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AS Series Module Manual



# **AS Series Module Manual**



# **AS Series Module Manual**

## **Revision History**

Version	Revision	Date
1 st	The first version was published.	2016/11/30
2 <sup>nd</sup>	<ol> <li>Chapter 1: Added information concerning new models AS08AD-B and AS08AD-C.</li> <li>Chapter 2: Added information concerning new models AS08AD-B andAS08AD-C.</li> <li>Chapter 3: Updated information concerning CR#23-24 and software new screenshots.</li> <li>Chapter 4: Updated information concerning CR#35-54/CR#210-225 and software new screenshots.</li> <li>Chapter 5: Updated information concerning CR#1-4/CR#210-217 and software new screenshots.</li> <li>Chapter 6: Updated information concerning CR#210-217 and software new screenshots.</li> <li>Chapter 7: Updated information concerning theoretical calibration and software new screenshots</li> <li>Chapter 8: Updated information concerning new</li> </ol>	2017/07/07
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#### AS Series Module Manual Table of Contents

#### Chapter 1 Introduction

1.1 Ov	erview	1-2
1.2 Sp	ecifications	1-4
1.2.1	General Specifications	1-4
1.2.2	EMS Standards	1-5
1.2.2	.1 EMI	1-5
1.2.2	.2 EMS	1-5
1.2.2	.3 Conducted Immunity Test	1-5
1.3 In:	stallation	
1.3.1	Installing a Module	
1.3.2	Installing a Removable Terminal Block	1-6
1.3.3	Changing a Module	1-9
1.3.4	Installing and Removing an Extension Card	
1.3.5	Installing a Wiring Module	

#### Chapter 2 Analog Input Module AS04/08AD

2.1	Overview	2-2
2.1.	.1 Characteristics	2-2
2.2	Specifications and Functions	2-2
2.2.	.1 Specifications	2-2
2.2.	.2 Profile	2-4
2.2.	is , and generic of remain die management	
2.2.	.4 Control Registers	2-6
2.2.	.5 Functions	
2.2.	.6 Wiring	
2.2.	.7 LED Indicators	
2.3	HWCONFIG in ISPSoft	2-24
2.3.	.1 Initial Setting	
2.3.	.2 Checking the Version of a Module	
2.3.	.3 Online Mode	
2.3.	.4 Importing/Exporting a Parameter File	
2.3.	.5 Parameters	2-30
2.4	Troubleshooting	2-33
2.4.	.1 Error Codes	
2.4.	.2 Troubleshooting Procedure	

#### Chapter 3 Analog Output Module AS04DA

3.1	Ove	rview
3.1.	1	Characteristics
3.2	Spe	cifications and Functions3-2
3.2.	1	Specifications
3.2.	2	Profile
3.2.	3	Arrangement of Terminals 3-5
3.2.	4	Control Registers
3.2.	5	Functions
3.2.	6	Wiring
3.2.	7	LED Indicators
3.3	HW	CONFIG in ISPSoft
3.3.	1	Initial Setting
3.3.	2	Checking the Version of a Module
3.3.	3	Online Mode
3.3.	4	Importing/Exporting a Parameter File
3.3.	5	Parameters
3.4	Trou	ubleshooting
3.4.	1	Error Codes
3.4.	2	Troubleshooting Procedure 3-20
Chapt	er 4	Analog Input/Output Module AS06XA
4.1	Ove	rview
4.1.	1	Characteristics
4.2	Spe	cifications and Functions4-3
4.2.	1	Specifications
4.2.	2	Profile
4.2.	3	Arrangement of Terminals 4-7
4.2.	4	Control Registers 4-7
4.2.	5	Functions

4.2.7	LED Indicators	
4.3 HV	VCONFIG in ISPSoft	
4.3.1	Initial Setting	4-23
4.3.2	Checking the Version of a Module	
4.3.3	Online Mode	4-27
4.3.4	Importing/Exporting a Parameter File	

Wiring...... 4-20

Parameters ...... 4-29

4.2.6

4.3.5

4.4	Trou	ubleshooting4	-33
4.4.	.1	Error Codes 4	-33
4.4.	.2	Troubleshooting Procedure 4	-34

#### Chapter 5 Temperature Measurement Module AS04/06RTD

5.1 Over	rview5-2			
5.1.1	Characteristics			
5.1.2	Characteristics			
5.2 Spec	cifications and Functions5-3			
5.2.1	Specifications5-3			
5.2.2	Profile5-4			
5.2.3	Arrangement of Terminals5-6			
5.2.4	Control Registers5-7			
5.2.5	Functions			
5.2.6	Control Mode5-17			
5.2.7	Wiring 5-17			
5.2.8	LED Indicators 5-20			
5.3 HW0	CONFIG in ISPSoft5-20			
5.3.1 In	itial Setting			
5.3.2 Cł	necking the Version of a Module			
5.3.3 0	nline Mode			
5.3.4 In	nporting/Exporting a Parameter File5-25			
5.3.5 Pa	arameters			
5.4 Trou	Ibleshooting5-29			
5.4.1 Er	ror Codes			
5.4.2 Tr	5.4.2 Troubleshooting Procedure			
5.4.3 St	5.4.3 State of the Connection5-31			

#### Chapter 6 Temperature Measurement Module AS04/08TC

6.1	Ove	erview	6-2
6.1.	1	Characteristics	6-3
6.2	Spe	cifications and Functions	6-4
6.2.	1	Specifications	6-4
6.2.	2	Profile	6-4
6.2.	3	Arrangement of Terminals	6-6
6.2.	4	AS04TC Control Registers	6-6

6.2.5	AS08TC Control Registers	6-10
6.2.6	Functions	6-16
6.2.7	Control Mode	
6.2.8	Wiring	6-37
6.2.9	LED Indicators	6-38
6.3 HW	CONFIG in ISPSoft	6-38
6.3.1	Initial Setting	6-38
6.3.2	Checking the Version of a Module	
6.3.3	Online Mode	6-42
6.3.4	Importing/Exporting a Parameter File	
6.3.5	Parameters	6-44
6.4 Tro	ubleshooting	6-47
6.4.1	Error Codes	6-47
6.4.2	Troubleshooting Procedure	6-48

#### Chapter 7 Load Cell Module AS02LC

7.1	Ove	erview
7.2	Spe	cifications
7.2	.1	Specifications
7.2	.2	Profile
7.2	.3	Arrangement of Terminals7-4
7.2	.4	Control Registers
7.2	.5	Functions
7.2	.6	Wiring
7.3	Mak	king Adjustments7-18
7.3	.1	Steps to adjust points
7.3	.2	Adjustment settings / LC Wizard 7-19
7.3	.3	Adjustment settings / Instructional calibration 7-23
7.3	.4	LED Indicators
7.4	нw	CONFIG in ISPSoft7-26
7.4	.1	Initial Setting 7-26
7.4.	.2	Checking the Version of a Module
7.4.	.3	Online Mode 7-30
7.4	.4	Importing/Exporting a Parameter File 7-31
7.4	.5	Parameters

bleshooting7-34	1.5 Troublesh	.5	7
Error Codes			
Troubleshooting Procedure7-3	7.5.2 Trouble	7.!	

#### Chapter 8 Serial Communication Module AS00SCM

8.1	Introduction	8-3
8.2	Specification, Function and Wiring	8-4
8.2	.1 The functional specifications	8-4
8.2	.2 Dimensions and Profile	8-5
8.2	.3 Wiring	8-7
8	3.2.3.1 AS00SCM-A Power Wiring	
8	3.2.3.2 AS00SCM-A Communication Interface	
8.3	COM mode	
	.1 Modbus	
	.2 UD Link	
	3.3.2.1 TX Packets and RX Packets	
	3.3.2.2 Command	
	3 CANopen Mode	
	3.3.3.1 Features 3.3.3.2 Corresponding Input / Output Device Range	
c		
8.4	RTU Mode	
8.4	.1 CANopen Mode (AS-FCOPM)	
	3.4.1.1 AS Remote Communication Mode	
	3.4.1.2 Delta Special Driver & AS Remote Mode	
	3.4.1.3 CANopen DS301 Mode	
	2 EtherNet/IP Mode	
	3.4.2.1 Connecting to Delta PLC Scanner through EIP Builder	
8.4	3.4.2.2 Connecting to 3rd Party PLC Scanner through EIP Builder	
0.4		
8.5	Normal Exchange Area	8-29
8.6	Application	
	.1 Modbus	
8	3.6.1.1 Modbus Slave–Connection to Delta Products	
	3.6.1.2 Modbus Master–Connection to Delta Products	
8.6	.2 UD Link	
8.6	.3 Remote IO Application (AS-FCOPM)	
8.6	.4 Remote IO Application (AS-FEN02)	

8.6.5 Remote IO Application (Multiple AS-FEN02)	8-64
8.7 Error Codes	
8.7.1.1 ERROR LED Indicators are ON 8.7.1.2 ERROR LED Indicators Blinking Every 0.5 Seconds 8.7.2 Troubleshooting for Module AS00SCM-A as a Remote Module	8-67
8.7.2.1 ERROR LED Indicators Are ON 8.7.2.2 ERROR LED Indicators Blinking Every 0.5 Seconds 8.7.2.3 ERROR LED Indicators Blinking Every 0.2 Seconds	8-68

#### **Chapter 9 Function Cards**

9.1 In	ntroduction	9-2
9.2 Sp	pecification and Function	9-2
9.2.1	AS-F232	
9.2.2	AS-F422	
9.2.3	AS-F485	
9.2.4	AS-F2AD	
9.2.5	AS-F2DA	
9.2.6	AS-FCOPM	
9.2.7	AS-FEN02	
9.2.7	7.1 Supported Software and Firmware Versions	
9.2.7	7.2 Features	
9.2.7	7.3 Specifications	
9.2.7	7.4 Topology	
9.2.7	7.5 SM/SR	
9.2.7	7.6 Data Mapping through EtherNet/IP Adapter	
9.2.7	7.7 Example of Connecting to 3rd Party PLC Scanner through	n EIP Builder
		9-11
9.2.7	7.8 Data Mapping through Modbus TCP	9-15
9.2.7	7.9 Webpage	9-17
9.3 Pr	ofiles and Dimensions	9-21
9.3.1	AS-F232	9-21
9.3.2	AS-F422/AS-F485/AS-F2AD/AS-F2DA	9-21
9.3.3	AS-FCOPM	9-21
9.3.4	AS-FEN02	
9.4 W	iring	9-23
9.4.1	AS-F2AD	9-23
9.4.2	AS-F2DA	9-24

9.5 HW	CONFIG in ISPSoft9-24
9.5.1	Initial Setting
Chapter 1	0 DeviceNet Master Scanner Module AS01DNET-A
10.1 Inti	roduction of AS01DNET-A10-3
10.1.1	Feature
10.1.2	Specifications
	•
	nponents of AS01DNET-A10-4
10.2.1	Profile and Dimensions10-4
10.2.2	Components 10-5
10.2.3	Mode Toggle ( RTU- Master/Slave ) 10-5
10.2.4	DeviceNet Connector
10.2.5	Address Switch 10-6
10.2.6	Function Switch 10-6
10.2.7	Digital Displayer10-6
10.3 Dev	viceNet Network Communication10-7
10.3.1	Relationship between Transmission Distance and Baud Rate
10.3.2	DeivceNet Network Topology Structure
10.3.3	Choice and Purpose of a DeviceNet Terminal Resistor
10.3.4	DeviceNet Network Supply Power
	ster /Slave Mode10-13
10.4.1	Introduction of Master/Slave Mode 10-13
10.4.1	1Scan List, Input Table and Output Table
10.4.2	Installation
10.4.2	2.1Connecting AS01DNET-A Module to AS series PLC 10-14
10.4.2	2.2Connecting the DeviceNet Communication Connector 10-14
10.4.3	IO Mapping for AS01DNET in AS PLC 10-15
10.4.3	3.1Data Mapping between Modules and AS PLC 10-15
10.4.3	3.2Tables of Input Mapping and Output Mapping areas 10-16
10.4.4	Bit-strobe Command 10-17
10.4.4	10-17 I.1Bit-strobe Work Principle
10.4.5	Network Node Status Display 10-18
10.4.5	5.1Scan-List Node Status Indication 10-18
10.4.5	5.2Module Status Indication 10-18
10.4.6	Setting the Time for Data Exchange between Master and Slaves 10-18
10.4.7	Application Example Network Node Status Indication
10.4.7	7.1.Constructing One DeviceNet Network
	2.2.Using DeviceNet Builder to Configure a DeviceNet Network 10-21
	2.3.DeviceNet Network Control
10.4.8	Sending Explicit Message through Ladder Diagram

10.4.8	3.1.Principle of Explicit Message Transmission	
10.4.8	3.2.Explicit Message Transmission Instruction DNETRW	
10.4.9	LED Indicators and Troubleshooting	
10.4.9	9.1.NS LED	
10.4.9	9.2.MS LED	
10.4.9	9.3.Combination of MS LED and NS LED	
10.4.9	9.4.Digital Displayer	
10.4.10	Master-Slave Mode Switch and 8 Baud Rates Setting via Softwar	re10-39
10.4.1	10.1.Setting AS01DNET-A to Slave Mode	
10.4.1	10.2.Setting AS01DNET-A to Master Mode	
10.4.1	10.3.Baud Rate Setting of When AS01DNET-A is in Slave Mode	
10.4.1	10.4.Baud Rate Setting of When AS01DNET-A is in Master Mode .	
10.5 RT	J Mode	10-50
10.5.1	Introduction of AS01DNET (in RTU Mode)	
10.5.2	AS-Series Extension Modules Connectable to AS01DNET (RTU).	
10.5.3	Installation	
10.5.3	3.1.Installing AS01DNET (in RTU Mode)	
10.5.3	3.2.Connecting the Cable to DeviceNet Connector	
10.5.4	Configuring AS01DNET (in RTU mode)	
10.5.4	1.1.Terms	
10.5.4	1.2.Introduction of Software	
10.5.4	4.3.DeviceNet Mapping Data	
10.5.4	4.4.Connecting AS01DNET (RTU) to the Network	
10.5.5	Application Example	
10.5.5	5.1.Network Structure	
10.5.5	5.2.Using DeviceNet Builder to Configure the Network	
10.5.5	5.3. Using LD Program to Control the Entire Network	
10.5.6	Error Diagnosis and Trouble Shooting	
10.5.6	5.1.Indicator Diagnosis	
10.5.6	5.2.Codes in Seven-Segment Displayer	
10.5.6	5.3.Status Word Diagnosis	
10.5.6	5.4.Software Diagnosis	

10.6 How to Call DeviceNet Builder through ISPSoft (AS-Series PLC) ... 10-95

# Chapter 1 Introduction

# **Table of Contents**

1.1	Overview	.1-2
1.2	Specifications	.1-4
1.2	.1 General Specifications	1-4
1.2	2.2 EMS Standards	1-5
	1.2.2.1 EMI	
1	1.2.2.2 EMS	1-5
1	1.2.2.3 Conducted Immunity Test	1-5
1.3	Installation	.1-6
1 2		
1.3.	Installing a Module	1-6
1.3.		
	Installing a Removable Terminal Block	1-6
1.3	<ul> <li>Installing a Removable Terminal Block</li> <li>Changing a Module</li> <li>Installing and Removing an Extension Card</li> </ul>	1-6 1-9 . 1-10
1.3. 1.3.	<ul> <li>Installing a Removable Terminal Block</li> <li>Changing a Module</li> <li>Installing and Removing an Extension Card</li> </ul>	1-6 1-9 . 1-10

#### 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. They are described in the following table.

Classification	Model Name	Description		
		4-channel analog input module		
		Hardware resolution: 16 bits		
	AS04AD-A	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		
		8-channel analog input module		
		Hardware resolution: 16 bits		
	AS08AD-B	0–10 V, 0/1–5 V, -5 to +5 V, -10 to +10 V		
		Conversion time: 2 ms/channel		
		8-channel analog input module		
		Hardware resolution: 16 bits		
	AS08AD-C	0/4–20 mA, -20 to +20 mA		
Analog		Conversion time: 2 ms/channel		
input/output module	AS04DA-A	4-channel analog input module		
modulo		Hardware resolution: 12 bits		
		-10 to +10 V, 0–20 mA, 4–20 mA		
		Conversion time: 2 ms/channel		
		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		
	AS06XA-A	Conversion time: 2 ms/channel		
	A3007A-A	2-channel analog input module		
		Hardware resolution: 12 bits		
		-10 to +10 V, 0–20 mA, 4–20 mA		
		Conversion time: 2 ms/channel		
Tomrereture		4-channel, 2-wire/3-wire RTD		
Temperature	AS04RTD-A	Sensor type: Pt100 / Ni100 / Pt1000 / Ni1000 / JPt100 / LG-Ni1000 /		
measurement module		Cu50 / Cu100 / 0–300 $\Omega$ / 0–3000 $\Omega$ input impedance		
modulo		Resolution: 0.1°C/0.1°F (16 bits)		

Classification	Model Name	Description		
		Conversion time: 200 ms/channel		
		6-channel, 2-wire/3-wire RTD		
		Sensor type: Pt100 / Ni100 / Pt1000 / Ni1000 / JPt100 / LG-Ni1000 /		
	AS06RTD-A	Cu50 / Cu100 / 0–300 $\Omega$ / 0–3000 input impedance		
		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		
	A5041C-A	Resolution: 0.1°C/0.1°F (24 bits)		
		Conversion time: 200 ms/channel		
		8-channel thermocouple		
		Sensor type: J, K, R, S, T, E, N, B, and -100 to +100 mV		
	AS08TC-A	Resolution: 0.1°C/0.1°F (24 bits)		
		Conversion time: 200 ms/channel		
	AS02LC-A	2-channel, 4-wire/6-wire load cell sensor		
		Eigenvalue applicable to a load cell: 1, 2, 4, 6, 20, 40, 80 mV/V		
Load cell module		Highest precision: 1/10000 @ 50 ms of the conversion time		
module		ADC Resolution : 24 bits		
		Conversion time: 2.5–400 ms (nine options to choose from)		
Network	AS00SCM-A	Serial communication module, 2x communication ports, applicable to		
module		communication cards, supporting MODBUS protocols		
Damata 1/0	AS00SCM-A			
Remote I/O module	+	Applicable to AS-FCOPM function cards		
module	AS-FCOPM			
	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 cards	10 500511	CANopen communication port, supporting DS301, AS series remote		
T UNCOUN CALUS	AS-FCOPM	modules, and Delta servo systems		
		2-channel analog input		
	AS-F2AD	0–10 V (12 bits), 4–20 mA (11 bits)		
		Conversion time: 3 ms/channel		

Classification	Model Name	Description		
		2-channel analog input		
	AS-F2DA	0–10 V, 4–20 mA (12 bits)		
		Conversion time: 2 ms/channel		

# 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%		
	No condensation		
Storage humidity	5–95%		
	No condensation		
Work environment	No corrosive gas		
Installation location	In a control box		
Pollution degree	2		
Ingress protection	IP20		
(IP ratings)	11 20		
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 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 temperature-barometric pressure-altitude	Operating: 1080 ~ 795hPa (-1000 ~ 2000 m) Storage:1080 ~ 660hPa (-1000 ~ 3500 m)		

#### 1.2.2 EMS Standards

#### 1.2.2.1 EMI

Port	Frequency Range	Level (Normative)	Reference Standard
Enclosure port	30-230 MHz	40 dB (µV/m) quasi-peak	
(radiated)			
(measured at a	230-1000 MHz	47 dB (μV/m) quasi-peak	
distance of 10 meters)			
		79 dB (μV) quasi-peak	IEC 61000-6-4
AC power port	0.15-0.5 MHz	66 dB (μV) average	
(conducted)		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	Contact Air		±4 kV
Discharge	IEC 81000-4-2			±8 kV
Radio Frequency		80% AM,	2.0-2.7 GHz	1 V/m
Electromagnetic Field	IEC 61000-4-3	1 kHz	1.4-2.0 GHz	3 V/m
Amplitude Modulated	ted sinusoidal		80-1000 MHz	10 V/m
Power Frequency	IEC 61000-4-8	60 Hz 50 Hz		30 A/m
Magnetic Field	IEC 01000-4-8			30 A/m

#### 1.2.2.3 Conducted Immunity Test

Environmental Phenomenon		Fast Transient Burst	High Energy Surge	Radio Frequency Interference
Reference Standard		IEC 61000-4-4	IEC 61000-4-5	IEC 61000-4-6
Interface/Port	Specific Interface/Port	Test Level	Test Level	Test Level
Data communication	Shielded cable	1 kV	1 kV CM	10 V

Environmental Phenomenon		Fast Transient Burst	High Energy Surge	Radio Frequency Interference	
Reference Standard		IEC 61000-4-4	IEC 61000-4-5	IEC 61000-4-6	
Interface/Port	Specific Interface/Port	Test Level	Test Level	Test Level	
	Unshielded cable	1 kV	1 kV CM	10 V	
		2 10/	2 kV CM	40.1/	
	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	
		0.1.1/	2 kV CM	10 V	
	AC power	2 kV	1 kV DM		
Equipment power		2111	0.5 kV CM	10 V	
	DC power	2 kV	0.5 kV DM		
	AC I/O and AC auxiliary		2 kV CM	10.1/	
I/O power and	power	2 kV	1 kV DM	10 V	
auxiliary power output	DC I/O and DC auxiliary	2 kV	0.5 kV CM	10 V	
	power	ZKV	0.5 kV DM	IUV	

### 1.3 Installation

#### 1.3.1 Installing a Module

- 1. Press 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.

1-6



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 shown below.



#### 1.3.2 Installing a Removable Terminal Block

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

#### Installation

1. Level the terminal block at the printed circuit board, and press it into the module.



#### Removal

1. Pull down the clip in the direction indicated by the arrow and then pull the terminal block up

as illustrated below.



#### 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.



#### Removal

Press the tab labeled  $\Pr{\bigtriangleup}^{\bigtriangleup}$  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.
- 2. 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 Analog Input Module AS04/08AD

## **Table of Contents**

2.1	Ove	erview	2-2
2.1.	1	Characteristics	2-2
2.2	Spe	cifications and Functions	2-2
2.2.	1	Specifications	2-2
2.2.	2	Profile	2-4
2.2.	3	Arrangement of Terminals	2-6
2.2.	4	Control Registers	2-6
2.2.	5	Functions	2-11
2.2.	6	Wiring	2-20
2.2.	7	LED Indicators	2-24
2.3	нw	CONFIG in ISPSoft	2-24
2.3.	1	Initial Setting	2-24
2.3.	2	Checking the Version of a Module	2-27
2.3.	3	Online Mode	2-28
2.3.	4	Importing/Exporting a Parameter File	2-29
2.3.	5	Parameters	2-30
2.4	Tro	ubleshooting	2-33
2.4.	1	Error Codes	2-33
2.4.	2	Troubleshooting Procedure	2-34

#### 2.1 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.

#### 2.1.1 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 25 ms per 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 without spending time writing programs to set registers to manage functions.

#### 2.2 Specifications and Functions

#### 2.2.1 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%)		% to +20%)
Connector Type	Removable terminal block		<u> </u>
Conversion Time	2ms/channel		

	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 VDC
Isolation	Isolation between an analog circuit and a ground: 500 VDC
	Isolation between an analog circuit and a digital circuit: 500 VDC
	Isolation between the 24 VDC and a ground: 500 VDC
Weight	145g

#### • Functional specifications

Analog-to-Digital Conversion			Voltage Input		
Rated Input Range	-10 V to +10 V	0 V–10 V	±5 V	0 V–5 V	1 V–5 V
Digital Conversion Range	K-32000– K+32000	K0-K32000	K-32000– K+32000	K0–K32000	K0-K32000
Hardware Input	-10.1 V to	-0.1 V to	-5.05 V to	-0.05 V to	0.95 V–
Range	+10.1 V	+10.1 V	+5.05 V	+5.05 V	5.05 V
Error Rate (Room Temperature)			±0.2%		
Error Rate (Full Temperature Range)	±0. 5%				
Linearity Error (Room Temperature)	±0.02%				
Linearity Error (Full Temperature Range)	±0.06%				
Hardware Resolution			16 bits		
Input Impedance			<u>≥</u> 2MΩ		
Absolute Input Range			±15 V		

Analog-to-Digital Conversion		Current Input		
Rated Input Range	±20 mA	0 mA–20 mA	4 mA–20 mA	
Digital Conversion Range	K-32000 to K+32000	K0-K32000	K0–K32000	
Hardware Input Range	-20.2 mA to +20.2 mA	-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) (Full Temperature Range)	±0.04%			
Linearity Error		±0.10%		
Hardware Resolution	16 bits			
Input Impedance	250 Ω			
Absolute Input Range	±32 mA			

#### 2.2.2 Profile

#### • AS04AD-A



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.
_		OFF: the module is operating normally.
		Blinking: A minor error exists in the module.
	Analog to Digital	Analog-to-digital conversion status
	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



#### 2.2.3 Arrangement of Terminals

#### 2.2.4 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	Defaults
0	Format Satur	0: integer format	0
0	Format Setup	1: floating point format	0
1	Channel 1 made setur	0: closed	
	1 Channel 1 mode setup	1: -10 V to +10 V	
2	Channel 2 mode setup	2: 0 V–10 V	
2		3: -5 V to +5 V	
	Channel 3 mode setup	4: 0 V–5 V	1
3		5: 1 V–5 V	
	Channel 4 mode setup	6: 0 mA–20 mA	
4		7: 4 mA–20 mA	
		8: -20 mA to +20 mA	

CR#	Name	Description	Defaults
5	Channel 1 offset		
6	Channel 2 offset	Range: -32768 to +32767	0
7	Channel 3 offset	Kange32700 10 +32707	0
8	Channel 4 offset		
9	Channel 1 gain		
10	Channel 2 gain	Bangar 20769 to 120767	1000
11	Channel 3 gain	Range: -32768 to +32767	1000
12	Channel 4 gain		
13	Channel 1 average times		
14	Channel 2 average times		10
15	Channel 3 average times	Range: 1–100	10
16	Channel 4 average times		
17	Channel 1 filter average percentage		
18	Channel 2 filter average percentage	- Range: 0–3 Unit: ±10%	
19	Channel 3 filter average percentage	1: ±10% 2: ±20% 3: ±30%	1
20	Channel 4 filter average percentage	- 3. ±30%	
21	Channel sampling cycle (sampling/integration time)	0: 2 ms 1: 4 ms 2: 10 ms 3: 15 ms 4: 20 ms 5: 30 ms 6: 40 ms 7: 50 ms 8: 60 ms 9: 70 ms 10: 80 ms 11: 90 ms	0

CR#	Name	Description	Defaults
		12: 100 ms	
		0: open channel alarm	
		1: close channel alarm	
		bit0: channel 1	
		bit1: channel 2	
		bit2: channel 3	
22	Channel Alarm Setup	bit3: channel 4	0
		0: warning	
		1: alarm	
		bit8: error in the power supply bit9: error in the module hardware	
		bit10: error in calibration	
23	The minimum coole range		
20	The minimum scale range for channel 1		-10.0
24	The minimum scale range	For analog-digital modules, it is much more	
25	for channel 2	convenient if the system can convert digital values to	-10.0
20	The minimum scale range	floating-point values for earier understanding. Here you can set the minimum and maximum scale ranges	
28	for channel 3	of corresponding floating-point values for channels.	-10.0
20	The minimum scale range	For example, if the scale range for an analog to digital	
30	for channel 4	input channel is $\pm 10.0$ V, it indicates the maximum	-10.0
		value is +10.0 V and the minimum value is -10.0 V.	
31 32	The maximum scale range for channel 1	If the scale range for an analog to digital input channel	10.0
		is 4 mA ~ 20 mA. It indicates the maximum value is 20	
33	The maximum scale range for channel 2	mA and the minimum value is 4 mA. When the format	10.0
34		is set to integer in HWCONFIG, the scale range is invalid.	
35	The maximum scale range	You can also use PLC instruction DSCLP (API0217)	10.0
36	for channel 3	and set SM685 to ON to use floating-point operations.	
37	The maximum scale range		10.0
38	for channel 4		

faults
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#### AS300 Series Module Manual

CR#	Name	Description	Defaults
222	The time to record for channel 1		1
223	The time to record for channel 2	Unit: 10 ms	1
224	The time to record for channel 3	Range: 1–100 Time to record the digital value for the channel	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		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	
4500– 4999	Records for channel 2	500 records for channel 2	
5000– 5499	Records for channel 3	500 records for channel 3	
5500– 5999	Records for channel 4	500 records for channel 4	

#### 2.2.5 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	Defaults
0	Format Setup	0: integer format 1: floating point format	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	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	0
13	Channel 5 offset		
14	Channel 6 offset		
15	Channel 7 offset		
16	Channel 8 offset		
17	Channel 1 gain	Range: -32768 to +32767	1000

2

#### AS300 Series Module Manual

CR#	Name	Description	Defaults
18	Channel 2 gain		
19	Channel 3 gain		
20	Channel 4 gain		
21	Channel 5 gain		
22	Channel 6 gain		
23	Channel 7 gain		
24	Channel 8 gain		
25	Channel 1 average times		10
26	Channel 2 average times		
27	Channel 3 average times		
28	Channel 4 average times	Range: 1–100	
29	Channel 5 average times	Range. 1-100	
30	Channel 6 average times		
31	Channel 7 average times		
32	Channel 8 average times		
33	Channel 1 filter average		
	percentage		
34	Channel 2 filter average		
	percentage		
35	Channel 3 filter average		
	percentage	Range: 0–3	
36	Channel 4 filter average percentage	Unit: ±10%	
37	Channel 5 filter average	1: ±10% 2: ±20%	1
	percentage	3: ±30%	
38	Channel 6 filter average		
	percentage		
39	Channel 7 filter average percentage		
40	Channel 8 filter average		
	percentage		

CR#	Name	Description	Defaults
41	Channel Sampling Cycle (Sampling/Integration Time)	0: 2 ms	0
		1: 4 ms	
		2: 10 ms	
		3: 15 ms	
		4: 20 ms	
		5: 30 ms	
		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	0
	Channel Alarm Setup	1: close channel alarm	
		bit0: channel 1	
		bit1: channel 2	
		bit2: channel 3	
		bit3: channel 4	
		bit4: channel 5	
42		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	
		bit10: error in calibration	
43	The minimum scale range	For analog-digital modules, it is much more	
44	for channel 1	convenient if the system can convert digital values to floating-point values for earier understanding. Here you can set the minimum and maximum scale ranges	-10.0
45	The minimum scale range		
46	for channel 2		

#### AS300 Series Module Manual

CR#	Name	Description	Defaults	
47	The minimum scale range	of corresponding floating-point values for channels.		
48	for channel 3	For example, if the scale range for an analog to digital		
49	The minimum scale range	input channel is $\pm 10.0$ V, it indicates the maximum		
50	for channel 4	value is +10.0 V and the minimum value is -10.0 V.		
51	The minimum scale range	If the scale range for an analog to digital input channel		
52	for channel 5	is 4 mA ~ 20 mA. It indicates the maximum value is 20 mA and the minimum value is 4 mA. When the format		
53	The minimum scale range	is set to integer in HWCONFIG, the scale range is		
54	for channel 6	invalid.		
55	The minimum scale range	You can also use PLC instruction DSCLP (API0217)		
56	for channel 7	and set SM685 to ON to use floating-point operations.		
57	The minimum scale range			
58	for channel 8			
59	The maximum scale range			
60	for channel 1			
61	The maximum scale range			
62	for channel 2			
63	The maximum scale range			
64	for channel 3			
65	The maximum scale range			
66	for channel 4		40.0	
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	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		
		16#0201: enable recording for channel 1		
201	Instruction Set	16#0202: enable recording for channel 2	0	
201	Instruction Set	16#0204: enable recording for channel 3	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			
		16#0502: restore default settings		
210	The maximum peak value		0	
210	for channel 1			
211	The maximum peak value		0	
	for channel 2			
212	The maximum peak value		0	
	for channel 3			
213	The maximum peak value		0	
	for channel 4	Integer format; the maximum peak value for analog		
214	The maximum peak value for channel 5	inputs	0	
	The maximum peak value			
215	for channel 6		0	
	The maximum peak value			
216	for channel 7		0	
	The maximum peak value			
217	for channel 8		0	

### AS300 Series Module Manual

CR#	Name	Description	Defaults
218	The minimum peak value for channel 1		0
219	The minimum peak value for channel 2		0
220	The minimum peak value for channel 3		0
221	The minimum peak value for channel 4	Integer format; the minimum peak value for analog	0
222	The minimum peak value for channel 5	inputs	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	1
224	The time to record for channel 3	Time to record the digital value for the channels	1
225	The time to record for channel 4		1

# 2.2.6 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	Calibration	Calibrate a linear curve.
3	Average	Conversion values are averaged and filtered.
4	Disconnection	Disconnection detection only operates when the analog range is 4
4	Detection	mA–20 mA or 1 V–5 V.

ltem	Function	Description
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.

#### 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.



#### 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 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.



#### 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.



### 2.2.7 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  $0.1-0.47 \ \mu$ F 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 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.

### 2.2.8 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.

# 2.3 HWCONFIG in ISPSoft

The following example uses the AS04AD-A module.

### 2.3.1 Initial Setting

(1) Start ISPSoft and double-click HWCONFIG.



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

	HWCONFIG					
🚝 Eile Edit	Option Help					_ 8 X
	3 5 5 5	2. 3. 4				
Product List						
<ul> <li>⇒ AS300</li> <li>⇒ Digital I/O M</li> <li>⇒ Analog I/O M</li> <li>⇒ Analog I/O M</li> <li>⇒ AS04DA</li> <li>→ AS04DA</li> <li>→ AS06XA</li> <li>Specification</li> </ul>	Module	-	-)	04 AD +		
-10~+10V, 0~	20 mA,, -20mA-					
			1	¥	1	
CPI I Group						
CPU Group Extension No	Type	Module Name	DDF Versi	Input Device R	Output Device	Comment
	Туре	Module Name	DDF Versi	Input Device R	Output Device	Comment
		Module Name AS332T	DDF Versi	. Input Device R X0.0 ~ X0.15	Output Device Y0.0 ~ Y0.15	Comment
Extension No Power Module	CPU Module					Comment
Extension No Power Module CPU Module Function Ce Function Ce	CPU Module	AS332T			Y0.0 ~ Y0.15	Comment
Extension No Power Module CPU Module Function Ce Function Ce	CPU Module	AS332T	01.00.00	X0.0 ~ X0.15	Y0.0 ~ Y0.15	Comment

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

	HWCONFIG	-			-	
🚝 File Edit	Option Help	-				_ <i>8</i> ×
	3 3 5 5	2 30				
Product List						
-10~+10V, 0~	Module bits analog inpu -10V, -5~+5V, 20 mA,, -20mA~	• • •		AD +		
		<b>_</b>	£	*		
CPU Group			Loos Loos	1	12000200000	 
Extension No Power Module	Туре	Module Name	DDF versi	Input Device R	Output Device	Comment
FowerModule		AS332T	01.00.00	X0.0 ~ X0.15	Y0.0 ~ Y0.15	
E CPU Module			The strength		Liere Lieree	
CPU Module Function Ca Function Ca		_				
Function Ca Function Ca		AS04AD-A	00.50.00	D28000 ~ D2801		

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	(o#line)	
	Hardware Version	(off-line)	
Default Import	Export	Jordane	
			ок

(4) Choose a parameter, set the values, and click  $\ensuremath{\text{OK}}$  .

AS04AD-A format CH1~CH4 Mode setting CH1~CH4 Calibration average/life sampling time	Parameter name	Valu	e	Unit	Default	Minimum	Maximum
	CH1 average times	10		1999 B	10	1	100
	CH2 average times	10			10	1	100
	CH3 average times	10			10	1	100
Channel Detect	CH4 average times	10	-		10	1	100
	CH1 filter Proportion	10%	•		10%	1	+
	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.

	HWCONFIG					
🚝 File Edit	Option Help					- B X
	3 3 5 5	2 - 0				
Product List		Download (Ctrl+H	(9)			
-10~+10V, 0~	iodule Module bits analog inpu 10V, -5~+5V, 20 mA,, -20mA-			da AD +		
		<u> </u>	-	¥		
CPU Group						
Extension No	Туре	Module Name	DDF Versi	Input Device R	Output Device	Comment
	the second se				and the state of the	
Power Module	CPUIModule	A\$332T	01 00 00	X0.0 ~ X0.15	V0.0 ~ V0.15	
E CPU Module	C Provide a support doctory pro-	AS332T	01.00.00	X0.0 ~ X0.15	Y0.0 ~ Y0.15	
E CPU Module		AS332T	01.00.00	×0.0 ~ ×0.15	Y0.0~Y0.15	
E CPU Module Function Ca Function Ca			01.00.00	X0.0 ~ X0.15		
E CPU Module Function Ca Function Ca						
E CPU Module Function Ca Function Ca						

### 2.3.2 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.



þ	
_	

Device Setting Options			
ASIMAD-A format CH1**CH4 Mode setting CH1**CH4 Calibration average filter sampling time Channel Detect and Alarr	Device Name Description Comment DDF Version	Normal Exchange Area AS04AD-A 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) 00.50.00 01.00.00 00.00.00	
Elefault Invaart	Bigant C	pdate	ОК

### 2.3.3 Online Mode

(1) Click **Online Mode** on the toolbar.

Product List	Option <u>H</u> elp J J J J G G Online	Mode (Ctrl+F4)	_			
-10~+10V, 0~	dodule bits analog inp 10V, -5~+5V, 20 mA., -20mA	• • •	+			
		*				
CPU Group		<b>•</b>	-	×		
Extension No	Туре	Module Name	DDF Versi	Input Device R.,	Output Device	Comment
Extension No Power Module		Module Name				Comment
Extension No Power Module CPU Module	CPU Madule		DDFVersi	Input Device R X0.0 ~ X0.15	Output Device Y0.0 ~ Y0.15	Comment
Extension No Power Module	CPU Module	Module Name				Comment
Extension No Power Module CPU Module Function Ce Function Ce	CPU Module	Module Name				Comment

(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

### 2.3.4 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 💦
Save As			?
Save in: 📋 My Documents		-	<b></b>
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	Import 💦	Export	
Open			_	? 🔀
Look in:	'es			<b>Ⅲ</b> ▼
File name: Files of type:	CSV File (*.csv	n)	-	Open Cancel

### 2.3.5 Parameters

(1) The input formats of the channels

Device Setting Options						
B-AS04AD-A	format					
	Parameter name	Value Integer format 🔻	Unit	Default Integer format	Minimum	Maximum
- sampling time - sampling time - Channel Detect and Alarr				inne ger format		
Default Import	Export Update					OK

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

Device Setting Options - AS04AD-A - format	CH1 <sup>~</sup> CH4 Mode setting		1 1=14	Defeat	Minimum	Maximum
		Value	Unit	Default		Maximum
average filter	CH1 mode setting CH2 mode setting		-	-10V~+10V -10V~+10V	-	-
- sampling time	CH2 mode setting	-10V~+10V -10V~+10V		-10V +10V -10V~+10V	-	_
Channel Detect and Alarr	CH4 mode setting	-10V~+10V		-10V~+10V	-	_
Default Import	Export Update					ОК

#### (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

Device Setting Options						
AS04AD-A format CH1~CH4 Mode setting CH1~CH4 Calibration sampling time Channel Detect and Alarr	average filter Parameter name CH1 average times CH2 average times CH3 average times CH4 average times CH4 average times CH1 filter Proportion CH2 filter Proportion CH3 filter Proportion CH4 filter Proportion	Value 10 10 10 10 10 10 10%	•	Default 10 10 10 10 10 10 10% 10% 10% 10%	Minimum 1 1 1 1	Maximum 100 100 100 - - - -
Default Import	Export Update					OK

#### (5) The sampling time settings

Device Setting					
Options - AS04AD-A - format - CH1~CH4 Mode setting - CH1~CH4 Calibration - average filter - <u>Sempling Ime</u> - Channel Detect and Alarr	sampling time Parameter name Sampling time	Value 2ms ▼	Unit Default 2ms	-	Maximum -
Default Import	Export Update				ОК

(6) The channel detection settings

- AS04AD-A	Channel Detect and Alarm setting	js		
- 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 🚽	
- 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 Update			ок

# 2.4 Troubleshooting

### 2.4.1 Error Codes

Error	Description	$A \rightarrow D LED$	ERROR LED
Code	Description	Indicator	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		
10#1000	that the hardware can receive.		
16#1809	The signal received by channel 2 exceeds the range of inputs that		
10#1009	the hardware can receive.	Run: blinking	Blinking
16#180A	The signal received by channel 3 exceeds the range of inputs that	Stop: OFF	Diriking
10#100A	the hardware can receive.		
16#180B	The signal received by channel 4 exceeds the range of inputs that		
10#100B	the hardware can receive.		

Error Code	Description	A → D LED Indicator	ERROR LED Indicator
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.		
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 the hardware can receive.		

# 2.4.2 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.
The signal received by channel 7 exceeds the range of inputs that the hardware can receive.	Check the signal received by channel 7.
The signal received by channel 8 exceeds the range of inputs that the hardware can receive.	Check the signal received by channel 8.



# Chapter 3 Analog Output Module AS04DA

# **Table of Contents**

3.1	Overview
3.1.	1 Characteristics
3.2	Specifications and Functions
3.2.	1 Specifications 3-2
3.2.	2 Profile
3.2.	3 Arrangement of Terminals 3-5
3.2.	4 Control Registers 3-5
3.2.	5 Functions
3.2.	6 Wiring
3.2.	
5.2.	7 LED Indicators 3-11
0.121	7       LED Indicators       3-11         HWCONFIG in ISPSoft         3-12
3.2. <b>3.3</b> 3.3.	HWCONFIG in ISPSoft
3.3	HWCONFIG in ISPSoft
<b>3.3</b> 3.3.	HWCONFIG in ISPSoft3-121Initial Setting3-122Checking the Version of a Module3-15
<b>3.3</b> 3.3. 3.3.	HWCONFIG in ISPSoft3-121Initial Setting3-122Checking the Version of a Module3-153Online Mode3-16
<b>3.3</b> 3.3. 3.3. 3.3.	HWCONFIG in ISPSoft       3-12         1       Initial Setting       3-12         2       Checking the Version of a Module       3-15         3       Online Mode       3-16         4       Importing/Exporting a Parameter File       3-17
<b>3.3</b> 3.3. 3.3. 3.3. 3.3. 3.3. 3.3.	HWCONFIG in ISPSoft       3-12         1       Initial Setting       3-12         2       Checking the Version of a Module       3-15         3       Online Mode       3-16         4       Importing/Exporting a Parameter File       3-17
<b>3.3</b> 3.3. 3.3. 3.3. 3.3. 3.3.	HWCONFIG in ISPSoft       3-12         1       Initial Setting       3-12         2       Checking the Version of a Module       3-15         3       Online Mode       3-16         4       Importing/Exporting a Parameter File       3-17         5       Parameters       3-18         Troubleshooting

### 3.1 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).

### 3.1.1 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  $\pm 0.2\%$  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 without spending time writing programs to set registers to manage functions.

# **3.2 Specifications and Functions**

### 3.2.1 Specifications

#### • Electrical specifications

Module Name	AS04DA-A	
Number of Outputs	4	
Analog-to-Digital 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 VDC Isolation between an analog circuit and a ground: 500 VDC Isolation between an analog circuit and a digital circuit: 500 VDC Isolation between the 24 VDC and a ground: 500 VDC	
Weight	145 g	

Analog-to-Digital Conversion			Voltage Output	t	
Rated Output Range	±10 V	0 V~10 V	±5 V	0 V~5 V	1 V~5 V
Analog to Digital	K-32000	K0~K32000	K-32000	К0	K0
Conversion Range	~ K32000	KU~K32000	~ K32000	~ K32000	~ 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				
Output Impedance	≧1 kΩ ≧500 Ω				

### • Functional specifications

Analog-to-Digital Conversion	Current	t Output
Rated Output Range	0 mA–20 mA	4 mA–20 mA
Analog to Digital Conversion	k	<0 ~
Range	K32	2000
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	0.5%
Linearity Error (Room Temperature)	±0.	03%
Linearity error (Full Temperature Range)	±0.	.03%

Analog-to-Digital Conversion	Current Output
Hardware Resolution	12 bits
Output Impedance	<u>≤</u> 550 Ω

## 3.2.2 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	ERROR LED Indicator	OFF: the module is operating normally.
		Blinking: a minor error exists in the module.
	Analog to Digital Conversion Indicator	Analog-to-digital conversion status
		Blinking: conversion is in process.
		OFF: conversion has stopped.
3	Removable Terminal	Outputs are connected to loads to be driven.
5	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

Number	Name	Description
7	Module Connecting Set	Connects the modules
8	Ground Clip	
9	Label	Nameplate

### 3.2.3 Arrangement of Terminals



### 3.2.4 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	Defaults
0	Format Setup	0: integer format	0
		1: floating-point format	0
1	Channel 1 mode setup	0: closed	
	Channel I mode Setup	1: -10 V to +10 V (default)	
2	Channel 2 mode setup	2: 0 V–10 V	1
2		3: -5 V to +5 V	1
3	Channel 3 mode setup	4: 0 V–5 V	
5		5: 1 V–5 V	

### AS Series Module Manual

CR#	Name	Description	Defaults
	Channel 4 mode setup	6: 0 mA–20 mA	
4		7: 4 mA–20 mA	
5	Channel 1 offset		
6	Channel 2 offset	Dec. 20.700 to 1.00707	0
7	Channel 3 offset	Range: -32768 to +32767	0
8	Channel 4 offset		
9	Channel 1 gain		
10	Channel 2 gain		4000
11	Channel 3 gain	Range: -32768 to +32767	1000
12	Channel 4 gain		
13	Retaining an output sent		
	by channel 1		
14	Retaining an output sent	0: when the PLC stops, the value of the analog output is	
	by channel 2	reset to 0.	0
15	Retaining an output sent	1: when the PLC stops, the value of the analog output is	
	by channel 3	retained.	
16	Retaining an output sent by channel 4		
	Refreshing the time for an		
17	output sent by channel 1		
	Refreshing the time for an	Range: 10–3200 (100 ms–32000 ms)	
18	output sent by channel 2	Unit: 10 ms	0
19	Refreshing the time for an	Any value less than 10 is processed as 0. Any value	0
19	output sent by channel 3	larger than 3200 is processed as 3200. Set the value to 0 to disable this function.	
20	Refreshing the time for an		
	output sent by channel 4		
21	The minimum scale range	For digital-analog modules, it is much more convenient if	-10.0
22	for channel 1	the system can convert digital values to floating-point values for earier understanding. Here you can set the minimum and maximum scale ranges of corresponding	
23	The minimum scale range		-10.0
24	for channel 2		. 5.0
25	The minimum scale range	floating-point values for channels.	-10.0
26	for channel 3	For example, if the scale range for a digital to analog	-10.0
27	The minimum scale range	output channel is ±10.0 V, it indicates the maximum	-10.0

### Chapter 3 Analog Output Module AS04DA

CR#	Name	Description	Defaults
28	for channel 4	value is +10.0 V and the minimum value is -10.0 V.	
29	The maximum scale range	If the scale range for a digital to analog output channel is	10.0
30	for channel 1	4 mA ~ 20 mA. It indicates the maximum value is 20 mA	10.0
31	The maximum scale range	and the minimum value is 4 mA. When the format is set	10.0
32	for channel 2	to integer in HWCONFIG, the scale range is invalid. You can also use PLC instruction DSCLP (API0217) and	10.0
33	The maximum scale range	set SM685 to ON to use floating-point operations.	10.0
34	for channel 3	3 F	10.0
35	The maximum scale range for channel 4		10.0
36			
37	Channel alarm setup	0: warning 1: alarm bit0: error in the power supply	0
-		bit1: error in the module hardware	
		bit2: error in calibration	

### 3.2.5 Functions

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	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
4	Output	slope.
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.



#### 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:



#### 3. 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.



#### 4. 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.



### 3.2.6 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.

### 3.2.7 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.

# 3.3 HWCONFIG in ISPSoft

### 3.3.1 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 Device Setting page.



evice mormatio	n Normal Exchange Area	
vice Name	AS04DA-A	
scription	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	
mment		
)F Version	01,00.00	
mware Version	(off-line)	
irdware Version	(off-line)	
xport	Jostene	-
	vice Name scription mment IF Version mware Version rolware Version	vice Name AS04DA-A scription 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 F Version 01,00.00 mware Version(off-line)

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

Device Setting						
Options  Ch120000-A  format CH120004 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		Default -10V~+10V -10V~+10V -10V~+10V -10V~+10V	Minimum - - -	Maximum - - -
Default Import	Export Update				1	ОК

(5) Click **Download** on the toolbar to download the parameters. Note you cannot download the parameters cannot be downloaded.

HWCONFIG File Edit Option Help 2 3 Product List Download (Ctrl+F8) ⊟ A\$300 🖻 Digital I/O Module 🖻 Analog I/O Module AS04AD AS04DA A \$06XA AS04RTD AS04TC AS02LC 🖻 Network Module 🗄 Power Module Specification \* 4 channels 12 bits analog output : -10~+10V, 0~10V, -5~+5V, 0/1~5V, 0/4~20 mA, conversion time = 2ms/channel -

### 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.



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 mA, conversion time = 2ms/channel Module current consumption:(Internal)50mA.(External) 110mA	
	Comment		
	DDF Version	01.00.00	
	Firmware Version	01.00.00	
	Hardware Version	00.00.00.00	
Protont 1 month 1	Europe 1 1	Indata	
Delaul Ingon		00.00.00.00	-

### 3.3.3 Online Mode

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



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



(3) View the module status.

AS04DA-A		×
Channel	Value (32 bits)	Data Type
Error code	6145	DECIMAL
CH1 Output	0	DECIMAL
CH2 Output	0	DECIMAL
CH3 Output	0	DECIMAL
CH4 Output	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).

ave As	?
Save in: 📔 My Documents	- E 💣 🖩 -
My Pictures	
WinCHM Projects	
WinCHM Projects	Save



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

Default	Import N	Export

Open	2 🔀 😒
Look in: My Documents	
My Music My Pictures WinCHM Projects	

### 3.3.5 Parameters

(1) The output formats of the channels

Device Setting Options				
S04DA-A	format	1	1	
- CH1~CH4 Mode setting CH1~CH4 Calibration CutPut Setting Alarm settings	Parameter name	Value Unit Integer format 💌	Default Minimum Integer format -	-
DefaultImport	<b>Export</b> Update			ОК

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

Device Setting						
Options						
⊡- AS04DA-A format	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 <b>▼</b>		-10V~+10V	-	-
- Alarm settings	CH3 Output mode setting	-10V~+10V 💌		-10V~+10V	-	-
	EH4 Output mode setting	-10V~+10V 💌		-10V~+10V	-	-
Default Import	Export Update					OK

(3) The CH1–CH4 calibration settings

- AS04DA-A format	CH1~CH4 Calibration	1		1	
- CH1~CH4 Mode setting	Parameter name	Value	Unit Default		Maximum
- CH1~CH4 Calibration	CH1 Cal. Offset (V/mA)	0	0	-32768	32767
- OutPut Setting Alarm settings		0	0	-32768	32767
- Alam settings		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

### (4) The output settings

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

### (5) The alarm settings

Device Setting						
Options E-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	Unit	Default Alarm Alarm	Minimum	Maximum - -
DefaultImport	Export Update					OK

# 3.4 Troubleshooting

### 3.4.1 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	#1802 Hardware failure		Blinking
16#1804	The factory calibration is abnormal.	OFF	Blinking

## 3.4.2 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.



# Chapter 4 Analog Input/Output Module AS06XA

# **Table of Contents**

4.1	Overview
4.1.	1 Characteristics
4.2	Specifications and Functions4-3
4.2.	1 Specifications
4.2.	2 Profile
4.2.	3 Arrangement of Terminals 4-7
4.2.	4 Control Registers 4-7
4.2.	
4.2.	6 Wiring 4-20
4.2.	7 LED Indicators
	7 LED Indicators
4.3	HWCONFIG in ISPSoft
	HWCONFIG in ISPSoft4-23
4.3	HWCONFIG in ISPSoft       4-23         1       Initial Setting       4-23
<b>4.3</b> 4.3.	HWCONFIG in ISPSoft4-231Initial Setting4-232Checking the Version of a Module4-26
<b>4.3</b> 4.3. 4.3.	HWCONFIG in ISPSoft4-231Initial Setting4-232Checking the Version of a Module4-263Online Mode4-27
<b>4.3</b> 4.3. 4.3. 4.3.	HWCONFIG in ISPSoft4-231Initial Setting4-232Checking the Version of a Module4-263Online Mode4-274Importing/Exporting a Parameter File4-28
<b>4.3</b> 4.3. 4.3. 4.3. 4.3.	HWCONFIG in ISPSoft4-231Initial Setting4-232Checking the Version of a Module4-263Online Mode4-274Importing/Exporting a Parameter File4-28
<b>4.3</b> 4.3. 4.3. 4.3. 4.3. 4.3.	HWCONFIG in ISPSoft       4-23         1       Initial Setting       4-23         2       Checking the Version of a Module       4-26         3       Online Mode       4-27         4       Importing/Exporting a Parameter File       4-28         5       Parameters       4-29         Troubleshooting       4-33

### 4.1 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

### 4.1.1 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.

#### (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 ±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 without spending time writing programs to set registers to manage functions.

# 4.2 Specifications and Functions

# 4.2.1 Specifications

#### • Electrical specifications

Module Name	AS06XA-A
Number of Analog	4 inputs 2 outputs
Inputs/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
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 VDC Isolation between an analog circuit and the ground: 500 VDC Isolation between an analog circuit and a digital circuit: 500 VDC Isolation between the 24 VDC and the ground: 500 VDC
Weight	145 g

#### • Functional specifications for the analog-to-digital conversion

Analog-to-Digital Conversion	Voltage Input				
Rated Input Range	-10 V to +10 V	0 V–10 V	±5 V	0–5 V	1–5 V
Analog to Digital Conversion Range	K-32000 ~ K32000	K0 ~ K32000	K-32000 ~ K32000	K0 ~ K32000	K0 ~ K32000
Hardware Input Range	-10.1 V to +10.1 V	-0.1 V to +10.1 V	-5.05 V to +5.05 V	-0.05 V to +5.05 V	0.95– 5.05 V
Error Range (Room Temperature)			±0.2%		
Error Range (Full Temperature Range)			±0.5%		
Linearity error (Room Temperature)		±0.02%			

Linearity error (Full Temperature Range)	±0.06%
Hardware Resolution	16 bits
Input Impedance	2 ΜΩ
Absolute Input Range	±15 V

Analog-to-Digital Conversion		Current Input	
Rated Input Range	±20 mA	0–20 mA	4–20 mA
Analog to Digital	K-32000	К0	К0
Conversion Range	~ K32000	~ K32000	~ K32000
Hardware Input Range	-20.2 mA to +20.2 mA	-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)	±0.04%		
Linearity Error (Full Temperature Range)	±0.10%		
Hardware Resolution	16 bits		
Input Impedance	≧250 Ω		
Absolute Input Range		±32 mA	

• Functional specifications for the digital-to-analog conversion

Digital-to-Analog Conversion	Voltage Output				
Rated Output Range	±10 V	0–10 V	±5 V	0–5 V	1–5 V
Analog to Digital Conversion Range	K-32000 ~ K32000	K0 ~ K32000	K-32000 ~ K32000	K0 ~ K32000	K0 ~ K32000
Hardware Output Range	-10.1 V to +10.1 V	-0.1 V to +10.1 V	-5.05 V to +5.05 V	-0.05 V to +5.05 V	0.95– 5.05 V
Error Rate			±0.2%		

(Room Temperature)			
Error Range		±0.5%	
(Full temperature range)	±0.5%		
Linearity Error		±0.05%	
(Room Temperature)	±0.05%		
Linearity Error		±0.05%	
(Full Temperature Range)		±0.05%	
Hardware Resolution		12 bits	
Permissible load	≥1kΩ	≥500Ω	
impedance	<u> </u>	<u>~0001</u>	

Digital-to-Analog Conversion	Curr	rent Output
Rated Output Range	0–20 mA	4–20 mA
Analog to Digital	K0 ~	K0 ~
Conversion Range	K32000	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 (Full Temperature Range)		±0.10%
Hardware Resolution	12 bits	
Permissible Load Impedance		≦550 Ω

### 4.2.2 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.
-		OFF: the module is operating normally.
		Blink: a minor error exists in the module.
	Digital to Analog	Digital-to-analog conversion status
	Conversion Indicator	Blinking: conversion is in process.
		OFF: conversion has stopped.
3	Removable Terminal Block	Inputs are connected to transducers.
5	Removable Terminal Block	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

\_4



### 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	Defaults
0	Format Setup	0: integer format 1: floating point format	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	1
3	Input channel 3 mode setup	4: 0–5 V 5: 1–5 V	

### AS Series Module Manual

CR#	Name	Description	Defaults
	Input channel 4 mode	6: 0–20 mA	
4	setup	7: 4–20 mA	
		8: -20 mA to +20 mA	
5	Input channel 1 offset		
6	Input channel 2 offset	Range: -32768 to +32767	0
7	Input channel 3 offset	Kange32708 10 +32707	0
8	Input channel 4 offset		
9	Input channel 1 gain		
10	Input channel 2 gain	Den 201 00700 to 1 00707	1000
11	Input channel 3 gain	Range: -32768 to +32767	1000
12	Input channel 4 gain		
13	Input channel 1 average times		
14	Input channel 2 average times		
15	Input channel 3 average times	Range: 1–100	10
16	Input channel 4 average times		
17	Input channel 1 filter average percentage		
18	Input channel 2 filter average percentage	Range: 0–3 Unit: ±10%	
19	Input channel 3 filter average percentage	1: ±10% 2: ±20%	1
20	Input channel 4 filter average percentage	3: ±30%	
21	Input channel sampling cycle	0: 2 ms 1: 4 ms 2: 10 ms	0
	(sampling/integration time)	3: 15 ms 4: 20 ms	

CR#	Name	Description	Defaults
		5: 30 ms	
		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	
22	Input channel alarm setup	bit3: channel 4	
22			
		0: warning	
		1: alarm	
		bit8: error in the power supply	
		bit9: error in the module hardware	
		bit10: error in calibration	
23	Output channel 1 mode	0: closed	
23	setup	1: -10 V to +10 V (default)	
	Output channel 2 mode	2: 0–10 V	
	setup	3: -5 V to +5 V	1
24		4: 0–5 V	
24		5: 1–5 V	
		6: 0–20 mA	
		7: 4–20 mA	
25	Output channel 1 offset	Banga: 22769 to 122767	
26	Output channel 2 offset	Range: -32768 to +32767	0
27	Output channel 1 gain	Range: -32768 to +32767	
28	Output channel 2 gain		1000

### AS Series Module Manual

CR#	Name	Description	Defaults
29	Retain the output sent by channel 1	0: When the PLC stops, the value of the analog output is reset to 0.	0
30	Retain the output sent by channel 2	1: When the PLC stops, the value of the analog output is retained.	U
31	Refresh the time for output sent by channel 1	Range: 10–3200 (100 ms–32000 ms) Unit: 10 ms	
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.	0
33 34	The minimum scale range for input channel 1		-10.0
35 36	The minimum scale range for input channel 2		-10.0
37 38	The minimum scale range for input channel 3	For analog-digital modules, it is much more convenient if the system can convert digital values to floating-point values for earier understanding. Here you can set the	-10.0
39 40	The minimum scale range for input channel 4		-10.0
41 42	The minimum scale range for output channel 1	minimum and maximum scale ranges of corresponding floating-point values for channels.	-10.0
43 44	The minimum scale range for output channel 2	For example, if the scale range for an analog to digital input channel is $\pm 10.0$ V, it indicates the maximum value	-10.0
45 46	The maximum scale range for input channel 1	is +10.0 V and the minimum value is -10.0 V. If the scale range for an analog to digital input channel is 4 mA ~ 20 mA. It indicates the maximum value is 20 mA	10.0
47 48	The maximum scale range for input channel 2	and the minimum value is 4 mA. When the format is set to integer in HWCONFIG, the scale range is invalid.	10.0
49 50	The maximum scale range for input channel 3	You can also use PLC instruction DSCLP (API0217) and set SM685 to ON to use floating-point operations.	10.0
51 52	The maximum scale range for input channel 4		10.0
53 54	The maximum scale range for output channel 1		10.0
55	The maximum scale range		10.0

CR#	Name	Description	Defaults	
56	for output channel 2			
		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		
201	Instruction Set	16#0204: enable recording for channel 3	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		
		16#0502: restore default settings		
210	The maximum peak value			
210	for channel 1		-	
211	The maximum peak value		_	
211	for channel 2	Integer format; the maximum peak value for analog		
212	The maximum peak value	inputs	-	
	for channel 3			
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 analog inputs		
216	The minimum peak value			
	for channel 3			
217	The minimum peak value		-	

### AS Series Module Manual

CR#	Name	Description	Defaults
	for channel 4		
222	The time to record for channel 1		1
223	The time to record for channel 2	Unit: 10 ms Range: 1–100	1
224	The time to record for channel 3	Time to record the digital value for the channels	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		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	
4500- 4999	Records for channel 2	500 records for channel 2	
5000- 5499	Records for channel 3	500 records for channel 3	
5500- 5999	Records for channel 4	500 records for channel 4	

### 4.2.5 Functions

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

#### • Analog input

Item	Function	Description
1	Enable/Disable a	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	Average	Conversion values are averaged and filtered.
4	Disconnection	Disconnection detection only operates when the analog range is 4-20
	Detection	mA or 1–5 V.
	Channel Detect and	If an input signal exceeds the range of inputs that the hardware can
5	Alarm	receive, the module produces an alarm or a warning. You can disable
		this function.
6	Limit Detections for	Save the maximum/minimum values for channels
	Channels	
7	Records for	Save the appled curves for channels
	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). 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:

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

4-13

#### 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 -32100.

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 Channel	<ol> <li>Enable or disable a channel.</li> <li>If a channel is disabled, the total conversion time decreases.</li> </ol>
2	Calibration	Calibrate a linear curve.
3	Retain an Output	When a module stops running, the system retains the signal sent by the

Item	Function	Description	
		module.	
4	Refresh Time for an Output	Refresh the analog output value according to the value of the fixed slope.	
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 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 to +3200.



#### 3. Retain an Output

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

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.



<sup>\*</sup>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.



### 4.2.6 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  $\mu$ F and a working voltage of 25 V.

- \*4. Connect the shielded cable to the terminal FE and to the ground terminal.
- \*5. Connect the terminal 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.

### 4.2.7 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.
	Digital to Analog	Digital-to-analog conversion status
3	Conversion	Blinking: conversion is in process.
	Indicator	OFF: conversion has stopped.

4

### 4.3 HWCONFIG in ISPSoft

### 4.3.1 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	国 武   市 φ
Product List	
<ul> <li>A\$300</li> <li>Digital I/O Module</li> <li>Analog I/O Module</li> <li>A\$04AD</li> <li>A\$04DA</li> <li>A\$04DA</li> <li>A\$04RTD</li> <li>A\$04RTD</li> <li>A\$04TC</li> <li>A\$02LC</li> <li>Network Module</li> <li>Power Module</li> </ul>	
Specification	
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 <sub>22</sub> -20mA~20 mA conversion time = 2ms/channel	
	<b>x</b>

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



Options			
⊟ AS06XA-A	Device Informatio	n Normal Exchange Area	
- Input CH1 ~ CH4 Mode se - Input CH1 ~ CH4 Calibratic	Device Name	AS06XA-A	
<ul> <li>Input average filter</li> <li>Input sampling time</li> <li>Input Channel Detect and</li> <li>Output CH1 ~CH2 Mode s</li> </ul>	Description	4 channels 16 bits analog input 2 channels 12 bits analog autput :-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		
	DDFVersion	00.40.00	
	Firmware Version	(off-line)	
	Hardware Version		
<u> </u>			
Default Import	Export	Intere	
	-		OK

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

Options	Input CH1~CH4 Mode setting					
format Input CH1~CH4 Mode se	Parameter name	Value	ι.	Jnit 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	-	-
<ul> <li>Input sampling time</li> </ul>	Input CH3 mode setting	-10V~+10V	-	-10∨~+10∨	-	-
— Input Channel Detect and — Output CH1~CH2 Mode s	Input CH4 mode setting	-10V~+10V	•	-10V~+10V	-	-
Output CH1*CH2 Calibra:     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.

HWCONFIG	
🚰 File Edit Option Help	
	Q X 17 0
Product List	Tv3
<ul> <li>AS300</li> <li>Digital I/O Module</li> <li>Analog I/O Module</li> <li>AS04AD</li> <li>AS04DA</li> <li>AS04DA</li> <li>AS04TC</li> <li>AS02LC</li> <li>Network Module</li> <li>Power Module</li> </ul>	Download (Ctrl+F8)
Specification	
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	<u>*</u>

4-25

### 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.



AS06XA-A	Device Informatio	n Normal Exchange Area	
- format - Input CH1 ~ CH4 Mode se	Device Name	AS06XA-A	
<ul> <li>Input CH1<sup>™</sup>CH4 Calibratic</li> <li>Input average fifter</li> <li>Input sampling time</li> <li>Input Channel Detect and</li> <li>Output CH1<sup>™</sup>CH2 Mode s</li> <li>Output CH1<sup>™</sup>CH2 Calibratic</li> <li>Output Setting</li> </ul>	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)	
	Comment		
	DDF Version	00.40.00	
	Firmware Version	01.00.00	
	Hardware Version	00.00.00	
Delani Ingot 1	Expan U	Jodate	
Estanti Indian		puole	ок

### 4.3.3 Online Mode

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



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



(3) View the module status.

### 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).

Default	port Export
Save As	2 🛛
Save in: 📋 My Documents	- 🗈 🖆 📰 -
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	Import	Export	
Open				? 🔀
🕍 My Mus 🛃 My Picti		\$		
File name: Files of type	e: CSV File (*.cs	v]		Open Cancel

### 4.3.5 Parameters

(1) The input modes of the channels

Device Setting					
Options					
⊡ AS06XA-A	format				
<mark>format</mark> Input CH1~CH4 Mode se	Parameter name	Value	Unit Default	Minimum	Maximum
- Input CH1~CH4 Calibratic	<mark>format</mark>	Integer format 💌	Integer forma	t -	-
- 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	Input CH1~CH4 Mode setting					
- format Input CH1~CH4 Mode se	Parameter name	Value		Unit Default	Minimum	Maximum
- Input CH1~CH4 Calibratic	r Input CH1 mode setting	-10V~+10V	-	-10V~+10V	-	-
- Input average filter	Input CH2 mode setting	-10V~+10V	-	-10V~+10V	-	-
- Input sampling time	Input CH3 mode setting	-10V~+10V	•	-10\/~+10\/	-	-
Input Channel Detect and Output CH1~CH2 Mode s	Input CH4 mode setting	-10V~+10V	▼	-10\~+10\	-	-
- Output CH1~CH2 Calibra - OutPut Setting						
Default Import	Export Update					OK

#### (3) Input CH1–CH4 calibration

AS06XA-A	Input CH1~CH4 Calibration				
- Input CH1~CH4 Mode se	Parameter name	Value	Unit De	fault Minimum	Maximum
Input CH1~CH4 Calibratic	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 <sup>~</sup> CH2 Mode s	Input CH4 Cal. Offset (V/mA)	0	0	-32768	32767
- Output CH1 ~ CH2 Mode s	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				OK

4

#### (4) Input average filter

Device Setting						
Options						
□ AS06XA-A format	Input average filter					
- Input CH1~CH4 Mode se	Parameter name	Value	Unit	Default	Minimum	Maximum
-Input CH1~CH4 Calibratic	Input CH1 average times	10		10		100
<mark>Input a∨erage 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
	Input CH1 filter Proportion	10%	<b>•</b>	10%	-	-
	Input CH2 filter Proportion	10%	<b>-</b>	10%	-	-
2	Input CH3 filter Proportion	10%	•	10%	-	-
	Input CH4 filter Proportion	10%	<b>•</b>	10%	-	-
Default Import	Export Update					OK

#### (5) Input sampling time

Device Setting Options					
ASU6XA-A     format     Input CH1*CH4 Mode set     Input CH1*CH4 Mode set     Input CH1*CH4 Calibratic     Input average filter     Input average filter     Input Channel Detect and     Output CH1*CH2 Calibrat     Output CH1*CH2 Calibrat     Output Setting	Input sampling time Parameter name Input sampling time	Value 2ms 🔽	Unit Default 2ms	- Minimum	Maximum -
Default Import	Export Update			_	ОК

#### (6) Input channel detection and alarm settings

	Input Channel Detect and Alarm s	settings			
	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	-	-
<ul> <li>Input Channel Detect and Output CH1<sup>~</sup>CH2 Mode s</li> </ul>	Input CH4 overrage Detect	📃 Disable	📃 Disable	-	-
Output CH1 ~ CH2 Calibra Output CH1 ~ CH2 Calibra OutPut Setting	External power supply error	📃 Alarm	🗌 Alarm	-	-
	Hardware error	📃 Alarm	🗌 Alarm	-	-
	adjustment error	📃 Alarm	🗌 Alarm	-	-
Default Import	Export Update				ОК

4-31

### (7) Output CH1-CH2 mode settings

Device Setting						
Options  -AS06XA-A - format - Input CH1 <sup>~</sup> CH4 Mode se - Input CH1 <sup>~</sup> CH4 Calibratic - Input average filter - Input average filter - Input Channel Detect and - Output CH1 <sup>~</sup> CH2 Mode s - Output CH1 <sup>~</sup> CH2 Calibrat - OutPut Setting - OutPut Setting - OutPut Setting	Output CH1 <sup>°°</sup> CH2 Mode setting Parameter name Output CH1 mode setting Output CH2 mode setting	Value -10√**10√ -10√**10√	Ur V	nit Default -10V <sup>~+</sup> +10V -10V <sup>~+</sup> +10V	-	Maximum -
Default Import	Export Update					OK

#### (8) Output CH1-2 calibration

Device Setting						
Options						
⊡- AS06XA-A	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
<ul> <li>Input sampling time</li> </ul>	Output CH1 Cal. Gain	1000		1000	-32768	32767
<ul> <li>Input Channel Detect and</li> <li>Output CH1<sup>~</sup>CH2 Mode s</li> </ul>	Output CH2 Cal. Gain	1000		1000	-32768	32767
- Output CH1*CH2 Calibre - OutPut Setting						
Default Import	Export Update					OK
#### (9) Output Settings

Options	OutPut Setting					
format 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	Output CH1 Setting time(10ms)	0		0	0	3200
Input Channel Detect and Output CH1~CH2 Mode s	Output CH2 Setting time(10ms)	0		0	0	3200
Default Import	Export					OK

# 4.4 Troubleshooting

# 4.4.1 Error Codes

Error	Description	A↔ D LED	ERROR LED
Code	Description	indicator	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		
10#1000	that the hardware can receive.		
16#1809	The signal received by channel 2 exceeds the range of inputs that		
10#1009	the hardware can receive.	Run: blinking	Blinking
16#180A	The signal received by channel 3 exceeds the range of inputs that	Stop: OFF	Diriking
10#100A	the hardware can receive.		
16#180B	The signal received by channel 4 exceeds the range of inputs that		
10#100B	the hardware can receive.		

4

# 4.4.2 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.

# 5

# Chapter 5 Temperature Measurement Module AS04/06RTD

# **Table of Contents**

		verview5-2
	5.1.1	
	5.1.2	Characteristics
5.2	2 Sp	pecifications and Functions5-3
Ę	5.2.1	Specifications
Ę.	5.2.2	
5	5.2.3	Arrangement of Terminals 5-6
5	5.2.4	
ŗ	5.2.5	Functions
5	5.2.6	
ŗ	5.2.7	Wiring 5-17
[	5.2.8	
5.3	в н	WCONFIG in ISPSoft5-20
Į,	5.3.1	Initial Setting 5-20
		Checking the Version of a Module 5-23
5	5.3.3	Online Mode 5-24
Į,	5.3.4	Importing/Exporting a Parameter File 5-25
[	5.3.5	Parameters
5.4	↓ Tr	oubleshooting5-29
		Error Codes
		Troubleshooting Procedure
		State of the Connection

# 5.1 Overview

## 5.1.1 Characteristics

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.

## 5.1.2 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

#### (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 without spending time writing programs to set registers to manage functions.

# **5.2 Specifications and Functions**

# 5.2.1 Specifications

### • Electrical specifications

Module	AS04RTD-A	AS06RTD-A	
Number of Analog Inputs	4	6	
	2-Wire & 3-Wire Pt100/Ni100/Pt1000/Ni1000/JPt100/LG- Pt100: DIN 43760-1980 JIS C1604-1989	Ni1000/Cu50/Cu100/0–300 Ω/0–3000 Ω ; 100 Ω 3850 PPM/°C	
Applicable Sensor	Pt1000: DIN EN60751; 1 kΩ 3850 PPM/°C Ni100/Ni1000: DIN 43760 JPt100: JIS C1604-1989 LG-Ni1000		
Supply Voltage	Cu50/Cu100 24 VDC (20.4–28.8 VDC) (-15% to +20%	6)	
Connector Type	Removable terminal block		
Overall Accuracy	Pt100/Ni100/Pt1000/Ni1000/JPt100 25° C/77° F: The allowed error range is = -20° C to 60° C/-4° F to 140° F: The allow LG-Ni1000 25° C/77° F: The allowed error range is = Cu50 25° C/77° F: The allowed error range is = Cu100 25° C/77° F: The allowed error range is =	wed error range is ±0.5% of full scale. ±0.1% of full scale. ±4% of full scale.	
Conversion Time	Two-wire/Three-wire configuration: 200 r	ns/channel	
Isolation	An analog circuit is isolated from a digita optocoupler, and the analog channels are optocouplers. Isolation between a digital circuit and the Isolation between an analog circuit and t Isolation between an analog circuit and t	e isolated from one another by ground: 500 VDC he ground: 500 VDC he digital circuit: 500 VDC	

Weight	115 g	125 g

#### • Functional specifications

Analog-to-Digital Conversion	Centigrade (°C)	Fahrenheit (°F)	Input Impedance
Rated Input Range <sup>∗1</sup>	Pt100 : -180° C to +800° C Ni100 : -80° C to +170° 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 Cu100 : -50° C to +150° C	Pt100 : -292° F to +1,472° F Ni100 : -112° F to +338° 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 +356° F Cu50 : -58° F to +302° F Cu100 : -58° F to +302° F	0–300 Ω 0–3000 Ω
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.

# 5.2.2 Profile



Unit: mm

Number	Name	Description	
1	Model Name	Model name of the module	
2	RUN LED Indicator	Operating status of the module ON: the module is running.	

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



# 5.2.3 Arrangement of Terminals

# 5.2.4 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	Defaults
0	Format Setup	0: integer format	0
0	Format Setup	1: floating point format	U
	Channel 1 mode setup	0: closed	
1		1:0–300 Ω (default)	
		2 : 0–3000 Ω	
2	Channel 2 made actur	3 : Pt100	
2	Channel 2 mode setup	4 : JPt100	
		5 : Pt1000	1
3	Channel 3 mode setup	6 : Ni100	
		7 : Ni1000	
		8 : LG-Ni1000	
4	Channel 4 mode setup	9 : Cu50	
		10 : Cu100	
5	Channel 1 offset		
6	Channel 2 offset	- Range: -32768 to +32767	0
7	Channel 3 offset		
8	Channel 4 offset		
9	Channel 1 gain		
10	Channel 2 gain	Bongo: 20760 to 122767	1000
11	Channel 3 gain	— Range: -32768 to +32767	1000
12	Channel 4 gain		
13	Channel 1 average times		
14	Channel 2 average times		
15	Channel 3 average times	Range: 1–100	10
16	Channel 4 average times		
17	Channel 1 filter average percentage	Range: 0–3	
18	Channel 2 filter average percentage	 Unit: ±10%	1
	1		I

#### AS Series Module Manual

CR#	Name	Description	Defaults
19	Channel 3 filter average percentage		
20	Channel 4 filter average percentage		
		0: Fahrenheit	
21	Units of temperature	1: Celsius	0
		0: open channel alarm	
		1: close channel alarm	
		bit0: channel 1	
		bit1: channel 2	
		bit2: channel 3	
22	Channel alarm setup	bit3: channel 4	0
22			
		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 again for	
		channel 4	
201	Instruction set	16#010F: record the peak values again for	0
		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	
		16#0211: disable recording for channel 1	

# Chapter 5 Temperature Measurement Module AS04/06RTD

CR#	Name	Description	Defaults
		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	-
212	The maximum peak value for channel 3	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 value for	-
216	The minimum peak value for channel 3	analog inputs	-
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	1
224	The time to record for channel 3	The time to record the digital value for the	1
225	The time to record for channel 4	channels	1
240	The number of records for channel 1		0
241	The number of records for channel 2		0
242	The number of records for channel 3	Range: 0–500, display the current records	0
243	The number of records for channel 4		0
4000-			
4499	Records for channel 1	500 records for channel 1	
4500-			
4999	Records for channel 2	500 records for channel 2	
5000-			
5499	Records for channel 3	500 records for channel 3	
5500-	Records for channel 4	500 records for channel 4	
5999			

# 5.2.5 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	Defaults
0	Format Setup	0: integer format	0
0	Format Setup	1: floating point format	
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	
4	Channel 4 mode setup	6 : Ni100	
		7 : Ni1000	
5	Channel 5 mode setup	8:LG-Ni1000	
6		9 : Cu50	
6	Channel 6 mode setup	10 : Cu100	
7	Channel 1 offset		
8	Channel 2 offset		
9	Channel 3 offset		
10	Channel 4 offset	Range: -32768 to +32767	0
11	Channel 5 offset		
12	Channel 6 offset		
13	Channel 1 gain		
14	Channel 2 gain		
15	Channel 3 gain		4000
16	Channel 4 gain	Range: -32768 to +32767	1000
17	Channel 5gain		
18	Channel 6 gain		
19	Channel 1 average times	D 4 400	
20	Channel 2 average times	Range: 1–100	10

CR#	Name	Description	Defaults
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	
28	Channel 4 filter average percentage	Unit: ±10%	1
29	Channel 5 filter average percentage		
30	Channel 6 filter average percentage		
31		0: Fahrenheit	0
51	Units of temperature	1: Celsius	0
		0: open channel alarm	
		1: close channel alarm	
		bit0: channel 1	
		bit1: channel 2	
		bit2: channel 3	
		bit3: channel 4	
32	Channel alarm setup	bit4: channel 5	0
52		bit5: channel 6	
		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	
201	Instruction set	channel 2	0
		16#0104: record the peak value again for	
		channel 3	

CR#	Name	Description	Defaults
		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	
		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 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	
		clear setting values in the Flash	
210	The maximum peak value for channel 1		-
211	The maximum peak value for channel 2	Integer format; the maximum peak value for	-
212	The maximum peak value for channel 3	analog inputs	-
213	The maximum peak value for channel 4		-

CR#	Name	Description	Defaults
214	The maximum peak value for channel 5		-
215	The maximum peak value for channel 6		-
216	The minimum peak value for channel 1		-
217	The minimum peak value for channel 2		-
218	The minimum peak value for channel 3	Integer format; the minimum peak value for	-
219	The minimum peak value for channel 4	analog inputs	-
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	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		0
241	The number of records for channel 2		0
242	The number of records for channel 3	Denses 0, 200, display the surrout records	0
243	The number of records for channel 4	Range: 0–200, display the current records	0
244	The number of records for channel 5		0
245	The number of records for channel 6		0
4000	Poperde for channel 1	200 records for shannel 1	
-4199	Records for channel 1	200 records for channel 1	-
4500	Records for channel 2	200 records for channel 2	
-4699			_
5000	Records for channel 3	200 records for channel 3	_
-5199			
5500	Records for channel 4	200 records for channel 4	-
-5699			
6000	Records for channel 4	200 records for channel 5	-
-6199			
6500	Records for channel 4	200 records for channel 6	-
-6699			

## 5.2.6 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	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.



#### 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).

#### 5.2.7 Control Mode

- 1. Refer to section 6.2.7 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.

### 5.2.8 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 Ni100/Ni1000, Pt100/Pt1000, Cu50/Cu100, JPt100, and LG-Ni1000 temperature sensors, and keep them separate from power cables and other cables that generate noise. Use a three-wire temperature sensor. If you must use a two-wire temperature sensor, Ln+ and ln+ must be short-circuited, and Ln- and ln- also must be short-circuited (where n is between 1-4).
- \*2. If you want to measure resistance between 0-300  $\Omega$ , use a two-wire or three-wire sensor instead of a four-wire sensor.
- \*3. You must select an appropriate sensor. If you are using a Ni100 temperature sensor, a Pt100 sensor, a JPt100, a Cu50/Cu100, or a resistance sensor, the internal excitation current is 1.53 mA. If you are using a Ni1000 temperature sensor, a Pt1000 temperature sensor, or a LG-Ni1000 sensor, the internal excitation current is 204.8 μA.

#### (2) AS04RTD-A



- \*1. Use shielded twisted pair cables for Ni100/Ni1000, Pt100/Pt1000, Cu50/Cu100, JPt100, and LG-Ni1000 temperature sensors, and keep them separate from power cables and other cables that generate noise. Use a three-wire temperature sensor. If you must use a two-wire temperature sensor, Ln+ and ln+ must be short-circuited, and Ln- and ln- also must be short-circuited (where n is between 1–4).
  - \*2. If you want to measure resistance between 0-300  $\Omega$ , use a two-wire or three-wire sensor instead of a four-wire sensor.
- \*3. You must select an appropriate sensor. If you are using a Ni100 temperature sensor, a Pt100 sensor, a JPt100, a Cu50/Cu100, or a resistance sensor, the internal excitation current is 1.0389 mA. If you are using a Ni1000 temperature sensor, a Pt1000 temperature sensor, or a LG-Ni1000 sensor, the internal excitation current is 208.3 μA.

## 5.2.9 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.
	Digital-to-Analog	Digital-to-analog conversion status
3	Conversion	Blinking: conversion is in process.
	Indicator	OFF: conversion has stopped.

# 5.3. HWCONFIG in ISPSoft

# 5.3.1 Initial Setting

The following uses 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 Informatio	n Normal Exchange Area	
- 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	(o#line)	
( ) ) )	Hardware Version	(off-line)	

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

Device Setting Options								
B- AS04RTD-A - format - CH1 <sup>∞</sup> 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 – Temperature measureme	CH2 mode setting	0~300ohm	•		0~300ohm	-	-	
- Channel Detect and Alarr	CH3 mode setting	0~300ohm	•		0~300ohm	-	-	
	CH4 mode setting	0~300ohm	•		0~300ohm	-	-	
4								
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**.



5

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



Options				
AS04RTD-A format CH1*CH4 Mode setting CH1*CH4 Calibration average filter Temperature measureme Channel Detect and Alarr	Device Information Device Name Description	conversion time = 200ms/channel	-	
	Comment			
	DDF Version	00.40.00	-	
	Firmware Version	01.00.00	- 1	
	Hardware Version	00.00.00.00	-	-
Delault Ingad	Export U	Jpdate		
				ОК

## 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.

	×
Value (32 bits)	Data Type
6145	DECIMAL
0	DECIMAL
	6145 0 0 0

# 5.3.4 Importing/Exporting a Parameter File

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

De	efault	Import		(Exp	iort 💦
Save As					? 🛛
Save in:			2		<
File name:	1			- 1	Save
Save as type:	CSV File (*.csv)				Cancel
	<sup>™</sup> a,	04RTD Microsoft 7 KB	Office	Excel	

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

	Default	[ Import ]	Export	
Open Look in:	My Documents	-	र मधार	2 S • • • •
My Music My Picture	s			
File name: Files of type:	CSV File (*.csv	i.	T	Open Cancel

# 5.3.5 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 Integer format ▼	Default Minimum Integer format	- Maximum
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	-	-
- Chamer Detect and Alan	CH4 mode setting	0~300ohm	▼		0~300ohm	-	-
<b>ч</b> р							
Default Import	Export						ОК

#### (3) Input CH1-CH4 calibration

∃- AS04RTD-A format	CH1~CH4 Calibration					
- 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					ок

5

## (4) Input average filter

De	evice Setting							
	Options							
	- AS04RTD-A - format	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%	Ŧ		10%	-	-
		CH2 filter Proportion	10%	Ŧ		10%	-	-
		CH3 filter Proportion	10%	•		10%	-	-
		CH4 filter Proportion	10%	Ŧ		10%	-	-
	4							
	Default Import	Export Update						ОК

#### (5) Temperature measurement

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

(6) Input channel detection and alarm settings

AS04RTD-A	Channel Detect and Alarm setting	s			
- format - CH1~CH4 Mode setting	Parameter name	Value	Unit Default	Minimum	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	-	-
٩ ٢					
Default Import	Export				ОК

# 5.4 Troubleshooting

# 5.4.1 Error Codes

Error	Description	A↔ D LED	ERROR LED
Code	Description	Indicator	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		
10#1000	that the hardware can receive.		
16#1809	The signal received by channel 2 exceeds the range of inputs that		
10#1009	the hardware can receive.	Run: blinking	Blinking
16#180A	The signal received by channel 3 exceeds the range of inputs that	Stop: OFF	Diritang
10#100A	the hardware can receive.		
16#180B	The signal received by channel 4 exceeds the range of inputs that		
10#1000	the hardware can receive.		

Error Code	Description	A↔ D LED Indicator	ERROR LED Indicator
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.		

# 5.4.2 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.	

Sta	State of connection		
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		
*1: for AS06RT	TD Series: in t	he modes of C	-300Ω and 0-3000Ω, it cannot detect I- state of connection.

# 5.4.3 State of the Connection

5

MEMO

# 6

# Chapter 6 Temperature Measurement Module AS04/08TC

# **Table of Contents**

6.1	Overview	
6.1.	1 Characteristics	6-3
6.2	Specifications and Functions	6-4
6.2.3	1 Specifications	6-4
6.2.2	2 Profile	6-4
6.2.3	3 Arrangement of Terminals	6-6
6.2.4	4 AS04TC Control Registers	6-6
6.2.	5 AS08TC Control Registers	6-10
6.2.6	-	
6.2.7	7 Control Mode	6-19
6.2.8		
6.2.9		
6.3	HWCONFIG in ISPSoft	6-38
6.3.3		6-38
6.3.2		6-41
6.3.3		
6.3.4	4 Importing/Exporting a Parameter File	6-43
6.3.		
6.4	Troubleshooting	6-47
6.4.	1 Error Codes	6-47
6.4.2		

## 6.1 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, or B, 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.

#### 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.

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

where  $Q_A$  and  $Q_B$  are the thermopowers (Seebeck coefficient) of the metals A and B, and T<sub>1</sub> and T<sub>2</sub> 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.

## 6.1.1 Characteristics

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

Type J thermocouples, type K thermocouples, type R thermocouples, type S thermocouples, type T thermocouples, type E thermocouples, or type N 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 software is built into ISPSoft. You can set modes and parameters directly in HWCONFIG without spending time writing programs to set registers to manage functions.

# 6.2 Specifications and Functions

## 6.2.1 Specifications

## Electrical specifications

Module Name	AH04TC-A	AH08TC-A	
Number of Analog Inputs	4 8		
Applicable Sensor	Type J, type K, type R, type S, type T, ty thermocouples; ±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.		
Conversion Time	200 ms/channel		
An analog circuit is isolated from a digital circ optocoupler, and the analog channels are iso optocouplers.		, , ,	
Isolation	Isolation between a digital circuit and the ground: 500 VDC		
	Isolation between an analog circuit and the ground: 500 VDC		
	Isolation between an analog circuit and a digital circuit: 500 VDC		
	Isolation between the 24 VDC and the ground: 500 VDC		
	Isolation between analog channels: 120	VAC	
Weight	115g	125g	

#### • Functional specifications

Analog-to-Digital Conversion	Centigrade (°C)	Fahrenheit (°F)	Voltage Input
Rated Input Range <sup>∗1</sup>	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 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 +1,800° 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 S: -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	±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.

## 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   ED Indicator	ON: a serious error exists in the module.
2		OFF: the module is operating normally.
		Blink: a minor error exists in the module.
	Digital to Apolog	Digital-to-analog conversion status
	Digital to Analog Conversion Indicator	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
4	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	

## 6.2.3 Arrangement of Terminals



## 6.2.4 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	Defaults
0	Format Setup	0: integer format 1: floating point format	0
1	Channel 1 mode setup	0: closed	
2	Channel 2 mode setup	1: -100 mV to +100 mV 2: J-Type 3: K-Type 4: R-Type	1
3	Channel 3 mode setup	5: S-Type 6: T-Type 7: E-Type	
4	Channel 4 mode setup	8: N-Type 9: B-Type	
5	Channel 1 offset		
6	Channel 2 offset	- Range: -32768 to +32767	0
7	Channel 3 offset		0
8	Channel 4 offset		

CR#	Name	Description	Defaults
9	Channel 1 gain		
10	Channel 2 gain	Range: -32768 to +32767	1000
11	Channel 3 gain	Trange52700 to 152707	1000
12	Channel 4 gain		
13	Channel 1 average times		
14	Channel 2 average times	Paper: 1, 100	10
15	Channel 3 average times	Range: 1–100	10
16	Channel 4 average times		
17	Channel 1 filter average percentage		
18	Channel 2 filter average percentage	Range: 0–3	
19	Channel 3 filter average percentage	Unit: ±10%	1
20	Channel 4 filter average percentage		
21	Units of temperature	0: Fahrenheit 1: Celsius	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 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	0

## AS Series Module Manual

CR#	Name	Description	Defaults
201	Instruction set	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 value again for         channel 4         16#0201: enable recording for channel 1         16#0202: enable recording for channel 2         16#0208: enable recording for channel 3         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 3         16#0213: disable recording for channel 4         16#0214: disable recording for channel 3         16#0215: disable recording for channel 4         16#0216: disable recording for channel 4         16#0217: disable recording for channel 3         16#0218: disable recording for channel 4         16#0218: disable recording for channel 4         16#0217: disable recording for channel 4         16#0218: disable recording for channel 4         16#0217: disable recording for channel 4         16#0218: disable recording for channel 4         16#02218: disable recording for channel 4 <td< td=""><td>0</td></td<>	0
210	The maximum peak value for channel 1		-
211	The maximum peak value for channel 2	Integer format; the maximum peak value for	-
212	The maximum peak value for channel 3	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 value for analog inputs	-
216	The minimum peak value for		-

CR#	Name	Description	Defaults
	channel 3		
217	The minimum peak value for channel 4		-
222	The time to record for channel 1		1
223	The time to record for channel 2	Unit: 100 ms Range: 1–100	1
224	The time to record for channel 3	The time to record the digital value for the channels	1
225	The time to record for channel 4		1
240	The number of records for channel 1		0
241	The number of records for channel 2	Papar: 0.500, display the surrent records	0
242	The number of records for channel 3	Range: 0-500, display the current records	0
243	The number of records for channel 4		0
4000- 4499	Records for channel 1	500 records for channel 1	
4500- 4999	Records for channel 2	500 records for channel 2	
5000- 5499	Records for channel 3	500 records for channel 3	
5500- 5999	Records for channel 4	500 records for channel 4	

## 6.2.5 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	Defaults
0	Format Setup	0: integer format 1: floating point format	0
1	Channel 1 mode setup		
2	Channel 2 mode setup	0: closed	
3	Channel 3 mode setup	1: -100 mV to +100 mV 2: J-Type	
4	Channel 4 mode setup	3: K-Type 4: R-Type	4
5	Channel 5 mode setup	5: S-Type 6: T-Type	1
6	Channel 6 mode setup	7: E-Type 8: N-Type	
7	Channel 7 mode setup	- 9: B-Type	
8	Channel 8 mode setup		
9	Channel 1 offset		
10	Channel 2 offset	-	
11	Channel 3 offset	-	0
12	Channel 4 offset		
13	Channel 5 offset	Range: -32768 to +32767	
14	Channel 6 offset	-	
15	Channel 7 offset	-	
16	Channel 8 offset	-	
17	Channel 1 gain		
18	Channel 2 gain	-	
19	Channel 3 gain	-	
20	Channel 4 gain		1000
21	Channel 5 gain	– Range: -32768 to +32767	1000
22	Channel 6 gain		
23	Channel 7 gain		
24	Channel 8 gain		
	1		

CR#	Name	Description	Defaults
25	Channel 1 average times		
26	Channel 2 average times		
27	Channel 3 average times		
28	Channel 4 average times	Den 14 400	10
29	Channel 5 average times	Range: 1–100	10
30	Channel 6 average times		
31	Channel 7 average times		
32	Channel 8 average times		
33	Channel 1 filter average percentage		
34	Channel 2 filter average percentage		
35	Channel 3 filter average percentage		
36	Channel 4 filter average percentage	Range: 0–3	1
37	Channel 5 filter average percentage	Unit: ±10%	
38	Channel 6 filter average percentage		
39	Channel 7 filter average percentage		
40	Channel 8 filter average percentage		
41	Units of temperature	0: Fahrenheit 1: Celsius	0
42	Channel alarm setup	0: open channel alarm 1: close channel alarm bit0: channel 1	0
		bit1: channel 2 bit2: channel 3 bit3: channel 4	

## AS Series Module Manual

CR#	Name	Description	Defaults
		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	
		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	
201	Instruction set	channel 6	0
		16#0140: record the peak value again for	
		channel 7	
		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	

CR#	Name	Description	Defaults
		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	
		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		_
210	for channel 1		-
211	The maximum peak value		_
	for channel 2		
212	The maximum peak value		-
	for channel 3	-	
213	The maximum peak value	Integer format; the maximum peak value for	-
	for channel 4	analog inputs	
214	The maximum peak value		-
	for channel 5		
215	The maximum peak value		-
	for channel 6	_	
216	The maximum peak value for channel 7		-

6\_

### AS Series Module Manual

CR#	Name	Description	Defaults
217	The maximum peak value for channel 8		-
218	The minimum peak value for channel 1		-
219	The minimum peak value for channel 2		-
220	The minimum peak value for channel 3	Integer format; the minimum peak value for	-
221	The minimum peak value for channel 4		-
222	The minimum peak value for channel 5	analog inputs	-
223	The minimum peak value for channel 6		-
224	The minimum peak value for channel 7		-
225	The minimum peak value for channel 8		-
226	The time to record for channel 1		1
227	The time to record for channel 2		1
228	The time to record for channel 3		1
229	The time to record for channel 4	Unit: 100 ms Range: 1–100	1
230	The time to record for channel 5	The time to record the digital value for the channels	1
231	The time to record for channel 6		1
232	The time to record for channel 7		1
233	The time to record for channel 8		1

CR#	Name	Description	Defaults
240	The number of records for channel 1		0
241	The number of records for channel 2		0
242	The number of records for channel 3		0
243	The number of records for channel 4	Range: 0-100, display the current records	0
244	The number of records for channel 5	Trange. 0-100, display the current records	0
245	The number of records for channel 6		0
246	The number of records for channel 7		0
247	The number of records for channel 8		0
4000 ~4099	Records for channel 1	100 records for channel 1	-
4500 ~4599	Records for channel 2	100 records for channel 2	-
5000 ~5099	Records for channel 3	100 records for channel 3	-
5500 ~5599	Records for channel 4	100 records for channel 4	-
6000 ~6099	Records for channel 5	100 records for channel 5	-
6500 ~6599	Records for channel 6	100 records for channel 6	-
7000 ~7099	Records for channel 7	100 records for channel 7	-
7500 ~7599	Records for channel 8	100 records for channel 8	-

## 6.2.6 Functions

ltem	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.
_	Disconnection	If the channel is open, the module can detect when it is disconnected. If
5	Detection	the input is open-circuited, the module produces an alarm or a warning.
	Channel Detection	If an input signal exceeds the range of inputs that the hardware can
6	and Alarm	receive, the module produces an alarm or a warning. You can disable
		this function.
7	Limit Detections for	Save the maximum/minimum values for channels.
	Channels	
0	Records for	Source the engline survey for channels
8	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  $0^{\circ}$  C to  $100^{\circ}$  C is 0–1000. If you change the offset to 100, the calibrated value for the original signal  $0^{\circ}$  C to  $100^{\circ}$  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.



Present measured 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.

6-17

#### 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 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

## Use DMPID to execute PID control

API	I	Instr	uction	code				C	Opera	nd					F	unctio	on	
1417	I	D	MPID			A	s sho	wn in	the f	ollow	ing ta	ble		PID		thm fo	or RTE es	D/TC
De	vice		Х	Y	М	s	Т	С	нс	D	FR	SM	SR	Е	к	16#	"\$"	F
GR	OUF	)								•					0	0		
MO	DUL	E								•					0	0		
C	ЭН									•					0	0		
UPD	DATE	=	•	•	•	•				•								
PID_	RU	N	•	•	٠	•				•								
S	SV									•					0	0		
PID_I	MOE	DE								•					0	0		
PID_		N	•	•	•	•				•								
MOUT	_AU	то	•	•	•	•				•								
AUTO	DE_DE	BW								•					0	0		
Kc	_Кр									•								0
Ti	_Ki									•								0
Td	_Kd									•								0
٦	Tf									•								0
PID	_EC	)	•	•	٠	•				•								
	_DE		•	•	•	•				•								
PID			•	•	•	•				•								
ERR										•								
AL	PHA									•					0	0		
	ETA									•					0	0		
	DUT									•								
	AS									•					0	0		
	CLE									•					0	0		
	٨V									•								
	٧٧									•								
	MV									•								
ERI	ROR	2								•								
Data type	BOOL		WORD	DWORD			UINT	N		DINT	LINT	į	REAL	LREAL		TMD	CNT	STRING
							See	the ex	xplana	ation b	below							
	Pulse instruction 16-Bit instruction 32-Bit instructi											ion						
				-	10					10					52		Siluci S	

En GROUP MODULE CH UPDATE PID_RUN SV	DMPID	MV PV I_MV ERROR	PID_RUN SV PID_MODE PID_MAN	· · · · · · · · · · · · · · · · · · ·	Group number Module number Channel number Update PID parameters Enable the PID algorithm Target value (SV) PID control mode PID Auto/Manual mode Manual/Auto output value Range within which the auto tuning is not working
PID_MODE PID_MAN MOUT_AUTO AUTO_DBW Kc_Kp Ti_Ki Td_Kd Tf PID_EQ			PID_EQ PID_DE		Proportional gain Integral coefficient (sec. or 1/sec) Derivative coefficient (sec) Derivate-action time constant (sec) PID formula types Calculation of the PID derivative error PID forward/reverse direction Range within which the error value is counted as 0
PID_DE PID_DIR ERR_DBW ALPHA BETA MOUT BIAS CYCLE					Initial value compensation of integral calculus (for heating up) Initial value compensation of integral calculus (for cooling down) Manual output value Feed forward output value Sampling time Output value (MV) Present value
			I_MV ERROR		Accumulated integral value Error code

Operand	Data type	Function	Setting range	Description		
GROUP	DWORD/DINT	Group number	The RTD/TC module group number that is connected to the right side of PLC directly or connected to the remote module that acts as PLC, e.g. the first connected module group is group number 1, the second connected module group is group number 2. Up to 15 module group can be connected and counted.			
MODULE	DWORD/DINT	Module number	to the right side of connected to the acts as PLC, e.g. module is module connected module	ber that is connected f PLC directly or remote module that the first connected number 1, the second e is module number 2. can be connected		

Operand	Data type	Function	Setting range	Description		
			and counted and	each type of modules		
			should be include	d in the count.		
			Channel number	for PID algorithm, e.g.		
СН	DWORD/DINT	Channel number	channel 1 is number 1 for PID algorithm			
			and channel 2 is			
			algorithm and so			
				D related parameters in		
		Update PID parameters	the module			
UPDATE	BOOL		PID_RUN^			
				ting is complete, it		
			refreshes t			
		Enabling the PID	True: use the PID	-		
PID_RUN	BOOL	algorithm	False: reset the output value (MV) to 0, and stop using the PID algorithm.			
			and stop using th	e PID algorithm.		
SV	DWORD/DINT	Target value	-32768~32767	Target value		
			0: Automatic cont	rol		
			When PID_MAN switches from True			
			to False, invoke the output value			
			(MV) in the automatic algorithm.			
			1: Auto tuning the parameters for the			
			temperature control. After tuning is			
PID_MODE	DWORD/DINT	PID control mode	done, the sysem switches to auto			
				PID_MODE is set to 0)		
				ppropriate parameters		
				Td_Kd, Tf, ALPHA		
			and BETA)			
				ode is set to 1, auto		
				parameter, you cannot cal value to set up.		
			True: Manual			
				MV apporting to		
PID_MAN	BOOL	PID A/M mode	Output the MV according to			
			MOUT. This setting has no effect			
			when PID_MODE is set to 1.			
			False: Automatic			

Operand	Data type	Function	Setting range	Description
			Output the PID algoriti	MV according to the
MOUT_AUTO	BOOL	MOUT automatic change mode	False: Normal	es with the MV. s not vary with the MV.
AUTO_DBW	DWORD/DINT	Range within which the auto tuning is not working	0~32000	Used when the mode is set to auto tuning, within the range of SV ± dead band, the auto tuning is not working.
Кс_Кр	REAL	Calculated proportional coefficient (Kc or Kp, according to the settings in PID_EQ)	Range of positive single- precision floating- point numbers	Calculated proportional coefficient (Kc or Kp) 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.
ті_кі	REAL	Integral coefficient (Ti or Ki, according to the settings in PID_EQ)	Range of positive single- precision floating- point numbers (unit: Ti = sec; Ki = 1/sec)	If the calculated coefficient I is less than 0, Ti_Ki is 0. If Ti_Ki is 0, it is not controlled by I.
Td_Kd	REAL	Derivative coefficient (Td or Kd, according to the settings in PID_EQ)	Range of positive single- precision floating-	If the calculated coefficient D is less than 0, Td_Kd is 0. If Ti_Ki is 0, it is not controlled by D.

Operand	Data type	Function	Setting range	Description		
			point numbers (unit: sec)			
Tf	REAL	Derivate-action time constant	Range of positive single- precision floating- point numbers (unit: sec)	If the derivate-action time constant is less than 0, Tf is 0 and it is not controlled by the derivate-action time constant (derivative smoothing).		
PID_EQ	BOOL	PID formula types	True: dependent formula False: independent formula			
PID_DE	BOOL	The calculation of the PID derivative error	True: use the variations in the PV to calculate the control value of the derivative (Derivative of the PV). False: use the variations in the error (E) to calculate the control value of the derivative (derivative of the error).			
PID_DIR	BOOL	PID forward/reverse direction	True: reverse acti (E=SV-PV) False: forward ac (E=PV-SV	) tion; cooling down		
ERR_DBW	DWORD/DINT	Range within which the error value is counted as 0.	-32768~32767	The error value (E) is the difference between the SV and the PV. When the setting value is 0, the function disabled; otherwise the CPU module checks whether the present error is less than the absolute value of		

Operand	Data type	Function	Setting range	Description
				ERR_DBW, and
				checks whether the
				present error meets
				the cross status
				condition. If the
				present error is less
				than the absolute
				value of ERR_DBW,
				and meets the cross
				status condition, the
				present error is
				counted as 0, and
				the PLC applies the
				PID algorithm ;
				otherwise the
				present error is
				brought into the PID
				algorithm according
				to the normal
				processing.
		Initial value		Initial value
ALPHA	DWORD/DINT	compensation of	0.0~100.0	compensation of
	DWORD/DINT	integral calculus	(unit: 1%)	integral calculus (for
		(for heating up)		heating up)
		Initial value		Initial value
BETA	DWORD/DINT	compensation of	0.0~100.0	compensation of
BEIA	DWORD/DINT	integral calculus	(unit: 1%)	integral calculus (for
		(for cooling down)		cooling down)
				When set to PID
				Manual
			0~1000	(PID_MAN=True),
MOUT	DWORD/DINT	MV		the MV value is
			(unit: 0.1%)	outputted as the
				value set manually
				for MOUNT.

Operand	Data type	Function	Setting range	Description		
BIAS	DWORD/DINT	Feed forward output value	-32768~32767	Feed forward output value, used for the PID feed forward.		
CYCLE	DWORD/DINT	Sampling time (Ts)	1~1000 (unit: 100 ms)	When the instruction is scanned, use the PID algorithm according to the sampling time, and refresh MV.		
MV	REAL	MV output value	0.0~100.0 (unit: 1%)			
PV	DWORD/DINT/REAL	Present value	Format is defined in HWCONFIG.			
I_MV	REAL	Accumulated integral value	range of 0-100%,	the MV is out of the		
ERROR	DWORD/DINT	Error / status codes	and is working no 16#1400 : the mo does not support 16#1401 : group number setting er 16#1402 : the mo	odule you are using this instruction. number or module ror odule you are using and communication		

Note:

- If the PID parameter exceeds the upper limit, only the maximum value can be written in the module, if the PID parameter is below the lower limit, only the minimum value can be written in the module.
- 2. When PID\_RUN switches from True to False, it clears the MV output value to 0. If you need to keep the last MV output value, you can swith the operand EN to False to close this instruction and the MV output value can be kept.

6\_

#### Example

- You need to set up the parameters before executing DMPID. Switch the operand EN from False to True to
  execute this instruction. If you need to change parameters during execution, you can use the UPDATE flag
  to update the parameters (including PID\_RUN ~ CYCLE). After the paraemters are updated, the system
  clears the flag UPDATE.
- When M0 is ON, the instruction is executed. When M2 is ON, the DMPID starts to process. When M2 is OFF, MV value is 0. And the value in MV is stored in D16. When M0 is OFF, the instruction is not executed. And the values in the instruction is not changed.
- 3. When the mode is set to 1, the system starts to auto tuning the parameters for the temperature control. After tuning is done, the system switches to auto control mode (PID\_MODE is set to 0) and fill in the appropriate parameters (Kc\_Kp, Ti\_Ki, Td\_Kd, Tf, ALPHA and BETA) to data devices. You can also use retentive devices to retain PID parameters.



### Use PID parameters

			CI	R#				Onevend	Function	Description	Damas
CH1	СН2	СНЗ	СН4	СН5	СН6	СН7	СН8	Operand	Function	Description	Range
600	630	660	690	720	750	780	810	PID_RUN	Enable the PID algorithm	<ol> <li>the PID</li> <li>algorithm is</li> <li>implemented.</li> <li>the output value</li> <li>(MV) is reset to</li> <li>and the PID</li> <li>algorithm is not</li> <li>implemented.</li> </ol>	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 complete, the device is automatically reset to 0, and the parameters Kc_Kp, Ti_Ki, Td_Kd, and Tf are set	0

## AS Series Module Manual

			C	R#				0	E	Description	Der
CH1	CH2	СНЗ	СН4	СН5	СН6	СН7	СН8	Operand	Function	Description	Range
										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
606 607		666 667	696 697	726 727	756 757		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

	CR#							Onenand	Function	Description	Damas
CH1	СН2	СНЗ	CH4	CH5	СН6	СН7	СН8	Operand Function	Description	Range	
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 Kd)	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	672 673	702 703	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
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	0

	CR#								_		
СН1	CH2	СНЗ	CH4	CH5	СН6	СН7	CH8	Operand	Function	Description	Range
										(derivative of E). 1: use the variations in the PV to calculate the control value of the derivative (derivative of PV).	
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 whether the present difference is less than the absolute value of ERR_DBW, and it checks whether the present difference meets the cross status condition. If the	0

	CR#							Onerend	Function	Decerintian	Damara
СН1	СН2	СНЗ	СН4	СН5	СН6	СН7	СН8	Operand	Function	Description	Range
CH1	CH2	CH3	CH4	CH5	Сне	СН7	СН8			present difference is less than the absolute value of ERR_DBW and it meets the cross status condition, the present error is counted as 0, and the PID algorithm is implemented. Otherwise the present error is brought into the PID algorithm	
618		678			768	798			Integral sum	normally. Range: 0–100	31
619	649				769	800		β value MOUT	Integral sum Manual output value (MOUT)	Unit: 0.01 When PID_MAN is set to 1, the MV value is output as this manual MOUT value, between MV_MAX and MV_MIN. Range: 0–1000 (0%–100%)	0
621	651	681	711	741	771	801	831	BIAS	Feedforward output value	Feedforward output value, used for the PID feedforward	0
622 623	652 653	682 683	712 713	742 743	772 773	802 803	832 833	MV	Output value (MV)	A floating-point number Range: 0–100 Unit: %	

6\_

### AS Series Module Manual

CR#								Onerend Function	Description		
CH1	CH2	СНЗ	CH4	CH5	СН6	СН7	CH8	Operand	Function	Description	Range
624 625		684 685		744 745				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 <sub>S</sub> )	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 1,000, it is read as 1,000. Unit: 100 ms	1

Note: When using PID parameters to set up control registers: PID control registers of AS04TC-A and RTD-A are retainable; however PID control registers of AS06RTD-A and AS08TC-A are not 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 )

$$MV = K_P E + Ki \int_0^t E dt + K_d * \frac{dE}{dt} + BIAS \quad (E = SV - PV \quad \text{or} \quad E = PV - SV)$$

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

2. 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:





#### 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  $\Delta$  **PV** as 0 to apply the PID algorithm. ( $\Delta$  **PV**= current **PV** – previous **PV**). In the following example, the present error or  $\Delta$  **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:

Output cycle width = MV (%) x output cycle

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

#### Example:

If the output cycle is 200 ms, then the output value is 50% after the PID algorithm is implemented.

> Output cycle width =  $50\% \times 2000$  ms = 1000 ms

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



#### Note:

- 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 increase.
- 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.

## 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.

- (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, type K, type R, type S, type T, type E, type N and type B thermocouples, and keep them separate from power cables and other cables which generate noise.

## 6.2.9 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.
	Digital to Analog	Digital-to-analog conversion status
3	Conversion	Blinking: conversion is in process.
	Indicator	OFF: conversion has stopped.

# 6.3 HWCONFIG in ISPSoft

## 6.3.1 Initial Setting

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

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

File Edit Yiew Compile	🖉 🕐 😄 🖳 🖳 🖉 🖉 🗮 🖓 🖉 🗮 🖓 🖉 🖉 🖉 🖉 🖉 🖉 🖉	- 8 ×
00110000	\$1 🕼 Q 🔍 100% 💦 - 🦉 🛅 🚰 🖆 🍲 🔟 반 반 🔖 ++ {] 🏗 캡 & - 초 수 ·	Ð
Project 4 ×	Local Symbols	Delta Library, Preview 4 >
Project [C:ProgramData/I     Project [C:Project [C:Pro	Class Identifiers Address Type Initial Value (A, Identifier Comment	Delta Library
Def Tasks     DUT     Global Symbols     Global Symbols     Figure 10 Programs     Fi	Network I	-
		Delta Library User Defi d > Preview 2
< m + Project	4	Preview
(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.



⊟ AS04TC-A	Device Informatio	n Normal Exchange Area	
- CH1 "CH4 Mode setting	Device Name	AS04TC-A	
- CH1~CH4 Calibration - average filter - Temperature measureme - Channel Detect and Alarr	Description	4 channels thermocouple input :- 100mV <sup>~1</sup> 00mV.H.K.R.S.T.E.N.B conversion time = 200ms/channel Module current consumption:(Internal)50mA.(External)	
	Comment		1 1 1 1
	DDF Version	00.40.00	
	Firmware Version	(off-line)	< 3
	Hardware Version	(off-line)	
	-		

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

Device Setting				
_ Options				
AS04TC-A	CH1~CH4 Mode setting			
CH1~CH4 Mode setting	Parameter name	Value	Unit Default Minimu	um Maximum
<ul> <li>CH1<sup>∞</sup>CH4 Calibration</li> <li>average filter</li> <li>Temperature measureme</li> <li>Channel Detect and Alarr</li> </ul>	CH1 mode setting	-100mV~100m'	-100mV~100m -	-
	<ul> <li>CH2 mode setting</li> <li>CH3 mode setting</li> </ul>	-100mV~100m' ▼ -100mV~100m' ▼	-100mV~100m - -100mV~100m -	-
	CH4 mode setting	-100mV~100m' ▼	-100mV~100m -	_
	1			
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.



E AS04TC-A	Device Information	n Normal Exchange Area	
- format - CH1 <sup>~</sup> CH4 Mode setting - CH1 <sup>~</sup> CH4 Calibration	Device Name	AS04TC-A	
- average filter - Temperature measureme - 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	1 14
	Firmware Version	01.00.00	× 3
	Hardware Version	00.00.00.00	
<u>a</u>			
Default Ingost	Espan L	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.

Value (32 bits)	Data Type
6145	DECIMAL
0	DECIMAL
	6145 0 0 0

## 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).

Default	Import	Export	<b>D</b>
Save As			28
Save in: Ay Document My Music My Pictures WinCHM Projects	S		
File name:			Save
Save as type: CSV File (*.c	sv]	•	Cancel



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



Open	2 🛛
Look in: My Documents My Music My Pictures WinCHM Projects	
File name: Files of type: CSV File (*.csv)	□pen ↓ Cancel

#### 6.3.5 Parameters

(1) The input modes of the channels

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

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

Device Setting Options - AS04TC-A	CH1 <sup>~</sup> CH4 Mode setting					
CH1~CH4 Mode setting	Parameter name	Value	Unit	Default	Minimum	Maximum
	CH1 mode setting	-100mV~100m'		-100mV~100m	-	-
average filter Temperature measureme Channel Detect and Alarr	CH2 mode setting	-100mV~100m' 💌		-100mV~100m	-	-
	CH3 mode setting	-100mV~100m' 💌		-100mV~100m	-	-
	CH4 mode setting	-100mV~100m' 💌		-100mV~100m	-	-
Default Import	Export Update					OK

#### (3) Input CH1-CH4 calibration

AS04TC-A	CH1~CH4 Calibration					
format <u>CH1~CH4 Mode setting</u>	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
		1000		1000	-32768	32767
	CH4 Cal. Gain	1000		1000	-32768	32767
Default Import	Export Update					ОК

### (4) Input average filter

Device Setting						
Options						
⊡- AS04TC-A	average filter					
- CH1~CH4 Mode setting	Parameter name	Value	Unit	Default	Minimum	Maximum
- <u>CH1~CH4 Ca</u> libration	CH1 average times	10		10	1	100
<mark>average filter</mark>	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					OK

#### (5) Temperature measurement

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

(6) Input channel detect and alarm settings

AS04TC-A	Channel Detect and Alarm setting	s			
- format - 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	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	-	-
	Cold junction compensation Error	📃 Alarm	🗌 Alarm	-	-
Default Import	Export Update				ок

# 6.4 Troubleshooting

## 6.4.1 Error Codes

Error	Description	A↔ D LED	ERROR LED
Code	Description	Indicator	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		
10#1000	that the hardware can receive.		
16#1809	The signal received by channel 2 exceeds the range of inputs that		
10#1009	the hardware can receive.	Run: blinking	Blinking
16#180A	The signal received by channel 3 exceeds the range of inputs that	Stop: OFF	Diriking
10#100A	the hardware can receive.		
16#180B	The signal received by channel 4 exceeds the range of inputs that		
	the hardware can receive.		

#### AS Series Module Manual

Error Code	Description	A↔ D LED Indicator	ERROR LED Indicator
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.		
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 the hardware can receive.		

# 6.4.2 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.
The signal received by channel 7 exceeds the range of inputs that the hardware can receive.	Check the signal received by channel 7.
The signal received by channel 8 exceeds the range of inputs that the hardware can receive.	Check the signal received by channel 8.

# 7

# Chapter 7 Load Cell Module AS02LC

# Table of Contents

7.1	Overview	·2
<b>7.2</b> 7.2. 7.2. 7.2. 7.2. 7.2. 7.2.	2Profile	-2 -3 -4 -4 L1
<b>7.3</b> 7.3. 7.3. 7.3. 7.3.	<ul> <li>Adjustment settings / LC Wizard</li></ul>	L8 L9 23
<b>7.4</b> 7.4. 7.4. 7.4. 7.4. 7.4. <b>7.5</b>	2Checking the Version of a Module7-23Online Mode7-34Importing/Exporting a Parameter File7-35Parameters7-3	26 29 30 31 32
7.5 7.5. 7.5.		34

## 7.1 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.

## 7.2 Specifications

## 7.2.1 Specifications

Load Cell Module	Voltage Output
Rated Supply Voltage/Power Consumption	24 VDC (-15% to +20%)/5 W
Minimum/Maximum Voltage	18–31.2 VDC
Maximum Current Consumption	150 mA
Input Signal Range	±40 mVDC
Sensibility	+5 VDC +/-10%
Highest Precision	0.04%
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
Common-mode Rejection Ratio (CMRR @50/60 Hz)	≥100 dB
Dynamic Filter	К1–К5
Average Weights	К1-К100
	Between a digital circuit and the ground: 500 VAC
Isolation	Between an analog circuit and the ground: 500 VAC
	Between an analog circuit and a digital circuit: 500 VAC

## 7.2.2 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.
	Digital-to-Analog Conversion Indicator	Digital-to-analog 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.
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	

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## 7.2.3 Arrangement of Terminals



## 7.2.4 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	Defaults
	Display of the nw/gw for channel 1	0: disabled	
0		1: net weight	1
		2: gross weight	
		0: 1 mV/V	
		1: 2 mV/V	
		2: 4 mV/V	
1	Eigenvalue for channel 1	3: 6 mV/V	1
		4: 20 mV/V	
		5: 40 mV/V	
		6: 80 mV/V	

CR#	Name	Description	Defaults
		0: 1 mV/V	
		1: 2 mV/V	
		2: 4 mV/V	
2	Sampling cycle for channel	3: 6 mV/V	4
	1	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	
3	Weight measured times in a	4: 50 ms	5
	stability range for channel 1	5: 60 ms	
		6: 100 ms	
		7: 200 ms	
		8: 400 ms	
4		Floating-point format	
5	Stability range for channel 1	Range: K1–K10000	10
6		Floating-point format	
	Maximum weight for	Maximum measuring weight; when the weight	400.000
7	channel 1	measured exceeds the limit, an alarm is triggered.	100,000
		The value should be greater than 1.	
		0: no filter (default)	
8	Filter mode for channel 1	1: maximum filter mode	0
		2: average filter mode	
0	Maximum filter for channel 1	Range: 0–8; the bigger the number the stronger	4
9	Maximum filter for channel 1	the filter	1
10	Average weight measured	Range: 1–100	10
10	times for channel 1		
11	Upper limit of the zero return	Floating-point format	10
12	for channel 1	Determines the current weight as the zero point in	
13	Lower limit of the zero return	the upper/lower range; when the lower range is	40
14	for channel 1	larger than the upper range, the lower range is	-10

CR#	Name	Description	Default
		read as the upper range and vice versa.	
45	Zero point tracking time for	Range: 1–500	10
15	channel 1	Unit: 100 ms	10
16	Zero point tracking range for	Floating-point format	
17	channel 1	Range: 0–10000; 0: disabled	0
18	Calibration points for channel 1	Range: 2–20	2
40.50	Calibrated weight for	Floating-point format	
19–58	channel 1	Calibrated weight of the calibration points 1-20	-
		0: disabled	
59	Display of the nw/gw for channel 2	1: net weight	1
	channel 2	2: gross weight	
	Eigenvalue for channel 2	0 : 1 mV/V	
		1 : 2 mV/V	
		2 : 4 mV/V	
60		3 : 6 mV/V	1
		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 channel	4:50 ms	4
	2	5:60 ms	
		6:100 ms	
		7:200 ms	
		8:400 ms	
62	Weight measured times in a stability range for channel 2	Range: K1–K500	5
63		Floating-point format	10
64	- Stability range for channel 2	Range: K1–K10000	10
65	Maximum weight for	Floating-point format	100,000

CR#	Name	Description	Defaults
	channel 2	Maximum measuring weight; when the weight	
66		measured exceeds the limit, an alarm is triggered.	
		The value should be greater than 1.	
		0: no filter (default)	
67	Filter mode for channel 2	1: maximum filter mode	0
		2: average filter mode	
68	Maximum filter for channel 2	Range: 0–8; the bigger the number the stronger the filter	1
69	Average weight measured times for channel 2	Range: 1–100	10
70	Upper limit of the zero return	Floating-point format	10
71	for channel 2	Determines the current weight as the zero point in	10
72	Lower limit of the zero return	the upper/lower range; when the lower range is	
73	for channel 2	larger than the upper range, the lower range is	-10
73		read as the upper range and vice versa.	
74	Zero point tracking time for	Range: 1–500	10
	channel 2	Unit: 100 ms	
75	Zero point tracking range for	Floating-point format	0
76	channel 2	Range: 0–10000; 0: disabled	0
77	Calibration points for channel 2	Range: 2–20	2
70 447	Calibrated weight for	Floating-point format	
78–117	channel 2	Calibrated weight of the calibration points 1–20	-
118	Decimal place for channel 1	Range: 0–4	1
119	Decimal place for channel 2	Range: 0–4	1
		0: warning 1: alarm	
120	Alarm	Bit1: error in the power supply	0
		Bit2: error in the module hardware	
		Bit3: error in the driver board	
200	State register	Refer to the explanation below.	-
201	Instruction set	Refer to the explanation below.	0
210	The maximum peak value	Floating-point format	-

#### AS Series Module Manual

CR#	Name	Description	Defaults
211	for channel 1	Maximum peak value for channel 1	-
212	The maximum peak value	Floating-point format	-
213	for channel 2	Maximum peak value for channel 2	-
214	The minimum peak value for	Floating-point format	-
215	channel 1	Minimum peak value for channel 1	-
216	The minimum peak value for	Floating-point format	-
217	channel 2	Minimum peak value for channel 2	-
222	The time to record for channel 1	Unit: 1 ms Range: 1–100 (1 ms–1 s)	50
223	The time to record for channel 2	Time to record the digital value for the channels	50
240	The number of records for channel 1	Range: 0–500; display the current records	-
241	The number of records for channel 2	Range: 0-500; display the current records	-
604	Tare measured by channel		-
605	1	Display the tare measured by channel 1	-
606	Tare measured by channel		-
607	2	Display the tare measured by channel 2	-
700–	Theoretical calibration for	Floating-point format	
739	channel 1	Output voltage unit: mV	0
740–	Theoretical calibration for	Floating-point format	0
779	channel 2	Output voltage unit: mV	0
4000	Records for channel 1	Floating-point format	
-4999		500 records for channel 1	
5000	Records for channel 2	Floating-point format	
-5999		500 records for channel 2	-

#### 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 instructions on the Normal Exchange Area tab of the Device Setting dialog box in the HWCONFIG utility in ISPSoft.

Device Setting			
Options			
AS02LC-A     CH1 Setting     CH1 Adjustment Setting	Device Information Normal Exchange Area	Address	]
- CH2 Setting - CH2 Adjustment Setting - Alarm Setting	Error code CH1 Input CH2 Input Status Code Command	D28000 ~ D28001 D28002 ~ D28003 D28004 ~ D28005 D28006 D28007	
Default Import	Export Update	ОК	-

#### 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	b9	16#0200	The weight measured by CH2 exceeds the

Bit	Code	Definition	Bit	Code	Definition
		that can be measured.			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 the stability range specified.	b15	16#8000	The weight measured by CH2 is in 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: Instruction set

#### Explanation

Input value	Description	Input value	Description
0	No action	16#0101	Start a new recording of the peak value for channel 1.
1–20	Instructions for calibrating calibration points 1–20 in channel 1	16#0102	Start a new recording of the peak value for channel 2.
21–40	Instructions for calibrating calibration points 1–20 in channel 2	16#010F	Start a new recording of the peak value for channels 1–2.
98	Activate the weight calibration.	16#0201	Start a new recording for channel 1.
99	Deactivate the weight calibration.	16#0202	Start a new recording for channel 2.
100	Subtract the tare measured by CH1.	16#020F	Start a new recording for channels 1–2.
101	Do not subtract the tare measured by CH1.	16#0211	Stop recording for channel 1.
102	Restore the weight measured by CH1 to 0.	16#0212	Stop recording for channel 2.
103	Subtract the tare measured by CH2.	16#021F	Stop recording for channels 1–2.
104	Do not subtract the tare measured by CH2.	16#0301	Start a theoretical calibration for channel 1.

Input value	Description	Input value	Description
105	Restore the weight measured by CH2 to 0.	16#0302	Start a theoretical calibration for channel 2.
16#030F	Start a theoretical calibration for channels 1–2.	16#0502	Restore default settings

## 7.2.5 Functions

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	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.

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#### 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. Gross weight is the total weight: net weight plus tare.

- Tare: 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

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=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 out weights

There are two ways to filter out weights.

- 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.

#### 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 channel 1 and CR#740–779 for channel 2. After entering the voltage values into the registers, you can use the instruction 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							
⊡- AS02LC-A CH1 Setting	CH1 Setting						
- CH1 Adjustment Setting	Parameter name	Value		Unit	Default	Minimum	Maximum 📤
CH2 Setting	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.

Device Setting Options						
⊡ AS02LC-A CH1 Setting	CH1 Adjustment Setting					
- CH1 Adjustment Setting	Parameter name	Value	Unit	Default	Minimum	Maximum
	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 instruction set CR#201.

Step 5: enter 16#0301 into the instruction 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 instruction set CR#201 to reset the value to 0 for channel 1.

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



#### 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.



## 7.2.6 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  $\Omega$ .

## 7.3 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 instructions below or by setting up the theoretical calibration (refer to section 7.2.5 for more details).

## 7.3.1 Steps to adjust points



## 7.3.2 Adjustment settings / LC Wizard

Step 1: set the eigenvalue in the HWCONFIG utility in ISPSoft.

AS02LC-A CH1 Setting	CH1 Setting						
- CH1 Adjustment Setting	Parameter name	Value		Unit	Default	Minimum	Maximum 🔺
- CH2 Setting	CH1 gross/net setting	gross	-		gross	-	-
- CH2 Adjustment Setting	- CH1 Characteristic value	2mV/V	-		2mV/V	-	-
- Alarm Setting	- CH1 sampling time	50ms	-		50ms	-	-
	- CH1 standstill times	5			5	1	500
		10			10	1	10000
	- Ch1 Max weight	100000			100000	1	-
	- CH1 Filter mode setting	Disable	-		Disable	-	-
	- CH1 Filter ratio	1	-		1	-	-
	- CH1 Filter average times	10			10	1	100
	- Ch1 Zero upper range	10			10	0	100000
	- Ch1 Zero lower range	-10			-10	-100000	0
	- CH1 Zero tranking timer	10			10	1	500 💌
	•						•

Step 2: 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.

Device Setting						
Options						
⊡- AS02LC-A CH1 Setting	CH1 Adjustment Setting					
- CH1 Adjustment Setting	Parameter name	Value	Unit	Default	Minimum	Maximum
CH2 Setting CH2 Adjustment Setting	CH1 Adjustment number	2		2	2	20
	CH1 weight of Adjustment point 1(Zero)	0 0		0	0	0
- Alarm Setting	CH1 weight of Adjustment point 2	1000		1000	-	-
Default Import	Export Update					ок

Extension No       Type       Module Name       DDF Version       Input Device Rage       Quput Device Ra.         Extension No       Type       Module Name       DDF Version       Input Device Ra.       Comment         Power Module       CPU Module       AS32T       01.0000       X0.0*X0.15       Y0.0*Y0.15	着 loadcell - H	CONFIG						_ 🗆 X
Extension No       Type       Module Name       DDF Version       Input Device Range       Output Device Ra.       Comment         Power Module	File Edit	Option Help						_ 8 ×
Power Module         Power Modue         Power Module         Power Module </th <th>AS300 Digital I/O M Analog I/O M Network Mo Power Modu</th> <th>odule Icodule tule e</th> <th>Download (Ctrl+F8)</th> <th></th> <th></th> <th></th> <th></th> <th></th>	AS300 Digital I/O M Analog I/O M Network Mo Power Modu	odule Icodule tule e	Download (Ctrl+F8)					
Power Module         Power Modue         Power Module         Power Module </th <th>Extension No</th> <th>Type</th> <th>Module Name</th> <th>DDF Version</th> <th>Input Device Range</th> <th>Output Device Ra</th> <th>Comment</th> <th></th>	Extension No	Type	Module Name	DDF Version	Input Device Range	Output Device Ra	Comment	
Function Card	Power Module							
Function Card	CPU Module	CPU Module	A\$332T	01.00.00	X0.0~X0.15	Y0.0 ~ Y0.15		
Function Dard	Function Ca	rd						
	Function Ca	rd						
Module Informatic/Analog I/D Module AS02LC-A 01:00:00 D28000 ~ D28006 D28007 ~ D28019	Module Informa	atic Analog I/D Module	AS02LC-A	01.00.00	D28000 ~ D28006	D28007 ~ D28019		

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

Step 4: right click the module and then click on LC Wizard to open the LC Wizard.



L	C Wizard		×
	Setting		
	Message	Please make sure that you have chose the channel and the adjusted Points.	
	Channel	CH1  CH1	
	Points	Clear Subtracting Tare Next	
		Reset to Zero Close	

Step 5: make sure the channel and the adjusted points displayed are the same as you have set.

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

Message	Please click "Next" to proceed. Adjusted Channel: 1 Adjusted Points: 1	E
		Back
11		Next

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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.

lessage	Please click "Next" to proceed. Adjusted Channel: 1 Adjusted Points: 2
-10-	Back
And in the local sectors of th	

#### Step 8: the calibration is complete.

essage	Correction Finish.	
75	Ē	Back
<u>_</u>		Finish

A characteristic curve is shown below.



## 7.3.3 Adjustment settings / Instructional calibration

AS02LC-A	CH1 Setting						
CH1 Setting CH1 Adjustment Setting	Parameter name	Value	Value		Default	Minimum	Maximum 📤
- CH2 Setting	CH1 gross/net setting	gross	-		gross	-	-
- CH2 Adjustment Setting	CH1 Characteristic value	2mV/V	•		2mV/V	-	-
Alarm Setting	- CH1 sampling time	50ms	•		50ms	-	-
	- CH1 standstill times	5			5	1	500
	- CH1 standstill Range	10			10	1	10000
	- Ch1 Max weight	100000			100000	1	-
	CH1 Filter mode setting	Disable	-		Disable	-	-
	- CH1 Filter ratio	1	•		1	-	-
	- CH1 Filter average times	10			10	1	100
	- Ch1 Zero upper range	10			10	0	100000
	Ch1 Zero lower range	-10			-10	-100000	0
	<ul> <li>CH1 Zero tranking timer</li> </ul>	10			10	1	500 -

Step 1: set the eigenvalue in the HWCONFIG utility in ISPSoft.

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.

De	rice Setting									
	Options									
AS02LC-A     Gring     Gring		CH1 Adjustment Setting								
	- CH1 Adjustment Setting	Parameter name	Value	Unit	Default	Minimum	Maximum			
	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	10	100	-	-			
	Default Import	Export Update					ОК			

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	Je Nie	Download (Ctrl+F8)	02 LC	+	-		-
Specification		<					
	-		·	¥			
			Lune				
Extension No	Туре	Module Name	DDF Version	Input Device Range	Output Device Ra	Comment	
Power Module	CPU Module	A\$332T	01.00.00	X0.0 ~ X0.15	Y0.0 ~ Y0.15		_
Function Card	and the second	H00021	01.00.00	AU.0 AU.13	10.0 10.13		
Function Card							-
the second	Analog I/D Module	AS02LC-A	01.00.00	D28000 ~ D28006	D28007 ~ D28019		

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

Step 4: verify that the corresponding address the instruction is D28007 in the Normal Exchange Area.

∃- AS02LC-A CH1 Setting	Device Information Normal Exchange Area	
CH1 Adjustment Setting CH2 Setting CH2 Adjustment Setting	Description  Frror code	Address D28000 ~ D28001
Alarm Setting	CH1 Input CH2 Input	D28002 ~ D28003 D28004 ~ D28005
	Status Code Command	D28006 D28007

Step 5: enter the instruction for activating the weight calibration 98 into D28007.

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



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 instruction for deactivating the weight calibration 99 into D28007. A characteristic curve is shown below.



## 7.3.4 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.
	Digital to Analog	Digital-to-analog conversion status
3	Conversion	Blinking: conversion is in process.
	Indicator	OFF: conversion has stopped.

## 7.4 HWCONFIG in ISPSoft

## 7.4.1 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 Device Setting page.

- AS02LC-A - CH1 Setting	Device Informatio	n Normal Exchange Area.		
- CH1 Adjustment Setting - CH2 Setting	Device Name	AS02LC-A		
CH2 Adjustment Setting Alarm Setting	Description	2 channels Load cell input Module current consumption:(Internal)50mA.(External) 0mA Module total witdh:35mm	•	
	Comment			E 👔 🖛
	DDF Version	01.00.00		- E 🗄 .
	Firmware Version	(off-line)		
	Hardware Version	(off-line)		· · ·

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

- AS02LC-A 	CH1 Setting							
- CH1 Adjustment Setting	Parameter name	Value		Unit	Default	Minimum	Maximum	•
- CH2 Setting	CH1 gross/net setting	gross	•		gross	-	-	1
– CH2 Adjustment Setting	- CH1 Characteristic value	2mV/V	•		2mV/V	-	-	
Alarm Setting		50ms	•		50ms	-	-	
	- CH1 standstill times	5			5	1	500	
	CH1 standstill Range	10			10	1	10000	
	- Ch1 Max weight	100000			100000	1	-	
	CH1 Filter mode setting	Disable	•		Disable	-	-	
	- CH1 Filter ratio	1	•		1	-	-	
	CH1 Filter average times	10			10	1	100	
	- Ch1 Zero upper range	10			10	0	100000	
	Ch1 Zero lower range	-10			-10	-100000	0	
	- CH1 Zero tranking timer	10			10	1	500	-
	4						•	

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



## 7.4.2 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.



⊟ AS02LC-A CH1 Setting	Device Informatio	n Normal Exchange Area		
– CH1 Adjustment Setting – CH2 Setting	Device Name	AS02LC-A		
- CH2 Adjustment Setting - Alarm Setting	Description	2 channels Load cell input Module current consumption:(Internal)50mA.(External) 0mA Module total witdh:35mm	•	
	Comment	×	-	
	DDF Version	01.00.00		
	Firmware Version	01.00.02		
	Hardware Version	00.00.00.00		
Dafault Import	Export	Jpdate		

## 7.4.3 Online Mode

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



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



(3) View the module status.



## 7.4.4 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	
Save As	2	
Save in: 📋 My Documents	- 🖻 🖆 🗐 -	
My Music My Pictures WinCHM Projects		
File name: Save as type: [CSV File (".csv]	Save Cancel	2

02LC

1 KB

Microsoft Office Excel

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

	Default	Import	Ехро	rt
	My Documents			≥ ? -⊡ *
My Music My Picture				
File name:	1			Open
Files of type:	CSV File (*.csv	)r	•	Cancel

## 7.4.5 Parameters

## (1) Settings for channel 1

Device Setting					
Options					
E-AS02LC-A CH1 Setting	CH1 Setting				
- CH1 Adjustment Setting	Parameter name	Value	Unit Default	Minimum	Maximum 📤
- CH2 Setting	CH1 gross/net setting	gross 🔽	gross		-
- CH2 Adjustment Setting	- CH1 Characteristic value	2mV/V 💌	2mV/V	-	-
Alarm Setting	- CH1 sampling time	50ms 💌	50ms	-	-
	- CH1 standstill times	5	5	1	500
	- CH1 standstill Range	10	10	1	10000
	- Ch1 Max weight	100000	100000	1	-
	CH1 Filter mode setting	Disable 🔻	Disable	-	-
	- CH1 Filter ratio	1 💌	1	-	-
	- CH1 Filter average times	10	10	1	100
	- Ch1 Zero upper range	10	10	0	100000
	- Ch1 Zero lower range	-10	-10	-100000	0
	- CH1 Zero tranking timer	10	10	1	500 🗸
	•				•
Default Import	Export Update				ок

## (2) Adjustment for channel 1

Device Setting					
Options					
⊡- 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	-	-
Default Import	Export Update				ОК

(3) Settings for channel 2

- CH1 Setting - CH1 Adjustment Setting	Parameter name	Value		Unit	Default	Minimum	Maximum
CH2 Setting	CH2 gross/net setting	gross	•		gross	-	-
CH2 Adjustment Setting	- CH2 Characteristic value	2mV/V	-		2mV/V	-	-
Alarm Setting	CH2 sampling time	50ms	-		50ms	-	-
	- CH2 standstill times	5			5	1	500
	- CH2 standstill Range	10			10	1	10000
	Ch2 Max weight	100000			100000	1	-
	CH2 Filter mode setting	Disable	-		Disable	-	-
	CH2 Filter ratio	1	-		1	-	-
	CH2 Filter average times	10			10	1	100
	Ch2 Zero upper range	10			10	0	100000
	Ch2 Zero lower range	-10			-10	-100000	0
	- CH2 Zero tranking timer	10			10	1	500
	•						•

## (4) Adjustment for channel 2

Device Setting						
Options						
- AS02LC-A - CH1 Setting - CH1 Adjustment Setting - CH2 Setting - CH2 Adjustment Setting	CH2 Adjustment Setting					
	Parameter name	Value	Unit	Default	Minimum	Maximum
	CH2 Adjustment number	2		2	2	20
	- CH2 weight of Adjustment point 1(Zero)	0	I	0	0	0
- Alarm Setting	CH2 weight of Adjustment point 2	2000		1000	-	-
Default Import	Export Update					ОК

7\_

### (5) Alarm settings

evice Setting				
Options				
- AS02LC-A - CH1 Setting - CH1 Adjustment Setting	Alarm Setting			
	Parameter name	Value	Unit Default Minimum	Maximum
CH2 Setting	External power supply error	🖌 Disable	📃 Disable -	-
CH2 Adjustment Setting	Hardware error	📃 Alarm	Alarm -	-
- Alarm Setting	L. Driver borad error	📃 Alarm	Alarm -	-
Default Import	Export Update			ОК

# 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#1801	The external voltage is abnormal.	OFF	Blinking
16#1802	Hardware failure	OFF	Blinking
16#1807	The driver board is abnormal.	OFF	Blinking
16#1808	The weight measured by CH1 exceeds the maximum weight that can be measured, or the voltage of SEN is incorrect.		
16#1809	The weight measured by CH1 exceeds the maximum weight that can be measured.		
16#180A	CH1 is adjusted incorrectly.	Run: blinking	Dlinking
16#180B	The weight measured by CH2 exceeds the maximum weight that can be measured, or the voltage of SEN is incorrect.	Stop: OFF	Blinking
16#180C	The weight measured by CH2 exceeds the maximum weight that can be measured.		
16#180D	CH2 is adjusted incorrectly.		

Description	Procedure
The external voltage is abnormal.	Ensure the power supply is functioning correctly.
Hardware failure	Return the module to the factory for repair.
The driver board is abnormal.	Return the module to the factory for repair.
The weight measured by CH1 exceeds the maximum weight that can be measured, or the voltage of SEN is incorrect.	Check the signal received by channel 1 and its wiring.
The weight measured by CH1 exceeds the maximum weight that can be measured.	Check the parameters of the related weight values for channel 1.
CH1 is adjusted incorrectly.	Check the adjusted weight value and the adjustment steps for channel 1.
The weight measured by CH2 exceeds the maximum weight that can be measured, or the voltage of SEN is incorrect.	Check the signal received by channel 2 and its wiring.
The weight measured by CH2 exceeds the maximum weight that can be measured.	Check the parameters of the related weight values for channel 2.
CH2 is adjusted incorrectly.	Check the adjusted weight value and the adjustment steps for channel 2.

## 7.5.2 Troubleshooting Procedure

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Memo



# Chapter 8 Serial Communication Module ASOOSCM

## **Table of Contents**

8.1	Introduction	8-3
8.	Specification, Function and Wiring 2.1 The functional specifications 2.2 Dimensions and Profile 2.3 Wiring	8-4 8-5
	8.2.3.1 AS00SCM-A Power Wiring	
	8.2.3.2 AS00SCM-A Communication Interface	8-8
	COM mode	8-9
	8.3.2.1 TX Packets and RX Packets	8-11
8.	8.3.2.2 Command 3.3 CANopen Mode	
	8.3.3.1 Features	
	8.3.3.2 Corresponding Input / Output Device Range	8-15
<b>8.4</b> 8	RTU Mode .4.1 CANopen Mode (AS-FCOPM)	
	8.4.1.1 AS Remote Communication Mode	8-17
	8.4.1.2 Delta Special Driver & AS Remote Mode	
8.	8.4.1.3 CANopen DS301 Mode .4.2 EtherNet/IP Mode	8-19 8-20
	8.4.2.1 Connecting to Delta PLC Scanner through EIP Builder	8-20
8.	8.4.2.2 Connecting to 3rd Party PLC Scanner through EIP Builder	
8.5	Normal Exchange Area	8-29
<b>8.6</b> 8	Application .6.1 Modbus	
	8.6.1.1 Modbus Slave–Connection to Delta Products	8-31
8. 8.	8.6.1.2 Modbus Master—Connection to Delta Products 6.2 UD Link 6.3 Remote IO Application (AS-FCOPM) 6.4 Remote IO Application (AS-FEN02) 6.5 Remote IO Application (Multiple AS-FEN02)	8-40 8-55 8-62

8.7 Error Codes	8-66
8.7.1 Troubleshooting for Module AS00SCM-A as a Communication Module	8-67
8.7.1.1 ERROR LED Indicators are ON	8-67
8.7.1.2 ERROR LED Indicators Blinking Every 0.5 Seconds	8-67
8.7.2 Troubleshooting for Module AS00SCM-A as a Remote Module	8-68
8.7.2.1 ERROR LED Indicators Are ON	8-68
8.7.2.2 ERROR LED Indicators Blinking Every 0.5 Seconds	8-68
8.7.2.3 ERROR LED Indicators Blinking Every 0.2 Seconds	8-69

## 8.1 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 the following communication cards:

- Serial communication cards: AS-F232, AS-F422, and AS-F485 support Modbus and UD Link (user-defined format).
- CANopen communication card AS-FCOPM (Card 2) can be used as AS series remote module and supports CANopen DS301. AS00SCM-A should be firmware V2.00 or later.
- Ethernet communication card AS-FEN02 (Card 2) supports Modbus TCP Client/Server and EtherNet/IP Adapter (DLR function not included). AS00SCM-A should be firmware V2.02 or later.

You can configure the AS00SCM-A by using ISPSoft. Download ISPSoft V3.06 or later from Delta's official website. If you use UD Link, configure it through SCMSoft, which is embedded in DCISoft. Download DCISoft V1.19 or later from Delta's official website. You can set up the EtherNet/IP via EIP Builder. Download EIP Builder V1.06 or later from Delta's official website.

	Drotocolo	COM (serie	RTU (Remote control)		
	Protocols	Card 1	Card 2	Card 2	
AS-F232		V	V	-	
AS-F485	MODBUS	V	V	-	
AS-F422	UD Link	V	V	-	
	AS Remote Communication		V (Slave)	(E) \/0.00 \	
AS-FCOPM	Delta Special Driver & AS Remote Mode	-	(Firmware V2.00 or later)	(Firmware V2.00 or later)	
	CANopen DS301	-		(Firmware V2.02 or later)	
AS-FEN02	EtherNet/IP MODBUS TCP	-	-	(Firmware V2.02 or later)	

## 8.2 Specification, Function and Wiring

## 8.2.1 The functional specifications

### ■ RS-485/RS-422 communication interface

ltem	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

ltem	Specifications		
Connector type	RJ45*2		
Transmission 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

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

### Electrical specifications

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



## 8.2.2 Dimensions and Profile

Number	Name	Description
1	Model Name	Model name of the module
		Operating status of the module
	RUN LED Indicator (blue)	ON: the module is running.
		OFF: the module has low voltage or no power.
		Error status of the module
		ON: there is a hardware error.
	ERROR LED Indicator (red)	OFF: the module is operating normally.
2		Blink: 1. the configuration of the module is invalid, or there is a
		communication error (blinking every 1 second).
		2. hardware/low voltage error (blinking every 0.2 seconds)
	Function card 1 Indicator	Blink: data is being transmitted to function card 1.
	(orange)	OFF: there is no data transmission to function card 1.
	Function card 2 Indicator	Blink: data is being transmitted to function card 2.
	(orange)	OFF: there is no data transmission to function card 2.
3	Switch for the Node ID and Format	2 sets, one for function card 1 and the other for function card 2
	Function Card 1 Slot	For AS-F232, AS-F422, AS-F485
4	Function Card 2 Slot	For AS-F232, AS-F422, AS-F485, AS-FCOPM, and AS-FEN02 (in RTU mode only)
5	Switch for the Work Mode	COM: communication mode RTU: remote control 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

#### • Switch for the node ID and format

 Modbus communication (AS-F232/AS-F422/AS-F485): can be installed in Card 1 and Card 2 (in COM mode only). Use the switch to set the node ID and its setting range is 0x01–0x0F. You can use ISPSoft (HWCONFIG) to set up the node ID, when the switch is turned to 0. Follow the descriptions shown on the HWCONFIG for node ID setting range.

ID Setup (AS-F232/AS-F422/AS-F485)							
ID1/ID2 Node ID Setup ID1/ID2 Node ID Setup							
0	Use ISPSoft (HWCONFIG)	1-F	Manual Setting				

#### 2. CANopen (AS-FCOPM): can only be installed in Card 2.

**COM Mode (SCM mode):** use the switch to set the node ID and its setting range is 0x01–0x0F. You can use ISPSoft (HWCONFIG) to set up the node ID, when the switch is turned to 0. Follow the descriptions shown on the HWCONFIG for node ID setting range.

**RTU Mode:** the setting varies according to different CANopen communication mode; refer to section 8.4.1 for more details.

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

#### • Switch for the format

 Modbus communication (AS-F232/AS-F422/AS-F485): can be installed in Card 1 and Card 2 (in COM mode only). Use the Format Switch to set the communication mode. You can use ISPSoft (HWCONFIG) to set up the communication mode, when the Format Switch is turned to 0. If you need to set the communication mode to UD Link, you need to turn the Format Switch to 0. Refer to section 8.3.2 for more details.

Modbu	Modbus (AS-F232/AS-F422/AS-F485) in COM mode										
Format 1/ Format 2	Baud rate (bps)	Data (bits)	Parity	Stop (bits)	ASCII/ RTU	Format 1/ Format 2	rate	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

 CANopen (AS-FCOPM): can only be installed in Card 2; the communication mode can be set to COM/RTU mode. Refer to the following table and use switch to set up. You cannot use ISPSoft (HWCONFIG) to set up the communication mode in this format.

	CANopen (AS-FCOPM)							
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

### • Switch for IP address (AS-FEN02)

When using the communication card AS-FEN02, it only supports RTU mode and the IP address can be edited through FORMAT 2. The parameters of AS-FEN02 are stored in AS300 PLC or AS00SCM-A. Thus you need to set up the IP address for AS-FEN02 or use COMMGR to scan and check for the IP address of AS-FEN02.

- When both switches ID2 and FORMAT 2 are set to 0, IP address is set through EIP Builder (ISPSoft -> HWCONFIG).
  - When connected to Delta AS/AH series, you can open HWCONFIG and EIP Builder through ISPSoft. Add AS00SCM (RTU) + AS-FEN02 to your network and click the scanner device from the created network in EIP Builder to open HWCONFIG to set up.
  - When the scanner is from the third party, you can open EIP Builder directly. Add AS00SCM (RTU) + AS-FEN02 to your network and click the scanner device from the created network in EIP Builder to open HWCONFIG to set up.
- When either ID2 or FOR MAT 2 is NOT 0, IP address is set by switches ID2 and FOR MAT 2. Hexadecimal format is used and ID2 corresponds to x16<sup>1</sup> and FOR MAT 2 to x16<sup>0</sup>. The possible IP address is 192.168.1.x, x=1~FE (1~254).

## 8.2.3 Wiring

### 8.2.3.1 ASOOSCM-A Power Wiring

• COM mode:

Switch 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 this module.

• RTU mode:

Switch 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.





Ground

- (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.

### 8.2.3.2 ASOOSCM-A Communication Interface

• COM 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 when the firmware is V2.00 or later. Refer to Chapter 9 for more information about wiring the cards.

• RTU mode:

The card 2 slot supports the AS-FCOPM communication card when the firmware is V2.00 or later and supports AS-FEN02 when the firmware is V2.02. For wiring information, refer to Chapter 9.

## 8.3 COM mode

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

## 8.3.1 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 8.2.2 for more details.
- 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 HWCONFIG. -> Set up the node ID and communication format. -> Create a data exchange table. -> Select a Mode (Program Control, PLC Run, or Always Enable). -> Download HWCONFIG. -> Enable this function. Refer to section 8.3 in AS Series Operation Manual for more details.
- When AS00SCM acts as adapter/slave, it provides a communication channel for AS series PLC to read and write.

Function Code	Attribute	Supporting addresses
		16#0000~16#0063
0x03	Attribute Read Write Read Write	16#0100~16#0163
0x04		16#0200~16#0263
		16#0300~16#0363
0x06	\\/rito	16#0000~16#0063
0x10	Write	16#0200~16#0263
		16#0000~16#0063
	Road	16#0100~16#0163
0x17	Reau	16#0200~16#0263
UXI7		16#0300~16#0363
	\A/rito	16#0000~16#0063
	vvnie	16#0200~16#0263

Supporting function codes and addresses are shown below.

#### 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

 Corresponding data registers can be obtained when AS series PLC uses AS00SCM-A for communication and via HWCONFIG to set up. Refer to section 8.6.1 for more details.

### 8.3.2 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. Make sure the switch of SCM module is turned to 0 before operation. SCMSoft is embedded in DCISoft. Go to <u>www.deltaww.com</u> to download DCISoft V1.19 or later. And after that you can use SCMSoft in ISPSoft.

The steps for creating a UD Link protocol communication are:

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, right-click the module to open SCMSoft in HWCONFIG.

In SCMSoft

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.

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. You need to create a new group list for different module that needs to use UD Link.

After the group list is created, you can edit packets for transmission.

Edit TX and RX packets. -> Create commands. -> Download parameters to UD Link. -> Download in groups and once a group number is trigger, the function card starts to send and receive packets according to the comment order.



### 8.3.2.1 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 Segment	t Edit Class	Format	Segment View	Up Down
				Delete
Message	ant	Variable	Address Constant	Variable
Ado	d	Checksum Add	No. 0 🔷 ~ N	ło. 0
			OK	Cancel

- 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 E	idit				
Format Variable Value	(	[0]), 1) Variable	,	Length	)
Variable Property Function Mapping Regist		Read R() D Register	~	0	]
Length Property Function Mapping Regist Constant	ter	Constant Base + Off 1	✓ 'set ✓	0	]
·		ОК		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: 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. You can also select to determine the length (\*) automatically. The data length can be specified between the packet interval (around 4 character time 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.

### 8.3.2.2 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 Packet1	~
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)
	ОК	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.

### 8.3.3 CANopen Mode

The 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 master modules in the CANopen network environment.

### 8.3.3.1 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

## 8.3.3.2 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.

File Edit O	ption <u>H</u> elp				
🖪   X 🗈 🛍	9 / 7   9 9	3 🎇 📅 🛷			
Product List					
<ul> <li>AS Series</li> <li>Digital I/O M</li> <li>Analog I/O N</li> <li>Network Mod</li> <li>Motion Cont</li> <li>Power Modu</li> <li>Specification</li> <li>Serial communicat MODBUS, UD Lir (COM. mode), Rer (RTU mode)</li> </ul>	Module dule rol Module le ion module, ik protocol				
		<b>•</b>	(	~	
CPU Group					
Extension No	Туре	Module Name	DDF Version	Input Device Range	Output Device Ra
Power Module					
CPU Module	CPU Module	AS332P	01.02.30	X0.0 ~ X0.15	Y0.0 ~ Y0.15
Function Ca					
Function Ca					
🖃 Module Inform	Network Module	AS00SCM-A	01.05.00	D28000~D28019	D28020~D28039
Function Ca					
Function Ca	Function Card	AS-FCOPM	None	D26200 ~ D26299	D26300 ~ D26399
🖃 Module Inform	Network Module	AS00SCM-A	01.05.00	D28040 ~ D28059	D28060~D28079
Function Ca					
Function Ca	Function Card	AS-FCOPM	None	D26600 ~ D26699	D26700 ~ D26799
🗆 Module Inform	Network Module	AS00SCM-A	01.05.00	D28080 ~ D28099	D28100~D28119
Function Ca					
Function Ca	Function Card	AS-FCOPM	None	D27000 ~ D27099	D27100~D27199
🗆 Module Inform	Network Module	AS00SCM-A	01.05.00	D28120 ~ D28139	D28140 ~ D28159
Function Ca					
Function Ca	Function Card	AS-FCOPM	None	D27400 ~ D27499	D27500~D27599

## 8.4 RTU Mode

## 8.4.1 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 switch FORMAT 1 to switch among three RTU modes.

A. RTU Communication Mode Setup Switch "FORMAT 1"

FORMAT1	Description
0	AS Remote Communication
4	CANopen DS301
8	Delta Special Driver & AS Remote Mode

#### B. Node ID Setup Switch "ID1/ID2"

- ID1: 0 (recommended)
- ID2: 0 (the switch is no function; set up through ISPSoft); see the table below for the switch setting range.

RTU mode	ID2 setting range
AS Remote Communication	1∼F (by the number of slaves)
Delta Special Driver & AS Remote Mode	1∼F (by the number of slaves)
CANopen DS301	1∼F (if the switch is at 0, the setting range is set by HWCONFIG)

### C. RTU Communication Speed Setup Switch "FORMAT 2"

Use the switch 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

### 8.4.1.1 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	1 <b>.</b> *
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	-	0~10V	-	-	•
DA Analog Output mode	0~10V ·	-	0~10V	-	-	
AD Sampling Time	3	ms	3	3	15	
AD Average Times	10		10	1	15	
-FCOPM Working mode	AS Remote Co	-	AS Remote	e Co -	-	
-FCOPM node ID	1		1	1	254	
Remote module No.	1	unit	1	1	15	
lect Run mode after detect remote m	c Run connectec •	-	Run conne	cter -	-	

Turn the FORMAT1 switch 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 switch ID2 to set up Node ID and use the switch 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 switch to 0 and FORMAT1 to 0; ID2 switch 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.

## 8.4.1.2 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	1 🔺
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	▼		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	-	-	
F2DA Analog Output mode	0~10V	·		0~10V	-	-	
F2AD Sampling Time	3	n	15	3	3	15	
F2AD Average Times	10			10	1	15	
AS-FCOPM Working mode	Delta Special Dri 🔻			AS Remote Com	-	-	
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 :	-	-	
AS CPU module keep or Stop when slave no	Only Show Error	•		Only Show Error	-	-	
Remote Communication time out	100	n	15	100	0	3000	
Re-connected Retry number after time out	60			60	0	255	
Auto Retry connection after Disconnected	60	s	ec	60	0	255	
AS-FCOPM Bit Rate	1000k 💌	r b	ps	125k	-	-	

Turn the FORMAT1 switch 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 switch ID2 to set up Node ID and use the switch 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 switch to 0 and FORMAT1 to 8; ID2 switch to 9 and FORMAT2 to 7.
- 3. Supply power to AS00SCM-A and connect AS00SCM-A to the PLC with a CANopen cable.
- 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.

### 8.4.1.3 CANopen DS301 Mode

- This mode supports AS Series PLC acts as the CPU and the 3<sup>rd</sup> 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 3<sup>rd</sup> 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 switch 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 8.6.3. 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.



#### 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 8.4.1.1 for more details.
- 2. Use AS series PLC to scan the I/O modules installed on the right-side of AS00SCM-A and download the parameters.
- 3. 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, switch ID2 to 0.
- 4. Install the I/O module to the right side of AS00SCM-A and switch the working mode to RTU.
- 5. Switch 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 8.6.3 PDO examples, if you are using AH10COPM-5A as the CPU.

### 8.4.2 EtherNet/IP Mode

AS00SCM-A (firmware V2.02 or later) can be installed on AS-FEN02. However it can only be used in RTU mode and you can use Delta PLC or the 3<sup>rd</sup> party EtherNet/IP device to control the right-side modules of the AS00SCM-A. Refer to section 9.2.7 for more details on the operations of AS-FEN02 installed on AS Series PLC.

### 8.4.2.1 Connecting to Delta PLC Scanner through EIP Builder

Through EIP Builder, an AS Series PLC (when acting as a scanner) can create an EtherNet/IP connection to AS00SCM-A (when installed) on AS-FEN02. Below shows an example of AS Series PLC acting as a scanner to create an EIP connection.

1. An AS Series PLC, AS-FEN02 and a computer can be connected together through an Ethernet switch. Configure the parameters in HWCONFIG and right-click the CPU to open EIP Builder.



 Scan the network to add AS-FEN02 (AS RTU) in EIP Builder. Drag the red block and drag it to the same network (Network\_0) as the AS Series PLC does. Double-click AS-FEN02 to open HWCONFIG and set the parameters for AS-FEN02.



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Network View		1	🚔 Ede Late Oprione Holp
Not Connected		8	図   X 回 〇 日 ( ク ) 回 三 文   型 の Samer Untiled (PO)
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			* Digital I O Module
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	Network 0	-	
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		100 · 41	
			(PU Seage
			Estension. Type Module DDFV Input Devi. Output De. RFI(m) Mubicast Timeout Trigger. Consects. Commer
			PeterM
			CPU Mo CPU Mada A5005CM 010100 D20000 - D2 D20010 - D2 10 Peint-to-Pr BPI x 4 Cyclic RTU IO Ov Fuert
			Panet
		-	
	1		
	<u>s</u> :		Offine Undefined Driver
vice Setting			
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Options			
- ASOOSCM(RTU	) + AS-FEN02	Device Infor	imation Nomal Exchange Area
AS00SCM(RTU)		Device Info	mation Normal Exchange Area
AS Serial Ren	mote Module S	Device Infor	
AS Serial Ren Ethernet Port	mote Module Set t Basic Setting		AS00SCM-A
AS Serial Ren	mote Module Set t Basic Setting		
AS Serial Ren Ethernet Port	mote Module Set t Basic Setting	Device Name	AS008CM-A Serial communication module, MODBUS, UD Link protocol (COM. mode), Remote IO control(RTU mode)
AS Serial Ren Ethernet Port	mote Module Set t Basic Setting	Device Name	AS00SCM-A Serial communication module, MODBUS, UD Link protocol (COM. mode), Remote IO control(RTU mode) Module current consumption:(Internal)22mA,(External)0mA
AS Serial Ren Ethernet Port	mote Module Set t Basic Setting	Device Name	AS008CM-A Serial communication module, MODBUS, UD Link protocol (COM. mode), Remote IO control(RTU mode) Module current consumption:(Internal)22mA,(External)0mA Module total witdh:53mm
AS Serial Ren Ethernet Port	mote Module Set t Basic Setting	Device Name	AS008CM-A Serial communication module, MODBUS, UD Link protocol (COM. mode), Remote IO control(RTU mode) Module current consumption:(Internal)22mA,(External)0mA Module total witdh:53mm
AS Serial Ren Ethernet Port	mote Module Set t Basic Setting	Device Name	AS00SCM-A Serial communication module, MODBUS, UD Link protocol (COM. mode), Remote IO control(RTU mode) Module current consumption:(Internal)22mA,(External)0mA Module total witch:33mm
AS Serial Ren Ethernet Port	mote Module Set t Basic Setting	Device Name Description	AS008CM-A Serial communication module, MODBUS, UD Link protocol (COM. mode), Remote IO control(RTU mode) Module current consumption:(Internal)22mA,(External)0mA Module total witdh:53mm
AS Serial Ren Ethernet Port	mote Module Set t Basic Setting	Device Name Description Comment	AS00SCM-A Serial communication module, MODBUS, UD Link protocol (COM. mode), Remote IO control(RTU mode) Module curent consumption:(Internal)22mA,(External)0mA Module total witdh:53mm
AS Serial Ren Ethernet Port	mote Module Set t Basic Setting	Device Name Description	AS008CM-A Serial communication module, MODBUS, UD Link protocol (COM. mode), Remote IO control(RTU mode) Module current consumption:(Internal)22mA,(External)0mA Module total witdh:53mm
AS Serial Ren Ethernet Port	mote Module Set t Basic Setting	Device Name Description Comment DDF Version	AS00SCM-A Serial communication module, MODBUS, UD Link protocol (COM. mode), Remote IO control(RTU mode) Module current consumption:(Internal)22mA,(External)0mA Module total witdh:53mm
AS Serial Ren Ethernet Port	mote Module Set t Basic Setting	Device Name Description Comment	AS00SCM-A Serial communication module, MODBUS, UD Link protocol (COM. mode), Remote IO control(RTU mode) Module curent consumption:(Internal)22mA,(External)0mA Module total witdh:53mm
AS Serial Ren Ethernet Port	mote Module Set t Basic Setting	Device Name Description Comment DDF Version	AS00SCM-A Setial communication module, MODBUS, UD Link protocol (COM mode), Remote IO control(RTU mode) Module current consumption:(Internal)22mA,(External)0mA Module total witch:53mm
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AS Serial Ren Ethernet Port	mote Module Set t Basic Setting	Device Name Description Comment DDF Version Furnivare Version	AS00SCM-A Setial communication module, MODBUS, UD Link protocol (COM mode), Remote IO control(RTU mode) Module current consumption:(Internal)22mA,(External)0mA Module total witch:53mm
AS Serial Ref Ethemet Por	mote Module Set t Basic Setting	Device Name Description Comment DDF Version Furnivare Version Hardware Version	AS00SCM-A Setial communication module, MODBUS, UD Link protocol (COM mode), Remote IO control(RTU mode) Module current consumption:(Internal)22mA,(External)0mA Module total witch:53mm

3. If the PLC is not connected to any module, you can drag and drop AS-FEN02 (AS RTU) from the Product List on the right to add it into the Network View.



- 4. 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 the previous step
- Data Exchange: data mapped from the RTU right-side modules of AS00SCM-A to the PLC

thect Time 0	Nezwolk View + x		
@ Untedad ∰ Network View ⇒ Findo # Findo # Econected ⇒ Not Connected	Network 0	Project Downleader      Select Al      Invert Selector      Nonc     V Select Al     V Selector      V Selector     V Selector      V Se	
		Auto close after completing Warning Handle Ispone Rems = Is	apased Time ; 0

 While downloading, the connection of PLC and RTU is off. After the downloading is complete, the connection will be re-established. Refer to section 8.4.3 for more details on the connection establishment of AS00SCM-A RTU modules.

## 8.4.2.2 Connecting to 3<sup>rd</sup> Party PLC Scanner through EIP Builder

Through EIP Builder, a 3<sup>rd</sup> party PLC (when acting as a scanner) can create an EtherNet/IP connection to AS00SCM-A (when AS-FEN02 is installed). Use the 3<sup>rd</sup> party PLC to connect to the computer and open EIP Builder to edit the right side modules of AS00SCM-A. You can manually or scan the network to add the AS00SCM(RTU) + AS-FEN02 to the network. Click the remote module to open HWCONFIG to scan and download the parameters of the right side modules of AS00SCM-A.



### AS Series Module Manual

Dev_1(AS-FENO		CONFIG			-	_ ×
E X B B 0	5 😨 🗊 🎘 🛝	4				
Product List	and the part of the					
<ul> <li>AS Series</li> <li> <i>B</i> Digital I/O Module          </li> <li></li></ul>		Transfer Items ✓ Download All It ✓ Hardware Co ✓ Remote Moo ✓ Ethernet-Baa ✓ Ethernet-Ad	onfiguration : dule Settin sic	× OK Cancel		
CPU Group	L					
Extension No	Туре	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	AS16AN01R-A	01.00.00			
		Offline Un	defined Driver			

- Go to <u>www.deltaww.com</u> to download EDS file and install the downloaded EDS file to the software of the 3<sup>rd</sup> party scanner. Refer to section 9.7 of AS Operation Manual for an operational example of Rockwell Studio 5000.
- The following example uses Rockwell PLC.
  - 1. After the installation is done, you can see AS00SCM(RTU) + AS-FEN02 in the list. Click it to see the module information page.

Rem Run     Run Mode       No Forces     Controller OK       No Edits     Image: Controller OK       Redundancy     Image: Controller OK	Path:        102\Backplane\0*         ₽           4         H <th>ielect Ianauaae ✓ 🛛 📽 ] Alarms 🔏 Bit 🔏 Timer/Counter 🔏 Input/Output 🔏 Com</th>	ielect Ianauaae ✓ 🛛 📽 ] Alarms 🔏 Bit 🔏 Timer/Counter 🔏 Input/Output 🔏 Com
Controller Organizer • • • × Controller AS00SCM_FEN02 Controller AS00SCM_FEN02 Tasks Add-On Instructions Add-On Instructions Data Types Trends I/O Configuration 1756 Backplane, 1756-A7 [] [1] 1756-EN2TR Ethernet [] AS00SCM(RTU) + AS-FE [] 1756-EN2TR Ethernet	General Connection       Module Info       Internet Protoco         Identification       Vendor:       Delta Electronics, Inc.         Product Type:       Communications Adapter         Product Code:       AS00SCM(RTU) + AS-F         Revision:       1.1         Serial Number:       23130209         Product Name:       AS00SCM(RTU)+AS-FEN	Port Configuration       Network         Status       Major Fault:       None         Minor Fault:       None       Internal State:         Internal State:       Run mode         Configured:       No         Owned:       Owned         Module Identity:       Match         Refresh       Reset Module

	Forces	<ul> <li>Run Mode</li> <li>Controller OK</li> </ul>	4	Path: 102/Backplane/0*					
No Forces No Edits Reduindancy Controller Orga Tasks Motion Gr Madd-On In Data Type: Trends VO Config 1756 Bar 5 (0) 17 5 (1) 17 5 (1) 17	coils 👌	<ul> <li>Energy Storage OK</li> <li>I/O OK</li> </ul>		4 High rest and the ComputerMath & Timer/Counter & Input/Output & Compare & ComputerMath & T					
Start Page	<ul> <li>Controller AS00SCM</li> <li>Tasks</li> <li>Motion Groups</li> <li>Add-On Instructions</li> <li>Data Types</li> <li>Trends</li> <li>I/O Configuration</li> <li>I/S6 Backplane, 1</li> <li>[-\$ [0] 1756-L71 AS</li> </ul>	00SCM_FEN02 ps uctions tion	Interne IP se if the • N	Connection Module Info Internet Protocol Port Configuration Network net Protocol (IP) Settings settings can be automatically configured ne network supports this capability. Manually configure IP settings ttings Configuration					
		SCM(RTU) + AS-FE -EN2TR Ethernet	Phy Dor	ysical Module IP Address: 192 . 168 . 1 . 3 Subnet Mask: 255 . 255 . 255 . 0 Gateway Address: 192 . 168 . 1 . 1 main Name. sst Name: AS-FEN02					

2. Select Multicast in the field of Input Type in the Connection sheet.

em Run Forces	Run Mode     Controller OK	Path:102\Backplane\0* 💌 🚠						
Edits	Energy Storage OK	K Favorites & Safety & Alarms & Bit & TimerCounter & Input/Output & Compare & Compute/Math & Move/Logic						
Controller Orga	anizer - * ×	Module Properties: Ethernet (AS00SCM(RT	U) + AS-FEN02 1.1)					
ar Controller AS00SCM_FEN02 ar Tasks ar MainTask ar MainProgram ar Program Tags		General Connection Module Info Internet Protocol Port Configuration Network						
		Name Requested Packet Interval (RPI) (ms)		nput Type Input Trigger				
	MainRoutine	RTU IO Owner	10 0 ÷ 5.0 - 1000 Multic	cast Cyclic 🖌				
50 [0] 17 5 [1] 17 5 [1] 17 5 & Eth 5 A	ckplane, 1756-A7 56-L71 AS00SCM_FEN 56-EN2TR Ethernet							
ĸ	>	Inhibit Module						
<ul> <li>Module Defi</li> <li>Astruteno:</li> <li>astruteno:</li> <li>astruteno:</li> </ul>	ned Tags 21 2:0	Inhibit Module Major Fault On Controllor If Connection Fails W Module Fault	ile in Run Mode					
Module Defi asituteno: asituteno:	ned Tags 21 2:0	Major Fault On Controller If Connection Fails Wi	ile in Run Mode					

3. Click Change in the General sheet to change the data length. To set up the data length, refer to the register length that a module occupies in HWCONFIG. The following uses a 16-point digital output module as an example. The output point of this module occupies 2 words. If the data type is SINT, the length unit is byte. Add 2 to the output default value 40.

Type: Vendor:	AS00SCM(RTU) + AS-FEN02 AS00SCM(R Delta Electronics, Inc.	TU) + AS-FEN02	on*
Parent:	EN2TR	Revision:	1 • 1 -
Name:	ASRTU	Electronic Keying:	Exact Match
Description:	-	Connections:	
		Name	Size
		RTU IO Owner	Input: 60 Output: 42 🖨 SINT
			Output.
		-	
Module Defi	nition		
Revision:	1.1		
Electronic K	Geying: Exact Match		
Connection	s: RTU IO Owner		
		ОК	Cancel
	Ch	ange	

4. The first module on the right side can start data mapping from the 41st byte (Data[40]). See the image below. bit0~bit7 of O.Data[40] are mapping to Y0~Y7 and bit0~bit7 of O.Data[41] are mapping to Y8~Y15. If the module is an input module, you need to edit the input length and use I.Dat mapping to a.

m Run D Run Mode Forces + Controller OK Edits 2 10 OK duadancy 51	Path		er 🕽 ImputiOutput 🛦 Compare 🔏 Co	mpate/Math <b>K</b> N	Jave/Log
Controller Organizer 🔹 🔹 🗙	Scope: AS00SCM_FEN0; V Show	r All Tags			~ X.
Controller AS00SCM_FEN02	Name	zalo Value	Force N	task* Style	Dat
a a Tasks	+ asrtuten02 O.Data[20]		2#0000_0000	Binary	SIN
<ul> <li>Tasks</li> <li>WainTask</li> <li>MainProgram</li> <li>Program Tags</li> </ul>	+ asrtufen02.0.Data[21]		2#0000_0000	Binary	SIN
	* asrtufen02:0.Data[22]		2#0000_00000	Binary	SIN
- MainRoutine	+ asrtufen02:0.Data[23]		2#0000_0000	Binary	SIN
Unscheduled Programs / Phase	* asrtufen02 O.Data[24]		2#0000_0000	Binary	SIN
	+ asrtufen02:0.Data[25]		2#0000_0000	Binary	SIN
Add-On Instructions	* asrtufen02:0 Data[26]		2#0000_0000	Binary	SIN
🕀 🍮 Data Types	* asrtufen02.0.Data[27]		2\$0000_0000	Binary	SIN
Trends	+ asrtufen02 O Data[28]		2#0000_0000	Binary	SIN
😑 当 I/O Configuration	+ asrtufen02:0.Data[29]		2#0000_0000	Binary	SIN
😑 🛲 1756 Backplane, 1756-A7	* asrtuten02.0.Data[30]		2#0000_0000	Binary	SIN
[0] 1756-L71 AS00SCM_FE	* asitufen02.0.Data[31]		2\$0000_0000	Binary	SIN
[1] 1756-EN2TR Ethernet	+ asrtufen02.0.Data[32]		2#0000_0000	Binary	SINT
🚍 🍰 Ethernet	+ asrtufen02.0,Data[33]		2#0000_0000	Binary	SINT
AS00SCM(RTU) + A'	* asrtufen02.0 Data[34]		2#0000_0000	Binary	SINT
- # 1756-EN2TR Ethern	* asrtufen02.0.Data[35]		2#0000_0000	Binary	SINT
	* asrtufen02:0.Data[36]		2#0000_0000	Binary	SINT
c >	+ asrtuten02.0.Data[37]		2#0000_0000	Binary	SINT
	* asrtufen02 O Data[38]		2#0000_0000	Binary	SINT
	+ asrtufen02:0.Data[39]		2#0000_0000	Binary	SINT
	* asrtufen02:0 Data[40]		2#1111_1111	Binary	SINT
	+ asrtufen02,0,Data[41]		2#1010 0001	Binary	SINT


# 8.4.3 Remote Module Setting

1. 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 or AS-FEN02:

- AS00SCM-A AS Serial Remote Module Se	AS Serial Remote Module Setting						
AS Senar Remote Module S	Parameter name	Value		Unit	Default	Minimum	Maximum
	Master Disconnected Handling	IO Module STOP	-		IO Module STC	) _	_
	Master Reconnected Handling	IO Module STOP	•		IO Module STC	-	-
	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
							Þ
ı <b>•</b>	•						

8-27

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 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

Procedure	Settings (RTU)	Digital & Analog Input Modules	Digital Output Modules	Analog Out (I/O Modul	put Module e Settings)	
		input wouldes	Woddles	Clear	Keep	
Master connection lost	I/O module stops running	Cannot update data on the master	Output value = 0	Output value = 0	No change to the output value	
1051	I/O module keeps the same state		No change	e to the output v	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 module (Ex.	I/O module stops running	No change to the output value	Output value = 0	Output value = 0	No change to the output value	
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 mast			
I/O connection lost	I/O module stops running	No change to the output value	Output value = 0	Output value = 0	No change to the output value	
(Ex. unstable connection)	VO module keeps the same state	Other functional modules: keep updating data on the master	Other fu output value = c	nctional module output value of t		

- Module configurations: refer to Section 8.1.2 in the AS Series Operation Manual.
- Module setups: refer to other chapters in the AS Series Module Manual.

## 8.5 Normal Exchange Area

#### 1) COM mode

- Function Card1 Setting	Device Information Normal Exchange Area			
Function Card 2 Setting	Description	Address		
	▶ Reserved	D28000		
	Error Code	D28001		
	Card 1 Data Exchange State (item 1~32) (0:none/fail, 1:success)	D28002 ~ D28003		
	Card 2 Data Exchange State (item 1~32) (0:none/fail, 1:success)	D28006 ~ D28007		
	Card 1 UD Link State (0:none/processing, 1:finshed)	D28010		
	Card 2 UD Link State (0:none/processing, 1:finshed)	D28011		
	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 ~ D28023		
	Card 2 Data Exchange Trigger (itme1~32) (0:no trigger, 1:trigger)	D28026 ~ D28027		
	Card 1 UD Link Group ID Trigger	D28030		
	Card 2 UD Link Group ID Trigger	D28031		

	nge Setup	aves, when the first time			1010	ode Progra	m Control 💌	1
Item	Enable	Remote Station Address	Local Address		Remote Address	Quantity	Add	
1	<b></b>	1	D26000	~<	D0	1		
			D26100	>>	D0	1	Move Up	
		1	D26000		D0		more op	
			D26100		D0		Move Down	
							Delete	
							Delete	
							Copy	

In the examples above, note that the Normal Exchange Area shows the corresponding data registers of the module and the PLC.

- 1. Module Status: 0 = stop, 1 = run
- 2. Error Code: refer to Section 8.7 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
- 4. Card 1 & Card 2 Data Exchange Mode Control: set the data register to 0: none, 1: once, 2: always.

- 5. 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
- 6. Card 1 & Card 2 UD Link Group ID Trigger: set the group ID to be triggered.

Dptions AS00SCM-A AS Serial Remote Module	Device Information Normal Exchange Area	
	Description	Address
	Module Status	D29000
	Module Error Code	D29001
	IO Module Error Code	D29002 ~ D29009
)		
Default Import	Export Update	

2) RTU Mode: (AS Series PLC acting as a Scanner)

- RTU Module Status: 0 = communication module stop, 1 = communication module run
- Module Error Code: refer to Section 8.7 for more information.
- Power Status: 0 = power error, 1 = power normal
- I/O Module Status: 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.

# 8.6 Application

### 8.6.1 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.

### 8.6.1.1 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		16#0100–16#0163
0x04	Read	16#0200–16#0263
		16#0300–16#0363
0x06	0x06 0x10 Write	16#0000–16#0063
0x10		16#0200–16#0263
		16#0000–16#0063
		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.

 Drag to add AS00SCM-A in the system configuration area. Make sure the switch 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.

🔳   X 🗅 🖸	9 8 9	D 🔣 🏷 🛷			
Product List					
A\$300     Digital I/0 Modt     Analog I/0 Modt     Analog I/0 Modu     Asoos CM-4     Power Module	ule e	+		+	
Specification Serial communicat MODBUS, UD Lin (COM. mode), Ren (RTU mode)	ion module, k protocol	•		×	
CPU Group					
CPU Group Extension No	Туре	Module Name	DDF Version	Input Device Range	Output Device Ra.
	Туре	Module Name	DDF Version	Input Device Range	Output Device Ra.
Extension No	Type CPU Module	Module Name AS332P	DDF Version	Input Device Range	Output Device Ra. Y0.0 ~ Y0.15
Extension No Power Module					
Extension No Power Module CPU Module Function Card Function Card	CPU Module	AS332P	01.00.00	×0.0 ~ ×0.15	Y0.0~Y0.15
Extension No Power Module CPU Module Function Card Function Card	CPU Module Network Module	AS332P AS00SCM-A	01.00.00	X0.0 ~ X0.15	Y0.0 ~ Y0.15 D28020 ~ D28039
Extension No Power Module CPU Module Function Card Function Card Module Informatic	CPU Module	AS332P	01.00.00	×0.0 ~ ×0.15	Y0.0 ~ Y0.15

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.



AS00SCM-A	COM1 Setting								
COM1 Setting COM2 Setting	Parameter name	Value		Unit	Default	Minimum	Maximum		
and an a	Function Card Type	AS-F485	-		None	-	-		
	Protocol	MODBUS RTU			None	-	+		
	Data Exchange Enable					+1	÷.		
	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		_						

4) Set the communication protocol values for COM1 using the HMI settings.

5) Click the Download button to download the parameters to the AS00SCM-A.

HWCON	FIG		
E X D D 9	85	5	10 4
Eile Edit Option	Help		

NOTE: Double-click the module to open the Device Setting dialog box to configure the parameters.

#### 8.6.1.2 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 switch of AS00SCM-A is turned to COM mode and no power connected to it.



2) Double-click COM2 Setting and set the Function Card Type to AS-F485.

B AS00SCM-A	COM2 Setting								
<ul> <li>COM1 Setting</li> <li>COM2 Setting</li> </ul>	Parameter name	Value	Unit Default	Minimum Maximum					
	Function Gard Type	None ▼ None AS-F232 AS-F422 AS-F425	None -						

 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.



4) Double-click the SCM module to open the configuration settings.



5) Set the communication protocol values for COM2:

COM1 Setting	Parameter name	Value	7	Unit	Default	Minimum	Maximum
	Function Card Type	AS-F485	*		None	-	-
	Protocol	MODBUS AS	C 🕶		None	-	4
	Data Exchange Enable		-				-
	ID	1			)	0	247
	Baud Rate	38400	-	ps	3600		-
	Format	7E1	-		7E1	10	-
	Delay time to Reply	0	1	ns	0	đ	10000
	Retry times	0			0	0	10
	Received Data Timeout	8000	h	ns	3000	0	60000
Default Impo	t Export Update						

 Set up the data exchange table: select Data Exchange – COM2 and click Add to create a new Data Exchange Setup table.

	ally scan sl nge Setup	aves, when the first time			Me	ode Alway	s Enable 💌	
Item	Enable	Remote Station Address	Local Address		Remote Address	Quantity	Add	
		1	D26200		D0			
			D26300	~~	D0		Move Up	
							Move Down	
							Delete	
							Copy	

7) In the Data Exchange Setup table double-click an item to edit its settings.

Enable The Shortest Update Cycle (ms) 10 For Apply to all	Slave Address 1	
Connection Timeout (ms) 50 For Apply to all	Remote Device Type AS300 series	
Local Start Address D26200 ~ D26299	Remote Start Address D0 ~ D29999 Quantity (v	word)
D Register 26200	D Register 0 1	
Local Start Address D26300 ~ D26399	Remote Start Address D0 ~ D29999 Quantity (v	word)
D Register • 26300	D Register v 0 1	

• 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

✓ Enable       The Shortest Update Cycle (ms)     10     I✓     Apply to all	Slave Address 10	
Connection Timeout (ms) 50 F Apply to all	Remote Device Type Standard Modbus Device	
Local Start Address D26200 ~ D26299       D Register	Remote Start Address (Hex) 0 ~ FFFF       MODBUS Register Hex       2103	Quantity (word)
Local Start Address D26300 ~ D26399	Remote Start Address (Hex) 0 ~ FFFF	Quantity (word)

• 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

### AS Series Module Manual

Slave Address 11
Remote Device Type Standard Modbus Device 💌
Remote Start Address (Hex) 0 ~ FFFF         Quantity (word)           MODBUS Register Hex         101         0         1
Remote Start Address (Hex) 0 ~ FFFF Quantity (word)

• 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

▼ Enable		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       D Register       26220	+	Remote Start Address D0 ~ D11999         Quantity (word)           D         Image: Constraint of the start
Local Start Address D26300 ~ D26399		Remote Start Address D0 ~ D11999 Quantity (word)

Setting								
otions	Data Excha	nge -COM <sup>y/</sup> Data Exchang	e -COM2					
uto Sca	n					Mode Always	Enable 💌	
a Excha	nge Setup				L			
Item	Enable	Remote Station Address	Local Address		Remote Address	Quantity	Add	
1	<b>O</b>	10	D26200	~~	2103	1		
			D26300	>>	2000	2	Move Up	
2	<b>O</b>	11	D26210	~<	101	1		
			D26310	>>	101	1	Move Down	
	0		D26220					
			D26320				Datata	
							Delete	
							Copy	
								OK

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.

- COM1 Setting		
- 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.

借 Untitled0 - HWCON	FIG	_			
	1 5		<b>1</b>	16	¢
Eile Edit Option	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.



### 8.6.2 UD Link

This section introduces how to use a non-Modbus RS485 communication port on the AS00SCM-A to connect to other industrial products.



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 switch 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.

Elle Edit Option Help			_ (#) x
Product List			
A 5300 Digital I/O Module Analog I/O Module Network Module Astrono Kodule Source Module Power Module	-		
evice Setting			
Options Data Exchange -CC	Dete Exchenge -00)	A2	
E AS00SCM-A COM1 Setting COM2 Setting	Device Information Device Name Description Comment DDF Version Firmware Version Hardware Version	IN Normal Exchange Area AS00SCM-A Serial communication module, MODBUS, UD Link protocol (COM, mode), Remote IO control(RTU mode) Current consumption.22mA 00.33.00	
Default Import	Export	Updene	OK

3) Select **AS-F485** as the **Function Card Type** for COM1.

evice Setting					
Options D: Const Const	Weiger (Charles and Charles an				
	11 Setting				
COM1 Setting COM2 Setting	Parameter name	Value	Unit	Default Minimu	m Maxamum
	ction Card Type	None	🛫 No	ne -	-
		None AS-F232 AS-F422 AS-F422			
Default Import Ex	por <u>Janes</u> Value	Unit	Default	Minimum	OK.
		1	1	winninght	Maximun
Function Card Type Protocol	AS-F485 MODBUS ASC <del>-</del>		None None	-	
	MUDBUS ASC V	1	None	-	-
Data Exchange Enable					-
	1	-	4	-	*
	1	Iteres	1	0	- 247
ID Baud Rate	9600 🛫	1	9600	- 0 +	- 247 -
Baud Rate Format	9600 <del>-</del> 7E1 -		9600 7E1	+	- 247 -
Baud Rate Format Delay time to Reply	9600 <u>-</u> 7E1 <u>-</u> 0		9600 7E1 0	+ - 0	- 247 - - 10000
Baud Rate	9600 <del>-</del> 7E1 -		9600 7E1	+	- 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	<b>~</b>	None	-	-
Protocol	UD LINK	-	None		-
Baud Rate	9600	🔻 bps	9600	-	-
Format	7E1	<b>~</b>	7E1	-	-

5) Right-click the AS00SCM-A and click Communication Software and then click SCMSoft.

+ E	+		
	Open(O)	Enter	
	Replace(R)	Ctrl+R	
	X Cut()	Ctrl+X	
	Сору(С)	Ctrl+C	
	Paste(P)	Ctrl+V	
	🛃 Delete(D)	Del	

SCMSoft - [Untitled0]				
Eile Edit View Tools Window	lelp			_ B ×
0 🚅 🖬 🖬 🧐 🗐 🗐 🔹	干土 团			
믜포	* Slot	COM PORT Setting	Group List	
COM PORT Setting COM PORT Setting COM PORT Setting COM PORT List COM PORT History	<b>()</b> 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 😂 🔜 🙀 🧐 🖳 🕸 🕸 🕸 🕸 🖬 🖬		
No. Group List Name	Slot Remain Size	
Compositive Composition Compo		
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				
🗋 🕞 🖬 🔒 🎁 🖙 🖳 🛊 🐳 Ŧ ± 🔤	1				
	*	No.	Group List Name	Slot	Remain Size
	욚	1	Group List1		
- → S COM PORT Setting	÷				
Group List				$\cup$	
Group List1					
COM PORT History					
J CONZ					

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.



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]				Seat Transmission
Eile Edit View Tools Window Help				
□ ☞ 團 🔒 前 👳 島 キキ干土 🖾	0			
I X	*	Group	Group Name	Command Co
☐ <sup>1</sup> Untitled19 ☐ <sup>3</sup> COM PORT Setting	<b>P</b>	1	Group1	2
UD Link Group List Slave_Simulation Group1 COM PORT History COM1 COM2 COM2				5

Create a group and name it "Master Send".

Group ID	1	
Group Name	Master Send	

) #				
	<u></u>	Group	Group Name	Command Co
COM PORT Setting  COM PORT Setting  Group List  Group List  Group Cist  Group Cist  Group Cist  Group Cist  Group Cist  Group Cist  Com Port History  Com Com Cist  Com Com Cist  Com Cist  Com Cist  Com Cist  Cist Cist	Ċ.	1	Master Send	0

10) Right-click **TX Packet** and click **TX Packet** to create a TX Packet1.

$\underline{File} \ \underline{E}dit \ \underline{V}iew \ \underline{T}ools \ \underline{W}indow \ \underline{H}elp$			
🕽 😂 🖬 😫 🍿 💀 🗣 🔶 干 🗄 🖾			
	*	Packet	TX Packet Name
COM PORT Setting COM PORT Setting COM PORT Setting COM PORT Setting COM PORT Setting Slave_Simulation	0	1	TX Packet1
Create TX Pace COM PORT Hist	ket		

8-45

11) Double-click TX Packet1 to open the Packet Edit form.

SCMSoft - [Untitled19]			
Eile Edit View Iools Window Help			
🗋 😅 🖪 ≩ 🎁 📟 🖳 🛊 4 7 ± 🖾	1		
	*	Packet	TX Packet Name
COM PORT Setting COM PORT Setting COM PORT Setting Comp List Comp Comp Compared and Compared and Compared and Comp Comp Comp Comp Comp Comp Comp Comp	0	1	TX Packet1

12) Give the Packet a Name (This example uses "TX POS Send")

Packet Name	TX POS Ser	nd	
acket View	N		
4			1
acket Segment Edit			
No. Class	For	Segment View	Úp
			Down
			Dowr
			Dowr
	_		Dowr
Message	_	Address	
Message Constant	Variable		
	Variable Checksur	Constant	Delet
Constant	Checksun	n Constant	Delet
Constant	Checksun	Constant	Delet

- 13) Edit the TX packet, "POS, xxx, yyy" (The example below uses POS, 123, 123)
- 14) Click Constant in the Message area.

¥				Ť
icket Segm	ient Edit			
No.	Class	Format	Segment View	Up
				Down
_				Delete
Message			Address	
Con	nstant	Variable	Constant	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 Nai acket View		TX POS Send			
3					•
acket Segn	ient Edit				
		Format	Segment View	10	
No.	Class	Format	orginent view		p
No.	Class	Format	organetic view	Do	
No.	Class	Format	organita rice	Do	wn
No.		Format	Address	Do	
Message		Variable		Do	wn
Message			Address	De	wn

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	Nu	1 -	•		
Variable Value	(R(	D Register [26	100]), 3)	6	
	0	Variable		Leng	ŗth
Reverse					
Variable Propert	y				
Function		Read R()	. ,	-	
Mapping Regi	ister	D Registe	ar -	- 261	00
Length Property	y				
Function		Constant	,	-	
Mapping Regi	ister	D Registe	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 👻	
Value		
	*	

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) + ","	
		Þ.

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	Nul	1 🔻			
Variable Value	(R.(	D Register [26102]),	3)		
	C	Variable •		Length	
Reverse					
Variable Propert	y				
Function		Read R()	-		
Mapping Regi	ster	D Register	-	26102	
Length Property	,				
Function		Constant	-		
Mapping Regi	ster	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	Nu	<u>ıll</u>
Variable Value	(R)	(D Register [26102]), 3)
	¢	Variable - Length )
Reverse		
Variable Propert	y	
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 (DRegister [26102], 3)) in the Packet View.

Packet View "POS," + (R(D Register [26100]), 3) + "," + (R(D Register [26102]), 3) 4

- 8
- 20) Edit the packet: Create a packet and name it "RX Result". Double-click it to open the editing window.

	*	Packet No.	RX Packet Name
⊡-🗳 Untitled0	0	1	RX Result
🖶 🚜 UD Link			
🚊 着 Group List			
🛓 🖳 🤤 Slave_Simulation			
🖃 📑 Master Send			
RX Packet			

Format Null	•			
Variable Value (W(	D Register [26000])	*)		
C	Variable +		Length	)
Reverse				
Variable Property				
Function	Write W()	•		
Mapping Register	D Register	•	26000	
Length Property				
Function	*	+		
Mapping Register	Base + Offset	+	0	
Constant	1			

Enter the sending packet into the D26000 register of the AS300 CPU. "\*" indicates that the length is not specified.

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
⊡	
COM PORT Setting	
🗄 🥳 🚜 UD Link	
🖨 🛱 Group List	
Slave_Simulation	
Master Sand	
TX P Create Comma	na
RX Packet	

8\_

		×	<u> </u>	Command No.	
Untitled0			₽	1	Send
🚽 👮 COM POF	(T Setting				
Group	List		<u> </u>		$\smile$
🖃 🔁 Sla	ve_Simulation		<u> </u>		
<b>⊡⊡</b>	Master Send				
	🙄 TX Packet 💭 RX Packet				
	Viveracker				
mmand Edit					
		_			
Command No.	1				
Command Type	Send		-		
Command Type Send Packet	Send		•		
Send Packet	Send		•		
Send Packet Recv Packet			•		
Send Packet Recv Packet Success	End	•	•		
Send Packet Recv Packet		•	•		
Send Packet Recv Packet Success	End	=	•		
Send Packet Recv Packet Success Fail	End Abort	•	•		
Send Packet Recv Packet Success Fail Retry	End Abort	(0 - 255) (0 - 255)	•		
Send Packet Recv Packet Success Fail Retry Repeat	End Abort 0	• (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 & Receive	i ,
Send Packet	TX POS Send	
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 <u>File Edit View T</u> ools <u>W</u> indow <u>H</u> elp					<u>_181</u> 3
🗋 😅 🔜 🎲 😨 🖳 🕈 🛎 Ŧ ±	1				
	*	Slot	COM PORT Setting	Group List	
COM PORT Setting COM PORT Setting CUD Link Coup List Cup List Cup Com Port Simulation Cup Com Port Setting Cup Com Port Setting Cup Com Port History Cup Com Port History Cup Com Port History Cup	Ċ	1	SCM Device1	Slave_Simulation	
Project				OM12 JUSB: COM12]	ASCPU300 Ser

25) Click the Download button to download the parameters to the AS00SCM.

	ONFIG
	9   5   5 🗊 🖳 🗮 🖏 🛷
🚰 File Edit Opti	ion <u>H</u> elp
	Select Module
	Select Slot
	OK. Cancel

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	an Uala					
	on Help	-				- 8
Product List						
E A\$300						
Specification						
Serial communication MODBUS, UD Links (COM. mode), Remo	protocol					
(RTU mode)						
(RTU mode)				*		
				v		
(RTU mode)		Module Name	DDF Version	V Input Device Range	Output Device Range	Comment
(RTU mode) CPU Group	-	-	DDF Version			Comment
(RTU mode) CPU Group Extension No Power Module	-	Module Name	DDF Version 01.00.00		Output Device Range	Comment
(RTU mode) CPU Group Extension No Power Module CPU Module Function Card1	Type	Module Name		Input Device Range		Comment
(RTU mode) CPU Group Extension No Power Module CPU Module Function Card1 Function Card2	Type CPU Module	Module Name	01.00.00	Input Device Range X0.0 ~ X0.15	Y0.0~Y0.15	Comment
(RTU mode) CPU Group Extension No Power Module CPU Module Function Card1 Function Card2 Module Information1	Type CPU Module Network Module	Module Name AS332T AS00SCM-A	01.00.00	Input Device Range X0.0 ~ X0.15 D28000 ~ D28019	Y0.0 ~ Y0.15 D28020 ~ D28039	Comment
(RTU mode) CPU Group Extension No Power Module CPU Module Function Card1 Function Card2 Module Information1 Function Card1	Type CPU Module	Module Name AS332T AS00SCM-A	01.00.00	Input Device Range X0.0 ~ X0.15	Y0.0~Y0.15	Comment
(RTU mode) CPU Group Extension No Power Module CPU Module Function Card1 Function Card2 Module Information1	Type CPU Module Network Module	Module Name AS332T AS00SCM-A	01.00.00	Input Device Range X0.0 ~ X0.15 D28000 ~ D28019	Y0.0 ~ Y0.15 D28020 ~ D28039	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

Options Data Exchange -CC	DM1   Dete Erchange -00M2					
⊟ AS00SCM-A COM1 Setting	Device Information Normal Exchange Area					
- COM2 Setting	Description	Address				
	<ul> <li>Module Status</li> <li>Error Code</li> <li>Card 1 Data Exchange State (item 1~32) (0:non</li> <li>Card 2 Data Exchange State (item 1~32) (0:non</li> <li>Card 1 Data Exchange Mode Control (0:none, 1</li> <li>Card 2 Data Exchange Mode Control (0:none, 1)</li> <li>Card 1 Data Exchange Mode Control (0:none, 1)</li> <li>Card 1 Data Exchange Trigger (item1~32) (0:no</li> <li>Card 2 Data Exchange Trigger (item1~32) (0:no</li> <li>Card 2 Data Exchange Trigger (item1~32) (0:no</li> <li>Card 1 UD Link Group ID Trigger</li> <li>Card 2 UD Link Group ID Trigger</li> </ul>	a/tail, 1:success) D28006 ~ D28009 :once, 2:always) D28020 :once, 2:always) D28021 trigger, 1.trigger) D28022 ~ D28025				
Default Import	Export Update	OK				

28) Use the monitor function in ISPSoft to verify that the transmission is working correctly.

D26100			12	123*	0.000	ASCII	-
D26101			3*	3*12	0.000	ASCII	•
D26102	Sen	a	12	123*	0.000	ASCII	•
D26103			3*	3***	0.000	ASCII	•
D26000			PO	POS,	740081729536.000	ASCII	•
D26001	Recei	10	S,	S,AC	12.207	ASCII	•
D26002	Rece	ve	AC	ACT*	2203402895360.000	ASCII	•
D26003			T*	T***	0.000	ASCII	•

- 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.



### 8.6.3 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 3<sup>rd</sup> 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

#### Step 1

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 8.4.1.1 for reference.



<ul> <li>System settings</li> <li>COM1 Port Setting</li> </ul>	Parameter name	Value	Unit	Default	Minimum	Maximum 🔺
COM2 Port Setting	F2AD Sampling Time	3	ms	3	3	15
- Ethernet Port Basic Setting	F2AD Average Times	10		10	1	15
Ethemet Port Advance Setti	AS-FCOPM Working mode	AS Remote Com 🔻	-	AS Remote Con	(+	
Function Card 1 Setting	AS-FCOPM node ID	1		1)	1	254
E Function Card 2 Setting	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		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 powe	-	-
Default Import	Export					

#### Step 2

Switch the Format 1 of AS00SCM-A to 4 (using CANopen DS301 mode) and switch 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.

8   X 0 0   3   8   9 9 %	
Product List      Extension Rack  Digital I/O Module  Analog I/O Module  Temperature Module  Motion Control Module  Network Module	Add Citri+Alc+3 Replace Citri+Alc+3 Replace Citri+Alc+3 Citri+C Citri+Alc+3 Citri+C
Specification	Intelligent Module Configuration EIP/Builder ECAP Builder Emmware Optials

#### 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.



#### Step 4

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.

de Configuratio	<b>)</b>					23	PDO Mapp	ing	_		
Node ID: 1 Node Informatio	Name: n(Hex)	AS00SC	M-ARTU			Protocol	Index : 1 Availab		N from EDS	ame : RxPDO 1 file	
Vendor ID:	000001DD		_	Effort	ontro	Protocol	Index	Sub-idx	R/W	Data Type	Object Name
Device Typ	e: 00000000			Auto SI	00 Co	nfiguration	2000	1	RW	UNSIGNED16	Rx Module1 EDO0
Product Co	de: 0000005A	-	Emer	rgency C	ORID	81	2000	2	RW	UNSIGNED16	Rx Module1 EDO1
Revision:	00000000						2000	3	RW	UNSIGNED16	Rx_Module1_EDO2
Kevision:	00010002		Nod	eguard O	OBID	701	2000	4	RW	UNSIGNED16	Rx_Module1_EDO3
PDO from EDS f	le						2000	5	RW	UNSIGNED16	Rx_Module1_EDO4
Index PDO N	ma	Type	Inhibit	Event		Export EDS file	2000	6	RW	UNSIGNED16	Rx_Module1_EDO5
	PDO1 parameter		maun	Lycin	=	[mport mo me]	2000	7	RW	UNSIGNED16	Rx_Module1_EDO6
	PDO1 parameter PDO2 parameter			-	1		2000	8	RW	UNSIGNED16	Rx Module1 ED07
	PDO2 parameter PDO3 parameter		-	-		Add		_			
	PDO4 parameter		1	2			1				
	PDO5 parameter					Delete		Objects			
	PDO6 parameter			-		Define DO	Index	Sub-idx	Object	Name	Type
1406 Receiv	PDO7 parameter	1		-		Dennerbo	2000	1	Rx_Mo	dule1_EDO0	UNSIGNED16
1.07 P. 1	-	•			-	/					
Configured PDC	1				1	man					
Index COB ID	R/T Len T	ype De	scription	_	1	PDO Mapping					
1400 201	Rx 0 1	Rx	PDO 1	1.11		Properties	1			ai.	
				_				-			-
								_	OK	Cancel	
						OK.	0	_	_		
						Cours )					
						Cancel					

3. Follow the previous steps to set up more modules.

Node ID	¢ 1		Name:		AS	00SCM-A	RTU			
Node I	information	(Hex)					-			
Vendor ID: 000001DD							Error C	ontrol	Protocol	
Device Type: 00000000			Auto SDO Co					O Con	onfiguration	
V P	roduct Cod	le: 01	000005.	A.	-	-	Emer	gency CO	DB ID:	81
V R	Revision: 00010002				-	Nodeguard COB ID: 701				
PDO fi	om EDS fil	e								
Index	PDO Na	me			Ту	pe Int	ubit	Event	*	Export EDS file
1400	Receive	PDO1	parame	ter	1	-			E	
1401	Receive	PDO2	parame	ter	1	1.0		-		
1402	Receive	PDO3	parame	ter	1	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	-		-		1
Config	ured PDO	nnon	-				_	_	-	
Index	COBID	R/T	Len	TV	pe	Descrip	tion		-	PDO Mapping
1400	201	Rx	2	1		RxPDO				Properties
1402	401	Rx	8	1		RxPDO	C			
1801	281	Tx	2	1		TxPDO	2		_ 1	
1803	481	Tx	8	1		TxPDO				OK
1804	1c1	Tx	8	1		TxPDO	5			OK
1805	2c1	Tx	2	1		TxPDO	6		- 1	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_ED10	D5000
AS04DA-A	4 Analog channels for output (Integer format)*	RxPDO3	Rx_Module3_EDO0 Rx_Module3_EDO1 Rx_Module3_EDO2 Rx_Module3_EDO3	D6001 D6002 D6003 D6004
AS04AD-A	4 Analog channels for input (Integer format)*	TxPDO4	Tx_Module4_ED10 Tx_Module4_ED11 Tx_Module4_ED12 Tx_Module4_ED13	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	ļ
AH10COPM , Master , Rack 1 , Slot 0 , Node Address 2	List Setting Available Nodes:	Node List:
	Node ID Node Name	Node ID Node Name
001	001 AS00SCM-ARTU	
	1	
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: I	0 • OK
	Input Start: I	Cancel

#### AS Series Module Manual

List Setti Available			Node List:	
Node ID	Node Name		Node ID	Node Name
		>	001	AS00SCM-ARTU
		<		
Output Ta	ible		Input Table	
Device	Device Mapping	*	Device	Device Mapping
D6000 L	[001]RxPDO-Rx Module1 EDC		D5000 L	[001]TxPDO-Tx Module1 EDI
D6000 H	[001]RxPDO-Rx Module1 EDC	E	D5000 H	[001]TxPDO-Tx Module1 EDI
D6001 L	[001]RxPDO-Rx Module3 EDC		D5001 L	[001]TxPDO-Tx Module4 EDI
D6001 H	[001]RxPDO-Rx Module3 EDC		D5001 H	[001]TxPDO-Tx Module4 EDI
D6002_L	[001]RxPDO-Rx_Module3_EDC		D5002_L	[001]TxPDO-Tx_Module4_EDI
D6002_H	[001]RxPDO-Rx_Module3_EDC		D5002 H	[001]TxPDO-Tx_Module4_EDI
D6003_L	[001]RxPDO-Rx_Module3_EDC		D5003_L	[001]TxPDO-Tx_Module4_EDI
D6003_H	[001]RxPDO-Rx_Module3_EDC		D5003_H	[001]TxPDO-Tx_Module4_EDI
D6004_L	[001]RxPDO-Rx_Module3_EDC		D5004_L	[001]TxPDO-Tx_Module4_EDI
D6004_H	[001]RxPDO-Rx_Module3_EDC		D5004_H	[001]TxPDO-Tx_Module4_EDI
D6005_L			D5005_L	[001]TxPDO-Tx_Module1_error
D6005_H			D5005_H	[001]TxPDO-Tx_Module1_error
D6006_L			D5006_L	[001]TxPDO-Tx_Module2_error
О6006_Н		-	D5006_H	[001]TxPDO-Tx_Module2_erro:
	: 0 🚔 Output	Start: D	<b>-</b> 0	ОК

#### 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(Het) IVendor ID: 00001DD Error Control Protocol	Node Heartbeat Producer Time: 200 ms Node List:
	Device Uppe         Occurring           Product Code:         0000003A           Emergency COB D:         81           Revision:         00010002           Nodeguard COB D:         81           Index:         POO from EDS Revision:           Index:         POO spanneter:           100         Revise:         Top           Index:         POO spanneter:           101         Revise:         POO spanneter:           102         Revise:         POO spanneter:           103         Revise:         POO spanneter:           104         Revise:         POO spanneter:           105         Revise:         POO spanneter:           106         Revise:         POO spanneter:           106         Revise:         POO spanneter:           108         Revise:         POO spanneter:           109         Revise:         POO spanneter:           100         Revise:         POO spanneter:           100         Revise:         POO spanneter:           100         Revise:         POO spanneter:	Node     Node Name     Consumer(ms)     Producer(ms)       002     AH10COPM Master     300     200       Heartbeat consumer;       Node     Node Name     Consumer(ms)       Node     Node Name     Consumer(ms)       002     AH10COPM Master     300     200
	Index         COB JD         R.T         Len         Type         Description         PDOM/prpmg           1400         201         Rx         2         1         RuPDO 1         Provemine           1402         401         Rx         8         1         RuPDO 1         Provemine           1402         401         Rx         8         1         RuPDO 1         Provemine           1402         401         Rx         8         1         RuPDO 1         Provemine           1801         241         Tx         8         1         RuPDO 1         Provemine           1804         481         Tx         8         1         RuPDO 3         OK         Provemine           1804         481         Tx         8         1         TuPDO 3         OK         Provemine	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.



# 8.6.4 Remote IO Application (AS-FEN02)

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. When AS300 Series PLC acts as master/scanner in EtherNet/IP communication, do not install AS-FCOPM; otherwise errors may occur on EtherNet/IP slave/adapter connections.

Device	Function	IP Address / Location	Data Mapping Range	
AS300	EtherNet/IP Master	192.168.1.5	D29000~D29019	
AS00SCM-A + AS-FEN02	EtherNet/IP Slave	192.168.1.3		
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. Refer to Section 8.4.2.1 for more details.


#### Step 2

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.

	View	Network							
54	merk V	-	-		-				
(P0) Conne	chim Count	-	Sort	Adapta Mara	-		Adapter	Landb (Bas)	,
Conne	ction Count Enable	TAG	<b>_</b>	Adapter Name - AS00501(RTU) + ASFERID2((Dev_1))	CPU Address/TAG D09000	603	Adapter	Length (Byte) 66	Property
D (PO)	chim Count	-	Sort IP Address		CPU Address/TAG		Adapter	Length (Byte) (6) SB	,
Conne	ction Count Enable	TAG	Sort IP Address		CPU Address/TAG D29000	+	Adapter	66	Property

#### 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 and 3 in this manual for more details on module operation.



# 8.6.5 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.

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.

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

#### Step 1 Set up an IP address for the RTU

Turn all the switches of the FORMAT 2 of the 3 new RTUs to 0. The default IP address of the 3 new RTUs is 192.168.1.3. Since different IP addresses are essential for devices to be in the same network, you need to use EIP Builder to set up the IP addresses to have the 3 new RTUs in the same network. Connect one RTU to your computer and open EIP Builder to scan the network to add the first RTU with the IP address 192.168.1.3 in.

roject Tree 🛛 🕈 - 🔁 Untitled4 - 🚇 Network View	ork View 😐 🛪 🔄			
► Connected Not Connected	IP 192.168.1.3 192.168.1.250	1.01	Comment Can't add the device beside	

🚒 EIP Builder		Ŷ
File Edit View Tool Operat	e Help	
E 🗅 🖕 💾 E 🔩 🖳 🗳	1 <b>0</b>	
Project Tree 4	Network View 🖷 🗙	
Outributed4     Network View     Note     Note     Note     Not Connected	ASSOSCAI (RTU) + AS IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	^
		~
	<	>
	Information EIP Parameter Device Parameter Module Name Version Port No.	IP Network Name
		.68.1.3 -
		00110

Before setting up the EIP network, you can double-click the RTU to open HWCONFIG and set up its IP address to 192.168.1.30 and other parameters. After the setting is complete, download the parameters to the connected module and the new IP address is reflected in the module. To minimize the risks of wrong operation, you can remove the module icon from the network and add another new RTU in. Repeat the previous steps to set up the IP address of the 2<sup>nd</sup> and 3<sup>rd</sup> RTU. For the setups of the right-side modules, you can leave them to the 3<sup>rd</sup> step.

#### 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.



8-65

#### Step 3

Now you can set up the right-side module of RTU. Refer to section 8.6.4 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.

# 8.7 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.

🖀 Untitled0 - HWCC	ONFIG		1.122	100		
	7 8 9 5	12 30	-			
Eile Edit Optic	-					_ <i>B</i> X
Product List						
<ul> <li>A\$300</li> <li>Digital I/0 Module</li> <li>Analog I/0 Module</li> <li>Network Module</li> <li>Power Module</li> <li>Specification</li> <li>A\$00\$SCM-A</li> <li>Serial communication</li> <li>MODBUS, UD Link p (COM mode), Remot (RTU mode)</li> </ul>	rotocol		H E E E E E E E E E E E E E E E E E E E	+		,
CPU Group						
Extension No	Туре	Module Name	DDF Version	Input Device Range	Output Device Range	Comment
Power Module		and the second second		100 C 10 C 10 C 10	· · · · · · · · · · · · · · · · · · ·	
E CPU Module	CPU Module	AS332T	01.00.00	×0.0 ~ ×0.15	Y0.0 ~ Y0.15	
- Function Card1		1				
- Function Card2						
Module Information1	Network Module	AS00SCM-A	00.33.00	D28000 ~ D28019	D28020 ~ D28039	
Function Card1						
Function Card2		1				
1.1						
			Offline	COM12, [USB: CO	DM12]	



# 8.7.1 Troubleshooting for Module AS00SCM-A as a Communication Module

#### 8.7.1.1 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	1. Check that the module is securely installed.
10#1000		2. Install a new AS00SCM-A or contact the factory.
	The function card setting is incorrect.	1. Check if the function card is securely installed.
		2. Install a new function card or contact the factory.
16#1606		3. Check if the setting in HWCONFIG is consistent with
		the function card setting.
		4. Install a new AS00SCM-A or contact the factory.

#### 8.7.1.2 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	<ol> <li>Check whether the communication cable is properly connected.</li> <li>Check if the station number and the communication format are correctly set.</li> <li>Check if the connection with the function card is working correctly.</li> </ol>
16#1804	The UD Link setting is incorrect.	<ol> <li>Check the settings of the UD Link.</li> <li>Check the warning settings in the PLC.</li> </ol>

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	<ol> <li>Check if the station number and the communication format are correctly set.</li> <li>Check if the connection with the function card is working correctly.</li> </ol>

Error Code	Description	Solution
16#0302	Function card 2 communication timeout	<ol> <li>Check if the station number and the communication format are correctly set.</li> <li>Check if the connection with the function card is working correctly.</li> </ol>
16#0400	Invalid UD Link Group ID for function card 1	<ol> <li>Check the UD Link settings.</li> <li>Check the warning settings in the PLC.</li> </ol>
16#0401	Invalid UD Link Group ID for function card 2	<ol> <li>Check the UD Link settings.</li> <li>Check the warning settings in the PLC.</li> </ol>
16#0402	Invalid UD Link Command for function card 1	<ol> <li>Check the UD Link settings.</li> <li>Check the warning settings in the PLC.</li> </ol>
16#0403	Invalid UD Link Command for function card 1	<ol> <li>Check the UD Link settings.</li> <li>Check the warning settings in the PLC.</li> </ol>

# 8.7.2 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.

#### 8.7.2.1 ERROR LED Indicators Are ON

Error codes:

Error Code	Description	Solution
16#1301	Hardware failure	<ol> <li>Check if the module is securely installed.</li> <li>Change and install a new AS00SCM-A or contact the factory.</li> </ol>
16#1302	The function card setting is incorrect.	<ol> <li>Check if the function card is securely installed with the AS-FCOPM card.</li> <li>Change and install a new function card or contact the factory.</li> <li>Check if the setting in HWCONFIG is consistent with the function card setting.</li> <li>Install a new AS00SCM-A or contact the factory.</li> </ol>

#### 8.7.2.2 ERROR LED Indicators Blinking Every 0.5 Seconds

Error codes:

Error Code	Description	Solution
16#1502	Incorrect parameters	Check the parameter in HWCONFIG. Download the parameter again.
16#1503	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.

#### 8.7.2.3 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 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.

MEMO

# 9

# **Chapter 9 Function Cards**

# **Table of Contents**

9.1	Introdu	action	9-2
9.2	Specifi	cation and Function	9-2
	9.2.1 AS-	-F232	
	9.2.2 AS-	-F422	
	9.2.3 AS-	-F485	
	9.2.4 AS-	-F2AD	
	9.2.5 AS	-F2DA	
	9.2.6 AS	-FCOPM	
	9.2.7 AS-	-FEN02	
	9.2.7.1	Supported Software and Firmware Versions	9-4
	9.2.7.2	Features	9-4
	9.2.7.3	Specifications	
	9.2.7.4	Topology	9-6
	9.2.7.5	SM/SR	9-7
	9.2.7.6	Data Mapping through EtherNet/IP Adapter	9-9
	9.2.7.7	Example of Connecting to 3rd Party PLC Scanner through E	IP Builder
			9-11
	9.2.7.8	Data Mapping through Modbus TCP	0 1 5
	9.2.7.9	Webpage	
9.3			
9.3	Profiles	Webpage	9-17 <b>9-21</b>
9.3	Profiles 9.3.1 AS	Webpage	9-17 <b>9-21</b> 9-21
9.3	<b>Profiles</b> 9.3.1 AS- 9.3.2 AS-	Webpage s and Dimensions	9-17 <b>9-21</b> 9-21 9-21
9.3	<b>Profiles</b> 9.3.1 AS- 9.3.2 AS- 9.3.3 AS-	Webpage s and Dimensions -F232 -F422/AS-F485/AS-F2AD/AS-F2DA	9-17 9-21 9-21 9-21 9-21
9.3 9.4	Profiles           9.3.1         AS           9.3.2         AS           9.3.3         AS           9.3.4         AS	Webpage s and Dimensions -F232 -F422/AS-F485/AS-F2AD/AS-F2DA -FCOPM	9-17 9-21 9-21 9-21 9-21 9-22
	Profiles 9.3.1 AS 9.3.2 AS 9.3.3 AS 9.3.4 AS Wiring.	Webpage <b>and Dimensions</b> -F232 -F422/AS-F485/AS-F2AD/AS-F2DA -FCOPM. -FEN02	9-17 9-21 9-21 9-21 9-22 9-22 9-23
	Profiles 9.3.1 AS- 9.3.2 AS- 9.3.3 AS- 9.3.4 AS- Wiring 9.4.1 AS-	Webpage <b>and Dimensions</b> -F232 -F422/AS-F485/AS-F2AD/AS-F2DA -FCOPM -FEN02	
	Profiles         9.3.1       AS-         9.3.2       AS-         9.3.3       AS-         9.3.4       AS-         Wiring.       9.4.1         9.4.2       AS-	Webpage <b>s and Dimensions</b> -F232 -F422/AS-F485/AS-F2AD/AS-F2DA -FCOPM. -FEN02 -FEN02	

# 9.1 Introduction

Function cards are extension cards such as analog input/output (AI/AO) and communication cards for the AS Series PLC.

# 9.2 Specification and Function

### 9.2.1 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 communication other interfaces such as RS-232, PC, and so on. Except for the communication interface, however, the communication functions are the same as 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.

#### Wiring example



#### 9.2.2 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 remain the same as 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



#### 9.2.3 AS-F485

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



# 9.2.4 AS-F2AD

2 analog signal input channels:

ltem		Voltage Input	Current Input
Analog Signal		DC 4 mA - 20 mA	
Resolution		12-bit	11-bit
Input Impedance		2 ΜΩ	250 Ω
Conversion Time		3 ms	/СН
Characteristic Curve		4000 4000 0 10V Voltage input	dution Digital Value Digital Value Digital Value Current input
Digital Value	Il Value Card 1 SR168 (CH1) SR169 (CH2		
Output	Card 2	SR170 (CH1)	SR171 (CH2)

Use the program to read the values in SR to obtain the corresponding A/D conversion value for the channel.

# 9.2.5 AS-F2DA

2 analog signal output channels:

ltem		Voltage Output	Current Output			
Analog Signal		DC 0 V - 10 V	DC 4 mA - 20 mA			
Resolution		12-bit	12-bit			
Impedance Allowance		≥1 kΩ	≤500 Ω			
Conversion Time		2ms	/ CH			
Characteristic Curve		10V tho tho tho tho tho tho tho tho	20mA 20mA 4000 Digital Value Input			
Digital Value	Card 1	SR172 (CH1)	SR173 (CH2)			
Output	Card 2	SR174 (CH1)	SR175 (CH2)			

Use the MOV instruction to move the value to the SR to obtain the corresponding voltage output value.

9\_

#### 9.2.6 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



#### 9.2.7 AS-FEN02

#### 9.2.7.1 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.
- The firmware of AS00SCM-A module (in RTU mode) should be V2.02 or later for AS-FEN02 to be installed on it.
- ISPSoft version should be V3.06 or later.
- EIP Builder version should be V1.06 or later.

#### 9.2.7.2 Features

- AS-FEN02 can be installed on AS300 Series PLC and AS00SCM-A (in RTU mode). This section introduces the operations when it is installed on AS300 Series PLC. For the operations when it is installed on AS00SCM-A and acting as remote module for AS/AH Series PLC, refer to section 8.4.2 for more details.
- When AS-FEN02 is installed on AS300 Series PLC, it acts as a Master or a Slave for Modbus TCP connection. The operation is the same as using the built-in connection port for communication, refer to section 8.3.1.2 of AS Series Operation Manual for more details.
- When AS-FEN02 is installed on AS300 Series PLC, it acts as aj EthernNet/IP Adapter but not EtherNet/IP Scanner for EtherNet/IP connection. The operation is the same as the EtherNet/IP port on AS Series PLC, refer to Chapter 9 of AS Series Operation Manual for more details.

#### 9.2.7.3 Specifications

#### • System Specifications

	ltem	Specification
	Device type	Master, Slave and RTU
	Topology	Star, linear, ring topologies are supported. (FW V1.04 or later to support DLR function)
General	IP Settings	Software: switch the ID2 and FORMAT2 to 00 Hardware: set the IP address to 192.168.1.X (X=1~254) for ID2 and FORMAT2
	Availability	AS300 Series PLC AS00SCM-A (available only for RTU mode)
	Max. connection number	8
Web	Functions	View device information Account management

ltem	Specification
	AS-FEN02 firmware update
	Module monitoring (when installed in AS00SCM-A,
	and in RTU mode)

#### • MODBUS TCP Specifications

	ltem	Specification
General	Device type	Server, Client
	Max. connection number	8
MODBUS TCP 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 Server and Client are counted separately.

#### • EtherNet/IP Specifications

	ltem	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	400 bytes
	Class 3 (Connected Type) UCMM (Non-Connected Type, only uses TCP connections)	Total 8 (Servers) (for both class 3 and UCMM connection types)
CIP Network Explicit Message	CIP Objects	Identity Object (16#01) Message Router Object (16#02) Assembly Object (16#04) Connection Manager Object (16#06) Port Object (16#F4) TCP/IP Interface Object (16#F5) Ethernet Link Object (16#F6) Not supporting self-defined objects

#### 9.2.7.4 Topology

With its own standalone communication port, the AS-FEN02 card can work independently and can be MODBUS TCP Server, Client and EtherNet/IP Adapter. After installing the extension card, use HWCONFIG in ISPSoft to configure the communication.



#### Ring Topology

A DLR function is required to create a ring topology. (AS-FEN02 with firmware V1.04 or later to support DLR function)

When a switch is needed for topology, the switch should support the DLR function. If not, the connection might fail.



#### 9.2.7.5 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	_	_	N	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	_	_	N	R/W	OFF
SM1013	Connection 6 for data exchange through AS-FEN02 started	0	-	OFF	_	_	N	R/W	OFF
SM1014	Connection 7 for data exchange through AS-FEN02 started	0	-	OFF	_	_	N	R/W	OFF
SM1015	Connection 8 for data exchange through AS-FEN02 started	0	-	OFF	_	_	N	R/W	OFF
SM1016	Successful data exchange connection 1 through AS-FEN02	0	-	OFF	_	_	N	R	OFF
SM1017	Successful data exchange connection 2 through AS-FEN02	0	-	OFF	_	_	N	R	OFF
SM1018	Successful data exchange connection 3 through AS-FEN02	0	-	OFF	_	_	N	R	OFF
SM1019	Successful data exchange connection 4 through AS-FEN02	0	-	OFF	_	_	N	R	OFF
SM1020	Successful data exchange connection 5 through AS-FEN02	0	-	OFF	_	_	N	R	OFF
SM1021	Successful data exchange connection 6 through AS-FEN02	0	-	OFF	_	-	N	R	OFF
SM1022	Successful data exchange connection 7 through AS-FEN02	0	-	OFF	_	-	N	R	OFF
SM1023	Successful data exchange connection 8 through AS-FEN02	0	-	OFF	_	_	N	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	_	_	Ν	R	OFF
SM1026	Error in data exchange connection 3 through AS-FEN02	0	-	OFF	_	_	Ν	R	OFF
SM1027	Error in data exchange connection 4 through AS-FEN02	0	-	OFF	_	-	Ν	R	OFF
SM1028	Error in data exchange connection 5 through AS-FEN02	0	-	OFF	_	_	Ν	R	OFF
SM1029	Error in data exchange connection 6 through AS-FEN02	0	-	OFF	_	-	Ν	R	OFF
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
SM1110	Filter setting error in EtherNet setting for AS-FEN02	0	-	OFF	_	-	Ν	R	OFF

#### AS Series Module Manual

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.				
SM1110	The flag is ON, when filter setting error in EtherNet setting for AS-FEN02.				

#### • Special Data Registers (SR)

SR	Function	AS300 Series	AS200 Series	OFF ↓ ON	STOP ↓ RUN	Û	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
SR1535	The error code for data exchange through the AS-FEN02 connection 8	0	_	0	_	_	Ν	R	0
SR1536	AS-FEN02 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 EtherNet/IP Adapter connection number	0	-	0	-	_	Ν	R	0
SR1540	AS-FEN02 EtherNet/IP Scanner connection number	0	-	0	-		Ν	R	0

Special data register	Refresh time			
SR1520~SR1535	Refresh after AS-FEN02 communication is done.			
SR1536~SR1540	The flag is ON, when the system is refreshed automatically.			

# 9.2.7.6 Data Mapping through EtherNet/IP Adapter

When AS-FEN02 is installed on AS Series PLC, you can create a connection through EIP Builder and make it act as an EtherNet/IP adapter. The below example uses two AS Series PLCs (one with AS-FEN02) to connect to each other and perform data mapping through EtherNet/IP connection. Refer to Chapter 9 in AS Series Operation Manual for more details on AS Series PLC acting as EtherNet/IP Scanner.

Device	Function	IP Address	Data Mapping Area	
AS300	AS300 EtherNet/IP Scanner 192.168.1.5			
AS300+ AS-FEN02	EtherNet/IP Adapter	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 AS-FEN02 to 192.168.1.3 and then connect the scanner EtherNet/IP port to the AS-FEN02 through a network cable. Right-click the AS300 Series PLC to open EIP Builder and then scan the network or drag and drop the ASCPU (AS-FEN02) to add it to the same network as the scanner's.



#### Step 2

Right click the Scanner's communication port (red spot) and select Data Mapping from the menu. Data mapping table appears for editing.



#### Step 3

Editing the data mapping table. You can enter the starting register address and the data length for data mapping between the scanner and adapter. The unit for data length is byte. As the below example shows the value in the scanner's D200 is written by the data from the adapter's D300. Read data from the adapter's D200 and store the data in the scanner's D100.



#### Step 4

Click the **Downloader** icon and then select the parameters that you'd like to download. After the scanner starts to run, check if the data stored in the adapter D300 and D200 increment by 1 every second to determine if the data mapping is going well.

Esp Builder		
File Edit View Tool Open	ste_Help	
	. <u>.</u> 0	
Protect Tree #	Het Des Vew Hotvori o + ×	
Hertendo Hertendo Veer Hertendo Veer Hertendo Veer Hertendo H	Nithork_0	Auto Comment II Project Downbader II Select A Invert Selecton Name Statue Comment V V Untitled V V Data exchange V Untitled (PD)
	c Untsted (P0) Sert: CIP connection used: 1 TO' connection	
	Enable TAG IP Address	
	• 1 🔽 🔲 192.168.1.3 *	
	2 2 .	
	•	Auto close after completing Warning Handle Ignore items - Elapsed Time : Os Communication Setting Start Close

# 9.2.7.7 Example of Connecting to 3<sup>rd</sup> Party PLC Scanner through EIP Builder

Through EIP Builder, a 3<sup>rd</sup> party PLC (when acting as a scanner) can create an EtherNet/IP connection to AS300 Series PLC (when AS-FEN02 is installed). The following example uses Rockwell PLC as a scanner to perform data mapping with a Delta PLC.

(1) Install the EDS file. After the installation is done, you can see the device information.

	Module Info Internet Protoco	a ton oringereddin		
Identification		Status		
Vendor:	Delta Electronics, Inc.	Major Fault:	None	
Product Type:	Programmable Logic Co.	Minor Fault	None	
Product Code:	ASCPU(AS-FEN02)	Internal State:	Run mode	
Revision	1.1			
Serial Number:	23130209	Configured.	No	
Product Name.	ASCPU (AS-FEN02)	Owned	Owned	
		Module Identity:	Match	
		Refresh	Beset Module -	

9

9-12

(2) Set up the network parameters. Make sure to set the Input Type to Multicast. For basic operation, you can use the default EDS file directly. No need to edit the EDS file.

Module Properties: Etherne	t_101 (ASCPU(AS-FEN02) 1.1)	
General Connection Module Info	Internet Protocol Port Configuration	
Internet Protocol (IP) Setting IP settings can be manually or if the network supports this ca	onfigured or can be automatically configured	
Manually configure IP setti	ngs	
IP Settings Configuration		
Physical Module IP Address:	192 . 168 . 1 . 5 Subnet Mask: 255 . 255 . 25	55 . 0
	<u>G</u> ateway Address: 192 . 168 . 1	1.1
Dom <u>a</u> in Name: H <u>o</u> st Name:	AS-FEN02	
Logix Designer - ASCPU_ASFEN02 [175 File Edit View Search Logic Commur	6-L71 21.11]* ications Tools Window Help	et 🗲
Rem Run 🕺 📮 Run Mode	✓ ▲▲▲ ▲ ► If I to NBackplane/0* ▼ ▲	
No Forces Controller OK	A THE HIGH ALL AND A MARKED	
No Edits a No OK Redundancy ke	Favorites & Safety & Alarms & Bit & Timer/Counter & Input/Output & Compa	are & Compute/Math & Move/Logical
Controller Organizer - • • ×	Module Properties: Ethernet_101 (ASCPU(AS-FEN02) 1,1)	- 0 ×
Controller ASCPU_ASFEN02     ASFEN02     ASFEN02     ASFEN02     ASFEN02     Add-On Instructions     Add-On Instructions     Data Types     Trends     VO Configuration     T756 Backplane, 1756-A;     SE (0) 1756-L71 ASCPU_/     SE (1) 1756-EN2TR Ether     ASCPU(AS-FENI     T756-EN2TR Ether     ASCPU(AS-FENI     T766-EN2TR Ether     AScpusten021     Ascpust	Description:	emet Address Privale Not 1 to 1 ta 1 5 🗘 IP Addrese
¢ >	Revision: 1.1 Electronic Keying: Exact Match Connections: Connection1 Change	

Controller Orga	rå	I Favorites & Safety & Alarms	K Bit K Timer/Counter ) Input/O	output ( Compare )	Compute/Math & Move/Log
	10 10 10 10 10 10 10 10 10 10 10 10 10 1	General Connection Module Info Internet Protoco	Port Configuration		
<ul> <li></li></ul>		Name	Requested Packet Interval (RPI) (ms)	Input Type	Input Trigger
Data Type		Connection1	20.0 \$ 5.0 - 1000	Multicast V	Cyclic
<	en0211 en02.01				
Description Status	Running	Inhibit Module			
Module Fault	TAULINING.	Major Fault On Controller If Connection Fails Wh	ile in Run Mode		
		Module Fault			

(3) Setting up the data mapping table

I: Input data (T $\rightarrow$ O), Ex. Connection 1 is corresponding to PLC D3000~D3099.

O: Output data ( $O \rightarrow T$ ), 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 Rockwell PLC.

		I/O Me	essage 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
Connection 5	Input (T→O)	0x6D	100 words	D3400~D3499

		I/O Me	essage Connection	
Connection No.	Function	Instance Attribute	Length	Defaults
	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

Configuration	Datatura	Description	Defaults
address	Data type	Description	(Connection 1)
Word[0]	UINT	Input corresponding device 0: D, 1: X, 2: Y	0
Word[1]	UINT	Reserved	200
Word[2-3]	DWORD	Input corresponding device number	3000
Word[4]	UINT	Output corresponding device 0: D, 2: Y	0
Word[5]	UINT	Reserved	200
Word[6-7]	DWORD	Output corresponding device number	2000

Controller O		# ×	Scope 1	BASCPU_ASFEN0: -	Show All Tags	~ 7	1 - n - N	1
Controller	ASCPU_ASFEN02		Name	::::	Value +	Force Mask*	Style	•
A MainTas	L.		ascp	ulen02J1 Data	frest.	( ]	Decimal	
a Mainf			"! asc	puten02.11.Data[0]	216	-	Decimal	
	gram Tags		* asc	pufen02.11 Data[1]	216		Decimal	
	inRoutine		+ asc	pufen0211 Data[2]	216		Decimal	
	duled Programs / Pha	ses	* asc	puten0211 Data[3]	216		Decimal	
Motion Gr		~	" asc	puten02 11.Data[4]	216		Decimal	
Add-On In			* asc	puten0211 Data[5]	0		Decimal	
Data Type			r aso	pufen0211 Data[6]	0		Decimal	
Trends			* aso	pufen0211 Data[7]	0		Decimal	
= I/O Config	uration		t'asc	puten02 (1.Data[8]	0		Decmal	
- m 1756 Ba	ckplane, 1756-A7		* aso	puten0211 Data[9]	0		Decimal	
章 [0] 17	56-L71 ASCPU_ASFEN	02	T aso	puferi02 i 1 Data[10]	0		Decimal	
a 5 [1] 17	56-EN2TR Ethernet_1	01	+ asc	pufen02:11 Data[11]	0		Decimal	
🚊 🎝 Eth	ernet		+ aso	pufen02.11 Data[12]	0		Decimal	
-5 A	SCPU(AS-FEN02) ascp	oufen02	+ asc	puten0211 Data[13]	0		Decimal	
51	756-EN2TR Ethernet_	101	+ asc	puten0211 Data[14]	0		Decimal	
			+ asc	pufen02.11 Data[15]	0		Decimal	
<		> <	+ aso	puten02.11.Data[16]	0	-	Decimal	
	elined Tags	~	+ asc	puten0211 Data[17]	0		Decimal	
ascput ascput			+ aso	pufen0211 Data[18]	0		Deomal	
ascput ascput			+ aso	puten02  1 Data[19]	.0	-	Deomal	
Description			+ aso	puten0211.Data[20]	.0	-	Decimal	
Stalus	Runnino	~	+ asc	pufen0211 Data[21]	0		Decimal	

 D1000	216	14155992	0.000
D1001	216	14155992	0.000
D1002	216	14155992	0.000
D1003	216	14155992	0.000
D1004	216	216	0.000
D0	0	0	0.000
DI	0	0	0.000
 D2	0	0	0.000
D3	0	0	0.000
D4	0	0	0.000

odancy 14		- (mar			D1000	3982	26096833 0.000	有號▼
ontroller Organizer 🔹 🖛 🗙	Scope: SASCPU_ASFEN0: V Sho	w. All Tags 🗸 🗸 🗠	$d^{2} = d^{2} \pi^{-1} (-\pi^{-1})^{2}$	~	D1001	3982	26096833 0.000	有了。
Controller ASCPU_ASFEN02	Name	== ¢ Value +	Force Mask* Style A		D1002	3982	26096833 0.000	有了。
Tasks	+ ascputen02:01 Data[0]	9876	0 Decir	3	D1003	3982	26096833 0.000	有了。
a MainTask	+ ascputen02 O1 Data[1]	2222	0 Decir		D1004	3982	3982 0.000	有
MainProgram Program Tags	+ ascpufen02:01.Data[2]	3333	Decir	æ	DO	9876	14563086 0.000	有了。
MainRoutine	* ascputen02 O1 Data[3]	6666	Decir	(0)	DI	2222	21843371 0.000	有了。
- Unscheduled Programs / Phases	+ ascputen02 O1 Data[4]	8888	Decir		D2	3333	43686630 0.000	有3 -
Motion Groups	+ ascpufen02.01.Data[5]	0	Decir		D3	6666	58249063 0.000	有了。
Add-On Instructions	+ ascputen02:01 Data[6]	0	Decir		D4	8888	8888 0.000	有1 -
Data Types	+ ascpufen02.01 Data[7]	0	Decir		1.4	0000	0000 0000	29 1 2
Trends	+ ascputen02:01 Data[8]	0	Decir					
I/O Configuration	+ ascputen02 O1 Data[9]	0	Decir					
= 1756 Backplane, 1756-A7	+ ascpulen02 O1 Data[10]	0	Decir					
- 10] 1756-L71 ASCPU_ASFEN02	+ ascputen02 O1 Data[11]	0	Decir					
B 1 [1] 1756-EN2TR Ethernet_101	+ ascputeri02:01.Data[12]	0	Decir					
🗟 🍰 Ethernet	+ ascputen02 O1 Data[13]	0	Decir					
# ASCPU(AS-FEN02) ascpufei	+ ascputen02:01.Data[14]	0	Decir					
1756-EN2TR Ethernet_101	+ ascpufen02 O1 Data[15]	0	Decir					
and the second sec	* ascputen02 O1 Data[16]	0	Decir					
· · · · · · · · · · · · · · · · · · ·	+ ascputen02 O1 Data[17]	0	Decir					
Module Defined Tags	+ ascpufen02.01.Data[18]	0	Decir					
Ascpulen0211 Ascpulen02.01	+ ascpufen02:01.Data[19]	0	Decir					
ascpulen02.C	* ascputen02 O1 Data[20]	0	Decir					
escription	+ ascpufen02 O1 Data[21]	0	Decir	-				
tatus Running V	+ ascpufen02 O1 Data[22]	0	Decit 🗸					
( )	Monitor Tags / Edit Tag	s <	>					

# 9.2.7.8 Data Mapping through Modbus TCP

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 Slave device.

The following example shows two AS Series PLCs (one with AS-FEN02) to connect each other and one as Master and the other as Slave (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 Master	192.168.1.5	D100, D200
AS300+ AS-FEN02	Modbus TCP Slave	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 A to 192.168.1.3 and then connect Master and Slave AS-FEN02.

Options Data Exchange -COM1 D	ata Exchange -COM2 Data Exchange -Ethen	net Data Exchange -FE	N02 Data
⊡ AS332T-A	AS-FEN02 Setting		
COM1 Port Setting	Parameter name	Value	Unit
COM2 Port Setting	IP Address	192.168.1.3	
Ethernet Port Basic Setting	Subnet Mask	255.255.255.0	
Ethernet Port Advance Setti	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 Master and then perform data mapping with the Slave (AS-FEN02).

Setting							
Exchar	nge -COM1 D	Data Exchange -COM <sup>7</sup> Da	ata Exchange -Ethernet 卫	ata Excl	ange -FEN02 <b>Data Exch</b>	ange -Function	Card1 Data Exchange -Function Card
					Mo	de Alway	ys Enable
Excha	nge Setup						
Item	Enable	IP Address	Local Address		Remote Address	Quantity	Add
	<ul> <li>Image: Construction</li> </ul>	192.168.1.3	D100		D200		
			D200		D300	1	Move Up
							Move Down
							Delete
							Copy
							copy
							OK

#### Step 3

Click the **Downloader** icon and then select the parameters that you'd like to download.



# 9.2.7.9 Webpage

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		
Mozilla	Firefox	V17 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.

b. After login, you can setting items on the left section.

Smarter: Greener: Together	Automation for A C	Changing World
User Admin	Device information	1
Password Logout	Device name Device description Firmware version IP address	AS-FEN02 V01.00.00.30 192.168.1.5
Network configuration     Account management     Firmware update     EtherNevI/P     DLR status     Save Config     Save configuration	MAC address Serial number	00:18:23:13:02:09

c. The menu shows data based on the permission of the current user.

Nadaa	Permission						
Nodes	Administrator	Read					
Device information	V	V					
Account management	V	Х					
Firmware update	V	Х					
DLR status	V	V					
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		Delete
6			Administrator		Delete
7			Administrator	•	Delete
8			Administrator	Ť	Delete

- 🙆 NELTA Automation for A Changing World User Admin **Firmware update** Password Select the firmware file Browse... Update Logout Update status Ready information Device information Network configuration Account management EtherNet/IP DLR status
- e. Firmware Update: You can update the firmware of AS-FEN02 via the webpage.

f. DLR Status: You can view the current DLR status and edit the refresh cycle. It is required to use AS-FEN02 with firmware V1.04 or later for DLR function.

Admin	EtherNet/IP DLR	status		
54d				cycle (1s ~ 60s): _ 10 +
L	Network topology		Linear	
Iormation Device information stwork configuration	Network status		Normal	
	Ring supervisor		0.0.0.0	
ccount management	Supervisor precedence		0	
rNet/IP		Fault detected	0	
R status Config	Ring fault	Supervisor status	Ring node	
we configuration		Last node on port 1		
		Last node on port 2		

g. 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. 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 Hardware Status.

Nodes	Permission					
Nodes	Administrator	Read				
Device information	V	V				
Account management	V	Х				
Firmware update	V	Х				
Hardware status	V	V				
DLR status	V	V				
Save configuration	V	Х				

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.

Aana	Hardware status														
			Febresh cycle (1s - 60s):	- 11										Floating	Format setting: 3 +
u	Extension No.	Module north						Value						States	Error code
manica	Ponar module														
pulca infairnasion	RTU module	ASDIDCMA													
off configuration count management measure acidate	-Function card	ASJEND		2				7	 	 n					
nostic educare contro nosta Ristoluci Config neo configuration	Module 1	AS32NN82T-A	¥0. ¥1.	1	2	11	1	1		1		2	8	100	
			input CH1 Hput CH2		K4 K4		~			1	î	1			
	Module 2	ASSEKA-A	Ppin CH1 Input CH1 Output CH1		RC RC										

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# 9.3 Profiles and Dimensions

# 9.3.1 AS-F232



#### 9.3.2 AS-F422/AS-F485/AS-F2AD/AS-F2DA



# 9.3.3 AS-FCOPM



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# 9.3.4 AS-FENO2



Number	Name	Description
		Indicates if the module has been set
1	MS indicator	ON: the setting is complete
		Blinking: the setting is not complete
		OFF: no power
		Indicates the status of Ethernet connection
		Green light ON: a CIP connection is established
		Green light BLINKING: a CIP connection is not established
2	NS indicator	Red light ON: duplicated IP address
		Red light BLINKING: communication timeout / DLR conection
		lost / IP address change
		OFF: no power / network cable is not connected
3	RJ-45 port X1/X2	Use for network connections
		Indicate the status of Ethernet connection
4	LINK indicator X1/X2	Green light ON: a network connection is established
		OFF: a network connection is not established
		Indicate the status of Ethernet communication
5	ACT indicator X1/X2	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	

# 9.4 Wiring 9.4.1 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 ln+ (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.

#### 9.4.2 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.

# 9.5 HWCONFIG in ISPSoft

#### 9.5.1 Initial Setting

(1) Start ISPSoft and double-click HWCONFIG.



(2) Select a function card on the module.

HWCONFIG					<u>10</u>	. O X
🚝 Ele Edit Opti	ion <u>H</u> elp				-	- <u>a</u> ×
	0					
Product List						
<ul> <li>AS300</li> <li>Digital I/O Module</li> <li>Analog I/O Modul</li> <li>Network Module</li> <li>Power Module</li> </ul>	le	+	•			
Specification						
			~		 	<u>.</u>
CPU Group						
Extension No	Туре	Name	Input Device Ra	Output Device R	Comment	
Power Module	-	1.2010.00		10 M 2 M 10 M 10		
E CPU Module Function Card1	CPU Module	AS332T	X0.0 ~ X0.15	Y0.0 ~ Y0.15		
Function Card2	÷					

(3) Double-click the function card to open the Device Setting page.

Card1 Detect mode: select Auto Detect or choose the function card model.

<ul> <li>AS332T</li> <li>System Information</li> <li>COM1 Port Setting</li> <li>COM2 Port Setting</li> <li>Ethernet Port Basic Setting</li> <li>Ethernet Port Advance Set</li> <li>Function Card 1 Setting</li> <li>Function Card 2 Setting</li> </ul>	Function Card 1 Setting							
	Parameter name	Value		Unit	Default	Min	Max	
	Card 1 Detect mode	Auto Detec	-		Auto Dete	ect -	-	
	Manual Select Card	None	-		None	-		
	Card 1 ID No.	1			1	1	254	
	Protocol Setup Opportunity	Stop -> Ru	•		Stop -> F	kur -	-	
	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	. 1	ms	200	0	3000	
	F2AD Analog Input mode	0~10V	$\mathbf{T}$		0~10V	÷	-	
•	F2DA Analog Output mode	0~10∨	•		0~10V	-	-	

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(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 - Eth	hernet									
<ul> <li>AS332T</li> <li>B System Information</li> <li>COM1 Port Setting</li> <li>COM2 Port Setting</li> <li>Ethernet Port Basic Setting</li> <li>Ethernet Port Advance Set</li> <li>Function Card 1 Setting</li> </ul>	Function Card 1 Setting									
	Parameter name	Value	Unit	Default	Min	Max				
	Card 1 Detect mode	Auto Detect		Auto Deter	ct-	÷				
	Manual Select Card	AS-F232 CC	-	None	+	-				
	Card 1 ID No.	1		1	1	254				
	Protocol Setup Opportunity	Stop -> Rui		Stop -> R	ur -	-				
- Function Card 2 Setting	Baud Rate	9600	• bps	9600	-	-				
	Data bit	7	• bit	7	~	~				
	Parity bit	Even	-	Even	-	100				
	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	0~10V		0~10V	-	-	+			

(b) Function card AS-FCOM can only be installed in function card slot 2.

E AS332T	Function Card 2 Setting									
<ul> <li>System Information</li> <li>COM1 Port Setting</li> </ul>	Parameter name	Value	Unit	Default	Min	Max				
COM2 Port Setting Ethernet Port Basic Setting Ethernet Port Advance Set Function Card 1 Setting Function Card 2 Setting	Card 2 Detect mode	Auto Detect	•	Auto Dete	ect -	~				
	Manual Select Card	AS-FOOPM	-	None	-					
	Card 2 ID No.	1	1	1	1	254				
	Protocol Setup Opportunity	Stop -> Rui	-	Stop -> R	(u) -	-				
	Baud Rate	9600	- bps	9600	-	~				
	Data bit	7	➡ bit	7	1	~				
	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∨	-	-				
1 D	F2DA Analog Output mode	0~10	•	0~10V	-					

(c) Configure the communication settings in the red box.

AS332T     System Information     COM1 Port Setting     COM2 Port Setting     Ethernet Port Basic Setting     Ethernet Port Advance Set     Function Card 1 Setting     Fonction Card 1 Setting	Function Card 2 Setting								
	Parameter name	Value	T	Unit	Default	Miń	Max.	4	
	F2AD Analog Input mode	0~10V	•		0~10V	10	-		
	F2DA Analog Output mode	0~10V	•		0~10V	-	-		
	F2AD Sampling Time	3	n	ns	3	3	15		
	F2AD Average Times	10			10	1	15		
	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 ren Run connec 🖛				Run conne	¢-	-		
	AS MPU keep or Stop when slave	Only Show I	-		Only Show E-				
	Remote Communication time out	100	n	ns	100	0	3000		
	Re-connected Retry number after	60			60	0	255		
	Auto Retry connection after Disco	60	s	sec	60	0	255		
रा म	AS-FCOPM Bit Rate	125k	₹ b	ps	125k	-	-		

Options - COM 1 - COM 2 - Eth	nemet									
AS332T     System Information     COM1 Port Setting     COM2 Port Setting	Function Card 1 Setting									
	Parameter name	Value	1	Init	Default	Min	Max	2		
	Card 1 ID No.	1	1		1	1	254			
-Ethernet Port Basic Setting	Protocol Setup Opportunity	Stop -> Rui	•		Stop -> Ru	Jt -	-			
Ethernet Port Advance Set	Baud Rate	9600	- bp:	5	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	0~10V	-		0~10V	41	+			
	F2AD Sampling Time	3	ms		3	3	15			
• • •	F2AD Average Times	10			10	1	15			

(d) When the function card is an AS-F2AD or AS-F2DA, configure the communication settings in the red box.

(e) When the function card is an AS-FEN02, configure the communication settings in the red box.

AS332T-A ⊕ System settings	AS-FEN02 Setting					
COM1 Port Setting	Parameter name	Value	Unit	Default	Minimum	Maximum
COM2 Port Setting	IP Address	192.168.1.5		192.168.1.5	1.1.1.1	223.255.255.255
Ethernet Port Basic Setting	- Subnet Mask	255.255.255.0		255.255.255.0	0.0.0	255.255.255.255
	Gateway	192.168.1.1		192.168.1.1	1.1.1.1	223.255.255.255
Function Card 1 Setting	TCP Keep Alive Timeout	30	sec	30	1	65535
- Function Card 2 Setting - AS-FEN02 Setting	Mode	Static	•	Static	-	-
	6					

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(f) Click **OK** to confirm the settings.

AS332T	Function Card 1 Setting									
	Parameter name	Value	Unit	Default	Min	Max				
	Card 1 Detect mode	Auto Detect	-	Auto Detect	i i	-				
-Ethernet Port Basic Setting	Manual Select Card	AS-F232 C(	-	None	÷	-				
Ethernet Port Advance Set	Card 1 ID No	1		1	1	254				
- Function Card 1 Setting	Protocol Setup Opportunity	Stop -> Rui		Stop -> Rui	5	-				
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	0~10V ·		0~10V	÷I	-				
1 F	F2DA Analog Output mode	0~10V ·		0~10V	-	-	-			

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

HWCONFIG	-					
🚝 Eile Edit Opt						- H ×
EX DO 9	595					
Product List	1000	1 100 1 001				
AS300     Digital I/O Modul     Analog I/O Modul     Network Module     Power Module	le ile	doad (Cul+F8)	-			
Specification		× )				
CPU Group			Y		_	
Extension No	Type	Name	Input Device Ra	Output Device R	1	Comment
Power Module			1	1	-	
E CPU Module	CPU Module	AS332T	×0.0 ~×0.15	Y0.0 ~ Y0.15		
Function Card1	Function Card	AS-F232				1
Function Card2	Function Card	AS-F485				


# Chapter 10 DeviceNet Master Scanner Module AS01DNET-A

# Table of contents

10.1 Int	roduction of AS01DNET-A10-3
10.1.1	Feature
10.1.2	Specifications 10-3
10.2 Cor	nponents of AS01DNET-A10-4
10.2.1	Profile and Dimensions
10.2.2	Components
10.2.3	Mode Toggle (RTU- Master/Slave ) 10-5
10.2.4	DeviceNet Connector
10.2.5	Address Switch 10-6
10.2.6	Function Switch
10.2.7	Digital Displayer 10-6
10.3 Dev	viceNet Network Communication10-7
10.3.1	Relationship between Transmission Distance and Baud Rate
10.3.2	DeivceNet Network Topology Structure
10.3.3	Choice and Purpose of a DeviceNet Terminal Resistor
10.3.4	DeviceNet Network Supply Power 10-12
10.4 Ma	ster /Slave Mode10-13
<b>10.4 Ma</b> 10.4.1	ster /Slave Mode10-13 Introduction of Master/Slave Mode
10.4.1	
10.4.1 10.4.1	Introduction of Master/Slave Mode 10-13
10.4.1 10.4.1 10.4.2	Introduction of Master/Slave Mode
10.4.1 10.4.1 10.4.2 10.4.2	Introduction of Master/Slave Mode
10.4.1 10.4.2 10.4.2 10.4.2 10.4.2	Introduction of Master/Slave Mode
10.4.1 10.4.2 10.4.2 10.4.2 10.4.2	Introduction of Master/Slave Mode10-13L.1Scan List, Input Table and Output Table10-13Installation10-142.1Connecting AS01DNET-A Module to AS series PLC10-142.2Connecting the DeviceNet Communication Connector10-14
10.4.1 10.4.2 10.4.2 10.4.2 10.4.2 10.4.3 10.4.3	Introduction of Master/Slave Mode10-131.1Scan List, Input Table and Output Table10-13Installation10-142.1Connecting AS01DNET-A Module to AS series PLC10-142.2Connecting the DeviceNet Communication Connector10-14IO Mapping for AS01DNET in AS PLC10-15
10.4.1 10.4.2 10.4.2 10.4.2 10.4.2 10.4.3 10.4.3 10.4.3	Introduction of Master/Slave Mode10-131.1Scan List, Input Table and Output Table10-13Installation10-142.1Connecting AS01DNET-A Module to AS series PLC10-142.2Connecting the DeviceNet Communication Connector10-14IO Mapping for AS01DNET in AS PLC10-153.1Data Mapping between Modules and AS PLC10-15
10.4.1 10.4.2 10.4.2 10.4.2 10.4.3 10.4.3 10.4.3 10.4.3	Introduction of Master/Slave Mode10-131.1Scan List, Input Table and Output Table10-13Installation10-142.1Connecting AS01DNET-A Module to AS series PLC10-142.2Connecting the DeviceNet Communication Connector10-14IO Mapping for AS01DNET in AS PLC10-153.1Data Mapping between Modules and AS PLC10-153.2Tables of Input Mapping and Output Mapping areas10-16
10.4.1 10.4.2 10.4.2 10.4.2 10.4.3 10.4.3 10.4.3 10.4.3	Introduction of Master/Slave Mode10-131.1Scan List, Input Table and Output Table10-13Installation10-142.1Connecting AS01DNET-A Module to AS series PLC10-142.2Connecting the DeviceNet Communication Connector10-14IO Mapping for AS01DNET in AS PLC10-153.1Data Mapping between Modules and AS PLC10-153.2Tables of Input Mapping and Output Mapping areas10-17
10.4.1 $10.4.2$ $10.4.2$ $10.4.2$ $10.4.3$ $10.4.3$ $10.4.3$ $10.4.4$ $10.4.4$ $10.4.4$	Introduction of Master/Slave Mode10-131.1Scan List, Input Table and Output Table10-13Installation10-142.1Connecting AS01DNET-A Module to AS series PLC10-142.2Connecting the DeviceNet Communication Connector10-14IO Mapping for AS01DNET in AS PLC10-153.1Data Mapping between Modules and AS PLC10-153.2Tables of Input Mapping and Output Mapping areas10-174.1Bit-strobe Work Principle10-17
10.4.1 $10.4.2$ $10.4.2$ $10.4.3$ $10.4.3$ $10.4.3$ $10.4.3$ $10.4.4$ $10.4.4$ $10.4.4$ $10.4.5$ $10.4.5$	Introduction of Master/Slave Mode10-131.1Scan List, Input Table and Output Table10-13Installation10-142.1Connecting AS01DNET-A Module to AS series PLC10-142.2Connecting the DeviceNet Communication Connector10-14IO Mapping for AS01DNET in AS PLC10-153.1Data Mapping between Modules and AS PLC10-153.2Tables of Input Mapping and Output Mapping areas10-174.1Bit-strobe Work Principle10-17Network Node Status Display10-18
10.4.1 $10.4.2$ $10.4.2$ $10.4.3$ $10.4.3$ $10.4.3$ $10.4.3$ $10.4.4$ $10.4.4$ $10.4.4$ $10.4.5$ $10.4.5$	Introduction of Master/Slave Mode10-131.1Scan List, Input Table and Output Table10-13Installation10-142.1Connecting AS01DNET-A Module to AS series PLC10-142.2Connecting the DeviceNet Communication Connector10-1410 Mapping for AS01DNET in AS PLC10-153.1Data Mapping between Modules and AS PLC10-153.2Tables of Input Mapping and Output Mapping areas10-174.1Bit-strobe Command10-174.1Bit-strobe Work Principle10-185.1Scan-List Node Status Indication10-18
10.4.1 $10.4.2$ $10.4.2$ $10.4.2$ $10.4.3$ $10.4.3$ $10.4.3$ $10.4.4$ $10.4.4$ $10.4.5$ $10.4.5$ $10.4.5$ $10.4.5$ $10.4.5$	Introduction of Master/Slave Mode10-131.1Scan List, Input Table and Output Table10-13Installation10-142.1Connecting AS01DNET-A Module to AS series PLC10-142.2Connecting the DeviceNet Communication Connector10-142.2Connecting for AS01DNET in AS PLC10-153.1Data Mapping between Modules and AS PLC10-153.2Tables of Input Mapping and Output Mapping areas10-16Bit-strobe Command10-174.1Bit-strobe Work Principle10-17Network Node Status Display10-185.2Module Status Indication10-18

10.4.	7.2.Using DeviceNet Builder to Configure a DeviceNet Network	10-21
10.4.	7.3.DeviceNet Network Control	10-28
10.4.8	Sending Explicit Message through Ladder Diagram	10-29
10.4.8	3.1.Principle of Explicit Message Transmission	10-29
10.4.8	3.2.Explicit Message Transmission Instruction DNETRW	10-30
10.4.9	LED Indicators and Troubleshooting	10-36
10.4.9	9.1.NS LED	10-36
10.4.9	9.2.MS LED	10-36
10.4.9	9.3.Combination of MS LED and NS LED	10-37
10.4.9	9.4.Digital Displayer	10-37
10.4.10	Master-Slave Mode Switch and 8 Baud Rates Setting via Softwar	e10-39
10.4.	10.1.Setting AS01DNET-A to Slave Mode	10-39
10.4.	10.2.Setting AS01DNET-A to Master Mode	10-42
10.4.	10.3.Baud Rate Setting of When AS01DNET-A is in Slave Mode	10-45
10.4.	10.4.Baud Rate Setting of When AS01DNET-A is in Master Mode.	10-48
10.5 RT	U Mode	10-50
10.5.1		
10.5.2	AS-Series Extension Modules Connectable to AS01DNET (RTU).	
10.5.3	Installation	
10.5.3	3.1.Installing AS01DNET (in RTU Mode)	10-52
10.5.	3.2.Connecting the Cable to DeviceNet Connector	10-53
10.5.4	Configuring AS01DNET (in RTU mode)	
10.5.4	4.1.Terms	10-54
10.5.4	4.2.Introduction of Software	10-55
10.5.4	4.3.DeviceNet Mapping Data	10-73
10.5.4	4.4.Connecting AS01DNET (RTU) to the Network	10-80
10.5.5	Application Example	10-81
10.5.	5.1.Network Structure	10-81
10.5.	5.2.Using DeviceNet Builder to Configure the Network	10-81
10.5.	5.3. Using LD Program to Control the Entire Network	10-90
10.5.6	Error Diagnosis and Trouble Shooting	10-90
10.5.0	5.1.Indicator Diagnosis	10-90
10.5.0	5.2.Codes in Seven-Segment Displayer	10-91
	5.3.Status Word Diagnosis	
10.5.0	5.4.Software Diagnosis	10-94
10.6 Ho	w to Call DeviceNet Builder through ISPSoft (AS-Series PL	C)10-95

# 10.1 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 10.4 and 10.5 for details about master/slave mode and RTU mode.

### 10.1.1 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.

### 10.1.2 Specifications

DeviceNet Connector

ltem	Specifications			
Transmission method	CAN			
Electrical isolation	DC500V			
Connector type	Removable terminal block with screws (5.08mm)			
Communication cable	2 communication wires, 2 power wires and 1 shielded wire included.			

#### DeviceNet Communication

ltem	Specifications			
Message type	VO 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

ltem	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

# 10.2 Components of AS01DNET-A

# 10.2.1 Profile and Dimensions







# 10.2.2 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.

# 10.2.3 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.	RTU Master/Slave

# 10.2.4 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	



### 10.2.5 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	α ( α ( α ( α ) σ ( x10 <sup>1</sup> η
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  $x10^1$  to 2 and the corresponding switch of  $x10^0$  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.
- $\checkmark$  Rotate the switch carefully with a slotted screwdriver to prevent damage to the switch.

### 10.2.6 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			
OFF	ON	250 Kbps			
ON	OFF	500 Kbps			
ON	ON	Entering the mode of extended baud rate	<b>№</b> □		
INIO	ON	When the slave is off-line, the I/O data in the buffer area will be held.	ω 🛄   DR0 + 🛄   DR1		
INO	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.
- $\checkmark$  Adjust the DIP switch carefully with a slotted screwdriver to prevent any damage to the switch.

### 10.2.7 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



# 10.3 DeviceNet Network Communication

### 10.3.1 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	5000	2500	1000	500	250	100	50	25
distance (M)	5000	2500	1000	500	200	100	50	20



# 10.3.2 DeivceNet Network Topology Structure

List of Delta DeviceNet Fieldbus Network Products:

Product picture	Model	Function
	AS01DNET-A	<ol> <li>AS01DNET-A, a DeviceNet module running on the right of AS PLC can work as a DeviceNet master or slave.</li> <li>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.</li> </ol>
	AH10DNET-5A	AH10DNET-5A, a DeviceNet module, running on the right of AH500 series PLC can work as a DeviceNet master or slave.
RTU-DHET	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.

### AS Series Module Manual

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.

### 10.3.3 Choice and Purpose of a DeviceNet Terminal Resistor

#### • Choice of a DeviceNet Terminal Resistor

A DeviceNet network requires two terminal resistors of 121  $\Omega$  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  $\Omega$ .

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.

## 10.3.4 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





# 10.4 Master /Slave Mode

### 10.4.1 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 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 10.4.10.

- 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 FROWTO 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 FROMTO instruction.

### 10.4.1.1. Scan List, Input Table and Output Table

ltem	Description	Figure
Scan List	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.	Scanner Module Configuration       Scan List setting Available Nodes:       Node Ad Node Name       Output Table       Register       Device Image       Doitoj H. (Pellpi AS0IDNET Slave       Doitoj L. (Pollpi AS0IDNET Slave       Doitog L. (Pollpi AS0IDNET Slave       Doitog L. (Pollpi AS0IDNET Slave       Doitoj L. (Pollpi LAS0IDNET Slave       Doitoj L. (Pollpi LAS0I

	The scanner module provides an input table of total size: 190 bytes and an output table of total size: 190	Scanner Module Configuration
	bytes for data exchange with slaves. When one slave 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	Node Ad Node Name Node Name Node Ad Node Name Node Ad Node Name Node Ad Node Name Node Name Node Ad Node Name Node Name Node Ad Node Name Node Ad Node Name Node Ad Node Name Node Name Node Name Node Ad Node Name Node Name Node Ad Node Name No
Input/output Table	and Output Table are the interface for data exchange between the PLC of the master and slaves and show the mapping relationships between the D registers in the PLC of the master and the I/O data of slaves. After the configuration is finished, download the configuration data to the scanner module. Then the module will exchange I/O data with corresponding slaves according to the configuration. The data in the output table will be transmitted to slaves and the data returned from slaves will be filled in the input table.	Output Table     Input Table       Register     Device Image       D26105_H     [PedI0]-AS0IDNET Slave       D26105_L     [PedI0]-AS0IDNET Slave       D2610_L     D2610_L       D2610_L     D2610_L       D2610_L     D2610_L       D2611_H     Imput       Vinit ID: 1     Start Output       D     26005       OK     Cancel

# 10.4.2 Installation

### 10.4.2.1. 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.

### 10.4.2.2. 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.



# 10.4.3 IO Mapping for AS01DNET in AS PLC

### 10.4.3.1. 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.

Exa	mple 1	Example 2				
Position of AS01DNET on the right of the PLC	Arrangement 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

Position of AS01DNET on the right of the PLC	Output mapping area	Input mapping area
4	D27300 – D27399	D27200 – D27299

### 10.4.3.2. 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 are	a (for sending data slave)	a to the	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 a		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		4 words	D26800~D26803	Scan-list node status indication area	4 words		
3	D26904	Reserved	1word	D26804	Module status indication area	1 word		
	3 D26904 D26905~D26999		95 words	D26805~D26899	DeviceNet input data area	95 words		
	D27300~D27303	303 Bit-strobe command area		D27200~D27203	Scan-list node status indication area	4 words		
4	D27304	Reserved	1word	D27204	Module status indication area	1 word		
	D27305~D27399	DeviceNet output data area	95 words	D27205~D27299	DeviceNet input data area	95 words		

Note: See section 10.4.5 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		

### 10.4.4 Bit-strobe Command

### 10.4.4.1. 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	b14	b13		b1	b0				
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.

### 10.4.5 Network Node Status Display

### 10.4.5.1. 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				

### 10.4.5.2. 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 section 10.9.5 Digital Displayer.

Register in								Desc	riptior	า						
the PLC	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
D26004		Module status ( 0 : Normal , 1 : Initializing , 2 : error )						)			Error	code ii	n the m	nodule		

### 10.4.6 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 slaves 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 Colline Scan DeviceNet Network	Master Mode Scan Interval Time: 10 ms Expected Packet Rate: 75
Download Dipload	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 = 20000
	Master-Slave Start Address: D = 2000 Master-Slave Start Address: D = 26100

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 X 75 = 300ms. 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.

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.

	Choose Baudrate:
Scan Interval Time: 10 ms Calculate Time	Choose Baumate.
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	1
Slave Mapping Address	
Master->Slave Start Address: D = 26000	
Master->Slave Start Address: D = 26000 Master<-Slave Start Address: D = 26100	

### 10.4.7 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.

### 10.4.7.1. 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 requreiment 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  $121\Omega$  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

### 10.4.7.2. 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.

OMMGR			
Name	Description	State	<u>A</u> dd
			Configure
			Delete
			-
			Stop
			Language
			About

Driver Name	Driver1	
Connection Setup		
Туре	Ethernet	2
Ethernet Card		
Description Real	tek PCI GBE Family Controller	2
192.168.0.122		
P Address Setting		
Add	Delete	Search
	Brine	1
IP Address		Device Name
IP Address Setup Responding Time of Auto-re	Port Description /	1.2
Setup Responding Time of Auto-re	Port Description /	Device Name

Name	Description	State	Add
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.

🔠 Delta DeviceNet Builder - Untitled	
<u>File Edit View N</u> etwork <u>T</u> ools <u>S</u> etu	
1 4 <b>7</b> 2 9 7 2 4 1 🗐	
🖃 🦳 Project List	AS01DNET-A, Master, UnitID 1, Node Address 0. The start input: D26005, The
AS01DNET-A , Master , UnitI	
⊀ III ► ►	
Am Project Device	*

5. Click Network>> Scan DeviceNet Network.

_	
	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.

Address: 1	Name:	AS01DNET S	lave	
Node infomation		Key Paramet	ers setti	ng
Vendor ID:	799	Vendor		
Device Type:	12	Device 1	Type	
Product Code:	92	Product	Code	
Major Rev:	1	Major R	ev	
Min Rev:	1	📝 Min Rev		
Polled Setting		COS/CC Set	ting	
Input Size: 8	Bytes	COS	O CC	
Output Size: 8	Bytes	Input Size:	0	Bytes
		Output Size:	0	Bytes
Bit-Strobe Sett	ing	Heartbeat:	250	ms
Input Size: 0	Bytes	Ack Timeout:	16	ms
Input Size: 0	Dytes	Inhibit Time:	1	ms
	-			

8. 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.

00 01			
	2		
	MET		
Scanner Slave	Cut	Ctrl+X	
	Сору	Ctrl+C	
	Paste	Ctrl+V	
	Remove	Delete -	
	Parameter Edit	taa	
	Properties		

A11 I	Paramete	ers - Read	Write Default All Values	÷
ID	Type	Parameter Name	Value	
1	RW	Working Mode	Slave mode	
2	R	Firmware Version	0	
3	R/W	Polled Input Length	8	
4	R/W	Polled Output Length	8	
5	R/W	Extend Baudrate Enable	Disable	
6	R/W	Extend Baudrate	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			
*	m j +		*	111		+
Unit ID: 1	Start Output	D =	26105		OK	
Manuals	Ilocation Start Input:	D =	26005		Canc	el

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			<	input Table		
Register	Device Image	*	Ī	Register	Device Image	1
D26105 H	-			D26005 H		
D26105_11				D26005 L		
D26105_L				D26006 H	• • • • • • • • • • • • • • • • • • •	
D26106 L	and the second sec			D26006 L	the second second second second second second second	
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	[Poll]01-AS01DNET Slave				[Poll]01-AS01DNET Slav	
D26107 L				D26007 L		
D26108 H	a second s			D26008 H	and the second	
D26108 L	the state of the second s			D26008 L	[Poll]01-AS01DNET Slav	
D26109 H	And the second second			D26009 H	a second second second	
D26109_L				D26009_L		
D26110_H				D26010_H		
D26110_L				D26010_L		
D26111 H		-		D26011 H		
*	111 F			*	m	*
Unit ID: 1	Start Output :	D	+	26105	OK	1
	llocation Start Input:	D		26005	Cano	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.

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?	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?	Do you wish to continue if this instruction will affect the state of the connected PLC?		Cannot perform this operation when PLC is in RUN mode!
		$(\cdot)$	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.

#### $\blacksquare \quad \textbf{AS01DNET-A} \rightarrow \textbf{Slave}$

AS PLC	AS01DNET(Master)	AS01DNET(Slave)	AS PLC
D26105			D26000
D26106			D26001
D26107			D26002
D26108			D26003

### **Slave** $\rightarrow$ 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.

### 10.4.7.3. 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:



#### **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:

MO		NMOV
	En	
	16#5555 — S	DD26105
	4 _n	



#### 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.

### 10.4.8 Sending Explicit Message through Ladder Diagram

AS01DNET-A supports the sending of explicit messages via DNETRW instruction.

### 10.4.8.1. 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.
- 4. AS PLC gets back the response message from AS01DNET-A master. Then the explicit message transmission of this time is finished.

10

### 10.4.8.2. Explicit Message Transmission Instruction DNETRW

• DNETRW instruction:

API	Ir	struct	ion co	de			Оре	erand					Fu	unctior	ı	
1818		DNE	TRW		<b>S</b> <sub>1</sub> · <b>S</b> <sub>2</sub>		6 <sub>4</sub> · S <sub>5</sub> · · D₂ · ∣			S <sub>9</sub> · S₁	0 '			write D nicatio	eviceN n data	et
Device	Х	Y	М	S	Т	С	HC	D	FR	SM	SR	E	K	16#	"\$"	F
S <sub>1</sub>								•	•				0	0		
<b>S</b> <sub>2</sub>								•	•				0	0		
S <sub>3</sub>								•	•				0	0		
S <sub>4</sub>								•	•				0	0		
S <sub>5</sub>								•	•				0	0		
S <sub>6</sub>								•	•				0	0		
<b>S</b> 7								•	•				0	0		
S <sub>8</sub>								•								
S <sub>9</sub>								•	•				0	0		
<b>S</b> <sub>10</sub>								•	•				0	0		
<b>D</b> <sub>1</sub>		•	•	•												
<b>D</b> <sub>2</sub>		•	•	•												
<b>D</b> <sub>3</sub>								•								
D <sub>4</sub>								•								
D <sub>5</sub>								•								

Data type	BOOL	WORD	DWORD	LWORD	UINT	INT	DINT	LINT	REAL	LREAL	TMR	CNT	STRING
S1		●			•	•							
<b>S</b> 2		•			•	•							
S3		•			•	•							
S4						•							
S₅					•	●							
S <sub>6</sub>		•			•	●							
<b>S</b> 7		•				•							
S8		•			•	●							
S9		•				•							
<b>S</b> 10						•							
D1	$\bullet$												
D2	•												
D3					•	•							
D4		•			•	•							
D5		•			•	•							

Pulse Instruction	16-bit instruction	32-bit instruction
-	AS	AS

#### • Symbol:

	DNETRW		
 S1		D1	
 S2		D2	
 S3		D3	
 S4		D4	
 S5		D5	
 S6			
 S7			
 S8			
 S9			
 S1(	0		

S1	The sequence number of the DeviceNet communication module
\$2	DeviceNet node address (MAC ID)
<b>S</b> 3	Service Code
S4	Class ID
S5	Instance ID
S6	Attribute ID
S7	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	Get all attributes (Get_Attribute_All)	
0x02	Set all attributes (Set_Attribute_All)	
0x0E	Get one single attribute (Get_Attribute_Single)	
0x10	0 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		
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 Set the node ID of AS01DNET-A to 00.	
Node ID	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	
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.	
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	
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.

# 10.4.9 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.



### 10.4.9.1. NS LED

LED status	Indication	Correction
OFF	No power; Or duplicate ID check has not been completed.	<ol> <li>Check if AS01DNET-A is powered and the connection is normal.</li> <li>Make sure that at least one node can communicate normally.</li> </ol>
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.	<ol> <li>Make sure that all the devices in the network have their unique node addresses.</li> <li>Check if the network installation is correct.</li> <li>Check if the baud rates of the master and slave are same.</li> <li>Check if the network power is normal.</li> </ol>

### 10.4.9.2. 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)	No module is configured.	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	When AS01DNET works as the master, the slave in Scan List can not	Refer to Digital Displayer. Make sure that the slave information in Scan List
LED status	Indication	Correction
--------------	-------------------------------	--
OFF: 0.5s	work normally.	matches that of the actually connected slave.
alternately)	When AS01DNET works as the	
	slave, an error occurs in the	
	configuration.	
		1. Check if the configuration is correct.
Red light ON	An error inside AS01DNET	2. Return the module to factory for repair if the error still exists after repower ON.

# 10.4.9.3. Combination of MS LED and NS LED

LED	status	la dia atian	Ormentian
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.	<ol> <li>Ensure that the node ID of AS01DNET is unique.</li> <li>Repower the module.</li> </ol>
Red light ON	Red light blinking (ON:0.5s and OFF: 0.5s alternately)	No network power	<ol> <li>Check if the network cable connection is proper.</li> <li>Check if the network power supply is normal.</li> </ol>
Red light ON	Red light ON	Hardware error	Return the module to the factory for repair.

# 10.4.9.4. 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.	<ol> <li>Ensure that the node address of AS01DNET is unique.</li> <li>Re-power AS01DNET.</li> </ol>
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.
F4	BUS-OFF	<ol> <li>Check if the network cable is normal and the shielded cable is grounded.</li> <li>Check if the baud rates of all nodes in the network are same.</li> <li>Check if the start and end of the network cable are both connected with a 121Ω terminal resistor.</li> <li>Re-power AS01DNET-A.</li> </ol>
F5	No network power	<ol> <li>Check if the network cable is normal.</li> <li>Ensure that the network power is normal.</li> </ol>
F6	Internal error; Flash or RAM	If the error still exists after re-power, send AS01DNET-A back to the

Code	Explanation	Correction
	check error	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	<ol> <li>Configure the network correctly and re-download it to AS01DNET-A.</li> <li>Check if the node address of one slave in the scan list is the same as that of AS01DNET-A.</li> </ol>
E0	Identification parameters returned from the slave do not match the configuration data.	<ol> <li>Check if there is any change in node ID of the slave in the network.</li> <li>Check if some node device in the network is replaced.</li> <li>Re-configure the network.</li> </ol>
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.	<ol> <li>Check if there is a change in the node address of the slave.</li> <li>Check if the communication cable is disconnected or connected loosely.</li> <li>Check if the bus cable length exceeds the maximum transmission distance. If so, the system may not be stable.</li> </ol>
E3	AS01DNET-A fails to transmit data.	<ol> <li>Make sure that the connection between AS01DNET-A and the network is normal.</li> <li>Check if the baud rate of AS01DNET-A is the same as that of other node in the network.</li> </ol>
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.	<ul> <li>If the code is displayed long, do the troubleshooting according to the following steps.</li> <li>Make sure that at least two nodes work normally in the network.</li> <li>Check if either end of the network is connected with the terminal resistor of 121Ω.</li> <li>Check if the baud rates of the node devices in the network are same.</li> <li>Check if the communication cable is normal so as to avoid that the cable is disconnected or connected loosely.</li> <li>Check if the bus cable length exceeds the maximum transmission distance. If so, the system may not be stable.</li> <li>Check if the shielded wire of the network cable is grounded.</li> <li>Re-power AS01DNET-A scanner module.</li> </ul>

## 10.4.10 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.

### 10.4.10.1. Setting ASO1DNET-A to Slave Mode

1. Build a driver through the COMMGR software.

Refer to Section 2.4 Communication Setting in the ISPSoft software for details.

2. Call the DeviceNet Builder software through the ISPSoft software.

Refer to section 10.6 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	
44 / 59 / 64 🕅 🖽 🗧 🖉	
× .	· · ·
⊡ 🧰 Device List	
Device Type	
e-⊡ Communications Adapter ⊡-⊡ Vendor	
DELTA ELECTRONIC, INC.	
	E
4 <u> </u>	
Am Project I Device	+
* Time Message Code Description	
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.



6. Click Project List>>Properties. Then the Properties dialog box appears. Select Slave mode and then click OK.



Module:	AS01DNET-A -
Mode:	Slave •
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 slave mode after repower ON.

dress 0 .

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.



### 10.4.10.2. Setting AS01DNET-A to Master Mode

- Build a driver through the COMMGR software.
   Refer to Section 2.4 Communication Setting in the ISPSoft software for details.
- Call the DeviceNet Builder software through the ISPSoft software.
   Refer to section 10.6 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 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
44/2998841042		
×		
Project List		
· · · · · · · · · · · · · · · · · · ·		
Am Project Device		
Time Message Code Description		
include beschpton		
* 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	- 0
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        Image: Setup Help
🖃 🧰 Project List	AS01DNET-A
AS01DNET-A	Scan DeviceNet Network
	Download
	Upload
	Update
	Add
	Сору
	Paste
Project 1	Delete
* Time	Properties

#### AS Series Module Manual

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, M	aster , UnitID 1 , Node Address 0 .	×
Download Nod	13 to scanner	
	OK	
	- 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.

	eration when PLC is in RUN mode! e if this instruction will affect the state of the connected PLC?
	OK Cancel
ning	2
No. Branning and a start	to the running state?
Do you want to go back	

### 10.4.10.3. 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		3
<u>File Edit View Network Tools Setu</u>	p <u>H</u> elp	
🗋 😅 📰 🗶 🐚 🛅 💩 🛃 🎒		
1 1 7 2 3 7 2 4 1	÷ 2	
× Project List	AS01DNET-A , Master , UnitID 1 , Node Address 0 .The start input: D26005 , Th	e
< Ⅲ ► amProject I Device		-

4. Clicking Network>> Scan DeviceNet Network, the DeviceNet Builder software starts to scan the whole network.

Browsing Node 2		
browsnig rode 2		
-		
	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         File       Edit       View       Network       Tools         □       □       □       □       □       □       □       □       □         •       □ <td< th=""><th>4 <b>DPQ</b></th></td<>	4 <b>DPQ</b>
Project List	AS01DNET-A, Master, UnitID 1, Node Address 0. The start input: D26005, The start output: D2
	AS01DNET AS01DNET Scanner Slave

6. Right-click AS01DNET(Slave), select **Parameter Edit...** on the drop-down menu to enter the **Parameter Edit** page.

Image: Delta DeviceNet Builder - Untitled         File       Edit       View       Network       Tools       S         Image:	3 0 9 0			_ = X
Project List	AS01DNET-A , Master , Unit		e start input: D26005 , Th	e start output: D2
	AS01DNET AS0 Scanner Slav		Ctrl+X Ctrl+C Ctrl+V Delete	
		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	
ID	Type	Parameter Name	Value	1
1	R/W	Working Mode	Slave mode 🔹	1
2	R	Firmware Version	0	
3	R/W	Polled Input Length	8,	,
4	R/W	Polled Output Length	8 10Kbps	]
5	R/W	Extend Baudrate Enable	20Kbps E 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.

### 10.4.10.4. Baud Rate Setting of When AS01DNET-A is in Master Mode

1. Opening the DeviceNet Builder software, the following window appears.

💼 Delta DeviceNet Builder - Untitled	- • ×
File Edit View Network Tools Setup Help	
	× E
* 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.

Driver	Driver1
Station Address	0
IP Address	192.168.1.11
O	Cancel

3. Click **Network** >> **Online** to scan the connected master.

👬 Delta DeviceNet Builder - Untitled		X
<u>File Edit View Network Tools Setu</u>	ip <u>H</u> elp	
□ ☞ 🖬 😨 🗶 🖿 🗈 😂 🍮		
	÷ 2	
Project List	AS01DNET-A , Master , UnitID 1 , Node Address 0 .The start input: D26005 , T	'nεΞ
< Ⅲ ► g <sup>w</sup> mProject <b>]</b> Device		

4. Clicking Network>> Scan DeviceNet Network, the DeviceNet Builder software starts to scan the whole network.

		×
Browsing Node 2		
1		
-	07	
	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	many int	-	-		00	×
File Edit View Network Tools	Setup Help					
🗋 😂 🔚 😨 🗶 🐚 🚺 🎂 🖻	8 0 9 0					
×	Langer and the	and the lot	the second second	Contra Manual		*
Project List	AS01DNET-A, Maste	er, UnitID 1, No	ode Address 0 .The sta	art input: D26005,	The start output:	D2 <sub>≡</sub>
AS01DNET-A , Master , I						
						- 11
	-	1				í I
	00	01				
	150	1				
	1 <sup>4</sup>	102				
	AS01DNET	AS01DNET				
	Scanner	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	Cacu	late Time
Expected Packet Rate:	75			
) Slave Mode				
Bit-Strobed				
Tx Size:	Bytes			
Polled				
Output Size: 8	Bytes	Input Siz	e: 8	Bytes
Change of State/Cycl	ic			
COS		Cyclic		
Tx Size:	Bytes	Rx Size:		Bytes
Slave Mapping Addr	ess			
Master->Slave Start	Address:	D -	26000	
Master<-Slave Start	Address:	D -	26100	
Extension Baudrate Enable Baudrat	e: 1Mbg	D5 🐨		
	e: 1Mbg	DS *		

7. 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.

# 10.5 RTU Mode

## 10.5.1 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.

# 10.5.2 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 mapping 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 mapping 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.

# 10.5.3 Installation

### 10.5.3.1. Installing AS01DNET (in RTU Mode)

#### 10.5.3.1.1. 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.



#### 10.5.3.1.2. 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.



### 10.5.3.2. 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.
- Tighten the screws on the connector by a slotted screwdriver and fix the communication cables in the holes in the connector.





# 10.5.4 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.

### 10.5.4.1. 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 10.5.4.3.4 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

No	Name	Unit	Description
			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 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.

#### 10.5.4.2. 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.)

#### 10.5.4.2.1. 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.

- Build a driver through the COMMGR software. Refer to Section 2.4 Communication Setting in ISPSoft help file.
- Call DeviceNet Builder via ISPSoft Refer to section 10.6 for details on how to operate.
- 3. The called DeviceNet Builder is started as below.

and Delta DeviceNet Builder - ISPSoft		
File Edit View Network Tools Help		
1 4 7 5 5 5 1 2		
×		
Project List		
Am Project Device		
* Time Message Code Description		
m		۴.
Ready	System Channel	Driver8

4. Click menu Network>> Online.

Delta DeviceNe	et Builder - ISPSoft		
File Edit View	Network Tools Help		
	🧉 Scanner setting	0	
	🖉 Online		
Project Li	Scan DeviceNet Network Download Download	6	
Troject	1 Device		
* Time	Message Code De	scription	
	111		

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	
B ≥ = 3 X = 0 4 € 6 0000	
X AS01DNET-A , Master	, UnitID 1 , Node Address 1 .The start input: D26005 , Th
Time     Message Code Description	
×	×.
Ready	System Channel Driver8

5. Click Network >> Scan DeviceNet Network.



6. After online is implemented, click the **Scan DeviceNet Network** button to start scanning the nodes in the network.



#### 10.5.4.2.2. 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.

	-	Name:	AS01DNET	(RTU)	
Node infomation	n		Key Parame	ters setti	ng
Vendor ID:	799		Vendor		
Device Type:	12		Device	Туре	
Product Code:	12320		Product	Code	
Major Rev:	1		Major R	lev	
Min Rev:	1		📝 Min Rev		
Polled Setting	3		COS/CC Se	tting	
Input Size: 2	B	ytes	COS	⊙ CC	-
Output Size: 2		ytes	Input Size:	0	Bytes
			Output Size:	0	Bytes
Bit-Strobe Se	tting		Heartbeat:	250	ms
Input Size: 0		ytes	Ack Timeout:	16	ms
Input Size: 0	, Di	ytes	Inhibit Time:	1	ms

2. Click the **I/O Configure...** button in the **Node Configuration...** window. Then the main configuration page appears as below.

1	DENT(RTU)				Scan
	* +			E	Upload
					Download
					Reset
					Clear config
					Start Monitor
List				•	Anna Arda
_	Name	 Description	Input	Output	Auto-Addr
I. -		 Description RTU DeviceNet		Output	Auto-Addr Clear-Addr
I. -	Name			Output	
I. - 0 1 2	Name			Output	
I. - 0 1 2 3	Name			Output	
I. - 0 1 2 3 4	Name			Output	
I. - 0 1 2 3 4 5	Name			Output	Clear-Addr
I. - 0 1 2 3 4 5 6	Name			Output	
- 0 1 2 3 4 5	Name			Output	Clear-Addr

### Explanation of parameters on the AS01DNET (RTU) configuration page

ltem	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.

ltem	Description
Clear config	Clear the configuration data stored in the latched area and automatically reset the configuration. Then the indicator displays F1.
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 <b>OK</b> button to finish the configuration.
Cancel	Clicking the <b>Cancel</b> 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.



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 <b>Change</b> from the menu which appears to change it into a module icon which can be recognized for configuration.

### 10.5.4.2.3. AS01DNET (RTU) Parameters Setup Page

After I/O modules are scanned, the main configuration interface changes as follows.



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:	## I	nput start device:	##
Firmware version:	0.10.0		
Error setting			
When loses Devicel	Net connection:	RTU Keep runnin	ng 🔻
When IO module er	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.						
When loses DeviceNet connection When IO module error or no reply	AS01DNET (RTU)'s error handling method when AS01DNET (RTU) and DeviceNet master are disconnected. "RTU keep running" and "RTU stop" are for option. 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 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 10.2.6 for details on function switch.	None					
Firmware version	Displays the firmware version of AS01DNET (RTU).	None					

### 10.5.4.2.4. 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 16 08 AM AP	+				* 111	Scan Upload Download
							Reset Clear config
							Start Monitor
						+	
List	<u> </u>	Piercerer	Description	Torrest	0.1.1.1		Auto-Addr
I.	Name	Firmware	Description	Input	Output		
L -	Name AS01DNET(RTU)	0.100	Description RTU DeviceNet		Output		Auto-Addr Clear-Addr
I. - 0	Name AS01DNET(RTU) AS32AM10N	0.100 -		##+1~##+2	Output		
I. - 0 1	Name AS01DNET(RTU) AS32AM10N AS16AM10N	0.100 - -		##+1~##+2 ##+3	Output	-	
I. - 0 1 2	Name AS01DNET(RTU) AS32AM10N	0.100 -		##+1~##+2	Output		
L. - 0 1 2 3	Name AS01DNET(RTU) AS32AM10N AS16AM10N	0.100 - -		##+1~##+2 ##+3	Output	•	
I. - 0 1 2	Name AS01DNET(RTU) AS32AM10N AS16AM10N	0.100 - -		##+1~##+2 ##+3	Output		
I. - 0 1 2 3 4 5	Name AS01DNET(RTU) AS32AM10N AS16AM10N	0.100 - -		##+1~##+2 ##+3	Output		Clear-Addr
I. - 0 1 2 3 4	Name AS01DNET(RTU) AS32AM10N AS16AM10N	0.100 - -		##+1~##+2 ##+3	Output		

Double click the 08AD icon. Then the AS08AD-C configuration interface appears as below for configuration of parameter mapping of AS08AD-C module.

Module Configuration :AS08AD-C				the second se	×
AS08AD-C AS08AD-C[77] Present value[9] format[17] CH1~CH8 Mode setting[8]	AS08AD-C[ 77 ] MDS Information				
CH1~CH8 Calibration[16] average filter[16] sampling time[1] Channel Detect and Alarm se		Module Name:	AS08AD-C		
		MDS Version:	1.00.00		
		MDS Build Date:	2017/08/01		
Exception handling : RTU Keep nu	ming	1		OK	Cancel

Explanation of I/O module configuration interface:

ltem	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	g[ 8 ]					
AS08AD-C[77]	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 -zomrx~zomrx	CH4 mode setting
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
4 <u>m</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).

AS08AD-C	CH1~CH8 Calibration[ 1	16]						
■ AS08AD-C[ 77 ] Present value[ 9 ]	Mapping to Device	Index	Description	Input	Output	Initial	Comment	
Present value[9] format[17]		10	CH1 Cal. Offset (V/1			100	CH1 Cal. Offset (V/mA)	
CH1-CH8 Mode setting[8] CH1-CH8 Calibration[16] average filter[16] sampling time[1]		11	CH2 Cal. Offset (V/t			0	CH2 Cal. Offset (V/mA)	
		12	CH3 Cal. Offset (V/1			0	CH3 Cal. Offset (V/mA)	
		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)	
		15	CH6 Cal. Offset (V/t			0	CH6 Cal. Offset (V/mA)	l
		16	CH7 Cal. Offset (V/r			0	CH7 Cal. Offset (V/mA)	l
		17	CH8 Cal. Offset (V/t			0	CH8 Cal. Offset (V/mA)	
		18	CH1 Cal. Gain			1000	CH1 Cal. Gain	l
		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	
* <u> </u>	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.

LS08AD-C	CH1~CH8 Calibration[1	16]				
<ul> <li>AS08AD-C[77]</li> <li>Present value[9]</li> <li>format[17]</li> <li>CH1~CH3 Mode setting[8]</li> <li>CH1~CH3 Calibration[16]</li> <li>average filter[16]</li> <li>sampling time[1]</li> </ul>	Mapping to Device	Index	Description In	put Output	Initial	Comment
		10	CH1 Cal. Offset (V/1 ##+	-22 ##+1	0	CH1 Cal. Offset (V/mA)
		11	CH2 Cal. Offset (V/1		0	CH2 Cal. Offset (V/mA)
	12		CH3 Cal. Offset (V/r		0	CH3 Cal. Offset (V/mA)
			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)
		15	CH6 Cal. Offset (V/1		0	CH6 Cal. Offset (V/mA)
		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 <u>III</u> +	4			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.

Module Configuration :AS08AD-C			0		×
AS08AD-C AS08AD-C[77] - Present value[9] - format[17] - CH1-CH8 Mode setting[8]	MDS Information				
- CH1-CH8 Calibration[16] - average filter[16] - sampling time[1] - Channel Detect and Alarm se		Module Name:	AS08AD-C		
		MDS Version:	1.00.00		
		MDS Build Date:	2017/08/01		
4 <u>10</u> >					
Exception handling : RTU Keep runn	ning 🔹			OK	Cancel

Nodule Configuration :AS08AD-C					×
A\$08AD-C A\$08AD-C[ 77 ] Present value[ 9 ] format[ 17 ]	AS08AD-C[ 77 ] MDS Information				
- CH1CH3 Mode setting[8] - CH1CH3 Calibration[16] - average filter[16] - sampling time[1] - Channel Detect and Alarm so		Module Name:	AS08AD-C		
		MDS Version:	1.00.00	-	
		MDS Build Date:	2017/08/01	_	
m     Fixception handling : RTU Keep nu		7		OK	Cancel

#### MDS information of AS08AD-C

#### Present value setting

AS08AD-C	Present value[9]					
AS08AD-CI 771	Mapping to Device	Index	Description	Input	Output	Ini
Present value[9]	*		Error code	D26030~D26031		
CH1~CH8 Mode setting[8]	*	-	CH1 Input	D26032 ~ D26033		
	*		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		
	*		CH6 Input	D26042 ~ D26043		
	*	-	CH7 Input	D26044~D26045		
	*	-	CH8 Input	D26046~D26047		
4 III			.UF			

### Format setting (Integer format and Float format for option)

AS08AD-C	format[17]							
⊡ AS08AD-C[ 77 ]	Mapping to D	Index	Description	Input	Output	Initial	Comment	4
Present value[9] format[17]		1	format			Integer form 🔻	format	
- CH1~CH8 Mode setting[ 8 ]		44	CH1 float Scale LSP		C	Integer format	CH1 float Scale LSP	
CH1~CH8 Calibration[ 16 ]		45	CH2 float Scale LSP			-10.000000	CH2 float Scale LSP	
— average filter[16] — sampling time[1]		46	CH3 float Scale LSP			-10.000000	CH3 float Scale LSP	
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	Ļ
		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	
* <u> </u>		52	OTTS 4			10.00000	CTTS A C TTCD	-

## CH1~CH8 Mode setting [8]

S08AD-C	CH1~CH8 Mode s	etting[8]					
- AS08AD-C[ 77 ]	Mapping to D	Index	Description	Input	Output	Initial	Comment
Present value[9] format[17]		2	CH1 mode setting			-20mA~20mA	CH1 mode setting
		3	CH2 mode setting			-20mA~20mA	CH2 mode setting
		4	CH3 mode setting			-20mA~20mA	CH3 mode setting
average filter[16] sampling time[1]		5	CH4 mode setting			-20mA~20mA	CH4 mode setting
Channel Detect and Alarm s		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
4 <u>IN</u> F							

AS08AD-C	CH1~CH8 Calibrati	on[16]				
	Mapping to D	Index	Description Input	Output	Initial	Comment
Present value[9]		10	CH1 Cal. Offset (V/m		0	CH1 Cal. Offset (V/mA)
CH1~CH8 Mode setting[8]		11	CH2 Cal. Offset (V/m		0	CH2 Cal. Offset (V/mA)
CH1~CH8 Calibration[ 16 ]		12	CH3 Cal. Offset (V/m		0	CH3 Cal. Offset (V/mA)
average mter[ 10 ] sampling time[ 1 ]		13	CH4 Cal. Offset (V/m		0	CH4 Cal. Offset (V/mA)
Channel Detect and Alarm se		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
		21	CH4 Cal. Gain		1000	CH4 Cal. Gain
		22	CH5 Cal. Gain		1000	CH5 Cal. Gain
4 <u>III</u> +		-	CTTA C-1 C-1-		1000	OTT C-1 C-1-

### CH1~CH8 Calibration [16]

### Average filter setting [16]

LS08AD-C	average filter[ 16 ]						
	Mapping to D	Index	Description Input	Output	Initial	Comment	1
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	
CH1-CH8 Calibration[16] average filter[16] - sampung ume[1] Channel Detect and Alarm se		28	CH3 average times		10	CH3 average times	
		29	CH4 average times		10	CH4 average times	
		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	CH8 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	OTTO EN. D		100/	OTTE Ett	

#### Sampling time

AS08AD-C	sampling time[1]						
	Mapping to D	Index	Description	Input	Output	Initial	Comment
Present value[9] format[17] CH1CH3 Mode setting[8] CH1CH8 Calibration[16] average filter[16] sampling tune[1] Channel Detect and Alarm set		42	Sampling time			2ms	Sampling time
4 III +							

### Channel Detect and Alarm settings

AS08AD-C	Channel Detect an	d Alarm s	ettings[1]				
<ul> <li>AS08AD-C[77]</li> <li>Present value[9]</li> <li>format[17]</li> <li>CH1-CH8 Mode setting[8]</li> <li>CH1-CH8 Calibration[16]</li> <li>average filter[16]</li> <li>sampling time[1]</li> <li>Channel Detect and Alann set</li> </ul>	Mapping to D	Index	Description	Input	Output	Initial	Comment
		43	CH1 overrage Detec			Disable	CH1 overrage Detect
		43	CH2 overrage Detec			Disable	CH2 overrage Detect
		43	CH3 overrage Detect			Disable	CH3 overrage Detect
		43	CH4 overrage Detec			Disable	CH4 overrage Detect
		43	CH5 overrage Detec			Disable	CH5 overrage Detect
		43	CH6 overrage Detec			Disable	CH6 overrage Detect
		43	CH7 overrage Detec			Disable	CH7 overrage Detect
		43	CHS 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
« III. »							

### 10.5.4.2.5. 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.

	÷ da	08 16 16 AN AM AN		Scan Upload Download
				Reset Clear config
I 0		Error code	Status	Stop Monitor
1	A		Running Running	Auto-Add
2	A		Running	Clear-Addr
3	A		Running	
4		0x1801	Running	
5		0x1801	Running	
6		0x1801	Running	
7	A	0x1801	Offline	
				OK

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.
04 12 20	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.

010	ENT(RTU)	Run Stop		Scan Upload Download
				Reset Clear config
	Name	Error code	Status	Stop Monitor
L	Name AS08AM10N	and the second second		Auto-Addr
0	AS08AM10N AS08AN01T	0x0 0x0	Running Running	Auto-Auto
2	AS16AM10N	0x0	Running	Clear-Addr
3	AS16AN01T	0x0	Running	
4	AS04RTD-A	0x0	Running	
5	AS04TC-A	0x0	Running	
6	AS04DA-A	0x1801	Running	
7	AS04AD-A	0x1674	Offline	
				OK
				t and
				Cancel
#### 10.5.4.3. 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).

Available No	des:		Scan List:			
	Node Name	0	Node Ad	Node Name		
03	AS01DNET(RTU)					
Output Table		<	Input Table			
Register	Device Image	*	Register	Device Image		
D26105 H			D26005 H			Ì
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			
*	TH	<u>•</u>	*	m		¢.
Unit ID: 1	Start Output	:D +	26105		OK	
	allocation Start Input:	D =	26005		Cancel	

10.5.4.3.1. The Rule for Assignment of Mapping Addresses by AS01DNET Master

Input are	a: Slave ⇒ Master		Output area	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.

#### 10.5.4.3.2. 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.

Node Ad Node Name Node Ad	scan List set vailable No	-			Scan List:		
Output Table       Input Table         Register       Device Image         D26105_H       Poll]01-AH10DNET Slave         D26105_L       Poll]01-AH10DNET Slave         D26106_L       Poll]01-AH10DNET Slave         D26106_L       Poll]01-AH10DNET Slave         D26106_L       Poll]01-AH10DNET Slave         D26106_L       Poll]01-AH10DNET Slave         D26107_H       Poll]01-AH10DNET Slave         D26006_L       Poll]01-AH10DNET Slave         D26007_L       Poll]01-AH10DNET Slave         D26007_L       Poll]01-AH10DNET Slave         D26007_L       Poll]01-AH10DNET Slave         D26007_L       Poll]01-AH10DNET Slave         D26008_L       Poll]03-AS01DNET (RTU)         D26008_L       Poll]03-AS01DNET (RTU)         D26009_H       D26009_L         D26010_L       D26010_L         D26010_L       D26010_L         D26010_L       D26010_L         D26010_L       D26010_L         D26011_H       H	Node Ad	Node Name			Node Ad	Node Name	
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_H     [Poll]01-AH10DNET Slave       D26107_L     [Poll]01-AH10DNET Slave     D26006_H     [Poll]01-AH10DNET Slave       D26107_L     [Poll]01-AH10DNET (RTU)     D26007_H     [Poll]01-AH10DNET (RTU)       D26108_H     [Poll]03-AS01DNET (RTU)     D26007_L     [Poll]03-AS01DNET (RTU)       D26108_L     [Poll]03-AS01DNET (RTU)     D26008_L     [Poll]03-AS01DNET (RTU)       D26109_H     D26010_L     D26009_L     D26009_L       D26110_H     D26010_L     D26010_L     D26010_L       D26111_H     +     +     +						and the second second second second second	
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_L     [Poll]01-AH10DNET Slave     D26005_L     [Poll]01-AH10DNET Slave       D26106_L     [Poll]01-AH10DNET Slave     D26006_L     [Poll]01-AH10DNET Slave       D26107_H     [Poll]01-AH10DNET Slave     D26006_L     [Poll]01-AH10DNET Slave       D26107_L     [Poll]03-AS01DNET (RTU)     D26007_L     [Poll]03-AS01DNET (RTU)       D26108_H     [Poll]03-AS01DNET (RTU)     D26008_L     [Poll]03-AS01DNET (RTU)       D26109_H     D26009_L     D26009_L     D26009_L       D26110_H     D26010_L     D26010_L     D26010_L       D26111_H     *     *     *	Output Table				Input Table		_
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_H         [Poll]01-AH10DNET Slave           D26107_H         [Poll]01-AH10DNET Slave         D26006_L         [Poll]01-AH10DNET Slave           D26107_H         [Poll]03-AS01DNET (RTU)         D26007_H         [Poll]03-AS01DNET (RTU)           D26108_H         [Poll]03-AS01DNET (RTU)         D26008_H         [Poll]03-AS01DNET (RTU)           D26109_H         D26109_L         D26009_H         D26009_L           D26110_H         D26010_L         D26010_L         D26010_L           D26111_H         *         *         *	Register	Device Image	*		Register	Device Image	-
D26106_H     [Poil]01-AH10DNET Slave     D26006_H     [Poil]01-AH10DNET Slave       D26106_L     [Poil]01-AH10DNET Slave     D26006_L     [Poil]01-AH10DNET Slave       D26107_H     [Poil]03-AS01DNET (RTU)     D26007_H     [Poil]03-AS01DNET (RTU)       D26108_H     [Poil]03-AS01DNET (RTU)     D26008_H     [Poil]03-AS01DNET (RTU)       D26109_H     D26109_H     D26009_H     D26009_H       D26110_H     D26010_L     D26010_H     D26010_H       D26110_H     D26010_L     D26010_L     D26010_H       D26111_H     *     *     *	D26105 H	[Poll]01-AH10DNET Slave			D26005_H	[Poll]01-AH10DNET Slave	Ľ
D26106_L       [Potl]01-AH10DNET Slave         D26107_H       [Potl]03-AS01DNET (RTU)         D26107_L       [Potl]03-AS01DNET (RTU)         D26108_H       [Potl]03-AS01DNET (RTU)         D26108_L       [Potl]03-AS01DNET (RTU)         D26108_L       [Potl]03-AS01DNET (RTU)         D26109_L       D26008_L         D26109_L       D26009_L         D26109_L       D26009_L         D26110_L       D26010_L         D26111_H       *	D26105_L	[Poll]01-AH10DNET Slave			D26005_L	[Poll]01-AH10DNET Slave	L
D26107_H     [Potl]03-AS01DNET (RTU)       D26107_L     [Potl]03-AS01DNET (RTU)       D26107_L     [Potl]03-AS01DNET (RTU)       D26108_H     [Potl]03-AS01DNET (RTU)       D26108_L     [Potl]03-AS01DNET (RTU)       D26109_H     D26008_L       D26109_L     D26009_L       D26110_L     D26010_L       D26111_H     TII	D26106_H	[Poll]01-AH10DNET Slave			D26006_H	[Poll]01-AH10DNET Slave	
D26107_L     [Poil]03-AS01DNET (RTU)       D26108_H     [Poil]03-AS01DNET (RTU)       D26108_L     [Poil]03-AS01DNET (RTU)       D26108_L     [Poil]03-AS01DNET (RTU)       D26109_H     D26009_L       D26110_H     D26010_L       D26111_H     TIT	D26106_L	[Poll]01-AH10DNET Slave			D26006_L	[Poll]01-AH10DNET Slave	
D26108 H     [Pott]03-AS01DNET (RTU)       D26108 L     [Pott]03-AS01DNET (RTU)       D26109 L     D26008 L       D26109 L     D26009 L       D26110 H     D26010 L       D26111 H     *	D26107_H	[Poll]03-AS01DNET (RTU)			D26007_H	[Poll]03-AS01DNET (RTU)	
D26108_L     [Potl]03-AS01DNET (RTU)       D26109_H       D26109_L       D26101_L       D26110_H       D26111_H       * ***********************************	D26107_L	[Poll]03-AS01DNET (RTU)			D26007_L	[Poll]03-AS01DNET (RTU)	
D26109 H     D26009 H       D26109 L     D26009 L       D26110 H     D26010 H       D26111 H     D26011 H       *     "" *	D26108_H	[Poll]03-AS01DNET (RTU)			D26008_H	[Poll]03-AS01DNET (RTU)	
D26109 L D26110 H D26110 L D26111 H * ''''''''''''''''''''''''''''''''''''	D26108_L	[Poll]03-AS01DNET (RTU)			D26008_L	[Poll]03-AS01DNET (RTU)	
D26110 H D26110 L D26111 H	D26109_H				D26009_H		
D26110 L D26111 H	D26109_L				D26009_L		
D26111 H T D26011 H	D26110_H				D26010_H		
· · · · · · · · · · · · · · · · · · ·	D26110_L				D26010_L		
	D26111 H		-		D26011 H		-
	*	4 (III	_		*	m	1
Unit ID: 1 🛟 Start Output : D + 26105 OK.	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 se Available No				Scan List:		
Node Ad	Node Name			Node Ad	Node Name	1
			N V	01 03	AH10DNET Slave AS01DNET (RTU)	
Output Tabl	e			Input Table		
Register	Device Image	*		Register	Device Image	*
D26105 H	[Poll]01-AH10DNET Slave			D26005 H	[Poll]01-AH10DNET Slave	
	[Poll]01-AH10DNET Slave			D26005 L		
D26106 H	and the second se			D26006 H	and the second of the second sec	
	[Poll101-AH10DNET Slave				Pollio1-AH10DNET Slave	
D26107_H	[Poll]03-AS01DNET (RTU)	1		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		τ		D26011 H		
*	III F	-		×	- m ) ()(	
Unit ID: 1	Start Output :	D	×	26105	OK.	

#### 10.5.4.3.3. 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 AS01DNET (RTU), the contents in **Input** and **Output** in the following figure represent mapping addresses 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.

		_		
AP DA AD	+			E Scan Upload Download
				Reset Clear config
				Start Monito
List				-
	I Description	Input	Output	Auto-Addr
I. Name - AS01DNET(RTU)	I Description 0. RTU DeviceNet			Auto-Addr Clear-Addr
I. Name - AS01DNET(RTU) 0 AS16AP11T	0. RTU DeviceNet	##+1	##+1	
I. Name - AS01DNET(RTU) 0 AS16AP11T 1 AS04DA-A	0. RTU DeviceNet	##+1 ##+2 ~ ##+3		
I. Name - AS01DNET(RTU) 0 AS16AP11T 1 AS04DA-A 2 AS04AD-A	0. RTU DeviceNet	##+1	##+1	
I. Name - AS01DNET(RTU) 0 AS16AP11T 1 AS04DA-A 2 AS04AD-A 3	0. RTU DeviceNet	##+1 ##+2 ~ ##+3	##+1	
I. Name - AS01DNET(RTU) 0 AS16AP11T 1 AS04DA-A 2 AS04AD-A 3 4	0. RTU DeviceNet	##+1 ##+2 ~ ##+3	##+1	
I. Name - AS01DNET(RTU) 0 AS16AP11T 1 AS04DA-A 2 AS04AD-A 3 4 5	0. RTU DeviceNet	##+1 ##+2 ~ ##+3	##+1	Clear-Addr
I. Name - AS01DNET(RTU) 0 AS16AP11T 1 AS04DA-A 2 AS04AD-A 3 4 5 6	0. RTU DeviceNet	##+1 ##+2 ~ ##+3	##+1	Clear-Addr OK
<ul> <li>AS01DNET(RTU)</li> <li>0 AS16AP11T</li> <li>1 AS04DA-A</li> </ul>	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.

Scan List set Available No	-		Scan List:		
Node Ad	Node Name		Node Ad	Node Name	
		2	02	AS01DNET (RTU)	
Output Table			Input Table		
Register			Register	Device Image	
D26105 H			D26005 H		
D26105_H D26105_L			D26005_H D26005 L		
D26105_L			D26005_L D26006 H		
D26106_11	[Poll]02-AS01DNET (RTU)		D26006 L	[Poll]02-AS01DNET (RTU)	
D26107 H			D26000_L D26007 H		
D26107_I			D26007_I		
	[Poll]02-AS01DNET (RTU)		D26008 H		
D26108 L			D26008 L		
D26109 H			D26009 H		
D26109 L			D26009 L	[Poll]02-AS01DNET (RTU)	
D26110 H			D26010 H		
D26110 L			D26010 L	[Poll]02-AS01DNET (RTU)	
D26111 H	[Poll]02-AS01DNET (RTU)	-	D26011 H	[Poll]02-AS01DNET (RTU)	-
*	4 III	_	*	m	2
Unit ID: 1	Start Output :		26105	OK	
	allocation Start Input:		26005	Cancel	1

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.

1	DENT(RTU)	04	+	_		-	Scan
1	AP DA	04 AD				III	Upload
		_	1				Download
							Reset
							Clear config
							Start Monitor
						-	
_		Fir	Description	Input	Output	-	Auto-Addr
_	Name		Description RTU DeviceNet	Input	Output	-	
I. -	Name	0.100	Description RTU DeviceNet		Output D26106	-	Auto-Addr
I. -	Name AS01DNET(	0.100 -			D26106	-	Auto-Addr
I. - 0	Name AS01DNET( AS16AP11T	0.100 - -		D26006	D26106	c	Auto-Addr
I. - 0 1	Name AS01DNET( AS16AP11T AS04DA-A	0.100 - -		D26006 D26007 ~ D26008	D26106	-	Auto-Addr
I. - 0 1 2 3 4	Name AS01DNET( AS16AP11T AS04DA-A	0.100 - -		D26006 D26007 ~ D26008	D26106	C	Auto-Addr
L - 0 1 2 3 4 5	Name AS01DNET( AS16AP11T AS04DA-A	0.100 - -		D26006 D26007 ~ D26008	D26106	,	Auto-Addr
- 0 1 2 3 4 5 6	Name AS01DNET( AS16AP11T AS04DA-A	0.100 - -		D26006 D26007 ~ D26008	D26106	- C	Auto-Addr
L - 0 1 2 3 4 5	Name AS01DNET( AS16AP11T AS04DA-A	0.100 - -		D26006 D26007 ~ D26008	D26106	,	Auto-Addr Clear-Addr

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	

10

The input and output mapping addresses of AS01DNET (RTU) are D26005~D26018 and D26105~D26114.

#### 10.5.4.3.4. 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.

Bit	Status value	Description
bitO	000	Make no control setting for the operation of AS01DNET(RTU)
~	001	Set AS01DNET(RTU) to RUN mode
bit2	010	Set AS01DNET(RTU) to STOP mode
	Other	Reserved
bit3	0	Reserved
DIG	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

#### • Control word of AS01DNET(RTU)

#### • Status word of AS01DNET(RTU)

Bit	Status value	Description
bit0	0	AS01DNET (RTU) in RUN state
Dito	1	AS01DNET (RTU) stops.
bit1	0/1	Reserved
bit2	0	No error occurs in I/O modules.
DILZ	1	An error occurs in I/O modules.
bit3	0/1	Reserved
bit4	0	Current connection matches the configuration.
DIL4	1	Current connection is inconsistent with the configuration.
bit5	0	AS01DNET (RTU) works normally.
Dito	1	The voltage of the power supply for AS01DNET (RTU) is too low.
bit6	0/1	Reserved
bit7	0	AS01DNET (RTU) works normally.
Dit7	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
bit13	0/1	Reserved
bit14	0/1	Reserved
bit15	0/1	Reserved

### 10.5.4.4. 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  $121\Omega$  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.

## 10.5.5 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.



#### 10.5.5.1. 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

3. Connect the 24V network power module between V+ and V- and a terminal resistor of 121 $\Omega$  between CAN\_H and CAN\_L.

#### 10.5.5.2. Using DeviceNet Builder to Configure the Network

#### 10.5.5.2.1. Building and Starting up Driver1 via COMMGR

Build driver1 in the COMMGR software. Refer to Section 2.4 Communication Setting in ISPSoft help file.

#### 10.5.5.2.2. Configuring AS01DNET (RTU)

1. Call DeviceNet Builder via ISPSoft.

Refer to section 10.6 for details on the operation.

2. The called DeviceNet Builder is started as below.

🔠 Delta DeviceNet Builder - ISPSoft		
File Edit View Network Tools Help		_
14/23380410+2		
Project List		
Am Project Device		
* Time Message Code Description		
m		*
Ready	System Channel	Driver8

3. Click menu Network>> Online.

🚡 Delta DeviceNet Builder - ISPSoft	
File Edit View Network Tools Help	
📓 💕 拱 🍓 🕍 Scanner setting	
📲 着 🖉 🖳 🐬 Online	
Project Lis Download	
Troject Device	
Time Message Code Description	
۲. m	
hange the current mode	System Channel Driver8

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	
1 4 7 3 3 5 2 4 1 0 🗧 🗧	
ASOIDNET-A , Master , Uniti	UnitID 1 , Node Address 1 .The start input: D26005 , Th
۲ الله الله الله الله الله الله الله الل	
Time Message Code Description	*
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 Help	p
🗎 🛩 🚍 🐄   X 🐃 🛍 📥 🥌 🎒	
4 4 🖉 🗣 🧛 🖗 🛃 🗐	
× Project List AS01DNET-A , Master , UnitI	AS01DNET-A, Master, UnitID 1, Node Address 1. The start in
	01 02
Browsing Node 15	
Time	OK .
.4   10	•
Ready	System Channel

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).

	ation				x	
Address: 2		Name:	AS01DNET (	(RTU)		
Node infomat	tion		Key Paramet	ters setti	ng	
Vendor ID: 799 Device Type: 12		99	Vendor		-	
		Device Type				
Product Cod	_	2320	Product	Code		
Major Rev:	1		Major R	ev		
Min Rev: 1		Min Rev	7			
Polled Sett	ting		COS/CC Set	tting		
Input Size:	4	Bytes	COS	⊙ CC		
Output Size:	4	Bytes	Input Size:	0	Bytes	
Sulput Size.	17	Dytes	Output Size:	0	Bytes	
Bit-Strobe	Setting		Heartbeat:	250	ms	
		-	Ack Timeout:	16	ms	
Input Size:	0	Bytes	Inhibit Time:	1	ms	
+						=
						Upload Download
						Upload
+						Download
						Cpioad Download Reset Clear confi
List						Cpioad Download Reset Clear confi
I. Name			escription In	put	Output	Clear confi
I. Name - AS01DNET			escription In IU DeviceNet	put		Cipioad Download Reset Ciear confit Start Monit
I. Name - AS01DNET 0				put		Download
I. Name - AS01DNET				put		Cipioad Download Reset Ciear confit Start Monit
I. Name - AS01DNET 0 1 2 3				put		Clear confi
I. Name - AS01DNET 0 1 2 3 4				put		Cipioad Download Reset Ciear confit Start Monit
- AS01DNET 0 1 2 3				put		Cipioad Download Reset Ciear confit Start Monit
I. Name - AS01DNET 0 1 2 3 4 5				put		Ciear confi Start Monit Clear-Add Clear-Add

7. Click the **Scan** button to scan the I/O modules connected to the right side of AS01DNET (RTU).

			23
+			Scan Upload Download
			Reset Clear config
List	Progress Scanning information	Cancel	Start Monitor
I. Name - AS01DNE	(RTU) - RTU Devi	iceNet	Clear-Addr
0 1 2 3			

8. 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.

S04DA-A	CH1~CH4 Output Mode :	setting[+]			_			
AS04DA-A[40]	Mapping to Device	Index	Description	Input	put Output	Initial	Comment	
Present value[5]		2	CH1 Output mode setting			-10V~+10V 🔻	CH1 Output mod	
CH1~CH4 Output Mode sett		3	CH2 Output mode setting			Disable -10V~+10V	CH2 Output mod	
- CH1~CH4 Calibration[ 8 ]		4	CH3 Output mode setting			07~107	CH3 Output mod	
- output Setting[ 8 ] Alarm settings[ 1 ]	-	5	CH4 Output mode setting			-5V~+5V 0V~+5V	CH4 Output mod	
						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).

	+ 16 04 04 AP DA AC	+			m N	Scan Upload
						Download
						Reset
						Clear config
						Start Monito
					-	
					-	
List	t				1	_
_	t Name	Firmw	Description	Input Output		Auto-Addr
_	Name			Input Output		
_		Firmw RTU		Input Output		
L -	Name ASO1DNET (1 -		Det ##+1			
L. - 0	Name AS01DNET (1 - AS16AP11T -		Det ##+1	##+1 ##+2 ~ ##+9		
L. - 0 1	Name ASO1DNET (I - AS16AP11T - AS04DA -		Det ##+1 ##+2 ~ ##+3	##+1 ##+2 ~ ##+9		
L - 0 1 2	Name ASO1DNET (I - AS16AP11T - AS04DA -		Det ##+1 ##+2 ~ ##+3	##+1 ##+2 ~ ##+9		
L. - 0 1 2 3	Name ASO1DNET (I - AS16AP11T - AS04DA -		Det ##+1 ##+2 ~ ##+3	##+1 ##+2 ~ ##+9		
L. - 0 1 2 3 4	Name ASO1DNET (I - AS16AP11T - AS04DA -		Det ##+1 ##+2 ~ ##+3	##+1 ##+2 ~ ##+9		Auto-Addr Clear-Addr
L - 0 1 2 3 4 5	Name ASO1DNET (I - AS16AP11T - AS04DA -		Det ##+1 ##+2 ~ ##+3	##+1 ##+2 ~ ##+9		Clear-Addr

#### AS Series Module Manual

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 Available No				Scan List:		
Node Ad	Node Name			Node Ad	Node Name	
			>	02	AS01DNET (RTU)	
			<			
Output Table			1	Input Table		
Register	Device Image	*		Register	Device Image	1
D26105 H	[Poll]02-AS01DNET (RTU)		10	D26005 H	[Poll]02-AS01DNET (RTU)	L
D26105 L				D26005 L	[Poll]02-AS01DNET (RTU)	
D26106 H	[Poll]02-AS01DNET (RTU)			D26006 H	[Poll]02-AS01DNET (RTU)	
D26106_L	[Poll]02-AS01DNET (RTU)			D26006_L	[Poll]02-AS01DNET (RTU)	
D26107_H	[Pot1]02-AS01DNET (RTU)			D26007_H	[Poll]02-AS01DNET (RTU)	
D26107_L	[Poll]02-AS01DNET (RTU)			D26007_L	[Poll]02-AS01DNET (RTU)	
D26108_H	[Potl]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	[Potl]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)	
D26111 H		*		D26011 H	[Poll]02-AS01DNET (RTU)	-
Unit ID: 1	Start Output :	D	+	26105	OK.	
_	allocation Start Input:	D	5	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.

I.,	Name	Firmware	Desc	Input	Output
-	AS01DNET(RTU)	0.100	RTU Dev		
0	AS16AP11T	-		D26006	D26106
1	AS04DA-A	÷		D26007~D26008	D26107~D26114
2	AS04AD-A	-		D26009 ~ D26018	
3					
4					
5					
6					
7					

	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	





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.

# 10.5.6 Error Diagnosis and Trouble Shooting

AS01DNET (RTU) provides four diagnosis methods such as LED indicator, seven-segment displayer, status word diagnosis and software diagnosis.

#### 10.5.6.1. 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.	<ol> <li>Check the power supply for AS01DNET (RTU) and the connection are normal.</li> <li>Make sure that the baud rates of AS01DNET (RTU) and the master match.</li> </ol>
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

LED status	Indication	How to deal with
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.	<ol> <li>Ensure that the IDs of all nodes are unique on the bus.</li> <li>Check if the network installation is normal.</li> <li>Check if the baud rate of AS01DNET (RTU) is the same as that of the bus.</li> <li>Check if the node ID of AS01DNET (RTU) is valid.</li> <li>Check if the network power supply is normal.</li> </ol>

#### • 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)	<ol> <li>AS01DNET (RTU) is waiting for the I/O data from DeviceNet master.</li> <li>No I/O data transmission between AS01DNET(RTU) and DeviceNet master</li> <li>The PLC connected to DeviceNet master is in STOP state.</li> </ol>	<ol> <li>Configure AS01DNET (RTU) in the DeviceNet software and download the configuration correctly.</li> <li>Switch the PLC to RUN state</li> </ol>
Green light ON	Normal transmission of I/O data between AS01DNET (RTU) and DeviceNet master	No correction needed
Red light blinking (ON:0.5s and OFF: 0.5s alternately)	No network power supply; Configuration error; Module alarms.	<ol> <li>Check if the network power supply is normal;</li> <li>Reset the internal parameters in AS01DNET (RTU);</li> <li>Check if there is an error or alarm in the I/O modules connected to the right side of AS01DNET (RTU).</li> </ol>
Red light ON	Hardware error	Return the product to factory for repair if the error still exists after re-power on.

# 10.5.6.2. 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.	<ol> <li>Ensure that the node ID of AS01DNET (RTU) is unique in the DeviceNet network within the range of 0~63.</li> <li>Repower it on after changing the node ID.</li> </ol>
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.

Code	Indication	How to deal with
F3	AS01DNET (RTU) enters the test mode.	Repower AS01DNET (RTU).
F4	AS01DNET (RTU) is the Bus-Off state.	<ol> <li>Check if the network communication cable is normal and the shielded cable is grounded.</li> <li>Ensure the baud rates of all network nodes are same.</li> <li>Check if the two ends of the network are both connected with a 120Ω terminal resistor.</li> <li>Repower the scanner module.</li> </ol>
F5	No network power supply for AS01DNET(RTU)	<ol> <li>Check if the network cable is normal.</li> <li>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).)</li> </ol>
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.
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	<ul> <li>If the code has emerged for a long time, please shoot troubles in the methods below.</li> <li>1. Ensure that there are at least two nodes working normally in the network.</li> <li>2. Check if the two ends of the network are both connected with a 121Ω terminal resistor.</li> <li>3. Ensure that the baud rates of all network nodes are same.</li> <li>4. Check if the network cable has a problem such as being disconnected and loosened.</li> <li>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.</li> <li>6. Check if the shielded wire of the network communication cable is grounded.</li> <li>7. Turn on the power of AS01DNET (RTU) again.</li> </ul>
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.

Code	Indication	How to deal with
80	AS01DNET (RTU) is in STOP state.	<ol> <li>Check if the RUN/STOP switch of the PLC connected to the DeviceNet master is turned to RUN.</li> <li>Check if the value of control word of AS01DNET (RTU) is 1. For details, refer to section 10.5.4.3.4.</li> </ol>
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).

#### 10.5.6.3. 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
DIIU	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.	<ol> <li>Check if currently connected module is consistent with the configuration in the software.</li> <li>Change current module to match the configuration in the software or change the configuration in the software to match currently connected module.</li> </ol>
	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		

#### AS Series Module Manual

Bit	Status value	Description	Disposal
bit7	0	AS01DNET(RTU) in normal operation	No correction needed
	Reserved		
bit8	Reserved		
bit9	Reserved		
bit10	Reserved		
bit11	Reserved		
bit12	Reserved		
bit13	Reserved		
bit14	Reserved		
bit15	Reserved		

**10.5.6.4.** Software Diagnosis Click the Start Monitor button on the AS01DNET (RTU) interface. The Error code column will show relevant contents as follows.

	DENT(RTU)			-	×
	+ 40 40 10			-	Scan
	<sup>2+</sup> 08 08 16 Am An Am	16 04 04 AN RTD TC		E	Upload
					Download
					Reset
				1	Clear config
				1	Stop Monitor
I	Name	Error code	Status	1	
I 0	Name AS08AM10N	Error code 0x0	Status Running	1	Auto-Addr
			COLUMN COLUMN		
0	AS08AM10N	0x0	Running		Auto-Addr Clear-Addr
0 1	AS08AM10N AS08AN01T	0x0 0x0	Running Running		
0 1 2	AS08AM10N AS08AN01T AS16AM10N	0x0 0x0 0x0	Running Running Running		
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	AS08AM10N AS08AN01T AS16AM10N AS16AN01T AS04RTD-A	0x0 0x0 0x0 0x0 0x0 0x0	Running Running Running Running Running		

Error No.	Explanation	Solution
0x8001	AS01DNET (RTU) can not detect the configured module.	<ol> <li>Check if the module is disconnected.</li> <li>Check if the module is damaged.</li> </ol>
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.

# 10.6 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.

📦 Delta ISPSoft		
File Edit View Compile PLC	Tools Wizard Window Help ♥ ♥ ♥ ♥ ♥ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ♥ ♥ ♥ ♥ ₩ ■ ↑	193491
Create a New Proj	ect	<b>X</b> )
Project Name Controller Type Drive/Path	Untitled1 AS300  PLC Type AS332T DVP AH AH MOTION AS300 TP Browser	
Properties	VFD OK Cancel	
Insert		Driver8, [USB: COM:

Note: The PLC type used in this section is AS332T-A.

- 📦 Untitled1 - Delta ISPSoft File Edit View Compile PLC Tools Wizard Window Help 🖹 🚔 🖪 🎒 🔲 😂 🤌 i 🔿 🖨 🔄 🖳 🖳 🦊 🍠 🙆 💷 🔍 🖳 0 19 OOX DO FINS Delta Library, Preview  $\mathbf{p} \times$ 🖃 🤷 Project [C:\ProgramD Delta Library \* 🔞 Device Comment 8 🖀 HWCONFIG 🗄 😭 Delta Library CARD Utility AS332T (Unti Tasks AS332T (Untitle DUT Global Symbols 1 Programs Function Blocks Delta Library User Defi k Preview \* \* iii Preview Project 0/131040 Steps DriverS, [USB: COM! Insert -
- 2. Click the **OK** button. Then the main interface of the ISPSoft software appears as below.

3. Set up COMMGR communication. For details on setup, refer to section 8.1.2 Overview of Communication Setting in COMMGR.





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	192.168.1.1		~
	OK	Close	T.

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						
OT THE TON	Option Help					- 8 >
AS Series     Digital I/C     Analog I/     Network N	Download Download PO Scan PO List PO List PO List	Ctrl+F8 Ctrl+N de Ctrl+F4	÷	+		
Specification						
			0	Y		
CPU Group			i.	×		
Extension No	Туре		DDF Versi	Input Device R	Output Device	Comment
	CPU Module		DDF Versi 01.04.00	V Input Device R X0.0 ~ X0.15	Output Device Y0.0 ~ Y0.15	Comment

8. 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.

ransfer Items	×
Download All Items	OK
F Hardware Configuration Settings	Cancel
COM 1	
IF COM 2	
F Ethemat-Basic	
🔽 Ethemst-Advance	
Function Card	
🔽 Data Exchange - COM 1	
🔽 Data Exchange - COM 2	
🔽 Data Exchange - Ethernet	

9. Then the following two dialog boxes of **HWCONFIG** and **PC=>AS** appear. Click **Yes** to perform the PC=>AS status.

VCONFIG	Case of Case o	
Write-in forbidden when PLC is run The action will affect the PLC conne		o continue?
ne selen nin snoet nie i ze come	and you want t	s continue:
	Yes	NO
		-
=> AS 61 %		

10. When the download is finished, the progress bar is shown as below.



# <u>10</u>

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.



B Delta DeviceNet Builder - ISPSoft File Edit View Network Tools Help	
📓 💕 🔚 🦏 🕍 Scanner setting 📀	
a a 🖉 🖳 💋 Online	
Project Lis 🗊 Download	
Theroject Device	
Time Message Code Description	
۲ III	

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 Help	
	0
ASIDNET-A , Master , Unit	DNET-A, Master, UnitID 1, Node Address 1. The start input: D26005, Th
< III +	
The Project 1 Device	-
* Time Message Code Desc	tion
4 [ m	
Ready	System Channel Driver8

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 Bu	ilder - ISPSoft	
File Edit View Ne	twork Tools Help	
	• • • • • • • • • • • • • • • • • • •	
7	9 👌 4 🐮 🗏 🗧 🗧	
	×	
🖃 🧰 Project List		ster , UnitID 1 , Node Address 1 . The start input: D26005 , Th $_{\rm E}$
AS01DNET	Scan DeviceNet Network	
	Download	
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	Properties	
*   m		
ThProject	Device	-
× Time	Message Code Description	
	m	,
Ready		System Channel Driver8

18. The following progress bar appears then.



📸 Delta DeviceNet Builder - ISPSoft	
File Edit View Network Tools Help	
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4 4 🖉 🛛 🤤 👌 坐 🕯 🔲 ∻ 💋	
AS01DI	NET-A , Master , UnitID 1 , Node Address 1 .The start input: D26005 , The
	01 02
	AS01DNET AS01DNET Scanner Slave
< الله الله الله الله الله الله الله الل	
* Time Message Code Descripti	on
< m	
Ready	System Channel Driver8

19. The master and slave which have been scanned both show up in the network.

MEMO