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Networked Robotics Interface to Thermo Fisher Scientific® Forma® and Napco® CO2 Water-Jacketed Incubators (#30018)

The Networked Robotics Thermo Scientific® Forma® incubator interface enables remote network data collection and monitoring of scientific data through computer networks. This 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.
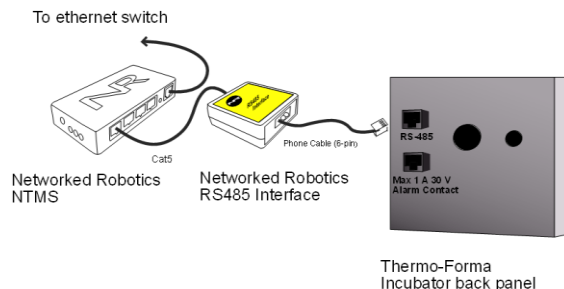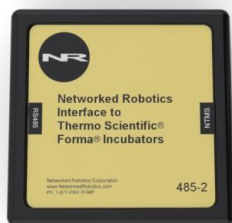
Description

This interface product enables the remote network data collection of temperature, oxygen concentration, carbon dioxide concentration, and humidity directly from the serial RS-485 data communications port of both Forma®-brand and Napco®-brand water jacketed incubators. The ability to support RS485 data output of these parameters is an option at incubator purchase time as is the ability to detect some of the above parameters. The option is required. If your incubator does not have this option, it is available from Thermo or from Networked Robotics with product #30020.

Using this interface, the values that are stored in the Tempurity System are the same as the values that are displayed on the incubator's front panel.

This interface supports data collection from Forma 3000-series incubators including Forma 3110 water-jacketed series, 310 series Direct Heat Incubators, 3307/3310 Stericults, the 370-series Stericycle models, and the Napco 8000WJ series. A separate Networked Robotics product serves newer 4000-series Thermo Fisher Scientific Forma water-jacketed incubator and Heraeus® Heracell incubators (#30031)

If you have questions about model compatibility call or e-mail Networked Robotics Corporation.

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
- (1) CAT5 Cable

Prerequisites

The incubator must have the capability of RS485 data communications. Many units come shipped with this option from the factory however if you do not have this option the capability may be added by purchasing the RS485 option for these units (Part number 190523) from Thermo or you can purchase this part from Networked Robotics (Part number 30020). 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. Consult installation instructions shipped with the part or your Thermo service representative.

If you do not have and do not wish to add the RS485 capability to your incubator in order to enable data collection via direct communication, as an alternative you can use Networked Robotics' advanced digital sensors to collect and monitor environmental data from these incubators.

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. Only a single monitored device, a direct connection to a Thermo Fisher Scientific® 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 scientific instruments and sensors.

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.

Installation is similar for both Forma-brand and Napco-brand incubators.

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 and 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.
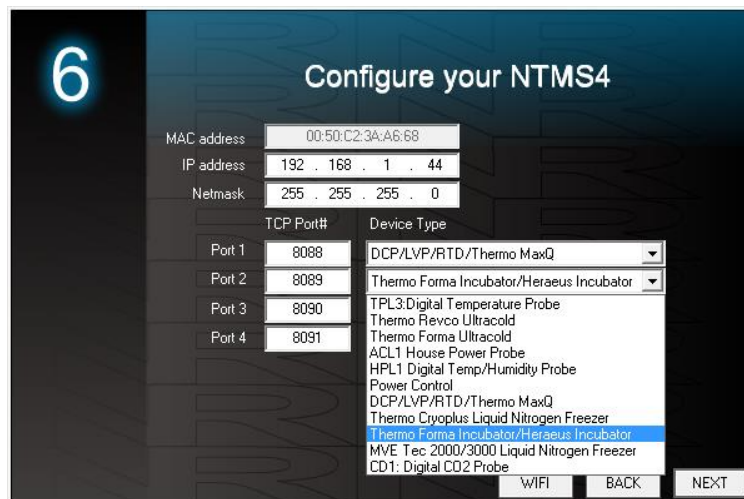
2. Configuring the NTMS

Configure your NTMS network hardware for data collection from this type of 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.
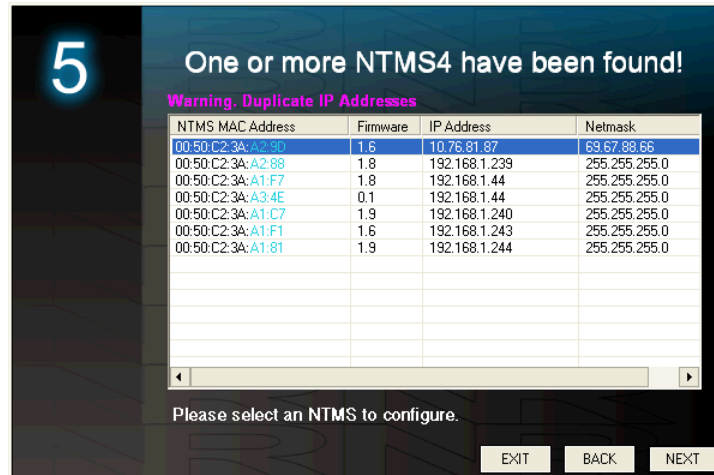
2. Select the NTMS to which the interface is attached, and proceed to the "NEXT" screen. (IP addresses must be set properly for your institution. If you are uncertain about the IP address to use, check with your network administrator.)

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.
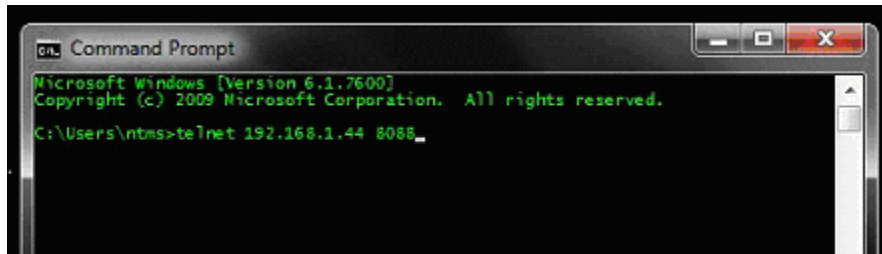
3. If you are successfully connected through the network you will see a blank screen.
4. Type a capital "T", "H","O", or "C", the command characters for this interface. An environmental value and the associated checksum should be returned. For more about debugging network connections to monitored devices 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 this "monitored device" to the Tempurity Server configuration. See the Tempurity System User's Guide and the section on server configuration for more information.

If a temperature is not returned through Telnet check network parameters, network ports, firewalls and connections and try again before attempting to configure data collection using the 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. Each reading takes about 3 seconds. The most recent values are reported to the network through the Tempurity Server upon request.

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.

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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