Advanced Controller

■ Overview

This product (model WJ-1103W0000) controls central plant, air conditioning, and other equipment for buildings.
This product can operate in a redundant configuration. If this controller fails, the backup controller will continue to provide control and monitoring.

■ Features

- Redundant controller function
  This function allows two controllers to connect to shared I/O modules with a ring connection. In this highly reliable system, if one of the two controllers fails, the other controller will continue to operate.
- Open communication protocol
  This product is compatible with BACnet/IP, which is an open protocol.
  If the controller redundancy function is not used, RS-485 communication allows connection of various devices that support BACnet MS/TP, Modbus™ RTU, and Modbus ASCII.
- Online engineering work
  If a need arises to change or add the monitored points or control applications, it is possible to change the controller's files without stopping the controller.
- Connection to the central monitoring unit
  By connecting to the central monitoring unit of the building management system, it is possible to manage each piece of equipment from the central monitoring unit.
- Risk distribution
  If the central monitoring unit fails, the Advanced Controller will continue running independently.

Safety Precautions

Please read instructions carefully and use the product as specified in this manual.
Be sure to keep this manual nearby for quick reference.

Restrictions on Use

This product was developed, designed, and manufactured for general air conditioning use.

Do not use the product in a situation where human life may be at risk or for nuclear applications in radiation controlled areas. If you wish to use the product in a radiation controlled area, please contact Azbil Corporation.

Particularly when the product is used in the following applications where safety is required, implementation of fail-safe design, redundant design, regular maintenance, etc., should be considered in order to use the product safely and reliably.

- •Safety devices for protecting the human body
- •Start/stop control devices for transportation machines
- •Aeronautical/aerospace machines

For system design, application design, instructions for use, or product applications, please contact Azbil Corporation.

Azbil Corporation bears no responsibility for any result, or lack of result, deriving from the customer's use of the product.

■ Caution for Instrumentation Design

Considering unexpected failures or contingencies, be sure to design and check safety of the system and equipment.

■ Recommended Design Life

It is recommended that this product be used within the recommended design life.

The recommended design life is the period during which you can use the product safely and reliably based on the design specifications.

If the product is used beyond this period, its failure ratio may increase due to time-related deterioration of parts, etc.

The recommended design life during which the product can operate reliably with the lowest failure ratio and least deterioration over time is estimated scientifically based on acceleration tests, endurance tests, etc., taking into consideration the operating environment, conditions, and frequency of use as basic parameters.

The recommended design life of this product is 11 years.

The recommended design life assumes that maintenance, such as replacement of the limited life parts, is carried out properly.

For maintenance, refer to ■ “Maintenance” in this manual.

■ Caution for Transporting

Lithium batteries are used in this product.

When this product, which uses lithium batteries, is transported by air or sea, ship it in accordance with IATA-DGR/IMDG-Code regulations.

Please inform your shipping company that lithium batteries are included in the product, and follow the necessary procedures according to the company's instructions.

If the product is shipped by air or sea without the necessary labels, etc., specified by the ordinances, you may be in violation of aviation or maritime safety laws and be subject to punishment.

■ Warnings and Cautions

 WARNING	Alerts users that improper handling may cause death or serious injury.
 CAUTION	Alerts users that improper handling may cause minor injury or material loss.

■ Symbols

	Alerts users to possible hazardous conditions caused by erroneous operation or erroneous use. The symbol inside △ indicates the specific type of danger. (For example, the sign on the left warns of the risk of electric shock.)
	Notifies users that specific actions are prohibited to prevent possible danger. The symbol inside ⃠ graphically indicates the prohibited action. (For example, the sign on the left means that disassembly is prohibited.)
	Instructs users to carry out a specific obligatory action to prevent possible danger. The symbol inside ● graphically indicates the actual action to be carried out. (For example, the sign on the left indicates general instructions.)

⚠ WARNING	
	Install this product in a place, such as a control cabinet, where only the administrator has access to it. Failure to do so may result in electric shock.
	Ground this product with a ground resistance of less than 100 Ω. Improper grounding may cause electric shock or malfunction. Doing so may cause electric shock.
	Before wiring or maintenance, turn off the power to this product. Failure to do so may result in electric shock or device failure.
	Do not insert conductive objects through product ventilation holes. Doing so may cause electric shock.
	Do not touch electrically charged parts. Doing so may cause electric shock.

⚠ CAUTION	
	Take anti-lightning surge measures based on regional and building characteristics. Lightning may cause fire or critical damage to this product if protective measures are not taken.
	Keep this product in the package for storage. Failure to do so may damage or stain the product.

⚠ CAUTION	
	Install, wire, and use this product under the conditions specified by this manual. Failure to do so may cause fire or device failure.
	Take anti-noise measures if this product is installed in a location near source of electric noise. Failure to do so may cause malfunction or device failure.
	Installation and wiring must be performed by personnel qualified to do instrumentation and electrical work. Failure to do so may cause fire or electric shock.
	All wiring must comply with applicable codes and ordinances. Otherwise there is a danger of fire.
	For wiring, strip the insulation from cables as specified in this manual. If the length of exposed wire is longer than specified, it may cause electric shock or short circuit between adjacent terminals. If it is too short, it may not make proper contact.
	Tighten the terminal screws with the specified torque. Insufficient tightening of the terminal screws may cause fire or overheating.
	Do not block the ventilation holes of this product. Doing so may cause device failure.
	Do not allow wire clippings, metal shavings, and other refuse to enter into the product. Doing so may cause fire or product damage.
	Do not disassemble this product. Doing so may cause device failure.
	Before cleaning the product or retorquing the terminal screws, turn off the power to the product. Failure to do so may cause electric shock, device failure, or malfunction.
	Dispose of used lithium batteries in accordance with local regulations. Do not throw them in the fire or dispose of them with ordinary garbage. Doing so may cause the batteries to burst or ignite.

■ System Configuration

There are two methods of operation: (1) connecting the Advanced Controller to the central monitoring unit, or (2) connecting the Advanced Controller to the Operator Interface for standalone operation.
For the former, the redundancy function is available.
When the Advanced Controller is used in a redundant configuration, standalone operation is not possible. The Advanced Controller without redundancy can be used in standalone operation.

● Operation connected to the system

With redundancy

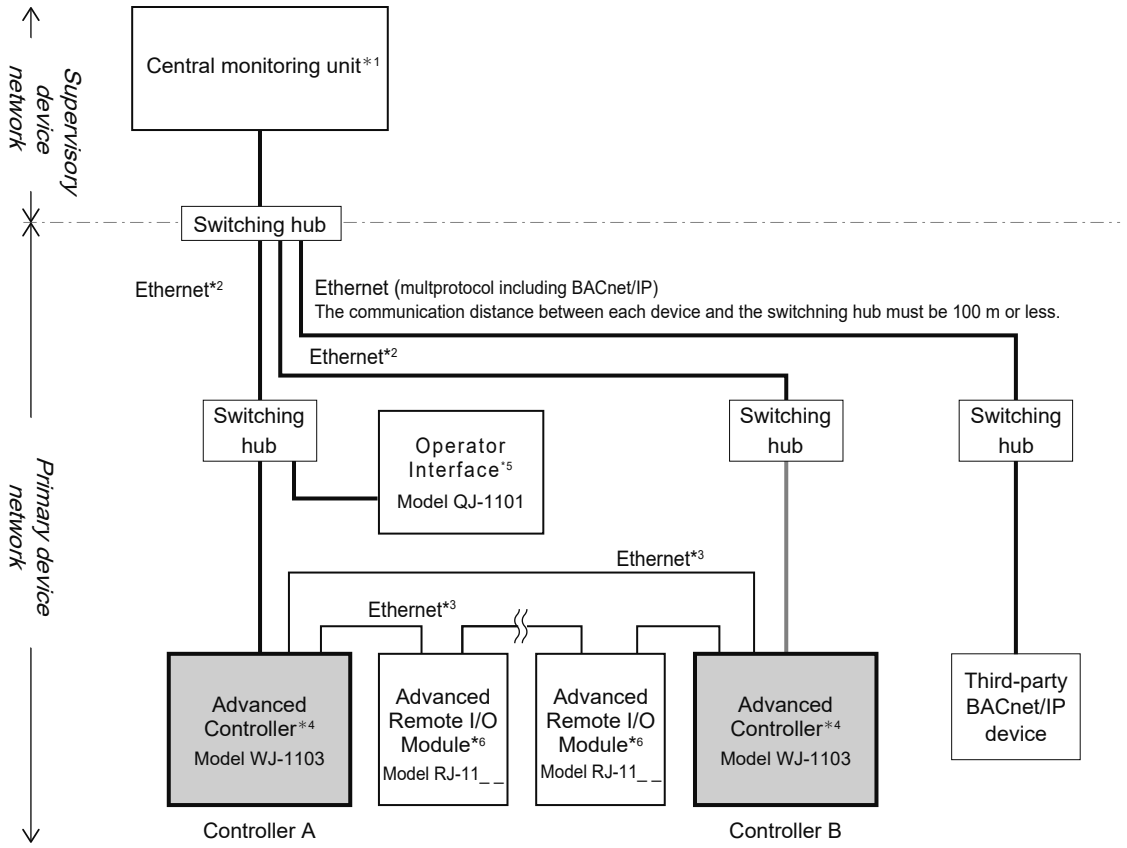


Figure 1 System configuration example

*1 The Advanced Controller can be connected to Azbil's Supervisory Controller (BH-101G0_0000) or a third-party central monitoring unit using BACnet/IP communications.

*2 A redundant network can be configured depending on the requirements of the job.

*3 A total of 20 Advanced Remote I/O Modules can be connected to two Advanced Controllers in a redundant configuration.
Connect the Advanced Controllers to the Advanced Remote I/O Modules in a ring network using Ethernet.
Advanced Remote I/O Modules cannot be connected to the remote I/O network Ethernet connection that connects this product to the host.

*4 The Advanced Controllers cannot connect to secondary devices using the RS-485 line.

*5 A set of controllers (A and B) can be managed by one Operator Interface.
The Operator Interface can be connected anywhere on the same network as the Advanced Controllers.

*6 The following Advanced Remote I/O Module firmware versions (and later) support redundancy.
Model RJ-1101: version 2.0.5. Model RJ-1102: version 2.0.5. Model RJ-1103: version 1.0.7.

Without redundancy

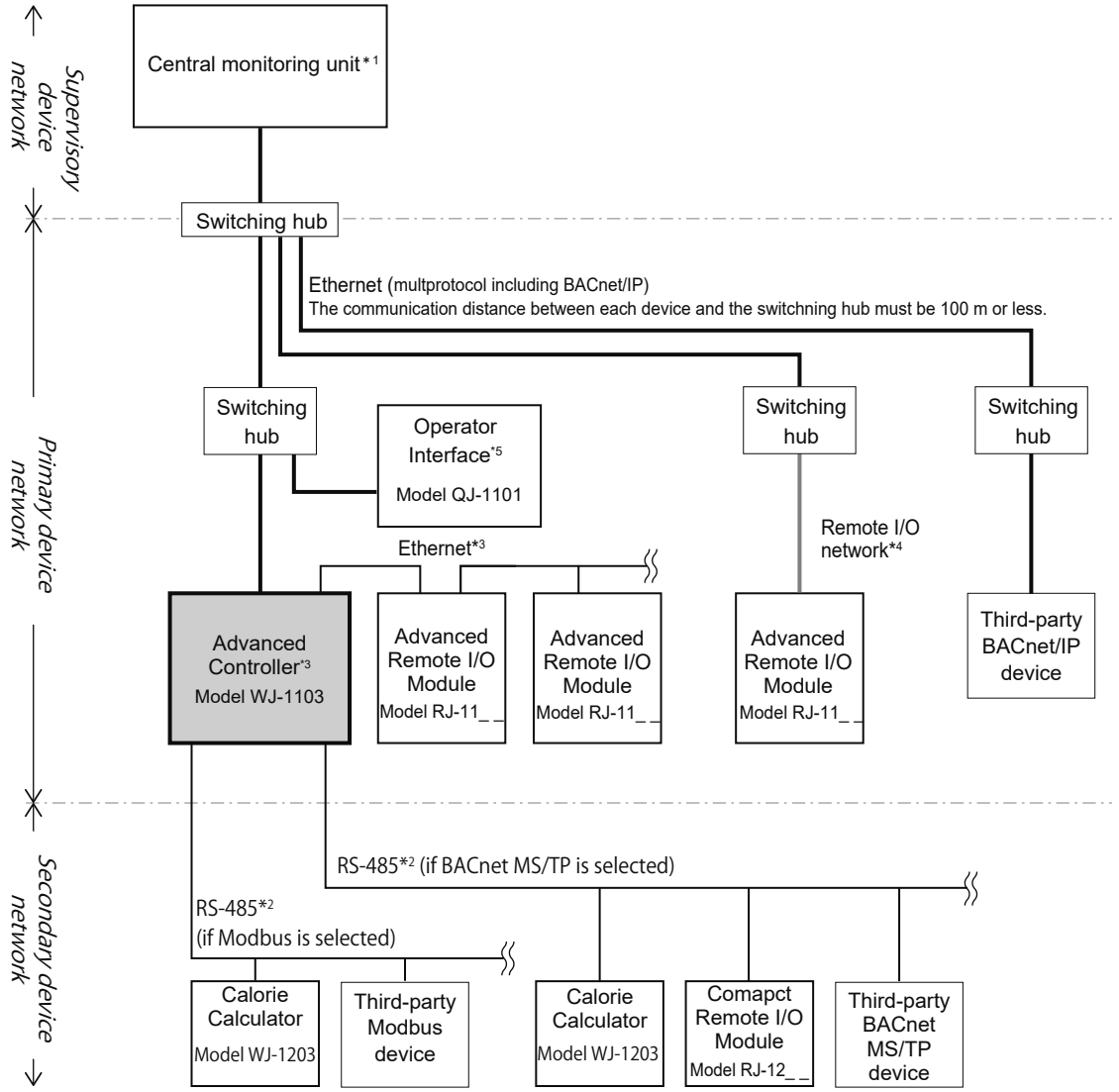


Figure 2 System configuration example

*1 The Advanced Controller can be connected to Azbil's Supervisory Controller (model BH-101G0_0000) or a third-party central monitoring unit using BACnet/IP communications.

*2 The Advanced Controller has two channels on the RS-485 line.
For each channel, a communication protocol can be selected from BACnet MS/TP, Modbus™ RTU, and Modbus™ ASCII.
- The number of devices that can be connected for BACnet MS/TP
  If only Azbil devices are connected: 50 devices per channel (Compact Remote I/O Modules, Calorie Calculator, etc.)
  If only third-party devices are connected: 31 devices per channel (with transmission speed of 76.8 kbps, 30 objects per device)
- Number of devices that can be connected with Modbus™
  31 devices per channel (with transmission speed of 76.8 kbps, 30 objects per device)

If the transmission speed and the number of objects are different among the third-party devices, or if the Azbil devices and third-party devices coexist on the same channel, the number of connected devices will vary. For details, please contact one of Azbil salespersons.

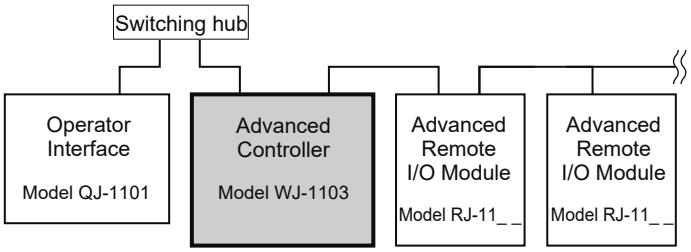
*3 A network that connects the Advanced Controller and subordinate Advanced Remote I/O Modules is called a local I/O network.
A switching hub is not required for a local I/O network since a daisy-chain Ethernet is used between the Advanced Controller and the subordinate Advanced Remote I/O Modules as well as between the Advanced Remote I/O Modules. The maximum number of Advanced Remote I/O Modules that can be connected to the Advanced Controller is 20, which is the sum of the modules connected to local and remote I/O networks.

*4 A network that connects the Advanced Controller and Advanced Remote I/O Modules through a host network is referred to as a remote I/O network.
A switching hub is required to connect the Advanced Remote I/O Modules to the remote I/O network.
The maximum number of Advanced Remote I/O Modules connected to this network is 3 per Advanced Controller.

*5 Up to 4 Advanced Controllers can be managed by the Operator Interface.
The Operator Interface can be connected anywhere on the same network as the Advanced Controller.

● **Standalone operation**

Without redundancy



■ Model Numbers

Model number	Description
WJ-1103W0000	Advanced controller • Ethernet (BACnet/IP) communication • Power: 100–240 V AC
WJ-1103W0000-U	Advanced controller • Ethernet (BACnet/IP) communication • Power: 100-240 V AC • UL certified

● **Optional parts**

Model number	Description
83104567-001	DIN rail clamp
83172137-001	RS-485 terminating resistor (× 10)
83173763-001	4–20 mA 250 Ω resistor (× 8)

● **Replacement parts**

Model number	Description	Remarks
83173707-001	Power connector (× 1)	
83173708-001	RS-485 connectors (for RS-485-1 × 1, for RS-485-2 × 1)	
83170639-001	Lithium battery (× 1)	Replacement cycle: 5 years
83170639-005	Lithium battery (× 5)	
83170639-010	Lithium battery (× 10)	

■ Specifications

● Basic specifications

(1/2)

Item			Specification
Power supply		Rated voltage	100–240 V AC, 50/60 Hz
		Operating voltage	85–264 V AC, 50/60 Hz ± 3 Hz
		Inrush current	20 A max. (100 V AC), 40 A max. (240 V AC)
		Power consumption	30 VA max.
		Leakage current	0.2 mA max. (100 V AC), 0.5 mA max. (240 V AC)
RAM and RTC backup			Powered by lithium batteries (not rechargeable)
CPU			32-bit
Memory capacity			256 MB SDRAM, 32 MB Flash ROM, 2 MB SRAM
Communication	Ethernet (LAN 0)	Protocol	BACnet/IP
		Communication speed	100 Mbps / 1000 Mbps
		Communication method	Autonegotiation, Auto MDI/MDI-X
	Ethernet (LAN 1, LAN 2)	Protocol	Proprietary
		Communication speed	100 Mbps
		Communication method	Auto MDI/MDI-X
		Number of connectable devices	Max. 20 Advanced Remote I/O Modules (per Advanced Controller)
	RS-485*1	Protocol	BACnet MS/TP or Modbus Note: Selectable via software settings.
		Number of channels	2
		Communication speed	• BACnet MS/TP 9.6 kbps, 19.2 kbps, 38.4 kbps, 76.8 kbps • Modbus 4.8 kbps, 9.6 kbps, 19.2 kbps, 38.4 kbps, 76.8 kbps Note: Selectable via software settings.
		Communication distance	1,000 m max.
		Number of connectable devices	• For BACnet MS/TS If only Azbil devices are connected: max. 50 per channel If only third-party devices are connected: max. 31 per channel • For Modbus RTU, Modbus ASCII Max. 31 per channel There are restrictions depending on the software.
Main material and color		Cover	Modified PPE, black
		DIN holder	Molded polyacetal resin
Weight			1.1 kg

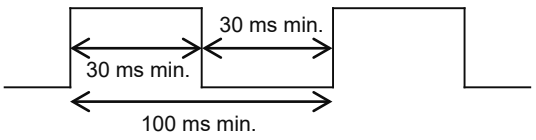
*1 This is available only for controllers that are not redundantly configured. The RS-485 line cannot be used when the controller is redundantly configured.

(2/2)

Item			Specification
Environmental conditions	Rated operating conditions	Ambient temperature	0–50 °C
		Ambient humidity	10–90 % RH (without condensation)
		Elevation	2,000 m max.
		Vibration	5.9 m/s^2 max. (at 10–150 Hz)
	Transportation/ storage conditions	Ambient temperature	−20–60 °C
		Ambient humidity	5–95 % RH (without condensation)
		Vibration (transport)	9.8 m/s^2 max. (at 10–150 Hz)
		Vibration (storage)	5.9 m/s^2 max. (at 10–150 Hz)
	Other		• No corrosive gas should be detected. • No exposure to direct sunlight. • Do not let the product get wet.
Installation location			In a control panel
Mounting			DIN rail or screws

● Input/output specifications

With redundancy

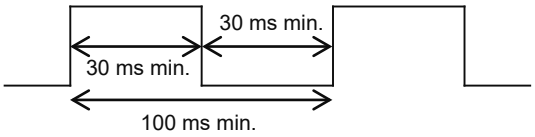
Item			Specification
Digital input*1	Number of inputs		1 (for redundancy function)
	Voltage		24 V DC typ.
	Current		5 mA DC typ.
	Connectable input		Dry contact or open collector
	Rated dry contact values		Allowable ON contact resistance: 100 Ω max. Allowable OFF contact resistance: 100 kΩ min.
	Open collector rated value		Allowable ON residual voltage: 3 V max. Allowable OFF leakage current: 500 μA max.
	Pulse input		10 Hz max. Note: Digital pulse input requires a pulse width and a pulse interval that satisfy the conditions shown in the figure below. 
Controller alarm output*2	Number of outputs		1 (for redundancy function)
	Relay output	Output method	Dry form A contact output (photo MOS relay)
		Rated contact voltage/current	24 V AC, 100 mA 24 V DC, 100 mA
	Applicable voltage		24 V AC ±15 %, 24 V DC ±15 %
	Contact ON resistance		20 Ω or less

*1 DI1 is used for the redundancy function.
The controller's I/O terminals other than DI1 cannot be used for controlling equipment that must be redundant.

*2 Overcurrent protection circuit is built-in.
When the overcurrent protection circuit is activated by a short-circuit, lightning surge, etc., the contacts separate (the same as an alarm state).
To restore the normal state, turn off the power to the output circuit and then turn it back on again.

Without redundancy

(1/2)

Item			Specifications
Digital input	Number of inputs		4
	Voltage		24 V DC typ.
	Current		5 mA DC typ.
	Connectable input		Dry contact or open collector
	Rated dry contact values		Allowable ON contact resistance: 100 Ω max. Allowable OFF contact resistance: 100 kΩ min.
	Open collector rated value		Allowable ON residual voltage: 3V max. Allowable OFF leakage current: 500 μA max.
	Pulse accumulation		10 Hz max. Note: Digital input pulse accumulation requires a pulse width and a pulse interval that satisfy the conditions shown in the following figure. 
Universal input	Number of input terminals		8
	Voltage input	Input range	0–10 V DC, 2–10 V DC, 0–5 V DC, 1–5 V DC
		Input impedance	1 MΩ typ.
	Current input	Input range	4–20 mA
		Input impedance	100 Ω typ.
	Resistance temperature detector input	Input method from connected sensor	Pt100, Pt1000
		Pt100 sensor measuring range	0–50 °C, 0–100 °C, 0–200 °C, −20–80 °C, −20–30 °C, −50–100 °C, −100–50 °C
		Pt1000 sensor measurement range	0–50 °C, 0–100 °C, −20–80 °C, −20–30 °C, −50–100 °C
	Digital input	Voltage	5 V DC typ.
		Current	1.5 mA DC typ.
		Connectable input	Dry contact or open collector
		Rated dry contact values	Allowable ON contact resistance: 100 Ω max. Allowable OFF contact resistance: 100 kΩ min.
		Open collector rated value	Allowable ON residual voltage: 3 V max. Allowable OFF leakage current: 100 μA max.
Digital output	Number of outputs		6
	Relay output	Output method	Relay N.O. (normally open) contact
		Rated contact voltage/current	24 V AC, 0.5 A max. (max. inductive load: cosϕ = 0.4) 24 V DC, 0.5 A max.
		Min. applicable load	5 V DC, 10 mA
Analog Output	Number of outputs		6
	Voltage output	Output range	0–10 V DC, 2–10 V DC, 0–5 V DC, 1–5 V DC
		Load resistance	10 kΩ or more
	Current output	Output range	4–20 mA
		Load resistance	500 Ω max.

(2/2)

Item			Specification
Controller alarm output*	Number of outputs		1
	Relay output	Output method	Photo MOS relay, form A contacts Normal: ON Abnormal, power off, idling, debugging, initializing: OFF
		Rated contact voltage/current	24 V AC: 100 mA max. 24 V DC: 100 mA max.
	Applicable voltage		24 V AC ±15 %, 24 V DC ±15 %
	Contact ON resistance		20 Ω or less

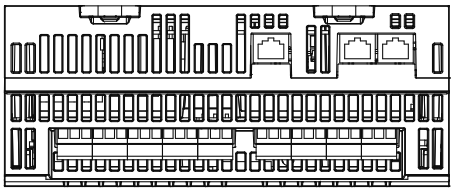
* Overcurrent protection circuit is built-in.
When the overcurrent protection circuit is activated by a short-circuit, lightning surge, etc., the contacts will separate (the same as an alarm state).
To restore the normal state, turn off the power to the output circuit and then turn it back on again.

■ Specifications for Wiring

Item	Wire type	Maximum cable length	Remarks
Power supply	600 V PVC-insulated cable (IEC 60227-3) / CVV equivalent, stranded cable, 1.25–2.0 mm^2 May be connected to another piece (but only if the cross-sectional area is the same, 1.25–1.5 mm^2)	—	
Ground	600 V PVC-insulated cable (IEC 60227-3) / CVV equivalent, stranded cable, 1.25–2.0 mm^2 May be connected to another piece (but only if the cross-sectional area is the same, 1.25–1.5 mm^2)	—	Ground the product with resistance less than 100 Ω.
Ethernet (LAN0)	EIA/TIA-568 category 5e or higher	100 m	
Ethernet (LAN1/LAN2)	EIA/TIA-568 category 5e or higher	100 m	
RS-485	Belden 3106A, 3107A, 9842, or equivalent, 0.2–0.3 mm^2 shielded twisted-pair cable (AWG24–AWG22) May be connected to another piece (but only if the cross-sectional area is the same)	1,200 m	Use cable that satisfies the following specifications: - Impedance: 100–130 Ω - Capacitance between conductors: 100 pF/m max. - Capacitance between conductor and shield: 200 pF/m max.
Digital input*1	600 V PVC-insulated cable (IEC 60227-3) / CVV equivalent, stranded cable, 0.5–1.25 mm^2 May be connected to another piece (but only if the cross-sectional area is the same)	100 m	
Digital output	600 V PVC-insulated cable (IEC 60227-3) / CVV equivalent, stranded cable, 0.5–1.25 mm^2 May be connected to another piece (but only if the cross-sectional area is the same)	100 m	
Universal input (Resistance temperature detector input)	600 V PVC-insulated cable (IEC 60227-3) / CVV equivalent, stranded cable, 0.5–1.25 mm^2	100 m	Since wiring resistance can cause an error, wire with a cross-sectional area of 1.25 mm^2 (16 AWG) are recommended.
Universal input (Voltage/current/digital input)	600 V PVC-insulated cable (IEC 60227-3) / CVV equivalent, stranded cable, 0.5–1.25 mm^2	100 m	
Analog Output	600 V PVC-insulated cable (IEC 60227-3) / CVV equivalent, stranded cable, 0.5–1.25 mm^2	100 m	
Controller alarm output	600 V PVC-insulated cable (IEC 60227-3) / CVV equivalent, stranded cable, 0.5–1.25 mm^2	30 m	If there is no need for CE marking, the maximum cable length is 100 m.

*1 Only DI1 is used when the Advanced Controller is redundantly configured.

■ Dimensions



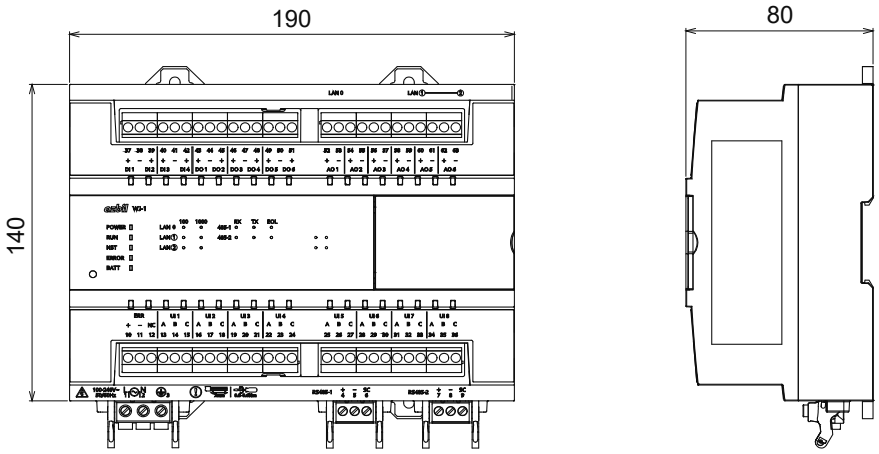


Figure 3 Dimensions (mm)

■ Name of Parts

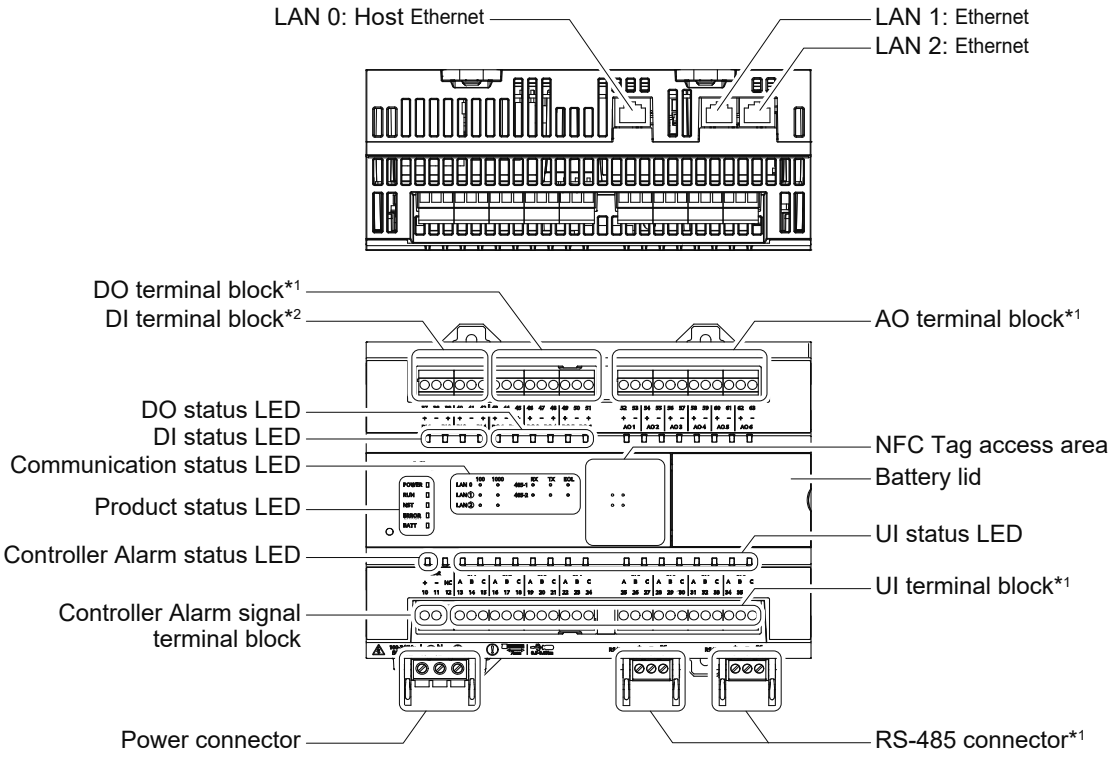


Figure 4

*1 This terminal cannot be used when the Advanced Controller is redundantly configured.
*2 Only DI1 is used when the controller is redundantly configured.

■ Functions

● Redundancy

Basic behavior

Controller A operates in an active state and controller B in a standby state.
Controllers A and B monitor each other to detect failure using lower-level Ethernet communication. If controller A fails, controller B switches from standby to active and continues control.
After controller A recovers, controller A can be manually returned to active state (and B to standby state) from the central monitoring unit.
Alternatively, controller B can continue as the active controller.

Note: Controller A is the redundant controller that is mainly used. Controller B is the redundant controller used for backup.

● Monitoring by central monitoring unit

The central monitoring unit uses a shared IP address to access the controllers without determining which controller is active. (In a redundant configuration, three IP addresses [controller A's IP address, controller B's IP address, and the shared IP address] are used.)

● Active/Standby state

In an active state, control operations are executed. In a standby state, control operations are not executed.
The active and standby states are as follows.

Communication with Advanced Remote I/O Modules

Active: Scanning of modules and output to modules.
Standby: Scanning of modules but no output to modules.*

* The standby controller does not independently scan I/O modules to synchronize accumulator (AC) objects, but rather obtains values from the active controller.

Control (including DDC program)

Active: Normal operation
Standby: Normal control operation, but without output*

* Control execution timing is synchronized with the active controller.

Report to Host Central Monitoring Unit

Active: COV notification and event notification is sent (via the shared IP address).
Standby: No COV or event notification

Shared IP Address

Active controller: Serves as the actual node that is accessed by the central monitoring unit using the shared IP address.
Standby controller: Obtains information for synchronization from the active controller.

● Active/Standby Switchover

The A and B controllers monitor each other's failure status and active/standby status via lower-level Ethernet communication (also used for connecting to Advanced Remote I/O Modules).
If the active controller is determined to have failed, the standby controller immediately becomes the active one and continues control.
Failure (> 300 ms) of the link to the controller's host Ethernet port is also considered to be a failure.
If lower-level Ethernet communication is unavailable (due to a break in the cable, etc.), controller B obtains controller A's information via the host Ethernet. If it cannot obtain the information, controller B determines that the controller A has failed. Controller B then switches from standby to active status.
If controller B learns via the host Ethernet that controller A is normal and active, controller B does the following.
If it is in the standby state, it refrains from becoming active to prevent both controllers from being active at the same time. If it is in the active state, it switches from active to standby.

● Data Synchronization

Ongoing synchronization

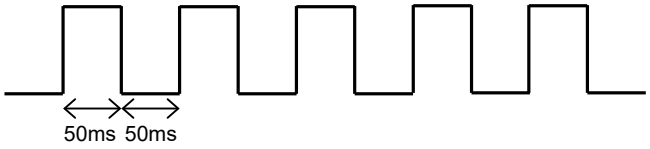
Controllers A and B are completely synchronized as long as they are operating properly because the command outputs from the host system and the editable parameters remain the same for both controllers.

Initial synchronization

If one of the controllers restarts (when the other controller is detected as normal and active) or when one controller fails and recovers (the recovered controller synchronizes with the active controller), the main I/O object data and DDC program data is synchronized.

● **Synchronous control**

A pulse signal is output from one of the controllers on a fixed 50 ms cycle and is received at the other controller's DI terminal (controller I/O unit).
This signal synchronizes the control execution of the controllers.



● **Power supply system**

If there are A and B power systems, power A should go to controller A, power B should go to controller B, and Advanced Remote I/O Modules should be switched between A and B.
A UPS should be installed for the Advanced Remote I/O Modules because it may take time to switch to the other power system.

■ Installation

⚠ WARNING
Install this product in a place, such as a control cabinet, where only the administrator has access to it. Failure to do so might cause electric shock.

⚠ CAUTION
Install, wire, and use this product under the conditions specified by this manual. Failure to do so may cause fire or device failure.
Installation and wiring must be performed by personnel qualified to do instrumentation and electrical work. Failure to do so may cause fire or electric shock.

● **Installation location**

The product should be installed in a place that satisfies the following conditions.

- Indoors, not in direct sunlight
- Where the product will not get wet

Note: The product is not waterproof.

This product must be installed in a panel cabinet.
Leave space as shown (the hatched area) around the product.

- The horizontal dimension depends on the number of I/O modules installed.

Installation on a DIN rail (single unit)

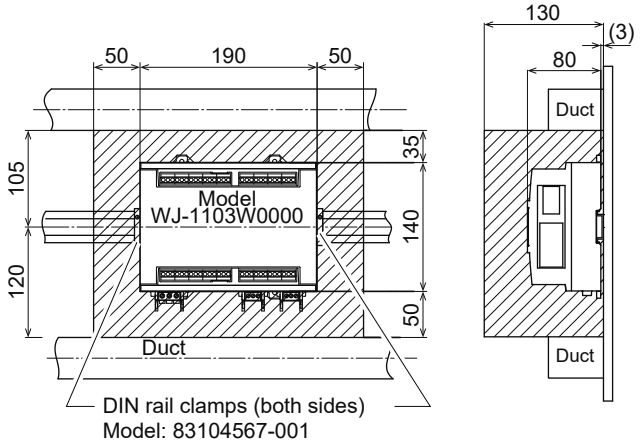
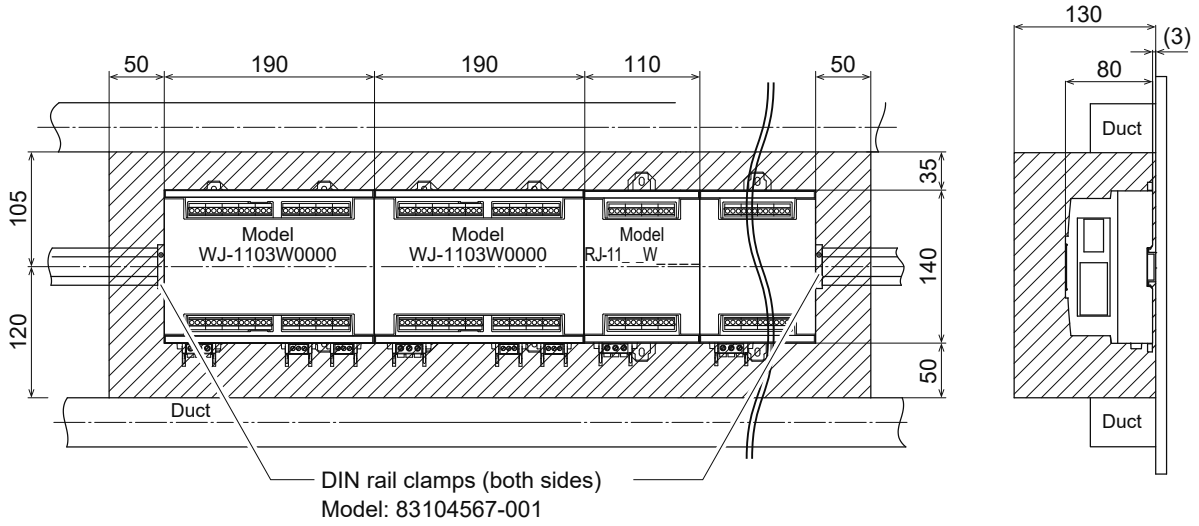


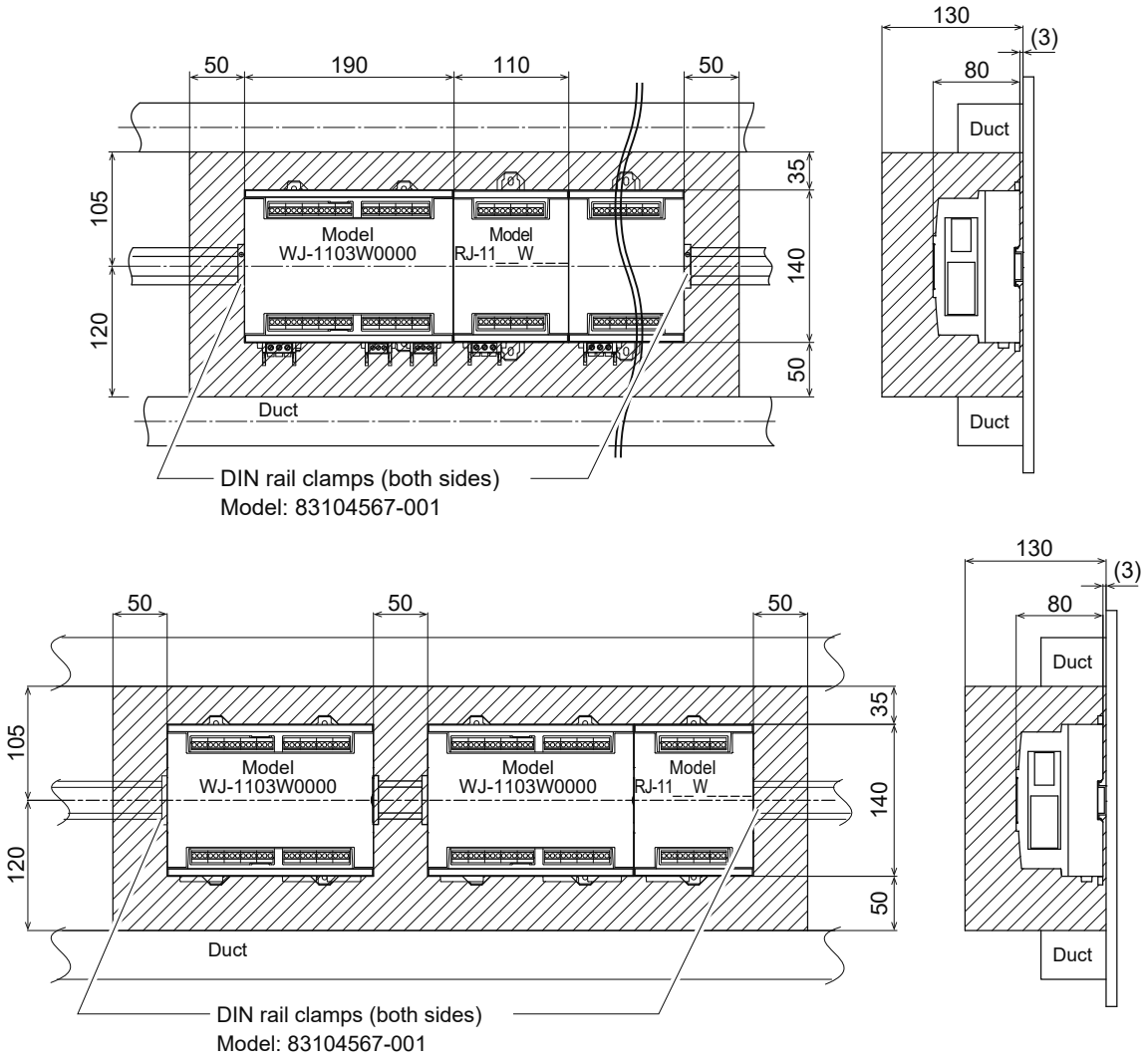
Figure 5 Installation on DIN rail (single unit) (mm)

Installation on a DIN rail (redundant units)



Note: With redundant controllers, a model WJ-1103W000 (or model RJ-11_ _W_ _ _ _) can be installed without space of another WJ-1103W000.

Installation on a DIN rail (no redundancy)



Note: If the controller is not redundant, a model RJ-11_ _W_ _ _ _ can be installed without space of model WJ-1103W000. However, space is required between two WJ-1103W000 controllers.
Leave space for maintenance around the product in the same manner as for single unit installation.

Figure 6 Installation on a DIN rail (multiple units) (mm)

Installation with screws (single unit)

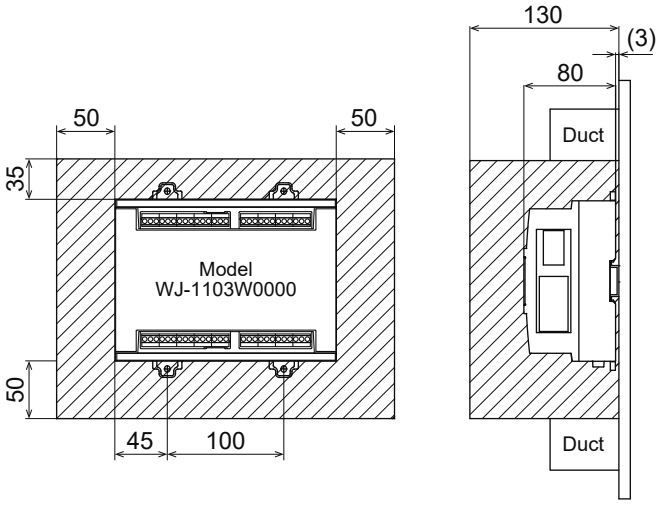


Figure 7 Installation with screws (single unit) (mm)

Note: Multiple units can also be installed with screws as with the DIN rail.

● Installation position

- This product should be installed upright in a panel.
  It cannot be installed on a slant or laid on its side. Doing so reduces the effectiveness of heat radiation, which may cause the internal temperature to rise abnormally.

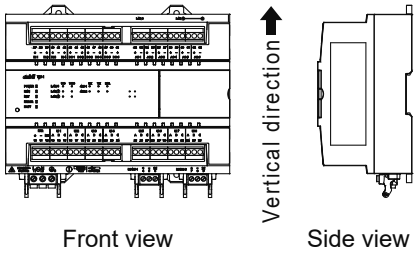


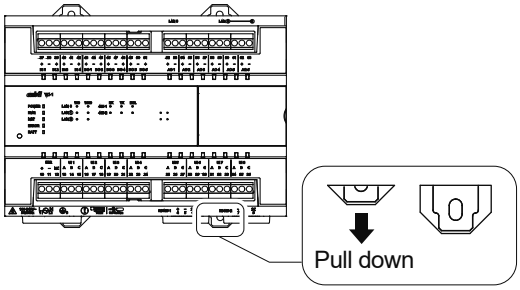
Figure 8 Installation position

- Do not block the ventilation holes by putting an object on top of the product, etc.

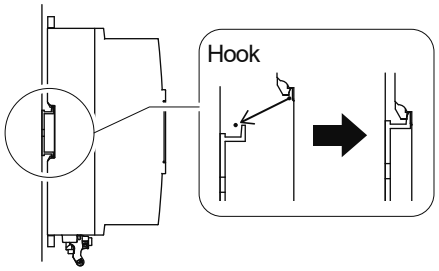
● Installation method

Installation on a DIN rail

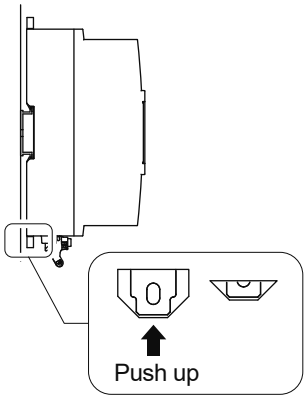
(1) Pull down the two DIN holders on the bottom of the product.



(2) Hook the DIN holders on top of the product on the DIN rail and check that it is hooked securely.



(3) Push up the two DIN holders on the bottom of the product.



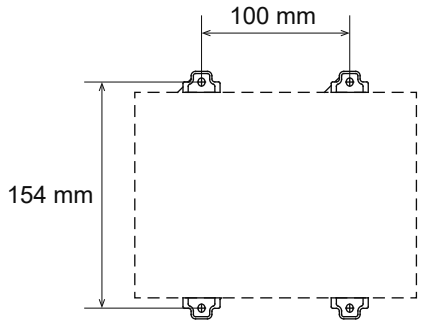
(4) Check that the four DIN holders on the top and bottom of the product are fastened to the DIN rail.
Check that the product does not wobble.

(5) Lock both ends with the DIN rail clamps (model 83104567-001).
After installation, be sure not to lose the included connectors before connecting the wiring.

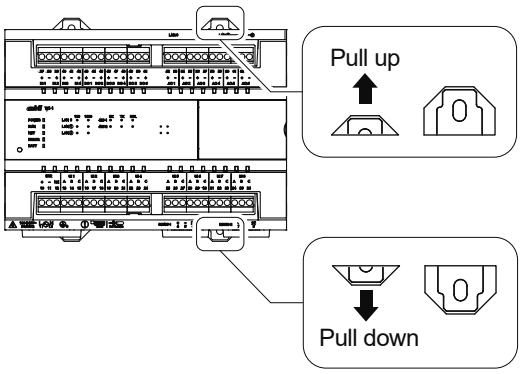
Direct Installation with Screws

Install the product on a wall using four M4 8 mm long screws.

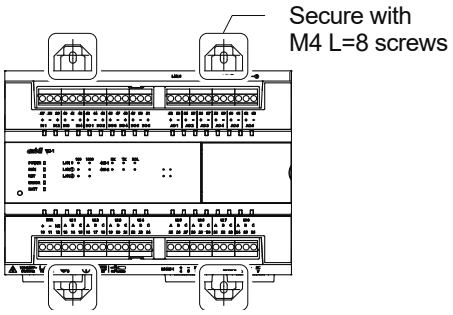
(1) Make four screw holes on the place for installation.



(2) Pull out the two DIN holders on the top of the product and the two on the bottom.



(3) Using the four holes in the DIN holders, fasten the product with the M4 L=8 screws.
Check that the product does not wobble.
After installation, be sure not to lose the included connectors before connecting the wiring.



■ Wiring

⚠ WARNING	
	Ground this product with a ground resistance of less than 100 Ω. Improper grounding may cause electric shock or malfunction. Doing so may cause electric shock.
	Before wiring or maintenance, turn off the power to this product. Failure to do so may result in electric shock or device failure.

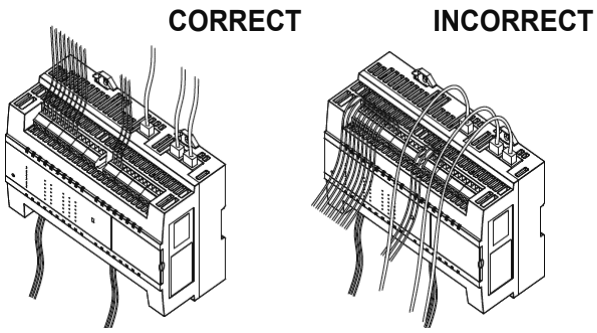
⚠ CAUTION	
	Installation and wiring must be performed by personnel qualified to do instrumentation and electrical work. Failure to do so may cause fire or electric shock.
	All wiring must comply with applicable codes and ordinances. Otherwise there is a danger of fire.
	Take anti-noise measures if this product is installed in a location near source of electric noise. Failure to do so may cause malfunction or device failure.
	For wiring, strip the insulation from cables as specified in this manual. If the length of exposed wire is longer than specified, it may cause electric shock or short circuit between adjacent terminals. If it is too short, it may not make proper contact.
	Tighten the terminal screws with the specified torque. Insufficient tightening of the terminal screws may cause fire or overheating.

● Notes on wiring

IMPORTANT:
- Incorrect wiring may cause the device to fail. Before turning on the power, check that all wires are correctly connected.
- If the controller is redundantly configured, its DO, AO, and UI terminal blocks, and the RS-485 connector, cannot be used.

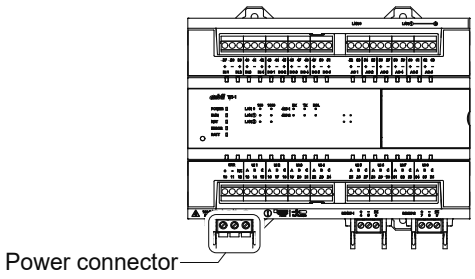
- Do not use unused spare terminals on this product as relay terminals.
  Doing so may cause device failure.

- Provide a circuit breaker for the power source to this product.
  This product does not have a power switch.
  If the controller is redundantly configured, provide circuit breakers so that the power can be shut off individually for controllers A and B during maintenance or replacement.
- Do not use an uninterruptible power supply that outputs rectangular waves.
  Doing so may cause the device to fail.
  Power wires must be routed separately from communication wires and signal wires. Electrical noise from power wires can affect signal wires, causing communication errors.
- Do not allow the cables to cover the front of this product.
  Run the cables away from the product, up or down as shown in the following figure.
  Do not hide the front of the product with cables because it contains LEDs and an area for adjusting the product.

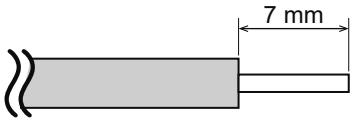


● **Wiring of the power terminal block**

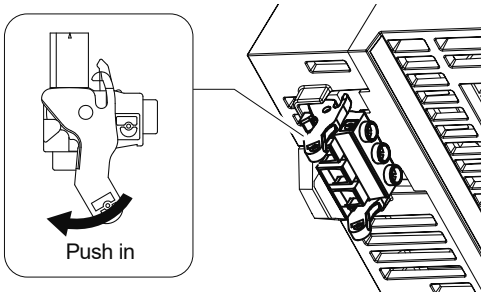
Screw connectors are used.



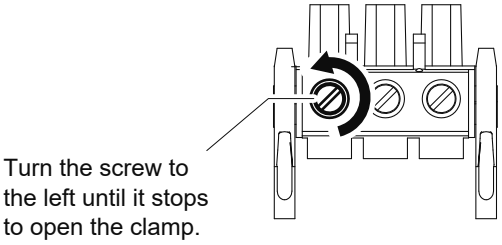
(1) Strip 7 mm of insulation from the cable core wire.



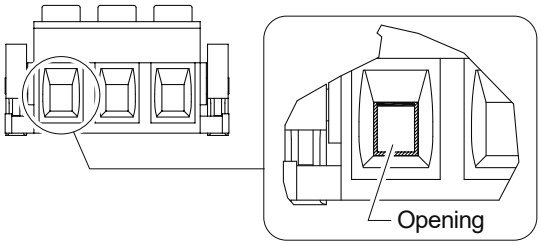
(2) If the connector is plugged into the product, push in the release levers on the right and left sides of the connector to remove it from the product.



(3) Turn the screw above the cable clamp (above the hole for the cable) of the connector to the left with a screwdriver to open the cable clamp.

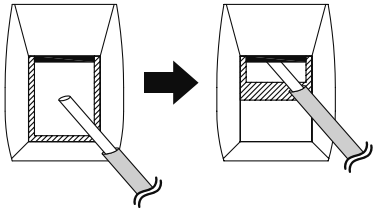


Note: Compatible screwdriver blade: 0.6 × 3.5 mm

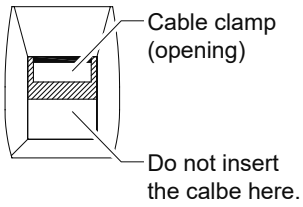


(4) For a daisy chain connection, twist the wires together (using the cables specified in “Specifications for Wiring,” limited to those with the same cross-sectional area ranging from 1.25 mm^2 to 1.5 mm^2).

(5) Insert the cable(s) stripped in step (1) into the cable clamp and tighten it by turning the screw above the cable clamp to the right with a screwdriver.
The screw tightening torque is 0.5 N·m–0.6 N·m.
Make sure there are no strands of cable wire protruding from the cable clamp.

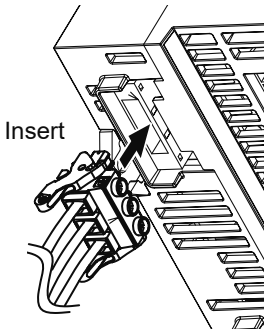


Note: Check that the wire is inserted into the cable clamp.

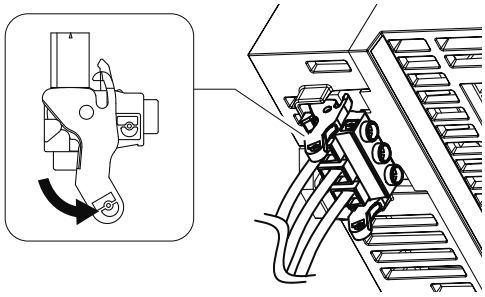


(6) Lightly pull on the cable to check that it does not come out.

(7) Insert the connector into the product.



Check that the release levers of the connector are securely locked.



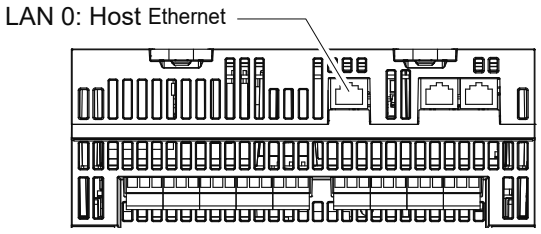
(8) Lightly pull on the cable to check that the power connector does not come out.

Power terminals

Terminal number	Display	Description
1	L	AC input
2	N	AC input
3	⏚	Protective ground terminal

● **Connecting to the host network**

Connect the LAN cable to LAN 0.

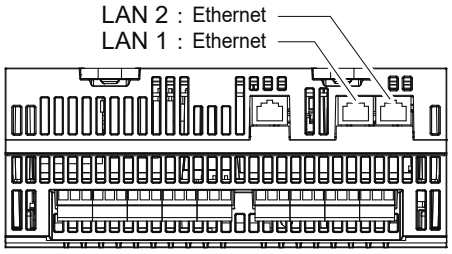


● **Connecting to the local I/O network (when the controller is redundant)**

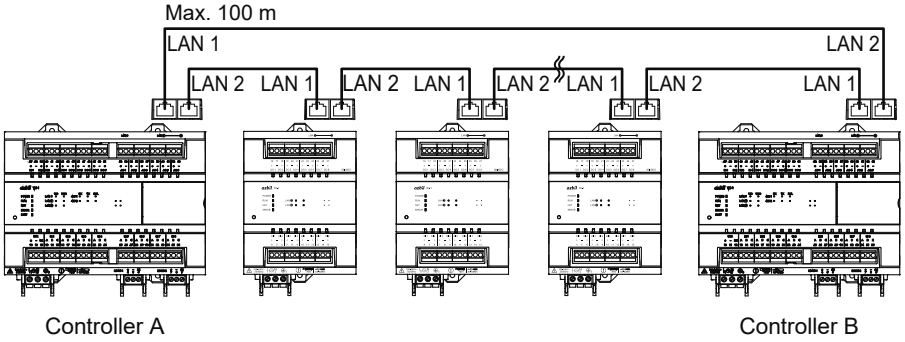
Connect the LAN cables to LAN 1 and LAN 2 (these LAN ports are used in pairs).

Connect controllers A and B (model WJ-1103W0000) directly.

A ring network is used to connect the Advanced Remote I/O Modules.



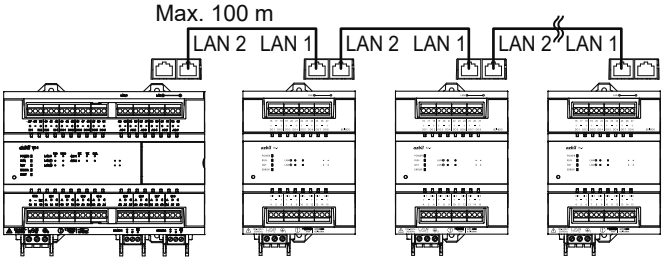
Ring network



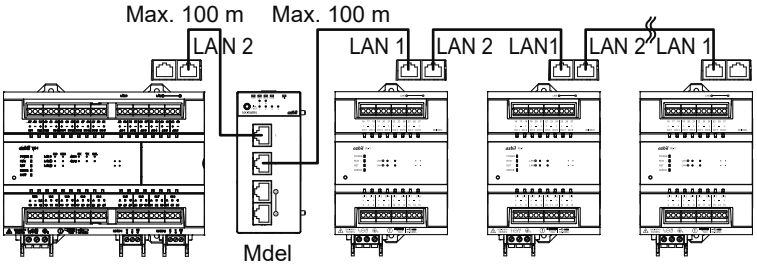
● **Connecting to the local I/O network (when the controller is not redundant)**

Connect LAN cables to LAN 1 and LAN 2 (these LAN ports are used in pairs).
A daisy chain ring network is used to connect the Advanced Remote I/O Modules.

Daisy chain network



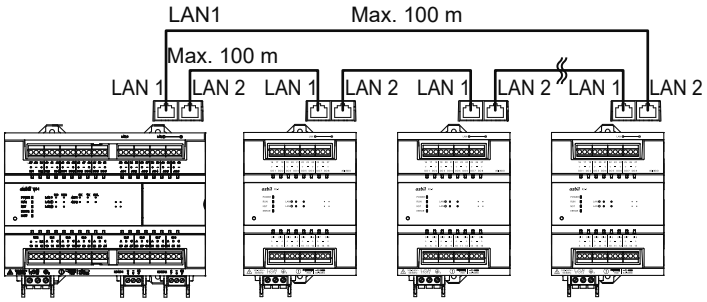
- The maximum communication distance is 100 m.
  To extend the communication distance, connect an industrial switching hub without ring communication (model NX-SWBN 004_ _) as shown below. This extends the communication distance by 100 m.



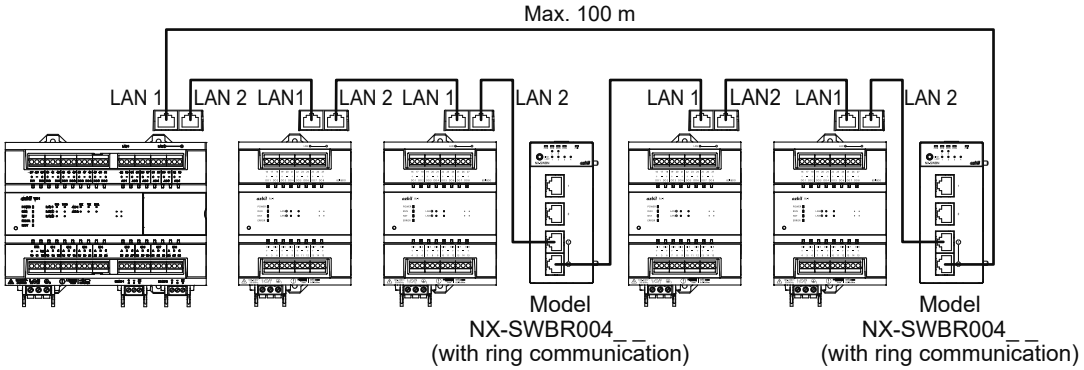
- The industrial switching hub requires a 24 V DC power supply.
  Any of the four Ethernet ports can be used.
  However, the two remained Ethernet ports must not be used.

Note: Refer to CP-UM-5718JE, *Industrial Switching Hub User's Manual for Installation.*

Ring network



- The maximum communication distance is 100 m.
  To extend the communication distance, connect an industrial switching hub dedicated for ring communication (model NX-SWBR 004_ _) as shown below. This extends the communication distance by 100 m.



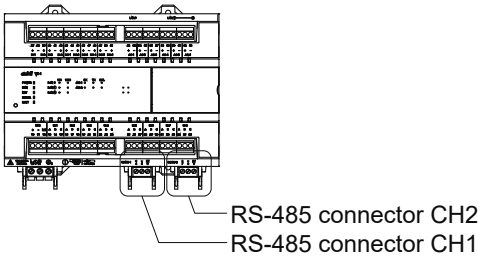
- The industrial switching hub requires a 24 V DC power supply.
  Only Ethernet ports 3 and 4 on the industrial switching hub can be used.

Note: Refer to CP-UM-5718JE, *Industrial Switching Hub User's Manual for Installation.*

● **Wiring of RS-485 terminals (when the controller is not redundant)**

IMPORTANT: • If the controller is redundantly configured, its DO, AO, and UI terminal blocks, and the RS-485 connector, cannot be used.

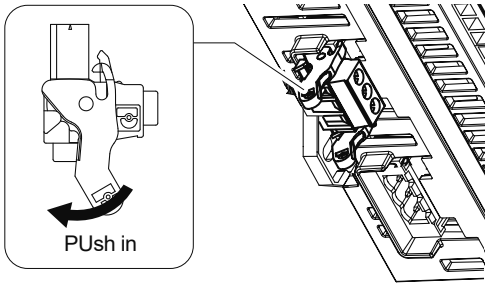
Screw connectors are used.



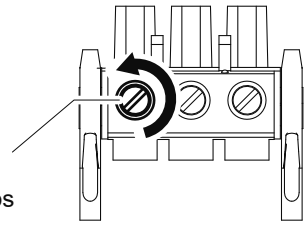
(1) Strip off the outer insulation from the shielded twisted-pair cable.

(2) Strip 7 mm of insulation from the cable core wire.

(3) If the connector is plugged into the product, push in the release levers on the right and left sides of the connector to remove it from the product.



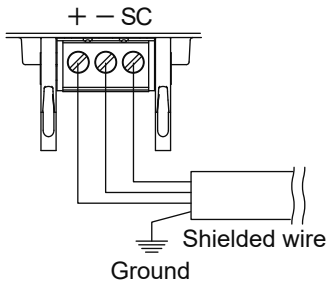
(4) Turn the screw above the cable clamp (above the hole for the cable) of the connector to the left with a screwdriver to open the cable clamp.



Note: Compatible screwdriver blade: 0.6 × 3.5 mm
Refer to the figure shown in step (3) of ● “Wiring of the power terminal block.”

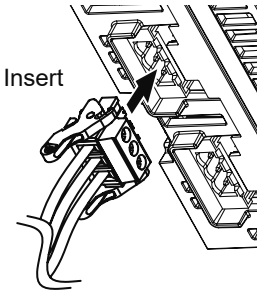
(5) For a daisy chain network, twist the wires together, using cables with the same cross-sectional area as specified in ■ “Specifications for Wiring.”

(6) Insert the cable(s) stripped in step (2) into the cable clamp and tighten it by turning the screw to the right with a screwdriver.
The screw tightening torque is 0.5 N·m–0.6 N·m.
Make sure there are no strands of cable wire protruding from the cable clamp.
Refer to the step (5) of ● “Wiring of the power terminal block” to insert the cable into the cable clamp correctly.
If this product is not at the end of the network, connect the twisted-together cables (with the same cross-sectional area, as specified in ■ “Specifications for Wiring”) to the RS-485 connector.

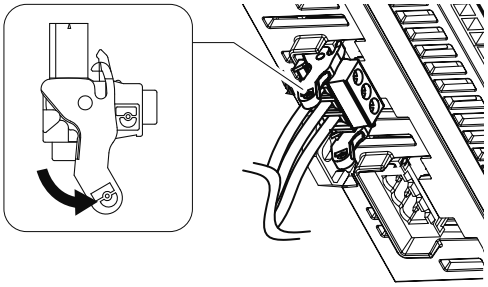


(7) Lightly pull on the cable to check that it does not come out.

(8) Insert the connector into the product.



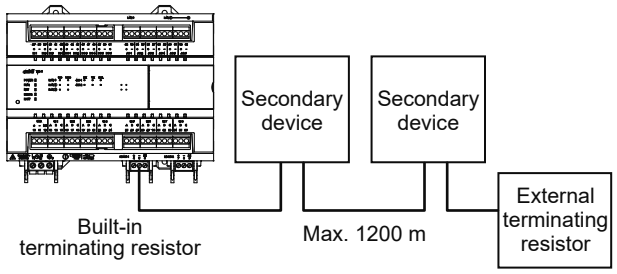
Check that the release levers of the connector are securely locked.



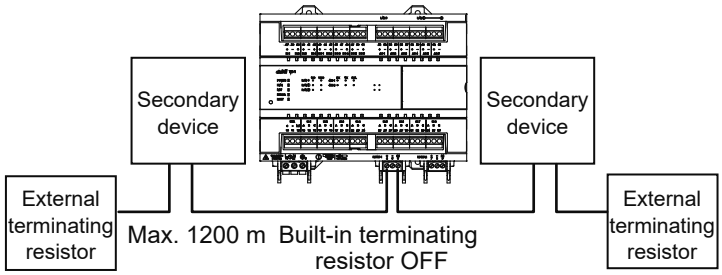
(9) Lightly pull on the cable to check that the RS-485 connector does not come off.

(10) Connect a terminating resistor to the last secondary device connected to the RS-485 wiring.

- If this product is at the end of the network



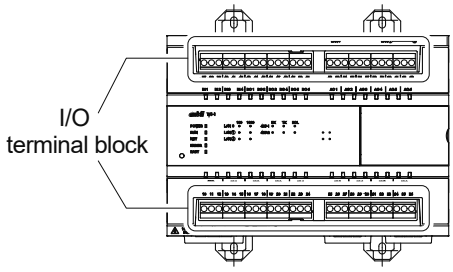
- If this product is not at the end of the network



RS-485 Terminals

Terminal number	Display	Description
4	+	CH1 +
5	−	CH1 −
6	SC	CH1 common
7	+	CH2 +
8	−	CH2 −
9	SC	CH2 common

● **Wiring the I/O terminal blocks**

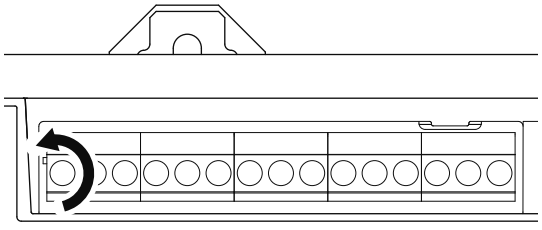


The terminal blocks use screw-operated clamp connections.

(1) Strip 7 mm of insulation from the cable core wire.

(2) Turn the screw of the terminal block to the left with a screwdriver to open the cable clamp (which is inside the hole for the cable).

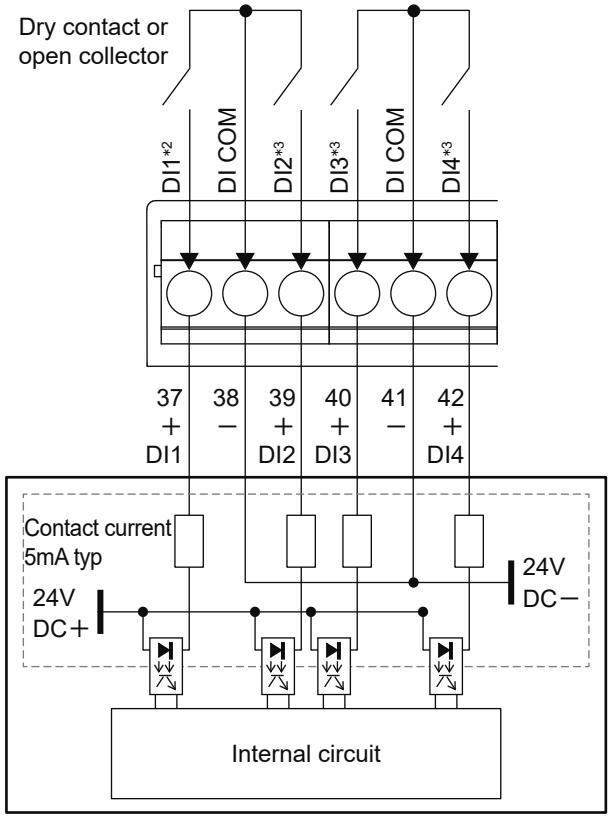
Note: Compatible screwdriver blade: 0.6 × 3.5 mm



(3) Insert the cable into the cable clamp of the terminal block, and then turn the screw to the right with a screwdriver to tighten the cable clamp.
The screw tightening torque is 0.5 N·m–0.6 N·m.
Make sure there are no strands of cable wire protruding from the cable clamp.
For every two channels, there is one common terminal for digital inputs and outputs.
Cables with the same cross-sectional area, as specified in ■ “Specifications for Wiring,” can be twisted together for direct connection to each other.

(4) Lightly pull on the cable to check that it does not come out.

DI Terminals



Terminal number	Display	Description
37	+	CH1 +
38	−	CH1 and CH2 common
39	+	CH2 +
40	+	CH3 +
41	−	CH3 and CH4 common
42	+	CH4 +

Figure 9 Example of DI wiring

*1 The area enclosed by the dotted lines indicates how this product is internally isolated.
*2 Only DI1 is used if the controller is redundant.
*3 Not available if the controller is redundant.
Note: Use contacts that have sufficient opening/closing capacity for the contact current and the open-circuit voltage for this product.

Controller alarm output terminal

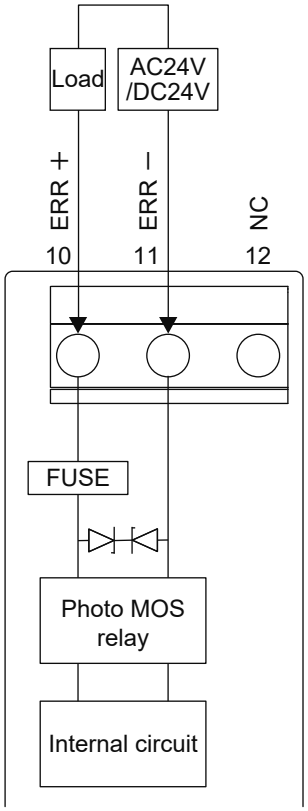


Figure 10 Example of controller alarm output

* Not available if the controller is redundant.
Note: Before connecting or removing a load, turn off the power to this product.
Failure to do so will cause malfunction of this product and load failure.

Synchronizing control output

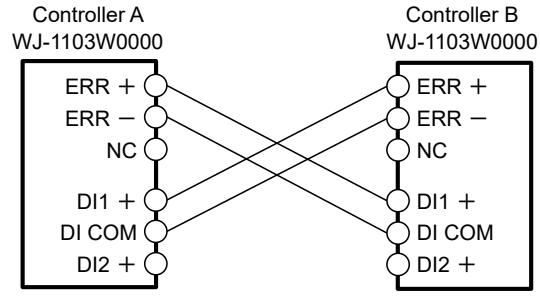
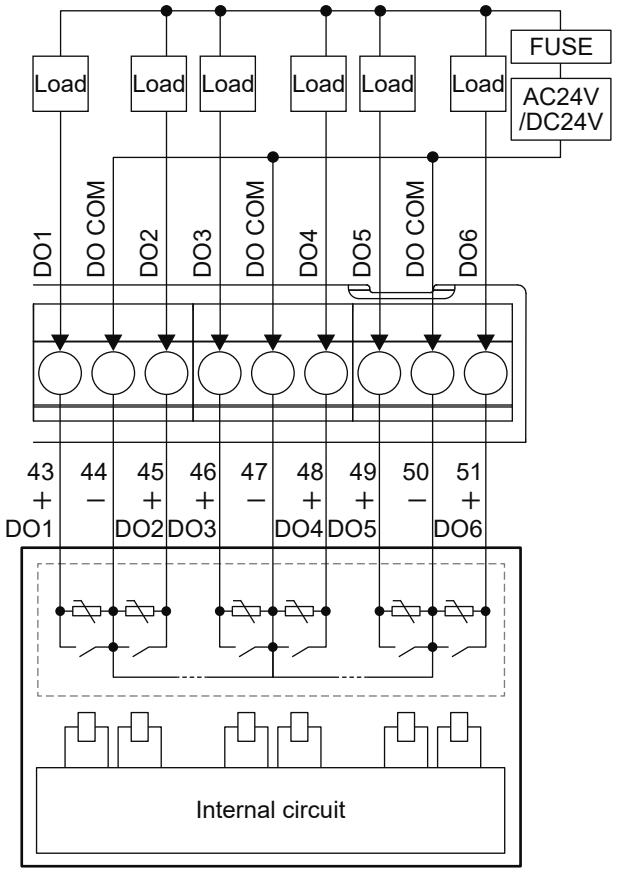


Figure 11 Example of synchronous control output

* This is used only when the controller is redundant.
* Connect controller A's alarm output to controller B's DI1.
* Connect controller B's alarm output to controller A's DI1.

DO Terminals



Terminal number	Display	Description
43	+	CH1 +
44	−	CH1 and CH2 common
45	+	CH2 +
46	+	CH3 +
47	−	CH3 and CH4 common
48	+	CH4 +
49	+	CH5 +
50	−	CH5 and CH6 common
51	+	CH6 +

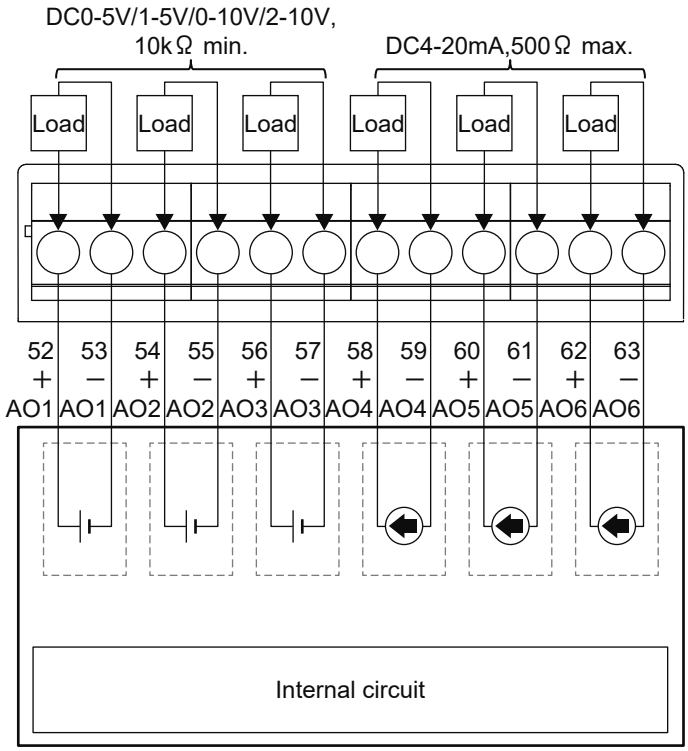
Figure 12 Example of DO wiring

* Not available if the controller is redundant.

Note:

1. Before connecting or removing a load, turn off the power to this product.
   Failure to do so will cause malfunction of this product and load failure.
2. The DO COMs are connected with each other internally in the product.
   However, there is a maximum current of 1 A per common terminal.

AO terminals



Terminal number	Display	Description
52	+	CH1
53	−	
54	+	CH2
55	−	
56	+	CH3
57	−	
58	+	CH4
59	−	
60	+	CH5
61	−	
62	+	CH6
63	−	

Figure 13 Example of AO wiring

* Not available if the controller is redundant.

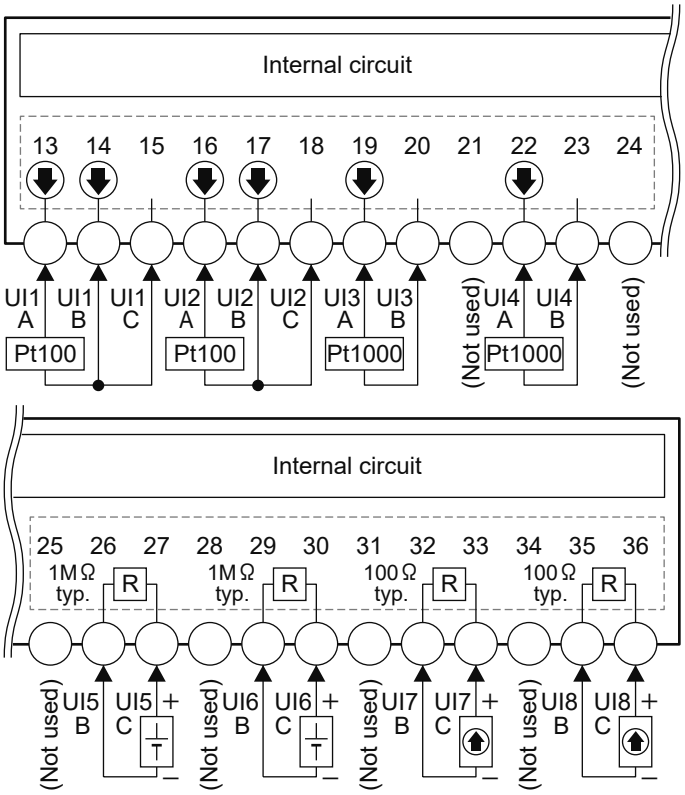
* An example when AO1–AO3 are voltage outputs and AO4–AO6 are current outputs.

* No restrictions on the channel settings.

Note:

1. Before connecting or removing a load, turn off the power to this product.
   Failure to do so will cause malfunction of this product and load failure.
2. The input impedance of the connected voltage-output device should be 10 kΩ min.
3. The sum of the input impedance of the connected current-input device and the wiring resistance should be equal or lower than 500 Ω.

UI terminals



The wiring differs depending on the input type.

Terminal number	Display	Description	Terminal number	Display	Description
13	A	CH1	25	A	CH5
14	B		26	B	
15	C		27	C	
16	A	CH2	28	A	CH6
17	B		29	B	
18	C		30	C	
19	A	CH3	31	A	CH7
20	B		32	B	
21	C		33	C	
22	A	CH4	34	A	CH8
23	B		35	B	
24	C		36	C	

Input type	Display		
	A	B	C
Voltage	NC	−	+
Current	NC	−	+
Pt100	A	B	C
Pt1000	A	B	NC
DI	+	NC	−

Figure 14 Example of UI wiring

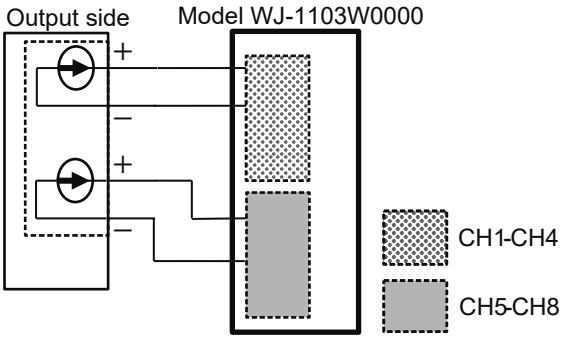
Note: Pt100 inputs for UI1–UI2, Pt1000 inputs for UI3–UI4, voltage inputs for UI5–UI6, and current inputs for UI7–UI8.

Note: The area enclosed by the dotted lines indicates how this product is internally isolated.

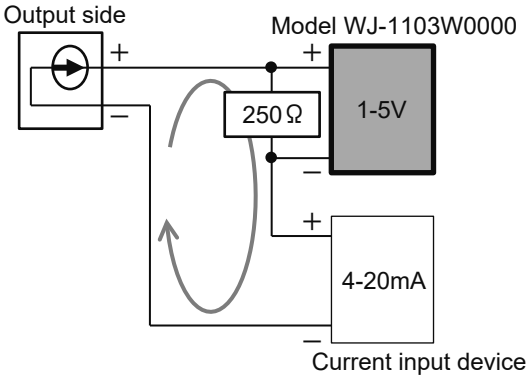
* Not available if the controller is redundant.

Note:

1. Connected devices must have isolated outputs.
2. Be careful regarding the input polarity of the connected devices.
3. Before connecting or removing a load, turn off the power to this product.
   Failure to do so will cause malfunction of this product and load failure.
4. Connection with devices that have multi-terminal outputs
   The connected devices are isolated from the power supply.
   Outputs that are not isolated between channels should be connected to isolated channels of this product (or an isolator should be connected). The figure below shows connections with current outputs. This also applies to voltage outputs.



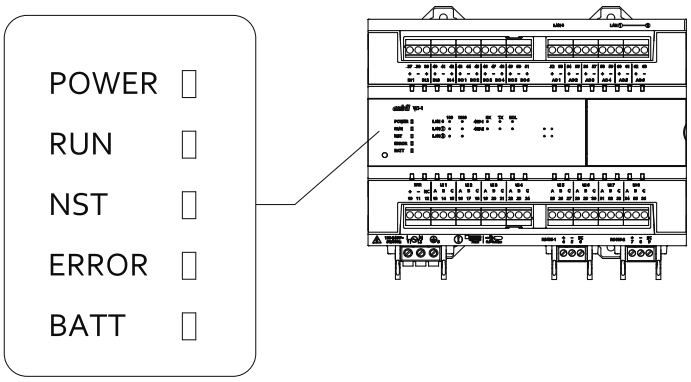
5. When the power is turned off, the internal circuits of this product are cut off, and thus, the current loop is also cut off.
   If a current loop is desired, set this product for 1–5 V input and install an external 250 Ω resistor (provided separately: model No. 83173763-001).
   Use an external 250 Ω resistor that satisfies the following specifications.
   • Allowable tolerance ±0.05 %, temperature characteristic ±25 ppm, rated power ¼ W or more.



6. Since the resistance temperature detector (Pt1000) has 2 wires, resistance of the wiring will cause a measurement error.
   If cross-sectional area of the wire is 1.25 mm^2, the measurement error will be approximately 0.1 °C per 10 m.
   Adjust for the error at the controller depending on the situation.
7. When digital inputs are used for universal inputs, totalizing pulse input is not supported.

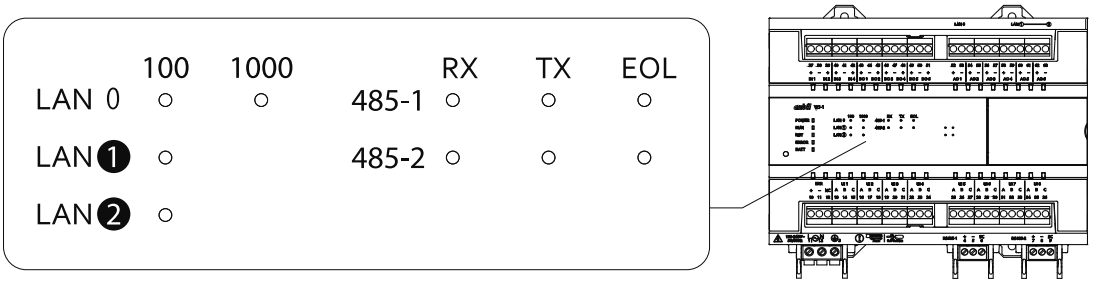
■ Indicators

● Product status LEDs



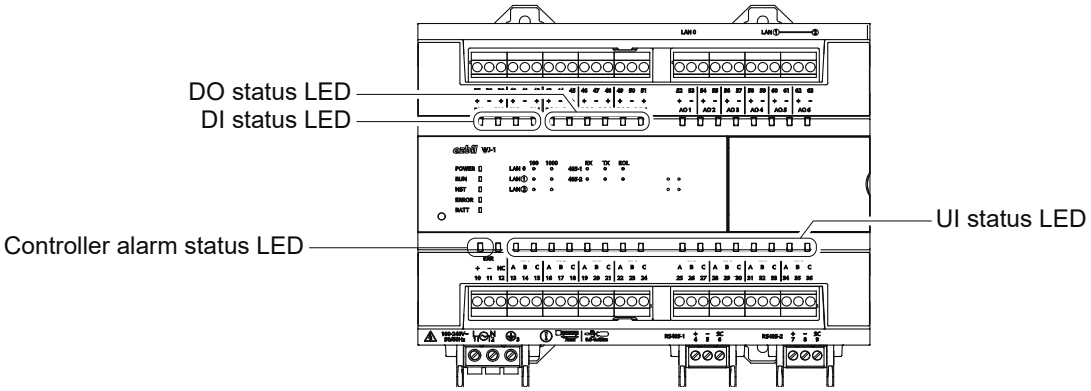
Item	LED name	Color	State	Description
Power status	POWER	Green	Lit	Power ON
			Not lit	Power OFF
Operation mode	RUN	Green	Lit	Operating in RUN mode Active state if the controller is redundant
			Off for 1.6 s→blinks twice in a 1.6 s cycle	Standby state if the controller is redundant
			Fast blink (every 0.2 s)	Ethernet congestion detected
			Slow blink (every 1.4 s)	Operating in DEBUG mode
			Not lit	Operating in IDLE mode
Network status	NST	Orange	Lit	Local I/O network is configured in a non-ring topology.
			Fast blink (every 0.2 s)	If the local I/O network is configured in a ring topology, it is disconnected somewhere between the controller and a directly connected I/O module.
			Slow blink (every 1.4 s)	If the local I/O network is configured in a ring topology, it is disconnected somewhere between two I/O modules.
			Not lit	If the local I/O network is configured in a ring topology, the network configuration is normal.
Abnormal status	ERROR	Red	Lit	Major failure
			Blinking	Minor failure
			Not lit	Normal
Battery status	BATT	Red	Lit	Battery voltage low
			Not lit	Normal battery voltage

● **Communication status LEDs**



Item	Indicator		Color	State	Description
Communication status	LAN 0 100		Green	Lit	Link is established at 100 Mbps.
				Blinking	Data is being transmitted at 100 Mbps.
				Not lit	Link is not established at 100 Mbps.
	LAN 0 1000		Green	Lit	Link is established at 1 Gbps.
				Blinking	Data is being transmitted at 100 Mbps.
				Not lit	Link is not established at 1 Gbps.
Communication status	LAN 1		Green	Lit	Link is established.
				Blinking	Sending/receiving data.
				Not lit	Link is not established.
	LAN 2		Green	Lit	Link is established.
				Blinking	Sending/receiving data.
				Not lit	Link is not established.
RS-485 CH1 Communication status	485-1	RX	Green	Blinking	Data is being received.
				Not lit	Data is not being received.
		TX	Green	Blinking	Data is being transmitted.
				Not lit	Data is not being transmitted.
		EOL	Green	Lit	RS-485 built-in terminating resistor ON
				Not lit	RS-485 built-in terminating resistor OFF
RS-485 CH2 Communication status	485-2	RX	Green	Lit	Data is being received.
				Not lit	Data is not being received.
		TX	Green	Lit	Data is being transmitted.
				Not lit	Data is not being transmitted.
		EOL	Green	Lit	RS-485 built-in terminating resistor ON
				Not lit	RS-485 built-in terminating resistor OFF

● **I/O status LEDs**



Item	Indicator	Color	State	Description
DI status	DI1–DI4	Green	Lit	DI ON
			Not lit	DI OFF
DO status	DO1–DO6	Green	Lit	DO ON
			Not lit	DO OFF
UI status	UI1–UI8	Green	Lit	DI is ON when DI is set.
			Not lit	DI is OFF when DI is set.
Controller alarm output	ERR	Green	Not lit (in a redundant configuration)	Controller alarm output is OFF (control output is not executed)
			Dimly blinking (in a redundant configuration)	Controller alarm output is ON (control output is executed)
			Not lit (in a non-redundant configuration)	Output OFF (control output is not executed)
			Lit (in a non-redundant configuration)	Controller alarm output is pulse signal (control output is being executed)

■ Handling

Do the following before turning the power on.

(1) Check again that the wiring is done correctly.

(2) Peel off the protective sheets before powering the device on.

Note: Check that all protective sheets have been completely removed.

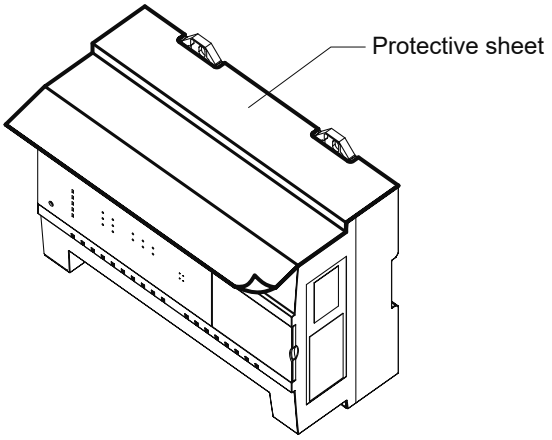


Figure 15 Protective sheet

⚠ WARNING

Do not touch electrically charged parts.
Doing so may cause electric shock.

⚠ CAUTION

Do not block the ventilation holes of this product. Doing so may cause device failure.

IMPORTANT: • If more than the rated voltage is accidentally applied to this product, replace the product with a new one.
Failure to do so may cause device failure.

■ Device Protection after Installation

If installation of other equipment (etc.) is ongoing near the product, take dust-proofing measures to prevent metal shavings, dust, and other particles from entering the product.

Note: Take dust-proofing measures for the product regardless of whether the protective sheets are still attached.

■ Maintenance

⚠ CAUTION

Do not disassemble this product.
Doing so may cause device failure.

Before cleaning the product or retorquing the terminal screws, turn off the power to the product.
Failure to do so may cause electric shock, device failure, or malfunction.

Azbil Corporation personnel who have been trained on the product will carry out periodic maintenance and parts replacement.
Please contact us as necessary.

Note: Refer to the ■ “Model Numbers” section for details on replacement parts.

■ Disposal

⚠ CAUTION

Dispose of used lithium batteries in accordance with local regulations. Do not throw them in the fire or dispose of them with ordinary garbage.
Doing so may cause the batteries to burst or ignite.

When this product is no longer used, dispose of this product as industrial waste in accordance with your local regulations.
Do not reuse all or part of this product.

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■ For CE-Marked Products

Install this product in a panel cabinet. Additionally, always keep the panel cabinet accessible only to people with sufficient knowledge concerning electrical equipment.
This product complies with the following harmonised standards of the Radio Equipment Directive (RED), the Electromagnetic Compatibility Directive (EMCD) and the Low Voltage Directive (LVD).

RED : EN 300 330
EMCD : EN 61326-1 Class A, Table 2 (for use in an industrial electromagnetic environment)
EN 301 489-1 / EN 301 489-3
LVD : EN 61010-1 Overvoltage category II
Pollution degree 2

■ For UL-Marked Products

Install this product in a panel cabinet.

- •PAZX ENERGY MANAGEMENT EQUIPMENT
- •E492866
- •UL 60730-1
- •Pollution degree 2
- •Overvoltage category II
- •Rated impulse voltage 4000V
- •IP20
- •TYPE 1 ACTION

The model number of the UL-certified product is WJ-1103W0000-U.

■ For BTL-Listed Products

BACnet is a registered trademark of ASHRAE. ASHRAE does not endorse, approve or test products for compliance with ASHRAE standards. Compliance of listed products to the requirements of ASHRAE Standard 135 is the responsibility of BACnet International (BI). BTL is a registered trademark of BI.

Firmware version 1.4.13 and later of this product comply with BTL certification requirements.

Azbil Corporation
Building Systems Company

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Rev. 4.0 Mar. 2022
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Specifications are subject to change without notice.