TF Series Intellegient Temperature Controller User Manual

Features:

⊙Optional input signal types and models

⊙With functions of measured display,control output,alarm output,analog output,RS485 communication,etc.

⊙ Diffferent types of PID arithmetic and with auto-tuning function.

⊙Used for industrial machinery, machine tools,measuring instruments.

⊙Economical and easy operation.

▣ Model

TF 6-□R 2 8-B — 1 2 3 4 5 6 7

1. B：Version
2. 10: without communication 18:with RS485
3. 1：1 alarm output 2: 2 alarms 0: No alarm
4. R：Relay output Q: SSR output C : DC 4-20mA (can be set to analog
5. output through ACT menu) M:SSR & Relay output K: SCR output (can be ordered)
   I: 4～20m Aanalog output (can be set to control output through ACT menu)
   Blank: No 4～20mA analog output
6. 3: 72W*36H*70.5L 4: 48W*48H*100L 6：48W*96H*100L 7：72W*72H*100L
   8：96W*48H*100L 9：96W*96H*100L 80：160W*80H*96L (mm)
7. TF series temperature controller

Please note the input signal type when you choose the model. 1st type:TC/RTD/mV/Rt；2nd type: mA/V.

Note :TF series is only one 4~20mA output function.

▣ Ordering Information

Model	Control output	Alarm	Analog 4～20mA	RS485
TF□-IR28	Relay / 4～20mA	2	Yes	Yes
TF□-IQ28	SSR / 4～20mA	2	Yes	Yes
TF□-C28	4～20mA	2	Multi-use of main control	Yes
TF□-M1	Relay and SSR	1	No	No
TF□-Q1	SSR	1	No	No

▣ Specifications

1、Electrical parameters:

Sample rate	2 times/per second
Relay capacity	AC 250V /3A Life of rated load>100,000 times
Power supply	AC/DC 100 ～ 240V（85-265V）
Power consumption	< 6VA
Environment	Temperature of indoor：0 ～ 50℃ no condensation，Humidity：＜85%RH，altitude<2000m
Storage enenvironment	-10 ～ 60℃, no condensation

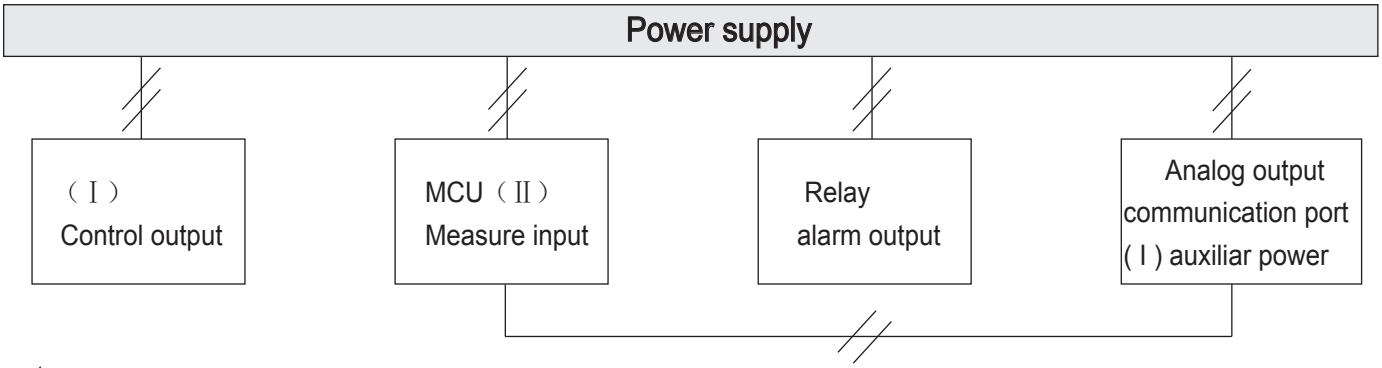
SSR output	DC 24V pulse voltage，load<30mA
Current output	DC 4 ～ 20mA load<500Ω
Communication port	RS485 port Modbus-RTU procotol, max input 30units
Insulation impedance	Input, output, power VS meter cover ＞20MΩ
ESD	IEC/EN61000-4-2 Contact ±4KV /Air ±8KV perf.Criteria B
Pulse traip anti-interference	IEC/EN61000-4-4 ±2KV perf.Criteria B
Surge immunity	IEC/EN61000-4-5 ±2KV perf.Criteria B
Voltage drop & short interruption immunity	IEC/EN61000-4-29 0% ～ 70% perf.Criteria B
Dielectric strength	Signal input /output /power 1500VAC 1min，between lower than 60V circuits, DC500V,1min
Total weight	About 400g
Shell material	The shell and panel frame PC/ABS (Flame Class UL94V-0)
Panel material	PET(F150/F200)
Power failure memory	10 years，times of writing: 1 million times
Panel Protection level	IP65(IEC60529)
Safety Standard	IEC61010-1 Overvoltage category Ⅱ，pollution level 2，level Ⅱ（Enhanced insulation）

2、Measured signal specifications：

Input type	Symbol	Measuring range	Resolution	Accuracy	Input impedance/ auxiliary current	Communication parameter code
K		-50 ～ 1200	1℃	0.5%F.S±3digits	＞500kΩ	0
J		0 ～ 1200	1℃	0.5%F.S±3digits	＞500kΩ	1
E		0 ～ 850	1℃	0.5%F.S±3digits	＞500kΩ	2
T		-50 ～ 400	1℃	0.5%F.S±2℃	＞500kΩ	3
PT100		-200 ～ 600	0.2℃	0.5%F.S±3digits	0.2mA	4
CU50		-50 ～ 150	0.2℃	0.5%F.S±3℃	0.2mA	5
CU100		-50 ～ 150	0.2℃	0.5%F.S±1℃	0.2mA	6
0 ～ 50mV		-1999 ～ 9999	12bit	0.5%F.S±3digits	＞500kΩ	7
0 ～ 400Ω		-1999 ～ 9999	12bit	0.5%F.S±3digits	0.2mA	8
* 4 ～ 20mA		-1999 ～ 9999	12bit	0.5%F.S±3digits	100Ω	9
* 0 ～ 10V		-1999 ～ 9999	12bit	0.5%F.S±3digits	>1MΩ	10

* Please note when you choose the model

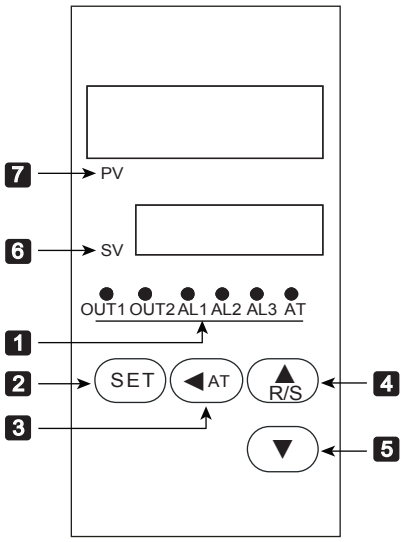
3、Isolation diagram



"⫽"：Isolation

Note：When the auxiliary power supply between (Ⅰ) & (Ⅱ) is used as the power supply of external sensor, if the sensor is non-isolated, it does not isolate.

▣ Name of universal panel

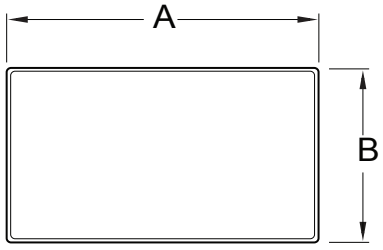


No	Symbol	Name	Function
1	OUT1	out1 indicate light(red) *	Main control output indicate light, it lights when the output is ON
	OUT2	out2 indicate light(red) *	Cooling output indicate light,it lights when output is ON
	AL1	Alarm1# indicate light(red)	1st alarm output indicate light
	AL2	Alarm2# indicate light(red)	2nd alarm output indicate light
	AL3	Alarm3# indicate light	3rd alarm output indicate light (can be ordered)
	AT	AT indicate light(green)	Auto-tuning indicate light,it indicates auto-tuning status when lighting on
2	SET	SET function key	Menu key/confirm key, to enter or exit modified mode or confirm modified parameters
3	◀AT	Shift/AT key	Activation/shift key/AT auto-tuning key,long press to enter/exit auto-tuning under measure control mode
4	▲ R/S	Increase key/R/S	Increase key, long press it to shift RUN/STOP mode under measure control mode.
5	▼	Decrease key	Decrease key
6	SV	Display window (green)	Setting value/parameters display window,display “STP” =stop control
7	PV	Display window (red)	measured value/parameters code display window

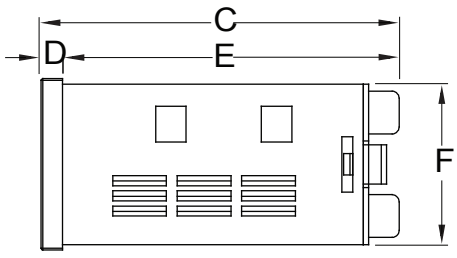
*: Size “3”is green color.

▣ Dimension and installation size

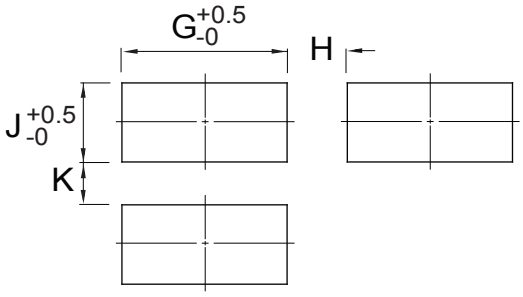
front size



side size



Hole size

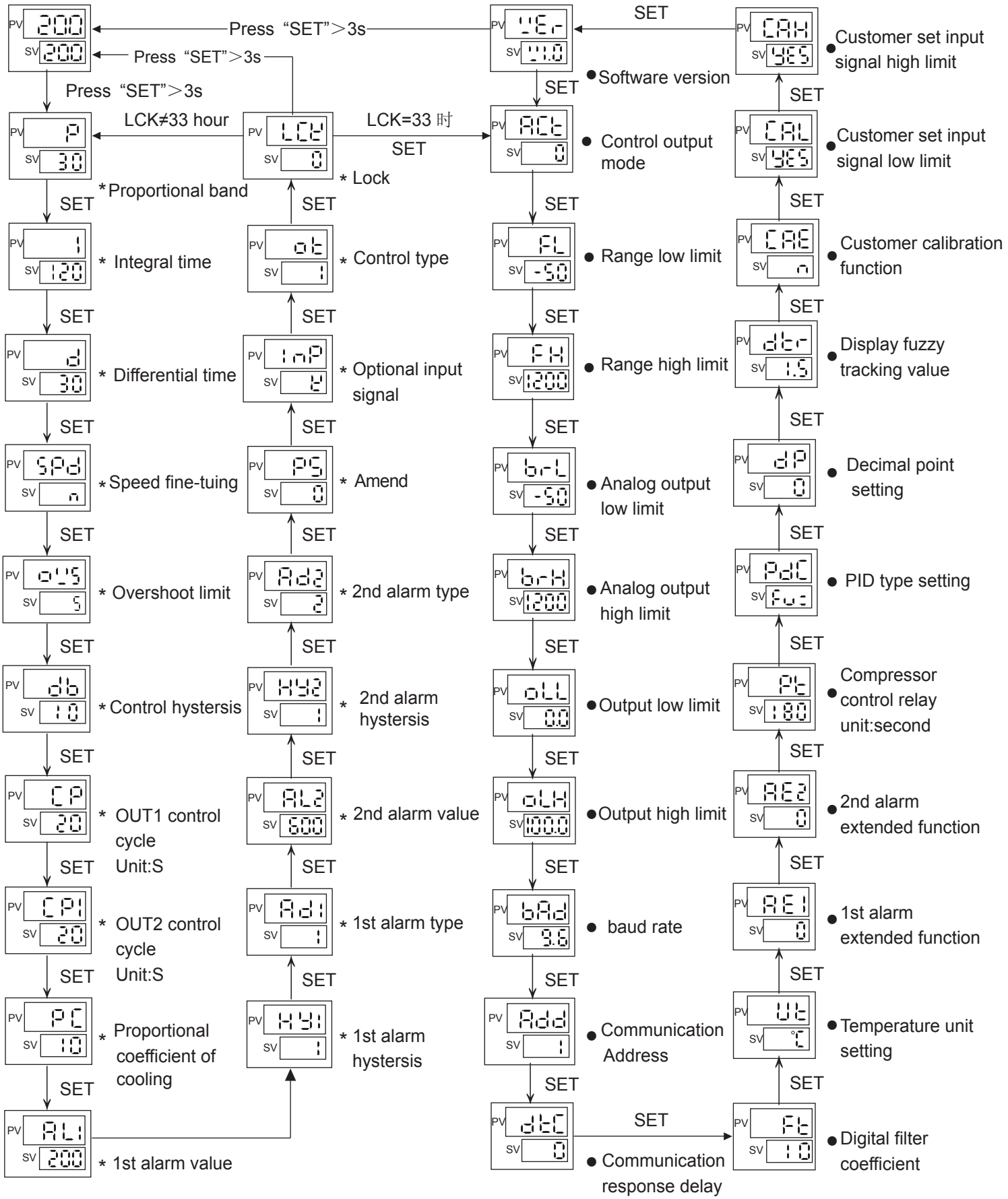


型 号	A	B	C	D	E	F	G	H(Min)	J	K(Min)
3:(72*36)	72	36	70.5	6.5	64	32	68	25	33	25
4:(48*48)	48	48	101	10	91	45	45.5	25	45.5	25
6:(96*48)	48	96	100	6	94	91	45.5	25	91.5	25
7:(72*72)	72	72	100	10	90	67.5	68	25	68	25
8:(48*96)	96	48	100	6	94	45	91.5	25	45.5	25
9:(96*96)	96	96	100	10	91	90.5	91	25	91	25
80:(80*160)	160	80	102	10	92	76	154	30	76.5	30
16:(160*80)	80	160	102	10	92	153.5	76.5	30	154	30

▣ Operation & menu

1、Operation process & method

measure control mode



"*" : Normal menu parameters

"●" : Project menu parameters

a. In the normal measure control mode , after power-on,long press SET key more than 3s to enter parameters checking mode.
b. In the menu parameter checking mode, press "SET" key shor time to check the menu parameters in cycle.
c. In the menu checking mode, press ◀ AT to flash the menu parameters to be modified, it can move one position to left,when pressing each short time (in this cycle)
d. In the menu modifing mode, press "▲ R/S" or "▼" key short time to increase or reduce the value.
e. In the menu modifing mode, press SET key to confirm modified parameters , and exit to menu checking mode.
f. In the normal measure control mode, press ◀ AT shortly to enter SV value modifing status. The method of modifing SV value is same as modifing menu parameters.
g. In the normal measure control mode, press "◀AT" more than 3s to enter auto-tuning status. During auto-tuning, PV value needs to be lower than SV value.
h.In the normal measure control mode,long press "▲ R/S" key more than 3s to enter or back to control mode.

2、Menu description

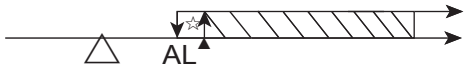
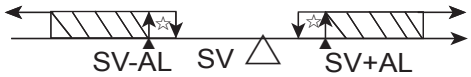
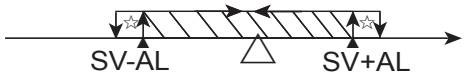
No.	Menu name	Description	Set range	Factory set
1	PV	Measure display value,it will flash or display LLLL/HHHH when the value is over the setting range.	Refer to measured signal table	No
2	SV	Set value (target control value)	FL ～ FH	200
3	P	Proportional band,the lower of setting value,the faster of system heating . Increase proportional band can reduce vibration,but it may increase control bias .Reduce proportional band can reduce control bias, may cause vibration	0 ～ 9999	30
4	I	Integral time the lower of the value,the stronger of integral action,the more tendency to eliminate and deviation of set value.If integral action is too weak, it may not eliminate the deviation. Unit: Second	0 ～ 9999	120
5	D	Differential time,reduce the effect of differential time to a proper value,which can prevent the system oscillation. The higher value,the stronger function of differential.Unit:s	0 ～ 9999	30
6	SPD	Control speed fine tuning,optional 0(N)no function,1(slow),2(ss)medium slow, 3（SSS）very slow，4（F）fast，5（FF）medium fast，6（FFF）express	0 ～ 6	N
7	OVS	Overshoot limit,in the process of PID control,when PV>SV+OVS,it force off output; The lower value,the lower PID adjusted range,the worse control stability;please set a proper value according actual state.	0 ～ 9999	5
8	DB	On-off control backlash(nagetive backlash on-off control)or cooling control and compressor cooling control dead zone. please change value according to decimal position,when you change input sigal type type.	0 ～ 1000	10
9	CP	OUT1 control cycle,1:SSR control output, 4-200:relay control output. Unit:second	1 ～ 200	20
10	CP1	OUT2 control cycle,cooling relay output cycle.Unit:second	4 ～ 200	20
11	PC	OUT2 cooling proportionality coefficient,the higher of value,the stronger of cooling	1.0 ～ 100.0	10.0
12	AL1	1st alarm value,note:the minus is dealed as absolute value when it is as a deviation value .	FL ～ FH	200
13	HY1	1st alarm backlash value	0 ～ 1000	1
14	AD1 (1)	1st alarm type,note:the value should set 0 when 1st alarm is as out2 , Set AD2 to 0 when setting value>6. Otherwise it will close alarm function when it is 0.。	0 ～ 12	1
15	AL2	2nd alarm value,note:the minus is dealed as absolute value when it is as a deviation value .	FL ～ FH	600
16	HY2	2nd alarm backlash value	0 ～ 1000	1
17	AD2 (1)	2nd alarm type,note:the value should set 0 to close alarm function when the AD1>6.	0 ～ 6	2
18	PS	Amend value,display value=actual measured value+ amend value	-1999 ～ 9999	0

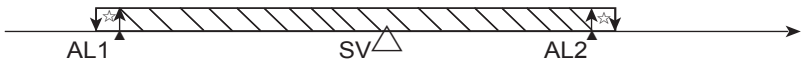
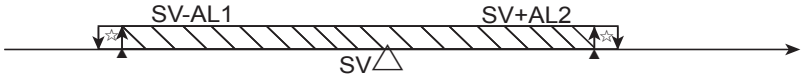
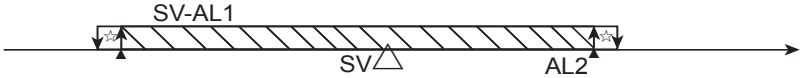
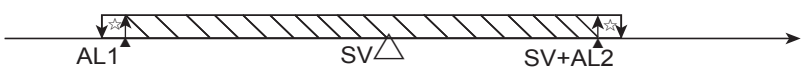
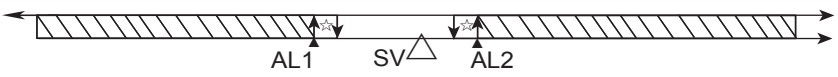
19	INP	Optional input measured signal type:refer to input signal parameters table. Note:it need to change the relevant parameters after changing.	0 ～ 10	0
20	OT	Control type,0:ON/OFF control;1:PID heating control; 2:compressor cooling control; 3:PID & cooling control,it should set the AD1 to 0,then OUT2 can operate.	0 ～ 3	1
21	LCK	Lock function;0001:SV value can not be modified, 0010:menu setting value only can be checked ,cannot modified. If set it as 0033 when checking the menu, it can enter to project menu	0 ～ 9999	0
22	ACT	Control output mode,0:relay/SSR output;1:single SSR output control 2：4 ～ 20mA output control, please set according selected meter 3:TE4,TE7 can set 3and change 4-20mA to analog output.	0 ～ 2/0~3	0
23	FL	Measure range low limit,the setting value must be less than measure range high limit	Refer to measured signal parameter table	-50
24	FH	Measure range high limit,the setting value must be more than measure range low limit.	Refer to measured signal parameter table	1200
25	BRL	Analog range low limit . Note: it also support reserse analog output function	FL ～ FH	-50
26	BRH	Analog range high limit. Note: it also support reserse analog output function	FL ～ FH	1200
27	OLL	current output low limit amplitude, limit the current output low limit amplitude	-5.0% ～ 100.0%	0
28	OLH	current output high limit amplitude, limit the current output high limit amplitude	0.0 ～ 105.0	100
29	BAD	RS485 communication baud rate 0（4.8）：4800；1（9.6）：9600	0（4.8）, 1（9.6）	9.6
30	ADD	Communication Address	0 ～ 255	1
31	DTC	Sequenced transport of communication data and setting 000 of respon relay; 1st is function reserve,2nd is byte sequenced exchange,3rd is respon relay,it can set 0~9 to 10~100ms.	Refer to communication procotol note②	0
32	FT	PV filter coefficient of digital filter,the higher of value,the stronger of filter function	0 ～ 255	10
33	UT	Temperature unit:℃：degrees Celsius F：Fahrenheit,note:the unit is only for temperature measure signal.	25（℃）26（℉）	25（℃）
34	AE1(2)	1st loop alarm extensions	0 ～ 5	0
35	AE2(2)	2nd loop alarm extensions	0 ～ 5	0
36	PT	Starting relay time of compressor,unit:s	0 ～ 9999	180
37	PDC	Optional PID type 0(FUZ)：Advanced fuzzy PID arithmetic； 1(FCT):Single prediction PID arithmetic; 2(STD)：normal PID arithmetic	0 ～ 2	FUZ
38	DP	Decimal point setting,it will be effective for line signal input.	0 ～ 3	0
39	DTR	PV fuzzy tracking value,it can get a stable control display value in some status. value. Note:when the alarm setting value is equal with SV setting value after setting the DTR value,operation of alarm output is subject to actual measured value.Setting 0 to close the function. Temperature unit:F/℃	0.0 ～ 2.0/0 ～ 20	1.5/15

40	CAE	User auto-calibrating enable function,this parameter is only for use of input signal expect TC/RTD;Y:user of enable auto-calibrating parameters N:user who don`t use enable auto-calibrating parameters	0（N），1（Y）	N
41	CAL	Operation of user auto-calibrating low limit input,it is starting,when the YES flash after signal input add the low-side signal. It can calibrate input signal low-side when it display OK after entering.	YES/OK	YES
42	CAH	Operation of user auto-calibrating low limit input,it is starting,when the YES flash after signal input add the high-side signal. It can calibrate input signal high-side when it display OK after entering.	YES/OK	YES
43	VER	Display the software version	———	———

（1）Alarm parameters and output logic diagram:

Symbol description：“☆”means alarm hystersis，“▲”means alarm value，“△”means SV value

No.	Type	Alarm output（AL1、AL2 is independent of each other） Image：the hatched section means the alarm action
1	High limit absolute value alarm	
2	Low limit absolute value alarm	
3	※High limit deviation value alarm	
4	※Low limit deviation value alarm	
5	※High/low limit deviation value alarm	
6	※High/low limit interval value alarm	

No.	Type	The following two group of alarm parameters(AL1、AL2) used in combination,AL1 alarm output , AD2 must set to 0
7	High/low limit absolute value alarm	
8	※High/low limit deviation value alarm	
9	※Alarm between high limit absolute value and low limit deviation value .	
10	※Alarm between high limit deviation value and low limit absolute value.	
11	High/low absolute value alarm	
12	※High/low limit deviation alarm	

※When the alarm value with deviation alarm set to a negative number,it will deal with it as an absolute value.

（2）Alarm extension function table

AE1/AE2 value	Alarm handling mode when show HHHH/LLLL	Remark
0	The state when alarm keep HHH/LLL in previous time	Power on alarm, alarm does not inhibit (As long as meet the requirement of alarm , make alarm output)
1	Forced alarm output	
2	Forced alarm close	
3	The state when alarm keep HHH/LLL in previous time	Power on alarm , alarm inhibits. (Before PV value reach the set value at the first time , the alarm does not output)
4	Forced alarm output	
5	Forced alarm close	

▣ Key function operation

1. Monitoring mode operation

1）Under the measure mode,press“▲R/S”into monitoring mode;and on the SV window display“STP”. Long Press“▲R/S”to back.

2）It can modify SV value and shift mode operation even if displaying STP.

3）Under the monitoring mode, main control output will stop or keeo minimum output , alarm output &analog output is normal

2. PID Parameter identification and auto-tuning operation:

1）The factory default PID parameters may not be suitable to usage occasion;please use auto-tuning function to get a suitable PID setting.

2）The meter will make control output after power on a short period. User can set the meter to monitor mode to make sure auto-tuning effect, or switch off the power of control output load at temporary . No matter how to operate, it should guarantee the set value is larger than the present measured value, it is better if much larger.

3）In order to avoid the effect of alarm output,please set the proper alarm value,or remove the alarm effect.

4）Set PID type and SV value;the factory default is PID with fuzzy.

5）Set PID control,please set current output to proper range if it has OLL & OLH output limit; default set :OLL=0%,OLH=100%.

6）Under the condition of PV value at normal room temperature,please back to monitoring mode or input the load power,and long press “◀AT ” enter auto-tuning mode, now, AT indicator will shine.

7）Auto-tuning need a period, to ensure the auto-tuning result,please don`t modify parameters or power-off during auto tuning.

8）When AT light is off , it will exit the auto-tuning. PID will update automatcially, and can get good control result.

9）During auto-tuning, long press “ ◀AT” key, measure beyond the range,display abnormally, shift to “STP” status,power-off ect will stop the auto-tuning.

10）Note: In the place with current output amplitude limit , it may not get the best PID parameters even after auto-tuning.

11）Experienced users can set a proper PID parameter according to their experience.

3. PID & Cooling control operation

1）PID control act on host control output OUT1； Cooling control act on OUT2.

2）AL1 alarm function & OUT2 can reuse,please set AD1 to 0 when using the cooling control;but the 1st alarm function can`t work after setting.

3）Please set the control type OT to 3.

4）Please set the cooling start offset to a value great than 5,to ensure the cooling would not affect the PID control impact.

5）Please change the cooling control cycle to a proper value,and change the cooling scaling factor to a a proper value.

6）When PV value > SV+DB value,the cooling control start to effect;the bigger value of PV,the longer output time of OUT2

4.Signal linear auto-tuning function operation

1）Set up the INP type,and ensure one of inputs(0～50mV、RT(0～400Ω)、4～20mA and 0～10V)

2）Add the input signal to a proper input channel.

3）Enter menu low-limit to calibrate CAL,press “ ◀AT ”to flash”YES”;and set the input signal to min value and input to meter.

4）When “YES”is flashing,and the min value of signal has input to meter,please press “SET”to ensure and save calibrating value.

5）After calibrating low-limit,enter the high limit to calibrate CAH in menu,and flash “YES”.

6）Set the input signal to max value to meter,and press “SET”to ensure and save the calibrating value when the “YES”is flashing.

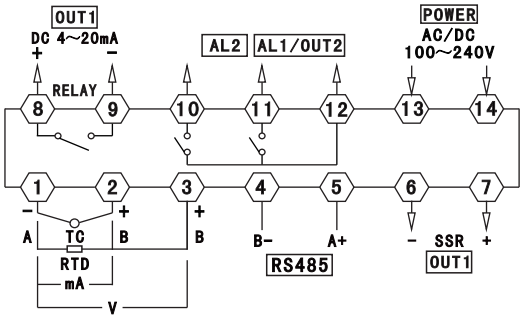
7）After calibrating,it can enter CAE,and change “N”to “Y”then it can use calibrating value,or it will use the factory default value.

8）The linear signal value of high-limit input should not great than the inout standard value range ±10%.

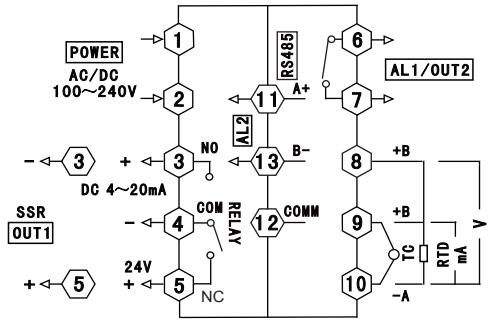
9）If you`re not satisfied with the calibrating result,you can reset.

▣ Connections

TF3



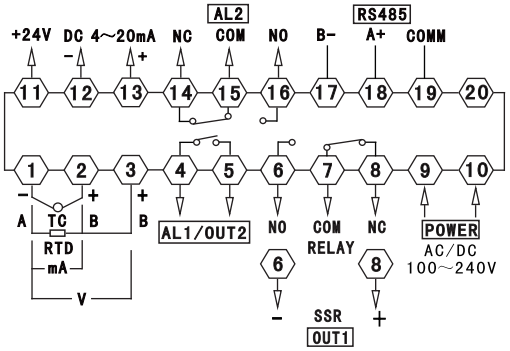
TF4



Note: OUT1 - SSR + (13, 11)

Model with “M”, SSR output terminal

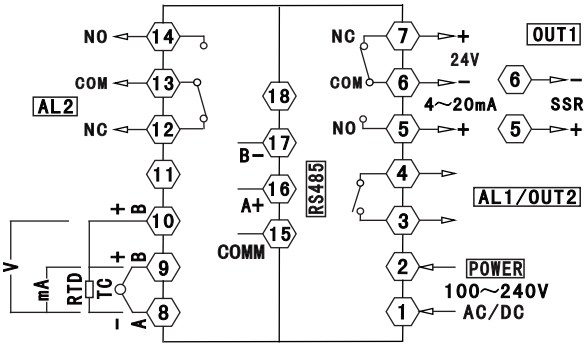
TF6



Note: OUT1 - SSR + (17, 18)

Model with “M”, ssr output terminal

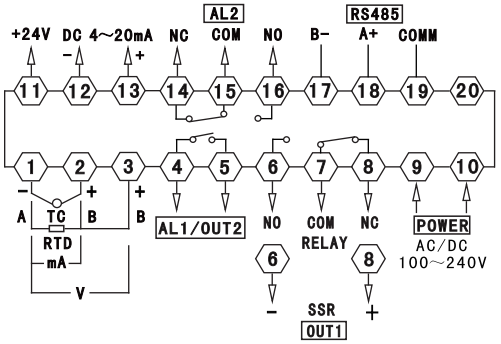
TF7



Note: OUT1 + SSR - (16, 17)

Model with “M”, ssr output terminal

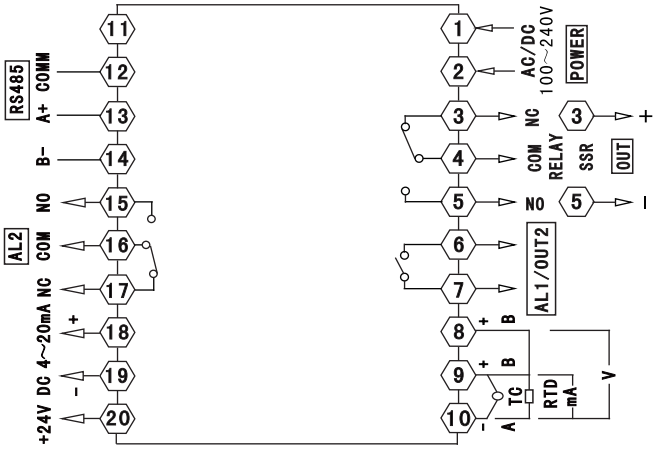
TF8



Note: OUT1 - SSR + (17, 18)

Model with “M”, ssr output terminal

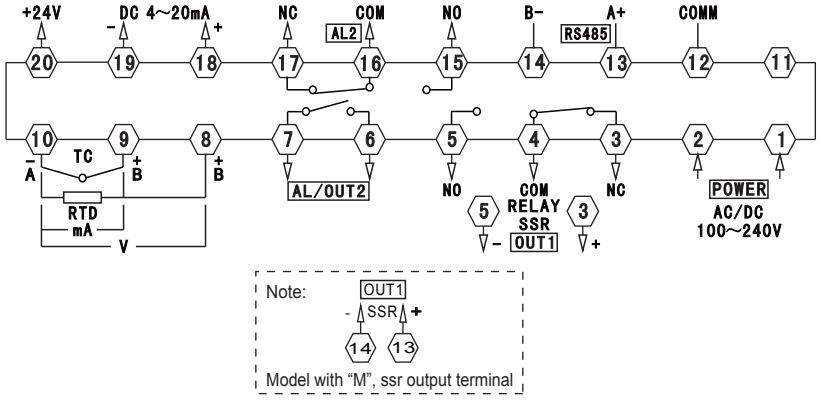
TF9



Note: OUT1 - SSR + (14, 13)

Model with “M”, ssr output terminal

TF80



Note: If there is any change, please subject to the drawing on the meter

▣ Methods of simple fault

Display	Methods
LLLL/HHHH	Checks whether the input disconnection and whether normal of FH value,FL value,work environment temperature and whether input signal is selected correctly.

▣ Communication procotol

Meter adopt RS485 Modbus RTU communication protocol, RS485 half duplex communication.Read function code:0x03, write function code 0x10/0x06.Adopts 16 digit CRC check, the meter does not return for error check.

Data frame format:

Start bit	Data bit	Stop bit	Check bit
1	8	1	No

Abnormal communication processing :

When abnormal response，put 1 on the highest bit of function code.For example:Host request function code 0x03,and slave response function code should be 0x83.

Error code:

0x01---Illegal function: the function code sent from host is not supported by meter.

0x02---Illegal address: the register address designated by host beyond the address range of meter.

0x03---Illegal data: Date value sent from host exceeds the corresponding data range of meter.

Communication cycle：

Communication cycle is the time from host request to slave response data . ie: communication cycle= time of request data sending +slave preparation time + response delay time + response return time

Eg:9600 Baud rate:communication cycle of single measured data ⩾250ms.

1、Read register

For example:Host reads integer SV(set value 200）

The address code of SV is 0x2000, because SV is integer(2 dyte),seizes 1data register.The memory code of 200 is0x00C8

Note:It should read DP value or confirm DP menu value first to ensure the decimal point postion when reading data,and converse the reading data to get the actual value. On the contrary ,it should converse the data to corresponding ratio first before writing the data into meter.

Host request（Read multi-register）							
1	2	3	4	5	6	7	8
Meter ADD	Function code	Start ADD High bit	Start ADD Low bit	Data byte length high bit	Data byte length high bit	※CRC code low bit	※CRC code high bit
0x01	0x03	0x20	0x00	0x00	0x01	0x8F	0XCA

Slave normal answer(Read multi-register）						
1	2	3	4	5	6	7
Meter ADD	Function code	Data byte number	Data high bit	Data low bit	※CRC code low bit	※CRC code high bit
0x01	0x03	0x02	0x00	0xC8	0xB9	0xD2

Function code abnormal answer:（For example:host request ADD is 0x2011）

slave abnormal answer(Read multi-register)				
1	2	3	8	9
Meter ADD	Function ID	Error code	※CRC code low bit	※CRC code high bit
0x01	0x83	0x02	0xC0	0xF1

2、Write multi-register

For example:Host use 0x10 function code write SV（setting value 150）
ADD code of SV is 0x2000,because SV is integer(2 dyte),seizes 1 data register.The hexadecimal code of 150 is 0x0096.

Host request（write multi-register）										
1	2	3	4	5	6	7	8	9	10	11
Meter ADD	Function code	Start ADD High bit	Start ADD Low bit	Data byte Length/ high bit	Data byte Length/ low bit	Data byte Length	Data high bit	Data low bit	※CRC code low bit	※CRC code high bit
0x01	0x10	0x20	0x00	0x00	0x01	0x02	0x00	0x96	0x07	0xFC

Slave normal answer (write multi-register)							
1	2	3	4	5	6	7	8
Meter ADD	Function ID	Start ADD High bit	Start ADD Low bit	Data byte Length/ high bit	Data byte Length/ low bit	※CRC code low bit	※CRC code high bit
0x01	0x10	0x20	0x00	0x00	0x01	0x0A	0x09

Host write SV with 0x06 function（setting value 150）

Host request（write single-register）							
1	2	3	4	5	6	7	8
Meter ADD	Function ID	ADD High bit	ADD Low bit	Data high bit	Data low bit	※CRC code low bit	※CRC code high bit
0x01	0x06	0x20	0x00	0x00	0x96	0x02	0x64
Slave normal answer（write single-register）							
1	2	7	4	5	6	7	8
Meter ADD	Function ID	ADD High bit	ADD Low bit	Data high bit	Data low bit	※CRC code low bit	※CRC code high bit
0x01	0x06	0x20	0x00	0x00	0x96	0x02	0x64

Data location error response:(For example:Host request the ADD index is 0x200F)

Slave abnormal answer (read multi-register)				
1	2	3	8	9
Meter ADD	Function code	Error code	※CRC code low bit	※CRC code high bit
0x01	0x90	0x02	0xCD	0xC1

Parameters reflection address

No.	Add reflection	Variable name	Register	Read/write	Remark
1	0x2000	Set value SV	1	R/W	
2	0x2001	1st alarm value AL1	1	R/W	
3	0x2002	1st alarm backlash HY1	1	R/W	
4	0x2003	2nd loop alarm AL2	1	R/W	
5	0x2004	2nd alarm backlash HY2	1	R/W	
6	0x2005	Display low limit FL	1	R/W	
7	0x2006	Display high limit FH	1	R/W	
8	0x2007	Analog output low limit BRL	1	R/W	
9	0x2008	Analog output high limit BRH	1	R/W	
10	0x2009	Control output low limit OLL	1	R/W	Default with 1 decimal point
11	0x200A	Control output high limit OLH	1	R/W	Default with 1 decimal point
12	0x200B	Overshoot limit OVS	1	R/W	
13	0x200C	Heat & Cool control dead zone DB	1	R/W	
14	0x200D	Proportional coefficient of cooling PC	1	R/W	Default with 1 decimal point
15	0x200E	Amend	1	R/W	
16	0x200F	Dispaly fuzzy tracking value DTR	1	R	Engineering work without decimal point
17	0x2010	Measure value PV	1	R	
Reserve					
18	0x2100	1st alarm mode AD1	1	R/W	
19	0x2101	2nd alarm mode AD2	1	R/W	
20	0x2102	1st alarm extended mode AE1	1	R/W	
21	0x2103	2nd alarm extended mode AE2	1	R/W	
22	0x2104	Control type OT	1	R/W	
23	0x2105	Control output mode ACT	1	R/W	
24	0x2106	RUN STOP operation	1	R/W	1：RUN 2：STP 3：Run auto-tuning 4：Stop auto-tuning

25	0x2107	Decimal point DP	1	R/W	
26	0x2108	Unit display UT	1	R/W	25（℃）26（℉）
27	0x2109	Filter constants FT	1	R/W	
28	0x210A	Proportional coefficient P	1	R/W	No decimal point
29	0x210B	Integral time I	1	R/W	No decimal point
30	0x210C	Differential time D	1	R/W	No decimal point
31	0x210D	Control speed fine-tune SPD	1	R/W	
32	0x210E	Heating control cycle CP	1	R/W	No decimal point
33	0x210F	Cooling control cycle CP1	1	R/W	No decimal point
34	0x2110	Cooling relay time PT	1	R/W	No decimal point
35	0x2111	Optional input signal INP	1	R/W	Refer to measured signal table
36	0x2112	Meter address ADD	1	R/W	
37	0x2113	Communication baud rate BAD	1	R	
38	0x2114	Communication delay setting DTC	1	R	Note ②
39	0x2115	PID arithmetic type PDC	1	R	
40	0x2116	Lock key LCK	1	R	
41	0x2117	Meter name	1	R	
42	0x2118	Output status	1	R	Note ①

R：Read； R/W：Read/write

Note① ：Measuring status indication,it means operation when the data position is 1,but it means no opertion when it is 0.

D7	D6	D5	D4	D3	D2	D1	D0
STOP	HHHH	LLLL	AT	AL2	AL1	OUT2	OUT1

Note②：Sequenced transport and response delay of DTC communication data

DTC： □ □ □ — Response delay：0 ～ 9 means 10 ～ 100ms
└— Sequenced transport of byte：0 = 1，2， 2 = 2，1
└— Reserve

※16 digits CRC check code get C program

```
unsigned int Get_CRC(uchar *pBuf, uchar num)
{
    unsigned i,j;
        unsigned int wCrc = 0xFFFF;
        for(i=0; i<num; i++)
        {
            wCrc ^= (unsigned int)(pBuf[i]);
            for(j=0; j<8; j++)
            {
                if(wCrc & 1){wCrc >>= 1; wCrc ^= 0xA001; }
                else
                    wCrc >>= 1;
            }
        }
    return wCrc;
}
```