# Catalog and User Manual

ME65 Three Digits Temperature Controller


## 1:General Features:

- Very easy to operate, simple but accurate
- White and green LED display, high visibility under direct sunlight
- ON/OFF, AI, PID control mode
- 0.3%F.S measuring accuracy
- Dual display,3 digits,7 segments LED display
- °C/°F display selectable
- Excellent performance, very limited overshoot and undershoot
- 1 decimal point for TC/RTD input
- Fast sampling rate at 250ms, ideal for accurate temp control
- Touch button, feedback beep sound when you tap on the buttons this is a very useful features for user to track the operation not only visually, but aslo auditory.
- 100~240Vac or 24VDC/AC source optional
- Very small temperature drift,<0.03%FS/°C
- Ultra low power consumption less than < 5W
- Output specs: Relay+SSR 2 outputs in 1 unit for bigger size
- Operates at extremely wide ambient range, -30℃~75℃ degree

***>Dust proof, water splash proof,***
***>corrosion proof***
***>IP65 protection***
***>3 years warranty,***
***longest warranty you can expect from controller made in China.***
***>Fully sealed housing without any open ventilation holes***

## 2:Ordering Information

ME65-[1][2][3][4][5][6]

### 1:Size of the contorller

| | |
|---|---|
| 05 | 48mm*48mm, panel cutout size( 45mm*45mm), depth(78mm) |
| 06 | 48mm*96mm, panel cutout size( 44mm*92mm), depth(68mm) |
| 07 | 72mm*72mm, panel cutout size( 68mm*68mm), depth(92mm) |
| 09 | 96mm*96mm, panel cutout size( 92mm*92mm), depth(68mm) |

### 2:Input

| | |
|---|---|
| 1 | Code "1" for factory default input, compatible with TC/RTD<br>Thermocouple input: K, S, R, T, R, J, N<br>RTD: PT100 |

### 3:Output

| | |
|---|---|
| 1 | Relay+SSR drive output, 2 outputs 1 in unit( for 72mm*72mm 48mm*96mm, 96mm*96mm controller) |
| 1 | Relay output(for 48mm*48mm controller) |
| 2 | SSR Drive output(for 48mm*48mm controller) |
| | The output is fixed as relay+SSR Drive output for bigger size have to specify the output only if the size is 48mm*48mm |

### 4:Alarm 1(fixed option)

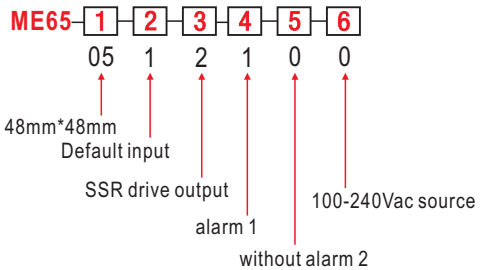
| | |
|---|---|
| 1 | 1 alarm(relay output NO+NC) |

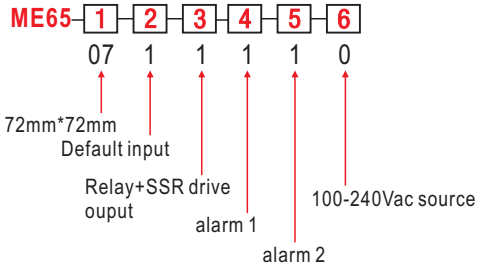
### 5:Alarm 2

| | |
|---|---|
| 0 | Without alarm 2 |
| 1 | With alarm 2 |

### 6:Power supply

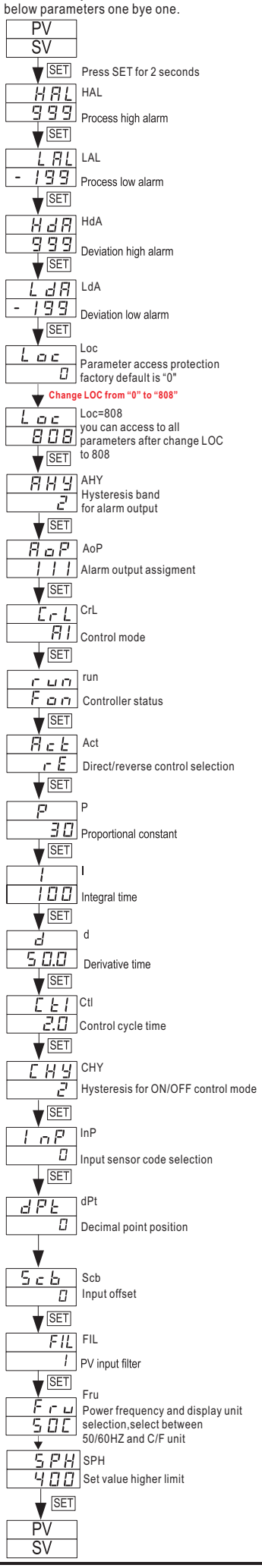
| | |
|---|---|
| 0 | 100~240Vac 50/60HZ |
| 24VDC | 24VDC source |



## 3:Parameter Setting

Press SET key for more than 2 seconds, and then tap on the SET key, you will see below parameters one bye one.




### 3.1 List of system parameters

Table 1

| Code | Description | Setting Range | Initial Setting | Remarks |
|---|---|---|---|---|
| HAL | process high alarm | -199~999 | 999 | refer to 3.1.1 |
| LAL | process low alarm | -199~999 | -199 | |
| HdA | deviation high alarm | -199~999 | 999 | |
| LdA | deviation low alarm | -199~999 | -199 | |
| AHY | alarm hysteresis band | 0~200 | 2 | |
| AoP | alarm output assigment | 0~922 | 111 | |
| CrL | control mode | onoF. AI.PId | AI | refer to 3.1.2 |
| run | controller status | Fon,run,StP | Fon | refer to 3.1.3 |
| Act | direct/reverse control selection | re,dr,rEb,drb | re | refer to 3.1.4 |
| P | proportional band | 1~999 | 30 | refer to 3.1.5 |
| I | integral time | 0~999 | 100 | |
| d | derivative time | 0~999 | 50.0 | |
| Ctl | control cycle time | 0.5~120 | 200 | refer to 3.1.6 |
| CHY | hysteresis for ON/OFF control | 0~200 | 2 | refer to 3.1.7 |
| InP | Input sensor code | 0,1,2,3,4,5,6,7,21 | 0 | refer to 3.1.8 |
| dPt | decimal point | 0 or 0.0 | 0 | refer to 3.1.9 |
| Scb | Input offset | -200~+400 | 0 | refer to 3.1.10 |
| FIL | Input filter strength | 0~40 | 1 | |
| Fru | C or F and power frequency selection | 50C,50F,60C,60F | 50C | refer to 3.1.11 |
| SPH | Setting value higher limit | 0~999 | 400 | refer to 3.1.12 |
| Loc | Password for access protection | 0,1,2,3,808 | 0 | refer to 3.1.13 |

### 3.1.1 Alarm parameters

HAL

-Absolute temperature value high alarm, if PV > HAL , then alarm on.
If PV < UPAL-AHY, alarm off. set UPAL=999 will deactive the alarm. AHY is alarm hysteresis

LAL

-Absolute temperature value low alarm, if PV < LAL , then alarm on.
If PV > LAL+AHY, alarm off. set LoAL=-199 will deactive the alarm.
AHYS is alarm hysteresis

HdA

-Deviation high alarm, when PV-SV > HdA, alarm on, when PV-SV < HdA, alarm off, set HdA=999 will deactive the alarm.

LdA

-Deviation low alarm, when PV-SV < LdA, alarm on, when PV-SV > LdA, alarm off, set LdA=-199 will deactive the alarm

AHY

-Alarm hysteresis, Also known as dead zone or hysteresis, it is used to avoid frequent alarm generation/relief due to fluctuations in measured input values.

**AOP**

AOP is used to define the output positions for HAL, LAL and HdA, LdA alarms as follows these controller has four alarms, absolute high/low alarm, deviation high/low alarm

AOP= 201 2: HdA/LdA 0: LAL 1: HAL

This is a three-digit number. The number on the hundreds place defines the output port of the deviation alarm(HdA/LdA).
The value ranges from 0 to 2
0 means that the respective alarm is not going to trigger any relay,
1 means the respective alarm will trigger EV1 relay(alarm 1)
2 means the respective alarm will trigger EV2 relay(alarm 2)
different alarm can trigger the same relay
For example if you set AOP =201, means both HdA and LdA alarm will trigger the same relay(EV2 alarm 2 relay)
if you set the AOP=111, means all alarm will trigger the same relay(EV1, alarm 1 relay)
Since this is a three digits display controller, and 4 alarms needs to be assigned, so the digits at the hundreds place
will define two alarms, HdA and LdA, below is the combination of on the definition

| Deviation alarm | HdA | LdA | | Deviation alarm | HdA | LdA |
|---|---|---|---|---|---|---|
| 0 | Won't trigger any relay | Won't trigger any relay | | 6 | AL2 | AL1 |
| 1 | AL1 | Won't trigger any relay | | 7 | Won't trigger any relay | AL1 |
| 2 | AL2 | Won't trigger any relay | | 8 | Won't trigger any relay | AL2 |
| 5 | AL1 | AL1 | | 9 | AL1 | AL2 |

### 3.1.2 Control mode(CrL)

This controller incorporates 3 different control modes, the parameter code are OnoF, AI, PID
**OnoF**: ON/OFF control mode, for simple application which accuracy is not that critical
**AI**: Artifical intelligence PID control mode
**PID**: Standard PID control mode

### 3.1.3 Controller status(run)

**Fon,** Run controller, and can not RUN/Stop via the set key of the controller
**Run**, Run the controller, press increase key and hold will stop the controller
**StP**, Stop controller, press decrease key and hold will run the controller

### 3.1.4 Direct/reverse or heating/cooling mode selection(Act)

This parameter available with 4 options, rE,dr, rEbA, drbA. these parameters are used to define the control action, whether you need heating or cooling control mode.
**rE**: reverse control mode, for heating application
**dr**: direct control mode, for cooling application
**rEb**: reverse control mode with alarm suppression, unnecessary absolute low limit and deviation low limit alarm will be suppressed.
**drb**: direct control mode with alarm suppression, unnecessary absolute high limit and deviation high alarm will be suppressed.

### 3.1.5 P.I.D values and PID control mode

Please note that this controller has two PID control mode, AI and PID, PID is a normal conventional PID control mode, it is similar to PID control mode from other controllers on the markets, AI is a unique fuzzy logic enhanced PID control with advance algorithm

In most cases the fuzzy logic enhanced PID control is very adaptive and may work well without changing the initial PID parameters. If not, users may need to use auto-tune function to let the controller determine the parameters automatically. If the auto tuning results are not satisfactory, you can manually fine-tune the PID constants for improved performance. Or you can try to modify the initial PID values and perform auto tune again. Sometimes the controller will get the better parameters.

(1)Proportinal constant "P"
Please note that the P constant is not defined as proportional band as in the traditional model under **AI** control mode, its unit is not in degrees. A larger constant results in larger and quicker action, which is the opposite of the traditional proportional band valve. it also functions in the entire control range rather than a limited band.
If you are controlling a very fast response system (>1°C/°F/second) that fuzzy logic is not quick enough to adjust, set the control mode as PID will change the controller to the traditional PID system with a moderate gain for the P.
(2) Integral time "I"
Integral action is used to eliminate offset. Larger values lead to slower action. Increase the integral time when temperature fluctuates regularly (system oscillating). Decrease it if the controller is taking too long to eliminate the temperature offset. When I = 0, the system becomes a PD controller.

(3) Derivative time "D"
Derivative action can be used to minimize the temperature overshoot by responding to its rate of change. The larger the number, the faster the action.

### 3.1.6 Control cycle time for reverse/heating action

**CtL**: Control cycle time for reverse/heating action, for SSR, analog and phase angled output, the range is 0.5~3 seconds. for relay output, the value will be around 15~40 seconds, the most optimal value will be calculated via auto-tuning process(This is a big difference between our PID and other PID on the markets, most of PID on the markets , the cycle time are predetermined, but for our PID, the control cycle time will be calculated via auto-tuning process, this will increase the control accuracy dramatically)

### 3.1.7 Hysteresis for ON/OFF control mode

**CHY**, This parameters is used to remove the frequent ON/OFF action of the relay around the set point in an ON/OFF control situation. for reverse/heating control, the relay will release if PV>SV, and relay will pull-in when PV<SV-CHY, for direct/cooling control application, the relay will release when PV<SV, and relay will pull-in when PV<SV+CHY.

### 3.1.8 Input sensor code InP

**InP**, Please see table 2 for acceptable sensor type and its range
Table 2. code for InP input and its range.

| InP code | Input sensor type | Display range (° C) | Display range (° F) |
|---|---|---|---|
| 0 | K (thermocouple) | 0~999 | -58~2372 |
| 1 | S (thermocouple) | 0~999 | -58~3092 |
| 2 | R(thermocouple) | 0~999 | 32~3092 |
| 3 | T (thermocouple) | 0~350 | -328~662 |
| 4 | E (thermocouple) | 0~800 | 32~1472 |
| 5 | J (thermocouple) | 0~1000 | 32~1832 |
| 6 | reserved for future use | 0~1800 | 32~3272 |
| 7 | N (thermocouple) | 0~1300 | 32~2372 |
| 21 | Pt100 | 0~2300 | 32~4172 |

### 3.1.9. Decimal point setting(dPt )

The parameter dPT defines how many decimal point you will see for PV and SV value, the display format can be 0, or 0.0

### 3.1.10 Input offset "Scb" and input filter strength "FIL"

Input offset Scb is used to add an offset value to compensate the sensor error or simply to shift the reading. for example, if the controller displays 2°C when probe is in ice/water mixture, setting Scb=-2, will shift the temperature reading to 0°C

If measurement input fluctuates due to noise, then a digital filter can be used to smooth the input. "FIL" may be configured in the range of 0 to 40. Stronger filtering increases the stability of the readout display, but causes more delay in the response to change in temperature. FIL = 0 disables the filter.

### 3.1.11 Frequency of power supply and display unit

These parameters have 4 options, "**50C**" "**50F**" "**60C**" "**60F**". 50 means the power supply is 50HZ AC source, C means the display will be in Celcius, 60 means the source is 60HZ AC source, F means the display will be in Fahrenheit ,to have a most optimal anti-inteference effect, make sure to choose the frequency according to your source, for instance, a typical north America source,the supply will be 110V 60HZ and display in Fahrenheit, in this case, user should chose 60F. for a domestic user in china, the setting will be 50C, 50HZ in Celcius unit.

To prevent the parameters and the program being changed accidently, you can completely or partially lock the parameters and the program after the initial setup. the configuration privilege is determined by "Loc", please refer to the table 5 for the privilege levels.

### 3.1.12 Setting value higher limit (SPH)

This parameters defines the maximum setting value end user can input to the controller, this is a very important safety feature, factory default is 400, means end user can not input a setting value higher than 400 C or F, this can prevent unauthorized input therefore prevent damage to the system

### 3.1.13 Table 4. "Loc" value and the configuration privilege level

| Loc value | Privilege | Field parameter adjustment | SV adjustment | Auto-tuning activation |
|---|---|---|---|---|
| 0 | Limited | Yes HAL LAL HdA LdA | Yes | Yes |
| 1 | Limited | No | Yes | Yes |
| 2 | Limited | Yes HAL LAL HdA LdA | No | Yes |
| 3 | Limited | No | No | Yes |
| 808 | unlimited | Yes | Yes | Yes |

## 4:Wiring Diagram