

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

This manual describes items relating only to the Z-1151 specification.

<b>CONTENTS</b>	
1. OUTLINE-----	1
2. MODEL CODE -----	1
3. DESCRIPTION OF THE RAMP/SOAK STABILIZER (RSS) FUNCTION-----	2
4. DESCRIPTION OF THE PARAMETER-----	3
4.1 Additional Parameters-----	3
4.2 Description of Each Parameters-----	3
4.3 Parameter with Specific Data Range-----	4
5. KEY OPERATION FOR Z-1151 SPECIFICATION -----	5
6. AUTOTUNING (AT) AT CASCADE CONTROL-----	8
7. COMMUNICATION DATA-----	9
7.1 RKC Communication -----	9
7.2 Modbus Communication-----	10

## 1. OUTLINE

Features of Z-1151:

- Autotuning (AT) can be conducted for Cascade control.
- Ramp/Soak stabilizer (RSS) function is added.
- The following parameters are added for Autotuning (AT):
  - Input 1\_AT differential gap (1.  $\Gamma_{\bar{P}H}$ )/Input 2\_AT differential gap (2.  $\Gamma_{\bar{P}H}$ )
  - Input 1\_proportional band adjusting factor (1.  $PA_{\bar{U}}$ )/Input 2\_proportional band adjusting factor (2.  $PA_{\bar{U}}$ )
  - Input 1\_integral time adjusting factor (1.  $IA_{\bar{U}}$ )/Input 2\_integral time adjusting factor (2.  $IA_{\bar{U}}$ )
  - Input 1\_derivative time adjusting factor (1.  $DA_{\bar{U}}$ )/Input 2\_derivative time adjusting factor (2.  $DA_{\bar{U}}$ )
- Data range and factory set value is changed for Input 1\_AT differential gap time (1.  $AFH$ ) and Input 2\_AT differential gap time (2.  $AFH$ ).
- DeviceNet communication, PROFIBUS communication, CC-Link communication and Infrared communication cannot be used for Communication function.

## 2. MODEL CODE

Z-1151 is added to end of model codes. In addition, specification of Communication 2 is different between Z-1151 specification and Standard specifications. Infrared function cannot be selected.

High-speed AT type:

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

### (11) Communication 2 (optional)

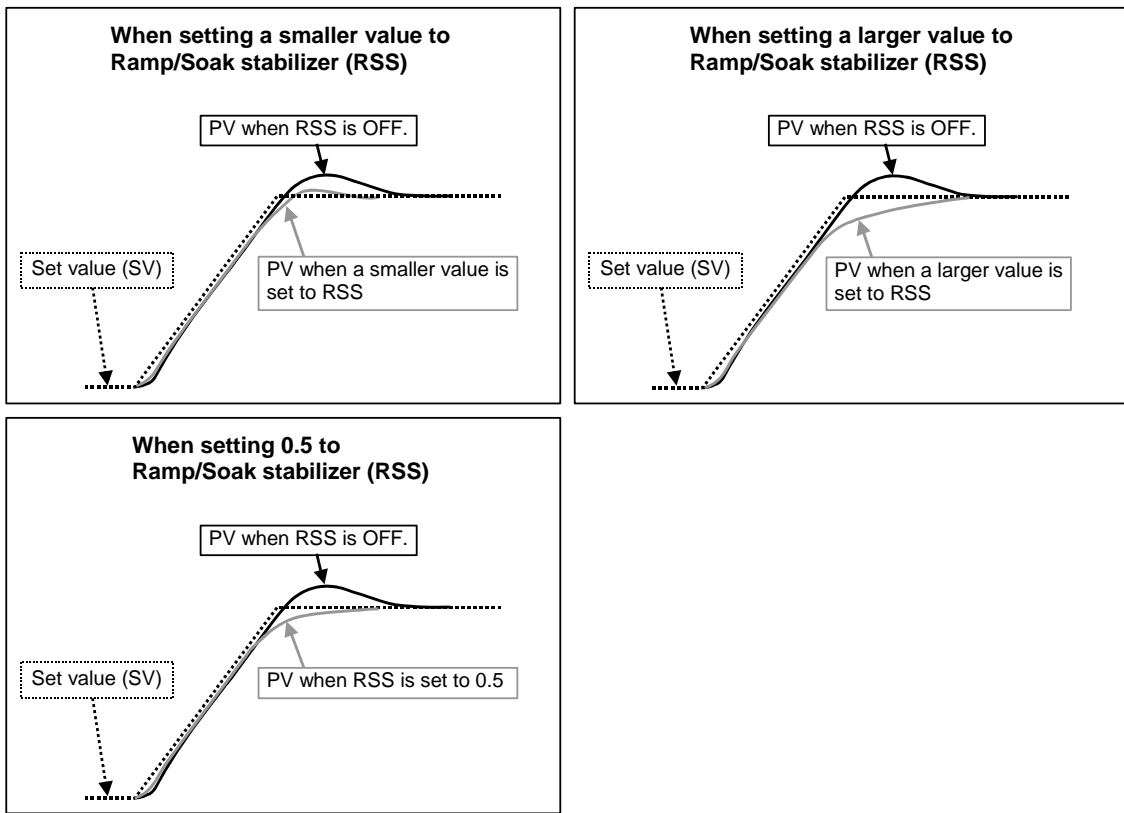
- |                                |                               |                     |
|--------------------------------|-------------------------------|---------------------|
| N: None                        | 5: RS-485 (RKC communication) | 8: RS-232C (Modbus) |
| 1: RS-232C (RKC communication)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


### (14) Instrument version

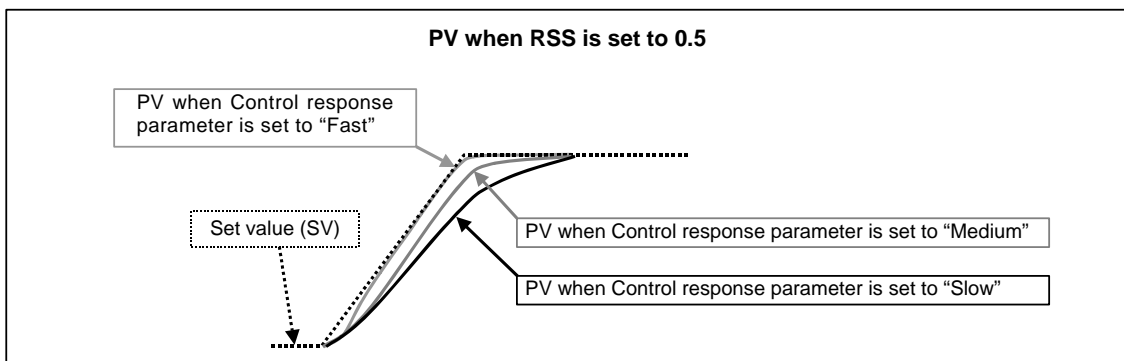
YN: Version symbol (Without Infrared function)

### 3. DESCRIPTION OF THE RAMP/SOAK STABILIZER (RSS) FUNCTION

Overshoot occurring during the transition from ramp segment to soak segment can be suppressed by Ramp/Soak stabilizer (RSS) function.




 To achieve better follow-up, activate Ramp/Soak stabilizer (RSS) and set the Control response parameter to "Fast."



#### Condition of action:

- Intensity factor of Ramp/Soak stabilizer is set to larger value of "0.1."
- Ramp state and Soak state is set by Setting change rate limiter function (or Link function).
- PI or PID control is used. (Excluding the Position proportioning PID control)
- Auto mode is selected and the operation is in RUN state.

 When the following setting is set to Input 2\_use selection ( $\overline{EPR}$ ), RSS function may not be operative:

- Remote input: RSS function is not operative for Input 1 side.
- Cascade control: RSS function is not operative for Input 2 (slave) side.

## 4. DESCRIPTION OF THE PARAMETER

### 4.1 Additional Parameters

The following parameters are added for Z-1151 specification:

- Input 1\_intensity factor of Ramp/Soak stabilizer (1. r55)
- Input 1\_AT differential gap (1. rPH)
- Input 1\_proportional band adjusting factor (1. PPL)
- Input 1\_integral time adjusting factor (1. I PL)
- Input 1\_derivative time adjusting factor (1. dPL)
- Input 2\_intensity factor of Ramp/Soak stabilizer (2. r55)
- Input 2\_AT differential gap (2. rPH)
- Input 2\_proportional band adjusting factor (2. PPL)
- Input 2\_integral time adjusting factor (2. I PL)
- Input 2\_derivative time adjusting factor (2. dPL)

### 4.2 Description of Each Parameters

#### ■ Intensity factor of Ramp/Soak stabilizer (1. r55, 2. r55) [Engineering mode F51, F52]

Set Intensity factor of Ramp/Soak stabilizer. Input 1 and Input 2 can be set individually.

Data range: 0.0 to 1.0 (0.0: Unused)

Factory set value: Input 1\_intensity factor of Ramp/Soak stabilizer (1. r55): 0.5  
Input 2\_intensity factor of Ramp/Soak stabilizer (2. r55): 0.5

#### ■ AT differential gap (1. rPH, 2. rPH) [Engineering mode F53, F54]

Use to set an ON/OFF action differential gap for Autotuning (AT). This function prevents the AT function from malfunctioning caused by noise.

Data range: Temperature input: 0 (0.0) to 100 (100.0) °C [°F]  
Voltage/Current input: 0.0 to 10.0 % of Input span

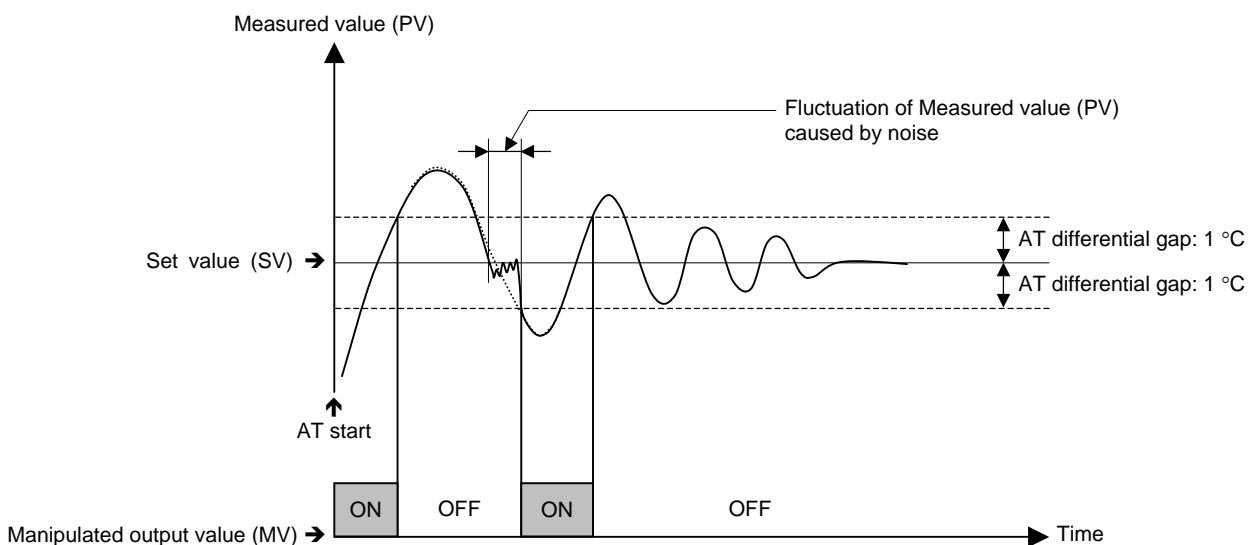
Factory set value: Input 1\_AT differential gap (1. rPH): Temperature input: 1.0  
Voltage/Current input: 0.1 of Input span  
Input 2\_AT differential gap (2. rPH): Temperature input: 1.0  
Voltage/Current input: 0.1 of Input span



**Do not use “AT differential gap” and “AT differential gap time” at the same time.**

Functional description:

Output may chatter due to the fluctuation of the Measured value (PV) caused by noise during Autotuning (AT). The differential gap of AT differential gap prevents the output from chattering during Autotuning (AT).



Example of action when setting AT differential gap to 1 °C (factory set value)

### ■ Proportional band adjusting factor ( 1. *PRJ*, 2. *PRJ*) [Engineering mode F53, F54]

This is a factor which is multiplied by the Proportional band computed by executing the Autotuning (AT) function. Input 1 and Input 2 can be set individually.

Data range: 0.01 to 10.00 times

Factory set value: Input 1\_proportional band adjusting factor ( 1. *PRJ*): 1.00  
Input 2\_proportional band adjusting factor (2. *PRJ*): 1.00

### ■ Integral time adjusting factor ( 1. *I RJ*, 2. *I RJ*) [Engineering mode F53, F54]

This is a factor which is multiplied by the Integral time computed by executing the Autotuning (AT) function. Input 1 and Input 2 can be set individually.

Data range: 0.01 to 10.00 times

Factory set value: Input 1\_integral time adjusting factor ( 1. *I RJ*): 1.00  
Input 2\_integral time adjusting factor (2. *I RJ*): 1.00

### ■ Derivative time adjusting factor ( 1. *dRJ*, 2. *dRJ*) [Engineering mode F53, F54]

This is a factor which is multiplied by the Derivative time computed by executing the Autotuning (AT) function. Input 1 and Input 2 can be set individually.

Data range: 0.01 to 10.00 times

Factory set value: Input 1\_derivative time adjusting factor ( 1. *dRJ*): 1.00  
Input 1\_derivative time adjusting factor (2. *dRJ*): 1.00

## 4.3 Parameter with Specific Data Range

Data range and Factory set value of the parameter below is changed.

### ■ AT differential gap time ( 1. *AFH*, 2. *AFH*) [Engineering mode F53, F54]

Use to set an ON/OFF action differential gap time for Autotuning (AT). This function prevents the AT function from malfunctioning caused by noise.

Data range: 0.00 to 100.00 seconds

Factory set value: Input 1\_AT differential gap time ( 1. *AFH*): 0.00  
Input 2\_AT differential gap time (2. *AFH*): 0.00



**Do not use “AT differential gap time” and “AT differential gap” at the same time.**

# 5. KEY OPERATION FOR Z-1151 SPECIFICATION

Set parameters related to Z-1151 in the Engineering mode.

**WARNING**

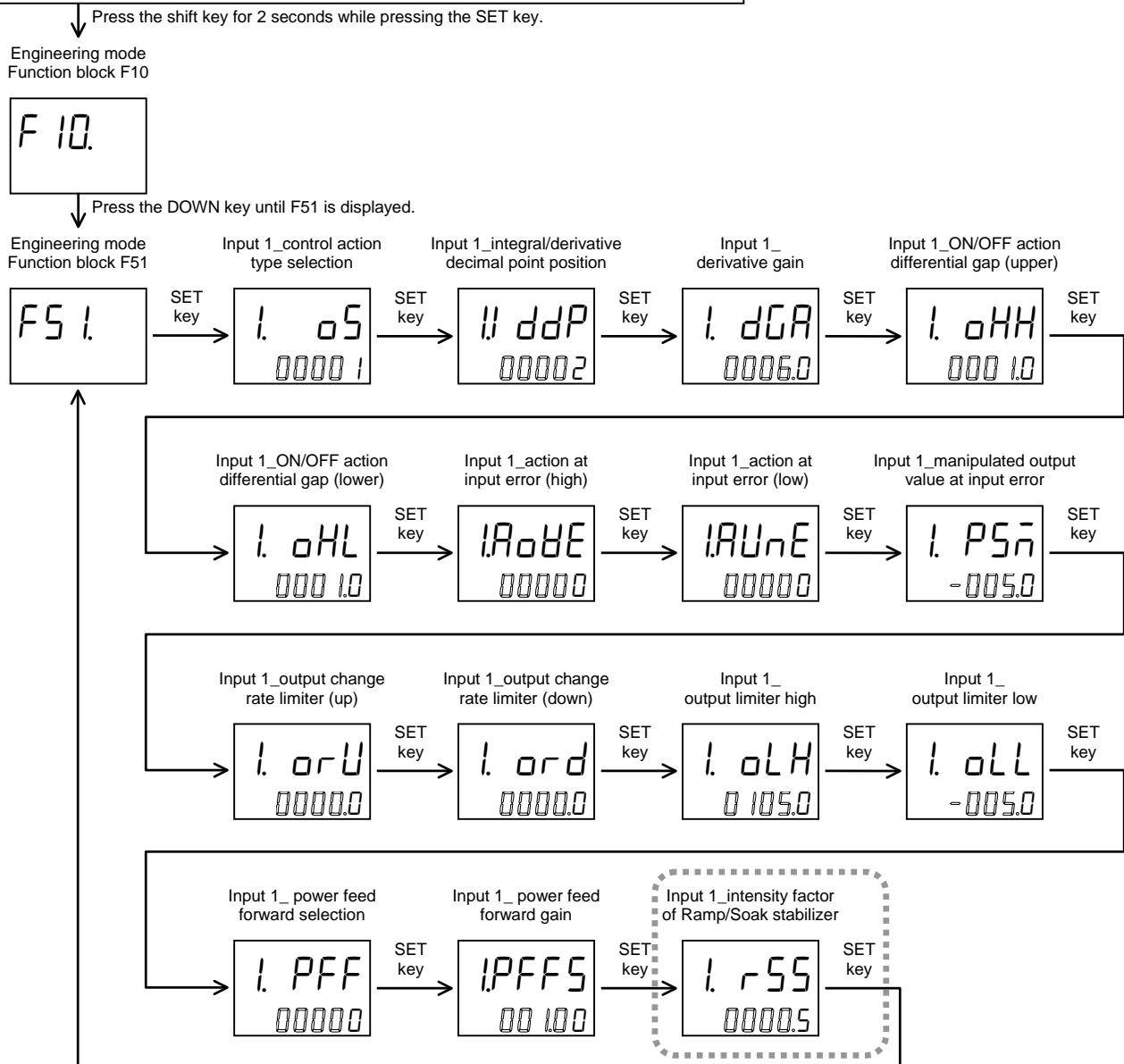
Parameters in the Engineering mode should be set according to the application before setting any parameter related to operation. Once the Parameters in the Engineering mode are set correctly, no further changes need to be made to parameters for the same application under normal conditions. If they are 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.
- This instrument returns to the PV1/SV1 monitor screen if no key operation is performed within 1 minute.

## ■ Input 1\_intensity factor of Ramp/Soak stabilizer (I\_r55)

Input 1\_intensity factor of Ramp/Soak stabilizer (I\_r55) is added after Input 1\_power feed forward gain (I\_PFF5) at the Function block F51.

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



## ■ Input 2\_intensity factor of Ramp/Soak stabilizer (2. r55)

Input 2\_intensity factor of Ramp/Soak stabilizer (2. r55) is added after Input 2\_power feed forward gain (2. PFF5) at the Function block F52.

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. ddp  
00002

Input 2\_  
derivative gain

2. dGA  
0006.0

Input 2\_ON/OFF action  
differential gap (upper)

2. 0HH  
0001.0

Input 2\_ON/OFF action  
differential gap (lower)

2. 0HL  
0001.0

Input 2\_action at  
input error (high)

2. A0HE  
00000

Input 2\_action at  
input error (low)

2. AUHE  
00000

Input 2\_manipulated output  
value at input error

2. P5n  
-005.0

Input 2\_output change  
rate limiter (up)

2. orU  
0000.0

Input 2\_output change  
rate limiter (down)

2. ord  
0000.0

Input 2\_  
output limiter high

2. oLH  
0105.0

Input 2\_  
output limiter low

2. oLL  
-005.0

Input 2\_power feed  
forward selection

2. PFF  
00000

Input 2\_power feed  
forward gain

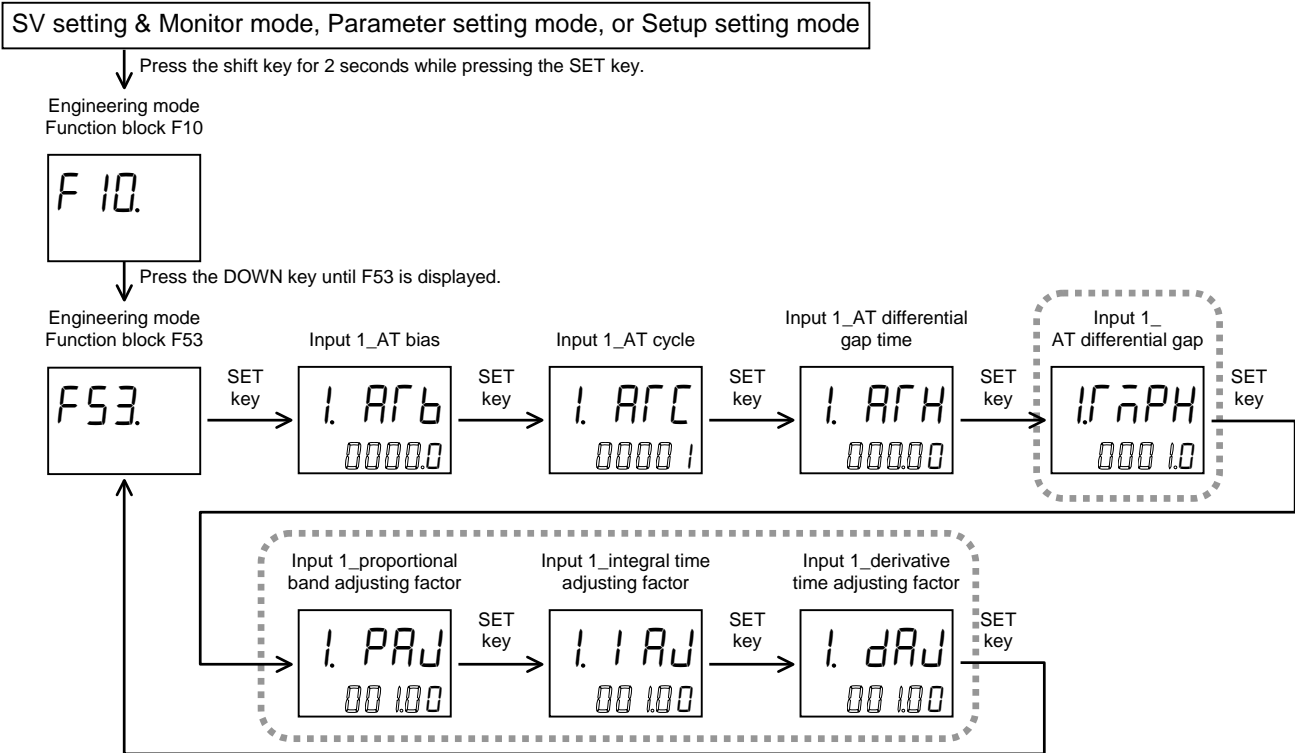
2. PFF5  
0010.0

Input 2\_intensity factor  
of Ramp/Soak stabilizer

2. r55  
0000.5

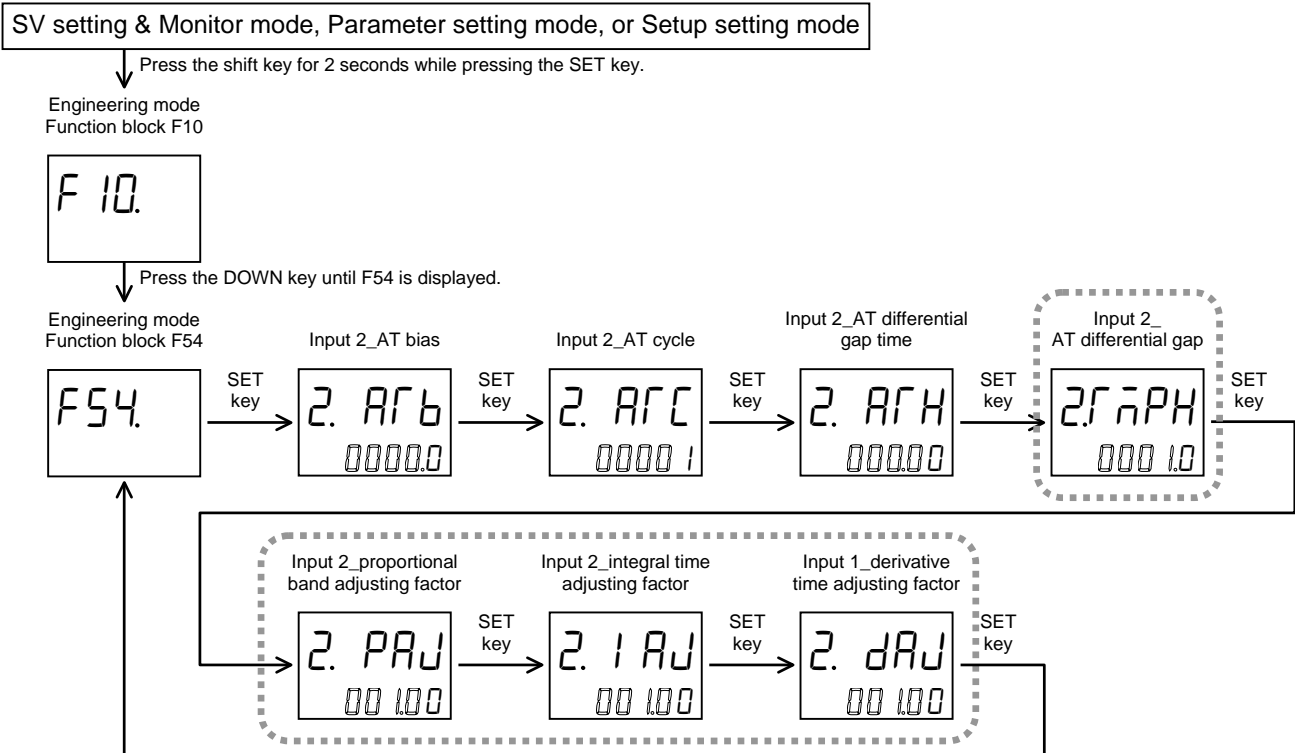
■ **Input 1\_AT differential gap (1.Γ̄PH), Input 1\_proportional band adjusting factor (1.PAJ), Input 1\_integral time adjusting factor (1.IAJ) and Input 1\_derivative time adjusting factor (1.dAJ)**

Setting display of each parameter above is added after Input 1\_AT differential gap time (1.AFH) at Function block F53.



■ **Input 2\_AT differential gap (2.Γ̄PH), Input 2\_proportional band adjusting factor (2.PAJ), Input 2\_integral time adjusting factor (2.IAJ) and Input 1\_derivative time adjusting factor (2.dAJ)**

Setting display of each parameter above is added after Input 2\_AT differential gap time (2.AFH) at Function block F54.



## 6. AUTOTUNING (AT) AT CASCADE CONTROL

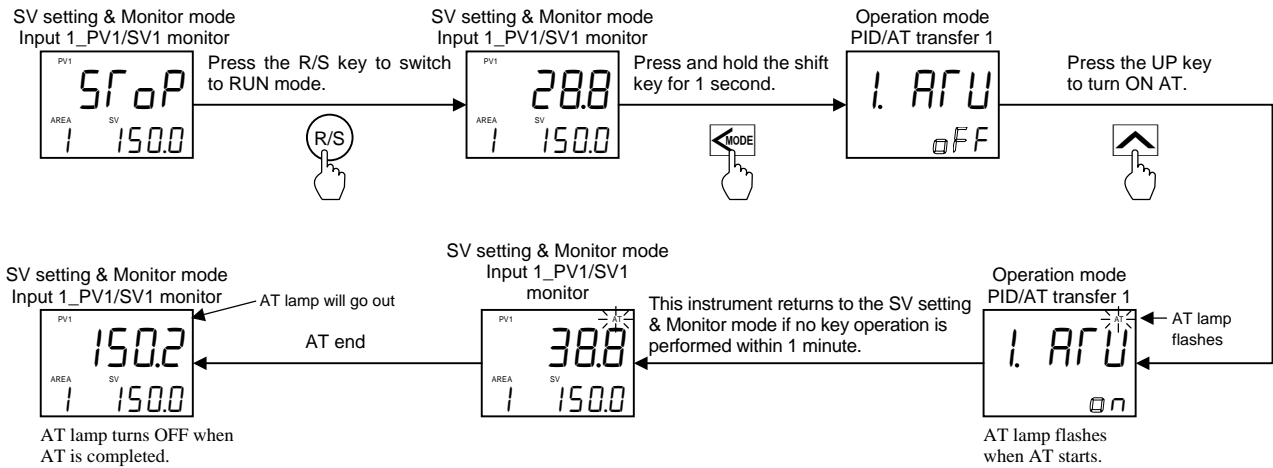
For HA400/900 standard version, PID values cannot be computed by Autotuning (AT) for either Input 1 or Input 2 when selecting “2: Cascade control (Slave)” at Input 2\_use selection (LR $\bar{n}$ ).

When specifying Z-1151 specification, Autotuning (AT) can be conducted for Cascade control and Autotuning (AT) is operative for both Input 1 and Input 2.

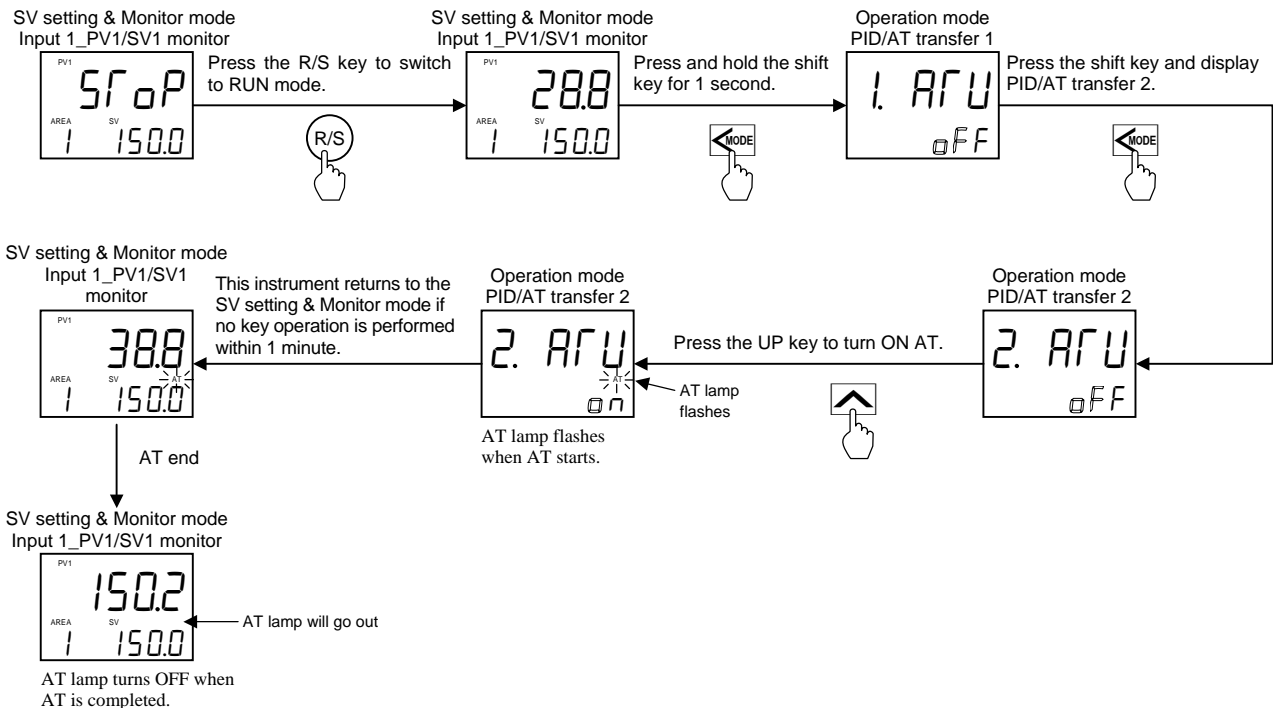
 For Autotuning (AT), refer to **HA400/HA900/HA401/HA901 Operation Manual (IMR01N02-E□)**.

### ■ Operation for Autotuning (AT)

#### ● To conduct Autotuning (AT) for Input 1



#### ● To conduct Autotuning (AT) for Input 2



For 2-input specification, both Input 1 and 2 are in Run state or Stop state when pressing the R/S key. RUN/STOP cannot be switched for each input.



## 7. COMMUNICATION DATA

### 7.1 RKC Communication

The communication data related to Autotuning (AT) is added. As the data is added after the **NZ** identifier, polling/selecting by **ACK** (Acknowledgment) is available. Additionally, confirm the communication data with changed setting ranges. 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

##### ● Additional communication data

RO: Read only R/W: Read and Write

No.	Name	Identifier	Attribute	Data range	Factory set value
233	Input 1_proportional band adjusting factor	<b>JC</b>	R/W*	0.01 to 10.00 times	1.00
234	Input 1_integral time adjusting factor	<b>JD</b>	R/W*	0.01 to 10.00 times	1.00
235	Input 1_derivative time adjusting factor	<b>JE</b>	R/W*	0.01 to 10.00 times	1.00
236	Input 2_proportional band adjusting factor	<b>JF</b>	R/W*	0.01 to 10.00 times	1.00
237	Input 2_integral time adjusting factor	<b>JG</b>	R/W*	0.01 to 10.00 times	1.00
238	Input 2_derivative time adjusting factor	<b>JH</b>	R/W*	0.01 to 10.00 times	1.00
239	Input 1_intensity factor of Ramp/Soak stabilizer	<b>CC</b>	R/W*	0.0 to 1.0 (0.0: Unused)	0.5
240	Input 2_intensity factor of Ramp/Soak stabilizer	<b>CD</b>	R/W*	0.0 to 1.0 (0.0: Unused)	0.5
241	Input 1_AT differential gap	<b>GU</b>	R/W*	Temperature input: 0 (0.0) to 100 (100.0) °C [°F] Voltage/Current input: 0.0 to 10.0 % of Input span	Temperature input: 1.0 Voltage/Current input: 0.1 of Input span
242	Input 2_AT differential gap	<b>GV</b>	R/W*	Temperature input: 0 (0.0) to 100 (100.0) °C [°F] Voltage/Current input: 0.0 to 10.0 % of Input span	Temperature input: 1.0 Voltage/Current input: 0.1 of Input span

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

##### ● Parameter with specific data range

RO: Read only R/W: Read and Write

No.	Name	Identifier	Attribute	Data range	Factory set value
185	Input 1_AT differential gap time	<b>GH</b>	R/W*	0.00 to 100.0 seconds	0.00
188	Input 2_AT differential gap time	<b>GG</b>	R/W*	0.00 to 100.0 seconds	0.00

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

## 7.2 Modbus Communication

The communication data related to Autotuning (AT) is added. Additionally, confirm the communication data with changed setting ranges.

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

### ■ Data Map List

#### ● Additional communication data

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_proportional band adjusting factor	0326	0327	806	807	R/W*	0.01 to 10.00 times	1.00
Input 1_integral time adjusting factor	0328	0329	808	809	R/W*	0.01 to 10.00 times	1.00
Input 1_derivative time adjusting factor	032A	032B	810	811	R/W*	0.01 to 10.00 times	1.00
Input 2_proportional band adjusting factor	032C	032D	812	813	R/W*	0.01 to 10.00 times	1.00
Input 2_integral time adjusting factor	032E	032F	814	815	R/W*	0.01 to 10.00 times	1.00
Input 2_derivative time adjusting factor	0330	0331	816	817	R/W*	0.01 to 10.00 times	1.00
Input 1_intensity factor of Ramp/Soak stabilizer	0332	0333	818	819	R/W*	0.0 to 1.0 (0.0: Unused)	0.5
Input 2_intensity factor of Ramp/Soak stabilizer	0334	0335	820	821	R/W*	0.0 to 1.0 (0.0: Unused)	0.5
Input 1_AT differential gap	0336	0337	822	823	R/W*	Temperature input: 0 (0.0) to 100 (100.0) °C [°F] Voltage/Current input: 0.0 to 10.0 % of Input span	Temperature input: 1.0 Voltage/Current input: 0.1 of Input span
Input 2_AT differential gap	0338	0339	824	825	R/W*	Temperature input: 0 (0.0) to 100 (100.0) °C [°F] Voltage/Current input: 0.0 to 10.0 % of Input span	Temperature input: 1.0 Voltage/Current input: 0.1 of Input span

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

#### ● Parameter with specific data range

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_AT differential gap time	02C6	02C7	710	711	R/W*	0.00 to 100.0 seconds	0.00
Input 2_AT differential gap time	02CC	02CD	716	717	R/W*	0.00 to 100.0 seconds	0.00

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