

IMR01N01-E1

Thank you for purchasing the 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 this manual in a convenient location for easy reference.

**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 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 adequate 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 of 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.

**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.
- 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.

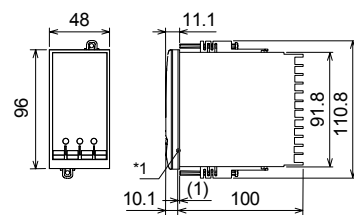
**■ Mounting Environment**

- (1) This instrument is intended to be used under the following environmental conditions. (IEC61010-1) [OVERVOLTAGE CATEGORY II, POLLUTION DEGREE 2]
- (2) Avoid the following conditions when selecting the mounting location:
  - Ambient temperature less than -10 or more than +50 °C.
  - Ambient humidity of less than 20 % or more than 85 % RH.
  - 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.

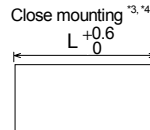
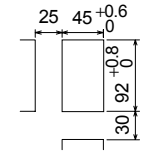
**■ Dimensions**

● HA400/HA401

(Unit: mm)



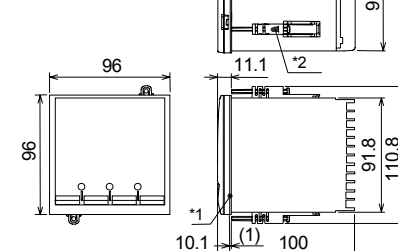
Individual mounting



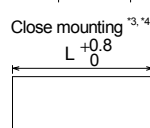
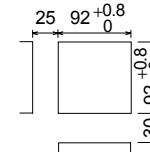
L = 48 × n - 3 n: Number of units (2 ≤ n ≤ 6)

● HA900/HA901

(Unit: mm)



Individual mounting

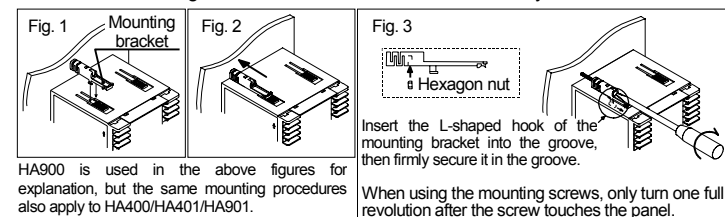


L = 96 × n - 4 n: Number of units (2 ≤ n ≤ 6)

- \*1 Rubber (Option)
  - \*2 Up to 4 mounting brackets can be used.
  - \*3 If the HA400/HA401 or HA900/HA901s have waterproof/dustproof options, protection will be compromised and not meet IP65 by close mounting.
  - \*4 When mounting each instrument closely side by side, be much careful that it is not exposed to an ambient temperature of more than 50 °C.
- For mounting of the HA400/HA401 or HA900/HA901, panel thickness must be between 1 to 10 mm. When mounting multiple HA400/HA401 or HA900/HA901s close together, the panel strength should be checked to ensure proper support.

**■ Mounting Procedures**

1. Prepare the panel cutout as specified in ■ 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. The other mounting bracket should be installed the same way described in 3. and 4.



- When the instrument is mounted, always secure with two mounting brackets either top and bottom.
- In addition, the mounting assembly also include two screws which can be used with the brackets to secure the instrument to the panel. See Fig. 3.
- The waterproof/dustproof option on the front of the instrument conforms to IP65 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.

**2. WIRING**

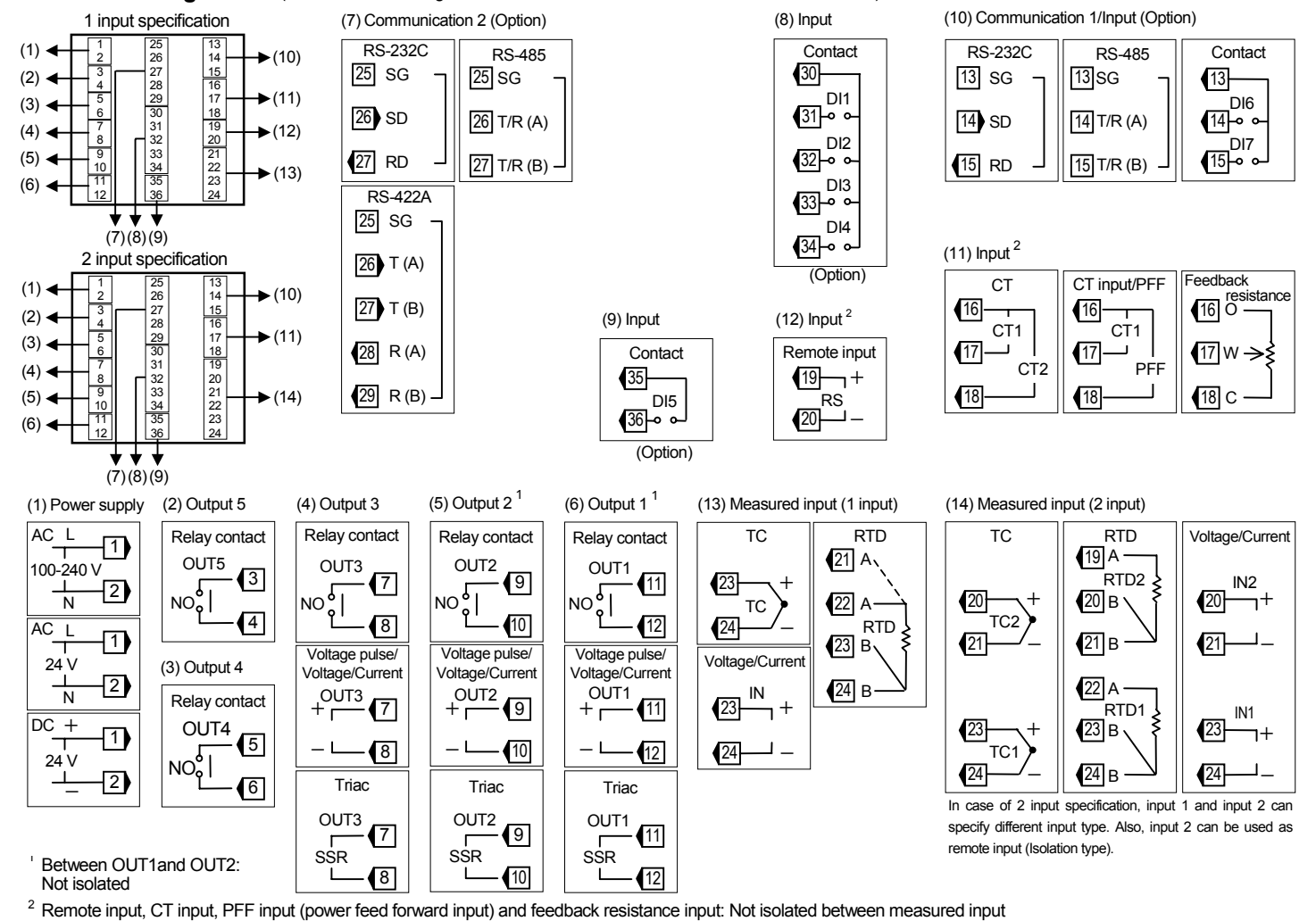
**WARNING**

To prevent electric shock or instrument failure, do not turn on the power until all the wiring is completed.

**■ 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.
- 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.
- 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. Screw size: M3 × 6 (With 5.8 × 8 square washer) Recommended tightening torque: 0.4 N·m (4 kgf·cm)

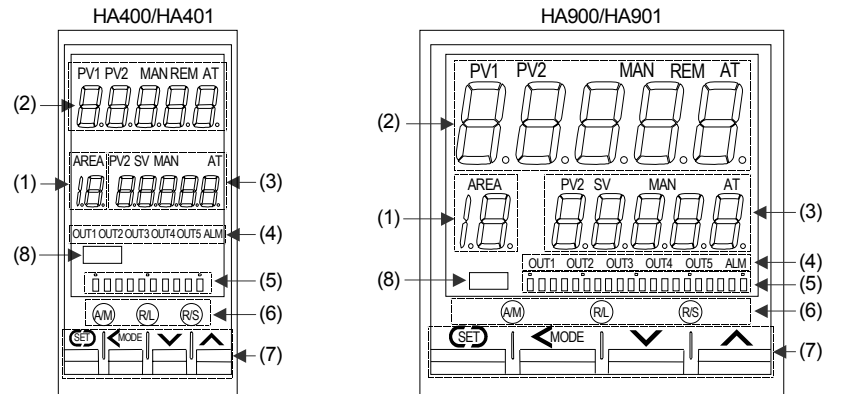
**■ Terminal Configuration** (All the terminal configuration of HA400, HA401, HA900 and HA901 is the same.)



**■ Specifications**

- Power supply voltage: 90 to 264 V AC [Power supply voltage range], 50/60 Hz (Rating: 100 to 240 V AC)  
 21.6 to 26.4 V AC [Power supply voltage range], 50/60 Hz (Rating: 24 V AC)  
 21.6 to 26.4 V DC [Power supply voltage range] (Rating: 24 V DC)
- Power consumption:  
 HA400/HA401: 12 VA max. (at 100 V AC) 17 VA max. (at AC 240 V)  
 11 VA max. (at 24 V AC) 270 mA max. (at 24 V DC)  
 HA900/HA901: 13 VA max. (at 100 V AC) 19 VA max. (at 240 V AC)  
 12 VA max. (at 24 V AC) 300 mA max. (at 24 V DC)
- Measured input: TC input, RTD input, Voltage input, Current input
- Option input: Remote input (Isolation type), Feedback resistance input, CT input, Event input, Power feed forward input
- Output (OUT1 to OUT3):  
 Relay contact output: 250 V AC, 3A (Resistive load), 1a contact  
 Electrical life 300,000 times or more (Rated load)
- Voltage pulse output: DC 0/12 V (Load resistance 600 Ω or more)
- Current output: 0 to 20 mA DC, 4 to 20 mA DC (Load resistance 600 Ω or less)
- Voltage output: 0 to 5 V DC, 1 to 5 V DC, 0 to 10 V DC (Load resistance 1 kΩ or more)
- Triac output: Rated current 0.4 A
- Output (OUT4 to OUT5):  
 Relay contact output: 250 V AC, 1 A (Resistive load), 1a contact  
 Electrical life 300,000 times or more (Rated load)
- Control method: Brilliant PID control (Direct action, Reverse action or Position proportioning is available)
- Ambient temperature: -10 to +50 °C
- Ambient humidity: 20 to 85 % RH (Non-condensing)
- Operating environment: There should be neither corrosive gases nor much dust.
- Weight: HA400/HA401: Approx. 360 g  
 HA900/HA901: Approx. 460 g

### 3. PARTS DESCRIPTION



(1) Area display		
Area (AREA) display lamp [Green]	Lights when memory area number is displayed.	
Memory area display	Displays memory area number. (1 to 16).	
(2) The upper display		
Measured value 1 (PV1) lamp [Green]	Lights when measured value 1 is displayed on the PV1/PV2 display unit.	
Measured value 2 (PV2) lamp * [Green]	Lights when measured value 2 is displayed on the PV1/PV2 display unit.	
Manual (MAN) mode lamp [Green]	Lights in manual operation.	
Remote (REM) mode lamp [Green]	Lights in remote setting.	
Autotuning (AT) lamp [Green]	Flashes during autotuning execution. (After autotuning is completed: AT lamp OFF)	
Measured value (PV1/PV2) display	Displays PV1, PV2 or various parameter symbols.	

\* Only when measured value is 2 input specification.

(3) The lower display		
Measured value2 (PV2) lamp * [Green]	Lights when measured value 2 is displayed on the SV display unit.	
Set value (SV) lamp [Green]	Lights when set value (SV) is displayed on the SV display unit.	
Manual (MAN) mode lamp * [Green]	Lights in manual operation.	
Autotuning (AT) lamp * [Green]	Flashes during autotuning execution. (After autotuning is completed: AT lamp OFF)	
Set value (SV) display	Displays SV, PV2 or various parameter set values.	

\* Only when measured value is 2 input specification.

(4) Output/Alarm lamp		
Output (OUT1 to OUT5) lamp [Green]	Lights when the output corresponding to each lamp is ON.	
Alarm (ALM) lamp [Red]	Lights when alarm is turned on.	

(5) Bar graph display *		
Manipulated output value (MV), feedback resistance input value and deviation can be displayed in bar-graph.		
Manipulated output value (MV) display	Displays the manipulated output value (MV). When manipulated output value (MV) becomes 0 % or less, the dot at the left end of the bar-graph only flashes and when it exceeds 100 %, that at the right end flashes.	[Example]
Feedback resistance input value display	Displays the feedback resistance input value (POS). (Only in position proportioning PID control)	[Example]
Deviation display	Displays the deviation of measured value (PV) corresponding to the set value (SV). The dots at both ends of bar-graph light to indicate deviation display.	[Example]
Measured value display	Displays the measured value (PV). Scaling in the scale range.	
Set value display	Displays the set value (SV). Scaling in the scale range.	

\*The number of dots: 10 dots (HA400/HA401), 20 dots (HA900/HA901)

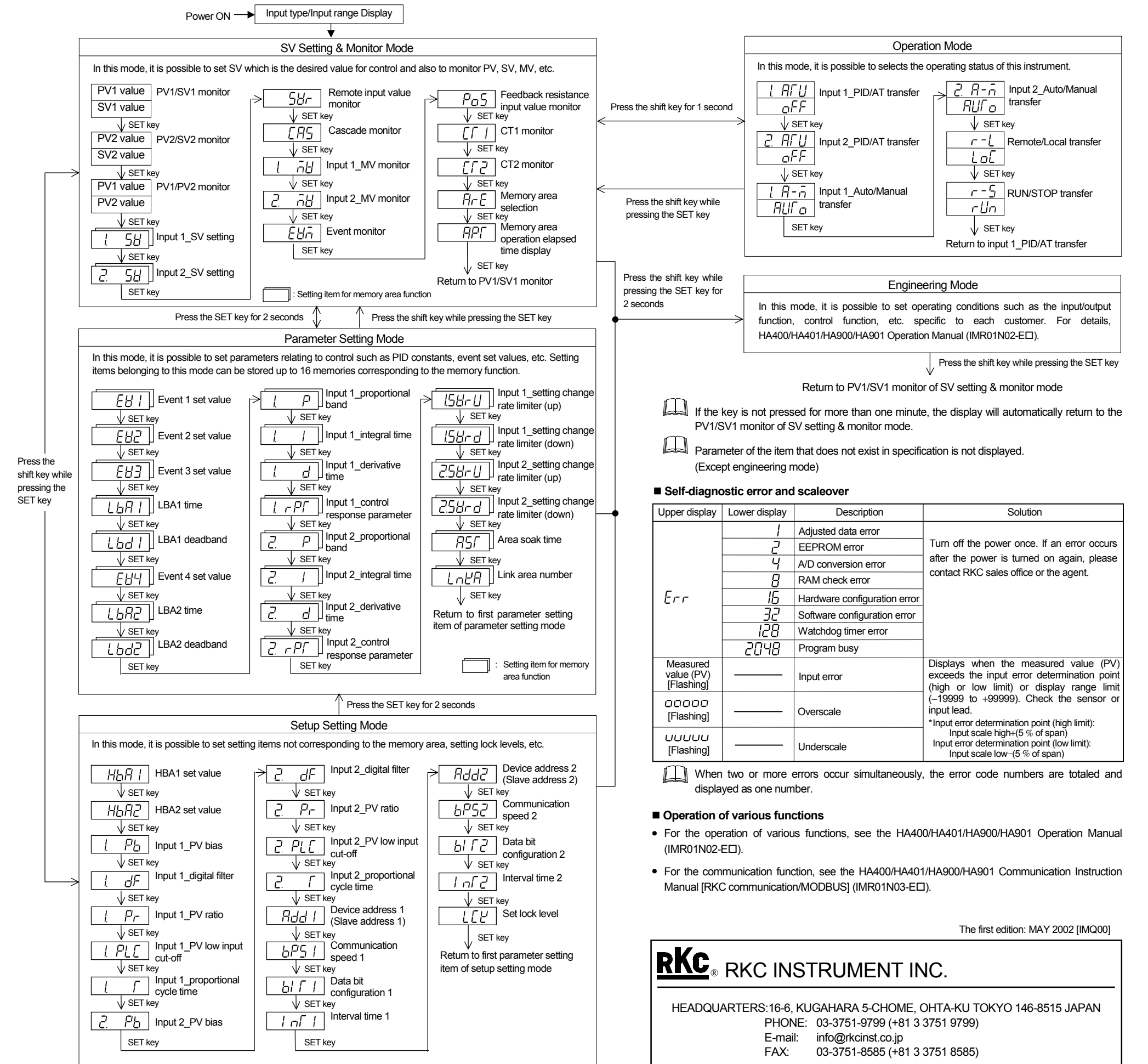
(6) Direct key		
(AM) Auto/Manual transfer key	Every time the A/M key is pressed, auto operation or manual operation is selected.	
(RL) Remote/Local transfer key	Every time the R/L key is pressed, remote setting or local setting is selected.	
(RS) RUN/STOP transfer key	Every time the R/S key is pressed, RUN or STOP is selected.	

(7) Operation key		
(SET) Set (SET) key	Used for parameter calling up and set value registration.	
(MODE) Shift key	Shift digits when settings are changed. Used to selection operation between modes.	
(DOWN) Down key	Decrease numerals.	
(UP) Up key	Increase numerals.	

(8) Loader communication  
Used when execute transmission and reception of data between this instrument and loader.  
(Available in the near future.)

### 4. OPERATION FLOW OF EACH MODE

In order to make this instrument operable after being mounted on equipment and then wired, it needs to be set with operating conditions such as the set value (SV), input/output function, control function, etc. specific to each customer. In addition, the following operational flowchart illustrates key operation in each mode or each setting item. When actually setting these operating conditions specific to the customer, see the HA400/HA401/HA900/HA901 Operation Manual (IMR01N02-ED).



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**RKC** RKC INSTRUMENT INC.

HEADQUARTERS:16-6, KUGAHARA 5-CHOME, OHTA-KU TOKYO 146-8515 JAPAN  
PHONE: 03-3751-9799 (+81 3 3751 9799)  
E-mail: info@rkcinst.co.jp  
FAX: 03-3751-8585 (+81 3 3751 8585)