

ARIO-C-CL1

CC-Link ver. 1.1

Coupler Manual MTO-ARIOCCL1U1-V1.2-EN

Thank you for purchasing an Autonics product.

This user manual contains information about the product and its proper use,
and should be kept in a place where it will be easy to access.

Autonics

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Preface

Thank you for purchasing Autonics products.

Be sure to read and follow the **Safety Precautions** thoroughly before use.

This manual contains information about the product and how to use it properly, so keep it in a place where users can easily find it.

Manual Guide

- Use the product after fully reading the contents of the manual.
- The manual explains the product functions in detail and does not guarantee the contents other than the manual.
- Any or all of the manual may not be edited or copied without permission.
- The manual is not provided with the product.
- Download and use from our website (www.autonics.com).
- The contents of the manual are subject to change without prior notice according to the improvement of the product's performance, and upgrade notices are provided through our website.
- We put a lot of effort to make the contents of the manual a little easier and more accurate. Nevertheless, if you have any corrections or questions, please feel free to comment through our website.

Common Symbols in the Manual



Failure to follow instructions may result in serious injury or death.



Failure to follow instructions may result in injury or product damage.



Supplementary explanation of the function



Example of that function



Important information about the feature

Safety Considerations

Observe all 'Safety Considerations' for safe and proper operation to avoid hazards.

Warning

1. Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss. (e.g., nuclear power control, medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime/disaster prevention devices, etc.) Failure to follow this instruction may result in personal injury, fire or economic loss.
 2. Do not use the unit in the place where flammable/explosive/corrosive gas, high humidity, direct sunlight, radiant heat, vibration, impact, or salinity may be present. Failure to follow this instruction may result in explosion or fire.
 3. Do not disassemble or modify the unit. Failure to follow this instruction may result in fire.
 4. Do not connect, repair, or inspect the unit while connected to a power source. Failure to follow this instruction may result in fire.
 5. Check 'Connections' before wiring. Failure to follow this instruction may result in fire.
-

Caution

1. Use the unit within the rated specifications. Failure to follow this instruction may result in fire or shortening the life cycle of the product.
 2. Use dry cloth to clean the unit, and do not use water or organic solvent. Failure to follow this instruction may result in fire or electric shock.
 3. When connecting the power input and output, use AWG 22-16 cable and check the connecting method of crimp terminal. Failure to follow this instruction may result in fire or malfunction due to contact failure.
 4. Keep the product away from metal chip, dust, and wire residue which flow into the unit. Failure to follow this instruction may result in fire or product damage.
 5. Do not connect or disconnect connector (terminal) wire or power, when the product is operating. Failure to follow this instruction may result in fire or malfunction of the product.
-

Cautions during Use

1. Follow instructions in 'Cautions during Use'. Otherwise, It may cause unexpected accidents.
2. BUS power and I/O power should be insulated by the individually insulated power device.
3. Power supply should be insulated and limited voltage/current or Class 2, SELV power supply device.
4. Keep away from high voltage lines or power lines to prevent inductive noise.
In case installing power line and input signal line closely, use line filter or varistor at power line and shielded wire at input signal line. For stable operation, use shield wire and ferrite core, when wiring communication wire, power wire, or signal wire.
5. Do not use near the equipment which generates strong magnetic force or high frequency noise.
6. Use the rated standard cables and connectors. Do not apply excessive power when connecting or disconnecting the connectors of the product.
7. Do not touch the module communication connector part of the base.
8. Do not connect, or remove the base while connected to a power source.
For removing the terminal, body or base, do not operate units for a long time without it.
9. This unit may be used in the following environments.
 - ① Indoors (in the environment condition rated in 'Specifications')
 - ② Altitude max. 2,000 m
 - ③ Pollution degree 2
 - ④ Installation category II

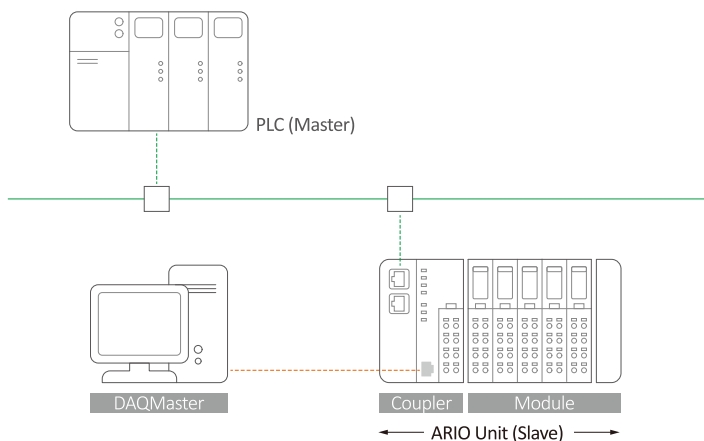
The specifications and dimensions of this manual are subject to change without any notice for product improvement. Be sure to read and follow the considerations written in the instruction manual, other manuals, and technical information on our Autonics website.

1. Reference Manuals



Be sure to read the reference manuals below to use the product correctly and follow the precautions written in these manuals.

You can download the reference manuals on our Autonics website.



Product manual

It contains information for you to setup and install the ARIO Unit.

1. Key features of ARIO Series
2. Environmental conditions and handling method for installation
3. Installation precautions
4. Instructions about maintenance, etc.

Coupler manual

It contains information for you to configure and use the coupler in the field network.

1. Communication protocol overview
2. Hardware information: specifications, indicators, connection diagram, and dimensions, etc.
3. Software information: process images, and mapping information, etc.

Module manual

It contains information on the modules provided by Autonics.

1. Hardware information: specifications, indicators, connection diagram, and dimensions, etc.

DAQMaster user manual

It contains information and usage guides on ARIO-related functions supported by DAQMaster, the comprehensive device management program.

1. Change properties of the coupler and modules
2. Module configuration via virtual mode
3. Check the address map of the Unit
4. Update the firmware version of the coupler, etc.

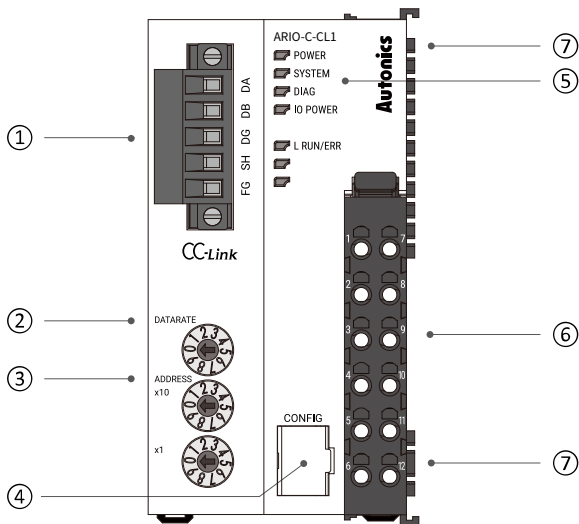
2. Overview of the ARIO-C-CL1

2.1. CC-Link Protocol

CC-Link, one of the Fieldbus networks, is an industrial network composed of a topology of RS-485. It supports the transmission distance of up to 100 meters at a transmission rate of 10 Mbps as well as up to 64 stations with a high speed and deterministic data communication. The link scan time supported by CC-Link can process the input signals of sensors that require a high-speed response or for intelligent devices that require a large capacity of data communication. The data link system also supports reducing wiring and costs for building a distributed system.

The ARIO-C-CL1 supports the CC-Link protocol. This coupler composes the physical structure of connected modules and devices and creates input and output process images linked with the data of CC-Link. The process images make it possible to experience a flexible installation environment, such as the mixed arrangement of analog and digital modules.

2.2. Unit Descriptions



1. CC-Link Communication Connector

It is a connector to connect with CC-Link master station such as PLC.

For detailed information on the communication cable, refer to the 2.3, “CC-Link Communication Connector”.

2. Datarate Rotary Switch

It is a setting switch to set the transmission rate in the CC-Link communication network.

For detailed information on setting the transmission rate, refer to the 2.4, “Set the Transmission Rate”.

3. Decimal Rotary Switches

It is a setting switch to designate the station number of the coupler in the CC-Link communication network. For detailed information on addressing method, refer to the 2.5, “Assign the Station Number”.

4. CONFIG Port

It is a port to connect to the PC where DAQMaster is installed.

1. Port type: USB 2.0 type Micro B

5. Indicators

It displays the status of the coupler and communication connection as shown below. For detailed information on the indicators, refer to the 3, Indicators.

1. Power and operating status of the coupler
2. CC-Link communication status

6. Power Supply Terminal

It is a terminal block that supplies power to the coupler and peripherals. For detailed information on the device supply, refer to the 2.6, “Connections of the Power Terminal”.

7. Power Supply Contacts

It is a contact that feeds the power input from the power supply terminal.

1. Top input contacts: feed the power supply for the coupler, module, and ABUS to be operated.
2. Bottom input contacts: feed the power supply for input and output signals of the connected module.

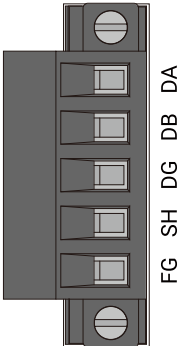
2.3. CC-Link Communication Connector



- Be sure to use the connector and cable approved by the CC-Link Partner Association (CLPA).

The 5-pin PCB connector is used for the CC-Link communication connection.

For more information on the pin assignment, refer to the table below.



Pin no.	Marking on the connector	Color	Description
1	DA: DATA A	Blue	RS-485 High signal
2	DB: DATA B	White	RS-485 Low signal
3	DG: Data Ground	Yellow	Ground for RS-485 signal
4	SH: Shield	-	Shield
5	FG: Frame Ground	-	Frame Ground

2.4. Set the Transmission Rate

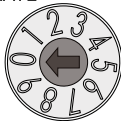


- Be sure to use the connector and cable approved by the CC-Link Partner Association (CLPA).
- Be sure not to exceed the maximum cable length of each transmission rate.
- The maximum overall cable distances are described based on the terminal resistor 110 Ω. For more information on the relationship between the cable distance and terminal resistor, refer to the CC-Link specifications sheet.

Refer to the table below to set the transmission rate via the DATARATE rotary switch.

Be sure to set the transmission rate of the coupler the same as that of the CC-Link master station.

DATARATE



Number of occupied stations ⁰¹⁾	Rotary switch setting	Transmission rate	Maximum overall cable distance
Automatic assignment depending on the data size of the module • Occupied stations: 1 to 4 stations	0	156 kbps	≤ 1200 m
	1	625 kbps	≤ 900 m
	2	2.5 Mbps	≤ 400 m
	3	5 Mbps	≤ 160 m
	4	10 Mbps	≤ 100 m
• Occupied stations: 4 stations fixed	5	156 kbps	≤ 1200 m
	6	625 kbps	≤ 900 m
	7	2.5 Mbps	≤ 400 m
	8	5 Mbps	≤ 160 m
	9	10 Mbps	≤ 100 m

01) Refer to the 5.2, “CC-Link Memory Map Layout”.

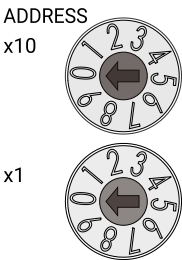
2.5. Assign the Station Number



- It is recommended to designate the station number of the coupler the same as the value of the rotary switches.
- The station number cannot be applied while the coupler is operating.
- Be sure to start the coupler again to apply the changed station number.

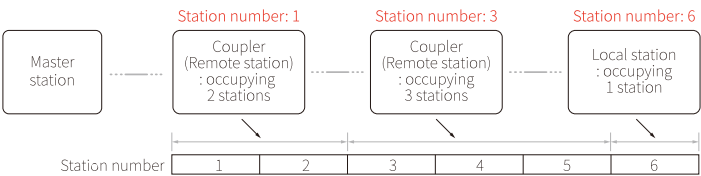
You can assign the coupler's station number via two decimal rotary switches.

Be sure to set the station number not to be duplicated with other stations considering occupied station numbers in each station (slave stations of the data link).

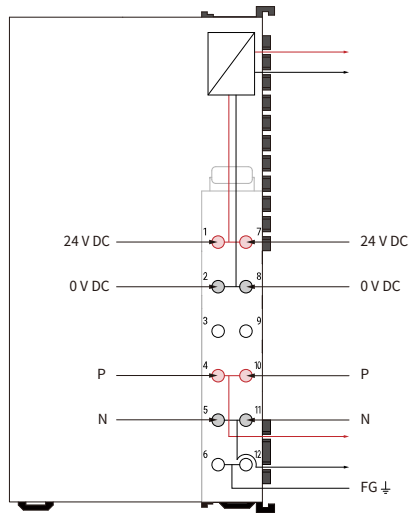


Rotary switches (x10, x1)	Station number
00	3
01 to 64	1 to 64

[Example] CC-Link system configuration



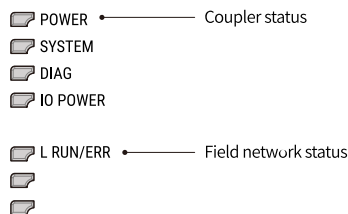
2.6. Connections of the Power Terminal



Power category	Terminal no.	Function
System Bus Power	1	Input/output for power supply (24 V _{DC})
	2	Input/output for power supply (0 V _{DC})
	3	Not connected
Field Power	4	Input/output for power supply (+)
	5	Input/output for power supply (–)
-	6	Frame Ground
System Bus Power	7	Input/output for power supply (24 V _{DC})
	8	Input/output for power supply (0 V _{DC})
	9	Not connected
Field Power	10	Input/output for power supply (+)
	11	Input/output for power supply (–)
-	12	Frame Ground

3. Indicators

The indicators of the ARIO-C-CL1 coupler consist of elements indicating the operating status for the coupler, and connection status for the field network (CC-Link) as shown in the figure below. For detailed information on each indicator, refer to the following tables below.



3.1. LEDs for the Coupler Status

1. The power supply status of the coupler

Indicator	LED color	Status	Description
POWER	Green	ON	Supply voltage: Normal
		OFF	Supply voltage: None

2. The status of the standby mode

Indicator	LED color	Status	Description
SYSTEM	Green	ON	Normal operation
		Flashing	Standby for connecting the master after initialization of the coupler
		OFF	Stop
	Red	ON	• Coupler initialization failure (non-recoverable) • An unrecoverable error occurred. • The type of field network and firmware version mismatch (non-recoverable)
		Flashing	• Field network initialization failure (non-recoverable) • Changing the settings of rotary switches (applicable models)
		OFF	Normal operation

3. The status of the module communication (ABUS)

Indicator	LED color	Status	Description
DIAG	Green	ON	Normal operation: Multi/Single-packet works
		Flashing	Hot-swap (normal state)
		OFF	• The operation of the coupler stopped • An error occurred
	Red	ON	ABUS communication error
		Flashing	The models of the replaced module and the previous one mismatch (normal operation)
		Flashing (2 times)	No module connection (non-recoverable)
		Flashing (3 times)	Abnormal module operation (non-recoverable)
		Flashing (4 times)	The number of modules and data size exceeded
		OFF	Normal operation

4. The status of power supply for the module

Indicator	LED color	Status	Description
IO POWER	Green	ON	Supply voltage for the I/O signals of modules : Normal
		OFF	Supply voltage for the I/O signals of modules : None

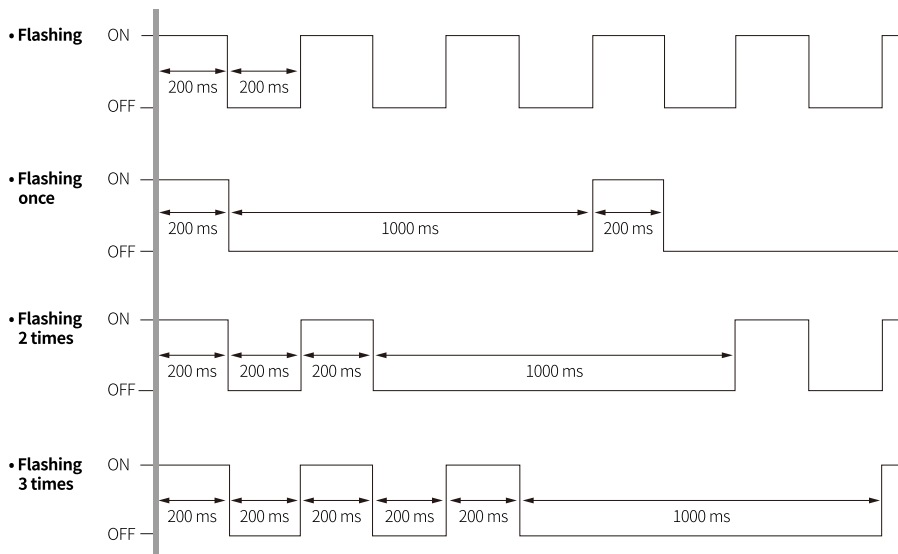
3.2. LEDs for the Field Network Status

1. The status of CC-Link communication and error

Indicator	LED color	Status	Description
L RUN/ERR	Green	ON	Data link is being executed.
		OFF	• Data link is in the standby state • Unable to detect carrier in the data channel • Timeout • Hardware (PLC CPU) reset
	Red	ON	• CRC error • Station number error (The range of station numbers is exceeded other than 0 to 64 including the master station)
		Flashing (0.4 sec)	The settings of transmission rate and station number are changed while the coupler is running.
		OFF	• Data link is being executed. • Hardware (PLC CPU) reset



Refer to the timing chart below for the flashing operation of indicators.
The operation is repeated as flashing every 200 microseconds and standby for 1 second.

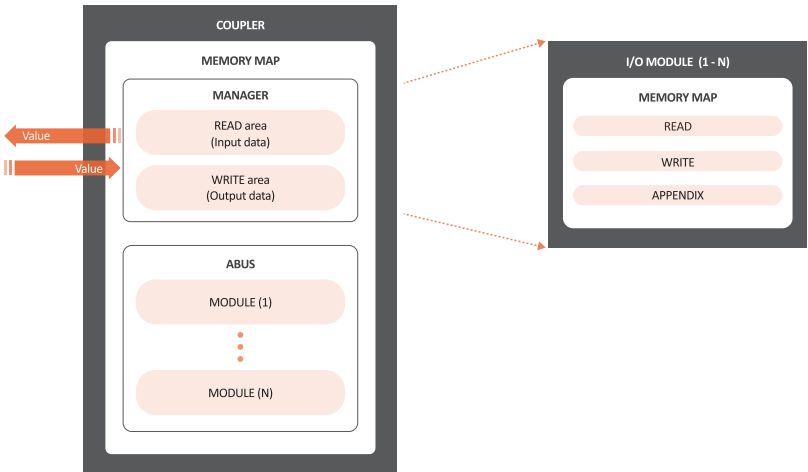


4. Process Images

4.1. Memory Map

The ARIO unit composes the memory map in its memory space to assign and manage the data collected by the coupler and modules. The master in the field network controls the input and output devices via this memory map generated by the ARIO unit.

The memory map is created based on the arrangement and data structure of the ARIO unit as shown in the figure below. The memory map of modules consists of each module and contains its data. The memory map of the coupler allocates the data considering the type (input or output) and sequence of connected modules (e.g., the slot number of each module), and data size to the read and write areas, making it easy to calculate the location of the master's register. In this way, the memory map comprised by the ARIO unit creates the input and output process images for data exchange.



- **READ area**
It is the area that transmits the data collected by the unit to the master in the field network. It contains the input data.
- **WRITE area**
It is the area that transmits the output commands from the master of the field network. It contains the output data.

4.2. Data Processing in the Module

The data of the module is processed depending on the input and output signals.

- **Digital modules**

The bit-oriented digital module indicates the value of the corresponding bit position as 1.

The size of each channel is 1 bit and is grouped into bytes.

- **Analog modules**

The byte-oriented analog module indicates the value of the input or output signal to the corresponding bytes. The size of each channel is grouped into words.

Module	Example of input/output format	Data processing size
Digital input/output : Bit-oriented	2 channels/module (2-CH/module)	1-byte
	4 channels/module (4-CH/module)	1-byte
	8 channels/module (8-CH/module)	1-byte
	16 channels/module (16-CH/module)	2-byte (= 1-word)
Analog input/output : Byte-oriented	8-bit/channel (8-bit/CH)	1-byte
	12-bit/channel (12-bit/CH)	2-byte (= 1-word)
	16-bit/CH (16-bit/CH)	2-byte (= 1-word)
	24-bit/channel (24-bit/CH)	4-byte (= 2-word)

4.2.1. Check the Data of the Modules

You can check the data of modules connected with the coupler as shown in the figure below.
To check the data, go to **Comm Mode » Run » I/O Monitor** in the DAQMaster.
The binary, decimal, and hexadecimal are supported as the display format in the DAQMaster.

1. The value of input signals on the point (or channels) 1 and 2 of the digital input module

• **Binary 0000 0011 (0x03)**

Slot Number	Module Name	Type	Channel	Data	Diagnostic Byte
1	DI08N	R	8	0x03	
	Point 1			1	
	Point 2			1	
	Point 3			0	
	Point 4			0	
	Point 5			0	
	Point 6			0	
	Point 7			0	
	Point 8			0	

2. The value of a voltage of 10.000 V applied to channel 1 of the analog input module

• **Big endian: 0x270D ($\approx 10,000_{\text{DEC}}$)**

Slot Number	Module Name	Type	Channel	Data	Diagnostic Byte
1	AI04V1	R	4	0x270D 0003 0003 0000	
	Channel 1			0x270D	
	Channel 2			0x0003	
	Channel 3			0x0003	
	Channel 4			0x0000	
2	AO04V1	W	4	0x2710 0000 0000 0000	
	Channel 1			0x2710	
	Channel 2			0x0000	
	Channel 3			0x0000	
	Channel 4			0x0000	



The data arrangements (the order or sequence) of the analog signal can be expressed as big-endian or little-endian in the DAQMaster.

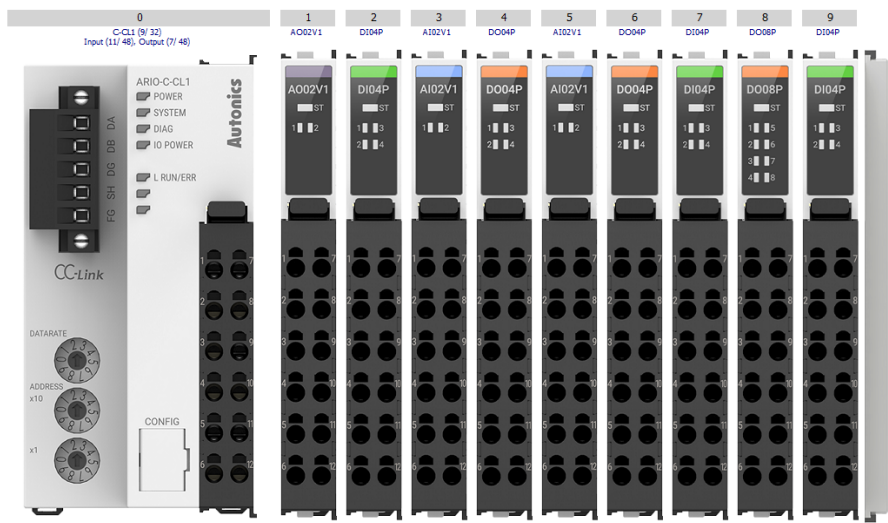
To select the endianness, go to **Comm Mode » Property tab of the coupler » Endian**. (factory default: Big-endian)

4.3. Example of the Process Image

You can check the input and output process images of the unit (coupler + modules) on the **AddressMap** menu in the DAQMaster.

Firstly, the input modules are mapped, and then the output modules are mapped. The process image of the CC-Link protocol (ver. 1.1) consists of bit-type information in the Remote Input/Output (RX and RY) and word-type information in the Remote Registers (RWr and RWw) for data exchange.

DAQMaster: An arrangement example of the ARIO unit



DAQMaster: The address map of the ARIO unit

Slot Number : Module Name	Address	Type	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
3 : AI02V1 - Channel 1_2 : DI04P	RWr0	R					P3	P2	P1	P0	C1H	C1H	C1H	C1H	C1H	C1H	C1H	C1H
3 : AI02V1 - Channel 1	RWr1	R	C1L	C1L	C1L	C1L	C1L	C1L	C1L	C1L	C2H	C2H	C2H	C2H	C2H	C2H	C2H	C2H
5 : AI02V1 - Channel 1_3 : AI0...	RWr2	R	C2L	C2L	C2L	C2L	C2L	C2L	C2L	C2L	C1H	C1H	C1H	C1H	C1H	C1H	C1H	C1H
5 : AI02V1 - Channel 1	RWr3	R	C1L	C1L	C1L	C1L	C1L	C1L	C1L	C1L	C2H	C2H	C2H	C2H	C2H	C2H	C2H	C2H
7 : DI04P_5 : AI02V1 - Channel 1	RWr4	R					P3	P2	P1	P0	C2L	C2L	C2L	C2L	C2L	C2L	C2L	C2L
9 : DI04P	RWr5	R													P3	P2	P1	P0
1 : AO02V1 - Channel 1	RWw0	W	C1H	C1H	C1H	C1H	C1H	C1H	C1H	C1H	C1L	C1L	C1L	C1L	C1L	C1L	C1L	C1L
1 : AO02V1 - Channel 2	RWw1	W	C2H	C2H	C2H	C2H	C2H	C2H	C2H	C2H	C2L	C2L	C2L	C2L	C2L	C2L	C2L	C2L
6 : DO04P_4 : DO04P	RWw2	W					P3	P2	P1	P0								
8 : DO08P	RWw3	W									P7	P6	P5	P4	P3	P2	P1	P0

4.3.1. Input Process Image

Byte		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	2: DI04P	-				Ch.4	Ch.3	Ch.2	Ch.1
1	3: AI02V1	Ch.1 High Byte							
2		Ch.1 Low Byte							
3		Ch.2 High Byte							
4		Ch.2 Low Byte							
5	5: AI02V1	Ch.1 High Byte							
6		Ch.1 Low Byte							
7		Ch.2 High Byte							
8		Ch.2 Low Byte							
9	7: DI04P	-				Ch.4	Ch.3	Ch.2	Ch.1
10	9: DI04P	-				Ch.4	Ch.3	Ch.2	Ch.1

4.3.2. Output Process Image

Byte		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	1: AO02V1	Ch.1 High Byte							
1		Ch.1 Low Byte							
2		Ch.2 High Byte							
3		Ch.2 Low Byte							
4	4: DO04P	-				Ch.4	Ch.3	Ch.2	Ch.1
5	6: DO04P	-				Ch.4	Ch.3	Ch.2	Ch.1
6	8: DO08P	Ch.8	Ch.7	Ch.6	Ch.5	Ch.4	Ch.3	Ch.2	Ch.1

5. CC-Link Address Area

5.1. Data Types

The remote device station exchanges bit unit or word unit data through the cyclic transmission.
The data types handled by CC-Link are shown in the table below.

Data unit	Signal name	Description
Bit	RX (Remote input)	The input data transmitted from the remote station to the master station
	RY (Remote output)	The output data transmitted from the master station to the remote station
Word	RWr (Remote register read/receive)	The input data transmitted from the remote station to the master station
	RWw (Remote Register write/transmit)	The output data transmitted from the master station to the remote station

5.2. CC-Link Memory Map Layout

- CC-Link operating mode: Ver 1.1
- Number of occupied stations per unit: 1 to 4 stations

Occupied stations	Signal	Data size
1 station	RX, RY	16-bit each
	RWr, RWw	4-word each
2 stations	RX, RY	48-bit each
	RWr, RWw	8-word each
3 stations	RX, RY	80-bit each
	RWr, RWw	12-word each
4 stations	RX, RY	112-bit each
	RWr, RWw	16-word each

5.3. Memory Map of the ARIO Unit

1. Data area of the remote I/O

- The "n" is the start I/O number assigned to the master station.
- Example of CC-Link configuration: 1 occupied station
- Total data size of RX/RY: 16-bit each

Link input	Signal name	Link output	Signal name
RXn00	DI 1, channel 1	RYn00	DO 1, channel 1
RXn01	DI 1, channel 2	RYn01	DO 1, channel 2
RXn02	DI 1, channel 3	RYn02	DO 1, channel 3
RXn03	DI 1, channel 4	RYn03	DO 1, channel 4
RXn04	DI 2, channel 1	RYn04	DO 2, channel 1
RXn05	DI 2, channel 2	RYn05	DO 2, channel 2
RXn06	DI 2, channel 3	RYn06	DO 2, channel 3
RXn07	DI 2, channel 4	RYn07	DO 2, channel 4
RXn08	DI 3, channel 1	RYn08	DO 3, channel 1
RXn09	DI 3, channel 2	RYn09	DO 3, channel 2
RXn0A	DI 3, channel 3	RYn0A	DO 3, channel 3
RXn0B	DI 3, channel 4	RYn0B	DO 3, channel 4
RXn0C to RXn10	Not used	RYn0C to RYn10	Not used

2. Data area of the remote register

- The "n" is the start I/O number assigned to the master station.
- Example of CC-Link configuration: 1 occupied station
- Total data size of RWr/RWw: 4-word each

Link register	Signal name	Link register	Signal name
RWrn00	AI 1, channel 1 MSB	RWwn00	AO 1, channel 1
RWrn01	AI 1, channel 1 LSB	RWwn01	AO 1, channel 2
RWrn02	AI 1, channel 2 MSB	RWwn02	Not used
RWrn03	AI 1, channel 2 LSB	RWwn03	Not used
RWrn04	AI 1, channel 3 MSB	RWwn04	Not used
RWrn05	AI 1, channel 3 LSB	RWwn05	Not used
RWrn06	AI 1, channel 4 MSB	RWwn06	Not used
RWrn07	AI 1, channel 4 LSB	RWwn07	Not used

6. GX-Works2 Guide



If the coupler's software (firmware) requires an update, refer to the DAQMaster user manual to update it to the latest version.

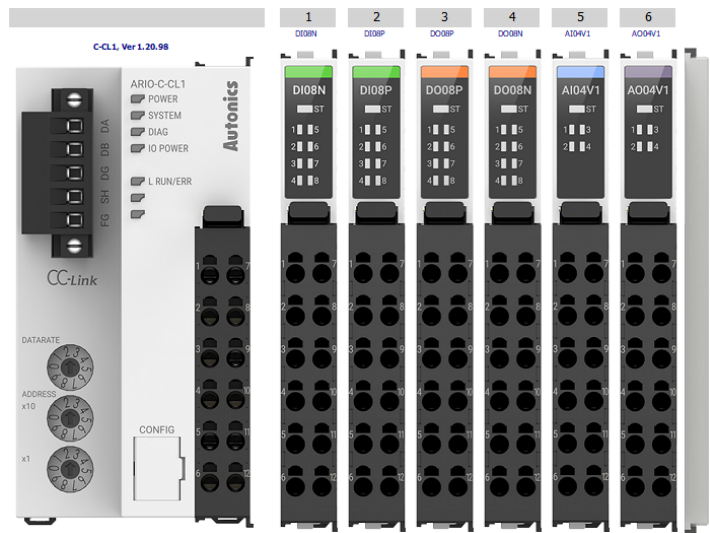
6.1. Before You Begin

Firstly, this chapter describes how to connect the ARIO unit, arranged as shown in the figure below, to the CC-Link master station.

After that, the following descriptions are given in this chapter:

- Read the input signals on channel 1 to 4 of the digital input module (DI08N, slot 1).
- Write the output signals on channel 1 to 4 of the digital output module (DO08N, slot 3).
- Monitor the data of connected modules.

Configuration of the ARIO unit

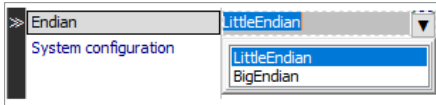


Configuration of CC-Link master station

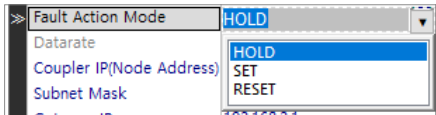
- Mitsubishi PLC CPU: Q03UDV
- Mitsubishi Network Module: QJ61BT11N
- Project Planning Software: GX-Works2 Ver 1

Settings of the ARIO coupler

- The setting of station number: 1
Set the positions of the decimal rotary switches to 01.
- The setting of transmission rate: 10 Mbps
Set the value of the DATARATE rotary switch to 9.
(Set the transmission rate same as the type of PLC CPU.)
- Endian: Little endian
The PLC used in this chapter supports the little-endian format.
To select the Little endian in the DAQMaster, go to **communication mode » Properties tab of coupler » Endian**.



- Fault Action setting: HOLD
To select the HOLD in the DAQMaster, go to **communication mode » Properties tab of coupler » Fault Action Mode**.





Fault Action function:

In the event of a field communication disruption, the output status of the expansion output module is automatically switched to a predefined value.

Setting range:

SET / RESET / HOLD

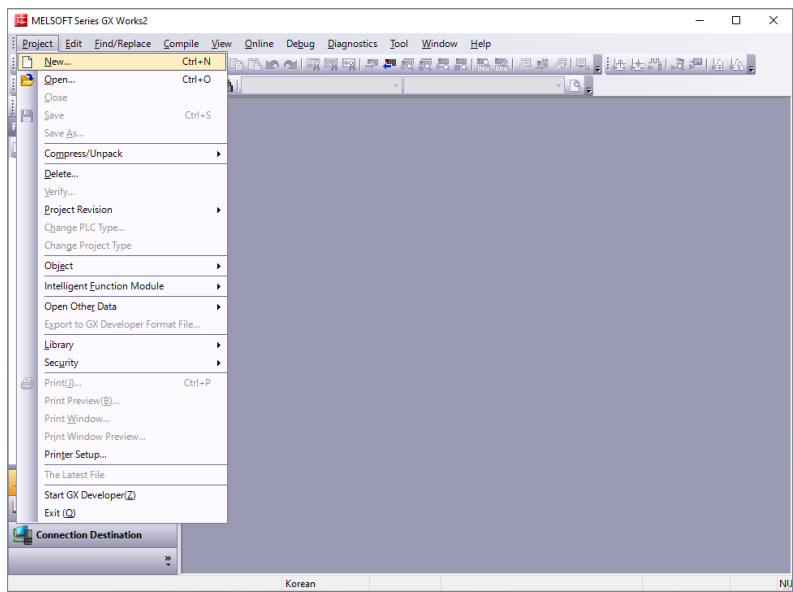
Setting	Digital output model	Analog output model
SET	All outputs of the module are switched to ON.	The default voltage/current setting is switched to the maximum value within the rated voltage/current range. (Ex. If the voltage range is $\pm 10 V_{DC}$, then upon SET operation, $10 V_{DC}$ is applied.)
RESET	All outputs of the module are switched to OFF.	Voltage output model: The default voltage setting is switched to $0 V_{DC}$. (Ex. If the voltage range is $\pm 10 V_{DC}$, then upon RESET operation, $0 V_{DC}$ is applied.) Current output model: The default current setting is applied as the minimum value within the rated current range. (Ex. If the current range is 4 to 20 mA, then upon RESET operation, 4 mA is applied.)
HOLD	The module's output status is maintained as it was prior to the communication disruption.	The module's output status is maintained as it was prior to the communication disruption.



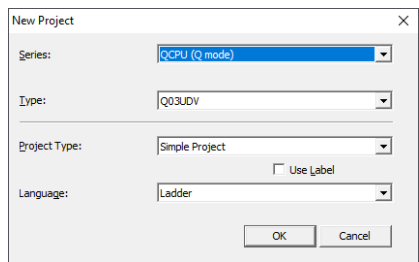
This chapter only describes based on the Mitsubishi's master (PLC) and software. For detailed information on communication connection and usage method with the master, refer to the user manuals provided by the specific manufacturer.

6.2. Create a Mitsubishi PLC Project

1. Click the **Project » New...** in the top menu.

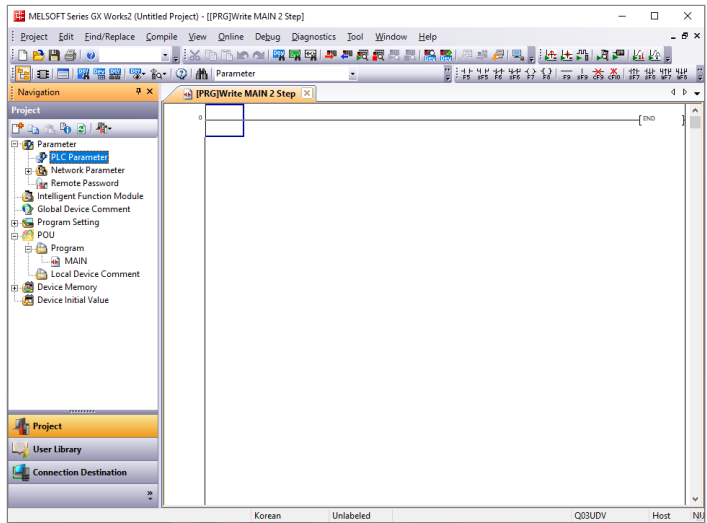


2. Configure the properties of connected PLC in the New Project window and click the **OK**.

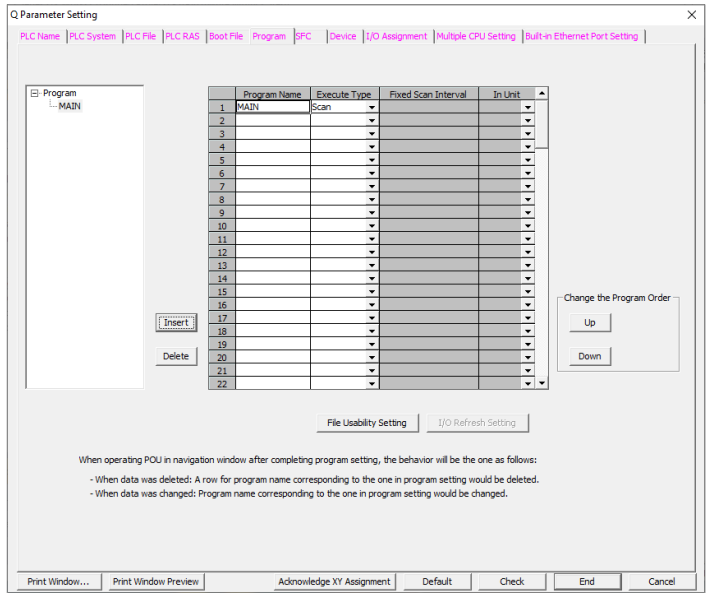


- **Series:** PLC CPU series name
- **Type:** PLC CPU model name
- **Language:** Ladder

3. Double-click the **Project View » Parameter » PLC Parameter** on the left side of the screen.



4. To register the **MAIN** program, click the **Insert** on the **Program** tab in the Q Parameter Setting window.



5. To import the information on the currently connected PLC, click the **Read PLC Data** on the **I/O Assignment** tab in the Q Parameter Setting window. (The PLC and ARIO unit are in the Online state.)

Q Parameter Setting

PLC Name | PLC System | PLC File | PLC RAS | Boot File | Program | SFC | Device | I/O Assignment | Multiple CPU Setting | Built-in Ethernet Port Setting

I/O Assignment(*1)

No.	Slot	PLC	Type	Model Name	Points	Start XY
0		PLC				
1	0(0-0)	Intelligent			32Points	
2	1(0-1)	Intelligent			32Points	
3	2(0-2)	Intelligent			32Points	
4						
5						
6						
7						

Switch Setting
Detailed Setting
Select PLC type
New Module

Assigning the I/O address is not necessary as the CPU does it automatically.
Leaving this setting blank will not cause an error to occur.

Base Setting(*1)

	Base Model Name	Power Model Name	Extension Cable	Slots
Main				3
Ext.Base1				
Ext.Base2				
Ext.Base3				
Ext.Base4				
Ext.Base5				
Ext.Base6				
Ext.Base7				

Base Mode
☐ Auto
☒ Detail
8 Slot Default
12 Slot Default
Select module name

Export to CSV File | Import Multiple CPU Parameter | Read PLC Data

(*1)Setting should be set as same when using multiple CPU.

Print Window... | Print Window Preview | Acknowledge XY Assignment | Default | Check | End | Cancel

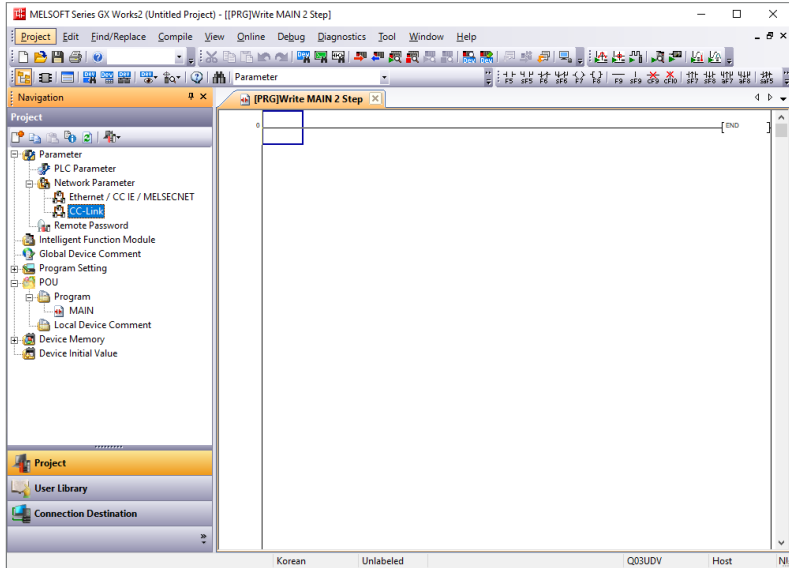
6. To check an error occurrence, click the **Check** at the bottom of the Q Parameter Setting window.

7. To save the settings, click the **End**.

6.3. Configure the CC-Link Parameters

6.3.1. General Settings

1. Double-click the **Project View » Network Parameter » CC-Link** on the left side of the screen.



2. To set each parameter in the CC-Link Module Configuration window, refer to the descriptions below.

- Number of Modules: The number of modules connected to the PLC CPU
- **Start I/O No.:** The head address of the network module
- Type: Master Station (→ CC-Link Master Board)
- Mode: Remote Net (Ver.1 Mode) (→ CC-Link Ver 1.1)
- Total Module Connected: The number of couplers connected to the CC-Link network
- Remote I/O, Remote Register (RX, RY, RWr, RWw): Start address of ARIO input/output module (e.g., X100, Y100, D500, D1000)
- Station Information Setting: Configuration of the coupler connected to the CC-Link network

Number of Modules 1 Boards		Blank : No Setting ☐ Set the station information in the CC-Link configuration window	
	1	2	
Start I/O No.	0000		
Operation Setting	Operation Setting		
Type	Master Station		
Master Station Data Link Type	PLC Parameter Auto Start		
Mode	Remote Net(Ver.1 Mode)		
Total Module Connected	1		
Remote Input(RX)	X100		
Remote Output(RY)	Y100		
Remote Register(RWw)	D1000		
Ver.2 Remote Input(RX)			
Ver.2 Remote Output(RY)			
Ver.2 Remote Register(RWw)			
Special Relay(SB)			
Special Register(SW)			
Retry Count	3		
Automatic Reconnection Station Count	1		
Standby Master Station No.			
PLC Down Select	Stop		
Scan Mode Setting	Asynchronous		
Delay Time Setting	0		
Station Information Setting	Station Information		
Remote Device Station Initial Setting	Initial Setting		
Interrupt Settings	Interrupt Settings		

- 3. To configure the coupler, click the **Station Information**.
- 4. The CC-Link Station Information Module window appears.

CC-Link Station Information Module 1

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	Ver.1 Remote I/O Station	Single	Occupied Station 1	32Points	No Setting			

Intelligent device station at station type also includes local station and standby master station.

Default

Check

End

Cancel

5. To configure the coupler, refer to the descriptions below.

Station No.	Station Type	Expanded Cyclic Setting	Number of Occupied Stations	Remote Station Points	Reserve/Invalid Station Select
1/ 1	Remote Device Station	Single	Occupied Stations 4	128Points	No Setting

Station Type

Select the Ver.1 Remote Device Station (only CC-Link Ver 1.1 is supported.)

Number of Occupied Stations

- Set the occupied station the same as the DATARATE rotary switch setting of the coupler.
- In the figure above, the occupied station number is set to 4 stations, because the DATARATE rotary switch of the coupler is set to 9.

Number of occupied stations ⁰¹⁾	Rotary switch setting	Transmission rates ⁰²⁾
Automatic assignment depending on the data size of the module • Occupied stations: 1 to 4 stations	0	156 kbps
	1	625 kbps
	2	2.5 Mbps
	3	5 Mbps
• Occupied stations: 4 stations fixed	4	10 Mbps
	5	156 kbps
	6	625 kbps
	7	2.5 Mbps
	8	5 Mbps
	9	10 Mbps

01) Refer to the 5.2, “CC-Link Memory Map Layout”.

02) It must be the same as the transmission rate of the master.

6. If multiple devices are connected and the number of occupied stations is different, designate the number right side of the **Station No.** as the station number. Set the positions of decimal rotary switches on the coupler to that station number.

Station No.	Station Type	Expanded Cyclic Setting	Number of Occupied Stations	Remote Station Points	Reserve/Invalid Station Select
1/ 1	Remote Device Station	Single	Occupied Stations 4	128Points	No Setting

7. To check an error occurrence, click the **Check** at the bottom of the CC-Link Station Information Module window. To save the settings, click the **End**.

CC-Link Station Information Module 1

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

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

Default Check End Cancel

8. To check an error occurrence, click the **Check** at the bottom of the CC-Link Module Configuration window. To save the settings, click the **End**.

Network Parameter - CC-Link

Number of Modules: 1

Station No.	1	2	3	4
Station 1	0000			
Operation Setting	Local Station (Master)			
Type	Master Station			
Master Station Data Link Type	PLC Register (Data Link)			
Mode	Remote Net (Com. 1 Mode)			
Transmit Module Connected	1			
Receive Input(Rx)	X100			
Receive Output(Rx)	Y100			
Remote Register(Remote)	0000			
Ver. 2 Remote Register(Remote)	0000			
Ver. 2 Remote Register(Remote)				
Special Register(Special)				
Special Register(Special)				
Relay Count	1			
Automatic Reconnection Station Count	1			
Standby Master Station No.				
PLC Clock Select	Stop			
Scan Mode Setting	Asynchronous			
Delay Time Setting	0			
Station Information Setting	Station Information			
Remote Device Station Initial Setting	Initial Setting			
Intermittent Setting	Intermittent Setting			

Setting Item Details

Print Window... Print Window... Acknowledge XY Assignment Clear Check End Cancel

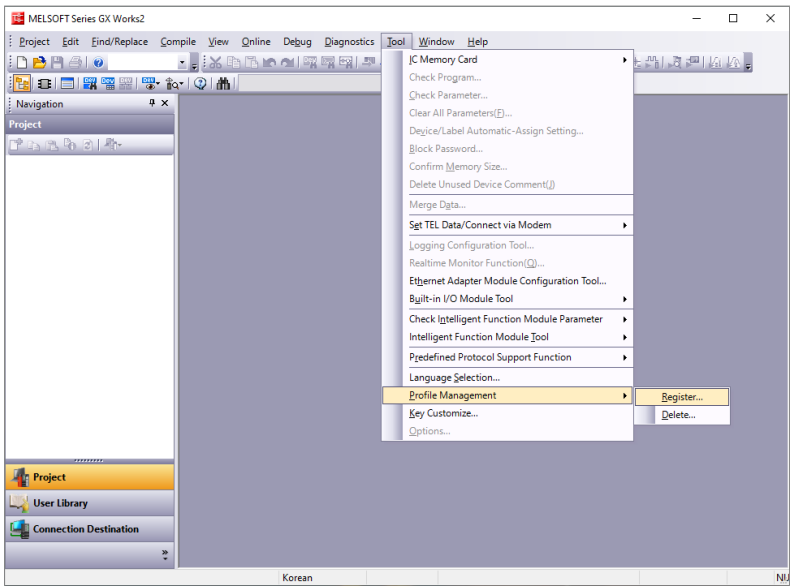
6.3.2. Settings with CSP+

1. Install the CSP+ File

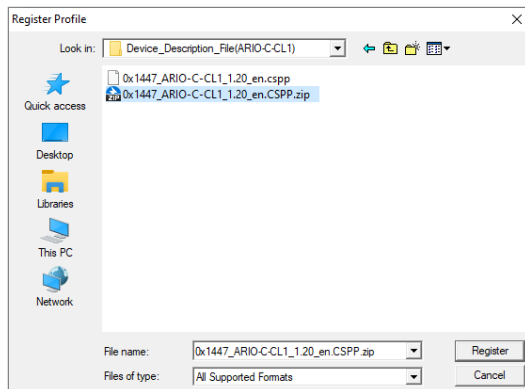


CC-Link Family System Profile Plus (CSP+) file defines the information of connected devices in CC-Link and CC-Link IE Field system. The CC-Link project planning software uses the CSP+ files to enable data exchange between the master and coupler. This file contains information about device specifications, parameters related to the network (occupied station and station type), input/output data (memory map), etc.

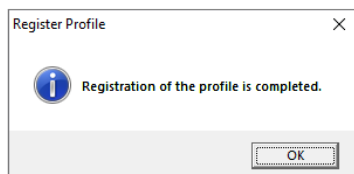
1. Download the CSP+ file of the ARI0-C-CL1 on our Autonics website.
2. Refer to the README.txt in the downloaded folder and select the CSP+ file suitable for the S/W version of the coupler.
3. Launch the GX-Works2.
4. Click the **Tool » Profile Management » Register...** in the top menu before opening a project file.



5. Select the downloaded CSP+ file and click the **Register**.



6. To install the CSP+ file, click the **OK**.



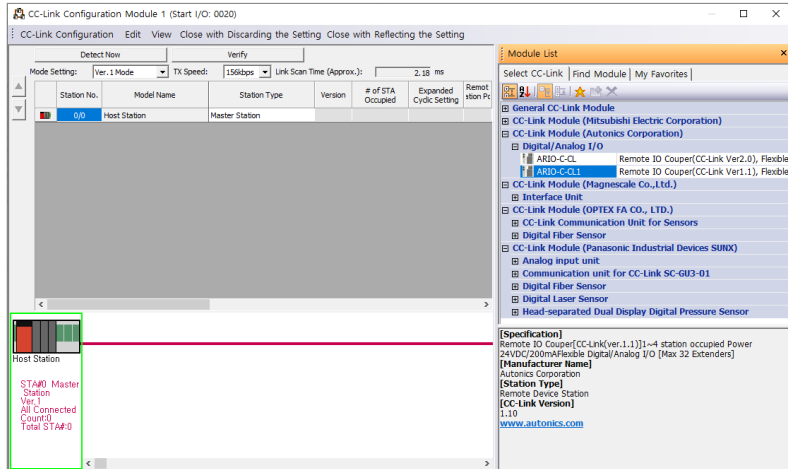
2. Configure the CC-Link parameters

1. Double-click the **Project View » Network Parameter » CC-Link** on the left side of the screen.
2. Firstly, select the checkbox of **Set the station information in the CC-Link configuration window** in the CC-Link Module Configuration window. To set each parameter, refer to the descriptions below.

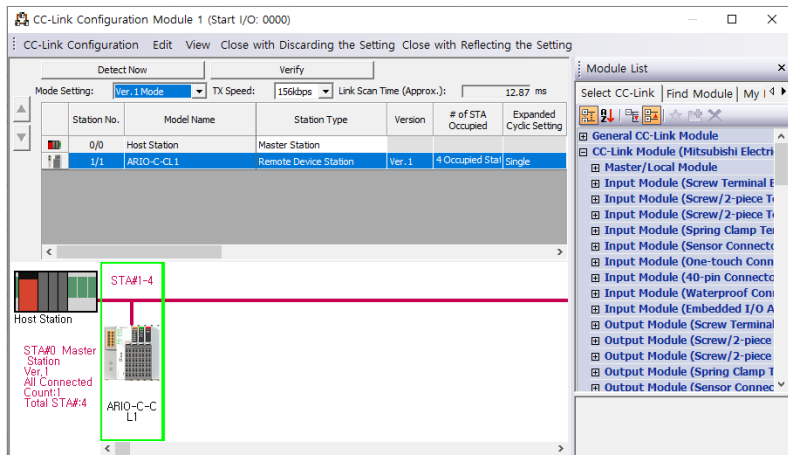
- Number of Modules: The number of modules connected to the PLC CPU
- **Start I/O No.:** The head address of the network module
- Type: Master Station (→ CC-Link Master Board)
- Mode: Remote Net (Ver.1 Mode) (→ CC-Link Ver 1.1)
- Total Module Connected: Automatic setting after the CC-Link configuration
- Remote I/O, Remote Register (RX, RY, RWr, RWw): Enter the start address of ARIO input/output module after the CC-Link configuration.
- Station Information Setting: Configure the coupler via CSP+ file.

Number of Modules	1	Boards	Blank : No Setting	☒ Set the station information in the CC-Link configuration window
	1	2		
Start I/O No.	0020			
Operation Setting	Operation Setting			
Type	Master Station			
Master Station Data Link Type	PLC Parameter Auto Start			
Mode	Remote Net(Ver.1 Mode)			
Total Module Connected(*1)	1			
Remote input(RX)				
Remote output(RY)				
Remote register(RWr)				
Remote register(RWw)				
Ver.2 Remote input(RX)				
Ver.2 Remote output(RY)				
Ver.2 Remote register(RWr)				
Ver.2 Remote register(RWw)				
Special relay(SB)	S80			
Special register(SW)	SW0			
Retry Count	3			
Automatic Reconnection Station Count	1			
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			

- To configure the coupler, click the **CC-Link Configuration Setting**.
- The CC-Link Configuration Module window appears.
Check whether **Module List » CC-Link Module (Autonics Corporation) » ARIO-C-CL1** is added on the right side of the screen.

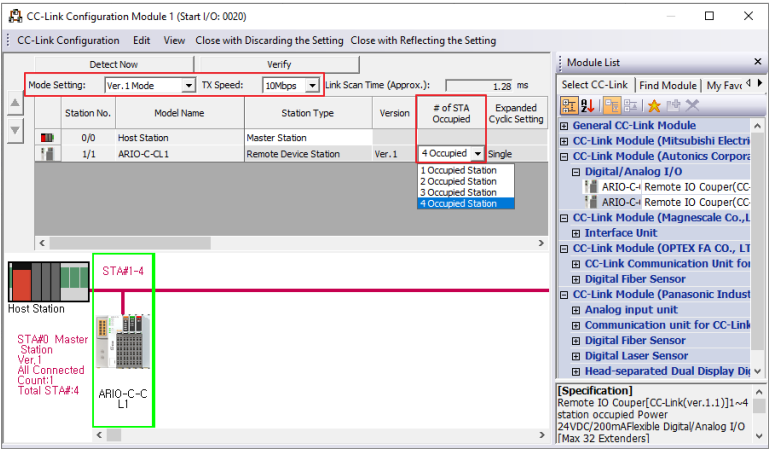


- Drag and Drop the ARIO-C-CL1 to the Host Station direction.



6. Set the **# of STA Occupied** the same as the value of the DATARATE rotary switch on the coupler.

- **Mode Setting:** Ver.1 Mode (→ CC-Link Ver 1.1) / **TX Speed:** Transmission rate



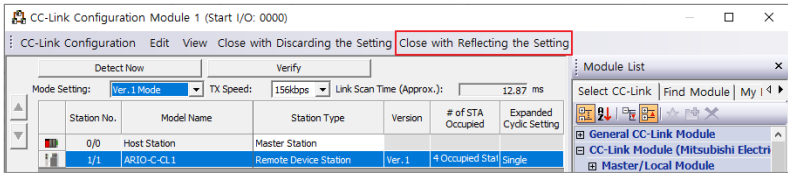
Number of occupied stations ⁰¹⁾	Rotary switch setting	Transmission rates ⁰²⁾
Automatic assignment depending on the data size of the module • Occupied stations: 1 to 4 stations	0	156 kbps
	1	625 kbps
	2	2.5 Mbps
	3	5 Mbps
	4	10 Mbps
• Occupied stations: 4 stations fixed	5	156 kbps
	6	625 kbps
	7	2.5 Mbps
	8	5 Mbps
	9	10 Mbps

01) Refer to the 5.2, “CC-Link Memory Map Layout”.

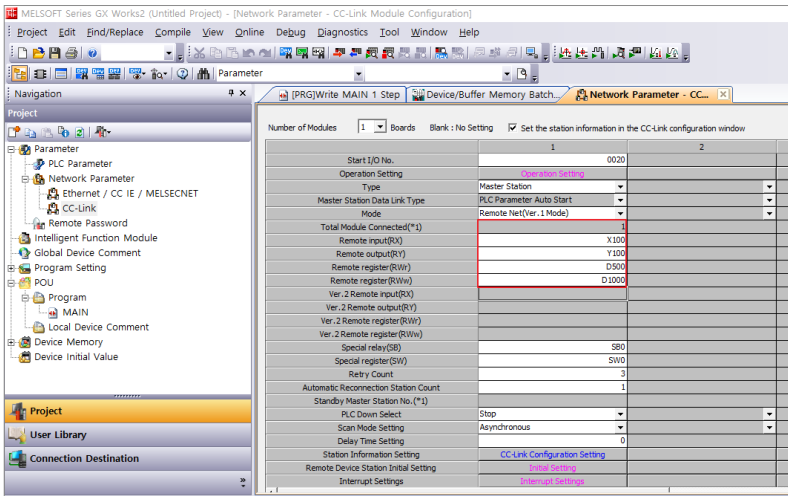
02) It must be the same as the transmission rate of the master.

7. If multiple devices are connected and the number of occupied stations is different, designate the number right side of the **Station No.** as the station number. Set the positions of decimal rotary switches on the coupler to that station number.

- Click the **Close with Reflecting the Setting** in the top menu.

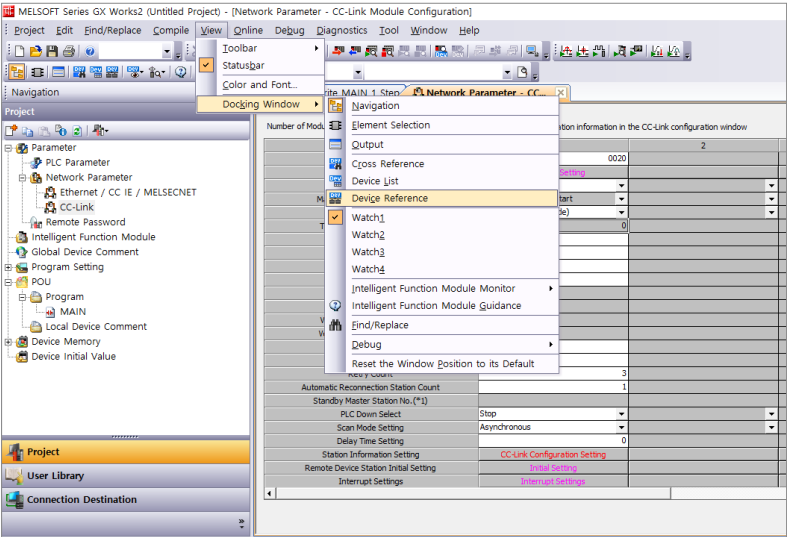


- The number of couplers connected to the Total Module Connected is applied.
Specify the start address of the ARIO input/output module to the Remote Input/Output (RX, RY) and Remote Register (RW, RWW).

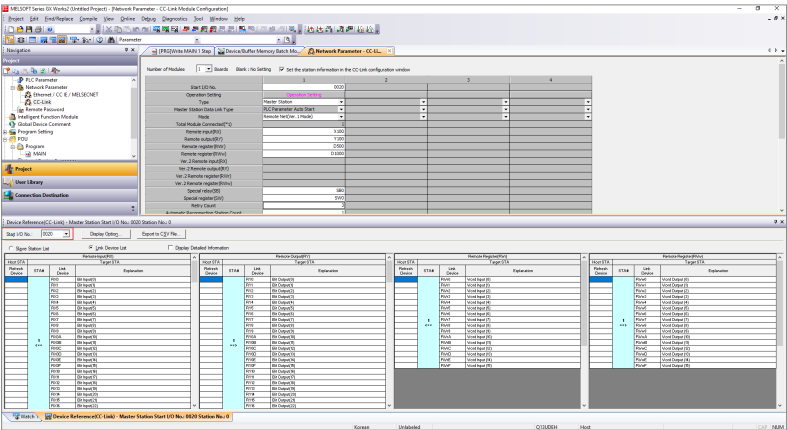


- To check an error occurrence, click the **Check** at the bottom of the window after the configuration is completed. To save the settings, click the **End**.

11. Click the **View » Docking Window » Device Reference** in the top menu.

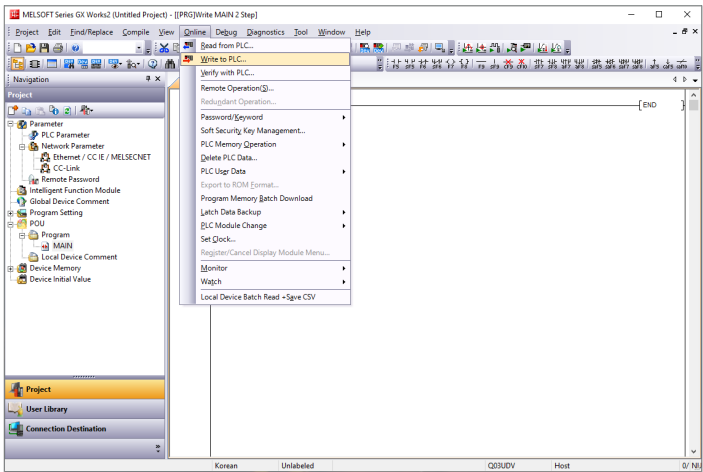


12. To check the mapping information of the ARIIO unit, select the Start I/O No. in the Device Reference(CC-Link) window.

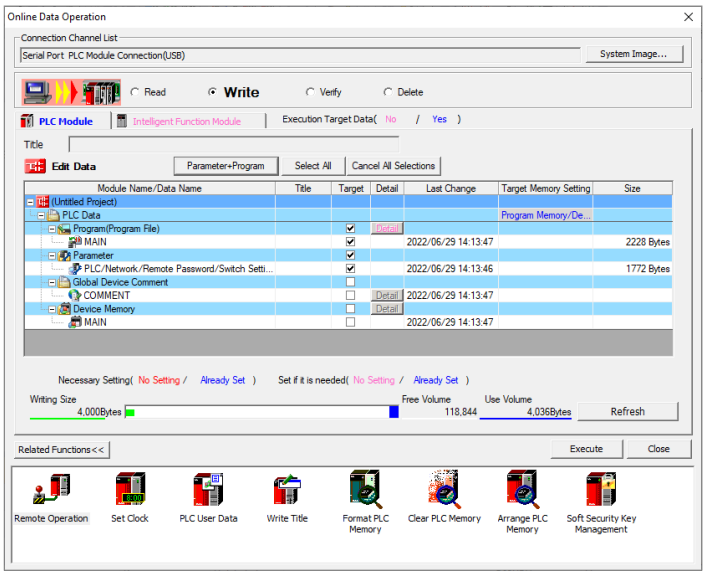


6.4. Download the Program

1. Click the **Online » Write to PLC...** in the top menu.



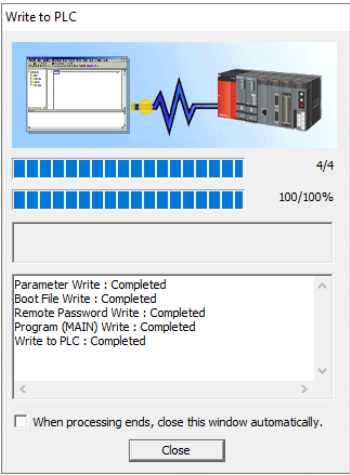
2. Click the **Parameter+Program** in the Online Data Operation window.



3. Click the **Execute** after confirming that all checkboxes of the Target below are selected.

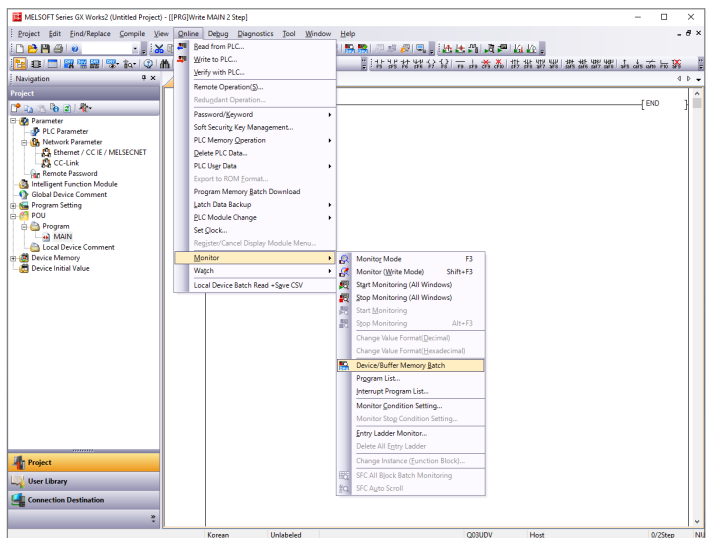
Module Name/Data Name	Title	Target	Detail	Last Change	Target Memory Setting	Size
(Untitled Project)						
PLC Data					Program Memory/De...	
Program(Program File)		☒	Detail			
MAIN		☒		2022/06/29 14:13:47		2228 Bytes
Parameter		☒		2022/06/29 14:13:46		1772 Bytes
PLC/Network/Remote Password/Switch Setti...		☒				
Global Device Comment		☐				
COMMENT		☐	Detail	2022/06/29 14:13:47		
Device Memory		☐	Detail			
MAIN		☐		2022/06/29 14:13:47		

4. Download is completed. Reset the PLC CPU.

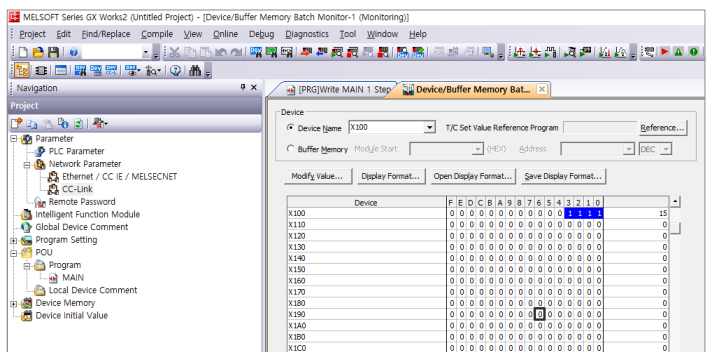


6.5. Monitor the I/O Data

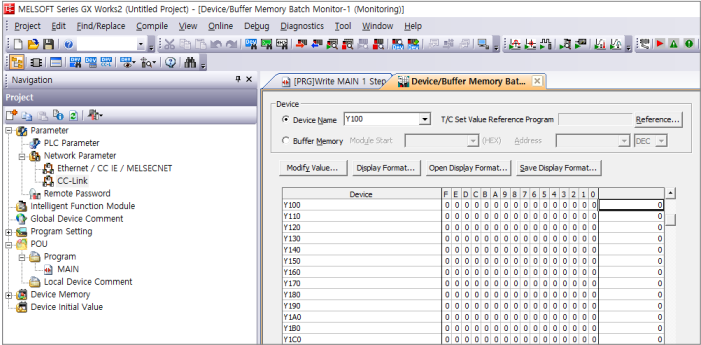
1. Click the **Online » Monitor » Device/Buffer Memory Batch** in the top menu.



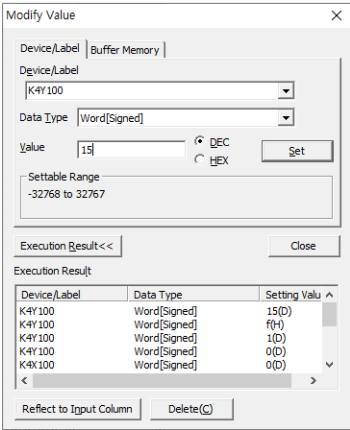
2. Enter the **X100** which is the start address of RX to the Device Name.
You can see that the input signals are applied to channel 1 to 4 of the first digital input module.



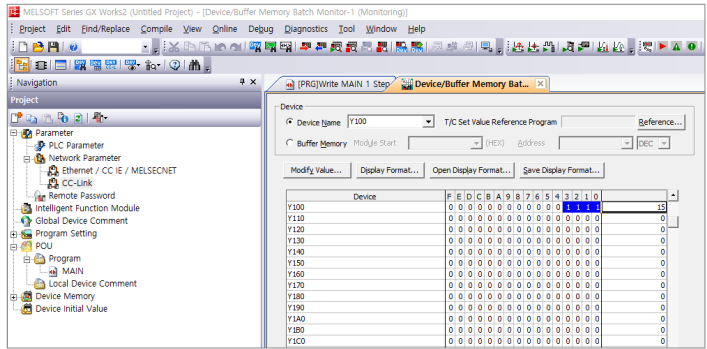
3. To check the address of the output module, enter the **Y100** which is the start address of RY to the Device Name. To apply the output signals to channel 1 to 4 of the first output module, double-click the value area on the right side of the mapping of the bits.



4. Enter the value of 15 to the Value area and click the **Set**. (15_{dec} = Binary 0000 1111)



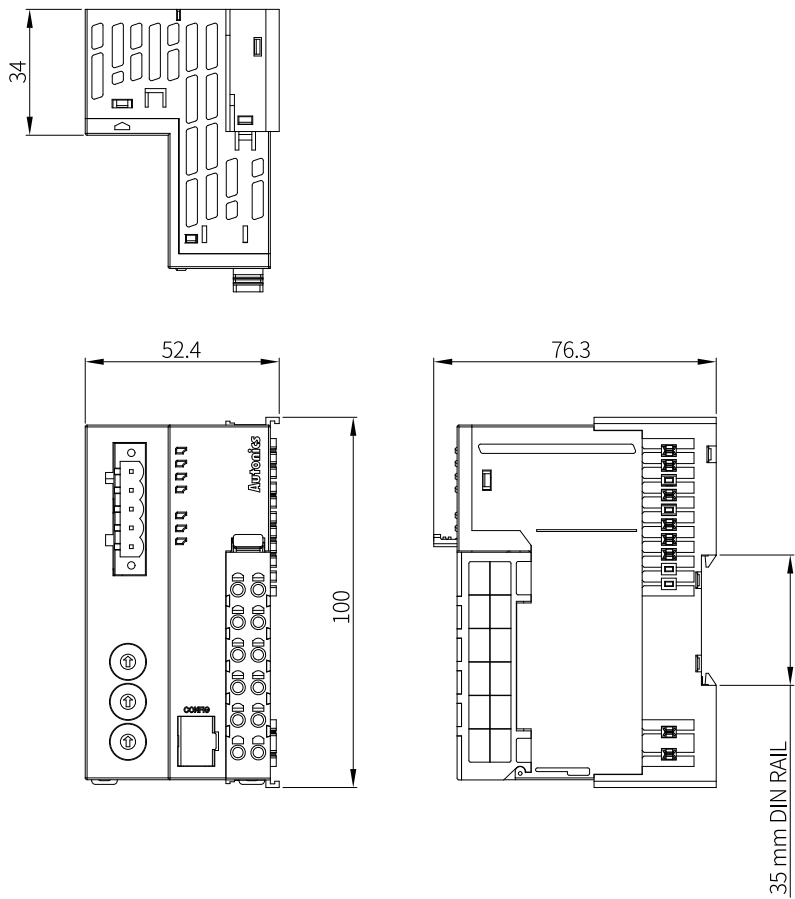
5. You can see that the output signals are applied as shown in the figure below.
(The channel indicators (no. 1 to 4) of digital output module light up.)



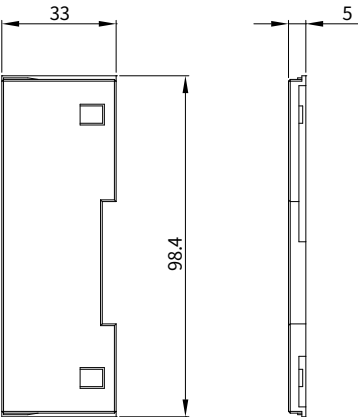
7. Dimensions

- For the detailed drawings, follow the Autonics website.
- Unit: mm

Coupler



End module



8. Specifications

8.1. Electrical/Mechanical Specifications

Protection circuit	Reverse field and supply power protection circuit
Power supply	• Unit (coupler + module): $\leq 9.6\text{ W}$, $\leq 400\text{ mA}$ ($\leq 200\text{ mA/CH}$, 2-CH/COM) • I/O: $\leq 96\text{ W}$, $\leq 4,000\text{ mA}$ ($\leq 2,000\text{ mA/CH}$, 2-CH/COM)
Supply voltage	• Coupler input voltage: 24 V_{DC} • ABUS supply voltage: 5 V_{DC}, $\leq 960\text{ mA}$ • I/O supply voltage: 24 V_{DC}
Current consumption	• The standby and run mode: 200 mA • The maximum load: 400 mA (at coupler max. load)
Comm. connector	5-pin PCB connector
CONFIG port	USB 2.0 type Micro B
Installation method	DIN rail mounting
Material	Terminal: PBT, Body: PC, Base: PA6, POM
Unit weight (packaged)	$\approx 165\text{ g}$ ($\approx 265\text{ g}$)

8.2. Environmental Conditions

Insulation resistance	$\geq 100\text{ M}\Omega$ (500 V _{DC} megger)
Dielectric strength	Between the charging part and the case: 1000 V _{AC} 50/60 Hz for 1 minute
Noise immunity	$\pm 500\text{ V}_{DC}$ the square wave noise (pulse width: 1 μs) by the noise simulator
Vibration	0.7 mm double amplitude at frequency of 10 to 55 Hz in each X, Y, Z direction for 1 hour
Vibration (malfunction)	0.5 mm double amplitude at frequency of 10 to 55 Hz in each X, Y, Z direction for 10 minutes
Shock	300 m/s ² ($\approx 30\text{ G}$) in each X, Y, Z direction for 3 times
Shock (malfunction)	100 m/s ² ($\approx 10\text{ G}$) in each X, Y, Z direction for 3 times
Ambient temperature	-10 to 55 °C, storage: -25 to 70 °C (no freezing or condensation)
Ambient humidity	35 to 85 %RH, storage: 35 to 85 %RH (no freezing or condensation)
Protection rating	IP20 (IEC standard)

8.3. Certification

Certification	CE, UKCA, UL Listed, KC, CC-Link
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9. Communication Specifications

9.1. CC-Link Communication

Comm. standard	CC-Link Ver 1.1
Station type	Remote device station (max. number of connected stations: ≤ 42 stations)
Memory size	• Input: RX 128-bit / RWr 32-byte • Output: RY 128-bit / RWw 32-byte
Max. number of connectable modules	≤ 32 (The length of connected modules: ≤ 384 mm)
Transmission rate setting	DATARATE rotary switch X 1
Transmission rates	156 kbps / 625 kbps / 2.5 Mbps / 5 Mbps / 10 Mbps
Cable spec.	The cable approved by the CC-Link Partner Association (CLPA)
Cable length	• 156 kbps: 1200 m • 625 kbps: 900 m • 2.5 Mbps: 400 m • 5 Mbps: 160 m • 10 Mbps: 100 m
Station number settings	Decimal rotary switches X 2
Station number	01 to 64
Occupied station	1 to 4 stations
Interface type	RS-485
Topology	Bus, Trunk, Drop Line, Daisy Chain
CSP+ file	Download the CSP+ file on our Autonics website

9.2. ABUS

Transmission rate	4 Mbps
Topology	Bus, Drop Line

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Dimensions or specifications on this manual are subject to change and some models may be discontinued without notice.

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