

**TAIE**



## Modular Miniature



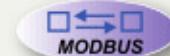
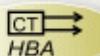
Digital PID  
Temperature /  
Process Controllers

**FE 300/250 Series**



**High Quality High Reliability**

Brand-new feelings -  
new release



\* Match to RoHS System

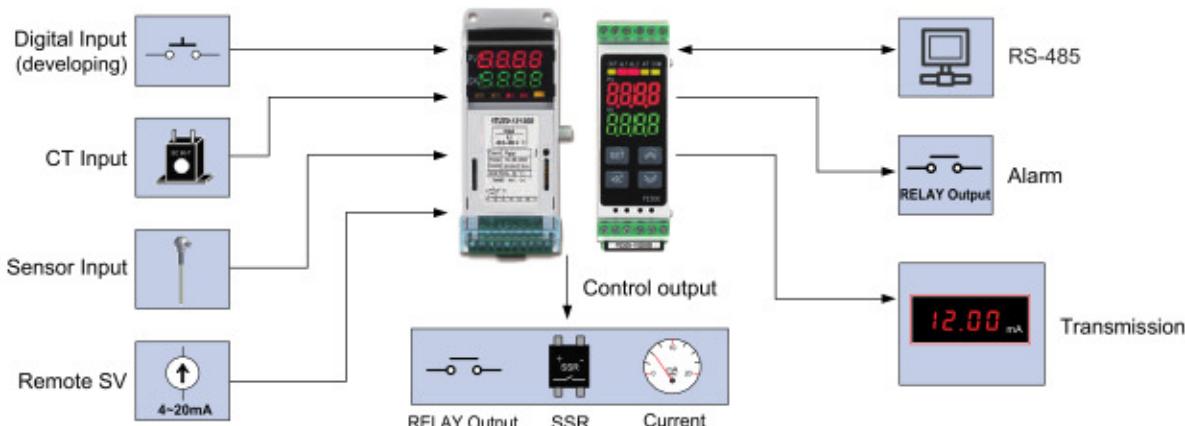
# FE 250\_25 / 300 Modular Miniature Digital PID Temperature Controller

Multiple functions' High performance' High reliability' High quality' Economic price

## Features :

1. Small volume, thinly design, multi pieces assembly side by side, saves the space.
2. Industrial innovation, high light high quality LED module, shows the action status clearly.
3. Provide EURO terminal "protection cover" to avoid the electric shock, save the person and controllers.
4. Multiple terminals design, show the diagram directly, easy to wiring.
5. Free to choose Input signal on panel, various choice. (Change TC/RTD/Linear need to switch the jumper.)  
Thermal couple: K / J / R / S / B / E / N / T / W / PLII / L...  
RTD: PT100  
Linear: 0~10V / 4~20mA...more than 12.
6. Three type of output mode: Relay / SSR / mA.
7. Unique provide "heating / cooling" output function, PID parameter can adjustment independently. (Without FE300.)
8. Output Relay capacity: 8A, extended life, better than others.
9. New modular communication Modbus RS485 design, wiring terminal above the controllers, easy to connecting.
10. RUN / STOP switch button, easily for testing.
11. High speed baud rate with 115200 bps, easy to connecting with PLC / HMI.
12. Free charge of "Controllers monitoring" software, any kind of function are all with in.
13. With Controllers / Signal converters / Alarm monitors 3 type of functions, can replace the converter  
change mV. V. RTD. into V or 4~20mA output.

## Patented design



## Various I / O Types



## Certification & Universal Voltage



All models are CE-certified.  
comply with RoHS Directive  
RoHS 2011/65/ EU and do not  
contain hazardous substances  
as defined by RoHS



## Free voltage corresponds / Operating temperature -10~55°C



World voltage correspondence used to AC100~240V,  
also provide DC12/24V for any occasion.

## RUN / STOP switch(on/off)

Use operation button to switch RUN/STOP, easy for testing and running.



## Status Indicator Light

Timely visual access to indicator status of Output (OUT1), Alarm (AL1 / AL2),  
Auto-Tuning (AT), Communication Response (COM)



## New-brand configuration design



**FE300**

1	PV	Indicates PV (measured value) and character information such as parameter codes and error codes(Red)
2	SV	Indicates SV (target set value) and parameter values (Green)
3	LED	OUT1 Lights when OUT1 is activated (Orange) AL1 Lights when Alarm 1 is activated (Red) AL2 Lights when Alarm 2 is activated (Red) AT Lights when Auto tuning is activated (Orange)
	COM	Lights when controller response data (Orange)
	Keypad	Used for parameter calling up and set value registration Shift digits when settings are changed Decrease numerals Increase numerals

High accuracy ±0.2%



**FE250**  
Plug-in-out terminal  
**FE251**  
Fixed terminal



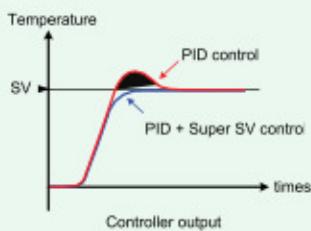
- Achieve whole set of module & miniaturization 40x107x43mm light and compact, save the space of panel .

DIN RAIL Installation	Design of separating secure cover for terminal	compact module assembly	base attaches the magnetic place ( Option)
<ul style="list-style-type: none"> <li>Provided with two installing ways of Din Rail &amp; Screw Lock, and suit for a Considerable quantities installation in the panel board. It is easy to install and take out controller itself.</li> </ul>	<ul style="list-style-type: none"> <li>Brand new design of secure cover for terminal with European standard</li> <li>Terminal with power does not expose external and feel artistic and security.</li> </ul>	<ul style="list-style-type: none"> <li>Organization assembly,disassembles easily,extreme light.</li> <li>Provided the advance SMT manufacturing system,high quality and high reliability.</li> </ul>	<ul style="list-style-type: none"> <li>Base attaches 3 magnets, may adsorb the made of iron box body willfully</li> <li>Don't need to worry about fix it problem, suitable in the short period testing or gauging.</li> </ul>

## Excellent Control Performance

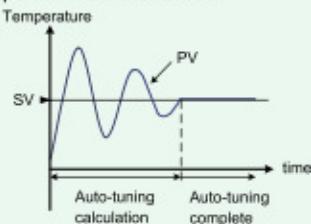
### PID Control

Built-in super SV function to effectively inhibit temperature overshoot.



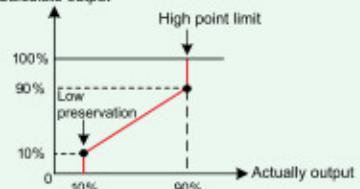
### Auto-Tuning

Automatic tuning to obtain optimal system PID value, in order to achieve accurate temperature-control effect.



### Limit Setting

Output high Limit → To prevent temperature overshoot  
Output low maintain → To prevent valve total shut-down  
Calculate output



## High Accuracy



Input with 14 bits A/D resolution, 0.2% accuracy of FS.  
Built in "AutoZero & AutoSpan" function , so as to maintain accuracy in long-term usage.

## Parameter Lock-Up Function

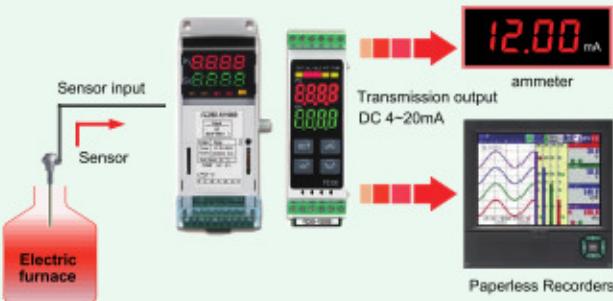


All parameters are distributed across 3 operation levels (Level1~Level3) Each parameter at any given level can be hidden or locked to prevent accidental changes by unauthorized users.

## Transmission Output

The controller transmission function allows parameters SV/PV/SV2/PV2/OP1(digital value) transmitted to an external device, via analog signals.

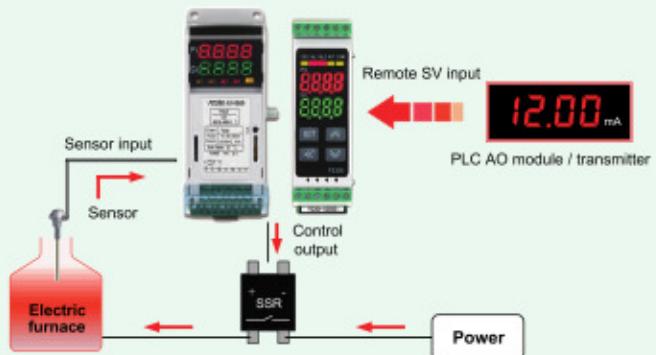
- Type : DC 0~20mA , 4~20mA ,  
DC 0~5V , 1~5V , 0~10V , 2~10V
- Output parameters : SV, PV, SV2, PV2,OP1



## Remote SV

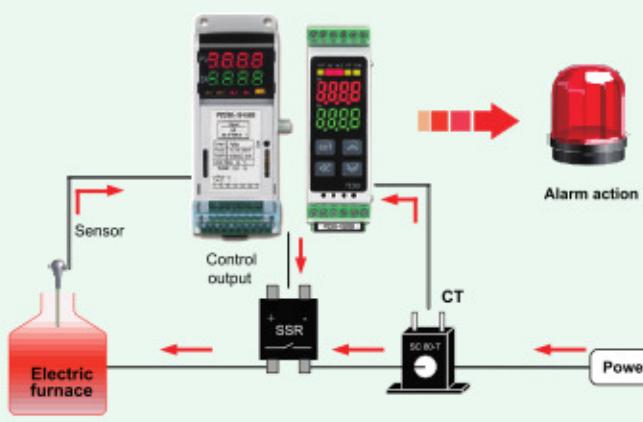
To control the parameter values of temperature controller, via analog signal mode, from an external device.

- Type : DC 0~20mA , 4~20mA ,  
DC 0~5V , 1~5V , 0~10V , 2~10V
- Output parameter : SV



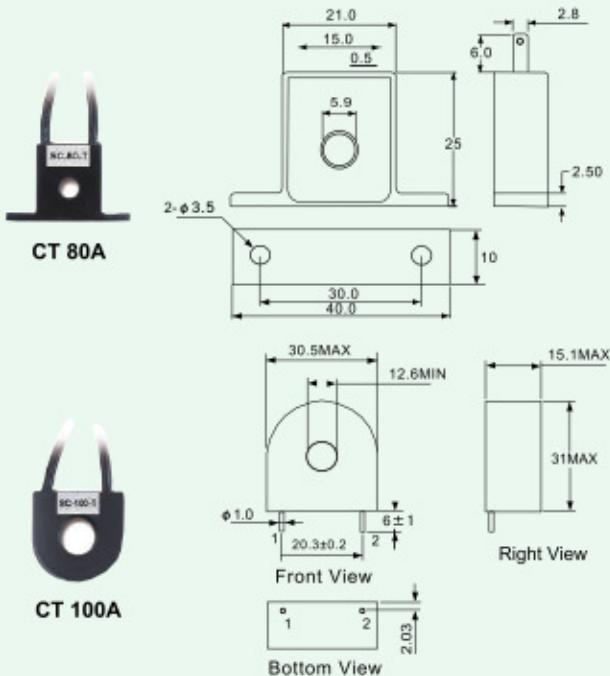
## Heater Break Alarm (HBA)

Coupling with CT (current transformer), via real-time monitoring, once abnormal drop in current value is detected, alarm signal will be output to inform users.



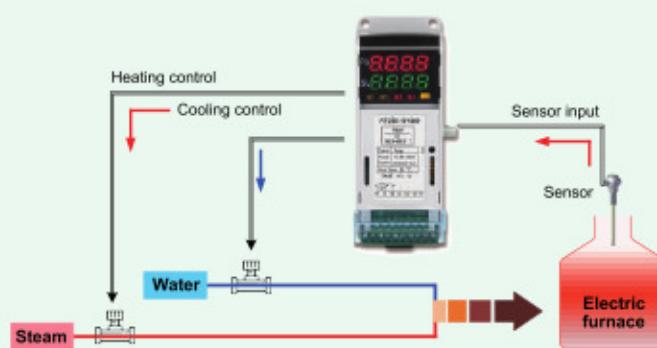
- Can be used as the ammeter
- Can be set break time
- Current value and alarm signal can be read by communication

Corresponding to the function of HBA under 100A. Two CT of 80A and 100A are available Current rated range: 0.0~99.9A, Accuracy: 1% FS, Alarm terminal : AL1 Attached accessory CT: SC-80-T (holing diameter : 5.8mm, 0.0~80.0A) or SC-100-T (holing diameter: 12mm, 0.0~99.9A)



## Heating and Cooling Control

Using two outputs of the controller, a device can control the heating / cooling equipment.



## Super Communication function of MODBUS (RTU, TAIE)

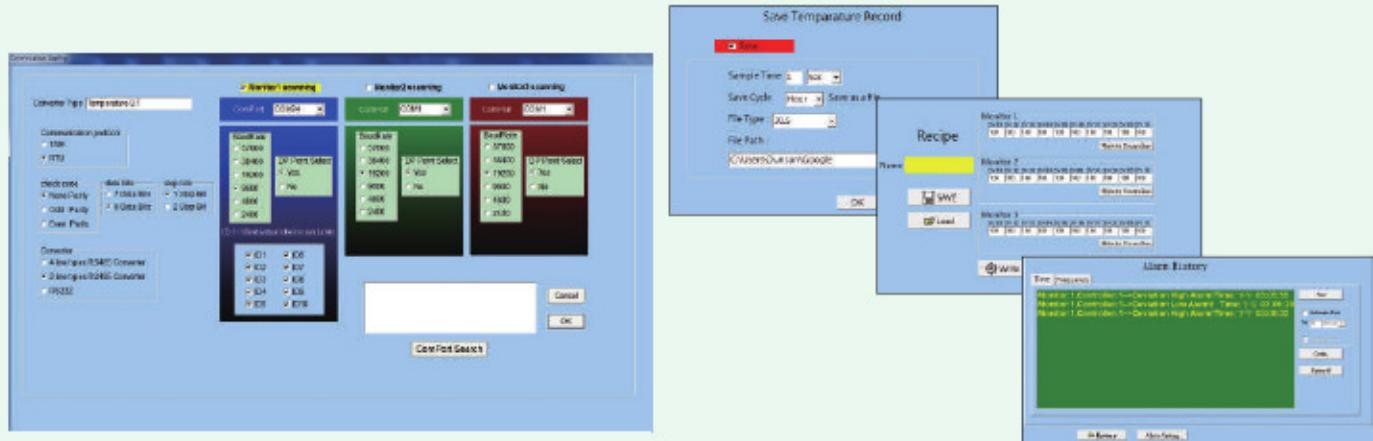
### Fast and Stable Communication

- Compatible with Modbus RTU communication protocol.
- Compatible with competitor's register address.
- Industry's fastest communication speed 115200 bps.



**Provide free professional temperature controller monitor software, any kind of diagram functions are all inside.**

- It can be connected and controlled with any FE products which owned the communicated interface of MODBUS
- Easily connect HMI, PLC or connect PC monitor system
- To select the monitor mode by hour or day through MODBUS-RS485 communication software which TAIE supplied with free of charge
- All data can be saved in TXT or EXECL files
- All the saved data can be retrieved to use, and can be made as a reference of historical trend diagram



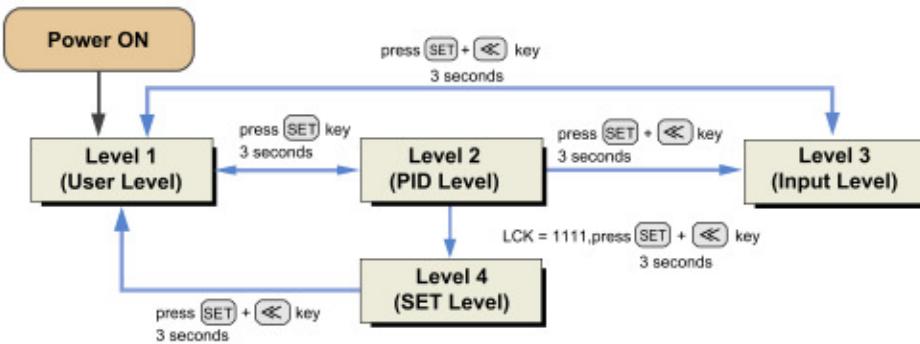
### KA301 Universal Converter USB ↔ RS-232 / 422 / 485 / TTL

#### (Option)

- KA301 USB Converter is suitable for various of industrial equipments such as PLC.HMI.Inverters . Temperature controllers which provided the communicated interface like • RS-232/RS-422/RS-485 &TTL to communicate and control with computer.
- KA301 provided 3 kind of converting connectors (KA502,KA504,KA503)and 3 kind of cables (CH-116,CH-117,CH-114)which are available for changing and extending use.



## Levels operation diagram



※ : This instrument returns to the PV/SV display mode if no key operation is performed for more than one minute.

## Flow chart of parameters setting

### 1. Levels operation mode

#### 1. LEVEL 1 enter to the LEVEL 2

Press and hold SET key for 3 seconds then enter to LEVEL 2

#### 2. LEVEL 1 enter to the LEVEL 3

Press and hold SET key + press SHIFT key for 3 seconds then enter to LEVEL 3

#### 3. LEVEL 1 enter to the LEVEL 4

Press and hold SET key for 3 seconds then enter to LEVEL 2 in LEVEL 2  
press SET key to find parameter "LCK", modify LCK value from current value to 1111  
then Press and hold SET key + press SHIFT key for 3 seconds enter to LEVEL 4

#### 4. LEVEL 2 return to the LEVEL 1

Press and hold SET key for 3 seconds then return to LEVEL 1

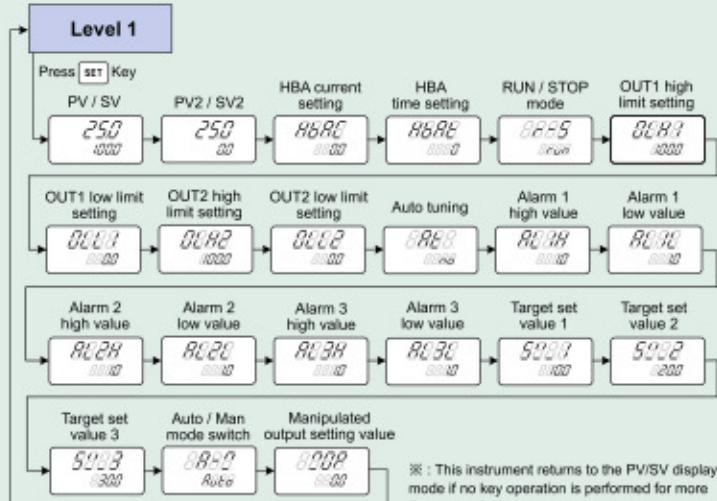
#### 5. LEVEL 3 return to the LEVEL 1

Press and hold SET key + press SHIFT key for 3 seconds then return to LEVEL 1

#### 6. LEVEL 4 return to the LEVEL 1

Press and hold SET key + press SHIFT key for 3 seconds then return to LEVEL 1

### 3. Level 1 (User Level) all parameters display



### 2. Data lock (LCK) function

Lock and protect set data of parameters, this function avoid the important parameters to being changed by operator during operation. If parameter cannot be changed check the LCK setting value first.

LCK	LEVEL				Remark
	Level_1	Level_2	Level_3	Level_4	
0000	⊕	⊕	⊕	X	modify LEVEL_1_2_3 parameter available (initial)
1111	⊕	⊕	X	⊕	modify LEVEL_1_2_4 parameter available
0110	⊕	⊕	X	X	modify LEVEL_1 parameter available
0001	⊕	⊕	X	X	only approval modify parameter SV + LCK
0011	⊕	⊕	X	X	only approval modify parameter SV + LCK + R-S
0101	⊕	⊕	X	X	only approval modify parameter LCK

⊕ : approval   X : inhibit

## Troubleshooting

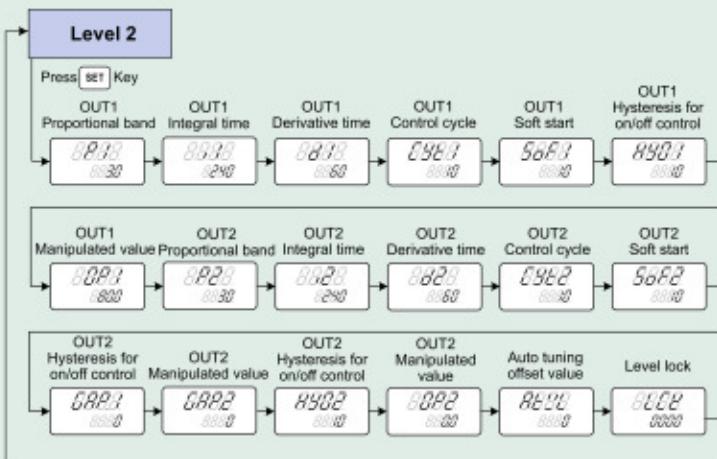
If the controller displays one of the following, carry out the appropriate remedy for the particular error.

LED	Error	Solution
INIE	INIE: Input Error	Check whether input loop is opened or wiring incorrect.
UUU1	UUU1:PV is above USPL	Check whether the input value is correct or not.
NNN1	NNN1:PV is below LSPL	Check whether the input value is correct or not.

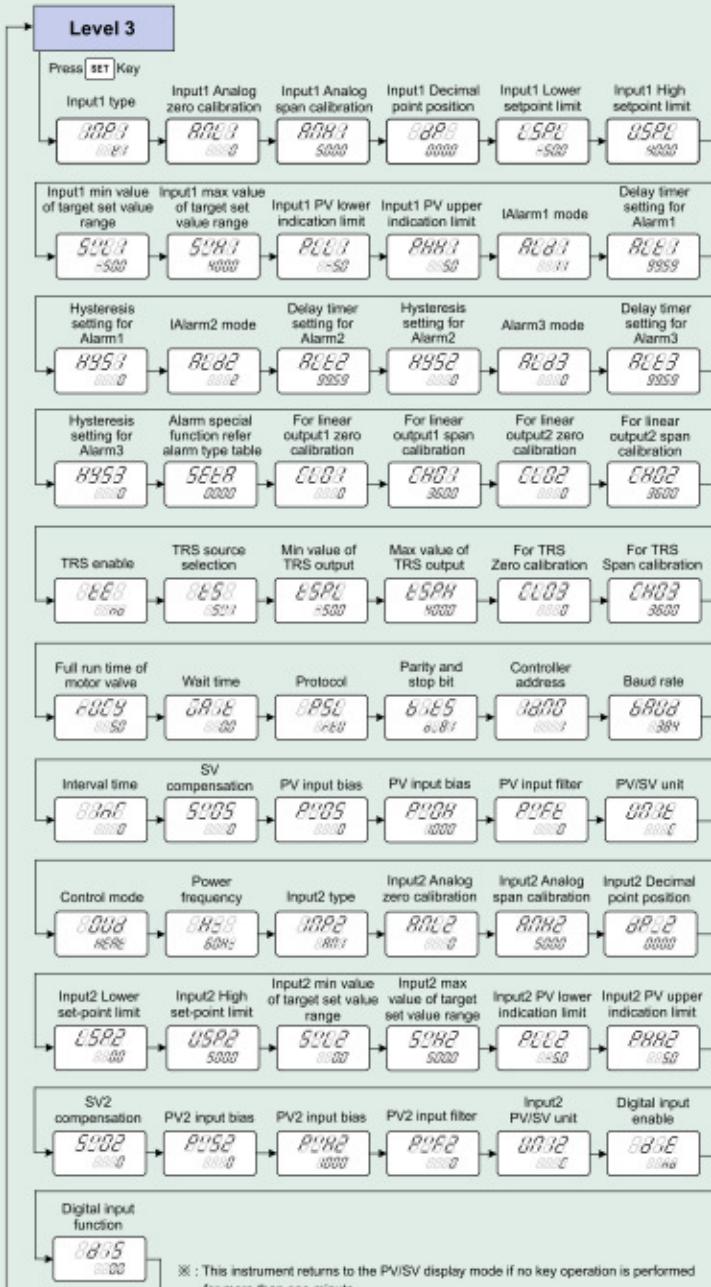
If any of the indication in the table below appear, the controller need to be repaired do not try to repair the Controller by yourself, order a new one or contact us to repair.

LED	Error	Solution
ADCF	ADCF: A/D convert failed	Send back repair.
CJCE	CJCE:Cold junction compensation failed	Send back repair.
EROF	EROF: EEPROM failed	Send back repair.

### 4. Level 2 (PID Level) all parameters display



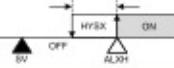
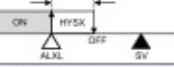
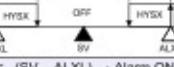
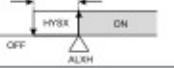
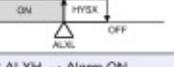
## 5. Level 3 (Input Level) all parameters display



## Alarm action explanation

### 1. Alarm mode

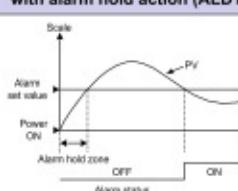
(▲ : SV △ : Alarm set value X : 1 or 2 )

ALDX	Alarm type	Description
00	No alarm	Not drive any alarm relays and the corresponding LED lamp.
01	Deviation high With hold action	
11	Deviation high	Formula PV > (SV + ALXH) → Alarm ON PV ≤ (SV + ALXH - HYSX) → Alarm OFF
02	Deviation low With hold action	
12	Deviation low	Formula PV < (SV - ALXL) → Alarm ON PV ≥ (SV - ALXL + HYSX) → Alarm OFF
03	Deviation high/low With hold action	
13	Deviation high/low	Formula PV < (SV - ALXL) → Alarm ON PV ≥ (SV - ALXL + HYSX) → Alarm OFF PV > (SV + ALXH) → Alarm ON PV ≤ (SV + ALXH - HYSX) → Alarm OFF
04	Band With hold action	
14	Band	Formula PV ≥ (SV - ALXL) → Alarm ON PV < (SV - ALXL) → Alarm OFF PV ≤ (SV + ALXH) → Alarm ON PV > (SV + ALXH) → Alarm OFF
05	PV high With hold action	
15	PV high	Formula PV > ALXH → Alarm ON PV ≤ (ALXH - HYSX) → Alarm OFF
06	PV low With hold action	
16	PV low	Formula PV < ALXL → Alarm ON PV ≥ (ALXL + HYSX) → Alarm OFF
07	Timer	(1) set ALXH = 1000 timer start counting , when timer count to ALTX setting value alarm action ON (2) set ALXH = 0 stop and reset timer ALTX='hour'.'minute'
08	Error	when PV show error message alarm action ON when PV show normal temperature alarm action OFF
09	SV high	Formula SV > ALXH → Alarm ON SV ≤ (ALXH - HYSX) → Alarm OFF
10	SV low	Formula SV < ALXL → Alarm ON SV ≥ (ALXL + HYSX) → Alarm OFF
21	HBA	Activated conditions : 1. Heater current is less the HBA set value 2. OUT1 output of more than 90% 3. Condition1 and 2 continued more than HBAT set the number of seconds

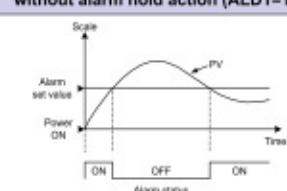
※ : When hold action is ON, the alarm action is suppressed at start-up until measured value has entered the non-alarm range.

### Ex: Process low alarm

with alarm hold action (ALD1=06)



without alarm hold action (ALD1=16)



### 2. Alarm special function

#### 1. Alarm Reverse Function

After power-on if no alarm events generate the alarm relay will contact in close condition if alarm events generate the alarm relay will contact in open condition.

#### 2. Alarm Lock Function

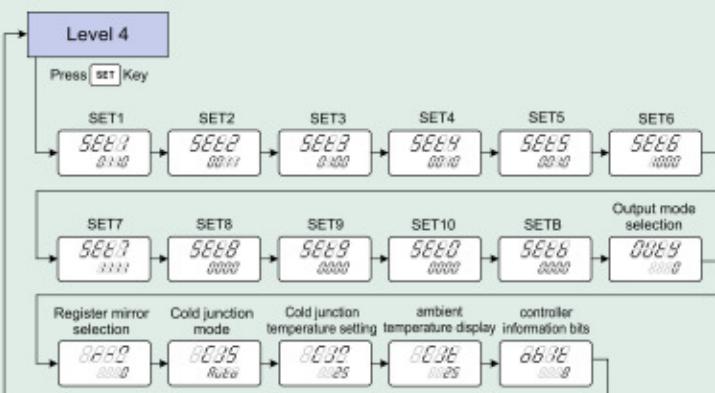
When alarm events generate the alarm relay contact and led indicator continuous will on even if PV/SV return to normal band led still not release until power reset the contact.



SETA default value 0000

- 0 : ALARM 1 reverse function disable (Normal Open)
- 1 : ALARM 1 reverse function enable (Normal Close)
- 0 : ALARM 2 reverse function disable (Normal Open)
- 1 : ALARM 2 reverse function enable (Normal Close)
- 0 : ALARM 1 lock function disable
- 1 : ALARM 1 lock function enable
- 0 : ALARM 2 lock function disable
- 1 : ALARM 2 lock function enable

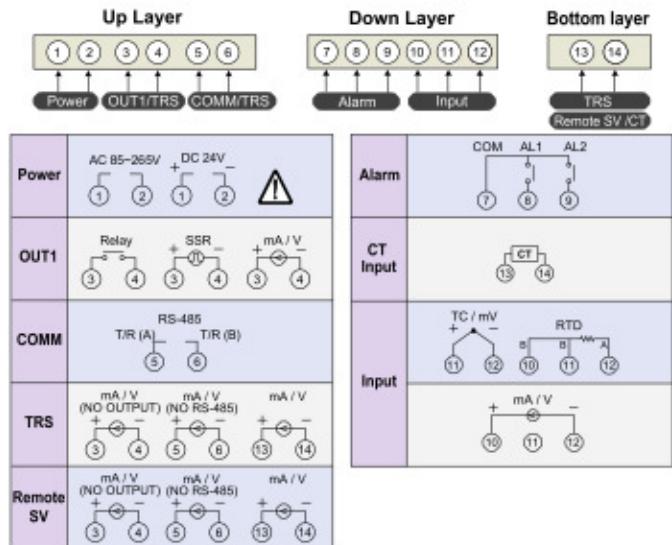
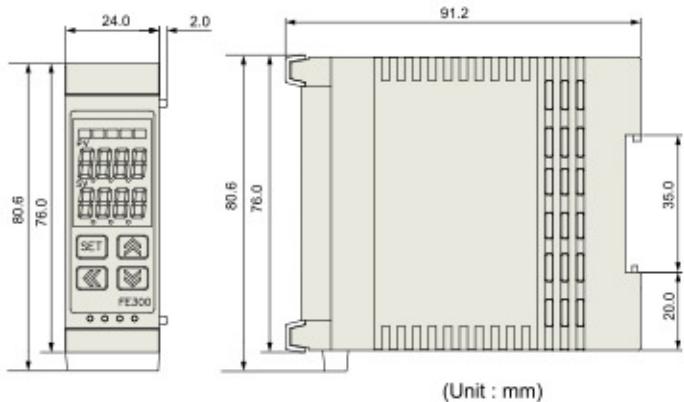
## 6. Level 4 (Setting Level) all parameters display



# FE300

## FE300 Terminal arrangement

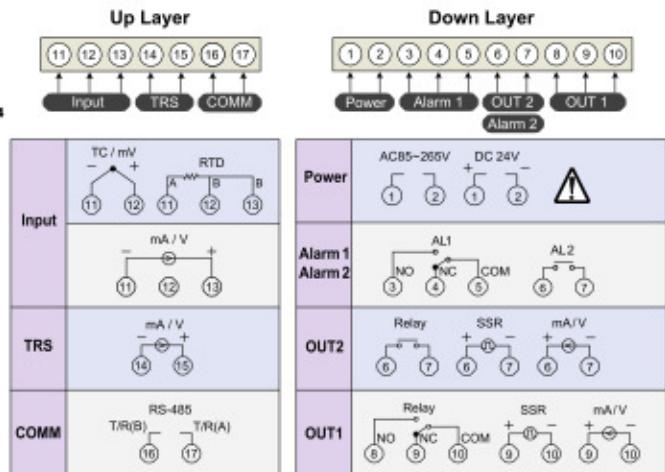
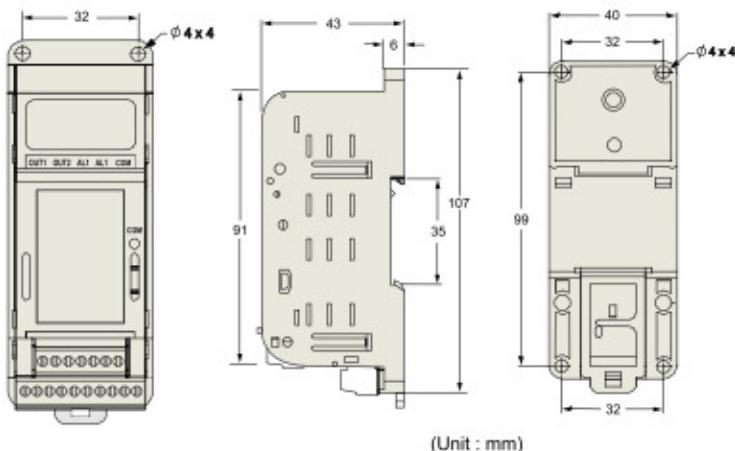
### FE300 Dimensions



# FE250 / 251

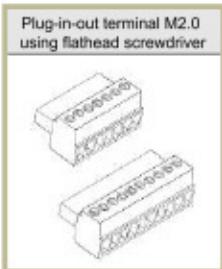
## FE250 Terminal arrangement

### FE250 / 251 Dimensions

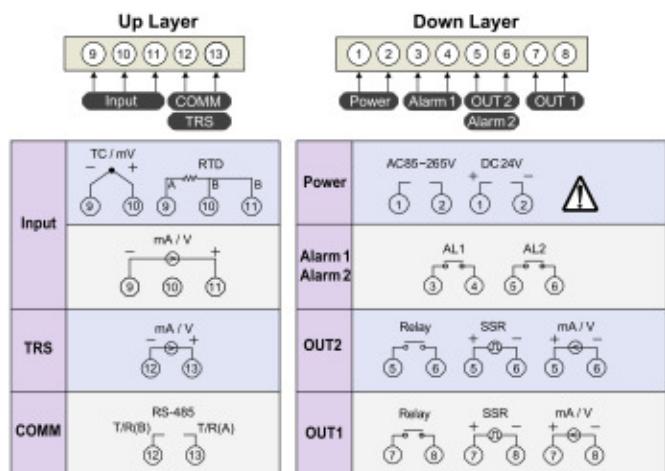
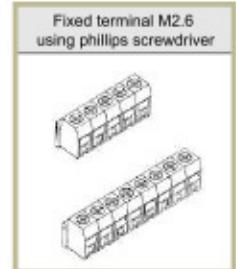


## FE251 Terminal arrangement

### FE250 Terminal icon



### FE251 Terminal icon



## Specifications

Model	FE300	FE250	FE251
<b>Power supply voltage</b>	AC 85 ~ 265V, DC 24V (Optional)		
<b>Frequency</b>	50/60 Hz		
<b>Power consumption</b>	Approx. 6VA		
<b>Memory</b>	Non-volatile memory EEPROM		
	Accuracy : 0.2% FS		
	Sample time 250ms		
<b>Sensor input</b>	TC : K、J、R、S、B、E、N、T、W、PL II、L		
※ Please refer to input range table	RTD : PT100		
	Linear : 0~20mA、4~20mA 0~1V, 0~5V, 0~10V, 0~2V, 1~5V, 2~10V 0~25mV、0~50mV、10~50mV、0~70mV		
	1a	1c	1a
<b>Control output</b>	<b>OUT1 Relay</b>	1a: SPST-NO, 250 VAC, 8A (resistive load), electrical life: 100,000 operations 1c: SPDT-NO, 250 VAC, 5A (resistive load), electrical life: 50,000 operations SPDT-NC, 250 VAC, 2A (resistive load), electrical life: 20,000 operations	
	<b>OUT2 Relay</b>	—	1a
	<b>SSR driver</b>	SPST-NO, 250 VAC, 8A (resistive load), electrical life: 100,000 operations	
	<b>Linear</b>	ON: 24 V OFF: 0V max. load current: 20 mA, with short-circuit protection circuit 4~20mA, 0~20mA, 0~5V, 0~10V, 1~5V, 2~10V	
<b>Control method</b>	ON-OFF or P, PI, PID control		
	1a	1c	1a
<b>Alarm 1 output</b>	1a: SPST-NO, 250 VAC, 5A (resistive load), electrical life: 100,000 operations 1c: SPDT-NO, 250 VAC, 5A (resistive load), electrical life: 50,000 operations SPDT-NC, 250 VAC, 2A (resistive load), electrical life: 20,000 operations		
<b>Alarm 2 output</b>		1a	
	SPST-NO, 250 VAC, 5A (resistive load), electrical life: 100,000 operations		
<b>Transmission</b>	Signal : 4~20mA、0~20mA、0~5V、0~10V、1~5V、2~10V		
<b>Remote SV</b>	Channel : PV1、SV1、PV2、OP1		
	Signal : 4~20mA、0~20mA、0~5V、0~10V、1~5V、2~10V		
<b>Communication</b>	<b>Interface</b>	RS-485 Maximum unit : 31 pcs Maximum distance : 1200m	
	<b>Protocol</b>	Modbus RTU , TAIE	
	<b>Parity</b>	None , Odd , Even	
	<b>Data bit</b>	8bit	
	<b>Stop bit</b>	1 or 2 bit	
	<b>Baud rate</b>	2400, 4800, 9600, 19200, 38400, 57600, 115200 bps	
	<b>Delay time</b>	0~250 ms	
<b>Special features</b>	Power-on soft start, Timer function (1 minute to 99 hours, 59 minutes)		
<b>Operating temperature humidity</b>	0 ~ 50°C (with no icing or condensation) 20% ~ 90% RH		
<b>Storage temperature</b>	-25 ~ 65°C (with no icing or condensation)		
<b>Dimension</b>	W26xH81xD90 mm		W40xH107xD43 mm
<b>Weight (approx)</b>	Approx. 90g		Approx. 105g

## Oder Information

Model	Output 1	Output 2	Alarm	TRS	Remote	COMM	Input type	Power
<b>FE250</b> Plug-in-out terminal	— 1 0 None 1 Relay 2 Voltage Pulse (SSR Drive) 3 4~20mA 4 0~20mA A 0~5V B 0~10V C 1~5V D 2~10V	0 (FE300 without) 0 None 1 Relay 2 Voltage Pulse (SSR Drive) 3 4~20mA 4 0~20mA A 0~5V B 0~10V C 1~5V D 2~10V	1 0 None 1 1 set 2 2 set A HBA B HBA+AL2	0 0 None 1 4~20mA 2 0~20mA A 0~5V B 0~10V C 1~5V D 2~10V	0 0 None 1 4~20mA 2 0~20mA A 0~5V B 0~10V C 1~5V D 2~10V	0 0 None 1 RS-485	0 1 See input type code	A AC 85~265V D DC 24V
<b>FE251</b>								
<b>FE300</b> Fixed terminals								

★Factory set value K1, code 01  
★TC Input(K,J,R,S,B,E,N,T,W,PLII,...)setting, can be changed to any types by user  
★RTD( PT100)setting,can be changed to any type by user  
★TC, RTD, LINEAR can be changed each other but need to change the parts of hardware.  
For more details, please contact local agents.

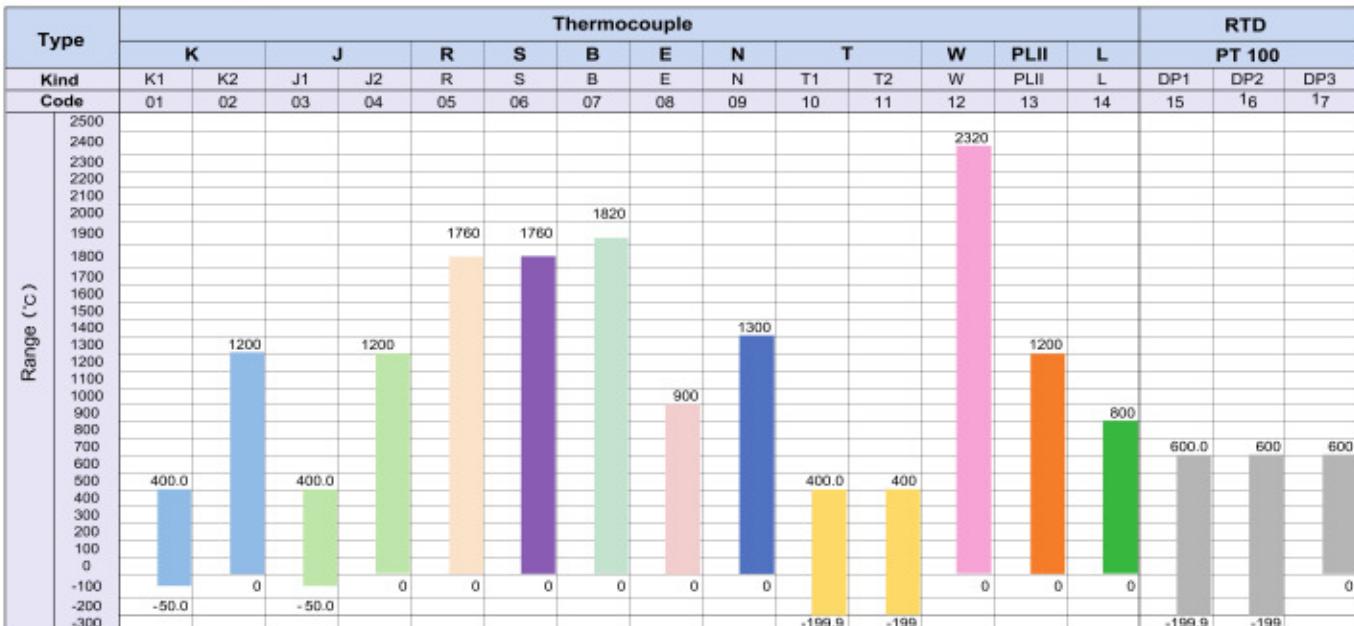
■ Block means optional functions with additional charge.

## DIN RAIL function type

※ When power is DC24V, FE250/251 has no AL1.

Model	OUTPUT		ALARM		Subsidiary function optional				Parameters which can be changed	
	1 set	2 set	1 set	2 set	RS-485	HBA	TRS	Remote SV		
	○	○	○	○	○	HBA/TRS/Remote 3 chooses 1				
FE250	○	○	○	○	○	HBA/TRS/Remote 3 chooses 1				2 set of Alarm are independent contact
FE251	○	○	○	△	△	A: With communication, HBA/TRS/Remote 3 chooses 1 (use AL2 terminal) B: Without communication, HBA/TRS/Remote 3 chooses 1 (use communication terminal)				2 set of Alarm are independent contact
FE300	○	X	○	○	△	Communication/HBA/TRS/Remote 4 chooses 2				2 set of Alarm are common contact

## Input Types Table



Type	LINEAR												AN3		
	AN1		AN2												
Code	18	19	20	21	22	23	24	25	26	27	28	29	DP1	DP2	DP3
Input Range	0~25mV	0~50 mV	0~20mA	4~20mA	0~1V	0~5V	0~10V	0~2V	1~5V	2~10V	other	0~70 mV			
Set Range	Four Kinds of choices : -1999~9999 -199.9~999.9 -19.99~99.99 -1.999~9.999														

Before operating this product, read the instruction manual carefully to avoid incorrect operation. This product is intended for use with industrial machines, test and measuring equipment. It is not design for use with medical equipment. If it is possible that an accident may occur as a result of the failure of the product or some other abnormality, an appropriate independent protection device must be installed.



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