

PG500 Installation Manual

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IMR02F01-E4

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 mounting, wiring and specifications.

For the operations, refer to **PG500 Operation Manual (IMR02F02-E□)**.
For the communication (Optional), refer to the **PG500 Communication Quick Instruction Manual (IMR02F03-E□)** or the separate **PG500 Communication Instruction Manual (IMR02F04-E□)**.
The manuals can be downloaded from the official RKC website:
http://www.rkcinst.com/english/manual_load.htm.

Accessories check

PG500 Installation Manual (IMR02F01-E4)	1
PG500 Operation Manual (IMR02F02-E□)	1
PG500 Communication Quick Instruction Manual (IMR02F03-E□) *	1
Mounting brackets (with screw)	2
Unit seal (SAP-368)	1

* Only PG500 provided with the communication function

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 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 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 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 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.
- 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



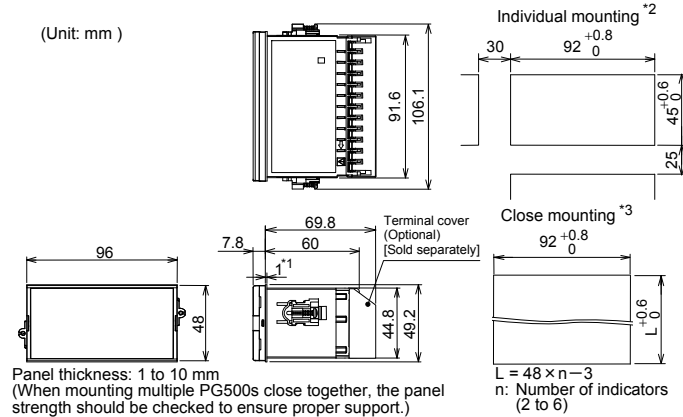
WARNING

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]
 - Use this instrument under 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
- (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 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.
- (3) 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 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, or the like. 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 horizontal direction, this causes malfunction.
 - 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.

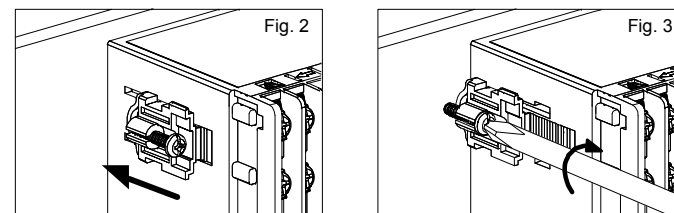
1.2 Dimensions



1.3 Procedures of Mounting and Removing

Mounting procedures

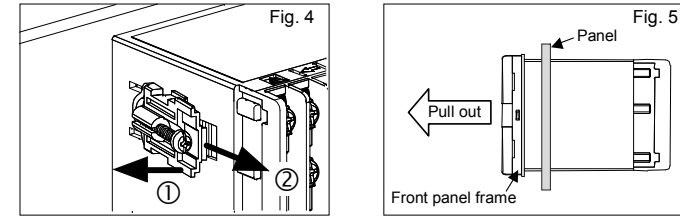
1. Prepare the panel cutout as specified in 1.2 Dimensions.
2. Insert the instrument through the panel cutout.
3. Insert the mounting bracket into the mounting groove of the instrument. (Fig. 1)
4. Push the mounting bracket forward until the bracket is firmly secured to the panel. (Fig. 2)
5. Only turn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



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

Removing 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. 4)
5. 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.
6. The other mounting bracket should be removed in the same way as described in 3. and 4.
7. Pull out the instrument from the mounting cutout while holding the front panel frame of this instrument. (Fig. 5)



2. WIRING



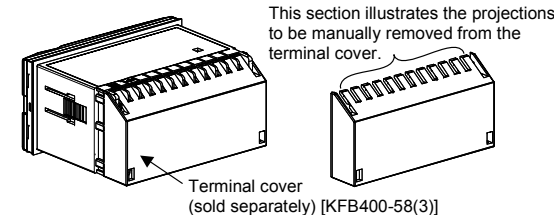
WARNING

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.

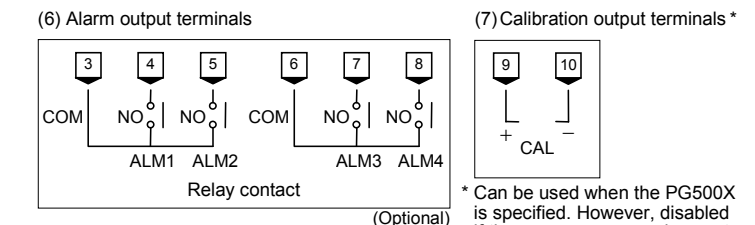
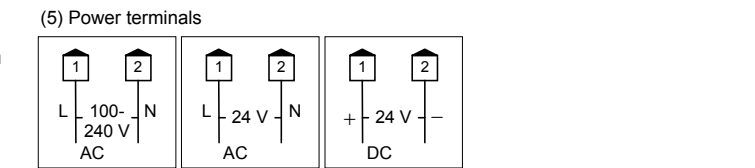
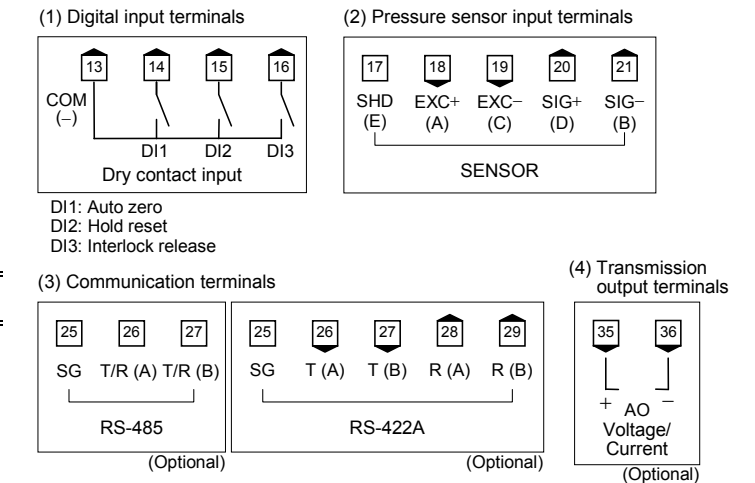
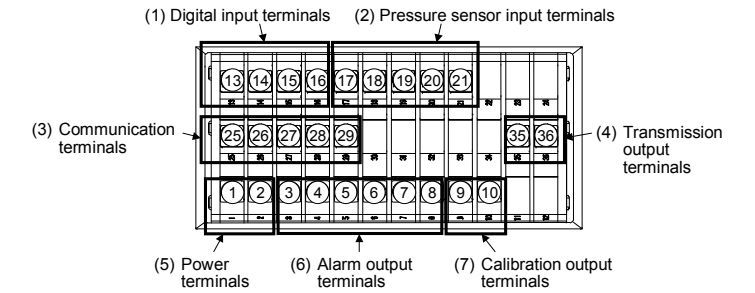
2.1 Wiring Cautions

- Use a shielded cable for connection with the pressure sensor.
- To avoid noise induction, keep communication 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 the 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.
 - Screw size: M3 × 7 (with 5.8 × 5.8 square washer)
 - Applicable wire: Solid/twisted wire of 0.25 to 1.65 mm²
 - Specified dimension: Refer to Fig. 6
 - Recommended tightening torque: 0.4 N·m (4 kgf·cm)
 - Specified solderless terminals:
 - Manufactured by J.S.T MFG CO., LTD.
 - Circular terminal with isolation V1.25-MS3
- Make sure that the any wiring such as solderless terminal is not in contact with the adjoining terminals.

- 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.
- 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 from the terminal cover by manually bending it in front and in rear until broken.



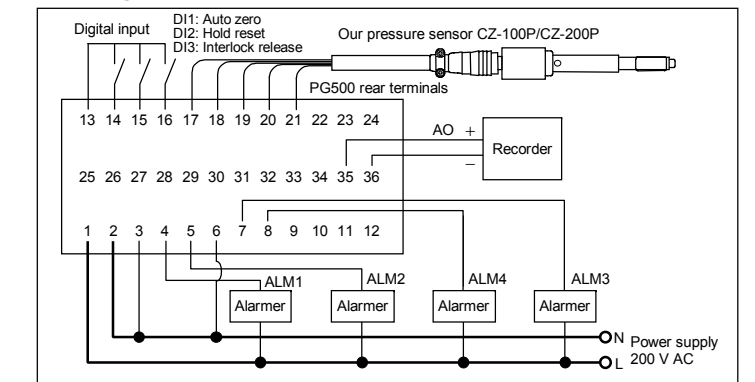
2.2 Terminal Configuration



Input/Output Isolation:
 Isolated from each other circuit blocks.
 Not isolated between inputs (or outputs).

Power supply	Transmission output (AO) Calibration output
Pressure sensor input	Alarm 1 output (ALM1)
Digital input 1 (DI1)	Alarm 2 output (ALM2)
Digital input 2 (DI2)	Alarm 3 output (ALM3)
Communication	Alarm 4 output (ALM4)

Wiring example



2.3 Connection to Pressure Sensor

Terminal number and signal details

Pressure sensor input terminals

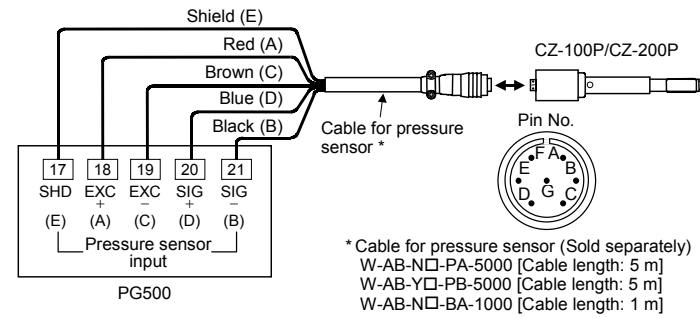
Pin No.	Signal name	Symbol
17	Shield	SHD (E)
18	Sensor supply voltage	EXC+ (A)
19	Sensor supply voltage	EXC- (C)
20	Sensor signal input	SIG+ (D)
21	Sensor signal input	SIG- (B)

Calibration output terminals *

Pin No.	Signal name	Symbol
9	Calibration output	CAL+
10	Calibration output	CAL-

* Can be used when the PG500X is specified. However, disabled if the pressure sensor does not have built-in resistance for sensitivity adjustment.

Connection to our CZ-100P/CZ-200P



For details on the CZ-100P/CZ-200P, refer to the CZ-100P/PCT-300 Resin Pressure Measuring System Instruction Manual (IM100CZ04-ED), CZ-200P Instruction Manual (IM100CZ08-ED).

For the connection of pressure sensor made by other companies, refer to the instruction manual for the respective pressure sensor.

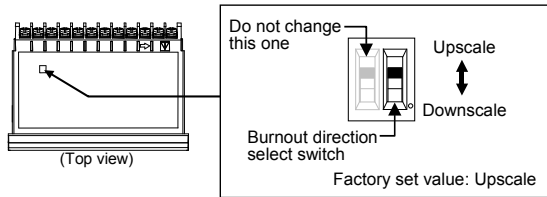
3. BURNOUT DIRECTION SETTING

Burnout direction is selected by the burnout direction select switch and Burnout direction (brKS) of parameter. It is necessary to set both setting switch and parameter.

Burnout function may not work properly if settings of "Burnout direction select switch" and "Burnout direction" parameter (brKS) do not match each other.

Burnout direction select switch

Turn the right side switch by a small screwdriver.

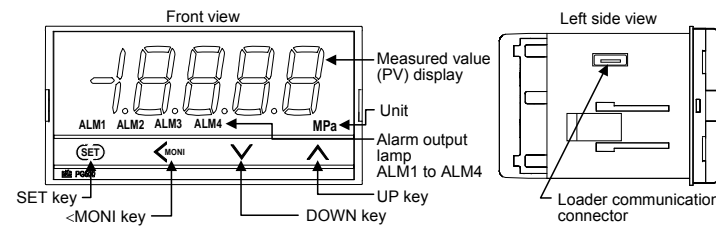


Burnout direction (brKS) in engineering mode F21

Name	Symbol	RKC Identifier	Modbus register address		Attribute	Data range	Factory set value
			HEX	DEC			
Burnout direction	brKS (brKS)	IB	010A	266	R/W	0: Upscale 1: Downscale	0

For the parameter setting and communication data (Optional), refer to the PG500 Operation Manual (IMR02F02-ED) and PG500 Communication Quick Instruction Manual (IMR02F03-ED).

4. PARTS DESCRIPTION



Measured value (PV) display [Red]	Displays Measured value (PV) or various parameters' symbols and set values.
Unit	Unit of Measured value (PV). If unit is other than MPa, stick an attached unit seal in accord with a unit to use.
Alarm output lamp [Red]	Lights when alarm output is turned on. ALM1 to ALM4: Alarm 1 output to Alarm 4 output
UP key	Use to increase a numerical value.
DOWN key	Use to decrease a numerical value.
<MONI key (Shift/Monitor key)	Use to change to Measured value (PV). Use to start changing settings. Use to move to a different digit when changing a setting.
SET key	Used for parameter calling up and set value registration.
Loader communication connector	Cannot be used in this specification. (For RKC maintenance)

5. SPECIFICATIONS

Input

Measured Input (PV)

Sensor type: Strain gauge type of pressure sensor
Input range: * Including zero point adjustment range

Gain setting range of pressure sensor	Input range *
0.500 to 0.999 mV/V	-6.0 to +15.9 mV
1.000 to 1.999 mV/V	-9.8 to +25.9 mV
2.000 to 2.999 mV/V	-12.3 to +32.6 mV
3.000 to 4.000 mV/V	-16.1 to +42.5 mV

Display range limit: -9999 to +19999 (No decimal place)
-999.9 to +1999.9 (One decimal place)
-99.99 to +199.99 (Two decimal places)
-9.999 to +19.999 (Three decimal places)

Decimal point position: No decimal place, One decimal place, Two decimal places, Three decimal places

Number of input: 1 point
Sampling cycle: 100 ms ± 0.3 %
Input impedance: 1 MΩ or more
Action at input break: Upscale or downscale
Input break is detected by input line and sensor power line
Setting range of input error determination point (high/low):
Pressure display low - (5 % of input span) to
Pressure display high + (5 % of input span)

Input correction:
• Zero-point calibration: Manually set or Auto zero
Manually set: -Input span to +Input span
Auto zero: -5.0 to +5.0 mV (Input conversion)

• PV ratio: 0.500 to 1.500
Manually set or Auto calibration (Functions when a resistance for sensitivity adjustment built-in pressure sensor is used)

• Gain setting range: Gain setting decimal point position is three decimal places (Factory set value):
0.500 to 4.000 mV/V
Gain setting decimal point position is four decimal places
0.5000 to 1.9999 mV/V

• Shunt resistance output value: 40.0 to 100.0 % (Functions when a resistance for sensitivity adjustment built-in pressure sensor is used)

• Linearize: Use to correct the non-linear nature of our pressure sensor CZ-100P/CZ-200P.
Select the linearizing type symbol engraved on the rated nameplate attached to the CZ-100P or CZ-200P housing.

• First order lag digital filter: 0.0 to 100.0 seconds (0.0: OFF)

Digital input (DI1 to DI3)

Number of input: 3 points
Input method: Dry contact input
Open state: 500 kΩ or more
Close state: 500 Ω or less
Contact current: 5 mA or less
Voltage at open: Approx. 5 V DC

Capture judgment time: 50 ms
Function: Auto zero (DI1), Hold reset (DI2), Interlock release (DI3)

Output

Power supply for strain gauge type of pressure sensor (Sensor power supply)

Rated voltage: 7.7 V DC
Rated current: 30 mA max.

Alarm output (ALM1 to ALM4) [Optional]

Number of output: 4 points
Contact type: 1a contact
Contact rating (Resistive load): 250 V AC 1 A, 30 V DC 1 A

Electrical life: 300,000 times or more (Rated load)
Mechanical life: 20 million times or more (Switching: 300 times/min)

Transmission output (AO) [Optional]

Number of outputs: 1 point, Outputs the Measured value (PV)
Output type:

Rating	Output range	Allowable load resistance	Out put impedance			
Voltage output	0 to 1 V DC	-0.05 to +1.05 V DC	1 kΩ or more	0.1 Ω or less		
	0 to 5 V DC	-0.25 to +5.25 V DC				
	1 to 5 V DC	0.8 to 5.2 V DC				
	0 to 10 V DC	-0.5 to +10.5 V DC				
Current output	0 to 10 mV DC	-0.5 to +10.5 mV DC	20 kΩ or more	Approx. 10 Ω		
	0 to 100 mV DC	-5 to +105 mV DC				
	4 to 20 mA DC	1 to 21 mA DC			600 Ω or less	1 MΩ or more
	0 to 20 mA DC	0 to 21 mA DC				

Performance (at the ambient temperature 23 ± 2 °C)

Input

Accuracy: 0.1 % of input span (excluding the sensor power supply)

Noise rejection: Normal mode: 40 dB or more (50/60Hz)
Common mode: 120 dB or more (50/60Hz)

A/D conversion: 1/80000

Transmission output (AO)

Accuracy: 0.1 % of span
Output resolution: Approx. 1/4000

Influence

Influence of ambient temperature (-5 to +50 °C):
Input: ±0.006 %/°C of input span
Sensor power: ±0.013 %/°C of output span

Influence of physical orientation (±90 °):
Input: Less than ±0.1 % of input span (excluding the Sensor power supply)
Output: Less than ±0.3 % of output span

Functions

Peak/bottom hold function

Peak/bottom hold: The peak hold/bottom hold function is used to store (hold) the maximum (peak) and minimum (bottom) Measured values (PV).

Alarm function [Optional]

Number of alarms: Up to 4 points
Alarm type: Process high, Process low
Alarm setting range: Same as input range
Additional function: Hold action, Alarm action at input error, Interlock, Energized/De-energized
Delay timer: 0.0 to 600.0 seconds
Differential gap: 0 to Input span

Output method: Assignable to alarm output (ALM1 to ALM4)

Host communication [Optional]

Interface: Based on RS-485 or RS-422A, EIA standard
Protocol: RKC communication (ANSI X3.28-1976 subcategories 2.5 and A4) Modbus-RTU

Communication speed: 1200 bps, 2400 bps, 4800 bps, 9600 bps, 19200 bps, 38400 bps
Maximum connections: Up to 31 instruments
Termination resistor: Externally connected
Interval time: 0 to 250 ms

Self-diagnostic Function (FAIL)

Control stop (Error number is displayed [Operation: Possible]):

Adjustment data error (Error code 1)
Back-up error (Error code 2)
A/D conversion error (Error code 4)
Watchdog timer error (Error code 128)
Program error (stack) (Error code 256)
Program error (busy) (Error code 2048)

Action stop (Error number is not displayed [Operation: Impossible]):

Power supply voltage monitoring error, RAM check error
When a self-diagnostic error occurs: All the output is OFF
Display: In an error is detected by the self-diagnostic function, the "Err" and error code are displayed alternately on the display unit.

Output: Same as power OFF

Recovery: First, remove all of the causes of the defect by making a correct diagnosis, and then turn on the instrument power again for recovery.

General specifications

Power supply voltage: 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 %
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 %
21.6 to 26.4 V DC [Including power supply voltage variation] (Rating 24 V DC)

Power consumption: 100 V AC: 6.5 VA or less 240 V AC: 10.0 VA or less
24 V AC: 7.0 VA or less 24 V DC: 210 mA or less

Rush current: 12 A or less

Allowable ambient temperature: -10 to +50 °C

Allowable ambient humidity: 5 to 95 % RH

(Absolute humidity: MAX.W.C 29.3 g/m³ dry air at 101.3 kPa)

Installation environment conditions:

Indoor use, Altitude up to 2000 m

Insulation resistance: Between measuring terminal and grounding: 20 MΩ or more at 500 V DC
Between power supply terminal and grounding: 20 MΩ or more at 500 V DC
Between power supply and measuring terminals: 20 MΩ or more at 500 V DC

When grounding is not provided: Between panels

Withstand voltage:

Time: 1 min	①	②	③	④	⑤
① Grounding terminal					
② Power terminal	1500 V AC				
③ Measured input and sensor power supply terminals	1500 V AC	2300 V AC			
④ Alarm output terminal	1500 V AC	2300 V AC	2300 V AC		
⑤ Transmission output terminal	1500 V AC	2300 V AC	1500 V AC		
⑥ Communication and digital input terminals	1500 V AC	2300 V AC	510 V AC	2300 V AC	1000 V AC

Power failure: A power failure of 20 ms or less will not affect the control action.

Memory backup: Backed up by non-volatile memory

Number of writing: User setting data: Ten quadrillion (10¹⁶) times (FRAM)
Adjustment and factory setting data: Approx. 100,000 times (EEPROM)
Depending on storage and operating conditions.

Mounting and structure: Mounting method: Panel-mounted
Case color: Black
Front panel material: PC [Flame retardancy: UL94 V-1]
Case material: PPE [Flame retardancy: UL94 V-1]
Panel sheet material: PET [Flame retardancy: V-1]
Approx. 200 g

Weight:

Standard

Safety standards: UL: UL61010-1
cUL: CAN/CSA-C22.2 No.61010-1
LVD: EN61010-1
OVERVOLTAGE CATEGORYII, POLLUTION DEGREE 2, Class II (Reinforced insulation)
EMC: EN61326-1 EN55011
C-Tick:
Panel sealing: NEMA 4X (NEMA250), IP66 (IEC60529) [Front panel]

6. MODEL CODE

Suffix code

PG500 □ □ * □ □ □ □ □ □ □ □ Y
(1) (2) (3) (4) (5) (6) (7) (8) (9)(10)(11)

(7) to (11): Indicates a specification code to be optional specified. If this section is blank, this means that no code is described on the nameplate.

(1) Input type

A: Resin pressure sensor CZ-100P/CZ-200P (RKC product) [Standard]

B: Resin pressure sensor CZ-100P/CZ-200P (RKC product)

[Explosionproof specification type]

C: Resin pressure sensor CZ-100P/CZ-200P (RKC product) [Standard]

Loose nut: 0.0 to 0.5 MPa, Fixed nut: 0 to 5 MPa

D: Resin pressure sensor CZ-100P/CZ-200P (RKC product)

[Explosionproof specification type]

Loose nut: 0.0 to 0.5 MPa, Fixed nut: 0 to 5 MPa]

X: 3.33 mV/V output type (Pressure sensor made by other companies)

(2) Power supply voltage

3: 24 V AC/DC 4: 100 to 240 V AC

(3) Alarm output (ALM1 to ALM4)

N: None 2: 2 points (ALM1, ALM2) 4: 4 points (ALM1 to ALM4)

1: 1 point (ALM1) 3: 3 points (ALM1 to ALM3)

(4) Transmission output (AO)

N: None 5: Voltage output (0 to 10 V DC)

1: Voltage output (0 to 10 mV DC) 6: Voltage output (1 to 5 V DC)

2: Voltage output (0 to 100 mV DC) 7: Current output (0 to 20 mA DC)

3: Voltage output (0 to 1 V DC) 8: Current output (4 to 20 mA DC)

4: Voltage output (0 to 5 V DC)

(5) Communication function

N: None 4: RS-422A 5: RS-485

(6) Quick start code

N: No quick start code (Configured at factory set value) *

1: Specify quick start code (Alarm function code)

* Factory set value:

Alarm 1: Process high alarm (without hold action) Alarm 3: No alarm

Alarm 2: Process low alarm (without hold action) Alarm 4: No alarm

(7) Alarm 1 function (AL1), (8) Alarm 2 function (AL2), (9) Alarm 3 function (AL3), (10) Alarm 4 function (AL4) [Quick start code]

No code: No specify quick start code

N None J: Process low L: Process low with hold action

H: Process high K: Process high with hold action

(11) Instrument specification

Y: Version symbol

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