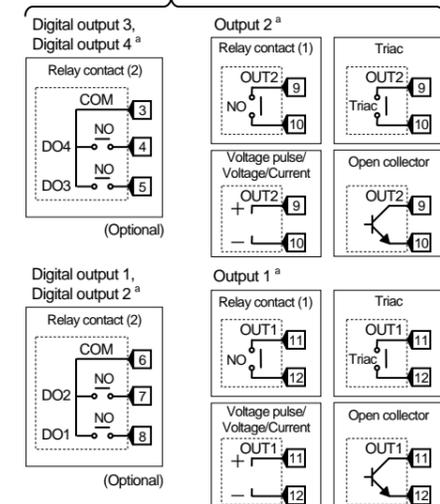
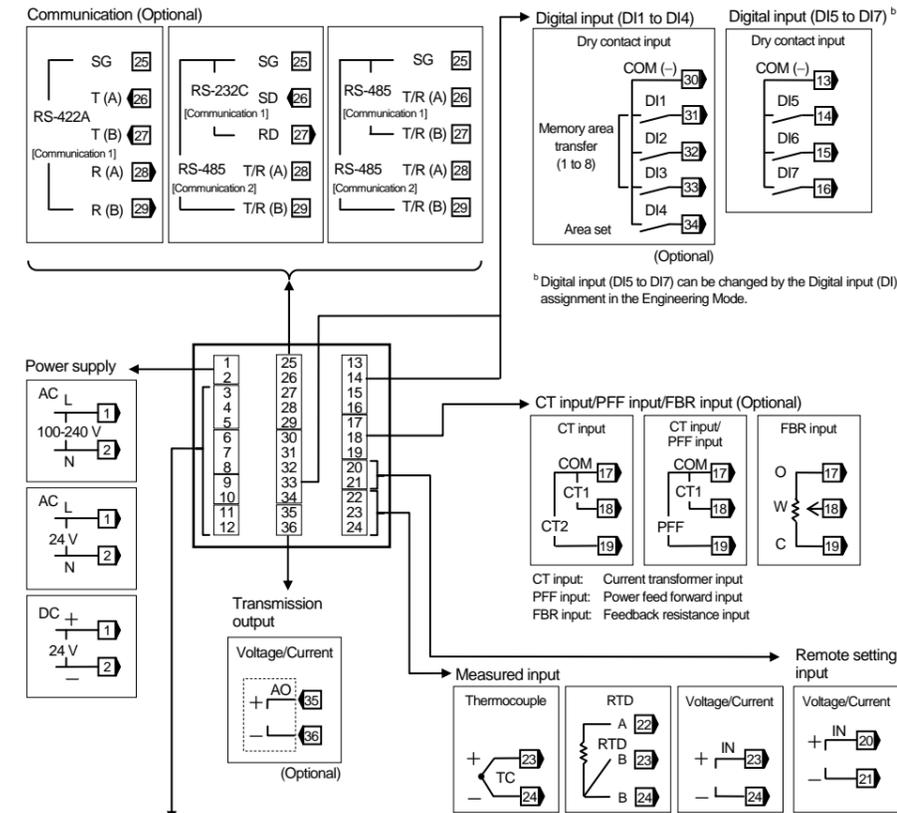


2.2 Terminal Configuration (All the terminal configuration of FB400 and FB900 is the same.)



Output assignment
 Output 1 (OUT1) and Output 2 (OUT2):
 Control output or Digital output can be allocated to OUT1 and OUT2. For Heat/Cool PID control, OUT1 corresponds to the heat-side output and OUT2 corresponds to the cool-side output. For Position proportioning PID control, OUT1 corresponds to the open-side output and OUT2 corresponds to the close-side output.

Digital output 1 (DO1) to Digital output 4 (DO4):
 Output of the Event function can be allocated to DO1 to DO4.

The following two methods of the output assignments are available:
 Specify when ordering (Initial setting code)
 Setting by Output assignment (Engineering Mode)

	OUT1 OUT2	DO1 to DO4	AO
Relay contact output (1)	○		
Relay contact output (2)		○	
Voltage pulse output	○		
Current output	○		○
Voltage output 0 to 5 V DC, 1 to 5 V DC, 0 to 10 V DC	○		○
Voltage output 0 to 1 V DC			○
Triac output	○		
Open collector output	○		

(○: Indicates that an output specification is supported.)

3. SPECIFICATIONS

Measured input
 Number of input: 1 point
 Input type and range: Refer to table 2.
 Sampling cycle: 100 ms±0.3% (50 ms±5% or 250 ms±0.3% is selectable)

Influence of external resistance: Approx. 0.2 μV/Ω (Converted depending on TC types)
 Influence of input lead: Approx. 0.01 %/Ω of PV (RTD input) 10 Ω or less per wire
 Input impedance: TC input: 1 MΩ or more
 Voltage (low) input: 1 MΩ or more
 Voltage (high) input: Approx. 1 MΩ
 Current input: Approx. 50 Ω
 Approx. 250 μA (RTD input)

Sensor current:
 Action at input break: TC input, Voltage (low) input: Upscale or Downscale
 Upscale
 RTD input: Upscale
 Voltage (high) input, Current input: Downscale (Indicates the value 0 V or 0 mA)

Action at input short circuit: Downscale (RTD input)
 Input correction: PV bias: -Input span to +Input span
 PV ratio: 0.500 to 1.500
 First order lag digital filter: 0.0 to 100.0 seconds (0.0: OFF)
 Low level cutoff: 0.00 to 25.00 % of input span
 Cold-junction temperature compensation error (TC input): Within ±1.0 °C
 Within ±1.5 °C (range of -10 to +50 °C)

Remote setting (RS) input
 Number of input: 1 point (Not isolated from measured input)
 Input type: Voltage (low) input: 0 to 10 mV DC, 0 to 100 mV DC, 0 to 1 V DC
 Voltage (high) input: 0 to 5 V DC, 1 to 5 V DC, 0 to 10 V DC
 Current input: 0 to 20 mA DC, 4 to 20 mA DC
 Twice of the measured input sampling cycle

Input impedance: Voltage (low) input: 1 MΩ or more
 Voltage (high) input: Approx. 1 MΩ
 Current input: Approx. 50 Ω
 Action at input break: Downscale (Indicates the value 0 V or 0 mA)
 Input correction: RS bias: -Input span to +Input span
 RS ratio: 0.001 to 9.999
 RS digital filter (first order lag): 0.0 to 100.0 seconds (0.0: OFF)
 Voltage (low) input: Within ±3.5 V
 Voltage (high) input: Within ±12 V

Current transformer (CT) input [Optional]
 Number of inputs: 2 points
 (when PFF input is selected: 1 point)
 CT type: CTL-6-P-N or CTL-12-S56-10L-N (Sold separately)
 Input range: CTL-6-P-N: 0.0 to 30.0 A
 CTL-12-S56-10L-N: 0.0 to 100.0 A
 Automatic power frequency detection: Power frequency can be set by automatic detection. No frequency may be able to be detected if at a CT value of less than 0.5A.
 Sampling cycle: Twice of the measured input sampling cycle

Feedback resistance (FBR) input [Optional]
 Number of input: 1 point
 Permissible resistance range: 100 Ω to 10 kΩ (Standard: 135 Ω)
 Input range: 0.0 to 100.0 %
 Automatic power frequency detection: Twice of the measured input sampling cycle
 Sampling cycle: Twice of the measured input sampling cycle
 Action at FBR break: Upscale

Power feed forward (PFF) input [Optional]
 Number of input: 1 point (Use the special transformer)
 Allowable voltage range: Input of instrument: 0 to 20 V
 Load power supply voltage: 120 V AC transformer (PFT-01): 0 to 168 V AC
 240 V AC transformer (PFT-02): 0 to 336 V AC
 Automatic power frequency detection: Power frequency can be set by automatic detection.
 Sampling cycle: Twice of the measured input sampling cycle
 Action at FBR break: Upscale

Digital input (DI)
 Number of inputs: 7 points (DI1 to DI4 [optional], DI5 to DI7)
 Input method: Dry contact input
 Open state: 500 kΩ or more
 Close state: 10 Ω or less
 Contact current: 5 mA or less
 Voltage at open: Approx. 5 V DC
 200 ms
 Capture judgment time: 200 ms

Output
 Number of outputs: 7 points (OUT1, OUT2, DO1 to DO4, AO)
 Output type: Relay contact output (1)
 Contact type: 1a contact
 Contact rating (Resistive load): 250 V AC 3 A / 30 V DC 1 A
 Electrical life: 300,000 times or more (Rated load)
 Mechanical life: 50 million times or more (Switching: 180 times/min)

Relay contact output (2)
 Contact type: 1a contact
 Contact rating (Resistive load): 250 V AC 1 A / 30 V DC 1 A
 Electrical life: 300,000 times or more (Rated load)
 Mechanical life: 20 million times or more (Switching: 300 times/min)

Voltage pulse output
 Output voltage: 0/12 V DC (Rating)
 ON voltage: 11 to 13 V
 OFF voltage: 0.2 V or less
 Allowable load resistance: 600 Ω or more

Current output
 Output current (Rating): 4 to 20 mA DC, 0 to 20 mA DC
 Output range: 1 to 21 mA DC, 0 to 21 mA DC
 Allowable load resistance: 600 Ω or less
 Output impedance: 1 MΩ or more

Triac output
 Output method: AC output (Zero-cross method)
 Allowable load current: 0.5 A (Ambient temperature 40 °C or less)
 Ambient temperature 50 °C: 0.3 A
 Load voltage: 75 to 250 V AC
 Minimum load current: 30 mA
 ON voltage: 1.6 V or less (at maximum load current)

Open collector output
 Output method: Sink type
 Allowable load current: 100 mA
 Load voltage: 30 V DC or less
 Minimum load current: 0.5 mA
 ON voltage: 2 V or less (at maximum load current)
 Leakage current at OFF: 0.1 mA or less

Communication [Optional]
 Interface: Based on RS-232C, RS-485, or RS-422A, EIA standard
 Multi-drop connection of RS-485 and RS-422A is available.
 Protocol: RKC communication (ANSI X3.28-1976 subcategories 2.5 and A4)
 Modbus-RTU
 Termination resistor: Externally connected (Example: 120 Ω 1/2W)

General specifications
 Power supply voltage: 100 to 240 V AC type: 90 to 264 V AC [Including power supply voltage variation], 50/60 Hz (Rating 100 to 240 V AC)
 Frequency variation: 50 Hz±10%, 60 Hz±10%
 24 V AC type: 21.6 to 26.4 V AC [Including power supply voltage variation], 50/60 Hz (Rating 24 V AC)
 Frequency variation: 50 Hz±10%, 60 Hz±10%
 24 V DC type: 21.6 to 26.4 V DC [Including power supply voltage variation] (Rating 24 V DC)

Power consumption (at maximum load):
 100 to 240 V AC type: FB400: 7.8 VA max. (at 100 V AC), 11.9 VA max. (at 240 V AC)
 FB900: 8.7 VA max. (at 100 V AC), 13.0 VA max. (at 240 V AC)
 24 V AC type: FB400: 8.2 VA max. (at 24 V AC) FB900: 9.3 VA max. (at 24 V AC)
 24 V DC type: FB400: 250 mA max. (at 24 V DC) FB900: 300 mA max. (at 24 V DC)
 Rush current: 12 A or less
 Allowable ambient temperature: -10 to +50 °C
 Allowable ambient humidity: 5 to 95 %RH (Absolute humidity: MAX.W.C 29.3 g/m³ dry air at 101.3 kPa)

Insulation resistance:
 Between measuring terminal and grounding: 20 MΩ or more at 500 V DC
 Between power supply terminal and grounding: 20 MΩ or more at 500 V DC
 Between power supply and measuring terminals: 20 MΩ or more at 500 V DC
 When grounding is not provided: Between panels

Withstand voltage:
 Time: 1 min.
 ① Grounding terminal
 ② Power terminal: 1500 V AC
 ③ Measured input terminal: 1500 V AC 2300 V AC
 ④ Output terminal (Relay contact, Triac): 1500 V AC 2300 V AC 2300 V AC
 ⑤ Output terminal (Voltage, Current): 1500 V AC 2300 V AC 1500 V AC
 ⑥ Communication, digital input (DI) terminals: 1500 V AC 2300 V AC 510 V AC 2300 V AC 1000 V AC

Transportation and Storage environment conditions:
 Shock: Height 800 mm or less
 Temperature: -25 to +55 °C (at storage), -40 to +70 °C (at transport)
 Humidity: 5 to 100 %RH (Non condensing)

Installation environment conditions:
 Indoor use
 Altitude up to 2000 m
 Weight: FB400: Approx. 230 g
 FB900: Approx. 290 g

Standard
 Safety standards: UL: UL61010-1
 cUL: CAN/CSA-C22.2 No.61010-1

CE marking:
 LVD: EN61010-1
 OVERVOLTAGE CATEGORY II, POLLUTION DEGREE 2, Class II (Reinforced insulation)
 EMC: EN61326-1
 RCM: EN55011
 Panel sealing: NEMA 4X (NEMA250), IP66 (IEC60529) [Front panel]

4. MODEL CODE

Suffix code



(1) Output 1 (OUT1), (2) Output 2 (OUT2)
 N: None (OUT2 only)
 M: Relay contact output
 V: Voltage pulse output
 4: Voltage output (0 to 5 V DC)
 5: Voltage output (0 to 10 V DC)
 6: Voltage output (1 to 5 V DC)
 7: Current output (0 to 20 mA DC)
 8: Current output (4 to 20 mA DC)
 T: Triac output
 D: Open collector output

(3) Power supply voltage
 3: 24 V AC/DC 4: 100 to 240 V AC

(4) Digital output (DO1 to 4)
 N: None 4: DO1 + DO2 + DO3 + DO4

(5) CT input/Power feed forward input/ Feedback resistance input
 N: None
 T: CT input (2 points)
 1: Power feed forward input (one 100-120 V AC transformer included)
 2: Power feed forward input (one 200-240 V AC transformer included)
 3: CT input (1 point) + Power feed forward input (one 100-120 V AC transformer included)
 4: CT input (1 point) + Power feed forward input (one 200-240 V AC transformer included)
 F: Feedback resistance input

(6) Transmission output (AO)
 N: None 6: Voltage output (1 to 5 V DC)*
 3: Voltage output (0 to 1 V DC)* 7: Current output (0 to 20 mA DC)*
 4: Voltage output (0 to 5 V DC)* 8: Current output (4 to 20 mA DC)*
 5: Voltage output (0 to 10 V DC)*
 * If any one of the Transmission outputs is specified (other than the code 'N'), the Digital inputs (from DI1 to DI4) are automatically added.

(7) Communication function/Digital input (DI1 to DI4)
 N: None
 1: Communication 1 (RS-232C) + No communication 2
 4: Communication 1 (RS-422A) + No communication 2
 5: Communication 1 (RS-485) + No communication 2
 W: Communication 1 (RS-232C) + Communication 2 (RS-485)
 X: Communication 1 (RS-485) + Communication 2 (RS-485)
 Y: No communication 1 + Communication 2 (RS-485)
 D: Digital input (DI1 to DI4) [Memory area transformer]
 * If any one of the Communication functions is also specified (other than the code 'N'), the Digital inputs (from DI1 to DI4) are automatically added.
 * Factory set value of Communication 2 protocol: Intercontroller communication

(8) Case color
 N: White A: Black

(9) Quick start code
 N: No quick start code (Configured to factory set value)
 1: Specify quick start code 1
 2: Specify quick start code 1 and 2
 * Factory set value: Refer to the Parameter list (IMR01W06-ED).

(10) Control Method [Quick start code 1]
 No code: Quick start code 1 is not specified
 F: PID control with AT (Reverse action)
 D: PID control with AT (Direct action)
 G: Heat/Cool PID control with AT
 A: Heat/Cool PID control with AT (for Extruder [air cooling])
 W: Heat/Cool PID control with AT (for Extruder [water cooling])
 Z: Position proportioning PID control without FBR (Reverse action)
 C: Position proportioning PID control without FBR (Direct action)

(11) Measured input and Range [Quick start code 1]
 No code: Quick start code 1 is not specified
 □ □ □: Refer to Range code table.

(12) Instrument specification
 Y: Version symbol

Quick start code 2 (Initial setting code)



(1) Output assignments (OUT1, OUT2, and DO1 to DO4) 1 to 7: Refer to Output assignments table.

(2) Remote setting input
 1: Voltage input (0 to 10 mV DC) 5: Voltage input (0 to 10 V DC)
 2: Voltage input (0 to 100 mV DC) 6: Voltage input (1 to 5 V DC)
 3: Voltage input (0 to 1 V DC) 7: Current input (0 to 20 mA DC)
 4: Voltage input (0 to 5 V DC) 8: Current input (4 to 20 mA DC)

(3) Event function 1 (EV1), (4) Event function 2 (EV2), (5) Event function 3 (EV3), (6) Event function 4 (EV4)
 N: None L: Process low
 A: Deviation high Q: Deviation high
 B: Deviation low R: Deviation low
 C: Deviation high/low T: Deviation high/low
 D: Band V: SV high
 E: Deviation high W: SV low
 F: Deviation low 1: MV high
 G: Deviation high/low 2: MV low
 H: Process high 3: Cooling MV high
 J: Process low 4: Cooling MV low
 K: Process high 5: Control loop break alarm (LBA)

(7) CT type
 N: CT1 (None), CT2 (None)
 P: CT1 (CTL-6-P-N), CT2 (None)
 S: CT1 (CTL-12-S56-10L-N), CT2 (None)
 T: CT1 (CTL-6-P-N), CT2 (CTL-6-P-N)
 U: CT1 (CTL-12-S56-10L-N), CT2 (CTL-12-S56-10L-N)

(8) Communication 1 protocol
 N: None
 1: RKC communication (ANSI X3.28-1976)
 2: Modbus
 * Range code table
 [Thermocouple (TC) input, RTD input]

Type	Code	Measured range	Code	Measured range
K	K35	-200.0 to +400.0 °C	KC4	-328.0 to +400.0 °F
	K40	-200.0 to +800.0 °C	KC6	-250.0 to +800.0 °F
	K41	-200 to +1372 °C	KC5	-328 to +2502 °F
	K09	0.0 to 400.0 °C	KA4	0.0 to 800.0 °F
	K10	0.0 to 800.0 °C	KA1	0 to 800 °F
	K14	0 to 300 °C	KA2	0 to 600 °F
	K02	0 to 400 °C		
	K04	0 to 800 °C		
	K27	-200.0 to +400.0 °C	JC6	-328.0 to +1200.0 °F
	J32	-200.0 to +800.0 °C	JC7	-200.0 to +700.0 °F
J15	-200 to +1200 °C	JB9	-328 to +2192 °F	
J08	0.0 to 400.0 °C	JB6	0.0 to 800.0 °F	
J09	0.0 to 800.0 °C	JA1	0 to 800 °F	
J02	0 to 400 °C	JA2	0 to 1600 °F	
J04	0 to 800 °C			
T	T19	-200.0 to +400.0 °C	TC2	-328.0 to +752.0 °F
E	E21	-200.0 to +700.0 °C	EA9	-328.0 to +1292.0 °F
E	E06	-200 to +1000 °C	EB1	-328 to +1832 °F
S	S06	-50 to +1768 °C	SA7	-58 to +3214 °F
R	R07	-50 to +1768 °C	RA7	-58 to +3214 °F
B	B03	0 to 1800 °C	BB2	0 to 3272 °F
N	N02	0 to 1300 °C	NA7	0 to 2372 °F
PLII	AL2	0 to 1390 °C	AL2	0 to 2534 °F
WSR/W24r	W03	0 to 2300 °C	WA2	0 to 4230 °F
U	U04	0.0 to 600.0 °C	UB2	32.0 to 1112.0 °F
L	L04	0.0 to 900.0 °C	LA9	32.0 to 1652.0 °F
PH100	D21	-200.0 to +200.0 °C	DO1	-200.0 to +200.0 °F
	D34	-100.0 to +100.0 °C	DC8	-199.99 to +199.99 °F
	D35	-200.0 to +850.0 °C	DC9	-328.0 to +1562.0 °F
JP100	P29	-100.0 to +100.0 °C	PC8	-199.99 to +199.99 °F
	P30	-200.0 to +640.0 °C	PC9	-328.0 to +1184.0 °F
			PD1	-200.0 to +200.0 °F

Type	Code	Measured range
0 to 10 mV DC	101	
0 to 100 mV DC	201	
0 to 1 V DC	301	
0 to 5 V DC	401	
0 to 10 V DC	501	
1 to 5 V DC	601	
0 to 20 mA DC	701	
4 to 20 mA DC	801	
-100 to +100 mV DC	901	
-1 to +1 V DC	902	
-10 to +10 mV DC	903	

Output assignments table

Code	OUT1	OUT2	DO1	DO2	DO3	DO4
1	MV1	MV2	EV1	EV2	EV3	EV4
2	MV1	MV2	EV1	EV2	EV3	HBA1 HBA2
3	MV1	MV2	EV1	EV2	HBA1 HBA2	FAIL
4	MV1	MV2	EV1	HBA1 HBA2	EV3	EV4
5	MV1	HBA1 HBA2	EV1	EV2	EV3	EV4
6	MV1	HBA1 HBA2	EV1	EV2	EV3	FAIL
7	MV1	FAIL	EV1	EV2	EV3	EV4

MV1: Control output 1, MV2: Control output 2, HBA1: Heater break alarm1, HBA2: Heater break alarm2, FAIL: Fail output (De-energized only), EV1 to EV4: Event output 1 to Event output 4
 - When used as Heat/Cool PID control or Position proportioning PID control, select any code of 1 to 4.
 - An output logic becomes OR output when two or more output functions are assigned to one output.

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