

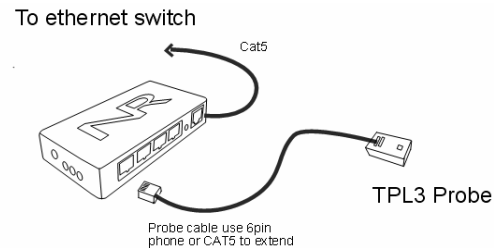


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Digital Temperature Probe TPL3 and TPL3U (#30002 and #30012)

The Networked Robotics TPL3 digital temperature probe collects temperatures through computer networks. The probe is used in conjunction with the Networked Robotics NTMS (Network Telemetry Monitoring System) hardware and Networked Robotics' Tempurity™ software. The Tempurity System is designed for data collection and monitoring in FDA-regulated environments including pharmaceutical, medical, and food industries.



Description

The TPL3 digital temperature probe series is optimized for use in scientific and regulatory environments. The probes are waterproof and can be used between -80C and +120C. The ultra-thin wire used to connect the probe to the network hardware is optimized for installations in freezers; it minimizes any disruption of freezer door seals when necessary. Each probe contains a unique electronic ID that can be read by the Networked Robotics Probe ID Unit and transferred to a computer for metrology and calibration. TPL3U probes display these unique IDs in the view window. An on-board LED indicates the status of the probe for network data collection.

Packing List

This package includes the basic hardware you will need to connect the TPL3 probe to the NTMS.

- (1) TPL3 or TPL3U Temperature Probe
- (1) RJ-45 Coupler for extensions

Hardware Installation

There are three major steps in the installation of this hardware:

- 1) Physical installation
- 2) Configuration of the Networked Robotics NTMS hardware
- 3) Manual testing of data collection via the network

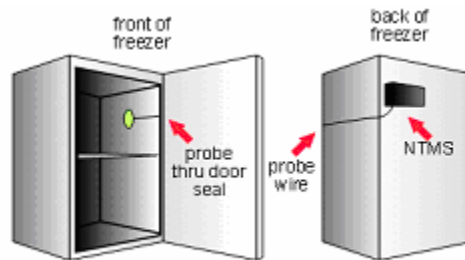
Each of these steps should be performed successfully before attempting to configure real-time data collection via the Tempurity System. Detailed information on configuring this “monitored device” through Tempurity is available in the Tempurity Systems User’s Guide (Networked Robotics document number “Tempurity-04-0006.5”) on the Networked Robotics web site.

1. Physical Installation

Attaching the Probe to the Inside of a Refrigerator or Freezer

Networked Robotics recommends that probes should be firmly attached inside freezers. This is because probes in stable positions provide continuous stable readings and because mounted probes are less likely to interfere with the insertion and withdrawal of samples. Different methods of attachment will be utilized for the TPL3 and TPL3U models as described below.

You will need to select an appropriate position for the probe inside the monitored device that will represent the conditions of the material that you are protecting. Networked Robotics recommends that probes be positioned $\frac{1}{4}$ of the way from the top of a refrigerator or freezer and about one foot deep on the door-hinge side wall. Placing the probe on the hinge side reduces the degree of fluctuation in temperature measurement caused by opening the door. Higher placement will usually result in a warmer reading. In a standard-size refrigerator a gradient of 4 degrees C is common between the top and the bottom of the unit.



1. Ensure that the freezer wall is dry. (If frost or condensation has built up on the wall, use a warm, gloved hand, and a paper towel to dry any moisture)
2. Secure the TPL3 to the monitored site using the “dual-lock” provided on the back. (The “dual-lock” sticks best to metal (except aluminum) or plastic surfaces. It may not adhere as well to surfaces such as drywall or wood, or to porous materials such as concrete.)
3. Probes are waterproof and can be mounted in glycerin-filled containers if needed. We recommend that these containers be attached to the wall of the freezer using dual-lock. Contact Networked Robotics for additional information.

Attaching the TPL3U Probe in an Ultracold Freezer

The harsher temperature of an ‘ultracold’ freezer asserts high mechanical stress on the wire of a TPL3U probe. In ‘ultracolds’, which often have both an exterior door and compartmental doors, the position of the probe and lead installation should seek to minimize mechanical stress on the lead.

1. Clear off any frost at the location of attachment.
2. Dip the suction cup of the TPL3U probe in hydrated glycerin. You can use 80% glycerin 20% water. Use gloves. It’s important to ensure that your hand is not touching any glycerin during this process.

3. Press the glycerin-soaked suction cup against the wall of the 'ultracold'.
4. Hold briefly, about 20 seconds, until it freezes. (Do not use water for this procedure as a water-dipped probe will not adhere to the wall of the 'ultracold'. The frozen glycerin provides a very high bond and will be difficult to remove without the application of heat. If the probe does not adhere within seconds of application in a freezer that has equilibrated to -70C or below, you may wish to dilute the glycerin solution with water and try again.)

Attaching the TPL3U Probe Underwater

Both the TPL3 and TPL3U are waterproof and are capable of being submerged in water. Total immersion in water will not damage either probe type. The unit can be installed outdoors, or in areas of temperatures up to 120C. NTMS network hardware must be installed in areas not subject to water.

1. Place TPL3U in water and ensure that the probe is disconnected from the NTMS
2. Submerge underwater and press against a smooth surface, such as glass or plastic. (The probe should hold permanently in position. If not, find a smooth location and try again.)


Room Temperature and Measurements via Wall Plate


In offices or laboratories that are well-populated with network jacks you can measure temperatures through network wall plates. Using this method, NTMS units are mounted on rack hardware and shelves in a network closet (not shown). Each temperature probe or other Networked Robotics interface is patched to a network wall plate.

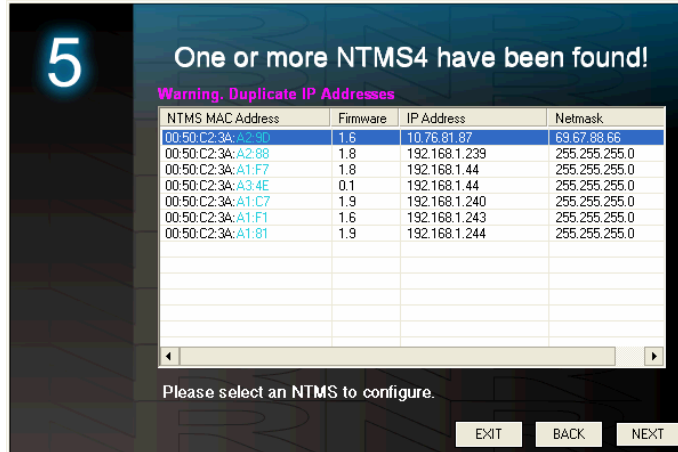
Extensions

The digital temperature probe can be extended to 300 feet from the Networked Robotics NTMS network hardware. You can easily extend the length of any connection using the included RJ-45 coupler and standard CAT5 network cable.

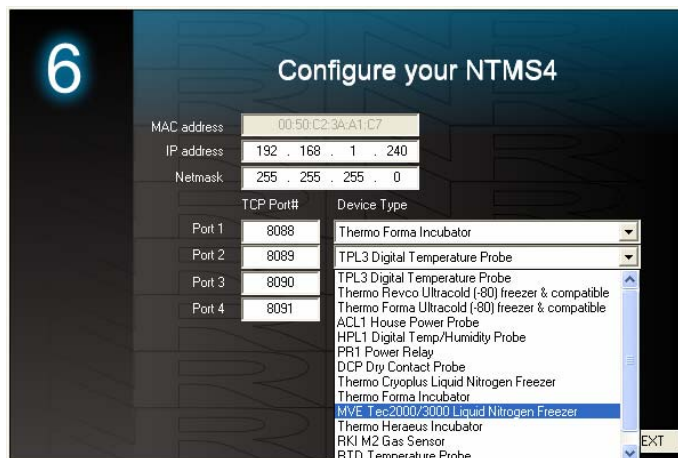
2. Configuring the NTMS

Configure your NTMS network hardware for data collection from this instrument. This is done by running the latest version of the NTMS Configuration Wizard  from any PC that is on the same subnet as the NTMS to be configured. You can obtain the configuration wizard from the "download" section of the Networked Robotics web page. New sensor and interface types are being added periodically to the wizard so the screens below may change.

1. Run the wizard from the same local area network as the NTMS and verify that the NTMS is discovered. (NTMS hardware must be running firmware revision 1.6 or higher. If it is not, stop the installation and upgrade your NTMS hardware's firmware with the NTMS Upgrade Wizard  available from the Networked Robotics download-page.)



2. Select the NTMS, and proceed to the “NEXT” screen.
3. Enter the correct static IP address and subnet mask for your facility.
4. Click on the NTMS measurement port where the probe is connected, and under the “Device Type” drop down, select the TPL3 temperature probe option.



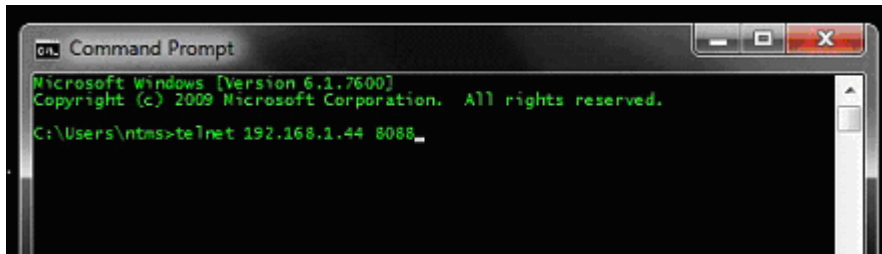
5. Click “NEXT” to complete the NTMS configuration.

3. Testing Data Collection through the Network

Once the configuration is complete we recommend manually testing the ability to make network temperature measurements by using the “Telnet” utility from any PC. This commonly-used network utility sends simple network commands that will elicit a temperature reading from the TPL3. For more about debugging network connections to probes see the appendix of the Tempurity System User’s Guide.

On Windows 7 clients you may need to enable the Telnet utility as follows: 1 Start 2 Control panel 3 Turn Windows Features on or off 4 Check “Telnet Client” 5 Click Ok

1. From Windows click “START”, then “RUN”, and then type “CMD” and return.
2. At the black screen type “Telnet” + IP Port (where IP is the IP address and Port is the network port address (e.g.8088) as selected by your use of the NTMS Configuration Wizard in screen 6 as described above.)



3. If you are successfully connected through the network you will see a blank screen.
4. Type a capital “T”; the command character for this probe. A temperature and the associated checksum value should be returned.

If a temperature is not returned, check network parameters, network ports, firewalls and connections and try again before attempting to configure data collection using Tempurity System software.

Operation

When first connected, the TPL3 LED will blink once on and off. This indicates that the probe has recognized that it is configured properly and is communicating properly with NTMS network hardware.

The table below shows conditions where the green indicator LED of the probe is either on or off.

Condition	LED Status
NTMS network hardware is unplugged	OFF
Probe is not connected to the NTMS	OFF
NTMS port is set to device type other than TPL3	OFF
Probe plugged into wrong NTMS measurement port	Probably ON -depends on wrong port setting
Bad probe	Depends on probe problem
Tempurity Server or Monitor down	ON
Temperature out-of-range	ON

TPL3U probes may blink on and off slowly in ‘ultracold’ environments.

The NTMS port must be configured to “TPL3 Digital Temperature Probe” in order for the LED to light and for temperature data acquisition to occur. If a mismatched configuration type (e.g. “Temperature of Revco Compatible Devices”) is selected the probe LED will not be lit.

The NTMS network hardware continually reads temperatures from the TPL3. Each reading takes about 3 seconds. The most recent values are available for network requests by the Tempurity System.

Reference

Unique IDs

All Networked Robotics hardware holds electronic globally unique IDs. TPL3U models show the unique ID visibly in the probe’s view window. Probe IDs are determined from the lasered unique internal ID embedded in the temperature-sensing integrated circuit. This ID is assigned by the chip manufacturer Dallas/Maxim at the time of chip manufacture.

An example ID is:

0000013F4409

Electronic IDs can be read electronically through a Windows computer using the Probe ID Unit (Networked Robotics part number #30010) through a USB connection.

Communications Specifications

The TPL3 Temperature probe communicates to the NTMS via a one-wire protocol specific to the Dallas DS18B20Z integrated circuit. For more information see the datasheet for this Dallas/Maxim part number. NTMS pins used: are 2 vcc, 3 bidirectional data, 4 gnd

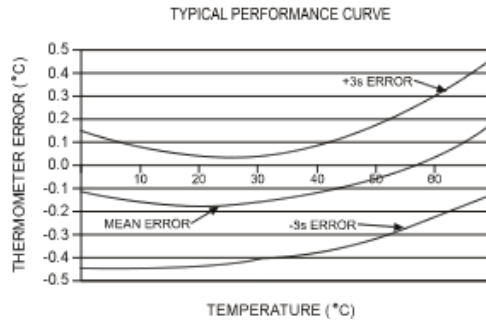
Physical Specifications

Probe head (ultra-thin wire, dual lock, and end connector not included unless indicated):

Weight:	8 grams (with dual lock)
Length:	3.17 cm
Width:	1.90 cm
Height:	0.70 cm

Performance and Accuracy

The probe's digital temperature measurement capability is built around the Dallas/Maxim DS18B20Z integrated circuit. The DS18B20Z chip reports to .1 degrees Celsius and has a distribution of accuracies based on the temperature. The chip has an accuracy of about .1 degrees C at 37C, and an accuracy of about 3 degrees C at -80 C.



Regulatory Calibration

National Institute of Standards and Technology (NIST) – traceable documented calibration is available for this product for an additional fee. Networked Robotics' contractors record the ID of the calibrated probe by the internal embedded unique ID.

Other Products

See the hardware manuals of other Networked Robotics scientific interface and sensor products for a description of how data is collected from other kinds of "monitored devices". Any interface can be used on any of the four data collection ports of the NTMS4 network hardware.

Support

If you need assistance with your TPL3 digital temperature probe or other products, contact Networked Robotics by phone at 877-FRZ-TEMP (877-379-8367) or by email at support@networkedrobotics.com