

UP550E/UP750E SHORT FORM INSTRUCTION MANUAL

ENHANCED GREEN SERIES

Congratulations on your purchase of the finest program controller available. This short form guide is designed to speed up your configuration and operation. For additional information, please refer to the Instruction Manual on CD-ROM provided with the controller.

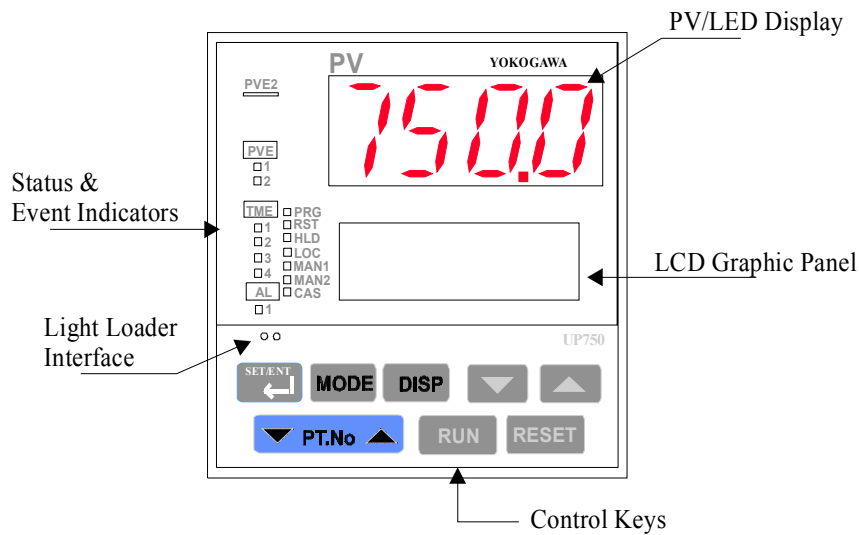


UP750/ UP550 INSTRUCTION MANUAL

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■ PANEL

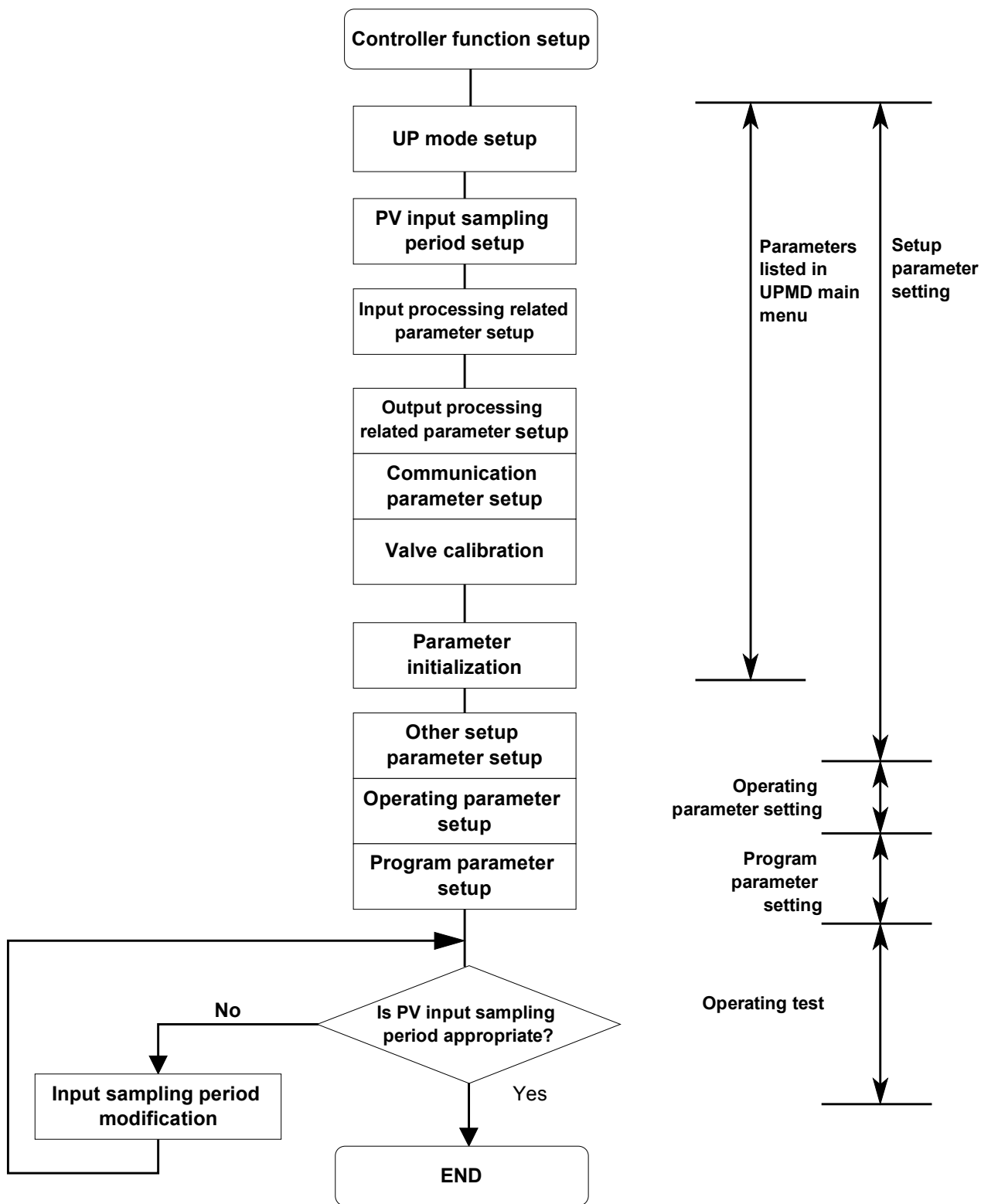


■ CONTROL KEY

Some keys have multiple functions depending on the display. Please note them.

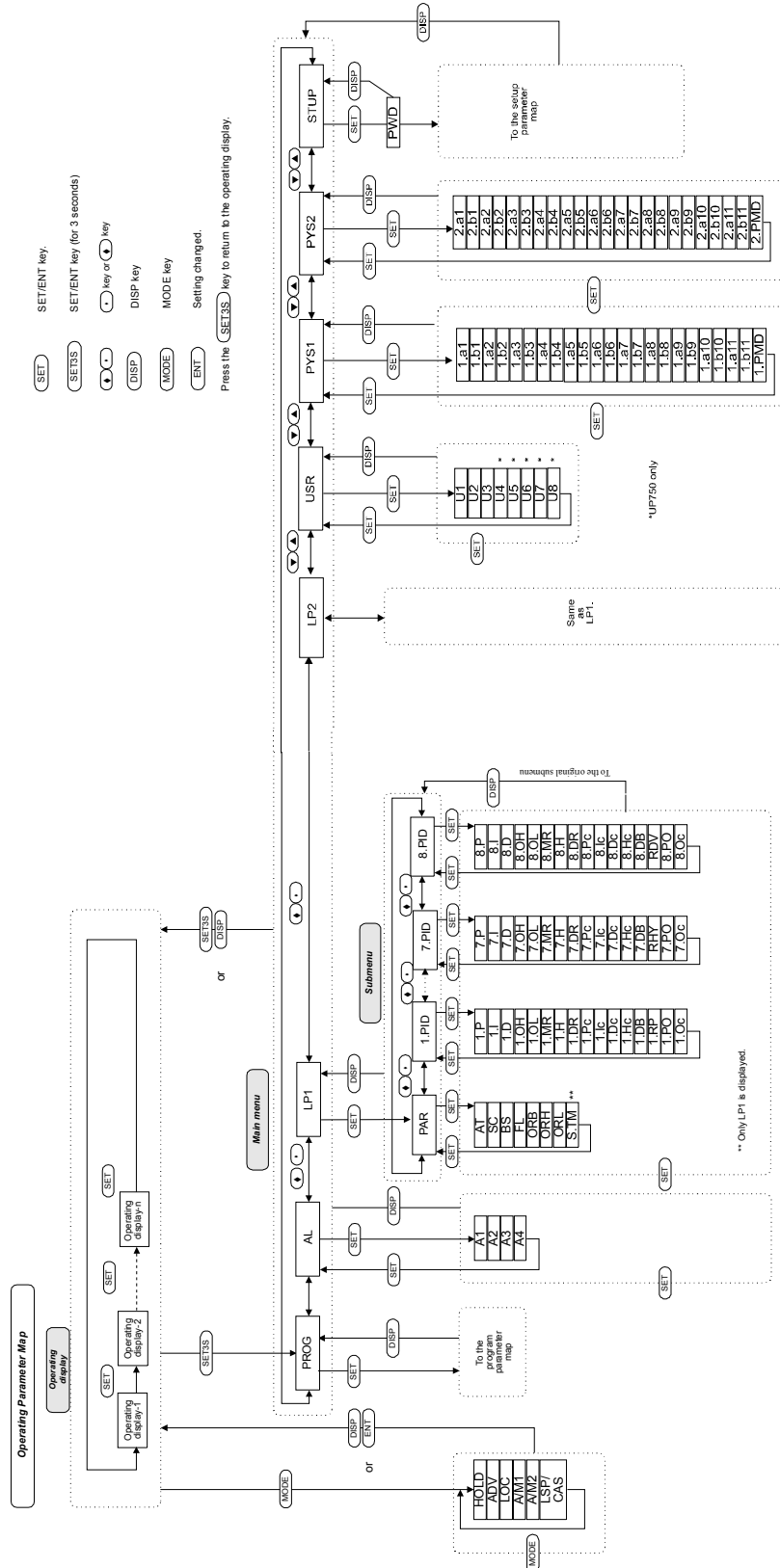
Key	Function
	The PT.No key is used to switch program pattern numbers when the operating display is shown.
	The RUN key starts program operation when pressed and held for more than 2 seconds. When the controller is used for the control of two loops, the operation of both loops simultaneously starts.
	The RESET key stops program operation when pressed and held for more than 2 seconds. When the controller is used for the control of two loops, the operation of both loops simultaneously stops.
	The SET/ENT key is used in switching between parameters or registering parameter settings. Pressing the key for more than 3 seconds switches LCD displays between an operating display and an operating parameter setting display. Pressing the key for at least 1 second or up to 3 seconds with an operating display shown switches it to a SELECT display.
	The MODE key is used to select the hold, advance, local, automatic/manual, or local/cascade operation mode.
	The DISP key switches LCD displays. Pressing the key on an operating display switches it to another operating display. Pressing the key on a display other than operating displays returns the current display to a one-level-higher display. To return to an operating display, press the key several times — a required number of times depends on the type of the display shown on the LCD.
	Used when modifying values shown on the LCD. The (DOWN) key decreases and the (UP) key increases the value displayed on the LCD. Pressing and holding either key gradually raises the value-changing speed. Used to switch between parameter menu displays. Switches between menu displays in the parameter setting displays.

Welcome to our program controllers. These powerful models require some care to operate them properly. To use your new UP550 or UP750 set it up in the following order. This assures correct operation. We highly recommend the use of the LL100/200 software and light loader for configuration and setup. It will speed the process while providing documentation and a superior interface. It is available from your Yokogawa dealer.



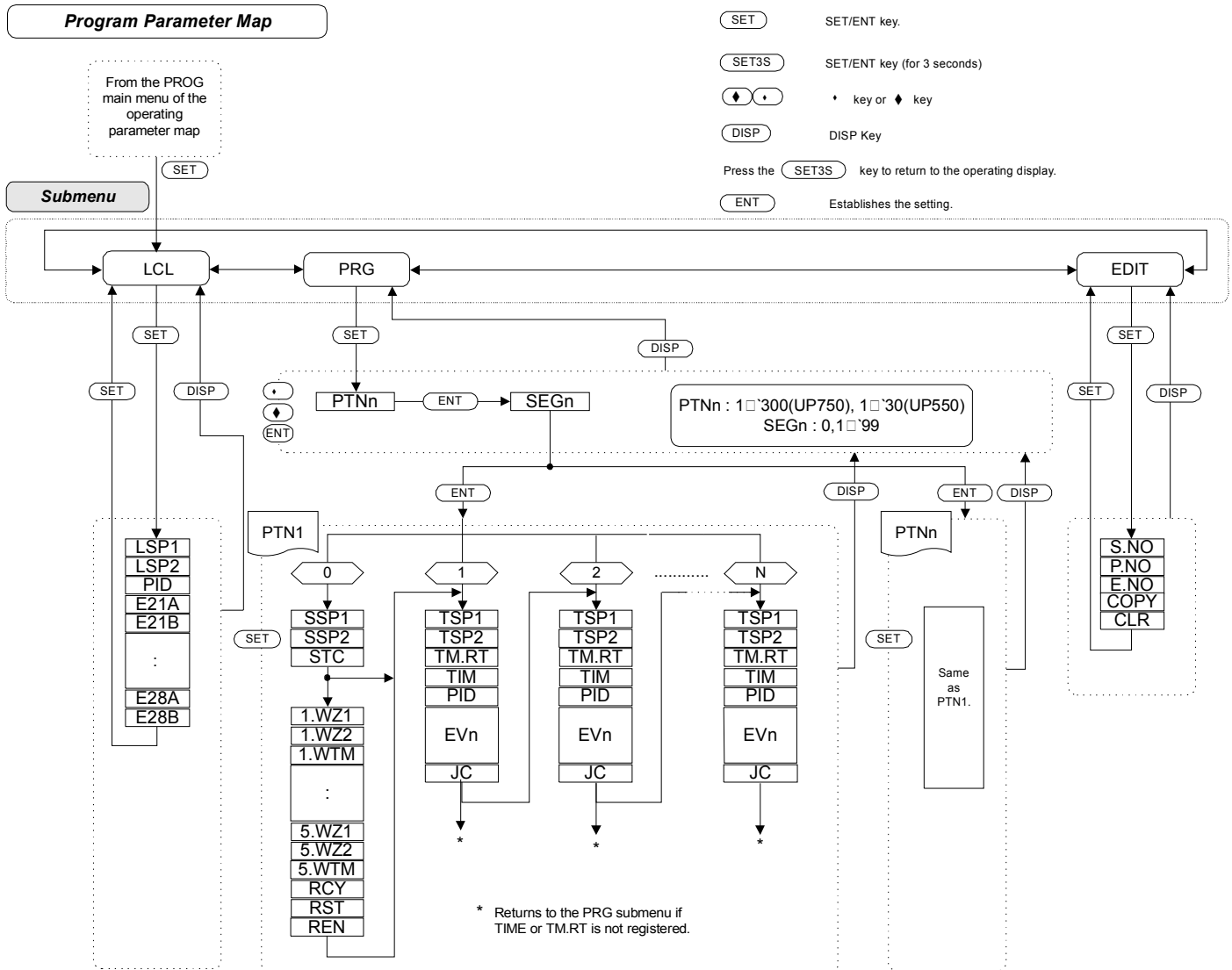
The map of the UP550/750 is attached. Once configured the setup parameters will not be adjusted, only the operating parameters.

The following maps will help you navigate the UP controller.



Program Pattern Setting

The UP550/750 are amongst the most flexible program controllers ever developed. Programs can be either time-based or rate-based. Time can be minutes and seconds or hours and minutes. Be certain your UP is configured properly.



1. Initial Setup

1-1. First step in configuration. Select the type of control (Refer to setup parameter map on page 4)

■ UP-mode parameters

The parameters listed in the table below are shown in the MD sub menu of the UPMD main menu of the setup parameter setting display. When UPM is changed, all parameters are initialized reset to default and the power-on display is shown.

Setup parameter setting display sub menu: MD

Parameter code	Description	Setting range	Default
UPM	UP mode (see note 1)	1: Single-loop control 2: Cascade primary-loop control 4: Cascade control 6: Loop control with PV switching 7: Loop control with PV auto-selector 11: Dual-loop control 12: Temperature and humidity control 13: Cascade control with two universal inputs 14: Loop control with PV switching and two universal inputs 15: Loop control with PV auto-selector and two universal inputs 21: Custom computation control (see note 2)	1 (all models)
SMP	PV input sampling period	100ms, 200ms, 500ms	200ms
SMEC	Sampling period error-counter (display only)	0 through 30000	0 when power is turned on.

Note 1:

Modes 2 through 7 are available for UP550-x1; modes 11 through 15 are not shown for UP550 and UP750-□. Modes 11 through 15 are shown only for UP750-5x.

Note 2:

Parameter UPM modes 21 can be selected when the optional LL200 custom computation building tool is used, which is applicable only to the UP750-xx.

For more information on these control modes, and what each accomplishes, please refer to the General Specifications or the LL Manual.

1-2. Second, the input types, ranges, and units must be selected. Note that other subsequent parameters will be changed. If input is changed you should check all following parameters. The input codes and ranges can be found in Table 1, page 11.

▪ **Input processing-related parameters (1: Both models)**

The parameters listed in the table below are shown in the IN sub menu of the UPMD main menu of the setup parameter setting display.

Setup parameter setting display sub menu: IN

Parameter code	Description	Setting range	Default
IN1	Input-1 type	(See note)	OFF
UNI1	Input-1 unit	%: Percent °F: Fahrenheit °C: Celsius –: No unit	°C
RH1	Analog input-1 range high-limit	Within instrument range (see note)	Instrument range high-limit
RL1	Analog input-1 range low-limit		Instrument range low-limit
SDP1	Input-1 decimal-point position (displayed when voltage is supplied)	DC voltage: 0 through 4	2
SH1	Input-1 scale high-limit (displayed when voltage is supplied)	DC voltage: –19999 through 30000 provided that $SL1 < SH1$, $(SH1 - SL1) \leq 30000$	100.00
SL1	Input-1 scale low-limit (displayed when voltage is supplied)		0.00
BSL1	Input-1 burnout	OFF: Disabled UP: Upscale DOWN: Downscale	UP
RJC1	Input-1 reference junction compensation	OFF: Disabled ON: Enabled	ON

Note:

Refer to table 1 on page 11 of this manual.

▪ **Input processing-related parameters (2: UP750 only)**

The parameters listed in the table below are shown in the IN sub menu of the UPMD main menu of the setup parameter setting display.

Setup parameter setting display sub menu: IN

Parameter code	Description	Setting range	Default
IN2	Input-2 type (see note 2)	(See note 1)	OFF
UNI2	Input-2 unit (see note 2)	%: Percent °F: Fahrenheit °C: Celsius –: No unit	°C
RH2	Analog input-2 range high-limit (see note 2)	Within instrument range (see note 2)	Instrument range high-limit
RL2	Analog input-2 range low-limit (see note 2)		Instrument range low-limit
SDP2	Input-2 decimal-point position (displayed when voltage is supplied) (see note 2)	DC voltage: 0 through 4	2
SH2	Input-1 scale high-limit (displayed when voltage is supplied) (see note 2)	DC voltage: –19999 through 30000 provided that $SL2 < SH2$, $(SH2 - SL2) \leq 30000$	100.00
SL2	Input-2 scale low-limit (displayed when voltage is supplied) (see note 2)		0.00
BSL2	Input-2 burnout (see note 2)	OFF: Disabled UP: Upscale DOWN: Downscale	UP
RJC2	Input-2 reference junction compensation (see note 2)	OFF: Disabled ON: Enabled	ON

Note 1:

Refer to table 1 on page 11 of this manual

Note 2:

These parameters 2 are shown only for UP750-5x and 7x.

▪ **Input processing-related parameters (3: Both models)**

The parameters listed in the table below are shown in the IN sub menu of the UPMD main menu of the setup parameter setting display.

Setup parameter setting display sub menu: IN

Parameter code	Description	Setting range	Default
IN3	Input-3 type (see note 2)	(See note 1)	1-5V
UNI3	Input-3 unit (see note 2)	%: Percent °F: Fahrenheit °C: Celsius -: No unit	%
RH3	Analog input-3 range high-limit (see note 2)	Within instrument range	5.000
RL3	Analog input-3 range low-limit (see note 2)		1.000
SDP3	Input-3 decimal-point position (see note 2)	DC voltage: 0 through 4	1
SH3	Input-3 scale high-limit (see note 2)	DC voltage: -19999 through 30000 provided that $SL1 < SH1$, $(SH1 - SL1) \leq 30000$	1370.0
SL3	Input-3 scale low-limit (see note 2)		-200.0 (UP750) -270.0 (UP550)
BSL3	Input-3 burnout (see note 2)	OFF: Disabled UP: Upscale DOWN: Downscale	OFF

Note 1:

Refer to table 1 on page 11 of this manual.

Note 2:

These parameters are shown only for UP750-x1 and UP550-x1.

▪ **Input processing-related parameters (4: Both models)**

The parameters listed in the table below are shown in the IN sub menu of the UPMD main menu of the setup parameter setting display.

Setup parameter setting display sub menu: IN

Parameter code	Description	Setting range	Default
P.UN1	PV1 unit	%: Percent °F: Fahrenheit °C: Celsius –: No unit	°C
P.DP1	PV1 decimal-point position	0 through 4	Same as SDP1
P.RH1	PV1 range high-limit	Thermocouple, resistance temperature detector, DC voltage: – 19999 through 30000 provided that P.RL1<P.RH1, (P.RH1 – P.RL1)≥ 30000	Thermocouple, RTD: P.RH1 DC voltage: 100.00
P.RL1	PV1 range low-limit		Thermocouple, RTD: P.RL1 DC voltage: 0.00
P.UN2	PV2 unit (see note)	%: Percent °F: Fahrenheit °C: Celsius –: No unit	°C
P.DP2	PV2 decimal-point position (see note)	0 through 4	Same as SDP1
P.RH2	PV2 range high-limit (see note)	Thermocouple, resistance temperature detector, DC voltage: – 19999 through 30000 provided that P.RL1<P.RH1, (P.RH1 – P.RL1)≥ 30000	Thermocouple, RTD: P.RH2 DC voltage: 100.00
P.RL2	PV2 range low-limit (see note)		Thermocouple, RTD: P.RL2 DC voltage: 0.00

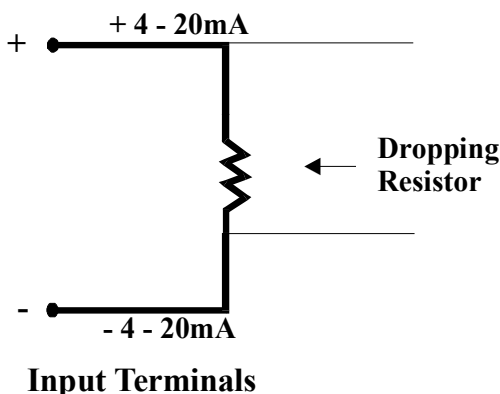
Note:

Parameters P.UN2 through P.RL2 are shown only when the controller is set up for dual-loop control (UP mode 11), temperature and humidity control (UP mode 12), cascade control (UP mode 4), or cascade control with two universal inputs (UP mode 13).

Table 1: Input Range Codes

Input classification	Input type	Instrument input range (°C)	Instrument input range (°F)	Instrument input range code ^(Note)
Unspecified	OFF	N/A	N/A	OFF
Thermocouple	K	-200.0 - 1370.0(UP750)	-300.0 - 2500.0 (UP750)	TypeK1
		-270.0 - 1370.0(UP550)	-450.0 - 2500.0 (UP550)	
		-200.0 - 1000.0(UP750)	0.0 - 2300.0 (UP750)	TypeK2
		-270.0 - 1000.0(UP550)	-450.0 - 2300.0 (UP550)	
		-200.0 - 500.0	-200.0 - 1000.0	TypeK3
	J	-200.0 - 1200.0	-300.0 - 2300.0	Type J
	T	-200.0 - 400.0(UP750)	-300.0 - 750.0 (UP750)	TypeT1
		-270.0 - 400.0(UP550)	-450.0 - 750.0 (UP550)	
	T	0.0 - 400.0	-200.0 - 750.0	TypeT2
	B	0.0 - 1800.0	32 - 3300	Type B
	S	0.0 - 1700.0	32 - 3100	TypeS
	R	0.0 - 1700.0	32 - 3100	TypeR
	N	-200.0 - 1300.0	-300.0 - 2400.0	TypeN
	E	-200.0 - 1000.0(UT750)	-300.0 - 1800.0 (UP750)	TypeE
		-270.0 - 1000.0(UT550)	-450.0 - 1800.0 (UP550)	
	L(DIN)	-200.0 - 900.0	-300.0 - 1600.0	TypeL
U(DIN)	-200.0 - 400.0	-300.0 - 750.0	TypeU1	
	0.0 - 400.0	-200.0 - 1000.0	TypeU2	
W(DIN)	0.0 - 2300.0	32 - 4200	TypeW	
	Platinel 2	0.0 - 1390.0	32.0 - 2500.0	Platinel 2
	PR20-40	0.0 - 1900.0	32 - 3400	PR2040
	W97Re3- W75Re25	0.0 - 2000.0	32 - 3600	W97Re3
RTD	JPt100	-200.0 - 500.0	-300.0 - 1000.0	JPt1
	JPt100	-150.00 - 150.00	-200.0 - 300.0	JPt2
	Pt100	-200.0 - 640.0	-300.0 - 1180.0	Pt1
	Pt100	-200.0 - 500.0	-300.0 - 1000.0	Pt2
	Pt100	-150.00 - 150.00	-200.0 - 300.0	Pt3
Standard signal (*)	0.4 - 2V (*)	0.400 - 2.000	The ranges on the left can be scaled to within a 30,000 count range.	0.4 - 2V
	1 - 5V (*)	1.000 - 5.000		1 - 5V
DC voltage	0 - 2V	0.000 - 2.000		0 - 2V
	0 - 10V	0.000 - 10.00		0 - 10V
DC voltage	-10 - 20mV	-10.00 - 20.00		mV1
	0 - 100mV	0.000 - 100.0		mV2

(*) For a 4-20mA DC signal select either the 0.4-2V range with a 100Ω dropping resistor or a 1-5V range with a 250Ω dropping resistor.



Now the universal output type is to be set. This will define the function of the control outputs and may effect some of the DO's as well. Take care to compare what output is assigned to each terminal. This is determined from tables 2, 3, and 4 on pages 13 - 15.

1-3. Output processing-related parameters

The parameters listed in the table below are shown in the OUT sub menu of the UPMD main menu of the setup parameter setting display.

Setup parameter setting display sub menu: OUT

Parameter code	Description	Setting range	Default
OT1	Control output-1 selection (see notes 1, 2)	0: Relay (Time proportional) 1: Voltage pulse (Time proportional) 2: Current output 3: ON/OFF control, relay 4 through 12: Heat/cool control (see note 3)	0 (4 for UP550 for heat/cool control)
OT2	Control output-2 selection (see notes 1, 2)	Same as above	Same as above
CT1	Control output-1 cycle time (see notes 1, 2)	1 through 1000 sec	30 sec
CT2	Control output-2 cycle time (see notes 1, 2)		30 sec
CTc1	Cooling-line control output-1 cycle time (see notes 1, 2)		30 sec
CTc2	Cooling-line control output-2 cycle time (see notes 1, 2)		30 sec
AO1	Analog output-1 or control output-1 (see note 1)		0: 4 through 20mA 1: 0 through 20mA 2: 20 through 4mA 3: 20 through 0mA (2 and 3 are applicable only to UP550]
AO2	Analog output-2 or control output-2 (see notes 1, 4)	0	
AO3	Analog output-3 for RET1	0	
A1H	Analog Output 1 High Limit	-5.0 to 105.0%	100.0%
A1L	Analog Output 1 Low Limit	-5.0 to 105.0%	0.0%
A2H	Analog Output 2 High Limit	-5.0 to 105.0%	100.0%
A2L	Analog Output 2 Low Limit	-5.0 to 105.0%	0.0%
A3H	Analog Output 3 High Limit	-5.0 to 105.0%	100.0%
A3L	Analog Output 3 Low Limit	-5.0 to 105.0%	0.0%

Note 1:

Parameters except AO3 are not shown for UP550-1x.

Note 2:

For the UP750, parameters OT2 and CT1 are shown but not OT1 and CT2 when the controller is set up for cascade control (UP mode 4) or cascade control with two universal inputs (UP mode 13); OT2, CT1 and CTc1 are shown but not OT1, CT2 and CTc2 when the controller is set up for the same UP mode and Heat/cool. For the UP550, OT2 and CT are shown but not OT1 when it is set up for cascade control (UP mode 4); OT2, CT, CTc are shown but not OT1 when it is set up for heat/cool control in UP-mode 4. See note 3.

Note 3:

Refer to tables 2, 3 and 4 on pages 13 – 15 of this manual.

Note 4:

Parameter AO2 is shown only for heat/cool control.

▪ **Output**

When output is a continuous current signal in PID control, for example, specifying 2 to OT1 enables retransmission-1 and event outputs. If the heating-line output uses current or pulse and the cooling-line output uses transistor output in heat/cool PID control, specifying 8 to OT1 also enables retransmission and event outputs.

At the time of shipping, OT1 is set at 0 for UP750 and UP550-0x, controllers; and 4 for the UP550-2x controller.

Setup parameter used

- OT1
Selects an output. Specify 0 through 12.

Table 2: Control Output Selection-1 (UP750)

↑: Same as above.

OT1	Control type	Output terminal				
		OUT1A Current/pulse 1	OUT3A Current/pulse 3	OUT1R Relay contact	DO3 Relay contact	DO4 Transistor contact
0	Time proportional PID	Retransmission output 2	Retransmission output 1	<u>Control output</u>	instrument alarm-1 output (see note)	Time event-1 output (see note)
1	↑	<u>Pulse control output</u>	↑	Not used	↑	↑
2	Continuous PID	<u>Current control output</u>	↑	↑	↑	↑
3	On/off control	Retransmission output 2	↑	<u>Control output</u>	↑	↑
4	Heating/cooling control	↑	↑	<u>Heating side output</u>	<u>Cooling side output</u>	↑
5	↑	<u>Heating pulse control output</u>	↑	Not used	<u>Cooling side output</u>	↑
6	↑	<u>Heating current control output</u>	↑	↑	<u>Cooling side output</u>	↑
7	↑	Retransmission output 2	↑	<u>Heating side output</u>	instrument alarm-1 output (see note)	<u>Cooling side output</u>
8	↑	<u>Heating pulse control output</u>	↑	Not used	↑	<u>Cooling side output</u>
9	↑	<u>Heating current control output</u>	↑	↑	↑	<u>Cooling side output</u>
10	↑	Retransmission output 2	<u>Cooling current control output</u>	<u>Heating side output</u>	↑	Time event-1 output (see note)
11	↑	<u>Heating pulse control output</u>	<u>Cooling current control output</u>	Not used	↑	↑
12	↑	<u>Heating current control output</u>	<u>Cooling current control output</u>	Not used	↑	↑

Note:

For instrument alarm-1 and time event-1 outputs assigned to DO3 and DO4, refer to the description of each UP-mode control on page 23 or the description of contact outputs.

Table 3: Control Output Selection-1 and 2 (UP550)

↑: Same as above.

Φ: Applicable (**M**: Factory-set)

OT1	Control type	Output terminal				Applicability	
		OUT1A Current/pulse 1	OUT2A Current/pulse 2	OUT1R Relay contact	OUT2R Relay contact	UP550-0x	UP550-2x
0	Time proportional PID	Retransmission output 2	Not used	<u>Control output</u>	Time event-6 output	M	Φ
1	↑	<u>Pulse control output</u>	↑	Time event-5 output	↑	Φ	Φ
2	Continuous PID	<u>Current control output</u>	↑	↑	↑	Φ	Φ
3	On/off control	Retransmission output 2	↑	<u>Control output</u>	↑	Φ	Φ
4	Heating/cooling control	↑	↑	<u>Heating side output</u>	<u>Cooling side output</u>		M
5	↑	<u>Heating pulse control output</u>	↑	Time event-5 output	<u>Cooling side output</u>		Φ
6	↑	<u>Heating current control output</u>	↑	↑	<u>Cooling side output</u>		Φ
7	↑	Retransmission output 2	<u>Cooling pulse control output</u>	<u>Heating side output</u>	Time event-6 output		Φ
8	↑	<u>Heating pulse control output</u>	<u>Cooling pulse control output</u>	Time event-5 output	↑		Φ
9	↑	<u>Heating current control output</u>	<u>Cooling pulse control output</u>	↑	↑		Φ
10	↑	Retransmission output 2	<u>Cooling current control output</u>	<u>Heating side output</u>	Not used		Φ
11	↑	<u>Heating pulse control output</u>	<u>Cooling current control output</u>	Time event-5 output	↑		Φ
12	↑	<u>Heating current control output</u>	<u>Cooling current control output</u>	↑	↑		Φ

The type of outputs for the Loop2 is determined by setup parameter OT2. Retransmission 2 and alarm outputs may not be output depending on the type of control output. PV event-2 and time event-2 outputs are assigned to contact output terminals by control output selection-2.

Control output selection-2 outputs for the UP750 are applicable when the controller is set up for dual-loop control (UP mode 11) or temperature and humidity control (UP mode 12).

Control output selection-2 outputs are only applicable to the UP550 set up for cascade control (UP mode 4).

Setup parameter used

- OT2
Selects an output. Specify 0 through 9. For output specifications, see Table 4 below for the UP750 and Table 3 on page 14 for the UP550.

Table 4: Control Output Selection-2 (UP750) ↑: Same as above.

OT2	Control type	Output terminal			
		OUT2A Current/pulse 1	OUT2R Relay contact	DO2 Relay contact	DO5 Transistor contact
0	Time proportional PID	Retransmission output 2	<u>Control output</u>	PV event-2 output	Time event-2 output
1	↑	<u>Pulse control output</u>	Not used	↑	↑
2	Continuous PID	<u>Current control output</u>	↑	↑	↑
3	Time proportional PID	Retransmission output 2	<u>Control output</u>	↑	↑
4	Heating/cooling control	↑	<u>Heating side output</u>	<u>Cooling side output</u>	↑
5	↑	<u>Heating pulse control output</u>	Not used	<u>Cooling side output</u>	↑
6	↑	<u>Heating current control output</u>	↑	<u>Cooling side output</u>	↑
7	↑	Retransmission output 2	<u>Heating side output</u>	PV event-2 output	<u>Cooling side output</u>
8	↑	<u>Heating pulse control output</u>	Not used	↑	<u>Cooling side output</u>
9	↑	<u>Heating current control output</u>	↑	↑	<u>Cooling side output</u>

Note:

For PV event-2 and time event-2 outputs assigned to DO2 and DO5, refer to the description at each UP-mode control in General Specifications document.

1-4. Now set the communications parameters on UP550-□1 and UP750-□1 only. This will determine how the comm port is used. Most PC software will require PSL=0 for PC link communications (check with your software vendor.) Only the address should need to be adjusted.

▪ **Communication-related parameters**

The parameters listed in the table below are shown in the R485 sub menu of the UPMD main menu of the setup parameter setting display.

Setup parameter setting display sub menu: **R485**

Parameter code	Description	Setting range	Default
PSL1	Protocol selection-1 (see note 1)	0: PC-link communication 1: PC-link communication with sum check 2: Ladder communication 3: Coordinated master station 7: Modbus (ASCII) 8: Modbus (RTU) 9: Coordinated master station (UP750 Loop 2)	0
BPS1	Communication rate-1 (see note 1)	600, 1200, 2400, 4800, 9600 bps	9600 bps
PRI1	Parity-1 (see note 1)	NONE: Disabled EVEN: Even parity ODD: Odd parity	EVEN
STP1	Stop bit-1 (see note 1)	1 or 2	1
DLN1	Data length-1 (see note 1)	7 or 8 (8 should be for protocol other than PC-link communication)	8
ADR1	Address-1 (see note 1)	1 through 99 (allowable connections up to 31 units, however)	1
RP.T1	Minimum response time-1 (see note 1)	0 through 10 (x10ms)	0
PSL2	Protocol selection-2 (see note 2)	0: PC-link communication 1: PC-link communication with sum check 2: Ladder communication 3: Coordinated master station 5: 1 Expansion module 6: 2 Expansion module 9: Coordinated master station (UP750 Loop 2)	0
BPS2	Communication rate-2 (see note 2)	600, 1200, 2400, 4800, 9600 bps 19200, 38400 bps (UP750) only	9600 bps
PRI2	Parity-2 (see note 2)	NONE: Disabled EVEN: Even parity ODD: Odd parity	EVEN
STP2	Stop bit-2 (see note 2)	1 or 2	1
DLN2	Data length-2 (see note 2)	7 or 8 (8 should be for protocol other than PC-link communication)	8
ADR2	Address-2 (see note 2)	1 through 99 (allowable connections up to 31 units, however)	1
RP.T2	Minimum response time-2 (see note 2)	0 through 10 (x10ms)	0

Note 1:

Parameters PSL1 through RP.T1 are shown only for UP750-x1. Parameters PSL through RP.T are shown only for UP550-x1.

Note 2:

Parameters PSL2 through RP.T2 are shown only for UP750-x1.

1-5. For UP550-1□ only. The valve mode (V.mod) should be set now. The travel time (V-mod 2 and 3) and slidewire calibration (V- mod 1 and 2) can be set later when the instrument is ready to operate the first time.

▪ **Valve calibration-related parameters**

The parameters listed in the table below are shown in the VALV sub menu of the UPMD main menu of the setup parameter setting display.

Setup parameter setting display sub menu: **VALV**

Parameter code	Description	Setting range	Default
V.RS	Valve position setting reset	1: Resets valve position setting and decimal point starts blinking. 0: No reset	0
V.L	Valve fully-closed position setting	Setting is saved when SET/ENT key is pressed with valve fully closed. V.L stops blinking when both V.L and V.H are adjusted.	Undefined
V.H	Valve fully-opened position setting	Setting is saved when SET/ENT key is pressed with valve fully closed. V.H stops blinking when both V.L and V.H are adjusted.	Undefined
TR.T	Valve operating time	5 through 300 sec	60 sec
V.MOD	Valve adjustment mode	0: Feedback mode 1: Feedback mode (changed to assuming mode when VP input error or wire breakage occurs) 2: Assuming mode	0

Note:

These parameters are shown only for UP550-1x.

1-6. Parameter initializing parameter

This parameter is shown in the INIT sub menu of the UPMD main menu of the setup parameter setting display. This function initializes setup and operating parameters other than those used for UP-mode controls, inputs and outputs, communication valve calibration. **WHEN THESE PARAMETERS ARE INITIALIZED, THEY WILL BE RESET TO THEIR DEFAULTS SET AT THE TIME OF SHIPPING.** For parameters related to the ranges and scales set by I/O parameters, such as PV output range for retransmission output, the set ranges and scales may be retained.

Setup parameter setting display sub menu: **INIT**

Parameter code	Description	Setting range	Default	CS #	Ref. page
INI	Parameter initialization	OFF: Disabled ON: Initializes parameters other than those in the UPMD main menu.	OFF	1266	

Now you have completed “configuration.” The next step is the setup parameters.

2. Setup Parameters

The second task requires setting the setup parameters, which defines how certain parts of the controller will function. Many of these will not require adjustment as the default is correct much of the time or you may not use that function. Please review the application with the designer or user to determine the correct settings. In some cases subsequent related parameters may be affected so use care when changing setup parameters after commissioning is complete. Note that these items are organized under 3 groups (Para-Parameters, CMLP – Common Loop Parameters and Conf – Configuration Parameters.)

Refer to setup parameter map on page 4.

2-1. Setpoint-related parameters

The parameters listed in the table below are shown in the SP sub menu of PARA main menus of the setup parameter setting display.

Setup parameter setting display sub menu: SP

Parameter code	Description	Setting range	Default	CS#	Ref. Page
SPT	SP tracking selection LSP tracked from program	OFF. ON. With JC=2	ON	902	
TMU	Program time unit	Hour.minute or Minute.second.	hh:mm	904	
SEG.T	Segment setting method	0: Segment time. 1: Segment ramp-rate.	0	905	
PT2.G	Program pattern-2 generation (Note)	OFF. ON	OFF	906	
PNC	Program pattern number clearance	Resets the pattern number to 0 at the end of a program	Off (0)	939	
SPH1	Program set point 1 high limit	Limits set point while in program mode	100.0% of PV range	933	
SPL1	Program set point 1 low limit	Limits set point while in program mode	0.0% of PV range	934	
SPH2	Program set point 2 high limit	Limits set point while in program mode	100.0% of PV range	973	
SPL2	Program set point 2 low limit	Limits set point while in program mode	0.0% of PV range	974	

Note:

Not available on UP750-5 when set to mode 11 or 12.

2-2. Instrument alarm- and event-related parameters

The parameters listed in the table below are shown in the ALM sub menu of PARA main menus of the setup parameter setting display.

Setup parameter setting display sub menu: **ALM**

Parameter code	Description	Setting range	Default	CS #	Ref. Page
PEH1	PV event-1 hysteresis	EUS (0.0-100.0%)	EUS (0.5%)	907	
PEH2	PV event-2 hysteresis	EUS (0.0-100.0%)	EUS (0.5%)	908	
PEH3	PV event-3 hysteresis	EUS (0.0-100.0%)	EUS (0.5%)	909	
PEH4	PV event-4 hysteresis	EUS (0.0-100.0%)	EUS (0.5%)	910	
PEH5	PV event-5 hysteresis	EUS (0.0-100.0%)	EUS (0.5%)	911	
PEH6	PV event-6 hysteresis	EUS (0.0-100.0%)	EUS (0.5%)	912	
PEH7	PV event-7 hysteresis	EUS (0.0-100.0%)	EUS (0.5%)	913	
PEH8	PV event-8 hysteresis	EUS (0.0-100.0%)	EUS (0.5%)	914	
AL1	Instrument alarm-1 type	OFF. Loop 1: 1-20, 25-27, 28-31 Loop 2: 41-60, 65-67, 68-71 (See Table 7)	1: PV high-limit	915	
AL2	Instrument alarm-2 type	OFF. Loop 1: 1-20, 25-27, 28-31 Loop 2: 41-60, 65-67, 68-71 (See Table 7)	2: PV low-limit	916	
AL3	Instrument alarm-3 type	OFF. Loop 1: 1-20, 25-27, 28-31 Loop 2: 41-60, 65-67, 68-71 (See Table 7)	1: PV high-limit	917	
AL4	Instrument alarm-4 type	OFF. Loop 1: 1-20, 25-27, 28-31 Loop 2: 41-60, 65-67, 68-71 (See Table 7)	2: PV low-limit	918	
HY1	Instrument alarm-1 hysteresis	EUS (0.0-100.0%)	EUS (0.5%)	919	
HY2	Instrument alarm-2 hysteresis	EUS (0.0-100.0%)	EUS (0.5%)	920	
HY3	Instrument alarm-3 hysteresis	EUS (0.0-100.0%)	EUS (0.5%)	921	
HY4	Instrument alarm-4 hysteresis	EUS (0.0-100.0%)	EUS (0.5%)	922	
AMD	Instrument alarm mode	0: Enabled. 1: Disabled in RESET mode. 2: Disabled in RESET or MAN mode.	0	923	

2-3 Control action-related parameters

The parameters listed in the table below are shown in the CTL sub menu of PARA main menus of the setup parameter setting display.

Secondary-loop or Loop 2 parameters are shown in main menus later than LOOP2 .

Setup parameter setting display sub menu: CTL

Parameter code	Description	Setting range	Default	CS#	Ref. Page
OPR1	Loop-1 output velocity limiter	OFF 0.1 through 100.0%/sec	OFF	926	
OPR2	Loop-2 output velocity limiter (see note 1)	OFF 0.1 through 100.0%/sec	OFF	966	
MOD1	Loop-1 PID-control mode	0: Batch control 1: Fixed-point control	0	927	
MOD2	Loop-2 PID-control mode (see note 1)	0: Batch control 1: Fixed-point control	0	967	
AR	Anti-reset windup	AUTO 50.0 through 200.0%	AUTO	928	
ZON	Zone-PID selection (see note 2) How PID is selected	0: Segment 1: Zone selection	0	929	
R.MD	Restart mode (see note 2) Recovery from power outage	CONT: Continue MAN: Manual RESET: Reset	CONT	930	
R.TM	Restart timer from power outage	0 through 10 sec	0 sec	931	
GRP	PID Group Number	Used PID Groups, 1-8	8	940	
1.RP1	Zone PID Reference Point 1	0.0 to 100.0% of PV input range	100.0% of PV input		
2.RP1	Zone PID Reference Point 2	0.0 to 100.0% of PV input range	100.0% of PV range		
3.RP1	Zone PID Reference Point 3	0.0 to 100.0% of PV input range	100.0% of PV range		
4.RP1	Zone PID Reference Point 4	0.0 to 100.0% of PV input range	100.0% of PV range		
5.RP1	Zone PID Reference Point 5	0.0 to 100.0% of PV input range	100.0% of PV range		
6.RP1	Zone PID Reference Point 6	0.0 to 100.0% of PV input range	100.0% of PV range		
RHY	Zone PID Switching Hysteresis	0.0 to 10.0% of PV range	OFF (0)		
RDV	Zone PID Reference Deviation from set point	0.0 to 100.0% of PV range	OFF (0)		

Note 1: Parameters OPR2 and MOD2 are shown when the UP750-x1 is set up for cascade control (UP mode 4), dual-loop control (UP mode 11), temperature-and-humidity control (UP mode 12), or cascade control with two universal inputs (UP mode 13); and when the UP550 is set up for cascade control (UP mode 4).

Note 2: Functions of parameters ZON, R.MD, and R.TM are common to Loop 1 and Loop 2 on UP750-5.

2-4. Input computation-related parameters

The parameters listed in the table below are shown in the AIN sub menu of the CMLP main menu of the setup parameter setting display.

Parameter code	Description	Setting range	Default	CS#	Ref. Page
A.BS1	Analog input-1 biasing	EUS (-100.0 through 100.0%)	EUS (0.0%)	1001	
A.FL1	Analog input-1 filtering	OFF 1 through 120 sec	OFF	1002	
A.SR1	Analog input-1 square root calculation	OFF ON	OFF	1003	
A.LC1	Analog input-1 low-cut	0.0 through 5.0%	1.0%	1004	
A.BS2	Analog input-2 biasing (see note 1)	EUS (-100.0 through 100.0%)	EUS (0.0%)	1005	
A.FL2	Analog input-2 filtering (see note 1)	OFF 1 through 120 sec	OFF	1006	
A.SR2	Analog input-2 square root calculation (see note 1)	OFF ON	OFF	1007	
A.LC2	Analog input-2 low-cut (see note 1)	0.0 through 5.0%	1.0%	1008	
A.BS3	Analog input-3 biasing (see note 2)	EUS (-100.0 through 100.0%)	EUS (0.0%)	1009	
A.FL3	Analog input-3 filtering (see note 2)	OFF 1 through 120 sec	OFF	1010	
A.SR3	Analog input-3 square root calculation (see note 2)	OFF ON	OFF	1011	
A.LC3	Analog input-3 low-cut (see note 2)	0.0 through 5.0%	1.0%	1012	

Note 1: Parameters A.BS2, A.FL2, A.SR2, and A.LC2 are shown only for UP750-5x.

Note 2: Parameters A.BS3, A.FL3, A.SR3, and A.LC3 are shown only for the UP750-x1 and UP550-x1 controllers.

2-5. Retransmission output-related parameters

The parameters listed in the table below are shown in the RET sub menu of the CMLP main menu of the setup parameter setting display.

Setup parameter setting display sub menu: RET

Parameter code	Description	Setting range	Default	CS#	Ref. Page
RET1	Retransmission output-1 selection	OFF 1: PV1 2: SP1 3: OUT1 4: LPS (sensor power supply) 5: PV2 6: SP2 7: OUT2	1	1013	
RTH1	Retransmission output-1 high-limit	EU (0.0 through 100.0%) provided that RTL1<RTH1	PRH1	1014	
RTL1	Retransmission output-1 low-limit	RET1 = 1, 2, 5, or 6 1 or 2: PV1-range display 5 or 6: PV2-range display	PRL1	1015	
RET2	Retransmission output-2 selection	OFF 1: PV1 2: SP1 3: OUT1 4: LPS (sensor power supply) 5: PV2 6: SP2 7: OUT2	2	1016	
RTH2	Retransmission output-2 high-limit	EU (0.0 through 100.0%) provided that RTL1<RTH1	PRH1	1017	
RTL2	Retransmission output-2 low-limit	RET2 = 1, 2, 5, or 6 1 or 2: PV1-range display 5 or 6: PV2-range display	PRL1	1018	

2-6. Deviation trend-related parameters

The parameters listed in the table below are shown in the TRND sub menu of the CMLP main menu of the setup parameter setting display.

Setup parameter setting display sub menu: TRND

Parameter code	Description	Setting range	Default	CS#	Ref. Page
TSC1	Primary-loop deviation trend scale	EUS (0.1 through 100.0%)	EUS (5%)	1021	
TSC2	Secondary-loop deviation trend scale (see note 1)	EUS (0.1 through 100.0%)	EUS (5%)	1022	
TTM	Deviation trend time	1 through 600 sec	5 sec	1023	

Note 1:

Parameter TSC2 is shown for the UP750-5x set up for cascade control (UP mode 4), dual-loop control (UP mode 11), temperature-and-humidity control (UP mode 12), or cascade control with two universal inputs (UP mode 13).

2-7. Security-related parameters

This locks certain keys and menus. It may need to be left “OFF” until setup and commissioning is complete and then turned “ON”. If no locks are required skip this menu. The parameters listed in the table below are shown in the LOCK sub menu of the CMLP main menu of the setup parameter setting display.

Setup parameter setting display sub menu: **LOCK**

Parameter code	Description	Setting range	Default	CS#	Ref. Page
▲,▼	Data setting key-locking	OFF ON	OFF	1024	
PT.No.	PT.No key locking	OFF ON	OFF	1026	
RUN	RUN and RESET keys- locking	OFF ON	OFF	1027	
MODE	Operating parameter main menu MODE display-locking	OFF ON	OFF	1028	
PROG	Operating parameter main menu PROG display-locking	OFF ON	OFF	1029	
LP1	Operating parameter main menu LP1 display-locking	OFF ON	OFF	1030	
LP2	Operating parameter main menu LP2 display-locking	OFF ON	(See note)	1031	
PID	Operating parameter main menu PID display-locking	OFF ON	OFF	1032	
USR	Operating parameter main menu USR display-locking	OFF ON	(See note)	1033	
PYS1	Operating parameter main menu PYS1 display-locking	OFF ON	OFF	1034	
PYS2	Operating parameter main menu PYS2 display-locking	OFF ON	(See note)	1035	
PWD	Password setting	0 (disabled) 1 through 30000	0		

Note: Defaults are determined by UP-mode settings.

2-8. SELECT-display registration parameters

This selects what parameters are available instantly to the operator/user. For parameters that require frequent or quick adjustment just choose the CS# in the column next to it and enter them here. If not using custom select displays then skip this menu. The parameters listed in the table below are shown in the CSEL sub menu of the CONF main menu of the setup parameter setting display.

Setup parameter setting display sub menu: **CSEL**

Parameter code	Description	Setting range	Default	CS#	Ref. Page
C.S1	SELECT display-1 registration	Select the value from the CS# column of the parameters you want to register.	OFF	1101	
C.S2	SELECT display-2 registration		OFF	1102	
C.S3	SELECT display-3 registration		OFF	1103	
C.S4	SELECT display-4 registration		OFF	1104	
C.S5	SELECT display-5 registration		OFF	1105	

2-9. Contact output-registration parameters

The parameters listed in the table below are shown in the DO sub menu of the CONF main menu of the setup parameter setting display. Select the parameter/function you wish to output from table 6 that follows. When that item is true/on the DO will be “ON” – otherwise the DO will be “OFF.” Verify the desired function with the loop engineer/designer. If not using digital outputs you may skip this area.

Setup parameter setting display sub menu: DO

Parameter code	Description	Setting range	Default	CS#	Ref. Page
DO1	DO1 output flag registration (relay)	D-registers: 0 (Not registered), 1 through 3300. I-relays: 1 through 748 (Add 5000 to the I-relay number)	(See note 1)	1106	
DO2	DO2 output flag registration (relay)		(See note 1)	1107	
DO3	DO3 output flag registration (relay)		(See note 1)	1108	
DO4	DO4 output flag registration (open collector)		(See note 1)	1109	
DO5	DO5 output flag registration (open collector)		(See note 1)	1110	
DO6	DO6 output flag registration (open collector)		(See note 1)	1111	
DO7	DO7 output flag registration (open collector)		(See note 1)	1112	
R151	RDO151 output flag registration (see note 2)		Not registered	1113	
R152	RDO152 output flag registration (see note 2)		Not registered	1114	
R153	RDO153 output flag registration (see note 2)		Not registered	1115	
R154	RDO154 output flag registration (see note 2)		Not registered	1116	
R155	RDO155 output flag registration (see note 2)		Not registered	1117	
R156	RDO156 output flag registration (see note 2)		Not registered	1118	
R157	RDO157 output flag registration (see note 2)		Not registered	1119	
R158	RDO158 output flag registration (see note 2)		Not registered	1120	
R251	RDO251 output flag registration (see note 2)		Not registered	1121	
R252	RDO252 output flag registration (see note 2)		Not registered	1122	
R253	RDO253 output flag registration (see note 2)		Not registered	1123	
R254	RDO254 output flag registration (see note 2)		Not registered	1124	
R255	RDO255 output flag registration (see note 2)		Not registered	1125	
R256	RDO256 output flag registration (see note 2)		Not registered	1126	
R257	RDO257 output flag registration (see note 2)		Not registered	1127	
R258	RDO258 output flag registration (see note 2)		Not registered	1128	

Note 1: Defaults are determined by UP-mode settings.

Note 2: Parameters R151 through R158 and R251 through R258 are shown only for the UP750-□1 when communications is set for and apply to the remote/extended I/O modules and apply to the remote/extended I/O modules.

Table 5: DO Settings

DO Function	I-Relay	DO Function	I-Relay
PV1 burn out	5018	TME7	5137
PV2 burn out	5042	TME8	5138
Calibration error	5049	TME9	5145
Manual (Loop 1)	5065	TME10	5146
Cascade	5069	TME11	5147
Automatic *	5070	TME12	5149
Manual *	5071	TME13	5150
Reset mode	5073	TME14	5151
Program mode	5074	TME15	5153
Local mode	5075	TME16	5154
Hold	5077	Pattern end	5157
Wait	5078	DI1	5161
Autotune (L1)	5079	DI2	5162
Manual (Loop 2)	5081	DI3	5163
Autotune (L2)	5097	DI4	5164
Alarm 1	5097	DI5	5165
Alarm 2	5098	DI6	5166
Alarm 3	5099	DI7	5167
Alarm 4	5101	Pattern 1	5626
PVE1	5113	Pattern 2	5627
PVE2	5114	Pattern 3	5628
PVE3	5115	Pattern 4	5629
PVE4	5117	Pattern 5	5630
PVE5	5118	Pattern 6	5631
PVE6	5119	Pattern 7	5632
PVE7	5121	Pattern 8	5633
PVE8	5122	Segment 1	5642
TME1	5129	Segment 2	5643
TME2	5130	Segment 3	5644
TME3	5131	Segment 4	5645
TME5	5134	Segment 5	5646
TME6	5135	Segment 6	5647

* For cascade (mode 4 or 13) only.

2-10. Contact input-registration parameters

Many things can occur based on a contact input or mode or event, alarm or status occurrence within the controller.

Examples:

- Turn on message 1 (MG1) when ALM1 occurs: 5097
- Go to hold mode when PVE2 occurs: 5114
- Change to display 2 when unit goes to manual (Loop 1): 5065

Select the function from table 6 on page 26.

The parameters listed in the table below are shown in the DI sub menu of the CONF main menu of the setup parameter setting display.

For details of contact-input registration, refer to *the Instruction Manual* on CD-ROM.

Setup parameter setting display sub menu: DI

Parameter code	Description	Setting range	Default
PROG	Program operation start (when changed from OFF to ON)	See table 6 which follows.	See note.
RST	Program operation stop (when changed from OFF to ON)		See note.
LOC	Local operation start (when changed from OFF to ON)		See note.
HOLD	Hold operation start (when changed from OFF to ON)		See note.
ADV	Advance operation start (when changed from OFF to ON)		See note.
A/M1	Loop-1 AUTO (ON)/MAN (OFF) operation mode switching		See note.
A/M2	Loop-2 AUTO (ON)/MAN (OFF) operation mode switching		See note.
LSP/CAS	Local/Cascade operation mode switching		See note.
PT.0	Pattern-number bit-0		See note.
PT.1	Pattern-number bit-1		See note.
PT.2	Pattern-number bit-2		See note.
PT.3	Pattern-number bit-3		See note.
PT.4	Pattern-number bit-4		See note.
PT.5	Pattern-number bit-5		See note.
PT.6	Pattern-number bit-6		See note.
PT.7	Pattern-number bit-7		See note.
PT.8	Pattern-number bit-8		See note.
MG1	Message interrupting display-1		See note.
MG2	Message interrupting display-2		See note.
MG3	Message interrupting display-3		See note.
MG4	Message interrupting display-4	See note.	

Note:

Defaults are determined by UP-mode settings. Refer to *the Instruction Manual on CD-ROM*.

Table 6 – DI Menu

DI Trigger	I-Relay	DI Trigger	I-Relay
IN1 Burnout	5005	Time Event 1	5129
IN2 Burnout	5006	Time Event 2	5130
IN3 Burnout	5007	Time Event 3	5131
Manual – Loop 1	5065	Time Event 4	5133
Cascade	5069	Time Event 5	5134
Automatic *	5070	Time Event 6	5135
Manual *	5071	Time Event 7	5137
Hold	5077	Time Event 8	5138
Wait	5078	Time Event 9	5145
Autotune (Loop 1)	5079	Time Event 10	5146
Manual (Loop 2)	5081	Time Event 11	5147
Autotune (Loop 2)	5095	Time Event 12	5149
Alarm 1, Loop 1	5097	Time Event 13	5150
Alarm 2, Loop 1	5098	Time Event 14	5151
Alarm 3, Loop 1	5099	Time Event 15	5153
Alarm 4, Loop 1	5101	Time Event 16	5154
PV Event 1	5113	Digital Input 1	5161
PV Event 2	5114	Digital Input 2	5162
PV Event 3	5115	Digital Input 3	5163
PV Event 4	5117	Digital Input 4	5164
PV Event 5	5118	Digital Input 5	5165
PV Event 6	5119	Digital Input 6	5166
PV Event 7	5121	Digital Input 7	5167
PV Event 8	5122		

▪ **10-segment linearizer I/O unit-registration parameters**

The parameters listed in the table below are shown in the C.PYS sub menu of the CONF main menu of the setup parameter setting display.

Setup parameter setting display sub menu: C.PYS

Parameter code	Description	Setting range	Default
PY1A	10-seg. linearizer-1 input unit	0: % 1: ABS0 2: ABS1 3: ABS2 4: ABS3 5: ABS4 6: EU (AIN1) 7: EUS (AIN1) 8: EU (AIN2) (Note) 9: EU (AIN2) (Note) 10: EU (AIN3) 11: EUS (AIN3) 12: EU (PV1) 13: EUS (PV1) 14: EU (PV2) 15: EUS (PV2)	12
PY1B	10-seg. linearizer-1 output unit		13
PY2A	10-seg. linearizer-2 input unit		14
PY2B	10-seg. linearizer-2 output unit		15

Note: Do not select setpoints 8 and 9 for the UP550 although they are shown for the controller.

Congratulations – you have now configured the setup portion of the controller. We will now proceed to the next part, the operation area of the controller.

3. Operating Parameters

The operating parameters will make your unit perform optimally and is the area where most common errors occur. Be certain your control functions are set properly.

Refer to operating parameter map on page 3.

3-1. Local Operation and Autotune

Before proceeding into programming, we recommend that you now operate the controller in local mode.

Programming from the front

Press the “Mode” key. Select loc: ON. Press “Set/Ent” key (which indicates local setpoint control.)

Press the “Mode” key several times until mode: Auto 1 is displayed. Press “Set/Ent.”

At this point the “Loc” light should be “ON” and the Man 1 light should be “OFF”.

The display should show:

▶	SP2: -200.0°C
L.	
PTNO : 300	SEGNO : 50/89
TM= 99h59	RCY : 654/981

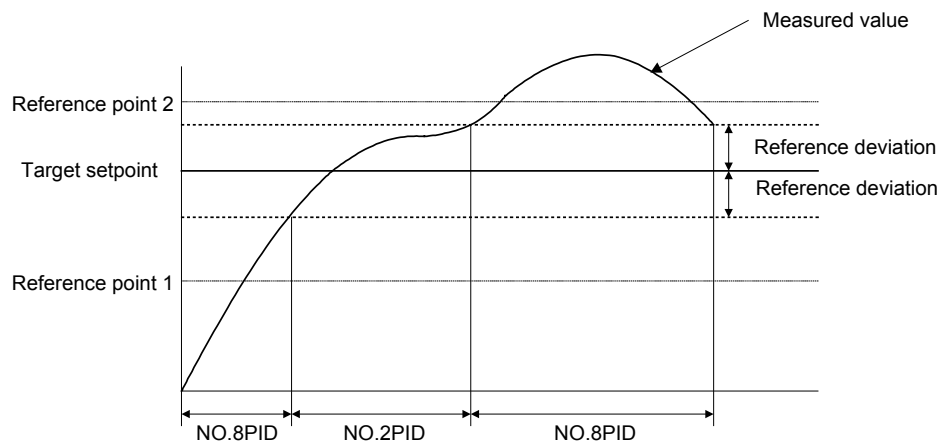
By pressing the ▲ and ▼ keys the setpoint can be changed. Select a reasonable median setpoint now. Pressing “Set/Ent” will make that setpoint active. Now enter the “Loop 1 Parameter” menu and set super control to “ON”. This will eliminate variations and overshoot and provide vastly superior control.

Finally the PID values must be tuned. We strongly advise the use of our automatic tuning function, which offers quick adjustment of the PID values and excellent control. If you have not adjusted the reference points, a part of each PID set when zone PID is selected then only PID set #1 will be used. Select autotune from the “loop 1 parameter” menu and set it to 1 (for PID set 1.)

Light Loader Software

If you are using the light loader software you may also accomplish the above. Select the tuning screen and using the pull down menus select “auto”, “local”, and then autotune “1”.

If you wish, you may have the 8th PID set function when a predetermined deviation is exceeded. This is set as RDV in the 8th PID set. An example is shown below.



Autotune will occur at the setpoint in use when autotune is turned “on”. Changing setpoint once autotune has started will have no effect, the autotune must be stopped and then restarted. Should autotune be selected during program operation the program is paused while autotune occurs. Once autotune is completed the program will resume.

Once autotune is completed, your unit should be controlling as well as possible. Now that the unit is operating properly we’re ready to begin developing programs.

4. Program Creation

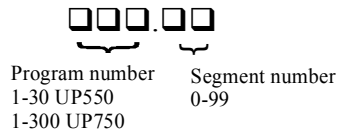
Several elements are required to define a single program. Each must be provided or the controller may not function as expected. This section will offer explanations and some examples. Let’s examine each part of a program first to make certain it is clearly understood.

A few tips:

1. We highly recommend the use of our LL100 or LL200 Windows Software and light loader interface to develop, download, and document programs. Please contact Yokogawa or your local dealer for information, price and delivery. It will speed your setup and programming and greatly improve your efficiency. Download a sample from our ftp site: <ftp://ftp.yca.com/cc/software> (LL200 Enhanced Version 3.06).
2. Before entering any programs, please review the following examples to ascertain how programs are entered and then use the form provided – page 40 and 41 to develop your programs. They can then be easily implemented.

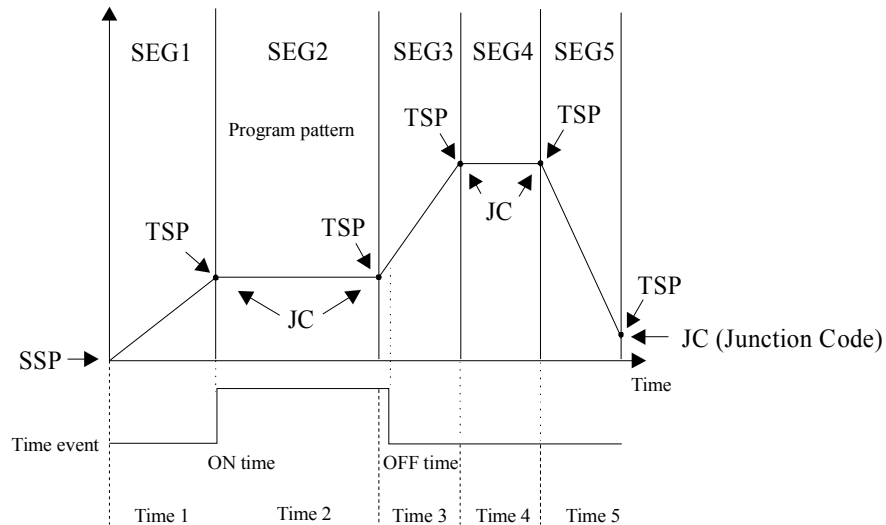
Program Creation

The UP controllers have a big memory and are able to hold a large number of programs, patterns, recipes and profiles internally. The UP550 can hold 30 and the UP750 can hold 300. The top display will prompt you for where you are:



Many variables such as time-base, PID selections, time or rate-based programming and more exist in the UP's so the examples contained may not exactly match your actual situation. Please try to use the various examples together to build your own requirements or contact our technical support department at 800-888-6400 or 770-254-0400 for assistance.

First let's explain terms and procedures.



Segment: A straight-line relationship between target setpoint and time.

JC: Junction Code – the Junction is the node where 2 segments meet. The junction code selects how the controller will handle the transition.

Pattern: The entire set of segments that define an entire program, profile, or recipe.

SSP: Starting setpoint. The beginning point of the 1st segment, which defines the rate of the 1st segment. The program doesn't necessarily start at this value – it only defines the beginning of the pattern. Setpoint at program start is determined by SSP, STC, and PV.

STC: Start code. This defines how the program handles the 1st segment when “Program” mode is selected.

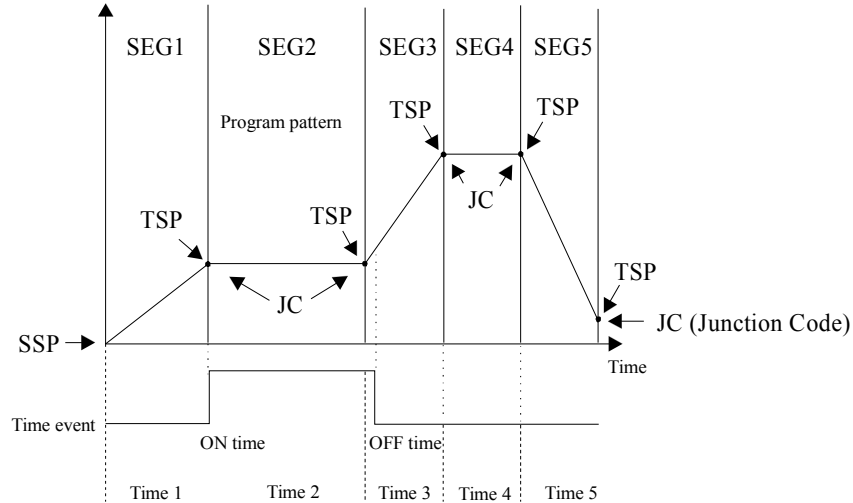
TSP: Target set point – the desired setpoint (usually temperature) you want at the end of a segment.

Time or Rate: The segment time or “Rate” that defines how long the segment will operate.

TME or Time Event: A time based output (DO) where the action of an output is strictly based on time.

PVE or Process Variable Event: An output (DO) is based strictly on process variable, deviation, setpoint, or output. A process related occurrence.

Example 1



▪ **Defining a Pattern**

SSP1: Starting setpoint for Loop 1: the starting setpoint will define the 1st point in the program. Setting it to 0 or some other reasonable value will make it easy to calculate what will occur. The starting setpoint is used to calculate the “Rate” of the 1st segment only. The initial setpoint when “Program” mode is selected is determined by the start code setting.

SSP2: Starting setpoint for Loop2: only on UP750-5/7 with dual loop modes (11 or 12) or when “Pattern Generator 2” function is turned on. Same as SSP1 but for a 2nd Loop.

STC: The start code designates what the initial setpoint is when “Program” is selected and also how much time is remaining:



In each case, here is how the unit will respond on the change to “Program”.

STC	Initial SP	Time Remaining
0	0	1 Hour
1	100	30 Minutes
2	100	1 Hour
3*	100*	30 Minutes *

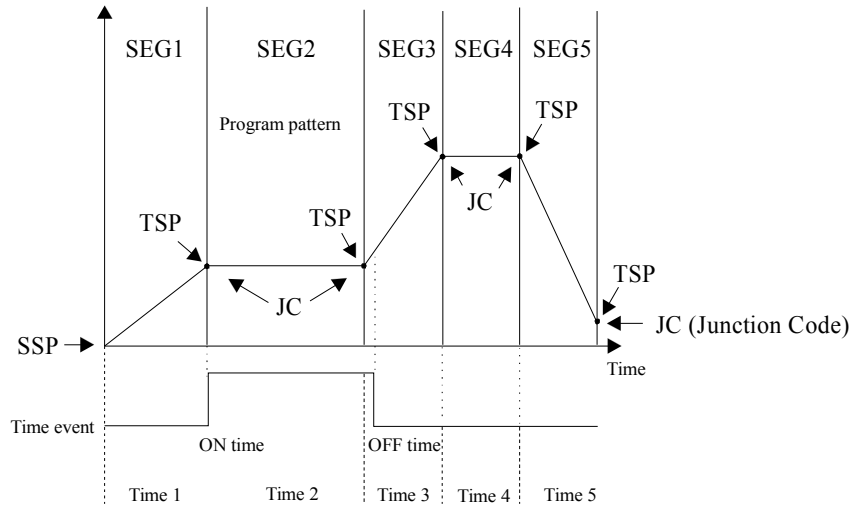
* Valid for UP750-5x model in mode 11 or 12.
Performs the same as STC1 except applies to Loop #2.

TSP1: Target setpoint – the temperature desired at the end of a particular segment for Loop 1.

TSP2: Target setpoint for Loop 2 or pattern generator at the end of a particular segment.

TIME: If SEG.T is set to 0, TIME based programs are selected

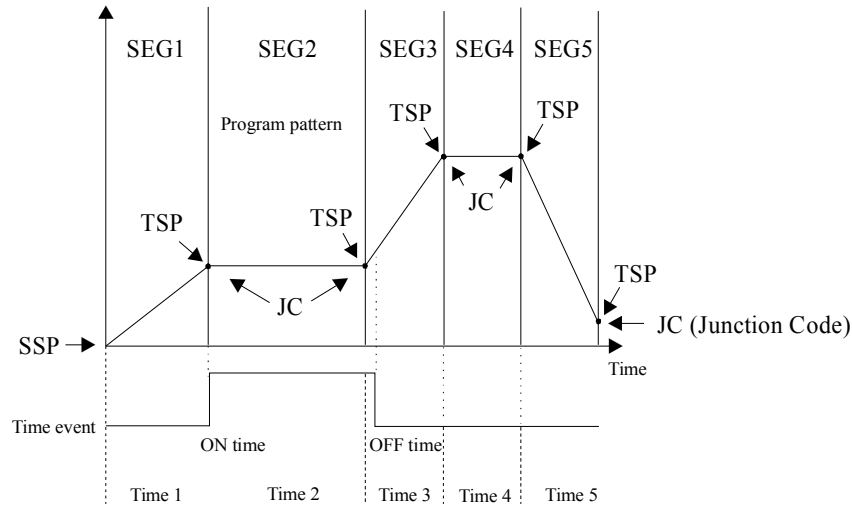
TM.RT: If SEG.T is set to 1 rate-based programs are selected.



Using our example for SEGS 1 and 2.

Seg.T = 0 TMU=0 (Hour) Seg.T = 1 TMU = 0 (Hour)

Seg	Time Based Program		Rate Based Program	
0	SSP	0	SSP	0
1	STC	1	STC	1
1	TSP1	200°	TSP1	200°
1	TIME	1.00 (1 Hour)	TM.RT	200° /HR
1	JC	0	JC	0
2	TSP1	200°	TSP1	200°
2	TIME	1.00 (1 Hour)	TM.RT	1.00 (1 Hour)
2	JC	0	JC	0



To show the different time base (TMU = 1, minutes. Seconds) we will now demonstrate the first 2 segments entered that way.

SEGT = 0 (Time Based Programs)
TMU = 1 (Minutes.Seconds)

SEG	PROMPT	VALUE
0	SSP	0
0	STC	1
1	TSP1	200°
1	TIME	60.00 Min
1	JC	0
2	TSP1	200°
2	TIME	60.00 Min
2	JC	0

SEGT = 1 (Rate based Programs)
TMU = 1 (°/Minute + Min.Sec)

PROMPT	VALUE
SSP	0
STC	1
TSP1	200°
TM.RT	3.3 0/Min
JC	0
TSP1	200°
TM.RT	60.00
JC	0

Note: The result is the same. We allow you to define any 2 of the 3 variable to fit how you want to implement your program. The controller calculates the 3rd variable.

Seg.T = 0
SSP 0
TSP 200
TIME 1 Hour
Controller Calculates: RATE =
200°/Hour
RATE = $\frac{TSP}{TIME}$
RATE = $\frac{200^\circ}{1 \text{ Hour}}$
RATE = 200°/Hour

Seg.T = 1
SSP 0
TSP 200
TM.RT 200°/Hour
Controller Calculates: TIME = 1
Hour
TIME = $\frac{TSP}{RATE}$
TIME = $\frac{200^\circ}{200^\circ/\text{Hour}}$
TIME = 1 Hour

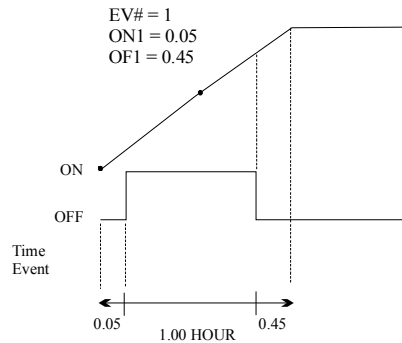
Care must be used in RATE method. If segment TIME exceeds 99 hours 59 minutes (or 99 min 59 sec) then the RATE is adjusted to fit the time constraints. Check each segment time.

- **Events**

Events can be time or process based.

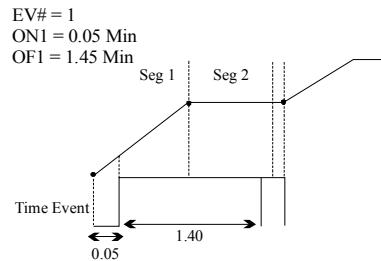
Time events: Turn on X time from the beginning of the segment where it is defined and turn off X time from the beginning of the segment where it is defined. This is set in the same time base as the unit.

Example 1:



In this case event 1 turns “ON” 5 minutes into this segment and OFF 45 minutes into this segment. Note – the event is ON a total of 40 minutes. If STC = 1 was selected, where we start at 30 minutes into the segment, EV1 is on immediately and OFF after 15 minutes. Use care when choosing start codes and events in segment #1.

Example 2:



In this case event 1 turns “ON” 5 minutes into this segment and OFF 1 hour and 40 minutes later which happens to be in segment 2. Events may occur across segment boundaries without concern. Should a wait or hold occur, the time event will be extended automatically by the same amount.

- **PV Events**

PV events also have 3 components: event number, type of event, and event setpoint. The event number assigns the output terminals that are to be used. This was configured in the DO section of your configuration procedure. Event types 1-20 and 28 to 31 are valid. The “Type of Event” is selected from table 7 (page 34), which includes choices for absolute high or low values, deviations from setpoint, setpoint limits, output limits, and diagnosis functions. The event setpoint is the value that, when exceeded, causes the output to change state.

Note: Once a PV event is defined, it is valid for the rest of the program until that EV number is redefined or set “OFF”.

Example 1:

Event # = 21 (1st PV Event)
 TY1 = 1 (High alarm from table 7)
 PE1 = 500° (Setpoint for event)

In this case the normally open output will close when the process variable exceeds 500°.

Table 7 – Alarm Types

Alarm type	Alarm setpoint	Alarm type	Alarm setpoint
Loop1 PV high-limit, no standby	1	Loop2 PV high-limit, no standby	41
Loop1 PV low-limit, no standby	2	Loop2 PV low-limit, no standby	42
Loop1 Deviation high-limit, no standby	3	Loop2 Deviation high-limit, no standby	43
Loop1 Deviation low-limit, no standby	4	Loop2 Deviation low-limit, no standby	44
Loop1 Deviation high-limit, deenergized, no standby	5	Loop2 Deviation high-limit, deenergized, no standby	45
Loop1 Deviation low-limit, deenergized, no standby	6	Loop2 Deviation low-limit, deenergized, no standby	46
Loop1 Deviation high-&low-limit, no standby	7	Loop2 Deviation high-&low-limit, no standby	47
Loop1 Deviation within high & low limits, no standby	8	Loop2 Deviation within high & low limits, no standby	48
Loop1 PV high-limit, deenergized, no standby	9	Loop2 PV high-limit, deenergized, no standby	49
Loop1 PV low-limit, deenergize, no standby	10	Loop2 PV low-limit, deenergize, no standby	50
Loop1 PV high-limit, standby	11	Loop2 PV high-limit, standby	51
Loop1 PV low-limit, standby	12	Loop2 PV low-limit, standby	52
Loop1 Deviation high-limit, standby	13	Loop2 Deviation high-limit, standby	53
Loop1 Deviation low-limit, standby	14	Loop2 Deviation low-limit, standby	54
Loop1 Deviation high-limit, deenergized, standby	15	Loop2 Deviation high-limit, deenergized, standby	55
Loop1 Deviation low-limit, deenergized, standby	16	Loop2 Deviation low-limit, deenergized, standby	56
Loop1 Deviation high-&low-limit, standby	17	Loop2 Deviation high-&low-limit, standby	57
Loop1 Deviation within high & low limits, standby	18	Loop2 Deviation within high & low limits, standby	56
Loop1 PV high-limit, deenergized, standby	19	Loop2 PV high-limit, deenergized, standby	59
Loop1 PV low-limit, deenergized, standby	20	Loop2 PV low-limit, deenergized, standby	60
Loop1 SP high-limit	28	Loop2 SP high-limit	68
Loop1 SP low-limit	29	Loop2 SP low-limit	69
Loop1 Output high-limit*	30	Loop2 Output high-limit*	70
Loop1 Output low-limit*	31	Loop2 Output low-limit*	71
		Sensor grounding**	25, 65
		Self diagnosis**	26, 66
		FAIL**	27, 67

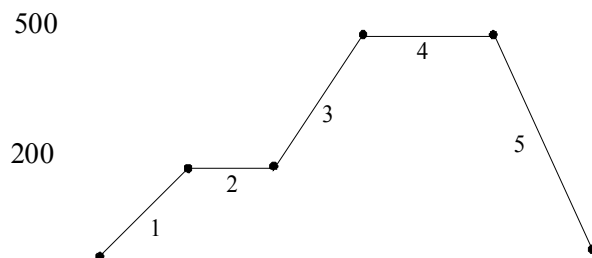
Note*: The output value alarm is set within the range from –5 to 105%.

Note**: The function is the same regardless of selection of the sensor grounding alarm or the FAIL diagnosis output.

Example 2:

EV # 23 (3rd PV event)
 TY2: 6 Normally closed (Open on alarm) low deviation
 PE2: 10° below setpoint

PVE Programming Example:



In this example, we have one alarm enunciator but need different actions at different times. In segments 1 and 2 a Hi/Low 10° band is required. In segment 3 an alarm if PV deviates low by 4° is required. No alarm during segment 4 is desired and a final alarm when the temperature falls below 60°.

TMU = 0 (HR.Minute) and SEG.T = 0 (Time based)

Seg	1	2	3	4	5
TSP	200	200	500	500	0
TIME	1.00	1.00	2.00	1.30	3.00
EV#	21	---	21	21	21
Ty1	7 (Hi/Lo Dev)	---	4 (Lo Dev)	Off	2 (Low)
PE1	10°	---	4°	---	60°
JC	1	0	1	0	0

When the process lags the setpoint by 10° the normally closed output opens until the deviation is reduced to less than 10°.

▪ **Junction Codes**

Junction codes determine how the transitions from 1 segment to the next will be handled. Each segment requires a junction code. Your choices are as follows.

JC	Description	Details
0	Continue	Program continues into the next segment without pause. If subsequent segment doesn't exist controller goes to "RESET".
1	Hold	Program enters "HOLD" mode and waits for operator to select "HOLD OFF" or digital signal from another device to resume operation.

JC	Description	Details
2	LOCAL	Valid only in the last segment. Controller will transfer to local setpoint control (either last setpoint or a previously selected local setpoint value – chosen as setpoint tracking function from SP menu of CMLP parameters).
11	WAIT – SET1	Controller will pause at the end of the segment and wait until conditions in wait set 1 are satisfied. See figure JC1.
12	WAIT – SET2	Same as above using wait set 2
13	WAIT – SET3	Same as above using wait set 3
14	WAIT – SET4	Same as above using wait set 4
15	WAIT – SET5	Same as above using wait set 5
21	WAIT WITHIN THE SEGMENT – SET1	Controller will pause anywhere within this segment that the conditions in wait set 1 are not satisfied. See Figure JC2.
22	WAIT WITHIN THE SEGMENT – SET2	Same as 21 except using set 2 parameters
23	WAIT WITHIN THE SEGMENT – SET3	Same as 21 except using set 3 parameters
24	WAIT WITHIN THE SEGMENT – SET 4	Same as 21 except using set 4 parameters
25	WAIT WITHIN THE SEGMENT – SET 5	Same as 21 except using set 5 parameters

▪ **Junction Code Examples**

*Wait function at the junction (JC = 11-15)

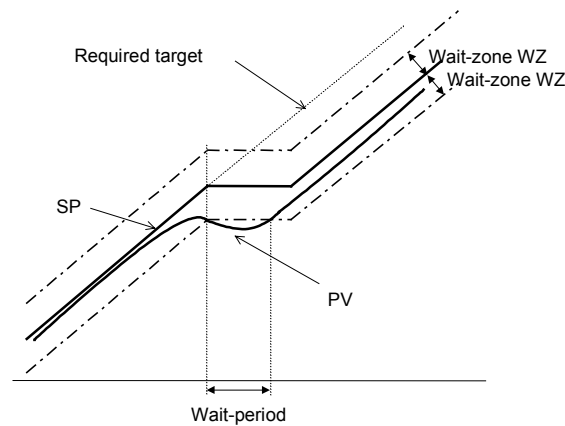


Figure: JC1

* Wait function within the segment (JC = 21-25)

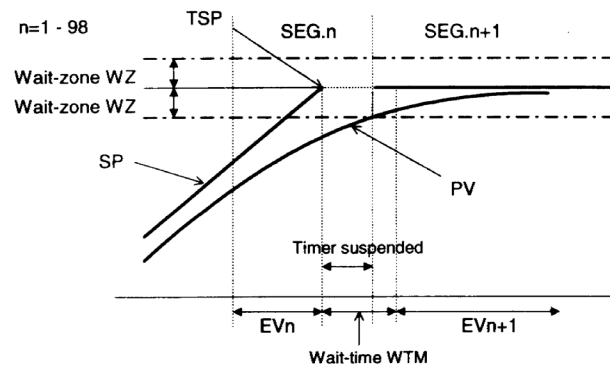


Figure: JC2

▪ **Programming Examples**

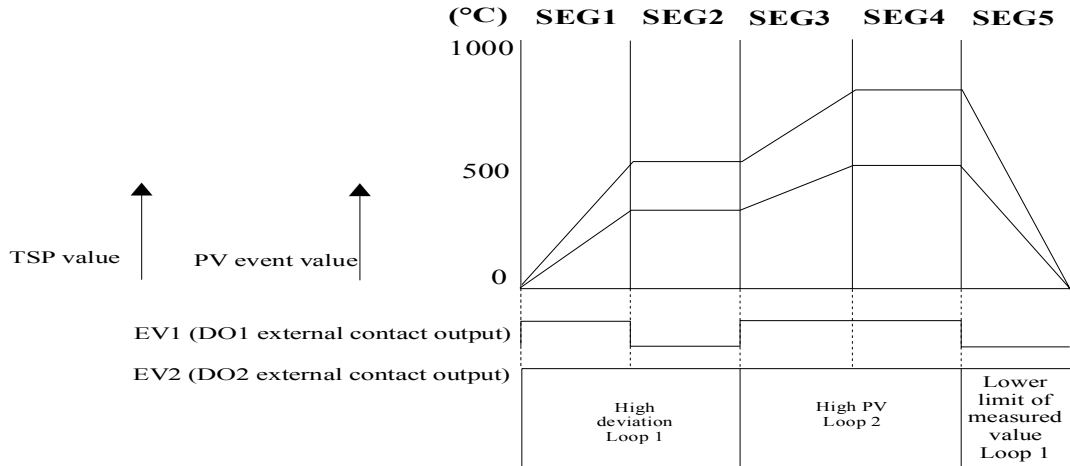
Example 1

2 loop control: Like UP750 in mode 11 or 12 or UP550 or UP750 with pattern generator “ON”.

TMU = 0 (Hours.minutes)

Seg Time = 0 (Time based)

Zone PID = OFF = Segment PID

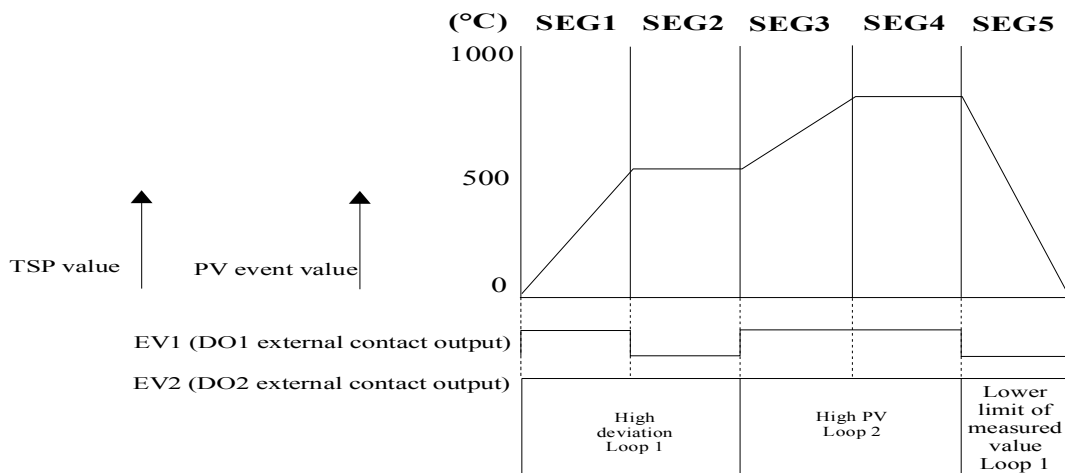


Segment number (S.NO)	1	2	3	4	5
Final target setpoint-1 (TSP1)	600°C	600°C	800°C	800°C	0°C
Final target setpoint-2 (TSP2)	300°C	300°C	500°C	500°C	0°C
Segment ramp-rate setting (TM.RT)					
Segment time (TIME)	30 min	60 min	30 min	120 min	30 min
PID number (PID)	2	2	1	1	3
Event-1 (EV1)	1			21	
PV event (TY1), ON-time event (ON1)	30 min			41	
PV event (PE1), OFF-time event (OFF1)	90 min			830°C	
Event-2 (EV2)	21			22	
PV event (TY2), ON-time event (ON2)	41			1	
PV event (PE2), OFF-time event (OFF2)	630°C			530°C	

Example 2

Example 2 is similar to example 1 except:

Seg.T = 1 Segment ramp rate method
 Example is single loop type



Segment number (S.NO)	1	2	3	4	5
Final target setpoint-1 (TSP1)	600°C	600°C	800°C	800°C	0°C
Final target setpoint-2 (TSP2)					
Segment ramp-rate setting (TM.RT)					
Segment time (TIME/RATE)	400°/Hr	60 min	400°/Hr	120 min	1600° /Hr
PID number (PID)	2	2	1	1	3
Event-1 (EV1)	1			21	
PV event (TY1), ON-time event (ON1)	min			41	
PV event (PE1), OFF-time event (OFF1)	90 min			830°C	
Event-2 (EV2)	21			22	
PV event (TY2), ON-time event (ON2)	41			1	
PV event (PE2), OFF-time event (OFF2)	630°C			530°C	

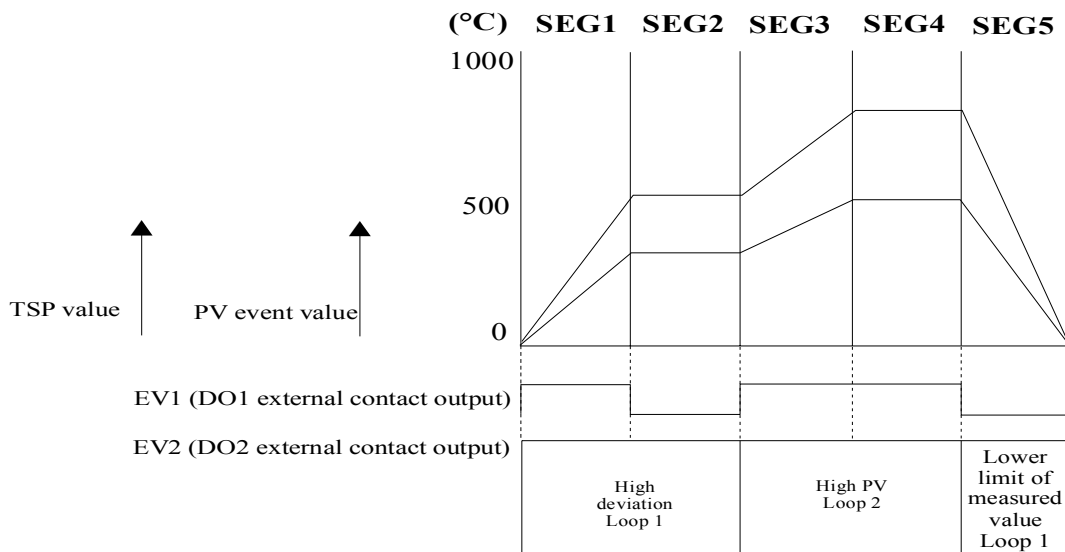
Example 3

Example 3 is similar to example 1 and 2 except:

TMU-Time unit = 1 minutes.seconds

Zone PID = 0 (off) for automatic PID selection by zone

Seg.T = 0 Time based programs



Segment number (S.NO)	1	2	3	4	5
Final target setpoint-1 (TSP1)	600°C	600°C	800°C	800°C	0°C
Final target setpoint-2 (TSP2)	300°C	300°C	500°C	500°C	0°C
Segment ramp-rate setting (TM.RT)					
Segment time (TIME)	30 min	60 min	30 min	90 min	30 min
PID number (PID)					
Event-1 (EV1)	1			21	
PV event (TY1), ON-time event (ON1)	30 min			41	
PV event (PE1), OFF-time event (OFF1)	90 min			830°C	
Event-2 (EV2)	21			22	
PV event (TY2), ON-time event (ON2)	41			1	
PV event (PE2), OFF-time event (OFF2)	630°C			530°C	

5. *Instrument Operation*

The UP550 and UP750 have 3 main operation modes.

RESET: Controller is “off”
LOCAL: Controller is operating as a fixed setpoint controller.
PROGRAM: Controller is operating as a program controller.

CHANGING OPERATION:

To select RESET: Hold reset button for 2 seconds. RST light will illuminate.

To select LOCAL: Press mode key until LOC is displayed. Press Set/Ent key to select. LOC light will illuminate.

To select PROGRAM MODE: Select the program number by pressing the PT. NO and keys. The pattern number PT.NO. Display will change to each entered program. When selected hold run button for 2 seconds. PRG light will illuminate.

To select MANUAL MODE: The MAN light indicates when the controller is in manual (not automatic) mode. This permits the user to directly adjust the output % when output % is displayed. To return to normal automatic control, press the mode key until mode: Auto or Auto 1 is displayed. Press Set/Ent to acknowledge.