User's
Manual

GREEN Series
User's Manual
- Detailed Instruction -

IM 05J01B02-01E

YOKOGAWA
Yokogawa Electric Corporation

IM 05J01B02-01E
5th Edition

GREEN Series
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CONTENTS

Ref.1.1: References Related to PV Input

IMPORTANT: Applicable models of this section

UP750	UP550	UP35□	UT750	UT5□□	UT4□0	UT3□□	UM3□□
UP750-□□	UP550-□□	UP35□-□□	UT750-□□	UT55□-□□ UT520-□□	UT450-□□ UT420-□□	UT35□-□□ UT32□-□□	None

Note: The functions discussed in this section apply to all the models of UT and UP series.
However, some of the functions are unavailable with certain models.
Such models, if any, will be clearly noted in each of the following items from (1) to (8).

These sections provide references related to PV input, such as PV correction, listed below.

Only read the following descriptions if necessary and carry out the required operation.

(1) Correcting the PV (1. Using PV input filter and PV input bias)
(2) Correcting the PV (2. Using ten-segment linearizer biasing or approximation)
(3) Square-root extraction of PV
(4) Changing the PV sampling period
(5) Checking that the changed PV sampling period is appropriate
(6) Correcting the input value from a sensor
(7) Using PV tracking function (UT only)
(8) PV input range adjustment (when the UT/UP mode No. is 6, 7 or 12 only)

Ref.1.1(1) Correcting the PV (1. Using PV input filter and PV input bias)

Filtering and biasing functions are available with all the UT/UP series models.

■ **PV input filtering can be used to remove noise from a PV input that contains high frequency noise, such as flow rate and pressure signals.**

The PV input filter provides first-order-lag computation.
Setting a larger time constant (as a parameter value) can increase the amount of noise removed.
This filtering is also used to improve controllability and for phase compensation.
The time constant of the PV filter is offered as an operating parameter and can be changed during operation.

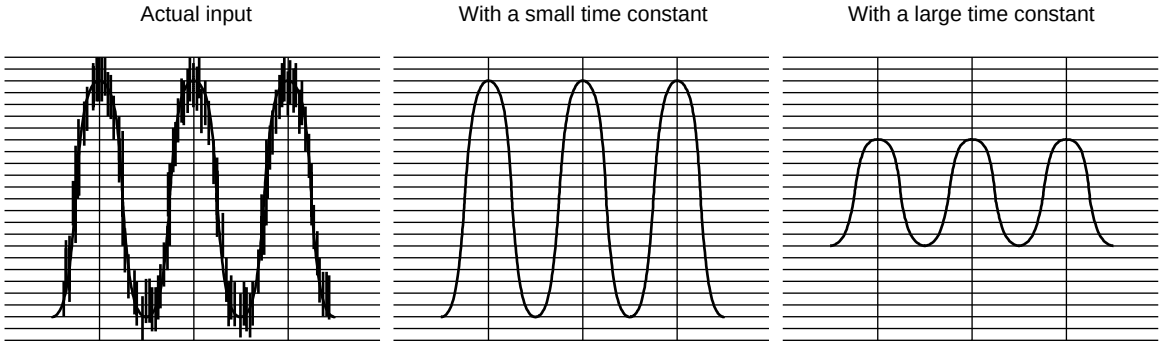


Fig. 1-1-1

■ PV input biasing adds a constant bias value to the PV input value, and the result is used for the controller display and control computation.

PV input value	+	PV input bias	=	PV value inside the controller

In some cases, the measured value is smaller than the actual value by a constant amount due to the physical circumstances at the sensor point.
For example, the ambient temperature inside a furnace is often measured instead of the material's temperature. In such cases, add a constant value for biasing.
When the PV value is within the allowable accuracy range but there is a dispersion in PV readings between other equipment, it is possible to use this function for fine adjustment.

● The following parameters are used.

• Operating parameters (Operation-related parameters): BS and FL

UP750 UP550 UT750 Code	UT5□□ UT4□0 Code	UP35□ UT3□□ Code	Description	Setting range	Default	D-register No.
BS	bS (BS)	bS (BS)	PV input bias	-100.0 to 100.0% of input range span	0.0% of input range span	243, 273(Note1)
FL	FL (FL)	FL (FL)	PV input filter	OFF or 1 to 120 s	OFF (No filtering)	244, 274(Note2)

Note1: For dual-loop control of UP750 and UT750, the D-register number of loop-2 BS is 273.
Note2: For dual-loop control of UP750 and UT750, the D-register number of loop-2 FL is 274.

To set the parameters, carry out the following steps.

■ For UP750, UP550, UT750, UT550, UT551, and UT520

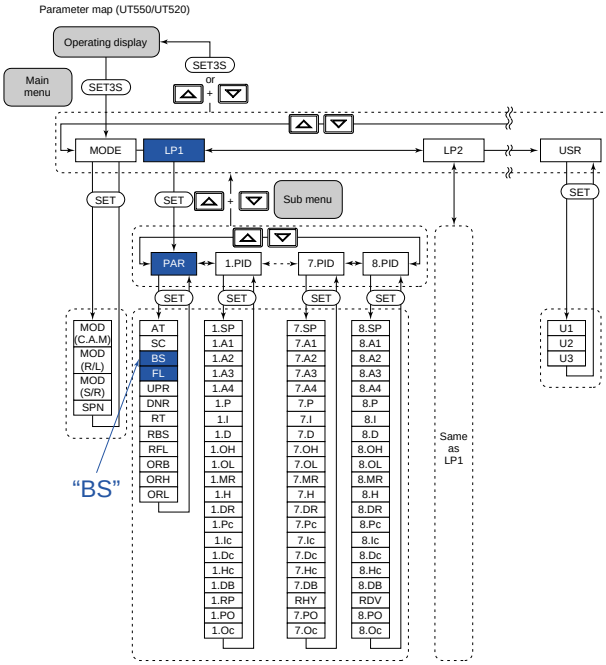
Here we explain how to display the parameter setting display and to change the parameter values. Before carrying out these operations be sure to refer to the User's Manuals Initial Settings and Parameter Map of the controller.
The parameter map is very helpful in finding the path to the setting display for a particular parameter.

1: Referring to the User's Manual above, display the operating parameter main menu [LP1] (Note1).
Then, display the submenu [PAR].

Note1: If the UP/UT mode has been set for using loop-2 or the secondary loop, also set the corresponding parameters under the main menu [LP2] in the same way.

2: Press the SET/ENT key 3 times* to display the PV input bias parameter BS.
* Depends on the controller mode.
Pressing the SET/ENT key one more time displays the PV input filter parameter FL.

3: In each of these parameter setting displays, adjust the parameter value using the ▲/▼ keys, then press the SET/ENT key to register it.



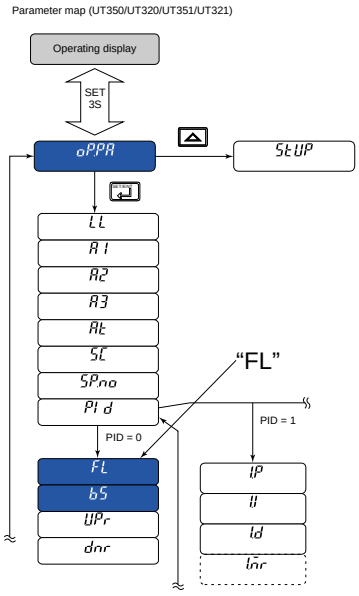
■ For UP35□, UT450, UT420, UT35□, and UT32□

Here we explain how to display the parameter setting display and to change the parameter values. Before carrying out these operations be sure to refer to the User's Manuals Initial Settings and Parameter Map of the controller.
The parameter map is very helpful in finding the path to the setting display for a particular parameter.

1: With the operating display shown, press and hold down the SET/ENT key for 3 seconds or longer to call up [oP.PA]. Then press the SET/ENT key repeatedly (Note) until the PV filter parameter FL appears.
Pressing the SET/ENT key one more time displays the PV input bias parameter BS.

Note: The number of times a SET/ENT key is pressed differs depending on the model of the controller. See the parameter map of your controller.

2: In each of these parameter setting displays, adjust the parameter value using the ▲ / ▼ keys, then press the SET/ENT key to register it.



<<Ref.1.1: References Related to PV Input>>

Ref.1.1(2) Correcting the PV (2.Using ten-segment linearizer biasing or approximation)

Ten-segment linearizer biasing and approximation are available with UP750, UP550, UT750, UT550, UT551, and UT520.

Whether to use the biasing or approximation function is specified by the parameter 1.PMD (Note), which is set to specify ten-segment linearizer biasing at the time of shipping.

As shown in the following “Operating parameters (Ten-segment linearizer input parameters)” table, the setting display of parameter 1.PMD is located after the ten-segment linearizer input 1 to 11 and ten-segment linearizer output 1 to 11.

Note:
- “1.PMD” is the parameter for UP750, UP550, and UT750.
- “1.MD” is the parameter for UT550, UT551 and UT520.
- “2.PMD” can also be used if the UP/UT mode is set for using loop-2 or the secondary loop.

→ For how to set the parameters required for the functions discussed here, see “■ Setting the Required Parameters” in the end of this subsection.

■ Ten-segment Linearizer Biasing

This function is used to correct an input signal affected by sensor deterioration. The corrected values (b) are obtained by adding the corresponding bias values to each of the 11 points of optionally set input values (a).
The input values used to configure the ten-segment linearizer are set with parameters 1.a1 to 1.a11 (Note). The bias values (b-axis) for each of the input values (a) are set with parameters 1.b1 to 1.b11 (Note).

Note:
- 1.a1 to 1.a11 and 1.b1 to 1.b11 are the parameters for UP750, UP550, and UT750.
- 1.A1 to 1.AB and 1.B1 to 1.BB are the parameters for UT550, UT551 and UT520.
- If the UP/UT mode is set for using loop-2 or the secondary loop, “2.a1 to 2.a11 and 2.b1 to 2.b11,” and “2.A1 to 2.AB and 2.B1 to 2.BB” can also be used.

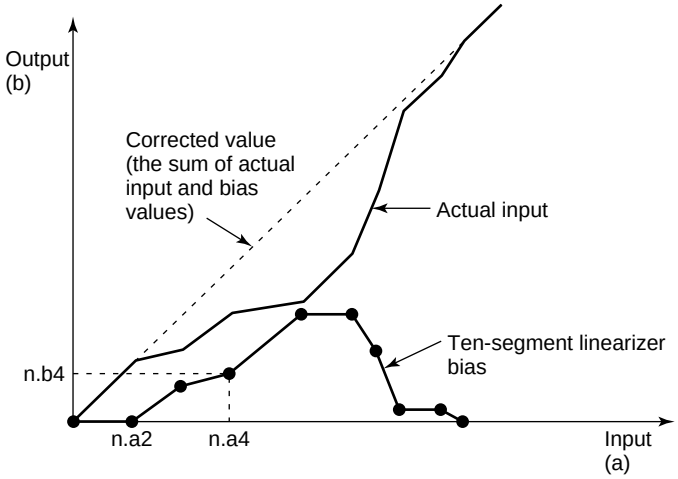


Fig. 1-1-2 Ten-segment Linearizer Biasing

■ Ten-segment Linearizer Approximation

This function is used when the input signal and the required measurement signal have a non-linear relationship. For example, when trying to obtain the volume from a sphere tank level.
As shown in the figure below, the output values (b) can be optionally set to 11 points of the optionally set input values (a).
The input values used to configure the ten-segment linearizer are set with parameters 1.a1 to 1.a11 (Note). The corrective values (b-axis) of ten-segment linearizer approximation for each of the input values (a) are set with parameters 1.b1 to 1.b11 (Note).

Note:
- 1.a1 to 1.a11 and 1.b1 to 1.b11 are the parameters for UP750, UP550, and UT750.
- 1.A1 to 1.AB and 1.B1 to 1.BB are the parameters for UT550, UT551 and UT520.
- If the UP/UT mode is set for using loop-2 or the secondary loop, “2.a1 to 2.a11 and 2.b1 to 2.b11” and “2.A1 to 2.AB and 2.B1 to 2.BB” can also be used.

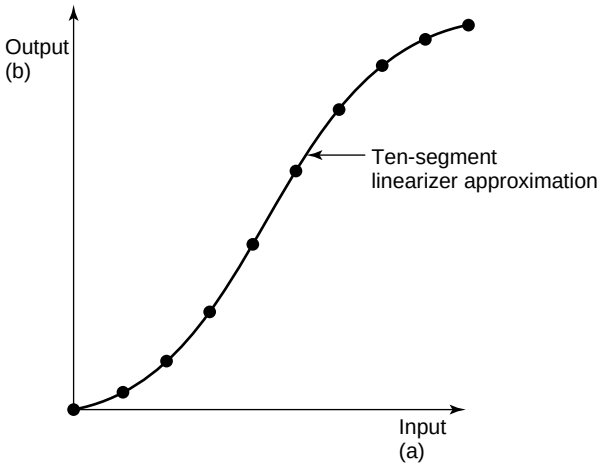


Fig. 1-1-3 Ten-segment Linearizer Approximation

● **The following parameters are used.**

• Operating parameters (Ten-segment Linealizer Parameters)

UP750 UP550 UT750 Code	UT5□□ Code	Description	Setting range	Default	D-register No.
1.a1	1A 1 (1.A1)	Ten-segment linearizer 1 input-1	-66.7% to 105.0% of PV input range	0.0% of PV input range	726
2.a1	2.A1 (for 2nd loop)	(Note 1)			751
1.b1	1b 1 (1.B1)	Ten-segment linearizer 1 output-1	-66.7% to 105.0% of PV input range span (Note 2)	0.0% of PV input range span (Note 2)	727
2.b1	2.B1 (for 2nd loop)	(Note 1)			752
1.a2	1A2 (1.A2)	Ten-segment linearizer 1 input-2	-66.7% to 105.0% of PV input range	0.0% of PV input range	728
2.a2	2.A2 (for 2nd loop)	(Note 1)			753
1.b2	1b2 (1.B2)	Ten-segment linearizer 1 output-2	-66.7% to 105.0% of PV input range span (Note 2)	0.0% of PV input range span (Note 2)	729
2.b2	2.B2 (for 2nd loop)	(Note 1)			754
1.a3	1A3 (1.A3)	Ten-segment linearizer 1 input-3	-66.7% to 105.0% of PV input range	0.0% of PV input range	730
2.a3	2.A3 (for 2nd loop)	(Note 1)			755
1.b3	1b3 (1.B3)	Ten-segment linearizer 1 output-3	-66.7% to 105.0% of PV input range span (Note 2)	0.0% of PV input range span (Note 2)	731
2.b3	2.B3 (for 2nd loop)	(Note 1)			756
1.a4	1A4 (1.A4)	Ten-segment linearizer 1 input-4	-66.7% to 105.0% of PV input range	0.0% of PV input range	732
2.a4	2.A4 (for 2nd loop)	(Note 1)			757
1.b4	1b4 (1.B4)	Ten-segment linearizer 1 output-4	-66.7% to 105.0% of PV input range span (Note 2)	0.0% of PV input range span (Note 2)	733
2.b4	2.B4 (for 2nd loop)	(Note 1)			758
1.a5	1A5 (1.A5)	Ten-segment linearizer 1 input-5	-66.7% to 105.0% of PV input range	0.0% of PV input range	734
2.a5	2.A5 (for 2nd loop)	(Note 1)			759
1.b5	1b5 (1.B5)	Ten-segment linearizer 1 output-5	-66.7% to 105.0% of PV input range span (Note 2)	0.0% of PV input range span (Note 2)	735
2.b5	2.B5 (for 2nd loop)	(Note 1)			760
1.a6	1A6 (1.A6)	Ten-segment linearizer 1 input-6	-66.7% to 105.0% of PV input range	0.0% of PV input range	736
2.a6	2.A6 (for 2nd loop)	(Note 1)			761
1.b6	1b6 (1.B6)	Ten-segment linearizer 1 output-6	-66.7% to 105.0% of PV input range span (Note 2)	0.0% of PV input range span (Note 2)	737
2.b6	2.B6 (for 2nd loop)	(Note 1)			762
1.a7	1A7 (1.A7)	Ten-segment linearizer 1 input-7	-66.7% to 105.0% of PV input range	0.0% of PV input range	738
2.a7	2.A1 (for 2nd loop)	(Note 1)			763
1.b7	1b7 (1.B7)	Ten-segment linearizer 1 output-7	-66.7% to 105.0% of PV input range span (Note 2)	0.0% of PV input range span (Note 2)	739
2.b7	2.B7 (for 2nd loop)	(Note 1)			764

UP750 UP550 UT750 Code	UT5□□ Code	Description	Setting range	Default	D-register No.
1.a8	1A8 (1.A8)	Ten-segment linearizer 1 input-8	-66.7% to 105.0% of PV input range	0.0% of PV input range	740
2.a8	2.A8 (for 2nd loop)	(Note 1)			765
1.b8	1b8 (1.B8)	Ten-segment linearizer 1 output-8	-66.7% to 105.0% of PV input range span (Note 2)	0.0% of PV input range span (Note 2)	741
2.b8	2.B8 (for 2nd loop)	(Note 1)			766
1.a9	1A9 (1.A9)	Ten-segment linearizer 1 input-9	-66.7% to 105.0% of PV input range	0.0% of PV input range	742
2.a9	2.A9 (for 2nd loop)	(Note 1)			767
1.b9	1b9 (1.B9)	Ten-segment linearizer 1 output-9	-66.7% to 105.0% of PV input range span (Note 2)	0.0% of PV input range span (Note 2)	743
2.b9	2.B9 (for 2nd loop)	(Note 1)			768
1.a10	1AA (1.AA)	Ten-segment linearizer 1 input-10	-66.7% to 105.0% of PV input range	0.0% of PV input range	744
2.a10	2.AA (for 2nd loop)	(Note 1)			769
1.b10	1bA (1.BA)	Ten-segment linearizer 1 output-10	-66.7% to 105.0% of PV input range span (Note 2)	0.0% of PV input range span (Note 2)	745
2.b10	2.BA (for 2nd loop)	(Note 1)			770
1.a11	1Ab (1.AB)	Ten-segment linearizer 1 input-11	-66.7% to 105.0% of PV input range	0.0% of PV input range	746
2.a11	2.AB (for 2nd loop)	(Note 1)			771
1.b11	1bb (1.BB)	Ten-segment linearizer 1 output-11	-66.7% to 105.0% of PV input range span (Note 2)	0.0% of PV input range span (Note 2)	747
2.b11	2.BB (for 2nd loop)	(Note 1)			772
1.PMD	1Md (1.MD)	Ten-segment linearizer 1 mode	0:Ten-segment linearizer biasing 1:Ten-segment linearizer approximation (Note 2)	0:Ten-segment linearizer biasing	748
2.PMD	2.MD (for 2nd loop)	(Note 1)			773

Note1: These parameters are used for loop-2 when the UP/UT mode is set for using loop-2 or the secondary loop.
Note2: As shown in the table, at the time of shipping, the ten-segment linearizer mode parameter (1.PMD and others) is set to 0, which selects biasing. In this mode, the ten-segment linearizer output parameters are bias values; therefore, their setting ranges at the time of shipping are -66.7 to 105.0% of measurement range span.
If the ten-segment linearizer mode is changed to 1, which selects approximation, the setting ranges of ten-segment linearizer output parameters will be -66.7 to 105.0% of the PV input range (corrective values for approximation).

■ Setting the Required Parameters

To set the parameters, carry out the following steps.

Here we explain how to display the parameter setting display and to change the parameter values. Before carrying out these operations be sure to refer to the User's Manuals Initial Settings and Parameter Map of the controller. The parameter map is very helpful in finding the path to the setting display for a particular parameter.

1: Referring to the User's Manuals above, display the operating parameter main menu [PSY1] (Note 1).

Note1: If the UP/UT mode has been set for using loop-2 or the secondary loop, also set the corresponding parameters under the main menu [PYS2] in the same way.

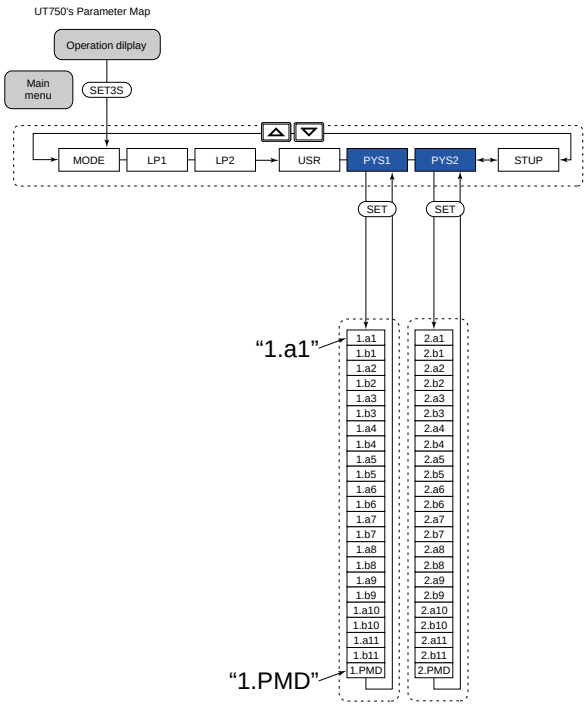
2: Press the SET/ENT key 23 times to display the parameter "1.PMD". (Note2)
And adjust the parameter value(0 or 1) using the ▲ / ▼ keys, then press the SET/ENT key to register it.

Note2: "1.PMD" is the parameter for UP750, UP550 and UT750.
"1.MD" is the parameter for UT550, UT551 and UT520.

3: Press the SET/ENT key once to display the parameter main menu [PYS1], and then press SET/ENT key again to display the parameter "1.a1" (Note3).

Note3: "1.a1" is the parameter for UP750,UP550 and UT750.
"1.A1" is the parameter for UT550, UT551 and UT520.

4: Thereafter, adjust the display value for each parameter in the order shown in the parameter table above, using the ▲ / ▼ keys then press the SET/ENT key to register them.



<<Ref.1.1: Reference Related to PV Input>>

Ref.1.1(3) Square-root extraction of PV

Square-root extraction is available with UP750, UP550, UT750, UT550, UT551 and UT520.

This calculation is used to convert, for example, a differential pressure signal from a throttling flow meter such as an orifice and nozzle into a flow-rate signal. A low signal cut off point can also be set.

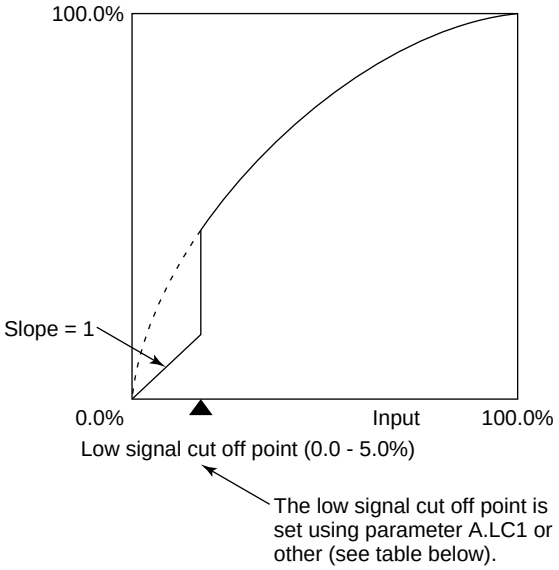


Fig. 1-1-4 Square-root Extraction

- **The following parameters are used.**
  - Setup parameters (Analog Input Computation Parameters)

UP750 UP550 UT750 Code	UT5□□ Code	Description	Setting range	Default	D-register No.
A.SR1	Sr 1 (SR1)	Analog input-1 spuare-root computation	OFF or ON (ON: Compute the square root)	OFF	1003
A.LC1	LC 1 (LC1)	Analog input-1 low signal cutoff	0.0 to 5.0% of PV input range	1.0%	1004
A.SR2 (Note 1)	no function	Analog input-2 spuare-root computation	OFF or ON (ON: Compute the square root)	OFF	1007
A.LC2 (Note 1)	no function	Analog input-2 low signal cutoff	0.0 to 5.0% of PV input range	1.0%	1008
A.SR3 (Note 2)	Sr 3 (SR3)	Analog input-3 spuare-root computation	OFF or ON (ON: Compute the square root)	OFF	1011
A.LC3 (Note 2)	LC 3 (LC3)	Analog input-3 low signal cutoff	0.0 to 5.0% of PV input range	1.0%	1012

Note 1: These parameters are used for 2-loop type of UP750 or UT750. Not displayed for UP550, UT550, UT551 and UT520.
Note 2: These parameters can be used when the controller has Remote input function.

■ Setting the Required Parameters

To set the parameters, carry out the following steps.

Here we explain how to display the parameter setting display and to change the parameter values. Before carrying out these operations be sure to refer to the User's Manuals Initial Settings and Parameter Map of the controller. The parameter map is very helpful in finding the path to the setting display for a particular parameter.

1: Referring to the User's Manuals above, display the Setup parameter main menu [CMLP]. Then, display the submenu [AIN].

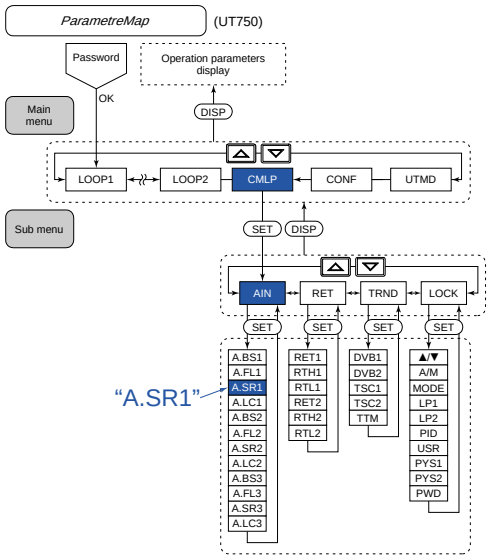
2: Press the SET/ENT key 3 times to display the parameter "A.SR1". (Note1)
When you use the "Spuare-root extraction of PV", set the parameter value to "ON" using the ▲ / ▼ keys, then press the SET/ENT key to register it.

Note1: "A.SR1" is the parameter for UP750, UP550 and UT750.
"SR1" is the parameter for UT550, UT551 and UT520.

3: Press the SET/ENT key once to display the parameter "A.LC1". (Note2)
Set the "Analog input-1 low signal cutoff" if necessary.

Note2: "A.LC1" is the parameter for UP750, UP550 and UT750.
"LC1" is the parameter for UT550, UT551 and UT520.

4: After the above operation, repeat the following operation if necessary.
- Display the parameter setting display which you want to set the value. (ex."A.LC2")
- Adjust the parameter value using the ▲ / ▼ keys, then press the SET/ENT key to register it.



TIP

Descriptions of other parameters that belong to submenu AIN, such as parameter A.FL1, are given in "Ref. 1.1 (6) Correcting the Input Value from a Sensor" of this section. Refer to it as necessary.

<<Ref. 1.1: References Related to PV Input>>

Ref.1.1(4) Changing the PV sampling period

CAUTION

When the controller is shipped, the PV sampling period is already set to values suitable for implementing the model's functions and specifications. Therefore, under normal conditions, the default sampling period should be used with the controller and changing it to a shorter one may disable some of the controller's functions. The sampling period should only be changed if you fully understand the procedures described in the following section.

CAUTION

The response time in communication may be longer when change the PV sampling period shorter. In this case, reset the PV sampling period longer.

The PV sampling period can be changed with UP750, UP550, UT750, UT550, UT551 and UT520.

■ For UP750 and UP550 (Program Controllers)

The PV sampling period can be selected from 100 ms (the fastest), 200 ms, and 500 ms.
(The factory-set default is 200 ms.)

■ For UT750, UT550, UT551 and UT520 (Digital Indicating Controllers)

The PV sampling period can be selected from 50 ms (the fastest), 100 ms, 200 ms, and 500 ms.
(The factory-set default is 200 ms.)

The following tables show the limitations of controller functions for each value of the PV sampling period.

(1) UP750 (Program controller)

PV sampling period	Limitations of controller functions
100 ms (the fastest)	Possible with single-loop models (UP750-0□) when neither cascade control (UP mode = 4) nor custom computation function is used.
200 ms (factory-set default)	Possible with single-loop models (UP750-0□) when cascade control is used. Possible with single-loop models (UP750-0□) and dual-loop models (UP750-5□) when about less than 50 custom computation modules are used. ← "50" is given as a rough guide (Note).
500 ms	When 50 or more custom computation modules are used. ← "50" is given as a rough guide (Note).

Note: • To check that the selected PV sampling period is appropriate, use the setup parameter SMEC described later.
• Set the PV sampling period as 200ms when the "SUPER 2" function is used.
Set the PV sampling period as 500ms when the "SUPER 2" function is used in Cascade control, dual loop control or Temperature and Humidity control mode.

(2) UP550 (Program controller)

PV sampling period	Limitations of controller functions
100 ms (the fastest)	Possible when cascade control (UP mode = 4) is not used and also none of the following functions are used. ← This is given as a rough guide (Note). • SUPER function • Heating/cooling control • PV input computation • Deviation alarm • Sensor grounding alarm • Self-diagnostic alarm • FAIL output • SP rate-of-change limiter • Output rate-of-change limiter
200 ms (factory-set default)	When any of the functions prohibited (listed above) with a 100 ms sampling period are used. When Cascade control mode is used.
500 ms	Note

Note: • To check that the selected PV sampling period is appropriate, use the setup parameter SMEC described later.
• Set the PV sampling period as 200ms when the “SUPER 2” function is used.
Set the PV sampling period as 500ms when the “SUPER 2” function is used in Cascade control, dual loop control or Temperature and Humidity control mode.

(3) UT750 (Digital indicating controller)

PV sampling period	Limitations of controller functions
50 ms (the fastest)	Possible with UT750-00 (single-loop model with no optional specification) when single-loop control (UT mode = 1) is used and none of the following functions are used. ← This is given as a rough guide (Note). • SUPER function • Heating/cooling control • PV input computation • Deviation alarm • Sensor grounding alarm • Self-diagnostic alarm • FAIL output • SP rate-of-change limiter • Output rate-of-change limiter
100 ms	Possible with single-loop models (UT750-0□) when cascade control (UP mode = 4) is not used. Possible with position-proportional models (UT750-1□). ← This is given as a rough guide (Note).
200 ms (factory-set default)	Possible with single-loop models (UT750-0□) when cascade control is used. Possible with single-loop models (UT750-0□) and dual-loop models (UT750-5□) when about less than 50 custom computation modules are used. ← “50” is given as a rough guide (Note).
500 ms	When 50 or more custom computation modules are used. ← “50” is given as a rough guide (Note).

Note: • To check that the selected PV sampling period is appropriate, use the setup parameter SMEC described later.
• Set the PV sampling period as 200ms when the “SUPER 2” function is used.
Set the PV sampling period as 500ms when the “SUPER 2” function is used in Cascade control, dual loop control or Temperature and Humidity control mode.

(4) UT550, UT551, UT520 (Digital indicating controller)

PV sampling period	Limitations of controller functions
50 ms (the fastest)	Possible with UT5□□ (single-loop model with no optional specification) when single-loop control (UT mode = 1) is used and none of the following functions are used. ← This is given as a rough guide (Note). • SUPER function • Heating/cooling control • PV input computation • Deviation alarm • Sensor grounding alarm • Self-diagnostic alarm • FAIL output • SP rate-of-change limiter • Output rate-of-change limiter
100 ms	Possible when cascade control (UP mode = 4) is not used and any of the fumctions prohibited (listed above) with a 100ms sampling period are used.
200 ms (factory-set default)	When cascade control mode is used.
500 ms	Note

Note: • To check that the selected PV sampling period is appropriate, use the setup parameter SMC described later.
• Set the PV sampling period as 100ms when the “SUPER 2” function is used.
Set the PV sampling period as 200ms when the “SUPER 2” function is used in Cascade control.

● The following parameters are used

• Setup parameters (UP Mode/UT Mode parameters):SMP

UP750 UP550 UT750 Code	UT5□□ Code	Description	Setting range	Default	D-register No.
SMP	SMP (SMP)	PV sampling period settig	50 (Note1), 100, 200 or 500	200	1281(UP mode) (Note 2) 1181(UT mode) (Note 2)

Note 1: Only UT750, UT550, UT551 and UT520 can select “50ms”.
Note 2: The D-register No. of UP750, UP550 (UP mode) is 1281 and the No. of UT750, UT5□□ is 1181.

■ Setting the Required Parameters

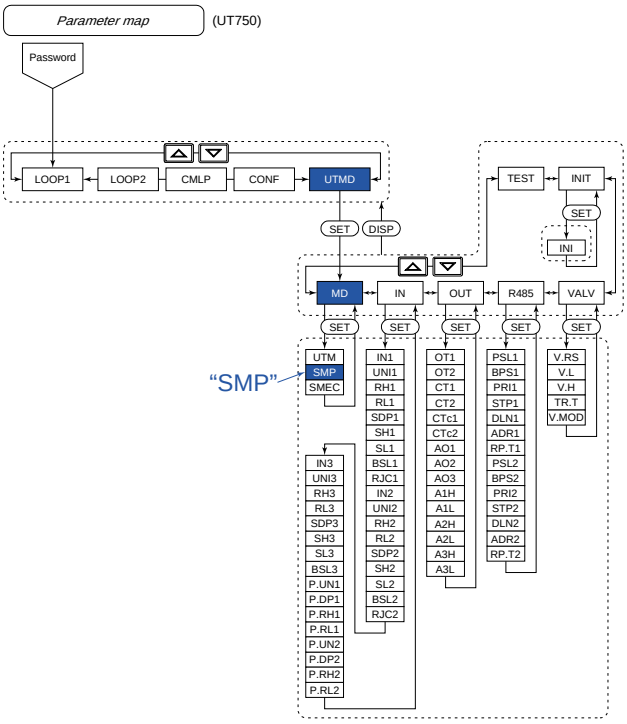
To set the parameters, carry out the following steps.

Here we explain how to display the parameter setting display and to change the parameter values. Before carrying out these operations be sure to refer to the User's Manuals Initial Settings and Parameter Map of the controller. The parameter map is very helpful in finding the path to the setting display for a particular parameter.

1: Referring to the User's Manual above, display the setup parameter main menu [UTMD].
Then, display the submenu [MD].

2: Press the SET/ENT key 2 times to display the parameter "SMP".

3: In the parameter setting displays, adjust the parameter value using the ▲/▼ keys, then press the SET/ENT key to register it.



<<Ref. 1.1: References Related to PV Input>>

Ref.1.1(5) Checking that the changed PV sampling period is appropriate

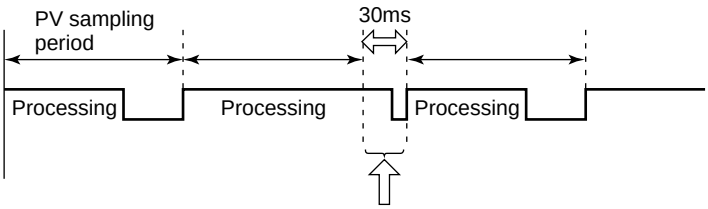
CAUTION

When you have changed the PV sampling period according to “Ref. 1.1 (4) Changing the PV sampling period” in this section, be sure to check that the new period is appropriate by referring to the following descriptions.

It is necessary to check the new period with UP750, UP550, UT750, UT550, UT551 and UT520 after the PV sampling period has been changed.

It is possible to check whether or not the currently set PV sampling period is appropriate for the controller to perform its required functions.
For example, with UT550, the PV sampling period can be selected from 4 periods as shown in Table 1-1-1.
However, some of the controller functions will be restricted under the use of each period.
Although these limitations are given as “Limitations of controller functions” in “Ref. 1.1 (4) Changing the PV sampling period”, they should be taken only as rough guides.
Therefore, you must check whether or not the period is appropriate before you use the controller.Carry out this check at the time of the operation test of the system that uses the controller.

This check is performed by monitoring the sampling error counter.
The counter value shows how many times the controller failed to process its operation at the current PV sampling period.(The controller increments the counter value by 1 per 10 ms of control period delay when it cannot execute all the processing within the specified period.)



This chart shows that processing cannot be executed within the specified sampling period.
In this example, the processing is delayed by 30 ms so the sampling error counter is incremented by 3.

Fig. 1-1-5 PV Sampling Period

If the counter value is not “0,” it means that some of the processing of the controller remains unprocessed.
For this reason, if an exact control is required, set the sampling period so that the counter value will not increase unless a long time has elapsed.
If the counter value increases in a short period of time, change the sampling period to a larger value.
You can monitor the counter value through the display of setup parameter SMEC (or SMC for UT5□□) as shown in the following.

Table 1-1-1

PV sampling period	Limitations of UT750 functions
50 ms (the fastest)	Possible with UT750-00 (single-loop model with no optional specification) when single-loop control (UT mode = 1) is used and none of the following functions are used. ← This is given as a rough guide (Note). • SUPER function • Heating/cooling control • PV input computation • Deviation alarm • Sensor grounding alarm • Self-diagnostic alarm • FAIL output • SP rate-of-change limiter • Output rate-of-change limiter
100 ms	Possible with single-loop models (UT750-0□) when cascade control (UP mode = 4) is not used. Possible with position-proportional models (UT750-1□). ← This is given as a rough guide (Note).
200 ms (factory-set default)	Possible with single-loop models (UT750-0□) when cascade control is used. Possible with single-loop models (UT750-0□) and dual-loop models (UT750-5□) when about less than 50 custom computation modules are used. ← "50" is given as a rough guide (Note).
500 ms	When 50 or more custom computation modules are used. ← "50" is given as a rough guide (Note).

Note: • To check that the selected PV sampling period is appropriate, use the setup parameter SMEC described later.
• Set the PV sampling period as 200ms when the "SUPER 2" function is used.
Set the PV sampling period as 500ms when the "SUPER 2" function is used in Cascade control, dual loop control or Temperature and Humidity control mode.

● The following parameters are used.

• Setup parameters (UP Mode / UT Mode Parameters): SMEC (SMC)

UP750 UP550 UT750 Code	UT5□□ Code	Description	Setting range	Default	D-register No.
SMEC	SnC (SMC)	Sampling period error counter	0 to 30000 (Note)	0 (Note)	32

Note: Since parameter SMEC is display only, it has no setting range.
When the controller is powered on for the first time, the error counter value is 0. The counter value displayed can increase up to 30000 as errors occur. Turning the power off resets the counter value to 0.

■ Setting the Required Parameters

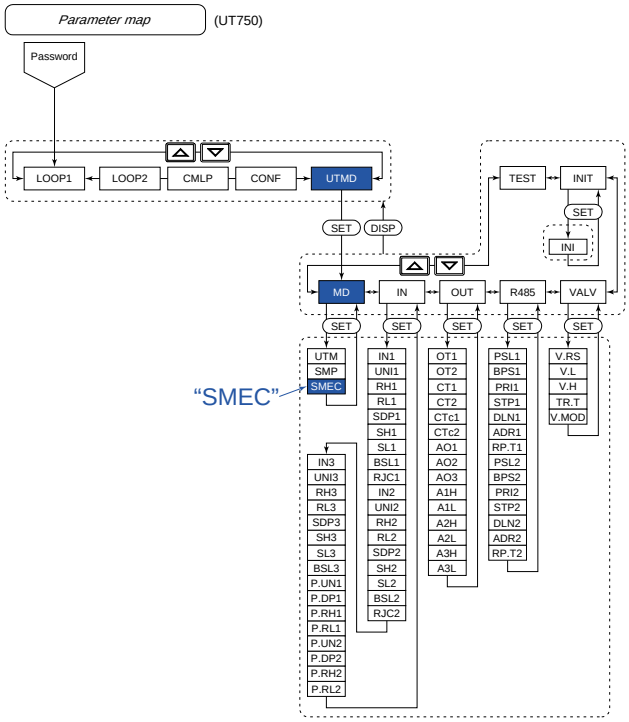
To check that the selected PV sampling period is appropriate.

Here we explain how to display the parameter setting display and to change the parameter values. Before carrying out these operations be sure to refer to the User's Manuals Initial Settings and Parameter Map of the controller. The parameter map is very helpful in finding the path to the setting display for a particular parameter.

1: Referring to the User's Manual above, display the setup parameter main menu [UTMD].
Then, display the submenu [MD].

2: Press the ENTER key 3 times to display the parameter "SMEC", and check the counter value.

Note1: "SMC" is the parameter for UT550, UT551 and UT520.



<<Ref. 1.1: References Related to PV Input>>

Ref.1.1(6) Correcting the input value from a sensor

CAUTION

The “analog input bias” and “analog input filter” described here are similar to the functions described in “Ref. 1.1 (1) Correcting the PV (1. Using PV filter and PV bias)” of this section.
To use the PV filter and PV bias, operating parameters FL and BS are used. As they are operating parameters, their settings can be changed during operation. Therefore, it is recommended that under normal circumstances you use FL and BS.
As for “analog input bias” and “analog input filter,” read the following description and only set them if necessary.

Sensor input value correction is available with UP750, UP550, UT750, UT550, UT551 and UT520.

Analog input bias is used to correct sensor-input characteristics, compensating lead wire errors, and so on. Normally, the PV biasing (BS) is convenient as mentioned in the CAUTION above, however, use the analog input bias (A.BS) in cases where a constant correction is required due to sensor deterioration or for other reasons. Since this biasing is set using a setup parameter, it is suitable for input correction where once the parameter is set, it will not be changed for a long time.

The analog input filter is used to remove noise from a PV input signal that contains high frequency noise such as flow rate and pressure signals.
This filter provides a first-order-lag calculation, which can remove more noise the larger the time constant becomes (see the figure below).
However, an excessively large time constant will distort the waveform. (See the figure below)
As mentioned in the CAUTION above, a similar effect can be obtained by using the PV filter (FL).
However, an analog input filter should be used in the cases where a constant level of correction is required, such as in an environment that contains a lot of noise.

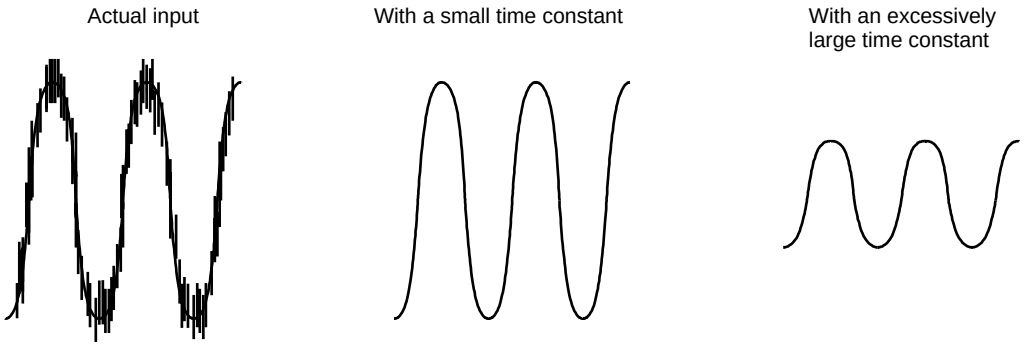


Fig. 1-1-6 Image of PV Input Correction by Analog Input Filter

● **The following parameters are used.**

• Setup parameters (Analog Input Computation Parameters) : A.BS1, A.FL1, etc.

UP750 UP550 UT750 Code	UT5□□ Code	Description	Setting range	Default	D-register No.
A.BS1	bS1 (BS1)	Analog input 1 bias	-100.0% to 100.0% of input range span	0.0% of input range span	1001
A.FL1	FL1 (FL1)	Analog input 1 filter	OFF or 1 to 120 (sec)	OFF (no filter)	1002
A.BS2 (Note1)	no function	Analog input 2 bias	-100.0% to 100.0% of input range span	0.0% of input range span	1005
A.FL2 (Note1)	no function	Analog input 2 filter	OFF or 1 to 120 (sec)	OFF (no filter)	1006
A.BS3 (Note2)	bS3 (BS3)	Analog input 3 bias	-100.0% to 100.0% of input range span	0.0% of input range span	1009
A.FL3 (Note2)	FL3 (FL3)	Analog input 3 filter	OFF or 1 to 120 (sec)	OFF (no filter)	1010

Note 1: These parameters are used for 2-loop type of UP750 or UT750. Not displayed for UP550, UT550, UT551 and UT520.
Note 2: These parameters can be used when the controller has Remote input function.

■ Setting the Required Parameters

To set the parameters, carry out the following steps.

Here we explain how to display the parameter setting display and to change the parameter values. Before carrying out these operations be sure to refer to the User's Manuals Initial Settings and Parameter Map of the controller. The parameter map is very helpful in finding the path to the setting display for a particular parameter.

1: Referring to the User's Manual above, display the setup parameter main menu [CMLP].
Then, display the submenu [AIN].

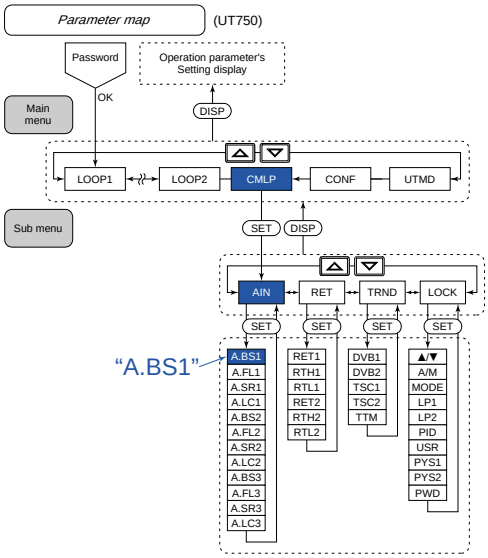
2: Press the SET/ENT key once to display the parameter "A.BS1". (Note1)
Adjust the parameter value using the ▲ / ▼ keys, then press the SET/ENT key to register it.

Note1: "A.BS1" is the parameter for UP750,UP550 and UT750.
"BS1" is the parameter for UT550, UT551 and UT520.

3 : Press the SET/ENT key once to display the parameter "A.FL1". (Note2)
Set the "Analog input-1 filter" if necessary.

Note2: "A.FL1" is the parameter for UP750,UP550 and UT750.
"FL1" is the parameter for UT550, UT551 and UT520.

4: After the above operation, repeat the following operation if necessary.
- Display the parameter setting display which you want to set the value. (ex."A.BS2")
- Adjust the parameter value using the ▲ / ▼ keys, then press the SET/ENT key to register it.



TIP

Descriptions of other parameters that belong to submenu AIN, such as parameter A.SR1, are given in "Ref. 1.1 (3) Square-root extraction of PV" of this section. Refer to it as necessary.

<<Ref. 1.1: References Related to PV Input>>
Ref.1.1(7) Using PV tracking function (UT only)

The PV tracking function is available with UT750, UT550, UT551. UT520, UT450, and UT420.

PV tracking is used to prevent a sudden change in PV.

Note: As shown below, PV tracking is turned OFF at the time of shipment. Turn it ON if necessary.

When PV tracking is ON, the controller sets the SP equal to PV temporarily in the event of the following:

- Power-on
- Switching from MAN to AUTO mode
- Switching from STOP to RUN
- Switching the number of setpoint (SP No.)

After SP is equalized to PV, the SP is gradually changed toward the original SP value at a constant rate-of-change (for ramp rate; see the CAUTION below and the following Fig. 1-1-7).

CAUTION

The SP rate-of-change (ramp rate) is set using parameter UPR and/or DNR, which is set to OFF at the time of shipment. To use PV tracking, you must set parameter UPR and/or DNR to a desired ramp rate value.
→ See “Ref.4.1(4) Changing SP at a ramp rate when SP is switched” in Ref. 4-1: References Related to Target Setpoint (SP).
With these parameters OFF, which specifies no ramp rate (ramp rate = 0), PV tracking will not operate.

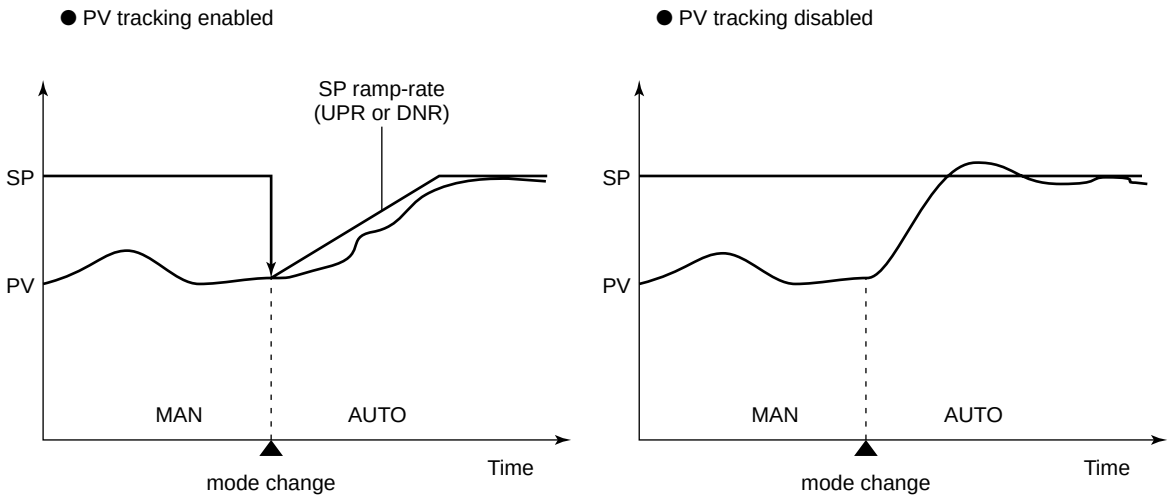


Fig. 1-1-7 PV tracking function

● **The following parameters are used.**

• Setup parameters (Target Setpoint-related Parameters) : PVT

UP750 UP550 UT750 Code	UT5□□ UT4□0 Code	Description	Setting range	Default	D-register No.	
PVT	PVt (PVT)	PV tracking selection	OFF or ON	OFF	903(for loop-1) 943(for loop-2)	(Note1)

Note 1: This parameter is used for loop-2 when the UP/UT mode is set for using loop-2 or secondary loop.

■ Setting the Required Parameters

To use the PV tracking function (to turn ON/OFF the PV tracking function), carry out the operation shown below.

Since the operation differs between UT750/UT550/UT551/UT520 and UT450/UT420, instructions will be given separately in [1] and [2]. Follow either of them according to your controller's model.

[1] UT750, UT550, UT551, UT520

To set the parameters, carry out the following steps.

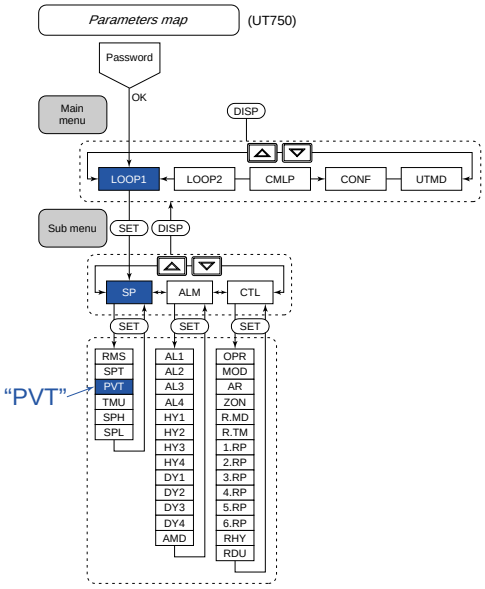
Here we explain how to display the parameter setting display and to change the parameter values. Before carrying out these operations be sure to refer to the User's Manuals Initial Settings and Parameter Map of the controller. The parameter map is very helpful in finding the path to the setting display for a particular parameter.

1: Referring to the User's Manual above, display the setup parameter main menu [LOOP1] (Note1). Then, display the submenu [SP].

Note 1: To set PVT for loop-2, go to the main menu [LOOP2], then the submenu [SP] and carry out the same procedure.

2: Press the SET/ENT key 3 times (Note 2) to display the parameter "PVT". And adjust the parameter value (OFF or ON) using the ▲ / ▼ keys, then press the SET/ENT key to register it. (When "ON" is set, PV tracking operate.)

Note 2: The times of key operation may change by the condition of controller's setting.



[2] UT450, UT420

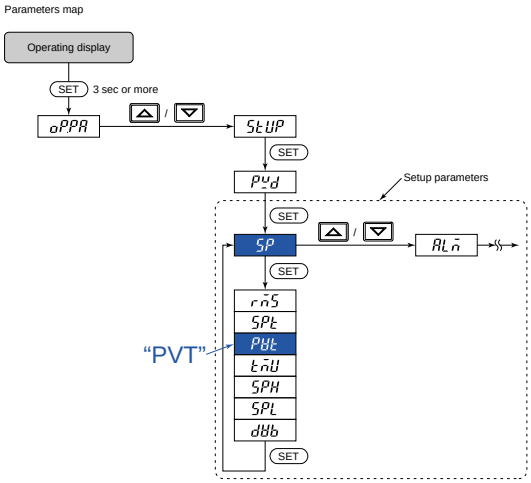
Here we explain how to display the parameter setting display and to change the parameter values. Before carrying out these operations be sure to refer to the User's Manuals Initial Settings and Parameter Map of the controller. The parameter map is very helpful in finding the path to the setting display for a particular parameter.

1: With the operating display shown, press and hold down the SET/ENT key for 3 seconds or longer to call up [oP.PA].

2: Press the ▲ / ▼ key one time to call up [STUP].

3: Press the SET/ENT key 5 times (Note) to display the parameter "PVT". And adjust the parameter value (OFF or ON) using the ▲ / ▼ keys, then press the SET/ENT key to register it. (When "ON" is set, PV tracking operate.)

Note: The times of key operation may change by the condition of controller's setting.



<<Ref. 1.1: References Related to PV Input>>

Ref.1.1(8) PV input range adjustment (When the UT/UP mode No. is 6, 7 or 12 only)

Parameters RH1 to RL3 are used to set the range used for control within the instrument range.
Parameters P.RH1 to P.RL2 (PV range) are used to set the PV ranges used for the controller's internal computation when the controller performs loop control with PV switching or loop control with PV auto-selector which receives two inputs of different measurement ranges (see Fig. 1-1-8). The parameters are also used to set the PV range for relative humidity data obtained from dry- and wet- bulb calculations in temperature and humidity control. The decimal point position of the PV range can be set with parameters P.DP1 and P.DP2.

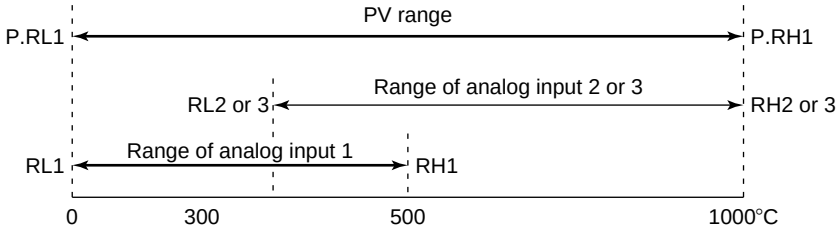


Fig. 1-1-8 PV Range for a Control Having More than One Input

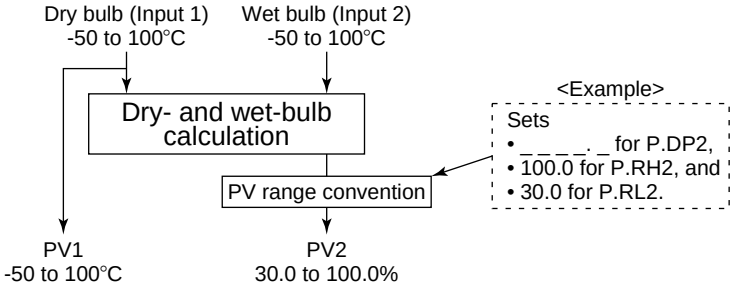


Fig. 1-1-9 PV Range for Temperature and Humidity Control

- Setup parameters (Input-related Parameters): P.UNn, P.RLn, etc

UP750 UP550 UT750 Code	UT55□ UT520 Code	Description	Setting range	Default	D-register No.
P.UNn (Note1)	Pun (P.Un)	PVn Unit	% : Percent °C : Degree Celsius °F : Fahrenheit – : No unit	°C : Degree Celsius	1230 (for loop-1) 1234 (for loop-2)
P.DPn	Pdn (P.D1)	PVn decimal	0 to 4 (Note2)	–	1231 (for loop-1) 1235 (for loop-2)
P.RHn	Phn (P.H1)	Maximum value of PVn range	-19999 to 30000 (Note3)	Maximum value of PVn range or scale	1232 (for loop-1) 1236 (for loop-2)
P.RLn	PLn (P.L1)	Minimum value of PVn range	-19999 to 30000 (Note3)	Minimum value of PVn range or scale	1233 (for loop-1) 1237 (for loop-2)

Note1: The "n" in the table is 1 or 2. The number 1 or 2 indicates the number of loop.
Note2: The number 0 to 4 of setting range means that: 0: no decimal point, 1: one digit below decimal point, 2: two digits below decimal point, 3: three digits below decimal point, 4: four digits below decimal point
Note3: Under normal operation, keep the value of these parameters between the maximum and minimum values of the PV range.
- When UP750,UP550 or UT750, P.RL1< P.RH1, where (P.H1-P.RL1)≤30000
- When UT550, UT551 or UT520, P.L1< P.H1, where (P.H1-P.RL1)≤30000

Ref.1.2: References Related to Remote Input

IMPORTANT: Applicable models of this section

UP750	UP550	UP35□	UT750	UT5□□	UT4□0	UT3□□
None	None	None	UT750-□1	UT55□-□1 UT55□-□2 UT55□-□4 UT551-□B UT551-□D UT52□-□7 UT52□-□8	UT450-□1 UT450-□2 UT450-□4 UT420-□7 UT420-□8	None

Note: Some of the functions below are not available on certain models. For more information, see those sections.

This section contains reference information on the following aspects of remote input. Refer to this information and change parameters only if necessary.

(1) Setting remote input units, range and scaling
(2) Using square root extraction during remote input
(3) Using remote setpoint filtering and ratio bias computing
(4) Tracking target setpoint when switching from remote to local control

<<Ref.1.2: Reference Related to Remote Input>>

Ref.1.2(1) Setting remote input units, range and scaling

To use these remote input functions, the controller must have auxiliary analog input capabilities. Auxiliary analog input is indicated as “input-3” in the parameter table below.

● **The following parameters are used.**

- Setup parameters (Input-related Parameters) : IN3, UN3, RH3, RL3, SDP3, SH3, SL3

UT750 Code	UT5□□ Code	UT4□0 Code	Description	Setting range	Default	D-register No.
IN3	In3 (IN3)	rSP (RSP)	Remote Input type (Input-3 type)	0.4 to 2V (40) 1 to 5V (41) 0 to 2V (50) 0 to 10V (51)	UT750 : 1 to 5V UT5□□: 41 UT4□0 : 41	1221
UNI3	Un3 (UN3)	–	Remote Input unit (Note 1)	% °C – (no unit) °F	%	1222
RH3	rH3 (RH3)	–	Maximum value of remote input range (Note 1)	Within the PV input range	5.000	1224
RL3	rL3 (RL3)	–	Minimum value of remote input range (Note 1)		1.000	1225
SDP3	dP3 (DP3)	–	Remote input decimal point position (Note 1)	0: 99999 (no decimal point) 1: 9999.9 2: 999.99 3: 99.999 4: 9.9999	1	1226
SH3	SH3 (SH3)	rSH (RSH)	Max. value of remote input scale	-19999 to 30000 However, SL1<SH, SH1-SL1≦30000	Maximum value of remote input range	1227
SL3	SL3 (SL3)	rSL (RSL)	Min. value of remote input scale		Minimum value of remote input range	1228

Note 1: UT450/UT420 do not have these parameters.
For UT450/UT420, use “DPC”, “RSH” and “RSL” parameters for the settings.
For UT551, revers range can be set.

Setting Example (1) For UT750 and UT5□□

The example below shows signal type, units, range and scaling setpoints used for remote input with the UT750, UT550, UT551 and UT520.
For example, with analog input-3 (IN3) = 41, the remote input range is 1.000 to 5.000 for standard signals (1 to 5 V).
Here, for an input range of 2 to 4 V, set as follows.

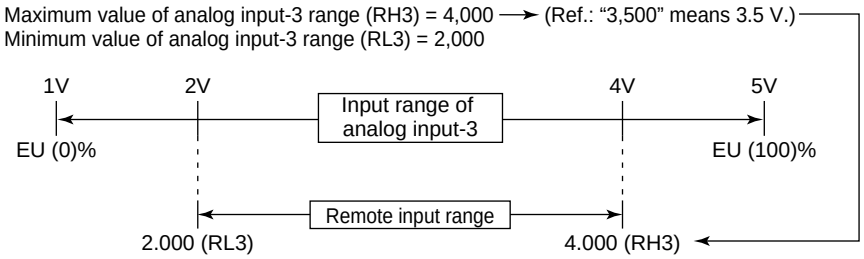


Fig. 1-2-1

In the above example, remote input range was set to 2 to 4 V. To change the input voltage signal to the physical unit of the actual controlled condition (hereinafter, “scaling”), see the Setting Scaling Procedure.

Setting Scaling Procedure

(1) For UT750 and UT5□□

The following procedure shows how to change setpoints from the factory-set defaults.

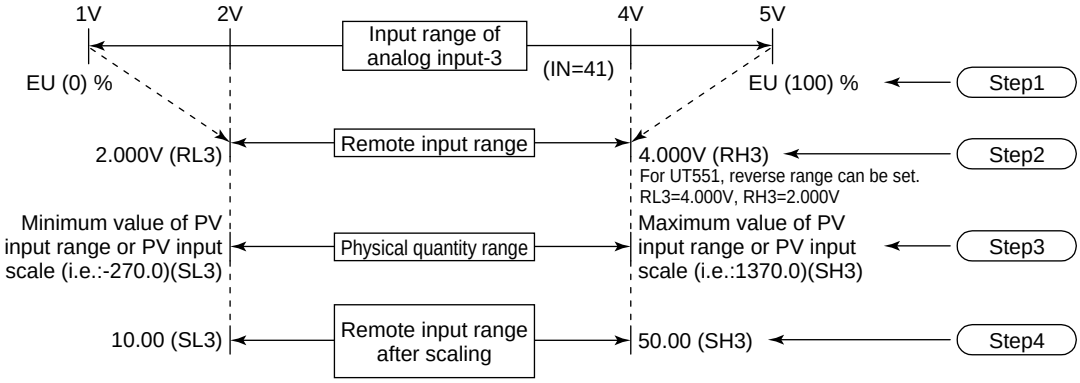


Fig. 1-2-2

Step1: This example shows a remote input range of 1.000 to 5.000 for standard signals (1 to 5 V) for an analog input -3 type (IN3) = 41.
Step2: In this example, the remote input range is set as 2.000 to 4.000V using the parameters RL3 and RH3.
Step3: With the UT750/UT5□□ the same units and decimal point position set for the PV input range are used for the remote input range. For this reason, if the PV input range is set to a thermocouple type K (-270.0 to 1370.0 °C) the initial value of SL3 is set to “-270.0” and that of SH3 is set to “1370.0”.
Step4: Change the initial settings of SDP3,SL3 and SH3 to the actual values for the remote Input range. In this example, the SDP3 is set to “2” and SL3 is set to “10.00” and the SH3 is set to “50.00”.

Setting Example (2) For UT4□0

The example below shows signal type, units, range and scaling setpoints used for remote input with the UT4□0. For example, with remote input type (RSP) = 41, the remote input range is 1.000 to 5.000 for standard signals (1 to 5 V).

Note: Unlike the UT750 and UT5□□, the UT4□0 does not have RH3 and RL3 parameters, therefore input signal range cannot be changed. To change the input voltage signal (1 to 5 V in this case) to the physical unit of the actual controlled condition (hereinafter, "scaling"), see the Setting Scaling Procedure.

Setting Scaling Procedure

(2) For UT4□0

The following procedure shows how to change setpoints from the factory-set defaults.

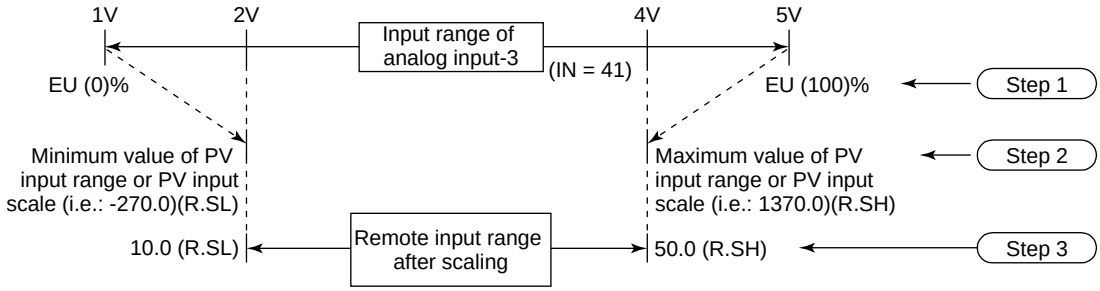


Fig. 1-2-3

Step1: This example shows a remote input range of 1.000 to 5.000 for standard signals (1 to 5 V) for a remote input type (RSP) = 41.

Step2: With the UT450/UT420, the same units and decimal point position set for the PV input range are used for the remote input range. For this reason, if the PV input range is set to a thermocouple type K (-270.0 to 1370.0 °C) the initial value of R.SL is set to "-270.0" and that of R.SH is set to "1370.0".

Step3: Change the initial settings of R.SL and R.SH to the actual values for the remote input Range. In this example, the R.SL is set to "10.0" and the R.SH is set to "50.0".

■ Setting the Required Parameters

Carry out the operation shown below.
(UT5□□'s parameter setting way is shown in the following example.)

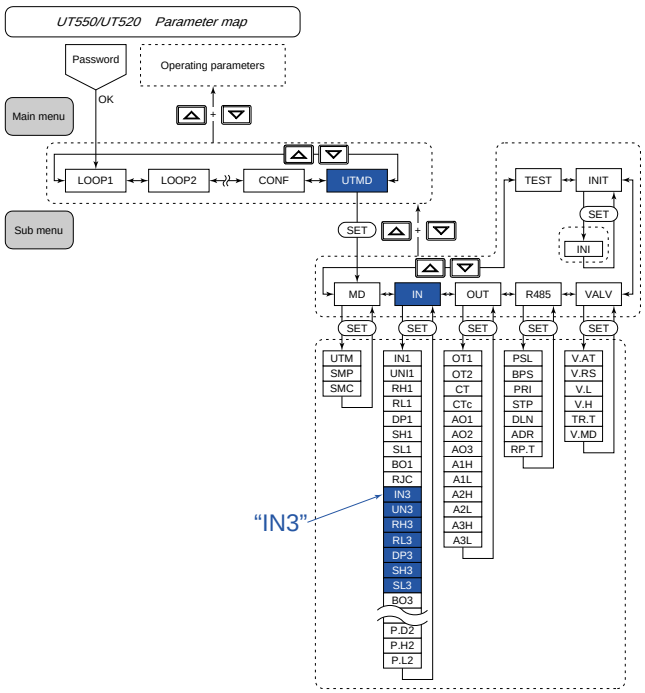
Here we explain how to display the parameter setting display and to change the parameter values. Before carrying out these operations be sure to refer to the User's Manuals Initial Settings and Parameter Map of the controller.
The parameter map is very helpful in finding the path to the setting display for a particular parameter.

1: Referring to the User's Manual above, display the setup parameter main menu [UTMD].
Then, display the submenu [IN].

2 : Press the SET/ENT key time and again to display the parameter "IN3".
Adjust the parameter value using the ▲ / ▼ keys, then press the SET/ENT key to register it.
For example, when you want to select "1 to 5V " input range, adjust the parameter value to
"41" and register it by pressing the SET/ENT key.

3 : Press the SET/ENT key once to display the parameter "UN3".
Set the "Remote Input Unit" if necessary.

4: After the above operation, repeat the following operation for the parameters "RH3", "RL3", "DP3", "SH3" and "SL3" if necessary.
- Display the parameter setting display which you want to set the value. (ie."RH3")
- Adjust the parameter value using the ▲ / ▼ keys, then press the SET/ENT key to register it.



This completes the setting operation. If other settings are unnecessary, return to the operating display.

<<Ref.1.2: Reference Related to Remote Input>>

Ref.1.2(2) Using square root extraction during remote input

Square-root extraction is available with UT750 and UT5□□ controllers that have auxiliary analog input capabilities. (It cannot be used with the UT4□0.) Square-root extraction can be used with remote input as shown in the flowchart below. It is also possible to set the square-root low signal cut off.

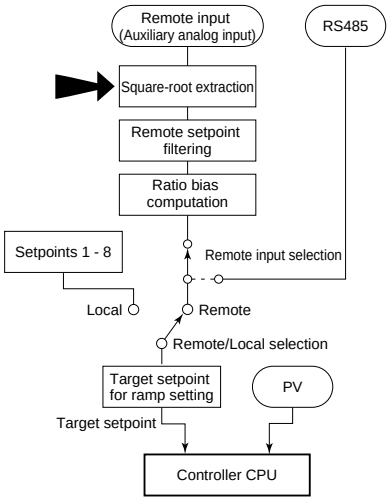


Fig. 1-2-4 Processing for remote setpoint input

● The following parameters are used.

Change parameters as explained in the User's Manuals Initial Settings and Parameter Map.

- Setup parameters (Analog Input Computation Parameters) : A.SR3, A.LC3

UT750 Code	UT5□□ Code	Description	Setting range	Default	D-register No.
A.SR3	Sr 3 (SR3)	Analog input-3 square-root computation	OFF, ON	OFF	1011
A.LC3	LC3 (LC3)	Analog input-3 low signal cut off	0.0 to 5.0% of PV input range	1.0%	1012

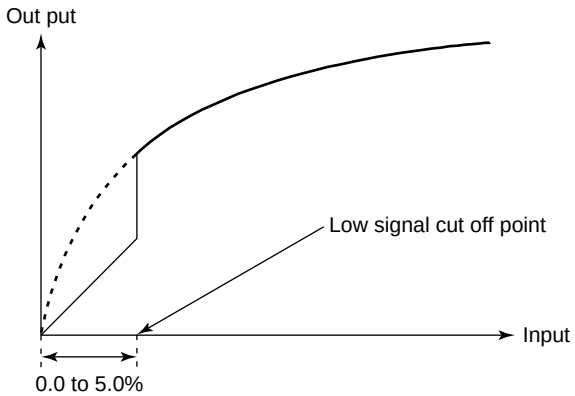


Fig. 1-2-5 Square-root Extraction

<<Ref.1.2: Reference Related to Remote Input>>

Ref.1.2(3) Using remote setpoint filtering and ratio bias computing

The function described below is available with UT750,UT5□□ and UT4□0 controllers that have auxiliary analog input (Remote input) capabilities.
Remote setpoint filtering and Ratio bias computation can be used with remote input as shown in the flowchart below.

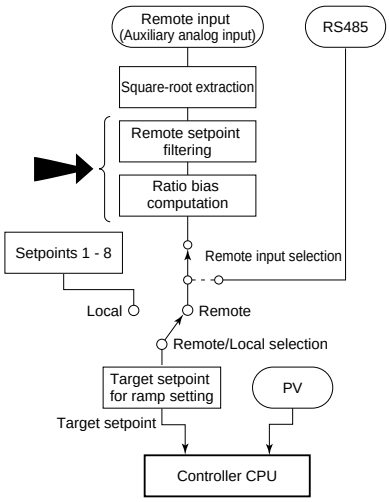


Fig. 1-2-6

■ Remote setpoint filtering

Remote setpoint filtering performs first-order-lag computation for the remote setpoint value (signal) transmitted from the external equipment.
The function of Remote setpoint filtering is same as that of PV input filter.
Refer the " Ref. 1.1 (1) Correcting the PV (1.Using PV input filter and PV input bias)".

● The following parameters are used.

Change parameters as explained in the User's Manuals Initial Settings and Parameter Map.

- Operating parameters (Operation-related Parameters) : RFL

UT750 Code	UT5□□ UT4□0 Code	Description	Setting range	Default	D-register No.
RFL	rFL (RFL)	Remote input filter	OFF, 1 to 120sec	OFF	loop-1: 249 loop-2: 279

Note: With UT750-□1, UT55□-□1, UT55□-□2, UT55□-□4, UT551-□B, UT551-□D, UT520-07, UT520-08, this parameter is displayed only for loop-1.
(However the function of this parameter is used at loop-1 and loop-2 in common.)
(With UT4□0-□□, loop-1 only.)

■ Ratio bias computing

Ratio bias computing performs ratio computation and bias addition for remote setpoints. This enables load distribution by zone, air-heat ratio control, 2-flow ratio control, etc.
This function acts on setpoints of substations used in coordinated operation.

Computation: SP = Remote setpoint input × Ratio + Remote input bias

● The following parameters are used.

Change parameters as explained in the User's Manuals Initial Settings and Parameter Map.

- Operating parameters (Operation-related Parameters) : RT, RBS

UT750 Code	UT5□□ UT4□0 Code	Description	Setting range	Default	D-register No.
RT	rt (RT)	Ratio setting	0.001 to 9.999	1.000	loop-1 : 247 loop-2 : 277
RBS	rbS (RBS)	Remote input bias	-100.0 to100.0% of PV input range span	0.0% of PV input range span	loop-1 : 248 loop-2 : 278

<<Ref.1.2: Reference Related to Remote Input>>

Ref.1.2(4) Tracking target setpoint when switching from remote to local control

Setpoint can be tracked with UT750, UT5□□ and UT4□0 controllers that have auxiliary analog input capabilities. This function equalizes the local setpoint to the remote setpoint when switching from remote to local control. This prevents any sudden change in setpoint when control is switched from remote to local.

Setpoint tracking functions as follows.

● Setpoint tracking ON
Regardless of any preset local setpoints, the remote setpoint is used as the local setpoint when control is switched from remote to local. To use the preset local setpoint, punch in the setpoint from the keys.

● Setpoint tracking OFF
When control is switched from remote to local, the preset local setpoint is used in operation.

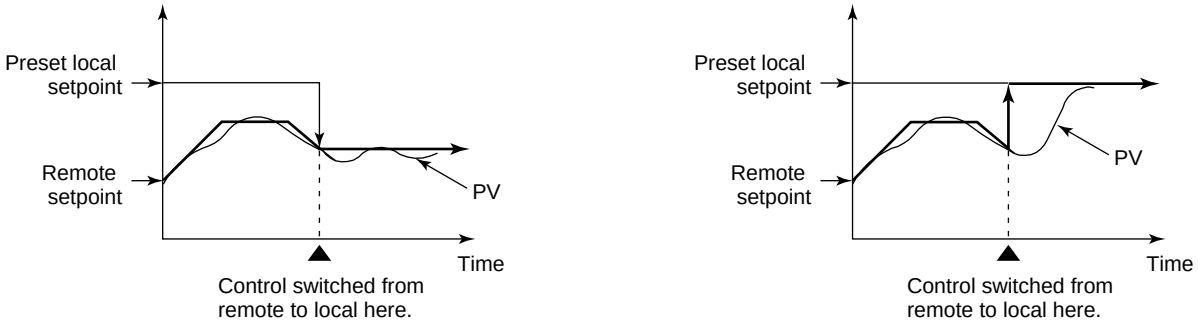


Fig. 1-2-7 Setpoint tracking

● **The following parameters are used.**
Change parameters as explained in the User's Manuals Initial Settings and Parameter Map.

- Setup parameters (Target Setpoint-related Parameters) : SPT

UT750 Code	UT5□□ UT4□0 Code	Description	Setting range	Default	D-register No.
SPT	SPt (SPT)	SP tracking selection (Note)	OFF, ON	ON	loop-1 : 902 loop-2 : 942

Note: This parameter can be displayed with UT750,UT5□□ and UT4□0 controllers that have auxiliary analog input capabilities.

Ref.2.1: References Related to Control Output

IMPORTANT: Applicable models of this section

UP750	UP550	UP35□	UT750	UT5□□	UT4□0	UT3□□
UP750-□□	UP550-□□	UP35□-□□	UT750-□□	UT5□□-□□	UT4□0-□□	UT3□□-□□

Note: Some of the functions discussed below may be limited to models with a specific suffix and/or option code. Each section will expressly refer to this limitative condition where it applies.

This section contains reference information on the following advanced controller operations related to control output. Refer to this information and set parameters (or change their settings) only if necessary.

(1) Switching between Direct and Reverse Actions
(2) Selecting PID Control Mode According to the Operating Condition
- Determining whether or not a change in the target setpoint involves control output bump
(3) Using Control Output Limiter
(4) Using Anti-reset Windup (Over-integration Prevention) Function
(5) Using “Super” (Overshoot Prevention) Function
(6) Using “Super2” (Hunting Prevention) Function
(7) Using Split-signal Computation/Output Function
(8) Setting Preset Output Values
(9) Placing Control Output in Tracking Mode (for Cascade Primary-loop Control or Loop Control for Backup)
(10) Using Shutdown Function

<<Ref. 2.1: References Related to Control Output>>

Ref.2.1(1) Switching between Direct and Reverse Actions

Switching between direct and reverse actions is possible with all models* in the UP and UT series of controllers. (*UP750, UP550, UP35□, UT750, UT5□□, UT4□0 and UT3□□)

The terms direct action and reverse action define the directions in which the control output changes to increase or decrease its value according to whether the deviation of a measured value (PV) from the target setpoint (SP) is positive or negative. The controller increases or decreases its control output value in the predetermined mode, either direct action or reverse action, in conjunction with the deviation of the current PV value from the SP value. Note that there are no direct/reverse action options for heating/cooling control.

You can switch between direct and reverse actions even when the controller is in operation. To switch, use the parameter appropriate for your controller model, as noted below.

- "n.DR" operating parameter for the UP750, UP550, UT750, UT5□□ and UT4□0
- DR operating parameter for the UP35□ and UT3□□

In the reverse action mode (factory-set default), the control output value decreases if the PV value is greater than the SP value. Inversely, it increases if the PV value is smaller than the SP value (see Fig. 2-1-1 below).

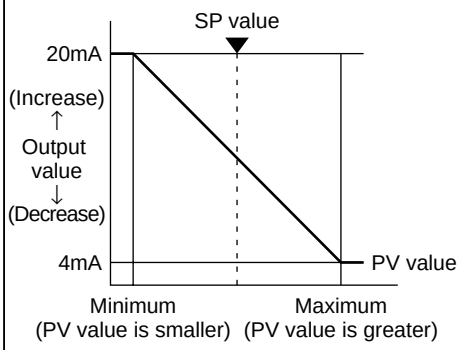
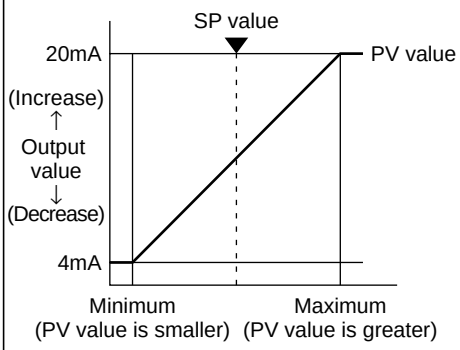
	Reverse Action		Direct Action	
Condition	PV>SP	PV<SP	PV>SP	PV<SP
ON/OFF output status	OFF	ON	ON	OFF
Current output	Decreases.	Increases.	Increases.	Decreases.
Time proportional output	The ON-state time decreases.	The ON-state time increases.	The ON-state time increases.	The ON-state time decreases.
Direction of change in control output	Reverse Action 		Direct Action 	

Fig. 2-1-1 Switching between Direct and Reverse Actions

● **The following parameters are used.**

Change parameters as explained in the User's Manuals Initial Settings and Parameter Map.

• Operating parameters (PID-related Parameters) : n.DR

UP750 UP550 UT750 Code (Note1)	UT5□□ UT4□0 Code (Note1)	UP35□ UT3□□ Code	Description	Setting range	Default	D-register No.
n.DR	n. dr (n.DR)	dr (DR)	Direct / reverse action switching (Note2)	• When UP750, UP550, UT750 REVERSE: Reverse action DIRECT: Direct action • When UT5□□, UT4□0 RVS: Reverse action DIR : Direct action • When UT3□□/UP35□ 0 : Reverse action 1 : Direct action	Reverse action • UP750, UP550, UT750 : REVERSE • UT5□□/UT4□0 : RVS • UT3□□/UP35□ : 0	• 257 (When UP35□ or UT3□□) (Note3)

Note1: "n" = 1 to 8. The number indicates the number of PID group.
Note2: This parameter cannot be displayed when heating/cooling control mode.
Note3: The D-register numbers are shown in the Table 2-1-1. (except for UP35□, UT3□□)

Table 2-1-1 1st=for loop-1 2nd=for loop-2 (UT4□0 has no loop-2)

	n=1		n=2		n=3		n=4		n=5		n=6		n=7		n=8	
	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd
n.DR	313	513	338	538	363	563	388	588	413	613	438	638	463	663	488	688

<<Ref. 2.1: References Related to Control Output>>

Ref.2.1(2) Selecting PID Control Mode According to the Operating Condition - Determining whether or not a change in the target setpoint involves control output bump

With UP and UT series controllers, you can select between two types of PID control modes. These control modes are referred to as the standard PID control mode and fixed-point control mode.

For each of these PID control modes, select either the PV derivative type PID control method or deviation derivative type PID control method to carry out control according to the operating condition (mode). You can also select from the Yes/No options for a control output bump at the moment of change in the SP value. (See Table 2-1-2 or 2-1-3 depending on your controller model.)

Note that there is a slight difference in this information between the UP750, UP550, UT750, UT5□□ and UT4□0 group of controllers and the UP35□ and UT3□□ group controllers.
This section discusses the former group first and then the latter group. See either reference topic according to your controller model.

[1] Control Mode Selection when the Model Is UP750, UP550, UT750, UT5□□ or UT4□0

To select the PID control mode, use one of the setup parameters explained below.
To set/change the parameter, see the Initial Settings or Parameters user's manual of the model in question.

■ Setup Parameters for UP750, UP550 and UT750

• Setup parameters (Control Action-related Parameters):MOD1, MOD2 and MOD

UP750 UP550 Code	UT750 Code	Description	Setting Range	Default	D-register No.
MOD1	**MOD** (Note1)	Loop-1 PID control mode	0: Standard PID control mode 1: Fixed-point control mode	0	927
MOD2 (Note2)	**MOD** (Note1)	Loop-2 PID control mode	0: Standard PID control mode 1: Fixed-point control mode	0	967

Note1: For the UT750, the MOD setup parameter applies to both the loop-1 and loop-2 PID control modes. More specifically, the MOD setup parameter belonging to the LOOP2 setup parameter main menu is used for the loop-2 PID control mode of the UT750. In addition, the setup parameter has the same name, MOD, as the one that belongs to the LOOP1 menu (though their D-register numbers differ, as shown in the table above).
The MOD setup parameter for loop 2 is only shown when the UT mode is cascade control, dual-loop control, temperature/humidity control or cascade control with two universal inputs.

Note2: The MOD2 setup parameter for the loop-2 PID control mode of the UP750 or UP550 is only shown when the UP mode is cascade control, dual-loop control, temperature/humidity control or cascade control with two universal inputs.

■ Setup Parameters for UT5□□ and UT4□0

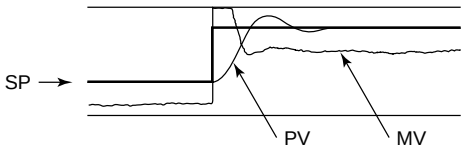
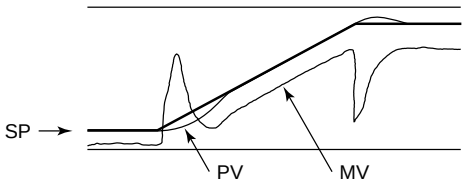
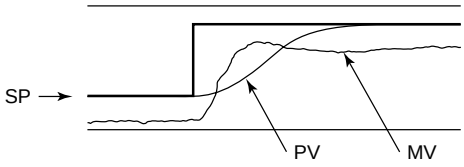
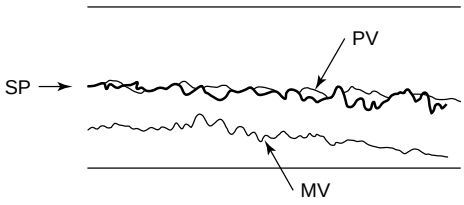
• Setup parameters (Control Action-related Parameters):MOD

UT5□□ UT4□0 Code	Description	Setting Range	Default	D-register No.
 (MOD)	PID control mode	0: Standard PID control mode 1: Fixed-point control mode	0	927

Note: For the UT5□□ and UT4□0, there is no parameter for loop-2.

The relationship between the control mode and operating condition of the UP750, UP550, UT750, UT5□□ and UT4□0 is as shown in Table 2-1-2 below.
Refer to the information under “Control Method” and “Description of Control Action,” to set the type of PID control mode appropriate for the operating condition (mode) you will use, using the setup parameter discussed earlier.

Table 2-1-2 Control Mode vs. Operating Condition Relationship for UP750, UP550, UT750, UT5□□ and UT4□0

Type of PID Control Mode	Control Method	Description of Control Action	Operating Condition (Mode)
Standard PID control mode Factory-set values For the UP□50, the mode is defined by setting MODn = 0 (n = 1 or 2). For the UT750, the mode is defined by setting MOD = 0.	PV derivative type PID control Control output bump is allowed during change in SP value.	The PV derivative type PID control mode is adopted so that the controller can reach the new SP value without delay when the current SP value is changed. In this control mode, the controller immediately outputs the value of the proportional term P which is proportional to the deviation resulting from a change in the SP value. The controller thus attempts to reach the new SP value as soon as possible. 	• For UT series (Note1) Local mode operation • For UP series (Note2) Local mode (Note3), hold mode or soak mode operation
	Deviation derivative type PID control	The deviation derivative type PID control mode is adopted in order to improve the follow-up capability of UP series program controllers for marginal variations in the SP value of a program pattern. By allowing the derivative term D to positively act upon variations resulting from a marginal change in the program pattern, the controller keeps track of the pattern without delay. 	• For UT series Remote mode or cascade mode operation • For UP series Program mode operation (except for hold or soak mode)
Fixed-point control mode Factory-set values For the UP□50, the mode is defined by setting as MODn = 1 (n = 1 or 2). For the UT750, the mode is defined by setting as MOD = 1.	PV derivative type PID control Control output bump is not allowed during change in SP value.	Use this control method in order to protect the PV value from any disorder that may result when the control output (MV) reacts over-sensitively against a change in the SP value during continuous fixed-point control. If the PV derivative type PID control mode is used with the permitted control output bump, the MV value does not change suddenly during a change in the SP value. The controller uses the integral term I only and gradually eliminates the deviation that has occurred. 	• For UT series (Note1) Local mode operation • For UP series (Note2) Local mode (Note3), hold mode or soak mode operation
	PV derivative type PID control Control output bump is allowed during change in SP value.	Use this control method when using the controller for the secondary loop of cascade control. In this method, the control output never reacts over-sensitively against a change in the primary-loop output. Rather, it delivers stable control output. 	• For UT series Remote mode or cascade mode operation • For UP series Program mode operation (except for hold or soak mode)

Note1: In the table above, the UT series refers to the UT750, UT5□□, UT4□0 and UT3□□.
Note2: In the table above, the UP series refers to the UP750, UP550 and UP35□.
Note3: The local mode of the UP series refers to the operating mode in which the SP value is kept constant.

[2] Control Mode Selection when the Model Is UP35□, UT35□ or UT32□

To select the PID control mode, use one of the setup parameters explained below.
To set/change the parameter, see the Initial Settings or Parameters user's manual of the model in question.

• Setup parameters (Control Action-related Parameters):C.MD

UP35□ UT3□□ Code	Description	Setting Range	Default	D-register No.
C.MD (C.MD)	PID control mode	0: Standard PID control mode 1: Fixed-point control mode	0	927

The relationship between the control mode and operating condition of the UP35□, UT35□ and UT32□ is as shown in Table 2-1-3 below.
Refer to the information under "Control Method" and "Description of Control Action," to set the type of PID control mode appropriate for the operating condition (mode) you will use, using the setup parameter discussed earlier.

Table 2-1-3 Control Mode vs. Operating Condition Relationship for UP35□, UT35□ and UT32□ (1/2)

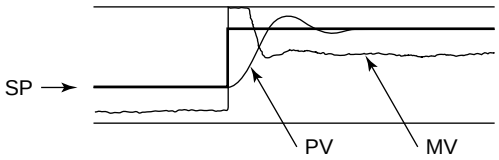
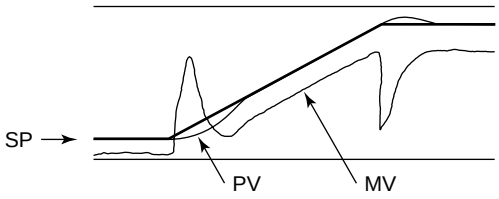
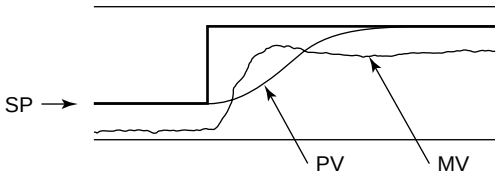
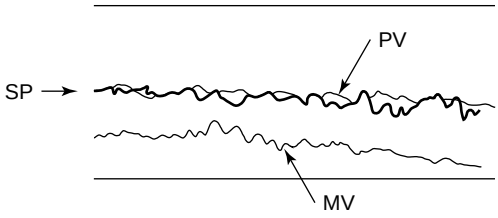
Type of PID Control Mode	Control Method	Description of Control Action	Operating Condition (Mode)
Standard PID control mode Factory-set values C.MD = 0	PV derivative type PID control Control output bump is allowed during change in SP value.	The PV derivative type PID control mode is adopted so that the controller can reach the new SP value without delay when the current SP value is changed. In this control mode, the controller immediately outputs the value of the proportional term P which is proportional to the deviation resulting from a change in the SP value. The controller thus attempts to reach the new SP value as soon as possible. 	• For UT3□□ When "SP number" is set to 1, 2, 3 or 4. • For UP35□ Hold mode or soak mode operation
	Deviation derivative type PID control	The deviation derivative type PID control mode is adopted in order to improve the follow-up capability of UP series program controllers for marginal variations in the SP value of a program pattern. By allowing the derivative term D to positively act upon variations resulting from a marginal change in the program pattern, the controller keeps track of the pattern without delay. 	• For UT3□□ When "SP number" is set to 0. (When using communication function) • For UP35□ Program mode operation (except for hold or soak mode)

Table 2-1-3 Control Mode vs. Operating Condition Relationship for UP35□, UT35□ and UT32□ (2/2)

Type of PID Control Mode	Control Method	Description of Control Action	Operating Condition (Mode)
Fixed-point control mode C.MD = 1	PV derivative type PID control Control output bump is not allowed during change in SP value.	Use this control method in order to protect the PV value from any disorder that may result when the control output (MV) reacts over-sensitively against a change in the SP value during continuous fixed-point control. If the PV derivative type PID control mode is used with the permitted control output bump, the MV value does not change suddenly during a change in the SP value. The controller uses the integral term I only and gradually eliminates the deviation that has occurred.  	• For UT3□□ When “SP number” is set to 1, 2, 3 or 4. • For UP35□ Hold mode or soak mode operation
	PV derivative type PID control Control output bump is allowed during change in SP value.	Use this control method when using the controller for the secondary loop of cascade control. In this method, the control output never reacts over-sensitively against a change in the primary-loop output. Rather, it delivers stable control output.  	• For UT3□□ When “SP number” is set to 0. (When using communication function) • For UP35□ Program mode operation (except for hold or soak mode)

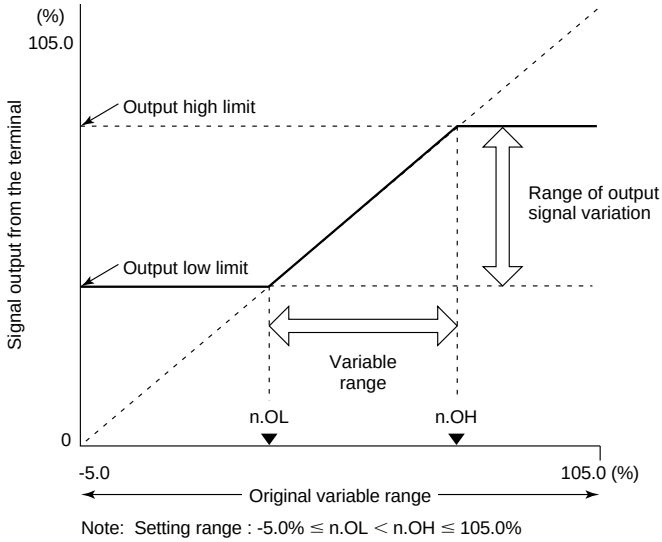
<<Ref.2.1: References Related to Control output>>

Ref.2.1(3) Using Control Output Limiter

This function can be used with UP750, UP550, UT750, UT5□□, UT4□0 and UT3□□.
For the function, the parameters “n.OH” and “n.OL” are used.
These parameters limit the control output, regardless of the operation mode.
UT750, UT5□□, UT4□0, UP750 and UP550 can set up to eight sets of “n.OH” and “n.OL”. (n=1 to 8)

CAUTION

The preset output value output when the controller operation stopped, will not be limited even when the “n.OH” and “n.OL” limits of output have been set.



Note: Setting range : -5.0% ≤ n.OL < n.OH ≤ 105.0%

Fig. 2-1-2

● The following parameters are used.

Change parameters as explained in the User's Manuals Initial Settings and Parameter Map.

• Operating parameters (PID-related Parameters) : n.OH, n.OL

UP750 UP550 UT750 Code	UT5□□ UT4□0 Code	UP35□ UT3□□ Code	Description	Setting range	Default	D-register No.
n.OH (Note1)	n.oH (n.OH)	oH (OH)	Output high limit Heating-side output high limit (in heating/cooling control) (Note2)	-5.0 to 105% (OL<OH), 0.0 to 100.0% (in heating/cooling control)	100.0%	• 254 (When UP35□, UT3□□) • See Table 2-1-4 (except for UP35□, UT3□□)
n.OL (Note1)	n.oL (n.OL)	oL (OL)	Output low limit Cooling-side output high limit (in heating/cooling control) (Note2)	-5.0 to 105% (OL<OH), 0.0 to 100.0% (in heating/cooling control)	0.0% 100.0% (in heating/cooling control)	• 255 (When UP35□, UT3□□) • See Table 2-1-4 (except for UP35□, UT3□□)

Note1: “n”=1 to 8, means the number of PID group.
Note2: Not displayed in ON/OFF control mode.

Table 2-1-4 1st : for loop-1 2nd : for loop-2 (UT4□0 has no loop-2)

	n=1		n=2		n=3		n=4		n=5		n=6		n=7		n=8	
	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd
n.OH	309	509	334	534	359	559	384	584	409	609	434	634	459	659	484	684
n.OL	310	510	335	535	360	560	385	585	410	610	435	635	460	660	485	685

<<Ref.2.1: References Related to Control output>>

Ref.2.1(4) Using Anti-reset Windup (Over-integration Prevention) Function

Note

The parameter AR is not used to turn on and off the anti-reset windup function.

This function can be used with UP750, UP550, UP35□, UT750, UT5□□, UT4□0 and UT3□□.

- Parameter AR sets the point (by specifying a deviation ratio (%)) at which to restart the integral computation that is suspended by the controller's anti-reset windup function. (Integral computation restarts when the deviation ratio has decreased to the AR value.)
- The deviation ratio (setting range of "AR") is obtained by the following expression.

$$\text{Deviation ratio (= Setpoint of AR)} = \frac{|\ PV - n.SP\ |}{\text{Proportional band (n.P)}} \times 100\ (\%)$$

- The setting range for the deviation ratio set in parameter AR is 50.0 to 200.0%. However, when the parameter is set at AUTO, another setting option, the controller automatically determines the point at which to restart the integral computation.

● **The following parameters are used.**

Change parameters as explained in the User's Manuals Initial Settings and Parameter Map.

• Setup parameters (Control Action-related Parameters) : AR, etc.

UP750 UP550 UT750 Code	UT5□□ UT4□0 Code	UP35□ UT3□□ Code	Description	Setting range	Default	D-register No.
AR1 **AR2** (Note1)	Ar (AR)	Ar (AR)	Anti-reset wind up	AUTO or 50.0 to 200.0%	AUTO	928 968 : loop-2 (Note1)

Note1: "AR2" are displayed only when the loop-2 is used (by UT/UP mode).

<<Ref. 2.1: References Related to Control Output>>
Ref.2.1(5) Using “Super” (Overshoot Prevention) Function

The “Super” (overshoot prevention) function is available with the UP750, UP550, UP350, UT750, UT5□□, UT4□0 and UT3□□. This function works when you set the “Super” code SC to 1. It does not work if you set the code to OFF. If the code is set to OFF, the controller operates in the regular PID control mode. (The code is set to OFF when the controller is shipped from the factory.)
If you set the code to 2 or 3, the “Super2” (hunting prevention) function works. For more information on the “Super2” functions, see Ref. 2.1 (6).

CAUTION

The SUPER function can only be used with the PID function. If both the integral time and derivative time are set to OFF, the SUPER function will not operate even when SC is set to 1.

The SUPER function operates under the condition that P, I, and D are set up. It is therefore more efficient to set the SUPER code (SC) to 1 after auto-tuning is carried out.

The SUPER function is an overshoot-suppressing function that uses fuzzy inference. This function is highly effective when used together with the auto-tuning function in the event of the following.

- Overshoots must be suppressed.
- Rise-up time needs to be shortened.
- Load varies often.
- SP is changed frequently.

When the SUPER function is set on, the controller monitors deviation in order to detect the possibility of an overshoot. When the possibility of overshoot is detected, the controller changes the target setpoint to a tentative value as a secondary setpoint (auxiliary setpoint SSP) and continued control. Then, when the possibility of an over shoot no longer exists, the target setpoint is gradually reset to its original value.

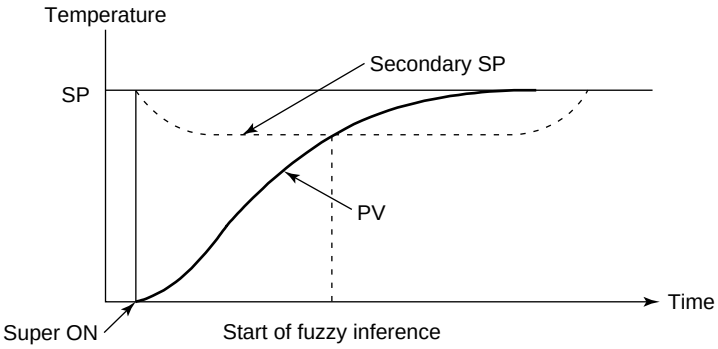


Fig. 2-1-3

● **The parameters used in this reference topic are as shown below.**

To set/change any of the parameters, see the Initial Settings or Parameter Map user’s manual of the model in question.

• Operating parameters (Operation-related Parameters):SC

UP750 UP550 UT750 Code	UT5□□ UT4□0 UP3□□ UT3□□ Code	Description	Setting Range	Default	D-register No.
SC	SC (SC)	On/off of “Super” function	OFF, or 1, 2 or 3 (Note1)	OFF (Note2)	Loop 1: 242 Loop 2: 272 (Note3)

Note1: When selecting the “Super” function, set the SC code to 1. If you set the SC code to either 2 or 3, the “Super2” hunting-preventing function works. This means you cannot use both the “Super” and “Super2” functions at the same time.
Note2: The “Super” function is turned off when the controller is shipped from the factory.
Note3: Loop 2 is supported only by models other than the UP35□, UT4□0 and UT3□□.

<<Ref. 2.1: References Related to Control Output>>
Ref.2.1(6) Using “Super2” (Hunting Prevention) Function

The “Super2” (hunting prevention) function is available with the UP750, UP550, UP350, UT750, UT5□□, UT4□0 and UT3□□. This function works when you set the “Super” code SC to either 2 or 3. It does not work if you set the code to OFF. If the code is set to OFF, the controller operates in the regular PID control mode. (The code is set to OFF when the controller is shipped from the factory.)
If you set the code to 1, the “Super” (overshoot prevention) function works. For more information on the “Super” functions, see Ref. 2.1 (5).

CAUTION

- Use “Super2” only for PID or PI control. The function does not work in any of the following control modes. On-off control, P control (control using the proportional band term only), PD control (control using the proportional band and derivative terms only), and heating/cooling control.
- Do not use the “Super 2” function for the fast-response process such as flowrate or pressure control.

If you will use the “Super2” function for PID control, also use auto-tuning together with the function to maximize the function’s capability. After auto-tuning, set the “Super” code SC to either 2 or 3.

“Super2” is effective when used in the following cases.

The “Super2” function is designed to prevent hunting by means of a phase compensation block built in the PID computation block (see Fig. 2-1-4 below).

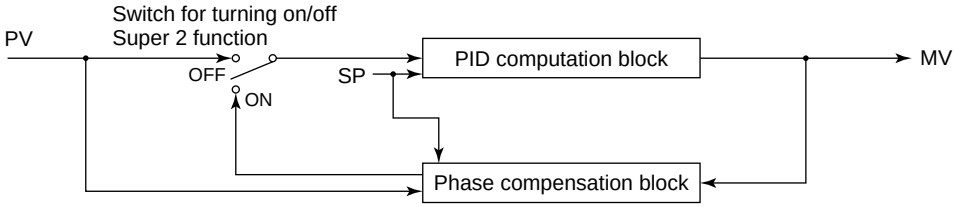


Fig. 2-1-4

“Super2” is effective when used in the following cases.

- There is a frequent change in the load.
- The controller is exposed to a high degree of disturbance and takes time to settle to normal.
- Even if the PID constants are correctly set, hunting remains when the SP value is changed.

The “Super2” hunting-preventing function has two modes, as shown in Table 2.1.5. You can select either of them by setting the SC parameter accordingly.

Table 2-1-5

Mode	Feature	Value of SC Parameter
Stability-oriented mode	Superior in control stability against a change in the load or SP value. This mode supports a wider range of characteristic change, compared with the responsiveness-oriented mode.	2
Responsiveness-oriented mode	This mode provides shorter PV tracking time/settling time for a change in the SP value.	3

You can select either the stability-oriented or responsiveness-oriented mode by setting the “Super” code SC accordingly. The characteristics of hunting prevention in each of these modes are as shown in Fig. 2-1-5.
The figure shows examples of the characteristics when PID constants are set for point SP (0) in each mode. Each graph shows how the “Super2” hunting-preventing function works when the SP value is changed to points SP (1) and SP (2) with different SP values. (The example of characteristics at point SP (2) is given to portray how the function works for a greater change in the SP value.)
Select whichever mode you think appropriate when you start using the controller.

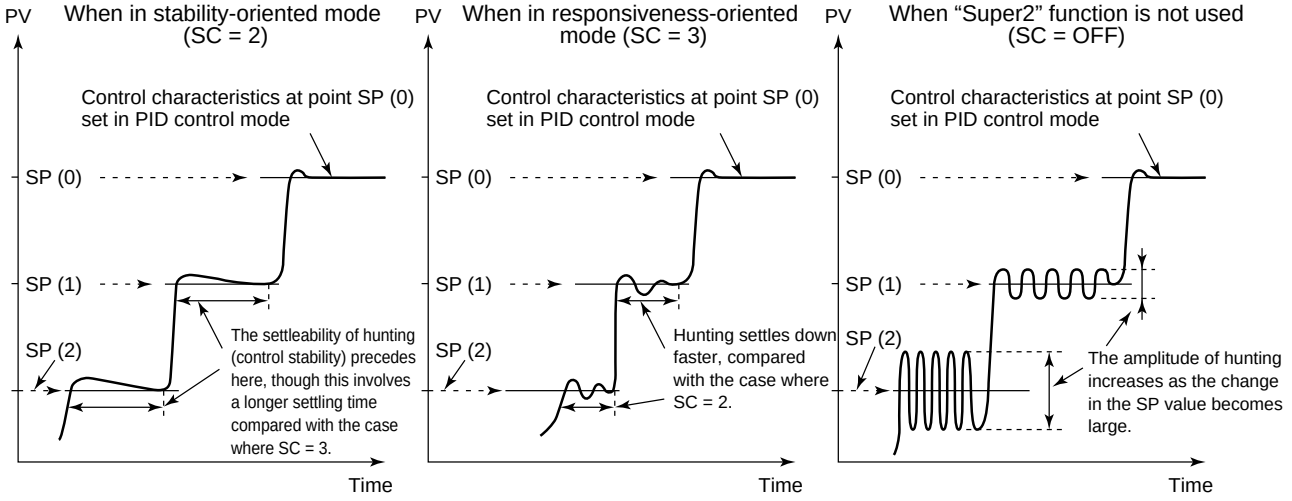


Fig. 2-1-5

- **The parameters used in this reference topic are as shown below.**

  To set/change any of the parameters, see the Initial Settings or Parameter Map user’s manual of the model in question.

  • Operating parameters (Operation-related Parameters):SC

UP750 UP550 UT750 Code	UT5□□ UT4□0 UP3□□ UT3□□ Code	Description	Setting Range	Default	D-register No.
SC	SC (SC)	On/off of “Super” function	OFF, or 1, 2 or 3 (Note1)	OFF (Note2)	Loop 1: 242 Loop 2: 272 (Note3)

Note1: When selecting the stability-oriented mode of the “Super2” function, set the SC code to 2. When selecting the responsiveness-oriented mode, set the code to 3. If you set the SC code to 1, the “Super” overshoot-preventing function works. This means you cannot use both the “Super” and “Super2” functions at the same time.
Note2: The “Super2” function is turned off when the controller is shipped from the factory.
Note3: Loop 2 is supported only by models other than the UP35□, UT4□0 and UT3□□.

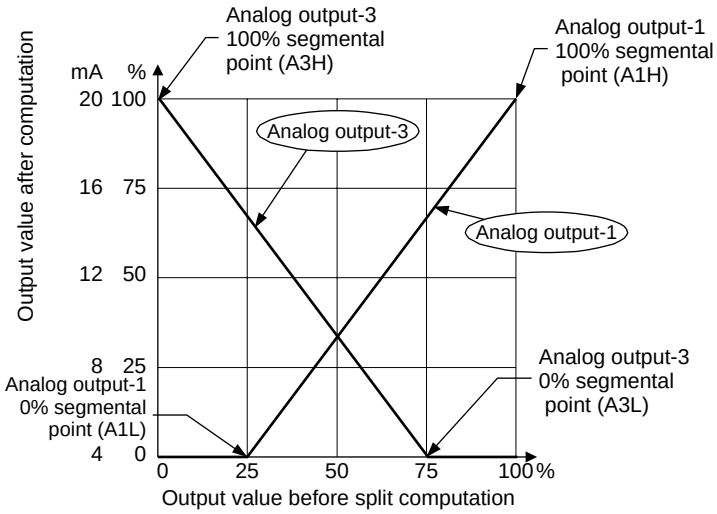
<<Ref.2.1: References Related to Control output>>

Ref.2.1(7) Using Split-signal Computation / Output Function

This function can be used with UP750, UP550, UT750, UT550, UT551 and UT520.
There are two modes ("V-mode Output" and "Parallel-mode Output") of the split-signal computation.

[1] When “V-mode Output”

[Example of the V-mode output]



[Outline]

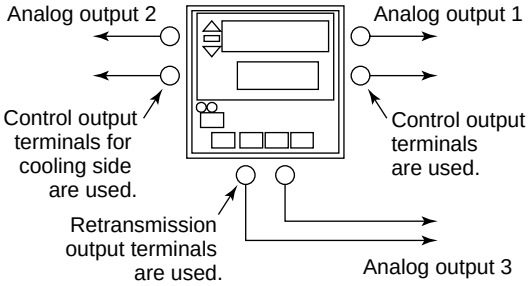


Fig. 2-1-6

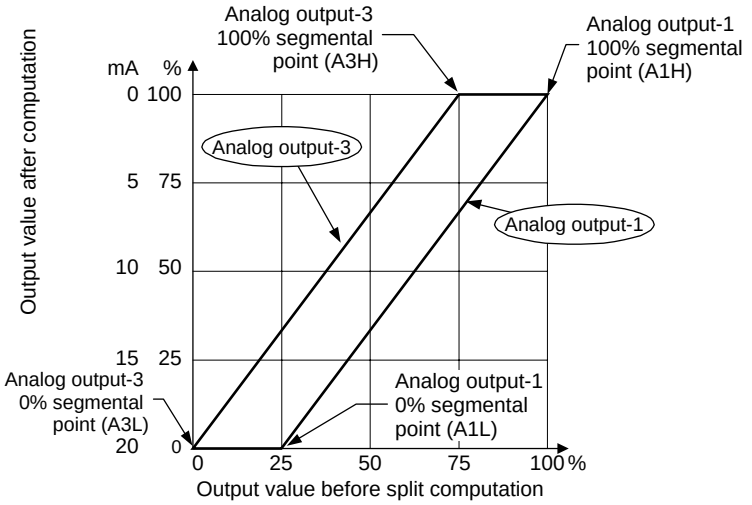
The following explains an example of letting “Analog OUTPUT-1 (terminals [16] and [17])” and “Analog OUTPUT-3 (terminals [14] and [15])” present the V-mode characteristics of split computations.

[1] Set the Control Output Type (OT1) parameter to “2”.
This sets the control output to “current output.”
[2] Set the Retransmission Output (RT1) parameter to “3”.
This sets the retransmission output to “control output retransmission.”
[3] Set the Analog Output-1 100% Segmental Point(A1H) parameter to “100%”.
[4] Set the Analog Output-1 0% Segmental Point(A1L) parameter to “25%”.
[5] Set the Analog Output-3 100% Segmental Point(A3H) parameter to “0%”.
[6] Set the Analog Output-3 0% Segmental Point(A3L) parameter to “75%”.

The figure above shows an example where both analog outputs-1 and 3 are set to the current signal of 4 to 20 mA DC. The type of output signal can be determined separately for each of the analog outputs listed above, using the following three parameters.
Analog output-1: Analog output-1 type (AO1)
Analog output-2: Analog output-2 type (AO2)
Analog output-3: Analog output-3 type (AO3)

[2] When “Parallel-mode Output”

[Example of the parallel-mode output]



[Outline]

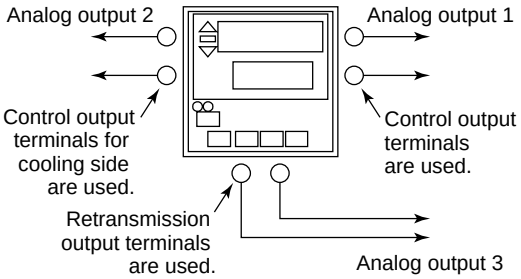


Fig. 2-1-7

The following explains an example of letting “Analog OUTPUT-1 (terminals [16] and [17])” and “Analog OUTPUT-3 (terminals [14] and [15])” present the Parallel-mode characteristics of split computations.

[1] Set the Control Output Type (OT1) parameter to “2”.
This sets the control output to “current output.”
[2] Set the Retransmission Output (RT1) parameter to “3”.
This sets the retransmission output to “control output retransmission.”
[3] Set the Analog Output-1 100% Segmental Point(A1H) parameter to “100%”.
[4] Set the Analog Output-1 0% Segmental Point(A1L) parameter to “25%”.
[5] Set the Analog Output-3 100% Segmental Point(A3H) parameter to “75%”.
[6] Set the Analog Output-3 0% Segmental Point(A3L) parameter to “0%”.

The figure above shows an example where both analog outputs-1 and 3 are set to the current signal of 20 to 0 mA DC. The type of output signal can be determined separately for each of the analog outputs listed above, using the following three parameters.
Analog output-1: Analog output-1 type (AO1)
Analog output-2: Analog output-2 type (AO2)
Analog output-3: Analog output-3 type (AO3)

Table 2-1-6

Parameter	Function	Split computation output terminal	Output signal type setting parameter
A1H	Analog output-1 100% segmental point	Control output terminal (Heating side terminal in Heating/cooling control)	AO1 (Note1)
A1L	Analog output-1 0% segmental point		
A2H	Analog output-2 100% segmental point	Cooling side output terminal Available for the dual-loop type of UT750/UP750 and heating/cooling control of UT55□/UP550.	AO2 (Note1)
A2L	Analog output-2 0% segmental point		
A3H	Analog output-3 100% segmental point	Retransmission-1 output terminal	AO3 (Note1)
A3L	Analog output-3 0% segmental point		

Note1: You can select the output signal type from Table 2-1-7. To select them, use the parameter “AO1”, “AO2” or “AO3”.

Table 2-1-7

Setting range of AO1, AO2 or AO3	Output signal type
0 (Default)	4 to 20mA
1	0 to 20mA
2	20 to 4mA
3	20 to 0mA

● The following parameters are used.

Change parameters as explained in the User's Manuals Initial Settings and Parameter Map.

Table 2-1-8

• Setup parameters (Output-related Parameters): AO1 to AO3 and A1H to A3L

UP750 UP550 UT750 Code	UT5□□ Code	Description	Setting range	Default	D-register No.
AO1	Ao 1 (AO1)	Analog output-1 type	0 : 4 to 20mA 1 : 0 to 20mA 2 : 20 to 4mA 3 : 20 to 0mA	0	1244
AO2	Ao2 (AO2)	Analog output-2 type		0	1245
AO3	Ao3 (AO3)	Analog output-3 type		0	1246
A1H	A 1H (A1H)	Analog output-1 100% segmental point	-5.0 to 105.0 (%) For UT551 -100.0 to 200.0 (%)	100 (%)	1268
A1L	A 1L (A1L)	Analog output-1 0% segmental point		0 (%)	1269
A2H	A2H (A2H)	Analog output-2 100% tumaround point		100 (%)	1270
A2L	A2L (A2L)	Analog output-2 0% segmental point		0 (%)	1271
A3H	A3H (A3H)	Analog output-3 100% segmental point		100 (%)	1272
A3L	A3L (A3L)	Analog output-3 0% segmental point		0 (%)	1273

<<Ref.2.1: References Related to Control output>>

Ref.2.1(8) Setting Preset Output Values

This function can be used with UP750, UP550, UP35□, UT750, UT5□□, UT4□0 and UT3□□.
However, the preset output function differs depending on the controller model.
This section explains the function for each of the following models. Refer to the paragraph that is applicable to your model.

[1] When the model is UP750, UP550, UT750, UT5□□ or UT4□0.
[2] When the model is UP35□, UT35□ or UT32□.

CAUTION

- The default value of the preset output values is set to 0.0% of control output.
  Change the setting value if necessary.
- The setting range of the preset output values is -5.0% to 105.0% of control output.
  However, the preset output value will not be limited even when the “n.OH” and “n.OL” limits of output have been set.

[1] When the model is UP750,UP550,UT750,UT5□□ or UT4□0

In the following situations, the controller outputs the preset output value.

- An input burnout has occurred during the AUTO mode or CAS mode operation.
- An abnormality in an analog/digital conversion circuit has occurred during the AUTO mode or CAS mode operation.
- The status of the controller changed from the operating mode to the stop mode.
  (With UP750 or UP550, the status changed from the operating mode to the reset mode.)

● The following parameters are used.

Change parameters as explained in the User's Manuals Initial Settings and Parameter Map.

• Operating parameters (PID-related Parameters): n.PO and n.Oc

UP750 UP550 Code	UT750 UT5□□ UT4□0 Code	Description	Setting range	Default	D-register No.
n.PO	n.Po (n.PO)	Preset output (Note1)	-5.0 to 105.0 (%) Heating-side: 5.0 to 105.0(%)	0.0	See Table2-1-9
n.Oc	n.oc (n.Oc)	Cooling-side preset output (Note2)	Cooling-side: -5.0 to 105.0(%)	0.0	See Table2-1-9

Note1: Heating-side preset output in heating/cooling control mode.
Note2: The parameter can be displayed in heating/cooling control mode.

Table 2-1-9 D-register No. list

	n=1		n=2		n=3		n=4		n=5		n=6		n=7		n=8	
	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd
n.PO	320	520	345	545	370	570	395	595	420	620	445	645	470	670	495	695
n.Oc	321	521	346	546	371	571	396	596	421	621	446	646	471	671	496	696

The UT551 can output the manual preset output value when the opration mode is changed from Auto to Manual. The control output value is changed to the manual preset output value with a bump at operation mode changing.

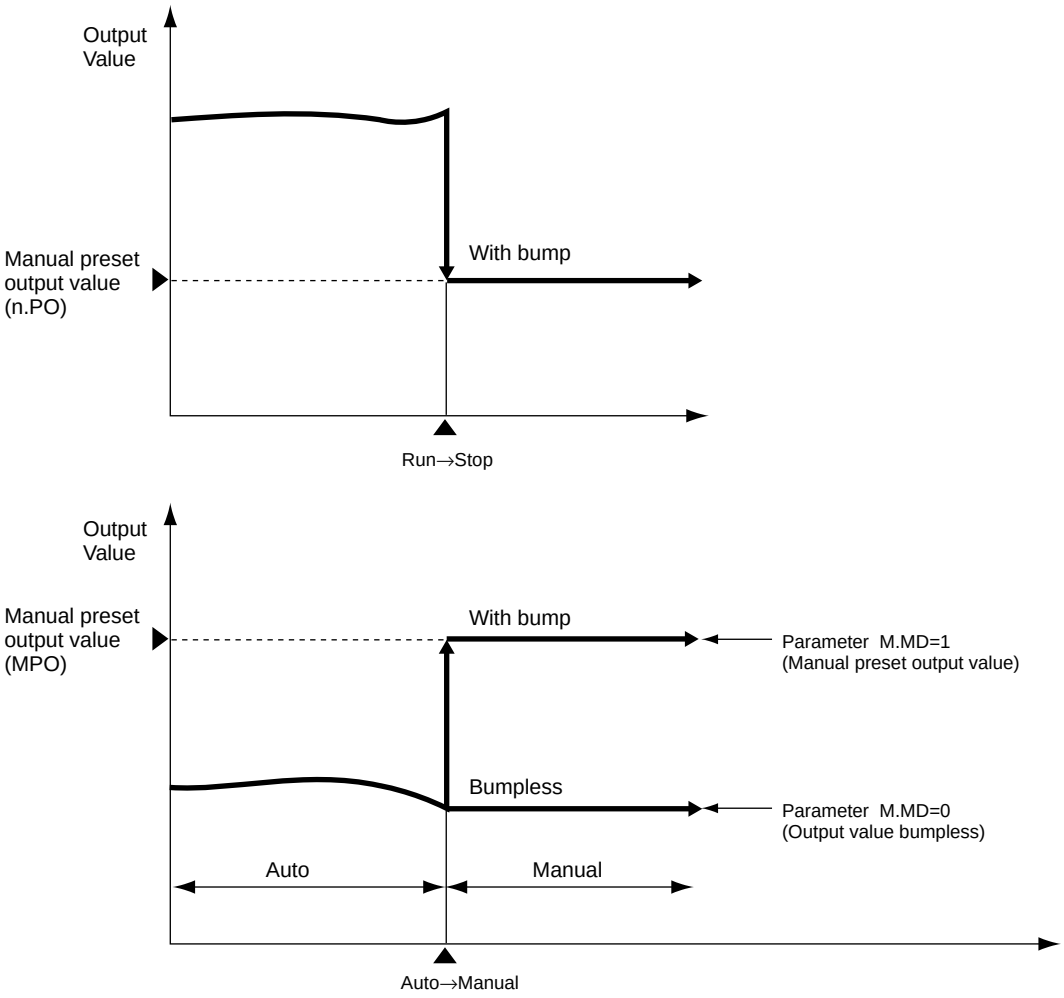


Fig. 2-1-8 Action when the operation mode is change from Auto to Manual

• Operating parameters: M.MD and MPO

UT551 Code	Description	Setting range	Default	D-register No.
nnd (M.MD)	Manual preset outout selection	0: Automatic operation output at switching (bumpless) 1: Manual preset outout value (MPO)	0	See Table2-1-10
nPo (MPO)	Manual preset outout value (MPO)	-5.0 to 105.0 (%) However, output is limited to the output high limit (OH) and low limit (OL) manual operation. In heating/cooling control, internal computation result before splitted into heating-side and cooling-side signals.	0.0	See Table2-1-10

Table 2-1-10 D-register No. list for the parameters of manual preset output value

	1st	2nd
M.MD	980	982
MPO	981	983

[2] When the model is UP35□,UT35□ or UT32□

In the following situations, the controller outputs the preset output value.

- An input burnout has occurred during the AUTO mode operation.
- An abnormality in an analog/digital conversion circuit has occurred during the AUTO mode operation.
- With UP35□, the status changed from the operating mode to the reset mode.

● The following parameters are used.

Change parameters as explained in the User's Manuals Initial Settings and Parameter Map.

• Setup parameters (Control Function-related Parameters): PO and POc (Note2)

UP35□ UT3□□ Code	Description	Setting range	Default	D-register No.
Po (PO)	Preset output (Note1)	-5.0 to 105.0 (%)	0.0	924
Poc (POc)	Cooling-side preset out (Note2)	0.0 to 105.0 (%)	0.0	925

Note1: Heating-side preset output in heating/cooling control mode.
The setting range in heating/cooling control mode is 0.0 to 105.0% of control output
Note2: The parameter can be displayed in heating/cooling control mode. UP35□ does not have the parameter.

<<Ref. -2.1: References Related to Control Output>>-

Ref.2.1(9) Placing Control Output in Tracking Mode (for Cascade Primary-loop Control or Loop Control for Backup)

Placing the control output in tracking mode is possible with the UP750, UP550, UT750, UT550, UT551 and UT520.

As noted in the heading above, this feature works only when the controller is used for cascade primary-loop control or loop control for backup (though the UP750 and UP550 do not support loop control for backup).

Output tracking is a function with which switching is carried out between an external tracking input signal and the control output signal of the controller by means of a contact input or communication. The output tracking function works only when the controller is in either of the two control modes discussed above. Fig. 2-1-8 briefly illustrates how this function works.

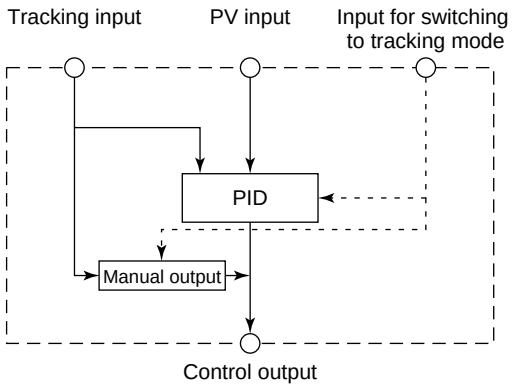


Fig. 2-1-8 Output Tracking Function

<<Ref. 2.1: References Related to Control Output>>
Ref.2.1(10) Using Shutdown Function

Using the shutdown function is possible with the UP750, UP550, UT750, UT550, UT551 and UT520.
The shutdown function is designed to fully close a control valve (forcibly zeroes the output) by sending a signal level beyond the limit of the dead band of the positioner of the valve. This function is enabled by setting the output limiter's lower limit (n.OL [n = 1 to 8] parameter) to the option "SD" when the controller is set to a 4 to 20 mA current output signal and in manual mode.

- When in automatic mode operation
  The output limiter's lower limit is set at -5.0% and is not lowered to 0.0 mA.
- When in manual mode operation
  The control output delivers a shutdown signal (approximately 0.0 mA) when decreased to the setpoint SD with the ▽ key (the SD symbol is displayed as the output value).

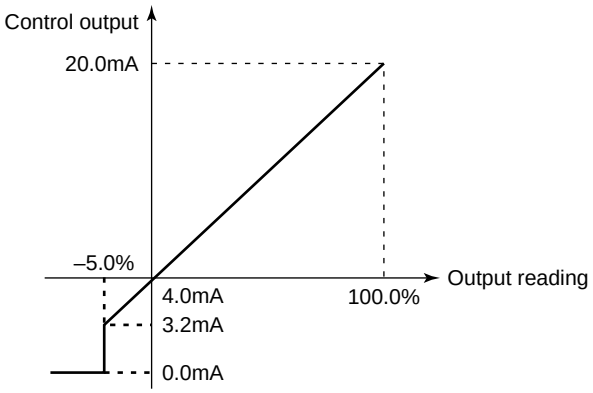


Fig. 2-1-9 Relationship between Output and Shutdown Levels in Continuous PID Control Mode

Ref.2.2: References Related to Retransmission Output

IMPORTANT: Applicable models of this section

UP750	UP550	UP35□	UT750	UT5□□	UT4□0	UT3□□
UP750-□□	UP550-□□	UP35□-□□	UT750-□□	UT55□-□□ UT520-□□	UT450-□□ UT420-□□	UT35□-□□ UT32□-□□

Note: The functions discussed in this section apply to all the models of UT and UP series.
However, some of the functions are unavailable with certain models.
Such models, if any, will be clearly noted in each of the following items from (1) to (3).

These sections provide references related to Retransmission Output, listed below.
Only read the following descriptions if necessary and carry out the required operation.

(1) Changing the type of retransmission output signal
(2) Retransmitting program pattern 2 (for UP750/UP550 only)
(3) Using the loop power supply function

<<Ref. 2.2: Reference Related to Retransmission Output>>

Ref.2.2(1) Changing the type of retransmission output signal

The type of retransmission output signal can be changed with all the GREEN Series UT or UP Controllers.
We show the changing way with UP750,UP550,UT750, UT550, UT551 and UT520 below.
The way with UP35□, UT450, UT420, UT35□ and UT32□ are shown in the next page.

[1] When the Model Is UP750, UP550,UT750 or UT5□□

The type of retransmission output signal is changed using the following setup parameter.
Change the parameter settings as explained in the Initial Settings or Parameters user's manual that comes with your controller.

- Setup parameters (Retransmission Output Parameters) : RET1, RET2 (Note1)

UP750 UP550 UT750 Code	UT5□□ Code	Description	Setting range	Default	D-register No.
RET1	rt1 (RT1)	Retransmission output -1 type selection	OFF or 1 to 7 (Note2)	1	1013
RET2	rt2 (RT2)	Retransmission output -2 type selection	OFF or 1 to 7 (Note2)	OFF	1016

Note1: The parameter RT1 and RT2 are parameters with UT550, UT551 and UT520.
Note2: See the below Table 2-2-1 for the meaning of the setting values .

Table 2-2-1 Parameter Settings and Types of Retransmission Output

Parameter Setting	Type of Retransmission Output	
OFF	Turns the function off (no retransmission output is used).	
1	PV1 (Measured value 1)	(TIP1)
2	SP1 (Setpoint 1)	(TIP1)
3	OUT1 (Control output 1)	(TIP1)
	However, the following conditions apply if the parameter is set to "3". • In position proportional control, a valve opening (0 to 100%) is output. • In heating/cooling control, the output value before allocation to the heating and cooling sides is output. (0 to 50%: Cooling-side output, 0 to 50%: Heating-side output)	
4	Loop power supply (Note 1)	
5	PV2 (Measured value 2) (Note 2)	(TIP2)
6	SP2 (Setpoint 2) (Note 2)	(TIP2)
7	OUT2 (Control output 2) (Note 2)	(TIP2)
8	TSP1 (Target setpoint 1)	(TIP3)
9	HOUT1 (Heating-side control output in the control other than cascade control)	(TIP3)
10	COUT1 (Cooling-side control output in the control other than cascade control)	(TIP3)
11	OUT1 (Position proportional control output in the control other than cascade control) (Internally computed output)	(TIP3, TIP4)
12	TSP2 (Target setpoint 2)	(TIP3)
13	HOUT2 (Heating-side control output in cascade control)	(TIP3)
14	COUT2 (Cooling-side control output in cascade control)	(TIP3)
15	OUT2 (Position proportional control output in cascade control) (internally computed output)	(TIP3, TIP4)
16	AI1 (Analog input 1) (Setup parameter RL1 to RH1)	(TIP3)
17	AI3 (Analog input 3) (Setup parameter RL3 to RH3)	(TIP3)

Note1: For more information on the loop power supply, see "(3) Using the Loop Power Supply Function."
Note2: PV2, SP2 and OUT2 are available for controller modes (UP/UT modes) that use a secondary loop. These types of retransmission output cannot be used for single-loop control. This feature is not supported with the UP35□, UT4□0 and UT3□0.

TIP1: The retransmission range can be represented with the PV input range scaled with RTH1* (Max. value) and RTL1* (Min. value).
TIP2: The retransmission range can be represented with the PV input range scaled with RTH2* (Max. value) and RTL2* (Min. value).
*: When UT5□□, TH1, TH2, TL1 and TL2 are used.
TIP3: The setpoints "8" to "17 " can be set for UT551 only. However, the UT551 with embedded Ethernet dose not have heating/cooling control.
TIP4: When opening or closing a valve by key operation in manual mode opration, the transmission output becomes -5.0 %.

[2] When the Model Is UP35□, UT4□0 or UT3□□

The type of retransmission output signal is changed using the following setup parameter.
Change the parameter settings as explained in the Initial Settings or Parameters user's manual that comes with your controller.

- Setup parameters (Retransmission Output Parameters) : RET

UP35□ UT4□0 UT3□□ Code	Description	Setting range	Default	D-register No.
rEt (RET)	Retransmission output -1 type	OFF or 1 to 4 (Note1)	1	1013

Note1: See the below Table 2-2-2 for the meaning of the setting values .

Table 2-2-2 Parameter Settings and Types of Retransmission Output

Parameter Setting	Type of Retransmission Output
OFF	Turns the function off (no retransmission output is used).
1	PV1 (Measured value 1) *TIP
2	SP1 (Target setpoint 1) *TIP
3	OUT1 (Control output 1) *TIP However, the following conditions apply if the parameter is set to "3". • In position proportional control, a valve opening (0 to 100%) is output. • In heating/cooling control, the output value before allocation to the heating and cooling sides is output. (0 to 50%: Cooling-side output, 0 to 50%: Heating-side output)
4	Loop power supply (Note 1)

Note1: For more information on the loop power supply, see "(3) Using the Loop Power Supply Function."
*TIP: The retransmission range can be represented with the PV input range scaled with RTH (Max. value) and RTL (Min. value).

<<Ref. 2.2: References Related to Retransmission Output>>

Ref.2.2(2) Retransmitting Program Pattern 2 (for UP750/UP550 only)

CAUTION

The UP750 and UP550 can retransmit program pattern 2 as explained below, though this is not possible with the following controller modes (UP modes) of these controllers.

- UP750: Cascade control, dual-loop control, temperature and humidity control, cascade control with universal input
- UP550: Cascade control

The UP750 and UP550 can retransmit program pattern 2 that is set for running on loop 2. For this reason, they can also serve as program generators. Both controllers can retransmit program pattern 2 at the same time when they are running their own program patterns.

TIP

The “PT2.G” parameter designed for this function is called the “Program Pattern 2 Retransmission” parameter, because it retransmits a program pattern used for loop 2.

To retransmit program pattern 2, the “RET1” and “RET2” setup parameters discussed in the previous section and the “PT2.G” parameter related to target setpoints are used. The terminals used for retransmission differ depending on which of the “RET1” or “RET2” parameters you select; therefore, you should also be careful with terminal wiring. Furthermore, exercise care not to use these terminals for control output.

Follow the steps below to configure these parameters:

[1] Set the “PT2.G” parameter to “ON”.
[2] Set either the “RET1” or “RET2” parameter to “6”.
As discussed earlier, the setting value “6” is used to select the target setpoint-2 (SP2) retransmission output.

This completes parameter setting.

Program pattern retransmission will begin at the same time when the controller goes into program operation.

● **The following parameters are used.**

Change parameters as explained in the User’s Manuals Initial Settings and Parameter Map.

- Setup parameters (Target Setpoint related Parameters) : PT2.G

UP750 UP550 Code	Description	Setting range	Default	D-register No.
PT2.G	Program pattern -2 retransmission	OFF or ON	OFF	906

<<Ref. 2.2: References Related to Retransmission Output>>

Ref.2.2(3) Using the Loop Power Supply Function

CAUTION

The loop power supply is available in two voltage levels.

(1) The 14.5 to 18.0V DC (21 mA DC) voltage level is the standard loop power supply for all controller models. This standard feature becomes available when you specify the type of retransmission output. See the explanation given below.

(2) The 21.6 to 28.0V DC (30 mA max.) voltage level is added to your controller as an option if specified (by the option code) at the time of ordering. This optional feature is assigned to specific terminals prior to delivery. Therefore, you can use the feature directly without having to select a type of retransmission output as explained below.

[1]Using the Standard Loop Power Supply

As discussed in “Ref. 2.2 (1) Changing the Type of Retransmission Output” earlier in this section, set the relevant parameter (see the table below) to “4” in order to use the standard loop power supply.

• Setup parameters (Retransmission Output Parameters)

UP750 UP550 UT750 Code	UT5□□ Code	UP35□ UP4□0 UT3□□	Description	Setting range
RET1	rt1 (RT1)	rET (RET)	Retransmission output 1 type selection	4
RET2	rt2 (RT2)	(Note)	Retransmission output 2 type selection	4 (Note)

Note: “Retransmission output 2 type selection” is not supported with the UP35h, UT4h0 and UT5hh.

The terminals used for retransmission differ depending on which of the “RET1” or “RET2” parameters you select; therefore, you should also be careful with terminal wiring. Furthermore, exercise care not to use these terminals for control output at the same time.

[2]About the Loop Power Supply Function

The loop power supply function supplies DC power to instruments, such as a two-wire transmitter. The loop power supply block is isolated from the controller's internal circuitry. In addition, the block is equipped with a current-limiting circuit. Therefore, accidental short-circuits that may occur in the field do not adversely affect the rest of the controller's internal circuitry.
Note that the loop power supply function cannot be used for digital communication where the supply voltage is superposed on the signal line.

As explained earlier, there are two types of loop power supply: the standard and optional power supplies. Use either of them according to your application needs.

	Specifications of Loop Power Supply
Standard supply	14.5 to 18.0V DC (21 mA DC)
Optional supply	21.6 to 28.0V DC (30 mA DC max.)

Examples of loop power supply connection are given below.

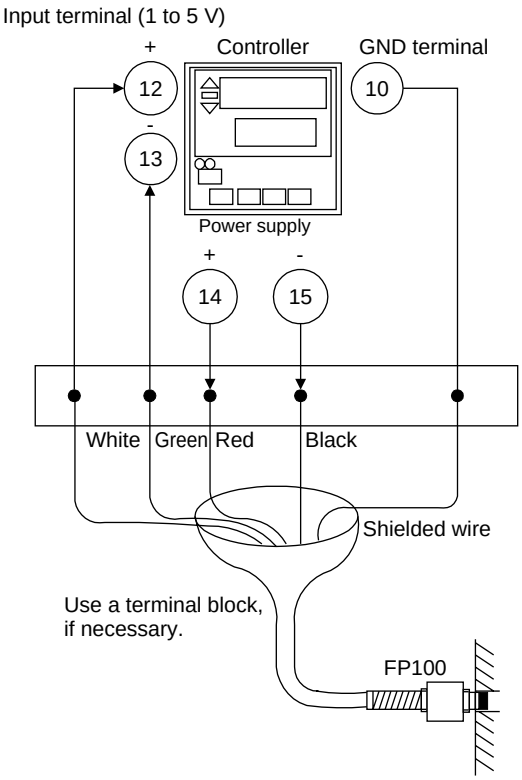


Fig. 2-2-1 Example of Connection with FP100 Cable

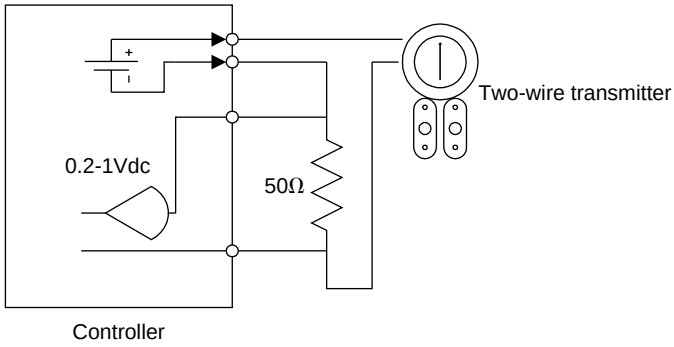


Fig. 2-2-2 Example of Connection to Two-wire Transmitter

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Ref.3.1: References Related to Contact Input

IMPORTANT: Applicable models of this section

UP750	UP550	UP35□	UT750	UT5□□	UT4□0	UT3□□
UP750-□□	UP550-□□	UP35□-□□	UT750-□□	UT55□-□□ UT520-□□	UT450-□□ UT420-□□	UT35□-□□ UT32□-□□

Note: The functions discussed in this section apply to all the models of UT and UP series.
However, some of the functions are unavailable with certain models.
Such models, if any, will be clearly noted in each of the following items from (1) to (7).

CAUTION

The contact input functions of a UT/UP series controller are pre-assigned to their respective input terminals when the controller is shipped from the factory. The function assignments in each of the UT/UP modes are defined in terms of the most frequently used. Check the controller model you will use and the factory-set terminal assignments for each controller mode of the model. Changes should only be made if you require any of the functions listed below or need to change any of the terminal numbers.
If you change any of the contact input terminal assignments, check that the new assignment agrees with the current wiring. If necessary, rewire the terminals.

This section contains reference information on the following aspects of contact input functions. Refer to this information and change parameter settings only if necessary.

This section explains the function for each of the following models. Refer to the paragraph that ia applicable to your model.

When the UT series controllers

(1) Changing contact input functions for the UT35□/UT32□
(2) Changing contact input functions for the UT450/UT420
(3) Changing contact input functions for the UT55□/UT520

Note : The function discussed in the following reference topic are not included in your controller model, and these are not described in this manual.

(4) Changing contact input functions for the UT750
(4-1) Changing contact input terminal assignments of the UT750
(4-2) Using contact I/O expansion module with the UT750
(4-3) Using Interrupt-message functions with the UT750
(4-4) Using Interrupt-operating display functions with the UT750

When the UP series controllers

(5) Changing contact input functions for the UP35□
(6) Changing contact input functions for the UP550
(7) Changing contact input functions for the UP750
(7-1) Changing contact input terminal assignments of the UP750
(7-2) Using contact I/O expansion module with the UP750
(7-3) Using Interrupt-message functions with the UP750
(7-4) Using Interrupt-operating display functions with the UP750

When the UT series controllers

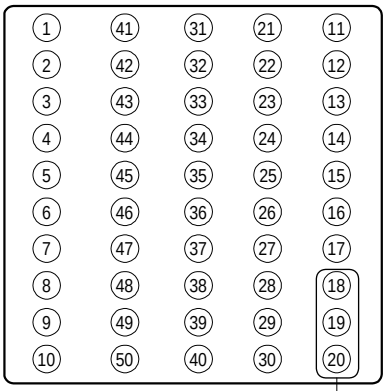
<<Ref. 3.1: References Related to Contact Input>>

Ref.3.1(1) Changing contact input functions for the UT35□/UT32□

Each UT35□ and UT32□ comes with three contact input terminals that can be used, for example, to change the operation mode. When the controller is shipped from the factory, the terminals are set to the functions "switching between target setpoints 1 and 2" and "switching between the auto and manual modes."

The terminal numbers are 18, 19 and 20 (common terminals). Terminal 18 is assigned as DI1 (for contact input 1) and terminal 19 as DI2 (for contact input 2). (See the terminal wiring diagrams in the Installation user's manual.)

< UT35□ Terminal Arrangement >



△ Tip : The terminal numbers of UT32□ are same as of UT35□.

* DIS is a setup parameter.
Changing DIS setpoint allows you to change the function of external contact input.

Terminal	Correspondence between parameters DIS and external contact input functions					
	When DIS=OFF	When DIS=1 (Factory-shipped setting)	When DIS=2	When DIS=3	When DIS=4	Contact
DI1 (No.19)	No function	2.SP when DI1=ON 1.SP when DI1=OFF	Hides the LOCK parameter when DI1=ON. Shows the LOCK parameter when DI1=OFF.	When switching target SP 1 to 4:	2.SP when DI1=ON 1.SP when DI1=OFF	UT DI1 19
DI2 (No.18)	No function	AUTO when DI2=ON MAN when DI2=OFF	No function	DI1 OFF ON OFF ON DI2 OFF OFF ON ON	STOP when DI2=ON RUN when DI2=OFF	DI2 18
COM. (No.20)	Common	Common	Common	Common	Common	COM 20

Fig. 3-1-1 UT35□/UT32□ Contact Input Terminals

The UT35□ and UT32□ are designed so that the functions assigned to their contact input terminals can be changed using the "DIS" setup parameter. If necessary, reassign functions by referring to the table in the Fig. 3-1-1.

● The following parameters are used.
Change parameters as explained in the User's Manuals Initial Settings and Parameter Map.

• Setup parameters (I/O-related Parameters): DIS

UT35□ UT32□ Display	Description	Setting range	Default	D-register No.
dI S (DIS)	DI function selection	OFF: Turns contact input off. 1: • Assigns the functions of switching between 2.SP and 1.SP to DI1. (Note1) • Assigns the function of switching between auto and manual modes to DI2. (Note1) 2: • Assigns the function of showing and hiding the "Keylock (LOCK)" setup parameter setting display to DI1. (Note2) • Nothing is assigned to DI2. 3: • Assigns the function of selecting the target setpoint number by turning on or off the DI1 and DI2 contact inputs. (Note3) 4: • Assigns the function of switching between 2.SP and 1.SP to DI1. (Note4) • Assigns the function of switching between the STOP and RUN statuses to DI2. (Note4)	1	932

Note1: When switching between setpoints 2.SP and 1.SP is assigned, 2.SP is selected when the contact is ON and 1.SP is selected when the contact is OFF. In operation mode switching, the auto mode is selected when the contact is ON and the manual mode is selected when the contact is OFF.
Note2: The "Keylock (LOCK)" setup parameter setting display is hidden when the DI1 contact is ON and is shown when the contact is OFF. This function of hiding the keylock parameter using external input is an extra safeguard against erroneous operations.
Note3: The ON and OFF states of the DI1 and DI2 contact inputs can be programmed as shown below to define four choices of target setpoints.

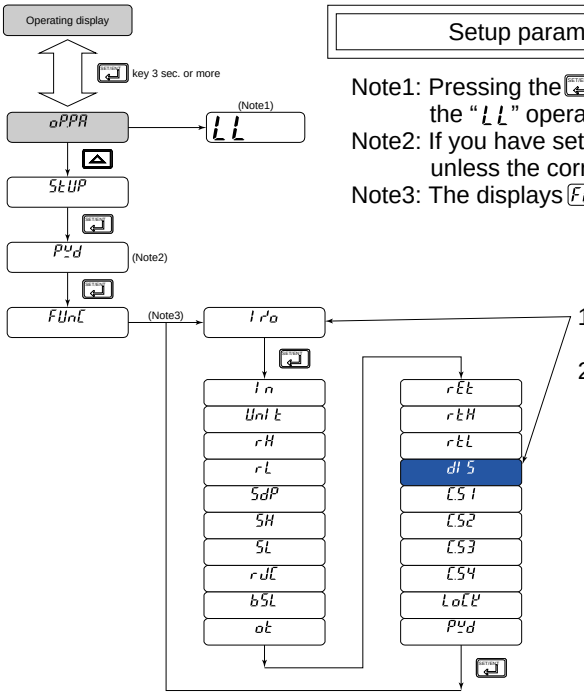
	DI1	DI2
1.SP	OFF	OFF
2.SP	ON	OFF
3.SP	OFF	ON
4.SP	ON	ON

Note4: When switching between the target setpoints 2.SP and 1.SP is assigned, 2.SP is selected when the contact is ON and 1.SP is selected when the contact is OFF. In the case of switching between the STOP and RUN statuses, the STOP status is selected when the contact is ON and the RUN status is selected when the contact is OFF.

Part of the parameter map for the UT35□/UT32□ is shown below. Refer to it when changing parameter values in order to access the desired parameter setting display.

CAUTION

If you change any contact input terminal assignment, check that the new assignment agrees with the current wiring. If necessary, rewire the terminals.



Setup parameter map

Note1: Pressing the key on the [OP.PA] display changes to the "LL" operating parameter setting display.
Note2: If you have set a password, "[FUNC]" is not displayed unless the correct password is entered.
Note3: The displays FUnC and I/O can be switched with or key.

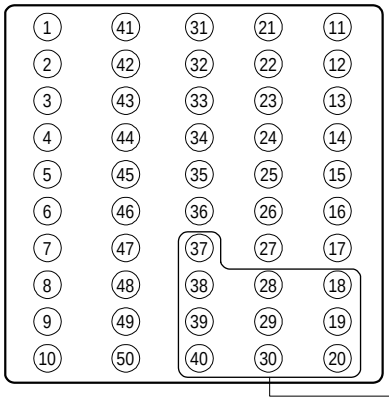
1. Call up the "I/O" display. (Refer to the Note 1 to 3 above)
2. Press the key to display the parameter "DIS" setting display.

<<Ref. 3.1: References Related to Contact Input>>

Ref.3.1(2) Changing contact input functions for the UT450/UT420

With UT450, 9 (Max.) contact input terminals can be used. (Note)
The terminal numbers are 18, 19, 20 (common terminal), 28, 30 (common terminal), 37, 38, 39 and 40.
With UT420, 6 (Max.) contact input terminals can be used. (Note)
The terminal numbers are 18, 19, 20 (common terminal), 28, 29 and 30 (common terminal).

< UT450 Terminal Arrangement >



Note : The numbers of contact Input terminals differ according to the controllers suffix code. Check the numbers of input terminals (DI1 to DI6 and R/L) of the controller that you have by the following table.

○: shows "available" , ×: shows "not available"

Model and suffix codes	Contact input terminals						
	DI1	DI2	DI3	DI4	DI5	DI6	R/L
UT450-□0	○	○	×	×	×	×	×
UT450-□1	○	○	○	○	○	○	○
UT450-□2	○	○	×	×	×	×	○
UT450-□3	○	○	○	○	○	○	×
UT450-□4	○	○	×	×	×	×	○
UT420-00	○	○	×	×	×	×	×
UT420-07	○	○	○	×	×	×	○
UT420-08	○	○	○	×	×	×	○

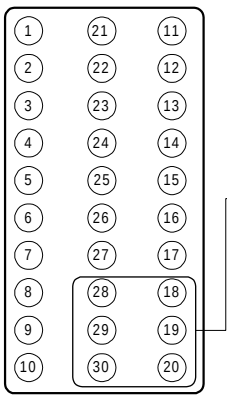
* DIS is a setup parameter.
Changing DIS setpoint allows you to change the function of external contact input.

Terminal	Correspondence between parameter DIS and external contact input functions					
	When DIS=0	When DIS=1 (Factory-shipped setting)	When DIS=2	When DIS=3	When DIS=4	Contact
DI1 (No.19)	No function	AUTO when DI1=ON MAN when DI1=OFF	AUTO when DI1=ON MAN when DI1=OFF	STOP when DI1=ON RUN when DI1=OFF	When switching target SP 1 to 4: 1.SP 2.SP 3.SP 4.SP DI1 OFF ON OFF ON DI2 OFF OFF ON ON	DI1 19
DI2 (No.18)	No function	STOP when DI2=ON RUN when DI2=OFF	2.SP when DI2=ON 1.SP when DI2=OFF	2.SP when DI2=ON 1.SP when DI2=OFF		DI2 18
DI3 (No.40)	No function	When switching target SP 1 to 8: 1.SP 2.SP 3.SP 4.SP 5.SP 6.SP 7.SP 8.SP DI3 ON OFF ON OFF ON OFF ON OFF DI4 OFF ON ON OFF OFF ON ON OFF DI5 OFF OFF OFF ON ON ON ON OFF DI6 OFF OFF OFF OFF OFF OFF OFF ON * If all of the contact inputs are set to OFF, the controller uses the immediately preceding target setpoint.	STOP when DI3=ON RUN when DI3=OFF	AUTO when DI3=ON MAN when DI3=OFF	STOP when DI3=ON RUN when DI3=OFF	DI3 40
DI4 (No.39)	No function		No function	No function	AUTO when DI4=ON MAN when DI4=OFF	DI4 39
DI5 (No.38)	No function		No function	No function	No function	DI5 38
DI6 (No.37)	No function		No function	No function	No function	DI6 37
COM. (No.20)	No function	Common	Common	Common	Common	COM 20
R/L (No.28)	Remote when R/L=ON Local when R/L=OFF	Remote when R/L=ON Local when R/L=OFF	Remote when R/L=ON Local when R/L=OFF	Remote when R/L=ON Local when R/L=OFF	Remote when R/L=ON Local when R/L=OFF	R/L 28
COM. (No.30)	Common	Common	Common	Common	Common	COM 30

Contact rating: 12 V DC, 10 mA or more

Fig. 3-1-2 UT450 Contact Input Terminals

< UT420 Terminal Arrangement >



* DIS is a setup parameter.
Changing DIS setpoint allows you to change the function of external contact input.

Terminal	Correspondence between parameter DIS and external contact input functions					
	When DIS=0	When DIS=1 (Factory-shipped setting)	When DIS=2	When DIS=3	When DIS=4	Contact
DI1 (No.19)	No function	AUTO when DI1=ON MAN when DI1=OFF	AUTO when DI1=ON MAN when DI1=OFF	STOP when DI1=ON RUN when DI1=OFF	When switching target SP 1 to 4: 1.SP 2.SP 3.SP 4.SP DI1 OFF ON OFF ON DI2 OFF OFF ON ON	DI1 19
DI2 (No.18)	No function	STOP when DI2=ON RUN when DI2=OFF	2.SP when DI2=ON 1.SP when DI2=OFF	2.SP when DI2=ON 1.SP when DI2=OFF		DI2 18
COM. (No.20)	No function	Common	Common	Common	Common	COM 20
DI3 (No.24)	No function	No function	STOP when DI3=ON RUN when DI3=OFF	AUTO when DI3=ON MAN when DI3=OFF	STOP when DI3=ON RUN when DI3=OFF	DI3 29
R/L (No.28)	Remote when R/L=ON Local when R/L=OFF	Remote when R/L=ON Local when R/L=OFF	Remote when R/L=ON Local when R/L=OFF	Remote when R/L=ON Local when R/L=OFF	Remote when R/L=ON Local when R/L=OFF	R/L 28
COM. (No.30)	Common	Common	Common	Common	Common	COM 30

Contact rating: 12 V DC, 10 mA or more

Fig. 3-1-3 UT420 Contact Input Terminals

The UT450's DI numbers (DI No.) and the corresponded terminal numbers are listed in the Table 3-1-1. (The factory-set function of each terminal is listed in the table.)
The Table 3-1-3 shows the UT420's. (The factory-set function of each terminal is listed in the table.)

Table 3-1-1 (When the UT450)

Terminal No.	DI No.	The factory-set function
19	DI1	Assigns the function of switching between auto and manual modes.
18	DI2	Assigns the function of switching between STOP and RUN statuses.
40	DI3	Assigns the function of selecting the target setpoint number (1.SP to 8.SP). (Note1)
39	DI4	
38	DI5	
37	DI6	
20	Common terminal	
28	R/L	Assigns the function of switching between remote and local modes.
30	Common terminal	

Note1: The ON and OFF status of the DI3, DI4, DI5 and DI6 contact inputs can be programmed as shown in the Table 3-1-2 to define eight (8) choices of target setpoints.

Table 3-1-2

	DI3	DI4	DI5	DI6
1.SP	ON	OFF	OFF	OFF
2.SP	OFF	ON	OFF	OFF
3.SP	ON	ON	OFF	OFF
4.SP	OFF	OFF	ON	OFF
5.SP	ON	OFF	ON	OFF
6.SP	OFF	ON	ON	OFF
7.SP	ON	ON	ON	OFF
8.SP	OFF	OFF	OFF	ON

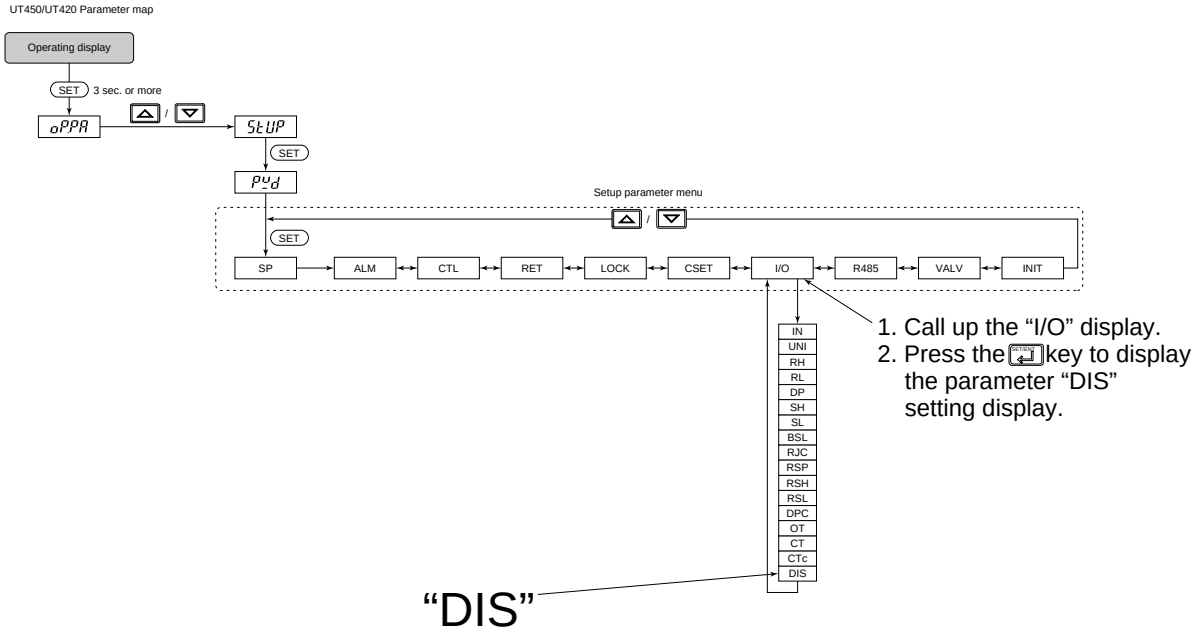
Table 3-1-3 (When the UT420)

Terminal No.	DI No.	The factory-set function
19	DI1	Assigns the function of switching between auto and manual modes.
18	DI2	Assigns the function of switching between STOP and RUN statuses.
20	Common terminal (for DI1 and DI2)	
29	DI3	No function
28	R/L	Assigns the function of switching between remote and local modes.
30	Common terminal (for DI3 and R/L)	

The UT450 and UT420 are designed so that the functions assigned to their contact input terminals can be change using the “DIS” setup parameter.
If necessary, reassign functions by referring to the “DIS” setup parameter table on page Ref. 3-8.

CAUTION

If you change any of the contact input terminal assignments, check that the new assignment agree with the current wiring. If necessary, rewire the terminals.



● The following parameters are used.
Change parameters as explained in the User's Manuals Initial Settings and Parameter Map.

• Setup parameters (I/O-related Parameters): DIS

Refer to table in Fig. 3-1-2 when you want to confirm the terminal numbers those are used for contact input.

UT450 UT420 Display	Description	Setting range	Default	D-register No.
dI 5 (DIS)	DI function selection	0: Remote/local mode switching function only. (This function is only assigned to terminals 28 and 30) (Note1) 1: • Switches between remote and local modes. (Note1) • Assigns auto/manual mode switching function to DI1. (Note2) • Assigns STOP/RUN status switching function to DI2. (Note3) • The UT450 is designed so that eight choices of setpoint numbers for controller operation can be defined by programming the ON/OFF states of DI3 to DI6 contact inputs. (Note4) The UT420 is not capable of switching among eight setpoints. 2: • Switches between remote and local modes. (Note1) • Assigns auto/manual mode switching function to DI1. (Note2) • Assigns 2.SP/1.SP switching function to DI2. (Note5) • Assigns STOP/RUN status switching function to DI2. (Note3) 3: • Switches between remote and local modes. (Note1) • Assigns STOP/RUN status switching function to DI1. (Note3) • Assigns 2.SP/1.SP switching function to DI2. (Note5) • Assigns auto/manual mode switching function to DI3. (Note2) 4: • Switches between remote and local modes. (Note1) • Four choices of setpoint numbers for controller operation can be defined by programming the ON/OFF states of DI1 and DI2 contact inputs. (Note6) • Assigns STOP/RUN status switching function to DI3. (Note3) • The UT450 is designed so that the auto/manual mode switching function can be assigned to DI4. (Note2) The UT420 has no DI4 contact input, so this function is not available.	1	932

Note1: The remote/local mode switching function is always available irrespective of the "DIS" parameter setting. Terminals 28 and 30 are always used for this purpose. The remote mode is selected when the contact is ON, whereas the local mode is selected when the contact is OFF.
Note2: With operation mode switching, the auto mode is selected when the contact is ON and the manual mode is selected when the contact is OFF.
Note3: With STOP/RUN status switching, the STOP status is selected when the contact is ON and the RUN status is selected when the contact is OFF.
Note4: Eight choices of target setpoint numbers can be defined by programming the ON/OFF states of DI3 to DI6 contact inputs.

	DI3	DI4	DI5	DI6
1.SP	ON	OFF	OFF	OFF
2.SP	OFF	ON	OFF	OFF
3.SP	ON	ON	OFF	OFF
4.SP	OFF	OFF	ON	OFF
5.SP	ON	OFF	ON	OFF
6.SP	OFF	ON	ON	OFF
7.SP	ON	ON	ON	OFF
8.SP	OFF	OFF	OFF	ON

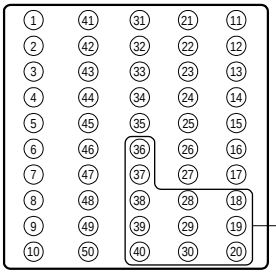
Note5: With 2.SP/1.SP setpoint switching, 2.SP is selected when the contact is ON and 1.SP is selected when the contact is OFF.
Note6: The following four choices of target setpoint numbers can be defined by programming the ON/OFF states of DI1 and DI2 contact inputs.

	DI1	DI2
1.SP	OFF	OFF
2.SP	ON	OFF
3.SP	OFF	ON
4.SP	ON	ON

<<Ref. 3.1: References Related to Contact Input>>
Ref.3.1(3) Changing contact input functions for the UT550/UT551/UT520

With UT55□, 10 (Max.) contact input terminals can be used. (Note)
The terminal numbers are 18, 19, 20 (common terminal), 28, 30 (commmon terminal), 36, 37, 38, 39 and 40.
With UT520, 6 (Max.) contact input terminals can be used. (Note)
The terminal numbers are 18, 19, 20 (common terminal), 28, 29 and 30 (commmon terminal).

< UT550/UT551 Terminal Arrangement >



Note: The numbers of contact Input terminals differ according to the controllers suffix code.Check the numbers of input terminals (DI1 to DI8) of the controller that you have by the following table.

○: shows “available” , ×: shows “not available”

Model and suffix codes	Contact input terminals							
	DI1	DI2	DI3	DI4	DI5	DI6	DI7	DI8
UT55□-□0, UT551-□A	○	○	×	×	×	×	×	×
UT55□-□1, UT551-□B	○	○	○	○	○	○	○	○
UT55□-□2, UT551-□C	○	○	×	×	×	×	×	○
UT55□-□3, UT551-□D	○	○	○	○	○	○	○	×
UT55□-□4	○	○	×	×	×	×	×	○
UT520-00	○	○	×	×	×	×	×	×
UT520-07	○	○	○	×	×	×	×	○
UT520-08	○	○	○	×	×	×	×	○

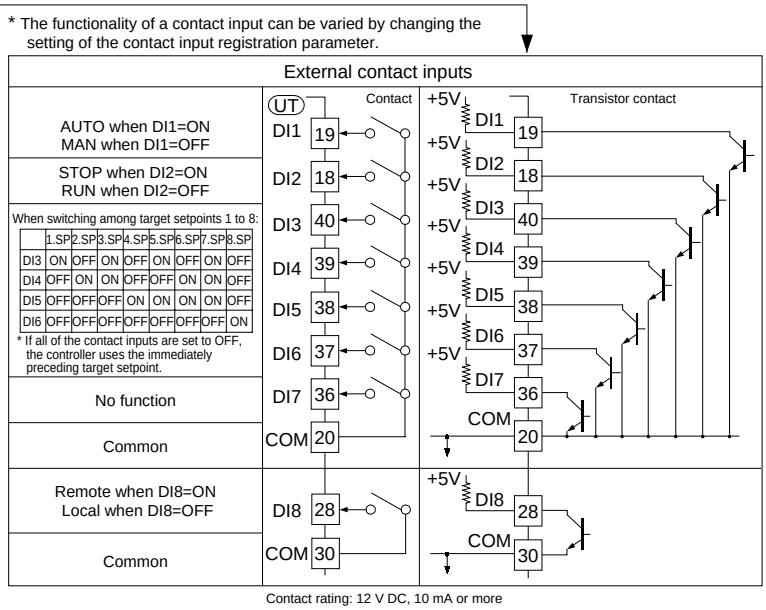


Fig. 3-1-4 UT5□□ Contact Input Terminals

The UT550/UT551’s DI numbers (DI No.) and the corresponded terminal numbers are listed in the Table 3-1-4. (The factory-set function of each terminal is listed in the table.)
The Table 3-1-6 shows the UT520’s . (The factory-set function of each terminal is listed in the table.)

Table 3-1-4 (When the UT550/UT551, Single-loop control mode : UT mode 1)

Terminal No.	DI No.	(“I relay” no. +5000)	The factory-set function
19	DI1	(5161)	Assigns the function of switching between auto and manual modes.
18	DI2	(5162)	Assigns the function of switching between STOP and RUN statuses.
40	DI3	(5163)	Assigns the function of selecting the target setpoint number (1.SP to 8.SP). (Note1)
39	DI4	(5164)	
38	DI5	(5165)	
37	DI6	(5166)	
36	DI7	(5167)	no function
20	Common terminal (for DI1 to DI7)		
28	DI8	(5168)	Assigns the function of switching between remote and local modes.
30	Common terminal (for DI8)		

Note1: The ON and OFF status of the DI3, DI4, DI5 and DI6 contact inputs can be programmed as shown in the Table 3-1-5 to define eight (8) choices of target setpoints.

Table 3-1-5

	DI3	DI4	DI5	DI6
1.SP	ON	OFF	OFF	OFF
2.SP	OFF	ON	OFF	OFF
3.SP	ON	ON	OFF	OFF
4.SP	OFF	OFF	ON	OFF
5.SP	ON	OFF	ON	OFF
6.SP	OFF	ON	ON	OFF
7.SP	ON	ON	ON	OFF
8.SP	OFF	OFF	OFF	ON

Table 3-1-6 (When the UT520, Single-loop control mode : UT mode 1)

Terminal No.	DI No.	("I relay" no. +5000)	The factory-set function
19	DI1	(5161)	Assigns the function of switching between auto and manual modes.
18	DI2	(5162)	Assigns the function of switching between STOP and RUN statuses.
21	Common terminal (for DI1 and DI2)		
29	DI3	(5163)	No function
28	DI8	(5168)	Assigns the function of switching between remote and local modes.
30	Common terminal (for DI3 and DI8)		

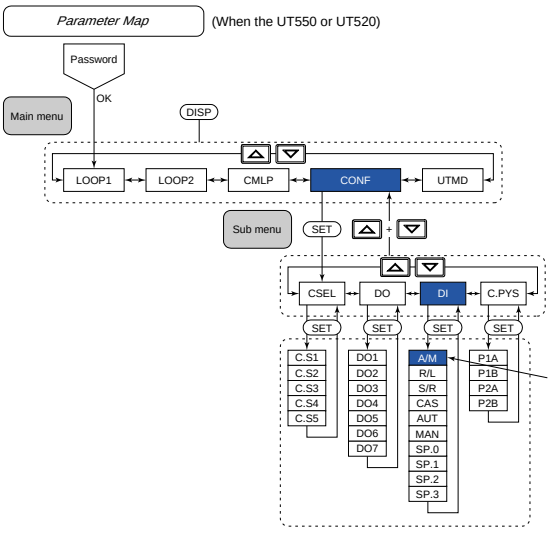
The UT550, UT551 and UT520 are designed so that functions assigned to their contact input terminals can be changed.

Select the desired contact input terminal with which a function predefined for each setup parameter (contact input registration parameter) is executed. To do this, register the "I Relay" number corresponding to the terminal's DI number with the setup parameter whose function you want to use. See the following parameter flowchart.

If necessary, reassign functions by referring to the "DIS" setup parameter table.

CAUTION

If you change any of the contact input terminal assignments, check that the new assignment agree with the current wiring. If necessary, rewire the terminals.



For example, when you want to use the DI2(terminal number 18) for the function of Auto and Manual mode switching, call up the parameter "A/M" setting display and set the value to 5162.
(The 5162 means "I relay" number of DI2 plus 5000.)
• Refer to the Table 3-1-4 or the Table 3-1-6.

● The following parameters are used.
Change parameters as explained in the User's Manuals Initial Settings and Parameter Map.

• Setup parameters (Contact Input Registration Parameters): A/M, R/L, S/R, CAS, AUT, MAN, SP.0, etc.

UT55□ UT520 Code	Description	Setting range	Default ("I relay" number plus 5000.)	D-register No.
A/M (A/M)	Auto/Manual switching (Note2) <Status switching>	The setting range equals the range of "I Relay" numbers (each number plus 5000) that correspond to the DI numbers of the contact input terminals you want to use. (Note1) Refer to the Note 1 below for the relationship between the DI numbers and the "I Relay" numbers.	5161 (DI1)	1129
R/L (R/L)	Remote/Local switching (Note3) <Status switching>		5168 (DI8)	1131
S/R (S/R)	Run/Stop switching (Note4) <Status switching>		5162 (DI2)	1133
CAS (CAS)	Switch to Cascade mode (only when in cascade control) (Note5) <Rising edge switching>		0(not specified)	1134
AUT (AUT)	Switch to Auto mode (Note5) <Rising edge switching>		0(not specified)	1135
MAN (MAN)	Switch to Manual mode (Note5) <Rising edge switching>		0(not specified)	1136
SP.0 (SP.0)	Bit-0 of SP number setting (Note6) <Status switching>		5163(DI3)	1137
SP.1 (SP.1)	Bit-1 of SP number setting (Note6) <Status switching>		5164(DI4)	1138
SP.2 (SP.2)	Bit-2 of SP number setting (Note6) <Status switching>		5165(DI5)	1139
SP.3 (SP.3)	Bit-3 of SP number setting (Note6) <Status switching>		5166(DI6)	1140
PN.0 (PN.0)	Bit 0 of PID number seting <Status switching>	For UT551 only Note: For Remote/Local switching or Auto/Manual switching, do not use the status switching and the rising edge switching at the same time. Note: PID number selection by external contact input is available only when the setup parameter ZON=3.	0(not specified)	*1174*
PN.1 (PN.1)	Bit 1 of PID number seting <Status switching>		0(not specified)	*1175*
PN.2 (PN.2)	Bit 2 of PID number seting <Status switching>		0(not specified)	*1176*
PN.3 (PN.3)	Bit 3 of PID number seting <Status switching>		0(not specified)	*1177*
REM (REM)	Remote switching <Rising dege switching>		0(not specified)	*1178*
LCL (LCL)	Local switching <Rising dege switching>		0(not specified)	*1180*

Note1: The “I Relay” numbers used here are 161 to 168. DI numbers for contact input terminals are specified by these “I Relay” numbers each of which is incremented by 5000. For more information on “I Relay” numbers, see Ref. 8.1(4).
The relationship between the factory-set DI numbers and input terminal assignments may differ depending on the UT mode of your controller. Always refer to the terminal wiring diagrams in the Installation user’s manual to verify the factory-set terminal assignments of each UT mode.
The range of “I Relay” numbers (each number plus 5000) equals the setting range.

DI1: 5161
DI2: 5162
DI3: 5163
DI4: 5164
DI5: 5165
DI6: 5166
DI7: 5167
DI8: 5168

Register an “I Relay” number (with an increment of 5000) with the parameter (e.g., A/M) of a function you want to use, as in the example shown in the table where default numbers are registered. This specifies the terminal that will execute the function.

Note2: With operation mode switching, the auto mode is selected when the contact is ON and the manual mode is selected when the contact is OFF.

Note3: With control mode switching, the remote mode is selected when the contact is ON and the local mode is selected when the contact is OFF.

Note4: With STOP/RUN status switching, the STOP status is selected when the contact is ON and the RUN status is selected when the contact is OFF.

Note 5: With cascade control, use separate contact input terminals to set the cascade, auto and manual modes. Each mode is executed when the state of the contact input changes from OFF to ON. It does not matter what the contact’s state (ON/OFF) was prior to the change. The UT551 can switch mode between auto and manual in the control modes other than cascage control.

Note 6: Parameters SP.0 to SP.3 correspond to bits 0 to 3 with which a selection is made from eight choices of target setpoints (see the table below). When the controller is shipped from the factory, contact input DI3 (terminal number 40) is set to SP.0. Likewise, DI4 is set to SP.1, DI5 to SP.2 and DI6 to SP.3, as shown below.

Target setpoints	SP.0 (bit 0) <DI3>	SP.1 (bit 1) <DI4>	SP.2 (bit 2) <DI5>	SP.3 (bit 3) <DI6>
1.SP	ON	OFF	OFF	OFF
2.SP	OFF	ON	OFF	OFF
3.SP	ON	ON	OFF	OFF
4.SP	OFF	OFF	ON	OFF
5.SP	ON	OFF	ON	OFF
6.SP	OFF	ON	ON	OFF
7.SP	ON	ON	ON	OFF
8.SP	OFF	OFF	OFF	ON

Target setpoints	Pn.0 (bit 0)	Pn.1 (bit 1)	Pn.2 (bit 2)	Pn.3 (bit 3)
1.PID	ON	OFF	OFF	OFF
2.PID	OFF	ON	OFF	OFF
3.PID	ON	ON	OFF	OFF
4.PID	OFF	OFF	ON	OFF
5.PID	ON	OFF	ON	OFF
6.PID	OFF	ON	ON	OFF
7.PID	ON	ON	ON	OFF
8.PID	OFF	OFF	OFF	ON

CAUTION

For Remote/Local switching or Auto/Manual switching, do not use the status swiching and the rising edge switching at the same time.

■ The Example of Auto/Manual Switching by External Contact Input (Rising Edge Switching)

The following example shows the switching from automatic operation to manual operation by external contact input (rising edge switching).
Rising edge switching to automatic operation:
Set “5161” (DI1) to the contact input registration parameter AUT.
Rising edge switching to manual operation:
Set “5162” (DI2) to the contact input registration parameter MAN.
The actions of the controller and key operation in this case are shown below.

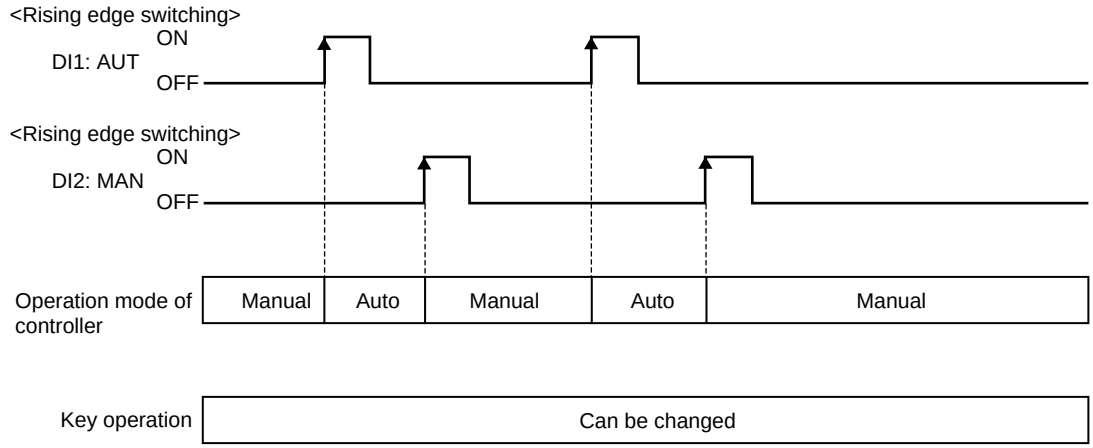


Fig. 3-1-5 The example of Auto/Manual switching by external contact input

<<Ref. 3.1: References Related to Contact Input>>
Ref.3.1(4) Changing contact input functions for the UT750

(4-1): Changing contact input terminal assignments of the UT750

With UT750, 8 (Max.) contact input terminals can be used. (Note)
The terminal numbers are 18, 19, 20 (common terminal), 36, 37, 38, 39 and 40.

If these do not suffice your needs, using I/O expansion modules increases the number of available contact inputs to a maximum of 23. See (4-2): Using the I/O expansion module for the UT750

< UT750 Terminal Arrangement >

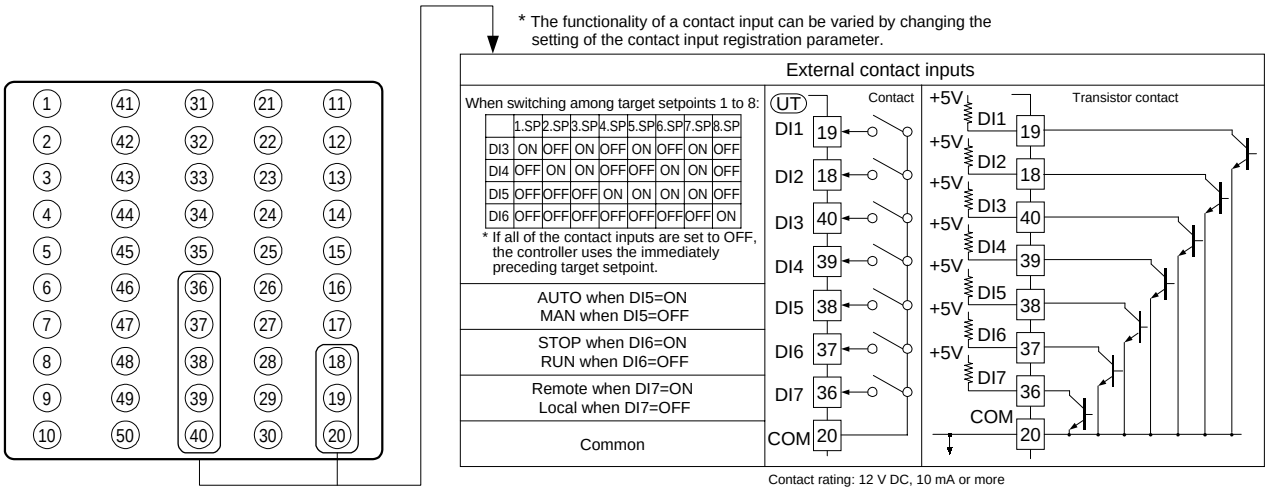


Fig. 3-1-5 UT750 Contact Input Terminals

The UT750's DI numbers (DI No.) and the corresponded terminal numbers are listed in the Table 3-1-7. (The factory-set function of each terminal is listed in the table.)

Table 3-1-7 (When the UT750, Single-loop control mode: UT mode 1)

Terminal No.	DI No.	("I relay" no. +5000)	The factory-set function
19	DI1	(5161)	Assigns the function of selecting the target setpoint number (1.SP to 8.SP). (Note1)
18	DI2	(5162)	
40	DI3	(5163)	
39	DI4	(5164)	
38	DI5	(5165)	Assigns the function of switching between auto and manual modes. (Note2)
37	DI6	(5166)	Assigns the function of switching between STOP and RUN statuses. (Note3)
36	DI7	(5167)	Assigns the function of switching between remote and local modes. (Note4)
20	Common terminal (for DI1 to DI7)		

Note1: The relationship between the ON/OFF status of each DI contact input and the setpoint numbers is given in Table 3-1-8.
Note2: In a dual-loop control configuration, the loop-1 auto/manual mode switching function is assigned to DI5 when the controller is shipped from the factory.
Note3: In a dual-loop control configuration, the loop-2 auto/manual mode switching function is assigned to DI6 when the controller is shipped from the factory.
Note4: In a dual-loop control configuration, the STOP/RUN status switching function common to both loops is assigned to DI7 when the controller is shipped from the factory.

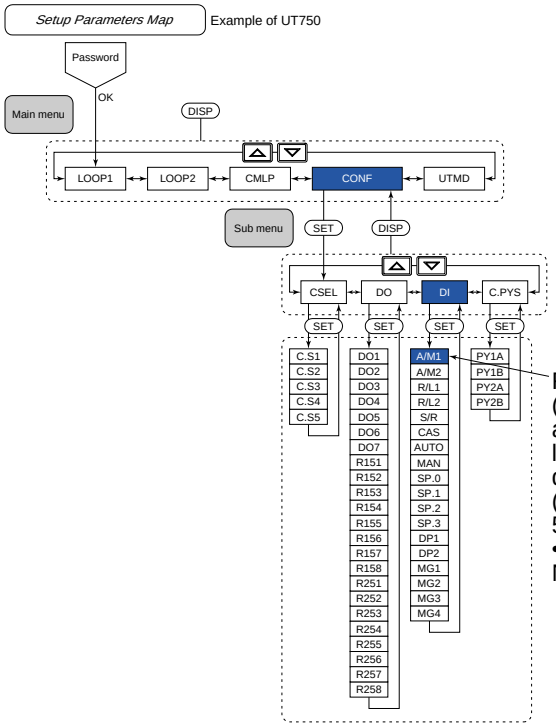
Table 3-1-8

	DI1	DI2	DI3	DI4
1.SP	ON	OFF	OFF	OFF
2.SP	OFF	ON	OFF	OFF
3.SP	ON	ON	OFF	OFF
4.SP	OFF	OFF	ON	OFF
5.SP	ON	OFF	ON	OFF
6.SP	OFF	ON	ON	OFF
7.SP	ON	ON	ON	OFF
8.SP	OFF	OFF	OFF	ON

The UT750 is designed so that functions assigned to its contact input terminals can be changed. In addition, functions can be assigned to the terminals of an optional I/O expansion module.
Select the desired contact input terminal with which a function predefined for each setup parameter (contact input registration parameter) is executed. To do this, register the “I Relay” number corresponding to the terminal’s DI number with the setup parameter whose you want to see. Use the following parameter map to reassign terminal functions as necessary.

CAUTION

If you change any of the contact input terminal assignments, check that the new assignment agrees with the current wiring. If necessary, rewire the terminals.



For example, when you want to use the DI2 (terminal number 18) for the function of Auto and Manual mode switching of the primary loop, call up the parameter “A/M1” setting display and set the value to 5162.
(The 5162 means “I relay” number of DI2 plus 5000.)
• Refer to the Table 3-1-7
Note: The parameter “A/M1” is factory-set to the DI5 as shown in the table below.

● The following parameters are used.
Change parameters as explained in the User's Manuals Initial Settings and Parameter Map.

• Setup parameters (Contact Input Registration Parameters): A/M, R/L, S/R, CAS, AUT, MAN, SP.0, etc. <<1/2>>

UT750 Code	Description	Setting range	Default ("I Relay" number plus 5000) (Note1)	D-resistor No.
A/M1	Loop-1 Auto/Manual Switching (Note2)	The setting range equals the range of "I Relay" numbers (each number plus 5000) that correspond to the DI numbers of the contact input terminals you want to use. (Note1) The relationship between the DI numbers and the "I Relay" numbers is as follows DI1: 5161 DI2: 5162 DI3: 5163 DI4: 5164 DI5: 5165 DI6: 5166 DI7: 5167	5165 (DI5)	1129
A/M2	Loop-2 Auto/Manual Switching (Note2)		5166 (DI6, when the secondary loop is used)	1130
R/L1	Loop-1 Remote/Local Switching (Note3)		5167 (DI7)	1131
R/L2	Loop-2 Remote/Local Switching (Note3)		0 (not specified)	1132
S/R	Run/Stop Switching (Note4)		5166 (DI6, when the single loop is used) 5167 (DI7, when the secondary loop is used)	1133
CAS	Switch to Cascade mode (Note5) (when in cascade control)		0 (not specified)	1134
AUTO	Switch to Auto mode (Note5) (when in cascade control)		0 (not specified)	1135
MAN	Switch to Manual mode (Note5) (when in cascade control)		0 (not specified)	1136
SP.0	Bit-0 of SP number setting (Note6)	The setting range equals the range of "I Relay" numbers (each number plus 5000) that correspond to the DI numbers of the contact input terminals you want to use. (Note1) The relationship between the DI numbers and the "I Relay" numbers is as follows DI1: 5161 DI2: 5162 DI3: 5163 DI4: 5164 DI5: 5165 DI6: 5166 DI7: 5167	5161 (DI1)	1137
SP.1	Bit-1 of SP number setting (Note6)		5162 (DI2)	1138
SP.2	Bit-2 of SP number setting (Note6)		5163 (DI3)	1139
SP.3	Bit-3 of SP number setting (Note6)		5164 (DI4)	1140
DP1	Operating display interruption-1 (Note7)		0 (not specified)	1141
DP2	Operating display interruption-2 (Note7)		0 (not specified)	1142
MG1	Message display interruption-1 (Note8)		0 (not specified)	1143
MG2	Message display interruption-2 (Note8)		0 (not specified)	1144
MG3	Message display interruption-3 (Note8)		0 (not specified)	1145
MG4	Message display interruption-4 (Note8)		0 (not specified)	1146

Note1: The "I Relay" numbers used here are 161 to 168. DI numbers for contact input terminals are specified by these "I Relay" numbers each of which is incremented by 5000. For more information on "I Relay" numbers, see Ref. 8.1(4).
The relationship between the factory-set DI numbers and input terminal assignments may differ depending on the UT mode of your controller. Always refer to the terminal wiring diagrams in the Installation user's manual to verify the factory-set terminal assignments of each UT mode.
Note2: With operation mode switching, the auto mode is selected when the contact is ON and the manual mode is selected when the contact is OFF.
Note3: With control mode switching, the remote mode is selected when the contact is ON and the local mode is selected when the contact is OFF.
Note4: With STOP/RUN status switching, the STOP status is selected when the contact is ON and the RUN status is selected when the contact is OFF.
Note5: With cascade control, use separate contact input terminals to set the cascade, auto and manual modes. Each mode is executed when the state of the contact input changes from OFF to ON. It does not matter what the contact's state (ON/OFF) was prior to the change.

Note6: Parameters SP.0 to SP.3 correspond to bits 0 to 3 with which a selection is made from eight choices of target setpoints (see the table below). When the controller is shipped from the factory, contact input DI1 (terminal number 19) is set to SP.0. Likewise, DI2 is set to SP.1, DI3 to SP.2 and DI4 to SP.3, as shown below.
Note7: See "(4-4): Using Interrupt-operating display functions with the UT750", for more details about "DP1" and "DP2" parameters.
Note8: See "(4-3): Using Interrupt-message functions with the UT750", for more details about "MG1" to "MG4" parameters.

Target setpoints	SP.0 (bit 0) <DI1>	SP.1 (bit 1) <DI2>	SP.2 (bit 2) <DI3>	SP.3 (bit 3) <DI4>
1.SP	ON	OFF	OFF	OFF
2.SP	OFF	ON	OFF	OFF
3.SP	ON	ON	OFF	OFF
4.SP	OFF	OFF	ON	OFF
5.SP	ON	OFF	ON	OFF
6.SP	OFF	ON	ON	OFF
7.SP	ON	ON	ON	OFF
8.SP	OFF	OFF	OFF	ON

(4-2): Using contact I/O expansion module with the UT750

The UT750 comes with eight contact input terminals (including one common terminal): terminals 18, 19, 20 (common terminal), 36, 37, 38, 39 and 40. If these do not suffice your needs, using I/O expansion modules increase the number of available contact inputs to a maximum of 23 (Note1).
Up to two expansion modules can be installed at a time. Each has eight contact inputs and eight contact outputs. Therefore, connecting two modules to the controller, provides a total of 23 inputs, 16 (8 x 2) inputs from the two modules and 7 standard inputs from the controller (actually there are only seven standard inputs available because terminal 20 of the above-mentioned eight terminals is reserved as a common terminals.)
Note1: Requires Yokogawa's optional add-on module for the μFA40 compact program controller.

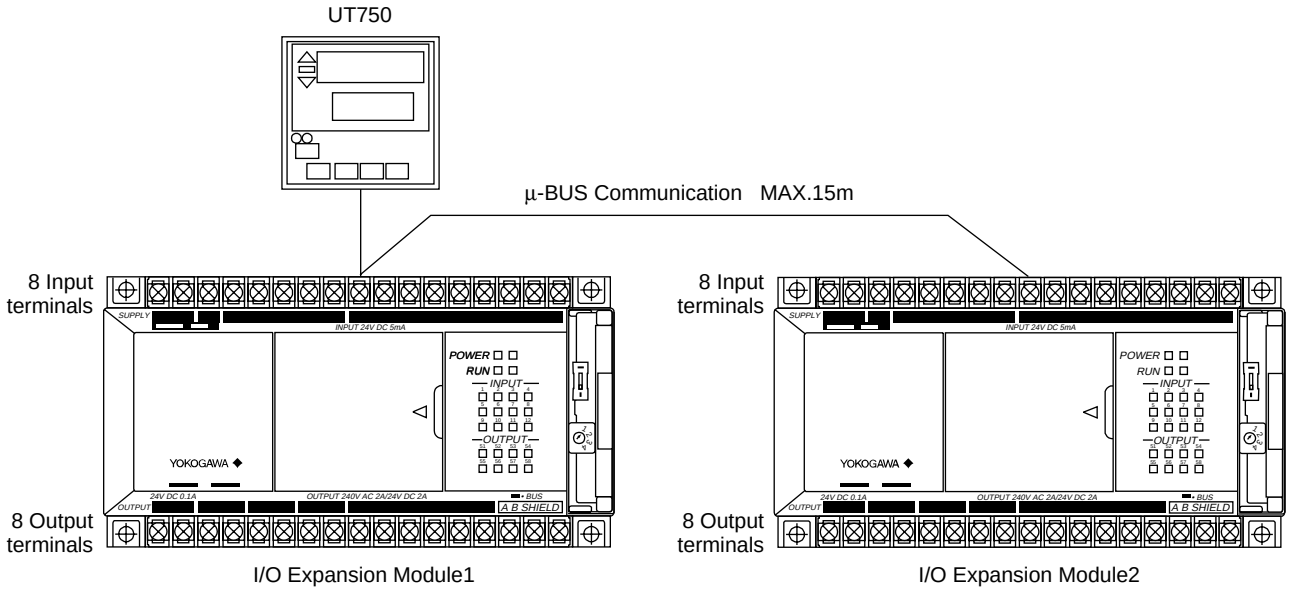


Fig. 3-1-6 I/O Expansion Module wiring outline

The connectable contact I/O expansion modules (optional) are shown below.

Module	Source voltage	Output type
P2ER1-20J	AC100 to 240V	Relay contact output
P2ET1-20J	AC100 to 240V	Transistor contact output
P2ER6-20J	DC24V	Relay contact output
P2ET6-20J	DC24V	Transistor contact output

The relationship between the contact input terminals of an I/O expansion module and the I Relay numbers is given in the table below. To assign contact-switched functions to the module's terminals, follow the steps below.

1) Select a contact-switched function to assign to a module terminal from the table of setup parameters (contact input registration parameters) in (4-1).
2) Select a terminal from those of the I/O expansion module listed in the table below.

3) Show the setting display of the setup parameter selected in step 1 and register the I Relay number (with an increment of 5000) of the terminal selected in step 2.

For example, register “5177” with the “R/L1” setup parameter to assign the Remote/Local status switching function to INPUT1.

Table 3-1-9

	Input terminals	“I relay” No. (+5000)	Code (Refer to the I-relay Map) (Note)
I/O expansion module 1	INPUT1	5177	RDI101
	INPUT2	5178	RDI102
	INPUT3	5179	RDI103
	INPUT4	5180	RDI104
	INPUT5	5181	RDI105
	INPUT6	5182	RDI106
	INPUT7	5183	RDI107
	INPUT8	5184	RDI108
I/O expansion module 2	INPUT1	5185	RDI201
	INPUT2	5186	RDI202
	INPUT3	5187	RDI203
	INPUT4	5188	RDI204
	INPUT5	5189	RDI205
	INPUT6	5190	RDI206
	INPUT7	5191	RDI207
	INPUT8	5192	RDI208

Note: See Ref.8.1(4) I-relay Outline and I-relay Map.

(4-3): Using Interrupt-message functions with the UT750

The UT750 is designed so that you can display one of up to four user-registered messages on a setting display using signals from contact input terminals. Messages must be no longer than 20 single-byte alphanumeric characters. This feature is convenient, as it automatically displays a message specific to an event that occurs during operation.

CAUTION

The optional communication function or the optional LL100 Parameters Setting Tool is required to register these messages (each comprising no more than 20 alphanumeric characters).

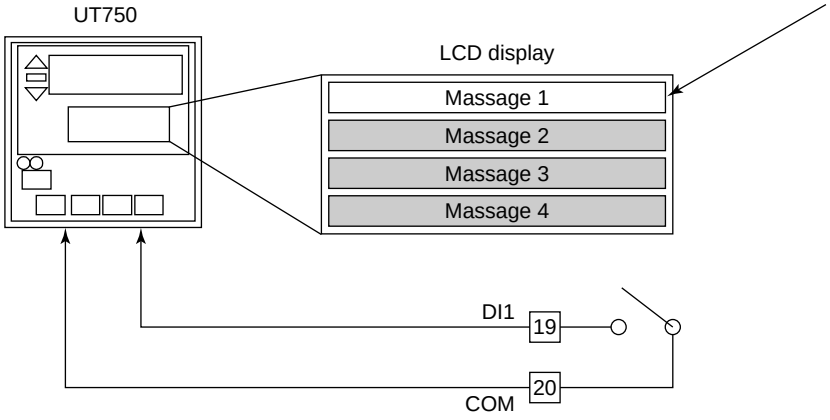
The text strings of messages must be registered with the UT750's D-registers (numbered 801 to 840) in advance. Up to four messages can be registered.
Register each message with its specifically numbered D-register, as shown below. For more information on how to register messages, see the user's manual of the communication function or the LL100 Parameters Setting Tool.

Register numbers for registering message 1 (MG1): D0801 to D0810
Register numbers for registering message 2 (MG2): D0811 to D0820
Register numbers for registering message 3 (MG3): D0821 to D0830
Register numbers for registering message 4 (MG4): D0831 to D0840

Messages are displayed in the following way.
A message appears when the controller is showing an operating display and the status of the contact input terminal where the message is registered changes from OFF to ON.
The four (maximum) messages correspond to the setup parameters "MG1" to "MG4". For example, if the message text registered with the "MG1" is "POWER DOWN", and for some reason the status of the assigned contact changes from OFF to ON, the message "POWER DOWN" appears on the display. This contact is selected by registering the "I-Relay" number (with an increment of 5000) that corresponds to the DI number of the contact terminal as the "MG1" setting, as explained earlier (see Table 3-1-7).

For example, if you use terminals 19 and 20, as shown in the Fig. 3-1-7, register "5161" (the "I-Relay" number of DI1 plus 5000) as the "MG1" setting.

Pressing the [DISP] key on the UT750's front panel clears the message from display. Showing an operating parameter setting display (by holding down the SET/ENT key for more than 3 seconds) on the display also clears the message.



- Message 1 created with the LL100 tool or by other alternative mean is registered with parameter "MG1" using the D-registers numbered D0801 to D0810. (The same applies to message 2 and later.)
- Specify the contact input terminal, where a change in status from OFF to ON is made to show message 1, as the "MG1" setting. For example, If you use terminals 19 and 20, as shown in the figure on the left, register "5161" (the "I Relay" number of DI1 plus 5000).

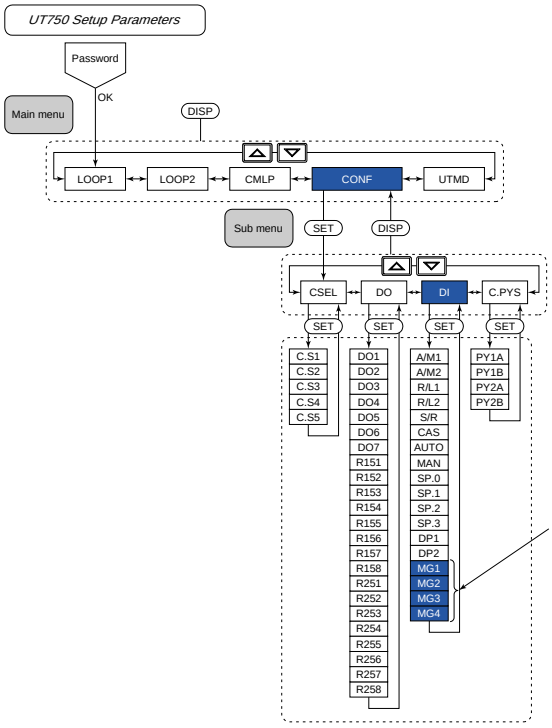
Fig. 3-1-7

● The following parameters are used.
Change parameters as explained in the User's Manuals Initial Settings and Parameter Map.

• Setup parameters (Contact Input Registration Parameters): MG1, MG2, MG3, MG4

UT750 Code	Description	Setting range	Default ("I Relay" number plus 5000) (Note1)	D-resistor No.
MG1	Message display interruption-1 (Note1)	The setting range equals the range of "I Relay" numbers (each number plus 5000) that correspond to the DI numbers of the contact input terminals you want to use. (Note1)	0 (not specified)	1143
MG2	Message display interruption-2 (Note1)		0 (not specified)	1144
MG3	Message display interruption-3 (Note1)		0 (not specified)	1145
MG4	Message display interruption-4 (Note1)		0 (not specified)	1146

Note1: The "I Relay" numbers used here are 161 to 168. When the I/O expansion module is used, the numbers 177 to 192 are also the applicable "I Relay" numbers. For more information on "I Relay" numbers, see Ref. 8.1(4).
The relationship between the factory-set DI numbers and input terminal assignments may differ depending on the UT mode of your controller.
Always refer to the terminal wiring diagrams in the Installation user's manual to verify the factory-set terminal assignments of each UT mode.



Register the contact input terminals (DI number), which are used to show the message 1 to 4, with parameters "MG1" to "MG4".
Specify the DI numbers as the "I Relay" numbers, each of which is incremented by 5000.

(4-4): Using Interrupt-operating display functions with the UT750

The UT750 is designed so that you can display the expected operating display using signals from contact input terminals. This feature is convenient, as it automatically displays the expected operating display specific to an event that occurs during operation.

CAUTION

The optional LL 200 custom computation building tool is required to use this function.
Refer to the User's manual of LL200 for more details.

The expected operating display appears when the status of the contact input terminal where the operating display is registered changes from OFF to ON.
The operating display correspond to the setup parameters "DP1" or "DP2". This contact is selected by registering the "I-Relay" number (with an increment of 5000) that corresponds to the DI number of the contact terminal as the "DP1" or "DP2" setting, as explained earlier (see Table 3-1-7).

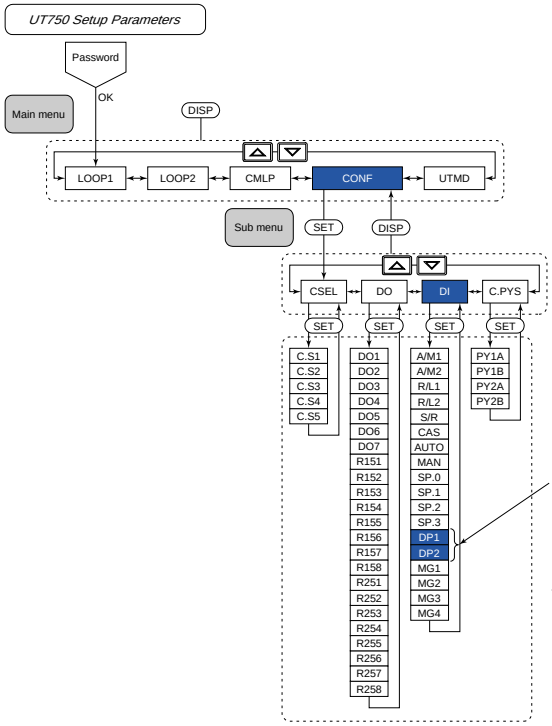
Pressing the [DISP] key on the UT750's front panel displays the next operating display.

- The following parameters are used.
  Change parameters as explained in the User's Manuals Initial Settings and Parameter Map.

• Setup parameters (Contact Input Registration Parameters): DP1, DP2

UT750 Code	Description	Setting range	Default ("I Relay" number plus 5000) (Note1)	D-resistor No.
DP1	Operating display interruption-1 (Note1)	The setting range equals the range of "I Relay" numbers (each number plus 5000) that correspond to the DI numbers of the contact input terminals you want to use. (Note1)	0 (not specified)	1141
DP2	Operating display interruption-2 (Note1)		0 (not specified)	1142

Note1: The "I Relay" numbers used here are 161 to 168. When the I/O expansion module is used, the numbers 177 to 192 are also the applicable "I Relay" numbers. For more information on "I Relay" numbers, see Ref. 8.1(4).
The relationship between the factory-set DI numbers and input terminal assignments may differ depending on the UT mode of your controller.
Always refer to the terminal wiring diagrams in the Installation user's manual to verify the factory-set terminal assignments of each UT mode.



Register the contact input terminals (DI number), which are used to show the operating displays you created, with parameters “DP1” and “DP2”. Specify the DI numbers as the “I Relay” numbers, each of which is incremented by 5000.

When the UP series controllers

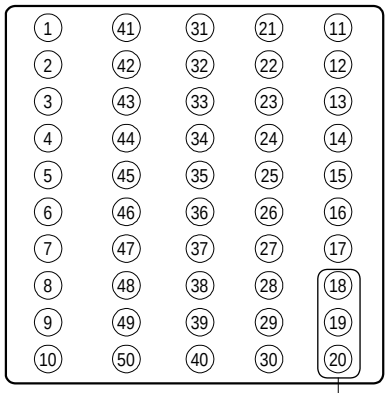
<<Ref. 3.1: References Related to Contact Input>>

Ref.3.1(5) Changing contact input functions for the UP35□

UP35□ comes with three contact input terminals that can be used, for example, to change the operation mode. When the controller is shipped from the factory, the terminals are set to the functions "starting and stopping (Reset) program-1 operation" and "starting and stopping (Reset) program-2 operation."

The terminal numbers are 18, 19 and 20 (common terminals). Terminal 18 is assigned as DI1 (for contact input 1) and terminal 19 as DI2 (for contact input 2). (See the terminal wiring diagrams in the Installation user's manual.)

< UP35□ Terminal Arrangement >



* DIS is a setup parameter.
Changing DIS setpoint allows you to change the function of external contact input.

Terminal	Correspondence between parameter DIS and external contact input functions			
	When DIS=OFF (Factory-shipped setting)	When DIS=1	When DIS=2	When DIS=3
DI1 (No.19)	No function	Start program 1 when DI1 = ON Reset program 1 when DI1 = OFF	Hide setup parameter lock when DI1 = ON Show setup parameter lock when DI1 = OFF	Start program 1 when DI1 = ON Reset program 1 when DI1 = OFF
DI2 (No.18)	No function	Start program 2 when DI2 = ON Reset program 2 when DI2 = OFF	No function	Hold program when DI2 = ON Cancel hold when DI2 = OFF
COM. (No.20)	Common	Common	Common	Common

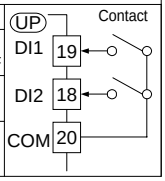


Fig. 3-1-8 UP35□ Contact Input Terminals

The UP35□ is designed so that the functions assigned to their contact input terminals can be changed using the "DIS" setup parameter. If necessary, reassign functions by referring to the table in the Fig. 3-1-8.

● The following parameters are used.
Change parameters as explained in the User's Manuals Initial Settings and Parameter Map.

• Setup parameters (I/O-related Paramerters): DIS

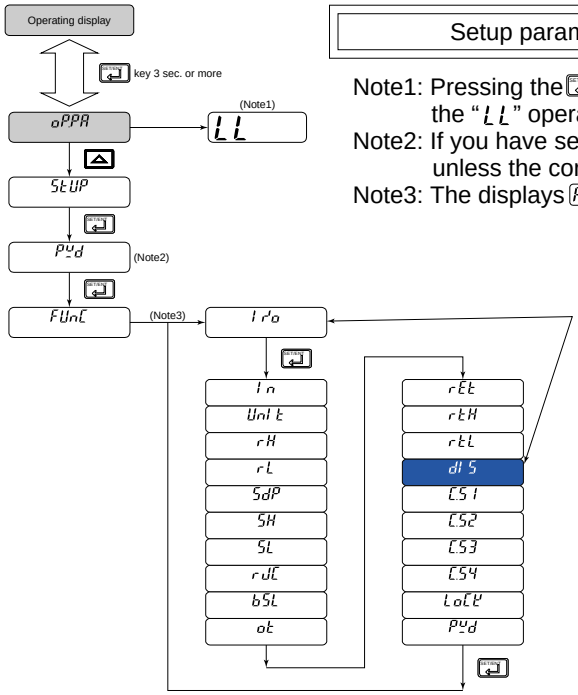
UP35□ Display	Description	Setting range	Default	D-register No.
dI S (DIS)	DI function selection	OFF: Turns contact input off. 1: • DI1: Starts (on)/stops (off) program-1 operation. • DI2: Starts (on)/stops (off) program-2 operation. 2: • DI1: Hides (on)/shows (off) the LOCK setup parameter. • DI2: Unused. 3: • DI1: Starts (on)/stops (off) program-1 operation. • DI2: Enables (on)/disables (off) the hold mode of program-1 operation.	OFF (0)	932

Note1: The program-1 (or -2) starts program operation when the contact is ON and stop (reset) program operation when the contact is OFF.
Note2: The "Keylock (LOCK)" setup parameter setting display is hidden when the DI1 contact is ON and is shown when the contact is OFF. This function of hiding the keylock parameter using external input is an extra safeguard against erroneous operations.
Note3: The Hold mode is selected when the contact is ON and the Hold status is removed when the contact is OFF.

Part of the parameter map for the UP35□ is shown below. Refer to it when changing parameter values in order to access the desired parameter setting display.

CAUTION

If you change any contact input terminal assignment, check that the new assignment agrees with the current wiring. If necessary, rewire the terminals.



Setup parameter map

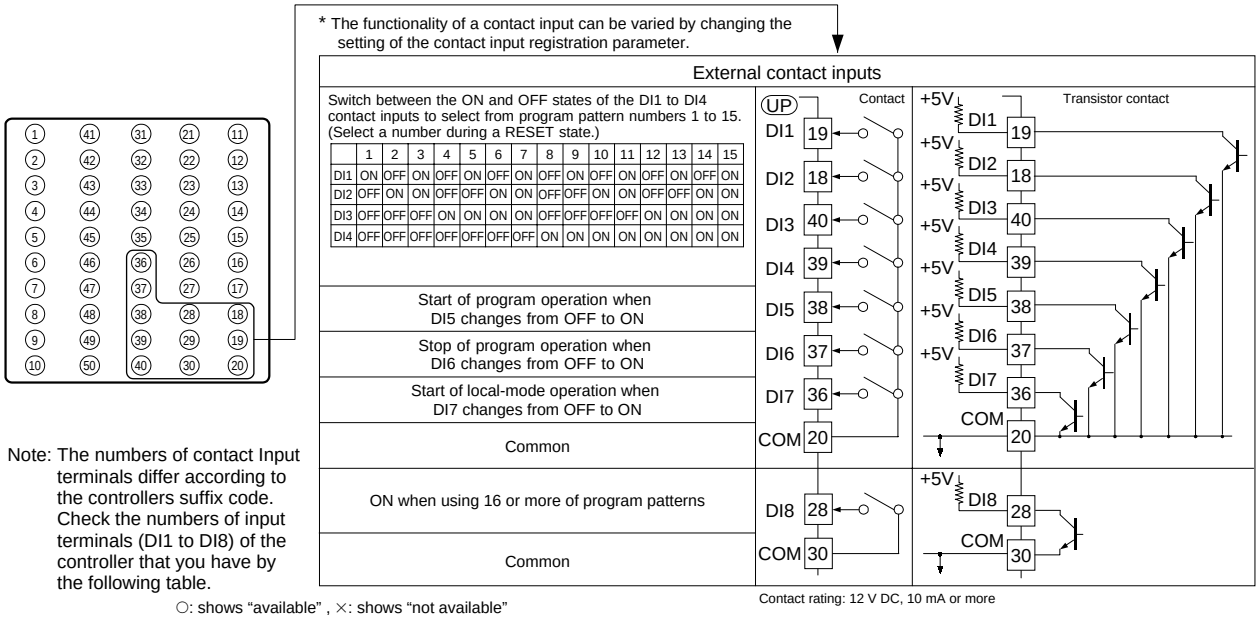
Note1: Pressing the SET/ENT key on the [OP.PA] display changes to the "LL" operating parameter setting display.
Note2: If you have set a password, "[FUNC]" is not displayed unless the correct password is entered.
Note3: The displays FUnC and I/o can be switched with ▲ or ▼ key.

1. Call up the "I/O" display. (Refer to the Note 1 to 3 above)
2. Press the SET/ENT key to display the parameter "DIS" setting display.

<<Ref. 3.1: References Related to Contact Input>>
Ref.3.1(6) Changing contact input functions for the UP550

With UP550, 10 (Max.) contact input terminals can be used. (Note)
The terminal numbers are 18, 19, 20 (common terminal), 28, 30 (common terminal), 36, 37, 38, 39 and 40.

< UP550 Terminal Arrangement >



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
DI1	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON
DI2	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON
DI3	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF	ON	ON	ON	ON
DI4	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON	ON	ON

Note: The numbers of contact Input terminals differ according to the controllers suffix code. Check the numbers of input terminals (DI1 to DI8) of the controller that you have by the following table.

○: shows “available” , ×: shows “not available”

Model and suffix codes	Contact input terminals							
	DI1	DI2	DI3	DI4	DI5	DI6	DI7	DI8
UP550-□0	○	○	○	○	○	○	○	×
UP550-□1	○	○	○	○	○	○	○	○

Fig. 3-1-9 UP550 Contact Input Terminals

The UP550’s DI numbers (DI No.) and the corresponded terminal numbers are listed in the Table 3-1-10. (The factory-set function of each terminal is listed in the table.)

Table 3-1-10 (When the UP550, Single-loop control mode : UP mode 1)

Terminal No.	DI No.	(“I relay” no. +5000)	The factory-set function
19	DI1	(5161)	Assign the function of selecting the program pattern number (1 to 15). (Note1)
18	DI2	(5162)	
40	DI3	(5163)	
39	DI4	(5164)	
38	DI5	(5165)	Assign the function of starting program operation (OFF→ON).
37	DI6	(5166)	Assign the function of stopping program operation (OFF→ON).
36	DI7	(5167)	Assign the function of starting Local mode operation (OFF→ON).
20	Common terminal (for DI1 to DI7)		
28	DI8	(5168)	no function
30	Common terminal (for DI8)		

Note1: The ON and OFF status of the DI1, DI2, DI3 and DI4 contact inputs can be programmed as shown in the Table 3-1-11 to define 15 choices of program pattern numbers.

Table 3-1-11 Program pattern No. and the ON/OFF status of the DI1 to DI15.

Program pattern No.	DI1 (bit 0)	DI2 (bit 1)	DI3 (bit 2)	DI4 (bit 3)
1	ON	OFF	OFF	OFF
2	OFF	ON	OFF	OFF
3	ON	ON	OFF	OFF
4	OFF	OFF	ON	OFF
5	ON	OFF	ON	OFF
6	OFF	ON	ON	OFF
7	ON	ON	ON	OFF
8	OFF	OFF	OFF	ON
9	ON	OFF	OFF	ON
10	OFF	ON	OFF	ON
11	ON	ON	OFF	ON
12	OFF	OFF	ON	ON
13	ON	OFF	ON	ON
14	OFF	ON	ON	ON
15	ON	ON	ON	ON

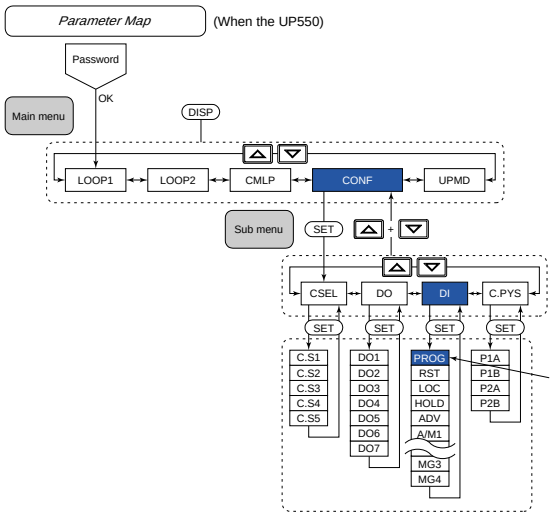
The UP550 is designed so that functions assigned to their contact input terminals can be changed.

Select the desired contact input terminal with which a function predefined for each setup parameter (contact input registration parameter) is executed. To do this, register the “I Relay” number corresponding to the terminal’s DI number with the setup parameter whose function you want to use. See the following parameter flowchart.

If necessary, reassign functions by referring to the “DIS” setup parameter table on the following page.

CAUTION

If you change any of the contact input terminal assignments, check that the new assignment agree with the current wiring. If necessary, rewire the terminals.



For example, when you want to use the DI2 (terminal number 18) for the function of starting program operation, call up the parameter “PROG” setting display and set the value to 5162.
(The 5162 means “I relay” number of DI2 plus 5000.)
• Refer to the Table 3-1-10.

● The following parameters are used.
Change parameters as explained in the User's Manuals Initial Settings and Parameter Map.

• Setup parameters (Contact Input Registration Parameters): PROG, RST, LOC, HOLD, etc.

UP550 Code	Description	Setting range	Default ("I relay" number plus 5000.) (Note1)	D-register No.
PROG	Start of program operation (When "DIn" changes from OFF to ON) (Note2)	The setting range equals the range of "I Relay" numbers (each number plus 5000) that correspond to the DI numbers of the contact input terminals you want to use. (Note1) The relationship between the DI numbers and the "I Relay" numbers are as follows. DI1: 5161 DI2: 5162 DI3: 5163 DI4: 5164 DI5: 5165 DI6: 5166 DI7: 5167 DI8: 5168	5165 (DI5)	1147
RST	Stop of program operation (When "DIn" changes from OFF to ON) (Note2)		5166 (DI6)	1148
LOC	Start of local-mode operation (When "DIn" changes from OFF to ON) (Note2)		5167 (DI7)	1149
HOLD	Start of hold-mode operation (When "DIn" changes from OFF to ON) (Note2)		0 (not specified)	1150
ADV	Advance of segment (When "DIn" changes from OFF to ON) (Note2)		0 (not specified)	1151
A/M1	Loop-1 AUTO/MAN switching (AUTO when contact input is ON; MAN when contact input is OFF)		0 (not specified)	1152
A/M2	Loop-2 AUTO/MAN switching (AUTO when contact input is ON; MAN when contact input is OFF)		0 (not specified)	1153
L/C	LOCAL/CASCADE switching Not used for single-loop control.		0 (not specified)	1154
PTN.0	Bit 0 of program pattern number (Note3)		5161 (DI1)	1155
PTN.1	Bit 1 of program pattern number (Note3)		5162 (DI2)	1156
PTN.2	Bit 2 of program pattern number (Note3)		5163 (DI3)	1157
PTN.3	Bit 3 of program pattern number (Note3)		5164 (DI4)	1158
PTN.4	Bit 4 of program pattern number (Note3)		5168 (DI8)	1159
MG1	Interruptive message display 1		0 (not specified)	1166
MG2	Interruptive message display 2		0 (not specified)	1167
MG3	Interruptive message display 3		0 (not specified)	1168
MG4	Interruptive message display 4		0 (not specified)	1169

Note1: The "I Relay" numbers used here are 161 to 168. DI numbers for contact input terminals are specified by these "I Relay" numbers each of which is incremented by 5000. For more information on "I Relay" numbers, see Ref. 8.1(4).
The relationship between the factory-set DI numbers and input terminal assignments may differ depending on the UP mode of your controller. Always refer to the terminal wiring diagrams in the Installation user's manual to verify the factory-set terminal assignments of each UP mode.
Note2: Each mode is executed when the state of the contact input changes from OFF to ON.
Note3: Refer to the table 3-1-11.

<<Ref. 3.1: References Related to Contact Input>>
Ref.3.1(7) Changing contact input functions for the UP750

(7-1): Changing contact input functions for the UP750

With UP750, 8 (Max.) contact input terminals can be used. (Note)
The terminal numbers are 18, 19, 20 (common terminal), 36, 37, 38, 39 and 40.

If these do not suffice your needs, using I/O expansion modules increases the number of available contact inputs to a maximum of 23. See "(7-2): Using the I/O Expansion module with the UP750."

< UP750 Terminal Arrangement >

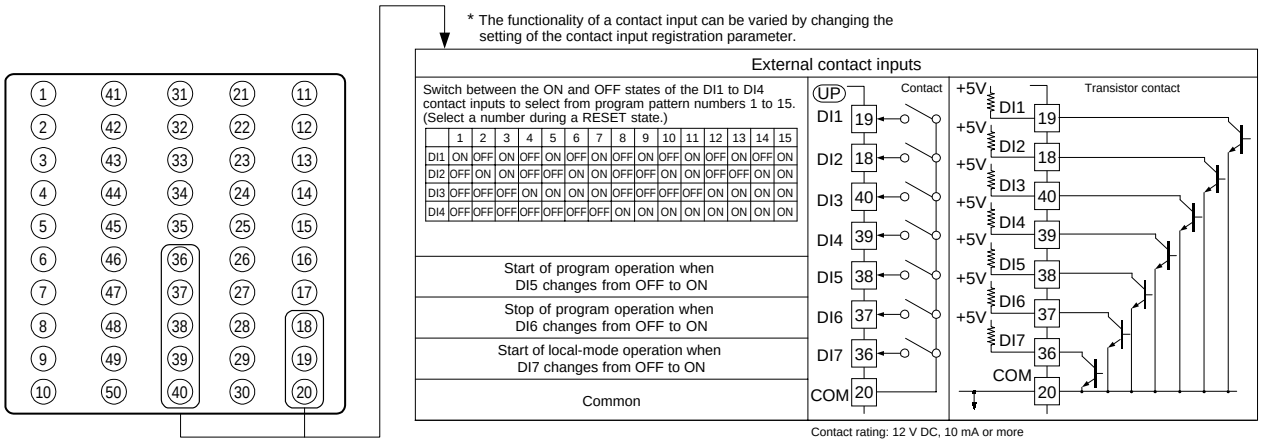


Fig. 3-1-10 UP750 Contact Input Terminals

The UP750's DI numbers (DI No.) and the corresponded terminal numbers are listed in the Table 3-1-12. (The factory-set function of each terminal is listed in the table.)

Table 3-1-12 (When the Single-loop control mode : UP mode 1)

Terminal No.	DI No.	("I relay" no. +5000)	The factory-set function
19	DI1	(5161)	Assign the function of selecting the program pattern number (1 to 15). (Note1)
18	DI2	(5162)	
40	DI3	(5163)	
39	DI4	(5164)	
38	DI5	(5165)	Assigns the function of starting program operation (OFF→ON).
37	DI6	(5166)	Assigns the function of stopping program operation (OFF→ON).
36	DI7	(5167)	Assigns the function of starting Local mode operation (OFF→ON).
20	Common terminal (for DI1 to DI7)		
28	DI8	(5168)	no function
30	Common terminal (for DI8)		

Note1: The ON and OFF status of the DI1, DI2, DI3 and DI4 contact inputs can be programmed as shown in the Table 3-1-13 to define 15 choices of program pattern numbers.

Table 3-1-13

Program pattern No.	DI1 (bit 0)	DI2 (bit 1)	DI3 (bit 2)	DI4 (bit 3)
1	ON	OFF	OFF	OFF
2	OFF	ON	OFF	OFF
3	ON	ON	OFF	OFF
4	OFF	OFF	ON	OFF
5	ON	OFF	ON	OFF
6	OFF	ON	ON	OFF
7	ON	ON	ON	OFF
8	OFF	OFF	OFF	ON
9	ON	OFF	OFF	ON
10	OFF	ON	OFF	ON
11	ON	ON	OFF	ON
12	OFF	OFF	ON	ON
13	ON	OFF	ON	ON
14	OFF	ON	ON	ON
15	ON	ON	ON	ON

TIP

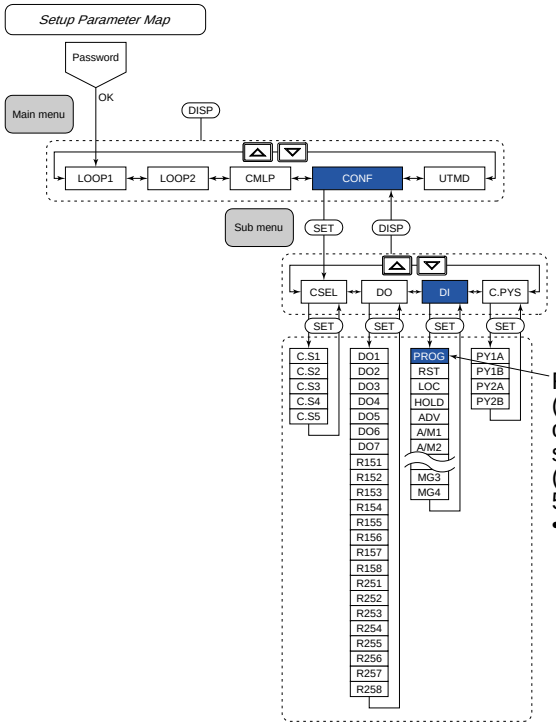
When you want to define the program pattern #100, set the ON/OFF status of “bit 0” to “bit 6” as follows. (Refer to the parameter list on page Ref. 3-31 for the “bit 4” to “bit 8”.)

< bit 0 > (2^0 =1)	< bit 1 > (2^1 =2)	< bit 2 > (2^2 =4)	< bit 3 > (2^3 =8)	< bit 4 > (2^4 =16)	< bit 5 > (2^5 =32)	< bit 6 > (2^6 =64)
(OFF)	(OFF)	ON	(OFF)	(OFF)	ON	ON

The UP750 is designed so that functions assigned to its contact input terminals can be changed. In addition, functions can be assigned to the terminals of an optional I/O expansion module.
Select the desired contact input terminal with which a function predefined for each setup parameter (contact input registration parameter) is executed. To do this, register the “I Relay” number corresponding to the terminal's DI number with the setup parameter whose you want to see. Use the following parameter map to reassign terminal functions as necessary.

CAUTION

If you change any of the contact input terminal assignments, check that the new assignment agrees with the current wiring. If necessary, rewire the terminals.



For example, when you want to use the DI2 (terminal number 18) for the function of program operation starting, call up the parameter “PROG” setting display and set the value to 5162. (The 5162 means “I relay” number of DI2 plus 5000.)
• Refer to the Table 3-1-12.

● The following parameters are used.
Change parameters as explained in the User's Manuals Initial Settings and Parameter Map.

• Setup parameters (Contact Input Registration Parameters): PROG, RST, LOC, HOLD, etc. <<1/2>>

UP750 Code	Description	Setting range	Default ("I relay" number plus 5000.) (Note1)	D-register No.
PROG	Start of program operation (When "DIn" changes from OFF to ON) (Note2)	The setting range equals the range of "I Relay" numbers (each number plus 5000) that correspond to the DI numbers of the contact input terminals you want to use. (Note1) The relationship between the DI numbers and the "I Relay" numbers are as follows. DI1: 5161 DI2: 5162 DI3: 5163 DI4: 5164 DI5: 5165 DI6: 5166 DI7: 5167 DI8: 5168	5165 (DI5)	1147
RST	Stop of program operation (When "DIn" changes from OFF to ON) (Note2)		5166 (DI6)	1148
LOC	Start of local-mode operation (When "DIn" changes from OFF to ON) (Note2)		5167 (DI7)	1149
HOLD	Start of hold-mode operation (When "DIn" changes from OFF to ON) (Note2)		0 (not specified)	1150
ADV	Advance of segment (When "DIn" changes from OFF to ON) (Note2)		0 (not specified)	1151
A/M1	Loop-1 AUTO/MAN switching (AUTO when contact input is ON; MAN when contact input is OFF)		0 (not specified)	1152
A/M2	Loop-2 AUTO/MAN switching (AUTO when contact input is ON; MAN when contact input is OFF)		0 (not specified)	1153
L/C	LOCAL/CASCADE switching Not used for single-loop control.		0 (not specified)	1154
PTN.0	Bit 0 of program pattern number (Note3)		5161 (DI1)	1155
PTN.1	Bit 1 of program pattern number (Note3)		5162 (DI2)	1156
PTN.2	Bit 2 of program pattern number (Note3)		5163 (DI3)	1157
PTN.3	Bit 3 of program pattern number (Note3)		5164 (DI4)	1158

• Setup parameters (Contact Input Registration Parameters): PROG, RST, LOC, HOLD, etc. <<2/2>>

UP750 Code	Description	Setting range	Default (“I relay” number plus 5000.) (Note1)	D-register No.
PTN.4	Bit 4 of program pattern number (Note3)	Use the I/O expansion module for specifying the “PTN.4” to “PTN.8” setup parameters.	0 (not specified)	1159
PTN.5	Bit 5 of program pattern number (Note3)		0 (not specified)	1160
PTN.6	Bit 6 of program pattern number (Note3)		0 (not specified)	1161
PTN.7	Bit 7 of program pattern number (Note3)		0 (not specified)	1162
PTN.8	Bit 8 of program pattern number (Note3)		0 (not specified)	1163
MG1	Message display Interruption-1		0 (not specified)	1166
MG2	Message display Interruption-2		0 (not specified)	1167
MG3	Message display Interruption-3		0 (not specified)	1168
MG4	Message display Interruption-4		0 (not specified)	1169

Note1: The “I Relay” numbers used here are 161 to 168. DI numbers for contact input terminals are specified by these “I Relay” numbers each of which is incremented by 5000. For more information on “I Relay” numbers, see Ref. 8.1(4).
The relationship between the factory-set DI numbers and input terminal assignments may differ depending on the UP mode of your controller. Always refer to the terminal wiring diagrams in the Installation user’s manual to verify the factory-set terminal assignments of each UP mode.
Note2: Each mode is executed when the state of the contact input changes from OFF to ON.
Note3: Refer to the table 3-1-13.

(7-2): Using contact I/O expansion module with the UP750

The UP750 comes with eight contact input terminals (including one common terminal): terminals 18, 19, 20 (common terminal), 36, 37, 38, 39 and 40. If these do not suffice your needs, using I/O expansion modules increase the number of available contact inputs to a maximum of 23 (Note1).
Up to two expansion modules can be installed at a time. Each has eight contact inputs and eight contact outputs. Therefore, connecting two modules to the controller, provides a total of 23 inputs, 16 (8 x 2) inputs from the two modules and 7 standard inputs from the controller (actually there are only seven standard inputs available because terminal 20 of the above-mentioned eight terminals is reserved as a common terminals.)
Note1: Requires Yokogawa's optional add-on module for the μFA20 compact program controller.

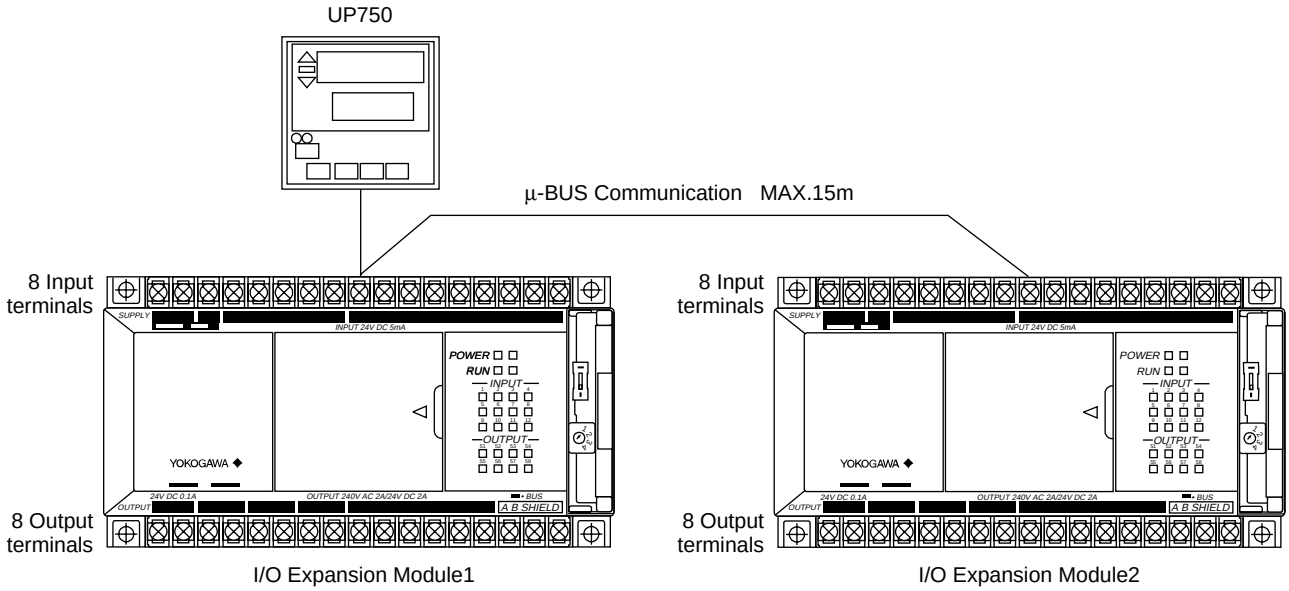


Fig. 3-1-11 I/O Expansion Module Wiring Outline

The connectable contact I/O expansion modules (optional) are shown below.

Model	Source Voltage	Output type
P2ER1-20J	AC100 to 240V	Relay contact output
P2ET1-20J	AC100 to 240V	Transistor contact output
P2ER6-20J	DC24V	Relay contact output
P2ET6-20J	DC24V	Transistor contact output

CAUTION

The factory-set function of each terminal of I/O Expansion module is listed in the table below. Reassign functions by referring to the “Function changing procedure” if necessary.

Input code	Function		Remarks
RDI101	Starting HOLD operation	Into “HOLD” when the contact status changed from OFF to ON	-
RDI102	Starting ADVANCE operation	Advance to the next segment when the contact status changed from OFF to ON	-
RDI103	Switching Auto/Manual operation	ON: AUTO OFF: MANUAL	Control output value can be changed by ▲/▼ key operation when MANUAL operation.
RDI104	Switching program pattern numbers	Up to #300 program pattern can be selected (Note)	Program patterns with the following numerals added to numbers selected by other contact turned on and off -- are selected: • RDI104 turned on: +16 • RDI105 turned on: +32 • RDI106 turned on: +64 • RDI107 turned on: +128 • RDI108 turned on: +256 (Note)
RDI105			
RDI106			
RDI107			
RDI108			

Note: For example, when you want to select the program pattern #17, set the ON/OFF status of the DIs as followings, DI: ON, DI2: OFF, DI3: OFF, DI4: OFF, RDI104: ON and RDI105 to RDI108: OFF.

Function changing program

The relationship between the contact input terminals of an I/O expansion module and the I Relay numbers is given in the table below. To assign contact-switched functions to the module’s terminals, follow the steps below.

1) Select a contact-switched function to assign to a module terminal from the table of setup parameters (contact input registration parameters) in Page Ref.3-30 and Ref.3-31.
2) Select a terminal from those of the I/O expansion module listed in the table below.
3) Show the setting display of the setup parameter selected in step 1 and register the I Relay number (with an increment of 5000) of the terminal selected in step 2.

For example, register “5177” with the “HOLD” setup parameter to assign the starting HOLD operation function to INPUT1.

Table 3-1-14

	Input terminals	"I" relay No. (+5000)	Code (Refer to the I-relay Map) (Note)
I/O expansion module 1	INPUT1	5177	RDI101
	INPUT2	5178	RDI102
	INPUT3	5179	RDI103
	INPUT4	5180	RDI104
	INPUT5	5181	RDI105
	INPUT6	5182	RDI106
	INPUT7	5183	RDI107
	INPUT8	5184	RDI108
I/O expansion module 2	INPUT1	5185	RDI201
	INPUT2	5186	RDI202
	INPUT3	5187	RDI203
	INPUT4	5188	RDI204
	INPUT5	5189	RDI205
	INPUT6	5190	RDI206
	INPUT7	5191	RDI207
	INPUT8	5192	RDI208

Note: See Ref.8.1(4) I-relay Outline and I-relay Map.

(7-3): Using Interrupt-message functions with the UP750

The UP750 is designed so that you can display one of up to four user-registered messages on a setting display using signals from contact input terminals. Messages must be no longer than 20 single-byte alphanumeric characters. This feature is convenient, as it automatically displays a message specific to an event that occurs during operation.

CAUTION

The optional communication function or the optional LL100 Parameters Setting Tool is required to register these messages (each comprising no more than 20 alphanumeric characters).

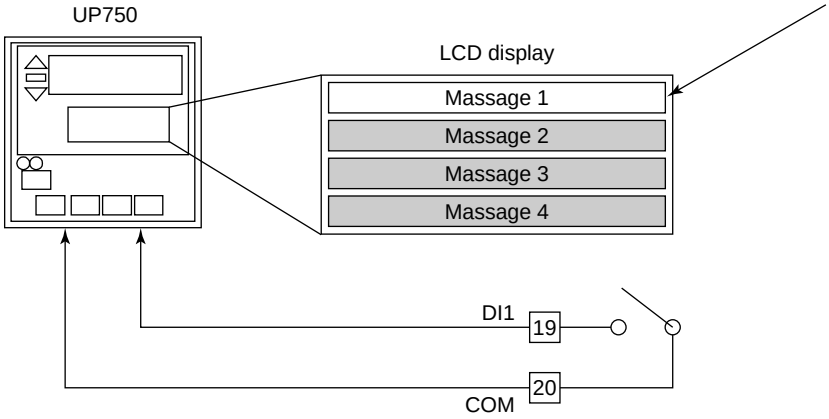
The text strings of messages must be registered with the UP750's D-registers (numbered 801 to 840) in advance. Up to four messages can be registered.
Register each message with its specifically numbered D-register, as shown below. For more information on how to register messages, see the user's manual of the communication function or the LL100 Parameters Setting Tool.

Register numbers for registering message 1 (MG1): D0801 to D0810
Register numbers for registering message 2 (MG2): D0811 to D0820
Register numbers for registering message 3 (MG3): D0821 to D0830
Register numbers for registering message 4 (MG4): D0831 to D0840

Messages are displayed in the following way.
A message appears when the controller is showing an operating display and the status of the contact input terminal where the message is registered changes from OFF to ON.
The four (maximum) messages correspond to the setup parameters “MG1” to “MG4”. For example, if the message text registered with the “MG1” is “POWER DOWN”, and for some reason the status of the assigned contact changes from OFF to ON, the message “POWER DOWN” appears on the display. This contact is selected by registering the “I-Relay” number (with an increment of 5000) that corresponds to the DI number of the contact terminal as the “MG1” setting, as explained earlier (see Table 3-1-12).

For example, if you use terminals 19 and 20, as shown in the Fig. 3-1-12, register “5161” (the “I-Relay” number of DI1 plus 5000) as the “MG1” setting.

Pressing the [DISP] key on the UP750’s front panel clears the message from display. Showing an operating parameter setting display (by holding down the SET/ENT key for more than 3 seconds) on the display also clears the message.



- Message 1 created with the LL100 tool or by other alternative mean is registered with parameter “MG1” using the D-registers numbered D0801 to D0810. (The same applies to message 2 and later.)
- Specify the contact input terminal, where a change in status from OFF to ON is made to show message 1, as the “MG1” setting. For example, If you use terminals 19 and 20, as shown in the figure on the left, register “5161” (the “I Relay” number of DI1 plus 5000).

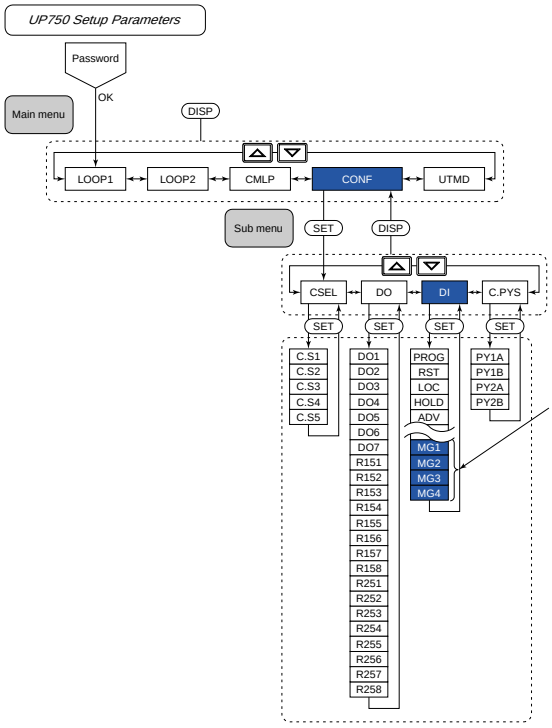
Fig. 3-1-12

● The following parameters are used.
Change parameters as explained in the User's Manuals Initial Settings and Parameter Map.

• Setup parameters (Contact Input Registration Parameters): MG1, MG2, MG3, MG4

UP750 Code	Description	Setting range	Default ("I Relay" number plus 5000) (Note1)	D-resistor No.
MG1	Message display interruption-1 (Note1)	The setting range equals the range of "I Relay" numbers (each number plus 5000) that correspond to the DI numbers of the contact input terminals you want to use. (Note1)	0 (not specified)	1166
MG2	Message display interruption-2 (Note1)		0 (not specified)	1167
MG3	Message display interruption-3 (Note1)		0 (not specified)	1168
MG4	Message display interruption-4 (Note1)		0 (not specified)	1169

Note1: The "I Relay" numbers used here are 161 to 168. When the I/O expansion module is used, the numbers 177 to 192 are also the applicable "I Relay" numbers. For more information on "I Relay" numbers, see Ref. 8.1(4).
The relationship between the factory-set DI numbers and input terminal assignments may differ depending on the UP mode of your controller.
Always refer to the terminal wiring diagrams in the Installation user's manual to verify the factory-set terminal assignments of each UP mode.



Register the contact input terminals (DI number), which are used to show the message 1 to 4, with parameters "MG1" to "MG4".
Specify the DI numbers as the "I Relay" numbers, each of which is incremented by 5000.

(7-4): Using Interrupt-operating display functions with the UP750

The UP750 is designed so that you can display the expected operating display using signals from contact input terminals. This feature is convenient, as it automatically displays the expected operating display specific to an event that occurs during operation.

CAUTION

The optional LL 200 custom computation building tool is required to use this function.
Refer to the User's manual of LL200 for more details.

The expected operating display appears when the status of the contact input terminal where the operating display is registered changes from OFF to ON.
The operating display correspond to the setup parameters "DP1" or "DP2". This contact is selected by registering the "I-Relay" number (with an increment of 5000) that corresponds to the DI number of the contact terminal as the "DP1" or "DP2" setting, as explained earlier (see Table 3-1-12).

Pressing the [DISP] key on the UP750's front panel displays the next operating display.

- The following parameters are used.
  Change parameters as explained in the User's Manuals Initial Settings and Parameter Map.

• Setup parameters (Contact Input Registration Parameters): DP1, DP2

UP750 Code	Description	Setting range	Default ("I Relay" number plus 5000) (Note1)	D-resistor No.
DP1	Operating display interruption-1 (Note1)	The setting range equals the range of "I Relay" numbers (each number plus 5000) that correspond to the DI numbers of the contact input terminals you want to use. (Note1)	0 (not specified)	1141
DP2	Operating display interruption-2 (Note1)		0 (not specified)	1142

Note1: The "I Relay" numbers used here are 161 to 168. When the I/O expansion module is used, the numbers 177 to 192 are also the applicable "I Relay" numbers. For more information on "I Relay" numbers, see Ref. 8.1(4).
The relationship between the factory-set DI numbers and input terminal assignments may differ depending on the UP mode of your controller. UP mode.

Ref.3.2: References Related to Contact Output

IMPORTANT: Information in this reference applies to the following models.

UP750	UP550	UP35□	UT750	UT5□□	UT4□0	UT3□□
UP750	UP550	NONE (Note1)	UT750	UT5□□	NONE (Note1)	NONE (Note1)

Note1: In the case of the UP35□, UT4□0 and UT3□□, it is not possible to change the factory-set output contact assignments. Therefore, the explanations on changing output contact assignments do not apply to these models.
Note2: Some of the functions discussed below may be limited to models with a specific suffix and/or option code. Each section will expressly refer to this limitative condition where it applies.

CAUTION

The contact output functions of a UT/UP series controller are pre-assigned to their respective output terminals when the controller is shipped from the factory. The terminal assignments in each of the UT/UP modes are defined in terms of the most frequently used. Check the controller model you will use and the factory-set terminal assignments for each controller mode of the model. To do this, see the terminal wiring diagrams in the Installation user's manual of each controller model and mode. Changes should only be made if you require any of the functions listed below or need to change any of the terminal numbers.

CAUTION

If you change any of the contact output terminal assignments, check that the new assignment agrees with the current wiring. If necessary, rewire the terminals.

This section contains reference information on the following aspects of contact output functions. Refer to this information and only change parameter settings if necessary.

(1) Changing Contact Output Functions for the UT750, UT550, UT551 and UT520
(2) Changing Contact Output Functions in the UP750 and UP550
(3) Using the I/O Expansion Module with UT750 and UP750

<<Ref. 3.2: References Related to Contact Output>>

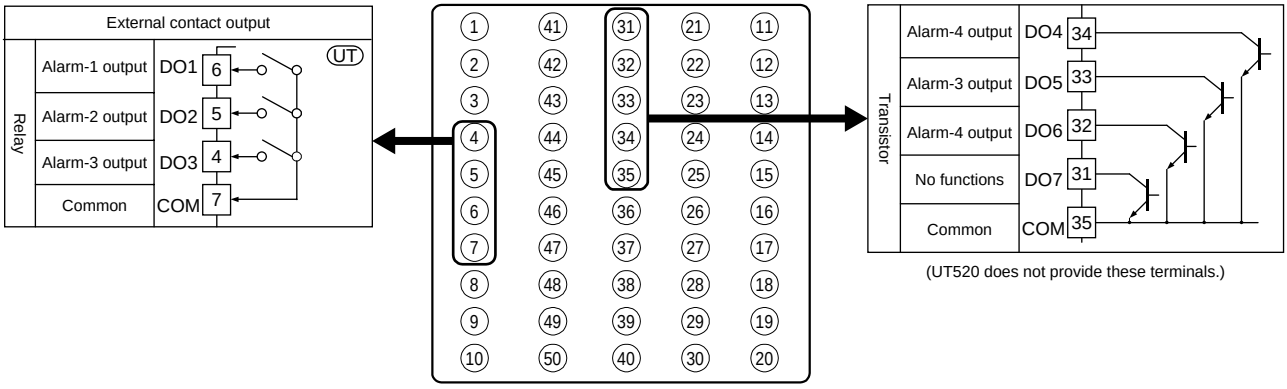
Ref.3.2(1) Changing Contact Output Functions for the UT750, UT550, UT551 and UT520

Each of UT750, UT550 and UT551 comes with nine contact output terminals and the UT520 comes with four. These include the common terminal. The terminals of the UT750, UT550 and UT551 are numbered 4, 5, 6, 7 (common), 31, 32, 33, 34 and 35 (common); the terminals of the UT520 are numbered 4, 5, 6 and 7 (common).

Note: For the UT550, UT551 and UT520, the number of contact output terminals varies depending on the model suffix codes. Check whether or not the related output terminals are present by referring to the table on the right. The UT750 provides all terminals described above.

Model and suffix codes	Contact output terminals						
	DO1	DO2	DO3	DO4	DO5	DO6	DO7
UT55□-□0, UT551-□A	○	○	○	x	x	x	x
UT55□-□1, UT551-□D	○	○	○	○	○	○	○
UT55□-□2, UT551-□B	○	○	○	x	x	x	x
UT55□-□3, UT551-□C	○	○	○	○	○	○	○
UT55□-□4	○	○	○	x	x	x	x
UT520-00	○	○	○	x	x	x	x
UT520-07	○	○	○	x	x	x	x
UT520-08	○	○	○	x	x	x	x

Note: ○: Present, x: Not present



The relationship between the DO numbers and output terminals of the UT750 in single-loop control is given in Table 3-2-1. This relationship is also given for the UT550, UT551 and UT520 in Tables 3-2-2 and 3-2-3, respectively.

When the controller is shipped from the factory, its contact output functions are pre-assigned to the DO terminals as shown in Table 3-2-1 (for the UT750), Table 3-2-2 (for the UT550, UT551) or Table 3-2-3 (for the UT520).

Settings of each controller model for control modes other than single-loop control are given on the following pages. Make sure the settings match the control mode you will use.

Table 3-2-1 Contact Output Terminals of UT750 (for Single-loop Control) and Their Factory-set Functions

Terminal No.	DO No.	Factory-set Function	Output Type
6	DO1	Alarm-1 output	Relay
5	DO2	Alarm-2 output	Relay
4	DO3	Alarm-3 output (or cooling-side control output [Note1])	Relay
7	Common terminal (for DO1 to DO3)		
34	DO4	Alarm-4 output (or cooling-side control output [Note1])	Transistor
33	DO5	Unassigned	Transistor
32	DO6	Unassigned	Transistor
31	DO7	FAIL output	Transistor
35	Common terminal (for DO4 to DO7)		

Note1: When heating/cooling control is selected as the option of the Control Output Selection parameter, cooling-side output is assigned to either DO3 (relay output) or DO4 (open-collector transistor output).

Table 3-2-2 Contact Output Terminals of UT550/UT551 (for Single-loop Control) and Their Factory-set Functions

Terminal No.	DO No.	Factory-set Function	Output Type
6	DO1	Alarm-1 output	Relay
5	DO2	Alarm-2 output	Relay
4	DO3	Alarm-3 output	Relay
7	Common terminal (for DO1 to DO3)		
34	DO4	Alarm-4 output	Transistor
33	DO5	Unassigned	Transistor
32	DO6	Unassigned	Transistor
31	DO7	FAIL output	Transistor
35	Common terminal (for DO4 to DO7)		

Table 3-2-3 Contact Output Terminals of UT520 (for Single-loop Control) and Their Factory-set Functions

Terminal No.	DO No.	Factory-set Function	Output Type
6	DO1	Alarm-1 output	Relay
5	DO2	Alarm-2 output	Relay
4	DO3	Alarm-3 output	Relay
7	Common terminal (for DO1 to DO3)		

The UT750, UT550, UT551 and UT520 are designed so that you can change the pre-assigned functions of their contact output terminals. For the UT750, UT550 and UT551, this can be done using the “DO1” to “DO7” setup parameters. (Each DO terminal number is associated with the code of each setup parameter. For example, the “DO1” parameter is used to define the function of the DO1 terminal.)
The contact output functions of the UT520 are defined using the “DO1” to “DO3” setup parameters.

The procedure of function assignment is as follows.

1) Decide what signal to output from which of the contact output terminals (see the table above).
2) Identify the “DO number” that corresponds to the selected terminal number.
   For example, the corresponding DO number is “DO1” if you output signals using terminal 6.
3) Define the type of signal to be output from the terminal.
   For example, if you want to set alarm output 4 as a relay contact output using terminal 6, register the “I Relay number” of alarm output 4, along with an increment of 5000, with the “DO1” parameter. As indicated on the I Relay Map, the “I Relay number” of alarm output 4 is 693. Therefore, register “5693” with the “DO1” parameter.

OFF						STATUS					
No.	385 ~	No.	449 ~	No.	513 ~	No.	577 ~	No.	641 ~	No.	705 ~
385	AD1ERR	449	A/M1	513		577	CSPNO.0	641		705	
386	AD2ERR					578	CSPNO.1	642		706	
		497		561		579	CSPNO.2	643		707	
434	UCALB.E	498		562	RDI102			644		754	
435	USER.E	499		563	RDI103	627					
436		500		564	RDI104	628		692		756	
437	UTMD	501		565	RDI105	629		693	ALO14	757	
438	RANGE	502		566	RDI106	630		694		758	
439	SETUP	503		567	RDI107	631		695		759	
440		504		568	RDI108	632		696		760	
441	PARA.E	505		569	RDI201	633		697	ALO21	761	
442	MODE.E	506		570	RDI202	634		698	ALO22	762	
443		507		571	RDI203	635		699	ALO23	763	
444		508		572	RDI204	636		700		764	
445	EEP.E	509		573	RDI205	637		701	ALO24	765	
446		510		574	RDI206	638		702		766	
447	SYSTEM.E	511		575	RDI207	639		703		767	
448		512		576	RDI208	640		704		768	

I-relay number for alarm output 4

As another example, note that the FAIL output is allocated the D register numbered 1609 (Note) for the single-loop control mode of the UT550, UT551 and UT520. If you want the FAIL output to be delivered from terminal 6, as discussed above, register “1609” with the “DO1” parameter.

Note: Refer to the table of “D-register and I-relay numbers assigned to contact outputs (at the factory before shipment)” of each UT-mode.

- To change the contact output functions, use the parameters listed in the table below.
  To change the parameter values, follow the Default Setting and Parameters section of the appropriate manual.

• Setup parameters (Contact Output Registration Parameters): DO1 to DO7

UT750 Code	UT55□ UT520 Code	Description	Setting Range and Default Settings	D-register No.
D01	do 1 (DO1)	DO1 output registration (relay)	The setting range is indicated by the D-register or I-relay number for a contact output flag + 5000. These numbers depend on the control mode set at the factory. So details on this are described on a mode basis later in this manual.	1106
D02	do2 (DO2)	DO2 output registration (relay)		1107
D03	do3 (DO3)	DO3 output registration (relay)		1108
D04	do4 (DO4)	DO4 output registration (transistor open-collector)		1109
D05	do5 (DO5)	DO5 output registration (transistor open-collector)		1110
D06	dob (DO6)	DO6 output registration (transistor open-collector)		1111
D07	do7 (DO7)	DO7 output registration (transistor open-collector)		1112

Contact Output Assignments (Default Settings) for Individual Control Modes (UT Modes)

(1) Single-loop control (UT mode 1)

■ UT750

DO	Output Type	Function
DO1	Relay	Alarm-1 output
DO2	Relay	Alarm-2 output
DO3	Relay	Alarm-3 output (or cooling-side output in heating/cooling control [Note])
DO4	Transistor	Alarm-4 output (or cooling-side output in heating/cooling control [Note])
DO5	Transistor	Alarm-3 output
DO6	Transistor	Alarm-4 output
DO7	Transistor	Not assigned

Note: When heating/cooing control using relay or transistor output in control output is selected, cooling-side output is assigned to DO3 or DO4.

■ UT550/UT520/UT551

DO	Output Type	Function
DO1	Relay	Alarm-1 output
DO2	Relay	Alarm-2 output
DO3	Relay	Alarm-3 output (Note2)
DO4 (Note1)	Transistor	Alarm-4 output (Note2)
DO5 (Note1)	Transistor	Not assigned
DO6 (Note1)	Transistor	Not assigned
DO7 (Note1)	Transistor	FAIL output

Note1: Used for the UT55□-□1, UT55□-□3, UT551-□C and UT551-□D only.
Note2: If the control output selects a transistor output, alarm-4 output is assigned to the relay terminal (for output 1) and alarm-3 output is also assigned to the relay terminal (for output 2) (UT55□-2□ only).

● D-register and I-relay numbers assigned to contact outputs (at the factory before shipment)

The registered numbers of the alarm and other functions assigned to contact output registration parameters DO1 to DO7 are shown below:

Model	Function	Registered number
Common to UT750, UT550, UT551 and UT520	Alarm-1 output	5689 (I-relay number)
	Alarm-2 output	5690 (I-relay number)
	Alarm-3 output	5691 (I-relay number)
	Alarm-4 output	5693 (I-relay number)
UT750 only	Cooling-side output via DO3	1607 (D-register number)
	Cooling-side output via DO4	1609 (D-register number)
UT550, UT551 and UT520 only	FAIL output	1609 (D-register number)

(2) Cascade, primary-loop control (UT mode 2)

■ UT750

DO	Output	Function
DO1	Relay	Alarm-1 output
DO2	Relay	Alarm-2 output
DO3	Relay	Alarm-3 output
DO4	Transistor	Alarm-4 output
DO5	Transistor	Not assigned
DO6	Transistor	Not assigned
DO7	Transistor	FAIL output

■ UT550/UT520/UT551

DO	Output Type	Function
DO1	Relay	Alarm-1 output
DO2	Relay	Alarm-2 output
DO3	Relay	FAIL output
DO4 (Note1)	Transistor	Alarm-4 output (Note2)
DO5 (Note1)	Transistor	Alarm-3 output (Note2)
DO6 (Note1)	Transistor	Not assigned
DO7 (Note1)	Transistor	Not assigned

Note1: Used for the UT55□-□1, UT55□-□3, UT551-□C and UT551-□D only.
Note2: If the control output selects a transistor output, alarm-4 output is assigned to the relay terminal (for output 1) and alarm-3 output is also assigned to the relay terminal (for output 2) (UT55□-2□ only).

● D-register and I-relay numbers assigned to contact outputs (at the factory before shipment)

The registered numbers of the alarm and other functions assigned to contact output registration parameters DO1 to DO7 are shown below:

Model	Function	Registered number
Common to UT750, UT550, UT551 and UT520	Alarm-1 output	5689 (I-relay number)
	Alarm-2 output	5690 (I-relay number)
	Alarm-3 output	5691 (I-relay number)
	Alarm-4 output	5693 (I-relay number)
UT750 only	FAIL output	1613 (D-register number)
UT550, UT551 and UT520 only	FAIL output	1611 (D-register number)

(3) Cascade, secondary-loop control (UT mode 3)

■ UT750

DO	Output Type	Function
DO1	Relay	Alarm-1 output
DO2	Relay	Alarm-2 output
DO3	Relay	Alarm-3 output (or cooling-side control in heating/cooling control [Note])
DO4	Transistor	Alarm-4 output (or cooling-side control in heating/cooling control [Note])
DO5	Transistor	Alarm-3 output
DO6	Transistor	Alarm-4 output
DO7	Transistor	Tracking selection signal (on in automatic/manual mode or halt status)

Note: When heating/cooing control using relay or transistor output in control output is selected, cooling-side output is assigned to DO3 or DO4 above.

■ UT550/UT520/UT551

DO	Output Type	Function
DO1	Relay	Alarm-1 output
DO2	Relay	Alarm-2 output
DO3	Relay	Tracking selection signal (on in automatic/manual mode or halt status)
DO4 (Note1)	Transistor	Alarm-4 output (Note2)
DO5 (Note1)	Transistor	Alarm-3 output (Note2)
DO6 (Note1)	Transistor	Not assigned
DO7 (Note1)	Transistor	FAIL output

Note1: Used for the UT55□-□1, UT55□-□3, UT551-□C and UT551-□D only.
Note2: If the control output selects a transistor output, alarm-4 output is assigned to the relay terminal (for output 1) and alarm-3 output is also assigned to the relay terminal (for output 2) (UT55□-2□ only).

● D-register and I-relay numbers assigned to contact outputs (at the factory before shipment)

The registered numbers of the alarm and other functions assigned to contact output registration parameters DO1 to DO7 are shown below:

Model	Function	Registered number
Common to UT750, UT550, UT551 and UT520	Alarm-1 output	5689 (I-relay number)
	Alarm-2 output	5690 (I-relay number)
	Alarm-3 output	5691 (I-relay number)
	Alarm-4 output	5693 (I-relay number)
	Tracking selection signal	1611 (D-register number)
UT750 only	Cooling output via DO3	1607 (D-register number)
	Cooling output via DO4	1609 (D-register number)
UT550, UT551 and UT520 only	FAIL output	1609 (D-register number)

(4) Cascade control (UT mode 4)

■ UT750

DO	Output Type	Function
DO1	Relay	Alarm-1 output
DO2	Relay	Alarm-2 output
DO3	Relay	Alarm-3 output (or cooling-side control in heating/cooling control [Note])
DO4	Transistor	Alarm-4 output (or cooling-side control in heating/cooling control [Note])
DO5	Transistor	Alarm-3 output
DO6	Transistor	Alarm-4 output
DO7	Transistor	Not assigned

Note: When heating/cooing control using relay or transistor output in control output is selected, cooling-side output is assigned to DO3 or DO4 above.

■ UT550/UT520/UT551

DO	Output Type	Function
DO1	Relay	Alarm-1 output
DO2	Relay	Alarm-2 output
DO3	Relay	Alarm-3 output (Note2)
DO4 (Note1)	Transistor	Alarm-4 output (Note2)
DO5 (Note1)	Transistor	Not assigned
DO6 (Note1)	Transistor	Not assigned
DO7 (Note1)	Transistor	FAIL output

Note1: Used for the UT55□-□1, UT55□-□3, UT551-□C and UT551-□D only.
Note2: If the control output selects a transistor output, alarm-4 output is assigned to the relay terminal (for output 1) and alarm-3 output is also assigned to the relay terminal (for output 2) (UT55□-2□ only).

● **D-register and I-relay numbers assigned to contact outputs (at the factory before shipment)**

The registered numbers of the alarm and other functions assigned to contact output registration parameters DO1 to DO7 are shown below:

Model	Function	Registered number
Common to UT750, UT550, UT551 and UT520	Alarm-1 output	5689 (I-relay number)
	Alarm-2 output	5690 (I-relay number)
	Alarm-3 output	5691 (I-relay number)
	Alarm-4 output	5693 (I-relay number)
UT750 only	Cooling output via DO3	1607 (D-register number)
	Cooling output via DO4	1609 (D-register number)
UT550, UT551 and UT520 only	FAIL output	1609 (D-register number)

(5) Loop control for backup (UT mode 5)

■ UT750

DO	Output Type	Function
DO1	Relay	Alarm-1 output
DO2	Relay	Alarm-2 output
DO3	Relay	Alarm-3 output (or cooling-side control in heating/cooling control [Note])
DO4	Transistor	Alarm-4 output (or cooling-side control in heating/cooling control [Note])
DO5	Transistor	Alarm-3 output
DO6	Transistor	Alarm-4 output
DO7	Transistor	FAIL output

Note: When heating/cooing control using relay or transistor output in control output is selected, cooling-side output is assigned to DO3 or DO4 above.

■ UT550/UT520/UT551

DO	Output Type	Function
DO1	Relay	Alarm-1 output
DO2	Relay	Alarm-2 output
DO3	Relay	FAIL output
DO4 (Note1)	Transistor	Alarm-4 output (Note2)
DO5 (Note1)	Transistor	Alarm-3 output (Note2)
DO6 (Note1)	Transistor	Not assigned
DO7 (Note1)	Transistor	Not assigned

Note1: Used for the UT55□-□1, UT55□-□3, UT551-□C and UT551-□D only.
Note2: If the control output selects a transistor output, alarm-4 output is assigned to the relay terminal (for output 1) and alarm-3 output is also assigned to the relay terminal (for output 2) (UT55□-2□ only).

● **D-register and I-relay numbers assigned to contact outputs (at the factory before shipment)**

The registered numbers of the alarm and other functions assigned to contact output registration parameters DO1 to DO7 are shown below:

Model	Function	Registered number
Common to UT750, UT550, UT551 and UT520	Alarm-1 output	5689 (I-relay number)
	Alarm-2 output	5690 (I-relay number)
	Alarm-3 output	5691 (I-relay number)
	Alarm-4 output	5693 (I-relay number)
UT750 only	Cooling output via DO3	1607 (D-register number)
	Cooling output via DO4	1609 (D-register number)
	FAIL output	1613 (D-register number)
UT550, UT551 and UT520 only	FAIL output	1611 (D-register number)

(6) Loop control with PV switching (UT mode 6)

■ UT750

DO	Output Type	Function
DO1	Relay	Alarm-1 output
DO2	Relay	Alarm-2 output
DO3	Relay	Alarm-3 output (or cooling-side control in heating/cooling control [Note])
DO4	Transistor	Alarm-4 output (or cooling-side control in heating/cooling control [Note])
DO5	Transistor	Alarm-3 output
DO6	Transistor	Alarm-4 output
DO7	Transistor	Not assigned

Note: When heating/cooing control using relay or transistor output in the control output is selected, cooling-side output is assigned to DO3 or DO4 above.

■ UT550/UT520/UT551

DO	Output Type	Function
DO1	Relay	Alarm-1 output
DO2	Relay	Alarm-2 output
DO3	Relay	Alarm-3 output (Note2)
DO4 (Note1)	Transistor	Alarm-4 output (Note2)
DO5 (Note1)	Transistor	Not assigned
DO6 (Note1)	Transistor	Not assigned
DO7 (Note1)	Transistor	FAIL output

Note1: Used for the UT55□-□1, UT55□-□3, UT551-□C and UT551-□D only.
Note2: If the control output selects a transistor output, alarm-4 output is assigned to the relay terminal (for output 1) and alarm-3 output is also assigned to the relay terminal (for output 2) (UT55□-2□ only).

(7) Loop control with PV auto-selector (UT mode 7)

■ UT750

DO	Output Type	Function
DO1	Relay	Alarm-1 output
DO2	Relay	Alarm-2 output
DO3	Relay	Alarm-3 output (or cooling-side control in heating/cooling control [Note])
DO4	Transistor	Alarm-4 output (or cooling-side control in heating/cooling control [Note])
DO5	Transistor	Alarm-3 output
DO6	Transistor	Alarm-4 output
DO7	Transistor	Not assigned

Note: When heating/cooing control using relay or transistor output in control output is selected, cooling-side output is assigned to DO3 or DO4 above.

■ UT550/UT520/UT551

DO	Output Type	Function
DO1	Relay	Alarm-1 output
DO2	Relay	Alarm-2 output
DO3	Relay	Alarm-3 output (Note2)
DO4 (Note1)	Transistor	Alarm-4 output (Note2)
DO5 (Note1)	Transistor	Not assigned
DO6 (Note1)	Transistor	Not assigned
DO7 (Note1)	Transistor	FAIL output

Note1: Used for the UT55□-□1, UT55□-□3, UT551-□C and UT551-□D only.
Note2: If the control output selects a transistor output, alarm-4 output is assigned to the relay terminal (for output 1) and alarm-3 output is also assigned to the relay terminal (for output 2) (UT55□-2□ only).

● D-register and I-relay numbers assigned to contact outputs (at the factory before shipment)

The registered numbers of the alarm and other functions assigned to contact output registration parameters DO1 to DO7 are shown below:

Model	Function	Registered number
Common to UT750, UT550, UT551 and UT520	Alarm-1 output	5689 (I-relay number)
	Alarm-2 output	5690 (I-relay number)
	Alarm-3 output	5691 (I-relay number)
	Alarm-4 output	5693 (I-relay number)
UT750 only	Cooling output via DO3	1607 (D-register number)
	Cooling output via DO4	1609 (D-register number)
UT550, UT551 and UT520 only	FAIL output	1609 (D-register number)

● D-register and I-relay numbers assigned to contact outputs (at the factory before shipment)

The registered numbers of the alarm and other functions assigned to contact output registration parameters DO1 to DO7 are shown below:

Model	Function	Registered number
Common to UT750, UT550, UT551 and UT520	Alarm-1 output	5689 (I-relay number)
	Alarm-2 output	5690 (I-relay number)
	Alarm-3 output	5691 (I-relay number)
	Alarm-4 output	5693 (I-relay number)
UT750 only	Cooling output via DO3	1607 (D-register number)
	Cooling output via DO4	1609 (D-register number)
UT550, UT551 and UT520 only	FAIL output	1609 (D-register number)

(8) Loop control with PV-hold function (UT mode 8)

■ For the UT550/UT520/UT551 only

DO	Output Type	Function
DO1	Relay	Alarm-1 output
DO2	Relay	Alarm-2 output
DO3	Relay	Alarm-3 output (Note2)
DO4 (Note1)	Transistor	Alarm-4 output (Note2)
DO5 (Note1)	Transistor	Not assigned
DO6 (Note1)	Transistor	Not assigned
DO7 (Note1)	Transistor	FAIL output

Note1: Used for the UT55□-□1, UT55□-□3, UT551-□C and UT551-□D only.
Note2: If the control output selects a transistor output, alarm-4 output is assigned to the relay terminal (for output 1) and alarm-3 output is also assigned to the relay terminal (for output 2) (UT55□-2□ only).

● **D-register and I-relay numbers assigned to contact outputs (at the factory before shipment)**

The registered numbers of the alarm and other functions assigned to contact output registration parameters DO1 to DO7 are shown below:

Function	Registered number
Alarm-1 output	5689 (I-relay number)
Alarm-2 output	5690 (I-relay number)
Alarm-3 output	5691 (I-relay number)
Alarm-4 output	5693 (I-relay number)
FAIL output	1609 (D-register number)

(9) Dual-loop control (UT mode 11)

■ For the UT750 only

DO	Output Type	Function
DO1	Relay	Loop-1, alarm-1 output
DO2	Relay	Loop-1, alarm-2 output (or cooling-side control in heating/ cooling control in loop 2 [Note])
DO3	Relay	Loop-1, alarm-3 output (or cooling-side control in heating/ cooling control in loop 1 [Note])
DO4	Transistor	Loop-1, alarm-4 output (or cooling-side control in heating/ cooling control in loop 1 [Note])
DO5	Transistor	Loop-2, alarm-1 output (or cooling-side control in heating/ cooling control in loop 2 [Note])
DO6	Transistor	Loop-2, alarm-2 output
DO7	Transistor	Loop-2, alarm-3 output

Note: When heating/cooing control using relay or transistor output in control output is selected, cooling-side output in loop 1 is assigned to DO3 or DO4 and cooling-side output in loop 2 is assigned to DO2 or DO5.

● **D-register and I-relay numbers assigned to contact outputs (at the factory before shipment)**

The registered numbers of the alarm and other functions assigned to contact output registration parameters DO1 to DO7 are shown below:

Function	Registered number
Loop 1, alarm-1 output	5689 (I-relay number)
Loop 1, alarm-2 output	5690 (I-relay number)
Loop 1, alarm-3 output	5691 (I-relay number)
Loop 1, alarm-4 output	5693 (I-relay number)
Loop 2, alarm-1 output	5697 (I-relay number)
Loop 2, alarm-2 output	5698 (I-relay number)
Loop 2, alarm-3 output	5699 (I-relay number)
Cooling output in loop 1 via DO3	1607 (D-register number)
Cooling output in loop 1 via DO4	1609 (D-register number)
Cooling output in loop 2 via DO2	1615 (D-register number)
Cooling output in loop 2 via DO5	1617 (D-register number)

(10) Temperature and humidity control (UT mode 12)

■ For the UT750 only

DO	Output Type	Function
DO1	Relay	Loop-1, alarm-1 output
DO2	Relay	Loop-1, alarm-2 output (or cooling-side control in heating/ cooling control in loop 2 [Note])
DO3	Relay	Loop-1, alarm-3 output (or cooling-side control in heating/ cooling control in loop 1 [Note])
DO4	Transistor	Loop-1, alarm-4 output (or cooling-side control in heating/ cooling control in loop 1 [Note])
DO5	Transistor	Loop-2, alarm-1 output (or cooling-side control in heating/ cooling control in loop 2 [Note])
DO6	Transistor	Loop-2, alarm-2 output
DO7	Transistor	Loop-2, alarm-3 output

Note: When heating/cooing control using relay or transistor output in control output is selected, cooling-side output in loop 1 is assigned to DO3 or DO4 and cooling-side output in loop 2 is assigned to DO2 or DO5.

● **D-register and I-relay numbers assigned to contact outputs (at the factory before shipment)**

The registered numbers of the alarm and other functions assigned to contact output registration parameters DO1 to DO7 are shown below:

Function	Registered number
Loop 1, alarm-1 output	5689 (I-relay number)
Loop 1, alarm-2 output	5690 (I-relay number)
Loop 1, alarm-3 output	5691 (I-relay number)
Loop 1, alarm-4 output	5693 (I-relay number)
Loop 2, alarm-1 output	5697 (I-relay number)
Loop 2, alarm-2 output	5698 (I-relay number)
Loop 2, alarm-3 output	5699 (I-relay number)
Cooling output in loop 1 via DO3	1607 (D-register number)
Cooling output in loop 1 via DO4	1609 (D-register number)
Cooling output in loop 2 via DO2	1615 (D-register number)
Cooling output in loop 2 via DO5	1617 (D-register number)

(11) Cascade control with two universal inputs (UT mode 13)

This function is for the UT750 only.
The contact output functions in this control mode is the same as for cascade control (UT mode 4) in Item (4). For more details, refer to Item (4) earlier in this manual.

(12) Loop control with PV switching and two universal inputs (UT mode 14)

This function is for the UT750 only.
The contact output functions in this control mode are the same as for the loop control with PV switching (UT mode 6) in Item (6). For more details, refer to Item (6) earlier in this manual.

(13) Loop control with PV auto-selector and two universal inputs (UT mode 15)

This function is for the UT750 only.
The contact output functions in this control mode are the same as for the loop control with PV auto-selector (UT mode 7) in Item (7). For more details, refer to Item (7) earlier in this manual.

(14) Custom computation control (UT mode 21)

This function is for the UT750 only. The contact output functions are not assigned at the factory before shipment.

<<Ref. 3.2: References Related to Contact Output>>
Ref.3.2(2) Changing Contact Output Functions in the UP750 and UP550

Nine contact output terminals (including a common terminal) are provided on both the UP750 and UP550. Their terminal numbers are 4, 5, 6, 7 (common), 31, 32, 33, 34, and 35 (common), as listed in the table below.

Table 3-2-4 also shows the DO numbers corresponding to each contact output terminal in single-loop UP750 and UP550 controllers. With these DO numbers, functions listed in the table are set at the factory before shipment. (In single-loop controllers, the same contact outputs are set at the factory before shipment.)

For the items set for other than single-loop controllers, refer to pages Ref. 3-49 through Ref. 3-54, to meet your selected model, later in this manual.

Table 3-2-4 Contact Output Terminals of the UP750 and UP550 (for Single-loop Control) and Their Factory-set Functions

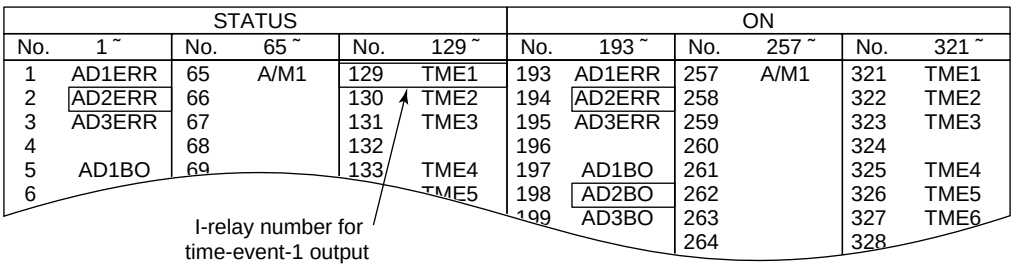
Terminal No.	DO No.	Factory-set Function	Output Type
6	DO1	PV-event 1 output	Relay
5	DO2	PV-event 2 output	Relay
4	DO3	Instrument alarm output (or cooling-side control output [Note1])	Relay
7	Common terminal (for DO1 to DO3)		
34	DO4	Time-event 1 output (or cooling-side control output [Note1])	Transistor
33	DO5	Time-event 2 output	Transistor
32	DO6	Time-event 3 output	Transistor
31	DO7	Time-event 4 output	Transistor
35	Common terminal (for DO4 to DO7)		

Note1: When heating/cooing control using relay or transistor output in control output is selected, cooling-side output is assigned to DO3 or DO4 above.

The UP750 and UP550 enable you to change the contact output functions. These functions can be set with setup parameters DO1 through DO7.

For the procedure of function assignments, follow the steps below:

1) Decide which signal to output from which contact output terminals (see the table above).
2) Identify the DO number corresponding to the selected terminal number. For example, if you use terminal number 6, the corresponding DO number is 1 (DO1).
3) Define the type of signal to be output from the terminal. For example, if time-event-1 output is issued with a relay-contact output using terminal number 6, register the I-relay number (+5000) for the time-event-1 output to parameter DO1.
   The I-relay number for time-event-1 output is 129 as indicated on the I-relay map. For this, register setpoint: 5129 for parameter DO1.



● To change the contact output functions, use the parameters listed below.
Refer to the Default Settings or Parameters section of the appropriate User's Manual to change the parameter values.

• Setup parameters (Contact Output Registration Parameters): DO1 to DO7

UP750 UP550 Code	Description	Setting Range and Default Settings	D-register No.
D01	DO1 output flag registration (relay)	The setting range is indicated by the D-register or I-relay number for a contact output flag + 5000. These numbers depend on the control mode set at the factory. So details on this are described on a mode basis later in this manual.	1106
D02	DO2 output flag registration (relay)		1107
D03	DO3 output flag registration (relay)		1108
D04	DO4 output flag registration (transistor open-collector)		1109
D05	DO5 output flag registration (transistor open-collector)		1110
D06	DO6 output flag registration (transistor open-collector)		1111
D07	DO7 output flag registration (transistor open-collector)		1112

The contact outputs assigned for individual UP modes in the UP750 and UP550 are as follows:

(1) Single-loop control (UP mode 1)

Contact output	Output Type	Function
DO1	Relay	PV-event-1 output
DO2	Relay	PV-event-2 output
DO3	Relay	Instrument alarm-1 output (or cooling-side output in heating/cooling control [Note1])
DO4	Transistor	Time-event-1 output (or cooling-side output in heating/cooling control [Note1])
DO5	Transistor	Time-event-2 output
DO6	Transistor	Time-event-3 output
DO7	Transistor	Time-event-4 output

Note1: When heating/cooing control using relay or transistor output in control output is selected, cooling-side output is assigned to DO3 or DO4 for the UP750.

TIP: If the output type other than a relay (see the table above) is selected for control output, time-event-5 output will be assigned to the relay terminal (for output 1) for the UP550, and time-event-6 output is assigned to the relay terminal (for output 2) for the UP550-2□ only.

■ **D-register and I-register numbers assigned to contact outputs and extended contact outputs (set at the factory)**

The registered numbers of the alarm and other functions assigned to contact output registration parameters DO1 to DO7 are shown below:

Model	Registered contact output parameters	Function	Registered number
Common to UP750 and UP550	DO1	PV-event-1 output	5705 (I-relay number)
	DO2	PV-event-2 output	5706 (I-relay number)
	DO3	Instrument alarm-1 output	5689 (I-relay number)
	DO4	Time-event-1 output	5129 (I-relay number)
	DO5	Time-event-2 output	5130 (I-relay number)
	DO6	Time-event-3 output	5131 (I-relay number)
	DO7	Time-event-4 output	5132 (I-relay number)
UP750 only	DO3	Cooling-side output in heating/cooling control	1607 (D-register number)
	DO4	Cooling-side output in heating/cooling control	1609 (D-register number)

(2) Cascade, primary-loop control (UP mode 2)

Contact output	Output Type	Function
DO1	Relay	PV-event-1 output
DO2	Relay	PV-event-2 output
DO3	Relay	Instrument alarm-1 output
DO4	Transistor	Time-event-1 output
DO5	Transistor	Time-event-2 output
DO6	Transistor	Time-event-3 output
DO7	Transistor	FAIL output

TIP: Time-event-5 output is assigned to the relay terminal (for output 1) for the UP550, and time-event-6 output is assigned to the relay terminal (for output 2) for the UP550-2□ only.

■ **D-register and I-register numbers assigned to contact outputs and extended contact outputs (set at the factory)**

The registered numbers of the alarm and other functions assigned to contact output registration parameters DO1 to DO7 are shown below:

Model	Registered contact output parameters	Function	Registered number
Common to UP750 and UP550	DO1	PV-event-1 output	5705 (I-relay number)
	DO2	PV-event-2 output	5706 (I-relay number)
	DO3	Instrument alarm-1 output	5689 (I-relay number)
	DO4	Time-event-1 output	5129 (I-relay number)
	DO5	Time-event-2 output	5130 (I-relay number)
	DO6	Time-event-3 output	5131 (I-relay number)
UP750 only	DO3	Cooling-side output in heating/cooling control	1607 (D-register number)
	DO4	Cooling-side output in heating/cooling control	1609 (D-register number)
	DO7	FAIL output	1613 (D-register number)
UP550 only	DO7	FAIL output	1611 (D-register number)

(3) Cascade control (UP mode 4)

Contact output	Output Type	Function
DO1	Relay	PV-event-1 output
DO2	Relay	PV-event-2 output
DO3	Relay	Instrument alarm-1 output (or cooling-side output in heating/cooling control [Note1])
DO4	Transistor	Time-event-1 output (or cooling-side output in heating/cooling control [Note1])
DO5	Transistor	Time-event-2 output
DO6	Transistor	Time-event-3 output
DO7	Transistor	Time-event-4 output

Note1: When heating/cooing control using relay or transistor output in control output is selected, cooling-side output is assigned to DO3 or DO4 for the UP750.
TIP: If the output type other than a relay (see the table above) is selected for control output, time-event-5 output will be assigned to the relay terminal (for output 1) for the UP550, and time-event-6 output will be assigned to the relay terminal (for output 2) for the UP550-2□ only.

■ D-register and I-register numbers assigned to contact outputs and extended contact outputs (set at the factory)

The registered numbers of the alarm and other functions assigned to contact output registration parameters DO1 to DO7 are shown below:

Model	Registered contact output parameters	Function	Registered number
Common to UP750 and UP550	DO1	PV-event-1 output	5705 (I-relay number)
	DO2	PV-event-2 output	5706 (I-relay number)
	DO3	Instrument alarm-1 output	5689 (I-relay number)
	DO4	Time-event-1 output	5129 (I-relay number)
	DO5	Time-event-2 output	5130 (I-relay number)
	DO6	Time-event-3 output	5131 (I-relay number)
	DO7	Time-event-4 output	5132 (I-relay number)
UP750 only	DO3	Cooling-side output in heating/cooling control	1607 (D-register number)
	DO4	Cooling-side output in heating/cooling control	1609 (D-register number)

(4) Loop control with PV switching (UT mode 6)

Contact output	Output Type	Function
DO1	Relay	PV-event-1 output
DO2	Relay	PV-event-2 output
DO3	Relay	Instrument alarm-1 output (or cooling-side output in heating/cooling control [Note1])
DO4	Transistor	Time-event-1 output (or cooling-side output in heating/cooling control [Note1])
DO5	Transistor	Time-event-2 output
DO6	Transistor	Time-event-3 output
DO7	Transistor	Time-event-4 output

Note1: When heating/cooing control using relay or transistor output in control output is selected, cooling-side output is assigned to DO3 or DO4 for the UP750.
TIP: If the output type other than a relay (see the table above) is selected for control output, time-event-5 output will be assigned to the relay terminal (for output 1) for the UP550, and time-event-6 output will be assigned to the relay terminal (for output 2) for the UP550-2□ only.

■ **D-register and I-register numbers assigned to contact outputs and extended contact outputs (set at the factory)**

The registered numbers of the alarm and other functions assigned to contact output registration parameters DO1 to DO7 are shown below:

Model	Registered contact output parameters	Function	Registered number
Common to UP750 and UP550	DO1	PV-event-1 output	5705 (I-relay number)
	DO2	PV-event-2 output	5706 (I-relay number)
	DO3	Instrument alarm-1 output	5689 (I-relay number)
	DO4	Time-event-1 output	5129 (I-relay number)
	DO5	Time-event-2 output	5130 (I-relay number)
	DO6	Time-event-3 output	5131 (I-relay number)
	DO7	Time-event-4 output	5132 (I-relay number)
UP750 only	DO3	Cooling-side output in heating/cooling control	1607 (D-register number)
	DO4	Cooling-side output in heating/cooling control	1609 (D-register number)

(5) Loop control with PV auto-selector (UP mode 7)

Contact output	Output Type	Function
DO1	Relay	PV-event-1 output
DO2	Relay	PV-event-2 output
DO3	Relay	Instrument alarm-1 output (or cooling-side output in heating/cooling control [Note1])
DO4	Transistor	Time-event-1 output (or cooling-side output in heating/cooling control [Note1])
DO5	Transistor	Time-event-2 output
DO6	Transistor	Time-event-3 output
DO7	Transistor	Time-event-4 output

Note1: When heating/cooing control using relay or transistor output in control output is selected, cooling-side output is assigned to DO3 or DO4 for the UP750.

TIP: If the output type other than a relay (see the table above) is selected for control output, time-event-5 output will be assigned to the relay terminal (for output 1) for the UP550, and time-event-6 output will be assigned to the relay terminal (for output 2) for the UP550-2□ only.

■ **D-register and I-register numbers assigned to contact outputs and extended contact outputs (set at the factory)**

The registered numbers of the alarm and other functions assigned to contact output registration parameters DO1 to DO7 are shown below:

Model	Registered contact output parameters	Function	Registered number
Common to UP750 and UP550	DO1	PV-event-1 output	5705 (I-relay number)
	DO2	PV-event-2 output	5706 (I-relay number)
	DO3	Instrument alarm-1 output	5689 (I-relay number)
	DO4	Time-event-1 output	5129 (I-relay number)
	DO5	Time-event-2 output	5130 (I-relay number)
	DO6	Time-event-3 output	5131 (I-relay number)
	DO7	Time-event-4 output	5132 (I-relay number)
UP750 only	DO3	Cooling-side output in heating/cooling control	1607 (D-register number)
	DO4	Cooling-side output in heating/cooling control	1609 (D-register number)

(6) Dual-loop control (UP mode 11)

This function is for the UP750 only.

Contact output	Output Type	Function
DO1	Relay	PV-event-1 output
DO2	Relay	PV-event-2 output (or cooling-side output in heating/cooling control in loop 2 [Note])
DO3	Relay	Instrument alarm-1 output (or cooling-side output in heating/cooling control in loop 1 [Note])
DO4	Transistor	Time-event-1 output (or cooling-side output in heating/cooling control in loop 1 [Note])
DO5	Transistor	Time-event-2 output (or cooling-side output in heating/cooling control in loop 2 [Note])
DO6	Transistor	Time-event-3 output
DO7	Transistor	Time-event-4 output

Note: When heating/cooing control using relay or transistor output in control output is selected, cooling-side output in loop 1 is assigned to DO3 or DO4, and cooling-side output in loop 2 is assigned to DO2 or DO5.

■ D-register and I-register numbers assigned to contact outputs and extended contact outputs (set at the factory)

The registered numbers of the alarm and other functions assigned to contact output registration parameters DO1 to DO7, R151 to R158, and R251 to R258 are shown below:

Contact output registration parameter	Function	Registered number
DO1	PV-event-1 output	5705 (I-relay number)
DO2	PV-event-2 output	5706 (I-relay number)
	Cooling-side control output in loop 2	1615 (D-register number)
DO3	Instrument alarm-1 output	5689 (I-relay number)
	Cooling-side control output in loop 1	1607 (D-register number)
DO4	Time-event-1 output	5129 (I-relay number)
	Cooling-side control output in loop 1	1609 (D-register number)
DO5	Time-event-2 output	5130 (I-relay number)
	Cooling-side control output in loop 2	1617 (D-register number)
DO6	Time-event-3 output	5131 (I-relay number)
DO7	Time-event-4 output	5132 (I-relay number)

(7) Temperature and humidity control (UP mode 12)

This function is for the UP750 only.

Contact output	Output Type	Function
DO1	Relay	PV-event-1 output
DO2	Relay	PV-event-2 output (or cooling-side output in heating/cooling control in loop 2 [Note])
DO3	Relay	Instrument alarm-1 output (or cooling-side output in heating/cooling control in loop 1 [Note])
DO4	Transistor	Time-event-1 output (or cooling-side output in heating/cooling control in loop 1 [Note])
DO5	Transistor	Time-event-2 output (or cooling-side output in heating/cooling control in loop 2 [Note])
DO6	Transistor	Time-event-3 output
DO7	Transistor	Time-event-4 output

Note: When heating/cooing control using relay or transistor output in control output is selected, cooling-side output in loop 1 is assigned to DO3 or DO4, and cooling-side output in loop 2 is assigned to DO2 or DO5.

■ **D-register and I-register numbers assigned to contact outputs and extended contact outputs (set at the factory)**

The registered numbers of the alarm and other functions assigned to contact output registration parameters DO1 to DO7, R151 to R158, and R251 to R258 are shown below:

Contact output registration parameter	Function	Registered number
DO1	PV-event-1 output	5705 (I-relay number)
DO2	PV-event-2 output	5706 (I-relay number)
	Cooling-side control output in loop 2	1615 (D-register number)
DO3	Instrument alarm-1 output	5689 (I-relay number)
	Cooling-side control output in loop 1	1607 (D-register number)
DO4	Time-event-1 output	5129 (I-relay number)
	Cooling-side control output in loop 1	1609 (D-register number)
DO5	Time-event-2 output	5130 (I-relay number)
	Cooling-side control output in loop 2	1617 (D-register number)
DO6	Time-event-3 output	5131 (I-relay number)
DO7	Time-event-4 output	5132 (I-relay number)

(8) Cascade control with two universal inputs (UP mode 13)

This function is for the UP750 only.
The contact output functions in this control mode is the same as for cascade control (UP mode 4) in Item (3). For more details, refer to Item (3) earlier in this manual.

(9) Loop control with PV switching and two universal inputs (UP mode 14)

This function is for the UP750 only.
The contact output functions in this control mode is the same as for the loop control with PV switching (UP mode 6) in Item (4). For more details, refer to Item (4) earlier in this manual.

(10) Loop control with PV auto-selector and two universal inputs (UP mode 15)

This function is for the UP750 only.
The contact output functions in this control mode is the same as for the loop control with PV auto-selector (UP mode 7) in Item (5). For more details, refer to Item (5) earlier in this manual.

(11) Custom computation control (UP mode 21)

This function is for the UP750 only. The contact output functions are not assigned at the factory before shipment.

<<Ref. 3.2: References Related to Contact Output>>
Ref.3.2(3) Using the I/O Expansion Module with UT750 and UP750

Nine contact output terminals (including a common terminal) are provided on both UT750 and UP550.
Their terminal numbers are 4, 5, 6, 7 (common), 31, 32, 33, 34, and 35 (common).

If the number of the contact output terminals is not enough, use contact I/O expansion modules (Note1) enabling you to use up to 23-point contact outputs. Up to two I/O expansion modules can be connected. One of these incorporates eight contact inputs and outputs. If you use two modules, 16-point plus 7-point contact outputs (excluding common terminals 7 and 35) are available.

Note1: Requires Yokogawa's optional add-on module for the μFA20 compact program controller.

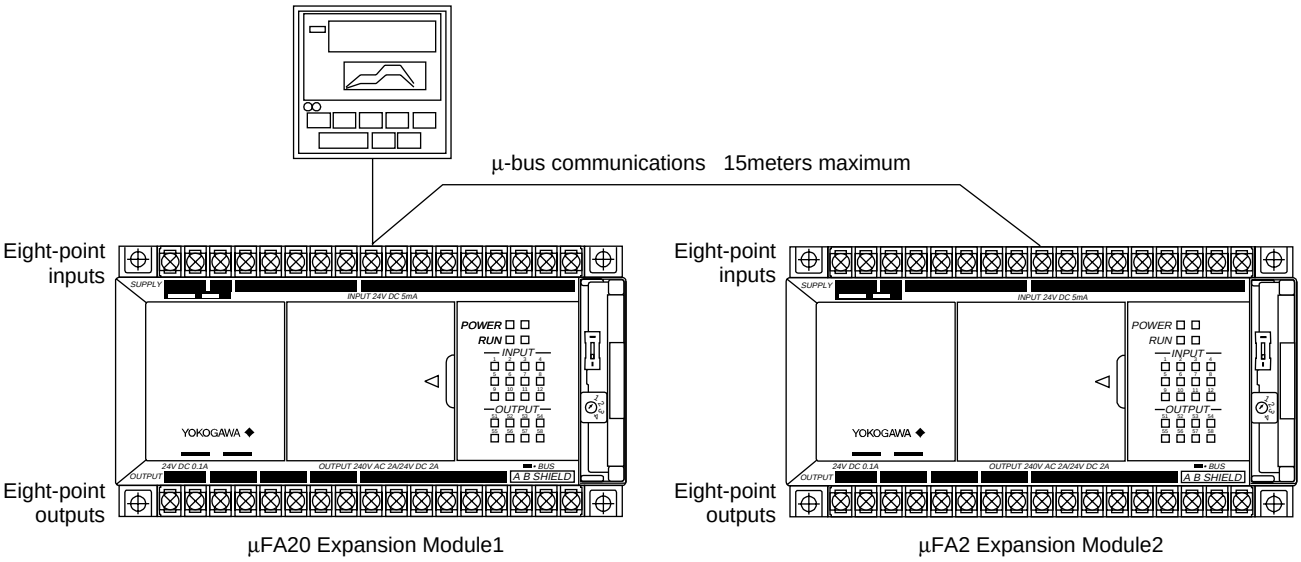


Fig. 3-2-1 I/O Expansion

The following four types of I/O expansion modules are available depending on the supply voltage and output types. Select the one that meets your needs.

Model	Supply voltage	Output type
P2ER1-20J	100 to 240 V AC	Relay
P2ET1-20J	100 to 240 V AC	Transistor
P2ER6-20J	24 V DC	Relay
P2ET6-20J	24 V DC	Transistor

Uses of the I/O expansion module's contact output terminals vary between the UT750 Digital Indicating Controller and the UP750 Program Controller.
The following describes the applications where the UT750 is used and then where the UP750 is used.
Select and refer to the one appropriate for your selected model.

[For UT750 Digital Indicating Controllers]

The I/O expansion module's contact output terminals and the corresponding contact output (setup) parameters are listed in Table 3-2-5. To assign the output functions to the extended contact output terminals, follow the steps below:

1) Select the desired I/O expansion module contact output terminals.
2) Check the contact output parameter corresponding to the selected contact terminal by referring to the table below.
3) Display the contact output parameter setup display and then register the D-register or I-register numbers (+5000) for setpoint output.

For example, with the UT750 in single-loop control, if alarm-4 output is assigned to I/O expansion OUTPUT 1 (relay-output specification), alarm-4 output can be a relay output. (For the standard model, alarm-4 output is a transistor open-collector output. If the UT750 is used in control mode other than single-loop control, follow the appropriate terminal assignments.)

In this case, register the I-register number (+5000) in alarm-4 output to contact output parameter R151. The I-relay number for alarm-4 output is 693 as indicated on the I-relay map. As such, register setpoint 5693 to parameter R151.

OFF						STATUS					
No.	385 ~	No.	449 ~	No.	513 ~	No.	577 ~	No.	641 ~	No.	705 ~
385	AD1ERR	449	A/M1	513		577	CSPNO.0	641		705	
386	AD2ERR					578	CSPNO.1	642		706	
		497		561		579	CSPNO.2	643		707	
434	UCALB.E	498		562	RDI102			644		754	
435	USER.E	499		563	RDI103	627					
436		500		564	RDI104	628		692		756	
437	UTMD	501		565	RDI105	629		693	ALO14	757	
438	RANGE	502		566	RDI106	630		694		758	
439	SETUP	503		567	RDI107	631		695		759	
440		504		568	RDI108	632		696		760	
441	PARA.E	505		569	RDI201	633		697	ALO21	761	
442	MODE.E	506		570	RDI202	634		698	ALO22	762	
443		507		571	RDI203	635		699	ALO23	763	
444		508		572	RDI204	636		700		764	
445	EEP.E	509		573	RDI205	637		701	ALO24	765	
446		510		574	RDI206	638		702		766	
447	SYSTEM.E	511		575	RDI207	639		703		767	
448		512		576	RDI208	640		704		768	

I-relay number for alarm-4 output

Table 3-2-5

	Extended contact output terminal	Contact output parameter	(D-register number for parameters to the left)
Contact I/O expansion module 1	OUTPUT1	R151	(1113)
	OUTPUT2	R152	(1114)
	OUTPUT3	R153	(1115)
	OUTPUT4	R154	(1116)
	OUTPUT5	R155	(1117)
	OUTPUT6	R156	(1118)
	OUTPUT7	R157	(1119)
	OUTPUT8	R158	(1120)
Contact I/O expansion module 2	OUTPUT1	R251	(1121)
	OUTPUT2	R252	(1122)
	OUTPUT3	R253	(1123)
	OUTPUT4	R254	(1124)
	OUTPUT5	R255	(1125)
	OUTPUT6	R256	(1126)
	OUTPUT7	R257	(1127)
	OUTPUT8	R258	(1128)

● The following parameters are used for extending the contact output functions.
To change the parameter values, consult the Default Settings or Parameters section of the appropriate user's manual.

• Setup parameters (Contact Output Registration Parameters): R151 to R258

UT750 Code	Description	Setting Range	Default	D-register Number
R151	R151 output flag registration		0 (with no functions)	1113
↓ ↓ ↓ ↓ ↓ ↓	Setting range: D-register or I-register number + 5000 For D-register numbers for parameters R152 to R257, see Table 3-2-5.			
R258	R258 output flag registration		0 (with no functions)	1128

[For the UP750 Program Controllers]

For the UP750, commonly used contact functions are assigned in advance to the I/O expansion module's contact output terminals.
The pre-assigned contact output features are listed in Table 3-2-6 below.

■ Extended contact output (for UP750 only)

When the contact I/O expansion module is connected to the UP750, PV-event and time-event outputs are output to the extended contact outputs (R151 to R158, and R251 to R258).

Table 3-2-6

Contact Output (Parameters)	Output type (Note1)	Functions	Default Settings (Set at the factory)
R151 (Note2)	Relay/O.C.	PV-event-3 output	5707 (I-relay number)
R152 (Note2)	Relay/O.C.	PV-event-4 output	5709 (I-relay number)
R153 (Note2)	Relay/O.C.	Time-event-5 output	5134 (I-relay number)
R154 (Note2)	Relay/O.C.	Time-event-6 output	5135 (I-relay number)
R155 (Note2)	Relay/O.C.	Time-event-7 output	5137 (I-relay number)
R156 (Note2)	Relay/O.C.	Time-event-8 output	5138 (I-relay number)
R157 (Note2)	Relay/O.C.	Time-event-9 output	5145 (I-relay number)
R158 (Note2)	Relay/O.C.	Time-event-10 output	5146 (I-relay number)
R251 (Note3)	Relay/O.C.	PV-event-5 output	5710 (I-relay number)
R252 (Note3)	Relay/O.C.	PV-event-6 output	5711 (I-relay number)
R253 (Note3)	Relay/O.C.	Time-event-11 output	5147 (I-relay number)
R254 (Note3)	Relay/O.C.	Time-event-12 output	5149 (I-relay number)
R255 (Note3)	Relay/O.C.	Time-event-13 output	5150 (I-relay number)
R256 (Note3)	Relay/O.C.	Time-event-14 output	5151 (I-relay number)
R257 (Note3)	Relay/O.C.	Time-event-15 output	5153 (I-relay number)
R258 (Note3)	Relay/O.C.	Time-event-16 output	5154 (I-relay number)

Note1: "O.C." in the table below indicates the open collector output (transistor output)
Note2: Extended contact output of contact I/O expansion module 1 connected to the UP750.
Note3: Extended contact output of contact I/O expansion module 2 connected to the UP750.

These functions can be used simply by connecting the I/O expansion module to the UP750 via μ-bus communications. In addition, part or all of the I/O expansion module terminal functions can also be changed. To do this, follow the steps below:
The I/O expansion module contact output terminals and the corresponding contact output parameter (setup parameter) numbers are shown in Table 3-2-7.

1) Select the desired I/O expansion module contact output terminals.
2) Check the contact output parameter corresponding to the selected contact terminal by referring to the table below.
3) Display the contact output parameter setup display and then register the D-register or I-register numbers (+5000) for setpoint output.

For example, with the UP750 in single-loop control, if time-event 1 is assigned to I/O expansion OUTPUT 1 (relay-output specification), time-event 1 can be a relay output. For the standard model, time-event 1 is transistor open-collector output. If the UP750 is used in a control mode other than single-loop control, follow the appropriate terminal assignments.

In this case, register the I-relay number (+5000) in time-event 1 to contact output parameter R151. The I-relay number for time-event 1 is 129 as indicated on the I-relay map. As such, register setpoint 5129 to parameter R151.

STATUS						ON					
No.	1 ~	No.	65 ~	No.	129 ~	No.	193 ~	No.	257 ~	No.	321 ~
1	AD1ERR	65	A/M1	129	TME1	193	AD1ERR	257	A/M1	321	TME1
2	AD2ERR	66		130	TME2	194	AD2ERR	258		322	TME2
3	AD3ERR	67		131	TME3	195	AD3ERR	259		323	TME3
4		68		132		196		260		324	
5	AD1BO	69		133	TME4	197	AD1BO	261		325	TME4
6					TME5	198	AD2BO	262		326	TME5
						199	AD3BO	263		327	TME6
								264		328	

I-relay number for time-event-1 output

Table 3-2-7

	Extended contact output terminal	Contact output parameter	D-register number for parameters to the left
Contact I/O expansion module 1	OUTPUT1	R151	1113
	OUTPUT2	R152	1114
	OUTPUT3	R153	1115
	OUTPUT4	R154	1116
	OUTPUT5	R155	1117
	OUTPUT6	R156	1118
	OUTPUT7	R157	1119
	OUTPUT8	R158	1120
Contact I/O expansion module 2	OUTPUT1	R251	1121
	OUTPUT2	R252	1122
	OUTPUT3	R253	1123
	OUTPUT4	R254	1124
	OUTPUT5	R255	1125
	OUTPUT6	R256	1126
	OUTPUT7	R257	1127
	OUTPUT8	R258	1128

● The following parameters are used for extending the contact output functions.
To change the parameter values, consult the Default Settings or Parameters section of the appropriate user's manual.

• Setup parameters (Contact Output Registration Parameters): R151 to R258

UP750 Code	Description	Setting Range	Default	D-register Number
R151	R151 output flag registration		0 (with no functions)	1113
↓				
↓	Setting range: D-register or I-register number + 5000			
↓				
↓	For D-register numbers for parameters R152 to R257, see Table 3-2-5.			
↓				
↓				
R258	R258 output flag registration		0 (with no functions)	1128

Ref.3.3: References Related to Alarms

IMPORTANT: Applicable models of this section

UP750	UP550	UP35□	UT750	UT5□□	UT4□0	UT3□□
None	None	None	UT750-□□	UT5□□-□□	UT4□0-□□	UT3□□-□□

For UP controllers, see Ref. 3.4: References on Events.

Note: Some of the functions below are not available on certain models.
For more information, see those sections.

This section contains reference information on the following aspects of alarms.
Refer to this information and change parameters only if necessary.

(1) Setting alarm trigger conditions
(2) Setting alarm hysteresis ON/OFF range
(3) Using the alarm timer (Control stable signal event)
(4) Using the sensor ground alarm
(5) Using the heater burnout alarm (UT350, UT320, UT351 and UT321 only)

<<Ref. 3.3: Reference Related to Alarms>>

Ref.3.3(1) Setting Alarm Trigger Conditions

Alarm trigger conditions can be set with the UT750, UT550, UT520, UT551, UT450 and UT420.

There are 3 alarm trigger conditions (alarm mode). (Note1)
Alarm mode is selected with the “AMD” parameter as indicted in the table below.

- Always active← (Factory-set default)
- Not active when in Stop mode
- Not active when in Stop mode or Manual operation

Note1: With the UT550, UT551 and UT520, alarm triggers can be selected from the following 3 conditions in addition to those above. These conditions are used as dual-loop control with a maximum 8 alarms.

- All 8 alarms always active
- All 8 alarms not active when in Stop mode
- All 8 alarms not active when in Stop mode or Manual operation

● **The following parameters are used.**

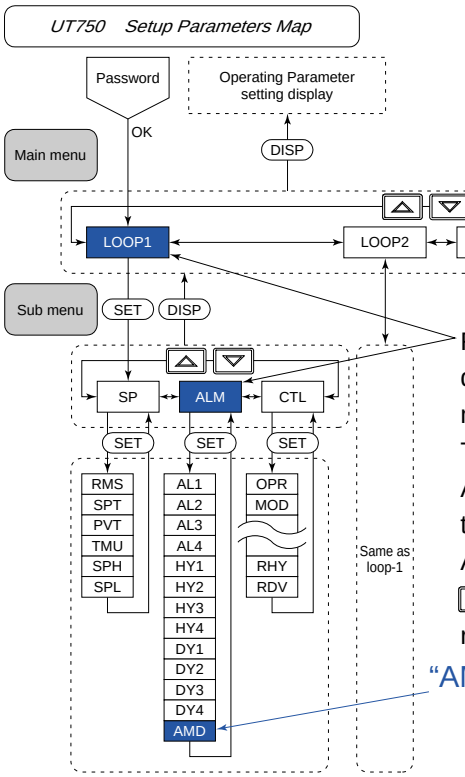
Change parameters as explained in the User’s Manuals Initial Settings and Parameter Map.

- Setup parameters (Alarm-related Parameters) : AMD

UT750 Code	UT5□□ UT4□0 Code	Description	Setting range	Default	D-register No.
AMD	AMD (AMD)	Alarm mode	0: Always active 1: Not active when in Stop mode 2: Not active when in Stop mode or Manual operation	0	923 (loop-1) 963 (loop-2)* *secondary loop
		The followings (Setpoint: 3 to 5) can be set with only UT5□□. However, those can not be set in Cascade control mode.	3: All 8 alarms always active 4: All 8 alarms not active when in Stop mode 5: All 8 alarms not active when in Stop mode or Manual operation		

Note1: With the UT5□□, displays the parameters (AL1 to AL4) for loop-2 when the set value 3, 4 or 5 is registered in “AMD”. The 5th to 8th alarms can be set to these parameters (AL1 to AL4) for loop-2. (However, those can not be set in Cascade control mode.)

A parts of the UT750 parameter map is shown below.
Refer and use the map to find the path to the setting display for a particular parameter.



Referring to the Parameter map, display the setup parameter main menu [LOOP1] .
Then, display the submenu [ALM].
And press the SET/ENT key time and again to display the parameter “AMD”.
Adjust the parameter value using the ▲ / ▼ keys, then press the SET/ENT key to register it.

“AMD”

<<Ref. 3.3: Reference Related to Alarms>>
Ref.3.3(2) Setting Alarm hysteresis ON/OFF range

Alarm hysteresis ON/OFF range can be set with the UT750, UT550, UT520, UT551, UT450, UT420, UT35□ and UT32□.
This function differs, as follows, according to model. Use it as specified for your model.

(1) With the UT35□, UT32□ and UT420, alarm 1 hysteresis (HY1) to alarm 3 hysteresis (HY3) correspond to alarm 1 (AL1) to alarm 3 (AL3), respectively.

(2) With the UT750, UT550, UT520, UT551 and UT450, alarm 1 hysteresis (HY1) to alarm 4 hysteresis (HY4) correspond to alarm 1 (AL1) to alarm 4 (AL4), respectively.

(3) The UT550, UT520 and UT551 add alarms 5 to 8 to those above. Alarm 5 hysteresis (uses HY1 of the secondary loop) to alarm 8 hysteresis (uses HY4 of the secondary loop) correspond to alarm 5 (uses AL1 of the secondary loop) to alarm 8 (uses AL4 of the secondary loop).

Note: With the UT550, UT520 and UT551, primary loop alarms 5 to 8 are set in the “AL1” to “AL4” parameters of the secondary loop. See Ref. 3-3: (1) Setting Alarm Trigger Conditions.

The alarm hysteresis (ON/OFF) bands for individual alarms can be set within the 0.0% to 100.0% range of PV input range span.

The following is an example of how to set the Alarm-1 hysteresis (HY1) when alarm1 is set as a PV high limit alarm (alarm type code=1)

In Fig. 3-3-1 and 3-3-2, “open” and “close” refer to the relay contact status.
In example below, the instrument range (RL to RH) is set as 0 to1000°C.
In Fig. 3-3-1, HY1 is set at 5 °C (0.5% of instrument range span).

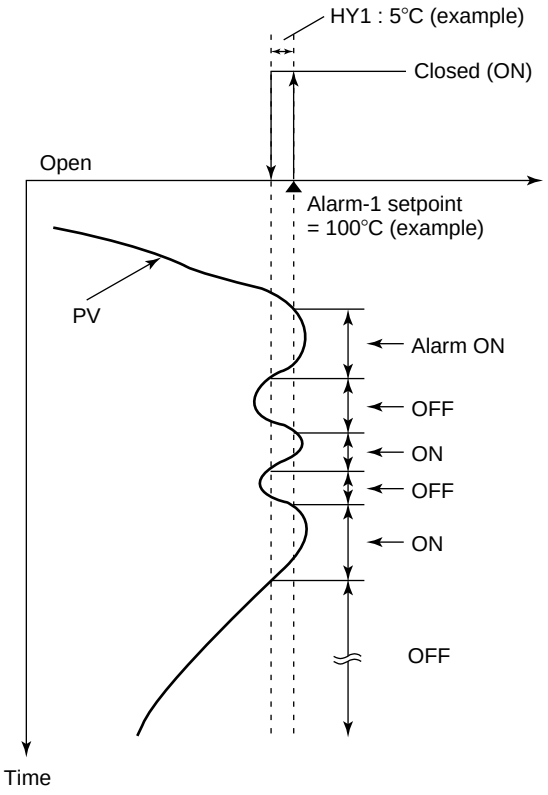


Fig. 3-3-1

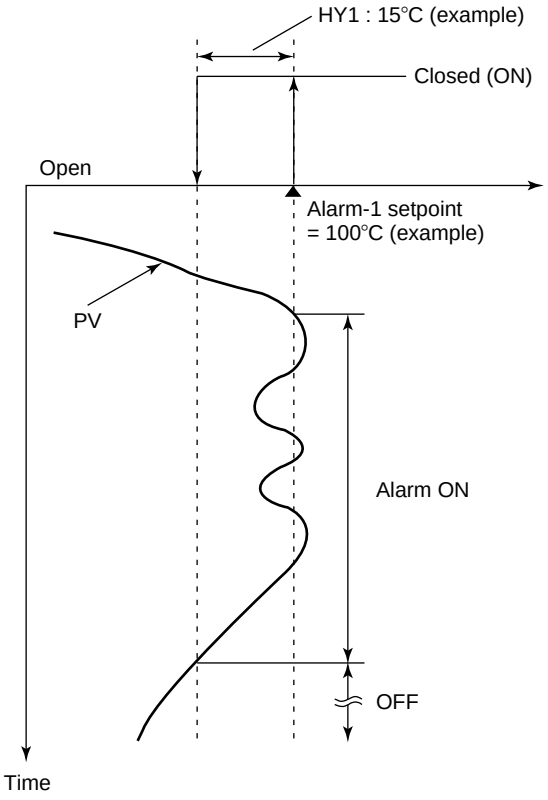


Fig. 3-3-2

If the alarm turns on and off too often, set hysteresis band wider to reduce the excessive number of on/off actions. In Fig. 3-3-2, the on/off action of the alarm is moderate compared to that in Fig. 3-3-1 because of the wider HY1 hysteresis band.

● **The following parameters are used.**

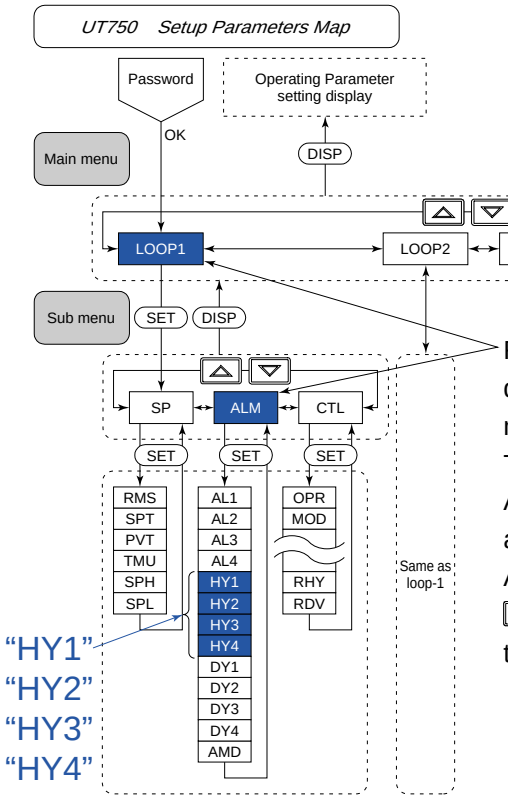
Change parameters as explained in the User's Manuals Initial Settings and Parameter Map.

- Setup parameters (Alarm related Parameters) : HY1, HY2, HY3, HY4 (Note1)

UT750 Code	UT5□□ UT4□0 UT3□□ Code	Description	Setting range	Default	D-register No.
HY1	HY1 (HY1)	Alarm-1 hysteresis	0.0 to 100.0% of PV input range span	0.5% of PV input range span	919 (loop-1) 959 (loop-2)*
HY2	HY2 (HY2)	Alarm-2 hysteresis	0.0 to 100.0% of PV input range span	0.5% of PV input range span	920 (loop-1) 960 (loop-2)*
HY3	HY3 (HY3)	Alarm-3 hysteresis	0.0 to 100.0% of PV input range span	0.5% of PV input range span	921 (loop-1) 961 (loop-2)*
HY4	HY4 (HY4) (Note1)	Alarm-4 hysteresis	0.0 to 100.0% of PV input range span	0.5% of PV input range span	922 (loop-1) 962 (loop-2)*

Note1: UT3□□ and UT420 has no Alarm-4 hysteresis.
Note2: UT3□□ and UT4□0 has no Loop-2 (* secondary loop).

A parts of the UT750 parameter map is shown below.
Refer and use the map to find the path to the setting display for a particular parameter.



Referring to the Parameter map, display the setup parameter main menu [LOOP1] . Then, display the submenu [ALM]. And press the SET key time and again to display the parameter "HY1". Adjust the parameter value using the ▲/▼ keys, then press the SET key to register it.

<<Ref. 3.3: Reference Related to Alarms>>

Ref.3.3(3) Using the alarm timer (Control stable signal event)

Alarm timer function can be used with the UT750, UT550, UT520, UT551, UT450 and UT420.

The alarm timer notifies the operator when PV is stable.
The timer starts counting the moment that PV attains the target setpoint (or is within that hysteresis range).
Then, when the set time elapses, alarm 1 (relay) output turns ON. To use the alarm timer, the “AL1” setup parameter that determines the type of alarm is set to “21” to “24”. Timer time is set with the “1.A1” operating parameter.
Timer output turns OFF in the following cases.

- When power is turned OFF
- When operation stops
- When target setpoint No. is changed (to any number other than 1)
- During remote control
- When timer time is set to “OFF”

■ The alarm timer can only be set for alarm 1. It cannot be set for alarms 2 to 4.

Example of the alarm timer operation

(1) The ON/OFF operation in upward detection is shown below (in Fig. 3-3-3).

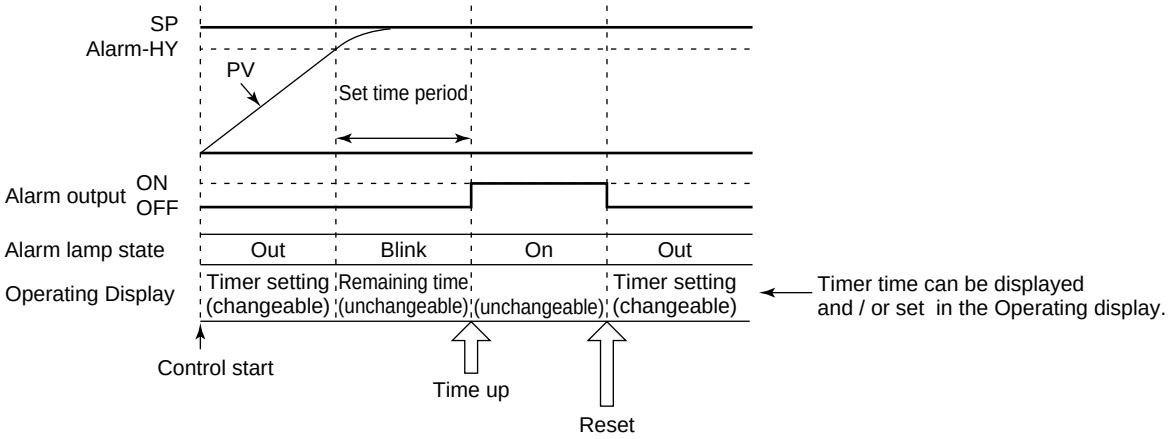


Fig. 3-3-3 Upward Detection

(2) The ON/OFF operation in downward detection is shown below (in Fig. 3-3-4).

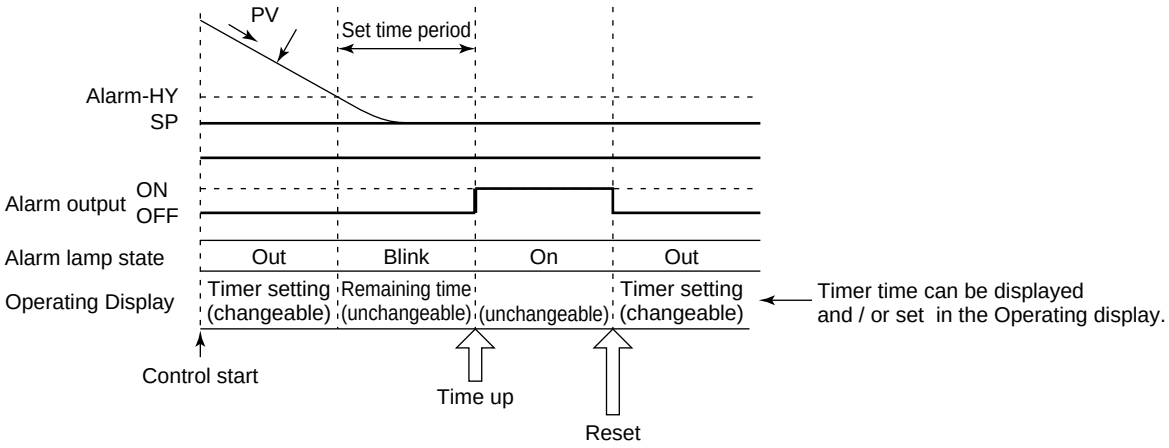


Fig. 3-3-4 Downward Detection

● **The following parameters are used.**

Change parameters as explained in the User's Manuals Initial Settings and Parameter Map.

- Setup parameters (Alarm related Parameters) : AL1

UT750 Code	UT5□□ UT4□0 Code	Description	Setting range	Default	D-register No.
AL1	AL 1 (AL1)	Alarm-1 type [Alarm timer can be set only to AL1]	To use the alarm timer, set 21 through 24. 21: Upward detection. Time unit : hours and minutes. 22: Downward detection. Time unit : hours and minutes. 23: Upward detection. Time unit : minutes and seconds. 24: Downward detection. Time unit : minutes and seconds.	1: PV high limit [To use the alarm timer, the setting value must be set to 21 through 24.]	915 (loop-1) 955 (loop-2) (Note: UT4□0 has no loop-2)

- Operating parameters (Setpoint-, Alarm- and PID-related Parameter) : n.A1

UT750 Code	UT5□□ UT4□0 Code	Description	Setting range	Default	D-register No.
n.A1	n.A 1 (n.A1)	Timer time (Alarm-1 setting value)	OFF or 00.00 to 99.59 h/m: hours,minutes m/s: minutes, seconds	OFF	See the Table 3-3-1

TIP

With UT5□□, the alarm timer can be used in the 5th alarm (= alarm1 of secondary loop) when the 8 alarms are used. However, there are no displays of timer time and lamps that indicate the status of the alarm timer.

Table 3-3-1 1st= for loop-1 2nd= for loop-2 (UT4□0 has no loop-2)

	n=1		n=2		n=3		n=4		n=5		n=6		n=7		n=8	
	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd
n.A1	302	502	327	527	352	552	377	577	402	602	427	627	452	652	477	677
n.A2	303	503	328	528	353	553	378	578	403	603	428	628	453	653	478	678
n.A3	304	504	329	529	354	554	379	579	404	604	429	629	454	654	479	679
n.A4	305	505	330	530	355	555	380	580	405	605	430	630	455	655	480	680

■ Setting the Required Parameters

To use the alarm timer , 2 parameters must be set at the same time.
These parameters are setup parameter “AL1” and operating parameter “n.A1”.
Carry out the parameter setting operation shown below.

Here we explain how to display the parameter setting display and to change the parameter values. Before carrying out these operations be sure to refer to the User’s Manuals Initial Settings and Parameter Map of the controller.
The parameter map is very helpful in finding the path to the setting display for a particular parameter.

1: Referring to the User’s Manual above, display the setup parameter main menu [LOOP1] .
Then, display the submenu [ALM].

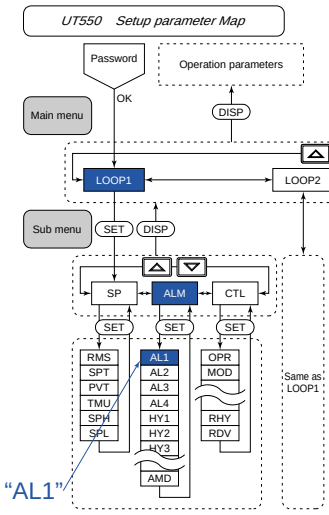
2 : Press the [SET/ENT] key one time to display the parameter “AL1”.
Set the parameter value to 21,22,23 or 24 using the [▲] / [▼] keys, then press the [SET/ENT] key to register it.
For example, register “21” when you want to select the alarm type of “Upward detection. Time unit : hours and minutes”.

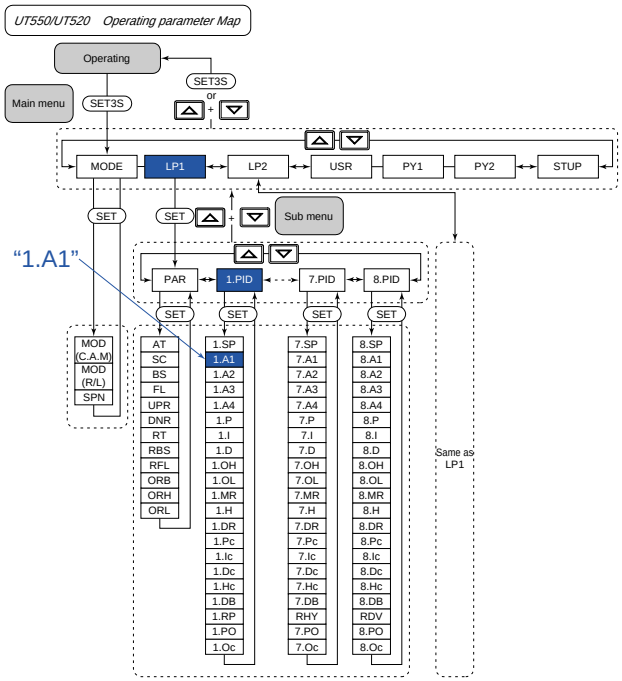
3 : After the above operation, pressing the [SET/ENT] key for at least 3 seconds to go back to the operating display.

4: Then, press the [SET/ENT] key for at least 3 seconds again to display the operating parameter main menu [MODE].
Press [▲] key one time to display main menu [LP1].
Then, display the submenu [1.PID].

5: Press the [SET/ENT] key 2 times to display the parameter “1.A1”.
The alarm timer time can be set to this parameter.
- Adjust the time value using the [▲] / [▼] keys, then press the [SET/ENT] key to register it.

(The unit of time has been set when the parameter “AL1” value registered.)





<<Ref. 3.3: Reference Related to Alarms>>

Ref.3.3(4) Using the sensor ground alarm

The sensor ground alarm can be used with the UT750,UT550,UT520, UT551, UT450,UT420,UT35□ and UT32□.
However, it can not be used with position proportional type controllers (UT750-1□ and UT55□-1□).

This function is not active in the following case.

- During manual operation mode.
- When operation stops
- During ON/OFF control mode
- During auto-tuning
- During cascade control mode

This function differs slightly, as follows, according to model.
Use it as specified for your model.

When the controller-indicated PV and actual temperature of the furnace differ, sensor loss can be evaluated from the change in output.
For example, when the temperature inside the furnace is 110°C despite the fact that the controller indicates as 100°C. In this particular case, output is higher than that at a 100°C PV. This can be detected by the sensor ground alarm. In using this function, the user must keep data on the normal output range (i.e.: how much output there is at a PV of 100°C).

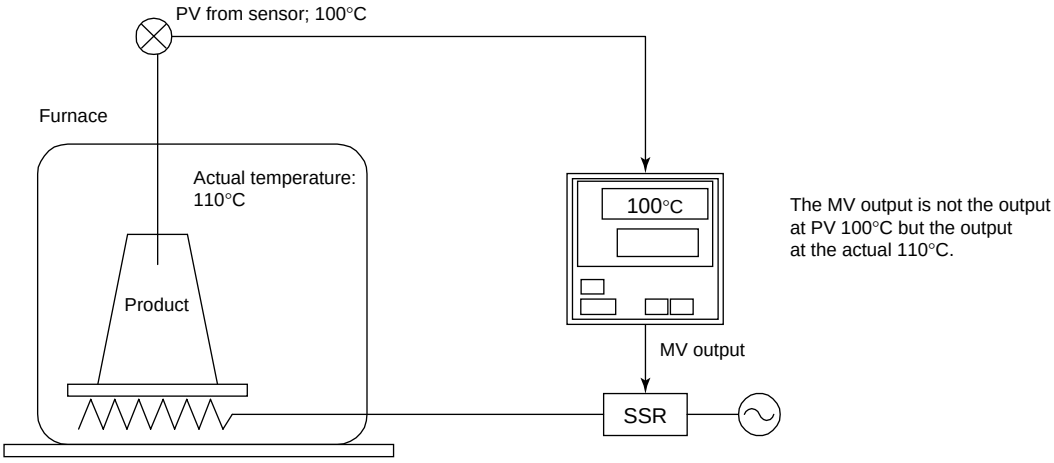


Fig. 3-3-5

Sensor loss detection works as follows. Sensor loss is detected and an alarm is output when the moving average of the control output (ON/OFF rate) drifts outside the set high limit (operating parameter “ORH”) and low limit (operating parameter “ORL”). This is done even if control is stable and PV stays within a constant range of the target setpoint. The sensor ground alarm trigger is shown in Fig. 3-3-2.
The moving average is computed as follows. Computation starts after PV is within the ON/OFF rate detection band.
Note: This moving average is the ON/OFF rate (OR).

With the UT35□ and UT32□, the ON/OFF rate (OR) value can be displayed for your checking. When needed, check it on the “OR” parameter display. Display capabilities are not provided on other models.
The displayed ON/OFF rate is the moving average taken from 5 control output cycles. When this moving average value drifts outside of the set ORL - ORH range, the sensor ground alarm is output.
Note: This moving average is the ON/OFF rate (OR).

$$\text{Moving average} = \frac{OUT_n + OUT_{n-1} + OUT_{n-2} + OUT_{n-3} + OUT_{n-4}}{5} = \text{ON/OFF rate (OR)}$$

OUTn is the current output.

The time width between each OUTn and OUTn-1, OUTn-1 and OUTn-2 ... OUTn-3 and OUTn-4 is the cycle time.

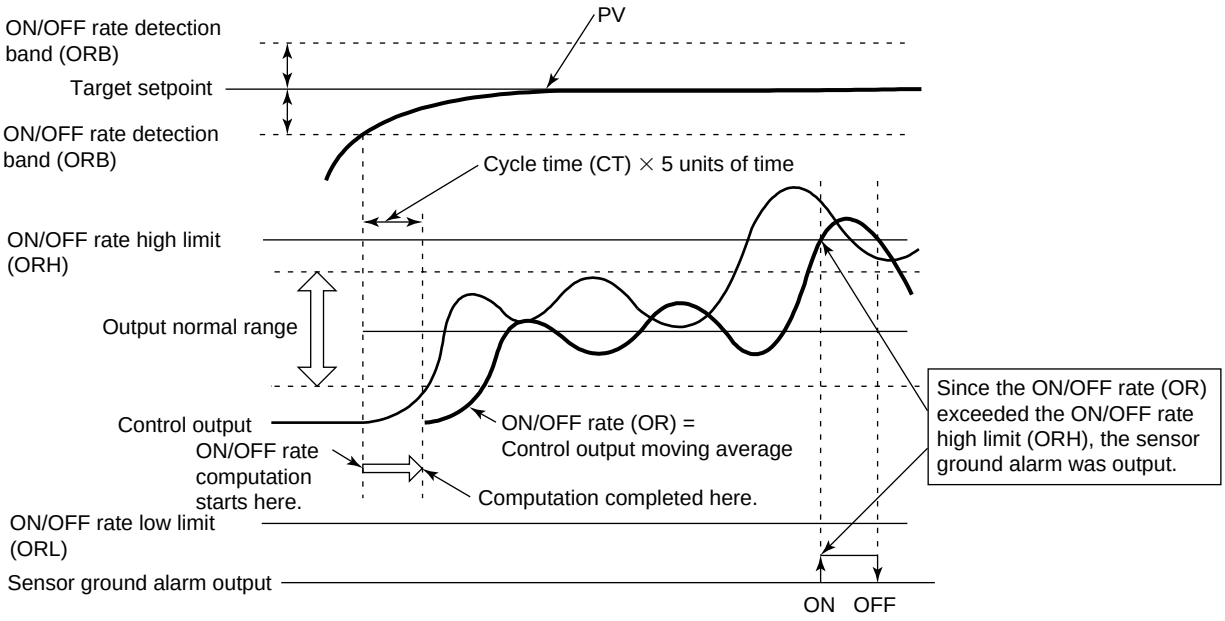


Fig. 3-3-6

As shown above, set the ON/OFF rate high limit (ORH) and the ON/OFF rate low limit (ORL) to a slightly wider range than the output normal range.

And, because ON/OFF rate computation starts when PV is within the ON/OFF rate detection band, set the ON/OFF detection band close to the target setpoint. If set too wide, the sensor ground alarm will trigger when output is unstable, hence it will be output frequently.

● **The following parameters are used.**

Change parameters as explained in the User's Manuals Initial Settings and Parameter Map.

- Setup parameters (Alarm-related Parameters) : AL1, AL2, AL3, AL4 (Note1)

UT750 Code	UT5□□ UT4□0 UT3□□ Code	Description	Setting range	Default	D-register No.
AL1	AL 1 (AL1)	Alarm-1 type	• 25 : To use the sensor ground alarm, set "25" to these parameters when the controller is other than UT35□/UT32□. • 23 : To use the sensor ground alarm, set "23" to these parameters when the controller is UT35□ or UT32□.	1:PV high limit To use the alaram timer, the setteing value must be set to 25 (or 23).	915 (loop-1) 955 (loop-2)
AL2	AL 2 (AL2)	Alarm-2 type			916 (loop-1) 956 (loop-2)
AL3	AL 3 (AL3)	Alarm-3 type			917 (loop-1) 957 (loop-2)
AL4	AL 4 (AL4) (Note 1)	Alarm-4 type			918 (loop-1) 958 (loop-2)

Note1: UT3□□and UT4□0 do not have the parameter "AL4".

- Setup parameters (Output-related Parameters) : CT1, CT2 (Note1)

UT750 Code	UT5□□ UT4□0 UT3□□ Code	Description	Setting range	Default	D-register No.
CT1	CT (CT)	Control output 1 cycle time	1 to 1000 sec	30sec	1240
CT2 (Note2)	no function	Control output 2 cycle time		30sec	1241

Note1: The parameter CT1 and CT2 can not be used with position proportional type controllers (UT750-1□ and UT55□-1□).
Note2: With UT750, CT2 can not be displayed in the cascade control mode or the Cascade with 2 universal input mode.

- Operating parameters (Opertion-related Parameters) : ORB, ORH, ORL

UT750 Code	UT5□□ UT4□0 UT3□□ Code	Description	Setting range	Default	D-register No.
ORB	orb (ORB)	ON/OFF rate detection band	0.0 to 100.0% of PV input range span	1.0% of PV input range span	250 (loop-1) 280 (loop-2) (Note1)
ORH	orH (ORH)	ON/OFF rate high limit	(ORL+1digit) to 105.0%	100.0%	251 (loop-1) 281 (loop2) (Note1)
ORL	orL (ORL)	ON/OFF rate low limit	-5.0% to (ORH - 1digit)	0.0%	252 (loop-1) 282 (loop-2) (Note1)

Note1: UT4□0 and UT3□□ do not have the function of secondary loop (loop-2).

■ Setting the Required Parameters

To use the sensor ground alarm , some parameters must be set at the same time.
These parameters are setup parameters “AIn”, “CTn”, “CTcn” and operating Parameters “ORB”, “ORH”, “ORL”.
Carry out the parameter setting operation shown below.
(Here, the setting procedure of UT5□0 is shown as an example. Refer the procedure when you have another controller, and set parameters in a same way.)

Here we explain how to display the parameter setting display and to change the parameter values. Before carrying out these operations be sure to refer to the User’s Manuals Initial Settings and Parameter Map of the controller.
The parameter map is very helpful in finding the path to the setting display for a particular parameter.

1: Referring to the User’s Manual above, display the setup parameter main menu [LOOP1] . Then, display the submenu [ALM].

2 : Press the SET/ENT key once to display the parameter “AL1”. With the UT5□0, the sensor ground alarm can be set to any of “AL1”, “AL2”, “AL3” or “AL4”. When you want to use “AL3”, press the SET/ENT key 2 times (more) and call up the “AL3” Setting display.

3 : Set the parameter value to 25 using the ▲ / ▼ keys, then press the SET/ENT key to register it.
“25” must be set when you want to use the sensor ground alarm.

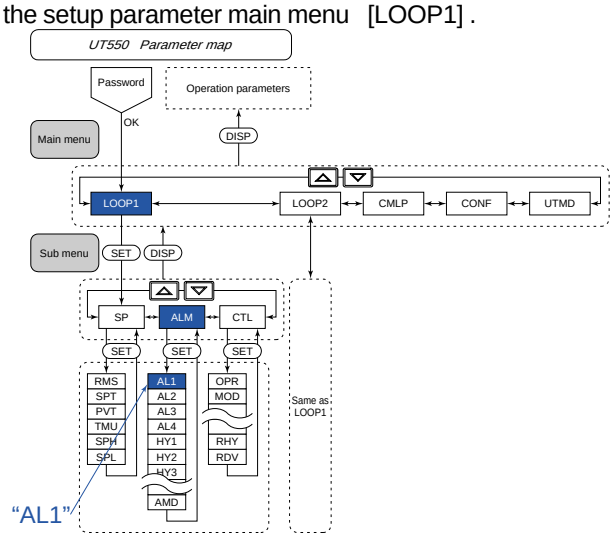
Note: With UT35□or UT32□, “23” must be set.

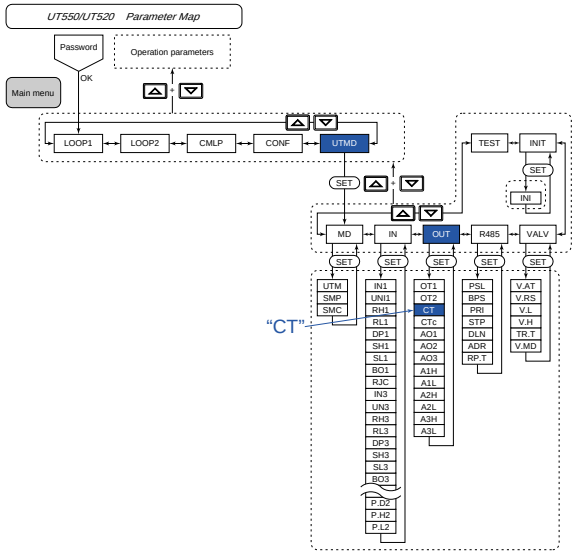
4 : After the above operation, set the cycle time “CT”. (The default value of “CT” is 30seconds. When the time is good, path the setting of “CT”.)

Display the setup parameter main menu [UTMD] and then, display the submenu [OUT].
Press the SET/ENT key 3 times to display the parameter “CT”.
Adjust the cycle time value using the ▲ / ▼ keys, and press the SET/ENT key to register it.

5 : After the above operation, pressing the SET/ENT key for at least 3 seconds to go back to the operating display.

6: Then, press the SET/ENT key for at least 3 seconds again to display the operating parameter main menu [MODE].
Press ▲ key once to display main menu [LP1].
Then, display the submenu [PAR].

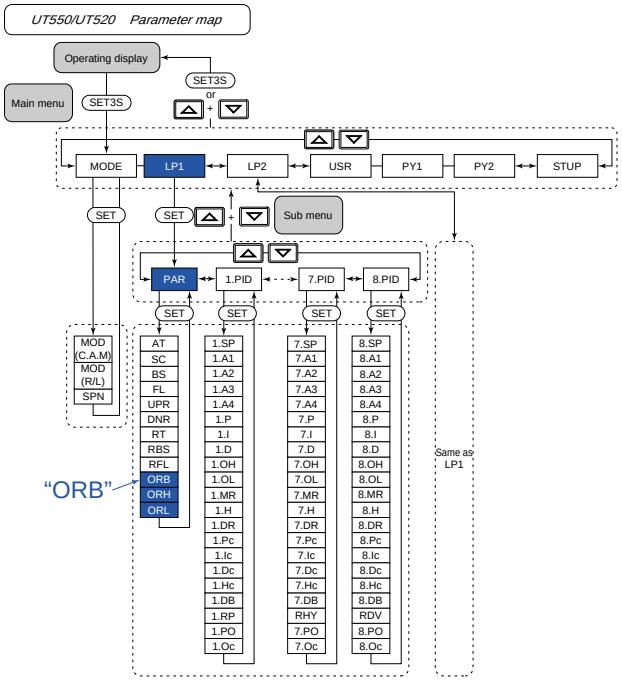




7: Press the [SET/ENT] key 10 times to display the parameter “ORB”.
Set the ON/OFF rate detection band value using the [▲] / [▼] keys, then press the [SET/ENT] key to register it.

8: Press the [SET/ENT] key once to display the parameter “ORH”.
Set the ON/OFF rate high limit value using the [▲] / [▼] keys, then press the [SET/ENT] key to register it.

9: Press the [SET/ENT] key once to display the parameter “ORL”.
Set the ON/OFF rate low limit value using the [▲] / [▼] keys, then press the [SET/ENT] key to register it.



The parameter setting operation for the sensor ground alarm is completed.
Pressing the [SET/ENT] key for at least 3 seconds to go back to the operating display.

<<Ref. 3.3: Reference Related to Alarms>>

Ref.3.3(5) Using the heater burnout alarm (UT35□ and UT32□ only)

The heater burnout alarm can be used with the UT35□ and UT32□.
The parameters for the heater burnout alarm are “AL1”, “AL2” and “AL3”.
When a two-phase heater is used, select heater burnout alarm 1 (alarm code:24).
See Fig. 3-3-7 below.

When a three-phase heater is used, select both heater burnout alarms, i.e.,1 and 2 to set up the alarm function.
See Fig. 3-3-8 below.

TIP

The heater current sensor used is the CTL-6-S-H sensor of U.R.D.,Ltd.
This sensor must be purchased by the user themselves.

(1) When a two-phase heater is used, select heater burnout alarm 1 (alarm code:24).

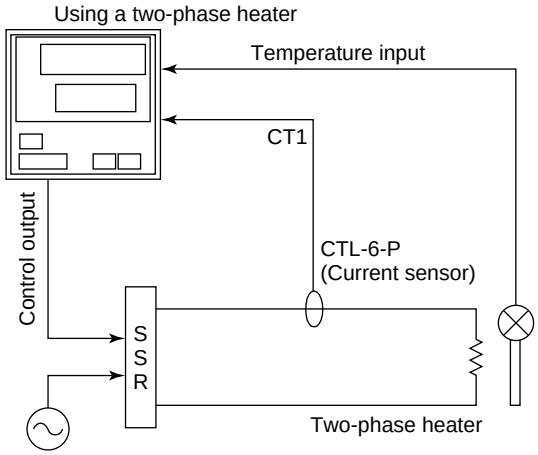


Fig. 3-3-7

(2) When a three-phase heater is used, select both heater disconnection alarms, i.e.,1 and 2 to set up the alarm function. (alarm code:24 and 25)

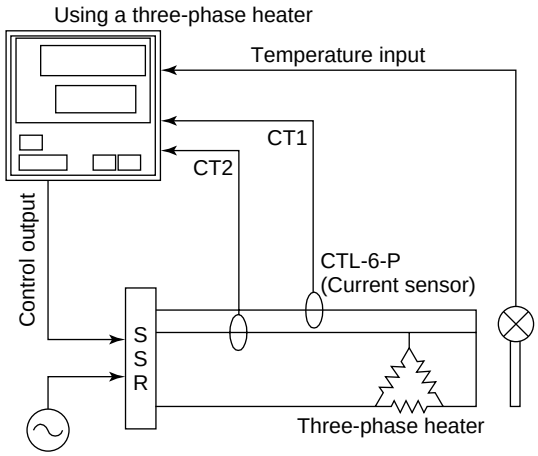


Fig. 3-3-8

Heater Burnout Current Setpoint 1, 2 (HB1, HB2)

Heater Burnout Measured Current 1, 2 (HC1, HC2)

The heater burnout alarm function measures the current of the heater, and issues a heater burnout alarm if the current goes outside the burnout detecting points set by parameters HB1 and HB2.

CAUTION

The heater disconnection alarm function operates in on/off control (relay output) or time-proportional PID control (relay output or voltage-pulse output) but not in continuous PID control. In heating/cooling control, the function operates for the heating-side only, not for the cooling side. Heater disconnection detection is not performed during auto-tuning.

TIP
The heater-burnout measured current 1 and 2 (HC1, HC2) are not to be set.
The measured values for the current detection are shown on the displays for HC1 and HC2

TIP
- Use the heater-burnout current setpoint 1 (HB1) for detecting the alarms of a 2-phase heater.
- For a 3-phase heater, use both HB1 and HB2 to detect alarms.

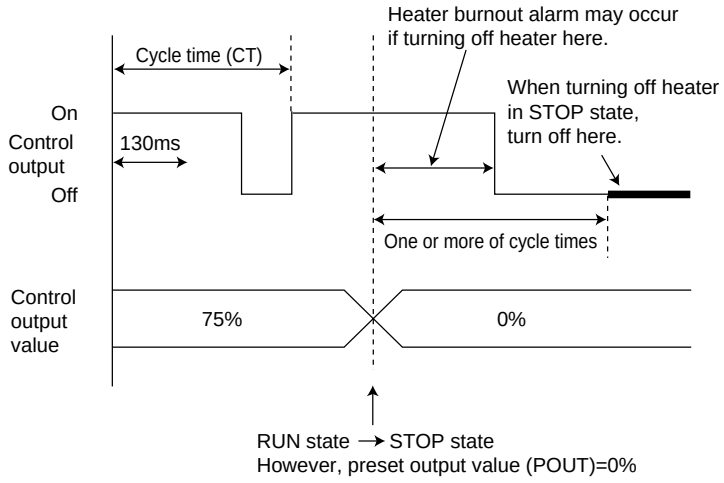
TIP
The heater burnout alarm shares the output terminals with the other alarm.

CAUTION

Precautions for Use of Heater Burnout Alarm

(1) The heater burnout alarm can be used only in on-off control (relay output) or in time proportional PID control (relay output, voltage pulse output). It cannot be used in continuous PID control (current output). Only heating-side can be used in heating/cooling control. (Cooling-side cannot be used.)
(2) Timing which detects an alarm is as follows.
- In time proportional PID control: When on-state time of control output is 130 ms or longer, heater current value is detected and measured heater current value is updated. Heater current value is detected 100 ms after control output turns on.
- In on-off control output: Heater burnout is detected in on state. (Heater burnout is not detected in off state.)
- Heater burnout is not detected during Auto-tuning. However, if Auto-tuning is started when heater burnout alarm occurs, alarm state will be held during Auto-tuning.

(3) In time proportional PID output, control output is updated for every cycle time. When the controller is set to STOP state (preset output value POUT=0%), control output is actually turned off after the cycle time in progress elapses. When turning off heater in STOP state, wait for one or more of cycle times after the operation is stopped.



Ref.3.4: References Related to Instrument Alarms and Events

IMPORTANT: Information in this reference applies to the following models.

UP750	UP550	UP35□	UT750	UT5□□	UT4□0	UT3□□
UP750-□□	UP5□0-□□	UP3□□-□□	N/A	N/A	N/A	N/A

(If your controller is a UT series model, see Ref. 3.3, “References Related to Alarms.”)

Note: Some of the functions discussed below may be limited to models with a specific suffix and/or option code. Each section will expressly refer to this limitative condition where it applies.

This section contains reference information on the following advanced controller operations related to instrument alarms and events. Refer to this information and set parameters (or change their settings) only if necessary.

(1) Using Instrument Alarms
(2) Setting the Operating Conditions of Instrument Alarms
(3) Setting Hysteresis (On-off Bandwidth) for Instrument Alarms
(4) Using the Sensor Ground Alarm
(5) Using PV Events
(6) Using Time Events
(7) Using Local Events

<<Ref. 3.4: References Related to Instrument Alarms and Events>>
Ref.3.4(1) Using Instrument Alarms

Using instrument alarms is possible with the UP550 or UP750.

You can set a maximum of four instrument alarms.
The types of instrument alarm include a measured value (PV) alarm, deviation alarm, sensor ground alarm, fault-diagnosis output and FAIL output.

CAUTION

An instrument alarm refers to an alarm function that works irrespective of the UP550 or UP750's operating mode (Note), such as program operation mode, local operation mode (constant target setpoints) or reset mode (stop of operation). Thus, the instrument alarm functionally differs from a PV event or local event discussed later, which works in program operation mode or local operation mode only. Be careful of the difference when using these functions.

Note: Fig. 3-4-1 shows the types of operating mode and the way a change is made from one mode to another.
For more information on each of these operating modes, see Ref. 5.2, "References Related to Program Setup."

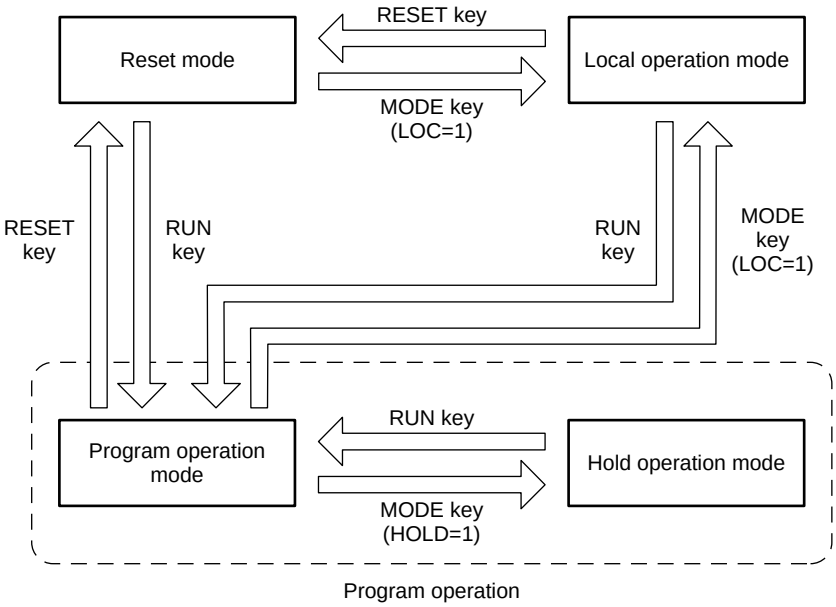


Fig. 3-4-1 Switching between Operating Modes

CAUTION

The output terminals for instrument alarms have been predetermined at the factory according to the UP mode. Confirm the terminal numbers allocated to instrument alarms or event outputs. If you have made any change to the instrument alarm settings, you must also change the DO output terminal assignments and the wiring (Note).

Note: For example, a single-loop control type UP750 controller comes with the factory-set DO contact output assignments shown in Table 3-4-1. The terminal number for instrument alarm output is 4 and its DO number is DO3. In other words, only one contact output is allocated to instrument alarms when the controller is shipped from the factory. To set more than one alarm function and output them through contact terminals, 1) specify their DO output terminal numbers, 2) select desired types of instrument alarms from among 2 (AL2) to 4 (AL4) and allocate them to these numbers, and 3) register I-relay numbers, each being incremented by 5000, that correspond to the allocated instrument alarms.
For information on how to register the I-relay numbers, see Ref.3.2(2), "Changing Contact Output Functions for the UP550 and UP750."
In addition, rewire the controller as required, according to the output terminal numbers you specified.

Table 3-4-1 Contact Output Terminals of Single-loop Control Type UP550 or UP750 and Their Factory-set Assignments

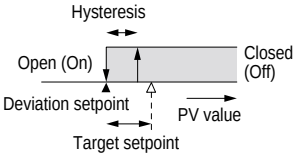
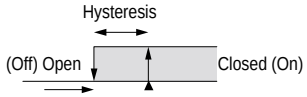
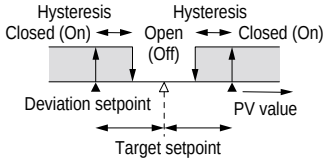
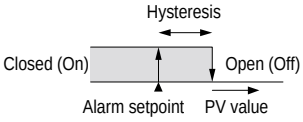
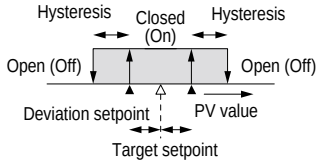
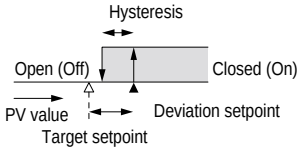
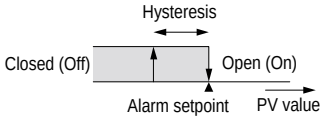
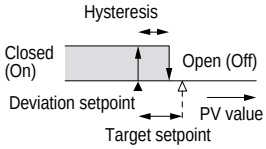
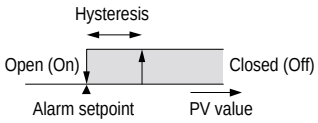
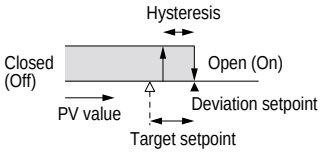
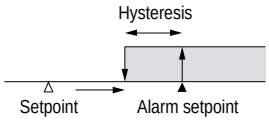
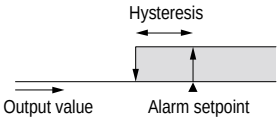
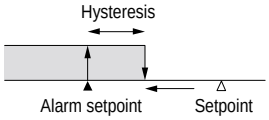
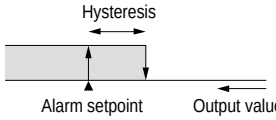
Terminal Number	DO Number	Factory-set Assignment	Output Type
6	DO1	PV event-1 output (local event 1)	Relay
5	DO2	PV event-2 output (local event 2)	Relay
4	DO3	Instrument alarm output (or cooling-side control output [Note])	Relay
7	Common terminal (for DO1 to DO3)		
34	DO4	Time event-1 output (or cooling-side control output [Note])	Transistor
33	DO5	Time event-2 output	Transistor
32	DO6	Time event-3 output	Transistor
31	DO7	Time event-4 output	Transistor
35	Common terminal (for DO4 to DO7)		

Note: If you select relay output or open-collector transistor output as the type of control output for your heating/cooling control, the cooling-side output is assigned to terminal DO3 or DO4.

■ The functionality of instrument alarms is as follows.

You can set a maximum of four instrument alarms (for the primary and secondary loops).
The types of instrument alarm include a measured value (PV) alarm, deviation alarm, sensor ground alarm, fault-diagnosis output and FAIL output. For more information on these types, see Table 3-4-2 below.

Table 3-4-2

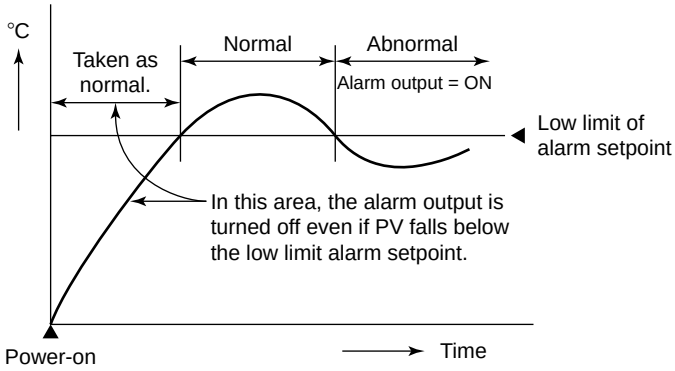
Alarm Type	Alarm Action "Open" and "Closed" refer to the state of a relay contact and "On" and "Off" the state of a lamp.	Alarm Type Code: Contact closed in case of alarm	Alarm Type Code: Contact opened in case of alarm	Alarm Type	Alarm Action "Open" and "Closed" refer to the state of a relay contact and "On" and "Off" the state of a lamp.	Alarm Type Code: Contact closed in case of alarm	Alarm Type Code: Contact opened in case of alarm
No alarm		OFF		De-energization in case of deviation lower-limit alarm			6 16 46 56
PV upper limit		1 11 41 51		Deviation upper/lower limits		7 17 47 57	
PV lower limit		2 12 42 52		Within deviation upper/lower limits		8 18 48 58	
Deviation upper limit		3 13 43 53		De-energization in case of PV upper-limit alarm			9 19 49 59
Deviation lower limit		4 14 44 54		De-energization in case of PV lower-limit alarm			10 20 50 60
De-energization in case of deviation upper-limit alarm			5 15 45 55	Fault-diagnosis output	See Ref. 3-79.	26 66	
Sensor ground alarm	See Ref. 3-84.	25 65		FAIL output	See Ref. 3-79.	27 67	
Setpoint upper limit		28 68		Output value upper limit		30 70	
Setpoint lower limit		29 69		Output value lower limit		31 71	

Alarm type codes 1 to 20 and 28 to 31 in the table above are assigned for the primary loop, while alarm type codes 41 to 60 and 68 to 71 are assigned for the secondary loop.
In addition, codes 1 to 10 and 41 to 50 denote alarms with no stand-by action, while codes 11 to 20 and 51 to 60 denote alarms with a stand-by action.

■ The waiting action

The waiting action turns off the PV and deviation alarms during the start-up of control and does not allow them to resume until the operation stabilizes. The following figure shows the behavior of an alarm with the waiting action.

Waiting Action



CAUTION

In the following events, the alarm output will be suppressed until a normal state is achieved, even though there is an abnormality, if the alarm set has the waiting action:

(1) Power-on
(2) Power recovery
(3) Alarm type is changed

■ Fault-diagnosis output

The function output an alarm signal when input burnout, A/D converter failure, or reference junction compensation failure. The preset value is output when the alarm condition is caused.

• Setup parameters “ALn (n=1 to 4)”

Function	Setpoint	Remarks
Using Fault-diagnosis output	26 or 66	1: The default value of “AL1”, “AL3”. 2: The default value of “AL2”, “AL4”.

■ FAIL output

The FAIL alarm is output when the program, ROM, RAM, or power failure detection fails. The FAIL alarm output is ON in normal state and turned OFF in a FAIL condition. When the FAIL condition is caused, control output value are turned OFF or 0%, the retransmission output value is set at 0%, the alarm output is turned OFF, and the controller operation is interrupted.

• Setup parameters “ALn (n=1 to 4)”

Function	Setpoint	Remarks
Using FAIL output	27 or 67	1: The default value of “AL1”, “AL3”. 2: The default value of “AL2”, “AL4”.

For more information on the sensor ground alarm, see Ref.3.4(4) “Using the Sensor Ground Alarm.”

● The following parameters are used to set the types of instrument alarms.
To change the settings of these parameters, see the Initial Settings user's manual or the Parameters user's manual for your controller model.

• Setup parameters (Alarm-related Parameters): AL1 to AL4

UP750 UP550 Code	Description	Setting Range	Default	D-Register No.
AL1	Instrument alarm-1 type	OFF or 1 to 71 (as indicated by the alarm type codes shown in Table 3-4-2)	1: PV upper limit (Note)	915
AL2	Instrument alarm-2 type		2: PV lower limit (Note)	916
AL3	Instrument alarm-3 type		1: PV upper limit (Note)	917
AL4	Instrument alarm-4 type		2: PV lower limit (Note)	918

Note: Each Instrument Alarm parameter defaults to either code 1 "PV upper limit" or code 2 "PV lower limit".
For example, set any of AL1 to AL4 to:
- 26 (or 66), in order to use fault-diagnosis output;
- 27 (or 67), in order to use FAIL output; or
- 25 (or 65), in order to use the sensor ground alarm.

● The following parameters are used to set the instrument alarms value.
To change the settings of these parameters, see the Initial Settings user's manual or the Parameters user's manual for your controller model.

• Operating parameters (Instrument Alarm Setting Parameters): A1 to A4

UP750 UP550 Code	Description	Setting Range	Default	D-Register No.
A1	Instrument alarm-1 setpoint	• -100.0% to 100.0% of PV input range for PV/setpoint alarms • -100.0% to 100.0% of PV input range span for deviation alarms • -5.0% to 105.0% for output value alarms	(Note1)	231
A2	Instrument alarm-2 setpoint		(Note2)	232
A3	Instrument alarm-3 setpoint		(Note1)	233
A4	Instrument alarm-4 setpoint		(Note2)	234

Note1: Both of instrument alarm types 1 and 3 are factory-set to "PV upper-limit alarm." Thus, both of instrument alarm-1 (A1) and alarm-3 (A3) setpoints are set to 100.0% of the PV range.
Note2: Both of instrument alarm types 2 and 4 are factory-set to "PV lower-limit alarm." Thus, both of instrument alarm-2 (A2) and alarm-4 (A4) setpoints are set to 0.0% of the PV range.

<<Ref. 3.4: References Related to Instrument Alarms and Events>>
Ref.3.4(2) Setting the Operating Conditions of Instrument Alarms

Setting the operating conditions of instrument alarms is possible with the UP550 or UP750.

There are the following three operating conditions (alarm modes) for instrument alarms.
Use the parameter AMD to select from the alarm mode options, as shown below.

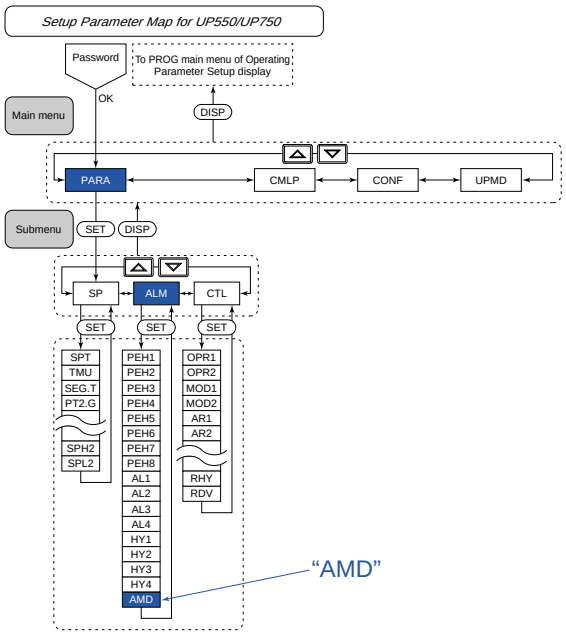
- **The instrument alarm is always effective (enabled). ← This is the factory-set option.**
- **The instrument alarm is ineffective (disabled) when the controller is at a stop (RESET mode).**
- **The instrument alarm is ineffective (disabled) when the controller is at a stop (RESET mode) or in manual operation (MAN mode).**

● The parameter used here is summarized below.
To change the settings of these parameters, see the Initial Settings user's manual or the Parameters user's manual for your controller model.

• Setup parameters (Alarms-related Parameters): AMD

UP750 UP550 Code	Description	Setting Range	Default	D-Register No.
AMD	Alarm mode	0: Always effective 1: Ineffective during stop of operation (RESET mode) 2: Ineffective during stop of operation (RESET mode) or manual operation (MAN mode).	0	923

The figure below is a partial view of the parameter map. Use this figure to guide you to the display for configuring the setup parameter discussed above.



<<Ref. 3.4: References Related to Instrument Alarms and Events>>
Ref.3.4(3) Setting Hysteresis (On-off Bandwidth) of an Instrument Alarm

Setting the hysteresis (on-off bandwidth) of an instrument alarm is possible with the UP550 or UP750.

Note1: The PV event hysteresis function of the UP550/UP750 is the same as the instrument alarm hysteresis function shown in Figures 3-4-2 and 3-4-3. For information on PV event hysteresis, also refer to the following explanation. (Note however that parameters used to set PV event hysteresis differ from those used to set instrument alarm hysteresis. If necessary, see Ref.3.4(5), "Using PV Events.")
Note2: The UP35□ has no instrument alarm function and, therefore, there is no need for instrument alarm hysteresis. The controller's PV hysteresis function is the same as described below, however. If you want to set the hysteresis of a PV event when using the UP35□, see Ref.3.4(5), "Using PV Events."

The parameters "Alarm-1 Hysteresis" (HY1) to "Alarm-4 Hysteresis" (HY4) correspond to instrument alarm types 1 (AL1) to 4 (AL4). You can set the hysteresis (on-off) bandwidth of an instrument alarm within 0.0% to 100.0% of the PV input range span. Figures 3-4-2 and 3-4-3 show examples of setting the parameter HY1 "Instrument Alarm-1 Hysteresis" when the parameter "Instrument Alarm-1 Type" (AL1) is set to the option "PV upper limit (alarm type code = 1)."
In these figures, "Open" and "Closed" indicate the states of a relay contact. Fig. 3-4-2 is an example when the instrument range (RL1 to RH1) is set to 0 to 1000°C and HY1 to 5°C (0.5% of the instrument range span).

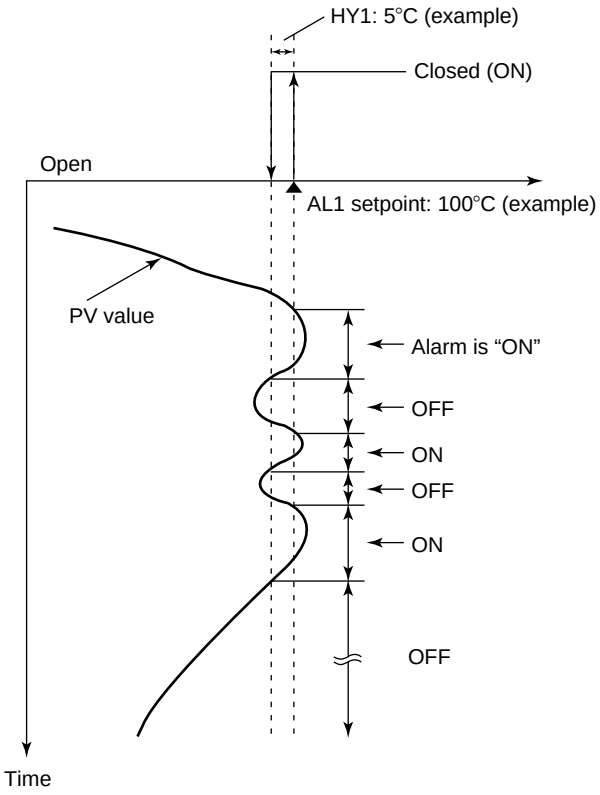


Fig. 3-4-2

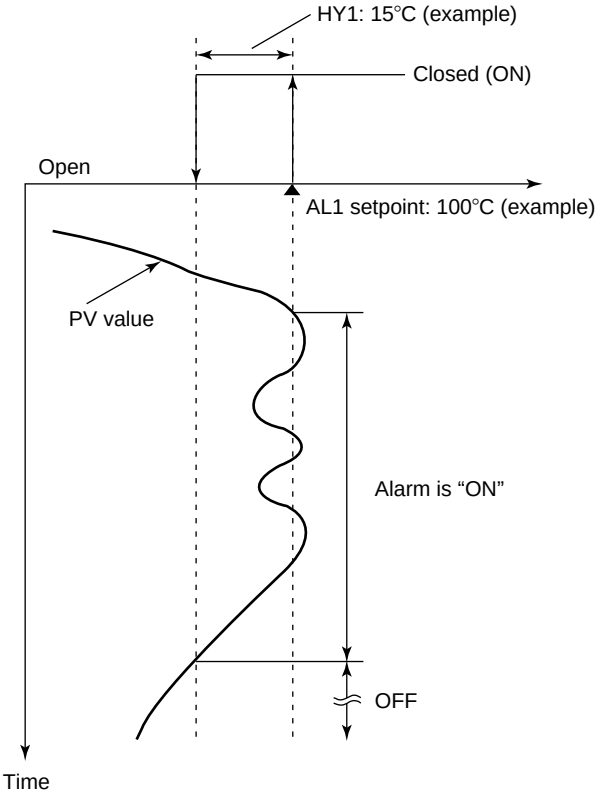


Fig. 3-4-3

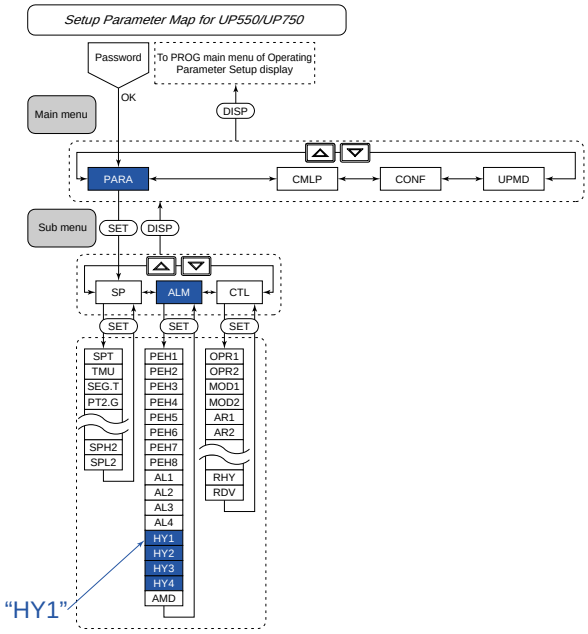
If the on-off switching of the instrument alarm is too busy, you can alleviate the busyness by increasing the hysteresis (on-off bandwidth).
Since the HY1 parameter in Fig. 3-4-3 is set to a larger value, compared with Fig. 3-4-2, the alarm switches on and off a slower rate.

- The parameter used here is summarized below.
  To change the settings of these parameters, see the Initial Settings user's manual or the Parameters user's manual for your controller model.

• Setup parameters (Alarm-related Parameters): HY1, HY2, HY3, HY4

UP750 UP550 Code	Description	Setting Range	Default	D-Register No.
HY1	Instrument alarm-1 hysteresis	0.0 to 100.0% of PV input range span	0.5% of PV input range span	919 (The primary loop)
HY2	Instrument alarm-2 hysteresis	0.0 to 100.0% of PV input range span	0.5% of PV input range span	920 (The primary loop)
HY3	Instrument alarm-3 hysteresis	0.0 to 100.0% of PV input range span	0.5% of PV input range span	921 (The primary loop)
HY4	Instrument alarm-4 hysteresis	0.0 to 100.0% of PV input range span	0.5% of PV input range span	922 (The primary loop)

The figure below is a partial view of the parameter map.
Use this figure to guide you to the display for configuring the setup parameter discussed above.



<<Ref. 3.4: References Related to Instrument Alarms and Events>>

Ref.3.4(4) Using the Sensor Ground Alarm

Using the sensor ground alarm is possible with the UP550 or UP750 (Note1).
The alarm does not work however in the following cases.

- The controller is in manual operation mode.
- The controller is at a stop (RESET mode).
- The controller is in on-off control mode.
- The controller is performing auto-tuning.

When the controller is used in heating/cooling control mode, relevant calculations are made with regard to internally computed values obtained before the control output is split into the heating- and cooling-side portions.

Note1: If either UP550 or UP750 controller is used in cascade control mode or a UP550-1□controller is used in position-proportional control mode, the sensor ground alarm function is disabled. Note that the UP35□has no sensor ground alarm function.

If the PV reading of the controller differs from the actual furnace temperature, you can judge the degree of deterioration in the sensor by observing a change in the output. For example, assume the controller indicates 100°C while the actual furnace temperature is 110°C. At this point, the output value is larger than the one when the PV input is 100°C. This condition is what the sensor ground alarm function is designed to detect. To be able to use this function, you must have data on the range of steady-state output values (for example, the output value when the PV input is 100°C).

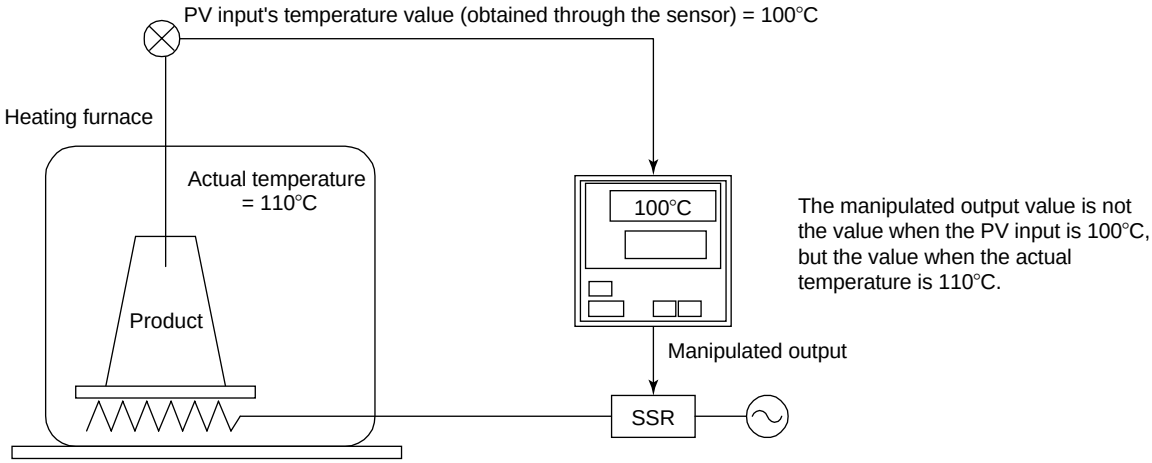


Fig. 3-4-4

A deterioration in the sensor is detected as described below. The controller judges it to be a sensor deterioration and outputs an alarm signal if the moving average (Note2) of the control output falls outside the upper limit (ORH operating parameter) and lower limit (ORL operating parameter) of the preset range despite the fact that control is stable and the PV input is within a given range of the target setpoint. The sensor ground alarm function works as shown in Fig. 3-4-4. The equation for calculating the moving average is given below (Note3). This calculation begins when the PV value falls within the on-off rate detection band (ORB parameter).

Note2: This moving average is referred to as the on-off rate (OR parameter).

Note3: The on-off rate is five cycles' worth of the moving average of control output. If this moving average falls outside the range from the ORL parameter setpoint to the ORH parameter setpoint, the controller outputs an alarm signal.

$$\text{Moving average} = \frac{OUT_n + OUT_{n-1} + OUT_{n+2} + OUT_{n-3} + OUT_{n-4}}{5} = \text{on-off rate (OR parameter)}$$

where OUTn is the current output value, and the time interval of each of OUTn, OUTn-1, . . ., OUTn-4 is the cycle time.

Set the on-off rate upper limit (ORH) and on-off rate lower limit (ORL) so that the range of the on-off rate is wider than the range of steady-state control output values, as shown in Fig. 3-4-5. In addition, set the on-off rate detection band close to the target setpoint. This is because the controller begins calculating the on-off rate when the PV input value falls within the on-off rate detection band. Setting the band at a larger value forces the sensor ground alarm function to work before the output stabilizes. This means the sensor ground alarm turns on very frequently.

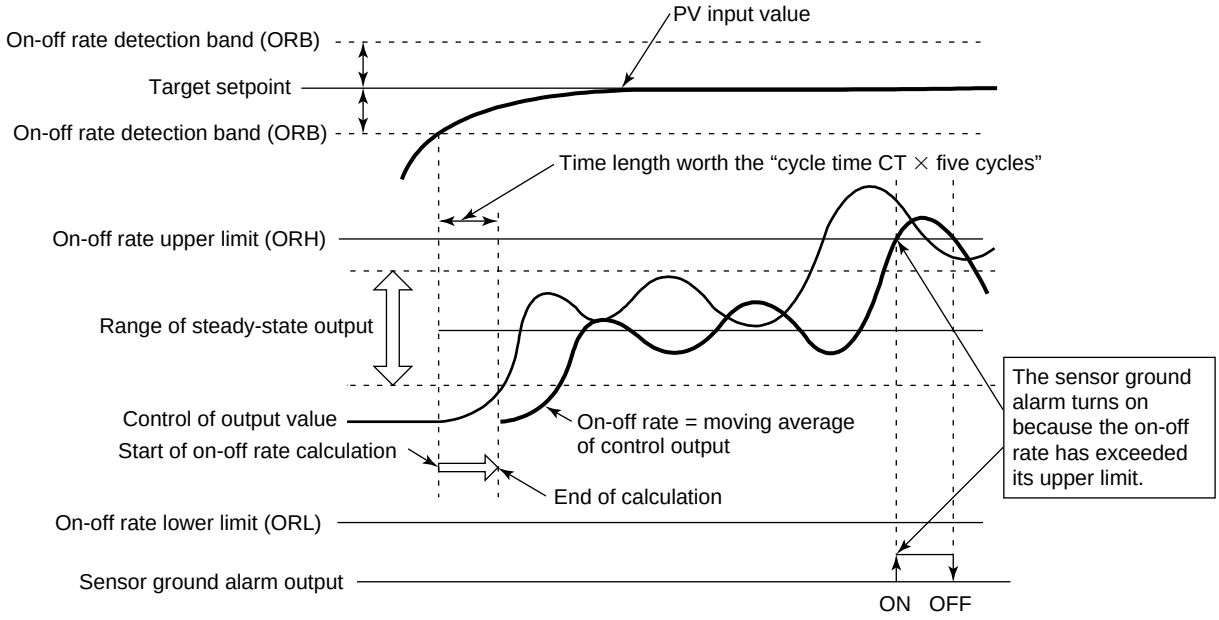


Fig. 3-4-5

- Parameters used to operate the sensor ground alarm are summarized below.
  You must configure two or more different types of parameter.
  To change the settings of these parameters, see the Initial Settings user's manual or the Parameters user's manual for your controller model.

• Setup parameters (Alarms-related Parameters): AL1 to AL4 (Note)

UP750 UP550 Code	Description	Setting Range	Default	D-Register No.
AL1	Instrument alarm-1 type	• Set to "25" when using the sensor ground alarm for the primary loop. • Set to "65" when using the sensor ground alarm for the secondary loop of the UP750.	1: PV upper limit (Note)	915
AL2	Instrument alarm-2 type		2: PV lower limit (Note)	916
AL3	Instrument alarm-3 type		1: PV upper limit (Note)	917
AL4	Instrument alarm-4 type		2: PV lower limit (Note)	918

Note: Each instrument alarm type parameter defaults to either code 1 "PV upper limit" or code 2 "PV lower limit". To use the sensor ground alarm function, be sure to change each of these parameters to "25" (or "65").

• Setup parameters (Output-related Parameters): CT1 and CT2 (Note1)

UP750 UP550 Code	Description	Setting Range	Default	D-Register No.
CT1	Control output-1 cycle time	1 to 1000 sec	30 sec	1240
CT2 (Note2)	Control output-2 cycle time		30 sec	1241

Note1: The parameters in this table are not displayed for a position-proportional control type UP550-1□controller.
Note2: Displayed for the UP750 only.
The CT2 parameter is not displayed, however, for a UP750 controller of the cascade control type or a cascade control type with two universal inputs.

• Operating parameters (Operation-related Parameters): ORB, ORH and ORL

UP750 UP550 Code	Description	Setting Range	Default	D-Register No.
ORB	ON/OFF rate detection band	0.0 to 100.0% of PV input range span	1.0% of PV input range span	250 (The primary loop) 280 (The secondary loop)
ORH	ON/OFF rate high limit	(ORL+1 digit) to 105.0%	100.0%	251 (The primary loop) 281 (The secondary loop)
ORL	ON/OFF rate low limit	-5.0% to (ORH-1 digit)	0.0%	252 (The primary loop) 282 (The secondary loop)

■ Setting the Required Parameters

To use the sensor ground alarm, some parameters must be set at the same time.
These parameters are setup parameters “Aln”, “CTn”, “CTcn” and operating Parameters “ORB”, “ORH”, “ORL”.
Carry out the parameter setting operation shown below.

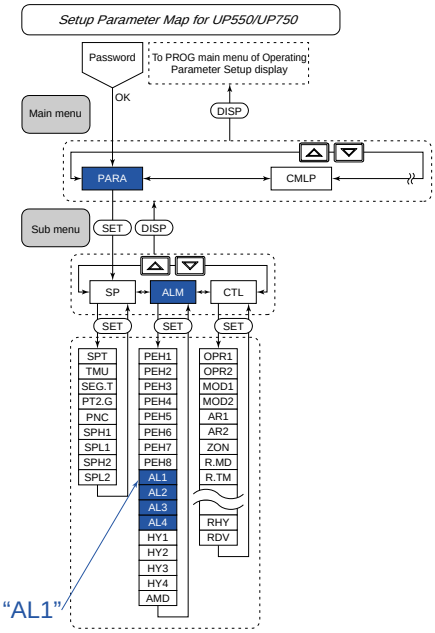
Here we explain how to display the parameter setting display and to change the parameter values. Before carrying out these operations be sure to refer to the User’s Manuals Initial Settings and Parameter Map of the controller.
The parameter map is very helpful in finding the path to the setting display for a particular parameter.

1: Referring to the User’s Manual above, display the setup parameter main menu [PARA]. Then, display the submenu [ALM].

2: Press the SET/ENT key nine times to display the parameter “AL1”. With the UP750 or UP550, the sensor ground alarm can be set to any of “AL1”, “AL2”, “AL3” or “AL4”. When you want to use “AL3”, press the SET/ENT key twice (more) and call up the “AL3” Setting display.

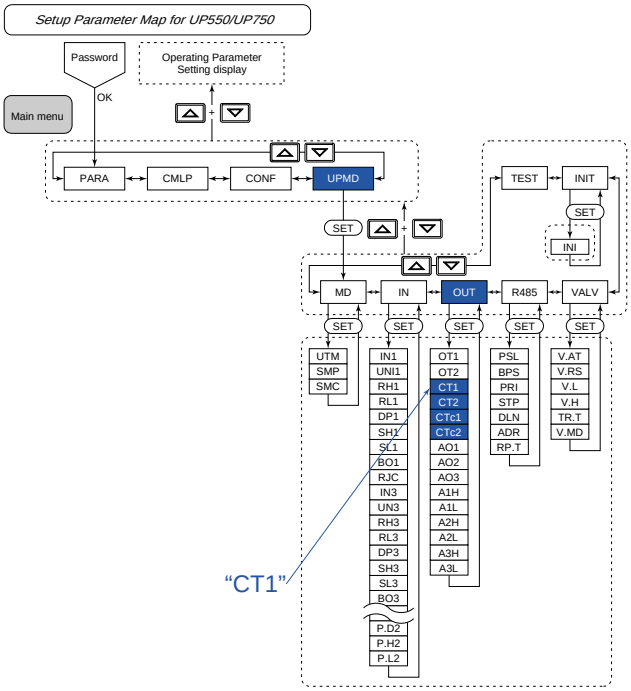
3: Set the parameter value to 25 using the ▲/▼ keys, then press the SET/ENT key to register it.
“25” must be set when you want to use the sensor ground alarm.

(Note: Set “65” for the secondary loop.)



4: After the above operation, set the cycle time “CT”. (The default value of “CT” is 30seconds. When the time is good, path the setting of “CT”.)

Display the setup parameter main menu [UPMD] and then, display the submenu [OUT].
Press the SET/ENT key 3 times to display the parameter “CT”.
Adjust the cycle time value using the ▲ / ▼ keys, and press the ▲ key to register it.



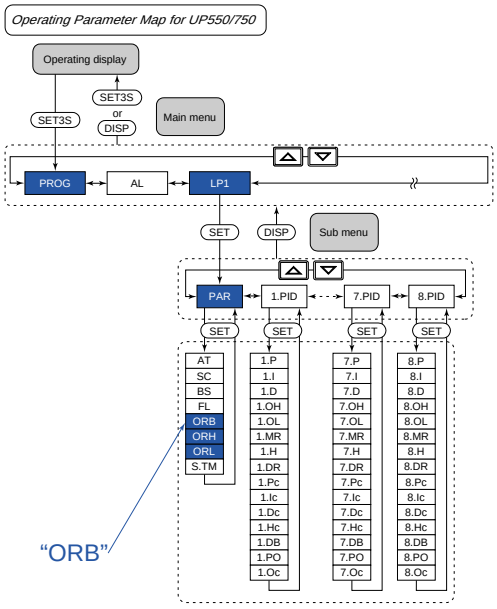
5: After the above operation, pressing the SET/ENT key for at least 3 seconds to go back to the operating display.

6: Then, press the SET/ENT key for at least 3 seconds again to display the operating parameter main menu [PROG].
Press ▲ key once to display main menu [LP1].
Then, display the submenu [PAR].

7: Press the SET/ENT key 5 times to display the parameter “ORB”.
Set the ON/OFF rate detection band value using the ▲ / ▼ keys, then press the SET/ENT key to register it.

8: Press the SET/ENT key once to display the parameter “ORH”.
Set the ON/OFF rate high limit value using the ▲ / ▼ keys, then press the SET/ENT key to register it.

9: Press the SET/ENT key once to display the parameter “ORL”.
Set the ON/OFF rate low limit value using the ▲ / ▼ keys, then press the SET/ENT key to register it.



The parameter setting operation for the sensor ground alarm is completed.
Pressing the ▲ key for at least 3 seconds to go back to the operating display.

<<Ref. 3.4: References Related to Instrument Alarms and Events>>
Ref.3.4(5) Using PV Events

Using PV events is possible with the UP35□, UP550 or UP750.
The function specifications differ however between the UP550/UP750 and the UP35□. This section first discusses **1) PV events when the controller is Model UP550 or UP750**, and then **2) PV events when the controller is Model UP35□**.

[1] When the Controller Is Model UP550 or UP750

CAUTION

The output terminals for PV events have been predetermined at the factory according to the UP mode. Confirm the terminal numbers allocated to instrument alarms or event outputs. If you have made any change to the instrument alarm or event settings, you must also change the DO output terminal assignments and the wiring (Note).

Note: For example, a single-loop control type UP750 controller comes with the factory-set DO contact output assignments shown in Table 3-4-3. The terminal number for PV event 1 or 2 is "6" or "5" and its DO number is DO1 or DO2. In other words, two contact outputs are allocated to PV events when the controller is shipped from the factory. On the other hand, you can set a maximum of eight PV events* for a single segment. (* Denotes the total number including time events.) Therefore, in order to set two or more PV events and output them through contact terminals, 1) specify their DO output terminal numbers, 2) select the numbers of desired PV events from EV1 to EV8 and allocate them to the terminal numbers, and 3) register I-relay numbers**, each being incremented by 5000, that correspond to the allocated PV events.
For information on how to register the I-relay numbers, see Ref.3.2(2), "Changing Contact Output Functions for the UP550 and UP750." In addition, rewire the controller as required, according to the output terminal numbers you specified.
** The I-relay numbers used for the "statuses" of PV events are defined as 113 to 122. For more information on the I-relay numbers, see Table 8-1-11 in Ref.8.1(4), "I-relay Outline and I-relay Map."
(Note that the I relay numbers used for PV events are shared by local events.)

Table 3-4-3

Terminal Number	DO Number	Factory-set Assignment	Output Type
6	DO1	PV event-1 output (local event 1)	Relay
5	DO2	PV event-2 output (local event 2)	Relay
4	DO3	Instrument alarm output (or cooling-side control output [Note])	Relay
7	Common terminal (for DO1 to DO3)		
34	DO4	Time event-1 output (or cooling-side control output [Note])	Transistor
33	DO5	Time event-2 output	Transistor
32	DO6	Time event-3 output	Transistor
31	DO7	Time event-4 output	Transistor
35	Common terminal (for DO4 to DO7)		

TIP

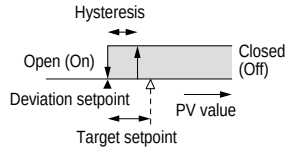
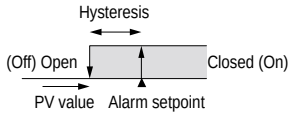
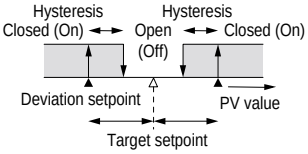
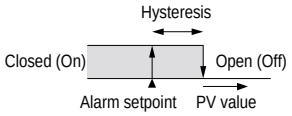
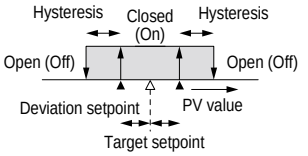
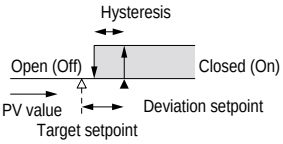
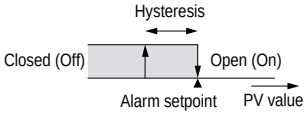
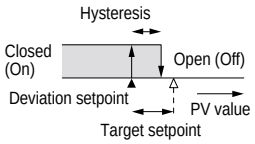
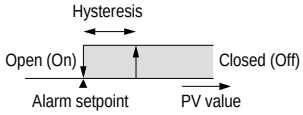
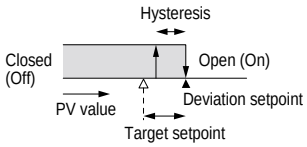
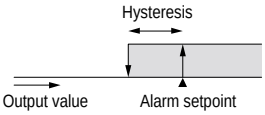
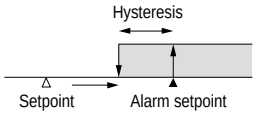
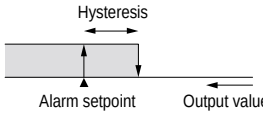
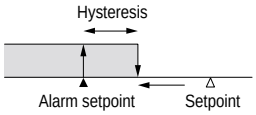
In principle, you can set a maximum of eight events for any single segment. If you want to set at least nine events but no more than 16 for the segment, assume the immediately preceding segment time to be zero and set a virtual segment. Likewise, if you want to set at least 17 events but no more than 24 for the segment, assume the immediately preceding two segment times to be zero and set virtual segments. Then, set necessary PV events or time events for these virtual segments.

■ Types of PV Event Available with UP550/UP750

A PV event is a function used to output a PV alarm signal or a deviation alarm signal that has been set in advance during program operation. The preset conditions of a PV event are retained even after the end of a given program segment.

The types of PV events available with the UP550/UP750 are summarized in Table 3-4-4. Use the EVn, TYn and PEn program parameters shown in the table to change the type of PV event or set its value. Confirm the factory-set values and change them (or set new values) only if necessary.

Table 3-4-4

Alarm Type	Alarm Action "Open" and "Closed" refer to the state of a relay contact and "On" and "Off" the state of a lamp.	Alarm Type Code: Contact closed in case of alarm	Alarm Type Code: Contact opened in case of alarm	Alarm Type	Alarm Action "Open" and "Closed" refer to the state of a relay contact and "On" and "Off" the state of a lamp.	Alarm Type Code: Contact closed in case of alarm	Alarm Type Code: Contact opened in case of alarm
No alarm		OFF		De-energization in case of deviation lower-limit alarm			6 46
PV upper limit		1 41		Deviation upper/lower limits		7 47	
PV lower limit		2 42		Within deviation upper/lower limits		8 48	
Deviation upper limit		3 43		De-energization in case of PV upper-limit alarm			9 49
Deviation lower limit		4 44		De-energization in case of PV lower-limit alarm			10 50
De-energization in case of deviation upper-limit alarm			5 15	Output value upper limit		30 70	
Setpoint upper limit		28 68		Output value lower limit		31 71	
Setpoint lower limit		29 69					

Alarm type codes 1 to 10 and 28 to 31 in the table above are assigned for the primary loop, while alarm type codes 41 to 50 and 68 to 71 are assigned for the secondary loop.

● Parameters used here are summarized below.
To change the settings of these parameters, see the Initial Settings user's manual or the Parameters user's manual for your controller model.

• Program parameters (Parameters for Setting the Event Action): EVn, TYn and PEn

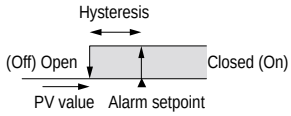
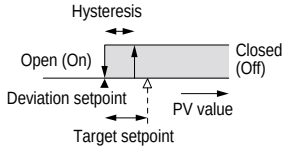
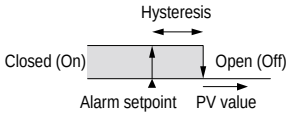
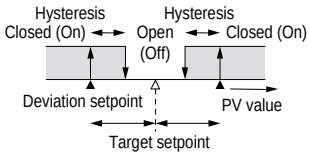
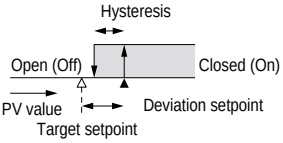
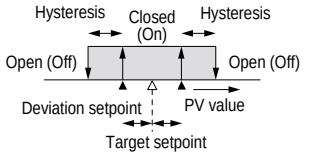
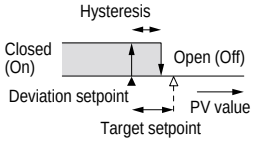
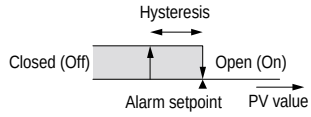
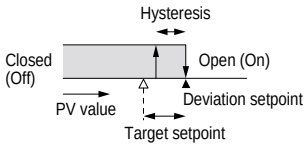
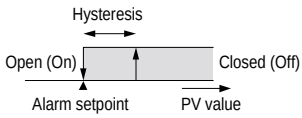
UP750 UP550 Code	Description	Setting Range	Default	B-Register No. (Note1)
EVn (Note2)	Event number	0, or 21 to 28 (Note3)	0 (unregistered)	116 to 139
TYn (Note2)	PV event type	OFF, 1 to 10, or 28 to 31 (Note4) (41 to 50, or 68 to 71) (Note5)	OFF (unregistered)	
PEn (Note2)	PV event setpoint	• -100.0% to 100.0% of PV input range for PV/Setpoint alarms • -100.0% to 100.0% of PV input range span for deviation alarms • -5.0% to 105.0% for output value alarms	←←← 100.0% for upper limit 0.0% for lower limit ←←← 0.0% of PV input range span ←←← 100.0% for upper limit 0.0% for lower limit	

Note1: These parameters are supported by B registers 116 to 139.
Note2: n denotes the event number and takes a value from 1 to 8, meaning there are eight events. The number is the total sum including both PV events and time events.
Note3: "0" means no events are used (registered). To use PV events, be sure to set a value from 21 to 28 to specify the event number n (1 to 8). For example, specify EV1 as PV event 1 by setting the EVn parameter to "21". (For time events, use a value from 1 to 16.)
Note4: For more information on the setting range, see "Alarm Type Code" in Table 3-4-4.
Note5: These setpoints are for the secondary loop or loop 2. See "Alarm Type Code" in Table 3-4-4, for more information on the setting range.

[2] When the Controller Is Model UP35□

You can separately set two events each for program pattern 1 and program pattern 2. The types of PV event available with the UP35□ are summarized in Table 3-4-5. Use the nAL1, nAL2, nA1 and nA2 program parameters shown in the table to change the type of PV event or set its value. Confirm the factory-set values and change them (or set new values) only if necessary.

Table 3-4-5

Alarm Type	Alarm Action "Open" and "Closed" refer to the state of a relay contact and "On" and "Off" the state of a lamp.	Alarm Type Code: Contact closed in case of alarm	Alarm Type Code: Contact opened in case of alarm	Alarm Type	Alarm Action "Open" and "Closed" refer to the state of a relay contact and "On" and "Off" the state of a lamp.	Alarm Type Code: Contact closed in case of alarm	Alarm Type Code: Contact opened in case of alarm
No alarm		OFF					
PV upper limit		1		De-energization in case of deviation lower-limit alarm			6
PV lower limit		2		Deviation upper/lower limits		7	
Deviation upper limit		3		Within deviation upper/lower limits		8	
Deviation lower limit		4		De-energization in case of PV upper-limit alarm			9
De-energization in case of deviation upper-limit alarm			5	De-energization in case of PV lower-limit alarm			10

● Parameters used here are summarized below.
To change the settings of these parameters, see the Initial Settings user's manual or the Parameters user's manual for your controller model.

• Program parameters: n.AL1, n.A1, n.AL2 and n.A2 (Note)

UP35□ Code	Description	Setting Range	Default	D-Register No.
n.AL1 (Note)	PV event-1 type	OFF, or 1 to 10	OFF (unregistered)	131 (for pattern 1) 161 (for pattern 2)
n.A1 (Note)	PV event-1 setpoint	• -100.0% to 100.0% of PV input range for PV/setpoint alarms • -100.0% to 100.0% of PV input range span for deviation alarms	←←← 100.0% for upper limit 0.0% for lower limit ←←← 0.0% of PV input range span	132 (for pattern 1) 162 (for pattern 2)
n.AL2 (Note)	PV event-2 type	OFF, or 1 to 10	OFF (unregistered)	133 (for pattern 1) 163 (for pattern 2)
n.A2 (Note)	PV event-2 setpoint	• -100.0% to 100.0% of PV input range for PV/setpoint alarms (The other settings are the same as those of n.A1 parameter.)	←←← 100.0% for upper limit 0.0% for lower limit	134 (for pattern 1) 164 (for pattern 2)

Note: n is either the value 1 or 2. Use this value to discriminate the parameter's application between pattern 1 and pattern 2.

■ Hysteresis of PV Events

You can set hysteresis for a PV event.

[1] Setting Hysteresis for UP550/UP750

Since you can set a maximum of eight PV events (EVn = 1 to 8) for the UP550/UP750, you can set as many values of hysteresis for these PV events.
Use the setup parameters PEH1 to ZPEH8 shown in the table below to set hysteresis. The functionality of PV event hysteresis is the same as that of instrument alarm hysteresis. For more information on the PV event hysteresis, see Ref.3.4(3), “Setting Hysteresis (On-off Bandwidth) for Instrument Alarms.”

● Parameters used here are summarized below.
To change the settings of these parameters, see the Initial Settings user’s manual or the Parameters user’s manual for your controller model.

• Setup parameters (Alarm-related Parameters): PEH1 to PEH8

UP750 UP550 Code	Description	Setting Range	Factory-set or Initial Value	D-Register Number
PEH1	PV event-1 hysteresis	0.0% to 100.0% of PV input range span	0.5% of PV input range span	907
PEH2	PV event-2 hysteresis		0.5% of PV input range span	908
PEH3	PV event-3 hysteresis		0.5% of PV input range span	909
PEH4	PV event-4 hysteresis		0.5% of PV input range span	910
PEH5	PV event-5 hysteresis		0.5% of PV input range span	911
PEH6	PV event-6 hysteresis		0.5% of PV input range span	912
PEH7	PV event-7 hysteresis		0.5% of PV input range span	913
PEH8	PV event-8 hysteresis		0.5% of PV input range span	914

[2] Setting Hysteresis for UP35□

The UP35□ has two setup parameters: HY1 and HY2. With these parameters, you can separately set hysteresis for PV event 1 and PV event 2. The PV event hysteresis is commonly used for both programs 1 and 2, however, as shown below.

PV Event Hysteresis	Corresponding PV Event
HY1	1.AL1 2.AL1
HY2	1.AL2 2.AL2

The functionality of PV event hysteresis is the same as that of instrument alarm hysteresis discussed earlier. For more information on the PV event hysteresis, see Ref.3.4(3), “Setting Hysteresis (On-off Bandwidth) for Instrument Alarms.”

● Parameters used here are summarized below.
To change the settings of these parameters, see the Initial Settings user’s manual or the Parameters user’s manual for your controller model.

• Setup parameters: HY1 and HY2

UP35□ Code	Description	Setting Range	Factory-set or Initial Value	D-Register Number
HY1 (HY1)	PV event-1 hysteresis	0.0% to 100.0% of PV input range span	0.5% of PV input range span	919
HY2 (HY2)	PV event-2 hysteresis		0.5% of PV input range span	920

△ TIP: (for UP550/UP750 only)

Transition between events during target setpoint tracking at the end of program operation

When switching the UP550 or UP750 to local mode operation (constant target setpoint) at the end of program operation, you can select either the “ON or OFF option for target setpoint tracking.” At this point, a transition also takes place between PV events and local events. For more information on the transition, see “When ‘Local End’ (JC = 2) Is Selected” in Ref.5.2(3), “Selecting segment end condition.”

<<Ref. 3.4: References Related to Instrument Alarms and Events>>
Ref.3.4(6) Using Time Events

Using time events is possible with the UP35□, UP550 or UP750.

The function specifications differ however between the UP550/UP750 and the UP35□. This section first discusses **1) time events when the controller is Model UP550 or UP750**, and then **2) time events when the controller is Model UP35□**.

[1] When the Controller Is Model UP550 or UP750

CAUTION

The output terminals for Time events have been predetermined at the factory according to the UP mode. Confirm the terminal numbers allocated to instrument alarms or event outputs. If you have made any change to the instrument alarm or event settings, you must also change the DO output terminal assignments and the wiring (Note).

Note: For example, a single-loop control type UP750 controller comes with the factory-set DO contact output assignments shown in Table 3-4-6. The terminal numbers for time events 1 to 4 is "34", "33", "32" and "31" and its DO numbers are DO4 or DO7. In other words, four contact outputs are allocated to time events when the controller is shipped from the factory. On the other hand, you can set a maximum of eight time events* for a single segment. (* Denotes the total number including PV events. See TIP below.) Therefore, in order to set five or more time events and output them through contact terminals, 1) specify their DO output terminal numbers, 2) select the numbers of desired time events from EV1 to EV8 and allocate them to the terminal numbers, and 3) register I-relay numbers**, each being incremented by 5000, that correspond to the allocated time events.
For information on how to register the I-relay numbers, see Ref.3.2(2), "Changing Contact Output Functions for the UP750 and UP550."
In addition, rewire the controller as required, according to the output terminal numbers you specified.
** The I-relay numbers used for the "statuses" of time events are defined as 129 to 154. For more information on the I-relay numbers, see Table 8-1-11 in Ref.8.1(4), "I-relay Outline and I-relay Map."
(Note that the I relay numbers used for PV events are shared by local events.)

Table 3-4-6

Terminal Number	DO Number	Factory-set Assignment	Output Type
6	DO1	PV event-1 output (local event 1)	Relay
5	DO2	PV event-2 output (local event 2)	Relay
4	DO3	Instrument alarm output (or cooling-side control output [Note])	Relay
7	Common terminal (for DO1 to DO3)		
34	DO4	Time event-1 output (or cooling-side control output [Note])	Transistor
33	DO5	Time event-2 output	Transistor
32	DO6	Time event-3 output	Transistor
31	DO7	Time event-4 output	Transistor
35	Common terminal (for DO4 to DO7)		

TIP

In principle, you can set a maximum of eight events for any single segment. If you want to set at least nine events but no more than 16 for the segment, assume the immediately preceding segment time to be zero and set a virtual segment. Likewise, if you want to set at least 17 events but no more than 24 for the segment, assume the immediately preceding two segment times to be zero and set virtual segments. Then, set necessary PV events or time events for these virtual segments.

Set time events for the UP550/UP750 on a segment-by-segment basis. As many as 16 time events are available for each program pattern. For each segment, however, you are allowed to set a maximum of only eight time events (including PV events) since there are only eight parameters, EV1 to EV8, available for this setting. Time segment is a function that turns on a given contact when a preset time expires after the start of program operation. Information that a time event carries is retained even after the segment, for which the event was set, comes to an end. You can set the points of time at which the time event turns on and off, both for the same segment and other segments.

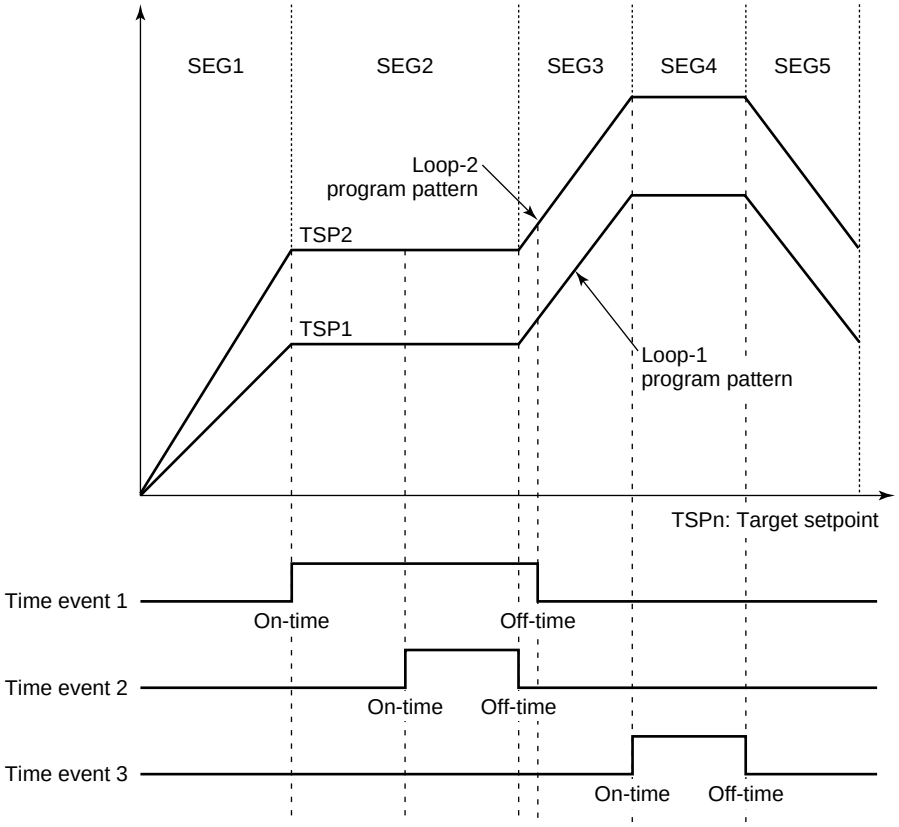


Fig. 3-4-6 Example of Program Patterns and Time Events Set for Dual-loop Type UP750

● UP550/UP750's Parameters for Setting Time Events

To change the settings of these parameters, see the Initial Settings user's manual or the Parameters user's manual for your controller model.

• Program parameters (Parameters for Setting the Event Action): EVn, ONn and OFFn

UP750 UP550 Code	Description	Setting Range	Default	B-Register No. (Note1)
EVn (Note2)	Event number	0, or 1 to 16 (Note3)	0 (unregistered)	116 to 139
ONn (Note2)	On time of time event	OFF, or 0.00 to 99.59 ("Hour:minute" or "minute:second") (Note4)	OFF (unused)	
OFFn (Note2)	Off time of time event	OFF, or 0.00 to 99.59 ("Hour:minute" or "minute:second") (Note4)	OFF (unused)	

Note1: These parameters are supported by B registers 116 to 139.
Note2: n denotes the event number and takes a value from 1 to 8, meaning there are eight events. The number is the total sum including both PV events and time events.
Note3: "0" means no events are used (registered). To use PV events, be sure to set a value from 1 to 16 to specify the event number n (1 to 8). For example, specify EV1 as PV event 1 by setting the EVn parameter to "1". (For PV events, use a value from 21 to 28.)
Note4: To set the time unit ("hour:minute" or "minute:second"), use the setup parameter TMU. The time unit is:
- "hour:minute", if TMU is 0 (factory-set default), or
- "minute:second", if TMU is 1.

For more information on the time unit, see Ref.5.1(1), "Selecting the Segment Setting Method (Time Setting Method or Ramp Grade Setting Method)."

[2] When the Controller Is Model UP35□

If your controller is Model UP35□, you can set a pair of time events for each of program patterns 1 and 2. The UP35□'s time segment turns on a given contact output when the preset "time segment on-time" expires after the start of the first segment of a program pattern. Likewise, the time segment turns off the contact output when the preset "time segment off-time" expires.

For program 1, you can set the on-time and off-time of a time event using the 1.EON and 1.EOF parameters shown in the following table.

● Parameters used to set the UP35□'s time events are summarized below.
To change the settings of these parameters, see the Initial Settings user's manual or the Parameters user's manual for your controller model.

• Program parameters (Parameters for Setting Event Actions): n.EON and nEOF

UP35□ Code	Description	Setting Range	Default	D-Register No. (Note1)
n.Eon (n.EON) (Note1)	Time event on-time	OFF, or 0.00 to 99.59 ("hour:minute" or "minute:second") (Note2)	OFF (unused)	135 (1.EON) 165 (2.EON)
n.EoF (n.EOF) (Note1)	Time event off-time	OFF, or 0.00 to 99.59 ("hour:minute" or "minute:second") (Note2)	OFF (unused)	136 (1.EOF) 166 (2.EOF)

Note1: n takes a value of either 1 or 2. Use this value to discriminate the parameter's application between program patterns 1 and 2.
Note2: To set the time unit ("hour:minute" or "minute:second"), use the setup parameter TMU. The time unit is:
- "hour:minute", if TMU is 0 (factory-set default), or
- "minute:second", if TMU is 1.

<<Ref. 3.4: References Related to Instrument Alarms and Events>>
Ref.3.4(7) Using Local Events

Using local events is possible with the UP550 or UP750.
Local events work only if the controller is in local mode.
(The UP35□ does not have local mode and, therefore, has no local events.)

CAUTION

The output terminals for each events have been predetermined at the factory according to the UP mode. Confirm the terminal numbers allocated to instrument alarms or event outputs. If you have made any change to the instrument alarm or event settings, you must also change the DO output terminal assignments and the wiring (Note).

Note: For example, a single-loop control type UP750 controller comes with the factory-set DO contact output assignments shown in Table 3-4-7. The terminal numbers for PV events 1 and 2 is “6” and “5” and its DO numbers are DO1 and DO2. In other words, two contact outputs are allocated to PV events when the controller is shipped from the factory.
On the other hand, these output terminals for PV events are changed to those for local events (E21A and E22A) because their I-relay numbers are shared as noted below. Therefore, set the “local event type” and “local event setpoint” for each of these two local events, E21A and E22A, to be able to use them.
In order to allocate three or more local events to output terminals, 1) specify the DO numbers of output terminals to be used, 2) select the numbers of desired local events from E21A to E28A, and 3) register I-relay numbers*, each being incremented by 5000, that correspond to the allocated local events.
For information on how to register the I-relay numbers, see Ref.3.2(2), “Changing Contact Output Functions for the UP750 and UP550.”
In addition, rewire the controller as required, according to the output terminal numbers you specified.

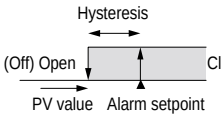
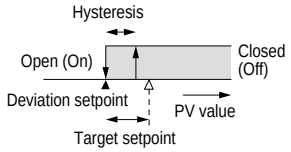
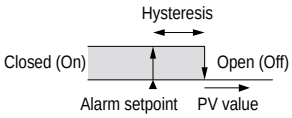
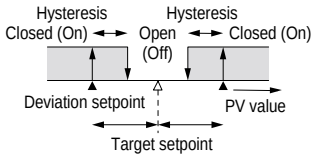
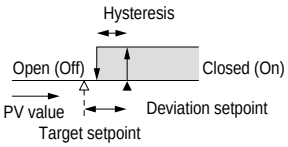
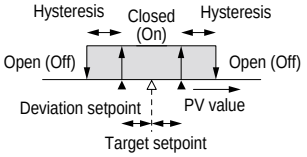
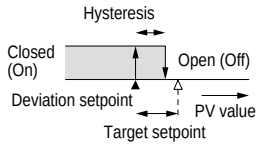
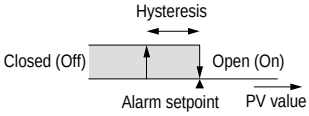
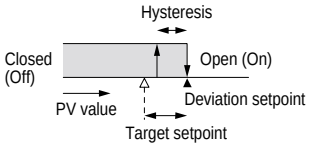
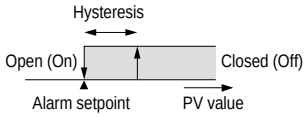
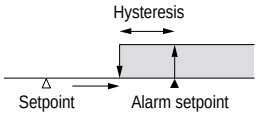
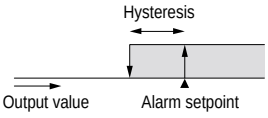
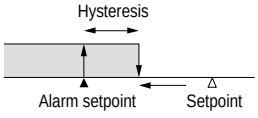
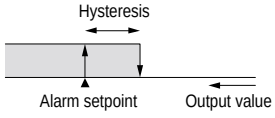
* Local events and PV events share the same I-relay numbers. In addition, the I-relay numbers used for the “statuses” of these events are defined as 113 to 122. For more information on the I-relay numbers, see Table 8-1-11 in Ref.8.1(4), “I-relay Outline and I-relay Map.”
(Note that the I relay numbers used for PV events are shared by local events.)

Table 3-4-7

Terminal Number	DO Number	Factory-set Assignment	Output Type
6	DO1	PV event-1 output (local event 1)	Relay
5	DO2	PV event-2 output (local event 2)	Relay
4	DO3	Instrument alarm output (or cooling-side control output [Note])	Relay
7	Common terminal (for DO1 to DO3)		
34	DO4	Time event-1 output (or cooling-side control output [Note])	Transistor
33	DO5	Time event-2 output	Transistor
32	DO6	Time event-3 output	Transistor
31	DO7	Time event-4 output	Transistor
35	Common terminal (for DO4 to DO7)		

The UP550/UP750's local event types are summarized in Table 3-4-8. Use the program parameters E21A to E28A and E21B to E28B shown in Table 3-4-8 to change the type of local event or set its value. Each local event type is set to OFF (unused) when the controller is shipped from the factory.
Change the factory-set values (or set new values) only if local events are necessary.

Table 3-4-8

Alarm Type	Alarm Action "Open" and "Closed" refer to the state of a relay contact and "On" and "Off" the state of a lamp.	Alarm Type Code: Contact closed in case of alarm	Alarm Type Code: Contact opened in case of alarm	Alarm Type	Alarm Action "Open" and "Closed" refer to the state of a relay contact and "On" and "Off" the state of a lamp.	Alarm Type Code: Contact closed in case of alarm	Alarm Type Code: Contact opened in case of alarm
No alarm		OFF					
PV upper limit		1 41		De-energization in case of deviation lower-limit alarm			6 46
PV lower limit		2 42		Deviation upper/lower limits		7 47	
Deviation upper limit		3 43		Within deviation upper/lower limits		8 48	
Deviation lower limit		4 44		De-energization in case of PV upper-limit alarm			9 49
De-energization in case of deviation upper-limit alarm			5 15	De-energization in case of PV lower-limit alarm			10 50
Setpoint upper limit		28 68		Output value upper limit		30 70	
Setpoint lower limit		29 69		Output value lower limit		31 71	

Alarm type codes 1 to 10 and 28 to 31 in the table above are assigned for the primary loop, while alarm type codes 41 to 50 and 68 to 71 are assigned for the secondary loop.

● Parameters used to set local events are summarized below.
To change the settings of these parameters, see the Initial Settings user's manual or the Parameters user's manual for your controller model.

• Program parameters (Local Setpoint Parameters): E21A to E28A and E21B to E28B

UP750 UP550 Code	Description	Setting Range	Default	D-Register No.
E21A	Local event-21 type	OFF, 1 to 10, or 28 to 31 (Note1) (41 to 50, or 68 to 71) (Note2)	OFF (unused)	104
E21B	Local event-21 setpoint	• -100.0% to 100.0% of PV input range for PV/Setpoint alarms • -100.0% to 100.0% of PV input range span for deviation alarms • -5.0% to 105.0% for output value alarms	←← 100.0% for upper limit 0.0% for lower limit ←← 0.0% of PV input range span ←← 100.0% for upper limit 0.0% for lower limit	105
↓ ↓ ↓ ↓	This range of symbols covers the parameters E22A to E27A and E22B to E27B. These parameters are allocated to the D-registers numbered 106 to 117. The setting range and factory-set default of the parameter E2xA are the same as the parameter E21A. Likewise, the setting range and factory-set default of the parameter E2xB are the same as the parameter E21B.			
E28A	Local event-28 type	OFF, 1 to 10, or 28 to 31 (Note1) (41 to 50, or 68 to 71) (Note2)	OFF (unused)	118
E28B	Local event-28 setpoint	(Note3)	(Note3)	119

Note1: For more information on the setting range, see "Alarm Type Code" in Table 3-4-8.
Note2: These setpoints are for the secondary loop or loop 2. See "Alarm Type Code" in Table 3-4-8, for more information on the setting range.
Note3: Same as the setting range and factory-set default of the parameter E21B "Local Event-21 Setpoint."

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Ref.4.1: References Related to Target Setpoints

IMPORTANT: Applicable models of this section

UP750	UP550	UP35□	UT750	UT5□□	UT4□0	UT3□□
None	None	None	UT750-□□	UT5□□-□□	UT4□0-□□	UT3□□-□□

Note: Some of the functions below are not available on certain models.
For more information, see those sections.

This section contains reference information on the following aspects of Target Setpoints.
Refer to this information and change parameters only if necessary.

(1) Using Multiple Target Setpoints (8 Max.)
(2) Selecting PID selection method (Target SP selection or Zone PID selection)
(3) Limiting Changes in Target Setpoints
(4) Setting ramp grades when switching between target setpoints

<<Ref. 4.1: References Related to Target Setpoints>>

Ref.4.1(1) Using Multiple Target Setpoints (8 Max.)

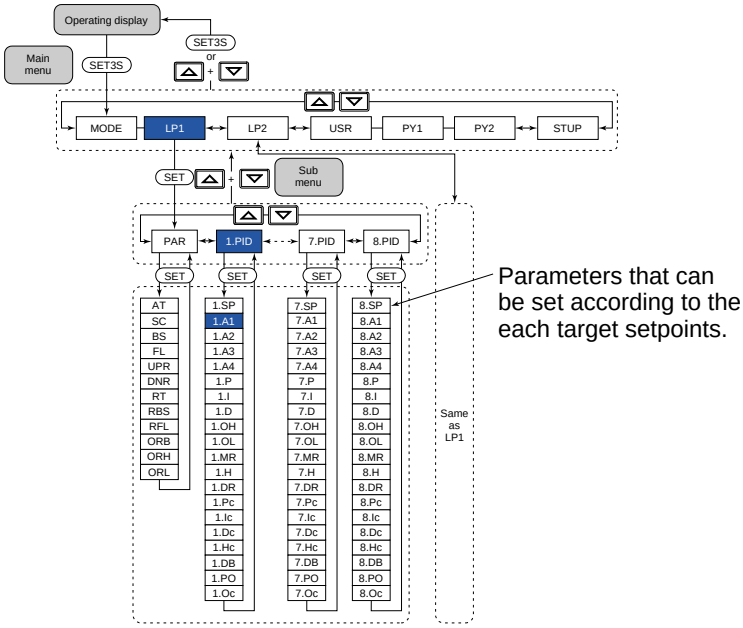
The UT750, UT5□□ and UT4□0 are designed so that you can set a maximum of eight target setpoints at a time. You can also set a maximum of eight target setpoints at a time for each loop in a controller mode of the UT750 or UT5□□ that uses two loops (Note). In the case of the UT3□□, you can set a maximum of four target setpoints at a time.
(Note): To change the number of target setpoints, set the “GRP” setup parameter to a desired value from 1 to 8.

This feature is convenient in such applications where more than one product is manufactured at the same time. Set multiple target setpoints in advance and switch between them according to the type of product.
You can set PID constants and other parameters separately for each individual target setpoint. However, applicable parameters will differ slightly according to the controller model. Parameters that can be set according to the target setpoints of each controller model are listed on the following parameter map. Verify the types of parameter available with your controller.

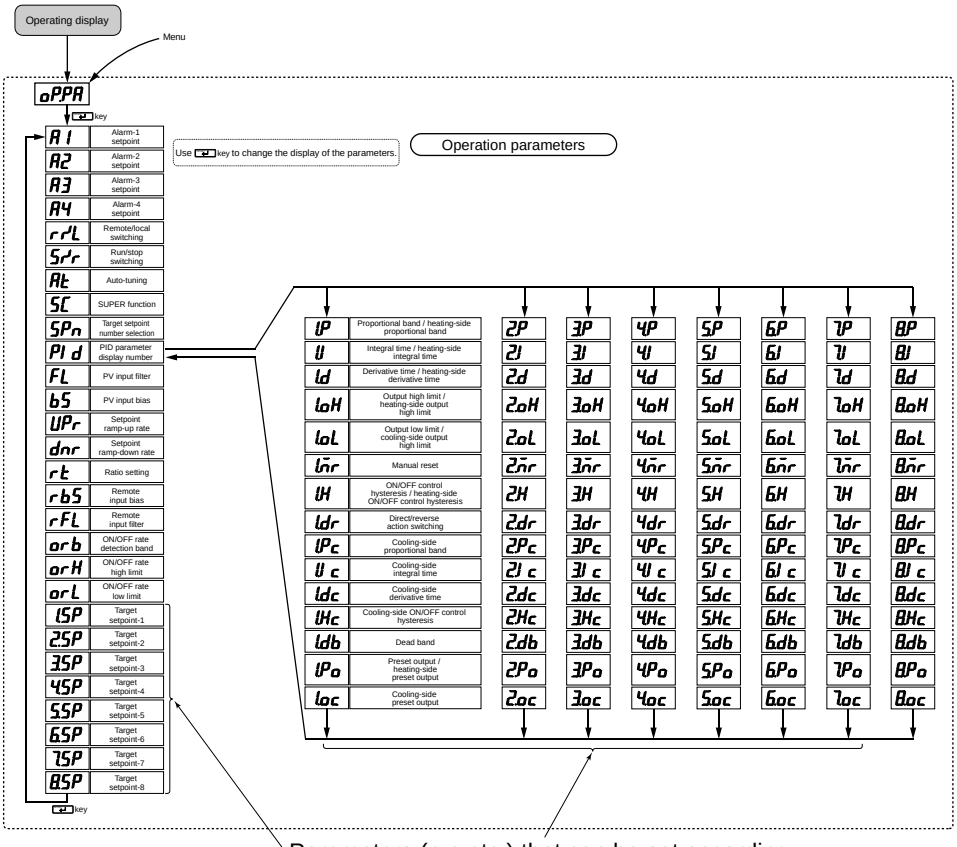
You can switch between target setpoints in any of the following ways:
- Select a target setpoint number by key operation.
- Use external contacts.
- Use communication means.

The number of target setpoint can be changed (reduced) with the parameter “GRP” (PID group number). For example, when “5” is set to the “GRP”, only five PID group parameters (1.PID to 5.PID) can be displayed.

[1] When the Model Is UT750, UT550, UT551 or UT520



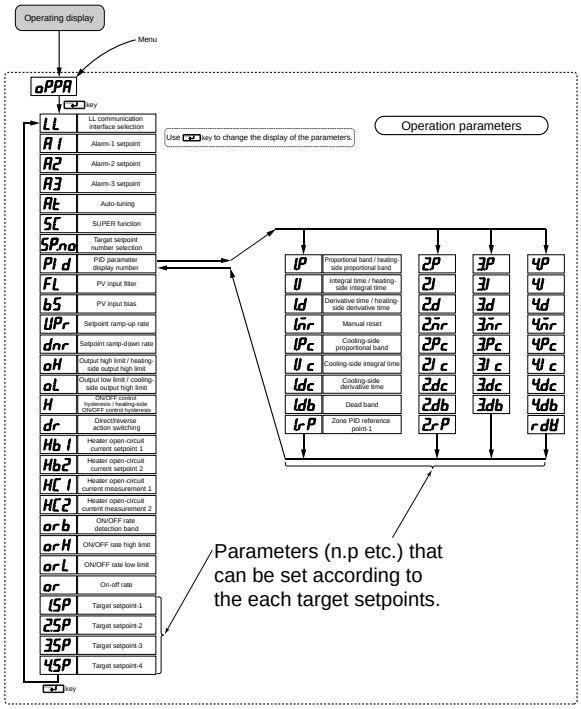
[2] When the Model Is UT450 or UT420



Parameters (n.p etc.) that can be set according to the each target setpoints.

[3] When the Model Is UT35□ or UT32□

The UT35□ and UT32□ accept a maximum of four target setpoints. Therefore, if the zone PID selection method is selected, three zones are formed since two reference points are set for four target setpoints. In addition, the “RVD” reference deviation is assigned in advance to the 4th target setpoint, making parameter setting easier.



Parameters (n.p etc.) that can be set according to the each target setpoints.

To set target setpoints and their associate parameters, such as PID constants, use the operating parameters listed below.
The setting parameters differs depending on the controller model.
Refer to the paragraph that is applicable to your model.

(1) When the Model Is UT750 or UT5□□

Change parameters as explained in the User's Manuals Initial Settings and Parameter Map.

- Operating parameters (Setpoint-, Alarm- and PID- related Parameters)
  (Heating/cooling control is not provided for the UT551 with embedded Ethernet.)

UT750 Code	UT5□□ Code	Description	Setting range	Default	D-register No.
n.SP (Note1)	n.SP (n.SP)	Target setpoint-1	0.0 to100.0% of PV input range	0.0% of PV input range	Refer to the Table 4-1-1
n.A1	n.A1 (n.A1)	Alarm-1 setpoint (Note2)	• When PV alarm is used: 0.0 to 100.0% of PV input range • When Deviation alarm is used: -100.0 to 100.0% of PV input range span • When Timer alarm (for alarm-1 only) is used: 00.00 to 99.59	• When PV alarm is used: 100.0% • When Deviation alarm is used: 0.0%	Refer to the Table 4-1-1
n.A2	n.A2 (n.A2)	Alarm-2 setpoint (Note2)			
n.A3	n.A3 (n.A3)	Alarm-3 setpoint (Note2)			
n.A4	n.A4 (n.A4)	Alarm-4 setpoint (Note2)			
n.P	n.P (n.P)	Promotional band / Heating-side proportional band (in heating/cooling control) (Note3)	0.1 to 999.9% In heating/cooling control : 0.0 to 999.9% (Note4)	5.0%	Refer to the Table 4-1-1
n.I	n.I (n.I)	Integral time / Heating-side integral time (in heating/cooling control) (Note3)	OFF or 1 to 6000 sec.	240 seconds	Refer to the Table 4-1-1
n.D	n.d (n.D)	Derivative time / Heating-side derivative time (in heating/cooling control) (Note3)	OFF or 1 to 6000 sec.	60 seconds	Refer to the Table 4-1-1
n.OH	n.oH (n.OH)	Output high limit / Heating-side output high limit (in heating/cooling control) (Note3)	-5.0 to 105.0% Heating side limiter in heating/cooling control : 0.0 to 105.0% (n.OL < n.OH)	100.0%	Refer to the Table 4-1-1
n.OL	n.oL (n.OL)	Output low limit / Heating-side output low limit (in heating/cooling control) (Note3)	SD (shut down, Note5) or -5.0 to 105.0% Cooling side limiter in heating/cooling control : 0.0 to 105.0% (n.OL < n.OH)	0.0% 100.0% (in heating/cooling control)	Refer to the Table 4-1-1
n.MR	n.mr (n.MR)	Manual reset / Heating-side manual reset (in heating/cooling control) (Note3)	-5.0 to 105.0% (enabled when integral time "n.I" is OFF.)	50.0%	Refer to the Table 4-1-1
n.H	n.H (n.H)	ON/OFF control hysteresis • Heating-side ON/OFF control hysteresis (in heating/cooling control)	0.0 to 100.0% of PV input range span • Position proportional PID control or heating/cooling control : 0.0 to 100.0%	0.5% of PV input range span 0.5%	Refer to the Table 4-1-1
n.DR	n.dr (n.DR)	Direct / reverse action switching (Note6)	• With UT750, REVERS : reverse action, DIRECT :direct action • With UT5□□, RVS : reverse action, DIR :direct action	REVERS (reverse action) RVS (reverse action)	Refer to the Table 4-1-1

< Continue >

UT750 Code	UT5□□ Code	Description	Setting range	Default	D-register No.
n.Pc	n.Pc (n.Pc)	Coolong-side proportional band (Note7)	0.0 to 999.9% (Note4)	5.0%	Refer to the Table 4-1-1
n.Ic	n.Ic (n.Ic)	Cooling-side Integral time (Note7)	OFF or 1 to 6000 sec.	240 seconds	Refer to the Table 4-1-1
n.Dc	n.dc (n.Dc)	Cooling-side Derivative time (Note7)	OFF or 1 to 6000 sec.	60 seconds	Refer to the Table 4-1-1
n.Hc	n.Hc (n.Hc)	Cooling-side ON/OFF control hysteresis (Note7)	0.0 to 100.0% of PV input range span	0.5% of PV input range span	Refer to the Table 4-1-1
n.DB	n.db (n.DB)	Dead band (Note8)	• In heating/cooling control: -100.0 to 50.0% • In position proportional control: 1.0 to 10.0%	3.0%	Refer to the Table 4-1-1
n.PO	n.Po (n.PO)	Preset output / Heating-side preset out (in heating/cooling control) (Note9)	-5.0 to 105.0% of control output (MV)	0.0%	Refer to the Table 4-1-1
n.Oc	n.oc (n.Oc)	Cooling-side preset out (in heating/cooling control) (Note7)	-5.0 to 105.0% of control output (MV)	0.0%	Refer to the Table 4-1-1

Note1: The prefix n in the table above represents the number of each of the parameters, such as target setpoints and their associate PID constants, listed in the table. Since a maximum of eight target setpoints are available with each of the UT750, UT550, UT551 and UT520, “n = 1 to 8” holds true.
Note2: The UT55□-□1, UT55□-□3, UT551-□C and UT551-□D are designed so that setting the “AMD” setup parameter, which is used to set a loop-1 alarm mode, to either “3”, “4” or “5” causes the n.A1 to n.A4 parameters for loop 2 to appear on the display. In this case, the “n.A1” to “n.A4” parameters may be used as the 5th to 8th alarm parameters for loop 1; this is not true with cascade control, however.
Note3: Not shown for on-off control; however, the parameter is shown for the on-off control mode of heating/cooling control.
Note4: If the heating-side proportional band is set to “0.0” in heating/cooling control, the heating side goes into on-off control. Likewise, if the cooling-side proportional band is set to “0.0”, the cooling side goes into on-off control.
Note5: SD stands for “Shut Down”. It is configurable when the control output is 4 to 20 mA and the controller is in manual operation. At shutdown, the control output is set to 0 mA.
Note6: Not shown for heating/cooling control.
Note7: Shown only for heating/cooling control. The parameter is shown in the [LP2] operating parameter main menu only if the controller is performing heating/cooling control and the controller mode (UT mode) is either cascade control or cascade control with 2 universal inputs.
Note8: Shown only for position proportional PID control or heating/cooling control.
Note9: If the controller mode (UT mode) is cascade control or cascade control with 2 universal inputs, the “n.PO” parameter is shown only in the [LP2] operating parameter main menu.

Table 4-1-1 PID related parameter D-register numbers list (1st: for loop-1, 2nd: for loop-2, UT750, UT550 and UT551 only)

	n=1		n=2		n=3		n=4		n=5		n=6		n=7		n=8	
	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd
n.SP	301	501	326	526	351	551	376	576	401	601	426	626	451	651	476	676
n.A1	302	502	327	527	352	552	377	577	402	602	427	627	452	652	477	677
n.A2	303	503	328	528	353	553	378	578	403	603	428	628	453	653	478	678
n.A3	304	504	329	529	354	554	379	579	404	604	429	629	454	654	479	679
n.A4	305	505	330	530	355	555	380	580	405	605	430	630	455	655	480	680
n.P	306	506	331	531	356	556	381	581	406	606	431	631	456	656	481	681
n.I	307	507	332	532	357	557	382	582	407	607	432	632	457	657	482	682
n.D	308	508	333	533	358	558	383	583	408	608	433	633	458	658	483	683
n.OH	309	509	334	534	359	559	384	584	409	609	434	634	459	659	484	684
n.OL	310	510	335	535	360	560	385	585	410	610	435	635	460	660	485	685
n.MR	311	511	336	536	361	561	386	586	411	611	436	636	461	661	486	686
n.H	312	512	337	537	362	562	387	587	412	612	437	637	462	662	487	687
n.DR	313	513	338	538	363	563	388	588	413	613	438	638	463	663	488	688
n.Pc	314	514	339	539	364	564	389	589	414	614	439	639	464	664	489	689
n.Ic	315	515	340	540	365	565	390	590	415	615	440	640	465	665	490	690
n.Dc	316	516	341	541	366	566	391	591	416	616	441	641	466	666	491	691
n.Hc	317	517	342	542	367	567	392	592	417	617	442	642	467	667	492	692
n.DB	318	518	343	543	368	568	393	593	418	618	443	643	468	668	493	693
n.PO	320	520	345	545	370	570	395	595	420	620	445	645	470	670	495	695
n.Oc	321	521	346	546	371	571	396	596	421	621	446	646	471	671	496	696

[2] When the Model Is UT450 or UT420

The UT450 and UT420 are designed so that you can use a maximum of eight target setpoints (SP); only four of them are made available, however, when the controller is shipped from the factory. To change the number of target setpoints, set the “GRP” setup parameter to a desired value from 1 to 8.

For each target setpoint, you can configure parameters (see the paragraphs below), such as PID constants, that have been exclusively assigned to that target setpoint. To do this, select a PID group number appropriate for each target setpoint number using the operating parameter “PID” (PID parameter number).

The paragraphs below list the parameters discussed here. The main points of the procedure for setting target setpoints are as follows.

- Determine the number of target setpoints using the parameter shown in paragraph (1) below.
- Select the PID group to be set for each target setpoint using the parameter shown in paragraph (2).
- Actually set the values of parameters, such as PID constants, using the parameters shown in paragraph (3).

(1) The following parameters are used to change the numbers of target set points (PID group number).

Change parameters as explained in the User’s Manuals Initial Settings and Parameter Map.

- Setup parameters (Control Action - related Parameters)

UT450 UT420 Code	Description	Setting range	Default	D-register No.
GrP (GRP)	PID group number (numbers of Target SPs)	1 to 8	4 (Note1)	940

Note1: Only four target setpoints are made available when the controller is shipped from the factory.

(2) The following parameters are used to specify the PID group

Change parameters as explained in the User’s Manuals Initial Settings and Parameter Map.

- Operating parameters

UT450 UT420 Code	Description	Setting range	Default	D-register No.
PId (PID)	PID parameter display number	MENU or 1Gr to 8Gr (Note1)	MENU	No register-No.

Note1: Only 1Gr to 4Gr can be displayed when the controller is shipped from the factory. To display 5Gr to 8Gr, change the setting value of “GRP” from the default value to 5 to 8.

(3) The following parameters are used to set the value of the following parameters, such as PID constants.

Change parameter as explained in the User's Manuals Initial Settings and Parameter map.

- Operating parameters

UT450 UT420 Code	Description	Setting range	Default	D-register No.
n.P (n.P) (Note1)	Promotional band / Heating-side proportional band (in heating/cooling control) (Note2)	0.1 to 999.9% In heating/cooling control : 0.0 to 999.9% (Note3)	5.0%	Refer to the Table 4-1-2
n.I (n.I)	Integral time / Heating-side integral time (in heating/cooling control) (Note2)	OFF or 1 to 6000 sec.	240 seconds	Refer to the Table 4-1-2
n.d (n.D)	Derivative time / Heating-side derivative time (in heating/cooling control) (Note2)	OFF or 1 to 6000 sec.	60 seconds	Refer to the Table 4-1-2
n.oH (n.OH)	Output high limit / Heating-side output high limit (in heating/cooling control) (Note2)	-5.0 to 105.0% Heating side limiter in heating/cooling control : 0.0 to 105.0% (n.OL < n.OH)	100.0%	Refer to the Table 4-1-2
n.oL (n.OL)	Output low limit / Heating-side output low limit (in heating/cooling control) (Note2)	SD (shut down, Note4) or -5.0 to 105.0% Cooling side limiter in heating/cooling control : 0.0 to 105.0% (n.OL < n.OH)	0.0% 100.0% (in heating/cooling control)	Refer to the Table 4-1-2
n.rr (n.MR)	Manual reset / Heating-side manual reset (in heating/cooling control) (Note2)	-5.0 to 105.0% (enabled when integral time "n.I" is OFF.)	50.0%	Refer to the Table 4-1-2
n.H (n.H)	ON/OFF control hysteresis	0.0 to 100.0% of PV input range span	0.5% of PV input range span	Refer to the Table 4-1-2
	• Heating-side ON/OFF control hysteresis (in heating/cooling control)	Position proportional PID control or heating/cooling control : 0.0 to 100.0%	0.5%	
n.dr (n.DR)	Direct / reverse action switching (Note5)	RVS : reverse action DIR :direct action	RVS (reverse action)	Refer to the Table 4-1-2
n.Pc (n.Pc)	Coolong-side proportional band (Note6)	0.0 to 999.9% (Note3)	5.0%	Refer to the Table 4-1-2
n.Ic (n.Ic)	Cooling-side Integral time (Note6)	OFF or 1 to 6000 sec.	240 seconds	Refer to the Table 4-1-2
n.dc (n.Dc)	Cooling-side Derivative time (Note6)	OFF or 1 to 6000 sec.	60 seconds	Refer to the Table 4-1-2
n.Hc (n.Hc)	Cooling-side ON/OFF control hysteresis (Note6)	0.0 to 100.0% of PV input range span	0.5% of PV input range span	Refer to the Table 4-1-2
n.db (n.DB)	Dead band (Note7)	In heating/cooling control: -100.0 to 50.0% In position proportional control: 1.0 to 10.0%	3.0%	Refer to the Table 4-1-2
n.Po (n.PO)	Preset output / Heating-side preset out (in heating/cooling control)	-5.0 to 105.0% of control output (MV)	0.0%	Refer to the Table 4-1-2
n.oc (n.Oc)	Cooling-side preset out (in heating/cooling control) (Note6)	-5.0 to 105.0% of control output (MV)	0.0%	Refer to the Table 4-1-2

Note1: The prefix n in the table above represents the number of each of the parameters, such as target setpoints and their associate PID constants, listed in the table. Since a maximum of eight target setpoints are available with each of the UT450 and UT420, "n = 1 to 8" holds true.
Note2: Not shown for on-off control; however, the parameter is shown for the on-off control mode of heating/cooling control.
Note3: If the heating-side proportional band is set to "0.0" in heating/cooling control, the heating side goes into on-off control. Likewise, if the cooling-side proportional band is set to "0.0", the cooling side goes into on-off control.
Note4: SD stands for "Shut Down". It is configurable when the control output is 4 to 20 mA and the controller is in manual operation. At shutdown, the control output is set to 0 mA.

Note5: Not shown for heating/cooling control.
Note6: Shown only for heating/cooling control.
Note7: Shown only for position proportional PID control or heating/cooling control.

Table 4-1-2 D-register number list

	n=1	n=2	n=3	n=4	n=5	n=6	n=7	n=8
n.P	306	331	356	381	406	431	456	481
n.I	307	332	357	382	407	432	457	482
n.D	308	333	358	383	408	433	458	483
n.OH	309	334	359	384	409	434	459	484
n.OL	310	335	360	385	410	435	460	485
n.MR	311	336	361	386	411	436	461	486
n.H	312	337	362	387	412	437	462	487
n.DR	313	338	363	388	413	438	463	488
n.Pc	314	339	364	389	414	439	464	489
n.Ic	315	340	365	390	415	440	465	490
n.Dc	316	341	366	391	416	441	466	491
n.Hc	317	342	367	392	417	442	467	492
n.DB	318	343	368	393	418	443	468	493
n.PO	320	345	370	395	420	445	470	495
n.Oc	321	346	371	396	421	446	471	496

[3] When the Model Is UT35□ or UT32□

The UT35□ and UT32□ are designed so that you can use a maximum of four target setpoints (SP).

For each target setpoint, you can configure parameters (see the paragraphs below), such as PID constants, that have been exclusively assigned to that target setpoint. To do this, select a PID group number appropriate for each target setpoint number using the operating parameter “PID” (PID parameter number).

The paragraphs below list the parameters discussed here. The main points of the procedure for setting target setpoints are as follows.

- Select the PID group to be set for each target setpoint using the parameter shown in paragraph (1) below.
- Actually set the values of parameters, such as PID constants, using the parameters shown in paragraph (2).

(1) The following parameter is used to specify the PID group

Change parameter as explained in the User’s Manuals Initial Settings and Parameter Map.

- Operating parameters

UT35□ UT32□ Code	Description	Setting range	Default	D-register No.
PId (PID)	PID parameter display number	MENU or 1Gr to 4Gr	MENU	No D-register No.

(2) The following parameters are used to set the value of the following parameters, such as PID constants.

Change parameter as explained in the User's Manuals Initial Settings and Parameter Map.

- Operating parameters

UT35□ UT32□ Code	Description	Setting range	Default	D-register No.
n.P (n.P) (Note1)	Promotional band / Heating-side proportional band (in heating/cooling control) (Note2)	0.1 to 999.9% In heating/cooling control : 0.0 to 999.9% (Note3)	5.0%	Refer to the Table 4-1-3
n.I (n.I)	Integral time / Heating-side integral time (in heating/cooling control) (Note2)	OFF or 1 to 6000 sec.	240 seconds	Refer to the Table 4-1-3
n.d (n.D)	Derivative time / Heating-side derivative time (in heating/cooling control) (Note2)	OFF or 1 to 6000 sec.	60 seconds	Refer to the Table 4-1-3
n.mr (n.MR)	Manual reset / Heating-side manual reset (in heating/cooling control) (Note2)	-5.0 to 105.0% (enabled when integral time "n.I" is OFF.)	50.0%	Refer to the Table 4-1-3
n.Pc (n.Pc)	Coolong-side proportional band (Note4)	0.0 to 999.9% (Note3)	5.0%	Refer to the Table 4-1-3
n.Ic (n.Ic)	Cooling-side Integral time (Note4)	OFF or 1 to 6000 sec.	240 seconds	Refer to the Table 4-1-3
n.dc (n.Dc)	Cooling-side Derivative time (Note4)	OFF or 1 to 6000 sec.	60 seconds	Refer to the Table 4-1-3
n.db (n.DB)	Dead band (Note5)	In heating/cooling control: -100.0 to 50.0%	3.0%	Refer to the Table 4-1-3
n.rP (n.RP)	Zone PID reference point-1	0.0 to 100.0% of PV input range. Note that 1.RP < 2.RP.	100.0% value of PV input range.	Refer to the Table 4-1-3
rdV (RDV)	Reference deviation	OFF or 0.0 to 100.0% of PV input range span	OFF	Refer to the Table 4-1-3

Note1: The prefix n in the table above represents the number of each of the parameters, such as target setpoints and their associate PID constants, listed in the table. Since a maximum of four target setpoints are available with each of the UT35□ and UT32□, "n = 1 to 4" holds true.
Note2: Not shown for on-off control; however, the parameter is shown for the on-off control mode of heating/cooling control.
Note3: If the heating-side proportional band is set to "0.0" in heating/cooling control, the heating side goes into on-off control. Likewise, if the cooling-side proportional band is set to "0.0", the cooling side goes into on-off control.
Note4: Shown only for heating/cooling control.
Note5: Shown only for heating/cooling control.

Table 4-1-3 D-register number list

	n=1	n=2	n=3	n=4
n.P	306	331	356	381
n.I	307	332	357	382
n.D	308	333	358	383
n.MR	311	336	361	386
n.Pc	314	339	364	389
n.Ic	315	340	365	390
n.Dc	316	341	366	391
n.DB	318	343	368	392
n.RP	319	344	–	494

<<Ref. 4.1: Reference Related to Target Setpoints>>

Ref.4.1(2) Selecting PID selection method (Target SP selection, Zone PID or Selection by specified PID number)

The following four method of PID selection are available with each of the UT750, UT5□□, UT4□0 and UT3□□.
You can select either of these four methods using the “ZON” program parameter.

- Target setpoint (SP) number selection (Factory-set default)
- Zone PID selection (selects by PV)
- Zone PID selection (selects by target setpoint) (for UT551 only)
- Selects by specified PID number (for UT551 only)

● The following parameter is used.

Change parameter as explained in the User’s Manuals Initial Settings and Parameter Map.

- Setup parameters (Control action-related parameter) : ZON

UT750 Code	UT5□□ UT4□0 UT3□□ Code	Description	Setting range	Default	D-register No.
ZON	ZON (ZON)	Zone PID selection	0 : Target setpoint (SP) number selection 1 : Zone PID (selects by PV) 2 : Zone PID (selects by target setpoint) 3 : Selects by specified PID number * Setpoints “2” and “3” can be used with UT551 only.	0 (OFF)	929

Note: With UT750 or UT5□□, this parameter is used commonly between loop-1 and loop-2.

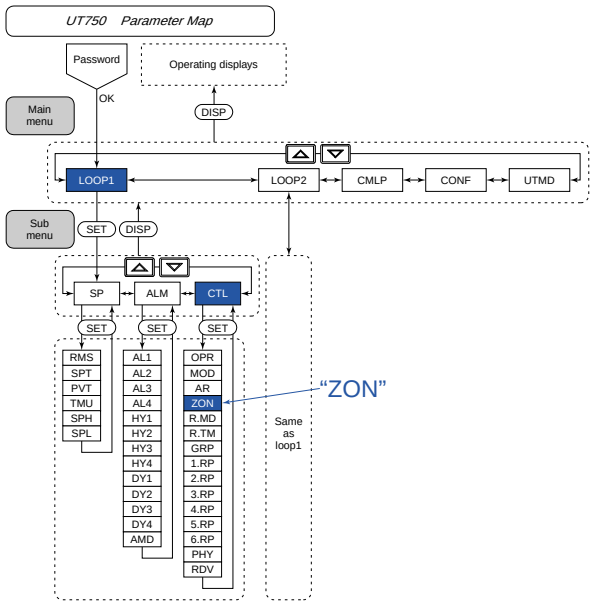
■ Setting the required parameters

Carry out the operation shown below.
(UT7□0’s parameter setting way is shown in the following example.)

Here we explain how to display the parameter setting display and to change the parameter values. Before carrying out these operations be sure to refer to the User’s Manuals Initial Settings and Parameter Map of the controller.
The parameter map is very helpful in finding the path to the setting display for a particular parameter.

1: Referring to the User’s Manual above, display the setup parameter main menu [LOOP1] .
Then, display the submenu [CTL].

2: Press the SET/ENT key time and again to display the parameter “ZON”.
Adjust the parameter value (to 0 or 1) using the ▲ / ▼ keys, then press the SET/ENT key to register it. For example, when you want to select “Zone PID (selects by PV)” Method, adjust the parameter value to “1” and register it by pressing the SET/ENT key.



This completes the setting operation. If other settings are unnecessary, return to operating display.

(2) - 1 When "Zone PID (selects PV)" Method Is Selected

The zone PID (selects by PV) method automatically switches between PID setpoints according to the measured value (PV). For this reason, the same group of PID constants are used to perform control within the same PV range, irrespective of whether the program is performing a "ramp-up" or "ramp-down" operation. Zone PID control is used for such applications as reactors where the gain of chemical reaction varies with temperature.

As shown in the figure below, the area defined by the minimum and maximum values of a measurement range can be segmented by reference points 1 to 6, into a maximum of seven zones. (In the case of the UT35□ and UT32□, this area is segmented by reference points 1 and 2 into three zones.) You can assign a group of optimum PID constants to each of these zones. Accordingly, even if a PV travels across any two or more zones, the controller automatically selects and uses the PID constants assigned to the zone where the PV is currently positioned.

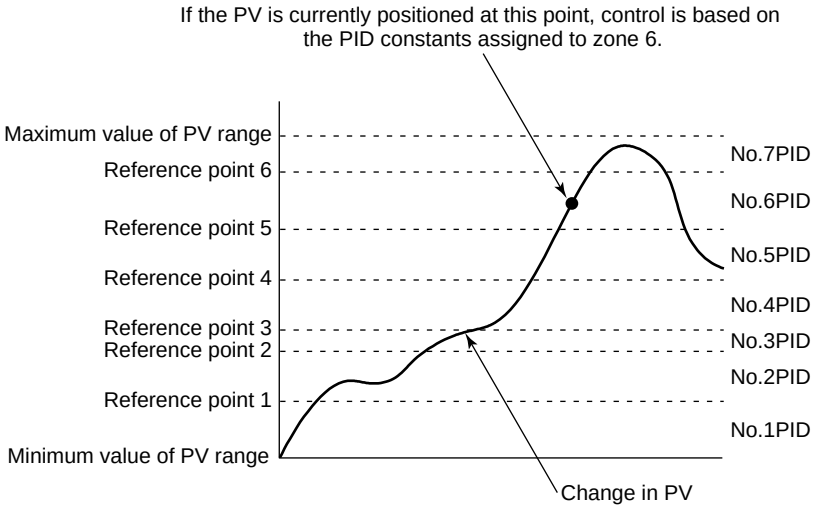


Fig. 4-1-1 Reference Points

Set reference points using the "n.RP" (n = 1 to 6) operating parameter. (For the UT35□ and UT32□, n = 1 or 2.)

● **The following parameters are used.**

Change parameters as explained in the User's Manuals Initial Settings and Parameter Map.

- Setup parameters (Control Action - related Parameters) : n.RP

UT750 Code	UT5□□ UT4□0 UT3□□ Code	Description	Setting range	Default	D-register No.
n.RP (Note) (n=1 to 6)	n.rP (n.RP) (n=1 to 6)	Zone PID reference point	0.0 to 100.0% of PV input range (Note)	100.0% of PV input range	Refer to the Table 4-1-4

Note: However, 1.RP<2.RP<3.RP<4.RP<5.RP<6.RP

Table 4-1-4 Zone PID reference point parameter "nRP" D-register numbers list

	n=1 (Note1)		n=2 (Note1)		n=3		n=4		n=5		n=6	
	1st	2nd(Note2)	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd
n.RP	319	519	344	544	369	569	394	594	419	619	444	644

Note1: With UT35□ or UT32□, numbers of "n" are 1 or 2 only.
Note2: The D-registers for the loop-2 can be used with UT750 or UT5□□ only.

Setting Hysteresis for Zone Switching

If you have selected the zone PID method, you can set hysteresis for zone switching.

To do this, use the “RYH” parameter. (The factory-set hysteresis is 0.5% of the PV input span.)

In the case of the UT750 and UT5□□, the RYH parameter belongs to the same submenu [CTL] as the “ZON” and “n.RP” parameters discussed earlier.

If the model is UT4□0, this parameter belongs to setup parameters (related to control/operation). If the model is UT3□□, hysteresis for zone switching is fixed at 0.5% of the PV input span.

● **The following parameters are used.**

Change parameters as explained in the User’s Manuals Initial Settings and Parameter Map.

- Setup parameters (Control Action - related Parameters) : RHY

UT750 Code	UT5□□ UT4□0 Code	Description	Setting range	Default	D-register No.
RHY	rHY (RHY)	Zone switching hysteresis	0.0 to 100.0% of PV input range span	0.5%	469 (for loop-1) 669 (for loop-2) (Note2)

Note1: UT35□ or UT32□ does not have a parameter for changing the value of Zone switching hysteresis. (The value is fixed to 0.5% of PV input range span.)
Note2: The D-registers for the loop-2 can be used with UT750 or UT5□□ only.

An example of the zone switching hysteresis is shown below.

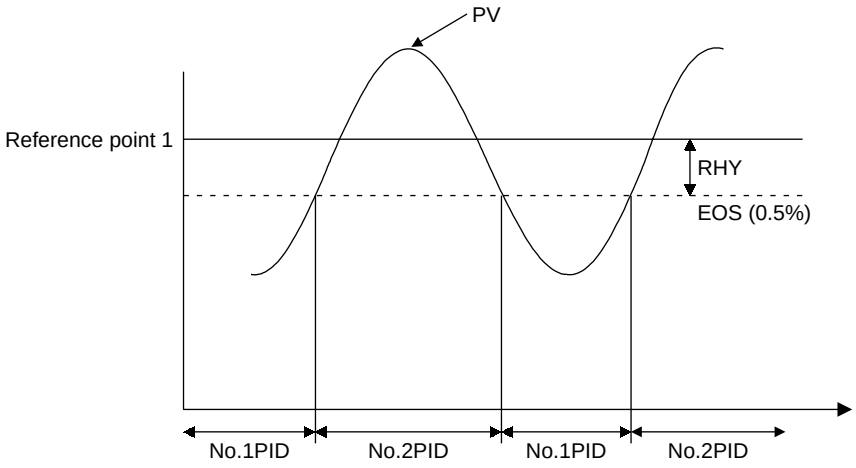


Fig. 4-1-2 Zone switching hysterisis

About the Reference Deviation Function

The process of changing PID settings according to the amount of deviation is called “reference deviation.” If the actual amount of deviation exceeds the setpoint of the “Reference Deviation” parameter discussed here, the controller automatically changes to the PID constants (8.PID parameter setting) set for that zone. (In the case of the UT35□ and UT32□, the controller changes to the 4.PID setting.)
For example, if the deviation is large, a target setpoint can be reached more rapidly by increasing the proportional gain (i.e., narrowing the proportional band).
PID setpoint switching based on the reference deviation has priority over PID setpoint switching based on the zone PID method. However, if the actual amount of deviation becomes smaller than the reference deviation setpoint, the controller immediately reverts to the PID constants assigned to the zone appropriate for the current PV value.

To make the reference deviation function available, use the “RDV” parameter. (This parameter is only shown for zone PID control.) If the model is UT750 or UT5□□, the RDV parameter belongs to the same submenu [CTL] as the “ZON” and “n.RP” parameters discussed earlier. If the model is UT4□0, this parameter belongs to the setup parameters (Control Action-related parameter). If the model is the UT3□□, this parameter belongs to the 4.PID group among operating parameters.

● **The following parameters are used to set the reference deviation.**

Change parameters as explained in the User’s Manuals Initial Settings and Parameter Map.

- Setup parameters (However, “RDV” belong to operating parameter with UT35□ or UT32□.)

UT750 Code	UT5□□ UT4□0 UT3□□ Code	Description	Setting range	Default	D-register No.
RDV	rdV (RDV)	Reference deviation	OFF or 0.0 to 100.0% of PV input range span	OFF	494 (for loop-1) 694 (for loop-2) (Note1)

Note1: The D-registers for the loop-2 can be used with UT750 or UT5□□ only.

For example, assume that controller’s measurement range is 0 to 1000° C. An RDV setting of 1% corresponds to a reference deviation of 10° C. Assuming that n.SP is 500° C, which is in zone 2, the RDV upper limit will be 510° C and the RDV lower limit 490° C, as shown in Fig. 4-1-3 . As long as the PV is controlled around SP and within the RDV range, the second set of PID constants can be used. And when PV goes out of the RDV range, the controller stops using the PID constants of the second set and starts using those of the fourth set (4.P, 4.I to 4.DB).

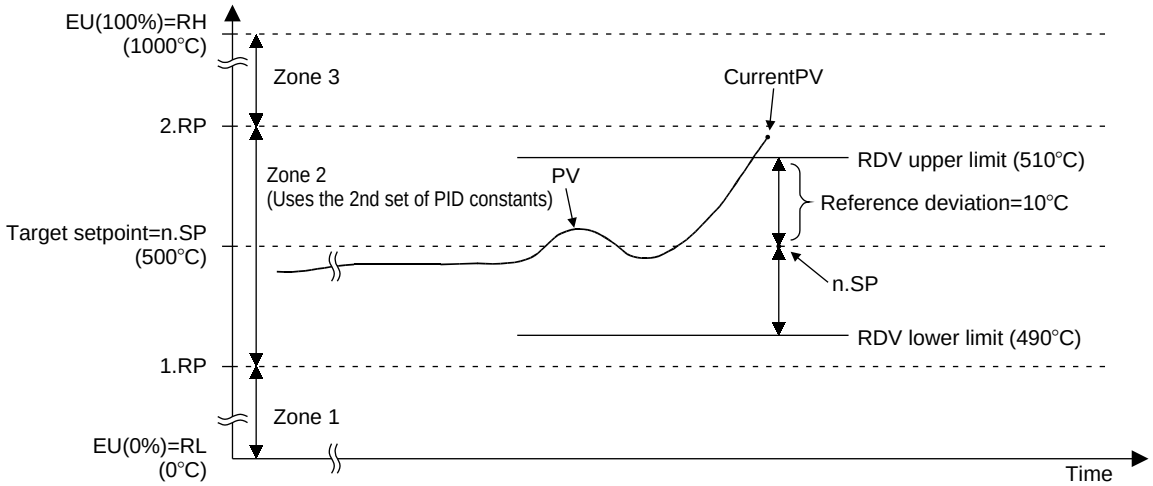


Fig. 4-1-3

(2) - 2 When “Target Setpoint (SP) number selection” Method Is Selected

In the SP number selection method, the operators of the controller can switch between the eight target setpoints as necessary (In the case of the UT35□ and UT32□, switch between the four SPs.). Switching is carried out by setting the parameter SP.NO using key operation, or by using external DIS contact inputs.
Switching of target setpoint is always possible. Once switched, the UPR (target setpoint ramp-up) or DNR (target setpoint ramp-down) function can be used to change the current setpoint. (See Ref.4.1(4).) When the target setpoint is switched, the controller performs control computation using the set of PID constants that correspond to the currently selected target setpoint (1.SP, 2.SP, 3.SP, to 8SP).

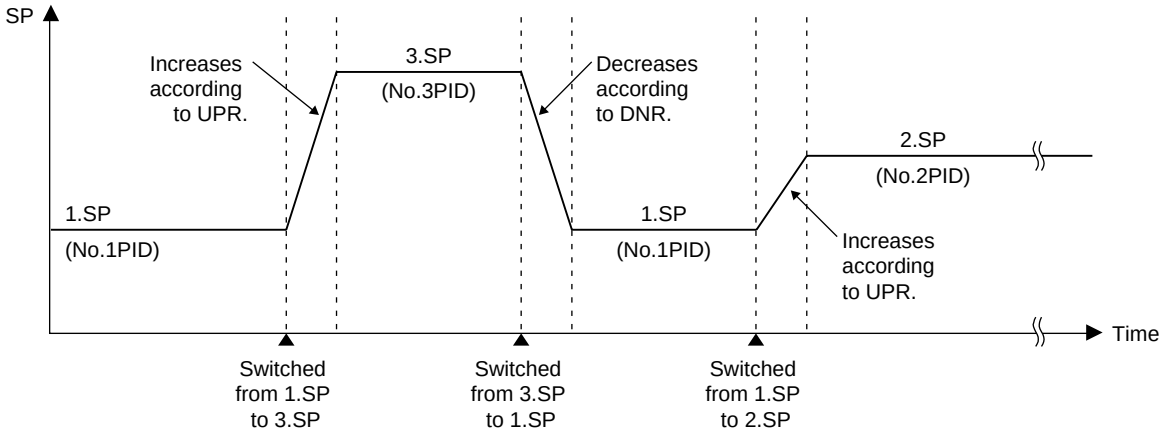


Fig. 4-1-4

(2) - 3 When "Zone PID (selects by target setpoint)" Method Is Selected (For UT551 only)

The Zone PID (selects by target setpoint) method automatically switches between PID setpoints according to the target setpoint.
To use this function, segment the area defined by the minimum and maximum values of a measurement range by reference points 1 to 6, into a maximum of seven zones.
For the reference point, see "(2)-1 When Zone PID (selects by PV) Method Is Selected."
The example where the area is segmented into five zones is shown below.
When the target setpoint is changed from 100°C to 350°C, the target setpoint is between the reference points 2 and 3. In this case, No.3PID is selected.
Then when the target setpoint is changed from 350°C to 250°C, the target setpoint is between the reference points 1 and 2. In this case, No.2PID is selected.
Finally, when the target setpoint is changed from 250°C to 800°C, the target setpoint is between the reference points 4 and 5. In this case, No.5 PID is selected.

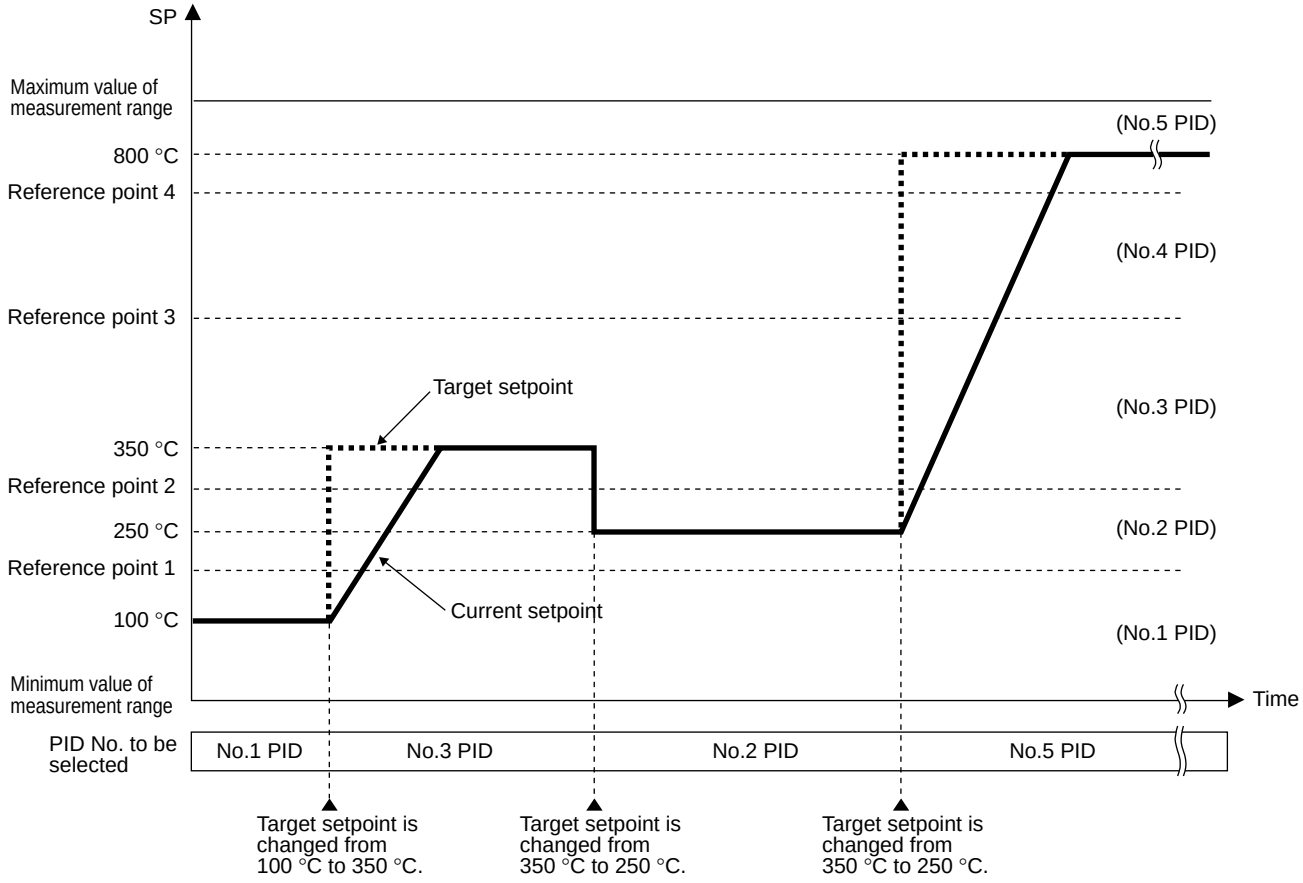


Fig. 4-1-5 Selecting a PID number by target setpoint

(2) - 4 When "Selects by specified PID number" Method Is Selected (For UT551 only)

In the PID number selection method, the operators of the controller can switch between the eight PID setpoints as necessary.
In this method, target setpoint is not in conjunction with PID setpoint and an arbitrary PID setpoint can be selected. On the other hand, in the Target setpoint (SP) number selection method, target setpoint is in conjunction with PID setpoint.
Switching is carried out by setting the parameter P.NO using key operation, or by using external DIS contact inputs.
For the switching by external contact input, see "Ref.3.1(3) Changing contact input functions for the UT550/ UT551/UT551."
When the PID number is selected by external contact input, the PID number cannot be selected by key operation or communication.
In the case of key operation and communication, the last selection is effective.
Change parameter as explained in the User's Manuals Initial Settings and Parameters.

- Setup parameters.

UT551 Code	Description	Setting range	Default	D-register No.
Pno (P.NO)	PID No. selection (Note 1)	1 to 8 (Note 2)	1	225

Note1: Displayed when the setup parameter ZON = 3.
Note2: The setting range depends on the setup parameter GRP.

<<Ref. 4-1: References Related to Target Setpoints>>

Ref.4.1(3) Limiting Changes in Target Setpoints

The UT750, UT5□□ and UT4□0 can be operated using the remote target setpoints that they receive externally. In this case, the control output may change suddenly when the controller switches from remote-mode operation to local-mode operation (operation based on the controller's own internal target setpoints). To avoid this problem, the UT750, UT5□□ and UT4□0 are designed to allow the control output to keep track of the PV so it can smoothly switch from the remote target setpoint to the local target setpoint. (The UT35□ and UT32□ do not have remote control capabilities, so this feature is not available.)

Selects the use of the SP tracking function. Specify OFF to disable the function, or ON to enable the function.

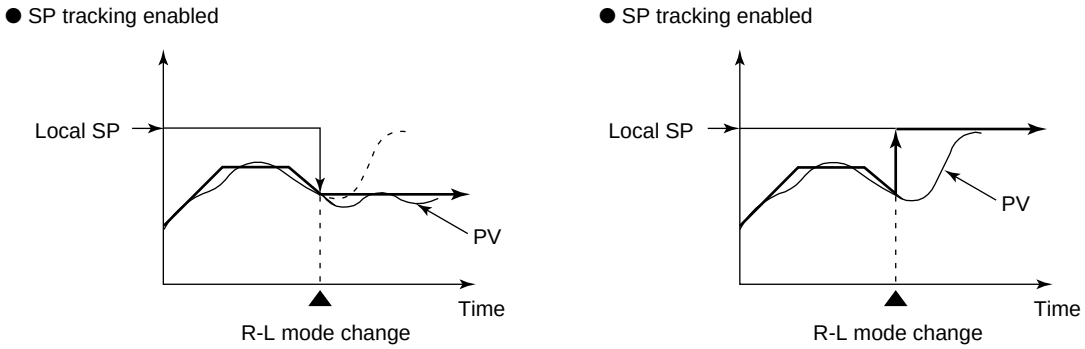


Fig. 4-1-5 SP Tracking

● **The following parameters are used to select ON or OFF of SP tracking function.**

Change parameters as explained in the User's Manuals Initial Settings and Parameter Map.

- Setup parameters

UT750 Code	UT5□□ UT4□0 Code	Description	Setting range	Default	D-register No.
SPT	SPt (SPT)	SP tracking selection	OFF or ON	ON	904 (for loop-1) 942 (for loop-2) (Note1)

Note1: The D-registers for the loop-2 can be used with UT750 or UT5□□ only.

<<Ref. 4.1: Reference Related to Target setpoint>>

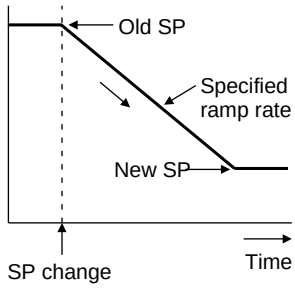
Ref.4.1(4) Setting ramp grades when switching between target setpoints

This function can be used with UT750, UT5□□, UT4□0 or UT3□□.

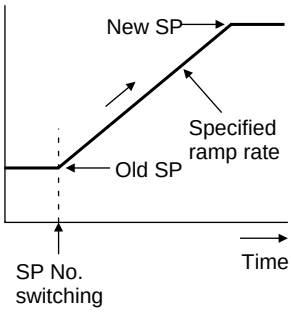
To prevent the target setpoint (SP) from changing suddenly or to change it at a constant rate, the ramp-up (UPR) and ramp-down (DNR) rates for SP can be set. This function is used in the following four events.

(1) SP is changed. (e.g., when 1.SP is changed from 100°C to 150°C)
(2) SP number (SP.NO) is switched. (e.g., when switched from 1.SP to 3.SP)
Note: This only applies during SP number selection.
(3) Power is turned on (or power has recovered). (Note).
(4) Switched from MAN mode to AUTO mode. (Note).
Note: SP changes at the specified ramp rate starting from the current PV value toward the original target setpoint.

(1) When SP is changed



(2) When SP number (SP.NO) is switched



(3) When power is turned on (or power has recovered)
(4) When switched from MAN to AUTO

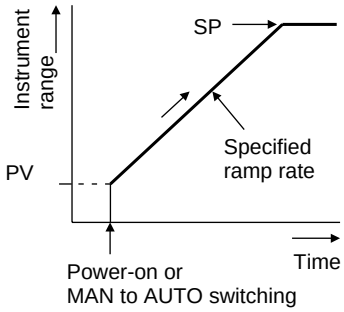


Fig. 4-1-6

TIP

The time unit of the ramp rate can be set to either an hour or minute, using parameter “TMU”.

Example of Setting the SP Ramp-up Rate (UPR)

Fig. 4-1-7 shows an example of how to et the SP ramp-up rate (UPR).
SPs are set as 1.SP=500° C and 2.SP=640° C. The controller first operates using 1.SP, and later switches to 2.SP, as the SP value increases at the specified rate. In this example, the temperature difference between 2.SP and 1.SP is 140° C, which needs to be changed within two minutes. To achieve this operation, UPR is set at 70 (° C/ minute).

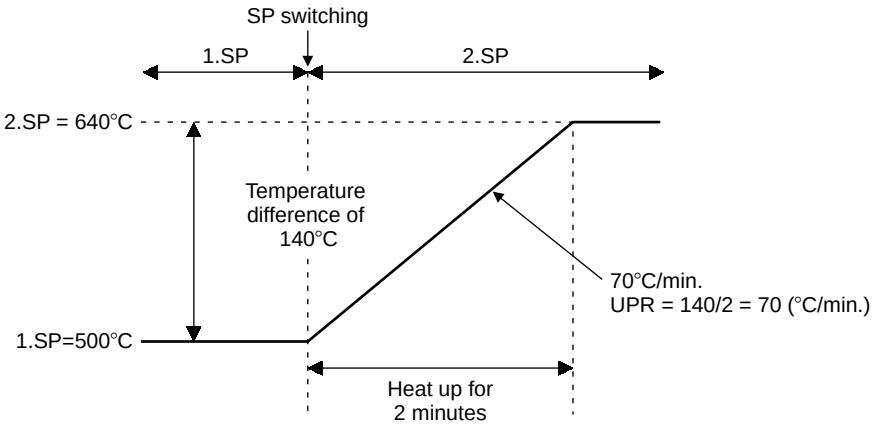


Fig. 4-1-7

$$\text{UPR} = \frac{\text{Temperature difference (°C)}}{\text{Time (min.) (Note)}} = \frac{140}{2} = 70\ (°\text{C/min.})$$

Note: The time unit of the ramp rate can be set to either an hour or minute, using parameter TMU (time unit for ramp-rate setting).

● **The following parameters are used.**

Change parameters as explained in the User's Manuals Initial Settings and Parameter Map.

[Ramp-rate Setting Parameters]

- Operating parameters (Operation-related Parameters) : UPR, DNR

UT750 Code	UT5□□ UT4□0 UT3□□ Code	Description	Setting range	Default	D-register No.
UPR	UPr (UPR)	Setpoint ramp-up rate	OFF or (0.0%+1digit) to 100.0% of PV input range span	OFF	245(for loop-1) 275(for loop-2) (Note1)
DNR	dnr (DNR)	Setpoint ramp-down rate	OFF or (0.0%+1digit) to 100.0% of PV input range span	OFF	246(for loop-1) 276(for loop-2) (Note1)

Note1: The D-registers for the loop-2 can not be used with UT4□0 or UT3□0 .

[Ramp-rate Time Unit Setting Parameter]

- Setup parameters (Target Setpoint-related Parameter) : TMU

UT750 Code	UT5□□ UT4□0 UT3□□ Code	Description	Setting range	Default	D-register No.
TMU	tmU (TMU)	Ramp-rate time unit setting	HOUR or MIN (Note1) HOUR : Denotes "per hour" MIN : Denotes "per minute"	HOUR	904(for loop-1) 944(for loop-2) (Note2)

Note1: With UT35□ or UT32□, the setting value is "0" or "1". "0" denotes "per hour" and "1" denotes "per minute".
Note2: The D-registers for the loop-2 can not be used with UT4□0 or UT3□□ .

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Ref.5.1: References Related to Segment Operation

IMPORTANT: Applicable models of this section

UP750	UP550	UP35□	UT750	UT5□□	UT4□0	UT3□□
UP750-□□	UP550-□□	UP35□-□□	None	None	None	None

Note: Some of the functions below are not available on certain models. For more information, see those sections.

This section contains reference information on the following aspects of segment operation programmed with UP Series program controllers.
Refer to this information and change parameters only if necessary.

(1) Selecting Segment time between Time and Ramp time
(2) Selecting PID Control between Zone and Segment

Ref.5.1(1) Selecting Segment time between Time and Ramp time

Segment time selection is available for the UP750, UP550 and UP35□.
Segment time can be selected between the two criteria below. Selection is made with the “SGT” setup parameter.

- Segment time (Factory-set default)
- Segment ramp time

The selected time criterion is applied to all segments in the program pattern.

CAUTION

Changing segment time criterion will erase the entire program pattern.

● The following parameters are used.
• Setup parameters (Target Setpoint-related Parameters): SEG.T

UP750 UP550 Code	UP35□ Code	Description	Setting Range	Default	D-register No.
SEG.T	SEGt (SEG.T)	Segment setting method	0: Programming by setting segment times 1: Programming by setting segment ramps	0	905

Depending on the selected segment time criterion, the above “SEG.T” parameter changes the content of the segment time in the program pattern as follows. (See Page Ref. 5-3 or Page Ref. 5-4)
- When SEG.T = 0, segment time is displayed as “TIME”.
- When SEG.T = 1, segment ramp time is displayed as “TM.RT”.

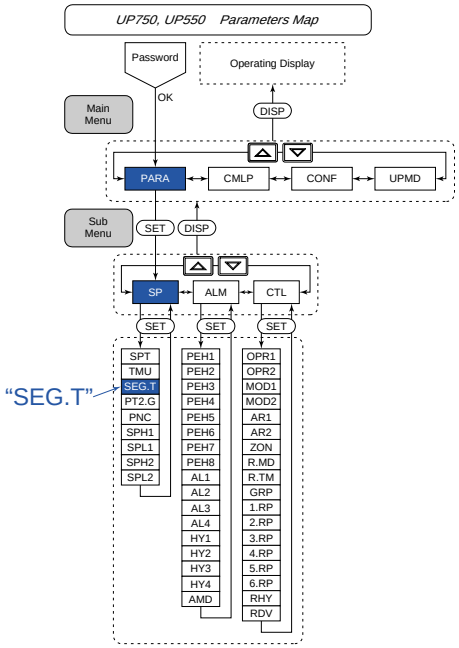
■ Setting the Required Parameters

Carry out the operation shown below.
(UP750/UP550 parameter setting way is shown in the following example.)

Here we explain how to display the parameter setting display and to change the parameter values. Before carrying out these operations be sure to refer to the User’s Manuals Initial Settings and Parameter Map of the controller.
The parameter map is very helpful in finding the path to the setting display for a particular parameter.

1: Referring to the User’s Manual above, display the setup parameter main menu [PARA].
Then, display the submenu [SP].

2 : Press the SET/ENT key three times to display the parameter “SEG.T”.
Adjust the parameter value (to 0 or 1) using the ▲ / ▼ keys, then press the SET/ENT key to Register it.
For example, when you want to select “Programming by setting segment ramps”, adjust the parameter value to “1” and register it by pressing the SET/ENT key.



This completes the setting operation. If other settings are unnecessary, return to operating display.

■ When segment time is selected (Factory-set default)

The segment time criterion bases segment operation on the “TSP1” target setpoint (Note) and the “TIME” segment time.
The target setpoint is the control target to be attained at segment end, whereas the segment time is the time duration from the start of that segment to the end.

Note: TSP2 can also be used if using dual-loop control with the UP750. With the UP35□, the n.SP1 - n.SPA (n is either parameter No. 1 or 2) parameters are used.

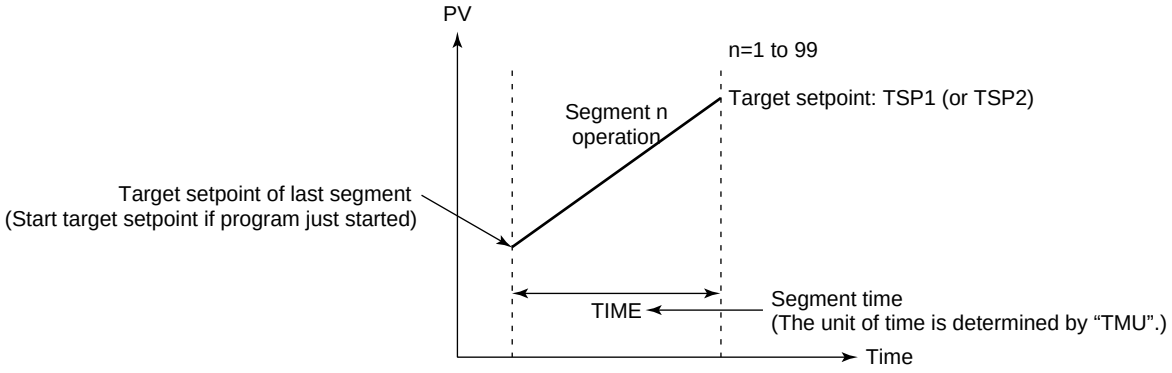


Fig. 5-1-1 Segment operation when segment time is selected

● The following parameters are used.
Change parameters as explained in the User’s Manuals Initial Settings, Programming and Parameter Maps.

• Program Parameters: TSP1, TSP2, TIME

UP750 UP550 Code	UP35□ Code	Description	Setting Range	Default	B-register No. [UP750, UP550 only]
TSP1	n.SP1 to n.SPA (n.SP1 to n.SPA) (n: 1 or 2)	Target setpoint of each segment	0.0 to 100.0% of PV input range	0.0% of PV input range	111
TSP2 (Note1)	(Note1)	Target SP (for 2nd loop)			112
TIME	n.tm1 to n.tmA (n.TM1 to n.TMA)	Time-set segment time [“TIME” is displayed only when “SEG.T” is set to “0”]	– (unregistered) or 00.00 to 99.59 [“Hour, minute” or “Minute, second”]	– (unregistered)	113

Note1: The parameter “TSP2” can be displayed only when the “PT2.G” parameter is set to ON.

• Setup Parameter (Target Setpoint-related Parameter): TMU

UP750 UP550 Code	UP35□ Code	Description	Setting Range	Default	D-register No.
TMU	tmU (TMU)	Program time unit	hh:mm: “Hour, minute” mm:ss: “Minute, second”	hh:mm	904

■ When segment ramp time is selected

The segment ramp time criterion bases segment operation on the “TSP1” target setpoint (Note) and the “TM.RT” segment ramp time.
Ramp time in segment ramp-up or ramp-down is expressed as an amount of change (between target setpoints) per hour or per minute.
The unit of time is selected with “TMU”. When segment is set for soaking at a constant target setpoint, ramp time expresses the time duration of the segment.

Note: TSP2 can also be used if using dual-loop control with the UP750. With the UP35□, the n.SP1 - n.SPA (n is either parameter No. 1 or 2) parameters are used.

● The following parameters are used.
Change parameters as explained in the User’s Manuals Initial Settings, Programming and Parameter Maps.

• Program Parameters: TSP1, TSP2, TM.RT

UP750 UP550 Code	UP35□ Code	Description	Setting range	Default	B-register No. [UP750, UP550 only]
TSP1	n.SP1 to n.SPA (n.SP1 to n.SPA) (n: 1 or 2)	Target setpoint of each segment	0.0 to 100.0% of PV input range	0.0% of PV input range	111
TSP2 (Note1)	(Note1)	Target SP (for 2nd loop)			112
TM.RT	n.tm1 to n.tmA (n.TM1 to n.TMA)	Ramp-set segment time [“TM.RT” is displayed only when “SEG.T” is set to “1”.]	1. For ramp segments: – (unregistered) or 0.0 to 100.0% of PV input range span per hour or minute. 2. For soak segments: – (unregistered) or 0.00 to 99.59 [“Hour, minute” or “Minute, second”]	– (unregistered)	114

Note1: The parameter “TSP2” can be displayed only when the “PT2.G” parameter is set to ON.

• Setup Parameter (Target Setpoint-related Parameter): TMU

UP750 UP550 Code	UP35□ Code	Description	Setting range	Default	D-register No.
TMU	tmU (TMU)	Program time unit	hh:mm: “Hour, minute” mm:ss: “Minute, second”	hh:mm	904

- **Segment time during ramp-up operations**

  When the target setpoint of the current segment is higher than that of the last segment, ramp-up operations are performed for the current segment.
  During ramp-up, the amount of change (between target setpoints) per hour or per minute is set with the ramp time parameter “TM.RM”.

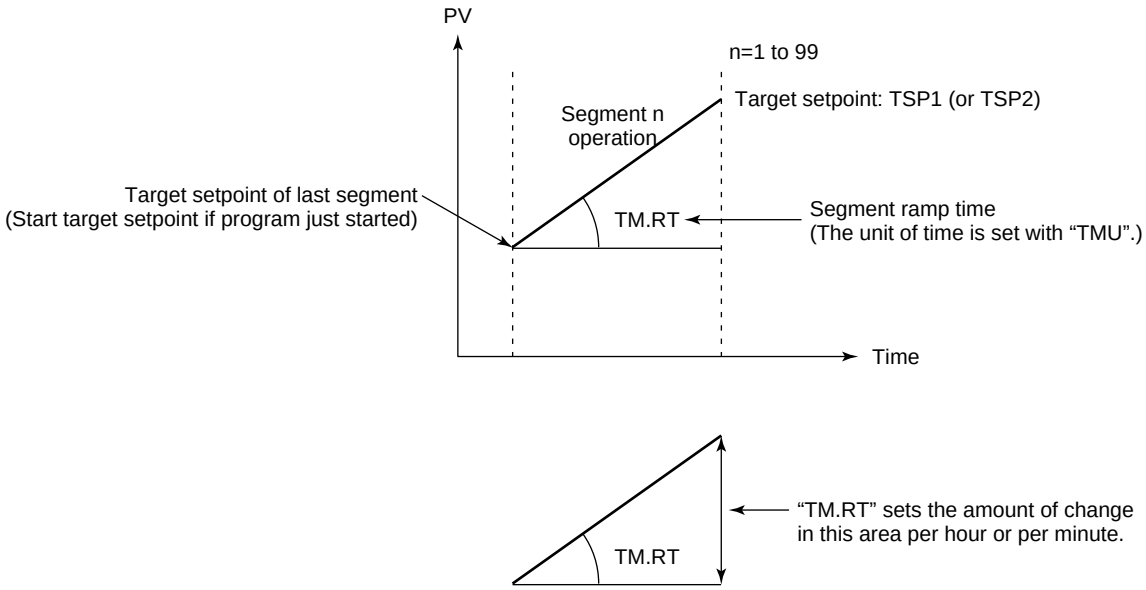


Fig. 5-1-2 Segment time during ramp-up operations

- **Segment time during ramp-down operations**

  When the target setpoint of the current segment is lower than that of the last segment, ramp-down operations are performed for the current segment.
  During ramp-down, the amount of change (between target setpoints) per hour or per minute is set with the ramp time parameter “TM.RM”.

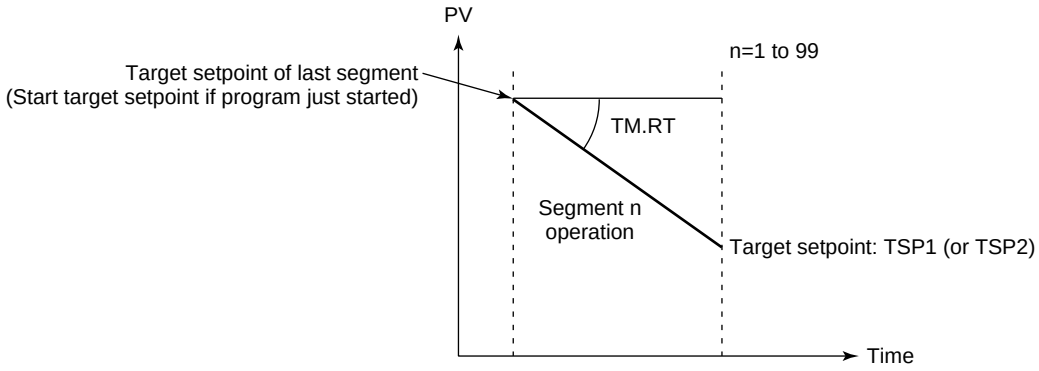


Fig. 5-1-3 Segment time during ramp-down operations

- **Segment time during soak operations**

  When the target setpoint of the current segment is the same as that of the last segment, soak operations are performed for the current segment.
  The time duration of the soak segment is set with the ramp time parameter “TM.RM”.

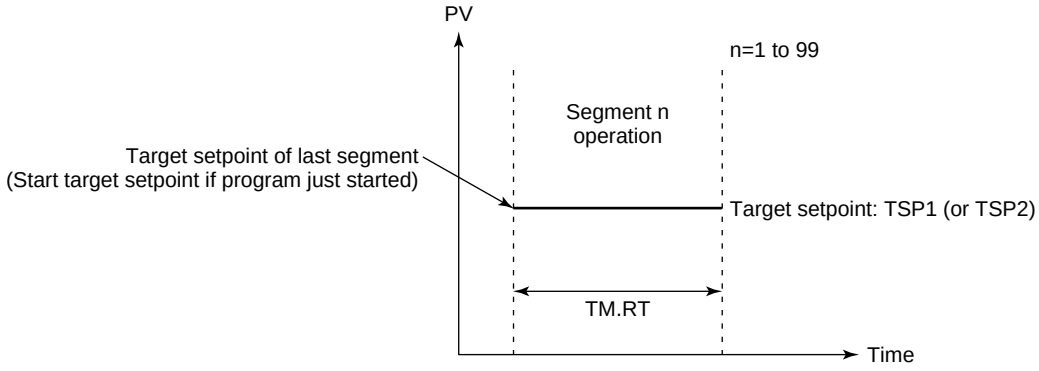


Fig. 5-1-4 Segment time during soak operations

<<Ref. 5.1: Reference Related to Segment Operation>>
Ref.5.1(2) Selecting PID control between Zone and Segment

With the UP750 and UP550 program controllers, PID control can be selected from the two criteria below. Selection is made with the “ZON” program parameter. (With the UP350, only zone PID control is available.)

- Zone PID (Factory-set default)
- Segment PID

● The following parameters are used.
Change parameters as explained in the User’s Manuals Initial Settings and Parameter Maps.

• Setup Parameter (Control Action-related parameter): ZON

UP750 UP550 Code	Description	Setting range	Default	D-register No.
ZON	Zone PID selection	0: Segment PID 1: Zone PID	1	929

Note: With UP750, this parameter is used with the 1st and 2nd loop in common.

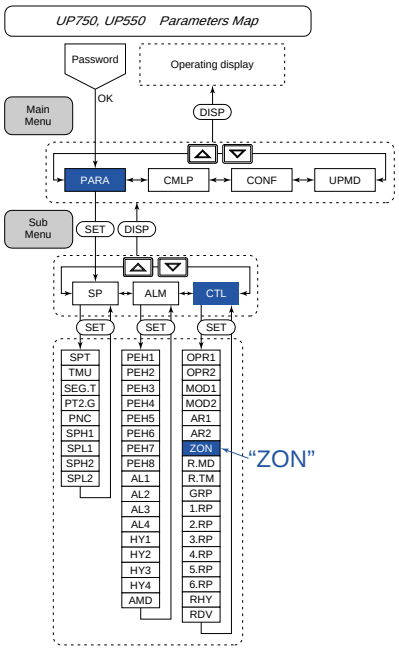
■ Setting the Required Parameters

Carry out the operation shown below.
(UP750/UP550 parameter setting way is shown in the following example.)

Here we explain how to display the parameter setting display and to change the parameter values. Before carrying out these operations be sure to refer to the User’s Manuals Initial Settings and Parameter Map of the controller.
The parameter map is very helpful in finding the path to the setting display for a particular parameter.

1: Referring to the User’s Manual above, display the setup parameter main menu [PARA].
Then, display the submenu [CTL].

2 : Press the SET/ENT key time and again to display the parameter “ZON”.
Adjust the parameter value (to 0 or 1) using the ▲/▼ keys, then press the SET/ENT key to Register it.
For example, when you want to select “Segment PID”, adjust the parameter value to “0” and register it by pressing the SET/ENT key.



This completes the setting operation. If other settings are unnecessary, return to operating display.

■ When zone PID control is selected

Zone PID control automatically switches PID settings according to PV.
Regardless whether the program is performing a ramp-up or ramp-down operation, control in the same PV zone is based on the same PID constants. Zone PID control is used with reactors that change chemical reaction gain according to temperature.

As shown in the figure below, up to 7 zones (Note) can be created using the maximum and minimum values of the PV range as reference points 1 - 6. PID constants can be assigned to each individual zone.
In this way, even if PV changes from zone to zone, control within each individual zone is automatically based on the PID constants assigned to that zone.

Note: With UP35□, up to 3 zones can be created.

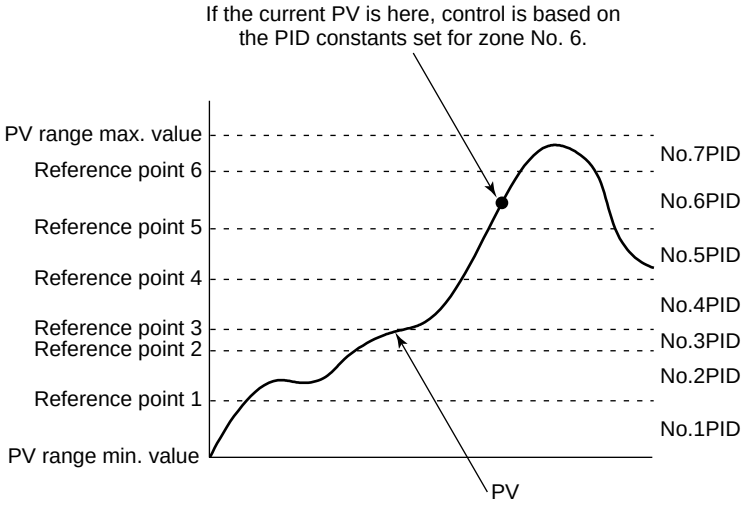


Fig. 5-1-5 Reference points

● The following parameters are used.
Change parameters as explained in the User's Manuals Initial Settings and Parameter Maps.

• Setup Parameter (Control Action - related Parameter): n.RP

UP750 UP550 Code	UP35□ Code	Description	Setting range	Default	D-register No.
n.RP(Note) (n: 1-6)	n.rP (n.RP) (n: 1 or 2)	Zone PID reference point	0.0 to 100.0% of PV input range (Note)	100.0% of PV input range	See the table 5-1-1 **D**

Note: However, 1.RP<2.RP<3.RP<4.RP<5.RP<6.RP

Table 5-1-1 PID-related parameter D-register numbers list (1st : for loop-1, 2nd : for loop-2, UP750 only)

	n=1		n=2		n=3		n=4		n=5		n=6		n=7		n=8	
	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd
n.P	306	506	331	531	356	556	381	581	406	606	431	631	456	656	481	681
n.I	307	507	332	532	357	557	382	582	407	607	432	632	457	657	482	682
n.D	308	508	333	533	358	558	383	583	408	608	433	633	458	658	483	683
n.OH	309	509	334	534	359	559	384	584	409	609	434	634	459	659	484	684
n.OL	310	510	335	535	360	560	385	585	410	610	435	635	460	660	485	685
n.MR	311	511	336	536	361	561	386	586	411	611	436	636	461	661	486	686
n.H	312	512	337	537	362	562	387	587	412	612	437	637	462	662	487	687
n.DR	313	513	338	538	363	563	388	588	413	613	438	638	463	663	488	688
n.Pc	314	514	339	539	364	564	389	589	414	614	439	639	464	664	489	689
n.Ic	315	515	340	540	365	565	390	590	415	615	440	640	465	665	490	690
n.Dc	316	516	341	541	366	566	391	591	416	616	441	641	466	666	491	691
n.Hc	317	517	342	542	367	567	392	592	417	617	442	642	467	667	492	692
n.DB	318	518	343	543	368	568	393	593	418	618	443	643	468	668	493	693
n.RP	319	519	344	544	369	569	394	594	419	619	444	644	–	–	–	–
n.PO	320	520	345	545	370	570	395	595	420	620	445	645	470	670	495	695
n.Oc	321	521	346	546	371	571	396	596	421	621	446	646	471	671	496	696

See this column for each D-register number of “n.RP” parameters.
(For example, the D-register number of 1.RP is 319.)

Note: UP35□ has only 1.RP and 2.RP (D-register number of 1.RP is 319 and it of 2.RP is 344.)

■ When segment PID control is selected

Segment PID control automatically switches PID settings to those set for each segment of the program pattern (in programmed operations).
It is best used when wanting to control the same PV zone to different PID constants during ramp-up and ramp-down.
The following example shows how PID settings change in segment PID control.

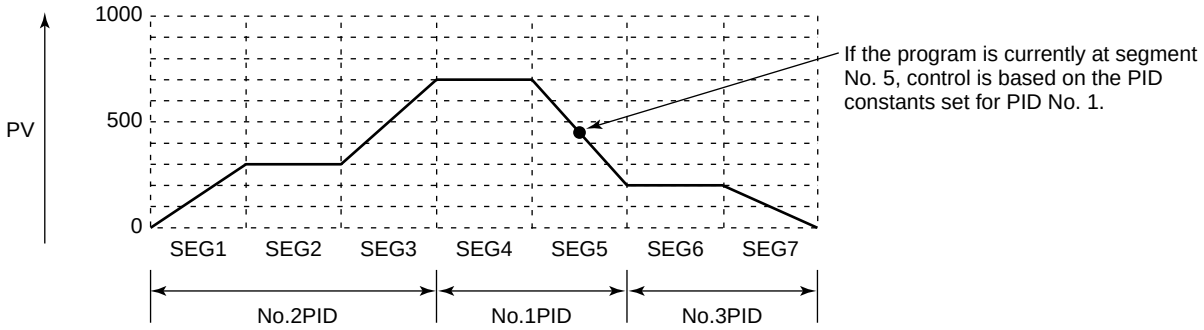


Fig. 5-1-6 Segment PID control example

PID No. is set with the “PID” program parameter when setting up the program pattern for each segment. For example, if “PID” is set to “2” for a segment, its control will be based on PID No. 2 that is set with another operating parameter.

● The following parameters are used.
Change parameters as explained in the User’s Manuals “Programming” and “Parameter Maps”.

• Program Parameter: PID

UP750 UP550 Code	Description	Setting range	Default	B-register No. [UP750, UP550 only]
PID (Note1)	Segment PID group number	1 to 8 (Note2)	1	115

Note1: The controller uses the 1st group of PID constants when the segment PID group number is larger than the PID group number (setup parameter GRP).
Note2: With UP750, this parameter is used with the 1st and 2nd loop in common.

Ref.5.2: References Related to Program Setup

IMPORTANT: Applicable models of this section

UP750	UP550	UP35□	UT750	UT5□□	UT4□0	UT3□□
UP750-□□	UP550-□□	UP35□-□□	None	None	None	None

Note: Some of the functions below are not available on certain models. For more information, see those sections.

This section contains reference information on the following aspects of program setup.
Refer to this information and change parameters only if necessary.

(1) Selecting Program Start Condition
(2) Using the Delayed Start Timer for Programmed Operations
(3) Selecting Segment-end condition
(4) Using the Wait Function
(5) Using the Hold Function (Changing Segment Setpoints in Hold Status)
(6) Using the Repeat Functions
(7) Using the Advance Functions
(8) Signal Output at Program end
(9) Operation in Local Mode (with Constant Target Setpoint)

Ref.5.2(1) Selecting Program Start Condition

The program start condition can be selected with the UP750, UP550 and UP35□.
It bases operation starting on the “STC” program parameter (Note1) and the “SSP1” start target setpoint (Note2).
“STC” can be selected from the 4 criteria (Note3) below.
To begin with, select the operation start condition with this “STC” program parameter.

- Starting operation at start target setpoint (Factory-set default)
- Ramp-prioritized PV1 start
- Time-prioritized PV start
- Ramp-prioritized PV2 start (Only for UP750, Dual loop control or Temperature and humidity control)

Note1: The n.STC (n is either pattern No. 1 or 2) is used with the UP350.
Note2: SSP2 can also be used when the “PT2.G” setup parameter is “ON” with the UP750.
With the UP35□, the n.SSP (n is either pattern No. 1 or 2) parameter is used.
Note3: With single loop controllers, three operation start conditions are available.
The wait and repeat operations described later on can be used provided “STC” is set to “-1”.
In this case, the previous start condition does not change.

● The parameter used for setting the start code is as follows.

• Program Parameter (Parameters for setting the Conditions of Program Operation Startup): STC

UP750 UP550 Code	UP35□ Code	Description	Setting range	Default	B-register No. [UP750, UP550 only]
STC	n.StC (n.STC)	Start Code (Start condition)	0: Starting operation at start target setpoint 1: Ramp-prioritized PV1 start 2: Time-prioritized PV start 3: Ramp-prioritized PV2 start (Note1) (-1: Note2)	0	13

Note1: Only for UP750 (Dual-loop control or Temperature and humidity control).
Note2: The wait and repeat operations described later on can be used provided "STC" is set to "-1". UP35□ can not be set "-1" to the "STC" parameter.

■ Setting the required parameters

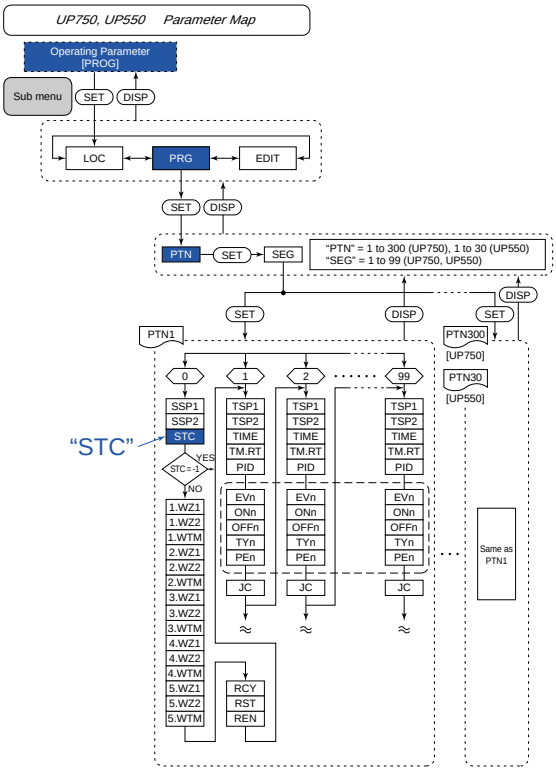
To set the start code, carry out the operation shown below.
(Here, the setting procedure of UP750/UP550 is shown as an example.)

1: Refer to the "Parameter Map" and "Program Parameter Map" in the user's Manual.
First, display the operating parameter main menu [PROG], then press the SET/ENT key to display the program parameter setting display. (Submenu [LOC] will be displayed.)

2: Press the ▲ / ▼ keys to display the submenu [PRG] .
And then press the SET/ENT key to show the "PTN" parameter setting display.

3: Perform the key operation following the parameter map to show the "STC" parameter setting display for the required program pattern number.

4: Adjust the "STC" parameter value using the ▲ / ▼ keys, then press the SET/ENT key to register it.



The parameter setting operation for the start code is completed.
Pressing the SET/ENT key at least 3 seconds to go back to the operating display.

■ Starting operation at start target setpoint: STC = 0 (Factory-set default)

The start target setpoint is the target setpoint at which programmed operation starts.
When selected as the start condition, the target setpoint can be changed from the start setpoint “SSPn (n = 1 or 2)” to the target setpoint “TSPn (n = 1 or 2) ”.
This change is made totally independent of PV, using the (TSPn - SSPn)/TIME ramp. (Note)
Note: When “SEG.T” is set to 1 (segment ramp time is selected), the ramp rate obey the “TM.RT” setting value. See Ref.5.1(1).

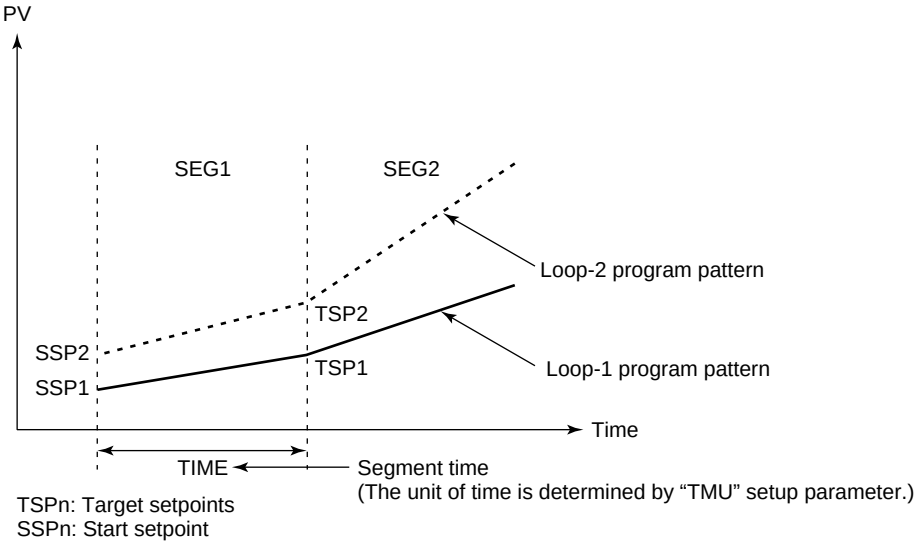


Fig. 5-2-1 Start operation at start target setpoint

● The parameter used to set the starting target setpoint is as follows.
Change parameters as explained in the User’s Manuals programming and Parameter Maps.

• Program Parameter (Parameters for setting the Conditions of Program Operation Startup): SSP1, SSP2

UP750 UP550 Code	UP35□ Code	Description	Setting range	Default	B-register No. [UP750, UP550 only]
SSP1 **SSP2** (Note1)	1.SSP 2.SSP (Note2) (1.SSP or 2.SSP)	Starting target setpoint	0.0 to 100.0% of PV input range	0.0% of PV input range	11 12 (Note1)

Note1: Only for UP750 (Dual-loop control or Temperature and humidity control).
Note2: The “2.SSP” parameter is used for the 2’nd program pattern.

■ Ramp-prioritized PV start: STC = 1

(This section explains about Ramp-prioritized PV2 start, too.)

With Ramp-prioritized PV start, operation start is triggered by primary loop PV (PV1) or secondary loop PV (PV2). The loop not selected as the start condition (PV2 if PV1 was selected) will start as specified by the PV start condition in the pattern. Examples of PV1 ramp start and PV2 ramp start are as follows.

(1) Example of a soak segment for segment No. 2 of the primary loop

When ramp-prioritized PV1 start is the selected start condition, the primary loop ramp is the start trigger.
The primary loop contains points C1, D1 and E1. (PV at those points will vary according to a - e.)
The secondary loop program will start at the same time as the primary loop does. For example, if C1 is the selected start point for the primary loop program, C2 will be that for the secondary loop program.

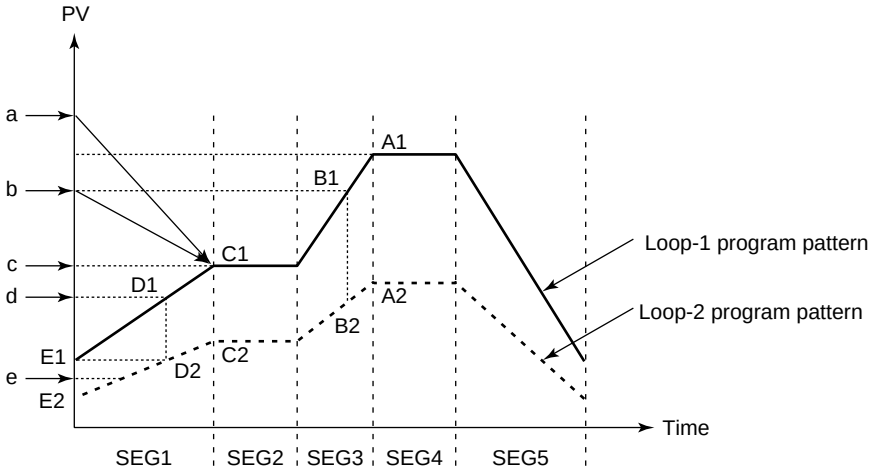


Fig. 5-2-2 Example of a soak segment for segment No. 2 of the primary loop

Program start point is determined by the primary loop PV as follows. Try to understand the relationship of a - e to program start points C1, D1 and E1 in the above figure.

PV at program operation start	The primary loop's program operation start points	The secondary loop's program operation start points
a	C1	C2
b	C1	C2
c	C1	C2
d	D1	D2
e	E1 (Start SP)	E2 (Start SP)

(2) Example of a soak segment for segment No. 3 of the secondary loop

When ramp-prioritized PV2 start is the selected start condition, the secondary loop ramp is the start trigger.
The secondary loop contains points A2 to E2. PV at those points will vary according to a - e.
The primary loop program will start at the same time as the secondary loop does. For example, if A2 is the selected start point for the secondary loop program, A1 will be that for the primary loop program.

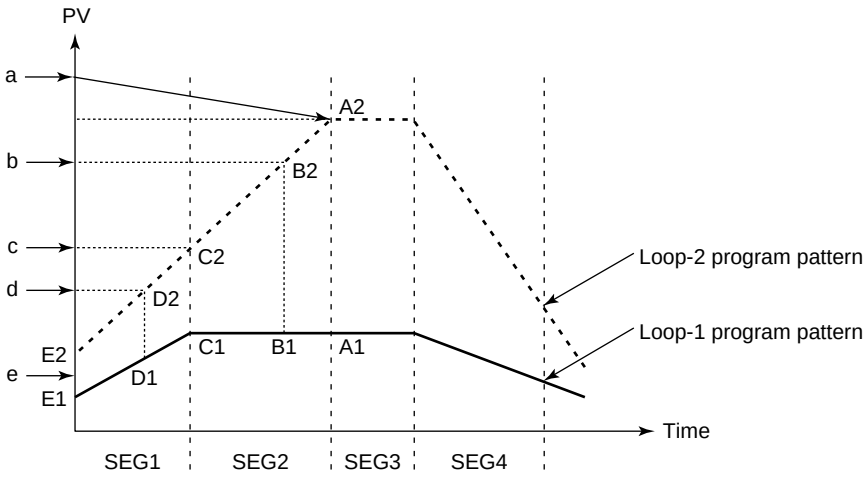


Fig. 5-2-3 Example of a soak segment for segment No.3 of the secondary loop

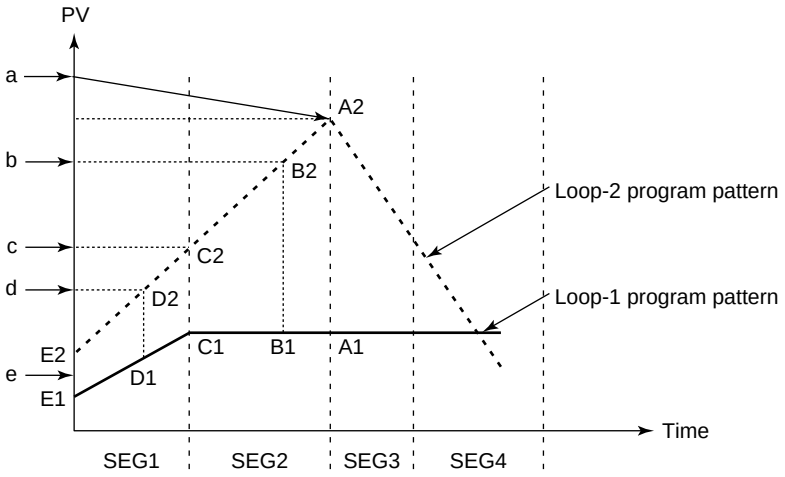


Fig. 5-2-4 Example of no soak segment in secondary loop

Program start point is determined by the secondary loop PV as follows. Try to understand the relationship of a - e to program start points A2 - E2 in the above figure.

PV at program operation start	The secondary loop's program operation start points	The primary loop's program operation start points
a	A2	A1
b	B2	B1
c	C2	C1
d	D2	D1
e	E2 (Start SP)	E1 (Start SP)

(3) Example of programs with only ramp-up segments

When Ramp-prioritized PV1 start is the selected start condition, the primary loop ramp is the start trigger.
The primary loop contains points B1 to E1. PV at those points will vary according to a - e. When the PV is at “a”, program operation can not be started.
The secondary loop program will start at the same time as the primary loop does. For example, if B1 is the selected start point for the primary loop program, B2 will be that for the secondary loop program.

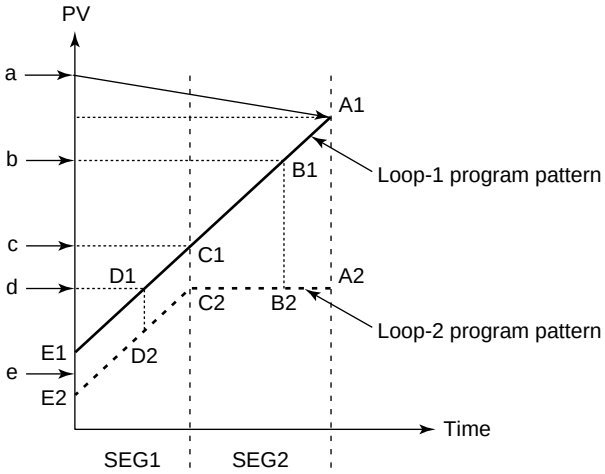


Fig. 5-2-5 Example of all segments in primary loop are “ramp”.

Program start point is determined by the primary loop PV as follows. Try to understand the relationship of a - e to program start points A1 - E1 in the above figure.

PV at program operation start	The primary loop’s program operation start points	The secondary loop’s program operation start points
a	Program operation can not be started (A1)	Program operation can not be started (A2)
b	B1	B2
c	C1	C2
d	D1	D2
e	E1 (Start SP)	E2 (Start SP)

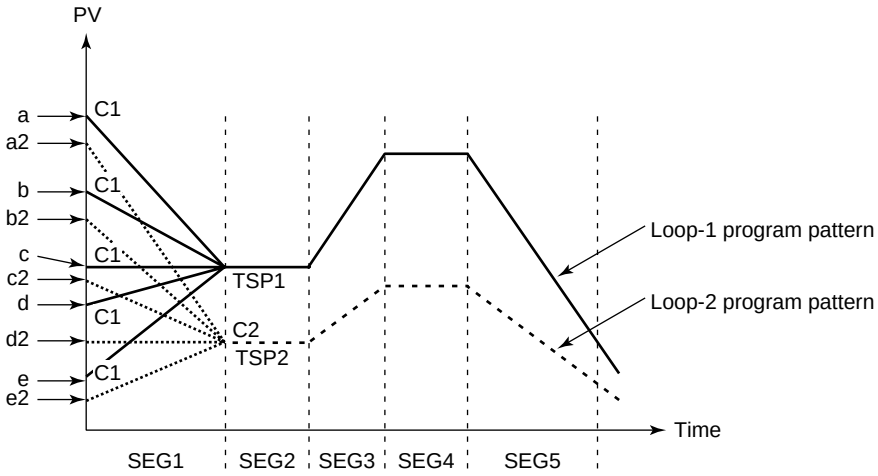
■ Time-prioritized PV start: STC = 2

With Time-prioritized PV starts, operation start is triggered by segment time 1, which sets the time from the PV at program start to the target setpoint of segment No. 1.
The segment ramps in the figure below are determined by the “TIME” segment time.
In this case, starting applies to both PV1 and PV2. An example of PV time start is as follows.

Ramp = (Target setpoint - PV)/Segment time

(1) Example of a soak segment for segment No. 2 of the primary loop

The start point of primary loop program will be a point a - e. Because the secondary loop program will start at the same point as the primary loop does, it will start at a point a2 - e2.



TSPn: Target setpoint of loop-n (n: 1 or 2)

Fig. 5-2-6 Example of a soak segment for segment No.2

Program start point is determined by the primary loop PV. The primary loop starts at PV1, while the secondary loop starts at PV2.

PV at program operation start	The primary loop’s program operation start points	The secondary loop’s program operation start points
a	a	a2
b	b	b2
c	c	c2
d	d	d2
e	e	e2

<<Ref. 5.2: References Related to Program Setup>>

Ref.5.2(2) Using the Delayed Start Timer for Programmed Operation

The delayed start timer can be used with the UP750 and UP550.

It sets the time delay from when the program start operation is performed (pressing the RUN key, etc.) to when operation actually starts.
When the secondary loop is used, the delay set here is used with both the primary and secondary loops.

- The parameter used for setting the start timer for program operation is as follows.
  Change parameters as explained in the User's Manuals Initial Settings and Parameter Map.

• Operating Parameter (Operation-related Parameter): S.TM

UP750 UP550 Code	Description	Setting range	Default	D-register No.
S.TM	Starting time of program pattern operation	00.00 to 99.59 ("hour, minute" or "minute, second") (Note1)	00.00	253

Note1: The unit of the time ("hour, minute" or "minute, second") is set by "TMU" setup parameter.

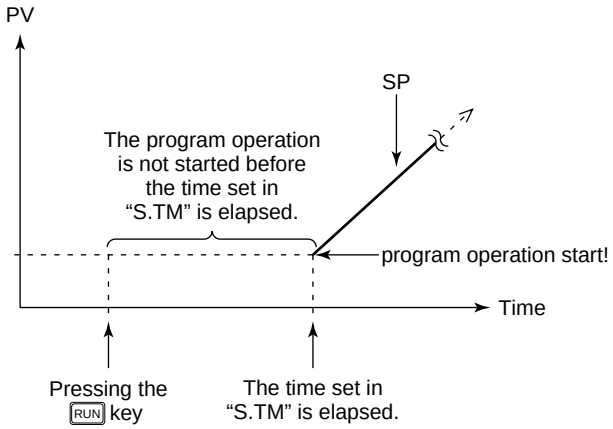


Fig. 5-2-7 Program start operation when the time delay is set.

<<Ref. 5.2: References Related to Program Setup>>

Ref.5.2(3) Selecting Segment-end Condition

Use the program parameter “JC” to specify the program segment-end conditions.
However, the program parameter setting functions for the UP750 and UP550 differ from those for the UP35□.
First, the program parameter setting functions for the UP750 and UP550 are described here.
(For the UP35□, refer to Ref. 5-22 later in this manual. Use either one to meet your selected model.)

[1] For the UP750 and UP550

Segment end condition can be set for each segment. End condition can be set so that the program advances automatically to the next segment.

- The following parameters are used herein:
  To change the parameter values, consult the Program Setup or Parameter Map in the appropriate user manuals provided separately.

• Program Parameter (Junction Code Parameter JC)

UP750 UP550 Code	Description	Setting range	Default	B-register No. [UP750, UP550 only]
JC	Junction code set	0: Switching for Continuation 1: Hold-on switching 2: Local-mode end 11 to 15: Wait during switching 21 to 25: Wait within a segment interval (Note1) INSERT: Allows a segment to be added. DELETE: Allows a specified segment to be deleted. (Note2)	0	140

Note1: For the wait features, see Ref.5.2(4) later in this manual.
Note2: For the INSERT and DELETE functions, see also Ref. 5.3 later in this manual.

■ Program continue: JC = 0 (Factory-set default)

If program continue (JC = 0) is selected as the segment end condition, the program advances to the next segment and operation continues when the current segment ends. If it is set for the last segment in the program, the program stops (resets) at the end of that segment.
At the end of the last segment, the start setpoint is taken as the target setpoint.
An example of program continue being used as the segment end condition is as follows:

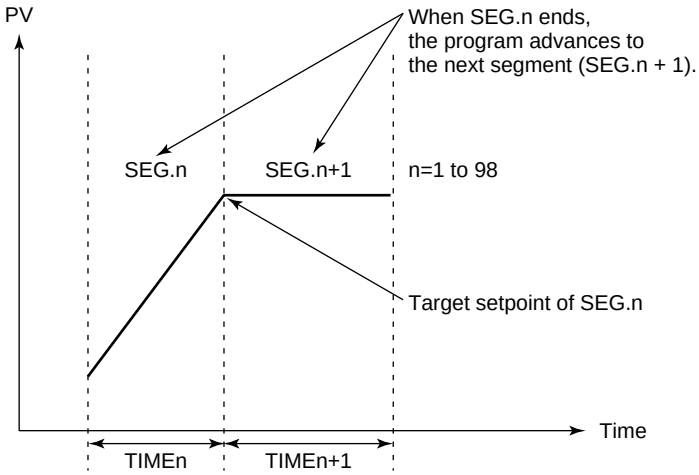


Fig. 5-2-8 Example of program continue as the segment end condition

■ Segment hold: JC = 1

When segment hold (JC = 1) is selected as the segment end condition, the program pauses (is placed on hold) at the end of the current segment. While the program is on hold, the HOLD lamp is lit.
The program is kept on hold until the hold state is released either by key input or external contact input. When the hold state is released for the last segment in the program, the program stops (resets). Executing the advance function while the program is on hold releases the hold state.
(Ref.) Ref.5.2(7) Using the Advance Function

An example of segment hold being used as the segment end condition is as follows:

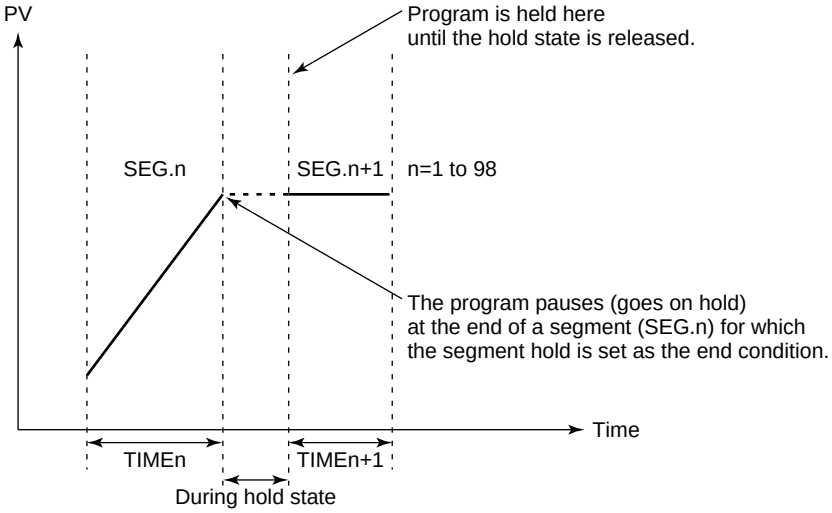


Fig. 5-2-9 Example of segment hold as the segment end condition

■ Local control: JC = 2

CAUTION

Local control (JC = 2) can be set only for the last segment in the program pattern.
If set for a segment in the middle of the program, the program will act as if program continue (JC = 0) were set as the segment end condition.

When local control (JC = 2) is selected as the segment end condition, the controller is in the local mode (constant setpoint) at the end of the last segment in the program.

The target setpoint and event setpoint used here will vary, between (1) and (2) below, depending on whether setpoint tracking is ON or OFF.

Note: • To turn setpoint tracking ON/OFF, see the descriptions below.
• For PID control (zone or segment) selection, follow the description “Selecting PID Control between Zone and Segment.”
• For local mode operation, see Ref.5.2(9) Operation in the Local (Constant Setpoint) Mode.

(1) When setpoint tracking is ON

At the end of the last segment in the program, the local (constant setpoint) mode is engaged. In this case, the target setpoint of the last segment is used as the target setpoint of the local mode. (See the figure below.)
The local setpoint can be set in advance, but when setpoint tracking is ON, the target setpoint of the last segment in the program will be tracked and used regardless of the local target setpoint.
Even in the local mode, the current PV event continues to operate (but the time event is off). The contents that are set in advance as local events are changed to PV events when in local mode. If no PV events are set in the program, events set as local events in advance are all off.

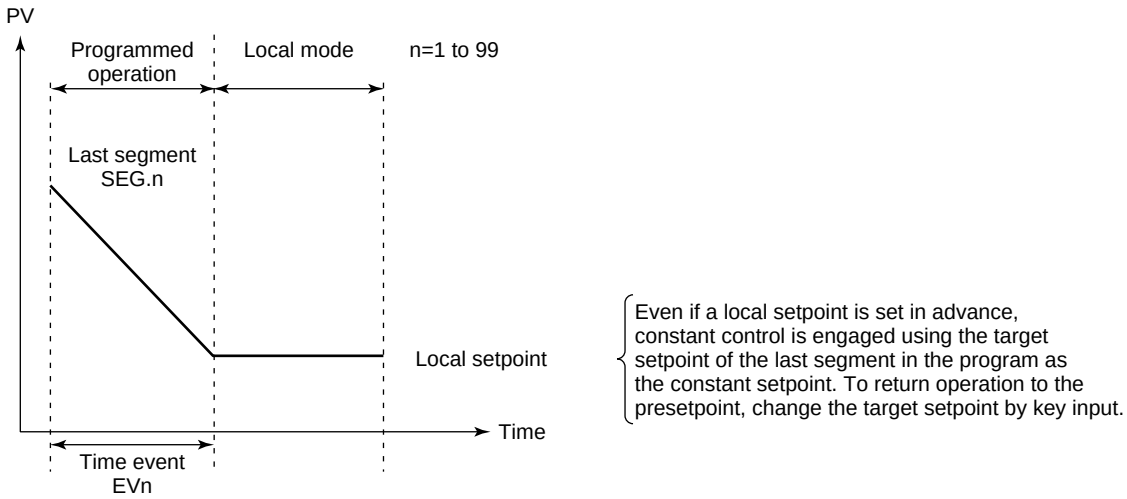


Fig. 5-2-10 Local control as the segment end condition when setpoint tracking is ON

(2) When setpoint tracking is OFF

At the end of the last segment in the program, the local (constant setpoint) mode is engaged. In this case, a local setpoint that is set in advance is used as the target setpoint.
In the local mode, PV events will operate according to the contents of the preset local events. The time events remain off.

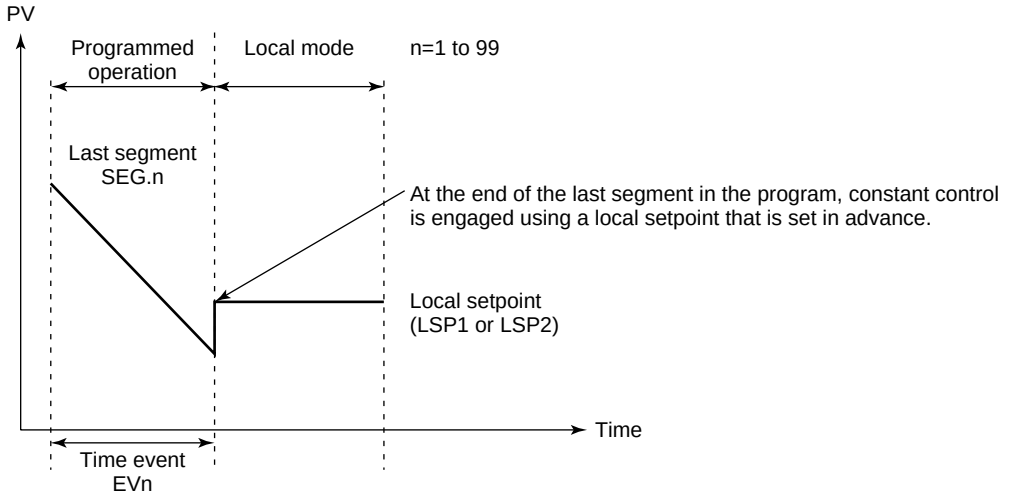


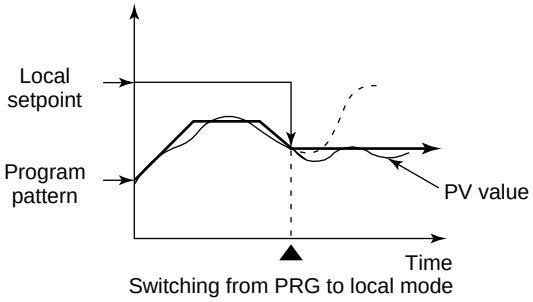
Fig. 5-2-11 Local control as the segment end condition when setpoint tracking is OFF

● **To turn setpoint tracking ON/OFF**

Setpoint can be tracked with the UP750 and UP550.
This function equalizes the local setpoint to the remote setpoint when switching from remote to local control. This prevents any sudden change in setpoint when control is switched from remote to local.

A brief expression regarding setpoint tracking is given below.

● Where the setpoint tracking features are provided:



● Where the setpoint tracking features are not provided:

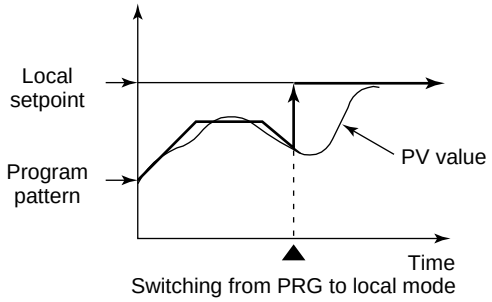


Fig. 5-2-12 Setpoint tracking operation

● The following parameters are used herein.
To change parameter values, consult the default setting or parameter map in the appropriate User's Manuals available separately.

• Setup parameter (target setpoint-related parameters): SPT

UP750 UP550 Code	Description	Setting range	Default	D-register No.
SPT	Setpoint tracking on/off	OFF or ON	ON	902

■ **Selecting the wait function at segment end (JC = 11 - 15) or during segment operation (JC = 21 - 25)**

For these functions, see Ref.5.2(4) Using the Wait Function later in this manual.

■ **Selecting segment insertion (JC = INSERT) or segment deletion (JC = DELETE)**

For these functions, see Ref.5.3 Handy Features for Creating and Editing Programs later in this manual.

[2] For the UP35□

Operations at the end of program patterns can be set with the junction code (JC).

(1) When the program is reset (JC = 0):
When the program is terminated, it will be reset. At this time, the control output is a preset output and an event is also reset.

(2) When the program is on hold (JC = 1):
After the program has been terminated, it is in the hold status. At this time, control is acted on the setpoint at the time of program termination. PV event operations will continue. The time event status remains held. This hold status continues until it is released with a key operation or an external contact. If the hold status is released, it will be in the reset status.

(3) Starting program 1 (JC = 2)
After program 1 or 2 is terminated, program 1 will start.

(4) Starting program 2 (JC = 3)
After program 1 or 2 is terminated, program 2 will start.

With (3) and (4) above, an identical program pattern can be repeated or program patterns 1 and 2 can be linked.
Figure 5-2-13 shows where program pattern 1 is repeated.
This repetition will continue until program pattern 1 is stopped with a key operation, by external contacts or via communications.

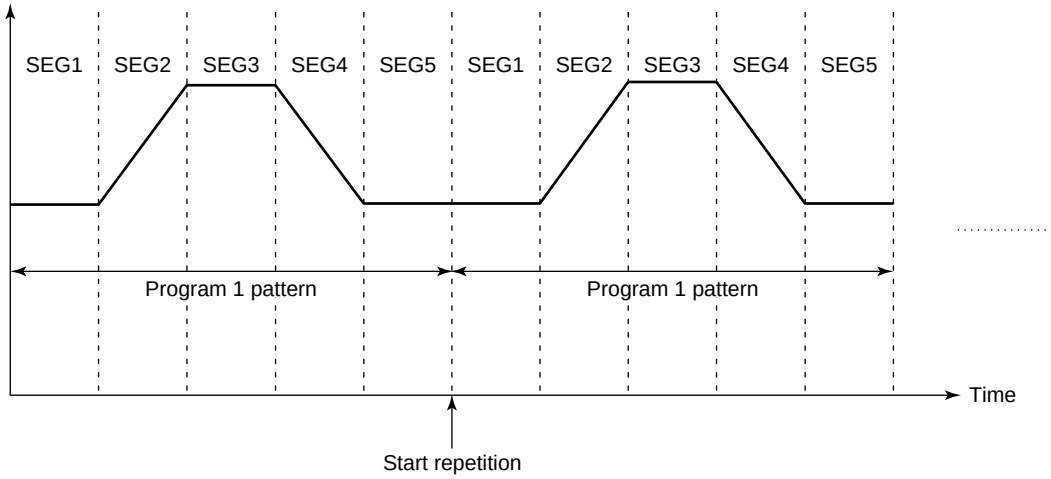


Fig. 5-2-13 Program pattern with program 1 repetition specified

- The following parameters are used herein:
  To change parameter values, consult the Program Setup or Parameter Map in the appropriate User's Manual.

• Program parameter: 1.JC or 2.JC

UP35□ Code	Description	Setting range	Default	D-register No.
1.JC (1.JC) or 2.JC (2.JC)	Junction code 1 or Junction code 2 (Notes below)	0: End of resetting 1: End of hold 2: Pattern 1 startup 3: Pattern 2 startup	0	159 189

Note: Junction code 1 (1.JC) is for program pattern 1.
Junction code 2 (2.JC) is for program pattern 2.

<<Ref. 5.2: References Related to Program Setup>>

Ref.5.2(4) Using the Wait Function

The wait function temporarily pauses the program if PV cannot track the setpoint.
Pausing the program stops the change in target setpoint. This gives PV a chance to track target setpoint. (See Fig. 5-2-14.)
The program is automatically resumed the moment that PV attains the target setpoint.

The wait functions for the UP750 and UP550 differ from those for the UP35□.
First, the wait functions for the UP750 and UP550 are described here.
(For the UP35□, refer to Ref. 5-28 later in this manual. Use either one to meet your selected model.)

[1] For the UP750 and UP550

With the UP750 and UP550, the wait function can be used in the following two ways.
Selection in both cases is made with the “JC” program parameter.

- Program waits at segment end (Set “JC” to 11 - 15.)
- Program waits in the middle of the segment (Set “JC” to 21 - 25.)

CAUTION

As indicated in the following parameter tables, “n.WZ1” and “n.WTM” are factory set to OFF.
Therefore, unless these parameters are changed, the wait function will remain OFF even if “JC” is set to 11 - 15 or 21 - 25.

However, it is necessary to determine the following two wait conditions before selecting “JC”.

(1) Wait zone (Note1) ON/OFF and, if turning wait zone ON, the deviation range (measurement range direction) of that wait zone.
(2) Wait time (Note2) ON/OFF and, if turning wait time ON, the duration of that wait time.

Note1: Wait zone is the deviation range that determines at what extent the PV must track the target setpoint. (See Fig. 5-2-14 on page Ref. 5-26.)
Note2: Wait time is amount of time that the PV waits before entering the wait zone. (See Fig. 5-2-14 on page Ref. 5-26.)

These conditions are set using the “n.WZ1” wait zone parameter (Note below) and the “n.WTM” wait time parameter.
Note: The n.WZ2 can also be used when using dual-loop control with the UP750.

Up to five “n.WZ1” (n=1 to 5) wait zone parameters can be set.
Up to five “n.WTM” (n=1 to 5) wait time parameters can also be set.

The 5 “n.WZ1” and “n.WTM” settings are grouped into a set in advance and an individual number is assigned to each set.

That number is as follows:
- Set the number between 11 and 15 if using the set to have the program wait at segment end. Do not use an identical number for another setting.
- Set the number between 21 and 25 if using the set to have the program wait in the middle of the segment. Do not use an identical number for another setting.

Once assigned a number, the sets can be set for individual segments in the program pattern using the “JC” junction code.
The table below shows which JC parameter settings correspond to which set of the “n.WZ1” wait zone parameter (n = 1 - 5) and “n.WTM” wait time parameter (n = 1 - 5). As can be seen, all sets have the same configuration.

JC	11	12	13	14	15
Sets for program wait at segment end	1.WZ1 1.WTM	2.WZ1 2.WTM	3.WZ1 3.WTM	4.WZ1 4.WTM	5.WZ1 5.WTM

JC	21	22	23	24	25
Sets for program wait in the middle of the segment	1.WZ1 1.WTM	2.WZ1 2.WTM	3.WZ1 3.WTM	4.WZ1 4.WTM	5.WZ1 5.WTM

Five sets of wait-zone parameters (n.WZ1) and wait-time parameters (n.WTM) can be set.

Specify which set is used with a JC number (JC=15, etc).

● The following parameters are used herein:
To change the parameter values, consult the Program Setup or Parameter Map of the appropriate User’s Manual.

• Program parameters: JC, n.WZ1, n.WZ2, and n.WTM

UP750 UP550 Code	Description	Setting range	Default	B-register No. [UP750, UP550 only]
JC	Setting Junction Code	11 to 15: Program wait at segment end 21 to 25: Program wait in the middle of the segment	0 (Note1)	140
n.WZ1	Program-pattern wait zone in the 1st loop (n = 1 to 5)	OFF or 0.0 to 100.0% of PV input range span	OFF	1.WZ1 : 14 2.WZ1 : 17 3.WZ1 : 20 4.WZ1 : 23 5.WZ1 : 26
n.WZ2	Program-pattern wait zone in the 2nd loop (n = 1 to 5) (Note2)	OFF or 0.0 to 100.0% of PV input range span	OFF	1.WZ2 : 15 2.WZ2 : 18 3.WZ2 : 21 4.WZ2 : 24 5.WZ2 : 27
n.WTM	Wait time (n = 1 to 5)	OFF or 00.01 to 99.59 (Hour, minute or Minute, second) (Note3)	OFF	1.WTM : 16 2.WTM : 19 3.WTM : 22 4.WTM : 25 5.WTM : 28

Note1: JC is set to 0 at the factory before shipment. Select the desired value as required. For the JC value other than the wait function, consult Ref.5.2(3), page Ref. 5-18 of this manual.
Note2: n.WZ2 parameter is for dual-loop control or the temperature and humidity control in the UP750.
Note3: Use a TMU setup parameter to set the time unit.

The following provides a brief explanation regarding operation of the wait functions.
Use these for your references.

■ Program wait at segment end (Set “JC” to 11 - 15.)

Program wait at segment end makes the program wait at segment end if PV has not attained the target setpoint. The program will advance to the next segment the moment that the measured input attains the wait zone. If the measured input does not attain the wait zone within the wait time, the program will advance to the next segment the moment the wait time elapses.

● Operation when the measured input attains the wait zone before the wait time elapses

From when the wait operation starts, if the measured input attains the wait zone, the wait state is changed to the operating state and the program advances to the next segment.
During the wait state, the program timer is stopped, therefore the time event (EVn) value is held.

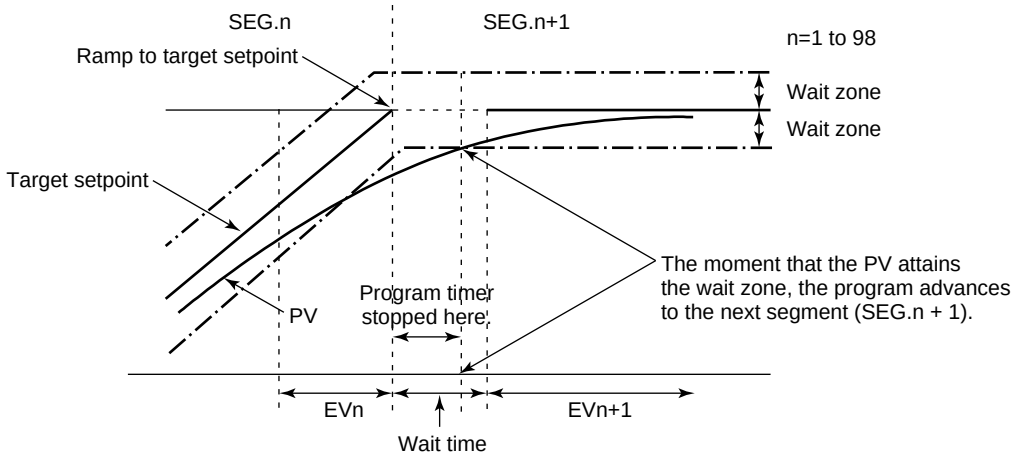


Fig. 5-2-14 Example of wait operation when the measured input attains the wait zone before the wait time elapses

● Operation when the measured input does not attain the wait zone within the wait time

If the wait time elapses before the measured input attains the wait zone, the wait state is changed to the operating state and the program advances to the next segment the moment that the wait time elapses. This happens even if the measured input has not attained the wait zone.

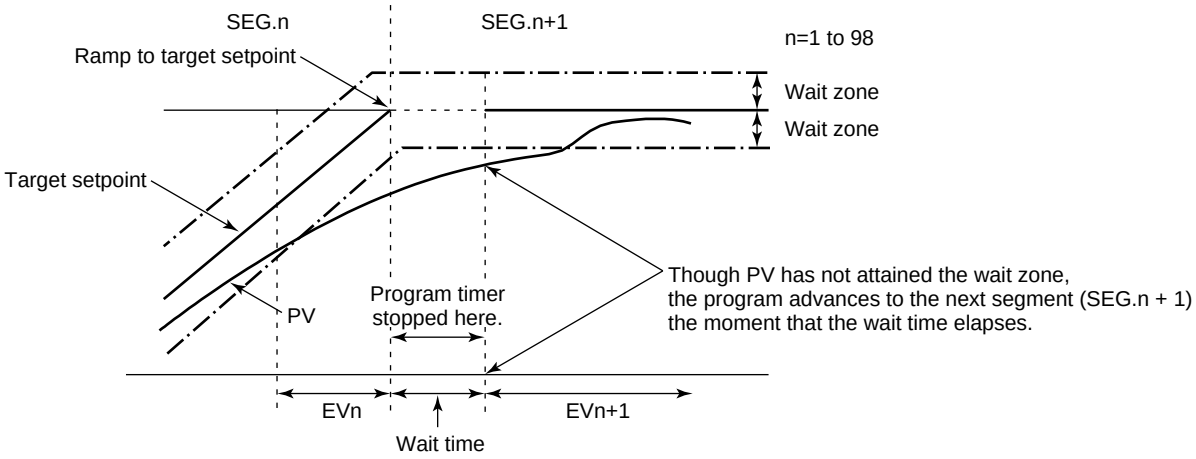


Fig. 5-2-15 Example of wait operation when the measured input does not attain the wait zone within the wait time

■ Program wait in the middle of a segment (Set “JC” to 21 - 25.)

When the wait operation is set so that the program waits in the middle of the segment, the wait state is automatically engaged and the program is delayed if PV drifts outside of a preset wait zone. This wait zone is set with respect to the current target setpoint. If PV returns within the wait zone, the wait state is changed to the operating state and the program resumes running.
In dual-loop control or temperature-and-humidity control, the operating state is changed to the wait state if PV drifts outside of either wait zone 1 or wait zone 2.

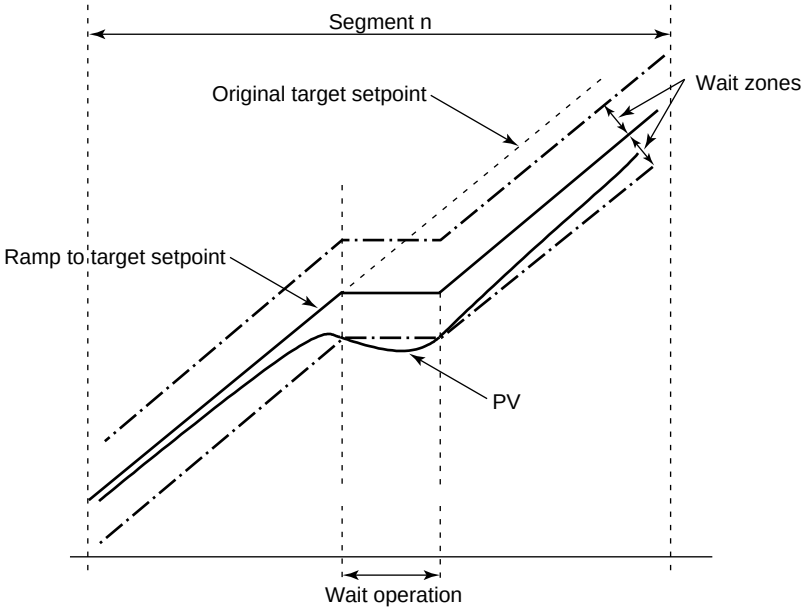


Fig. 5-2-16 Example of wait operation when the program waits in the middle of a segment

[2] For the UP35□

With the UP35□, the wait function is used at the end of the segment.
It works only when a ramp (up or down) segment changes to a soak segment.

The wait function is set during program setup using the “WIT.Z” wait zone parameter and the “WIT.T” wait time parameter.
Settings apply to both program patterns 1 and 2.
Note: That the weight function does not work if the weight time “WIT.T” remains off.

- The parameters used herein are as follows:
  To change the parameter values, follow the Program Setup or Parameter Map section in the appropriate User’s Manual.

• Program parameters: WIT.Z and WIT.T

UP35□ Code	Description	Setting range	Default	D-register No.
(WIT.Z)	Wait Zone	OFF or 0.0 to 100.0% of PV input range span	OFF	260
(WIT.T)	Wait Time	OFF or 0.01 to 99.59	OFF	261

The following provides a brief explanation regarding operation of the wait functions.
Use these for your references.

- **Operation when the measured input attains the wait zone before the wait time elapses**

From when the wait operation starts, if the measured input attains the wait zone, the wait state is changed to the operating state and the program advances to the next segment.
During the wait state, the program timer is stopped, therefore the time event (EVn) value is held.

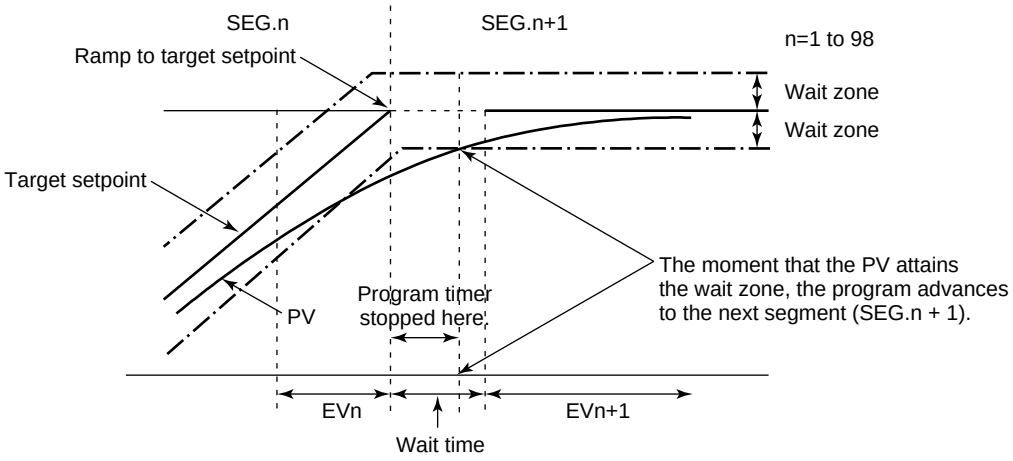


Fig. 5-2-17 Example of wait operation when the measured input attains the wait zone before the wait time elapses

● **Operation when the measured input does not attain the wait zone within the wait time**

If the wait time elapses before the measured input attains the wait zone, the wait state is changed to the operating state and the program advances to the next segment the moment that the wait time elapses. This happens even if the measured input has not attained the wait zone.

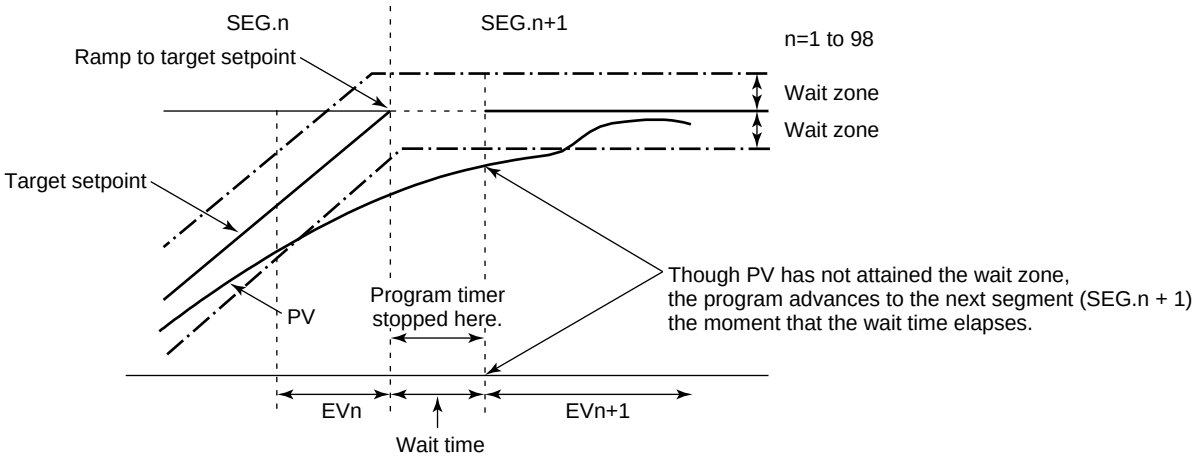


Fig. 5-2-18 Example of wait operation when the measured input does not attain the wait zone within the wait time

<<Ref. 5.2: References Related to Program Setup>>

Ref.5.2(5) Using the Hold Functions (Changing Segment Setpoint in Hold Status)

Functions that change the segment setpoint in the hold status apply to Models UP750, UP550, and UP35□.

This “hold” function enables program control to be in the hold status (the timer stops) while the program is running (see Note1 below).
In this hold status, the following three segment setpoints can be changed (see also Note2).

- Changing the target segment setpoint
- Increasing the segment ramp time
- Decreasing the segment ramp time

This section describes the operations after individual setpoints are changed.

Note1: Junction codes, key operations, and external contacts enable programs to be in the hold status. For key operations, see the Program Setup section of the appropriate User’s Manual available separately. For external contacts by which programs are in the hold status, see Ref. 3.1, “References Related to Contact Input.”
Note2: To change each setpoint, see the Program Setup section in the appropriate User’s Manual.

CAUTION

Changes can be made to parameter settings only during soak segments (constant setpoint) that are on hold. However, with dual-loop control on the UP750, see the TIP below.

CAUTION

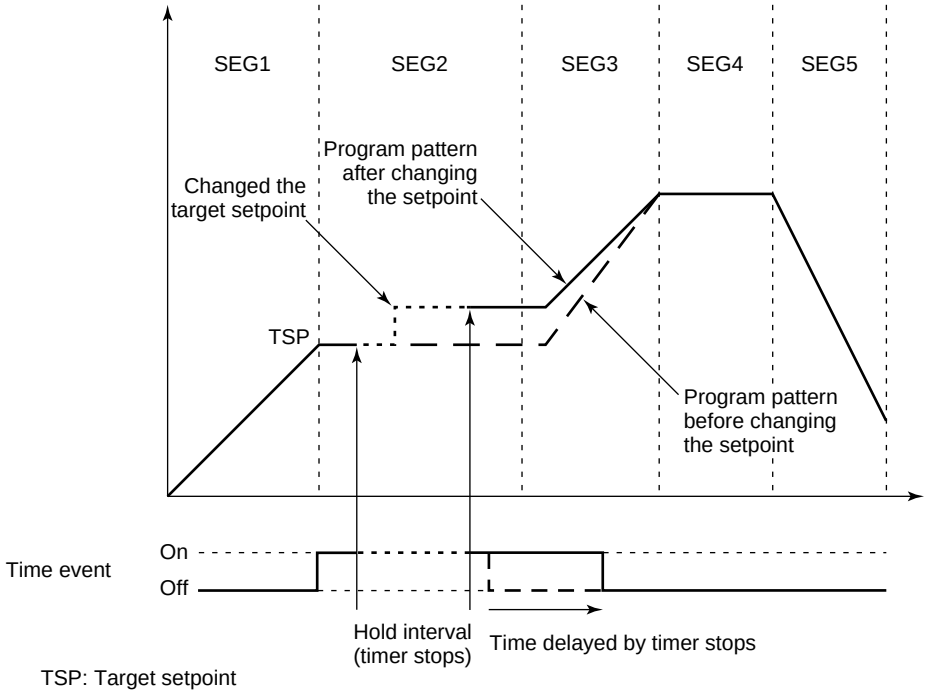
- The UP750, UP550, and UP35□ can change the target segment setpoint to more advanced settings than the currently operating segment, and changes are applied to operation.
- With the UP750, UP550 and UP35□, it is possible to change the target setpoint parameter of a running program from the program parameter display during a ramp segment. Changes will not be applied to operation. The program will continue towards the previously set target setpoint.
- With the UP750 and UP550, if the program is first put on hold and then the target setpoint parameter of that program is changed from the program parameter display, the program will resume towards the new target setpoint the moment that the hold state is released. It is also possible, during the hold state, to change the target setpoint of segments yet to be run and have those changes applied to operation.
  However, set the segment setting to “time-set segment time”, and the “HOLDSP” and “HOLDTIME” parameters must not be changed while the program is on hold.

■ To change the target segment setpoint

CAUTION

Changes can be made to parameter settings for soak segments only (constant setpoint) that are on hold. However, when the UP750 is in the dual-loop control mode or in the temperature and humidity control mode, or when the setup parameter “PT2.G” in other the UP mode is on, follow the TIP below.

Fig. 5-2-19 shows where the target segment setpoint can be changed while in the hold status.
If the program control is in the hold status, the time event and segment time are extended following the time over which the program remains held.



TSP: Target setpoint

Fig. 5-2-19 Changing target setpoint in hold status

TIP

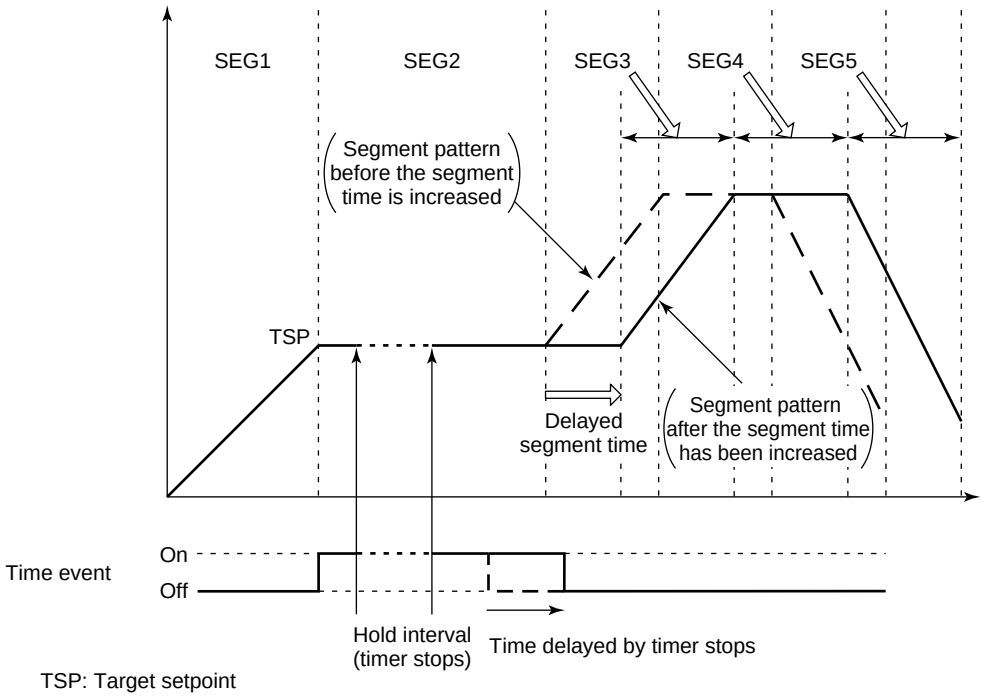
When running 2 patterns simultaneously with the UP750, as long as both the held segments in the primary loop pattern and the secondary loop pattern are soak segments, both target setpoints can be changed.
If only one is a soak segment, then only the target setpoint for that segment can be changed. That of the another pattern cannot.

■ To increase the segment (ramp) time

CAUTION

Changes can be made to parameter settings for soak segments only (constant setpoint) that are on hold. However, when the UP750 is in the dual-loop control mode or in the temperature and humidity control mode, or when the setup parameter “PT2.G” in other the UP mode is on, follow the TIP below.

Fig. 5-2-20 shows where the segment time can be increased while in the hold status.
If the segment time is increased, the time event and segment time are delayed (automatically adjusted) following the time over which the program segment is held, and an increment of the segment (ramp) time.



TSP: Target setpoint

Fig. 5-2-20 Segment time delayed by timer stops

TIP

When running 2 patterns simultaneously with the UP750, as long as both the held segments in the primary loop pattern and the secondary loop pattern are soak segments, the segment time can be changed.

■ To decrease the segment (ramp) time

CAUTION

Changes can be made to parameter settings for soak segments only (constant setpoint) that are on hold. However, when the UP750 is in the dual-loop control mode or in the temperature and humidity control mode, or when the setup parameter “PT2.G” in other the UP mode is on, follow the TIP below.

Fig. 5-2-21 shows where the segment time can be decreased while in the hold status.
If the segment time is decreased, the time event and segment time are automatically adjusted following the time over which the program segment is held, and a decrement of the segment (ramp) time.

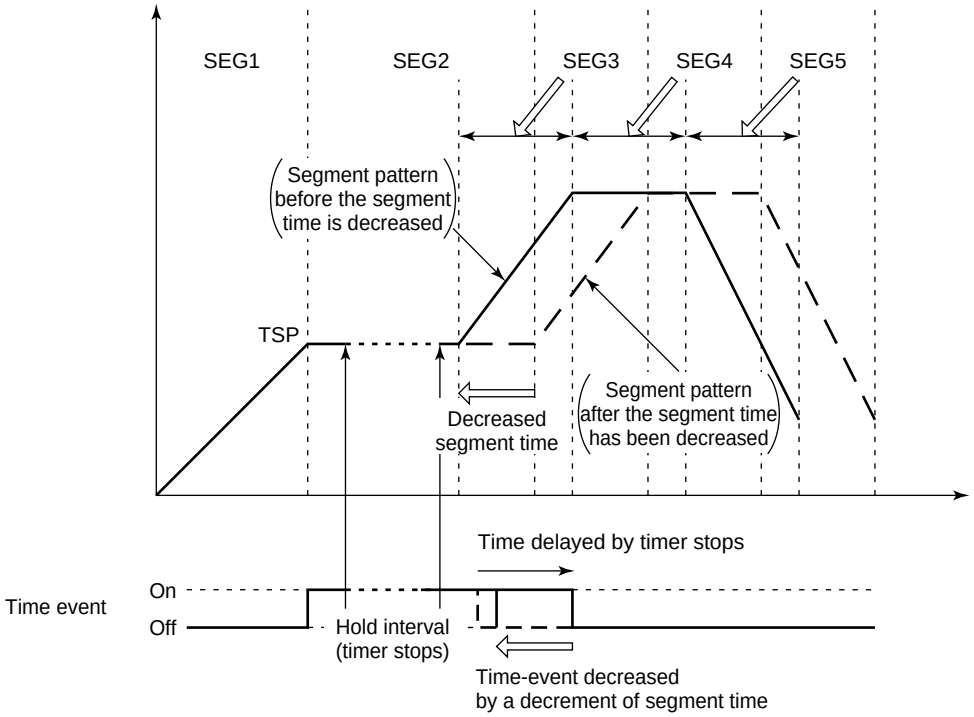


Fig. 5-2-21 Segment time decreased in hold state

TIP

When running 2 patterns simultaneously with the UP750, as long as both the held segments in the primary loop pattern and the secondary loop pattern are soak segments, the segment time can be changed.

<<Ref. 5.2: References Related to Program Setup>>

Ref.5.2(6) Using the Repeat Functions

Repeat functions enable you to repeat successive segments in a program pattern a multiple number of times.
There are some differences in using these functions between the UP750, UP550 and UP35□.
This section first provides those functions for the UP750 and UP550.
For those that apply to the UP35□, see Page Ref. 5-36 later in this manual.
Refer to either of these as appropriate for your selected model.

[1] For the UP750 and UP550

CAUTION

- The moment that the repeat operation starts, the event settings for the segments in that operation are defaulted.
  For this reason, reset any events needed in the repeat operation.
- If the "STC" program start condition parameter is set to either PV ramp start or PV time start, the start condition is applied to the repeat operation when it starts.

To use the repeat operation, set the repeat start segment, repeat end segment and number of repeat cycles.

The next page shows the difference in program pattern progression when repeat operation is used and when not.

RCY (repeat cycles) = 1
RST (repeat start segment No.) = 3
REN (repeat end segment No.) = 5

With the above settings, segments Nos. 3 to 5 are repeated 1 time as shown on the next page.

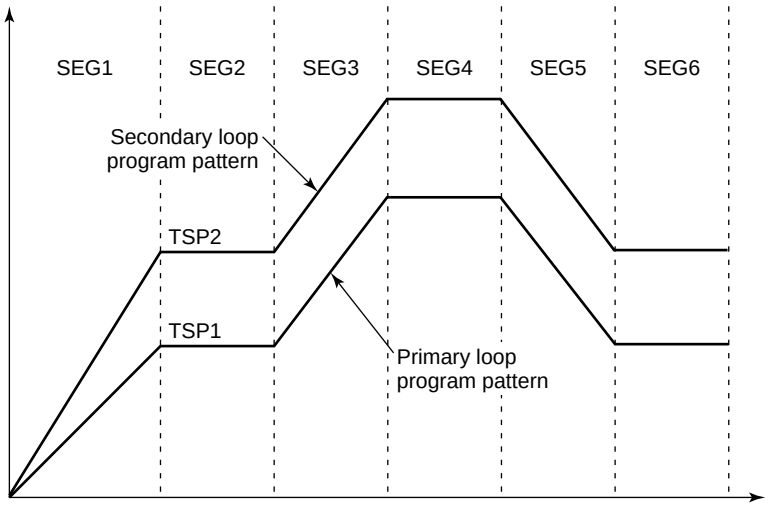
● The following parameters are used:
To change parameter values, follow the Program Setup or Parameters section of the appropriate User's Manual.

• Program parameters (repeat operation parameters): RCY, RST, and REN

UP750 UP550 Code	Description	Setting range	Default	B-register No. [UP750, UP550 only]
RCY	Number of repetitions	0 to 999, CONT (Indefinite repetitions)	0: (no repeat operation)	29
RST	Start of repetition segment number	1 ≦ RST ≦ REN ≦ 99	1	30
REN	End of repetition segment number		1	31

■ Program pattern without the repeat operation

Fig. 5-2-22 shows the program pattern without the repeat operation.



TSPn: Target setpoint

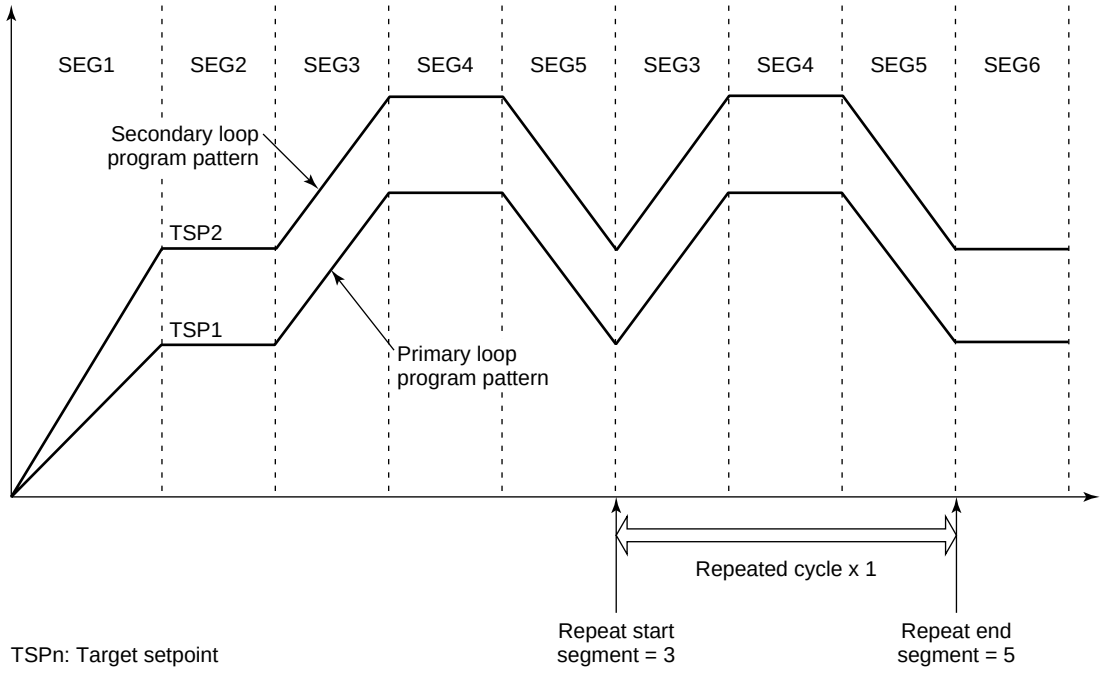
Fig. 5-2-22 Program pattern without the repeat operation

TIP

The above figure is for dual-loop control with the UP750. The secondary loop program pattern is also shown. If it were single loop control, there would be no secondary loop program pattern.

■ Program pattern with the repeat operation

Fig. 5-2-23 shows the program pattern with one repeat cycle.
Repeat cycle = 1, Repeat start segment = 3, Repeat end segment = 5



TSPn: Target setpoint

Fig. 5-2-23 Program pattern with one repeat cycle

[2] For the UP35□

With the UP35□, the repeat function can be used by setting the junction code either “1.JC” or “2.JC.”

Though the UP35□ can run two program patterns, the repeat function set with “1.JC” or “2.JC” is applied to both patterns.

The repeat function must start from segment number 1.
All event settings can also be used during the repeat operation as they are.
Once the repeat operation starts, it will continue operation until otherwise stopped by key operations, external contacts, or via communications.

The following shows where an identical program pattern will be repeated.

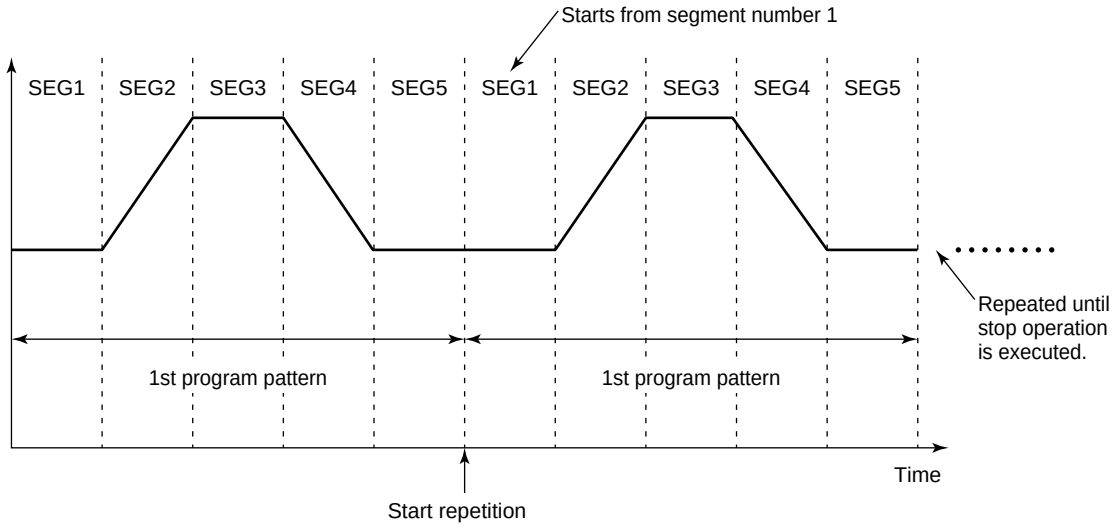


Fig. 5-2-24 Program pattern with program 1 repetition specified

- The following parameters are used:
  To change parameter values, follow the Program Setup or Parameters section in the appropriate User’s Manual.

• Program parameters (junction-code parameters): 1.JC, 2.JC

UP35□ Code	Description	Setting range	Default
1JC (1.JC)	Junction code (for program pattern 1)	2: Pattern 1 startup 3: Pattern 2 startup Set 2 or 3 above to set repeat operation.	0: End of resetting (Repeat operation is not set at the factory before shipment.)
2JC (2.JC)	Junction code (for program pattern 2)		

<<Ref. 5.2: References Related to Program Setup>>

Ref.5.2(7) Using the Advance Functions

The advance function enables a program to be advanced forcibly to the next segment while the program is running.

This section describes how to operate the advance function.
Operation of the advance function for the UP750 and UP550 is different from that for the UP35□.
The following shows operation of the advance function for the UP750 and UP550.
For that for the UP35□, consult page Ref. 5-38.
Use the advance function as appropriate for your needs.

[1] For the UP750 and UP550

Note

The advance function is set by key input, external contact input or communication command.
For external contact input, see Ref. 3-1: References Related to Contact Input earlier in this manual. For the communication function, see the separate GREEN Series Communications User's Manual.

The advance function can be used by key input as follows: Press the MODE key on the operating display to highlight "ADV: ON". Next, press the SET/ENT key. For more information on key input, see the User's Manual Operations.

Applying the advance function to the currently running segment advances the program to the next segment. However, operation differs, as follows, depending on the operating state of the segment.

- If the advance function is applied during any segment other than the last segment of the program pattern, the program advances to the next segment, regardless of the "JC" setting.
- If the advance function is applied in the last segment of the program pattern, the programs acts according to the "JC" setting.
  For example, if "JC" = 2 (local control) is set, the local (constant setpoint) mode is engaged. See Ref. 5-2: (9) Operation in the Local (Constant Setpoint) Mode on page Ref. 5-41 of this manual.
  On the other hand, if "JC" = 0 (program continue) or "JC" = 1 (segment hold), the program is reset (stopped). Control output in this case is the preset output.
- If the advance function is applied in the repeat end segment, the repeat operation is started.
- If the advance function is applied while the program is on hold, the hold state is released and the program resumes from the next segment.

[2] For the UP35□

Note

The advance function is performed through key operation or via communications. For the applications of communication functions, see the separate GREEN Series Communications User's Manual.

To use the advance function by key input, highlight the "ADV" operating parameter for the running pattern and set it to "1".
After the advance function has been applied, the monitor will automatically return to the operating display (PV/SP display).
For more information on key input, see the User's Manual Operations.

Applying the advance function to the currently running segment advances the program to the next segment. However, operation differs, as follows, depending on the operating state of the segment.

- If the advance function is applied during any segment other than the last segment of the program pattern, the program advances to the next segment, regardless of the "1.JC" or "2.JC" (Note) setting.
- If the advance function is applied in the last segment of the program pattern, the programs acts as follows depending on the "1.JC" or "2.JC" (Note) setting.

"1.JC" or "2.JC" setting for last segment	and	operating state after advance function is applied
0: Reset (Operation stopped)	→	Reset (Operation stopped) state
1: Segment hold	→	Reset (Operation stopped) state
2: Program pattern 1 start	→	Program pattern 1 running
3: Program pattern 2 start	→	Program pattern 2 running

- If the advance function is applied while the program is on hold, the hold state is released and the program resumes from the next segment.

Note: With the UP350, two program patterns can be run simultaneously. "1.JC" is the junction code for program pattern 1 and "2.JC" for program pattern 2.

<<Ref. 5.2: References Related to Program Setup>>
Ref.5.2(8) Signal Output at Program end

This function can be used with UP750 or UP550.

The pattern-end signal output function outputs a signal via a relay contact at program end. However, the pattern-end signal is not output when the program operation is forcibly ended by key operation, communication or contact input. If the several program patterns are linked (pattern link), the pattern-end signal is output when the linked program pattern is ended. The contact remains ON for 1, 3 or 5 seconds to output the signal.
The pattern end signal can be used by assigning the controller's internal "I relay" (No. 5157, 5158 or 5159) to the external output terminals (DO1 - DO7) (refer to Table 5-2-1).
It is also possible with the UP750 and the optional I/O expansion module (Note1) to use the pattern-end signal by assigning the controller's internal "I relay" (No. 5157, 5158 or 5159) to the module output terminals (OUTPUT51 - OUTPUT58).
Note1: For information on the contact I/O expansion module, see Section Ref.3.2, earlier in this manual.

CAUTION

The following example only shows how to assign the pattern-end signal in UP mode 1. For instruction on how to assign the "I relay" in other modes, see Section Ref.3.2, earlier in this manual.

With the UP750 and UP550, parameters (DO1 - DO7) that set output functions in UP mode 1 are assigned to the terminals as shown in the table below.
To assign the pattern end signal to one of these output terminals, it is necessary to change these parameters from their factory-set defaults.
Accordingly, check the terminal assignments in the table below and assign pattern-end signal output to the indicated terminal.

Terminal number	Parameter	Output	Function
6	DO1	Relay	Outputs PV event 1.
5	DO2	Relay	Outputs PV event 2.
4	DO3	Relay	Outputs alarm output 1 (or cooling output in heating and cooling control) (Note1).
34	DO4	Transistor	Outputs time-event 1 (or cooling output in heating and cooling control) (Note1).
33	DO5	Transistor	Transistor Outputs time-event 2.
32	DO6	Transistor	Transistor Outputs time-event 3.
31	DO7	Transistor	Transistor Outputs time-event 4.

For example, to assign pattern-end signal output to parameter "DO7" (sets terminal No. 31), complete the following steps.

1: Get the "DO7" parameter setting display from the [DO] submenu on the [CONF] main menu. See the User's Manuals Initial Settings and Parameters.
2: From the "I Relay" Table (Table 5-2-1), check the "I relay" number assigned to the pattern-end signal (PTEND) is "157".
3: Change the "DO7" parameter setting to "5157" and press the  key. (Add 5000 to 157, "I relay " No. and

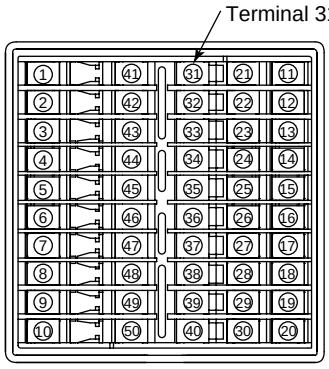
register it as “5157”.) As such, the pattern-end signal is assigned to terminal 31 and a transistor output can be sent when needed.

Table 5-2-1 “I Relay” Table

STATUS						ON					
No.	1 to	No.	65 to	No.	129 to	No.	193 to	No.	257 to	No.	321 to
1	AD1ERR	65	A/M1	129	TME1	193	AD1ERR	257	A/M1	321	TME1
2	AD2ERR	66		130	TME2	194	AD2ERR	258		322	TME2
3	AD3ERR	67		131	TME3	195	AD3ERR	259		323	TME3
4		68		132		196		260		324	
5	AD1BO	69		133	TME4	197	AD1BO	261		325	TME4
6	AD2BO	70		134	TME5	198	AD2BO	262		326	TME5
7	AD3BO	71		135	TME6	199	AD3BO	263		327	TME6
8		72		136		200		264		328	
9	RJC1ERR	73	RESET	137	TME7	201	RJC1ERR	265	RESET	329	TME7
10	RJC2ERR	74	PROG	138	TME8	202	RJC2ERR	266	PROG	330	TME8
11		75	LOCAL	139		203		267	LOCAL	331	
12		76		140		204		268		332	
13		77	HOLD	141		205		269	HOLD	333	
14		78	WAIT	142		206		270	WAIT	334	
15		79	AT1	143		207		271	AT1	335	
16		80		144		208		272		336	
17	PV1ADC	81	A/M2	145	TME9	209	PV1ADC	273	A/M2	337	TME9
18	PV1BO	82		146	TME10	210	PV1BO	274		338	TME10
19	RJC1ERR	83		147	TME11	211	RJC1ERR	275		339	TME11
20		84		148		212		276		340	
21	PV1+over	85		149	TME12	213	PV1+over	277		341	TME12
22	PV1-over	86		150	TME13	214	PV1-over	278		342	TME13
23		87		151	TME14	215		279		343	TME14
24		88		152		216		280		344	
25		89	CAS/LSP	153	TME15	217		281	CAS/LSP	345	TME15
26		90		154	TME16	218		282		346	TME16
27		91		155	WEND	219		283		347	
28		92		156		220		284		348	
29		93		157	PTEND	221		285		349	PTEND
30		94		158	PTEND3	222		286		350	
31	AT1ERR	95	AT2	159	PTEND5	223	AT1ERR	287	AT2	351	
32		96		160		224		288		352	
33					DI1	225		289	ALM11	353	DI1
								290	ALM12	354	DI2
								291	ALM13	355	

Check the “I relay” numbers for the pattern-end signals are 157 to 159 in this table.

“I Relay” no. + 5000	Code	Pattern-end signal output period
5157	PTEND	1 sec.
5158	PTEND3	3 sec.
5159	PTEND5	5 sec.



Setting “5157” to the “DO7” parameter that controls terminal 31 enables the pattern-end signal to be output (via transistor) from terminal 31.

Fig. 5-2-25 Terminal arrangement

<<Ref. 5.2: References Related to Program Setup>>
Ref.5.2(9) Operation in Local Mode (with Constant Target Setpoint)

The UP750 and UP550 can be operated in the local mode.

In addition to this mode, the following four modes are available in the UP750 and UP550.
Each mode can be transferred with the MODE key.

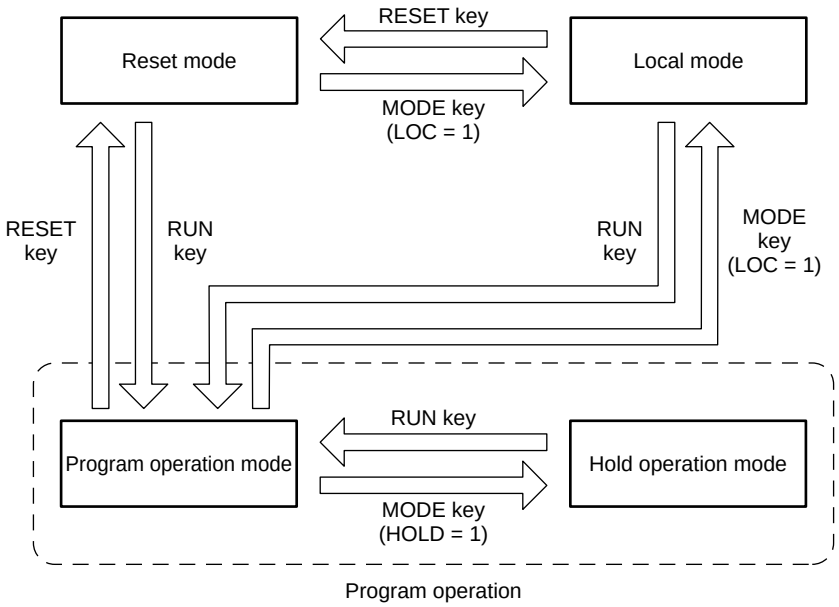


Fig. 5-2-26 Switching Between Operation Modes

The controller can be transferred to local mode with the MODE key while the program is running.

CAUTION

The operation mode can be transferred with a key operation, by external contacts or via communications. When transferring through external contacts, see Section Ref. 3.1 earlier in this manual. When transferring via communications, see the separate GREEN Series Communications User's Manual.

In the local mode, the controller runs at the target (constant) setpoint set with the program parameter "LSP1" (Note1).
For this, set "LSP1" and the other parameters shown in the following table to the required values before running the controller in the local mode.
Note1: LSP2 can also be used when using dual-loop control or temperature and humidity control with the UP750.

● The following parameters are used herein:
To change the parameter values, consult the Program Setup or Parameters in the appropriate User's Manual.

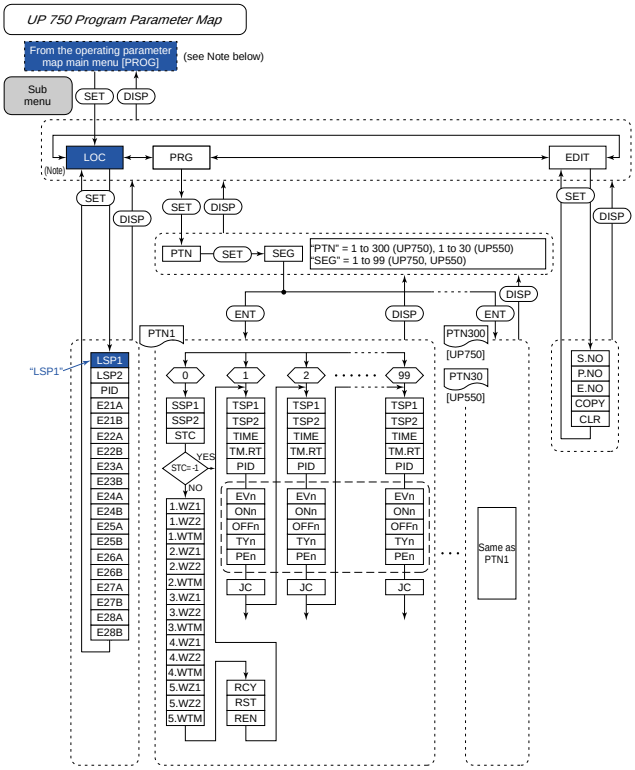
• Program parameters (local setpoint parameters): LSP1, LSP2, PID, EnA and EnB

UP750 UP550 Code	Description	Setting range	Default	D-register No.
LSP1	Target setpoint 1 in local mode	0.0 to 100.0% of PV input range (within PV1 or PV2 input range)	0.0% of PV input span	101
LSP2 (Note1)	Target setpoint 2 in local mode			102
PID (Note2)	PID group no. in local mode	1 to 8	1	103
EnA (Note3)	Local event (n types)	Off: 1 to 10, 28 to 31 (for control loop 1) Off: 41 to 50, 68 to 71 (for control loop 2)	OFF	104 to 118 (Note5)
EnB (Notes 3 and 4)	Local event (n types)	PV/SP alarm: -100.0 to 100.0% of PV input range	0.0% of PV input range	105 to 119 (Note5)
		Deviation alarm: -100.0 to 100.0% of PV input range span	0.0% of PV input range span	
		Output alarm: -5.0 to 105% of output range		

Note1: Used only for dual-loop control or temperature-and-humidity control in the UP750.
Note2: Displayed only in segment PID control (see Ref.5.1(2), "Selecting PID Control Between Zone and Segment" earlier in this manual.) The controller uses the 1st group of PID constants when PID group number in local mode is larger than the PID group number (setup parameter GRP).
Note3: n in EnA and EnB is 21 to 28. Eight events can be used in the local mode.
Note4: After a maximum of eight events have been set, those event settings are set with EnB.
Note5: D-register numbers are alternately assigned to EnA and EnB.

EnA	D-register No.	EnB	D-register No.
E21A	104	E21B	105
E22A	106	E22B	107
E23A	108	E23B	109
E24A	110	E24B	111
E25A	112	E25B	113
E26A	114	E26B	115
E27A	116	E27B	117
E28A	118	E28B	119

Part of the parameter map (for the UP750) is given below.
Refer to this to display the desired parameter display.



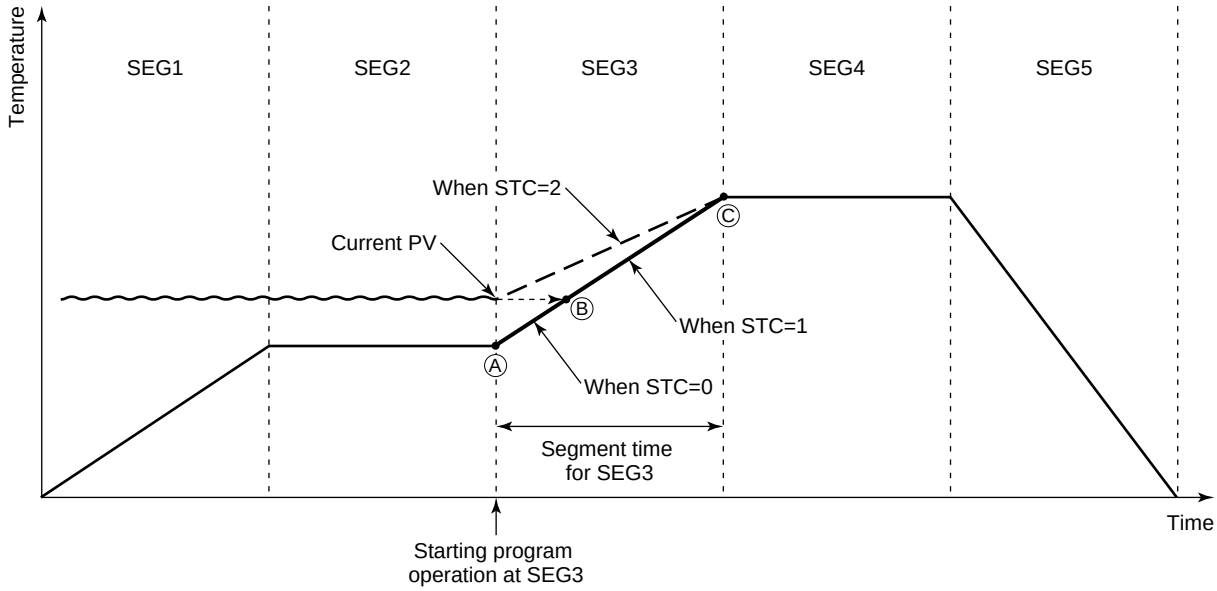
Note: Display the program parameter submenu [LOC] through the operating parameter main menu [PROG]. Then, display the LSP1 set with the SET/ENT key. Press, in turn, the SET/ENT key to display parameter set displays LSP2 through E28B as indicated above.
On each display, press the ▲ / ▼ keys to display the desired value, and then press the SET/ENT key to register that value.

<<Ref. 5.2: References Related to Program Setup>>

Ref.5.2(10) Starting the Program Operation at Any Segment

This function is for UP750 and UP550.

For example, this function can be used for restarting the program operation after returning the program in operation to the preceding segment.
The following shows an example of starting operation at SEG 3. Note that the controller should be set to RESET mode when it is in operation.



The program operation starts according to the Start Code (STC) as follows when starting the program operation at SEG3.

1: When STC=0 (SSP start)
Program operation starts at the point Ⓐ as starting target setpoint to the point Ⓒ.

2: When STC=1 (Ramp-prioritized PV1 start)
Program operation starts at the point Ⓑ to the point Ⓒ.

3: When STC=2 (Time-prioritized PV start)
Program operation starts at the current PV to the point Ⓒ with the segment time for SEG3.

4: When STC=3 (Ramp-prioritized PV2 start) – Only for UP750 Dual-loop Control or Temperature and Humidity Control
For STC=3, refer to Ref.5.2(1), “Selecting Program Start Condition.”

- The following parameter is used (displayed by pressing MODE key on the front panel several times):
  To change parameter value, follow the Program Setup or Parameters section of the appropriate User's Manual.

• Operating parameter (Operation Mode parameter): SST

UP750 UP550 Code	Description	Setting range	Default	D-register No.
SST	Program start segment number	1 to 99	1	D0224

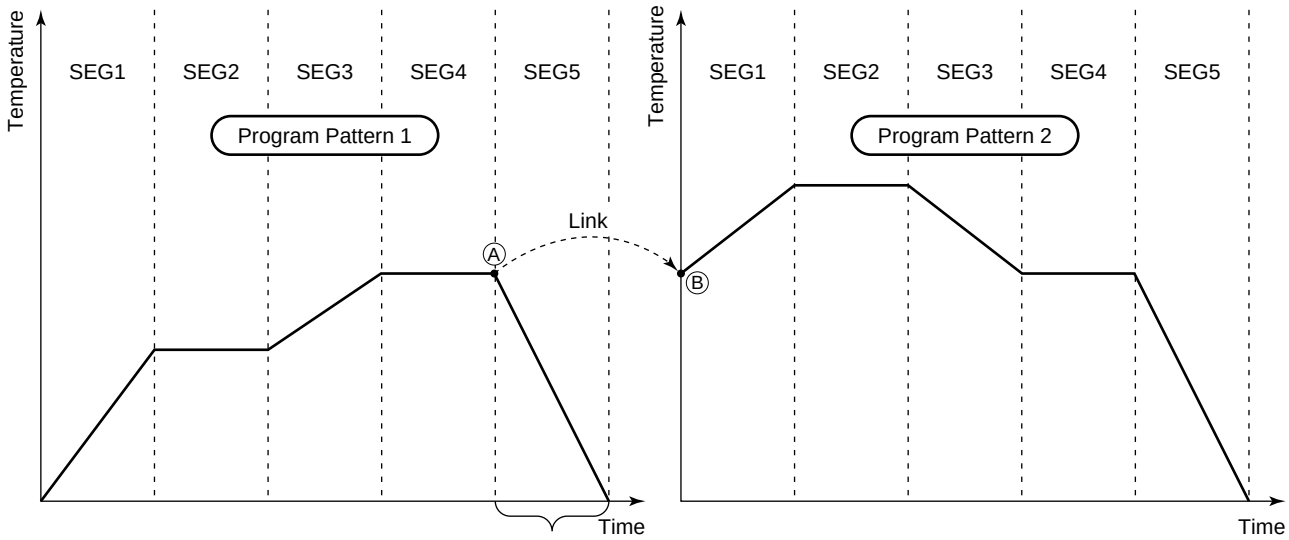
Note

- Program operation is not started when the segment set in Program Start Segment Number (SST) does not exist.
- SST is back to "1" in program operation RESET mode or LOCAL mode.
- EVENT (PV, Time) do not work in the segment precedent to the segment set in the Program Start Segment Number (SST).
- Repeat function and pattern-link function do not work in this function.

<<Ref. 5.2: References Related to Program Setup>>
Ref.5.2(11) Operation with Linked Program Patterns (Pattern-link)

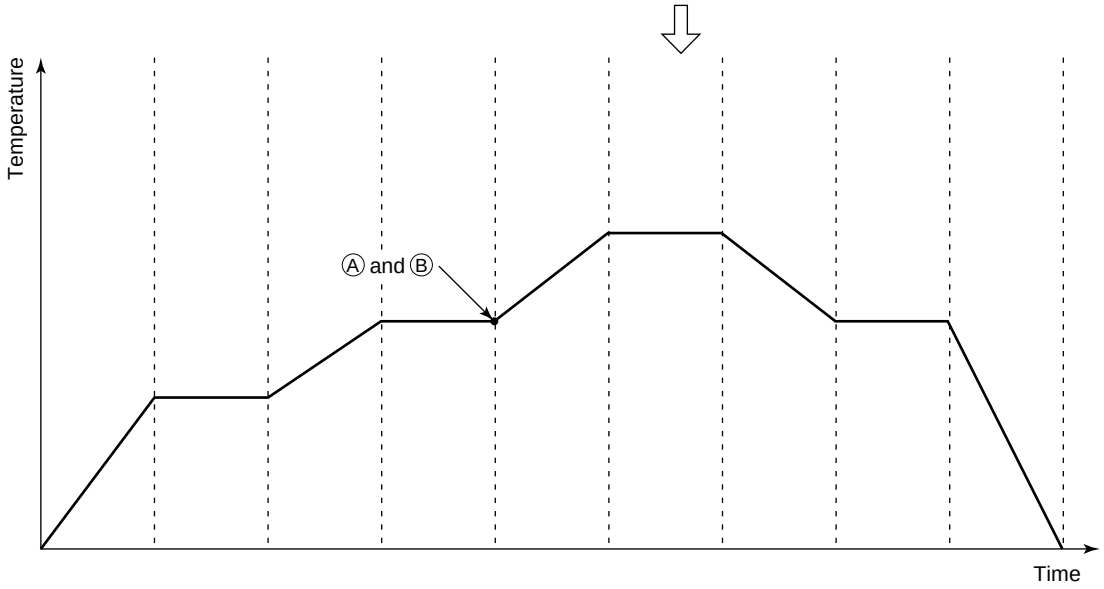
This function is for UP750 and UP550.

The following shows an example of linking the program patterns 1 and 2 (pattern-link).



* Linking the point Ⓐ to the point Ⓑ like the above example disables the operation for SEG5 of the program pattern 1.

Link the point Ⓐ of the program pattern 1 to the point Ⓑ of the program pattern 2 (pattern-link).



Note

When the temperature difference between the points Ⓐ and Ⓑ is large, the derivative item (D-item) works and the output may travel up to 100% and stay at this point.
However, only when Start Code (STC) is set to 0.

For the above pattern-link, set the value added 100 to the program pattern number “2” to be linked, to the Junction Code (JC) parameter of SEG4 of the program pattern 1. (JC=102)

● The following parameter is used:
To change parameter value, follow the Program Setup or Parameters section of the appropriate User's Manual.

• Program Parameter (Junction Code parameter): JC

UP750 UP550 Code	Description	Setting range	Default	D-register No.
JC	Setting Junction code	101 to 130 (for UP550): Program patterns 1 to 30 101 to 199 (for UP750): Program patterns 1 to 99	0	140

Ref.5.3: Handy Features for Creating and Editing Programs

IMPORTANT: Applicable models of this section

UP750	UP550	UP35□	UT750	UT5□□	UT4□0	UT3□□	UM3□0
UP750-□□	UP550-□□	None (Note)	None	None	None	None	None

Note: These functions are not available with the UP35□.

This section contains reference information on the following aspects of program creating and editing.
This information can be particularly handy in creating new program patterns from existing patterns.
Refer to and use this information only if necessary.

(1) Checking the Total Number of Unused Segments
(2) Checking the number of segments in a specific Program Pattern
(3) Checking the number of all unused events
(4) Copying Program Patterns
(5) Deleting Program Patterns
(6) Adding (Inserting)/Deleting segments in Program Patterns

Ref.5.3(1) Checking the Total Number of Unused Segments

The total number of unused segments amongst all program patterns can be checked with the UP750 and UP550.

The total number of segments allowed with the UP750 is 3,000.
That for the UP550 is 300.
The more program patterns (Note1) are created, the less unused segments are left.
This function can be used to check how many segments are left before creating a new program pattern.
Note1: A single program pattern can contain a maximum of 99 segments.

- The parameter used to check the total number of unused segments is as follows.

• Program Parameter (Parameters for Editing Programs): ALL.S

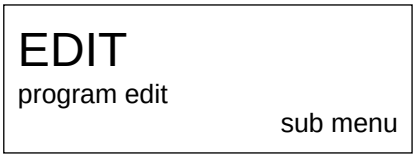
UP750 UP550 Code	Description	Setting range	Default	B-register No. [UP750, UP550 only]
ALL . S	Shows the number of remaining unused segments	None (Note1)	————	8 or 108 (Note2)

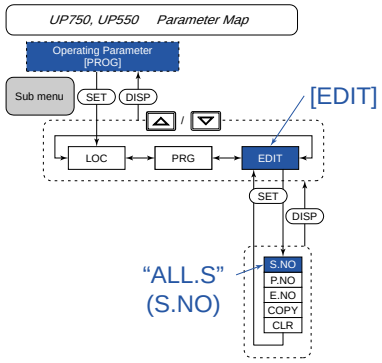
Note1: The “ALL.S” (S.NO =) parameter is used only to display the total number of unused segments. It need not be set.
Note2: The number of total unused parameters (B register No. 8 or 108) can be read by writing 1 for the read flag of B register 3 (RDTRG), after writing the No. of any used program pattern and a segment No. in B registers 1 (PTNO) and 2 (SEGNO).

To check the number of remaining unused segments, carry out the operation shown below.

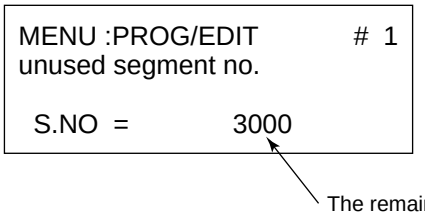
1: Refer to the “Parameter Map” and “Program Parameter Map” in the user’s Manual.
First, display the operating parameter main menu [PROG], then press the SET/ENT key to display the program parameter setting display. (Submenu [LOC] will be displayed.)

2: And then press ▽ / △ keys to display the submenu [EDIT].





3: Press the SET/ENT key one time to display the parameter “ALL.S” (S.NO).
The remaining unused segments number is shown on this display.



TIP: The remaining unused segments number is displayed in LCD display as shown below. This time, the parameter code “ALL.S” is displayed on PV display (LED).

<<Ref. 5.3: Handy Features for Creating and Editing Programs>>
Ref.5.3(2) Checking the number of segments in a specific Program Pattern

The number of segments in a specific program pattern can be checked with the UP750 and UP550.

With both the UP750 and UP550, a single program can contain a maximum of 99 segments.

This function can be used to check how many segments can be added to a program pattern before actually adding them to the program.

- The parameter used to check the number of segments in a specific program pattern is as follows.

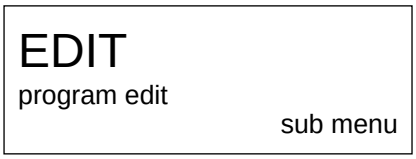
• Program Parameter (Parameters for Editing Programs): Ptn.S

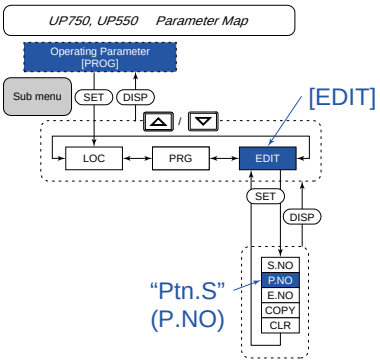
UP750 UP550 Code	Description	Setting range	Default	B-register No. [UP750, UP550 only]
Ptn.S	Shows the number of segments within a pattern	None (Note1)	————	10 (Note2)

Note1: The “Ptn.s” (P.NO) parameter is used only to display the number of segments within a program. It need not be set.
Note2: The number of segments within a program (B-register No.10) can be read by writing 1 for the read flag of B-register 3 (RDTRG), after writing the program pattern No. in B-register 1 (PTNO).

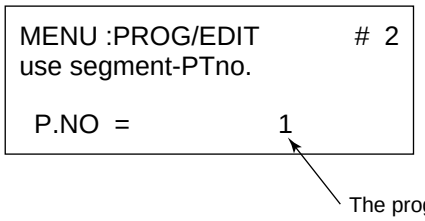
To check the number of segments in a specific pattern, carry out the operation shown below.

1: Refer to the “Parameter Map” and “Program Parameter Map” in the user’s Manual.
First, display the operating parameter main menu [PROG], then press the SET/ENT key to display the program parameter setting display. (Submenu [LOC] will be displayed.)
2: And then press ▽ / △ keys to display the submenu [EDIT] .



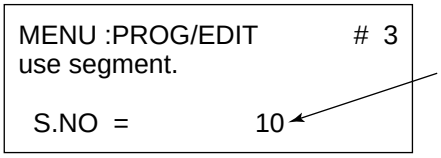


3: Press the [SET/ENT] key two times to display the parameter “Ptn.S” (P.NO).
Press [▽] / [△] keys to specify a pattern No, and press [SET/ENT] key to register it.



TIP: The message “use segment-Ptno.” is displayed in LCD display as shown in the figure. This time, the parameter code “Ptn.S” is displayed on PV display (LED).

4: The following “S.No” display will be displayed.
The number of segments within the pattern can be checked with this display.



<<Ref. 5.3: Handy Features for Creating and Editing Programs>>

Ref.5.3(3) Checking the number of all unused events

The number of all unused events can be checked with UP750 and UP550.

The total number of events allowed with the UP750 is 4,000.
That for the UP550 is 400.
The more program patterns (Note1) are created, the less unused events are left.
This function can be used to check how many events are left before creating a new program pattern.

Note1: The maximum of 16 time events and 8 PV events can be used in the segment under operation. A single segment can contain maximum of 8 events. However, the total number of event signal outputs is 7 for both PV events and time events combined. With the optional I/O expansion module, an additional 16 outputs can be added.

- The parameter used to check the number of all unused events is as follows.

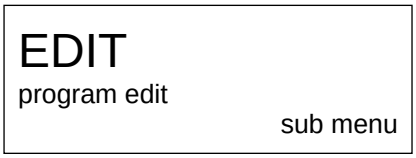
• Program Parameter (Parameters for Editing Programs): ALL.E

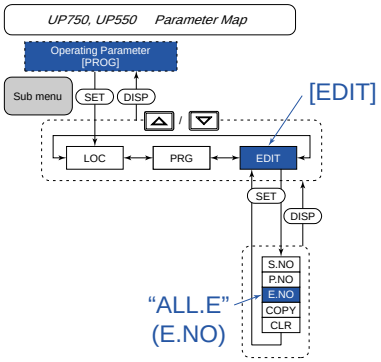
UP750 UP550 Code	Description	Setting range	Default	B-register No. [UP750, UP550 only]
ALL.E	Shows the number of remaining unused events	None (Note1)	————	9 or 109 (Note2)

Note1: The “ALL.E” (E.NO) parameter is used only to display the number of all unused events. It need not be set.
Note2: The number of all unused events (B-register No.9 or 109) can be read by writing 1 for the read flag of B-register 3 (RDTRG), after writing the No. of any used program pattern and a segment No. in B-register 1 (PTNO) and 2 (SEGNO).

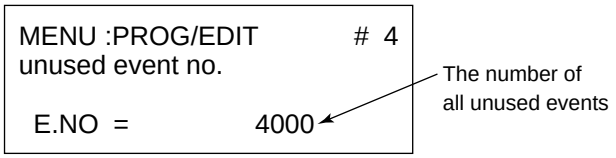
To check the number of all unused events, carry out the operation shown below.

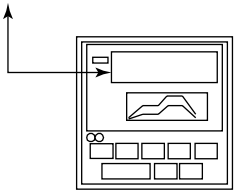
1: Refer to the “Parameter Map” and “Program Parameter Map” in the user’s Manual.
First, display the operating parameter main menu [PROG], then press the SET/ENT key to display the program parameter setting display. (Submenu [LOC] will be displayed.)
2: And then press ▲ / ▼ keys to display the submenu [EDIT].





3: Press the SET/ENT key three times to display the parameter “ALL.E” (E.NO).





TIP: The message “unused event no./ E.NO= ##.” is displayed in LCD display as shown in the figure.This time, the parameter code “ALL.E” is displayed on PV display (LED).

<<Ref. 5.3: Handy Features for Creating and Editing Programs>>
Ref.5.3(4) Copying Program Patterns

CAUTION

It is impossible to copy the program pattern when the controller is in the program operating mode. Stop (reset) the program operation when you want to copy the program pattern.

The copying program patterns function can be used with UP750 and UP550.

It is possible to copy existing program patterns.
This function can simplify the pattern creating process because an existing pattern can be copied and then edited only in the necessary places.

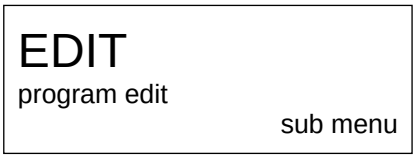
- The parameter used to copy the program pattern is as follows.

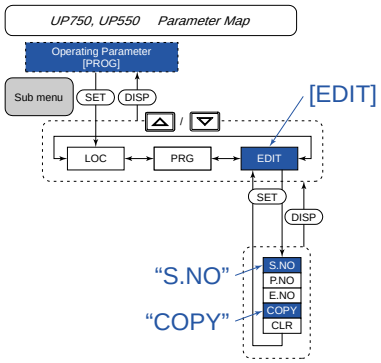
• Program Parameter (Parameters for Editing Programs): Copy

UP750 UP550 Code	Description	Setting range	Default	B-register No. [UP750, UP550 only]
Copy	Program pattern copying	1 to 30 (when UP550) 1 to 300 (when UP750)	————	none

To copy the program patterns, carry out the operation shown below.

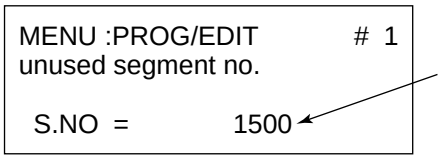
1: Refer to the “Parameter Map” and “Program Parameter Map” in the user’s Manual.
First, display the operating parameter main menu [PROG], then press the SET/ENT key to display the program parameter setting display. (Submenu [LOC] will be displayed.)
2: And then press ▲/▼ keys to display the submenu [EDIT].





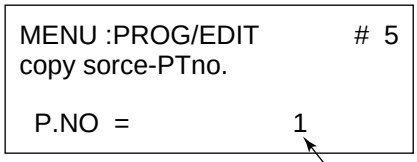
3: Press the [SET/ENT] key one time to display the parameter “ALL.S” (S.NO).
The remaining unused segment numbers is shown on this display.
Confirm that the unused segment numbers can be left after copying the new program pattern here.

Note: The program pattern can not be copied when remaining segments are not enough.
For example, the program pattern to be copied has 30 segments and the numbers of remaining segment are 20, the program pattern can not be copied.



The remaining unused segment numbers

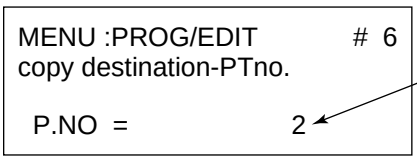
4: After confirmation of remaining unused segment numbers, press the [SET/ENT] key three times to display the “copy source-Ptno.” (COPY) setting display.
Then, set the source program pattern number which you want to copy to new program pattern number using [▲] / [▼] keys, and press the [SET/ENT] key to register it.



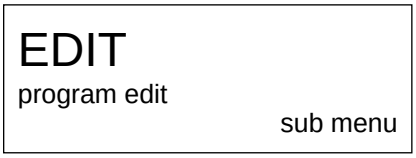
TIP: The message “copy source-Ptno.” is displayed in LCD display as shown below.
This time, the parameter code “COPY” is displayed on PV display (LED).

The source program pattern number

5: The message “copy destination-Ptno.” Will be displayed.
Set the destination program pattern number using [▲] / [▼] keys, and press the [SET/ENT] key to register it.



The destination program pattern number



The submenu [EDIT] will be displayed automatically after copying the program pattern.

TIP: Copying may need a long time when the source program has many segments or events.
When the remaining unused segments or events are few, copying may need a long time too.

<<Ref. 5.3: Handy Features for Creating and Editing Programs>>
Ref.5.3(5) Deleting Program Patterns

CAUTION

It is impossible to delete the program pattern when the controller is in the program operating mode. Stop (reset) the program operation when you want to delete the program pattern.

The deleting program patterns function can be used with UP750 and UP550.

Unnecessary program patterns can be deleted.
If wanting to create a new pattern but there are not enough segments left to do so, delete any unnecessary patterns with this function.

- The parameter used to delete the program pattern is as follows.

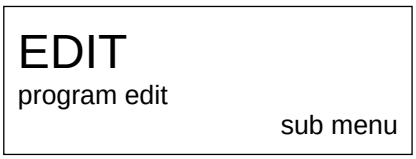
• Program Parameter (Parameters for Editing Programs): CLEAR

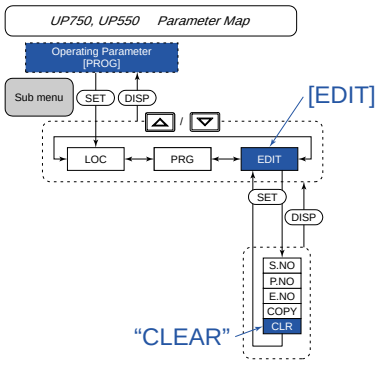
UP750 UP550 Code	Description	Setting range	Default	B-register No. [UP750, UP550 only]
CLEAR	Program pattern clearance	1 to 30 (when UP550) 1 to 300 (when UP750) (Note)	————	none

Note: The setting values of this parameter are the program pattern numbers those are already registered.

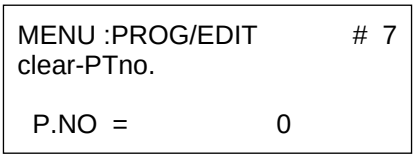
To delete the program patterns, carry out the operation shown below.

1: Refer to the “Parameter Map” and “Program Parameter Map” in the user’s Manual.
First, display the operating parameter main menu [PROG], then press the SET/ENT key to display the program parameter setting display. (Submenu [LOC] will be displayed.)
2: And then press ▲ / ▼ keys to display the submenu [EDIT] .



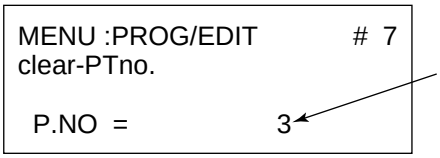


3: Press the SET/ENT key five times to display the parameter “clear-Ptno” (CLEAR).

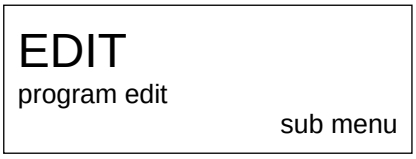


TIP: The “clear-Ptno.” is displayed in LCD display as shown in the figure.
This time, the parameter code “CLERA” is displayed on PV display (LED)

4: Press ▲ / ▼ keys to specify a pattern No. to be deleted, and press SET/ENT key to register it. The submenu [EDIT] will be displayed automatically after deleting the program pattern.



The program pattern number to be deleted



The submenu [EDIT] will be displayed automatically after deleting the program pattern.

<<Ref. 5.3: Handy Features for Creating and Editing Programs>>

Ref.5.3(6) Adding (Inserting)/Deleting segments in Program Patterns

CAUTION

It is impossible to add (or delete) the segments in program pattern when the controller is in the program operating mode. Stop (reset) the program operation when you want to add (or delete) the segments in program pattern.

This function can be used with UP750 and UP550.

New segments can be added to existing program patterns.
And, unnecessary segments can be deleted.
If a new pattern you are creating is similar to an existing pattern, an efficient thing to do is to copy the pattern and add or delete segments as necessary.
Segment additions (insertion) and deletions are done with the “JC” junction code.

- The parameter used to add (or delete) the segment is as follows.

• Program Parameter (Junction Code Parameter): JC

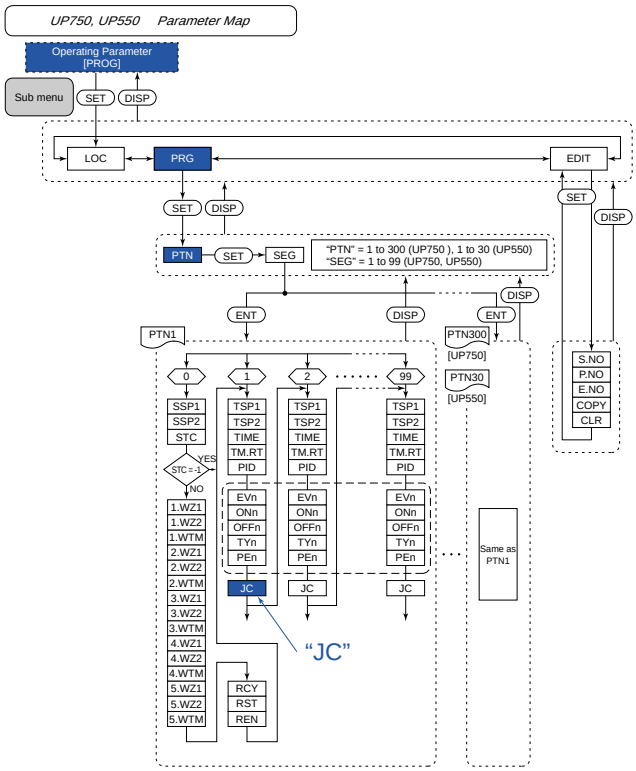
UP750 UP550 Code	Description	Setting range	Default	B-register No. [UP750, UP550 only]
JC	Junction code	INSERT DELETE	0 (Note)	140
	(note)	(Note) 0: Switching for continuation		

Note: Refer to the “Ref.5.2: References Related to Program setup” for the other functions of this “JC” parameter.

To add (or delete) the segment, carry out the operation shown below.

1: Refer to the “Parameter Map” and “Program Parameter Map” in the user’s Manual.
First, display the operating parameter main menu [PROG], then press the SET/ENT key to display the program parameter setting display. (Submenu [LOC] will be displayed.)

2: And then press ▲ / ▼ keys to display the submenu [PRG].




```
PRG
programming
                    sub menu
```

3: Press the SET/ENT key one time to display the parameter “PTN=”.
And then press ▲ / ▼ keys to display the program pattern number in which the segment will be added or deleted, and press SET/ENT key to register it.

```
MENU :PROG/PRG          # 1
PTno. input

 PTN =              1
```

4: “SEG=” will be displayed.
Set the segment number to be added (or deleted) by pressing ▲ / ▼ keys, and press SET/ENT key to register it.

```
MENU :PROG/PRG          # 2
SEGno. input

 SEG =              1
```

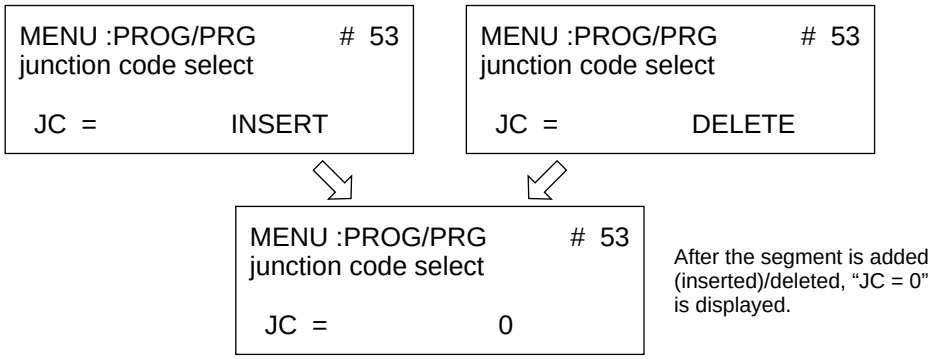
The segment number to be added (or deleted).

5: Press the SET/ENT key until displaying the “JC” setting display .

```
MENU :PROG/PRG          # 53
junction code select

 JC =               0
```

6: Press the ▲ / ▼ keys until displaying “INSERT”, if wanting to add segments, or “DELETE” if wanting to delete segments. Then, press the RETURN key to execute the operation.



- With the “INSERT” operation, a segment with the exact same content as the selected segment is added immediately after the selected segment. However, the “JC” of the added segment will be “0” (program continue).
- With the “DELETE” operation, the selected segment is deleted.

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Ref.6.1: References Related to Displays

IMPORTANT: : Applicable models of this section

UP750	UP550	UP35□	UT750	UT5□□	UT4□0	UT3□□
UP750	UP550	UP35□	UT750	UT5□□	UT4□0	UT3□□

Note : Some of the functions discussed below may be limited to models with a specific suffix and/or option code. Each section will expressly refer to this limitative condition where it applies.

This section contains reference information on the following aspects of controller displays. Refer to this information and change parameter settings only if necessary.

(1) Using SELECT displays
(2) Changing contents of Deviation Trend display (for UP750, UP550 and UT750 only)
(3) Changing Deviation Display Range of Deviation Monitor (for UT750, UT550, UT551 and UT450 only)

<<Ref. 6.1: References Related to Displays>>
Ref.6.1(1) Using SELECT Displays

SELECT displays can be created on all models in the UP and UT series of controllers. The UP750, UP550, UT750, UT5□□ and UT4□0 permit the use of up to five SELECT displays, whereas the UP35□ and UT3□□ permit the use of up to four.

A SELECT display is selected from among all the parameter setting displays (Note1) and contains a parameter whose setting value is frequently changed. This allows you to change the setting value easily on an operating display, rather than on a parameter setting display. Configure SELECT displays using the “C.S1” to “C.S5” setup parameters (Note2).

For example, if you want to frequently change the type of retransmission output 1, select the setting display of the “RET1” setup parameter (Note3).

When the Model is UT5□□, UT4□0, UT3□□ or UP35□

SELECT displays are added last to the series of (factory-set) standard operating displays. You can switch between the SELECT displays, as with the standard operating displays, by pressing the SET/ENT key. With the SET/ENT key, you can switch from one SELECT display to another in the order of SELECT displays from 1 to 5 (Note4). Pressing the SET/ENT key after showing a SELECT display returns to a Measured Value (PV) display.

When the Model is UT750, UP750 or UP550

SELECT displays are shown when the SET/ENT key is pressed more than 1 second on the operating displays. You can switch between the SELECT displays, as with the standard operating displays, by pressing the SET/ENT key. With the SET/ENT key, you can switch from one SELECT display to another in the order of SELECT displays from 1 to 5 (Note4). Pressing the SET/ENT key after showing a SELECT display returns to a Measured Value (PV) display.

Note1: If your model is UP750, UP5□□, UT750 or UT5□0, you cannot select any parameter on the Setup Parameter main menu [UTMD].
Note2: If your model is UP35□, UT4□0 or UT3□□, use the four setup parameters, “C.S1” to “C.S4”.
Note3: If your model is UP35□, UT4□0 or UT3□□, the setup parameter is “RET”.
Note4: If your model is UP35□, UT4□0 or UT3□□, the order is SELECT displays 1 to 4.

CAUTION

- No SELECT display is shown unless you configure the “C.S1” or any other associate setup parameters. (All of the relevant setup parameters are factory-set to “OFF”; therefore no SELECT display is shown.)
- Any of the “C.S1” and associate setup parameters should be specified using a number shown on the D Register Map. If the parameter is not found on the map or if you specify a parameter whose display does not exist, you cannot show any SELECT display.
- If you change the setting of a parameter shown on a SELECT display, the setting of the parameter’s original setting display is automatically updated to the same value.

Registering SELECT Display

The procedure for registering the SELECT display is as follows.

(1) Select a maximum of five parameters to be registered as SELECT displays.
In this example, the three parameters RET1, RTH1 and RTL1 are registered.

● Retransmission Output Parameters

Located in: Main menu = CMLP ; Submenu = RET

Parameter Symbol	Name of Parameter	Setting Range and Description
RET1	Retransmission output-1 type	OFF: Disable 1: PV1, 2: SP1, 3: OUT1, 4: LPS loop power supply (15 V), 5: PV2, 6: SP2, 7: OUT2 Setpoints 5 to 7 are not available for single-loop control. Retransmission output 1 is always provided via terminals 14 and 15. In position proportional control, a valve opening signal (0% to 100%) is transmitted if setpoint "3" is selected. In heating/cooling control, an output value before allocation to heating/cooling control (0% to 100%) is transmitted if setpoint "3" is selected. (0% to 50%: Cooling-side output; 50% to 100%: Heating-side output)
RTH1	Maximum value of retransmission output-1 scale	RT1=1, 2: TL1 + 1 digit to 100.0% of PV input range RT1=3: TL1 + 1 digit to 100.0%
RTL1	Minimum value of retransmission output-1 scale	RT1=1, 2: 0.0% of PV input range to TH1 - 1 digit RT1=3: 0.0% to TH1 - 1 digit
RET2	Retransmission output-2 type	Retransmission output-2 is available when the type of control output is not "current" or "voltage pulse." The output is provided via terminals 16 and 17. OFF: Disable 1: PV1, 2: SP1, 3: OUT1, 4: LPS loop power supply (15 V), [illegible] 6: SP2, 7: OUT2 [illegible] to 7 are not available for single-loop control.

(2) Confirm the D-register numbers of these parameters.
The D-register numbers of the parameters used in this example are:

RET1:1013
RTH1:1014
RTL1:1015

● D-register map

CMLP				CONF			
No.	1001 to	No.	1051 to	No.	1101 to	No.	1151 to
1001	A.BS1(BS1)	1051		1101	C.S1	1151	
1002	A.FL1(FL1)	1052		1102	C.S2	1152	
1003	A.SR1(SR1)	1053		1103	C.S3	1153	
1004	A.LC1(LC1)	1054		1104	C.S4	1154	
1005	A.BS2	1055		1105	C.S5	1155	
1006	A.FL2	1056		1106	DO1	1156	
1007	A.SR2	1057		1107	DO2	1157	
1008	A.LC2	1058		1108	DO3	1158	
1009	A.BS3(BS3)	1059		1109	DO4	1159	
1010	A.FL3(FL3)	1060		1110	DO5	1160	
1011	A.SR3(SR3)	1061		1111	DO6	1161	
1012	A.LC3(LC3)	1062		1112	DO7	1162	
1013	RET1(RT1)	1063		1113	RDO151	1163	
1014	RTH1(TH1)	1064		1114	RDO152	1164	
1015	RTL1(TL1)	1065		1115	RDO153	1165	
1016	RET2(RT2)	1066		1116	RDO154	1166	
1017	RTH2(TH2)	1067		1117	RDO155	1167	
1018	RTL2(TL2)	1068		1118	RDO156	1168	
[illegible]				1119	RDO157	1169	
				[illegible]	RDO158	1170	

(3) Register the D-register numbers for parameter C.S1 to C.S3, considering the display order of the SELECT displays.
In this example, the numbers are registered as shown below in order to show the SELECT Displays in the order of RET1, RTH1, RTL1.

Table 6-1-1

Parameters	Setting value
C.S1	1013
C.S2	1014
C.S3	1015
C.S4	OFF
C.S5*	OFF

*: UP35□ or UT3□□ has only four parameters (C.SI to C.S4).

(4) This completes the registration.

● **The following parameters are used.**

Change parameters as explained in the User's Manuals Initial Settings and Parameter Map.

- Setup parameters (SELECT display Parameters) : C.S1 to C.S5

UP750 UP550 UT750 Code	UP35□ UT5□0 UT4□0 UT3□□ Code	Description	Setting range	Default	D-register No.
C.S1	C.S1 (C.S1)	SELECT display-1 registration	OFF or within the range of D-register numbers (Note2)	OFF	1101
C.S2	C.S2 (C.S2)	SELECT display-2 registration		OFF	1102
C.S3	C.S3 (C.S3)	SELECT display-3 registration		OFF	1103
C.S4	C.S4 (C.S4)	SELECT display-4 registration		OFF	1104
C.S5	C.S5 (C.S5) (Note1)	SELECT display-5 registration		OFF	1105

Note1: UP35□, UT4□0 or UT3□0 does not have a parameter "C.S5".
Note2: With UT3□□, UP35□: OFF or 1 to 9999
With UT4□0, UT5□□: OFF or 201 to 1039
With UT750: OFF or 201 to 1023
With UP550, UP750: OFF or 101 to 1023

<<Ref. 6.1: References Related to Displays>>

Ref.6.1(2) Changing Contents of Deviation Trend Display (for UP750, UP550 and UT750 only)

A Deviation Trend display appears on the UP750, UP550 and UT750. This section explains how to rescale the deviation trend axis (deviation bandwidth) and/or change the sampling interval.

CAUTION

- The Deviation Trend display is factory-set to the following setpoints.
  Trend scale of Loop-1 Deviation Trend display:5% of the PV input range span
  Trend scale of Loop-2 Deviation Trend display:5% of the PV input range span
  Trend time of Deviation Trend display:5 sec.

Do not change these setpoints inadvertently. Otherwise, the trend graph may become difficult to read because of the limited view area, or the trend data may be updated too quickly or slowly. For this reason, change the setpoints, only if necessary, according to the procedure given below.

The deviation trend display uses a chart to show the current deviation trend and can be shown in any controller operation mode (UT/UP mode).
It shows

1) A single-loop deviation (DV)
2) A primary-loop deviation
3) A secondary-loop deviation

The following Fig. 6-1-1 Indicates an example of the deviation trend display.

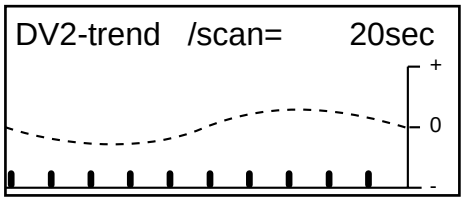

Fig. 6-1-1 Example of Deviation Trend Display (with a secondary-loop deviation)

TIP

[When the controller is UP750 or UP550]

The display shows a primary-loop deviation (DV1) when the controller is set up for cascade control (UT mode 4) or cascade control with 2 universal inputs (UT mode 13) and in the cascade operation mode, and the CAS indicator lamp is lit.
The display shows a secondary-loop deviation (DV2) in the secondary-loop Local operation mode.

[When the controller is UT750]

The display shows a primary-loop deviation (DV1) when the controller is set up for cascade control (UT mode 4) or cascade control with 2 universal inputs (UT mode 13) and in the cascade operation mode, and the CAS indicator lamp is lit.
The display shows a secondary-loop deviation (DV2) in the AUTO (automatic) or MAN (manual) operation mode.

The following procedure explains how to change the contents of a Deviation Trend display.

1) Changes can only be made to the trend scale and/or trend time of the Loop-1 Deviation Trend display.
(Note: This procedure also applies to the trend scale of the Loop-2 Deviation Trend display.)

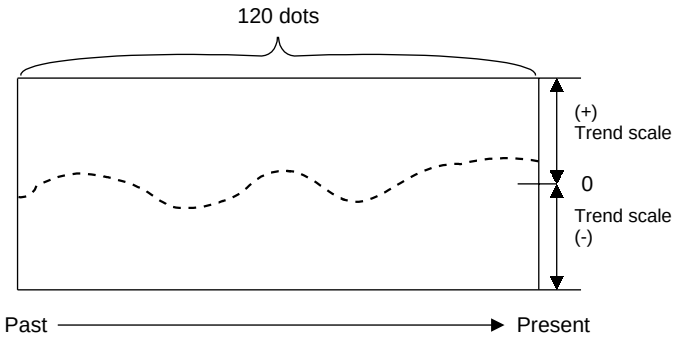

Fig. 6-1-2 Deviation Trend scale

2) As shown in the figure above, the trend scale of the Loop-1 Deviation Trend display can be set to 0.1 to 100.0% of the PV input range span for both positive (+) and negative (-) deviations. The “TSC1” setup parameter is used for this purpose (use “TSC2” for loop 2).

3) As noted above, you can also set the trend time of a Deviation Trend display. The trend time can range from 1 to 600 seconds. At this point, note that the trend data is represented by a maximum of 120 plots running along the time axis. Consequently, the controller can show trend data worth a specified time length, ranging from a minimum of two minutes (120 sec) to a maximum of 20 hours (72000 sec). Specify the time length using the “TIM” setup parameter.

TIP

If trend data exceeds 120 plots, all earlier on-screen plots disappear from the display. Trend data is not saved in memory; therefore, there is no way of redisplaying the data once it disappears.

- **The following parameters are used.**

Change parameters as explained in the User’s Manuals Initial Settings and Parameter Map.

- Setup parameters (Deviation Monitor Parameters) : TSC1, TSC2, TIM

UP750 UP550 UT750 Code	Description	Setting range	Default	D-register No.
TSC1	Deviation trend scale (for loop-1)	0.1 to 100.0% of PV input range span	5.0% of PV input range span	1021
TSC2	Deviation trend scale (for loop-2)		5.0% of PV input range span	1022
TIM	Deviation trend scan time	1 to 600 sec.	5sec.	1023

Note1: “TSC2” can be displayed only when the controllers are in the following UT or UP mode.
Cascade control, dual-loop control, temperature and humidity control or cascade control with 2 universal inputs.
Note2: “TIM” (deviation trend scan time) is used commonly between “TSC1” and “TSC2”.

<<Ref. 6.1: References Related to Displays>>

Ref.6.1(3) Changing Deviation Display Range of Deviation Monitor (for UT750, UT550, UT551 and UT450 only)

The deviation monitor is only available with the UT750, UT550, UT551 and UT450. (In other words, the monitor is supported only by controller models whose panel size is 96 mm^2 and, therefore, is not available with the UT350.) This section explains how to change the deviation display range (deviation bandwidth) of the deviation monitor.

CAUTION

- The deviation display range of the deviation monitor is factory-set to 1% of the PV input range span.

Only if necessary, change the setpoint as instructed below, in accordance with your object of control.

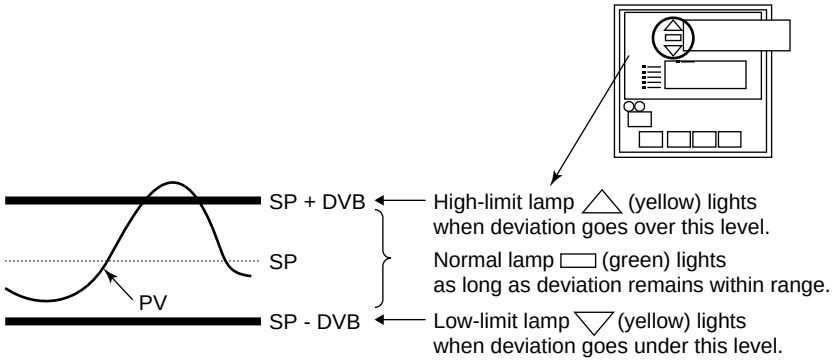

Fig. 6-1-3 Deviation Range

● **The following parameters are used.**

Change parameters as explained in the User's Manuals Initial Settings and Parameter Map.

- Setup parameters (Deviation Monitor Parameters) : DVB1, DVB2

UT750 Code	UT55□ UT450 Code	Description	Setting range	Default	D-register No.
DVB1	dUb (DVB)	Deviation display band (for loop-1)	0.0 to 100.0% of PV input range span	1.0 % of PV input range	1019
DVB2	dU2 (DV2) (Note1)	Deviation display band (for loop-2)		1.0 % of PV input range	1020

Note1: UT450 does not have the parameter "DV2".

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Ref.7.1: References Related to Security

IMPORTANT: Applicable models of this section

UP750	UP550	UP35□	UT750	UT5□□	UT4□0	UT3□□
UP750-□□	UP550-□□	UP35□-□□	UT750-□□	UT5□□-□□	UT4□0-□□	UT3□□-□□

Note: The functions discussed in this section apply to all the models of UT and UP series.
However, some of the functions are unavailable with certain models.
Such models, if any, will be clearly noted in each of following items from (1) to (2).

This section contains reference information on the following aspects of security. Refer to this information and change parameters only if necessary.

(1) Setting a password to prevent unauthorized changes to setup parameters
(2) Using the keylock function to prevent unauthorized key operation

Ref.7.1(1) Setting a password to prevent unauthorized changes to setup parameters

A password can be set with all controllers of the UT and UP Series.

By setting a password, you can prevent inadvertent changes to setup parameters. The password is verified when you switch from the operating parameter setting display to the setup parameter setting display.

CAUTION

- Always remember your password. Once a password has been set, you cannot access the setup parameter setting display unless you enter the correct password. To cancel your password, the controller must be serviced (for a fee) at a Yokogawa service center.
- Canceling a password reverts all parameters back to their factory-set defaults. For this reason, it is strongly recommended to keep a written record of all controller parameter settings.

● The following parameters are used.
Change parameters as explained in the User's Manuals Initial Settings and Parameter Map.

• Setup parameters (Security - related Parameters) : PWD

UP750 UP550 UT750 Code	UP35□ UT5□□ UT4□0 UT3□□ Code	Description	Setting range	Default	D-register No.
PWD	PWD (PWD)	Password settig	0:Passward not set (Note1) or 1 to 30000 (However, 1 to 9999 with UP35□,UT35□ or UT32□)	0	No register No.

Note: The setpoint 0 means a password has not yet been set. Setting the PWD parameter back to "0" does not enable you to cancel your current password.

<<Ref. 7.1: References Related to Security>>

Ref.7.1(2) Using the keylock function to prevent unauthorized key operation

This function prohibits you from working with the predefined group of operation panel keys during controller operation or with the parameter setting display.

CAUTION

- The keylock function locks all of the predefined group of operation panel keys.
  If any of the panel keys is found to be disabled while correct operation is being carried out in accordance with the User's Manual, first check the setpoint of the LOCK parameter.

CAUTION

- Even when the keylock function is enabled, relevant key operation is possible with an external contact.
  (Operation based on external contacts has priority over key operation. For this reason, it is possible to operate the controller by external contact input switching even when keys are locked.)

The keylock function differs depending on the controller model. This section explains the function for each of the following models. Refer to the paragraph that is applicable to your model.

[1] When the Model Is UT35□ or UT32□

[2] When the Model Is UT450 or UT420

[3] When the Model Is UT750, UT550, UT551 or UT520

[4] When the Model Is UP35□

[5] When the Model Is UP750 or UP550

[1] When the Model Is UT35□ or UT32□

The keylock function of the UT35□ and UT32□ is as follows. Any one of the function options in Table 7-1-1 can be selected by using the "LOCK" setup parameter.

Table 7-1-1 Keylock Function Options and Their Settings

LOCK Parameter Setting	Function
OFF	• Turns the keylock function OFF. This is the factory-set default.
1	• Prohibits any parameter setting from being changed. When "1" is selected, no change is allowed to any of the operating and setup parameters; only viewing the parameters is allowed, however. In this case, it is only possible to change the "LOCK" parameter. (Selecting OFF turns the keylock function OFF.)
2	• Prohibits operating parameters from being viewed. The operating parameter setting display is not shown, so settings cannot be changed. The setup parameter setting display can be viewed, however, by holding down the SET/ENT key for more than 3 seconds when an operating display is being shown. (If a password has been set, a password verification display will appear. If the correct password was entered, the setup parameter setting display appears. You can now change the setup parameter setting.)
3	• Disables the A/M key. You are not allowed to switch between auto and manual modes with the front-panel A/M key.

● The following parameters are used.
Change parameters as explained in the User's Manuals Initial Settings and Parameter Map.

• Setup parameters (Security - related Parameters) : LOCK

UT35□ UT32□ Code	Description	Setting range	Default	D-register No.
LocK (LOCK)	Key lock	OFF: No key lock (turns the key lock function OFF) 1 to 3: (See the Table 7-1-1)	OFF	1036

[2] When the Model Is UT450 or UT420

The keylock function of the UT450 and UT420 works as described in the table below. Two or more options of the keylock function can be selected using security-related setup parameters.

Table 7-1-2 Keylock Function Options

Keylock Function Option	Description
▲ / ▼ keylock	• Locks the ▲ / ▼ keys on the controller front panel to prohibit their operation. However, the password setting or the following security-related parameters setting operation is possible.
A/M key lock	• Locks the A/M key on the controller front panel to prohibit switching between auto and manual modes.
Remote/Local mode lock	• The “R/L” operating parameter, which is used to switch between remote and local modes, is not shown. This prohibits you from switching between the two modes by key operation.
PID parameter number lock	• The “PID” operating parameter, which is used to select from the groups 1 to 8 of PID parameters, is not shown. This prohibits you from changing your choice of PID parameters by key operation.

● The following parameters are used.
Change parameters as explained in the User’s Manuals Initial Settings and Parameter Map.

• Setup parameters (Security - related Parameters) : DAT, A/M, R/L, PID

UT4□0 Code	Description	Setting range	Default	D-register No.
dAt (DAT)	▲ / ▼ key lock (Data setting key lock)	OFF or ON	OFF	1024
A/M (A/M)	A/M key lock	OFF or ON	OFF	1025
r/L (R/L)	Lock of Remote/Local selection parameter	OFF or ON	OFF	1028
PId (PID)	Lock of parameter for PID parameter display number	OFF or ON	OFF	1032

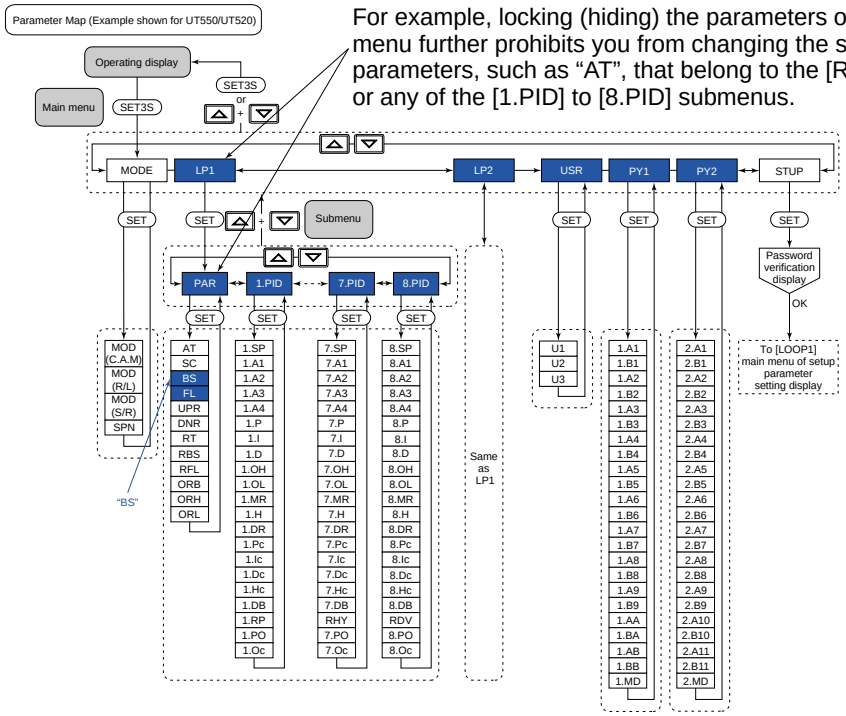
[3] When the Model Is UT750, UT550, UT551 or UT520

The keylock function of the UT750, UT550, UT551 or UT520 works as described in the table below. Two or more options of the keylock function can be selected using security-related setup parameters.

Table 7-1-3 Keylock Function Options

Keylock Function Option	Description
[▲] / [▼] keylock	• Locks the [▲] / [▼] keys on the controller front panel to prohibit their operation. However, the password setting or the following security-related parameters setting operation is possible.
[A/M] key lock	• Locks the [A/M] key on the controller front panel to prohibit switching between auto and manual modes.
Operation mode lock	• The parameters in the main menu "MODE," which are used to select operation mode, are not shown. This prohibits you from making the following changes by key operation.
1) When the Model Is UT750	
• Switching between loop-2 auto and manual modes • Selecting from auto, manual and cascade modes during cascade control (the parameters are shown only during cascade secondary-loop control, cascade control or cascade control with 2 universal inputs.) • Switching between loop-1 remote and local modes • Switching between loop-2 remote and local modes • Switching between STOP and RUN statuses • Selecting target setpoint number (common to loops 1 and 2)	
2) When the Model Is UT550, UT551, UT520	
• Selecting from auto, manual and cascade modes during cascade control (the parameters are shown only during cascade secondary-loop control, cascade control or cascade control with 2 universal inputs.) • Switching between loop-1 remote and local modes • Switching between STOP and RUN statuses • Selecting target setpoint number (common to loops 1 and 2)	
[LP1] operating parameter lock	• The [LP1] operating parameter main menu (see Fig. 7-1-1) is not shown. This prohibits you from changing any of the [LP1] parameter settings.
[LP2] operating parameter lock (Note1)	• The [LP2] operating parameter main menu (see Fig. 7-1-1) is not shown. This prohibits you from changing any of the [LP2] parameter settings.
[n.PID] operating parameter lock	• The [n.PID] (n = 1 to 8) operating parameter submenu (see Fig. 7-1-1) is not shown. This prohibits you from changing of any of the PID parameter settings by key operation.
[USR] operating parameter lock	• The [USR] operating parameter main menu (see Fig. 7-1-1) is not shown. This prohibits you from changing any of the [USR] parameter settings.
[PYS1] operating parameter lock (Note2)	• The [PYS1] operating parameter main menu (see Fig. 7-1-1) is not shown. This prohibits you from changing any of the [PYS1] parameter settings.
[PYS2] operating parameter lock (Note3)	• The [PYS2] operating parameter submenu (see Fig. 7-1-1) is not shown. This prohibits you from changing of any of the [PYS2] parameter settings.

Note1: When using a UT mode requiring no secondary loop, such as single-loop control, the controller shows a parameter with which you can decide whether to show or hide the [LP2] or [PYS2] parameter. You need not set the parameter in this case, however.
Note2: With UT5□□, the parameter PY1 is used.
Note3: With UT5□□, the parameter RY2 is used.



For example, locking (hiding) the parameters of the [LP1] main menu further prohibits you from changing the settings of parameters, such as “AT”, that belong to the [RAR] submenu or any of the [1.PID] to [8.PID] submenus.

Fig. 7-1-1

- The following parameters are used.
  Change parameters as explained in the User’s Manuals Initial Settings and Parameter Map.

• Setup parameters (Security - related Parameters)

UT750 Code	UT5□□ Code	Description	Setting range	Default	D-register No.
▲/▼	dAt (DAT)	▲ / ▼ key lock (data setting key lock)	OFF or ON	OFF	1024
A/M	A/M (A/M)	A/M key lock	OFF or ON	OFF	1025
MODE	mod (MOD)	Operating parameter main menu [MODE] lock	OFF or ON	OFF	1028
LP1	LP1 (LP1)	Operating parameter main menu [LP1] lock	OFF or ON	OFF	1030
LP2	LP2 (LP2)	Operating parameter main menu [LP2] lock	OFF or ON	OFF	1031
PID	PId (PID)	Operating parameter main menu [PID] lock	OFF or ON	OFF	1032
USR	USr (USR)	Operating parameter main menu [USR] lock	OFF or ON	OFF	1033
PYS1	PY1 (PY1)	Operating parameter main menu [PYS1] lock	OFF or ON	OFF	1034
PYS2	PY2 (PY2)	Operating parameter main menu [PYS2] lock	OFF or ON	OFF	1035

[4] When the Model Is UP35□

The keylock function of the UP35□ is as follows. Any one of the function options in Table 7-1-4 can be selected by using the "LOCK" setup parameter.

Table 7-1-4 Keylock Function Options and Their Settings

LOCK Parameter Setting	Function
OFF	• Turns the keylock function OFF. This is the factory-set default.
1	• Prohibits any parameter setting from being changed. When "1" is selected, no change is allowed to any of the operating and setup parameters; only viewing the parameters is allowed, however. In this case, it is only possible to change the "LOCK" parameter. (Selecting OFF turns the keylock function OFF.)
2	• Prohibits operating parameters from being viewed. The operating parameter setting display is not shown, so settings cannot be changed. The setup parameter setting display can be viewed, however, by holding down the SET/ENT key for more than 3 seconds when an operating display is being shown. (If a password has been set, a password verification display will appear. If the correct password was entered, the setup parameter setting display appears. You can now change the setup parameter setting.)
3	• Disables the RESET key. You are not allowed to stop program operation with the front-panel RESET key.
4	• Disables the PRG 1 key. Prohibits program 1 from starting. (Use this option to prevent program 1 from starting by mistake in an application where, for example, only program 2 needs to be routinely used.)
5	• Disables the 2 PRG key. Prohibits program 1 from starting. (Use this option to prevent program 1 from starting by mistake in an application where, for example, only program 2 needs to be routinely used.)
6	• Disables both the PRG 1 and 2 PRG keys. Prohibits program operation.
7	• Prohibits program 1 parameter settings from being changed. Although program 1 parameters can be viewed on the operating parameter setting display by pressing the PRG 1 key, you are not allowed to change their settings.
8	• Prohibits program 2 parameter settings from being changed. Although program 2 parameters can be viewed on the operating parameter setting display by pressing the 2 PRG key, you are not allowed to change their settings.
9	• Prohibits both the program 1 parameter settings and program 2 parameter settings from being changed. Although program 1 and / or 2 parameters can be viewed on the operating parameter setting display by pressing the PRG 1 or 2 PRG key, you are not allowed to change their settings.

● The following parameters are used.
Change parameters as explained in the User's Manuals Initial Settings and Parameter Map.

• Setup parameters (Security - related Parameters)

UP35□ Code	Description	Setting range	Default	D-register No.
LocK (LOCK)	Key lock	OFF: No key lock (turns the key lock function OFF) 1 to 9: (See the Table 7-1-4)	0	1036

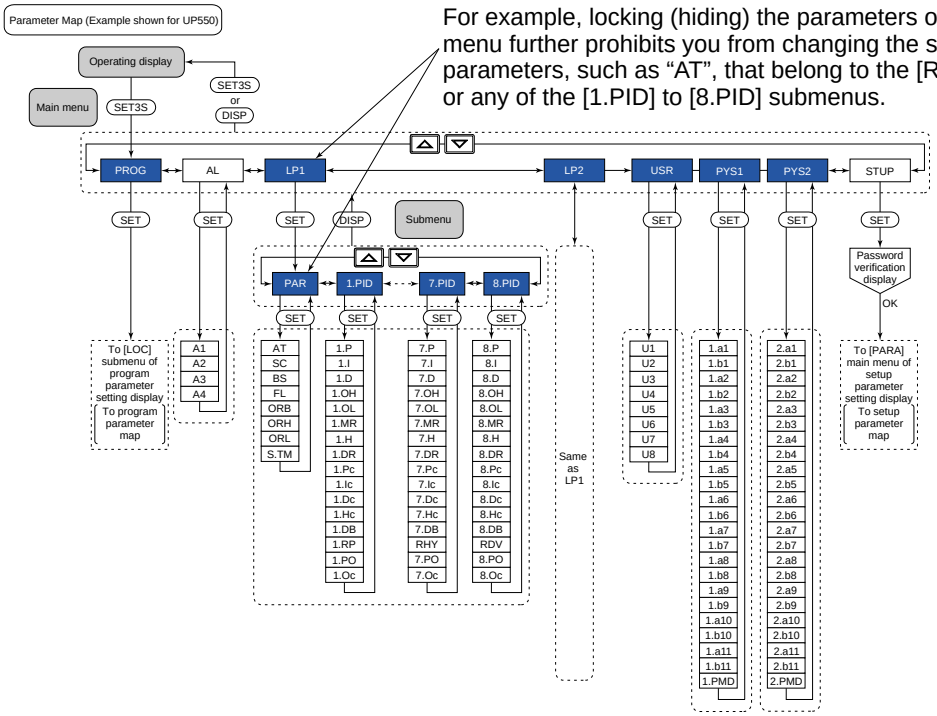
[5] When the Model Is UP750 and UP550

The keylock function of the UP750 and UP550 works as described in the table below. Two or more options of the keylock function can be selected using security-related setup parameters.

Table 7-1-5 Keylock Function Options

Keylock Function Option	Description
[▲] / [▼] keylock	• Locks the [▲] / [▼] keys on the controller front panel to prohibit their operation. However, the password setting or the following security-related parameters setting operation is possible.
[▼PT.No▲] key lock	• Locks the [▼PT.No▲] key on the controller front panel to prohibit switching Program pattern No..
[RUN] key lock	• Locks the [RUN] key on the controller front panel.
[MODE] key lock	• Locks the [MODE] key on the controller front panel. This prohibits you from making the following changes by key operation.
1) When the Model Is UP750	
	• Switching to hold mode of program operation • Advancing to the next segment during program operation • Starting operation in local mode (with the target setpoint kept constant) • Switching between loop-1auto and manual modes • Switching between loop-2 auto and manual modes (the parameters are shown only during cascade control, dual-loop control, temperature and humidity control, or cascade control with 2 universal inputs) • Switching between loop-2 local and cascade modes (the parameters are shown only during cascade control or cascade control with 2 universal inputs) • Selecting starting segment number
2) When the Model Is UP550	
	• Switching to hold mode of program operation • Advancing to the next segment during program operation • Starting operation in local mode (with the target setpoint kept constant) • Switching between loop-1auto and manual modes • Switching between loop-2 local and cascade modes (the parameters are shown only during cascade control or cascade control with 2 universal inputs) • Selecting starting segment number
[PROG] operating parameter lock	• The [PROG] operating parameter main menu (see Fig. 7-1-2) is not shown. This prohibits you from changing any of the [PROG] parameter settings.
[LP1] operating parameter lock	• The [LP1] operating parameter main menu (see Fig. 7-1-2) is not shown. This prohibits you from changing any of the [LP1] parameter settings.
[LP2] operating parameter lock	• The [LP2] operating parameter main menu (see Fig. 7-1-2) is not shown. This prohibits you from changing any of the [PROG] parameter settings.
[n.PID] operating parameter lock	• The [n.PID] (n = 1 to 8) operating parameter submenu (see Fig. 7-1-2) is not shown. This prohibits you from changing of any of the PID parameter settings by key operation.
[USR] operating parameter lock	• The [USR] operating parameter main menu (see Fig. 7-1-2) is not shown. This prohibits you from changing any of the [USR] parameter settings.
[PYS1] operating parameter lock (Note1)	• The [PYS1] operating parameter main menu (see Fig. 7-1-2) is not shown. This prohibits you from changing any of the [PYS1] parameter settings.
[PYS2] operating parameter lock (Note1)	• The [PYS2] operating parameter submenu (see Fig. 7-1-2) is not shown. This prohibits you from changing of any of the [PYS2] parameter settings.

Note1: When using a UP mode requiring no secondary loop, such as single-loop control, the controller shows a parameter with which you can decide whether to show or hide the [LP2] or [PYS2] parameter. You need not set the parameter in this case, however.



For example, locking (hiding) the parameters of the [LP1] main menu further prohibits you from changing the settings of parameters, such as “AT”, that belong to the [RAR] submenu or any of the [1.PID] to [8.PID] submenus.

Fig. 7-1-2

- The following parameters are used.
  Change parameters as explained in the User’s Manuals Initial Settings and Parameter Map.

• Setup parameters (Security - related Parameters)

UP750 UP550 Code	Description	Setting range	Default	D-register No.
▲/▼	[▲] / [▼] key lock (data setting key lock)	OFF or ON	OFF	1024
PT.NO	[PT.No] key lock	OFF or ON	OFF	1026
RUN	[RUN] key lock	OFF or ON	OFF	1027
MODE	[MODE] key lock	OFF or ON	OFF	1028
LP1	Operating parameter main menu [LP1] lock	OFF or ON	OFF	1030
LP2	Operating parameter main menu [LP2] lock	OFF or ON	OFF	1031
PID	Operating parameter main menu [PID] lock	OFF or ON	OFF	1032
USR	Operating parameter main menu [USR] lock	OFF or ON	OFF	1033
PYS1	Operating parameter main menu [PYS1] lock	OFF or ON	OFF	1034
PYS2	Operating parameter main menu [PYS2] lock	OFF or ON	OFF	1035

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Ref.8.1: Outline of Registers and I - relays

IMPORTANT: Applicable models of this section

UP750	UP550	UP35□	UT750	UT5□□	UT4□0	UT3□□
UP750	UP550	UP35□	UT750	UT5□□	UT4□0	UT3□□

Note: The “D-registers” and “I-relays” apply to all the models of UT and UP series. However, the kinds of D-registers or “I-relays” differ according to the controller model. The “B-registers” are used with UP750 or UP550.

These sections below provide outline of Registers and I-relays.
Refer to the manual of “LL200 PC-based Custom Computation Building Tool” or the manual of “GREEN Series Communication Function” (Optional) for more details about the functions of registers and I-relays.

(1) Outline of Registers and I-relays
(2) D-register Outline and D-register Map
(3) B-register Outline and B-register Map
(4) I-relay Outline and I-relay Map
(5) I-relay Timer setting

CAUTION

The controller internal data should be destroyed, and do not read or write operation to the Registers or I-relays in the “unused area.”
The “unused area” is shown in each Map of registers or I-relays.
For example, any cells left blank for I-relays 1 through 720 (in the I-relay map) are the “unused area.”

<<Ref.8.1: Outline of Registers and I - relays >>

Ref.8.1(1) Outline of Registers and I - relays

With all the GREEN Series controllers, the function of all terminals are specified when the Controller is shipped from the factory.
Especially with UP750, UP550, UT750, UT550, UT551 and UT520 that can specify a controller mode, the function of terminals are specified for each controller mode.
However, the function of terminals can be changed if necessary. To change them, use the D-registers or I - relays.

When you use the personal computer or the graphic display, centralized watching of control status can be permitted with the D-registers.

When you use the function of communication, the Program patterns making are permitted with the B-registers.

Ref.8.1(1) to Ref.8.1(5) show the outline and Registers or I-relays map (list).

Refer to them if necessary.

<<Ref.8.1: Outline of Registers and I - relays >>

Ref.8.1(2) D-register Outline and D-register Map

The process data or setting parameters (operating parameters or setup parameters) are kept in the D-registers.

With D-registers, the followings are permitted.

- Registration of SELECT displays (Note1)
- Building the User defining area (Note2)
- Reading / writing data with the programmable logic controllers (FA-M3, etc.) (Note3)
- Centralized watching of control status with the personal computer or the graphic display. (Note3)

Note1: Refer to Ref.6.1(1) when you want to register SELECT displays
Note2: Only UP750 or UT750 can build the User defining area. Refer to the manual of "LL200 PC-based Custom Computation Building Tool" for more details.
Note3: Refer to the manual of "GREEN series Communication function" (Optional) for more details.

Each D-register has a D-register number.
The number of each D-register can be confirmed by the D-register Map. See Table 8-1-2 (the table is for UP750 and UP550) to Table 8-1-6 (the table is for UT35□ and UT32□).
When you want to know the classification of D-registers, see the Table 8-1-1 below.

Table 8-1-1

Register No.	Classification		Description
1 to 49	Process values (Note1)	Operating display data.	PV, SP, OUT values, etc.
50 to 100	User area (Note2)	————————	For communication with display.
101 to 200	LOCAL operation parameters	LOCAL setup parameters.	Local setpoints, PID numbers, event settings.
201 to 230	Operating parameters	Operation modes and parameters.	A/M, C/A/M, MOUT, etc.
231 to 300		Operation-related parameters.	AT, SC, BS, FL, etc.
301 to 800		PID-related parameters.	P, I, D, etc.
801 to 900	Message display.	Message.	Up to 20 alphanumeric characters used for each message.
901 to 1000	Setup parameters.	Control action parameters.	SP, ALM, CTL
1001 to 1100		Common setup parameters.	AIN, RET, TRND, LOCK
1101 to 1200		Display, I/O registration parameters.	C.SEL, DO, DI, C.PYS
1201 to 1300		UT/UP mode, I/O type parameters.	UPMD, IN, OUT, R485, INIT
1301 to 1500	User defined custom computation area (Note3).	Input block.	Block I/O, module output.
1501 to 1700		Output block.	

Note1: D-register numbers 1 through 49 are read-only registers.
Note2: D-register numbers 50 through 100 (User area) are registers for 16-bit device data those are used with the device like a graphic display. Do not read or write the data from/to the D-registers in these area when you use the Device like a display.
Note3: The D-registers in this area (1301 to 1700) are used with "LL200 PC-based Custom Computation Building Tool" and only UP750 or UT750 can use them. The data in these area use 0 through 30000 count (0 to 100%) data or flags, or absolute data.

UP750,UP550 D-register Map

Table 8-1-2 (1/4) UP750,UP550 D-register Map (1/4)

PROCESS			PROGRAM			MODE/PAR			OPERATION(1)							
No.	1~	No. 51~	No. 101~		No. 151~	No. 201~		No. 251~	No. 301~		No. 351~		No. 401~		No. 451~	
1	ADERROR	51	101	LSP1	151	201		251	ORH.1	301		351		401		451	
2	ERROR.1	52	102	LSP1	152	202		252	ORL.1	302		352		402		452	
3	PV.1	53	103	PIDNO	153	203		253	S.TM	303		353		403		453	
4	CSP.1	54	104	EV21A	154	204		254		304		354		404		454	
5	OUT.1	55	105	EV21B	155	205		255		305		355		405		455	
6	HOUT.1	56	106	EV22A	156	206		256		306	1.P	356	3.P	406	5.P	456	7.P
7	COUT.1	57	107	EV22B	157	207		257		307	1.I	357	3.I	407	5.I	457	7.I
8	MOD.1	58	108	EV23A	158	208	R/P/L	258		308	1.D	358	3.D	408	5.D	458	7.D
9	PIDNO.1	59	109	EV23B	159	209	HOLD	259		309	1.OH	359	3.OH	409	5.OH	459	7.OH
10		60	110	EV24A	160	210	ADV	260		310	1.OL	360	3.OL	410	5.OL	460	7.OL
11	ALM	61	111	EV24B	161	211	A/M.1	261		311	1.MR	361	3.MR	411	5.MR	461	7.MR
12	PVEV	62	112	EV25A	162	212	A/M.2	262		312	1.H	362	3.H	412	5.H	462	7.H
13	TMEV1	63	113	EV25B	163	213	LSP/CAS	263		313	1.DR	363	3.DR	413	5.DR	463	7.DR
14	TMEV2	64	114	EV26A	164	214	PTNO	264		314	1.Pc	364	3.Pc	414	5.Pc	464	7.Pc
15	PTN	65	115	EV26B	165	215		265		315	1.Ic	365	3.Ic	415	5.Ic	465	7.Ic
16	SEGNO	66	116	EV27A	166	216		266		316	1.Dc	366	3.Dc	416	5.Dc	466	7.Dc
17	TIME	67	117	EV27B	167	217	MOUT.1	267		317	1.Hc	367	3.Hc	417	5.Hc	467	7.Hc
18	ERROR.2	68	118	EV28A	168	218	MOUTc.1	268		318	1.DB	368	3.DB	418	5.DB	468	7.DB
19	PV.2	69	119	EV28B	169	219	MOUT.2	269		319	1.RP	369	3.RP	419	5.RP	469	RHY
20	CSP.2	70	120		170	220	MOUTc.2	270		320	1.PO	370	3.PO	420	5.PO	470	7.PO
21	OUT.2	71	121		171	221	HOLDSP.1	271	AT.2	321	1.Oc	371	3.POc	421	5.Oc	471	7.POc
22	HOUT.2	72	122		172	222	HOLDSP.2	272	SC.2	322		372		422		472	
23	COUT.2	73	123		173	223	HOLDTM	273	BS.2	323		373		423		473	
24	MOD.2	74	124		174	224	SST	274	FL.2	324		374		424		474	
25	PIDNO.2	75	125		175	225		275		325		375		425		475	
26	DEV.1	76	126		176	226		276		326		376		426		476	
27	OR.1	77	127		177	227		277		327		377		427		477	
28		78	128		178	228		278		328		378		428		478	
29		79	129		179	229		279		329		379		429		479	
30	DEV.2	80	130		180	230		280	ORB.2	330		380		430		480	
31	OR.2	81	131		181	231	A1	281	ORH.2	331	2.P	381	4.P	431	6.P	481	8.P
32	SMEC	82	132		182	232	A2	282	ORL.2	332	2.I	382	4.I	432	6.I	482	8.I
33	DISTS	83	133		183	233	A3	283		333	2.D	383	4.D	433	6.D	483	8.D
34	RDISTS	84	134		184	234	A4	284		334	2.OH	384	4.OH	434	6.OH	484	8.OH
35	PARAERR	85	135		185	235		285		335	2.OL	385	4.OL	435	6.OL	485	8.OL
36	ALOSTS	86	136		186	236		286		336	2.MR	386	4.MR	436	6.MR	486	8.MR
37		87	137		187	237		287		337	2.H	387	4.H	437	6.H	487	8.H
38		88	138		188	238		288		338	2.DR	388	4.DR	438	6.DR	488	8.DR
39	DISP1	89	139		189	239		289		339	2.Pc	389	4.Pc	439	6.Pc	489	8.Pc
40	DISP2	90	140		190	240		290		340	2.Ic	390	4.Ic	440	6.Ic	490	8.Ic
41	TIME	91	141		191	241	AT.1	291		341	2.Dc	391	4.Dc	441	6.Dc	491	8.Dc
42	PTNO	92	142		192	242	SC.1	292		342	2.Hc	392	4.Hc	442	6.Hc	492	8.Hc
43	SEGNO	93	143		193	243	BS.1	293		343	2.DB	393	4.DB	443	6.DB	493	8.DB
44	SEGUSE	94	144		194	244	FL.1	294		344	2.RP	394	4.RP	444	6.RP	494	RDV
45	REM.RCY	95	145		195	245		295		345	2.PO	395	4.PO	445	6.PO	495	8.PO
46	ALL.RCY	96	146		196	246		296		346	2.POc	396	4.POc	446	6.POc	496	8.POc
47	RST	97	147		197	247		297		347		397		447		497	
48	REN	98	148		198	248		298		348		398		448		498	
49	PVEOSTS	99	149		199	249		299		349		399		449		499	
50		100	150		200	250	ORB.1	300		350		400		450		500	

unused area

Note:
- The code in the square like a “RDISTS” is used only with UP750.
- The number attached to the end of code means loop-number. “□□□.1” indicates that the code is for the loop-1. For example, “CSP.1” is the code for the loop-1 and “CSP.2” is for the loop-2.
- The number attached to the top of code means PID group number. “1.□□□” indicates that the code is for the PID group-1. For example, “1.P” is the code for the PID group-1 and “2.P” is for the PID group-2.

Table 8-1-2 (2/4) UP750,UP550 D-register Map (2/4)

OPERATION(2)								USR/PY				MSG				L1/L2			
No.	501~	No.	551~	No.	601~	No.	651~	No.	701~	No.	751~	No.	801~	No.	851~	No.	901~	No.	951~
501		551		601		651		701	U1	751	2.A1	801	MG 10	851		901		951	
502		552		602		652		702	U2	752	2.B1	802	MG 11	852		902	SPT.1	952	
503		553		603		653		703	U3	753	2.A2	803	MG 12	853		903		953	
504		554		604		654		704	U4	754	2.B2	804	MG 13	854		904	TM U.1	954	
505		555		605		655		705	U5	755	2.A3	805	MG 14	855		905	SEG.T	955	
506	1.P	556	3.P	606	5.P	656	7.P	706	U6	756	2.B3	806	MG 15	856		906	PT2.G	956	
507	1.I	557	3.I	607	5.I	657	7.I	707	U7	757	2.A4	807	MG 16	857		907	EHY1	957	
508	1.D	558	3.D	608	5.D	658	7.D	708	U8	758	2.B4	808	MG 17	858		908	EHY2	958	
509	1.OH	559	3.OH	609	5.OH	659	7.OH	709		759	2.A5	809	MG 18	859		909	EHY3	959	
510	1.OL	560	3.OL	610	5.OL	660	7.OL	710		760	2.B5	810	MG 19	860		910	EHY4	960	
511	1.MR	561	3.MR	611	5.MR	661	7.MR	711		761	2.A6	811	MG 20	861		911	EHY5	961	
512	1.H	562	3.H	612	5.H	662	7.H	712		762	2.B6	812	MG 21	862		912	EHY6	962	
513	1.DR	563	3.DR	613	5.DR	663	7.DR	713		763	2.A7	813	MG 22	863		913	EHY7	963	
514	1.Pc	564	3.Pc	614	5.Pc	664	7.Pc	714		764	2.B7	814	MG 23	864		914	EHY8	964	
515	1.Ic	565	3.Ic	615	5.Ic	665	7.Ic	715		765	2.A8	815	MG 24	865		915	AL1.1	965	
516	1.Dc	566	3.Dc	616	5.Dc	666	7.Dc	716		766	2.B8	816	MG 25	866		916	AL2.1	966	OPR.2
517	1.Hc	567	3.Hc	617	5.Hc	667	7.Hc	717		767	2.A9	817	MG 26	867		917	AL3.1	967	MO D.2
518	1.DB	568	3.DB	618	5.DB	668	7.DB	718		768	2.B9	818	MG 27	868		918	AL4.1	968	AR.2
519	1.RP	569	3.RP	619	5.RP	669	RHY	719		769	2.A10	819	MG 28	869		919	HY1.1	969	
520	1.PO	570	3.PO	620	5.PO	670	7.PO	720		770	2.B10	820	MG 29	870		920	HY2.1	970	
521	1.Oc	571	3.POc	621	5.Oc	671	7.POc	721		771	2.A11	821	MG 30	871		921	HY3.1	971	
522		572		622		672		722		772	2.B11	822	MG 31	872		922	HY4.1	972	
523		573		623		673		723		773	2.PMD	823	MG 32	873	unused area	923	AM D.1	973	SPH.2
524		574		624		674		724		774		824	MG 33	874		924		974	SPL.2
525		575		625		675		725		775		825	MG 34	875		925		975	
526		576		626		676		726	1.A1	776		826	MG 35	876		926	OPR.1	976	
527		577		627		677		727	1.B1	777		827	MG 36	877		927	MO D.1	977	
528		578		628		678		728	1.A2	778		828	MG 37	878		928	AR.1	978	
529		579		629		679		729	1.B2	779		829	MG 38	879		929	ZON	979	
530		580		630		680		730	1.A3	780		830	MG 39	880		930	R.M D	980	
531	2.P	581	4.P	631	6.P	681	8.P	731	1.B3	781		831	MG 40	881		931	R.TM	981	
532	2.I	582	4.I	632	6.I	682	8.I	732	1.A4	782		832	MG 41	882		932		982	
533	2.D	583	4.D	633	6.D	683	8.D	733	1.B4	783		833	MG 42	883		933	SPH.1	983	
534	2.OH	584	4.OH	634	6.OH	684	8.OH	734	1.A5	784		834	MG 43	884		934	SPL.1	984	
535	2.OL	585	4.OL	635	6.OL	685	8.OL	735	1.B5	785		835	MG 44	885		935		985	
536	2.MR	586	4.MR	636	6.MR	686	8.MR	736	1.A6	786		836	MG 45	886		936		986	
537	2.H	587	4.H	637	6.H	687	8.H	737	1.B6	787		837	MG 46	887		937		987	
538	2.DR	588	4.DR	638	6.DR	688	8.DR	738	1.A7	788		838	MG 47	888		938		988	
539	2.Pc	589	4.Pc	639	6.Pc	689	8.Pc	739	1.B7	789		839	MG 48	889		939	PNC	989	
540	2.Ic	590	4.Ic	640	6.Ic	690	8.Ic	740	1.A8	790		840	MG 49	890		940		990	
541	2.Dc	591	4.Dc	641	6.Dc	691	8.Dc	741	1.B8	791		841	NAM E1	891		941		991	
542	2.Hc	592	4.Hc	642	6.Hc	692	8.Hc	742	1.A9	792		842	NAM E2	892		942		992	
543	2.DB	593	4.DB	643	6.DB	693	8.DB	743	1.B9	793		843	NAM E3	893		943		993	
544	2.RP	594	4.RP	644	6.RP	694	RDV	744	1.A10	794		844	NAM E4	894		944		994	
545	2.PO	595	4.PO	645	6.PO	695	8.PO	745	1.B10	795		845	NAM E5	895		945		995	
546	2.POc	596	4.POc	646	6.POc	696	8.POc	746	1.A11	796		846	NAM E6	896		946		996	
547		597		647		697		747	1.B11	797	unused area	847	NAM E7	897		947		997	
548		598		648		698		748	1.PMD	798		848	NAM E8	898		948		998	
549		599		649		699		749		799		849	NAM E9	899		949		999	
550		600		650		700		750		800		850	NAM E10	900		950		1000	

Note:
- The code in the square is used only with UP750.
- The number attached to the end of code means loop-number. “□□□.1” indicates that the code is for the loop-1.
- The number attached to the top of code means PID group number. “1.□□□” indicates that the code is for the PID group-1. For example, “1.P” is the code for the PID group-1 and “2.P” is for the PID group-2.

Table 8-1-2 (3/4) UP750,UP550 D-register Map (3/4)

CMLP			CONF				UPMD			
No.	1001~	No. 1051~	No.	1101~	No.	1151~	No.	1201~	No.	1251~
1001	A.BS1	1051	1101	C.S1	1151	ADV	1201	IN1	1251	DLN1
1002	A.FL1	1052	1102	C.S2	1152	A/M .1	1202	UNI1	1252	ADR1
1003	A.SR1	1053	1103	C.S3	1153	A/M .2	1203	DP1	1253	RP.T1
1004	A.L C1	1054	1104	C.S4	1154	LSP/CAS	1204	RH1	1254	PSL2
1005	A.BS2	1055	1105	C.S5	1155	PTNO.b0	1205	RL1	1255	BPS2
1006	A.FL2	1056	1106	DO1	1156	PTNO.b1	1206	SDP1	1256	PRI2
1007	A.SR2	1057	1107	DO2	1157	PTNO.b2	1207	SH1	1257	STP2
1008	A.L C2	1058	1108	DO3	1158	PTNO.b3	1208	SL1	1258	DLN2
1009	A.BS3	1059	1109	DO4	1159	PTNO.b4	1209	BSL 1	1259	ADR2
1010	A.FL3	1060	1110	DO5	1160	PTNO.b5	1210	RJC1	1260	RP.T2
1011	A.SR3	1061	1111	DO6	1161	PTNO.b6	1211	IN2	1261	V.RS
1012	A.L C3	1062	1112	DO7	1162	PTNO.b7	1212	UNI2	1262	V.L
1013	RET1	1063	1113	RDO151	1163	PTNO.b8	1213	DP2	1263	V.H
1014	RTH1	1064	1114	RDO152	1164	DP1	1214	RH2	1264	TR.T
1015	RTL1	1065	1115	RDO153	1165	DP2	1215	RL2	1265	V.M OD
1016	RET2	1066	1116	RDO154	1166	MG 1	1216	SDP2	1266	INIT
1017	RTH2	1067	1117	RDO155	1167	MG 2	1217	SH2	1267	V.AT
1018	RTL2	1068	1118	RDO156	1168	MG 3	1218	SL2	1268	A1H
1019		1069	1119	RDO157	1169	MG 4	1219	BSL 2	1269	A1L
1020		1070	1120	RDO158	1170	PYA1	1220	RJC2	1270	A2H
1021	TSC1	1071	1121	RDO251	1171	PYB1	1221	IN3	1271	A2L
1022	TSC2	1072	1122	RDO252	1172	PYA2	1222	UNI3	1272	A3H
1023	TTM	1073	1123	RDO253	1173	PYB2	1223	DP3	1273	A3L
1024	▲▼	1074	1124	RDO254	1174		1224	RH3	1274	
1025		1075	1125	RDO255	1175		1225	RL3	1275	
1026	PT.NO	1076	1126	RDO256	1176		1226	SDP3	1276	
1027	RUN	1077	1127	RDO257	1177		1227	SH3	1277	
1028	MO DE	1078	1128	RDO258	1178		1228	SL3	1278	
1029	PRG	1079	1129		1179		1229	BSL 3	1279	
1030	LP1	1080	1130		1180		1230	P.UNI1	1280	UPM
1031	LP2	1081	1131		1181		1231	P.DP1	1281	SMP
1032	PID	1082	1132		1182		1232	P.RH1	1282	
1033	USR	1083	1133		1183		1233	P.RL1	1283	
1034	PYS1	1084	1134		1184		1234	P.UNI2	1284	
1035	PYS2	1085	1135		1185		1235	P.DP2	1285	
1036		1086	1136		1186		1236	P.RH2	1286	
1037		1087	1137		1187		1237	P.RL2	1287	
1038		1088	1138		1188		1238	OT1	1288	
1039		1089	1139		1189		1239	OT2	1289	
1040		1090	1140		1190		1240	CT1	1290	
1041		1091	1141		1191		1241	CT2	1291	
1042		1092	1142		1192		1242	CTc1	1292	
1043		1093	1143		1193		1243	CTc2	1293	
1044		1094	1144		1194		1244	AO1	1294	
1045		1095	1145		1195		1245	AO2	1295	
1046		1096	1146		1196		1246	AO3	1296	
1047		1097	1147	PROG	1197		1247	PSL1	1297	
1048		1098	1148	RESET	1198		1248	BPS1	1298	
1049		1099	1149	LOCAL	1199		1249	PRI1	1299	
1050		1100	1150	HOL D	1200		1250	STP1	1300	

unused area

unused area

Note:
- The code in the square like a “A.BS2” is used only with UP750.
- The code in the shaded square like a “V.RS” is used only with UP550.
- The number attached to the end of code means loop-number. “□□□.1” indicates that the code is for the loop-1.
- The number attached to the top of code means PID group number. “1.□□□” indicates that the code is for the PID group-1.

Table 8-1-2 (4/4) UP750,UP550 D-register Map (4/4)

INPUT BLOCK						OUTPUT BLOCK					
No.	1301~	No.	1351~	No. 1401~	No. 1451~	No.	1501~	No. 1551~		No. 1601~	No. 1651~
1301	AIN1	1351		1401 MO1L	1451 MO26L	1501	PV.1	1551	RDO251	1601 MO1L	1651 MO26L
1302	AIN2	1352		1402 MO1H	1452 MO26H	1502	PV.2	1552	RDO252	1602 MO1H	1652 MO26H
1303	AIN3	1353		1403 MO2L	1453 MO27L	1503	CSP.1	1553	RDO253	1603 MO2L	1653 MO27L
1304		1354		1404 MO2H	1454 MO27H	1504	CSP.2	1554	RDO254	1604 MO2H	1654 MO27H
1305		1355		1405 MO3L	1455 MO28L	1505	OUT.1	1555	RDO255	1605 MO3L	1655 MO28L
1306		1356		1406 MO3H	1456 MO28H	1506	OUT.2	1556	RDO256	1606 MO3H	1656 MO28H
1307		1357		1407 MO4L	1457 MO29L	1507	HOUT.1	1557	RDO257	1607 MO4L	1657 MO29L
1308		1358		1408 MO4H	1458 MO29H	1508	HOUT.2	1558	RDO258	1608 MO4H	1658 MO29H
1309		1359		1409 MO5L	1459 MO30L	1509	COUT.1	1559		1609 MO5L	1659 MO30L
1310		1360		1410 MO5H	1460 MO30H	1510	COUT.2	1560		1610 MO5H	1660 MO30H
1311		1361	PROG	1411 MO6L	1461 MO31L	1511	RET1	1561		1611 MO6L	1661 MO31L
1312		1362	RESET	1412 MO6H	1462 MO31H	1512	RET2	1562		1612 MO6H	1662 MO31H
1313		1363	LOCAL	1413 MO7L	1463 MO32L	1513		1563		1613 MO7L	1663 MO32L
1314		1364	HOLD	1414 MO7H	1464 MO32H	1514		1564		1614 MO7H	1664 MO32H
1315		1365	ADV	1415 MO8L	1465 MO33L	1515		1565		1615 MO8L	1665 MO33L
1316		1366	A/M.1	1416 MO8H	1466 MO33H	1516		1566		1616 MO8H	1666 MO33H
1317		1367	A/M.2	1417 MO9L	1467 MO34L	1517		1567		1617 MO9L	1667 MO34L
1318		1368	LSP/CAS	1418 MO9H	1468 MO34H	1518		1568		1618 MO9H	1668 MO34H
1319		1369	PTNO.b0	1419 MO10L	1469 MO35L	1519		1569		1619 MO10L	1669 MO35L
1320		1370	PTNO.b1	1420 MO10H	1470 MO35H	1520		1570		1620 MO10H	1670 MO35H
1321		1371	PTNO.b2	1421 MO11L	1471 MO36L	1521		1571		1621 MO11L	1671 MO36L
1322		1372	PTNO.b3	1422 MO11H	1472 MO36H	1522		1572		1622 MO11H	1672 MO36H
1323		1373	PTNO.b4	1423 MO12L	1473 MO37L	1523		1573		1623 MO12L	1673 MO37L
1324		1374	PTNO.b5	1424 MO12H	1474 MO37H	1524		1574		1624 MO12H	1674 MO37H
1325		1375	PTNO.b6	1425 MO13L	1475 MO38L	1525		1575		1625 MO13L	1675 MO38L
1326		1376	PTNO.b7	1426 MO13H	1476 MO38H	1526		1576		1626 MO13H	1676 MO38H
1327		1377	PTNO.b8	1427 MO14L	1477 MO39L	1527		1577		1627 MO14L	1677 MO39L
1328		1378	DP1	1428 MO14H	1478 MO39H	1528		1578		1628 MO14H	1678 MO39H
1329		1379	DP2	1429 MO15L	1479 MO40L	1529		1579		1629 MO15L	1679 MO40L
1330		1380	MG1	1430 MO15H	1480 MO40H	1530		1580		1630 MO15H	1680 MO40H
1331	PVIN.1	1381	MG2	1431 MO16L	1481 MO41L	1531	OUT1A	1581		1631 MO16L	1681 MO41L
1332	PVIN.2	1382	MG3	1432 MO16H	1482 MO41H	1532	OUT2A	1582		1632 MO16H	1682 MO41H
1333	RSPIN.1	1383	MG4	1433 MO17L	1483 MO42L	1533	OUT3A	1583		1633 MO17L	1683 MO42L
1334	RSPIN.2	1384		1434 MO17H	1484 MO42H	1534	OUT1R	1584		1634 MO17H	1684 MO42H
1335	GAIN.1	1385		1435 MO18L	1485 MO43L	1535	OUT2R	1585		1635 MO18L	1685 MO43L
1336	GAIN.2	1386		1436 MO18H	1486 MO43H	1536	DO1	1586		1636 MO18H	1686 MO43H
1337	TRG.1	1387		1437 MO19L	1487 MO44L	1537	DO2	1587		1637 MO19L	1687 MO44L
1338	TRG.2	1388		1438 MO19H	1488 MO44H	1538	DO3	1588		1638 MO19H	1688 MO44H
1339	TRF.1	1389		1439 MO20L	1489 MO45L	1539	DO4	1589		1639 MO20L	1689 MO45L
1340	TRF.2	1390		1440 MO20H	1490 MO45H	1540	DO5	1590		1640 MO20H	1690 MO45H
1341		1391		1441 MO21L	1491 MO46L	1541	DO6	1591		1641 MO21L	1691 MO46L
1342		1392		1442 MO21H	1492 MO46H	1542	**DO7**	1592		1642 MO21H	1692 MO46H
1343		1393		1443 MO22L	1493 MO47L	1543	RDO151	1593		1643 MO22L	1693 MO47L
1344		1394		1444 MO22H	1494 MO47H	1544	RDO152	1594		1644 MO22H	1694 MO47H
1345		1395		1445 MO23L	1495 MO48L	1545	RDO153	1595		1645 MO23L	1695 MO48L
1346		1396		1446 MO23H	1496 MO48H	1546	RDO154	1596		1646 MO23H	1696 MO48H
1347		1397		1447 MO24L	1497 MO49L	1547	RDO155	1597		1647 MO24L	1697 MO49L
1348		1398		1448 MO24H	1498 MO49H	1548	RDO156	1598		1648 MO24H	1698 MO49H
1349		1399		1449 MO25L	1499 MO50L	1549	RDO157	1599		1649 MO25L	1699 MO50L
1350		1400		1450 MO25H	1500 MO50H	1550	RDO158	1600		1650 MO25H	1700 MO50H

Note: • The code in the square is used only with UP750.
• The number attached to the end of code means loop-number. "□□□.1" indicates that the code is for the loop-1.
• The number attached to the top of code means PID group number. "1.□□□" indicates that the code is for the PID group-1.

UP35□ D-register Map

Table 8-1-3 (1/4) UP35□ D-register Map (1/4)

	PROCESS	PROGRAM	MODE/PAR	OPERATION(1)		OPERATION(2)		USR/PY
No	+0	+100	+200	+300	+400	+500	+600	+700
1	ADERROR							
2	ERROR							
3	PV							
4	CSP							
5	OUT							
6				1.P				
7				1.I				
8	MOD		R/P1/P2	1.D				
9	PIDNO		HOLD					
10			ADV					
11				1.MR				
12	PVE							
13	TME							
14								
15								
16	SEGNO							
17	TIME							
18								
19				1.RP				
20								
21			HOLDSP					
22								
23			HOLDTM					
24								
25								
26								
27								
28								
29								
30								
31		1.AL1		2.P				
32		1.A1		2.I				
33		1.AL2		2.D				
34		1.A2						
35	PARAERR	1.EON						
36		1.EOF		2.MR				
37		1.SSP	PCCH(Note)					
38		1.STC	PCCL(Note)					
39		1.SP1						
40		1.TM1						
41		1.SP2	AT					
42		1.TM2	SC					
43		1.SP3	BS					
44		1.TM3	FL	2.RP				
45		1.SP4						
46		1.TM4						
47		1.SP5						
48		1.TM5						
49		1.SP6						
50		1.TM6						

is read only register. is the “User area.”

Note : The codes PCCH and PCCL are used only with UP351.

Table 8-1-3 (2/4) UP35□ D-register Map (2/4)

	PROCESS	PROGRAM	MODE/PAR	OPERATION(1)		OPERATION(2)		USR/PY
No	+0	+100	+200	+300	+400	+500	+600	+700
51		1.SP7						
52		1.TM7						
53		1.SP8						
54		1.TM8	OH					
55		1.SP9	OL					
56		1.TM9	HYS	3.P				
57		1.SPA	DR	3.I				
58		1.TMA		3.D				
59		1.JC						
60	User		WIT.Z					
61	area	2.AL1	WIT.T	3.MR				
62	(50~100)	2.A1						
63		2.AL2						
64		2.A2						
65		2.EON						
66		2.EOF						
67		2.SSP						
68		2.STC						
69		2.SP1						
70		2.TM1						
71		2.SP2						
72		2.TM2						
73		2.SP3						
74		2.TM3						
75		2.SP4						
76		2.TM4						
77		2.SP5						
78		2.TM5						
79		2.SP6						
80		2.TM6						
81		2.SP7		4.P				
82		2.TM7		4.I				
83		2.SP8		4.D				
84		2.TM8						
85		2.SP9						
86		2.TM9		4.MR				
87		2.SPA						
88		2.TMA						
89		2.JC						
90								
91								
92								
93								
94					RDV			
95								
96								
97								
98								
99								
100								

is read only register. is the “User area.”

Table 8-1-3 (3/4) UP35□ D-register Map (3/4)

	MSG	L1/L2	CMLP	CONF	UPMD
No	+800	+900	+1000	+1100	+1200
1				C.S1	IN
2				C.S2	UNI
3				C.S3	
4		TMU		C.S4	RH
5		SEG.T			RL
6					SDP
7					SH
8					SL
9					BSL
10					RJC
11					
12					
13			RET		
14			RTH		
15			RTL		
16					
17					
18					
19		HY1			
20		HY2			
21					
22					
23					
24		PO			
25					
26					
27		C.MD			
28		AR			
29					
30					
31					
32		DIS			
33					
34					
35					
36			LOCK		
37			PCMD(Note)		
38			ERJC(Note)		OT
39					
40					CT
41					
42					
43					
44					
45					
46					
47					PSL
48					BPS
49					PRI
50					STP

Note : The codes PCMD and ERJC are used only with UP351.

Table 8-1-3 (4/4) UP35□ D-register Map (4/4)

	MSG	L1/L2	CMLP	CONF	UPMD
No	+800	+900	+1000	+1100	+1200
51					DLN
52					ADR
53					RP.T
54					
55					
56					
57					
58					
59					
60					
61					
62					
63					
64					
65					
66					
67					
68					
69					
70					
71					
72					
73					
74					
75					
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81					
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83					
84					
85					
86					
87					
88					
89					
90					
91					
92					
93					
94					
95					
96					
97					
98					
99					
100					

UT750, UT55□, UT520 D-register Map

Table 8-1-4 (1/4) UT750, UT55□, UT520 D-register Map (1/4)

PROCESS			PROGRAM		MODE/PAR				OPERATION(1)							
No.	1~	No. 51~	No. 101~	No. 151~	No.	201~	No.	251~	No.	301~	No.	351~	No.	401~	No.	451~
1	ADERROR	51	101	151	201	A/M 1	251	ORH.1	301	1.SP	351	3.SP	401	5.SP	451	7.SP
2	ERROR.1	52	102	152	202	A/M 2	252	ORL.1	302	1.A1	352	3.A1	402	5.A1	452	7.A1
3	PV.1	53	103	153	203	R/L1	253		303	1.A2	353	3.A2	403	5.A2	453	7.A2
4	CSP.1	54	104	154	204	R/L2	254		304	1.A3	354	3.A3	404	5.A3	454	7.A3
5	OUT.1	55	105	155	205	S/R	255		305	1.A4	355	3.A4	405	5.A4	455	7.A4
6	HOUT.1	56	106	156	206	C.A.M	256		306	1.P	356	3.P	406	5.P	456	7.P
7	COUT.1	57	107	157	207	SPNO(SPN)	257		307	1.I	357	3.I	407	5.I	457	7.I
8	MOD.1	58	108	158	208		258		308	1.D	358	3.D	408	5.D	458	7.D
9	PIDNO.1	59	109	159	209		259		309	1.OH	359	3.OH	409	5.OH	459	7.OH
10	CSPNO	60	110	160	210		260		310	1.OL	360	3.OL	410	5.OL	460	7.OL
11	ALM	61	111	161	211		261		311	1.MR	361	3.MR	411	5.MR	461	7.MR
12		62	112	162	212		262	PCH.1	312	1.H	362	3.H	412	5.H	462	7.H
13		63	113	163	213		263	PCL.1	313	1.DR	363	3.DR	413	5.DR	463	7.DR
14		64	114	164	214		264		314	1.Pc	364	3.Pc	414	5.Pc	464	7.Pc
15		65	115	165	215	C.RSP.1	265		315	1.Ic	365	3.Ic	415	5.Ic	465	7.Ic
16		66	116	166	216	C.RSP.2	266		316	1.Dc	366	3.Dc	416	5.Dc	466	7.Dc
17		67	117	167	217	MOUT.1	267		317	1.Hc	367	3.Hc	417	5.Hc	467	7.Hc
18	ERROR.2	68	118	168	218	MOUTc.1	268		318	1.DB	368	3.DB	418	5.DB	468	7.DB
19	PV.2	69	119	169	219	MOUT.2	269		319	1.RP	369	3.RP	419	5.RP	469	RHY
20	CSP.2	70	120	170	220	MOUTc.2	270		320	1.PO	370	3.PO	420	5.PO	470	7.PO
21	OUT.2	71	121	171	221		271	AT.2	321	1.Oc	371	3.POc	421	5.Oc	471	7.POc
22	HOUT.2	72	122	172	222		272	SC.2	322		372		422		472	
23	COUT.2	73	123	173	223		273	BS.2	323		373		423		473	
24	MOD.2	74	124	174	224		274	FL.2	324		374		424		474	
25	PIDNO.2	75	125	175	225	P.NO	275	UPR.2	325		375		425		475	
26	DEV.1	76	126	176	226		276	DNR.2	326	2.SP	376	4.SP	426	6.SP	476	8.SP
27	OR.1	77	127	177	227		277	RT.2	327	2.A1	377	4.A1	427	6.A1	477	8.A1
28		78	128	178	228		278	RBS.2	328	2.A2	378	4.A2	428	6.A2	478	8.A2
29		79	129	179	229		279	RFL.2	329	2.A3	379	4.A3	429	6.A3	479	8.A3
30	DEV.2	80	130	180	230		280	ORB.2	330	2.A4	380	4.A4	430	6.A4	480	8.A4
31	OR.2	81	131	181	231		281	ORH.2	331	2.P	381	4.P	431	6.P	481	8.P
32	SMEC(SMC)	82	132	182	232		282	ORL.2	332	2.I	382	4.I	432	6.I	482	8.I
33	DISTS	83	133	183	233		283		333	2.D	383	4.D	433	6.D	483	8.D
34	RDISTS	84	134	184	234		284		334	2.OH	384	4.OH	434	6.OH	484	8.OH
35	PARAERR	85	135	185	235		285		335	2.OL	385	4.OL	435	6.OL	485	8.OL
36	ALOSTS	86	136	186	236		286		336	2.MR	386	4.MR	436	6.MR	486	8.MR
37	TIM 1	87	137	187	237		287		337	2.H	387	4.H	437	6.H	487	8.H
38	TIM 2	88	138	188	238		288		338	2.DR	388	4.DR	438	6.DR	488	8.DR
39	DISP1	89	139	189	239		289		339	2.Pc	389	4.Pc	439	6.Pc	489	8.Pc
40	DISP2	90	140	190	240		290		340	2.Ic	390	4.Ic	440	6.Ic	490	8.Ic
41		91	141	191	241	AT.1	291		341	2.Dc	391	4.Dc	441	6.Dc	491	8.Dc
42		92	142	192	242	SC.1	292	PCH.2	342	2.Hc	392	4.Hc	442	6.Hc	492	8.Hc
43		93	143	193	243	BS.1	293	PCL.2	343	2.DB	393	4.DB	443	6.DB	493	8.DB
44		94	144	194	244	FL.1	294		344	2.RP	394	4.RP	444	6.RP	494	RDV
45		95	145	195	245	UPR.1	295		345	2.PO	395	4.PO	445	6.PO	495	8.PO
46		96	146	196	246	DNR.1	296		346	2.POc	396	4.POc	446	6.POc	496	8.POc
47		97	147	197	247	RT.1	297		347		397		447		497	
48		98	148	198	248	RBS.1	298		348		398		448		498	
49		99	149	199	249	RFL.1	299		349		399		449		499	
50		100	150	200	250	ORB.1	300		350		400		450		500	

unused area

Note:
- The code in the square like a “RDISTS” is used only with UT750.
- The code in the shaded square like a “P.NO” is used only with UT551.
- The code in parentheses is for UT550, UT520 and UT551.
- The number attached to the end of code means loop-number. “□□□.1” indicates that the code is for the loop-1. For example, “CSP.1” is the code for the loop-1 and “CSP.2” is for the loop-2.
- The number attached to the top of code means PID group number. “1.□□□” indicates that the code is for the PID group-1. For example, “1.SP” is the code for the PID group-1 and “2.SP” is for the PID group-2.

Table 8-1-4 (2/4) UT750, UT55□, UT520 D-register Map (2/4)

OPERATION(2)								USR/PY				MSG				L1/L2			
No.	501~	No.	551~	No.	601~	No.	651~	No.	701~	No.	751~	No.	801~	No.	851~	No.	901~	No.	951~
501	1.SP	551	3.SP	601	5.SP	651	7.SP	701	U1	751	2.A1	801	MG 10	851		901	RMS.1	951	
502	1.A1	552	3.A1	602	5.A1	652	7.A1	702	U2	752	2.B1	802	MG 11	852		902	SPT.1	952	
503	1.A2	553	3.A2	603	5.A2	653	7.A2	703	U3	753	2.A2	803	MG 12	853		903	PVT.1	953	
504	1.A3	554	3.A3	604	5.A3	654	7.A3	704	U4	754	2.B2	804	MG 13	854		904	TMU.1	954	
505	1.A4	555	3.A4	605	5.A4	655	7.A4	705	U5	755	2.A3	805	MG 14	855		905		955	AL1.2
506	1.P	556	3.P	606	5.P	656	7.P	706	U6	756	2.B3	806	MG 15	856		906		956	AL2.2
507	1.I	557	3.I	607	5.I	657	7.I	707	U7	757	2.A4	807	MG 16	857		907		957	AL3.2
508	1.D	558	3.D	608	5.D	658	7.D	708	U8	758	2.B4	808	MG 17	858		908		958	AL4.2
509	1.OH	559	3.OH	609	5.OH	659	7.OH	709		759	2.A5	809	MG 18	859		909		959	HY1.2
510	1.OL	560	3.OL	610	5.OL	660	7.OL	710		760	2.B5	810	MG 19	860		910		960	HY2.2
511	1.MR	561	3.MR	611	5.MR	661	7.MR	711		761	2.A6	811	MG 20	861		911		961	HY3.2
512	1.H	562	3.H	612	5.H	662	7.H	712		762	2.B6	812	MG 21	862		912		962	HY4.2
513	1.DR	563	3.DR	613	5.DR	663	7.DR	713		763	2.A7	813	MG 22	863		913		963	AMD.2
514	1.Pc	564	3.Pc	614	5.Pc	664	7.Pc	714		764	2.B7	814	MG 23	864		914		964	
515	1.Ic	565	3.Ic	615	5.Ic	665	7.Ic	715		765	2.A8	815	MG 24	865		915	AL1.1	965	
516	1.Dc	566	3.Dc	616	5.Dc	666	7.Dc	716		766	2.B8	816	MG 25	866		916	AL2.1	966	OPR.2
517	1.Hc	567	3.Hc	617	5.Hc	667	7.Hc	717		767	2.A9	817	MG 26	867		917	AL3.1	967	MOD.2
518	1.DB	568	3.DB	618	5.DB	668	7.DB	718		768	2.B9	818	MG 27	868		918	AL4.1	968	AR.2
519	1.RP	569	3.RP	619	5.RP	669	RHY	719		769	2.A10	819	MG 28	869		919	HY1.1	969	
520	1.PO	570	3.PO	620	5.PO	670	7.PO	720		770	2.B10	820	MG 29	870		920	HY2.1	970	
521	1.Oc	571	3.POc	621	5.Oc	671	7.POc	721		771	2.A11	821	MG 30	871		921	HY3.1	971	
522		572		622		672		722		772	2.B11	822	MG 31	872		922	HY4.1	972	
523		573		623		673		723		773	2.PMD	823	MG 32	873	unused area	923	AMD.1	973	SPH.2
524		574		624		674		724		774		824	MG 33	874		924		974	SPL.2
525		575		625		675		725		775		825	MG 34	875		925		975	DY1.2
526	2.SP	576	4.SP	626	6.SP	676	8.SP	726	1.A1	776		826	MG 35	876		926	OPR.1	976	DY2.2
527	2.A1	577	4.A1	627	6.A1	677	8.A1	727	1.B1	777		827	MG 36	877		927	MOD.1	977	DY3.2
528	2.A2	578	4.A2	628	6.A2	678	8.A2	728	1.A2	778		828	MG 37	878		928	AR.1	978	DY4.2
529	2.A3	579	4.A3	629	6.A3	679	8.A3	729	1.B2	779		829	MG 38	879		929	ZON	979	
530	2.A4	580	4.A4	630	6.A4	680	8.A4	730	1.A3	780		830	MG 39	880		930	RMD	980	
531	2.P	581	4.P	631	6.P	681	8.P	731	1.B3	781		831	MG 40	881		931	R.TM	981	
532	2.I	582	4.I	632	6.I	682	8.I	732	1.A4	782		832	MG 41	882		932		982	
533	2.D	583	4.D	633	6.D	683	8.D	733	1.B4	783		833	MG 42	883		933	SPH.1	983	
534	2.OH	584	4.OH	634	6.OH	684	8.OH	734	1.A5	784		834	MG 43	884		934	SPH.1	984	
535	2.OL	585	4.OL	635	6.OL	685	8.OL	735	1.B5	785		835	MG 44	885		935	DY1.1	985	
536	2.MR	586	4.MR	636	6.MR	686	8.MR	736	1.A6	786		836	MG 45	886		936	DY2.1	986	
537	2.H	587	4.H	637	6.H	687	8.H	737	1.B6	787		837	MG 46	887		937	DY3.1	987	
538	2.DR	588	4.DR	638	6.DR	688	8.DR	738	1.A7	788		838	MG 47	888		938	DY4.1	988	
539	2.Pc	589	4.Pc	639	6.Pc	689	8.Pc	739	1.B7	789		839	MG 48	889		939		989	
540	2.Ic	590	4.Ic	640	6.Ic	690	8.Ic	740	1.A8	790		840	MG 49	890		940	GRP	990	
541	2.Dc	591	4.Dc	641	6.Dc	691	8.Dc	741	1.B8	791		841	NAM E1	891		941	RMS.2	991	
542	2.Hc	592	4.Hc	642	6.Hc	692	8.Hc	742	1.A9	792		842	NAM E2	892		942	SPT.2	992	
543	2.DB	593	4.DB	643	6.DB	693	8.DB	743	1.B9	793		843	NAM E3	893		943	PVT.2	993	
544	2.RP	594	4.RP	644	6.RP	694	RDV	744	1.A10	794		844	NAM E4	894		944	TMU.2	994	
545	2.PO	595	4.PO	645	6.PO	695	8.PO	745	1.B10	795		845	NAM E5	895		945		995	
546	2.POc	596	4.POc	646	6.POc	696	8.POc	746	1.A11	796		846	NAM E6	896		946		996	
547		597		647		697		747	1.B11	797	unused area	847	NAM E7	897		947		997	
548		598		648		698		748	1.PMD	798		848	NAM E8	898		948		998	
549		599		649		699		749		799		849	NAM E9	899		949		999	
550		600		650		700		750		800		850	NAM E10	900		950		1000	

Note: • The code in the square is used only with UT750.
• The number attached to the end of code means loop-number. "□□□.1" indicates that the code is for the loop-1.
• The number attached to the top of code means PID group number. "1.□□□" indicates that the code is for the PID group-1.

Table 8-1-4 (3/4) UT750,UT55□,UT520 D-register Map (3/4)

CMLP				CONF				UTMD			
No.	1001~	No.	1051~	No.	1101~	No.	1151~	No.	1201~	No.	1251~
1001	A.BS1(BS1)	1051	unused area	1101	C.S1	1151		1201	IN1	1251	DLN1(DLN)
1002	A.FL1(FL1)	1052		1102	C.S2	1152		1202	UNI1(UN1)	1252	ADR1(ADR)
1003	A.SR1(SR1)	1053		1103	C.S3	1153		1203	DP1	1253	RP.T1(RP.T)
1004	A.LC1(LC1)	1054		1104	C.S4	1154		1204	RH1	1254	PSL2
1005	A.BS2	1055		1105	C.S5	1155		1205	RL1	1255	BPS2
1006	A.FL2	1056		1106	DO1	1156		1206	SDP1(DP1)	1256	PRI2
1007	A.SR2	1057		1107	DO2	1157		1207	SH1	1257	STP2
1008	A.LC2	1058		1108	DO3	1158		1208	SL1	1258	DLN2
1009	A.BS3(BS3)	1059		1109	DO4	1159		1209	BSL1(BO1)	1259	ADR2
1010	A.FL3(FL3)	1060		1110	DO5	1160		1210	RJC1(RJC)	1260	RP.T2
1011	A.SR3(SR3)	1061		1111	DO6	1161		1211	IN2	1261	V.RS
1012	A.LC3(LC3)	1062		1112	DO7	1162		1212	UNI2	1262	V.L
1013	RET1(RT1)	1063		1113	RDO151	1163		1213	DP2	1263	V.H
1014	RTH1(TH1)	1064		1114	RDO152	1164		1214	RH2	1264	TR.T
1015	RTL1(TL1)	1065		1115	RDO153	1165		1215	RL2	1265	V.MOD(V.MD)
1016	RET2(RT2)	1066		1116	RDO154	1166		1216	SDP2	1266	INIT (INI)
1017	RTH2(TH2)	1067		1117	RDO155	1167		1217	SH2	1267	V.AT
1018	RTL2(TL2)	1068		1118	RDO156	1168		1218	SL2	1268	A1H
1019	DVB1(DVB)	1069		1119	RDO157	1169		1219	BSL2	1269	A1L
1020	DVB2(DV2)	1070		1120	RDO158	1170	PYA1(P1A)	1220	RJC2	1270	A2H
1021	TSC1	1071		1121	RDO251	1171	PYB1(P1B)	1221	IN3	1271	A2L
1022	TSC2	1072		1122	RDO252	1172	PYA2(P2A)	1222	UNI3(UN3)	1272	A3H
1023	TTM	1073		1123	RDO253	1173	PYB2(P2B)	1223	DP3	1273	A3L
1024	L-▲▼	1074		1124	RDO254	1174	PIDNO.b0	1224	RH3	1274	DPC
1025	L-A/M	1075	PRT	1125	RDO255	1175	PIDNO.b1	1225	RL3	1275	
1026		1076	(Note1)	1126	RDO256	1176	PIDNO.b2	1226	SDP3(DP3)	1276	
1027		1077		1127	RDO257	1177	PIDNO.b3	1227	SH3	1277	
1028	L-MODE	1078		1128	RDO258	1178	REM	1228	SL3	1278	
1029		1079		1129	A/M.1	1179		1229	BSL3(BO3)	1279	
1030	L-LP1	1080		1130	A/M.2	1180	LCL	1230	P.UNI1(P.U1)	1280	UTMD
1031	L-LP2	1081		1131	R/L.1	1181		1231	P.DP1(P.D1)	1281	SMP
1032	L-PID	1082		1132	R/L.2	1182		1232	P.RH1(P.H1)	1282	
1033	L-USR	1083		1133	S/R	1183		1233	P.RL1(P.L1)	1283	
1034	L-PY1	1084		1134	CAS	1184		1234	P.UNI2(P.U2)	1284	
1035	L-PY2	1085		1135	AUTO(AUT)	1185		1235	P.DP2(P.D2)	1285	
1036		1086		1136	MAN	1186		1236	P.RH2(P.H2)	1286	
1037	PCM.1	1087		1137	SPb0	1187		1237	P.RL2(P.L2)	1287	
1038	ERJ	1088		1138	SPb1	1188		1238	OT1	1288	
1039	PCM.2	1089		1139	SPb2	1189		1239	OT2	1289	
1040		1090		1140	SPb3	1190		1240	CT1	1290	
1041	unused area	1091		1141	DP1	1191		1241	CT2	1291	unused area
1042		1092		1142	DP2	1192		1242	CTc1(CTc)	1292	
1043		1093		1143	MG1	1193		1243	CTc2	1293	
1044		1094		1144	MG2	1194		1244	AO1	1294	
1045		1095		1145	MG3	1195		1245	AO2	1295	
1046		1096		1146	MG4	1196		1246	AO3	1296	
1047		1097		1147		1197		1247	PSL1(PSL)	1297	
1048		1098		1148		1198		1248	BPS1(BPS)	1298	
1049		1099		1149		1199		1249	PRI1(PRI)	1299	
1050		1100		1150		1200		1250	STP1(STP)	1300	

Note:
- The code in the square like a “A.BS2” is used only with UT750.
- The code in the shaded square like a “PCM.1” is used only with UT551.
- The code in parentheses is for UT550, UT520 and UT551.
- The number attached to the end of code means loop-number. “□□□.1” indicates that the code is for the loop-1.
- The number attached to the top of code means PID group number. “1.□□□” indicates that the code is for the PID group-1.

Note 1: The code PRT is used only with UT551 with embedded Ethernet.

Table 8-1-4 (4/4) UT750,UT55□,UT520 D-register Map (4/4)

INPUT BLOCK								OUTPUT BLOCK							
No.	1301~	No.	1351~	No.	1401~	No.	1451~	No.	1501~	No.	1551~	No.	1601~	No.	1651~
1301	AIN1	1351	SP.b0	1401	MO 1L	1451	MO 26L	1501	PV.1	1551	RDO251	1601	MO 1L	1651	MO 26L
1302	AIN2	1352	SP.b1	1402	MO 1H	1452	MO 26H	1502	PV.2	1552	RDO252	1602	MO 1H	1652	MO 26H
1303	AIN3	1353	SP.b2	1403	MO 2L	1453	MO 27L	1503	CSP.1	1553	RDO253	1603	MO 2L	1653	MO 27L
1304		1354	SP.b3	1404	MO 2H	1454	MO 27H	1504	CSP.2	1554	RDO254	1604	MO 2H	1654	MO 27H
1305		1355	DP1	1405	MO 3L	1455	MO 28L	1505	OUT.1	1555	RDO255	1605	MO 3L	1655	MO 28L
1306		1356	DP2	1406	MO 3H	1456	MO 28H	1506	OUT.2	1556	RDO256	1606	MO 3H	1656	MO 28H
1307		1357	MG 1	1407	MO 4L	1457	MO 29L	1507	HOUT.1	1557	RDO257	1607	MO 4L	1657	MO 29L
1308		1358	MG 2	1408	MO 4H	1458	MO 29H	1508	HOUT.2	1558	RDO258	1608	MO 4H	1658	MO 29H
1309		1359	MG 3	1409	MO 5L	1459	MO 30L	1509	COUT.1	1559		1609	MO 5L	1659	MO 30L
1310		1360	MG 4	1410	MO 5H	1460	MO 30H	1510	COUT.2	1560		1610	MO 5H	1660	MO 30H
1311		1361		1411	MO 6L	1461	MO31L	1511	RET1	1561		1611	MO 6L	1661	MO31L
1312		1362		1412	MO 6H	1462	MO31H	1512	RET2	1562		1612	MO 6H	1662	MO31H
1313		1363		1413	MO 7L	1463	MO32L	1513		1563		1613	MO 7L	1663	MO32L
1314		1364		1414	MO 7H	1464	MO32H	1514		1564		1614	MO 7H	1664	MO32H
1315		1365		1415	MO 8L	1465	MO33L	1515		1565		1615	MO 8L	1665	MO33L
1316		1366		1416	MO 8H	1466	MO33H	1516		1566		1616	MO 8H	1666	MO33H
1317		1367		1417	MO 9L	1467	MO34L	1517		1567		1617	MO 9L	1667	MO34L
1318		1368		1418	MO 9H	1468	MO34H	1518		1568		1618	MO 9H	1668	MO34H
1319		1369		1419	MO 10L	1469	MO35L	1519		1569		1619	MO 10L	1669	MO35L
1320		1370		1420	MO 10H	1470	MO35H	1520		1570		1620	MO 10H	1670	MO35H
1321		1371		1421	MO 11L	1471	MO36L	1521		1571		1621	MO 11L	1671	MO36L
1322		1372		1422	MO 11H	1472	MO36H	1522		1572		1622	MO 11H	1672	MO36H
1323		1373		1423	MO 12L	1473	MO37L	1523		1573		1623	MO 12L	1673	MO37L
1324		1374		1424	MO 12H	1474	MO37H	1524		1574		1624	MO 12H	1674	MO37H
1325		1375		1425	MO 13L	1475	MO38L	1525		1575		1625	MO 13L	1675	MO38L
1326		1376		1426	MO 13H	1476	MO38H	1526		1576		1626	MO 13H	1676	MO38H
1327		1377		1427	MO 14L	1477	MO39L	1527		1577		1627	MO 14L	1677	MO39L
1328		1378		1428	MO 14H	1478	MO39H	1528		1578		1628	MO 14H	1678	MO39H
1329		1379		1429	MO 15L	1479	MO40L	1529		1579		1629	MO 15L	1679	MO40L
1330		1380		1430	MO 15H	1480	MO40H	1530		1580		1630	MO 15H	1680	MO40H
1331	PVIN.1	1381		1431	MO 16L	1481	MO41L	1531	OUT1A	1581		1631	MO 16L	1681	MO41L
1332	PVIN.2	1382		1432	MO 16H	1482	MO41H	1532	OUT2A	1582		1632	MO 16H	1682	MO41H
1333	RSPIN.1	1383		1433	MO 17L	1483	MO42L	1533	OUT3A	1583		1633	MO 17L	1683	MO42L
1334	RSPIN.2	1384		1434	MO 17H	1484	MO42H	1534	OUT1R	1584		1634	MO 17H	1684	MO42H
1335	GAIN.1	1385		1435	MO 18L	1485	MO43L	1535	OUT2R	1585		1635	MO 18L	1685	MO43L
1336	GAIN.2	1386		1436	MO 18H	1486	MO43H	1536	DO1	1586		1636	MO 18H	1686	MO43H
1337	TRG.1	1387		1437	MO 19L	1487	MO44L	1537	DO2	1587		1637	MO 19L	1687	MO44L
1338	TRG.2	1388		1438	MO 19H	1488	MO44H	1538	DO3	1588		1638	MO 19H	1688	MO44H
1339	TRF.1	1389		1439	MO 20L	1489	MO45L	1539	DO4	1589		1639	MO 20L	1689	MO45L
1340	TRF.2	1390		1440	MO 20H	1490	MO45H	1540	DO5	1590		1640	MO 20H	1690	MO45H
1341		1391		1441	MO 21L	1491	MO46L	1541	DO6	1591		1641	MO 21L	1691	MO46L
1342		1392		1442	MO 21H	1492	MO46H	1542	DO7	1592		1642	MO 21H	1692	MO46H
1343	A/M .1	1393		1443	MO 22L	1493	MO47L	1543	RDO151	1593		1643	MO 22L	1693	MO47L
1344	A/M .2	1394		1444	MO 22H	1494	MO47H	1544	RDO152	1594		1644	MO 22H	1694	MO47H
1345	R/L.1	1395		1445	MO 23L	1495	MO48L	1545	RDO153	1595		1645	MO 23L	1695	MO48L
1346	R/L.2	1396		1446	MO 23H	1496	MO48H	1546	RDO154	1596		1646	MO 23H	1696	MO48H
1347	S/R	1397		1447	MO 24L	1497	MO49L	1547	RDO155	1597		1647	MO 24L	1697	MO49L
1348	CAS	1398		1448	MO 24H	1498	MO49H	1548	RDO156	1598		1648	MO 24H	1698	MO49H
1349	AUTO	1399		1449	MO 25L	1499	MO50L	1549	RDO157	1599		1649	MO 25L	1699	MO50L
1350	MA N	1400		1450	MO 25H	1500	MO50H	1550	RDO158	1600		1650	MO 25H	1700	MO50H

Note:
- The code in the square is used only with UT750.
- The number attached to the end of code means loop-number. "□□□.1" indicates that the code is for the loop-1.
- The number attached to the top of code means PID group number. "1.□□□" indicates that the code is for the PID group-1.

UT450,UT420 D-register Map

Table 8-1-5 (1/3) UT450,UT420 D-register Map (1/3)

PROCESS			PROGRAM		MODE/PAR			OPERATION(1)							
No.	1~	No. 51~	No. 101~	No. 151~	No.	201~	No. 251~	No. 301~		No. 351~		No. 401~		No. 451~	
1	ADERROR	51	101	151	201	A/M	251 ORH	301	1.SP	351	3.SP	401	5.SP	451	7.SP
2	ERROR	52	102	152	202		252 ORL	302		352		402		452	
3	PV	53	103	153	203	R/L	253	303		353		403		453	
4	CSP	54	104	154	204		254	304		354		404		454	
5	OUT	55	105	155	205	S/R	255	305		355		405		455	
6	HOUT	56	106	156	206		256	306	1.P	356	3.P	406	5.P	456	7.P
7	COUT	57	107	157	207	SPN	257	307	1.I	357	3.I	407	5.I	457	7.I
8	MOD	58	108	158	208		258	308	1.D	358	3.D	408	5.D	458	7.D
9	PIDNO	59	109	159	209		259	309	1.OH	359	3.OH	409	5.OH	459	7.OH
10	CSPNO	60	110	160	210		260	310	1.OL	360	3.OL	410	5.OL	460	7.OL
11	ALM	61	111	161	211		261	311	1.MR	361	3.MR	411	5.MR	461	7.MR
12		62	112	162	212		262	312	1.H	362	3.H	412	5.H	462	7.H
13		63	113	163	213		263	313	1.DR	363	3.DR	413	5.DR	463	7.DR
14		64	114	164	214		264	314	1.Pc	364	3.Pc	414	5.Pc	464	7.Pc
15		65	115	165	215	C.RSP	265	315	1.Ic	365	3.Ic	415	5.Ic	465	7.Ic
16		66	116	166	216		266	316	1.Dc	366	3.Dc	416	5.Dc	466	7.Dc
17		67	117	167	217	MOUT	267	317	1.Hc	367	3.Hc	417	5.Hc	467	7.Hc
18		68	118	168	218	MOUTc	268	318	1.DB	368	3.DB	418	5.DB	468	7.DB
19		69	119	169	219		269	319	1.RP	369	3.RP	419	5.RP	469	RHY
20		70	120	170	220		270	320	1.PO	370	3.PO	420	5.PO	470	7.PO
21		71	121	171	221		271	321	1.Oc	371	3.POc	421	5.Oc	471	7.POc
22		72	122	172	222		272	322		372		422		472	
23		73	123	173	223		273	323		373		423		473	
24		74	124	174	224		274	324		374		424		474	
25		75	125	175	225		275	325		375		425		475	
26	DEV	76	126	176	226		276	326	2.SP	376	4.SP	426	6.SP	476	8.SP
27	OR	77	127	177	227		277	327		377		427		477	
28		78	128	178	228		278	328		378		428		478	
29		79	129	179	229		279	329		379		429		479	
30		80	130	180	230		280	330		380		430		480	
31		81	131	181	231	A1	281	331	2.P	381	4.P	431	6.P	481	8.P
32		82	132	182	232	A2	282	332	2.I	382	4.I	432	6.I	482	8.I
33	DISTS	83	133	183	233	A3	283	333	2.D	383	4.D	433	6.D	483	8.D
34		84	134	184	234	A4	284	334	2.OH	384	4.OH	434	6.OH	484	8.OH
35	PARAERR	85	135	185	235		285	335	2.OL	385	4.OL	435	6.OL	485	8.OL
36	ALOSTS	86	136	186	236		286	336	2.MR	386	4.MR	436	6.MR	486	8.MR
37	TIM1	87	137	187	237		287	337	2.H	387	4.H	437	6.H	487	8.H
38	TIM2	88	138	188	238		288	338	2.DR	388	4.DR	438	6.DR	488	8.DR
39		89	139	189	239		289	339	2.Pc	389	4.Pc	439	6.Pc	489	8.Pc
40		90	140	190	240		290	340	2.Ic	390	4.Ic	440	6.Ic	490	8.Ic
41		91	141	191	241	AT	291	341	2.Dc	391	4.Dc	441	6.Dc	491	8.Dc
42		92	142	192	242	SC	292	342	2.Hc	392	4.Hc	442	6.Hc	492	8.Hc
43		93	143	193	243	BS	293	343	2.DB	393	4.DB	443	6.DB	493	8.DB
44		94	144	194	244	FL	294	344	2.RP	394	4.RP	444	6.RP	494	RDV
45		95	145	195	245	UPR	295	345	2.PO	395	4.PO	445	6.PO	495	8.PO
46		96	146	196	246	DNR	296	346	2.POc	396	4.POc	446	6.POc	496	8.POc
47		97	147	197	247	RT	297	347		397		447		497	
48		98	148	198	248	RBS	298	348		398		448		498	
49		99	149	199	249	RFL	299	349		399		449		499	
50		100	150	200	250	ORB	300	350		400		450		500	

Table 8-1-5 (2/3) UT450,UT420 D-register Map (2/3)

OPERATION(2)				USR/PY		MSG		L1/L2	
No. 501~	No. 551~	No. 601~	No. 651~	No. 701~	No. 751~	No. 801~	No. 851~	No. 901~	No. 951~
501	551	601	651	701	751	801	851	901 RMS	951
502	552	602	652	702	752	802	852	902 SPT	952
503	553	603	653	703	753	803	853	903 PVT	953
504	554	604	654	704	754	804	854	904 TMU	954
505	555	605	655	705	755	805	855	905	955
506	556	606	656	706	756	806	856	906	956
507	557	607	657	707	757	807	857	907	957
508	558	608	658	708	758	808	858	908	958
509	559	609	659	709	759	809	859	909	959
510	560	610	660	710	760	810	860	910	960
511	561	611	661	711	761	811	861	911	961
512	562	612	662	712	762	812	862	912	962
513	563	613	663	713	763	813	863	913	963
514	564	614	664	714	764	814	864	914	964
515	565	615	665	715	765	815	865	915 AL1	965
516	566	616	666	716	766	816	866	916 AL2	966
517	567	617	667	717	767	817	867	917 AL3	967
518	568	618	668	718	768	818	868	918 AL4	968
519	569	619	669	719	769	819	869	919 HY1	969
520	570	620	670	720	770	820	870	920 HY2	970
521	571	621	671	721	771	821	871	921 HY3	971
522	572	622	672	722	772	822	872	922 HY4	972
523	573	623	673	723	773	823	873	923 AMD	973
524	574	624	674	724	774	824	874	924	974
525	575	625	675	725	775	825	875	925	975
526	576	626	676	726	776	826	876	926 OPR	976
527	577	627	677	727	777	827	877	927 MOD	977
528	578	628	678	728	778	828	878	928 AR	978
529	579	629	679	729	779	829	879	929 ZON	979
530	580	630	680	730	780	830	880	930 R.MD	980
531	581	631	681	731	781	831	881	931 R.TM	981
532	582	632	682	732	782	832	882	932 DIS	982
533	583	633	683	733	783	833	883	933 SPH	983
534	584	634	684	734	784	834	884	934 SPL	984
535	585	635	685	735	785	835	885	935 DY1	985
536	586	636	686	736	786	836	886	936 DY2	986
537	587	637	687	737	787	837	887	937 DY3	987
538	588	638	688	738	788	838	888	938 DY4	988
539	589	639	689	739	789	839	889	939	989
540	590	640	690	740	790	840	890	940 GRP	990
541	591	641	691	741	791	841	891	941	991
542	592	642	692	742	792	842	892	942	992
543	593	643	693	743	793	843	893	943	993
544	594	644	694	744	794	844	894	944	994
545	595	645	695	745	795	845	895	945	995
546	596	646	696	746	796	846	896	946	996
547	597	647	697	747	797	847	897	947	997
548	598	648	698	748	798	848	898	948	998
549	599	649	699	749	799	849	899	949	999
550	600	650	700	750	800	850	900	950	1000

Table 8-1-5 (3/3) UT450,UT420 D-register Map (3/3)

CMLP			CONF				UTMD			
No.	1001~	No. 1051~	No.	1101~	No.	1151~	No.	1201~	No.	1251~
1001		1051	1101	C.S1	1151		1201	IN	1251	DLN
1002		1052	1102	C.S2	1152		1202	UNI	1252	ADR
1003		1053	1103	C.S3	1153		1203		1253	RP.T
1004		1054	1104	C.S4	1154		1204	RH	1254	
1005		1055	1105	C.S5	1155		1205	RL	1255	
1006		1056	1106		1156		1206	SDP	1256	
1007		1057	1107		1157		1207	SH	1257	
1008		1058	1108		1158		1208	SL	1258	
1009		1059	1109		1159		1209	BSL	1259	
1010		1060	1110		1160		1210	RJC	1260	
1011		1061	1111		1161		1211		1261	V.RS
1012		1062	1112		1162		1212		1262	V.L
1013	RET1	1063	1113		1163		1213		1263	V.H
1014	RTH1	1064	1114		1164		1214		1264	TR.T
1015	RTL1	1065	1115		1165		1215		1265	V.MOD
1016		1066	1116		1166		1216		1266	INI
1017		1067	1117		1167		1217		1267	V.AT
1018		1068	1118		1168		1218		1268	
1019	DVB1	1069	1119		1169		1219		1269	
1020		1070	1120		1170		1220		1270	
1021		1071	1121		1171		1221	RSP	1271	
1022		1072	1122		1172		1222		1272	
1023		1073	1123		1173		1223		1273	
1024	L-▲▼	1074	1124		1174		1224		1274	DPC
1025	L-A/M	1075	1125		1175		1225		1275	
1026		1076	1126		1176		1226		1276	
1027		1077	1127		1177		1227	RSH	1277	
1028	L-R/L	1078	1128		1178		1228	RSL	1278	
1029		1079	1129		1179		1229		1279	
1030		1080	1130		1180		1230		1280	
1031		1081	1131		1181		1231		1281	
1032	L-PID	1082	1132		1182		1232		1282	
1033		1083	1133		1183		1233		1283	
1034		1084	1134		1184		1234		1284	
1035		1085	1135		1185		1235		1285	
1036		1086	1136		1186		1236		1286	
1037		1087	1137		1187		1237		1287	
1038		1088	1138		1188		1238	OT	1288	
1039		1089	1139		1189		1239		1289	
1040		1090	1140		1190		1240	CT	1290	
1041		1091	1141		1191		1241		1291	
1042		1092	1142		1192		1242	CTc	1292	
1043		1093	1143		1193		1243		1293	
1044		1094	1144		1194		1244		1294	
1045		1095	1145		1195		1245		1295	
1046		1096	1146		1196		1246		1296	
1047		1097	1147		1197		1247	PSL	1297	
1048		1098	1148		1198		1248	BPS	1298	
1049		1099	1149		1199		1249	PRI	1299	
1050		1100	1150		1200		1250	STP	1300	

UT35□, UT32□ D-register Map

Table 8-1-6 (1/4) UT35□,UT32□ D-register Map (1/4)

	PROCESS	PROGRAM	MODE/PAR	OPERATION(1)		OPERATION(2)		USR/PY
No	+0	+100	+200	+300	+400	+500	+600	+700
1	ADERROR		A/M	1.SP				
2	ERROR							
3	PV							
4	CSP							
5	OUT		S/R					
6	HOUT			1.P				
7	COUT		SPNO	1.I				
8	MOD			1.D				
9	PIDNO							
10	CSPNO							
11	ALM			1.MR				
12								
13								
14				1.Pc				
15			C.RSP	1.Ic				
16				1.Dc				
17			MOUTH					
18			MOUTC	1.DB				
19				1.RP				
20								
21								
22								
23								
24								
25								
26				2.SP				
27	OR							
28	HBC1							
29	HBC2							
30								
31			A1	2.P				
32			A2	2.I				
33			A3	2.D				
34								
35	PARAERR							
36				2.MR				
37			PCCH(Note)					
38			PCCL(Note)					
39				2.Pc				
40				2.Ic				
41			AT	2.Dc				
42			SC					
43			BS	2.DB				
44			FL	2.RP				
45			UPR					
46			DNR					
47								
48								
49								
50			ORB					

is read only register. is the “User area.”

Note: The codes PCCH and PCCL are used only with UT351 and UT321.

Table 8-1-6 (2/4) UT35□,UT32□ D-register Map (2/4)

	PROCESS	PROGRAM	MODE/PAR	OPERATION(1)		OPERATION(2)		USR/PY
No	+0	+100	+200	+300	+400	+500	+600	+700
51			ORH	3.SP				
52			ORL					
53								
54			OH					
55			OL					
56			UYS	3.P				
57			DR	3.I				
58			HB1	3.D				
59			HB2					
60	User							
61	area			3.MR				
62	(50-100)							
63								
64				3.Pc				
65				3.Ic				
66				3.Dc				
67								
68				3.DB				
69								
70								
71								
72								
73								
74								
75								
76				4.SP				
77								
78								
79								
80								
81				4.P				
82				4.I				
83				4.D				
84								
85								
86				4.MR				
87								
88								
89				4.Pc				
90				4.Ic				
91				4.Dc				
92								
93				4.DB				
94					RDV			
95								
96								
97								
98								
99								
100								

is read only register. is the “User area.”

Table 8-1-6 (3/4) UT35□,UT32□ D-register Map (3/4)

	MSG	L1/L2	CMLP	CONF	UTMD
No	+800	+900	+1000	+1100	+1200
1				C.S1	IN
2				C.S2	UNI
3				C.S3	
4		TMU		C.S4	RH
5					RL
6					SDP
7					SH
8					SL
9					BSL
10					RJC
11					
12					
13			RET		
14			RTH		
15		AL1	RTL		
16		AL2			
17		AL3			
18					
19		HY1			
20		HY2			
21		HY3			
22					
23					
24		PO			
25		POc			
26					
27		C.MD			
28		AR			
29		ZON			
30					
31					
32		DIS			
33					
34					
35					
36			LOCK		
37			PCMD(Note)		
38			ERJC(Note)		OT
39					
40					CT
41					
42					CTc
43					
44					
45					
46					
47					PSL
48					BPS
49					PRI
50					STP

Note : The codes PCMD and ERJC are used only with UT351 and UT321.

Table 8-1-6 (4/4) UT35□,UT32□ D-register Map (4/4)

	MSG	L1/L2	CMLP	CONF	UTMD
No	+800	+900	+1000	+1100	+1200
51					DLN
52					ADR
53					RP.T
54					
55					
56					
57					
58					
59					
60					
61					
62					
63					
64					
65					
66					
67					
68					
69					
70					
71					
72					
73					
74					
75			PRT(Note)		
76					
77					
78					
79					
80					
81					
82					
83					
84					
85					
86					
87					
88					
89					
90					
91					
92					
93					
94					
95					
96					
97					
98					
99					
100					

Note : The code PRT is used only with UT351 with embedded Ethernet.

<<Ref.8.1: Outline of Registers and I - relays >>

Ref.8.1(3) B-register Outline and B-register Map

Only UP750 or UT750 use the B-registers.

When you use the function of communication, the making of Program patterns are permitted with the B-registers. Refer to the manual of “Communication function” (Optional) for more details.

Each B-register has a B-register number.
The number of each B-register can be confirmed by the B-register Map (See Table 8-1-8).
When you want to know the classification of B-registers, see the Table 8-1-7 below.

Table 8-1-7

Register No.	Classification	Description
1 to 100	Program pattern read/write operation	Start target setpoint, wait function, repeat function, etc.
101 to 140	Segment information read/write operation	Event function, etc.
1301 to 1600	99 segments TSP value	Target setpoint, etc.
1602 to 1700	99 segments segment time (TIME)	Segment time (time setting or ratio setting) [Use “SEG.T” parameter]

UP750,UP550 B-register Map

Table 8-1-8 (1/2) UP750,UP550 B-register Map (1/2)

PTNWR				SEGWR			
No.	1~	No.	51~	No.	101~	No.	151~
1	PTNO	51		101		151	
2	SEGNO	52		102		152	
3	RDTRG	53		103	RDTRG	153	
4	WRTRG	54		104	WRTRG	154	
5	RTN.ERR	55		105	PTN.ERR	155	
6		56		106		156	
7		57		107		157	
8	rem.SEG	58		108	rem.SEG	158	
9	rem.EV	59		109	rem.EV	159	
10	PTN.SEG	60		110	PTN.SEG	160	
11	SSP1	61	PTNO-A	111	TSP1	161	
12	SSP2	62	PTNO-B	112	TSP2	162	
13	STC	63	PTE-TRG	113	TIM E	163	
14	1.WZ1	64	PTC-TRG	114	TM .RT	164	
15	1.WZ2	65	PTN.ERR	115	PI DNO	165	
16	1.WTM	66		116	EV1	166	
17	2.WZ1	67		117	ON1 or TY1	167	
18	2.WZ2	68		118	OFF1 or PE1	168	
19	2.WTM	69		119	EV2	169	
20	3.WZ1	70		120	ON2 or TY2	170	
21	3.WZ2	71		121	OFF2 or PE2	171	
22	3.WTM	72		122	EV3	172	
23	4.WZ1	73		123	ON3 or TY3	173	
24	4.WZ2	74		124	OFF3 or PE3	174	
25	4.WTM	75		125	EV4	175	
26	5.WZ1	76		126	ON4 or TY4	176	
27	5.WZ2	77		127	OFF4 or PE4	177	
28	5.WTM	78		128	EV5	178	
29	RCY	79		129	ON5 or TY5	179	
30	RST	80		130	OFF5 or PE5	180	
31	REN	81	PTN.USE1	131	EV6	181	
32		82	PTN.USE2	132	ON6 or TY6	182	
33		83	PTN.USE3	133	OFF6 or PE6	183	
34		84	PTN.USE4	134	EV7	184	
35		85	PTN.USE5	135	ON7 or TY7	185	
36		86	PTN.USE6	136	OFF7 or PE7	186	
37		87	PTN.USE7	137	EV8	187	
38		88	PTN.USE8	138	ON8 or TY8	188	
39		89	PTN.USE9	139	OFF8 or PE8	189	
40	P.NAM E1	90	PTN.USE10	140	JC	190	
41	P.NAM E2	91	PTN.USE11	141		191	
42	P.NAM E3	92	PTN.USE12	142		192	
43	P.NAM E4	93	PTN.USE13	143		193	
44	P.NAM E5	94	PTN.USE14	144		194	
45	P.NAM E6	95	PTN.USE15	145		195	
46	P.NAM E7	96	PTN.USE16	146		196	
47	P.NAM E8	97	PTN.USE17	147		197	
48	P.NAM E9	98	PTN.USE18	148		198	
49	P.NAM E10	99	PTN.USE19	149		199	
50		100		150		200	

Note: • The code in the square like a “1.WZ2” is used only with UP750.
• Other codes are common to UP750 and UP550.

Table 8-1-8 (2/2) UP750,UP550 B-register Map (2/2)

TSPTG			TSP1				TSP2				TIME			
No.	1301~	No. 1351~	No.	1401~	No.	1451~	No.	1501~	No.	1551~	No.	1601~	No.	1700~
1301	PTNO	1351	1401	SSP1	1451	TSP1.50	1501	SSP.2	1551	TSP2.50	1601		1651	TIME.50
1302		1352	1402	TSP1.1	1452	TSP1.51	1502	TSP2.1	1552	TSP2.51	1602	TIME.1	1652	TIME.51
1303	RDTRG	1353	1403	TSP1.2	1453	TSP1.52	1503	TSP2.2	1553	TSP2.52	1603	TIME.2	1653	TIME.52
1304	WR.TRG	1354	1404	TSP1.3	1454	TSP1.53	1504	TSP2.3	1554	TSP2.53	1604	TIME.3	1654	TIME.53
1305	PTN.ERR	1355	1405	TSP1.4	1455	TSP1.54	1505	TSP2.4	1555	TSP2.54	1605	TIME.4	1655	TIME.54
1306		1356	1406	TSP1.5	1456	TSP1.55	1506	TSP2.5	1556	TSP2.55	1606	TIME.5	1656	TIME.55
1307		1357	1407	TSP1.6	1457	TSP1.56	1507	TSP2.6	1557	TSP2.56	1607	TIME.6	1657	TIME.56
1308		1358	1408	TSP1.7	1458	TSP1.57	1508	TSP2.7	1558	TSP2.57	1608	TIME.7	1658	TIME.57
1309		1359	1409	TSP1.8	1459	TSP1.58	1509	TSP2.8	1559	TSP2.58	1609	TIME.8	1659	TIME.58
1310	PTN.SEG	1360	1410	TSP1.9	1460	TSP1.59	1510	TSP2.9	1560	TSP2.59	1610	TIME.9	1660	TIME.59
1311		1361	1411	TSP1.10	1461	TSP1.60	1511	TSP2.10	1561	TSP2.60	1611	TIME.10	1661	TIME.60
1312		1362	1412	TSP1.11	1462	TSP1.61	1512	TSP2.11	1562	TSP2.61	1612	TIME.11	1662	TIME.61
1313		1363	1413	TSP1.12	1463	TSP1.62	1513	TSP2.12	1563	TSP2.62	1613	TIME.12	1663	TIME.62
1314		1364	1414	TSP1.13	1464	TSP1.63	1514	TSP2.13	1564	TSP2.63	1614	TIME.13	1664	TIME.63
1315		1365	1415	TSP1.14	1465	TSP1.64	1515	TSP2.14	1565	TSP2.64	1615	TIME.14	1665	TIME.64
1316		1366	1416	TSP1.15	1466	TSP1.65	1516	TSP2.15	1566	TSP2.65	1616	TIME.15	1666	TIME.65
1317		1367	1417	TSP1.16	1467	TSP1.66	1517	TSP2.16	1567	TSP2.66	1617	TIME.16	1667	TIME.66
1318		1368	1418	TSP1.17	1468	TSP1.67	1518	TSP2.17	1568	TSP2.67	1618	TIME.17	1668	TIME.67
1319		1369	1419	TSP1.18	1469	TSP1.68	1519	TSP2.18	1569	TSP2.68	1619	TIME.18	1669	TIME.68
1320		1370	1420	TSP1.19	1470	TSP1.69	1520	TSP2.19	1570	TSP2.69	1620	TIME.19	1670	TIME.69
1321		1371	1421	TSP1.20	1471	TSP1.70	1521	TSP2.20	1571	TSP2.70	1621	TIME.20	1671	TIME.70
1322		1372	1422	TSP1.21	1472	TSP1.71	1522	TSP2.21	1572	TSP2.71	1622	TIME.21	1672	TIME.71
1323		1373	1423	TSP1.22	1473	TSP1.72	1523	TSP2.22	1573	TSP2.72	1623	TIME.22	1673	TIME.72
1324		1374	1424	TSP1.23	1474	TSP1.73	1524	TSP2.23	1574	TSP2.73	1624	TIME.23	1674	TIME.73
1325		1375	1425	TSP1.24	1475	TSP1.74	1525	TSP2.24	1575	TSP2.74	1625	TIME.24	1675	TIME.74
1326		1376	1426	TSP1.25	1476	TSP1.75	1526	TSP2.25	1576	TSP2.75	1626	TIME.25	1676	TIME.75
1327		1377	1427	TSP1.26	1477	TSP1.76	1527	TSP2.26	1577	TSP2.76	1627	TIME.26	1677	TIME.76
1328		1378	1428	TSP1.27	1478	TSP1.77	1528	TSP2.27	1578	TSP2.77	1628	TIME.27	1678	TIME.77
1329		1379	1429	TSP1.28	1479	TSP1.78	1529	TSP2.28	1579	TSP2.78	1629	TIME.28	1679	TIME.78
1330		1380	1430	TSP1.29	1480	TSP1.79	1530	TSP2.29	1580	TSP2.79	1630	TIME.29	1680	TIME.79
1331		1381	1431	TSP1.30	1481	TSP1.80	1531	TSP2.30	1581	TSP2.80	1631	TIME.30	1681	TIME.80
1332		1382	1432	TSP1.31	1482	TSP1.81	1532	TSP2.31	1582	TSP2.81	1632	TIME.31	1682	TIME.81
1333		1383	1433	TSP1.32	1483	TSP1.82	1533	TSP2.32	1583	TSP2.82	1633	TIME.32	1683	TIME.82
1334		1384	1434	TSP1.33	1484	TSP1.83	1534	TSP2.33	1584	TSP2.83	1634	TIME.33	1684	TIME.83
1335		1385	1435	TSP1.34	1485	TSP1.84	1535	TSP2.34	1585	TSP2.84	1635	TIME.34	1685	TIME.84
1336		1386	1436	TSP1.35	1486	TSP1.85	1536	TSP2.35	1586	TSP2.85	1636	TIME.35	1686	TIME.85
1337		1387	1437	TSP1.36	1487	TSP1.86	1537	TSP2.36	1587	TSP2.86	1637	TIME.36	1687	TIME.86
1338		1388	1438	TSP1.37	1488	TSP1.87	1538	TSP2.37	1588	TSP2.87	1638	TIME.37	1688	TIME.87
1339		1389	1439	TSP1.38	1489	TSP1.88	1539	TSP2.38	1589	TSP2.88	1639	TIME.38	1689	TIME.88
1340		1390	1440	TSP1.39	1490	TSP1.89	1540	TSP2.39	1590	TSP2.89	1640	TIME.39	1690	TIME.89
1341		1391	1441	TSP1.40	1491	TSP1.90	1541	TSP2.40	1591	TSP2.90	1641	TIME.40	1691	TIME.90
1342		1392	1442	TSP1.41	1492	TSP1.91	1542	TSP2.41	1592	TSP2.91	1642	TIME.41	1692	TIME.91
1343		1393	1443	TSP1.42	1493	TSP1.92	1543	TSP2.42	1593	TSP2.92	1643	TIME.42	1693	TIME.92
1344		1394	1444	TSP1.43	1494	TSP1.93	1544	TSP2.43	1594	TSP2.93	1644	TIME.43	1694	TIME.93
1345		1395	1445	TSP1.44	1495	TSP1.94	1545	TSP2.44	1595	TSP2.94	1645	TIME.44	1695	TIME.94
1346		1396	1446	TSP1.45	1496	TSP1.95	1546	TSP2.45	1596	TSP2.95	1646	TIME.45	1696	TIME.95
1347		1397	1447	TSP1.46	1497	TSP1.96	1547	TSP2.46	1597	TSP2.96	1647	TIME.46	1697	TIME.96
1348		1398	1448	TSP1.47	1498	TSP1.97	1548	TSP2.47	1598	TSP2.97	1648	TIME.47	1698	TIME.97
1349		1399	1449	TSP1.48	1499	TSP1.98	1549	TSP2.48	1599	TSP2.98	1649	TIME.48	1699	TIME.98
1350		1400	1450	TSP1.49	1500	TSP1.99	1550	TSP2.49	1600	TSP2.99	1650	TIME.49	1700	TIME.99

Note : • The number attached to the code (just prior to the period) means loop-number. "□□1.□" indicates that the code is for the loop-1. For example, "TSP1.□" is the code for the loop-1 and "TSP2.□" is for the loop-2.

<<Ref.8.1: Outline of Registers and I - relays >>

Ref.8.1(4) I-relay Outline and I-relay Map

The status of controller's operation mode, the status of alarm/event and so on are kept as a flag (0 or 1) to the I-relays.

They can be read using an external device when their respective I-relay numbers are assigned to the controller's DO terminals.

With UP750, UP550, UT750, UT550, UT551 or UT520, the function of contact input terminals can be changed by using the I-relays. (See Ref.3.1:References Related to Contact Input.)

The data kept in I-relays are classified as followings.

I-relay numbers 1 through 192 (Status), 193 through 384 (ON Status) and 385 through 576 (OFF Status) contain the same information.

- The area of I-relays 1 through 192 always contains ON/OFF information and it normally read for status information.
- ON-status I-relays 193 through 384 are turned ON for one control cycle only when the status changed from OFF to ON.
- OFF-status I-relays 385 through 576 are turned ON for one control cycle only when the status changed from ON to OFF.

CAUTION

The controller internal data should be destroyed, and do not read or write operation to the I-relays in the “unused area.”
Any cells left blank for I-relays 1 through 720 (in the I-relay map) are the “unused area.”

The codes of I-relays are same as those of D-registers but for the I-relays shown in Table 8-1-9 below.

Table 8-1-9

I-relay No.	Code	Description
0577 to 0580	CSPNO.0 to 3	SP number (When UT750 or UT5□□)
0593 to 0596	PIDNO1.1 to 3	Loop 1 PID number.
0609 to 0612	PIDNO2.0 to 3	Loop 2 PID number.
0657 to 0661	TIM.1S to TIM.1M	Timer setting: 1 sec through 1 min.
0672 to 0674	PON to LP2	Power ON, front-panel lamp state for PV2 and LP2.
0681 to 0687	DEV1- to DEV1+	Loop 1 and Loop 2 deviation.
0689 to 0693	ALO11 to ALO14	Instrument alarm output state. (When UP750 or UP550)

When the UP750,UP550

Table 8-1-10 UP750,UP550 I-relay classification

I-relay	Classification	Description
1 to 16	Status	Input error (same as D0001).
17 to 32		PV1 error (same as D0002).
33 to 48		PV2 error (same as D0018).
49 to 64		Calibration, parameter error (same as D0035).
65 to 80		Loop1 mode (same as D0008).
81 to 96		Loop2 mode (same as D0024).
97 to 112		Alarm status (same as D0011).
113 to 128		PV event 1 to 8 (same as D0012).
129 to 160		Time event 1 to 16 (same as D0013 and D0014).
161 to 176		External contact input status (same as D0033).
177 to 192		Expanded external contact input status (same as D0034).
193 to 208	ON status	Input error.
209 to 224		PV1 error.
225 to 240		PV2 error.
241 to 256		Calibration, parameter error.
257 to 272		Loop1 mode.
273 to 288		Loop2 mode.
289 to 304		Alarm status.
305 to 320		PV event 1 to 8.
321 to 352		Time event 1 to 16.
353 to 368		External contact input status.
369 to 384		Expanded external contact input status.
385 to 400	OFF status	Input error.
401 to 416		PV1 error.
417 to 432		PV2 error.
433 to 448		Calibration, parameter error.
449 to 464		Loop1 mode.
465 to 480		Loop2 mode.
481 to 496		Alarm status.
497 to 512		PV event 1 to 8.
513 to 544		Time event 1 to 16.
545 to 560		External contact input status.
561 to 576		Expanded external contact input status.
577 to 592	Status	Use not permitted.
593 to 608		Current Loop1 PID number (same as D0009). (Note 1)
609 to 624		Current Loop2 PID number (same as D0025). (Note 1)
625 to 656		Current program number (same as D0042).
657 to 672		Timer setting 1 sec, 5 sec, 10 sec, 1 min. (Note 2)
673 to 688		PV2 deviation lamp status. (Note 3)
689 to 704		Alarm output status (same as D0036).
705 to 720		PV event output status (same as D0049).
721 to 784	User area (Note 4)	User write/read area.

Note1: Four-bit information using hexadecimals:0000 for 0, 0010 for 2, 0011 for 3, to 0111 for 7, and 1000 for 8. The least significant bit of four bits corresponds to the last digit in the relay number.
Note2: The timer settings (1, 5, 10 or 60 sec.) are only applicable to I-relay.
Note3: The status of the lamps on the front panel: lit when ON(1), unlit when OFF(0) .
Note4: The I-relays number 769 through 784 in the “user area” are not shown in the I-relay map, but write or read operation is possible with the communication function.

UP750, UP550 I-relay Map

Table 8-1-11 (1/2) UP750,UP550 I-relay Map (1/2)

STATUS						ON STATUS					
No.	1~	No.	65~	No.	129~	No.	193~	No.	257~	No.	321~
1	AD1ERR	65	A/M1	129	TME1	193	AD1ERR	257	A/M1	321	TME1
2	AD2ERR	66		130	TME2	194	AD2ERR	258		322	TME2
3	AD3ERR	67		131	TME3	195	AD3ERR	259		323	TME3
4		68		132		196		260		324	
5	AD1BO	69		133	TME4	197	AD1BO	261		325	TME4
6	AD2BO	70		134	TME5	198	AD2BO	262		326	TME5
7	AD3BO	71		135	TME6	199	AD3BO	263		327	TME6
8		72		136		200		264		328	
9	RJC1ERR	73	RESET	137	TME7	201	RJC1ERR	265	RESET	329	TME7
10	RJC2ERR	74	PROG	138	TME8	202	RJC2ERR	266	PROG	330	TME8
11		75	LOCAL	139		203		267	LOCAL	331	
12	VLVAT.ERR	76		140		204	VLVAT.ERR	268		332	
13	VLV.BOUT	77	HOLD	141		205	VLV.BOUT	269	HOLD	333	
14		78	WAIT	142		206		270	WAIT	334	
15		79	AT1	143		207		271	AT1	335	
16		80		144		208		272		336	
17	PV1ADC	81	A/M2	145	TME9	209	PV1ADC	273	A/M2	337	TME9
18	PV1BO	82		146	TME10	210	PV1BO	274		338	TME10
19	RJC1ERR	83		147	TME11	211	RJC1ERR	275		339	TME11
20		84		148		212		276		340	
21	PV1+over	85		149	TME12	213	PV1+over	277		341	TME12
22	PV1-over	86		150	TME13	214	PV1-over	278		342	TME13
23		87		151	TME14	215		279		343	TME14
24		88		152		216		280		344	
25		89	CAS/LSP	153	TME15	217		281	CAS/LSP	345	TME15
26		90		154	TME16	218		282		346	TME16
27		91		155	WEND	219		283		347	WEND
28		92		156		220		284		348	
29		93		157	PTEND	221		285		349	PTEND
30		94		158	PTEND3	222		286		350	PTEND3
31	AT1ERR	95	AT2	159	PTEND5	223	AT1ERR	287	AT2	351	PTEND5
32		96		160		224		288		352	
33	PV2ADC	97	ALM 11	161	DI1	225	PV2ADC	289	ALM 11	353	DI1
34	PV2BO	98	ALM 12	162	DI2	226	PV2BO	290	ALM 12	354	DI2
35	RJC2ERR	99	ALM 13	163	DI3	227	RJC2ERR	291	ALM 13	355	DI3
36		100		164	DI4	228		292		356	DI4
37	PV2+over	101	ALM 14	165	DI5	229	PV2+over	293	ALM 14	357	DI5
38	PV2-over	102	OR1	166	DI6	230	PV2-over	294	OR1	358	DI6
39		103		167	DI7	231		295		359	DI7
40		104		168	DI8	232		296		360	DI8
41		105		169	DP1	233		297		361	DP1
42		106		170	DP2	234		298		362	DP2
43		107		171	MG1	235		299		363	MG1
44		108		172	MG2	236		300		364	MG2
45		109		173	MG3	237		301		365	MG3
46		110	OR2	174	MG4	238		302	OR2	366	MG4
47	AT2ERR	111		175		239	AT2ERR	303		367	
48		112		176		240		304		368	
49	CALB.E	113	PVE1	177	RDI101	241	CALB.E	305	PVE1	369	RDI101
50	UCALB.E	114	PVE2	178	RDI102	242	UCALB.E	306	PVE2	370	RDI102
51	USER.E	115	PVE3	179	RDI103	243	USER.E	307	PVE3	371	RDI103
52		116		180	RDI104	244		308		372	RDI104
53	UPMD	117	PVE4	181	RDI105	245	UPMD	309	PVE4	373	RDI105
54	RANGE	118	PVE5	182	RDI106	246	RANGE	310	PVE5	374	RDI106
55	SETUP	119	PVE6	183	RDI107	247	SETUP	311	PVE6	375	RDI107
56		120		184	RDI108	248		312		376	RDI108
57	PARA.E	121	PVE7	185	RDI201	249	PARA.E	313	PVE7	377	RDI201
58	MODE.E	122	PVE8	186	RDI202	250	MODE.E	314	PVE8	378	RDI202
59	FILE.E	123		187	RDI203	251	FILE.E	315		379	RDI203
60		124		188	RDI204	252		316		380	RDI204
61		125		189	RDI205	253		317		381	RDI205
62		126		190	RDI206	254		318		382	RDI206
63	SYSTEM.E	127		191	RDI207	255	SYSTEM.E	319		383	RDI207
64		128		192	RDI208	256		320		384	RDI208

Note: • The code in the square like a “AD2ERR” is used only with UP750.
• The code in the shaded square like a “VLVAT.ERR” is used only with UP550.

Table 8-1-11 (2/2) UP750,UP550 I-relay Map (2/2)

OFF STATUS						STATUS					
No.	385~	No.	449~	No.	513~	No.	577~	No.	641~	No.	705~
385	AD1ERR	449	A/M1	513	TME1	577		641	SEGNO.0	705	PVEO1
386	AD2ERR	450		514	TME2	578		642	SEGNO.1	706	PVEO2
387	AD3ERR	451		515	TME3	579		643	SEGNO.2	707	PVEO3
388		452		516		580		644	SEGNO.3	708	
389	AD1BO	453		517	TME4	581		645	SEGNO.4	709	PVEO4
390	AD2BO	454		518	TME5	582		646	SEGNO.5	710	PVEO5
391	AD3BO	455		519	TME6	583		647	SEGNO.6	711	PVEO6
392		456		520		584		648		712	
393	RJC1ERR	457	RESET	521	TME7	585		649		713	PVEO7
394	RJC2ERR	458	PROG	522	TME8	586		650		714	PVEO8
395		459	LOCAL	523		587		651		715	
396	VLVAT.ERR	460		524		588		652		716	
397	VLV.BOUT	461	HOLD	525		589		653		717	
398		462	WAIT	526		590		654		718	
399		463	AT1	527		591		655		719	
400		464		528		592		656		720	
401	PV1ADC	465	A/M2	529	TME9	593	PIDNO1.0	657	TIM .1S	721	
402	PV1BO	466		530	TME10	594	PIDNO1.1	658	TIM .5S	722	
403	RJC1ERR	467		531	TME11	595	PIDNO1.2	659	TIM.10S	723	
404		468		532		596	PIDNO1.3	660		724	
405	PV1+over	469		533	TME12	597		661	TIM .1M	725	
406	PV1-over	470		534	TME13	598		662		726	
407		471		535	TME14	599		663		727	
408		472		536		600		664		728	
409		473	CAS/LSP	537	TME15	601		665	V.GUE	729	
410		474		538	TME16	602		666		730	
411		475		539	WEND	603		667		731	
412		476		540		604		668		732	
413		477		541	PTEND	605		669		733	
414		478		542	PTEND3	606		670		734	
415	AT1ERR	479	AT2	543	PTEND5	607		671		735	
416		480		544		608		672	PON	736	
417	PV2ADC	481	ALM 11	545	DI1	609	PIDNO2.0	673	PV2	737	
418	PV2BO	482	ALM 12	546	DI2	610	PIDNO2.1	674		738	
419	RJC2ERR	483	ALM 13	547	DI3	611	PIDNO2.2	675		739	
420		484		548	DI4	612	PIDNO2.3	676		740	
421	PV2+over	485	ALM 14	549	DI5	613		677		741	
422	PV2-over	486	OR1	550	DI6	614		678		742	
423		487		551	DI7	615		679		743	
424		488		552	DI8	616		680		744	
425		489		553	DP1	617		681	DEV1-	745	
426		490		554	DP2	618		682	DEV1Z	746	
427		491		555	MG1	619		683	DEV1+	747	
428		492		556	MG2	620		684		748	
429		493		557	MG3	621		685	DEV2-	749	
430		494	OR2	558	MG4	622		686	DEV2Z	750	
431	AT2ERR	495		559		623		687	DEV2+	751	
432		496		560		624		688		752	
433	CALB.E	497	PVE1	561	RDI101	625	PTNO.0	689	ALO 11	753	
434	UCALB.E	498	PVE2	562	RDI102	626	PTNO.1	690	ALO 12	754	
435	USER.E	499	PVE3	563	RDI103	627	PTNO.2	691	ALO 13	755	
436		500		564	RDI104	628	PTNO.3	692		756	
437	UPMD	501	PVE4	565	RDI105	629	PTNO.4	693	ALO 14	757	
438	RANGE	502	PVE5	566	RDI106	630	PTNO.5	694		758	
439	SETUP	503	PVE6	567	RDI107	631	PTNO.6	695		759	
440		504		568	RDI108	632	PTNO.7	696		760	
441	PARA.E	505	PVE7	569	RDI201	633	PTNO.8	697		761	
442	MODE.E	506	PVE8	570	RDI202	634		698		762	
443	FILE.E	507		571	RDI203	635		699		763	
444		508		572	RDI204	636		700		764	
445		509		573	RDI205	637		701		765	
446		510		574	RDI206	638		702		766	
447	SYSTEM.E	511		575	RDI207	639		703		767	
448		512		576	RDI208	640		704		768	

Note: • The code in the square like a “AD2ERR” is used only with UP750.
• The code in the shaded square like a “VLVAT.ERR” is used only with UP550.

When the UT750,UT550, UT551 or UT520

Table 8-1-12 UT750,UT5□□ I-relay classification

I-relay	Classification	Description
1 to 16	Status	Input error (same as D0001).
17 to 32		PV1 error (same as D0002).
33 to 48		PV2 error (same as D0018).
49 to 64		Calibration, parameter error (same as D0035).
65 to 80		Loop1 mode (same as D0008).
81 to 96		Loop2 mode (same as D0024).
97 to 112		Alarm status (same as D0011).
113 to 160		Use not permitted.
161 to 176		External contact input status (same as D0033).
177 to 192		Expanded external contact input status (same as D0034).
193 to 208	ON status	Input error.
209 to 224		PV1 error.
225 to 240		PV2 error.
241 to 256		Calibration, parameter error.
257 to 272		Loop1 mode.
273 to 288		Loop2 mode.
289 to 304		Alarm status.
305 to 352		Use not permitted.
353 to 368		External contact input status.
369 to 384		Expanded external contact input status.
385 to 400	OFF status	Input error.
401 to 416		PV1 error.
417 to 432		PV2 error.
433 to 448		Calibration, parameter error.
449 to 464		Loop1 mode.
465 to 480		Loop2 mode.
481 to 496		Alarm status.
497 to 544		Use not permitted.
545 to 560		External contact input status.
561 to 576		Expanded external contact input status.
577 to 592	Status	Actual cascade SP No. (same as D0010). (Note1)
593 to 608		Current Loop1 PID number (same as D0009). (Note1)
609 to 624		Current Loop2 PID number (same as D0025). (Note1)
625 to 656		Use not permitted.
657 to 672		Timer setting 1 sec, 5 sec, 10 sec, 1 min. (Note2)
673 to 688		PV2, LP2 deviation lamp status. (Note3)
689 to 704		Alarm output status (same as D0036).
705 to 720		Use not permitted.
721 to 2048	User area (Note4)	User write/read area.

Note1: Four-bit information using hexadecimals:0000 for 0, 0010 for 2, 0011 for 3, to 0111 for 7, and 1000 for 8. The least significant bit of four bits corresponds to the last digit in the relay number.
Note2: The timer settings (1, 5, 10 or 60 sec.) are only applicable to I-relay.
Note3: The status of the lamps on the front panel: lit when ON(1), unlit when OFF(0) .
Note4: The I-relays number 769 through 2048 in the “user area” are not shown in the I-relay map, but write or read operation is possible with the communication function.

Table 8-1-13 (1/2) UT750,UT55□ or UT520 I-relay Map (1/2)

STATUS						ON STATUS					
No.	1~	No.	64~	No.	128~	No.	193~	No.	257~	No.	321~
1	AD1ERR	65	A/M1	129		193	AD1ERR	257	A/M1	321	
2	AD2ERR	66	R/L1	130		194	AD2ERR	258	R/L1	322	
3	AD3ERR	67	R/S1	131		195	AD3ERR	259	R/S1	323	
4		68		132		196		260		324	
5	AD1BO	69	CAS	133		197	AD1BO	261	CAS	325	
6	AD2BO	70	AUT	134		198	AD2BO	262	AUT	326	
7	AD3BO	71	MAN	135		199	AD3BO	263	MAN	327	
8		72		136		200		264		328	
9	RJC1ERR	73		137		201	RJC1ERR	265		329	
10	RJC2ERR	74		138		202	RJC2ERR	266		330	
11		75		139		203		267		331	
12	VLVAT.ERR	76		140		204	VLVAT.ERR	268		332	
13	VLV.BOUT	77		141		205	VLV.BOUT	269		333	
14		78		142		206		270		334	
15		79	AT1	143		207		271	AT1	335	
16		80		144		208		272		336	
17	PV1ADC	81	A/M2	145		209	PV1ADC	273	A/M2	337	
18	PV1BO	82	R/L2	146		210	PV1BO	274	R/L2	338	
19	RJC1ERR	83		147		211	RJC1ERR	275		339	
20		84		148		212		276		340	
21	PV1+over	85		149		213	PV1+over	277		341	
22	PV1-over	86		150		214	PV1-over	278		342	
23		87		151		215		279		343	
24		88		152		216		280		344	
25	RSP1ADC	89		153		217	RSP1ADC	281		345	
26	RSP1BO	90		154		218	RSP1BO	282		346	
27		91		155		219		283		347	
28		92		156		220		284		348	
29	C.RSP1ADC	93		157		221	C.RSP1ADC	285		349	
30	C.RSP1BO	94		158		222	C.RSP1BO	286		350	
31	AT1ERR	95	AT2	159		223	AT1ERR	287	AT2	351	
32		96		160		224		288		352	
33	PV2ADC	97	ALM 11	161	DI1	225	PV2ADC	289	ALM 11	353	DI1
34	PV2BO	98	ALM 12	162	DI2	226	PV2BO	290	ALM 12	354	DI2
35	RJC2ERR	99	ALM 13	163	DI3	227	RJC2ERR	291	ALM 13	355	DI3
36		100		164	DI4	228		292		356	DI4
37	PV2+over	101	ALM 14	165	DI5	229	PV2+over	293	ALM 14	357	DI5
38	PV2-over	102	OR1	166	DI6	230	PV2-over	294	OR1	358	DI6
39		103		167	DI7	231		295		359	DI7
40		104		168	DI8	232		296		360	DI8
41	RSP2ADC	105	ALM 21	169	DP1	233	RSP2ADC	297	ALM 21	361	DP1
42	RSP2BO	106	ALM 22	170	DP2	234	RSP2BO	298	ALM 22	362	DP2
43		107	ALM 23	171	MG1	235		299	ALM 23	363	MG1
44		108		172	MG2	236		300		364	MG2
45	C.RSP2ADC	109	ALM 24	173	MG3	237	C.RSP2ADC	301	ALM 24	365	MG3
46	C.RSP2BO	110	OR2	174	MG4	238	C.RSP2BO	302	OR2	366	MG4
47	AT2ERR	111		175		239	AT2ERR	303		367	
48		112		176		240		304		368	
49	CALB.E	113		177	RDI101	241	CALB.E	305		369	RDI101
50	UCALB.E	114		178	RDI102	242	UCALB.E	306		370	RDI102
51	USER.E	115		179	RDI103	243	USER.E	307		371	RDI103
52		116		180	RDI104	244		308		372	RDI104
53	UTMD	117		181	RDI105	245	UTMD	309		373	RDI105
54	RANGE	118		182	RDI106	246	RANGE	310		374	RDI106
55	SETUP	119		183	RDI107	247	SETUP	311		375	RDI107
56		120		184	RDI108	248		312		376	RDI108
57	PARA.E	121		185	RDI201	249	PARA.E	313		377	RDI201
58	MODE.E	122		186	RDI202	250	MODE.E	314		378	RDI202
59		123		187	RDI203	251		315		379	RDI203
60		124		188	RDI204	252		316		380	RDI204
61	EEP.E	125		189	RDI205	253	EEP.E	317		381	RDI205
62		126		190	RDI206	254		318		382	RDI206
63	SYSTEM.E	127		191	RDI207	255	SYSTEM.E	319		383	RDI207
64		128		192	RDI208	256		320		384	RDI208

Note:
- The code in the square like a “AD2ERR” is used only with UT750.
- The code in the shaded square like a “VLVAT.ERR” is used only withUT550, UT551 or UT520.
- Other codes are common to UT750, UT550, UT551 and UT520.

Table 8-1-13 (2/2) UT750,UT55□ or UT520 I-relay Map (2/2)

OFF STATUS						STATUS					
No.	385~	No.	449~	No.	513~	No.	577~	No.	641~	No.	705~
385	AD1ERR	449	A/M1	513		577	CSPNO.0	641		705	
386	AD2ERR	450	R/L1	514		578	CSPNO.1	642		706	
387	AD3ERR	451	R/S1	515		579	CSPNO.2	643		707	
388		452		516		580	CSPNO.3	644		708	
389	AD1BO	453	CAS	517		581		645		709	
390	AD2BO	454	AUT	518		582		646		710	
391	AD3BO	455	MAN	519		583		647		711	
392		456		520		584		648		712	
393	RJC1ERR	457		521		585		649		713	
394	RJC2ERR	458		522		586		650		714	
395		459		523		587		651		715	
396	VLVAT.ERR	460		524		588		652		716	
397	VLV.BOUT	461		525		589		653		717	
398		462		526		590		654		718	
399		463	AT1	527		591		655		719	
400		464		528		592		656		720	
401	PV1ADC	465	A/M2	529		593	PIDNO1.0	657	TIM .1S	721	
402	PV1BO	466	R/L2	530		594	PIDNO1.1	658	TIM .5S	722	
403	RJC1ERR	467		531		595	PIDNO1.2	659	TIM.10S	723	
404		468		532		596	PIDNO1.3	660		724	
405	PV1+over	469		533		597		661	TIM .1M	725	
406	PV1-over	470		534		598		662	DI1	726	
407		471		535		599		663	DI2	727	
408		472		536		600		664	DI3	728	
409	RSP1ADC	473		537		601		665	V.GUE	729	
410	RSP1BO	474		538		602		666		730	
411		475		539		603		667		731	
412		476		540		604		668		732	
413	C.RSP1ADC	477		541		605		669		733	
414	C.RSP1BO	478		542		606		670		734	
415	AT1ERR	479	AT2	543		607		671		735	
416		480		544		608		672	PON	736	
417	PV2ADC	481	ALM 11	545	DI1	609	PIDNO2.0	673	PV2	737	
418	PV2BO	482	ALM 12	546	DI2	610	PIDNO2.1	674	LP2	738	
419	RJC2ERR	483	ALM 13	547	DI3	611	PIDNO2.2	675	DI4	739	
420		484		548	DI4	612	PIDNO2.3	676	DI5	740	
421	PV2+over	485	ALM 14	549	DI5	613		677	DI6	741	
422	PV2-over	486	OR1	550	DI6	614		678	DI7	742	
423		487		551	DI7	615		679	DI8	743	
424		488		552	DI8	616		680		744	
425	RSP2ADC	489	ALM 21	553	DP1	617		681	DEV1-	745	
426	RSP2BO	490	ALM 22	554	DP2	618		682	DEV1Z	746	
427		491	ALM 23	555	MG1	619		683	DEV1+	747	
428		492		556	MG2	620		684		748	
429	C.RSP2ADC	493	ALM 24	557	MG3	621		685	DEV2-	749	
430	C.RSP2BO	494	OR2	558	MG4	622		686	DEV2Z	750	
431	AT2ERR	495		559		623		687	DEV2+	751	
432		496		560		624		688		752	
433	CALB.E	497		561	RDI101	625		689	ALO 11	753	
434	UCALB.E	498		562	RDI102	626		690	ALO 12	754	
435	USER.E	499		563	RDI103	627		691	ALO 13	755	
436		500		564	RDI104	628		692		756	
437	UTMD	501		565	RDI105	629		693	ALO 14	757	
438	RANGE	502		566	RDI106	630		694		758	
439	SETUP	503		567	RDI107	631		695		759	
440		504		568	RDI108	632		696		760	
441	PARA.E	505		569	RDI201	633		697	ALO 21	761	
442	MODE.E	506		570	RDI202	634		698	ALO 22	762	
443		507		571	RDI203	635		699	ALO 23	763	
444		508		572	RDI204	636		700		764	
445	EEP.E	509		573	RDI205	637		701	ALO 24	765	
446		510		574	RDI206	638		702		766	
447	SYSTEM.E	511		575	RDI207	639		703		767	
448		512		576	RDI208	640		704		768	

Note:
- The code in the square like a “AD2ERR” is used only with UT750.
- The code in the shaded square like a “VLVAT.ERR” is used only with UT550, UT551 or UT520.
- The codes DI1 to DI8 (662 to 664, 675 to 679) (reverse status) are used only with UT551.
- Other codes are common to UT750, UT550, UT551 and UT520.

<<Ref.8.1: Outline of Registers and I - relays >>

Ref.8.1(5) I-relay Timer setting

The I-relay has the timer function.
The I-relay ON/OFF cycle-time can be set by the timer to 1, 5, 10seconds or 1minutes.
Use the following I-relays for the timer cycle-time setting if necessary.

ON/OFF cycle-time	I-relay code	I-relay No.
1sec.	TIM.1S	657
5sec.	TIM.5S	658
10sec.	TIM.10S	659
1min.	TIM.1M	661

The timer function can be used when you use the “LL200 PC-based Custom Computation Building Tool”.
The signal of I-relay ON/OFF status are able to output to external devices when the timer signal is registered to DO (Contact output).
The I-relay ON/OFF action is shown the Fig.8-1-1 below.

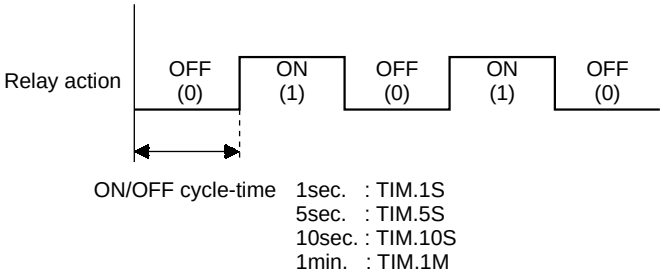

Fig. 8-1-1 The I-relay ON/OFF Action

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