









P961 Program Controller Instruction Manual
















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Panel Description:

Code	Description	Code	Description
PV	Process value display	▲	Temp. rise indication led
SV	Setting value display	■	Temp. hold indication led
C1	1 st output indication led	▼	Temp. drop indication led
C2	2 nd output indication led	1~8 ►	Indicator of temp. seg.
A1	1 st Alarm indication led		Program selected key
A2	2 nd Alarm indication led		Program run or hold key
AT	Auto-tuning indicator		Temp. seg. selected
MA	Manual indicator		hold 5 secs to stop prg.
PTN1	1 st program indicator		Set up & Parameters key.
PTN2	2 nd program indicator		Increase value key
RUN	Program run indicator		Decrease value key
HOLD	Program pause indicator		Modified key / Shift key
STOP	Program stop indicator		

- Press  to run the program, press  for 5 seconds when running to pause/hold the program.
- Press  to advance the program to the next segment.
- Press  for 5 seconds to stop the program.
- Press  for 5 seconds to access the PID & Auto-Tuning Menu (Table 4)
- Press  once to access the pattern menu. Here you can select Ptn1, Ptn2 or Link. Cycle through the parameters by tapping the  button. The parameter list can be found under table 5.
- Press  once to access level 1 parameters (Table 6)
- Press  for 5 seconds to access level 2 parameters (Table 6)
- Press  +  for 5 seconds to access level 3 parameters (Table 6)

Note: Press  +  once to exit any menu and return to the main display.

Features:


1. Two patterns with 8 steps for each one. Every step includes a ramp step and a soak step. If you select Link at the pattern selection parameter the controller will link both programs into 1 program of 16 steps.
2. The RUN, HOLD, STOP and STEP functions are controllable through external input signals.
3. Programmable 6 point PID zones with Auto-tuning for each.
4. Time units are selectable as hh:mm(hours:minutes) or mm:ss(minutes:seconds)
5. Alarms be set as Times signals End of Cycle signals.

Program Parameter Set Up


Press PROG, PROG displays “OFF”. This means that the controller is in single setpoint mode and will also have one auto-tuning zone (see table 6)

Changing “OFF” to PTN1 will select Pattern 1 and PTN2 will select Pattern 2. If you select LINK it will link the two patterns into a single 16 step pattern.

Once you have selected your program, tap the SET button to cycle through the parameters of the program such as the alarms, units, and the ramp setpoints, ramp times and soak times.


To add and delete steps while programming, press the  button to make the current setpoint the last in the program. Press it again on the last step to unlock the rest of the program.


For a list of the program parameters please refer to Table 5.

While the program is running, the RUN led is ON. If  is pressed the program will be paused. The HOLD led will flash and the RUN led will be off.

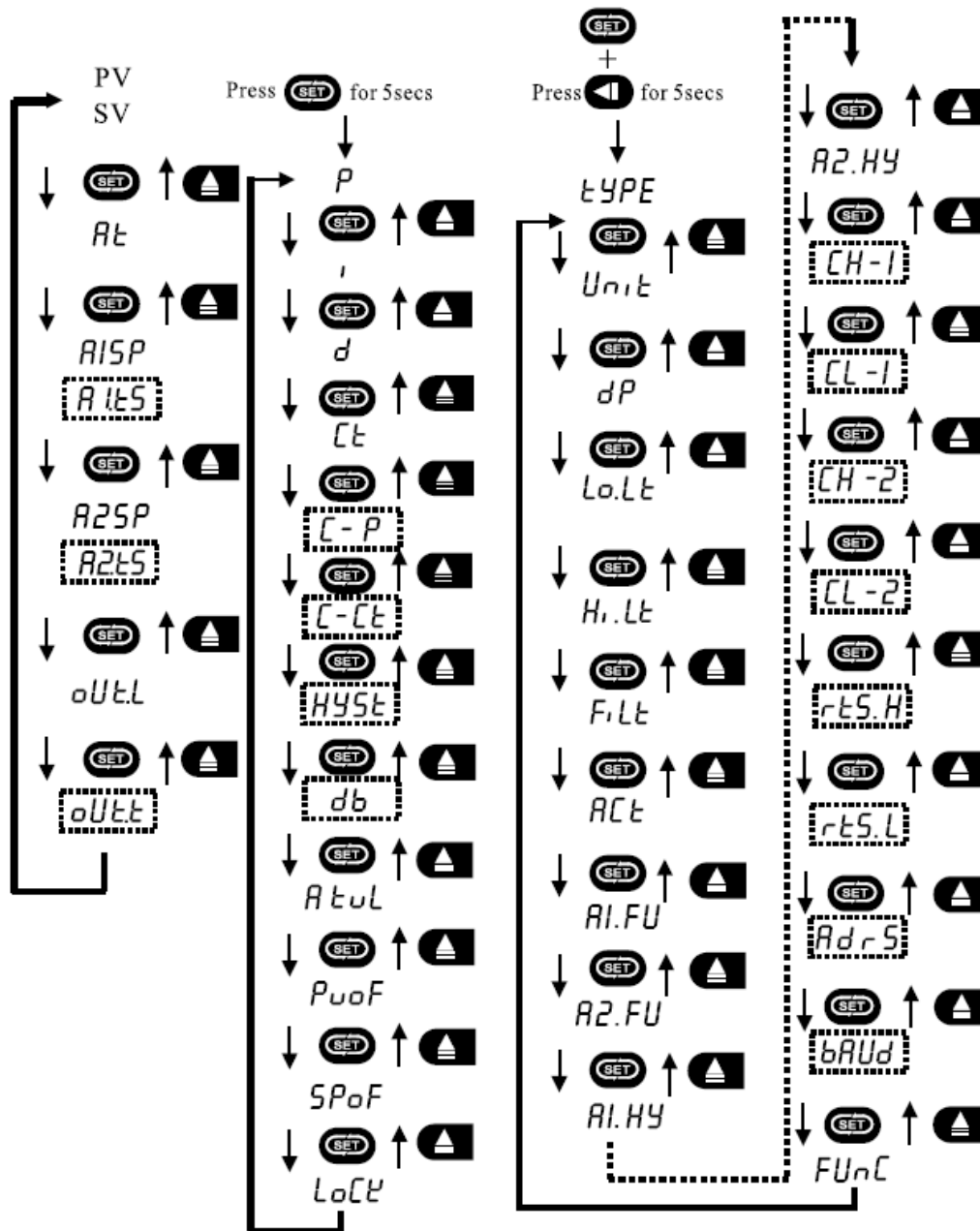
To resume the program simply press the  button again, the RUN led will be on again and HOLD will switch off.

While a program is running, press  to advance to the next segment.

While the program is running press and hold the  button for 5 seconds to stop the program.

At the end of a program, the display will flash End. Press and hold the  button for 5 seconds to go back to the initial display.

Parameter flow:

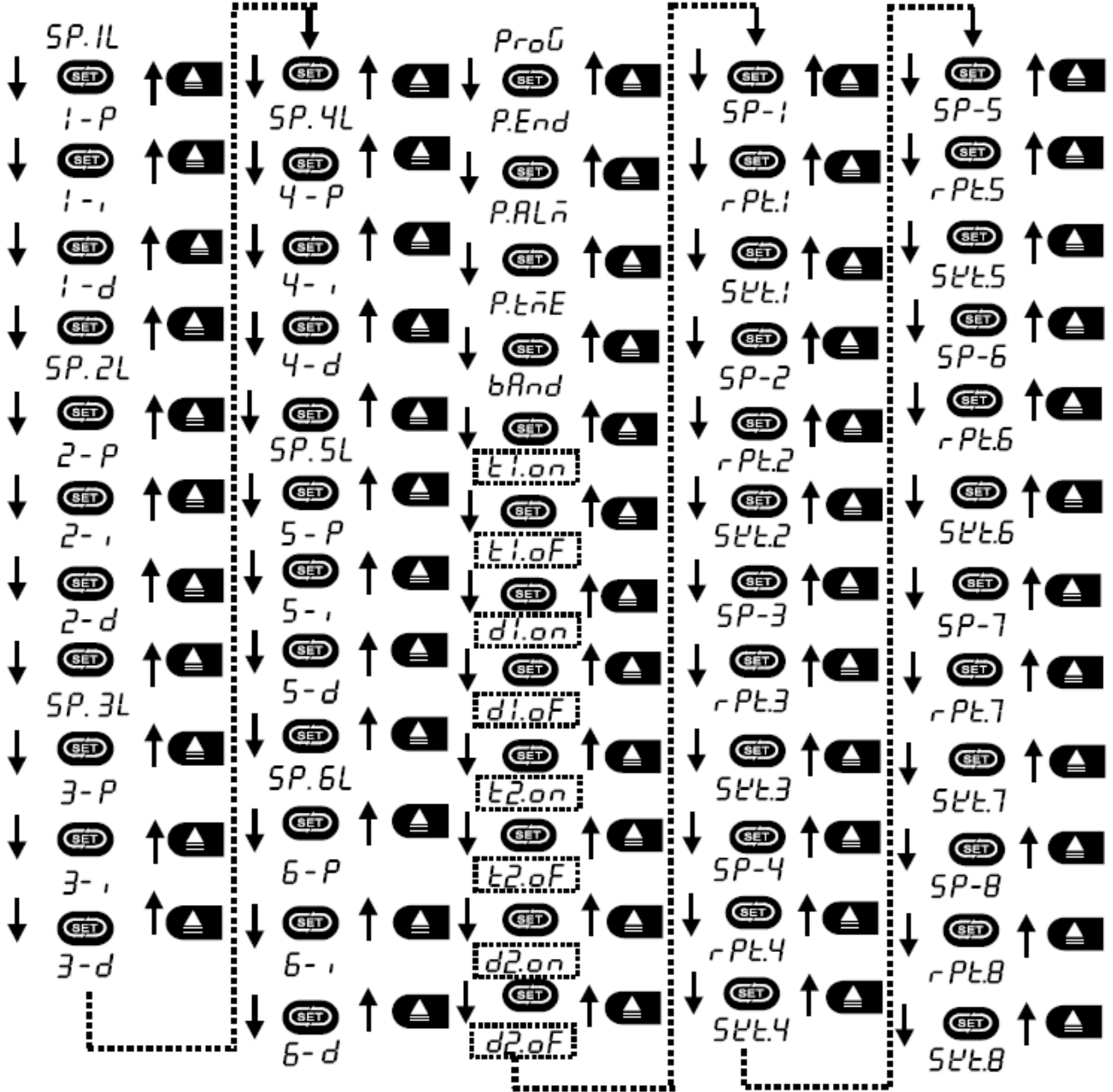


Notes:

1. The special parameters that are surrounded by dotted lines are only shown when other parameters and features have been set/activated.
2. A1.SP and A2.SP become A1.tS and A2.tS when A1.FU or A2.FU are to time mode.
3. There are two ways to restart the timer function when the timer has ended.
 - 3.1 Set A1.tS to 0000 then set a new time
 - 3.2 Power cycle the controller.

Press **PROG** **END** for 5 secs.




Press **PROG** **END**



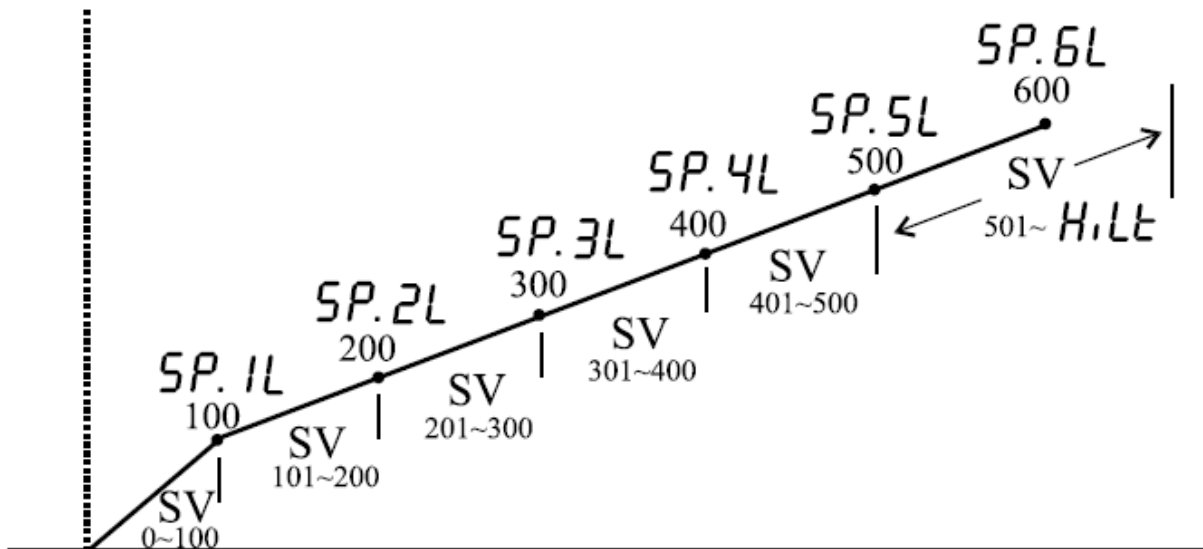
Abnormal Code Description:

UUUU	Input Signal > Hi. Lt over 5%
AEr	Auto-tuning failure
nnnn	Input Signal < Lo.Lt over 5%
oPEr	Input has no signal, disconnected or open
CEr	Memory breaks

Unique functions:

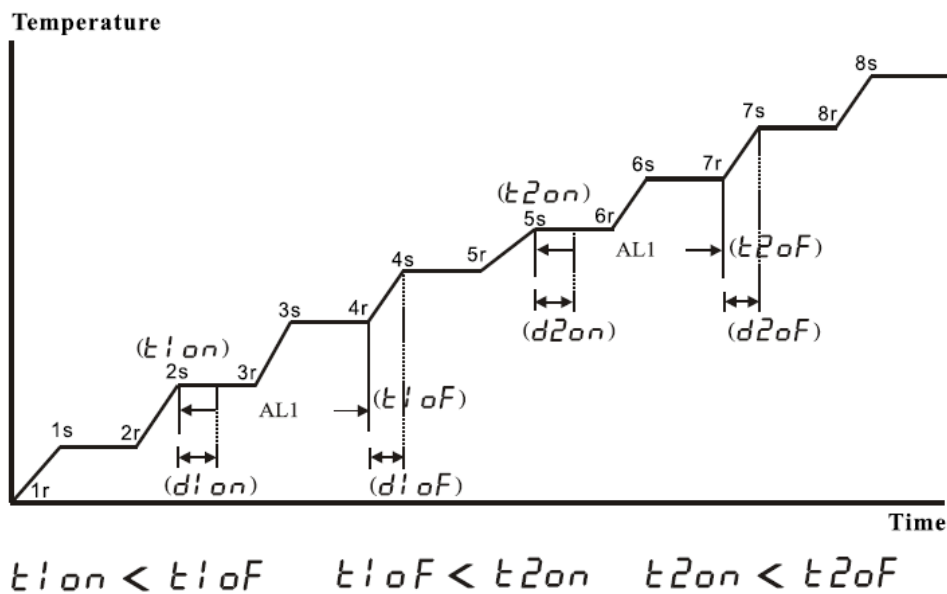
1. To take manual control of the process tap the  button until the OUT.L is displayed and hold the  button for 5 seconds. The MA led will start to flash. The controller output is now in manual mode. The controller will go back to automatic control when the OUT.L value reaches the SV. If the controller has been set to manual mode it will remain in manual mode whenever the controller is switched on. To disable this simply go back to OUT.L and press and hold the  for 10 seconds and the MA light will stop flashing.
2. Master and Slave control. A master controller may change the SV of other slave controllers if this option is selected when ordering. The P961 can only act as a master controller and not a slave. In order to have slave functionality you will need to order the controller with RS485 Modbus functionality.
3. Calibration of 4-20mA is done in the 3rd parameter level. CH-1 is the span value and can be adjusted until you reach the desired mA value. The same can be done with CL-1 which is the zero value (4mA). The retransmission can also be calibrated the same way with rtS.H and rts.L

4. 6 sets of PID Auto-Tuning zones can be configured. This is designed to solve the problem of having a single set of PID values as your process increases or decreases through a wide range of temperatures. For example, the PID values for an oven at 100°C will likely be very different to the PID values to control at 800°C. But you may have a program that spans from ambient at start and progresses all the way up to 1000°C with some soak points. These temperature zones will require different PID values to control accurately and maintain the desired rate of change.



Refer to table 4 for a detailed parameter list. Press and hold **PROG** button for 5 seconds to access the PID menu.

Time Signal:



Note: The 1st set of time signals must be lower than the 2nd set.

Lock Codes:

Table 1

	<i>SV</i>	<i>AL1</i>	<i>AL2</i>	<i>USER</i>	<i>PID</i>	<i>OPTION</i>	<i>PROG</i>
0000	✓	✓	✓	✓	✓	✓	✓
0001	⊗	⊗	⊗	⊗	⊗	⊗	⊗
0010	⊗	⊗	⊗	⊗	⊗	⊗	⊗ ✓
0011	✓	⊗	⊗	✓	⊗	⊗	⊗
0100	✓	⊗	⊗	⊗	⊗	⊗	⊗
0101	✓	⊗	⊗	⊗	⊗	⊗	✓
0110	✓	✓	✓	⊗	⊗	⊗	⊗
0111	✓	✓	✓	⊗	⊗	⊗	✓
1000	✓	✓	✓	✓	⊗	×	⊗
1001	✓	✓	✓	✓	⊗	×	✓
1010	✓	✓	✓	✓	✓	×	⊗
1011	✓	✓	✓	✓	✓	×	✓
1100	✓	✓	✓	✓	⊗	✓	⊗
1101	✓	✓	✓	✓	⊗	✓	✓
1110	✓	✓	✓	✓	✓	✓	⊗

✓ adjustable

⊗ readable

× can not be entered

Input Table:

Table 2

<i>INPUT</i>	<i>Character</i>	°C	°F
J	<i>tP-J</i>	0~1000	32~1832
K	<i>tP-t</i>	0~1300	32~2372
T	<i>tP-t</i>	-199~400	-199~752
E	<i>tP-E</i>	0~850	32~1562
B	<i>tP-b</i>	0~1800	32~3272
R	<i>tP-r</i>	0~1720	32~3128
S	<i>tP-S</i>	0~1720	32~3128
N	<i>tP-n</i>	0~1300	32~2372
C	<i>tP-C</i>	0~1800	32~3272
RTD(DIN)	<i>d-Pt</i>	-199~850	-199~1562
RTD(JIS)	<i>J-Pt</i>	-199~600	-199~1112
Linear	<i>LinE</i>	-1999~9999	-1999~9999

Note: When changing from Thermocouple to RTD or RTD into Thermocouple please be sure to reboot/power cycle the controller.

Alarm Modes:

Table 3

	Characer	Description	Description
1	<i>nonE</i>	Without Alarm	
2	<i>---[</i>	Process alarm (highest limit)	
3	<i>]---</i>	Process alarm (lowest limit)	
4	<i>-+-[</i>	Deviation alarm (highest limit)	
5	<i>]+-</i>	Deviation alarm (lowest limit)	
6	<i>]--[</i>	Band alarm (outside)	
7	<i>-[]-</i>	Band alarm (inside)	
8	<i>---E</i>	Related to item 2 but not alert the first time.	
9	<i>3---</i>	Related to item 3 but not alert the first time.	
10	<i>-+-E</i>	Related to item 4 but not alert the first time.	
11	<i>3+-</i>	Related to item 5 but not alert the first time.	
12	<i>3--E</i>	Related to item 6 but not alert the first time.	
13	<i>-E3-</i>	Related to item 7 but not alert the first time.	
14	<i>on.-E</i>	Related to item 8 but alarm will latch when alter.	
15	<i>3-on</i>	Related to item 9 but alarm will latch when alter.	
16	<i>on.+E</i>	Related to item 10 but alarm will latch when alter.	
17	<i>3+.on</i>	Related to item 11 but alarm will latch when alter.	
18	<i>3.on.E</i>	Related to item 12 but alarm will latch when alter.	
19	<i>E.on.3</i>	Related to item 13 but alarm will latch when alter.	
20	<i>t-on</i>	Timer function (unit:h.m)	
21	<i>t-oF</i>	Timer function (unit:h.m)	
22	<i>t.on.5</i>	Timer function (unit:m.s)	
23	<i>t.oF.5</i>	Timer function (unit:m.s)	

Program Auto-Tuning & PID Zones:
Table 4

Character	Description	Setting range
<i>SP. 1L</i>	1 st Auto-tuning setting value	LOLT~SP.2L
<i>1-P</i>	1 st P	0.1~200
<i>1-I</i>	1 st I	1~3600
<i>1-d</i>	1 st D	1~900
<i>SP. 2L</i>	2 nd Auto-tuning setting value	SP.1L~SP.3L
<i>2-P</i>	2 nd P	0.1~200
<i>2-I</i>	2 nd I	1~3600
<i>2-d</i>	2 nd D	1~900
<i>SP. 3L</i>	3 rd Auto-tuning setting value	SP.2L~SP.4L
<i>3-P</i>	3 rd P	0.1~200
<i>3-I</i>	3 rd I	1~3600
<i>3-d</i>	3 rd D	1~900
<i>SP. 4L</i>	4 th Auto-tuning setting value	SP.3L~SP.5L
<i>4-P</i>	4 th P	0.1~200
<i>4-I</i>	4 th I	1~3600
<i>4-d</i>	4 th D	1~900
<i>SP. 5L</i>	5 th Auto-tuning setting value	SP.4L~SP.6L
<i>5-P</i>	5 th P	0.1~200
<i>5-I</i>	5 th I	1~3600
<i>5-d</i>	5 th D	1~900
<i>SP. 6L</i>	6 th Auto-tuning setting value	SP.5L~HILT
<i>6-P</i>	6 th P	0.1~200
<i>6-I</i>	6 th I	1~3600
<i>6-d</i>	6 th D	1~900

Program Level: Press  to enter, then press the  button to continue. **Table 5**

	Character	Setting range	intital	Description	unit
✓	<i>ProG</i>	Off/Ptn1/Ptn2/Link	OFF	Pattern mode	Ptn
⊗	<i>P.End</i>	End/Hold/LP.01~LP.12/Loop	HOLD	Program end mode	
⊗	<i>P.ALn</i>	Off/T.SNL/T.Ed.n/T.Ed.F/T.S.E.n/T.S.E.F	OFF	Program alarm mode	
⊗	<i>P.tnE</i>	P-H.M P-M.S 0-H.M 0-M.S	P-HM	Time unit operation	
⊗	<i>bAnd</i>	0~50%FS	1℃	wait zone	℃/°F
⊗	<i>t1.on</i>	P1.1r~P2.8s	P1.1r	1 st Time signal on	
⊗	<i>t1.oF</i>	P1.1r~P2.8s	P1.2s	1 st Time signal off	
⊗	<i>d1.on</i>	00.00~99.59	0.00	Delay time of 1 st time signal on	HH/MM
⊗	<i>d1.oF</i>	00.00~99.59	0.00	Delay time of 1 st time signal off	HH/MM
⊗	<i>t2.on</i>	P1.1r~P2.8s	OFF	2 nd Time signal on	
⊗	<i>t2.oF</i>	P1.1r~P2.8s	P1.2s	2 nd Time signal off	
⊗	<i>d2.on</i>	00.00~99.59	0.00	Delay time of 2 nd time signal on	HH/MM
⊗	<i>d2.oF</i>	00.00~99.59	0.00	Delay time of 2 nd time signal off	HH/MM
✓	<i>SP-1</i>	LOLT~HILT	0	Set the target temp of segment 1	℃/°F
✓	<i>rPt.1</i>	End/00.00~99.59	0.00	Set the time of 1 st ramp	HH/MM
✓	<i>Stt.1</i>	End/00.00~99.59	0.00	Set the time of 1 st soak	HH/MM
✓	<i>SP-2</i>	LOLT~HILT	0	Set the target temp of segment 2	℃/°F
✓	<i>rPt.2</i>	End/00.00~99.59	0.00	Set the time of 2 nd ramp	HH/MM

※ The action mode of Alarm function like *AL.FU* *R2.FU* , when *P.ALn* = off
t.SnL = (AL1)Time Signal Function
t.Ed.n = (AL2) it is ON when program ends
t.Ed.F = (AL2) it is OFF when program ends
t.S.E.n = Time Signal + Time End, it is ON
t.S.E.F = Time Signal + Time End, it is OFF

✓	<i>SE2</i>	End/00.00~99.59	0.00	Set the time of 2 nd soak	HH/MM
✓	<i>SP-3</i>	LOLT~HILT	0	Set the target temp of segment 3	°C/°F
✓	<i>rPE3</i>	End/00.00~99.59	0.00	Set the time of 3 rd ramp	HH/MM
✓	<i>SE3</i>	End/00.00~99.59	0.00	Set the time of 3 rd soak	HH/MM
✓	<i>SP-4</i>	LOLT~HILT	0	Set the target temp of segment 4	°C/°F
✓	<i>rPE4</i>	End/00.00~99.59	0.00	Set the time of 4 th ramp	HH/MM
✓	<i>SE4</i>	End/00.00~99.59	0.00	Set the time of 4 th soak	HH/MM
✓	<i>SP-5</i>	LOLT~HILT	0	Set the target temp of segment 5	°C/°F
✓	<i>rPE5</i>	End/00.00~99.59	0.00	Set the time of 5 th ramp	HH/MM
✓	<i>SE5</i>	End/00.00~99.59	0.00	Set the time of 5 th soak	HH/MM
✓	<i>SP-6</i>	LOLT~HILT	0	Set the target temp of segment 6	°C/°F
✓	<i>rPE6</i>	End/00.00~99.59	0.00	Set the time of 6 th ramp	HH/MM
✓	<i>SE6</i>	End/00.00~99.59	0.00	Set the time of 6 th soak	HH/MM
✓	<i>SP-7</i>	LOLT~HILT	0	Set the target temp of segment 7	°C/°F
✓	<i>rPE7</i>	End/00.00~99.59	0.00	Set the time of 7 th ramp	HH/MM
✓	<i>SE7</i>	End/00.00~99.59	0.00	Set the time of 7 th soak	HH/MM
✓	<i>SP-8</i>	LOLT~HILT	0	Set the target temp of segment 8	°C/°F
✓	<i>rPE8</i>	End/00.00~99.59	0.00	Set the time of 8 th ramp	HH/MM
✓	<i>SE8</i>	End/00.00~99.59	0.00	Set the time of 8 th soak	HH/MM

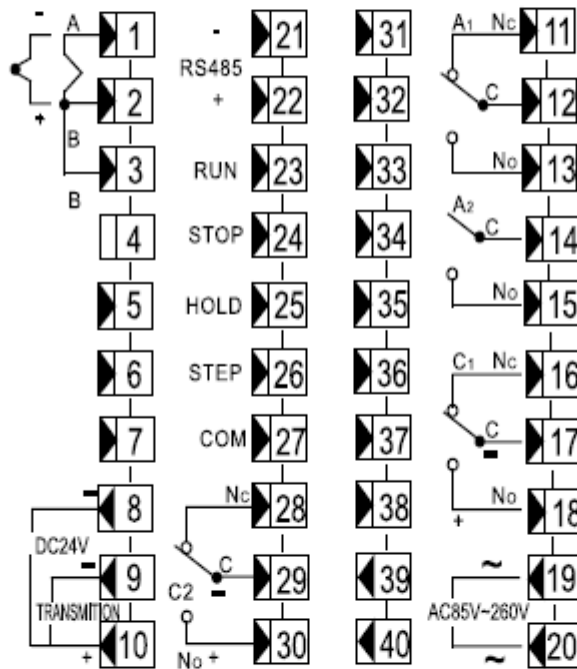
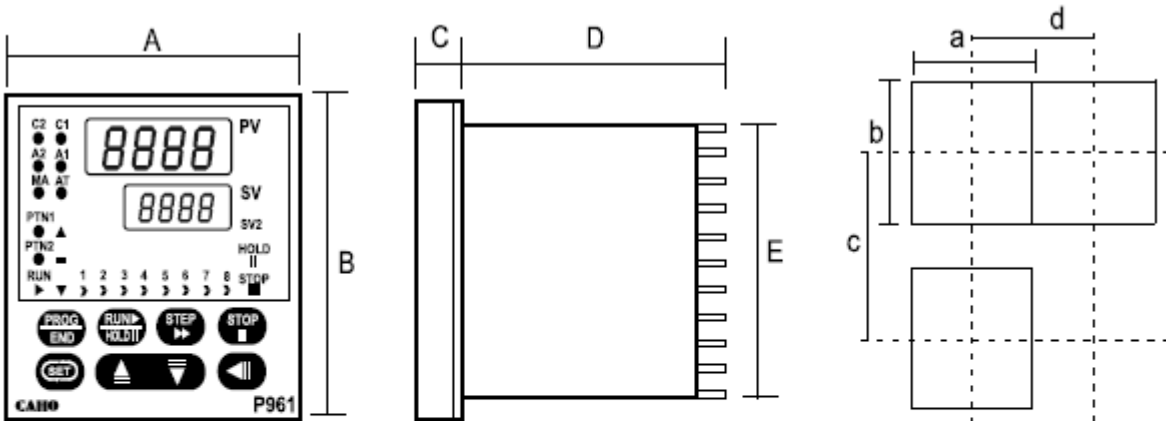
※ *P.tnE* 0-*n*.5 Start from 0°C, Time unit = m.s
 0-H,*n* Start from 0°C, Time unit = h.m
P-n.5 Start from PV, Time unit = m.s
P-H,n Start from PV, Time unit = h.m

Level Description:

Table 6

Character	Description	Setting range	unit	initial	Note	
Level 1 (USER)	<i>At</i>	PID auto-tuning	YES/NO	NO	P=0 failure	
	<i>A1SP</i>	Alarm 1 setpoint	H.LLT-LO.LT	°C/°F	10	
	<i>A2SP</i>	Alarm 2 setpoint	H.LLT-LO.LT	°C/°F	20	
	<i>oUeL</i>	Output indication - %	0%~100%	%		Press 10secs to become output manually
	<i>oUeT</i>	Temperature	LO.LT~H.LLT	°C/°F	0	It appears when output is manually
Level 2 (PID)	<i>P</i>	The 1 st proportional band	0.0~200.0	%	3.0	P=0, the action becomes on/off
	<i>I</i>	The 1 st integral time	0~3600	SEC	240	P=0 to conceal
	<i>d</i>	The 1 st differential time	0~900	SEC	60	P=0 to conceal
	<i>CT</i>	The 1 st output cycle time	0~100	SEC		P=0 to conceal Relay 10 secs, SSR 2 secs, SCR 0 sec
	<i>C-P</i>	The 2 nd proportional band	0.1~200.0	%	3.0	To select and make purchase
	<i>C-CT</i>	The 2 nd output cycle time	0~100	SEC	10	Relay 10 secs, SSR 2 secs
	<i>HYS</i>	hysteresis	0~50%FS	°C/°F	1	It appears when P = 0
	<i>db</i>	Dead Band	-50%~50%FS	°C/°F	0	
	<i>AtuL</i>	Auto-tuning in advance	0~50%FS	°C/°F	0	P=0 to conceal
	<i>Puof</i>	Process value offset	-50%~50%FS	°C/°F	0	
Level 3 (OPTION)	<i>SPoF</i>	Set value offset	-50%~50%FS	°C/°F	0	It appears when the action on/off
	<i>LoCK</i>	Function Lock	0000~1111		0000	See table 1 (page 7)
	<i>TYPE</i>	Type mode	J.K.T.E.B.R.S.N.C.L		TP-K	See table 2 (page 7)
	<i>Unit</i>	unit	°C/°F/ENG		°C	
	<i>dP</i>	Decimal point	0000/000.0/00.00/0.000		0000	Temperature 000.0
	<i>Lo.Lt</i>	Setpoint lowest limiter	LO.LT~H.LLT	°C/°F	0	
	<i>Hi.Lt</i>	Setpoint highest limiter	LO.LT~H.LLT	°C/°F	400	
	<i>Fi.Lt</i>	Filter setting	0.0~100.0		3.0	
	<i>ACT</i>	Control action	HEAT/COOL		<i>HEAT</i>	
	<i>A1.FU</i>	Alarm 1 mode setting			-1-C	See table 3 (page 8)
Level 3 (OPTION)	<i>A2.FU</i>	Alarm 2 mode setting			-1-C	See table 3 (page 8)
	<i>A1.HY</i>	Alarm 1 hysteresis setting	0~A1SP	°C/°F	1	
	<i>A2.HY</i>	Alarm 2 hysteresis setting	0~A2SP	°C/°F	1	
	<i>CH-1</i>	The 1 st current output highest setting	0~500		500	It appears when CT=0
	<i>CL-1</i>	The 1 st current output lowest setting	0~500		0	It appears when CT=0
	<i>CH-2</i>	The 2 nd current output highest setting	0~500		500	It appears when C-CT=0
	<i>CL-2</i>	The 2 nd current output lowest setting	0~500		0	It appears when C-CT=0
	<i>rtS.H</i>	transmission highest setting	0~500		500	To select and make purchase
	<i>rtS.L</i>	transmission lowest setting	0~500		0	To select and make purchase
	<i>AdrS</i>	address	1~255		1	To select and make purchase
Level 3 (OPTION)	<i>bAUd</i>	Baud rate	2400/4800/9600/1.92K	BPS	9600	To select and make purchase
	<i>FUnC</i>	Operation function lock	0000~1111		0000	Correct by original factory

Dimensions:



P961

Panel Cutout

(Unit: mm)

Model	A	B	C	D	E	a	b	c	d
P961	96	96	12	92	91	92 ^{+0.5} _{-0.5}	92 ^{+0.5} _{-0.5}	120	110