Rev.：1.1

ETC serials
Ex Temperature controller

User Manual

Proviso

We reserve the right to make technical changes. Changes, errors, and literal errors do not justify any claim for damage compensation. For security components and systems, the relevant standards as well as the relevant operating and assembly instructions have to be followed.

This product catalogue replaces all former catalogues.

1. General

ETC serials Ex thermostat is designed for trace heating/heater temperature controlling exactly and reliable. They can also monitor the current, voltage, leakage current and accumulate the total power. They can not only Installation, display and operation on the site, but also have the remote controlling function.

The product is designed as a combined explosion protection including Ex e, Ex m and Ex i according to IEC 60079-0-2011 Explosive atmospheres -- Part 0: Equipment -- General requirements、IEC 60079-7-2006 Explosive atmospheres - Part 7: Equipment protection by increased safety "e"、IEC 60079-18-2009 Explosive atmospheres -- Part 18: Equipment protection by encapsulation "m"、IEC 60079-11-2011 Explosive atmospheres -- Part 11: Equipment protection by intrinsic safety"i"、IEC60079-31:2013 Explosive atmospheres - Part 31: Equipment dust ignition protection by enclosure "t".

Ex e anti-corrosive strengthen polyester enclosure and patent non-contact key are used in ETC. they have very good ingress protection. The intrinsically safe circuit is adopted for the key, display and sensor; the relay is encapsulated with Ex m explosion protection type. The product was examined, tested and approved by the third-party agency which can be applied in the hazardous area (zone 1 or zone 2, zone 21 or zone 22) and non-hazardous areas.

The explosion-proof marking is Ex e ib [ib] mb IIC T1~T6 Gb / Ex tD A21 IP66 T85℃~T450℃

The parts and structure of the product cannot be replaced or changed at random during the maintenance,

The main relay is failed-safe mode. It means the main relay is always open for making sure the load is power off when the sensor is broken or main relay is damaged.

Note: Any operations shall be guided by the qualified person.

2. Product Type and Classification

Product type and classification as below:

Name	Type No.	Remark
Ex thermostat	RH -3003-2001	Display, key, communication
Ex temperature limiter	RH -3004-1001	Display, key, communication
Operation pen	RH -3003-0001	Parameters setup
Temperature sensor	RH -3005-0001	PT100, 3-wires，-60℃~200℃
Temperature sensor	RH -3005-0002	PT100, 3-wires, -60℃~600℃
Bracket	RH -6001-0001	304ss
Fixing tapes	RH -6001-2001	304ss
Fixing tapes locker	RH -6001-2002	304ss

3. Technical Parameters

3.1. Technical data:

- Atmospheric press: 0.086～0.108（Mpa）;
- Enclosure Dimension: 160*160*90（L*W*H）
- Ingress protection: IP66
- Cable glands
  a) Power supply：1*M25 Gland
  b) Load：2*M20 Plug
  c) Communication, Alarm：1*M16 Gland or Plug
  d) Sensor：1*M16 Gland
- Weight: 3.3kg
- Display and setup on the site;
- Failed safe mode
- Indoor or outdoor applications.

3.2. Electrical data:

- Rated Voltage: AC110V～400V/（47Hz～63Hz）
- Rated Current: 32A
- Sensor(Optional): Pt100, 3-Wire，2m
  1) RH -3005-0001，-60℃~200℃（±0.5%，Default）;
  2) RH -3005-0002，-60℃~600℃（±0.5%，Customized）
- Measurement range: -60℃～600℃
- Accuracy: ±3℃
- Hysteresis: 5℃（Setable）
- Dry-contact: 5A 250 Vac
- Communication: RS485，Modbus RTU, 9600, N 8 1
- Ex Certificate: GYB 19.2320
- Ex markings: Ex e ib mb IIC T4 Gb / Ex tD A21 IP66 T85℃
- Durable years：＞ 5 years

4. Installation, wiring and cautions

4.1. The product shall be installed vertically.

The mounting dimensions as below see Fig. 1 and Fig. 2.

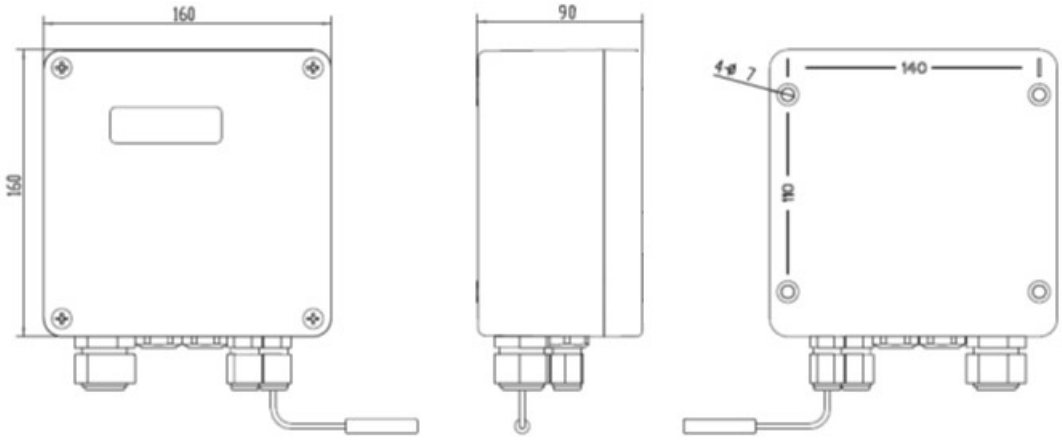


Fig. 1: The mounting dimensions

The layout of key, window and terminals as below See the Fig. 2.

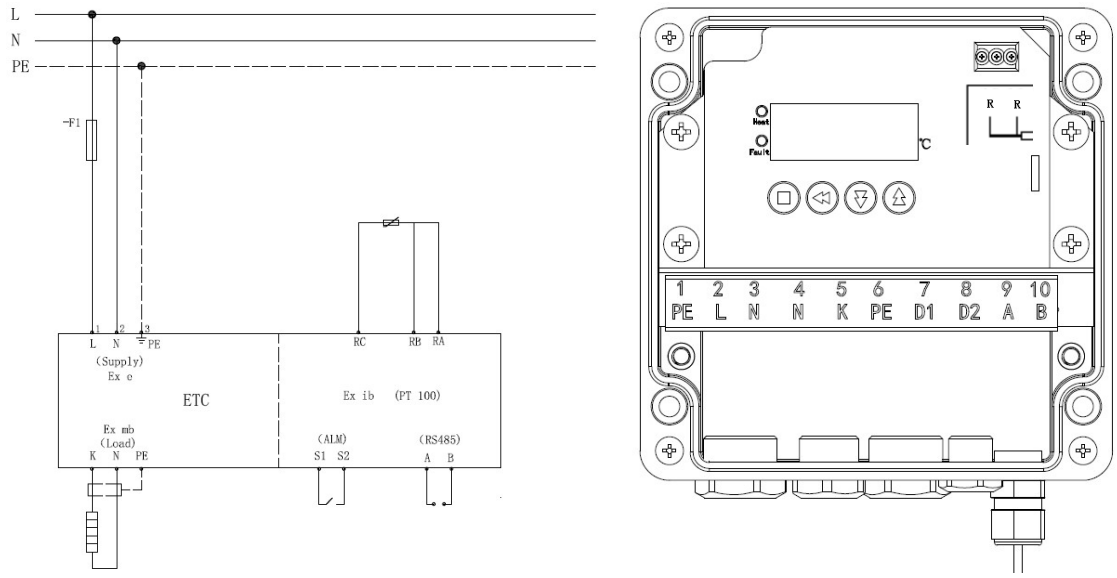


Fig. 2 The schematic of key, window and terminals

4.2. Wiring

1） The layout of inlet wire gland is shown in the Fig. 3, from the left to right is the power supply (thread specification: M25X1.5), heating cable(thread specification: M20X1.5) , heating cable(thread specification: M20X1.5. For constant wattage cable)), Communication or alarm output (thread specification: M16X1.5) and sensor gland (thread specification: M16X1.5).The user shall select proper inlet wire Gland basing on the selected cables, it shall meet the Exe and Extb explosion-proof requirements and temperature range is -40℃~85℃. The maximum exposure temperature of the power and signal cable is higher than 85℃.

2） The tightening torque of the wiring terminal is 1.2Nm.

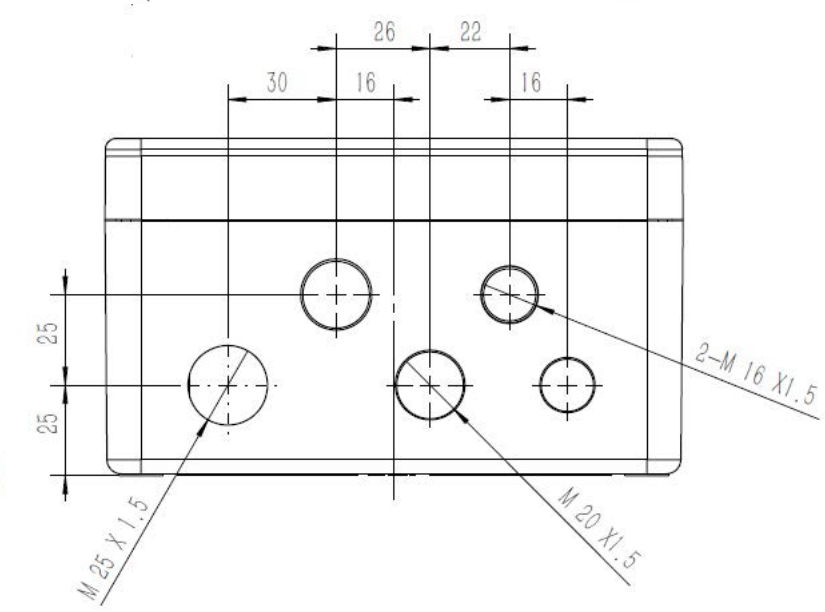


Fig. 3 The schematic of inlet wire gland

3）The terminal definition in Fig2 is described in table 1.

Tab. 1 terminal definition

Terminal No.	Markings	Description
1	PE	GND
2	L	Power supply-L
3	N	Power supply-N
4	N	Heating cable-N
5	K	Heating cable-L
6	PE	GND
7	D1	Alarm relay output
8	D2	Alarm relay output
9	A	RS485-A
10	B	RS485-B
	RC、RB、RA	PT100

4）Precautions for installation：

a) The controller shall be installed at position of the vibration and the shock as small as possible.
b) Users are not permitted to replace the components and parts of the product by themselves and they shall solve all faults during the operation together with the manufacturer for avoiding any unexpected damage;
c) The installation site shall be covered in the specified places of this instruction manual;
d) Due to the sensor/communication is intrinsically safe circuit, it shall be connected independently with non-intrinsically safe wire;
e) Internal programming port is only provided to the supplier for programming and maintenance;
f) The principle of "it is forbidden to open the cover with electricity" and "it is forbidden to open the cover at hazardous dust area" must be strictly followed during field operation and maintenance. The operator shall be qualified.
g) During the site operation and running of the product, the surface shall be regularly cleaned to make sure the thickness of dust is less than 5mm;
h) When the product is installed in the Explosive atmospheres, the cable intake shall be equipped the right cable entry device or plug with explosive-proof type Ex eIIC Gb and protection class IP66, they shall be approved by the third party agency referring to IEC 60079-0-2011 Explosive atmospheres-Part 0: Equipment-General requirements, IEC 60079-7-2006 Explosive atmospheres - Part 7: Equipment protection by increased safety "e"、IEC60079-31:2013 Explosive atmospheres - Part 31: Equipment dust ignition protection by enclosure "t".
i) During the installation, operation and maintenance, the below standards shall be followed.
   - IEC 60079-19-2010 Explosive atmospheres. Part 19: Equipment repair, overhaul and reclamation
   - IEC 60079-14-2013 Explosive atmospheres - Part 14: Electrical installations design, selection and erection
j) The Ex i parameter of Sensor：

	Ui (V)	Li (mA)	Pi (mW)	Ci (μ F)	Li (mH)
PT 100	5.88	0.8	110	2.9	1

5. Display & Operation

5.1. As shown in the Fig. 3, the instructions for the Display and the Keys are as follows:

1) The real-time temperature is displayed on the screen with 4 bit and 8 sections LED;
2) The green LED displays the status of heating output. Once it is illumed, it means heating cable is power on;
3) When the ETC status is normal operation, The red LED is not illumed. When some upper limited values (Temperature, voltage, current, leakage current) comes or there are some faults happening , it will be illumed.
4) The keys are in order from the left to the right: "SET", *"SFT"*, "INC" and "DEC".
   - "SFT" is cycle left shift;
   - Both "INC" and "DEC" are cycle increase or decrease.

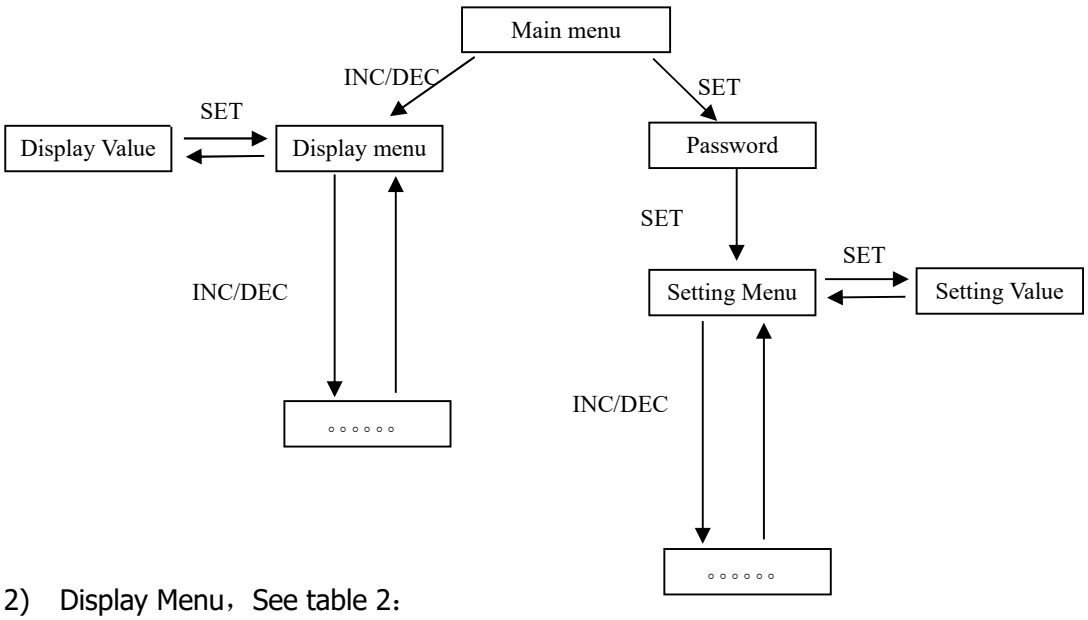
5.2. Operating instructions

1) The instrument can automatically move to working status after self-inspection when it's powered on; Press the "SET" to input the password for entering the setting menu at working condition(Show measuring temperature); Press the "SET" to input the password for entering the setting menu at working condition(Show measuring temperature); Press the "INC/DEC" to enter the display menu.
2) In the display menu or setting menu, Press the "SET"to enter the display value or related setting value.
3) In the display menu or setting menu, Press the "SFT"to back to the main menu.
4) In the display menu or setting menu, Press the "INC/DEC" show different display menu or setting menu circularly.
5) The setting value can be set up by "SFT/INC/DEC".
6) In the any menu, the thermostat can return to the main menu after 8 seconds without any operation.

Note: The operation by operating pen shall be point-blank for avoiding mis-operation.

5.3. Menu Structure

1) Main Menu：Display Measuring Temperature；



2) Display Menu，See table 2：

Table 2 Display Menu

S/N	Menu	Symbol	Unit	Remark
1	Measuring Value	PT	℃	
2	Setting Value	ST	℃	
3	Voltage	VOL	Vac	
4	Current	CT	A	Average value in 5min。
5	Leakage Current	CTL	mA	
6	Energy Consumption	EC	KW.h	
7	Relay Alarm Code	AL	N/A	No Alarm: 0000 (abcd） a：Temperature Upper Limited Alarm; b：Other Upper Limited Alarm（Current, Voltage, Leakage Current）; c：Communicate Failure Alarm（N/A）; d：Sensor Failure Alarm. Note: 1）1 means alarm, 0 means no alarm; For example, 1000 means Temperature Upper Limited Alarm. 2）It shows the real failure, not related to alarm relay output. 3）Red failure light is illumed **synchronous**. 4） Once the resistance value of PT100 is over range (18.52Ω~322.79Ω（-200℃~660℃）), it will show 0001；
8	Soft Rev. H	REV	N/A	1.0

3) Setting Menu , See Table 3：

Table 3 Setting Menu

S/N	Menu	Symbol	Unit	Remark
1	Setting Value	ST	℃	Defaulted: 50, Settable.
2	Hysteresis	HT	℃	Defaulted: 5, Settable. When temperature value is lower than 50℃, main relay is closed; When temperature value is higher than 55℃, main relay is open.
3	T Upper Value	TA	℃	Defaulted: 600℃, Settable. When temperature value is higher than 600℃, the red LED is illumed and main relay is open. When temperature value goes down up to lower than 600℃, the red LED is still illumed and main relay is still open except human interruption by pressing "SFT" key 10s for reset.
4	V Upper Value	UA	Vac	Defaulted: 400V, Settable. When Voltage value is higher than 400V, the red LED is illumed.
5	C Upper Value	CTA	A	Defaulted: 32A, Settable. When current value is higher than 32A, the red LED is illumed.
6	LC Upper Value	CTLA	mA	Defaulted: 100mA, Settable. When leakage current value is higher than 100mA, the red LED is illumed.
7	Relay Alarm Way	ALW	N/A	Defaulted: 1101（abcd）。 a：Temperature Upper Limited Alarm; b：Other Upper Limited Alarm（Current, Voltage,

				Leakage Current）; c：Communicate Failure Alarm（N/A）; d：Sensor Failure Alarm. Note: Comparing with Relay Alarm Code. Once they are both 1 (Any bit), alarm relay will closed.
8	Calculating the Power Consumption way	ECH	W	Defaulted: 0000. It means the power consumption value is added automatically, the data will be cycled once it reaches 9999. When it is set as 0024, it means the power consumption value will be the total in the following 24hours.
9	Address	ADD	N/A	Defaulted: 1. 1~247 Settable.
10	Baud rate	BAUD	N/A	Defaulted:2.9600bps, N,8,1；
11	Password	PW	N/A	**Defaulted:0001.**

6. **Communication**

ETC can communicate with PC or computer network system. Due to the interference or ground potential differences may disturb the communication, the isolated interface module is recommended and the screening twisted pair cable shall be adopted as soon as possible. See Table 4 for the register address information.

Table 4 The register address

S/N	Register Name	Attribute	Address	Length	Data Type
1	Soft Rev. H	R	3000	1	Int
2	Measuring Value	R	3001	2	Floating Number
3	Setting Value	R/W	3003	2	Floating Number
4	Hysteresis	R/W	3005	2	Floating Number
5	Voltage	R	3007	2	Floating Number
6	Current	R	3009	2	Floating Number
7	Leakage Current	R	3011	2	Floating Number
8	Power Consumption	R	3013	2	Floating Number
9	Calculating the Power Consumption way	R/W	3015	1	Int
10	Relay Alarm Code	R	3016	1	Int
	Relay Alarm Way	R/W	3017	1	Int
11	T Upper Limited Value	R/W	3018	2	Floating Number
12	V Upper Limited Value	R/W	3020	2	Floating Number
13	C Upper Limited Value	R/W	3022	2	Floating Number
14	LC Upper Limited Value	R/W	3024	2	Floating Number
16	Address	R/W	3026	1	Int
17	Baud rate	R/W	3027	1	Int
18	Password	R	3028	1	Int

Note: Modbus reading command: 03H, writing command: 10H.

7. **Storage**

The controller shall be stored in a dry, ventilated and non-corrosive warehouse.

8. **Packing list**

One controller, one PT100, One operation manual, One product qualification certificate.