) (0:no trigger, 1:trigger)	D28026 - D28027			
	Card 1 U	D Link Group ID Trigger	D28030			
	Card 2 U	D Link Group ID Trigger	D28031			

The examples above shows that AS00SCM-A is installed as the first module on the right side of AS PLC CPU; note that the Normal Exchange Area shows the corresponding data registers of the module and the PLC.

- Module Status: 0 = stop, 1 = run
- Error Code: refer to Section 9.7 for more information.
- Card 1 & Card 2 Data Exchange State: occupies 4 data registers (32-bit data); each bit 1–32 represents the state of the corresponding data point 1–32 to be exchanged: 0 = none/fail, 1 = success.
- Card 1 & Card 2 Data Exchange Mode Control: set the data register to 0: none, 1: once, 2: always.
- Card 1 & Card 2 Data Exchange Trigger: occupies 4 data registers; each bit 1–32 represents the state of the corresponding data point 1–32 to be exchanged: 0 = no trigger, 1 = trigger.
- Card 1 & Card 2 UD Link Group ID Trigger: set the group ID to be triggered.

2) RTU Mode: (AS Series PLC acting as a Scanner)

AS00SCM(RTU) + AS-FEN02 AS Serial Remote Module S	Device Information Normal Exchange Ar	ea	
-Ethernet Port Basic Setting	Description	Address	
Ethernet Port Advance Sett	RTU Error Code	D29000	
	IO Module Error Code	D29001 ~ D29008	
	RTU Operation Status	D29009	
▶			

- RTU Error Code: refer to Section 9.7 for more information.
- I/O Module Error Code: refer to the I/O module manual for more information.
- RTU Operation Status: 0 = communication module stop, 1 = communication module run

3) RTU Mode: (AH Series PLC acting as a Scanner)

AS00SCM(RTU) + AS-FEN02 AS Serial Remote Module S	Device Information Normal Exchange Area	
Ethernet Port Basic Setting	Description	Address
Ethernet Port Advance Sett	▶ RTU State	D0
	RTU Error Code	D1 ~ D2
	Reserved	D3 ~ D9
	Power State	D10
	IO Module State	D11
	Reserved	D12~D15
	IO Module Error Code	D16~D23
	RTU Operation State	D24
	Reserved	D25 ~ D29
٠ • • • • • •		

- RTU State: 0 = communication module is working fine, 1 = communication module is NOT working fine.
- RTU Error Code: refer to Section 9.7 for more information.
- Power State: 0 = power error, 1 = power normal
- I/O Module State: each I/O module uses 1 bit to show its status (0 = normal, 1 = not running normally)
- I/O Module Error Code: refer to the I/O module manual for more information.
- RTU Operation State: 0 = communication module stop, 1 = communication module run

9.6 Application

9.6.1 Modbus

This section introduces how to use the Modbus protocol to connect the AS00SCM-A to other Delta industrial products such as human-machine interfaces, temperature controllers, programmable logic controllers, AC motor drives, and servo motors.

9.6.1.1 Modbus Slave – Connection to Delta Products

The following table shows the slave station supports the following function codes and their corresponding addresses.

Function Code	Attribute	Addresses Supported
		16#0000–16#0063
0x03	Deed	16#0100–16#0163
0x04	Read	16#0200–16#0263
		16#0300–16#0363
0x06		16#0000–16#0063
0x10	Write	16#0200–16#0263
		16#0000–16#0063
	Deed	16#0100–16#0163
	Read	16#0200–16#0263
0x17		16#0300–16#0363
		16#0000–16#0063
	Write	16#0200–16#0263

The structures:

Example of a slave structure: HMI (master station) → AS-F485 + AS00SCM-A COM1 (slave station)

Product	Slave ID	Communication protocol	Device from which data is read	Register in the CPU module	Device into which data is written	Register in the CPU module
HMI	5	9600, RTU, 8, E, 1	16#0100	D26100	16#0000	D26000

If the AS00SCM-A functions as a Modbus slave, you need to set a slave ID and baud rate.

1) Drag to add AS00SCM-A in the system configuration area. Make sure the knob of AS00SCM-A is turned to COM mode and no power connected to it.



2) Click the I/O Scan button to make the system read the module's current configuration. The PLC assigns the input and output device ranges.



Function card	Device from which data is read	Register in the CPU module	Device into which data is written	Register in the CPU module
Function card 1	16#0000	D26000	16#0100	D26100
Function card 2	16#0200	D26200	16#0300	D26300

3) Double-click the SCM module to open the configuration settings.

Eile Edit Option Help			- 8 X
EX0099999	× 5 ¢		
Product List			
A \$300 Digital I/O Module Metwork Module Network Module Storm Kodule Network Module Power Module Power Module	+		
levice Setting			
Options Data Exchange -COM1	Data Exchange -COM	12	
E AS00SCM-A COM1 Setting COM2 Setting	Device Informatio Device Name Description Comment DDF Version Firmware Version	n Normal Exchange Area AS00SCM-A Serial communication module, MODBUS, UD Link protocol (COM. mode), Remote 10 control(RTU mode) Current consumption.22mA 00.33.00	
Default Import	Export	Jpdate	OK

4) Set the communication protocol values for COM1 using the HMI settings.

COM1 Setting COM2 Setting	Parameter name	Value	Unit	Default	Minimum	Maximum
oom setting	Function Card Type	AS-F485	-	None	-	-
	Protocol	MODBUS RTU	-	None	-	+
	Data Exchange Enable				+	-
	ID	1		1	0	247
	Baud Rate	9600	🔻 bps	9600	-	-
	Format	8E1		7E1	-	-
	Delay time to Reply	0	ms	0	0	10000
	Retry times	0		0	0	10
	Received Data Timeout	3000	ms	3000	0	60000
Default Import	Export Lipitare					

5) Click the Download button to download the parameters to the AS00SCM-A.

	借 Untitle	d0 -	HWCON	FIG		_		
		È	00	8	5		10	\$
ĺ	🚰 <u>F</u> ile	Edit	Option	Help				

NOTE: Double-click the module to open the Device Setting dialog box to configure the parameters.

9.6.1.2 Modbus Master – Connection to Delta Products

This section introduces how to use COM2 to connect the AS00SCM-A to other Delta industrial products such as programmable logic controllers, AC motor drives, and servo motors.

The structures:

Example of a master structure: AS-F485 + AS00SCM-A COM2 (master station) → VFD, ASDA, and DVP series PLC

Product	Slave ID	Communication protocol	Device from which data is read	Register in the CPU module	Device into which data is written	Register in the CPU module
VFD	10	38400, ASCII, 7, E, 1	16#2103	D26200	16#2000 16#2001	D26300- D26301
ASDA	11	38400, ASCII, 7, E, 1	16#0101	D26210	16#0101	D26310
PLC	12	38400, ASCII, 7, E, 1	D100-D109	D26220- D26229	D200-D204	D26320- D26324

If the AS00SCM-A is functioning as a Modbus master, you need to set a slave ID and baud rate.

1) Drag to add AS00SCM-A in the system configuration area. Make sure the knob of AS00SCM-A is turned to COM mode and no power connected to it.



- Device Setting Options Data Exchange -COM1 Data Exchange =COV2 ■ AS00SCM-A - COM1 Setting - COM2 Setting COM2 Setting Parameter name Value Unit Default Minimum Maximum Function Card Type None ¥ None AS-F232 AS-F422 Export Update Default Import OK.
- 2) Double-click COM2 Setting and set the Function Card Type to AS-F485.

3) Click the I/O Scan button to make the system read the module's current configuration. The PLC assigns the input and output device ranges.

L.		3399				
Pro	duct List					
	A S300 Digital I/O Modu Analog I/O Modu Network Module A S00S CM-4 Power Module	ule e	+ C		*	
Se	rial communication ODBUS, UD Lin	ion module, k protocol	-			
(C	OM. mode), Ren IU mode)	note IO control	-			
(C (R			-	6	•	
(C (R	TU mode)	Type	Module Name	DDF Version	V	Output Devíce Ra.
(C (R CP	TU mode) U Group		Module Name	DDF Version		Output Device Ra.
(C (R CP	TU mode) U Group Extension No		Module Name AS332P	DDF Version 01.00.00		Output Device Ra Y0.0 ~ Y0.15
(C (R CP	TU mode) U Group Extension No Power Module CPU Module Function Card	Туре			Input Device Range	
(CR	TU mode) U Group Extension No Power Module CPU Module Function Card Function Card	Type CPU Module	AS332P	01.00.00	Input Device Range X0.0 ~ X0.15	Y0.0 ~ Y0.15
(CR	TU mode) U Group Extension No Power Module CPU Module Function Card Function Card Module Informatic	Type CPU Module			Input Device Range	
(CR	TU mode) U Group Extension No Power Module CPU Module Function Card Function Card	Type CPU Module Network Module	AS332P	01.00.00	Input Device Range X0.0 ~ X0.15	Y0.0~Y0.15

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4) Double-click the SCM module to open the configuration settings.

Eile Edit Option Help			- E X
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Product List			
A S300 Digital I/O Module Digital I/O Module Network Module A S005 CM-A Pover Module	+		
Device Setting			
Options Data Exchange -CO	M1 Data Exchange -COM	12	
■ AS00SCM-A COM1 Setting COM2 Setting	Device Informatio	n Normal Exchange Area AS00SCM-A	
	Description	Serial communication module, MODBUS, UD Link protocol (COM. mode), Remote IO control(RTU mode) Current consumption:22mA	
	Comment	1	
	DDF Version	00.33.00	
	Firmware Version		
	Hardware Version		
Default Import	Export	Update	
			OK

5) Set the communication protocol values for COM2:

ASDOSCM-A COM1 Setting	COM2 Setting Parameter name	Value	Unit	Default	Minimum	Maximum
COM2 Setting	Function Card Type	AS-F485	* Onic	None	-	-
	Protocol	MODBUS ASC		None	-	-
	Data Exchange Enable					-
	ID	1		1	Û	247
	Baud Rate	38400	🔫 ops	3600	-	-
	Format	7E1	-	7E1	10	-
	Delay time to Reply	0	ms	Ð	đ	10000
	Retry times	0		0	Û	10
	Received Data Timeout	8000	ms	3000	0	60000
Default Import	Export Update					OK

6) Set up the data exchange table: select **Data Exchange – COM2** and click **Add** to create a new Data Exchange Setup table.

	ally scan singe Setup	laves, when the first time			М	ode Alway	s Enable	
Item	Enable	Remote Station Address	Local Address		Remote Address	Quantity	Add	
		1	D26200		D0			
			D26300	>>	D0	1	Move Up	
							Move Down	
							Delete	
							Dutt	
							Copy	

7) In the Data Exchange Setup table double-click an item to edit its settings.

The Shortest Update Cycle (ms)	Slave Address
Connection Timeout (ms) 50 F Apply to all Support Read/write synchronization (Function Code: 0x17)	Remote Device Type AS300 series
Local Start Address D26200 ~ D26299 D Register ✓ 26200 . 9	Remote Start Address D0 ~ D29999 Quantity (word) D Register 0 1
Local Start Address D26300 ~ D26399	Remote Start Address D0 ~ D29999 Quantity (word) D Register 0 0

• Select Standard Modbus Device as the Remote Device Type, enter the parameters, and check Enable.

Product	Slave ID	Communication protocol	Device from which data is read	Register in the CPU module	Device into which data is written	Register in the CPU module
VFD	10	38400, ASCII, 7, E, 1	16#2103	D26200	16#2000 16#2001	D26300- D26301

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✓ Enable The Shortest Update Cycle (ms) 10 √ Apply to all	Slave Address 10	
Connection Timeout (ms) 50 🕢 Apply to all Support Read/write synchronization (Function Code: 0x17)	Remote Device Type Standard Modbus Device 💌	
Local Start Address D26200 ~ D26299	Remote Start Address (Hex) 0 ~ FFFF Quant	tity (word)
D Register 26200 . 0	MODBUS Register Hex 2103 0	1
Local Start Address D26300 ~ D26399	Remote Start Address (Hex) 0 ~ FFFF Quant	tity (word)
		the second se

• Select **Standard Modbus Device** as the **Remote Device Type**, enter the ASDA parameters, and check **Enable**.

Product	Slave ID	Communication protocol	Device from which data is read	Register in the CPU module	Device into which data is written	Register in the CPU module
ASDA	11	38400, ASCII, 7, E, 1	16#0101	D26210	16#0101	D26310

m2	
 ✓ Enable The Shortest Update Cycle (ms) 10	Slave Address 11
Connection Timeout (ms) 50 Image: Connection Code: 0x17 Support Read/write synchronization (Function Code: 0x17)	Remote Device Type Standard Modbus Device
Local Start Address D26200 ~ D26299 D Register 26210	Remote Start Address (Hex) 0 ~ FFFF Quantity (word) MODBUS Register Hex 101 0
Local Start Address D26300 ~ D26399 D Register 26310	Remote Start Address (Hex) 0 ~ FFFF Quantity (word) MODBUS Register Hex 101 1
	OK Cancel

• Select PLC devices as the Remote Device Type, enter the PLC parameters, and check Enable.

Product	Slave ID	Communication protocol	Device from which data is read	Register in the CPU module	Device into which data is written	Register in the CPU module
PLC	12	38400, ASCII, 7, E, 1	D100-D109	D26220- D26229	D200-D204	D26320- D26324
		Slave Address 12				
--	---	---				
The Shortest Update Cycle (ms) 10 🛛 🖂 Apply to all						
Connection Timeout (ms) 50 🔽 Apply to all						
□ Support Read/write synchronization (Function Code: 0x17)		Remote Device Type DVP EH3/SV2/SE				
Local Start Address D26200 ~ D26299	-	Remote Start Address D0 ~ D11999 Quantity (word)				
Local Start Address D26200 ~ D26299 D Register	+	Remote Start Address D0 ~ D11999 Quantity (word) D 100 10				
	+					

8) Select Always Enable in the Mode.



NOTE: If the Data Exchange Mode Control is set by the program, you can check and control the register address on the Normal Exchange Area page. The following example shows when writing "2: always" to D28021, it indicates Card 2 is always the one to perform data mapping.

⊟- AS00SCM-A COM1 Setting	Device Information Normal Exchange Area	
COM2 Setting	Description Address	
	Module Status D28000	
	Error Code D28001	
	Card 1 Data Exchange State (item 1~32) (0:none/fail, 1:success) D28002 ~ D28005	
	Card 2 Data Exchange State (item 1~32) (0:none/fail, 1:success) D28006 ~ D28009	
	Card 1 Data Exchange Mode Control (0:none, 1:once, 2:always) D28020	
	Card 2 Data Exchange Mode Control (0:none, 1:once, 2:always) D28021	
	Card 1 Data Exchange Trigger (item1~32) (0:no trigger, 1:trigger) D28022 ~ D28025	
	Card 2 Data Exchange Trigger (itme1~32) (0:no trigger, 1:trigger) D28026 ~ D28029	
	Card 1 UD Link Group ID Trigger D28030	
	Card 2 UD Link Group ID Trigger D28031	

9) Download the parameters to the AS00SCM-A.

	🐣 Ur	title	d0 -	HWC	ON	FIG				
		Х	È	a :	9	8	5	9	16	\$
Í	<u> 1</u>	ile	Edit	Opti	on	Help				

If you set Mode to Always Enable, the data exchange begins immediately after downloading the parameters.

If you set Mode to Program Control, the program starts the data exchange after downloading the parameters.



9.6.2 UD Link

This section introduces how to use a non-Modbus RS485 communication port on the AS00SCM-A to connect to other industrial products.



RS485

9600, 7, E, 1

Communication with a slave

Packet to Send (→)	Packet to Receive (←)	Description
POS, xxx, yyy	POS, ACT	xxx and yyy are coordinates (0–999)

1) Drag to add AS00SCM-A in the system configuration area. Make sure the knob of AS00SCM-A is turned to COM mode and no power connected to it.



2) Double-click the SCM module to open the configuration settings.

Eile Edit Option Help			_ 8 X
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Product List			
A\$300 Digital I/O Module Analog I/O Module Network Module A S005 CM-A Power Module			
Device Setting			
Options Data Exchange -COM	11 Data Exchange -00M	112	
AS00SCM-A COMI Setting COM2 Setting	Device Information Device Name Description Comment DDF Version Firmware Version Hardware Version	AS00SCM-A AS00SCM-A Serial communication module, MODBUS, UD Link protocol (COM. mode), Remote IO control(RTU mode) Current consumption:22mA 00.33.00	
DefaultImport	Export	Update	ОК

3) Select **AS-F485** as the **Function Card Type** for COM1.

vice Setting				-	
Options D: Concernent	All the second				
	11 Setting				
COM1 Setting COM2 Setting	Parameter name	Value	Unit	Default Minim	um Maximum
	clion Card Type	None	🐨 - Na	cne -	
		None AS-F232 AS-F422 AS-F422			
Dafault Import Fr					
	port	1 Init	Default	Minimum	OK.
Parameter name	Value	Unit	Default	Minimum	
Parameter name Function Card Type	Value AS-F485		None	Minimum	_
Parameter name Function Card Type Protocol	Value		1	-	_
Parameter name Function Card Type Protocol Data Exchange Enable	AS-F485 MODBUS ASC		None None	-	Maximur - -
Parameter name Function Card Type Protocol Data Exchange Enable ID	Value AS-F485 MODBUS ASC		None None	-	_
Parameter name Function Card Type Protocol Data Exchange Enable ID Baud Rate	Value AS-F485 MODBUS ASC 1 9600		None None 1 9600	- - - 0	Maximur - - 247
Parameter name Function Card Type Protocol Data Exchange Enable ID Baud Rate Format	Value AS-F485 MODBUS ASC 1 9600	bps	None None 1 9600 7E1	- - 0 +	Maximun - - 247 -
Parameter name Function Card Type	Value AS-F485 MODBUS ASC 1 1 9600 7E1	• bps	None None 1 9600	- - - - - -	Maximur - - 247 -

4)	Select UD Link as the Protocol, set the Baud Rate and Format, and click OK.
----	---

Parameter name	Value		Unit	Default		Minimum		Maximum
Function Card Type	AS-F485	•		None	-		-	
Protocol	UD LINK	-		None				
Baud Rate	9600	•	bps	9600	-		-	
Format	7E1	-		7E1	-		-	

5) Right-click the AS00SCM-A and click **Communication Software** and then click **SCMSoft**.

+ -	+		
	Open(Q)	Enter	
		Ctrl+R	
	X Cut()	Ctrl+X	
	Copy(C)	Ctrl+C	
	Paste(P)	Ctrl+V	
	🛃 Delete(D)	Del	

SCMSoft - [Untitled0]				
Eile Edit View Tools Window	<u>H</u> elp			×
0 🚅 🖬 🖬 👘 🗐 🗐 🗣 🕸	T ± E	2		
IX	* Slot	COM PORT Setting	Group List	
COM PORT Setting	G 1	SCM Device1	Not Set	
Project				
Ready			COM12 ,[USB: COM12]	ASCPU300 Ser

6) Right-click Group List and then click Create Group List to create a group list.

SCMSoft - [Untitled17]		
Eile Edit View Tools Window Help		X
D 🖨 🖬 🗣 谢 🗣 🗣 🕸 🕈 🕸 🗖 🖬		
No. Group List Name	Slot Remain Size	
Com PORT Setting Com PORT Setting Seque MODBUS Advance COM PORT History COM1 COM2		
Project		
Ready	Undefined Driver	ASCPU300 Series

7) You can find a created Group List1. Double-click it to open an editing window to edit the Group List Name and the Slot.

SCMSoft - [Untitled19]					-
Eile Edit View Tools Window Help					
🗋 🗅 🚅 🔚 🔒 🎁 📟 🖳 🔹 🗮 🔛	1				
	*	No.	Group List Name	Slot	Remain Size
COM PORT Setting COM PORT Setting COM PORT Setting Group List COM PORT History COM1 COM2 COM2	Q 3	1	Group List1	× 2)

Give the group list a Name (this example uses "Slave_Simulation") and select 1 (COM1) as the Slot number.

Group List Name	Slave_Simulation
Slot	

8) Right-click **Slave_Simulation** and click **Create Group List** to create a group list for the Slave_Simulation group.

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Eile Edit View Tools Window Help	р		
🗋 🚅 🖬 🙀 🎁 😨 🖳 🛊 🕂 🗄 🗌	87		
	s Group	Group Name	Command Co
⊡ 🗳 Untitled19			
COM PORT Setting			
Slave_Simulation			
COM PORTH Create Group			
- 3 COM1			

9) You can find a created Group List1. Double-click it to open an editing window to edit the Group List Name and the Slot.

SCMSoft - [Untitled19]				ALC: NOT THE OWNER.
Eile Edit View Tools Window Help				
🗋 🚅 🔜 📬 🥵 🗣 🕸 🕇 🛓 🖾				
IX	*	Group	Group Name	Command Co
COM PORT Setting COM PO	C 23	1	Group1	2
COM PORT History				

Create a group and name it "Master Send".

	1	Group ID
	Master Send	Group Name
OK		or oup r name

<u>File Edit View Tools Window Help</u>				
] 🚅 🔜 🕼 🚽 🖳 🛊 美干土 🔯				
I X	*	Group	Group Name	Command Co
COM PORT Setting COM PORT Setting COM PORT Setting Comp List Comp Comp Comp Comp Comp Comp Comp Comp	C 2	1	Master Send	0

10) Right-click **TX Packet** and click **TX Packet** to create a TX Packet1.

SCMSoft - [Untitled19]			
Eile Edit View Tools Window Help			
🗋 😂 📑 🙀 🙀 💀 🗣 🛊 干 🛓 🔤			
	*	Packet	TX Packet Name
COM PORT Setting Group Link Group List Group Slave_Simulation Master Send Comparison Q	1	TX Packet1	
Create TX Pac	ket	-	
COM PORT His COM1 COM2			

11) Double-click TX Packet1 to open the Packet Edit form.



12) Give the Packet a Name (This example uses "TX POS Send")

Packet Name acket View	TX POS Send		
4 acket Segment Edit			×
No. Class	For	Segment View	Up
			Down
Message	-	Address	Delete
Message Constant	Variable		Delete /ariable
	Variable Checksum		
Constant	J <u>[</u>	Constant	⁄ariable

- 13) Edit the TX packet, "POS, xxx, yyy" (The example below uses POS, 123, 123)
- 14) Click **Constant** in the Message area.

	7			
4				÷
acket Segi	ment Edit			
No.	Class	Format	Segment View	Up
				Down
				Delete
Messag	e		Address	
-	e onstant	Variable	Address Constant	Variable
-	-	Variable		Variable

Enter "POS" in the Value area. Click **OK** and verify the packet contents in the Packet View.

Format	ASCII 🔻	
Value	POS	
	4	

15) [xxx] is a variable, so click Variable in the Message area to edit it. Use ISPSoft to get the value from data registers D26100–D26101. The example below uses D26100: 16#3132 and D26101: 16#3300 and the value is 123.

Packet Name Packet View		TX POS Send		
3				
Packet Segment	t Edit			
No.	Class	Format	Segment View	Up
				Down
				Delete
Message	-		Address	Delete
Message Const	ant	Variable	Address Constant	Delete
_	ant	Variable Checksum		
Const			Constant	

16) Enter the data register that contains the value you want to find. The example below uses D26100 and the value returned is 3. Use ISPSoft to get the value from data registers D26100–D26199.

Format	Nul	1 .				
Variable Value	(R.(D Register [26	100]),	3)		
	(Variable			Length	2
Reverse						
Variable Propert	у					
Function		Read R()	0	•		
Mapping Regi	ister	D Regist	er	•	26100	
Length Property	Y					
Function		Constant		•		
Mapping Regi	ster	D Regist	er	-	0	
Constant			3			

Click OK and verify the values ("POS,"+ (R (D Register [26100], 3)) in the Packet View.



17) [·]: Use Address Constant to enter this Value and set the Format to ASCII.

Format	ASCII 👻	
	(the second sec	
Value		
	*	1

Click OK and verify the values ("POS,"+ (R (D Register [26100], 3)) in the Packet View.

P	acket View	
	"POS," + (R(D Register [26100]), 3) + ","	
	< > >	-

18) [yyy] is a variable, so click Variable in the Message area to edit it. Use ISPSoft to get the value from data registers D26102–D26103. The example below uses D26102: 16#3132 and D26103: 16#3300 and the value is 123.

Format Nu	111 -
Variable Value (R	(D Register [26102]), 3)
C	Variable - Length
Reverse	
Variable Property	
Function	Read R() 🔻
Mapping Register	D Register 👻 26102
Length Property	
Function	Constant 👻
Mapping Register	D Register - 0
Constant	3

19) Enter the data register that contains the value you want to find. The example below uses D26102 and the value returned is 3. Use ISPSoft to get the value from the data registers D26100–D26199.

Format	Null
Variable Value	(R(D Register [26102]), 3)
	(Variable - Length)
Reverse	
Variable Propert	у
Function	Read R() 👻
Mapping Regi	ster D Register - 26102
Length Property	,
Function	Constant 👻
Mapping Regi	ster D Register – 0
Constant	3

Click OK and verify the values ("POS,"+ (R (D Register [26102], 3)) in the Packet View.

P	acket View	
	"POS," + (R(D Register [26100]), 3) + "," + (R(D Register [26102]), 3)	
	4	Þ

20) Edit the packet: Create a packet and name it "RX Result". Double-click it to open the editing window.



Enter the sending packet into the D26000 register of the AS300 CPU. "*" indicates that the length is not specified.

Format	Nul	1		
Variable Value	(W	(D Register [26000]),	*)	
	(Variable +		Length)
Reverse				
Variable Property				
Function		Write W()	•	
Mapping Regist	er	D Register	•	26000
Length Property				
Function		*	+	
Mapping Regist	er	Base + Offset	τ	0
Constant		1		

The packet should look like the example below.

P	acket View	
	(W(D Register [26000]), *)	
	•	Þ

21) Create a command: Right-click Master Send and click the Create Command.

	*	Comr
⊡-🗳 Untitled0		
COM PORT Setting		
🗄 🖓 UD Link		
🚊 🚝 Group List		
E Slave_Simulation		
Master Cond	L	
TX P Create Comma	na	
RX Packet		

		X	*	Command No.	
🔮 Untitled0			₽	1	Send
	T Setting				
iania di Cink	List		L		\smile
	ve_Simulation		L		
- <u>-</u>	Master Send		<u> </u>		
	🙄 TX Packet		L		
L(🙄 RX Packet		- I		
nmand Edit	-				
Command No.	1				
Command Type	Send	_	-1		
Command Type	Senu		· · · ·		
and the state	-		-		
Send Packet			•		
Send Packet Recv Packet			+		
	End	•	+		
Recv Packet	End	•	+		
Recv Packet Success		• • (0 - 255)	*		
Recv Packet Success Fail	Abort	=	*		
Recv Packet Success Fail Retry	Abort 0	(0 - 255)	• •		
Recv Packet Success Fail Retry Repeat	Abort 0 0	(0 - 255) (0 - 255)			

22) Double-click the new command on the list to open the Command Edit window.

23) Set Send Packet to "TX POS Send" and set Recv Packet (received contents) to "RX Result".

Command No.	1	
Command Type	Send & Receiv	e 🔹
Send Packet	TX POS Send	4
Recv Packet	RX Result	
Success	End 🔻]
Fail	Abort 🔻]
Retry	0	(0 - 255)
Repeat	0	(0 - 255)
Send Wait	0	(0 - 65535 ms)
Timeout	50	(0 - 65535 ms)

24) Make sure the Group is in slot 1 (COM1).

SCMSoft - [Untitled0]					
II Eile Edit View Iools Window Help					
🗋 😅 🖬 🕼 🗐 🗐 🖳 🕈 4 T ±	5/				
	+	Slot	COM PORT Setting	Group List	
COM PORT Setting COM PORT Setting CUD Link Cud	2	1	SCM Device1	Slave_Simulation	
COMPORT History					

25) Click the Download button to download the parameters to the AS00SCM.

		<u>E</u> dit		Help		
lect M	lodule				-	
Selec	t Slot					1
R			1	1	-	
			-	_	_	-

26) Set up the devices for the UD Link Group ID Trigger in HWCONFIG. Once you create the AS00SCM-A module, the system automatically assigns the corresponding addresses.

Eile Edit Opti	on <u>H</u> elp	_				- 8
Product List						
🖃 A \$ 300		-				
Specification	-		R			
AS00SCM-A Serial communication MODBUS, UD Link	protocol			+		
(COM. mode), Remo (RTU mode)						
	-			v		
	2			Y	>	
CPU Group Extension No	Type	Module Name	DDF Version	▼ Input Device Range	Output Device Range	Comment
Extension No	Туре	Module Name				Comment
Extension No Power Module			DDF Version 01.00.00	VIII Input Device Range	Output Device Range	Comment
Extension No Power Module CPU Module Function Card1	Туре	Module Name				Comment
Extension No Power Module CPU Module Function Card1 Function Card2	Type CPU Module	Module Name AS332T	01.00.00	×0.0 ~ ×0.15	Y0.0~Y0.15	Comment
Extension No Power Module CPU Module Function Card1 Function Card2 Module Information	Type CPU Module	Module Name AS332T AS00SCM-A	01.00.00	X0.0 ~ X0.15 D28000 ~ D28019	Y0.0 ~ Y0.15 D 28020 ~ D 28039	Comment
Extension No Power Module CPU Module Function Card1 Function Card2	Type CPU Module	Module Name AS332T	01.00.00	×0.0 ~ ×0.15	Y0.0~Y0.15	Comment
Extension No Power Module CPU Module Function Card1 Function Card2 Module Information Function Card1	Type CPU Module	Module Name AS332T AS00SCM-A	01.00.00	X0.0 ~ X0.15 D28000 ~ D28019	Y0.0 ~ Y0.15 D 28020 ~ D 28039	Comment

27) Double-click AS00SCM-A to open the Device Setting page. Verify that the Card 1 UD Link Group ID Trigger is set to D28030. Use ISPSoft to enter 1 into register D28030 to start the data exchange.

COM1 Setting COM2 Setting	Device Information Normal Exchange Area							
	Description	Address						
	Module Status	D28000						
	Error Code	D28001						
	Card 1 Data Exchange State (item 1~32) (0:none/fail, 1:success)							
	Card 2 Data Exchange State (item 1~32) (0:none/fail, 1:success)	and the second						
	Card 1 Data Exchange Mode Control (0:none, 1:once, 2:always) D28020							
	Card 2 Data Exchange Mode Control (0:none, 1:once, 2:always) D28021							
		Card 1 Data Exchange Trigger (item1~32) (0:no trigger, 1:trigger) D28022 ~ D28025						
	Card 2 Data Exchange Trigger (itme1~32) (0:no trigger, 1:trigger) D28026 ~ D28029							
	Card 1 UD Link Group ID Trigger	D28030 D28031						
	Card 2 UD Link Group ID Trigger	D20031						
	1.2							
and I work	i and it and it							
Default Import	Export Update							

D26100		12	123*	0.000	ASCII 🛛 🔻
D26101		3*	3*12	0.000	ASCII 🛛 🗸
D26102	Send	12	123*	0.000	ASCII 🛛 🔻
D26103		3*	3***	0.000	ASCII 🛛 🗸
D26000		PO	POS,	740081729536.000	ASCII 🛛 🗸
D26001	Receive	S,	s,ac	12.207	ASCII 🛛 🔻
D26002	Receive	AC	ACT*	2203402895360.000	ASCII 🛛 🗸
D26003		T*	T***	0.000	ASCII 🛛 🔻

28) Use the monitor function in ISPSoft to verify that the transmission is working correctly.

- 29) In SCMSoft, right-click the item COM PORT History on the left and click the option "Upload COM History Data" to see the transmission history of COM1 and COM2 respectively. Under the item COM1 and COM2, you can view recent transmission history; however the shown recent history cannot be deleted or saved.
- 30) Select *Tools -> Return to Default* to clear the previous settings and have all the settings back to defaults. After this, turn the power off and on again.



9.6.3 Remote IO Application (AS-FCOPM)

This example shows other series PLC, AH10COPM-5A, as a CANopen Master that controls four IO modules on the right side of AS00SCM-A that acts as a CANopen Slave. (You can use this method to connect to a 3rd party PLC.)

Device	Function
AS300	Scan and download AS00SCM-A (RTU mode), right side module configurations
AS00SCM-A + AS-FCOPM	CANopen Slave
AHCPU530-EN + AH10COPM-5A	CANopen Master
AS16AN10R-A	16 Digital outputs
AS16AM01N-A	16 Digital inputs
AS04DA-A	4 Analog channels for output
AS04AD-A	4 Analog channels for input

Use AS300 to connect to AS00SCM-A through AS Remote Communication (RTU mode) and then use HWCONFIG to scan and download the parameters. If the Card 2 LED is blinking normally, with no error messages, and no need to download the PLC programs, the device power can be turned off. Refer to Section 9.4.1.1 for reference.



AS332P-A	Function Card 2 Setting					
COM1 Port Setting COM2 Port Setting Ethernet Port Basic Setting Ethernet Port Advance Setti Function Card 1 Setting Function Card 2 Setting	Parameter name	Value	Unit	Default	Minimum	Maximum 🔺
	F2AD Sampling Time	3	ms	3	3	15
	F2AD Average Times	10		10	1	15
	AS-FCOPM Working mode	AS Remote Com 🔻	-	AS Remote Com	-	-
	AS-FCOPM node ID	1		1	1	254
	AS Remote module No.	1	unit	1	1	15
	Select Run mode after detect remote module	Run connected r 🔻		Run connected	-	=
	AS CPU module keep or Stop when slave no	Only Show Error 🔻		Only Show Erro	-	-
	Remote and CANopen communication time of	100	ms	100	0	3000
	Re-connected Retry number after time out	60	1.0	60	0	255
	Auto Retry connection after Disconnected	5	sec	60	0	255
	AS-FCOPM Bit Rate	125k 💌	bps	125k	-	-
	DS301 PDO Data Exchanged	Start after power 🔻		Start after power	-	-
	•					1.1
Default Import	Export					
Deraut import	Export					

Turn the Format 1 of AS00SCM-A to 4 (using CANopen DS301 mode) and turn Format 2 to 7 (setting the bit rate to 1000kbps) and then turn the power off and on again. After that wiring AH10COPM-5A and set the node ID to 2 and set the bit rate to 1000kbps. Use ISPSoft (V3.04 or later) and HWCONFIG to scan and download the parameters to AH500. Right click AH10COPM-5A and open **Intelligent Module Configuration** (CANopen Builder) from the menu.

Product List			
 			
Temperature Module	CPU	Add	Ctrl+Alr+.
H Motion Control Module		Replace	+
H → Network Module Sector A → Network Module	n	X Cut	Ctrl+X
		Copy	Ctrl+C
	<	Easte	Chirl+5
		Delete	Del
		Intelligent Module (Configuration
pecification		EIP Budder	
		ECAT Builder	
		Einnware Update	

Step 3

Use CANopen Builder to scan the network. You should find Node ID 1 and its name to be AS00SCM-A RTU.

If not, check if you follow the first two steps right. And repeat the previous steps. Recommended to set the value in cycle period to 50 ms to ensure a more complete module functions. Double click the module to open the **Node Configuration** window and set up the PDO manually. RPDO is for DO/AO and TPDO is for DI/AI and error codes of RTU/IO.



Here uses a first right side digital output module (16 points) as an example.

- Since it is the first one, here it corresponds to Receive PDO1 (index: 1400), indicating RTU receives data from Master through CANopen communication. (If this is an input module, it sends data to Master through CANopen communication.) Double click to add it in the table. Double click the table to open the PDO setting window.
- 2. Since it is the first one, here it corresponds to Rx_Module 1. It is a 16-point digital output module so that only the object of one word Rx_Module1_EDO0 (Index: 2000) should be selected. Click the arrow to add it into the data mapping parameter table and you have set up a PDO for the first module. If t is a 32-point digital output module, objects of 2 words Rx_Module1_EDO0 and Rx_Module1_EDO1 should be selected in numerical order.



3. Follow the previous steps to set up more modules.

Node III	: 1		Name:		ASO	OSCM	-A RTU	Ι.		
Node	Information	(Hex)					-			
VV	endor ID:	0	00001D	D				Error C	ontro	l Protocol
VD	evice Type	0	000000	0				Auto SE	O Co	nfiguration
Product Code:		le: 01	000005.	A			Emer	rgency CO	DB ID	81
V R	evision:	0	001000	2			Nod	eguard CO	DB ID	701
PDO fi	rom EDS fil	e								
Index	PDO Na	me			Ty	pe	Inhibit	Event	*	Export EDS file
1400	Receive	PDO1	parame	ter	1			-	Ε	
1401	Receive	PDO2	parame	ter	1		-	-		
1402	Receive	PDO3	parame	ter	1		1			Add
1403	Receive	PDO4	parame	ter	1		-	-		
1404	Receive	PDO5	parame	ter	1		÷	-		Delete
1405	Receive	PDO6	parame	ter	1			-		Define PDO
1406	Receive	PDO7	parame	ter	1		-	-	-	
Config	gured PDO	-				-				
Index	COB ID	R/T	Len	Typ	pe	Desc	ription			PDO Mapping
1400	201	Rx	2	1		RxPI	001			Properties
1402	401	Rx	8	1		RxPI	003			
1801	281	Tx	2	1		TxPI	002			
1803	481	Tx	8	1		TxPL	004			OK
1804	1c1	Tx	8	1		TxPI	005			
1805	2c1	Tx	2	1		TxPL	006			Cancel

Device	Function	PDO	PDO Mapping	Mapping Registers
AS16AN01R-A	16 digital outputs	RxPDO1	Rx_Module1_EDO0	D6000
AS16AM01N-A	16 digital inputs	TxPDO2	Tx_Module2_EDI0	D5000
AS04DA-A	4 Analog channels for	RxPDO3	Rx_Module3_EDO0 Rx_Module3_EDO1	D6001 D6002
	output (Integer format)*		Rx_Module3_EDO2 Rx_Module3_EDO3	D6003 D6004
AS04AD-A	4 Analog channels for input (Integer format)*	TxPDO4	Tx_Module4_EDI0 Tx_Module4_EDI1 Tx_Module4_EDI2 Tx_Module4_EDI3	D5001 D5002 D5003 D5004
IO Module Error Code	- TxPDO5		Tx_Module1_error_code Tx_Module2_error_code Tx_Module3_error_code Tx_Module4_error_code	D5005 D5006 D5007 D5008
RTU Error Code	-	TxPDO6	Tx_RTU_error_code	D5009

* Here the analog module uses integer format; if you need to use floating point format, two PDOs will be used per channel.

* Index 2002 to Index 200d are for system internal use only. Avoid using this range, when PDO is used.

* Only synchronization cycle is supported.

Step 5

Double click the PLC icon and select Node ID 001 from the available nodes and then use the **Right** arrow to add the selected one into the Node List. Output and Input tables are mapping registers for PDOs.

002	Node List Setting	
AH10COPM , Master , Rack 1 , Slot 0 , 1	Iode Address 2 List Setting Available Nodes:	Node List:
	Node ID Node Name	Node ID Node Name
001	001 AS00SCM-A RTU]
AS00SCM-A RTU	Output Table	Input Table
	Device Device Mapping	Device Device Mapping
	D6000_L	D5000_L
	D6000_H	D5000_H
	D6001_L	D5001_L
	D6001_H	D5001_H
	D6002_L	D5002_L
	D6002_H	D5002_H
	D6003_L	D5003_L
	D6003_H	D5003_H
	D6004_L	D5004_L
	D6004_H	D5004_H
	D6005_L	D5005_L
	D6005_H	D5005_H
	D6006_L	D5006_L
	D6006_H +	D5006_H
	Unit ID: 0 🕂 Output Start: D	
	Input Start: D	 Cancel

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List Setti Available				Node List:		
Node ID	Node Name			Node ID	Node Name	
			>	001	AS00SCM-ARTU	
			<			
Output Ta	able		י קר	nput Table		
Device	Device Mapping			Device	Device Mapping	
D6000_L	[001]RxPDO-Rx_Module1_ED0			D5000_L	[001]TxPDO-Tx_Module1_ED	I
D6000_H	[001]RxPDO-Rx_Module1_ED0	-		D5000_H	[001]TxPDO-Tx_Module1_ED	I
D6001_L	[001]RxPDO-Rx_Module3_ED0			D5001_L	[001]TxPDO-Tx_Module4_ED	I
D6001_H	[001]RxPDO-Rx_Module3_ED0			D5001_H	[001]TxPDO-Tx_Module4_ED	J
D6002_L	[001]RxPDO-Rx_Module3_ED0			D5002_L	[001]TxPDO-Tx_Module4_ED	J
D6002_H	[001]RxPDO-Rx_Module3_ED0			D5002_H	[001]TxPDO-Tx_Module4_ED	N
D6003_L	[001]RxPDO-Rx_Module3_ED0	1		D5003_L	[001]TxPDO-Tx_Module4_ED)I
D6003_H	[001]RxPDO-Rx_Module3_ED0			D5003_H	[001]TxPDO-Tx_Module4_ED)I
D6004_L	[001]RxPDO-Rx_Module3_ED0			D5004_L	[001]TxPDO-Tx_Module4_ED	J
D6004_H	[001]RxPDO-Rx_Module3_ED0			D5004_H	[001]TxPDO-Tx_Module4_ED	Л
D6005_L				D5005_L	[001]TxPDO-Tx_Module1_em	0
D6005_H				D5005_H	[001]TxPDO-Tx_Module1_em	0
D6006_L				D5006_L	[001]TxPDO-Tx_Module2_em	0
D6006_H		-		D5006_H	[001]TxPDO-Tx_Module2_em	0
Unit ID	: 0 🚊 Outpu	t Star	t: D	• 0	OK	

Step 6

Double click the module icon and the **Node Configuration** window appears. Click **Error Control Protocol** and then Error Control Setting windows appears. Select **Heartbeat** and set values for the **Master Consumer Timeout** and **Node Heartbeat Producer Timer**. Select AH10COPM Master from the Node List and click the **Down** arrow to add it to the list of Heart Consumer and then disconnection detection is now available for AS00SCM-A (RTU mode).

		Error Control Setting
		Node Guarding Guard Time (0x100C): 0 Life Time Factor (0x100D): 0
002	Node Configuration	Heartbeat Master Consumer Timeout: 300 ms
AH10COPM , Master , Rack 1 , Slot 0	Node ID: 1 Name: AS00SCM-ARTU Node Information(Hes) 2 Vendor ID: 000001DD Error Control Protocol	Node Heartbeat Producer Time: 200 ms Node List:
	Auto SDO Configuration Product Code: 0000000 Emergency COB ID: \$1 Revision: 00010002 Nodeguard COB ID: 701 PDO from EDS file	Node Node Name Consumer(ms) Producer(ms) 002 AH10COPM Master 300 200
	Index PDO Name Type Inhibit Event * Expost EDS file 1400 Receive PDOI parameter - <td>Heartbeat consumer: Node Node Name Consumer(ms) Producer(ms)</td>	Heartbeat consumer: Node Node Name Consumer(ms) Producer(ms)
	Configured PDO Index COBID R/T Len Type Description PDOM/apping	002 AH10COPM Master 300 200
	1400 201 Rx 2 1 RxPD01 Prepense 1402 401 Rx 8 1 RxPD03 1801 281 Tx 2 1 TxPD03 1801 281 Tx 2 1 TxPD04 1804 1c4 Tx 8 1 TxPD05 1804 1c4 Tx 8 1 TxPD05 1804 1c4 Tx 8 1 TxPD05 1805 2c4 Tx 2 1 TxPD06 Cancel	Edit OK Cancel

Click OK to confirm the setting. Download the parameters to the PLC. And then PLC can control the input/output of the IO module remotely.



An example of using PLC to control the input/output of the IO module remotely:

Start ISPSoft and download the program from AH series PLC. Switch digital output module between 1 and 0 in every 0.5 seconds; change output values of the analog output module. Wire DI/DO modules to AI/AO modules and then you can see the changes of D6000 from D5000 and D6001-D6004 from D5001-D5004 as the example below shown. The module error codes are stored in D5005-D5009. Refer to relevant module manuals for error code definitions.



9.6.4 Remote IO Application (AS-FEN02) Through EIP Builder

When the firmware is V2.02 or later, AS-FEN02 can be installed on AS00SCM-A (RTU mode) and then PLC can monitor right side IO modules remotely.

Here use EIP Builder to demonstrate. For ISPSoft V3.13 or later, there is no need to use EIP Builder, you can complete the settings in HWCONFIG. Refer to section 9.4.2.3 for more information.

Device	Function	IP Address / Location	Data Mapping Range
AS300	EtherNet/IP Master	192.168.1.5	D20000 D20010
AS00SCM-A + AS-FEN02	EtherNet/IP Slave	192.168.1.3	D29000~D29019
AS08AM10N	Digital Input	right side of AS00SCM-A	X1.0~X1.15
AS08AN01T	Digital Output	right side of AS00SCM-A	Y1.0~Y1.15
AS04AD-A	Analog Input	right side of AS00SCM-A	D29060~D29079
AS04DA-A	Analog Output	right side of AS00SCM-A	D29080~D29099

Step 1

After setting up AS300 in ISPSoft and HWCONFIG. Open EIP Builder and scan the network to add AS00SCM-A (RTU) + AS-FEN02 to the Network. Double-click RTU module to open HWCONFIG and scan to obtain the configuration and mapped register addresses of the I/O module on the right side of AS00SCM-A. You can also edit the module configurations and write down the mapped register addresses. After saving, close HWCONFIG.



You can see the IP address and the data length from the data mapping table in EIP Builder. The data mapping table can be downloaded and upload the mapped data to the device.

< (P0	course of				-				
Conn	oction Count	-	Sort						_
	Enable	TAG	IP Address	Adapter Name	CPU Address/TAG	+	Adapter	Length (Byte)	Property
			102 168 1 1	 Aconscrat/Pitril + Acuteur/2/Day 11 				66	and the second second
• 1	Bidde		192.168.1.1	 AS005CM(RTU) + AS-#EH02(Dev_1) 	D29000 D29010	-		66 58	
• 1 2		0	192.168.1.1	 A\$005CM(RTu) + A54EH02(Dev_1) + 	D29000 D29010			66 58	and the second second

Step 3

An example of using PLC to control the input/output of the IO module remotely:

Start ISPSoft and switch digital output module between 1 and 0 in every 0.5 seconds and shift output values of the analog output module between 10 V and 5V. Wire DI/DO modules to AI/AO modules. Refer to Chapter 2, 3 and 4 in this manual for more details on module operation.



9.6.5 Remote IO Application (Multiple AS-FEN02)

When AS-FEN02 is installed on AS Series PLC, it can be used as the Ethernet port of the CPU.

Device	Function	IP Address	Data Mapping Area
AS200	EtherNet/IP master/scanner	192.168.1.5	
AS00SCM-A + AS-FEN02	EtherNet/IP slave/adapter	192.168.1.30	D29540~D29559
AS00SCM-A + AS-FEN02	EtherNet/IP slave/adapter	192.168.1.31	D29180~D29199
AS00SCM-A + AS-FEN02	EtherNet/IP slave/adapter	192.168.1.32	D29360~D29379
AS08AN01T	Digital output	The right side of RTU	Y1.0~Y1.15
AS16AM10N-A	Digital input	The right side of RTU	X1.0~X1.15
AS08AM10N-A	Digital input	The right side of RTU	X2.0~X2.15

The following example shows how to add multiple AS00SCM-A (RTU) + AS-FEN02 (hereafter referred to as the "RTU") to an AS Series PLC in EIP connection. All IP addresses of RTU are set by the software.

Step 1 Set up an IP address for the RTU

Turn all the knobs of the FORMAT 2 of the 3 new RTUs to 0. The default IP addresses are 192.168.1.3. Refer to section 9.4.2.2 for more information on using **IP Setting Tool** to set up the IP address.

Step 2

After the IP addresses of the 3 new RTUs are set, you can scan and add them in the network and connect to the AS Series PLC. Do not download the project before uploading the already set RTU values to the network.

Now you can set up the right-side module of RTU. Refer to section 9.6.4 for more details. Scan all the RTU and save the parameters. Make sure the data mapping table is updated and then download the project, including the parameters, configurations, and data mapping table to the AS Series PLC and the RTUs.



9.7 Error Codes

The error flags and the UD Link status codes are stored in data registers. You can modify the input device range as needed.



SUBCM-A - COM1 Setting	Device Information Normal Exchange Area	
- COM2 Setting	Description	Address
	Module Status	D28000
	Error Code	D28001
	Card 1 Data Exchange State (item 1~32) (0:none/fail, 1:success)	
	Card 2 Data Exchange State (item 1~32) (0:none/fail, 1:success)	
	Card 1 Data Exchange Mode Control (0:none, 1:once, 2:always)	D28020
	Card 2 Data Exchange Mode Control (0:none, 1:once, 2:always)	
	Card 1 Data Exchange Trigger (item1~32) (0:no trigger, 1:trigger)	
	Card 2 Data Exchange Trigger (itme1~32) (0:no trigger, 1:trigger)	D28026 D28029 D28030
	Card 1 UD Link Group ID Trigger	D28030 D28031
	Card 2 OD Link Group ID Trigger	D20031
efault Import	Export Update	

9.7.1 Troubleshooting for Module AS00SCM-A as a Communication Module

9.7.1.1 ERROR LED Indicators are ON

The following error codes indicate possible errors when the AS00SCM-A module is installed on the right side of the CPU module and is acting as a communication module.

Error Code	Description	Solution
16#1605	Hardware failure	 Check that the module is securely installed. Install a new AS00SCM-A or contact the factory.
16#1606	The function card setting is incorrect.	 Check if the function card is securely installed. Install a new function card or contact the factory. Check if the setting in HWCONFIG is consistent with the function card setting. Install a new AS00SCM-A or contact the factory.

9.7.1.2 ERROR LED Indicators Blinking Every 0.5 Seconds

The following error codes identify possible errors when the AS00SCM-A module is installed on the right side of the CPU module and acts as a communication module.

Error Code	Description	Solution
16#1802	Incorrect parameters	Check the parameter in HWCONFIG. Download the parameter again.
16#1803	Communication timeout	 Check whether the communication cable is properly connected. Check if the station number and the communication format are correctly set. Check if the connection with the function card is working correctly.
16#1804	The UD Link setting is incorrect.	 Check the settings of the UD Link. Check the warning settings in the PLC.

The following error codes can only be viewed with SCMSoft; when the following errors occur, they are not shown on the LED indicators and the system does not send the error messages to the CPU module.

Error Code	Description	Solution
16#0107	The settings in HWCONFIG and manual settings are not consistent with function card 1.	Check the settings in HWCONFIG and manual settings for function card 1.
16#0108	The settings in HWCONFIG and manual settings are not consistent for function card 2.	Check the settings in HWCONFIG and manual settings for function card 2.
16#0201	Incorrect parameters	Check the parameter in HWCONFIG. Download the parameter again.
16#0301	Function card 1 communication timeout	 Check if the station number and the communication format are correctly set. Check if the connection with the function card is working correctly.

Error Code	Description	Solution
16#0302	Function card 2 communication timeout	 Check if the station number and the communication format are correctly set. Check if the connection with the function card is working correctly.
16#0400	Invalid UD Link Group ID for function card	1. Check the UD Link settings.
16#0400	1	2. Check the warning settings in the PLC.
16#0401	Invalid UD Link Group ID for function card	1. Check the UD Link settings.
10#0401	2	2. Check the warning settings in the PLC.
16#0402	Invalid UD Link Command for function card	1. Check the UD Link settings.
16#0402	1	2. Check the warning settings in the PLC.
16#0402	Invalid UD Link Command for function card	1. Check the UD Link settings.
16#0403	1	2. Check the warning settings in the PLC.

9.7.2 Troubleshooting for Module AS00SCM-A as a Remote Module

Errors from the remote modules are regarded as warnings for AS Series CPU modules. The LED indicator of the CPU module blinks and the CPU module can still operate. Use flag SM30 to manage error presentation in the remote modules.

9.7.2.1 ERROR LED Indicators Are ON

Error codes:

Error Code	Description	Solution
16#1301	Hardware failure	 Check if the module is securely installed. Change and install a new AS00SCM-A or contact the factory.
16#1302	The function card setting is incorrect.	 Check if the function card is securely installed with the AS-FCOPM card. Change and install a new function card or contact the factory. Check if the setting in HWCONFIG is consistent with the function card setting. Install a new AS00SCM-A or contact the factory.
16#1304	More than eight remote modules on the right side of the CPU module.	Check the total number of remote modules on the right side of the CPU module (maximum is 8).

9.7.2.2 ERROR LED Indicators Blinking Every 1 Seconds

Error Code	Description	Solution
16#1506	Remote module had been stopped. (available for firmware V2.06 or later)	This error code should work with AS Series Remote Module Setting in ISPSoft. When this error code shows up, it indicates the remote module had been stopped: Master Disconnected, Master Reconnected, IO Module Alarm, or IO Module Timeout. Check and clear the problem and then power-off and then power- on the remote module to refresh its state. Refer to section 9.4.3 in AS Series Module Manual for more details.

9.7.2.3 ERROR LED Indicators Blinking Every 0.5 Seconds

Error codes:

Error Code	Description	Solution
16#1500	Remote module communication timeout	Make sure the communication cable is well connected
16#1502	Incorrect parameters	Check the parameter in HWCONFIG. Download the parameter again. Or use the knob to restore the modules to the default settings.
16#1503	Remote extension module communication timeout	Make sure the communication cable is well connected and the module is properly connected to the CPU module and turn the modules on again.
16#1505	The actual placement of the extension modules is NOT the same as it is set.	Check if the parameter in HWCONFIG is the same as the actual placement.
16#1604	Extension module communication timeout	 Make sure the module is properly connected to the CPU module and turn the modules on again. If the problem persists, contact the local authorized distributors.

9.7.2.4 ERROR LED Indicators Blinking Every 0.2 Seconds

This happens when the 24 VDC power supply for the remote module is not sufficient. Check the power supply. If the power supply is normal, remove the extension module from the CPU module and then check if the SCM remote module is out of order. Error codes:

Error Code	Description	Solution
16#1303	24VDC power supply had not been sufficient before and then recovered from low-voltage that was less than 10 ms.	Check whether the 24 V power supply to the module is normal.

10

Chapter 10 Function Cards

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10.1 Introduction

Function cards are extension cards such as analog input/output (AI/AO) and communication cards for the AS Series PLC.

10.2 Specification and Function

10.2.1 AS-F232

The AS Series PLC is built with COM1 (RS-485) and COM2 (RS-485) ports. You can use the AS-F232 extension card for other communication interfaces such as RS-232, PC, and so on. Except for the communication interface, the communication functions and the isolation voltage are the same as the functions of the built-in ones. You can set up the communication port as either a slave or a master node. After installing the extension card, use HWCONFIG in ISPSoft to configure the communication.



DB9 male to DB9 female (standard cable)

10.2.2 AS-F422

Use the AS-F422 extension card to communicate with Delta HMI devices or other devices that use an RS-422 communication port. Other than the different communication interface, the communication functions and the isolation voltage remain the same as the functions of the built-in ones. You can set the communication port as either a slave or a master node. After installing the extension card, use HWCONFIG in ISPSoft to configure the communication.

■ Wiring example for communication with Delta HMI DOPA series via COM2



10.2.3 AS-F485

Other than the different communication interface, the communication functions and the isolation voltage remain the same as the functions of the built-in ones. With its own standalone communication port, the AS-F485 card can work independently and can be either a slave or a master node. After installing the extension card, use HWCONFIG in ISPSoft to configure the communication.

■ Wiring example



10.2.4 AS-F2AD

2 DC analog signal input channels:

Item	Voltage Input	Current Input	
Rated Input Range	0 V - 10 V	4 mA - 20 mA	
Resolution	12-bit	11-bit	
Digital Conversion Range	0 - 4000	0 - 2000	
Hardware Input Limit*1	0V ~ +10.24V	4mA ~ 20.37mA (FW V1.00) 3.63mA ~ 20.37mA (FW V1.20 or later)	
Digital Conversion Limit*2	0 ~ 4095	0 ~ 2047 (FW V1.00) - 48 ~ 2047(FW V1.20 or later)	
Error Rate	room temperature: $\pm 0.5\%$; f	ull temperature range: ±1.0%	
Isolation voltage	An analog circuit is isolated from a digital circuit, but the channels are not isolated from one another. Isolation between an analog circuit and a digital circuit: 500 VC		
Input Impedance	2 ΜΩ	250 Ω	
Conversion Time* ³	3 ms / CH		
Characteristic Curve	Digital Value Output 0 10V Voltage input	Digital Value Output d 2000 4 20mA Current input	
Digital Value Output*4	Card 1	SR168 (CH1), SR169 (CH2)	
	Card 2	SR170 (CH1), SR171 (CH2)	

*1: The input signal should NOT exceed the limit. If exceeding the limit, damage may occur.

*2: If the input signal exceeds the hardware input limit, the module only shows the maximum value. If the input signal is below the lower limit, it only shows the minimum value. If the input signal exceeds the hardware input limit, it also exceeds the digital conversion limit and a conversion limit error appears. For example in the current input mode (4 mA to 20 mA), when the input signal is 0 mA, exceeding the hardware lower limit, it also exceeds the conversion lower limit. The module uses the lower limit value (-48) as the input signal. If a disconnected analysis is required, you can check if the digital conversion value is -48.

*3: The conversion time is the time for each channel to convert signals to hardware input signals. If you need to calculate a complete conversion time, you need to add the PLC scan time.

*4: Use the program to read the values in SR to obtain the corresponding A/D conversion value for the channel.

Refer to section 2.2.16 from AS Programming Manual for more information on SM27 and SR27.

10.2.5 AS-F2DA

2 DC analog signal output channels:

ltem	Voltage Outpu	ıt	Current Output		
Analog Signal	0 V - 10 V		4 mA - 20 mA		
Resolution	12-bit		12-bit		
Digital Conversion Limit	0 - 4000		0 - 4000		
Error Rate	room temperature: $\pm 0.5\%$; full temperature range: $\pm 1.0\%$				
Isolation voltage	An analog circuit is isolated from a digital circuit, but the channels are not isolated from or another. Isolation between an analog circuit and a digital circuit: 500 VC				
Impedance Allowance	≥1 kΩ		≤500 Ω		
Conversion Time*1		2m:	s / CH		
Characteristic Curve	tindho oftade Digital Value In	00 put	20mA 20mA 4000 Digital Value Input		
Digital Value Output* ²	Card 1 SR172		(CH1)	SR173 (CH2)	
	Card 2 SR174		(CH1) SR175 (CH2)		

*1: The conversion time is the time for each channel to convert signals to hardware input signals. If you need to calculate a complete conversion time, you need to add the PLC scan time.

*2: Use the MOV instruction to move the value to the SR to obtain the corresponding voltage output value.

10.2.6 AS-FCOPM

With its own standalone communication port, the AS-FCOPM card can work independently and can be either a slave or a master node. After installing the extension card, use HWCONFIG in ISPSoft to configure the communication.

■ Wiring example



10.2.7 AS-FEN02

This communication card can work independently and does NOT occupy the communication port of PLC CPU. It can act as Modbus TCP Client or Modbus TCP Server and EtherNet/IP Adapter. After AS-FEN02 is installed, you can go to HWCONFIG from ISPSoft for editing in the Function Card 2 section.

A\$332P-A	A54	FEN02 Setting					
+ System settings		Name	Value	Unit	Default	Minimum	Maximum
COM1 Port Setting	•	IP Address	192.168.1.5		192.168.1.5	1.1.1.1	223.255.255.255
COM2 Port Setting		Subnet Mask	255.255.255.0		255.255.255.0	0.0.0.0	255.255.255.255
Ethernet Port Basic Setting		Gateway	192.168.1.1		192.168.1.1	1.1.1.1	223.255.255.255
+ Ethernet Port Advanced Setting		TCP Keep Alive Timeout	30	sec	30	1	65535
Function Card 1 Setting	1	Mode	Static		Static		
- Function Card 2 Setting		House	outre.		3565	· ·	
AS-FEN02 Setting							
AS-FEN02 IP Filter							
+ Delta Device Parameter Restore S							

All the AS-FEN02 parameters are stored in AS300 PLC CPU or AS00SCM-A. If you need the IP address of AS-FEN02, you need to go to HWCONFIG from ISPSoft to check its IP address in the Function Card 2 section. You can also use COMMGR to see the IP address of this device.

10.2.7.1 Supported Software and Firmware Versions

- The firmware of AS300 Series PLC should be V1.06 or later for AS-FEN02 to be installed on it. Use ISPSoft V3.06 or later as the PLC editing software.
- The firmware of AS00SCM-A module should be V2.02 or later for AS-FEN02 to be installed on it. AS00SCM should be in RTU mode only, not supported when installed on the right-side of the AS PLC CPU.

	AS-FEN02	AS00SCM-A
	V1.00	V2.02
Compatible firmware	V1.02	V2.04
versions	V1.03	V2.06

- If using Delta AS/AH PLC CPU in RTU mode, it is suggested to use ISPSoft V3.13 or later. Use HWCPNFIG V4.0 to set up EtherNet/IP for AS PLC CPU and use EIP Builder to set up EtherNet/IP for AH PLC CPU.
- If using the 3rd party EtherNet/IP Scanner in RTU mode, it is suggested to use EIP Builder V1.06 or later to set up the remote IO modules.

10.2.7.2 Features

- AS-FEN02 can be installed on AS300 Series PLC and AS00SCM-A (in RTU mode). But the firmware of AS00SCM-A module should be V2.02 or later for AS-FEN02 to be installed on it. AS00SCM should be in RTU mode only, not supported when installed on the right-side of the AS PLC CPU.
- This section introduces the operations when it is installed on AS300 Series PLC. For the operations when it is installed on AS00SCM-A, refer to Chapter 9 for more details.
- When AS-FEN02 is installed on AS300 Series PLC, it acts as a Client or Server of Modbus TCP connection. Go to HWCONFIG and click AS300 PLC CPU. Select Data Exchange in the editing area and if the AS-FEN02 is installed, you can find FEN02 in the function card section. Click it to edit the data exchange table. The rest is the same as using the built-in connection port for communication. Refer to Chapter 8 from AS Series Hardware and Operation Manual for more details.

090	FEN02						
COM 1	Mode:	Always Enable •	Add 🗹 Eds Es Move Up	Move Down D Copy D* De	lete 📋 Delete All		
COM 2		Enable	IP Address	Local Address	Direction	Remote Address	Quantity
Ethemet	1	10	192.168.1.1	DO		D5000	100
Function Card		20 19	192.168.1.1	0100		D5000	100
Function Care	2 2		192.168.1.1	D200	•	D6000	1
FEN02		· 192.100.1.1	0300		D6000	0	
	3	8	192.168.1.1	D400		D7000	0
		10	192.106.1.1	D500	+	07000	1
	4	23	192.168.1.1	D600		00000	1
		192	192.105.1.1	D700	•	D8000	100
	5	121	192.168.1.1	D800		D9000	100
		<i>e</i> .	192.108.1.1	0900		D9000	1
	6	12	192.168.1.1	D1000		D10000	1
		10 N	192-100-1-1	D1100	•	D10000	1
	7	Ξ.	192.168.1.1	D1200	+	D11000	100
		100	192.100.1.1	D1300	•	D11000	0
		1.00	100.100.11			013300	

- When AS-FEN02 is installed on AS300 Series PLC, it acts as an EthernNet/IP Adapter but not Scanner for EtherNet/IP connection. When using Delta PLC CPU, you can use EtherNet/IP software to scan and add the device in.
- When AS00SCM-A+AS-FEN02 is used with the 3rd party EtherNet/IP Scanner, you need to set up the remote IO modules in EIP Builder (V1.06 or later). Go to Delta Official Website Delta | Download Center (deltaww.com) (steps: Select Product Category: Industrial Automation; Select Product Sub-Category: PLC-Programmable Logic Controllers; Select Series: AS Series; Filter: Electrical Parameter and click Submit and then find the EtherNet/IP EDS File: AS00SCM-RTU (AS-FEN02)) to download the EDS file and then install the downloaded EDS file in the EtherNet/IP software. Refer to the user manual of the 3rd party EtherNet/IP Scanner for more information.

10.2.7.3 Specifications

System Specifications

Item		Specification			
General	Device type	Scanner, Adapter, and RTU communication interface			
	Тороlоду	Star and linear topologies are supported.			
	IP Settings	 When installed on AS300 PLC CPU, you can only use HWCONFIG from ISPSoft for editing. When installed on AS00SCM-A and used for RTU application, you can edit via software or hardware. Software: Set the ID2 and FORMAT2 to 0x000 and use HWCONFIG from EIP Builder for editing. Hardware: Use the ID2 and FORMAT2 to set IP address to 192.168.1.X (X=1~254) or turn ID2 and FORMAT2 to 0xFF to make it in DHCP mode. 			
	Availability	AS300 Series PLC AS00SCM-A (available only for RTU mode; NOT supported when installed on the right-side of the AS PLC CPU.)			
	Max. connection number	8			
Web	Functions	View device information Account management AS-FEN02 firmware update When installed on AS00SCM-A and in RTU mode, the module monitoring is supported.			
• MODBUS TCP Specifications (only available for CPU modules)

	ltem	Specification
General	Device type	Server, Client
MODBUS TCP	Max. connection number	8
Server	Max. data length/per transmission	200 words
MODBUS TCP	Max. connection number	8
Client	Max. data length/per transmission	200 words
Note: The connection	numbers of Conver and Client are sounds	d concretely

Note: The connection numbers of Server and Client are counted separately.

• EtherNet/IP Specifications

	Item	Specification
General	Device type	Adapter
	CIP connection number	8
	TCP connection number	8 (Servers)
CIP Network I/O Connection	Requested Packet Interval (RPI)	1 ms~1000ms
Connection	Max. Transmission Speed	10,000 pps
	Max. data length/per transmission	200 bytes
	Class 3	
	(Connected Type)	Total 8 (Servers)
	UCMM	(for both class 3 and UCMM connection
	(Non-Connected Type, only uses	types)
	TCP connections)	
CIP Network		Identity Object (16#01)
Explicit Message		Message Router Object (16#02)
		Assembly Object (16#04)
	CID Objecto	Connection Manager Object (16#06)
	CIP Objects	Port Object (16#F4)
		TCP/IP Interface Object (16#F5)
		Ethernet Link Object (16#F6)
		Not supporting self-defined objects

10.2.7.4 IP Setting

- The IP address of AS-FEN02 is not stored on the function card. When you install AS-FEN02 onto AS300 PLC CPU or AS00SCM-A, the IP settings of AS-FEN02 will be obtained automatically.
- When installed on AS300 PLC CPU, you can go to *ISPSoft -> HWCONFIG -> Function Card* 2 Setting -> Ethernet Port Basic Setting to edit the parameters.



 AS-FEN02 can be installed on AS00SCM-A (firmware V2.02 or later) so that AS00SCM-A can act as a remote module. When the knob is set to 0, the IP address is 192.168.1.3 by default. Before setting up the remote IO module, you need to set up the IP settings. Two methods for you to set up the IP addresses for AS-FEN02 installed on AS00SCM-A.

■ Using knobs: Highly suggested. You can use ID2 and FORMAT2 knobs to set up the IP address. Hexadecimal format is used and ID2 corresponds to x16¹ and FORMAT 2 to x16⁰. The possible IP address is 192.168.1.x, x=1~FE (1~254). (DHCP mode)

- Using IP Manager Tool: You can find IP Manager Tool in HWCONFIG (V4.0 or later). If you need to use an IP address that is NOT part of 192.168.1.x, you can use IP Manager Tool to set up the IP address.
- 1. Open EIP Builder and add AS00SCM (RTU) + AS-FEN02 to your network. Make sure all four knobs on the AS00SCM-A (remote module) are turned to 0. And then connect to your computer via Ethernet.
- 2. AS-FEN02 (FW V1.02.40 or later) supports **IP Manager Tool** from the **Tool** on the tool bar to scan for the device for IP address setup. You can use IP Search to search for one specific **IP Search** or use **Broadcast**

Search to scan all the AS-FEN02 in the network. This tool can be used when there is IP duplications, the IP addresses are in various network segments, or you need to edit the IP addresses of multiple devices at the same time.

- 3. Steps:
 - 1) Select a network adapter for the computer.
 - 2) Search for the function card you'd like to add through IP Search or Broadcast Search.
 - 3) This tool uses MAC address to recognize the identities of different devices and you can use the MAC address of each device to edit the IP addresses of multiple devices at the same time.
 - 4) Select one or multiple devices at the same time and click **Download**. After downloading, you can scan the devices again to check if the parameters are correct.

Note: You can use **IP Manager Tool**, when AS-FEN02 is installed on AS300 PLC CPU, but do not use it to set up the IP address to avoid conflicts with the parameters of AS300 PLC CPU project.

	Common	File	NFIG Edit View	Commu	nication	Tool Hel	0		
	Device Des File Mana		Environment Setting	PO List	P DHCP S	ager Tool			
	Project Tre	e	ņ.			on (Device 0)			
	Device			Reset C	onfiguratio	on Show	Informati	on	
	AS30	0		Remarks:					
Manager Tool	- 🔏 H	CONFIG 1 Iardware	Configuration		1	+			
nection Setup				Communica	tion Setting			2	_
e 1 Ethernet oter: Intel(R) Ethernet Connection	(2) 1219-LM			0.0.0		IF	Search	Count 4	Broadcast Search
			_				-		-
munication Setting	Description AS-FEN02 AS-FE		Passwo_ IP Configuratio		Gateway	MAC Address	Progress		Result
IP Address		EN02	Static	 255.255.255.0 255.255.255.0 	192.168.1.1 192.168.1.1	00:18:23:3D:4 00:18:23:74:F	0%		
IP Address Image: Part of the second seco		own Device(
✓ IP Address ✓ 192.168.1.5 // ✓ 192.168.1.107 (Static	* 255.255.255.0	192.168.1.1	00:18:23:3D:4	0%		

10.2.7.5 SM/SR

• Special Auxiliary Relays (SM)

SM	Function	AS300 Series	AS200 Series	OFF ↓ ON	STOP ↓ RUN	RUN ↓ STOP	Latched	Attribute	Default
SM1006	Data exchange through AS-FEN02 enabled by ISPSoft.	0	-	OFF	-	OFF	Ν	R/W	OFF
SM1008	Connection 1 for data exchange through AS-FEN02 started	0	-	OFF	_	_	Ν	R/W	OFF
SM1009	Connection 2 for data exchange through AS-FEN02 started	0	_	OFF	_	-	Ν	R/W	OFF
SM1010	Connection 3 for data exchange through AS-FEN02 started	0	_	OFF	_	_	Ν	R/W	OFF
SM1011	Connection 4 for data exchange through AS-FEN02 started	0	_	OFF	_	_	Ν	R/W	OFF
SM1012	Connection 5 for data exchange through AS-FEN02 started	0	-	OFF	_	-	Ν	R/W	OFF
SM1013	Connection 6 for data exchange through AS-FEN02 started	0	-	OFF	-	-	Ν	R/W	OFF
SM1014	Connection 7 for data exchange through AS-FEN02 started	0	-	OFF	-	-	Ν	R/W	OFF
SM1015	Connection 8 for data exchange through AS-FEN02 started	0	-	OFF	-	-	Ν	R/W	OFF
SM1016	Successful data exchange connection 1 through AS- FEN02	0	-	OFF	-	-	Ν	R	OFF
SM1017	Successful data exchange connection 2 through AS- FEN02	0	-	OFF	-	-	Ν	R	OFF
SM1018	Successful data exchange connection 3 through AS- FEN02	0	-	OFF	-	-	Ν	R	OFF
SM1019	Successful data exchange connection 4 through AS- FEN02	0	_	OFF	_	-	Ν	R	OFF
SM1020	Successful data exchange connection 5 through AS- FEN02	0	_	OFF	_	-	Ν	R	OFF
SM1021	Successful data exchange connection 6 through AS- FEN02	0	_	OFF	_	-	Ν	R	OFF
SM1022	Successful data exchange connection 7 through AS- FEN02	0	_	OFF	_	-	Ν	R	OFF
SM1023	Successful data exchange connection 8 through AS- FEN02	0	_	OFF	_	_	Ν	R	OFF
SM1024	Error in data exchange connection 1 through AS- FEN02	0	_	OFF	_	-	Ν	R	OFF
SM1025	Error in data exchange connection 2 through AS- FEN02	0	-	OFF	-	_	N	R	OFF
SM1026	Error in data exchange connection 3 through AS- FEN02	0	-	OFF	-	_	N	R	OFF
SM1027	Error in data exchange connection 4 through AS- FEN02	0	-	OFF	-	_	N	R	OFF
SM1028	Error in data exchange connection 5 through AS- FEN02	0	-	OFF	_	_	N	R	OFF
SM1029	Error in data exchange connection 6 through AS- FEN02	0	-	OFF	_	_	Ν	R	OFF

SM	Function	AS300 Series	AS200 Series	OFF ↓ ON	STOP ↓ RUN	RUN ↓ STOP	Latched	Attribute	Default
SM1030	Error in data exchange connection 7 through AS- FEN02	0	_	OFF	_	_	Ν	R	OFF
SM1031	Error in data exchange connection 8 through AS- FEN02	0	_	OFF	_	_	Ν	R	OFF

Special auxiliary relay	Refresh time
SM1006	After the parameters of data exchange are downloaded, you set the flag to ON or OFF.
SM1008~SM1015	After the parameters of data exchange are downloaded, you set the flag to ON or OFF.
SM1016~SM1031	The flag is ON, when the system is refreshed automatically.

• Special Data Registers (SR)

SR	Function	AS300 Series	AS200 Series	OFF ↓ ON	STOP ↓ RUN	RUN ↓ STOP	Latched	Attribute	Default
SR1520	Actual connection time for data exchange through the AS-FEN02 connection 1	0	_	0	-	_	Ν	R	0
SR1521	Actual connection time for data exchange through the AS-FEN02 connection 2	0	_	0	-	-	Ν	R	0
SR1522	Actual connection time for data exchange through the AS-FEN02 connection 3	0	_	0	-	_	Ν	R	0
SR1523	Actual connection time for data exchange through the AS-FEN02 connection 4	0	_	0	-	_	Ν	R	0
SR1524	Actual connection time for data exchange through the AS-FEN02 connection 5	0	_	0	-	_	Ν	R	0
SR1525	Actual connection time for data exchange through the AS-FEN02 connection 6	0	_	0	-	_	Ν	R	0
SR1526	Actual connection time for data exchange through the AS-FEN02 connection 7	0	-	0	-	-	Ν	R	0
SR1527	Actual connection time for data exchange through the AS-FEN02 connection 8	0	-	0	-	-	Ν	R	0
SR1528	The error code for data exchange through the AS- FEN02 connection 1	0	_	0	-	_	Ν	R	0
SR1529	The error code for data exchange through the AS- FEN02 connection 2	0	_	0	-	_	Ν	R	0
SR1530	The error code for data exchange through the AS- FEN02 connection 3	0	_	0	-	-	Ν	R	0
SR1531	The error code for data exchange through the AS- FEN02 connection 4	0	_	0	-	_	Ν	R	0
SR1532	The error code for data exchange through the AS- FEN02 connection 5	0	_	0	-	_	Ν	R	0
SR1533	The error code for data exchange through the AS- FEN02 connection 6	0	_	0	-	_	Ν	R	0
SR1534	The error code for data exchange through the AS- FEN02 connection 7	0	_	0	-	_	Ν	R	0

SR	Function	AS300 Series	AS200 Series	OFF ↓ ON	STOP ↓ RUN	RUN ↓ STOP	Latched	Attribute	Default
SR1535	The error code for data exchange through the AS- FEN02 connection 8	0	-	0	-	-	N	R	0
SR1536	AS-FEN02/FOPC02 TCP current connection number	0	-	0	-	-	Ν	R	0
SR1537	AS-FEN02 MODBUS/TCP Server connection number	0	-	0	-	-	Ν	R	0
SR1538	AS-FEN02 MODBUS/TCP Client connection number	0	-	0	-	-	Ν	R	0
SR1539	AS-FEN02/FOPC02 EtherNet/IP Adapter connection number	0	_	0	_	_	N	R	0

Special data register	Refresh time					
SR1520~SR1535	Refresh after AS-FEN02 communication is done.					
SR1536~SR1539	The flag is ON, when the system is refreshed automatically.					

10.2.7.6 Example of AS Series PLC CPU (Scanner) Connects to AS Series PLC CPU + AS-FEN02 (Adapter)

When AS-FEN02 is installed on AS Series PLC, it can act as an EtherNet/IP adapter.

Use HWCONFIG to set the IP Address of AS-FEN02.



The below example uses PLC 1 and PLC 2 (with AS-FEN02) to connect to each other and perform data mapping through EtherNet/IP connection. When AS PLC CPU acts as a Scanner, you need to set the network to EtherNet/IP in ISPSoft. Refer to Chapter 9 in AS Series Hardware and Operation Manual for more details on AS Series PLC acting as EtherNet/IP Scanner.

Device	Function	IP Address	Data Mapping Area
PLC 1	EtherNet/IP Scanner	192.168.1.5	D100, D200
PLC 2	EtherNet/IP Adapter	192.168.1.3	D1000, D2000

Steps

 Right-click AS PLC CPU of the PLC1 project in HWCONFIG and then go to Communication Software -> EtherNet/IP.

Reset Configur	ation 🚦 Show Info	rmation 🛞 Input/Output Devic	e Rearrange	Show HWCONFIG Table 📄 EtherNe
	RET			
	+	+		
	+	+ Communication Software	•	CANopen Builder (AS-FCOPIvi)
	+		•	CANopen Builder (AS-FCOPIVI). EtherNet/IP

(2) Scan the network or to add ASCPU(ASFEN02) (the latest version) manually. After adding the function card in, drag and drop it to the red dot of Network_0 to add it to the same network as the scanner's. Click Data Exchange tab to open the data exchange table and to edit the data mapping table, including Scanner Start Address, Adapter Starter Address, and Length for data mapping between the scanner and adapter; the unit for data length is word.

AS300 - HWCONFIG									- 6
	nunication Tool	Help							
💾 🛛 🖛 👔 🗙 🕐		-							
Save The Courts Uploa	d Download Scar								
ojeccinee #	e Configuration (Dev		/IP (Device 0) + ×						
evice 🛱 Clea	Adapters 🔚 Sho	w RTU Information	Show Data Exchange	Show HWCONFIG T	able 📑 Hardware Config	uration	🛊 Point Tool 👋 Pa	in Tool 🔛 Resize 🔍 🕯	2 87% -
ED A5300									
Device 0 (AS332T-A)	therNet/	P							
HWCONFIG Table		Aller		Dev 0					
- C Hardware Configuration		J.		CONTRACTOR OF STREET,					
	A	332T-A	ASCPU(AS-FEI (v1.3)	(02)					
- 🚳 CPU Group		192.168.1.5	192.168	1.3					
CPU (AS332T-A		T		TI					
- Å EtherNet/IP	vetwork_0	-	_	-					
+ Conntected	-		-						
* Not Connected	8								×
									EtherNet/IP
Data D	change Informat	on Device Parameter							Ethenweyte
			-						
192.	168.1.5	E* Add 🗹 Edit	昌才 Move Up 目4	Move Down	opy 🗗 Delete 🇂 🛙	Delete All 😅 Bart By)	#Address		
		CIP Connection Used (N	faximum Value: 32): 1	TCP Connection Used	(Maximum Value: 16): 1	Assume Scan Time:	5 ‡ EIP Theo	oretical Rate: 106 packet	per second (PPS)
		Enable EIP T	ag Product Name	Name IP Ad				iress / EIP Tag / Parameter	Length (byte)
		1 💌	ASCPU(AS-FE	Dev_0 192.1	6813			D1000	100
					D	200 •	→	D2000	100

(3) Click the **Download** on the tool bar and then start data exchange. Click the **On-line Mode** to check the connection status.

10.2.7.7 Example of A 3rd Party EtherNet/IP PLC CPU (Scanner) Connects to AS Series PLC CPU + AS-FEN02 (Adapter)

A 3rd party PLC (when acting as a scanner) can create an EtherNet/IP connection to AS300 Series PLC (when AS-FEN02 is installed). Before you begin, you need to go to <u>www.deltaww.com</u> to download EDS file. Go to Delta Official Website Delta | Download Center (deltaww.com) (steps: Select Product Category: Industrial Automation; Select Product Sub-Category: PLC- Programmable Logic Controllers; Select Series: AS Series; Filter: Electrical Parameter and click Submit and then find the EtherNet/IP EDS File: AS00SCM-RTU (AS-FEN02)) to download the EDS file and then install the downloaded EDS file in the EtherNet/IP software. Refer to the user manual of the 3rd party EtherNet/IP Scanner for more information. The following uses EtherNet/IP Scanner from manufacturer A as an example.

- (1) Right-click Ethernet to see the context menu and click New Module to add a new device in.
- (2) Set up the parameters including device name, IP address and many more. For basic operation, you can use the default EDS file directly. No need to edit the EDS file. But you should change the data type to meet the system format. Click **Change** in the section of Module Definition on the General tab to change the data type according to your needs. Here the data type is INT, meaning when monitoring, data in each deice is shown in one word (a D device).
- (3) Setting up the data mapping table
 - I: Input data (T->O), The Scanner reads data from the Adapter. Ex. Connection 1 is corresponding to PLC D3000~D3099.
 - O: Output data (O->T), The Scanner writes data in the Adapter. Ex. Connection 1 is corresponding to PLC D2000~D2099.

C: here corresponds to the configurations. You can edit the corresponding PLC addresses of input and output. After editing, you need to download the parameters to the 3rd party PLC and establish a connection to make the changes become effective.

	I/O Message Connection				
Connection No.	Function	Instance Attribute	Length	Defaults	
	Input (T->O)	0x65	100 words	D3000~D3099	
Connection 1	Output (O->T)	0x64	100 words	D2000~D2099	
	Configuration	0x80	8 words	Refer to the table below	
	Input (T->O)	0x67	100 words	D3100~D3199	
Connection 2	Output (O->T)	0x66	100 words	D2100~D2199	
	Configuration	0x81	8 words	Refer to the table below	
	Input (T->O)	0x69	100 words	D3200~D3299	
Connection 3	Output (O->T)	0x68	100 words	D2200~D2299	
	Configuration	0x82	8 words	Refer to the table below	
	Input (T->O)	0x6B	100 words	D3300~D3399	
Connection 4	Output (O->T)	0x6A	100 words	D2300~D2399	
	Configuration	0x83	8 words	Refer to the table below	
	Input (T->O)	0x6D	100 words	D3400~D3499	
Connection 5	Output (O->T)	0x6C	100 words	D2400~D2499	

	Configuration	0x84	8 words	Refer to the table below
	Input (T->O)	0x6F	100 words	D3500~D3599
Connection 6	Output (O->T)	0x6E	100 words	D2500~D2599
	Configuration	0x85	8 words	Refer to the table below
	Input (T->O)	0x71	100 words	D3600~D3699
Connection 7	Output (O->T)	0x70	100 words	D2600~D2699
	Configuration	0x86	8 words	Refer to the table below
	Input (T->O)	0x73	100 words	D3700~D3799
Connection 8	Output (O->T)	0x72	100 words	D2700~D2799
	Configuration	0x87	8 words	Refer to the table below

10.2.7.8 Example of AS Series PLC CPU (Modbus TCP Client) Connects to AS Series PLC CPU + AS-FEN02 (Server)

When AS-FEN02 is installed on AS Series PLC, you can create a connection by configuring the IP address and some relevant parameters to make it act as a Modbus TCP Server.

The following example shows two AS Series PLCs (one with AS-FEN02) to connect each other and one as Client and the other as Server (AS-FEN02) to perform data mapping through the Modbus TCP connection. For the support function codes and corresponding addresses, refer to AS Series Operation Manual for more details.

Device	Function	IP Address	Data Mapping Area
AS300	Modbus TCP Client	192.168.1.5	D100, D200
AS300+ AS-FEN02	Modbus TCP Server	192.168.1.3	D200, D300

Step 1

Double click AS Series PLC in HWCONFIG and the **Device Setting** window appears. Set up the IP Address of the AS300+AS-FEN02 to 192.168.1.3.

Options Data Exchange -COM1 I	Data Exchange -COM2	Data Exchange -Ethernet	Data Exchange -FEN	02 Dat
⊡ AS332T-A	AS-FEN02 Setting			
COM1 Port Setting	Para	meter name	Value	Uni
COM2 Port Setting	IP Address		192.168.1.3	
Ethernet Port Basic Setting	Subnet Mask		255.255.255.0	
	Gateway		192.168.1.1	
- Function Card 1 Setting	TCP Keep Alive Timeout		30	sec
- Function Card 2 Setting - AS-FEN02 Setting - IP Filter	Mode		Static	

Step 2

Create a data mapping table in the Client and then perform data mapping with the Server (AS300+AS-FEN02).

1 🤡			Remote Address	Quantity	Add	
	192.168.1.3	D100	D200			
		D200	D300		Move Up	
					212010 000	
					Move Down	
					Delete	
					Copy	

Step 3

Click the **Downloader** icon and then select the parameters that you'd like to download.

🕌 Untitled1 - HW	CONFIG						- 🗆 🗙
Eile Edit Opt	ion <u>H</u> elp						- 6 ×
		5 × ×	¢				
Product List							
 AS Series Digital I/O Mo Analog I/O Mo Network Modu Motion Control 	odule ile il Module	+				_	
🗄 Power Module		Transfer It	ems			×	
		De De	wnload All Item:	s	ОК		
		T.	Hardware Cont	figuration Settings	Cano	el	
		T.	COM 1				
Specification		F	COM 2				
		<u> </u>	Ethernet-Basic				
		F	Ethemet-Adva	ince			
		F.	Function Card	(Data Exchange/Settin	g)		
		-	Data Exchange	- COM 1			
		- F	Data Exchange	- COM 2			
CPU Group		l.	Data Exchange	- Ethemet			
Extension No	Туре	1					Comment
Power Module	PU Module	AS332T-A	01.04.00	X0.0~X0.15	Y0.0 ~ Y0.15		
Function Cat	or o iviodule	A55521-A	01.04.00	A0.0~ A0.13	10.0~10.15		
Function Car							

10.2.7.9 Web Server

When AS-FEN02 is installed on AS300 Series PLC or AS00SCM-A (RTU mode), you can enter AS-FEN02 IP address in the search bar of your browser to connect to your device. After that you can set up, update firmware and monitor AS-FEN02. The webpage displays differently, when AS-FEN02 is installed on AS300 Series PLC or AS00SCM-A (RTU mode). They will be explained in different sections.

List of browsers that support AS-FEN02 webpage:

Provider	Browser	Supported versions	
Microsoft	Internet Explorer	V10.0 and later	
Microsoft	Edge	V20 and later	
Google	Chrome	V14 and later	
Apple	Safari	V5.1 and later	

- When AS-FEN02 is installed on AS300 Series PLC
 - a. After the setting IP address in HWCONFIG of ISPSoft. Open your browser and enter AS-FEN02 IP address in the search bar to connect to AS-FEN02. After the webpage appears, enter "Admin" in the User section and click Login without entering any password. You can set up the password after login.

	Device information	on	
rd	Device name Device description	AS-FEN02	
	Firmware version	V01.00.00.30	
nation vice information	IP address	192.168.1.5	
	MAC address	00:18:23:13:02:09	
	Serial number		

b. After login, you can check the items shown on the left section.

Smarter: Greener: Together	Automation for A Ch	nanging World
User Admin	Device information	
Password Logout Device information Device information Network configuration	Device name Device description Firmware version IP address MAC address	AS-FEN02 V01.00.00.30 192.168.1.5 00.18.23:13.02.09
Account management Firmware update DLR status Save Config Save configuration	Serial number	

c. The menu shows data based on the permission of the current user.

Nodes	Permission			
Noues	Administrator	Read		
Device information	V	V		
Account management	V	Х		
Firmware update	V	Х		
Save configuration	V	Х		

d. Account Management: You can set 2 kinds of access types, Administrator and Read. After the setting is done, click **Apply** and save the settings in Save configuration.

No.	User ID	Password	Access type		Delete
1	Admin		Administrator	•	Delete
2	Test1		Read	•	Delete
3			Administrator Write/Read		Delete
4			Read		Delete
5			Administrator	۲	Delete
6			Administrator		Delete
7			Administrator	•	Delete
8			Administrator		Delete

- e. Firmware Update: You can update the firmware of AS-FEN02 via the webpage.
- f. Save Configuration: After any setting is done, save the settings in Save Configuration to reflect the changes.

• When AS-FEN02 is installed on AS00SCM-A

A account management

- Use the switches on AS00SCM-A to set the AS-FEN02 IP address. Open your browser and enter AS-FEN02 IP address in the search bar to connect to AS-FEN02. After the webpage appears, enter "Admin" in the User section and click Login without entering any password. You can set up the password after login.
- b. The menu shows data based on the permission of the current user. When it is installed on AS00SCM-A, you can monitor the right-side module (Hardware Status) and check the EtherNet/IP connection information.

Neder	Permi	ssion
Nodes	Administrator	Read
Device information	V	V
Account management	V	Х
Firmware update	V	Х
Hardware status*	V	V
EtherNet/IP information**	V	V
Save configuration	V	Х

Note:

* AS00SCM-A is recognizable for AS-FEN02 FW V1.13 or later, AS00SCM-A FW V2.06 or later.

** AS-FEN02 firmware V1.13 supports webpage monitoring function.

c. Hardware Status: you can monitor the connected right-side I/O modules, including their module names, the current values, statuses and error codes. You can edit the values in the Refresh Cycle to update the cycle.

		Refresh c	ycle (1s ~ 6	0s):	10	-												Floating	format setting: 3
Extension No.	Module name									Value									Status	Error code
Power module																				
RTU module	AS00SCM-A																		12	
Function card	AS-FEN02																			
Module 1	AS08AM10N-A	xo	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	10	
Module 2	AS16AP11R-A	x0 Y0	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
Module 3	AS04AD-A	Input	CH1 CH2 CH3 CH3			-0 -0	003 002 001 001		1										'n.	
Module 4	AS04DA-A	Outp	ut CH ut CH	2		0,	000													
		Outp	ut CH-	4		0	000													

d. EtherNet/IP Information: when using a 3rd party device as an EtherNet/IP Scanner, you can check this page for more information on connection parameters. Refer to Chapter 9 for more information on AS00SCM-A.

	I/O Connection	Input	Output
	Instance	101	100
	Total size (INT)	54	39
Extension No.	Module name	Input offset	Output offset
RTU module	AS00SCM-A	0 - 29	0 - 19
- Function card	AS-FEN02		
Module 1	AS08AM10N-A	30 ~ 30	
Module 2	AS16AP11R-A	31 ~ 31	20 ~ 20
Module 3	AS04AD-A	32 ~ 51	
Module 4	AS04DA-A	52 - 53	21~38

10.2.7.10 Network Security

To enhance security and performance of the system, it is suggested to use closed network or LAN with firewall protection to prevent cyber-attacks.

10.2.8 AS-FPFN02

When AS-FPFN02 is installed on AS300 PLC CPU, this communication card can work independently and does NOT occupy the communication port of PLC CPU. AS-FPFN02 can act as a PROFINET device and connect to a PROFINET controller to exchange data on the PROFINET Network (PN). When AS-FPFN02 is installed on AS00SCM-A, Delta AS Series I/O modules can be used remotely, and only available in RTU mode; NOT supported when installed on the right-side of the AS PLC CPU). Delta software does NOT support PN network configuration, you can use software from the PN controller for editing the PN parameters. After editing, you need to download the updated parameters to the controller and then the controller transfers the settings to AS-FPFN02.

10.2.8.1 Supported Firmware Versions

- When installed on AS300 series PLC CPU, it can be a PROFINET remote device: The firmware of AS300 Series PLC should be V1.08 or later. The firmware of AS-FPFN02 should be V1.00 or later.
- When installed on AS00SCM-A, it can be a PROFINET remote IO module: The firmware of AS00SCM should be V2.06 or later. The firmware of AS-FPFN02 should be V2.00 or later.
- It can work with Siemens PLC CPU: S7-1500, S7-1200, S7-300 and so forth. (TIA Portal V15.1 or later)
- To upgrade the hardware of AS-FPFN02 to version 2.00 is not supported.

10.2.8.2 Features

- When AS-FPFN02 is installed on AS300 PLC CPU or AS00SCM-A in RTU mode, it acts as a PROFINET device and exchanges data with PROFINET (PN) Controller. But AS00SCM-A that can be installed on the right-side of AS PLC CPU is NOT supported.
- Architecture: you can use software from the PN controller for editing the PN parameters. After editing, you need to download the updated parameters to the controller and then the controller transfers the settings to AS-FPFN02.



PROFINET Solution

Item	Specif	ication			
Installed on PLC	AS300	AS00SCM-A			
Communication Protocol	PROFINET RT				
EtherNet/IP Interface	100 Mbit with 2 x RJ45				
Fieldbus	PROFINET Devices				
Network Cable Length	100 meter				
Error Indicator	System Fail (SF): Red; Bus Fail (BF): Red				
Max. IO Slot Supported	17	9			
Devices to Read and Write	AS300 series data registers	RTU IO modules			
Minimum Time for Data Exchange to Operate	10 ms				
Maximum Data Length/Per Transmission	Input: 250 words Output: 250 words (Data of the module information is included, see the sections below.)				
PROFINET Configuration	Download PROFINET Configurations from PN Controller				

10.2.8.3 Specifications

10.2.8.4 Configuring the Data Length for I/O Module (Works with AS300)

The module and IO module mentioned in here and other 10.2.8 sections indicates a unit of PN controller and AS300 for data exchange. And each module is treated as one data exchange.

When AS-FPFN02 communication card is installed on AS300 Series PLC, up to 500/500 bytes of I/O address area are available. From the following table you can create various kinds of data exchanges – different data length and functions (e.g. 32 word in- and output).

Set up the corresponding I/O module addresses to the AS300 data register addresses from the software of the upper computer. Refer to Section 10.2.8.8 for more reference.

Data Length (word)	1, 2, 4, 8, 10, 16, 32, 64, 100
Data Type	Input, Output, In- and Output

The total data size and the number of modules used are relevant. The total usage of I/O address area should also include IO Production Status (IOPS), IO Consumption Status (IOCS) of each module, also Device Access Point (DAP) and the bytes for information.

Module Type (for both DIO and AIO modules)	Additional Input Data Length (IOPS / IOCS)	Additional Output Data Length (IOPS / IOCS)
Slot 0 (DAP)	4 bytes	4 bytes
Input module	1 byte	1 byte
Output module	1 byte	1 byte
I/O module	2 bytes	2 bytes

From the following table, you can see that users need to count the module information in, otherwise, if exceeding the total size, PLC editing software would prompt an error message while compiling.

			In (byte)		Out (byte)			
Slot	Module	Data Size	IOPS / IOCS	Total	Data Size	IOPS / IOCS	Total	
0	AS300-CPU (DAP)*	0	4	4	0	4	4	
1	Status Register**	8	1	9	0	1	1	
2	100 Word In- and Output_1	200	2	202	200	2	202	
3	100 Word In- and Output_2	200	2	202	200	2	202	
4	16 Word In- and Output_1	32	2	34	32	2	34	
5	16 Word In- and Output_2	32	2	34	32	2	34	
6	04 Word Output	0	1	1	8	1	9	
	Total Size			486			486	

Note:

* DAP should be counted in the data of input and output module.

** Status Register is counted as the data of input module.

10.2.8.5 Status Register (Works with AS300)

When AS-FPFN02 is installed on AS300 Series PLC CPU, Slot 1 is used as status register to show the communication card status. Up to 8 bytes of status registers can be used for displaying the status of PN Device.

Status Register (Siemens S7-1500)	Name	Description
%10.0	Input Data Available	If the value is TRUE, the input data to be sent to PN Controller is valid. If the value is 0, the input data to be sent to PN Controller is invalid.
%l4.0 - %l4.7	Connection	Indicates PN connection status of Slot 2 ~ Slot 9. If the value is TRUE, the Slot is with a working PN connection (with IO module) If the value is FALSE, the Slot is without a working PN connection.
%l5.0 - %l5.7	Status	Indicates PN connection status of Slot 10 ~ Slot 17. If the value is TRUE, the Slot is with a working PN connection (with IO module) If the value is FALSE, the Slot is without a working PN connection.

• Determine whether the input data is valid.

You can check the first bit of the bytes %I0.0 (device register) to see if the data exchange is started; this can be used when the PN device starts to work. You can determine if the input data is valid by checking %I0.0 (device register); if it says TRUE, the input data is valid and data exchange can begin.

• Determine if the Slot is with a working PN connection.

You can check the corresponding registers %I4.0~%I4.7 and %I5.0~%I5.7 to see if the Slot 2~17 is with a working PN connection.

The following example shows the values in the corresponding registers %I4.0~14.22 are TRUE and that indicates Slot 2~4 are with PN connections respectively.

<u>10</u>

10.2.8.6 I/O Module Selection (Works with AS00SCM-A)

When AS-FPFN02 communication card is installed on AS00SCM-A, you can use PN Controller's Software to configure the modules. You can drag and drop the I/O modules to Slot 2 ~ 9. And then you can double-click the module to open the setting page and configure the module parameters.

	Available for the following modules						
	AS08AM10N-A, AS16AM10N-A, AS32AM10N-A, AS64AM10N-A, AS08AN01P-A, AS08AN01R-A,						
Digital modules	AS08AN01T-A, AS16AN01P-A, AS16AN01R-A, AS16AN01T-A, AS32AN02T-A, AS64AN02T-A ,						
	AS16AP11P-A, AS16AP11R-A, AS16AP11T-A						
	AS04AD-A, AS08AD-B, AS08AD-C, AS04RTD-A, AS06RTD-A, AS04TC-A, AS08TC-A, AS04DA-A,						
Analog modules	AS06XA-A						

Time	Madula Nama	Length to b	e used (bit)	Length is be	ing used (bit)
Туре	Module Name	In (I)	Out (Q)	In (I)	Out (Q)
	AS08AM10N-A	16	0	8	0
Divital innut	AS16AM10N-A	16	0	16	0
Digital input	AS32AM10N-A	32	0	32	0
	AS64AM10N-A	64	0	64	0
	AS08AN01P-A				
	AS08AN01R-A	0	16	0	8
	AS08AN01T-A				
Digital autout	AS16AN01P-A				
Digital output	AS16AN01R-A	0	16	0	16
	AS16AN01T-A				
	AS32AN02T-A	0	32	0	32
	AS64AN02T-A	0	64	0	64
Digital	AS16AP11P-A				
Digital	AS16AP11R-A	16	16	16	16
input/output	AS16AP11T-A				

• Digital module addresses

• Analog module addresses

(1) The first two words of the input data head is the error code for the module.

(2) Each channel takes two words of length, starting from channel 1, in numerical order.

		-	o be used ord)	Length is being used (word)			
Туре	Module Name			In	(I)	Out (Q)	
		In (I)	Out (Q)	Error code	Data in channel	Data in channel	
	AS04AD-A						
	AS04RTD-A	20	0	2	8	0	
	AS04TC-A						
Analog input	AS06RTD-A	20	0	2	12	0	
	AS08AD-B						
	AS08AD-C	20	0	2	16	0	
	AS08TC-A						
Analog output	AS04DA-A	2	18	2	0	8	
Analog input/output	AS06XA-A	10	10	2	8	4	

• Example

Use S7-1500 as a Controller and AS remote module as the 1st Device. The address starts from 0. The actual used address for the module is from the starting address of each module shown on the software. For those unused addresses are reserved by the system. The unit is byte. For example, 20 to 21 is seen as a word and for the next word, it will be 22 to 23. The image shown below is the grouped module.



Slot	Module Name	Arrangement shown on Name the software			mbering in n editing	Explanation
		I	Q	I	Q	•
1	AS00SCM-A (AS-FPFN02)	0~19	0~19	0~13		Status register Refer to the next section for more details
2	AS08AM10N-A	20~21		20.0~20.7		8 input points
3	AS16AM10N-A	22~23		22.0~23.7		16 input points
4	AS08AN01P-A		20~21		20.0~20.7	8 input points
5	AS16AP11P-A	24~25	22~23	24.0~24.7	22.0~22.7	8 input points, 8 point output
				26~29		Module error code
				30~33		Channel 1
6	AS04AD-A	26~65		34~37		Channel 2
				38~41		Channel 3
				42~45		Channel 4

10.2.8.7 Status Register (Works with AS00SCM-A)

When AS-FPFN02 is installed on AS00SCM-A, and Slot 1 is used as status register. The input data length of I address is 10 words for storing the current status of AS00SCM-A. Q address occupies 10 words and reserves for output data.

Status Register Name (Siemens S7-1500)		Description			
%IW0	Operation Status	0: STOP 1: RUN			
%IW2	Farra O a da	For AS00SCM-A; refer to AS00SCM-A for more information			
%IW4 - %IW18	Error Code	For Slot 2 to slot 9; refer to its corresponding module chapter			

The unit for the address series is byte. The data size for each status register is one word; %IW0 indicates from the address of 0 byte to read a length of word (%IB0 & %IB1) and the next word is %IW2 (%IB2 & %IB3) and so forth.

Select Slot 1 to set up when to Stop I/O module remotely. Double-click AS00SCM-A -> AS remote module in Device Setting and click **AS Serial Remote Module** in HWCONFIG. Refer to Section 9.4.3 from AS Module Manual for more information.

When the extension module is disconnected, the error code shown on AS00SCM-A is 16#1503. The address of the extension module that is disconnected from the AS00SCMA is shown 16#1604.

10.2.8.8 Example of AS-FPFN02 Acting as A PROFINET Device

This section shows using Manufacturer S software to create a PROFINET IO from S7-15XX and PLC, using the function card AS-FPFN02 to read data registers in Delta AS300 Series PLC.

- The connection is established by Ethernet communication. The IP addresses of your PC and PN controller (S7-15XX) should be in the same network segment. The IP address of S7-15XX can be edited by its panel. The IP address of your PN device (AS-FPFN02) can be edited by PN Controller; see the steps below.
- 2. Create a new project.
- Add a new device
- Select a PN Controller Model
- Select the Project View or click **Device & Network** to enter the Project View.
- 3. Install the GSDML file and add the device in.
- Go to Delta Official Website Delta | Download Center (<u>Delta | Download Center (deltaww.com</u>)) (steps: Select Product Category: Industrial Automation; Select Product Sub-Category: PLC- Programmable Logic Controllers; Select Series: AS Series; Filter: Electrical Parameter and click **Submit** and then find the **AS-FPFN02 (CPU) GSDML file**. Or if AS-FPFN02 is installed on the AS00SCM-A in RTU mode, find the **AS-FPFN02 (RTU) GSDML file**.
- Download the GSDML file and then install the downloaded GSDML file in the Manufacturer S software.
- After the installation is complete, go to Project tree -> Device Configuration -> Network View.
- Find and select the just-installed device from the **Hardware Catalog** on the right and drag and drop the selected device to **Device View** on the left.
 - * ASCPU (AS-FPFN02): Other field devices-> PROFINET IO-> PLCs & CPs-> Delta Electronics, Inc.-> PLC * AS00SCM-RTU (AS-FPFN02): Other field devices-> PROFINET IO-> I/O-> Delta Electronics, Inc.-> RTU
- Drag the green block of S7-15XX to connect AS-FPFN02 together. Click AS-FPFN02 image to open the setting
 page and edit its IP address. *Properties-> General-> PROFINET interface-> Ethernet address*. The IP addresses
 of your PC and PN controller (S7-15XX) should be in the same network segment.
- 4. Define PN Device Name
- Go to *Project tree-> Online access*, find the name of the function card and that is the PROFINET device name. The name for AS-FPFN02 is as it was saved from the last use. The default name is as-fpfn02.
- Click **Online & diagnostics** and select **Assign PROFINET device name**. You can enter a new PROFINET device name and after that click **Assign name** to save the change.
- Go back to the Network View and click the AS-FPFN02 image to enter the setting page to edit the device name to have it the same as you have set in the last step. *Properties -> General -> Name*.
- 5. Establish a connection

Click the S7-15XX image and go to Online-> Download to device. The IP address of AS-FPFN02 will be set as what you have set in the previous step. Compile and download the project.

6. Check the connection status

Go to *Online-> Go Online*, to check the connection status in the Project tree. If the project is downloaded successfully, the operation is normal and the basic configurations are complete, you can the check signs in Local modules and Distribute I/O. You can also check the communication status of AS-FPFN02, if the indicators of SF and BF are OFF, the communication is normal.

7. Data Exchange

The range of data registers in AS300 PLC CPU that an AS-FPFN02 can read/write is between D0 and D29999. The data to be outputted is from PN controller to PN device. The data to be inputted is from PN device to PN controller.

- Configuring the data length for I/O module Select a right-side module and then configure the data length for it. Up to 250 bytes of data length is available for input and output respectively. Double click to add in order or drag and place it to the preferable position to add. If exceeding the limit, the parameters cannot be used. Refer to Section 10.2.8.4 for more details.
- 9. Setting up the starting address of the data register to exchange data. Select an added module and enter the starting address in Module Parameters for data exchange. For example set the value "08 Word In- and Output_1" in Slot 2 and click the name in the Module to set the starting register address of the corresponding AS300: *Properties -> General-> Module parameters-> IO Address*. When entering 100 in Input D Register and 200 in Output D Register and using a 8 Word In/Out module, the PN Controller reads values starting from D100 to D107 and writes the values in the data register starting from D200 to D207.
- PN Controller transmits 8 Words of data (Q0~Q15) to the data register D200~D207 in AS300 PLC CPU.
- AS-FPFN02 transmits 8 Words of data (D100~D107) to the data register I8~I23 in S7-15XX.
- The data exchange can only begin when the Bit Input Data Available is TRUE. Refer to Section 10.2.8.5 for more details.
- Apply the same setting procedure when AS-FPFN02 is installed in AS00SCM-A in RTU mode. But you need to pay
 attention on the IO modules in the software that should be consistent to the actual placement of the right-side of
 AS00SCM-A in RTU.

10.2.8.9 Network Security

To enhance security and performance of the system, it is suggested to use closed network or LAN with firewall protection to prevent cyber-attacks.

10.2.9 AS-FOPC02

AS-FOPC02 can be installed on AS300 PLC CPU. Communication can be done independently and that does NOT occupy the communication port of PLC CPU. It can act as an OPC UA Server. After AS-FOPC02 is installed, you can go to HWCONFIG from ISPSoft to do the editing in Ethernet Port Basic Setting and Ethernet Port IP Filter.

All the AS-FOPC02 parameters are stored in AS300 PLC CPU. Go to HWCONFIG from ISPSoft to check AS-FOPC02 IP address in the Function Card 2 section. You can also use COMMGR to see the IP address of this device.

10.2.9.1 Supported Firmware Versions

- The firmware of AS300 Series PLC should be V1.10.00 or later for AS-FOPC02 to be installed on it.
- AS00SCM-A does NOT support AS-FOPC02. You can NOT install AS-FOPC02 on AS00SCM-A.
- ISPSoft version should be V3.13 or later.

10.2.9.2 Features

- When AS-FOPC02 is installed on AS300 Series PLC, it can act as OPC UA Server. The tag settings are the same as the network communication settings for AS Series; refer to Chapter 9 from AS Series Hardware and Operation Manual for more information.
- For PLC CPU with firmware version 1.10 or previous versions, before scanning to add AS-FOPC02 in, remerber to change the setting "Setting delay time to detect I/O Module" to 3 seconds and then download the settings to PLC CPU.

								Hardv	vare Configura
eneral Data Exchange									
AS332T-A	Δ Sγ	/stem Parameter							
- System settings		1	lame	Setting Value		Unit	Default	Minimum	Maximum
System Information		Select Action	when I/O Module	Auto update	~		Auto update	-	-
		CPU module 9	Stop when I/O Mod	Stop	-		Stop	-	-
System Parameter		CPU module S	Stop when I/O Mod	Keep Run	-		Keep Run	-	-
Device Range Setting		Setting delay	time to detect I/O	30).1sec	20	20	200
Input Point Filter Time		Non-Retain S	mbol Initial Value T	Disable	-		Disable	-	-
Position Control Parameter			l Initial Value Take	Disable			Disable		
Daylight Saving Timing									-
COM1 Port Setting			t Point Control Run	Disable	*		Disable	-	-
COM2 Port Setting		Select X Inpu	t Point	X0.8	~		X0.8	-	-
Ethernet Port Basic Setting		Constant Sca	n Cycle Time	Disable	-		Disable	-	-

10.2.9.3 Specifications

• System Specifications

	Item	Specification
	Device type	Server
	Тороlоду	Star and linear topologies are supported.
General	IP Settings	When installed on AS300 PLC CPU, you can use HWCONFIG from ISPSoft for editing
	Availability	AS300 Series PLC
	Max. connection number	8
Web		View device information
AAGD	Functions	Account management
		AS-FOPC02 firmware update

• Modbus TCP Specifications

	Item	Specification
General	Device type	Server (TCP port: 502)
	Max. connection number	8
Modbus TCP Server	Max. data length	200 words

• OPC UA Specifications

lte	em			Specification				
General	Device type	Serv	ver (TCP port: 4840)					
OPC UA	Max. sessions	6 (C	lients)					
Server	Max. tags	100	0					
Security policy		Non	е					
Authentication		Ano	nymous					
Default endpoin	t/port	opc.	tcp://192.168.1.5:48	40/				
Transport proto	col / encoding	opc.	tcp / binary					
Supported profi	les	UA۱	1.03 Nano Embedd	ed Device Server Profile)			
Sampling rate (ms)	100	, 200, 300(default), 4	, 300(default), 400, 500, 60050000				
Publish interval	(ms)	i) 100, 200, 300, 400, 500(default), 60050000						
Supported data	type	Int16, Uint16, Int32, Uint32, Float, Boolean						
Max. subscription	ax. subscription per session 2							
Max. monitored	items	3000 (including all sessions)						
Session timeou	t (ms) 5000 ~ 30000							
Subscription ke	ep alive count	ive count 1~1000ms						
		1) Maximum data size of monitor items for all sessions < 50000bytes						
			Monitor Items	Total Data size of	Sampling and			
				monitor items	Publish interval			
				(Bytes)	time (second)			
			1~500	1~10000	1			
				10001~20000	2			
Restrictions				20001~30000	3			
Restrictions				30001~40000	4			
				40001~50000	5			
			501~1000	1~10000	2			
				10001~20000	3			
				20001~30000	4			
				30001~40000	5			
				40001~50000	6			

Item		Specification	
	1001~1500	1~10000	3
		10001~20000	4
		20001~30000	5
		30001~40000	6
		40001~50000	7
	1501~2000	1~10000	4
		10001~20000	5
		20001~30000	6
		30001~40000	7
		40001~50000	8
	2001~2500	1~10000	5
		10001~20000	6
		20001~30000	7
		30001~40000	8
		40001~50000	9
	2501~3000	1~10000	6
		10001~20000	7
		20001~30000	8
		30001~40000	9
		40001~50000	10
		y elements = 512 or dat	a size < 400Bytes
	 Maximum tag nam 	e length = 40bytes	

10.2.9.4 Special Data Registers (SR) for AS300 Series Only

SR	Function	AS300 Series	AS200 Series	OFF ↓ ON	STOP ↓ RUN	RUN ↓ STOP	Latched	Attribute	Default
SR913	Total data of ASFOPC02 monitor items; unit: bytes; low word	0	-	0	-	_	N	R	0
SR914	Total data of ASFOPC02 monitor items; unit: bytes; high word	0	-	0	-	_	N	R	0
SR1430	Connection number of AS-FOPC02 OPC UA Server	0	-	0	-	-	Ν	R	0
SR1537	Connection number of AS-FOPC02 Modbus/TCP Server	0	-	0	_	_	N	R	0

Special data register	Refresh time
SR913, SR914, SR1430, SR1537	The flag is ON, when the system is refreshed automatically.

10.2.9.5 OPC UA Server

When AS-FOPC02 is installed on AS300 Series PLC, it can act as an OPC UA Server. Follow the steps below to create Tags on AS300 Series PLC via OPC UA variables.

(1) Open ISPSoft and create a new project and then double-click **Global OPC UA Variables** under the **Global Symbols** node to open the **Global OPC UA Variables** setting table.



🗊 Global OPC-UA Variak	oles				
		Global	OPC-UA Variables		
Class	Identifiers	Address	Туре	Initial Value	Identifier Comment

(2) Right-click on the **Global OPC UA Variables** setting table to see the context menu. Click **Add a Symbol** to open the setting page.

	Add a Symbol									
	Symbols Filter									
	Remove Addres	s								
	Move Up	Alt+Up								
	Move Down	Alt+Down								
3	<u>U</u> ndo	Ctrl+Z	1	Add Symbol						
Ð	<u>R</u> edo	Ctrl+Y		Identifier	Address	Type	Initial	/alue (Active wh	Comment	
X	Cu <u>t</u>	Ctrl+X						ande (rieure na	Comment	
Þ	<u>C</u> opy	Ctrl+C	5							
Ð	<u>P</u> aste	Ctrl+V		Class VAR	🔻 🗹 Au	to-close Dialog 🔲	Insert		OK	Canc
9	Delete	Del		-						-
	Select All	Ctrl+A								

(3) Set up the OPC UA tag. See the following example for reference. Supported data types are: WORD, DWORD, INT, DINT, REAL, and ARRAY; supported data types in ARRAY are

BOOL, WORD, DWORD, INT, DINT, and REAL.

Identifier	Address	Туре	Initial Valu	e (Active whe Comment	
status	D100	WORD		PLC	

(4) After the settings are complete, download the settings to PLC. After that devices can read/write the Tag. The way to connect to the Tags varies in different brands. Refer to the specific device manual for more information on using tags to connect.

10.2.9.6 Setting UTC Time in OPC UA Server

When AS-FOPC02 is installed on AS300 PLC CPU. You can create a connection through OPC UA and then the AS300 PLC CPU can be an OPC UA Server. Follow the steps below to set up the RTC and the time zone of OPC UA UTC.





(2) Set up the time zone. Edit Area Data Exchange General NTP Device Range Setting Name Setting Value Unit Input Point Filter Time NTP Client Function Enable Position Control Parameter NTP Server 1.1.1.1 Daylight Saving Timing Update Cycle 30 min COM1 Port Setting (GMT-12:00) Eniwetok, Kwajalein Time Zone COM2 Port Setting Ethernet Port Basic Setting - Ethernet Port Advanced Setting **IP** Filter NTP + Email + Socket

10.2.9.7 Network Security

To enhance security and performance of the system, it is suggested to use closed network or LAN with firewall protection to prevent cyber-attacks.

10.2.9.8 The copyright information about the Used External Software Sources

IwIP TCP/IP stack

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10.2.10 AS-FFTP01

AS-FFTP01 can only be installed on AS Series PLC CPU. Communication can be done independently and that does NOT occupy the communication port of PLC CPU. It supports IIoT related protocols. After AS-FFTP01 is installed, you can go to HWCONFIG from ISPSoft for editing.

The AS-FFTP01 basic parameters (IP address and other parameters) are stored in AS Series PLC CPU. Other parameters are stored in the SD card. After AS-FFTP01 is installed on AS Series PLC CPU, you can use the following steps to obtain the parameters and make sure the IP address of AS-FFTP01 is correct.

- 1. Go to HWCONFIG from ISPSoft to upload the AS Series PLC CPU parameters and to check the IP address of AS-FFTP01.
- 2. If the IP address is a dynamic one, use COMMGR to scan and check the IP address of this device.

10.2.10.1 Supported Firmware Versions

- The firmware of AS Series PLC should be V1.12 or later for AS-FFTP01 to be installed on it.
- AS00SCM-A does NOT support AS-FFTP01. You can NOT install AS-FFTP01 on AS00SCM-A.
- ISPSoft version should be V3.16 or later.

System Specifications					
Item	Specification				
Device Type	IIoT module				
Availability	AS Series PLC				
Тороlоду	Star and linear (end point) topologies are supported.				
IP Settings	When installed on AS Series PLC CPU, you can use HWCONFIG from ISPSoft for editing				
Storage Interface	Micro SD (up to 32GB supported)				

10.2.10.2 Specifications

Supported Protocols

Supported Protocol Name	
Name	Description
	It can act as an OPC UA Server. AS-FFTP01 and AS-FOPC02 share the same OPC
OPC UA Server	UA symbols table in ISPSoft.
	File Transfer Protocol (FTP); enter the IP address or the network name and the port
FTP Server	number (default 21) in FTP Client and then enter username and password to log in.
	The read/write permission varies according to different users. You can set up the
	parameters and the user permission in HWCONFIG.
Data Log	You can save data in .csv file format, save user-defined contents in a table, and
	design triggering conditions. The data log will be saved in the SD card on AS-
	FFTP01 and which can be retrieved from the SD card or obtained through FTP
	Server.
	MQTT Client supported; you can use APIs of PLC and message broker to create
MQTT Client	connections, publish and subscribe messages. For AS-FFTP01 with firmware
	version 1.00 or previous version, only Amazon Web Services (AWS) is supported.
	Web page function is supported. (AS Series PLC CPU has its own independent web
Web Server	page.) You can monitor the diagnosis of the communication card and update
Web Server	firmware through the webpage. Node-RED Dashboard is supported, you can use
	Node-RED editor to read/write data from the AS Series registers.
	Modbus TCP communication supported; the upper computer of Modbus TCP can
Modbus TCP Server	use AS-FFTP01 communication card to read/write AS Series PLC CPU; up to 8
	connections are supported simultaneously.

• Modbus TCP Specifications

Item	Specification
Device type	Modbus TCP Server
Communication port	502
Maximum connection number	8
Maximum data length	200 words

• Standard Modbus device address

Device	Туре	Format	Range	Modbus address (Dec)	AS Series Address (Hex)
x	Bit	DD.DD	X0.0~X63.15	124577~125600	6000~63FF
	Word	DD	X0~X63	332769~332832	8000~803F
Y	Bit	DD.DD	Y0.0~Y63.15	040961~041984	A000~A3FF
Ť	Word	DD	Y0~Y63	440961~441024	A000~A03F
М	Bit	DDDD	M0~M8191	000001~008192	0000~1FFF
SM	Bit	DDDD	SM0~SM4095	016385~020480	4000~4FFF

	1	1			
SR	Word	DDDD	SR0~SR2047	449153~451200	C000~C7FF
D	Word	DDDDD	D0~D29999	400001~430000	0000~752F
S	Bit	DDDD	S0~S2047	020481~022528	5000~57FF
т	Bit	DDD	T0~T511	057345~057856	E000~E1FF
	Word	DDD	T0~T511	457345~457856	E000~E1FF
с	Bit	DDD	C0~C511	061441~061952	F000~F1FF
	Word	DDD	C0~C511	461441~461952	F000~F1FF
нс	Bit	DDD	HC0~HC255	064513~064768	FC00~FCFF
	DWord	DDD	HC0~HC255	464513~464768	FC00~FCFF
E	Word	DD	E0~E9	465025~465039	FE00~FE09

• Standard Modbus function codes and range

Function code	Description	Applicable to devices	Supported device range
01	Read multiple bit devices	X, Y, M, SM, S, T, C, HC	1~1600
02	Read multiple bit devices	X, Y, M, SM, S, T, C, HC	1~1600
03	Read multiple word devices	X, Y, SR, D, T, C, HC, E	1~100, but for HC: 1~50
04	Read multiple word devices	Х	1~100
05	Write the status in a single bit device	Y, M, SM, S, T, C, HC	1
06	Write data in a single word device	Y, SR, D, T, C, HC, E	1
0F	Write the status in multiple bit devices	Y, M, SM, S, T, C, HC	1~1600
10	Write the status in multiple word devices	Y, SR, D, T, C, HC, E	1~100, but for HC: 1~50
17	Read/write the status from/in multiple word devices	Y, SR, D, T, C, HC, E	1~100, but for HC: 1~50

10.2.10.3 Before You Begin

• Setting up IP Address

1: Scan to add AS-FFTP01 in (recommended) or set the Function Card 2 to AS-FFTP01 in HWCONFIG.

2: Go to Function Card 2 Setting -> Ethernet Port Basic Setting to set up the IP address for AS-FFTP01.

AS332T-A	Et	hernet Port Basic Setting			
+ System settings	1	Name	Setting Value	Unit	De
COM1 Port Setting	•	IP Address	192.168.1.58		192.168.1.
		Subnet Mask	255.255.255.0		255.255.25
COM2 Port Setting		Gateway	192.168.1.1		192.168.1.
Ethernet Port Basic Setting		TCP Keep Alive Timeout	30	sec	30
+ Ethernet Port Advanced Setting		Mode	Static -		Static
Function Card 1 Setting		DNS Server Address	192.168.1.1		192.168.1.
- Function Card 2 Setting		and the state of the			192.100.1.
Ethernet Port Basic Setting		Web Server Enable			b
Ethernet Port IP Filter					

+ Delta Device Parameter Restore ...

- After setting is done, download the parameters from HWCONFIG. And the Ehternet settings will be stored in AS Series PLC CPU. If you replace the AS-FFTP01 communication card with another one, there is no need to set up the IP address again.
- After connecting to AS-FFTP01 via Ethernet, you can use COMMGR to scan for AS-FFTP01 and check its IP address.

• Setting up NTP (RTC and Time Zone)

It is required to have accurate time for AS-FFTP01. And AS-FFTP01 time is synchronizing with the time of AS Series PLC CPU. There it is necessary to check the time accuracy of AS Series PLC CPU.

- 1. Go to HWCONFIG -> Ethernet Port Advanced Setting -> NTP.
- 2. If there is a NTP Server, you can enable NTP Client Function.
- 3. If there is no NTP Server, you can go to *ISPSoft -> Tool -> Real Time Clock* to set up the time for AS Series PLC CPU.
- 4. After setting up the Time Zone and the RTC, power off and then power on AS Series PLC CPU. AS-FFTP01 time will synchronize with the time of AS Series PLC CPU.

General	Data Exchange	AS-FFTF	01				
со	M2 Port Setting		*	NTP			
Eth	ernet Port Basic Set	ting			Name	Setting Value	Un
					NTP Client Function Enable		
- Eth	ernet Port Advance	d Setting	÷.		NTP Server	1.1.1.1	-
	IP Filter				Update Cycle	30	min
	NTP						
+	Email				Time Zone	(GMT+08:00) Taipei *	
+	Socket						

• Setting up the parameters

- Go to HWCONFIG -> AS-FFTP01 setting page to set up. You will need to use Upload and Download buttons on this page to upload/download the parameters set for AS-FFTP01. The upload/download function on the PLC CPU setting page does not include the parameters of AS-FFTP01.
- 2. Use the Upload and Download buttons on the AS-FFTP01 setting page to upload/download the parameters to the project. This will not alter the AS PLC CPU parameters in the project.
- 3. Note: After powering on or downloading the parameters, AS-FFTP01 will begin initializing. After the initialization is done, the upload/download can be executed again. Once AS-FFTP01 is ready, the MS LED will be ON. (Green LED).
- 4. Password: A password can be created or changed to protect AS-FFTP01. This password should be different from other projects or webpages. It is required to enter the created password whenever you need to upload/download AS-FFTP01 in HWCONFIG. You can delete the old password by leaving the new password field blank and press the enter key.
- 5. Restore to default settings: This only restores the AS-FFTP01 parameters to defaults. AS PLC CPU parameters will not be affected.



10.2.10.4 OPC UA Server

OPC UA Specifications

Item	Specification
Device Type	OPC UA Server
TCP Port	4840
Maximum Sessions	6 (Clients)
Maximum Tags	1000
Security policy	None, Basic128Rsa15 – Sign, Basic128Rsa15 - Sign & Encrypt Basic256 – Sign Basic256 - Sign & Encrypt
Authentication	Anonymous Sign
Default endpoint/port	opc.tcp://192.168.1.5:4840/
Transport protocol / encoding	opc.tcp / binary
Supported profiles	UA v1.03 Nano Embedded Device Server Profile
Sampling rate (ms)	100, 200, 300(default), 400, 500, 60050000
Publish interval (ms)	100, 200, 300, 400, 500(default), 600…50000
Supported data type	Int16, Uint16, Int32, Uint32, Float, Boolean
Max. subscription per session	2
Max. monitored items	3000 (including all sessions)
Session timeout (ms)	5000 ~ 30000
Subscription keep alive count	1~1000ms

When AS-FFTP01 is installed on AS PLC CPU, OPC UA clients can create connections through OPC UA and AS-FFTP01 to read and write OPC UA tags of AS PLC CPU. It is required for AS-FFTP01 to communicate with an OPC UA client certificate; communication without OPC UA client certificate is not supported. Set up the related parameters in HWCONFIG.

Refer to the following steps and examples for more information.

- 1. Enable / disable OPC UA Server
 - As long as there is OPC UA tags created in ISPSoft, OP UA Server is enabled. If you need to disable OPC UA Server, all you need to do is clear all the OPC UA tags.
- 2. Create OPC UA Tags in ISPSoft. (Refer to sections 10.2.9.5 and 10.2.9.6.)
- 3. Make sure if the IP address, time and time zone are accurate in AS-FFTP01.
- 4. Create an username and password.
 - (1) Go to HWCONFIG -> AS-FFTP01 -> OPC UA Server Setting: You can use anonymous to login by ticking the option Allow Anonymous Login. Otherwise, you will need to create a username and a password.

	nge Password 🐵 Factory Reset		
- MQTT Client Setting	* OPC UA Server Setting		
MOTT User Setting 1	Name	Setting Value	Unit
Fight Oser Setting 1	Allow Anonymous Login		
- OPC UA Server Setting			
OPC UA User Setting 1	-		
OPC UA User Setting 2			
OPC OA Oser Setting 2			
OPC UA User Setting 2			

(2) Go to *HWCONFIG -> AS-FFTP01 -> OPC UA Server Setting -> OPC UA User Setting 1*: Create an User name and a Password. Up to 4 unique user names can be created.

Upload 💽 Download 📑 Cha	nge Passwor	d	Di Factory Reset		
MQTT User Setting 1	*	OP	C UA User Setting 1		
- OPC UA Server Setting			Name	Setting Value	Unit
OPC UA User Setting 1		•	User name	Deta …	
OPC UA User Setting 2			Password	*******	
OPC UA User Setting 3					
OPC UA User Setting 4	_				
OPC UA Server Certification Man	agem				

- (3) Download the AS-FFTP01 parameters.
- 5. Client Certificate: Since communication without a client certificate is not supported, you will need to create one. The followings demonstrate how to create a Client Certificate by using VTScada.
 - (1) Establish a VTScada connection.
 - i. Create a communication port.

	y Used Types				
TCP/IP Po	ort				
100000000000000000000000000000000000000	Client Driver				
	Calculations				
Alarm Da	itabase	_	_	_	
Tag Gro	oups				
🛅 All Ta	ag Types				
👌 Anal	ogs				
🗎 Anal	- 1 - 12 - C				
w TCP/IP Port	Properties				
ID	Connection		TLS	Di	splay
ame					
OPC UA Port					
rea					
escription					
alo Saarch Kou					
elp Search Key					

<u>10</u>

1,984 Running Tags | Using 0 of Unlir Draw Plot View Alarms Show Children ¥ Cut All Areas v Show Disabled h Copy Name Paste as Child AlarmPriority0 New Child AlarmPriority1 M Select Type X AlarmPriority2 X Delete AlarmPriority3 ~ Enabled AlarmPriority4 **Recently Used Types** Set Start Condition AnalogFont BiggerFont TCP/IP Port Create New Type Default Call-Out (OPC UA Client Driver Redefine Type LabelFont AW I/O and Calculations Go to Page MediumFont Alarm Database Go to Page (Popup) Menus MeterFont Properties Tag Groups OPC UA Port Operator Notes Operator Notes 🛅 All Tag Types SmallMeterFont Font for Meter Leg

iii. Enter the Endpoint URL: Use the format: opc.tcp://AS-FFTP01 IP Address:4840

ID	Connection	Authentication	Client Certificate	Server Certificate	Diagnostic
E	ndpoint URL				
	opc.tcp://192.168	.1.58:4840			
E	Allow unsecure	d connections			
	Hold				
_					
_				OK Cancel	Арріу

iv. Enter the username and password
 You can select Anonymous if you have ticked the option Allow Anonymous Login in the OPC UA
 Server Setting. If not, you need to select Username and then enter the username and password you have created.

ii. Create a connection.

Connection Aut	hentication	Client	Certific	ate	Server Certificate	Diagnostic
Authentication Method						
O Anonymous		-	sernar	me		
 Username 		L.	Delta	1		
 Certificate 		Ē	asswo			
1		1		•••		
Create New Use Se	lected in	nport.	Valid	Remove	Thumbprint	
*.deltaww.com	Sectigo RSA Organizati	ion Validation	Yes	4EE9ED	AC520D21FFDEA39A	52B2770F78
ZACK.CHANG@deltaww.com						
zack.chang@deltaww.com	Communication	ns Server	Yes	DAEF22	A441ACC893B77E33	7669F32CEC

(2) Client Certificate

Set up the Client Certificate: Under the Client Certificate tab, select the valid one from the list and i. click Use Selected and then click Apply.

ID	Connection	Aut	Authentication Client C		Certificate		Server Certificate	Diagnostics
-	Client Certificate	-						
	Create New	Use Se	lected	Import		Remove		
1	Certificate Name		Issuer Name		Valid Yes	Thumbprint C5803279A0345CE87AE009F53DCA9450		
	OPC UA Client\OPC UA		OPC UA Client\OPC UA					
1		_			_			
		_						
		_						
		_	-					
.0								
ii. Make sure AS-FFTP01 is connected through EtherNet. Go to Server Certificate page and use Add Trust button to add all the valid ones to the Trust list.

	Connection A	uthentication Clier	nt Certifi	cate	Server Certificate	Diagnostics			
1.5	erver Certificate rusted certificates								
	Certificate Name	Issuer Name	Valid		Thumbprint				
	Delta OPC UA Server	Delta OPC UA Server	Yes	0D77	0D77D2B4A2F838481F9D5072CEF8FFE5				
	Delta OPC UA Server	Delta OPC UA Server	Yes	21C6FEC4529002B2E0A411793BFD2020					
L	Intrusted certificates Certificate Name	Add Trust 🛊	Valid		e Trust Thumbprint	^			
	Delta OPC UA Server	Delta OPC UA Server	-	1	4FF0FFB42C4375E0EC4L	03C988BI			
	Delta OPC UA Server	Delta OPC UA Server	No	4E28	AA1ED81791D44EC22E1	0B28011			
11.5	Delta OPC UA Server	Delta OPC UA Server	No	6443	D463C9CF512F0CC6350	D4E3121			
	<	1	1	1		>			
	<u>.</u>								

- iii. AS-FFTP01 will renew its Client Certificate automatically if any of the following executions is performed, RTC adjust, time zone adjust, firmware update or restoring back to defaults. If you have problem connecting to OPC UA Client, follow the previous steps to set up the Client Certificate again.
- (3) Set up OPC UA Server Certification for AS-FFTP01.
 - i. After setting up Client Certificate in VTScada, you need to upload parameters on AS-FFTP01 to HWCONFIG.
 - ii. After that, go to HWCONFIG -> AS-FFTP01 -> OPC UA Server Setting -> OPC UA Server Certification Management.



iii. Select the certificates from the right and then click the directional button (to the right) to add the selected ones to the Trust List on the left.

Trust List			Optional L	ist		
inter text to search		P	Enter text	to search		¢.
Common Name Organizati	Certificate File Name		2	Common Name	Organization	Certificate File Name
			+ 2			C5B03279A0345CE87AE009F
– Trust Lis	t					
Enter tex	t to search				٥	
	Common Name Organizati		Certificate	e File Name		
•		C5B03279A034	45CE87AE	009F53DCA945098	C188F0	

- iv. Download AS-FFTP01 parameters.
- v. If you need to clear the unwanted certificates, you need to synchronize the certificates in HWCONFIG and AS-FFTP01 by using Upload and Download buttons. After that, select the option Clear all optional certificates to remove unwanted certificates.



After the initialization is done, the MS LED will be ON. (Green LED). Upload the AS-FFTP01 parameters and the certificate list is updated and the unwanted certificates are cleared.

(4) Connection

i. After setting up the client certificates for AS-FFTP01, click **Restart Comms** to restart connection in VTScada.

ID	Connection	Authentication	Client Certificate	Server Certificate	Diagnostic
0	erver Information				
	Product URI		aWW.com/		
	/anufacturer	1			
F	roduct Name	: Delta OPC UA S	erver		
1	/ersion				
E	uild Number	1			Endpoints
E	uild Date	1			
S	tate	: Running			Refresh
C	Client Jser	: 10 Mar 2023 15: : 07 Dec 2022 16: :			
0	communication st	atus			
S	ecurity Profile		ation.org/UA/Security	Policy#Basic256	
S	ecurity Type	: Sign & Encrypt			
E	Minimum Secu	rity			Restart Comms
10					

ii. Check the OPC UA Connection. If the value is 0, that means the connection is working fine. If the value is any other number, you will need to check the VTScada manual to see what that error code indicates.

Names 😔	Show Children	All Areas	v	All Equipment Types	μ.	All Types		× 7	×	Ra II	5.1
E-0 1		Name	 Description	Туре	Equi	pment Type	Address	Value			
Menus OPC UA Port	O OPC	UA Connection		OPC UA Client Driver			opctcps//192.168.1.58	0			
OPC UA Port OPC UA Connection System Alarm DB											

scada					Search (see notes on the Weld
MDS Diagnostic Driver		Viewing: Bet	rence > Tag	Beference > Communication Driver Tags > OPC UA CI	ient Onver > OPC UA Client Error Codes
Modbus Compatible Device Driver	-	OPCI		nt Error Codes 2	
Motorola ACE Driver		OPCI	ACTIE	nt Error Codes 🖻	
MOTT Client Driver		If diagnos	ing error o	ode 270 - No valid endpoint, use the Endpo	aints tool that is available in the O
and a second second	0.0	Driver Stat			
NMEA 0183 Driver	-				
Omron FINS Driver	*	Error code (Decimal)	Error code (Hex)	Meaning	
Omron Host Link Driver		-10051	0x2743	Port unreachable	
OPC Client Driver		-10053	0x2745	Connection aborted	
	. 1	-10054	0x2746	Connection reset	
OPC UA Client Driver	* I	10060	0v274c	Connection timeout	
OPC UA Addressing		-10061	Di274d	Connection refused	
OPC UA Client Error		-10065	0x2751	Host unreachable	
Codes		0	0x0000	No error	
OPC Server Setup	- B	259	6x0103	Failed to connect to server	
Opto 22 Mux Driver	2	260	0x0104	Connection to server lost	
Bullion Balance Barrow		361	0x0105	Bad message received	
Polling Driver Tags	÷	262	0x0106	Missing client certificate	
Siemens S7 Driver	7	263	0x0107	Missing server certificate or thumbprint	
SNMP Driver		264	0x0108	Bad security policy reflection	
		265	0x0109	Incorrect security token ID	
SQL Data Query Driver		266	0x010A	Decryption failure	
Tesco Driver		267	0x010B	Message signature mismatch	
T1505 Device Driver		268	0x010C	Incorrect request ID or sequence number	
	-	269	0x010D	Bad Server URI	
Veeder Root Driver	-	270	Div010E	No valid endpoint	

- (5) Create Tags
 - i. Select I/O and Calculations.

Select Type	×
Recently Used Types	
I/O and Calculations	
TCP/IP Port	
OPC UA Client Driver	
Alarm Database	
Tag Groups	
🖻 All Tag Types	
🖰 Analogs	
Analytics	
Containers	
🛅 Digitals	
🛅 Drivers	
🛅 Inputs	
C Memory	

ii. Set up Data Type.



iii. Click **OPC UA** under **I/O** tab to open the setting page. And OPC UA tags created in ISPSoft will appear in here for selection.

ID 1/0	Scaling	Quality	Loggi	ing Alan	ms	Display			
I/O Device			Γ		ddress	Select			
[*Driver]				E-S opc.tcp:			n		
				E- Obje		00.1.30.4040		Attribute	Value
			Scan Int	E-> S		6	and the states	NodelD	=/OPC UA Data Provider without C
OPCUA 1		1				vithout Configuration F	NodeClass	2	
History Addre	ess		Scan Int	Int VFD_freq				BrowseName	ns=1;id=VFD_fre
		OPCUA	60	- Viev		- np		DisplayName	VFD_freq
Write Address								Description	
Write Addres	2	OPCUA						WriteMask	0
		OFCOM						UserWriteMask	0
Privilege								Value	3516
No Security								DataType	UInt16
Publish								ValueRank	Scalar
								ArrayDimensions	
								AccessLevel	3
								UserAccessLevel	3
								MinimumSamplingInterval	-1
								Historizing	False
OPC UA Port	OPC UA Co	nnection •	OF		_				
irch	Names		w Childre				→ All Equipment T	roes V A	1 Types

Analog [In]

rs=15d=/OPC UA Data Provide without Conf. 5.261

- 6. Application Diagnostic OPC UA
 - (1) Connection error
 - i. Make sure the client end and server end are in each other's trust list.

VFD freq

ii. Make sure the username and password are correct.

VFD_freq

- iii. If the MS LED is green and blinking, that means OPC UA server is initializing or starting up. You will need to reconnect once the MS LED is green and ON.
- iv. If MS LED is red and ON / blinking, power off and power on the device. And then check the error code stored in SR38 of AS Series PLC CPU.
- (2) Log in to the webpage and then go to *Diagnostic -> Application diagnostic* to check the OPC UA Server status. If its status is in error, you can use **Reboot** button to restart the OPC UA Server.

	Automation for	A Changing World		AS-FFTP01
User Admin	Application diag	gnostic		
Password	OPC UA status	Running	Reboot	
Logout	Log status	Running	Reboot	
Information Davice information Davice information Davice information Davice information System diagnostic Configuration Acount management Firmware update Save Configuration Node-RED Editor Dashboard				

10.2.10.5 FTP Server

• FTP Specifications

2.

Item	Specifications
Device type	FTP Server
Communication port	21 (default)
Maximum user accounts	4 (at least one user should be created)
Data storage	SD card

It is required for AS-FFTP01 to have a SD card inserted to use FTP function. SD card of AS-FFTP01 can be accessed by the FTP software. FTP server function is supported but not FTPS nor SFTP.

- When there is no card reader, FTP function can be used with Log function, and if necessary, system log output and firmware update functions on the webpage can be used together. Refer to the following sections for more details.
- Set up the related parameters in HWCONFIG. Refer to the following steps and examples for more information.
- 1. Make sure the IP address, time and time zone of AS-FFTP01 are accurate. (refer to section 10.2.10.4 for more information).

General Data Exchange AS-FFTP01					
😰 Upload 📑 Download 📑 Change Passwo	rd	Factory Reset			
AS-FFTP01	FI	TP Server Setting			
- FTP Server Setting		Name	Setting Value	Unit	Defau
the second se		Server Enable			
FTP User Setting 1		Port	21		21
FTP User Setting 2		Port	21		21
FTP User Setting 3					
FTP User Setting 4					

- 3. Make sure the port that FTP is going to use. (default: 21; no need to change it if there is no other concern).
- 4. Set up the user account and password for users to log in to FTP Server. Up to 4 unique users can be set. At least one user account should be created.

General Data Exchange AS-FFTP01							
🖭 Upload 💽 Download 📑 Change Passwo	ord	Tactory Reset					
AS-FFTP01	F	P User Setting 1					
- FTP Server Setting			Name	Setting \	/alue	Unit	Default
		User name		Delta			
FTP User Setting 1		Password		******			
FTP User Setting 2	- h						
FTP User Setting 3							
FTP User Setting 4							

- Use FTP Client from your computer to connect to AS-FFTP01. Enter the followings:
- 1. IP address of the communication or the network name.
- 2. Port number (default: 21)
- 3. User account and password

After that AS-FFTP01 is connected and you can upload/download data on the SD card of AS-FFTP01.

Status: Directory listing Status: Deleting 61 files Status: Retrieving direct Status: Directory listing Local site: Remote site:	Username: Delta Password: Delte Port: Quickconnect V
Status: Deleting 61 files Status: Retrieving direct Status: Directory listing Local site: Remote site: P-1/2 /	ory listing of "/Delta/LOG1_20220413"
Status: Retrieving direct Status: Directory listing Local site: ~ Remote site: ~	of "/Delta/LOG1_20220413" successful
Status: Directory listing	from "/Delta/LOG1_20220413"
Local site: V Remote site:	ory listing of "/"
▲ □ □ □ 1	of "/" successful
	/
~	stem Volume Information

The following folders and zip files are for system use. Do not edit or remove them. If the files are deleted accidentally, you can download the AS-FFTP01 parameters again from HWCONFIG.

you our download the rie ri or paran	notoro u	ganninonn	1100011110.			
Filename	Filesize	Filetype	Last modified	Permissions	Owner/G	
📕						
System Volume Information		File fold	1/14/2022 1:11:00 A	drwxrwxrwx	0 0	
📳 iot.zip	1,263	Compre	4/13/2022 2:57:00 P	-rwxrwxrwx	0 0	
📳 uasave.zip	3,937	Compre	4/13/2022 2:57:00 P	-rwxrwxrwx	0 0	

10.2.10.6 Log

Log Specifications

ltem	Specification
Device Type	Registers M and D
Supported Format	BOOL, INT16, UINT16, INT32, UINT32, Float
Supported User Account	4
Log Mode	 PLC Run Always Enable Program Control
Creating a new subdirectory when any of the conditions is met.	 Over 500 pieces of data Every self-defined date (cyclic) Every self-defined month (cyclic)
Creating a new file when any of the conditions is met.	 Self-defined minutes (1-1440) Self-defined hours (1-168) Self-defined days (1-31) Over 10000 pieces of data
Data storage	SD card

You can save the data to the SD card in .csv file that is installed on AS-FFTP01. Up to four groups of logs (Log1 to Log4) can be set. Each group of log can set its own triggering conditions to log data. You can retrieve data from the SD card or through FTP to download data.

- Before you begin:
- 1. Make sure a SD card is installed in AS-FFTP01.
- 2. Make sure the IP address, time and time zone of AS-FFTP01 are accurate. (refer to section 10.2.10.4 for more information).
- Set up the related parameters in HWCONFIG. Refer to the following steps and examples for more information.

1. Log Setting

Gene	ral Data Exchange	AS-FFTP01											
2 U	pload 💽 Download	Change Passwo	rd 😨 F	actory Reset									
	OPC UA User Setting	4	Table 1										
	OPC UA Server Certificati	on Managem	∎* Add	Move Up	A Move Down	Delete	1 Delete All			1	Preview CSV File	Enter text to search	p
		orritionogerini	-	Column Id	Column N	ame	Register Type		Register Address		Data Type	Decimal Places	
-	Log Setting				1	Date							
	- Table 1		-		2	Time							
	Log Mode				3			D -		0	INT1	6 -	0
	File Name												_

On the Log Setting page, row 1 and row 2 are fixed for date and time. For other rows, one row corresponds to one register. Click **+Add** to create a new row in the .csv file and up to 60 rows can be added. The following parameters can be set here on the Log Setting page.

- Name: user-defined, the maximum length is 64 characters.
- Register Type: Registers D and M
- Register Address: Register number
- Data Type: INT16, UINT16, INT32, UINT32, and Float can be used. After the file is saved in the log, the

corresponding data type and acceptable data length will be applied.

Decimal Places: Up to 5 decimal places can be used for the use of floating-point data type.

2. Log Mode

Log Mode	Program Control +				
Les Cude	Disable				
Log Cyde	Program Control				
	PLC Run				
	Always Enable				

- (1) Log Mode:
- Disable: Not using this log function
- Program Control: Work with Record_Trigger instruction (API2305); the execution of instruction is used for PLC to control the log recording timing. For more details, refer to AS Series Programming Manual.
- PLC Run: When PLC starts running, the log function is enabled. When PLC stops running, the log function is disabled.
- Always Enable: Once PLC starts running, the log function is enabled. The log function is enabled, even if the PLC stops running.
- (2) Log Cycle:
- When Log Mode is PLC Run or Always Enable: The triggering time to record log is set here; the interval unit is 0.1 second.
- When Log Mode is Program Control: The triggering time to record log is defined by PLC program.

3. File Name

Data log can only be saved on the SD card. You can define the directory name and the file name, for instance, a created file name looks like this: 'SD card/Delta/MyLog_20220425/Device_log_20220425_184031.csv".

	Name	Setting Value	Unit	Default
×	Parent directory Name (SD Card/)	Delta		
	Subdirectory Name	MyLog		LOG1
	Automatically Appended Subdirectory Name	Date -		Disable
	File Name (.csv)	Device_log		log1
	Automatically Appended File Name	Data + Time 🔹		Disable

- (1) Parent directory name (SD Card): Set up the parent directory name.
- (2) Subdirectory name: Set up the subdirectory name.
- (3) Automatically Appended Subdirectory Name: Disable, Date, Date + Time
 If Date or Date + Time is selected, the date or date + time will be added right after your set subdirectory name.
 Make sure you have set up the real time correctly in AS PLC CPU before selecting Date or Date + Time option.
- (4) File name (.csv): Set up the file name. Do not leave this field blank.
- (5) Automatically Appended File Name: Disable, Date, Date + Time If Date or Date + Time is selected, the date or date + time will be added right after your set filename. Make sure you have set up the real time correctly in AS PLC CPU before selecting Date or Date + Time option.

4. Parameter Settings

Name	Setting Value	Unit	Default	Minimum	Maximum
New Directory Creating Timing	Automatically create a new *		Automatically creat	-	-
New Directory Creating Parameter	1		1	1	31
New File Creating Timing	Overwrite existing file -		Overwrite existing file	-	-
New File Creating Parameter	10000		10000	1	10000
Save to SD Card Timing	Count -		Count	-	-
Save to SD Card Parameter	100	Count	100	1	500

- New Directory Creating Timing: New subdirectories can be created according to the following selections. Up to 500 subdirectories can be created in one directory.
 - Automatically create a new directory: when the number of the files in the subdirectory has reached to 500, a new subdirectory will be created.
 - Date, Month: When selecting the cycle unit, date or month the system will create a new subdirectory and save the data in the new subdirectory when the saving condition is met.
- (2) New Directory Creating Parameter: Up to 500 files can be created in a subdirectory.
- (3) New File Creating Timing: New files can be created according to the following selections. Up to 10000 files can be created in one subdirectory.
 - Overwrite existing file: When the number of the data in the file is reached to the maximum number (up to 10000), the file will be overwritten.
 - Minute, Day, Month: When selecting the cycle unit, minute, day, or month, the system will create a new file and save the data in the new file when the saving condition is met. Up to 10000 pieces of data can be saved; if exceeding the limit, the system will create a new file for recording.
 - Set maximum records of created file: You can set a maximum number for records in a file. The set maximum of records can be saved, if exceeding the limit, the system will create a new file for recording.
- (4) New File Creating Parameter: Up to 10000 pieces of data can be created in a file.
- (5) Save to SD Card Timing: The system saves data from the registers to the files in the SD card by counts or by seconds.
 - Count, second: Set the number of counts or seconds. When the number is reached, the system saves data from the registers to the files on the SD card. The less the setting value is, the sooner, the data will be saved and data loss is prevented. But the frequency of writes on the SD card will be increased and the working life of the SD card may be decreased.
- (6) Save to SD Card Parameter: Up to 500 files from the registers can be saved on a SD card. When the setting value is set to 0 or less than the recording cycle, the system saves data automatically. When the data in the register is more than 60% full, the system saves data to the SD card immediately.

5. Example

- Make sure a SD card is installed in AS-FFTP01.
- Make sure the RTC and time zone are set accurately.
- Setting up the parameters.
 - (1) There are two pieces of data stored in register D and their data types are INT16 and Float respectively.

#* Add #* Move Up	A Move Down	Delete	Delete All		Preview CSV File	Enter text to search	p
Column Id	Column	Name	Register Type	Register Address	Data Type	Decimal Places	
	1	Date					
	2	Time					
	3 VI	FD frequency	D *	2103	INT10	6 +	
	4	Temperature	D -	0	Floa	t -	

- (2) Log Mode
 - Log Mode: PLC Run
 - Log Cycle: The triggering time to record log is recording 1 piece of data every second; the interval unit is 0.1 second.

Name	Setting Value	Unit
Log Mode	PLC Run +	
Log Cyde	10	0.1 sec

(3) File Name

- Parent directory name: Delta
- Subdirectory name: MyLog
- Automatically Appended Subdirectory Name: Date
- File Name: Device_log
- Automatically Appended File Name: Date + Time

File	Name				
		Name	Setting Value		
•	Parent directo	ry Name (SD Card/)	Delta		
	Subdirectory I	Vame	MyLog		
	Automatically	Appended Subdirectory Na	. Date -		
	File Name (.c	sv)	Device_log		
	Automatically	Appended File Name	Data + Time	- 7	

(4) Parameter Settings:

- The system will create a new subdirectory and save the data in the new subdirectory daily.
- The system will create a new file every 10 minutes.
- The system will save the file to the SD card every 10 seconds.

Name	Setting Value	Unit	Default	Minimum	Maximum
New Directory Creating Timing	Daily -		Automatically creat	-	-
New Directory Creating Parameter	1	Daily	1	1	31
New File Creating Timing	Minute		Overwrite existing file	-	-
New File Creating Parameter	10	Minutely	1	1	1440
Save to SD Card Timing	Second -		Count	-	+
Save to SD Card Parameter	10	Second	10	1	120

- (5) Download data through FTP
 - Enter the IP address, the username and password in FTP software to log in.
 - Data is recorded under the folder with the name "/Delta/MyLog_20220325".
 - After downloading, the .csv file can be opened for reviewing.

Remote site: /Delta/MyLog_20220325			~
AS-FFTP01			
MyLog_20220325			
System Volume Information			
Filename	Filesize	Filetype	Last modified
1 Heridine	11103120	Thetype	Last mounicu
1 .	Thesize	Thetype	Last modified
Device_log_20220325_163018_0000.csv			
	43,252	Microso	3/25/2022 4:39:00 3/25/2022 4:49:00
L. Device_log_20220325_163018_0000.csv	43,252 44,288	Microso Microso	3/25/2022 4:39:00 3/25/2022 4:49:00
	43,252 44,288 43,474	Microso Microso Microso	3/25/2022 4:39:00

(6) Log status

Log in to the webpage of AS-FFPT01 and then go to *Diagnostic -> Application diagnostic* to check the Log status. If its status is in error, you can use **Reboot** button to restart the Log.

Application diagnostic								
OPC UA status	Running	Reboot						
Log status	Crashed	Reboot						

10.2.10.7 Web Server

• Web Specifications

Item		Specification	
Communication port		80	
Maximum connection number		8	
		Check the device information	
		 System diagnostic and Application diagnostic 	
Functio	n	 Management on the permission of users 	
		Firmware update	
		Built-in Node-RED	
Nede	Version	V0.18.5	
Node- RED	Communication	1000	
RED	port	1880	

You can enter AS-FFTP01 IP address in the search bar of your browser to connect to your device. After that you can monitor the operation, diagnose the problem and reboot the system if necessary. Node-RED is also supported.

To enable web server, go to HWCONFIG -> Function Card 2 Setting -> Ethernet Port Basic Setting -> Web Server Enable.

General	Data Exchange	AS-FFTP01			
со	M2 Port Setting	*	Ethernet Port Basic Setting		
Eth	ernet Port Basic Set	ting	Name	Setting Value	
			Subnet Mask	255.255.255.0	
	ernet Port Advance		Gateway	192.168.1.1	
Fur	nction Card 1 Setting	,	TCP Keep Alive Timeout	30	sec
- Fur	nction Card 2 Setting		Mode	Static -	1
	Ethernet Port Basic	Setting		100	-
	Ethernet Port IP Fil	ter	DNS Server Address	192.168.1.1	-
De	ta Device Paramete	Derte	Web Server Enable	V	

• List of browsers that support AS-FFTP01 webpage:

Provider	Browser	Supported versions
Microsoft	Internet Explorer	V10.0 and later
Microsoft	Edge	V20 and later
Google	Chrome	V14 and later
Apple	Safari	V5.1 and later

Log in

After the setting up IP address in HWCONFIG of ISPSoft. Open your browser and enter AS-FFTP01 IP address in the search bar to connect to AS-FFTP01. After the webpage appears, enter "Admin" in the User section and click Login without entering any password. You can set up the password after login.

	ation
Device name	AS-FFTP01
Device description	
Firmware version	V01.00.00.00
ation IP address	192.168.1.5
MAC address Serial number	00:18:23:13:02:09
	User Admin Password
	Logout

- Diagnostic: Use this page to execute System diagnostic and Application diagnostic.
 - System diagnostic: The system diagnostic can be exported. Click Export button to export the system status to the SD card. If something went wrong on the function card, your local authorized distributor can use the system diagnostic as reference to solve the problem. Once the Export status shows *Finished*, you can take out the SD card and use a card reader or FTP software to check the message.zip file from the SD card.

System diagnostic				
Export status	Finished			
Export syslog file to SDCard/message.zip	Export syslog file to SDCard/message.zip Export			

Filename	Filesize	Filetype	La
System Volume Information		File fold	1/
👔 iot.zip	1,263	Compre	
📳 message.zip	752,913	Compre	4/
uasave.zip	3,937	Compre	4/

Application diagnostic: You can use this page to check the OPC UA status and Log status. If the status is in error, you can use Reboot button to restart the OPC UA or Log.

Application diagnostic				
OPC UA status	Running	Reboot		
Log status	Running	Reboot		

Configuration

Account management

There is only one account; that is Admin. For its password, you can edit the password and then click **Apply** button. After that go to **Save Configuration** page to save the change. This password will be used in this webpage and Node-RED editor.

Acco	Account management						
No.	User ID	Password	Access type	Delete			
1	Admin	•••••	Administrator ~	Delete			
Apply							

• Firmware update

Store the firmware on SD card of AS-FFTP01 via a card reader or FTP function and then you can use this page to update the firmware. After firmware update is complete, power off and then power on your PLC to have the new firmware to take effect.

Firmware update			
Start firmware update mode	Start		
Update status	Ready		

• Save configuration: After settings are done, you need to save the changes in this page to make the changes effective.

Save configuration				
Save configuration				
Saving all applied changes will cause all changes to configuration panels that were applied, but not saved, to be saved, thus retaining their new values.				
Save				

- Node-RED Editor: You can create flow charts to make components and to read/write data from PLC data registers.
 - (1) You can use Modbus TCP communication to access to AS Series PLC CPU in Node-RED editor. The IP address is 127.0.0.1. And then you can see the data from the AS PLC CPU on this page.
 - (2) Click the **Click** button and then enter the fixed account name "Admin" and your password (default: Admin) to open the editor.

pen Node-RED ed		Click			
andard Modbus I Device	Device Addresses Type	Device range	AS address (Hexadecimal)	AS address (Decimal)	Function code (Hexadecim
	Bit	X0.0-X63.15	6000-63FF	24576-25599	01.02
x	Word	X0-X63	8000-803F	32768-32831	03.04
	Bit	Y0.0-Y63.15	A000-A3EE	40960-41983	01, 02, 05, 0F
Y	Word	Y0-Y63	A000-A03F	40960-41023	03.06.10.17
M	Bit	M0-M8191	0000-1FFF	0-8191	01, 02, 05, 0F
SM	Bit	SM0-SM4095	4000-4FFF	16384-20479	01, 02, 05, 0F
SR	Word	SR0-SR2047	C000-C7FF	49152-51199	03.06.10.17
D	Word	D0-D29999	0000-752F	0-29999	03, 06, 10, 17
s	Bit	S0-S2047	5000-57FF	20480-22527	01, 02, 05, 0F
	Bit	T0-T511	E000-E1FF	57344-57855	01, 02, 05, 0F
т	Word	T0-T511	E000-E1FF	57344-57855	03, 06, 10, 17
	Bit	C0-C511	F000-F1FF	61440-61951	01, 02, 05, 0F
C	Word	C0-C511	F000-F1FF	61440-61951	03, 06, 10, 17
E	Word	E0-E9	FE00-FE09	65024-65033	03, 06, 10, 17
		-~	Username: Admin Password:		

- Node-RED dashboard: Once you click it, a new window will be opened and a complied Node-RED dashboard will be shown visually.
- Users cannot create new nodes for AS-FFTP01 V1.00.
- Example

The Demo-page can be opened if this is your first time to use AS-FFTP01 function card or you just restore AS-FFTP01 to its default settings.

Node-RED		
Q filter nodes	Demo_page	
~ input		
inject		
catch		function=1; address=16599 (16384+215); quantity=1;
status	(Read SM215 Address Flex Getter
link		
mqtt		
http	1s pluse	function=3; address=49563 (49152+411); quantity=6;
websocket	timestamp to	Read SR411~SR416 Modbus Flex Getter
) tcp		
) udp		
~ output		
debug		
link		

(1) The SM, SR, M, D devices of AS Series PLC CPU can be transferred to nodes of the dashboard in different formats. For example, the D500 is read and shown in floating-point format. Follow the steps below.

	function=1; address=0; quantity=1; The min. response length of FC01 is 8 bits Flag Bit0 (M0) Read M0 Modbus Flex Getter Bit1 (M1) M1
timestamp ∪	function=3; address=500 ; quantity=2; f Read D500 (Float) addius Flex Getter f N716_To_Float32 f N716_To
	function=3; address=500 ; quantity=2; use methods Buffer.writeUInt16BE & Buffer.readInt32 Read D500 (INT32) Modbus Flex Getter active INT16_To_INT32

- i. Create an inject node and set the timestamp for transferring to one second.
- ii. Use Function nodes to send out msg.payload (Modbus TCP commands are included) to the node of Modbus TCP as the example shown below. The function code 03, address 500 (in decimal format), and quantity 2 are set.

Na	me
Read	1 D500 (Float)
-	nction
	var fc=3;
2	var address=500;
3	var quantity=2;
4	<pre>msg.payload = { value: msg.payload, 'fc': fc, 'unitid'</pre>
5	return msg;

iii. Create a server in the node of Modbus. IP address is 127.0.0.1.

Name	AS300
🗖 Туре	TCP 🗸
Host	127.0.0.1
Port	502
📕 ТСР Туре	DEFAULT Y
Unit-Id	1

iv. Now the data is being processed in the node of Function. After the data is converted to the floating-point format, it will be presented in nodes shown in the dashboard. For more details, refer to the reference in Node-Red editor.

Status		CPU Scan Time			Network	
PLC Run (SM215)		START/RESET	Current (SR411, SR412)	3.1	STANT/RESET	
Data			CPU Scan Time (ms)		Network Lo	ading (%)
MO		10			37.6	
M1		a 26 ministration		-	29	
D500 (Ficat)	55.550	10 11(60:00) 14(00:00) M	10.00 MICON 18.000 18.4	10:00 10:01:00	5 15 5010 16 00 01 16 10 00 16 2	LOS MERIOD 18-40.00 MM
D500 (NT32)	1113469747	Maximum (SR413, SR41	4) 55.6 Minimum (SR415. S	R416) 0.1	Network Loading	Packet Loss (SR4019)
					(SR1018/SR1017*100%)	

Backup and Restoration

- (1) If the AS-FFTP01 is restored to its defaults, only the demo page will be shown. Thus it is important to back up your Node-RED data after editing is done.
- (2) Click any nodes in the editor to open the function list on the upper-right corner of the screen. Select *Export -> Clipboard* and then you can select the sections to be backed up. After that, click **Export to clipboard** to copy the codes and then save them in any textbook. And then a copy of your codes is made.

	E Deploy 👻 🚨 🗮
	✓ View
	✓ Import
Clipboard	
Library	Search flows
xport nodes to clipb	oard
Frank to officiate and	
Export to clipboard	selected nodes current flow all flows
At	selected nodes: current flow all flows
((120, "wires":[[]]]}, ("id":"603b3ffd 0ac8	* 8" "type""'comment" "z" "595bdfba 6dbeb" "na
120,"wires" [[]]}, ("id": "603b3ffd.0ac8 me" "use methods I	* 8" "type": "comment", "z" "595bdfba 6dbeb" "na 3uffer.writeUInt16BE &
120,"wires" [[]]}, ("id":"603b3ffd.0ac8 me" "use methods I	* 8" "type""'comment" "z" "595bdfba 6dbeb" "na
120, "wires" [[]]], ("Id":"603b3ffd 0ac8 me" "use methods I Buffer readInt32BE"	8", "type": "comment", "z" "595bdtba.6dbeb", "na Buffer.writeUInt16BE & ""info" "", "x":1000, "y":1180, "wires"
" 120, "wires" [[]]], ("Id":"603b3ffd 0ac6 me" "use methods I Buffer readInt32BE"	* 8" "type": "comment", "z" "595bdfba 6dbeb" "na 3uffer.writeUInt16BE &
" 120, "wires" [[]]], ("Id":"603b3ffd 0ac6 me" "use methods I Buffer readInt32BE"	8", "type": "comment", "z" "595bdtba.6dbeb", "na Buffer.writeUInt16BE & ""info" "", "x":1000, "y":1180, "wires"

(3) For restoration, select *Import -> Clipboard* from the upper-right corner of the screen to import your copied codes and then your codes can be used again.



For more information, go to https://nodered.org/docs/user-guide/editor/

10.2.10.8 MQTT Client

• MQTT Specifications

Item	Specifications
Device type	MQTT Client
Supported platform	Amazon Web Service
Communication port	8883
Maximum connection number	1
Maximum connection number	1
to be recorded	I
Quality of Service (QoS)*	0, 1
Section to be read	Register D
Maximum data length in Publish	128 words
Maximum data length in Subscribe	128 words
	MQTT_Connect
Application command	MQTT_Publish
	MQTT_Subscribe

*Note: QoS (Quality of Service): There are 3 QoS levels in MQTT. But for AS-FFTP01 V1.0, only 0 and 1 are supported. For more details, refer to the instructions, including MQTT_Connect (API2214), MQTT_Publish (API2215) and MQTT_Subscribe (API2216) from AS Programming Manual.

AS-FFTP01 V1.00 supports **Amazon AWS IoT Core for MQTT**. You can use the MQTT feature **Publish** to publish messages to the specific topic on the cloud where the MQTT Broker designed. For example, you can update the status of the PLC registers to the specific topic on the cloud. Up to 5 topics can be subscribed at the same time. Users can use the MQTT feature **Subscribe** to scribe the specific topic and after the subscription is complete, they can receive the published messages that they subscribed or the status of the PLC registers.

Before the connection is established, you will need to set up AWS IoT Core.

aws Services	Q Search for serv	vices, features, blogs, docs, and more	[Alt+S]	
AWS IoT	×	Introducing the new AWS IoT console ex We're updating the console experience for menu.		periences and <u>let us know what you think.</u> You can tu
Activity		AWS IoT > Manage > Things		
▼ Connect		Awaron y manage y minigs		
Overview Get started Fleet provisioning temp Manage	lates	Things (0) Info An lot thing is a representation and record a needs a thing record in order to work with A C Advanced search		Delete Create things
Overview		Q Filter things by: name, type, grou	p, billing, or searchable attribute.	
Things Types	- 1	Name		Thing type
Thing groups Billing groups			No th	No things nings to display in this Region
Jobs				Create things
Job templates				
Tunnels				

2. Select the **Create single thing** and click **Next**. On the next page, provide the to-be-created thing with a name and then click **Create thing type**. On the next page, provide the to-be-created thing type with a name and then click **Create**.

	AWS IoT > Manage > Things > Create things		
	Create things տ		
	A thing resource is a digital representation of a physical device or logica resource in the registry to use AWS IoT features such as Device Shadows		
	Number of things to create		
	 Create single thing Create a thing resource to register a device. Provision the certificate and IoT. 	policy necessary to allow the device to connect to AWS	
	Create many things Create a task that creates multiple thing resources to register devices and connect to AWS IoT.	d provision the resources those devices require to	
		Cancel Next	
		Create thing type	×
		Thing types store description and configuration information that devices.	is common to similar
Constitution .		Thing type name	
Specify thing	properties Info representation of a physical device or logical entity in AWS IoT. Your device or entity needs a thing	mydevice	
	se AWS IoT features such as Device Shadows, events, jobs, and device management features.	Enter a unique name that contains only: letters, numbers, hyphens, colom, o type name can't contain any spaces.	r underscores. A thing
		Description - optional	
Thing properties In	afo	Enter description	
Thing name			
Delta_Test			te
	ing only, letters, numbers, hyphens, colons, or underscores. A thing name can't contain any spaces	Additional configuration You can add additional information to the thing type that can help you to or search your things.	ganize, manage, and
You can use these configuration		You can add additional information to the thing type that can help you to or	ganize, manage, and
You can use these configurati	ations one to add detail that can help you to organize, manage, and search your things.	You can add addidonal information to the thing type that can help you to or search your things.	ganize, manage, and
 Thing type - optional 	ations one to add detail that can help you to organize, manage, and search your things.	You can add additional information to the thing type that can help you to or search your things.	ganize, manage, and
 Thing type - optional 	ations com to add detail that can help you to organize, manage, and search your things. /	You can add addidonal information to the thing type that can help you to or search your things.	ganize, manage, and

3. Select Auto-generate a new certificate (recommended) and click **Next**. Configure device certificate - optional Info

evi	ice certificate
0	Auto-generate a new certificate (recommended)
	Generate a certificate, public key, and private key using AWS IoT's certificate authority.
0	Use my certificate
	Use a certificate signed by your own certificate authority.
0	Upload CSR
~	Register your CA and use your own certificates on one or many devices.
0	Skip creating a certificate at this time
~	You can create a certificate for this thing and attach a policy to the certificate at a later time.

4. Click Create policy to manage AWS IoT actions and then click Create.

Policies (0) Select up to 10 policies to attac	h to this certificate.	C Create policy 🔀
Q , Filler policies		< 1 > @
Name		
		olicies e found in us-east-2.
		Cancel Previous Create thing
te policy 📷	٩١	
	All AWS IoT actions	
te policy two Core policies allow you to manage access to th cy properties T Core supports name! policies so that many identifi		
Core policies allow you to manage access to the y properties T Core supports named policies so that many identiti	All AWS IoT actions	
Core policies allow you to manage access to the y properties. T Consupport named policies so that many identificant name ence	All AWS IoT actions	n (-), espant sign (-), and at sign (()) thanesters, but no spaces.
Core policies allow you to manage access to the y properties. T Core supports named policies so that many identificant name exice returne it or alphanameter throng that can also contain ga - option of y document into	All AWS IsT actions	n (+), espaid sign (-), and at sign (git characters, but no spaces. effect that spants or denies the actions by the resources.
Core policies allow you to manage access to the cy properties. T Core supports named policies so that many identities name evice	All AWS IoT actions All AWS IoT actions MQTT policy actions Iot.Connect Permosalo to connect to the AWS IoT Core message braker. Iot.Publish Permosalor to publish an MQTT opic. Iot.Receive Permosalor to rooten a message from AWS for Core. Iot.GetRetainedMessages Iot.ListRetainedMessages	Builder JSON

5. After that, attach policies to certificate and then click **Create thing**.

Policies (1/1)	C Create policy
ielect up to 10 policies to attach to this certificate.	
Q Filter policies	< 1 >
2 Name	
MyDevice	

- 6. Download all the certificates and keys. We will need the followings for the set up.
 - Root certificate (Root CA1)
 - Device certificate (.crt)
 - Private key

ownload certificates a	ind keys	×
ownload certificate and key fi WS.	les to install on your device so that	: it can connect to
evice certificate		
u can activate the certificate now, VS IoT.	or later. The certificate must be active fo	or a device to connect to
evice certificate	Deactivate certificate	M Download
b34b7e2acte.pem.crt		
ey files ne key files are unique to this certif ownload them now and save them	ficate and can't be downloaded after you in a secure place.	leave this page.
A This is the only time you	i can download the key files for thi	s certificate.
ublic key file		世 Download
bb34b7e2ac6d761dc718b0	db1da50-public.pem.key	
rivate key file		M Download
bb34b7e2ac6d761dc718b0	b1da50-private.pem.key	
Root CA certificates		
Download the root CA certificate file rou're using. You can also download	that corresponds to the type of data en the root CA certificates later.	dpoint and cipher suite
Amazon trust services endpoin	t .	Download
RSA 2048 bit key: Amazon Roo	t CA 1	E Dominoud
Amazon trust services endpoin	t	Download
CC 256 bit key: Amazon Root		Downtoad
	tificate that you need here, AWS Io	T supports additional
	CA certificates and others are avail	lable in our developer

7. Go to the setting page to copy the Endpoint address. You will need to use this address later in HWCONFIG.



Setting up MQTT in HWCONFIG:

- 1. Go to MQTT User Setting 1 page.
- 2. Cloud: Select AWS.
- 3. Server Mode: Select Domain Name.
- 4. Server Domain Name: Paste the Endpoint address that you've just copied from AWS setting page.
- 5. Port number: 8883

Name	Setting Value	Unit	Default	Minimum	Maximum
Cloud	AWS -		AWS		-
TLS/SSL	Enable +		Enable	-	-
Port	8883		8883	1	65535
Server Mode	Domain Name *		Domain Name	-	-
Server Domain Name	acyauof29ysuz-ats.iot.us-eas			÷	÷
User name				÷	-
Password					-
Root Certificate	AmazonRootCA1.pem ····			-	-
Certificate	certificate.pem.crt ···			-	-
Key	private.pem.key ····				-

6. Import the AWS provided RootCA1, Certification (.crt) and Private Key file.

- 7. After the connection is established, you can use the PLC instruction MQTT_Connect (API2214) to establish connections.
- 8. After connected, use the PLC instructions MQTT_Publish (API2215) and MQTT_Subscribe (API2216) to publish and subscribe messages.
- 9. Refer to AS Programming Manual for more details on instruction executions.

10.2.10.9 Network Security

To enhance security and performance of the system, it is suggested to use closed network or LAN with firewall protection to prevent cyber-attacks.

10.2.10.10 Error Codes

AS-FFTP01 uses SM38 as an error flag and stores error codes in SR38.

- Any error occurs, the flag SM38 will be ON.
- The error codes will be stored in SR38. When there are more than one error occur at the same time, only the one with higher priority will be shown in SR38. For example, if the errors 16#9001 and 16#900F occur at the same time, only 16#9001 will be shown in SR38. The following error codes are numbered according to their priorities. The higher the priority is, the sooner it will be presented in this table.

Error Code	Description	Solution
16#9000	A firmware update is undergoing now.	After the firmware update is complete, power off and power on your PLC CPU to restart.
16#9001	Failed to communicate internally	 Check if the function card is securely inserted into the slot. Check if the settings in HWCONIG are the same as the actual settings for function card. Power off and power on your PLC CPU to restart. If the problem persists, contact the local authorized distributors.
16#9002	Internal master communication stops working.	Power off and power on your PLC CPU to restart. If the problem persists, contact the local authorized distributors.
16#9003	Internal slave communication stops working.	Power off and power on your PLC CPU to restart. If the problem persists, contact the local authorized distributors.
16#9004	Modbus TCP slave stops working.	Power off and power on your PLC CPU to restart. If the problem persists, contact the local authorized distributors.
16#9005	MQTT client stops working.	Power off and power on your PLC CPU to restart. If the problem persists, contact the local authorized distributors.
16#9006	OPC UA server stops working.	 Reboot OPC UA server on the diagnostic web page. Power off and power on your PLC CPU to restart. If the problem persists, contact the local authorized distributors.

Error Code	Description	Solution
16#9007	FTP server or Log function stops working.	Power off and power on your PLC CPU to restart. If the problem persists, contact the local authorized distributors.
16#9008	Web server function stops working.	Power off and power on your PLC CPU to restart. If the problem persists, contact the local authorized distributors.
16#9009	Internal communication stops working.	Power off and power on your PLC CPU to restart. If the problem persists, contact the local authorized distributors.
16#900B	Initialization on internal master communication failed	Power off and power on your PLC CPU to restart. If the problem persists, contact the local authorized distributors.
16#900C	Initialization on internal slave communication failed	Power off and power on your PLC CPU to restart. If the problem persists, contact the local authorized distributors.
16#900D	Initialization on Modbus TCP slave failed	Power off and power on your PLC CPU to restart. If the problem persists, contact the local authorized distributors.
16#900E	Initialization on MQTT client failed	Power off and power on your PLC CPU to restart. If the problem persists, contact the local authorized distributors.
16#900F	Initialization on OPC UA server failed	 Reboot OPC UA server on the diagnostic web page. Power off and power on your PLC CPU to restart. If the problem persists, contact the local authorized distributors.
16#9010	Initialization on FTP server or Log function failed	Power off and power on your PLC CPU to restart. If the problem persists, contact the local authorized distributors.
16#9011	Initialization on Web failed	Power off and power on your PLC CPU to restart. If the problem persists, contact the local authorized distributors.
16#9012	Initialization on internal communication failed	Power off and power on your PLC CPU to restart. If the problem persists, contact the local authorized distributors.
16#9013	Initialization on RTC failed	Power off and power on your PLC CPU to restart. If the problem persists, contact the local authorized distributors.
16#9014	RTC function stops working.	Power off and power on your PLC CPU to restart. If the problem persists, contact the local authorized distributors.
16#9200	Internal communication timeout	 Check if the function card is securely inserted into the slot. Power off and power on your PLC CPU to restart. If the problem persists, contact the local authorized distributors.
16#9201	Failed to store in SD card	Check if the SD card is functioning properly. And then download the HWCONFIG parameters again.
16#9202	Failed to back up	Power off and power on your PLC CPU to restart. And then download the HWCONFIG parameters again.
16#9203	Failed to read HWCONFIG parameters	Power off and power on your PLC CPU to restart. If the problem persists, contact the local authorized distributors.
16#9204	Failed to read parameter from OPC UA server	Power off and power on your PLC CPU to restart. If the problem persists, contact the local authorized distributors.
16#9205	Failed to restore to defaults	 Check if the function card is securely inserted into the slot. Power off and power on your PLC CPU and try to restore the settings to defaults again. If the problem persists, contact the local authorized distributors.
16#9206	Failed to update firmware	Check if the SD card is functioning properly. Power off and power on your PLC CPU to restart. If the problem persists, contact the local authorized distributors.
16#9207	IP address conflict	Remove the device with the same IP address on the network or modify the IP address of AS-FFTP01.
16#92FF	Unknown error	Power off and power on your PLC CPU to restart. If the problem persists, contact the local authorized distributors.

10.2.11 AS-FECAT

This communication card can work independently and does NOT occupy the communication port of PLC CPU. It can act as Modbus TCP Server and EtherCAT Master. After AS-FECAT is installed, you can go to HWCONFIG from ISPSoft for editing in the Function Card 2 section.

For the AS-FECAT basic parameters (IP address and other parameters) are stored in AS300 Series PLC CPU. After AS-FECAT is installed on AS300 Series PLC CPU, you can use the following steps to obtain and make sure the IP address of AS-FECAT is correct.

1. Go to HWCONFIG from ISPSoft to upload the AS Series PLC CPU parameters to check the IP address of AS-FECAT 2. If the IP address is a dynamic one, use COMMGR to scan and check the IP address of this device.

A5332T-A		Inction Card 2 Setting Name	Setting Value	Unit	Default	Minimum	Maximum
+ System settings						Minimum	Maximum
COM1 Port Setting		Card 2 Detect mode	Manual		Auto Detect	-	-
		Manual Select Card	AS-FECAT Card		None	-	-
COM2 Port Setting		Received Data Timeout	200	ms	200	0	3000
Ethernet Port Basic Setting		ECAT port	Xi		XI		
+ Ethernet Port Advanced Setting	114	CCAT port	A1		AI		0
Function Card 1 Setting							
- Function Card 2 Setting							
Ethernet Port Basic Setting							

10.2.11.1 Supported Firmware Versions

- The firmware of AS300 Series PLC should be V1.14 or later for AS-FECAT to be installed on it.
- ISPSoft version should be V3.16 or later.
- Built-in ISPSoft, HWCONFIG, should be V4.06 or later.

10.2.11.2 Features

- AS-FECAT can be installed on AS300 Series PLC CPU.
- When AS-FECAT is installed on AS300 Series PLC CPU, it can act as a Server of Modbus TCP. The way to use AS-FECAT is the same as using the built-in connection port for communication.
- When AS-FECAT is installed on AS300 Series PLC CPU, you can use the INITEC instruction (API2820) to initialize EtherCAT communication and then set up one of the AS-FECAT port as the EtherCAT Master's port in HWCONFIG. As for the other port, it can be used by Server of Modbus TCP. The way to use the two communication ports is the same as using the built-in connection port for communication.

10.2.11.3 Specifications

System Specifications

	Item	Specification
	Device type	Master and Slave
General	Topology Availability IP Settings Max. connection number	Star and linear topologies are supported. Note: Once the EtherCAT communication is initialized via the INITEC instruction (API2820), the above mentioned topologies are not supported. There are two ports on AS-FECAT; one will be used as EtherCAT port and the other will be Ethernet port. Two ports work independently.
General Device type Master Topology Star at Note: 0 initialization above There as Eth port. T Availability Availability AS300 IP Settings • Wh Master Star at Web Master	AS300 Series PLC CPU	
	Device type Master and Slave Topology Star and linear topologies are support initialized via the INITEC instruction (above mentioned topologies are not structed topologies are not structe	 When installed on AS300 PLC CPU, you can use HWCONFIG from ISPSoft for editing.
	Max. connection number	8
Web	Functions	Account management

• MODBUS TCP Specifications (only available for CPU modules)

	Item	Specification
General	Device type	Server
Modbus TCP	Max. connection number	1
Server	Max. data length/per transmission	200 words

• EtherNet/IP Specifications

Item	Specification
Baudrate	100Mbps
Communication protocol	EtherCAT packet
Supported number of axis	16 Note: only available for Delta Servo drives, ASDA-A2-E, ASDA-A3-E, ASDA-
	B3-E and Delta inverters, C2000 and CH2000.



10.2.11.4 IP Setting

- The IP address of AS-FECAT is not stored on the function card. When you install AS-FECAT onto AS300 PLC CPU or AS00SCM-A, the IP settings of AS-FECAT will be obtained automatically.
- When installed on AS300 PLC CPU, you can go to *ISPSoft -> HWCONFIG -> Function Card 2 Setting -> Ethernet* Port Basic Setting to edit the parameters.



Note: You can use **IP Manager Tool**, when AS-FECAT is installed on AS300 PLC CPU, but do not use it to set up the IP address to avoid conflicts with the parameters of AS300 PLC CPU project.

10.2.11.5 Set up the ECAT Port

When AS-FECAT is installed on AS300 Series PLC CPU, you can use the INITEC instruction (API2820) to initialize EtherCAT communication and then set up one of the AS-FECAT port as the EtherCAT Master's port in HWCONFIG. As for the other port, it can be used by Server of Modbus TCP. Two ports work independently. If the EtherCAT communication is NOT initialized, the two ports of AS-FECAT can be used by Servers of Modbus TCP.

eneral Data Exchange								Hardware Configuration
COM2 Port Setting	* P	unction Card 2 Setting						
Ethernet Port Basic Setting		Name	Setting Value		Unit	Defauk	Minimum	Maximum
		Card 2 Detect mode	Manual	4		Auto Detect	-	
+ Ethernet Port Advanced Setting		Manual Select Card	AS-FECAT Card	-		None	-	
Function Card 1 Setting		Received Data Timeout	200	m		200	0	3000
- Function Card 2 Setting		ECAT port	X1		1	XI	-	
Ethernet Port Basic Setting		LOAT por	XI			~1		17
Ethernet Port IP Fiker			X2					
+ Delta Device Parameter Restore Setting								

10.2.11.6 SM/SR

• The following table shows special flags (SM) and registers (SR) related to ECAT communication.

Flag	R/W	ID. 1 to ID. 16
Initialization and communication complete (INITC and CASD)	R	SM1681
Communication error	R	SM1682
Heartbeat error handling	R/W	SM1684 = OFF (default; when one goes down, all the drives are OFF.) SM1684 = ON (when one goes down, only the defective drive is OFF.)
ECAT SDO abort code (32-bit)	R/W	SR656 SR657
ID number with a communication error	R/W	SR658
Communication error code	R/W	SR659

Function	R/W	ID. 1	ID. 2	ID. 3	ID. 4	ID. 5	ID. 6	ID. 7	ID. 8
Servo Positioning complete ^{#1}	R/W	SM1631	SM1632	SM1633	SM1634	SM1635	SM1636	SM1637	SM1638
Servo Stop	R/W	SM1641	SM1642	SM1643	SM1644	SM1645	SM1646	SM1647	SM1648
Servo-ON, inverter-ON	R	SM1651	SM1652	SM1653	SM1654	SM1655	SM1656	SM1657	SM1658
Go-back/go-forth enabled Only DDRVAC is supported.	R/W	SM1661	SM1662	SM1663	SM1664	SM1665	SM1666	SM1667	SM1668
Go-back/go-forth direction indicator Only DDRVAC is supported.	R	SM1671	SM1672	SM1673	SM1674	SM1675	SM1676	SM1677	SM1678
Auto return communication control right. Only DDRVAC is supported.	R/W	SM1581	SM1582	SM1583	SM1584	SM1585	SM1586	SM1587	SM1588
Heartbeat error code#2	R/W	SM1691	SM1692	SM1693	SM1694	SM1695	SM1696	SM1697	SM1698

Function	R/W	ID. 9	ID. 10	ID. 11	ID. 12	ID. 13	ID. 14	ID. 15	ID. 16
Servo Positioning complete#1	R/W	SM1921	SM1922	SM1923	SM1924	SM1925	SM1926	SM1927	SM1928
Servo Stop	R/W	SM1931	SM1932	SM1933	SM1934	SM1935	SM1936	SM1937	SM1938
Servo-ON, inverter-ON	R	SM1621	SM1622	SM1623	SM1624	SM1625	SM1626	SM1627	SM1628
Go-back/go-forth enabled Only DDRVAC is supported.	R/W	SM1941	SM1942	SM1943	SM1944	SM1945	SM1946	SM1947	SM1948
Go-back/go-forth direction indicator Only DDRVAC is supported.	R	SM1951	SM1952	SM1953	SM1954	SM1955	SM1956	SM1957	SM1958
Auto return communication control right. Only DDRVAC is supported.	R/W	SM1601	SM1602	SM1603	SM1604	SM1605	SM1606	SM1607	SM1608
Heartbeat error code#2	R/W	SM1611	SM1612	SM1613	SM1614	SM1615	SM1616	SM1617	SM1618

#1: The timing for the servo positioning completion flag to be cleared to off automatically is when the outputting of the axis is enabled. If you need to use positioning instructions on a certain axis for several times in a row, you need to clear the servo positioning completion flag by yourself. If you do not clear the servo positioning completion flag and then use the positioning instruction again and again, it is possible that before the next positioning instruction is executed, a servo positioning completion flag is detected and then the execution of positioning instruction will be stopped.

2: Since the heartbeat is not available for ECAT communication, working counter (WKC) is used as a way to determine whether the connection of a slave is lost or not.

Parameter Name (Number)	R/W	ID. 1	ID. 2	ID. 3	ID. 4	ID. 5	ID. 6	ID. 7	ID. 8
Servo PR command (P5-07) / Inverter status (index 6041H-00H)	R	SR661	SR662	SR663	SR664	SR665	SR666	SR667	SR668
Servo Alarm code (P0-01)	R	SR671	SR672	SR673	SR674	SR675	SR676	SR677	SR678
Servo DO state (P0-46)	R	SR681	SR682	SR683	SR684	SR685	SR686	SR687	SR688
Servo command positon CMD_O (P0-09)	R	SR691 SR692	SR693 SR694	SR695 SR696	SR697 SR698	SR699 SR700	SR701 SR702	SR703 SR704	SR705 SR706
Servo target position CMD_E (P0- 10)	R	SR711 SR712	SR713 SR714	SR715 SR716	SR717 SR718	SR719 SR720	SR721 SR722	SR723 SR724	SR725 SR726
Servo DI state (P4-07)	R	SR731	SR732	SR733	SR734	SR735	SR736	SR737	SR738
Current torque (P0-11)	R	SR741	SR742	SR743	SR744	SR745	SR746	SR747	SR748
Servo Self-defined (P0-12)	R	SR791 SR792	SR793 SR794	SR795 SR796	SR797 SR798	SR799 SR800	SR801 SR802	SR803 SR804	SR805 SR806
Positioning completion range setting	R/W	SR811	SR812	SR813	SR814	SR815	SR816	SR817	SR818

• The following table shows special flags (SM) and registers (SR) related to Servo ECAT communications.

Parameter Name (Number)	R/W	ID. 9	ID. 10	ID. 11	ID. 12	ID. 13	ID. 14	ID. 15	ID. 16
Servo PR command (P5-07) / Inverter status (index 6041H-00H)	R	SR751	SR752	SR753	SR754	SR755	SR756	SR757	SR758
Servo Alarm code (P0-01)	R	SR761	SR762	SR763	SR764	SR765	SR766	SR767	SR768
Servo DO state (P0-46)	R	SR1191	SR1192	SR1193	SR1194	SR1195	SR1196	SR1197	SR1198
Servo command positon CMD_O (P0-09)	R	SR1201 SR1202	SR1203 SR1204	SR1205 SR1206		SR1209 SR1210	-	SR1213 SR1214	
Servo target position CMD_E (P0- 10)	R	SR1221 SR1222	SR1223 SR1224	SR1225 SR1226	-	SR1229 SR1230	SR1231 SR1232	SR1233 SR1234	SR1235 SR1236
Servo DI state (P4-07)	R	SR781	SR782	SR783	SR784	SR785	SR786	SR787	SR788
Current torque (P0-11)	R	SR771	SR772	SR773	SR774	SR775	SR776	SR777	SR778
Servo Self-defined (P0-12)	R	SR1241 SR1242	SR1243 SR1244	SR1245 SR1246	-	SR1249 SR1250	SR1251 SR1252	SR1253 SR1254	SR1255 SR1256
Positioning completion range setting	R/W	SR1261	SR1262	SR1263	SR1264	SR1265	SR1266	SR1267	SR1268

• Special Data Registers (SR)

SR	Function	AS300 Series	AS200 Series	OFF ↓ ON	STOP ↓ RUN	RUN ₽ STOP	Latched	Attribute	Default
SR1536	AS-FEN02/FOPC02 TCP current connection number		-	0	-	_	Ν	R	0
SR1537	AS-FEN02 MODBUS/TCP Server connection number	0	-	0	-	_	Ν	R	0

Special data register	Refresh time
SR1536~SR1537	The flag is ON, when the system is refreshed automatically.

10.2.11.7 Example of Setting up EtherCAT Master

When AS-FECAT is installed on AS300 Series PLC CPU, you can set up one of the AS-FECAT port as the EtherCAT Master's port in HWCONFIG.

1. Set up the ECAT port x1 in HWCONFIG for AS-FECAT.

eneral Data Exchange								
COM2 Port Setting	Fu	nction Card 2 Setting						
Ethernet Port Basic Setting		Name	Setting Value		Unit	Defauk	Minimum	Maximum
Ethernet Port Advanced Setting Function Card 1 Setting		Card 2 Detect mode	Manual	~	- Auto Dete	Auto Detect	-	-
		Manual Select Card	AS-FECAT Card			None	-	-
		Received Data Timeout	ut 200		ms 20	200	0	3000
- Function Card 2 Setting	0	ECAT port	XI	•	XI			
Ethernet Port Basic Setting	1		X1					
Ethernet Port IP Fiker			X2					
+ Deka Device Parameter Restore Setting								

- Use the INITEC instruction (API2820) to initialize EtherCAT communication. Refer to section API2820 from section 6.27 Delta CANopen Communication Instructions of AS Programming Manual for more details. After the initialization of EtherCAT communication is complete, port x1 can act as the port for an EtherCAT Master, and then communicate with Slaves.
- 3. After the initialization of EhterCAT communication is complete, port x2 can be used by a server of Modbus TCP or can be used by a webpage. But it is not suggested to use it to execute data exchange or monitoring for a long time.
- 4. After the initialization of EhterCAT communication is complete, if PLC switches from RUN to STOP, port x1 will no longer be used as a port for an EtherCAT Master. And then two ports, port x1 and port x2 can both be used by servers of Modbus TCP or can be used by a webpage.

10.2.11.8 Example of Setting up Modbus TCP Server

When AS-FECAT is installed on AS300 PLC CPU, you can create a connection by configuring the IP address and some relevant parameters to make it act as a Modbus TCP server.

The following example shows two AS300 PLC CPUs (one with AS-FECAT) to connect to each other and one as Client and the other as Server (AS-FECAT) to perform data mapping through the Modbus TCP connection. For the support function codes and corresponding addresses, refer to AS Series Operation Manual for more details.

Device Function		IP Address	Data Mapping Area
AS300	Modbus TCP Client	192.168.1.5	D100, D200
AS300+ AS-FECAT	Modbus TCP Server	192.168.1.3	D200, D300

Step 1

Double click AS 300 PLC CPU in HWCONFIG and set up the IP Address of the AS-FECAT to 192.168.1.3

eneral Data Exchange							
COM2 Port Setting	+ E	themet Port Basic Setting					
Ethernet Port Basic Setting		Name	Setting Value	Unit	Default	Minimum	Maximum
Ethemet Port Advanced Setting	t	IP Address	192.168.1.3		192.168.1.5	1.1.1.1	223.255.255.255
		Subnet Mask	255.255.255.0		255.255.255.0	0.0.00	255.255.255.255
Function Card 1 Setting	1	Gateway	192.168.1.1		192.168.1.1	1.1.1.1	223.255.255.255
 Function Card 2 Setting 		TCP Keep Alve Timeout	30	sec	30	1	65535
Ethernet Port Basic Setting		Mode	Static	-	Static	->	-
+ Deta Device Parameter Restore Setting							

Step 2

Create a data mapping table in the Client and then perform data mapping with the Server (AS-FECAT).

						The stage of the s
						Hardware Configuration
General Data Exchange						
CPU	Mode:	Program Control	- 🗗 Add 🗹 Edit and Move Up als	Сору	Delete 🟮 Delete All	
COM 1	Enable	IP Address	Local Address	Direction	Remote Address	Quantity
CONT	1 20	192.168.1.3	D100	+	D200	1
COM 2			D200	+	D300	1
Ethernet						
Function Card						

Step 3

Click the **Downloader** icon and then select the parameters that you'd like to download.

Save Cut Copy				9996			
roject Tree 🔹	Hardware Configuration (Devic		P (Device 0)				_
evice	Reset Configuration	Download				×	e a a 100% -
Device 0 (AS332T-A)	Remarks:	Device 0 (AS332T-A)	- Communication		HWCONFIG General HWCONFIG Data Exchange		
			Driver: Station Address:	Ethernet_114	HWCONFIG	Result	ge Output Device Range
HWCONFIG Table	FIE		1P Address:	192.168.1.5:502	😪 Hardware Configuration Settings		Y0.0 - Y0.15
- 👶 Hardware Configuratio	-		Port:	502	፼ COM 1		NONE
- 💩 CPU Group			Labet	U	☑ COM 2		
CPU (AS332T-	Edit Area		Туре:	AS332T	😔 Ethernet - Basic		×
				Task	Ethernet - Advanced		Hardware Configuration
- Å, EtherNet/IP	General Data Exchange		7111.4		Function Card		naturale comparaturi
+ Connected					🗹 Deta Device Parameter Restore Setting		
3€ Not Connected	- CPU		2 HWCONFI	G General			Quantity
	COM 1		☑ HWCONFI	G Data Exchange			1
	COM 2						1
	Ethernet						
	Function Card				Information		
			Task Result				
			Total Task(s):	0			
			Successful Task(s)	: 0			
			Faied Task(s):	0		-	

10.2.11.9 Web Server

When AS-FECAT is installed on AS300 Series PLC, you can enter AS-FECAT IP address in the search bar of your browser to connect to your device. After that you can set up, update firmware and monitor AS-FECAT. List of browsers that support AS-FECAT webpage:

Provider	Browser	Supported versions	
Microsoft	Internet Explorer	V10.0 and later	
Microsoft	Edge	V20 and later	
Google	Chrome	V14 and later	
Apple	Safari	V5.1 and later	

• When AS-FECAT is installed on AS300 Series PLC CPU

a. After the setting IP address in HWCONFIG of ISPSoft. Open your browser and enter AS-FECAT IP address in the search bar to connect to AS-FECAT. After the webpage appears, enter "Admin" in the User section and click Login without entering any password. You can set up the password after login.

Smarter. Greener. Together.	Automation for A	Changing World	
User	Device information	on	
Password	Device name	AS-FECAT	
Login	Device description		
	Firmware version	V00.40.00.00	
Device information	IP address	192.168.1.7	
	MAC address	00:18:23:13:02:09	
	Serial number		

b. After login, you can check the items shown on the left section.

Smarter. Greener. Together.	Automation for A	Changing World
User Admin	Device information	on
Password Logout	Device name Device description	AS-FECAT
	Firmware version	V00.40.00.00
Device information	IP address	192.168.1.7
Network configuration	MAC address	00:18:23:13:02:09
Save Config	Serial number	

Neder	Permi	ission
Nodes	Administrator	Read
Device information	V	V
Account management	V	Х
Firmware update	V	Х
Save configuration	V	Х

c. The menu shows data based on the permission of the current user.

d. Account Management: You can set 2 kinds of access types, Administrator and Read. After the setting is done, click **Apply** and save the settings in Save configuration.

No.	User ID	Password	Access type		Delete
1	Admin		Administrator	۲	Delete
2	Test1		Read	•	Delete
3			Administrator Write/Read		Delete
4			Read		Delete
5			Administrator		Delete
6			Administrator	Y	Delete
7			Administrator		Delete
8			Administrator		Delete

- e. Firmware Update: You can update the firmware of AS-FECAT via the webpage.
- f. Save Configuration: After any setting is done, save the settings in Save Configuration to reflect the changes.

10.2.11.10 Network Security

To enhance security and performance of the system, it is suggested to use closed network or LAN with firewall protection to prevent cyber-attacks.

10.3 Profiles and Dimensions

10.3.1 AS-F232



Unit: mm

10.3.2 AS-F422/AS-F485/AS-F2AD/AS-F2DA



10.3.3 AS-FCOPM



10.3.4 AS-FEN02



Number	Name	Description
1	MS indicator	Indicates the status of the communication card Green light ON: the operation is working normal Green light BLINKING: the setting is not complete Red light ON: internal communication fail, can NOT be recovered Red light BLINKING: internal communication timeout OFF: no power
2	NS indicator	Indicates the status of Ethernet connection Green light ON: a CIP connection is established Green light BLINKING: a CIP connection is not established after power-on Red light ON: duplicated IP address Red light BLINKING: communication timeout (a CIP connection has been established after power-on) / IP address change OFF: no power / network cable is not connected
3	RJ-45 port X1/X2	For network connections
4	LINK indicator X1/X2	Indicate the status of Ethernet connection Green light ON: a network connection is established OFF: a network connection is not established
5	ACT indicator X1/X2	Indicate the status of Ethernet communication Orange BLINKING: data transmission OFF: no data transmission
6	Clip ring	Secures AS series

RJ-45 Pin Definition

Pin No.	RJ-45	
1	TX+	
2	TX-	
3	RX+	
4	N/C	
5	N/C	81
6	RX-	
7	N/C	
8	N/C	

10.3.5 AS-FPFN02



Number	Name	Description
1	SF indicator	System Fault Indicator Red light ON: an error occurs in the topology or RTU module OFF: no system error
2	BF indicator	Bus Fault Indicator Red light ON: no PROFINET connection Red light BLINKING: the connection is working fine but the communication with PROFINET Controller is NOT normal. OFF: the connection with PN-Controller is working fine.
3	RJ-45 port X1/X2	Uses for network connections
4	LINK indicator X1/X2	Indicates the status of Ethernet connection Green light ON: a network connection is established OFF: a network connection is not established
5	ACT indicator X1/X2	Indicates the status of Ethernet communication Orange BLINKING: data transmission OFF: no data transmission
6	Clip ring	Secures AS series

RJ-45 Pin Definition

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Pin No.	RJ-45	
1	TX+	
2	TX-	
3	RX+	
4	N/C	
5	N/C	8-1
6	RX-	
7	N/C	
8	N/C	

10.3.6 AS-FOPC02



Number	Name	Description
1	MS indicator	Indicates the status of the communication card Green light ON: the operation is working normal Green light BLINKING: the setting is not complete Red light ON: powering on, or internal communication fail, can NOT be recovered Red light BLINKING: internal communication timeout OFF: no power
2	NS indicator	Indicates the status of Ethernet connection Green light ON: an OPC UA connection is established Green light BLINKING: an OPC UA connection is not established after power-on Red light ON: duplicated IP address Red light BLINKING: communication timeout (OPC UA connection has been established after power-on) / IP address change OFF: no power / network cable is not connected
3	RJ-45 port X1/X2	For network connections
4	LINK indicator X1/X2	Indicate the status of Ethernet connection Green light ON: a network connection is established OFF: a network connection is not established
5	ACT indicator X1/X2	Indicate the status of Ethernet communication Orange BLINKING: data transmission OFF: no data transmission
6	Clip ring	Secures AS series

RJ-45 Pin Definition

Pin No.	RJ-45	
1	TX+	
2	TX-	
3	RX+	
4	N/C	
5	N/C	8-1
6	RX-	
7	N/C	
8	N/C	

10.3.7 AS-FFTP01



Number	Name	Description
1	MS indicator	Indicates the status of the communication card Green light ON: the communication card operation is working normal Green light BLINKING: communication card is initializing Red light ON: powering on or internal communication fail, can NOT be recovered Red light BLINKING: internal communication timeout; reboot is required. OFF: no power
	NS indicator	Red light ON: IP address conflict; remove the device with the same IP address on the network
2	Micro SD card slot	For Micro SD card
3	RJ-45 port	For network connections
4	LINK indicator	Indicate the status of Ethernet connection Green light ON: a network connection is established OFF: a network connection is not established
5	ACT indicator	Indicate the status of Ethernet communication Orange BLINKING: data transmission OFF: no data transmission
6	Clip ring	Secures AS series

RJ-45 Pin Definition

Pin No.	RJ-45	
1	TX+	
2	TX-	
3	RX+	
4	N/C	
5	N/C	8-1
6	RX-	
7	N/C	
8	N/C	
10.3.8 AS-FECAT



Unit: mm

Number	Name	Description
1	SYS indicator	Indicates the power status of the communication card and the status of the firmware update Green light ON: Power On Green light BLINKING: firmware updating OFF: no power or firmware updating is complete.
2	ECAT indicator	Indicates the status of EtherCAT communication Green light ON: the communication card operation is working normal (All slaves are in the operational state.) Red light ON: the network connection between master and slave is not established. Red light BLINKING (2s): the connection of slave is lost. Red light BLINKING (5s): the state of slave is not normal OFF: ECAT master function is not enabled. Going to state of firmware updating
3	RJ-45 ports x1, x2	For network connections
4	LINK indicators x1, x2	Indicate the status of Ethernet connection Green light ON: a network connection is established OFF: a network connection is not established
5	ACT indicators x1, x2	Indicate the status of Ethernet communication Orange BLINKING: data transmission OFF: no data transmission
6	Clip ring	Secures AS series

RJ-45 Pin Definition

Pin No.	RJ-45	
1	TX+	
2	TX-	
3	RX+	
4	N/C	
5	N/C	81
6	RX-	
7	N/C	
8	N/C	

10.4 Wiring 10.4.1 AS-F2AD



- *1. Use shielded cables to isolate the analog input signal cable from other power cables.
- *2. If the module is connected to a current signal, the terminals Vn and In+ (n=1-2) must be short-circuited.
- *3. If variability in the input voltage results in interference within the wiring, connect the module to a capacitor having a capacitance in the range of 0.1–0.47 μF and a working voltage of 25 V.
- *4. Connect the shielded cable to the terminal FE.
- *5. The wording "CHX" indicates that you can use the five wiring methods listed above for every input channel.

10.4.2 AS-F2DA



- *1. Use shielded cables to isolate the analog input signal cable from other power cables.
- *2. If variability in the input voltage results in interference within the wiring, connect the module to a capacitor having a capacitance in the range of 0.1–0.47 μF and a working voltage of 25 V.
- *3. Connect the shielded cable to the terminal FE.
- *4. The wording "CHX" indicates that you can use the two wiring methods listed above for every input channel.

10.4.3 Topology of AS-FEN02, AS-FOPC02, AS-FPFN02 and AS-FECAT

1. AS-FEN02, AS-FOPC02, AS-FPFN02, AS-FECAT (EtherCAT OFF)

Linear Topology



• Star Topology



2. AS-FECAT sets EtherCAT Master Port via HWCONFIG (EtherCAT ON)

• Use Port x1 as EtherCAT Master



Use Port x2 as EtherCAT Master



10.4.4 Topology of AS-FFTP01

• Linear Topology



• Star Topology



10.5 HWCONFIG in ISPSoft

10.5.1 Initial Setting

(1) Start ISPSoft and double-click HWCONFIG.



(2) Select a function card on the module.

HWCONFIG							
🚝 Eile Edit Op	tion <u>H</u> elp						- <u>a</u> ×
	00						
Product List							
 AS300 Digital I/O Modu Analog I/O Modu Network Module Power Module 	ule	+	•				
Specification							
		13 ×1	~				F
CPU Group							
Extension No	Туре	Name	Input Device Ra	Output Device R	le le	Comment	
Power Module			1				
😑 CPU Module	CPU Module	AS332T	×0.0 ~ ×0.15	Y0.0 ~ Y0.15			
Function Card1							
Function Card2							
5-							

(3) Double-click the function card to open the Device Setting page.

Card1 Detect mode: select Auto Detect or choose the fur	nction card model.
---	--------------------

ice Setting		-					
Options - COM 1 - COM 2 - Eth	nemet						
AS332T	Function Card 1 Setting						
COM1 Port Setting	Parameter name	Value	U	Init Def	ault Mi	n Max	
COM2 Port Setting	Card 1 Detect mode	Auto Detect	-	Auto I	Detect -	-	
- Ethernet Port Basic Setting	Manual Select Card	None	+	None	-		
Ethernet Port Advance Set	Card 1 ID No.	1		1	1	254	
-Function Card 1 Setting	Protocol Setup Opportunity	Stop -> Rui	•	Stop -	-> Rui -	-	
- Function Card 2 Setting	Baud Rate	9600	▼ bps	9600	-	-	
	Data bit	7	▼ bit	7	-	-	
	Parity bit	Even	-	Even	+	-	
	Stop bit	1	▼ bit	1	-	-	
	- MODBUS mode	ASCII	•	ASCII	-	-	
	Delay time to Reply	0	ms	0	0	3000	
	Received Data Timeout	200	ms	200	0	3000	
	F2AD Analog Input mode	0~10∨	•	0~10\	/ -	-	
	- F2DA Analog Output mode	0~10∨	•	0~10\	(-	-	+

(a) When the function card is an AS-F232, AS-F422, or AS-F485, configure the communication settings in the red box.

Options - COM 1 - COM 2 - Ett	hernet						
AS332T	Function Card 1 Setting						
-COM1 Port Setting	Parameter name	Value	Unit	Default	t Min	Max	
COM2 Port Setting	Card 1 Detect mode	Auto Detect	•	Auto Dete	ect -	÷	
- Ethernet Port Basic Setting	Manual Select Card	AS-F232 C0	-	None	1-	~	
Ethernet Port Advance Set	Card 1 ID No.	1	-	1	1	264	
Function Card 1 Setting	Protocol Setup Opportunity	Stop -> Rui	+	Stop -> F	Rur -	-	
- Function Card 2 Setting	Baud Rate	9600	 bps 	9600	-	-	
	Data bit	7	✓ bit	7	-	-	
	Parity bit	Even	-	Even	-	-	
	Stop bit	1	➡ bit	1	-	-	
	MODBUS mode	ASCII	*	ASCII	-	-	
	Delay time to Reply	0	ms	0	0	3000	
	Received Data Timeout	200	ms	200	0	3000	
	F2AD Analog Input mode	0~10∨	•	0~10V	-	-	
1 D	F2DA Analog Output mode	0~10V	*	0~10V	-	-	

(b) Function card AS-FCOM can only be installed in function card slot 2.

E AS332T	Function Card 2 Setting						
 E System Information COM1 Port Setting 	Parameter name	Value	Unit	Default	Min	Max	4
-COM2 Port Setting	Card 2 Detect mode	Auto Detec	1-	Auto Dete	ct -	-	
- Ethernet Port Basic Setting	Manual Select Card	AS-FOOPM	-	None	-	-	
Ethernet Port Advance Set	Card 2 ID No.	1	1.00	1	1	254	
- Function Card 1 Setting	Protocol Setup Opportunity	Stop -> Ru		Stop -> F	ur-		
- Function Card 2 Setting	Baud Rate	9600	▼ bps	9600	-	-	
	Data bit	7	🔫 bit	7	-	~	
	Panty bit	Even	-	Even	-	÷	
	Stop bit	1	▼ bit	1	-	~	
	MODBUS mode	ASCII	*	ASCII	-	~	
	Delay time to Reply	0	ms	0	0	3000	
	Received Data Timeout	200	ms	200	0	3000	
	F2AD Analog Input mode	0~10V		0~10∨	-	-	
4 F	F2DA Analog Output mode	0~10V	*	0~10V	-	-	

(c) Configure the communication settings in the red box.

Options - COM 1 - COM 2 - Et	incirior i							
AS332T	Function Card 2 Setting							
 System Information COM1 Port Setting 	Parameter name	Value		Unit	Default	Min	Max	4
-COM2 Port Setting	F2AD Analog Input mode	0~10V	•		0~10V	~	~	
Ethernet Port Basic Setting	F2DA Analog Output mode	0~10V	•		0~10	-	-	
Ethernet Port Advance Set	F2AD Sampling Time	3	-	ns	3	3	15	
Function Card 1 Setting	F2AD Average Times	10			10	1	15	
Function Card 2 Selling	AS-FCOPM Working mode	AS Remote	-		AS Remote	9 -	*	
	AS-FCOPM node ID	1			1	1	254	
	AS Remote module No.	1		Init	1	1	15	
	Select Run mode after detect rem	Run connec	-		Run conne	c -	-	
	AS MPU keep or Stop when slave	Only Show E	-		Only Show	E -	14	
	Remote Communication time out	100		ns	100	0	3000	
	Re-connected Retry number after	60			60	0	255	
	Auto Retry connection after Disco	60	1	sec	60	0	255	
र 👘 🖂	AS-FCOPM Bit Rate	125k	-	pps	125k	÷	+	-

(d) When the function card is an AS-F2AD or AS-F2DA, configure the communication settings in the red box.

E AS332T	Function Card 1 Setting						
 System Information COM1 Port Setting 	Parameter name	Value	Unit	Default	Min	Max	
COM2 Port Setting	Card 1 ID No.	1	and the second	1	1	254	
-Ethernet Port Basic Setting	Protocol Setup Opportunity	Stop -> Rui	•	Stop -> Ru	jr -	-	
Ethernet Port Advance Set	Baud Rate	9600	• bps	9600	-	-	
Function Card 1 Setting	Data bit	7	- bit	7		-	
Function Card 2 Setting	Parity bit	Even	•	Even	~	-	
	Stop bit	1	✓ bit	1	÷(-	
	MODBUS mode	ASCII	-	ASCII		-	
	Delay time to Reply	0	ms	0	0	3000	
	Received Data Timeout	200	ms	200	0	3000	
	F2AD Analog Input mode	0~10V	-	0~10V	-	-	
	F2DA Analog Output mode	0~10	-	0~10V	2	-	
	F2AD Sampling Time	3	ms	3	3	15	
I III	F2AD Average Times	10		10	1	15	-

(e) When the function card is an AS-FEN02 or AS-FECAT, configure the communication settings in the red box.

						Hardware Configuratio
Et	hemet Port Basic Setting					
	Name	Setting Value	Unit	Default	Minimum	Maximum
I	IP Address	192.168.1.3		192.168.1.5	1:1.1.1	223.255.255.255
	Subnet Mask	255.255.255.0		255.255.255.0	0.0.00	255.255.255.255
	Gateway	192.168.1.1		192.168.1.1	1.1.1.1	223.255.255.255
	TCP Keep Alve Timeout	30	sec.	30	1	65535
	Mode	Static	14	Static		-
		T IP Address Subnet Mask Gateway	Name Setting Value I IP Address 192.168.1.3 Subnet Mask 255.255.255.0 Gateway: 192.168.1.1 TCP Keep Alve Trineout 30	Name Setting Value Unit I IP Address 192.168.1.3 Subnet Mask 255.255.255.0 Gateway 192.168.1.1 TCP Keep Alive Timeout. 30 sec	Name Setting Value Unit Default T IP Address 192.108.1.3 192.108.1.5 Subnet Mask 255.255.255.0 255.255.255.0 Gateway 192.168.1.1 192.168.1.1 TCP Keep Alive Timeout 30 sec 30	Name Setting Value Unit Default Minimum T IP Address 192.168.1.3 192.168.1.5 1.1.1 Subnet Mask 255.255.255.0 255.255.255.0 0.0.0 Gateway 192.168.1.1 192.168.1.1 1.1.1 TCP Keep Alve Timeout 30 sec 30 1

(f) Click **OK** to confirm the settings.

E AS332T	Function Card 1 Setting						
System Information COM1 Port Setting	Parameter name	Value	Unit	Default	Min	Max	
- COM2 Port Setting	Card 1 Detect mode	Auto Detect	-	Auto Detec	st -	-	
Ethernet Port Basic Setting	Manual Select Card	AS-F232 CC	-	None	~	-	
Ethernet Port Advance Set	Card 1 ID No	1		1	1	254	
- Function Card 1 Setting	Protocol Setup Opportunity	Stop -> Rui	2	Stop -> Ru	JI -	-	
- Function Card 2 Setting	Baud Rate	9600	bps	9600	~	-	
	Data bit	7	• bit	7	~	-	
	Parity bit	Even	1	Even	÷	-	
	Stop bit	1	r bit	1	~		
	MODBUS mode	ASCII		ASCII	-	-	
	Delay time to Reply	0.	ms	0	0	3000	
	Received Data Timeout	200	ms	200	0	3000	
	F2AD Analog Input mode	0~10V		0~10∨	+	-	
	F2DA Analog Output mode	0~10∨		0~10V	-	-	
	Party contraction of the second se						-

(4) Click **Download** on the toolbar to download the parameters. Note that you cannot download the parameters while the CPU module is running.

HWCONFIG					
HEile Edit Opt	ion Help				- 5 8
EXDO-	5 9 5				
Product List AS300 Digital I/O Modul Analog I/O Module Power Module	le	iload (Cuil-FS)	-		
Specification		*			
Specification		×			
Specification CPU Group					
	Туре		Input Device Ra.		Comment
CPU Group	Туре	Name	Input Device Ra	Output Device R.,	Comment
CPU Group Extension No Power Module	CPU Module	Name AS332T			Comment
CPU Group Extension No Power Module CPU Module	CPU Module Function Card	Name	Input Device Ra	Output Device R.,	Comment

MEMO

11

Chapter 11 DeviceNet Master Scanner Module AS01DNET-A

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11.1 Introduction of AS01DNET-A

- Thank you for choosing Delta AS01DNET-A. Please read this chapter carefully before use so as to ensure correct installation and operation of AS01DNET-A.
- The instruction is simply a guideline for operation of the product and the details on the DeviceNet protocol is excluded here. Please refer to relevant articles and literatures for more details on the DeviceNet protocol.
- AS01DNET-A, a DeviceNet network module can work in two modes: master /slave and RTU. The RTU-Master/Slave switch is used for selecting one of the two modes. When AS01DNET-A works in master/slave mode, it makes up the DeviceNet master or slave with AS-series PLC together. When working in RTU mode, AS01DNET-A needs an external 24VDC power supply and can connect AS-series I/O modules onits right side.

Refer to Section 11.4 and 11.5 for details about master/slave mode and RTU mode.

11.1.1 Feature

- Supports the Group 2 server slave and Group 2 only servers.
- Supports the explicit connection in the predefined master/slave connection and I/O polling connection.
- Able to work as a DeviceNet master or slave as well as a remote RTU connecting AS series I/O modules.
- The network configuration software DeviceNet Builder offers the graphical configuration interface.
- Supports the EDS file configuration in the DeviceNet network configuration tool.

11.1.2 Specifications

DeviceNet Connector

ltem	Specifications
Transmission method	CAN
Isolation voltage	500 VAC
Connector type	Removable terminal block with screws (5.08mm)
Communication cable	2 communication wires, 2 power wires and 1 shielded wire included.

DeviceNet Communication

Item	Specifications
Message type	I/O polling connection, explicit connection
	Standard: 125 kbps, 250 kbps and 500 kbps
Baud rate	Extension: 10 kbps, 20 kbps, 50 kbps, 125 kbps, 250 kbps, 500 kbps, 800kbps and 1M bps.

• Electrical Specification

Item	Specifications
Voltage	The power wires of the communication cable provide 11 ~ 25 VDC.
Current	28mA (typical value), 125mA impulse current (24 VDC)

• Environment

11

Item	Specifications
Noise immunity	ESD (IEC 61131-2, IEC 61000-4-2): 8KV Air Discharge EFT (IEC 61131-2, IEC 61000-4-4): Power Line: 2KV, Digital I/O: 1KV Analog & Communication I/O: 1KV Damped-Oscillatory Wave: Power Line: 1KV, Digital I/O: 1KV RS (IEC 61131-2, IEC 61000-4-3): 26MHz ~ 1GHz, 10V/m
Operating Environment	-20°C ~ 60°C (Temperature); 5 ~ 95% (Humidity), no condensation; pollution degree: 2
Storage Environment	-40°C ~ 80°C (Temperature); 5~95% (Humidity), no condensation
Vibration/Shock resistance	International standard IEC 61131-2, IEC 68-2-6 (TEST Fc)/IEC 61131-2 & IEC 68-2-27 (TEST Ea)
Safety	Conforms to IEC 61131-2, UL508
Weight	128 g

11.2 Components of AS01DNET-A

11.2.1 Profile and Dimensions







11.2.2 Components

Note:

The power input port of the network module is required to connect an external 24VDC power supply only when the toggle (RTU- Master/Slave) is switched to RTU mode. Otherwise, the port does not need an external 24VDC power supply connected when the toggle (RTU- Master/Slave) is switched to Master/Slave mode.

11.2.3 Mode Toggle (RTU- Master/Slave)

Mode Selection	Description
Master/Slave	Works in master or slave mode and constitutes a DeviceNet master or slave without external power supply.
RTU	When working in remote (RTU) mode, AS01DNET-A is required to connect the external DC 24V power supply and can have AS series I/O modules connected on its right side.

11.2.4 DeviceNet Connector

The connector is used for the connection to DeviceNet. Wire by using the connector enclosed with AS01DNET -A.

Pin	Signal	Color	Description	
1	V-	Black	0 VDC	
2	CAN_L	Blue	Signal-	
3	SHIELD	-	Shielded wire	
4	CAN_H	White	Signal+	
5	V+	Red	24 VDC	

11.2.5 Address Switch

The switch is used for setting up the node address of AS01DNET-A in DeviceNet network. Range: 00~63 (64~99 are forbidden.)

Switch setting	Description	
0 63	Valid DeviceNet node address	Node Address
6499	Invalid DeviceNet node address	

Example: If users need to set the node address of AS01DNET-A to 26, simply switch the corresponding switch of x101 to 2 and the corresponding switch of x100 to 6.

Note:

- ✓ After the setup is completed, repower AS01DNET-A.
- ✓ While AS01DNET-A is working, changing the setting of the node address is invalid.
- ✓ Rotate the switch carefully with a slotted screwdriver to prevent damage to the switch.

11.2.6 Function Switch

- The function switches are used for:
 - Setting up the work mode (IN0)
 - Setting up the baud rate of DeviceNet network (DR0~DR1)

DR1	DR0	Baud Rate		
OFF	OFF	125 Kbps	zo	1
OFF	ON	250 Kbps		IN 0
ON	OFF	500 Kbps	N 🗔	IN 1
ON	ON	Entering the mode of extended baud rate	ω 📖	DR0
INO	ON	When the slave is off-line, the I/O data in the buffer area will be held.	4	DR1
	OFF	When the slave is off-line, the I/O data in the buffer area will be cleared.		
IN1	Reserved	1		

Note:

- ✓ After the setup of the function switch is completed during power off, repower AS01DNET-A.
- ✓ While AS01DNET-A is working, changing the setting of the node address is invalid.
- ✓ Adjust the DIP switch carefully with a slotted screwdriver to prevent any damage to the switch.

11.2.7 Digital Displayer

- The digital displayer provides following functions:
 - Showing the node address of AS01DNET-A and error ID
 - Showing the error information about a slave



11.3 DeviceNet Network Communication

11.3.1 Relationship between Transmission Distance and Baud Rate

The transmission distance of a DeivceNet network is determined by the baud rate. The following table shows the corresponding maximum communication distance at different baud rates.

Baud rate (bits/s)	10K	20K	50K	125K	250K	500K	800K	1M
Max. transmission distance (M)	5000	2500	1000	500	250	100	50	25



11.3.2 DeivceNet Network Topology Structure

List of Delta DeviceNet Fieldbus Network Products:
--

Product picture	Model	Function
	AS01DNET-A	 AS01DNET-A, a DeviceNet module running on the right of AS PLC can work as a DeviceNet master or slave. AS01DNET-A can also be used as AS series remote IO module for connecting AS series DI/DO modules and AI/AO modules to DeviceNet network.
	AH10DNET-5A	AH10DNET-5A, a DeviceNet module, running on the right of AH500 series PLC can work as a DeviceNet master or slave.
	AHRTU-DNET-5A	AHRTU-DNET-5A, a remote I/O module of AH series, is used for connecting AH500 series DI/DO module, AI/AO module and 10SCM module to DeviceNet network.
	DVPDNET-SL	DVPDNET-SL, a DeviceNet module, running on the left of S series PLC can work as a DeviceNet master or slave.
	RTU-DNET	RTU-DNET, a remote I/O module of S series, is used for connecting S-series DI/DO module, AI/AO module and other device to DeviceNet network.

Product picture	Model	Function
	IFD9502	Used for connection of the DeviceNet network and electromechanical equipment such as AC motor drive, PLC, temperature controller, servo drive, HMI, user-defined device.
	IFD6503	A fieldbus data analysis tool, with one end: CAN interface and the other end: USB interface can be used for getting the CAN data or sending the data to the CAN node. It is used with the Netview Builder software together.
	E-series AC motor drive	Used for connecting AC motor drive to DeviceNet network via CME-DN01 card.
	CMC-DN01	Used for connecting C2000 series AC motor drive to the DeviceNet network.
	DN-02	Used for the connection of DeviceNet network and AC motor drive.
	DVPDT01-S	Used for the connection of DeviceNet network and S series PLC.

Product picture	Model	Function
	DVPDT02-H2	Used for the connection of DeviceNet network and DVP-EH2 series PLC.
	TAP-CP01	The distribution box for CAN topology, with the 120 ohm resistor enclosed which is controlled to take effect or not via its switch.
	TAP-CN01	The distribution box for CAN topology, with the 120 ohm resistor enclosed which is controlled to take effect or not via its switch.
	TAP-CN02	The distribution box for CAN topology, with the 120 ohm resistor enclosed which is controlled to take effect or not via its switch.
	UC-DN01Z-01A	UC-DN01Z-01A: DeviceNet trunk cable.
	UC-DN01Z-02A	UC-DN01Z-02A: DeviceNet branch cable.

11.3.3 Choice and Purpose of a DeviceNet Terminal Resistor

• Choice of a DeviceNet Terminal Resistor

A DeviceNet network requires two terminal resistors of 121 Ω connected at both ends of the trunk cable respectively.

The thick cable represents the trunk cable, the thin cable represents the branch cable and the yellow boxes at the two ends are terminal resistors in the following figure.



Purpose of a DeviceNet Terminal Resistor

The terminal resistor is used for eliminating the signal reflection in the communication cable.

All signal transmission cables have the characteristic impedance. The characteristic impedance of Delta DeviceNet communication cable is about 121 Ω .

When being transmitted to the end of the communication cable, because the impedance of the end is different from the characteristic impedance, the signal will be reflected, which will interfere with the new signal and the signal wave form distortion will happen.

The phenomenon of the signal wave form distortion is not obvious in the short-distance transmission. But the wave form distortion will become severer in the increasingly long communication cable. Therefore, the two ends of the trunk cable must be installed with the terminal resistors respectively.

Installation Position of Terminal Resistors

The DeviceNet communication cable consists of five wires such as red wire, blue wire, white wire, black wire and shielded wire as below.



The terminal resistors must be installed to the two ends of the trunk cable only. Since the blue wire and white wire are for signal transmission, both of the terminal resistors must be installed between blue wire and white wire at the two ends of the main cable.

11.3.4 DeviceNet Network Supply Power

The network requires one or multiple supply powers to supply the power to each piece of network equipment via the bus cable.

Delta DeviceNet communication cable consists of five wires, among which the power cable and signal cable occupy two wires respectively and the one on the left is the shielded wire as the above figure shows.

The supply power for the bus is optional and could be a single supply power or multiple supply powers according to the actual demand.

• Single Supply Power



• Multiple Supply Powers





11.4 Master /Slave Mode

11.4.1 Introduction of Master/Slave Mode

AS01DNET-A can work as a DeviceNet master as well as slave with at most 4 AS01DNET modules connectable to the right side of AS PLC. Running on the right of AS-series PLC, AS01DNET-A with AS-series PLC together constitutes the DeviceNet master or slave. When working in Master/Slave mode, AS01DNET-A is required to switch the function toggle (RTU- Master/Slave) to Master/Slave mode and the DeviceNet Builder of version 2.04 and above is used for the setup.

For details about the setup, refer to Section 11.4.10.

- As a master, AS01DNET-A can provide the following function.
 - Supporting the Client function of Explicit message;
 - Supporting IO polling connection with slaves;
 - The network configuration software DeviceNet Builder provides graphic configuration interface.
 - Sending explicit messages to read and write the data in slave through the explicit message instruction DNETRW.
 - Automatically performing data exchange with the PLC module; users just need write a program for D register in the PLC without using FROM/TO instructions.
 - Offering 190 bytes of output data area and 190 bytes of input data area for exchanging data with the master.
- As a slave, AS01DNET-A can provide the following function.
 - Explicit message Server and Group 2 only server connection mode;
 - Polling connection;
 - Offering 200 bytes of input data area and 200 bytes of output data area for exchanging data with master;
 - Automatically exchanging data with the PLC. The user just need to write a program for D register in the PLC without using FROM/TO instruction.

11.4.1.1. Scan List, Input Table and Output Table

ltem	Description	Figure
Item Scan List	Description Before AS01DNET-A module works, the scan list must be configured through the configuration software. The scan list stores slave information including node address, I/O type, I/O size and etc. for data exchange. The scanner module manages the slaves in the scan list, makes a connection with slaves and exchange I/O data with them. For those slaves which have not been configured to the scan list, AS01DNET-A will not make a connection and I/O data exchange with them.	Figure Scanner Module Configuration Scan List setting Available Nodes: Scan List: Node Ad Node Name Scan List: Output Table Node Ad Node Name Input Table Register Device Image Input Table D26105_H [Poli]01-AS0IDNET Slave D26005_H [Poli]01-AS0IDNET Slave D26105_H [Poli]01-AS0IDNET Slave D26005_L [Poli]01-AS0IDNET Slave D26100_L

		Scanner Module Configuration
	The scanner module provides an input table of total	Scan List setting Available Nodes: Scan List:
	size: 190 bytes and an output table of total size: 190	Node Ad Node Name Node Ad Node Name
	bytes for data exchange with slaves. When one slave	≥ 01 AS01DNET Stave
	is configured to the scan list, the configuration	
	software will automatically assign corresponding size	
	of I/O data exchange area to the slave. Input Table	Output Table Input Table
	and Output Table are the interface for data exchange	Register Device Image Register Device Image D26105_H [PolI]01-AS0IDNET Slave D26005_H [PolI]01-AS0IDNET Slave D26105_L [PolI]01-AS0IDNET Slave D26005_L [PolI]01-AS0IDNET Slave
Input/output	between the PLC of the master and slaves and show	D26106_H [Poll]01-AS01DNET Slave D26006_H [Poll]01-AS01DNET Slave
Table	the mapping relationships between the D registers in	D26106_L [Poll]01-AS01DNET Slave D26107_H [Poll]01-AS01DNET Slave D26007_H [Poll]01-AS01DNET Slave
	the PLC of the master and the I/O data of slaves.	D26107_L [Poll]01-AS01DNET Slave D26007_L [Poll]01-AS01DNET Slave D26108_H [Poll]01-AS01DNET Slave D26008_H [Poll]01-AS01DNET Slave
	After the configuration is finished, download the	D26108_L [Poil]01-AS01DNET Slave D26008_L [Poil]01-AS01DNET Slave D26109 H D26009 H D26009 H D26009 H
	configuration data to the scanner module. Then the	D26109 L D26009 L D26110 H D26010 H
	module will exchange I/O data with corresponding	D26110_L D26010_L D26011_H
	slaves according to the configuration. The data in the	
	output table will be transmitted to slaves and the data	Unit ID: 1 - Start Output: D - 26105 OK
	returned from slaves will be filled in the input table.	Manual allocation Start Input: D - 26005 Cancel

11.4.2 Installation

11.4.2.1. Connecting AS01DNET-A Module to AS series PLC

For the details on how AS01DNET-A (in Master/slave mode) is connected to AS series PLC, refer to Section 1.3.1 Installing a Module in AS Series Module Manual.

11.4.2.2. Connecting the DeviceNet Communication Connector

- Make sure that the color marks for the PINs of the DeviceNet connection port match the colors of the connection cables and the cable should be connected to the right PIN.
- Delta's power module is recommended as the power module in the communication.



11.4.3 IO Mapping for AS01DNET in AS PLC

11.4.3.1. Data Mapping between Modules and AS PLC

Up to four AS01DENT modules can be connected to the right side of AS PLC at most. After AS01DNET modules and PLC are connected, PLC will assign data mapping areas to each module.



AS01DNET modules are connected to the right of the PLC. The position of the first module on the right of AS PLC is 1, the second module is 2, the third module is 3 and the fourth module is 4. The position is only defined for network modules such as AS01DNET and AS00SCM, instead of digital modules, analog modules, temperature modules, and weight-measurement modules. The positions of AS01DNET modules on the right of the PLC are shown in the following table where there are two arrangement ways of module connections.

Exam	ple 1	Example 2		
Position of AS01DNET on the right of the PLCArrangement order of AS PLC and modules on the right of the PLC		Position of AS01DNET on the right of the PLC	Arrangement order of AS PLC and modules on the right of the PLC	
	AS PLC		AS PLC	
1	AS01DNET	1	AS01DNET	
	AS04AD		AS04AD	
2	2 AS01DNET		AS00SCM	
		3	AS01DNET	

When AS01DNET is at different positions of the right of the PLC, the input and output mapping areas for the AS01DNET module in AS PLC are listed in the following table.

Position of AS01DNET on the right of the PLC	Output mapping area	Input mapping area
1	D26100 – D26199	D26000 – D26099
2	D26500 – D26599	D26400 – D26499
3	D26900 – D26999	D26800 – D26899
4	D27300 – D27399	D27200 – D27299

11.4.3.2. Tables of Input Mapping and Output Mapping areas

• When AS01DNET works in master mode, the input and output mapping areas for AS01DNET at different positions of the right of AS PLC are listed in the following table.

Position of AS01DNET	Output mapping a the	rea (for sending o e slave)	data to	Input mapping area (for receiving data from the slave)		
on the right of the PLC	D register	Mapping area	Data size	D register	Mapping area	Data size
	D26100~D26103	Bit-strobe command area	4 words	D26000~D26003	Scan-list node status indication area	4 words
1	D26104	Reserved	1word	D26004	Module status indication area	1 word
	D26105~D26199	DeviceNet output data area	95 words	D26005~D26099	DeviceNet input data area	95 words
	D26500~D26503	Bit-strobe command area	4 words	D26400~D26403	Scan-list node status indication area	4 words
2	D26504	Reserved	1word	D26404	Module status indication area	1 word
	D26505~D26599	DeviceNet output data area	95 words	D26405~D26499	DeviceNet input data area	95 words
	D26900~D26903	Bit-strobe command area	4 words	D26800~D26803	Scan-list node status indication area	4 words
3	D26904	Reserved	1word	D26804	Module status indication area	1 word
	D26905~D26999	DeviceNet output data area	95 words	D26805~D26899	DeviceNet input data area	95 words
	D27300~D27303	Bit-strobe command area	4 words	D27200~D27203	Scan-list node status indication area	4 words
4	D27304	Reserved	1word	D27204	Module status indication area	1 word
	D27305~D27399	DeviceNet	95	D27205~D27299	DeviceNet input	95

Position of AS01DNET	Output mapping a the	rea (for sending o e slave)	data to	Input mapping ar	a from	
on the right of the PLC	D register Mapping area Data size			D register	Mapping area	Data size
		output data area	words		data area	words

Note: See Section 11.4.5 for further explanation of scan-list node status indication areas and module status indication areas. The input and output mentioned here are defined in the perspective of the master of the entire fieldbus system.

When AS01DNET works in slave mode, the input and output mapping areas for AS01DNET at different positions
of the right of AS PLC are listed in the following table.

Position of AS01DNET on	Area for sending da	ata to the master	Area for receiving data from the master		
the right of the PLC	D register	Data length	D register	Data length	
1	D26100~D26199	100 words	D26000~D26099	100 words	
2	D26500 – D26599	100 words	D26400 – D26499	100 words	
3	D26900 – D26999	100 words	D26800 – D26899	100 words	
4	D27300 – D27399	100 words	D27200 – D27299	100 words	

11.4.4 Bit-strobe Command

11.4.4.1. Bit-strobe Work Principle

Bit strobe is one of the standard DeviceNet I/O transmission methods. The command length is fixed to 8 bytes, i.e. 64 bits. (Maximum 64 stations exist in a DeviceNet network.) One bit corresponds to one node. The following table takes the first AS01DNET on the right of AS PLC for example.

Bit-strobe	Corresponding network node						
register	b15	b15 b14 b13 b1					
D26100	Node 15	Node 14	Node 13		Node 1	Node 0	
D26101	Node 31	Node 30	Node 29		Node 17	Node 16	
D26102	Node 47	Node 46	Node 45		Node 33	Node 32	
D26103	Node 63	Node 62	Node 61		Node 49	Node 48	

When the value of bit0 of D26100 is 0, node 0 is selected and need return data to the master.

When the values of bit0 and bit1 of D26100 are both 0, node 0 and node 1 are selected and they need return data to the master.



In the bit-strobe method, the master does not send control data to the slave node. However, the slave node need return I/O data to the master if the corresponding bit is set to 0. If the corresponding bit is set to 1, the slave node does not need to return I/O data to the master.

11.4.5 Network Node Status Display

11.4.5.1. Scan-List Node Status Indication

The following table takes the first AS01DNET on the right of AS PLC for example. AS01DNET master can monitor whether the configured slave is online or not in real time and have the status of the configured slave mapped to one bit. Users can get the status of network nodes by monitoring the contents in D26000~D26003. The corresponding relationships between devices in the PLC and network nodes are shown in the following table. If the node in Scan List is normal, the corresponding bit is OFF. If the node in Scan List is abnormal, the corresponding bit is ON.

Register in	Corresponding network node					
the PLC	b15	b14	b13		b1	b0
D26000	Node15	Node 14	Node 13		Node 1	Node 0
D26001	Node 31	Node 30	Node 29		Node 17	Node 16
D26002	Node 47	Node 46	Node 45		Node 33	Node 32
D26003	Node 63	Node 62	Node 61		Node 49	Node 48

11.4.5.2. Module Status Indication

The following table takes the first AS01DNET on the right of AS PLC for example. Users can get the status of the network node by monitoring the content in D26004. When the module works normally, the content in D26004 is 0. When the module is initializing, the content in the high byte of D26004 is 1 and the content in the low byte is 0. When an error occurs in the module, the content in the high byte of D26004 is 2 and the content in the low byte is an error code. For details on error codes, see Digital Displayer.

Register in	Description															
the PLC	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
D26004		(0: N		Modul , 1: Ir		is ng, 2:	error	.)			Error	code ir	n the m	nodule		

11.4.6 Setting the Time for Data Exchange between Master and Slaves

When AS01DNET works in master mode, the period of time for a data exchange between master and all slaves need be set. Master and all salves will periodically perform the data exchange based on the set time. See the following explanation for details. Click menu **Network** >> **Scanner Setting** on the DeviceNet Builder software page. The **Scanner Setting** window appears as below.

Scanner setting Online Scan DeviceNet Network	Master Mode Scan Interval Time: 10 ms Expected Packet Rate: 75
Download Upload	© Slave Mode Bit-Strobed Tx Size: Bytes
	Polled
	Output Size: 8 Bytes Input Size: 8 Bytes
	Change of State/Cyclic
	COS Cyclic
	Tx Size: Bytes Rx Size: Bytes
	Slave Mapping Address
	Master->Slave Start Address: D = 26000
	Master<-Slave Start Address: D = 26100
	Extension Baudrate

Scan Interval Time	The period of time needed for a data exchange between master and all slaves. Master and all salves will periodically exchange data based on the set interval time.
Expected Packet Rate (EPR)	Sets the timeout time for connection of master and slaves. The calculation method: 4 X EPR with the unit: ms. The default EPR is 75. The EPR for the connection of master and slaves is $4 \times 75 = 300$ ms. The value indicates that the IO data exchange should be achieved once at least within 300 ms. Otherwise, the connection will fail due to communication timeout and then the connection will have to be re-made so that the IO data exchange can proceed.

The explanation of Scan Interval Time and Expected Packet Rate is shown in the following table.

Since most DeviceNet slaves only support polled IO data exchange, the EPR value is related to the value of **Scan Interval Time**. Make sure that the actual setting must meet the following condition.

Scan Interval Time < (4 X EPR)

We suggest users refer to the following condition while setting the value of Scan Interval Time.

Scan Interval Time < (4 X EPR) / 5

Click the **Calculate Time** button. The **Calculate Scan Interval Time** dialog box comes out. Clicking the **Calculate** button, the values of **Total input size**, **Total output size** and **Scan Interval Time** are calculated. The value of **Scan Interval Time** is a value in theory. We suggest users should set the scan interval time to a value slightly greater than the actually calculated time. The scan interval time calculated here will not be filled in the **Scan Interval Time** box automatically and so users need enter the value manually.

Master Mode	Choose Baudrate:
Scan Interval Time: 10 ms Calculate Time	
Expected Packet Rate: 75	Baudrate: 500Kbps - Calculate
Slave Mode	Calculate result:
Bit-Strobed	Total input size: bytes
Tx Size: Bytes	Total Output size: bytes
Polled	Scan Interval Time: ms
Output Size: 8 Bytes Input Size: 8 Bytes	
Change of State/Cyclic	OK Cancel
COS Cyclic	
Tx Size: Bytes Rx Size: Bytes	
Slave Mapping Address	
Master->Slave Start Address: D ~ 26000	
Master<-Slave Start Address: D = 26100	
Extension Baudrate	

11.4.7 Application Example

To explain how to configure a DeviceNet network through an application example

Control requirement: AS PLC remotely monitors D26105~D26108 and D26005~D26008 in AS module through DeviceNet network to achieve the data exchange as AS01DNET-A works as master and slave respectively.

11.4.7.1. Constructing One DeviceNet Network

This section describes how to construct a DeviceNet network configuration through an application example. Before constructing a DeviceNet network, users should understand the control requirement of the network; plan the data for exchange in advance such as maximum communication distance, slaves, total data length for exchange as well as the requirement for response time during data exchange.

The information above will determine whether the constructed network is reasonable and able to meet the demand. Even it will directly affect the future maintenance and convenience of network capacity expansion and upgrade.

Connection Figure



Note: Both of the ends of the DeviceNet Bus cable must connect one 121Ω terminal resistor respectively. The terminal resistor is connected between CAN_H and CAN_L.

• Modules Setting

Prepare two AS PLCs and two AS01DNET-A modules for constructing one DeviceNet network. The setups for two AS01DNET-A modules are shown in the follwing table.

DeviceNet network module	Node address	Baud rate
AS01DNET-A (Master)	0	500kbps
AS01DNET-A (Slave)	1	500kbps

11.4.7.2. Using DeviceNet Builder to Configure a DeviceNet Network

• Configuring DeviceNet slave

 Set the driver for the connection of AS PLC and PC. Clicking Add, the Driver Properties dialog box appears. Select the connection type for AS PLC and PC in the Type field. In this example, select Ethernet as the connection type. Click Search to search the PLC and then click OK after searching is finished.

COMMGR			
Name	Description	State	<u>A</u> dd
			Configure
			Delete
			Stop
			Language
			About

Driver Name	Driver1	
Connection Setu	p	
Туре	Ethernet	<u>•</u>
Ethernet Card		
Description Re	altek PCI GBE Family Controlle	r 💌
192.168.0.122		
IP Address Settin	ng	
Add	Delete	Search
IP Address	Port Description	Device Name
Setup Respondin Time of Auto- Time Interval	-	3 30 ₹

Name	Description	State	<u>A</u> dd
Driver1	Ethernet, Realtek PCI GBE Family Controller, Local IP Address	OK (START)	<u>A</u> 00
			Configure
			Delete
			Language
			Language

2. Opening the DeviceNet Builder software, the following window appears.



3. Selecting **Setup>> Communication Setting**, the following dialog box appears. Select the driver for connection of AS PLC and PC as below. Click **OK** to finish the selection of Driver.

Driver	Driver1	
Station Address	0	
IP Address	192.168.1.11	

4. Click **Network** >> **Online** to scan the connected master.

<u>File E</u> dit <u>V</u> iew <u>N</u> etwork <u>T</u> ools <u>S</u> etu	
] 🛩 🖬 😨 X 📭 🛅 🕹 💽 🎒 1 1 1 🖉 2 11 12 13 14 15 14 15 14 15 14 15 14 15 14 15 14 15 14 15 14 15 14 15 14 15 14 15 14 15 14 15 14 15 14	I have been a second se
→ Project List AS01DNET-A , Master , UnitI	AS01DNET-A, Master, UnitID 1, Node Address 0. The start input: D26005, The

5. Click Network>> Scan DeviceNet Network.

Browsing Node 2		
		_
	And and a second second	
	OK	

6. After scanning is finished, all node icons and device names which have been scanned in the network will appear on the following interface. The node address of AS01DNET-A is 00 in this example.



7. Double click the icon of AS01DNET Slave. Then the **Node Configuration...** dialogue box appears. Input Size and Output Size are both set to 8 bytes. Click OK to finish the setting.

		lave	
	Key Paramet	ers setti	ng
799	 Vendor Device Type Product Code Major Rev Min Rev 		
12			
92			
1			
1			
Bytes	COS Input Size:	0 CC	Bytes
Bytes	-		Bytes
Bytes	Output Size:	0	Bytes
ing	Heartbeat:	250	ms
Batter	Ack Timeout:	16	ms
Dytes	Inhibit Time:	1	ms
	799 12 92 1 1 1 Bytes Bytes	799 Image: Weight of the second s	799 Image: Construction of the sector of

Right click the icon of AS01DNET Slave and click Parameter Edit... on the drop-down menu. The Parameters
Edit... dialog box appears and Polled Input Length and Polled Output Length are both set to 8 bytes as
shown in the following red box. Then click Write button. Click OK after writing is finished. Afterwards, repower
AS01DNETSlave.



A11 I	aramete	ers - Read	Write Default All Values	
ID	Type	Parameter Name	Value	
1	R/W	Working Mode	Slave mode	
2	R	Firmware Version	0	
3	R/W	Polled Input Length	8	
1	R/W	Polled Output Length	8	
5	R/W	Extend Baudrate Enable	Disable	
	13.111	Extend Baudrate	10771	
5	R/W	Extend Daudrate	10Kbps	•

• Configuring AS01DNET-A

1. Double click the icon of AS01DNET Scanner (node 0). The **Scanner Module Configuration...** dialog box appears. The left list shows the current available node AS01DNET Slave and the right Scan List is empty as below.

Scan List set Available No			Scan List:			
Node Ad	Node Name		Node Ad	Node Name		_
01	AS01DNET Slave		-			
Output Table			Input Table			_
Register	Device Image	*	Register	Device Image	-	-
D26105 H			D26005 H			
D26105 L			D26005 L			
D26106 H			D26006 H			
D26106_L			D26006_L			
D26107_H			D26007_H			
D26107_L			D26007_L			
D26108_H			D26008_H			
D26108_L			D26008_L			
D26109_H			D26009_H			
D26109_L			D26009_L			
D26110_H			D26010_H			
D26110_L			D26010_L			
D26111 H			D26011 H			-
*	4 1		*	III	+	
Unit ID: 1	Start Output :	D =	26105		OK	
Manual	Ilocation Start Input:	D =	26005		Cancel	
Move the DeviceNet slaves from the left list to Scan List of the right side. Follows the steps: Select one DeviceNet slave node and then click. Then the DeviceNet slave nodes are moved to the Scan List one by one.

Scan List set Available No				Scan List:		
Node Ad	Node Name			Node Ad	Node Name	
				01	AS01DNET Slave	
			<			
Output Table	61		í	Input Table		
Register	Device Image	*		Register	Device Image	
D26105 H	[Poll]01-AS01DNET Slave			D26005 H	[Poll]01-AS01DNET Slav	re -
D26105 L				D26005 L		
D26106 H	and the second se			D26006 H		
D26106 L	[Poll]01-AS01DNET Slave			D26006_L	[Poll]01-AS01DNET Slav	
D26107_H	[Poll]01-AS01DNET Slave			D26007_H	[Poll]01-AS01DNET Slav	re
D26107_L	[Poll]01-AS01DNET Slave			D26007_L	[Poll]01-AS01DNET Slav	re
D26108_H	[Poll]01-AS01DNET Slave			D26008_H	[Poll]01-AS01DNET Slav	re
D26108_L	[Poll]01-AS01DNET Slave			D26008_L	[Poll]01-AS01DNET Slav	re.
D26109_H				D26009_H		
D26109_L				D26009_L		
D26110_H				D26010_H		
D26110_L				D26010_L		
D26111 H				D26011 H		
*	• •	_		*	m	*
Unit ID: 1	Start Output :	D	+	26105	OK	
	llocation Start Input:	D	-	26005	Canc	el

3. Click **OK** to finish the configuration above. Then download the configuration data to AS01DNET-A. During the download, the **Warning** dialog box will pop out if AS PLC is in RUN mode. Click **OK** to continue the download.

A	Cannot perform this operation when PLC is in RUN mode! Do you wish to continue if this instruction will affect the state of the connected PLC?
-	Do you wish to continue if this instruction will affect the state of the connected PLC?

- Configure the DeviceNet network by following the steps above. The IO data mappings between AS01DNET-A and the slave are shown in the following tables.
 - $\blacksquare \qquad \textbf{AS01DNET-A} \rightarrow \textbf{Slave}$

AS PLC	AS01DNET(Master)	AS01DNET(Slave)	AS PLC
D26105			D26000
D26106			D26001
D26107			D26002
D26108			D26003

■ Slave → AS01DNET-A

AS PLC	AS01DNET(Master)	AS01DNET(Slave)	AS PLC
D26005			D26100
D26006			D26101
D26007			D26102
D26008			D26103

• Saving configuration data

Select File>> Save to save current network configuration.

11.4.7.3. DeviceNet Network Control

This section describes how to write a ladder program to achieve the control requirement of the DeviceNet network.

• PLC Programs

■ The program in the PLC connecting AS01DNET slave:

SM400	NMOV En	
1.1	D26000S	DD26100
	4_n	

Program Explanation:

The contents in D26000~D26003 are the data received from the master and the contents in D26100~D26103 are the data transmitted to the master. SM400 is a normally open contact. The program above can make the contents in D26000~D26003 move to D26100~D26103.

The program in the PLC connecting AS01DNET master:





Program Explanation:

- 1. When M0 changes to ON, the value 16#5555 is written to D26105~D26108 in AS PLC. The data are transmitted to the slave cyclically via DeviceNet Bus.
- 2. The contents in D26005~D26008 are the data which the master receives from the slave via DeviceNet Bus. When M1 changes to ON, the data in D26005~D26008 are moved to D0, D1, D2 and D3.

11.4.8 Sending Explicit Message through Ladder Diagram

AS01DNET-A supports the sending of explicit messages via DNETRW instruction.

11.4.8.1. Principle of Explicit Message Transmission

- 1. AS PLC transmits the explicit request message to AS01DNET-A master according to the user program.
- 2. AS01DNET-A transmits the explicit request message to the slave according to the user program.
- 3. The slave sends back the response message to AS01DNET-A master after handling data.
- AS PLC gets back the response message from AS01DNET-A master. Then the explicit message transmission of this time is finished.

11.4.8.2. Explicit Message Transmission Instruction DNETRW

• DNETRW instruction:

ΑΡΙ	Ir	nstruct	ion co	de	Operand						Fu	unctior	1			
1818		DNE	TRW		S ₁ · S		· S ₄ · S D ₁ · D ₂				,			write D nicatior		et
Device	Х	Y	М	S	Т	С	HC	D	FR	SM	SR	E	К	16#	"\$"	F
S ₁								•	•				0	0		
S ₂								•	•				0	0		
S ₃								•	•				0	0		
S 4								•	•				0	0		
S₅								•	•				0	0		
S ₆								•	•				0	0		
S 7								•	•				0	0		
S ₈								•								
S ₉								•	•				0	0		
S 10								•	•				0	0		
D ₁		•	•	•												
D ₂		•	•	•												
D ₃								•								
D4								•								
D ₅								•								

Data type	BOOL	WORD	DWORD	LWORD	UINT	INT	DINT	LINT	REAL	LREAL	TMR	CNT	STRING
S ₁		•			\bullet	●							
S 2		•			•	•							
S ₃		●			•	●							
S 4		•			•	●							
S ₅		•			●	●							
S 6		•			●	●							
S 7		•			•	•							
S ₈		•			●	•							
S ₉		•			●	•							
S ₁₀		•			●	•							
D1	•												
D ₂													
D ₃		•				•							
D4		•				•							
D ₅		•			•	•							

Pulse Instruction	16-bit instruction	32-bit instruction
-	AS	AS

• Symbol:

	DNETRW		
 S1		D1	<u> </u>
 S2		D2	
 S3		D3	
 S4		D4	
 S5		D5	<u> </u>
 S6			
 S7			
 S8			
 S9			
 S1(C		

S1	The sequence number of the DeviceNet communication module
S2	DeviceNet node address (MAC ID)
S 3	Service Code
S4	Class ID
S5	Instance ID
S6	Attribute ID
\$7	Written-data size
S8	The start device where written data are stored
S9	Communication timeout time
S10	Times of re-transmission
D1	Completion flag
D2	Error flag
D3	Error code
D4	Read-data size
D5	The start device where read data are stored

• Explanation:

- S1 is the sequence number of the module on the right of the PLC. The number of the first module is 1; the second module is 2 and so on. Any type of module need be numbered within the range of 1~32. If the number is out of the range, the instruction will take the minimum (1) or maximum (32) for operation.
- S2 is a DeviceNet node address within the range of 0~63. Users can specify the node address of a slave which the master is to read and write. It also can be the node address of the master, which means to read and write the data in the master.

S3 is DeviceNet service code:

Service code	Explanation			
0x01	0x01 Get all attributes (Get_Attribute_All)			
0x02	2 Set all attributes (Set_Attribute_All)			
0x0E	Get one single attribute (Get_Attribute_Single)			
0x10	Set one single attribute (Set_Attribute_Single)			

- **S4**, **S5** and **S6** represent Class ID, Instance ID and Attribute ID respectively.
- **S7** is the written-data size with the unit: Byte.
- **S8** is the start device where written data are stored. The data are arranged in the order from low byte to high byte.
- **S9** is the communication timeout time within the range: 1~100 and with the unit: 0.1 second.
- **S10** is the times of re-transmission within the range: 0~3. When communication timeout occurs, the communication will be resent
- **D3** represents the error codes to read and write.

Error	Code	Fundamedian
Code 1 (High Byte)	Code 2 (Low Byte)	Explanation
XX	FF	Not conform to the DeviceNet standard
20	01	The target slave does not exist.
20	02	Unable to make the connection with the slave
20	03	Sending explicit message failed.
16	00	Explicit message response timeout.

- **D4** is the read-data size with the unit: Byte.
- D5 is the start device where read data are stored. The data are arranged in the order from low byte to high byte.
- **D1** and **D2** are communication completion flag and error flag respectively.

• Application Example 1

Control requirement: when M0=ON, read the data of class1>>instance1>>attribute1 of the DeviceNet function card CMC-DN01.

Connection Figure



Parameters Setting and Device Explanation

Setup for AS01DNET-A

Parameter Setting value Description		Description	_
	Node ID 00 Set the node ID of AS01DNET-A to 00.		1
	Baud rate 500 kbps Set the baud rate of AS01DNET-A to 500 kbps.		

Setup for VFD-C2000

Parameter	Setting value	Description
00-20	0-20 08 Frequency command source	
00-21	05	Operation command source
09-30	0	Communication decoding method
09-70	01	Node ID of AC motor drive
09-71	02	Baud rate: 500Kbps

PLC Program



- > S1: The number of the module sending DeviceNet communication. The first one of the right side is 01.
- S2 : DeviceNet node ID (MAC ID); Node ID of VFD-C2000: 01.
- S3 : Service code; 0X0E: read one single attribute content.
- S4 : Class ID; Class ID of CMC-DN01: 01;
- S5 : Instance ID; Instance ID of CMC-DN01: 01;
- S6 : Attribute ID; Attribute ID of CMC-DN01: 01 ;
- S7 : Write data size. When DNETRW instruction is used to read data, the value in S7 can be set to any data.
- S8 : The start device where the written data are stored. When DNETRW instruction is used to read data, the value in S8 can be set to any data.
- S9 : Communication timeout time
- > S10 :Times of re-transmission. Times of re-sending communication when communication timeout occurs.
- D1 : Completion flag

- D2 : Error flag
- D3 : Error code
- D4 : Read data size
- D5: The start device where data are read.

Program Explanation

- When M0 changes to ON, execute the explicit message instruction DNETRW to read Class 1 >> Instance 1 >> Attribute 1 of the target equipment with node ID: 01. If the explicit message communication succeeds, the completion flag M1 changes to ON.
- When M0 changes to ON, AS01DNET-A sends out the request message only once. If the request message is to be resent, the instruction DNETRW need be re-triggered.
- If the data reading succeeds, the content of Class 1>> Instance1 >> Attribute 1 of CMC-DN01 will be stored in D5. In this example, the content in D5 should be 031FHex.

• Application Example 2

Control requirement: When M1 changes to ON, set the content of Class ID: 0x05>> Instance 1>>Attribute ID: 09 of CMC-DN01 to 000AHex.

Connection figure



Parameters Setting and Device Explanation

Setup for AS01DNET-A

	Parameter	Setting value	Description	
Node ID 00 Set the node ID of AS01DNET-A to 00.		Set the node ID of AS01DNET-A to 00.		
	Baud rate	500 kbps	Set the baud rate of AS01DNET-A to 500 kbps.	

Setup for VFD-C2000

Parameter	Setting value	Description	
00-20 08 Frequency command source		Frequency command source	
00-21	05	Operation command source	
09-30	0	Communication decoding method	
09-70	01	Node ID of AC motor drive	
09-71	02	Baud rate: 500Kbps	

PLC Program



- S1 : The number of the module sending DeviceNet communication. The first one of the right side is 01.
- S2 : DeviceNet node ID (MAC ID); Node ID of VFD-C2000: 00.
- S3 : Service code; 0X10: read one single attribute content.
- S4 : Class ID; Class ID of CMC-DN01: 05.
- S5 : Instance ID; Instance ID of CMC-DN01: 01.
- S6 : Attribute ID; Attribute ID of CMC-DN01: 09.
- > S7 : Write data size with the unit: Byte. The written-data size is 2 in this example.
- S8 : The start device where the written data are stored.
- > S9 : Communication timeout time.
- > S10 :Times of re-transmission. Times of re-sending communication when communication timeout occurs.
- D1 : Completion flag.
- D2 : Error flag.
- D3 : Error code.
- D4 : Read data size. When DNETRW instruction is used to write data, the value in D4 can be set to any data.
- D5 : The start device where read data are stored. When DNETRW instruction is used to write data, the value in D5 can be set to any data.

Program Explanation

- When M0 changes to ON, AS01DNET-A sends the request message and 000AHex is written to Class ID: 05>> Instance 1 >> Attribute ID: 09 of the target equipment with node ID: 01. If explicit message communication succeeds, the completion flag M1 changes to ON.
- When M0 changes to ON, AS01DNET-A sends out the request message only once. If the request message is to be resent, the instruction DNETRW need be re-triggered.

11.4.9 LED Indicators and Troubleshooting

AS01DNET-A has two LED indicators and one digital displayer. NS LED and MS LED display the connection status of AS01DNET-A. The digital displayer shows the node address and error information of AS01DNET-A as well as error information of the slave.

F	01DNE	Т	
1		MS	
	ŰÜ	NS	MUUN
-			

11.4.9.1. NS LED

LED status	Indication	Correction
OFF	No power; Or duplicate ID check has not been completed.	 Check if AS01DNET-A is powered and the connection is normal. Make sure that at least one node can communicate normally.
Green light blinking (ON:0.5s and OFF: 0.5s alternately)	The connection to the DeviceNet network failed.	No correction; Refer to Digital Displayer for troubleshooting.
Green light ON	Online; The connection to the DeviceNet network is normal.	No correction
Red light blinking (ON:0.5s and OFF: 0.5s alternately)	Communication error	Refer to Digital Displayer for troubleshooting.
Red light ON Network trouble, duplicate node ID, no network power or Bus-OFF.		 Make sure that all the devices in the network have their unique node addresses. Check if the network installation is correct. Check if the baud rates of the master and slave are same. Check if the network power is normal.

11.4.9.2. MS LED

LED status	Indication	Correction
OFF	No power	Make sure that the power supply for AS01DNET-A is normal and the connection is proper.
Green light blinking (ON:0.5s and OFF: 0.5s alternately)		Configure the scan list and then download the configuration to AS01DNET.
Green light ON	Input and output data are normal.	
Red light blinking (ON:0.5s and OFF: 0.5s alternately)	When AS01DNET works as the master, the slave in Scan List can not work normally. When AS01DNET works as the slave, an error occurs in the configuration.	Refer to Digital Displayer. Make sure that the slave information in Scan List matches that of the actually connected slave.
Red light ON	An error inside AS01DNET	 Check if the configuration is correct. Return the module to factory for repair if the error still exists after repower ON.

11.4.9.3. Combination of MS LED and NS LED

LED status		Indiantian	Osmaatian	
NS LED	MS LED	Indication	Correction	
OFF	OFF	No power	Check if the power supply for AS01DNET-A is normal.	
OFF	Green light ON	Duplicate ID check has not been completed.	Make sure that the baud rate of at least one node in the network is the same as that of the module and their communication is normal.	
Red light ON	Green light ON	Duplicate ID check failed or Bus-OFF.	 Ensure that the node ID of AS01DNET is unique. Repower the module. 	
Red light ON	Red light blinking (ON:0.5s and OFF: 0.5s alternately)	No network power	 Check if the network cable connection is proper. Check if the network power supply is normal. 	
Red light ON	Red light ON	Hardware error	Return the module to the factory for repair.	

11.4.9.4. Digital Displayer

Code	Explanation	Correction
0~63	Node address of AS01DNET-A (in normal operation)	
80	AS01DNET-A is in STOP status.	Turn the PLC to RUN and start I/O data exchange
F0	The node ID of AS01DNET is the same as that of other node or exceeds the allowed range.	 Ensure that the node address of AS01DNET is unique. Re-power AS01DNET.
F1	No slave is configured in Scan List.	Configure the scan list and then download the configuration to AS01DNET.
F2	Too low voltage of the work power	Check if the power supply for AS01DNET and the PLC is normal.
F3	AS01DNET enters the test mode	Switch the function switch IN1 from On to Off and re-power AS01DNET-A.

Code	Explanation	Correction
F4	BUS-OFF	 Check if the network cable is normal and the shielded cable is grounded. Check if the baud rates of all nodes in the network are same. Check if the start and end of the network cable are both connected with a 121Ω terminal resistor. Re-power AS01DNET-A.
F5	No network power	 Check if the network cable is normal. Ensure that the network power is normal.
F6	Internal error; Flash or RAM check error	If the error still exists after re-power, send AS01DNET-A back to the factory for repair.
F8	Error produced in factory manufacturing	If the error still exists after re-power, send AS01DNET-A back to the factory for repair.
F9	Internal error; EEPROM access failure	If the error still exists after re-power, send AS01DNET-A back to the factory for repair.
FA	Invalid configuration data	 Configure the network correctly and re-download it to AS01DNET- A. Check if the node address of one slave in the scan list is the same as that of AS01DNET-A.
E0	Identification parameters returned from the slave do not match the configuration data.	 Check if there is any change in node ID of the slave in the network. Check if some node device in the network is replaced. Re-configure the network.
E1	I/O Data size returned does not match that in the scan list.	Re-configure I/O data size of the slave, download the configuration to AS01DNET-A and run the PLC.
E2	The slave device in the scan list does not exist or is offline when AS01DNET-A is in master mode. The I/O connection between the slave AS01DNET-A and the master is broken when AS01DNET-A is in slave mode.	 Check if there is a change in the node address of the slave. Check if the communication cable is disconnected or connected loosely. Check if the bus cable length exceeds the maximum transmission distance. If so, the system may not be stable.
E3	AS01DNET-A fails to transmit data.	 Make sure that the connection between AS01DNET-A and the network is normal. Check if the baud rate of AS01DNET-A is the same as that of other node in the network.
E4	Error detected in sequence of fragmented I/O data from the slave device.	Check if the slave is operating normally.
E5	The slave device returns error when AS01DNET-A attempts to communicate with it.	Check if the slave is operating normally.
E6	IO data size returned from the slave is bigger than that configured in Scan List.	Check that the IO data size of the slave should be the same as that configured in Scan List.
E7	AS01DNET-A is checking MAC ID.	 If the code is displayed long, do the troubleshooting according to the following steps. Make sure that at least two nodes work normally in the network. Check if either end of the network is connected with the terminal resistor of 121Ω. Check if the baud rates of the node devices in the network are

Code	Explanation	Correction	
		 same. 4. Check if the communication cable is normal so as to avoid that the cable is disconnected or connected loosely. 5. Check if the bus cable length exceeds the maximum transmission distance. If so, the system may not be stable. 	
		6. Check if the shielded wire of the network cable is grounded.	
		7. Re-power AS01DNET-A scanner module.	

11.4.10 Master-Slave Mode Switch and 8 Baud Rates Setting via Software

AS01DNET-A can serve as a DeviceNet master or slave by modifying its mode. When the AS01DNET-A module works as a slave, the input and output data sizes are both 8 Bytes by default. The maximum input and output data sizes are both 200 Bytes.

Under standard mode, AS01DNET-A supports three baud rates: 125K, 250K and 500K. Under non-standard mode, AS01DNET-A supports eight baud rates: 10K, 20K, 50K, 125K, 250K, 500K, 800K and 1M.

11.4.10.1. Setting AS01DNET-A to Slave Mode

1. Build a driver through the COMMGR software.

Refer to Section 2.4 Communication Setting in the ISPSoft User Manual for more details.

2. Call the DeviceNet Builder software through the ISPSoft software.

Refer to Section 11.6 in this manual for details on how to operate.

3. The called DeviceNet Builder software interface is shown as below.

🛗 Delta DeviceNet Builder - Untitled	
File Edit View Network Tools Setup Help	
🗋 😅 📰 🗶 🐚 🚺 🎂 🛍 🍘 🔲 💭 🥝	
×	<u>^</u>
Device List	
Device Type	
e-⊡ Communications Adapter ⊡-⊡ Vendor	
🚊 🛄 DELTA ELECTRONIC, INC.	
	E
4 III +	
Tim Project 1 Device	
× The Manager Carlo Dentified	
Time Message Code Description	
۰ m	
Ready	System Channel

4. Selecting **Setup**>> **Communication Setting**, the following dialog box appears. Select the driver for connection of AS PLC and PC as below. Click **OK** to finish the selection of Driver.

Driver	Driver1	_
Station Address	0	
IP Address	192.168.1.11	

5. Click **Network** >> **Online** to scan the connected master.

📇 Delta DeviceNet Builder - Untitled	
<u>File Edit View Network Tools Setu</u>	ip <u>H</u> elp
● # # ₩ X * • • • • • • • • • • • • • • • • •	the second
× Project List AS01DNET-A , Master , UnitI	AS01DNET-A, Master, UnitID 1, Node Address 0. The start input: D26005, The
< ∰ Amproject] Device	

6. Click Project List>>Properties. Then the Properties dialog box appears. Select Slave mode and then click OK.

- 📄 Project Li	ist AS01DNET-
AS010	Scan DeviceNet Network
	Download
	Upload
	Update
	Add
	Сору
m	Paste
	Delete
Time	Properties

Module:	AS01DNET-A	Ŧ
Mode:	Slave	•
Unit:	1	
Node ID:	0	
OK	Cano	el

 Click Network >> Download. If the PLC is in STOP state, the following dialog box will exist during the download. The dialog box will disappear automatically after the download is finished. AS01DNET-A will be in slave mode after repower ON.

-	
	1

8. If the PLC is in RUN state, the **Warning** dialog boxes will pop out before and after the download. Users can click **OK** or **Cancel** according to actual situation.



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11.4.10.2. Setting ASO1DNET-A to Master Mode

1. Build a driver through the COMMGR software.

Refer to Section 2.4 Communication Setting in the ISPSoft User Manual for more details.

2. Call the DeviceNet Builder software through the ISPSoft software.

Refer to Section 11.6 in this manual for details on how to operate.

3. The called DeviceNet Builder software interface is shown as below.

📇 Delta DeviceNet Builder - ISPSoft		
File Edit View Network Tools Help		-
1 🖬 🖬 🕺 🐘 🚺 🍐 🐘 🎒 🔲 🖵 🤪		
		
X		
Project List		
Project Device		
× Time Manage Code Description		
Time Message Code Description		
*m		•
Ready	System Channel	Driver8

4. Selecting **Setup**>> **Communication Setting**, the following dialog box appears. Select the driver for connection of AS PLC and PC as below. Click **OK** to finish the selection of Driver.

Driver	Driver1
Station Address	0
IP Address	192.168.1.11

5. Click **Network** >> **Online** to scan the connected slave.



6. Click **Project List>>Properties** as below. Then the **Properties** dialog box appears. Select **Master** mode and then click **OK**.

🗋 😅 📰 😨 🗶 🐚	ork Iools Setup Help
🖃 🛅 Project List	AS01DNET-A
AS01DNET-A	Scan DeviceNet Network
	Download
	Upload
	Update
	Add
	Сору
	Paste
r Project 1	Delete
Time	Properties

Module:	AS01DNET-A 👻
Mode:	Master 🔹
Unit:	1
Node ID:	0
OK	Cancel

 Click Network >> Download. If the PLC is in STOP state, the following dialog box will exist during the download. The dialog box will disappear automatically after the download is finished. AS01DNET-A will be in master mode after repower ON.

ASO1DNET-A, Ma	ster , UnitID 1 , Node Address 0 .	×
Download Node	3 to scanner	
	OV I	
	OK	

8. If the PLC is in RUN state, the **Warning** dialog boxes will pop out before and after the download. Users can click **OK** or **Cancel** according to actual situation.

.C is in RUN mode!	
tion will affect the state of the con	nected PLC?
Cancel	
13	
state?	
Cancel	
	tion will affect the state of the con Cancel

11.4.10.3. Baud Rate Setting of When AS01DNET-A is in Slave Mode

1. Opening the DeviceNet Builder software, the following window appears.



2. Selecting **Setup**>> **Communication Setting**, the following dialog box appears. Select the driver for connection of AS PLC and PC as below. Click **OK** to finish the selection of Driver.

Driver	Driver1	
Station Address	0	
IP Address	192.168.1.11	

3. Click **Network** >> **Online** to scan the connected master.

📇 Delta DeviceNet Builder - Untitled	
File Edit View Network Tools Setu	
X =	the second
× Project List AS01DNET-A, Master, UnitI	AS01DNET-A, Master, UnitID 1, Node Address 0. The start input: D26005, The
< m ► Maroject 1 Device	

4. Clicking Network>> Scan DeviceNet Network, the DeviceNet Builder software starts to scan the whole network.

Browsing Node 2		
nowsnig Node 2		
1		
	OK	

5. After scanning is finished, all node icons and device names which have been scanned in the network will appear on the following interface. The node address of AS01DNET-A is 01 in this example.

📇 Delta DeviceNet Builder - Untitled	States in the			X
File Edit View Network Tools				
🗋 🗃 🖾 X 🛢 🔂 🛓 🖻				
2 4 7 2 9 7 2 4				
×	ASOIDNET A Masta	r UnitID 1 Node A	ddrass 0. The start input T	26005 , The start output: D2
AS01DNET-A , Master , I	ASUIDINE I-A , Masic	, onition, typic P	duress 0 . The start input. I	20005, The start output. DZ
		(i)		
	00	01		
	120			
	11.2	302		
	AS01DNET	AS01DNET		
	Scanner	Slave		

6. Right-click AS01DNET(Slave), select **Parameter Edit...** on the drop-down menu to enter the **Parameter Edit** page.

Delta DeviceNet Builder - Untitled ile Edit View Network Tools C C T T T T T T T T T T T T T T T T T T	a b b e	31	
Project List	AS01DNET-A , Master , Unit		t input: D26005 , The start output: D2
	AS01DNET AS0 Scanner Slave	Copy Cti Paste Cti	rl+X rl+C rl+V elete
		Parameter Edit Properties	

7. Set **Extend Baudrate Enable** to **Enable** and then select the desired baud rate. Click **Write** button after setting is finished.

All F	aramete	rs 🔹 Read	Write Default All Values	4
ID	Type	Parameter Name	Value	
1	R/W	Working Mode	Slave mode	
2	R	Firmware Version	0	
3	R/W	Polled Input Length	8	
4	R/W	Polled Output Length	gitterops	
5	R/W	Extend Baudrate Enable	E 20Kbps 50Kbps	
			250Kbps 500Kbps 800Kbps 1Mbps	
	ue Infon ault: 10		Help Tips:	

8. After the download is completed, switch DR0 and DR1 of AS01DNET to ON. Finally, repower AS01DNET-A.

11.4.10.4. Baud Rate Setting of When AS01DNET-A is in Master Mode

1. Opening the	DeviceNet Build	er software.	the following	window appears.
----------------	-----------------	--------------	---------------	-----------------

Delta DeviceNet Builder - Untitled	
File Edit View Network Tools Setup Help	
Device List Device Type Device Ty	F
4 III + Min Project II Device	
* Time Message Code Description	
< []	
Ready	System Channel

2. Selecting **Setup**>> **Communication Setting**, the following dialog box appears. Select the driver for connection of AS PLC and PC as below. Click **OK** to finish the selection of Driver.

0
192.168.1.11

3. Click **Network** >> **Online** to scan the connected master.



4. Clicking Network>> Scan DeviceNet Network, the DeviceNet Builder software starts to scan the whole network.

Browsing Node 2		
nowsing Node 2		
1		
	OK	

5. After scanning is finished, all node icons and device names which have been scanned in the network will appear on the following interface. The node address of AS01DNET-A is 00 in this example.

Delta DeviceNet Builder - Untitled File Edit View Network Tools			
〕☞■╗Ҳ┓┓≛≧ -⊇╕╱Ⴝ╗╕≥∠╣			
Project List	AS01DNET-A , Mast	er , UnitID 1 , Node Addres	ss 0 .The start input: D26005 , The start output: I
	00	01	
	AS01DNET Scanner	AS01DNET Slave	



6. Click Network >> Scanner Setting. The Scanner Setting dialog box appears. Select Enable under Extension Baudrate and the desired baud rate as below. Click OK after the setting is finished.

Master Mode			-	
Scan Interval Time:	10	ms	Cacula	te Time
Expected Packet Rate:	75			
) Slave Mode				
Bit-Strobed				
Tx Size:	Bytes			
Polled				
Output Size: 8	Bytes	Input Size:	8	Bytes
Change of State/Cyclic	c			
COS		Cyclic		
Tx Size:	Bytes	Rx Size:	1	Bytes
Slave Mapping Addre	ss			
Master->Slave Start.	Address:	D - 2	6000	
Master Slave Start	Address:	D - 2	6100	
Extension Baudrate				
	e: 1Mbg	os 🐨		

 Click Network >> Download to download the extension baud rate setting to the master. After the download is completed, switch DR0 and DR1 of AS01DNET-A to ON. Finally, repower AS01DNET-A.

11.5 RTU Mode

11.5.1 Introduction of AS01DNET (in RTU Mode)

- As DeviceNet slave, AS01DNET-A supports standard DeviceNet communication protocol.
- Supports explicit connection in the predefined master/slave connection and I/O polling connection.
- The network configuration software DeviceNet Builder provides graphic configuration interface, and supports auto scan and recognition of I/O modules, free mapping of special module parameters as I/O exchange data as well as the setting of exception handling and diagnosis of module error states.
- Users can choose to retain the data in registers or not when the network is disconnected according to actual need.
- AS01DNET (in RTU mode) can connect max. 8 AS-series extension modules including digital modules, analog
 modules, temperature modules and etc. The mapping length of digital modules is determined by number of
 digital points. The max. length of mapping parameters for input of other module is 20 words and the max.
 length of mapping parameters for output of other module is 20 words.
- Max lengths for output data and input data of AS01DNET (in RTU mode) are both 100 bytes.
- AS01DNET (in RTU mode) needs the external 24VDC power supply.

11.5.2 AS-Series Extension Modules Connectable to AS01DNET (RTU)

The model and specification of AS-series digital modules connectable to AS01DNET (in RTU mode):

	Length of I/O mappir	ng data (Unit: words)
Digital I/O module model	(Master→AS01DNET)	(AS01DNET→Master)
AS08AM10N-A	None	1
AS16AM10N-A	None	1
AS32AM10N-A	None	2
AS64AM10N-A	None	4
AS08AN01T-A	1	None
AS08AN01R-A	1	None
AS08AN01P-A	1	None
AS16AN01T-A	1	None
AS16AN01R-A	1	None
AS16AN01P-A	1	None
AS32AN02T-A	2	None
AS64AN02T-A	4	None
AS16AP11T-A	1	1
AS16AP11R-A	1	1
AS16AP11P-A	1	1

The model and specification of AS-series special modules connectable to AS01DNET (in RTU mode):

	Length of I/O mappin	g data (Unit: words)
Special module model	DeviceNet→AS01DNET(RTU)	AS01DNET(RTU)→DeviceNet
AS04AD-A	6	None
AS04DA-A	2	4
AS06XA-A	10	4
AS02LC-A	7	1
AS04RTD-A	10	None
AS06RTD-A	14	None
AS04TC-A	10	None
AS08TC-A	18	None
AS08AD-B	18	None
AS08AD-C	18	None

Note:

The length of mapping data of the I/O modules connected to AS01DNET (in RTU mode) is fixed. The default mapping parameters of special modules must be chosen.

Besides default mapping parameter configuration, you can also choose other parameters for I/O mapping according to need when special modules are connected to AS01DNET (RTU). The max. input length and max. output length of default parameters and user-added mapping parameters of each special module are both 20 words.

11.5.3 Installation

11.5.3.1. Installing AS01DNET (in RTU Mode)

11.5.3.1.1. Connecting AS01DNET-A (in RTU Mode) and Extension Module on DIN Rail

- Please push the clips of AS01DNET-A (RTU) in the directions indicated by arrow ① until hearing a click. That means the DIN clips are interlocked each other. Then insert the module hooks at the bottom into the DIN rail mounting slot until hearing a click. That means AS01DNET-A (RTU) is connected to the DIN rail.
- To install the second module AS16AP11T, push the clips of AS16AP11T in the direction indicated by arrow ①. Then aim the left-side slot of AS16AP11T at the right-side slot of AS01DNET-A (RTU) and push AS16AP11T in the direction as illustrated by arrow ② until hearing a click. That means the module is on the DIN rail and is connected to AS01DNET-A (RTU). In the same way, install more IO modules on the right side of AS01DNET-A (RTU) and DIN rail one by one.



• Tighten the screws on the top of the module at the end of installing.



11.5.3.1.2. Connecting the DeviceNet Communication Connector

- The color marks on the communication connector match the colors of the connection cables. During the wiring, please check whether the colors of the connection cable and the color mark are same.
- > Delta's power module is recommended as the power module in the communication.



11.5.3.2. Connecting the Cable to DeviceNet Connector

- Use an efficient tool to peel the communication cable for approx. 30mm. DO NOT damage the shielded cable during the peeling.
- Peel off the metallic shielded net and foil, and you will see 2 power cables (red and black), 2 signal cables (blue and white) and 1 shielded cable.
- Peel off the exterior metallic shielded net, foil and the plastic cover of the power cable and signal cable for appropriate length.







• Insert the peeled communication cables into the holes in the connector in correct order.



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• Tighten the screws on the connector by a slotted screwdriver and fix the communication cables in the holes in the connector.



11.5.4 Configuring AS01DNET (in RTU mode)

As DeviceNet slave, AS01DNET (RTU) mainly achieves the data exchange between the master and AS-series I/O modules connected to AS01DNET.

- Transmits output data of DeviceNet master to I/O modules.
- Transmits input data from I/O modules to DeviceNet master.

11.5.4.1. Terms

No.	Name	Unit	Description
1	Control word	WORD	The first WORD for output data that the master assigns to AS01DNET is the control word of AS01DNET for setting the work mode of AS01DNET. When the content in the control word is set to 2, AS01DNET is in STOP mode. When the content in the control word is set to 1, AS01DNET is in RUN mode.
2	Status word	WORD	The first WORD for input data that the master assigns to AS01DNET is the status word of AS01DNET for displaying the operation state of AS01DNET. Refer to section 11.5.4.3.4 for more about status word.
5	Range of input data in modules	WORD	Determined by start input address and input mapping parameter length of each module.
6	Range of output data in modules	WORD	Determined by start output address and output mapping parameter length of each module.
7	Input data size	WORD	The sum of the size of status word of AS01DNET and the size of input data of the modules connected to it. The status word occupies one word. Digital input module takes 16 bits as one word. The input data length of analog I/O modules and temperature modules are determined by the default mapping parameter length and user-added parameter length, no more than 20 words.
8	Output data size	WORD	The sum of the size of control word of AS01DNET and the size of output data of the modules connected to it. The control word occupies one word. Digital output module takes 16 bits as one word. The output data length

No.	Name	Unit	Description
			of analog I/O modules and temperature modules are determined by the default mapping parameter length and user-added parameter length together, no more than 20 words.

11.5.4.2. Introduction of Software

Before the new version of DeviceNet Builder software is used for making a connection with PLC, make sure that the communication manager COMMGR has been installed.

(Refer to ISPSoft user manual for details on COMMGR usage.)

11.5.4.2.1. Making a connection between DeviceNet Builder and PLC

Before making a normal connection between DeviceNet Builder and PLC, you have to do relevant setup for COMMGR software.

1. Build a driver through the COMMGR software.

Refer to Section 2.4 Communication Setting in the ISPSoft User Manual for more details.

2. Call DeviceNet Builder via ISPSoft

Refer to Section 11.6 for details on how to operate.

3. The called DeviceNet Builder is started as below.

📲 Delta DeviceNet Builder - ISPSoft		
File Edit View Network Tools Help		
44 / 535 24 1 0 + 2		
Project List		
Tim Project T Device		
* Time Message Code Description		
- m		×
Ready	System Channel	Driver8

4. Click menu Network>> Online.

🔠 Delta DeviceNet Builder - ISPSoft	
File Edit View Network Tools Help	
📓 📽 🔚 🍓 📔 者 Scanner setting	
-1 -1 -7 😤 🖉 Online	
Project Lis II Download	
The Project	
* Time Message Code Descr	
A M	

5. The master module AS01DNET-A which has been scanned is shown in the left-side Project List.

a Delta DeviceNet Builder - ISPSoft.dev	
File Edit View Network Tools Help	
🗎 📽 🚍 🖹 👗 🚺 🍐 💽 📿 🥥	
4 4 5 5 5 6 1 1 0 4 1 1 0 4 1 1 0 4 1 1 1 1 1 1 1 1 1 1	
AS01DNET-A , Master , Unit	er , UnitID 1 , Node Address 1 .The start input: D26005 , The
Image: Arrow of the state o	
m m	N
Ready	System Channel Driver8

6. Click Network >> Scan DeviceNet Network.



7. After online is implemented, click the Scan DeviceNet Network button to start scanning the nodes in the network.



11.5.4.2.2. Main Configuration Page of AS01DNET (RTU)

1. After scanning is finished, double click the AS01DNET (RTU) node in the network. Then the **Node Configuration...** window comes out. The polled transmission is supported with default input data size of 2 bytes and output data size of 2 bytes which are mapping address lengths of control word and status word of AS01DNET (RTU) respectively.

Input Size and **Output Size** under **Polled Setting** mean the lengths of AS01DNET (RTU) parameters which are mapped in the master.

Address: 2		Name:	AS01DNET (RTU)	
Node infomati	ion		Key Paramet	ers setti	ng
Vendor ID:		9	Vendor		
Device Type:	12		Device Type		
Product Code	: 123	320	Product	Code	
Major Rev:	1		Major R	ev	
Min Rev:	1		Min Rev		
Polled Setti	ng		COS/CC Set	ting	
Input Size:	2	Bytes	COS	⊙ cc	-
Output Size:	2	Bytes	Input Size:	0	Bytes
		1	Output Size:	Q	Bytes
Bit-Strobe	Setting		Heartbeat:	250	ms
Input Size:	0	Bytes	Ack Timeout:	16	ms
mput size.	v	Bytes	Inhibit Time:	1	ms
_	_	-	OK	Cano	-

2. Click the **I/O Configure...** button in the **Node Configuration...** window. Then the main configuration page appears as below.

	+					Scan
l					E	Upload
						Downlo
						Reset
						Clear con
						Start Mon
					+	
Lis		Pinnen	Description	Tourse		Auto-Ad
I.	Name	Firmware	Description RTIL Device Nat	Input	Output	-
I. -			Description RTU DeviceNet			-
I.	Name					-
I. - 0	Name					-
I. - 0 1	Name					-
I. - 0 1 2	Name					-
I. - 0 1 2 3	Name					-
I. - 0 1 2 3 4	Name					-
I. - 0 1 2 3 4 5	Name					Auto-Ad Clear-Ad OK Cancel

Explanation of parameters on the AS01DNET (RTU) configuration page

Item	Description
Scan	All I/O modules currently connected to the right side of AS01DNET (RTU) are scanned. The existing modules in the software will be compared with the actually connected I/O module. The mismatched one will be displayed in an abnormal icon.
Upload	Upload and show the configuration data including I/O list, I/O configuration, parameter mapping and basic control information in AS01DNET (RTU) in the software.
Download	Download current AS01DNET (RTU) configuration including I/O list, I/O configuration, parameter mapping and basic control information to AS01DNET (RTU), which is retained when the power is turned off.
Reset	Make the connected AS01DNET (RTU) restart.
Clear config	Clear the configuration data stored in the latched area and automatically reset the configuration. Then the indicator displays F1.

Item	Description
Start Monitor	Watch and set in real time the configured exchange data in current system; change output data, watch input data and use control word to control the operation state of AS01DNET (RTU) in real time.
Name	Name of each module
Firmware	Firmware version of each module. Choosing corresponding version of firmware, download the module parameter information which matches the firmware version.
Description	The description of basic information of each module.
Input	The mapping range of input data of each module, determined by start address offset of mapping input data and the size.
Output	The mapping range of output data of each module, determined by start address offset of mapping output data and the size.
Comment	Add a comment for each I/O modules
ОК	The current configuration data will not be saved until you click the OK button to finish the configuration.
Cancel	Clicking the Cancel button to exit AS01DNET (RTU) configuration page, current configuration data will not be saved.

3. Clicking the **Scan** button on the page, the main AS01DNET (RTU) configuration page changes as below.

	16 ? Al	+				M	Scan Upload
							Download Reset Clear config
							Start Monito
Lis							Auto-Addr
L	Name	Firmw		Input	Output		
L.	Name AS01DNET(RTU)		Description RTU DeviceNet		Output		
I. - 0	Name				Output		
I. - 0 1	Name AS01DNET(RTU) AS16AM10N	-	RTU DeviceNet	##+1	Output		
I. - 0 1 2	Name AS01DNET(RTU)	-	RTU DeviceNet		Output		Auto-Addr Clear-Addr
I. - 0 1 2 3	Name AS01DNET(RTU) AS16AM10N	-	RTU DeviceNet	##+1	Output		
I. - 0 1 2	Name AS01DNET(RTU) AS16AM10N	-	RTU DeviceNet	##+1	Output		
I. - 0 1 2 3 4	Name AS01DNET(RTU) AS16AM10N	-	RTU DeviceNet	##+1	Output		
L - 0 1 2 3 4 5	Name AS01DNET(RTU) AS16AM10N	-	RTU DeviceNet	##+1	Output		Clear-Addr

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After the I/O modules connected to AS01DNET (RTU) are scanned, abnormal icons may appear.

Here is the list of abnormal icons.

	The I/O module configured in the software does not match the current I/O module actually connected, e.g. the software configuration is AS32AM, but the actually connected module is AS16AP. So the abnormal icon such as left-side icon will appear after the scan. You can change it into current configuration icon with double clicks on it.
32 AM	The I/O module in the software configuration does not exist in the actual connection, e.g. the software configuration is AS32AM, but it has not been connected actually. So the abnormal icon such as left-side icon will appear after the scan. You can change it into current configuration icon with double clicks on it.
?	AS01DNET (RTU) scans an unknown module. Right click current icon to select Change from the menu which appears to change it into a module icon which can be recognized for configuration.

11.5.4.2.3. ASO1DNET (RTU) Parameters Setup Page

After I/O modules are scanned, the main configuration interface changes as follows.

	** 32 16 AM				*	Scan Upload Download
						Reset Clear config
						Start Monito
					-	
List	t					- Aug. 6.34
	t Name	Firmware	Description	Input	Output	Auto-Addr
	P	the second second second	Description RTU DeviceNet	Input	Output	L
I.	Name	the second second second		Input ##+1 ~ ##+2	Output	L. Sectoreares
L. -	Name AS01DNET(RTU)	the second second second			Output	L. Sectoreares
I. - 0 1 2	Name AS01DNET(RTU) AS32AM10N	0.100 -		##+1~##+2	Output	L
I. - 0 1 2 3	Name AS01DNET(RTU) AS32AM10N	0.100 -		##+1~##+2	Output	L
I. - 0 1 2 3 4	Name AS01DNET(RTU) AS32AM10N	0.100 -		##+1~##+2	Output	L
L. - 0 1 2 3 4 5	Name AS01DNET(RTU) AS32AM10N	0.100 -		##+1~##+2	Output	Clear-Addr
L. - 0 1 2 3 4 5 6	Name AS01DNET(RTU) AS32AM10N	0.100 -		##+1~##+2	Output	L. Sectore and
L. - 0 1 2 3 4 5	Name AS01DNET(RTU) AS32AM10N	0.100 -		##+1~##+2	Output	Auto-Addr Clear-Addr OK Cancel
Double click **AS01DNET (RTU)** icon on the far left of the configuration page. Then the parameter setting interface of AS01DNET (RTU) comes out for setting the error handling method as follows.

Parameters setting					
Output start device:	##	Input s	start device:	##	
Firmware version:	0.10.0				
Error setting					
When loses Device?	Net connection	RTU	Keep runnii	ng	-
When IO module en	ror or no reply:	RTU	Keep runnii	ng	-
Software baudrate	500 -	Kbps	TimeOut:	200	ms

Explanation of AS01DNET (RTU) parameter setup:

ltem	Description	Default
Output start address	The start output address of AS01DNET (RTU), occupying one word.	None
Input start address	The start input address of AS01DNET (RTU), occupying one word.	None
When loses DeviceNet connection	AS01DNET (RTU)'s error handling method when AS01DNET (RTU) and DeviceNet master are disconnected. "RTU keep running" and "RTU stop" are for option.	RTU keep running
When IO module error or no reply	AS01DNET (RTU)'s error handling method when an error occurs in any one of I/O modules connected to the right side of AS01DNET (RTU). "RTU keep running" and "RTU stop" are for option.	RTU keep running
Software baud rate	Chooses the extension baud rate of AS01DNET (RTU) after ticking the checkbox of it. The selected baud rate is stored in AS01DNET (RTU) after the download and it will not take effect until the hardware switch of AS01DNET (RTU): DR1 and DR0 are both ON. Refer to Section 11.2.6 for details on function switch.	None
Firmware version	Displays the firmware version of AS01DNET (RTU).	None

11.5.4.2.4. I/O Module Configuration Page

The mapping parameters of each module can be set through double clicks on the selected I/O module icon on the following interface.

010	DENT(RTU)						×
	÷ 32 15 bk					Â.	Scan
	⁺⁺ 32 15 DB AM AM AD	+				H	Upload
							Download
							Reset
							Clear config
							Start Monitor
List L	Name	Firmware	Description	Input	Output		Auto-Addr
I.	Name	Firmware 0 100	Description RTU DeviceNet	Input	Output		Auto-Addr
L. -	Name AS01DNET(RTU)	0.100	Description RTU DeviceNet		Output		
I. - 0	Name AS01DNET(RTU) AS32AM10N	- Contraction of the		CALL STREET	Output	-	Auto-Addr
I. - 0 1	Name AS01DNET(RTU) AS32AM10N	0.100 -		##+1~##+2	Output		Auto-Addr
I. - 0 1	Name AS01DNET(RTU) AS32AM10N AS16AM10N	0.100 - -		##+1 ~ ##+2 ##+3	Output		Auto-Addr
L. - 0 1 2	Name AS01DNET(RTU) AS32AM10N AS16AM10N	0.100 - -		##+1 ~ ##+2 ##+3	Output		Auto-Addr
I. - 0 1 2 3	Name AS01DNET(RTU) AS32AM10N AS16AM10N	0.100 - -		##+1 ~ ##+2 ##+3	Output	-	Auto-Addr
I. - 0 1 2 3 4	Name AS01DNET(RTU) AS32AM10N AS16AM10N	0.100 - -		##+1 ~ ##+2 ##+3	Output		Auto-Addr
I. - 0 1 2 3 4 5	Name AS01DNET(RTU) AS32AM10N AS16AM10N	0.100 - -		##+1 ~ ##+2 ##+3	Output	-	Auto-Addr Clear-Addr

Double click the 08AD icon. Then the AS08AD-C configuration interface appears as below for configuration of parameter mapping of AS08AD-C module.

S08AD-C AS08AD-C[77] Present value[9]	AS08AD-C[77] MDS Information				
- format[17] - CH1~CH8 Mode setting[8] - CH1~CH8 Calibration[16] - average filter[16] - sampling time[1]		Module Name:	AS08AD-C		
Channel Detect and Alarm s	e	MDS Version:	1.00.00	=	
		MDS Build Date:	2017/08/01		
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Explanation of I/O module configuration interface:

Item	Description
MDS information	Displays module name, MDS version and creation date. The module parameters will be shown in the left-side window based on the MDS file. For explanation of module parameters, refer to the relevant module manual.
I/O parameter list	Displays all module parameters read from the MDS file of the module. Set up these parameters to control the operation of the module.
Exception handling	The error handling of AS01DNET (RTU) when AS01DNET (RTU) detects that an error occurs in the module. "RTU keep running" or "RTU stop" can be selected as the solution to the error.

Generally, the settings for I/O module parameters and device mappings can be made in the following three cases.

Case 1: Select one appropriate parameter value from the drop-down list in the **Initial** column, e.g. select -20Ma~+20mA as channel 1 input mode of AS08AD-C.

S08AD-C	CH1~CH8 Mode setting	3[8]					
 AS08AD-C[77] Present value[9] format[17] 	Mapping to Device	Index	Description	Input	Output	Initial	Comment
		2	CH1 mode setting			-20mA~20m 🔻	CH1 mode setting
- CH1~CH8 Mode setting[8]		3	CH2 mode setting			Disable -20mA~20mA	CH2 mode setting
CH1~CH8 Calibration[16]		4	CH3 mode setting			0mA~20mA	CH3 mode setting
- average filter[16] sampling time[1]		5	CH4 mode setting			4mA~20mA -20mra~20mra	CH4 mode setting
sampling time[1] Channel Detect and Alarm se		6	CH5 mode setting			-20mA~20mA	CH5 mode setting
		7	CH6 mode setting			-20mA~20mA	CH6 mode setting
		8	CH7 mode setting			-20mA~20mA	CH7 mode setting
		9	CH8 mode setting			-20mA~20mA	CH8 mode setting
< <u>III</u> +							

Case 2: Manually enter the value for the parameter to change in the Initial column, e.g. write 100 for CH1 Cal.Offset of AS08AD-C).

S08AD-C	CH1~CH8 Calibration[1	[6]						
AS08AD-C[77]	Mapping to Device	Index	Description	Input	Output	Initial	Comment	100
Present value[9] format[17]		10	CH1 Cal. Offset (V/1			100	CH1 Cal. Offset (V/mA)	
- CH1~CH8 Mode setting[8]		11	CH2 Cal. Offset (V/t			0	CH2 Cal. Offset (V/mA)	
CH1~CH8 Calibration[16]		12	CH3 Cal. Offset (V/1			0	CH3 Cal. Offset (V/mA)	
average filter[16]		13	CH4 Cal. Offset (V/r			0	CH4 Cal. Offset (V/mA)	
Channel Detect and Alarm se		14	CH5 Cal. Offset (V/1			0	CH5 Cal. Offset (V/mA)	1
		15	CH6 Cal. Offset (V/t			0	CH6 Cal. Offset (V/mA)	
		16	CH7 Cal. Offset (V/r			0	CH7 Cal. Offset (V/mA)	
		17	CH8 Cal. Offset (V/t			0	CH8 Cal. Offset (V/mA)	
		18	CH1 Cal. Gain			1000	CH1 Cal. Gain	
		19	CH2 Cal. Gain			1000	CH2 Cal. Gain	
		20	CH3 Cal. Gain			1000	CH3 Cal. Gain	
		21	CH4 Cal. Gain			1000	CH4 Cal. Gain	
		22	CH5 Cal. Gain			1000	CH5 Cal. Gain	
• III •	4			10)	

Case 3: For the module parameter which need be monitored in real time or need be modified in its value, tick the desired parameter in the **Mapping to Device** column and then the corresponding value of the parameter will map to the bus data for exchange i.e. the D registers in PLC. After the values of the ticked parameters in the **Mapping to Device** column go to the software monitor page, the current values of parameters can be monitored and modified in real time.

	CH1~CH8 Calibration[1						-
□ AS08AD-C[77] Present value[9]	Mapping to Device	Index	Description Input	Output	Initial	Comment	-
format[17]		10	CH1 Cal. Offset (V/1 ##+22	##+1	0	CH1 Cal. Offset (V/mA)	
CH1~CH8 Mode setting[8]		11	CH2 Cal. Offset (V/r		0	CH2 Cal. Offset (V/mA)	1
		12	CH3 Cal. Offset (V/r		0	CH3 Cal. Offset (V/mA)	
- average filter[16] - sampling time[1]		13	CH4 Cal. Offset (V/r		0	CH4 Cal. Offset (V/mA)	
- sampling time[1] Channel Detect and Alam se		14	CH5 Cal. Offset (V/1		0	CH5 Cal. Offset (V/mA)	1
		15	CH6 Cal. Offset (V/1		0	CH6 Cal. Offset (V/mA)	l
		16	CH7 Cal. Offset (V/r		0	CH7 Cal. Offset (V/mA)	1
		17	CH8 Cal. Offset (V/1		0	CH8 Cal. Offset (V/mA)	
		18	CH1 Cal. Gain		1000	CH1 Cal. Gain	
		19	CH2 Cal. Gain		1000	CH2 Cal. Gain	
		20	CH3 Cal. Gain		1000	CH3 Cal. Gain	
		21	CH4 Cal. Gain		1000	CH4 Cal. Gain	
		22	CH5 Cal. Gain		1000	CH5 Cal. Gain	
4 III +	*	_	10				

• Explanation of IO module parameters

Double click the icon of AS08AD-C module. Then the **Module Configuration: AS08AD-C** dialog box comes out as below.

S08AD-C					
 A\$08AD-C[77] Present value[9] format[17] CH1-CH8 Mode setting[8] CH1-CH8 Calibration[16] average filter[16] 	MDS Information	Module Name:	AS08AD-C	_	
sampling time[1] Channel Detect and Alarm se		MDS Version:	1.00.00	-	
		MDS Build Date:	2017/08/01		
6) <u> </u>					

MDS information of AS08AD-C

Module Configuration :AS08AD-C					×
AS08AD-C AS08AD-C[77] - Present value[9] - format[17] - CH1-CH8 Mode setting[8]	AS08AD-C[77] MDS Information				
		Module Name:	AS08AD-C		
		MDS Version:	1.00.00		
		MDS Build Date:	2017/08/01	_	
Exception handling : RTU Keep nur		7		OK	Cancel

Present value setting

AS08AD-C	Present value[9]					
AS08AD-C[77 1	Mapping to Device	Index	Description	Input	Output	Ini
Present value[9]	*		Error code	D26030~D26031		
CH1~CH8 Mode setting[8]	*	-	CH1 Input	D26032~D26033		
CH1~CH8 Calibration[16]	*		CH2 Input	D26034~D26035		
 average filter[16] sampling time[1] 	*	-	CH3 Input	D26036~D26037		
Channel Detect and Alarm se	*		CH4 Input	D26038~D26039		
	*	-	CH5 Input	D26040~D26041		
	*	(m)	CH6 Input	D26042 ~ D26043		
	*	-	CH7 Input	D26044~D26045		
	*	-	CH8 Input	D26046~D26047		
< 10 F	4		m			,

AS08AD-C	format[17]						
	Mapping to D	Index	Description Inpu	t Output	Initial	Comment	
 Present value[9] format[17] CH1~CH8 Mode setting[8] CH1~CH8 Calibration[16] average filter[16] 		1	format		Integer form 🔻	format	_)
		44	CH1 float Scale LSP		Integer format	CH1 float Scale LSP	
		45	CH2 float Scale LSP		-10.000000	CH2 float Scale LSP	
		46	CH3 float Scale LSP		-10.000000	CH3 float Scale LSP	
sampling time[1] Channel Detect and Alarm se		47	CH4 float Scale LSP		-10.000000	CH4 float Scale LSP	
		48	CH5 float Scale LSP		-10.000000	CH5 float Scale LSP	
		49	CH6 float Scale LSP		-10.000000	CH6 float Scale LSP	
		50	CH7 float Scale LSP		-10.000000	CH7 float Scale LSP	
		51	CH8 float Scale LSP		-10.000000	CH8 float Scale LSP	
		52	CH1 float Scale HSP		10.000000	CH1 float Scale HSP	
		53	CH2 float Scale HSP		10.000000	CH2 float Scale HSP	
		54	CH3 float Scale HSP		10.000000	CH3 float Scale HSP	
		55	CH4 float Scale HSP		10.000000	CH4 float Scale HSP	
* III +		54	CITS A C TICD		10.00000	OTTS 8 C	

Format setting (Integer format and Float format for option)

CH1~CH8 Mode setting 【8】

S08AD-C	CH1~CH8 Mode s	etting[8]					
	Mapping to D	Index	Description	Input	Output	Initial	Comment
- Present value[9] format[17]		2	CH1 mode setting			-20mA~20mA	CH1 mode setting
CH1~CH8 Mode setting[8]		3	CH2 mode setting			-20mA~20mA	CH2 mode setting
CH1~CH8 Calibration[16]		4	CH3 mode setting			-20mA~20mA	CH3 mode setting
average filter[16] sampling time[1]		5	CH4 mode setting			-20mA~20mA	CH4 mode setting
sampling time[1] Channel Detect and Alarm se		6	CH5 mode setting			-20mA~20mA	CH5 mode setting
		7	CH6 mode setting			-20mA~20mA	CH6 mode setting
		8	CH7 mode setting			-20mA~20mA	CH7 mode setting
		9	CH8 mode setting			-20mA~20mA	CH8 mode setting
< III +							

CH1~CH8 Calibration 【16】

AS08AD-C	CH1~CH8 Calibrati	on[16]					
	Mapping to D	Index	Description Input	t Output	Initial	Comment	-
Present value[9] format[17]		10	CH1 Cal. Offset (V/m		0	CH1 Cal. Offset (V/mA)	
CH1~CH8 Mode setting[8] CH1~CH8 Calibration[16] average niter[10]		11	CH2 Cal. Offset (V/n		0	CH2 Cal. Offset (V/mA)	
	12 1 1	12	CH3 Cal. Offset (V/m		0	CH3 Cal. Offset (V/mA)	_
		13	CH4 Cal. Offset (V/n		0	CH4 Cal. Offset (V/mA)	
sampling time[1] Channel Detect and Alarm s		14	CH5 Cal. Offset (V/m		0	CH5 Cal. Offset (V/mA)	
		15	CH6 Cal. Offset (V/m		0	CH6 Cal. Offset (V/mA)	
		16	CH7 Cal. Offset (V/m		0	CH7 Cal. Offset (V/mA)	
		17	CH8 Cal. Offset (V/m		0	CH8 Cal. Offset (V/mA)	
		18	CH1 Cal. Gain		1000	CH1 Cal. Gain	
		19	CH2 Cal. Gain		1000	CH2 Cal. Gain	
		20	CH3 Cal. Gain		1000	CH3 Cal. Gain	Ļ
		21	CH4 Cal. Gain		1000	CH4 Cal. Gain	
		22	CH5 Cal. Gain		1000	CH5 Cal. Gain	
4. III. F		12	OTTA C-1 C-1-		1000	CTT4 C-1 C-1-	

Average filter setting 【16】

AS08AD-C	average filter[16]						
⊡ AS08AD-C[77]	Mapping to D	Index	Description Inp	ut Output	Initial	Comment	2
Present value[9] format[17]		26	CH1 average times		10	CH1 average times	
- CH1~CH8 Mode setting[8]		27	CH2 average times		10	CH2 average times	
<u>CH1~CH8 Calibration[16]</u>		28	CH3 average times		10	CH3 average times	
Long and the second sec		29	CH4 average times		10	CH4 average times	
Channel Detect and Alam se		30	CH5 average times		10	CH5 average times	
		31	CH6 average times		10	CH6 average times	
		32	CH7 average times		10	CH7 average times	
		33	CH8 average times		10 CH5 average times 10 CH6 average times		
		34	CH1 filter Proportion		10%	CH1 filter Proportion	
		35	CH2 filter Proportion		10%	CH2 filter Proportion	
		36	CH3 filter Proportion		10%	CH3 filter Proportion	Ļ
		37	CH4 filter Proportion		10%	CH4 filter Proportion	
		38	CH5 filter Proportion		10%	CH5 filter Proportion	
4 III +		20	OTT & 214		100/	OTTO CHAND AND AND AND AND AND AND AND AND AND	

Sampling time

AS08AD-C	sampling time[1]						
- AS08AD-C[77]	Mapping to D	Index	Description	Input	Output	Initial	Comment
 Present value[9] format[17] CH1-CH8 Mode setting[8] CH1-CH8 Calibration[16] average filter[16] sampling time[1] Channel Detect and Alarm set 		42	Sampling time			2ms	Sampling time
< III +							

Channel Detect and Alarm settings

S08AD-C	Channel Detect and	d Alarm s	ettings[1]				
AS08AD-C[77]	Mapping to D	Index	Description	Input	Output	Initial	Comment
Present value[9] format[17]		43	CH1 overrage Detec			Disable	CH1 overrage Detect
CH1~CH8 Mode setting[8]		43	CH2 overrage Detec			Disable	CH2 overrage Detect
CH1~CH8 Calibration[16] average filter[16] sampling time[1] Channel Detect and Alarm se		43	CH3 overrage Detec			Disable	CH3 overrage Detect
		43	CH4 overrage Detec			Disable	CH4 overrage Detect
		43	CH5 overrage Detect			Disable	CH5 overrage Detect
		43	CH6 overrage Detec			Disable	CH6 overrage Detect
		43	CH7 overrage Detec			Disable	CH7 overrage Detect
		43	CH8 overrage Detec			Disable	CH8 overrage Detect
		43	External power supp			Alarm	External power supply error
		43	Hardware error			Alarm	Hardware error
		43	adjustment error			Alarm	adjustment error
n n							

11.5.4.2.5. Monitor Function of the Software

When the software is in online mode and current configuration in AS01DNET (RTU) is the same as that stored in the software, click the **Start Monitor** button to enter the monitor interface and start to monitor the operation states of AS01DNET (RTU) and I/O modules in real time.

1	te da	da 15 15	04 04 04 04	Scan
l	80 [÷] An	08 15 15 AN AM AN	04 04 04 04 RTO TC DA AO	■ Upload
LEase				Download
				Reset Clear config
				Stop Monito
	N	Error code	Status	
)	A	0x0	Running	Auto-Addr
	A A		Running Running	
1		0x0	A second s	Auto-Addr Clear-Addr
0 1 2 3	A A A	0x0 0x0 0x0	Running	
2	A A A	0x0 0x0	Running Running	
1 2	A A A A	0x0 0x0 0x0 0x1801 0x1801	Running Running Running	
1 2 3	A A A A A	0x0 0x0 0x0 0x1801 0x1801 0x1801	Running Running Running Running Running Running	
1 2 3 4 5	A A A A A	0x0 0x0 0x0 0x1801 0x1801	Running Running Running Running Running	
1 2 3 4 5	A A A A A	0x0 0x0 0x0 0x1801 0x1801 0x1801	Running Running Running Running Running Running	

The list of operation state of modules:

04 TC	Indicates that the module is in the normal operation.
04 TC	Indicates that the module is in the Stop state.
04 TC	Indicates that the module is in the warning or error state. For details on errors, refer to explanation of error codes in the related product manual.
	Indicates that the actually connected module does not match the module configured in the software or currently configured module has been disconnected.

On the following interface, right click the selected module icon and select RUN or Stop from the drop-down box to change the operation state of the I/O module.

	DENT(RTU)		04 04 DA AD	Scan
		Run Stop		
		Stop	,	Download
				Reset
				Clear config
				Stop Monito
I	Name	Error code	Status	
	Name AS08AM10N	Error code 0x0	Status Running	Auto-Add
0 1	AS08AM10N AS08AN01T		Running Running	
0 1 2	AS08AM10N AS08AN01T AS16AM10N	0x0 0x0 0x0	Running Running Running	Auto-Add Clear-Add
0 1 2 3	AS08AM10N AS08AN01T AS16AM10N AS16AN01T	0x0 0x0 0x0 0x0 0x0	Running Running Running Running	
0 1 2 3 4	AS08AM10N AS08AN01T AS16AM10N AS16AN01T AS04RTD-A	0x0 0x0 0x0 0x0 0x0 0x0	Running Running Running Running Running	
0 1 2 3 4 5	AS08AM10N AS08AN01T AS16AM10N AS16AN01T AS04RTD-A AS04TC-A	0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0	Running Running Running Running Running Running	
0 1 2 3 4 5 6	AS08AM10N AS08AN01T AS16AM10N AS16AN01T AS04RTD-A AS04TC-A AS04DA-A	0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x1801	Running Running Running Running Running Running Running Running	
0 1 2 3 4 5 6	AS08AM10N AS08AN01T AS16AM10N AS16AN01T AS04RTD-A AS04TC-A	0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0	Running Running Running Running Running Running	
I 0 1 2 3 4 5 6 7	AS08AM10N AS08AN01T AS16AM10N AS16AN01T AS04RTD-A AS04TC-A AS04DA-A	0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x1801	Running Running Running Running Running Running Running Running	

11.5.4.3. DeviceNet Mapping Data

The model of the entire mapping data exchange is displayed below and eventually data will map to the registers in the PLC of the master.



Note: All mapping addresses mentioned below means the D registers in the PLC.

The start input address and start output address of AS01DNET (RTU) are assigned automatically by the master when AS01DNET (RTU) is added to the master. The input mapping address length and output mapping address length of AS01DNET (RTU) are determined by the configuration of modules connected to AS01DNET (RTU).

The start input and output mapping addresses of one I/O module are assigned automatically by the software. Its input mapping address length and output mapping address length are determined by the configuration of the module. The range of input / output mapping address is limited by the input / output mapping address range of AS01DNET (RTU).

11.5.4.3.1. The Rule for Assignment of Mapping Addresses by AS01DNET Master

Scan List se Available No				Scan List:			
Node Ad	Node Name			Node Ad	Node Name		_
03	AS01DNET(RTU)						
Output Tabl			<	input Table			
Register	e Device Image	14		Register	Device Image		
D26105 H	are rice mage			D26005 H	Service midge		
D26105_H				D26005_H			
D26106 H				D26006 H			
D26106 L				D26006 L			
D26107 H				D26007 H			
D26107 L				D26007 L			
D26108 H				D26008 H			
D26108 L				D26008 L			
D26109 H				D26009 H			
D26109 L				D26009 L			
D26110 H				D26010 H			
D26110_L				D26010_L			
D26111 H				D26011 H			1
*	111	- F		*	m	+	
Unit ID: 1	÷ Start	Output : D	+	26105		OK	
-	allocation Start	Input: D	-	26005		Cancel	Ī

Input are	a: Slave ⇔ Master		Output are	a: Master ⇔ Slave	•
Register in AS PLC	Purpose	Data size	Register in AS PLC	Purpose	Data size
D26000~D26003	Scan-list node state indication area	4 words	D26100~D26103	Bit-strobe command area	4 words
D26004	Scanner module state indication area	1 word	D26104	Reserved	1 word
D26005~D26099	DeviceNet input data area; for receiving state data back from slaves	95words	D26105~D26199	DeviceNet output area; the data in the registers will be sent to slaves as control data.	95 words

Data mapping areas are assigned according to the following table.

11.5.4.3.2. The Rule for Assignment of Mapping Addresses for AS01DNET (RTU)

The start input and start output mapping addresses of AS01DNET (RTU) are assigned automatically by the master when AS01DNET (RTU) is added to the master. The master assigns mapping addresses of AS01DNET (RTU) according to input mapping address length and output mapping address length. Input mapping address length and output mapping address length are determined by the configuration parameters of all modules connected to AS01DNET (RTU). The start addresses of AS01DNET (RTU) will not be assigned until AS01DNET (RTU) is added to the master and they are related to the order of adding slaves to the master.

When there are two slaves of AH10DNET and AS01DNET (RTU), the input size and output size of AH10DNET are both 4 bytes and the input size and output size of AS01DNET (RTU) are both 4 bytes. If AS01DNET (RTU) is added to the master before AH10DNET is added to the master, then the input mapping addresses and output mapping addresses of AS01DNET (RTU) are respectively D26005~D26006 and D26105~D26106 as below. D26005 and D26105 are respectively the start input mapping address and start output mapping address, i.e. status word and control word of AS01DNET (RTU). The registers after start input mapping address and start output mapping address are for mapping the configuration parameters of I/O modules.

Scan List set Available No				Scan List:		
Node Ad	Node Name			Node Ad	Node Name	
			× ×	01 03	AH10DNET Slave AS01DNET (RTU)	
Output Table			1	Input Table		
Register	Device Image	*		Register	Device Image	*
D26105_H	[Poll]01-AH10DNET Slave			D26005_H	[Poll]01-AH10DNET Slave	-
D26105_L	[Poll]01-AH10DNET Slave			D26005_L	[Poll]01-AH10DNET Slave	
D26106_H	[Poll]01-AH10DNET Slave			D26006_H	[Poll]01-AH10DNET Slave	
D26106_L	[Poll]01-AH10DNET Slave			D26006_L	[Poll]01-AH10DNET Slave	
D26107_H	[Poll]03-AS01DNET (RTU)			D26007_H	[Poll]03-AS01DNET (RTU)	
D26107_L	[Poll]03-AS01DNET (RTU)			D26007_L	[Poll]03-AS01DNET (RTU)	
D26108_H	[Poll]03-AS01DNET (RTU)			D26008_H	[Poll]03-AS01DNET (RTU)	
D26108_L	[Poll]03-AS01DNET (RTU)			D26008_L	[Poll]03-AS01DNET (RTU)	
D26109_H				D26009_H		
D26109_L				D26009_L		
D26110_H				D26010_H		
D26110_L				D26010_L		
D26111 H		*		D26011 H		-
1	III F	_		*	— m.	_
Unit ID: 1	Start Output :	D	+	26105	OK	

If AS01DNET (RTU) is added to the master after AH10DNET is added to the master, then the input mapping addresses and output mapping addresses of AS01DNET (RTU) are respectively D26007~D26008 and D26107~D26108 as below. D26007 and D26107 are respectively the start input mapping address and start output mapping address, i.e. status word and control word of AS01DNET (RTU). The registers after start input mapping address and start output mapping address are for mapping the configuration parameters of I/O modules.

Scan List set Available No			Scan List:		
Node Ad	Node Name		Node Ad	Node Name	
		\geq	01	AH10DNET Slave	
		<	03	AS01DNET (RTU)	
Output Table			Input Table		
Register	Device Image		Register	Device Image	
D26105 H			D26005 H		
D26105 L			D26005_1		
D26106 H	the second s		D26006 H	the second of the second s	
	Poll01-AH10DNET Slave		D26006 L	and the second sec	
	[Poll]03-AS01DNET (RTU)		D26007 H	A PROPERTY OF THE OWNER AND A PROPERTY OWNER AND A	1
D26107 L			D26007 L		
D26108 H		-	D26008 H		
D26108 L	[Poll]03-AS01DNET (RTU)		D26008_L	[Poll]03-AS01DNET (RTU)	
D26109_H			D26009_H		
D26109_L			D26009_L		
D26110_H			D26010_H		
D26110_L			D26010_L		
D26111 H			D26011 H		
*	111 F		*	m	1
Unit ID: 1	Start Output : D) . .	26105	OK.	
Manual a	Ilocation Start Input:	-	26005	Cancel	

11.5.4.3.3. The Rule for Assignment of Mapping Addresses for I/O Modules

Each module has two forms of data mapping. When DeviceNet master has not assigned the start input mapping address and start output mapping address to AS01DNET (RTU), the contents in **Input** and **Output** in the following figure represent offsets based on start input or start output mapping address of AS01DNET (RTU). After DeviceNet master has assigned the start input mapping address and start output mapping address to AS01DNET (RTU), the contents in **Input** and **Output** in the following figure represent in the following figure represent mapping address of parameters in the modules on the right of AS01DNET (RTU).

When AS01DNET (RTU) is added to **Scan List** on the page of **Scanner Module Configuration...**, DeviceNet master assigns start input and output mapping addresses to AS01DNET (RTU). When AS01DNET (RTU) is removed from **Scan List** on the page of **Scanner Module Configuration...**, the start input and start output mapping addresses of AS01DNET (RTU) are unknown.

Before the master assigns mapping addresses to AS01DNET (RTU), the device mappings of modules connected to the right side of AS01DNET (RTU) are displayed as below.

5011	DENT(RTU)					
	16 04 04 AP 0A AD	+			* III	Scan Upload Download
						Reset Clear config
						Start Monitor
					-	
List L.	t Name	I Description	Input	Output	-	Auto-Addr
_	Name	I Description 0. RTU DeviceNet	Input	Output	-	Auto-Addr Clear-Addr
I. -	Name	I Description 0.: RTU DeviceNet -		Output ##+1	-	
I. - 0	Name AS01DNET(RTU)	0. RTU DeviceNet				
I. - 0 1 2	Name AS01DNET(RTU) AS16AP11T	0. RTU DeviceNet	##+1	##+1		
I. - 0 1 2 3	Name AS01DNET(RTU) AS16AP11T AS04DA-A	0. RTU DeviceNet - -	##+1 ##+2 ~ ##+3	##+1		
I. - 0 1 2 3 4	Name AS01DNET(RTU) AS16AP11T AS04DA-A	0. RTU DeviceNet - -	##+1 ##+2 ~ ##+3	##+1		
I. - 0 1 2 3 4 5	Name AS01DNET(RTU) AS16AP11T AS04DA-A	0. RTU DeviceNet - -	##+1 ##+2 ~ ##+3	##+1		Clear-Addr
L. - 0 1 2 3 4 5 6	Name AS01DNET(RTU) AS16AP11T AS04DA-A	0. RTU DeviceNet - -	##+1 ##+2 ~ ##+3	##+1		
I. - 0 1 2 3 4 5	Name AS01DNET(RTU) AS16AP11T AS04DA-A	0. RTU DeviceNet - -	##+1 ##+2 ~ ##+3	##+1		Clear-Addr

After AS01DNET (RTU) is pulled into **Scan List**, the mapping addresses that the master assigns to AS01DNET (RTU) are shown as below.

		1		
Node Ad	Node Name	-	-	Node Name
			02	AS01DNET (RTU)
			-	
		<		
Output Table			Input Table	
Register	Device Image		Register	Device Image
D26105 H	[Poll]02-AS01DNET (RTU)	1	D26005 H	[Poll]02-AS01DNET (RTU)
D26105 L	[Poll]02-AS01DNET (RTU)		D26005 L	[Poll]02-AS01DNET (RTU)
D26106 H	[Poll]02-AS01DNET (RTU)		D26006 H	[Poll]02-AS01DNET (RTU)
D26106 L			D26006 L	[Poll]02-AS01DNET (RTU)
D26107 H	[Poll]02-AS01DNET (RTU)		D26007 H	[Poll]02-AS01DNET (RTU)
D26107_L	[Poll]02-AS01DNET (RTU)		D26007_L	[Poll]02-AS01DNET (RTU)
D26108_H	[Poll]02-AS01DNET (RTU)		D26008_H	[Poll]02-AS01DNET (RTU)
D26108_L	[Poll]02-AS01DNET (RTU)		D26008_L	[Poll]02-AS01DNET (RTU)
D26109_H	[Poll]02-AS01DNET (RTU)		D26009_H	[Poll]02-AS01DNET (RTU)
D26109_L	[Poll]02-AS01DNET (RTU)		D26009_L	[Poll]02-AS01DNET (RTU)
D26110_H	[Poll]02-AS01DNET (RTU)		D26010_H	[Poll]02-AS01DNET (RTU)
D26110_L	[Poll]02-AS01DNET (RTU)		D26010_L	[Poll]02-AS01DNET (RTU)
and the second sec	[Poll]02-AS01DNET (RTU)		D26011 H	
< [III F		*	m
Unit ID: 1	Start Output : D	-1	26105	OK
omens. 1	* Start Output : D	1	20103	OR

	DENT(RTU)	D4 AD	+			* 10	Scan Upload Download
							Reset Clear config
						1	Start Monitor
List	t					*	
List L		Fir	Description	Input	Output	- c	Auto-Addr
I. - 0 1 2 3	Name AS01DNET(AS16AP11T AS04DA-A	0.100 - -	Description RTU DeviceNet		D26106		Auto-Addr Clear-Addr
I. - 0 1 2 3 4	Name AS01DNET(AS16AP11T AS04DA-A	0.100 - -		D26006 D26007 ~ D26008	D26106		
I. - 0 1 2 3 4 5	Name AS01DNET(AS16AP11T AS04DA-A	0.100 - -		D26006 D26007 ~ D26008	D26106		Clear-Addr
I. - 0 1 2 3 4	Name AS01DNET(AS16AP11T AS04DA-A	0.100 - -		D26006 D26007 ~ D26008	D26106	C	

After the master assigns mapping addresses to AS01DNET (RTU), the mapping devices of the modules connected to the right side of AS01DNET (RTU) are shown as below.

The software automatically assigns mapping addresses of module parameters in the arrangement order of modules connected to the right side of AS01DNET (RTU) from left to right.

Below is the table of configuration of one master AS01DNET and one slave AS01DNET (RTU) and mapping addresses that the software automatically assigns to each module. D26005 and D26105 are the control word and status word of AS01DNET (RTU). The input mapping address and output mapping address of AS16AP are D26006 and D26106 respectively. The input mapping addresses and output mapping addresses of AS04DA are D26007~D26008 and D26107~D26114 respectively. The input mapping addresses of AS04AD are D26009~D26018.

Auto Assignment	Input	Output
AS01DNET(RTU)	D26005 status word	D26105 control word
AS16AP	D26006	D26106
AS04DA	D26007~D26008	D26107~D26114
AS04AD	D26009~D26018	

The input and output mapping addresses of AS01DNET (RTU) are D26005~D26018 and D26105~D26114.

11.5.4.3.4. Status Word and Control Word of AS01DNET (RTU)

The start input address and start output address in the mapping areas of AS01DNET (RTU) are used as the status word and control word of AS01DNET (RTU) respectively with the detailed explanation in the following table.

• Control word of AS01DNET(RTU)

Bit	Status value	Description		
	000	Make no control setting for the operation of AS01DNET(RTU)		
bit0	001	Set AS01DNET(RTU) to RUN mode		
~ bit2	010	Set AS01DNET(RTU) to STOP mode		
DILZ	Other	Reserved		
h:+0	0	Reserved		
bit3	1	Restart AS01DNET (RTU)		
bit4	0/1	Reserved		
bit5	0/1	Reserved		
bit6	0/1	Reserved		
bit7	0/1	Reserved		
bit8	0/1	Reserved		
bit9	0/1	Reserved		
bit10	0/1	Reserved		
bit11	0/1	Reserved		
bit12	0/1	Reserved		
bit13	0/1	Reserved		
bit14	0/1	Reserved		
bit15	0/1	Reserved		

• Status word of AS01DNET(RTU)

Bit	Status value	Description	
h:0	0	AS01DNET (RTU) in RUN state	
bitO	1	AS01DNET (RTU) stops.	
bit1	0/1	Reserved	
L:10	0	No error occurs in I/O modules.	
bit2	1	An error occurs in I/O modules.	
bit3	0/1	Reserved	
L:14	0	Current connection matches the configuration.	
bit4	1	Current connection is inconsistent with the configuration.	
h:45	0	AS01DNET (RTU) works normally.	
bit5	1	The voltage of the power supply for AS01DNET (RTU) is too low.	
bit6	0/1	Reserved	
L :+7	0	AS01DNET (RTU) works normally.	
bit7	1	The number of points/ modules exceeds allowed range.	
bit8	0/1	Reserved	
bit9	0/1	Reserved	
bit10	0/1	Reserved	
bit11	0/1	Reserved	
bit12	0/1	Reserved	

Bit	Status value	Description
bit13	0/1	Reserved
bit14	0/1	Reserved
bit15	0/1	Reserved

11.5.4.4. Connecting AS01DNET (RTU) to the Network

To configure AS01DNET (RTU) successfully and make it work normally in the network, the following steps should be taken for the setup.



Hardware wiring

During hardware wiring, notice that the standard cable should be used and two terminal resistors of 121Ω should be connected respectively to the two ends of the main line in the DeviceNet network. The node IDs of all nodes in the network bus can not be repeated and their baud rates should be consistent.

• Online scan

The online scan consists of two parts: scanning online network nodes and scanning I/O modules of AS01DNET (RTU). Before the scan, make sure that the communication channel selected is proper and the communication setup is normal in the communication manager COMMGR.

• Configuration setting

The configuration setting includes the master configuration and AS01DNET (RTU) configuration settings. The master configuration contains the master scanner module setting (configuration of master) and the scan list configuration setting. AS01DNET (RTU) configuration contains AS01DNET (RTU) setting and other I/O modules setting.

Configuration Download

Configuration download consists of master configuration download and AS01DNET (RTU) configuration download. During the master configuration download, the seven-segment displayer of AS01DNET (RTU) shows 80 and its node ID alternately. During the AS01DNET (RTU) configuration download, the seven-segment displayer of AS01DNET (RTU) shows 83 and its node ID alternately.

Monitor and Check

After the configuration is downloaded, check if AS01DNET (RTU) works normally. If AS01DNET (RTU) works normally, the digital displayers of the master and AS01DNET (RTU) show their own node IDs and MS and NS indicators are ON in green.

11.5.5 Application Example

This section describes how to configure AS01DNET (RTU) and its right-side I/O module parameters in the DeviceNet Builder software through an application example. And how the parameters of the I/O modules connected to the right side of AS01DNET (RTU) are controlled and accessed through AS01DNET master is illustrated as well.

Control Requirement:

- 1. Connect the output point of AS16AP to the input point; turn on the output point to make the input point ON.
- 2. Write one value for channel 1 of AS04DA to change into analog signal and then convert the analog signal to digital signal to output via AS04AD.



11.5.5.1. Network Structure

Note:

- 1. During the wiring, connect the voltage output of channel 1 of AS04DA to the voltage input of channel 1 of AS04AD. And add the 24 V power to AS04DA and AS04AD respectively.
- 2. Make sure that the baud rates of AS01DNET and AS01DNET (RTU) match.

Module	Node ID	Baud rate
AS01DNET	0	500Kbps
AS01DNET(RTU)	2	500Kbps

 Connect the 24V network power module between V+ and V- and a terminal resistor of 121Ω between CAN_H and CAN_L.

11.5.5.2. Using DeviceNet Builder to Configure the Network

11.5.5.2.1. Building and Starting up Driver1 via COMMGR

Build driver1 in the COMMGR software.

Refer to Section 2.4 Communication Setting in the ISPSoft User Manual for more details.

11.5.5.2.2. Configuring AS01DNET (RTU)

1. Call DeviceNet Builder via ISPSoft.

Refer to Section 11.6 for details on the operation.

2. The called DeviceNet Builder is started as below.

🔠 Delta DeviceNet Builder - ISPSoft		
File Edit View Network Tools Help		
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
14/2092410+2		
×		
Project List		
There Device		
Time Message Code Description		
Ready	System Channel	Driver8
Ready	system channel	Drivero

3. Click menu Network>> Online.

ile Edit Viev	v Network Tools Help	
	Scanner setting	
	6 Online	
Project I	Scan DeviceNet Network Is I Download I Upload	
am Project Time	1 Device Message Code Description	
am Project Time		

The AS01DNET-A master module which has been scanned is shown in the left-side Project List.

📇 Delta DeviceNet Builder - ISPSoft.dev	
File Edit View Network Tools Help	
14/20002410+2	
AS01DNET-A , Master	, UnitID 1 , Node Address 1 . The start input: D26005 , Th
< III + Am Froject Device	
* Time Message Code Description	
m	×
Ready	System Channel Driver8

4. Click menu Network >> Scan DeviceNet Network.



5. The RTU slave in the DeviceNet network is scanned as follows.

🔓 Delta DeviceNet Builder - ISPSoft			
File Edit View Network Tools Hel	p		
🗎 💕 📰 🕺 🗶 🐘 🛍 🕹 🗟 🎒			
Project List	AS01DNET-A, N	laster, UnitID 1, Nod	e Address 1 . The start in
AS01DNET-A , Master , UnitI			
			1
	01	02	
	1		
			×
Browsing Node 15			
< m			
- mProject			
	OK		
Time			
Ready		S	stem Channel

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6. Double click AS01DNET (RTU). Then the **Node Configuration...** dialog box appears. Click the **IO Configure...** button to make the **AS01RTU-DNET** interface appear, where to configure the modules connected to AS01DNET (RTU).

	AS01DNET (I	RTU)	
VI 1 TD 700	Key Paramet	ers settin	g
Vendor ID: 799	Vendor		
Device Type: 12	Device T	ype	
Product Code: 12320	Product	Code	
Major Rev: 1	Major Re	ev	
Min Rev: 1	Min Rev		
Polled Setting	COS/CC Set	ting	
Input Size: 4 Bytes	COS	⊙ CC	
Output Size: 4 Bytes	put Size:	0	Byte
	utput Size:	0	Byte
Bit-Strobe Setting	eartbeat:	250	ms
A.	ck Timeout:	16	ms
Input Size: 0 Bytes	hibit Time:		-
	OK	1 Cance	ms
IO Configure			
IO Configure		Cance	el Scan
IO Configure			el Scan Upload
IO Configure		Cance	el Scan
IO Configure		Cance	el Scan Upload
IO Configure		Cance	el Scan Upload Downlo
		Cance	el Scan Upload Downlo Reset
IO Configure		Cance	el Scan Uploac Downlo Reset Clear cor
OIDENT(RTU)		Cance	el Scan Upload Downlo Reset Clear cor Start Mor
IO Configure		Cance	el Scan Upload Downlo Reset Clear cor Start Mor Auto-Ad
IO Configure OIDENT(RTU) Image: transmission of transmissi andifference of transmission of transmissi an	OK	Cance	el Scan Upload Downlo Reset Clear cor Start Mor
IO Configure	OK	Cance	el Scan Upload Downlo Reset Clear cor Start Mor Auto-Ad
IO Configure	OK	Cance	el Scan Upload Downlo Reset Clear cor Start Mor Auto-Ad

- 23 AS01DENT(RTU) * Scan Ξ Upload Download Reset Clear config X Progress Start Monitor Scanning information List Cancel Auto-Addr I. Name AS01DNET(RTU) -RTU DeviceNet Clear-Addr -0 1 2 3 4 5 6 OK 7 Cancel 4 TH. Þ.
- 7. Click the Scan button to scan the I/O modules connected to the right side of AS01DNET (RTU).

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After the module is scanned, configure module parameters. Double click AS04DA module and select "-10V~+10V" for channel 1 mode setting. Click the OK button to finish the setting. Use the same setting way for channel 1 mode setting of AS04AD and set it to "-10V~+10V" as well.

AS04DA-A[40]	Mariante	Index	Balantation		0	Initial	0
Present value[5]	Mapping to Device	2	Description CH1 Output mode setting	Input	Output	-10V~+10V -	Commer CH1 Output mod
format[9] CH1~CH4 Output Mode sett	<u> </u>	3	CH2 Output mode setting		-	Disable	CH2 Output mod
- CH1~CH4 Calibration[8]		4	CH3 Output mode setting			-10V~+10V	CH3 Output mo
 output Setting[8] Alarm settings[1] 		5	CH4 Output mode setting			-5V~+5V 0V~+5V	CH4 Output mo
						1V~+5V 0mA~20mA 4mA~20mA	
m	4		III				

9. After the configuration of modules is finished, click the **Download** button to download the configuration of I/O modules connected to the right side of AS01DNET (RTU) to AS01DNET (RTU).

Ī	16 04 AP DA	04 +	-		N	Scan
						Upload
						Reset Clear config
						Start Monito
Lis					-	
_	t Name	Firmw	Description	Input Output		Auto-Add
_	Name			Input Output		
L		RTU		Input Output	•	
I. -	Name ASO1DNET (1 -	RTU	Det	##+1		
I. - 0	Name ASO1DNET(I - AS16AP11T -	RTU	Det ##+1	##+1 3 ##+2 ~ ##+9		
I. - 0 1	Name AS01DNET() - AS16AP11T - AS04DA -	RTU	Det ##+1 ##+2 ~ ##+	##+1 3 ##+2 ~ ##+9		
I. - 0 1 2	Name AS01DNET() - AS16AP11T - AS04DA -	RTU	Det ##+1 ##+2 ~ ##+	##+1 3 ##+2 ~ ##+9		Auto-Adda Clear-Adda
- 0 1 2 3	Name AS01DNET() - AS16AP11T - AS04DA -	RTU	Det ##+1 ##+2 ~ ##+	##+1 3 ##+2 ~ ##+9	•	
I. - 0 1 2 3 4	Name AS01DNET() - AS16AP11T - AS04DA -	RTU	Det ##+1 ##+2 ~ ##+	##+1 3 ##+2 ~ ##+9	•	
I. - 0 1 2 3 4 5	Name AS01DNET() - AS16AP11T - AS04DA -	RTU	Det ##+1 ##+2 ~ ##+	##+1 3 ##+2 ~ ##+9	•	Clear-Add

10. After the download, click the **OK** button to go back to the main page of the software. Double click AS01DNETScanner icon and then move the slave in **Available Nodes** to **Scan List** on the **Scanner Module Configuration** dialog box. Click the **OK** button to finish the setting.

Scan List set wailable No				Scan List:		
Node Ad	Node Name			Node Ad	Node Name	
-				02	AS01DNET (RTU)	
			<			
Output Table				Input Table		
Register	Device Image	*		Register	Device Image	
D26105 H				D26005 H		
D26105 L	[Poll]02-AS01DNET (RTU)			D26005 L		
	[Poll]02-AS01DNET (RTU)			D26006 H		
D26106 L	[Poll]02-AS01DNET (RTU)			D26006 L		
D26107 H	[Poll]02-AS01DNET (RTU)			D26007 H	[Poll]02-AS01DNET (RTU)	
D26107 L	[Poll]02-AS01DNET (RTU)			D26007 L	[Poll]02-AS01DNET (RTU)	
D26108_H	[Poll]02-AS01DNET (RTU)			D26008_H	[Poll]02-AS01DNET (RTU)	
D26108_L	[Poll]02-AS01DNET (RTU)			D26008_L	[Poll]02-AS01DNET (RTU)	
D26109_H	[Poll]02-AS01DNET (RTU)			D26009_H	[Poll]02-AS01DNET (RTU)	
D26109_L	[Poll]02-AS01DNET (RTU)		11	D26009_L	[Poll]02-AS01DNET (RTU)	
D26110_H	[Poll]02-AS01DNET (RTU)			D26010_H	[Poll]02-AS01DNET (RTU)	
D26110_L	[Poll]02-AS01DNET (RTU)			D26010_L	[Poll]02-AS01DNET (RTU)	
D26111 H	[Poll]02-AS01DNET (RTU)	*		D26011 H	[Poll]02-AS01DNET (RTU)	-
Unit ID: 1	Start Output :	D	*	26105	OK	
Manuala	llocation Start Input:	D		26005	Cancel	

11. Click menu Network >> Download to download AS01DNET (RTU) configuration to the master.

The input mapping address D26005~D26018 and output mapping address D26105~D26114 are for AS01DNET (RTU). The start input address D26005 and start output address D26105 are respectively used as the status word and control word of AS01DNET (RTU). The parameter mappings of all modules connected to AS01DNET (RTU) are displayed below.

put	Outpu	Input	Desc	Firmware	Name	
		1	RTU Dev	0.100	AS01DNET(RTU)	
106	D2610	D26006		÷	AS16AP11T	
107 ~ D26114	D2610	D26007~D26008		÷	AS04DA-A	
		D26009 ~ D26018		÷.	AS04AD-A	2
		1				
				m		

	I/O Module	Input	Output
AS16AP		D26006	D26106-
	Status	D26007~D26008	
	Channel 1 output value		D26107~D26108
AS04DA	Channel 2 output value	-	D26109~D26110
	Channel 3 output value	-	D26111~D26112
	Channel 4 output value	-	D26113~D26114
	Status	D2609~D26010	
	Channel 1 input value	D26011~D26012	
AS04AD	Channel 2 input value	D26013~D26014	
	Channel 3 input value	D26015~D26016	
	Channel 4 input value	D26017~D26018	

11.5.5.3. Using LD Program to Control the Entire Network



Program Explanation:

- 1. In network 1, write a value for the output of AS16AP and for the output of channel 1 of AS04DA when M0 changes to ON.
- 2. In network 2, move the input value of AS16AP to D0 and the input value of channel 1 of AS04AD to D1 when M1 changes to ON.

11.5.6 Error Diagnosis and Trouble Shooting

AS01DNET (RTU) provides four diagnosis methods such as LED indicator, seven-segment displayer, status word diagnosis and software diagnosis.

11.5.6.1. Indicator Diagnosis

• NS indicator

LED status	Indication	How to deal with
OFF	No power supply; Or the repeated node ID detection has not been completed.	 Check the power supply for AS01DNET (RTU) and the connection are normal. Make sure that the baud rates of AS01DNET (RTU) and the master match.
Green light blinking (ON:0.5s and OFF: 0.5s alternately)	No connection between AS01DNET (RTU) and its right- side modules	Configure AS01DNET (RTU) in the DeviceNet software and download the configuration correctly.
Green light ON	Normal I/O data transmission between AS01DNET (RTU) and DeviceNet master	No correction needed
Red light blinking (ON:0.5s and OFF: 0.5s alternately)	I/O connection timeout between AS01DNET (RTU) and DeviceNet master	Refer to the error shooting in Codes in Seven-Segment Displayer below.
Red light ON	Network trouble; Repeated node ID; No network power; Or BUS-OFF.	 Ensure that the IDs of all nodes are unique on the bus. Check if the network installation is normal. Check if the baud rate of AS01DNET (RTU) is the same as that of the bus. Check if the node ID of AS01DNET (RTU) is valid. Check if the network power supply is normal.

• MS indicator

LED status	Indication	How to deal with
OFF	No power	Check if the power supply for AS01DNET (RTU) and connection are normal.
Green light blinking (ON:0.5s and OFF: 0.5s alternately)	 AS01DNET (RTU) is waiting for the I/O data from DeviceNet master. No I/O data transmission between AS01DNET(RTU) and DeviceNet master The PLC connected to DeviceNet master is in STOP state. 	 Configure AS01DNET (RTU) in the DeviceNet software and download the configuration correctly. Switch the PLC to RUN state
Green light ON	Normal transmission of I/O data between AS01DNET (RTU) and DeviceNet master	No correction needed

LED status	Indication	How to deal with
Red light blinking (ON:0.5s and OFF: 0.5s alternately)	No network power supply; Configuration error; Module alarms.	 Check if the network power supply is normal; Reset the internal parameters in AS01DNET (RTU); Check if there is an error or alarm in the I/O modules connected to the right side of AS01DNET (RTU).
Red light ON	Hardware error	Return the product to factory for repair if the error still exists after re-power on.

11.5.6.2. Codes in Seven-Segment Displayer

Code	Indication	How to deal with
0~63	Node ID of the scanner module (When in RUN state)	No correction needed
F0	The node ID is repeated or exceeds allowed range.	 Ensure that the node ID of AS01DNET (RTU) is unique in the DeviceNet network within the range of 0~63. Repower it on after changing the node ID.
F1	No I/O module is configured to AS01DNET (RTU) in the DeviceNet Builder software.	Add I/O modules in AS01DNET (RTU) in the DeviceNet Builder software and download the configuration data to AS01DNET (RTU) after the configuration is finished.
F2	The work voltage of AS01DNET (RTU) is too low.	Check if the power supply for AS01DNET (RTU) works normally.
F3	AS01DNET (RTU) enters the test mode.	Repower AS01DNET (RTU).
F4	AS01DNET (RTU) is the Bus- Off state.	 Check if the network communication cable is normal and the shielded cable is grounded. Ensure the baud rates of all network nodes are same. Check if the two ends of the network are both connected with a 120Ω terminal resistor. Repower the scanner module.
F5	No network power supply for AS01DNET(RTU)	 Check if the network cable is normal. Check if the network power supply is normal. (The external 24V DC network power supply is connected between red V+ and black V- of AS01DNET (RTU) .)
F6	Internal error; An error in the internal storage units of AS01DNET (RTU)	Return the product to factory for repair if the error still exists after re-power on.
F7	Internal error; An error in the data exchange units of AS01DNET (RTU)	Return the product to factory for repair if the error still exists after re-power on.
F8	Manufacture error	Return the product to factory for repair if the error still exists after re-power on.

Code	Indication	How to deal with
F9	Internal error; An error in the access of the Flash of AS01DNET (RTU)	Return the product to factory for repair if the error still exists after re-power on.
E4	Module error	Check if an error occurs in the modules connected to the right side of AS01DNET (RTU); Check if the module exists; Check if current module matches that configured in the software; Check if the unconfigured module is added.
E7	Repeated node ID detection	 If the code has emerged for a long time, please shoot troubles in the methods below. 1. Ensure that there are at least two nodes working normally in the network. 2. Check if the two ends of the network are both connected with a 121Ω terminal resistor. 3. Ensure that the baud rates of all network nodes are same. 4. Check if the network cable has a problem such as being disconnected and loosened. 5. Check if the bus communication cable length exceeds maximum transmission distance. If the maximum transmission distance is exceeded, the stability of the system can not be ensured. 6. Check if the shielded wire of the network communication cable is grounded. 7. Turn on the power of AS01DNET (RTU) again.
E9	The number of I/O modules connected to AS01DNET (RTU) exceeds the maximum 8.	Check if the number of I/O modules connected to AS01DNET (RTU) is more than 8.
80	AS01DNET (RTU) is in STOP state.	 Check if the RUN/STOP switch of the PLC connected to the DeviceNet master is turned to RUN. Check if the value of control word of AS01DNET (RTU) is For details, refer to Section 11.5.4.3.4.
83	The AS01DNET (RTU) configuration in the software is being downloading.	Wait until the download of AS01DNET (RTU) configuration data is completed.

When multiple errors exist, the seven-segment displayer of AS01DNET (RTU) will display error codes cyclically. For example, the error codes: E4 03 80 02 are displayed cyclically. See the detailed meaning as below.



- E4 indicates a module error or offline. For details, see the explanation of codes above.
- 03 indicates the position of the module where an error occurs. The position of the first module connected to the right side of AS01DNET (RTU) is 1 and that of the second module is 2. Maximum 8 I/O modules are connectable to AS01DNET (RTU) within the range of 1~8.

- 80 means AS01DNET (RTU) is in STOP state.
- 02 is the node ID: 2 of AS01DNET (RTU).

11.5.6.3. Status Word Diagnosis

The status word of AS01DNET (RTU) shows the operation states of special modules and digital I/O modules. See the following table for status word diagnosis and disposal.

Bit	Status value	Description	Disposal
bit0	0	AS01DNET (RTU) is in RUN state	No correction needed
Ditu	1	AS01DNET (RTU) is in STOP state.	Restart AS01DNET(RTU)
	0	Valid configuration data in AS01DNET(RTU)	No correction needed
bit1	1	Invalid configuration data in AS01DNET (RTU)	Re-download the configuration data to AS01DNET (RTU) by using the DeviceNet Builder software.
bit2	Reserved		
bit3	Reserved		
	0	Currently connected module matches the configuration in the software.	No correction needed
bit4	1	Currently connected module is inconsistent with the configuration in the software.	 Check if currently connected module is consistent with the configuration in the software. Change current module to match the configuration in the software or change the configuration in the software to match currently connected module.
	0	AS01DNET(RTU) in normal operation	No correction needed
bit5	1	AS01DNET(RTU) in low voltage	Check if the power supply for AS01DNET (RTU) is normal.
bit6	Reserved		
bit7	0	AS01DNET(RTU) in normal operation	No correction needed
5117	Reserved		
bit8	Reserved		
bit9	Reserved		
bit10	Reserved		
bit11	Reserved		
bit12	Reserved		
bit13	Reserved		
bit14	Reserved		
bit15	Reserved		

11.5.6.4. Software Diagnosis

Click the **Start Monitor** button on the AS01DNET (RTU) interface. The **Error code** column will show relevant contents as follows.

	* 08 08 15 AM AN AM	16 04 04 AN RTD TC		* E	Scan Upload
					Download
					Reset
					Clear config
					Stop Monito
I	Name	Error code	Status	*	
0	AS08AM10N	0x0	Running		Áuto-Áddr
1	AS08AN01T	0x0	Running		
2	AS16AM10N	0x0	Running		Clear-Addr
3	AS16AN01T	0x0	Running		
4	AS04RTD-A	0x0	Running		
	AS04TC-A	0x0	Running		
5					
5				1	OK
5					OK Cancel

Error No.	Explanation	Solution
0x8001	AS01DNET (RTU) can not detect the configured module.	 Check if the module is disconnected. Check if the module is damaged.
0x8002	Current module is not consistent with the configured module.	Ensure that the actually connected module is the same as that configured in the software.

Note: For details on more error codes, refer to the explanation of Error ID in AS-series product manual.

Remark:

> The software diagnosis function can not be enabled until the DeviceNet Builder software is online.

11.6 How to Call DeviceNet Builder through ISPSoft (AS-Series PLC)

Network structure

Connect the devices according to the following figure. PC accesses AS-series PLC through Ethernet.



Operation of Software

1. Open the ISPSoft software and then select menu **File>> New>> New**. In the following dialog box which appears, select corresponding PLC type **AS** marked in the red box below.



Note: The PLC type used in this section is AS332T-A.
- 📦 Untitled1 - Delta ISPSoft File Edit View Compile PLC Tools Wizard Window Help E 🖹 🖆 🖪 🎒 🔲 🚍 🧇 00X300/83 Delta Library, Preview **4** × 🔮 Project [C:\ProgramD Delta Library E * Device Comment &
 Arrow CONFIG
 CARD Utility 🗄 📬 Delta Library 🎬 AS332T (Untitle 🚺 Tasks DUT Global Symbols ÷.... 🚽 Function Blocks 🔮 Device Monitor I E TAPIs Delta Library User Defr 4 k Preview . 4 111 Project Preview 0/131040 Steps DriverS, [USB: COM! Insert
- 2. Click the **OK** button. Then the main interface of the ISPSoft software appears as below.

 Set up COMMGR communication. Refer to Section 2.4 Communication Setting in the ISPSoft User Manual for more details. 11





5. The following dialog box appears. Select one desired driver which has been created and then click the **OK** button.

Driver	Driver8		
Station Address	0 🔻		
IP Address	192.068.1.1		79
	OK	Close	1

6. Double click **HWCONFIG** marked in the red box below.



7. Select menu **Option>> I/O Scan** in the following window which pops up. Then the AS01DNET-5A icon will show up.

File Edit Option Help Image: Specification Image: Specification Image: Specification Image: Specification Extension No Type Module Name DDF Versi Input Device R Output Device	
Product List Download Ctrl+F8 AS Series Online Mode Ctrl+F4 Analog I PO List Network Nework Newor	
B Digital I C Online Mode Ctrl+F4 Analog I PO List Network Networ	
Analog I PO List Network	
Motion Control Module Power Module Specification CPU Group Extension No Type Module Name DDF Versi Input Device R Output Device	
Power Module Specification CPU Group Extension No Type Module Name DDF Versi Input Device R Output Device	
Specification	
CPU Group Extension No Type Module Name DDF Versi Input Device R Output Device	
CPU Group Extension No Type Module Name DDF Versi Input Device R Output Device	•
CPU Group Extension No Type Module Name DDF Versi Input Device R Output Device	•
Extension No Type Module Name DDF Versi Input Device R Output Device	
	Comment
Power Modu	
CPU Module CPU Module AS332T-A 01.04.00 X0.0 ~ X0.15 Y0.0 ~ Y0.15 Function (
Function 4	
Offline Driver8, [USB: COM5]	

11

 Select menu Option>> Download in the HWCONFIG window. Then the following dialog box appears. Select the checkbox of Download All Items or select the checkboxes of the items which are needed for download. Afterwards, click the OK button.



9. Then the following two dialog boxes of **HWCONFIG** and **PC=>AS** appear. Click **Yes** to perform the PC=>AS status.

VCONFIG	Constitutes 1	_
Write-in forbidden when PLC is run		
he action will affect the PLC conne	ction status, do you want t	to continue?
	Yes	NO
and the second resident		
=> AS		

10. When the download is finished, the progress bar is shown as below.



Meanwhile the following dialog box pops out. Click the Yes button.



11. The following dialog box appears to show that the download has been finished.



12. Return to the HWCONFIG window and right-click AS01DNET module to make the drop-down menu pop out. Select **Communication Software >> DeviceNet Builder** from the menu.



13. The following dialog box pops out. Click the Yes button there.



14. The DeviceNet Builder software is opened as below, which means the DeviceNet Builder software has been opened through the ISPSoft software.

🔒 Delta DeviceNet Builder - ISPSoft		
File Edit View Network Tools Help		
1 4 ∕ 5 5 5 6 4 1 ÷ 2		
×		
Project List		
am Project Device		
× Time Message Code Description		
10		Ť.
Ready	System Channel	Driver8

ILE EDIT VIEW I NETWOR	rk Tools Help	
	anner setting	
a a 🖉 🗷 💆 👩		
	an DeviceNet Network Winload	
mProject 1 De	evice	

15. Click menu Network>> Online.

16. The master module AS01DNET-A has been scanned as below.

🗄 Delta DeviceNet Builder - ISPSoft.dev			
File Edit View Network Tools He	lp		
🖹 📽 🖪 🥦 X 🐃 🛍 📥 🖻 🤮			
1 8 5 5 5 2 1 0	1 ÷ Ø		
× Project List AS01DNET-A , Master , Unitl	AS01DNET-A , Master , UnitID	1 , Node Address 1 .The star	t input: D26005 , Th
	2		
< 117. •			
The Project Device			
Time Message Cod	e Description		
* [m			,

17. Right-click the master module AS01DNET-A under the left-side Project List. Then a drop-down list pops up. Click the option **Scan DeviceNet Network** from the list.

🚡 Delta DeviceNet	Contraction of the Contraction o	
File Edit View	Network Tools Help	
	▓ ■ 0 ▲ 3 4 □ 7 2	
Project Lis	t AS01DNET-A , Master	, UnitID 1 , Node Address 1 .The start input: D26005 , Th
AS01D	Scan DeviceNet Network	
	Download	
	Upload	
	Update	
	Add	
	Сору	
	Paste	
	Delete	
	Properties	
۲ III The Project	1 Device	
Time	Message Code Description	
4	m	
leady		System Channel Driver8

18. The following progress bar appears then.

18		×
Browsing Node 17		
	OK	
	OK	

- 📇 Delta DeviceNet Builder - ISPSoft File Edit View Network Tools Help 🖹 🚅 🔚 🐘 🗶 🖿 🚺 📥 💽 😂 🔲 🖵 🥹 AS01DNET-A, Master, UnitID 1, Node Address 1. The start input: D26005, Th 🖃 🥘 Project List AS01DNET-A , Master , UnitI 01 02 AS01DNET AS01DNET Scanner Slave Project 1 Device × Message Code Description Time 4 Ready System Channel Driver8
- 19. The master and slave which have been scanned both show up in the network.

11

MEMO

11

12

Chapter 12 Positioning Module AS02/04

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12.4 Tr 12.4.1. 12.4.2. 12.4.3.	Troubleshooting Procedure

12.1 Overview

This chapter describes the specifications for the positioning module, its operation, and its programming. On the analog input/output module, four channels receive analog signals (voltage or current), and converts those signals into 16-bit digital signals. In addition, the analog input/output module receives two blocks of 16-bit digital data from a CPU module, and converts the digital data into analog signals (voltage or current). The analog input/output module sends the analog signals by two channels. For software operation, ISPSoft, DIADesigner or DIADesigner-AX is what you need. If you are using AS Series PLC CPU, refer to ISPSoft User Manual or DIADesigner Manual for more information. The new software DIADesigner-AX only supports AX Series PLC CPU and AS Series modules now, refer to AX-3 User Manual for more information on software operation.

12.1.1. Characteristics

(1) Use the AS02/04 PU-A module, based on its practical application.

AS02PU-A: 2-axis differential output, 1 encoder

AS04PU-A: 4-axis NPN transistor (sinking) output

(2) High-speed input/output

AS02PU-A: high speed output frequency at 200 k Hz (A/B/Z phase) and 2-axis 200 k HZ differential output

AS04PU: 4-axis NPN transistor (sinking) output at 100 k Hz

(3) Input/output

AS02PU-A: 5 direct current input points (sinking or souring)

AS04PU-A: 6 direct current input points (sinking or souring)

(4) Use the utility software to configure the module.

The HWCONFIG utility software is built into ISPSoft. You can set modes and parameters directly in HWCONFIG of ISPSoft or Hardware Configuration of DIADesigner without spending time writing programs to set registers to manage functions.

(5) Specially designed instructions for the module

You can use specially designed instructions to control the modules without spending too much time to figure out how to achieve the required applications.

12.2 Specifications and Functions

12.2.1. Specifications

• Electrical specifications for the inputs

Module Name		AS02PU-A		AS04PU-A
Input		High speed	Standard	Standard
Number of Input Points		3 (A+/A-, B+/B-, Z+/Z-)	5 (X0.0-X0.4)	6
Connector Type		Removable terminal block		
Input Form		Differential input	Direct current (sinking or sourcing)	Direct current (sinking or sourcing) Sinking: The inputs are NPN transistors whose collectors are open collectors. Sourcing: The inputs are PNP transistors whose collectors are open collectors.
Input Curren	t	5-24 VDC, 5 mA	24 VDC, 5 mA	24 VDC, 5 mA
Action Level	OFF→ON	>3 VDC	>15 VDC	>15 VDC
Action Level	ON→OFF	<1.5 VDC	<5 VDC	<5 VDC
Response tin	ne	<2.5 µs	<0.5 ms	<0.5 ms
Maximum input frequency		200 k Hz (A+/A-, B+/B-, Z+/Z-)	10 k Hz	10 k Hz
Input impeda	ince	4.7kΩ		
Input isolatio	on voltage	500 VAC		
Input display	,	When the optoco	upler is driven, the input L	ED indicator is ON.
Weight		120 g		

• Electrical specifications for the outputs

Item	Model	AS02PU-A	AS04PU-A	
Number of c	outputs	Four (2-axis) Eight (4-axis)		
Connector t	уре	Removable terminal blocks		
Output form	1	differential output Transistor-T (sinking) (NF		
Output curre	ent	5 VDC*1 5-30 VDC		
	Resistance	10 mA	0.1A	
Maximum Ioad	Inductance	N/A		
1040	Bulb	N/A		
Maximum	Resistance	200 kHz	100 kHz	
output	Inductance	N/A		
frequency ^{*1}	ncy ^{*1} Bulb N/A		Ά	
Maximum	OFF→ON	0.1 µs	1.5 µs	
Response time	ON→OFF	0.1 µs	1.5 µs	
Input isolati	on voltage	500	VAC	
Weight		120 g		

*1: Acutal output: 4 VDC (high input impedance) to 3.3 VDC (10 mA)/output

12.2.2. Profile



Number	Name	Description				
1	Model name	Model name of the module				
	POWER LED indicator (Blue)	Indicates the status of the power supply ON: the power is on OFF: no power				
	Run LED indicator (Green)	Operating status of the module ON: the module is running and ready to accept instructions. OFF: the module is stopped and can NOT accept instrucitons.				
2	Error LED indicator (Red)	Error status of the module OFF: the module is normal. Blinking (0.2 seconds ON/OFF): hardware error occurs in the module, can NOT operate normally				
	Input LED indicator (Red)	ON: Receives an input signal OFF: Receives no input signal				
	Output LED indicator (Red)	ON: Receives an output signal OFF: Receives no output signal				
3	Removable terminal block	The inputs are connected to sensors. The outputs are connected to loads to be driven.				
4	Arrangement of the input/output terminals	Arrangement of the terminals				
5	Terminal block clip	Removal of the terminal block				
6	DIN rail clip	Secures the module onto the DIN rail				

Number	Name	Description
7	Module connecting set	Connects the modules
8	Ground clip	On the DIN reail for grounding
9	Label	Nameplate

12.2.3. Arrangement of Terminals



	AS02	PU-A		AS04PU-A								
Wordings with	Vordings with the same indications that are used						Wordings with the same indications that are us					
on th	e terminal b	lock and m	anual		on the terminal block and manual							
	Terminal		Terminal				Terminal		Terminal			
Manual	Block	Manual	Block			Manual	Block	Manual	Block			
	(left)		(right)				(left)		(right)			
A+	A+	A-	A-			S/S	S/S	C0	C0			
B+	B+	B-	B-			S/S	S/S	Y0.0	0			
Z+	Z+	Z-	Z-			X0.0	0	Y0.1	1			
S/S	S/S	X0.0	0			X0.1	1	Y0.2	2			
X0.1	1	X0.2	2			X0.2	2	Y0.3	3			
X0.3	3	X0.4	4			X0.3	3	C1	C1			
Y0.0+	0+	Y0.0-	0-			X0.4	4	Y0.4	4			
Y0.1+	1+	Y0.1-	1-			X0.5	5	Y0.5	5			
Y0.2+	2+	Y0.2-	2-				•	Y0.6	6			
Y0.3+	3+	Y0.3-	3-				•	Y0.7	7			

12.2.4. Special Features

The following special instructions (API 14) are designed for AS Positioning Modules, for example, setting output control parameters, reading output status, pulse output (no acceleration), relative position output (with acceleration and deceleration), absolute addressing output (with acceleration and deceleration), homing, jog output, MPG output, and high-speed counter function. Refer to section 6.15 (API 14) in AS Programming Manual for more information.

12.2.5. Wiring

Precautions

To ensure the positioning module functions well and reliably, the external wiring must prevent noise. Before you install the cables, follow the precautions below.

- To prevent a surge and induction, the AC cable and the input signal cables that are connected to the AS02/04PU-A must be separate cables.
- (2) Do not install the cable near a main circuit, a high-voltage cable, or a cable connected to a load that is not a PLC. In addition, the cable must not be bound to a main circuit, a high-voltage cable, or a cable connected to a load which is not a PLC.
- (3) Ground shielded cables and hermetically sealed cables separately.
- (4) Terminals with insulation sleeves cannot be arranged as a terminal block, so you should cover the terminals with insulation tubes.
- (5) Use single-core cables or twin-core cables with a diameter of 24–22 AWG and with pin-type connectors smaller than 1 mm. The plastic jackets that are removed from the cables should be 8 mm to 10 mm long. Only use copper conducting wires which can withstand temperatures of 60° C /75° C or higher.



- (6) Note: use cables with the same length (less than 200 m) and use wire resistance of less than 100 ohm.
- (7) Notes on two-wire, three-wire, and four-wire connections:
 - Two-wire connection/three-wire connection (passive transducer): connect the transducer and the analog input module to the same power circuit.
 - Four-wire connection (active transducer): the transducer uses an independent power supply, so do not connect it to the same power circuit as the analog input module.

External wiring

(1) AS02PU-A



*1. Sinking

*2. Souring

- *3. Differential input
- *4. Open collector sinking
- *5. Open collector sourcing

*6. Open collector sinking/sourcing to connect to phase A/B/Z and if the input frequenct is higher than 100

kHz, add a 3W/470 ohm resistor between + the positive end and - the negative end.

*7. Refer to API1402 in AS Series Programming Manual and Delta Servo Drive Manual for more information on the output mode.

(2) AS04PU-A



- *1. VDD and COM are seen as a group and its power is provided by Delta servo drive.
- *2. It is a load or an input point.
- *3. Use the same power supply for the same COM group.
- *4. Sinking
- *5. Sourcing

12.3 HWCONFIG in ISPSoft

12.3.1. Initial Setting

(1) Start ISPSoft and double-click HWCONFIG.



(2) Select a module and drag it to the working area.



(3) Double-click the module in the working area to open the Setting page.

idit Area			
			Hardware Configuration
General			
- AS02PU-A	Device Information	Normal Exchange Area	
Input Point Setting	Device Name	AS02PU-A	
Output Point Setting	Description	2 axes of 200 kHz differential output, 1 set of encoder (for differential, sink or source input modes), 5 input points (sink or source input mode)	
Axis 1		input points (sink or source input mode) Module Current Consumption: (internal)50mA, (external)90mA Module width: 35mm	
Axis 2		House water. Some	-
			22PU
	Comment		
	DDF Version	01.00.00 -	
	Firmware Version	(off-line)	
	Hardware Version	(off-line)	
	4		
Default Import Exp	oort Update		

(4) Choose the parameter, set the values, and close the setting page.

Input Point Setting	General Input
Input Point Setting Name Setting Value Unit Default Minimum Minimum <th>General Input</th>	General Input
Output Point Setting X0.0 Mode General Input Gener	General Input
Axis 1 X0.1 Mode General Input General Input General Input Image: Comparison of Comparison o	
Axis 2 X0.2 Mode General Input	General Input
X0.2 Mode General input General input General input - </td <td></td>	
X0.4 Mode General Input General Input General Input - </td <td>General Input</td>	General Input
x0.0 Filter Time 10 ms 10 25 x0.1 Filter Time 10 ms 10 0 25 x0.2 Filter Time 10 ms 10 0 25	General Input
X0.1 Filter Time 10 ms 10 25 X0.2 Filter Time 10 ms 10 0 25	General Input
X0.2 Filter Time 10 ms 10 0 25	10 ms 10 0 25
	10 ms 10 0 25
V0.2 Effort Time 10 proc 10 0.25	10 ms 10 0 25
X0.5 Ficel fille 10 118 10 0 25	10 ms 10 0 25
X0.4 Filter Time 10 ms 10 0 25	10 ms 10 0 25

(5) Click **Download** on the toolbar to download the parameters. Note that you cannot download the parameters while the CPU module is running.



12.3.2. Checking the Version of a Module

(1) On the **Common** menu, click **On-line Mode**.



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(2) Double-click the module to open the Setting page. The versions of both the firmware and the hardware are displayed.



ea			
			Hardware Configuration
ral Diagnosis	Information	Normal Exchange Area	
Input Point Setting Device N		AS02PU-A	
Output Point Setting Descript	ion	2 axes of 200 kHz differential output, 1 set of encoder (for differential, sink or source input modes), 5 input points (sink or source input mode)	
Axis 1		input points (sink or source input mode) Module Current Consumption: (internal)50mA, (external)90mA Module width: 35mm	
Axis 2		House when, Shinin	
		*	02PU
Commer	nt	*	
			2
		*	
DDF Ver	sion	01.00.00 +	
Firmwar	e Version	01.02.00	
Hardwar	e Version	00.00.00	

12.3.3. Online Mode

(1) On the **Option** menu, click **Online Mode**.



(2) Right-click the module and click Module Status.



(3) View the module status.

Channel	Value (Decimal)		
Error code	0		
Axis 1 current position	-131731069		
Axis 1 current speed	0		
Axis 2 current position	-131731009		
Axis 2 current speed	0		
Input status	0		
Status code(Axis 1 / Axis	0		
MPG input pulse	0		
MPG input frequency	0		

12.3.4. Importing/Exporting a Parameter File

(1) Click **Export** in the Device Settings dialog box to save the current parameters as a dep file (.dep).



Save As						>
> • ^ 🚺	> Thi	is PC » Desktop 🤉	AS02PU	v U	Search AS02PU	Q
Organize • No	ew folde	er			amo	- ?
This PC 3D Objects	^	Name	^		Date modifie	ed
Desktop			No it	ems match y	our search.	
Documents						
Downloads	11					
👌 Music						
Pictures						
📲 Videos						
🐛 Local Disk (C						
、 新增磁碟區	(D:) 🗸	٢				
	: AS02	PU-A				
File name	Eller (*.dep)				
File name Save as type	; Flies (
	: Flies (

(2) Click **Import** in the Device Settings dialog box and select a .dep file to import saved parameters.

	Default	Import		Export		
Save As						×
* 1	> This PC > Deskto	op > AS02PU	v ت	Search AS02PU		P
Organize • New	folder				1111	0
This PC 3D Objects	^ Name	^	ems match y	Date m	odified	1
 Desktop Documents Downloads Music Pictures Videos Local Disk (C:) 						
✔ 新增磁碟區 (D	:) 🗸 <					
File name:	AS02PU-A					`
Save as type:	Files (*.dep)					`
Hide Folders				Save	Cancel	

12.3.5. Parameters

• The input point settings

Edit Area

You can set values in the input points as the triggering conditions (phase Z, DOG, LSN, LSP) for the axis1 and axis 2 to position. Rising-edge and falling-edge can also be specified in the triggering conditions.

• ×

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									Hardware Configuration
General									That a marce consignation
- AS02PU-A	In	put Point Setting							
Input Point Setting		Na	me	Setting Value		Unit	Default	Minimum	Maximum
Output Point Setting	•	X0.0 Mode		General Input	-		General Input	-	-
Axis 1		X0.1 Mode		General Input	-		General Input	-	-
Axis 2		X0.2 Mode		General Input	-		General Input	-	-
		X0.3 Mode		General Input	-		General Input	-	-
		X0.4 Mode		General Input	-		General Input	-	-
		X0.0 Filter Time		10	m	ns	10	0	25
		X0.1 Filter Time		10	m	ns	10	0	25
		X0.2 Filter Time		10	m	ns	10	0	25
		X0.3 Filter Time		10	m	ns	10	0	25
		X0.4 Filter Time		10	m	ns	10	0	25
Default Import E	Export	Update							

The example shows X0.0 is Axis 1 DOG falling edge triggered.

Input	Point Setting					
	Name	Setting Value	Unit	Default	Minimum	Maximum
a.	X0.0 Mode	General Input 🔹		General Input	-	-
	X0.1 Mode	Axis 1 Z Falling edge trigger Axis 2 Z Falling edge trigger		General Input	-	-
	X0.2 Mode	Axis 1 DOG Raise edge trigger Axis 2 DOG Raise edge trigger		General Input	-	-
	X0.3 Mode	Axis 1 DOG Falling edge trigger Axis 2 DOG Falling edge trigger	5	General Input	-	-
	X0.4 Mode	Axis 1 LSN Raise edge trigger	-	General Input	-	-
	X0.0 Filter Time	10	ms	10	0	25
	X0.1 Filter Time	10	ms	10	0	25
	X0.2 Filter Time	10	ms	10	0	25
	X0.3 Filter Time	10	ms	10	0	25
	X0.4 Filter Time	10	ms	10	0	25

• Filter time settings

The default setting is 10 ms; the system filters out distortion and noises in a pulse width modulated transmission that is below 10 ms.

• The output point settings

You can set values in the output points (single pulse output, pulse + direction, CW+CCW, A phase + B phase). Refer to API1402 in AS Series Programming Manual for more information on output modes.

Edit Area								• ×
								Hardware Configuration
General								
- AS02PU-A		Outp	ut Point Setting					
Input Point Setting			Name	Setting Value	Unit	Default	Minimum	Maximum
Output Point Setti	ng	Ø.	Y0.0/Y0.1 Output Mode	Pulse(Y0.0)+Direction(Y0.1)		Pulse(Y0.0)+Directi	-	-
Axis 1			Y0.2/Y0.3 Output Mode	Single Pulse Output Pulse(Y0.0)+Direction(Y0.1)		Pulse(Y0.2)+Directi	-	-
Axis 2				CW(Y0.0)+CCW(Y0.1) A phase(Y0.0)+B phase(Y0.1)				

Axis settings

You can set up the axis in HWCONFIG or through positioning instructions. Use API1402 to set up the followings starting speed, accelation time, deceleration time, max. speed, seeking the set number of Z phase after homing, output the offset position after homing. Use API1407 to setup homing mode. Refer to API1402 – 1410 in AS Series Programming Manual for more information on the settings of axis.

								Hardware Configurat
eral								
AS02PU-A	1	Axis 1						
Input Point Setting			Name	Setting Value	Unit	Default	Minimum	Maximum
Output Point Setting	•		Start speed	100	Hz	100	0	10000
Axis 1			Accelerate time	100	ms	100	0	10000
Axis 2			Decelerate time	100	ms	100	0	10000
			Max speed	200000	Hz	200000	100	200000
800			Seek the set number of Z phase after th	0		0	-100	100
			Output the offset position after the homi	0	Pulse	0	-10000	10000
			Home mode select	Mode 1 : the axis starts to 👻		Mode 1 : the axis st	-	-
			Negative limited position	0	Pulse	0	-2147483648	2147483647
		1	Positive limited position	0	Pulse	0	-2147483648	2147483647

12.3.6. Normal Exchange Area

For data exchange among the CPU module and the modules, the system assign special devices for specified parameters.

AS02PU-A

Ed	Edit Area							
(General							
F	AS02PU-A]	D	e.	vice In	formation	Normal Exchange Area	
	Input Point Setting					De	scription	Address
	Output Point Setting		۱.	-	In	put		
	Axis 1					Error code		D28000
	Axis 2					Axis 1 curr	ent position	D28001 - D28002
						Axis 1 curr	ent speed	D28003 - D28004
						Axis 2 curr	ent position	D28005 - D28006
		2000				Axis 2 current speed Input status		D28007 - D28008
								D28009
						Status cod	e(Axis 1 / Axis 2)	D28010
						MPG input	pulse	D28011 - D28012
						MPG input	frequency	D28013 - D28014

AS04PU-A

504PU-A)evi	ce Ir	formation	Normal Exchange Area	
Input Point Setting					escription	Address
Output Point Setting	 •	-	In	put		
Axis 1		1		Error code		D28020
Axis 2				Axis 1 curr	ent position	D28021 - D28022
Axis 3				Axis 1 curr	ent speed	D28023 - D28024
Axis 4				Axis 2 curr	ent position	D28025 - D28026
				Axis 2 curr	ent speed	D28027 - D28028
				Axis 3 curr	ent position	D28029 - D28030
				Axis 3 curr	ent speed	D28031 - D28032
				Axis 4 curr	ent position	D28033 - D28034
				Axis 4 curr	ent speed	D28035 - D28036
				Input stat	us	D28037
				Status coo	le(Axis 1 / Axis 2)	D28038
				Status coo	le(Axis 3 / Axis 4)	D28039

12.4 Troubleshooting

12.4.1. Error Codes

Error	Description	$A \leftrightarrow D LED$	ERROR LED
Code	Description	indicator	indicator
16#1802	Hardware failure	OFF	Blinking

12.4.2. Troubleshooting Procedure

Description	Procedure
Hardware failure	Return the module to the factory for repair.

12.4.3. State Codes (Axis 1 - 4)

State Code Byte #	Description	Axis 1-2	Axis 3-4	
0	Error flag			
1	The output is active.			
2	The output has stopped working.			
3	The instruction execution is complete.			
4	Pulse in positive direction not allowed	Axis 1	Axis 3	
5	Pulse in negative direction not allowed			
6	Current position value overflow			
7	Pulse direction (positive or negative)			
8	Error flag			
9	The output is active.			
10	The output has stopped working.			
11	The instruction execution is complete.			
12	Pulse in positive direction not allowed	Axis 2	Axis 4	
13	Pulse in negative direction not allowed			
14	Current position value overflow			
15	Pulse direction (positive or negative)			

MEMO

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Chapter 13 IO-Link Communication Module AS04SIL

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13.1 Overview

Thank you for using the IO-Link master module AS04SIL-A. To ensure that your AS04SIL-A is installed and operated correctly, read this manual carefully before using the module.

The AS04SIL-A module is an AS series IO-Link communication module (hereafter referred to as "SIL" module) connected on the right side of AS CPU module or AS00SCM-A (RTU mode). When the communication card AS-FCOPM is being used together, they serve as a CAN remote device. SIL provides 4 channels, which can be separately configured in IO-Link master or standard I/O (SIO) mode. IO-Link master can freely connect with IO-Link devices and supports the hybrid use of IO-Link sensors and traditional sensors. Digital I/O of the SIL module can be extended with IO-Link hubs so that the sensors which do not support IO-Link can be connected to. Therefore it is pretty flexible to use the SIL module.

The setup software for AS04SIL-A is HWCONFIG 4.0 which is built in ISPSoft. Go to Delta official website to download and install ISPSoft.

13.1.1 Firmware and Software Versions

	Firm	ware	
Model	AS series CPU	AS00SCM-A	AS04SIL-A
Version	V1.08.50 and later	V2.06 and later	V1.00 and later

	Software					
Model	ISPSoft	HWCONFIG 4.0	AS00SCM-A CANopen EDS file (Remote DS301 Mode)			
Version	V3.12 and later	V4.02 and later	V2.06 and later			

13.2 Specification and Wiring

13.2.1 Specifications

Unit Specification

Item		Specifications	
Module type		IO-Link master	
Model name		AS04SIL-A	
Number of IO-Link po	rts	4	
	Baud rate	4.8kbps, 38.4kbps,230.4kbps	
Communication	Topology	1:1	
Communication	Compliant standards	 IO-Link Interface and System Specification Version 1.1.2 IO-Link Tester Specification Version 1.1.2 	
	IO-Link	Yes	
Mode	SIO (DI)	Yes	
	SIO (DO)	Yes, up to 100 mA / channel	
Cyclic communication	าร	Min. 2 ms; dynamic, according to the valid data length	
Input: data size in each communication port		Max. 32 bytes	
Output: data size in ea communication port	ach	Max. 32 bytes	
Input: data size in eac	h module	Max. 128 bytes	
Output: data size in ea	ach module	Max. 128 bytes	
Input PDO data size		Max. 100 words	
Output PDO data size		Max. 100 words	
Backup		Yes	
	Туре	Unshielded (can also apply to shielded ones)	
	Length	Max. 20 m	
Cable specification	Electrostatic capacity between lines	Max. 3 nF	
	Loop resistance	Max. 6 Ω	
External connection te	erminals	Removable terminal block, clamping connector	

• Electrical Specifications

Item		Specifications	
Power supply to	Rated voltage	24VDC (20.4VDC~ 28.8VDC) (-15%~+20%)	
device in IO-Link mode or SIO (DI)	Max. load current	0.2A/port	
mode	Short-circuit protection	Yes	
	Internal I/O common	NPN, PNP	
Digital inputs in SIO	Input voltage/ current	24VDC, 5mA	
(DI) mode	ON voltage	>15VDC	
	OFF voltage	<5VDC	
	Filter time	0~65 ms (0: no filter)	
	Internal I/O common	NPN, PNP	
Digital outputs in	Output voltage/ current	24VDC (20.4VDC~ 28.8VDC),0.1A/port	
SIO (DO) mode	Short-circuit protection	Yes	
	Leakage current	<0.1mA	
	Residual voltage	<1.5VDC	
	Internal I/O common	NPN, PNP	
Digital inputs for	Input voltage/ current	24 VDC, 2mA	
Pin2 in IO-Link mode	ON voltage	>15VDC	
	OFF voltage	<5VDC	
	Filter time	0~65 ms (0: no filter)	
Isolation voltage		500 VAC	
Power consumption		0.8W	
Weight		133g	
13.2.2 Profile



Unit: mm

Number	Name	Description
1	Model name	Model name of the module
	POWER LED indicator (Blue)	Indicates the status of the power supply ON: the power is on OFF: no power or the power voltage is too low
	Module LED indicator (Red)	 Error status of the module OFF: The module is normal. ON: The communication with its left-side PLC or RTU module fails. Blinking: Module setting or communication error (blinks every 1 second) Hardware or low voltage error (blinks every 0.2 second)
2	Network LED indicator (Orange)	Error status of the network ON: No external power supply Blinking: Scanning is ongoing or the module is already configured and the diagnosis is done. OFF: The module has been configured but the diagnosis has not done yet.
	C1, C2, C3, C4 LED indicator (Orange)	IO-Link connection status of each communication portON: The communication port is in IO-Link mode and a device is connected.Blinking: The communication port is in IO-Link mode but no device is connected or the device connected is not configured.OFF: The communication port is disabled or in SIO mode.
	Q1, Q2, Q3, Q4 LED indicator (Orange)	Indicates the status of input / output in SIO mode ON: The input/output is working in SIO mode. OFF: The communication port is disabled or in IO-Link mode.
	E1, E2, E3, E4 LED indicator (red)	Indicates if any warning or error occurs in each communication port of the IO-Link connection. Blinking: A warning or an error occurs OFF: No warnings or errors
3	Removable terminal block	IO-Link

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Number	Name	Description
4	Arrangement of the input/output terminals	Arrangement of the terminals
5	Terminal block clip	Removal of the terminal block
6	DIN rail clip	Secures the module onto the DIN rail
7	Module connecting set	Connects the modules
8	Label	Nameplate

13.2.3 Wiring

13.2.3.1 IO-Link Mode Wiring for Power and Communication

Precautions:

1. Keep the input cables, output cables and power cable separate from one another. It is suggested to use independent power for AS04SIL-A. See the example below.



- 2. The 24 VDC cable should be twisted and connected to a module within a short distance.
- 3. Do not bundle 110 VAC cable, 220 VAC cable, 24 VDC cable, the (high-voltage high-current) main circuit, and the I/O signal cable together and keep the power cables away from the earth cable. It is suggested that the distance between adjacent cables should be more than 100 millimeters.
- 4. Connect a cable with a diameter of 14 AWG or higher to ground.
- 5. Use single-wire cables or two-wire cables with a diameter of 20 AWG to 14 AWG. Only use copper conducting wires with a temperature rating of 60/75°C.

13.2.3.2 Digital Input Wiring in SIO Mode



13.2.3.3 Digital Output Wiring in SIO Mode



Note: n= 1~4

13.2.3.4 Digital Input Wiring



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13.3 Functions

AS04SIL-A supports the IO-Link devices when it works as the IO-Link master. Between the master and the devices is the point-to-point connection adopting the reliable 3-wire technology and the unshielded standard cable to connect intelligent sensors/actuators which function as IO-Link devices. AS04SIL-A is compatible with traditional digital sensors/actuators. The designs for circuit status and data channels are both based on the reliable 24VDC technology.

13.3.1 Basic Functions

13.3.1.1 Cyclic Communication Function

I/O data (process data) in the IO/Link devices is cyclically exchanged with the IO-Link master module which operates as the IO-Link communication master. Meanwhile as the extension module of the upper device, AS04SIL-A can cyclically update the device data and status of the IO-Link master to the upper device.

For example, users can use cyclic communications to check the amount of incident light for photoelectric sensors, stability detection margins, and excessive proximity for proximity sensors, etc. as well as detect the amount of performance deterioration in devices and changes in usage conditions.

There are three modes for cyclic communications:

- (1) Asynchronous: AS04SIL-A and IO-Link device defines the cycle time for each port and uses the shortest update cycle time.
- (2) Fixed Value: the system uses what you have set for the update cycle time here. The value here should be within the cycle time range of the connected device and the minimum value should be a number bigger than the shortest cycle time that the connected device supports.
- (3) Synchronization: AS04SIL-A defines the update cycle time for all the selected communication ports synchronously. (You need to select at least two ports.) Since different device supports different update cycle time, the system uses the biggest time among all the shortest cycle times to have every device covered.

Edit Area									×
							IO-Link	Hardware Configura	ation
- AS04SIL-A	Ports P	Process Data							
[Port 1] : IO-Link + AI built-in amplifier type 🖉 Scan All Device 🎯 Replace Device									1
[Port 2] : IO-Link · E3S-DCP21-IL3	Port ID	Operating Mode	Device Name	DI/DO Type	Port Cycle	Inspection Level	DS Activation State	Cycle Time (µs)	
[Port 3] : IO-Link · MAXIM RL78 02	1	IO-Link 🔹	AI built-in amplifier type	PNP 👻	Fixed Value	 Type Compatible 	Disable -	3200	
[Port 4] : IO-Link + MAXIM_RL78_03	2	IO-Link 👻	E3S-DCP21-IL3	PNP 👻	Asynchronous Fixed Value	Type Compatible 🔻	Disable 👻	1500	_
[POIC 4] : 10-LITK / MAXIM_KE/6_05	3	IO-Link -	MAXIM_RL78_02	PNP +	Synchronization	Type Compatible 🔻	Disable 👻	2000	-
	4	IO-Link 👻	MAXIM_RL78_03	PNP -	Fixed Value	- Type Compatible -	Disable 🔻	1000	-

13.3.1.2 Message Communication Funciton

AS04SIL-A receives messages (non-cyclic) from PLC or ISPSoft, sends the data to IO-Link devices and sends back the response from IO-Link devices to AS04SIL-A. Non-cyclic data, including device parameters and events, uses specific index and sub-index for searching and data mapping. AS04SIL-A uses explicit message to read and write these data. It is very useful to use index or sub-index in reading and writing data.

For example, during operation you can use fuction blocks to change and adjust device parameters, such as threshold settings, execution tuning, and ON-delay time from a program as well as check the internal status, such as the operating time of devices. Refer to section 13.3.2.5 for more information.

You can select the data or parameter type, select one or all parameters to read or to write. See the setting image shown below for reference.

								IO-Link	Hardware Configu
S04SIL-A	Para	meter	Process Data						
[Port 1] : IO-Link · AI built-in amplifier type	👻 F	Read Se	lected 🗈 Read All	Write Select Write All					
[Port 2] : IO-Link · E3S-DCP21-IL3			Name	Value		Unit	Default	Minimum	Maximum
[Port 3] : IO-Link , MAXIM_RL78_02		F	Reset Request	(Unknown)	-				
[Port 4] : IO-Link · MAXIM_RL78_03		E	External Calibration Input	(Unknown)					
	- F	Parame	ter Menu						
		- Start configuration							
	-	I	anguage	English (0)	-		English (0)		
	8	6	Current limit	Off (0)	*		Off (0)		
		1	/O select for AI-1000C or	OUT1+INPUT (0)	*		OUT1+INPUT (0)		
		Bank	:0						
		- (Output setting value						
			Output1 setting value	500			500	0	999
			Output2 setting value	500			500	0	999
			Trigger setting value						
			Trigger setting value	200			200	0	999

13.3.1.3 Communication Mode Setting

You can select one operating mode among the modes of **Inactive**, **SIO** (**Digital Output**, **Digital Input**) and **IO-Link** for each communication port on the following software page.

Area											IO-Li	ink	Hardware Configura
AS04SIL-A		Ports F	Process Data										
[Port 1] : IO-Link + AI built-in amplifier type		🔎 Scan A	All Device 🔂 Re	place	e Device 😑 Remove Device								
[Port 2] : IO-Link : E3S-DCP21-IL3		Port ID	Operating Mo	de	Device Name	DI/DO Type		Port Cycle		Inspection Level	DS Activation St	ate	Cycle Time (µs)
[Port 3] : IO-Link · MAXIM_RL78_02	8	1	IO-Link	•	AI buit-in amplifier type	PNP	Ŧ	Fixed Value	-	Type Compatible 🔻	Disable	Ŧ	3200
[Port 4] : IO-Link + MAXIM RL78 03	-1	2	Inactive Digital Output		E3S-DCP21-IL3	PNP	-	Fixed Value	-	Type Compatible 🔻	Disable	-	1500
[Fore 4] : 10-tille - MARTINE AC 0_00	_	3	Digital Input IO-Link	_	MAXIM_RL78_02	PNP	Ŧ	Fixed Value	-	Type Compatible 🔻	Disable	-	2000
		4	IO-Link IO-Link	Ŧ	MAXIM_RL78_03	PNP	-	Fixed Value	+	Type Compatible 👻	Disable	-	1000

A mixture of IO-Link communication and digital I/O can apply to the same AS04SIL-A module.

13.3.1.4 Digital Input and Digital Output Function (SIO)

CQ1-CQ4 of AS04SIL-A can be used independently as the standard input or output. The DI/DO types of PNP and NPN are supported and can be set up separately on the IO-Link page.

dit Area	Area X)
										IO-Link	Hardware Configurat	tion
AS04SIL-A	Ports P	rocess Data										
[Port 1] : IO-Link · AI built-in amplifier type	🔎 Scan A	ll Device 🔂 Re	place	Device 🤤 Remove Device								i
[Port 2] : IO-Link + E3S-DCP21-IL3	Port ID	Operating Mod	le	Device Name	DI/DO Type		Port Cycle		Inspection Level	DS Activation State	Cycle Time (µs)	
[Port 3] : IO-Link , MAXIM RL78 02	1	IO-Link	-	AI buit-in amplifier type	PNP	-	Fixed Value	-	Type Compatible 🔻	Disable -	3200	
[Port 4] : IO-Link · MAXIM RL78 03	2	IO-Link	•		PNP NPN	ľ	Fixed Value	•	Type Compatible 🔻	Disable 👻	1500	
For 11.10 Env Photo_05	3	IO-Link	*	MAXIM_RL78_02	PNP	Ŧ	Fixed Value	*	Type Compatible 👻	Disable 👻	2000	1
	4	IO-Link	*	MAXIM_RL78_03	PNP	Ŧ	Fixed Value	*	Type Compatible 🔻	Disable 👻	1000	

13.3.1.5 Automatic IO-Link Baud Rate Setting

AS04SIL-A can automatically match one of existing baud rates (4.8kbps, 38.4kbps and 230.4kbps) of IO-Link devices and communicate with them. Thus there is no need to set the baud rate at communication ports for connected devices.

13.3.1.6 Connected Device Verification

As long as the **Type Compatible** option under **Inspection Level** is enabled and the setting is downloaded, AS04SIL-A will check if the IO-Link device actually connected matches the product model of the configured device. If not matched, the status code of the communication port will show 16#8CA2 which indicates that the connected device is inconsistent with the configured one.

x X											
							IO-Link	Hardware Configurat	tion		
- AS04SIL-A	Ports P	rocess Data									
[Port 1] : IO-Link · AI built-in amplifier type 🖉 Scan All Device 🌚 Replace Device 🥃 Remove Device											
[Port 2] : IO-Link · E3S-DCP21-IL3	Port ID	Operating Mode	Device Name	DI/DO Type	Port Cycle	Inspection Level	DS Activation State	Cycle Time (µs)			
[Port 3] : IO-Link · MAXIM RL78 02	1	IO-Link 🔫	AI built-in amplifier type	PNP 🔻	Fixed Value	 Type Compatible 	Disable -	3200			
[Port 4] : IO-Link + MAXIM_RC78_03	2	IO-Link 👻	E3S-DCP21-IL3	PNP 👻	Fixed Value	No Check Type Compatible	Disable 👻	1500			
[FOIL 4] . IO-LINK / MAXIM_NE/C/0_05	3	IO-Link 👻	MAXIM_RL78_02	PNP -	Fixed Value	 Type Compatible 	Disable 👻	2000			
	4	IO-Link -	MAXIM_RL78_03	PNP 👻	Fixed Value	- Type Compatible -	Disable -	1000			

13.3.1.7 DI (Digital Input) Function of IO-Link Pin2

The IO-Link system may not respond fast enough for high-speed applications. When the connected IO-Link sensor supports the second output, connect the sensor's pin2 to DI of the port of AS04SIL-A. At this moment, the sensor can still be watched and set up via the sensor's pin4.

The real-time data can be monitored through **Port 1- 4 Pin2 value** of **Normal Exchange Area**. See the following figure as an example.

eral Data Exchange							
AS04SIL-A	De	vice Information	Normal Exchange Area				
			Description		Address	Tag Name	Comment
		Error code		D29020			
		Reserved		D29021			
	2	Port1 - 2 Devi	ce Status	D29022 - D29024 D29025 - D29027			
		Port3 - 4 Devi	ce Status				
		Port1 - 4 (10-	Link Process Data) Input Invald Flag	D29028			
		Port1 - 4 Pin2	value	D29029			

The mapped register for **Port 1- 4 Pin2 value** of **Normal Exchange Area** is D29029. For the pin2 input value, the addresses D29029.0~ D29029.3 correspond to port 1~ port 4 respectively.

Communication Port	Address
Port 1	D29029.0
Port 2	D29029.1
Port 3	D29029.2
Port 4	D29029.3

DI1-DI4 of AS04SIL-A can also be used separately as standard inputs.

13.3.1.8 IO-Link Communications Error Detection

This function detects I/O-Link cable breaks, disconnections from IO-Link device ports, error-level device events, device configuration verification errors, and IO-Link device malfunctions. See section 13.5 for IO-Link event codes.

13.3.1.9 Detection of Short-Circuits in I/O Cables

This function detects short-circuits in I/O cables. The status code for communication ports will show 16#8CA4 if an error occurs.

13.3.1.10 Event Log

The IO-Link event codes listed in section 13.5 are refreshed in the mapped devices for ports in the **Normal Exchange Area** section as below.

AS04SIL-A	Dev	ice Information	Normal Exchange Area				
		Description			Address	Tag Name	Comment
		Error code		D29020			
		Reserved		D29021			
		Port1 - 2 Devi	e Status	D29022 - D29024			
		Port3 - 4 Devi	te Status	D29025 - D29027			
		Port1 - 4 (10-	ink Process Data) Input Invald Flag	D29028			
		Port1 - 4 Pm2	value	D29029			

The device status for each port should be set to 3 bytes in length. See the following table of above device addresses corresponding to ports in order.

Description	Address
Port 1	D29022_H, D29022_L, D29023_H
Port 2	D29023_L, D29024_H, D29024_L
Port 3	D29025_H, D29025_L, D29026_H
Port 4	D29026_L, D29027_H, D29027_L

Device status consists of Event qualifier and Event Code as follows.

For event codes, see section 13.5.

Event Qualifier	Event	Code		
Byte 0	Byte 1	Byte 2		

The data frame of Event Qualifier:

МС	DDE	TY	PE	SOURCE		INSTANCE	
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

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Bit 0~ Bit 2: INSTANCE

Value	Definition
0	Unknown
1-3	Reserved
4	Application
5-7	Reserved

Bit 3: SOURCE

Value	Definition
0	Device (Remote)
1	Master (Local)

Bit 4~ Bit 5: TYPE

Value	Definition
0	Reserved
1	Notification
2	Warning
3	Error

Bit 6~ Bit 7: MODE

Value	Definition
0	Reserved
1	Event single shot
2	Event disappears
3	Event appears

13.3.1.11 Notification of Input Data Invalidity

Input Invalid Flag is used to determine whether the process input data in the upper device is invalid for the IO-Link communication or not.

Whether the input data is invalid or not can be monitored by **Port1 – 4(IO-Link Process Data) Input Invalid Flag** of the **Normal Exchange Area** section. If the flag is 1, then the input data is invalid. If it is 0, the input data is valid. See the example in the following figure.

The mapped register for **Port1 – 4(IO-Link Process Data) Input Invalid Flag** is D29028 and for the input invalid flag, D29028.0~ D29028.3 correspond to Port 1~Port 4 respectively as shown in the following table.

Communication Port	Address
Port 1	D29028.0
Port 2	D29028.1
Port 3	D29028.2
Port 4	D29028.3

kral Data Exchange							
S04SIL-A	De	vice Information	Normal Exchange Area				
			Description		Address	Tag Name	Comment
		Error code		D29020			
		Reserved		D29021			
	2	Port1 - 2 Devi	ce Status	D29022 - D29024			
		Port3 - 4 Devi	ce Status	D29025 - D29027			
		Port1 - 4 (IO-	Link Process Data) Input Invald P	bg D29028			
	-	Port1 - 4 Pm2	value	D29029			

13.3.1.12 IO-Link Device Scan Function

HWCONFIG 4.0 can enable AS04SIL-A to auto-identify all IO-Link devices at its communication ports via a click on **Scan** button.

🖀 Untitled2 - HW	/CONFI	G			
Common File	Edit	View	Communication	Tool	Help
Upload Download	р Scan	On-line Mode			

You can also select any AS04SIL-A module and then click **Scan All Device** to scan all the IO-Link devices connected to the communication port of AS04SIL-A.

Reset Configuration Show Informati	on () Input/Output Device Ream	ange 🦪 Set All Tag 🏓	Clear All Tag					De F	letize 🛃 💐 100%
emarks:			CONTRACT.						
A.P.	and and and and and				1	CPU Group			
ISTERN	Bay Bay Bay Bay					Module	Module Name	Input Device Range	Output Device Rang
		Module Total Width: 180m	m			3	AS04SIL-A	D28040 - D28059	
CPU Group		Module Current Consumpl					Data Exchange	D26800 - D26899	D26900 - D26999
<u>a 8 4 4</u>		Module Current Consumpt	tion (External): 0mA			4	AS04SIL-A	D28060 - D28079	
And the second se					-		Data Exchange	D27200 - D27299	D27300 - D27399
							baca Exchange	10-Link	
	Ports Proce	ess Data					Data Exchange		
dit Area		ss Data vice 🌍 Add Device 🥥	Francisk Denne				Data Exchange		
dit Area - ASO4SIL-A		Operating Mode	Remote Device Device Name	DI/DO Type	Port Cycle		Inspection Level	DS Activation State	
dit Area - ASO4SIL-A [Port 1] Inactive	P Scan All De	wice 🔘 Add Device 🥥		01/DO Type	Port Cycle			10-Link	. Hardware Configura
dt Area - ASOISIL-A [Port 1] Inactive (Port 2] Inactive (Port 3] Inactive	P Scan All De	Operating Mode		DI/DO Type	Port Cycle			DS Activation State	. Hardware Configura
dt Area - ASOISIL-A [Port 1] : Inactive (Port 2] : Inactive	Port ID	Operating Mode		-	Port Cycle	-		DS Activation State Disable	. Hardware Configura

While SIL is auto-identifying devices, all IO-Link devices connected to IO-Link master need be restarted and therefore the devices will probably stop running for a short time.

13.3.2 Application Functions

13.3.2.1 Load Rejection for Upper Device Stop or Communication Error

When the upper device enters STOP state or the communication with the upper device fails in IO-Link or SIO mode, the output function of AS04SIL-A is disabled and all process data outputs are 0. This function is used to prevent the incorrect output from the upper device as a communications error occurs.

13.3.2.2 The Switch among Process Data Parameter Sets

IODD file allows IO-Link devices support several work modes, each of which corresponds to different Process Data parameter sets. Therefore SIL supports the switch among Process Data parameter sets if the IODD file of the configured device supports more than two work modes. However, the Process Data parameter set can not be changed if the IODD file of the configured device supports only one work mode.

For example, the IO-Link device configured for Port 1 supports four work modes in the following figure. The default work mode is Segment mode (0).

AS04SIL-A	Parameter Process Data				
[Port 1] : 10-Link · BN10086	Port ID In	put Address Input Leng	th Output Address	Output Length	Process Data ID
[Port 2] : 10-Link - E35-0CP21-IL3	1		D26100 - D26105	6 WORD	Segment mode (0)
[Port 3] : 10-Link + MAXIM_RL78_02 [Port 4] : 10-Link + MAXIM_RL78_03	Process Data				Segment mode (0) Level mode (1) Runlight mode (2) Flexible mode (3)
Los d'une construction	Name	Address	Data Type	Tag	Name Comment
	Sync Start	D26100.0	Boolean		
	Sync Impulse	D26100.1	Boolean		
	Buzzer State	D26100.2	Boolean		
	Segment 3 blinks	D26100.3	Boolean		
	Segment 1 blinks	D26100.4	Boolean		
	Segment 2 blinks	D26100.5	Boolean		
	Reserved	D26101.0 - D26101.3	Unsigned Integer		
	Color of segment 3	D26102.0 - D26102.2	Unsigned Integer		
	Reserved	D26103.0 - D26103.3	Unsigned Integer		
	Color of segment 1	D26104.0 - D26104.2	Unsigned Integer		
	Color of segment 2	D26105.0 - D26105.2	Unsigned Integer		

When Level mode (1) is switched to, a **Confirm** dialog box will appear to alert that the Process Data content will be changed.

AS04SIL-A	Parameter Process Data				
[Port 1] : IO-Link + BNI0086	Port ID I	nput Address Input Leng	th Output Address	Output Length	Process Data ID
[Port 2] : 10-Link · E3S-DCP21-IL3	1		D26100 - D26105	6 WORD	Level mode (1)
[Port 3] : IO-Link + MAXIM_RL78_02	Process Data				
[Port 4] IO-Link MAXIM_RL78_03	Input Output				
	Name	Address	Data Type	Tag Name	Comment
	Sync Start	D26100.0 Confirm		x	
	Sync Impulse	D26100.1			
	Buzzer State	D26100.2 Process Da	ta content will be changed. Do you want to	continue?	
	Segment 3 blinks	D26100.3	Yes No		
	Segment 1 blinks	026100.4			
	Segment 2 blinks	D26100.5	Boolean		
	Reserved	D26101.0 - D26101.3	Unsigned Integer		
	Color of segment 3	D26102.0 - D26102.2	Unsigned Integer		
	Reserved	D26103.0 - D26103.3	Unsigned Integer		
	Color of segment 1	D26104.0 - D26104.2	Unsigned Integer		
	Color of segment 2	D26105.0 - D26105.2	Unsigned Integer		

AS04SIL-A	Parameter Process Data				
[Port 1] : IO-Link · BNI0086	Port ID	Input Address Input Leng	th Output Address	Output Length	Process Data ID
[Port 2] : 10-Link : E3S-DCP21-1L3	1		D26100 - D26105	6 WORD	Level mode (1)
[Port 3] : 10-Link + MAXIM_RL78_02	Process Data				
[Port 4] : 10-Link · MAXIM_RL78_03	Input Output				
from al . to run . human "urs o "on	adart Anthone				
front of the same in standing of on	Namé	Address	Data Type	Tag Name	Comment
for d'inclusion and an of a	and the particular second	Address D26100.0	Data Type Boolean	Tag Name	Comment
four d'i Yorang, soong as of on	Namé			Tag Name	Comment
for 1, ware seen for for	Name Sync Start	D26100.0	Boolean	Tag Name	Comment
found to rear more free of the	Name Sync Start Sync Impulse	D26100.0 D26100.1	Boolean Boolean	Tag Name	Comment

Clicking Yes button, the Process Data content will be refreshed in the software.

Click menu Communication > Download. The switch is completed once the download is done.

13.3.2.3 Backup and Restoration of Parameter Setup in IO-Link Devices

The V1.1 IO-Link devices support the Backup and Restore functions which are not necessary functions and are determined by their IODD files.

IO-Link device parameter settings are backed up to the IO-Link master or restored to IO-Link devices. When IO-Link devices are replaced, the communication can be resumed according to original settings instead of setting parameters once again. See the setting page below.

Edit Area										×			
								IO-Link	Hardware Configurat	tion			
AS04SIL-A Ports Process Data													
[Port 1] : IO-Link - AI built-in amplifier type	🔎 Scan Al	ll Device 💮 Replace	e Device 🛛 😑 Remove Device							1			
[Port 2] : IO-Link · E3S-DCP21-IL3	Port ID	Operating Mode	Device Name	DI/DO Type	Port Cycle		Inspection Level	DS Activation State	Cycle Time (µs)				
[Port 3] : IO-Link , MAXIM_RL78_02	1	IO-Link -	AI built-in amplifier type	PNP -	Fixed Value	-	Type Compatible 🔻	Disable -	3200				
[Port 4] : IO-Link · MAXIM RL78 03	2	IO-Link 👻	E3S-DCP21-IL3	PNP 👻	Fixed Value	-	Type Compatible 🔻	Disable 🔻	1500				
[POIL 4] . 10-LINK / MAXIM_RE/6_03	3	IO-Link 🔻	MAXIM_RL78_02	PNP 👻	Fixed Value	-	Type Compatible 🔻	Disable Backup / Restore	2000	-			
	4	IO-Link 👻	MAXIM_RL78_03	PNP -	Fixed Value	*	Type Compatible 👻	Restore	1000	-			

Option	Description
Disable	The backup function is disabled and the backed up process data is cleared.
Backup/Restore	The backup file is empty if no data exists. It is allowed to back up the parameters read from the connected device to the master and write the parameters to the connected device.
Restore	To write parameters to the connected device is allowed.

13.3.2.4 Digital Input Filter

You can use any DI or any CQ of the operation mode SIO (DI) as the standard input and use the input filter function to filter out noises. The filtering time of each channel can be set between 0 ~ 65 ms. 0 indicates no filtering. The setting page is as shown below.

idit Area						
						ID-Link Hardware Configuration
General						
- AS0458A	input Rer timer setting					
input filter timer setting	Name	Setting Value	Unit	Default	Minimum	Haximum
	Port 1 nput filter timer setting	0.	-	9	0	65
	Port 2 input filter timer setting	0	178	0	0	65
	Port 3 input filter timer setting	0	(m)	0	0	65
	Port 4 input filter timer setting.	0	ins.	0	0	-65

13.3.2.5 Application-specific API for Communications of IO-Link Devices

Once you complete the configurations for IO-Link devices via HWCONFIG. You can use ISPSoft as well as specific API to read/write data from IO-Link devices to AS04SIL-A. Refer to the device manual or the IODD file for the index number, data type, data size of the parameters. And refer to AS Series Programming Manual for the detailed operation of API 14 instructions.

13.4 Application Examples

13.4.1 Using AS Series CPU as Upper Device

The AS04SIL-A module can be connected on the right side of AS series CPU or AS00SCM-A (RTU mode). If AS04SIL-A is placed on the right of AS00SCM-A (RTU mode), the AS-FCOPM communication card need be added to AS00SCM-A. AS04SIL-A supports three remote communication modes and communicates with the upper device via CAN port. When the upper device is an AS series CPU, the application situation is as illustrated in the following figure.



An AS04SIL-A module can connect with 4 IO-Link devices at most. If the hybrid use of the IO-Link devices and multiple traditional sensors (binary sensors) is needed, there are two connection methods based on the number of traditional sensors on site.

- 1. If there is only a small number of traditional sensors to be connected, each of AS04SIL-A module's ports can connect with one traditional sensor by using the DI function of Pin2 for each port.
- 2. If there are many traditional sensors to be connected, use the IO-Link hub from other brand to extend the connectable digital I/O devices.

Work mode	Description
AS Special Remote Mode	The AS04SIL-A module is a NIO module. The number of configurable modules is limited to AS series CPU including remote modules. 4 NIO modules can be configured at most.
Delta Special Driver & AS Remote Mode	All SIL modules and IO-Link devices can be configured in HWCONFIG 4.0. and can be monitored online by the software.
CANopen DS301 Mode	Here AS CPU is a CANopen master and AS00SCM-A is a CANopen slave. Up to 4 SIL modules can be configured on the right side of the slave AS00SCM-A (RTU). As many as 64 slaves can be connected to the AS CPU. CANopen Builder does not support the configuration of extension modules on the right side of AS00SCM-A and connected IO-Link devices. First make the connection in AS special remote mode, complete the configuration of all extension modules and IO-Link devices in HWCONFIG 4.0 and then switch the mode back to CANopen DS301 mode. Open CANopen Builder and configure PDO mapping according to the EDS file of AS00SCM-A with V2.06 or later. For details on operation, see section 13.4.5.

There are three communication modes for AS00SCM-A plus AS-FCOPM.

13.4.2 Using AH Series CPU or Non-Delta Master PLC as Upper Device

As CANopen master, AH series CPU need be used together with AH10COPM-5A module to communicate with the CANopen slave AS00SCM-A. See the application situation as illustrated in the following figure.



According to the description on CANopen DS301 Mode in section 13.4.1, connect the AS00SCM-A module to AS CPU in AS special remote mode, configure all extension modules and IO-Link devices in HWCONFIG 4.0 and then switch the mode back to the CANopen DS301 mode.

If the upper device is an AH series CPU, the CANopen Builder software can be opened. Configure the PDO mapping list according to the EDS file of the AS00SCM-A module. See the details in section 13.4.5.

If the upper device is a master PLC from other brand, use the software from the brand to configure the CANopen slaves and PDO mapping.

13.4.3 Application of AS Special Remote Mode

See the following table of devices used in the application example:

Model name	Device type
AS332T-A	PLC
AS00SCM-A	RTU
AS04SIL-A	IO-Link Master
AI-B100	3 rd IO-Link Device
E3S-DCP21-IL3	3 rd IO-Link Device
MAXREFDES27#	3 rd IO-Link Device
MAXREFDES36#	3 rd IO-Link Device

First of all, open the HWCONFIG 4.0 software and import the IODD files of IO-Link devices which can be downloaded from vendors' official websites. Follow the steps here to import the IODD files through the **Device Description File Manager** tool.





😝 Device Description File Manager			-		x
Select Description File Type Please choose the description file type that you are going to import.					
Choose type of the description file:					
● IODD File (IO Device Description)					
Back to Menu	< Back	Next >		Cance	

Put all IODD files in the same folder so as to import multiple IODD files at a time.

> 🛃 Quick access	Name	Date modified
	Maxim-logo.png	3/26/2019 10:22 A
> 🤰 This PC	Maxim-Saratoga-20140318-IODD1.0.1.xml	3/26/2019 10:22 A
> 🥩 Network	Maxim-Saratoga-20140318-IODD1.1.xml	3/13/2018 10:11 A
	_Maxim-Saratoga-icon.png	3/13/2018 10:47 A
	🧾Maxim-Saratoga-pic.png	3/13/2018 10:47 A
Device Description File Man	ager	×
We'll import the image that has Install IODD files	s same name with the IODD file in the same folder.	
• Install all IODD files from d	lirectory	
C:\Users\larry.chung\Des	ktop\IODD Browse	•
Back to Menu	< Back	Next > Cancel

		Description File Ma								×
istal			ou can also change ti	ne image that will use	in the s	oftware here. The fi	e with err	or will not		
	Select	All Devices				E	nter text	to search		p
In	stall	Device Name	File Name	Vendor Name	Versi	Device Series	Status	Mes	ssage	٦
+	\checkmark	AI	KEYENCE-AI-201	Keyence	V11	AI Family	0			
+	✓	Maxim San Franci	Maxim-SanFrancis	Maxim Integrated	V10	IO-Link Sample D	0			
+	\checkmark	Maxim San Franci	Maxim-SanFrancis	Maxim Integrated	V11	IO-Link Sample D	0			
+	\checkmark	Maxim Saratoga	Maxim-Saratoga-2	Maxim Integrated	V10	IO-Link Sample D	0			
+	\checkmark	Maxim San Franci	Maxim-Saratoga-2	Maxim Integrated	V11	IO-Link Sample D	0			
+	\checkmark	E3S-DCP21-IL3	OMRON-E3S-DCP	OMRON Corporati	V11	Photoelectric Sen	0			
icł	k to M	enu				< Back	Next	>	Cance	1
De	evice	Description File M	anager							
			Task Con	nplete						
			You have succes	sfully completed the	task.					
			You have succes	sfully completed the	task.					
			You have succes	sfully completed the t	task.					
			You have succes	sfully completed the t	task.					
			You have succes	sfully completed the t	task.					
			You have succes	sfully completed the t	task.					
			You have succes	sfully completed the t	task.					
			You have succes	sfully completed the t	task.					
			You have succes	sfully completed the t	task.					
				sfully completed the t		Finish.				

Check the following setups before the AS00SCM-A module is powered on.

- 1. The AS-FCOPM card is inserted to AS00SCM-A via Card 2. (The 120Ω terminal resistor is enabled.)
- 2. Use Delta standard cables to connect to AS CPU and the mode switch is turned to RTU mode.
- 3. Four switches are set to ID1: 0/ FORMAT1: 0/ ID2: 1/ FORMAT2: 7 and the status is set to AS Remote Communication, node ID 1 and baud rate 1Mbps.
- 4. AS04SIL-A is connected on the right side of AS00SCM (RTU). Ensure that IO-Link devices are connected to the four ports according to the wiring in section 13.2.3.

Switch the power on after the AS-FCOPM card is inserted to AS332T-A via Card 2. (The 120Ω terminal resistor is enabled.) Open the HWCONFIG 4.0 software, set up function card 2 for AS CPU and then download the settings as follows.

idit Area			
General Data Exchange			
- AS332T-A	Funct	ion Card 2 Setting	
+ System settings		Name	Value
COM1 Port Setting		Parity bit	Even
COM2 Port Setting		Stop bit	1
Ethernet Port Basic Setting		MODBUS mode	ASCII
+ Ethernet Port Advanced Setting		Delay time to Reply	0
Function Card 1 Setting		Received Data Timeout	200
+ Function Card 2 Setting		F2AD Analog Input mode	0~10V
		F2DA Analog Output mode	0~10V
		F2AD Sampling Time	3
		F2AD Average Times	10
		AS-FCOPM Working mode	AS Remote Comminucation
		AS-FCOPM node ID	1
	I	AS Remote module No.	1
		Select Run mode after detect remote module	Run connected remote module
		AS CPU module keep or Stop when slave node	Only Show Error Message
		Remote and CANopen communication time out	100
		Re-connected Retry number after time out	60
		Auto Retry connection after Disconnected	60
		AS-FCOPM Bit Rate	1000k
		Communication data sampling position	Auto
		DS301 PDO Data Exchanged	Start after power-on
		CAN Hardware error counter	Enable



PLC_0	Communication	Setting		HWCONFIG General	HWCONFIG Data Exchange	IO-Link	
(AS332T-A)	Driver:	AS USB		HWCONFIG			
	Station Address:				Item		Result
				Hardware Configu	uration Settings		
		Task		COM 1			
	- 🗹 Hardware Co			✓ COM 2			
	✓ HWCONFI		II-				
		G Data Exchange		Ethernet-Basic			
	✓ IO-Link			Ethernet-Adavan	ce		
				Function Card			
			-	Information			
	- Task Result Total Quantity: Success Quantity:	0					
	Fail Quantity:	0					
ownload	Fail Quantity:	0				Download	OK Canc
ownload	Communication	Setting		HWCONFIG General	HWCONFIG Data Exchange	Download IO-Link	OK Canc
	Communication	SettingAS USB	-	HWCONFIG			
PLC 0	Communication	SettingAS USB		- HWCONFIG	Item		Result
PLC 0	Communication	setting AS USB 0	• •	HWCONFIG	Item		Result
PLC 0	Communication	Setting AS USB 0 Task	•	HWCONFIG	Item		Result O
PLC 0	Communication Driver: Station Address:	Setting AS USB 0 Task figration	•	HWCONFIG	Item		Result
PLC 0	Communication Driver: Station Address: E Hardware Co HWCONFI	Setting AS USB 0 Task rfigration G General	• •	HWCONFIG	Item		Result O
PLC 0	Communication Driver: Station Address: Urity Hardware Co Urity HWCONFI HWCONFI HWCONFI	Setting AS USB 0 Task figration	* *	HWCONFIG V Hardware Configu COM 1 V COM 2 COM 2 Ethernet-Basic	Item uration Settings		Result O O O
PLC 0	Communication Driver: Station Address: E Hardware Co HWCONFI	Setting AS USB 0 Task rfigration G General		HWCONFIG Hardware Configu COM 1 COM 2 Ethernet-Basic Ethernet-Adavan	Item uration Settings		Result C
PLC 0	Communication Driver: Station Address: Urity Hardware Co Urity HWCONFI HWCONFI HWCONFI	Setting AS USB 0 Task nfgration G General G Data Exchange	* *	HWCONFIG V Hardware Configu COM 1 V COM 2 COM 2 Ethernet-Basic	Item uration Settings		Result O O O O

Ensure that the CANopen cables are connected properly and the AS00SCM-A module is already powered on. Check if the Card2 LED indicator of AS00SCM-A keeps blinking after the configuration of AS332T-A is downloaded so as to make sure the communication works normally.

Click Scan button.

🖀 Untitled2 - HV	VCONFI	G			
Common File	Edit	View	Communication	Tool	Help
Upload Download	р Scan	On-line Mode			

P Scan									×
PLC_0	- 👻 Communicatio	n Setting		Scan					
(AS332T-A)	Driver:	AS USB	Ŧ	HWC	ONFIG				
	Station Address:	0	-		Item			Result	
				Scan					
		Task							
	- 🗹 Hardware Co	onfigration							
	Scan								
				_ Infor	mation				
	– Task Result –								
	Total Quantity:								
	Success Quantity								
	Fail Quantity:	0							-
							Scan	ОК	Cancel
Proces	ssina								
Hardw	Joing								
	Step			P	rogress		Resul	t	
Sca									
Sc	an								
Confirm									x
comm									^
7 The s	software will so	an current mod	ule configu	uration	s, do you want to sca	an the pa	rameters on	the module(s) as	well?
The	current parame	eter will be over	written.						
		[Vac		No Cance				
			Yes		No Cance	9			
								Abort	
Result								ADDIC	

Once any AS04SIL-A module is detected through the software scan, the software will ask whether to scan the connected IO-Link device.

- V Hardw	Processing]
✓ Sca	Step	Progress	Result	
	Scan			
		•		
Confirm				×
If y	e IO-Link device scan will be executed. ou click [Yes], IO-Link devices scanning ou click [No], the IO-Link device will no	will be performed.	unning status of IO-Link. Do you want t	o continue?
– Task Result			Abort	

Perform the scan of IO-Link devices. If some configured devices are in communication during the scan, they will fail to be used temporarily. Restart the devices after the scan is over and restore the original work mode.

Processing					
	Step		Progress		Result
Scan					
P Scan	✓ Communication Setting		Scan		Abort ,
(AS332T-A)	Driver: AS USB	-	HWCONFIG		Darault
	Station Address: 0		Item Scan		Result
	Task Result Task Result Total Quantity: I Guantity: I		- Information		
				S	ican OK Cancel

Click the IO-Link module and then select the **IO-Link** page where each device model and related information are can be seen and the parameters to be set up are all default values.

If no matched IODD file can be found out for the scanned device, **Unknown Device** will be shown in the device name field. Users need download the IODD file of the device from the coporate website of the device product according to the scanned device details such as Vendor Name, Vendor ID, Device ID and Device Name and then import the file into the HWCONFIG software.

13

Reset Configuration 📲 Show Information 🐵 Input	Output Device Re	arrange							Pa Recit	ce 🔍 🔍 100%
arks:	/output Device Re	rairange							13 Nosis	ie og og 100%
						-	Group_1			
1555TA							Module	Module Name	Input Device Range	e Output Device Rar
	Iodule Total Width	h: 80mm					Remote	AS00SCM-A	D29000 - D29009	··· D29010 - D29019
CPU Group 🕂 🖪 🕂 🖷 🕅		onsumption (Internal)						AS-FCOPM		
	Iodule Current Co	onsumption (External)	: 0mA				1	AS04SIL-A	D29020 - D29039	
								Data Exchange	D26000 - D26099	D26100 - D26199
Group_1	Module	e Current Consumpti e Current Consumpti		_		÷			10-Link	Hardware Configuratio
Area AS04511-A	e Module	e Current Consumpti	on (External): 0mA	_		*			IO-Link	Hardware Configurati
Area ASD45IL-A [Port 1] : IO-Link - AI built-in amplifier type	Ports Pro Scan All	e Current Consumption	on (External): 0mA	D//00 Tett		+				
Area AS04511-A	Ports Pro Scan All Port ID	e Current Consumption ocess Data Device @ Replace Operating Mode	on (External): 0mA Device 💿 Remove Device Device Name	DI/OO Type		Port Cycle		Inspection Level	DS Activation State	Cycle Time (µs)
Area ASD45IL-A [Port 1] : IO-Link - AI built-in amplifier type	Ports Pro Scan All Port ID 1	e Current Consumption occess Data Device (2) Replace Operating Mode IO-Link +	on (External): 0mA Device @ Remove Device Device Name Al built-in amplifier type	PNP	7 A	xed Value	7	Type Compatible -	DS Activation State Disable -	Cycle Time (µs) 3200
Area ASD4SIL-A [Port 1] : IO-Link - AI built-in amplifier type [Port 2] : IO-Link - E3S-DCP21-JL3	Module Ports Pro Prot ID 1 2	e Gurrent Consumption ocess Data Device @ Replace Operating Mode IO-Link - IO-Link -	Device Remove Device Device Name Al buik-in amplifier type E3S-DCP21-1L3	PNP	- Fi	<mark>xed Value</mark> xed Value	-	Type Compatible -	DS Activation State Disable - Disable -	Cycle Time (µs) 3200 1500
Area ASO4SIL-A [Port 1]: IO-Link - AI built-in amplifier type [Port 2]: IO-Link - E3S-DCP21-JL3 [Port 3]: IO-Link - MAXIM_RL78_02	Module Ports Pro Scan All Port ID 1 2 3	e Current Consumption access Data Device @ Replace Operating Mode 10-Link • 10-Link •	Device Remove Device Device Name AI buit-n amplifier type E35-DCP21-1L3 MAXIM_RL78_02	PNP PNP PNP	- Fi - Fi - Fi	<mark>xed Value</mark> xed Value xed Value	+ + +	Type Compatible - Type Compatible - Type Compatible -	DS Activation State Disable - Disable - Disable -	Cycle Time (µs) 3200 1500 2000
Area ASO4SIL-A [Port 1]: IO-Link - AI built-in amplifier type [Port 2]: IO-Link - E3S-DCP21-JL3 [Port 3]: IO-Link - MAXIM_RL78_02	Module Ports Pro Prot ID 1 2	e Gurrent Consumption ocess Data Device @ Replace Operating Mode IO-Link - IO-Link -	Device Remove Device Device Name Al buik-in amplifier type E3S-DCP21-1L3	PNP	- Fi - Fi - Fi	<mark>xed Value</mark> xed Value	+ + +	Type Compatible -	DS Activation State Disable - Disable -	Cycle Time (µs) 3200 1500
Area ASO4SIL-A [Port 1]: IO-Link - AI built-in amplifier type [Port 2]: IO-Link - E3S-DCP21-JL3 [Port 3]: IO-Link - MAXIM_RL78_02	Module Ports Pro Scan All Port ID 1 2 3	e Current Consumption access Data Device @ Replace Operating Mode 10-Link • 10-Link •	Device Remove Device Device Name AI buit-n amplifier type E35-DCP21-1L3 MAXIM_RL78_02	PNP PNP PNP	- Fi - Fi - Fi	<mark>xed Value</mark> xed Value xed Value	+ + +	Type Compatible - Type Compatible - Type Compatible -	DS Activation State Disable - Disable - Disable -	3200 1500 2000
Area ASO4SIL-A [Port 1]: IO-Link - AI built-in amplifier type [Port 2]: IO-Link - E3S-DCP21-JL3 [Port 3]: IO-Link - MAXIM_RL78_02	Ports Pro Ports Pro Ports Pro Port ID 1 2 3 4 Detais	e Current Consumption acess Data Device Replace Operating Mode 10-Link • 10-Link • 10-Link •	on (External): 0mA Device Content of the environment Device Name AI built-in amplifier type E3S-0CP21-IL3 MAXIM_RL78_02 MAXIM_RL78_03	PNP PNP PNP PNP	- Fi - Fi - Fi	xed Value xed Value xed Value xed Value	+ + +	Type Compatible - Type Compatible - Type Compatible -	DS Activation State Disable - Disable - Disable - Disable -	Cycle Time (µs) 3200 1500 2000
Area ASO4SIL-A [Port 1]: IO-Link - AI built-in amplifier type [Port 2]: IO-Link - E3S-DCP21-JL3 [Port 3]: IO-Link - MAXIM_RL78_02	Ports Pro Ports Pro Port ID 1 2 3 4	e Current Consumption acess Data Device @ Replace Operating Mode IO-Link • IO-Link • IO-Link •	on (External): 0mA Device Content of the environment Device Name AI built-in amplifier type E3S-0CP21-IL3 MAXIM_RL78_02 MAXIM_RL78_03	PNP PNP PNP	- Fi - Fi - Fi	xed Value xed Value xed Value xed Value	+ + +	Type Compatible - Type Compatible - Type Compatible - Type Compatible -	DS Activation State Disable - Disable - Disable - Disable -	Cycle Time (µs) 3200 1500 2000

Under the Process Data tab, you can find the supported register addresses of each port. Since ISPSoft V3.11 supports using tags in PLC programming, it is very useful to set up the tags and its corresponding register addresses. Follow the steps 1~3 below to set up the tabs.

Step 1: Click Set All Tag

Step 2: A confirmation shows up asking you if you want to overwrite the set tags and comments. Click Yes to proceed.



Step 3: All the editable tags show up. Double-click the tags in blue to edit if you need to use a different name other than the default ones.

Note: One register address coresponds to one tag, and it shows on the first group of address.





Unver: AS USB Station Address: 0 Item Result Task Hardware Configration COM 1 HWCONFIG General COM 2 HWCONFIG Data Exchange Ethernet Basic HWCONFIG Data Exchange Ethernet Adavance	PLC_0 (AS332T-A)	Communication Setting	HWCONFIG General HWCONFIG Data Exchange IO-Link
 Andvare Configration HWCONFIG General HWCONFIG Data Exchange Ethernet-Basic Ethernet-Adavance Function Card 		Station Address: 0	Item Result Hardware Configuration Settings Item
- Task Result		 ✓ HWCONFIG General ✓ HWCONFIG Data Exchange 	Ethermet-Basic Ethermet-Adavance
Total Quantity: 0 Success Quantity: 0			- Information
		Total Quantity: 0 Success Quantity: 0	

Download	1										×
PLC_0	Communication	Setting	╢╹	HWCON	IFIG General	н	HWCONFIG Data Exchange	IO-Link			
(AS332T-A)	Driver:	AS USB 👻		HWCO	NFIG						
	Station Address:	•] [Item			Result	
				Mar	rdware Config	gurat	tion Settings			0	
	- 🗹 Hardware Cor	Task		✓ CO	M 1					0	
	- Hardware Cor			✓ co	M 2					0	
				Ft	nernet-Basic					0	
	✓ HWCONFI	G Data Exchange		_	hernet-Adavar					0	
	IO-LINK			_		nce				-	
				Fur	nction Card					0	
	- Task Result			- Inform Success							•
								D	ownload	OK	Cancel

Processing			
	Step	Progress	Result
HWCONFI	G General		
HWCONFI	G Data Exchange		
IO-Link	Confirm Write-in ope To do this,	eration is forbidden when PLC is runnir PLC execution will be stopped, do you Yes No	x ng! u want to continue? Abort

13

Step		Progress	Result				
HWCONFIG Generation	al		O				
HWCONFIG Data E	xchange						
IO-Link	Confirm		×				
Yes No							

Download			×
PLC_0 (AS332T-A)	Communication Setting	HWCONFIG General HWCONFIG Data Exchange	IO-Link
	Station Address: 0	Item	Result
	Task	Hardware Configuration Settings	0
	- V Hardware Configration	COM 1	•
	HWCONFIG General	COM 2	•
	HWCONFIG Data Exchange	Ethernet-Basic	0
	✓ IO-Link	C Ethernet-Adavance	0
		Function Card	0
	- Task Result	- Information	
			Download OK Cancel

Click the **On-line Mode** button on the IO-Link page and then see the connection status of all devices and the real time monitored values of input and output process data.



S04SIL-A	Online						
[Port 1] : IO-Enk - Al built-in amplifier type	Status Port ID	Mode	Type	Source	Instance	Definition	
[Port 2] 10-Link - E3S-DCP21-IL3		ent single shot.	Notification	Master	Application	(0xFF21) DL: Device plugged in (NEW_SLAVE).	
(Port 3) : 10-Link - MAXIM_RL78_02		ent single shot.	Notification	Master	Application	(0xFF21) DL: Device plugged in (NEW_SLAVE).	
[Port 4] - 10-Link - MAXIM_RL78_03		ent single shot.	Notification	Master	Application	(0xFF21) DL: Device plugged in (NEW_SLAVE).	
	2 4 Eve	ent single shot.	Notification	Master	Application	(0xFF21) DL: Device plugged in (NEW_SLAVE).	
	Process Data						
	Irout Output						
	Name	Addre	ess	Data Type	Value	Tag Name	Comment
	- Port 1	D26000 - D26002					
	External Calibration Inpu	t Response D26000.0	Boolean		OFF (false)	NIO_AS045IL_A_2_1_1_External_Calibration	
	External Calibration Don	e D26000.1	Boolean		OFF (false)		
	Light Off Input Respons	D26005.2	Boolean		OFF (false)		
	Error	026000.3	Boolean		OFF (false)		
	Output1	D26000.4	Boolean		OFF (faise)		
	Output2	D26000.5	Boolean		OFF (false)		
	Current Value Valid	D26000.6	Boolean		covi (true)		
	Hold Input Response	D26000.7	Boolean		OFF (false)		
	Bank Input Response	D26001.0 - D26001.1	Unsigned Integer		12	NIO_ASO4SIL_A_2_1_1_Bank_Input_Resp.	
	Current Value	D26002.0 - D26002.9	Unsigned Integer		3	NID_AS0458_A_2_1_1_Current_Value	
	- Port 2	D26003 - D26007					
	Control Output 1	D26003.0	Boolean		ON (true)	NID_ASO4SIL_A_2_1_2_Control_Output_1	
	Control Output 2	D26003.1	Boolean		OFF (false)		
	Instability Alarm	D26003.2	Boolean		Stable (false)		
	Warning	026003.3	Boolean		Normal (false)		
	Enor	026003.4	Boolean		Normal (faise)		
	Incident Light Level Slu				0	NIO_ASOISIL_A_2_1_2_Incident_Light_L_	
	Incident Light Level Gre				0	NID_AS04SIL_A_2_1_2_Incident_Light_L_	
	Incident Light Level Rec				12	NID_AS04SB_A_2_1_2_Incdent_Light_L	
	Light Emitting Color	D26007.0 - D26007.2	Unsigned Integer		R(1)	NID ASDISE A 2 1 2 Light Emitting C	
	- Port 3	D26008 - D26009	another and the				
	Digital Out	D26008.0	Boolean		false	NID ASOISIL A 2 1 3 Digital Out	
	Sensor Switch	D26008.0	Bookan		tius	http://sonsal_n_z_1_3_000a_001	

The **Status** of Port 1~ Port 4 above can also be known through the parsing in the **Normal Exchange Area** of the AS04SIL-A module below.

neral Data Exchange							
AS04SIL-A	Dev	vice Information	Normal Exchange Area				
			Description		Address	Tag Name	Comment
		Error code		D29020			
		Reserved		D29021			
	8	Port1 - 2 Devi	ce Status	D29022 - D29024	0		
		Port3 - 4 Devi	ce Status	D29025 - D29027			
		Port1 - 4 (IO-Link Process Data) Input Invald Flag		D29028			
		Port1 - 4 Pm2	value	D29029			

With a click on any device, only the input and output process data of the clicked single device will be displayed.

											10-Link Hard	ware Configurat
AS04SIL-A	Online											
[Port 1] : IO-Link + AI built-in amplifier type	Statu	Port ID	Mode		Туре		Source	Instance		Definition		
[Port 2] : IO-Link · E3S-DCP21-IL3	0	1	Event single	shot.	Notification		Master	Application	(0xFF21)) DL: Device plugged in (NEW_SLAVE).		
[Port 3] : IO-Link + MAXIM_RL78_02	- Proce	ss Data										
[Port 4] IO-Link · MAXIM_RL78_03	Inpu	Output										
		Nam	ne		Address		Data Type		Value	Tag Name	Comme	nt
	Ð	ternal Calibr	ation Input Re	D26000.0		Boolean		OFF (faise)		NIO_AS04SIL_A_2_1_1_Extern		
	Ð	ternal Calbr	ation Done	D26000.1		Boolean		OFF (false)				
	U	pht Off Inpu	t Response	D26000.2		Boolean		OFF (faise)				
	E	ror		D26000.3		Boolean		OFF (false)				
	0	utput1		026000.4		Boolean		OFF (false)				
	0	utput2		D26000.5		Boolean		OFF (faise)				
	0	irrent Value	Valid	D26000.6		Boolean		ON (true)				
	н	old Input Re	sponse	D26000.7		Boolean		OFF (faise)				
	83	ink Input Re	sponse	D26001.0 +	D26001.1	Unsigned	Integer	12		NIO_AS04SIL_A_2_1_1_Bank_1		
	0	ment Value		D26002.0 -	D26002.9	Unsigned	Integer	1		NIO_AS0458_A_2_1_1_Curren		

13.4.4 Application of Delta Special Driver & AS Remote Mode

The device list in the following example is the same as that in section 12.4.3.

Model name	Device type				
AS332T-A	PLC				
AS00SCM-A	RTU				
AS04SIL-A	IO-Link Master				
AI-B100	3 rd IO-Link Device				
E3S-DCP21-IL3	3 rd IO-Link Device				
MAXREFDES27#	3 rd IO-Link Device				
MAXREFDES36#	3 rd IO-Link Device				

Complete the following setups before the AS00SCM-A module is powered on.

- 1. The AS-FCOPM card is inserted to AS00SCM-A via Card 2. (The 120Ω terminal resistor is enabled.)
- 2. Use Delta standard cable to connect to AS CPU and the mode switch is turned to RTU mode.
- 3. Four switches are set to ID1: 0 / FORMAT1: 8 / ID2: 9 / FORMAT2: 7 and the status is set to **Delta Special Driver & AS Remote Communication**, node ID 9 and baud rate 1Mbps.
- 4. AS04SIL-A is connected on the right side of AS00SCM (RTU). Ensure that IO-Link devices are connected to the four ports according to the wiring in section 13.2.3.

Switch the power on after the AS-FCOPM card is inserted to AS332T-A via Card 2. (The 120Ω terminal resistor is enabled.) Open the HWCONFIG 4.0 software, set up function card 2 for AS CPU and then download the settings as follows.

neral Data Exchange				
AS332T-A	Fu	incti	on Card 2 Setting	
+ System settings			Name	Value
COM1 Port Setting			Parity bit	Even
COM2 Port Setting			Stop bit	1
Ethernet Port Basic Setting			MODBUS mode	ASCII
+ Ethernet Port Advanced Setting			Delay time to Reply	0
Function Card 1 Setting			Received Data Timeout	200
+ Function Card 2 Setting			F2AD Analog Input mode	0~10V
			F2DA Analog Output mode	0~10V
			F2AD Sampling Time	3
			F2AD Average Times	10
	•		AS-FCOPM Working mode	Delta Special Driver & AS Remot
			AS-FCOPM node ID	1
			Number of remote modules in Delta Special Driv	1
			Select Run mode after detect remote module	Run connected remote module
			AS CPU module keep or Stop when slave node	Only Show Error Message
			Remote and CANopen communication time out	100
			Re-connected Retry number after time out	60
			Auto Retry connection after Disconnected	60
			AS-FCOPM Bit Rate	1000k
			Communication data sampling position	Auto
			DS301 PDO Data Exchanged	Start after power-on

The following steps are the same as the operation in section 13.4.3.

13.4.5 Application of CANopen DS301 Mode

In this example, the AS00SCM-A RTU module works with EDS V2.06. Please download the EDS from Delta official website and import the CANopen Builder software.

The device list in the following example is the same as that in section 12.4.3.

Model name	Device type				
AS332T-A	PLC				
AS00SCM-A	RTU				
AS04SIL-A	IO-Link Master				
AI-B100	3 rd IO-Link Device				
E3S-DCP21-IL3	3 rd IO-Link Device				
MAXREFDES27#	3 rd IO-Link Device				
MAXREFDES36#	3 rd IO-Link Device				

The CANopen Builder does not support the configuration of extension modules on the right of the AS00SCM-A module and connected IO-Link devices.

First make the connection in **AS Special Remote** mode, configure all extension modules and IO-Link devices in the HWCONFIG 4.0 software (see the example in section 13.4.3) and then switch back to the **CANopen DS301** mode.

Please complete the following setups before the AS00SCM-A module is powered on.

- 1. The AS-FCOPM card is inserted to AS00SCM-A via Card 2. (The 120Ω terminal resistor is enabled.)
- 2. Use Delta standard cables to connect to AS CPU and the mode switch is turned to RTU mode.
- 3. Four switches are set to ID1: 0 / FORMAT1: 4 / ID2: 2 / FORMAT2: 7 and the status is set to CANopen DS301, node ID 2 and baud rate 1Mbps.
- 4. AS04SIL-A is connected on the right side of AS00SCM (RTU). Ensure that IO-Link devices are connected to the four ports according to the wiring in section 13.2.3.

Switch the power on after the AS-FCOPM card is inserted to AS332T-A via Card 2. (The 120Ω terminal resistor is enabled.) Open the HWCONFIG 4.0 software, set up function card 2 for AS CPU and then download the settings as follows.

eneral Data Exchange										
AS332T-A		Function Card 2 Setting								
+ System settings			Name	Value						
COM1 Port Setting			Data bit	7						
COM2 Port Setting			Parity bit	Even						
Ethernet Port Basic Setting			Stop bit	1						
+ Ethernet Port Advanced Setting			MODBUS mode	ASCII						
Function Card 1 Setting			Delay time to Reply	0						
+ Function Card 2 Setting			Received Data Timeout	200						
			F2AD Analog Input mode	0~10V						
			F2DA Analog Output mode	0~10V						
			F2AD Sampling Time	3						
			F2AD Average Times	10						
	+		AS-FCOPM Working mode	CANopen DS301						
			AS-FCOPM node ID	1						
			Select Run mode after detect remote module	Run connected remote module						
			AS CPU module keep or Stop when slave node	Only Show Error Message						
			Remote and CANopen communication time out	100						
			Re-connected Retry number after time out	60						
			Auto Retry connection after Disconnected	60						
			AS-FCOPM Bit Rate	1000k						
			Communication data sampling position	Auto						
			DS301 PDO Data Exchanged	Start after power-on						
			CAN Hardware error counter	Enable						

Right-click the AS332T-A symbol and open the CANopen Builder software as below.



Click the **Online** button.



Click the Scan button. Then the AS00SCM-A RTU module can be detected.

File
Edit
View
Network
Tools
Setup
Help

Image: Image:

击 Delta CANopen Builder - Untitled1_STA_0.cop



Double-click the detected AS00SCM-A RTU module and ensure that it is with EDS file V2.06 or later. If the EDS file is not matched, check if the V2.06 EDS file has been imported to the left-side device list and the firmware of AS00SCM-A is V2.06 or later.



Each object in the EDS file is 1 word (2 bytes) in size and thus one PDO corresponds to one mapped register. Assign all input parameters to available TxPDOs according to the parameters in the **Normal Exchange Area** of AS04SIL-A in section 13.4.3. The mapped PDO object of the input process data is Tx_ModuleX_EDIY (Exchanging Data Input which is referred to as EDI).

In this example, the AS04SIL-A module is the first one on the right of the RTU module. Therefore the value of X is 1 and the PDO mapped object for error codes is Tx_Module1_error_code. The corresponding objects starts from Tx_Module1_EDI0 as below.

lode ID	: 2		Name:	A	S00SC	M-ARTU	I								
Node I	nformation	(Hex)								_	_				
⊻ V	endor ID:	0	00001D	D			Error C	ontro	1 Protocol	PDO Map	ping				
D	evice Type	0	000000	0	_		Auto SD	O Co	nfiguration	Index : 1	A00b	Name : TxPDO 1			
∠ P	roduct Cod	e: 0	000005.	A	=	Eme	igency CO)B ID	82	L _		from EDS file			
R	evision:	0	002060	0	-	Nod	eguard CO	DB ID	: 702	Index	Sub-idx			• Norma	
												R/W	Data Type	1	
PDO fr	om EDS file									2000	1	RW	UNSIGNED16	-	lodule1_EDO
Index	PDO Nar	ne			Type	Inhibit	Event	^	Export EDS file	2000	2	RW	UNSIGNED16	-	lodule1_EDO
1803	Transmit	PDO4	naram		1	50	0			2000	3	RW	UNSIGNED16	_	lodule1_EDC
1804	Transmit		•		1	50	0			2000	4	RW	UNSIGNED16	-	lodule1_EDO
1805	Transmit				-	50	0		Add	2000	5	RW	UNSIGNED16	-	lodule1_EDO
1806	Transmit					50	0			. 2000	6	RW	UNSIGNED16	_	lodule1_EDO
1800	Transmit		•		1	50	0	-	Delete	2000	7	RW	UNSIGNED16	Rx_M	lodule1_EDC
					-			12		2000	8	RW	UNSIGNED16	Rx M	lodule1 EDC
1808	Transmit				1	50	0		Define PDO	<	_				>
1809	Transmit	PDOI			1	50	0	~		5		₩	1		
	ured PDO								·	Mappe	d Objects				
Index	COB ID	R/T	Len	Type	e De	scription		_	PDO Mapping	Index	Sub-idx	Object	Name		Туре
1400	202	Rx	6	1		PDO 1			Properties	2001	43	Tx_Mo	dule1_error_code		UNSIGNEI
1800	182	Tx	8	1		PDO 1		_		2001	1	Tx_Module1_EDI0			UNSIGNEE
1800	282	Tx	8	1		PDO 2		-		2001	2	Tx_Mo	dule1_EDI1		UNSIGNEE
1801	382	Tx	8	1		PDO 2 PDO 3				2001	3	Tx_Mo	dule1_EDI2		UNSIGNEE
1802	482	Tx	8	1		PD0 3 PD0 4			OK	<					
1803	482 1c2	Tx Tx	8 2	1		PD0 4 PD0 5			Cancel	· ·					

Based on all communication port address information in the HWCONFIG 4.0 software in section 13.4.3, assign all input process data to available TxPDOs, which corresponds to the mapped object Tx_NIOX_PD_InputZ and assign all output process data to available RxPDOs, which corresponds to the mapped object Rx_NIOX_PD_OutputY.

In this example, the AS04SIL-A module is the first one on the right of the RTU module. Therefore the value of X is 1, the input objects starting from Tx_NIO1_PD_Input0 correspond to IO-Link Port1~ Port4 in **Process Data- Input** respectively and the output objects starting from Rx_NIO1_PD_Output0 correspond to IO-Link Port1~ Port4 in **Process Data- Output** respectively.

Configure all parameters which need to be updated continuously (which are called objects in CANopen Builder) to one TxPDO or RxPDO according to the steps described above. Add AS00SCM-A RTU to the slave list (Node List) and then the real addresses of mapped registers in AS CPU show up immediately as below.

Available No	odes:			Node List:			
Node ID Node Name				Node ID	Node Name		
			>	002	AS00SCM-ARTU	í	
			<				
Output Tabl	e		I	nput Table –			
Device D	evice Mapping	^		Device	Device Mapping		1
D25032_L [0	02]RxPDO-Rx_NIO1_	PD_Out		D24032_L	[002]TxPDO-Tx_M	odule1_error	
D25032_H [0	02]RxPDO-Rx_NIO1_	PD_Out		D24032_H	[002]TxPDO-Tx_M	odule1_error	
D25033_L [0	02]RxPDO-Rx_NIO1_	PD_Out		D24033_L	[002]TxPDO-Tx_M	odule1_EDI	
D25033_H [0	02]RxPDO-Rx_NIO1_	PD_Out		D24033_H	[002]TxPDO-Tx_M	odule1_EDI	
D25034_L [0	02]RxPDO-Rx_NIO1_	PD_Out		D24034_L	[002]TxPDO-Tx_M	odule1_EDI	
D25034_H [0	02]RxPDO-Rx_NIO1_	PD_Out		D24034_H	[002]TxPDO-Tx_M	odule1_EDI	
D25035_L				D24035_L	[002]TxPDO-Tx_M	odule1_EDI	
D25035_H				_	[002]TxPDO-Tx_M	_	
D25036_L				_	[002]TxPDO-Tx_M	_	
D25036_H				_	[002]TxPDO-Tx_M	_	
D25037_L				_	[002]TxPDO-Tx_M	_	
D25037_H					[002]TxPDO-Tx_M	_	
D25038_L				_	[002]TxPDO-Tx_M	-	
D25038_H		*		D24038_H	[002]TxPDO-Tx_M	odule1_EDI:	`
Unit ID:	0	Output Start:		~ 0		OK	
Unit ID.	T	•					

According to the **Normal Exchange Area** page in HWCONFIG in section 13.4.3, the PDO mapped objects correspond to the mapped registers assigned by CANopen Builder as follows.

	Devic	e Information	Normal Exchange Area					
Г			Description	Assign mapped	registers by CANopen Builder	PDO mapped objects		
	•	Error code		B28000	D24032	Tx_Module1_error_code		
		Reserved		D28001				
		Port1 - 2 Devi	ce Status	028002 - D28004	D24033 - D24035	Tx_Module1_EDI0 - Tx_Module1_EDI2		
		Port3 - 4 Devi	ce Status	D28005 - D28007	D24036 - D24038	Tx_Module1_EDI3 - TX_Module1_EDI5		
		Port1 - 4 (IO-L	ink Process Data) Input Invalid	. D 28008	D24039	Tx_Module1_EDI6		
L		Port1 - 4 Pin2	value Example did	n't select this object i	nto PDO, so no mapped register.	Tx_Module1_EDI7		

Parameter	Configured PDO	PDO mapped object	Mapped register in AS CPU
Error code		Tx_Module_error_code	D24032
		Tx_Module1_EDI0	D24033
Port 1-2 Device	TxPDO1	Tx_Module1_EDI1	D24034
Status		Tx_Module1_EDI2	D24035
		Tx_Module1_EDI3	D24036
Port 3-4 Device		Tx_Module1_EDI4	D24037
Status	TxPDO2	Tx_Module1_EDI5	D24038
Port1-4 (IO-Link Process Data) Input Invalid Flag	TXFD02	Tx_Module1_EDI6	D24039
		Tx_NIO1_PD_Input0	D24040
Port 1 Process		Tx_NIO1_PD_Input1	D24041
Data- Input	TxPDO3	Tx_NIO1_PD_Input2	D24042
Port 2 Process		Tx_NIO1_PD_Input3	D24043
Data- Input		Tx_NIO1_PD_Input4	D24044
		Tx_NIO1_PD_Input5	D24045
	TxPDO4	Tx_NIO1_PD_Input6	D24046
		Tx_NIO1_PD_Input7	D24047
Port 3 Process		Tx_NIO1_PD_Input8	D24048
Data- Input	TxPDO5	Tx_NIO1_PD_Input9	D24049
Port 4 Process	TXPDO5	Tx_NIO1_PD_Input10	D24050
Data- Input		Tx_NIO1_PD_Input11	D24051
Port 1 Process		Rx_NIO1_PD_Output0	D25032
Data- Output		Rx_NIO1_PD_Output1	D25033
Port 2 Process		No parameter need be output	No parameter need
Data- Output	RxPDO1		be output
Port 3 Process		Rx_NIO1_PD_Output2	D25034
Data- Output			
Port 4 Process Data- Output		Rx_NIO1_PD_Output3	D25035

13.5 IO-Link Event Code Table

Here is the table of IO-Link event codes which are recorded in **Port1-4 Device Status** of the **Normal Exchange Area** page. If the sources of events are IO-Link devices, please also refer to the IO-Link device operation manual.

IO-Link		Туре				Sou	rce
Event Codes	Warning	Error	Notifica- tion	Event	Solution	IO-Link Master	IO-Link Device
16#4000		v		Device temperature over-load	Lower load		V
16#4210	V			Device temperature over-run	Clear source of heat		V
16#5101		V		Device fuse blown	Change fuse		V
16#5110	V			Power supply voltage over-run	Check tolerance		V
16#5111	V			Power supply voltage under-run	Check tolerance		V
16#6320		v		Parameter error	Check device specifications		V
16#6321		v		Parameter missing	Check device specifications		V
16#7710		V		Device short circuit	Check installation		V
16#8C10	V			Process variable range over-run	Check process data		V
16#8C20		v		Measurement range over-run	Check application		V
16#8C30	V			Process variable range under-run	Check process data		V
16#8CA0	V			No connected IO-Link device	Check installation	V	
16#8CA1	V			The version of the IO- Link protocol is different from the one configured.	Use matching IODD file and configured again.	V	
16#8CA2	V			Connected device is different from the one configured in the software	Check configurations and installation	V	
16#8CA3				Reserved		V	
16#8CA4 16#8CAD 16#8CAE		v		IO-Link device process cable short circuit	Check installation	V	
16#8CA5	V			Master temperature exceeds 135°C	Clear source of heat	V	
16#8CA6		V		Master temperature exceeds 160°C	Clear source of heat and lower load	V	
16#8CA7	V			Device power supply voltage under-run L+ (<18V)	Check the external power supply	V	

IO-Link		Туре				Sou	rce
Event Codes	Warning	Error	Notifica- tion	Event	Solution	IO-Link Master	IO-Link Device
16#8CA8		v		Device power supply voltage under-run L+ (<9V)	Check the external power supply	V	
16#8CA9	V			Illegal device ID	Check device specifications	V	
16#8CAA	V			HWCONFIG configured process data exceeding the IO-Link process data range	Check device specifications	V	
16#8CAB	V			IO-Link process data exceeding HWCONFIG configured process data range	Scan the device and download the configuration again	V	
16#8CAC		V		Data storage error	Contact the factory	V	
16#FF21			V	New connected device		V	
16#FF22			V	Device disconnected	Check installation	V	
16#FF23			V	Data storage identification mismatch	Set the Data Storage access locked and set it to backup / restore and then backing up data according to actual placement.	V	
16#FF24			V	Data storage not sufficient	Check device specifications	V	
16#FF25			V	Data storage parameter access denied	Check device specifications	V	
13.6 Module Status Codes

The following error codes identify possible errors when the AS04SIL module as a communication module is installed on the right side of the CPU module or RTU module.

Error Code	Description	Solution	
16#1605	Hardware failure	Install a new AS04SIL or contact the factory.	
16#1606	24VDC power supply is not sufficient and then recovered from low-voltage for less than 10 ms.	Check whether the 24 V power supply to the module is normal.	

Error Code	Description	Solution	
16#1800	Error occurs in IO-Link Master	See section 13.5 for more information.	
16#1801	Error occurs in IO-Link device	See section 13.5 for more information.	
16#1802	No external power supply	Check the external power supply	
16#1803	Error in the download of IO-Link device mapping tables	Redownload the configuration by the software	
16#1804	Failure to switch the process data parameter set	Check if the connected device is the same as that configured in the software.	
16#1805	Error occurs in the communication port 1 of IO-Link connection		
16#1806	Error occurs in the communication port 2 of IO-Link connection	1. Cut the external power off for 3 seconds and power-on again	
16#1807	Error occurs in the communication port 3 of IO-Link connection	2. Download the configurations again	
16#1808	Error occurs in the communication port 4 of IO-Link connection		
16#1809	Error occurs in scan device and force to stop scanning	 Cut the external power off for 3 seconds and power-on again Scan all devices again 	

MEMO



14

Chapter 14 High Speed Counter Module AS02HC

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14.1 Overview

The AS02HC-A module is a high-speed counter module with two built-in channels. It performs counting through receiving the pulse signal input or SSI encoder signal input. It is only connected to the right side of AS series CPU modules. Configuring it to the right side of the remote modules is not allowed. This chapter mainly introduces the specifications, functions and operation of the module. For software operation, ISPSoft, DIADesigner or DIADesigner-AX is what you need. If you are using AS Series PLC CPU, refer to ISPSoft User Manual or DIADesigner Manual for more information. The new software DIADesigner-AX only supports AX Series PLC CPU and AS Series modules now, refer to AX-3 User Manual for more information on software operation.

14.1.1 Characteristics

1. Pulse signal / SSI signal input interface selection

- Pulse input: Supports single-phase pulse input, two-phase pulse input (multiplication x2/4) and CW / CCW pulse input, 5V differential signal and 5-24VDC single-ended signal. The counting speed can reach up to 200kHz (for single-phase input).
- SSI input: The data transmission frequency can reach up to 1.25 MHz; the received data length can be up to 32 bits; supports multi-turn and single-turn SSI encoders as well as the conversion of gray and binary codes.

2. 32-bit counter

The two channels of AS02HC-A are both 32-bit counters with the counting range of -2147483648 to 2147483647.

3. Counter type setting

Ring counter: cyclical counting between -2147483648 and 2147483647.

Linear counter: The upper and lower limit values need be set. When the counter value is out of the allowed range, the module can detect that the upper or lower limit is exceeded.

4. High-speed comparison

Preset a comparison value and compare it with the present value of the counter. When they are equal, the external output point actions can be controlled, the interrupt program can be executed or the counter value can be cleared at the same time.

5. Phase-Z function selection

Each of the two channels is configured with a phase Z which can be used as the external input point for Reset, Capture or Gate control.

6. External output points

Four external output points. They can be controlled individually or be used for the output together with high-speed comparison function.

7. Counter value capture

The counting value is captured through a phase Z input trigger or channel comparison-matched trigger.

8. Pulse rate and rotation rate (RPM) measurement

The function measures the input pulse rate and position change rate of the SSI encoder. And the rotation speed (RPM) can be calculated automatically.

9. Use the tool software for easy settings

The HWCONFIG utility software is built into ISPSoft. You can set modes and parameters directly in HWCONFIG of ISPSoft or Hardware Configuration of DIADesigner without spending time writing programs to set registers to manage functions.

10. Miscellaneous API instructions

The functions such as counter control, counter value capture, high-speed comparison output and measurement can be achieved via dedicated API instructions.

14.2 Specifications and Functions

14.2.1 Specifications

Functional specification

Item		Description	
Number	of channels	2	
	Input type	Phase A/B differential pulse input (multiplication x2/4), CW/CCW pulse inputs and pulse + direction inputs	
Pulse Input	Max. counting frequency	200 kHz	
	Max. transmission distance	200 kHz \rightarrow 30 m	
	Counter type	Ring counter, linear counter	
	Max. data length	32-bit (The single-turn, multi-turn and status data length can be set.)	
	Coding method	binary code, gray code	
	Transmission frequency	250 kHz, 500 kHz, 625 kHz, 1 MHz, 1.25 MHz	
SSI Input	Max. transmission distance	250 kHz \rightarrow 150 m 500 kHz \rightarrow 50 m 625 kHz \rightarrow 40 m 1 MHz \rightarrow 20 m 1.25 MHz \rightarrow 10 m	
	Parity check	None, odd parity, even parity	
	Counter type	Absolute counter and ring counter	
	Counting range	-2147483648 ~ 2147483647 (32-bit counter)	
Counter	Counter control	Reset, preset, gate, capture offset correction for absolute position	
Counter	State check	Count direction, counting overflow/underflow, linear counting beyond the lower and upper limit values, SSI feedback, SSI position exceeding the protection limit, SSI parity checking, SSI communication status, a zero point is set beyond SSI encoder resolution	
	Input point number	2 (one point per channel)	
External input	Function	Counter reset, gate control, counting value capture	
point (phase Z)	Digital filtering	Disabled, 100 us, 200 us20 ms	
	Min. software interrupt response time	20 us (hardware response time included)	
External output point	Output point number	4	
	Output type	NPN transistor (sinking)	
Comparison	Instruction	General comparison output instruction, table comparison output instruction	
function	Interrupt	Using comparison to achieve the interrupt function	
Measurement	Measured item	Pulse rate and rotation rate (RPM)	
function	Average times	1 ~ 10 times	

Electrical specifications for the inputs

Model		Pulse input External input		
Numbe	r of inputs	4 (A+/B+/A-/B-)	2 (Z+/Z-)	
Connec	tor type	D-sub15		
Input voltage / current		5~24 VDC, 6~15 mA		
Action	OFF→ON	3 V		
level	ON→OFF	1 V		
Maximum input frequency		200 kHz 20 kHz		
Input in	npedance	4.7 kΩ		
Input signal		Single-ended signal: 5 ~ 24 VDC (sinking or sourcing); differential signal: 5 V		
Isolation voltage		500 VAC		
Input display		When the optocoupler is driven, the input LED indicator is ON.		
Weight		138 g		

Electrical specifications for the SSI input and output

Item	Model	SSI input	SSI output	
Number outputs	r of inputs /	2 (DATA+/DATA-)	2 (CLK+/CLK-)	
Connec	tor type	D-sub15		
Voltage	/ Current	5 VDC, 1 mA	5 VDC, ±60 mA (Max)	
Action	OFF→ON	$V_{ID}^{*1} \ge 0.2 V$	-	
level	ON→OFF	$V_{ID} \leq -0.2 V$	-	
Maximu frequer		1.25 MHz		
Impeda	ince	12 kΩ (terminal resistor 120 Ω) -		
Signal		RS-422		
Isolation voltage		500 VAC		
Input / output display		When the optocoupler is driven, the LED indicator is ON.		

*1 : V_{ID} is the voltage difference between DATA+ and DATA-.

	Model	AS02HC-A	
Item			
Number of c	outputs	4	
Connector t	уре	D-sub15	
Output type		NPN transistor (sinking)	
Voltage / Cu	rrent	5~30 VDC, 0.1 A	
	Resistance	0.1 A	
Maximum load	Inductance	•	
	Bulb	-	
Maximum	Resistance	10 kHz	
output	Inductance		
frequency	Bulb	-	
Maximum Response time	OFF→ON	25 us	
Isolation voltage		500 VAC	

Electrical specifications for the external outputs

Electrical specifications for the +5 V encoder power supply

Model	AS02HC-A
Number of outputs	2 (+5VO/GND)
Connector type	D-sub15
Voltage / Current	5 VDC (±5%), 100 mA (Max)

14.2.2 Profile







Number	Name	Description	
1	Model name	Model name of the module	
	POWER LED indicator	Indicates the status of the power supply ON: The power is on. OFF: No power	
	Error LED indicator	Error status of the module ON: A major error occurs in the module. OFF: The module is normal. Blinking: A minor error occurs in the module.	
2	Counter LED indicator for Ch1 Act. & Ch2 Act. Counter LED indicator for Ch1 Act. & Ch2 Act. Counter LED indicator for Ch1 Act. & Ch2 Act. Counter is enabled but the result of counting is Blinking: The result of counting is updating. When the SSI input takes place: Blinking: The counter is enabled and the position value is		
	Input / output LED indicator	ON: Receives an input / output signal OFF: Receives no input / output signal Refer to section 14.2.8 for details.	
3	D-sub15	Input: Connected for pulse input and encoder Output: Connected to loads to be driven Power: Providing external encoder +5 VDC	
4	DIN rail clip	Secures the module onto the DIN rail	
5	Extension module port	Connects extension modules	
6	Ground clip	For Grounding	
7	Label	Nameplate	

14.2.3 Terminals

	Pin No.	CH1	CH2
	8	A1+	A2+
	3	A1-	A2-
	7	B1+	B2+
	2	B1-	B2-
	6	Z1+	Z2+
	1	Z1-	Z2-
	10	CLK1+	CLK2+
	5	CLK1-	CLK2-
	9	DATA1+	DATA2+
D-sub15 pin	4	DATA1-	DATA2-
	14	+5VO1	+5VO2
	15	GND1	GND2
	12	Y0.0	Y0.2
	11	Y0.1	Y0.3
	13	COM0	COM1

14.2.4 Wiring

14.2.4.1 Pulse Input

The NPN output encoder wiring



The PNP output encoder wiring



External power supply: 5V, 12V, 24VDC

- AS02HC-A The encoder with 5 V differential outputs Isolation circuit A+ A Phase A Т A-Ā B+ В Phase B B B-Z+ Ζ Phase Z 1 Z **Z**-
- The 5V differential output encoder wiring





Note:

If the power supply to the SSI encoder is non-5 VDC power supply, please supply corresponding external power based on SSI encoder specifications of different vendors.

14.2.4.3 External Output



*1 : Loads or input points

*2 : Use one single power supply for each COM port.

Indicator	Color	Name	Description	
PWR	Blue	Power indicator	ON: The power supply is normal. OFF: No power supply	
ERR	Red	Error indicator	ON: A major error occurs in the module. OFF: The module is operating normally. Blinking: A minor error occurs in the module (Blinks every 0.5 seconds.)	
CH1 Act.	Green	Ch1 counter state indicator	OFF: The counter is disabled. Pulse Input - ON: The counter is enabled but there is no change in the counter value. Blinking: The counter value is changing. (Blinks every 0.5 seconds.) SSI Input - Blinking: The counter is enabled and the position value is being updated. (Blinks every 0.5 seconds.)	
CH1 A	Red	Ch1 phase-A input indicator	ON: The phase-A input for channel 1 is active. OFF: The phase-A input for channel 1 is not active.	
CH1 B	Red	Ch1 phase-B input indicator	ON: The phase-B input for channel 1 is active. OFF: The phase-B input for channel 1 is not active.	
CH1 Z	Red	Ch1 phase-Z or DION: The phase-Z input for channel 1 is active.input indicatorOFF: The phase-Z input for channel 1 is not active.		
Y0.0	Red	Y0.0 output statusON: The Y0.0 output is active.indicatorOFF: The Y0.0 output is not active.		
Y0.1	Red	Y0.1 output statusON: The Y0.1 output is activeindicatorOFF: The Y0.1 output is not active.		
CH2 Act.	Green	Ch2 counter state indicator	 OFF: The counter is disabled. Pulse Input - ON: The counter is enabled but there is no change in the counter value. Blinking: The counter value is changing. (Blinks every 0.5 seconds.) SSI Input - Blinking: The counter is enabled and the position value is being updated. (Blinks every 0.5 seconds.) 	
CH2 A	Red	Ch2 phase-A input indicator	ON: The phase-A input for channel 2 is active. OFF: The phase-A input for channel 2 is not active.	
CH2 B	Red	Ch2 phase-B input ON: The phase-B input for channel 2 is active.		
CH2 Z	Red	Ch2 phase-Z or DI input indicator	ON: The phase-Z input for channel 2 is active. OFF: The phase-Z input for channel 2 is not active.	
Y0.2	Red	Y0.2 output status indicator	ON: The Y0.2 output is active OFF: The Y0.2 output is not active.	
Y0.3	Y0.3 output status ON: The Y0.3 output is active indicator OFF: The Y0.3 output is not active.			

14.2.5 LED Indicators

14.3 Operation

14.3.1 Parameter Settings

Before using AS02HC-A to count, you need to set the following shown settings in ISPSoft-HWCONFIG. Set the parameters and download the settings to AS02HC-A. Refer to section 14.4. for detailed ISPSoft-HWCONFIG operations.

Tab	Input Interface	Setting Value	Setting Option	
		Pulse Type	 A / B Phase (2x) (default) A / B Phase (4x) CW / CWW Pulse + Direction 	
	Pulse Input	Counter Type	Absolute Position (default)Ring Counter	
		Maximum	0 ~ 2147483647 (H0 ~ H7FFFFFF) (default: H7FFFFFF)	
		Minimum	-2147483648 ~ 0 (H80000000 ~ H0) (default: H80000000)	
		Ecoder Coding Method	Binary Code (default)Gray Code	
		Clock Rate	 250 KHz 500 KHz 625 KHz 1 MHz (default) 1.25 MHz 	
CH 1 Setting		Data Length	7~32 (default: 5)	
		Multi-Turn Length	0~32 (default: 12)	
		Multi-Turn MSB Location	b0~b31 (default: b24)	
		Single-Turn Length	1~32 (default: 13)	
	SSI Input	Single-Turn MSB Location	b0~b31 (default: b12)	
		Status Length	0~15 (default: 0)	
		Status MSB Location	b0~b31 (default: b0)	
		Parity Check	None (default)Even Parity CheckOdd Parity Check	
		Parity Bit Locaiton	b0 ~ b31 (default: b0)	
		Parity Check Start	b0 ~ b31 (default: b0)	
		Parity Check Length	0~31 (default: 0)	
		Counter Type	Absolute Position (default)Ring Counter	
		Monoflop Time	4~2500; unit: 16us (default: 4)	
		Maximum Variation Limit	0~2147483647 (default: 0, disabled)	
CH 2 Setting	Same as sett	Same as settings in CH1 Setting		

Tab	Input Interface	Setting Value	Setting Option
Z-Phase Function Setting		CH1 Z-Phase Function	 Reset Counter (default) Reset Counter + clear Yno (Reset the current counter value and the assigned Y output points from DHCCMP and DHCCMPT instructions.) Capture Gate Control
		CH2 Z-Phase Function	Same as CH1 Z-Phase Function
		Filter Time	0~200; unit: 100us; default: 0
		CH1 Ring Counter Overflow / Underflow Detect	Default: disabled
Alorm Sotting		CH1 SSI Zero Crossing Detect	Default: disabled
Alarm Setting		CH2 Ring Counter Overflow / Underflow Detect	Default: disabled
		CH2 SSI Zero Crossing Detect	Default: disabled

14.3.2 Pulse Input Counting

To perform the pulse-input counting, first set the configuration of channels, which includes pulse type and counter type selection in HWCONFIG. If the counter type is set to the linear counter, the maximum counting value and minimum counting value need be set. After the configuration setting is completed, use the API instruction DHCCNT which is special for AS02HC-A in a program to obtain the counting value, achieve the counter control as well as get the real time counter state.

1. Pulse Type

Specify the pulse input type which can be A/B phase (2x), A/B phase (4x), CW/CCW or pulse + direction.







2. Using the ring counter

The ring counter value is cyclical in the range of -2,147,483,648 to 2,147,483,647. When it is greater than 2,147,483,647, the count value changes to -2,147,483,648 and then the counting continues. When it is less than - 2,147,483,648, the count value changes to 2,147,483,647 and then the counting continues.



3. Using the linear counter

The maximum and minimum counter values must be set up. The counter counts up and down between the two limit counter value. When the count value exceeds the maximum value, the counter state will show the warning of "The value exceeds the range!" and the count value will be fixed at the maximum counter value. When the count value is below the minimum value, the counter state will show the warning of "The value exceeds the range!" and the counter state will show the warning of "The value exceeds the range!" and the count value will be fixed at the minimum counter value.

When the count value is beyond the allowed range, the counting persists internally in the hardware. The counter returns to normal and the count value is refreshed when the internal count value comes back within the valid range.

But when the internal count value in the hardware is beyond the valid range of -2,147,483,648 to 2,147,483,647, the counter state shows linear counter overflow or linear counter underflow, the counting stops and the internal count value stops at 2,147,483,647 or -2,147,483,648. The counting can not continue until the count value overflow state of the counter is cleared.

The methods to clear the states include resetting the counter through phase-Z inputs, executing Reset/Preset via DHCCNT instruction, disabling DHCCNT instruction or changing the CPU from RUN to STOP.

Parameter	Setting	Unit	Default
Max. counter value (upper limit)	0 ~ 2147483647	-	2147483647
Min. counter value (lower limit)	-2147483648 ~ 0	-	-2147483648



4. Ring counter overflow/underflow detection

Enable the **Ring Counter Overflow/Underflow Detect** function in the Alarm Setting of HWCONFIG. When the overflow or underflow occurs, the alarm will appear.



14.3.3 SSI Input Counting

To perform the SSI input counting, first set the configuration of channels in HWCONFIG which includes encoder coding method, clock rate, SSI data format, monoflop time and maximum variation limit. After the configuration setting is completed, use the API instruction DHCCNT which is special for AS02HC-A in a program to obtain the counting value, achieve the counter control as well as get the real time counter state.

1. Encoder Coding Method

There are two coding methods, Binary Code and Gray Code for SSI absolute encoder. The Binary Code is the default coding method. If the Gray Code is selected, the gray-code position data (multi-turn and single-turn data) transmitted back from the SSI encoder will be converted into the binary-code position data.

2. Clock Rate

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The HWCONFIG software provides 5 clock rates for option including 250 kHz, 500 kHz, 625 kHz, 1 MHz and 1.25 MHz. Default: 1 MHz.

3. SSI Data Format

Set Multi-turn, Single-turn and Status Data start bit & length as well as Parity Check based on the specifications of the used SSI absolute encoder. For SSI data format, 12ST, 13ST, 12 MT+13ST and User-Defined are provided for option. See the descriptions as below for details.

Data Format - 12ST:



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Data Format - 13ST:



Data Format - 12MT+13ST (Default):



Data Format – User-Defined:

Users can define all parameters based on the illustration in the following diagram.



Note: For a multi-turn encoder, the multi-turn data and single-turn data should be next to each other without additional data placed between them.

Item	Setting	Default
Data Length (bits)	7 ~ 31	25
Multi-Turn Data Length (bits)	0 ~ 31	12
Multi-Turn Data Start Bit	B0 ~ b30	B24
Single-Turn Data Length (bits)	1 ~ 31	13
Single-Turn Data Start Bit	B0 ~ b30	B12
Status Data Length (bits)	0 ~ 15	0
Status Data Start Bit	B0 ~ b30	B0
Parity Check	No check, odd parity check, even parity check	No check
Parity Check Bit	B0 ~ b30	B0
Parity Check Start Bit	B0 ~ b30	B0
Parity Check Length (bits)	0 ~ 30	0

Example 1: 25-bit Single-Turn Encoder











4. Monoflop Time

The Monoflop Time parameter determines the interval time between two SSI data frames. The correct position data can be received as long as the setting value is greater than that specified for the connected encoder. The range is set as follows.



Parameter	Setting	Unit	Default
Monoflop time	4 ~ 2500	16us	4

5. Maximum Variation Limit

The parameter is used to prevent sudden errors occurring in reading absolute position values due to noise interference. You can set the limit value for the variation between two consecutive SSI positions.

When the position change exceeds the set limit, the read position value is discarded, the present count value is not refreshed and the error code is displayed in the counter status. When the position change is back within the set range, the counting returns to normal and the error code is cleared.

When the maximum position variation limit is set to 0, the function is disabled and no check on the position change will be done.

Parameter	Setting	Unit	Default
Maximum Variation Limit	0 ~ 2147483647	-	0 (Disabled)

6. Absolute Position

When the **Absolute Position** option is selected as the counter type, the counter value will show the absolute position of the SSI absolute encoder within the range of 0 to 2^{resolution}. The data information including single-turn data, multi-turn data status, data and counting direction can be displayed independently based on the set data format. The offset setting of the SSI absolute encoder can be modified as well. Refer to DHCCNT instruction for more.

7. Ring Counter

When **Ring Counter** is chosen as the counter type, AS02HC-A is used as a 32-bit ring counter by making two read absolute position variations added up and the count value is changing cyclically in the range of -2147483648 to 2147483647. The counting value changes cyclically within the range of -2147483648 to 2147483647. The ring counter value can be cleared to zero through phase Z. The DHCCNT instruction can also be used to clear and preset the counter value. Refer to DHCCNT instruction for details.

8. Zero Crossing Detection

The **SSI Zero Crossing Detect** function is enabled on the Alarm Setting tab page of the HWCONFIG software. The alarm will appear if the absolute position of the SSI encoder crosses the zero position. The detection function can be used for both the absolute position and ring counters. The timing for the zero crossing is illustrated in the following table.





9. Ring Counter Overflow / Underflow Detection

The **Ring Counter Overflow/Underflow Detection** function is enabled on the Alarm Setting tab page of the HWCONFIG software. The alarm will appear as the counter value overflow/underflow occurs.



10. SSI Encoder Rotation Rate Restriction

For the SSI input counting, the rotation rate restriction is influenced by the SSI encoder resolution and monoflop time. Use the corresponding formula in the following table to calculate the rotation speed of the SSI encoder.

Encoder type	Rotation rate (RPM)	
Single-turn encoder	$\pm \frac{60}{2 \times tp \times 10^{-6}}$ (tp: monoflop time, unit: us)	
Multi-turn encoder	$\pm \frac{60 \times 2^{MT \text{ data length}}}{2 \times \text{tp} \times 10^{-6}}$ (tp: monoflop time, unit: us)	

Monoflop time (us)	Max. rotation rate of single-turn encoders (RPM)	Max. rotation rate of multi-turn encoders (RPM)
64	468750	$468750 imes 2^{ ext{MT data length}}$
4000	7500	$7500 imes 2^{ ext{MT data length}}$
8000	3750	$3750 imes 2^{ ext{MT data length}}$
12000	2500	$2500 imes 2^{ ext{MT data length}}$
16000	1875	$1875 imes 2^{\text{MT data length}}$
20000	1500	$1500 imes 2^{\text{MT data length}}$
24000	1250	$1250 imes 2^{\text{MT data length}}$
28000	1071	$1071 imes 2^{\text{MT data length}}$
32000	938	$938 imes 2^{ ext{MT} ext{ data length}}$
36000	833	$833 imes 2^{ ext{MT} ext{ data length}}$
40000	750	$750 imes 2^{ ext{MT} ext{ data length}}$

See the reference values for the formula above in the following table.

14.3.4 Z-Phase Function Setting

AS02HC-A's two channels which are with one input point CH1 Z and CH2 Z respectively should be configured in function by HWCONFIG before they are used to achieve the functions of counter reset, gate control, counter value capture and digital filtering.

Item name	Setting	Unit	Default
Phase-Z Function Setting	Counter Reset, Counter Reset +Yno, Gate Control and Capture	-	Counter Reset
Phase-Z Function	Description		Remark
Counter Reset (Default)	reset to 0 and the counter status is		value can not be cleared if ut and the absolute-position are selected.
Counter Reset +Yno	Same to Counter Reset above. Also clears the output points that are set by the DHCCMP comparison instruction or table comparison instruction DHCCMPT.	The DHCCM used.	IP or DHCCMPT instruction is
Capture	The counter value capture is triggered through the rising edge and falling edge of phase Z.		P instruction is used.
Gate controlWhen phase Z is at low level, the counter's counting pauses. When phase Z is at high level, the counter's counting continues.		Applicable to	o the pulse input only.

Item name	Setting	Unit	Default
Filter time	0 ~ 200	100 us	0 (Disabled)

14.3.5 List of Dedicated API Instructions

The operation of AS02HC-A is realized via dedicated API instructions in HWCONFIG after the counter configuration setting is done. The dedicated API instructions for AS02HC-A include DHCCNT, DHCCAP, HCDO, DHCCMP, DHCCMPT and DHCMEAS. For details on these instructions and application examples, refer to **AS Series Programming Manual**.

Instruction	Symbol	Function
DHCCNT (Counter control)	DHCCNT — En — Module CurCnt — ChNo ST — Update MT — Action AStat — Value RefCnt Dir — CntStat — Error — ErrCode	Enable/ disable the counter Change the count value Clear the counter Preset the counter Show current counter value Show the counting direction Show the counter state Correct SSI offset Show SSI data
DHCCAP (Count vlaue capture)	DHCCAP — En — Module Capt1 — — ChNo Cmplt1 — — TrgSel Capt2 — Cmplt2 — Error — ErrCode —	Set a capture method Show captured count values
HCDO (Output point control)	HCDO — En — Module Dostate — — Update Error — — Dodata ErrCode —	Control output points Show output-point state
DHCCMP (Comparison output)	DHCCMP — En — Module Match1 — — ChNo Match2 — — Update Error — — Comp1 ErrCode — — Action1 — Yno1 — Comp2 — Action2 — Yno2	Enable/disable comparison output function Set two point comparison values Set comparison-matched actions Show comparison-matched status

Instruction	Symbol	Function
DHCCMPT (Table comparison output)	DHCCMPT – En – Module CurNo – – ChNo Error – – Update ErrCode – – CmpLen – CompS – ActionS – YnoS – Inos	Enable/disable table comparison output function Set comparison values for up to ten points Set comparison-matched action Show comparison-matched status
DHCMEAS (Rotation rate measurement)	DHCMEAS — En — Module Freq — — ChNo RPM — — Update Error — — Cnt/Rev ErrCode — — Smpl — Avg	Enable/disable measurement function Set average times Show measured frequency Show measured rotations per minute

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14.3.6 The impact of AS CPU Status on AS02HC-A

The following table lists the module execution states corresponding to AS CPU operation states of poweroff, and Run -> Stop. After the AS CPU state switches from Stop to Run, the operation state of AS02HC-A module is controlled by the PLC program.

ltem	Poweroff, CPU Run -> Stop	
Y0.0~Y0.3	Reset to OFF	
Phase Z	Disabled	
Counter	The counting stops and counter state is cleared.	
DHCCNT	The instruction is disabled.	
HCDO	The instruction is disabled.	
DHCCAP	The instruction is disabled.	
DHCCMP	The instruction is disabled; MATCH1 and MATCH2 are cleared.	
DHCCMPT	The instruction is disabled and CurNo is cleared.	
DHCMEAS	The instruction is disabled.	

14.4 Hardware Configuration via HWCONFIG in ISPSoft

14.4.1 Initial Setting

1. Start ISPSoft and then double-click **HWCONFIG**.

🜍 AS02HC - Delta ISPSoft - [Prog0]							- 🗆 X
Eile Edit View Compile PLC	Tools Wizard	Window Help					_ # × ;
🗋 🚅 🖬 🚭 🔲 🖬 🧇 🛛 🔇) 🖨 🖗 🖗 😫	i 🛃 🥭 😫 🗐 🗐	e 16	- 12 Q (L)			
💿 💿 🗶 🖻 🗖 🍠 🔍 👫 😘	Q Q 100%	- 👻 🎞 💱 🕯	1 🐿 🐿 🔟 🖳	l} ++ {] I™ :	③ ▲ · 主 + · ①		
Project 0 -				Local Symbols			Delta Library, Pre 🎗 🗙
E-C:Userswenlung.hao/Des	Class	Identifiers	Address	Type	Initial Value (Activ	Identifier Comment	Delta Library
Device Comment List Used Device Report HWCONFIG CARD Utility AS324MT (Untitled)							📧 — 🌍 Delta Library
E Jasks			•		nonnon A		
I AS32491 (United)	Network 1				-		
🖃 🚽 🚽 Global Symbols	-						
Main Table							
EtherNet/IP Table (Cor							
C Global Variables						2	
OPC UA Table							
Frograms							
Function Blocks							
🖉 Device Monitor Table							
C resource							Delta Library U: 🔍 🕨
							Preview 🔺
< >							Invest
Project							Preview

2. Click the Scan button.

Common	File	Edit	View	Commu	nication	Tool	Help	
	i Cut. V Copy	Paste	X Delete	Upload	Download	р Scan	On-line Mode	
Project Tre	e		#		Configuration			
Device				-	onfiguration	n 🖁 Sl	how Inform	nation 🛞 Input/Output Device Rearrang
AS	D2HC		-	Remarks:				
+ 🖬 De	vice 0 (A	AS324MT	-A)					
					1.1		Time	
						+		+
							(F) (B)	+

3. After the scanning is completed, AS02HC-A will appear in the following window.





4. Select AS02HC-A and set module parameters.

			Hardware Configuration
neral			
AS02HC-A	Device Information	Normal Exchange Area	
CH1 Setting	Device Name	AS02HC-A	
CH2 Setting	Description	2 channels high speed counter for incremental encoder or SSI absolute value encoder; 1 DI/ch, 2	*
Z-Phase Function Setting		DO/ch. Module Current Consumption: (internal)150mA, (external)0mA Module width: 35mm	1000
Alarm Setting		Module Which, Schim	DHC -
			- 1 1
	Comment		
	DDF Version	00.05.00	
	Firmware Version	(off-line)	
	Hardware Version	(off-line)	
	4.00		

Edit Are	ea							□ ×
								Hardware Configuration
Gene	ral							
- AS	502HC-A	CH1	Setting					
	CH1 Setting		Name	Setting Value	Unit	Default	Minimum	Maximum
	CH2 Setting	•	Input Interface	SSI Input 👻		OFF	-	-
	Z-Phase Function Setting		Encoder Coding Method	Gray Code 👻	Bi	Binary Code	-	-
	Alarm Setting		Clock Rate	1.25 MHz 👻		1 MHz	-	-
			SSI Data Format	User Defined 👻		12 MT +13 ST	-	-
			Data Length	31	bits	25	7	31
			Multi-Turn Length	16	bits	12	0	31
	8		Multi-Turn MSB Location	b30 👻		b24	-	-
			Single-Turn Length	16	bits	13	1	31
			Single-Turn MSB Location	b15 -		b12	-	-
			Status Length	0	bits	0	0	15
			Status MSB Location	b0 -		b0	-	-
			Parity Check	None 👻		None	-	-
			Counter Type	Ring counter 👻		Absolute Position	-	-
			Monoflop Time	4	16us	4	4	2500
			Maximum variation Limit	0		0	0	2147483647
De	fault Import Export		Update					

5. Close the setting page to finish the setting.

6. Click **Download** to download the configuration data. (The download can not be performed if the CPU is in RUN state)



14.4.2 Checking the Module Version

1. Click Common menu > On-line Mode.



2. Double-click **AS02HC** module to check the firmware version and hardware version.

Onlin	e	

			Hardware Configuration
General Diagnosis			
- AS02HC-A	Device Information	Normal Exchange Area	
CH1 Setting	Device Name	AS02HC-A	
CH2 Setting	Description	2 channels high speed counter for incremental encoder or SSI absolute value encoder; 1 DI/ch, 2 * DO/ch.	
Z-Phase Function Setting		Module Current Consumption: (internal)150mA, (external)0mA Module width: 35mm	
Alarm Setting		Module wildh. Sonin	010
	Comment		
	Continent		
		2	
	DDF Version	00.05.00 -	
	Firmware Version	00.04.09	
	Hardware Version	00.00.00	
	1141		

14.4.3 Online Mode

1. Click **On-line Mode** to enter the online mode.

0



2. Right-click **AS02HC** module and select **Hardware Configuration** or **Module State** from the context menu. Then the error code information can be seen in the module state window and module error log can be seen in the diagnosis area.

ine			
		Hardware Configuration 🔸	General

14.4.4 Import and Export a Parameter File

1. Click **Export** in the dialog box to save the current parameters as a dep file (.dep).

	Default	Import		Export	
Save As					×
1	> This PC > Desi	ktop > AS02HC >	s s	Search AS02HC	Q
Organize • Ne	w folder			1	. 0
This PC	^ Name	2		Date modified	Type
3D Objects Desktop Documents Downloads Music Pictures Videos Local Disk (C:)		iption File		10/12/2020 6:41 PM	File folder
→ 新增磁碟區((D:) v «				4
File name:	AS02HC-A.dep				Ģ
Save as type:	Files (*.dep)				~
▲ Hide Folders				Save	Cancel

.....

2. Click Import in the dialog box and select a dep file to save parameters.

.....

Open				×
↑ > This	PC > Desktop > AS02HC >	~ U	Search AS02HC	Q.
Organize * New folder			目・	
program ^	Name		Date modified	Туре
This PC	AS02HC.bak		10/12/2020 6:41 PM	BAK File
	AS02HC.dlhw		10/12/2020 6:42 PM	DLHW F
3D Objects	AS02HC.ecam		10/12/2020 6:41 PM	ECAM F
Desktop	AS02HC.etg		10/12/2020 6:45 PM	ETG File
Documents	AS02HC.ex		10/12/2020 6:42 PM	EX File
Downloads	AS02HC.hwc		10/12/2020 6:42 PM	HWC Fil
Music	AS02HC		10/12/2020 6:45 PM	Configu
Pictures	AS02HC		10/12/2020 6:41 PM	ISP File
Videos	AS02HC.pnt		10/12/2020 6:41 PM	PNT File
-	AS02HC.tag		10/12/2020 6:42 PM	TAG File
Local Disk (C:)	AS02HC-A.dep		10/12/2020 6:47 PM	DEP File
← 新增磁碟區 (D:)	logfile		10/12/2020 6:47 PM	Text Doc
Mohuark Y 4				>
File name	a: AS02HC-A.dep			~

.....

14.4.5 Parameters

1. Select one input interface in CH1 Setting / CH2 Setting.

							COUL CROWN		
Edit Area									□ ×
									Hardware Configuration
General									
- AS02H0	C-A	CH	11 Setting						
CH1	l Setting			Name	Setting Value	Unit	Default	Minimum	Maximum
CH2	2 Setting	Ø.	Input Ir	nterface	OFF 🝷		OFF	-	-
Z-PI	hase Function Setting	8			OFF Pulse Input				
Alar	m Setting				SSI Input				
Default	Import Export	:	Update						

2. Pulse Input in CH1 Setting / CH2 Setting.

Edit Area										- ×
										Hardware Configuration
General										
- AS02HC-A		CH1	Setting							
CH1 Settin	g			Name	Setting Val	ie	Unit	Default	Minimum	Maximum
CH2 Settin	g		Input Interface		Pulse Input	-		OFF	-	
Z-Phase Fu	nction Setting		Pulse Type		A/B phase (2x)	-		A/B phase (2x)	-	-
Alarm Setti	ing		Counter Type		Ring counter	-		Ring counter	-	-
Default	Import Export		Update							

3. SSI Input in CH1 Setting / CH2 Setting

								Hardware Configurati
eneral								
AS02HC-A	CH	1 Setting						
CH1 Setting		Name	Setting Value		Unit	Default	Minimum	Maximum
CH2 Setting	•	Input Interface	SSI Input	-		OFF	-	-
Z-Phase Function Setting		Encoder Coding Method	Gray Code	-		Binary Code	-	-
Alarm Setting		Clock Rate	1.25 MHz	-		1 MHz	-	-
		SSI Data Format	User Defined	*		12 MT +13 ST	-	-
		Data Length	31		bits	25	7	31
		Multi-Turn Length	16		bits	12	0	31
8	8	Multi-Turn MSB Location	b30	*		b24	-	-
	8	Single-Turn Length	16		bits	13	1	31
		Single-Turn MSB Location	b15	-		b12	-	-
		Status Length	0		bits	0	0	15
		Status MSB Location	b0	*		b0	-	-
		Parity Check	None	*		None	-	-
		Counter Type	Ring counter	-		Absolute Position	-	-
		Monoflop Time	4		16us	4	4	2500
		Maximum variation Limit	0			0	0	2147483647
			1		,			

4. Z-Phase Function Setting

Edit Area								
								Hardware Configuration
General								
- AS02HC-A	Z-P	Phase Function Setting						
CH1 Setting		Name		Setting Value	Unit	Default	Minimum	Maximum
CH1 Setting CH2 Setting Z-Phase Function Setting Alarm Setting	+	CH1 Z-Phase Function		Reset Counter+Yno 🔹		Reset Counter	-	-
Z-Phase Function Setting		CH2 Z-Phase Function		Reset Counter+Yno 👻		Reset Counter	-	-
Alarm Setting		Filter Time		0	100us	0	0	200
	_							
Default Import Export Update								
Default Import Export Update								

5. Alarm Setting

Edit Area								□ ×	
									Hardware Configuration
Ge	neral								
-	AS02HC-A		Alarm Setting						
	CH1 Setting			Name	Setting Value	Unit	Default	Minimum	Maximum
	CH2 Setting Z-Phase Function Setting		CH1 Ring	Counter Overflow/underflow De	C Enable		Enable	-	-
			CH1 SSI	Zero Crossing Detect	C Enable		Enable	-	-
	Alarm Setting	~	CH2 Ring Counter Overflow/underflow De		C Enable		Enable	-	-
•		CH2 SSI	Zero Crossing Detect	🗹 Enable		Enable	-		
	Default Import Export Update								

14.4.6 Normal Exchange Area

The data exchange area between the CPU and a module is in the Device Setting dialog box. The normal exchange areas for modules are different from one another. Special D registers are corresponded to automatically based on the configuration data for the convenience of directly reading the values. The error codes of AS02HC-A are configured in the Normal Exchange Area. The error codes of the module can be known by monitoring D registers.

Edit Area					□ ×
					Hardware Configuration
General					
- AS02HC-A	Device Information	Normal Exchange Area			
CH1 Setting	De	scription	Address	Identifier	Identifier Comment
CH2 Setting	+ - Input				
Z-Phase Function Setting	Error code		D28000		
Alarm Setting					
Default Import Export	Update				
_					

14.5 Troubleshooting

14.5.1 Error Codes

Error code	Description	ERR LED	Counter action	Remark	
16#1605	Counted result in the latched area is not retainable (major error) Module settings in the latched		The counter	The error alarm makes the CPU	
16#1606	area is not retainable. (major error)	ON	module stops operating and counting	stop the system. (The module need be set to keep counting or stop for when an error occurs in the module:)	
16#1607	Module setting error (major error)				
16#1800	Counter overflow / underflow on CH1	Blinking	Linear counter: Counting stops.	Linear counter: Counter value overflow inside the hardware Ring counter: After the Ring Counter	
16#1801	Counter overflow / underflow on CH2		Ring counter: Counting continues.	Overflow/Underflow Detect function is enabled in the Alarm Setting of HWCONFIG, the alarm will appear when the overflow or underflow occurs.	
16#1802	Linear count exceeding the set upper/lower limit on CH1	Blinking	The counting value is fixed at the set max. counter value or the set min. counter value.	The counting inside the hardware persists. When the internal counter value is back within the valid range, the counter returns to normal and the counting value is refreshed.	
16#1803	Linear count exceeding the set upper/lower limit on CH2	Diriking			
16#1804	The variation in relation to an SSI encoder position exceeding the limit on CH1	Blinking	The counting value is fixed at the most recent correct count value.	The variation between two consecutive SSI positions exceeds the setting value.	
16#1805	The variation in relation to an SSI encoder position exceeding the limit on CH2	Billining			
16#1806	Abnormal SSI communication on CH1	The counting value is fixed at the most	Encoder disconnection/ wiring error/no power supply to the encoder/ data format error/parity check setting error		
16#1807	Abnormal SSI communication on CH2	Dimining	recent correct count value.	(Error log will not appear unless five consecutive abnormal situations occur.)	
16#1808	SSI absolute position cross zero point on CH1			After the SSI Zero Crossing Detect function is enabled on the Alarm Setting tab page of the HWCONFIG software, the alarm will appear as the absolute position of the SSI encoder crosses the zero position.	
16#1809	SSI absolute position cross zero point on CH2	Blinking	Counting continues.		

14.5.2 Troubleshooting Procedure

Description	Solution			
Counted result in the latched area is not retainable (major error)	Counted data is lost. Switch the module power OFF and ON again. The error code is cleared by the system. Contact the factory if the problem persists.			
Module settings in the latched area is not retainable. (major error)	Module setting data is lost. Switch the module power OFF and ON again. Download the HWCONFIG settings again to clear the error code. Contact the factory if the problem persists.			
Module setting error (major error)	Check if the setting in HWCONFIG is consistent with the actual placement. Contact the factory if the problem persists.			
Counter overflow / underflow on CH1	Check the counter result. If the alarm is not required, disable the alarm output function in HWCONFIG. Use any of the followings to clear the			
Counter overflow / underflow on CH2	error code: clear, reset, preset the counter, restart the module, or execute DHCCNT instruction again.			
Linear count exceeding the set upper/lower limit on CH1	Check the signal received by channel 1 and 2. Hardware counter is still counting; when the number is back within the range of the maximum to the minimum, the error code will be cleared.			
Linear count exceeding the set upper/lower limit on CH2				
The variation in relation to a SSI encoder position exceeding the limit on CH1	Check if there is any interruption and check the device specification to			
The variation in relation to a SSI encoder position exceeding the limit on CH2	see if the offset setting is matching with the actual placement.			
Abnormal SSI communication on CH1	Check the execution of DHCCNT instruction. If it is parity check, check it			
Abnormal SSI communication on CH2	there is any interruption and check if the data format is correct. Check if the device wiring is secure, and if the encoder power supply is normal.			
SSI absolute position cross zero point on CH1	Check the SSI absolute encoder specification and modify the setting accordingly. If the alarm is not required, disable the alarm output function			
SSI absolute position cross zero point on CH2	in HWCONFIG. Use any of the followings to clear the error code: clear, reset, preset the counter, restart the module, or execute DHCCNT instruction again.			
Chapter 15 High-Speed Analog Input Module AS02ADH

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15.1 Overview

The AS02ADH module is a high-speed analog-to-digital module with two built-in channels. The conversion rate of analog to digital signals can be as fast as 20 µs per channel. Its two built-in channels are capable of sampling simultanelously. The channels are designed as isolated to reduce interferences and ensure the accuracy of the measured results. This chapter mainly introduces the specifications, functions and operation of the module. For software operation, ISPSoft, DIADesigner or DIADesigner-AX is what you need. If you are using AS Series PLC CPU, refer to ISPSoft User Manual or DIADesigner Manual for more information. The new software DIADesigner-AX only supports AX Series PLC CPU and AS Series modules now, refer to AX-3 User Manual for more information on software operation.

15.1.1 Characteristics

(1) High-speed conversion

The conversion rate of analog to digital signals can be as fast as 20 µs per sampling cycle for two channels simulanelously.

(2) High accuracy

Conversion accuracy: The error range for both voltage input and current input is $\pm 0.1\%$ at ambient temperature of 25° C.

(3) Fully insulation (insulation between channels included)

Apart from the design of separating the digital and analog signals, the insulation between channels is included to reduce interferences between channels and ensure stability.

(4) External input points triggering

By triggering the external input points to achieve recording the log in real time.

(5) Record function

At the speed of 20 µs, high-speed recording works with external input points triggering to activate recording the log continuously or just the execution points in real time.

(6) Use the tool software for easy settings

The HWCONFIG utility software is built into ISPSoft. You can set modes and parameters directly in HWCONFIG of ISPSoft or Hardware Configuration of DIADesigner without spending time writing programs to set registers to manage functions.

(7) Miscellaneous API instructions

The functions including recording log and peak value can be achieved through dedicated API instructions.

15.2 Specifications and Functions

15.2.1 Specifications

• Functional specifications

Module Name	AS02ADH-A
Number of input channels	2
Analog input	Voltage: -10 V to 10 V, 0 V to 10 V, 5 V to -5 V, 0 V to 5 V, 1 V to 5 V Current: -20 mA to 20 mA, 0 mA to 20 mA, 4 mA to 20 mA
Digital output	16-bit integer 32-bit floating point
Error rate	Room temperature: ±0.1% ; full temperature range: ±0.2%
Hardware resolution	16 bits
Input resistance value	Voltage: $\geq 2 M\Omega$ Current: 250 Ω
Absolute input range ^{*1}	Voltage: ±15 V Current: ±32 mA
Channel sampling Cycle ^{*2}	20 μs, 40 μs and 80 μs
Bandwidth of analog input signal	20 kHz
Average function	Time average, moving average: 1 to 1000 times
Digital filtering	Low-pass filter, band-pass filter
Logging function* ³	Digital output value (2000 per channel), peak value
Digital calibration	Maximum / minimum digital output value clipping, gain, offset
Abnoraml input signal detection	Limit-exceeding detection, disconnection detection#4
External input triggering	2 points (1 point / channel), rising-edge or falling-edge triggered
Maximum frequency of	
external input point	10 kHz
triggering	

*1: If an input signal exceeds the absolute range, it might damage the channel.

*2: Two channels are in A/D conversion simulanelously.

*3: Logging function should be used with API instructions.

*4: Disconnecton detecton can only be used in the modes of 4 mA to 20 mA and 1V to 5 V.

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Analog-to-Digital Conversion	Voltage Input				
Rated Input Range	-10 V to 10 V	0 V to 10 V	±5 V	0 V to 5 V	1 V to 5 V
Rated Conversion	K-32000	K0	K-32000	K0	K0
	to	to	to	to	to
Range	K32000	K32000	K32000	K32000	K32000
Hardware Input Limit*1	-10.12V	-0.12V	-5.06V	-0.06V	0.95V
	to	to	to	to	to
	10.12V	10.12V	5.06V	5.06V	5.05V
Conversion Limit* ²	K-32384	K-384	K-32384	K-384	K-384
	to	to	to	to	to
	K32384	K32384	K32384	K32384	K32384

• Conversion characteristics - Voltage

*1: If the input signal exceeds the hardware input limit, the module only shows the maximum value. If the input signal is below the lower limit, it only shows the minimum value.

*2: If the input signal exceeds the hardware input limit, it also exceeds the digital conversion limit and a conversion limit error appears. For example in the voltage input mode (-10 V to +10 V), when the input signal is 10.15 V, exceeding the hardware upper limit, it also exceeds the conversion upper limit. The module uses the upper limit value (32384) as the input signal and a conversion limit error appears.

• Conversion characteristics - Current

Analog-to-Digital Conversion	Current Input		
Rated Input Range	±20 mA	0 mA to 20 mA	4 mA to 20 mA
Rated Conversion Range	K-32000 to K+2000	K0 to K32000	K0 to K32000
Hardware Input Limit* ¹	-20.24 mA to 20.24 mA	-0.24 mA to 20.24 mA	3.81 mA to 20.19 mA
Conversion Limit*2	K-32384 to K32384	K-384 to K32384	K-384 to K32384

*1: If the input signal exceeds the hardware input limit, the module only shows the maximum value. If the input signal is below the lower limit, it only shows the minimum value.

*2: If the input signal exceeds the hardware input limit, it also exceeds the digital conversion limit and a conversion limit error appears. For example in the voltage input mode (4 mA to 20 mA), when the input signal is 0 mA, exceeding the hardware upper limit, it also exceeds the conversion upper limit. The module uses the upper limit value (-384) as the input signal and a conversion limit error appears.

• Electrical specifications

Module Name	AS02ADH-A	
Supply Voltage	24 VDC (20.4 VDC to 28.8 VDC) (-15% to +20%)	
Connector Type	Removable terminal block	
	An analog circuit is isolated from a digital circuit. The analog channels are isolated from one another.	
	Isolation between a digital circuit and a ground: 500 VAC	
Isolation	Isolation between an analog circuit and a ground: 500 VAC	
	Isolation between an analog circuit and a digital circuit: 500 VAC	
	Isolation between the 24 VDC and a ground: 500 VAC	
Rated voltage of	24.1/DC	
external input point	24 VDC	
Rated currentof external input point	5 mA	
Resistance value of external input point	3.9 kΩ	
Hardware response time of external input point OFF -> ON	5 µs	
Hardware response time of external input point ON -> OFF	5 μs	
Weight	154g	

15.2.2 Profile



Unit: mm

Number	Name	Description
1	Model Name	Model name of the module
		Status of the power supply
	POWER LED Indicator	ON: the power is on.
		OFF: the power is off.
		Error status of the module
	ERROR LED Indicator	ON: a serious error exists in the module.
		OFF: the module is operating normally.
2		Blinking: A minor error exists in the module.
		Input point status of the module
	Input Point Status Indicator	ON: the input point is functioning
		OFF: the input point is not functioning
		Analog-to-digital conversion status
	Analog to Digital Conversion Indicator	Blinking: conversion is in process.
		OFF: conversion has stopped.
3	Removable Terminal Block	Inputs are connected to sensors.
4	Arrangement of the Input/Output Terminals	Arrangement of the terminals
5	Terminal Block Clip	For removing the terminal block
6	DIN Rail Clip	Secures the module onto the DIN rail
7	Module Connecting Set	Connects the modules
8	Ground Clip	
9	Label	Nameplate

	S/S	X0.0
02ADH	S/S	X0.1
	٠	•
	V1+	AG1
	l1+	VI1-
	SLD	SLD
	V2+	AG2
• OT 024V 🗖	12+	VI2-
	٠	24V
	Ŧ	0V

15.2.3 Arrangement of Terminals

15.2.4 AS02ADH Control Register

*If you use HWCONFIG to set values in CRs, once the set value is downloaded, the values can be retained in the module; however if you use TO instruction to write data into CRs, the values CANNOT be retained, after power failure or after transition of the CPU from STOP to RUN.

CR#	Name	Description	Atr.	Defaults
0	E-mark O-turn	0: integer format	R	0
	Format Setup	1: floating point format	ĸ	0
		0: closed		
		1: -10 V to +10 V		
1	Channel 1 mode setup	2: 0 V to 10 V		
		3: -5 V to +5 V		
		4: 0 V to 5 V		
		5: 1 V to 5 V	R/W	1
		6: 0 mA to 20 mA		
2		7: 4 mA to 20 mA		
2	Channel 2 mode setup	8: -20 mA to +20 mA		
		Note: when the format is set as floating point		
		format, you can NOT change the mode through		
		TO instruction.		
3	Channel 1 offset	Range: -32768 to +32767	R/W	0
4	Channel 2 offset	Nange52700 to +52707		Ū
5	Channel 1 gain	Dense: 22769 to 122767	R/W	1000
6	Channel 2 gain	Range: -32768 to +32767		1000
7	Channel 1 filtering method	0: moving average 1: time average		
		2 : 50 Hz low-pass filter		
		3:60 Hz low-pass filter		
		4:1 kHz low-pass filter (for sampling cycle 40 μs and 80 μs only)		
8	Channel filtering method	5:3 kHz low-pass filter (for sampling cycle 40 μs and 80 μs only)	R/W	0
		6:5 kHz low-pass filter (for sampling cycle 40 μs and 80 μs only)		
		7:7 kHz low-pass filter (for sampling cycle 40 μs only)		
		8:9 kHz low-pass filter (for sampling cycle 40 μs only)		

Note: The attribute of the CR must be W (write) to use TO instruction.

Π

CR#	Name	Description	Atr.	Defaults
9	Channel 1 average times	 9 : 11 kHz low-pass filter (for sampling cycle 40 µs only) 10 : 1.5 to 3 kHz band-pass filter (for sampling cycle 40 µs and 80 µs only) 11 : 3 to 5.5 kHz band-pass filter (for sampling cycle 40 µs and 80 µs only) 12 : 5.5 to 8 kHz band-pass filter (for sampling cycle 40 µs only) 13 : 8 to 10.5 kHz band-pass filter (for sampling cycle 40 µs only) 13 : 8 to 10.5 kHz band-pass filter (for sampling cycle 40 µs only) Time average, moving average: 1 to 1000 times 	R/W	10
10	Channel 2 average times			
11	Channel sampling cycle	0: 20 μs 1: 40 μs 2: 80 μs	R/W	0
12	Channel 1 maximum digital output value	When the digital output value is out of the range (-32384 to 32384), the digital clipping is	R/W	32384
13	Channel 2 maximum digital output value	used to fix the exceeding value to the maximum digital output value.		
14	Channel 1 minimum digital output value	When the digital output value is out of the range (-32384 to 32384), the digital clipping is	R/W	-32384
15	Channel 2 minimum digital output value	used to fix the exceeding value to the minimium digital output value.		02004
16	Trigger method of the external input point X0.0	0: rising-edge trigger	R/W	0
17	Trigger method of the external input point X0.1	1: falling-edge trigger		
18	Digital filtering time of the external input point X0.0	0: OFF 1: 100 μs	R/W	
19	Digital filtering time of the external input point X0.1	2: 200 µs 3: 500 µs		0
20	Channel Alarm Setup	 0: enable channel alarm 1: disable channel alarm bit0: channel 1 analog input value exceeding the range detection bit1: channel 2 analog input value exceeding 	R/W	3

CR#	Name	Description	Atr.	Defaults
		the range detection		
		0: warning (minor error)		
		1: alarm (major error)		
		bit8: error in the external power supply		
		bit9: error in the module hardware		
		bit10: error in calibration		
21		When the format is set to integer in		
21	The minimum scale range	HWCONFIG, the scale range is invalid. When		
	for channel 1	the format is set to floating-point, the values		-10.0
22		are shown in HWCONFIG.		
		Here you can set the minimum and maximum		
23		scale ranges of corresponding floating-point		
	The minimum scale range	values for channels.		-10.0
0.4	for channel 2	For example, if the scale range for an analog to		10.0
24		digital input channel is ±10.0 V, it indicates the		
		maximum value is +10.0 V and the minimum	R	
25		value is -10.0 V.		
	The maximum scale range	If the scale range for an analog to digital input		10.0
26	for channel 1	channel is 4 mA to 20 mA. It indicates the		
		maximum value is 20 mA and the minimum value is 4 mA.		
		Note: You can use PLC instruction DSCLP		
27	The maximum scale range for channel 2	(API0217) and set SM685 to ON to use		
		floating-point operations when the conversion		10.0
28		range needs to edit.		

Item	Function	Description
1	Digital output format	Integer and floating point formats
2	Calibration	Calibrate a linear curve.
3	Average function	Conversion values are averaged and filtered for each channel.
4	Digital filtering	Low-pass filtering and band-pass filtering: to screen out unwanted frequency
5	Sampling cycle	The conversion rate of analog to digital signals can be set to 20 μ s, 40 μ s or 80 μ s per sampling cycle for two channels simultaneously.
6	External input point trigger for digital filtering	Input point filtering is available to reduce the chance of being triggered by mistake.
7	Digital output value range	When the digital output value is out of the range (-32384 to 32384), the digital clipping is used to fix the exceeding value to the maximum / minimum digital output value.
8	Channel detection and alarm	If an input signal exceeds the input hardware range, the module produces an alarm or a warning. You can disable this function.
9	Logging function	Used with instruction ADLOG and DADLOG (API 1424) to save the analog curves for channels.
10	Peak records for channels	Used with instruction ADPEAK and DADPEAK (API 1425) to save the maximum and minimum value for channels.
11	Disconnection Detection	Disconnection detection only operates when the analog range is 4 mA– 20 mA or 1 V–5 V.

15.2.5 Functions

1. Digital output format

You can choose integer (16-bits, binary format) or floating-point format for the digital output format. If you set the format to floating-point, you can set the scale range. The analog output mode of a channel has a corresponding digital range. Digital values correspond to analog outputs sent by the module. For example, if the analog range is -10 V to +10 V, the digital range is -10.0 to +10.0, the HSP scale is 10.0, and the LSP scale is -10.0. The digital values -10.0 to +10.0 correspond to the analog values -10 V to +10 V, as the example below shows.



2. Calibration

To make a curve meet specific needs, calibrate the curve by changing the offset and the gain. The calibration range depends on the range of inputs that the hardware can receive. The formula is:

$$Output = \frac{(Input \times Gain)}{1000} + Offset$$

Example:

A channel receives voltage inputs between -10.0 V to +10.0 V. The gain is 1000, and the offset is 0. The corresponding value for the original signal -10.0 V to +10.0 V is -32000 to +32000. If you change the offset to -100, the calibrated value for the original signal -10.0 V to +10.0 V becomes -31900 to +32100.



3. Average function

There are two kinds of averages, including moving average and time average; the setting range is 1 to 1000. When the setting value (sampling value) is 1, averaging is not executed. Moving average is to use the lastest N number of read values to perform averaging and thus the latest digital output values can be obtained. Thus in moving average, digital value updating cycle = sampling cycle. For time average, it is to accumulate sampling cycle for a time set and then perform averaging on the total value. Thus in time average, digital value updating cycle = sample, when the sampling cycle is 20 μ s and set the time to 1000, the digital value updating cycle is 200 ms (20 μ s x 1000).

Average	Setting range	Digital value updating cycle
Moving average		Sampling cycle
Time average	1~1000	Sampling cycle × times

4. Digital filtering

AS02ADH-A comes with various digital filters. You can use low-pass filter to screen out some specific frequency or use band-pass filter to perform filtering on some specific range of frequency. According to the sampling cycle, you choose an apporiate digital filter; refer the table below.

Sampling cycle Filter	20 µs	40 µs	80 µs
50 Hz low-pass filter	•	•	•
60 Hz low-pass filter	•	•	•
1 kHz low-pass filter	-	•	•
3 kHz low-pass filter	-	•	•
5 kHz low-pass filter	-	•	•
7 kHz low-pass filter	-	•	-
9 kHz low-pass filter	-	•	-
11 kHz low-pass filter	-	•	-
1.5~3 kHz band-pass filter	-	•	•
3~5.5 kHz band-pass filter	-	•	•
5.5~8 kHz band-pass filter	-	•	_
8~10.5 kHz band-pass filter	-	•	-





Low-pass filter									
Magning Mag									
	Sampling cycle fpass fstop Realization tin								
A labeless were filter	40 µs	1 kHz	2.5 kHz	1.28 ms					
1 kHz low-pass filter	80 µs	1 kHz	1.75 kHz	2.56 ms					
3 kHz low-pass filter	40 µs	3 kHz	4.5 kHz	1.28 ms					
	80 µs	3 kHz	3.75 kHz	2.56 ms					
5 kHz low-pass filter	40 µs	5 kHz	6.5 kHz	1.28 ms					
5 KHZ 10W-Pass Hitel	80 µs	5 kHz	5.75 kHz	2.56 ms					
7 kHz low-pass filter	40 µs	7 kHz	8.5 kHz	1.28 ms					
r knz iow-pass miter	80 µs	-	-	-					
	40 µs	9 kHz	10.5 kHz	1.28 ms					
9 kHz low-pass filter	80 µs	-	-	-					
11 kHz low-pass filter	40 µs	11 kHz	12.5 kHz	1.28 ms					
IT KILL IOW-Pass III.el	80 µs	-	_	_					



5. Sampling cycle

The conversion rate of analog to digital signals can be set to $20 \ \mu$ s, $40 \ \mu$ s or $80 \ \mu$ s per sampling cycle for two channels simultaneously. See the framework below.



Example:

The conversion rate of analog to digital signals used in this example is 20 µs per sampling cycle for two channels simultaneously.



6. External input point trigger for digital filtering

Input point filtering is available to reduce the chance of being triggered by mistake or interferences: you can set the digital filtering cycle to 0 (disabled), 100 μ s, 200 μ s, 500 μ s according to your requirement. The filtering cycle used in this example is 100 μ s.



7. Digital output range

When the digital output value is out of the range (-32384 to 32384), the digital clipping is used to fix the exceeding value to the maximum / minimum digital output value.



8. Channel detection and alarm

If an input signal exceeds the allowable hardware input range, an error message appears and error LED starts to blink. You can disable this function in the setting of Channel Detect and Alarm so that the module does not produce an alarm or a warning when the input signal exceeds the input range.

9. Logging function

AS02ADH can record 10000 piece of data, if used with instructions ADLOG and DADLOG (API 1424), you can set up the parameters, enable or disable recording for channels. Refer to section 6.15 (API14 Module Instructions) from AS Series Programming Manual for more information.

Instruction	Symbol	Functions
ADLOG (16-bit)	ADLOG — En — Group Datalog — — Module CurNo — — ChNo Cmplt — — Mode Error — — Period ErrCode — — Points — Postrig	Enable / disable recording Record mode: Fixed period, Fixed period + Trigger start, Point logging, Fixed period + Trigger position assign Recording cycle: multiples of 1~32000 Total number of all records: 1~2000 The number of records before/after being triggered: 0~2000
DADLOG (32-bit)	DADLOG — En — Group Datalog — — Module CurNo — — ChNo Cmplt — — Mode Error — — Period ErrCode — — Points — Postrig	When the output value is in floating-point format, you need to use this 32-bit instruction. The fuctions for 32-bit instruciton are the same as they are stated for 16-bit instruction above.

AS02ADH-A can record the shortest time (20 μ s) of data and the longest time (2.56 s) of data. It can also record by external input point triggering or as every single log recording. Up to 2000 pieces of data can be recorded. And there are four recording modes are available.

 Fixed period mode: Set Mode=0, the data recording would be performed according to the pre-defined record period when EN switches to ON. After the recording of a specified number of log points is complete, the Cmplt flag would be set to High automatically.
 Example:



(2) Fixed period + Trigger start mode: Set Mode=1 and switch instruction EN to ON before the recording starts. When a trigger signal is detected at the external input point, start recording based on the predefined record period. And the Cmplt flag is set to High automatically when completed. Before the recording is complete, any operation at the external input points does NOT affect the proceeding of record. When the recording of log points is complete and the Cmplt flag is High, trigger the external input points again to start a new cycle of recording; the instruction EN does NOT required to be turned OFF and then ON again to start another new recording.

Record	The signal source corresponding to the external input points
Channel	(Set the timing for external input trigger in HWCONFIG)
Channel 1	X0.0 rising-edge or falling-edge triggered
Channel 2	X0.1 rising-edge or falling-edge triggered

Example:

Set Points = 2000, the trigger timing for the external input point is set to rising-edge triggered.



The feature of Fixed period + Trigger Start is similar to Fixed period. But the start timing of recording in Fixed period mode would be delayed as a result of PLC scan time and module communication time, which is shown in the following illustration. It is assumed that M0 is the device to control EN of ADLOG instruction. We can see when M0 switches from OFF to ON, the module does not start recording immediately but with a slight delay.



(3) Point Logging mode: Set Mode=2, turn the instruction EN to ON before the recording starts. One log point would be recorded for each triggering at external input point until it reaches the pre-defined point number, Cmplt flag would set to High automatically. If you need to the recording to be continued after the Cmplt flag is set to High, execute the instruction again.

Record	The signal source corresponding to the external input points
Channel	(Set the timing for external input trigger in HWCONFIG)
Channel 1	X0.0 rising-edge or falling-edge triggered
Channel 2	X0.1 rising-edge or falling-edge triggered

Example:

Set Points = 2000, the trigger timing for external input point is set to rising-edge triggered.



(4) Fixed period + Trigger position Assign mode: Set Mode=3 and set parameters Points and PostTrg according to your requirements. This mode is to trigger at the external input point and record the predefined number of log points before and after the triggering occurs. When using EN to turn on this mode, AS02ADH-A would start waiting for signals to be triggered at external input. And the sampling would start right after, until it reaches the pre-defined point number, and then Cmplt flag would set to High automatically. The value in CurNo is 0 before triggered, and after triggered, the modules start to send the before-triggered data log to the PLC CPU. Therefore the value of CurNo would catch up to the number of accumulated log points.

Record	The signal source corresponding to the external input points
Channel	(Set the timing for external input trigger in HWCONFIG)
Channel 1	X0.0 rising-edge or falling-edge triggered
Channel 2	X0.1 rising-edge or falling-edge triggered

Example

Set **Mode**=3, **Points** = 2000, and **PostTrg** = 1500 so the position of point 501 (**Points** – **PostTrg**) would be the first record after an external trigger signal is detected.



10. Peak records for channels

AS02ADH can record 10000 piece of data, if used with instructions ADPEAK and DADPEAK (API 1425) to save the maximum and minimum value for channels. Refer to section 6.15 (API14 Module Instructions) from AS Series Programming Manual for more information.

Instruction	Symbol	Functions
ADPEAK (16-bit)	ADPEAK — En — Group MAX — Module MIN — ChNo Error — ErrCode	Enable / disable peak data recording
DADPEAK (32-bit)	DADPEAK — En — Group MAX — Module MIN — ChNo Error — ErrCode	When the output value is in floating-point format, you need to use this 32-bit instruction. The fuctions for 32-bit instruciton are the same as they are stated for 16-bit instruction above.

11. Disconnection detection

Disconnection detection only operates when the analog range is 4-20 mA or 1-5 V. If a module that can receive inputs between 4-20 mA or from 1-5 V is disconnected, the input signal exceeds the range of allowable inputs, so the module produces an alarm or a warning.

15.2.6 Wiring

• Precautions

To ensure the analog-to-digital module functions well and reliably, the external wiring must prevent noise. Before you install the cables, follow the precautions below.

- To prevent a surge and induction, the AC cable and the input signal cables that are connected to the module must be separate cables.
- (2) Do not install the cable near a main circuit, a high-voltage cable, or a cable connected to a load that is not a PLC. In addition, the cable must not be bound to a main circuit, a high-voltage cable, or a cable connected to a load which is not a PLC.
- (3) Ground shielded cables and hermetically sealed cables separately.
- (4) Terminals with insulation sleeves cannot be arranged as a terminal block, so you should cover the terminals with insulation tubes.
- (5) Use single-core cables or twin-core cables in a diameter of 24 AWG–22 AWG with pin-type connectors smaller than 1 mm. Use only copper conducting wires that can resist temperatures above 60° C-75° C.



- (6) Notes on two-wire, three-wire, and four-wire connections:
 - Two-wire connection/three-wire connection (passive transducer): connect the transducer and the analog input module to the same power circuit.
 - Four-wire connection (active transducer): the transducer uses an independent power supply so do not connect it to the same power circuit as the analog input module.
- (7) Note: use cables with the same length (less than 200 m) and use wire resistance of less than 20 ohm.



15.2.6.1 Digital Input Wiring

15.2.6.2 Analog Input Wiring



- *1. Use shielded cables to isolate the analog input signal cable from other power cables.
- *2. If the module is connected to a current signal, the terminals Vn and In+ (n=1-2) must be short-circuited.
- *3. If variability in the input voltage results in interference within the wiring, connect the module to a capacitor with a capacitance between 0.1–0.47 μ F and a working voltage of 25 V.
- *4. The wording "CHX" indicates that very channel can operate with the wiring presented above.
- *5. If the environment is severe or there is interferences in 24 V pwer supply, short-circuit AGn (n=1-2) and the input signal.



- *1. Use shielded cables to isolate the analog input signal cable from other power cables.
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• 2-wired



- *1. Use shielded cables to isolate the analog input signal cable from other power cables.
- *2. If the module is connected to a current signal, the terminals Vn and In+ (n=1-2) must be short-circuited.
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- *4. The wording "CHX" indicates that very channel can operate with the wiring presented above.
- *5. If the environment is severe or there is interferences in 24 V pwer supply, short-circuit AGn (n=1-2) and the input signal.

Printed as	Function	Description
PWR	Power indicator	Power status of the module ON: The power supply is normal. OFF: No power supply
ERR	ERROR indicator	Error status of the module ON: a major error occurs in the module. OFF: the module is operating normally. Blink: a minor error occurs in the module.
X0.0	X0.0 input status indicator	ON: The X0.0 input is active. OFF: The X0.0 input is not active.
X0.1	X0.1 input status indicator	ON: The X0.1 input is active. OFF: The X0.1 input is not active.
AD1	CH1 analog to digital conversion indicator	Analog-to-digital conversion status
AD2	CH2 analog to digital conversion indicator	Blinking: conversion is in process. OFF: conversion has stopped.

15.2.7 LED Indicators

15.3HWCONFIG in ISPSoft

15.3.1 Initial Setting

(1) Start ISPSoft and double-click **HWCONFIG**.



(2) Click Scan to see the available devices.

/ U nt	titled0 - HV	VCONFI	G															×
Comn	non File	Edit	View	Commun	nication	Tool H	lelp											
Save	🔏 Cut	Paste	Delete	(f) Upload	Download	Scan	On-line Mode											
Pro	Device 0 (A	.5332P-A)	# X			Scan (Ctrl+F7)											-
Project Tree	Reset Co Remarks:	onfigurati	ion 📕	Show Info	ormation	Input/	Output De	evic	Rearran	ange	Ser Ser	t All Tag		ag PU Groi	_	esize 🥴 🍭	100% *	Product List
														1odule		Input Devic	. Output De	
														CPU	AS332P-A		Y0.0 - Y0.15	
			2	R	1										Function Card	1		
			+		+										Function Card	1		

(3) After the scanning is completed, AS02ADH will appear in the following window.



(4) Select AS02ADH and set module parameters.

Edit Area		□ ×						
		Hardware Configuration						
General								
- AS02ADH-A	Device Information	Normal Exchange Area						
format	Device Name	AS02ADH-A						
CH1~CH2 Mode setting	Description	2 channels high-speed conversion of analog input : -10~+10V, 0~10V, -5~+5V, 0/1~5V, 0/4~20mA, -20~20mA; Conversion time = 20us/2channels; 1 Trigger imput/ch						
CH1~CH2 Calibration		Module Current Consumption: (internal)50mA, (external)90mA						
Sampling cycle		Module width: 35mm						
Average filter								
Output clipping		•						
External trigger input	Comment							
Detect and Alarm setting								
		*						
	DDF Version	01.00.00 *						
	Firmware Version	(off-line)						
	Hardware Version	(off-ine)						
	4	• • • • • • • • • • • • • • • • • • •						
Default Import Export	Default Import Export Update							

(5) Close the setting page to finish the setting.

neral								
AS02ADH-A	0	H1~CH2 Mode setting						
format		Name	Setting Valu	Je	Unit	Default	Minimum	Maximum
CH1~CH2 Mode setting	+	CH1 mode setting	-10V~+10V			-10V~+10V	*	4
CH1~CH2 Calibration		CH2 mode setting	-10V~+10V			-10V~+10V		4
Sampling cycle								
Average filter								
Output clipping								
External trigger input	1.2							
Detect and Alarm setting								

 (6) Click **Download** to download the configuration data. (The download can not be performed if the CPU is in RUN state)



15.3.2 Checking the Version of a Module

(1) Click **Common** menu > **On-line Mode**.



(2) Double-click AS02ADH module to check the firmware version and hardware version.



Edit Area		□ ×
		Hardware Configuration
General Diagnosis		
- AS02ADH-A	Device Information	Normal Exchange Area
format	Device Name	AS02ADH-A
CH1~CH2 Mode setting	Description	2 channels high-speed conversion of analog input : -10~+10V, 0~10V, -5~+5V, 0/1~5V, 0/4~20mA, -20~20mA; Conversion time = 20us/2channels; 1 Trigger imput/ch
CH1~CH2 Calibration		Module Current Consumption: (internal)50mA, (external)90mA
Sampling cycle		Module width: 35mm
Average filter		
Output clipping		×
External trigger input	Comment	· · · · · · · · · · · · · · · · · · ·
Detect and Alarm setting		
		*
	DDF Version	01.00.00 *
	Firmware Version	01.00.00
	Hardware Version	00.00.00
	4	۶. ۲
Default Import Export	Update	

15.3.3 Online Mode

(1) Click **On-line Mode** to enter the online mode.



(2) Right-click the module and click **Module State** or **Diagnosis**. You can find digital output value and error codes in **Module State** and the error log can be found in **Diagnosis**.



(1) View the module state.

🔏 AS02ADH	-A	×
Channel	Value (Decimal)	Value (Float)
Error code	0	0.000
CH1 Input	0	0.000
CH2 Input	0	0.000

15.3.4 Importing/Exporting a Parameter File

(1) Click **Export** in the dialog box to save the current parameters as a dep file (.dep).

	Default		Import	1	Export		
Save As						_	×
← · · ↑ ♣	> This PC > Downloads			× 0	Search Downloads		P
Organize * New	folder					用.+	0
 This PC 3 D Objects Desktop Documents Documents Music Pictures Wideos Local Disk (D) Local Disk (D) 		^ 	Date	modified	Type	Size	
File game:	AS02ADH-A						
Save as type:	Files (*.dep)						
∧ Hide Folders					Save	Cance	



(2) Click **Import** in the dialog box and select a dep file to save parameters.

)pen						0
↑ ↓ → 1	This PC > Downloads		× 0	Search Downloads		P
Organize * New fold	der			la In	• 💷	0
This PC	Name	-	Date modified	Туре	Size	
3D Objects	AS02ADH-A.de	p	3/23/2021 2:05 Pt	A DEP File		91
L Apple iPhone						
Desktop						
Documents						
Downloads						
Music						
Pictures						
Videos						
Local Disk (C:)						
						_
Network Y	· · ·					
File <u>p</u> a	ame: AS02ADH-A.dep					Y
				Open	Cancel	

15.3.5 Parameters

(1) Set up the parameters.

	format							
02ADH-A format	TORTINGE	Name	Setting Va	lue	Unit	Default	Minimum	Maxim
CH1~CH2 Mode setting	+ form		Integer format			Integer format		-
CH1~CH2 Calibration								
Sampling cycle								
Average filter								
Output clipping								
External trigger input	2							
Detect and Alarm setting								

(2) The CH1–CH2 (channel 1–channel 2) mode settings

neral								
AS02ADH-A	CH	II~CH2 Mode setting						
format		Name	Setting Valu	e	Unit	Default	Minimum	Maximun
CH1~CH2 Mode setting		CH1 mode setting	-10V~+10V	-		-10V~+10V	x	4
CH1~CH2 Calibration		CH2 mode setting	-10V~+10V	+		-10V~+10V	*	-
Sampling cycle								
Average filter								
Output clipping	-							
External trigger input	8							
Detect and Alarm setting								

(3) The CH1-CH2 calibration settings

neral							
AS02ADH-A	a	HI~CH2 Calibration					
format		Name	Setting Value	Unit	Default	Minimum	Maximum
CH1~CH2 Mode setting		CH1 Cal. Offset (V/mA)	0		0	-32768	32767
CH1~CH2 Calibration		CH2 Cal. Offset (V/mA)	0		0	-32768	32767
Sampling cycle		CH1 Cal. Gain	1000		1000	-32768	32767
Average filter		CH2 Cal. Gain	1000		1000	-32768	32767
Output clipping	- 8						
External trigger input	-						
Detect and Alarm setting	_						
Detect and Alarm setting							

(4) The sampling cycle settings

AS02ADH-A	Sa	mpling cycle							
format			Name	Setting	Value	Unit	Default	Minimum	Maximum
CH1~CH2 Mode setting	+	Sampling c	yde	20us			20us		4
CH1~CH2 Calibration	· .								
Sampling cycle									
Average filter									
Output clipping									
External trigger input	1.2								
Detect and Alarm setting									

(5) The average filter settings

eneral							
AS02ADH-A	Av	erage fiker					
format		Name	Setting Value	Unit	Default	Minimum	Maximum
CH1~CH2 Mode setting	+	CH1 filtering method	Moving average -		Moving average	*	4
CH1~CH2 Calbration		CH1 average times	10		10	1	1000
Sampling cycle		CH2 filtering method	Moving average -		Moving average		2
Average filter		CH2 average times	10		10	1	1000
Output clipping			12		140		
External trigger input							
Detect and Alarm setting	-						

(6) The output clipping settings

eneral							
AS02ADH-A	0	utput clipping					
format		Name	Setting Value	Unit	Default	Minimum	Maximum
CH1~CH2 Mode setting	+	CH1 upper limit	32384		32384	-32384	32384
CH1~CH2 Calibration		CH1 lower limit	-32384		-32384	-32384	32384
Sampling cycle		CH2 upper limit	32384		32384	-32384	32384
Average filter		CH2 lower limit	-32384		-32384	-32384	32384
Output clipping	8		12722		1.000	1000	1.000
External trigger input	8						
Detect and Alarm setting							

(7) The external trigger input settings

AS02ADH-A	E	xternal trigger input						
format		Name	Setting Value		Unit	Default	Minimum	Maximum
CH1~CH2 Mode setting		X0.0 Filter time	Disable	+		Disable	*	-
CH1~CH2 Calbration		X0.0 Trigger condition	Rising edge	+		Rising edge		4
Sampling cycle		X0.1 Filter time	Disable			Disable		4
Average fiter	_	X0.1 Trigger condition	Rising edge			Rising edge		4
Output clipping	. 8	2001 00 10 10 10 10 10 10 10 10 10 10 10				10.000		
External trigger input								
Detect and Alarm setting								
Detect and Alarm setting								

(8) The detect and alarm settings

AS02ADH-A	De	tect and Alarm setting					
format		Name	Setting Value	Unit	Default	Minimum	Maximun
CH1~CH2 Mode setting	+	CH1 over rage detect	Enable		Z Enable	*	4
CH1~CH2 Calbration		CH2 over rage detect	🗷 Enable		🗹 Enable		+
Sampling cycle		External power supply error	Alarm		Alarm		2
Average filter		Hardware error	Alarm		Alarm	4	4
Output clipping	8	adjustment error	Alarm		Alarm		
External trigger input		adjustment en or	Marm		L. Marine		-
Detect and Alarm setting							

15.4 Troubleshooting

15.4.1 Error Codes

Error	Description	$A \rightarrow D LED$	ERROR LED
Code	Description	Indicator	Indicator
16#1605		Run: Blinking	
10#1005	Hardware failure	Stop: OFF	ON
16#1606		Run: Blinking	
10#1000	The parameter setting is not consistent. (alarm)	Stop: OFF	ON
16#1607	The external voltage is abnormal. (alarm)	OFF	ON
40#4000		Run: Blinking	011
16#1608	The factory calibration is abnormal. (alarm)	Stop: OFF	ON
16#1801	The external voltage is abnormal.	OFF	Blinking
40#4000		Run: Blinking	
16#1802	Hardware failure	Stop: OFF	Blinking
16#1804		Run: Blinking	Dliabian
10#1004	The factory calibration is abnormal.	Stop: OFF	Blinking
16#1808	The signal received by channel 1 exceeds the range of inputs		
10#1000	that the hardware can receive.	Run: Blinking	Blinking
16#1809	The signal received by channel 2 exceeds the range of inputs	Stop: OFF	Diliking
10#1000	that the hardware can receive.		
			Blinking once
			or twice and
-	When power-on, the module is not detected by CPU module.	OFF	after 2
	· · · · · · · · · · · · · · · · · · ·		seconds, it
			blinks
			repeatedly

15.4.2 Troubleshooting Procedure

Description	Procedure
The external voltage is abnormal.	Make sure the external 24 V power supply to the module is functioning normally.
Hardware failure	Return the module to the factory for repair.
Internal error The factory calibration is abnormal.	Contact the factory.
The signal received by channel 1 exceeds the range of inputs that the hardware can receive.	Check the signal received by channel 1
The signal received by channel 2 exceeds the range of inputs that the hardware can receive.	Check the signal received by channel 2.
When power-on, the module is not detected by CPU module.	Check if the connection between module and CPU module is working. If not, connect again.