

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

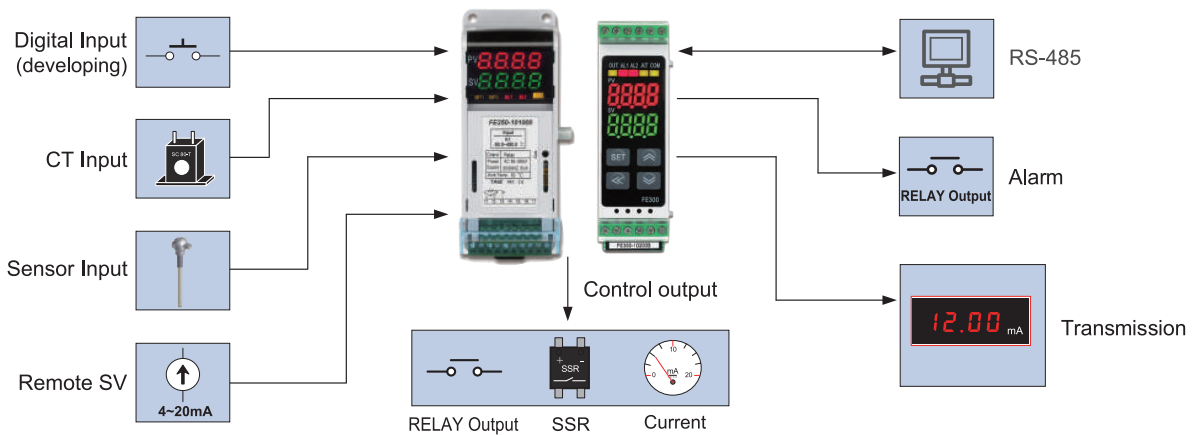
FE 250_251_300 Modular Miniature Digital PID Temperature Controller

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.

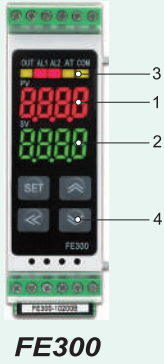


Status Indicator Light

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)
4	Keypad	SET Used for parameter calling up and set value registration
		SHIFT Shift digits when settings are changed
		DOWN Decrease numerals
		UP Increase numerals

High accuracy $\pm 0.2\%$



FE250
Plug-in-out terminal
FE251
Fixed terminal

- Plug in out terminal design is easy connection.(FE250)
- External control box with double display has 7 segments display itself and can show PV value.
- New LED module design with 4 big digit display of PV & SV in control box is touched smoothly and can be plug in out and operate easily.
- The controller can be independently operated when the external control box is plug out from the controller After Parameter setting to prevent the man-made operating mistake.



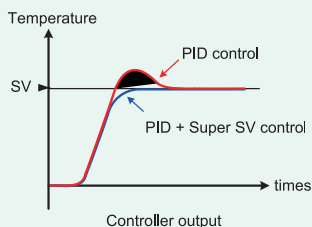
- Achieve whole set of module & miniaturization 40x107x43mm light and compact, save the space of panel .

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

Excellent Control Performance

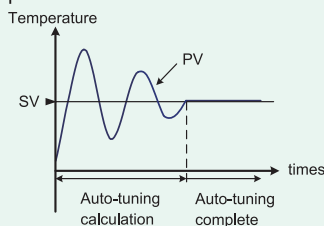
PID Control

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



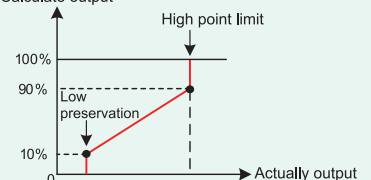
Auto-Tuning

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



Limit Setting

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



High Accuracy

$\pm 0.2\%$

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

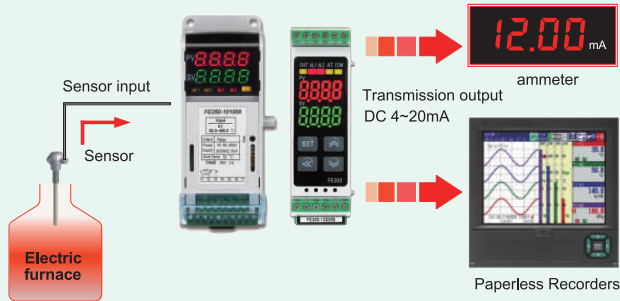
LOCK

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.

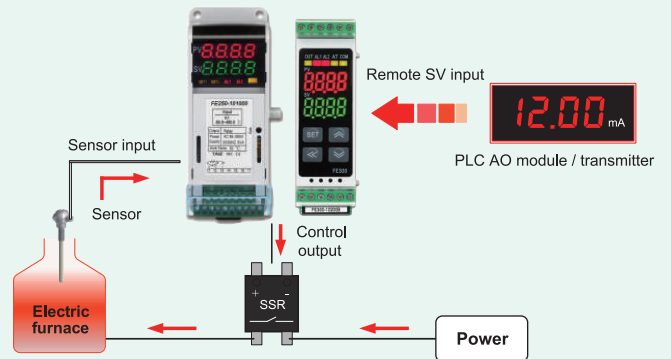
- Type : DC 0~20mA , 4~20mA , DC 0~5V , 1~5V , 0~10V , 2~10V
- Output parameters : SV, PV, SV2, PV2, OP1



Remote SV

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

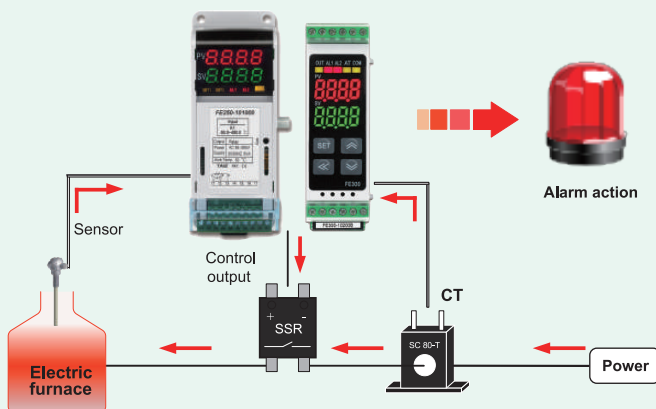
- Type : DC 0~20mA , 4~20mA , DC 0~5V , 1~5V , 0~10V , 2~10V
- Output parameter : SV



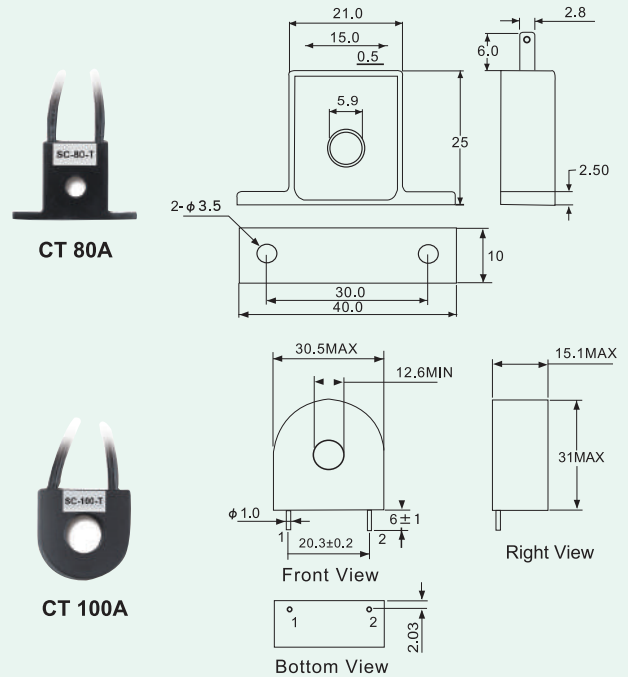
Heater Break Alarm (HBA)

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.

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)

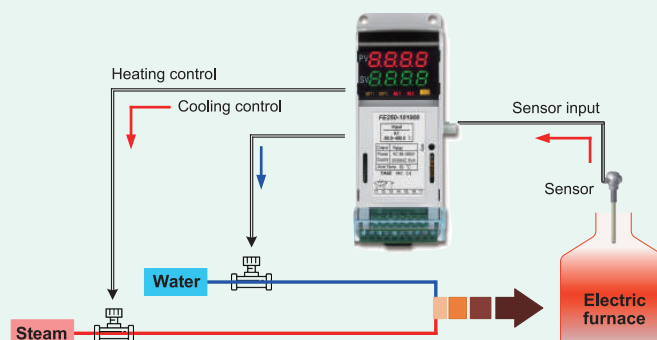


- Can be used as the ammeter
- Can be set break time
- Current value and alarm signal can be read by communication



Heating and Cooling Control

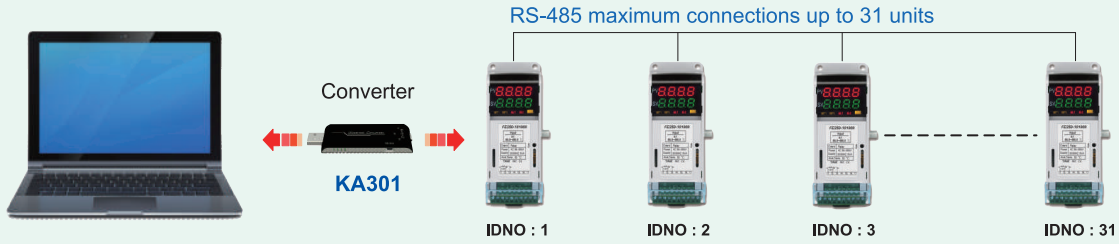
Using two outputs of the controller, a device can control the heating / cooling equipment.



Super Communication function of MODBUS (RTU, TAIE)

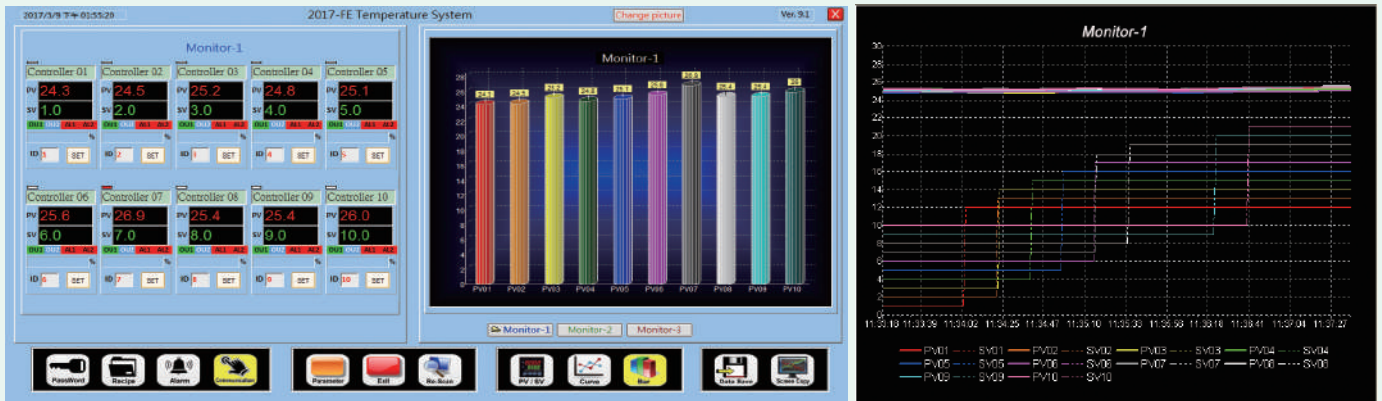
Fast and Stable Communication

- 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



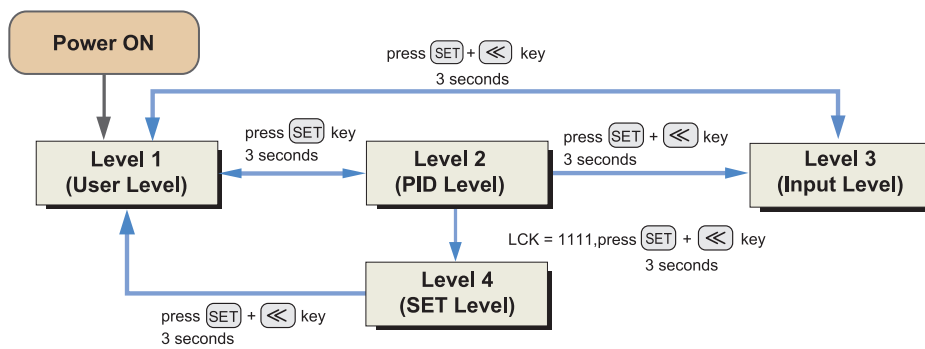
KA301 Universal Converter USB ↔ RS-232 / 422 / 485 / TTL

(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 condrol 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

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

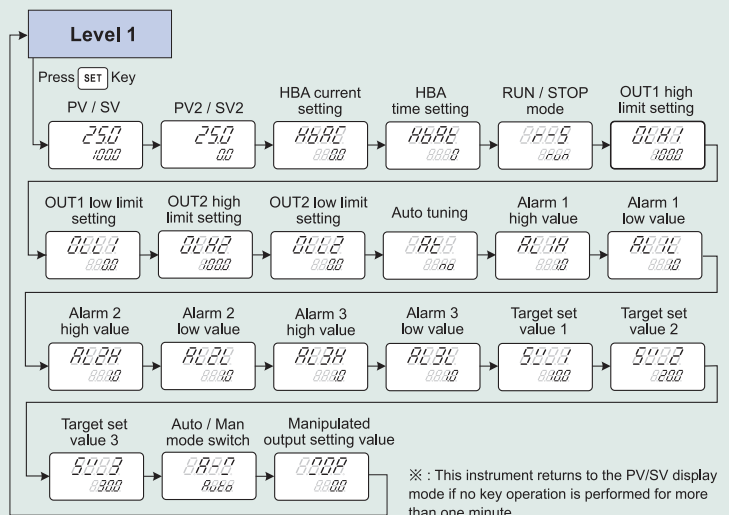
If the controller displays one of the following, carry out the appropriate remedy for the particular error.

LED	Error	Solution
ERR1	INIE: Input1 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.

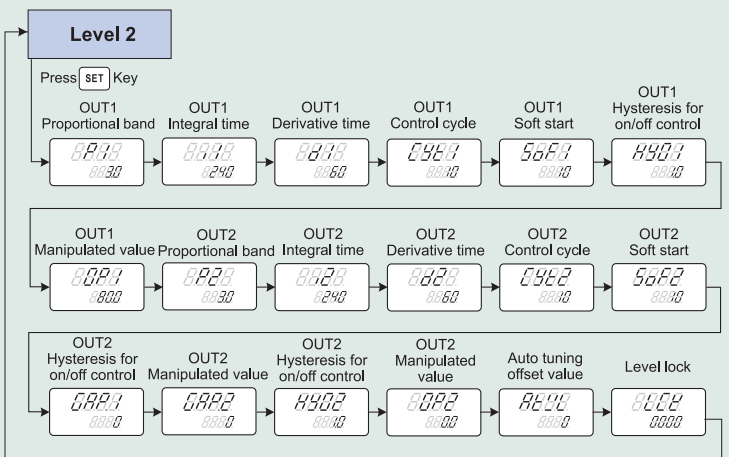
LED	Error	Solution
ADCF	ADCF: A/D convert failed	Send back repair.
CJCE	CJCE: Cold junction compensation failed	Send back repair.
RAMF	RAMF: EEPROM failed	Send back repair.

3. Level 1 (User Level) all parameters display



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

4. Level 2 (PID Level) all parameters display



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

5. Level 3 (Input Level) all parameters display

Level 3

Press **SET** Key

Input1 type 0000 0000	Input1 Analog zero calibration 0000 0000	Input1 Analog span calibration 0000 5000	Input1 Decimal point position 0000 0000	Input1 Lower setpoint limit 0500 +500	Input1 High setpoint limit 0500 +000
Input1 min value of target set value range 5000 +500	Input1 max value of target set value range 5000 +000	Input1 PV lower indication limit 0000 0050	Input1 PV upper indication limit 0000 0050	Alarm1 mode 0000 0000	Delay timer setting for Alarm1 0000 9959
Hysteresis setting for Alarm1 0000 0000	Alarm2 mode 0000 0000	Delay timer setting for Alarm2 0000 9959	Hysteresis setting for Alarm2 0000 0000	Alarm3 mode 0000 0000	Delay timer setting for Alarm3 0000 9959
Hysteresis setting for Alarm3 0000 0000	Alarm special function refer alarm type table 0000 0000	For linear output1 zero calibration 0000 0000	For linear output1 span calibration 0000 3600	For linear output2 zero calibration 0000 0000	For linear output2 span calibration 0000 3600
TRS enable 0000 0000	TRS source selection 0000 0000	Min value of TRS output 0000 +500	Max value of TRS output 0000 +000	For TRS Zero calibration 0000 0000	For TRS Span calibration 0000 0000
Full run time of motor valve 0000 0000	Wait time 0000 0000	Protocol 0000 0000	Parity and stop bit 0000 0000	Controller address 0000 0000	Baud rate 0000 0000
Interval time 0000 0000	SV compensation 5000 0000	PV input bias 0000 0000	PV input bias 0000 1000	PV input filter 0000 0000	PV/SV unit 0000 0000
Control mode 0000 HERE	Power frequency 0000 50Hz	Input2 type 0000 0000	Input2 Analog zero calibration 0000 0000	Input2 Analog span calibration 0000 5000	Input2 Decimal point position 0000 0000
Input2 Lower set-point limit 0500 0000	Input2 High set-point limit 0500 5000	Input2 min value of target set value range 5000 0000	Input2 max value of target set value range 5000 5000	Input2 PV lower indication limit 0000 0050	Input2 PV upper indication limit 0000 0050
SV2 compensation 5000 0000	PV2 input bias 0000 0000	PV2 input bias 0000 1000	PV2 input filter 0000 0000	Input2 PV/SV unit 0000 0000	Digital input enable 0000 0000
Digital input function 0000 0000	※ : This instrument returns to the PV/SV display mode if no key operation is performed for more than one minute.				

6. Level 4 (Setting Level) all parameters display

Level 4

Press **SET** Key

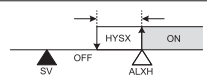
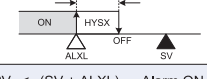

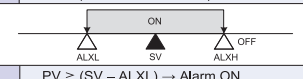
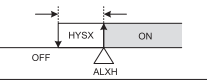
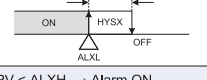
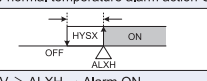
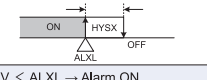
SET1 0000 0000	SET2 0000 0000	SET3 0000 0000	SET4 0000 0000	SET5 0000 0000	SET6 0000 1000
SET7 0000 0000	SET8 0000 0000	SET9 0000 0000	SET10 0000 0000	SETB 0000 0000	Output mode selection 0000 0000
Register mirror selection 0000 0000	Cold junction mode 0000 0000	Cold junction temperature setting 0000 0000	ambient temperature display 0000 0000	controller information bits 0000 0000	

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

Alarm action explanation

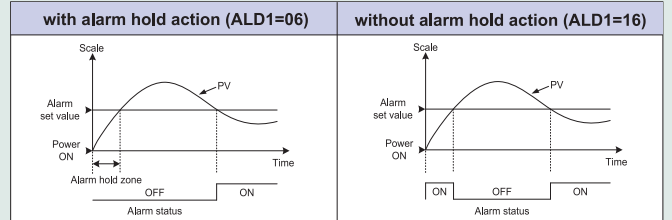
1. Alarm mode

(▲ : 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	
10	SV low	
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



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.

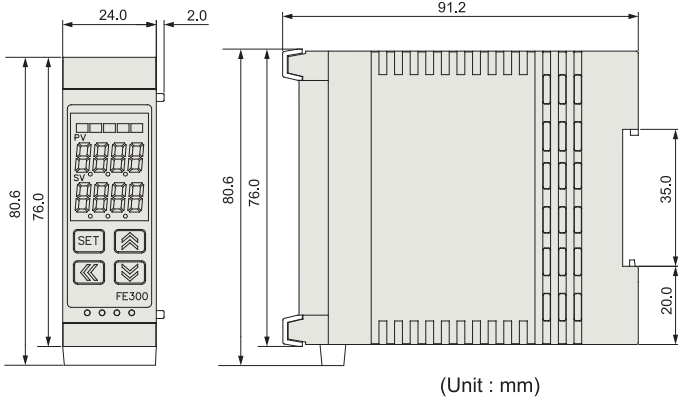
5EER
0000

SETA default value 0000

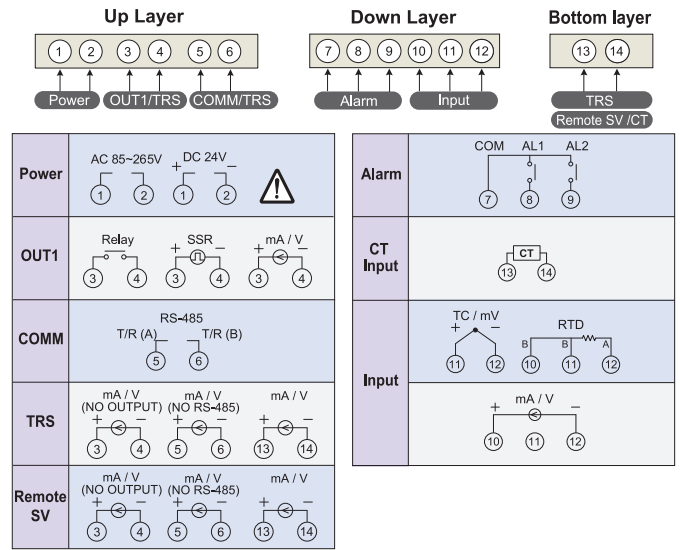
- 0 : ALARM 1 reverse function disable (Normal Open)
- 1 : ALARM 1 reverse function enable (Normal Close)
- 0 : ALARM 2 reverse function disable (Normal Open)
- 1 : ALARM 2 reverse function enable (Normal Close)
- 0 : ALARM 1 lock function disable
- 1 : ALARM 1 lock function enable
- 0 : ALARM 2 lock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

FE300

FE300 Dimensions

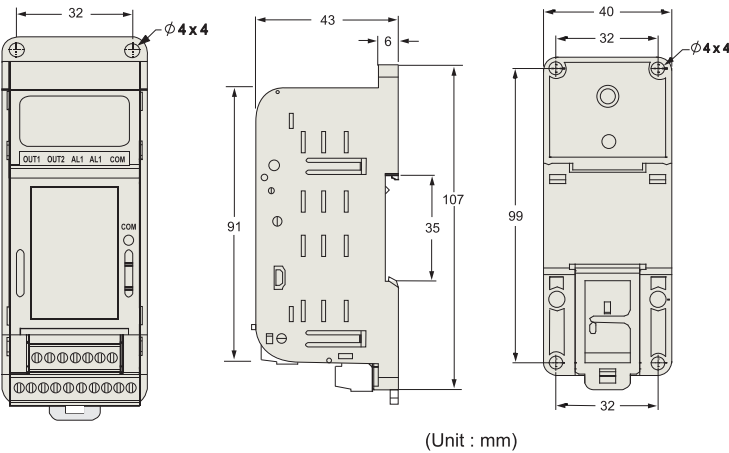


FE300 Terminal arrangement

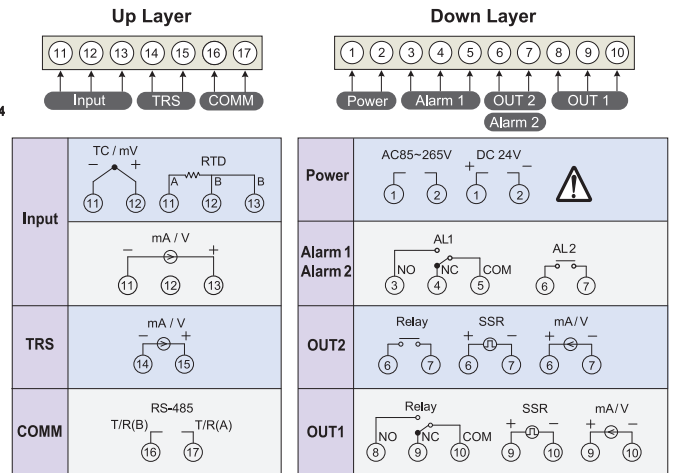


FE250 / 251

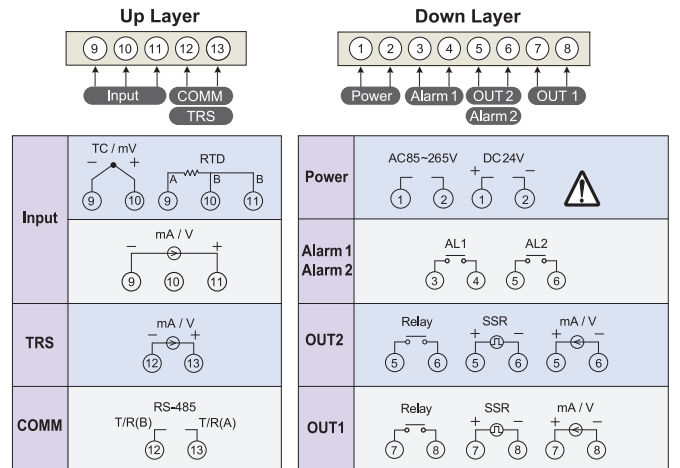
FE250 / 251 Dimensions



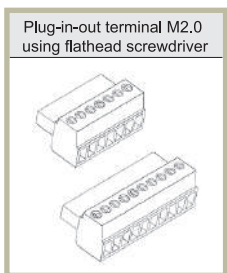
FE250 Terminal arrangement



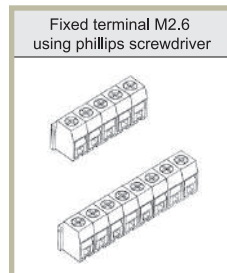
FE251 Terminal arrangement



FE250 Terminal icon



FE251 Terminal icon



Specifications

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

Order Information

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

 Block means optional functions with additional charge.

★ Factory set value K1, code 01

★ TC Input(K.J.R.S.B.E.N.T.W.P.LII.L...) 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.

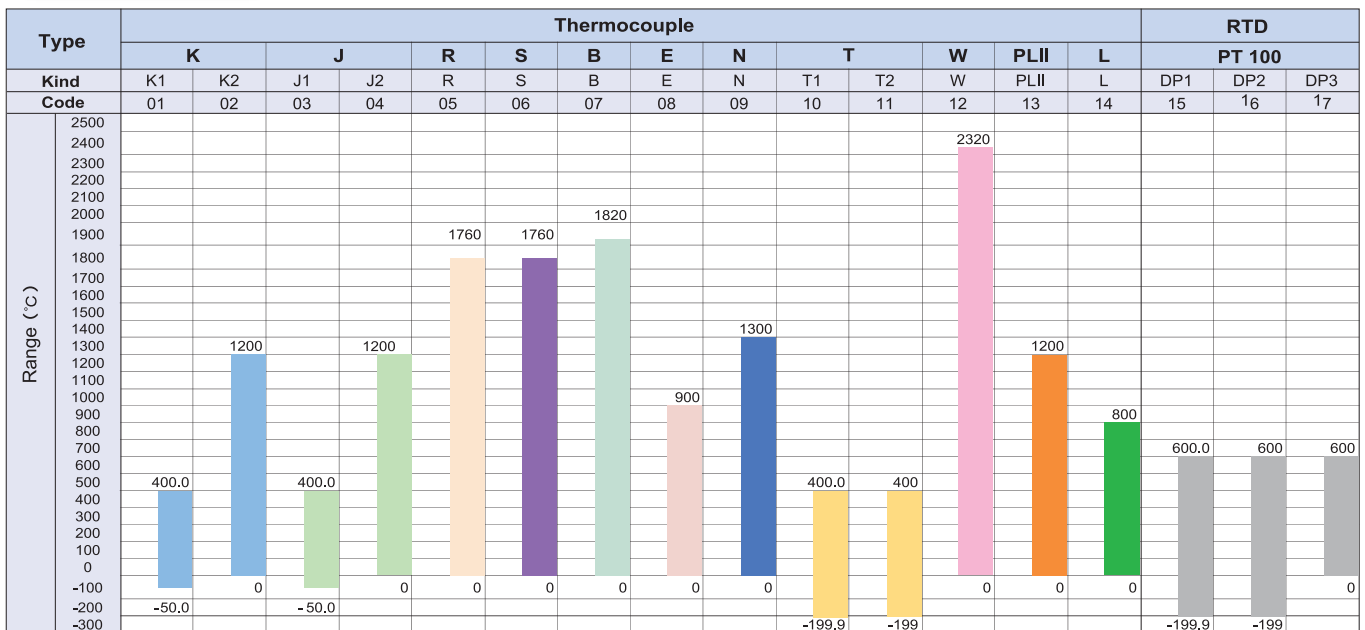
For more details, please contact local agents.

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	
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												
	AN1			AN2							AN3		
Code	18	19	20	21	22	23	24	25	26	27	28	29	
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.

Distributor



TAI TAIWAN INSTRUMENT & CONTROL CO., LTD

© Specifications are subject to change without notice.

COPYRIGHT © 2017 All Rights Reserved

Printed in Taiwan