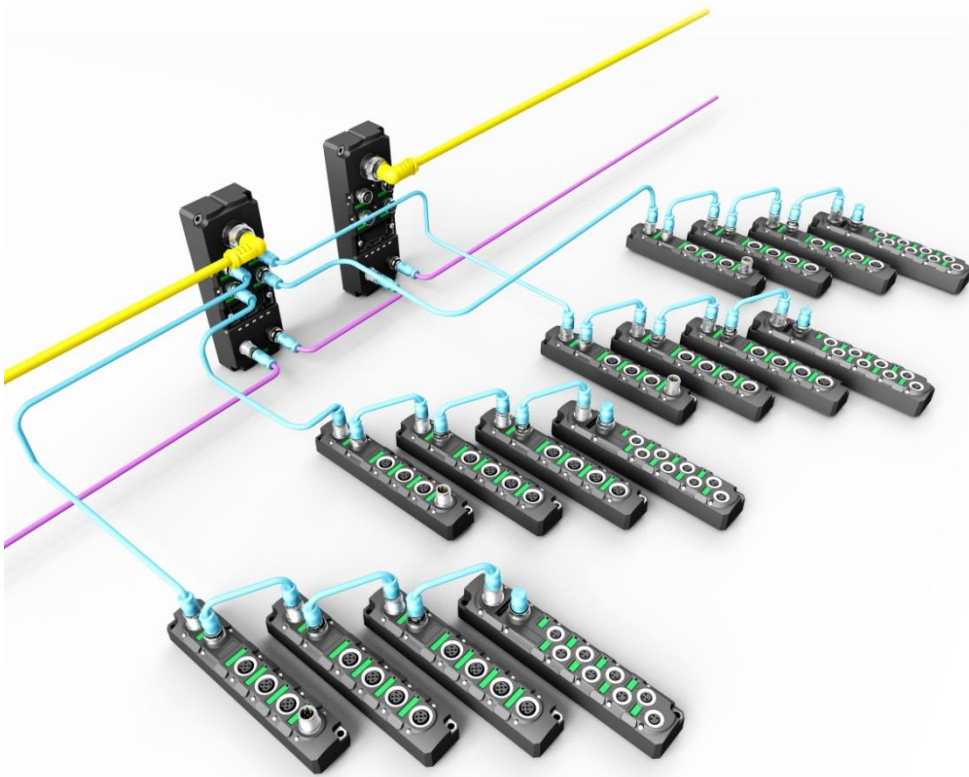# Spider67 I/O Module

----CC-Link system Manual

Preface

1. Scope of this manual:

This manual applies to the ELCO CC-Link Spider67 distributed I/O device.
The information in this manual enables you to run the Spider67 module on
CC-Link in a distributed I/O device.

2. Basic knowledge requirements

This manual presumes a general knowledge in the field of automation
engineering and describes the components based on the data valid at the time of
its release.
ELCO reserves the right of including a product information for each new
component, and for each component of a later version.

3. Guide

This manual describes the hardware of the CC-Link Spider67 distributed I/O
device.
Covered topics are:
● Installation and wiring
● Commissioning and diagnostics
● Components
● Article numbers
● Technical specifications

4. Technical support:

This manual describes the characteristics and the usage of a Spider67 distributed
I/O device.
Please contact your local ELCO representative or dial 400-608-4005 if you have
any questions about the products described in this manual.
Additional information about ELCO products is available:
http://www.elco-holding.com/

5. Disclaimer of liability:

We have reviewed the contents of this publication to ensure consistency with the
hardware and software described. Since variance cannot be precluded entirely,
we cannot guarantee full consistency. However, the information in this
publication is reviewed regularly and any necessary corrections are included in
subsequent editions.

CONTENTS

1. Product overview

1.1 Introduction

Spider67 from ELCO supports modern installation methods with a new and revolutionary expandable I/O system. The simple and easy to install Fieldbus system Spider67 is especially suitable for applications in rough environments.

1.2 Applications

Recently, the wide-range usage of industrial fieldbus I/O products brought deep impact to the automation industry. The traditional centralized control method was replaced by intelligent distribution devices. Besides that, more devices were transferred from cabinets directly to the site. Therefore the reason lies in saving costs, reducing the operation time and shorten the maintenance period. It also optimizes the system procedure.

ELCO Spider67 exactly complies this tendency and represents a revolutionary new generation of I/O solutions. Spider67 is an expandable industrial fieldbus I/O product with protection class IP67. It supports standard industrial bus protocol gateways (such as Profibus-DP, Profinet, EtherCAT, CC-Link) and diversified extended I/O configuration modules and can easily be connected to PLC systems. Compared to the traditional IP67 I/O products, Spider67 expanded modules include digital modules, analog modules and high-speed counting modules etc. Regarding its functions, Spider67 can meet most of the requirements, e.g. processing concentrated / dispersed switch signals etc. At the same time, this product series offers flexible cable connection and can directly be mounted on a cage lifter or rotational device.

1.3 Features

- IP67 protection class leading to convenient mounting
- Compact design minimizes mounting space requirement
- Standard connection, fast, safe and reliable
- Various input and output signals
- Flexible I/O configuration with a combination of analog, digital, and function modules
- LED status indication, fast function diagnosis
- Can be combined with Compact 67 system at random

1.4 Type

No.	Type	Description
1	SPCL-GW-001	CC-Link substation interface module 1-male 7/8"power supply 2 M12 A-Code fieldbus interface (male+female) 4 female, M12 B-Code extended interface
2	SPDB-0800D-001 SPDB-0800D-003	8 PNP/NPN switches or dry contact 4-female, M12 A-Code interface
3	SPDB-0800D-011 SPDB-0800D-013	8 PNP/NPN switches or dry contact 8-female, M8 interface, 3-pin
4	SPDB-0404D-001 SPDB-0404D-003	4 PNP/NPN switches or dry contact 4DI4DO, 0.5A each channel 4-female, M12 A-Code interface
5	SPDB-0404D-011 SPDB-0404D-013	4 PNP/NPN switches or dry contact 4DI4DO, 0.5A each channel 8-female, M8 interface, 3-pin
6	SPDB-08UP-001	8DI+DO, configurable 4-female, M12 A-Code interface
7	SPDB-08UP-011	8DI+DO, configurable 8-female, M8 interface, 3-pin
8	SPDB-0008D-001	8DO, 0.5A each channel 4-female, M12 A-Code interface
9	SPDB-0008D-011	8DO, 0.5A each channel 8-female, M8 interface, 3-pin
10	SPDB-0006D-001	8DO, 2A each channel 1-male, M12 A-Code interface 3-female,M12 A-Code interface
11	SPDB-0300A-001	3AI 0~20mA, 4~20mA, ±20mA optional 3-female, M12 A-Code interface
12	SPDB-0300A-002	3AI 0~10V, ±10V optional 3-female, M12 A-Code interface

13	SPDB-0003A-001	3AO 0~20mA, 4~20mA, ±20mA optional 3-female, M12 A-Code interface
14	SPDB-0003A-002	3AO 0~10V, ±10V optional 3-female, M12 A-Code interface
15	SPDB-0400A-005	4AI RTD PT100，PT200，PT500，PT1000，Ni100，Ni1000，150/300/600/3000Ω 4-female, M12 A-Code interface
16	SPDB-0400A-006	4AI Thermocouple B，E，J，K，N，R，S，T 4-female, M12 A-Code interface
17	BB6S30P01Dxxx BB6S30P01Mxxx	Pre-wired extensible cable PVC, 5-core shielded, outer diameter 6.5mm Customized length, D=cm，M=dm
18	BB6S30P03Dxxx BB6S30P03Mxxx	Pre-wired extensible cable（drag chain） PUR, 5-core shielded, outer diameter 6.5mm Customized length, D=cm，M=dm
19	BB6S30P09Dxxx BB6S30P09Mxxx	Pre-wired extensible cable（long distance communication） PVC, 5-core shielded, outer diameter 8mm Customized length, D=cm，M=dm
20	BB6S06	Extension terminal resistance Connecting to the last I/O module

2. Technical characteristics

2.1 Gateway

Power interface:
24VDC, 2 independent power supply
Power supply for system and extensible module

Expansion interface
4×M12，4 for each interface

Setting/Display
Set address and rate
Display operating status and fault message

Communication interface
Standard interface based on different protocols

Spider67 gateway is a remote device station, and each gateway occupies 4 sub-station addresses and 128 bits (16 bytes) for both Remote Input (RX) and Remote Output (RX); Remote Register (RWr) 16 words (32bytes); Remote Register (RWw) 16 words (32bytes). Each Spider67 gateway can support up to 112 digital input/output / 9 analog input / 3 analog output.

Each Spider67 gateway has up to 4 strings. Each string can connect up to 4 I/O modules; 4 expansion interfaces can connected up to 14 I/O modules, in which up to 3 analog input modules, 1 analog output module; extensible distance up to 100m. Modules are allocated to 1-14 in light of extension interface（P0-P1-P2-P3）and the distance to the gateway, and are configured by programming software Step7 (see 4.4). If modules are less than 4, the number will be brought forward automatically. For example, P0 connects 3 modules, the number of 1st module of P1 interface is 4.

2.2 I/O module

This picture is a schematic of a Spider67 I/O module

Extension interface
In/out, serial
1 cable for communication and power supply

I/O interface:
4×M12
8×M8

I/O modules of Spider67 are serial connected, and are connected to In of 1st module by extension cable, then Out of 1st module to In of 2nd, up to 4 modules. Spider67 I/O modules are designed by the same housing dimensions, including digital, analog, input and output, only 2 different interfaces, 4-M12 and 8-M8. M12 A-Code, 2 digital or 1 analog are available. M8, 3-pin, 1 digital is available.

2.3 Extension cable

Spider67 extension cable is used between gateways and I/O modules. The overall cable length from the extension interface to the last module is less than 100m . P01 series cable is the standard extension cable. P09 series long distance communication cable is recommended if the extension distance is over 10m or high load current, P03 series flexible communication cable is especially used for bending lifespan like drag chain (see 1.4)

Terminal resistance is recommended to eliminate reflection and echo, which are used to prevent discontinuous extensible cable resistance or interference caused by long distance communication. As Spider67 is installed terminal resistance, users need to connect a resistance to Out of the last module of each extension interface.

2.4 Hardware

2.4.1 Technical data of gateway

Type	SPCL-GW-001
Extensible channel	4 (P0~P3)
Extensible module/channel	4
Extension distance	Max. 100m
CC-Link input	A-Code M12（Male）
CC-Link output	A-Code M12（Female）
Extension channel	B-Code M12（Female,）
Power input	7/8"（Male,）
U_{MOD}	24VDC (18~30V)
U_{SP}	24VDC (18~30V)
Operation current	<200mA
Max. output current	6A/channel，total for gateway 8A
Operation temperature	-25℃…70℃
Storage temperature	-40℃…85℃
Shock resistance grade	Comply with IEC60068-2-6
EMC	EN 61000-6-2
Protection class	IP67
Operating life	100,000 hours

2.4.2 Digital IO Module

Type	SPDB-0800D-001 SPDB-0800D-011 SPDB-0800D-003 SPDB-0800D-013	SPDB-0404D-001 SPDB-0404D-011 SPDB-0404D-003 SPDB-0404D-013	SPDB-08UP-001 SPDB-08UP-011	SPDB-0008D-001 SPDB-0008D-011	SPDB-0006D-001
Input points	8	4	Max 8	0	0
Output points	0	4	Max 8	8	6
Extension input	B-Code M12（Male）				
Extension output	B-Code M12（Female）				
Input and output Signal	A-Code M12（Female）				
Maximum output current	Each channel 0.5A，module 4A				Each channel 2A, Module 8A
Input response frequency	30Hz				
Output voltage	U_{SP} -0.7V				
Signal type	PNP/NPN				
Input point Supply current	Holding current 200mA，Action current 400mA				
Normal input voltage	24VDC (10~30V)				
Operation temperature	-25℃…70℃				
Storage temperature	-40℃…85℃				
Anti-vibration Class	IEC60068-2-6				
Anti-interference EMC	EN 61000-6-2				
Protection class	IP67				
Operating life	100,000 hours				

2.4.3 Analog IO Module

Model	SPDB-0300A-001	SPDB-0300A-002	SPDB-0003A-001	SPDB-0003A-002
Input points	3	3	0	0
Output points	0	0	3	3
Extension input	B-Code M12（Male）			
Extension output	B-Code M12（Female）			
Input and output Signal	A-Code M12（Female）			
Input range	0~20mA 4~20mA -20~20mA	0~5V 0~10V -5~5V -10~10V	Null	Null
Output range	Null	Null	0~20mA 4~20mA	0~5V 0~10V -5~5V -10~10V
Internal impedance	<125Ω	<100kΩ	>450Ω	>1kΩ
Resolution	14Bit			
Measurement accuracy	±0.3%			
Input point Supply current	Max. 200mA			
Operation temperature	-25℃…70℃			
Storage temperature	-40℃…85℃			
Anti-vibration Class	IEC60068-2-6			
EMC	EN 61000-6-2			
Protection class	IP67			
Operating life	100,000 hours			

2.4.4 RTD and TC Module

Model	SPDB-0400A-005	SPDB-0400A-006
Input points	4	
Output points	0	
Extension input	B-Code M12（Male）	
Extension output	B-Code M12（Female）	
Input and output Signal	A-Code M12（Female）	
Input range	PT100,PT200,PT500,PT1000 Ni100,Ni1000 0~150/300/600/3000Ω	Type B，E，J，K，N，R，S，T
Output range	Null Null	
Internal impedance	250Ω	1MΩ
Resolution	14Bit	
Measurement accuracy	±0.2%	
Input point Supply current	Max. 200mA	
Operation temperature	-25℃…70℃	
Storage temperature	-40℃…85℃	
Anti-vibration Class	IEC60068-2-6	
EMC	EN 61000-6-2	
Protection class	IP67	
Operating life	100,000 hours	

2.5 LED display

Gateway display

Extension communication indication

Extension power supply indication

Gateway status indication

CC-Link SD indication

Umod indication

CC-Link RD indication

Usp indication

I/O module display

Address assignment output indication

Address assignment input indication

Module status indication

Extension communication indication

Signal/status indication
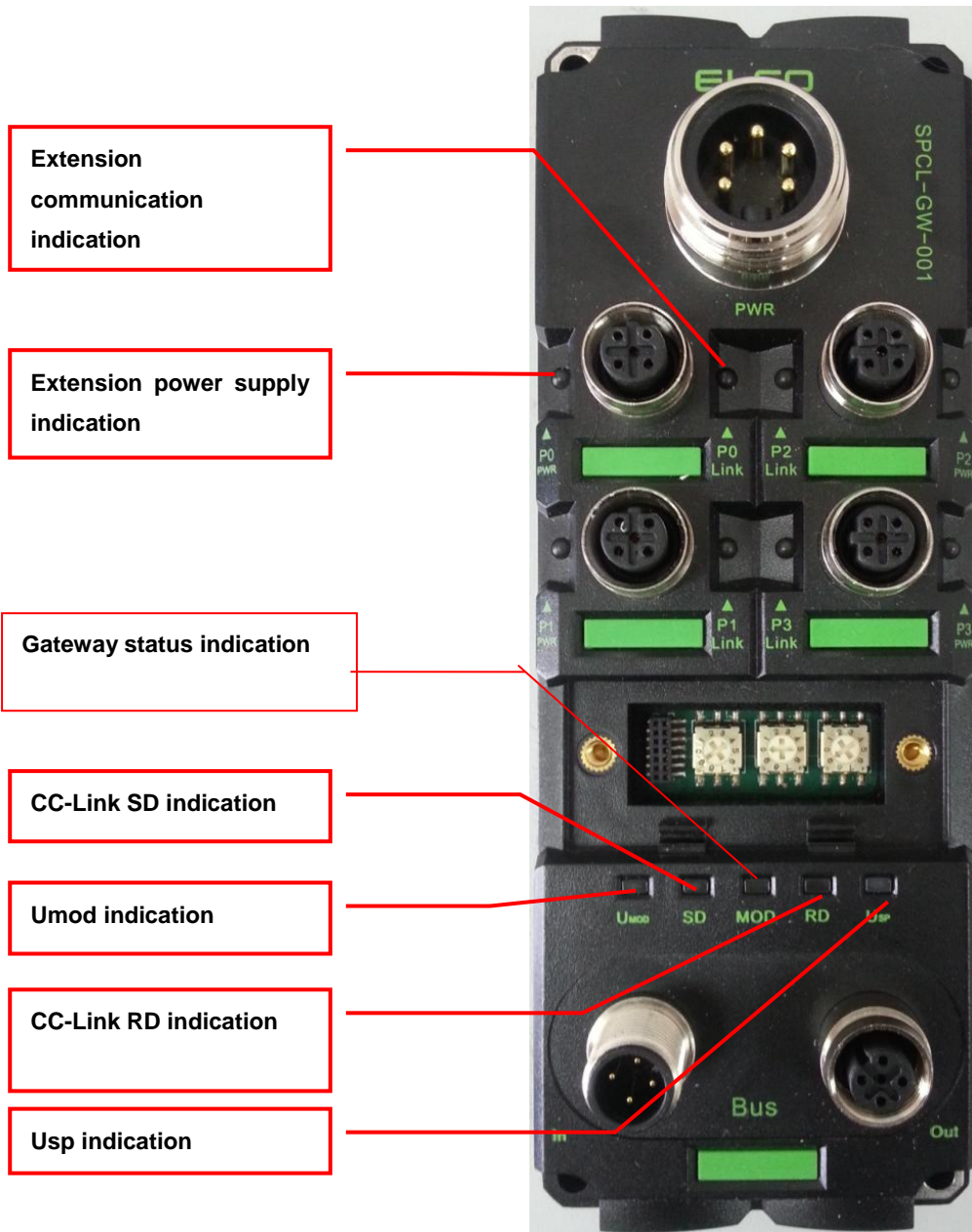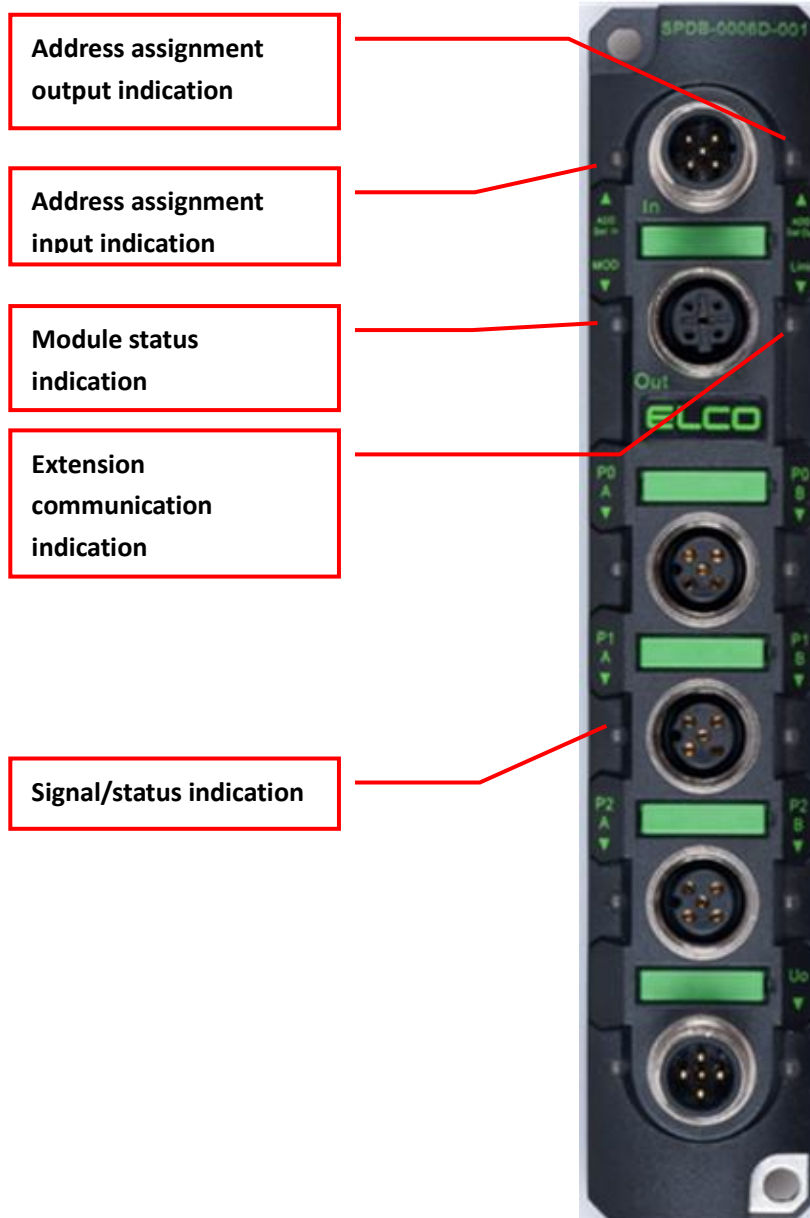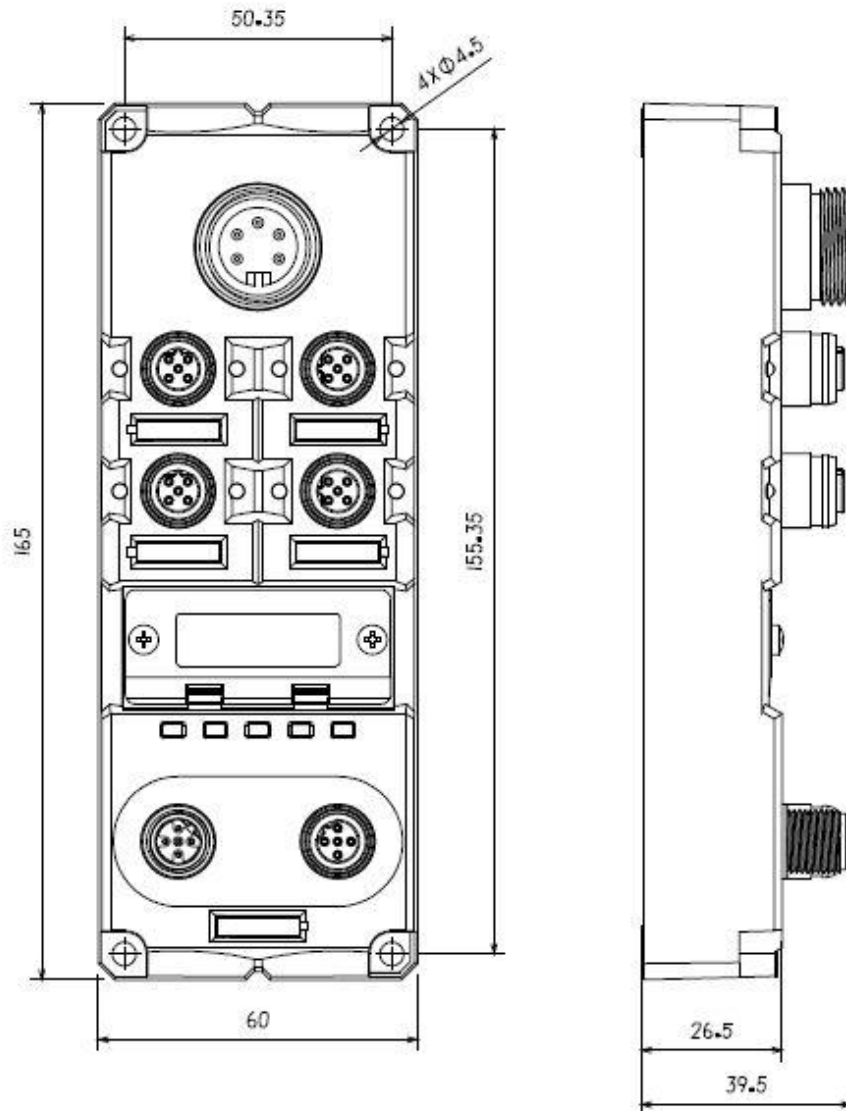
3. Installing

3.1 Mounting dimensions

3.1.1 Gateway dimensions

3.1.2 Module dimensions
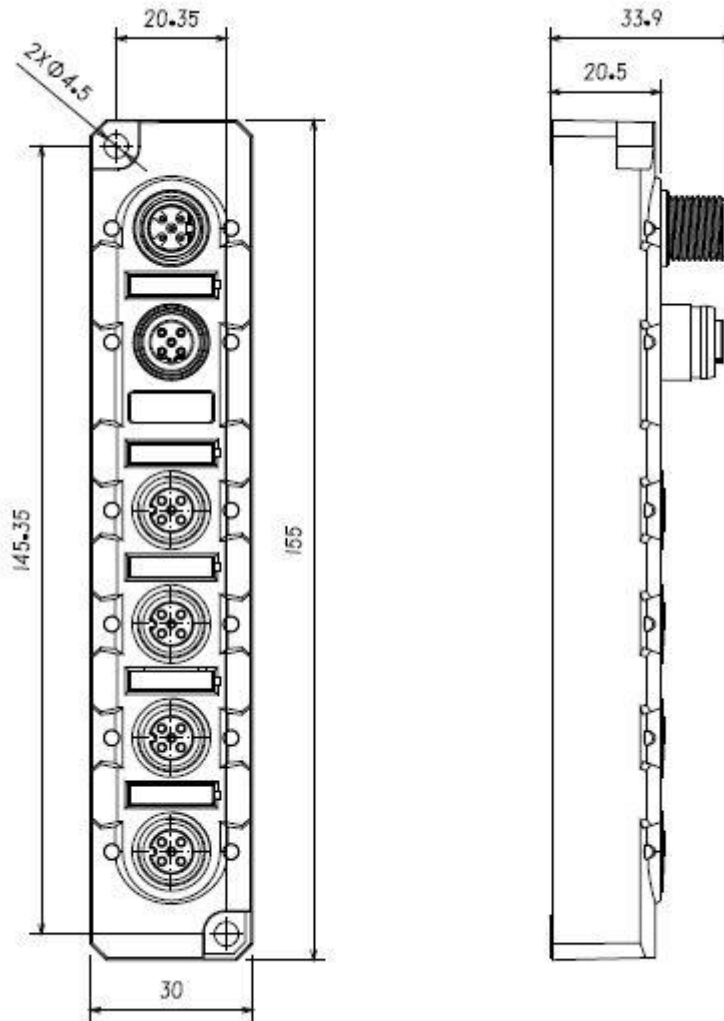
3.2 Mounting position, mounting dimensions

Spider67 can be mounted in any position.

The following table shows the mounting dimensions of Spider67 gateway and I/O module.

	Gateway	I/O module
Mounting width	60mm	30mm
Mounting height	165mm	155mm
Mounting depth	39mm (without connector)	33.5mm (without connector)

3.3 Setting CC-Link Spider67 address

CC-Link address assigns Spider67 distributed I/O device address in CC-Link network. CC-Link address can be set by opening plastic cover of dial switches:

1) Address is set by rotary encoder, power-off operation
2) Exclusive slave address in the same CC-Link network
3) Switch address and module address in configuration is consistent.
4) Address set : 1-64
5) The module can only accept changed CC-Link address when power on.

3 rotary switches on the module: transfer rate, switch ×10,switch ×1, indicating current value by arrow.

For example, CC-Link is set Baud rate 10M, station no. 9:
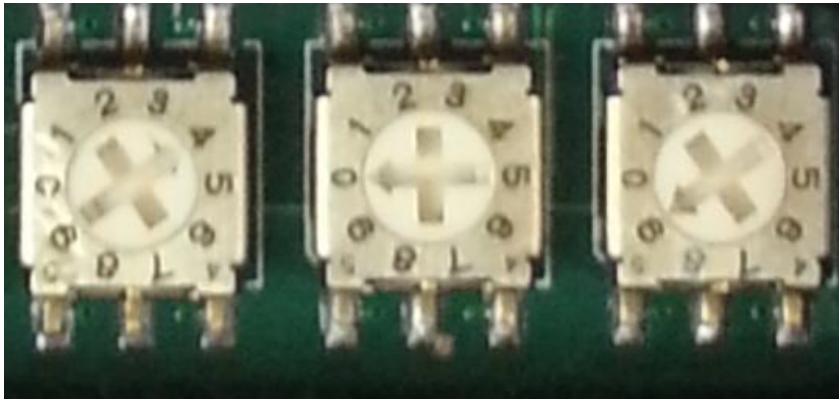
Baud rate settings:

0：156Kbps   1：625Kbps

2：2.5Mbps   3：5Mbps

4：10Mbps   5~9：error

Station No. settings：

1~64：   Correct

0 or 65 above：Error

3.4 Wiring Spider67

Please make sure to cut off power supply when wiring to ensure safety.

3.4.1 Connecting Spider67 to protective earth (PE)

● Always connect the Spider67 to protective earth.

● The module also requires this connection to protective earth in order to discharge any interference currents to ground, and for EMC compatibility.

● Always make sure you have a low-impedance connection to protective earth.

3.4.2 Spider67 power supply

Proposal: Spider67 series gateway uses 24VDC power supply, I/O module power supply by extensible cable, voltage range 18~30VDC, standard 7/8" connector. Two parts for power supply: gateway module power supply U_{MOD}(1L+, 1M), signal module power supply (2L+, 2M). Electrical isolation between 1L+ and 2L+, internally connected between common point 1M and 2M.

1）Power in　(Male)
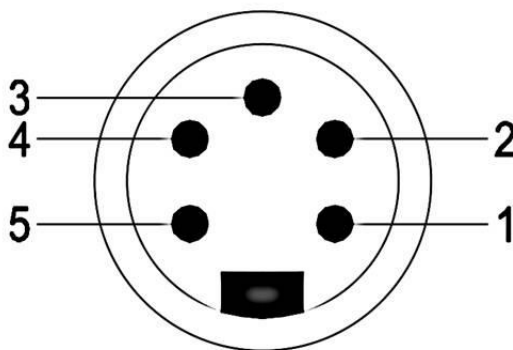
2）Power definition
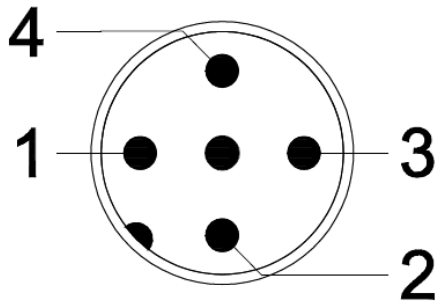
Terminal	Function	Power supply
1	Signal module power supply 2M	0V
2	Gateway module power supply 1M	0V
3	PE	
4	Gateway module power supply 1L+	24V
5	Signal module power supply 2L+	24V

The six-point output module of Spider67, SPDB-0006D-001 supports auxiliary power supply to the load. The single output point can up to 2A, and the whole module can up to 8A. This power supply interface also uses standard 24VDC power supply and M12 A-Code standard interface.

1）Auxiliary power supply（Male）

2）Power definition

Terminal	Function	Power supply
1	Auxiliary power supply L+	24V
2	Auxiliary power supply L+	24V
3	Auxiliary power supply M	0V
4	Auxiliary power supply M	0V

Note: In order to improve the power supply capability of the interface, it is recommended that all four pins should be connected with power supply.
In fact, pin1&2 should be connected together and pin 3&4 should be connected together.

3.4.3 Spider67 BUS connection

Spider67 gateway, supporting CC-Link protocol, transmits signals by a shielded cable, A-Code M12 connector.

1）BUS-In (Female)
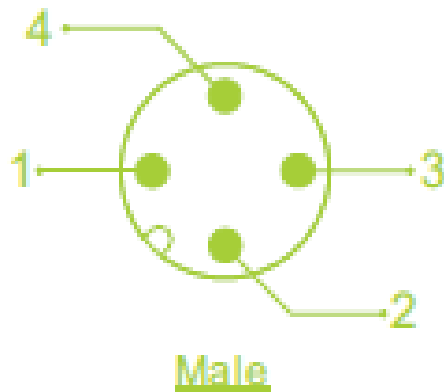
2）BUS-Out (Female)
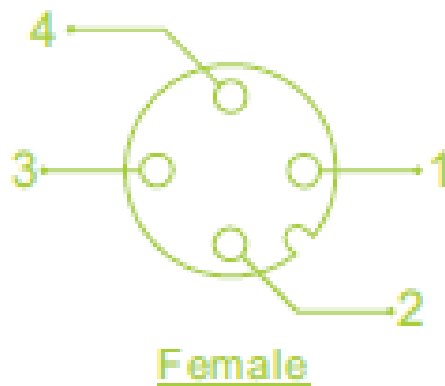
3）Bus definition

Terminal	Function	Cable color
1	SLD	Shielded cable
2	DB	White
3	DG	Yellow
4	DA	Blue

3.4.4 Spider67 digital signal connection

Spider67 digital I/O modules are connected by standard 5-pin M12 or 3-pin M8 connector, max. 2 signals (input or output) can be connected to M12 interface, 1 signal (input or output) can be connected to M8 interface.

1）Signal receiving (Female)
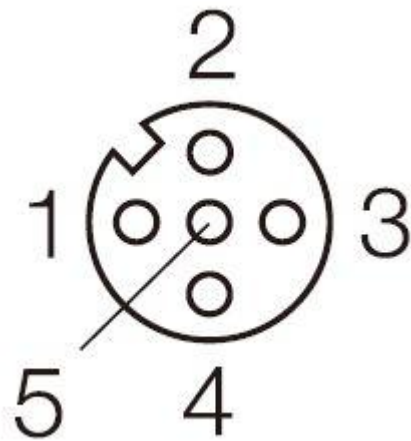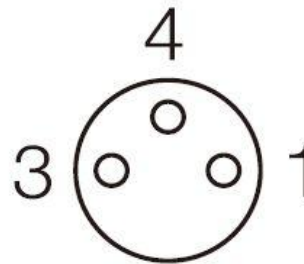
M12 connector   **M8 connector**

2）Digital signal interface definition

Terminal	M12 connector		M8 connector
1	Power supply 24V+		Power supply 24V+
2	Signal in/out B	2nd signal	None
3	Power supply GND		Power supply GND
4	Signal in/out A	1st signal	Signal in/out
5	PE		None

3） Wiring example

    a) Double input signal – 1 connector connects 2 DI, SPDB-0800D-001, SPDB-0404D-001, and SPDB-08UP-001 support this connection.
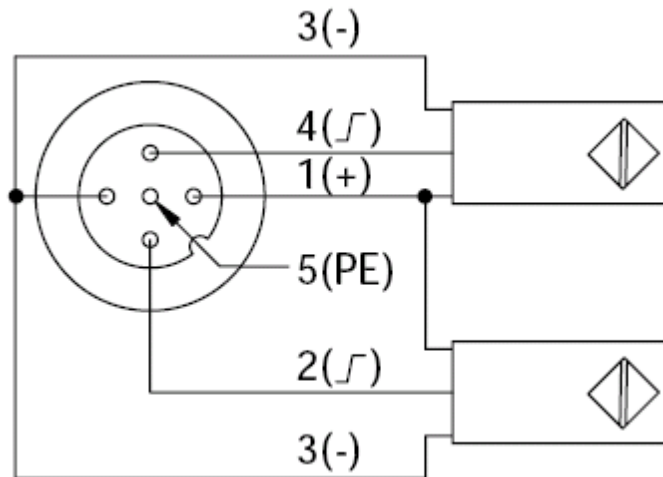
    b) Double output signal – 1 connector connects 2 DO, SPDB-0008D-001, SPDB-0404D-001, SPDB-08UP-001, SPDB-0006D-001 support this connection.
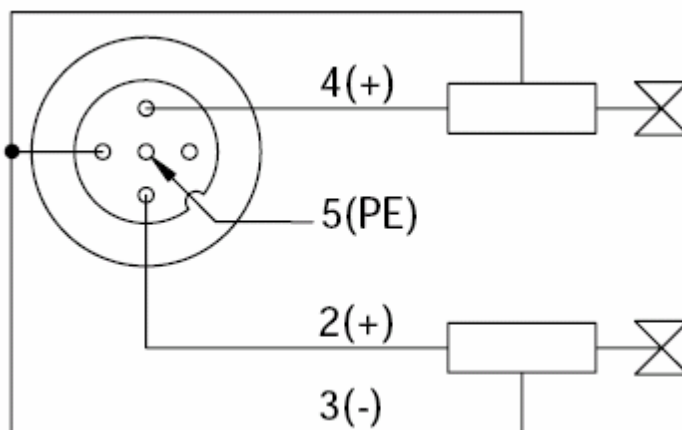
c) Input and output signal – 1 connector connects 1 DI and 1 DO,
   SPDB-08UP-001 supports this connection
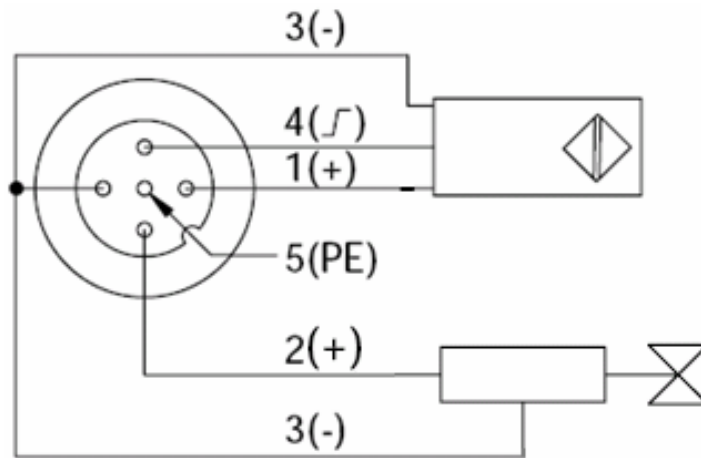
d) Single input signal – 1 connector connects 1 DI, SPDB-0800D-011,
   SPDB-0404D-011, SPDB-08UP-011 support this connection.
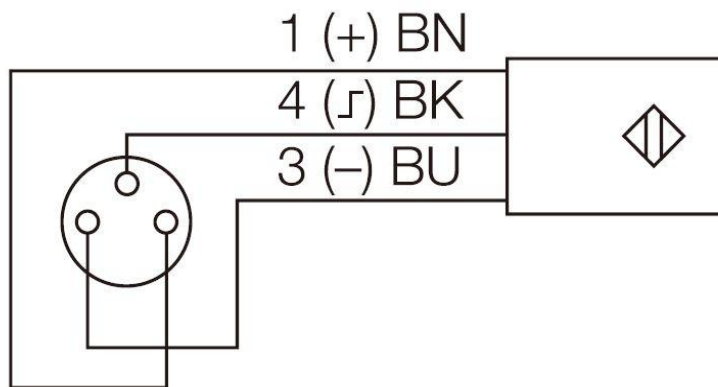
e) Single output signal – 1 connector connects 1 DO, SPDB-0404D-011,
   SPDB-0008D-011, SPDB-08UP-011 support this connection.
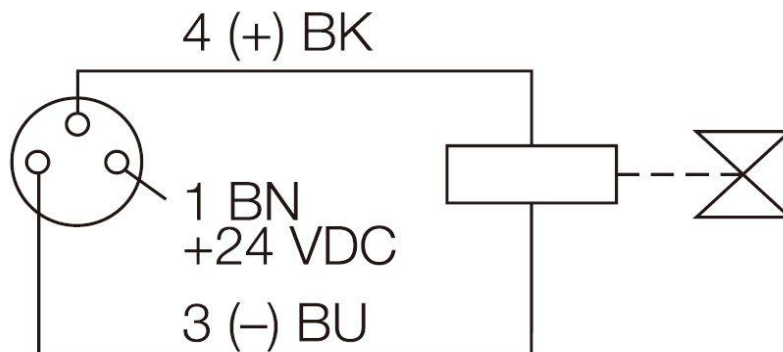
3.4.5 Spider67 analog signal

Spider67 analog I/O modules are connected by standard 5-pin M12, 1 signal (input or output) can be connected to interface.

1）Signal receiving (Female)
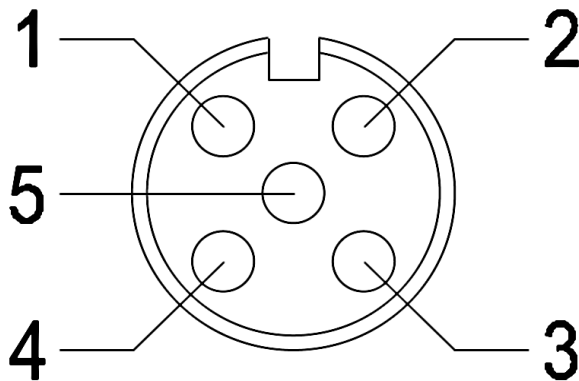
2）Analog signal interface definition

Terminal	Function	Function
1	Power supply 24V+	
2	Signal in/out +	AI/AO +
3	Power supply GND	
4	Signal in/out -	AI/AO -
5	PE	

RTD and TC signal interface definition

Terminal	Function	Function
1	Power supply I+	
2	Signal in M+	RTD/TC +
3	Power supply I-	
4	Signal in M-	RTD/TC -
5	PE	

3）Wiring example

a) 2-wire input - 1 connector connects 1 2-wire input, SPDB-0300A-001 supports this connection.
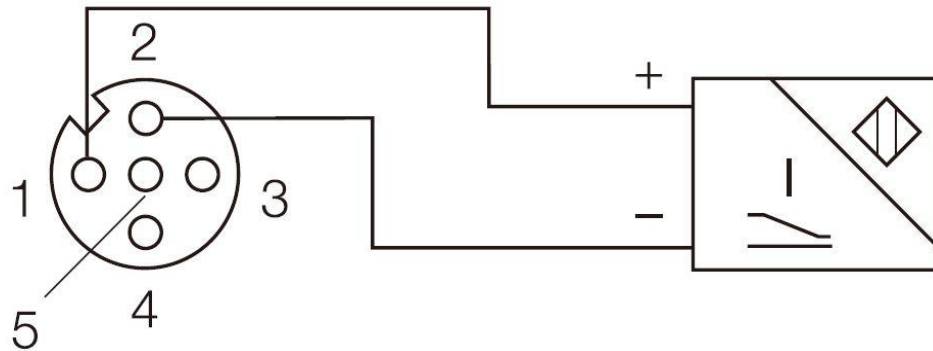
b) 4-wire input - 1 connector connects 1 4-wire input, SPDB-0300A-001 supports this connection.
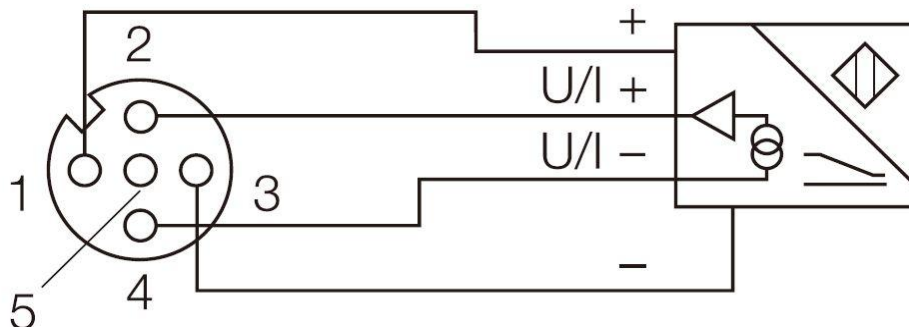
c) Voltage input- 1 connector connects 1 voltage input, SPDB-0300A-002 supports this connection.
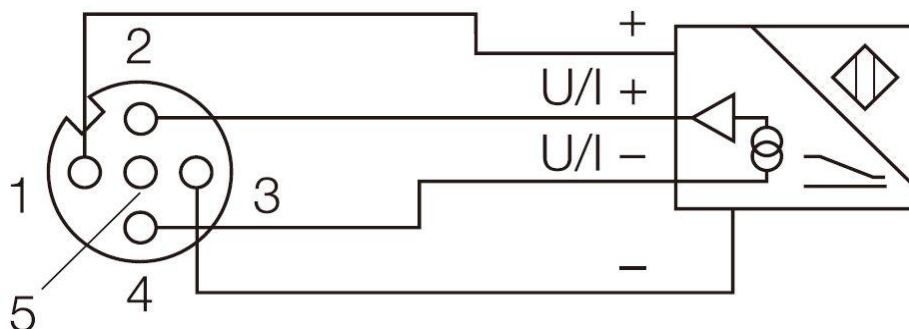
d) Current output- 1 connector connects 1 current output, SPDB-0003A-001 supports this connection.
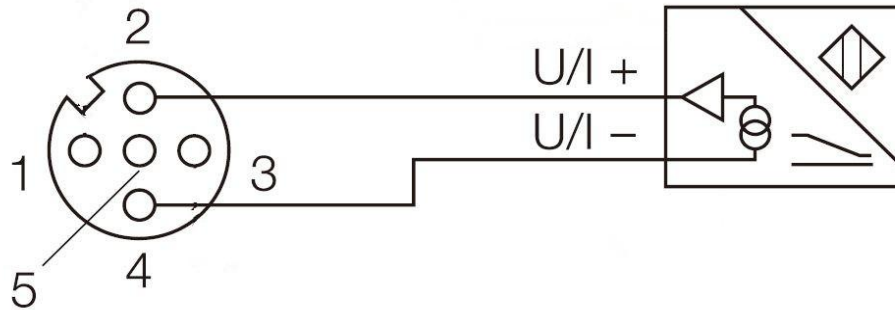
e) Voltage output- 1 connector connects 1 voltage output, SPDB-0003A-002 supports this connection.
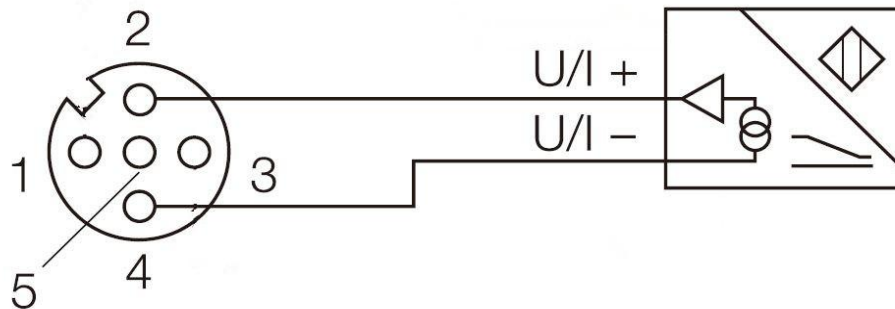
f) Two-wire thermal resistance signal — 1 connector connects 1 two-wire thermal resistance input signal, the model SPDB-0400A-005 of the signal module supports this form of connection.
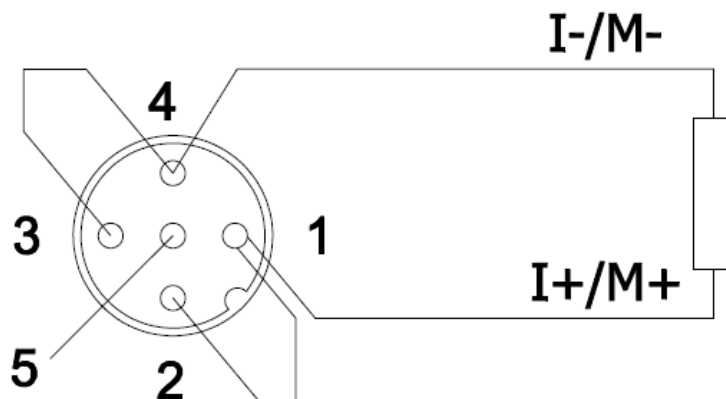
g) Three-wire thermal resistance signal — 1 connector connects 1 three-wire thermal resistance input signal, the model SPDB-0400A-005 of the signal module supports this form of connection.
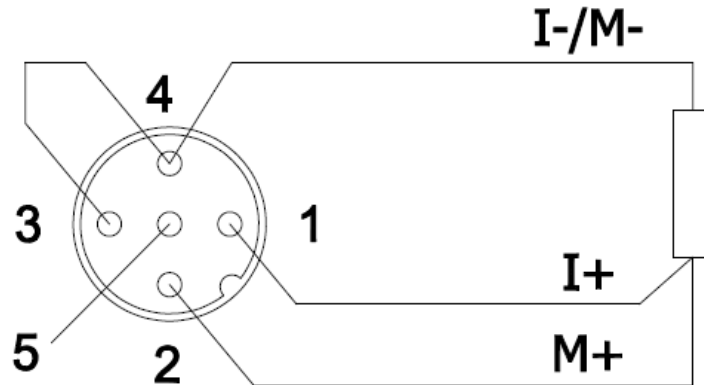
h) Four-wire thermal resistance signal — 1 connector connects 1 four-wire thermal resistance input signal，the model SPDB-0400A-005 of the signal module supports this form of connection.
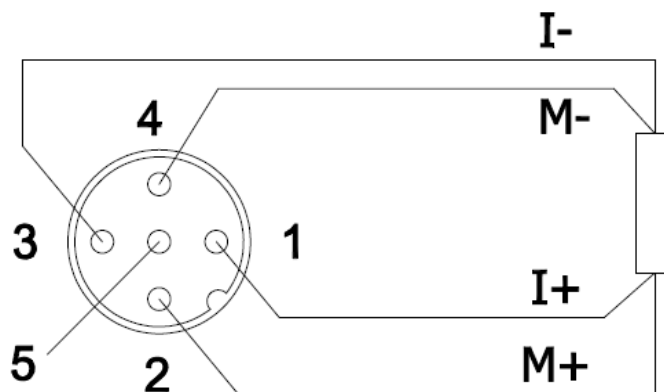
i) Thermocouple signal —1 connector connects 1 thermocouple input signal, the model SPDB-0400A-006 of the signal module supports this form of connection.
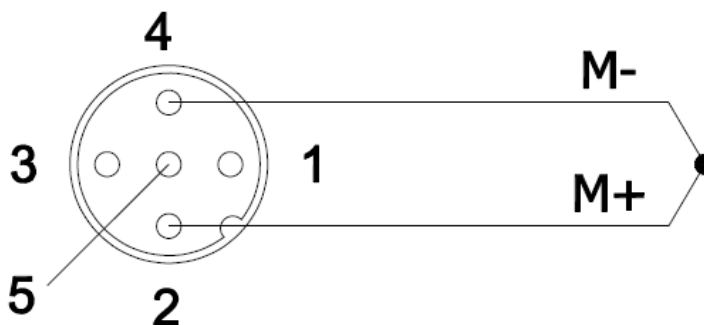
4. Configuration Commissioning

4.1 Installation of configuration files

PLC programming software is programmed by GX Works2. Import configuration files, then create project file and set network configuration.
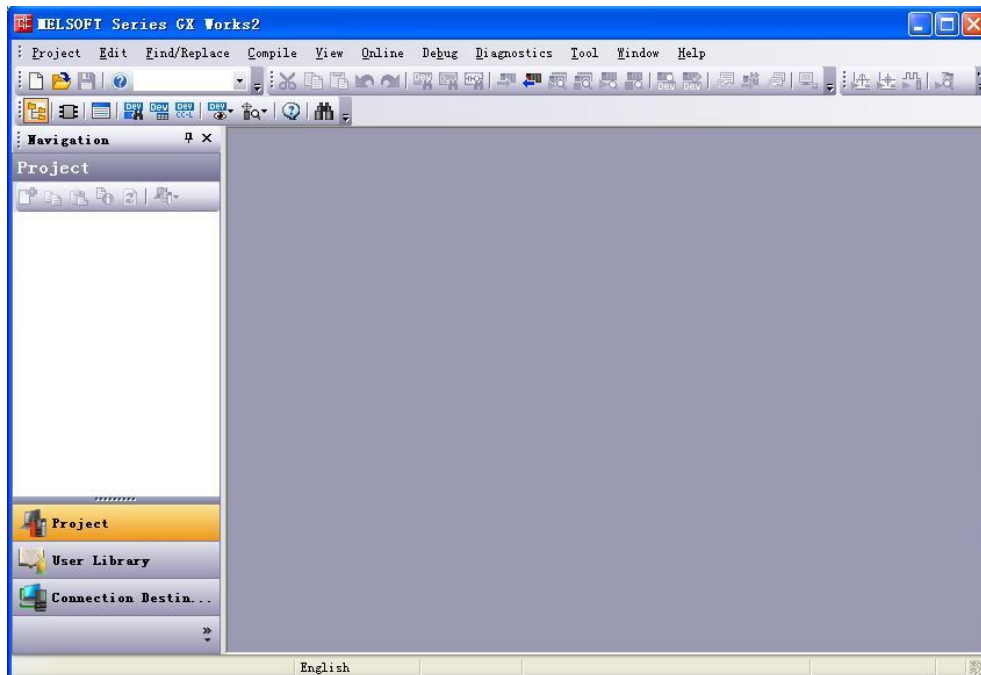
Open 'Tool' - click 'Register Profile'.
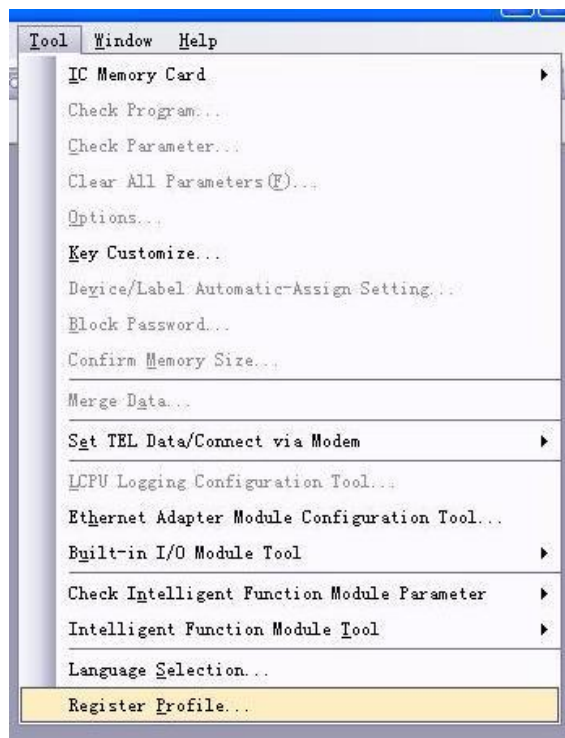
Find gateway configuration file
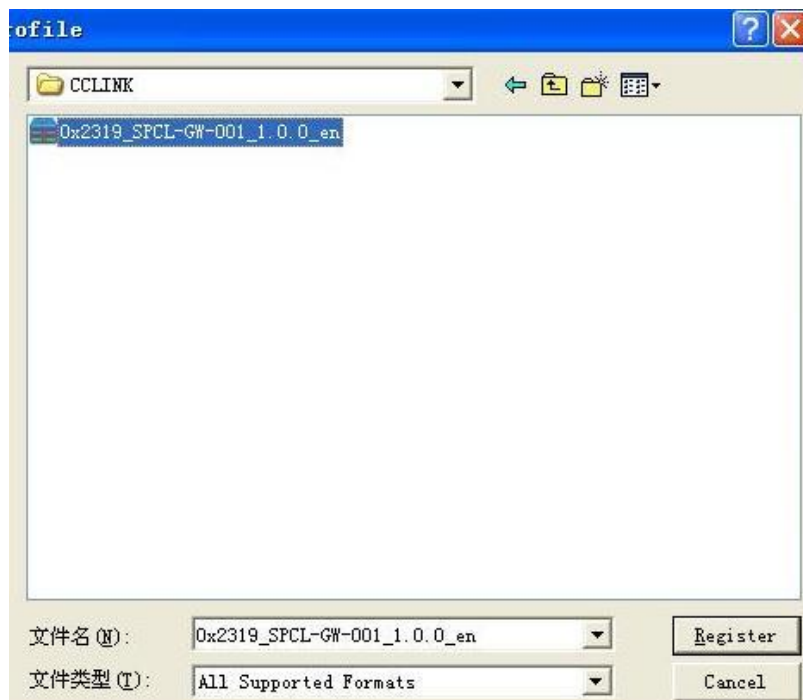
Select 0x2319_SPCL-GW-001_1.0.0_en.zip, click 'Register'.

When above message pops up, it's completed.

4.2 Signal address assignment

Each signal module with M12 interface has 4 connectors (P0~P3) for signal communication; each connector has 5 pins (Pin1~Pin5). Each signal module with M8 interface has 8 connectors (P0~P7) for signal communication; each connector has 3 pins (Pin1, Pin3, Pin4). The following table indicates the matchup between signal status and bytes transmitted by CC-Link.

1）8-bit analog input modules SPDB-0800D-001, SPDB-0800D-011

Byte	Bit	M12 SPDB-0800D-001	M8 SPDB-0800D-011	e. g.
Input Byte 0	Bit 0	P0.Pin4	P0.Pin4	X100
	Bit 1	P0.Pin2	P1.Pin4	X101
	Bit 2	P1.Pin4	P2.Pin4	X102
	Bit 3	P1.Pin2	P3.Pin4	X103
	Bit 4	P2.Pin4	P4.Pin4	X104
	Bit 5	P2.Pin2	P5.Pin4	X105
	Bit 6	P3.Pin4	P6.Pin4	X106
	Bit 7	P3.Pin2	P7.Pin4	X107

2）4-bit input; 4-bit output digital modules: SPDB-0404D-001, SPDB-0404D-011
The module occupies 8 bits for input and 8 bits for output. Each signal only has 4 bits, so input signal occupies X100~X103, and X104~X107 is useless; output signal occupies Y104~Y107, and Y100~Y103 is useless.

Byte	Bit	M12 SPDB-0404D-001	M8 SPDB-0404D-011	e.g.
Input Byte 0	Bit 0	P0.Pin4	P0.Pin4	X100
	Bit 1	P0.Pin2	P1.Pin4	X101
	Bit 2	P1.Pin4	P2.Pin4	X102
	Bit 3	P1.Pin2	P3.Pin4	X103
Output Byte 0	Bit 4	P2.Pin4	P4.Pin4	Y104
	Bit 5	P2.Pin2	P5.Pin4	Y105
	Bit 6	P3.Pin4	P6.Pin4	Y106
	Bit 7	P3.Pin2	P7.Pin4	Y107

3）8-bit digital input/output configurable modules: SPDB-08UP-001, SPDB-08UP-011

The module occupies 8 bits for input and 8 bits for output; X-address and Y-address are configurable according to actual application, and the rest addresses are useless. E.g. two signals of first interface are used as input, then X100 and X101 are occupied; Y100 and Y101 are useless.

Byte	Bit	M12 SPDB-08UP-001	M8 SPDB-08UP-011	e.g.
Input/Output Byte 0	Bit 0	P0.Pin4	P0.Pin4	X100 Y100
	Bit 1	P0.Pin2	P1.Pin4	X101 Y101
	Bit 2	P1.Pin4	P2.Pin4	X102 Y102
	Bit 3	P1.Pin2	P3.Pin4	X103 Y103
	Bit 4	P2.Pin4	P4.Pin4	X104 Y104
	Bit 5	P2.Pin2	P5.Pin4	X105 Y105
	Bit 6	P3.Pin4	P6.Pin4	X106 Y106
	Bit 7	P3.Pin2	P7.Pin4	X107 Y107

4）8-bit digital output modules: SPDB-0008D-001, SPDB-0008D-011

The module occupies 8 bits for output.

Byte	Bit	M12 SPDB-0008D-001	M8 SPDB-0008D-011	e.g.
Output Byte 0	Bit 0	P0.Pin4	P0.Pin4	Y100
	Bit 1	P0.Pin2	P1.Pin4	Y101
	Bit 2	P1.Pin4	P2.Pin4	Y102
	Bit 3	P1.Pin2	P3.Pin4	Y103
	Bit 4	P2.Pin4	P4.Pin4	Y104
	Bit 5	P2.Pin2	P5.Pin4	Y105
	Bit 6	P3.Pin4	P6.Pin4	Y106
	Bit 7	P3.Pin2	P7.Pin4	Y107

5）6-bit digital output modules: SPDB-0006D-001

The module occupies 8 bits for output.

Byte	Bit	M12 SPDB-0006D-001	e.g.
Output Byte 0	Bit 0	P0.Pin4	Y100
	Bit 1	P0.Pin2	Y101
	Bit 2	P1.Pin4	Y102
	Bit 3	P1.Pin2	Y103
	Bit 4	P2.Pin4	Y104
	Bit 5	P2.Pin2	Y105
	Bit 6	P3.Pin4	----
	Bit 7	P3.Pin2	-----

6）3-channel analog input modules: SPDB-0300A-001, SPDB-0300A-002

The module occupies 6 bytes for input.

Byte	Byte	Connector	e.g.
Input Byte 0~5	Byte 0 Byte 1	P0	RWr0
	Byte 2 Byte 3	P1	RWr1
	Byte 4 Byte 5	P2	RWr2

7）3-channel analog output modules: SPDB-0003A-001, SPDB-0003A-002

The module occupies 6 bytes for output.

Byte	Byte	Connector	e.g.
Output Byte 0~5	Byte 0 Byte 1	P0	RWw0
	Byte 2 Byte 3	P1	RWw1
	Byte 4 Byte 5	P2	RWw2

4.3 Instruction of Analog Value

PLC controller processes analog values in a binary system; the analog input module transfers analog process signals into digital signals; the analog output module transfers the digital output value into an analog signal.

Digital analog values are suitable to the same rated input and output value; each analog signal occupies 1 word PLC address, i. e. each analog signal corresponds to 16 bit. The symbol of analog is set on bit15: 0 represents '+'; 1 represents '1'. For the analog module with resolution less than 16 bits, the analog value is saved in the format of left justifying; the idle least significant bit is padded with '0'.

Example: analog value18035 can be expressed in binary system as follows:

Resolution	Analog Value															
Bit No.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
16bit	0	1	0	0	0	1	1	0	0	1	1	1	0	0	1	1
14bit	0	1	0	0	0	1	1	0	0	1	1	1	0	0	0	0

Two types of analog signals: unipolar and bipolar. Current bipolar value ±20mA; voltage bipolar value ±5V and ±10V; current unipolar value 0~20mA and 4~20mA; voltage unipolar value 0~5V and 0~10V.

Note: Analog output only supports rated analog value; overshoot range only represents input module.

- Analog value within bipolar current input/output range:

System Value			Input/Output Range	
	Decimalism	hexadecimal	±20 mA	
118.5149%	32767	7FFF	≥ 23.7 mA	Overflow, lock the maximum
	27649	6C01		Overshoot range
100%	27648	6C00	20 mA	Rated range
75%	20736	5100	15 mA	
0.003617%	1	1	723.4 nA	
0%	0	0	0 mA	
	-1	FFFF	-723.4 nA	
-75%	-20736	AF00	-15 mA	
-100%	-27648	9400	-20 mA	
	-27649	93FF		Overshoot range
-118.519%	-32768	8000	≤ -23.7 mA	Underflow, lock the least value

- Analog value within bipolar voltage input/output range:

System Value			Input/Output Range		
	Decimalism	hexadecimal	± 5V	± 10V	
118.5149%	32767	7FFF	≥ 5.926 V	≥ 11.85 V	Overflow, lock the maximum
	27649	6C01			Overshoot range
100%	27648	6C00	5 V	10 V	Rated range
75%	20736	5100	3.75 V	7.5 V	
0.003617%	1	1	180.8 μV	361.7 μV	
0%	0	0	0 V	0 V	
	-1	FFFF	-180.8 μV	-361.7 μV	
-75%	-20736	AF00	-3.75 V	-7.5 V	
-100%	-27648	9400	-5 V	-10 V	
	-27649	93FF			Overshoot range
-118.519%	-32768	8000	≤ -5.926 V	≤ 11.85 V	Underflow, lock the least value

● Analog value within unipolar current input/output range:

System Value			Input/Output Range		
	Decimalism	hexadecimal	0~20mA	4~20mA	
118.5149%	32767	7FFF	≥ 23.7 mA	≥ 22.96 mA	Overflow, lock the maximum
	27649	6C01			Overshoot range
100%	27648	6C00	20 mA	20 mA	Rated range
75%	20736	5100	15 mA	16 mA	
0.003617%	1	1			
0%	0	0	0 mA	4 mA	
	-1	FFFF			
-75%	-20736	AF00	0 mA	0 mA	Underflow, lock the least value
-100%	-27648	9400			
	-27649	93FF			
-118.519%	-32768	8000	0 mA	0 mA	

● Analog value within unipolar voltage input/output range:

System Value			Input/Output Range		
	Decimalism	hexadecimal	0~5 V	0~10 V	
118.5149%	32767	7FFF	≥ 5.926 V	≥ 11.85 V	Overflow, lock the maximum
	27649	6C01			Overshoot range
100%	27648	6C00	5 V	10 V	Rated range
75%	20736	5100	3.75 V	7.5 V	
0.003617%	1	1			
0%	0	0	0 V	0 V	
	-1	FFFF			
-75%	-20736	AF00	0 V	0 V	Underflow, lock the least value
-100%	-27648	9400			
	-27649	93FF			
-118.519%	-32768	8000	0 V	0 V	

- Analog value within resistance range:

System Value			Input/Output Range				
	Decimalism	hexadecimal	0~ 150Ω	0~ 300Ω	0~ 600Ω	0~ 3000Ω	
118.5149%	32767	7FFF	≥ 176.4 Ω	≥ 352.8 Ω	≥ 705.5 Ω	≥ 3530 Ω	Overflow, lock the maximum
	27649	6C01					Overshoot range
100%	27648	6C00	150 Ω	300 Ω	600 Ω	3000 Ω	Rated range
75%	20736	5100	112.5 Ω	225 Ω	450 Ω	2250 Ω	
0.003617%	1	1	5.43 mΩ	10.85 mΩ	21.7 mΩ	108 mΩ	
0%	0	0	0 Ω	0 Ω	0 Ω	0 Ω	
No resistance is negative							

- Analog value within PT x00 thermal resistance:

System Value			Input/Output Range	
	Decimalism	hexadecimal	-200~+850 ℃	
	32767	7FFF	≥ 850.1 ℃	Overflow, lock the maximum
	8500	2134	850 ℃	Rated range
	6375	18E7	637.5 ℃	
	10	A	1 ℃	
	0	0	0 ℃	
	-10	FFF6	-1 ℃	
	-1500	FA24	-150 ℃	
	-2000	F830	-200 ℃	
	-32768	8000	≤ -200.1 ℃	Underflow, lock the least value

- Analog value within Ni x00 thermal resistance:

System Value			Input/Output Range	
	Decimalism	hexadecimal	-60~+250 ℃	
	32767	7FFF	≥ 250.1 ℃	Overflow, lock the maximum
	2500	9C4	250 ℃	Rated range
	1875	753	187.5 ℃	
	10	A	1 ℃	
	0	0	0 ℃	
	-10	FFF6	-1 ℃	
	-450	FE3E	-45 ℃	
	-600	FDA8	-60 ℃	
	-32768	8000	≤ -60.1 ℃	Underflow, lock the least value

- Analog value within thermocouple:

  Type B，E，J，K，N，R，S，T thermocouple determines the rated input and output range according to the temperature range of the scale. Dividing the decimal value of the system by 10, the current temperature can be obtained. The resolution is 0.1 C, and the maximum or minimum value can be locked out beyond the limit.

4.4 Module Startup Process

Check whether the following requirements are met for the startup of the Spider67 distributed I/O module system:

- Spider67 gateway and module are power, bus and signal wired.
- The module address is set by software.
- Spider67 is configured and downloaded into the controller.
- Supply voltage for controller is switched on.

Startup of Spider67:

```
                   ┌──────────────────┐
                   │    Switch on     │◄────────────────┐
                   └──────────────────┘                 │
                            │                            │
                            ▼                            │
                         ╱──────╲          N   ┌─────────────────────┐
                        ╱ If Ui   ╲───────────►│ Check power polarity│
                        ╲  green   ╱           │ and undervoltage    │
                         ╲──────╱              └─────────────────────┘
                            │ Y
                            ▼
                   ┌──────────────────┐
                   │    Link red      │
                   └──────────────────┘
                            │
                            ▼
           ┌────────────────────────────────┐
           │  Receiving configuration data  │◄────────────┐
           └────────────────────────────────┘             │
                            │                               │
                            ▼                               │
                        ╱──────╲         N    ┌──────────────────┐
                       ╱ Confi.  ╲───────────►│   Double check   │
                       ╲ correct  ╱           └──────────────────┘
                        ╲──────╱
                            │ Y
                            ▼
                   ┌──────────────────┐
                   │    Link green    │
                   └──────────────────┘
```
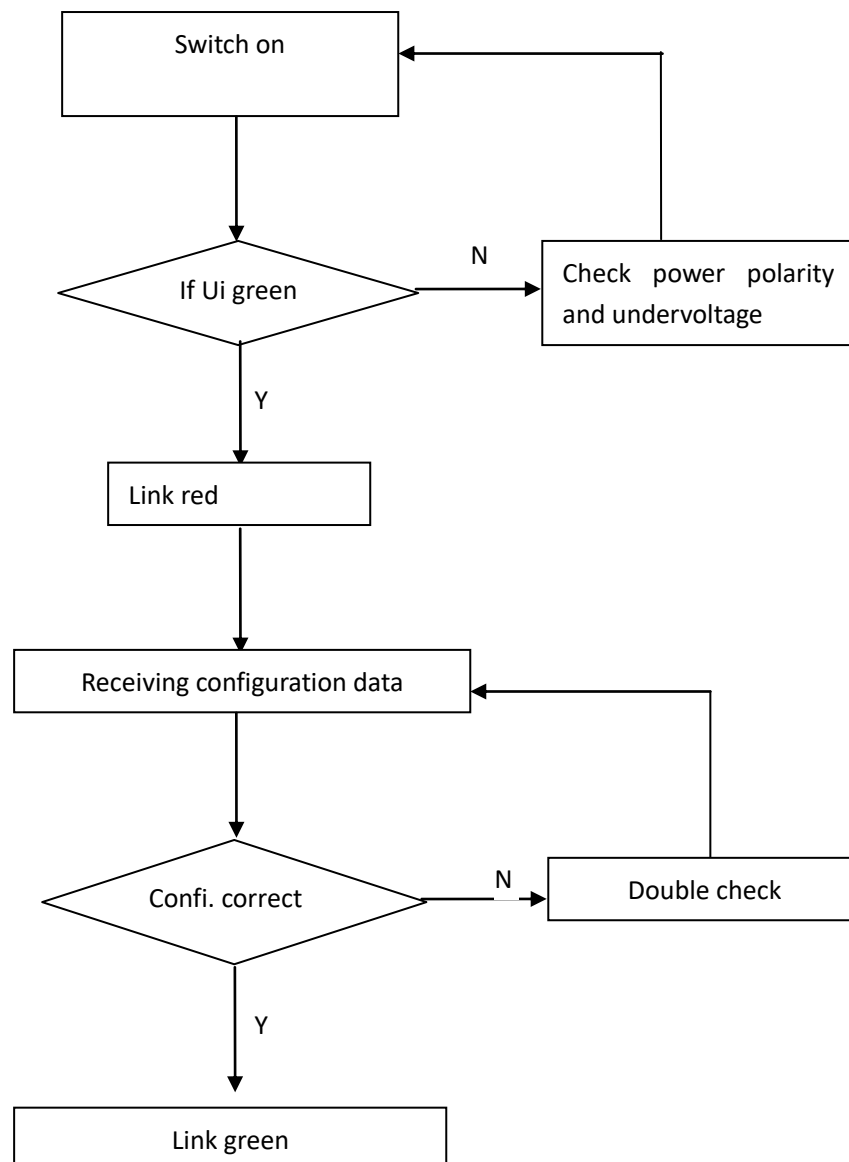
4.5 Module Configuration

This chapter makes users realize Spider67 distributed I/O system through configuration operation. In the example, ELCO Spider67, as CC-Link slave, connects CC-Link controller Q02UCPU and QJ61BT11N of MITSUBISHI. We assume that power and bus are wired.

Spider67 system includes 1 gateway module SPCL-GW-001, PORT0 connecting SPDB-0800D-001, PORT1 connecting SPDB-0008D-001, PORT2 connecting SPDB-08UP-001, PORT3 connecting SPDB-0008D-001、SPDB-0003A-001.

1） Create a new project
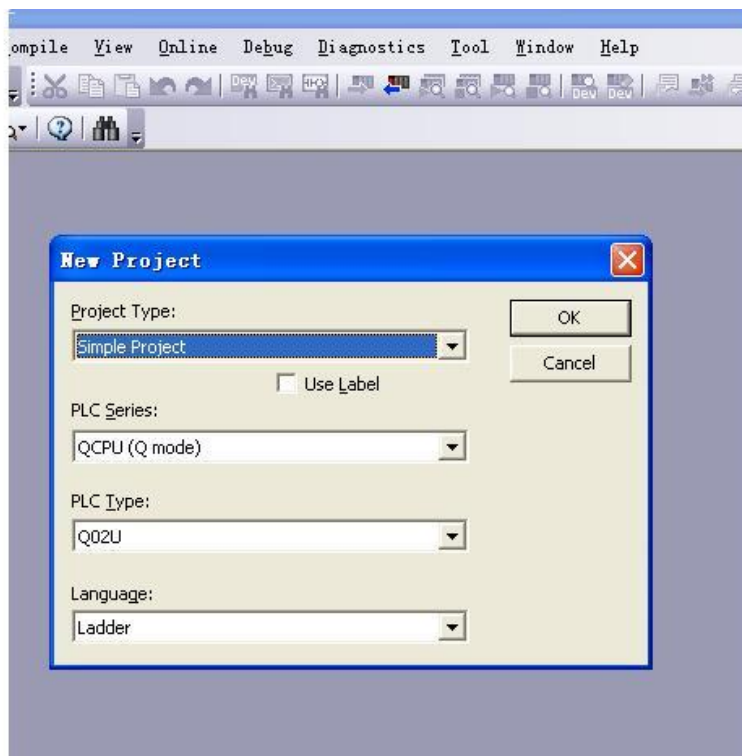
2） CC-Link network parameter setting
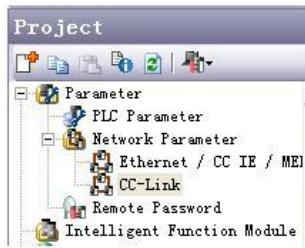
Double click

Number of Modules: 1; Start I/O No.: 0000; Type: Master Station; Mode: Remote Net (Ver.1 Mode); Total Module Connected: 1 (depends on actual quantity of connected module)；Remote Input (RX): X100; Remote Output (RX): Y100; Remote Register (RWr); D100；Remote Register (RWw): D200; Special relay (SB): SB0; Special Register (SW): SW0; Retry Count: 3; Automatic Reconnection Station Count: 1; Make no change for other items.

Click 'Station Information'

Station No.	Station Type	Expanded Cyclic Setting	Number of Occupied Stations	Remote Station Points	Reserve/Invalid Station Select	Intelligent Buffer Select(Word)		
						Send	Receive	Automatic
1/1	Remote I/O Station	Single	Occupied Stations 4	128Points	No Setting			

Station Type: Remote I/O Station; Number of Occupied Stations: Occupied Stations 4.

"Intelligent Device Station" of "Station Type" includes local station and standby master station.

| Default | Check | End | Cancel |

Click 'End' to return to main setting interface.

MELSOFT Series GX Works2

There is no error.

OK

Click 'Check', ,if there's no fault, click 'End'.

Online   Debug   Diagnostics

Read from PLC...

Write to PLC...

Verify with PLC...

Remote Operation...

Password/Keyword
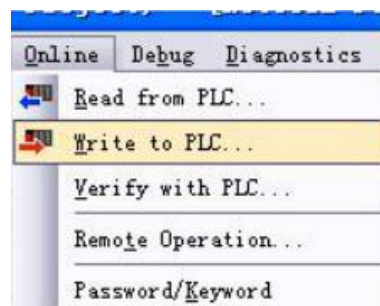
Download, click 'Online' - Write to PLC
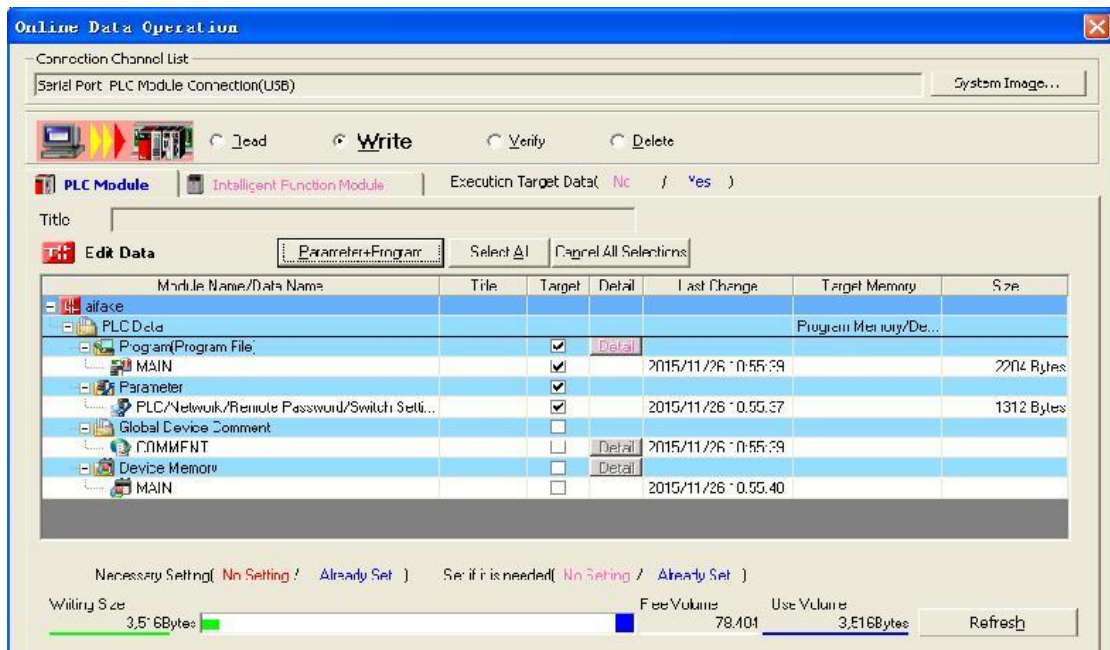
Choose 'Parameter+Program',
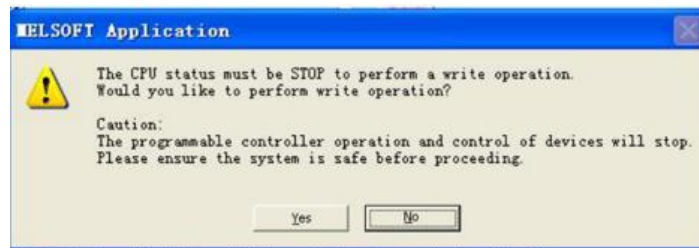
click 'Execute' ,
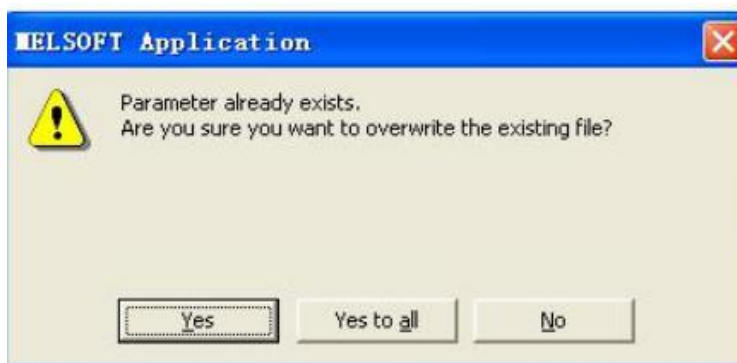
click 'Y'

Choose 'Yes to all'; Click 'Close' after download.

Configuration completed.

Another way for configuration. Check as follows:

Standby Master Station No.(*1)		
PLC Down Select	Stop ▼	
Scan Mode Setting	Asynchronous ▼	
Delay Time Setting	0	
Station Information Setting	CC-Link Configuration Setting	
Remote Device Station Initial Setting	Initial Setting	
Interrupt Settings	Interrupt Settings	

Click and and find SPCL-GW-001，drag it into network;

Then execute configuration download. The same as above.

3) Program initialization

Configuration sequence initialization

After finishing the gateway initialization,connect to the RX(m+n)B(eg.X17B),OFF turn to ON,which means the remote station is ready, then start the device initialization.

< note: m= (station no. -1) *2, Hexadecimal>

< note: n= offset ,which relate to station no..>

<1 station: n=1, 2 station: n=3, 3 station: n=5, 4 station: n=7>

RX(m+n)B
Remote preparation

RX (m+n) C (eg.X17C) for the configuration status indication,
error is 1 while correct is 0.

The sequence information of the small module is written to the RWw0 - RWw6;
while the analog module configuration information is written to RWwB - RWw8.
RWw8 - RwwA is the configuration information of three analog input modules,
RWwB is the configuration information of an analog output module.

<table>
<tr><td colspan="4">Remote Register(RWw)</td></tr>
<tr><td>Host STA</td><td colspan="3">Target STA</td></tr>
<tr><td>Refresh Device</td><td>STA#</td><td>Link Device</td><td>Explanation</td></tr>
<tr><td>D200</td><td></td><td>RWw0</td><td>model1 and model2 type</td></tr>
<tr><td>D201</td><td></td><td>RWw1</td><td>model3 and model4 type</td></tr>
<tr><td>D202</td><td></td><td>RWw2</td><td>model5 and model6 type</td></tr>
<tr><td>D203</td><td></td><td>RWw3</td><td>model7 and model8 type</td></tr>
<tr><td>D204</td><td></td><td>RWw4</td><td>model9 and model10 type</td></tr>
<tr><td>D205</td><td></td><td>RWw5</td><td>model11 and model12 type</td></tr>
<tr><td>D206</td><td></td><td>RWw6</td><td>model13 and model14 type</td></tr>
<tr><td>D207</td><td>1</td><td>RWw7</td><td></td></tr>
<tr><td>D208</td><td>==></td><td>RWw8</td><td>Config_AD1_Model</td></tr>
<tr><td>D209</td><td></td><td>RWw9</td><td>Config_AD2_Model</td></tr>
<tr><td>D210</td><td></td><td>RWwA</td><td>Config_AD3_Model</td></tr>
<tr><td>D211</td><td></td><td>RWwB</td><td>Config_DA_Model</td></tr>
<tr><td>D212</td><td></td><td>RWwC</td><td>DA_Output_model_CH0</td></tr>
<tr><td>D213</td><td></td><td>RWwD</td><td>DA_Output_model_CH1</td></tr>
<tr><td>D214</td><td></td><td>RWwE</td><td>DA_Output_model_CH2</td></tr>
<tr><td>D215</td><td></td><td>RWwF</td><td>DA_Output_model_CH3</td></tr>
</table>

Byte order are always big endian. Type code for each module table is shown in table
2. Setting Type Code according to the hardware module sequence as follows:
D200 - 0x0201   (With two modules for a Word write, low byte written in the former
module in sequence, the first module is SPDB-0800D-001, the second module is
SPDB-0008D-001, according to Table2 to get Type Code)
D201 - 0x0203   (With two modules for a Word write, low byte written in the former
module in sequence, the third module is SPDB-08UP-001, the fourth module is
SPDB-0008D-001, according to Table2 to get Type Code)
D202 - 0x0014   (With two modules for a Word write, low byte written in the former
module in sequence, the fifth module is SPDB-0003A-001, the sixth module is null,
according to Table2 to get Type Code)

D203 - D206   Write value 0

D207   Write value 0

D208 - D210   Write value 0, (Due to not connect to the analog input module, so it can be written nothing)

D211-0xF444   3 channel current output module, from the upper is CH3, CH2, CH1, CH0, refer to table 3,CH3 is closed while CH0 - CH2 is set to 4-20mA output.

Test program are as follows:

After downloading the above program to PLC, the gateway MOD LED is green, which indicates that the configuration is correct, and then set up normal communication with the module, the Link LED turns green.

4) Flow LED test program

According to MITSUBISHI input and output registers corresponding relationship, find the address of each module input and output points and program properly. Byte allocated according to the table 1.

IO Byte Allocation:

Module Type	Sequence	RX	RY	RWr	RWw
SPDB-0800D-001	1	X100—X107	——	——	——
SPDB-0008D-001	2	——	Y100—Y107	——	——
SPDB-08UP-001	3	X108—X10F	Y108—Y10F	——	——
SPDB-0008D-001	4	——	Y110—Y117	——	——
SPDB-0003A-001	5	——	——	D211 （Confingation）	D212-D215 （Data output）

5. Alarm

5.1 LED display

Users can realize the status of module by LED display of Spider67 distributed I/O.

Gateway LED indication					Meaning	Solution
U_{MOD}	U_{SP}	SD	RD	MOD		
Red	-	-	-	-	Power supply of gateway module low than 18V	Check module power supply
-	Red	-	-	-	Power supply of module load low than 18V	Check **auxiliary** power supply
-	-	-	-	Red	I/O short-circuit or overload	Check sensor or load
					The actual setting of extended module is different from the configuration.	Check configuration
					Other module failure	Contact technical supports
Green	Green	OFF	OFF	Red	Normal module and auxiliary power supply, but fail to communicate with CC-Link master	Check CC-Link cable
						Check CC-Link address set
						Check slave configuration
Green	Green	Green	Green	Green	Module ready	-

Module LED indication				Meaning	Remedy
ADD$_{In}$	ADD$_{Out}$	Link	MOD		
Red	Red	-	-	Wrong address assignment of extension module	Re-power supply for gateway
-	-	Red	-	Wrong extension module connection	Check Extension cable connection
				Extension modules communicating with gateway configuration	Waiting for recovery
-	-	-	Red	I I/O short-circuit or overload	Check sensor or load
				The actual configuration of the extended module is incompatible with configuration	Check configuration
				Other module failure	Contact technical supports
Green	Green	Green	Green	Module ready	-

5.2 Alarm

The alarm function for the Gateway includes the address setting error, baud rate setting error, loss of communication, module power short circuit, output overload etc. CC-Link network communication error can be checked via special register. Small module error is interacted by RX (m + n) A. In the case that there are any errors, RX (m + n) will turn from OFF to ON, while RX (m + n) B will turn to OFF.

As shown below:

The error information is stored in the four remote RWrF - RWrC registers, which corresponds to error message of PORT0-PORT3:

The error information is stored in the four remote RWrF - RWrC registers, which corresponds to error message of PORT0-PORT3:

F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
1. 8--F(upper byte) corresponding to 8 input points short circuit information; 0--7(low byte) corresponding to 8 output points overload information. For example, D112 receives data 0100 0000, means PORT0 ,6th channel has power short; D113 received data0000 0100, means PORT1 3rd channel has output overload;															
2. When 8--F(upper byte) all is 1 and 0-7 (low byte) have value, it means that the small module is lost from the network.The error address start error message from the front of the Gateway output with 0-7 portfolio. For example, D115 receives data 11110100, means PORT3 , 3rd small module lost;															

Recovery:

The RX (m+n)A turn OFF to ON in the case of error, if the fault is removed but this point still be locked, reset through RX (m+n) A for recovery.

The detail as follows:
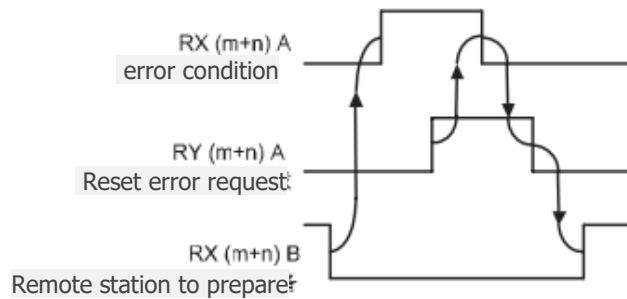
Note: RX(m+n) A , m =(Station No.-1)*2 ,n = 7

If the gateway station No. is 1, then the remote device station is RX7B, with the corresponding input it is X17B;

Appendix:

Table One : Bytes for each module

	8UP	8DI	8DO	6DO	4I4O	0300A	0003A	0400A	0004A	Function
RX	1B	1B	--	--	1B	--	--	--	--	Read in IO
RY	1B	--	1B	1B	1B	--	--	--	--	Output IO
RWw	--	--	--	--	--	2B	6B+2B	2B	8B+2B	Data Output
RWr	--	--	--	--	--	6B	--	8B--	--	Data Input

Table Two: type control tables for each module

Module name	Type code	Type description	Notes
SPDB-0800D-001	0x01	M12 8 points input	
SPDB-0008D-001	0x02	M12 8 points output	
SPDB-08UP-001	0x03	M12 8 points configurable	
	0x04		Reserved
SPDB-0006D-001	0x05	M12 6 points output	
	0x06	M12 4 relay output	Reserved
	0x07	M12 high speed count input	Reserved
	0x08		Reserved
SPDB-0404D-001	0x09	M12 4 input 4 output	
SPDB-0800D-011	0x0A	M8 8 points input	
SPDB-0008D-011	0x0B	M8 8 points output	
SPDB-08UP-011	0x0C	M8 8 points configurable	
SPDB-0404D -011	0x0D	M8 4 input 4 output	
	0x0E		Reserved
	0x0F		Reserved
SPDB-0300A-001	0x10	3 channels current input	
SPDB-0300A-002	0x11	3 channesl voltage input	
	0x12	4 channels current input	Reserved
	0x13	4 channels voltage input	Reserved
SPDB-0003A-001	0x14	3 channels current output	
SPDB-0003A-002	0x15	3 channels voltage output	
	0x16	4 channels current output	Reserved
	0x17	4 channels voltage output	Reserved
	0x18	3 channels current and voltage	Reserved
	0x19	4 channels current and voltage	Reserved
SPDB-0800D-013	0x1A	M8 8 points can input NPN	
	0x1B	M8 8 points cac output NPN	Reserved
	0x1C	M8 8 points can be configured for NPN	Reserved
SPDB-0404D-013	0x1D	M8 4 input 4 output NPN	
SPDB-0800D-003	0x1E	M12 8 points input NPN	
	0x1F	M12 8 points output NPN	Reserved

	0x20	M12 8 points can be configured for NPN	Reserved
SPDB-0404D-003	0x21	M12 4 input 4 output NPN	
SPDB-0032D-Vxxx	0X22	32 points valve output	
SPDB-0024D-Vxxx	0x23	24 points valve output	
SPDB-0016D-Vxxx	0x24	16 points valve output	
SPDB-0008D-Vxxx	0x25	8 points valve output	
SPDB-0400A-005	0x26	M12 hot resistance	
SPDB-0400A-006	0x27	M12 thermocouple	
	0x28		Reserved
	0x29		Reserved
SPDB-0800D-Mxxx	0x2A	direct outlet line 8 points input	
SPDB-0008D-Mxxx	0x2B	direct outlet line 8 points output	
SPDB-0404D-Mxxx	0x2C	direct outlet line 4 input 4 output	
SPDB-08UP-Mxxx	0x2D	direct outlet line 8 points configurable	
	0x2E		Reserved
	0x2F		Reserved

Table Three: module volume channel function configuration table

Type	0x0	0x1	0x2	0x3	0x4	0x5	0x6	0x7
Voltage type	0~10V	-10~+10V	0~5V	-5~+5V	——	——	——	——
Current type	——	——	——	——	0~20mA	4~20mA	-20~+20mA	——
Hot resistance	PT100	PT200	PT500	PT1000	Ni100	Ni200	Ni500	Ni1000
Thermocouple	Type K	Type J	Type N	Type E	Type B	Type S	Type T	Type R

Type	0x8	0x9	0xA	0xB	0xC	0xD	0xE	0xF
Voltage type	——	——	——	——	——	——	——	Closed
Current type	——	——	——	——	——	——	——	Closed
Hot resistance	150Ω Hot resistance	300Ω Hot resistance	600Ω Hot resistance	3000Ω Hot resistance	——	——	——	Closed
Thermocouple	Voltage 1	Voltage 2	——	——	——	——	——	Closed

The analog module configuration starts from the high channel, followed by CH3, CH2, CH1 and CH0.

Table Four: CC-Link Communication Cable

Sl.No.	Color	Explanation
1	Shield	SLD
2	White	DB
3	Yellow	DG
4	Blue	DA