

Relevant instruction manual number: IMR01N01-E□, IMR01N02-E□, IMR01N03-E□, IMR01N05-E□, IMR01N24-E□

This manual describes items relating only to the Z-1145 specification.

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1. OUTLINE

Features of Z-1145:

- Level PID function is added.
- PROFIBUS communication, CC-Link communication and Infrared communication cannot be used for Communication function.

2. MODEL CODE

Z-1145 is added to end of model codes. In addition, specification of Communication 2 is different between Z-1145 specification and Standard specifications. Infrared function cannot be selected.

High-speed AT type:

HA400 – □ □ – □ □ – □ * □ □ – □ □ □ □ – □ / □ / Y N Z - 1 1 4 5
 HA900 (1) (2) (3) (4) (5) (6) (7) (8) (9)(10)(11) (12) (13) (14)

Standard AT type:

HA401 – □ □ – □ □ – □ * □ □ – □ □ □ □ – □ / □ / Y N Z - 1 1 4 5
 HA901 (1) (2) (3) (4) (5) (6) (7) (8) (9)(10)(11) (12) (13) (14)

(11) Communication 2 (optional)

- | | | |
|--------------------------------|-------------------------------|---------------------|
| N: None | 5: RS-485 (RKC communication) | 8: RS-232C (Modbus) |
| 1: RS-232C (RKC communication) | 6: RS-485 (Modbus) | A: DeviceNet |
| 4: RS-422A (RKC communication) | 7: RS-422A (Modbus) | |

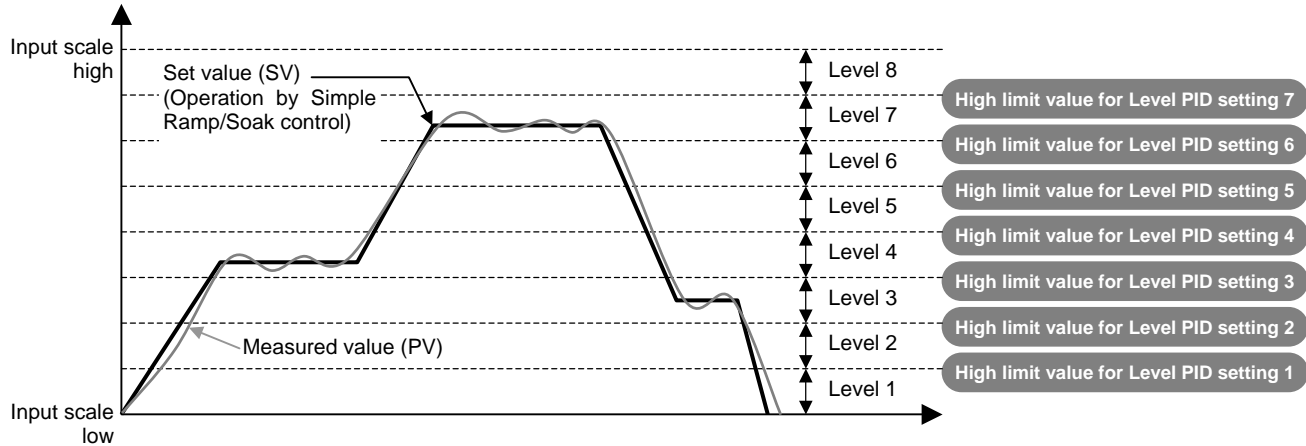
(14) Instrument version

YN: Version symbol (Without Infrared function)

3. DESCRIPTION OF THE LEVEL PID FUNCTION

Level PID function is used to set the following parameters for control to each divided level of the input range (up to 8 levels): PID values, Control response parameters, Control loop break alarm (LBA) time and LBA deadband. Set the values such as PID values of each level to the Memory area 1 to 8.

The input range can be divided based on the setting for the parameters of Level PID setting 1 (1. L801, 2. L801) to Level PID setting 7 (1. L807, 2. L807). Level PID function for this instrument finds the level PID setting range of the Set value (SV) or the Measured value (PV) in operation and then proceeds to control based on the PID values of the Memory area for the level. For this instrument, Memory area can be switched based on the change in Set value (SV) or the Measured value (PV).



■ Memory area to be used for level

Memory area to be used for each level is selected by comparing Level PID setting value to Set value (SV) or Measured value (PV) as described in the table below.

Comparison value: Set value (SV) or Measured value (PV)

Level	Description	Memory area
Level 8	Level PID setting 7 < Comparison value \leq Input scale high (or low*)	Memory area 8
Level 7	Level PID setting 6 < Comparison value \leq Level PID setting 7	Memory area 7
Level 6	Level PID setting 5 < Comparison value \leq Level PID setting 6	Memory area 6
Level 5	Level PID setting 4 < Comparison value \leq Level PID setting 5	Memory area 5
Level 4	Level PID setting 3 < Comparison value \leq Level PID setting 4	Memory area 4
Level 3	Level PID setting 2 < Comparison value \leq Level PID setting 3	Memory area 3
Level 2	Level PID setting 1 < Comparison value \leq Level PID setting 2	Memory area 2
Level 1	Input scale low (or high*) \leq Comparison value \leq Level PID setting 1	Memory area 1

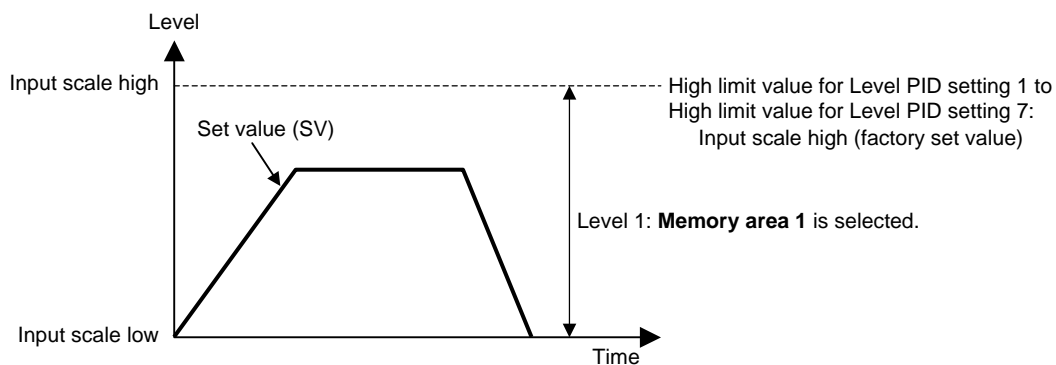
* Only for Voltage input/Current input (Refer to P. 12.)



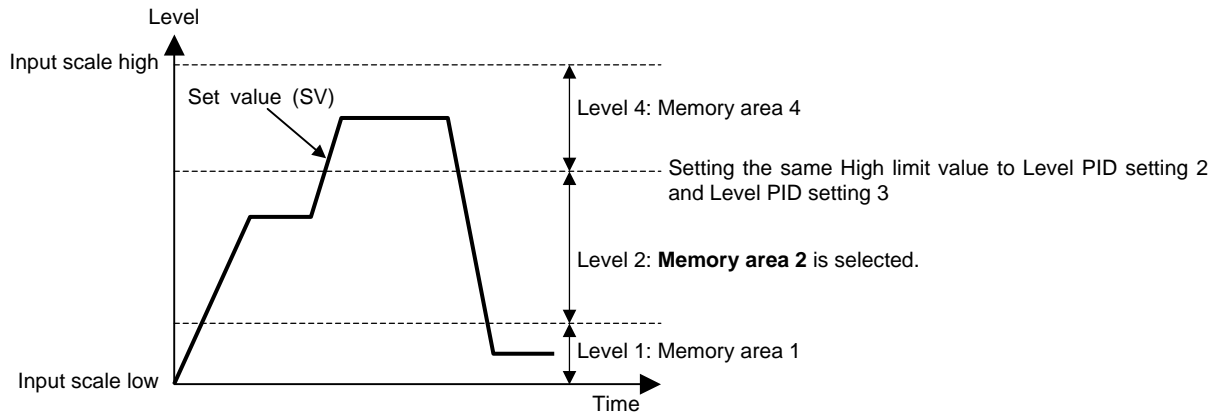
When setting the same value to all Level PID settings, smaller Memory area number is applied.

Example 1: When using factory set value for Level PID setting

The factory set values for all Level PID settings (Level PID setting 1 [1. L801, 2. L801] to Level PID setting 7 [1. L807, 2. L807]) are preset to Input scale high. As Input scale range is not divided, the program is recognized as Level 1 and Memory area 1 is applied.

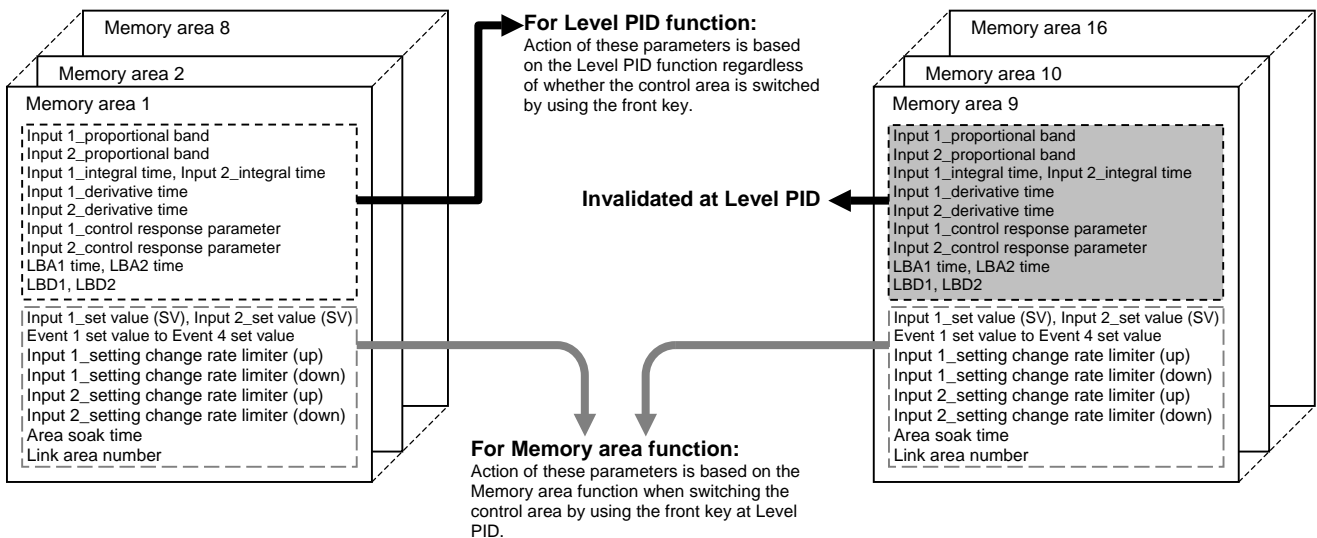


Example 2: When setting the same value of the High limit value to Level 2 and Level 3
 When setting the same value to the High limit value of Level 2 and Level 3, the range of Level 2 is validated and Memory area 2 is applied.



■ Parameters of Memory area at Level PID

When using Level PID, parameters of Memory area are separated to be used for the Level PID function and the regular Memory area function.



Parameters of Memory area (at Level PID)

● Parameters for Level PID function

The following parameters of the Memory area 1 to 8 are used for Level PID function; however, the setting of the following parameters of the Memory area 9 to 16 is invalidated:

- Input 1_proportional band/Input 2_proportional band
- Input 1_integral time/Input 2_integral time
- Input 1_derivative time/Input 2_derivative time
- Input 1_control response parameter/Input 2_control response parameter
- Control loop break alarm 1 (LBA1) time/Control loop break alarm 2 (LBA2) time
- LBA1 deadband/LBA2 deadband

Memory area number for the control area can be changed by the front key, communication, Event input or simple ramp/soak function; however, the parameters for Level PID function of the changed Memory area are invalidated. Control continues based on the parameters for Level PID function of the Memory area for the Level PID setting range (level) of the Set value (SV) or the Measured value (PV) in operation.



To use regular Memory area function

Regular Memory area function can be used by setting “No Level PID action” at Input 1_Level PID action selection (1. LPI d) or Input 2_Level PID action selection (2. LPI d). When using regular Memory area function, Level PID function cannot be used.

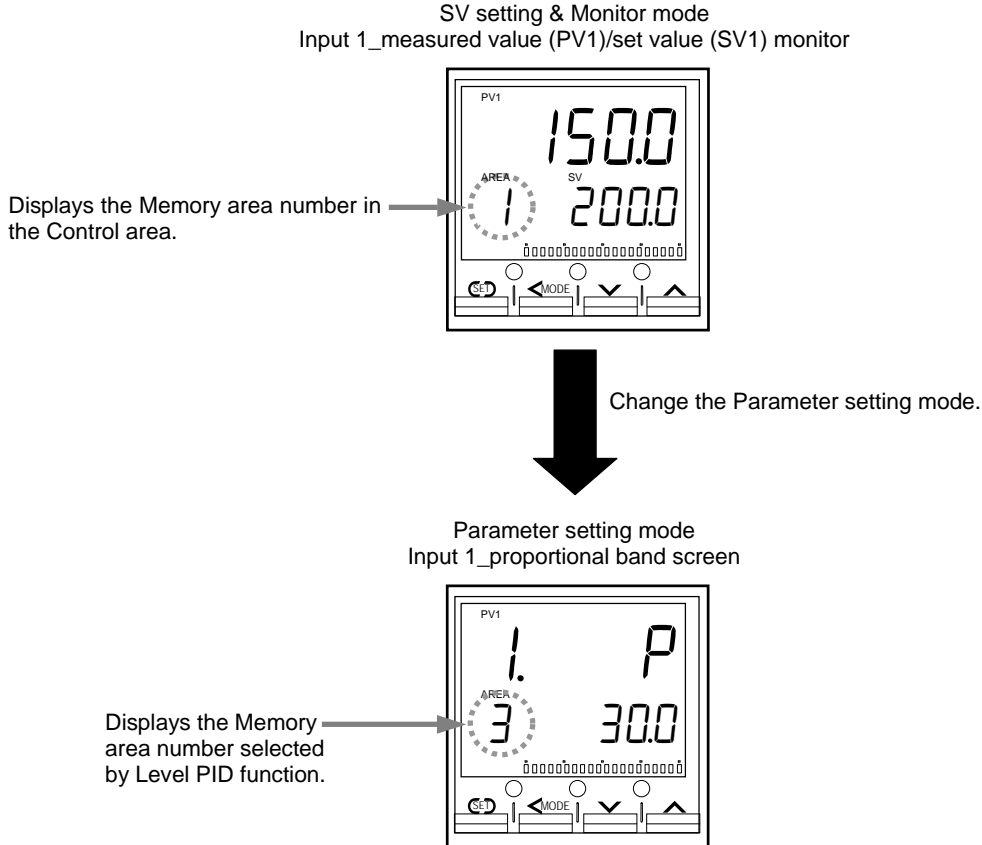


Memory area display at Level PID

The memory area number selected by Level PID function is displayed at the Memory area display when switching to the parameters of Level PID function in the Parameter setting mode.

The Memory area number selected by Level PID function remains at the Memory area display regardless of whether the Memory area number for the control area is changed by the front key, communication or Event input, or by area link function at simple Ramp/Soak control.

Display example: When switching to Input 1_proportional band



This display processing is applied only for the parameters for Level PID function.

●Parameters for Memory area function

The parameters below of the Memory area 1 to 16 can be used for the regular Memory area function.

The parameters for the changed Memory area are validated by switching the Memory areas of the control area by the front key, communication, Event input or simple Ramp/Soak function.

Input 1_set value (SV1)/Input 2_set value (SV2)

Event 1 set value/Event 2 set value/Event 3 set value/Event 4 set value

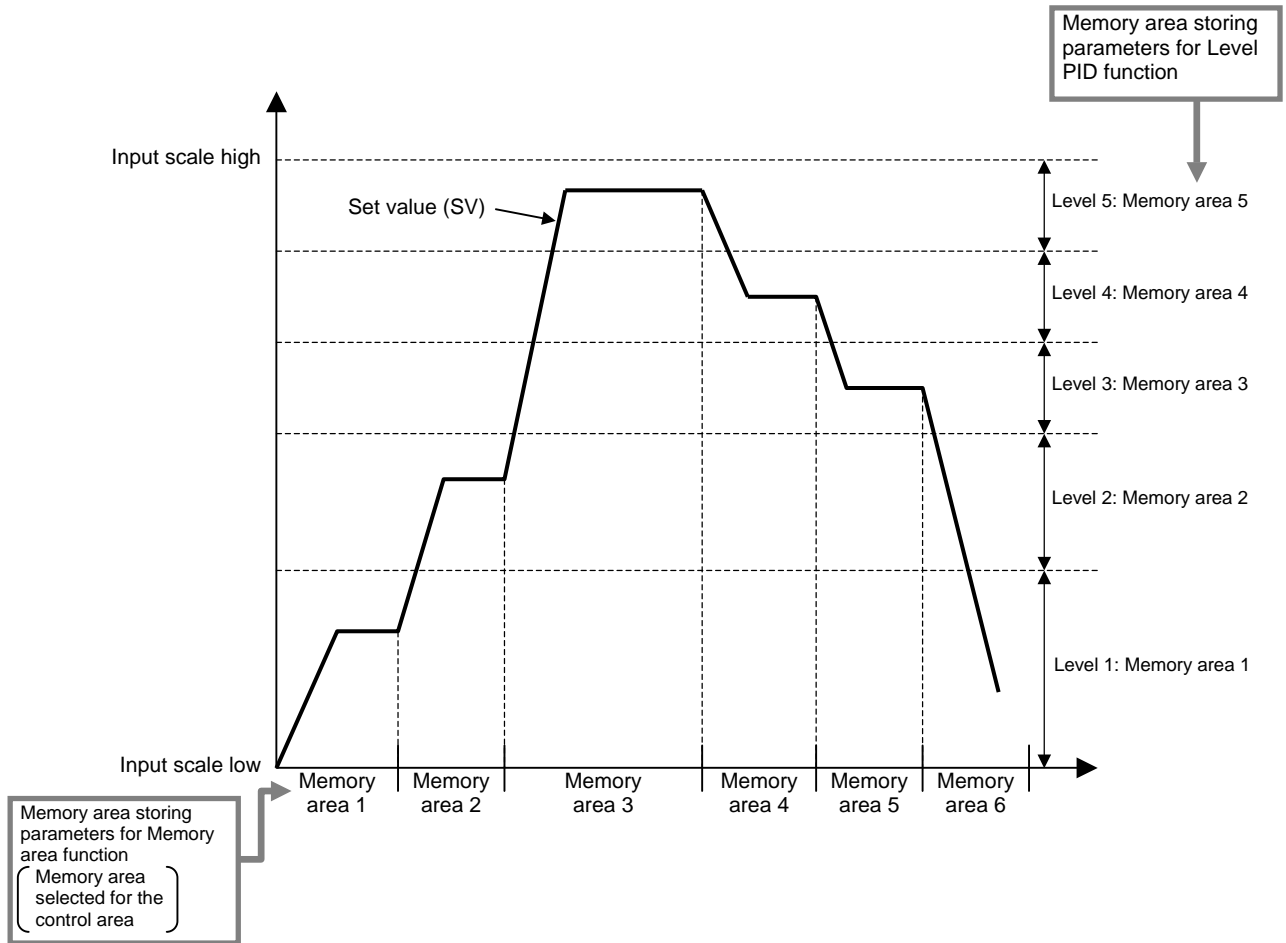
Input 1_setting change rate limiter (up)/Input 2_setting change rate limiter (up)

Input 2_setting change rate limiter (up)/Input 2_setting change rate limiter (down)

Area soak time

Link area number

● Example of action of the Memory area when setting simple Ramp/Soak program at Level PID



4. DESCRIPTION OF THE PARAMETER

4.1 Additional Parameters

The following parameters are added for Z-1145 specification:

- Input 1_Level PID action type selection (1.LPl d)
- Input 1_Level PID differential gap (1.LH5)
- Input 1_Level PID setting 1 (1.LH01)
- Input 1_Level PID setting 2 (1.LH02)
- Input 1_Level PID setting 3 (1.LH03)
- Input 1_Level PID setting 4 (1.LH04)
- Input 1_Level PID setting 5 (1.LH05)
- Input 1_Level PID setting 6 (1.LH06)
- Input 1_Level PID setting 7 (1.LH07)
- Input 2_Level PID action type selection (2.LPl d)
- Input 2_Level PID differential gap (2.LH5)
- Input 2_Level PID setting 1 (2.LH01)
- Input 2_Level PID setting 2 (2.LH02)
- Input 2_Level PID setting 3 (2.LH03)
- Input 2_Level PID setting 4 (2.LH04)
- Input 2_Level PID setting 5 (2.LH05)
- Input 2_Level PID setting 6 (2.LH06)
- Input 2_Level PID setting 7 (2.LH07)

4.2 Description of Each Parameters

■ Level PID action type selection (1.LPl d, 2.LPl d) [Engineering mode F51, F52]

Level PID function can be set to used or unused; when using Level PID function, comparison value can be selected between the Measured value (PV) and Set value (SV). Input 1 and Input 2 can be set individually.

Data range: 0: No Level PID action
 1: Switch by Set value (SV)
 2: Switch by Measured value (PV)

Factory set value: Input 1_Level PID action type selection (1.LPl d): 2
 Input 2_Level PID action type selection (2.LPl d): 2

■ Level PID differential gap (1.LH5, 2.LH5) [Engineering mode F51, F52]

Differential gap for the Level PID setting 1 to Level PID setting 7 can be set. Input 1 and Input 2 can be set individually.

Data range: 0.0 to Input span

Factory set value: Input 1_Level PID differential gap (1.LH5): 0.0
 Input 2_Level PID differential gap (2.LH5): 0.0



The common value of Level PID differential gap is used for the Level PID setting 1 to Level PID setting 7.

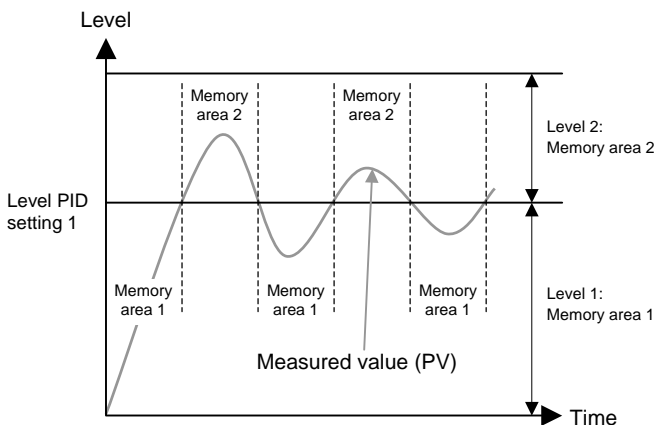
Description of function:

When setting “Switch by Measured value (PV)” to Level PID action:

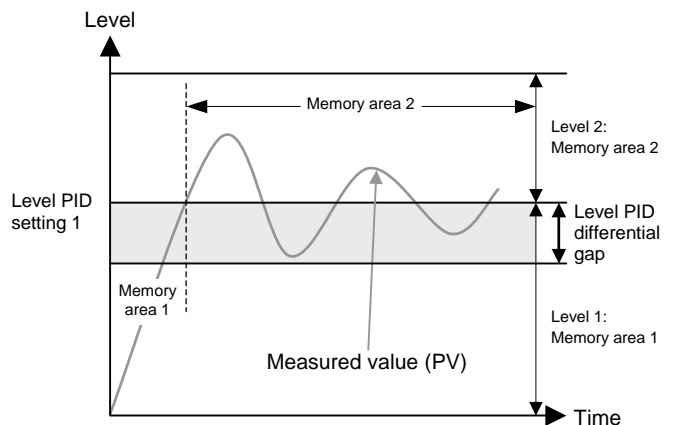
The Memory areas storing the parameters for Level PID function may switch frequently by the fluctuation of the input when the Measured value (PV) is close to the Level PID set value.

Setting Level PID differential gap prevents memory areas from switching too frequently.

When Level PID differential gap is not set



When Level PID differential gap is set



When setting “Switch by Set value (SV)” to Level PID action:

The setting of Level PID differential gap is validated; however, it is recommended to set “0.0” to Level PID differential gap.

■ Level PID setting 1 (1. L801, 2. L801) [Setup setting mode]

Set the value to divide the Level into Level 1 and Level 2.

Data range: Input 1_Level PID setting 1 (1. L801): Input 1_input scale low to Input 1_Level PID setting 2
Input 2_Level PID setting 1 (2. L801): Input 2_input scale low to Input 2_Level PID setting 2

Factory set value: Input 1_Level PID setting 1 (1. L801): Input 1_input scale high
Input 2_Level PID setting 1 (2. L801): Input 2_input scale high

■ Level PID setting 2 (1. L802, 2. L802) [Setup setting mode]

Set the value to divide the Level into Level 2 and Level 3.

Data range: Input 1_Level PID setting 2 (1. L802): Input 1_Level PID setting 1 to Input 1_Level PID setting 3
Input 2_Level PID setting 2 (2. L802): Input 2_Level PID setting 1 to Input 2_Level PID setting 3

Factory set value: Input 1_Level PID setting 2 (1. L802): Input 1_input scale high
Input 2_Level PID setting 2 (2. L802): Input 2_input scale high

■ Level PID setting 3 (1. L803, 2. L803) [Setup setting mode]

Set the value to divide the Level into Level 3 and Level 4.

Data range: Input 1_Level PID setting 3 (1. L803): Input 1_Level PID setting 2 to Input 1_Level PID setting 4
Input 2_Level PID setting 3 (2. L803): Input 2_Level PID setting 2 to Input 2_Level PID setting 4

Factory set value: Input 1_Level PID setting 3 (1. L803): Input 1_input scale high
Input 2_Level PID setting 3 (2. L803): Input 2_input scale high

■ Level PID setting 4 (1. L804, 2. L804) [Setup setting mode]

Set the value to divide the Level into Level 4 and Level 5.

Data range: Input 1_Level PID setting 4 (1. L804): Input 1_Level PID setting 3 to Input 1_Level PID setting 5
Input 2_Level PID setting 4 (2. L804): Input 2_Level PID setting 3 to Input 2_Level PID setting 5

Factory set value: Input 1_Level PID setting 4 (1. L804): Input 1_input scale high
Input 2_Level PID setting 4 (2. L804): Input 2_input scale high

■ Level PID setting 5 (1. L805, 2. L805) [Setup setting mode]

Set the value to divide the Level into Level 5 and Level 6.

Data range: Input 1_Level PID setting 5 (1. L805): Input 1_Level PID setting 4 to Input 1_Level PID setting 6
Input 2_Level PID setting 5 (2. L805): Input 2_Level PID setting 4 to Input 2_Level PID setting 6

Factory set value: Input 1_Level PID setting 5 (1. L805): Input 1_input scale high
Input 2_Level PID setting 5 (2. L805): Input 2_input scale high

■ Level PID setting 6 (1. L806, 2. L806) [Setup setting mode]

Set the value to divide the Level into Level 6 and Level 7.

Data range: Input 1_Level PID setting 6 (1. L806): Input 1_Level PID setting 5 to Input 1_Level PID setting 7
Input 2_Level PID setting 6 (2. L806): Input 2_Level PID setting 5 to Input 2_Level PID setting 7

Factory set value: Input 1_Level PID setting 6 (1. L806): Input 1_input scale high
Input 2_Level PID setting 6 (2. L806): Input 2_input scale high

■ Level PID setting 7 (1. L807, 2. L807) [Setup setting mode]

Set the value to divide the Level into Level 7 and Level 8

Data range: Input 1_Level PID setting 7 (1. L807): Input 1_Level PID setting 6 to Input 1_input scale high
Input 2_Level PID setting 7 (2. L807): Input 2_Level PID setting 6 to Input 2_input scale high

Factory set value: Input 1_Level PID setting 7 (1. L807): Input 1_input scale high
Input 2_Level PID setting 7 (2. L807): Input 2_input scale high

5. KEY OPERATION FOR Z-1145 SPECIFICATION

5.1 Engineering Mode



WARNING

Parameters in the Engineering mode 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.



Parameters in Engineering mode are settable only when the controller is in STOP mode.



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

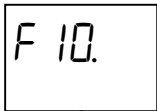
■ Input 1_Level PID action type selection/Input 1_Level PID differential gap

The following parameters are added after Input 1_power feed forward gain (*l. PFF5*) at Function block F51: Input 1_Level PID action type selection (*l. LPI d*) screen and Input 1_Level PID differential gap (*l. LHS*) screen.

SV setting & Monitor mode, Parameter setting mode, or Setup setting mode

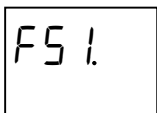
Press the shift key for 2 seconds while pressing the SET key.

Engineering mode
Function block F10

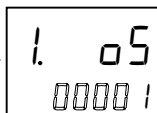


Press the DOWN key until F51 is displayed.

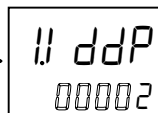
Engineering mode
Function block F51



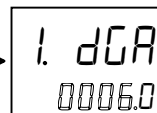
Input 1_control action
type selection



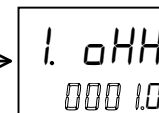
Input 1_integral/derivative
decimal point position



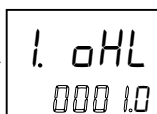
Input 1_
derivative gain



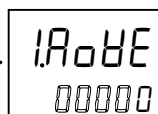
Input 1_ON/OFF action
differential gap (upper)



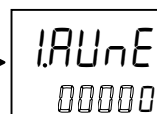
Input 1_ON/OFF action
differential gap (lower)



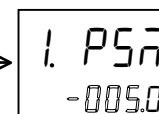
Input 1_action at
input error (high)



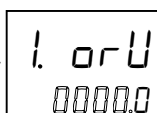
Input 1_action at
input error (low)



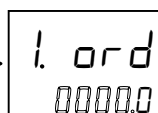
Input 1_manipulated output
value at input error



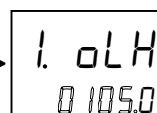
Input 1_output change
rate limiter (up)



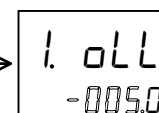
Input 1_output change
rate limiter (down)



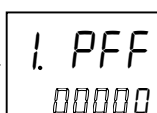
Input 1_
output limiter high



Input 1_
output limiter low



Input 1_ power feed
forward selection



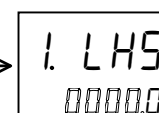
Input 1_ power feed
forward gain



Input 1_Level PID
action type selection



Input 1_Level PID
differential gap



■ Input 2_Level PID action type selection/Input 2_Level PID differential gap

The following parameters are added after Input 2_power feed forward gain (2.PFF5) at Function block F52: Input 2_Level PID action type selection (2.LPI d) screen and Input 2_Level PID differential gap (2.LHS) screen.

SV setting & Monitor mode, Parameter setting mode, or Setup setting mode

Press the shift key for 2 seconds while pressing the SET key.

Engineering mode
Function block F10

F10.

Press the DOWN key until F52 is displayed.

Engineering mode
Function block F52

F52.

Input 2_control action
type selection

2. 05
00001

Input 2_integral/derivative
decimal point position

2. d d P
00002

Input 2_
derivative gain

2. d G A
0006.0

Input 2_ON/OFF action
differential gap (upper)

2. 0 H H
0001.0

Input 2_ON/OFF action
differential gap (lower)

2. 0 H L
0001.0

Input 2_action at
input error (high)

2. A 0 H E
00000

Input 2_action at
input error (low)

2. A U n E
00000

Input 2_manipulated output
value at input error

2. P S n
-005.0

Input 2_output change
rate limiter (up)

2. 0 r U
00000

Input 2_output change
rate limiter (down)

2. 0 r d
00000

Input 2_
output limiter high

2. 0 L H
0105.0

Input 2_
output limiter low

2. 0 L L
-005.0

Input 2_power feed
forward selection

2. P F F
00000

Input 2_power feed
forward gain

2. P F F 5
00100

Input 2_Level PID
action type selection

2. L P I d
00001

Input 2_Level PID
differential gap

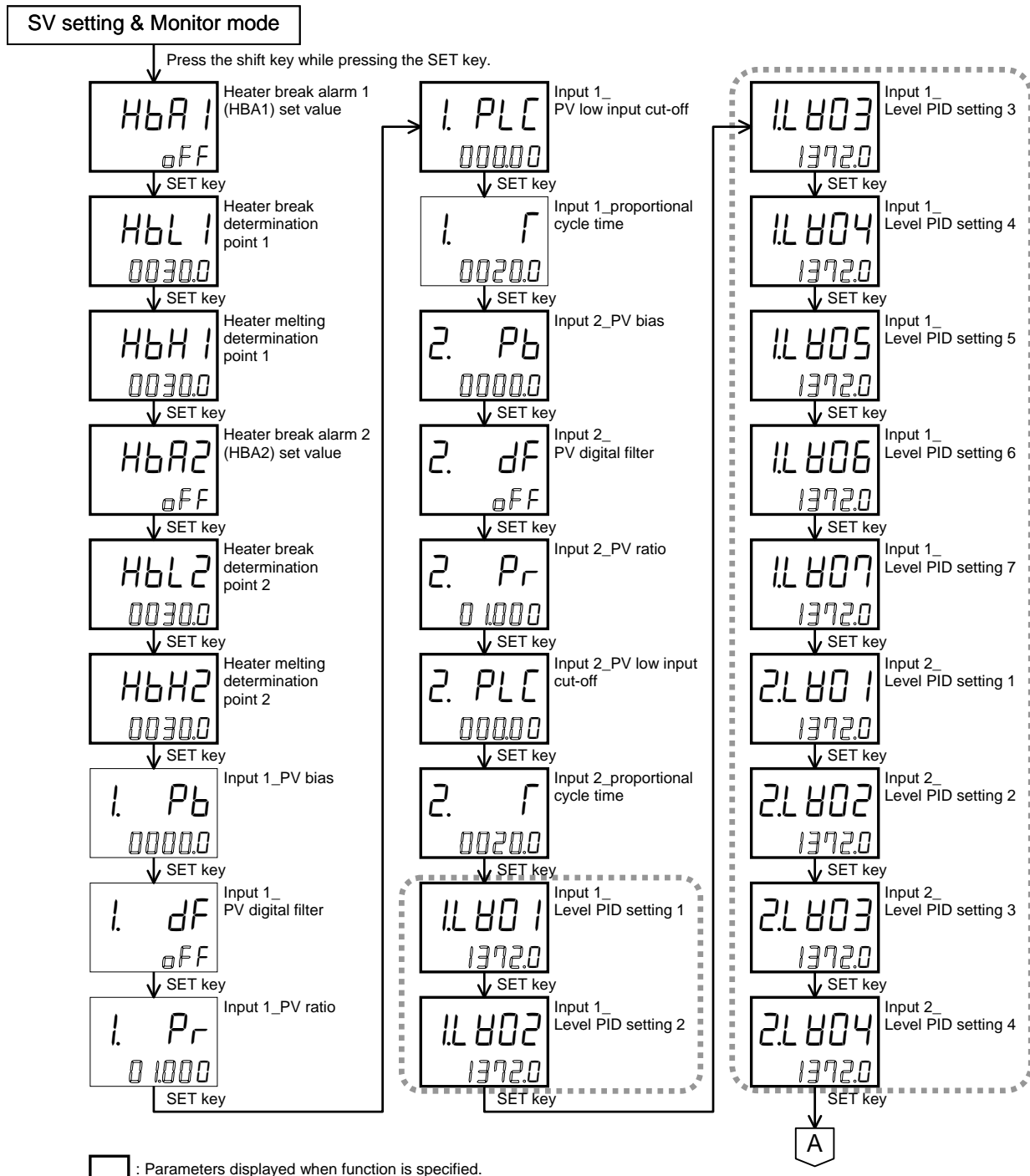
2. L H S
00000

5.2 Setup Setting Mode

■ From Level PID setting 1 to Level PID setting 7

The following parameters are added after Input 2_proportional cycle time (2. *f*) in the Setup setting mode: Input 1_Level PID setting 1 (1. *LH01*) to Input 1_Level PID setting 7 (1. *LH07*) and Input 2_Level PID setting 1 (2. *LH01*) to Input 2_Level PID setting 7 (2. *LH07*) screen.

- The screens of Input 1_Level PID setting 1 (1. *LH01*) to Input 1_Level PID setting 7 (1. *LH07*) display when Level PID function is used based on the setting at Input 1_Level PID action type selection (1. *LPl d*).
- The screens of Input 2_Level PID setting 1 (2. *LH01*) to Input 2_Level PID setting 7 (2. *LH07*) display when:
 - Measured input is 2-input specification.
 - Level PID function is used based on the setting at Input 2_Level PID action type selection (2. *LPl d*) screen.



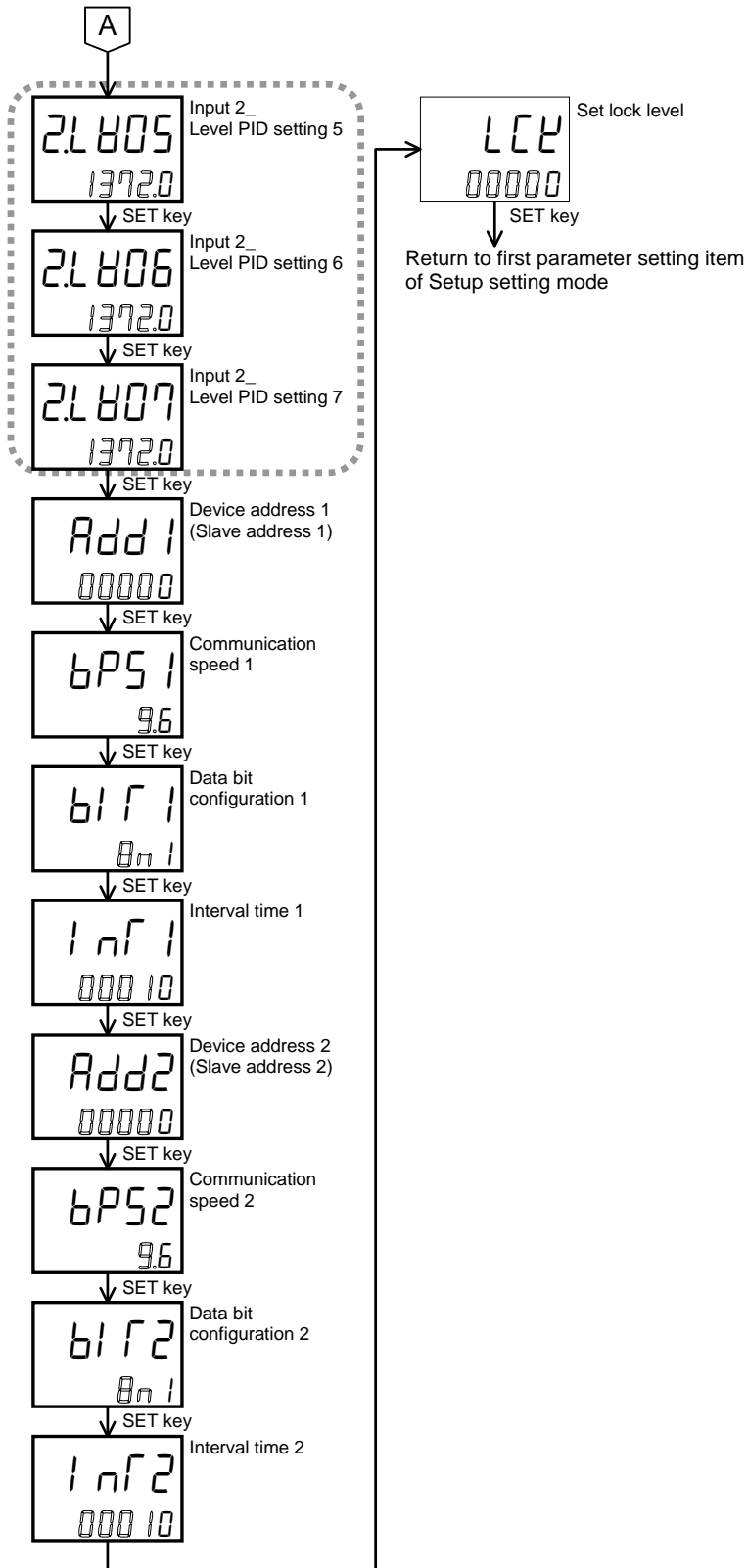
Parameters which are not related to existing functions on the controller are not displayed.



To return the SV setting & Monitor mode, press the shift key while pressing the SET key.



This instrument returns to the PV1/SV1 monitor screen if no key operation is performed within 1 minute.



: Parameters displayed when function is specified.

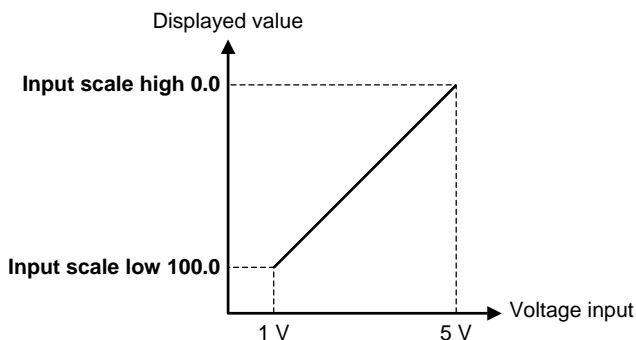


Level PID setting at Voltage input/Current input

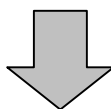
Input scale low can be set to a larger value than Input scale high when Measured input is specified with Voltage input or Current input.

When a larger value is set to Input scale low than Input scale high at Level PID setting, Input scale high is applied to the lower side of the Level PID setting range and Input scale low is applied to the higher side of the Level PID setting range.

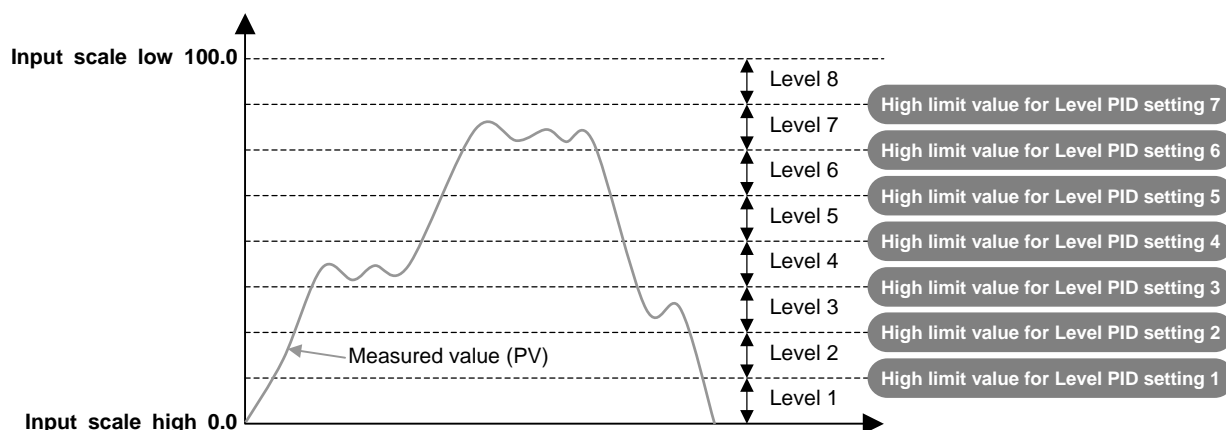
Example: Set “100.0” to Input scale low and “0.0” to Input scale high when the measured input is Voltage input (1 to 5V).



Set Input scale to “100.0 to 0.0.”



Level PID setting range changes as follows:



6. AUTOTUNING (AT) AT LEVEL PID

To conduct Autotuning (AT) when using Level PID function, set “0: No Level PID action” to Input 1_Level PID action type selection or Input 2_Level PID action type selection first. Then set a target Memory area to the Control area prior to conducting Autotuning (AT).

Description:

When Level PID function is unused, the computed value of Autotuning (AT) is stored in the Memory area set to the Control area. On the other hand, when using Level PID function, the computed value is stored in any of the Memory area 1 to 8.

When using Level PID, the instrument automatically chooses the Memory area to store the computed value based on the Set value (SV) or the Measured value (PV) at the end of Autotuning (AT). To store the computed value in the specific Memory area, set “0: No Level PID action” first and conduct Autotuning (AT).



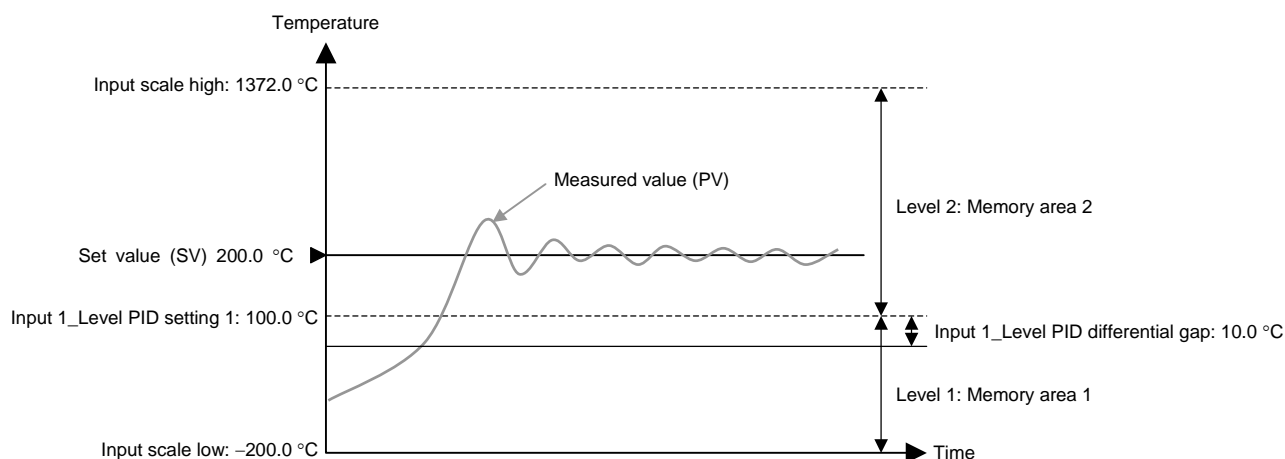
To conduct Autotuning (AT), refer to P. 15 and P. 16.

7. SETTING EXAMPLE OF THE LEVEL PID

This section describes the setting example to control the input scale range of the Input 1 based on two sets of PID values. One set of PID values is used at the startup of the load and the other set of PID values is used when the Measured value is stable.

Condition of setting example

Input specification: 1-input controller
 Input scale range: -200.0 to 1372.0 °C (Factory set value when Input type is not specified.)
 Input 1_set value (SV1): 200.0 °C (Stored in Memory area 2)
 PID values switch: Switch by Measured value (PV)
 Input 1_Level PID differential gap: 10.0 °C
 Input 1_Level PID setting 1: 100.0 °C



Setting contents of Memory area

To conduct the operation of the diagram above, both Memory area 1 and Memory area 2 are used. Refer to the set values below in the table to be used for this setting example.

- Event function is not used: The screens of Event 1 set value (EV1) to Event 4 set value (EV4) do not display.
- As the input specification is 1-input controller, parameters for input 2 do not display.

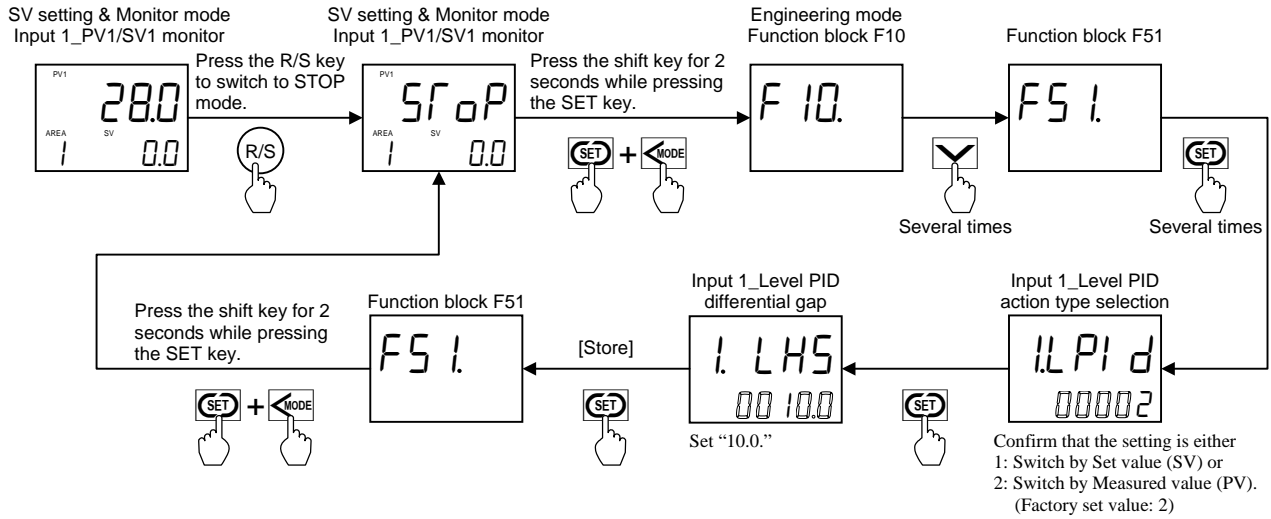
Setting parameter	Setting contents	
	Memory area 1	Memory area 2
Input 1_set value (SV1)	80.0 °C Set arbitrary value required to compute PID values for Level 1 by Autotuning (AT). (As an example, 80.0 °C is set.)	200.0 °C (Target temperature) (As an example, 200.0 °C is set.)
Input 1_proportional band	Computed by Autotuning (AT).	Computed by Autotuning (AT).
Input 1_integral time	Computed by Autotuning (AT).	Computed by Autotuning (AT).
Input 1_derivative time	Computed by Autotuning (AT).	Computed by Autotuning (AT).
Input 1_control response parameter	0: Slow (factory set value)	0: Slow (factory set value)
Input 1_setting change rate limiter (up)	OFF: Unused (factory set value)	OFF: Unused (factory set value)
Input 1_setting change rate limiter (down)	OFF: Unused (factory set value)	OFF: Unused (factory set value)
Area soak time	0.00.00 (factory set value)	0.00.00 (factory set value)
Link area number	OFF: No link (factory set value)	OFF: No link (factory set value)

■ Setting procedure for Level PID

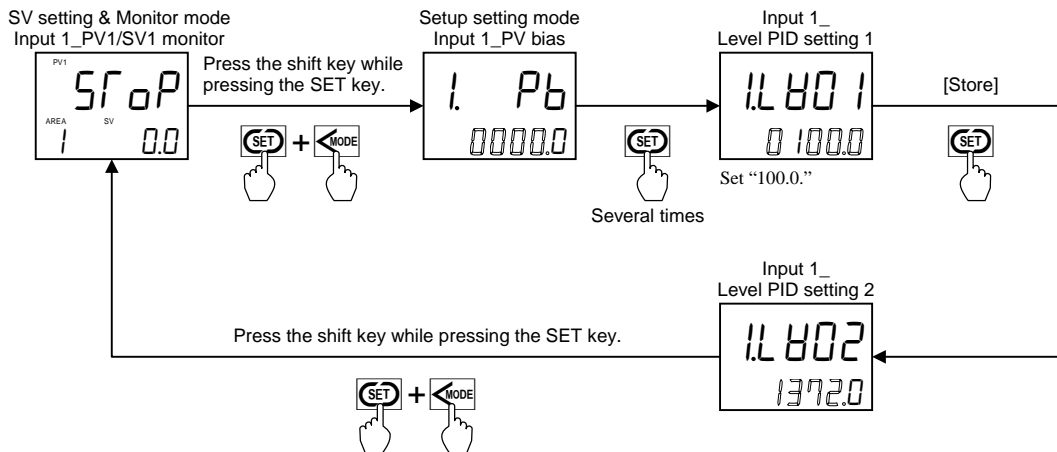


For a parameter setting other than the setting example of this section, refer to **HA400/HA900/HA401/HA901 Operation Manual (IMR01N02-E□)**.

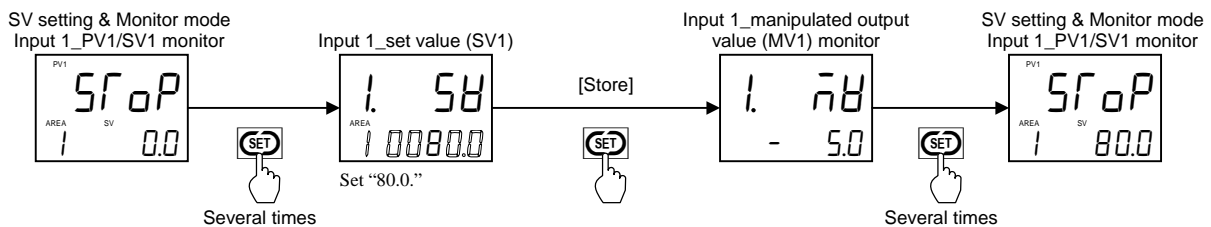
1. Set the Input 1_Level PID differential gap to “10.0 °C.” [Engineering mode]



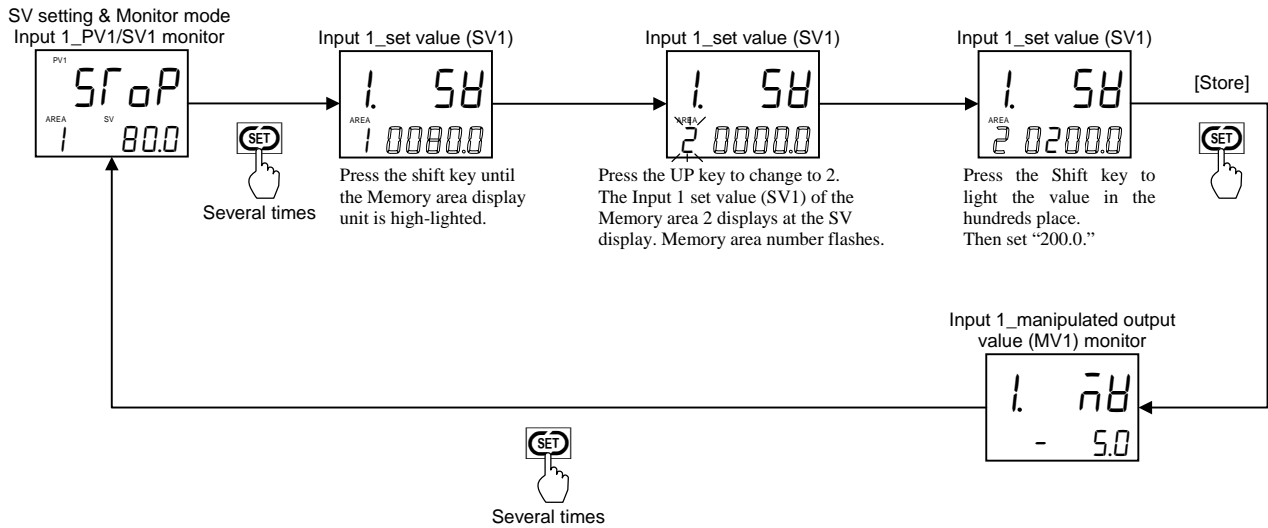
2. Set the Input 1_Level PID setting 1 to “100.0 °C.” [Setup setting mode]



3. Set “80.0 °C” to Input 1_set value (SV1) of the Memory area 1. [SV setting & Monitor mode]

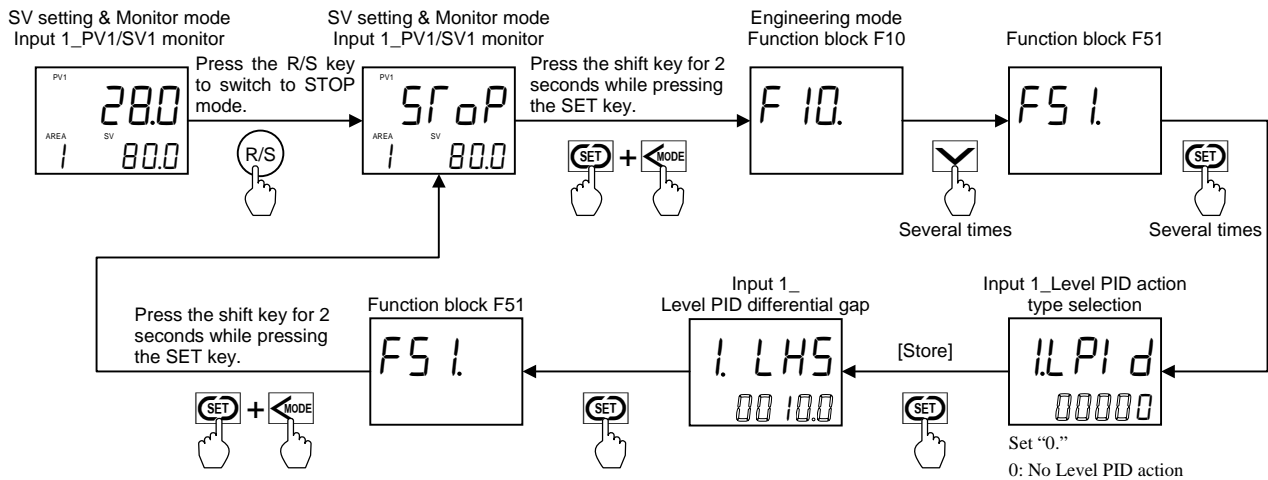


4. Set “200.0 °C” to Input 1_set value (SV1) of the Memory area 2. [SV setting & Monitor mode]

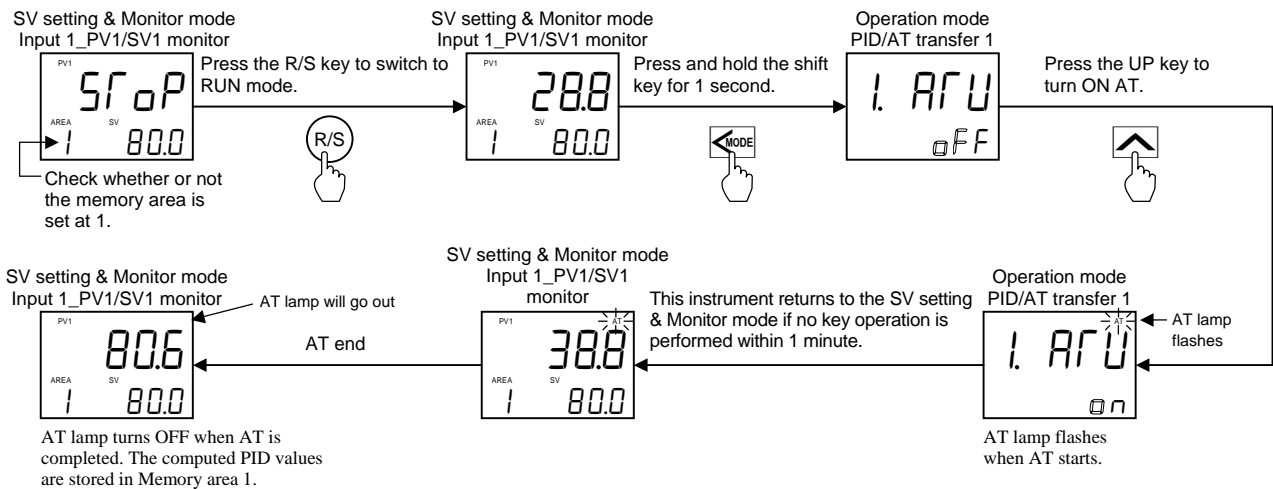


■ Operation procedure of Autotuning (AT) at Level PID

1. Set “0: No Level PID action” to Input 1_Level PID action type selection. [Engineering mode]

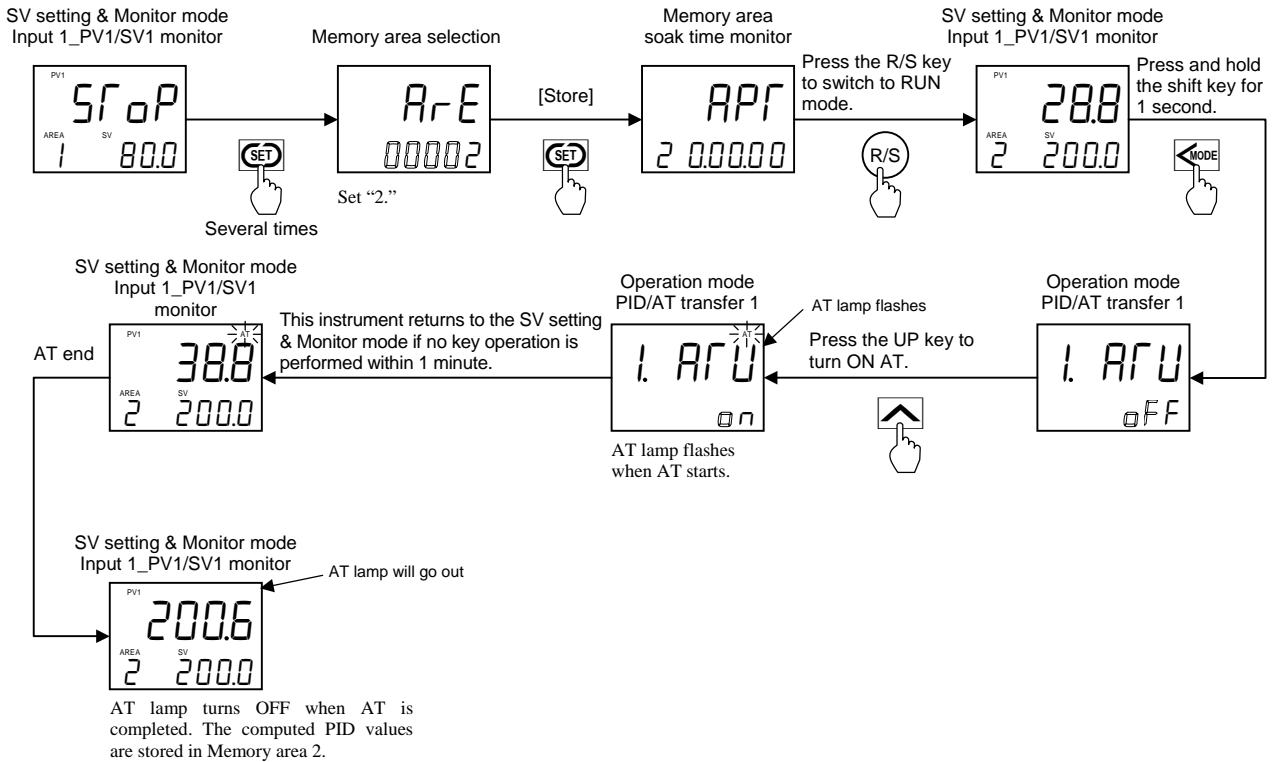


2. Compute PID values of Level 1 (memory area 1)



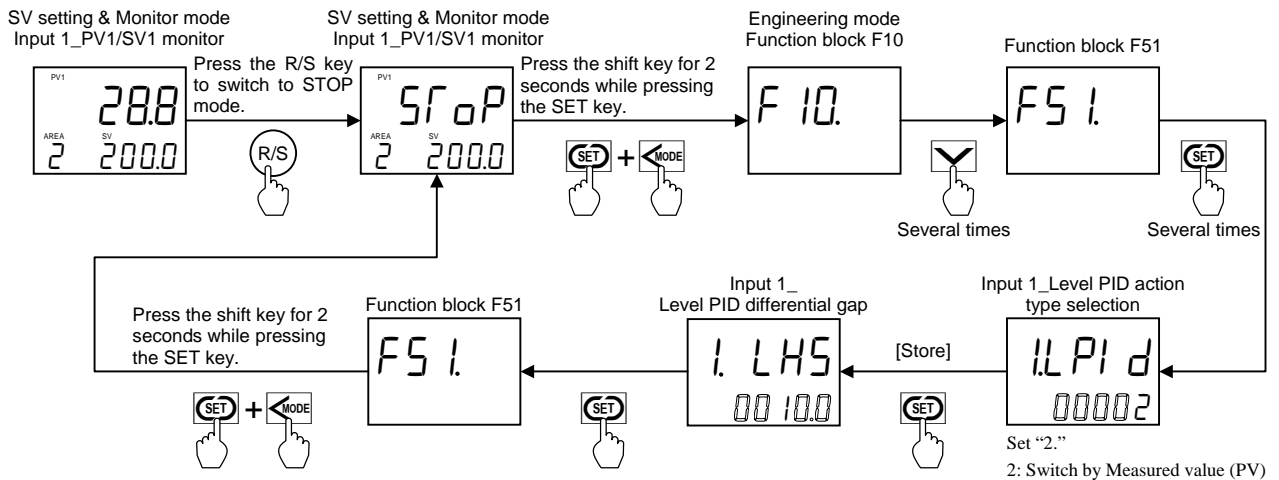
To start and cancel Autotuning (AT), refer to **HA400/HA900/HA401/HA901 Operation Manual (IMR01N02-E□)**.

3. Compute PID values of Level 2 (memory area 2)



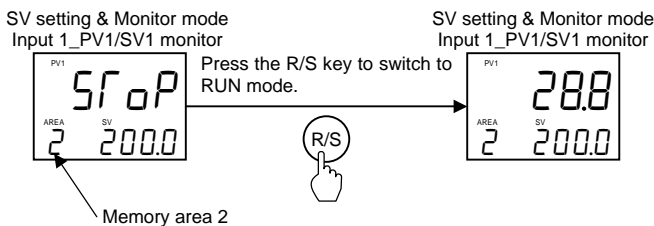
4. Set "2: Switch by Measured value (PV)" to Input Input 1_Level PID action type selection.

[Engineering mode]



■ Operation start


The operation like the one described in the diagram on page 13 can be achieved by starting control when Memory area 2 is set to the Control area.



8. COMMUNICATION DATA

8.1 RKC Communication

Communication data related to Level PID function is added. Since the data is added after the **NZ** identifier, polling/selecting by ACK (Acknowledgment) is available. Data is in 7 digits.

 For details of communication protocol, refer to the **HA400/HA900/HA401/HA901 Communication Instruction Manual (IMR01N03-E□)**.

■ Communication item list


RO: Read only R/W: Read and Write

No.	Name	Identifier	Attribute	Data range	Factory set value
233	Input 1_Level PID memory area number	NJ	RO	1 to 8 Memory area number selected for Input 1 at Level PID.	—
234	Input 2_Level PID memory area number	QJ	RO	1 to 8 Memory area number selected for Input 2 at Level PID.	—
235	Input 1_Level PID differential gap	NK	R/W*	0.0 to Input span The common value of Level PID differential gap is used for the Level PID setting 1 to Level PID setting 7.	0.0
236	Input 2_Level PID differential gap	QK	R/W*		0.0
237	Input 1_Level PID setting 1	NL	R/W	Input 1_input scale low to Input 1_Level PID setting 2	Input 1_input scale high
238	Input 1_Level PID setting 2	NM	R/W	Input 1_Level PID setting 1 to Input 1_Level PID setting 3	Input 1_input scale high
239	Input 1_Level PID setting 3	NN	R/W	Input 1_Level PID setting 2 to Input 1_Level PID setting 4	Input 1_input scale high
240	Input 1_Level PID setting 4	NO	R/W	Input 1_Level PID setting 3 to Input 1_Level PID setting 5	Input 1_input scale high
241	Input 1_Level PID setting 5	NP	R/W	Input 1_Level PID setting 4 to Input 1_Level PID setting 6	Input 1_input scale high
242	Input 1_Level PID setting 6	NQ	R/W	Input 1_Level PID setting 5 to Input 1_Level PID setting 7	Input 1_input scale high
243	Input 1_Level PID setting 7	NR	R/W	Input 1_Level PID setting 6 to Input 1_input scale high	Input 1_input scale high
244	Input 2_Level PID setting 1	QL	R/W	Input 2_input scale low to Input 2_Level PID setting 2	Input 2_input scale high
245	Input 2_Level PID setting 2	QM	R/W	Input 2_Level PID setting 1 to Input 2_Level PID setting 3	Input 2_input scale high
246	Input 2_Level PID setting 3	QN	R/W	Input 2_Level PID setting 2 to Input 2_Level PID setting 4	Input 2_input scale high
247	Input 2_Level PID setting 4	QO	R/W	Input 2_Level PID setting 3 to Input 2_Level PID setting 5	Input 2_input scale high
248	Input 2_Level PID setting 5	QP	R/W	Input 2_Level PID setting 4 to Input 2_Level PID setting 6	Input 2_input scale high
249	Input 2_Level PID setting 6	QQ	R/W	Input 2_Level PID setting 5 to Input 2_Level PID setting 7	Input 2_input scale high
250	Input 2_Level PID setting 7	QR	R/W	Input 2_Level PID setting 6 to Input 2_input scale high	Input 2_input scale high
251	Input 1_Level PID action type selection	LS	R/W*	0: No Level PID action 1: Switch by Set value (SV)	2
252	Input 2_Level PID action type selection	LT	R/W*	2: Switch by Measured value (PV)	2

* The attribute for the communication data is RO (Read only) when the instrument is in RUN state.

8.2 Modbus Communication

Communication data related to Level PID function is added.

 For details of communication protocol, refer to the **HA400/HA900/HA401/HA901 Communication Instruction Manual (IMR01N03-E□)**.

■ Data map list


RO: Read only R/W: Read and Write

Name	Register address				Attribute	Data range	Factory set value
	Hexadecimal		Decimal				
	Low-order	High-order	Low-order	High-order			
Input 1_Level PID memory area number	0326	0327	806	807	RO	1 to 8 Memory area number selected for Input 1 at Level PID.	—
Input 2_Level PID memory area number	0328	0329	808	809	RO	1 to 8 Memory area number selected for Input 2 at Level PID.	—
Input 1_Level PID differential gap	032A	032B	810	811	R/W*	0.0 to Input span The common value of Level PID differential gap is used for the Level PID setting 1 to Level PID setting 7.	0.0
Input 2_Level PID differential gap	032C	032D	812	813	R/W*		0.0
Input 1_Level PID setting 1	032E	032F	814	815	R/W	Input 1_input scale low to Input 1_Level PID setting 2	Input 1_input scale high
Input 1_Level PID setting 2	0330	0331	816	817	R/W	Input 1_Level PID setting 1 to Input 1_Level PID setting 3	Input 1_input scale high
Input 1_Level PID setting 3	0332	0333	818	819	R/W	Input 1_Level PID setting 2 to Input 1_Level PID setting 4	Input 1_input scale high
Input 1_Level PID setting 4	0334	0335	820	821	R/W	Input 1_Level PID setting 3 to Input 1_Level PID setting 5	Input 1_input scale high
Input 1_Level PID setting 5	0336	0337	822	823	R/W	Input 1_Level PID setting 4 to Input 1_Level PID setting 6	Input 1_input scale high
Input 1_Level PID setting 6	0338	0339	824	825	R/W	Input 1_Level PID setting 5 to Input 1_Level PID setting 7	Input 1_input scale high
Input 1_Level PID setting 7	033A	033B	826	827	R/W	Input 1_Level PID setting 6 to Input 1_input scale high	Input 1_input scale high
Input 2_Level PID setting 1	033C	033D	828	829	R/W	Input 2_input scale low to Input 2_Level PID setting 2	Input 2_input scale high
Input 2_Level PID setting 2	033E	033F	830	831	R/W	Input 2_Level PID setting 1 to Input 2_Level PID setting 3	Input 2_input scale high
Input 2_Level PID setting 3	0340	0341	832	833	R/W	Input 2_Level PID setting 2 to Input 2_Level PID setting 4	Input 2_input scale high
Input 2_Level PID setting 4	0342	0343	834	835	R/W	Input 2_Level PID setting 3 to Input 2_Level PID setting 5	Input 2_input scale high
Input 2_Level PID setting 5	0344	0345	836	837	R/W	Input 2_Level PID setting 4 to Input 2_Level PID setting 6	Input 2_input scale high
Input 2_Level PID setting 6	0346	0347	838	839	R/W	Input 2_Level PID setting 5 to Input 2_Level PID setting 7	Input 2_input scale high
Input 2_Level PID setting 7	0348	0349	840	841	R/W	Input 2_Level PID setting 6 to Input 2_input scale high	Input 2_input scale high
Input 1_Level PID action type selection	034A	034B	842	843	R/W*	0: No Level PID action 1: Switch by Set value (SV)	2
Input 2_Level PID action type selection	034C	034D	844	845	R/W*	2: Switch by Measured value (PV)	2

* The attribute for the communication data is RO (Read only) when the instrument is in RUN state.

8.3 DeviceNet Communication

Communication data related to Level PID function is added.

 For details of DeviceNet communication, refer to the **HA400/HA900/HA401/HA901 DeviceNet Communication Instruction Manual (IMR01N05-E□)**.

8.3.1 Communication items list

RO (Read only) R/W (Read and Write)

Attribute ID	Name	Attribute	Data range	Factory set value
88 (0x0058)	Input 1_Level PID memory area number	RO	1 to 8 Memory area number selected for Input 1 at Level PID.	—
89 (0x0059)	Input 2_Level PID memory area number	RO	1 to 8 Memory area number selected for Input 2 at Level PID.	—
90 (0x005A)	Input 1_Level PID differential gap	R/W*	0.0 to Input span The common value of Level PID differential gap is used for the Level PID setting 1 to Level PID setting 7.	0.0
91 (0x005B)	Input 2_Level PID differential gap	R/W*		0.0
92 (0x005C)	Input 1_Level PID setting 1	R/W	Input 1_input scale low to Input 1_Level PID setting 2	Input 1_ input scale high
93 (0x005D)	Input 1_Level PID setting 2	R/W	Input 1_Level PID setting 1 to Input 1_Level PID setting 3	Input 1_ input scale high
94 (0x005E)	Input 1_Level PID setting 3	R/W	Input 1_Level PID setting 2 to Input 1_Level PID setting 4	Input 1_ input scale high
95 (0x005F)	Input 1_Level PID setting 4	R/W	Input 1_Level PID setting 3 to Input 1_Level PID setting 5	Input 1_ input scale high
96 (0x0060)	Input 1_Level PID setting 5	R/W	Input 1_Level PID setting 4 to Input 1_Level PID setting 6	Input 1_ input scale high
97 (0x0061)	Input 1_Level PID setting 6	R/W	Input 1_Level PID setting 5 to Input 1_Level PID setting 7	Input 1_ input scale high
98 (0x0062)	Input 1_Level PID setting 7	R/W	Input 1_Level PID setting 6 to Input 1_input scale high	Input 1_ input scale high
247 (0x00F7)	Input 2_Level PID setting 1	R/W	Input 2_input scale low to Input 2_Level PID setting 2	Input 2_ input scale high
248 (0x00F8)	Input 2_Level PID setting 2	R/W	Input 2_Level PID setting 1 to Input 2_Level PID setting 3	Input 2_ input scale high
249 (0x00F9)	Input 2_Level PID setting 3	R/W	Input 2_Level PID setting 2 to Input 2_Level PID setting 4	Input 2_ input scale high
250 (0x00FA)	Input 2_Level PID setting 4	R/W	Input 2_Level PID setting 3 to Input 2_Level PID setting 5	Input 2_ input scale high
251 (0x00FB)	Input 2_Level PID setting 5	R/W	Input 2_Level PID setting 4 to Input 2_Level PID setting 6	Input 2_ input scale high
252 (0x00FC)	Input 2_Level PID setting 6	R/W	Input 2_Level PID setting 5 to Input 2_Level PID setting 7	Input 2_ input scale high
253 (0x00FD)	Input 2_Level PID setting 7	R/W	Input 2_Level PID setting 6 to Input 2_input scale high	Input 2_ input scale high
254 (0x00FE)	Input 1_Level PID action type selection	R/W*	0: No Level PID action 1: Switch by Set value (SV)	2
255 (0x00FF)	Input 2_Level PID action type selection	R/W*	2: Switch by Measured value (PV)	2

* The attribute for the communication data is RO (Read only) when the instrument is in RUN state.

8.3.2 Device profiles

Object mounting

■ Controller Object (0x64: 64Hex)

● Object instance

	ID	Description	Get	Set	Type	Value *
Attributes	88	Input 1_Level PID memory area number	Yes	No	DINT	Refer to P. 19
	89	Input 2_Level PID memory area number	Yes	No	DINT	Refer to P. 19
	90	Input 1_Level PID differential gap	Yes	Yes	DINT	Refer to P. 19
	91	Input 2_Level PID differential gap	Yes	Yes	DINT	Refer to P. 19
	92	Input 1_Level PID setting 1	Yes	Yes	DINT	Refer to P. 19
	93	Input 1_Level PID setting 2	Yes	Yes	DINT	Refer to P. 19
	94	Input 1_Level PID setting 3	Yes	Yes	DINT	Refer to P. 19
	95	Input 1_Level PID setting 4	Yes	Yes	DINT	Refer to P. 19
	96	Input 1_Level PID setting 5	Yes	Yes	DINT	Refer to P. 19
	97	Input 1_Level PID setting 6	Yes	Yes	DINT	Refer to P. 19
	98	Input 1_Level PID setting 7	Yes	Yes	DINT	Refer to P. 19
	247	Input 2_Level PID setting 1	Yes	Yes	DINT	Refer to P. 19
	248	Input 2_Level PID setting 2	Yes	Yes	DINT	Refer to P. 19
	249	Input 2_Level PID setting 3	Yes	Yes	DINT	Refer to P. 19
	250	Input 2_Level PID setting 4	Yes	Yes	DINT	Refer to P. 19
	251	Input 2_Level PID setting 5	Yes	Yes	DINT	Refer to P. 19
	252	Input 2_Level PID setting 6	Yes	Yes	DINT	Refer to P. 19
	253	Input 2_Level PID setting 7	Yes	Yes	DINT	Refer to P. 19
	254	Input 1_Level PID action type selection	Yes	Yes	DINT	Refer to P. 19
	255	Input 2_Level PID action type selection	Yes	Yes	DINT	Refer to P. 19

* Page number of this document