

Multi-Loop Controller Instruction Manual

1. Features:

1.1. 2-channel temperature controls: up to 2 channels in a compact size.

2 kinds of combinations of temperature set value, PID constant, alarm set value, etc.

1.1. Input Sensor Types

Thermocouple : K, J, T, E, S

Resistance thermometer: Pt100, CU50

1.2. Control Outputs: DC 0-10V

1.3. Adjusting PID Constants

Can be easily set the optimum PID constants by performing AT (auto-tuning) with the limit cycle method.

1.4. Standard Alarms (optional)

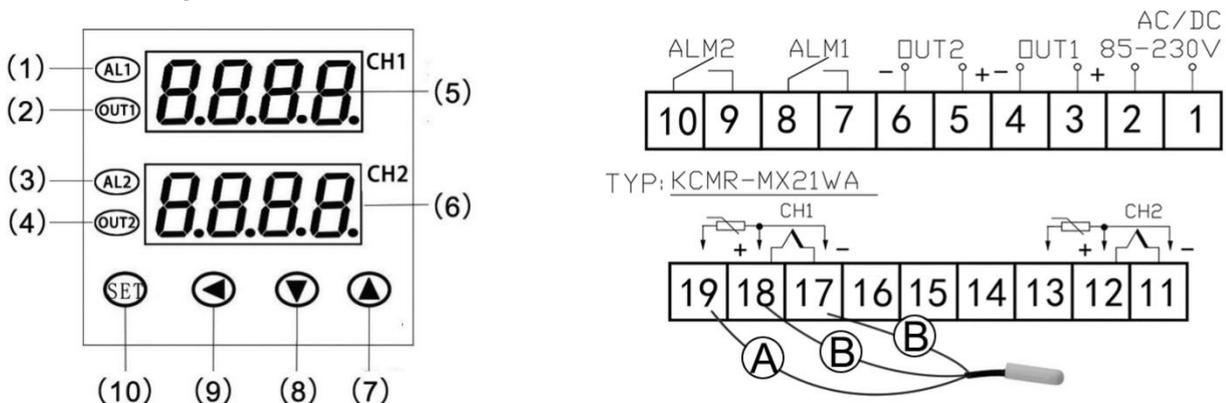
Can be output an alarm when the deviation, process value, set point, or manipulated value reaches a specified value.

1.5. Use this controller within the following allowable range:

Allowable ambient temperature: -0 to +55 °C

Allowable ambient humidity: 5 to 85 % RH.

2. Panel description:



1 ALM1: lamp Lights when loop 1 Event occurs

2 Out1 lamp: Lights when loop 2 output is turned on

5 CH1 display: Displays loop 1 Measured value (PV1) or various Parameter symbols

7 Up key:

-Ramp/Soak Controller Increase numerals.

9 Shift key: Shift digits when settings are changed.

3 ALM2 lamp: Lights when loop 2 Event occurs

4 Out2 lamp: Lights when loop 2 output is turned on

6 CH2 display: Displays loop 2 Measured value (PV2), or various Parameter setvalues.

8 Down key:

-Decrease numerals

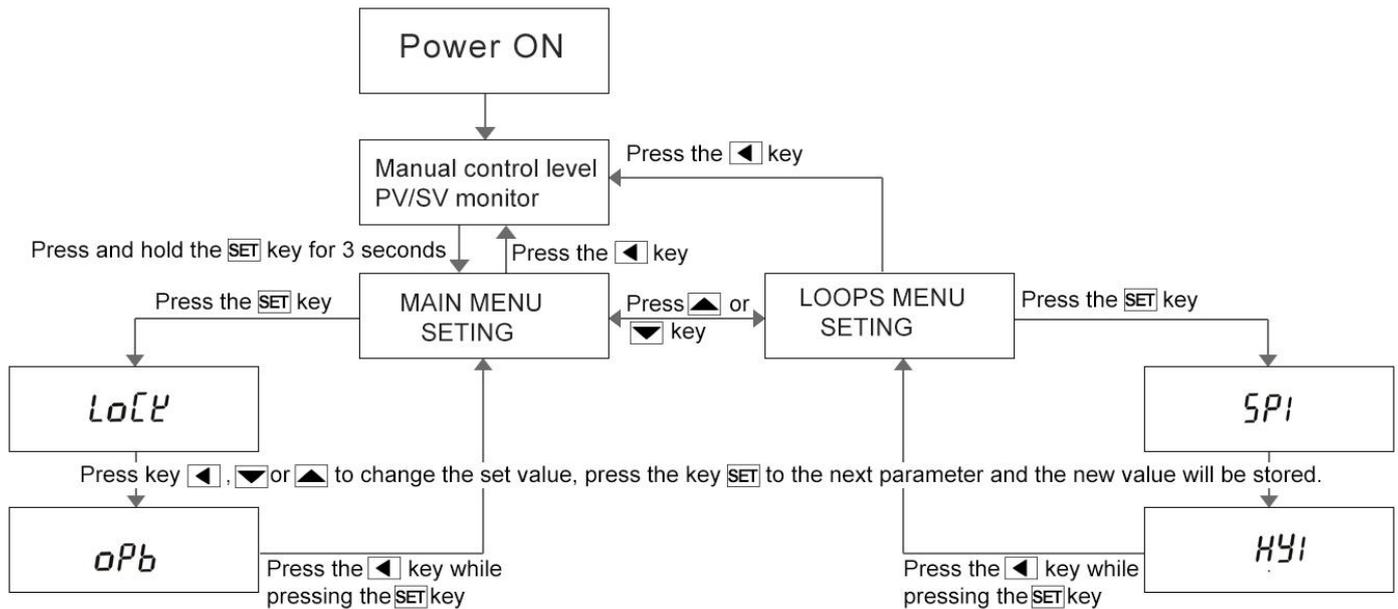
10 Set (SET) key: Used for Parameter calling up and set value registration.

3. Parameters

ID	Code	Name	Manual	Setting range	Ex-Factory
The public parameters(Main menu)					
0	Lock	Set data lock	LOCK=0, parameters can be set. Otherwise parameters cannot be set.	0~50	0
1	sn	Input type	Current: 0-mA(0-10mA),4-mA(4-20mA) RTD: Cu (cu50),Pt (pt100) TC: K,E, J,T;	-	-
2	OPB	Communication	0:no output; 1:RS232 or RS485 MODBUS-RTU;	0-1	1
3	Addr	Address	Device address, can be set from 0 to 255	0~255	1

4	bAud	Communication speed	1200; 2400; 4800; 9600;	—	9600
5	C F	Channel1 unit select	C: Celsius F: Fahrenheit If the channel of input type is analog, the parameter is invalid	C	C
The Parameters of each channels(loops menu)					
6	SP	Set value	Set the temperature set value (SV) which is the target value for control	Determined by PSL PSH	100
7	HY	Differential gap	When P=0,the controller is ON/OFF control ON/OFF action differential gap	0.1~50.0	0.1
8	ALH	Alarm Set value	Refer to 6. Alarm (ALM1) function	Determined by PSL PSH	300
9	AL				300
10	AHY	Differential gap	Alarm differential gap		
11	SC	PV Bias	The value set in the PV bias is added to the actual input value to correct the input value.		
12	P	Proportional Band	Set when PI or PID control is performance. For heating / cooling PID action. When P=0,the controller is ON/OFF control	1~100.0	15
13	I	Calculus time	Eliminates offset occurring in proportional control.	0~3000	500
14	d	Differential time	Prevents overshoot and/or undershoot caused by integral action effect..	0~2000S	100S
15	T	PID control period	Control response time	2~120	2S
16	U0	Initial value	PID control Initial output value	0~3000	500
17	AT	Auto tuning	1: Auto tuning (AT) with learning start 0: Auto tuning (AT) with learning stop Turns OFF automatically when the AT with learning function is completed.	0~1	0
18	PBH	Transmission high	Transmission Output limiter high	0~200	200
19	PBL	Transmission low	Transmission Output limiter low	0~200	40
20	OP	Control action	Refer to 7. Main output function	0~5	0
21	ALP	Alarm output Opt.	0: Alarm function OFF; 1: Process high alarm; 2:Process low alarm; 3: Deviation High alarm ; 4: Deviation low alarm; 5: Band alarm. 6: Band outside alarm.	0~10	1
22	PF	Digital Filter	This is a 1st-order lay filter by software prepared in order to reduce fluctuations of measured value (PV) by noise.	0~99	20
23	PSH	Range high	Input range high	P-SL~9999	1300
24	PSL	Range high	Input range low	-1999~P-SH	0
25	DP	Decimal point position	TC/ RTD input: Only 0 or 1 can be set. Voltage (V)/Current (I) input: From 0 to 3 can be set.	0~3	1
26	UTH	Output limiter high	The min value and max value of output current.	outL~200	200
27	UTL	Output limiter low		0~outH	0

4. Operation



4.1 Menu level switching

Press and hold the “SET” key for 3 seconds to into the main Parameters (Main menu), the CH1 display shows “Main ,” and the CH2 display shows “set”.

Press Key “▲” or “▼” to switch between main menu level and loops menu level

Press the “SET” key to into parameter setting mode of the selected menu level

Press the “□” key to go back to the PV/SV monitor

Display returns to the PV/SV monitor if no key operation is performed within 4 seconds

4.2 Parameter setting mode:

The parameter value will be changed by using the “▲” key or the “▼” key

The flashing decimal point which digit can be set. Press “□” key to go to a different digit. Every time the shift key “□” is pressed, the flashing decimal point moves.

Press the “SET” key , the new value will then be saved and the display will move to the next parameter.

Press the “□” key while pressing the “SET” key for 1 seconds to go back to the PV/SV monitor

Display returns to the PV/SV monitor if no key operation is performed within 4 seconds

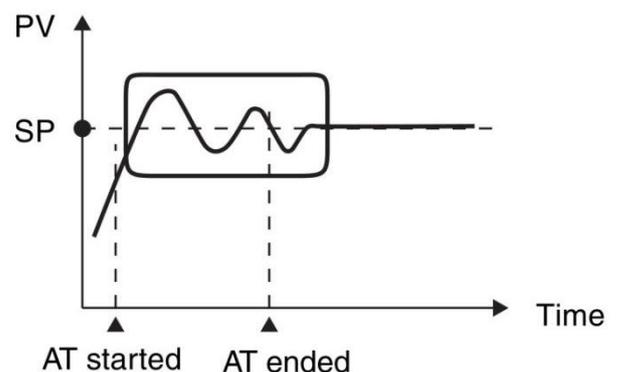
Attentions:

LOCK=0, parameters can be set. Otherwise parameters cannot be set.

5. Determining PID Constants(Auto-tuning)

When AT is executed, the optimum PID constants for the set point at that time are set automatically. A method (called the limit cycle method) for forcibly changing the manipulated variable and finding the characteristics of the control object is employed.

Set the set value (Sp) as the actual set value of customers, set the parameter HY as 0.5, then set the AT as on, in this time the controller enter into **Auto-tuning**. the CH2 display shows “AT” and set value, now meter’s control way is on-off mode, after 3 times vibrating(3 control period) automatic save P, I, D parameter, the self-adjusting procession finished. When AT is finished, the controller will restart automatically.



Attentions:

when **Auto-tuning**, the controller should not change the set value.

When the power off during **Auto-tuning**, it will restart **Auto-tuning** next time.

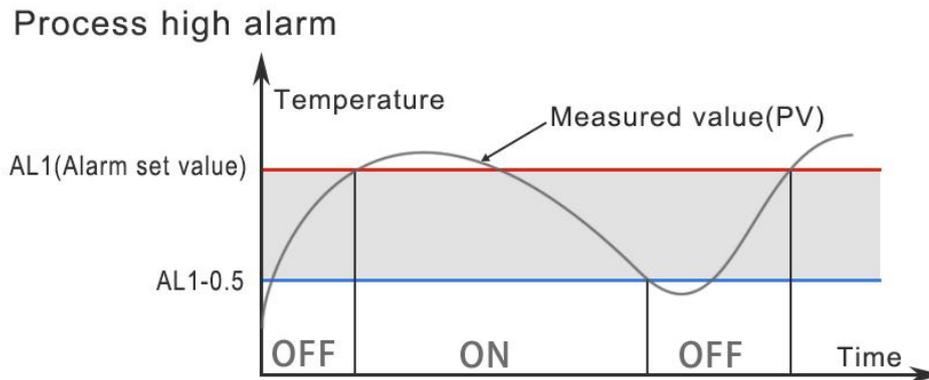
When it need artificially exit during **Auto-tuning**, set the Parameter(AT) to 0 so that can exit, but the setting result will not be valid.

6. Alarm (ALM1) function[optional]:

Alarm (ALM) function	Alarm status[ON]	Alarm status[OFF]
Process high alarm	Measured value(PV)>Alarm set value(AL)	PV<Alarm set value(AL)- AHY
Process low alarm	PV<Alarm set value(AL)	PV>Alarm set value(AL)+AL
Deviation high alarm	PV>Alarm set value(AL) + Set value(SP)	PV>Alarm set value(AL) + Set value(SP)- AHY
Deviation low alarm	PV<Alarm set value(AL) - Set value(SP)	PV>Alarm set value(AL) - Set value(SP)+ AHY
Band alarm	PV< Alarm set value (ALH) And PV>Alarm set value(AL)	PV> Alarm set value (ALH)+ AHY Or PV< Alarm set value(AL)- AHY
Out of band alarm	PV> Alarm set value(ALH) Or PV< Alarm set value(AL)	PV< Alarm set value(ALH)- AHY And PV> Alarm set value(AL)+ AHY

The parameters(AL,ALH, AHY) Refer to “3. Parameters”

[Example: Process high alarm]



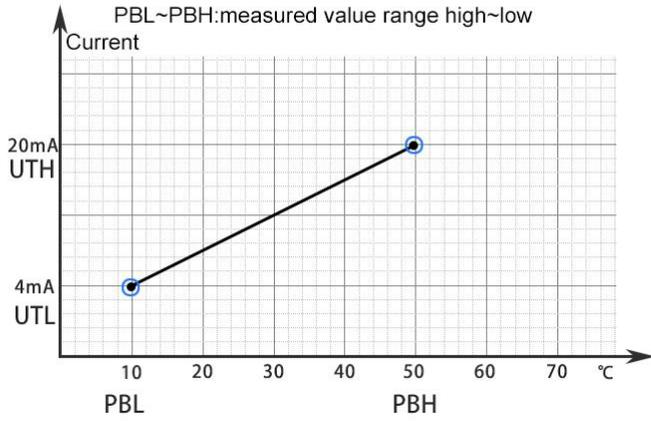
7. Main output function:

Control action	Value	Details
PID control output	OP=0	Heat PID control: direct action
PID control output	OP=1	Cool PID control: reverse action
Transmission output	OP=2	The channel's measured value
Transmission output	OP=3	The maximum measured value of all channels
Transmission output	OP=4	The minimum measured value of all channels
Transmission output	OP=5	The average measured value of all channels
Transmission output	OP=6	The difference between the first channel's measured value and the second channel's value, the difference will be transmitted output as 0-10v dc
Transmission output	OP=7	The absolute value of the difference between the first channel's measured value and the second channel's value,the value will be transmitted output as 0-10v dc

8. Transmission outputs and analogue inputs:

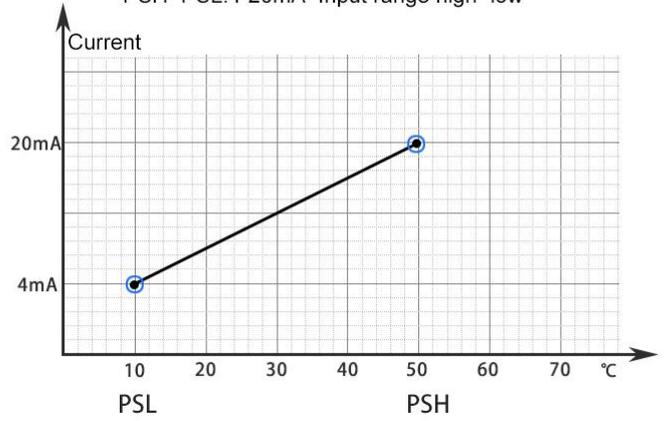
Transmission output

UTH~UTL: Output limiter high~low
 PBL~PBH: measured value range high~low



4-20mA input

PSH~PSL: 4-20mA Input range high~low



Character Symbols : This manual indicates 9-segment display characters as shown below.

A	B	C	D	E	F	G	H	I	J	K	L	M
<i>A</i>	<i>b</i>	<i>C</i>	<i>d</i>	<i>E</i>	<i>F</i>	<i>G</i>	<i>H</i>	<i>I</i>	<i>J</i>	<i>K</i>	<i>L</i>	<i>M</i>
<i>N</i>	<i>O</i>	<i>P</i>	<i>Q</i>	<i>R</i>	<i>S</i>	<i>T</i>	<i>U</i>	<i>Y</i>				
<i>n</i>	<i>o</i>	<i>p</i>	<i>q</i>	<i>r</i>	<i>s</i>	<i>t</i>	<i>u</i>	<i>y</i>				