

Instruction Manual

BACnet MS/TP compatible I/O Module Digital I/O Module

Thank you for purchasing WATANABE product. Please check that the product matches the specifications you ordered and the indications on its rating label, and use it in accordance with this manual.

This product has been manufactured and inspected under strict quality control standards. Should any problem occur, such as damage in transit, please contact our company or the dealer from whom you purchased the product as soon as possible.

This product is a module that accepts ON/OFF signals from relay contacts or open collectors and outputs ON/OFF signals through relay contacts. It can also accept and accumulate signals from equipment that outputs pulses. (pulse count, ON-time accumulation)

This manual describes the installation and connection of this product. For setting methods and other details, please use the following manual. Please download it from our website and check it.

<https://www.watanabe-electric.co.jp/en/>

- Checking the package contents
 - WBI-DIO4R module: 1

- Download from our website (see the URL above)

Product name	Document No.
BACnet MS/TP compatible I/O Module Instruction Manual	IM-0806

1. Precautions

Please be sure to observe the following in order to use this product correctly and safely.

- Read this manual carefully before use, and use the product correctly.
- After reading, keep this manual in a safe place where it can always be seen, and read it whenever necessary.

Restrictions on Use

- Do not use this product as part of equipment intended to sustain human life.
- Do not use this product in a way that a failure could directly lead to personal injury or property damage.

Caution

- Do not disassemble or modify this product. It may cause failure, electric shock or fire.

1-1. Operating Environment and Conditions

Do not use the product in the following places. Doing so may cause malfunction or shorten its life.

- Places where the ambient operating temperature is outside the range of -5 to 55 °C
- Places where the ambient operating humidity is outside 10 to 90% RH, or where freezing or condensation occurs
- Places with much dust, metal powder, etc. (housing in a dust-proof enclosure and heat-dissipation measures are required)
- Places with corrosive gas, salt or oil smoke
- Places subject to, or at risk of, vibration or shock
- Places exposed to rain or water drops
- Places with strong electromagnetic fields or much external noise

1-2. Mounting and Connection

- Read this manual carefully before installation and connection, and have installation and connection performed by a person with the necessary technical skill.
- Do not run the power line, input/output lines or communication line close to noise sources or relay drive lines.
- Bundling with lines on which noise is superimposed, or housing them in the same duct, may cause communication errors.
- Do not block the ventilation openings of the main unit case.
- This product does not communicate for 90 seconds after power-on or restart.

1-3. Checks Before Use

- Use the product at an installation location that satisfies the operating environment and conditions.
- Check the power supply rating (voltage, frequency, etc.).

2. Specifications

• Power supply specifications

AC100 to 240 V $\pm 10\%$ Power consumption: approx. 7 VA (AC100 V),
: approx. 9.5 VA (AC240 V)

• Digital input section

Input signal : Pulse / voltage-free contact or transistor
Input sensing current : Approx. 5.5 mA (when ON resistance is 0 Ω)
Input pull-up voltage : DC24 V $\pm 10\%$ (internal pull-up)
Input pulse ON time : 10 ms or more
Input pulse OFF time : 10 ms or more
Allowable pulse input frequency : 50 Hz or less
Number of input points : 4 points
Input common : Negative common
(1 common per input point)
Input settings : Pulse max., pulse reset, time accum. reset,
change count reset, prescale, unit,
pulse coefficient

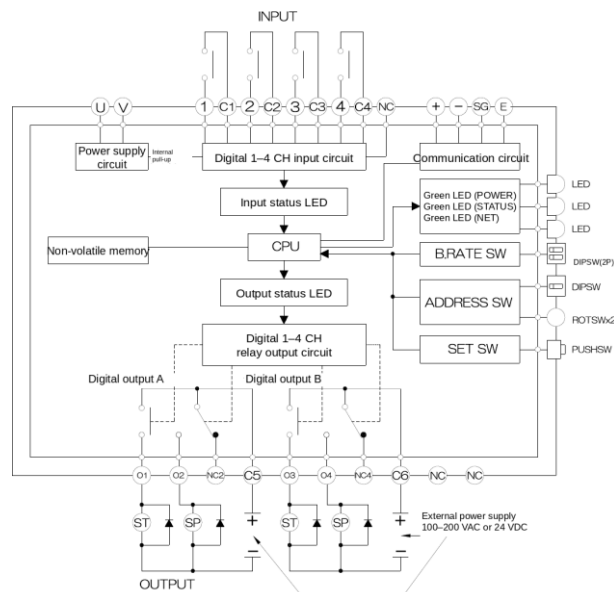
• Digital output section

Output signal : Relay contact output (a-contact $\times$ 2, c-contact $\times$ 2)
Rated control capacity : 2 A/250 VAC, 2 A/30 VDC
Minimum applicable load : 10 mA/5 VDC
Dielectric strength : Between open contacts: AC750 V for 1 minute
Mechanical life : 5 million operations or more
Electrical life : 200,000 operations or more (at rated load)
Number of output points : 4 points (a-contact $\times$ 2, c-contact $\times$ 2)
Output common : 1 common for digital output A (O1, O2, NC2)
1 common for digital output B (O3, O4, NC4)
Response speed : 15 ms

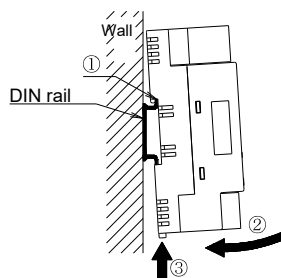
Output settings

: Output inversion, standard/run-stop switching,
min. ON/OFF time, time accum. reset,
change count reset, power-recovery restore,
startup delay

3. Circuit Block Diagram



4. Attaching to / Removing from a DIN Rail



- ① Hook the DIN rail mounting groove hooks on the back of this product onto the DIN rail.
- ② Push the lower part of this product in the direction of the arrow in the figure until you hear a "click".
- ③ Push in the DIN rail mounting lock and check that this product is firmly fixed.

To remove it, insert a flat-blade screwdriver or similar into the groove of the mounting lock ③ and pull it in the direction opposite to ③ to remove this product.

5. Precautions for Installation

5-1. Consideration of Ambient Temperature

The operating temperature range of this product is -5 °C to 55 °C.

When installing inside a panel, observe the following points.

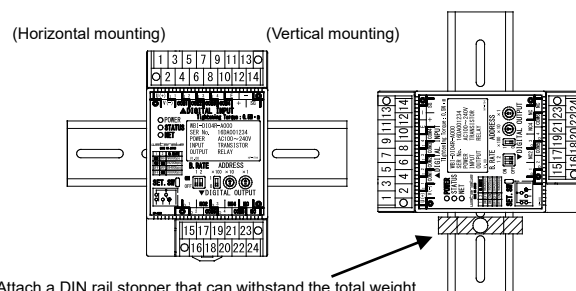
- Do not install it at the very top of the panel, where warmed air stagnates.
- To secure ventilation space, keep sufficient distance above and below from other equipment, wiring ducts, etc.

- Do not install it directly above equipment that generates much heat, such as heaters, transformers and high-capacity resistors.
- Avoid places exposed to direct sunlight.

5-2. Mounting Orientation

This product can be mounted either vertically or horizontally.

However, when mounting vertically, attach a DIN rail stopper that can withstand the total weight of this product and the wiring load.



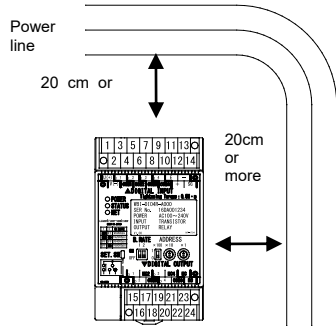
Attach a DIN rail stopper that can withstand the total weight of this product and the wiring load.

5-3. Wiring and Installation

- Mounting inside a panel containing an inverter induces noise, so wire and install the product separated as far as possible.

If the product is easily affected by noise, provide a partition and ground it.

- Install this product at least 20 cm away from high-voltage lines and power lines.



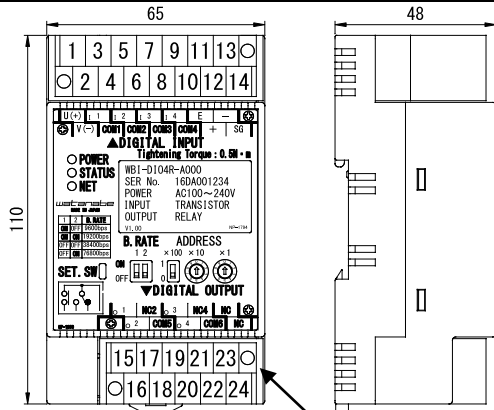
- Avoid running the power line, input/output signal lines and communication line in parallel with, or bundled with, power lines (inverter input/output lines).
- Use shielded cables for input/output signal lines and communication lines.
 - Ground the shield of shielded cables to earth.
- Keep wiring cables as short as possible.
- Attach ferrite cores to each line subject to noise to reduce the effect of noise. Attach them near the cable outlet or near the terminals of this product.
- When attaching a filter to a cable, do not let the wiring before and after the filter come close to each other.
- If lines on which noise is superimposed must unavoidably be bundled or housed in the same duct, provide a partition in the duct and ground it.

5-4. Grounding

- Use a dedicated ground wherever possible. Grounding should be Class D (formerly Class 3) grounding, ideally a dedicated ground separate from the grounds of other equipment.

In particular, never share a ground with large-capacity equipment such as motors and inverters; provide separate grounds so that they do not affect each other.

6. Outline Dimensions and Terminal Arrangement



(Mass: approx. 250 g)

The circled parts at both ends of the terminal block (4 places in total) are screws for fixing the terminal block. Because they are narrower than the other screw parts, use a screwdriver with a shaft diameter of $\phi 6.0$ mm or less. Do not connect wires to them.

- Upper and lower terminals are detachable terminals.
- M3 screw terminal block; terminal screw tightening torque: 0.5 N·m (5.1 kgf·cm)
- Can be mounted closely side by side

Terminal No.	Nameplate symbol	Description
Control power supply		
1	U(+)	Power terminals (AC100–240 V ±10%)
2	V(-)	
Digital input terminals		
3	I 1	Digital input 1
4	COM 1	Common 1 (for digital input 1) *1
5	I 2	Digital input 2
6	COM 2	Common 2 (for digital input 2) *1
7	I 3	Digital input 3
8	COM 3	Common 3 (for digital input 3) *1
9	I 4	Digital input 4
10	COM 4	Common 4 (for digital input 4) *1
MS/TP communication terminals		
11	E	Communication terminating terminal *2
12	+	Communication + terminal
13	–	Communication – terminal
14	SG	Communication SG terminal

Digital output terminals A			
15	O 1	a-contact relay	Digital output 1 (normally open)
16	O 2	c-contact relay	Digital output 2 (normally open)
17	NC 2		Digital output 2 (normally closed)
18	COM 5	O1,O2,NC2 Common	Common 5 (for digital outputs 1/2)
Digital output terminals B			
19	O 3	a-contact relay	Digital output 3 (normally open)
20	O 4	c-contact relay	Digital output 4 (normally open)
21	NC 4		Digital output 4 (normally closed)
22	COM 6	O3,O4,NC4 Common	Common 6 (for digital outputs 3/4)
23	NC		Empty terminal *3
24	NC		

*1 The commons for digital inputs 1 to 4 are common internally.

*2 Terminating resistor

Connect a terminating resistor of 100 Ω to 220 Ω between communication terminals "12 and 13".

If the WBI series is at the end of the system, short "11: terminating terminal" and

"13: - terminal" to enable the built-in 220 Ω terminating resistor.

If you do not enable the terminating resistor, do not connect anything.

(The appropriate value differs depending on the cable type, but it has been confirmed that the above resistance values cause no problem.

However, use the same resistance value for the terminating resistors at both ends.)

*3 Do not connect anything to empty terminals.

7. Communication Line Wiring

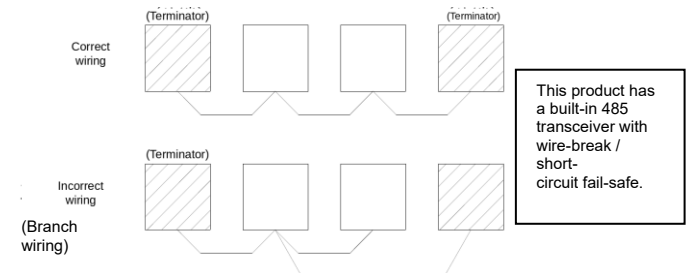
For the communication line, use a cable equivalent to the following specifications.

Recommended communication line

Cable	Size	Equivalent product
Shielded twisted-pair Cable	AWG16 to AWG24	Hitachi Metals (Hitachi Cable) CO-SPEV-SB(A) 1P $\times$ 0.3SQ LF, etc. (equivalent to AWG22)

Wiring between devices

Wire the communication line between devices as shown in the figure below.



8. Names and Functions of Parts

• LED status

POWER	G	Normal operation	Steady on
		Communication settings confirmed	Blinks twice (ON/OFF 250 ms each)
STATUS	G	Operation abnormality (stopped)	All LEDs (POWER, STATUS, NET) lit
		Normal operation	Off
		Communication error	Lit while the error continues (for at least 3 seconds)
		Operation abnormality (minor fault)	Blinks 3 times continuously (ON/OFF 250 ms each)
NET	G	Operation abnormality (stopped)	All LEDs (POWER, STATUS, NET) lit
		Communication status	Blinks during communication (ON/OFF 50 ms each)
		Invalid address setting	Blinks continuously (ON/OFF 250 ms each)
		Operation abnormality (stopped)	All LEDs (POWER, STATUS, NET) lit
INPUT	G	On input	Lit for the corresponding channel
OUTPUT	G	On output	Lit for the corresponding channel

• Operation switches

SET.SW	Set switch	Hold for 3 seconds to apply the settings. (When confirmed, the POWER LED blinks twice.)
B.RATE	Communication speed setting	Sets the communication speed.
ADDRESS	Address setting	Sets an address from "000" to "127".

◦ Communication speed setting (DIP SW, 2-pole)

Communication speed	DIP SW(1,2)
9600bps	ON, OFF
19200bps	ON, ON
38400bps	OFF, OFF (default)
76800bps	OFF, ON

- Address setting switches

Used to set the address. The address can be set from 0 to 127.

Do not set any other value.

(The address and communication speed settings are applied when the power is turned on or when the set switch is held for 3 seconds.)

* The device instance ID is assigned as follows according to the state of the address switches at power-on, when the set switch is held for 3 seconds, and when ReinitializeDevice-B (DM-RD-B) is sent.

Automatically assigned device instance ID = address (0 to 127)

If Device_Object_Identifier is set via communication, automatic assignment is disabled.

9. Warranty

9-1. Warranty Period

The warranty period of this product is one year from delivery.

9-2. Scope of Warranty

If a failure occurs within the warranty period due to a cause attributable to our company, we will provide a replacement or repair the failed product free of charge.

However, failures caused by any of the following are excluded from this warranty.

- ① Use outside the conditions, environment and handling range described in this manual.
- ② Modification or repair of the structure, performance, specifications, etc. by anyone other than our company.
- ③ Causes other than this product.
- ④ Causes that could not have been foreseen at the level of science and technology at the time of shipment from our company.
- ⑤ Other causes not attributable to our company, such as natural disasters, calamities and force majeure.

This warranty is limited to the product itself. Damage induced by a failure or defect of this product is excluded from the warranty.

9-3. Limitation of Liability

Our company shall not be liable in any case for damage arising from this product.