OmniFlex™

With USB Interface

Fiber Optic Thermometer Systems

Multi-Channel Systems (1 to 512 channels)
Neoptix-OmniLink Software Release 1.1

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Proprietary notice:

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TABLE OF CONTENTS

Warning

Permanent damage may be done to the thermometer if the power supply connections are not done correctly. In particular, do not connect the power input (18-24VDC) to any of the analog output connectors. Note that the 20 mA analog output options are self-powered interfaces (by opposition to loop-powered interfaces), and thus do not require any external supply.

With 0-10 volt analog outputs, avoid shorting output leads together; as this may destroy the electronic drivers inside the OFX modules.

The supplied 24VDC power supply module is limited to 4A. Neoptix recommends that one power module be used for each OmniFlex chassis, despite the fact that more than one chassis can be linked together using only one power module. If more than one chassis is using a single power-supply module, care must be exercise to avoid overloading power-supply modules.

Fiber optic probes are fragile, and will break if the bending radius becomes less than ~1cm, even temporarily. Probe breakages are not covered under the standard Neoptix warranty.

To assure cleanliness of optical connectors, keep caps on unused connectors at all time. This is also required during operation, as parasitic light entering via unused connectors into the OFX modules may cause false temperature readings, even on other channels.

The Neoptix OmniFlex products are CE marking certified.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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1.1 OmniFlex Family and Neoptix Probe Warranty Notice

Your *OmniFlex* unit is guaranteed (Parts and Workmanship) for one full year from the date of purchase. Upon written notification of any defect, Neoptix will either repair or replace any faulty product or components thereof. A Return Authorization Number (RMA) must be obtained from Neoptix Canada LP or authorized distributor prior to any merchandise return.

Due to the unique nature of the fiber optic probes that are used with the Neoptix Conditioner system, probes are not warranted.

When using any electrical appliance, basic safety precautions should be followed, including the following:
- Do not operate in wet / damp environments
- Do not operate in explosive atmospheres
- Keep product surface dry and clean.

Always make sure all electrical installations are made in accordance with local authorities' regulations and laws.

2 INTRODUCTION

Congratulations on the purchase of your OmniFlex-USB™[1] thermometer product! Your new temperature sensing system will soon allow you to take full advantage of the benefits inherent to fiber optic sensing technology. It offers accurate and reliable temperature measurements in a package that offers unprecedented configuration flexibility, combined with extraordinary insensitivity to EMI/RFI, high voltage insulation and disturbance free sensing due to the non-electrical nature of the sensor element used.

Not only does the OmniFlex family of products gives consumers' access to reliable measurements, but it also offers a simple user interface that makes the technology easy to use. Moreover, no special calibration is required when changing the fiber optic sensor elements.

The thermometer chassis is packaged in a standard 4U 19" rack, which is ideally suited for industrial applications. It can also be used as a desktop instrument.

The standard configuration is offered with an USB interface (b-type connector) as well as an analog output feature that can be used for remote interfacing purposes (picture below needs to be updated to show the USB connector).

2.1 System description

A complete OmniFlex system is normally composed of one or more OmniFlex chassis, and one or more signal conditioner modules (called OmniModules). Each chassis can accept up to 8 OmniModules. Neoptix offers different type of OmniModules, as follows (each must be purchased separately):

- o 2-channel, direct
- o 4-channel, direct
- o 4-channel, sequential
- o 8-channel, sequential.

Internally, all modules, and chassis, are linked to each other via a high-speed RS485 link. For easy of connection to your PC computer, this internal signal is converted to a RS232 communication standard; baud rate is fixed at 38,400 (no parity, one stop bit, no handshake). When using the OmniLink software (one copy included with each chassis), the user does not need to worry about these interfacing details.

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[1] The OmniFlex-USB product is referred as OmniFlex in this guide.

2.2   OmniFlex general specifications

The following table gives specifications that are applicable to an OmniFlex system. Then, each OmniModule is described separately.

Resolution	0.1°C
Accuracy	+/- 1°C
Calibrated Temperature Range	-35° to 175°C
Usable Temperature Range	-80° to 250°C Cryogenic temperature range available as an option*
Number of channels*	1, 2, 4 or 8 (per module)
Number of modules per chassis	Up to 8
Maximum number of channels	512
Probe length	1 to 300 meters
Response time	Typically 0.2 second per channel (probe configuration dependent)
Unit	User selection of °C or °F
Operating temperature	0° to 50°C, non-condensing
Storage temperature	-30° to 60°C
Local display	No local temperature display Each channel includes a probe working/non-working led
Power	18 to 28VDC (24 VDC nominal) (see note below, front panel item #10)
Size	19 inch rack mount (height: 4U) 180H x 480W x 320D mm
Weight	3 to 6 kg per chassis
Standard interface	USB (b-type connector) Analog output* (4-20mA or 0-10V)
Sensor	Dielectric epoxy or silicone tipped optical fiber

*: Selection must be specified at time of order.

WARNING: You must install the USB driver before you connect the OmniFlex chassis to your PC computer; please refer to Section 6.1 for specific instructions on how to do this.

2.3   OmniModule specifications

2.3.1   1-channel module (OFX-1D)

Number of channels	1
Electronic refresh time	0.1 second
Size	175H x 50W x 250D mm
Weight	1.1 kg
Power*	18 to 30 VDC Current, typical: 0.12A @24VDC input voltage Current, worst case: 0.15A @24VDC input voltage

*: Power consumption should be taken into account when cascading multiple chassis together. Take note that the standard Neoptix power module has a current capacity of 4A @24VDC.

2.3.2 2-channel module, direct (OFX-2D)

Number of channels	2
Electronic refresh time	0.1 second (direct)
Size	175H x 50W x 250D mm
Weight	1.4 kg
Power (direct)	18 to 30 VDC Current, typical: 0.24A @24VDC input voltage Current, worst case: 0.30A @24VDC input voltage

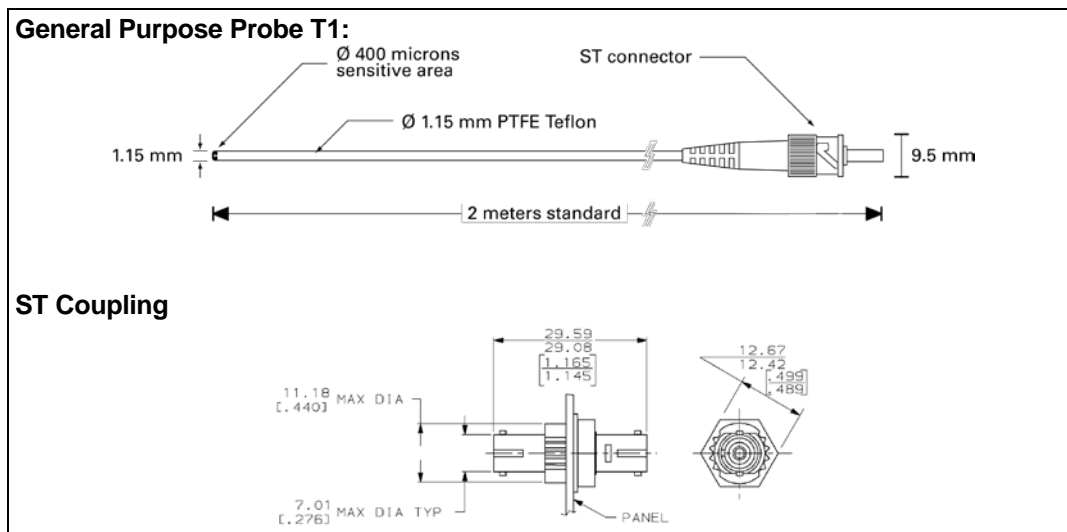### 2.3.3 4-channel module, direct (OFX-4D) or sequential (OFX-4S)

Number of channels	4
Electronic refresh time	0.1 second (direct) 1.0 second (sequential)
Size	175H x 50W x 250D mm
Weight	1.6 kg
Power (direct)	18 to 30 VDC Current, typical: 0.5A @24VDC input voltage Current, worst case: 0.60A @24VDC input voltage
Power (sequential)	18 to 30 VDC Current, typical: 0.12A @24VDC input voltage Current, worst case: 0.20A @24VDC input voltage

2.3.4 8-channel module, sequential only (OFX-8S)

Number of channels	8
Electronic refresh time	2.0 second (sequential)
Size	175H x 50W x 250D mm
Weight	1.2 kg
Power	18 to 30 VDC Current, typical: 0.24A @24VDC input voltage Current, worst case: 0.33A @24VDC input voltage

2.4 Options

The following figure gives a description of the various probe configurations that are optionally available from Neoptix.

General Purpose Probe T1:

Ø 400 microns sensitive area
ST connector
Ø 1.15 mm PTFE Teflon
1.15 mm
9.5 mm
2 meters standard

ST Coupling

29.59 / 29.08 [1.165] [1.145]
12.67 / 12.42 [.499] [.489]
11.18 [.440] MAX DIA
7.01 [.276] MAX DIA TYP
PANEL

ST-ST Extension Cable

Ø 3 mm Polyurethane cable
reinforced with Kevlar threading

9.5 mm

ST connector
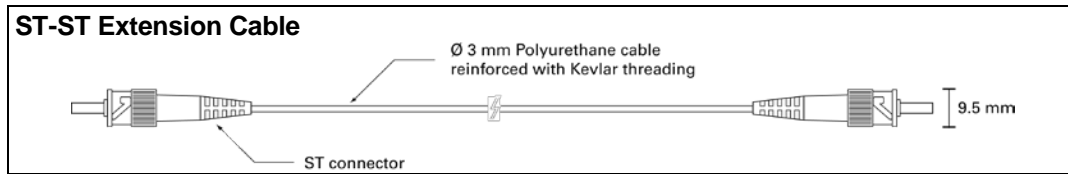
Other options and configurations are also possible; contact Neoptix for more information.

2.5 Calibration

Each OmniFlex OmniModule comes factory-calibrated. The OmniFlex system normally would not require any future calibration; however, an annual re-calibration is recommended every 12 months or whenever performance verification indicates that calibration is necessary, according to your ISO9000 requirement or equivalent. NIST traceable calibration certificates are available. All calibrations are performed at the factory. Contact your Neoptix Representative for further information.

3 UNPACKING

Before using your OmniFlex thermometer, check the box content to be sure all items have been included. Your package should normally contain:

- OmniFlex chassis
- Signal conditioner module(s)
- Blank panels (enough, so the total of modules and blank panels is 8 per chassis)
- Power supply module (universal input: 100-240VAC, 50/60Hz)
- Interconnection cable
- Neoptix OmniLink™ software (supplied on a CD)
- USB interface cable (A type male to B type male cable)
- User manual (this manual), supplied on the same CD
- Calibration Certificates, one for each signal conditioner.

Options:
- Fiber optic temperature sensor probes
- Fiber optic extension cables (also called sometime "patch cords")
- Fiber optic coupling
- Carrying case & accessories.

Make sure all listed items have been received and are in good condition. Note any evidence of rough handling in transit; immediately report any damage to the shipping agent. Should a part be missing or damaged, please contact your distributor immediately. Returns must be made with the original packaging, accompanied by an authorization number (RMA). Your distributor will provide you with information concerning the return of merchandise.

The carrier will not honor damage claims unless all shipping material is saved for inspection. After examining and removing contents, save packing material and carton in the event reshipment becomes necessary.

4   OMNIFLEX™ HARDWARE REFERENCE

Warning: The USB interface requires that a special software driver be installed, before you attempt to connect your new OmniFlex system to your PC; refer to Section 6.1 for more information.
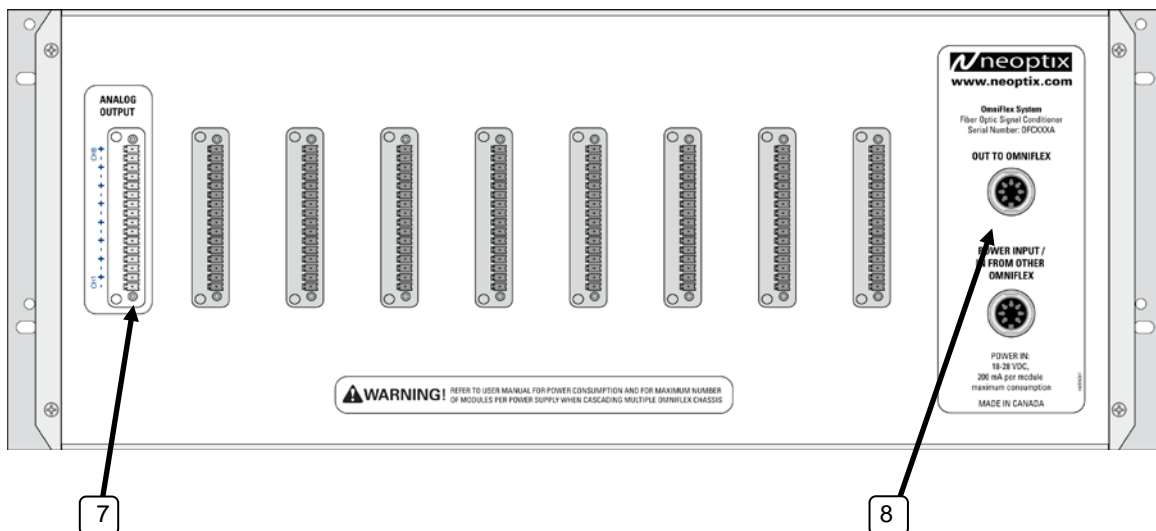
Warning: When reconfiguring a system by removing or adding OmniModules, make sure power is turn off for all chassis composing your OmniFlex system (no green POWER LEDs should be lit, for all modules).

4.1   Interface details

The following figure shows the OmniFlex front panel, loaded with 8 OmniModules:
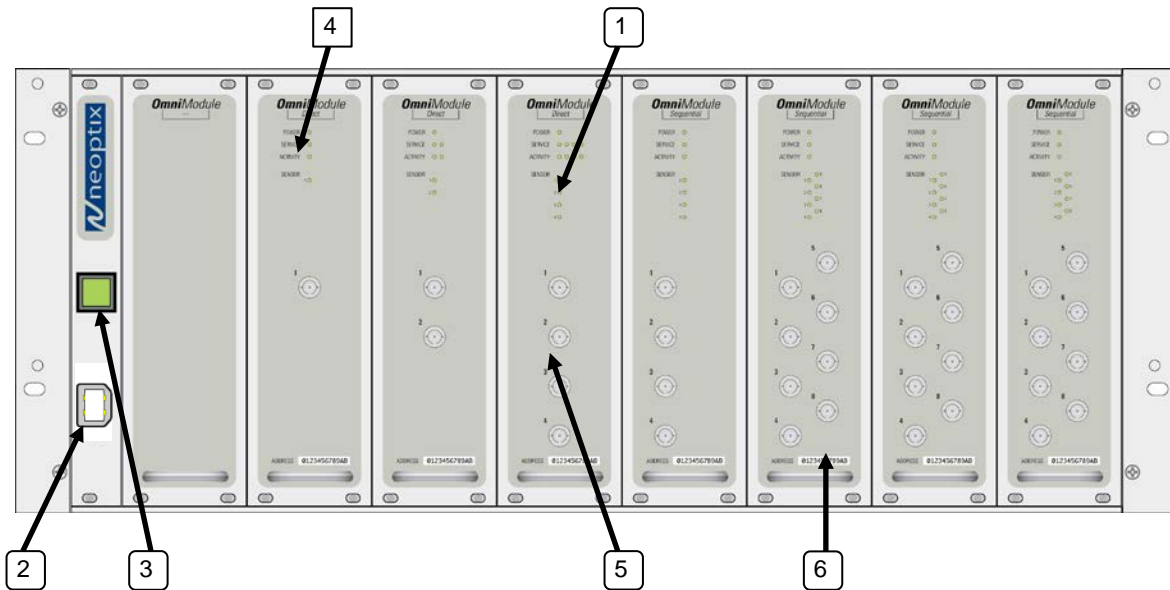
The OmniFlex back panel is as follows:

The following presents a full description of the user interface as well as detailed instructions on how to use the thermometer.

1) Sensor status light(s): There are a total of up to 8 lights for this, one for each channel. These indicators inform you about the system status, as applicable to each channel. If any remains off, this indicates that either that channel is disabled or there is a problem with that sensor (or with the optional extension cable connected to it). Check if all optical connectors are correctly mated or if the sensor fiber (or extension cable) is not broken.

A quickly flashing light indicates that the calibration table applicable to this channel is corrupted. If this happens, the integrity of the temperature readings for this channel is not guaranteed; please use precaution. Contact Neoptix for further information on how to resolve this issue.

2) USB communication interface: This port is used to interface to your PC, to configure and to extract information for the instrument. This USB b-type connector is similar to what you will find on a USB-printer. A 2 meter USB cable is included with the unit. See below for a complete description of the serial commands that are available.

When using an OmniFlex system that is composed of more than one chassis, make sure that ONLY ONE USB cable is used; any USB connector can be used, leave the other USB connectors unconnected.

3) Power switch. Make sure the OmniFlex power supply module is connected and powered. With systems that have multiple chassis, you will need to turn on each chassis. When properly powered, each OmniModule should have its green POWER led on.

4) Module status lights: 3 LEDs are provided on each module, as follows:

- POWER led: Green, when this module is power up.

- SERVICE led: Currently not used.

- ACTIVITY led: Blinks red when this module sends information to your PC computer.

5) Sensor connector(s): These are ST type connectors, mating to each of up to 8 optical temperature sensors. If you need to extend a sensor fiber, you should use optional extension cables that are available from your Neoptix supplier.

> **Warning:** The fiber type that is used with your OmniFlex thermometer is of a special type, and it is recommended that you get ALL of your extension cables from Neoptix or a Neoptix authorized distributor.

6) OmniModule address: Each OmniModule is uniquely labelled with an hexadecimal address number that can range from 0001 to FEFF. This address is used to inform the OmniLink software about the physical location of each module. See the Software section for more information.

7) Analog output connectors: There are a total of 8 such connectors, one for each OmniModule. Prior to shipment, your OmniFlex thermometer was factory set to one of the following configurations: 4-20mA or 0-10V output. <u>The minimum analog output value corresponds to minus 100°C and the maximum analog output value corresponds to 300°C</u>. The thermometer normal range is from minus 80°C to 250°C, so a minimum value indicates an under-range error; likewise, a maximum value indicates an over-range error condition. Note: OmniFlex OmniModules that have extended range, such as cryogenic versions, may differ; contact Neoptix for more information. If there is a sensor problem for a given channel, the analog output may take one of the following 3 states (refer to the "o" command, Section 6.3.3.2):
  a) It will toggle between the minimum and maximum values, at approximately 0.5 Hz; this indicates a sensor problem for that channel (o0). This is the default setting; to change it, you will need to use the RS-232 "o1" or "o2" command.

b) The analog output is forced to its maximum value (o1); this would indicate a "too-hot" situation.

c) The analog output is forced to its minimum value (o2); this would indicate a "too-cold" situation.

Warning: 1- Do not connect any external voltages to these outputs; this may cause permanent damage to the thermometer unit. 2- Avoid shorting output leads together, as this may destroy the electronic drivers inside the OFX modules.

Note: If the OmniFlex unit is in "sleep" mode, the analog outputs will keep their values until the OmniFlex acquires new temperature values.

8) 24 Volts DC power connector: You can use a DC power supply from 14V to 28V; note that at 15V or less, you will be unable to use more than one (1) 500Ω load at the analog output, for all current output configurations (4-20mA). Each OmniModule is fitted with an internal fuse, to protect the system in case of electrical problems; this fuse is not user changeable.

See next Section for instructions on how best to connect power to your OmniFlex system.

4.2 Connecting multiple chassis together

The OmniFlex system has been designed to allow for flexible cascading of multiple chassis. The recommended technique to connect multiple chassis together is to use one power-supply module per OmniFlex chassis.

4.2.1 One power-supply module per chassis

This is the Neoptix recommended method, although it is a bit more cumbersome due to the fact that you need to use more power-supply modules. In this configuration (illustrated below), one power module is used for each chassis, using any one of the two power connectors found at the rear of each chassis (the use of the bottom connector, labelled "Power Input / In From Other OmniFlex" is recommended).

The main advantage of this method is that you do not need to worry about the power rating of the power-supply modules as each power-supply module has ample power capacity to drive a fully loaded OmniFlex chassis.

Each power-supply module is wired with a communication dongle cable. If you are using only one chassis, this dongle cable should be left unconnected. If using multiple chassis, the dongle cable of the base chassis should be connected to any of the two power connectors found on the next chassis ("Out to OmniFlex" connector is recommended); the other connector should be used to connect the power-supply module to this chassis.
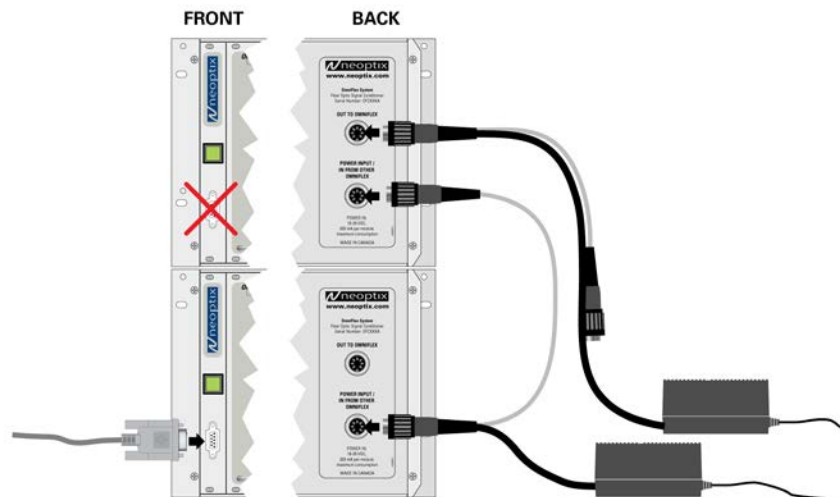
Use a proper USB cable to connect the OmniFlex system to your PC computer. Each OmniFlex chassis is fitted with a front USB B-type female connector; any front USB connectors can be used for this purpose. **Warning**: connect only one cable per system, any one is fine.

4.3   Adding and removing OmniModule modules

OmniModules can be added, removed or moved in a system.

Warning: Make sure power is turned off before removing or adding any OmniModules.

To remove a module:

- Turn system power off.

- Unscrew the 4 corner screws found at each corner of the module you want to remove. A small flat screwdriver is required for this.

- Pull on the module firmly using the small handle located at the bottom of the module.

- If no other module is to be inserted in the same location, make sure you use a blank panel to fill the hole. Screw the blank panel using the 4 corner screws. It is important to make sure no holes are present, to insure good system EMI rejection and integrity.

- Configure the OmniLink software to "inform" it that you have removed a specific module.

To add an OmniModule:

- Remove the module or the blank panel located at the position where you want to insert your new module. Follow the instructions given above.

- Insert the new module in the hole, and push it firmly until the module front panel is flush with the adjacent panels. Screw the module in place using the 4 corner screws.

- Turn the power on, and confirm that the POWER led is lit.

- Configure the OmniLink software to "inform" it that you have added a new module.

5 USING THE TEMPERATURE PROBES

5.1 Caution

Each time you connect a temperature probe to the unit, the probe **optical connector should be cleaned beforehand.** Otherwise, particles of grease or dirt may obstruct the device internal connector and affect the measurements by completely blocking the signal or by generating too much attenuation when using a long fiber length.

Never use a cloth other than the type recommended for fiber optic cleaning. Dampening the cloth with pure isopropyl alcohol ensures good cleaning.

Occasionally, clean the inside of the bulkhead connector (attached to the thermometer) with a wipe or cotton swab dipped in alcohol (2.5 mm mini foam swabs work best).

Very dirty connectors could occasionally be cleaned using a strong solvent such as acetone (acetone is strong solvent, must be used with care). After using acetone, you should remove any deposits left by the acetone, using some isopropyl alcohol, as indicated above.
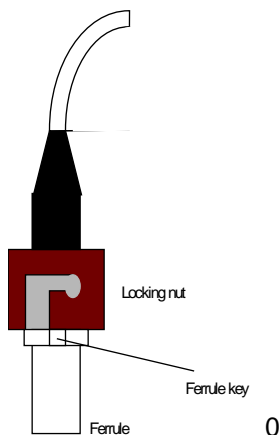
5.2 Description

The optical connector used is a standard ST type connector.
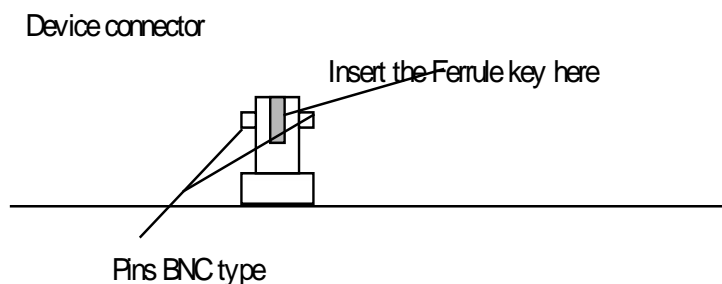
To install the connector,
Slide the ferrule key gently into the above key.
Then, turning, insert the two BNC pins into
The appropriate slots on the ST connector.

5.3 Warning

The T1 probe is quite fragile and it must be handled carefully. Please note that any probe damages are not covered by the standard warranty.

The probe tip is made of silicone rubber. Although silicone is resistant to a large number of chemical aggressors, strong acids or alkali may damage it, especially at high temperature and/or if used for extended periods of time. Warning: Solvents and fuel oils can cause problems for silicone rubber.

Neoptix also manufactures probes that have their tips made of epoxy. Just like silicone, epoxy resin is resistant to a large number of chemical aggressors, strong acids or alkali may damage it, especially at high temperature and/or if used for extended periods of time.

Contact your distributor for additional chemical compatibility information.

Do not expose your probes to temperatures that are higher than specified. Permanent damage can be caused to probes that have been exposed to temperatures that are higher than their limits.

5.4 Working with long probes

This note is important when using probes or extension cables that have a combined length of 100 meters or more. Working with long probes or extension cables presents special problems. To limit the amount of back reflection caused by the fiber optic connector located on the thermometer unit, you may have to use a matching gel optical couplant in the connector. This gel is a grease-like compound with high clarity, good resolution properties and a refractive index close to quartz. Apply the gel onto connector end faces.

Avoid disconnecting the connectors for which gel has been used. In other words, it is recommended to use the gel only for permanent installations. If the connectors are disconnected many times, you may have to clean entirely the connector assemblies that have had the gel; this may require opening the instrument enclosure to remove the excess gel.

Note that it is not required to use this gel with connectors that are far away from the thermometer electronic unit.

5.5 Working with cryogenic probes

The use of a cryogenic probe requires special attention. In particular, the probes become more brittle at very low temperatures. Avoid cycling the probes quickly between cryogenic temp and ambient temperatures, as this may cause material fatigue at the probe tips.

Warning

Always wear protective gloves and clothing when working with cryogenic material.

Never use general purpose probes at cryogenic temperatures. Neoptix sells special probes that can be used at cryogenic temperatures.

Please note that your OmniFlex thermometer will require a special factory calibration to be used at cryogenic temperatures (below -80°C). Consult Neoptix for more information.

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6 OMNILINK SOFTWARE DESCRIPTION

The Neoptix OmniLink™ software package option allows using your thermometer system in a highly flexible manner. The built-in functions allow for temperature displaying and data logging, as well as exporting to a variety of standard spreadsheet packages, such as Microsoft Excel. OmniLink has been developed based on the time-tested Neoptix-Assistant software package.

6.1 Installing the USB software driver

The USB driver has been developed by B&B Electronics, USA. The USB interface is in really a serial bridge that is interfaced to a USB port (it is serial port to USB converter). The B&B Electronics part number is USOPTL4, and the USB software driver is included on the CD that ships with this instrument; it can also be downloaded from Internet, at the following address: http://www.bb-elec.com/Products/USB-Connectivity/USB-to-Serial-Adapters/In-line-USB-to-Serial-Converters/USOPTL4.aspx.

IMPORTANT: You must install the software driver before you connect the OmniFlex to your computer.

Futhermore, before using OmniLink, you will have to know which COM port number is being emulated by the USB converter; you can normally get this information from Windows "Device Manager" (normally available from "My Computer"). For example, the figure below shows that the COM port number is 5.
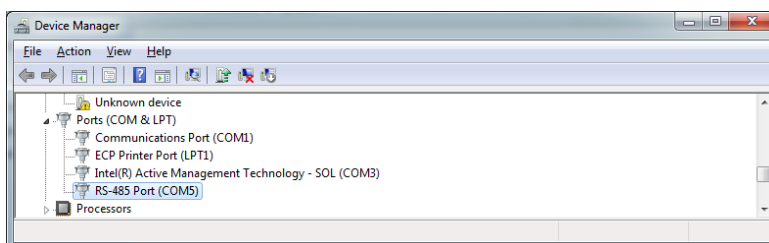
6.2 Getting started with OmniLink

OmniLink was designed to acquire temperature readings from all models of the OmniFlex thermometer family. This versatile software package is designed to work with Microsoft Windows operating system; to fully exploit the capabilities of OmniLink, it is recommended to use it in conjunction to commercial spreadsheet software, such as Microsoft Excel.

6.2.1 Hardware and software requirements

The following list includes the minimum requirements for running the Neoptix-OmniLink software:

- o A Pentium class or higher CPU
- o VGA or higher resolution display system supported by Windows
- o 256 MB of RAM memory (4 GB with Win7)
- o At least 25 MB of hard disk space
- o A CD disk drive (to load software)
- o A mouse or other Windows pointing device
- o A RS-232 interface (COM1 to COM32)
- o Windows XP or later (Win7 and XP preferred)
- o A Windows supported printer.

6.2.2 Installing OmniLink

Before opening the CD and installing the software, please refer to the **License and Limited Warranty Agreement** at the beginning of this manual.

You must have at least one, or more, properly installed OmniFlex thermometer unit(s).

1- Start Windows, and make sure you are not running any other Windows program.
2- By inserting the CD in your computer, the SETUP application should automatically start; if not, start it manually.
3- Follow the instructions that are displayed.
4- Restart your computer.

6.3 A quick tour of OmniLink

1- Connect your OmniFlex unit(s) to the COM port; see Section 4.2 for specific instructions on how to do this.
2- Start OmniLink, if not already running.

3- The following Main Window is displayed:
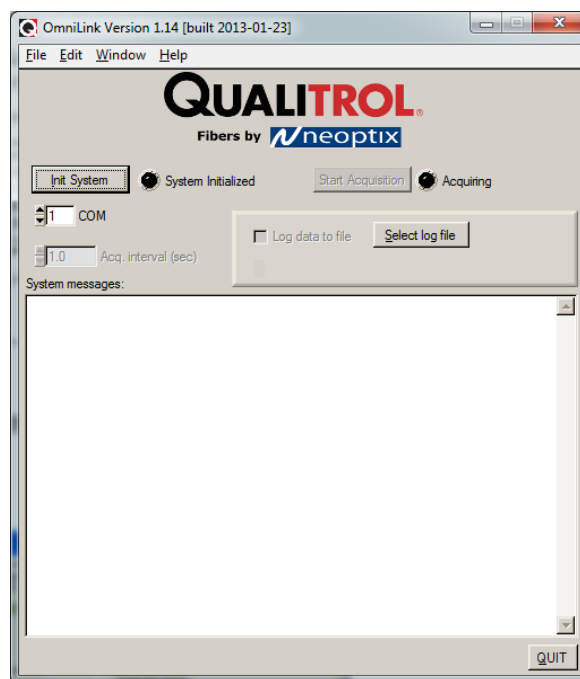
This Window is the first window you will see after starting OmniLink. This is the most complex window in this software package; however, it is important to set it up correctly to ensure an easy and reliable operation of OmniLink.

As shown in the figure below, the window is logically arranged in 2 sections as follows:

- The top portion has to do with the hardware configuration of your computer and thermometer units. It is also used to set up configuration and data file names.

- The bottom section is used to display and log system messages, as you make changes to your configuration and other system operations.

Click the "Init System" button to establish communication between the OmniFlex system and the OmniLink software and confirm that the physical link between your PC and the OmniFlex is correct. For example, if you read the last line of information in the figure below, you will notice that zero modules have been detected; this indicates that OmniLink has *not* been able to communicate with your OmniFlex hardware. This situation may be caused by:

1- Modules have not been edited yet, or that the information given in the edit window is erroneous.
2- Your physical link between your PC and the OmniFlex chassis is broken.
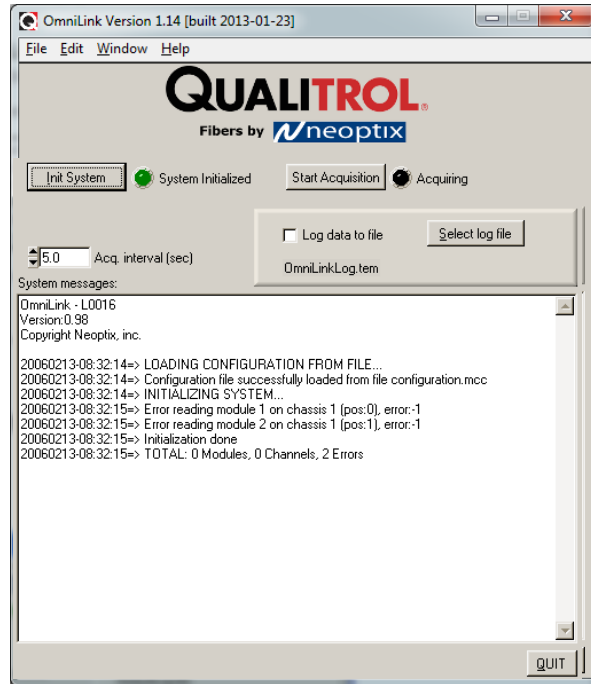
On another hand, if by clicking on the "Init System" button, and you get the following, this confirms that OmniLink has been able to communicate with one or more OmniModules (as shown below, two modules have been detected in positions # 1 and # 2 of chassis # 1).
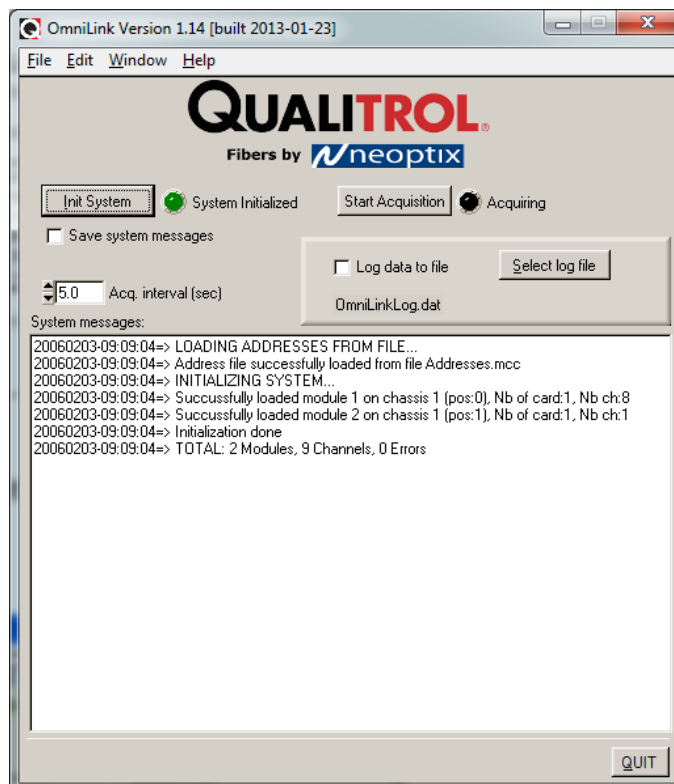
As can be read from the above screen shot, the last line indicates "0 Errors", which means that the automatically detected hardware configuration is in accordance with the OmniLink saved configuration. If you get 1 or more errors, you will need to configure OmniLink, as explained in the next Section, to make sure that your "hardware" configuration corresponds to your "software" configuration.

Hint: When OmniLink is first started, it is possible that some undesirable characters are still present in the PC serial communication protocol; to avoid any problems link to this, it is suggested to click twice on the "Init System" button to assure that no error is due to this.

The next Section explains how to configure your modules so OmniLink can detect them correctly.

6.3.1 Configuring the OmniModules

From the Edit menu, select "Edit OmniModules". The following window will open:
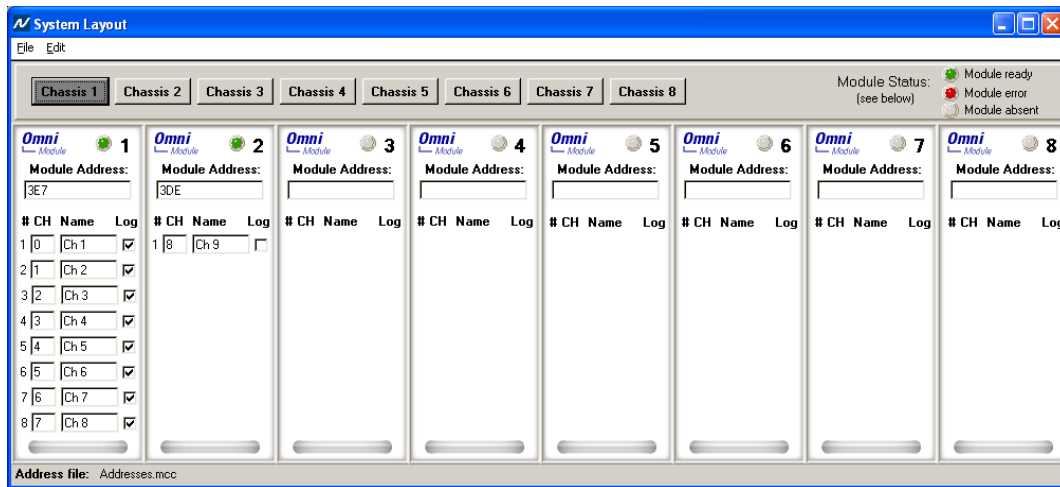
The chassis illustrated above has two OmniModules installed.

The most important parameter here is the Module Address. This address allows OmniLink to recognize this particular module (OmniModule). Each OmniModule has a unique address (expressed as a hexadecimal number), somewhat similar to a MAC address for an Ethernet controller. To help you, Neoptix prints this address directly on the module, just above the little handle present on each module. Simply enter the printed address in the "Module Address:" text-box in the System Layout window, so the module shows up in the same physical location as it appears in the window; doing this matching helps the user in mapping correctly any OmniModule location.

- To disable an OmniModule, simply make sure that the "Module Address:" text-box is empty.

- You can enter a name of your choice for each channel, in the "Name" text-box.

- To enable or disable logging for any channel, check or uncheck the corresponding "Log" checkbox.
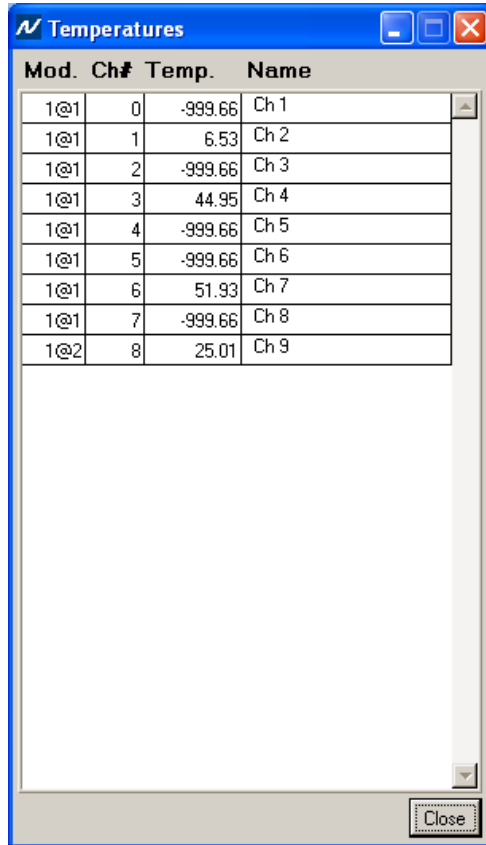
Up to 8 chassis are supported by this layout window. When working with multiple chassis, you can select the chassis you want to configure by clicking on the appropriate "Chassis x" buttons, found in the upper portion of the Configuration window.

When done configuring OmniModules, click "Close" to close this window. You will be given the opportunity to save, or discard your changes.

You are now ready to display temperatures, and optionally log them.

6.3.2 Displaying temperatures

The simplest method that you can use to display temperatures is to open the "Temperatures" window. First, click the "Start Acquisition" button; then, from the task bar, select Window, and then View Temperatures[2]. The following window will appear:

Mod.	Ch#	Temp.	Name
1@1	0	-999.66	Ch 1
1@1	1	6.53	Ch 2
1@1	2	-999.66	Ch 3
1@1	3	44.95	Ch 4
1@1	4	-999.66	Ch 5
1@1	5	-999.66	Ch 6
1@1	6	51.93	Ch 7
1@1	7	-999.66	Ch 8
1@2	8	25.01	Ch 9

The displayed temperatures are updated according to the "Acq. interval (sec)" setting (in the main window).

999.66 is displayed for channels that cannot be read (no probes or broken probes).

6.3.2.1   *Viewing the Temperature Trends window*

The next method that you can use to visualize your temperature values is to use the Trends window. As with the Temperatures window, this window may be automatically displayed if the "Launch Trends automatically" is selected (from the Edit task bar menu item).

From the main task bar, select "Window" and the "View Trends". The following window will appear:

---

[2] This window will appear automatically if the "Launch temps. window automatically" option is selected (from the Edit task bar menu item).
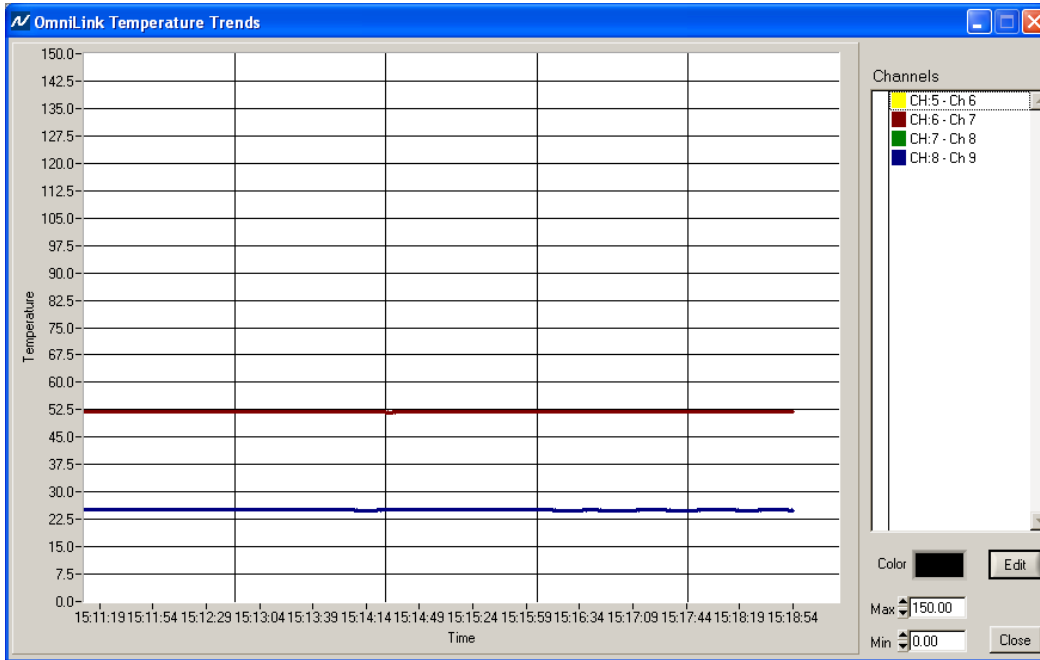
To change which traces will be shown in this window, click Edit and click one or more times the trace name to enable or disable this trace (the presence of the check mark indicates that this trace will display). Once done editing, click the same button to return to the display mode (each time the trend configuration is edited, all traces are cleared).

6.3.2.2 Logging temperatures

OmniLink offers the possibility to log temperature values to an Excel compatible file. The file name must be selected from OmniLink main window, and the "Log data to file" checkbox must be checked. The default file extension is .tem; this file can be subsequently opened using Excel, which should open it and automatically recognize as an Excel compatible CSV file. Default file location is "My Documents", for Windows 7 and above.

When subsequently trying to open the *.tem file, it is possible that you may get the following message:
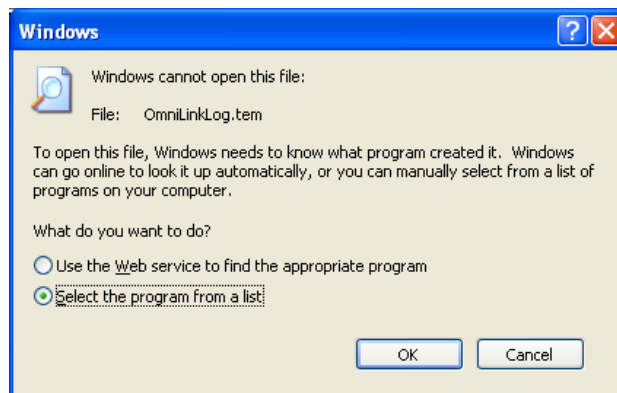
Select "Select the program from a list", and click OK. In the next window, you should instruct Windows to always open this type of file with Microsoft Excel.

If you get the following message, you should select "Read Only".
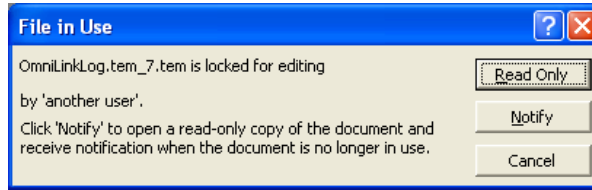
In Excel, the data file should look like this:
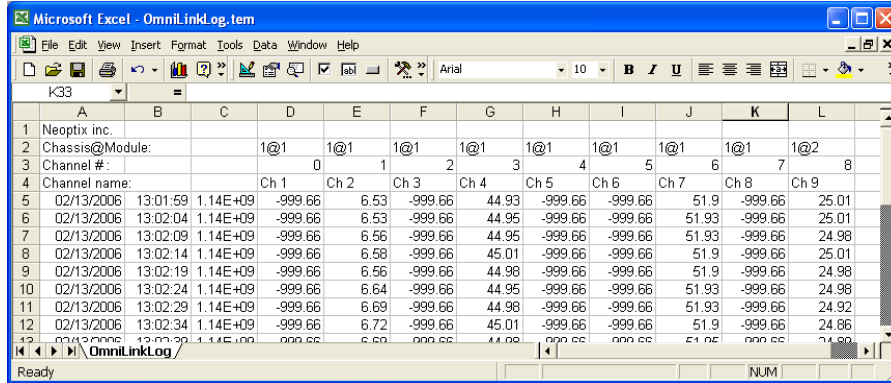
Notes: 1) The C column is a date/time stamp, which gives the number of seconds since the first of January 1970. This is a standard time stamp used by industrial controllers.
2) If a column shows "#######", this means that this column is too narrow to display the data; use your mouse to widen this column.
3) If you open a logging file during acquisition, the Excel window is not refreshed as the acquisition is taking place. To get a more recent version of the file, close the Excel program, and start Excel again.

If you stop the acquisition, and start it again with the same file name, the new values will simply be appended to the existing file content. However, a new 4-line header is inserted first, as shown here:
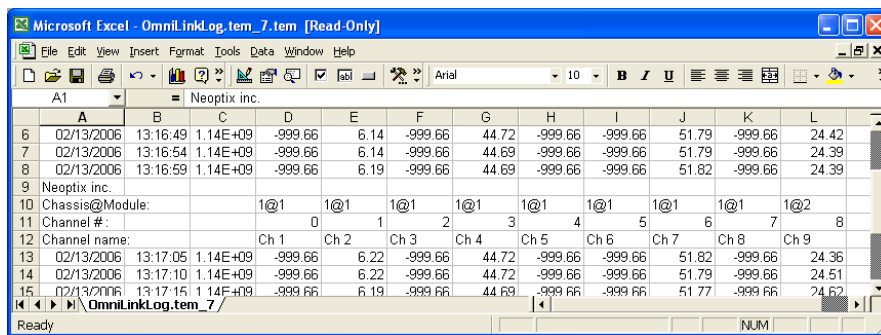
When logging temperatures for a very long time, one needs to note that a standard Excel sheet is limited to 65535 lines. If this limit is reached, the logging process will close the current data-logging file, and will open a new one, with the same name but with "_1" appended to the file name, and so on ("_2" …), until the application is stopped or your disk becomes full.

For more detailed information on each menu item, please refer to Section 6.4 below.

6.3.3 The OmniLink console

The console, which can be invoked through the Window and then Open Console from OmniLink main window menu bar, is useful to manage each OmniModule in details. Take note that the console can only be opened when no temperature acquisition is taking place. It can be useful also to understand problems and malfunctions that a module may exhibit. It operates in a similar fashion as Windows HyperTerminal, which Neoptix suggests to use with other of its thermometer models (such as the Reflex or T/Guard).

The console can be used to get information such as:

- Information on calibration date, serial number, etc.

- Enable / disable channels

- Set the analog output parameters (zero and span)

- Control operational features, such as fast/slow scanning more, wtune, etc.

The following illustrates the OmniLink Console:
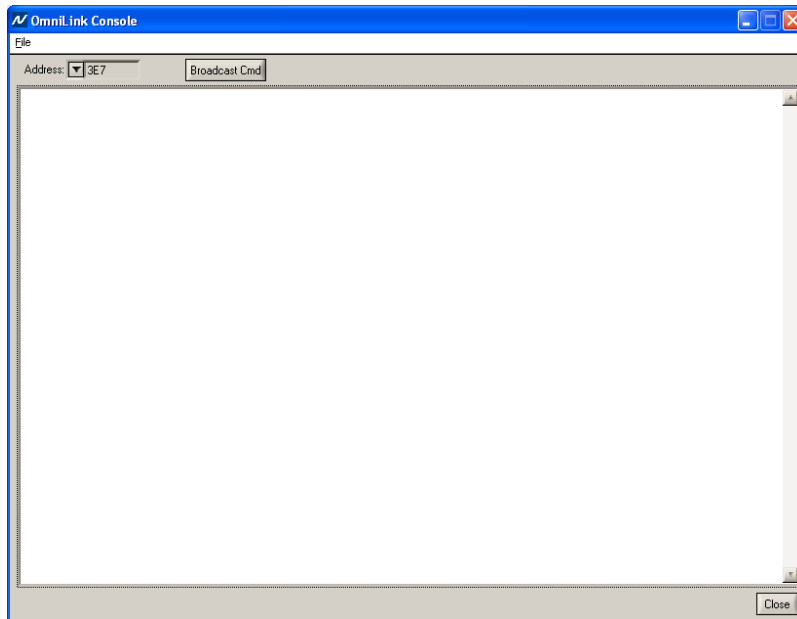
Before sending commands and receiving information from a specific module, it is necessary to enter the OmniModule address of the module that you want to interrogate. Please note that only ONE module can be selected at a time; if the same command is to be sent to all modules, then it is necessary to repeat the command for each individual module (unless the broadcast command is used, see below).

Make sure the cursor is at the bottom of the screen before sending a command.

You can use "Copy and Paste" Windows commands (such as the following shortcuts: ctl-c and ctl-v) to copy selected content of the console content to other Windows programs, such as Notepad, etc.

6.3.3.1 Console help menu

The following is the menu as displayed by the instrument when sending the "h" command. This help menu can be used as a reminder of all available commands.

OmniModule-1	OmniModule-2 to -8	Description
a	a	Ignore
b	b	Return enclosure temperature
N/A	e[1;2; ... ;n]	Enable channels to scan (if no argument, scan all)
f[j]	f[i;j]	Set point adjustment on channel [i] to [j]
gskip[i]	gskip[i]	Skip up to i marginal read cycles
h	h	Help menu (this screen)
i	i	Get factory and status information
l[i]	l[i]	Lock the keypad (l+ to lock, l- to unlock)
n+o *or* n+e	n+o *or* n+e	Toggle calibration (n+e for Neoptix, n+o for Nortech Fibronic inc.)
o[i]	o[i]	Analog out, if error (0:Max-Min 1Hz, 1:Max level, 2: Min level)
p[i]	p[i]	Sleep mode (p+ to sleep, p- for continuous scanning)
q	q	Scanning rate (q+ for fast/quick, q- for slow)
r	r	Ignore
s[j]	s[i;j]	Specify analog output Span [j] for channel [i]
t	t[i]	Get Temperature reading channel [i]
ta[i]	ta[i]	Auto temperature output to serial port (+ to enable, - to disable)
tb[nnnn]	tb[nnnn]	Ignore
u[i]	u[i]	Unit (c = ^{o}Celcius, f = ^{o}Fahrenheit)
x	x	Ignore
wtune[i]	wtune[i]	Optimize CCD read time (wtune+ to enable, wtune- to disable)
y	y	Quality index
z[j]	z[i;j]	Temperature [j] for analog output Zero on channel [i].

As an example, this table can be invoked by typing the "h" command, as follows:

```
OmniLink Console                                              _ □ ✕
File

Address: ▼ 3E7          Broadcast Cmd

h
 RS-232 help menu

 b ............. Return enclosure temperature
 e[1;2;...;n] .. Enable channels to scan (if no argument, scan all)
 f[i;j] ........ Set point adjustment on channel [i] to [j]
 h ............. Help menu (this screen)
 i ............. Get factory and status Information
 o[i] .......... Analog out if error (0:Max-Min 1Hz, 1:Max level, 2:Min level)
 p[i] .......... Sleep mode (p+ to sleep, p- for continuous scanning)
 q[i] .......... Scanning rate (q+ for fast/quick, q- for slow)
 s[i;j] ........ Specify analog output Span [j] for channel [i]
 t[i] .......... Get Temperature reading, channel [i]
 ta[i] ......... Continuous output to serial port (+ to enable, - to disable
 u[i] .......... Unit(c=°Celcius, f=°Fahrenheit)
 y ............. Quality index (consult Neoptix)
 z[i;j] ........ Temperature [j] for analog output Zero on channel [i].

*

i
    Model:.................... OmniFlex
    Option:................... NB Channel:8
    Mode:..................... Continuous Scanning Mode (0x01)
    Scanning rate:............ Fast
    Serial:................... OFX999A
    Internal Software:........ 0.2.07
    Last Factory Calibration:. --/--/--

                                                             Close
```

6.3.3.2   Detailed description of RS-232 commands

All commands must be terminated by a carriage return character (E). When more than one argument are required, each argument must be separated from the next one by a blank or space character. Characters are not echoed back to your controlling device.

Every time a command is executed successfully by the thermometer, the "*" prompt character is automatically sent, except in case of failures when the "Errx" error code is sent instead. Do not send your next command before receiving either the "*" or the "Errx" prompt. The "[" and "]" characters must not be typed in; they are used here for ease of reading only.

Most commands are applicable to all OmniModule versions (different number of channels). When using one-channel model, the channel number [i] must not be typed in.

"a" Ignore.

"b" This command returns the internal temperature of the enclosure. The temperature is returned in ^{o}C or ^{o}F unit, as specified by the "u" command.
ex: "b:32.2 E "

"c" or **"c[i]"** Ignore.

"e[[-]1 [-]2 ... [-]n]" This command is not recognized by the one-channel model. Specify which channels are enabled and read by the addressed OmniModule. Preceding a channel number with the minus sign "-" will disable that particular channel. This command is useful to ignore channels that are not currently used. Enter the channel numbers that you would like to use, each one separated by a blank character.
ex: "e-1 2 3 E ", to enable only channels 2 and 3 and at the same time to deactivate channel 1.

"f[j]" or **"f[i j]"** This command forces an actual temperature reading (j) for channel # i; any resulting offset will be applied to all future measurements for that channel. This is useful to compensate for small temperature deviations that may occur between sensors. A maximum offset of +/-5°C is recommended; if it is required for you to force a larger offset, your thermometer probably requires a new factory calibration; consult your distributor or factory for more information. This command can also be used to force older Nortech Fibronic inc. probes to read similar temperatures as the newer Neoptix probes. This command alters the internal calibration of the instrument. Always follow the recommended procedure, as given below.

Force temperature procedure:

I.   Apply a stable and known temperature to the sensor tip
II.   Check the display reading for abnormal deviation from the known temperature
III.   Send the "f" command followed by channel number, a blank character and the reference temperature value (example "f2 27.0 E   "). Temperatures must be entered in units as specified by the "u" command
IV.   Wait a few seconds
V.   Confirm that the readings correspond to the known temperature.

Note: You can revert at any time to the factory calibration using the "f" (or "f[i]") command (ex: "f2 E   ").

Note: Always make sure you are reading a valid temperature value before using the "f " command; otherwise, your thermometer may display a random value for a channel where the "f" command has been used.

"gskip[i]" This command is useful to eliminate annoying dropouts that can happen when using "weak" probes. The parameter "i" indicates the number of scans that the system will perform before actually indicating that it cannot read the probe on a specific channel. The range of i is from 0 to 9; a value of 0 indicates that the OmniModule makes no attempt at removing dropouts. A value of 3 to 5 is recommended, especially for transformer applications. This command is active even when the sleep command is valid, but is limited to a timeout of 2 minutes.

"h" Displays a help menu screen (see above).

"i" Returns general information regarding the instrument, as well as some parameters that have been programmed previously in the thermometer:

Ex:	Model:	OmniFlex Direct
	Option:	NB Channel:4
	Mode:	Continuous Scanning Mode
	Serial:	RFX32A
	Internal Software:	V1.21
	Last Factory Calibration*:	05/02/04 (YY/MM/DD)
	Unit	oC
	Analog out, if error	Toggle Max-Min 1Hz

Channel	Zero	Span	Enabled	Offset*	Firm. rev.
1	xxx.x	xxx.x	Yes/No	±xxxx.x	23
2**	xxx.x	xxx.x	Yes/No	±xxxx.x	23
3**	xxx.x	xxx.x	Yes/No	±xxxx.x	23
4**	xxx.x	xxx.x	Yes/No	±xxxx.x	33

*: Temperature differential that is a consequence of the "f" command.
**: Only for multi-channel models.

"l[i]" Not applicable to the OmniFlex. This command is useful to prevent a local user from configuring the thermometer using the keypad. "i" can take two values: "+" or "-"; entering "l+" will lock the keypad, while "l-" will unlock it, thus enabling a user to make local changes. A locked keypad can only be unlocked using the "l-" RS-232 command.

"n+o" or "n+e" This command can be used to change the calibration type that is active at any give time. "n+o" should be used to enable the Nortech Fibronic inc. calibration, while "n+e" should be used for Neoptix probes.

"o[i]" This command can be used to change the behavior of the analog output(s) when the OmniFlex thermometer cannot read a temperature for this channel. "i" can take one of three values:
a)   i=0. This is the default value, to assure compatibility with older Nortech Fibronic inc. thermometers. With this setting, the analog output will oscillate between its maximum and its minimum value at a rate of approximately 1Hz.
b)   i=1. In case of a probe problem, the analog output for this channel will be forced to its maximum possible value (e.g., 10V or 20mA).
c)   i=2. In case of a probe problem, the analog output will be forced to its minimum possible value (e.g., 0V or 4mA).

"p[i]" This command allows the user to force the OmniFlex thermometer to enter in sleep mode (p+) or to exit it (p-). Once in sleep mode, the thermometer will acquire new temperature values ONLY when the "t" or "t[i]" command is received; when the t command is received, the thermometer will immediately scan all enabled channels, and the new temperature values will be sent through the serial link, after which it will return again in sleep mode (there is no need to resend the p+ command again).
a)   When the thermometer is powered on, the sleep mode is always disabled.
b)   When new temperature values are acquired, these new values will be shown on the display (if present) for about 40 seconds, after which "Sleep mode" will be displayed.
c)   The analog outputs will keep the last temperature readings, until new ones become available.
d)   The front panel led status lights will keep their values until new readings are acquired.

"q" "q" allows for selecting the fast (q+) or the slow (q-) acquisition mode. In slow mode, the last 4 temperatures are averaged before being displayed or sent to the serial port; this provides a better reading at the expense of being slower.

"r" Ignore.

"s[j]" or **"s[i j]"** This command will set the analog output span for the analog channel # i (if using a multi-channel thermometer, the "i" parameter specifies the channel to which the command is addressed). The "j" parameter specifies the span that can range from 1.0 to 1000.0, in temperature units that are defined by the last "u" command.

"t" or **"t[i]"** Returns the current temperature reading for channel # i. "---.-" is displayed if the specified channel number is not currently enabled or when no valid temperature is available for the requested channel. However, during the initial warm-up time, the error "Err1" is sent in response to the "t" command. For multi-channel instruments, if the "t" command is received without parameter, the temperatures for all channels are returned. All temperatures are returned in ^{o}C or ^{o}F unit, as specified by the "u" command.

ex: "t4 E   " will return the temperature for channel # 4.

          "t E   ", with the OmniFlex-4 thermometer, will return:
               +24.3<CR>
               +24.5<CR>
               +24.7<CR>
               +24.4<CR>
               *

The "t" command is also available in a special "**ta**" version, that can be useful for continuously and automatically monitoring all enabled channels. This special mode is recommended when automatically acquiring temperature readings with suitable data-logging software, and can be activated by issuing the "ta+" command, or deactivated with the "ta-" command. Once activated, the following information is automatically sent when the temperature on a channel has been acquired:
          "C:I;T: ±xxx.x<CR>"

where i is the channel number, and xxx.x is the temperature reading (signed number). For the OmniFlex-1 model, i is always 1.

"tb[nnnn]" Ignore.

"u[i]" Set units of measurements to either Celsius (i=c) or Fahrenheit (i=f). Note that this unit selection is the same as the temperature unit selection made from the keypad (if the display option is installed).
ex: "uc E   ", to select ºC (Celsius).

"x" Reserved for service and maintenance purposes.

"wtune[i]" This command can be used to increase the optical integration time of each channel (each of the 1 to 8 channels are treated independently) to force an OmniModule to read temperatures when the optical signal is weak, at the expense of a slower response (slower temperature update frequency). This command (wtune+) enables this feature for all channels (individual channel cannot be enabled or disabled). It should be noted that in general the scanning rate of the system would slow down when this command is enabled. It is highly recommended for power transformer applications.
Warning: When wtune is enabled, and that a probe is inserted, or removed, it may take some time (from several seconds to as much as a minute, when multiple channels are being optimized at the same time) for the OmniModule to detect the probe, due to the optimization process that takes place.

"y" The "y" command can be used to confirm the "quality" of a probe and/or its connection. It can be used as a diagnostic tool to confirm the good operation of a probe and its extension cable (if applicable) connected to a channel. The returned value can be between 1.00 to approximately 3.00; a higher value is better. A minimum of 1.25 is required for a channel to return a temperature.
ex: "t E   ", with an OmniModule-4 thermometer, will return:

> CH1:2.61, lamp attenuation: 250, CCD time: 250ms (auto*)<CR>
> CH2:2.51, lamp attenuation: 250, CCD time: 100ms (auto)<CR>
> CH3:2.38, lamp attenuation: 125, CCD time: 500ms (auto)<CR>
> CH4:1.09**, lamp attenuation: 125, CCD time: 500ms (auto)<CR>

*: Value: Auto (when wtune+ is active) or Fixed (when the wtune command is disabled).
**: 1.0 to 1.1 indicates that no probe is detected for this channel.

"z[j[" or **"z[i;j]"** This command is used in conjunction with the "s" command, as it sets the temperature that corresponds to the analog zero (minimum value of analog output). For multi-channel models, the "i" parameter specifies the channel to which the command is addressed; valid values are 1 to 8 (the maximum value depends on the number of channels of each OmniModule). The "j" parameter specifies the zero temperature value, and can range from -100.0 to 1000.0, in units that are defined by the last "u" command. Factory default is -100.0; OmniFlex thermometers that have been factory calibrated for cryogenic temperatures have a lower setting.

6.3.3.3   Error codes
The following error messages are displayed under certain error conditions:

RS-232	Display	Analog Out	Description
Err2	Err2		Internal memory checksum error. Memory corruption. When a channel has its calibration table corrupted, the corresponding front panel LED will continuously flash to indicate the corruption problem. Contact Neoptix.
"- - . -"	"- - - - -"	Hi-Lo, 0.5 Hz*	Temperature out of maximum instrument limits or no signal
Err5			Argument out of range
Err6			Unrecognized command

*: The exact analog output behavior is a function of the command "o"; see previous Chapter.

Note that these error codes are not applicable when using the OmniLink software package. This high-level software package is programmed to automatically handle all types of errors.

6.3.3.4   The Broadcast Command

To simplify sending the same command to multiple OmniModules, a special broadcast command feature is included in OmniLink. Click the "Broadcast Cmd" button, or select "Broadcast Command" from the File menu bar); the following window is displayed:
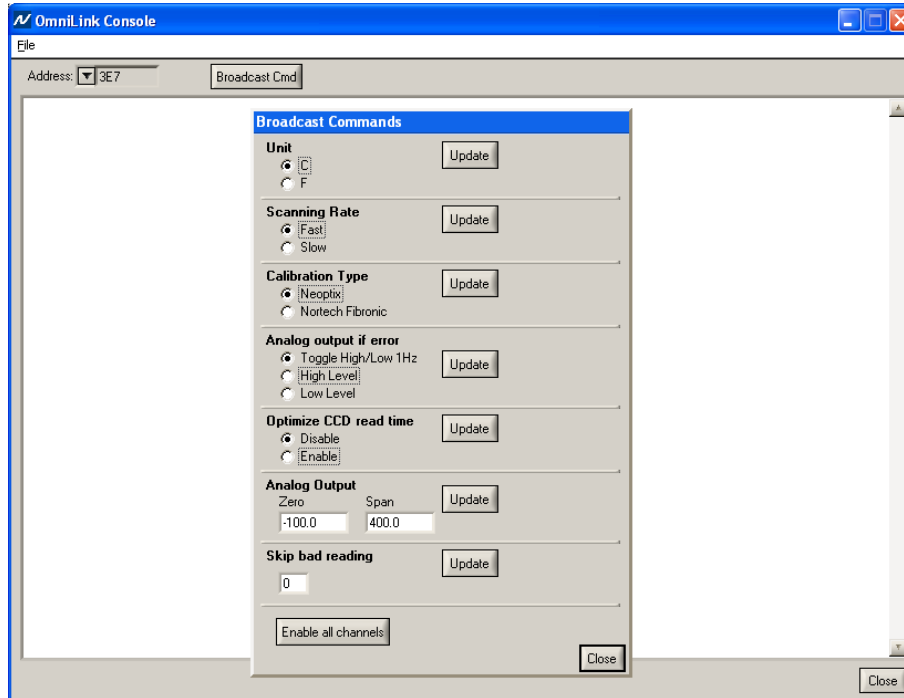
As can be seen from this window, the Broadcast Command feature offers a simple yet elegant way to send common parameters to all OmniModules. It is also useful to assure that ALL OmniModules are programmed with similar parameters, thus avoiding potentially disastrous errors.

To change a class of parameters, as illustrated in the above figure, simply select the correct value for a given parameter, and click the corresponding Update button. Please note that if you have many OmniModules in your systems, the update process can take many seconds.

6.4   OmniLink functions

This section explains in detail each one of the functions provided by the menus of the OmniLink software package.

6.4.1 The File menu

6.4.1.1   Quit

Select Quit from the File menu to exit OmniLink and return to your Windows operating environment. If you have made changes to any file, be sure to save all files to disk before quitting.

6.4.2 The Edit menu

6.4.2.1 Edit Configuration

Select this menu item to configure your OmniModules. For a new installation, this is one of the first menu items you need to choose in order to properly configure your OmniFlex system. Amongst other things, you can set the following parameters:

- OmniModule address (usually a 3-digit hexadecimal number)
- Channel names (your reference names)
- Logging enable / disable status.

You should set the addresses so the OmniModules appear in the same order (within a chassis and amongst multiple chassis) as your physical module layouts; doing so should simplify the "visualization" of your OmniFlex system.

6.4.2.2 Edit Trends

This selection allows for setting the look of the trend graphic window. It is equivalent to clicking the Edit button that shows in the Trends window during temperature acquisition.

6.4.2.3 Launch Trends window automatically

Click this menu item to toggle between having the Trends window automatically displayed or not, when the "Start Acquisition" button is pressed.

6.4.2.4 Launch Temp. window automatically

Click this menu item to toggle between having the Temperatures window automatically displayed or not, when the "Start Acquisition" button is pressed.

6.4.3 The Window menu

6.4.3.1 Open Console

The console allows for accessing all setup and control parameters that are available from each OmniModule. It imitates the Windows HyperTerminal program, which Neoptix recommends to use with other Neoptix products.

Take note that the Console can be invoked only when no temperature acquisition is taking place.

6.4.3.2 View Temperatures

This command calls the Temperatures window, as explained above. Please note that this view can be displayed automatically by toggling correctly the "Launch Temp. window automatically" in Edit menu.

6.4.3.3 View Trends

This command calls the Trends window, as explained above. Please note that this view can be displayed automatically by toggling correctly the "Launch Trends window automatically" in Edit menu.

6.4.4 The Help menu

6.4.4.1 Help

This is a standard Windows Help menu.

6.4.4.2 About

For information and support only.

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