XMT-6000

INTELLIGENT DIGITAL DISPLAY TEMPERATURE CONTROLLER

INSTRUCTION MANUAL

Before using this product, please carefully read this manual for its correct use. In addition, after reading the manual keep it available easily anytime.

WARNING

• Wiring precautions

—If failure or error of this instrument could result in a critical accident of the system, install an external protection circuit to prevent such an accident.

—In order to prevent instrument damage or failure, protect the power line and the input/output lines from high currents by using fuses with appropriate ratings.

• Power supply

—In order to prevent instrument damage or failure, supply power of the specified rating from 85VAC to 264VAC.—In order to prevent electric shock or instrument failure, do not turn on the power supply until all of the wiring is completed.

• In order to prevent fire, explosion or instrument damage never use this instrument at a location where inflammable or explosive gases or vapor exist.

• Never touch the inside of the instrument.

—In order to prevent electric shock or burns, never touch the inside of the instrument. Only "YATAI" service engineers can touch the inside of the instrument to check the circuit or to replace parts. High voltage and high temperature sections inside the instrument are extremely dangerous!

• Never modify the instrument.

—In order to prevent accident or instrument failure, never modify the instrument.

• Maintenance

—In order to prevent electric shock, burns or instrument failure, only "YATAI" service engineers may replace parts.

—In order to use this instrument continuously and safely, conduct periodic maintenance. Some parts used in this instrument have a limited service life and may deteriorate with time.

OPERATION PRECAUTIONS

Before cleaning the instrument, check that the power is turned off.

Remove stains on the display unit using a soft cloth or tissue paper.

As the display unit is easily scratched, do not scrub or touch it with a hard object.

Do not operate the front key with a pointed object such as a ballpoint pen or screwdriver, as this may scratch or damage the key.

1. PRODUCT CHECK

This instrument is applicable for the machines or equipments of injection molding, extrusion, bottle manufacture, food, packaging, printing and also can be used for controlling the temperature of the equipments of thermostats, dryness, heat treatment of metal and so on.

The PID parameters of this instrument can be set up automatically, so it is an intelligent instrument and its employ is vary convenient. This instrument is the optimal replacements of the electronic pointer controller and simulated digital display temperature instrument recently.

This instrument satisfies the requirements of the standard of the Q/SQG01-1999 intelligent digital display controller.

Check whether the delivered product is as specified by referring to the following model code list.

XMT □-□□□□ □ □ □—□

① ②③④⑤ ⑥ ⑦ ⑧ ⑨

①Panel Dimensions (mm)

D:96×96

E:72×72

F:96×48 (Vertical form)； F(H):48×96 (Horizontal form)

G:48×48

②Type of Display

6: Double rows display

③Type of control action

0: On off action Relay

3: Time proportion action

4: On-off PID action with auto-tuning

7: Single phase zero-across pulse PID action with auto-tuning

④On off position Alarm

0: No alarm

1: High alarm (XMTD, XMTF zero-across pulse output, logic level output and all models of XMTG have no this function)

⑤Type of Input

1: Thermocouple signal

2: Thermo-resistance signal (RTD input)

⑥Type of Output

No: Relay contact (Maximum 3A)

V: Logic output for SSR

A: Relay contact (Maximum 16A)

B: Relay contact (Maximum 16A)

⑦Type of calibration

⑧Lower limit of the span

⑨Upper limit of the span

<Accessories>

Mounting bracket: 2 pieces

Instruction manual: 1 copy

2. MOUNTING

2.1 Mounting cautions

（1）environmental condition

Ambient pressure：86~106kPa。

Ambient temperature：0~50℃。

Ambient humidity：45~85%RH。

（2）Following cautions must be kept in mind while mounting:

Rapid changes in ambient temperature, which may cause condensation.

Corrosive or inflammable gases.

Direct vibration or shock to the mainframe.

Water, oil, chemicals, vapor or steam splashes.

Excessive dust, salt or iron particles.

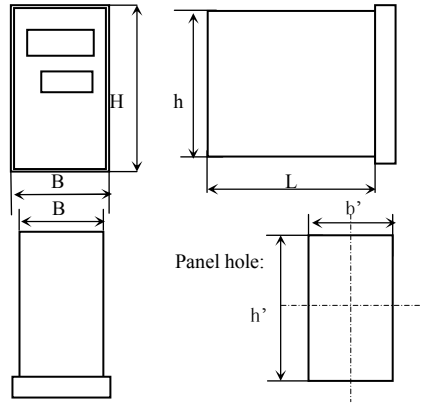
Excessive induction noise, static electricity, magnetic fields or noise.

Direct airflow from an air conditioner.

Should be used indoors where the system is not exposed to direct sunlight.

Heat to be accumulated radiation heat.

2. 3 Dimensions



mm

Type	H×B	h×b×L	h' ×b'
XMTD	96×96	92×92×100	(92+1) ×(92+1)
XMTE	72×72	68×68×100	(68+1) ×(68+1)
XMTF	96×48	92×44×100	(92+1) ×(44+1)
XMTF(H)	48×96	44×92×100	(44+1) ×(92+1)
XMTG	48×48	44×44×100	(44+1) ×(44+1)

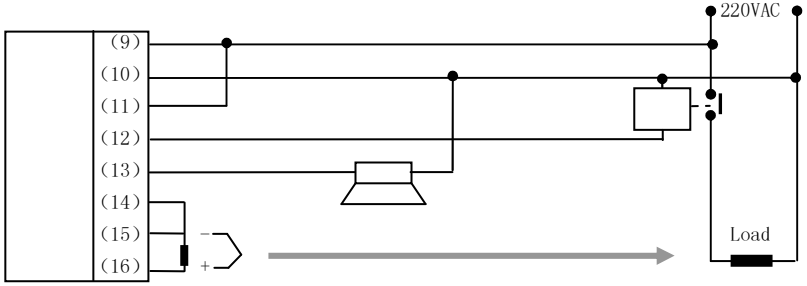
3. WIRING

3．1 Wiring cautions

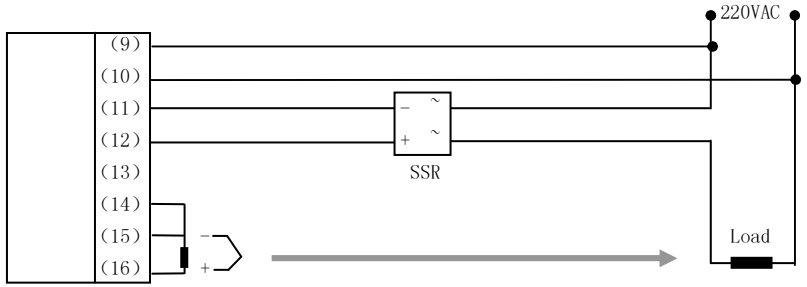
（1）For thermocouple input, use the specified compensation wire.
（2）For RTD input, use leads with low resistance and having no resistance differences among the 3 leads.
（3）Conduct input signal wiring away from instrument power, electric equipment power and load lines to avoid noise induction.

3．2 Terminals' configuration

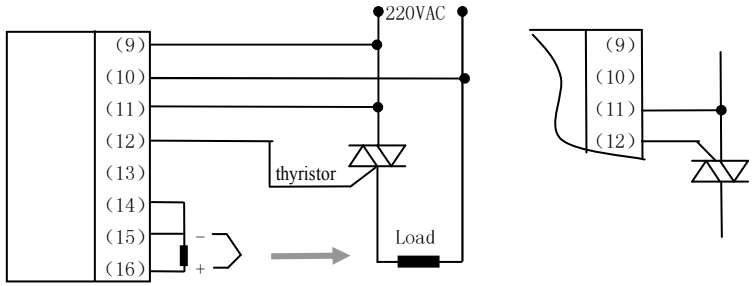
（1）Terminals for Model: XMTD-6011, 6311, 6411, 6012, 6312, 6412 and XMTF-6011, 6311, 6411, 6012, 6312, 6412 (96×96) （96× 48



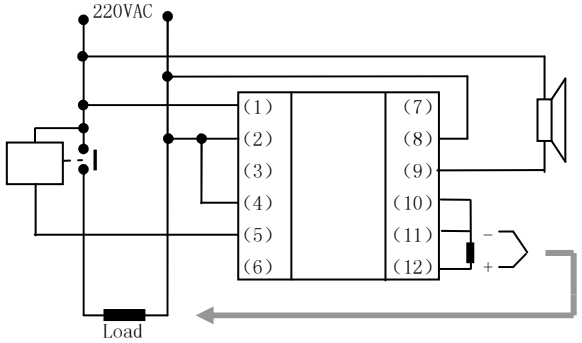
（2）Terminals for Model (with SSR): XMTD-6401V, 6401V, 6302V, 6402V and XMTF-6301V, 6401V, 6302V, (96×96) （96× 48



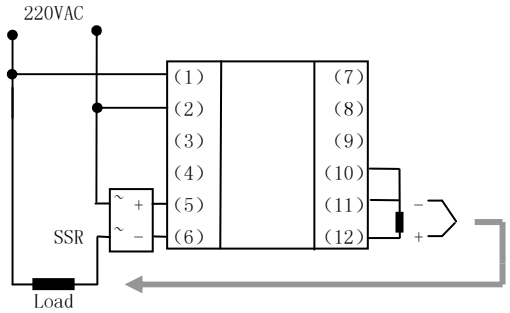
（3）Terminals for Model (with bi-directional thyristor): XMTD-6701, 6702 and XMTF-6701, 6702 (96×96) (96×48)



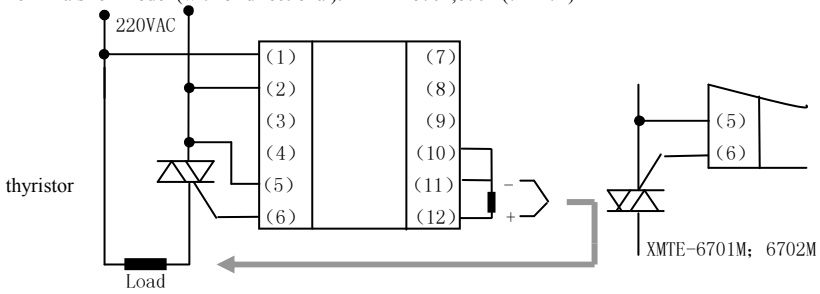
（4）Terminals for Model: XMTE-6011, 6311, 6411, 6012, 6312, 6412 (72×72)



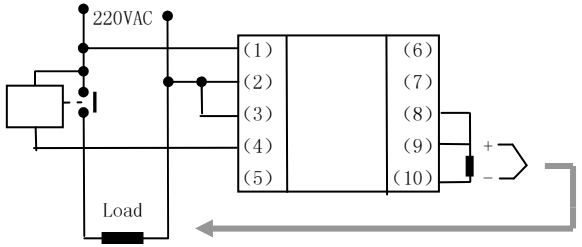
（5）Terminals for Model (with SSR): XMTE-6301V, 6401V, 6302V, 6402V(72×72)



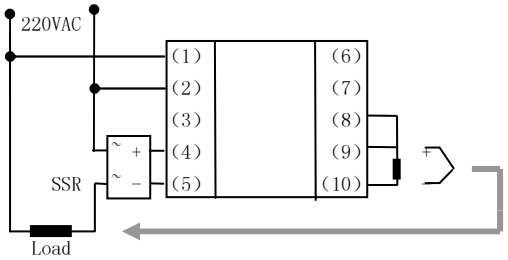
（6）Terminals for Model (with bi-directional): XMTE-6701,6702 (72×72)



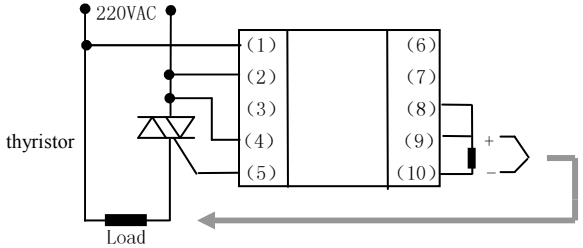
（7）Terminals for Model: XMTG-6001, 6401, 6002,6302, 6402 (48×48)



（8） Terminals for Model (with SSR): XMTG-6301V, 6401V, 6302V, 6402V(48×48)

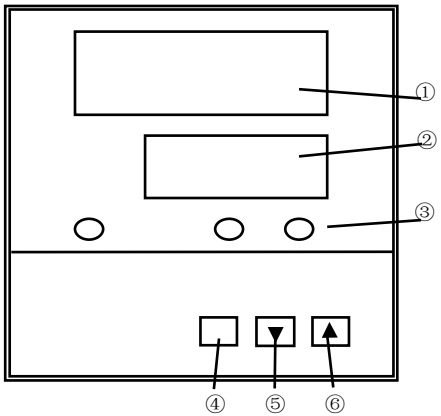


（9）Terminals for Model (with bi-directional thyristor): XMTG-6701,6702(48×48)



Power supply voltage:
198 to 242 VAC (Including power supply voltage variation)(50Hz)
Control output rated:
Relay contact output: 240 VAC, 3A(Resistive load)
Voltage output:0 to 12 VDC (Load resistance 600Ω or more)

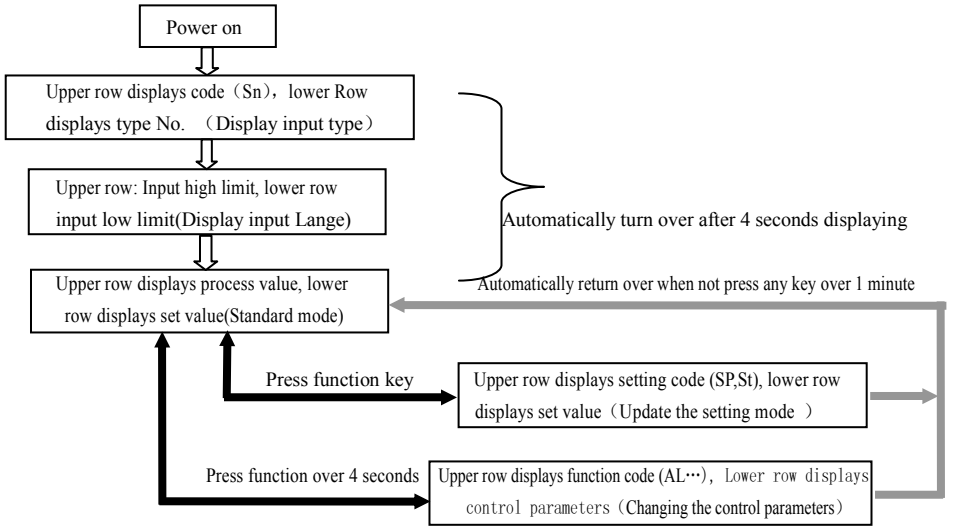
3.3 Configuration of the Instrument Panel



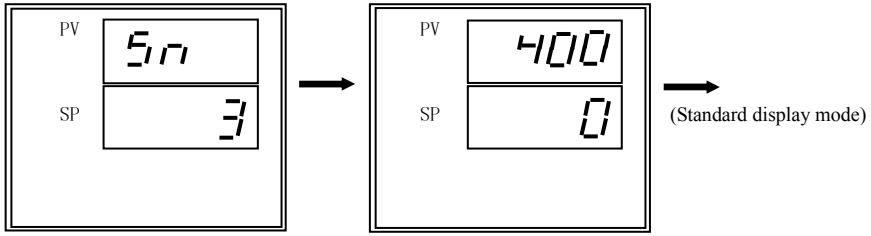
①Measured value (PV)display unit (Red)
•Displays measured value (PV).
•Displays various characters depending on the instrument.
②Set value (SV)display unit (Green)
•Displays set value (SV)
•Displays various each parameter set value depending on the instrument.
③Indication lamps
•Auto-tuning(AT)lamp [Green]. Flashes during auto-tuning execution.
•Control output lamps [Green]（OUT）turned on when outputs operate
•Alarm output lamp (ALM)[Red] turned on when output operate
④ Function key
•Used for displaying the change and confirm of the parameters
⑤、⑥Adjusting key to change the digital code and/or the key to express entering the auto-tuning state
•. Used for adjusting the digital code displayed or entering the auto-tuning state.

4. OPERATION

4. 1 Sequence to pick up the functions of the instrument



Example：Input: Thermocouple E, 0~400℃.When turn on power, display:



Code	Sn	Type
Type of input	0	S
	1	B
	2	K
	3	E
	6	Pt100
	7	Pt100
	8	Cu50

Input signal	Type	Range（℃）
Thermocouple	E	0~600
	K	0~1300
	S	0~1600
	B	200~1800
RTD	Pt100	-200.0~2.000
	Pt100	-200~500
	Cu50	-50.0~150.0

4.2 The detail description for every function

• If upper row displays “OVER” the sensor is in open circuit or the input signal excesses the range

of measurement.

• The method for changing set value:

Press ↻ key the high row displays SP. Press ▲ or ▼ key，the low row displays the needed value. Again press ↻ key, return to the standard display mode.

• The method for changing control parameter:

Press ↻ key over 4 seconds, the high row displays the parameter display code. Press ▲ or ▼ key the low row displays the needed parameter value. Again press ↻ key over 4 seconds,

return to the standard display mode. (If not press any key over 1 minute, return to the standard display mode automatically.)

• Following table lists the function parameters

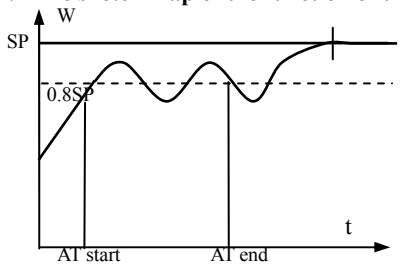
Parameter display code	Name	Setting range	Description	Initial value setting at factory
rE	Time Proportion Re-setting	-99（99.9）～100（100.0）℃	The proportion re-setting only used for adjusting the static deviation of The proportional system.	0
rt	Process value biasing	-99（99.9）～100（100.0）℃	Used for correcting the measure deviation caused by the sensors and compensation wire of thermocouple	0
dF	Dead band	0.4～100（100.0）℃	Dead band for on-off control and Alarm. For on-off controller, On-off control and alarm adopted Same value.	0.4
AL	Alarm point (Setting)	-1999～1999 ℃	Upper limit alarm for AL＞0, low Limit alarm for AL＜0. The state of Output turn over automatically.	50
T	Control Period (On heating side)	1～100 second	Relay output ＜20s,SSR and thyristor output＜3s continuous output,1s.	20 2
Ct	The delay time fof alarm output	1～3600 second	When the measuring value increases to the alarm value, after Ct time the alarm relay output acts.	0
P	Proportional Band (On heating side)	1～300 ℃	When “P” is large, the proportional action is small. Only used for heating side.	30
I	Integral Time (Re-setting time)	1～3600 second	When “I” is large, the integral action is small.	240
d	Derivative Time (Pre -setting)	1～3600 second	When “D” is large the derivative action in large.	60
Lc	Set data lock function	0～2	0:All parameters can be updated. 1:Only SP can be updated. 2:All parameters cannot be updated.	0

4.3 The function of the controller Auto-tuning

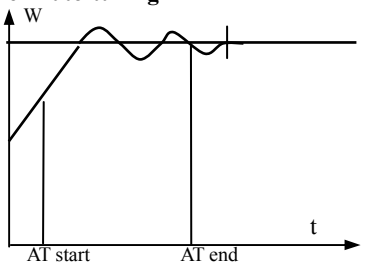
After pressing ▲ key 8 seconds the lamp of AT flashes and the auto-tuning process starts; after the end of auto-tuning the lamp of AT world be turned out. Then a set of PID parameters can be got automatically for quickly increasing the process temperature. The controller operates according to this set of PID parameters.

After pressing ▼ key 8 seconds the lamp of AT flashes and the auto-tuning press starts; after the end of auto-tuning the lamp of AT be turned out. A set of PID parameters can be got automatically for overcoming temperature overshoot. The controller operates according to this set of PID parameters.

4.4 The sketch map of the function of the controller Auto-tuning



Press ▼ key to start auto-tuning



Press ▲ key to start auto-tuning

5. Description of each function

• rE——for re-setting of proportional controller. This function is only used for XMT-8300. Due to the varieties of process power and controlled temperature, the static deviation of the system controlled by the proportional controller is caused. Through adjusting the value of the parameter rE, the static deviation may be decreased even removed.

Example as a equipment with a setting point temperature 200℃. After system have to be stable the controlled temperature is 204.5℃. That is to say a static deviation of 4.5℃is yielded. Then we can set the rE to -4.5℃. After some time the system can be re-stable at the controlled temperature about 200℃.

• rt——for correcting the measuring value. This function can be used for all the controllers in this series o instrument. The deviations caused from sensor, compensation wire of thermocouple and the controller accuracy can also be decreased even to be removed by adjusting the parameter rt.

Example as the setting value of the controller is 200℃ and the measuring value also is 200℃, but the actual controlled temperature measured by a high accuracy mercury temperature meter is 201.7℃. At that time we can set the parameter rt=1.7℃,then the temperature displayed as 201.7℃. After a very long controlling time the temperature also be stable at 200℃ that is the same as the value measuring by the mercury temperature meter.

• dF——for setting the dead band of on-off control and alarm. If we set dF=1.0℃, than the output of controller will be changed at ±0.5℃ deviated from the setting value of temperature.

• AL——for setting the alarm point.

When the controller is set as deviation alarm, the actual alarm point will be SP+AL. Example as a controller whose set point SP is 200℃. When we set the alarm point AL to be 10℃, then the actual alarm controlled point is at 200.0+10.0=210.0℃. That is to say, if the process temperature is larger than SP+AL+1/2dF, the alarm relay will be put on and when the process temperature is smaller than SP+AL-1/2dF, the alarm relay may be put on at 210.5℃ and put off 209.5℃.

On the other hand, when we set the AL at -10.0℃, then the actual alarm controlled point is on the value of 200.0-10.0=190.0℃. At the same time the state of output is also changed. When the process temperature is smaller than SP+AL-1/2dF, the alarm relay will be put on and larger than SP+AL-1/2Df the alarm relay will be put off. If dF also be set at 1.0℃, then the alarm relay point for putting on is 189.5℃ and the point for putting off is 190.5℃. This function not only can be used to low limit alarm but also be used for controlling heating with large power (needed dual heating elements) to shorten the time of increasing temperature and decrease the overshoot of the system.

When the controller is set as absolute measuring value alarm the actual point of alarm is AL. If AL is set larger than SP the alarm is an upper limit alarm one. If AL is smaller than SP the alarm is a low limit alarm.

• Ct——for setting the delay time of alarm. Ordinary the ct value should be set to zero. When the alarm output is used to the refrigeration compressor, the delay time of alarm ought to longer than 180 seconds..

• T——for setting the control period. Ordinarily if the controller using the AC contactor, the control period is ought to set between 20.0~60.0 seconds and if the controller using the solid relay and deadband the control period is ought set between 2.0~10.0 seconds.

• P——for setting proportional band. When take place regular oscillation of controlled temperature, the proportional band should be increased and if controlled temperature drifts irregularly we ought to decrease the proportional band.

• I——for setting the integral time. When the system takes place regular oscillation ought to increase integral time and if the system controlled can not remove the static deviation in a long time ought to decrease the integral time.

• d——for setting the derivative time. Increasing the derivative time can decrease the overshoot of the system.

Shanghai Yatai Instrumentation Co., Ltd.

Address：
No.1851 Sichuanbei Road, Shanghai, China
Tel：021-51053127 51053128 Fax : 086-021-51053123
Mail Code: 200081 Email: yatai@yatai.sh.cn