Mounting and wiring instruction manual

Digital I/O module **QDM1 series** No. QDM11E1 2024.11

Preface

Thank you for purchasing our digital I/O module [QDM1 series].
This manual contains instructions for the mounting and wiring when operating the digital I/O module [QDM1 series].
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. 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.)
- Please contact us for periodic maintenance (for a fee).
- 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

Installation Precautions

⚠ Caution

This instrument is intended to be used under the following environmental conditions (IEC61010-1):
- 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.

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 an appropriate power switch, circuit breaker and fuse near the instrument.
- When wiring the power supply (24 VDC), do not confuse the polarities.

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.

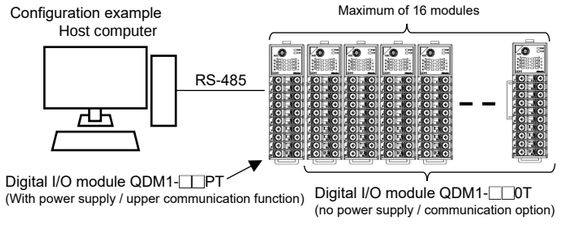
1. Specifications

Power supply voltage	24 V DC
Allowable voltage fluctuation	20 to 28 V DC
Power consumption	Approx. 2 W or less
Inrush current	Max. 10 A
Input specifications	Common: Plus/minus common (NPN/PNP compatible) Number of input points: 8 points/16 points Input status indicator lamp: Green when ON (LED) Input power supply voltage tolerance: 24 V DC ±10 %, ripple content 5 %p-p max. ON voltage/ON current: 15 V DC or more/3.5 mA or more OFF voltage/OFF current: 5 V DC or less/1 mA or less Input current: 5.5 mA or less (at 24 V DC) Input resistance: Approx. 4.7 kΩ ON delay time: 0.2 ms max. OFF delay time: 0.5 ms max. Sampling cycle setting: 1 ms, 5 ms via communication, setting range 1 to 100 ms
Output specifications	Common: Minus / plus common (for NPN specification / for PNP specification) Number of output points: 8 points/16 points Output status indicator lamp: Green when ON (LED) Output power supply voltage tolerance: 24 V DC ±10 %, ripple content 5 %p-p max. Rated output current: 0.1 A/point, 1.6 A/common Residual voltage: 1.2 V or less Leakage current: 0.1 mA or less ON delay time: 0.2 ms or less OFF delay time: 0.5 ms or less Overcurrent protection function: When an overcurrent is detected, the current value is limited. Output setting at communication break: Output state (hold or off) can be set until normal data is received in the event of a communication error (lasting 1 minute or longer) (factory default: hold)
Serial communication	Perform the following operations from an external computer (1) Read and set each CH digital output setting value (2) Read each CH digital input (3) Read and set the sampling cycle for each CH digital input Communication line: EIA RS-485 compliant Communication method: Half-duplex communication Synchronization method: Asynchronous Communication protocol: MODBUS RTU Communication speed: 9600, 19200, 38400, 57600 bps Data bit: 8 Parity: Even, odd, no parity Stop bit: 1 or 2 Response delay: 0 to 1000 ms (factory default: 0 ms) Sampling cycle: 1 to 100 ms (factory default: 1 ms)
CUnet communication	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 (cable 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. 160 g
Installation environment	Overvoltage Category II, Pollution degree 2 (IEC61010-1)
Memory protection	Non-volatile IC memory (number of writes: 1 million times)

2. Overview

This instrument is a digital I/O module with input 16 points, output 16 points or input 8 points/output 8 points.
A multi-point digital I/O system can be configured via a host computer or PLC.
A maximum of 16 modules can be BUS-connected, and a maximum of 256 points of digital input/output can be performed.

Configuration example

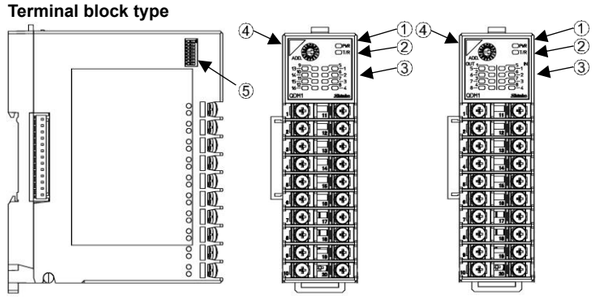


3. Model

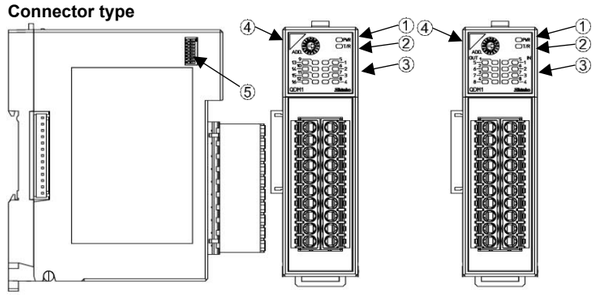
QDM1-	□	□	□	□	
I/O points	DI16				Input 16 points
	DO16				Output 16 points
	DIO8				Input 8 points/output 8 points
Plus/minus common		A			Minus common (NPN)
		B			Plus common (PNP)
Power supply / communication option			0		No options
			P		With power supply / upper communication function
			C		With power supply / CUnet communication function
Wiring type				T	Terminal block type
				C	Connector type

4. Name and Functions

Terminal block type

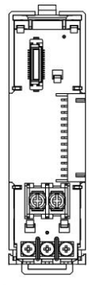


Connector type

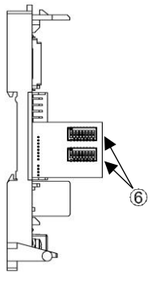


Base part

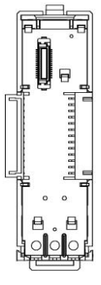
With power supply / upper communication function



With power supply / CUnet communication function

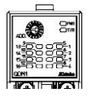


No power supply / communication option



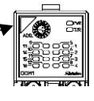
Panel part

Depending on whether have the option, the panel design differs.
With power supply / upper communication function
With power supply / CUnet communication function



No power supply / communication option

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



Operation indicator

No.	Symbol (color)	Name	Function
①	PWR (Green)	Power indicator	When energized: Lights up During warm-up: Flashing for 3 sec. (500 ms cycle) Non-volatile IC memory error or ADC error: Flashing (500 ms cycle)
②	T/R (Yellow)	Communication indicator	During communication TX output: lights up
③	INx/OUTx (Green)	Input/output indicator	During digital input/output ON: Lit (1 point/1 CH)

Switch and connector

No.	Symbol	Name
④	ADD.	Module address setting rotary switch
⑤		Communication specification setting dip switch
⑥		CUnet communication specification setting dip switch

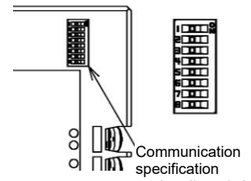
5. Communication Parameter Setting

5.1 Setting 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.
Set the communication speed, data bit, parity, stop bit, internal bus connection communication type, MODBUS specification/SIF specification and output at communication break.
The factory default settings are as follows.



- Communication speed
  With power supply / upper communication function: 57600 bps
  With power supply / CUnet communication function: 38400 bps
- Data bit: 8 bits • Parity: Even • Stop bit: 1 bit
- Internal bus connection communication type:
  Standard speed communication with QMC1 via internal bus connection
- MODBUS specification/SIF specification: MODBUS specification
- Output at communication break: Hold

(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

(3) Internal bus connection communication type selection

Communication specification setting dip switch		Internal bus connection communication type
6	OFF	Standard-speed communication with QMC1 via internal bus connection
	ON	High-speed communication with QMC1 via internal bus connection

(4) MODBUS specification/SIF specification selection

Communication specification setting dip switch		MODBUS specification/SIF specification
7	OFF	MODBUS specification
	ON	SIF specification (master module)

Disabled when power supply and CUnet communication functions are present.

(5) Output selection at communication break

Communication specification setting dip switch		Output at communication break
8	OFF	Output at communication break: Hold
	ON	Output at communication break: OFF

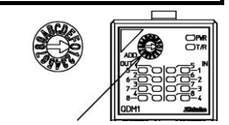
Communication break is a state in which no valid command is received for 1 minute or more.

5.2 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.
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.



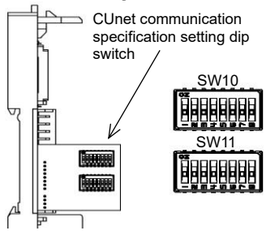
Module address setting rotary switch

Module address: 0 to F (1 to 16)

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

5.3 Setting of CUnet communication specification

The CUnet communication specifications are set by the dip switches (SW10, SW11) on the base part.
Refer to (1) in "7.2.2 Power Supply and Communication Terminal Arrangement" to remove the case.
After setting, refer to (3) in "7.2.2 Power Supply and Communication Terminal Arrangement" to mount the case.



(1) Setting of Station Address and Communication Speed (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) Select master address and number of occupied (OWN) items (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	QDM1	
	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)

6. Mounting

⚠ Caution

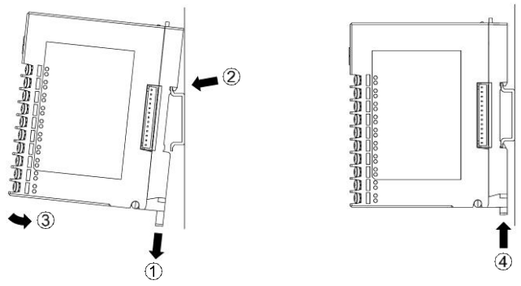
- Turn off the power supply to this instrument when mounting or removing it.
- Mount the DIN rail horizontally.
- This instrument fits the following DIN rails.
  Top hat rail TH35 JIS C 2812-1988
- If this instrument is mounted in a position susceptible to vibration or shock, mount commercially available 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.

6.1 Mounting

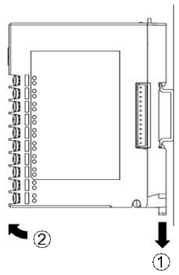
Mounting to the DIN rail

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

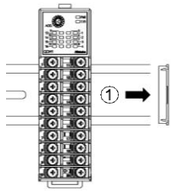
① Insert a flat blade screwdriver into the lock lever of this instrument and lower the lock lever until it stops.
② Remove this instrument from the DIN rail by lifting it from below.

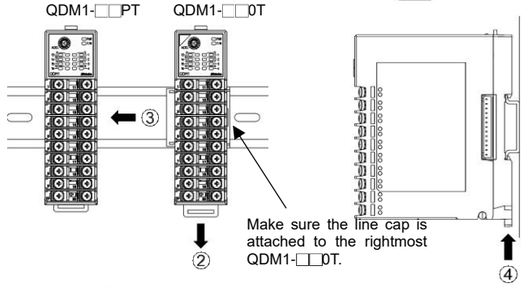


Mounting multiple modules to the DIN rail

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

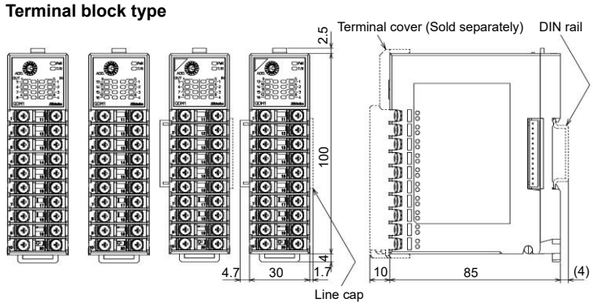
① Remove the line cap on the right side of the QDM1-□□P□ .
② Lower the lock lever of the QDM1-□□0□ , and mounting the QDM1-□□0□ to the DIN rail.
③ Slide the QDM1-□□0□ to the left and connect the connectors to each other.
④ Raise the lock lever of the QDM1-□□0□ .
Make sure it is fixed to the DIN rail.



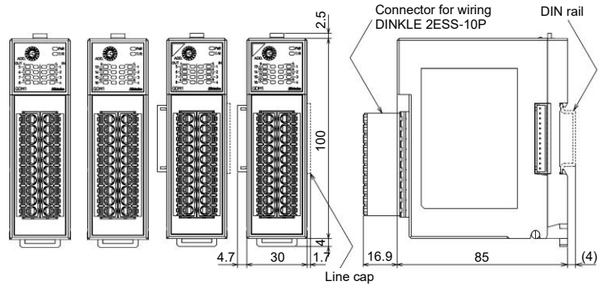


6.2 External Dimensions(Scale: mm)

Terminal block type



Connector type



7. Wiring

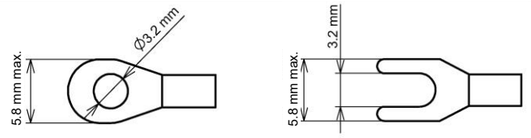
⚠ Warning

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.

7.1 Recommended Terminal

Use a solderless terminal with an insulation sleeve in which an M3 screw fits as shown below. Use the Ring-type for the power supply and communication section.

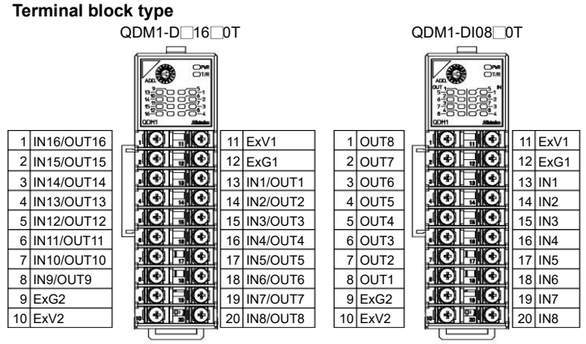
Solderless Terminal	Manufacturer	Model	Compatible wire size	Tightening torque
Y-type	NICHIFU TERMINAL INDUSTRIES CO., LTD.	TMEX1.25Y-3	AWG22 to 16	Input/output section: 0.63 N・m Power supply section: 0.5 N・m serial communication section: 0.3 N・m
	J.S.TMFG.CO.,LTD.	VD1.25-B3A		
Ring-type	NICHIFU TERMINAL 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	



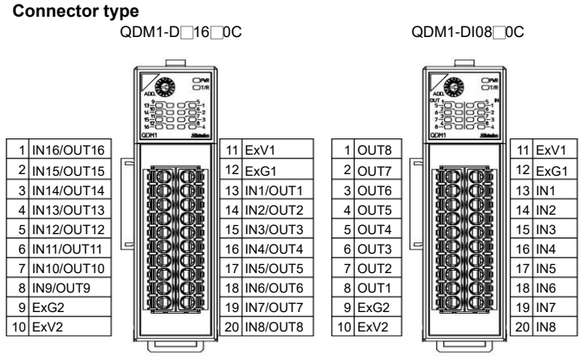
7.2 Terminal Arrangement

7.2.1 Input and Output Terminal Arrangement

Terminal block type



Connector type



7.2.2 Power Supply and Communication Terminal Arrangement

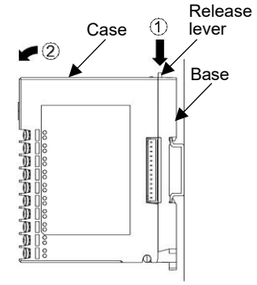
⚠ Caution

Be sure to use the correct polarity for the power supply voltage (24 V DC).

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

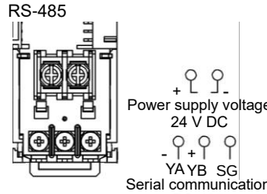
(1) Case removal

① Push the release lever on the top of this instrument to unlock it.
② Remove the case.

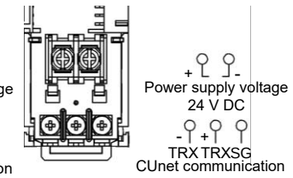


(2) Wiring

Serial communication RS-485



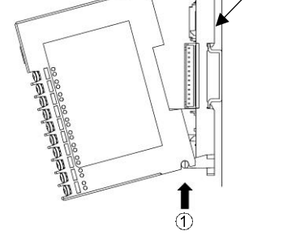
CUnet communication



For CUnet communication, install a terminator [optional 100 Ω (RES-S07-100)] on the last module of the communication line.

(3) Case mounting

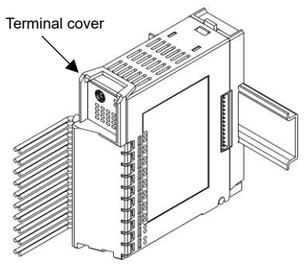
① Hook the case on the lower part ① of this instrument.
② Mount the case so that the lower part ① of this instrument is the fulcrum and covers the release lever. There is a clicking sound.



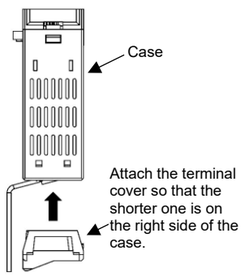
7.3 Using Terminal Cover Precaution

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.

QDM1-□□PT



Top of QDM1-□□PT



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