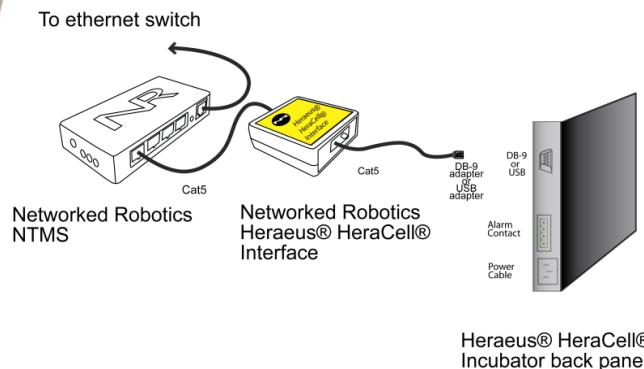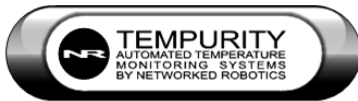Networked Robotics Corporation
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Networked Robotics Interface to Thermo Fisher Scientific® Heraeus® Heracell and Cytomat® Incubators (#30026 and #30044), Heracell VIOS incubators and Forma 4000 Series Incubators (#30031)

These products enable remote network data collection from Thermo Fisher Scientific® Heraeus® Heracell, Cytomat® and Thermo Fisher Scientific® Forma® 4000-series incubators. They are designed for use with Networked Robotics' NTMS (Network Telemetry Monitoring System) hardware and Networked Robotics' Tempurity™ System software The Tempurity System is engineered for data collection and monitoring in FDA-regulated environments including the pharmaceutical, medical, and food industries.

To ethernet switch

Networked Robotics NTMS

Networked Robotics Heraeus® HeraCell® Interface

Cat5

Cat5

DB-9 adapter or USB adapter

DB-9 or USB

Alarm Contact

Power Cable

Heraeus® HeraCell® Incubator back panel

Description

This product enables real-time network data collection and monitoring of trending temperature, carbon dioxide concentration, oxygen concentration, and relative humidity status by a single direct connection to the data communications port of the incubator. Some Heracell and Cytomat incubators support temperature and carbon dioxide concentration only depending on the options

ordered. With minor exceptions, the data that is collected and stored in the Tempurity System is the same as the data that is displayed on the front panel of the incubator.

Product #30026 is designed for use with Heracell 150i and 240i models. Product #30044 is designed for use with Heracell 150, 240, and Cytomat incubators. Product #30031 is designed for use with the Heraeus Vios line, models 160i and 250i and also all 4000-series Forma water-jacketed incubators.

Packing List

This package includes the hardware that you will need in order to connect the incubator to the NTMS.

- (1) Thermo Fisher Scientific Heraeus Heracell Interface
- (1) Heracell serial interface connector (9-pin) (#30026 and #30044 only)
- (1) USB A male to USB B male cable (#30031 only)
- (1) MicroUSB power supply (#30031 only)
- (1) RJ-45 coupler for extensions
- (1) CAT5 cable

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, especially manual testing through the network, as described below, 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 System's User's Guide (Networked Robotics document number "Tempurity-04-0006.5") on the Networked Robotics web site.

1. *Physical Installation*
Attaching the Heraeus Heracell Interface - NR Product #30026 and #30044

Products #30026 and #30044 attach to the RS232 interface of Heracell and Cytomat incubators. If your product has only a USB port (Vios models) you must use Networked Robotics product #30031.

You will attach this Heracell interface hardware either to the back or side of the incubator. Secure the interface using the "dual-lock" backing provided. The "dual-lock" sticks best to metal (except aluminum) or plastic surfaces. It may not adhere as well to porous surfaces such as drywall, wood, or concrete.

Connect the interface to one of the four ports of an NTMS using the Cat5 cable as shown in the figure on the first page. The green light on the interface will illuminate once the NTMS port is connected. If not then check the connection to the NTMS and check that the NTMS is powered on.

Verify that the data collection port of the NTMS is set properly for data collection from a Thermo Forma incubator (see below for detailed instructions).

Connect the Cat5 cable from the Heracell Interface port marked "Incubator" to the RS232 adapter. Then Connect the RS232 adapter to the incubator's serial port. This is located at the back of the instrument on the left side.

After a few minutes the yellow LED on the interface will illuminate indicating that the interface is getting data from the instrument. If the yellow light does not illuminate check that connections are correct and the baud rate is set properly on the incubator. The yellow light will only illuminate if the NTMS port is configured for the Heraeus instrument type as described below.

The red LED on the NTMS side of the interface will take one or two minutes to illuminate. It flashes at regular intervals when data is being sent from the interface to the NTMS network hardware.

Attaching the Heraeus Heracell Interface - NR Product #30031

Connect the standard USB cable from the interface in any one of the four USB ports on the interface and plug the other end into the USB port on the incubator.

Connect the standard Cat5 cable from the top-mounted RJ45-jack on the interface labeled "NTMS" to one of the NTMS data jacks.

Connect the microUSB power supply to the interface.

Configuring the Incubator

The all Heracell models with an "i" suffix must have communications data rates set via the front panel. Go to "Menu" then "Settings" then "Interface" to set the speed to "57600". If the Incubator is set to the incorrect baud rate the red LED will not illuminate and data will not be received from the incubator. Other Heracell and Cytomat incubator models are factory set to the 9600 baud proper speed.

Extensions

This interface 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 Physical Port for the Appropriate Data Collection Type

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 (behind the same router) 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.

3. 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.)
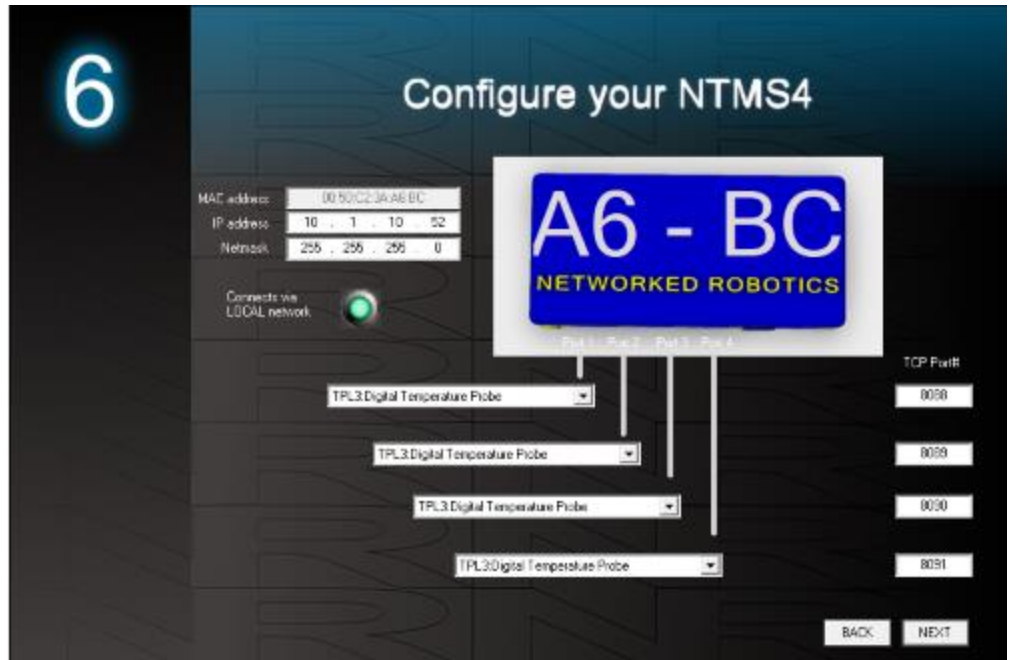
4. Click on the drop-down for the physical port on the NTMS where the probe is connected, and under the "Device Type" drop down, select Thermo Forma/Heraeus incubator.
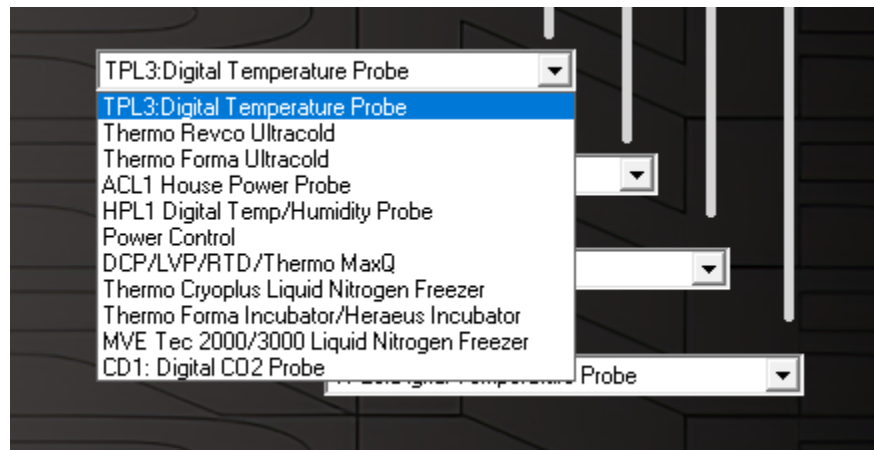

3. Testing Data Collection through the Network

Once the configuration is complete, we recommend manually testing the ability to make network temperature measurements by using the common "Telnet" utility. This can be done from any networked computer with access to the NTMS network hardware.

Telnet is included with Windows but you may need to activate it. On Windows 10 and 11 computers activate the Telnet utility as follows: 1 Start 2 Control panel 3 Programs 4 Turn Windows Features on or off 5 Check "Telnet Client" 6 Click Ok

1. From the Windows Command Prompt. On some Windows versions click the Windows key (start), then type "CMD", and then click on the command prompt.

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.)

   For example "Telnet 10.1.200.3 8088"
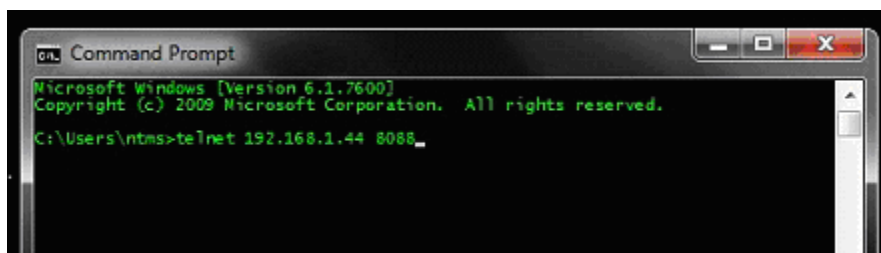
3. If you are successfully connected through the network you will see a blank screen.

4. Type a capital "T", "C", "O", or "H" the command characters for this device. A value for the associated query should be returned. Temperature, carbon dioxide, and oxygen concentration return trending values. "H" returns a status code (0 or 1) indicating whether a low humidity condition exists.

Failure to connect indicates a network problem. An "error" message indicates a problem in the connection at the instrument. If a temperature is not returned, check network parameters, network ports, firewalls and connections and try again. It is best to confirm successful network data collection using Telnet before attempting to configure data collection in the Tempurity System.

For more about debugging network connections to probes see the appendix of the Tempurity System User's Guide.

Operation

NTMS network hardware continually reads data from the Heracell Interface. Each reading takes about 5 seconds. The most recent values are available for network requests by the Tempurity System.

The #30044 model produces slightly different readings from the front panel in that the Tempurity readings are truncates where the instrument readings are rounded to the nearest tenths decimal place.

Temperature, carbon dioxide and oxygen readings are fully trending. The relative humidity reading is a status only and indicates only in a yes/no way whether a low humidity condition exists. A zero reading indicates normal humidity. A reading of one indicates that a low humidity condition exists.

An attempt to access oxygen concentrations when not supported by the unit will yield a -999.9 reading. On models with no "i" suffix humidity readings always yield 0. The Tempurity System

should not be configured for continuous data collection from unsupported internal sensors that are not available for your incubator.

Reference

Communication

Data Rate of Incubator

57600 Baud (30031 and 30026)
9600 Baud (30044)
Data bits 8
Parity none
Stop bits 1
Flow Control None

Interface Cable NR interface #30026 and #30044

DB9 male to RJ45 jack

DB-9 Pin 1 = NTMS RJ45 pin 2 = DCD	DB-9 Pin 5 = NTMS RJ45 pin 4 = GND
DB-9 Pin 2 = NTMS RJ45 pin 5 = RD	DB-9 Pin 6 = NTMS RJ45 pin 1 = DSR
DB-9 Pin 3 = NTMS RJ45 pin 6 = TD	DB-9 Pin 7 = NTMS RJ45 pin 8 = RTS
DB-9 Pin 4 = NTMS RJ45 pin 3 = DTR	DB-9 Pin 8 = NTMS RJ45 pin 7 = CTS

Physical Specifications

#30026 and #30044

Weight:	56 grams (2.0 ounces)
Length:	67.22 mm (2.647 inches)
Width:	66.22 mm (2.607 inches)
Height:	28 mm (1.102 inches)

#30031

Weight:	99.2 grams (3.5 ounces)
Length:	95 mm (3.74 inches)
Width:	67 mm (2.63 inches)
Height:	42 mm (1.65 inches)

Unique IDs Product #30026 and #30044

The electronic unique IDs are of the format:

36:0000:0000:0302   #30026   Heraeus 150i and 240i
38:0000:0000:2102   #30044   Heraeus 150, 240, Cytomat

Where the first field indicates the product number, and the other characters indicate the sequential electronic ID of the unit. Electronic IDs can be read through a Windows computer using the Networked Robotics "Calibration Programmer and ID Unit" (Networked Robotics part number #30010) hardware through a USB connection.

Performance and Accuracy

This product reports the values as that are obtained directly from the Heracell incubator. These values correspond to the values that are displayed on the front panel of the

instrument. Accuracy is per manufacturer's specifications. Follow the manufacturer's instructions for calibration.

This interface rounds data produced by the interface to the nearest 1 decimal point in order to match the front panel display of the incubator which also rounds values to the same precision.

Networked Robotics Hardware Class

Products #30026 and #30044 are based on a version of the Networked Robotics' "Streamer Probe". Product #30031 is based on the Raspberry Pi™ processor board.

Support

If you need assistance with your Networked Robotics Interface to the Heraeus Heracell or Forma-4000-series class of incubators 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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