

Monitoring Temperature in Refrigerator, Freezer, and Ultra-Low Freezer Applications

Minco's Thermal-Vial™ helps sensors avoid false alarms

Thermal-Vial Overview

Reliable ultra-low cold storage of vaccines, tissue and plasma samples are regularly required in a variety of medical and pharmaceutical applications. Temperature measurement in applications as low as -120°F are a challenge on multiple fronts. With Minco's extensive experience using our wire wound platinum RTD (resistance temperature detector) technology, paired with 4-20mA transmitters for simple and reliable signal transmission, the following challenges of low temperature measurement can be overcome.

Many temperature sensors simply are not rated to temperatures below -50°F . This is especially true of thin-film RTDs which lose accuracy and reliability at low temperatures due to thermal expansion issues – or in this case thermal contraction issues – where the rigidly bonded thin-film materials (ceramic, platinum, glass, lead wires) contract at different rates, causing strains on the sensing element. At best, these strains produce errors in the sensor output. At worst, the strains can cause cracks or breaks, leading to failure of the sensing element. Our wire wound RTDs are constructed to avoid this strain issue which makes them suitable at much lower temperatures – in some cases, as low as -452°F .

Not surprisingly, temperature sensors indicate their temperature, not the temperature of the contents of a freezer or refrigerator. This is fine if you never open the freezer door but that is not very practical! When you do open the door, warmer air enters the freezer and will likely cause the sensor to indicate a temperature that is warmer than the actual freezer contents which have a larger mass than the warmer air that just entered. Our Thermal-Vial™ assemblies solve this problem by enclosing the temperature sensor in a vial containing a liquid with a low freezing point. Being in the vial will slow down the rate of change of the temperature sensor to more accurately match that of the contents. You want to know the temperature of the contents – not the air in the freezer. Moreover, you definitely don't want to have a false alarm triggered by the temperature sensor measuring a short blast of warm air instead of the freezer's contents.



Technical Details

Probe case: Stainless steel.

Element: Platinum.

Resistance (excluding leadwire resistance):

PM platinum: $100.00\ \Omega \pm 0.06\%$ at 0°C (32°F) (Class A).

PD platinum: $100.00\ \Omega \pm 0.12\%$ at 0°C (32°F) (Class B).

PF platinum: $1000.00\ \Omega \pm 0.12\%$ at 0°C (32°F).

TCR: $.00385\ \Omega/\Omega/^{\circ}\text{C}$ nominal from 0°C to 100°C .

Operating temperature range:

Probe and vial: -200 to 120°C (-328 to 248°F).

Transmitter: -25 to 85°C (-13 to 185°F).

Insulation resistance: 1000 megohms minimum at 500 VDC, leads to probe case.

Leads: AWG #22, stranded, TFE insulated, with TFE jacket overall.

Thermal vial: Polyethylene bottle with cap.

Thermowell: Delrin material.

Transmitter: 4-20 mA output; 8.5 to 35 VDC loop powered.

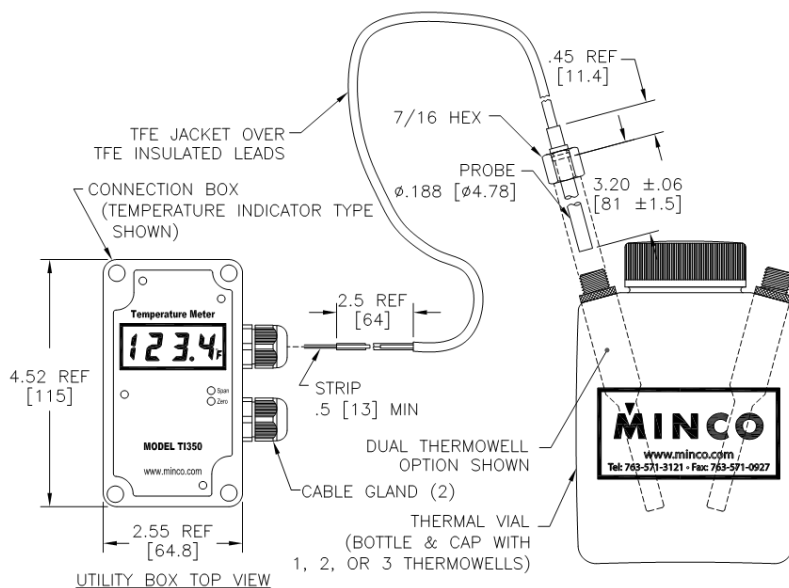
Connection box: Polycarbonate enclosure, NEMA 4X.

Thermal Vial Temperature Sensing System

Technical Details and accessories

Overview

- Ideal for ultralow freezers, laboratories, blood banks, walk-in freezers and refrigerators, even incubators — anywhere accurate sensing of the contents instead of the air is a vital concern.
- Sealed polyethylene Thermal Vial eliminates spillage and contamination. Simply fill with fluid such as ethylene glycol, alcohol, water, or a cryopreservative to accurately emulate the material being stored or processed.
- Large (50 mm x 50 mm) footprint of the single well vial provides stability on a shelf or rack. Holds 175 ml (6 oz) of fluid. Other vial configurations are available.
- Platinum RTD probe is constructed of 316 Stainless Steel and operates to -200°C (-328°F).
- Metal shielded cable is rugged and washdown proof.
- 4 to 20 mA transmitter is match calibrated to the RTD for improved system accuracy.
- NIST/SI certificate and calibration data supplied at no additional cost.
- Additional accessories available.
- Customizable for validation requirements.
- Connection box and indicator are polycarbonate and NEMA 4X sealed to be washdown proof.



Specification and order options

AS103282 Specification

	Sensing element, .00385 TCR:
PM	PM = 100Ω Platinum +/- .06%, Class A PD = 100Ω Platinum +/- .12%, Class B PF = 1000Ω Platinum +/- .12%
60	Cable length in inches: 60, 120 are standard
D	Vial configuration: S = Single thermowell, standard vial D = Dual thermowell T = Triple thermowell M = Single thermowell, miniature vial L = Single thermowell, large vial
C	Connection box type: C = Indicating °C F = Indicating °F B = Non-indicating
20	System accuracy: 20 = .20% of span or .1°C, whichever is greater 50 = .50% of span 75 = .75% of span
EZ	Temptran temperature range code: EZ = -100/0°C (-148/32°F) M = -50/50°C (-58/122°F) C = 0/100°C (32/212°F)

AS103282PM60DC20EZ = Sample part number

Contact Minco for a complete list of available temperature codes.



Bottle accessories

Part Number	Description	Capacity
AC101394	Single	6 oz./175ml
AC102026	Double	8 oz./250ml
AC102647	Triple	8 oz./250ml
AC103316	Mini	2 oz./60ml
AC102551	Large	32 oz./1000ml



Bracket accessories

Part Number	Description
AC101540	Single well bracket
AC102732	Double/triple well bracket
AC102074	Air sensor bracket

Junction box accessories

Minco utilizes a 4-20mA transmitter wired directly to the sensor and located on the outside of the freezer or refrigerator. The 4-20mA signal is sent by a simple two-wire configuration to the control system. This current (mA) signal is immune to long wire runs which could adversely affect accuracy of the sensor through added circuit resistance or electrical noise. An optional local display is available if a visual indication of temperature is desired at the freezer itself.



Part Number	Description
T1350	Loop-powered indicating
CH102777	Non-indicating



Refrigeration & Freezer Temperature System

Accurate, rugged, and weatherproof temperature sensors

Overview

For applications where air temperature must be measured, choose these sensors for the ultimate combination of rugged design with repeatable and accurate low temperature measurement. These sensors utilize the same wire wound sensing elements as the Thermal Vial and thereby enjoy the same thermal stability and reliability inherent in Minco's wire wound element design.

- Ideal for refrigerated rooms, freezers, cold storage facilities and laboratories — anywhere an accurate, rugged, and weatherproof temperature sensor is needed.
- 100 Ω platinum RTD probe is constructed of 316 stainless steel to be resistant to most chemicals, including ammonia.
- Operates to -452°F (-269°C).
- 4 to 20 mA transmitter is epoxy potted to protect circuitry from condensation and ice. Operates in ambient temperatures down to -13°F (-25°C).
- Transmitter is match calibrated to RTD for 0.75% system accuracy. Free NIST/SI certificate.
- Enclosure is gasketed and moisture resistant.
- RTD probe is available in lengths ranging from 2 inches to 48 inches, and the probe can be center-mounted for through-the-wall installation, or end-mounted for flush-to-the-wall mounting.

Specifications

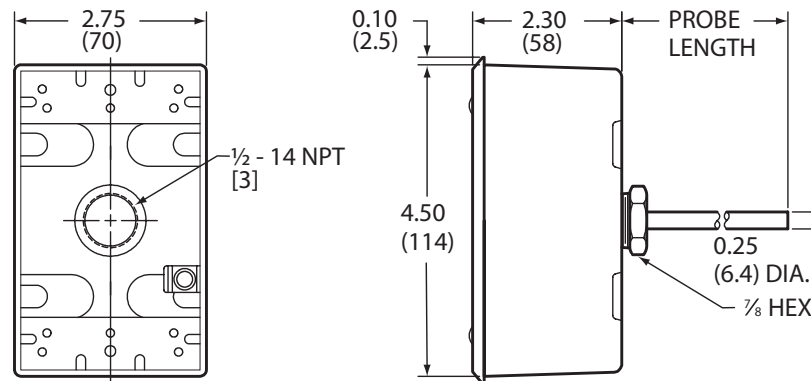
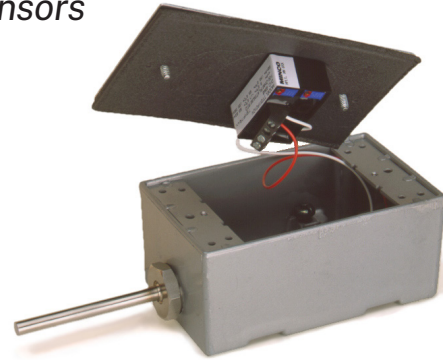
Temperature range:

Probe: -269 to 260°C (-452 to 500°F).

Transmitter: -25 to 85°C (-13 to 185°F).

RTD probe: 100 Ω platinum, 0.00385 TCR.

Transmitter: 4-20 mA output, 8.5 to 35 VDC loop powered.



Refrigeration and Freezer Temperature System

AS100279 Specification

AS100279	Specification
PD	100 Ω platinum RTD
67	<p>Probe length: Specify in 0.1" increments (Ex: 67 = 6.7 inches)</p>
M	<p>Temperature range for 4-20 mA output: M = -50 to 50°C (-58 to 122°F) AD = -40 to 48.9°C (-40 to 120°F) DN = -30 to 50°C (-22 to 122°F) S = -18 to 37.8°C (0 to 100°F) BY = -10 to 40°C (14 to 104°F) Contact Minco for a complete list of available temperature codes.</p>
AS100279PD67M = Sample part number	