

Cryo-Torr® Temperature Indicator Installation and Operation Instructions

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HELIX TECHNOLOGY CORPORATION
<http://www.helixtechnology.com>

Cryo-Torr® Temperature Indicator Installation and Operation Instructions

The Cryo-Torr Vacuum-Pump Temperature Indicator, Part No. 8043459G001 shown in Figure 1, is used with Cryo-Torr high-vacuum pumps, to monitor cryopump operating temperatures. In cryopumps provided with a silicon diode sensor, the indicator is easily connected to the cryopump with an electrical cable. The digital readout is in Kelvin, with a system range from 9K to 320K. The indicator has two set points that are adjustable over this range. When the vacuum pump temperature reaches either setpoint, electrical contacts in the in-line 6-pin male connector on the rear panel can be used to activate indicators or to operate solenoid valves for controlling temperature-related functions. A pair of switches on the front panel permits momentary display of the two setpoints.

The Temperature Indicator can be used on a desktop or installed in an electronics rack using customer-supplied mounting hardware.

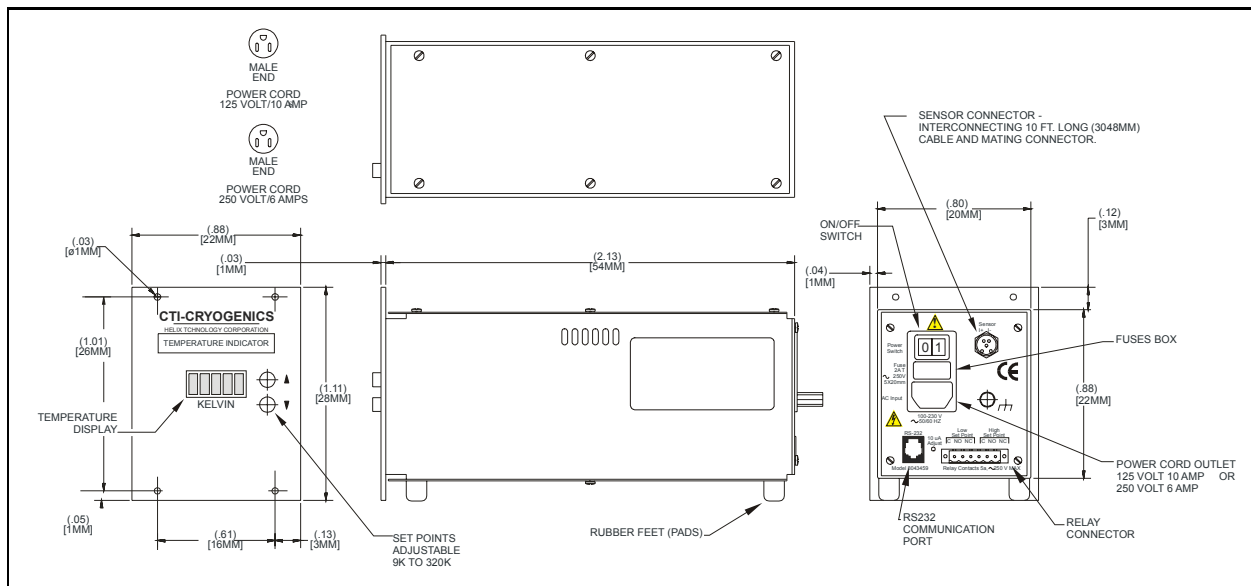


Fig 1. Cryo-Torr Temperature Indicator

Each Temperature Indicator comes with (box contains the following):

- 115VAC POWER CORD - 7 ft. (2.13 m)
- 230VAC POWER CORD - 7 ft. (2.13 m)
- SENSOR CABLE (PUMP-TO-TEMPERATURE-INDICATOR) - 10 ft. (3 m)
- FUSES (2)
- COMMUNICATION CABLE (DB9 TO RJ11) - 7 ft. (2.13 m)
- SNAP-ON FERITE BEADS (2)
- RELAY CONNECTOR (INLINE 6-PIN FEMALE)
- TEMPERATURE INDICATOR
- COPY OF THIS QUICK INSTALL GUIDE

Specifications

Electrical

100 - 230V, single phase (1 ϕ), 50/60Hz (Nominal)

Two (2) 2A 250VAC fuses in the **POWER INPUT MODULE** on rear panel

10.0 - microampere (μ A) constant current output to diode

System Accuracy

10 - 27K: \pm 2.5K

27 - 80K: \pm 3.5K

80 - 90K: \pm 4.5K

90 - 100K: \pm 5.5K

100 - 320K: \pm 2.5K

Readout Meter

Digital panel meter with temperature scale in Kelvin, range 9K to 320K, 100 microampere (μ A) full scale.

Resolution

0.1K from 9 to 99.9K

1.0K from 100 to 450K

Alarm

Setpoints – Two (2) setpoints adjustable over 9K to 320K range, via front panel switches.

Output – Two relays - SPDT with 5.0A / 250V (max) (C, NO, NC) contacts.

RS-232 Interface

Output of temperature

External setting of alarm setpoints

Shipping Weight

5 pounds (11 Kg)

Input/Output Connections

1. Sensor Connector (5-pin round female connector)

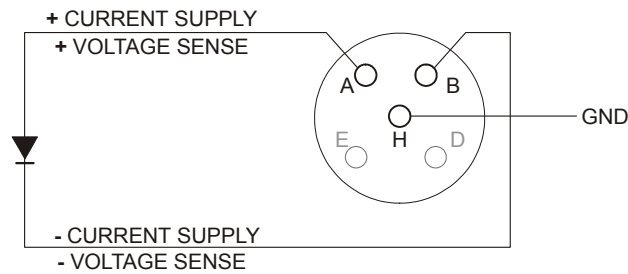


FIG 2. Sensor Connection Pinout

2. RS-232 Communication Connector (RJ-11 connector)

Table 1: RS-232 Connections

BLK - Ground	GRN - Receive (In)
RED - Transmit (out)	YEL - (No Connection)

3. Relay Alarm Output Connector (inline 6-pin male connector)

Table 2: Relay Connector Pin Assignments

Pin Number	Low Setpoint Relay 1	Pin Number	High Setpoint Relay 2
1	Common	4	Common
2	Normally Open (NO)	5	Normally Open (NO)
3	Normally Closed (NC)	6	Normally Closed (NC)

Installation (See Fig 3. “Temperature Indicator Installation,” pg. 4 below.)

1. If you wish to install the electronics rack, perform the following steps:
 - a. Remove the four pads from the bottom of the Temperature Indicator using a Phillips screwdriver.
 - b. Install the Temperature Indicator into the electronics rack using customer-supplied mounting hardware.
2. Connect the cryopump to the Temperature Indicator’s **SENSOR** connector using the 10 ft. (3 m) interconnecting cord supplied with the indicator. If the supplied cord is too short, contact CTI-CRYOGENICS for the purpose of ordering a longer cord.
3. Connect the Temperature Indicator to an appropriate power receptacle, using the correct power cord. Both 115V and 230V power cords are supplied with the unit, in the box. The unit has a universal power supply capable of operation from 85 to 264 VAC, 50/60Hz, 5 Watts. No switching is required to change the power cord.
4. Connect the ground stud on the Temperature Indicator to a suitable connection.

NOTE: This is only required when the power cord is connected to an ungrounded power supply.

5. Wire the inline 6-pin female connector, supplied in the box, as shown in Step 3 of Input/Output Connections, to either the indicators or the solenoid valves as required.
6. Insert the inline 6-pin female connector into the male connector at the rear of the Temperature Indicator.
7. If required, connect an RS-232 cable between the RS-232 connector on the Temperature Indicator and the host computer, using the cable supplied. See Fig 4. “Ferrite Installation - to Host Computer,” pg. 5, below, for proper installation of ferrites.

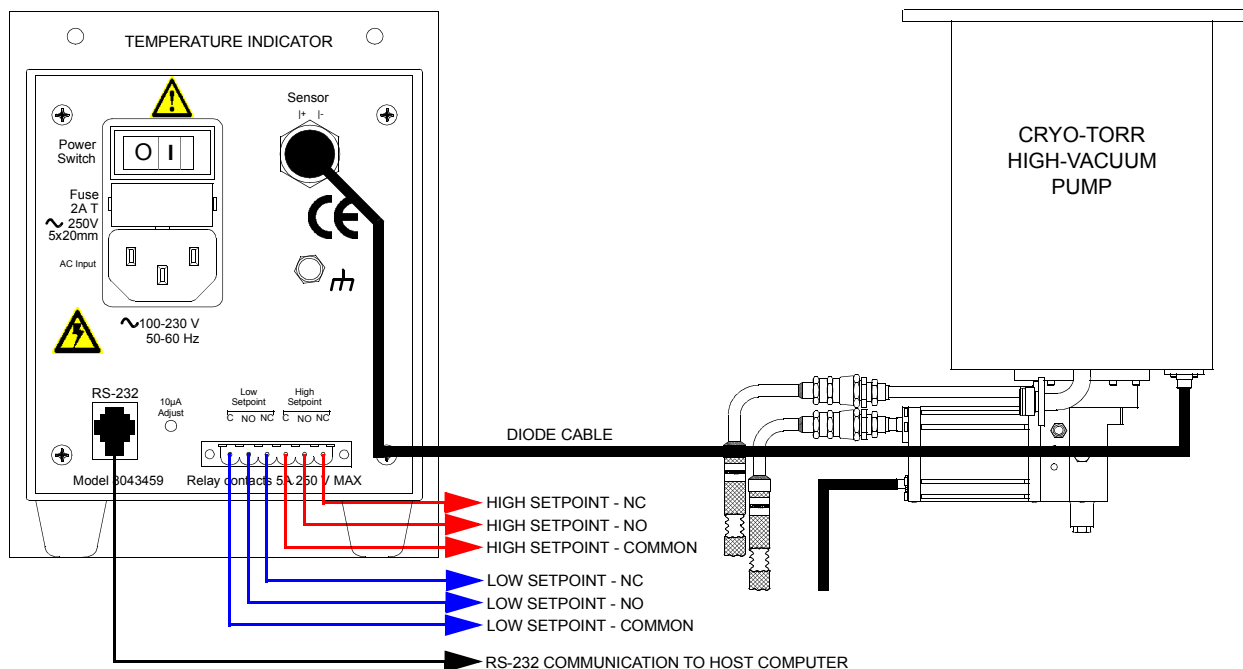


FIG 3. Temperature Indicator Installation



FIG 4. Ferrite Installation - to Host Computer

Operation

- 1. Turn On Power.** Set the main power rocker switch of the power module on the rear panel to (I) ON. The panel meter will display temperature in Kelvin.
- 2. Set the Temperature Setpoints.** Temperature setpoints control the operation of the relays within the Temperature Indicator. When the sensing diode inside the Cryo-Torr High-Vacuum Pump senses the temperature has fallen below the LOW setpoint temperature power will be applied to the LOW SETPOINT RELAY. If the temperature is at or above the HIGH setpoint, power will be applied to the HIGH SETPOINT RELAY.
 - a. Press and release the UP arrow button to display the HIGH setpoint or press the DOWN arrow button to display the LOW setpoint.
 - b. Press and hold both UP and DOWN arrow buttons. The digital display will flash.

NOTE: Pressing and holding the UP or DOWN arrow button causes the digital display value to change rapidly.

- c. Press the UP or DOWN arrow buttons to increase/decrease the temperature setpoint.
- d. Release the arrow button once setpoint temperature has been reached. Three seconds after the new setpoint has been set, the setpoint is stored and displayed for two additional seconds. The normal Cryo-Torr High-Vacuum Pump temperature is then displayed.

Check the setpoint readout. Operate the push button switches located on the right side of the front panel. Press the bottom switch to display the LO setpoint reading on the meter. Press the top switch to display the HI setpoint reading on the meter.

NOTE: A display of 00.0 indicates an open sensor, please contact Helix Technology Corporation.

3. Relay Function. The NC (normally closed) contacts of the LO setpoint relay remain closed until the temperature of the sensor drops below the LO setpoint. The NC (normally closed) contacts of the HI setpoint relay remain closed until the temperature of the sensor rises above the HI setpoint. Refer to Table 3, "Relay Contact Truth Table," below.

Table 3: Relay Contact Truth Table

Temperature	HI-NC	HI-NO	LO-NC	LO-NO
Above HI Setpoint	Open	Closed	Closed	Open
Between Setpoints	Closed	Open	Closed	Open
Below LO Setpoint	Closed	Open	Open	Closed

4. RS-232 Function.

- a. Insert the cable assembly receptacle into the RS-232 port located at the extreme left-hand side of the rear panel.
- b. Set the computer to a baud rate of 9600, no parity, 8 data bits and 1 stop bit. Hardware flow control is not needed.
- c. Communicating data to/from the Temperature Indicator:

Temperature Data. The Temperature Indicator transmits the current temperature reading to the host computer when a 'T' and carriage return <CR> are received.

NOTE: The instrument responds to both upper-case and lower-case keystrokes.

Transmitting Setpoint Data. The Temperature Indicator accepts a new alarm setpoint value for the selected relay when the host computer transmits the following code:

S1N <CR>

in which:

S1 indicates that the setpoint is for relay #1 (use S2 for relay #2)

Table 4: Setpoint Designations

S1	High Setpoint
S2	Low Setpoint

N is the temperature setpoint in Kelvin (to tenths-of-a-degree resolution), with the least significant digit being the tenth's digit.

<CR> is a carriage return.

Example: A setpoint value of 12.3K for relay #2 is transmitted to the Temperature Indicator as:

S2123 <CR>

Since the maximum range of the system is 300K, the largest alarm setpoint value that will be correctly interpreted is 3000.

Table 5: Default Setpoints

Default Setpoints	
Low	20K
High	290K

Querying Setpoint Data. The Temperature Indicator transmits the current setpoint value for the selected relay when the host computer transmits the following query code:

S1 <CR> or S2 <CR>

as applicable.

5. Accessing The Diagnostic Subroutine.

- a. Before applying power, **PRESS AND HOLD** the **DOWN** switch. Apply power and release the **DOWN** switch. The instrument will now enter the diagnostic subroutine and all eight segments of all readout decades will be displayed.
- b. Press the **DOWN** switch again. The instrument will display the version of software in the instrument.
- c. Press the **DOWN** switch once more to return the instrument to its normal display of temperature.

Table 6: Troubleshooting

Fault	Possible Cause	Corrective Action
Panel meter fails to indicate a reading.	Power switch is off.	Turn switch on.
	Power cord not plugged in.	Plug in power cord
	Fuse blown on rear panel of indicator.	Replace the fuse.
	No power coming from power source.	Check the service fuses, circuit breakers, and wiring associated with power source and repair as needed.
	Defective interconnecting cable.	Check continuity and replace, if needed.
	<p style="text-align: center;">CAUTION</p> <p>When checking diode or connections to diode, do not use a multimeter which could subject the diode to more than five milliamperes forward current, or more than 200 volts reverse bias. Excess current or voltage will permanently damage the diode.</p> <p>Connections to the diode sensor are loose or disconnected.</p>	<p>Check the continuity at the cryopump connections pins 3 and 4. Repairs must only be made by a qualified technician.</p>
Solenoid valves or indicator are not being operated at proper temperature in accordance with Table 3.	Defective relays or electronics.	Check to see if the proper signal is being provided by the electronics. Repair as required by a qualified technician.

Appendix A - Customer Support Information

Customer Support Center Locations

To locate a Customer Support Center near you, please visit our website www.helixtechnology.com on the world wide web and select *CONTACT* on the home page.

Guaranteed Up-Time Support (GUTS)

For 24 hour, 7 day per week Guaranteed Up-Time Support (GUTS) dial:

800-367-4887 - Inside the United States of America

508-337-5599 - Outside the United States of America

Product Information

Please have the following information available when calling so that we may assist you:

- Product Part Number
- Product Serial Number
- Product Application
- Specific Problem Area
- Hours of Operation
- Equipment Type
- Vacuum System Brand/Model/Date of Manufacture

E-mail

For your convenience, you may also e-mail us at:

techsupport@helixtechnology.com

