
Before using this manual, please check whether the range, input and output match your requirement.

1. Front Panel Instruction

1.1 Display

PV : Process Value, 4-digit display (red color)

SP : Set Point, 4-digit display (green color)

1.2 LED

OUT1 : Output 1, green color

OUT2 : Output 2, green color

AT : Auto-Tuning, yellow color

PRO : Program, yellow color

AL1 : Alarm 1, red color

AL2 : Alarm 2, red color

MAN : Manual, yellow color

1.3 Key

SET : MODE(LEVEL) & SET key



: SHIFT key



: DOWN key



: UP key

A/M : Auto/Manual key

2. Auto Tuning

2.1 Once AT set 'YES', auto tuning is to be performed.

2.2 After auto tuning finished, PID parameter is to be set automatically.

2.3 ATVL = auto tuning offset, and it will be deduced from SP.

(It prevents over-shooting during auto tuning)

SP-ATVL = Auto-tuning value, ATVL = Auto tuning offset

Ex.) SP = 200°C, ATVL = 5, Auto tuning point is at 195°C

* ATVL means auto-tuning point (195°C) in program type model

2.4 Auto tuning failure

2.4.1 ATVL is too big

→ If no sure, set ATVL = 0)

2.4.2 System time is too long.

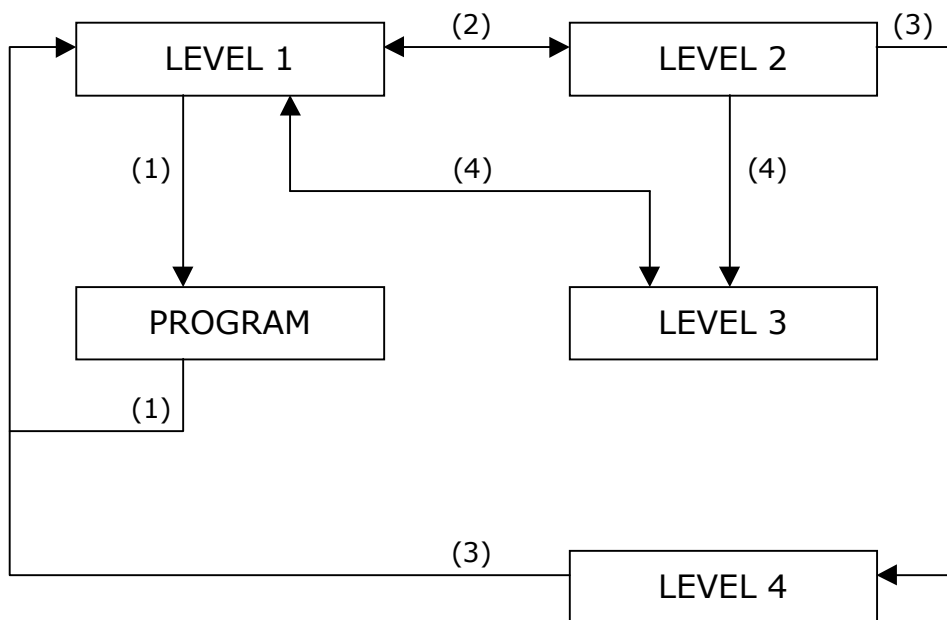
→ Set PID parameter individually.

3. Error Information

IN1E	Open circuit of main control sensor(INP1)
* AdCF	A/D converter failed
* CjCE	Cold junction compensation failed
IN2E	Open circuit of sub control sensor(INP2)
UUU1	PV exceeds USPL(INP1)
nnn1	PV under LSPL(INP1)
UUU2	Input signal of sub control exceeds the upper limit(INP2)
nnn2	Input signal of sub control under the lower limit(INP2)
* rA2F	RAM failed
INtF	Interface failed
AUtF	Auto tuning failed

Note) Once one of the " * " marked errors comes up, controller needs to be repaired.

4. Operating Flow



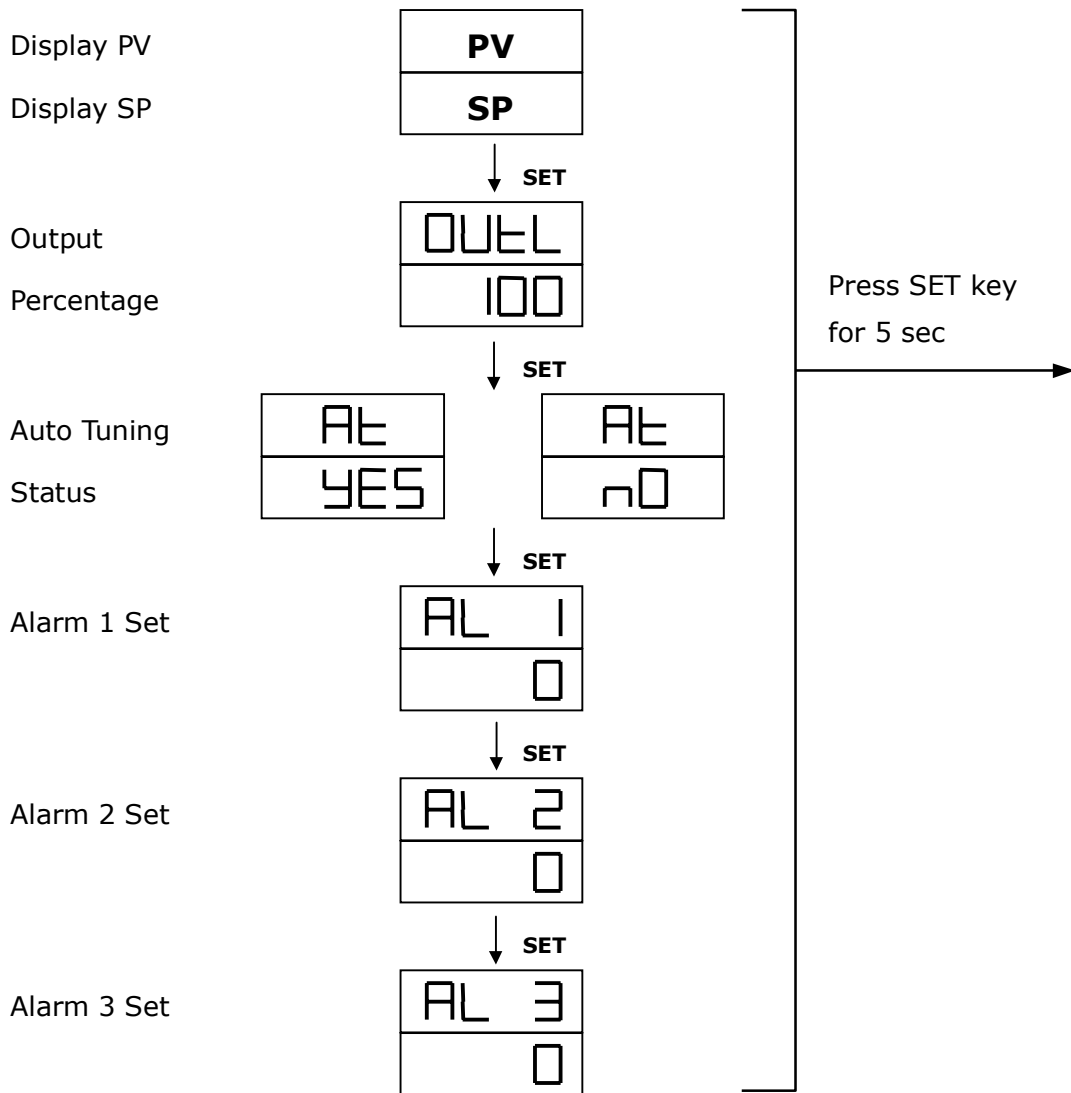
(1) : Press 'SET' key.

(2) : Press 'SET' key for 5sec

(3) : when LCK='1111', Press 'SET' key and '◁'key for 5 sec.

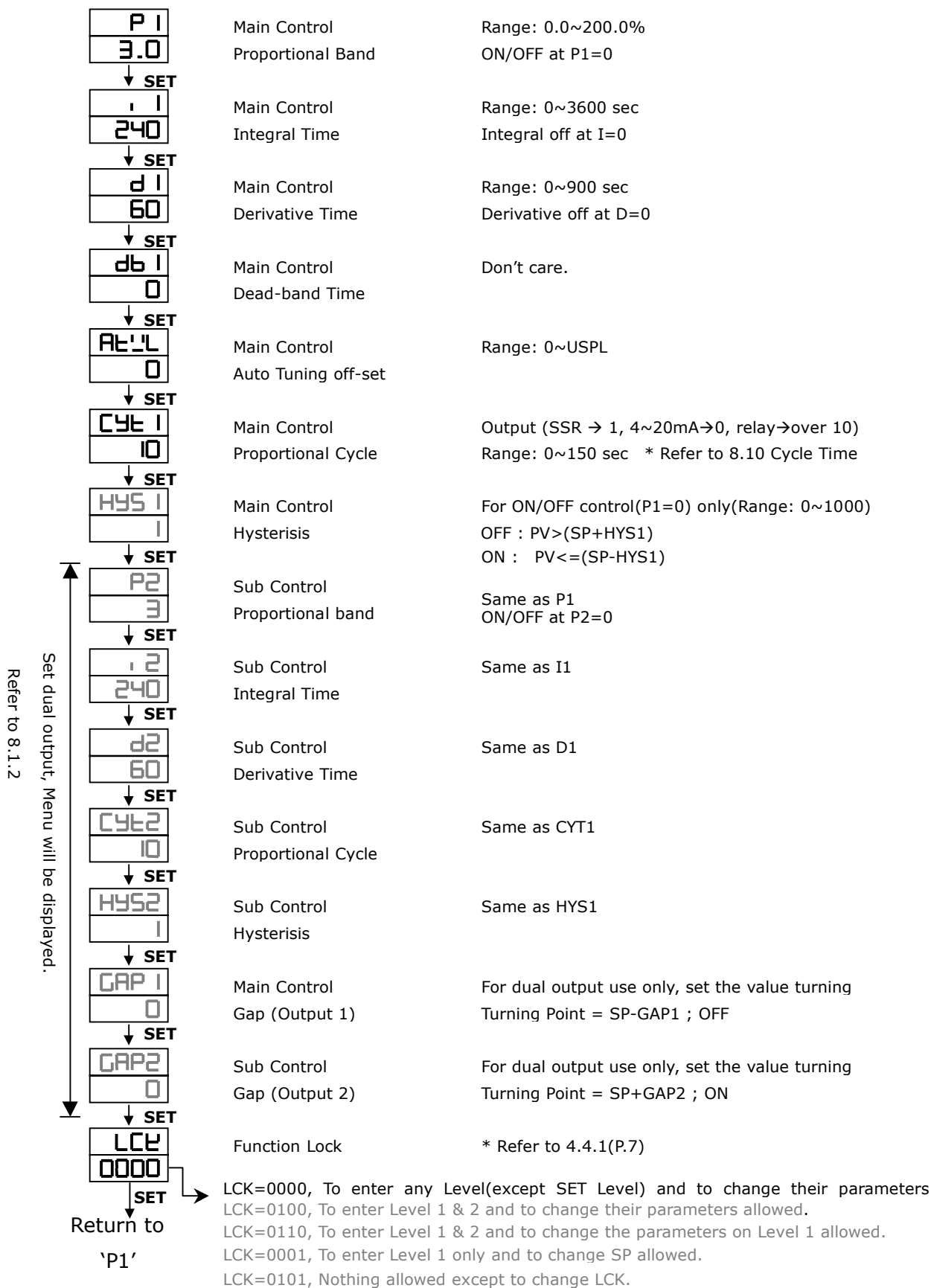
(4) : when LCK='0000', Press 'SET' key and '◁'key for 5 sec.

4.1 Level 1



- 4.1.1 Press SHIFT key (◀) to change the parameters. If SHIFT key is pressed, the first digit begins blinking. Press UP key (△) or DOWN key (▽) to increase or decrease the value of the digit, then press SHIFT key again to go to the next digit. As all the digits are written, press SET key to enter the value.
- 4.1.2 SET key also has the function of changing MODEs. If SET key is pressed, the display shows the next MODE.
- 4.1.3 Press SET key for 5 sec. The display goes to level 2, and do the same thing to return to level 1.
- 4.1.4 If any key were not pressed for 1 minute, the display will go to level 1.
- 4.1.5 Press A/M key to go to level 1, no matter where it is.
- 4.1.6 If the output percentage is "0", it means the controller has no output.

4.2 Level 2

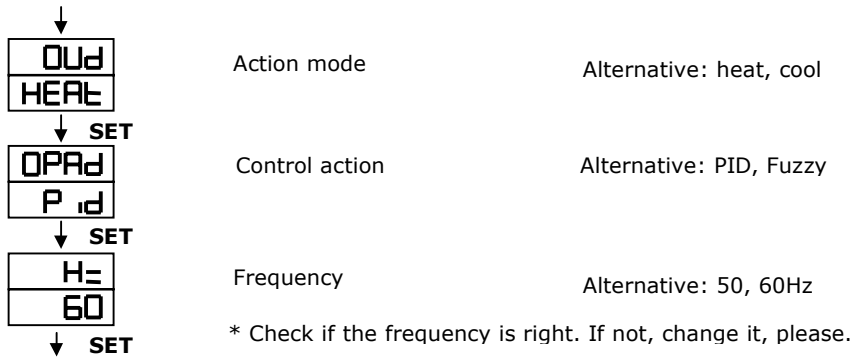


4.3 Level 3

When LCK=0000, press SET key and SHIFT key for 5 seconds to enter level 3.

	Main Control(INP1) Input Selection	Select the input range. Refer to 5.1 Input selection on P.12~P.13
↓ SET		
	Main Control(INP1) Analog Zero set	Used as input code which are AN1 to AN5 Range: LSPL~USPL
↓ SET		
	Main Control(INP1) Analog Span set	Same as ANL1
↓ SET		
	Decimal point	To set the position of decimal point (Available for INP1=AN1 to AN5)
↓ SET		
	Lower Set-point limit	To set the lowest point within INP1
↓ SET		
	Upper Set-point limit	To set the highest point within INP1
↓ SET		
	Sub Control(INP2) Analog Zero set	Used as input code which are AN1 to AN5 Range: LSPL~USPL
↓ SET		
	Sub Control(INP2) Analog Span set	Same as ANL2
↓ SET		
	Alarm mode of AL1	Range: 00~19 Refer to '6.1 Alarm Function Selection' on P.14
↓ SET		
	Time set of Alarm 1	Used in program function (Range: 0~99.59 min.) 0=flicker alarm, 99.59=continued, others = on delay time * in Program Model, Alarm on time(ALD1=17)
↓ SET		
	Alarm mode of AL2	Range: 00~19 Refer to '6.1 Alarm Function Selection' on P.14
↓ SET		
	Time set of Alarm 2	Same as ALT 1
↓ SET		
	Alarm mode of AL3	Range: 00~19 Refer to '6.1 Alarm Function Selection' on P.14
↓ SET		
	Time set of Alarm 3	Same as ALT 1
↓ SET		
	Hysterisis of Alarm	Range: 0~1000
↓ SET		

↓ CLO1 150	Main Control(OUT1) Calibration	To calibrate the low value of output Range: LSPL~USPL (Current output only)
↓ SET CHO1 3500	Main Control(OUT1) Calibration high	To calibrate the high value of output Range: 0~9999 (Current output only)
↓ SET CLO2 150	Sub control(OUT2) Calibration low	Same as CL01
↓ SET CHO2 3500	Sub Control(OUT2) Calibration high	Same as CH01
↓ SET CLO3 0	Transmitter control Calibration low	Same as CL01
↓ SET CHO3 5000	Transmitter control Calibration high	Same as CH01
↓ SET TUCY 5	Timer for Motor valve control	Full run time of proportional motor (without potentiometer) Range: 5~200 sec
↓ SET WA T 0	To use in program for waiting continued operation	0=No wait Others = Wait time
↓ SET SEtA 0000	Hysterisis for motor control Program RUN & End ALM	0= "a" contact, 1= "b" contact Refer to 8.5 'SETA Function' Description
↓ SET IDn0 1	ID number (please skip this step)	Communication ID number
↓ SET bAUD 2400	Baud rate (please skip this step)	UART Baud Rate selection Range: 110~9600 BIT/sec
↓ SET SPO5 0	Compensate SP	Range: -1000~1000
↓ SET PVO5 0	Compensate PV	Range: LSPL~USPL
↓ SET Un t C	Unit of PV & SP	Range: C, F, A (analog)
↓ SET SOFT 0.05	Soft filter (please skip this step)	Adjust the response time of PV (the bigger, the faster) Range: 0.05~1.00
↓ SET CASC	Please skip this step	
↓ SET		



Return to 'INP1'

4.4 Level 4 (LOCK FUNCTION)

4.4.1 Functions of LCK

LCK=0100, To enter Level 1 & 2 and to change their parameters allowed.

LCK=0110, To enter Level 1 & 2 and to change the parameters on Level 1 allowed.

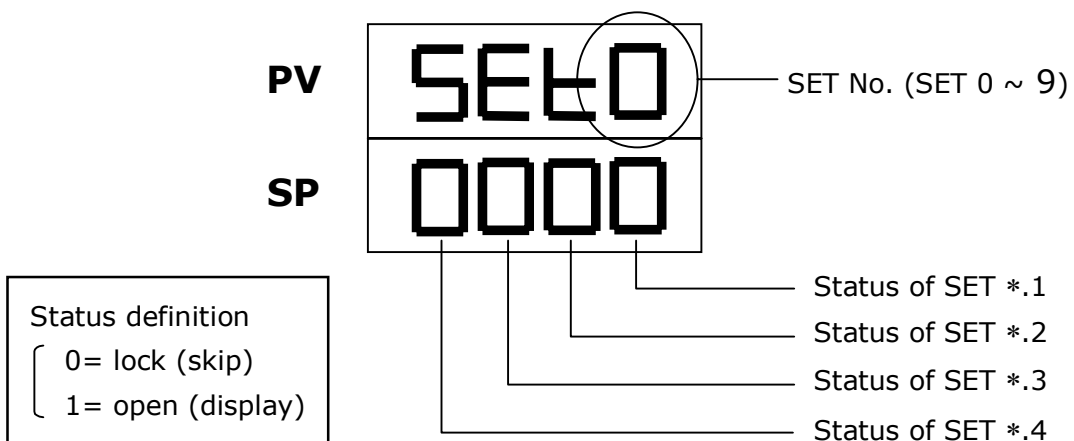
LCK=0001, To enter Level 1 only and to change SP allowed.

LCK=0000, To enter Level 3 allowed then press SET + SHIFT key (◀)

LCK=1111, To enter Level 4 allowed then press SET + SHIFT key (◀)

LCK=0101, Nothing allowed except to change LCK.

4.4.2 Let the display go to "LCK" in level 2, and set "1111" in LCK, then press SET key and SHIFT key (◀) for 5 seconds to enter "SET" status. There are SET0.1 to SET9.4 for use.

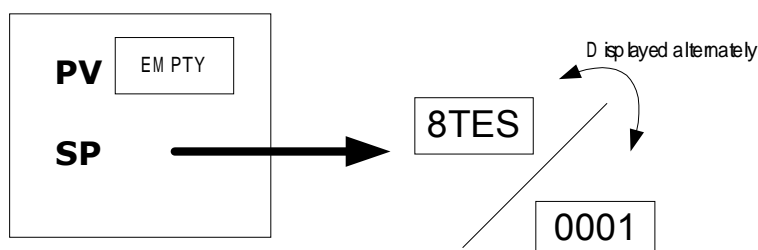


4.4.3 Functions of SETs

SET	Function	SET	Function
1.1	OUTL	5.1	CL02, CH02
1.2	AT	5.2	CL03, CH03
1.3	AL1	5.3	Rucy, WAIT, SETA
1.4	AL2	5.4	IDNO, BAUD
2.1	AL3	6.1	SVOS
2.2	ANL1, ANH1, DP	6.2	PVOS
2.3	LSPL, USPL	6.3	UNIT
2.4	ANL2, ANH2	6.4	SOFT
3.1	ALD1	7.1	CASC
3.2	ALT1	7.2	ODU
3.3	ALD2	7.3	OPAD
3.4	ALT2	7.4	Hz
4.1	ALD3		
4.2	ALT3		
4.3	HYSA		
4.4	CL01, CH01		

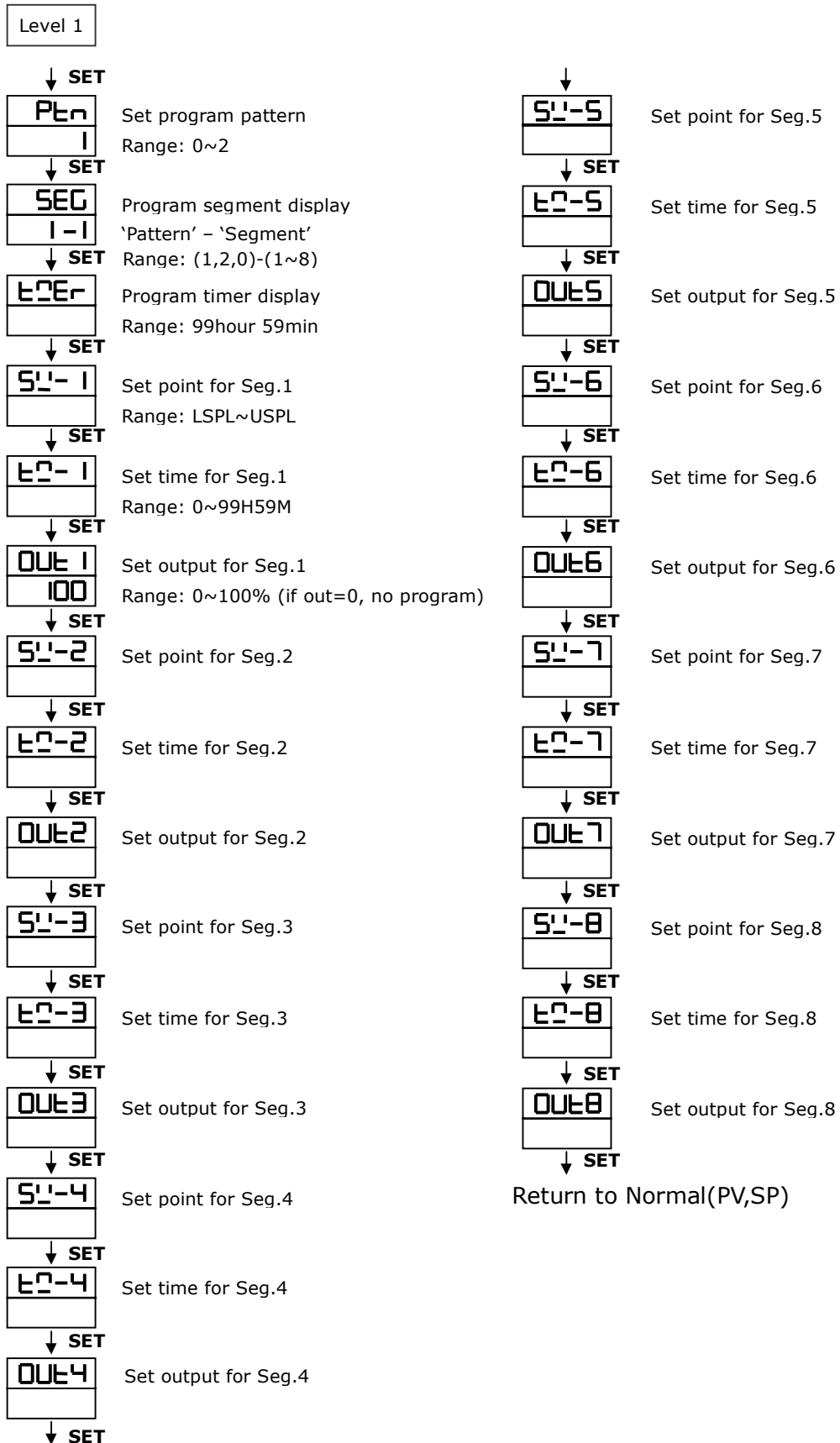
SET	Function	Remarks
8.1	0= No Repeat	Program Model Use
	1= Program Repeat	
8.2	0= No Power Failure	
	1= With Power Failure	
8.3	0= Start from 0	
	1= Start from PV	
9.3	TRS SP	Auxiliary Output Use
9.4	TRS PV	
0.3	0= No Remote SP	
	1= Remote SP	

* Caution: Don't operate SET8.4, the process of the controller will be in confusion.
 If SET8.4=1, the controller will be in 'Single Display' mode. The PV LED will not be displayed any more, and the SP LED will be displayed reversed value and status alternately and repeatedly.



In case of SET8.3=1, SP display will be changed to PV display.
 The time to reach until to be desired SP will be decreased. The remaining time to reach the SP will be shown in PARAMETER 'TMER'. Where, the time of countdown is related to the PV, not segments.

4.5 Program Level



4.5.1 This program has 2 patterns, each pattern contains 8 segments.
The segment can be arranged a period of RAMP status or SOAK status.

4.5.2 Terminologies

Pattern : A program consists of some segments

Step : A RAMP status + a SOAK status

RAMP status : The status with changing SP

SOAK status : The status with fixed SP

4.5.3 Operating

1) Key functions (No changing parameters)

\triangle (START) : To start program procedure, PRO in panel flicker

∇ (WAIT) : To suspend program procedure, PRO in panel will stop flicker but light

\triangle +SET (JUMP) : To jump segment

∇ +SET (RESET) : To reset program procedure, PRO in panel will be "off"

2) Alarm function

If ALD1 to be set 07 (*refer to the selection),

AL1 to be set 2 (AL1=2, it means alarm in segment 2 end),

ALT1 to be set 00.10 (alarm time 10 sec.).

*In this case, when program proceeds to segment 2 end, ALM1 relay will be on 10 sec.

3) End function

If ALD to be set 17 (* refer to the selection), this program will be end in segment 8 or 16.

* In this case, PV and END will flicker in display window, and the alarm relay acts.

This controller does not have END order if program procedure are less than 8 segments. In this case, please set next segment's out=0, then this program will be end in last set segment. Otherwise, it will proceed 8 or 16 segments.

4) Linking function

PTN=1, Proceed pattern1, which contains 8 segments

PTN=2, Proceed pattern2, which contains 8 segments

PTN=0, linking proceed pattern 1 and 2 ,totally 16 segments

(Set PTN1 and PTN2 first, then set PTN=0)

5) Other function (*refer to level 4)

SET8.1=1 Program repeat

SET8.2=0 No power failure

SET8.2=1 With power failure function

(If power suspended, the controller will keep the memory)

SET8.3=0 Program start from 0

SET8.3=1 Program start from PV

5. Input

5.1 Input selection (INP 1)

TYPE	CODE	RANGE
K	K1	0.0~200.0°C/0.0~392.0°F
	K2	0.0~400.0°C/0.0~752.0°F
	K3	0.0~600.0°C/0.0~1112.0°F
	K4	0.0~800.0°C/0.0~1472.0°F
	K5	0.0~1000.0°C/0.0~1832.0°F
	K6	0.0~1200.0°C/0.0~2192.0°F
J	J1	0.0~200.0°C/0.0~392.0°F
	J2	0.0~400.0°C/0.0~752.0°F
	J3	0.0~600.0°C/0.0~1112.0°F
	J4	0.0~800.0°C/0.0~1472.0°F
	J5	0.0~1000.0°C/0.0~1832.0°F
	J6	0.0~1200.0°C/0.0~2192.0°F
R	R1	0.0~1600.0°C/0.0~2912.0°F
	R2	0.0~1769.0°C/0.0~3216.0°F
S	S1	0.0~1600.0°C/0.0~2912.0°F
	S2	0.0~1769.0°C/0.0~3216.0°F
B	B1	0.0~1820.0°C/0.0~3308.0°F
E	E1	0.0~800.0°C/0.0~1472.0°F
	E2	0.0~1000.0°C/0.0~1832.0°F
N	N1	0.0~1200.0°C/0.0~2192.0°F
	N2	0.0~1300.0°C/0.0~2372.0°F
T	T1	-199.9~400.0°C/-199.9~752.0°F
	T2	-199.9~200.0°C/-199.9~392.0°F
	T3	0.0~350.0°C/0.0~662.0°F
W	W1	0.0~2000.0°C/0.0~3632.0°F
	W2	0.0~2320.0°C/0.0~2372.0°F
PLII	PL1	0.0~1300.0°C/0.0~2372.0°F
	PL2	0.0~1390.0°C/0.0~2534.0°F
U	U1	-199.9~600.0°C/-199.9~999.9°F
	U2	-199.9~200.0°C/-199.9~392.0°F
	U3	0.0~400.0°C/0.0~752.0°F
L	L1	0.0~400.0°C/0.0~752.0°F
	L2	0.0~800.0°C/0.0~1472.0°F

* The initial set in factory mode is K2 without any certain requirement.

TYPE	CODE	RANGE
JIS Pt100	JP1	-199.9~600.0°C/-199.9~999.9°F
	JP2	-199.9~400.0°C/-199.9~752.0°F
	JP3	-199.9~200.0°C/-199.9~392.0°F
	JP4	0.0~200.0°C/0.0~392.0°F
	JP5	0.0~400.0°C/0.0~752.0°F
	JP6	0.0~600.0°C/0.0~1112.0°F
DIN Pt100	dP1	-199.9~600.0°C/-199.9~999.9°F
	dP2	-199.9~400.0°C/-199.9~752.0°F
	dP3	-199.9~200.0°C/-199.9~392.0°F
	dP4	0.0~200.0°C/0.0~392.0°F
	dP5	0.0~400.0°C/0.0~752.0°F
	dP6	0.0~600.0°C/0.0~1112.0°F
JIS Pt50	JP1	-199.9~600.0°C/-199.9~999.9°F
	JP2	-199.9~400.0°C/-199.9~752.0°F
	JP3	-199.9~200.0°C/-199.9~392.0°F
	JP4	0.0~200.0°C/0.0~392.0°F
	JP5	0.0~400.0°C/0.0~752.0°F
	JP6	0.0~600.0°C/0.0~1112.0°F
AN1	AN1	-10~10mV/-1999~9999
AN2	AN2	0~10mV/-1999~9999
AN3	AN3	0~20mV/-1999~9999
AN4	AN4	0~50mV/-1999~9999
AN5	AN5	10~50mV/-1999~9999

6. Alarm

6.1 Alarm function selection

CODE	DESCRIPTION	Hold-On
00/ 10	None	
01	Deviation high limit alarm	Yes
11	Deviation high limit alarm	No
02	Deviation low limit alarm	Yes
12	Deviation low limit alarm	No
03	Deviation high/low alarm	Yes
13	Deviation high/low alarm	No
04/ 14	Deviation high/low range alarm	No
05	Absolute value high limit alarm	Yes
15	Absolute value high limit alarm	No
06	Absolute value low limit alarm	Yes
16	Absolute value low limit alarm	No
07	Segment end alarm (use for program only)	-
17	Program run alarm (use for program only)	-
08	System error alarm-on	-
18	System error alarm-off	-
19	On delay timer alarm	-

* Note : "Hold-On" means the alarm does not work at the first time.

6.2 Alarm action description

6.1.1 CODE 00/10 : None

6.1.2 CODE 01 : Deviation high alarm inhibit



6.2.3 CODE 11 : Deviation high alarm no inhibit



6.2.4 CODE02 : Deviation low alarm inhibit



6.2.5 CODE12 : Deviation low alarm no inhibit



6.2.6 CODE03 : High/low alarm inhibit



6.2.7 CODE13 : High/low alarm no inhibit



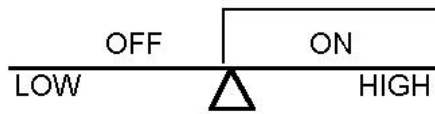
6.2.8 CODE04/14 : Band alarm



6.2.9 CODE05 : Absolute high alarm inhibit



6.2.10 CODE15 : Absolute high alarm no inhibit



6.2.11 CODE06 : Absolute low alarm inhibit



6.2.12 CODE16 : Absolute low alarm no inhibit



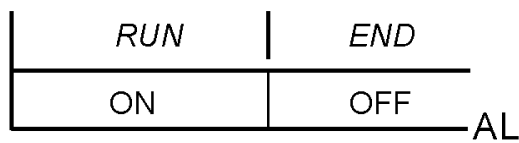
6.2.13 CODE07 : Segment end alarm (program only)

i) ALD 1~3, set 07

ii) AL1~3, alarm segment no. set

iii) ALT1~3, if set 0 = flicker alarm
 set 99.59 = alarm continued
 set others = on delay time

6.2.14 CODE17 : Program run alarm (program only)



6.2.15 CODE08 : System Error- ON



6.2.16 CODE18 : System Error-OFF

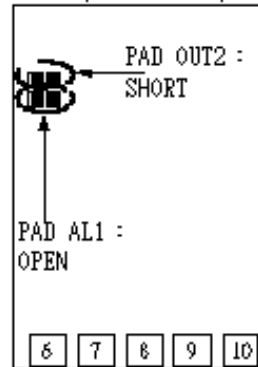
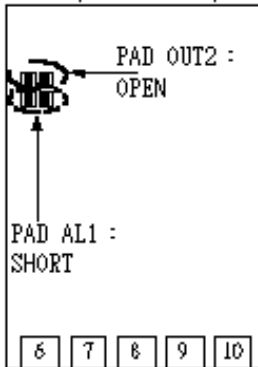
<i>Normal</i>	<i>Error</i>
ON	OFF

AL

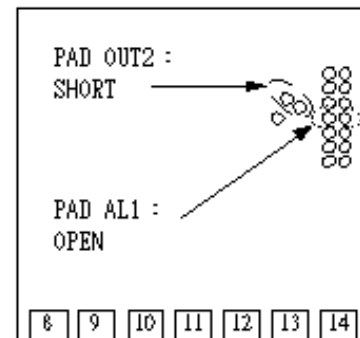
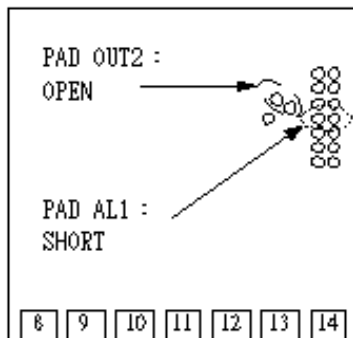
6.2.17 CODE19 : on delay timer
when PV=alarm SP, it keeps a certain period (set time)
before alarm action (Range: 00H00M~99H59M)

7. Modification of HEAT/ALARM → HEAT/COOL (on PC board)

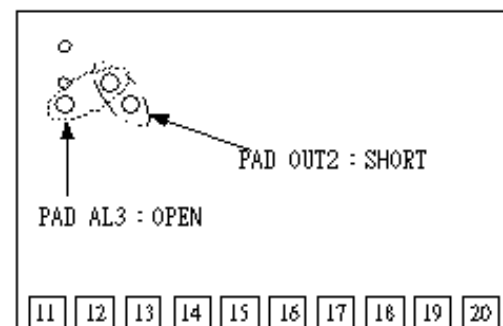
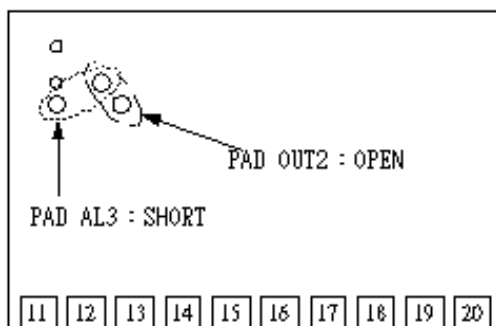
7.1 DC1010



7.2 DC1030

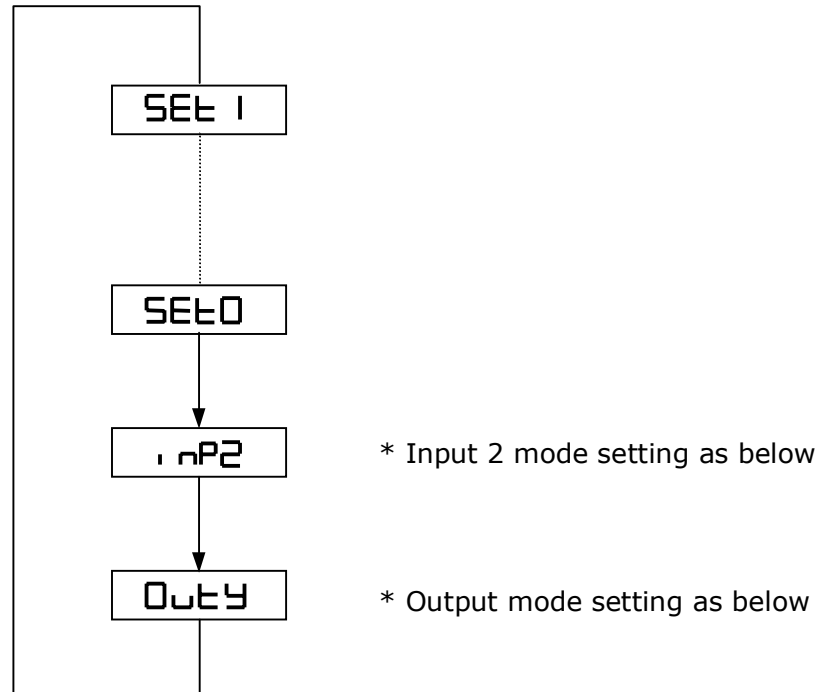


7.3 DC1020/1040



8. Special Function Description

8.1 Special Function ('SET' Menu of Level4)



8.1.1 Second input mode(INPUT2)

INP 2 = 0, Non

INP 2 = 1, 1~5V/4~20mA/2~10V

INP 2 = 2, 0~5V/0~20mA/0~10V

8.1.2 Output mode

OUTY = 0, Single output

OUTY = 1, Double output

OUTY = 2, None

OUTY = 3, Motor valve

OUTY = 4, Single phase SCR (Single phase control)

OUTY = 5, Three phase SCR (Three phase control)

8.2 RAMP & SOAK

8.2.1 RAMP

- i) Set "SET2.1= 1", "SET4.1= 1" at Set level
- ii) Set "ALD 3 = 9" at Input level
- iii) Then, "AL 3" menu will not be displayed

PV	RAMP	Range = 00.00~99.99 (°C/minute) If RAMP not used, set ALD 3 = 0
SP	0000	

8.2.2 SOAK

- i) ALD1/ALD2 = 19
- ii) Then, AL1/AL2 will be displayed

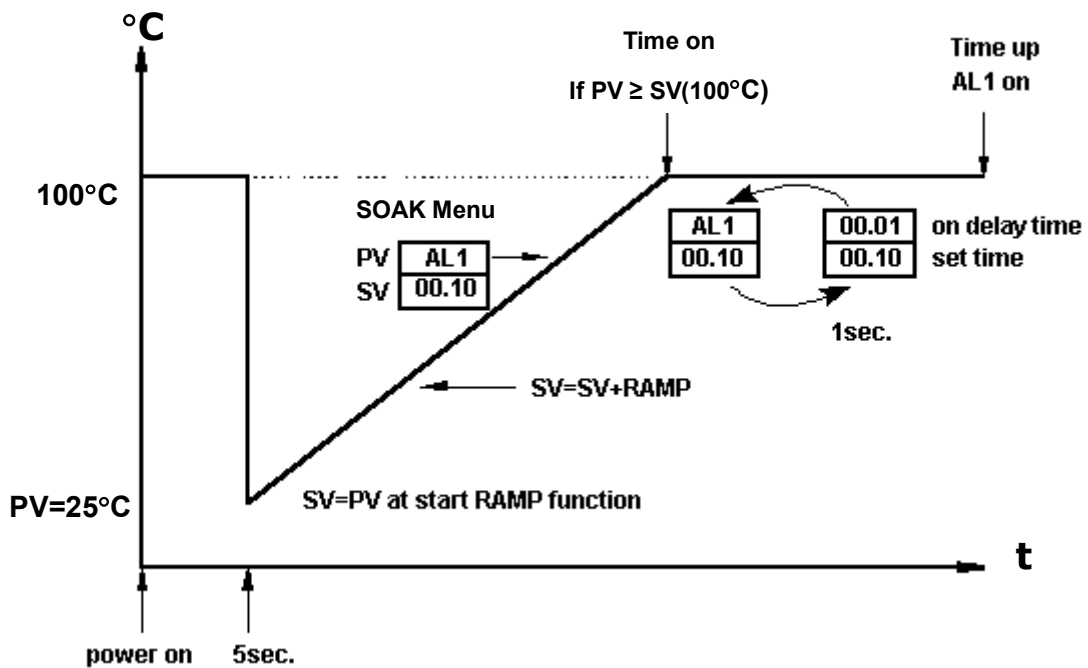
PV	AL 1	Range = 00.00~99.59 (hour/minute)
SP	0000	

Example)

SP = 100°C, RAMP = 10.00 °C/minute

Time(minute) = 10 minute → AL1 = 00.10

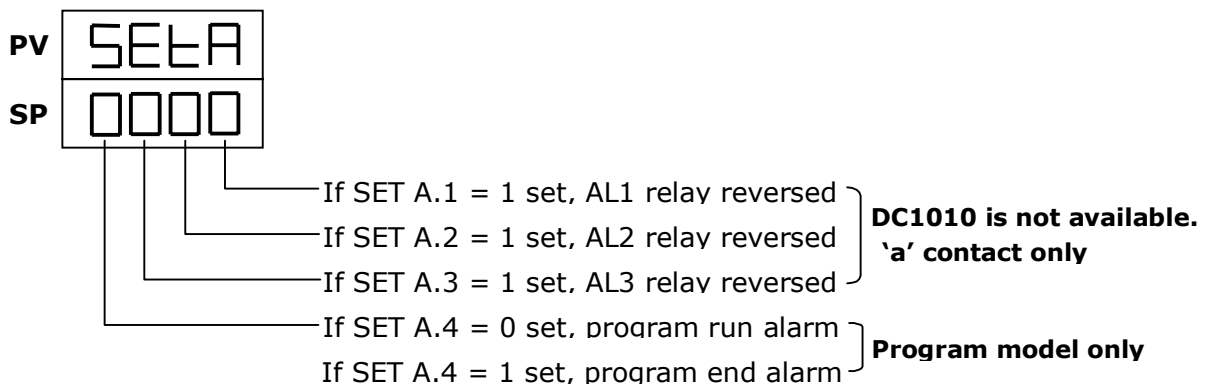
PV = 25°C



-
- 8.3 Remote SP(Second Input)
 - 8.3.1 Hardware must be mounted
 - 8.3.2 Set 'INP2' to 1 or 2 (ANL2, ANH2 used for Calibration)
 - 8.3.3 SET 0.3 = 1 means Remote SP from Input 2 channel
(*SET 0.3 = 0 means Local SP)

 - 8.4 Alarm Timer ALT1/ALT2/ALT3 description
 - 8.4.1 ALT 1 = 0 means 'flicker alarm' if AL 1 is ON
 - 8.4.2 ALT 1 = 99.59 means 'continuous alarm' if AL 1 is ON
 - 8.4.3 ALT 1 = 00.01~99.58 means AL 1 is on delay timer
(* Use for large EMI affect controller)

 - 8.5 Function SET A(LEVEL3)



- 8.6 Function SET 8
 - 8.6.1 SET 8.1 = 0 Non
SET 8.1 = 1 Program Repeat
 - 8.6.2 SET 8.2 = 0 Non (program model only)
SET 8.2 = 1 Power failure access
 - 8.6.3 SET 8.3 = 0 Zero start (program model only)
SET 8.3 = 1 PV start
 - 8.6.4 SET 8.4 = 0 Non
SET 8.4 = 1 Display will be transferred to single display
(Don't change it)
* 'SET 8.4 = 1' can make return to double display

8.7 Function SET 9

- 8.7.1 SET 9.1 = 0 Non
SET 9.1 = 1 PV/SP switching (* Don't change it)
* This is for the single display set (refer to SET 8.4)
- 8.7.2 SET 9.2 = 0 Non
SET 9.2 = 1 Non Program model : Not display value of change in RAMP
Program model : Timer change from H.M to M.S
- 8.7.3 SET 9.3 = 0 Non
SET 9.3 = 1 Transmission SP
- 8.7.4 SET 9.4 = 0 Non
SET 9.4 = 1 Transmission PV

8.8 Function SET 0

- 8.8.1 SET 0.1 = 0 None
SET 0.1 = 1 Certain Communication Set(Don't change it)
* Not available for DC1010/1020/1030/1040
- 8.8.2 SET 0.2 = 0 * Don't change it
SET 0.2 = 1 Rate for AL3 (ALD 3 = 0)
- 8.8.3 SET 0.3 = 0 None
SET 0.3 = 1 Remote SP
- 8.8.4 SET 0.4 = 0 Motor valve close = "b" out
SET 0.4 = 1 Motor valve close = "a" out

8.9 Input level wait

Wait = 0 means "no wait"

Wait ≠ 0 means "wait"

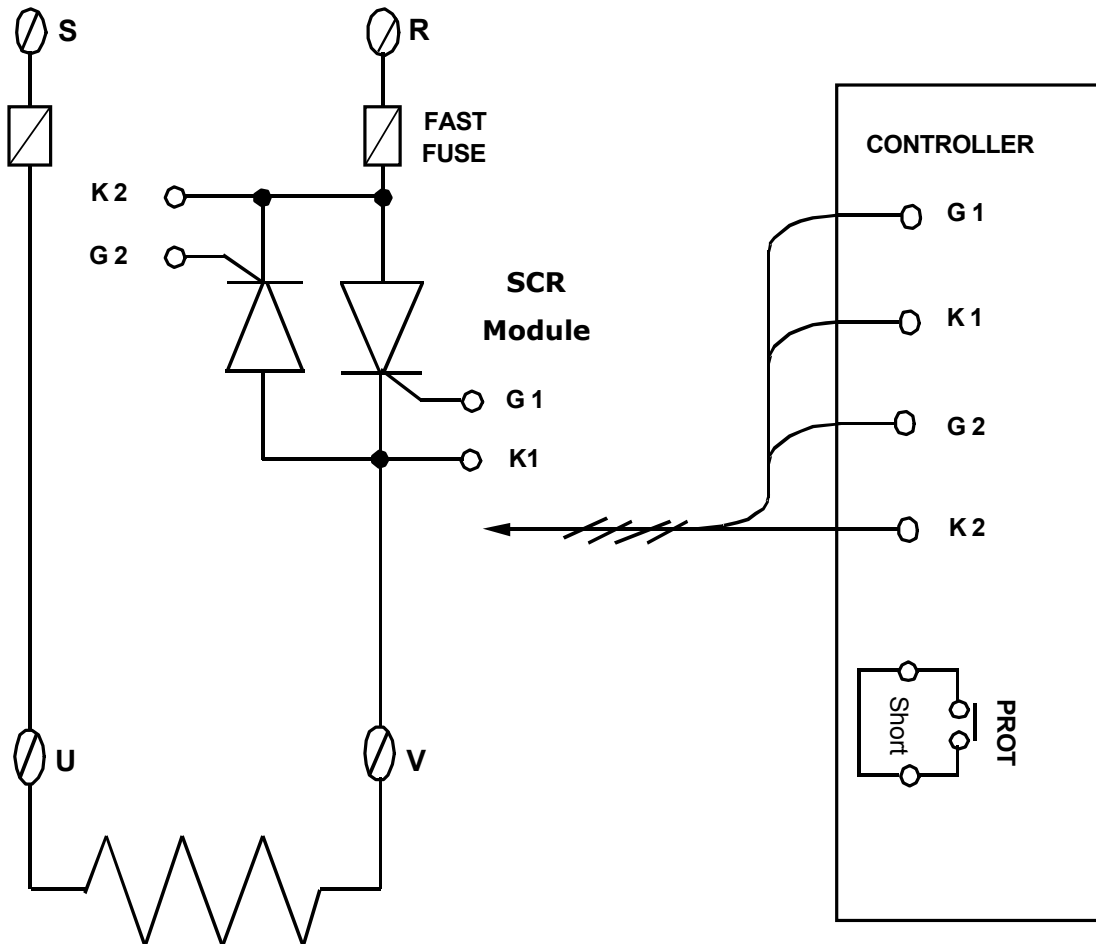
8.10 Cycle Time

Range: 0~150 sec

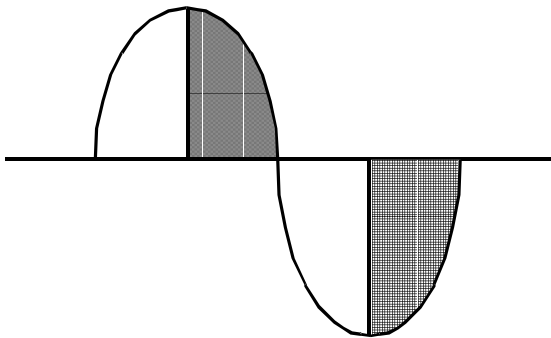
- CYT1= 0 (i) mA
(ii) Phase control(SCR)
- CYT1= 1 Phase zero control(SSR)
- CYT1= over 10 Relay output
Voltage Pulse Output

Application 1. Single Phase Control

- . Available models: DC1030/1040, DC1030P/1040P
- . Data Change:
 - OUTY = 4
 - CYT1 = 0
 - CL01 = 0, CH01 = 5000 if used for resistance load
 - CL01 = 0, CH01 = 4000 if used for inductor load

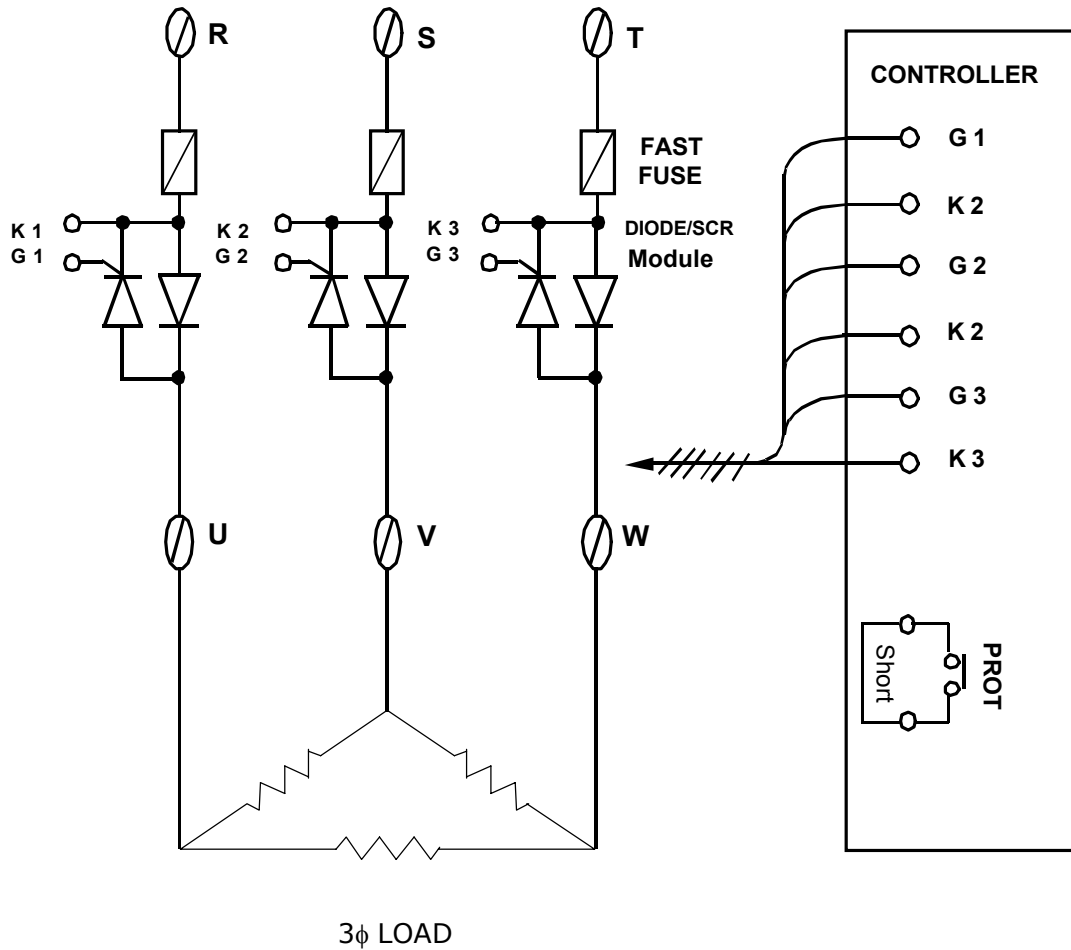


** Controller source phase must be same as load source phase



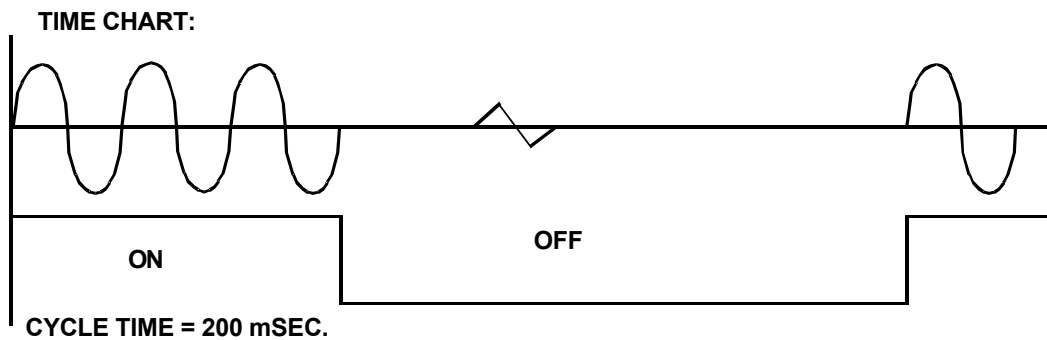
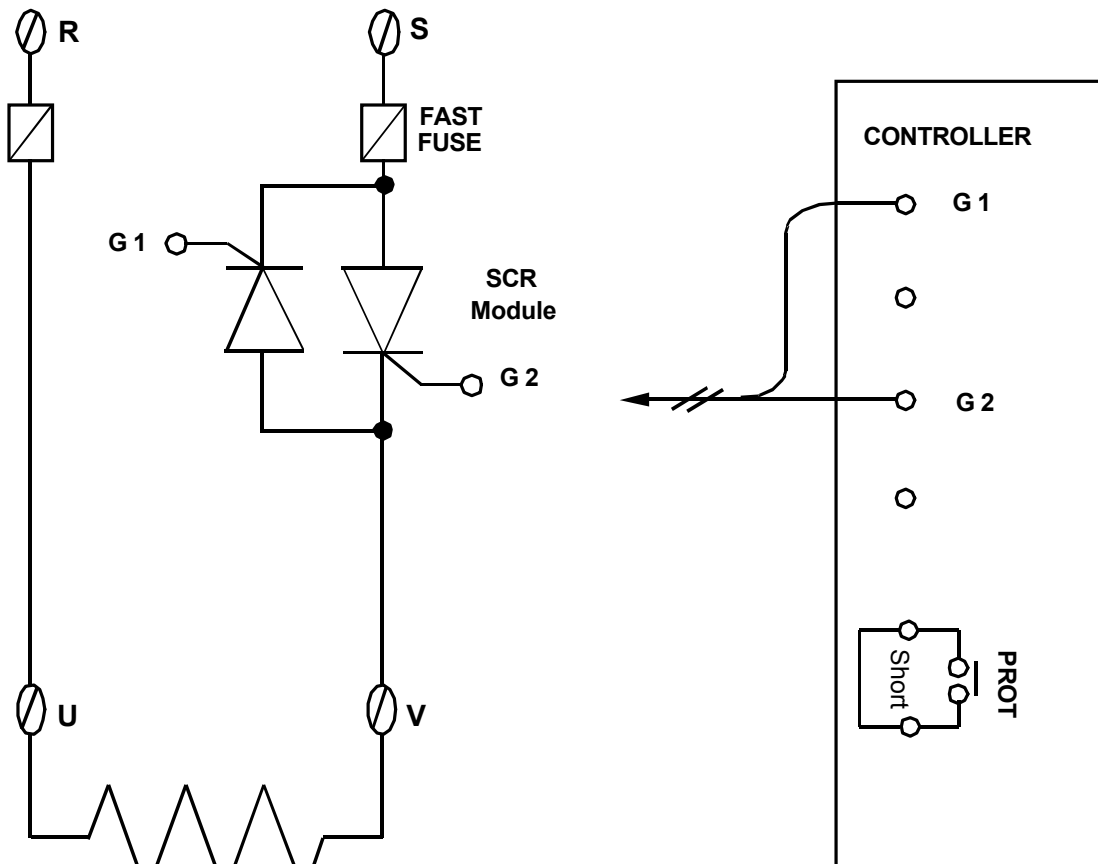
Application 2. Three Phase Control

- Available Models: DC1040/DC1040P
- Data Change :
 - OUTY = 5
 - CYT1 = 0
 - CL01 = 0, CH01 = 5000 only if used for resistance load



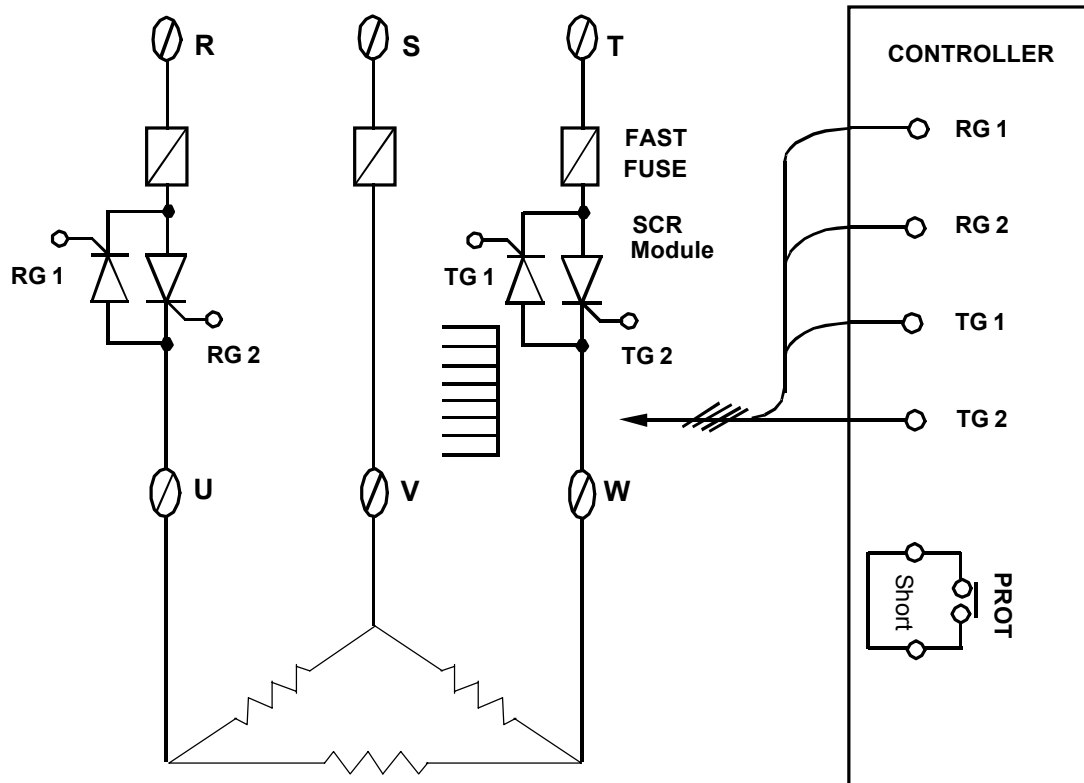
Application 3. Single Phase Zero Control

- Available Models: DC1030/1040
DC1030P/1040P
- Data Change: OUTY = 0
CYT1 = 1

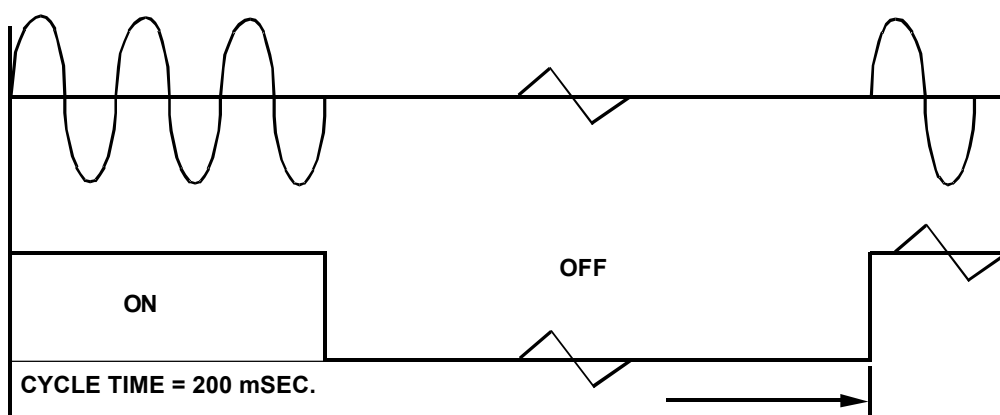


Application 4. Three Phase Zero Control

- Available Models: DC1040/1040P
- Data Change: OUTY = 0
CYT1 = 1

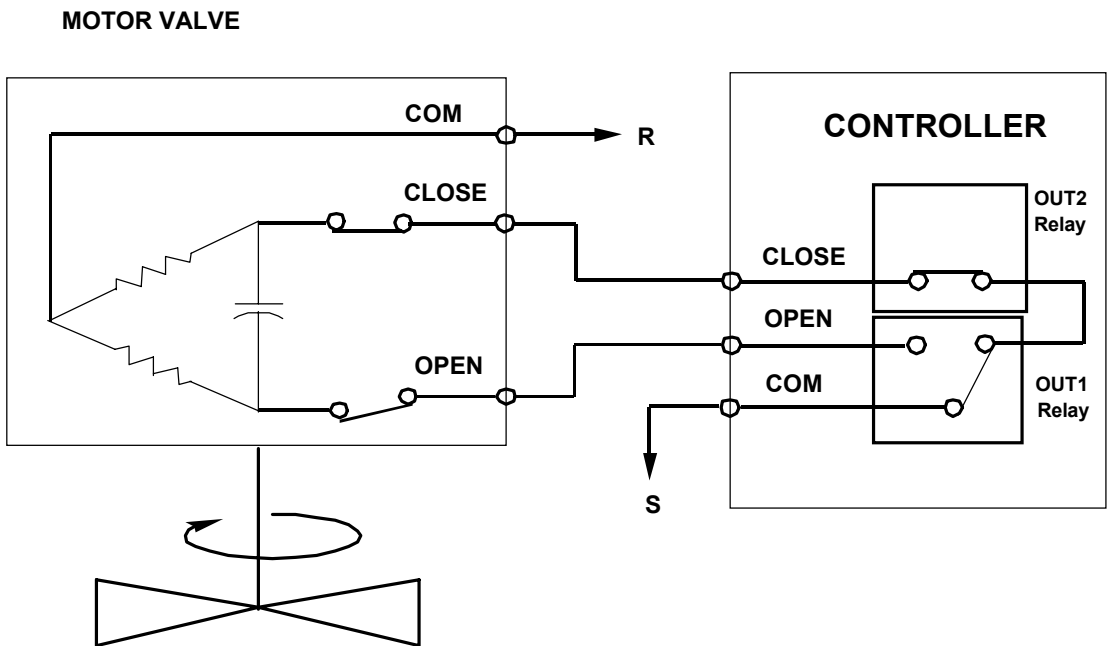


TIME CHART:



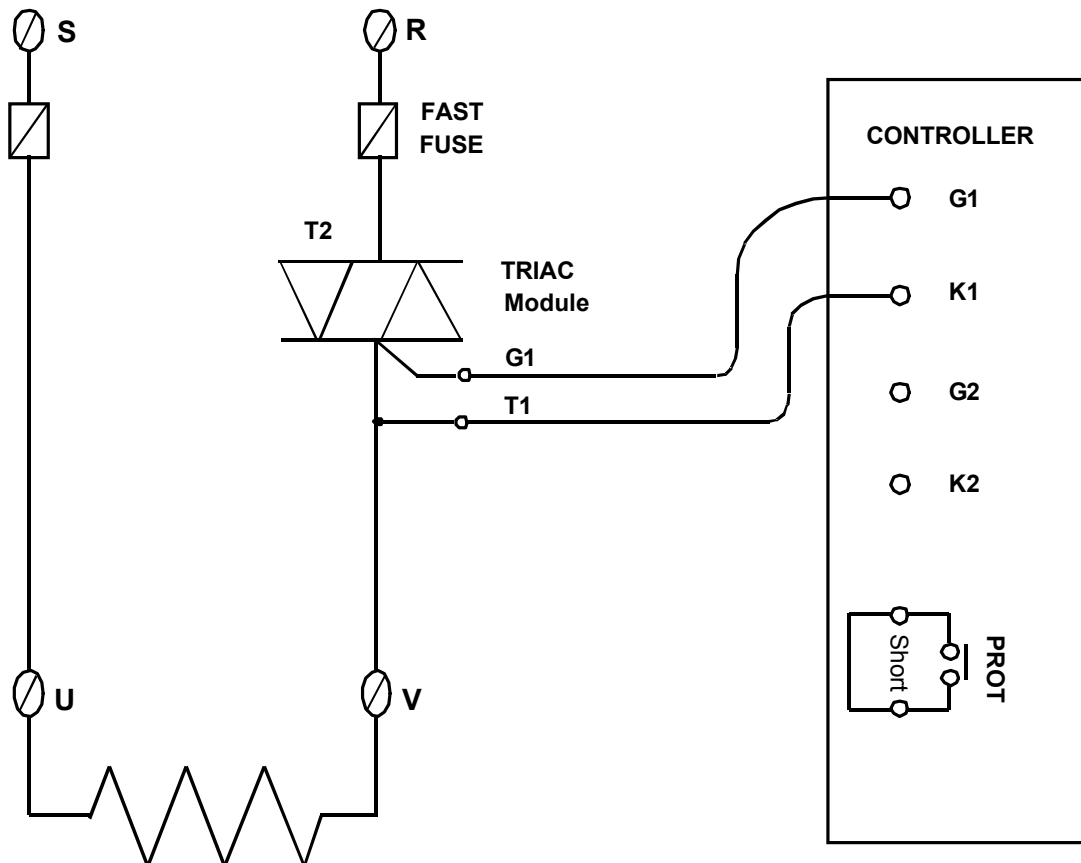
Application 5. Motor Valve Control

- . Available Models: DC1020/1030/1040
DC1020P/1030P/1040P
 - . Data Change: OUTY = 3
CYT1 = 1~150 sec. (Normally, default set 5 sec.)
RUCY = 5~200 sec.
- * 1. CYT1 is the cycle time of Open/Close
2. RUCY is the running time of motor valve 0~100%



Application 6. Single Phase Control (for TRIAC module)

- Available Models: DC1030/1040
DC1030P/1040P
- Data Change: OUTY = 4
CYT1 = 0
CLO1=0, CHO1=5000 if use for resistance load
CLO1=0, CHO1=4000 if use for inductor load



** Controller source phase must be same as load source phase

