Pressure Indicator

AG500 Communication Instruction Manual

IMR02F08-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 AG500. For the installation, the parts description, the specifications and the operation method, please read if necessary the following separate manuals.

- AG500 Installation Manual (IMR02F06-E□): Enclosed with AG500
- AG500 Operation Manual (IMR02F07-E□): Enclosed with AG500

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.

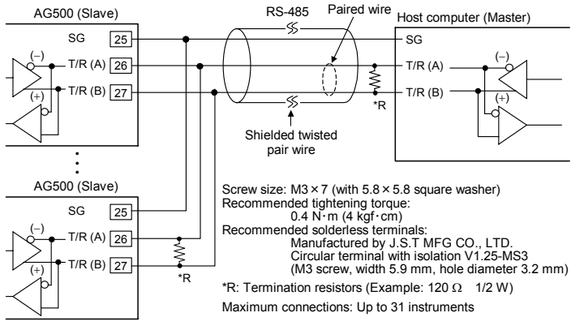
The cable must be provided by the customer.

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)

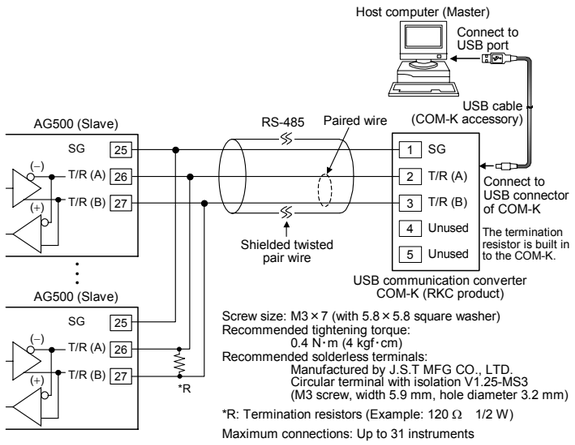
■ When the interface of host computer (Master) is RS-485



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 AG500.



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□)**.

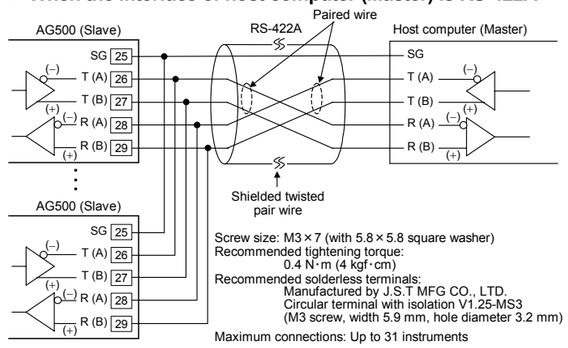
1.2 RS-422A

■ Communication terminal number and signal details

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

Terminal No.	Signal name	Symbol
28	Receive data	R (A)
29	Receive data	R (B)

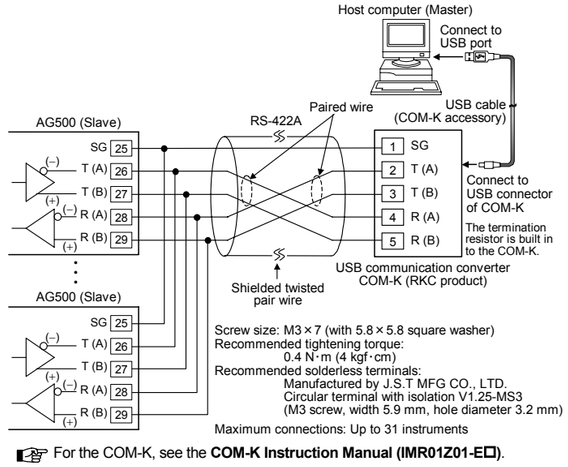
■ When the interface of host computer (Master) is RS-422A



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 AG500.



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 AG500, 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 **AG500 Operation Manual (IMR02F07-E□)**.

■ Description of each parameters

● Engineering mode F60

Symbol	Name	Data range	Description	Factory set value
F60. (F60)	Function block 60	This is the first parameter symbol of function block 60.		
CMP (CMP)	Communication protocol	0: RKC communication 1: Modbus	Use to select a protocol of communication function.	0
dGT (dGT)	Communication data digit *	0: 6 digits 1: 7 digits	The number of communication data digits in RKC communication	1

* Display range limit is table shown below.

Input decimal point position	Communication data 6 digits	Communication data 7 digits (Factory set value)
No decimal place	–9999 to +19999	–19999 to +19999
One decimal place	–999.9 to +1999.9	–1999.9 to +1999.9
Two decimal places	–99.99 to +199.99	–199.99 to +199.99
Three decimal places	–9.999 to +19.999	–19.999 to +19.999
Four decimal places	None	–1.9999 to +1.9999

● 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 AG500 (slave) and the host computer (master).	19.2
bIT (bIT)	Data bit configuration	See **Data bit configuration table**	Set the same data bit configuration for both the AG500 (slave) and the host computer (master).	8n1
InT (InT)	Interval time	0 to 250 ms	The interval time for the AG500 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
8n1	8	Without	1
8n2	8	Without	2
8E1	8	Even	1
8E2	8	Even	2
8o1	8	Odd	1
8o2	8	Odd	2

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

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

Interval time:
The interval time for the AG500 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 AG500 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 AG500 to send data:
- Response wait time after AG500 sends BCC in polling procedure
- Response wait time after AG500 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 AG500 receives ENQ	3 ms max.
Response send time after AG500 receives ACK	3 ms max.
Response send time after AG500 receives NAK	3 ms max.
Response send time after AG500 sends BCC	1 ms max.

RKC communication (Selecting procedure)

Procedure details	Time
Response send time after AG500 receives BCC	34 ms max.
Response wait time after AG500 sends ACK	1 ms max.
Response wait time after AG500 sends NAK	1 ms max.

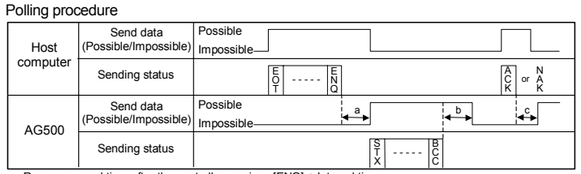
Modbus

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	16 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)

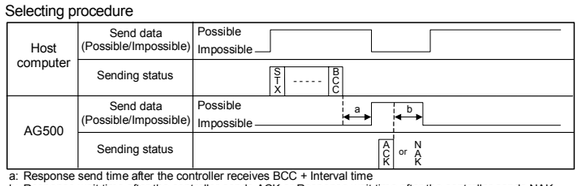
RS-485 communication is conducted through two wires, therefore the transmission and reception of data requires precise timing.

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 AG500 to process data.
- In Polling procedure, Response wait time after the AG500 sends BCC
- In Selecting procedure, Response wait time after the AG500 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.

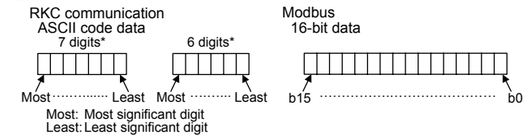
■ Modbus data processing precautions

- 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.

4. COMMUNICATION DATA LIST

The communication data map shows data which can be used for communication between the host computer and AG500.

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 ← AG500)
  R/W: Reading and writing data is possible (Host computer ↔ AG500)
- Data



Most: Most significant digit
Least: Least significant digit

* The number of communication data digits in RKC communication varies with the setting of the communication data digit (dGT).

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	Input scale low to Input scale 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		—
Alarm 5 state monitor	AE	00E6	230	RO		—
Alarm 6 state monitor	AF	00E7	231	RO		—
Peak hold monitor	HP	00E8	232	RO	Input scale low to Input scale high	—
Bottom hold monitor	HQ	00E9	233	RO	At input break: Display range limit *	—

* This item is invalid when using voltage (high) input (0 to 10 V DC, 0 to 5 V DC, 1 to 5 V DC, ±1 V DC) and current input.

Continued on the rear page

Name	RKC Identifier	Modbus register address HEX	Modbus register address 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 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 to 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 hold reset (DI1) 2nd digit: The state of Interlock release (DI2) 3rd digit to Most significant digit: Unused Data 0: Contact open 1: Contact closed	—
					Modbus (Bit data) b0: The state of hold reset (DI1) b1: The state of Interlock release (DI2) b2 to b15: Unused Data 0: Contact open 1: Contact closed [Decimal number: 0 to 3]	—
Alarm output state monitor	Q1	00EC	236	RO	RKC communication Least significant digit to 6th digit: The state of alarm 1 output to alarm 6 output Most significant digit: Unused Data 0: OFF 1: ON	—
					Modbus (Bit data) b0 to b5: The state of alarm 1 output to alarm 6 output b6 to b15: Unused Data 0: OFF 1: ON [Decimal number: 0 to 63]	—
Integrated operating time monitor	UT	00ED	237	RO	0 to 19999 hours	—
Holding peak value ambient temperature monitor	HT	00EE	238	RO	−10.0 to +100.0 °C	—
Unused	—	00EF ⋮ 00F1	239 ⋮ 241	—	—	—
Hold reset	HR	00F2	242	R/W	0: Hold reset execution 1: Hold state	1 [a]
Interlock release [b]	IR	00F3	243	R/W	0: Interlock release execution 1: Interlock state	1 [a]
Alarm 1 set value [c]	A1	00F4	244	R/W	Input scale low to Input scale high Signals are output from the alarm outputs (ALM1 to ALM6) if exceeding the alarm set value.	50
Alarm 2 set value [c]	A2	00F5	245	R/W		50
Alarm 3 set value [c]	A3	00F6	246	R/W		50
Alarm 4 set value [c]	A4	00F7	247	R/W		50
Alarm 5 set value [c]	A5	00F8	248	R/W		50
Alarm 6 set value [c]	A6	00F9	249	R/W		50
Input type When the input type is changed to the voltage (low) or voltage (high) input group, it is necessary to transfer the input select switch. For details, see the **AG500 Operation Manual (IMR02F07-E□)**.	XI	00FA	250	R/W	0: K 14: 0 to 20 mA DC 1: J 15: 4 to 20 mA DC 2: R 16: 0 to 10 V DC 3: S 17: 0 to 5 V DC 4: B 18: 1 to 5 V DC 5: E 19: 0 to 1 V DC 6: N 20: 0 to 100 mV DC 7: T 21: 0 to 10 mV DC 8: W5Re/W26Re 9: PLII 24: ±1 V DC 10: U 25: ±100 mV DC 11: L 26: ±10 mV DC 12: Pt100 13: JPt100 22, 23: Don't set this one	Depends on model code. When not specifying: 0
Unused	—	00FB	251	—	—	—

[a] When "0" is written, the interlock is released or hold reset is performed. When done, the value reverts to "1."

[b] This item is invalid when the alarm 1 to 6 Interlock are set to "0: Unused."

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

Name	RKC Identifier	Modbus register address HEX	Modbus register address DEC	Attribute	Data range	Factory set value
Display unit	PU	00FC	252	R/W	0: °C 1: °F	0
Input decimal point position [a]	XU	00FD	253	R/W	0: No decimal place 1: One decimal place 2: Two decimal places 3: Three decimal places 4: Four decimal places	Depends on model code. When not specifying: 0
Input scale high	XV	00FE	254	R/W	TC/RTD inputs: Input scale low to Maximum value of the input range Voltage (V)/current (I) inputs: −19999 to +19999 [b]	TC/RTD inputs: Maximum value of the input range V/I inputs: 100.0
Input scale low	XW	00FF	255	R/W	TC/RTD inputs: Minimum value of the input range to Input scale high Voltage (V)/current (I) inputs: −19999 to +19999 [b]	TC/RTD inputs: Minimum value of the input range V/I inputs: 0.0
Unused	—	0100	256	—	—	—
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
PV low input cut-off [c]	DP	0104	260	R/W	0.00 to 25.00 % of input span	0.00
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	0
					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
Unused	—	0106	262	—	—	—
PV display condition	DU	0107	263	R/W	RKC communication 0 to 255 (Decimal) Set the bit data (See Modbus) after converting it to decimal.	0
					Modbus (Bit data) b0: Minus display of PV value [d] b1: Input error b2: Alarm 1 occurs b3: Alarm 2 occurs b4: Alarm 3 occurs b5: Alarm 4 occurs b6: Alarm 5 occurs b7: Alarm 6 occurs b8 to b15: Unused Data b0: 0: Minus display 1: Non-minus display b1 to b7: 0: Non-flashing display 1: Flashing display [Decimal number: 0 to 255]	0
Input error determination point (high)	AV	0108	264	R/W	Input scale low − (5 % of input span) to Input scale high + (5 % of input span)	Note 1
Input error determination point (low)	AW	0109	265	R/W	Input scale low − (5 % of input span) to Input scale high + (5 % of input span)	Note 1
Burnout direction [e]	IB	010A	266	R/W	0: Upscale 1: Downscale	0

[a] Data range of input decimal point position

Input type		Data range
TC input RTD input	Input range without decimal points	0
	Input range with one decimal place	0, 1
	Input range with two decimal place	0 to 2
Voltage (V)/current (I) inputs [For communication data 6 digits: 0 to 3]		0 to 4

☞ For the input range, see the **AG500 Installation Manual (IMR02F06-E□)**.

[b] Varies with the setting of the input decimal point position.

[c] This item is invalid when the square root extraction is set to "0: Unused."

[d] This item is valid when using voltage (V)/current (I) inputs.

[e] This item is valid when using thermocouple input and voltage (low) input.
Voltage (low) input: 0 to 10 mV DC, ±10 mV DC, 0 to 100 mV DC, ±100 mV DC, 0 to 1 V DC

Note 1 Factory set value of Input error determination point (high/low)

Input error determination point	TC/RTD inputs	Voltage (V)/current (I) inputs
High	Input scale high + (5 % of input span)	+105.0
Low	Input scale low − (5 % of input span)	−5.0

Name	RKC Identifier	Modbus register address HEX	Modbus register address DEC	Attribute	Data range	Factory set value
Unused	—	010B	267	—	—	—
Square root extraction	XH	010C	268	R/W	0: Unused 1: Used	0
Unused	—	010D	269	—	—	—
Transmission output scale high	HV	010E	270	R/W	Transmission output scale low to Input scale high	Input scale high
Transmission output scale low	HW	010F	271	R/W	Input scale low to Transmission output scale high	Input scale low
Unused	—	0110	272	—	—	—
Alarm 1 type	XA	0111	273	R/W	0: None 1: Process high 2: Process low	Depends on model code. When not specifying: 0
Alarm 1 hold action	WA	0112	274	R/W	0: OFF 1: Hold action ON	Depends on model code. When not specifying: 0
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	
Alarm 5 type	XE	012D	301	R/W	Same as Alarm 1 type	
Alarm 5 hold action	WE	012E	302	R/W	Same as Alarm 1 hold action	
Alarm 5 interlock	QE	012F	303	R/W	Same as Alarm 1 interlock	
Alarm 5 energized/ de-energized	NE	0130	304	R/W	Same as Alarm 1 energized/ de-energized	
Alarm 5 differential gap	HE	0131	305	R/W	Same as Alarm 1 differential gap	
Alarm 5 delay timer	TJ	0132	306	R/W	Same as Alarm 1 delay timer	
Alarm 5 action at input error	OK	0133	307	R/W	Same as Alarm 1 action at input error	
Alarm 6 type	XF	0134	308	R/W	Same as Alarm 1 type	
Alarm 6 hold action	WF	0135	309	R/W	Same as Alarm 1 hold action	
Alarm 6 interlock	QF	0136	310	R/W	Same as Alarm 1 interlock	
Alarm 6 energized/ de-energized	NF	0137	311	R/W	Same as Alarm 1 energized/ de-energized	
Alarm 6 differential gap	HF	0138	312	R/W	Same as Alarm 1 differential gap	
Alarm 6 delay timer	TK	0139	313	R/W	Same as Alarm 1 delay timer	
Alarm 6 action at input error	OU	013A	314	R/W	Same as Alarm 1 action at input error	

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) Name	Register address HEX	Register address DEC
Setting 1 (For 1500H)	1000	4096
Setting 2 (For 1501H)	1001	4097
Setting 3 (For 1502H)	1002	4098
Setting 4 (For 1503H)	1003	4099
⋮	⋮	⋮
Setting 16 (For 150FH)	100F	4111

Mapping data Name	Register address HEX	Register address DEC
Measured value (PV)	00E0	224
Alarm 1 state monitor	00E2	226
Alarm 2 state monitor	00E3	227
Alarm output state monitor	00EC	236

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	Register address DEC	Name
1500	5376	Measured value (PV)
1501	5377	Alarm 1 state monitor
1502	5378	Alarm 2 state monitor
1503	5379	Alarm output state monitor

High-speed communication is performed by reading or writing data in the consecutive register addresses from 1500H to 1503H.

6. MODBUS 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.

7. 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)
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.

RKC RKC INSTRUMENT INC. The first edition: OCT. 2007 [IMQ00]
The second edition: JAN. 2008 [IMQ00]
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)
JAN. 2008

Digital Indicator

AG500 Operation Manual

IMR02F07-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 operation method of the AG500. For the installation, the parts description, the specifications and the communication function (Optional), please read if necessary the following separate manuals.

- AG500 Installation Manual (IMR02F06-E□): Enclosed with AG500
- AG500 Communication Instruction Manual (IMR02F08-E□): Enclosed with AG500*

  * Only AG500 provided with the communication function

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

1. HANDLING PROCEDURES

Mounting and wiring — See **AG500 Installation Manual (IMR02F06-E□)**

↓

Power ON

↓

Setting of usage condition — Set the parameters for sensor's usage condition in setup setting mode. See **4.2 Setup Setting Mode**

↓

Setting of operating condition — Set the parameters for instrument's basic functions in engineering mode. See **4.4 Engineering Mode**

↓

Setting of alarm — Set the alarm set value. See **4.3 Parameter Setting Mode**

↓

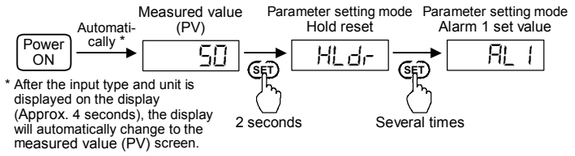
Operation start

2. CHANGING DATA SETTINGS

- To store a new value for the parameter, always press the SET key.
- After a new value is displayed on the display by using UP and DOWN keys, if no key operation is performed for more than 1 minute without pressing SET key, this instrument returns to the Measured value (PV) screen and the set value will not be changed.

Example: Changing the alarm 1 set value (AL1) to 20 °C

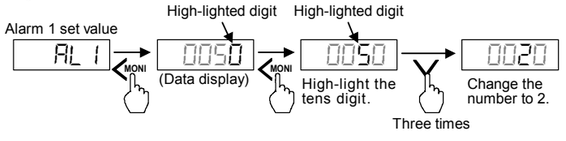
***1.* Select the alarm 1 set value (AL1) of parameter setting mode**



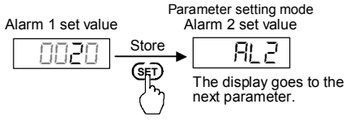
* After the input type and unit is displayed on the display (Approx. 4 seconds), the display will automatically change to the measured value (PV) screen.

***2.* Change the alarm 1 set value (AL1) to 20 °C**

Pressing the <MONI key displays the data display. The high-lighted digit indicates which digit can be set.



***3.* Store the alarm 1 set value (AL1)**

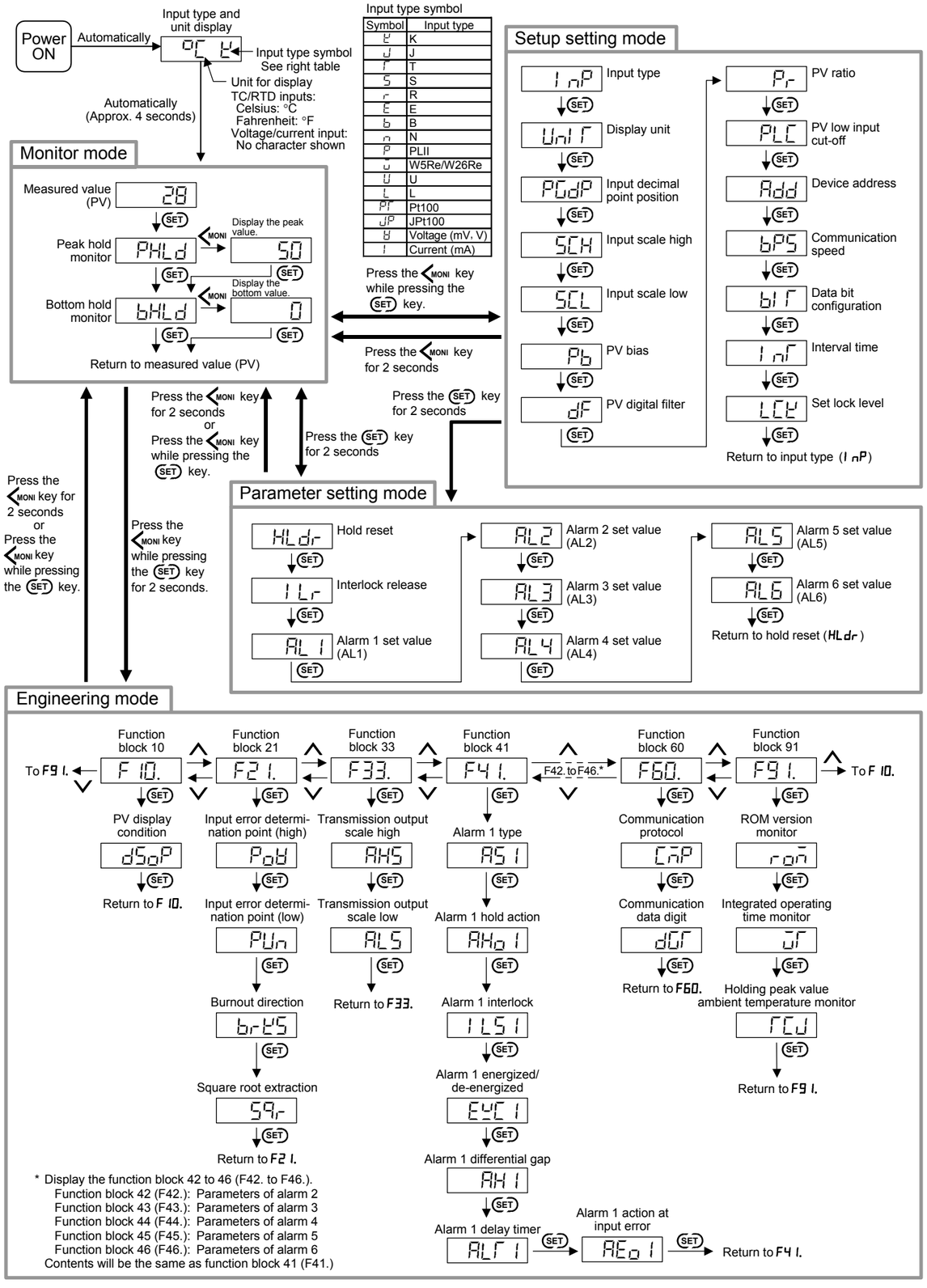


Other data can also be set by the same procedures as described in steps ***1*** to ***3***.

3. TRANSFER TO EACH MODE AND PARAMETER

This instrument return to Measured value (PV) screen, if key operation for more than 1 minute is not performed.

Any parameter which is not used in the controller will not be displayed except for parameters in engineering mode.



* Display the function block 42 to 46 (F42. to F46.).
Function block 42 (F42.): Parameters of alarm 2
Function block 43 (F43.): Parameters of alarm 3
Function block 44 (F44.): Parameters of alarm 4
Function block 45 (F45.): Parameters of alarm 5
Function block 46 (F46.): Parameters of alarm 6
Contents will be the same as function block 41 (F41.)

4. PARAMETER LIST

4.1 Monitor Mode

Symbol	Name	Data range	Description
—	Measured value (PV)	Input scale low to Input scale high	Display the measured value (PV).
PHLd (PHLd)	Peak hold monitor [1]	Input scale low to Input scale high	Display the maximum value of measured value (PV).
bHLd (bHLd)	Bottom hold monitor [1]	At input break: Display range limit [2]	Display the minimum value of measured value (PV).

[1] The hold reset function can be executed by hold reset (HLdr) in parameter setting mode and digital input 1 (DI1, terminal Nos. 13 and 14). Reset also takes place when the power is turned off, or when the set value of Input type (InP), Display unit (UnIT) or Input decimal point position (PGdP) is changed.

[2] This item is invalid when using voltage (high) input (0 to 10 V DC, 0 to 5 V DC, 1 to 5 V DC, ±1 V DC) and current input.

4.2 Setup Setting Mode

Symbol	Name	Data range	Description	Factory set value
InP (InP)	Input type	0 to 26 See **Input type number table**	Use to select the input type.	Depends on model code. When not specifying: 0
UnIT (UnIT)	Display unit	0: °C 1: °F	Use to select the display unit for TC/RTD inputs.	0
PGdP (PGdP)	Input decimal point position [a]	0: No decimal place 1: One decimal place 2: Two decimal places 3: Three decimal places 4: Four decimal places	Use to select the decimal point position of the input display value.	Depends on model code. When not specifying: 0
SCH (SCH)	Input scale high	TC/RTD inputs: Input scale low to Maximum value of the input range Voltage (V)/current (I) inputs: −19999 to +19999 [b]	Use to set the high limit of the input scale range.	TC/RTD inputs: Maximum value of the input range V/I inputs: 100.0
SCL (SCL)	Input scale low	TC/RTD inputs: Minimum value of the input range to Input scale high Voltage (V)/current (I) inputs: −19999 to +19999 [b]	Use to set the low limit of the input scale range.	TC/RTD inputs: Minimum value of the input range V/I inputs: 0.0
Pb (Pb)	PV bias	−Input span to +Input span	PV bias adds bias to the measured value (PV).	0
dF (dF)	PV digital filter	0.1 to 100.0 seconds oFF: Unused	This item is the time of the first-order lag filter eliminate noise against the measured input.	oFF

[a] Data range of input decimal point position

Input type		Data range
TC input RTD input	Input range without decimal points	0
	Input range with one decimal place	0, 1
	Input range with two decimal place	0 to 2
Voltage (V)/current (I) inputs [For communication data 6 digits: 0 to 3]		0 to 4

For the input range, see the **AG500 Installation Manual (IMR02F06-E□)**.

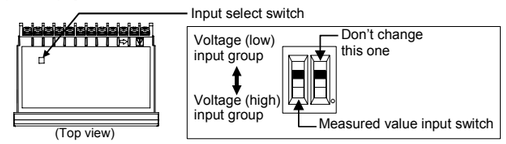
[b] Varies with the setting of the input decimal point position.

Input type number table

Set value	Input type	Hard-ware	Set value	Input type	Hard-ware
0	TC input K	Voltage (low) input group	13	RTD input JPt100	Voltage (low) input group
1	TC input J		14	Current input 0 to 20 mA DC	
2	TC input R		15	Current input 4 to 20 mA DC	
3	TC input S		19	Voltage (low) input 0 to 1 V DC	
4	TC input B		20	Voltage (low) input 0 to 100 mV DC	
5	TC input E		21	Voltage (low) input 0 to 10 mV DC	
6	TC input N		25	Voltage (low) input ±100 mV DC	
7	TC input T		26	Voltage (low) input ±10 mV DC	
8	TC input W5Re/W26Re		16	Voltage (high) input 0 to 10 V DC	Voltage (high) input group
9	TC input PLII		17	Voltage (high) input 0 to 5 V DC	
10	TC input U		18	Voltage (high) input 1 to 5 V DC	
11	TC input L		24	Voltage (high) input ±1 V DC	
12	RTD input Pt100		22, 23	Don't set this one	

As the input decimal point position, input scale high and input scale low are initialized if the input type is changed, it is necessary to conduct the re-setting.

When the input type is changed to the voltage (low) or voltage (high) input group, it is necessary to transfer the input select switch. Turn the measured value input switch (left side) by a small screwdriver.



Continued on the rear page

Symbol	Name	Data range	Description	Factory set value
Pr (Pr)	PV ratio	0.500 to 1.500	PV ratio is a multiplier to be applied to the measured value (PV).	1.000
PLC (PLC)	PV low input cut-off	0.00 to 25.00 % of input span This parameter isn't displayed when the square root extraction is set to "0: Unused."	The measured value less than the PV low input cut-off is ignored to prevent control disturbance caused by input variation at low measured value range.	0.00
Add (Add)	Device address	This parameter is displayed when there is the communication function [Optional]. See the **AG500 Communication Instruction Manual (IMR02F08-E□)**.		
bPS (bPS)	Communication speed			
bIT (bIT)	Data bit configuration			
InT (InT)	Interval time			
LCK (LCK)	Set lock level	0: Unlock 1: Lock Set to "0" or "1" for each digit.	The set lock level restricts parameter setting changes by key operation (Set data lock function).	0000

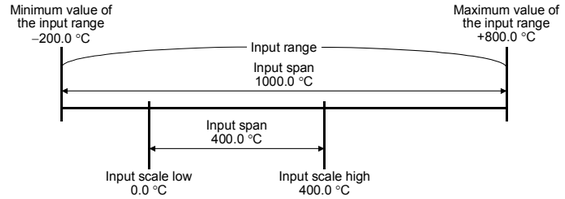
0000 ← PV display
- Parameters other than alarm set value (AL1 to AL6).
- Alarm set value (AL1 to AL6)
- "0" Fixed (Don't change this one)
- "0" Fixed (Don't change this one)

■ Input scale high/low

The input range can be changed for temperature input. For voltage (V)/current (I) inputs, display scaling can be made in the range of −19999 to +19999.

Example of temperature input:

When the range of −200.0 to +800.0 °C for thermocouple type K is changed to 0.0 to 400.0 °C



When outside the input scale range, the PV display flashes.The alarm setting range is within the input scale range.

Example of voltage (V)/Current (I) inputs:

When the input scale is changed to "0.0 to 50.0" from "0.0 to 100.0" at a voltage input of 1 to 5 V DC

When the voltage input is 1 V → Displays the "0.0"
When the voltage input is 5 V → Displays the "100.0"

When the voltage input is 1 V → Displays the "0.0"
When the voltage input is 5 V → Displays the "50.0"

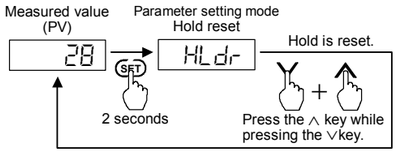
4.3 Parameter Setting Mode

Symbol	Name	Data range	Description	Factory set value
HLdr (HLdr)	Hold reset *	—	Peak hold/bottom hold value is reset.	—
ILr (ILr)	Interlock release *	— This parameter isn't displayed when the alarm 1 to 6 Interlock are set to "0: Unused."	If the alarm state is interlocked, interlock can be released. The interlock states of all alarms are released.	—
AL1 (AL1)	Alarm 1 set value (AL1)	Input scale low to Input scale high This parameter isn't displayed when the alarm type is set to "0: None."	Use to set the set value of the alarm action. Signals are output from the alarm outputs (ALM1 to ALM6) if exceeding the alarm set value.	50
AL2 (AL2)	Alarm 2 set value (AL2)			50
AL3 (AL3)	Alarm 3 set value (AL3)			50
AL4 (AL4)	Alarm 4 set value (AL4)			50
AL5 (AL5)	Alarm 5 set value (AL5)			50
AL6 (AL6)	Alarm 6 set value (AL6)			50

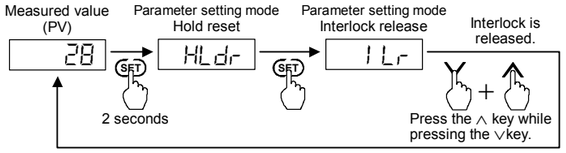
* The hold reset and interlock release functions can be executed by turning on the digital input.
DI1 (Terminal Nos. 13 and 14): Hold reset DI2 (Terminal Nos. 13 and 15): Interlock release

For the digital input, see the **AG500 Installation Manual (IMR02F06-E□)**.

● **Hold reset**



● **Interlock release**



4.4 Engineering Mode

WARNING

Parameters in the Engineering mode (F10 to F91) should be set according to the application before setting any parameter related to operation. Once the Parameters in the Engineering mode are set correctly, those parameters are not necessary to be changed for the same application under normal conditions. If they are changed unnecessarily, it may result in malfunction or failure of the instrument. RKC will not bear any responsibility for malfunction or failure as a result of improper changes in the Engineering mode.

All parameters of the engineering mode are displayed regardless of the instrument specification.

Symbol	Name	Data range	Description	Factory set value
F10. (F10)	Function block 10	This is the first parameter symbol of function block 10.		
dSoP (dSoP)	PV display condition	0 to 255 (Decimal) 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: Alarm 5 occurs b7: Alarm 6 occurs Data b0 0: Minus display 1: Non-minus display b1 to b7 0: Non-flashing display 1: Flashing display	Sets the condition for flashing display of the measured value (PV) and minus display of the measured value (PV). When an alarm occurs and flashing is enabled, the measured value (PV) and alarm number are alternately displayed. Bit data 00000000 b7 ····· b0 Set the bit data after converting it to decimal.	0
F21. (F21)	Function block 21	This is the first parameter symbol of function block 21.		
PoV (PoV)	Input error determination point (high)	Input scale low − (5 % of input span) to Input scale high + (5 % of input span)	If the measured value (PV) is above the Input error determination point (high), alarm action at input error will be taken.	Note 1
PUn (PUn)	Input error determination point (low)	Input scale low − (5 % of input span) to Input scale high + (5 % of input span)	If the measured value (PV) is below the Input error determination point (low), alarm action at input error will be taken.	Note 1
brKS (brKS)	Burnout direction	0: Upscale 1: Downscale This item is valid when using thermocouple input and voltage (low) input [2].	Use to select burnout direction in input break.	0
SQr (SQr)	Square root extraction	0: Unused 1: Used	Use to select Use/Unuse of the square root extraction for the measured value.	0

[1] When flashing is enabled, the measured value (PV) flashes at the following times:
- Measured value (PV) exceeds the input scale high/low.
- Measured value (PV) exceeds the input error determination point (high/low limit).

[2] Voltage (low) input: 0 to 10 mV DC, ±10 mV DC, 0 to 100 mV DC, ±100 mV DC, 0 to 1 V DC

Note 1 Factory set value of Input error determination point (high/low)

Input error determination point	TC/RTD inputs	Voltage (V)/current (I) inputs
High	Input scale high + (5 % of input span)	+105.0
Low	Input scale low − (5 % of input span)	−5.0

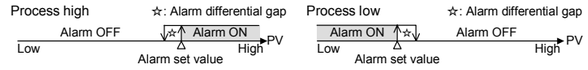
Symbol	Name	Data range	Description	Factory set value
F33. (F33)	Function block 33	This is the first parameter symbol of function block 33.		
AHS (AHS)	Transmission output scale high	Transmission output scale low to Input scale high	Use to set a scale high limit value of the transmission output.	Input scale high
ALS (ALS)	Transmission output scale low	Input scale low to Transmission output scale high	Use to set a scale low limit value of the transmission output.	Input scale low
F41. (F41) ⋮ F46. (F46)	Function block 41 ⋮ Function block 46	This is the first parameter symbol of function block 41 to 46. F41: Parameters of alarm 1 F42: Parameters of alarm 2 F43: Parameters of alarm 3 F44: Parameters of alarm 4 F45: Parameters of alarm 5 F46: Parameters of alarm 6		
AS1 (AS1) ⋮ AS6 (AS6)	Alarm 1 type ⋮ Alarm 6 type	0: None 1: Process high 2: Process low	Use to select the action type of the alarm.	Depends on model code. When not specifying: 0
AHo1 (AHo1) ⋮ AHo6 (AHo6)	Alarm 1 hold action ⋮ Alarm 6 hold action	0: OFF 1: Hold action ON	Use to select the hold action for the alarm.	Depends on model code. When not specifying: 0
ILS1 (ILS1) ⋮ ILS6 (ILS6)	Alarm 1 interlock ⋮ Alarm 6 interlock	0: Unused (OFF) 1: Used	Use to select the interlock function for the alarm.	0
EXC1 (EXC1) ⋮ EXC6 (EXC6)	Alarm 1 energized/ de-energized ⋮ Alarm 6 energized/ de-energized	0: Energized 1: De-energized	Use to select the alarm energized or de-energized.	0
AH1 (AH1) ⋮ AH6 (AH6)	Alarm 1 differential gap ⋮ Alarm 6 differential gap	0 to Input span	Use to set a differential gap of the alarm.	2
ALT1 (ALT1) ⋮ ALT6 (ALT6)	Alarm 1 delay timer ⋮ Alarm 6 delay timer	0.0 to 600.0 seconds	Alarm delay timer is to set an output delay time for alarm outputs	0.0
AEo1 (AEo1) ⋮ AEo6 (AEo6)	Alarm 1 action at input error ⋮ Alarm 6 action at input error	0: Normal alarm action 1: Forced alarm ON when temperature measured value exceeds the input error determination point (high or low limit).	Alarm action at input error is to select the alarm action when the measured value (PV) reaches the input error determination point (high or low limit).	0
F60. (F60)	Function block 60	This is the first parameter symbol of function block 60.		
CMP (CMP)	Communication protocol	0: RKC communication 1: Modbus	Use to select a protocol of communication function.	0
dGT (dGT)	Communication data digit *	0: 6 digits 1: 7 digits	The number of communication data digits in RKC communication	1
F91. (F91)	Function block 91	This is the first parameter symbol of function block 91.		
roM (roM)	ROM version monitor	Version of ROM built in the instrument	Displays the version of the ROM on the instrument.	—
WT (WT)	Integrated operating time monitor	0 to 19999 hours	Displays the integrated total operating time of the instrument.	—
TCJ (TCJ)	Holding peak value ambient temperature monitor	−10.0 to +100.0 °C	Displays the maximum ambient temperature of the instrument.	—

* Display range limit is table shown below.

Input decimal point position	Communication data 6 digits	Communication data 7 digits (Factory set value)
No decimal place	−9999 to +19999	−19999 to +19999
One decimal place	−999.9 to +1999.9	−1999.9 to +1999.9
Two decimal places	−99.99 to +199.99	−199.99 to +199.99
Three decimal places	−9.999 to +19.999	−19.999 to +19.999
Four decimal places	None	−1.9999 to +1.9999

■ Alarm function [Optional]

Action: When the measured value (PV) reaches the alarm set value, alarm ON occurs.



● **Alarm hold action**

When hold action is ON, the alarm action is suppressed at start-up (Power ON) until the measured value has entered the non-alarm range.

● **Alarm interlock**

The alarm interlock function is used to hold the alarm state even if the measured value (PV) is out of the alarm area after its entry into the area once.

● **Alarm differential gap**

It prevents chattering of alarm output due to the measured value fluctuation around the alarm set value.

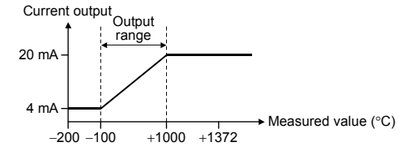
● **Alarm delay timer**

When an alarm condition becomes ON status, the output is suppressed until the delay timer set time elapses. After the time is up, if the alarm output is still ON status, the output will be produced.

■ Transmission output function (AO) [Optional]

The transmission output function is used to output any measured value (PV) as the voltage/current output. In addition, any range of the measured value (PV) can be output with the transmission output scale low and transmission output scale high set.

Example: When a measured value (PV) of −100 to +1000 °C needs to be recorded on a recorder at an input range of −200 to +1372 °C.
Output type: Current output, 4 to 20 mA DC
Transmission output scale high (AHS): +1000 °C
Transmission output scale low (ALS): −100 °C



5. ERROR DISPLAYS

■ Display when input error occurs

Prior to replacing the sensor, always turn OFF the power.

Display	Description	Action (Output)	Solution
PV [Flashing] *	PV exceeds the input scale high/low.	Output depending on the alarm action at input error	Check input type, input range, sensor and sensor connection.
	PV exceeds the input error determination point (high/low limit).		
	Flashes when any of Alarms 1 to 6 has occurred. (The PV and alarm number are displayed alternately)	Output depending on the normal alarm action	
oooo [Flashing]	Over-scale PV is above the input scale high + (5 % of input span).	Output depending on the alarm action at input error	
uuuu [Flashing]	Underscale PV is below the input scale low − (5 % of input span)		

* The PV flashes depending on the PV display condition (dSoP) of engineering mode F10.

■ Self-diagnostic error

In an error is detected by the self-diagnostic function, the "Err" and error code are displayed alternately on the PV display unit. If two or more errors occur simultaneously, the total summation of these error codes is displayed.

Solution: Turn off the power once. If an error occurs after the power is turned on again, please contact RKC sales office or the agent.

PV display	Description	Action
1	Adjustment data error	Display: Error display (Err and error number) Output: All the output is OFF (Same as power OFF) Communication: Send the error code
2	Back-up error	
4	A/D conversion error	
128	Watchdog timer error	
256	Program error (stack)	
2048	Program error (busy)	
All display is OFF	Power supply voltage monitoring error	Display: All display is OFF Output: All output OFF Communication: Stop
	RAM check error	

RKC RKC INSTRUMENT INC. The first edition: NOV. 2007 [IMQ01]
The second edition: JAN. 2008 [IMQ00]
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) JAN. 2008

Digital Indicator

AG500 Installation Manual

 IMR02F06-E1

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 mounting, wiring and specifications. For the operations, see AG500 Operation Manual (IMR02F07-E□).

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

■ Accessories check

AG500 Installation Manual (This manual)	1
AG500 Operation Manual (IMR02F07-E□)	1
AG500 Communication Installation Manual (IMR02F08-E□) *	1
Mounting brackets (with screw)	2
Unit seal (SAP-306)	1

* Only AG500 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

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 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.
- Do not connect modular connectors to telephone line.

NOTICE

- This manual assumes that the reader has a fundamental knowledge of the principles of electricity, process control, computer technology and communications.
- The figures, diagrams and numeric values used in this manual are only for purpose of illustration.
- RKC is not responsible for any damage or injury that is caused as a result of using this instrument, instrument failure or indirect damage.
- RKC is not responsible for any damage and/or injury resulting from the use of instruments made by imitating this instrument.
- Periodic maintenance is required for safe and proper operation of this instrument. Some components have a limited service life, or characteristics that change over time.
- Every effort has been made to ensure accuracy of all information contained herein. RKC makes no warranty expressed or implied, with respect to the accuracy of the information. The information in this manual is subject to change without prior notice.
- No portion of this document may be reprinted, modified, copied, transmitted, digitized, stored, processed or retrieved through any mechanical, electronic, optical or other means without prior written approval from RKC.

1. MOUNTING

WARNING

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

1.1 Mounting Cautions

(1) This instrument is intended to be used under the following environmental conditions. **(IEC61010-1)** [OVERVOLTAGE CATEGORY II, POLLUTION DEGREE 2]

(2) Use this instrument within the following ambient temperature and ambient humidity.
- Allowable ambient temperature: −10 to 50 °C
- Allowable ambient humidity: 5 to 95 % RH
  (Absolute humidity: MAX. W. C 29.3 g/m^3 dry air at 101.3 kPa)
- Installation environment conditions: Indoor use, Altitude up to 2000 m

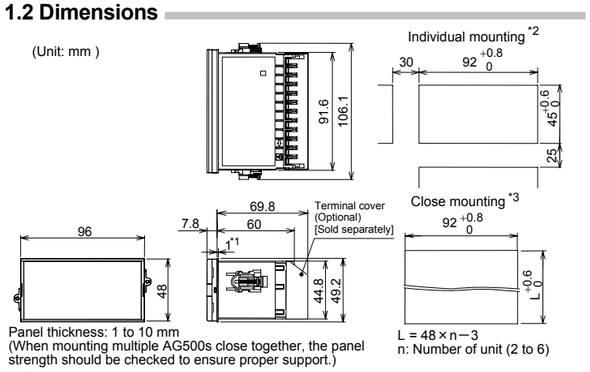
(3) Avoid the following conditions when selecting the mounting location:
- Rapid changes in ambient temperature which may cause condensation.
- Corrosive or inflammable gases.
- Direct vibration or shock to the mainframe.
- Water, oil, chemicals, vapor or steam splashes.
- Excessive dust, salt or iron particles.
- Excessive induction noise, static electricity, magnetic fields or noise.
- Direct air flow from an air conditioner.
- Exposure to direct sunlight.
- Excessive heat accumulation.

(4) Take the following points into consideration when mounting this instrument in the panel.
- 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.
- In order to improve safety and the immunity to withstand noise, mount this instrument as far away as possible from high voltage equipment, power lines, and rotating machinery.
  High voltage equipment: Do not mount within the same panel.
  Power lines: Separate at least 200 mm.
  Rotating machinery: Separate as far as possible.
- The display cannot be seen from the outside of the view angle range. The view angle of this controller is 30° to the upper side, and 30° to the lower side from the center of the display vertically.

(5) This instrument is Permanently connected to equipment, please take the following points.
- A switch or circuit-breaker shall be included in the building installation.
- It 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

(Unit: mm)



Panel thickness: 1 to 10 mm
(When mounting multiple AG500s close together, the panel strength should be checked to ensure proper support.)

L = 48 × n − 3
n: Number of unit (2 to 6)

*1 Case rubber packing

*2 When cutting out each mounting hole through a panel for individual mounting, observe that there is no bur or distortion along the panel cutout surface, or there is no bend on the panel surface. If so, the water resistant characteristics may worsen.

*3 Remove the case rubber packing. Because of closely mounting the AG500s, protection will be compromised and not meet IP66 (NEMA 4X) by close mounting.

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***.

Fig. 1

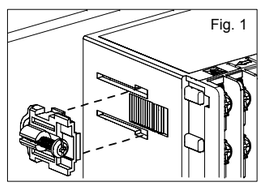


Fig. 2

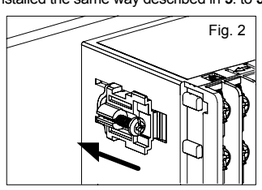
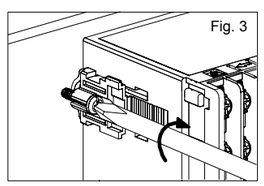


Fig. 3

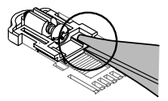


The front of the instrument conforms to **IP66 (NEMA4X)** when mounted on the panel. For effective waterproof/dustproof, the rubber packing must be securely placed between instrument and panel without any gap. If rubber packing is damaged, please contact RKC sales office or the agent.

■ Removing procedures

1. Turn the power OFF.
2. Remove the wiring.
3. Loosen the screw of the mounting bracket. (Fig. 4)
4. Lift the latch of the mounting bracket (①), then pull the mounting bracket (②) to remove it from the case. (Fig. 4)

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



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

Fig. 4

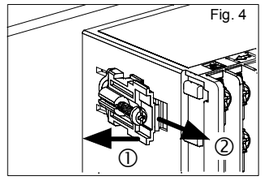
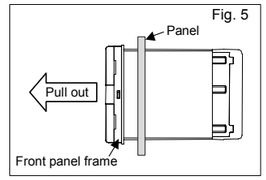


Fig. 5



2. WIRING

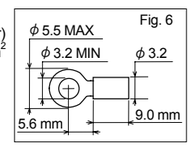
WARNING

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

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 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 mm^2
  Specified dimension: See 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

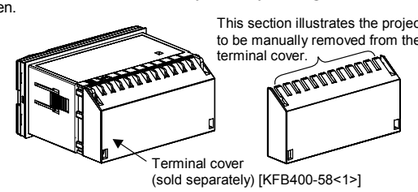
Fig. 6



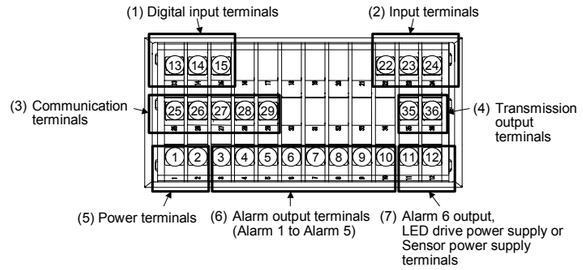
If solderless terminal lugs other than those in not specified dimensions are used, terminal screws may not be tightened. In such a case, bend each solderless terminal lug in advance and then conduct wiring. If the terminal screw is forcibly tightened, it may be damaged.

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

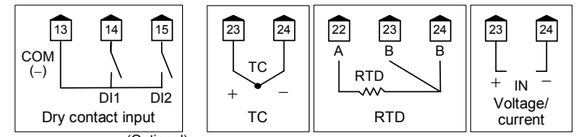
Caution for the terminal cover usage:
If each solderless terminal lug touches the terminal cover, remove each projection from the terminal cover by manually bending it in front and in rear until broken.



2.2 Terminal Configuration

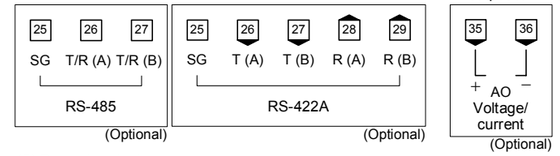


(1) Digital input terminals / (2) Input terminals

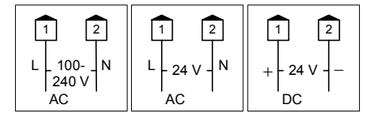


DI1: Hold reset
DI2: Interlock release

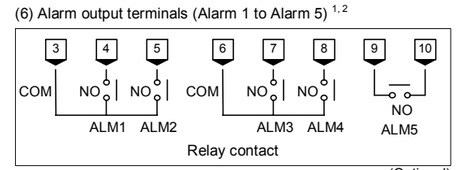
(3) Communication terminals / (4) Transmission output terminals



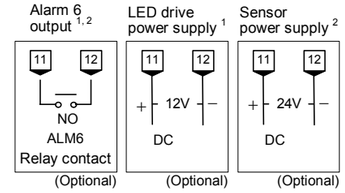
(5) Power terminals



(6) Alarm output terminals (Alarm 1 to Alarm 5) [1, 2]



(7) Alarm 6 output, LED drive power supply or Sensor power supply terminals



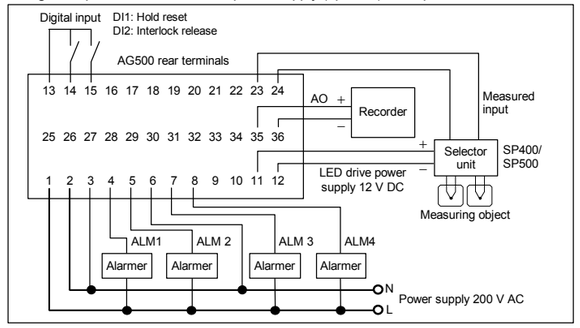
[1] If the LED drive power supply (12 V DC) is specified, ALM6 cannot be used.
[2] If the sensor power supply (24 V DC) is specified, ALM3 to ALM6 cannot be used.

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

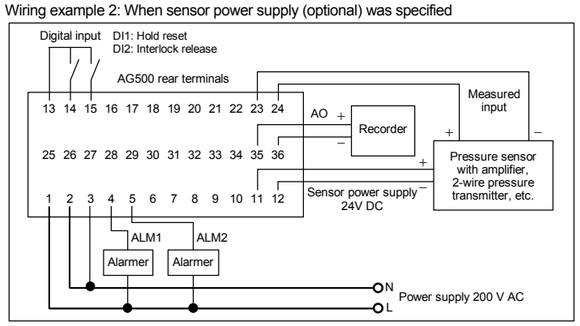
Power supply	Transmission output (AO)
	Alarm 6 output (ALM6) LED drive power supply Sensor power supply
Measured input	Alarm 5 output (ALM5)
	Alarm 1 output (ALM1)
Digital input 1 (DI1)	Alarm 2 output (ALM2)
Digital input 2 (DI2)	Alarm 3 output (ALM3)
Communication	Alarm 4 output (ALM4)

■ Wiring example

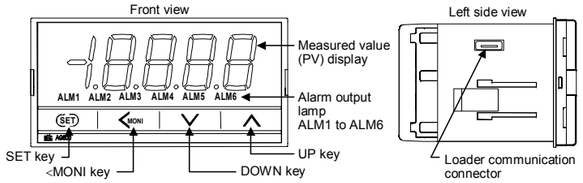
Wiring example 1: When LED drive power supply (optional) was specified



Wiring example 2: When sensor power supply (optional) was specified



3. PARTS DESCRIPTION



Measured value (PV) display [Red]	Displays measured value (PV) or various parameters' symbols and set values.
Alarm output lamp [Red]	Lights when alarm output is turned on. ALM1 to ALM6: Alarm 1 output to Alarm 6 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)

4. SPECIFICATIONS

■ Input

Measured Input (PV)

Number of input: 1 point
Input type and range: See **Range code table**.
Display range limit: Communication data 7 digits (Factory set value):
−19999 to +19999 (No decimal place) [The input decimal point position is selectable to decimal four places].
Communication data 6 digits:
−9999 to +19999 (No decimal place) [The input decimal point position is selectable to decimal three places]
Sampling cycle: 250 ms ± 0.3 %
Influence of external resistance:
Approx. 0.2 μV/Ω (Converted depending on TC types)
Influence of input lead: Approx. 0.01 %/Ω of Reading (RTD input)
10 Ω or less per wire
Input impedance: Voltage (high) input: Approx. 1 MΩ
Voltage (low) input: 1 MΩ or more
Current input: Approx. 50 Ω
Sensor current: Approx. 250 μA (RTD input)
Action at input beak: TC input, Voltage (low) input: Upscale or downscale
RTD input: Upscale
Voltage (high) input, Current input:
Downscale (display of about zero value)
Action at input short circuit:
Downscale (RTD input)
Action at input error: Setting range of Input error determination point (high/low):
Input scale low − (5 % of input span) to
Input scale high + (5 % of input span)
Input correction: PV bias: −Input span to +Input span
PV ratio: 0.500 to 1.500
First order lag digital filter:
0.0 to 100.0 seconds (0.0: OFF)
Square root extraction function (Voltage input, Current input):
Calculation method:
Measured value = √ (Input value × PV ratio + PV bias)
Low level cutoff: 0.00 to 25.00 % of input span

Digital input (DI1, DI2) [Optional]

Number of input: 2 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: Hold reset (DI1), Interlock release (DI2)

■ Output

Alarm output (ALM1 to ALM6) [Optional]

Number of output: 6 points
When LED drive power supply (12 V DC) was specified, the number of alarm output points becomes 5 maximum.
When sensor power supply (24 V DC) was specified, the number of alarm output points becomes 2 maximum.
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
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		
	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		
Current output	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		

LED drive power supply (Sensor power supply 12 V) [Optional]

Output voltage: 12 V±1 V DC
Output current: 20 mA or less
Allowable load resistance: 600 Ω or more

Sensor power supply 24 V [Optional]

Output voltage: 24 V±1.2 V DC
Output current: 24 mA or less
Allowable load resistance: 1 kΩ or more

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

Measured input

Accuracy:

Input type	Input range	Accuracy
K, J, T, PLII, E, U, L	Less than −100 °C	±1.0 °C
	−100 °C or more, less than +500° C	±0.5 °C
	500 °C or more	±(0.1 % of Reading +1 digit)
S, R, N, 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 +1 digit)
B	Less than 400 °C	±70.0 °C
	400 °C or more, less than 1000 °C	±(1.4 °C +1 digit)
	1000 °C or more:	±(0.1 % of Reading +1 digit)
Pt100, JPt100	Less than 200 °C	±0.2 °C
	200 °C or more	±(0.1 % of Reading +1 digit)
Voltage input Current input	±0.1 % of input span	

Noise rejection: Nomal mode: 60 dB or more (50/60Hz)
Common mode: 120 dB or more (50/60Hz)
A/D conversion: 1/80000
Cold-junction temperature compensation error (TC input):
Within ±1.0 °C (23±2°C)
Within ±1.5 °C (range of 0 to 50 °C)

Transmission output

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
Influence of physical orientation (± 90 °):
Input:
TC input: ±0.3 % of input span or ±3.0 °C or less
RTD input: ±0.5 °C or less
Voltage/Current input: Less than ±0.1 % of input span
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 6 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 ALM6)

Host Communication [Optional]

Interface: Based on RS-485 or RS-422A, EIA standard
Protocol: RKC communication (ANSI X3.28-1976 subcategory 2.5, A4)
Modbus-RTU
Communication speed: 1200 bps, 2400 bps, 4800 bps, 9600 bps, 19200 bps, 38400 bps
Maximum connections: Up to 31 instruments
Number of communication data digits:
7 or 6 digits

■ 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:7.0 VA or less 240 V AC:10.8 VA or less
24 V AC: 7.6 VA or less 24 V DC: 230 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/m^3 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 terminal	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: 10 to the 16th power times (FRAM)
Adjustment and factory setting data:
Approx. 100,000 times (EEPROM)
Depending on storage and operating conditions.
Data storage period: Approx. 10 years
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]
Weight: Approx. 190 g

■ Standard

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

5. MODEL CODE

■ Suffix code

AG500 -□ * □ -□ -□ -□ -□□ -□□□ /□
(1) (2) (3) (4) (5) (6) (7) (8) (9)

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

(1) Power supply voltage
3: 24 V AC/DC 4: 100 to 240 V AC

(2) Alarm output (ALM1 to ALM6)
N:None 3: 3 points (ALM1 to ALM3) 6: 6 points (ALM1 to ALM6)
1: 1 point (ALM1) 4: 4 points (ALM1 to ALM4)
2: 2 points (ALM1, ALM2) 5: 5 points (ALM1 to ALM5)

(3) Digital input (DI1, DI2)
N: None 2: 2 points (DI1, DI2)

(4) Sensor power supply
N: None
P: 12 V DC (LED drive power supply for SP400/SP500)[1]
Q:24 V DC[2]
[1] When 12 V DC was specified, the number of alarm output points becomes 5 maximum.
[2] When 24 V DC was specified, the number of alarm output points becomes 2 maximum.

(5) 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)

(6) Communication function
N: None 4: RS-422A 5: RS-485

(7) Quick start code
N:No quick start code (Configured at factory set value) *
1: Specify Measured input/range code
2: Specify Measured input/range code and Initial setting code
* Factory set value: K41 (K −200 to +1372 °C), No alarm 1 to 6

(8) Measured input and Range [Quick start code]
No code: No specify quick start code
□□□: See ■ **Range code table**.

(9) Instrument specification
Y:Version symbol

■ Initial setting code

Initial setting code tells the factory to ship with each parameter preset to the values detailed as specified by the customer. Initial setting code is not necessarily specified when ordering, unless the preset is requested. These parameters are software selectable items and can be re-programmed in the field via the manual

□ □ □ □ □ □
(1) (2) (3) (4) (5) (6)

(1) Alarm 1 function (AL1), (2) Alarm 2 function (AL2), (3) Alarm 3 function (AL3), (4) Alarm 4 function (AL4), (5) Alarm 5 function (AL5), (6) Alarm 6 function (AL6)

N None J: Process low L: Process low with hold action
H:Process high K:Process high with hold action

■ Range code table

Thermocouple (TC) input, RTD input

Type	Code	Range (Input span)	Code	Range (Input span)	Code	Range (Input span)
K	K35	−200.0 to +400.0 °C	K02	0.0 to 400 °C	KA4	0.0 to 800.0 °F
	K40	−200.0 to +800.0 °C	K04	0 to 800 °C	KA1	0 to 800 °F
	K41	−200 to +1372 °C	KC4	−328.0 to +400.0 °F	KA2	0 to 1600 °F
	K09	0.0 to 400.0 °C	KC6	−250.0 to +800.0 °F		
	K10	0.0 to 800.0 °C	KC5	−328 to +2502 °F		
J	J27	−200.0 to +400.0 °C	J02	0 to 400 °C	JB6	0.0 to 800.0 °F
	J32	−200.0 to +800.0 °C	J04	0 to 800 °C	JA1	0 to 800 °F
	J15	−200 to +1200 °C	JC6	−328.0 to +1200.0 °F	JA2	0 to 1600 °F
	J08	0.0 to 400.0 °C	JC7	−200.0 to +700.0 °F		
	J09	0.0 to 800.0 °C	JB9	−328 to +2192 °F		
T	T19	−200.0 to +400.0 °C	TC2	−328.0 to +752.0 °F		
E	E21	−200.0 to +700.0 °C	EA9	−328.0 to +1292.0 °F		
	E06	−200 to +1000 °C	EB1	−328 to +1832 °F		
S	S06	−50 to +1768 °C	SA7	−58 to +3214 °F		
R	R07	−50 to +1768 °C	RA7	−58 to +3214 °F		
B	B03	0 to 1800 °C	BB2	0 to 3272 °F		
N	N02	0 to 1300 °C	NA7	0 to 2372 °F		
PLII	A02	0 to 1390 °C	AA2	0 to 2534 °F		
W5Re/W26Re	W03	0 to 2300 °C	WA2	0 to 4200 °F		
U	U04	0.0 to 600.0 °C	UB2	32.0 to 1112.0 °F		
L	L04	0.0 to 900.0 °C	LA9	32.0 to 1652.0 °F		
Pt100	D21	−200.0 to +200.0 °C	D35	−200.0 to +850.0 °C	DC8	−199.99 to +199.99 °F
	D34	−100.00 to +100.00 °C	DD1	−200.0 to +200.0 °F	DC9	−328.0 to +1562.0 °F
JPt100	P29	−100.00 to +100.00 °C	PC8	−199.99 to +199.99 °F	PD1	−200.0 to +200.0 °F
	P30	−200.0 to +640.0 °C	PC9	−328.0 to +1184.0 °F		

Voltage input, Current input

Range (Input span): Programmable range −19999 to +19999
(Factory set value: 0.0 to 100.0)

Type	Code
Voltage (high) input: −1 to +1 V DC	902
Voltage (high) input: 0 to 5 V DC	401
Voltage (high) input: 1 to 5 V DC	601
Voltage (high) input: 0 to 10 V DC	501
Voltage (low) input: 0 to 10 mV DC	101
Voltage (low) input: −10 to +10 mV DC	903

Type	Code
Voltage (low) input: 0 to 100 mV DC	201
Voltage (low) input: −100 to +100 mV DC	901
Voltage (low) input: 0 to 1 V DC	301
Current input: 0 to 20 mA DC	701
Current input: 4 to 20 mA DC	801

RKC RKC INSTRUMENT INC. The first edition: OCT. 2007 [IMQ00]

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)

OCT. 2007