

# KCM- 91W PID controller instruction manual

## 1.Features:

### 1.1 Input Sensor Types

Can be connect the following sensors and signals to the universal input.

Thermocouple (temperature input): K, J, T, E, S

Resistance thermometer (temperature input): Pt100, CU50

### 1.2.Control Outputs

a. Relay output: relay contact: 250 V AC, 3 A (Resistive load)

b. SSR output: DC 0/10v voltage output (for driving SSR)

c. Current output : 4-20mA or 0-10v  
depending on the controller model.

### 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 Relay contact: 250 V AC, 3 A (Resistive load).

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

### 1.5 Sampling Time: 0.5 sec

### 1.6.Use this controller within the following allowable range:

Allowable ambient temperature: -0 to +55 °C

Allowable ambient humidity: 5 to 85 % RH.

## 2. Dimensions:

M:160x80mm panel cutout :152x76mm(horizontal)

MA:96x96mm panel cutout :92x92mm

MF:96x48mm panel cutout :92x44mm(horizontal)

MG:48mm panel cutout :44x44mm

MS:80x160mm panel cutout :76x152mm(vertical)

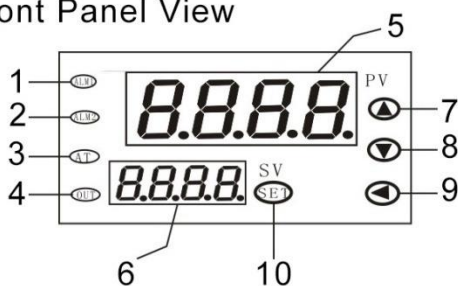
MD: 72x72mm panel cutout :68x68mm

ME:48x96mm panel cutout :44x92mm(vertical)

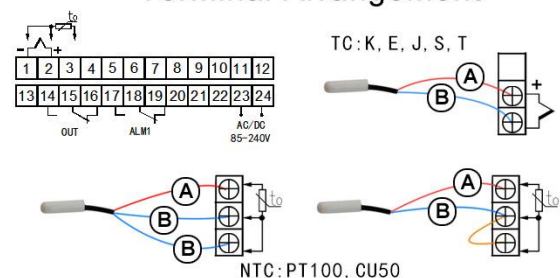
MR:88x72x59mm DIN 35 rail mounting socket

## 3.Parts Description:

### Front Panel View



### Terminal Arrangement



This wiring diagram is offered for example purposes only.

*Tip: Correct terminal arrangement depending on the actual model.*

**1 ALM1:** lamp Lights when Event occurs

**3 AT lamp:** Flashes during Auto-tuning (AT)

**5 PV display:** Displays Measured value (PV) or various  
Parameter symbols

**7 Up key:** Increase numerals.

**9Shift key:** Shift digits when settings are changed.

**2 ALM2 lamp:** Lights when Event occurs

**4 Output lamp:** Lights when output is turned on

**6 SV display:** Displays segment level, Set value (SV),  
Manipulated output value (MV) or various Parameter set  
values.

**8 Down key:** Decrease numerals

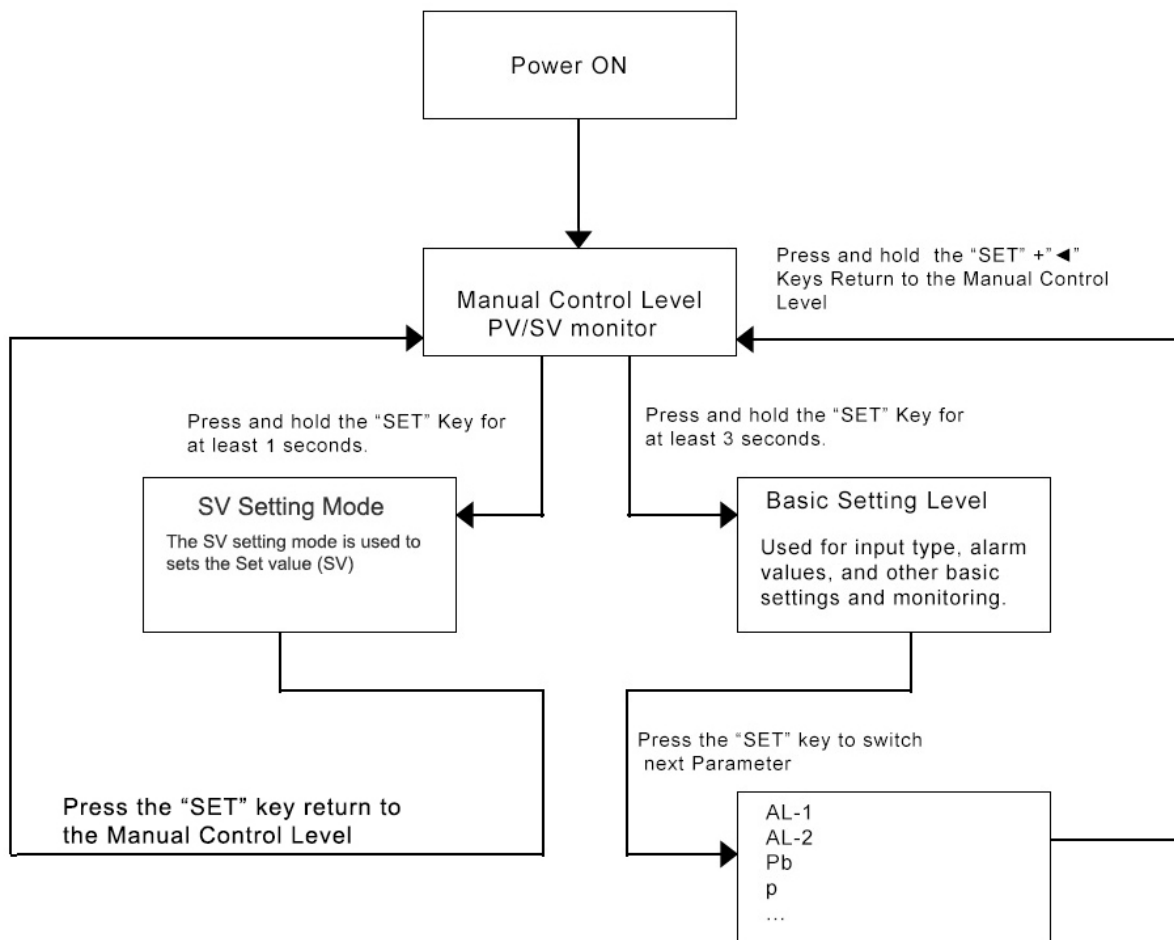
**10 Set (SET) key:** Used for Parameter calling up and set

## 4.Parameters

ID	Code	Name	Manual	Setting range	Ex-Factory
1	<i>SP</i>	Setting value	Set the temperature set value (SV) which is the target value for control	Determined by P-SL P-SH	100
2	<i>AL1</i>	Alarm Setting value	refer to ALP for the alarm mode suitable.	Determined by P-SL, P-SH	300
3	<i>AL2</i>			Determined by P-SL, P-SH	300
4	<i>P</i>	Proportional Band	Set when PI or PID control is performance. For heating / cooling PID action. <b>When P=0, the controller is ON/OFF control</b>	1~100.0	8
5	<i>I</i>	Calculus time	Eliminates offset occurring in proportional control.	0~9999	500
6	<i>d</i>	Differential time	Prevents overshoot and/or undershoot caused by integral action effect..	0~250S	100S
7	<i>At</i>	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
8	<i>t</i>	Control time	Proportional cycle time	2~120	20S
9	<i>HY</i>	Differential gap	When the control is ON/OFF control(P=0) Relay contact may repeat its turning ON and OFF due to input fluctuation if measured value (PV) is near the alarm set value. the differential gap setting can prevent the relay contact from ON or OFF repetition.	0.1~50.0	0.5
10	<i>HY-1</i>	Alarm2 Differential gap	Relay contact may repeat its turning ON and OFF due to input fluctuation if measured value (PV) is near the alarm set value. the differential gap setting can prevent the relay contact from ON or OFF repetition.	0.1~50.0	0.5
11	<i>HY-2</i>	Alarm1 Differential gap		0.1~50.0	0.5
12	<i>Pb</i>	PV Bias	The value set in the PV bias is added to the actual input value to correct the input value.	±20.0	0.0
13	<i>FiLt</i>	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
14	<i>dP</i>	Decimal point position	Set the position of the decimal point for the measured value to be displayed.	0~3	0
15	<i>P5-H</i>	Input range high	The control is displayed after the Input type and Input range.	P-SL~9999	1300
16	<i>P5-L</i>	Input range low		-1999~P-SH	0
17	<i>outL</i>	Output limiter low	The min value and max value of output current.	outL~200	200
18	<i>outH</i>	Output limiter high		0~outH	0

19	<i>ALP1</i>	Alarm1 define	0: Alarm function OFF; 1: Process high alarm;	0~10	—
20	<i>ALP2</i>	Alarm2 define	2:Process low alarm; 3: Deviation High alarm ; 4: Deviation low alarm;	0~10	—
21	<i>CoOL</i>	Hot/Cold	0:reverse control(heating) 1:positive control(cooling)	0~1	0
22	<i>oPPo</i>	Initial output	PID output initial value	0~100	0.5
23	<i>LoCK</i>	Set data lock	LOCK=0, all the parameter can be set. Otherwise, all the parameter can't be set	0~50	0
24	<i>Sn</i>	Input type	Cu50( <i>u50</i> )-50.0~150.0°C; Pt100( <i>Pt1</i> )-199.9~200.0°C; Pt100( <i>Pt2</i> )-199.9~600.0°C; K( <i>K</i> )-30.0~1300°C; E( <i>E</i> )-30.0~700.0°C;      J( <i>J</i> )-30.0~900.0°C; T( <i>T</i> )-199.9~400.0°C;      S( <i>S</i> )-30~1600°C;		
25	<i>oP-R</i>	Output Define	0:no output 1:Relay output 2:Voltage output (for driving SSR) 3:Zero-cross output(for driving Triac) 4:PID linear current output(4-20mA /0-10v) depending on the controller model	0~4	READ ONLY
26	<i>CF</i>	Measured value unit	C: Celsius. F: Fahrenheit	C F	C

## 5.Operation



### 5.1 Basic Setting Level:

Press the key SET 3 seconds to enter into the main Parameters, the controller will display the Parameter code(1~25)in the window at the upper tube, and display the Parameter data at the lower tube. Press Key ▲、▼ or ◀ to adjust the Parameters, and then press the Key SET to preserve.

It will be preserved of the data and withdrawal of the setting with no any operations automatically within 10 seconds.

Electronics Lock. All the Parameter can be revised when Lock=0; Only the “SP” can be revised when Lock=1.

### 5.2 Setting value Level:

Press the key SET 1 seconds to enter into the SV Setting Mode. When the operation mode is the Auto-tuning mode, the Set value (SV) can be set.

### 5.3 Manual Control Operation:

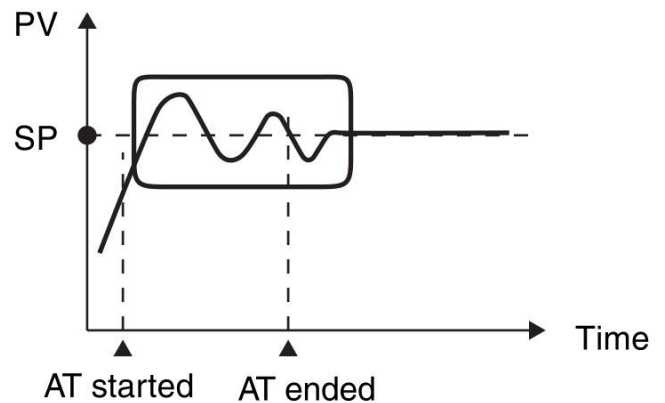
Press the ◀ key about 3S enter into the manual regulation, it will display “H” at the lower row, in this time can set the output power; press the ◀ key about 3S again it will withdraw the manual regulation.

## 6. 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 HY is 0.5~1℃, if the output is relay set the  $t=2S$ , then set the AT=1, the lamp of AT will be flashed, in this time the controller enter into **Auto-tuning**. now meter's control way is on-off mode, after 3 times vibrating( 3 control period) automatically save P, I, D parameter, the self-adjusting procession finished.

Operation will be as shown in the following diagram:



#### 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.

## 7. Alarm function

Alarm (ALM) function sets up the alarm status when the measured value (PV) or the deviation reaches the alarm set values. In the alarm status, the alarm output is output from the digital output terminals, and the alarms are used to drive the equipment danger signals or the safety equipment.

Alarm 1 define	Alarm status[ON]	Alarm status[OFF]
$ALPI = 1$	$PV \geq ALI$	$PV \leq ALI - HY-1$
$ALPI = 2$	$PV \leq ALI$	$PV \geq ALI + HY-1$
$ALPI = 3$	$PV \geq SP + ALI$	$PV \leq SP + ALI - HY-1$
$ALPI = 4$	$PV \leq SP - ALI$	$PV \geq SP - ALI + HY-1$

The parameters of  $SP$  ,  $ALI$  ,  $HY-1$  ,  $ALPI$  refer to 4. Parameters

## 8. OUT Relay contact On/Off mode

set the parameter of p(Proportional Band)=0, When P=0,the controller is ON/OFF control.

OUT function	OUT status[ON]	OUT status[OFF]
$CoOL=1, P=0$	$PV \geq SP + HY$	$PV \leq SP - HY$
$CoOL=0, P=0$	$PV \leq SP - HY$	$PV \geq SP + HY$

The parameters of  $SP$ ,  $P$ ,  $CoOL$ ,  $HY$  refer to 4. Parameters

**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>
N	O	P	Q	R	S	T	U	Y				
<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>				

## 11. Model and Suffix Code:

Specifications	Model and Suffix Code																		
Model	KC											<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
SIZE	160x80mm panel cutout :152x76mm (horizontal)	M																	
	80x160mm panel cutout :152x76mm(vertical)	MS																	
	96x96mm panel cutout :92x92mm	MA																	
	96x48mm panel cutout :92x44mm(horizontal)	MF																	
	48x96mm panel cutout :44x92mm(vertical)	ME																	
	72x72mm panel cutout :68x68mm	MD																	
	48x48mm panel cutout :44x44mm	MG																	
	88x107x59mm DIN 35 rail mounting socket	MR																	
Control method	PID control									9									
Alarm output	1 Alarm relay out									1									
	2 Alarm relays out									2									
Input Type	Thermocouple: K, E,J, R, S, T,WR25,N,RTD : Pt100, Cu50										W								
	DC voltage : 0-5V, 1 -5V or Current 0 -10 mA DC, 4-20 mA DC										A								
	Thermocouple, RTD, DC voltage(or Current )										M								
Control output	Relay output										<input type="checkbox"/>								
	Voltage pulse(for driving SSR)										G								
	Analog output (DC current:4-20mA,0-10mA or Voltage 0 to 10 V DC)										A								
Power supply voltage	100 to 240V AC																		
	24V DC												<input type="checkbox"/>						
													1						
Communications	NONE												<input type="checkbox"/>						
	RS-485(2-wire system: MODBUS-RTU)																		RS
	RS-232(3-wire system: MODBUS-RTU)																		RX
	Measured value Transmission output																		BS