

SRS10 (SRS11/SRS13/SRS14) Series 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 (hereinafter referred to as "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 SRS10 Series.

The manual does not contain precautions for handling, mounting method, wiring, description of functions or operation method for the SRS10 Series. For information on those topics you should refer to the standard instruction manual.

Be sure to observe all precautions and adhere to the procedures provided in the standard instruction manual.

SHIMADEN CO., LTD.

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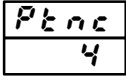
1. Before using the programming function

Set the following parameters before using the programming function.

1-1. number of patterns

The number of patterns is set by screen group 4:

Initialization setting screen group "4-52 Number of patterns."



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.

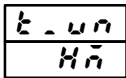
| Number of patterns | Pattern No. | Number of steps | Total number of steps |
|--------------------|-------------|-----------------|-----------------------|
| 1 | 1 | 1 - 32 | 32 |
| 2 | 1 | 1 - 16 | 32 |
| | 2 | 1 - 16 | |
| 4 | 1 | 1 - 8 | 32 |
| | 2 | 1 - 8 | |
| | 3 | 1 - 8 | |
| | 4 | 1 - 8 | |

* 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

Time unit is set by screen group 4: Initialization setting screen group "4-53 Time unit."



Initial value: HM
Setting range: HM, MS

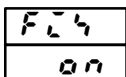
Time unit sets the time unit for step time.

| 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

The programming function is switched to by screen group 1: FIX setting screen group "1-1 FIX."



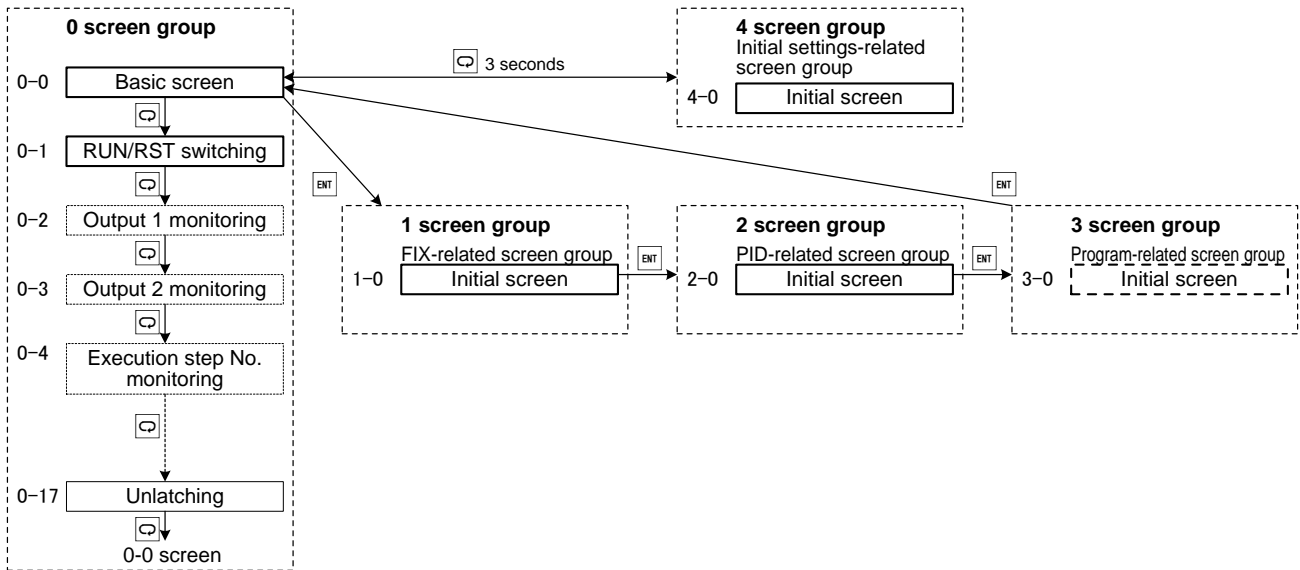
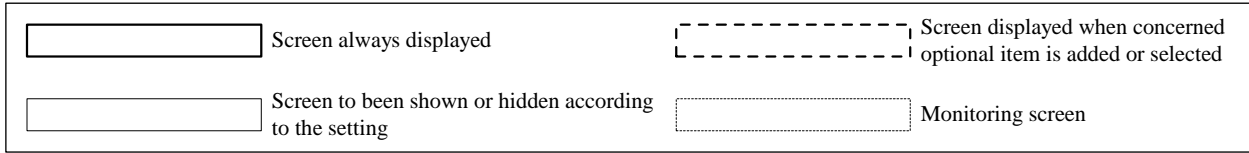
Initial value: ON
Setting range: ON, OFF


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



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 and screen group 3 is accomplished by pressing the  key on the basic screen of screen group 0, and initial screen of group 1 and screen group 3 respectively.

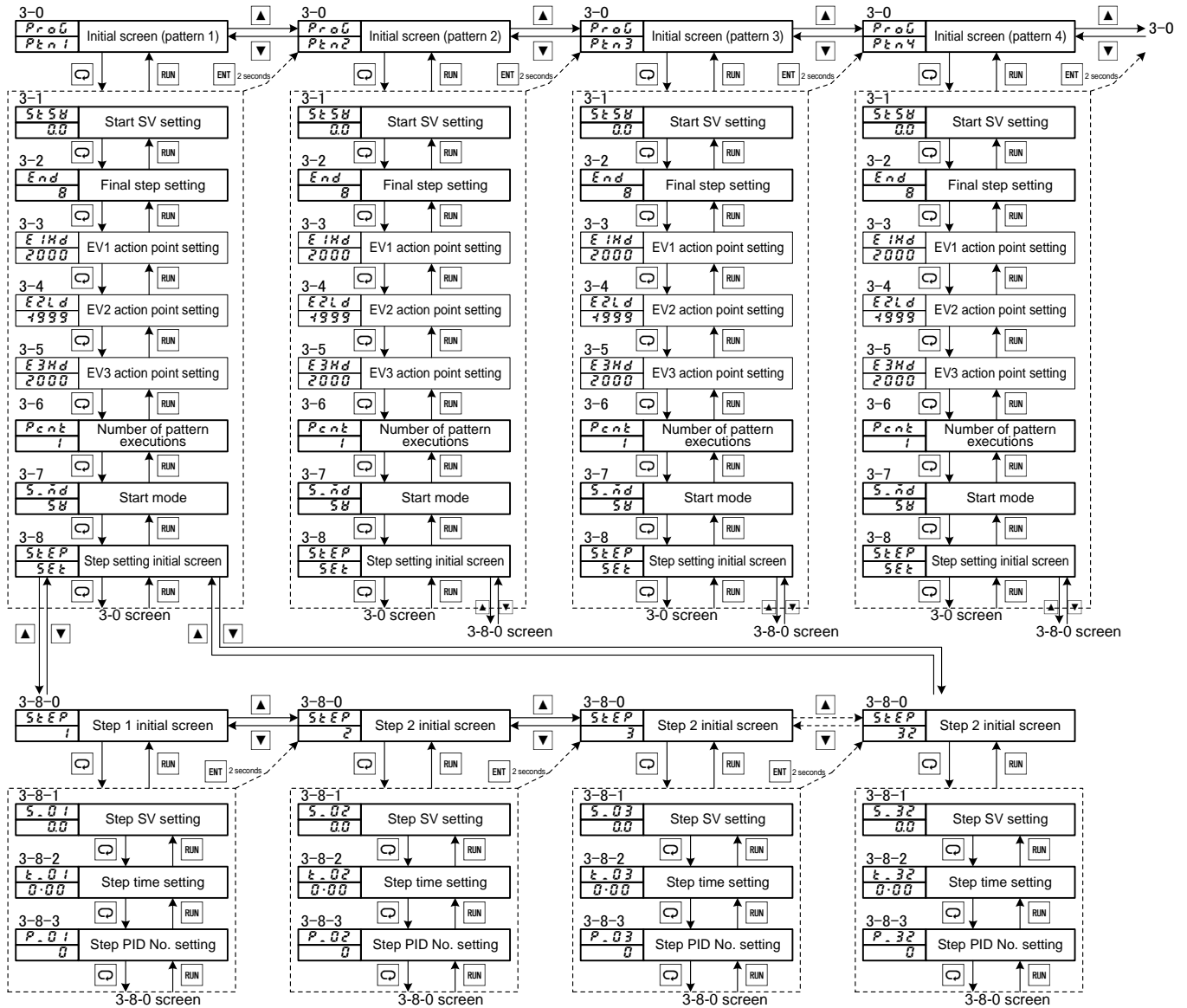
Note 2: For transfer between screen group 0 and screen group 4, pressing and holding the  key on the basic screen of screen group 0 for at least 3 seconds switches to the initial screen of screen group 4, and pressing and holding the  key on the initial screen of screen group 4 for at least 3 seconds 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 4-52 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.

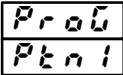
2-2. Screen group 3: program-related screen group



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

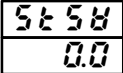
3. Pattern information description and setting

3-1. Initial 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

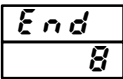
Select the pattern No. to be set.
 Pattern No. that can be selected differs according to number of patterns set.

3-2. Start SV setting 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, it is clipped to the SV limiter value.

3-3. End step setting screen

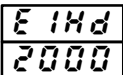
 Initial value: 8
 Setting range: 1 – max. number of steps

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 |

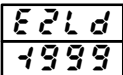
If you change the setting to a number of steps that is less than the step No. currently being executed, the program quits or returns to the first step as soon as the step being executed is finished.

3-4. Event 1 action point setting screen

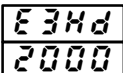
 Initial value: Higher limit deviation alarm (Hd): 2000
 Lower limit deviation alarm (Ld): -1999
 Outside higher/lower limit deviation alarm (od): 2000
 Inside higher/lower limit deviation alarm (id): 2000
 Higher limit absolute value alarm (HA): Measurement range higher limit value
 Lower limit absolute 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 if alarm is allocated to EV1; sets event action point during program action.
 Not displayed if alarm is not allocated to EV1.

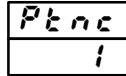
3-5. Event 2 action point setting screen

 Same as for event 1 action point.

3-6. Event 3 action point setting Screen

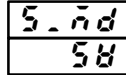
 Same as for event 1 action point.

3-7. Number of pattern executions setting screen

 Initial value: 1
 Setting range: 1 – 9999

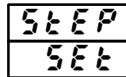
Sets the number of target pattern executions.
 If you set a number of pattern executions that is less than the number being executed while the program is running, the program quits after the last step is executed.

3-8. Start mode setting 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, starts from PV value if PV value is closer to SV value of step 1 than start SV value.
 This can eliminate wasted time.

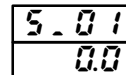
3-9. Step initial Screen

 : To step 1 initial screen
 : To step 8 initial screen (if there are 8 steps)
 [ENT] : To basic screen

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

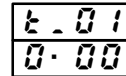
4. Step information description and setting

4-1. Step SV setting screen

 Initial value: 0.0
 Setting range: Within SV limiter

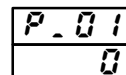
Sets SV value of target step.
 Display changes from “S.01” to “S.32” according to target step. (Up to final step.)
 If the SV limiter is altered and the SV limiter range is exceeded, it is clipped to the SV limiter value.

4-2. Step time setting screen

 Initial value: 00:00
 Setting range: 00:00:00 – 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

 Initial value: 0
 Setting range: 0 – 3

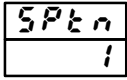
Sets the PID No. of target steps.
 Display changes from “P.01” to “P.32” according to target step. (Up to final step.)
 If 0 is set, PID No. used for previous step is used.
 If 0 is set for step 1, operates by PID No. 1.

5. Start pattern description and setting

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

Start pattern setting screen is set by screen group 0 "0-16 start pattern No."



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

Set the pattern No. to use.

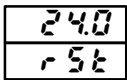
If the DI option is mounted, the start pattern No. can be set for the DI function.

Modifications cannot be made on the screen by keys in this case.

* Settings cannot be modified when executing program.

5-2. Start/stop execution

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/EXE (FIX: STBY/EXE)

Start or stop program execution.

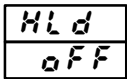
It cannot be operated if assigned to the DI function.

It will not execute if all the step times set on start pattern setting screen, are set to "00:00."

6. HLD/ADV description and setting

6-1. HLD setting screen

HLD setting screen is set by screen group 0 "0-8 HLD screen."



Initial value: oFF
Setting range: ON, OFF

By setting HLD screen to ON, program execution is temporarily stopped.

Only 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.

Modifications cannot be made on the screen by keys in this case.

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

6-2. ADV setting screen

ADV setting screen is set by screen group 0 "0-9 ADV screen."



Initial value: OFF
Setting range: ON/OFF

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.

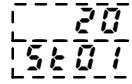
Modifications cannot be made on the screen by keys in this case.

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

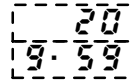


Top: PV value
Bottom: Execution step No.

Displays step No. currently being executed.

SV display section decimal point flashes during HLD.

7-2. Remaining time of step monitoring screen

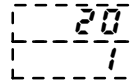


Top: PV value
Bottom: Remaining time of step

Displays remaining time of step currently being executed.

SV display section decimal point flashes during HLD.

7-3. Number of pattern executions monitoring screen

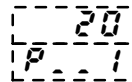


Top: PV value
Bottom: Number of pattern executions

Displays number of pattern executions currently being executed.

SV display section decimal point flashes during HLD.

7-4. Execution PID No. monitoring screen



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 standard instruction manual.

8-1. Start pattern No.

Can be allocated to DI1/DI2.

P t n 3 : Start pattern 3 bit designation (DI1 only)

P t n 2 : Start pattern 2 bit designation

Designates pattern No. using specified number of bits.

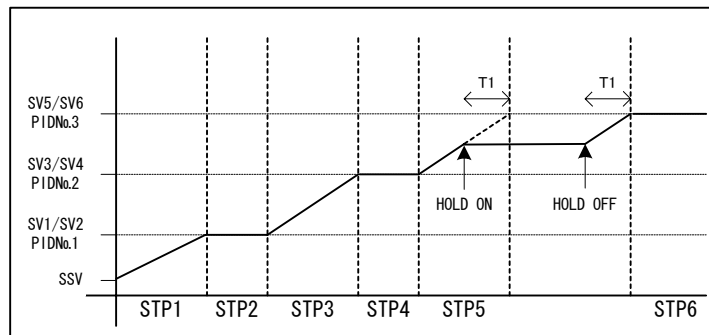
If the bit pattern of DI is modified while the program is running, the change is not applied to start pattern until the program finishes running.

| DI code | Selected DI No. | Used DI NO. | DI3 | DI2 | DI1 input | Start pattern No. | |
|----------------|-----------------|-------------|-----|-----|-----------|-------------------|---|
| <i>P t n 3</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>P t n 2</i> | DI1 | DI1/DI2 | 0 | 0 | | 1 | |
| | | | 0 | 1 | | 1 | |
| | | | 1 | 0 | | 2 | |
| | | | | 1 | 1 | | 3 |
| | DI2 | DI2/DI3 | 0 | 0 | | 1 | |
| | | | 0 | 1 | | 1 | |
| | | | 1 | 0 | | 2 | |
| 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.

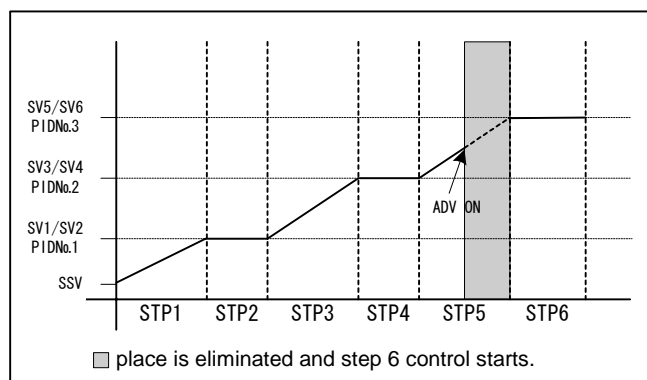
- ① During DI allocation, HLD operation cannot be conducted by key and communication.
- ② If HLD is activated, HLD is executed by start SV value for RUN execution.
- ③ If start SV value, step SV value, step time or step PID No. is modified during HLD, the change is not applied until HLD is canceled.
- 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.

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 complete 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 (u.SL)

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

9-7. Down slope signal (d.SL)

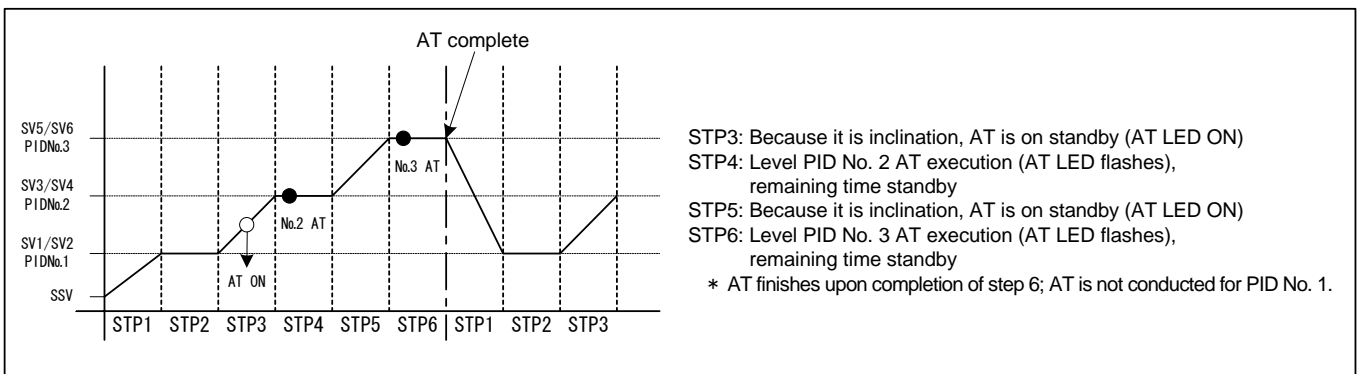
A down slope signal is output while down slope steps are executed while the program is running.

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.

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

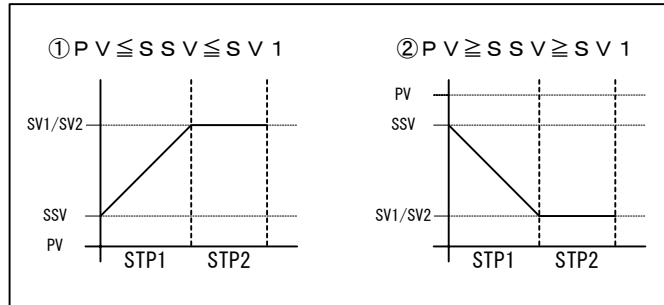
If the start SV value and PV value are separated with initial step of the program being inclination control, waste may be produced in action time.

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.

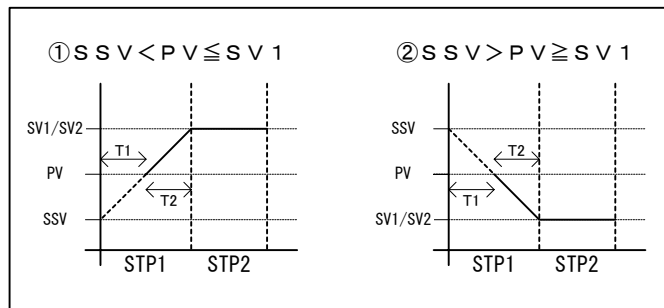
11-1. Cases where PV start does not function

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

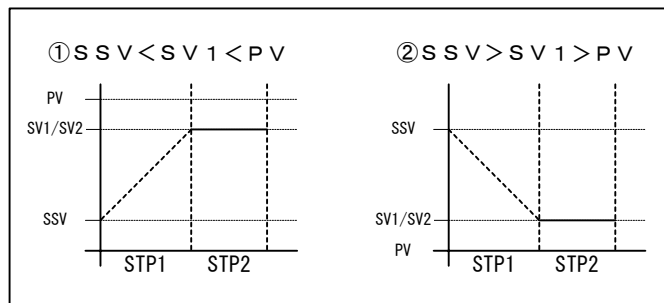
If the PV value fits between the start SV value (SSV) and target step 1 SV value (SV1), the PV start function operates and time is shortened.



T1: Shortened time PV start.
T2: Execution time

11-3. Cases where PV start functions and omits step 1

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.

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

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