Digital Indicator

AG500 Operation Manual

IMR02F07-E4

Thank you for purchasing this RKC product. In order to achieve maximum performance and ensure proper operation of your new instrument, carefully read all the instructions in this manual. Please place the manual in a convenient location for easy reference.
This manual describes the 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 Quick Instruction Manual (IMR02F08-E□): Enclosed with AG500 *
- AG500 Communication Instruction Manual (IMR02F09-E□): Separate volumes
* Only AG500 provided with the communication function.

The manuals can be downloaded from the official RKC website:
http://www.rkcinst.com/english/manual_load.htm.

1. HANDLING PROCEDURES

Mounting and wiring → Refer to **AG500 Installation Manual (IMR02F06-E□)**

Power ON

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

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

Setting of alarm → Set the alarm set value. Refer to **4.3 Parameter Setting Mode**
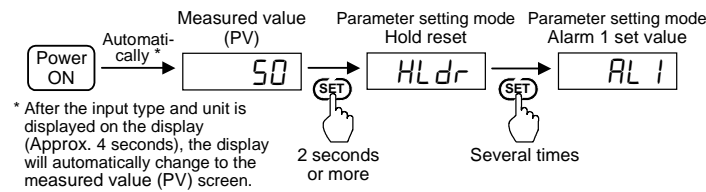
Operation start

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 within 1 minute without pressing SET key, this instrument returns to the Measured value (PV) screen and the set value will not be changed.
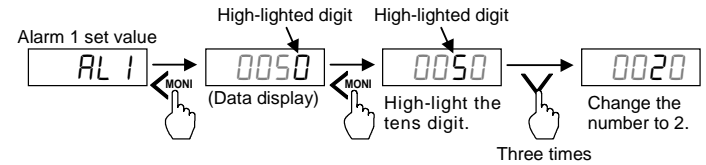
Example: Changing the alarm 1 set value (AL1) to 20 °C
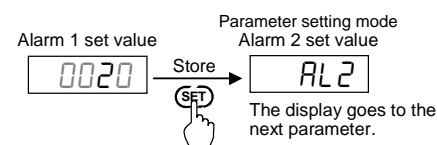**1. Select the Alarm 1 set value (AL1) of parameter setting mode**

Power ON → Automatically * → Measured value (PV) → Parameter setting mode Hold reset → Parameter setting mode Alarm 1 set value

* 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 seconds or more / Several times

2. Change the Alarm 1 set value (AL1) to 20 °C
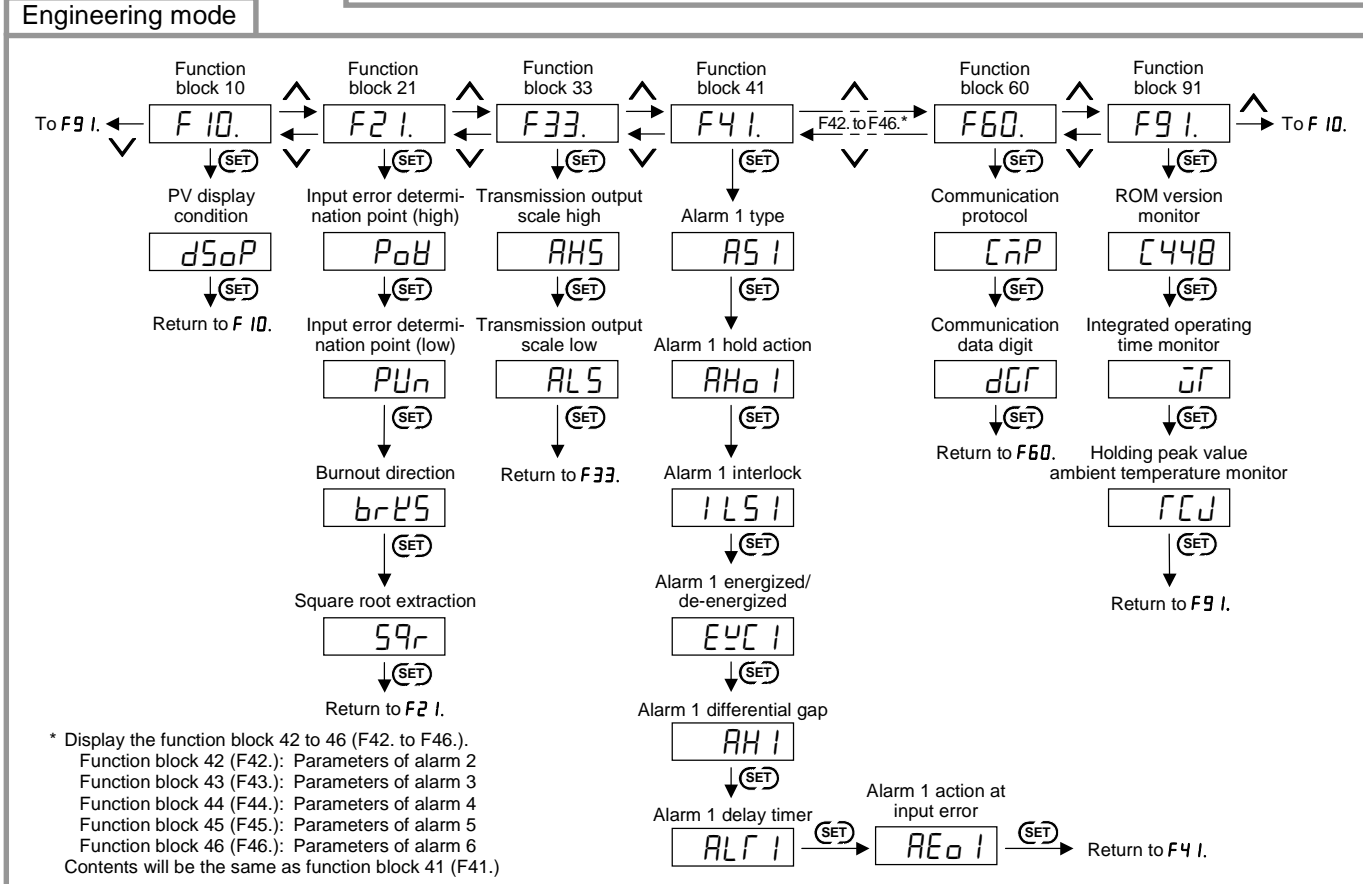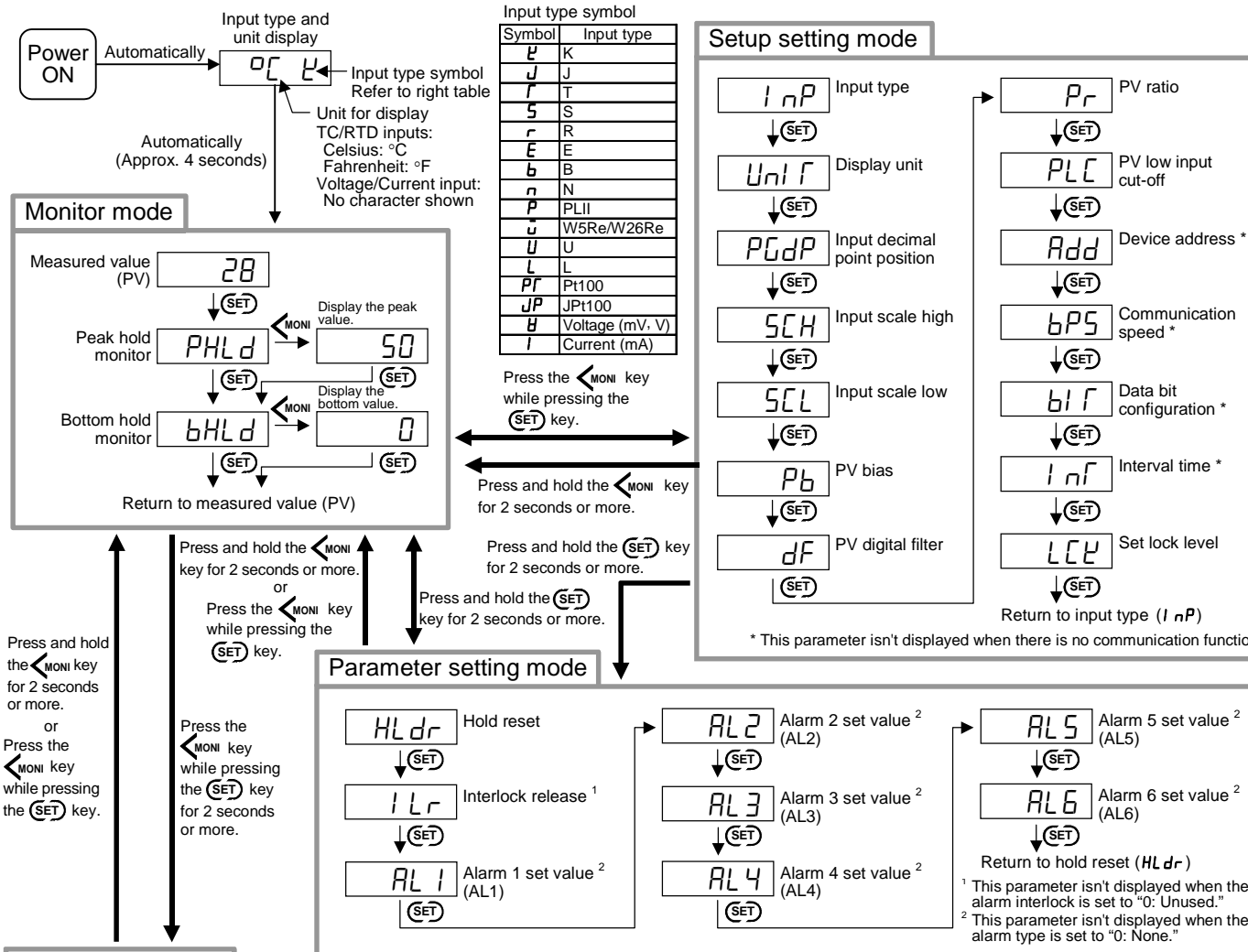Pressing the <MONI key displays the data display. The high-lighted digit indicates which digit can be set.

Alarm 1 set value → (Data display) → High-light the tens digit. → Change the number to 2.

High-lighted digit / High-lighted digit / Three times

3. Store the Alarm 1 set value (AL1)

Alarm 1 set value → Store → Parameter setting mode Alarm 2 set value

The display goes to the next parameter.

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 within 1 minute is not performed.

Any parameter which is not used in the AG500 will not be displayed except for parameters in engineering mode.

Power ON → Automatically → Input type and unit display

Input type symbol — Refer to right table
Unit for display TC/RTD inputs:
Celsius: °C
Fahrenheit: °F
Voltage/Current input: No character shown

Automatically (Approx. 4 seconds)

Input type symbol

Symbol	Input type
K	K
J	J
r	T
S	S
r	R
E	E
b	B
n	N
P	PLII
W5Re/W26Re	W5Re/W26Re
U	U
L	L
Pr	Pt100
JP	JPt100
H	Voltage (mV, V)
A	Current (mA)

Monitor mode

Measured value (PV) → Peak hold monitor `PHLd` → Display the peak value. `50`
→ Bottom hold monitor `bHLd` → Display the bottom value. `0`
→ Return to measured value (PV)

Press and hold the <MONI key for 2 seconds or more. or Press the <MONI key while pressing the SET key.

Setup setting mode

`InP` Input type → `UnIT` Display unit → `PGdP` Input decimal point position → `SCH` Input scale high → `SCL` Input scale low → `Pb` PV bias → `dF` PV digital filter

`Pr` PV ratio → `PLC` PV low input cut-off → `Add` Device address * → `bPS` Communication speed * → `bIT` Data bit configuration * → `InT` Interval time * → `LCK` Set lock level

Return to input type (`InP`)

Press the <MONI key while pressing the SET key.

Press and hold the <MONI key for 2 seconds or more.

Press and hold the SET key for 2 seconds or more.

* This parameter isn't displayed when there is no communication function.

Parameter setting mode

`HLdr` Hold reset → `ILr` Interlock release [1] → `AL1` Alarm 1 set value [2] (AL1)
`AL2` Alarm 2 set value [2] (AL2) → `AL3` Alarm 3 set value [2] (AL3) → `AL4` Alarm 4 set value [2] (AL4)
`AL5` Alarm 5 set value [2] (AL5) → `AL6` Alarm 6 set value [2] (AL6)
Return to hold reset (`HLdr`)

[1] This parameter isn't displayed when the alarm interlock is set to "0: Unused."
[2] This parameter isn't displayed when the alarm type is set to "0: None."

Press and hold the <MONI key for 2 seconds or more. or Press the <MONI key while pressing the SET key.

Press and hold the SET key for 2 seconds or more.

Engineering mode

To `F91.` ← `F10.` | `F21.` | `F33.` | `F41.` | F42. to F46.* | `F60.` | `F91.` → To `F10.`

Function block 10: `dSoP` PV display condition → Return to `F10.`

Function block 21: `PoH` Input error determination point (high) → `PUn` Input error determination point (low) → `brKS` Burnout direction → `Sqr` Square root extraction → Return to `F21.`

Function block 33: `AHS` Transmission output scale high → `ALS` Transmission output scale low → Return to `F33.`

Function block 41: `AS1` Alarm 1 type → `AHo1` Alarm 1 hold action → `ILS1` Alarm 1 interlock → `EYC1` Alarm 1 energized/de-energized → `AH1` Alarm 1 differential gap → `ALT1` Alarm 1 delay timer → `AEo1` Alarm 1 action at input error → Return to `F41.`

Function block 60: `CnP` Communication protocol → `dGT` Communication data digit → Return to `F60.`

Function block 91: `C448` ROM version monitor → `uT` Integrated operating time monitor → `rCJ` Holding peak value ambient temperature monitor → Return to `F91.`

* 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 Refer to **Input type number table**	Use to select the input type.	Based 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.	Based on model code. When not specifying: 0
PGdP (PGdP)	Input decimal point position [1]	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.	Based on model code. When not specifying: 0
SCH (SCH)	Input scale high [2]	TC/RTD inputs: Input scale low to Maximum value of the input range Voltage (V)/Current (I) inputs: −19999 to +19999	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 When not specifying: +1372	Based on model code.
SCL (SCL)	Input scale low [2]	TC/RTD inputs: Minimum value of the input range to Input scale high Voltage (V)/Current (I) inputs: −19999 to +19999	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 When not specifying: −200	Based on model code.
Pb (Pb)	PV bias [2]	−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

[1] 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 places	0 to 2
Voltage (V)/Current (I) inputs	[For communication data 6 digits: 0 to 3]	0 to 4

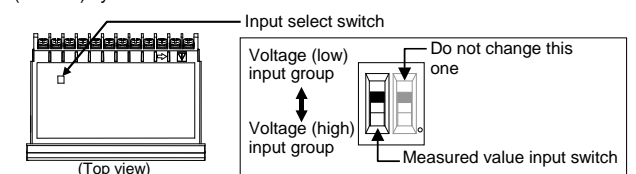For the input range, refer to the **AG500 Installation Manual (IMR02F06-E□)**.

[2] Varies with the setting of the Input decimal point position. When a Voltage/Current input type is selected, the Input scale high limit can be set lower than the Input scale low limit.

Input type number table

Set value	Input type	Hardware	Set value	Input type	Hardware
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	Do not 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.

Input select switch
Voltage (low) input group
Voltage (high) input group
Do not change this one
Measured value input switch
(Top view)

(Setup Setting Mode continued table)

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	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. This parameter isn't displayed when the square root extraction is set to "0: Unused."	0.00
Add (Add)	Device address			
bPS (bPS)	Communication speed	This parameter is displayed when there is the communication function [Optional]. Refer to the **AG500 Communication Quick Instruction Manual (IMR02F08-E□)**.		
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 of Setup Setting Mode and Parameter
      Setting Mode other than alarm set value (AL1 to AL6)
      [except for parameters in Engineering Mode ].
  └── Alarm set value (AL1 to AL6) only
  └── "0" Fixed (Do not change this one)
  └── "0" Fixed (Do not 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.
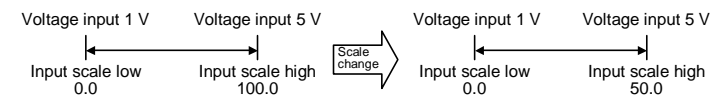
Example of temperature input:
When the range of −200 to +1372 °C for thermocouple type K is changed to 0 to 400 °C

```
Minimum value of                    Maximum value of
the input range                     the input range
−200 °C                             +1372 °C
        ├──── Input range ────┤
        ├──── Input span ─────┤
             1572 °C
           ┌─ Input span ─┐
              400 °C
    Input scale low      Input scale high
        0 °C                 400 °C
```
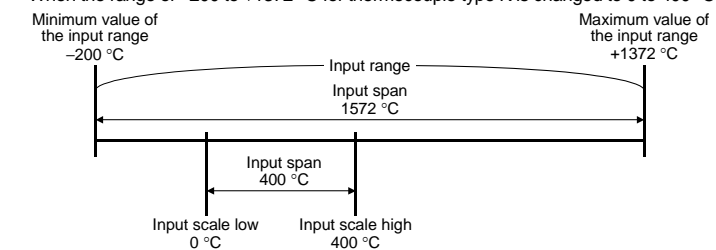
📖 When outside the input scale range, the PV display flashes. The alarm setting range is within the input scale range.

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

```
Voltage input 1 V    Voltage input 5 V       Voltage input 1 V    Voltage input 5 V
Input scale low     Input scale high   Scale  Input scale low    Input scale high
   0.0                100.0            change     0.0                 50.0
```

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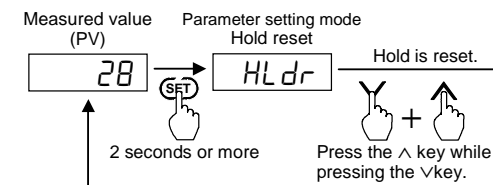When the voltage input is 5 V → Displays the "50.0"

4.3 Parameter Setting Mode

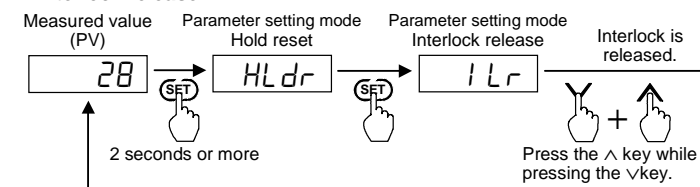| Symbol	Name	Data range	Description	Factory set value
HLdr (HLdr)	Hold reset *	—	Peak hold/bottom hold value is reset.	—
ILr (ILr)	Interlock release *	This parameter isn't displayed when the alarm 1 to 6 interlock are set to "0: Unused."	If the alarm state is interlocked, interlock can be released. The interlock states of all alarms are released.	—
AL1 (AL1)	Alarm 1 set value	Input scale low to Input scale high	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. Varies with the setting of the Input decimal point position.	50
AL2 (AL2)	Alarm 2 set value	This parameter isn't displayed when the alarm type is set to "0: None." When alarm function is not specified with an initial setting cord at the time of an order, alarm type (AS1 to AS6) are set to "0: None." To use the alarm function, set alarm type (AS1 to AS6) to "1: Process high" or "2: Process low."		50
AL3 (AL3)	Alarm 3 set value			50
AL4 (AL4)	Alarm 4 set value			50
AL5 (AL5)	Alarm 5 set value			50
AL6 (AL6)	Alarm 6 set value			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, refer to the **AG500 Installation Manual (IMR02F06-E□)**.

● Hold reset

```
Measured value        Parameter setting mode
(PV)                     Hold reset
                                              Hold is reset.
  [28]  →(SET)→  [HLdr]       →  (∧ + ∨)
2 seconds or more      Press the ∧ key while
                       pressing the ∨ key.
```

● Interlock release

```
Measured value     Parameter setting mode    Parameter setting mode
(PV)                   Hold reset               Interlock release
                                                                Interlock is
                                                                released.
  [28] →(SET)→ [HLdr] →(SET)→ [ILr]           → (∧ + ∨)
2 seconds or more                        Press the ∧ key while
                                         pressing the ∨ key.
```

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, no further changes need to be made to parameters 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
F 10. (F10)	Function block 10	This is the first parameter symbol of function block 10.		
dSoP (dSoP)	PV display condition	0 to 255 (Decimal) Bit 0 : Minus display of PV value Bit 1: Input error [1] Bit 2: Alarm 1 occurs Bit 3: Alarm 2 occurs Bit 4: Alarm 3 occurs Bit 5: Alarm 4 occurs Bit 6: Alarm 5 occurs Bit 7: Alarm 6 occurs. Data Bit 0 0: Minus display 1: Non-minus display Bit 1 to Bit 7 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 Bit 7 ···· Bit 0. Set the bit data after converting it to decimal.	0
F 21. (F21)	Function block 21	This is the first parameter symbol of function block 21.		
PoU (PoV)	Input error determination point (high) [2]	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) [2]	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 [3].	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] Varies with the setting of the Input decimal point position.
[3] 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

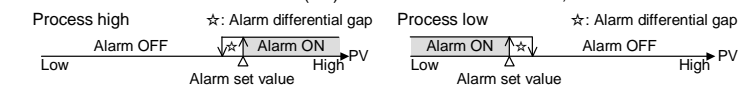| Symbol	Name	Data range	Description	Factory set value
F 33. (F33)	Function block 33	This is the first parameter symbol of function block 33.		
AHS (AHS)	Transmission output scale high	Transmission output scale low to Input scale high	Use to set a scale high limit value of the transmission output.	Input 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
F 41. (F41) ⋮ F 46. (F46)	Function block 41 ⋮ Function block 46	This is the first parameter symbol of function block 41 to 46. F41: Parameters of alarm 1 F45: Parameters of alarm 5 F42: Parameters of alarm 2 F46: Parameters of alarm 6 F43: Parameters of alarm 3 F44: Parameters of alarm 4		
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.	Based 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.	Based 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
F 60. (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 [2]	0: 6 digits 1: 7 digits	The number of communication data digits in RKC communication	1
F 91. (F91)	Function block 91	This is the first parameter symbol of function block 91.		
C448 (C448)	ROM version monitor	0 to 999 (C448-□□□)	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.	—

[1] Varies with the setting of the Input decimal point position.
[2] 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.

```
Process high    ☆: Alarm differential gap      Process low    ☆: Alarm differential gap
Alarm OFF  ↗☆↑ Alarm ON → PV          Alarm ON ↑☆↘ Alarm OFF → PV
Low      Alarm set value    High       Low   Alarm set value    High
```

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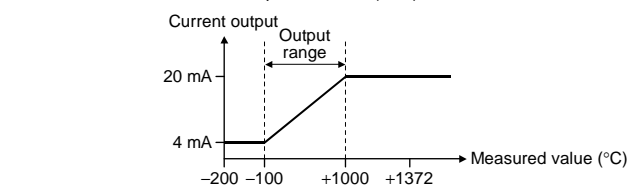
● Alarm delay timer
When an alarm condition becomes ON status, the output is suppressed until the delay timer set time elapses. After the time is up, if the alarm output is still ON status, the output will be produced.

■ 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
```

```
Current output
           Output
            range
20 mA  ───────┐
              /
              /
4 mA  ──────/───────────────→ Measured value (°C)
   −200 −100  +1000  +1372
```

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	
0000 [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 at 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	