CAHO

Microprocessor Program Controllers
Instruction Manual

I. Panel Description

Code name	Description	Code name	Description
PV	Display: process value	▲	Led: light on when set value goes up
SV	Display: setting value	▬	Led: light on when set value soak
C1	Led: light on when output 1 action	▼	Led: light on when set value goes down
C2	Led: light on when output 2 action	1~8	Led: temperature of segment
A1	Led: light on when alarm 1 or time-signal action	PROG END	Key: changing the pattern
A2	Led: light on when alarm 2 or time-end action	RUN HOLD	Key: program-run program-hold
AT	Led: light on when auto-tuning to start	STEP	Key: changing the temperature of segment
MA	Led: light on when manual to start	STOP	Key: program stop(press 5 secs)
PTN1	Led: light on when operation pattern 1	SET	Key: change mode or enter
PTN2	Led: light on when operation pattern 2	▲	Key: changing set value
RUN	Led: light on when program to start	▼	Key: changing the value
HOLD	Led: light on/off alternately when program hold on	◀	Key: shift
STOP	Led: light on when program stop		

II. **Features:**

1. Two pattern- include 8 ramp step and 8 soak step for every pattern, can be link 1 and 2 pattern become 16 ramp step and 16 soak step
2. Can be external contact input (RUN , STOP HOLD and STEP)
3. Can be setting 6 point temperature auto-tuning
4. Alarm mode: Time signal (setting AL1) or Time end(setting AL2)
5. Time mode: (hour : minute or minute :second)

III. Parameter setup**:**

1. Press PROG END , PrOG display show " oFF " It's single control and single auto-tuning only , see table 6
2. Changing oFF to = Ptn1 , for setting program control with 8 step in pattern 1
   = Ptn2 , for etting program control with 8 step in pattern 2
   = LInE ,for can be link two pattern become 16 ramp step and 16 soak step
3. In Ptn1 or Ptn2, press SET ,setting program control mode (see table 5)
4. In Ptn1 or Ptn2, press PROG END for 5 secs , enter program auto-tuning level (see table 4) ,press SET to setting auto-tuning function
5. When setting the temperature in unit step , press PROG END for setting final step ; second press PROG END , for setting other unfinished step
6. After finishing program set should be perform PID auto-tuning for getting best control

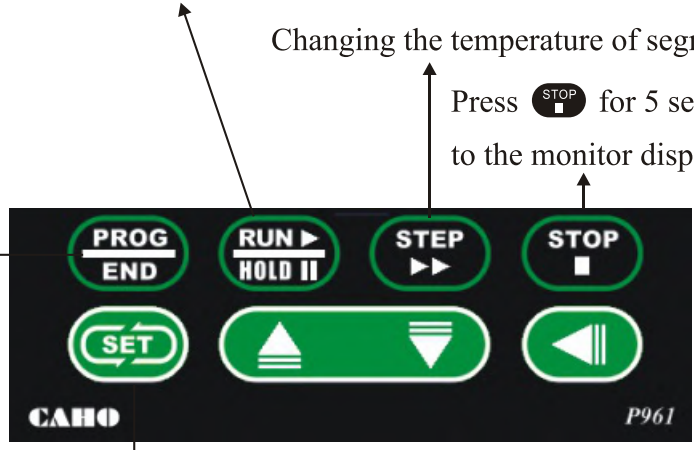
7. Press RUN/HOLD the " RUN " light on = Program performance , press RUN/HOLD again = program hold on (the " HOLD " light on/off alternately the " RUN " light is off) , press RUN/HOLD again = back program prformance (the " HOLD " light is off the " RUN " light is on)

8. Press STEP forcibly transfers to the next segment during operation STEP

9. Press STOP 5 secs forcibly stop the program during operation

10. At the end of program , the End indicates on/off alternately press STOP for 5 secs to return to the monitor display

Press RUN/HOLD the program start , press RUN/HOLD again the program stop

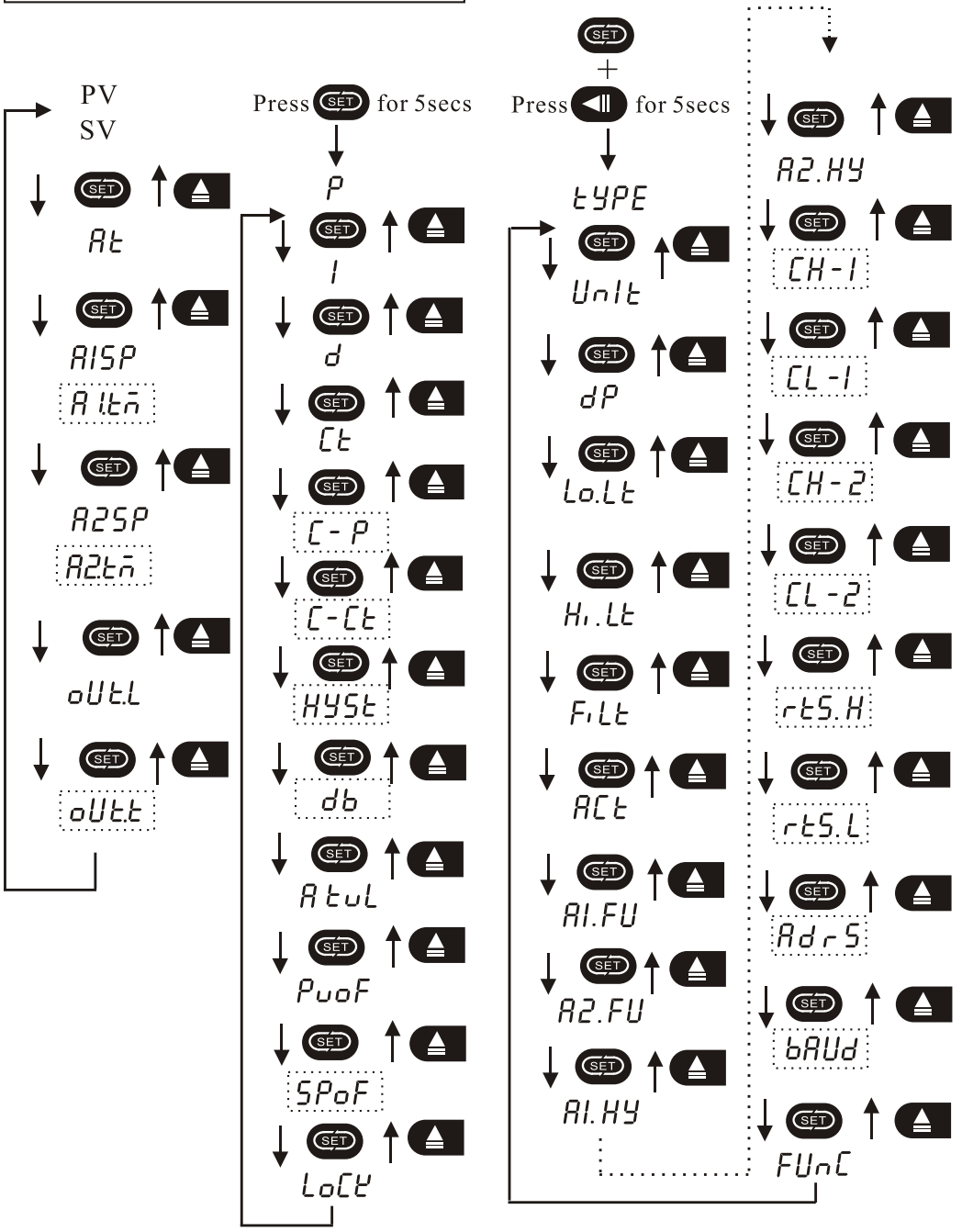


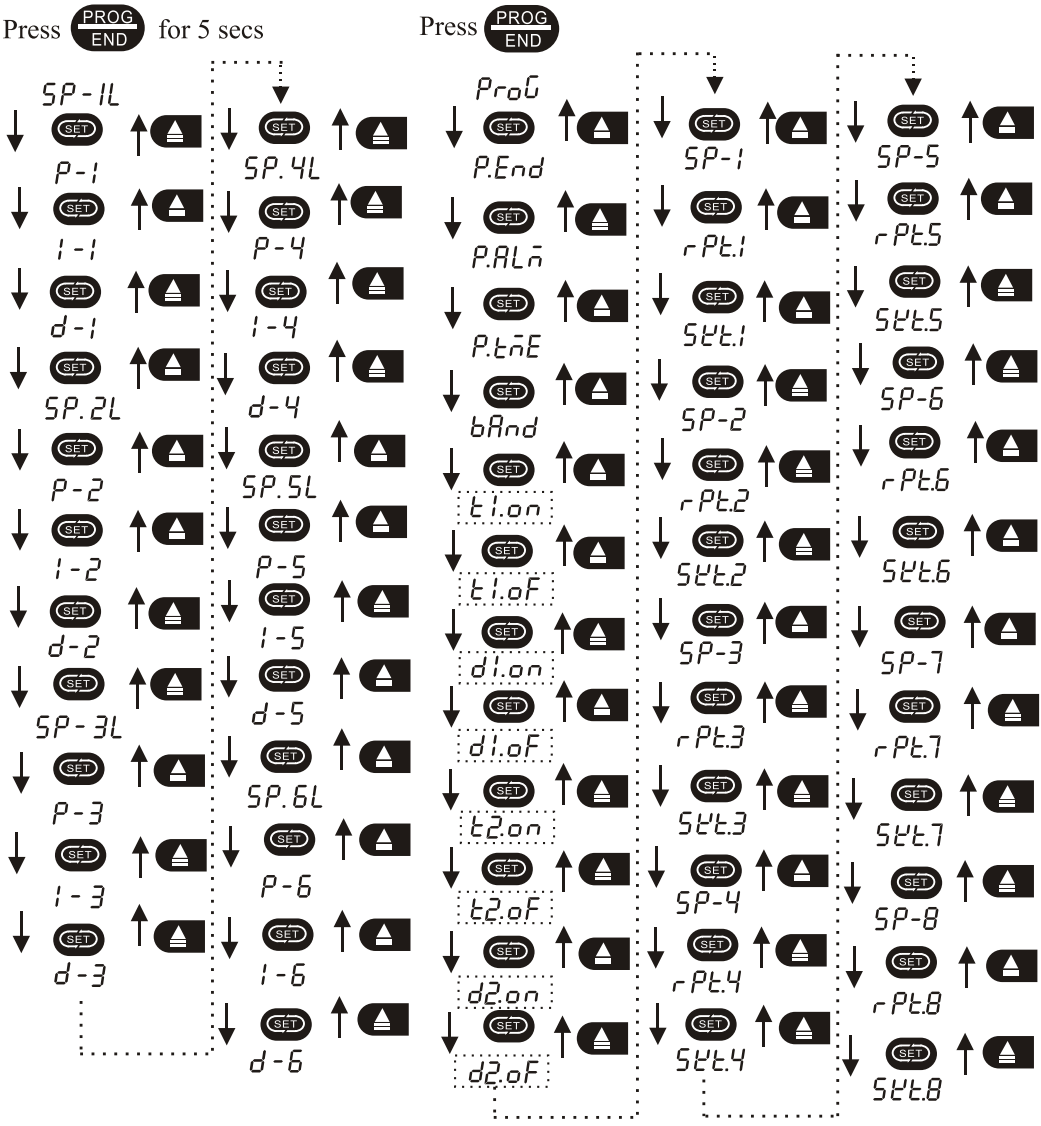
1. Press PROG/END for 5 secs to see the table 4
2. Press PROG/END then press SET to program level to see the table 5

1. Press SET for 5 secs to see the table 6
2. Press SET for 5 secs to see the table 4
3. Press SET + ◀ to return to the monitor display

Note: Press SET + ◀ to come back start picture at any parameter or level

PARAMETER PROCESS





※The dispaly shows " End " of steps. to indicate finished when SP > HiLt , please set from final pattern if want to release or set.

※ Press PROG END at final step to increase or decrease the amount of steps

Level Description

(Table 6)

Character		Description	Setting range	unit	initial	Note
Level 1 (USER) SET	AT	PID auot-tuning	YES/NO		NO	P=0 failure
	A1.SP	Alarm 1 setpoint	HILT-LOLT	℃/℉	10	
	A2.SP	Alarm 2 setpoint	HILT-LOLT	℃/℉	0	
	oUt.L	Output indication - %	0%~100%	%		Press 5secs to become output in hand
	oUt.t	Time of output in hand	00.00~99.59	HH/MM	0	It appears when output is in hand
Level 2 (PID) SET Press 5 secs	P	The 1st proportional band	0.0~200.0	%	3.0	P=0, the action becomes on/off
	I	The 1st integral time	0~3600	SEC	240	P=0 to conceal
	d	The 1st differential time	0~900	SEC	60	P=0 to conceal
	Ct	The 1st cycle time	0~100	SEC	10	P=0 to conceal Relay to secs, SSR 2 secs SCR 0 secs
	C-P	The 2st proportional band	0.1~200.0	%	3.0	To selrct and make purchase
	C-Ct	The 2st cycle time	0~100	SEC	10	Relay10 secs , SSR 2 secs
	HYSt	hysteresis	0~50%FS	℃/℉	1	It appears when P = 0
	db	Dead Band	-50%~50%FS	℃/℉	0	
	AtuL	Auto-tuning in advance	0~50%FS	℃/℉	0	P=0 to conceal
	PuoF	Process value offset	-50%~50%FS	℃/℉	0	
	SPoF	Set value offset	-50%~50%FS	℃/℉	0	It appears when the action on/off
	LoCt	Function Lock	0000~1111		0000	See table 1
Level 3 (OPTION) SET + ◀II Press 5 secs	tYPE	Type mode	J.K.T.E.B.R.S.N.C.L		TP-K	See table 2
	Unit	unit	℃/℉/ENG		℃	
	dP	Decimal point	0000/000.0/00.00/0.000		0000	
	Lo.Lt	Setpoint lowest limiter	LO.LT~HILT	℃/℉	0	
	Hi.Lt	Setpoint highest limiter	LO.LT~HILT	℃/℉	400	
	FiLt	Filter setting	0.0~100.0		3.0	
	ACt	Control action	HEAT/COOL		HEAt	
	A1.FU	Alarm 1 mode setting			-1-C	
	A2.FU	Alarm 2 mode setting			none	
	A1.HY	Alarm 1 hysteresis setting	0~A1SP	℃/℉	1	
	A2.HY	Alarm 2 hysteresis setting	0~A2SP	℃/℉	1	
	CH-1	The 1st current output highest setting	0~500		500	It appears when CT=0
	CL-1	The 1st current output lowest setting	0~500		0	It appears when CT=0
	CH-2	The 2st current output highest setting	0~500		500	It appears when C-CT=0
	CL-2	The 2st current output lowest setting	0~500		0	It appears when C-CT=0
	rtS.H	transmition highest setting	0~500		500	To select and make purchase
	rtS.L	transmition lowest setting	0~500		0	To select and make purchase
	AdrS	address	1~255		1	To select and make purchase
	bAUd	Baud rate	2400/4800/9600/1.92K	BPS	9600	To select and make purchase
	FUnC	Operation function lock	0000~1111		0000	Correct by original factory

Setting of program auto-tuning

Press PROG END for 5 secs (Table 4)

Character	Description	Setting range
SP.1L	1st Auto-tuning set value	LOLt~SP.2L
P-1	1st P	0.1~200
I-1	1st I	1~3600
d-1	1st D	1~900
SP.2L	2nd Auto-tuning set value	SP.1L~SP.3L
P-2	2nd P	0.1~200
I-2	2nd I	1~3600
d-2	2nd D	1~900
SP.3L	3rd Auto-tuning set value	SP.2L~SP.4L
P-3	3rd P	0.1~200
I-3	3rd I	1~3600
d-3	3rd D	1~900
SP.4L	4th Auto-tuning set value	SP.3L~SP.5L
P-4	4th P	0.1~200
I-4	4th I	1~3600
d-4	4th D	1~900
SP.5L	5th Auto-tuning set value	SP.4L~SP.6L
P-5	5th P	0.1~200
I-5	5th I	1~3600
d-5	5th D	1~900
SP.6L	6th Auto-tuning set value	SP.5L~HILT
P-6	6th P	0.1~200
I-6	6th I	1~3600
d-6	6th D	1~900

Note: When SP > HILt then the other auto-tuning set is disable

※ : ProG can be not in oFF state when the 6 pattern PID runs.

Program Level

Press PROG END to enter

(Table 5)

Character	Setting range	intital	Description	unit
ProG	Off/Ptn1/Ptn2/Link	OFF	Pattern mode	Ptn
P.End	End/Hold/Loop	END	Program end mode	
P.ALn	Off/T.SNL/T.Ed.n/T.Ed.F/T.S.E.n/T.S.E.F	OFF	Program alarm mode	
P.tnE	HH.MM/MM.SS	HH.MM	Time unit operation	
bAnd	0~50%FS	None	wait zone	℃/℉
t1.on	P1.RP~P8.SK	P1.RP	1st Time signal on	
t1.oF	P1.RP~P8.SK	P8.SK	1st Time signal off	
d1.on	00.00~100.00	00.00	1st Time signal on delay time	HH/MM
d1.oF	00.00~100.00	00.00	1st Time signal off delay time	HH/MM
t2.on	P1.RP~P8.SK	P1.RP	2st Time signal on	
t2.oF	P1.RP~P8.SK	P8.SK	2st Time signal off	
d2.on	00.00~100.00	00.00	2st Time signal on delay time	HH/MM
d2.oF	00.00~100.00	00.00	2st Time signal off delay time	HH/MM
SP-1	LOLT~HILT	0.0	Set the target temp of segment 1	℃/℉
rPt.1	End/00.00~100.00	End	Set the time of 1st ramp	HH/MM
SUt.1	End/00.00~100.00	00.00	Set the time of 1st soak	HH/MM
SP-2	LOLT~HILT	0.0	Set the target temp of segment 2	℃/℉
rPt.2	End/00.00~100.00	End	Set the time of 2nd ramp	HH/MM

※ The action mode of Alarm function like AL1.FU AL2.FU , when P.ALn = off

t.SnL = Time Signal Function

t.Ed.n = (AL2) ON when program finished

t.Ed.F = (AL2) OFF when the program finished

t.S.E.n= Time Signal+Time End ON that runs

t.S.E.F= Time Signal+ Time End OFF that runs

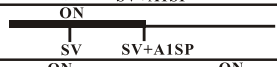
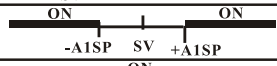
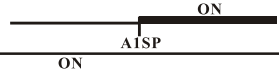
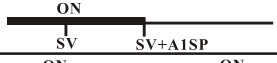
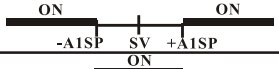
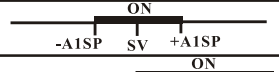
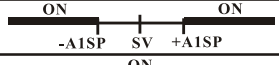
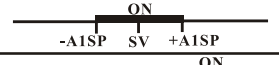
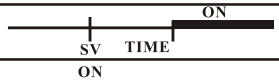
SUt.2	End/00.00~100.00	00.00	Set the time of 2nd soak	HH/MM
SP-3	LOLT~HILT	0.0	Set the target temp of segment 3	℃/℉
rPt.3	End/00.00~100.00	End	Set the time of 3rd ramp	HH/MM
SUt.3	End/00.00~100.00	00.00	Set the time of 3rd soak	HH/MM
SP-4	LOLT~HILT	0.0	Set the target temp of segment 4	℃/℉
rPt.4	End/00.00~100.00	End	Set the time of 4th ramp	HH/MM
SUt.4	End/00.00~100.00	00.00	Set the time of 4th soak	HH/MM
SP-5	LOLT~HILT	0.0	Set the target temp of segment 5	℃/℉
rPt.5	End/00.00~100.00	End	Set the time of 5th ramp	HH/MM
SUt.5	End/00.00~100.00	00.00	Set the time of 5th soak	HH/MM
SP-6	LOLT~HILT	0.0	Set the target temp of segment 6	℃/℉
rPt.6	End/00.00~100.00	End	Set the time of 6th ramp	HH/MM
SUt.6	End/00.00~100.00	00.00	Set the time of 6th soak	HH/MM
SP-7	LOLT~HILT	0.0	Set the target temp of segment 7	℃/℉
rPt.7	End/00.00~100.00	End	Set the time of 7th ramp	HH/MM
SUt.7	End/00.00~100.00	00.00	Set the time of 7th soak	HH/MM
SP-8	LOLT~HILT	0.0	Set the target temp of segment 8	℃/℉
rPt.8	End/00.00~100.00	End	Set the time of 8th ramp	HH/MM
SUt.8	End/00.00~100.00	00.00	Set the time of 8th soak	HH/MM

※:1. Set bAnd = 0 is "no wait" , time's up then enter next program

2. Power is failure suddenly when program runs and the segment one will re-run after power return
3. Set " P.tnE " when the program runs , Display will show the remainder time of this segment

A1FU A2FU **Alarm mode**

(Table 3)

Characer	Description	Description
nonE	Not fitted	
---C	Process alarm (high limit)	
J---	Process alarm (low limit)	
-H-C	Deviation alarm (high limit)	
J-L-	Deviation alarm (low limit)	
J--C	Band alarm (outside)	
-CJ-	Band alarm (inside)	
---E	Same 1 but 1st time will not on	
3---	Same 2 but 1st time will not on	
-H-E	Same 3 but 1st time will not on	
3-L-	Same 4 but 1st time will not on	
3--E	Same 5 but 1st time will not on	
-E3-	Same 6 but 1st time will not on	
on.-E	Same 7 but on be latch	
3-.on	Same 8 but on be latch	
on.LE	Same 9 but on be latch	
3H.on	Same 10 but on be latch	
3.on.E	Same 11 but on be latch	
E.on.3	Same 12 but on be latch	
t-on	Timer function (unit: h.m)	
t-oF	Timer function (unit: h.m)	
t.on.S	Timer function (unit: m.s)	
t.oF.S	Timer function (unit: m.s)	

LoCU Mode

	SP	*AL1*	*AL2*	*USER*	*PID*	*OPTION*	*PROG*
0000	✓	✓	✓	✓	✓	✓	✓
0001	⊗	⊗	⊗	⊗	⊗	⊗	⊗
0010	⊗	⊗	⊗	⊗	⊗	⊗	⊗
0011	⊗	⊗	⊗	⊗	⊗	⊗	⊗
0100	✓	⊗	⊗	⊗	⊗	⊗	⊗
0101	✓	⊗	⊗	⊗	⊗	⊗	✓
0110	✓	✓	✓	⊗	⊗	⊗	⊗
0111	✓	✓	✓	⊗	⊗	⊗	✓
1000	✓	✓	✓	✓	⊗	×	⊗
1001	✓	✓	✓	✓	⊗	×	✓
1010	✓	✓	✓	✓	✓	×	⊗
1011	✓	✓	✓	✓	✓	×	✓
1100	✓	✓	✓	✓	⊗	✓	⊗
1101	✓	✓	✓	✓	⊗	✓	✓
1110	✓	✓	✓	✓	✓	✓	⊗
1111	✓	✓	✓	✓	✓	×	✓

✓ can be set ⊗ can be indication but can not be set × can not be entered

※ The PROG function of program controller only

(Table 1)

tYPE Mode

INPUT	*Character*	℃	℉
J	tP-J	0~1000	32~1832
K	tP-Y	0~1300	32~2372
T	tP-t	-199~400	-199~752
E	tP-E	0~850	32~1562
B	tP-b	0~1800	32~3272
R	tP-r	0~1600	32~2912
S	tP-S	0~1600	32~2912
N	tP-n	0~1300	32~2372
C	tP-C	0~1800	32~3272
RTD(DIN)	d-Pt	-199~850	-199~1562
RTD(JIS)	J-Pt	-199~600	-199~1112
Linear	LInE	-1999~9999	-1999~9999

(Table 2)

Noted :1. It is unique setting parameter inside of dotted line.

2. A1.SP becomes A1.tn ; A2.SP becomes A2.tn when A1.FU or A2.FU be set to Time model.

3. A1 or A2 light on / off alterrately when Time were counted.
want to adjust Time that "Time" must be not counted and PV < SV

4. A1.tn at press ◀II will show remainder time when time were counted.

5. There are two way to re-start Time when Time finished actions:

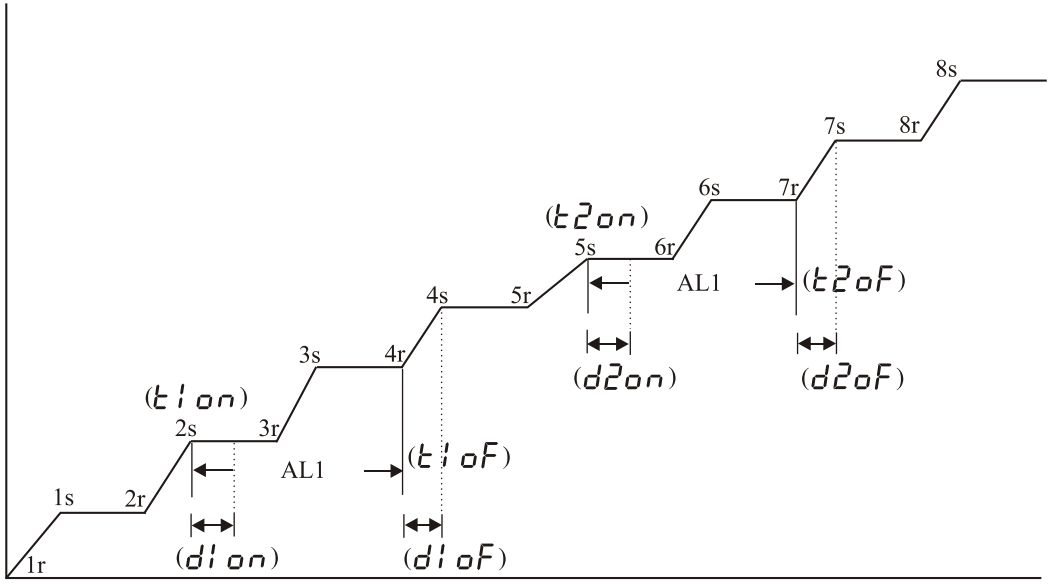
1. Set A1.tn to 0000 then re-set new time.

2. Turn off power then re-start.

※PV < SV

Temperature

Time Signal Example



t1on < t1oF t1oF < t2on t2on < t2oF

The 1st Time Signal < The 2nd Time Signal

Unusual code description

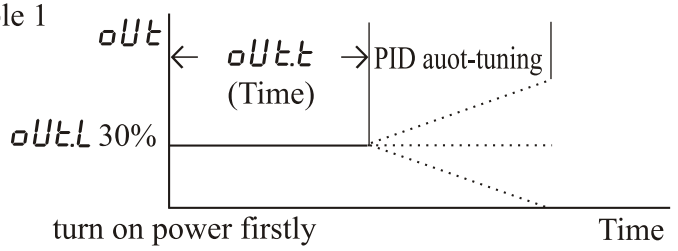
uuuu	Input Signal > Hi.Lt over 5%
AtEr	Auto-tuning failue cause :time too long
nnnn	Input Signal < Lo.Lt under 5%
oPEn	Input do not connect or open
CSEr	Memory Broken

Unique function

1. Output in manual + Time control , Set oUt.L press ◀II 5 secs then MA light on/off alternately. Adjust the input value is by manual. in this time. It will return auto after oUt.t 's finished.

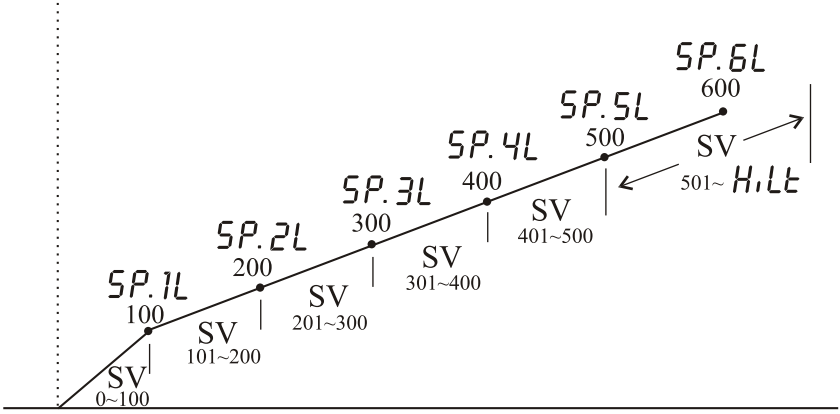
※ After setting "Output in manual " , Turn on power the output in manual firstly until release output in manual or oUt.t 's time is up. There is a way to release output in manual is setting set oUt.L press ◀II for 5 secs then MA light don't on and return auto contral.

example 1



3．Design 6 PID auto-tuning function

example 3



※ Detail parameter see table 4 . press PROG END 5 secs to enter

4．One controller control many others. (Mater and pupil called also)
One could change other controllers's SV.

5．3rd level parameter that 4~20mA output correct. The electric current output when set CH-1 (span correct). To increase the value to ada to output. To decrease the value to reduce output. CL-1 (zero correct) the same above method.

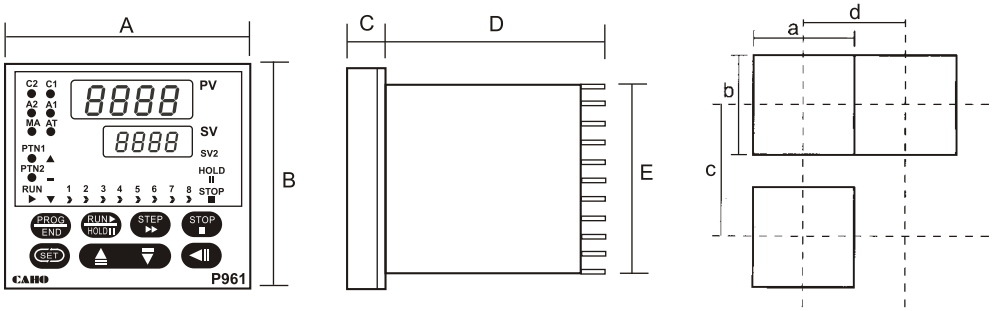
Retransmisson correct the same above method

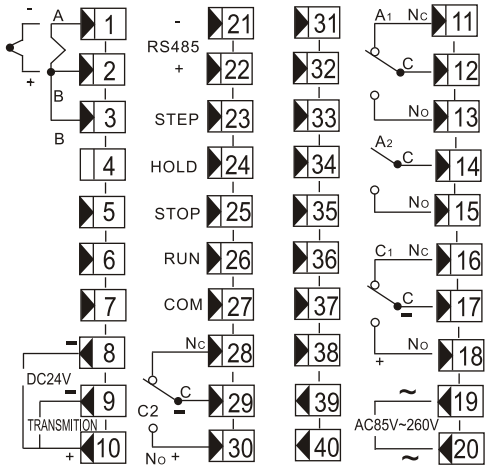
Parameter " rtS.H " span correct

Retransmisson correct the same above method

Parameter " rtS.L " zero correct

DIMENSION





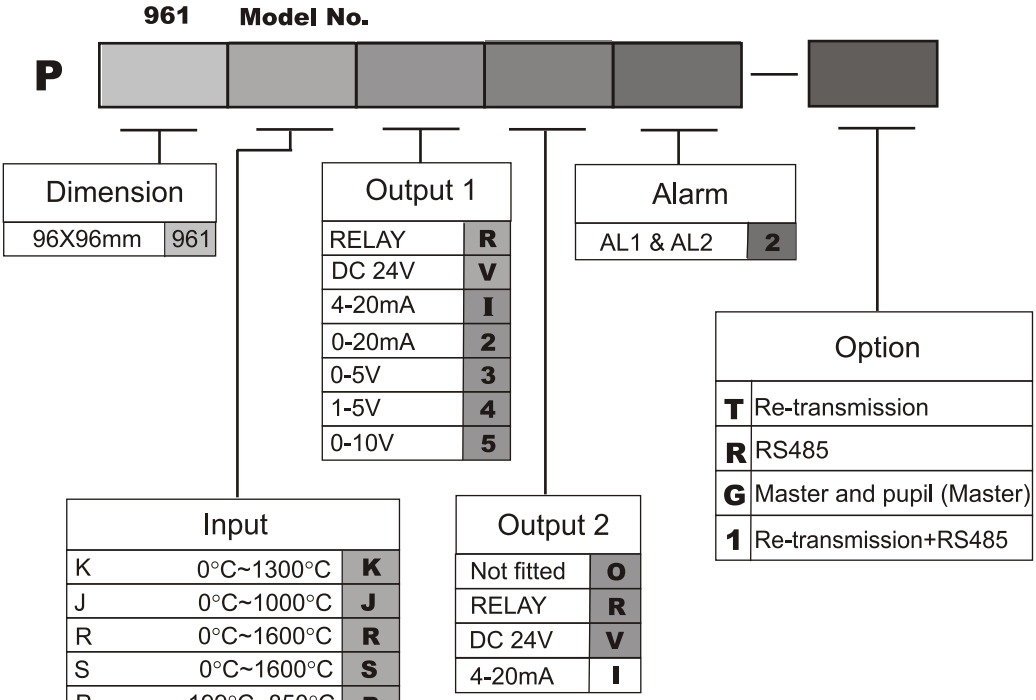
P961

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

※ PanelCutout 9 6 X 9 6 — Cut 9 2X 9 2 mm

■ ORDERING CODE




САНО