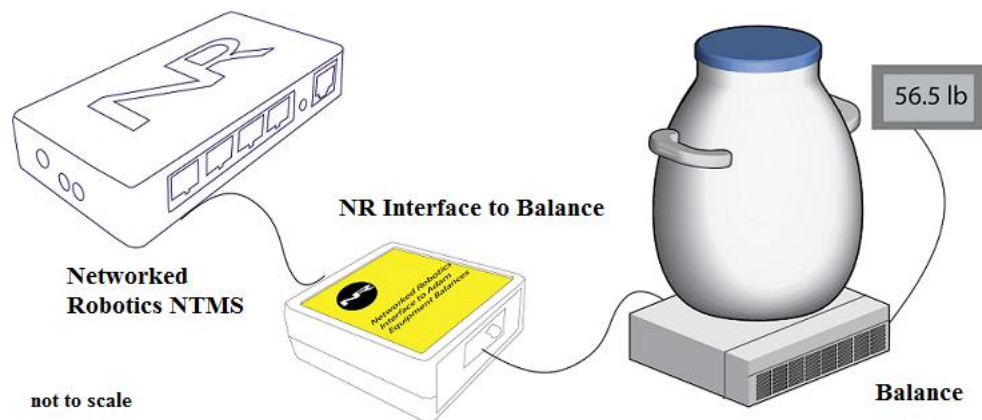Networked Robotics Corporation
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Networked Robotics Interface to Ohaus Defender® Bench Scales (#30042)

This product enables the continuous remote data collection of weight from Ohaus Defender bench scales. This product may be used to monitor the weight of liquid nitrogen-filled storage dewars as a means of ensuring valid storage conditions. This product is designed to be used in conjunction with the Networked Robotics NTMS4 (Network Telemetry Monitoring System) hardware and Networked Robotics' Tempurity™ System software. Tempurity is designed for network-based data collection and monitoring of real-time scientific data in FDA-regulated environments.

Description

This product supports continuous data collection from Ohaus Defender-series balances and scales. The "NTMS" side of the Ohaus Interface connects to one of the four measurement ports of the Networked Robotics NTMS. The "Balance" side is connected to the serial digital output port of the instrument's controller. This unit supports the data collection of weight in either kilograms or pounds.

The 2000-series line of Ohaus scales requires the purchase of an optional serial interface to work with this product. (RS232 Kit part #.30101019) The required serial data transmission capability is standard on 3000 and 5000 series scales.

For those customers planning to use the product to monitor liquid nitrogen storage dewars, information on the matching of Ohaus scale model numbers and platform size to dewar model and size can be found in the reference section of this document.

Packing List

This package includes the basic hardware you will need to connect the balance interface to the NTMS.

- (1) Ohaus Balance Interface
- (1) Balance Interface Cable
- (1) CAT5E Cable
- (1) RJ45 Coupler for Extensions

The Ohaus Defender scale is not included and must be purchased separately.

Data Collection from Any Combination of Monitored Devices

Each NTMS4 unit has 4 "universal" measurement ports. Data from any combination of Networked Robotics interfaces to scientific instruments and sensors can be collected with a single NTMS unit. For example temperature can be monitored inside dewars using our RTD Probe, product # 30014)..You can collect data from 4 balances/scales or from any combination of our interfaces on the 4 data collection ports of our network hardware.

Installation

The Networked Robotics Ohaus Defender balance interface is attached to the balance and to any free data collection port on Networked Robotics' NTMS network hardware. There are three major steps in the installation of this product:

1) Physical installation including configuration of balance\scale parameters
2) Configuration of the Networked Robotics NTMS hardware to which the balance is attached
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
Configuring the Instrument for Data Collection

The balance should be plugged into a power outlet. Although Ohaus Defender-series balances can optionally be battery-powered Networked Robotics highly recommends that the unit should be permanently connected to power for continuous monitoring applications.

Data transmission parameters must be set correctly in the balance to enable network data transmission.

Your Defender scale must have a serial port. The Defender 2000 series has an optional product that enables serial data transmission, where serial data communication is standard on the 3000 and 5000 series.

Use the Ohaus T51 controller "5000 Series Indicators Instruction Manual" or T31 controller "3000 Series Indicators Instruction Manual" depending on your scale model to make changes in the configuration.

3000 series models
https://us.ohaus.com/en-US/Defender3000

5000 series models
https://us.ohaus.com/en-US/Defender5000

The balance must be set to 1200 baud, 8 bits, 1 stop bit and to the continuous streaming mode of data output labeled "trn 2" in the configuration.

Data/Electronic Connections

This product can be installed as far as 100 meters from the Networked Robotics NTMS network hardware and connections are easily made and extended with CAT5 cable and the included couplers. You may wish to install the Networked Robotics NTMS hardware in a network closet, and then "patch' to this product at the monitored site via your company's network cable plant.

The interface unit should be placed in a location removed from possible exposure to high temperature, liquids, or other harsh environmental conditions.

If you are using the balance to monitor a dewar it is important to place the dewar squarely on the balance. If possible attach a safety cord to prevent tipping. If you are connecting one of the models where the controller is mounted on a stand, attach the dewar to the stand with bungee cords or by other means.

Connect this product to one of the four ports of an NTMS using the CAT5 cable. Check that the NTMS is powered on, and verify that the data collection port is set properly for data collection from LVP\DCP (see below). If the NTMS is powered on, and the CAT5E cable connection is made correctly between this product and the NTMS, the green LED will illuminate, and the red LED will illuminate periodically when the balance is polled by the NTMS hardware.

Connect the 9pin connector to the indicator module (the Ohaus T51, T31 etc. controller) and use the included CAT5 cable from the connector to the connector labeled "Balance" on the interface. The yellow LED will illuminate when the Networked Robotics interface is acquiring data from the balance.

Secure the interface unit to a convenient permanent location 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. The probe can be removed from its dual-lock base for maintenance or cleaning.

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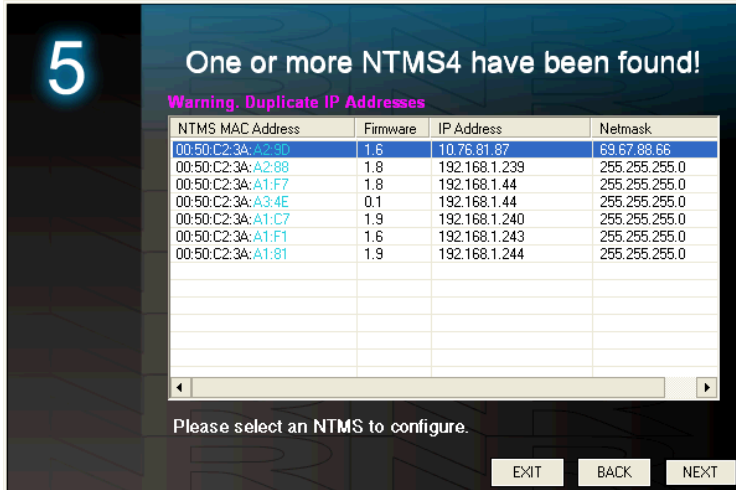
2. Select the NTMS to which the interface is attached, and proceed to the "NEXT" screen. (IP addresses must be set properly for your institution. If you are uncertain about the IP address to use, check with your network administrator.)
3. Click on the NTMS measurement port where the probe is connected,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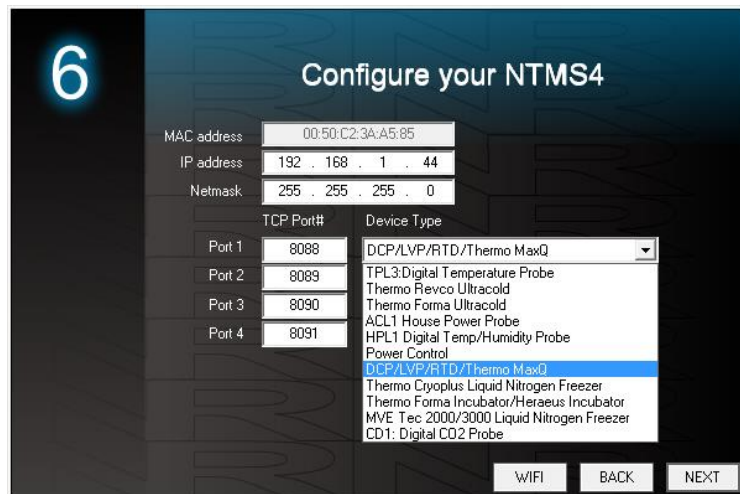

4. Click "NEXT" to complete the NTMS configuration.

Note: If the NTMS measurement port is configured as the incorrect interface type (The correct type is "DCP/LVP") in the NTMS Configuration Wizard, then the green LED light will never activate despite having the correct physical connection to both the NTMS and the voltage source.

3. Testing Data Collection 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 current reading from the probe.

Windows clients may need to enable the Telnet utility as follows (Windows 7,8,10): 1 Start. 2 Control Panel. 3) Programs and Features. 4 Turn Windows Features on or off (upper right of screen). 5 Check "Telnet Client". 6 Press Ok.

1. From Windows choose "START", then "RUN", and then type "CMD" and press return.
2. In 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.
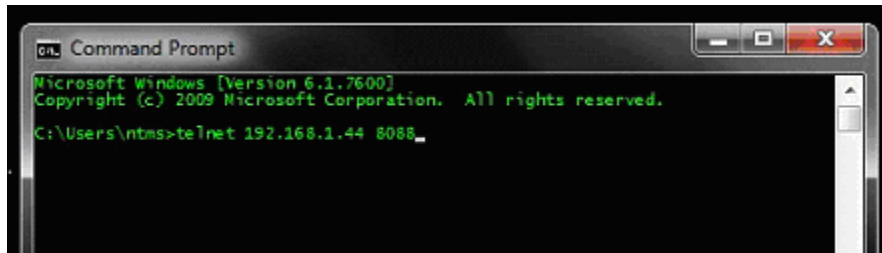
3. If you are successfully connected through the network you will see a blank screen.
4. Type a capital "T", the command character for this device. A reading and the associated checksum value should be returned. For non-temperature values ignore the reported units. For more about debugging network connections 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 Ohaus balance interface) to the Tempurity Server configuration. See the Tempurity System User's Guide section on server configuration for more information.

The control character for this interface is "T" for all products.

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

Configuring Data Collection in the Tempurity Server Configuration Utility 🔧

Use of this product for measuring weight requires the definition of a monitored device of type "Custom" in the Tempurity Server Configuration Utility. See the Tempurity System User's Guide, especially pages 38 and 39 of the Version 2 User's Guide (NR Document Number Tempurity 04 0006.5) and the section on Tempurity Server configuration for more information. The control character to acquire weight from this product is "T".

The figure below shows how a Networked Robotics balance interface is configured. In the case of these interfaces the value type would be "weight" for example and the units would be "lb" however "kg" can also be used if the balance is set to use kilogram units.

Device Type:	Custom ▾	
Value Type:	Weight	Calibration Factor: 0
Value Units:	lb	
Value Precision:	1	
Control Character:	T	

[OK] [Cancel]

Operation

The Networked Robotics' NTMS network hardware continually reads values from the balance at approximately 4 second intervals. The most recent value collected by the NTMS is available for network requests by the Tempurity System which by default collects remote data at one minute intervals.

During normal operation, the yellow LED will occasionally blink. The blink indicates an active data read from the balance. If the yellow LED does not activate then either the configuration of the balance serial port has been changed and is no longer correct for the interface or the connection is lost and the cables should be checked. The Tempurity System will read 0 weight.

When a power failure occurs the balance will not automatically restart. You will need to turn the balance on manually using the on/off button on the display. A tare is recommended but is not always required however without a tare the reading may be somewhat affected by the power restart. The factory provides a modification where power restore will automatically start the balance. However when this happens the balance will automatically tare if the weight at start is less than 10% of the maximum weight of the unit. That means that if you want to have this modification done, the empty weight of the dewar should be greater than 10% of the full scale capability of the balance.

When the interface is disconnected from the balance or if the power of the balance is off the yellow light will stop blinking and the balance interface will read 0 to the network.

If you are using this interface to monitor scientific dewars, the empty to full weight ratio in dewars between 10 liters and 50 liters is about 1 to 3. So about 2/3 of the weight of a full dewar is liquid nitrogen. Care must be taken to set the low limit weight for the device in the Tempurity System to above the empty weight of the dewar plus the expected weight of samples. If you know the model number of your dewar then empty and full weights are available online for most dewar manufacturers.

Reference

Maximum Weight

The interface is currently tested to a maximum weight of 150kg but is expected to support up to 999 kg. When the balance is set to pounds the maximum weight is 200 pounds even if the balance it is connected to supports a greater weight.

Power Supply

The interface unit derives its power from the regulated 5 volts DC supplied by the Networked Robotics NTMS hardware. It requires no external supply.

History

This product is a modified version of the Networked Robotics Streamer Probe on which several other Networked Robotics products are based. In this case the Ohaus balance is set to "stream" data continuously.

Selecting a Scale: Links to Dewar Manufacturer Weight and Diameter Specifications

If you are using this product to monitor liquid nitrogen dewars care must be taken to use the correct scale with the correct-size balance platform for the base of each dewar. If your dewar uses a roller base or tipping stand you may wish to consider versions of these scales with wheels.

> *Available Defender 3000 Series Platforms Sizes (inches)*
>
> > *14 x 12*
> > *21.7 x 16.5*
> > *25.6 x 19.7*
>
> *Available Defender 5000 Series Platforms Sizes (inches)*
>
> > *14 x 12*
> > *19.7 x 15.7*
> > *21.7 x 16.5*
>
> *Available Defender 700 Series Platforms Sizes (inches)*
>
> > *14 x 12*
> > *19.7 x 15.7*
> > *21.7 x 16.5*

Dewars have a concave bottom with an internal ring that supports the weight of the tank on the floor. This ring has a few-inch smaller diameter than the width of a dewar. Therefore on many models a few-inch smaller diameter scale platform can be used than the dewar diameter. The links to the dewar manufacturer sites below are designed to be accessed in the electronic form of this document.

> Taylor Wharton® XT-series
> Taylor Wharton® XC Series
> Worthington® LD Series = Taylor Wharton LD Series
> Chart Biomedical® MVE Cryosystem

Unique IDs

All Networked Robotics sensor hardware holds electronic globally unique IDs. The IDs for these Ohaus interface products - are of the format:

> **35:0000:0000:0302**

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.

Note that this product is the same as that used on Adam Equipment scales and balances. The module speaks the languages of both types of instrument.

Physical Specifications

Weight:	65 grams (2.3 ounces)
Length:	77.22 mm (3.040 inches)
Width:	66.22 mm (2.607 inches)
Height:	48 mm (1.890 inches)

Performance and Accuracy

The precision and accuracy of this product are generally that of the Ohaus electronics except for the rounding mentioned below. See the scale manufacturer's manual for details. Networked Robotics rounds the hundredths digit displayed by the instrument. The thousandth digit is ignored.

Support

If you need assistance with your Networked Robotics Ohaus Defender Balance 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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