SX700 SERIES
TEMPERATURE CONTROLLER

SILVER AUTOMATION INSTRUMENTS

Control Loop: 1-2 loops

Program Quantity:
Max 10 suits programs;
Each suit contains max 30 segments.

High Accuracy: ± (0.1% F.S)

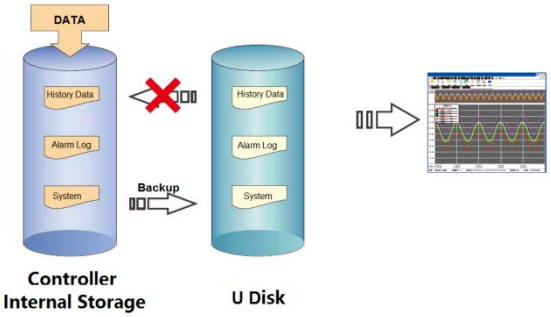
Sampling Period: 200msec

Configuration Backup

- Configuration parameter and program segments can be transferred by U disk or Communication to PC. The parameters can be saved or edited by our provided free software on PC. Then you can transfer the parameters to temperature controller by U disk or communication.

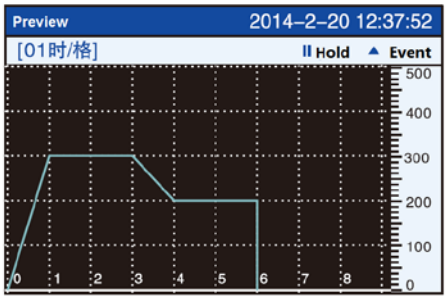
Record & Backup

- The reordered data can be transferred to PC by U disk. You can analyze or save the data through the provided software on PC.



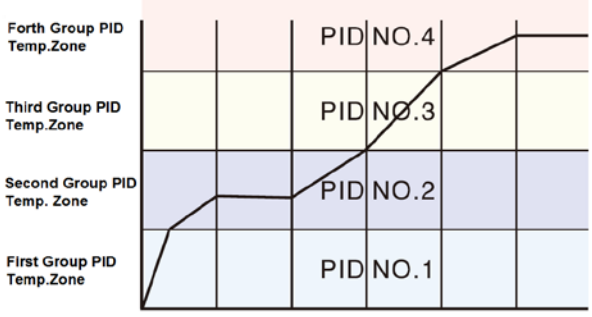
Program Segments & Preview

- Program segments: max 10 suits programs; each suit contains max 30 segments.
- Preview: Preview function could display a curve table of current program.



Zone PID

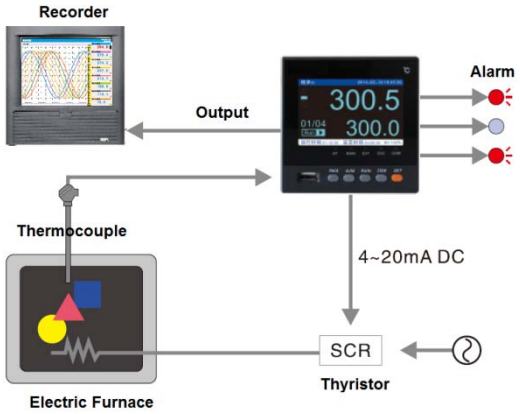
- You can choose PID parameters according to the temperature zones.
- Max 4 groups.



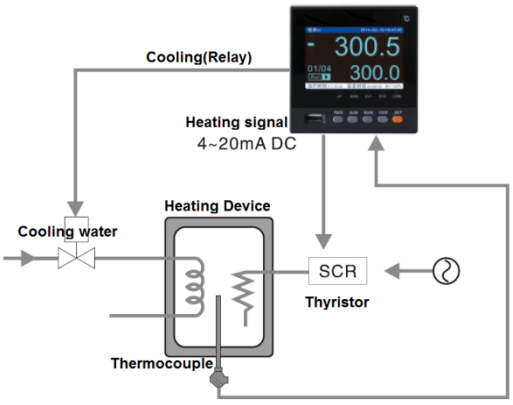
Application

Industry Furnace Control

Electric Furnace Control

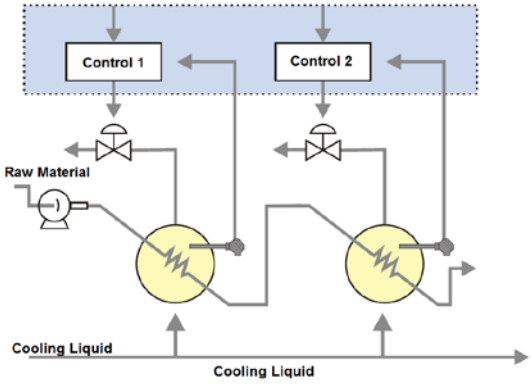


Heating/Cooling

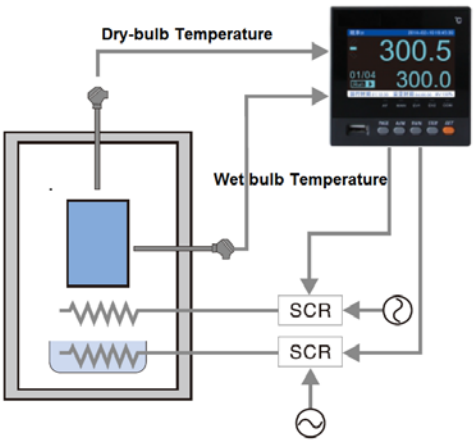


Scientific Experiments & Control

Double Loops Control

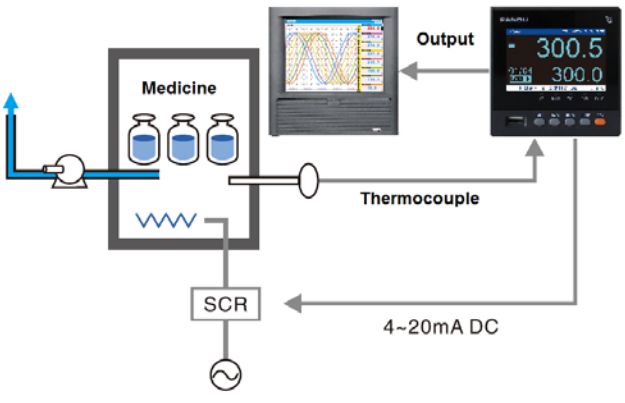


Temperature /Humid Control



Medicine & Semiconductor Production Application

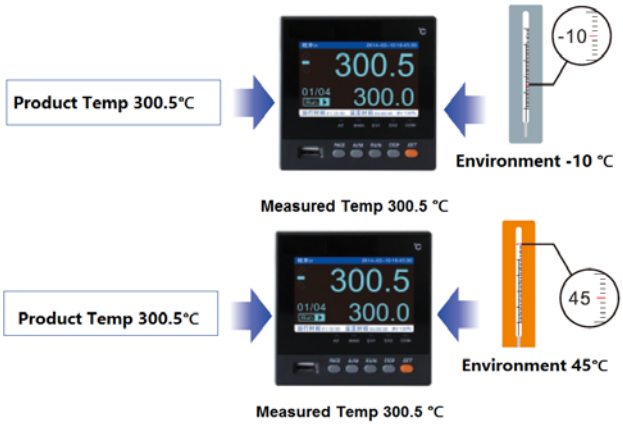
Temp Control Disinfection



Reflow Oven Temp Control

Universal Inputs

- High accuracy: Adapts 24 bits high accuracy∑-△A/D converting chip, sampling accuracy ± (0.1% F.S)
- High speed: response time ≤ 0.5 second
- Anti-Interference: High
- Open circuit detection: Open circuit of thermocouple, RTD, open circuit occurs when standard signal under 0.5V or 2mA.
- Response time of open circuit: 2 seconds
- Low temperature drift: low temperature drift, input value will not be affected by the areas and the seasons.



Control Output

- **Current Output**

Signal type: 4-20mA/0-10mA/0-20mA

Function: 1. Control Output

2. Transmitting output

Load Capacity: 600Ω or lower load resistance

Accuracy: ± (0.1% F.S)

- **Output Pulse Voltage**

Function: Control output or external solid relay

Output Mode: Time scale

Resolution: 10ms or 0.1% of the input value

Threshold voltage:12V or large,600Ω or higher load resistance

Low Voltage Shutdown: 0.1V or lower

- **Relay**

Function1: Control output

Output Mode: Time scale

Resolution: 200ms or 0.1% of the input value

Function 2: Alarm output

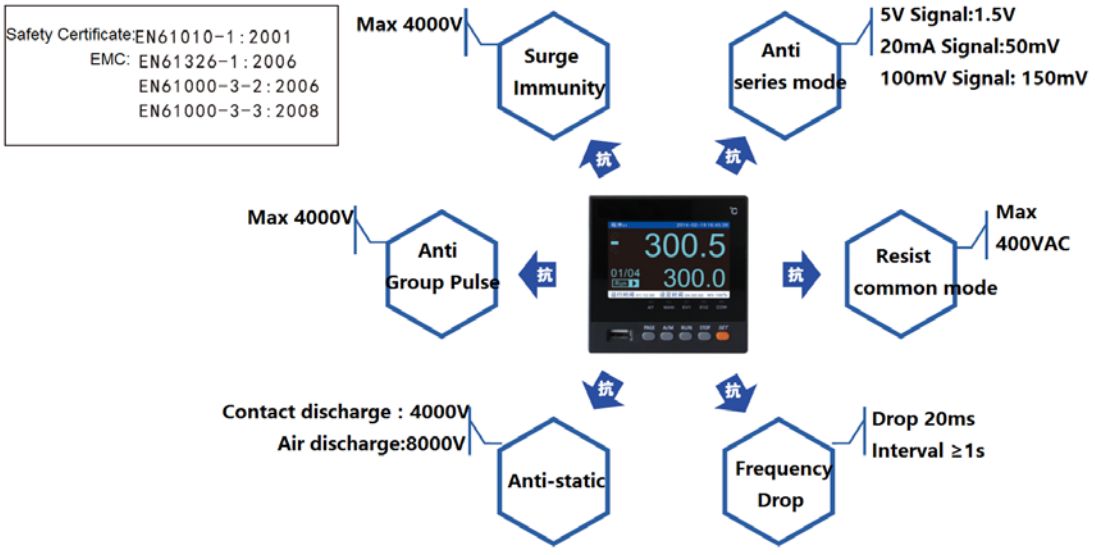
Function 3: Output event

Rating value of junction:

250 VAC(50/60Hz)3A

30VDC/3A(resistance load)

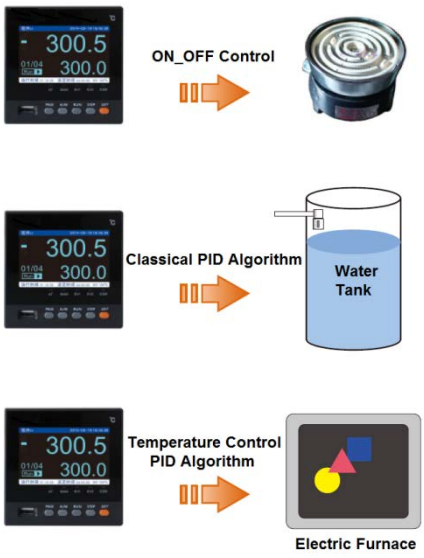
Anti-Interference



Control Algorithm

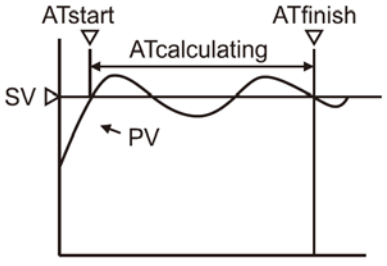
SX700 has 3 kinds control Algorithm.

1. ON_OFF control: simple use and low control accuracy
2. Classical PID Algorithm: Widely used algorithm, simple theory, easy realization, widely application and simple parameters.
3. Temperature Control PID Algorithm: it is an optimizing algorithm; it has obvious effect on the objects of self-equilibrium such as the electric heating system. It has high control accuracy.

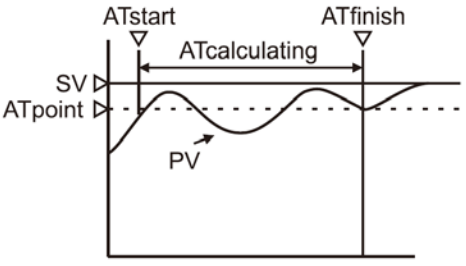


At algorithm

PID algorithm is difficult to obtain ideal parameter. However, At algorithm is an idea way in doing. This applies the relay feedback At algorithm. After At progress, the meter will calculate the PID data automatically .Biased At is applied in a situation where measured value does not exceed the setting value. Once the biased At is set, the meter will calculate the tuning value automatically and execute the tuning process.



unbiased AT

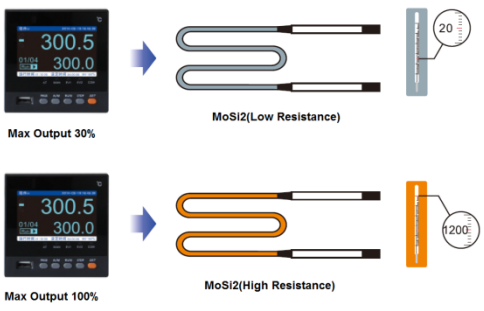


biased AT

Power Limitation

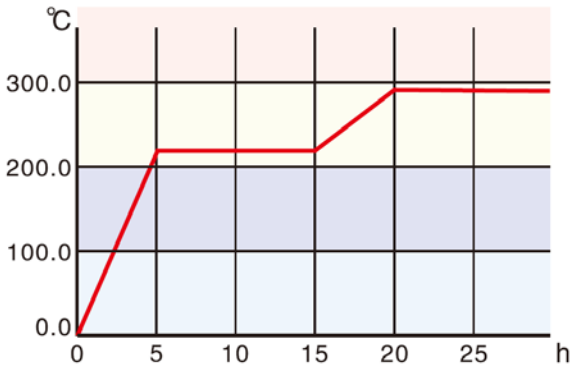
Heating element such as MoSi2's resistance value is small under low temperature. And the resistance value will become bigger after heating. It's easy to burn down the electrical heating element if the output value is very big when operating in a low temperature environment.

When the power limitation mode turns on, if the measured temperature is lower than the temperature limitation, the output value of valve location will limited under the range of Limitation Valve; if the measured value exceed the limitation temperature, it could up to limit of ouput, in this way, the electrical heating element could be saved from burning and the control of setting value could be promised.



Program Segments

1. Max 10 suits programs; each suit contains max 30 segments
2. In a suits of program, it concludes the start, heating process, holding period, cooling process, event, stop., etc.
3. Action: Continue, Hold, Stop
4. Restart mold including Continue,Runing and Hold
5. Measuring value startup function
6. With program segment preview function



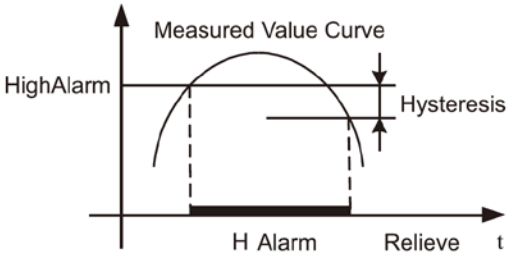
Record Function

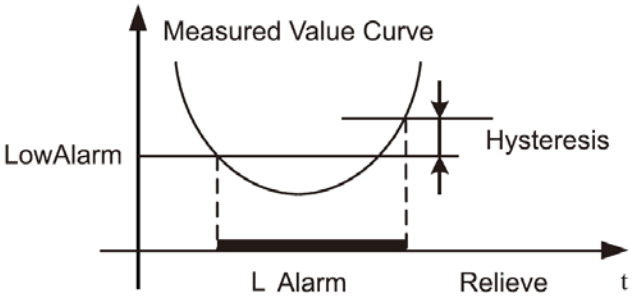
The measured value of every circuit will be recorded in the meter and all of the previous records make up the historical data. Historical data is saved in the meter circularly. The data which is out of the record time will be eliminated. The length of the record time is related to the inter-record gap. The bigger it is, the longer the record time is.

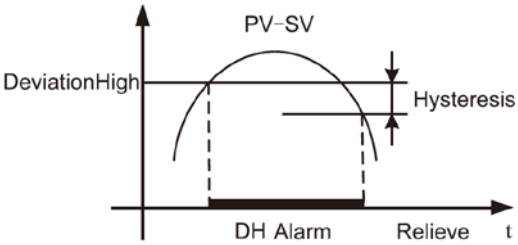
Interval	1 second	2 seconds	5 seconds	10 seconds	30 seconds
Record time	3 days	6 days	15 days	1 month	3 months
Interval	1 minute	2 minutes	5 minutes	10 minutes	30 minute
Record time	6 months	1 year	2.5 years	1 year	15 years

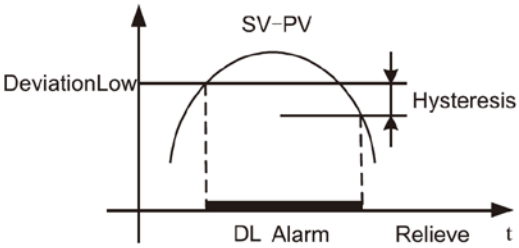
Alarm

Alarm type: High alarm (H), Low alarm (L), Deviation High (DH), Deviation Low (DL)

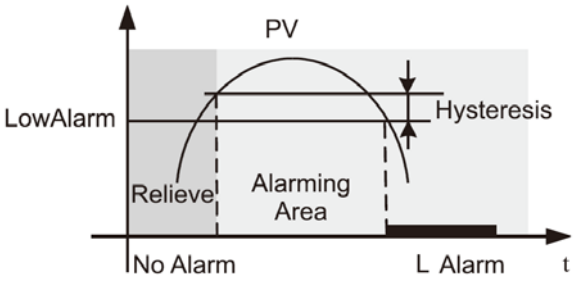






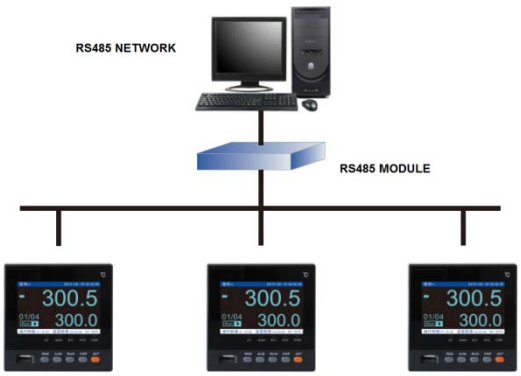


Prevent Alarm: LOAL or DLAL often occur when you are starting up the meter or modifying the settings. But during this time, the system runs normally. Thus the alarm is invalid. The Function of Prevent Alarm is to eliminate this kind of invalid alarm.

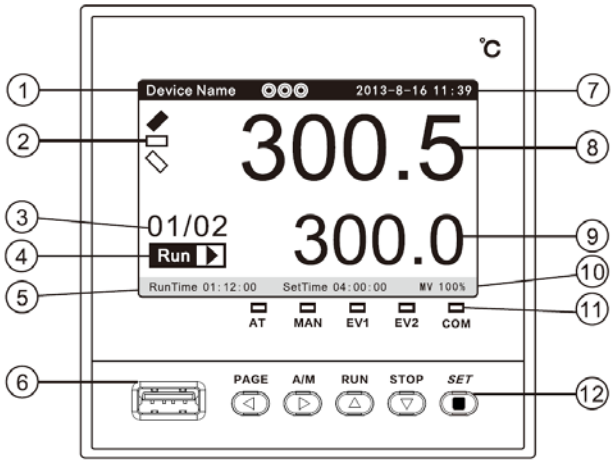


Communication

The SX700 temperature Controller can connect to PC through RS485.

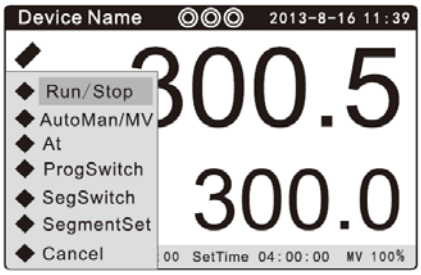


Display and Operation Instructions

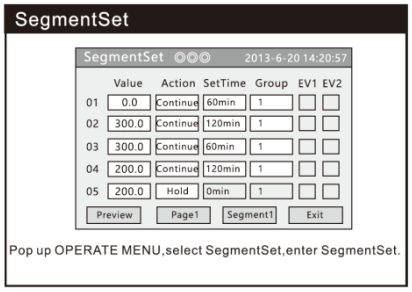


NO.	Description	Function	NO.	Description	Function
①	Title	Display [Device Name]	⑦	System time	display the system time of the instrument
②	Indicator of heating	heat up heat preservation heat down	⑧	PV value	display the measured value
			⑨	SV value	display the setting value
			⑩	MV value	display the valve value
③	Indication for program segment	The "01"of "01/02"indicates the number of running program;the "02"of "01/02"indicates running program segment	⑪	Indicator	"AT" The indicator will flicker when it's self-tuning "MAN" The indicator will turn on in manual mode "EV1" After trigger event NO.1, the indicator will turn on "EV2" After trigger event NO.2, the indicator will turn on "COM" The indicator will flicker during communication
④	Running status	"RUN" means running "HOLD" means pause "STOP" means stop running			
⑤	Time indicator	Display the running time and setting time of the present segment	⑫	Key	◄left 【PAGE】 ►right 【A/M】 ▲increase 【RUN】 ▼reduce 【STOP】 SET set
⑥	USB	Configuration parameter import, data backup			

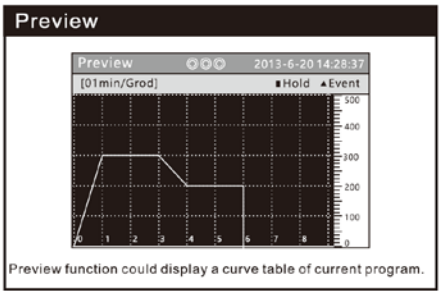
Display



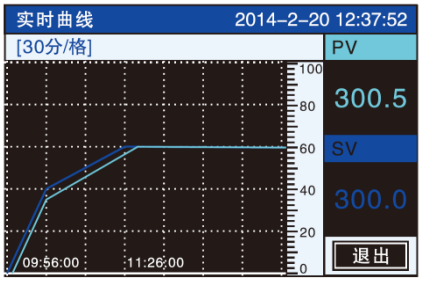
Control Display



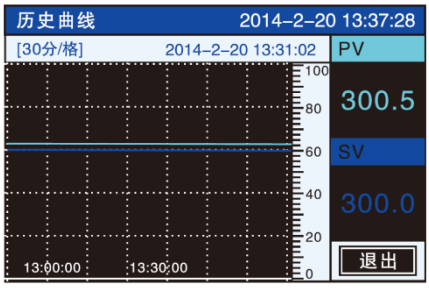
Segment Set



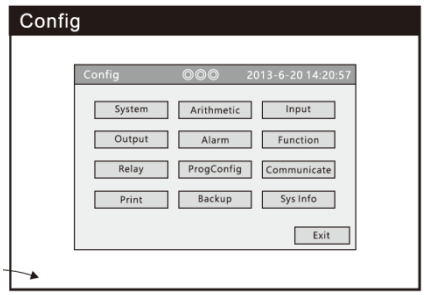
Preview



Real Curve



History Curve



Configuration

Technical Specification

Construction

Installation Method	Panel mounted
Installation Angle	Horizontal tilted backwards 30 degree
Panel thickness	1-10mm
Outline Dimensions	96(W)×96(H)×93(D)
Net Weight	＜ 0.8kg (not including accessories)

Power

Rated power supply:	220VAC
Allowed Voltage Range:	100VAC~240VAC
Rated Frequency:	50Hz
Consumption	≤3W

Input

Input Channel:	1-2 channels
Measuring Period	≤0.5 second
Signal types:	Direct Current (I), direct voltage (V), thermoucple and RTD.

Input types and Range

Signal	Signal Type	Measuring Ranges	Accuracy (25℃)	Input Resistance
RTD	PT100	-200.0℃-650.0℃	±0.3℃	---
	Cu50	-50.0℃-150.0℃	±0.3℃	---
TC	S	-50℃-1768℃	±1℃	1MΩ
	R	-50℃-1768℃	±1℃	1MΩ
	B	500℃-1820℃	±1℃	1MΩ
	K	-200℃-1372℃	±1℃	1MΩ
	N	-200℃-1300℃	±1℃	1MΩ
	E	-200℃-1000℃	±1℃	1MΩ
	J	-200℃-1200℃	±1℃	1MΩ
	T	-200℃-385℃	±1℃	1MΩ
	WRE5-26	0℃-2310℃	±2℃	1MΩ
	WRE3-25	0℃-2310℃	±2℃	1MΩ
Current	4-20mA	4.00mA-20.00mA	±0.2%	≤300Ω
	0-10mA	0.00mA-10.00mA	±0.2%	≤300Ω
	0-20mA	0.00mA-20.00mA	±0.2%	≤300Ω
Voltage	1-5V	1.000V-5.000V	±0.2%	1MΩ
	0-5V	0.000V-5.000V	±0.2%	1MΩ
	20mV	0.00mV-20.00mV	±0.2%	1MΩ
	100mV	0.00mV-100.00mV	±0.2%	1MΩ
Resistance	400Ω	0.0Ω-400.0Ω	±0.2%	---

Control output

{Control Output}

Signal type: 4-20mA/0-10mA/0-20mA

Load Capacity: 600Ω or lower load resistance

Function: 1. Control output 2. Transmitting output

{Output Pulse Voltage}

Output Mode: Time scale

Resolution: 10ms or 0.1% of the input value

Threshold Voltage: 12V or large,600Ω or higher load resistance

Close Voltage o.1 V or smaller

{Relay}

Output Mode: Time scale

Resolution: 200ms or 0.1% of the input value

Rating value of junction: 250 VAC(50/60Hz)3A 30VDC/3A(resistance load)

Analogue Input Board

Resolution: 16 bits

Sampling speed: 1 second

Signal terminal voltage: Min -24V ,max +24V

Series-mode Rejection Voltage(50Hz): 5V signal:1.5V, 10V signal:1.5V, 20mV signal：50mV

	100mV signal：150mV
Open circuit detection:	Open circuit of thermocouple, RTD, open circuit occurs when standard signal under 0.5V or 2mA.

Display

Display:	3.5” TFT color LCD (320×240 dots)
Unit：	7 letters or numbers
Status Display:	Title,alarm,USB,Time,etc
Display modes:	Control display, Function display (real curve, history curve, back up, system log),configuration display
History Curve:	Display the recorded value, zoom 1/2/4/8/16/32
Display refresh Rate:	0.5 second

Alarm

Alarm types:	High alarm (H), Low alarm (L), Deviation High (DH), Deviation Low (DL)
Alarm Delay time:	0-10 second
Display	When alarm occurred, it will display on corresponding display ,and alarm icon on status bar
Alarm log:	Alarm log display happened alarms

Alarm Event Relay

Output points:	3 relays
Contact Capacity:	250VAC/3A;30VDC/3A (Resistance load)

Transportation and Storage

Environment Temp:	-10 ℃~60℃
Environment Humidity:	0%~95% (Non-condensate)

USB Function

Protocol:	Compatible USB 2.0 protocol
Terminal Port Quantity	1

Additional Specifications

Output Voltage (/T1)

Output type:	4~20mA/0-10mA/0-20mA

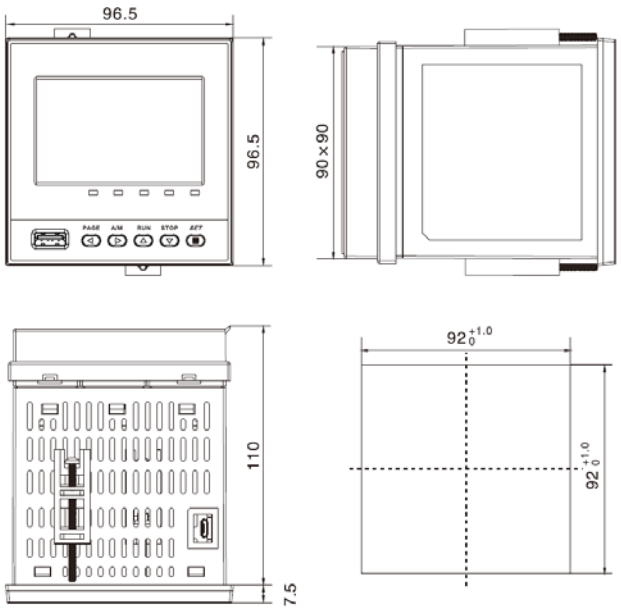
Communication Function (/C3,/C33)

Mode:	RS485
Protocol:	MODBUS-RTU
Rate:	1200/2400/4800/9600/19200/38400/57600/115200

Print (/C4)

Printer:	Panel type micro printer
Print content:	Real curve, history curve,
Print Method:	Manual or timing print

Sizes (unit mm)



Model Selection:

Model	Code		Function
SX701			Single loop control,30 segments *1
SX702			Double loop controls,30 segments for each loop *1
Addition	/T1		4~20mA output 1 channel *2
	/A□	1~3	Relay 1~3 *3
	/MT10		Each loop 10 groups process parameters, each process max 30 segments program
	/C□	3	1 channel RS485
		33	2 channels RS485
		4	Micro printer terminal port *4
	/U		USB port

*1 :Signal inputs: K,S,T,B,E,J,R,N,WRE5-26,WRE3-25

*2: Signal outputs Options: 4~20mA, 0~20mA, 0~10mA,

*3: Relay 1 & relay 2 is normal open relay, relay 3 is normal close .

*4: Dedicated to micro Pinter.

Terminal Wiring