Pressure Indicator
PG500 Communication Instruction Manual

IMR02F03-E2

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 this manual in a convenient location for easy reference.

This manual describes the communication function of the PG500. For the installation, the parts description, the specifications and the operation method, please read if necessary the following separate manuals.

- PG500 Installation Manual (IMR02F01-E□): Enclosed with PG500
- PG500 Operation Manual (IMR02F02-E□): Enclosed with PG500

📖 The above manuals can be downloaded from our website:
URL: http://www.rkcinst.com/english/manual_load.htm

1. CONNECTION TO HOST COMPUTER

⚠ **WARNING**

To prevent electric shock or instrument failure, turn off the power before connecting or disconnecting the instrument and peripheral equipment.
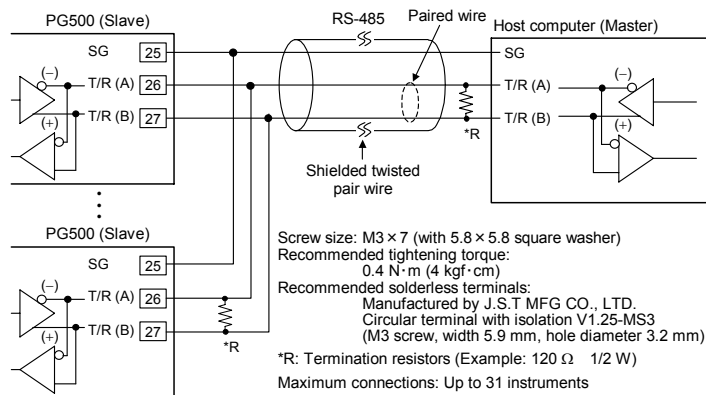
📖 The cable must be provided by the customer.

1.1 RS-485

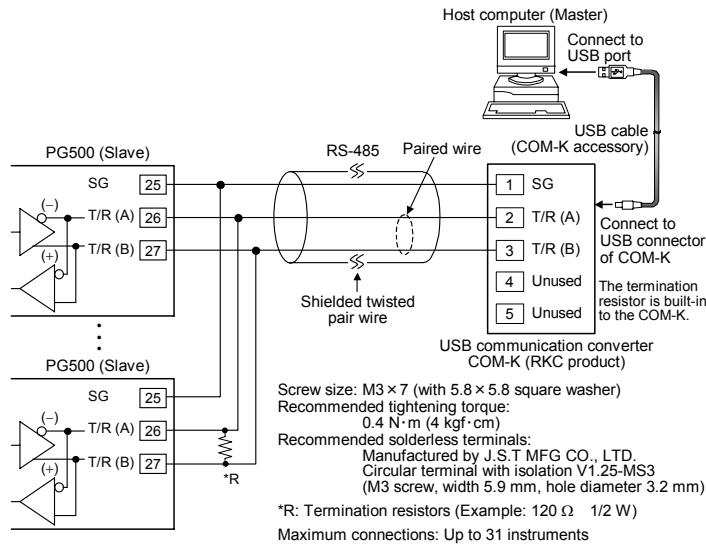■ **Communication terminal number and signal details**

Terminal No.	Signal name	Symbol
25	Signal ground	SG
26	Send/Receive data	T/R (A)
27	Send/Receive data	T/R (B)

■ **When the interface of host computer (Master) is RS-485**

Screw size: M3 × 7 (with 5.8 × 5.8 square washer)
Recommended tightening torque:
0.4 N·m (4 kgf·cm)
Recommended solderless terminals:
Manufactured by J.S.T MFG CO., LTD.
Circular terminal with isolation V1.25-MS3
(M3 screw, width 5.9 mm, hole diameter 3.2 mm)
*R: Termination resistors (Example: 120 Ω 1/2 W)
Maximum connections: Up to 31 instruments

■ **When the host computer (Master) has a USB connector**
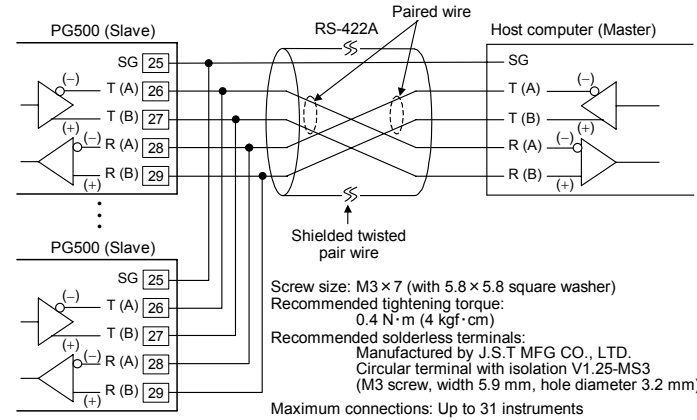Connect the USB communication converter between the host computer and the PG500.

USB communication converter
COM-K (RKC product)
Screw size: M3 × 7 (with 5.8 × 5.8 square washer)
Recommended tightening torque:
0.4 N·m (4 kgf·cm)
Recommended solderless terminals:
Manufactured by J.S.T MFG CO., LTD.
Circular terminal with isolation V1.25-MS3
(M3 screw, width 5.9 mm, hole diameter 3.2 mm)
*R: Termination resistors (Example: 120 Ω 1/2 W)
Maximum connections: Up to 31 instruments

☞ For the COM-K, see the **COM-K Instruction Manual (IMR01Z01-E□)**.

1.2 RS-422A
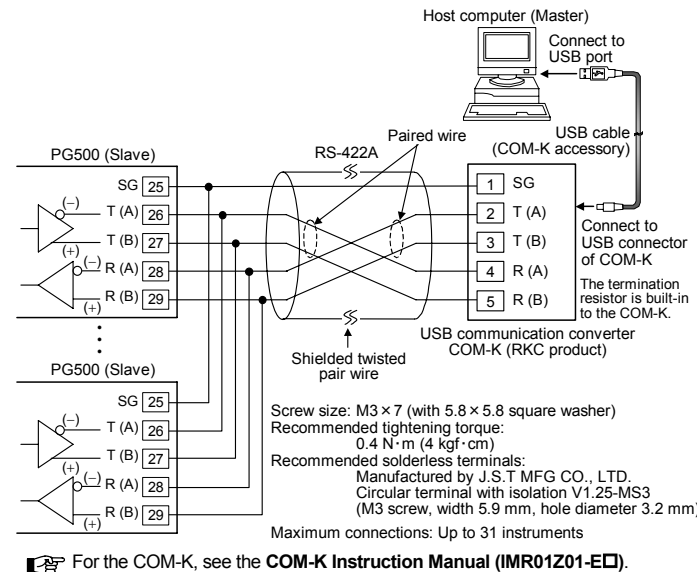
■ **Communication terminal number and signal details**

Terminal No.	Signal name	Symbol	Terminal No.	Signal name	Symbol
25	Signal ground	SG	28	Receive data	R (A)
26	Send data	T (A)	29	Receive data	R (B)
27	Send data	T (B)			

■ **When the interface of host computer (Master) is RS-422A**

Screw size: M3 × 7 (with 5.8 × 5.8 square washer)
Recommended tightening torque:
0.4 N·m (4 kgf·cm)
Recommended solderless terminals:
Manufactured by J.S.T MFG CO., LTD.
Circular terminal with isolation V1.25-MS3
(M3 screw, width 5.9 mm, hole diameter 3.2 mm)
Maximum connections: Up to 31 instruments

■ **When the host computer (Master) has a USB connector**
Connect the USB communication converter between the host computer and the PG500.

USB communication converter
COM-K (RKC product)
Screw size: M3 × 7 (with 5.8 × 5.8 square washer)
Recommended tightening torque:
0.4 N·m (4 kgf·cm)
Recommended solderless terminals:
Manufactured by J.S.T MFG CO., LTD.
Circular terminal with isolation V1.25-MS3
(M3 screw, width 5.9 mm, hole diameter 3.2 mm)
Maximum connections: Up to 31 instruments

☞ For the COM-K, see the **COM-K Instruction Manual (IMR01Z01-E□)**.

2. SETTING

To establish communication parameters between host computer and PG500, it is necessary to set the following parameters.

📖 When all communication parameter settings have been completed, turn the power off and then on to make the new set values take effect.

☞ This section describes the parameters to need setting for communication. For the mode/parameters transfer and data setting, see the **PG500 Operation Manual (IMR02F02-E□)**.

■ **Description of each parameters**
● **Engineering mode F60**

Symbol	Name	Data range	Description	Factory set value
CⱮP (CMP)	Communication protocol	0: RKC communication 1: Modbus	Use to select a protocol of communication function.	0

● **Setup setting mode**

Symbol	Name	Data range	Description	Factory set value
Add (Add)	Device address (Slave address)	0 to 99 Maximum connections: Up to 31 instruments	Do not use the same device address for more than one instrument in multi-drop connection. Each instrument must have a unique address in multi-drop connection. In Modbus communication, communication is not possible when the address is 0.	0
bPS (bPS)	Communication speed	1.2: 1200 bps 2.4: 2400 bps 4.8: 4800 bps 9.6: 9600 bps 19.2: 19200 bps 38.4: 38400 bps	Set the same communication speed for both the PG500 (slave) and the host computer (master).	9.6

Symbol	Name	Data range	Description	Factory set value
bIⱮ (bIT)	Data bit configuration	See **Data bit configuration table**	Set the same data bit configuration for both the PG500 (slave) and the host computer (master).	8n1
InⱮ (InT)	Interval time	0 to 250 ms	The interval time for the PG500 should be set to provide a time for host computer to finish sending all data including stop bit and to switch the line to receive status for the host.	10

Data bit configuration table

Set value	Data bit	Parity bit	Stop bit	Set value	Data bit	Parity bit	Stop bit
8n1	8	Without	1	7n1 *	7	Without	1
8n2	8	Without	2	7n2 *	7	Without	2
8E1	8	Even	1	7E1 *	7	Even	1
8E2	8	Even	2	7E2 *	7	Even	2
8o1	8	Odd	1	7o1 *	7	Odd	1
8o2	8	Odd	2	7o2 *	7	Odd	2

* When the Modbus communication protocol selected, this setting becomes invalid.

Interval time:
The interval time for the PG500 should be set to provide a time for host computer to finish sending all data including stop bit and to switch the line to receive status for the host. If the interval time between the two is too short, the PG500 may send data before the host computer is ready to receive it. In this case, communication transmission cannot be conducted correctly.

3. COMMUNICATION REQUIREMENTS

■ **Processing times during data send/receive**
When the host computer is using either the polling or selecting procedure for communication, the following processing times are required for PG500 to send data:
- Response wait time after PG500 sends BCC in polling procedure
- Response wait time after PG500 sends ACK or NAK in selecting procedure

📖 Response send time is time at having set interval time in 0 ms.

RKC communication (Polling procedure)

Procedure details	Time
Response send time after PG500 receives ENQ	3 ms max.
Response send time after PG500 receives ACK	3 ms max.
Response send time after PG500 receives NAK	3 ms max.
Response send time after PG500 sends BCC	1 ms max.

RKC communication (Selecting procedure)

| Procedure details	Time
Response send time after PG500 receives BCC	34 ms max.
Response wait time after PG500 sends ACK	1 ms max.
Response wait time after PG500 sends NAK	1 ms max.

Modbus

Procedure details	Time
Read holding registers [03H] Response send time after the slave receives the query message (When 125 registers are collectively read)	360 ms max.
Preset single register [06H] Response send time after the slave receives the query message	25 ms max.
Diagnostics (loopback test) [08H] Response send time after the slave receives the query message	15 ms max.
Preset multiple registers [10H] Response send time after the slave receives the query message (When 123 registers are collectively write)	360 ms max.

■ **RS-485 (2-wire system) send/receive timing** (RKC communication)
RS-485 communication is conducted through two wires, therefore the transmission and reception of data requires precise timing.
Polling procedure
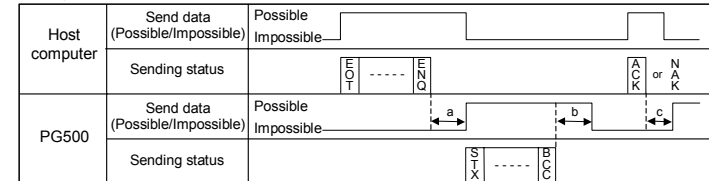
a: Response send time after the controller receives [ENQ] + Interval time
b: Response send time after the controller sends BCC
c: Response send time after the controller receives [ACK] + Interval time or Response send time after the controller receives [NAK] + Interval time

Selecting procedure
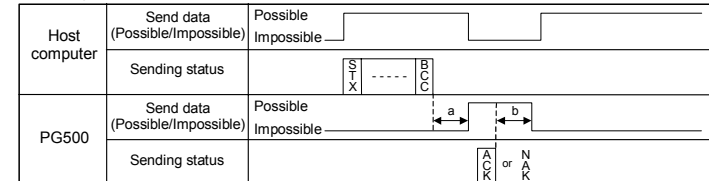
a: Response send time after the controller receives BCC + Interval time
b: Response wait time after the controller sends ACK or Response wait time after the controller sends NAK

📖 To switch the host computer from transmission to reception, send data must be on line.

📖 The following processing times are requires for the PG500 to process data.
- In Polling procedure, Response wait time after the PG500 sends BCC
- In Selecting procedure, Response wait time after the PG500 sends ACK or NAK

■ **RS-422A/RS-485 fail-safe**
A transmission error may occur with the transmission line disconnected, shorted or set to the high-impedance state. In order to prevent the above error, it is recommended that the fail-safe function be provided on the receiver side of the host computer. The fail-safe function can prevent a framing error from its occurrence by making the receiver output stable to the MARK (1) when the transmission line is in the high-impedance state.

■ **Modbus data processing precautions**
- The numeric range of data used in Modbus protocol is 0000H to FFFFH. Only the set value within the setting range is effective.
  📖 FFFFH represents −1.
- Data with decimal point is treated as data without decimal point on the Modbus protocol.
- If data (holding register) exceeding the accessible address range is accessed, an error response message is returned.
- Read data of unused item is a default value.
- Any attempt to write to an unused item is not processed as an error. Data can not be written into an unused item.
- If data range or address error occurs during data writing, it is not processed as an error. Except the data that error occurred, normal data is written in data register. Therefore, it is necessary to confirm data after the end of setting data.
- Communication data includes data that becomes RO (read only) depending on the specification. No error occurs even if data is written when set to RO. However in this case, no data is written.
- Send the next command message at time intervals of 30 bits after the master receives the response message.
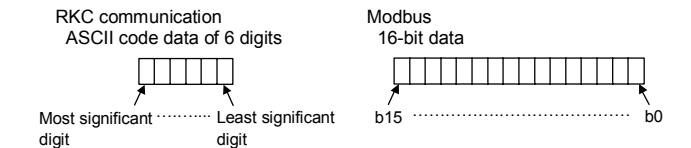- Error code

Problem	Probable cause	Solution
Error code 1	Function cod error (Specifying nonexistent function code)	Confirm the function code
Error code 2	When the mismatched address is specified	Confirm the address of holding register
Error code 3	When the specified number of data items in the query message exceeds the maximum number of data items available	Confirm the setting data
Error code 4	Self-diagnostic error	Turn off the power to the instrument. If the same error occurs when the power is turned back on, please contact RKC sales office or the agent.

4. COMMUNICATION DATA LIST

The communication data map shows data which can be used for communication between the host computer and PG500.

📖 Explanation of data map items
- Modbus register address
  HEX: Hexadecimal   DEC: Decimal
- Attribute (A method of how communication data items are read or written when viewed from the host computer is described)
  RO: Only reading data is possible   (Host computer ← PG500)
  R/W: Reading and writing data is possible   (Host computer ↔ PG500)
- Data

RKC communication
ASCII code data of 6 digits

Modbus
16-bit data

Most significant digit ···· Least significant digit
b15 ···· b0

Name	RKC Identifier	Modbus register address HEX	Modbus register address DEC	Attribute	Data range	Factory set value
Model code	ID	—	—	RO	Model character code (32-digit)	—
ROM version monitor	VR	—	—	RO	Version of ROM built-in the instrument (8-digit)	—
Measured value (PV)	M1	00E0	224	RO	Pressure display low to Pressure display high	—
Burnout state monitor	B1	00E1	225	RO	0: OFF 1: ON	—
Alarm 1 state monitor	AA	00E2	226	RO	0: OFF 1: ON	—
Alarm 2 state monitor	AB	00E3	227	RO		—
Alarm 3 state monitor	AC	00E4	228	RO		—
Alarm 4 state monitor	AD	00E5	229	RO		—
Unused	—	00E6	230	—		—
Unused	—	00E7	231	—		—
Peak hold monitor	HP	00E8	232	RO	Pressure display low to Pressure display high	—
Bottom hold monitor	HQ	00E9	233	RO	At input break: Display range limit	—

Name	RKC Identifier	Modbus register address HEX	DEC	Attribute	Data range	Factory set value
Error code	ER	00EA	234	RO	RKC communication 1: Adjustment data error 2: Back-up error 4: A/D conversion error 16: Auto zero/auto calibration error 128: Watchdog timer error 256: Program error (stack) 2048: Program error (busy) Modbus (Bit data) b0: Adjustment data error b1: Back-up error b2: A/D conversion error b3: Unused b4: Auto zero/auto calibration error b5, b6: Unused b7: Watchdog timer error b8: Program error (stack) b9: Unused b10: Unused b11: Program error (busy) b12 to b15: Unused Data 0: OFF 1: ON [Decimal number: 0 to 2439]	—
Digital input (DI) state monitor	L1	00EB	235	RO	RKC communication Least significant digit: The state of auto zero (DI1) 2nd digit: The state of hold reset (DI2) 3rd digit: The state of Interlock release (DI3) 4th digit to Most significant digit: Unused Data 0: Contact open 1: Contact closed Modbus (Bit data) b0: The state of auto zero (DI1) b1: The state of hold reset (DI2) b2: The state of Interlock release (DI3) b3 to b15: Unused Data 0: Contact open 1: Contact closed [Decimal number: 0 to 7]	—
Alarm output state monitor	Q1	00EC	236	RO	RKC communication Least significant digit to 4th digit: The state of alarm 1 output to alarm 4 output 5th digit to Most significant digit: Unused Data 0: OFF 1: ON Modbus (Bit data) b0 to b3: The state of alarm 1 output to alarm 4 output b4 to b15: Unused Data 0: OFF 1: ON [Decimal number: 0 to 15]	—
Integrated operating time monitor	UT	00ED	237	RO	0 to 19999 hours	—
Unused	—	00EE	238	—	—	—
Unused	—	00EF	239	—	—	—
Auto zero	AZ	00F0	240	R/W	0: Normal state 1: Auto zero execution When "1" is written, auto zero starts. When done, the value reverts to "0". 3: Error When "0" is written, returns to a normal state.	0
Auto calibration [1]	FS	00F1	241	R/W	0: Normal state 1: Auto calibration execution When "1" is written, auto calibration starts. When done, the value reverts to "0". 3: Error When "0" is written, returns to a normal state.	0
Hold reset	HR	00F2	242	R/W	0: Hold reset execution 1: Hold state When "0" is written, the hold reset is performed. When done, the value reverts to "1".	1
Interlock release [2]	IR	00F3	243	R/W	0: Interlock release execution 1: Interlock state When "0" is written, the interlock is released. When done, the value reverts to "1".	1
Alarm 1 set value [3]	A1	00F4	244	R/W	Pressure display low to Pressure display high Signals are output from the alarm outputs (ALM1 to ALM4) if exceeding the alarm set value.	50
Alarm 2 set value [3]	A2	00F5	245	R/W		0
Alarm 3 set value [3]	A3	00F6	246	R/W		50
Alarm 4 set value [3]	A4	00F7	247	R/W		50
Unused	—	00F8	248	—	—	—
Unused	—	00F9	249	—	—	—

[1] This item is valid when using resistance for sensitivity adjustment built-in pressure sensor.

[2] This item is invalid when the alarm 1 to 4 Interlock are set to "0: Unused".

[3] This item is invalid when the alarm type is set to "0: None".

Name	RKC Identifier	Modbus register address HEX	DEC	Attribute	Data range	Factory set value
Input type	XI	00FA	250	R/W	0 to 4 See Input type and factory set value table.	Depends on model code.
Gain setting	GA	00FB	251	R/W	0.500 to 4.000 mV/V or 0.5000 to 1.9999 mV/V * (Varies with the setting of the gain setting decimal point position)	See Input type and factory set value table
Display unit	PU	00FC	252	R/W	0: Kgf/cm² 2: bar 1: MPa 3: psi	1
Input decimal point position	XU	00FD	253	R/W	0: No decimal point 1: One decimal place 2: Two decimal places 3: Three decimal places	0
Pressure display high	XV	00FE	254	R/W	Pressure display low to 19999 (Varies with the setting of the input decimal point position)	50
Pressure display low	XW	00FF	255	R/W	0 to Pressure display high (Varies with the setting of the input decimal point position)	0
Linearizing type	LI	0100	256	R/W	0 to 7	0
PV bias	PB	0101	257	R/W	–Input span to +Input span	0
PV digital filter	F1	0102	258	R/W	0.0 to 100.0 seconds (0.0: Unused)	0
PV ratio	PR	0103	259	R/W	0.500 to 1.500 *	1.000
Unused	—	0104	260	—	—	—
Set lock level	LK	0105	261	R/W	RKC communication Least significant digit: Items other than alarm set value. 2nd digit: Alarm set value 3rd digit to Most significant digit: Unused Data 0: Unlock 1: Lock Modbus (Bit data) b0: Items other than alarm set value. b1: Alarm set value b2 to b15: Unused Data 0: Unlock 1: Lock [Decimal number: 0 to 3]	0
Display timer	TL	0106	262	R/W	0.1 to 10.0 seconds	0.1
PV display condition	DU	0107	263	R/W	RKC communication 0 to 63 (Decimal) Set the bit data (See Modbus) after converting it to decimal. Modbus (Bit data) b0: Minus display of PV value b1: Input error b2: Alarm 1 occurs b3: Alarm 2 occurs b4: Alarm 3 occurs b5: Alarm 4 occurs b6 to b15: Unused Data b0 の場合 0: Minus display 1: Non-minus display b1 to b5 0: Non-flashing display 1: Flashing display [Decimal number: 0 to 63]	0

* The setting value varies depending on using pressure sensor.

Data name	When using our CZ-100P or CZ-200P	When using resistance for sensitivity adjustment built-in pressure sensor
Gain setting	See ● Gain setting and linearizing type of PG500 Operation Manual (IMR02F02-E□).	Set the appropriate gain setting value.
Linearizing type		Use a factory set value of "0."
PV ratio	[Explosionproof specification type] Set the desired correction factor of our safety barrier RZB-001 to the PV ratio (Pr). Thus, an indicated error caused by the use of the safety barrier is corrected. The correction factor is described in the nameplate attached to the safety barrier (RZB-001). [Non-explosionproof specification type] Use a factory set value of "1.000."	The result obtained by auto calibration is reflected to the PV ratio (Pr). Manual full scale adjustment can be performed by changing this PV ratio value.

Input type and factory set value table

Set value	Input type	Factory set value of gain setting (mV/V)
0	Our CZ-100P/CZ-200P (Standard)	1.500
1	Our CZ-100P/CZ-200P (Explosionproof)	1.500
2	Our CZ-100P/CZ-200P (Standard) [Loose nut: 0.0 to 0.5 MPa, Fixed nut: 0 to 5 MPa]	0.650
3	Our CZ-100P/CZ-200P (Explosionproof) [Loose nut: 0.0 to 0.5 MPa, Fixed nut: 0 to 5 MPa]	0.650
4	3.33 mV/V output type (Pressure sensor made by other companies)	3.330

Name	RKC Identifier	Modbus register address HEX	DEC	Attribute	Data range	Factory set value
Input error determination point (high)	AV	0108	264	R/W	Pressure display low – (5 % of input span) to Pressure display high + (5 % of input span)	53
Input error determination point (low)	AW	0109	265	R/W	Pressure display low – (5 % of input span) to Pressure display high + (5 % of input span)	–2
Burnout direction	IB	010A	266	R/W	0: Upscale 1: Downscale Setting of a burn out direction select switch is necessary to select a burn out direction. For the switch setting, see the PG500 Installation Manual (IMR02F01-E□).	0
Gain setting decimal point position	GS	010B	267	R/W	3: Three decimal places 4: Four decimal places	3
Unused	—	010C	268	—	—	—
Shunt resistance output value [1]	OR	010D	269	R/W	40.0 to 100.0 %	80.0
Transmission output scale high	HV	010E	270	R/W	Transmission output scale low to Pressure display high	50
Transmission output scale low	HW	010F	271	R/W	Pressure display low to Transmission output scale high	0
Transmission output timer	TO	0110	272	R/W	0.1 to 10.0 seconds	0.1
Alarm 1 type	XA	0111	273	R/W	0: None 1: Process high 2: Process low	Depends on model code [2]
Alarm 1 hold action	WA	0112	274	R/W	0: OFF 1: Hold action ON	Depends on model code [2]
Alarm 1 interlock	QA	0113	275	R/W	0: Unused (OFF) 1: Used	0
Alarm 1 energized/de-energized	NA	0114	276	R/W	0: Energized 1: De-energized	0
Alarm 1 differential gap	HA	0115	277	R/W	0 to Input span	2
Alarm 1 delay timer	TD	0116	278	R/W	0.0 to 600.0 seconds	0.0
Alarm 1 action at input error	OA	0117	279	R/W	0: Normal alarm action 1: Forced alarm ON when temperature measured value exceeds the input error determination point (high or low limit).	0
Alarm 2 type	XB	0118	280	R/W	Same as Alarm 1 type	
Alarm 2 hold action	WB	0119	281	R/W	Same as Alarm 1 hold action	
Alarm 2 interlock	QB	011A	282	R/W	Same as Alarm 1 interlock	
Alarm 2 energized/de-energized	NB	011B	283	R/W	Same as Alarm 1 energized/de-energized	
Alarm 2 differential gap	HB	011C	284	R/W	Same as Alarm 1 differential gap	
Alarm 2 delay timer	TG	011D	285	R/W	Same as Alarm 1 delay timer	
Alarm 2 action at input error	OB	011E	286	R/W	Same as Alarm 1 action at input error	
Alarm 3 type	XC	011F	287	R/W	Same as Alarm 1 type	
Alarm 3 hold action	WC	0120	288	R/W	Same as Alarm 1 hold action	
Alarm 3 interlock	QC	0121	289	R/W	Same as Alarm 1 interlock	
Alarm 3 energized/de-energized	NC	0122	290	R/W	Same as Alarm 1 energized/de-energized	
Alarm 3 differential gap	HC	0123	291	R/W	Same as Alarm 1 differential gap	
Alarm 3 delay timer	TH	0124	292	R/W	Same as Alarm 1 delay timer	
Alarm 3 action at input error	OC	0125	293	R/W	Same as Alarm 1 action at input error	
Alarm 4 type	XD	0126	294	R/W	Same as Alarm 1 type	
Alarm 4 hold action	WD	0127	295	R/W	Same as Alarm 1 hold action	
Alarm 4 interlock	QD	0128	296	R/W	Same as Alarm 1 interlock	
Alarm 4 energized/de-energized	ND	0129	297	R/W	Same as Alarm 1 energized/de-energized	
Alarm 4 differential gap	HD	012A	298	R/W	Same as Alarm 1 differential gap	
Alarm 4 delay timer	TI	012B	299	R/W	Same as Alarm 1 delay timer	
Alarm 4 action at input error	OD	012C	300	R/W	Same as Alarm 1 action at input error	
Unused	—	012D 013A	301 314	—	—	—

[1] This item is valid when using resistance for sensitivity adjustment built-in pressure sensor.

[2] When not specifying: Alarm 1: Process high (without hold action)　Alarm 3: No alarm
Alarm 2: Process low (without hold action)　Alarm 4: No alarm

5. HOW TO USE MODBUS DATA MAPPING

In this communication, it is possible to continuously read/write data by freely specifying 16 sets of data.

Register address to specify mapping data: **1000H to 100FH**
Register address to actually read/write data: **1500H to 150FH**
Register address of data which can be mapped: See **4. COMMUNICATION DATA LIST.**

Example: When mapping Measured value (PV), Alarm 1 state monitor, Alarm 2 state monitor and Alarm output state monitor to the register addresses from 1500H to 1503H

For data mapping Factory set value: (–1: No mapping)				Mapping data		
Name	Register address HEX	DEC		Name	Register address HEX	DEC
Setting 1 (For 1500H)	1000	4096		Measured value (PV)	00E0	224
Setting 2 (For 1501H)	1001	4097		Alarm 1 state monitor	00E2	226
Setting 3 (For 1502H)	1002	4098		Alarm 2 state monitor	00E3	227
Setting 4 (For 1503H)	1003	4099		Alarm output state monitor	00EC	236
⋮	⋮	⋮				
Setting 16 (For 150FH)	100F	4111				

Write to 1000H to 1003H.

1. The register address, "00E0H" of the "Measured value (PV)" to be mapped is written to register address setting 1 (1000H).

2. The register address, "00E2H" of the "Alarm 1 state monitor" to be mapped is written to register address setting 2 (1001H).

3. The register address, "00E3H" of the "Alarm 2 state monitor" to be mapped is written to register address setting 3 (1002H).

4. The register address, "00ECH" of the "Alarm output state monitor" to be mapped is written to register address setting 4 (1003H).

5. The assignment of the register addresses from 1500H to 1503H from/to which data is actually read/written becomes as follows.

Register address HEX	DEC	Name	
1500	5376	Measured value (PV)	High-speed communication is performed by reading or writing data in the consecutive register addresses from 1500H to 1503H.
1501	5377	Alarm 1 state monitor	
1502	5378	Alarm 2 state monitor	
1503	5379	Alarm output state monitor	

6. COMMUNICATION SPECIFICATIONS

Interface: Based on RS-422A or RS-485, EIA standard
Synchronous method: Start-stop synchronous type
Communication speed: 1200 bps, 2400 bps, 4800 bps, 9600 bps, 19200 bps, 38400 bps
Data bit configuration: Start bit: 1
　Data bit: RKC communication: 7 or 8
　　　　Modbus: 8
　Parity bit: Without, Odd or Even
　Stop bit: 1 or 2
Connection method:
　RS-422A: 4-wire system, half-duplex multi-drop connection
　RS-485: 2-wire system, half-duplex multi-drop connection
Protocol:
● RKC communication (ANSI X3.28-1976 subcategory 2.5, A4)
　Error control: Vertical parity (With parity bit selected)
　　　　　　　Horizontal parity (BCC check)
　Communication code: ASCII 7-bit code
　Xon/Xoff control: None
● Modbus
　Signal transmission mode:
　　Remote Terminal Unit (RTU) mode
　Function code: 03H (Read holding registers)
　　　　　　06H (Preset single register)
　　　　　　08H (Diagnostics: loopback test)
　　　　　　10H (Preset multiple registers)
　Error check method: CRC-16
Maximum connections: Up to 31 instruments
Termination resistor: Externally connected (Example: 120 Ω 1/2W)
Data mapping function: Up to 16 items (Only Modbus)
Interval time: 0 to 250 ms
Signal logic: RS-422A, RS-485

Signal voltage	Logic
V (A) – V (B) ≥ 2 V	0 (SPACE)
V (A) – V (B) ≤ –2 V	1 (MARK)

Voltage between V (A) and V (B) is the voltage of (A) terminal for the (B) terminal.