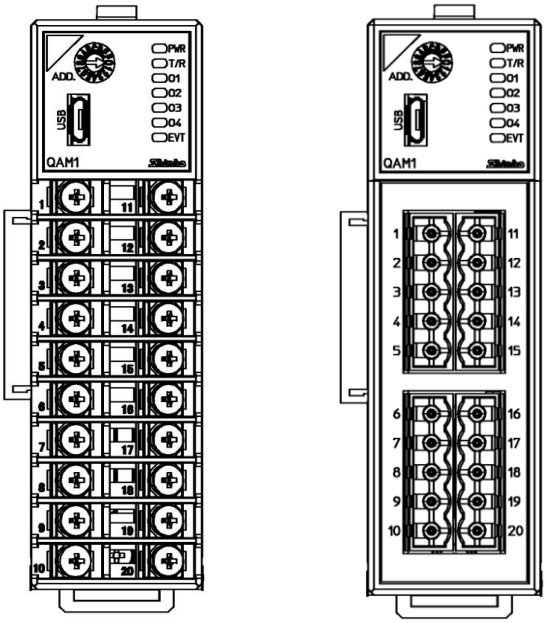
4 points Analog I/O Module

QAM1-4

MOUNTING AND WIRING

INSTRUCTION MANUAL



Shinko

Preface

Thank you for purchasing our 4 points Analog I/O Module [QAM1-4].
This manual contains instructions for the mounting and wiring when operating the 4 points Analog I/O Module [QAM1-4].
To prevent accidents arising from the misuse of this instrument, please ensure the operator receives this manual.

For details on how to use it, refer to the instruction manual (detailed version).
Please access our website from the following URL or QR code to download the instruction manual (detailed version).
https://shinko-technos.co.jp/e/download/d_manual_download.html#Q

Notes

- This instrument should be used in accordance with the specifications described in the manual. If it is not used according to the specifications, it may malfunction or cause a fire.
- Be sure to follow the warnings, cautions and notices. If they are not observed, serious injury or malfunction may occur.
- The contents of this instruction manual are subject to change without notice.
- Care has been taken to ensure that the contents of this instruction manual are correct, but if there are any doubts, mistakes or questions, please inform our sales department.
- This instrument is designed to be installed on a DIN rail within a control panel indoors. If it is not, measures must be taken to ensure that the operator does not touch power terminals or other high voltage sections.
- Any unauthorized transfer or copying of this document, in part or in whole, is prohibited.
- Shinko Technos Co., Ltd. is not liable for any damage or secondary damage(s) incurred as a result of using this product, including any indirect damage.

SAFETY PRECAUTIONS (Be sure to read these precautions before using our products.)

The safety precautions are classified into categories: “Warning” and “Caution”.
Depending on circumstances, procedures indicated by ⚠ Caution may result in serious consequences, so be sure to follow the directions for usage.

⚠ Warning Procedures which may lead to dangerous conditions and cause death or serious injury, if not carried out properly.

⚠ Caution Procedures which may lead to dangerous conditions and cause superficial to medium injury or physical damage or may degrade or damage the product, if not carried out properly.

⚠ Warning

- To prevent an electrical shock or fire, only Shinko or qualified service personnel may handle the inner assembly.
- To prevent an electrical shock, fire, or damage to instrument, parts replacement may only be undertaken by Shinko or qualified service personnel.

⚠ Safety Precautions

- To ensure safe and correct use, thoroughly read and understand this manual before using this instrument.
- This instrument is intended to be used for industrial machinery, machine tools and measuring equipment. Verify correct usage after purpose-of-use consultation with our agency or main office. (Never use this instrument for medical purposes with which human lives are involved.)
- External protection devices such as protective equipment against excessive temperature rise, etc. must be installed, as malfunction of this product could result in serious damage to the system or injury to personnel. Proper periodic maintenance is also required.
- This instrument must be used under the conditions and environment described in this manual. Shinko Technos Co., Ltd. does not accept liability for any injury, loss of life or damage occurring due to the instrument being used under conditions not otherwise stated in this manual.

⚠ Caution with Respect to Export Trade Control Ordinance

To avoid this instrument from being used as a component in, or as being utilized in the manufacture of weapons of mass destruction (i.e. military applications, military equipment, etc.), please investigate the end users and the final use of this instrument.
In the case of resale, ensure that this instrument is not illegally exported.

Precautions for Use

1. Installation Precautions

⚠ Caution

This instrument is intended to be used under the following environmental conditions (EN61010-1):

- Overvoltage Category II, Pollution degree 2

Ensure the mounting location corresponds to the following conditions:

- A minimum of dust, and an absence of corrosive gases
- No flammable, explosive gases
- No mechanical vibrations or shocks
- No exposure to direct sunlight, an ambient temperature of -10 to 50°C(14°F to 122°F) that does not change rapidly, and no icing
- An ambient non-condensing humidity of 35 to 85%RH
- No large capacity electromagnetic switches or cables through which large current is flowing
- No water, oil or chemicals or the vapors of these substances can come into direct contact with the unit.
- When installing this unit within a control panel, please note that ambient temperature of this unit – not the ambient temperature of the control panel – must not exceed 50°C (122°F).
  Otherwise the life of electronic components (especially electrolytic capacitor) may be shortened.

* Avoid setting this instrument directly on or near flammable material even though the case of this instrument is made of flame-resistant resin.

2. Wiring Precautions

⚠ Caution

- Do not leave bits of wire in the instrument, because they could cause a fire and malfunction.
- When wiring, use a crimping pliers and a solderless terminal with an insulation sleeve in which an M3 screw fits.
- The terminal block of this instrument has a structure that is wired from the left side.
  Be sure to insert the lead wire into the terminal of the instrument from the left side and tighten the terminal screw.
- Tighten the terminal screw using the specified torque. If excessive force is applied to the screw when tightening, the screw or case may be damaged.
- Do not pull or bend the lead wire with the terminal as the base point during or after wiring work.
  It may cause malfunction.
- This instrument does not have a built-in power switch, circuit breaker and fuse. It is necessary to install a power switch, circuit breaker and fuse near the instrument.
  (Recommended fuse: Time-lag fuse, rated voltage 250 V AC, rated current 2 A)
- When wiring the power supply (24 VDC), do not confuse the polarities.
- Do not apply a commercial power source to the sensor which is connected to the input terminal nor allow the power source to come into contact with the sensor.
- Use the thermocouple and compensation lead wire that match the sensor input specifications of the instrument.
- Use a RTD of 3-conducting wire type that meets the sensor input specifications of this instrument.
- Separate the input line (thermocouple, RTD, etc.) from the power line and load line.

3. Operation and Maintenance Precautions

⚠ Caution

- Do not touch live terminals. This may cause electrical shock or problems in operation.
- Turn the power supply to the instrument OFF when retightening the terminal or cleaning.
  Working on or touching the terminal with the power switched ON may result in severe injury or death due to electrical shock.
- Use a soft, dry cloth when cleaning the instrument.
  (Alcohol based substances may tarnish or deface the unit.)
- As the panel part is vulnerable, be careful not to put pressure on, scratch or strike it with a hard object.

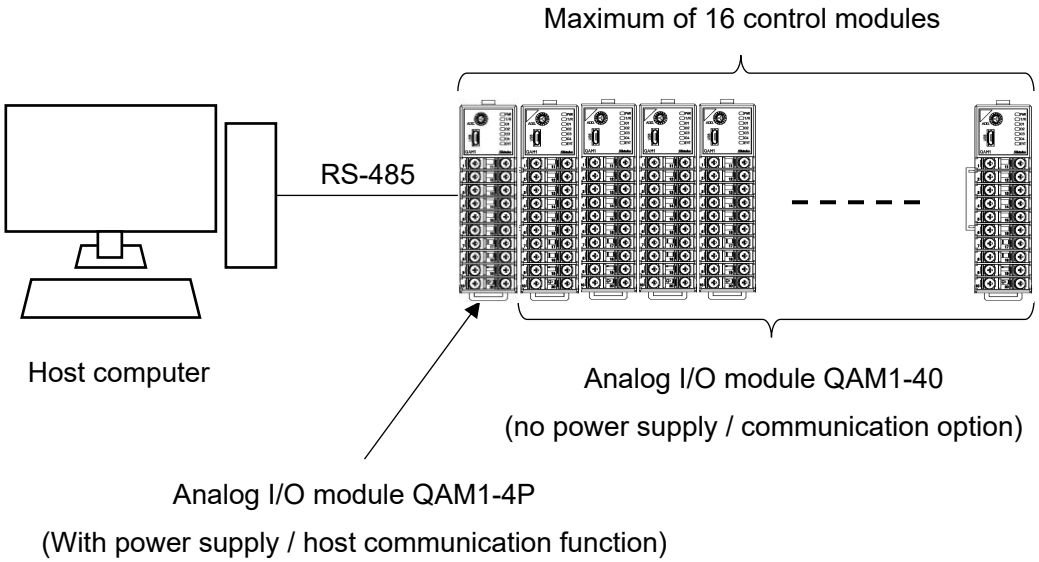
Contents

1. Overview

This instrument is a 4 points analog I/O module.

A multi-point measurement system can be configured via a host computer or PLC.

A maximum of 16 instruments can be connected to the BUS, and a maximum of 64 points can be measured. One block connected to BUS is called "1 unit".



2. Model

2.1 Model

QAM1-4	□	□	-□	-□	□	□	□	□	□	□	□	
Power supply / communication option	0											No option
	P											With power supply / host communication function
	C											With power supply / CUnet communication function
Wiring type		T										Terminal block type
		C										Connector type
I/O type (*)			-0									Input 4 points
			-1									Output 4 points
			-2									I/O 4 points each
Analog output 1				-□								Refer to output code table
Analog output 2					□							
Analog output 3						□						
Analog output 4							□					
Analog intput 1								□				Refer to input code table
Analog intput 2									□			
Analog intput 3										□		
Analog intput 4											□	

(*): For input-only type, output code selection is invalid.

For output-only type, input code selection is invalid.

Output code table

Output code	Output type
A	DC current output 4 to 20 mA DC
0	DC current output 0 to 20 mA DC
V	DC voltage output 0 to 1 V DC
1	DC voltage output 0 to 5 V DC
2	DC voltage output 1 to 5 V DC
3	DC voltage output 0 to 10 V DC
N (*)	No output

(*): Output code N is valid only when I/O type 0 (input 4 points) is selected.

Intput code table

Input code	Input type		Range
M	Thermocouple input	K	-200 to 1370 °C
		K	-200.0 to 400.0 °C
		J	-200 to 1000 °C
		R	0 to 1760 °C
		S	0 to 1760 °C
		B	0 to 1820 °C
		E	-200 to 800 °C
		T	-200.0 to 400.0 °C
		N	-200 to 1300 °C
		PL-Ⅱ	0 to 1390 °C
		C (W/Re5-26)	0 to 2315 °C
		K	-328 to 2498 °F
		K	-328.0 to 752.0 °F
		J	-328 to 1832 °F
		R	32 to 3200 °F
		S	32 to 3200 °F
		B	32 to 3308 °F
		E	-328 to 1472 °F
		T	-328.0 to 752.0 °F
		N	-328 to 2372 °F
		PL-Ⅱ	32 to 2534 °F
		C (W/Re5-26)	32 to 4199 °F
	RTD input	Pt100	-200.0 to 850.0 °C
		Pt100	-328.0 to 1562.0 °F
	DC voltage input	0 to 1 V DC	-32768 to 32767(*1)
	DC current input	4 to 20 mA DC (External receiving resistor)	-32768 to 32767(*1)
		0 to 20 mA DC (External receiving resistor)	-32768 to 32767(*1)
A	DC current input	4 to 20 mA DC (Built-in receiving resistor)	-32768 to 32767(*1)
		0 to 20 mA DC (Built-in receiving resistor)	-32768 to 32767(*1)
V	DC voltage input	0 to 5 V DC	-32768 to 32767(*1)
		1 to 5 V DC	-32768 to 32767(*1)
		0 to 10 V DC	-32768 to 32767(*1)
N (*2)	No input		

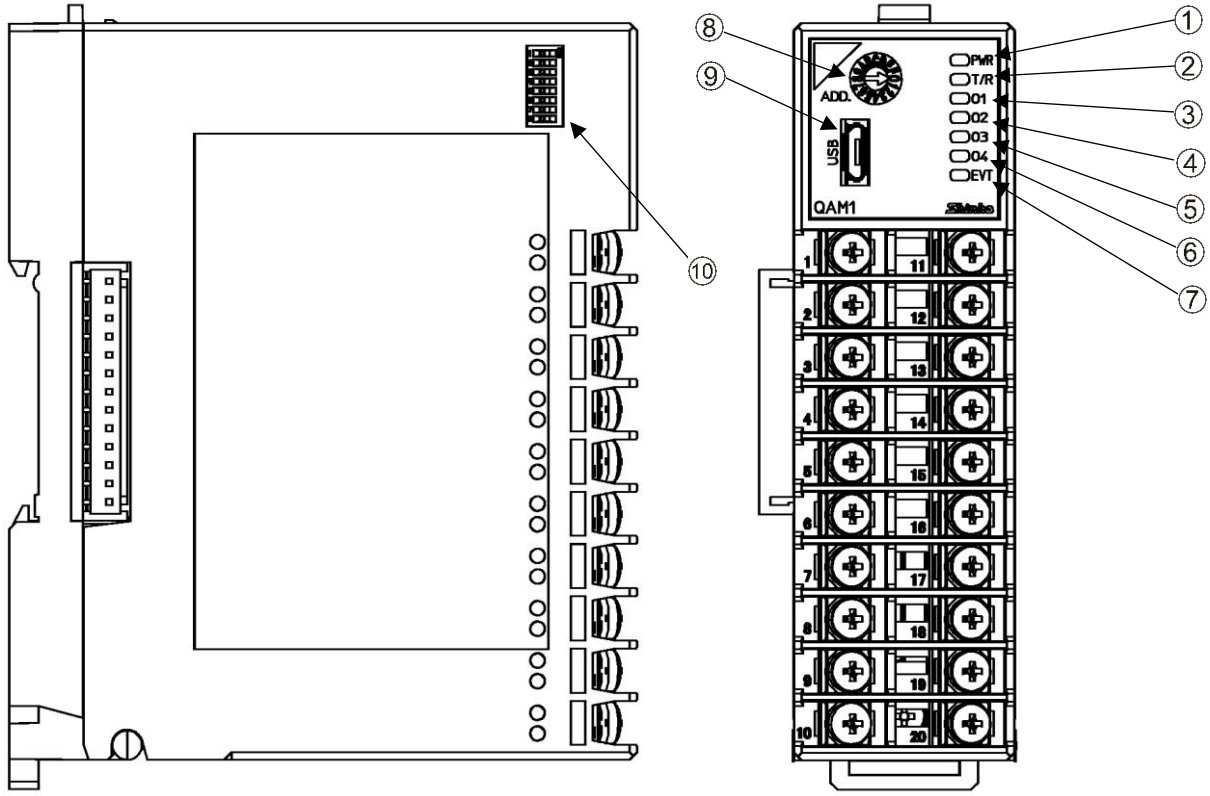
(*1): Scaling possible (16-bit signed range)

(*2): Input code N is valid only when I/O type 1 (output 4 points) is selected.

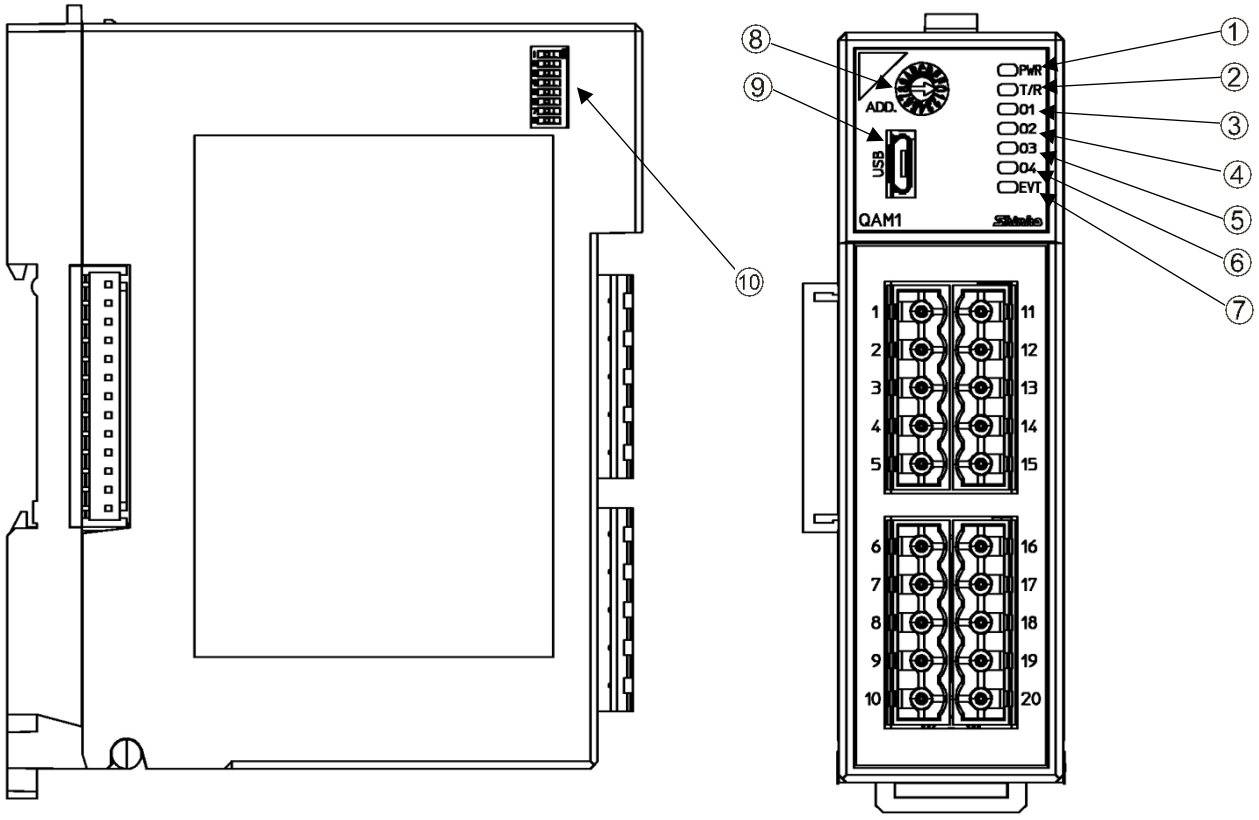
3. Name and Functions

3.1 Analog I/O Module QAM1-4

Terminal block type

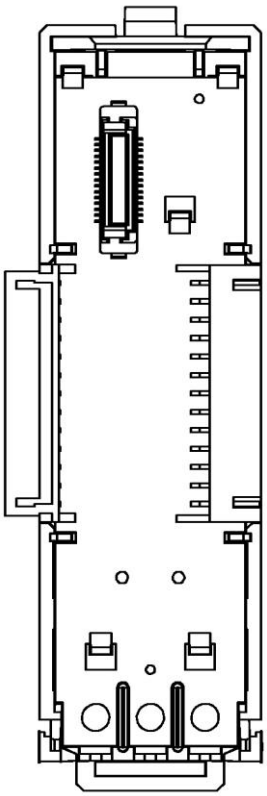


Connector type

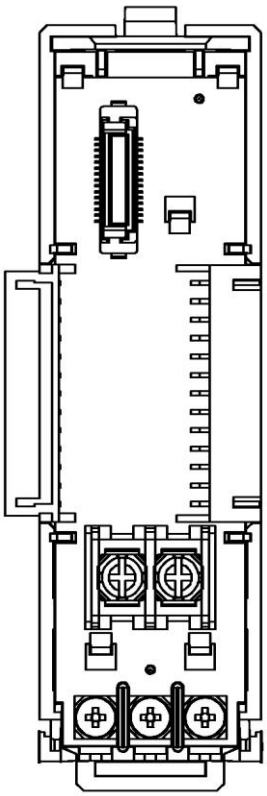


Base part

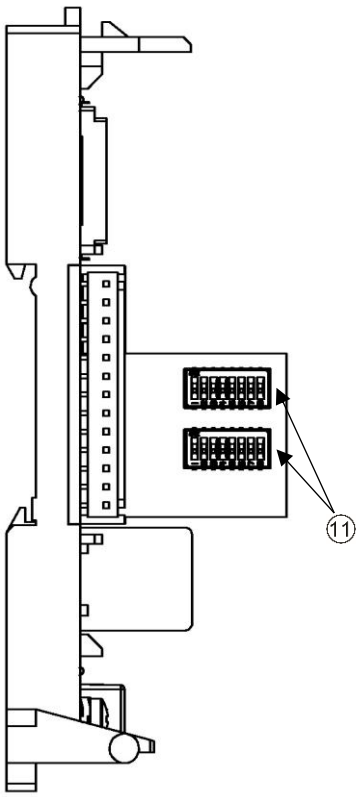
No power supply / communication option



With power supply / host communication option



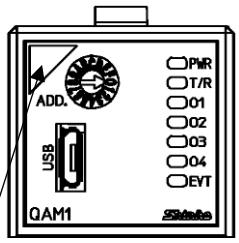
With power supply / CUnet communication option



Panel part

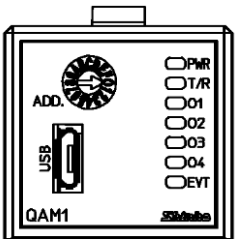
Depending on whether have the option, the panel design differs.

No power supply / communication option

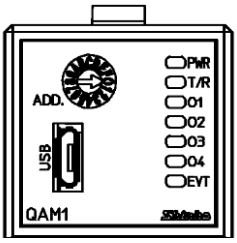


There is a triangle mark on the upper left of the panel

With power supply / host communication option



With power supply / CUnet communication option



Operation indicator

No.	Symbol (color)	Name and Function
①	PWR (Green)	Power indicator • Lights off (always): No power supply to the instrumen • Lights up (always): Power supply to the instrumen • Flashing for 500 ms (3 seconds): Warming up the instrument • Flashing for 500 ms (always): Internal failure of the instrument [When non-volatile IC memory error or ADC (internal circuit) error]
②	T/R (Yellow)	Communication indicator • Lights off (always): Communication error (no response) or USB communication • Flashing (slow): Communication error (reception error) • Flashing (fast): Communication is normal
③	O1 (Green)	Analog output 1 indicator Always lights off
④	O2 (Green)	Analog output 2 indicator Always lights off
⑤	O3 (Green)	Analog output 3 indicator Always lights off
⑥	O4 (Green)	Analog output 4 indicator Always lights off
⑦	EVT (Red)	Event indicator • Flashing for 500 ms: Sensor error (overscale, underscale) • Flashing for 250 ms: Sensor error (input disconnection) or power is supplied from the computer by USB bus power

Switch and connnector

No.	Symbol	Name and Function
⑧	ADD	Module address setting rotary switch Rotary switch for module address selection. The module address is the value of the selected rotary switch plus one.
⑨	USB	Console communication connector Connector for console communication tool cable.
⑩		Communication specification setting dip switch DIP switch for setting communication specifications. Set the communication specifications such as communication speed, data bit, parity, stop bit and communication protocol.
⑪		CUnet communication specification setting dip switch DIP switches for setting CUnet communication specifications. Set the station address, communication speed, master address, and number of occupied (OWN) items.

4. Communication Parameter Setting

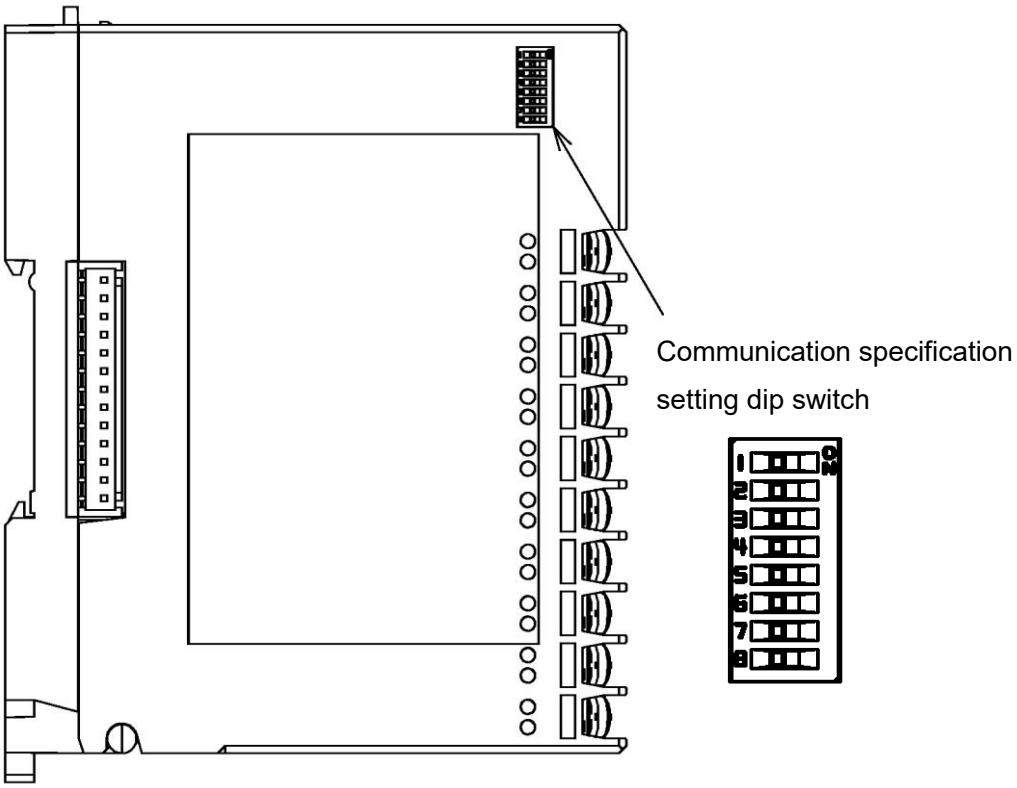
4.1 Communication Parameter Setting

4.1.1 Selection of Communication Specifications

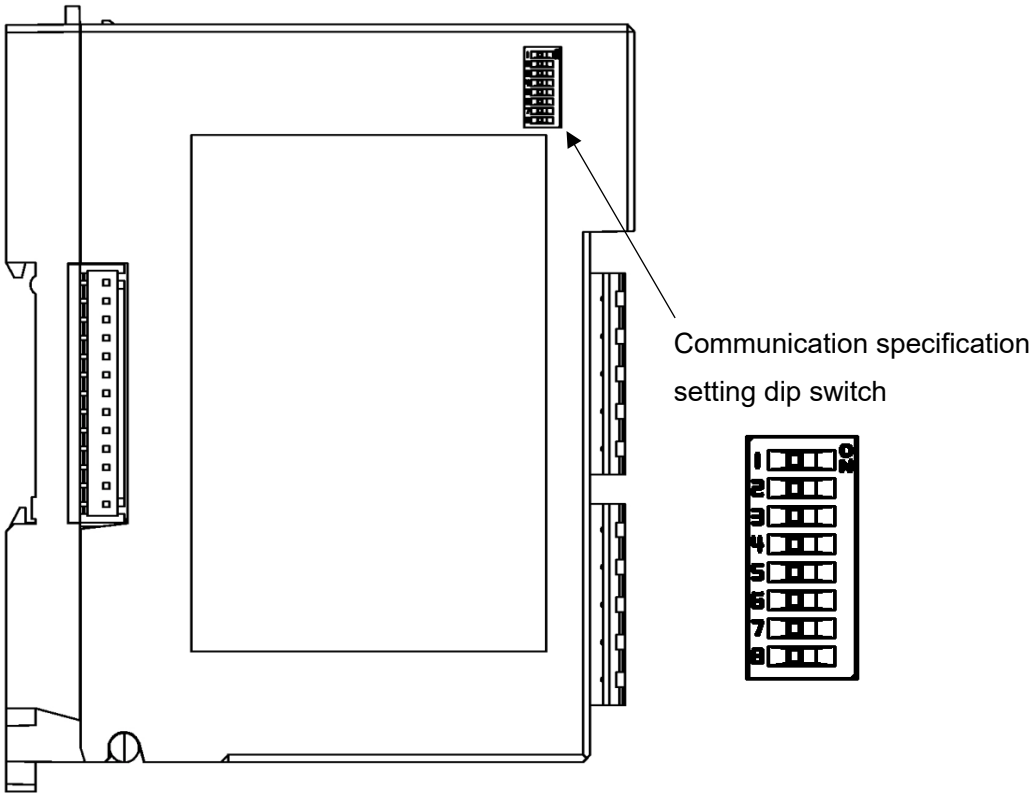
> **⚠ Caution**
>
> When connecting to the communication expansion module QMC1, the communication specification selection is not required.
> Use it in the factory default (all OFF).

Use the communication specification setting dip switch on the left side of the instrument to set communication specifications.

Terminal block type



Connector type



Set the communication speed, data bit, parity, and stop bit.

The factory defaults are as follows.

- Communication speed

  With power supply / host communication option: 57600 bps

  With power supply / CUnet communication option: 38400 bps
- Data bit: 8 bits
- Parity: Even
- Stop bit: 1 bit

(1) Setting of communication speed

Communication specification setting dip switch		Communication speed
1	2	
OFF	OFF	57600 bps
ON	OFF	38400 bps
OFF	ON	19200 bps
ON	ON	9600 bps

(2) Setting of data bit, parity and stop bit

Communication specification setting dip switch			Data bit, parity and stop bit
3	4	5	
OFF	OFF	OFF	8 bits, Even, 1 bit
ON	OFF	OFF	8 bits, Even, 2 bits
OFF	ON	OFF	8 bits, Odd, 1 bit
ON	ON	OFF	8 bits, Odd, 2 bits
OFF	OFF	ON	8 bits, None, 1 bit
ON	OFF	ON	8 bits, None, 2 bits

Dip switches No.6, No.7 and No.8 does not use. Leave it OFF.

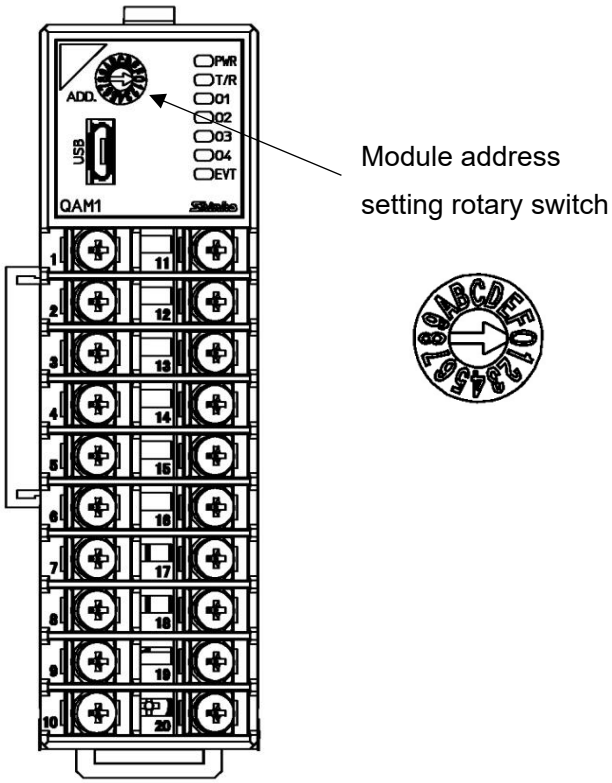
4.1.2 Setting of Module Address

⚠ Caution

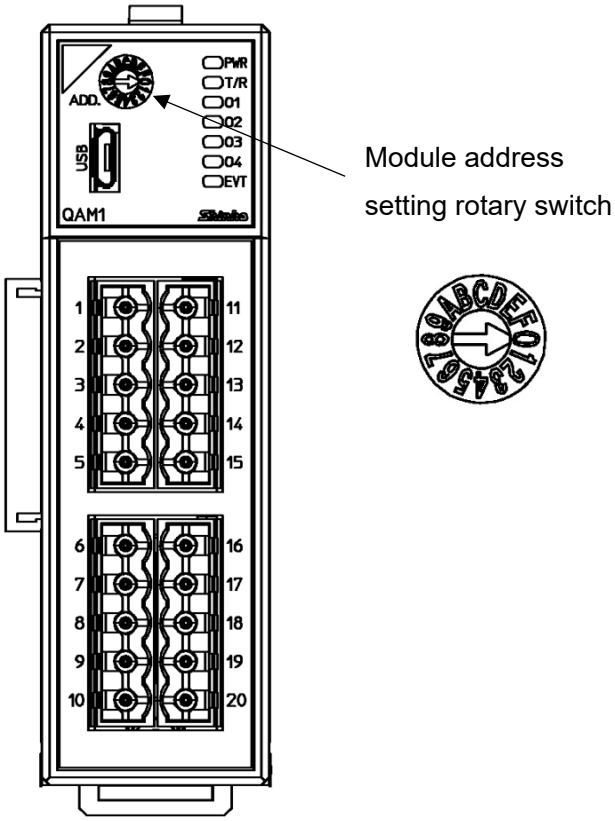
When using the SIF function, module addresses should be set to consecutive numbers starting from 1.
When using the MODBUS specification, any number between 0 to F (1 to 16) can be set.

The module addresses are set with the rotary switch.

Terminal block type



Connector type



Use a small flat-blade screwdriver to set the module addresses.

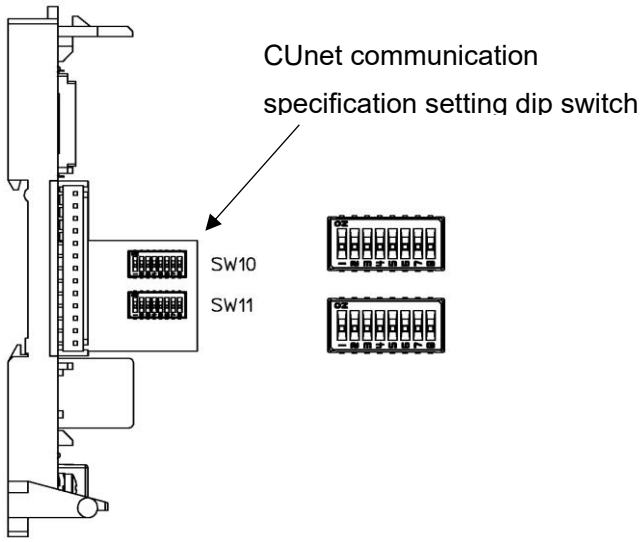
The value obtained by adding 1 to the value of the set rotary switch becomes the module addresses.

Module address: 0 to F (1 to 16)

Rotary switch	0	1		9	A	B		F
Module address	1	2		10	11	12		16

4.1.3 Setting CUnet communication specifications

The CUnet communication specifications are set by the dip switches (SW10, SW11) on the base part.



Refer to “6.3.2 Power Supply and Serial Communication Terminal Arrangement” (1) and remove the case.

After setting, refer to “6.3.2 Power Supply and Serial Communication Terminal Arrangement” (3) and mount the case.

(1) Station address and communication speed settings (SW10)

No.	Setting item	Status	Factory default
1	Station address setting	Bit0 ON: Enable, OFF: Disable	Disable
2		Bit1 ON: Enable, OFF: Disable	Disable
3		Bit2 ON: Enable, OFF: Disable	Disable
4		Bit3 ON: Enable, OFF: Disable	Disable
5		Bit4 ON: Enable, OFF: Disable	Disable
6		Bit5 ON: Enable, OFF: Disable	Disable
7	Communication speed setting	7: OFF 8: OFF 12 Mbps 7: ON 8: OFF 6 Mbps 7: OFF 8: ON 3 Mbps 7: ON 8: ON Disable (12 Mbps)	12 Mbps
8			

(2) Master address and number of occupied (OWN) items selection (SW11)

No.	Setting item	Status	Factory default
1	Master address setting	Bit0 ON: Enable, OFF: Disable	Disable
2		Bit1 ON: Enable, OFF: Disable	Disable
3		Bit2 ON: Enable, OFF: Disable	Disable
4		Bit3 ON: Enable, OFF: Disable	Disable
5		Bit4 ON: Enable, OFF: Disable	Disable
6		Bit5 ON: Enable, OFF: Disable	Disable
7	Number of occupied (OWN) items selection(*)	7: OFF 8: OFF 1 item 7: ON 8: OFF 2 items 7: OFF 8: ON 3 items 7: ON 8: ON 4 items	1 item
8			

(*): The following items are allocated to global memory for each module.

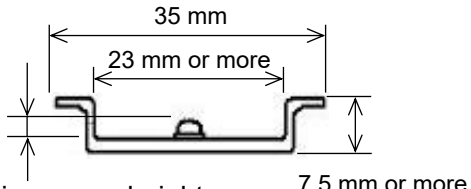
Number of occupied (OWN) items	QAM1-4	
	DI item	DO item
1	PV: 03E8-03EB	Output: 0014-0017
2	Status 1: 03F4-03F7	
3	MV: 03EC-03EF	
4		

Shaded area is invalid because there is no allocation (no area is allocated in global memory)

5. Mounting

⚠ Caution

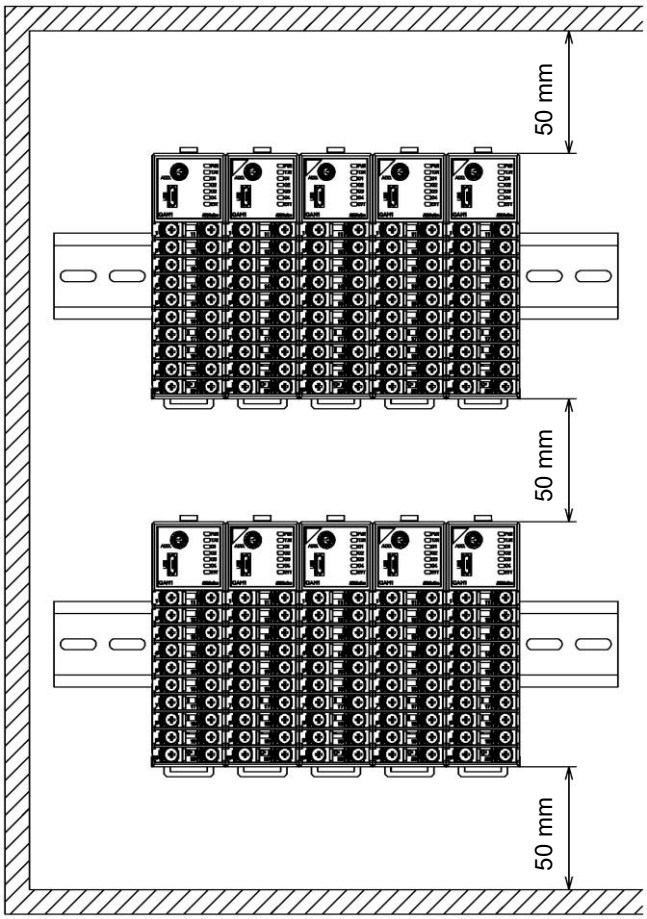
- When mounting or removing this instrument, be sure to turn off the power supply to this instrument.
- Mount the DIN rail horizontally.
- This instrument fits the following DIN rails.
  Top hat rail TH35 JIS C 2812-1988



Mounting screw height
6 mm or more

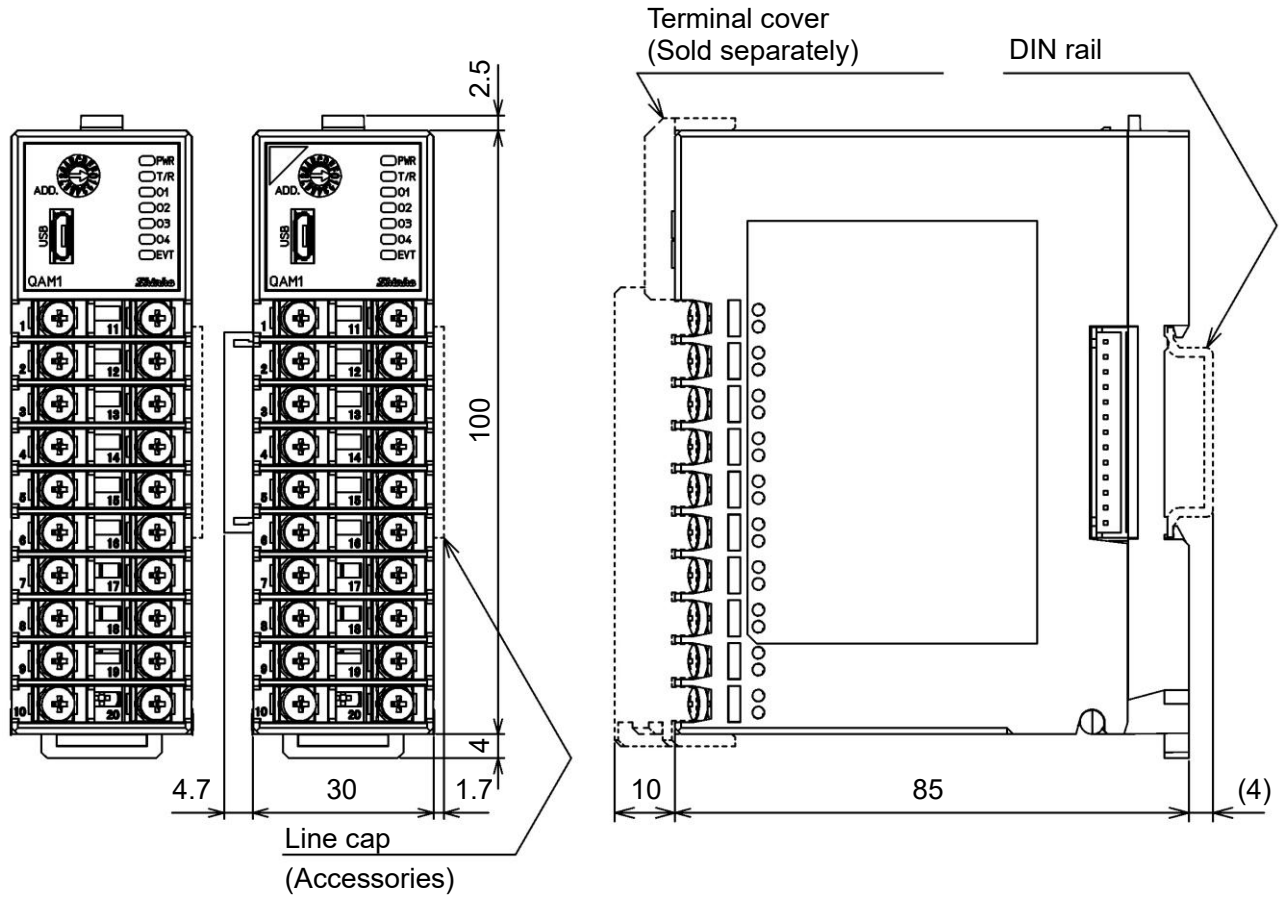
Width: 35 mm
Height: 7.5 mm or more
Groove width: 23 mm or more
DIN rail mounting screw height:
6 mm or more
(For DIN rail height 7.5 mm)

- If this instrument is mounted in a position susceptible to vibration or shock, mount commercially available end plate at both ends of the instrument.
- When installing, make sure that the orientation (upper and lower) of this instrument is correct.
- When mounting or removing this instrument on the DIN rail, it must be tilted slightly
  Secure a space of 50 mm or more in the vertical direction of the instrument, considering the wiring space of the power supply/communication line and heat dissipation.

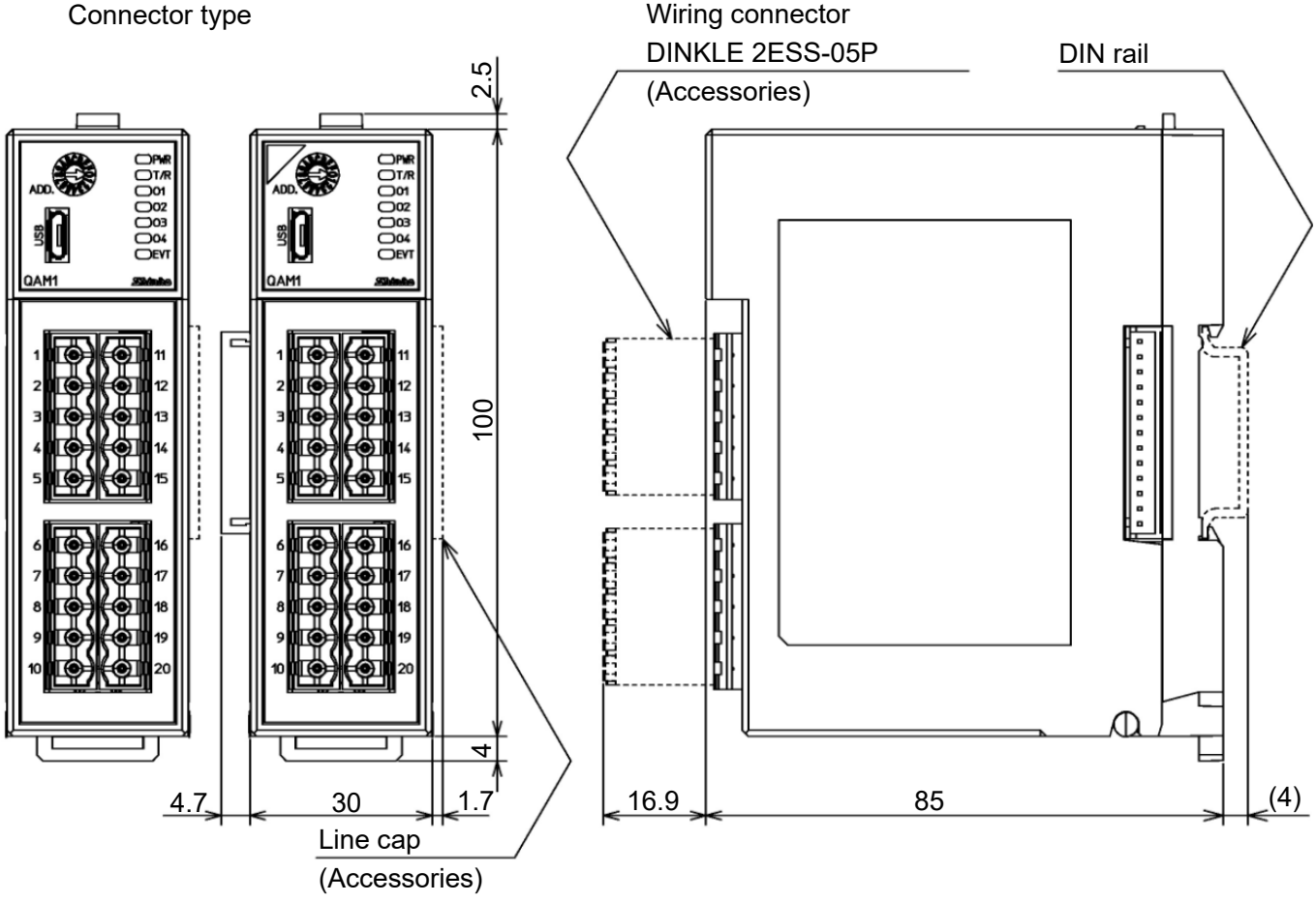


5.1 External Dimensions (Scale: mm)

Terminal block type



Connector type



5.2 Mounting

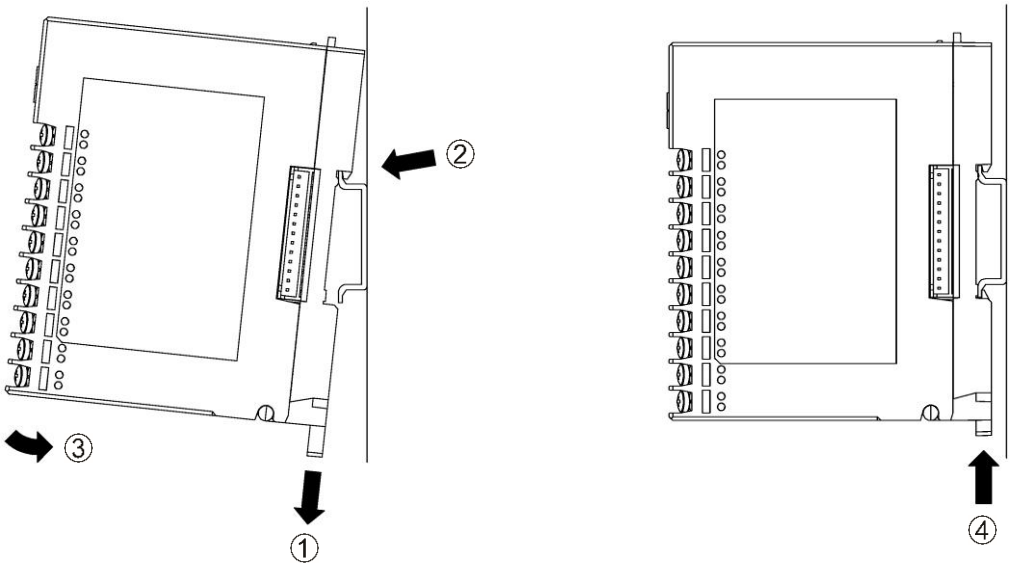
Mounting to the DIN rail

① Lower the lock lever of this instrument. (The lock lever of this instrument has a spring structure, but if lower it in the direction of the arrow until it stops, it will be locked in that position.)

② Hook the part ② of this instrument onto the top of the DIN rail.

③ Insert the lower part of this instrument with the part ② as a fulcrum.

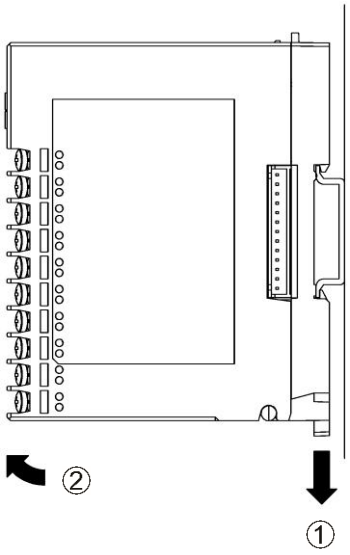
④ Raise the lock lever of this instrument.
Make sure it is fixed to the DIN rail.



Removal from the DIN rail

① Insert a flat blade screwdriver into the lock lever of this instrument and lower the lock lever until it stops.

② Remove this instrument from the DIN rail by lifting it from below.



Mounting multiple modules to the DIN rail

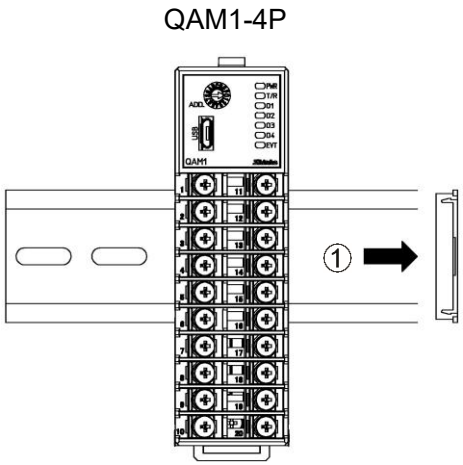
This section describes an example of mounting multiple modules on the DIN rail.

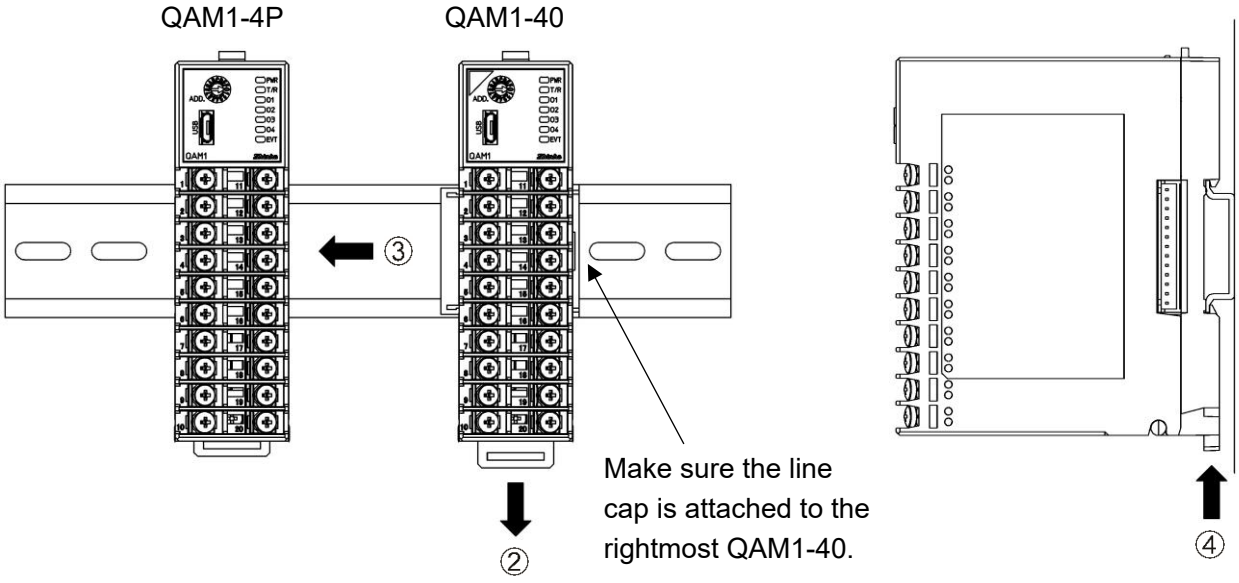
① Remove the line cap on the right side of the QAM1-4P.

② Lower the lock lever of the QAM1-40, and mounting the QAM1-40 to the DIN rail.

③ Slide the QAM1-40 to the left and connect the connectors to each other.

④ Raise the lock lever of the QAM1-40.
Make sure it is fixed to the DIN rail.





6. Wiring

⚠ Warning

Turn off the power supply to this instrument before wiring.
If you work while the power is supplied, you may get an electric shock, which could result in an accident resulting in death or serious injury.

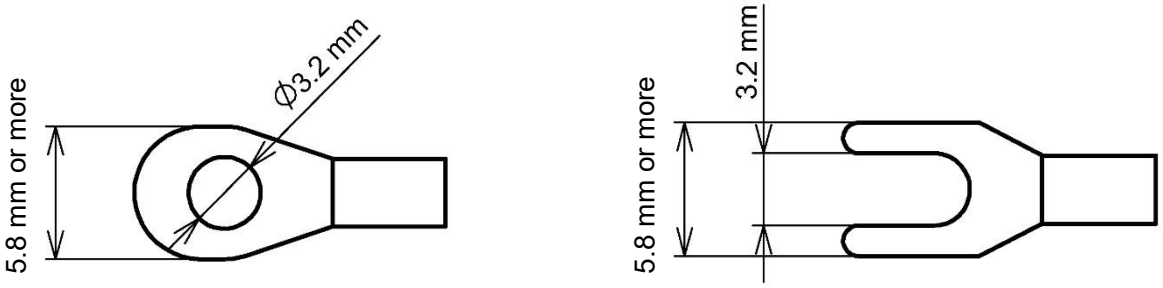
6.1 Recommended Terminal and Recommended Rod Terminal

Recommended terminal

Use a solderless terminal with an insulation sleeve in which an M3 screw fits as shown below.

Ring-type for power supply, serial communication section, and CUnet communication section.

Solderless terminal	Manufacturer	Model	AWG	Tightening torque
Y-type	NICHIFU TERMINAL INDUSTRIES CO., LTD.	TMEX1.25Y-3	AWG22 to 16	Input/output section: 0.63 N•m Power supply section: 0.5 N•m Serial communication section: 0.3 N•m CUnet communication section: 0.3 N•m
	J.S.TMFG.CO.,LTD.	VD1.25-B3A		
Ring-type	NICHIFU TERMINAL INDUSTRIES CO., LTD.	TMEX1.25-3	AWG22 to 16	
		TMEX2-3S	AWG16 to 14	
	J.S.TMFG.CO.,LTD.	V1.25-3	AWG22 to 16	
		V2-MS3	AWG16 to 14	



Recommended rod terminal (connector specifications)

For connector specifications, use PHOENIX CONTACT brand rod terminals with insulating sleeves and crimping tools for the input/output sections.

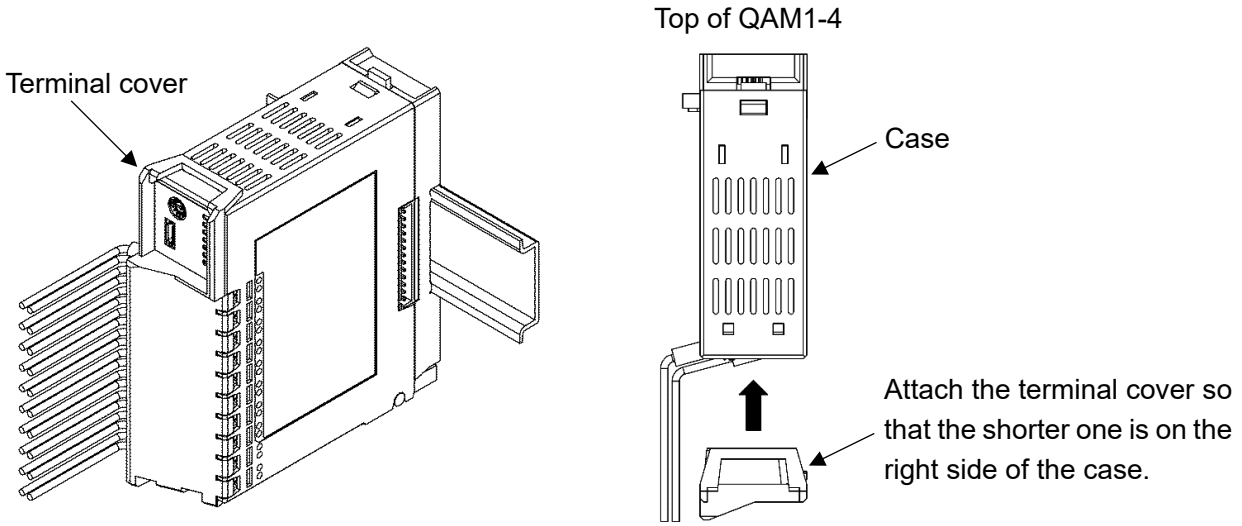
Model	AWG	Crimping tool
AI 0,25-10 YE	AWG24	ZA3 CRIMPFOX UD 6
AI 0,34-10 TQ	AWG22	
AI 0.5-10 WH	AWG20	
AI 0,75-10 GY or AI 1-10 RD	AWG18	
AI 1,5-10 BK	AWG16	
AI 2,5-10 BU	AWG14	
AI 4-10 GY	AWG12	

6.2 Using Terminal Cover Precaution

Attach the terminal cover TC-QTC (sold separately) (*) so that the shorter one is on the right side of the case.

For the wiring of terminal numbers 11 to 20, pass through the left side of the terminal cover.

(*): QAM1 has the same case shape as QTC1, so the terminal cover of QTC1 is used.



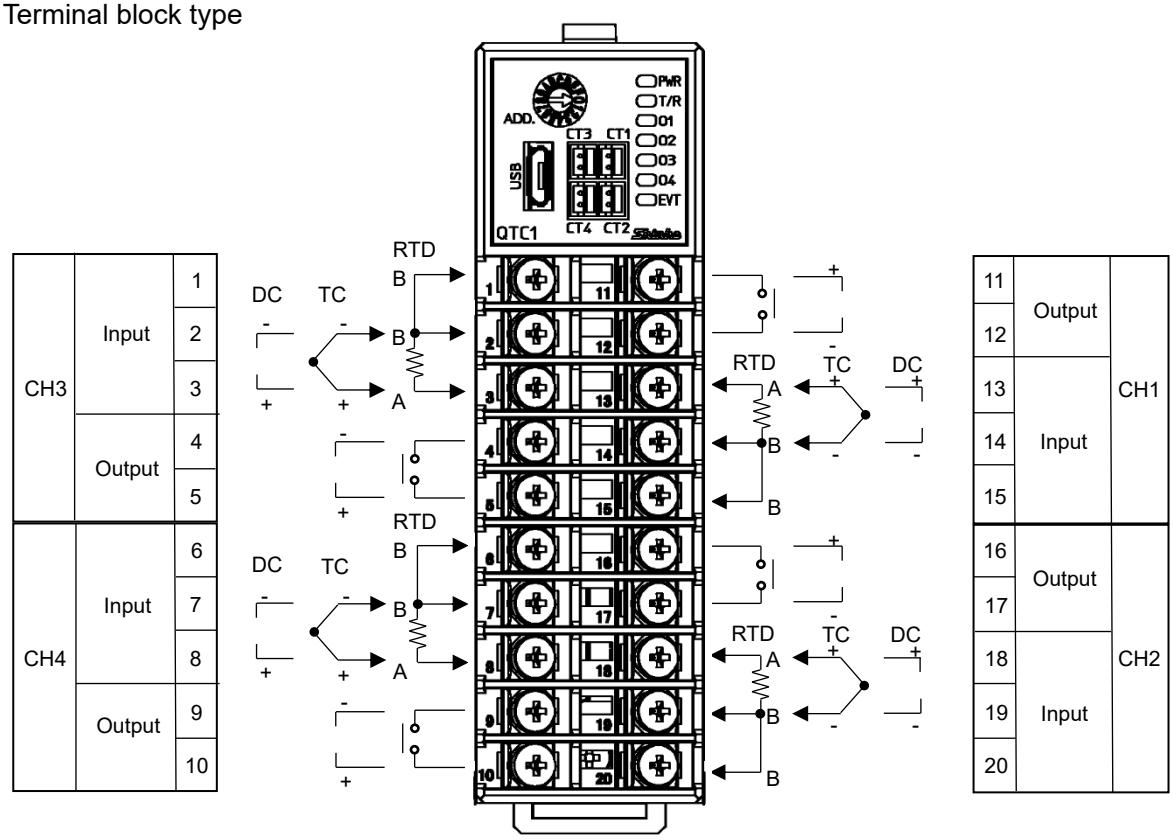
6.3 Terminal Arrangement

6.3.1 Input and Output Terminal Arrangement

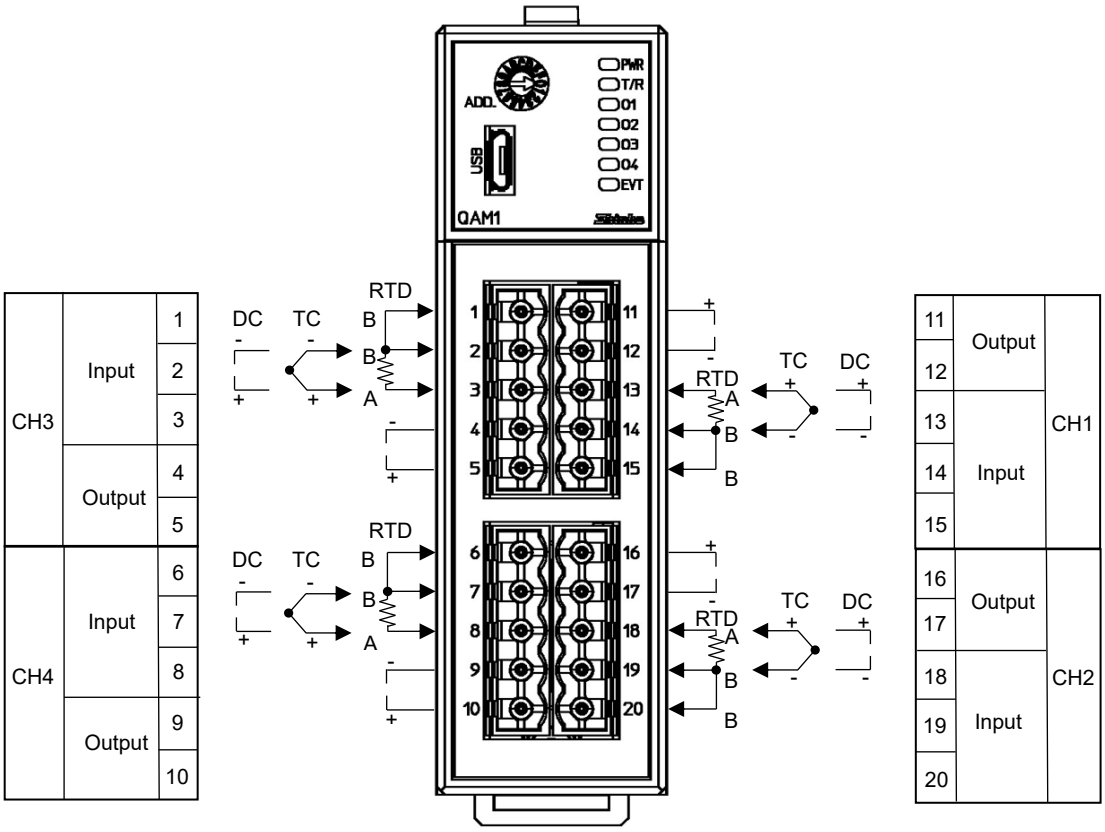
⚠ Caution

- Please note that CH1, CH2 and CH3, CH4 have different terminal arrangements.

Terminal block type



Connector type



6.3.2 Power Supply and Serial Communication Terminal Arrangement

⚠ Caution

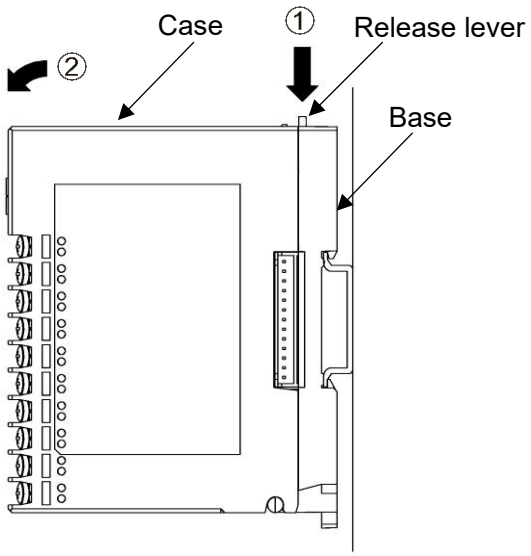
When wiring the power supply (24 VDC), do not confuse the polarities.

The terminal block for power supply and communication is located on the base of this instrument. Wiring by the following procedure.

(1) Case removal

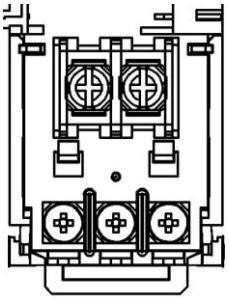
① Push the release lever on the top of this instrument to unlock it.

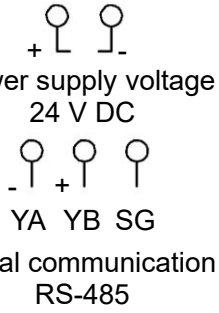
② Remove the case.



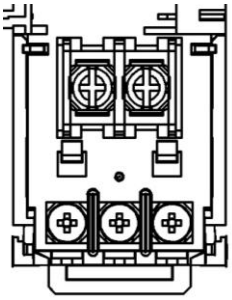
(2) Wiring

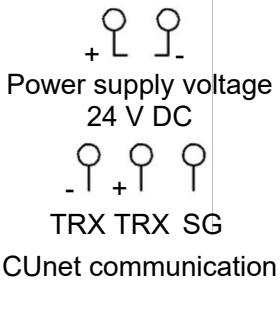
Serial communication RS-485





CUnet communication



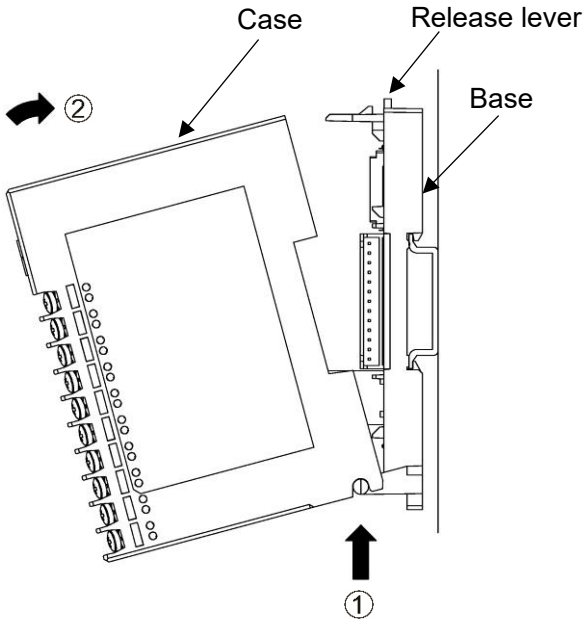


Install a 100 Ω terminator [RES-S07-100 (optional)] on the last unit in the communication line.

(3) Case mounting

① Hook the case on the lower part ① of this instrument.

② Mount the case so that the lower part ① of this instrument is the fulcrum and covers the release lever. There is a clicking sound.



7. Specifications

<table>
<tr><td>Power supply voltage</td><td>24 V DC
Allowable voltage fluctuation: 20 to 28 V DC</td></tr>
<tr><td>Power consumption</td><td>5 W or less</td></tr>
<tr><td>Inrush current</td><td>Max. 10 A</td></tr>
<tr><td>Input base accuracy</td><td>When the ambient temperature is 23°C and the mounting angle is ±5 degrees
<table>
<tr><td>Thermocouple input</td><td>Within ±0.2% of each input span
Within 0°C (32°F), within ±0.4% of each input span
R, S input, 0 to 200°C (32 to 392°F):
Within ±6°C (12°F)
B input, 0 to 300°C (32 to 572°F):
Accuracy is not guaranteed.</td></tr>
<tr><td>RTD input</td><td>Within ±0.1% of each input span</td></tr>
<tr><td>Direct current input
DC voltage input</td><td>Within ±0.2% of each input span</td></tr>
</table></td></tr>
<tr><td>Output base accuracy</td><td>When the ambient temperature is 23°C and the mounting angle is ±5 degrees
Direct current input, DC voltage input: Within ±0.2% of each output span</td></tr>
<tr><td>Cold junction compensation accuracy</td><td>Within ±1°C at -10 to 50°C</td></tr>
<tr><td>Input sampling period</td><td>20 ms (only direct current input and DC voltage input are valid)
50 ms (only direct current input and DC voltage input are valid)
125 ms
For thermocouple input and RTD input, fixed to 125 ms</td></tr>
<tr><td>Output update cycle</td><td>20 ms</td></tr>
<tr><td>Output circuit response time</td><td>100 ms or less (excluding 0 to 90 % communication cycle time)</td></tr>
<tr><td>Setting accuracy</td><td>Same as base accuracy</td></tr>
<tr><td>Power supply / RS-485 communication function</td><td>Reads and sets various setting values, reads PV operating status, and changes functions from the external computer.
Communication line: EIA RS-485
Communication method: Half-duplex communication
Synchronization method: Start-stop synchronization
Communication protocol: MODBUS RTU
Communication speed: 9600 bps, 19200 bps, 38400 bps or 57600 bps
Data bit: 8 bits
Parity: Even, Odd, No parity
Stop bit: 1 bit or 2 bits
Communication response delay time:
0 to 1000 ms (Factory default: 0 ms)</td></tr>
</table>

Power supply / CUnet communication function	Connection type: Multi-drop Communication method: 2-wire half-duplex Synchronization method: Bit-synchronous Error detection: CRC-16 Number of occupied slave addresses: 1 Maximum number of connected nodes: 64 nodes Communication speed (Maximum network length): 12 Mbps (100 m), 6 Mbps (200 m), 3 Mbps (300 m) Isolation method: Pulse transformer isolation Impedance: 100 Ω
Ambient temperature	-10 to 50°C (no condensation or freezing)
Ambient humidity	35 to 85%RH (no condensation)
Environmental specification	RoHS directive compliant
Weight	Approx. 170 g
Mounting environment	Overvoltage category II, Pollution degree 2 (per EN 61010-1)
Memory protection	Non-volatile IC memory (Writes: Approx. 1 trillion times)

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