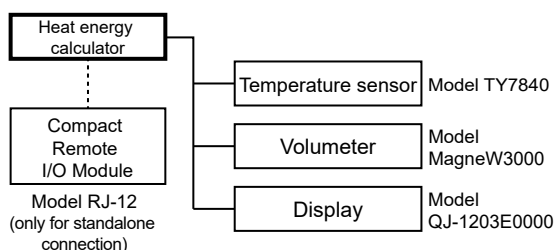


# Heat Energy Calculator

## ■ Overview

Heat energy calculator (model WJ-1203W0000), combined with the temperature sensor (model TY7840\_ \_ \_ \_ \_) and volumeter (model MGG) of an energy meter, works as an energy meter for chilled/hot water.

This product can be used for energy measurement in a heat source, heat exchanger, or AHU and for energy fee charging for a pipe with DN40 or larger.



**IMPORTANT!!** • According to the Measurement Act, if the diameter of a volumeter is 40 mm or less, the product is regarded as a specified measuring instrument. So the combination shown in the above figure cannot be used for transactions. In this case, use model MCJ20A.

## ■ Features

- **Accurate energy calculation**  
This product achieves a higher temperature difference measurement accuracy by alternately measuring the supply water temperature and the return water temperature in the same circuit.
- **Automatic calculation of the energy conversion coefficient**  
This product automatically calculates the energy conversion coefficient for chilled/hot water from the measured temperature to improve the energy calculation accuracy.  
This product can also be used with fixed values for cooling and heating as before.
- **Conformance to JIS B 7550 (2017)**  
This product conforms to JIS B 7550 (2017).
- **Individual accumulation of cooling energy and heating energy**  
This product can individually accumulate cooling energy and heating energy by itself.
- **Support for brine**  
This product can measure the energy of a liquid other than water (brine) at as low as  $-20^{\circ}\text{C}$ .
- **Data storage in the event of power failure**  
This product saves cumulative data and various parameters in the non-volatile memory in case of power failure.
- **Communication**  
This product can be connected with Azbil Corporation central monitoring system savic-net™ G5 via BACnet MS/TP, Modbus™ RTU, or Modbus ASCII.
- **Connection of display panel (provided separately)**  
The display panel can be used to locally check the various kinds of data.  
(Total energy (cooling/heating), total flow rate, instantaneous energy, instantaneous flow rate, supply water temperature, return water temperature, and energy conversion coefficient)
- **Standalone operation**  
The main unit of the heat energy calculator outputs cumulative heat energy pulse and cumulative flow rate pulse.  
When Azbil Corporation Compact Remote I/O Modules (RJ-12) are connected, this product supports alarm output, cooling/heating changeover input, and analog output such as instantaneous energy.



Safety Precautions

Please read the 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 applications like the following where safety is especially required, implementation of fail-safe design, redundant design, regular maintenance, etc., should receive appropriate consideration so that the product can be used 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

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



Recommended Design Life  
(Recommended Period of Use)

It is recommended that this product be used within its design life. The 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 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 design life of this product is 10 years.







The design life specified for this product assumes that maintenance, such as replacement of the limited-life parts, is carried out properly. Refer to the section on maintenance in this manual.











Warnings and Cautions








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

Symbols

	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.)

 <b>WARNING</b>	
	Install this product in a location out of reach of unauthorized people. (e.g., inside of the control panel with a lock) There is a danger of electric shock.
	Ground this product with ground resistance of less than 100 Ω. Improper grounding may cause electric shock or malfunction.
	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 into the ventilation holes of the product. 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 the products in the package for storage. Failure to do so may damage or stain the products.
	Install, wire, and use this product under the conditions specified in this manual. Failure to do so may cause fire or device failure.
	Take anti-noise measures if this product is installed in an environment with a lot of electrical noise. Failure to do so may cause malfunction or device failure.
	Provide a power circuit breaker for the power source to this product. This product cannot be turned off because it does not have a power switch.
	Use crimp terminals with insulation for connections to the product terminals. Failure to do so may cause a short circuit leading to fire or device failure.
	Do not use unused/spare terminals on this product as relay terminals. Doing so may cause device failure.
	Installation and wiring must be performed by personnel qualified to do instrumentation and electrical work. Mistakes in installation or wiring 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.

⚠ CAUTION	
	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.
	Before touching this product, touch grounded metal to remove any static electrical charge from your body. Otherwise the static electricity might damage some components of the product.
	Do not use transceivers or low-power wireless devices near this product. Doing so may cause radio wave interference and malfunction of the product.
	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.

## ■ System Configuration

### ● System Connection

Connect this product to the central monitoring unit for operation.

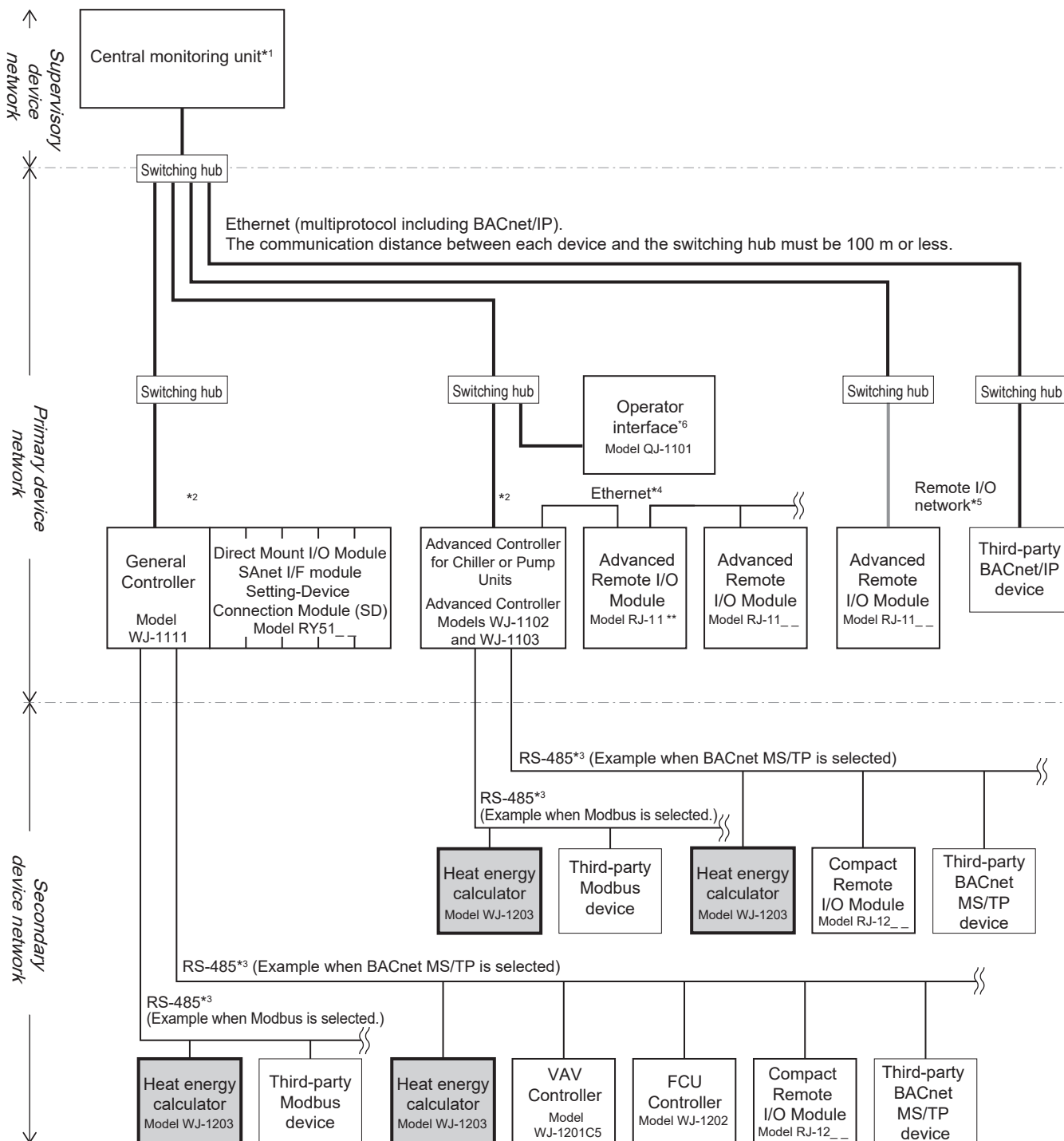


Figure 1 Example of system configuration

- \*1 Azbil's Supervisory Controller (model BH-101G0W0000) or a third-party central monitoring unit using BACnet/IP communications can be used for central monitoring.
- \*2 The General Controller, Advanced Controller for Chiller Units, Advanced Controller for Pump Units, and Advanced Controller (model WJ-1103W000) use BACnet/IPv4 or BACnet/IPv6. The IPv6 specification is based on BACnet-2012 (compliant with the IEC 61850-3:2017 standard by the Institute of Electrical Installation Engineers of Japan) with ANNEX U of BACnet-2016.
- \*3 The General Controller, Advanced Controller for Chiller Units, Advanced Controller for Pump Units, and Advanced Controller (model WJ-1103W000) have two RS-485 communication channels.  
For each channel, a communication protocol can be selected from among BACnet MS/TP, Modbus RTU, and Modbus ASCII.
- Number of connectable devices if BACnet MS/TP is used  
If only Azbil devices are connected:  
50 devices per channel (VAV/FCU Controllers, Compact Remote I/O Modules, heat energy calculator, etc.)  
For the General Controller, there are restrictions: 70 secondary devices or 50 of Azbil's VAV and FCU controllers in total.  
If only third-party devices are connected:  
31 devices per channel (with a transmission speed of 76.8 kbps, 30 objects per device)
  - Number of connectable devices if Modbus™ is used  
31 devices/channel (with a transmission speed of 76.8 kbps, 30 objects per device)
- If the third-party devices have different transmission speeds or number of objects, or if Azbil devices and third-party devices are on the same channel, the number of devices that can be connected will vary. For details, please contact Azbil Corporation.
- \*4 A network that connects Advanced Controllers (for Chiller Units, Pump Units, and/or model WJ-1103W000) and Advanced Remote I/O Modules under their control is referred to as a local I/O network. A switching hub is not required for a local I/O network since daisy chained Ethernet is used between the Advanced Controller and the Advanced Remote I/O Modules under its control, as well as between the Advanced Remote I/O Modules and the I/O modules for the Advanced Controller.
- \*5 A network that connects Advanced Remote I/O Module to Advanced Controllers (for Chiller Units, Pump Units, and/or model WJ-1103W000) 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.  
Do not connect any more than three Advanced Remote I/O Modules to this network per Advanced Controller for Chiller Units, Advanced Controller for Pump Units, and Advanced Controller (model WJ-1103W000).  
When using IPv6 for BACnet communication, the Advanced Remote I/O Module cannot be connected via a remote I/O network.
- \*6 The Operator Interface (model number QJ-1101D0000) can manage a maximum of four controllers (model WJ-1102\_ and/or WJ-1103W000).

## ● Standalone Operation

Compact Remote I/O Modules are only connected to the heat energy calculator for operation. They are not connected to the central monitoring unit. \*1

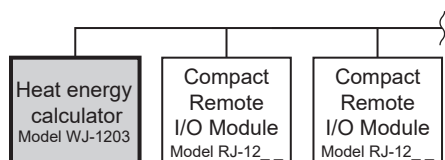


Figure 2 Example of system configuration

- \*1 Up to four Compact Remote I/O Modules can be combined with a heat energy calculator that serves as the master device. A single Compact Remote I/O Module cannot be used across multiple heat energy calculators.

## ■ Model Number

Basic model number						Additional specifications	Item
WJ-1203							Heat energy calculator
	W	0	0	0			
					0		Standard model
					-A		Inspection certificate provided

### ● Items Provided Separately

Model number	Item
QJ-1203E0000	Display panel for the display unit of the heat energy calculator
83104567-001	DIN rail clamp
RJ-1202W0800*1	Compact Remote I/O Module*3 (DIO module)
RJ-1203W0200*2	Compact Remote I/O Module*3 (UIO module)
83174315-001	Replacement kit assembly

\*1 Both DI and DO use the first channel.

The DO type is "maintain."

Alarm output is the same as the equipment failure alarm for the host communication point.

DI : For cooling/heating changeover, ON: Cooling / OFF: Heating

DO : For alarm output, ON: Abnormal / OFF: Normal

\*2 Used as 4–20 mA output.

The total is up to 6 (2 channels × 3 devices).

Select from instantaneous energy, instantaneous flow rate, supply water temperature, return water temperature, temperature difference, and moving average of instantaneous energy.

\*3 Up to four Compact Remote I/O Modules can be connected.

Specifically, one DIO module and three UIO modules.

However, when installing Compact Remote I/O Modules in a panel using the replacement kit assembly, up to three Compact Remote I/O Modules can be connected.

### ● Replacement Parts

Model number	Description
83173707-001	Power connector (× 1)

### ■ Principles of Operation

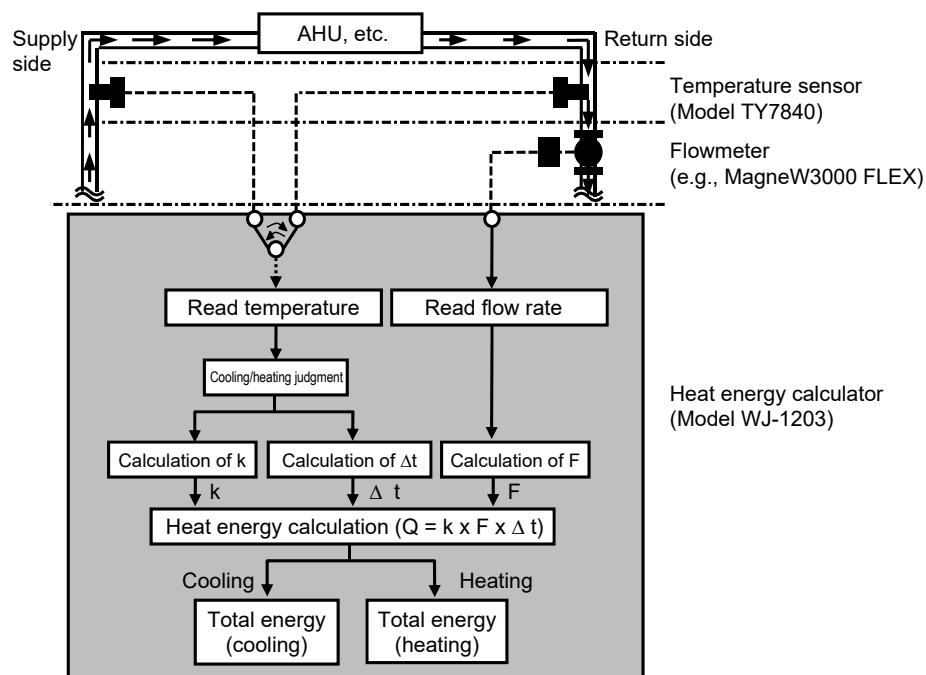


Figure 3 Operation principle

The following calculation is performed for every fixed cycle to calculate the energy and then it is totaled.

$$Q = k \times F \times \Delta t$$

Q: Energy, k: Energy conversion coefficient, F: Return side flow rate,  $\Delta t$ : Temperature difference

Calculation of k

k is automatically calculated with the arithmetic expression in JIS B 7550 (2017).

However, the pressure is assumed to be 2 MPa (fixed value) for calculation. Because the error due to pressure fluctuations is 0.1 % F.S. or less, adoption of the fixed value has almost no effect on the energy accuracy.

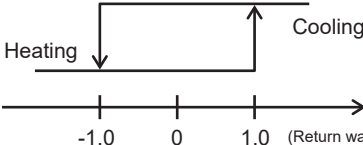
When using automatic calculation, make sure that the water temperature is 0 °C or higher.

To use a fixed value as k, please contact Azbil Corporation.

## ■ Specifications

### ● Specifications

(1/2)

Item		Specifications																																												
Type or applications		Energy measurement in a heat source, heat exchanger, AHU, or other equipment (for both cooling and heating) Charging tenants or a district heating and cooling facility for energy (for a pipe with DN40 or larger) (for both cooling and heating)																																												
Power	Input voltage	100–240 V AC (85–264 V AC)																																												
	Input frequency	50/60 Hz ±3 Hz																																												
	Power consumption	9 VA or less																																												
	Inrush current	20 A max. (for 100 V AC) 40 A max. (for 240 V AC)																																												
	Leakage current	0.2 mA max. (for 100 V AC) 0.5 mA max. (for 240 V AC)																																												
	Insulation resistance	Between power terminals and ground terminal 100 MΩ min. (at 500 V DC)																																												
CPU		32bit																																												
Measurement or calculation range	Total energy/ Total flow rate/ Instantaneous energy/ Instantaneous flow rate* <sup>1</sup>	<table><tr><td></td><td>Total energy</td><td>Total flow rate</td><td>Instantaneous energy</td><td>Instantaneous flow rate</td></tr><tr><td>0</td><td>9999999.9 GJ</td><td>9999999.9 m<sup>3</sup></td><td>9999 GJ/h</td><td>9999 m<sup>3</sup>/h</td></tr><tr><td>1</td><td>999999.99 GJ</td><td>9999999.9 m<sup>3</sup></td><td>999.9 GJ/h</td><td>9999 m<sup>3</sup>/h</td></tr><tr><td>2</td><td>999999.99 GJ</td><td>999999.99 m<sup>3</sup></td><td>999.9 GJ/h</td><td>999.9 m<sup>3</sup>/h</td></tr><tr><td>3</td><td>99999.999 GJ</td><td>999999.99 m<sup>3</sup></td><td>99.99 GJ/h</td><td>999.9 m<sup>3</sup>/h</td></tr><tr><td>4</td><td>99999.999 GJ</td><td>99999.999 m<sup>3</sup></td><td>99.99 GJ/h</td><td>99.99 m<sup>3</sup>/h</td></tr><tr><td>5</td><td>9999.9999 GJ</td><td>99999.999 m<sup>3</sup></td><td>9.999 GJ/h</td><td>99.99 m<sup>3</sup>/h</td></tr><tr><td>6</td><td>9999.9999 GJ</td><td>9999.9999 m<sup>3</sup></td><td>9.999 GJ/h</td><td>9.999 m<sup>3</sup>/h</td></tr></table>						Total energy	Total flow rate	Instantaneous energy	Instantaneous flow rate	0	9999999.9 GJ	9999999.9 m <sup>3</sup>	9999 GJ/h	9999 m <sup>3</sup> /h	1	999999.99 GJ	9999999.9 m <sup>3</sup>	999.9 GJ/h	9999 m <sup>3</sup> /h	2	999999.99 GJ	999999.99 m <sup>3</sup>	999.9 GJ/h	999.9 m <sup>3</sup> /h	3	99999.999 GJ	999999.99 m <sup>3</sup>	99.99 GJ/h	999.9 m <sup>3</sup> /h	4	99999.999 GJ	99999.999 m <sup>3</sup>	99.99 GJ/h	99.99 m <sup>3</sup> /h	5	9999.9999 GJ	99999.999 m <sup>3</sup>	9.999 GJ/h	99.99 m <sup>3</sup> /h	6	9999.9999 GJ	9999.9999 m <sup>3</sup>	9.999 GJ/h	9.999 m <sup>3</sup> /h
			Total energy	Total flow rate	Instantaneous energy	Instantaneous flow rate																																								
		0	9999999.9 GJ	9999999.9 m <sup>3</sup>	9999 GJ/h	9999 m <sup>3</sup> /h																																								
		1	999999.99 GJ	9999999.9 m <sup>3</sup>	999.9 GJ/h	9999 m <sup>3</sup> /h																																								
2		999999.99 GJ	999999.99 m <sup>3</sup>	999.9 GJ/h	999.9 m <sup>3</sup> /h																																									
3		99999.999 GJ	999999.99 m <sup>3</sup>	99.99 GJ/h	999.9 m <sup>3</sup> /h																																									
4		99999.999 GJ	99999.999 m <sup>3</sup>	99.99 GJ/h	99.99 m <sup>3</sup> /h																																									
5	9999.9999 GJ	99999.999 m <sup>3</sup>	9.999 GJ/h	99.99 m <sup>3</sup> /h																																										
6	9999.9999 GJ	9999.9999 m <sup>3</sup>	9.999 GJ/h	9.999 m <sup>3</sup> /h																																										
Supply water temperature	–20.0 °C–120.0 °C																																													
Return water temperature	–20.0 °C–120.0 °C																																													
Cooling/heating changeover * <sup>2</sup> * <sup>3</sup>		Automatic changeover according to the temperature difference (return water temperature – supply water temperature) <div></div>																																												
		The value calculated by subtracting the supply water temperature from the return water temperature (called temperature difference below) is compared with the above condition to determine the operation mode. The last operation mode is used at startup. The operation mode changes if the temperature difference remains different from the current mode for 180 seconds or more. Note: Heating energy may be counted when chilled water is caused to flow through the chilled water coil for anti-freezing control in winter.																																												

\*1 The measurement ranges (maximum values) of total energy, total flow rate, instantaneous energy, and instantaneous flow rate are as shown in the table.

Select display range Nos. 0 to 6 to satisfy all of maximum instantaneous energy, maximum instantaneous flow rate, and maximum total energy.

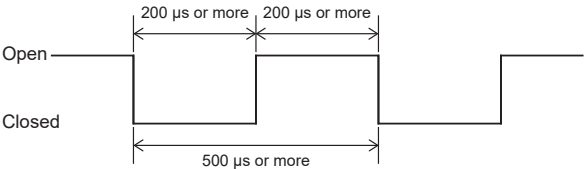
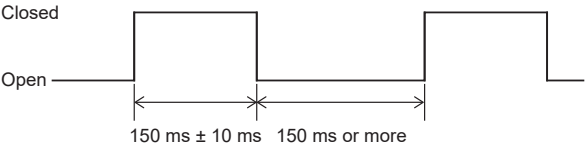
\*2 During standalone operation, you can change between cooling and heating from outside by connecting a Compact Remote I/O Module (model RJ-1202W0800).

\*3 Cooling or heating can be selected depending on the parameter settings (code 01/2.1.4 or later).

Item			Specifications																									
Communication	RS-485	Communication method	BACnet MS/TP, Modbus RTU, Modbus ASCII																									
		Communication speed	BACnet MS/TP: 9.6 kbps, 19.2 kbps, 38.4 kbps, or 76.8 kbps (default: 76.8 kbps) Modbus RTU and Modbus ASCII: 4.8 kbps, 9.6 kbps, 19.2 kbps, 38.4 kbps, or 76.8 kbps (default: 19.2 kbps)																									
		Communication distance	• BACnet MS/TP, Modbus RTU, or Modbus ASCII communication connection EIA/TIA-568 category 5e or higher: 1000 m max. Shielded twisted-pair cable: 1200 m max. • Standalone connection EIA/TIA-568 category 5e or higher: 3 m max.																									
	Display panel	Communication method	Proprietary serial communication (12 V DC power supply)																									
		Communication speed	4.8 kbps																									
		Communication distance	3 m or less																									
		Number of connectable units	1																									
	Host communication points		<div>Host communication points<table><tr><th>Name</th><th>Type</th></tr><tr><td>Total energy (cooling)</td><td>Accumulator point</td></tr><tr><td>Total energy (heating)</td><td>Accumulator point</td></tr><tr><td>Total flow rate</td><td>Accumulator point</td></tr><tr><td>Instantaneous energy</td><td>Measuring point</td></tr><tr><td>Instantaneous flow rate</td><td>Measuring point</td></tr><tr><td>Supply water temperature</td><td>Measuring point</td></tr><tr><td>Return water temperature</td><td>Measuring point</td></tr><tr><td>Temperature difference</td><td>Measuring point</td></tr><tr><td>Moving average of energy</td><td>Measuring point</td></tr><tr><td>Energy conversion coefficient</td><td>Measuring point</td></tr><tr><td>Cooling/heating mode</td><td>Status point</td></tr><tr><td>Equipment failure alarm</td><td>Alarm point</td></tr></table><p>Note: Different points can be used for cooling and heating for total flow rate, instantaneous energy, instantaneous flow rate, and energy moving average value.</p><div>IMPORTANT!! • The cooling/heating mode is not an ON/OFF point.</div></div>	Name	Type	Total energy (cooling)	Accumulator point	Total energy (heating)	Accumulator point	Total flow rate	Accumulator point	Instantaneous energy	Measuring point	Instantaneous flow rate	Measuring point	Supply water temperature	Measuring point	Return water temperature	Measuring point	Temperature difference	Measuring point	Moving average of energy	Measuring point	Energy conversion coefficient	Measuring point	Cooling/heating mode	Status point	Equipment failure alarm
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Moving average of energy	Measuring point																											
Energy conversion coefficient	Measuring point																											
Cooling/heating mode	Status point																											
Equipment failure alarm	Alarm point																											
Materials	Case, cover		Modified PPE resin																									
	Lens, frame		PC resin molding compound																									
	DIN holder		POM resin																									
Weight			0.65 kg																									
Environmental conditions	Operating conditions	Ambient temperature	0–55 °C																									
		Ambient humidity	10–93 % RH (without condensation)																									
		Altitude	2,000 m or less																									
		Vibration	5.9 m/s <sup>2</sup> max., 10–150 Hz																									
	Transportation/ storage conditions	Ambient temperature	-20–60 °C																									
		Ambient humidity	5–95 % RH (without condensation)																									
		Vibration (storage)	5.9 m/s <sup>2</sup> max., 10–150 Hz																									
		Vibration (transport)	9.8 m/s <sup>2</sup> max., 10–150 Hz																									
	Other		• No detectable corrosive gas • No exposure to direct sunlight • Do not let the product get wet.																									
Installation location			In the control panel																									
Installation method			Installed on a DIN rail or panel, or with screws																									



# ● Specifications for Inputs and Outputs

Item		Specifications	Remarks
Flow rate pulse input *1	Number of input terminals	1	
	Voltage	24 V DC typ.	
	Current	5 mA DC typ.	
	Connected device output method	Non-voltage contact or open collector	
	Rated non-voltage contact values	Allowable ON contact resistance 100 $\Omega$ max. Allowable OFF contact resistance 100 k $\Omega$ min.	
	Rated open collector values	Allowable ON residual voltage 3 V max. Allowable OFF leakage current 500 $\mu$ A max.	
	Pulse frequency	2,000 Hz max. Note: Pulse accumulation requires a pulse width and a pulse interval that satisfy the conditions shown in the following figure. 	
Total pulse output *2	Number of output terminals	3	
	Voltage	26.4 V DC or less	
	Current	0.1 A max.	
	Residual voltage	2 V max.	
	Output method	Open collector	
	Pulse integration	3 Hz max. Note: Pulse accumulation is output under the condition shown in the following figure. 	
Temperature input	Number of input terminals	Supply water temperature input: 1 Return water temperature input: 1	
	Connected sensor	Model TY7840 resistance temperature detector Pt100 (JIS A class)	
	Measurable range	-20–120 °C	Error of temperature detection is 0.08 °C or less.

\*1 Use Azbil Corporation flowmeter MGG so that the comprehensive accuracy including the volumeter conforms to JIS B 7550 (2017).

\*2 Total heat energy pulse output (cooling or cooling/heating combined), total heat energy pulse output (heating), and total flow rate pulse output

## ● Criteria Accuracy

Display item	Criteria accuracy (temp. difference: 0–80 °C)
Total energy	Temperature difference of 4 °C or more $\pm(1 + 4 \times \Delta T_{\min} / \Delta T) \% \text{ rdg. or less (water temperature of 0 °C or more)}$ (Accuracy of combination with model TY7840. However, the accuracy of the volumeter is not included.) Temperature difference of less than 4 °C $\pm(0.5 + \Delta T_{\min} / \Delta T + 10) \% \text{ rdg. or less (water temperature of 0 °C or more)}$ (Accuracy of combination with model TY7840. However, the accuracy of the volumeter is not included.)
Instantaneous energy	$\pm 1.0 \% \text{ FS}$ (The accuracy of model TY7840 and the accuracy of the volumeter are not included.)
Instantaneous flow rate	$\pm 1.0 \% \text{ FS}$ (The accuracy of the volumeter is not included.)
Total flow rate	Accuracy of the volumeter
Supply water temperature	$\pm 0.1 \text{ °C or less (0.07 °C or less@25 °C. The accuracy of model TY7840 is not included.)}$
Return water temperature	$\pm 0.1 \text{ °C or less (0.07 °C or less@25 °C. The accuracy of model TY7840 is not included.)}$
Temperature difference	$\pm(0.5 + \Delta T_{\min} / \Delta T) \% \text{ rdg. or less (}\Delta T: \text{ Difference between supply temperature and return temperature at measurement. Use } \pm 10 \% \text{ rdg. if the difference is less than 4 °C.)}$

The wiring loss and the temperature characteristic of the temperature sensor are not considered in all the accuracy values. The ambient temperature is 0 to 55 °C.

The accuracy of the total energy can be calculated by adding the loss in this product  $\pm(0.5 + \Delta T_{\min} / \Delta T)$  and the loss in the TY7840  $\pm(0.5 + 3 \times \Delta T_{\min} / \Delta T)$ .

$\Delta T_{\min}$ : Minimum temperature difference (2 °C in this product)

- IMPORTANT!!**
- If the temperature difference is less than the low level cut value (defined by the parameter, default is 0.5 °C), the energy and flow rate are not totaled.
  - To get the comprehensive accuracy of the total energy, the error of volumeter portion should be added.
  - You must select a volumeter that has the following total flow rate accuracy to ensure that the comprehensive accuracy including the volumeter conforms to JIS B 7550 (2017) (accuracy class 3).  
 Flow rate of 10 % or more:  $\pm(3 + 0.05 \times qp / q) \% \text{ rdg.}$   
 Flow rate of less than 10 %:  $\pm 5 \% \text{ rdg. or } \pm(3 + 0.05 \times qp / q) \% \text{ rdg., whichever is larger}$   
 qp: Maximum rated flow rate, q: Measured flow rate
  - To conform to JIS B 7550 (2017), specify a display range No. that does not allow the total value to go all the way around even if the maximum instantaneous energy continues for 2000 hours.

## ■ Specifications for Wiring

Item	Recommended cable	Rating	Maximum cable length	Remarks
Power	IV, CVV, or equivalent	1.25–2.0 mm <sup>2</sup> stranded wire (AWG16–AWG14)	–	
Ground	IV, CVV, or equivalent	1.25–2.0 mm <sup>2</sup> stranded wire (AWG16–AWG14)	–	Ground resistance is 100 Ω max.
RS-485	–	EIA/TIA-568 category 5e or higher*	1,000 m	BACnet MS/TP or Modbus communication connection
	–		3 m	Standalone connection
	–	Belden 3106A, 3107A, 9842, or equivalent, 0.2–0.3 mm <sup>2</sup> shielded twisted-pair cable (AWG24–AWG22)	1,200 m	Use the following applicable cable. • Characteristic impedance: 100–130 Ω • Capacities between cables: 100 pF/m max. • Capacities between conductor and shield: 200 pF/m max.
Display panel	VCTF	0.3 mm <sup>2</sup> stranded wire (AWG22)	3 m	
Pulse input	IV, CVV, CVV-S, or equivalent	0.5–1.25 mm <sup>2</sup> stranded wire (AWG20–AWG16)	50 m	
Temperature input	CVV-S or equivalent	1.25 mm <sup>2</sup> stranded wire (AWG16)	50 m	
Pulse output	IV, CVV, or equivalent	0.5–1.25 mm <sup>2</sup> stranded wire (AWG20–AWG16)	50 m	

Note: EIA/TIA-568 category 3 or category 5 is also supported for reuse of the existing line.  
 Contact Azbil Corporation for the cable length.

■ Dimensions

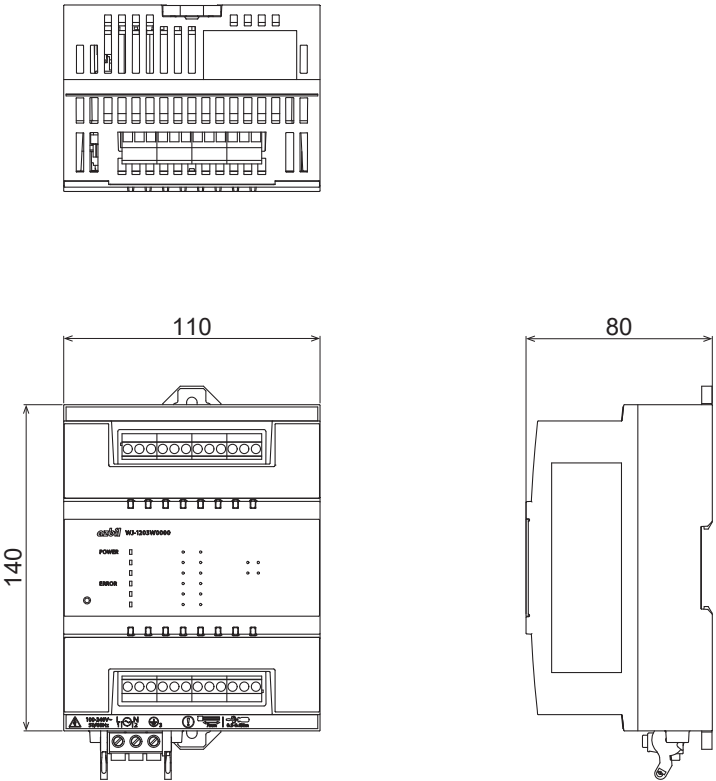


Figure 4 Dimensions (mm)

■ Name of Each Section

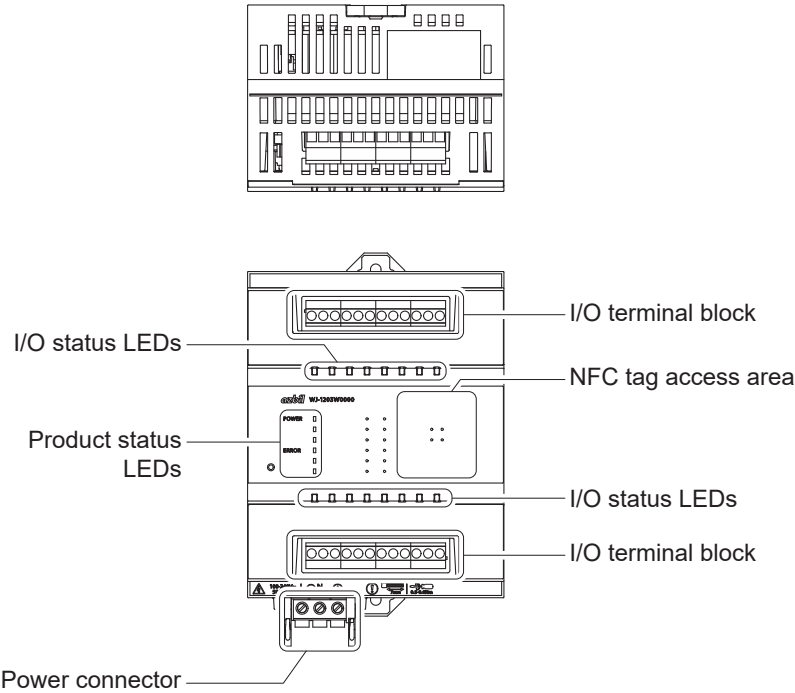


Figure 5

## ■ Installation

### ⚠ WARNING



Install this product in a location out of reach of unauthorized people. (e.g., inside of the control panel with a lock) There is a danger of electric shock.

### ⚠ CAUTION



Install, wire, and use this product under the conditions specified in this manual. Failure to do so may cause fire or device failure.



Installation and wiring must be performed by personnel with special skills who are qualified for instrumentation work and electric work. Failure to abide by this may result in fire or electric shock.

## ● Installation Location

The panel should be installed in a place that satisfies the following:

- An indoor place where the product is not exposed to direct sunlight
- A place where the product does not get wet

Note: The product is not waterproof.

For CE conformity, this product must be installed in a panel cabinet.

Leave maintenance space as shown around the product (the hatched area).

- The total horizontal dimension varies according to the number of heat energy calculators attached.

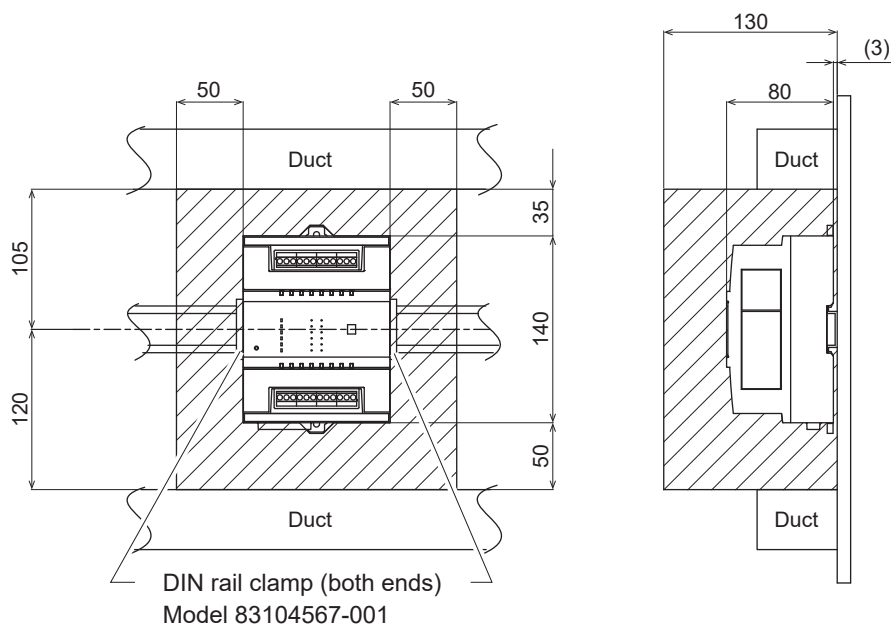


Figure 6 Installation on a DIN rail (single unit) (mm)

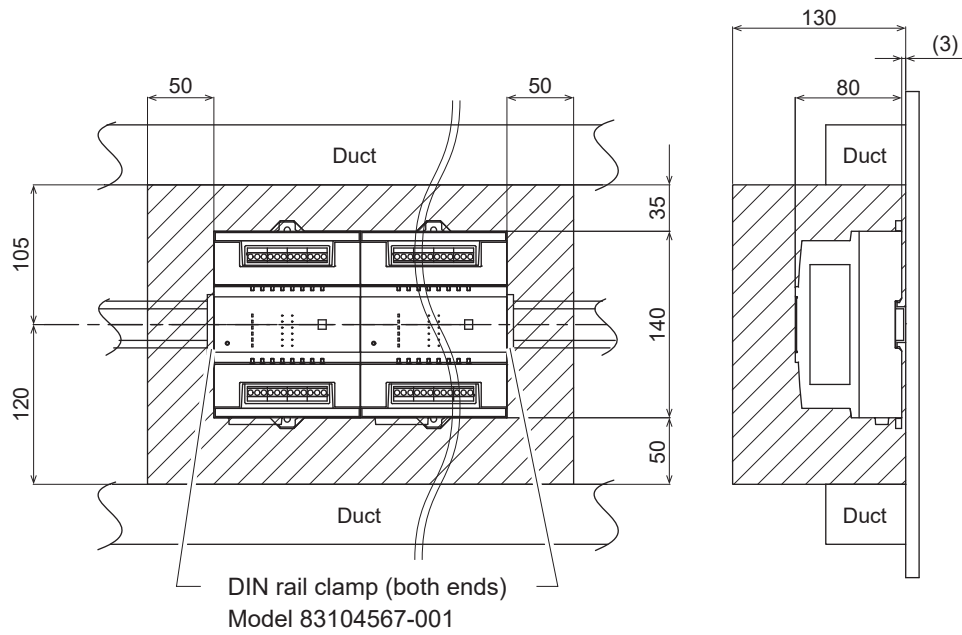


Figure 7 Installation on a DIN rail (multiple units) (mm)

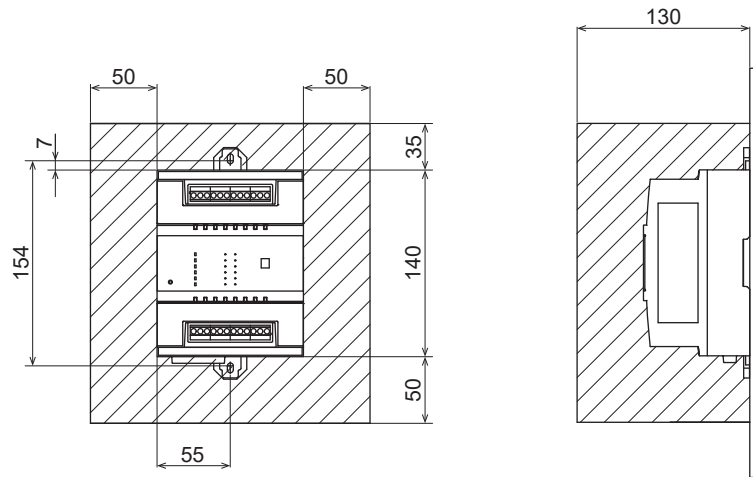


Figure 8 Installation with screws (standalone) (mm)

Note: When multiple units are mounted, leave room for maintenance as shown in figure 7, "Mounting on a DIN rail (multiple units)."

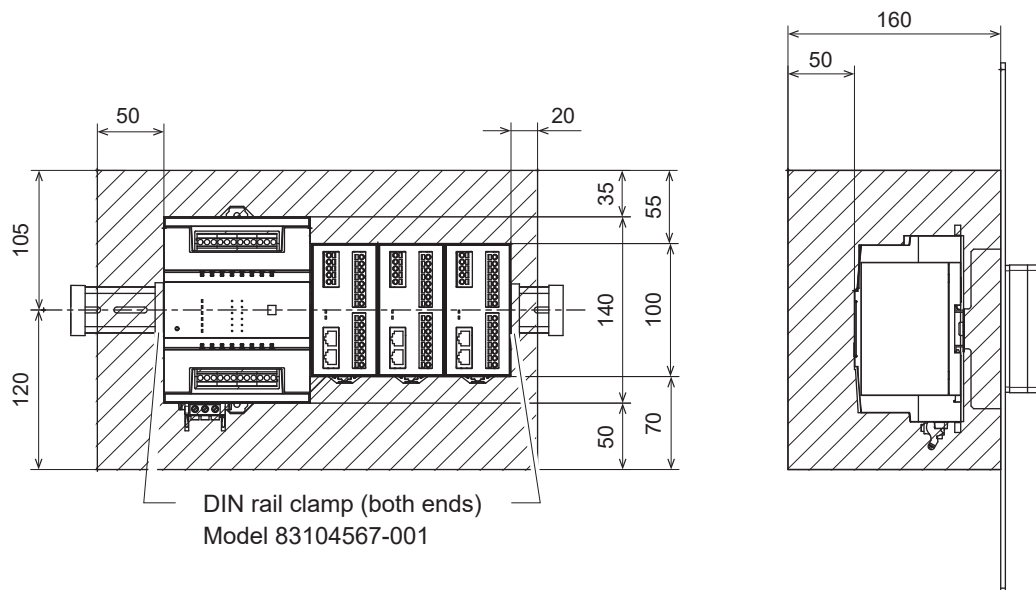


Figure 9 Installation in a panel (standalone) (mm)

Note: Up to three Compact Remote I/O Modules can be installed in a panel.

## ● Installation Angle

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

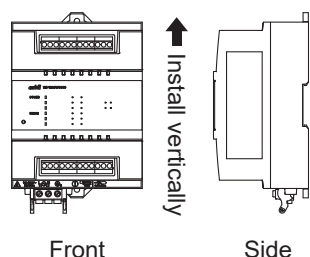


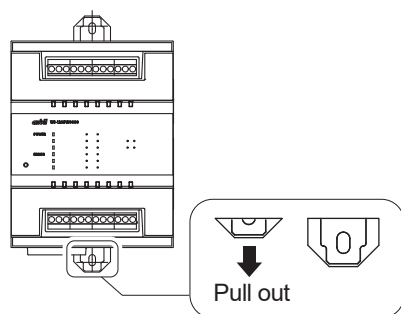
Figure 10 Installation angle

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

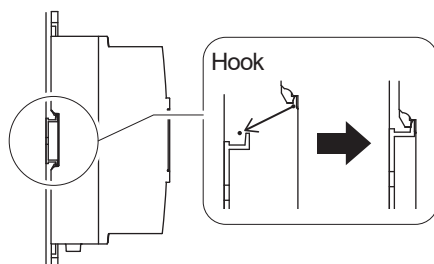
## ● Installation Method

### Installation on a DIN Rail

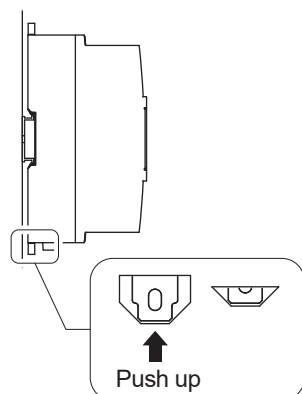
- (1) Pull down one DIN holder on the bottom of the device.



- (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 DIN holder (x1) on the bottom of the device.

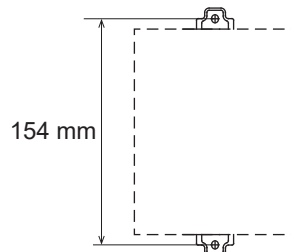


- (4) Check that the two DIN holders on the top and bottom of the device are secured on the DIN rail. Check that the device is steady.
- (5) Secure both ends with the DIN rail clamps (model 83104567-001).  
After installation, keep the connectors that come with the device because they will be used for wiring connection.

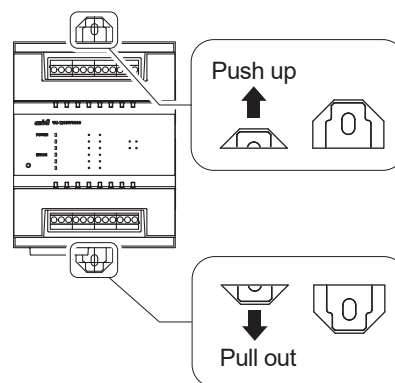
### Direct Installation with Screws

Install the product on the wall using two M4 L=8 screws.

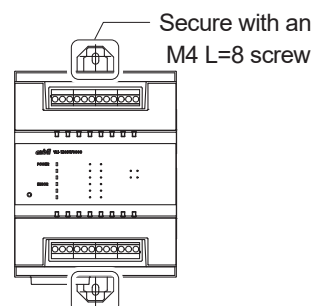
- (1) Make two screw holes at the installation location.





- (2) Push up the DIN holder on the top of the device and then pull out the DIN holder on the bottom.








- (3) Use the two holes for the DIN holder to secure the device with the M4 L=8 screws. Check that the device is steady.  
After installation, keep the connectors that come with the device because they will be used for wiring connection.



## ■ Wiring

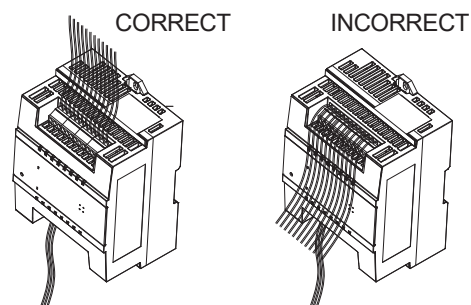
⚠ WARNING	
	Be sure to ground this product with ground resistance of less than 100 Ω. Improper grounding may cause electric shock or malfunction.
	Before wiring, turn off the power to this product. Failure to do so may result in electric shock or device failure.

⚠ CAUTION	
	Installation and wiring must be performed by personnel with special skills who are qualified for instrumentation work and electric work. Failure to abide by this may result in 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 an environment with a lot of electrical noise. Failure to do so may cause malfunction or device failure.
	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 to the specified torque. Insufficient tightening of the terminal screws may cause fire or overheating.

### ● Notes on Wiring

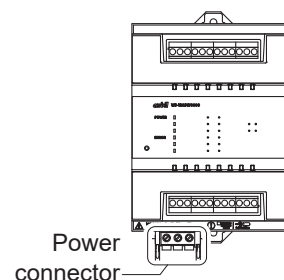
- Do not use unused/spare terminals on this product as relay terminals.  
Doing so may cause device failure.
- Provide a power circuit breaker for the power source to this product.  
This product cannot be turned off because it does not have a power switch.
- Do not use an uninterruptible power supply (UPS) that outputs rectangular waves.  
Doing so may cause the device to fail.
- Separate the power supply lines from the signal lines so that noise generated in the power supply lines will not affect the signal lines.  
Failure to do so may cause 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 Power Supply Terminal Block

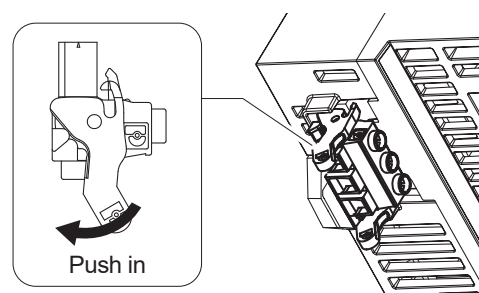
Screw connectors are used.



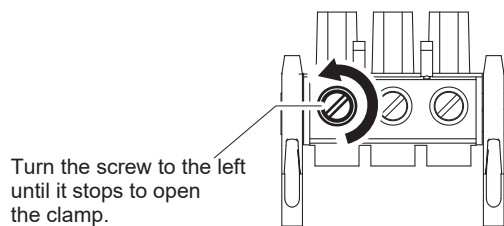
- Strip 7 mm of sheath from the cable core wire.



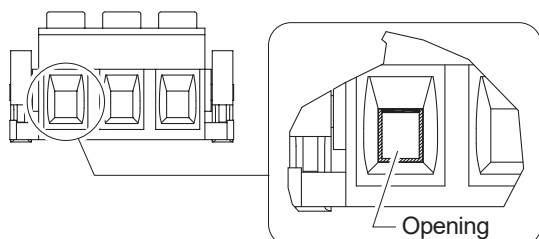
- If the connector is plugged into the device, push in the release levers on the right and left sides of the connector to remove it from the device.



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

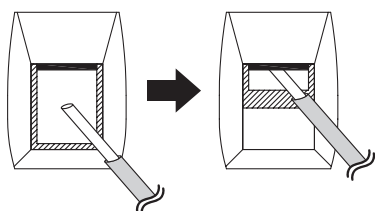


Note: Compatible screwdriver blade: 0.6 × 3.5 mm

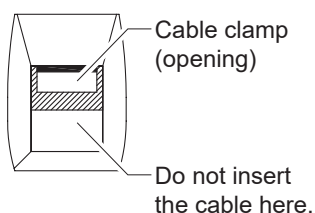


- (4) For a daisy chain connection, use the cables specified in "Specifications for Wiring" (limited to those with the same cross-sectional area ranging from 1.25 mm<sup>2</sup> to 1.5 mm<sup>2</sup>) and twist them together.
- (5) Insert the cable whose wire was exposed in step (1) into the cable clamp and tighten it by turning the screw above the cable clamp to the right with a screwdriver.

The screw tightening torque is 0.5 Nm–0.6 Nm. Make sure there are no strands of cable wire protruding from the cable clamp.

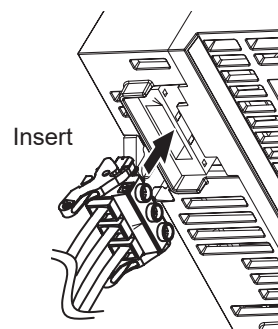


Note: Check that the wire is inserted into the cable clamp.

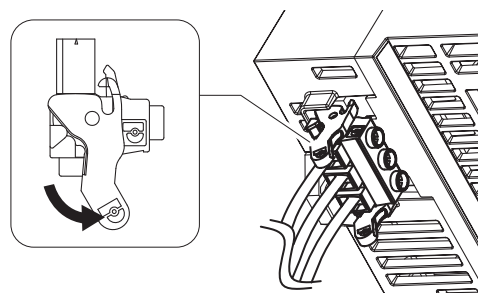


- (6) Lightly pull the cable to check that it does not come out.

- (7) Insert the connector into the device.



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

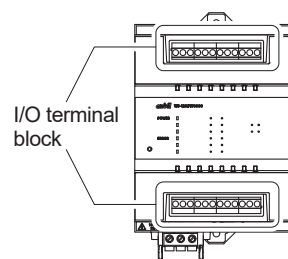


- (8) Lightly pull the cable to check that the power connector does not come out.

#### Power Supply Terminals

Terminal No.	Display	Description
1	L	AC input
2	N	AC input
3		Protective ground terminal

#### ● Wiring the I/O Terminal Block



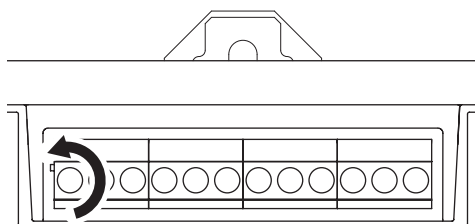
The terminal blocks use screw connections (clamping).

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



- (2) Turn the screw of the terminal block to the left with a screwdriver to open the cable clamp (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 Nm–0.6 Nm. Make sure there are no strands of cable wire protruding from the cable clamp. For every two channels there is one common terminal for pulse inputs and pulse outputs. The cables with the same cross-sectional area, which are specified in “Specifications for Wiring,” can be used for direct wire connection and twisted together.
- (4) Lightly pull the cable to check that it does not come out.

### ● Inputs

- (1) Connection with the temperature sensor\*1

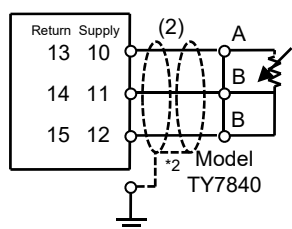


Figure 11

- (2) Connection with the volumeter

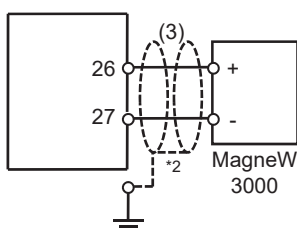
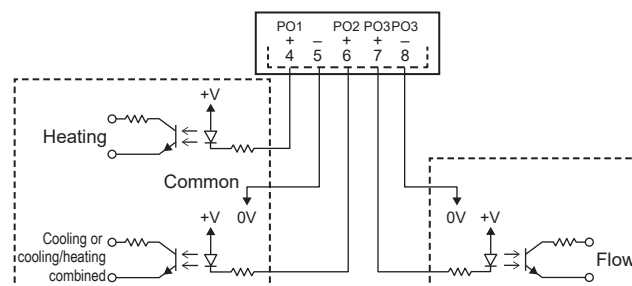


Figure 12

**IMPORTANT!!**

- Note that energy cannot be accurately measured if wiring is incorrect.
- Note that energy cannot be accurately measured if wiring for the supply water temperature sensor or return water temperature sensor is incorrect.

### ● Outputs



### ● Note

- Before connecting or removing a load, turn off the power to this product. Failure to do so may cause failure of this product and loads.
- The negative side of PO1 and PO2 is used in common (terminal No. 5) and they are internally connected with each other in the product.
- The negative side of PO1 and PO2 (terminal No. 5) is not internally connected with the negative side of PO3 (terminal No. 8) in the product.

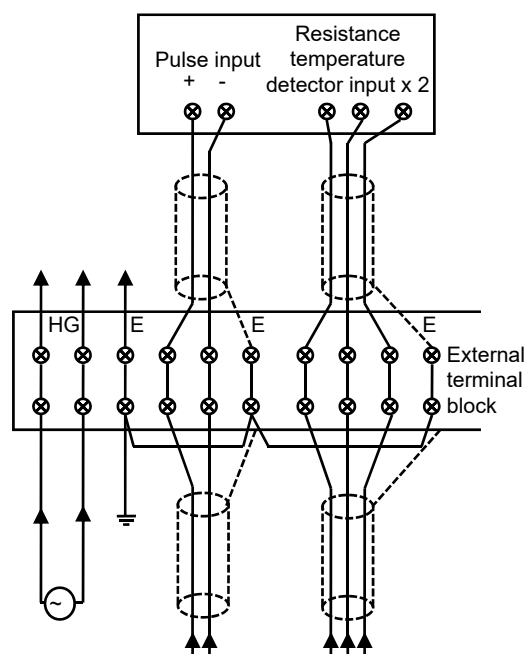


Figure 13

- \*1 Use the same cable length for the supply water temperature and the return water temperature so that their wiring resistance will be the same.
- \*2 Although the pulse input and resistance temperature detector input use shielded cables, the terminal block in the main unit does not have terminals for shielded cable. Separately prepare a ground terminal block of 100 Ω or less or equivalent. (See fig. 13.)

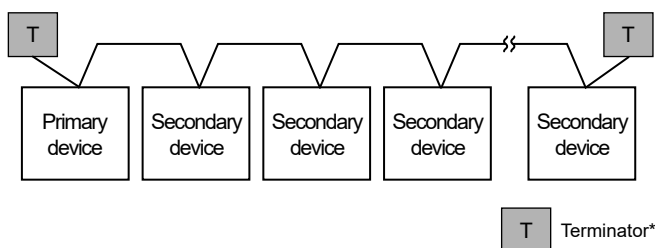
Table 1 Model WJ-1203W0000 I/O terminal

Terminal No.	Code	Description
4	PO1 +	Cumulative energy pulse output (heating)
5	PO1,2 -	Cumulative energy pulse output (common)
6	PO2 +	Cumulative energy pulse output (cooling or cooling/heating combined)
7	PO3 +	Cumulative flow rate pulse output
8	PO3 -	Cumulative flow rate pulse output
9	NC	Unused
10	Ts-A	Pt100 Supply water temperature input
11	Ts-B	
12	Ts-B	
13	Tr-A	Pt100 Return water temperature input
14	Tr-B	
15	Tr-B	
16	+	RS485 -1 DATA +
17	-	RS485 -1 DATA -
18	SC	RS485 -1 Signal Common
19*3	+	RS485 -2 DATA +
20*3	-	RS485 -2 DATA -
21*3	SC	RS485 -2 Signal Common
22	DC+12	Connected with the display panel.
23	SG	Communication RS-485
24	DA	Connect terminal Nos. 22 to 25 to terminal Nos. 1 to 4 on the display in order.
25	DB	
26	FLOW+	Flow rate input
27	FLOW-	

\*3 Terminal for daisy chain connection

### ● Wiring the RS-485 Terminals

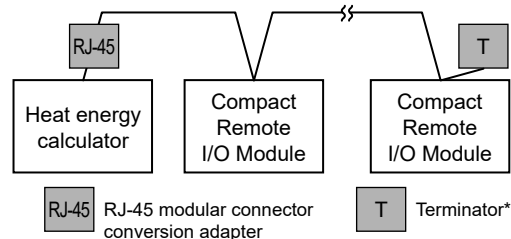
The terminal block uses screw type terminals.  
Connect a terminator (120 Ω) to the end device connected to RS-485.



Note: Use the terminator listed below.  
Model 83172137-001 (x10)

### ● Wiring for Standalone Operation

Connect the terminator to a Compact Remote I/O Module. Otherwise, the product may not be able to communicate with the Compact Remote I/O Module.



Note: Use the terminator listed below.

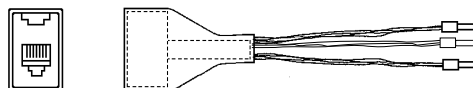
Model 83162637-005: Modular terminator (x1)

Model 83162637-006: Modular terminator (x10)

### ■ Material

#### ● RJ-45 Modular Connector Conversion Adapter

This adapter is used for conversion to the RJ-45 modular connector.



Note: Order model numbers

Model 83159766-007: Modular connector (3P) (x1)

Model 83159766-008: Modular connector (3P) (x10)

Note:

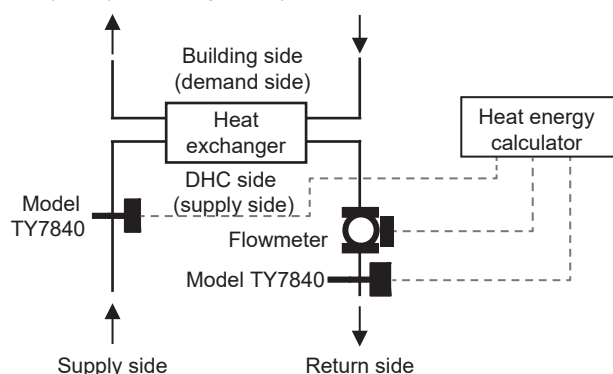
1. For RS-485 communication, no branch wiring is allowed.
2. Branch wiring using model DY7203A0000 is prohibited.

### ● Notes for Use

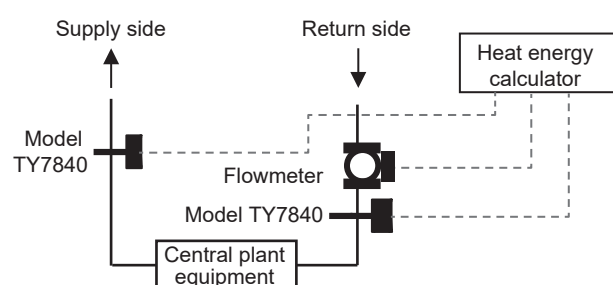
- Install this product in a panel, outlet box, etc.
- Plug in the modular plug into the modular jack until they click. Lightly pull the cable to make sure it does not come out.
- Use the same type of line cables for a daisy chain connection.
- Connect the terminator to a Compact Remote I/O Module. Otherwise, the product may not be able to communicate with the Compact Remote I/O Module. If a power failure occurs in standalone configuration, alarm output from a compact remote I/O may be turned OFF. Therefore, use the same system as the heat energy calculator to power Compact Remote I/O Modules.

## ■ Instrumentation Examples

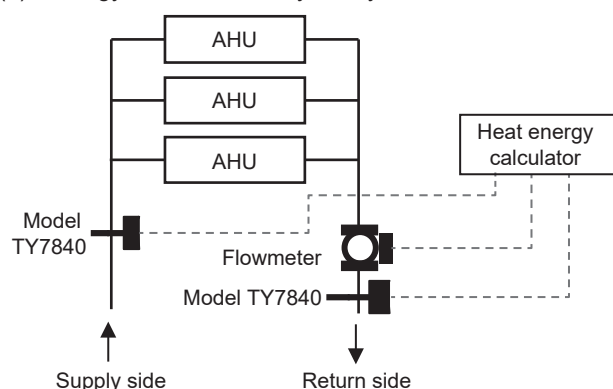
- (1) Energy fee charging for a district heating and cooling (DHC) receiving facility



- (2) Measurement of energy generated from a heat source

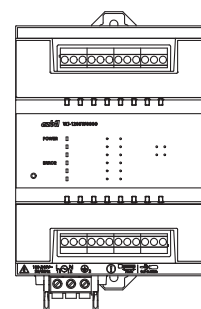


- (3) Energy measurement by the system



## ■ Display

### ● Product Status LEDs



Item	LED name	Color	State	Description
Power status	POWER	Green	Off	Power OFF
			On	Power ON
Abnormal status	ERROR	Red	Off	No abnormalities
			Flashing (1.4 s intervals)	Minor failure
			On	Major failure
			Flashing (0.2 s intervals)	Communication error

Note:

- When the power supply is started or when the CPU is reset, the red LED lights up temporarily, however, this is not an error status.
- The LED flashes in the event of a communication error only when a BACnet MS/TP connection is used.

## ■ ID Label

Write down the communication protocol channel No. under the host controller, the address of this product, and the Ethernet address of the host controller on the label and affix it to the product during engineering.

Affixed to the product

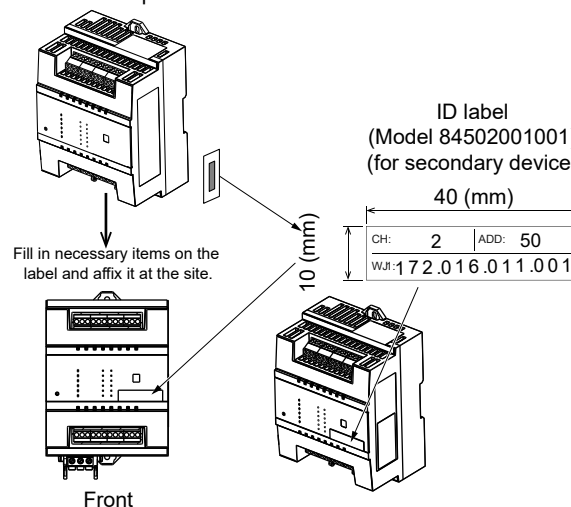



Figure 14

Note: You do not have to affix the ID label for standalone operation.

## ■ Handling

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

**IMPORTANT!!**

- Do not test the withstand voltage of this product. Doing so may result in a malfunction.
- If more than the rated voltage is accidentally applied to this product, replace the product with a new one. Failure to do so may result in a malfunction.

## ● Notes Before Power-On

- Double check that the wiring is done correctly.
- Peel off the protective sheets before powering the device on.

Note: Make sure that all protective sheets have been peeled off.

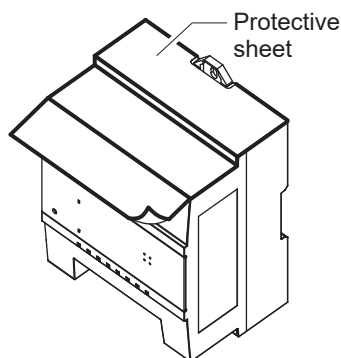



Figure 15 Protective sheet



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

## ■ Device Protection After Installation

If installation of other equipment 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, be sure to 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

Dispose of the product as industrial waste in accordance with your local regulations.

Do not reuse all or part of this product.

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BACnet is a registered trademark of ASHRAE.  
Modbus is a trademark and the property of Schneider Electric SE, its subsidiaries and affiliated companies.

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*Specifications are subject to change without notice*

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