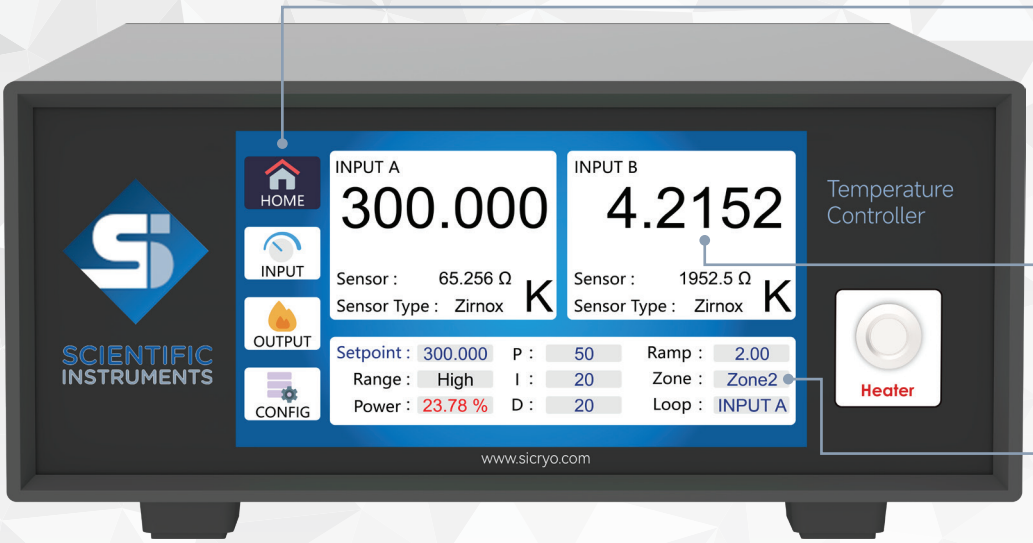
TC-2
Temperature Controller

SCIENTIFIC INSTRUMENTS



Navigation Bar
Quickly switch between interfaces

Temperature Display
Monitoring channels displayed in large format for quick view of input temperature, sensor value and sensor type

Parameter Settings
Set the target temperature, PID parameters, temperature ramp rate, output power, relay output and other key parameters

The home interface displays the current temperature, setpoint, PID parameters, temperature ramp rate, output power and more

The TC-2 Cryogenic Temperature Controller is engineered for precision and versatility in low-temperature research applications. It features two independent, high-accuracy temperature monitoring channels, providing robust and reliable measurement capabilities. The unit includes one high-power, PID-controlled output channel (100 W), enabling efficient and stable thermal regulation.

To support system integration and control flexibility, the controller also offers one relay output and one analog output channel. Key advanced functions such as PID closed-loop control, Zone Mode, customizable temperature ramp rates and active over-temperature protection enhance operational safety and performance. These features make the TC-2 an ideal solution for demanding cryogenic environments across a range of scientific and industrial research settings.

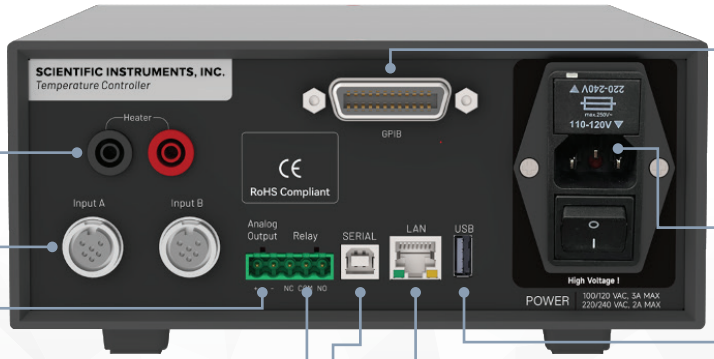
Key Features

- Temperature range of measurement and control down to 300 mK
- Automatic tuning of the excitation current for higher accuracy and lower heating
- Supports setting temperature ramp rate
- PID parameters can be switched according to the zone table for different temperature ranges (Zone mode)
- Automatic protections such as heater short and open detection, setpoint limits are supported

Output
Max 100W; 3 ranges; Short & open protection10 SPS sampling rate

Inputs
2 independent channels;
10 SPS sampling rate

Analog Output
0 – 10V; 16-bit resolution



GPIB
Compatible with IEEE488.2 protocol

Power
100/120 VAC; 3A Max
220/240 VAC, 2A Max

Relay Output
30V voltage;
Max current 5A

Serial Port
USB Type-B interface,
115200 baud rate

LAN
Compatible with TCP/IP Protocol;
10M/100M rate

USB
USB Type A Interface; 16-M U Disc;
Support 1000+ curves

TC-2 Temperature Controller

INPUT

Number of Input	2
Isolation	Sensor inputs optically isolated from other circuits
ADC Resolution	24 bit
Max Update Rate	10 reads/s on each input
User Curves	1000+ curves (400 points max in single curve)
Filter	Kalman Filter

INPUT SPECIFICATIONS

Sensor Type	Diodes/RTDs								
Measurement Type	4 leads								
Excitation	Constant current with current reversal for RTDs								
Supported Sensors	Diodes: Si, GaAiAs; RTDs: 100 Ω & 1000 Ω Pts, Ge, Carbon-Glass, Cernox, Zirnox and Rox								
NTC-Input Range	0 - 10 Ω	10 - 30 Ω	30 - 100 Ω	100 - 300 Ω	300Ω - 1 kΩ	1 - 3 kΩ	3 - 10 kΩ	10 - 30 kΩ	10 - 100 kΩ
NTC-Excitation Current	1 mA	0.3mA	0.1mA	30µA	10µA	3µA	1µA	0.3µA	0.1µA
Max Sensor Power	10µW	2.7µW	1µW	270nW	100nW	27nW	10nW	2.7nW	1nW
NTC-Measurement Resolution	0.15 mΩ	0.45 mΩ	1.5 mΩ	4.5 mΩ	15 mΩ +0.02% of rdg	45 mΩ +0.02% of rdg	150 mΩ +0.02% of rdg	450 mΩ +0.02% of rdg	1.5 Ω +0.05% of rdg
NTC-Accuracy	8 mΩ	20 mΩ	50 mΩ	120 mΩ	0.5 Ω +0.02% of rdg	1.2 Ω +0.02% of rdg	5 Ω +0.02% of rdg	15 Ω +0.02% of rdg	15 Ω +0.05% of rdg

CONTROL

Control Loops	1
PiD Parameters	Autotune (one loop at a time)
PiD Tuning	P (Gain): 0 to 1000 with 0.01 setting resolution, I (Reset): 0 to 1000 with 0.01 setting resolution, D(Rate): 0 to 200 % with 0.01% setting resolution, Manual output: 0 to 100% with 0.01 setting resolution
Zone Mode	5 temperature zones with PID and heater range
Setpoint Ramping	0.1 K/min ~ 20 K/min

OUTPUT LOOP 1

	25 Ω Heater	50 Ω Heater
Output Type	Variable DC current source	
DAC Resolution	16 bit	
Max. Power	100 W	50W
Max. Current	2 A	1 A
Voltage Compliance	50V	
Heater Load Range	10 to 100 Ω	
Output Range	3	

GENERAL

Relay Output	1
Analog Output	1, 0~10V, 16 bit
Communication	Serial port (USB): USB-TypeB interface, baud rate: 115200, GPIB:IEEE488.2, support setting address, LAN:TCP/IP, 10M/100M rate, support setting address and pot
Display	5.0 inch TFT touch-screen with 1280 x 720 pixels
Storage	16 M, PC driver-free connection
Safety Limit	Short & open circuit protection, Setpoint & temperature limit protection
Size	215(W) * 88.9(H) * 358(L) (unit: mm)