**Digital Controller** 

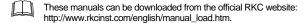
# FB400/FB900

# Installation Manual

Thank you for purchasing this RKC product. In order to achieve maximum performance and ensure proper operation of your new instrument, carefully read all the instructions in this manual. Please place the manual in a convenient location for easy reference

This manual describes the handling precautions, mounting, wiring and specifications only. For the basic operations, refer to FB400/FB900 Quick Operation Manual (IMR01W02-ELI) For detailed handling procedures and various function settings, please refer to the following separate manuals:

- FB400/FB900 Instruction Manual (IMR01W03-E□)
- FB100/FB400/FB900 Communication Instruction Manual (IMR01W04-E□)



#### **■ Product Check**

FB400/FB900 Installation Manual (IMR01W01-E8)	1 * 1 * 1
Case rubber packing (FB400: KFB400-36<1>, FB900: KFB900-36<1>)	

<sup>\*</sup> The German, French, Italian, Spanish and Chinese versions of the document are also available

#### ■ Optional (Sold separately)

Terminal cover (KFB400-58 <2>)

# ■ Safety Precautions



- An external protection device must be installed if failure of this instrument could result in damage to the instrument, equipment or injury to personnel.
- All wiring must be completed before power is turned on to prevent electric shock, fire or damage to instrument and equipment.
- This instrument must be used in accordance with the specifications to prevent fire or damage to instrument and equipment.
- This instrument is not intended for use in locations subject to flammable or explosive gases.
- Do not touch high-voltage connections such as power supply terminals, etc. to avoid electric shock.
- RKC is not responsible if this instrument is repaired, modified or disassembled by other than factory-approved personnel. Malfunction can occur and warranty is void under these conditions.

# CAUTION

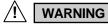
- This product is intended for use with industrial machines, test and measuring equipment. (It is not designed for use with medical equipment and nuclear energy.) This is a Class A instrument. In a domestic environment, this instrument may cause radio
- interference, in which case the user may be required to take additional measures. • This instrument is protected from electric shock by reinforced insulation. Provide
- reinforced insulation between the wire for the input signal and the wires for instrument power supply, source of power and loads.
- Be sure to provide an appropriate surge control circuit respectively for the following:
- If input/output or signal lines within the building are longer than 30 meters.
- If input/output or signal lines leave the building, regardless the length.
- This instrument is designed for installation in an enclosed instrumentation panel. All high-voltage connections such as power supply terminals must be enclosed in the instrumentation panel to avoid electric shock by operating personnel.
- All precautions described in this manual should be taken to avoid damage to the instrument or equipment.
- All wiring must be in accordance with local codes and regulations.
- To prevent instrument damage or failure, protect the power line and the input/output lines from high currents with a protection device such as fuse, circuit breaker, etc.
- Prevent metal fragments or lead wire scraps from falling inside instrument case to avoid electric shock, fire or malfunction.
- Tighten each terminal screw to the specified torque found in the manual to avoid electric shock, fire or malfunction.
- For proper operation of this instrument, provide adequate ventilation for heat dispensation.
- Do not connect wires to unused terminals as this will interfere with proper operation of the
- Turn off the power supply before cleaning the instrument.
- Do not use a volatile solvent such as paint thinner to clean the instrument. Deformation or discoloration will occur. Use a soft, dry cloth to remove stains from the instrument.
- To avoid damage to instrument display, do not rub with an abrasive material or push
- When high alarm with hold action/re-hold action is used for Event function, alarm does not turn on while hold action is in operation. Take measures to prevent overheating which may occur if the control device fails.

#### NOTICE

- This manual assumes that the reader has a fundamental knowledge of the principles of electricity, process control, computer technology and communications.
- The figures, diagrams and numeric values used in this manual are only for purpose of illustration
- RKC is not responsible for any damage or injury that is caused as a result of using this instrument, instrument failure or indirect damage. • RKC is not responsible for any damage and/or injury resulting from the use of instruments
- Periodic maintenance is required for safe and proper operation of this instrument. Some components have a limited service life, or characteristics that change over time.
- Every effort has been made to ensure accuracy of all information contained herein. RKC makes no warranty expressed or implied, with respect to the accuracy of the information. The information in this manual is subject to change without prior notice.
- No portion of this document may be reprinted, modified, copied, transmitted, digitized, stored, processed or retrieved through any mechanical, electronic, optical or other means without prior written approval from RKC.

#### 1. MOUNTING

made by imitating this instrument.



To prevent electric shock or instrument failure, always turn off the power before mounting or removing the instrument.

#### 1.1 Mounting Cautions =

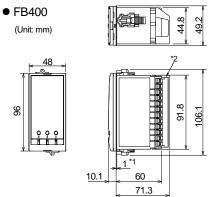
- (1) This instrument is intended to be used under the following environmental conditions (IEC61010-1) [OVERVOLTAGE CATEGORY II, POLLUTION DEGREE 2]
- (2) Use this instrument within the following environment conditions:
- Allowable ambient temperature: -10 to +50 °C
- Allowable ambient humidity: 5 to 95 %RH
- (Absolute humidity: MAX. W. C 29.3 g/m³ dry air at 101.3 kPa)
- Installation environment conditions: Indoor use
  - Altitude up to 2000 m
- (3) Avoid the following conditions when selecting the mounting location:
- Rapid changes in ambient temperature which may cause condensation.
- · Corrosive or inflammable gases.
- · Direct vibration or shock to the mainframe
- · Water, oil, chemicals, vapor or steam splashes.
- · Excessive dust, salt or iron particles.
- Excessive induction noise, static electricity, magnetic fields or noise.
- Direct air flow from an air conditioner.
- · Exposure to direct sunlight.
- Excessive heat accumulation.
- (4) Mount this instrument in the panel considering the following conditions:
- Provide adequate ventilation space so that heat does not build up.
- Do not mount this instrument directly above equipment that generates large amount of heat (heaters, transformers, semi-conductor functional devices, large-wattage resistors.)
- If the ambient temperature rises above 50 °C, cool this instrument with a forced air fan, cooler, etc. Cooled air should not blow directly on this instrument.
- In order to improve safety and the immunity to withstand noise, mount this instrument as far away as possible from high voltage equipment, power lines, and rotating machinery.

High voltage equipment: Do not mount within the same panel.

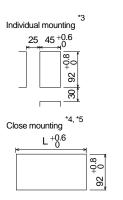
Power lines: Separate at least 200 mm Rotating machinery: Separate as far as possible.

- Mount this instrument in the horizontal direction for panel. If you did installation except a
- (5) If this instrument is permanently connected to equipment, it is important to include a switch or circuit-breaker into the installation. This should be in close proximity to the equipment and within easy reach of the operator. It should be marked as the disconnecting device for the equipment.

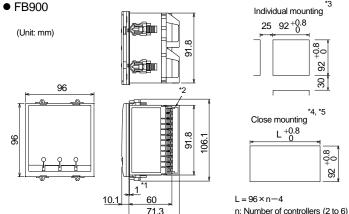
# 1.2 Dimensions =



Panel thickness: 1 to 10 mm (When mounting multiple FB400s close together, the panel strength should be checked to ensure proper support.



 $L = 48 \times n - 3$ n: Number of controllers (2 to 6)



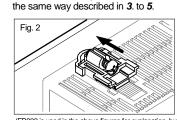
Panel thickness: 1 to 10 mm (When mounting multiple FB900s close together, the panel strength should be checked to ensure proper support.)

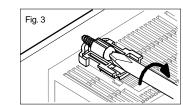
- \*1 Case rubber packing
- \*2 Terminal cover KFB400-58 <2> (optional) [sold separately]
- \*3 When cutting out each mounting hole through a panel for individual mounting, observe that there is no bur or distortion along the panel cutout surface, or there is no bend on the panel surface. If so, the water resistant characteristics may worsen.
- \*4 Remove the case rubber packing. Because of closely mounting the FB400s or FB900s, protection will be compromised and not meet IP66 (NEMA 4X) by close mounting.
- \*5 When controllers are closely mounted, ambient temperature must not exceed 50 °C.

## 1.3 Procedures of Mounting and Removing

## ■ Mounting procedures

- 1. Prepare the panel cutout as specified in 1.2 Dimensions.
- 2. Insert the instrument through the panel cutout. 3. Insert the mounting bracket into the mounting
- groove of the instrument. (Fig. 1) 4. Push the mounting bracket forward until the bracket
- is firmly secured to the panel. (Fig. 2) 5. Only turn one full revolution after the screw touches
- the panel. (Fig. 3) 6. The other mounting bracket should be installed





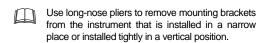
(FB900 is used in the above figures for explanation, but the same mounting procedures also apply to FB400.) The front of the instrument conforms to IP66 (NEMA 4X) when mounted on the panel. For effective waterproof/dustproof, the gasket must be securely placed between instrument and panel without any gap. If gasket is damaged,

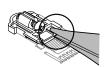
# ■ Removing procedures

- 1. Turn the power OFF.
- 2. Remove the wiring.
- 3. Loosen the screw of the mounting bracket. (Fig. 4)

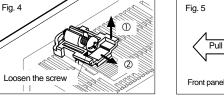
please contact RKC sales office or the agent.

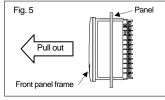
4. Lift the latch of the mounting bracket (10), then pull the mounting bracket (20) to remove it from the case. (Fig. 4)





- 5. The other mounting bracket should be removed in the same way as described in 3.
- 6. Pull out the instrument from the mounting cutout while holding the front panel frame of this instrument. (Fig. 5)





### 2. WIRING

# /!\ WARNING

To prevent electric shock or instrument failure, do not turn on the power until all wiring is completed. Make sure that the wiring is correct before applying power to the instrument.

#### 2.1 Wiring Cautions =

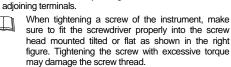
- For thermocouple input, use the appropriate compensation wire.
- For RTD input, use low resistance lead wire with no difference in resistance between
- To avoid noise induction, keep input signal wire away from instrument power line, load lines and power lines of other electric equipment.
- · If there is electrical noise in the vicinity of the instrument that could affect operation, use a noise filter
- Shorten the distance between the twisted power supply wire pitches to achieve the most effective noise reduction.
- Always install the noise filter on a grounded panel. Minimize the wiring distance between the noise filter output and the instrument power supply terminals to achieve the most effective noise reduction.
- Do not connect fuses or switches to the noise filter output wiring as this will reduce the effectiveness of the noise filter.
- About five seconds are required as preparation time for contact output every time the instrument is turned on. Use a delay relay when the output line is used for an external interlock circuit.
- Power supply wiring must be twisted and have a low voltage drop.
- For an instrument with 24 V power supply, supply power from a SELV circuit.
- · A suitable power supply should be considered in end-use equipment. The power supply must be in compliance with a limited-energy circuits (maximum available current of 8 A).
- This instrument is not furnished with a power supply switch or fuse. Therefore, if a fuse or power supply switch is required, install close to the instrument. Recommended fuse rating: Rated voltage 250 V, Rated current 1 A

Fuse type: Time-lag fuse Use the solderless terminal appropriate to the screw size. M3 × 7 (with 5.8 × 5.8 square washer) Screw size: Recommended tightening torque:

0.4 N·m (4 kgf·cm Applicable wire: Solid/twisted wire of 0.25 to 1.65 mm<sup>2</sup> Specified dimension: Refer to fig. 6

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) • Make sure that the any wiring such as solderless terminal is not in contact with the





φ 5.5 MAX

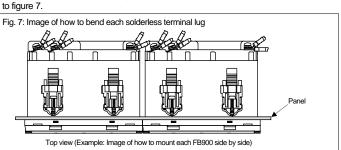
5.6 mm\_

φ 3.2 MIN

Fig. 6

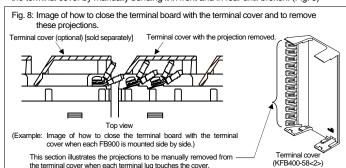
d 5 Ω

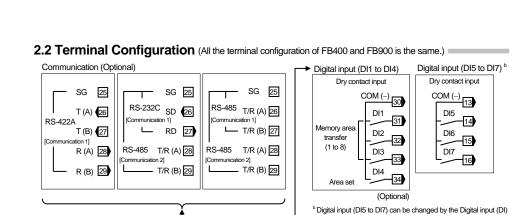
· Up to two solderless terminal lugs can be connected to one terminal screw, then refer



If solderless terminal lugs other than those in not specified dimensions are used, terminal screws may not be tightened. In such a case, bend each solderless terminal lug in advance and then conduct wiring. If the terminal screw is forcibly tightened, it may be damaged

 Caution for the terminal cover usage: If each solderless terminal lug touches the terminal cover, remove each projection from the terminal cover by manually bending it in front and in rear until broken. (Fig. 8)





25 26 27 28 29 30 31 32 33 34 35 36 Power supply CT input/PFF input/FBR input (Optional) 1 100-240 V CT input FBR input N 2 COM 17 COM 17 17 0 -CT1 CT1 18 AC L W ≸ <del><</del>18 23 24 1 12 19 19 19 c L 2 N CT input: Current transformer input PFF input: Power feed forward input Transmission DC + FBR input: Feedback resistance input 1 output 24 V Voltage/Curren Remote setting Measured input + AO 35 RTD Voltage/Current Voltage/Curren A 22

assignment in the Engineering Mode

RTD B 23

: Isolated from each other circuit blocks.

- в 24

TC 24

[Input/Output Isolation]

Power supply

Measured input

CT input

PFF input

FBR input

Digital input (DI1

Digital input (DI2)

Digital input (DI3)

Digital input (DI4)

Digital input (DI5)

Digital input (DI6)

Digital input (DI7)

Input type

S, R

PLII

Communication 1/Communication

When OUT1 and OUT2 can be used for

Table 2: Input type and Measured range

there is isolation between each output (OUT1, OUT2, AO).

-200.0 to +400.0 °C

-200.0 to +800.0 °C

-200 to +1372 °C

-328.0 to +400.0 °F

-250.0 to +800.0 °F

-328 to +2502 °F

-200.0 to +400.0 °C

-200.0 to +800.0 °C

-200 to +1200 °C

-200.0 to +700.0 °F

328.0 to +1200.0 °F

-328 to +2192 °F

-200.0 to +400.0 °C

-328.0 to +752.0 °F

-200 to +1000 °C

-328.0 to +1292.0 °

-328 to +1832 °F

0 to 1800 °C

0 to 3272 °F

0 to 1300 °C

0 to 2372 °F

0 to 1390 °C

0 to 2534 °F

−50 to +1768 °C 0 to 5 V

-58 to +3214 °F 1 to 5 V

-200.0 to +700.0 °C 0 to 10 V

0.0 to 400.0 °C

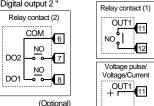
Remote setting inpu

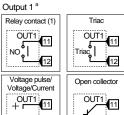
Digital output 3, Output 2 a Digital output 4 Relay contact (1) Triac OUT2 Relay contact (2) OUT2 9 riac 10 COM 3 NO NO 4 Voltage pulse/ Open collector DO3 NO 5 Voltage/Current OUT2 9 OUT2 + 9 (Optional) 10 10

\_ 🗀 [36]

(Optional)

Digital output 1 Digital output 2 Relay contact (2)





riac 12 OUT1 12 12

<sup>a</sup> 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)

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

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

# 3. SPECIFICATIONS

#### Measured input

Number of input 1 point Refer to table 2. Input type and range: Sampling cycle: 100 ms+0.3 %

(50 ms±5 % or 250 ms±0.3 % is selectable)

Influence of external resistance Approx. 0.2  $\mu$ V/ $\Omega$ (Converted depending on TC types)

Influence of input lead: Approx. 0.01 %/ $\Omega$  of PV (RTD input)  $10\,\Omega$  or less per wire Input impedance: TC input:

Voltage (low) input: 1 MΩ or more Voltage (high) input: Approx. 1 M $\Omega$ Approx. 50  $\Omega$ Approx. 250 μA (RTD input)

Sensor current: Action at input beak

TC input. Voltage (low) input: Upscale or Downscale

Voltage (high) input, Current input: Downscale (Indicates the value 0 V or 0 mA)

Action at input short circuit: Downscale (RTD input) -Input span to +Input span PV bias:

0.500 to 1.500 First order lag digital filter: 0.0 to 100.0 seconds (0.0: OFF) 0.00 to 25.00 % of input span Low level cutoff: Cold-junction temperature compensation error (TC input):

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: 0 to 10 mV DC, 0 to 100 mV DC, Voltage (low) input: 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 Sampling cycle: Input impedance Voltage (low) input: 1 MO or more

+ IN 20

\_\_\_21

Output (

Output module

-0-0-

-23

**-**24

ransmission output (AO)

Output 1 (OUT1)

Output 2 (OUT2)

Digital output 1 (DO1)

Digital output 2 (DO2)

Digital output 3 (DO3)

Digital output 4 (DO4)

0 to 2300 °C

0 to 4200 °F

0.0 to 600.0 °C

32.0 to 1112.0 °F

0.0 to 900.0 °C

32.0 to 1652.0 °F

100.00 to +100.00 °

-200.0 to +850.0 °C

199.99 to +199.99 °

328.0 to +1562.0 °F

100.00 to +100.00 °C

-200.0 to +640.0 °C

199.99 to +199.99 °

328.0 to +1184.0 °

Programmable

range

19999 to +19999

Measured range Input type Measured range

Pt100

JPt100

±1 V

0 to 1 V

0 to 100 mV

±100 mV

±10 mV

0 to 20 mA

4 to 20 mA

Relay contact output (2)]

Voltage (high) input: Approx. 1 M $\Omega$ Current input: Approx.  $50 \Omega$ Downscale (Indicates the value 0 V or 0 mA) Action at input beak: 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 Allowable input voltage:

# 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) CTL-6-P-N: Input range:

Automatic power frequency detection: Power frequency can be set by automatic

CTL -12-S56-10L-N: 0.0 to 100.0 A

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  $\Omega$  to 10 k $\Omega$  (Standard: 135  $\Omega$ ) Input range: 0.0 to 100.0 %

(for adjustment span of open and close) Sampling cycle: Twice of the measured input sampling cycle

#### Power feed forward (PFF) input [Optional]

Number of input: 1 point (Use the special transformer) Allowable voltage range:

0 to 20 V Input of instrument: 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

Twice of the measured input sampling cycle

# Digital input (DI)

Number of inputs 7 points (DI1 to DI4 [optional], DI5 to DI7) Input method: Dry contact input Open state:  $500 \text{ k}\Omega$  or mo Close state:  $10 \Omega$  or less 500 kO or more Contact current: 5 mA or less

Voltage at open: Approx. 5 V DC Capture judgment time: 200 ms

#### Output Number of outputs:

Output type:

7 points (OUT1, OUT2, DO1 to DO4, AO) Refer to table 1

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: 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 0/12 V DC (Rating) Output voltage: ON voltage: 11 to 13 V

OFF voltage: 0.2 V or less Allowable load resista e: 600 O 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 M $\Omega$  or more Voltage output

Output voltage (Rating): 0 to 10 V DC, 0 to 5 V DC, 1 to 5 V DC 0 to 1 V DC (AO only)

-0.5 to +10.5 V DC, -0.25 to +5.25 V DC, Output range 0.8 to 5.2 V DC. -0.05 to +1.05 V DC Allowable load resistance: 1 k $\Omega$  or more

Output impedance: Triac output

AC output (Zero-cross method) Output 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 Sink type Output method: Allowable load current: 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]

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

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/m<sup>3</sup> dry air at 101.3 kPa)

Between measuring terminal and grounding:

20 M $\Omega$  or more at 500 V DC Between power supply terminal and grounding: 20 MO or more at 500 V DC Between power supply and measuring terminals:

20  $M\Omega$  or more at 500 V DC When grounding is not provided: Between panels Withstand voltage

Time: 1 min.	Φ	(2)	3	(4)	(5)
Grounding terminal					
② Power terminal	1500 V AC				
<ul> <li>Measured input terminal</li> </ul>	1500 V AC	2300 V AC			
Output terminal (Relay contact, Triac)	1500 V AC	2300 V AC	2300 V AC		
<ul><li>Output terminal (Voltage, Current)</li></ul>	1500 V AC	2300 V AC	1500 V AC		
<ul> <li>Communication, digital input (DI) terminals</li> </ul>	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 -25 to +55 °C (at storage), Temperature:

-40 to +70 °C (at transport) Humidity 5 to 100 %RH (Non condensing) Installation environment conditions:

Altitude up to 2000 m

FB400: Approx. 230 g Weight FB900: Approx. 290 a

#### Standard

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

FN61010-1

I VD.

OVERVOLTAGE CATEGORYII, POLLUTION DEGREE 2. Class II (Reinforced insulation)

• FMC: FN61326-1 RCM: EN55011

NEMA 4X (NEMA250), IP66 (IEC60529) Panel sealing

[Front panel]

# 4. MODEL CODE

### Suffix code

FB900 (1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12)

: Indicates a specification code to be optional specified. If this section is blank, this

# (1) Output 1 (OUT1), (2) Output 2 (OUT2)

N: None (OUT2 only) 6: Voltage output (1 to 5 V DC) M: Relay contact output : Current output (0 to 20 mA DC) 8: Current output (4 to 20 mA DC) V: Voltage pulse output

4: Voltage output (0 to 5 V DC) T: Triac output 5: Voltage output (0 to 10 V DC) 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)

4: DO1 + DO2 + DO3 + DO4 N: None

(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

## F: Feedback resistance input

(6) Transmission output (AO) 6: Voltage output (1 to 5 V DC)\* N: None 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 1,2

W: Communication 1 (RS-232C) + Communication 2 (RS-485) 1,2 X: Communication 1 (RS-485) + Communication 2 (RS-485) Y: No communication 1 + Communication 2 (RS-485) 1,2

D: Digital input (DI1 to DI4) [Memory area transformer]

<sup>1</sup> 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.

<sup>2</sup> 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)

Specify quick start code 1 2: Specify quick start code 1 and 2

Factory set value: Refer to the Parameter list (IMR01W06-E□) (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)

00-000-00 (1) (2) (3) (4) (5) (6) (7) (8)

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

#### (2) Remote setting input

: 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) 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)

A: Deviation high Q: Deviation high R: Deviation low <sup>2</sup>
T: Deviation high/low B: Deviation low C: Deviation high/low

D: Band V: SV high W: SV low Deviation high F: Deviation low 1: MV high Deviation high/low MV low

3: Cooling MV high H: Process high 4: Cooling MV low
5: Control loop break alarm (LBA)<sup>3</sup> Process lov K: Process high

With Hold action 3 Can be selected only for Event 4 (EV4). With Re-hold action

(7) CT type N: CT1 (None), CT2 (None) P: CT1 (CTL-6-P-N), CT2 (None) S: CT1 (CTI -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

#### RKC communication (ANSI X3.28-1976) Modbus

 Range code table ermocouple (TC) input, RTD inpu

sured range -200.0 to +800.0 ° -200 to +1372 °C 0.0 to 400.0 °C -328 to +2502 °F 0.0 to 800.0 °F 0.0 to 800.0 °C 0 to 300 °C -200 to +1200 °C 0.0 to 400.0 °C -328 to +2192 °F 0.0 to 800.0 °F 0 to 400 °C 0 to 1600 °F E21 E06

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	Programmable range
0 to 10 V DC	501	-19999 to +19999
1 to 5 V DC	601	(Factory set value: 0.0 to 100.0 %)
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

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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