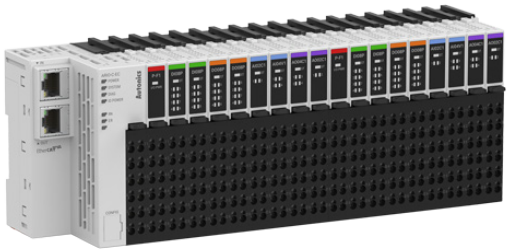
Autonics

Slim Remote I/O



ARIO Series

PRODUCT MANUAL

For your safety, read and follow the considerations written in the instruction manual, other manuals and Autonics website.

The specifications, dimensions, etc. are subject to change without notice for product improvement. Some models may be discontinued without notice.

Features

- I/O supported based on industrial Ethernet / Fieldbus serial communication for Smart Factory
- Sequential multiple I/O distribution control via PLC, Industrial PC, etc.
- Coupler
  : Supports a total of 8 different communications
  - EtherCAT, CC-Link, ProfiNet, ProfiBus, Ethernet/IP, DeviceNet, Modbus TCP compatible, Modbus RTU compatible
- Modules
  : Various Input / Output Modules, Power Modules
  - Remote ABUS/ I/O power, Digital input/output (4/8 CH), Analog input/output (2/4 CH), Temperature input (4 CH)
  - Up to 64 modules can be extended (depending on communication)
- Hot-swap function
  : Maintenance and setting can be restored automatically by replacing terminal and body during operation
- Push-in connection method
  : Easy wire connection without tools helps reducing workload
- Expanded user convenience with DAQMaster, a device integration management program
  - Module setting, real time control and monitoring / diagnosis of input / output signal (except ARIO-C-PN/PB)
  - Product selection and placement through virtual mode, offering recommended sorting

Safety Considerations

- Observe all 'Safety Considerations' for safe and proper operation to avoid hazards.
- ⚠ symbol indicates caution due to special circumstances in which hazards may occur.

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

01. **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.
02. **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.
03. **Do not disassemble or modify the unit.**
    Failure to follow this instruction may result in fire.
04. **Do not connect, repair, or inspect the unit while connected to a power source.**
    Failure to follow this instruction may result in fire.
05. **Check 'Connections' before wiring.**
    Failure to follow this instruction may result in fire.

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

01. **Use the unit within the rated specifications.**
    Failure to follow this instruction may result in fire or shortening the life cycle of the product.
02. **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.
03. **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.
04. **Keep metal chip, dust, and wire residue from flowing into the unit.**
    Failure to follow this instruction may result in fire or product damage.
05. **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

- Follow instructions in 'Cautions during Use'. Otherwise, It may cause unexpected accidents.
- BUS power and I/O power should be insulated by the individually insulated power device.
- Power supply should be insulated and limited voltage/current or Class 2, SELV power supply device.
- 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. Do not use near the equipment which generates strong magnetic force or high frequency noise.
- Use the rated standard cables and connectors. Do not apply excessive power when connecting or disconnecting the connectors of the product.
- Do not touch the module communication connector part of the base.
- 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.
- This unit may be used in the following environments.
  - Indoors (in the environment condition rated in 'Specifications')
  - Altitude max. 2,000 m
  - Pollution degree 2
  - Installation category II

Ordering Information

This is only for reference, the actual product does not support all combinations.
For selecting the specified model, follow the Autonics website.

■ Coupler

ARIO	-	C	-	❶

❶ Protocol
EC: EtherCAT
CL: CC-Link
PN: ProfiNet
PB: ProfiBus
EI: Ethernet/IP
DN: DeviceNet
MT: Modbus TCP compatible
MR: Modbus RTU compatible

■ I/O module

ARIO	-	S	-	❶	❷	❸

❶ I/O signal
DI: Digital input
DO: Digital output
AI: Analog input
AO: Analog output

❷ The number of channel
02: 2 CH
04: 4 CH
08: 8 CH

❸ I/O specifications
N: NPN
P: PNP
V1: Voltage (-10 to 10 VDC⎓)
V2: Voltage (0 to 10 VDC⎓)
C1: Current (0 to 20 mA)
C2: Current (4 to 20 mA)
TC: Thermocouple
RTD: Resistance thermometer

■ Power module

ARIO	-	P	-	❶

❶ Power supply
B: Bus power
F: I/O power
T: Terminal power

Product Components

■ Coupler

Model	ARIO-C-EC	ARIO-C-CL	ARIO-C-PN	ARIO-C-PB
Product components	Product, instruction manual			
End module	× 1	× 1	× 1	× 1
Communication connector	-	× 1	-	-
Terminating resistance	-	× 2	-	-

Model	ARIO-C-EI	ARIO-C-DN	ARIO-C-MT	ARIO-C-MR
Product components	Product, instruction manual			
End module	× 1	× 1	× 1	× 1
Communication connector	-	× 1	-	× 1
Terminating resistance	-	× 2	-	× 2

■ Module

- Product
- Instruction manual

Manual

For proper use of the product, refer to the manuals and be sure to follow the safety considerations in the manuals.
Download the manuals from the Autonics website.

Software

Download the installation file and the manuals from the Autonics website.

■ DAQMaster

It is the comprehensive device management program for Autonics' products, providing parameter setting, monitoring and data management.

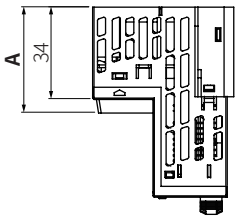
Sold Separately

- Terminal and base of the coupler
- Terminal, body, and base of the module

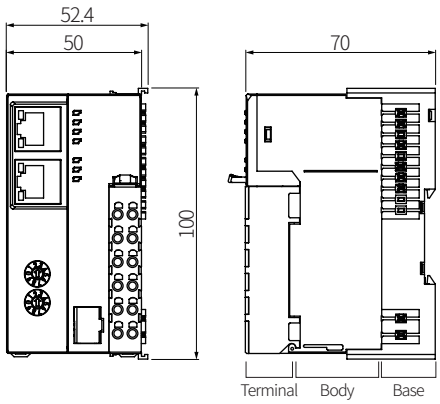
Dimensions

- Unit: mm, For the detailed drawings, follow the Autonics website.
- It may differ depending on the model.

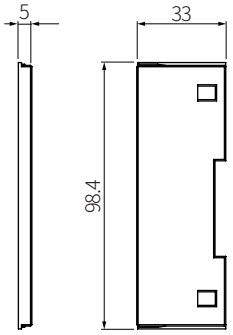
■ Coupler



Model	A
ARIO-C-EC/EI/PN/MT	39
ARIO-C-DN/CL/MR	36.2
ARIO-C-PB	38.2

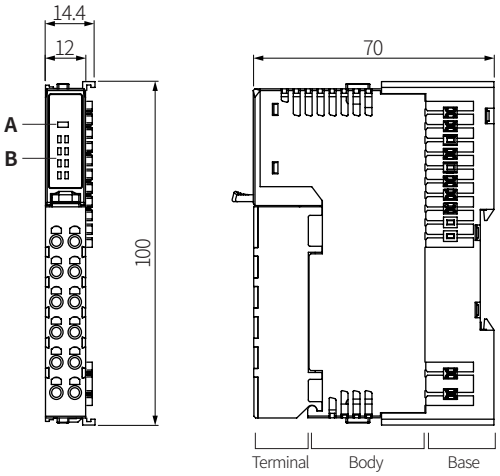


- End module



■ Module

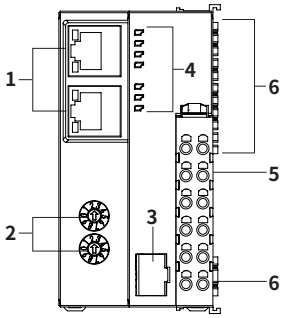
A	Status indicator
B	Channel indicator



Unit Descriptions

- It may differ depending on the model.
- Refer to the 'Dimensions' in case of the module.

■ Coupler



01. Communication connector
02. Communication setting switch
03. Setting connector (USB 2.0 type Micro B)
04. Indicators for the power and communication status
05. Power terminal block
06. ABUS communication connector

01. Communication connector

ARIO-C-EC/PN/EI/MT	ARIO-C-PB	ARIO-C-CL/DN/MR
RJ-45 connectors: 2	D SUB-9 Pin	5-pin PCB Connector
		

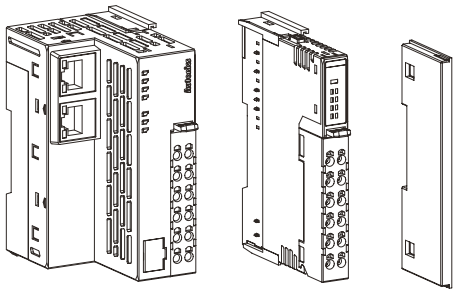
02. Communication setting switch

ARIO-C-EC	ARIO-C-CL/DN	The others
None	Decimal rotary switches: 3 (communication speed, address (×10, ×1))	Hexagonal rotary switches: 2 (address (×16, ×1))

Cautions during Installation

⚠ Follow the regulations below to configure the modules. For the configuration of the unit, refer to the figure below.
⚠ For more information, be sure to see the 'Manual of ARIO Series.'

- The number of connected modules: up to 32 or 64 modules
- The length of connection: 768 mm (include the power module and except the coupler/end modules)
- 8 digital I/O modules and 4 analog/special modules can be connected to ARIO-P-B or ARIO-P-F1.
- Do not connect the temperature input module at the left and right side of the power module.
- If you placed the coupler on the left side, recommend installing the modules with a bit or 1-byte type on the right side of the I/O module with word type.



Coupler Module End module

Specifications

■ Coupler

Model	ARIO-C-EC	ARIO-C-CL	ARIO-C-PN	ARIO-C-PB
Protocol	EtherCAT	CC-Link	PROFINET	PROFIBUS
Transfer rate	100 Mbps	10 Mbps	100 Mbps	12 Mbps
Max. connections for modules	≤ 64	≤ 32	≤ 64	≤ 32
Memory map	1024 Byte	512 Byte	1024 Byte	488 Byte
Communication connector	RJ45 × 2	5-pin PCB	RJ45 × 2	9-pin D SUB
Setting connector	USB 2.0 type Micro B			

Model	ARIO-C-EI	ARIO-C-DN	ARIO-C-MT	ARIO-C-MR
Protocol	EtherNet/IP	DeviceNet	ModbusTCP compatible	ModbusRTU compatible
Transfer rate	10/100 Mbps	500 kbps	10/100 Mbps	115.2 kbps
Max. connections for modules	≤ 64	≤ 32	≤ 64	≤ 32
Memory map	1008 Byte	510 Byte	1024 Byte	512 Byte
Communication connector	RJ45 × 2	5-pin PCB	RJ45 × 2	5-pin PCB
Setting connector	USB 2.0 type Micro B			

Power supply	• ABUS (external consump.): 24 VDC⎓, ≤ 400 mA (≤ 9.6 W, coupler + module, ≤ 200 mA/CH, 2 CH/COM)
	• ABUS (internal supply): 5 VDC⎓, ≤ 960 mA (≤ 4.8 W, module)
	• I/O: 24 VDC⎓, ≤ 4,000 mA (≤ 96 W, ≤ 2,000 mA/CH, 2 CH/COM)
Power consumption	24 VDC⎓, standby/run: 200 mA, Max. load: 400 mA (coupler max. load)

■ Module

Type	Digital input	Digital output
Model	ARIO-S-DI□□	ARIO-S-DO□□
Channel	4 CH, 8 CH model	
I/O common	NPN, PNP model	
I/O signal level	24 VDC⎓ ± 10 %	
Input voltage	Turn ON: ≥ 7 VDC⎓ Turn OFF: ≤ 0.4 VDC⎓	-
Output leakage voltage	-	≤ 1.2 VDC⎓
I/O current consumption	6 mA/CH	-
Rated output current	-	500 mA/CH
Power consumption	ABUS: 5 VDC⎓, ≤ 100 mA (≤ 0.5 W)	
On delay time	≤ 0.5 ms	
Off delay time	≤ 1.5 ms	
Internal transmission speed	4 Mbps	
Insulation	I/O to inner circuit: photocoupler insulated	

Type	Analog input			
Model	ARIO-S-AI□V1	ARIO-S-AI□V2	ARIO-S-AI□C1	ARIO-S-AI□C2
Channel	2 CH, 4 CH model			
Input method	Voltage input		Current input	
Input range	-10 to 10 VDC⎓	0 to 10 VDC⎓	0 to 20 mA	4 to 20 mA
Accuracy	• Room temperature: PV ±0.3% F.S. • Out of room temperature: PV ±0.6% F.S.			
Input impedance	≥ 1 MΩ		≤ 250 Ω	
Status indicator ON	≤ -1 V or ≥ 1 V	≥ 1 V	≥ 1 mA	≥ 4 mA
Resolution	12-bit			
Power consumption	• ABUS: 5 VDC⎓, ≤ 180 mA (≤ 0.9 W)			
	• I/O: 24 VDC⎓, ≤ 15 mA (≤ 0.36 W)			
Internal transmission speed	4 Mbps			
Insulation	• I/O to inner circuit: photocoupler insulated • Between channels: non-insulated			

Type	Analog output			
Model	ARIO-S-AO□V1	ARIO-S-AO□V2	ARIO-S-AO□C1	ARIO-S-AO□C2
Channel	2 CH, 4 CH model			
Output method	Voltage output		Current output	
Output range	-10 to 10 VDC⎓	0 to 10 VDC⎓	0 to 20 mA	4 to 20 mA
Accuracy	• Room temperature: PV ±0.3% F.S. • Out of room temperature: PV ±0.6% F.S.			
Load resistance	≥ 5 kΩ		≤ 350 Ω	
Status indicator ON	≤ -1 V or ≥ 1 V	≥ 1 V	≥ 1 mA	Always ON
Resolution	12-bit			
Power consumption	• ABUS: 5 VDC⎓, ≤ 180 mA (≤ 0.9 W)		• ABUS: 5 VDC⎓, ≤ 100 mA (≤ 0.5 W)	
	• I/O: 24 VDC⎓, ≤ 15 mA (≤ 0.36 W)		• I/O: 24 VDC⎓, ≤ 60 mA (≤ 1.44 W)	
Internal transmission speed	4 Mbps			
Insulation	• I/O to inner circuit: photocoupler insulated • Between channels: non-insulated			

Type	Temperature input	
Model	ARIO-S-AI04TC	ARIO-S-AI04RTD
Channel	4 CH	
Input method	Voltage input	Resistance input
Input range	Refer to the 'Input type and using range'	
Display accuracy 01)	(PV ±0.2% F.S. or ±2 °C, select the higher one) ±1-digit	(PV ±0.2% F.S.) ±1-digit
Status indicator ON	Temperature input within the rated range ※ No operation when the thermometer is not attached	
Resolution / Display	16-bit / 0.1 °C	
Power consumption	• ABUS: 5 VDC⎓, ≤ 180 mA (≤ 0.9 W)	
	• I/O: 24 VDC⎓, ≤ 15 mA (≤ 0.36 W)	
Internal transmission speed	4 Mbps	
Insulation	• I/O to inner circuit: photocoupler insulated • Between channels: non-insulated	

01) Refer to the 'Measurement accuracy' below

• Input type and using range

Input type		Using range (°C)	Data display (dec)
Thermocouple	K (CA)	-200.0 to 1350.0	-2000 to 13500
	J (IC)	-200.0 to 800.0	-2000 to 8000
	E (CR)	-200.0 to 800.0	-2000 to 8000
	T (CC)	-200.0 to 400.0	-2000 to 4000
	B (PR)	0.0 to 1800.0	00 to 18000
	R (PR)	0.0 to 1750.0	00 to 17500
	S (PR)	0.0 to 1750.0	00 to 17500
	N (NN)	-200.0 to 1300.0	-2000 to 13000
	C (TT) 01)	0.0 to 2300.0	00 to 23000
	G (TT) 02)	0.0 to 2300.0	00 to 23000
	L (IC)	-200.0 to 900.0	-2000 to 9000
	U (CC)	-200.0 to 400.0	-2000 to 4000
	Platinel II	0.0 to 1390.0	00 to 13900
RTD	Cu50 Ω	-200.0 to 200.0	-2000 to 2000
	Cu100 Ω	-200.0 to 200.0	-2000 to 2000
	JPt50 Ω	-200.0 to 650.0	-2000 to 6500
	JPt100 Ω	-200.0 to 650.0	-2000 to 6500
	JPt1000 Ω	-200.0 to 500.0	-2000 to 5000
	DPt50 Ω	-200.0 to 650.0	-2000 to 6500
	DPt100 Ω	-200.0 to 650.0	-2000 to 6500
	DPt1000 Ω	-200.0 to 500.0	-2000 to 5000
	Nickel100 Ω	-50.0 to 200.0	-500 to 2000
	Nickel120 Ω	-50.0 to 200.0	-500 to 2000
	Nickel1000 Ω	-50.0 to 200.0	-500 to 2000

01) C(TT): Same as existing W5(TT) type sensor
02) G(TT): Same as existing W(TT) type sensor

• Measurement accuracy

Input type	Using temperature	Measurement accuracy
Thermo -couple RTD	At room temperature (23 ±5 °C)	• Thermocouple K, J, T, N, E below -100 °C and L, U, PLII: (PV ±4 °C) ±1-digit • Thermocouple R, S below ±200 °C : ±4 °C ±1-digit • Thermocouple B below 400 °C: no accuracy standards • RTD Cu50 Ω, Cu100 Ω, Ni100 Ω, Ni120 Ω, Ni1000 Ω: (PV ±2 °C) ±1-digit
	Out of room temperature range	• Thermocouple: (PV ±0.5% F.S or ±7 °C higher one) ±1-digit • RTD: (PV ±0.5% F.S or ± 3 °C higher one) ±1- digit

Type	ABUS power supply
Model	ARIO-P-B
Power supply	• ABUS (external consump.): 24 VDC⎓, ≤ 320 mA (≤ 7.5 W, ≤ 160 mA/CH, 2 CH/COM)
	• ABUS (internal supply): 5 VDC⎓, ≤ 1,500 mA (≤ 7.5 W)

Type		I/O power supply			
Model		ARIO-P-F1	ARIO-P-F2	ARIO-P-T1	ARIO-P-T2
Input	Voltage	24 VDC⎓ 10% (≤ 48 W)		-	
	Max. current	2,000 mA/CH, 2 CH/COM		-	
Output	Voltage	24 VDC⎓ 10% (≤ 48 W)		24 VDC⎓ 10% (≤ 48 W)	
	Max. current	2,000 mA/CH, 6 CH/COM		2,000 mA/CH, 8 CH/COM	

■ Common specifications

Insulation resistance	≥ 100 MΩ (500 VDC⎓ megger)
Dielectric strength	1000 VAC~ 50/60 Hz for 1 min
Noise immunity	500 VDC⎓ 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 (for 1 min) in each X, Y, Z direction for 1 hour
Vibration (malfunction)	0.5 mm double amplitude at frequency of 10 to 55 Hz (for 1 min) in each X, Y, Z direction for 10 min
Shock	300 m/s² (≈ 30 G) in each X, Y, Z direction for 3 times
Shock (malfunction)	100 m/s² (≈ 10 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)
Material	Terminal: PA6, body: MPPO, base: PA6, POM
Installation method	DIN rail mounting
Certification	CE cULus LISTED KC
Unit weight (packaged)	• Coupler: ≈ 165 g (≈ 265 g) • Module: ≈ 75 g (≈ 108 g)