



Temperature Controller

## GZ400/GZ900

## Installation Manual

IMR03D01-E3

All Rights Reserved, Copyright © 2020, RKC INSTRUMENT INC.

Thank you for purchasing this RKC product. In order to achieve maximum performance and ensure proper operation of the instrument, carefully read all the instructions in this manual. Please place the manual in a convenient location for easy reference. This manual describes installation and wiring of GZ400/900 controllers.

For detailed handling procedures and key operations, refer to separate **GZ400/GZ900 Instruction Manual**. The manual can be downloaded from the official RKC website: <https://www.rkcinst.co.jp/english/download-center/>

### WARNING

- To prevent injury to persons, damage to the instrument and the equipment, a suitable external protection device shall be required.
- All wiring must be completed before power is turned on to prevent electric shock, fire or damage to the instrument and the equipment.
- This instrument must be used in accordance with the specifications to prevent fire or damage to the instrument and the 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 may 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 plant.)
- 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 to operating personnel.
- All precautions described in this manual should be taken to avoid damage to the instrument or equipment.
- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.
- All wiring must be in accordance with local codes and regulations.
- To prevent instrument damage as a result of failure, protect the power line and the input/output lines from high currents with a suitable overcurrent protection device with adequate breaking capacity such as a fuse, circuit breaker, etc.
- A malfunction in this product may occasionally make control operations impossible or prevent alarm outputs, resulting in a possible hazard. Take appropriate measures in the end use to prevent hazards in the event of malfunction.
- 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 dissipation.
- 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 may occur. Use a soft, dry cloth to remove stains from the instrument.
- To avoid damage to the instrument display, do not rub with an abrasive material or push the 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 explanation purpose.
- 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.

- Various symbols are used on the equipment, and they have the following meaning.
  - ~: Alternating current
  - : Reinforced insulation
  - ⚠: Safety precaution
- This symbol is used where the instruction manual needs to be consulted for the safety of both the operator and the equipment. Carefully read the cautions in this manual before using the instrument.

## 1. MOUNTING

### WARNING

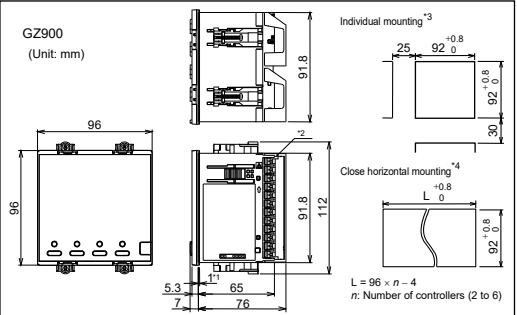
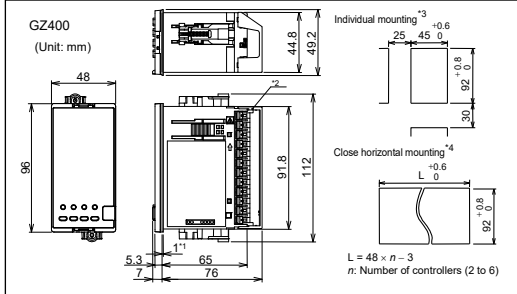
To prevent electric shock or instrument failure, always turn off the power before mounting or removing the instrument.

### 1.1 Mounting Cautions

- (1) This instrument is intended to be used under the following environmental conditions. (IEC 61010-1) [OVERVOLTAGE CATEGORY II, POLLUTION DEGREE 2]
  - Use this instrument within the following environment conditions:
    - Allowable ambient temperature: -10 to +55 °C
    - Allowable ambient humidity: 5 to 95 %RH (Absolute humidity: MAX. W. C 29 g/m3 dry air at 101.3 kPa)
  - Installation environment conditions: Indoor use
    - Altitude up to 2000 m
    - Short-term temporary overvoltage: 1440 V
    - Long-term temporary overvoltage: 490 V
- (2) 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 instrument.
  - 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:
  - Ensure at least 50 mm space on top and bottom of the instrument for maintenance and operating environment.
  - Do not mount this instrument directly above the equipment that generates large amount of heat (heaters, transformers, semi-conductor functional devices, large-voltage resistors).
  - If the ambient temperature rises above 55 °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.
  - For correct functioning mount this instrument in a horizontal position.
- (5) In case this instrument is connected to a supply by means of a permanent connection, a switch or circuit-breaker shall be included in the installation. This shall be in close proximity to the equipment and within easy reach of the operator. It shall be marked as the disconnecting device for the equipment.

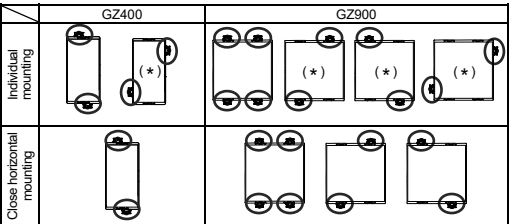
### 1.2 Dimensions



Panel thickness: 1 to 10 mm (When mounting multiple GZ400/900 controllers close together, the panel strength should be checked to ensure proper support.)

- \*1 Gasket (optional)
- \*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 gasket. When the GZ400/900 is mounted closely protection will be compromised and they will not meet IP65 standards.

### ■ The mounting position of the mounting brackets

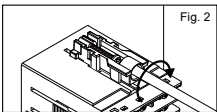
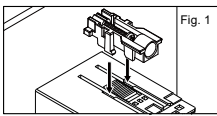


(\*) GZ400 with mounting brackets attached on the side and GZ900 mounted with two mounting brackets do not provide water and dustproof protection.

### 1.3 Procedures of Mounting and Removing

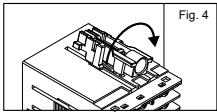
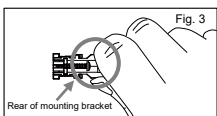
#### ■ Mounting procedures

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) Do not push the bracket forcibly forward.
4. Tighten up the screw for the mounting bracket with a Phillips screwdriver so that the mounting bracket is firmly secured in place. (Fig. 2) Give the screw another turn when the tip of the screw touches the panel.
5. The other mounting bracket(s) should be installed in the same way as described in 3 and 4.



#### ■ Removal procedures

1. Turn the power OFF.
2. Remove the wiring.
3. Loosen the screw of the mounting bracket.
4. Hold the rear of the mounting bracket (Fig.3), and lift up one side to remove it from the case. (Fig. 4)
5. The other mounting bracket(s) 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.



Use long-nose pliers to remove the mounting brackets from the instrument that is installed in a narrow space or installed closely to each other in a vertical position.

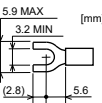
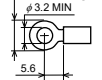
## 2. WIRING

### 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

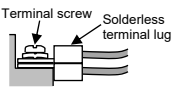
- For thermocouple input, use the appropriate compensation wire.
- For RTD input, use low resistance lead wire with no difference in resistance between the three lead wires.
- To avoid noise induction, keep input signal wire away from instrument power line, load lines and power lines of other electric equipment.
- Signal connected to Voltage input and Current input shall be low voltage defined as "SELV" circuit per IEC 60950-1.
- 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.
- For an instrument with 24 V power supply input, supply power from a "SELV" circuit defined as IEC 60950-1.
  - Fuse type: Time-lag fuse (Approved fuse according IEC 60127-2 and/or UL 248-14)
  - Fuse rating: Rated voltage 250 V AC
  - Rated current: 0.5 A (for 24 V AC/DC type) 1 A (for 100 to 240 V AC type)
- This instrument is not provided with an overcurrent protection device. For safety, install an overcurrent protection device (such as a fuse) with adequate breaking capacity close to the instrument.
  - Fuse type: Time-lag fuse (Approved fuse according IEC 60127-2 and/or UL 248-14)
  - Fuse rating: Rated voltage 250 V AC
  - Rated current: 0.5 A (for 24 V AC/DC type) 1 A (for 100 to 240 V AC type)
- Use the solderless terminal appropriate to the screw size.
  - Screw size: M3 x 7 (with 5.8 x 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 mm<sup>2</sup>
- Specified dimension: See Fig. at the right
- Specified solderless terminal:
  - Manufactured by J.S.T MFG CO., LTD.
  - Circular terminal with isolation V1.25-MS3



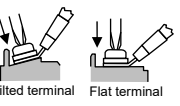
- Make sure that during field wiring parts of conductors cannot come into contact with adjacent conductive parts.

If solderless terminal lugs other than the recommended dimensions are used, terminal screws may not be tightened. In that case, bend each solderless terminal lug before wiring. If the terminal screw is forcibly tightened, it may be damaged.

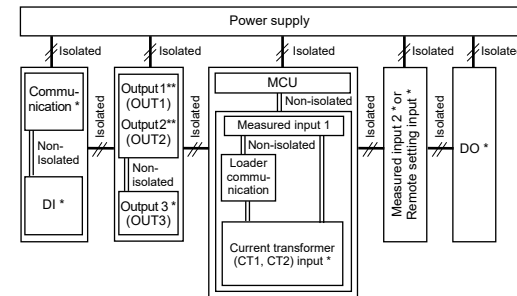
Up to two solderless terminal lugs can be connected to one terminal screw. The requirements of reinforced insulation can be still complied with in this condition. When actually doing this, place one solderless terminal lug over the other as illustrated right.



When tightening a screw of the instrument, make sure to fit the screwdriver properly into the screw head mounted tilted or flat as shown in the right figure. Tightening the screw with excessive torque may damage the screw thread.

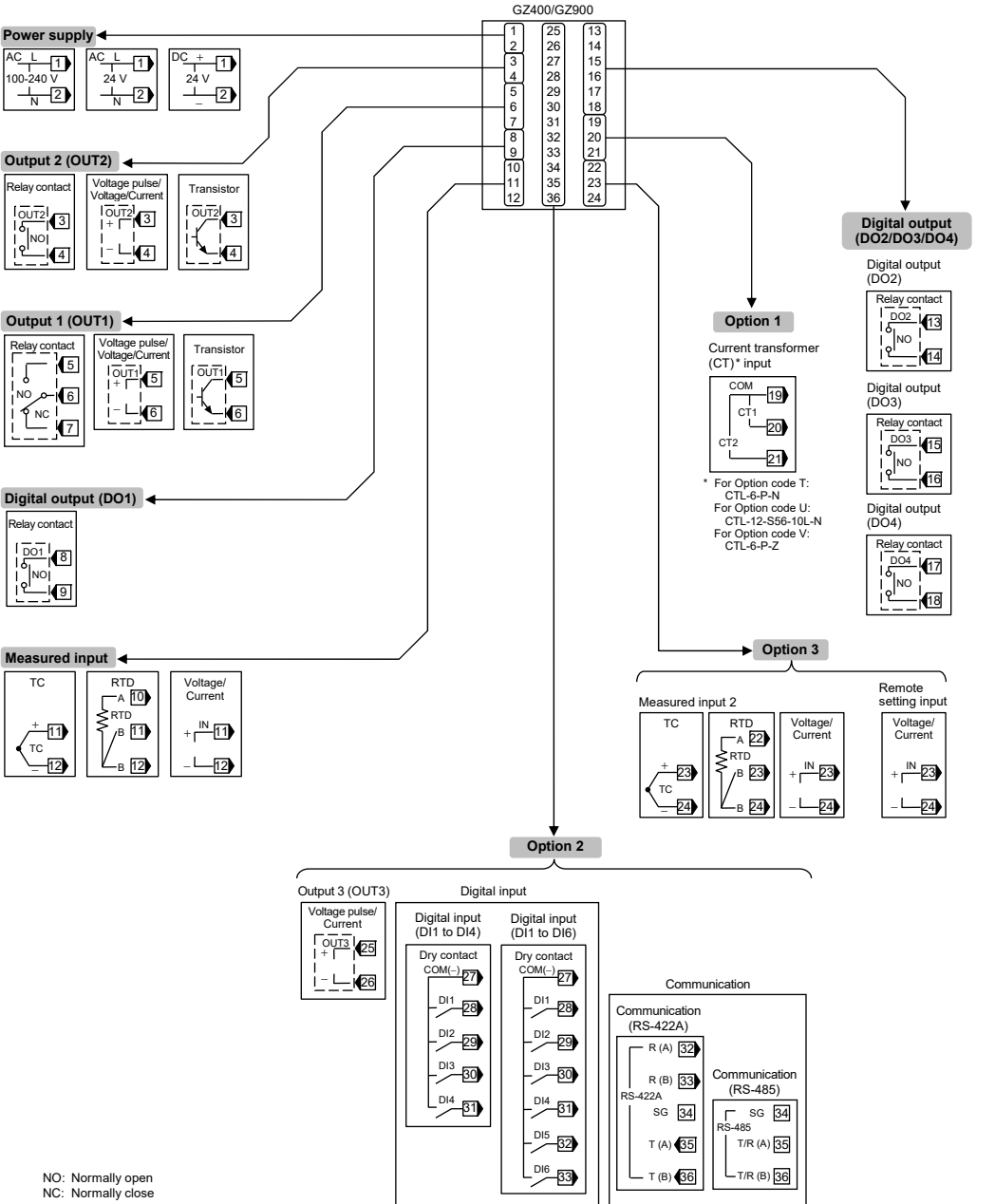


For isolation block diagram of the instrument, see the following:



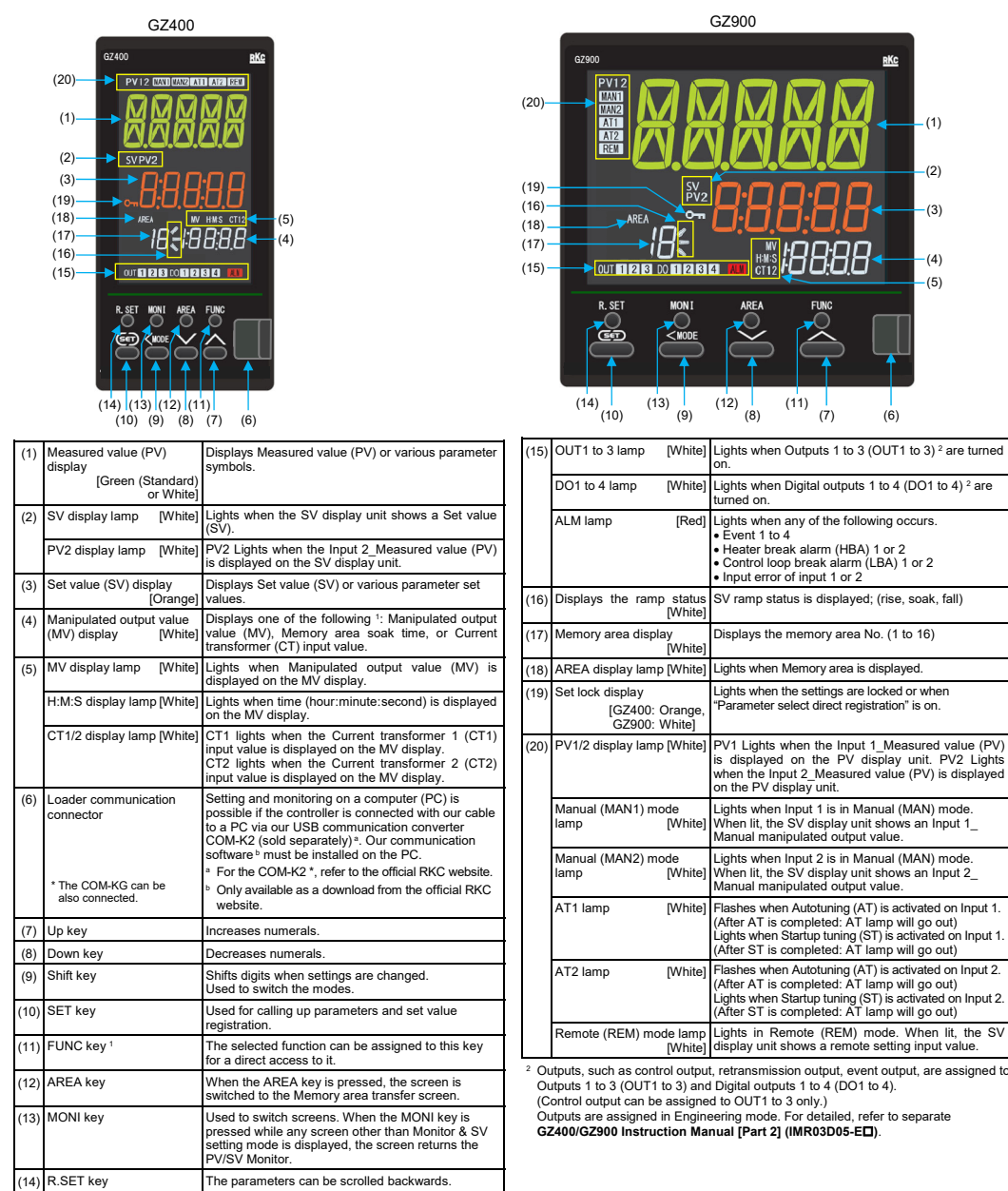
\* Option  
\*\* Outputs are isolated if either OUT1 or OUT2 is "relay contact output." If both outputs are not "relay contact output," outputs are not isolated.

## 2.2 Terminal Configuration



- NO: Normally open  
NC: Normally close
- To prevent malfunctioning, do not connect wires to unused terminals.
  - The dotted box diagram describes the output state of the instrument.

## 3. PARTS DESCRIPTION



(1) Measured value (PV) display	[Green (Standard) or White]	Displays Measured value (PV) or various parameter symbols.
(2) SV display lamp	[White]	Lights when the SV display unit shows a Set value (SV).
(3) Set value (SV) display	[Orange]	Displays Set value (SV) or various parameter set values.
(4) Manipulated output value (MV) display	[White]	Displays one of the following 1: Manipulated output value (MV), Memory area soak time, or Current transformer (CT) input value.
(5) MV display lamp	[White]	Lights when Manipulated output value (MV) is displayed on the MV display.
(6) H.M.S display lamp [White]		Lights when time (hour:minute:second) is displayed on the MV display.
(7) CT1/2 display lamp [White]		CT1 lights when the Current transformer 1 (CT1) input value is displayed on the MV display. CT2 lights when the Current transformer 2 (CT2) input value is displayed on the MV display.
(8) Loader communication connector		Setting and monitoring on a computer (PC) is possible if the controller is connected with our cable to a PC via our USB communication converter COM-K2 (sold separately)*. Our communication software <sup>2</sup> must be installed on the PC. * The COM-KG can be also connected. <sup>2</sup> Only available as a download from the official RKC website.
(9) Up key		Increases numerals.
(10) Down key		Decreases numerals.
(11) Shift key		Shifts digits when settings are changed. Used to switch the modes.
(12) SET key		Used for calling up parameters and set value registration.
(13) FUNC key <sup>1</sup>		The selected function can be assigned to this key for a direct access to it.
(14) AREA key		When the AREA key is pressed, the screen is switched to the Memory area transfer screen.
(15) MONI key		Used to switch screens. When the MONI key is pressed while any screen other than Monitor & SV setting mode is displayed, the screen returns the PV/SV Monitor.
(16) R.SET key		The parameters can be scrolled backwards.

(15) OUT1 to 3 lamp	[White]	Lights when Outputs 1 to 3 (OUT1 to 3) <sup>2</sup> are turned on.
DO1 to 4 lamp	[White]	Lights when Digital outputs 1 to 4 (DO1 to 4) <sup>2</sup> are turned on.
ALM lamp	[Red]	Lights when any of the following occurs. • Event 1 to 4 • Heater break alarm (HBA) (LBA) 1 or 2 • Control loop break alarm (LBA) 1 or 2 • Input error of input 1 or 2
(16) Displays the ramp status	[White]	SV ramp status is displayed; (rise, soak, fall)
(17) Memory area display	[White]	Displays the memory area No. (1 to 16)
(18) AREA display lamp [White]		Lights when Memory area is displayed.
(19) Set lock display	[GZ400: Orange, GZ900: White]	Lights when the settings are locked or when "Parameter select direct registration" is on.
(20) PV1/2 display lamp [White]		PV1 Lights when the Input 1_Measured value (PV) is displayed on the PV display unit. PV2 Lights when the Input 2_Measured value (PV) is displayed on the PV display unit.
Manual (MAN1) mode lamp	[White]	Lights when Input 1 is in Manual (MAN) mode. When lit, the SV display unit shows an Input 1_Measured manipulated output value.
Manual (MAN2) mode lamp	[White]	Lights when Input 2 is in Manual (MAN) mode. When lit, the SV display unit shows an Input 2_Measured manipulated output value.
AT1 lamp	[White]	Flashes when Autotuning (AT) is activated on Input 1. (After AT is completed: AT lamp will go out) Lights when Startup tuning (ST) is activated on Input 1. (After ST is completed: AT lamp will go out)
AT2 lamp	[White]	Flashes when Autotuning (AT) is activated on Input 2. (After AT is completed: AT lamp will go out) Lights when Startup tuning (ST) is activated on Input 2. (After ST is completed: AT lamp will go out)
Remote (REM) mode lamp	[White]	Lights in Remote (REM) mode. When lit, the SV display unit shows a remote setting input value.

<sup>2</sup> Outputs, such as control output, retransmission output, event output, are assigned to Outputs 1 to 3 (OUT1 to 3) and Digital outputs 1 to 4 (DO1 to 4). (Control output can be assigned to OUT1 to 3 only.) Outputs are assigned in Engineering mode. For detailed, refer to separate **GZ400/GZ900 Instruction Manual [Part 2] (IMR03D05-ED)**.

<sup>1</sup> Functions are configured in the Engineering mode. For detailed, refer to separate **GZ400/GZ900 Instruction Manual [Part 2] (IMR03D05-ED)**.

4. SPECIFICATIONS

■ Measured input

Number of input: 1 point + 1 point (optional) (Isolated between each input)

TC input: K, J, T, S, R, E, B, N (JIS C1602-1995), PLII (NBS), W5Re/W26Re (ASTM-E988-96 [Reapproved 2002]), U, L (DIN43710-1985), PR40-20 (ASTM-E1751-00)

RTD input: Pt100 (JIS C1604-1997), JPt100 (JIS C1604-1997, Pt100 of JIS C1604-1981)

Low voltage input: 0 to 10 mV DC, 0 to 100 mV DC

High voltage input: 0 to 1 V DC, 0 to 5 V DC, 1 to 5 V DC, 0 to 10 V DC, -5 to +5 V DC, -10 to +10 V DC

Current input: 0 to 20 mA DC, 4 to 20 mA DC

Input accuracy:

Input type	Input range	Accuracy
K, J, T, E, U, L	Less than -100 °C	±1.0 °C (Approximate value)
	-100 °C or more, Less than +500 °C	±0.5 °C
	+500 °C or more	±0.1 % of Reading
S, R, N, PLII, W5Re/W26Re	Less than 0 °C	±2.0 °C
	0 °C or more, Less than 1000 °C	±1.0 °C
	1000 °C or more	±0.1 % of Reading
B	Less than 400 °C	±70 °C (Approximate value)
	400 °C or more, Less than 1000 °C	±1.4 °C
	1000 °C or more	±0.1 % of Reading
PR40-20	Less than 400 °C	±20 °C (Approximate value)
	400 °C or more, Less than 1000 °C	±10 °C
	1000 °C or more	±0.1 % of Reading
Pt100, JPt100	Less than 200 °C	±0.2 °C
	200 °C or more	±0.1 % of Reading
	0.00 to 50.00 °C	±0.10 °C
Voltage/Current		±0.1 % of span

The display accuracy is the above accuracy rounded up at the minimum resolution.

\*1: Accuracy is not guaranteed for less than -100 °C

\*2: Accuracy is not guaranteed for less than 400 °C for TC input type S, R, W5Re/W26Re B and PR40-20.

Sampling cycle: 10 ms

Influence of signal source resistance (TC input): Approx. 0.18 μV/1 (Converted depending on TC types)

Influence of input lead (RTD input): Approx. 0.006 %/Ω of span (100 Ω or less per wire) If the resistance is 100 Ω or more, the measuring range may be limited.

Input impedance (Voltage/Current input): 1 MΩ or more (Low/High voltage), Approx. 50 Ω (Current)

Measured current (RTD input): Approx. 1 mA

Action at input break: TC input and Low voltage input: Upscale or Downscale (selectable) RTD input: Upscale High voltage input and Current input: Downscale (Indicates value near 0)

Action at input short circuit: Downscale (RTD input: except 0.00 to 50.00 °C range) Upscale (RTD input: 0.00 to 50.00 °C) -Input span to -Input span

PV bias: -Input span to -Input span

PV ratio: 0.500 to 1.500

PV digital filter (First order lag digital filter): 0.00 to 10.00 seconds (0.00: Filter OFF)

Square root extraction function (Voltage/Current input): Calculation method: Measured value = √((Input value) × PV ratio + PV bias) PV low input cut-off: 0.00 to 25.00 % of input span

Allowable input range: -1.0 to +3.0 V (TC/RTD/Low voltage), -12 to +12 V (High voltage), -20.0 to +30.0 mA (Current)

■ Remote setting input

Number of input: 1 point (Isolated from PV)

TC input (Select from the list below when Measured input 2 is selected): K, J, T, S, R, E, B, N (JIS C1602-1995), PLII (NBS), W5Re/W26Re (ASTM-E988-96 [Reapproved 2002]), U, L (DIN43710-1985), PR40-20 (ASTM-E1751-00)

RTD input (Select from the list below when Measured input 2 is selected): Pt100 (JIS C1604-1997), JPt100 (JIS C1604-1997, Pt100 of JIS C1604-1981)

Low voltage input: 0 to 10 mV DC, 0 to 100 mV DC

High voltage input: 0 to 1 V DC, 0 to 5 V DC, 1 to 5 V DC, 0 to 10 V DC, -5 to +5 V DC, -10 to +10 V DC

Current input: 0 to 20 mA DC, 4 to 20 mA DC

Input range: Programmable range

Sampling cycle: 10 ms

Input impedance: 1 MΩ or more (Low/High voltage), Approx. 50 Ω (Current)

Action at input break: TC input and Low voltage input: Upscale or Downscale (selectable) RTD input: Upscale High voltage input and Current input: Downscale (Indicates value near 0)

RS bias: -Input span to -Input span

RS ratio: 0.001 to 9.999

RS digital filter (First order lag digital filter): 0.00 to 10.00 seconds (0.00: Filter OFF)

Allowable input range: -1.0 to +3.0 V (TC/RTD/Low voltage), -12 to +12 V (High voltage), -20.0 to +30.0 mA (Current)

■ Current transformer (CT) input

Number of input: 2 points

Input range: 0.0 to 0.1 Arms

Measurable current range: 0.0 to 10.0 A (CTL-6-P-Z) 0.0 to 30.0 A (CTL-6-P-N) 0.0 to 100.0 A (CTL-12-S56-10L-N)

Sampling cycle: 0.5 seconds

Voltage of through current: 300 V or less

■ Digital input (DI)

Number of input: MAX. 6 points

Input method: Dry contact input OFF (Open state): 50 kΩ or more ON (Close state): 1 kΩ or less Contact current: 3.3 mA DC or less Voltage at open: Approx. 5 V DC

Capture judgment time: Within 50 ms

■ Output

Relay contact output [ OUT1]:

Contact type: c 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)

Proportional cycle time: 0.1 to 100.0 seconds (When configured for control output)

Relay contact output [OUT2]:

Contact type: a 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)

Proportional cycle time: 0.1 to 100.0 seconds (When configured for control output)

Relay contact output [DO1 to DO4]:

Contact type: a 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: 300 times/min)

Voltage pulse output [OUT1 and OUT2]:

Output voltage: 0/12 V DC (Rated) ON voltage: 10 to 13 V OFF voltage: 0.5 V or less

Allowable load resistance: 500 Ω or more

Proportional cycle time: 0.1 to 100.0 seconds (When configured for control output)

Voltage pulse output [OUT3]:

Output voltage: 0/14 V DC (Rated) ON voltage: 12 to 17 V OFF voltage: 0.5 V or less

Allowable load resistance: 600 Ω or more

Proportional cycle time: 0.1 to 100.0 seconds (When configured for control output)

Current output [OUT1, OUT2 and OUT3]:

Output current: 4 to 20 mA DC, 0 to 20 mA DC

Output range: 3.2 to 20.8 mA DC, 0 to 21 mA DC

Allowable load resistance: 500 Ω or less

Continuous voltage output [OUT1 and OUT2]:

Output voltage: 0 to 5 V DC, 1 to 5 V DC, 0 to 10 V DC

Output range: 0 to 5.25 V DC, 0.8 to 5.2 V DC, 0 to 10.5 V DC

Allowable load resistance: 1 kΩ or more

Transistor output [OUT1 and OUT2]:

Allowable load current: 100 mA

Load voltage: 30 V DC or less

Voltage drop at ON: 2 V or less (at allowable load current)

Leakage current at OFF: 0.1 mA or less

Proportional cycle time: 0.1 to 100.0 seconds (When configured for control output)

■ Communication

Interface: Based on RS-485, EIA standard Based on RS-422A, EIA standard

Protocol: RKC communication (ANSI X3.28-1976 subcategories 2.5 and A4) Modbus-RTU PLC communication (MAPMAN)

■ General specifications

Power supply voltage: • 85 to 264 V AC [Including power supply voltage variation] (Rated: 100 to 240 V AC) Frequency variation: 50/60 Hz (-10 % to +5 %)

• 20.4 to 26.4 V AC [Including power supply voltage variation] (Rated: 24 V AC) Frequency variation: 50/60 Hz (-10 % to +5 %)

• 20.4 to 26.4 V DC [Including power supply voltage variation] (Rated: 24 V DC)

Power consumption: • 100 to 240 V AC GZ400: 6.8 VA max. (at 100 V AC), 10.1 VA max. (at 240 V AC) GZ900: 7.4 VA max. (at 100 V AC), 10.9 VA max. (at 240 V AC)

• 24 V AC GZ400: 6.9 VA max. (at 24 V AC) GZ900: 7.4 VA max. (at 24 V AC)

• 24 V DC GZ400: 175 mA max. (at 24 V DC) GZ900: 190 mA max. (at 24 V DC)

Rush current: • 100 to 240 V AC GZ400: 5.6 A or less (at 100 V AC), 13.3 A or less (at 240 V AC) GZ900: 5.6 A or less (at 100 V AC), 13.3 A or less (at 240 V AC)

• 24 V AC GZ400: 16.3 A or less (at 24 V AC) GZ900: 16.3 A or less (at 24 V AC)

• 24 V DC GZ400: 11.5 A or less (at 24 V DC) GZ900: 11.5 A or less (at 24 V DC)

Power failure: A power failure of 20 ms or less will not affect the control action (100 to 240 V AC, 24 V AC) A power failure of 5 ms or less will not affect the control action (24 V DC)

Memory backup: Backed up by non-volatile memory Number of writing: Approx. One trillion (10<sup>12</sup>) times (FRAM) Data storage period: Approx. 10 years

Weight: GZ400: Approx. 221 g GZ900: Approx. 291 g

5. MODEL CODE

■ Suffix code

<b>GZ400</b>	□	□□□	-	□	□	□	*	□	□	□	□	□	/	□
<b>GZ900</b>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)		

(1) Control method

F: PID control with AT (Reverse action)

D: PID control with AT (Direct action)

G: Heat/Cool PID control with AT (for Extruder [air cooling])

W: Heat/Cool PID control with AT (for Extruder [water cooling])

(2) Measured input and Range

□□□: See Range Code Table

(3) Output 1 (OUT1),

(4) Output 2 (OUT2)

N: None

M: Relay contact output

V: Voltage pulse output (0/12 V DC)

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)

B: Transistor output

(5) Power supply voltage

3: 24 V AC/DC

4: 100 to 240 V AC

(6) Digital output (DO)

1: Digital output [1 point] (DO1)

4: Digital output [4 points] (DO1 to DO4)

(7) Option 1

N: None

T: CT input (2 points) [CTL-6-P-N]

U: CT input (2 points) [CTL-12-S56-10L-N]

V: CT input (2 points) [CTL-6-P-Z]

(8) Option 2

N: None

A: Output 3 (OUT3)

B: Digital input (6 points)

C: Communication (RS-422A)

D: Communication (RS-485)

E: Output 3 (OUT3)

+ Digital input (6 points)

F: Output 3 (OUT3)

+ Communication (RS-422A)

G: Output 3 (OUT3)

+ Communication (RS-485)

H: Output 3 (OUT3)

+ Digital input (4 points)

+ Communication (RS-422A)

J: Output 3 (OUT3)

+ Digital input (6 points)

+ Communication (RS-485)

(9) Option 3

N: None


1: Remote setting input

2: Measured input 2

(10) Display color

N: Green (Standard)

 1: White || (11) Waterproof/Dustproof (optional) | N: None | 1: Waterproof/Dustproof |
| (12) Quick start code | N: Quick start code not specified | 1: Specify quick start code |

 For details of the Digital input assignment, refer to a separate **GZ400/GZ900 Instruction Manual [Part 1] (IMR03D04-ED)**.

■ **Quick start code (Initial setting code)**

<input type="checkbox"/>	<input type="checkbox"/>	-	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-	<input type="checkbox"/>
(1)	(2)	(3)	(4)	(5)	(6)	(7)	

■ Quick start code (Initial setting code)

(1) Output assignment (OUT1, OUT2, DO1 to DO4)

1 to 8: See to Output Assignment Code Table

(2) Remote setting input type

N: None

3: Voltage input (0 to 1 V DC)

4: Voltage input (0 to 5 V DC)

5: Voltage input (0 to 10 V DC)

6: Voltage input (1 to 5 V DC)

7: Current input (0 to 20 mA DC)

8: Current input (4 to 20 mA DC)

9: Voltage input (-5 to +5 V DC)

A: Voltage input (-10 to +10 V DC)

(3) Event 1 type, (4) Event 2 type, (5) Event 3 type, (6) Event 4 type

N: None

A: Deviation high (High/low individual setting)

B: Deviation low

C: Deviation high/low

D: Band

E: Deviation high with hold action

F: Deviation low with hold action

G: Deviation high/low with hold action

H: Process high

J: Process low

K: Process high with hold action

L: Process low with hold action

Q: Deviation high with re-hold action

R: Deviation low with re-hold action

T: Deviation high/low with re-hold action

(7) Communication protocol

N: None

1: RKC communication (ANSI X3.28-1976)

2: Modbus

3: PLC communication: MITSUBISHI MELSEC series special protocol (QnA-compatible 3C frame format 4)

Range Code Table

● TC input

Type	Code	Range	See Note
K	K01	0 to 200 °C	5
	K02	0 to 400 °C	5
	K03	0 to 600 °C	5
	K04	0 to 800 °C	5
	K06	0 to 1200 °C	5
	K07	0 to 1372 °C	5
	K08	-199.9 to +300.0 °C	5
	K09	0.0 to 400.0 °C	5
	K10	0.0 to 800.0 °C	5
	K14	0 to 300 °C	5
	K41	-200 to +1372 °C	5
	K42	-200.0 to +1372.0 °C	5
J	KA1	0 to 800 °F	5
	KA2	0 to 1600 °F	5
	KA3	0 to 2502 °F	5
	J01	0 to 200 °C	5
	J02	0 to 400 °C	5
	J03	0 to 600 °C	5
	J04	0 to 800 °C	5
	J08	0.0 to 400.0 °C	5
	J29	-200.0 to +1200.0 °C	5
	JA1	0 to 800 °F	5
	JA3	0 to 2192 °F	5
	JA6	0 to 400 °F	5
T	T01	-199.9 to +400.0 °C	5
	T02	-199.9 to +100.0 °C	5
	T03	-100.0 to +200.0 °C	5
	T19	-200.0 to +400.0 °C	5
R	R01	0 to 1600 °C	5
	R07	-50 to +1768 °C	5
	R08	-50.0 to +1768.0 °C	1
	R09	0.0 to 1600.0 °C	1
S	S06	-50 to +1768 °C	5
	S07	-50.0 to +1768.0 °C	1
B	B03	0 to 1800 °C	5
	B04	0.0 to 1800.0 °C	1
E	E01	0 to 800 °C	5
	E23	0.0 to 800.0 °C	1
	N02	0 to 1300 °C	5
	N05	0.0 to 1300.0 °C	1
W5R/W26Re	W03	0 to 2300 °C	5
PLII	A01	0 to 1300 °C	5

● RTD input

Type	Code	Range	See Note
Pt100	D01	-199.9 to +649.0 °C	5
	D04	-100.0 to +100.0 °C	5
	D05	-100.0 to +200.0 °C	5
	D06	0.0 to 50.0 °C	5
	D07	0.0 to 100.0 °C	5
	D08	0.0 to 200.0 °C	5
	D09	0.0 to 300.0 °C	5
	D10	0.0 to 500.0 °C	5
	D12	-199.9 to +600.0 °C	5
	D21	-200.0 to +200.0 °C	5
	D27	0.0 to 50.0 °C	5
	D34	-100.0 to +100.0 °C	5
JPt100	D35	-200.0 to +850.0 °C	5
	D48	-100.0 to +850.0 °C	5
	DA1	-199.9 to +999.9 °F	5
	DA9	0.0 to 500.0 °F	5
	P08	0.0 to 200.0 °C	5
	P29	-100.0 to +100.0 °C	5
	P30	-200.0 to +640.0 °C	5
	P36	-100.0 to +640.0 °C	5

● Voltage/Current input

Type	Code	Range	See Note
0 to 10 mV DC	101		5
	0 to 100 mV DC	201	5
	0 to 1 V DC	301	5
	0 to 5 V DC	401	5
	0 to 10 V DC	501	5
	-1999.9 to +9999.9		5
	0 to 5 V DC	601	5
	0 to 20 mA DC	701	5
	4 to 20 mA DC	801	5
	-10 to +10 V DC	904	5
	-5 to +5 V DC	905	5

Note The number of displayed digits of the measured value.

In case of RKC communication, if the displayed data is 5 digits, it is handled as 7 digit data.

In case of Modbus communication, the 5-digit display is handled as a "double word".

\* Order of data transfer: upper word to lower word

<sup>1</sup> The least significant digit (LSD) may flicker when the display resolution is set to 0.1°C.

Output Assignment Code Table

Code	OUT1	OUT2 *	DO1	DO2	DO3	DO4
1	MV1	HBA1/HBA2	EV1	EV2	EV3	EV4
2	MV1	HBA1/HBA2	EV1	LBA1/LBA2	EV3	EV4
3	MV1	FAIL	EV1	HBA1/HBA2	EV3	LBA1/LBA2
4	MV1	HBA1/HBA2	EV1	FAIL	EV3	EV4
5	MV1	EV1	LBA1/LBA2	HBA1/HBA2	EV3	EV4
6	MV1	HBA1/HBA2	LBA1/LBA2	FAIL	EV3	EV4
7	MV1	EV1	HBA1/HBA2	FAIL	EV3	EV4
8	MV1	EV2/EV4	EV1/EV3	HBA1/HBA2	LBA1/LBA2	FAIL

MV1: Input 1\_Control output (Heat/Cool PID control: Heat-side)

HBA1: Heater break alarm 1 (HBA1) output

HBA2: Heater break alarm 2 (HBA2) output

LBA1: Control loop break alarm 1 (LBA1) output

LBA2: Control loop break alarm 2 (LBA2) output

FAIL: FAIL output

EV1: Event 1 output

EV2: Event 2 output

EV3: Event 3 output

EV4: Event 4 output

If two or more items are assigned to the same output, the resultant output is OR.

\* OUT2 assignment

The output assignment depends on the Control action and the selection of Option 3.

Control action	Option 3	OUT2 assignment
PID control	Option 3: None or Remote setting input	One item from the above Output Assignment Code Table.
	Measured input 2	Input 2_Control output
Heat/Cool PID control	Option 3: None or Remote setting input	Input 1_Control output [ Heat/Cool PID control: Cool-side ]

6. ERROR DISPLAYS

■ Input error displays

Display	Description	Solution
Measured value (PV) [Flashing]	Measured value (PV) exceeded the input error determination point or the input range.	Prior to replacing the sensor, always turn the power OFF or change the mode to STOP.
Over-scale [Flashing]	Measured value (PV) exceeded the high limit of display range.	
Underscale [Flashing]	Measured value (PV) exceeded the low limit of display range.	

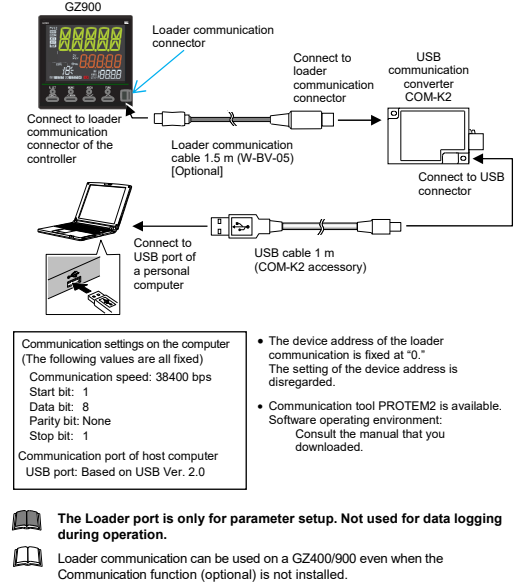
■ Self-diagnostic error

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

Description	Display	Output	Communication	Solution
<div>Err1</div> <div>← Flashing</div> <div>Adjustment data error</div>	Indication lamp: All lamps turn off	All outputs are OFF	Error code "1"	Turn off the power once. If an error occurs after the power is turned on again, please contact RKC sales office or the agent.
<div>Err2</div> <div>← Flashing</div> <div>Data back-up error</div>			Error code "2"	
<div>Err4</div> <div>← Flashing</div> <div>A/D conversion error/ Temperature compensation error</div>			Error code "4"	
Display units error	All displays are OFF		Error code "64"	
Power supply voltage is abnormal			No response	
Watchdog timer				

7. CONNECTING A LOADER CONNECTOR

Connect the controller, COM-K2, and personal computer using a USB cable and a loader communication cable. Make sure the connectors are oriented correctly when connecting.



The loader communication corresponds to the RKC communication protocol "Based on ANSI X3.28-1976 subcategories 2.5 and A4."

The COM-KG can be also used.