Modbus Remote I/O

ARM 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.

CE UK CA EAC

Features

- Modbus RTU standard protocol
- Saving work time for wiring with sensor connector (CNE series, sold separately)
- Compact size
  : Small size with W 26 × L 76 × H 54 mm to install at narrow space
  : Available DIN Rail mounting and panel mounting method
- Low-speed (16 bit / 30 CPS) counter function
- Real-time monitoring by various functions
  : Communication speed auto-recognition
  : Reading number of expansion units and specifications, Reading model name of basic and expansion units
  : Monitoring Single byte input/output, Multi byte input/output and status Flag
- Easy expansion
  : Available to connect up to 63 basic units per 1 master unit
  : Available to connect up to 7 expansion units per 1 basic units (controllable input/output for max. 64 points)
  : Combines the desired specifications of input/output by various input/output units
  : Organizes power and communication system by only communication cable lines
- High reliability
  : Built-in surge, short, overheat, reverse power polarity and ESD protection circuits

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, economic loss or fire.
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 product damage.
02. **Use a 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. **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.
04. **Do not cut off power or disconnect connectors while operating the unit.**
Failure to follow this instruction may result in fire or malfunction.

Cautions during Use

- Follow instructions in 'Cautions during Use'. Otherwise, it may cause unexpected accidents.
- 24 VDC⎓ model power supply should be insulated and limited voltage/current or Class 2, SELV power supply device.
- Use only designated connector and do not apply excessive power when connecting or disconnecting the connectors..
- 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. Do not use near the equipment which generates strong magnetic force or high frequency noise.
- Do not connect or disconnect the expansion unit when power is being supplied.
- 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.

| AR | ❶ | - | ❷ | ❸ | ❹ | ❺ | - | ❻ |

❶ **Network**
M: Basic unit - Modbus
X: Expansion unit - Modbus / DeviceNet compatible

❷ **Type**
D: Digital

❸ **I/O configuration**
I: Input
O: Outhput

❹ **I/O points**
08: 8-point

❺ **I/O specifications**
N: NPN open collector
P: PNP open collector

❻ **Terminal type**
4S: Sensor connector
(4-pin socket)

Product Components

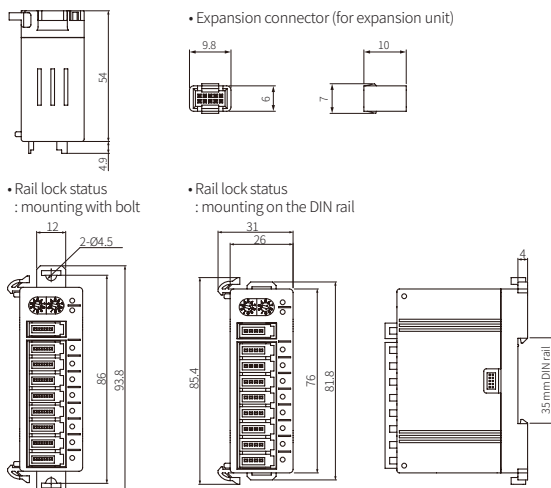| Model	ARM-D☐08☐-4S	ARX-D☐08☐-4S
Product components	Product, instruction manual	
Network connector	× 1	-
Expansion connector	-	× 1
Terminating resistance	× 2	-

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.

Sold Separately

• Sensor connector: CNE Series

Dimensions

• Unit: mm, For the detailed drawings, follow the Autonics website.
• Same dimensions are applied to both basic and expansion unit.

• Expansion connector (for expansion unit)

• Rail lock status
: mounting with bolt

• Rail lock status
: mounting on the DIN rail

Connections

• For more information, refer to the 'Specifications.'
• When wiring the communication connector, use AWG 20 cable and tighten the connector screw with a tightening torque of 0.5 N m.
• Connect terminating resistances (recommended: 120 Ω, 1 % of the metallic film, 1/4 W) on both ends of the network cables. Otherwise, impedance fluctuation could cause communication errors.

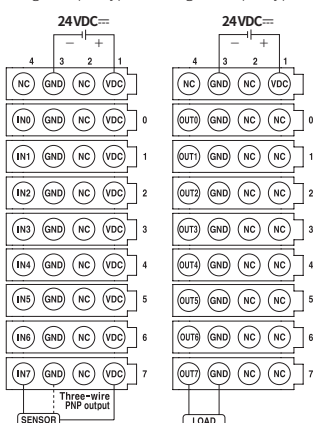### ■ NPN open collector

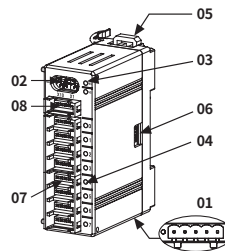Digital input type   Digital output type
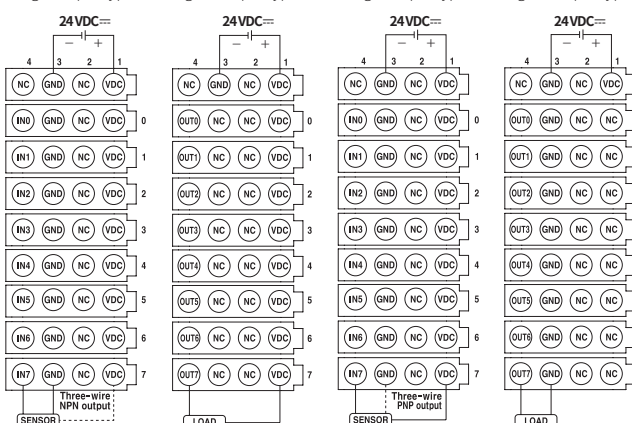
■ PNP open collector

Digital input type   Digital output type

Unit Descriptions

■ Basic unit

01. **Network connector**
02. **Rotary switch**
For setting NODE ADDRESS
03. **Status indicator**
For unit status (MS) and network status (NS)
04. **I/O Status indicator**
For I/O status
05. **Rail lock**
For the DIN rail and panel mount
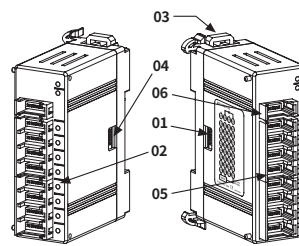06. **Connector output part**
For connecting the expansion unit
07. **Sensor connector**
For I/O with the external device
08. **External power connector**
For connecting the external power

■ Expansion unit

01. **Connector input part**
For connecting the basic and expansion units
02. **I/O status indicator**
For I/O status
03. **Rail lock**
For the DIN rail and panel mount
04. **Connector output part**
For connecting the expansion unit
05. **Sensor connector**
For I/O with the external device
06. **External power connector**
For connecting the external power

■ Network connector

No.	Function	Pinout
5	24 VDC⎓ (+)	5: 24 VDC⎓
4	GND	4: GND
3	N.C	3: N·C
2	B	2: B
1	A	1: A

■ I/O status indicator

Input	Green LED, ON
Output	Red LED, ON

■ Status indicator

		Red LED	Green LED	Description
Unit status (MS) indicator		ON	OFF	Error of the expansion units
		Flashing	OFF	MAC ID error
		OFF	ON	Normal operation
		OFF	OFF	Power is not supplied.
Network status (NS) indicator		ON	OFF	Not supported communication speed (at auto baud rate)
		Flashing	OFF	Packet error
		OFF	ON	Normal communication
		OFF	Flashing	Communication standby

Set NODE ADDRESS

• Setting method: Rotary switch / internal EEPROM
• The NODE ADDRESS of the connected unit must not be duplicated.
• When changing the NODE ADDRESS during operation, the unit status (MS) LED flashes in red, and the unit communicates as the address before. To apply the changed NODE ADDRESS, be sure to power on again.
• The communication speed is automatically set to that of the Master (PC, PLC, etc.). When changing the communication speed during operation, the network status (NS) LED flashes in red, and communication is not possible.
Power on again to operate in the normal state.

■ Rotary switch

01. **Turn the two rotary switches to set the NODE ADDRESS.**
(NODE ADDRESS range: 01 to 99)

• [e.g.]

Rotary switch	X10 (tens digit)	X1 (ones digit)	NODE ADDRESS
X10 X1	3	3	33

■ Internal EEPROM

01. **Turn the two rotary switches to "00."**
02. **During communication status with the Master (PLC or PC), set the desired NODE ADDRESS on the 41029 EEPROM MAC ID parameter.**

Installation

■ Mounting on the DIN rail

01. Pull two Rail locks on the rear part of a unit.
02. Place the unit on the DIN rail to be mounted.
03. Press the Rail locks to fix the unit tightly.

■ Mounting on the panel

01. Pull two rail locks on the rear part of a unit, and there is a fixing bolt hole.
02. Place the unit on a panel to be mounted.
03. Make a hole on a fixing bolt hole position.
04. Fasten the bolt to fix the unit tightly.
    (tightening torque: ≤ 0.5 N m or 1.8 to 2.5 N m)

Connect Expansion Unit

01. Turn OFF the power of a basic unit.
02. Remove the cover of the expansion connector (accessory of the expansion unit) with nippers.
03. Mount the expansion connector and connector input part of the expansion unit.
04. Connect the expansion unit to the connector output part of the basic unit.
05. Power on the basic unit, recognizing the expansion unit.

Specifications

Model		AR□-DI08□-4S	AR□-DO08□-4S
Power supply		Rated voltage: 24 VDC⎓, voltage range: 12-28 VDC⎓	
Power consumption		≤ 3 W	
I/O points		NPN or PNP input 8-point	NPN or PNP output 8-point
Control I/O	Voltage	10-28 VDC⎓ input	10-28 VDC⎓ output (voltage drop: ≤ 0.5 VDC⎓)
	Current	10 mA/point (sensor current: 150 mA/point)	0.3 A/point (leakage current: ≤ 0.5 mA)
	COMMON method	8-point, common	
Number of connected expansion unit		≤ 7 units	
I/O points		≤ 64-point	
Counter function [01]		16 bits low-speed counter (30 CPS)	-
Insulation method		I/O and internal circuit: photocoupler insulation, Modbus to internal bus and internal circuit: insulation, unit power: non-insulation	
Insulation resistance		≥ 200 MΩ (500 VDC⎓ megger)	
Noise immunity		±240 VDC⎓ the square wave noise (pulse width: 1 µs) by the noise simulator	
Dielectric strength		Between the charging part and the case: 1,000 VAC∼ at 50 / 60 Hz for 1 min	
Vibration		1.5 mm amplitude at frequency 10 to 55 Hz in each X, Y, Z direction for 2 hours	
Shock		500 m/s^2 (≈ 50 G) in each X, Y, Z direction for 3 times	
Ambient temperature		-10 to 55 °C, storage: -25 to 75 °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)	
Protection circuit		Surge, short-circuit, overheat and ESD protection, reverse power protection circuit	
		Overcurrent protection circuit (operation: ≥ 0.17 A)	Overcurrent protection circuit (operation: ≥ 0.7 A)
Indicator		Network status (NS) and unit status (MS) indicator (green, red LED), I/O status indicator (input: green LED, output: red LED)	
Material		Front and body case: PC	
Mounting method		DIN rail or panel mounting	
Certification		CE UKCA EHC	
Unit weight (packaged)	Basic unit	≈ 61.8 g (≈ 123.3 g)	≈ 61.8 g (≈ 123.3 g)
	Expansion unit	NPN type: ≈ 56 g (≈ 117.5 g) PNP type: ≈ 57 g (≈ 118.5 g)	NPN type: ≈ 58 g (≈ 119.5 g) PNP type: ≈ 59 g (≈ 120.5g)

01) CPS (counter per second): Specification of accepting external signals per second
The digital output type is available to use the counter when using with digital input type.
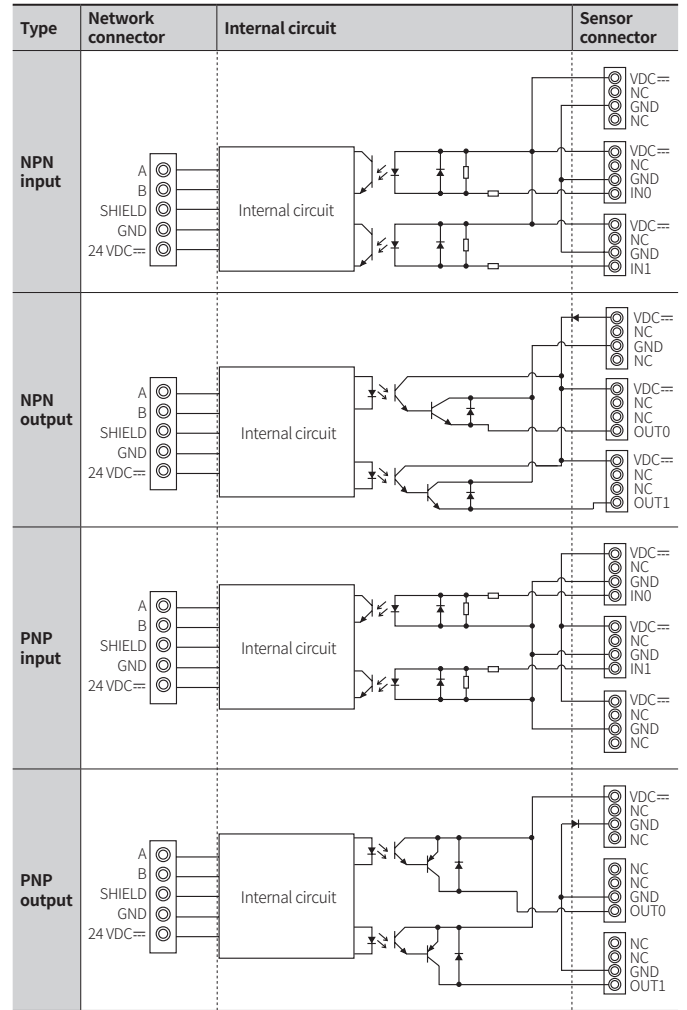
Communication Interface

■ RS485

Comm. protocol	Modbus RTU
Application standard	Compliance with EIA RS485
Max. connection	32-unit
Medium access	POLL
Comm. method	2-wire half duplex
Comm. distance	≤ 800 m
Comm. speed	2,400 / 4,800 / 9,600 (default) / 19,200 / 38,400 / 57,600 / 115,200 bps
Data bit	8-bit (fixed)
Parity bit	None (default), Even, Odd
Stop bit	1-bit, 2-bit (default)

I/O Circuit Diagram

Type	Network connector	Internal circuit	Sensor connector
NPN input	A, B, SHIELD, GND, 24 VDC⎓	Internal circuit	VDC⎓, NC, GND, NC / VDC⎓, NC, GND, IN0 / VDC⎓, NC, GND, IN1
NPN output	A, B, SHIELD, GND, 24 VDC⎓	Internal circuit	VDC⎓, NC, GND, NC / VDC⎓, NC, NC, OUT0 / VDC⎓, NC, NC, OUT1
PNP input	A, B, SHIELD, GND, 24 VDC⎓	Internal circuit	VDC⎓, NC, GND, IN0 / VDC⎓, NC, GND, IN1 / VDC⎓, NC, GND, NC
PNP output	A, B, SHIELD, GND, 24 VDC⎓	Internal circuit	VDC⎓, NC, GND, NC / NC, NC, GND, OUT0 / NC, NC, GND, OUT1