Digital Temperature Controller

RF100/RF400/RF900 Instruction Manual [Installation]

Z-1132 Specification

IMR02C34-E1

This Manual describes mounting, wiring, parts descriptions, etc. 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.

■ Product Check

Instruction Manual [Installation] (IMR02C34-E1) 1
Instruction Manual [Initial setting & Operation] (IMR02C35-E□) 1
Mounting bracket (with screw) .....2 *
Case rubber packing (optional) [Waterproof/Dustproof] 1
*RF900 Waterproof/Dustproof type: 4

■ Optional (Sold separately)

Terminal cover [KCA100-517] (RF100) 1
Terminal cover [KFB400-58<1>] (RF400/900) 1
Front cover [KRB100-36] (RF100) [KRB400-36] (RF400) [KRB900-36] (RF900).....1

■ Safety Precautions

⚠ WARNING

- 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 instrument.
- 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 front panel with a hard object.
- When high alarm with hold action/re-hold action is used for Alarm 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 made by imitating this instrument.
- 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

⚠ WARNING

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: 0 to 50 °C
- Allowable ambient humidity: 10 to 90 %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.

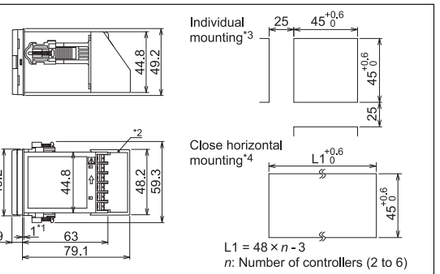
(4) Mount this instrument in the panel considering the following conditions:
- Provide adequate ventilation space so that heat does not build up.
- Ensure at least 50 mm space on top and bottom of the instrument for maintenance and environmental reasons.
- Do not mount this instrument directly above 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.
- The view angle of this controller is 30° to the upper side and the lower side from the center of the display.

(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

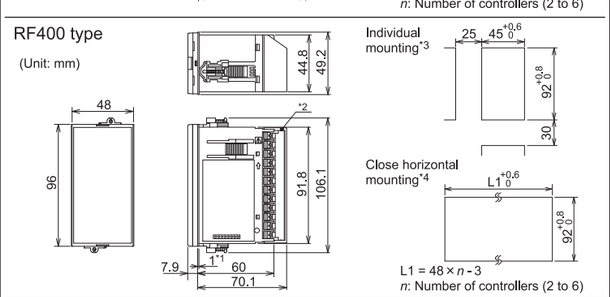
RF100 type

(Unit: mm)



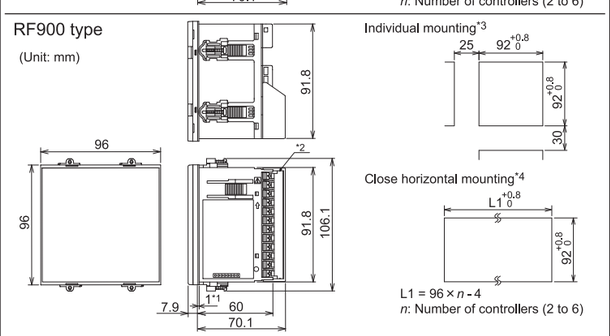
RF400 type

(Unit: mm)



RF900 type

(Unit: mm)

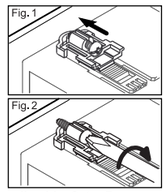


Panel thickness: 1 to 10 mm
(When mounting multiple RF series controllers close together, the panel strength should be checked to ensure proper support.)

*1 Case rubber packing (optional) [Waterproof/Dustproof]
*2 Terminal cover (optional) [sold separately]
*3 To keep the instrument as waterproof as possible, make sure that the panel surface has no burr or distortion where the hole is to be cut out.
*4 Remove the case rubber packing. When the RF series is mounted closely protection will be compromised and they will not meet IP66 (NEMA4X) standards.

1.3 Procedures of Mounting and Removing

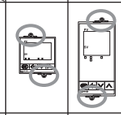
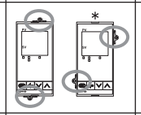
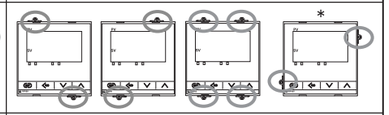
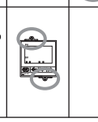
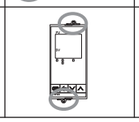
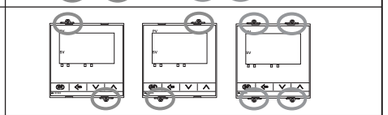
■ Mounting procedures



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.
4. Push the mounting bracket forward until the bracket is firmly secured to the panel. (Fig. 1)
5. Only turn one full revolution after the screw touches the panel. (Fig. 2)
6. The other mounting bracket should be installed the same way described in ***3.*** to ***5.***

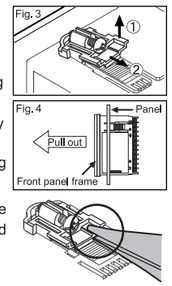
The front of the instrument conforms to **IP66 (NEMA4X)** [Specify when ordering] when mounted on the panel. For effective waterproof/dustproof, the gasket must be securely placed between instrument and panel without any gap. If gasket is damaged, please contact RKC sales office or the agent.

● The mounting position of the mounting bracket

	RF100	RF400	RF900
Individual mounting			
Close horizontal mounting			

If only two mounting brackets are used on the Waterproof/Dustproof type controller as shown in the figure (marked *), sufficient Waterproof/Dustproof performance cannot be obtained.

■ Removal procedures



1. Turn the power OFF.
2. Remove the wiring.
3. Loosen the screw of the mounting bracket.
4. Lift the latch of the mounting bracket (①), then pull the mounting bracket (②), to remove it from the case. (Fig. 3)
5. The other mounting bracket should be removed in the same way as described in ***3.*** and ***4.***
6. Pull out the instrument from the mounting cutout while holding the front panel frame of this instrument. (Fig. 4)

Use long-nose pliers to remove mounting brackets from the instrument that is installed in a narrow place or installed tightly in a vertical position.

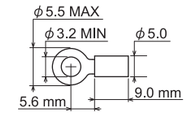
2. WIRING

⚠ 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 the three lead wires.
- 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.
- Allow approximately 5 seconds for contact output when 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.
- This instrument is not furnished with a power supply switch or fuse. 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.
  Screw size: M3 × 7 (with 5.8 × 5.8 square washer)
  Recommended tightening torque: 0.4 N·m (4 kgf·cm)
  Applicable wire: Solid/twisted wire of 0.25 to 1.65 mm²
  Specified dimension: Refer to Fig. at the right
  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)

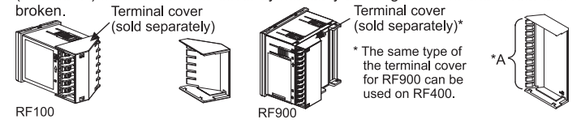


- Make sure that the any wiring such as solderless terminal is not in contact with the adjoining terminals.

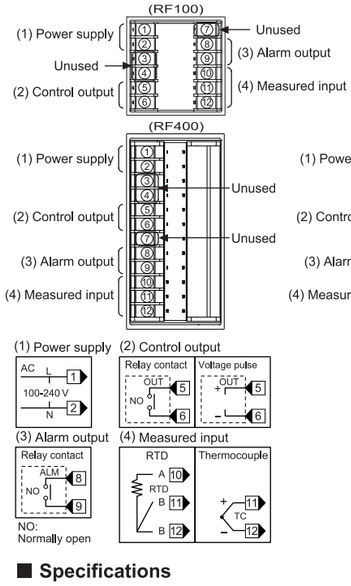
If specified terminal lugs other than those in not recommended dimensions are used, terminal screws may not be tightened. In such a case, bend each solderless terminal lug in advance and then conduct wiring. If the terminal screw is forcibly tightened, it may be damaged.

Up to two solderless terminal lugs can be connected to one terminal screw. However, in this case, reinforced insulation cannot be used.

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

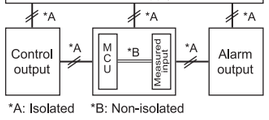


2.2 Terminal Configuration



To prevent malfunctioning, do not connect wires to unused terminals (No. 3, 4, and 7).

Isolation block diagram:



■ Specifications

Measured input

Number of input: 1 point
TC input: K, J, T, S, R, E, B, N (JIS C1602-1995), PLII (NBS), W5Re/W26Re (ASTM-E988-96)
Input impedance: 1 MΩ or more
Influence of external resistance: Approx. 0.25 μV/Ω
RTD input: Pt100 (JIS C1604-1997), JPt100 (JIS C1604-1997, JIS C1604-1981 of Pt100)
Influence of input lead: Approx. 0.03 %/Ω of span (10 Ω or less per wire)

Input accuracy:

Input type	Input range	Accuracy
K, J, T, E	Less than -100 °C	±(3.0 °C + 1 digit)
	-100 °C or more, Less than +500 °C	±(1.5 °C + 1 digit)
*1	+500 °C or more	±(0.3 % of Reading + 1 digit)
N, R, S, PLII, W5Re/W26Re	Less than 0 °C	±(6 °C + 1 digit)
	0 °C or more, Less than 1000 °C	±(3 °C + 1 digit)
*2	1000 °C or more	±(0.3 % of Reading + 1 digit)
B	Less than 400 °C	±(70 °C + 1 digit)
	400 °C or more, Less than 1000 °C	±(3 °C + 1 digit)
*2	1000 °C or more	±(0.3 % of Reading + 1 digit)
Pt100, JPt100	Less than 200 °C	±(0.6 °C + 1 digit)
	200 °C or more	±(0.3 % of Reading + 1 digit)

*1: Accuracy is not guaranteed for less than -100 °C.
*2: Accuracy is not guaranteed for less than 400 °C for Input type R, S, B, and W5Re/W26Re.

Sampling cycle: 500 ms
Action at input break: Upscale or downscale (TC)
Upscale (RTD)
Action at input short circuit: Downscale (RTD)
PV bias: -1999 to +9999 °C or -199.9 to +999.9 °C
First order lag digital filter: 0 to 100 seconds (0: filter OFF)

Output

Number of outputs: 2 points (OUT, ALM)
Relay contact output (OUT):
Contact type: 1a contact
Contact rating (Resistive load): 250 V AC 3 A, 30 V DC 1 A
Electrical life: 100,000 times or more (Rated load)
Mechanical life: 20 million times or more (Switching: 360 times/min [no-load])
Relay contact output (ALM):
Contact type: 1a contact
Contact rating (Resistive load): 250 V AC 1 A, 30 V DC 0.5 A
Electrical life: 150,000 times or more (Rated load)
Mechanical life: 20 million times or more (Switching: 360 times/min [no-load])
Voltage pulse output:
Output voltage (Rating): 0/12 V DC
ON voltage: 10 V to 13 V (at 20 mA)
OFF voltage: 0.5 V or less
Allowable load resistance: 600 Ω or more (20 mA or less)

Control

Control type: PID control (Reverse/Direct action)
P, PI, PD, or ON/OFF action is available
Option: Autotuning, Startup tuning, Fine tuning

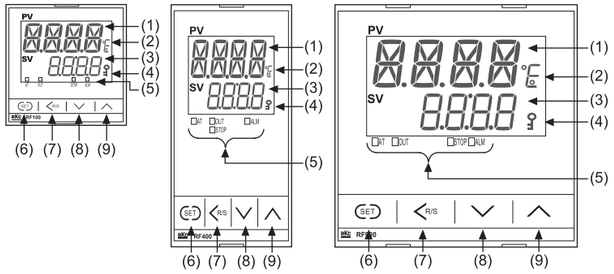
General specifications

Power supply voltage: 90 to 264 V AC [Including power supply voltage variation] (Rating 100 to 240 V AC), 50/60 Hz
Power consumption (at maximum load):
RF100: 5.1 VA max. (at 100 V AC) 8.1 VA max. (at 240 V AC)
RF400: 4.9 VA max. (at 100 V AC) 7.5 VA max. (at 240 V AC)
RF900: 5.2 VA max. (at 100 V AC) 7.7 VA max. (at 240 V AC)
Rush current: 5.6 A or less (at 100 V AC) 13.3 A or less (at 240 V AC)
Memory backup: Backed up by non-volatile memory
Number of writing: Approx. 1,000,000 times
Data storage period: Approx. 10 years
Allowable ambient temperature: 0 to 50 °C
Allowable ambient humidity: 10 to 90 %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
Material: Front panel, Case: PC *
Terminal block: PPE *
Panel sheet: Polyester
* Flame retardancy: UL94V-1
Weight: RF100: Approx. 105 g
RF400: Approx. 145 g
RF900: Approx. 210 g

Standard

Safety standards: UL: UL61010-1
cUL: CAN/CSA-C22.2 No. 61010-1
CE marking: LVD: EN61010-1
OVERVOLTAGE II, POLLUTION DEGREE 2, Class II (Reinforced insulation)
EMC: EN61326
C-Tick: AS/NZS CISPR 11 (equivalent to EN55011)
Panel sealing: NEMA 4X (NEMA250) IP66 (IEC60529) [Front panel (if specified in the model code)]

3. PARTS DESCRIPTION



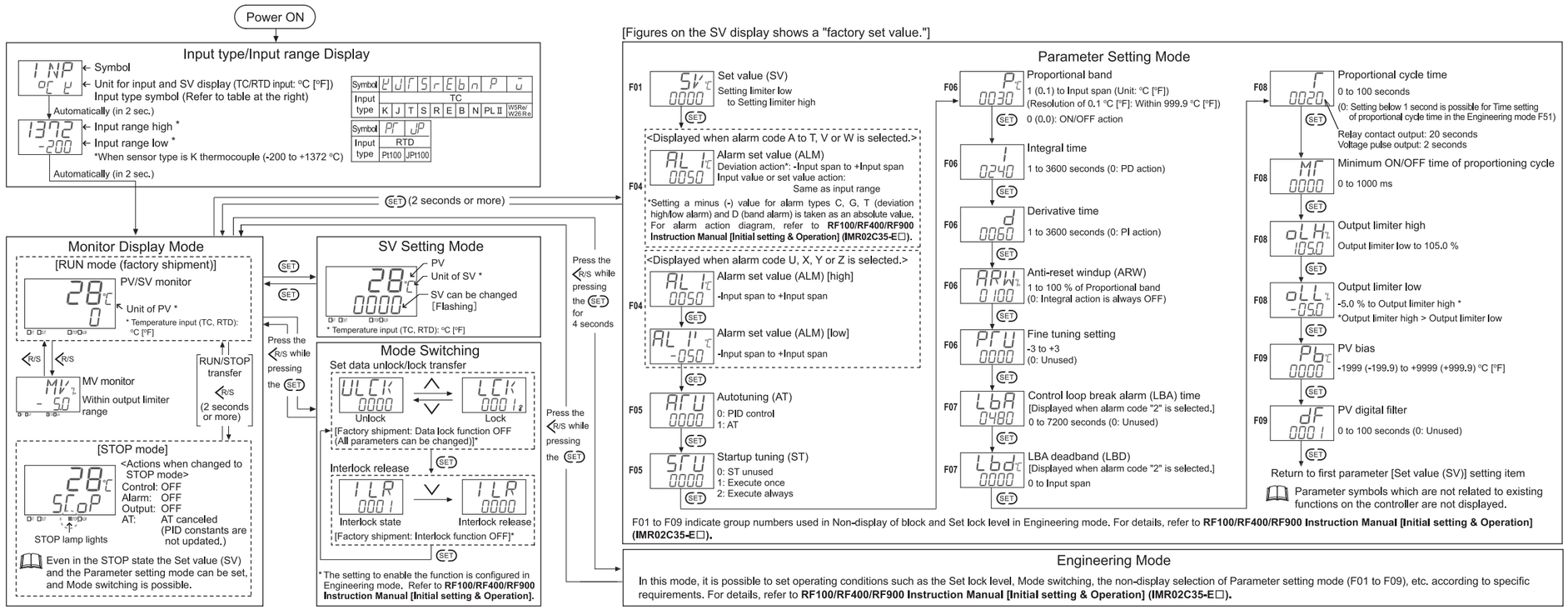
(1)	Measured value (PV) display	[Green]	Displays Measured value (PV) or various parameter symbols.
(2)	Unit display	[Green]	Displays the units (Temperature units: °C or °F) of displayed data.
(3)	Set value (SV) display	[Orange]	Displays Set value (SV) or various parameter set values.
(4)	Set lock display	[Orange]	Lights when the settings are locked.
(5)	AT lamp	[Green]	Flashes when Autotuning is activated. (After Autotuning is completed: AT lamp will go out) Light during Startup tuning (ST) execution.
	Output lamp	[Green]	OUT: Lights when control output is turned on.
	STOP lamp	[Green]	Lights when control is stopped (STOP).
	Alarm lamp	[Orange]	ALM: Lights when alarm output is turned on.

(6)	Set (SET) key	Used for parameter calling up and set value registration.
(7)	Shift key	Shift digits when settings are changed. Used to switch monitor items, RUN/STOP, and modes.
(8)	Down key *	Decrease numerals.
(9)	Up key *	Increase numerals.

* Also used to switch items within Mode switching (Set data unlock/lock, interlock release).

To avoid damage to the instrument, never use a sharp object to press keys.

4. OPERATION FLOW



● Set value change and registration

The changed data cannot be registered only by the operation of the ∧ and ∨ keys. In order for the new parameter value to be stored, the (SET) key must be pressed within 1 minute after the new value is displayed. The new value will then be saved and the display will move to the next parameter.

■ Operations

Cautions related to operation and an example of a basic operation procedure are given below. For details of the operation, refer to **RF100/RF400/RF900 Instruction Manual [Initial setting & Operation] (IMR02C35-E□).**

CAUTIONS

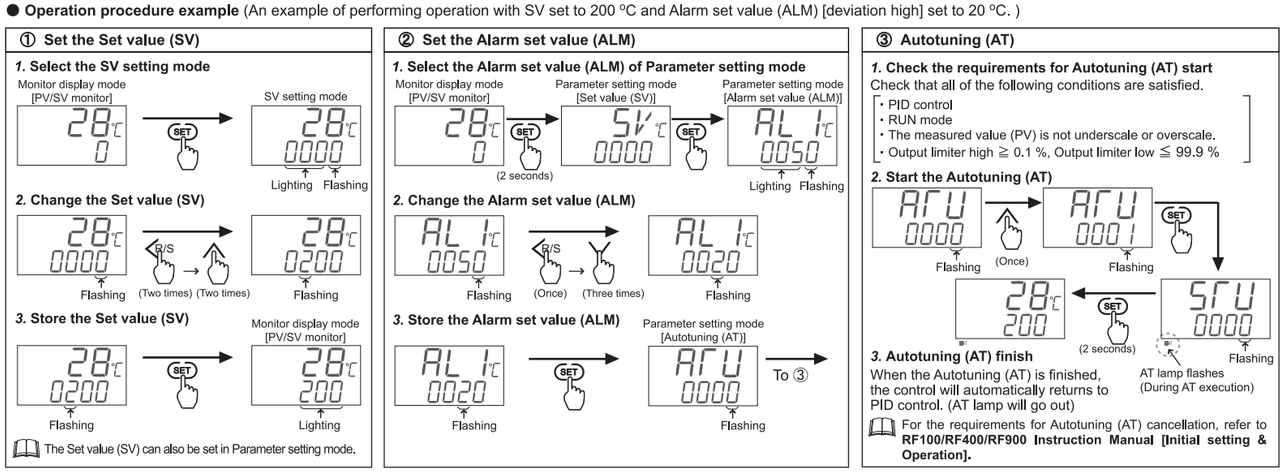
- There is no power switch on this instrument, and the instrument starts operation immediately following initial power ON (Factory set value: RUN).
- If the input signal wiring is disconnected or short-circuited (RTD input only), the instrument determines that input error (burnout, etc.) has occurred.

<Burnout direction>
Upscale: Thermocouple input*, RTD input (when input break)
Downscale: Thermocouple input*, RTD input (when short-circuited)
*Burnout direction can be selected by Engineering mode. (Factory set value: Upscale)

<Output at burnout>
Control output: According to the contents set by Control output at burnout (Factory set value: 0 [Result of control computation])
Alarm output: According to the contents set by Alarm output state at input burnout (Factory set value: 0 [The Alarm output is not forcibly turned ON when the burnout function is activated.])

- A power failure of 20 ms or less will not affect the control action. When a power failure of more than 20 ms occurs the instrument assumes that the power has been turned off. When power returns the controller will retain the conditions that existed prior to shut down.
- The alarm hold action is activated when the power is turned on or when transferred from STOP mode to RUN mode. (Alarm type with hold action)
- The alarm re-hold action is activated when not only the SV is changed, but also the power is turned on or when transferred from STOP mode to RUN mode. (Alarm type with re-hold action)

● Operation procedure example (An example of performing operation with SV set to 200 °C and Alarm set value (ALM) [deviation high] set to 20 °C.)



5. ERROR DISPLAYS

■ Display when input error occurs

Display	Description	Solution
Measured value (PV) [Flashing]	PV is outside of input range.	**Prior to replacing the sensor, always turn the power OFF or change to STOP with RUN/STOP transfer.** Check input range, sensor and sensor connection.
0000 [Flashing]	Over-scale: PV is above the display range limit high	
UUUU [Flashing]	Underscale: PV is below the display range limit low	

■ Self-diagnostic error

If two or more errors occur simultaneously, the total summation of these error codes is displayed.

Description	Action	Operation at error	Solution
Err 1 Flashing Adjustment data error	Indication lamp: All lamp turns off	Control output: Time-proportional control output: OFF Continuous control output: Output of -5 %	Turn off the power at once. If an error occurs after the power is turned on again, please contact RKC sales office or the agent.
Err 2 Flashing Data back-up error			
Err 4 Flashing A/D conversion error*		FAIL output: Contact open [When FAIL is selected for the Alarm (ALM)]	
Power supply voltage is abnormal	All display is OFF		
Watchdog timer			

* Including temperature compensation error

6. MODEL CODE

■ Suffix code

RF100
RF400 □□□□-□ ∗ □□/A/Y **Z-1132**
RF900 (1) (2) (3) (4) (5) (6) (7)

(1) Control Method
F: PID action with AT (Reverse action)
D: PID action with AT (Direct action)

(2) Measured input and Range
□□□: Refer to input range code table.

(3) Control output (OUT)
M: Relay contact output
V: Voltage pulse output (0/12 V DC)

(4) Alarm output (ALM)
□: Refer to alarm type code table.

(5) Waterproof/Dustproof
N: None
1: Waterproof/Dustproof (NEMA 4X, IP66)

(6) Case color
A: Black

(7) Instrument specification
/Y: Version symbol

Input range code table:

Type	Code	Range
K	K01	0 to 200 °C
	K02	0 to 400 °C
	K03	0 to 600 °C
	K04	0 to 800 °C
	K05	0 to 1000 °C
	K06	0 to 1200 °C
	K41	-200 to +1372 °C
	K43	-199.9 to +400.0 °C
	K09	0.0 to 400.0 °C
	K10	0.0 to 800.0 °C
	KA1	0 to 800 °F
	KA2	0 to 1600 °F
	KC7	-328 to +2501 °F
	KC8	-100.0 to +752.0 °F

Type	Code	Range
J	J01	0 to 200 °C
	J02	0 to 400 °C
	J03	0 to 600 °C
	J04	0 to 800 °C
	J05	0 to 1000 °C
	J06	0 to 1200 °C
	J15	-200 to +1200 °C
	J07	-199.9 to +300.0 °C
	JA1	0 to 800 °F
	JA2	0 to 1600 °F
	JB9	-328 to +2192 °F
	JC8	-199.9 to +550.0 °F
T	T02	-199.9 to +100.0 °C
	T03	-100.0 to +200.0 °C

Type	Code	Range
T	T05	-199.9 to +300.0 °C
	T06	0.0 to 400.0 °C
	TC7	0.0 to 600.0 °F
	TC8	-199.9 to +300.0 °F
	TC9	-328 to +752 °F
S	S02	0 to 1769 °C
	SA2	0 to 3216 °F
R	R02	0 to 1769 °C
	RA2	0 to 3216 °F
E	E01	0 to 800 °C
	E02	0 to 1000 °C
	EA1	0 to 1600 °F
	EA2	0 to 1832 °F
B	B01	400 to 1800 °C

Type	Code	Range
B	B02	0 to 1820 °C
	BA1	800 to 3200 °F
	BA2	0 to 3308 °F
N	N01	0 to 1200 °C
	N02	0 to 1300 °C
	NA1	0 to 2300 °F
	NA2	0 to 2372 °F
PL II	A01	0 to 1300 °C
	A02	0 to 1390 °C
	AA1	0 to 2400 °F
	AA2	0 to 2534 °F
WRe5/ W26Re	W01	0 to 2000 °C
	W02	0 to 2320 °C
	WA4	0 to 4208 °F

Type	Code	Range
Pt100	D01	-199.9 to +649.0 °C
	D02	-199.9 to +200.0 °C
	D03	-100.0 to +50.0 °C
	D04	-100.0 to +100.0 °C
	D05	-100.0 to +200.0 °C
	D06	0.0 to 50.0 °C
	D07	0.0 to 100.0 °C
	D08	0.0 to 200.0 °C
	D09	0.0 to 300.0 °C
	D10	0.0 to 500.0 °C

Type	Code	Range
Pt100	DA2	-199.9 to +400.0 °F
	DA3	-199.9 to +200.0 °F
	DA4	-199.9 to +100.0 °F
	DA5	-199.9 to +300.0 °F
	DA6	0.0 to 100.0 °F
	DA7	0.0 to 200.0 °F
	DA8	0.0 to 400.0 °F
	DA9	0.0 to 500.0 °F
	DB2	-199.9 to +900.0 °F

Type	Code	Range
JPt100	P01	-199.9 to +649.0 °C
	P02	-199.9 to +200.0 °C
	P03	-100.0 to +50.0 °C
	P04	-100.0 to +100.0 °C
	P05	-100.0 to +200.0 °C
	P06	0.0 to 50.0 °C
	P07	0.0 to 100.0 °C
	P08	0.0 to 200.0 °C
	P09	0.0 to 300.0 °C
	P10	0.0 to 500.0 °C

Alarm type code table:

Code	Type	Code	Type	Code	Type	Code	Type
A	Deviation high	H	Process high	U	Band (High/Low individual setting)	Y	Deviation high/low [1] (High/Low individual setting)
B	Deviation low	J	Process low				
C	Deviation high/low	K	Process high [1]	V	SV high	Z	Deviation high/low [2] (High/Low individual setting)
D	Band	L	Process low [1]	W	SV low		
E	Deviation high [1]	Q	Deviation high [2]	X	Deviation high/low (High/Low individual setting)	2	Control loop break alarm (LBA)
F	Deviation low [1]	R	Deviation low [2]			3	FAIL
G	Deviation high/low [1]	T	Deviation high/low [2]			4	Monitor during RUN

[1] With hold action [2] With re-hold action

The first edition: JUL. 2009 [IMQ00]

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