SenseFuture TEC215 Dual Channel Temperature Controller Instruction Manual

Contents

SenseFuture TEC215 Dual Channel Temperature Controller

Striving for the Bright Future of Precision Optical Measurement.

Product Functions

TEC207/215 is primarily used for temperature measurement and control in large sample chambers.

Product Features

- Temperature measurement sensitivity: 0.1 mK, long-term temperature measurement drift (24h): <1 mK.
- Temperature control stability: ±0.001~0.01°C (dependent on the controlled object and parameters), suitable for most scenarios, including the stringent temperature control requirements of semiconductor lasers.
- Bipolar or unipolar output options available.
- Capable of limiting the maximum rate of temperature change.
- Supports thermistor temperature sensors (NTC).
- Capable of high-power output (maximum support for single channel 24V 15A).
- Features overheat protection for the circuit board, reliable performance.
- Allows direct parameter setting via the display control module, with data retention upon power loss, facilitating production by operators.
- Provides complete serial port control commands, open platform.

Product Parameters

Table1 Basic Parameters of TEC207/215 Series

PARAMETER	MODEL				UNIT
	TEC207L	**TEC207**	**TEC215L**	**TEC215**	
24-hour Temperature Measurement Stability (with the matched thermistor)	<0.001@20℃				℃
Temperature drift caused by ambient temperature	0.0001				℃/℃
Optimal Temperature Control Stability (related to the overall system)	**±0.01**	**±0.001**	**±0.01**	**±0.001**	℃
Temperature Change Limit Setting Range	0.01~2.5				℃/s
Temperature Setting Method	UART				
Power Supply Voltage (Short-term Maximum Voltage: 30V)	7~24				V
Output Polarity	Bipolar Unipolar				V
Number of Channels	2				
Maximum Output Voltage	±90%Vin (Settable)				
Output Current Range	**±7A each channel**		**±15A each channel**		A
Maximum Output Current Limit	±10A		±20A		A
Operating Ambient Temperature	-55~70				℃
Operating Ambient Humidity	0~98				%RH
Thermal Dissipation Requirements	No Additional Thermal Dissipation Needed Within Rated Operating Range				
Circuit Board Overheat Protection	Yes				
Power Loss Memory	Yes				
PID Parameters	User Adjustable				
Dimension	94.3*79.5*20.5				mm^3
Weight	≈240				g

Interface Introduction

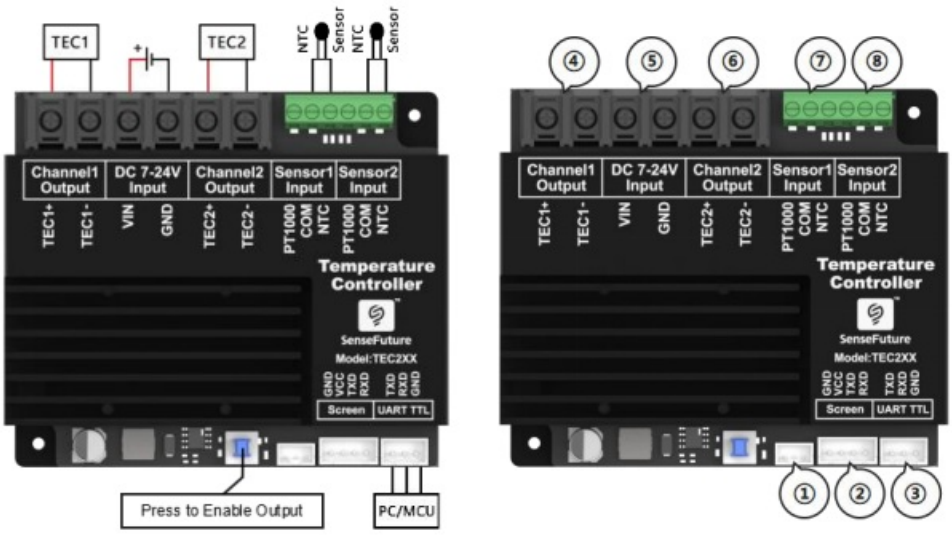


Figure2 Wiring Diagram of TEC207/215 Series

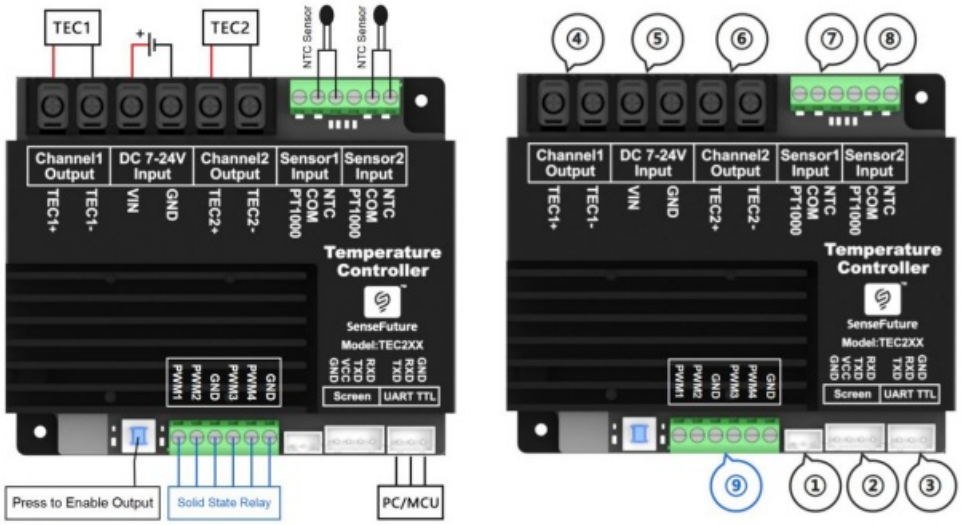


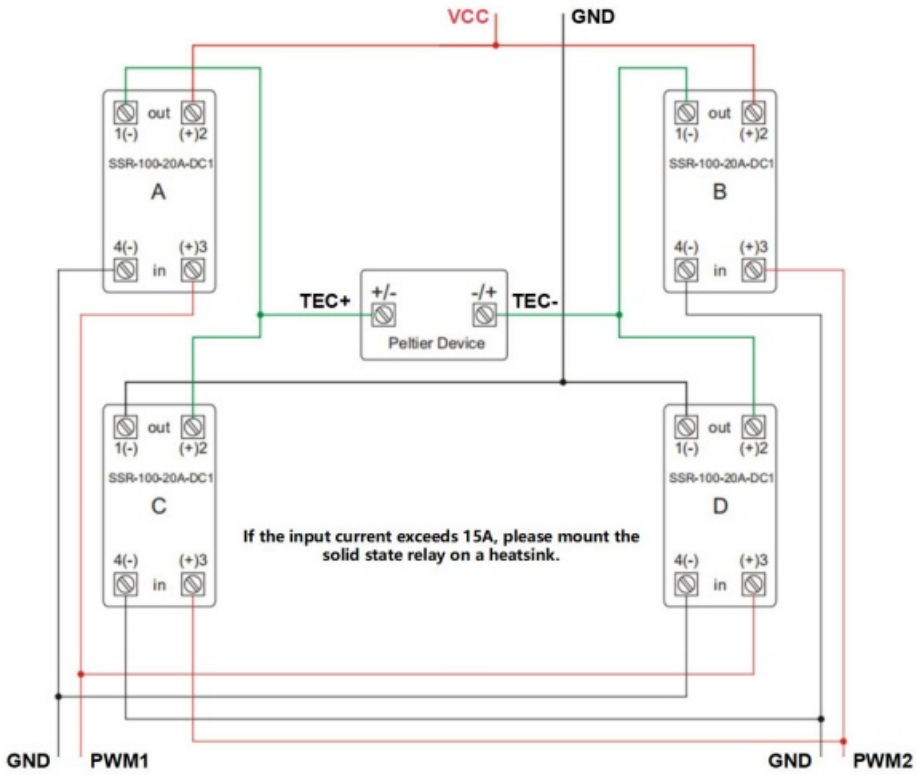
Figure3 Wiring Diagram of TEC207/215 Series（**Solid State Relay Version**）

Table2 Pin Definition Table for TEC207/215 Series

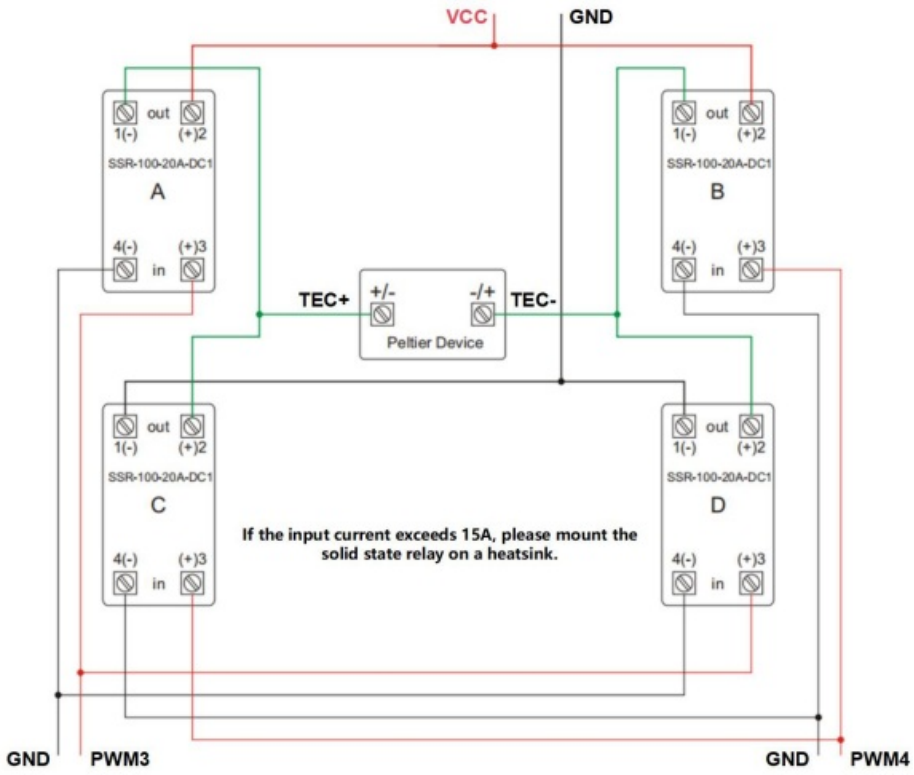
	Pin Name	**Pin Type**	**Pin Definition (High Level: 3.3V, Low Level: 0V)**
①	STATE1	Output	Channel 1 Temperature Control Status Output. High Level: Temperature control is normal (temperature control error < 0.01°C); Low Level: Temperature control abnormal (temperature control error ≥ 0.01°C). The temperature control standard of 0.01°C is configurable.
	STATE2	Output	Channel 2 Temperature Control Status Output. High Level: Temperature control is normal (temperature control error < 0.01°C); Low Level: Temperature control abnormal (temperature control error ≥ 0.01°C). The temperature control standard of 0.01°C is configurable.
	GND	Input	Power Input Negative Pole (Low Current).
	GND	Input	Power Input Negative Pole (Low Current).
	VCC	Output	3.3V Output, Intended for Connecting to the Screen Display Control Module, Not Recommended for Other Purposes.

②	TXD	Output	Serial Port Transmitter, TTL Level, Used for Connecting to Screen Display Control Module.
	RXD	Input	Serial Port Receiver, TTL Level, for Connecting to Screen Display Control Module.
③	TXD	Output	Serial Port Transmitter, TTL Level, used for connecting to PC control software. Data Bits: 8, Stop Bit: 1, Parity: None, Baud Rate: 38400.
	RXD	Input	Serial Port Receiver, TTL Level, used for connecting to PC control software. Data Bits: 8, Stop Bit: 1, Parity: None, Baud Rate: 38400.
	GND	Input	Power Input Negative Pole (High Current).
④	TEC1+	Output	The positive terminal of the temperature control current output is typically connected to the positive terminal of the Thermoelectric Cooler (TEC).
	TEC1-	Output	The negative terminal of the temperature control current output is usually connected to the negative terminal of the Thermoelectric Cooler (TEC).
⑤	VIN	Input	Power Input Positive Pole, with an input voltage range of 7 to 24V.
	GND	Input	Power Input Negative Pole (High Current).
⑥	TEC2+	Output	The positive terminal of the temperature control current output is typically connected to the positive terminal of the Thermoelectric Cooler (TEC).
	TEC2-	Output	The negative terminal of the temperature control current output is usually connected to the negative terminal of the Thermoelectric Cooler (TEC).
⑦	1k	Input	Platinum Resistance Thermometer (Pt1000) Interface (Please contact Technical Support before purchase).
	COM	Input	Common Interface for Platinum Resistance Thermometer (Pt1000) and NTC Thermistor.
	10k	Input	Thermistor (NTC) Interface.
⑧	1k	Input	Platinum Resistance Thermometer (Pt1000) Interface (Please contact Technical Support before purchase).

	COM	Input	Common Interface for Platinum Resistance Thermometer (Pt1000) and NTC Thermistor.
	10k	Input	Thermistor (NTC) Interface.
⑨	PWM1	Output	Solid State Relay Input Terminal 1
	PWM2	Output	Solid State Relay Input Terminal 2
	GND	Input	Power Input Negative Terminal (Low Current)
	PWM3	Output	Solid State Relay Input Terminal 3
	PWM4	Output	Solid State Relay Input Terminal 4
	GND	Input	Power Input Negative Terminal (Low Current)



Wiring Method for Channel 1 Solid State Relay



Wiring Method for Channel 2 Solid State Relay

Dimensional Drawing

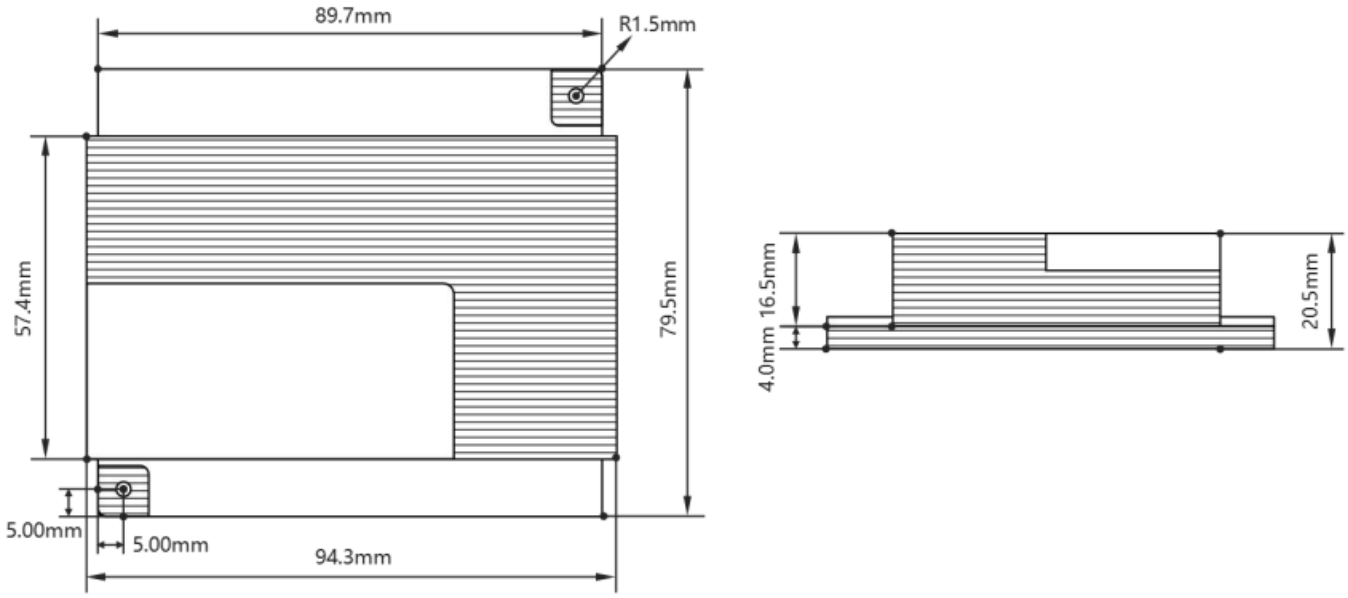


Figure4 Dimensional drawing of TEC207/215 Series

Computer Software

(Communication Protocol Refer to Attachment)

Figure5 Computer Software

Instructional Video

【SenseFuture】±0.001℃ Temperature Controller (TEC207/215 Series) Instructions for Use —— DFB Laser Temperature Control https://www.youtube.com/watch?v=Dx6vYbeO9ow

Selection Guide

Table 3 Temperature Controllers Selection Guide

MODEL	STABILITY (°C)@20°C	SENSOR TYPES	CHANNELS	DRIVING CAPACITY @24V	POWER SUPPLY VOLTAGE(V)	FEATURES
TEC103L	±0.01	NTC	1	±3A	7-24	Single-channel, Compact
TEC103	±0.001					
TEC207L	±0.01	NTC PT1000	2	±7A each channel		Dual-channel, Medium Current
TEC207	±0.001					
TEC215L	±0.01			±15A each channel		Dual-channel, High-current, Solid State Relay
TEC215	±0.001					
TEC215 pro	±0.001	NTC PT1000 CCR Low Temperature Resistor				Dual-channel, High-current, Solid State Relay, Polynomial Temperature Calibration

Customized Temperature Control System Services

We offer complete temperature control solutions, providing custom temperature control systems for institutions such as the National Institute of Metrology of China, the Anhui Institute of Optics and Fine Mechanics, Nanjing University, and Shenzhen University.

For customized temperature control systems, please contact our technical support at +86 191 2054 5883 WhatsApp ID same as phone number

Attachment 1. Typical Application Cases

Gas Absorption Chamber Temperature Control Case

- Temperature Control Object Information: Aluminum alloy gas chamber measuring 80cm in length and 4.5cm in diameter, hollow interior, featuring inlet and outlet ports at both ends.
- Temperature Sensor: Accompanying NTC 10K B3950 temperature sensor provided by our company.
- Heating/Cooling Device: Thermoelectric cooler (TEC) supplied by our company operating at 12V and 6A.
- Temperature Controller Brand and Model: SenseFuture™ TEC215.
- Target Temperature: 45°C.
- Temperature Controller Settings: Power supply voltage is 12V with a maximum output voltage percentage of 80% (equivalent to 12V × 80% = 9.6V).

  For Temperature Controller 1: PID parameters set as P = 100,000, I = 400, D = 0.

For Temperature Controller 2: PID parameters set as P = 50,000, I = 150, D = 0.

- **Measured Results:**

  Achieved temperature control stability : ±0.001°C (over a 24-hour test period, with an ambient temperature variation of ±2°C.)

  Temperature measurement stability : ±0.002°C (over a 24-hour test period, also under an ambient temperature fluctuation of ±2°C.)

  (Need a specific solution? Please consult technical support for quotation at +86 191 2054 5883)

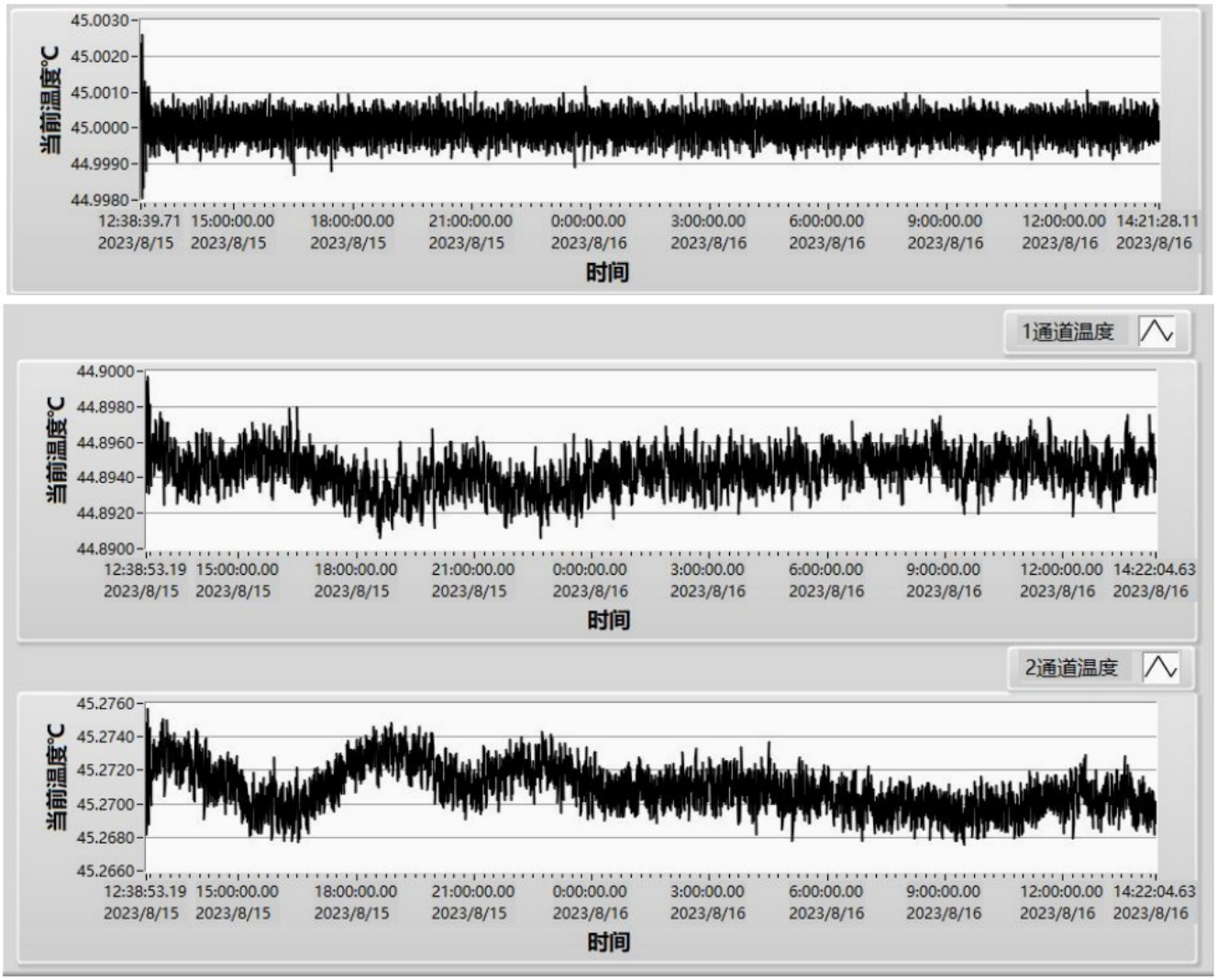


Figure Attached1.1 Temperature Control Data for the 80cm Gas Absorption Chamber (Top: Temperature Control Data; Middle and Bottom: Temperature Measurement Data for Inlet and Outlet Ports)

Copper Block Temperature Control Case

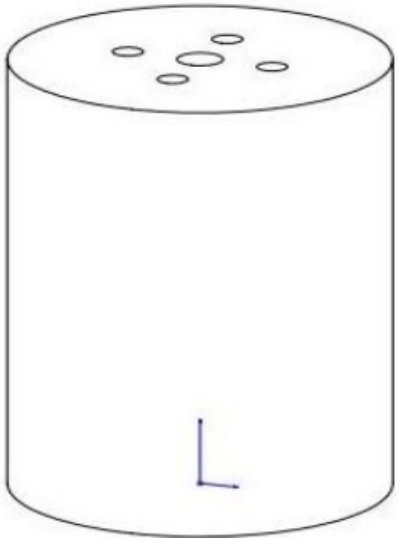


Figure Attached1.2 Uniform Temperature Copper Block

- Temperature Control Object Information: Uniform temperature copper block measuring 7cm in length and 5cm in diameter.
- Temperature Sensor: Accompanying NTC 10K B3950 temperature sensor provided by our company.
- Heating/Cooling Device: Heating film.
- Temperature Controller Brand and Model: SenseFuture™ TEC215.
- Target Temperature: 50°C.
- Temperature Controller Settings: Power supply voltage is 12V with a maximum output voltage percentage of 90% (equivalent to 12V × 90% = 10.8V).
- For Temperature Controller 1, PID parameters are set as P = 80,000, I = 500, D = 0.
- Measured Results:
  Achieved temperature control stability : ±0.0002°C (over a 6-hour test period, with an ambient temperature variation of ±2°C.)
  Temperature measurement stability : ±0.001°C (over the same 6-hour test period, also under an ambient temperature fluctuation of ±2°C.)
  (Need a specific solution? Please consult technical support for quotation at +86 191 2054 5883)

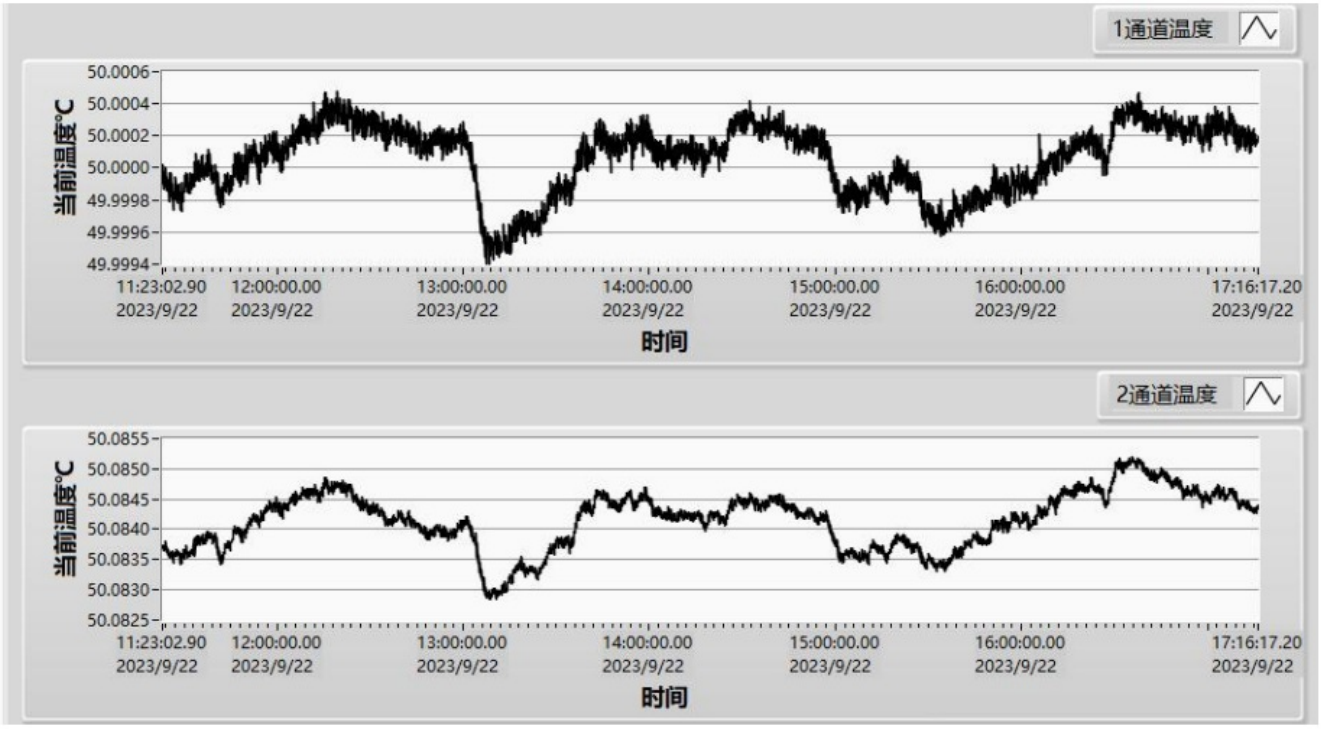


Figure Attached 1.3 Temperature Control and Measurement Data for the Uniform Temperature Copper Block (Top: Temperature Control Data; Bottom: Temperature Measurement Data)

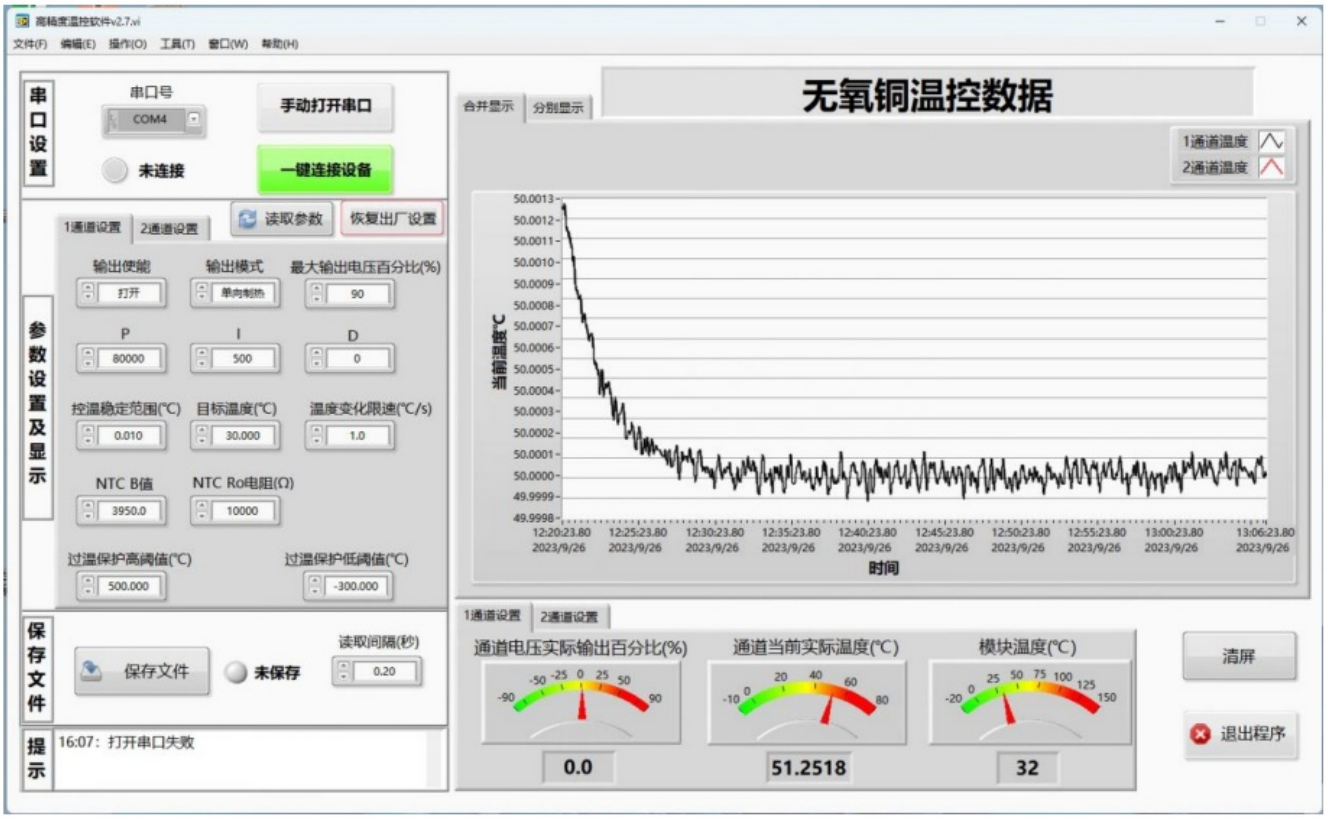


Figure Attached 1.4 Short-Term Temperature Control Data for the Uniform Temperature Copper Block

Partners

Universities and Research Institutes

Optical Instrument Technology Company

- Add 4F, Building B, Gaoke Innovation Center, Guangming District, Shenzhen, Guangdong, China
- Tel +86 191 2054 5883
- Mail sales@sensefuture.com
- Web www.sensefuture.com / www.sensefuture.com.cn

Original Aspiration Determines the Future, Innovation Creates Value,
Sharing Unites Hearts.
Looking forward to achieving win-win cooperation with you!

Download

SenseFuture Technologies Co., Ltd.

Documents / Resources

	**SenseFuture TEC215 Dual Channel Temperature Controller** [pdf] Instruction Manual TEC215 Dual Channel Temperature Controller, TEC215, Dual Channel Temperature Controller, Channel Temperature Controller, Temperature Controller, Controller

References

- SenseFuture
- -
- User Manual