

SRS10A Series (SRS11A/ SRS12A/SRS13A/SRS14A) Programming Function Instruction Manual

Thank you for purchasing a Shimaden Digital Controller. After making sure the product fits the desired description, you should carefully read the instructions and get a good understanding of the contents before attempting to operate the equipment.

Request

The instruction manual should be kept in a handy place where the end user can refer to it when necessary.

Preface

The manual is written for the programming function of the SRS10A Series.

The manual does not contain precautions for handling, mounting method, wiring, description of functions or operation method for the SRS10A Series. For information on those topics you should refer to the instruction manual (Detailed version). Be sure to observe all precautions and adhere to the procedures provided in the instruction manual (Detailed version).

SHIMADEN CO., LTD.

SRS10AP-1CE
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Contents

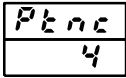
1. Before using the programming function.....3	7-1. EXECUTION STEP NO. MONITORING SCREEN (0-4 SCREEN) 7
1-1. NUMBER OF PATTERNS (4-56 SCREEN) - 3 -	7-2. REMAINING TIME OF STEP MONITORING SCREEN (0-5 SCREEN) 7
1-2. TIME UNIT (4-57 SCREEN) - 3 -	7-3. NUMBER OF PATTERN EXECUTIONS MONITORING SCREEN (0-6 SCREEN) 7
1-3. SWITCHING TO PROGRAMMING FUNCTION (1-1 SCREEN) - 3 -	7-4. EXECUTION PID NO. MONITORING SCREEN (0-7 SCREEN) 7
2. Screen description and settings4	8. External control input (DI).....8
2-1. PARAMETER DIAGRAM 4	8-1. START PATTERN NO. 8
2-2. SCREEN GROUP 3: PROGRAM-RELATED SCREEN GROUP 5	8-2. HLD (HOLD) 8
3. Pattern information description and setting6	8-3. ADV (ADVANCE)..... 8
3-0. INITIAL SCREEN (3-0 SCREEN) 6	8-4. PROG (PROGRAM)..... 9
3-1. START SV SETTING SCREEN (3-1 SCREEN)..... 6	8-5. RUN/RST 9
3-2. END STEP SETTING SCREEN (3-2 SCREEN) 6	9. Events9
3-3 – 5. EVENT ACTION POINT SETTING SCREENS (3-3, 3-4, 3-5 SCREENS)..... 6	9-1. STEP SIGNAL (<i>StPS</i>)..... 9
3-6. NUMBER OF PATTERN EXECUTIONS SETTING SCREEN (3-6 SCREEN) 6	9-2. PATTERN SIGNAL (<i>PtnS</i>)..... 9
3-7. START MODE SETTING SCREEN (3-7 SCREEN) 6	9-3. PROGRAM END SIGNAL (<i>EndS</i>) 9
3-8. GUARANTEE SOAK ZONE SETTING SCREEN (3-8 SCREEN) 6	9-4. HOLD SIGNAL (<i>Hold</i>) 9
3-9. STEP INITIAL SCREEN (3-9 SCREEN)..... 6	9-5. PROGRAM SIGNAL (<i>Prog</i>)..... 9
4. Step information description and setting6	9-6. UP SLOPE SIGNAL (<i>u. Sl</i>) 9
4-1. STEP SV SETTING SCREEN (3-9-1 SCREEN) 6	9-7. DOWN SLOPE SIGNAL (<i>d. Sl</i>) 9
4-2. STEP TIME SETTING SCREEN (3-9-2 SCREEN)..... 6	9-8. GUARANTEE SOAK SIGNAL (<i>GUA</i>)..... 9
4-3. STEP PID NO. SETTING SCREEN (3-9-3 SCREEN) 6	10. Auto tuning (AT).....9
5. Start pattern setting and execution7	11. PV start 10
5-1. START PATTERN SETTING SCREEN (0-16 SCREEN) 7	11-1. CASES WHERE PV START DOES NOT FUNCTION 10
5-2. START/STOP EXECUTION (0-1 SCREEN) 7	11-2. CASES WHERE PV START FUNCTIONS AND SHORTENS TIME 10
6. HLD/ADV description and setting7	11-3. CASES WHERE PV START FUNCTIONS AND STEPS ARE OMITTED..... 10
6-1. HLD SETTING SCREEN (0-8 SCREEN) 7	12. Guarantee soak (GUA)..... 11
6-2. ADV SETTING SCREEN (0-9 SCREEN) 7	12-1. OFF..... 11
7. Monitoring screen description.....7	12-2. IF GUARANTEE SOAK ZONE IS SET 11

1. Before using the programming function

Set the following parameters before using the programming function.

1-1. Number of patterns (4-56 screen)

The number of patterns is set by screen group 4: Initialization setting screen group “4-56 Number of program patterns setting.”



Initial value: 4
Setting range: 1, 2, 4

Sets the number of patterns to be used.

The total number of steps that can be used is 32. The number of steps that can be used for each pattern differs according to the number of patterns set.

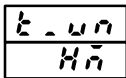
Number of patterns	Pattern No.	Number of steps	Total number of steps
1	1	1 - 32	32
2	1	1 - 16	32
	2	1 - 16	
4	1	1 - 8	32
	2	1 - 8	
	3	1 - 8	
	4	1 - 8	

* Settings cannot be modified while the program is running.

You should also note that if any setting is modified, all program-related parameters are initialized.

1-2. Time unit (4-57 screen)

The unit is set by screen group 4: Initialization setting screen group “4-57 Program time unit setting.”



Initial value: HM
Setting range: HM, MS

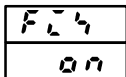
Time unit sets the time unit for step time.

Time unit	Time	Setting range
H n	Hr, min	From 00 hrs, 00 min to 99 hrs, 59 min
n s	Min, sec	From 00 min, 00 sec to 99 min, 59 sec

* Settings cannot be modified while the program is running.

1-3. Switching to programming function (1-1 screen)

The programming function is switched to by screen group 1: FIX setting screen group “1-1 FIX control ON/OFF switching screen.”



Initial value: ON
Setting range: ON, OFF

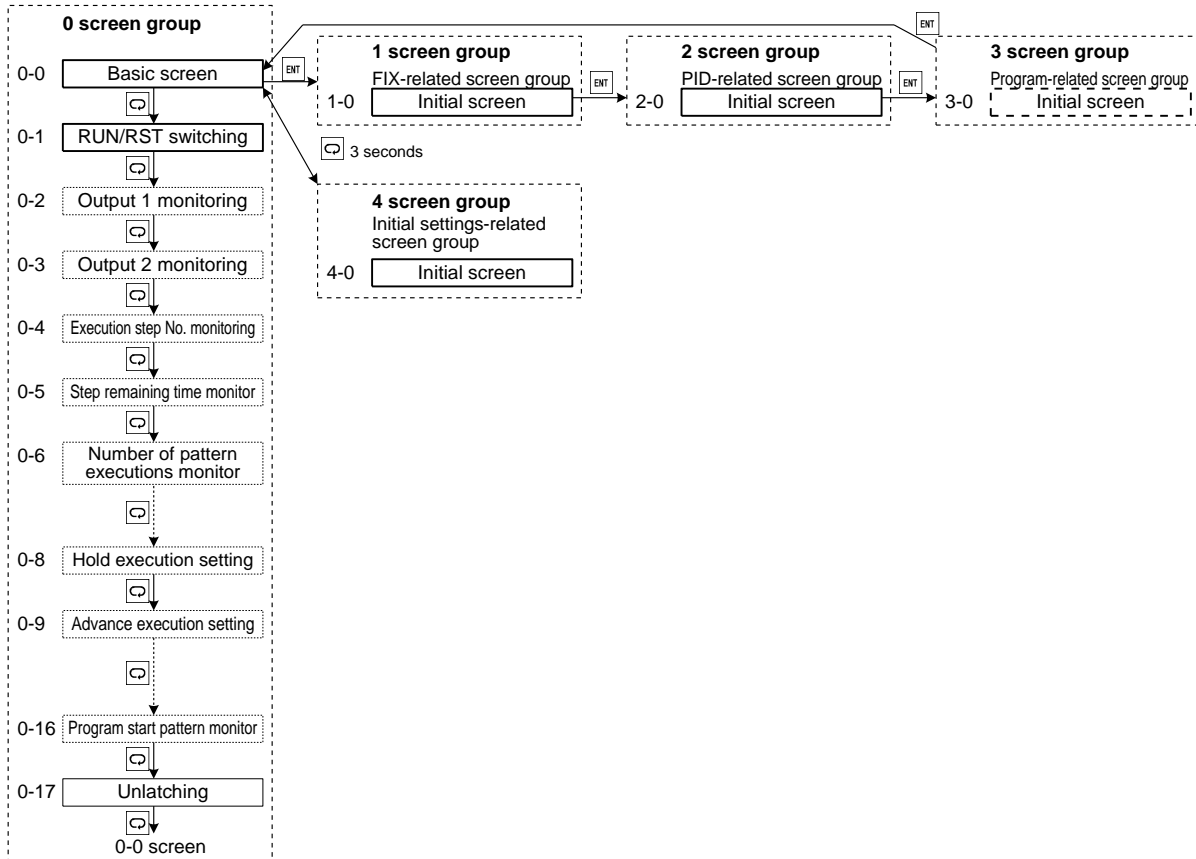
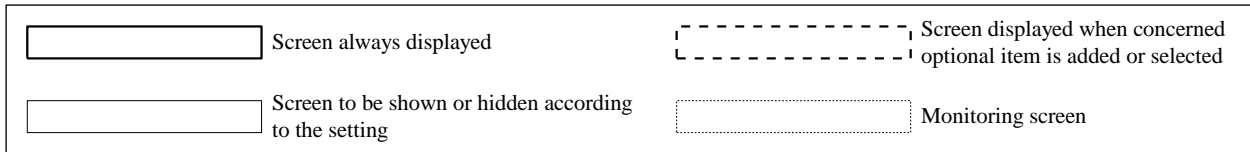
If FIX is set to OFF, operation switches to programming function. If PROG is allocated to DI, keys cannot be operated.

When switching FIX ⇔ PROG, execution or standby status continues.

2. Screen description and settings

2-1. Parameter diagram

Note: The windows of the various screens are divided as follows. The number on the left side of the window is the screen No.



Note 1: Mutual transfer among screen group 0, screen group 1, screen group 2 and screen group 3 is accomplished by pressing the **ENT** key on the basic screen of screen group 0, and initial screen of screen group 1, screen group 2 and screen group 3 respectively.

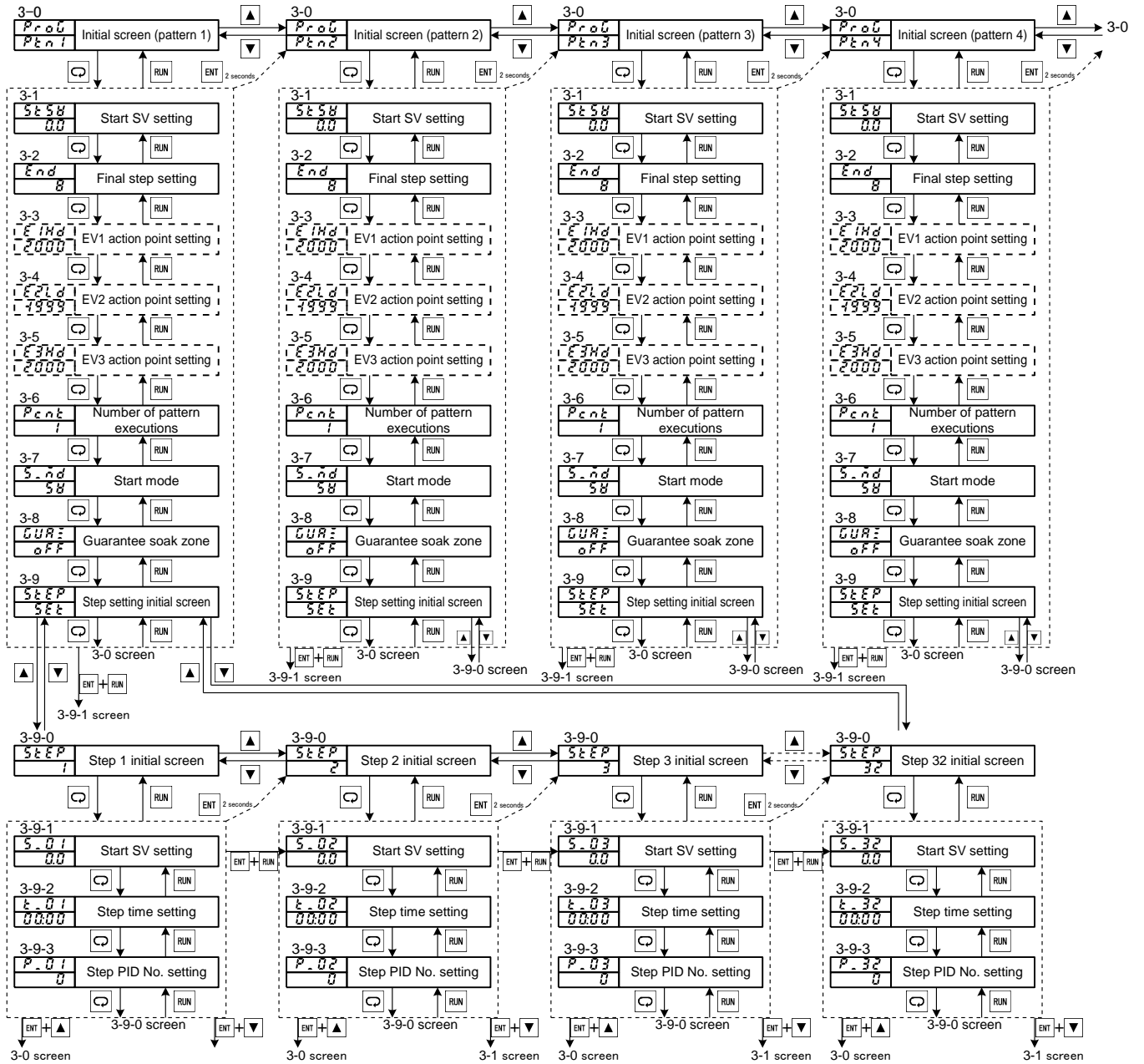
Note 2: For transfer between screen group 0 and screen group 4, pressing and holding the **☞** key on the basic screen of screen group 0 for at least 3 seconds switches to the initial screen of screen group 4, and pressing and holding the **☞** key on the initial screen of screen group 4 for at least 3 seconds switches to the basic screen of screen group 0.

Note 3: Pressing the **☞** key switches to the next screen for all screen groups and pressing the **☞** key on the final screen in the screen group returns to the initial screen.

Note 4: Screen group 3 has patterns 1-4. The number of patterns is decided by the number of patterns setting. (The number of patterns is set on the 4-56 screen. The initial value is “4.”)
There are steps 1 - 32. The number of steps is decided by the number of steps setting. (The number of steps is set on the 3-2 screen. The initial value is “8.”)

Note 5: You can transfer among screen group 3 (program-related) as described on the following page. For transferring in other screen groups, see the standard instruction manual (Detailed version).

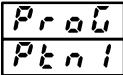
2-2. Screen group 3: program-related screen group



Note 1: This screen group is displayed only when the program option is selected.

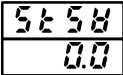
3. Pattern information description and setting

3-0. Initial screen (3-0 screen)

 ▲ : To pattern 2 initial screen (if there are multiple patterns)
▼ : To pattern 4 initial screen (if there are 4 patterns)
ENT : To basic screen

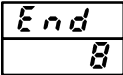
Select the pattern No. to be set.
Pattern No. that can be selected differs according to number of patterns set.

3-1. Start SV setting screen (3-1 screen)

 Initial value: 0.0
Setting range: Within SV limiter

Sets temperature to start program.
If the SV limiter is altered and the SV limiter range is exceeded, the same value as the SV limiter value is set.

3-2. End step setting screen (3-2 screen)

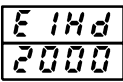
 Initial value: 8
Setting range: 1 – max. number of steps

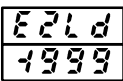
Sets number of steps used by program pattern.
The max. number of steps differs according to the number of patterns.


Number of patterns	Max. number of steps
1	32
2	16
4	8

If you change the setting to a number of steps that is less than the step No. currently being executed, the program quits or returns to the first step as soon as the step being executed is finished.

3-3 – 5. Event action point setting screens (3-3, 3-4, 3-5 screens)

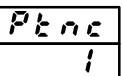
 Initial value: Higher limit deviation alarm (Hd): 2000
Lower limit deviation alarm (Ld): -1999
Outside higher/lower limit deviation alarm (od): 2000

 Inside higher/lower limit deviation alarm (id): 2000

 Higher limit absolute value alarm (HA):
Measurement range higher limit value
Lower limit absolute value alarm (LA):
Measurement range lower limit value
Setting range: higher/lower limit deviation alarm: -1999 – 2000
Outside/inside higher/lower limit deviation alarm: 0 – 2000
Higher/lower limit absolute value alarm:
Within measuring range

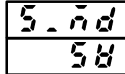
Displayed when alarm is allocated to target event code.
Event action point is set when program runs.
Not displayed when alarm is not allocated.

3-6. Number of pattern executions setting screen (3-6 screen)

 Initial value: 1
Setting range: 1 – 9999


Sets the number of target pattern executions.
If you set a number of pattern executions that is less than the number being executed while the program is running, the program quits after the last step is executed.

3-7. Start mode setting screen (3-7 screen)

 Initial value: SV
Setting range: SV, PV

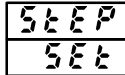
Sets start mode of program.
If set to SV, starts from start SV value; if set to PV, PV start function operates under certain conditions. This can eliminate wasted time. (See 11. PV start.)

3-8. Guarantee soak zone setting screen (3-8 screen)

 Initial value: OFF
Setting range: OFF, 1 – 999

Sets guarantee soak zone.
Guarantee soak does not function when set to OFF. (See 12. Guarantee soak zone.)

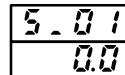
3-9. Step initial screen (3-9 screen)

 ▲ : To step 1 initial screen
▼ : To step 8 initial screen (if there are 8 steps)

Select the step No. to be set.
Number of steps that can be selected differs according to number of set at final step.

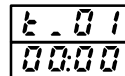
4. Step information description and setting

4-1. Step SV setting screen (3-9-1 screen)

 Initial value: 0.0
Setting range: Within SV limiter

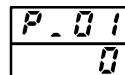
Sets SV value of target step.
Display changes from “S. 01” to “S. 32” according to target step. (Up to final step.)
If the SV limiter is altered and the SV limiter range is exceeded, the same value as the SV limiter value is set.

4-2. Step time setting screen (3-9-2 screen)

 Initial value: 00:00
Setting range: 00:00 – 99: 59

Sets the time of target steps.
Display changes from “t. 01” to “t. 32” according to target step. (Up to final step.)
Time unit is the unit set in “4-53 Time unit.”

4-3. Step PID No. setting screen (3-9-3 screen)

 Initial value: 0
Setting range: 0 – 3

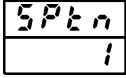
Sets the PID No. of target steps.
Display changes from “P. 01” to “P. 32” according to target step. (Up to final step.)
If 0 is set, PID No. used for previous step is used.
If 0 is set for step 1, operates by PID No. 1.

5. Start pattern setting and execution

Setting of pattern number for execution and execution methods are as follows. In addition, same operation can be conducted for DI. For details, see “8. External control output (DI).”

5-1. Start pattern setting screen (0-16 screen)

Start pattern setting screen is set by screen group 0 “0-16 Program start pattern monitor.”



Initial value: 1
Setting range: 1 – Number of patterns (max. 4)

Set the pattern No. to use.

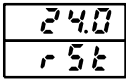
If the DI option is mounted, the start pattern No. can be set for the DI function.

Key operations are not possible on the screen if set to DI.

* Settings cannot be modified when executing program.

5-2. Start/stop execution (0-1 screen)

Start/stop execution is set by screen group 0 “0-1 standby action setting screen” or by holding the “RUN/RST” key for 2 seconds on “0-0 basic screen.”



Initial value: RST (FIX: EXE)
Setting range: RST/RUN (FIX: STBY/EXE)

Start or stop program execution.

It cannot be operated by key if assigned to the DI function.

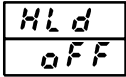
It will not execute if all the step times set on program start pattern monitor, are set to “00:00.”

6. HLD/ADV description and setting

6-1. HLD setting screen (0-8 screen)

HLD setting screen is set by screen group 0 “0-8 Program hold execution setting.”

Displayed when program is operated



Initial value: OFF
Setting range: OFF, ON

By setting HLD screen to ON, program execution is temporarily stopped. Only program execution time stops; control action does not stop.

It becomes fixed value control.

If equipped with DI option, you can set HLD function for DI function.

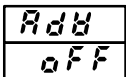
Key operations are not possible on the screen if set to DI.

When HLD is canceled, the time begins to run again.

6-2. ADV setting screen (0-9 screen)

ADV setting screen is set by screen group 0 “0-9 Advance execution setting.”

Displayed when program is operated



Initial value: OFF
Setting range: OFF/ON

By setting HLD screen to ON, you can quit the step currently being executed and move on to the next step.

If equipped with DI option, you can set ADV function for DI function.

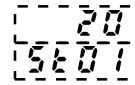
Key operations are not possible on the screen if set to DI.

When ADV action is completed, the display returns to OFF.

7. Monitoring screen description

Monitoring screens related to programming function are as follows. All belong to the 0 screen group.

7-1. Execution step No. monitoring screen (0-4 screen)

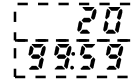


Displayed when program is operated
Top: PV value
Bottom: Execution step No.

Displays step No. currently being executed.

SV display section decimal point flashes during HLD.

7-2. Remaining time of step monitoring screen (0-5 screen)

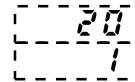


Displayed when program is operated
Top: PV value
Bottom: Remaining time of step

Displays remaining time of step currently being executed.

SV display section decimal point flashes during HLD.

7-3. Number of pattern executions monitoring screen (0-6 screen)

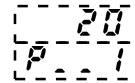


Displayed when program is operated
Top: PV value
Bottom: Number of pattern executions

Displays number of pattern executions currently being executed.

SV display section decimal point flashes during HLD.

7-4. Execution PID No. monitoring screen (0-7 screen)



Displayed only when in EXE (RUN)
Top: PV value
Bottom: Execution PID No.

Displays PID No. currently being executed.

SV display section decimal point flashes during HLD.

* SV display section decimal point flashes during HLD for basic screen as well.

8. External control input (DI)

DI functions related to programming function are as follows. For information concerning other functions, see the instruction manual (Detailed version).

8-1. Start pattern No.

Can be allocated to DI1/DI2.

Pt n3 : Start pattern 3 bit designation (DI1 only)

Pt n2 : Start pattern 2 bit designation

Designates pattern No. using specified number of bits.

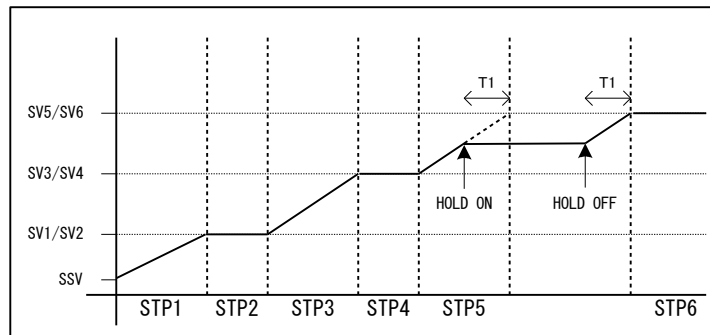
If the bit pattern of DI is modified while the program is running, the change is not applied to start pattern until the program finishes running.

DI code	Selected DI No.	Used DI NO.	DI3	DI2	DI1 input	Start pattern No.
<i>Pt n3</i>	DI1	DI1/DI2/DI3	0	0	0	1
			0	0	1	1
			0	1	0	2
			0	1	1	3
			1	0	0	4
			1	0	1 or more	4
<i>Pt n2</i>	DI1	DI1/DI2	0	0	1	1
			0	1	1	1
			1	0	2	
	DI2	DI2/DI3	1	1	1	3
			0	0	1	1
			0	1	1	1
			1	0	2	2
			1	1	1	3

8-2. HLD (Hold)

You can activate the HLD function by shorting DI. While shorted, time stops and SV value is fixed.

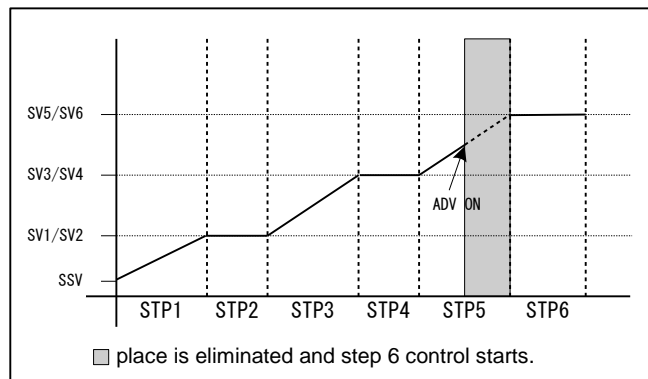
- ① During DI allocation, HLD operation cannot be conducted by key and communication.
- ② If HLD is activated, HLD is executed by start SV value for RUN execution.
- ③ If start SV value, step SV value, step time or step PID No. is modified during HLD, the change is not applied until HLD is canceled.
- ④ The decimal point of the SV display section flashes during HLD for the basic screen and program-related monitoring screen.



8-3. ADV (Advance)

You can activate the ADV function by shorting DI. The action is carried out once by shorting once. ADV cannot be executed during HLD. If shorted during HLD, the ADV function is ignored.

- ① The next step is executed as soon as ADV is input.
- ② Once ADV is executed, ADV input is invalid for approximately 2 seconds.
- ③ After the step is switched, ADV input is invalid for approximately 1 second.



8-4. PROG (Program)

By shorting DI, you can switch to program mode. Freeing DI switches to the FIX mode.

8-5. RUN/RST

You can switch between execution and reset by DI. You can select either RUN 1 or RUN 2.

- ① To allocate RUN1 (level)
 - Status is execute while DI is shorted.
 - If the program finishes running normally, status does not switch to execution unless DI is released and is shorted again.
 - If DI is shorted when power is applied, status switches to execution immediately after power is applied.
- ② To allocate RUN2 (edge)
 - Status switches between execution and reset each time DI is shorted.
 - If the program finishes running normally, status switches to execution when DI is shorted again.
 - If DI is shorted when power is applied, status does not switch to execution immediately after power is applied.

9. Events

Program-related event functions are as follows. For information concerning other alarms, see the standard instruction manual (Detailed version).

9-1. Step signal (STPS)

When the program is executed, a step signal is output for 1 second each time a step is completed.

9-2. Pattern signal (PTNS)

When the program is executed, a pattern signal is output for 1 second each time a pattern is completed.

9-3. Program end signal (ENDS)

A program complete signal is output for 1 second when program execution is complete.

9-4. Hold signal (HOLD)

When the program is executed, if the hold function is set to ON, a hold signal is output while ON.

9-5. Program signal (PROG)

A program signal is output while set to program mode.

9-6. Up slope signal (USL)

An up slope signal is output while up slope steps are executed while the program is running.

9-7. Down slope signal (DSL)

A down slope signal is output while down slope steps are executed while the program is running.

9-8. Guarantee soak signal (GUR)

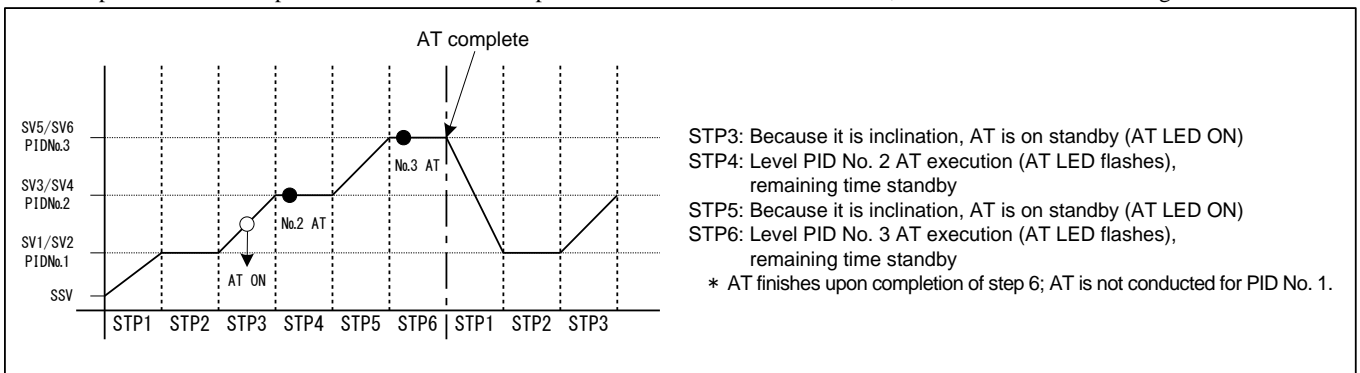
Output during program execution when guarantee soak is set.

10. Auto tuning (AT)

Auto tuning is conducted to find the most suitable PID value for conducting PID operation control. For details, see the standard instruction manual (Detailed version).

When in program mode, AT cannot be conducted during inclination step execution. This however does not include during hold action. Even if number of program executions is set to 2 or more, AT stops at the final step. Also, if AT is completed for all PID Nos. by the final step, AT finishes at that point.

Example: If the final step is set to 6 and number of pattern executions is set to 2 or more, action such as the following is carried out.



11. PV start

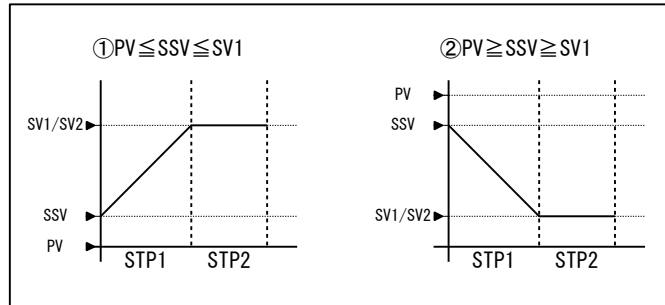
If the start SV value and PV value are separated with initial step of the program being inclination control, waste may be produced in action time.

To omit wasted time, you can start with the PV value as the start SV value.

You can use “3-7. Start mode” for setting to PV.

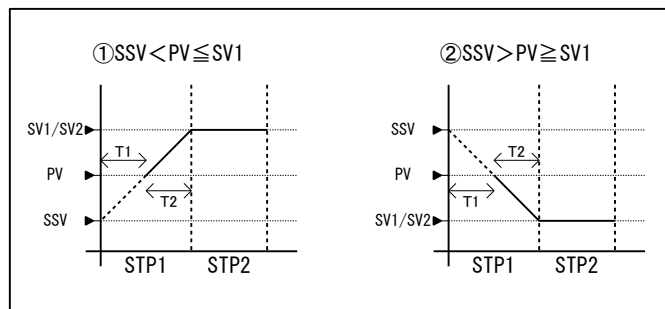
11-1. Cases where PV start does not function

If the PV value does not fit between the start SV value (SSV) and target step 1 SV value (SV1), the PV start function will not operate.



11-2. Cases where PV start functions and shortens time

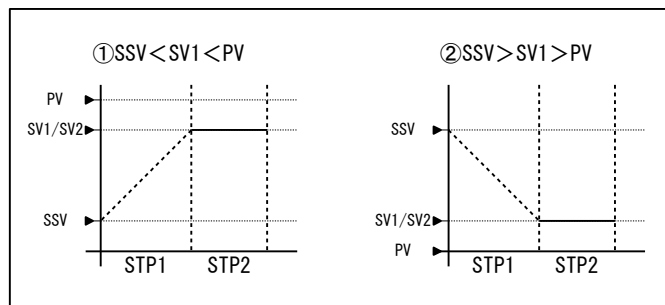
If the PV value fits between the start SV value (SSV) and target step 1 SV value (SV1), the PV start function operates and time is shortened.



T1: Shortened time PV start.
T2: Execution time

11-3. Cases where PV start functions and steps are omitted

If the PV value exists in a place that exceeds the step 1 SV value (SV1), the PV start function operates and step 1 is omitted.



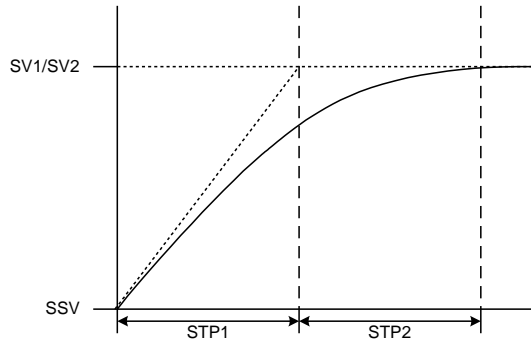
Proceeds to step 2 and step 1 is omitted.

12. Guarantee soak (GUA)

If PV is not in the specified guarantee soak zone (GUA zone) when switching from an inclination step to a level step, it does not shift to the next control step. It is only effective when shifting from an inclination step to a level step.

12-1. OFF

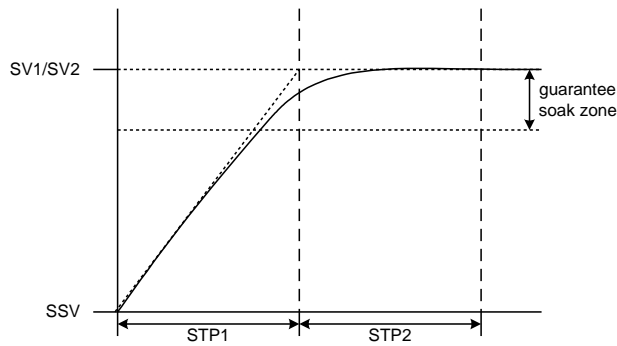
After step 1 time elapses, it shifts to step 2 even if PV has not yet reached SV1.



12-2. If guarantee soak zone is set

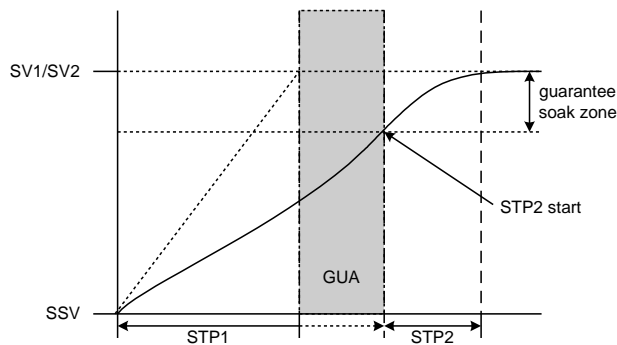
① If PV delay is small for SV inclination

After step 1 time elapses, it shifts to step 2 if it has reached the GUA zone.



② If PV delay is large for SV inclination

If the GUA zone has not yet been reached even though step 1 time has elapsed, guarantee soak is executed until it reaches the GUA zone.



* Guarantee soak is executed even if step 1 is level (SSV = SV1).

Even if 00:00 is set as step time, guarantee soak is executed if the conditions match.

During GUA, the decimal point of the 2 digits on the left of the PV display of the basic screen, execution step No. monitoring screen, monitoring remaining time of step monitoring screen, number of pattern executions monitoring screen and execution PID No. monitoring screen flashes.

The contents of this manual are subject to change without notice.

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