Digital Controller

FB400/FB900 Communication Quick Manual

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IMR01W07-E4

This manual describes the connection method with host computer, communication parameters and communication data (except for parameters in Engineering Mode) of the FB400/FB900. For detailed host communication such as communication data in the Engineering mode, protocol and Modbus data mapping description, refer to the **FB100/FB400/FB900 Communication Instruction Manual (IMR01W04-E□)**.

The **Communication Instruction Manual** can be downloaded from the official RKC website: http://www.rkcinst.com/english/manual_load.htm.

1. OUTLINE

Digital Controller FB400/FB900 (hereafter, called controller) interfaces with the host computer via RKC or Modbus communication protocols. In addition, there is the Modbus data mapping function which enables high-speed communication by collecting only the data to be communicated at all times in the specified address area.

• Communication port

There are two communication ports: Communication 1 and Communication 2.
Communication 1 is used for host communication.
Communication 2 is used for intercontroller communication, but can be also used for host communication.

When Communication 2 is used for host communication, refer to the **FB100/FB400/FB900 Communication Instruction Manual (IMR01W04-E□)**.

• Communication interface

Communication 1 interface: RS-422A, RS-485, RS-232C
Communication 2 interface: RS-485
(When Communication 1 is used for RS-422A, no Communication 2 can be used.)

2. WIRING

WARNING

To prevent electric shock or instrument failure, turn off the power before connecting or disconnecting the instrument and peripheral equipment.

Make sure that lugs or unshielded cables of the communication terminals are not touched to the screw heads, lugs, or unshielded cables of the power supply terminals to prevent electric shock or instrument failure. Use additional care when two lugs are screwed to one communication terminal.

The cable and termination resistor(s) must be provided by the customer.

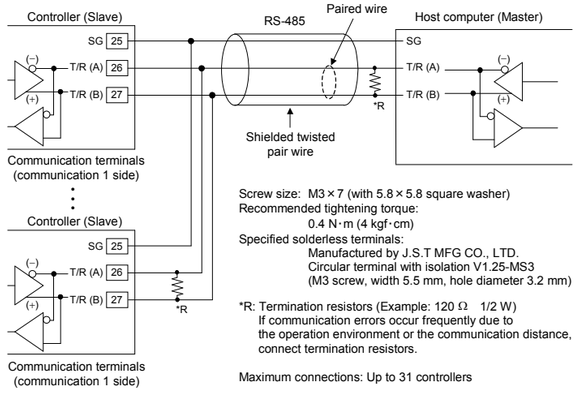
2.1 RS-485

■ **Communication terminal number and signal details**

Terminal No.	Signal name	Symbol
25	Signal ground	SG
26	Send data/Receive data	T/R (A)
27	Send data/Receive data	T/R (B)

■ **Wiring method**

● **When the interface of host computer (Master) is RS-485**



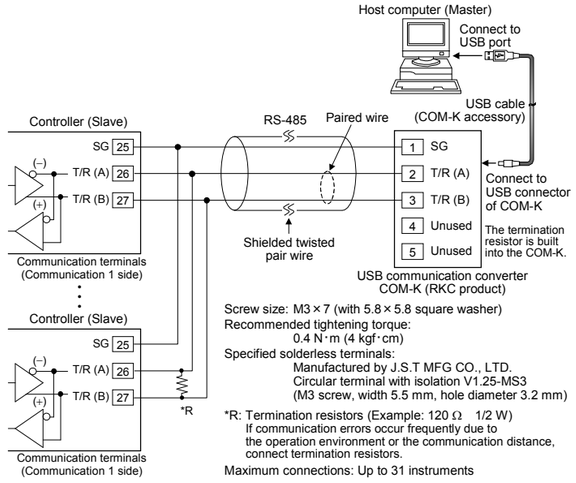
Screw size: M3 × 7 (with 5.8 × 5.8 square washer)
Recommended tightening torque:
0.4 N·m (4 kgf·cm)
Specified solderless terminals:
Manufactured by J.S.T MFG CO., LTD.
Circular terminal with isolation V1.25-MS3
(M3 screw, width 5.5 mm, hole diameter 3.2 mm)

*R: Termination resistors (Example: 120 Ω 1/2 W)
If communication errors occur frequently due to the operation environment or the communication distance, connect termination resistors.

Maximum connections: Up to 31 controllers

● **When the host computer (Master) has a USB connector**

Connect the USB communication converter between the host computer and the controller.



Screw size: M3 × 7 (with 5.8 × 5.8 square washer)
Recommended tightening torque:
0.4 N·m (4 kgf·cm)
Specified solderless terminals:
Manufactured by J.S.T MFG CO., LTD.
Circular terminal with isolation V1.25-MS3
(M3 screw, width 5.5 mm, hole diameter 3.2 mm)

*R: Termination resistors (Example: 120 Ω 1/2 W)
If communication errors occur frequently due to the operation environment or the communication distance, connect termination resistors.

Maximum connections: Up to 31 instruments

For the COM-K, refer to the **COM-K Instruction Manual (IMR01Z01-E□)**.

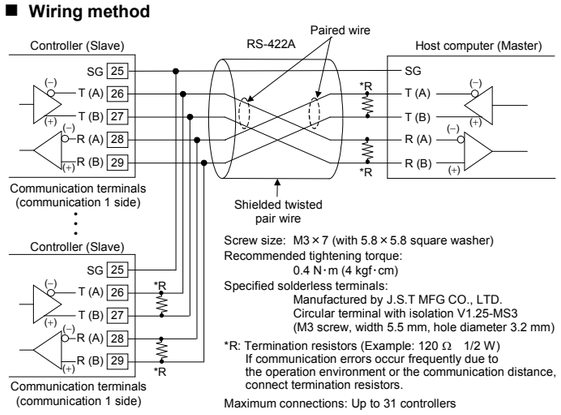
2.2 RS-422A

■ **Communication terminal number and signal details**

Terminal No.	Signal name	Symbol
25	Signal ground	SG
26	Send data	T (A)
27	Send data	T (B)

Terminal No.	Signal name	Symbol
28	Receive data	R (A)
29	Receive data	R (B)

■ **Wiring method**



Screw size: M3 × 7 (with 5.8 × 5.8 square washer)
Recommended tightening torque:
0.4 N·m (4 kgf·cm)
Specified solderless terminals:
Manufactured by J.S.T MFG CO., LTD.
Circular terminal with isolation V1.25-MS3
(M3 screw, width 5.5 mm, hole diameter 3.2 mm)

*R: Termination resistors (Example: 120 Ω 1/2 W)
If communication errors occur frequently due to the operation environment or the communication distance, connect termination resistors.

Maximum connections: Up to 31 controllers

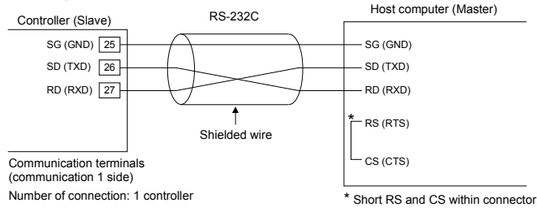
Using a USB communication converter COM-K (RKC product) enables connection with the USB port of the host computer.

2.3 RS-232C

■ **Communication terminal number and signal details**

Terminal No.	Signal name	Symbol
25	Signal ground	SG (GND)
26	Send data	SD (TXD)
27	Receive data	RD (RXD)

■ **Wiring method**



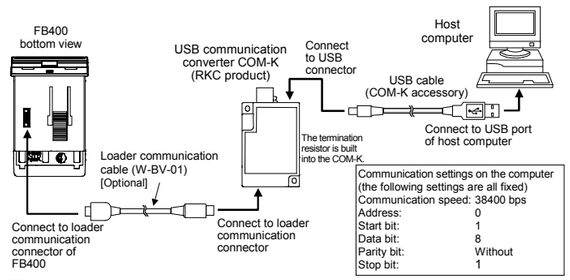
Number of connection: 1 controller

* Short RS and CS within connector.

Screw size: M3 × 7 (with 5.8 × 5.8 square washer)
Recommended tightening torque:
0.4 N·m (4 kgf·cm)
Specified solderless terminals:
Manufactured by J.S.T MFG CO., LTD.
Circular terminal with isolation V1.25-MS3
(M3 screw, width 5.5 mm, hole diameter 3.2 mm)

2.4 Connections for Loader Communication

Controller is equipped standard with a loader communication connector.
The controller loader communication connector, our COM-K USB communication converter (sold separately), and a host computer can be connected with the appropriate cables.



The Loader port is only for parameter setup.

Loader communication corresponds to RKC communication (based on ANSI X3.28-1976 subcategories 2.5 and A4).

For the COM-K, refer to the **COM-K Instruction Manual (IMR01Z01-E□)**.

3. SETTING

To establish communication parameters between host computer (master) and controller (slave), it is necessary to set the device address (slave address), communication speed, data bit configuration and interval time on each controller (slave) in the Setup setting mode.

After all communication parameters are set, in order to make these values thus set valid perform any of the following operations.
• The power is turned on again after turning it off once.
• The RUN/STOP mode is changed in RUN from STOP again after changing it in STOP once.

Parameters which are not related to existing functions on the controller are not displayed.

This instrument returns to the PV/SV monitor screen if no key operation is performed for more than one minute.

This section describes the parameters which must be set for host communication. For the screen operation and key operation, refer to the **FB400/FB900 Quick Operation Manual (IMR01W02-E□)**.

■ **Description of each parameters**

Symbol	Name	Data Setting	Description	Factory set value
Add 1 (Add1)	Device address 1 (Slave address 1)	0 to 99	Do not use the same device address for more than one controller in multi-drop connection. Each controller must have a unique address in multi-drop connection. In Modbus communication, communication is not possible when the address is 0.	0
bPS 1 (bPS1)	Communication speed 1	2.4: 2400 bps 4.8: 4800 bps 9.6: 9600 bps 19.2: 19200 bps 38.4: 38400 bps	Set the same communication speed for both the controller (slave) and the host computer (master).	19.2
bIT 1 (bIT1)	Data bit configuration 1	Refer to data bit configuration table	Set the same data bit configuration for both the controller (slave) and the host computer (master).	8n1
InT 1 (InT1)	Interval time 1 *	0 to 250 ms	The interval time for the controller should be set to provide a time for host computer to finish sending all data including stop bit and to switch the line to receive status for the host.	10

* The interval time for the controller should be set to provide a time for host computer to finish sending all data including stop bit and to switch the line to receive status for the host. If the interval time between the two is too short, the controller may send data before the host computer is ready to receive it. In this case, communication transmission cannot be conducted correctly.

Data bit configuration table

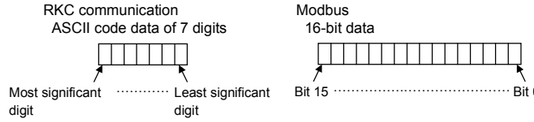
Set value	Data bit	Parity bit	Stop bit
8n1	8	Without	1
8n2	8	Without	2
8E1	8	Even	1
8E2	8	Even	2
8o1	8	Odd	1
8o2	8	Odd	2

Set value	Data bit	Parity bit	Stop bit
7n1 [a]	7	Without	1
7n2 [a]	7	Without	2
7E1 [a]	7	Even	1
7E2 [a]	7	Even	2
7o1 [a]	7	Odd	1
7o2 [a]	7	Odd	2

[a] When the Modbus communication protocol selected, this setting becomes invalid.

4. COMMUNICATION DATA LIST

• Modbus register address
HEX: Hexadecimal DEC: Decimal
• Attribute (A method of how communication data items are read or written when viewed from the host computer is described)
RO: Read only data (Host computer ← Controller)
R/W: Read and Write data (Host computer ↔ Controller)
• Data



■ **Communication data (RKC communication/Modbus)**

No.	Name	RKC Identifier	Modbus register address HEX	Modbus register address DEC	Attribute	Data range	Factory set value
1	Model codes	ID	—	—	RO	Model code (character)	—
2	Measured value (PV) [1]	M1	0000	0	RO	Input scale low to Input scale high	—
3	Current transformer 1 (CT1) input value monitor	M3	0001	1	RO	CTL-6-P-N: 0.0 to 30.0A CTL-12-S56-10L-N: 0.0 to 100.0 A	—
4	Current transformer 2 (CT2) input value monitor	M4	0002	2	RO		—
5	Set value (SV) monitor [1]	MS	0003	3	RO	Setting limiter low to Setting limiter high	—
6	Remote setting (RS) input value monitor [1]	S2	0004	4	RO	Setting limiter low to Setting limiter high	—
7	Burnout state monitor	B1	0005	5	RO	0: OFF 1: ON	—
8	Burnout state monitor of feedback resistance input	B2	0006	6	RO	0: OFF 1: ON	—
9	Event 1 state monitor	AA	0007	7	RO	0: OFF 1: ON	—
10	Event 2 state monitor	AB	0008	8	RO		—
11	Event 3 state monitor	AC	0009	9	RO		—
12	Event 4 state monitor	AD	000A	10	RO		—
13	Heater break alarm 1 (HBA1) state monitor	AE	000B	11	RO	0: OFF 1: ON	—
14	Heater break alarm 2 (HBA2) state monitor	AF	000C	12	RO		—
15	Manipulated output value (MV1) monitor [heat-side]	O1	000D	13	RO	PID control or Heat/Cool PID control: −5.0 to +105.0 % Position proportioning PID control with feedback resistance (FBR) input: 0.0 to 100.0 %	—
16	Manipulated output value (MV2) monitor [cool-side]	O2	000E	14	RO	−5.0 to +105.0 %	—
17	Error code	ER	000F	15	RO	RKC communication 1: Adjustment data error 2: Back-up error 4: A/D conversion error 32: Custom data error 128: Watchdog timer 256: Stack overflow 2048: Program error (busy)	—
						Modbus (Bit data) Bit 0: Adjustment data error Bit 1: Back-up error Bit 2: A/D conversion error Bit 3 to Bit 4: Unused Bit 5: Custom data error Bit 6: Unused Bit 7: Watchdog timer Bit 8: Stack overflow Bit 9 to Bit 10: Unused Bit 11: Program error (busy) Bit 12 to Bit 15: Unused Data 0: OFF 1: ON [Decimal number: 0 to 4095]	—

[1] Varies with the setting of the Decimal point position selection.

Continued from the previous page.

No.	Name	RKC Identifier	Modbus register address HEX	Modbus register address DEC	Attribute	Data range	Factory set value
18	Digital input (DI) state monitor	L1	0010	16	RO	RKC communication Least significant digit: DI1 2nd digit: DI2 3rd digit: DI3 4th digit: DI4 5th digit: DI5 6th digit: DI6 Most significant digit: DI7 Data 0: Contact open 1: Contact closed	—
						Modbus (Bit data) Bit 0: DI1 Bit 1: DI2 Bit 2: DI3 Bit 3: DI4 Bit 4: DI5 Bit 5: DI6 Bit 6: DI7 Bit 7 to Bit 15: Unused Data 0: Contact open 1: Contact closed [Decimal number: 0 to 127]	—
19	Output state monitor	Q1	0011	17	RO	RKC communication Least significant digit: OUT1 2nd digit: OUT2 3rd digit: DO1 4th digit: DO2 5th digit: DO3 6th digit: DO4 Most significant digit: Unused Data 0: OFF 1: ON	—
						Modbus (Bit data) Bit 0: OUT1 Bit 1: OUT2 Bit 2: DO1 Bit 3: DO2 Bit 4: DO3 Bit 5: DO4 Bit 6 to Bit 15 Unused Data 0: OFF 1: ON [Decimal number: 0 to 63]	—
20	Operation mode state monitor	L0	0012	18	RO	RKC communication Least significant digit: Control STOP 2nd digit: Control RUN 3rd digit: Manual mode [1] 4th digit: Remote mode [1] 5th digit to Most significant digit: Unused Data 0: OFF 1: ON	—
						Modbus (Bit data) Bit 0: Control STOP Bit 1: Control RUN Bit 2: Manual mode [1] Bit 3: Remote mode [1] Bit 4 to Bit 15: Unused Data 0: OFF 1: ON [Decimal number: 0 to 15]	—
21	Memory area soak time monitor	TR	0013	19	RO	0 minutes 00 seconds to 199 minutes 59 seconds or 0 hours 00 minutes to 99 hours 59 minutes [2]	—
22	Integrated operating time monitor	UT	0014	20	RO	0 to 19999 hours	—
23	Holding peak value ambient temperature monitor	Hp	0015	21	RO	−10.0 to +100.0 °C	—
24	Power feed forward input value monitor	HM	0016	22	RO	0.0 to 160.0 % Display in the percentage of the load voltage (rated value).	—
25	Backup memory state monitor	EM	0017	23	RO	0: The content of the backup memory does not coincide with that of the RAM. 1: The content of the backup memory coincides with that of the RAM	—
26	ROM version monitor	VR	—	—	RO	ROM version	—
27 to 34	Unused	—	0018 to 001F	24 to 31	—	—	—
35	PID/AT transfer	G1	0020	32	R/W	0: PID control 1: Autotuning (AT)	0
36	Auto/Manual transfer	J1	0021	33	R/W	0: Auto mode 1: Manual mode	0
37	Remote/Local transfer [3]	C1	0022	34	R/W	0: Local mode 1: Remote mode	0
38	RUN/STOP transfer	SR	0023	35	R/W	0: RUN mode (Control start) 1: STOP mode (Control stop)	0
39	Memory area transfer	ZA	0024	36	R/W	1 to 8	1

[1] During operation in manual mode, the manual mode of the operation mode state monitor is set to the “1: ON” state and the remote mode of the same monitor is se to the “0: OFF” state even if the parameter, “Remote/Local transfer” is set to “1: Remote mode.”

[2] Data range of Memory area soak time monitor can be selected on the Soak time unit.
RKC communication: 0:00 to 199:59 (min:sec) or 0:00 to 99:59 (hrs:min)
Modbus: 0 to 11999 seconds or 0 to 5999 minutes

[3] Data write is enabled only when the Remote setting (RS) input is provided.

No.	Name	RKC Identifier	Modbus register address HEX	Modbus register address DEC	Attribute	Data range	Factory set value
40	Interlock release	IL	0025	37	R/W	0: Interlock release (execution/state) 1: Interlock state “1” is for monitoring the interlocked state. Under this condition, do not write “1.”	0
41	Event 1 set value (EV1) [1] ★	A1	0026	38	R/W	Deviation: −Input span to +Input span [3] Process and set value: Input scale low to Input scale high [3] Manipulated output value (MV1 or MV2): −5.0 to +105.0 %	50
42	Event 2 set value (EV2) [1] ★	A2	0027	39	R/W		50
43	Event 3 set value (EV3) [1] ★	A3	0028	40	R/W		50
44	Event 4 set value (EV4) [1] ★	A4	0029	41	R/W		50
45	Control loop break alarm (LBA) time [2] ★	A5	002A	42	R/W	0 to 7200 seconds (0: Unused)	480
46	LBA deadband [2, 3] ★	N1	002B	43	R/W	0 to Input span	0
47	Set value (SV) [3] ★	S1	002C	44	R/W	Setting limiter low to Setting limiter high	TC/RTD: 0 V/I: 0.0
48	Proportional band [heat-side] ★	P1	002D	45	R/W	TC/RTD inputs: 0 (0.0, 0.00) to Input span [3] (Unit: °C [°F]) Voltage (V)/Current (I) inputs: 0.0 to 1000.0 % of Input span 0 (0.0, 0.00): ON/OFF action	TC/RTD: 30 V/I: 30.0
49	Integral time [heat-side] ★	I1	002E	46	R/W	PID control or Heat/Cool PID control: 0 to 3600 seconds or 0.0 to 1999.9 seconds [4] (0, 0.0: PD control [both heat-side and cool-side]) Position proportioning PID control: 1 to 3600 seconds or 0.1 to 1999.9 seconds [4]	240
50	Derivative time [heat-side] ★	D1	002F	47	R/W	0 to 3600 seconds or 0.0 to 1999.9 seconds [4] (0, 0.0: PI control)	60
51	Control response parameter ★	CA	0030	48	R/W	0: Slow 2: Fast 1: Medium [When the P or PD action is selected, this setting becomes invalid.]	Note 1
52	Proportional band [cool-side] [5] ★	P2	0031	49	R/W	TC/RTD inputs: 1 (0.1, 0.01) to Input span [3] (Unit: °C [°F]) Voltage (V)/Current (I) inputs: 0.1 to 1000.0 % of Input span	30
53	Integral time [cool-side] [5] ★	I2	0032	50	R/W	0 to 3600 seconds or 0.0 to 1999.9 seconds [2] (0, 0.0: PD control [both heat-side and cool-side])	240
54	Derivative time [cool-side] [5] ★	D2	0033	51	R/W	0 to 3600 seconds or 0.0 to 1999.9 seconds [4] (0, 0.0: PI control)	60
55	Overlap/Deadband [5] ★	V1	0034	52	R/W	TC/RTD inputs: −Input span to +Input span [3] (Unit:°C [°F]) Voltage (V)/Current (I) inputs: −100.0 to +100.0 % of Input span Minus (−) setting results in overlap. However, the overlapping range is within the proportional range.	0
56	Manual reset [6] ★	MR	0035	53	R/W	−100.0 to +100.0 %	0.0
57	Setting change rate limiter (up) [3] ★	HH	0036	54	R/W	0 to Input span/unit time * (0: Unused)	0
58	Setting change rate limiter (down) [3] ★	HL	0037	55	R/W	* Unit time: 60 seconds (factory set value)	0
59	Area soak time ★	TM	0038	56	R/W	0 minutes 00 seconds to 199 minutes 59 seconds or 0 hours 00 minutes to 99 hours 59 minutes [7]	RKC: 0:00 Modbus: 0
60	Link area number ★	LP	0039	57	R/W	0 to 8 (0: No link)	0
61	Heater break alarm 1 (HBA1) set value [8, 9]	A7	003A	58	R/W	CTL-6-P-N: 0.0 to 30.0 A (0.0: Unused) CTL-12-S56-10L-N: 0.0 to 100.0 A (0.0: Unused)	0.0

★: Data related to Multi-memory area function

[1] If there is no Event function, set to RO (Only reading data is possible). If Event 4 corresponds to Control loop break alarm (LBA), the Event 4 set value becomes RO.

[2] Data write is enabled only when the Event 4 corresponds to Control loop break alarm (LBA).

[3] Varies with the setting of the Decimal point position selection.

[4] Varies with the setting of the Integral/Derivative time decimal point position selection.

[5] Data write is enabled only when the control action is Heat/Cool PID control.

[6] Data write is enabled only when the Integral time [heat-side] or Integral time [cool-side] is set to 0 or 0.0.

[7] Data range of Area soak time can be selected on the Soak time unit.
RKC communication: 0:00 to 199:59 (min:sec) or 0:00 to 99:59 (hrs:min)
Modbus: 0 to 11999 seconds or 0 to 5999 minutes

[8] Data write is enabled only when the CT1 is provided.

[9] If CT1 assignment (Engineering mode) corresponds to “0: None,” set to RO (Only reading data is possible).

Note 1: PID control, Position proportioning PID control: 0 Heat/Cool PID control: 2

No.	Name	RKC Identifier	Modbus register address HEX	Modbus register address DEC	Attribute	Data range	Factory set value
62	Heater break determination point 1 [1, 2, 3]	NE	003B	59	R/W	0.0 to 100.0 % of HBA1 set value (0.0: Heater break determination is invalid)	30.0
63	Heater melting determination point 1 [1, 2, 3]	NF	003C	60	R/W	0.0 to 100.0 % of HBA1 set value (0.0: Heater melting determination is invalid)	30.0
64	Heater break alarm 2 (HBA2) set value [4, 5]	A8	003D	61	R/W	CTL-6-P-N: 0.0 to 30.0 A (0.0: Unused) CTL-12-S56-10L-N: 0.0 to 100.0 A (0.0: Unused)	0.0
65	Heater break determination point 2 [4, 5, 6]	NH	003E	62	R/W	0.0 to 100.0 % of HBA2 set value (0.0: Heater break determination is invalid)	30.0
66	Heater melting determination point 2 [4, 5, 6]	NI	003F	63	R/W	0.0 to 100.0 % of HBA2 set value (0.0: Heater melting determination is invalid)	30.0
67	PV bias [7]	PB	0040	64	R/W	−Input span to +Input span	0
68	PV digital filter	F1	0041	65	R/W	0.0 to 100.0 seconds (0.0: Unused)	0.0
69	PV ratio	PR	0042	66	R/W	0.500 to 1.500	1.000
70	PV low input cut-off	DP	0043	67	R/W	0.00 to 25.00 % of input span	0.00
71	RS bias [7, 8]	RB	0044	68	R/W	−Input span to +Input span	0
72	RS digital filter [8]	F2	0045	69	R/W	0.0 to 100.0 seconds (0.0: Unused)	0.0
73	RS ratio [8]	RR	0046	70	R/W	0.001 to 9.999	1.000
74	Proportional cycle time [heat-side]	T0	0047	71	R/W	0.1 to 100.0 seconds M: Relay contact output V: Voltage pulse output T: Triac output D: Open collector output	M: 20.0 V, T, D: 2.0
75	Proportional cycle time [cool-side]	T1	0048	72	R/W		M: 20.0 V, T, D: 2.0
76	Manual manipulated output value	ON	0049	73	R/W	PID control: Output limiter low [MV1] to Output limiter high [MV1] Heat/Cool PID control: −Output limiter high [MV2] to +Output limiter high [MV1] For overlap: −105.0 to +105.0 % * * Actual output value is limited by the output limiter function. Position proportioning PID control with feedback resistance (FBR) input: Output limiter low [MV1] to Output limiter high [MV1]	0.0
77	Set lock level	LK	004A	74	R/W	RKC communication Least significant digit: Lock only setting items other than SV and event set value (EV1 to EV4). 2nd digit: Lock only event set value (EV1 to EV4) 3rd digit: Lock only set value (SV) 4th digit to Most significant digit: Unused Data 0: Unlock 1: Lock	0
						Modbus (Bit data) Bit 0: Lock only setting items other than SV and event set value (EV1 to EV4). Bit 1: Lock only event set value (EV1 to EV4) Bit 2: Lock only set value (SV) Bit 3 to Bit 15: Unused Data 0: Unlock 1: Lock [Decimal number: 0 to 7]	0
78 to 205	Engineering mode For the data, refer to the **FB100/FB400/FB900 Communication Instruction Manual (IMR01W04-E□).**						
206	Startup tuning (ST) [9]	ST	00CB	203	R/W	0: ST unused 1: Execute once * 2: Execute always * When the startup tuning is finished, the setting will automatically returns to “0: ST unused.”	0
207 to 211	Engineering mode For the data, refer to the **FB100/FB400/FB900 Communication Instruction Manual (IMR01W04-E□).**						
212	Automatic temperature rise learning [10]	Y8	00D1	209	R/W	0: Unused 1: Learning * * When the automatic temperature rise learning is finished, the setting will automatically returns to “0: Unused.”	1
213 to 226	Engineering mode For the data, refer to the **FB100/FB400/FB900 Communication Instruction Manual (IMR01W04-E□).**						

[1] Data write is enabled only when the CT1 is provided.

[2] If CT1 assignment (Engineering mode) corresponds to “0: None,” set to RO (Only reading data is possible).

[3] Data write is enabled only when the HBA1 type is type B.

[4] Data write is enabled only when the CT2 is provided.

[5] If CT2 assignment (Engineering mode) corresponds to “0: None,” set to RO (Only reading data is possible).

[6] Data write is enabled only when the HBA2 type is type B.

[7] Varies with the setting of the Decimal point position selection.

[8] Data write is enabled only when the Remote setting (RS) input is provided.

[9] If control is Position proportioning PID control, set to RO (Only reading data is possible).

[10] If the Automatic temperature rise group (Engineering mode) corresponds to “0: Automatic temperature rise function OFF,” set to RO (Only reading data is possible).

■ Communication data for multi-memory area (only for Modbus)

Use the register addresses of 0500H to 0514H to confirm or change set values of parameters in multi-memory areas which are not selected.

No.	Name	Modbus register address HEX	Modbus register address DEC	Attribute	Data range	Factory set value
1	Setting memory area number	0500	1280	R/W	1 to 8	1
2	Event 1 set value (EV1) [1]	0501	1281	R/W	Deviation: −Input span to +Input span [3] Process and set value: Input scale low to Input scale high [3] Manipulated output value (MV1 or MV2): −5.0 to +105.0 %	50
3	Event 2 set value (EV2) [1]	0502	1282	R/W		50
4	Event 3 set value (EV3) [1]	0503	1283	R/W		50
5	Event 4 set value (EV4) [1]	0504	1284	R/W		50
6	Control loop break alarm (LBA) time [2]	0505	1285	R/W	0 to 7200 seconds (0: Unused)	480
7	LBA deadband [2, 3]	0506	1286	R/W	0 to Input span	0
8	Set value (SV) [3]	0507	1287	R/W	Setting limiter low to Setting limiter high	TC/RTD: 0 V/I: 0.0
9	Proportional band [heat-side]	0508	1288	R/W	TC/RTD inputs: 0 (0.0, 0.00) to Input span [3] (Unit: °C [°F]) Voltage (V)/Current (I) inputs: 0.0 to 1000.0 % of Input span 0 (0.0, 0.00): ON/OFF action	TC/RTD: 30 V/I: 30.0
10	Integral time [heat-side]	0509	1289	R/W	PID control or Heat/Cool PID control: 0 to 3600 seconds or 0.0 to 1999.9 seconds [4] (0, 0.0: PD control [both heat-side and cool-side]) Position proportioning PID control: 1 to 3600 seconds or 0.1 to 1999.9 seconds [4]	240
11	Derivative time [heat-side]	050A	1290	R/W	0 to 3600 seconds or 0.0 to 1999.9 seconds [4] (0, 0.0: PI control)	60
12	Control response parameter	050B	1291	R/W	0: Slow 2: Fast 1: Medium [When the P or PD action is selected, this setting becomes invalid.]	Note 1
13	Proportional band [cool-side] [5]	050C	1292	R/W	TC/RTD inputs: 1 (0.1, 0.01) to Input span [3] (Unit: °C [°F]) Voltage (V)/Current (I) inputs: 0.1 to 1000.0 % of Input span	30
14	Integral time [cool-side] [5]	050D	1293	R/W	0 to 3600 seconds or 0.0 to 1999.9 seconds [4] (0, 0.0: PD control [both heat-side and cool-side])	240
15	Derivative time [cool-side] [5]	050E	1294	R/W	0 to 3600 seconds or 0.0 to 1999.9 seconds [4] (0, 0.0: PI control)	60
16	Overlap/Deadband [5]	050F	1295	R/W	TC/RTD inputs: −Input span to +Input span [3] (Unit:°C [°F]) Voltage (V)/Current (I) inputs: −100.0 to +100.0 % of Input span Minus (−) setting results in overlap. However, the overlapping range is within the proportional range.	0
17	Manual reset [6]	0510	1296	R/W	−100.0 to +100.0 %	0.0
18	Setting change rate limiter (up) [3]	0511	1297	R/W	0 to Input span/unit time * (0: Unused)	0
19	Setting change rate limiter (down) [3]	0512	1298	R/W	* Unit time: 60 seconds (factory set value)	0
20	Area soak time	0513	1299	R/W	0 to 11999 seconds or 0 to 5999 minutes Data range of Area soak time can be selected on the Soak time unit.	0
21	Link area number	0514	1300	R/W	0 to 8 (0: No link)	0
22	Unused	0515	1301	—	—	—

[1] If there is no Event function, set to RO (Only reading data is possible). If Event 4 corresponds to Control loop break alarm (LBA), the Event 4 set value becomes RO.

[2] Data write is enabled only when the Event 4 corresponds to Control loop break alarm (LBA).

[3] Varies with the setting of the Decimal point position selection.

[4] Varies with the setting of the Integral/Derivative time decimal point position selection.

[5] Data write is enabled only when the control action is Heat/Cool PID control.

[6] Data write is enabled only when the Integral time [heat-side] or Integral time [cool-side] is set to 0 or 0.0.

Note 1: PID control, Position proportioning PID control: 0 Heat/Cool PID control: 2

☞ For the Modbus data mapping function, refer to the **FB100/FB400/FB900 Communication Instruction Manual (IMR01W04-E□).**

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