

BACnet MS/TP compatible I/O Module WBI Series Instruction Manual

WBI-DI8
WBI-DIO4R

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1. Introduction

This manual describes the BACnet MS/TP compatible I/O modules of the WBI series [WBI-DI8 and WBI-DIO4R] (hereinafter referred to as the WBI series).

The WBI series conforms to the BACnet Application Specific Controller (B-ASC).

This manual describes the hardware specifications and BACnet communication specifications of the WBI series.

The BACnet communication specifications mainly cover the content related to this product.

The BACnet communication specifications conform to ANSI/ASHRAE Standard 135-2010 (hereinafter referred to as SSPC135).

※ Some content described in SSPC135 is not repeated in this manual. For details of the BACnet specifications, please refer to SSPC135.

1-1. Features

1-1-1. Features of the WBI Series

- Operates as a BACnet MS/TP master.
- Digital inputs are internally pulled up to 24 V.
- Terminals and main unit are detachable for ease of maintenance.
- Can be mounted on a DIN rail.
- Accumulated values and setting values are stored in non-volatile memory during a power failure.
- Built-in 220 Ω terminating resistor. (Shorting terminal numbers 11 and 13 enables the terminating resistor.)
- Can join the network without a dedicated configuration tool.
- The communication interval can be adjusted to suit the network. *1

1-1-2. Features of the WBI-DI8

- Digital inputs 1 to 8 ch can also be used as pulse inputs.
- Accumulates the number of changes and the operating time of the digital inputs.
- Equipped with a change-of-state transmission function for digital input states.

1-1-3. Features of the WBI-DIO4R

- Digital inputs 1 to 4 ch can also be used as pulse inputs.
- Accumulates the number of changes and the operating time of the digital inputs and outputs.
- Built-in a-contact and c-contact relays allow the unit to be incorporated into control circuits in power panels, making CX/TX relays unnecessary.
- In addition to standard output objects, equipped with run/stop control objects. *2
- Equipped with versatile output control functions. (Output control with 16 priority levels, minimum ON time and minimum OFF time supported)
- Equipped with an output restoration function that restores the output immediately before power loss when power is restored. *1
- A startup delay suppresses simultaneous output and automatically distributes the load. *1
- Equipped with a change-of-state transmission function for digital input/output states.

*1 Configuration using a proprietary property is required.

*2 Use only one of them during operation.

2. Warranty

2-1. Warranty Period

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

2-2. 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 these delivery specifications.
- 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.

2-3. Limitation of Liability

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

2-4. Handling Precautions

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



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.

2-4-1. 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

2-4-2. Mounting and Connection

Please check the following items regarding mounting and connection.

- Check the connection method 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 signal line, communication line or ground wire 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.
- This product does not communicate for 90 seconds after power-on or restart.
- This product can be mounted closely side by side.

2-4-3. Meaning of "Warning" and "Caution"

 Caution	This indication means that incorrect handling may result in "a risk of injury or in property damage only."
 Warning	This indication means that incorrect handling may result in "a risk of death or serious injury."

Warning

● About the module

- 1 Do not perform live-line work. It may cause electric shock, or equipment failure, burnout or fire due to a short circuit.
- 2 Always close the terminal cover before use. Using the product with the cover open may cause electric shock.
- 3 Do not disassemble or modify this product. It may cause failure, electric shock or fire.

Caution

● About the module

- 1 This product requires a power supply. For equipment and circuit protection, we recommend installing a circuit breaker, fuse, etc. in the power circuit.
- 2 Check the connection diagram thoroughly before wiring. Improper wiring may cause equipment failure, fire or electric shock.
- 3 Use wires of an appropriate standard. Improper wires may generate heat and cause a fire.
- 4 Use crimp terminals suited to the wire standard. Improper ones may cause wire breakage or poor contact, resulting in malfunction, failure, burnout or fire.
- 5 After tightening the screws, always make sure none has been left untightened. Untightened screws may cause malfunction, fire or electric shock.
- 6 Excessive tightening may damage terminals or screws, and insufficient tightening may cause malfunction, fire or electric shock.

2-4-4. Checks Before Use

Use the product at an installation location that satisfies the operating environment and conditions.
Check the power supply rating.

2-4-5. Usage

Use the product within the range of the basic specifications described in this document. Use outside that range may cause malfunction or equipment failure, as well as ignition or burnout.

2-4-6. Repair in Case of Failure and Action in Case of Abnormality

If any abnormal noise, odor, smoke or heat is emitted from this product, switch off the power immediately. Before concluding that the product is faulty, please check the following points again.

- ① Is power being supplied correctly?
- ② Is the wiring correct?
- ③ Are the settings correct?
- ④ Are any addresses duplicated?
- ⑤ Are the communication settings correct?

2-4-7. Maintenance and Inspection

To use this product correctly and for a long time, please carry out the following inspections periodically.

- ① Is the product damaged?
- ② Are there any abnormalities in the indicators?
- ③ Is there any abnormal noise, odor or heat?
- ④ Are the mounting and terminal connections loose? (Always carry this out while the power is off.)

2-4-8. Disposal

The products covered in these delivery specifications should be disposed of appropriately as general industrial waste, in accordance with the ordinances of the local government.

2-5. Maintenance Period

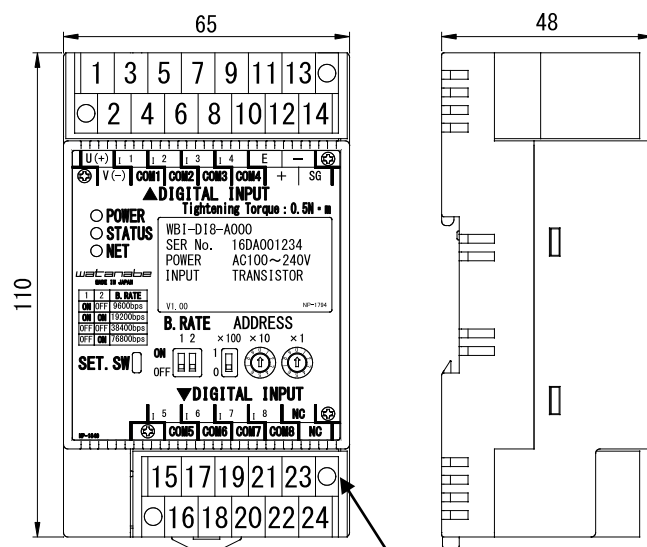
Seven years after product shipment.

3. Appearance

This section describes the outline dimensions, terminal arrangement, switches and LEDs of the WBI series.

3-1. WBI-DI8

3-1-1. Outline Dimensions and Terminal Arrangement



The circled parts at both ends of the terminal block (4 places in total) are screws for fixing the terminal block. Do not connect wires to them.

Terminal	Nameplate	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
12	+	Communication + terminal
13	-	Communication - terminal
14	SG	Communication SG terminal
Digital input terminals		
15	I 5	Digital input 5
16	COM 5	Common 5 (for digital input 5) *1
17	I 6	Digital input 6
18	COM 6	Common 6 (for digital input 6) *1
19	I 7	Digital input 7
20	COM 7	Common 7 (for digital input 7) *1
21	I 8	Digital input 8
22	COM 8	Common 8 (for digital input 8) *1
23	NC	Empty terminal (do not connect)
24	NC	

- Upper and lower terminals are detachable terminals
- M3 screw terminal block; terminal screw tightening torque : 0.5 N·m (5.1 kgf·cm)

*1 The commons for digital inputs 1 to 8 are common internally.

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

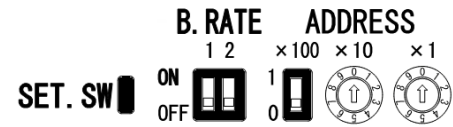
If the WBI series is at the end of the system,
short "11: terminating terminal" and "13: - terminal" to enable the built-in 220 Ω terminating resistor.

If you do not enable the terminating

3-1-2. Operation Switches

The specifications of the operation switches are as follows.

- The operation switch specifications are common to the WBI series.



Switch name	Switch type	Marking on unit	Description
Set switch	Push switch × 1	SET.SW	Used to confirm the address and communication speed.
Address setting	DIP switch: 1 bit	ADDRESS ×100	Used for address setting. (hundreds digit)
	Rotary switches, decimal × 2	ADDRESS ×10, ×1	Used for address setting. (tens and ones digits)
Communication speed setting	DIP switch: 2 bits	B.RATE	Used for communication speed setting.

- ※ The address can be set from 0 to 127. Do not set any other value.
- ※ If an incorrect address is set, the NET LED blinks. (For details, see "3-1-3-3. NET LED Function".)

3-1-2-1. Set switch

Pressing and holding the set switch for 3 seconds applies the state of the address and communication setting switches.

3-1-2-2. Address switches

The address is determined by a 1-bit DIP switch for the hundreds digit and two rotary switches for the tens and ones digits.

The valid address range is 0 to 127. (Do not set any other value.)

The changed settings are applied when the power is turned on or when the set switch operation described above is performed.

- ※ If Device Object_Identifier is set, automatic assignment of the device instance ID is disabled. For details of automatic assignment, see "6-5-1. Device Instance Specifications".

3-1-2-3. Communication speed setting switches

Functions are assigned to the two DIP switches as follows.

Settings other than the communication speed are fixed.

Setting item	DIP switch		Communication setting			
	1	2	Communication speed	Data length	Parity	Stop bit
Communication setting	ON	OFF	9600bps	8bit	None	1bit
	ON	ON	19200bps			
	OFF	OFF	38400bps			
	OFF	ON	76800bps			

- ※ The factory setting is 38400 bps.

The settings are applied when the power is turned on or when the set switch operation described above is performed.

3-1-3. LED Indicators

This section describes the LED indicators (display color: green).

- ※ The LED indicator specifications are common to the WBI series.
- ※ For minor faults, see "6-6-1. Minor Faults"; for major faults, see "6-6-2. Major Faults".

3-1-3-1. POWER LED Function

The POWER LED lights or blinks under the following conditions.

LED Indicators	Condition	Description
Steady on	Power ON	Lit continuously while the power is on.
Blinking	Address/communication settings confirmed	When the SET switch is pressed and the address and communication settings are confirmed, the LED blinks twice with ON time/OFF time of 250 ms each.
Steady on (all LEDs)	Hardware failure: major fault	All LEDs (POWER, STATUS, NET) are lit.

3-1-3-2. STATUS LED Function

The STATUS LED lights or blinks under the following conditions.

LED Indicators	Condition	Description
Steady on (all LEDs)	Hardware failure: major fault	All LEDs (POWER, STATUS, NET) are lit.
Blinks 3 times	Hardware failure: minor fault	Blinks 3 times continuously with ON time/OFF time of 250 ms each. (3-second cycle)
On	Communication error	Lit while the error continues, and turns off when the error is cleared. (Lit for at least 3 seconds)
Off	Normal operation	Off.

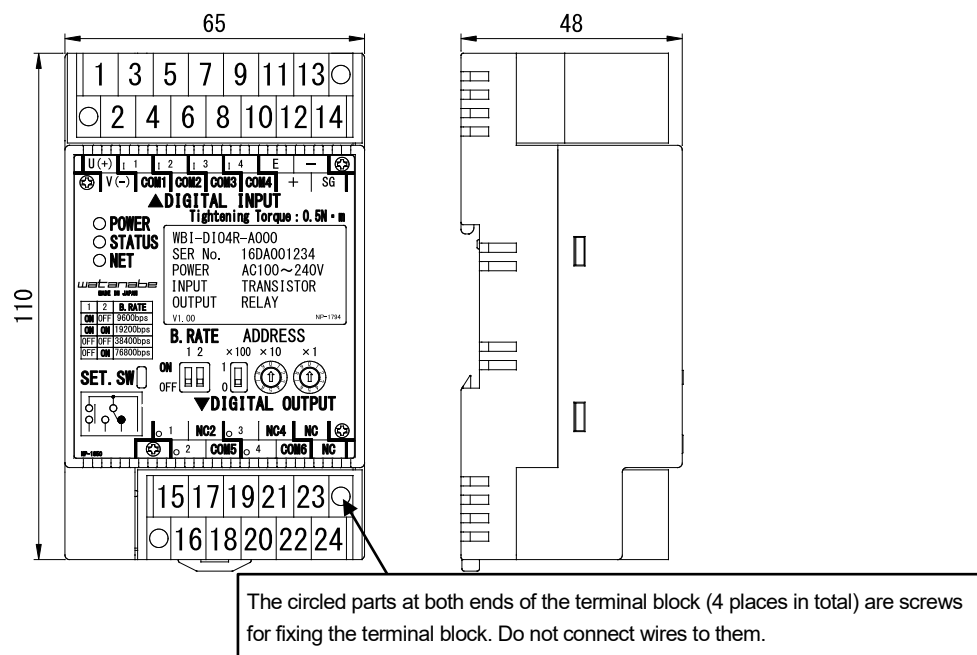
3-1-3-3. NET LED Function

The NET LED lights or blinks under the following conditions.

LED Indicators	Condition	Description
Off	Power OFF, no communication	Off when the power of the unit is OFF or when there is no communication. Communication is not possible for 90 seconds after startup or restart, so the LED stays off during that time.
Continuous blinking	Invalid address setting	When the address is not set correctly (set between 128 and 199), the LED blinks with ON time/OFF time of 250 ms each.
Blinking (continuous)	Communicating	During continuous communication, the LED blinks with ON time/OFF time of 50 ms each. (Lit for at least 50 ms)
Steady on (all LEDs)	Hardware failure: major fault	All LEDs (POWER, STATUS, NET) are lit.

3-2. WBI-DIO4R

3-2-1. Outline Dimensions and Terminal Arrangement



Terminal	Nameplate	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	Digital output 1 (normally open)
16	O 2	c-contact	Digital output 2 (normally open)
17	NC 2	relay	Digital output 2 (normally closed)
18	COM 5	O1,O2,NC2	Common 5 (for digital outputs 1/2)
Digital output terminals B			
19	O 3	a-contact	Digital output 3 (normally open)
20	O 4	c-contact	Digital output 4 (normally open)
21	NC 4	relay	Digital output 4 (normally closed)
22	COM 6	O3,O4,NC4	Common 6 (for digital outputs 3/4)
23	NC	Empty terminal (do not connect)	
24	NC		

· Upper and lower terminals are detachable terminals

· M3 screw terminal block; terminal screw tightening torque

: 0.5 N·m (5.1 kgf·cm)

*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

3-2-2. Operation Switches

The operation switch specifications are common to the WBI series.
See "3-1-2. Operation Switches" for the WBI-DI8.

3-2-3. LED Indicators

The LED indicator specifications are common to the WBI series.
See "3-1-3. LED Indicators" for the WBI-DI8.

4. Functional Overview

This section gives an overview of the functions of this product.

4-1. Overview of Main Unit Functions

Category	Functional Overview	Remarks
Unit I/O	Communication via BACnet MS/TP is possible.	
	Pulse input (up to 50 Hz) on the digital input ports can be detected, and can be used together with the digital input function.	
	Digital output control is possible.	DIO4R: 4 ch only
Unit functions	Setting values, accumulated values, etc. are retained even when the power is cut.	
Time management	The clock stops while the power is off. (This product has no battery.)	

- ※ Because this product has no battery, the timekeeping function stops while the power is off. After power-on, synchronize the time using the TimeSynchronization service (or UTCTimeSynchronization service). (For details, see "6-4-1-3. Processing of TimeSynchronization" or "6-4-1-4. Processing of UTCTimeSynchronization".)

4-2. Overview of BACnet Communication Functions

This product operates as a BACnet MS/TP master.

The selectable communication speeds are 9600 bps, 19200 bps, 38400 bps and 76800 bps.

5. Hardware Specifications

5-1. Specifications

5-1-1. Model Number

The model numbers of this product are as follows.

WBI	-	□	-	A	□	02	
Series	Type	Power supply	Inspection report	Serial suffix	Description		
WBI					BACnet MS/TP compatible I/O module		
	DI8				8 digital inputs		
	DIO4R				4 digital inputs, 4 digital outputs (relay outputs)		
		A			AC100 to AC240 V $\pm 10\%$		
			0		None		
			1		Included		
				02	Standard		

5-1-2. Basic Specifications

The basic specifications are as follows.

Basic functions	WBI-DI8: 8 digital inputs WBI-DIO4R: 4 digital inputs, 4 digital outputs (relay outputs)
Operating temperature and humidity range	-5 to +55 °C, 10% to 90% RH or less (no condensation, no freezing)
Storage temperature and humidity range	-20 to +60 °C, 90% RH or less (no condensation, no freezing)
Warm-up time	30 minutes
Supply voltage	AC100 to 240 V $\pm 10\%$ (50/60 Hz)
Power consumption	WBI-DI8: approx. 5 VA (AC100 V), approx. 7.5 VA (AC240 V) WBI-DIO4R: approx. 7 VA (AC100 V), approx. 9.5 VA (AC240 V)
Isolation	WBI-DI8: between power – communication – input terminals WBI-DIO4R: between power – communication – input – output terminals
Insulation resistance	DC500 V megger, 100 M Ω or more
Dielectric strength	WBI-DI8: between power – communication – input terminals, AC1500 V for 1 minute WBI-DIO4R: between power – communication – input – output terminals, AC1500 V for 1 minute
Dimensions and weight	65 [W] × 110 [H] × 48 [D] mm, approx. 250 g
Structure	DIN rail mounting

5-1-3. Wiring Section Specifications

The specifications of the wiring section are as follows.

5-1-3-1. WBI-DI8

Wiring section	Power line Communication line Input signal line (1CH to 4CH)	M3 screw terminal block (detachable) 14P Phosphor bronze, nickel plating with partial gold plating Screw tightening torque: recommended 0.5 N·m
	Input signal line (5CH to 8CH)	M3 screw terminal block (detachable) 10P Phosphor bronze, nickel plating with partial gold plating Screw tightening torque: recommended 0.5 N·m

The tightening torque of the terminal fixing screws is 0.5 N·m.

5-1-3-2. WBI-DIO4R

Wiring section	Power line Communication line Input signal line (1CH to 4CH)	M3 screw terminal block (detachable) 14P Phosphor bronze, nickel plating with partial gold plating Screw tightening torque: recommended 0.5 N·m
	Output signal line (1CH to 4CH)	M3 screw terminal block (detachable) 10P Phosphor bronze, nickel plating with partial gold plating Screw tightening torque: recommended 0.5 N·m

The tightening torque of the terminal fixing screws is 0.5 N·m.

5-1-4. Communication Specifications

The communication specifications of this product are as follows.

Standard	Conforms to EIA-485 (RS-485)	
Communication speed	9600, 19200, 38400 (default), 76800 bps	
Communication method	3-wire half-duplex	
Synchronization	Asynchronous (start-stop)	
Protocol	BACnet MS/TP (master)	
BACnet profile	BACnet Application Specific Controller (B-ASC)	
Number of connected units	Max. 31 units per segment (max. 80 units with 2 repeaters connected)	
Transmission distance	1200 m or less per segment (varies with connected equipment and transmission path)	
Recommended communication cable	Shielded twisted-pair cable, AWG16 to AWG24	
	Equivalent product	Hitachi Metals (Hitachi Cable): CO-SPEV-SB(A) 1Px0.3SQ LF, etc. (equivalent to AWG22)
Terminating resistor (built-in)	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, connecting "11: terminating terminal" and "13: – terminal" enables 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.)	
Transmission format	Data length	8bit
	Parity	None
	Stop bit	1bit

5-2. WBI-DI8 Specifications

5-2-1. Digital Input Specifications

The digital input specifications of the WBI-DI8 are as follows.

For details of the settings, see "6-3-3-1. Accumulator Object Type" and "6-3-3-2. Binary Input Object Type".

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, internal pull-up
Input pulse ON time	10 ms or more
Input pulse OFF time	10 ms or more
Pulse input frequency	50 Hz or less
Input common	Negative common (1 common per input point) *1
Number of input points	8 points

※1 The commons for digital inputs 1 to 8 are common internally.

5-3. WBI-DIO4R Specifications

5-3-1. Digital Input Specifications

The digital input specifications of the WBI-DIO4R are as follows.

For details of the settings, see "6-3-3-1. Accumulator Object Type" and "6-3-3-2. Binary Input Object Type".

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, internal pull-up
Input pulse ON time	10 ms or more
Input pulse OFF time	10 ms or more
Pulse input frequency	50 Hz or less
Input common	Negative common (1 common per input point) *1
Number of input points	4 points

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

5-3-2. Digital Output Specifications

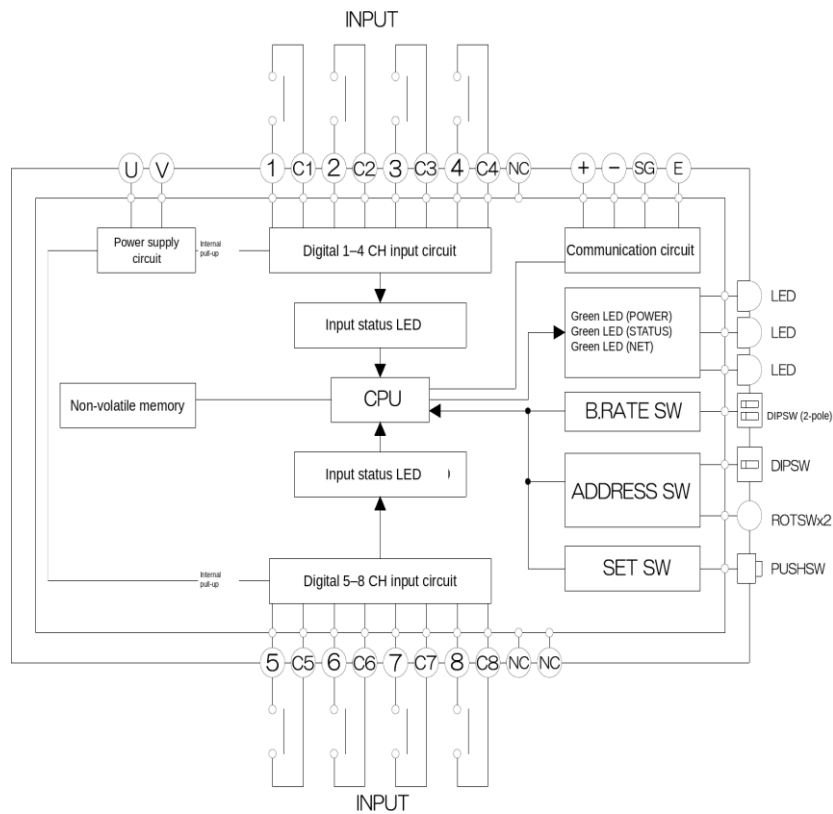
The digital output specifications of the WBI-DIO4R are as follows.

For details of the settings, see "6-3-3-3. Binary Output Object Type".

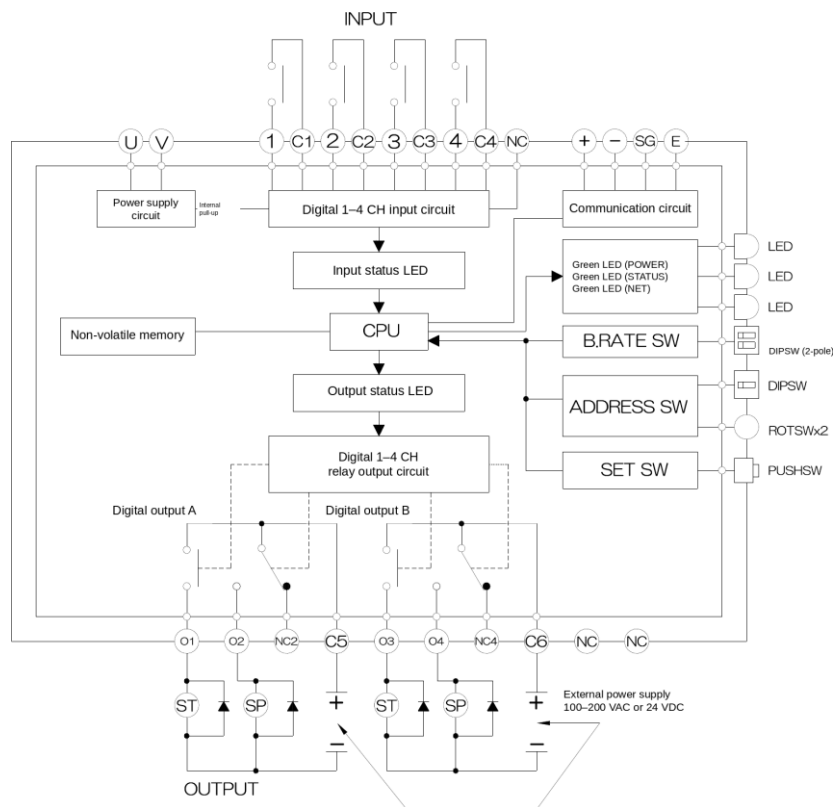
Output signal	Relay contact output (a-contact $\times$ 2, c-contact $\times$ 2)
Rated control capacity	2A/250VAC、2A/30VDC
Minimum applicable load	10mA/5VDC
Dielectric strength	Between open contacts: AC750 V for 1 minute
Mechanical life	5 million operations or more
Electrical life	200,000 operations or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

5-4. Block Diagrams

5-4-1. WBI-DI8 Block Diagram (Wiring Example)



5-4-2. WBI-DIO4R Block Diagram (Wiring Example)



6. BACnet Communication Specifications

6-1. Network Specifications

6-1-1. Overview

This product communicates based on the BACnet MS/TP protocol specifications defined by SSPC135.

Protocol: BACnet MS/TP master

Profile: BACnet Application Specific Controller (B-ASC)

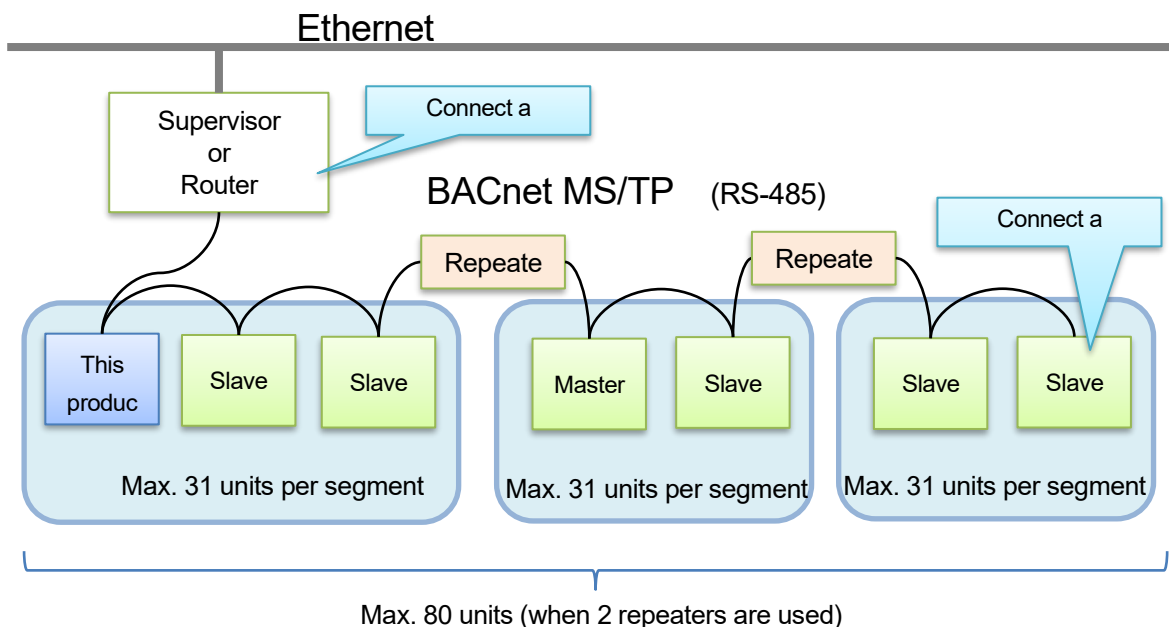
6-1-2. Physical Layer Specifications

This product performs BACnet MS/TP communication over RS-485 in accordance with SSPC135.

Communication method		Conforms to EIA-485 (RS-485)
		3-wire half-duplex
Synchronization		Asynchronous (start-stop)
Terminating resistor		Built-in (220 Ω) *For details, see P15, 5-1-4. Communication Specifications
Number of connected units		Max. 31 units per segment (max. 80 units with 2 repeaters connected)
Transmission distance		1200 m or less per segment (varies with connected equipment and transmission path)
Communication speed		9600, 19200, 38400 (default), 76800 bps
Transmission format	Data length	8bit
	Parity	None
	Stop bit	1bit

6-1-3. Network Configuration Example

An example of a network configuration using this product is shown below.



Connect a terminating resistor to the device installed at the end of the RS-485 communication line.
The maximum wiring length of one segment is 1200 m.

6-1-4. Others

- Packet segmentation (split transmission/reception) is not supported.
- Static address binding is not supported.
- This is a non-secure device. It can operate without BACnet network security.

6-2. List of Supported BIBBs

The supported BIBBs are shown in the table below.

BIBB category	Supported functions	Remarks
Data Sharing	ReadProperty-B (DS-RP-B)	
	ReadPropertyMultiple-B (DS-RPM-B)	
	WriteProperty-B (DS-WP-B)	
	WritePropertyMultiple-B (DS-WPM-B)	
	COV-B (DS-COV-B)	SubscribeCOV ConfirmedCOVNotification UnconfirmedCOVNotification
Device Management	Dynamic Device Binding - B (DM-DDB-B)	Who-is, I-Am
	Dynamic Object Binding - B (DM-DOB-B)	Who-Has, I-Have
	TimeSynchronization-B (DM-TS-B)	
	DeviceCommunicationControl-B (DM-DCC-B)	
	ReinitializeDevice-B (DM-RD-B)	
	UTCTimeSynchronization-B (DM-UTC-B)	
	Device Management Restart – B (DM-R-B)	

6-3. List of Supported Objects

The supported objects differ by model.

6-3-1. WBI-DI8

The objects supported by the WBI-DI8 are shown in the table below.

Object	Remarks
Accumulator Object Type	
Binary Input Object Type	
Device Object Type	

6-3-2. WBI-DIO4R

The objects supported by the WBI-DIO4R are shown in the table below.

Object	Remarks
Accumulator Object Type	
Binary Input Object Type	
Binary Output Object Type	
Device Object Type	

6-3-3. Object Details

This section describes the details of the objects.

This product does not support dynamic creation/deletion of objects.

6-3-3-1. Accumulator Object Type

Properties of the Accumulator Object Type.

1) Property

The properties in the table below used by the Accumulator Object Type are standard properties; those that need additional explanation are described. For other properties, refer to SSPC135.

For other properties, refer to SSPC135.

ID	Property	Type	R/W	Range	Default	Backup ^{※2}
75	Object_Identifier	BACnetObjectIdentifier	R			–
77	Object_Name	CharacterString	R			–
79	Object_Type	BACnetObjectType	R			–
85	Present_Value	Unsigned	R ^{※1}	0 - Max_Pres_Value		On change
28	Description	CharacterString	R			–
31	Device_Type	CharacterString	R			–
111	Status_Flags	BACnetStatusFlags	R			–
36	Event_State	BACnetEventState	R			–
103	Reliability	BACnetReliability	R/W	0 – 255		On write
81	Out_Of_Service	Boolean	R/W	True/False	FALSE	On write
187	Scale	BACnetScale	R/W	※4	1.000	On write
117	Units	BACnetEngineeringUnits	R/W	0 – 65535	no-units	On write
185	Prescale	BACnetPrescale	R/W	[Numerator]: 1 – 65535 *3 [Denominator]: 1 – 65535 *3	[Numerator]: 1 [Denominator]: 1	On write
65	Max_Pres_Value	Unsigned	R/W	0 - 999999	999999	On write
192	Value_Change_Time	BACnetDateTime	R			On change
190	Value_Before_Change	Unsigned	R	0 – 999999		On change
191	Value_Set	Unsigned	R/W	0 – 999999		On write

※1 Present_Value can be written when Out_Of_Service is TRUE, but in that case Present_Value is not backed up to non-volatile memory.

※2 Describes the timing at which the value is backed up to non-volatile memory.

※3 The numerator and denominator when Prescale is expressed as an integer ratio.

※4 Within $\pm 3.402823\text{e}+38$ for Float scale; -8388608 to 8388607 for Integer scale.

If writing to non-volatile memory succeeds, the status becomes normal (Reliability is "NO_FAULT_DETECTED" and FAULT in Status_Flags is FALSE).

① Present_Value

Present_Value is the pulse input after prescale processing.

The maximum value of Present_Value is Max_Pres_Value.

Operation differs depending on the Out_Of_Service value. (See the table below.)

Out_Of_Service	How Present_Value is changed	Backup of Present_Value after the change to non-volatile memory	Operation when written to Value_Set
TRUE	Direct write	Not backed up	–
FALSE	Write to Value_Set (direct write not possible)	Backed up	· The value immediately before the change is written to Value_Before_Change. · The date and time of the change are written to Value_Change_Time.

② PreScale

PreScale is a coefficient that converts the pulse input value; its value is reflected in Present_Value.

If PreScale is changed, it takes effect for pulse inputs after the change.

③ Max_Pres_Value

The maximum value of Present_Value is Max_Pres_Value.

- If Present_Value would exceed the calculated Max_Pres_Value, the remainder of dividing Present_Value by (Max_Pres_Value + 1) becomes Present_Value.

2) Operation in Case of Abnormality

When an abnormality occurs, properties are set according to the error. This is described below.

In every case, the internal sampling, accumulation and storage processing continues.

① Property initialization error (Present_Value)

If an initialization error of Present_Value occurs, the values are set as follows.

Property name		Value set
Present_Value		0
Reliability		UNRELIABLE_OTHER
Status_Flags	FAULT	TRUE
	OVERRIDDEN	TRUE

② Property initialization error (other than Present_Value)

If an initialization error occurs in any other property stored in non-volatile memory, the values are set as follows.

Property name		Value set
Reliability		CONFIGURATION_ERROR
Out_Of_Service		Default value: FALSE
Scale		Default value: 1.000
Units		Default value: No-units
Prescale		Default value: 1
Max_Pres_Value		Default value: 999,999
Value_Change_Time		Default value: 1990/01/01
Value_Before_Change		Default value: 0
Value_Set		Default value: 0
Status_Flags	FAULT	TRUE

- ※ When Reliability is CONFIGURATION_ERROR, writing to anything other than Reliability is prohibited. In this case, the Error Class of the ERROR response is "Property" and the Error Code is "Other".

③ Write error to non-volatile memory

If a write error to non-volatile memory occurs, the values are set as follows.

Property name		Value set
Reliability		PROCESS_ERROR
Status_Flags	FAULT	TRUE

6-3-3-2. Binary Input Object Type

Properties of the Binary Input Object Type.

This object supports COV.

1) Property

The properties in the table below used by the Binary Input Object are standard properties; those that need additional explanation are described.

For other properties, refer to SSPC135.

ID	Property	Type	R/W	Range	Default	Backup※3
75	Object_Identifier	BACnetObjectIdentifier	R			–
77	Object_Name	CharacterString	R			–
79	Object_Type	BACnetObjectType	R			–
85	Present_Value	BACnetBinaryPV	R※1			–
28	Description	CharacterString	R			–
31	Device_Type	CharacterString	R			–
111	Status_Flags	BACnetStatusFlags	R			–
36	Event_State	BACnetEventState	R			–
103	Reliability	BACnetReliability	R/W	0 – 255		On write / On change
81	Out_Of_Service	Boolean	R/W	True/False	FALSE	On write
84	Polarity	BACnetPolarity	R/W	Normal/Reverse	NORMAL	On write
46	Inactive_Text	CharacterString	R/W	UTF-8: 20 characters Double-byte: 17 characters UCS-2: 9 characters	“OFF”	On write
4	Active_Text	CharacterString	R/W	UTF-8: 20 characters Double-byte: 17 characters UCS-2: 9 characters	“ON”	On write
16	Change_Of_State_Time	BACnetDateTime	R			On change
15	Change_Of_State_Count	Unsigned32	R/W※2	0 - 4294967295		On write / On change
115	Time_Of_State_Count_Reset	BACnetDateTime	R			On change
33	Elapsed_Active_Time	Unsigned32	R/W※2	0 - 4294967295		On write / On change
114	Time_Of_Active_Time_Reset	BACnetDateTime	R			On change

※1 Present_Value can be written when Out_Of_Service is TRUE.

※2 Only 0 can be written to these properties.

※3 Describes the timing at which the value is backed up to non-volatile memory.

If writing to non-volatile memory succeeds, the status becomes normal (Reliability is "NO_FAULT_DETECTED" and FAULT in Status_Flags is FALSE).

① Present_Value

Reflects the physical input state of the DI, or the feedback state of the DO.

- For a DI, the state must continue for 20 ms or more.

When Out_Of_Service is TRUE, Present_Value can be written.

② Change_Of_State_Count

When Present_Value changes, Change_Of_State_Count is incremented by 1.

- A change includes not only a change of Present_Value but also a change of Polarity and writing of Present_Value while Out_Of_Service is TRUE.

After reaching the upper limit, the value is held.

Only 0 can be written from the upper system. When 0 is written, the date and time are recorded in Time_Of_State_Count_Reset.

③ Change_Of_State_Time

Records the date and time when Present_Value changed.

④ Elapsed_Active_Time

Accumulates, in seconds, the time during which Present_Value remains Active.

After reaching the upper limit, the value is held.

Only 0 can be written from the upper system. When 0 is written, the date and time are recorded in Time_Of_Active_Time_Reset.

⑤ Polarity

Inverted / non-inverted can be set for the physical input state of the DI (or the DO feedback state).

When non-inverted, the state is Active when the physical input state is High and Inactive when it is Low.

When inverted, the state is Inactive when the physical input state is High and Active when it is Low.

2) Operation in Case of Abnormality

When an abnormality occurs, properties are set according to the error. This is described below.

In every case, the internal sampling, accumulation and storage processing continues.

① Property initialization error (Change_Of_State_Count, Change_Of_State_Time, ElapsedActiveTime)

If an initialization error of Change_Of_State_Count, Change_Of_State_Time or ElapsedActiveTime occurs, operation starts with the accumulated value 0 and the time undefined.

Property name		Value set
Reliability		UNRELIABLE_OTHER
Status_Flags	FAULT	TRUE
	OVERRIDDEN	TRUE

② Property initialization error (other than the above)

If an initialization error occurs in any other property stored in non-volatile memory, operation starts with default values set for the properties other than those above.

Property name		Value set
Reliability		CONFIGURATION_ERROR
Out_Of_Service		Default value: FALSE
Polarity		Default value: NORMAL
Inactive_Text		Default value: "OFF"
Active_Text		Default value: "ON"
Time_Of_State_Count_Reset		Default value: 1990/01/01
Time_Of_Active_Time_Reset		Default value: 1990/01/01
Status_Flags	FAULT	TRUE

※When Reliability is CONFIGURATION_ERROR, writing to anything other than Reliability is prohibited. In this case, the Error Class of the ERROR response is "Property" and the Error Code is "Other".

③ **Write error to non-volatile memory**

If a write error to non-volatile memory occurs, the values are set as follows.

Property name		Value set
Reliability		PROCESS_ERROR
Status_Flags	FAULT	TRUE

6-3-3-3. Binary Output Object Type

The properties of the Binary Output Object Type are as follows.

This object supports COV.

This type has normal properties and properties unique to this product.

1) Property

The properties in the table below used by the Binary Output Object are standard properties;

those that need additional explanation are described.

For other properties, refer to SSPC135.

ID	Property	Type	R/W	Range	Default	Backup ^{*2}
75	Object_Identifier	BACnetObjectIdentifier	R			–
77	Object_Name	CharacterString	R			–
79	Object_Type	BACnetObjectType	R			–
85	Present_Value	BACnetBinaryPV	R/W	Active/Inactive(/Null)		–
28	Description	CharacterString	R			–
31	Device_Type	CharacterString	R			–
111	Status_Flags	BACnetStatusFlags	R			–
36	Event_State	BACnetEventState	R			–
103	Reliability	BACnetReliability	R/W	0 – 255		On write
81	Out_Of_Service	Boolean	R/W	True/False	BO1-4:TRUE BO5-6:FALSE	On write
84	Polarity	BACnetPolarity	R/W	Normal/Reverse	NORMAL	On write
46	Inactive_Text	CharacterString	R/W	UTF-8: 20 characters Double-byte: 17 characters UCS-2: 9 characters	BO1-4:"OFF" BO5-6:"STOP"	On write
4	Active_Text	CharacterString	R/W	UTF-8: 20 characters Double-byte: 17 characters UCS-2: 9 characters	BO1-4:"ON" BO5-6:"RUN"	On write
16	Change_Of_State_Time	BACnetDateTime	R			On change
15	Change_Of_State_Count	Unsigned32	R/W ^{*1}	0 – 4294967295		On write / On change
115	Time_Of_State_Count_Res et	BACnetDateTime	R			On change
33	Elapsed_Active_Time	Unsigned32	R/W ^{*1}	0 – 4294967295		On write / On change
114	Time_Of_Active_Time_Res et	BACnetDateTime	R			On change
66	Minimum_Off_Time	Unsigned32	R/W	0 – 4294967295	0	On write
67	Minimum_On_Time	Unsigned32	R/W	0 – 4294967295	0	On write
87	Priority_Array	BACnetPriorityArray	R			On change
104	Relinquish_Default	BACnetBinaryPV	R/W	Active/Inactive	Inactive	On write

*1 Only 0 can be written to these properties.

*2 Describes the timing at which the value is backed up to non-volatile memory.

If writing to non-volatile memory succeeds, the status becomes normal (Reliability is "NO_FAULT_DETECTED" and FAULT in Status_Flags is FALSE).

① Present_Value

Represents the commanded state of the DO, but it may not match the actual output state.

- When Out of Service is TRUE, no physical output is made even if Present_Value changes.
- The behavior for run/stop also does not match.

② Change_Of_State_Count

When Present_Value changes, Change_Of_State_Count is incremented by 1.

- A change includes not only a change of Present_Value but also writing of Present_Value while Out of Service is TRUE.

After reaching the upper limit, the value is held.

Only 0 can be written from the upper system. When 0 is written, the date and time are recorded in Time_Of_State_Count_Reset.

③ Change_Of_State_Time

Records the date and time when Present_Value changed.

④ Elapsed_Active_Time

Accumulates, in seconds, the time during which Present_Value remains Active.

After reaching the upper limit, the value is held.

Only 0 can be written from the upper system. When 0 is written, the date and time are recorded in Time_Of_Active_Time_Reset.

⑤ Polarity

Inverted / non-inverted can be set for the physical output state of the DO.

When non-inverted, the state is Active when the physical output state is High and Inactive when it is Low.

When inverted, the state is Inactive when the physical output state is High and Active when it is Low.

2) Proprietary properties

The properties unique to this product are shown in the table below.

These properties are backed up to non-volatile memory when written.

ID	Property	Type	R/W	Range	Default	Backup
516	HEAVY_EQUIP_DELAY	Unsigned	R/W	0 – 255sec	0	On write
517	HED_CONTROLLER	Unsigned	R/W	0 – 5	0	On write
721	RESTORE_COMMAND_PRIORITY	Bit String	R/W	16bit	0xF9FF	On write
580	IGNORE_RELINQUISH_DEFAULT	Boolean	R/W	True/False	BO1-4:FALSE BO5-6:TRUE	On write
32608	LOCAL_CONTROL	Boolean	R/W	True/False	FALSE	On write
3001	TIME_OF_ONESHOT	Unsigned16	R/W	1 – 6553sec	BO1-4:0 BO5-6:2	On write

① HEAVY_EQUIP_DELAY

This property represents the startup delay time (unit: seconds). The default is 0 seconds.

This is a function to avoid simultaneous startup of equipment controlled by run/stop BOs (BO-5 and BO-6) and to distribute the load.

When Active is written to the Present_Value of multiple run/stop BO objects at the same time (at short intervals), the I/O does not output simultaneously but is controlled so as to output with a delay.

After any run/stop BO object outputs to the Active-side I/O, a delay time is set according to HEAVY_EQUIP_DELAY set for each BO object. When these become Inactive at the same time, the stop output is made without delay.

This property is ignored for BOs other than run/stop.

*If you are using a product of V1.12 or earlier, restart the product (for example with `ReinitializeDevice`) after changing this property.

② HED_CONTROLLER

As the power system number used for management in the upper system, one system can be specified within one device controlled by the run/stop BOs.

③ RESTORE_COMMAND_PRIORITY

This property is a 16-bit flag matching the number of elements of the Priority Array.

This product stores the Priority Array in a backup area, and restores the Priority Array from the backup area when power is restored. At that time, array elements whose flag is FALSE are not restored and NULL is written instead.

The most significant bit of the flag corresponds to array index 1 (highest priority), and the least significant bit corresponds to array index 16 (lowest priority).

④ IGNORE_RELINQUISH_DEFAULT

When the Priority_Array is all NULL, this flag determines whether to output according to the value of Relinquish_Default. When this flag is TRUE, no output is made according to Relinquish_Default.

- That is, when the Priority_Array becomes all NULL, the output is maintained regardless of the value of Relinquish_Default.

When this flag is FALSE and the Priority_Array is all NULL, the value of Relinquish_Default is output.

⑤ LOCAL_CONTROL

A flag that specifies whether WriteProperty to Priority 16 (lowest priority) is accepted.

If this flag is TRUE (1), it is not accepted; if FALSE (0), it is accepted. When TRUE (1), the response to a command for Priority 16 (lowest priority) is "WRITE_ACCESS_DENIED"; when FALSE (0), the response is "SIMPLE_ACK".

⑥ TIME_OF_ONESHOT

This property represents the one-shot output time (see * below) in seconds.

This property is ignored for BOs other than run/stop.

When the Present_Value of a run/stop BO (BO-5 and BO-6) changes to Active, this product makes a one-shot output to the run I/O; when it changes to Inactive, to the stop I/O, for the time set in this property.

When Present_Value changes, the I/O output side before the change is always returned to Inactive, regardless of the time of this property.

Set this property to a time shorter than Minimum_On_Time and Minimum_Off_Time.

- * One-shot output: outputs a physical Active (whether it is High or Low is determined by Polarity) for a fixed time, then returns to Inactive.

3) Operation in Case of Abnormality

When an abnormality occurs, properties are set according to the error. This is described below.
In every case, the internal sampling, accumulation and storage processing continues.

① Property initialization error (Change_Of_State_Count, Change_Of_State_Time, ElapsedActiveTime, Priority_Array)

If an initialization error of Change_Of_State_Count, Change_Of_State_Time, ElapsedActiveTime or Priority_Array occurs, operation starts with the accumulated value 0, the time undefined and the Priority_Array all NULL. Writing is possible and output operation continues.

Property name		Value set
Reliability		UNRELIABLE_OTHER
Status_Flags	FAULT	TRUE
	OVERRIDDEN	TRUE

② Property initialization error (other than the above)

If an initialization error occurs in any other property stored in non-volatile memory, operation starts with default values set for the properties other than those above.

Property name	Value set	
	For general-purpose output	For run/stop output
Reliability	CONFIGURATION_ERROR	
Out_Of_Service	Default value: TRUE	Default value: FALSE
Polarity	Default value: NORMAL	
Inactive_Text	Default value: "OFF"	Default value: "STOP"
Active_Text	Default value: "ON"	Default value: "RUN"
Time_Of_State_Count_Reset	Default value: 1990/01/01	
Time_Of_Active_Time_Reset	Default value: 1990/01/01	
Minimum_Off_Time	Default value: 0	
Minimum_On_Time	Default value: 0	
Relinquish_Default	Default value: Inactive	
HEAVY_EQUIP_DELAY	Default value: 0	
HED_CONTROLLER	Default value: 0	
RESTORE_COMMAND_PRIORITY	Default value: 0xF9FF	
IGNORE_RELINQUISH_DEFAULT	Default value: FALSE	Default value: TRUE
LOCAL_CONTROL	Default value: FALSE	
TIME_OF_ONESHOT	Default value: 0	Default value: 2
Status_Flags	FAULT	TRUE

(Property names in all capital letters are proprietary properties.)

- ※ When Reliability is CONFIGURATION_ERROR, writing to anything other than Reliability is prohibited. In this case, the Error Class of the ERROR response is "Property" and the Error Code is "Other".

③ Write error to non-volatile memory

If a write error to non-volatile memory occurs, the values are set as follows.

Property name		Value set
Reliability		PROCESS_ERROR
Status_Flags	FAULT	TRUE

4) Output Processing

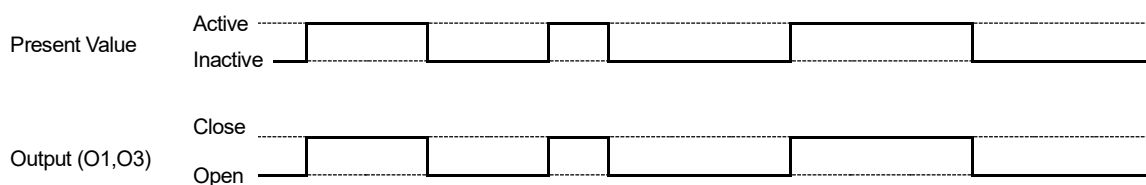
① General-purpose output processing (BO-1 to BO-4)

The output processing of BO objects whose object name starts with "DO" is as follows.

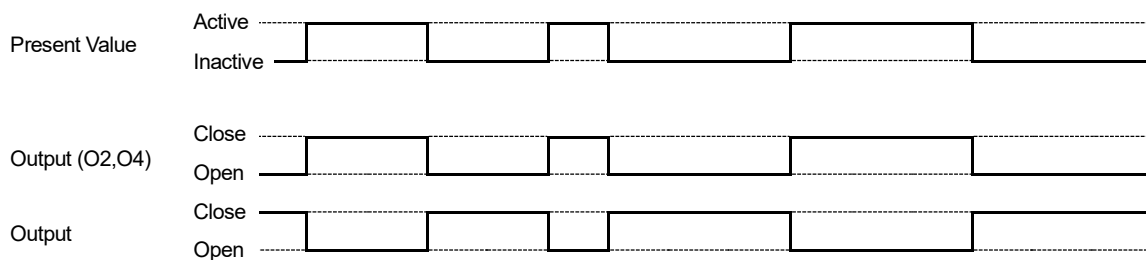
For non-inverted output

Property	Setting value
Polarity	NORMAL

For an a-contact (DO-a*), terminals O1 and O3 follow changes in Present Value.



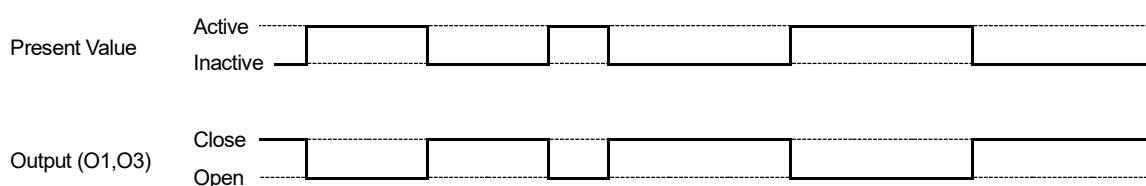
For a c-contact (DO-c*), terminals O2 and O4 follow the changes but terminals NC2 and NC4 change in the inverted direction.



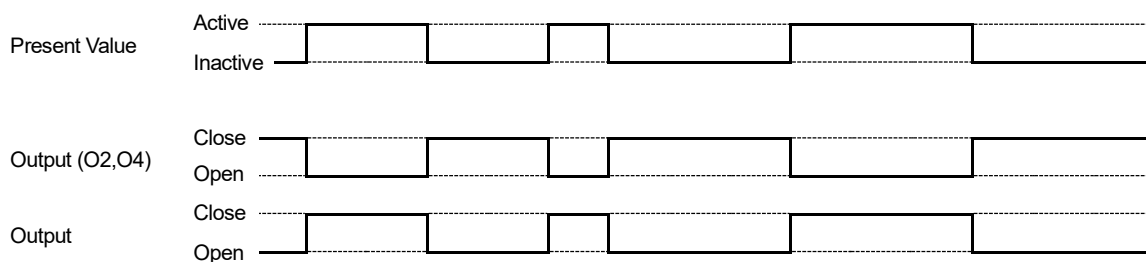
For inverted output

Property	Setting value
Polarity	REVERSE

For an a-contact (DO-a*), terminals O1 and O3 change in the inverted direction following changes in Present Value.



For a c-contact (DO-c*), terminals O2 and O4 change in the inverted direction but terminals NC2 and NC4 follow the changes.



① Run/stop output processing (BO-5 to BO-6)

The output processing of BO objects whose object name starts with "RUN/STOP" is as follows. On a rising/falling edge of Present_Value, a one-shot output is made to the run/stop output destination. According to changes in RUN/STOP1, the O1 terminal of the run output and the O2 (and NC2) terminals of the stop output change. According to changes in RUN/STOP2, the O3 terminal of the run output and the O4 (and NC4) terminals of the stop output change.

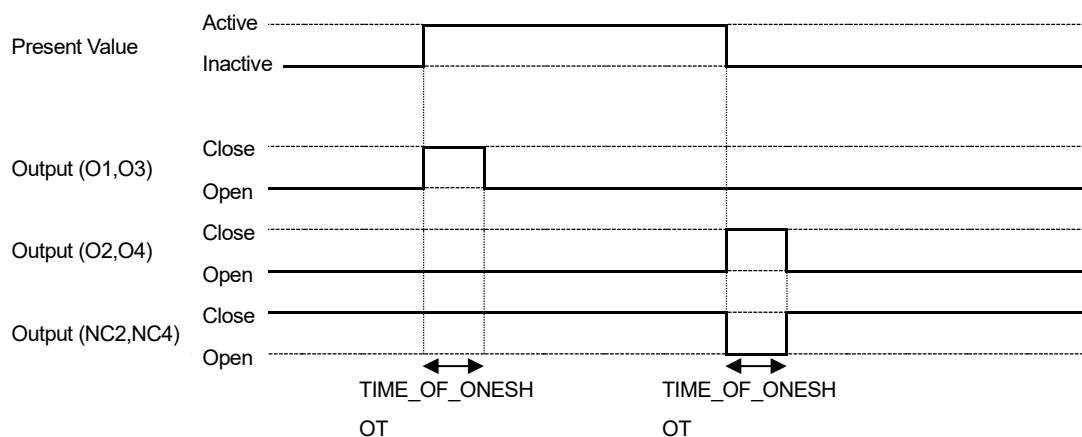
For non-inverted output

Property	Setting value
Polarity	NORMAL

A rising change of Present Value controls terminals O1 and O3 (a-contacts).

A falling change of Present Value controls terminals O2, NC2 and terminals O4, NC4 (c-contacts).

(The O terminals and NC terminals change in opposite directions.)



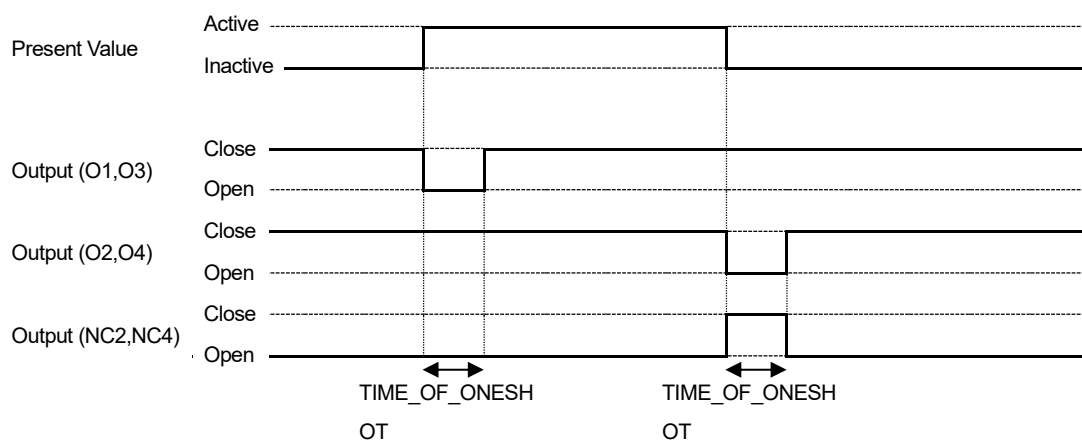
For inverted output

Property	Setting value
Polarity	REVERSE

A rising change of Present Value controls terminals O1 and O3 (a-contacts).

A falling change of Present Value controls terminals O2, NC2 and terminals O4, NC4 (c-contacts).

(The O terminals and NC terminals change in opposite directions.)



The relationship between Present_Value and the output terminal state is shown in the table below.

Polarity	Present_Value	Output terminal state
NORMAL	Inactive	O2, NC2 (or O4, NC4) give a one-shot output
	Active	O1 (or O3) gives a one-shot output
REVERSE	Inactive	O2, NC2 (or O4, NC4) give a one-shot output
	Active	O1 (or O3) gives a one-shot output

The one-shot time can be changed in 1-second units in the range of 1 to 6553 seconds for each BO object using the proprietary property "TIME_OF_ONESHOT".

The number of run/stop operations can be referenced in Change_Of_State_Count, and the cumulative operating time in Elapsed_Active_Time.

Because feedback is not monitored, this does not indicate the state of the controlled equipment.

BO-5: on a transition to Active, outputs to O1; on a transition to Inactive, outputs to O2 or NC2.

BO-6: on a transition to Active, outputs to O3; on a transition to Inactive, outputs to O4 or NC4.

※Use only one of BO-1 to 4 (direct operation) and BO-5 to 6 (run/stop operation); do not mix them. For example, when using BO-5, set Out_Of_Service of BO-1 and BO-2 to TRUE. Conversely, when using BO-1 and BO-2, set Out_Of_Service of BO-5 to TRUE. Likewise for BO-6 with BO-3 and BO-4, set Out_Of_Service of the unused one to TRUE.

5) Priority Processing

This product allows 16 priority levels to be specified when performing WriteProperty to Present_Value.

Operation depends on the commanded value and priority at WriteProperty, as shown in the table below.

Specified priority Commanded value	Priority equal to or higher than the current highest non-NULL priority	Priority lower than the current highest non-NULL priority
Other than NULL	Outputs according to the commanded value unconditionally	The output does not change
NULL	Checks the priority at which the next non-NULL value appears, and outputs if it differs from Present_Value	The output does not change

- ※ If either or both of Minimum_on_time and Minimum_off_time are not 0, specifying Priority = 6 returns WRITE_ACCESS_DENIED.
- ※ If Local_Control is TRUE, specifying Priority = 16 returns WRITE_ACCESS_DENIED.

6) Minimum ON/OFF Time Processing

The following processing is performed when the output is updated by a PriorityArray value.

- (a) When Active and Minimum_on_time is not 0, PriorityArray 6 is set to Active. After the time set in Minimum_on_time elapses, PriorityArray 6 is set to NULL, the highest priority at which a non-NULL value appears is searched, and if it differs from Present_Value the output is updated and processing (a) or (b) is repeated.
- (b) When Inactive and Minimum_off_time is not 0, PriorityArray 6 is set to Inactive. After the time set in Minimum_off_time elapses, PriorityArray 6 is set to NULL, the highest priority at which a non-NULL value appears is searched, and if it differs from Present_Value the output is updated and processing (a) or (b) is repeated.

When the output is updated by Relinquish_Default, PriorityArray 6 is not updated.

7) Startup Output Processing (general-purpose output only)

Searches for the highest priority at which a non-NULL value appears and outputs it.

If PriorityArray is all NULL, the value of Relinquish_Default is reflected in Present_Value. At this time, if IGNORE_RELINQUISH_DEFAULT is TRUE no output is made, and if FALSE the output is made. Run/stop outputs do not perform startup output.

6-3-3-4. Device Object Type

The properties of the Binary Output Object Type are as follows.

This type has normal properties and properties unique to the product.

1) Property

ID	Property	Type	R/W	Range	Default	Backup ^{※2}
75	Object_Identifier	BACnetObjectIdentifier	R/W	0 - 4194302	※3	On write / On change
77	Object_Name	CharacterString	R			–
79	Object_Type	BACnetObjectType	R			–
112	System_Status	BACnetDeviceStatus	R			–
121	Vendor_Name	CharacterString	R			–
120	Vendor_Identifier	Unsigned16	R			–
70	Model_Name	CharacterString	R			–
44	Firmware_Revision	CharacterString	R			–
12	Application_Software_Version	CharacterString	R			–
58	Location	CharacterString	R/W	UTF-8: 32 characters Double-byte: 29 characters UCS-2: 15 characters	“Customer Locatioin”	On write
28	Description	CharacterString	R/W	UTF-8: 40 characters Double-byte: 37 characters UCS-2: 19 characters	“Customer Description XXX ^{※5} ”	On write
98	Protocol_Version	Unsigned	R			–
139	Protocol_Revision	Unsigned	R			–
97	Protocol_Services_Supported	BACnetServiceSupported	R			–
96	Protocol_Object_Types_Suppor ted	BACnetObjectType Supported	R			–
76	Object_List	BACnetARRAY[N] of BACnetObjectIdentifier	R			–
62	Max_APDU_Length_Accepted	Unsigned	R/W	51 - 480	480	On write
107	Segmentation_Supported	BACnetSegmentation	R			–
167	Max_Segmentation_Accepted	Unsigned	R		1	–
57	Local_Time ^{※1}	Time	R		0:00:00	On change
56	Local_Date ^{※1}	Date	R		1990/1/1	On change
119	UTC_Offset	Integer	R/W	-780 - +780	-540	On write
24	Daylight_Savings_Status	Boolean	R/W	True/False	FALSE	On write
10	APDU_Segment_Timeout	Unsigned	R/W	0 to 4294967295 *4		On write
11	APDU_Timeout	Unsigned	R/W	1 to 65535	3000	On write
73	Number_of_APDU_Retries	Unsigned	R/W	1 – 3	3	On write
64	Max_Master	Unsigned	R/W	1 – 127	127	On write
63	Max_Info_Frames	Unsigned	R/W	1 to 65535	1	On write
30	Device_Address_Binding	List of BACnetAddressBinding	R			–
155	Database_Revision	Unsigned	R			–
152	Active_COV_Subscriptions	List Of BACnetCOVSubscription	R			–
196	Last_Restart_Reason	BACnetRestartReason	R			–
202	Restart_Notification_Recipients	BACnetLIST of BACnetRecipient	R			–
203	Time_Of_Device_Restart	BACnetTimeStamp	R			–

※1 The date and time of this product do not advance while the power is cut. After a long power cut, always perform time synchronization. Also, because time is not kept while the power is cut, switching the power on and off causes the time to drift little by little; please be aware of this.

※2 Describes the timing at which the value is backed up to non-volatile memory.

※3 The initial value is the address setting value.

※4 Segmentation is not supported, so this setting is effectively invalid.

※5 XXX is the string corresponding to the model type (DI8 or DIO4R).

2) Proprietary properties

The properties unique to this product are shown in the table below.

These properties are backed up to non-volatile memory when written.

ID	Property	Type	R/W	Range	Default	Backup
8001	T_USEAGE_TIMEOUT	Unsigned	R/W	30 - 100	20	On write
8002	N_RETRY_TOKEN	Unsigned	R/W	0 - 5	1	On write

① T_USEAGE_TIMEOUT

This parameter is the Tusage_timeout setting described in SSPC135 Clause 9.

A node that has sent the token to its successor node regards the token pass as failed if no interrupt occurs within the time shown in this property, and resends the token up to the number of times specified by N_RETRY_TOKEN below.

② N_RETRY_TOKEN

This parameter is the Nretry_token retry setting described in SSPC135 Clause 9.

After resending the number of times set in this property, the node moves on to successor node detection and token passing.

6-4. BACnet Communication

6-4-1. Device Management

6-4-1-1. Processing of Who-Is

When Who-Is is received, this product sends I-Am. If a Range is specified, I-Am is sent only when it applies.

BACnet user	↔	This product	Remarks
Sends Who-Is (Device Instance Range Low Limit) (Device Instance Range High Limit)	→ ←	I-Am I-Am Device Identifier Max APDU Length Accepted Segmentation Supported Vendor Identifier	After obtaining the token, only if within the Range

6-4-1-2. Processing of Who-Has

When Who-Has is received, if the applicable object exists in this product, I-Have is sent. If a Range is specified, I-Have is sent only when it applies.

BACnet user	↔	This product	Remarks
Sends Who-Has Object Identifier / Object Name (Device Instance Range Low Limit) (Device Instance Range High Limit)	→ ←	I-Have Device Identifier Object Identifier Object Name	After obtaining the token, If the specified object exists, only if within the Range

6-4-1-3. Processing of TimeSynchronization

When TimeSynchronization is received from a BACnet user, the clock time of this product is changed.

BACnet user	↔	This product	Remarks
Sends TimeSynchronization	→	Changes the clock time of this product	The setting range is 1990/ 1/ 1 00:00:00.00 to 2117/12/31 23:59:59.99.

6-4-1-4. Processing of UTCTimeSynchronization

When UTCTimeSynchronization is received from a BACnet user, UTC_Offset in the Device Object is subtracted from the received date and time, and the clock time of this product is changed.

BACnet user	↔	This product	Remarks
Sends UTCTimeSynchronization	→	Subtracts UTC_Offset and changes the clock time of this product	

6-4-1-5. Processing of Device Communication Control

A client BACnet user can stop/resume the communication function of this product using Device Communication Control.

BACnet user	↔	This product	Remarks
Sends Device Communication Control (Time Duration) (0 or omitted means unlimited) Enable/Disable (Password)	→ ← ←	Normal Returns SimpleAck Abnormal Returns Error	

After the SimpleAck response, the following operation applies depending on the specification.

- When Enable/Disable = ENABLE
The communication function is resumed.
- When Enable/Disable = DISABLE
For the time specified by Time Duration, reception processing and transmission of all APDUs other than DeviceCommunicationControl and ReinitializeDevice are stopped.
- When Enable/Disable = DISABLE_INITIATION
For the time specified by Time Duration, sending of I-Am in response to Who-Is, and reception processing and transmission of all APDUs other than DeviceCommunicationControl and ReinitializeDevice are stopped.

* These functions do not stop the MS/TP token passing.

6-4-1-6. Processing of ReinitializeDevice

A client BACnet user can instruct this product to restart using Reinitialize Device.

BACnet user	↔	This product	Remarks
Sends ReinitializeDevice Reinitialized State of Device (Password)	→ ← ←	Normal Returns SimpleACK Abnormal Returns Error	COLDSTART / WARMSTART

After the SimpleACK response, the following operation applies depending on the specification.

- When Reinitialized State of Device = COLDSTART or WARMSTART
Both services perform the same startup processing as turning the power on again.
If the communication function had been stopped by DeviceCommunicationControl, it is resumed after startup.

6-4-1-7. Startup Notification

At startup or restart, this product broadcasts a startup notification.

- ※ The product does not communicate for 90 seconds after startup or restart, but non-communication tasks such as measurement are performed. No commands can be received during that time. (The startup notification is also sent after 90 seconds.)

	↔	This product	Remarks
	←	Notification of	
	←	UnconfirmedCOVNotification	
		Process Identifier	
		Initiating Device Identifier	
		Monitored Object Identifier	
		Time Remaining	
		List of Values	

The content of the transmitted data is as follows.

- Process Identifier = 0
- Initiating Device Identifier = Device Object ID
- MonitoredObjectIdentifier = Device Object ID
- TimeRemaining = 0
- ListOfValues

1) system-status

Normal ... OPERATIONAL

Major fault ... OPERATIONAL_READ_ONLY

2) time of device restart (time of the previous power cut)

3) last restart reason

Mode switching, recovery from major fault: SUSPENDED

COLDSTART : COLDSTART

WARMSTART : WARMSTART

Abnormality detection reset: SOFTWARE_WATCHDOG

Power OFF, others: DETECTED_POWER_LOST

6-4-2. Point Requests

For properties of BACnet objects that can be read, the client can read the values by issuing ReadProperty or ReadPropertyMultiple.

Client	↔	This product	Remarks
Sends ReadProperty Object Identifier Property Identifier Array Index (only when the target is an array element)	→ ← ←	Normal Returns ComplexACK Abnormal Returns Error / Abort	
Sends ReadPropertyMultiple List of Read Access Specification (list below) Object Identifier Property Identifier* Array Index (only when the target is an array element)	→ ← ←	Normal Returns ComplexACK Abnormal Returns Error / Abort	A single property of a single object can also be read.

* The maximum number of properties that can be referenced at once with the ReadPropertyMultiple service is 29.

* With ReadPropertyMultiple, the following can be used as the Property Identifier.

all (8): references all properties at once

required (105): references all properties whose conformance code is required (R or W) at once

optional (80): references all properties whose conformance code is optional (O), and the proprietary properties, at once

However, "all" cannot be used for the Device Object, because the response packet for "all" exceeds the maximum APDU length.

Also, for the Device Object, "optional" becomes unusable when the response packet exceeds the maximum APDU length, depending on the number of characters of Description and Location and the SubscribeCOV registration status. Please be careful when the number of COV subscriptions is 7 or more.

6-4-3. Control Operations

For properties of BACnet objects that are writable, the client can change the values by issuing WriteProperty or WritePropertyMultiple.

Client	↔	This product	Remarks
Sends WriteProperty Object Identifier Property Identifier Array Index (only when the target is an array element) Property Value Priority (only when the target is Commandable)	→ ← ←	Normal Returns SimpleACK Abnormal Returns Error	
Sends WritePropertyMultiple List of Write Access Specification Object Identifier Property Identifier Array Index (only when the target is an array element) Property Value Priority (only when the target is Commandable)	→ ← ←	Normal Returns SimpleACK Abnormal Returns Error / Abort	

- * When writing to setting-type properties (those for which backup is "on write only" in 6-3-3. Object Details), leave an interval of 500 ms or more between writes.
- * When settings are made to multiple objects with WritePropertyMultiple, leave an interval of at least {500 ms x number of objects set} before making the next setting.

6-4-4. Change-of-State Notification

By using SubscribeCOV, the client can subscribe to, and cancel its subscription to, notifications of state changes (mainly changes of Present_Value) of the target objects of this product.

6-4-4-1. Start of subscription / re-registration

Client	↔	This product	Remarks
Sends SubscribeCOV Subscriber Process Identifier Monitored Object Identifier Issue Confirmed Notifications (Lifetime)	→ ← ←	Normal Returns SimpleACK Abnormal Returns Error	
When ConfirmedCOVNotification is received Returns SimpleACK	← →	(first notification after returning SimpleACK) Notification of COVNotification Process Identifier Initiating Device Identifier Monitored Object Identifier Time Remaining List of Values	Sends the current values of Present_Value and Status_Flags (as initial values)
When ConfirmedCOVNotification is received Returns SimpleACK	← →	(Present_Value or Status_Flags change) Notification of COVNotification Process Identifier Initiating Device Identifier Monitored Object Identifier Time Remaining List of Values	

The client writes, in Subscriber Process Identifier, the identifier of the handler that processes the COV when it is received. 0 means registration of an unsubscribe COV (COV without a specified subscriber), which this product does not support.

Specify in Monitored Object Identifier the identifier of the object for which COV notification is requested.

When Issue Confirmed Notification is TRUE, state changes are sent as ConfirmedCOVNotification.

When Issue Confirmed Notification is FALSE, state changes are sent as UnconfirmedCOVNotification.

Specify in Lifetime, in seconds, the time during which the COV subscription is valid. If 0 or omitted, it is unlimited. The valid range is up to 43200 (12 hours).

The upper limit of COV subscriptions that can be registered is the number of object instances having the object types listed in SSPC 135 Table 13-1, plus 1. However, in this product the Accumulator object and the Device object do not support COV.

Model	Supported objects	COV upper limit
WBI-DI8	Binary Input	9
WBI-DIO4R	Binary Input, Binary Output	15

If the client address, Subscriber Process Identifier and Monitored Object Identifier are already registered, it is regarded as re-registration, and Issue Confirmed Notification and Lifetime are overwritten.

6-4-4-2. Cancelling a subscription

From the client that registered the subscription, send a SubscribeCOV that states the Subscriber Process Identifier and Monitored Object Identifier whose subscription is to be cancelled, and omits both Issue Confirmed Notification and Lifetime. This cancels the subscription and stops the corresponding COV notification.

Client	↔	This product	Remarks
Sends SubscribeCOV Subscriber Process Identifier Monitored Object Identifier	→ ←	Returns SimpleACK	Stops the corresponding COV notification

6-4-4-3. Notes on COV Notification

1) Transmission performance

Including COV notifications, a total of up to 16 packets that this product sends on its own initiative can be stored in the transmission queue.

After obtaining the token, transmission is performed from this queue of 16 according to the Max_Info_Frames setting.

Events that do not fit in the queue are pending. When space becomes available in the queue, events are queued starting with the oldest; however, if the state changes while pending, only the latest state is sent.

2) Subscription registration and cancellation

To cancel a subscription, the address of the client that registered it must match the address of the client making the cancellation request. Therefore, if the client address is changed after registering a subscription with Lifetime 0 (unlimited), the subscription can no longer be cancelled.

If the registration limit is reached and no new subscription can be registered, restarting this product with ReinitializeDevice or similar releases the subscriptions and allows new registration.

3) When using a product of V1.12 or earlier

- In a configuration in which multiple clients register COV via a single BACnet router, these clients are judged to have the same address. From V1.13, such clients are treated as separate addresses.
 - No COV is sent upon re-registration. From V1.13, COV is sent upon re-registration.
 - In an environment without a router, retries are always performed when sending ConfirmedCOVNotification. The transmission queue is occupied for APDU_Timeout × (Number_of_APDU_Retries + 1), so depending on the frequency of changes, change transmission may be delayed or changes may not be fully sent.
It is recommended to use UnconfirmedCOVNotification, or to set APDU_Timeout and Number_of_APDU_Retries to small values.
- From V1.13, retries are stopped upon receipt of SimpleACK even in an environment without a router, so the above consideration is not necessary.

6-4-5. Character Sets

The following character sets are supported.

Character Sets	Number of writable characters
ISO 10646 (UTF-8)	: Reference (n)
IBM® /Microsoft® Double-byte	: 3 fewer characters (n-3)
ISO 10646 Universal Character Set-2 (UCS-2) ※	: Half-width characters are also counted as 2 characters, and 1 more character fewer

If up to n half-width alphanumeric characters can be set in ISO 10646 (UTF-8), IBM® / Microsoft® Double-byte allows n-3 characters, and ISO 10646 Universal Character Set-2 (UCS-2) allows up to n/2-1 characters. (ISO 10646 Universal Character Set-2 (UCS-2) counts half-width characters as 2 characters.)

When a fixed string or a string that the device holds as its initial value is read, the response is encoded in UTF-8.

Strings that can be changed can be recognized when encoded by any of the above; when a set string is read, the response is encoded in UTF-8.

* UCS-2 can be used from V1.13 onward.

In V1.12 and earlier, a write is not treated as an error but is not written correctly; please be careful.

6-5. Models and Instances

6-5-1. Device Instance Specifications

The device instance ID of this series is assigned as follows according to the state of the address switches, at power-on, when the set switch is pressed and 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.

➤ To enable automatic assignment, set Device Object_Identifier to 4194303 (factory default).

6-5-2. Device Object

Instance ID	Object name	Description	Initial value (factory setting)
Address	WBI-○○-xxxx	Customer Description ○○	Location = "Customer Location" Max_APDU_Length_Accepted = 480 Max_Segmentation_Accepted = 1 Local_Time = 0:00:00 Local_Date = 1990/1/1 UTC_Offset = -540 Daylight_Savings_Status = FALSE APDU_Timeout = 3000 Number_of_APDU_Retries = 3 Max_Master = 127 Max_Info_Frames = 1 T_USEAGE_TIMEOUT = 50 N_RETRY_TOKEN = 1

* "○○" is the "type" of the model number.

* "xxxx" in the object name is the product-specific serial number.

6-5-3. WBI-DI8

This section describes the objects used in the WBI-DI8 and their instances.

6-5-3-1. Binary Input Object instances

Instance ID	Object name	Description	Initial value (factory setting)
BI-1	DI1	Indicates DI 1 status	Out_Of_Service=FALSE, Polarity=NORMAL, Active(Text)="ON" Inactive(Text)="OFF"
BI-2	DI2	Indicates DI 2 status	
BI-3	DI3	Indicates DI 3 status	
BI-4	DI4	Indicates DI 4 status	
BI-5	DI5	Indicates DI 5 status	
BI-6	DI6	Indicates DI 6 status	
BI-7	DI7	Indicates DI 7 status	
BI-8	DI8	Indicates DI 8 status	

6-5-3-2. Accumulator Object instances

Instance ID	Object name	Description	Initial value (factory setting)
accumulator-1	DI1 Accumulator	Measurement of input pulse with DI1	Out_Of_Service =FALSE, Max_Pres_Value =999999, Prescale=1, Scale=1.000, Units =no-units
accumulator-2	DI2 Accumulator	Measurement of input pulse with DI2	
accumulator-3	DI3 Accumulator	Measurement of input pulse with DI3	
accumulator-4	DI4 Accumulator	Measurement of input pulse with DI4	
accumulator-5	DI5 Accumulator	Measurement of input pulse with DI5	
accumulator-6	DI6 Accumulator	Measurement of input pulse with DI6	
accumulator-7	DI7 Accumulator	Measurement of input pulse with DI7	
accumulator-8	DI8 Accumulator	Measurement of input pulse with DI8	

By default, each represents a pulse count value.

By setting Scale, Units, Prescale, etc., it can be handled as arbitrary measurement data such as electric energy or gas flow rate.

6-5-4. WBI-DIO4R

This section describes the objects used in the WBI-DIO4R and their instances.

6-5-4-1. Binary Input Object instances**1) List of Binary Output instances**

The instances of the Binary Input Object are shown in the table below.

Instance ID	Object name	Description	Initial value (factory setting)
BI-1	DI1	Indicates DI 1 status	Out_Of_Service =FALSE, Polarity=NORMAL, Active(Text)="ON", Inactive(Text)="OFF"
BI-2	DI2	Indicates DI 2 status	
BI-3	DI3	Indicates DI 3 status	
BI-4	DI4	Indicates DI 4 status	
BI-5	DO-a1 FB	Indicates DO-a1 physical status	
BI-6	DO-c1 FB	Indicates DO-c1 physical status	
BI-7	DO-a2 FB	Indicates DO-a2 physical status	
BI-8	DO-c2 FB	Indicates DO-c2 physical status	

6-5-4-2. Binary Output Object instances**1) List of Binary Output instances**

The instances of the Binary Output Object are shown in the table below.

Instance ID	Object name	Description	Initial value (factory setting)
BO-1	DO-a1	Control DO-a1 status	Out_Of_Service =TRUE, Polarity=NORMAL, Active(Text)="ON", Inactive(Text)="OFF", Minimum_Off_Time=0, Minimum_On_Time=0, Relinquish_Default=Inactive, HEAVY_EQUIP_DELAY=0, HED_CONTROLLER=0, RESTORE_COMMAND_PRIORITY=F9FF, IGONRE_RELINQUISH_DEFAULT=FALSE, LOCAL_CONTROL=FALSE, TIME_OF_ONESHOT=0
BO-2	DO-c1	Control DO-c1 status	
BO-3	DO-a2	Control DO-a2 status	
BO-4	DO-c2	Control DO-c2 status	
BO-5	RUN/STOP 1	Control start/stop status of drive 1	Out_Of_Service = FALSE, Polarity=NORMAL, Active(Text)= "RUN", Inactive(Text)= "STOP", Minimum_Off_Time=0, Minimum_On_Time=0, Relinquish_Default=Inactive, HEAVY_EQUIP_DELAY=0, HED_CONTROLLER=0, RESTORE_COMMAND_PRIORITY=F9FF, IGONRE_RELINQUISH_DEFAULT=TRUE, LOCAL_CONTROL=FALSE, TIME_OF_ONESHOT=2
BO-6	RUN/STOP 2	Control start/stop status of drive 2	

* Use only one of BO1 to 4 (direct operation) and BO5 to 6 (run/stop operation); do not mix them.
For details, see "6-3-3-3. 4) Output Processing" in "6-3-3-3. Binary Output Object Type".

2) Instances and Output Terminals

The relationship between Binary Output instance IDs and digital output terminals is shown in the table below.

Operation	Instance ID	Object name	Output terminal
Direct	BO-1	DO-a1	O1
	BO-2	DO-c1	O2, NC2
	BO-3	DO-a2	O3
	BO-4	DO-c2	O4, NC4
Run/stop	BO-5	RUN/STOP 1	O1, O2, NC2
	BO-6	RUN/STOP 2	O3, O4, NC4

6-5-4-3. List of Accumulator Object instances

1) List of Accumulator Object instances

The instances of the Accumulator Object are shown in the table below.

Instance ID	Object name	Description	Initial value (factory setting)
accumulator-1	DI1 Accumulator	Measurement of input pulse with DI1	Out_Of_Service =FALSE, Max_Pres_Value=999999, Prescale=1, Scale=1.000, Units=no-units
accumulator-2	DI2 Accumulator	Measurement of input pulse with DI2	
accumulator-3	DI3 Accumulator	Measurement of input pulse with DI3	
accumulator-4	DI4 Accumulator	Measurement of input pulse with DI4	

By default, each represents a pulse count value.

By setting Scale, Units, Prescale, etc., it can be handled as arbitrary measurement data such as electric energy or gas flow rate.

6-6. Abnormality Handling

6-6-1. Minor Faults

During a minor fault, the internal sampling, accumulation and storage processing continues.
For detailed operation, see "6-6-4. Priority of Abnormality Handling".

6-6-2. Major Faults

In case of a major fault, "BACnet-Error-PDU" is returned in response to any write.

The Error Class is "Device" and the Error Code is "INTERNAL_ERROR".

In addition, OPERATIONAL_READ_ONLY is set in System_Status, Reliability of all objects becomes "UNRELIABLE_OTHER", and FAULT in Status_Flags becomes TRUE.

During a major fault, the internal accumulation processing and accumulation storage processing are stopped.

6-6-3. Basic Device Setting Abnormality

If an abnormality is detected in the basic device information or communication settings (= Device Object), responses on BACnet MS/TP are stopped.

6-6-4. Priority of Abnormality Handling

6-6-4-1. Accumulator objects and Binary Input objects

The priority of abnormality handling for Accumulator objects and Binary Input objects is as follows.

	State	Reliability	Status_Flags	WriteProperty
High	Major Faults	UNRELIABLE_OTHER	FAULT	Not allowed
	Minor fault (setting values)	CONFIGURATION_ERROR	FAULT	Only Reliability allowed
	Minor fault (data)	UNRELIABLE_OTHER	FAULT_OVERRIDE	Allowed
	Minor fault (write)	PROCESS_ERROR	FAULT	Allowed
Low	Normal	NO_FAULT_DETECTED	-	Allowed

6-6-4-2. Binary Output objects

The priority of abnormality handling for Binary Output objects is as follows.

	State	Reliability	Status_Flags	WriteProperty	Output
High	Major Faults	UNRELIABLE_OTHER	FAULT	Not allowed	Fixed Low
	Minor fault (setting values)	CONFIGURATION_ERROR	FAULT	Only Reliability allowed	Fixed Low
	Minor fault (data)	UNRELIABLE_OTHER	FAULT_OVERRIDE	Allowed	Controllable
	Minor fault (write)	PROCESS_ERROR	FAULT	Allowed	Controllable
Low	Normal	NO_FAULT_DETECTED	-	Allowed	Controllable

6-6-4-3. Device object

System_Status indicates the state with the highest priority.

	State	System_Status	WriteProperty	ReadProperty
High	Minor fault (setting values)	NON_OPERATIONAL	Response stopped	Response stopped
	Major Faults	OPERATIONAL_READ_ONLY	Rejected	Allowed
	Minor fault (write)	OPERATIONAL	Allowed	Allowed
	Minor fault (date and time)	OPERATIONAL	Allowed	Allowed
Low	Normal	OPERATIONAL	Allowed	Allowed

7. Revision History

Rev. No.	Issue date	Revision details
00	Oct 14, 2026	First edition issued

The contents of these specifications may be changed without notice for product improvement. Thank you for your understanding.

watanabe

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