

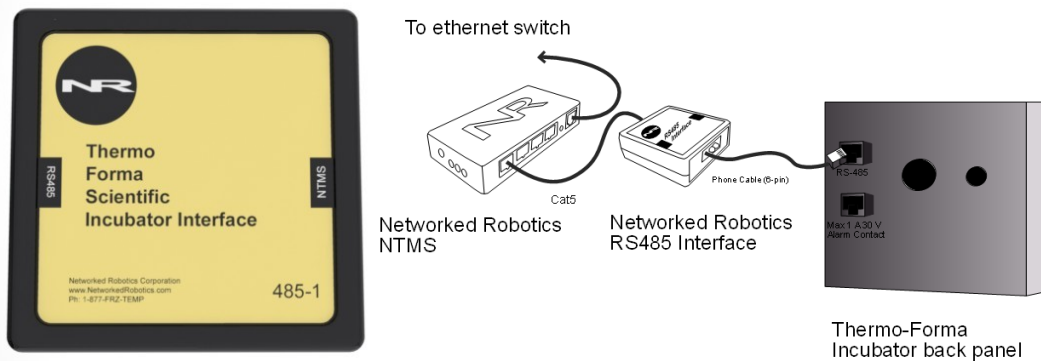


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Networked Robotics Interface to Thermo Scientific® Forma® CO2 Water-Jacketed Incubators (RS485 interface #30018)

The Networked Robotics incubator interface is designed to be used as part of the Tempurity System for the collection and monitoring of scientific data through computer networks. The interface is used in conjunction with the Networked Robotics NTMS (Network Telemetry Monitoring System) hardware and may be used with Networked Robotics' Tempurity™ software. The Tempurity System is designed for data collection and monitoring in FDA-regulated environments including the pharmaceutical, medical, and food industries.



Description

The Networked Robotics Thermo Forma® Incubator interface enables network data collection of temperature, oxygen concentration, carbon dioxide concentration, and humidity data from the serial port of Forma®-brand water jacketed incubators. Measurement capability for temperature, humidity, carbon dioxide concentration, and oxygen concentration are shipped as options on each incubator, and thus the capability for data collection depends on the sensor types included in the incubator. Because data is communicated from the sensors resident in the unit to the Tempurity System via a data interface, the values for each reading that are stored in the Tempurity System will be the same as the values displayed on the front panel. The interface is attached to the back of the unit, and to the Networked Robotics NTMS as shown in the diagram above. For more detailed information see the section on installation.

Packing List

This package includes the basic hardware you will need to connect the Networked Robotics Forma® incubator to the NTMS.

- (1) RS485 Interface
- (1) RJ-45 Coupler for extensions

Prerequisites

This type of incubator must have the capability of RS485 data communications for use with the Networked Robotics interface and the Tempurity System. Many units come shipped with this option from the factory. If you don't have this option on your incubator the capability may be added by purchasing the RS485 option for these units (Part number 190523) from Thermo® at low cost. Because part numbers may change, confirm with Thermo® or consult the operating manual for the appropriate part number. On these units the upgrade is simply an internal cable, and may be self-installed depending on the capability in your organization. The option is installed by opening the incubator's control unit, installing one end of a cable to the control board, and the other end to the back panel of the incubator. Consult installation instructions shipped with the part or your Thermo® service representative. You will need to configure the RS485 interface on the front panel of the unit for data collection to occur. See the section on "Incubator Front Panel Setup" below.

If you do not have and do not wish to add the RS485 capability to your incubator, you can use Networked Robotics temperature or humidity sensors to collect data from your unit. Proprietary oxygen and carbon dioxide concentration sensors are currently not available.

Through direct connection, Tempurity can monitor the Forma® 3110 water-jacketed series, 310 series Direct Heat Incubators, 3307/3310 Stericults and the 370-series Stericycle models. If you have questions about model compatibility please call or e-mail Networked Robotics Corporation.

Data Collection from Multiple Monitored Devices

Because each NTMS4 unit has 4 measurement ports, data from other types of monitored devices such as Networked Robotics sensors or direct connections to many types of freezers or other scientific equipment, can be collected simultaneously. Because of higher load on the hardware a maximum of two incubator direct connections can be connected to a single NTMS4, although the other two ports can be used to collect data from other sensor types or interfaces. Only a single monitored device, a direct connection to a Thermo Forma® water jacketed incubator is shown in the figure above. See other Networked Robotics hardware manuals for descriptions of how to enable network-based data collection from other types of sensors and scientific instruments.

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 and monitor real-time data via the Tempurity System. Detailed information on configuring data collection in 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 Cables

Use a 6-pin phone cable to connect the interface to the incubator, and Cat5 to connect the interface to the NTMS measurement port as shown in the diagram above.

Attaching the RS-485 Interface

You may wish to secure the interface unit to the monitored site using the “dual-lock” provided on the back. The “dual-lock” sticks best to metal or plastic surfaces. It may not adhere as well to surfaces such as drywall or wood, or to porous materials such as concrete.

Incubator Front Panel Setup

Forma® water-jacketed incubators use the RS-485 method of communicating with the outside world. This communication method requires that addresses be set to distinguish one incubator from another. On Forma® incubators the RS485 port is enabled when such an address is defined and thus the Networked Robotics interface requires that such an address be set from the front panel. This address is not used though as the Networked Robotics architecture uses network technology to distinguish between many potential units on the network. Set the RS485 address with the steps below:

From the front panel choose the Mode Key
Press the right arrow until RS485 XX is displayed in message center
Press the up/down arrow to move the RS485 address. Set to 1.
Press Enter to Save the RS485 address
Press the Mode key to return to Run mode

An RS485 address must be set in order for data collection to occur.


Extensions

The reach of the interface, and thus the incubator can be as far as 400 feet away from the Networked Robotics NTMS network hardware. You can easily extend the length of any connection using the included RJ-45 coupler and either 6-pin phone cable or CAT5. You can mount your NTMS network hardware in a network closet, and “patch” the connection to an incubator RS485 interface using a standard wall plate in your lab or office.

If the NTMS is powered up, and the CAT5E cable connection is made correctly between the RS485 interface and the NTMS, the yellow LED on the interface will illuminate. If the yellow LED is not lit, check the connection to the NTMS and that the LEDs on the NTMS are lit. If not, make sure the NTMS is powered on.

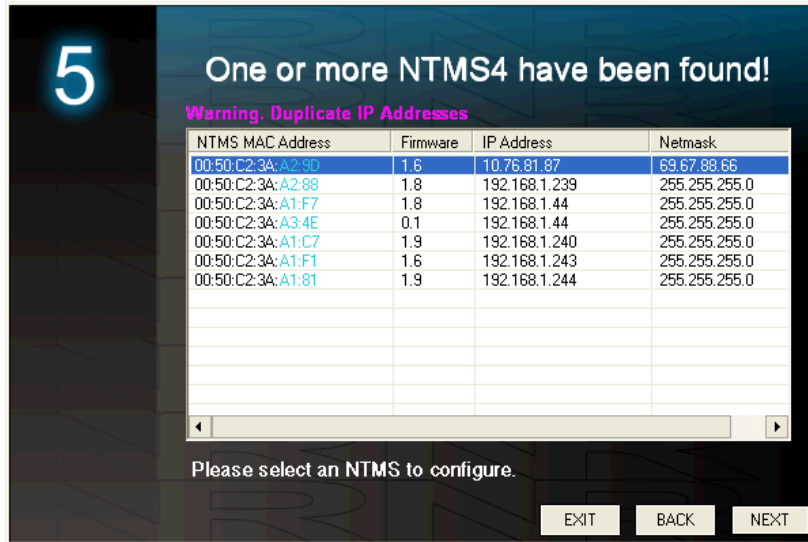
LEDs on Networked Robotics-proprietary sensors usually indicate the existence of a logical connection to the NTMS. The yellow LED on the RS485 interface indicates only that physical connection has been made to the NTMS.

2. Configuring the NTMS

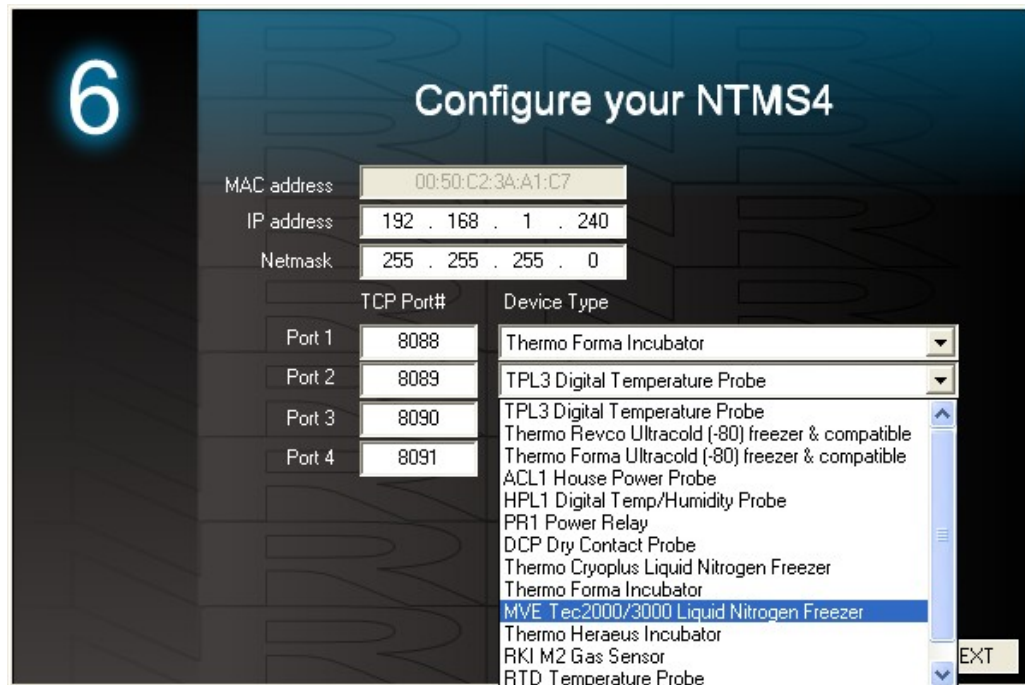
Configure your NTMS network hardware for data collection from this instrument. This is done by running the latest version of the NTMS Configuration Wizard  from any PC that is on the same subnet as the NTMS to be configured. You can obtain the configuration wizard from the “download” section of the Networked 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 and verify that the NTMS to which the interface is attached is discovered. This NTMS must be running firmware revision 2.0 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. There are special precautions needed when upgrading an NTMS running firmware version 1.x to firmware version 2.0 or higher.



2. Select the NTMS to which the interface is attached, and proceed to the "NEXT" screen. (IP addresses must be set properly for your institution. If you are uncertain about the IP address to use, check with your network administrator.)
3. Click on the NTMS measurement port where the probe is connected, and under the "Device Type" drop down, select "Thermo Forma® Incubator".



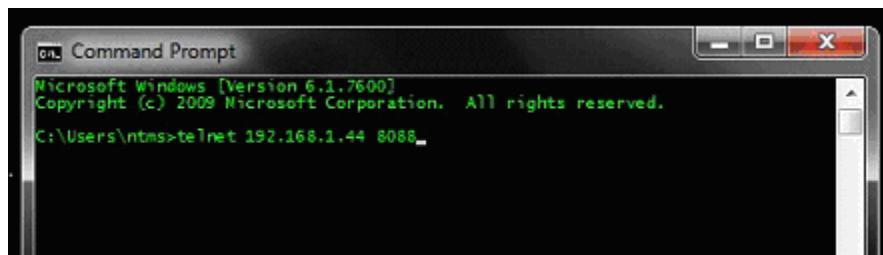
3. Click "NEXT" to complete the NTMS configuration.

3. Testing through the Network

Once the configuration is complete as described above we recommend testing the ability to make network temperature and other measurements by using the "Telnet" utility from any PC. This commonly-used network utility sends simple network commands that will elicit a temperature, humidity, oxygen, or co2 reading from the incubator.

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 Press Ok.

1. From Windows choose "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 as selected by your use of the NTMS Configuration Wizard as described above.



3. If you are successfully connected through the network you will see a blank screen.
4. Type a capital "T". A temperature and the associated checksum value should be returned. For more about debugging network connections to monitored devices see the Tempurity System User's Guide.

For use with the Tempurity System, you will need to add the network address (IP address and network port address) of the new monitored device (the ultracold freezer) to the Tempurity Server configuration. See the Tempurity System User's Guide and the section on server configuration for more information. The control character for this interface is "T" for temperature.

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

The NTMS network hardware continually reads temperatures and other data from the incubator(s). The most recent values are available for network requests by the Tempurity System. Because each reading takes about 3 seconds, data collected may be slightly different from the reading on the front panel, especially if values are changing rapidly.

Command Characters (Case sensitive)

The Tempurity System command character for temperature is "T".
The Tempurity System command character for humidity level is "H".
The Tempurity System command character for carbon dioxide level is "C".

The Tempurity System command character for oxygen level is “O”.

Reference

Unique IDs

Unique IDs are not supported via this direct interface as they are when using Networked Robotics proprietary sensors for data collection.

Communications Specifications

The RS485 interface communicates to Forma® incubators via RS485 protocol, and to Networked Robotics hardware via RS-232 protocol at 1200 baud.

Electrical Specifications

The RS485 interface needed to connect the incubator receives power from the regulated 9-12V DC supplied by the Networked Robotics NTMS hardware (no external power supply necessary.) Simply plug the interface into the NTMS as described above.

Physical Specifications

Weight:	50 grams (with dual lock)
Length:	67.22 mm (2.647 inches)
Width:	66.22 mm (2.607 inches)
Height:	28 mm (1.102 inches)

Support

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

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