Nomad-*Touch*™

Portable Fiber Optic Thermometer Instrument

1-Channel System
With QLink Software

Proprietary notice:

Part number: G1050R04 (February 2017)

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Warning

Permanent damage may be done to the thermometer if the power supply connections are not done correctly. Only approved 5 VDC USB power supply modules should be used to operate this Nomad-*Touch*. 1 ampere power supplies are recommended; one such power supply is included with your new unit.

This product does not contain any user-serviceable parts. Although the battery case is user accessible, the battery itself is not user replaceable. Opening this precision instrument will void its warranty and may disturb its factory calibration. Always seek servicing from an authorized Neoptix service depot.

To assure cleanliness of the optical connector, keep the protection cap on unused connector at all time.

Fiber optic probes and extension cables are fragile, and will break if the bending radius becomes less than ~1 cm, even temporarily. Probe and extension cable breakages are not covered under the standard Neoptix warranty. Do not bend the last 1 cm of the probes!

The Neoptix Nomad 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 Neoptix Nomad-Touch and Probe Warranty Notice

Your Nomad-*Touch* 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 this Neoptix Conditioner system, probes and extension cables are not guaranteed.

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 Nomad-*Touch*™ thermometer product! Your new temperature-sensing instrument will soon allow you to take full advantage of the benefits inherent to fiber optic sensing technology. It offers accurate and reliable temperature measurements, 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 Nomad family of products gives 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 is packaged in a small hand-held package, which is ideally suited for portable applications. This model does not feature an analog output option nor a through RS485 serial port; the Neoptix model T/Guard-405 is recommended when these options are required.

The standard configuration is offered with a USB interface. In addition, a large color touch LCD graphical display (QVGA, 320 x 240 pixels) makes it easy to see the temperature, either in Celsius (°C) or in Fahrenheit (°F), even in dark areas (by activating the back light); menu selections are all made by touching icons on the display; these standard features are great for laboratory and field applications. Furthermore, a convenient data-logging feature is included; logging is done directly to an internal 32 MB memory, allowing saving almost 400,000 temperature events.

This newly designed thermometer includes the latest developments in fiber optic temperature measurement technologies. Most types of GaAs-based probes now available on the market are supported, even probes manufactured by Neoptix' competitors. It will also interface with and read marginal probes, or probes with dirty connectors, and so forth. It will give you years of excellent service.

The QLink software package is an excellent complement to your thermometer.

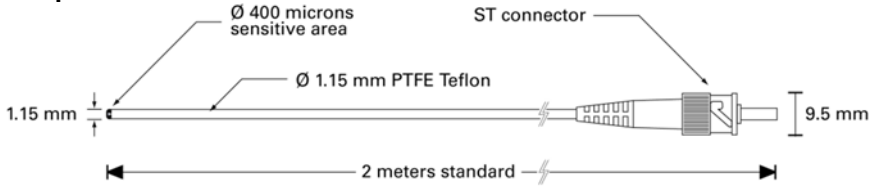
2.1 Nomad-Touch product specifications

Resolution	0.1 °C
Accuracy	± 1 °C
Calibrated Temperature Range	-45° to 200 °C
Usable Temperature Range	-80° to 250 °C
Number of channel	1
Probe length	1 to 500 meters (and more)
Sensor	Dielectric epoxy or silicone tipped optical fiber probes Any T1 or T2 Neoptix probes Second calibration supports older Nortech Fibronic Inc. probes
Response time	Typically 0.2 to 0.5 second (Probe and setting configuration dependent) Sampling rate is ~ 5 Hz
Probe compatibility	All Neoptix probes (T1 and T2) Nortech Fibronic Inc. probes (with built-in special calibration)
Unit	User selection of °C or °F
Data logging feature	Internal 32 MB memory for readings and probe performance data
Operating temperature	-20 ° to 50 °C, non-condensing
Storage temperature	-30 ° to 50 °C **Warning**: the battery will degrade quickly at high temperature
Local display	Display of temperature readings as well as various user information Graphical resolution: QVGA 240 x 320 pixels, color Touch resistive plane
Power	5 VDC (USB port), ~350 mA
Upgradability	Main firmware: through USB port Display: through concealed USB port in battery compartment
Internal batteries	Lithium-Ion rechargeable battery Battery is *not* user replaceable Autonomy of up to 5 hours
Size	170L x 118W x 37D mm
Weight	0.7 kg
Standard interface	USB connector (type B)

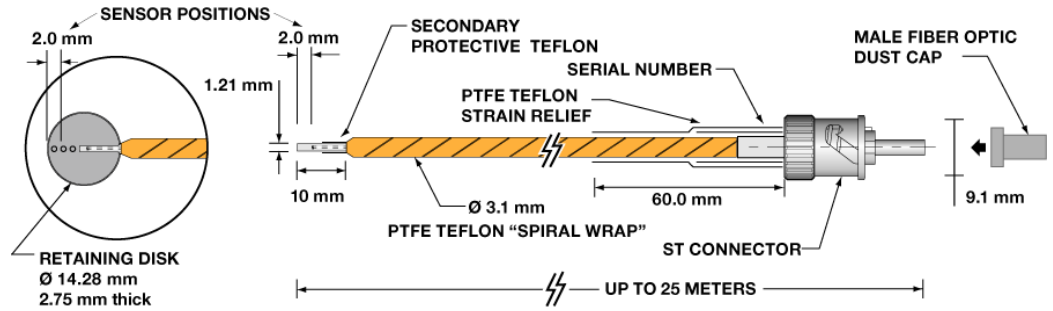
All technical specifications are subject to change without notice.

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

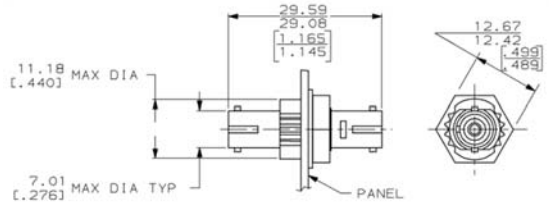
General Purpose Probe T1:



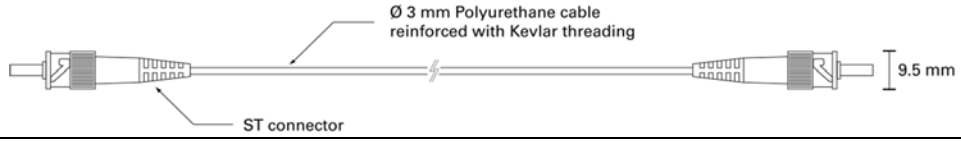
General Purpose Probe T2:



ST-ST Coupling:



ST-ST Extension Cable



2.2 Calibration

Your T/Guard thermometer comes factory-calibrated. Experience has shown that re-calibration is not required over the whole product life; however, if your ISO rules state that an annual re-calibration is required, then it is your responsibility to comply with those rules. For laboratory applications, a new calibration is standard every 12 months or whenever performance verification indicates that calibration is necessary; NIST traceable calibration certificates are available. All calibrations are performed at the factory. Contact your Neoptix Representative for further information.

2.3 Transformer applications

One of the main applications for the T/Guard product is monitoring temperature of hot spots in power transformers. Since its inception, Neoptix has developed expertise in this application, and is considered as a world leader in this field. Sister products of the T/Guard, the T/Guard-2B, T/Guard-Link, T/Guard-408, are ideal for the power transformer industry. Neoptix publishes a User Guide, called "Probe Installation Guide", totally dedicated to the power transformer industry; do not hesitate to ask for your copy if you are working in this field (Neoptix document # G1009).

3 UNPACKING

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

- Nomad-*Touch* signal conditioner unit
- USB power supply module (universal input: 100-240 VAC, 50/60 Hz; output: 5 VDC 1 A).
- Short extension cord and mating sleeve (should be used to minimize damages to the connector at the Nomad interface)
- 1 m USB cable
- Neoptix QLink software package, on the DVD
- User manual (this manual) (paper copy not included, supplied as a PDF document on the DVD)
- Calibration Certificate.

Options:
- Fiber optic temperature sensor probes
- Fiber optic extension cables
- Fiber optic couplings and feedthroughs
- Carrying case, for Nomad and accessories.

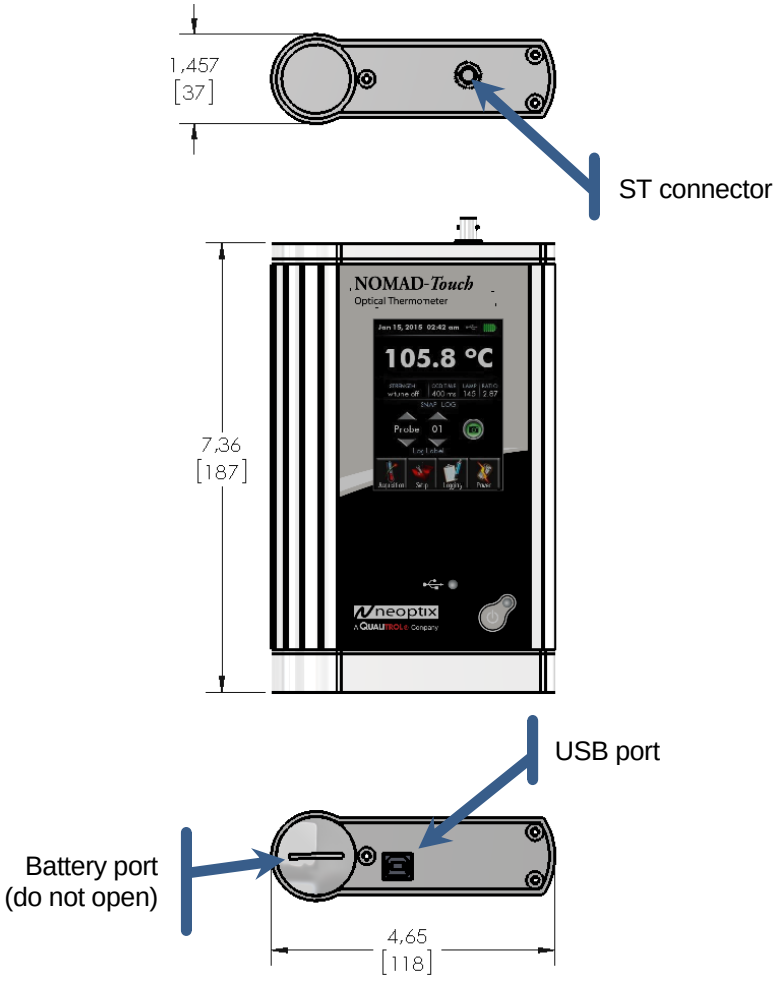
Make sure all listed items have been received and are in good condition. Note any evidence of rough handling in transit; immediately report any damage to the shipping agent. Should a part be missing or damaged, please contact your distributor immediately. Returns must be made with the original packaging,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

The carrier will not honour 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 QUICK INTRODUCTION

The best way to familiarize yourself with your new Nomad is, of course, to use it! This chapter shows you to prepare your unit and do some initial measurements. The detailed instructions are given in the next Chapter.

Your new Nomad comes calibrated and ready to use. This figure shows the main view of the Nomad, along with the top and bottom views.



4.1 Making your first measurements

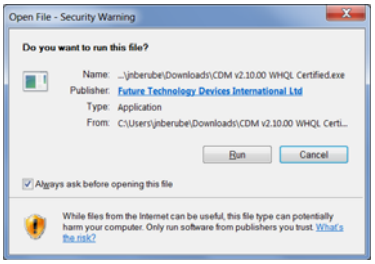
4.1.1 Installing the USB serial driver

WARNING: It is highly recommended to install the USB driver in your PC *BEFORE* you connect the Nomad-*Touch* to it. You will find the driver on the Internet and on the DVD that comes with this Nomad. This section explains how to install this driver.

You will find the driver on the DVD; you can also download it from the Internet from this site: http://www.ftdichip.com/Drivers/CDM/CDM%20v2.10.00%20WHQL%20Certified.exe. The procedure is as follows (assuming the download is done on the Internet):

- Save the file on your C: hard disk, or on a local disk of your choice.

- Click the file name (in Windows Explorer) to execute it.



- The installation will proceed, first with this window, click Extract:

- Then the installation proper will proceed, click Next:

- Finally, you get this information. Click Finish.

You can now connect your Nomad-Touch to this PC. In case of problems, Section 8.11 includes some hints about possible solutions to common problems.

4.1.2 Charging the internal battery

Before using the unit, you will need to connect it to a suitable USB power source; with the included 1 A power module, you should wait about 5 hours to fully charge the internal battery.

If you connect it to a PC USB port, a full charge may be as long as 10 to 15 hours. It will take longer if the unit is on during the charging process and also much longer if the FTDI serial driver has not been installed on that PC (see previous section on how to install the serial driver).

4.1.3 Using the Nomad-*Touch*

To make your first temperature measurement, do as follows:

- Remove the dust cap on the optical connector of the Nomad (located on the top of the Nomad).
- Remove the dust cap on the probe connector.
- Insert the connector from your probe into the sensor connector of the Nomad. Make sure the two mating parts are properly aligned and twist the connector clockwise to fasten it securely. Note: Do not apply force on this connector!
- Turn your Nomad on by pressing  for at least one second. After a few seconds, a "splash" screen with the some software version information will be displayed. Then the temperature is immediately displayed, along with the date and time, and probe performance data. This is shown here:

- Place the sensor tip on a warmer surface (such as your hand): you can observe the temperature variation on the display.
- You can power it down by pressing again this key, for a minimum of one second:  .

5 NOMAD™ THERMOMETER HARDWARE REFERENCE

5.1 Display description

The display is organized in 5 logical horizontal regions:

- The top portion gives general information to the user about the unit current status, such as battery condition, USB connection status, and time and date.
- Then you have the temperature number, in Celsius or Fahrenheit.
- Immediately below the temperature, you get some information about your probe optical performance. See section 6.5 for a discussion on probe performance.
- The next portion gives information about temperature logging. Logging can occur in two ways: 1) snap logging which is manual, and 2) automated logging done at regular time interval.
- The bottom portion shows four icons that can be invoked to further configure your thermometer, or to give you access to more advanced menus.

The display is illustrated below:

Date, and other information

Temperature, in °C or °F

Probe signal strength information

Logging information, including a button to snap a log entry (in snap mode)

Configuration icons.

The Nomad-*Touch* front panel includes an on/off button, with a red LED on indicator. Furthermore, a status USB LED gives the following information:

- Off: The Nomad is not connected to any USB supply.
- Yellow-green: The unit is connected to a USB 5 VDC power supply, and the battery is being charged.
- Green: The unit is connected to a USB power supply, and the battery is fully charged.

Note: This LED gives a status on the 5 VDC power supply. It does not give a status about any software link to a PC.

5.2 Touch screen operation

The touch screen is very simple to use. The touch technology used for the Nomad-*Touch* is resistive touch layer. This means that the menu selection can be done by anything that can apply a small pressure on the display surface; this pressure can be applied by naked fingers, gloves, stilettos, etc. You can select the "Power" icon to change the operation of the display, such as brightness and backlight. The "Power" icon gives you the following display variations:

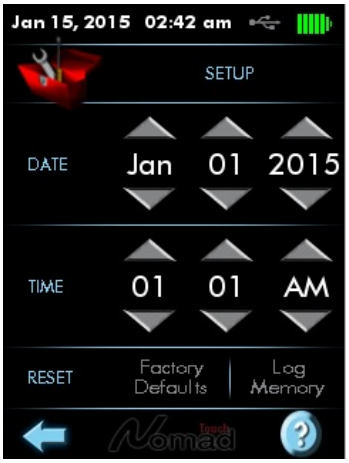
From this screen, you can optimize the battery use parameters (when connected and not connected to USB). Note: "-" means "never".

- DIMMED SCREEN: Number of minutes after which the screen will be dimmed.
- STANDBY: Number of minutes after which the screen is turned off.
- SHUT DOWN: Number of minutes after which the Nomad-*Touch* is turned off.

Each sub-menu has a "help" button that gives more information about the various parameters.

5.3 The setup menu

This menu allows for setting the date and time. It can also be invoked to reset all parameters to the factory defaults, as well as clearing the temperature logging memory.

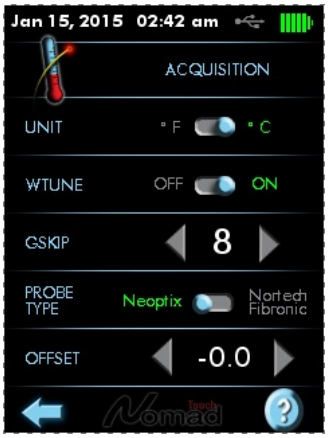


The details of these parameters are here:

- DATE: Enter today's date.
- TIME: Enter current time. Time can be entered and displayed in 12h or 24h format.
- RESET: Factory defaults and Log memory. This action requires a confirmation.
    - Press the appropriate area on the screen for a minimum of 1 second, and then a message requesting confirmation will appear.
- RESET: Log memory. This action requires a confirmation.
    - Press the appropriate area on the screen for a minim of 1 second, and then a message requesting confirmation will appear. This delete operation may take a few minutes.
    - Log temperature files can also be erased using the QLink tool; see QLink information below.

5.4 The acquisition menu

This menu can be selected by pressing the “Acquisition” icon from the main window. The following screen then appears:



Here you have access to the following parameters:

- UNIT: Celsius or Fahrenheit
- WTUNE: It is suggested to turn on this parameter, unless very fast measurements are to be done. This makes the system more sensitive, at the cost of speed.
- GSKIP: A value of 5 is suggested. This represents the number of readings the thermometer will do before abdicating.
- PROBE TYPE: Select Nortech Fibronic Inc. to read old probes.
- OFFSET: This allows modifying the calibration by adding this offset to the read value. The offset must be within ±20 degrees.

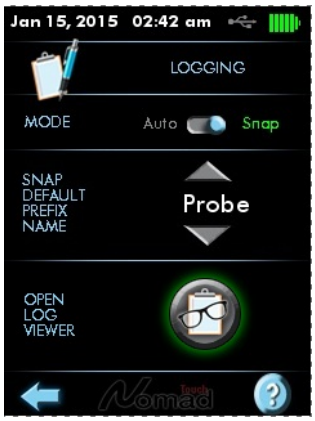
Information: If you select Nortech Fibronic probes or an offset, there will be a note informing you in the main window.

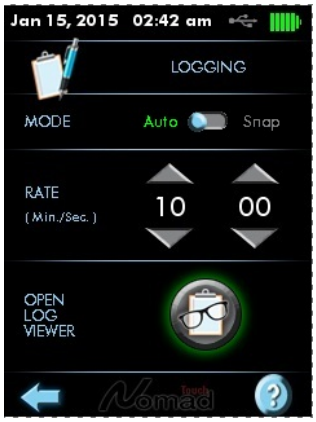
5.5 The logging menu

Your Nomad-*Touch* includes a very useful temperature-logging feature. The logged data is internally stored as binary files. The files consist of up to 65,000 lines of data, each line representing the temperature for the single channel along with a date-time stamp, the probe name (prefix and sequential number 00 to 99), and probe optical performance data. This means that the 32 MB total space can accommodate a total of 6 such files. This represents a grand total of 390,000 lines, or about 7.5 years of data if the sampling rate is 1 sample per 10 minutes. Once all 6 files have been filled up, the oldest file is deleted without any warning and replaced by a new one. These 6 files can be downloaded using the QLink software.

The logging files can be deleted via

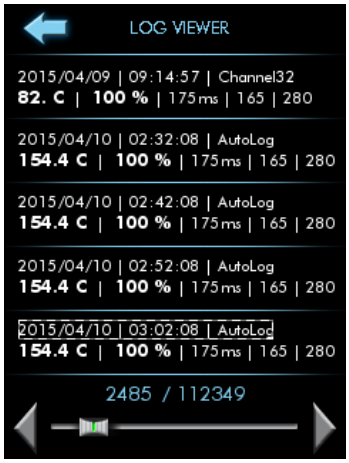
The logging parameters can be controlled from the 2 windows shown below; the one on the left illustrates the case where the “snap” mode is active, while the one on the right illustrates the logging done automatically at regular time intervals.





The parameters available from these screens are:

- MODE: Auto means that logging will be done at fixed time intervals. Snap means “manual” logging; a sample is saved when the SNAP (on the main screen) button is pressed.
- RATE: Logging rate from adjustable from 1 second to 61 minutes.
- SNAP DEFAULT PREFIX NAME: Prefix that will be used to identify probes when testing in snap mode. This prefix will be followed by 2 numbers that would normally identify the probe then currently tested. QLink allows you to manage the prefixes; 15 prefixes are supported.)
    - The prefix name and the 2-digit number are saved with the logged temperature data when the snap button is pressed.
- OPEN LOG VIEWER: Allows you to review the temperature data logged in internal memory. Data can be selected by 1) the cursor, for coarse selection; and 2) the left and right arrows, for fine selection. The log viewer screen looks like this:



Note that the cursor () is not displayed when the log memory contains less than 11 entries.

File name conventions:

1- The current log file is always named temperatures.tem
2- When the current file is full, it is archived with the same name but by adding to it a prefix that corresponds to the date and time at the time of closing this file.

5.6 Probe connector

This ST connector mates to a Neoptix temperature probe. It will also work fine with older Nortech Fibronic Inc. probes, as long as the appropriate calibration selection is made.

6 USB COMMUNICATION DESCRIPTION (SERIAL PORT)

You can communicate with your Nomad-*Touch* thermometer via the standard USB link. This first protocol implementation on this Nomad is an emulation of a serial port.

VERY IMPORTANT: Before you connect it for the first time to a PC, you must install a driver in this PC. The procedure to do this is outlined in Section 4.1.1.

Recommendation: The use of QLink software is highly recommended as an alternative to the serial command protocol described in this chapter; for more information on QLink, see chapter 8.

Your Nomad-Touch should now be ready for use with software's such as:

- QLink
- HyperTerminal[1], or Tera-Term; this is described below..

Take note of the serial port information given when the driver is installed (COM8 in the above example); you may need this information to connect to the above mentioned software packages.

6.1 Restrictions on Serial Port Use

The use of serial port may occasionally cause some problems. Some of them are:

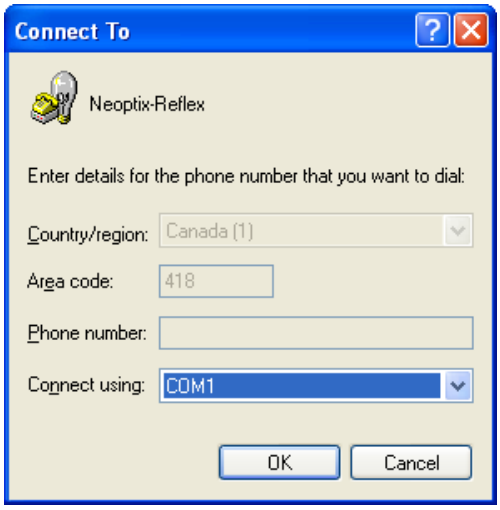
- When you connect multiple Nomad-*Touch's* to your PC, the serial port Windows logic will always generate a different COM port number, a new one every time you connect a new instrument. After a while, this may result in a COM port that has an assigned number which is very high (for example, QLink requires that the port number be 32 or less). If this is the case, you will need to overwrite older COM ports that you do not use anymore; a COM port number can be reassigned in Device Manager.
- If your PC does not find a driver automatically, you should use the one that is on the DVD included with the instrument.

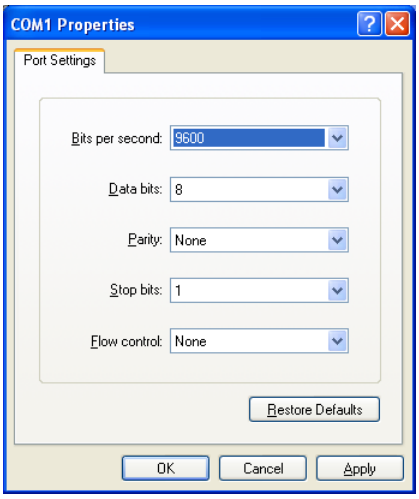
6.2 Using HyperTerminal in Windows

Hyper Terminal is a standard Windows program that can be easily used to exercise your Nomad thermometer. To use Hyper Terminal, you first set its properties as follows:

1- In the "Connection Description" window, enter a name that suits you, such as "Neoptix-Nomad". Click OK.
2- In the next window, "Connect To", select COM1 (or another COM port, if you are planning to use another port than COM1) in the box called "Connect using". Click OK.
3- Then the COM1 Properties window will come up. As indicated above and as shown in the figure at right, set the port parameters to 9600 Baud, 1 Stop-Bit and No-Parity. Click OK.
4- You are ready to go. Type "h ENTER " to test your setup (see below). Warning: the characters that you enter are not echoed to you!

[1] Vista, Win-7, -8 and -10 Windows users: HyperTerminal is not included with Vista and subsequent Windows versions. However, an equivalent program (HTPE) can be downloaded (for a fee) at the following website: http://www.hilgraeve.com/htpe/download.html. Tera Term (freeware) has also given good results; see http://ttssh2.sourceforge.jp/ .





6.3 Serial help menu

The following is the menu as displayed by the instrument when sending the “h” command. Note that the USB interface can also be used to upgrade the thermometer controlling firmware, without opening the thermometer case. Instructions to perform an upgrade are normally sent with the upgrade program; a PC compatible computer will be required to perform such upgrade.

Nomad-1	Description
`baud:nnnn`	Set baud rate to ‘nnnn’ bit per second, valid rates are: 9600, 115200 or 921000 (remember to reconnect)
`batt?`	Battery information
`c:xxxxx`	Clean up (delete) log file xxxxx (use command “l” to list files)
`f[j]`	Set point adjustment on channel to [j]
`format`	Erase all log files
`gskip[i]`	Skip up to i (0 to 9) marginal read cycles
`h`	Help menu (this screen)
`i`	Get factory and status information
`l`	List log files
`logging[i]`	Logging+ to enable logging, logging- to disable. Note: to use snap, logging- must be selected
`n+[i]`	Select calibration type (n+e for Neoptix, n+o for Nortech-F)
`rd`	Read date and time
`rr`	Read logging rate
`resetoff`	Reset temperature offset to zero

`t`	Get Temperature reading
`ta[i]`	Auto temperature output to serial port (+ to enable, - to disable)
`u[i]`	Unit (c = °Celcius, f = °Fahrenheit)
`wd:yyyy/mm/dd`	Write current date
`wt:hh:mm`	Write current time (23:59)
`wr[n]`	Write logging rate
`n`	Logging rate
`1,2,3,4,5`	1, 2, 5, 10, 30 sec
`6,7,8,9`	1, 5, 10, 30 min
`10`	1 hour
`wtune[i]`	Optimize CCD read time (wtune+ to enable, wtune- to disable)
`y`	Probe optical signal strength

6.4 Detailed description of USB serial commands

All commands must be terminated by a carriage return character (ENTER). When more than one argument is 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.

"baud:nnnn" Making a change in the baud rate used to communicate with the serial port will automatically disable your serial port client program: you will then need to disconnect *HyperTerminal* or *Tera Term*, modify the setting on your serial client to match the setting you just saved, then reconnect. This command is useful if you need to transfer files faster: by raising the baud rate you will also make the file transfer faster. Remember that a baud rate change for the Neoptix protocol is not persistent after a reboot; it will revert to 9600 baud.

"batt?" This command gives information about the internal Lithium-Ion battery. The following information is given: battery voltage (mV), charging current (mA), capacity (mAh) and % charge availability.

"c:xxxx" The content of log files is designed to be easy to copy and paste into a Microsoft Excel spreadsheet. Certain older versions of Excel had a limitation of about 65,000 lines which could be copied and pasted into it. For this reason, when a log file reaches that size, it is archived and a new log file is started. This has the benefits of saving disk space as well as providing a relatively small log file containing the latest readings ready for download. Archived log files can also be downloaded, or they can be disposed of file-by-file using this command.

"f[j]" This command forces an actual temperature reading (j); 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 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 [ENTER] "). 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" command (ex: "f [ENTER] ").

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.

"format" This command deletes the current as well as all archived log files. This preserves disk space but is not necessary in normal use, even after several years, unless the logging rate has been reduced substantially on the device for long periods of time.

"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 Nomad 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 Nomad 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 (either by serial commands or via the touch screen):

Ex:		
	Model:	Nomad-Touch
	Serial:	NMT003B
	Number of channels	1
	Calibration type:	Neoptix probe
	Internal Software:	V1.0
	Factory Calibration:	15/03/04 (YY/MM/DD)
	Unit	degrees C
	Temperature offset:	0.0

"l" This lists the files that you can download using the "d" command. This would include the temperature log files, as well as some information file related to the smart protocols, and other system files, such as "status". File size is also given, for download time estimation. See section 5.5 for information regarding log file name convention.

"logging[i]" Convenience to start (logging+) and to stop (logging-) temperature logging in internal memory. Logging must be disabled to activate the logging "snap" mode.

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

"rd" This will display the current system date and time in the format "yyyy/mm/dd hh:mm:ss" (these settings are configurable with two separate commands, *wd* for the date and *wt* for the time, with the exception of seconds which cannot be set).

"rr" This displays the interval in seconds currently set on the system for logging. This interval can be reduced all the way down to one second; however, if the logging rate is set to a number of seconds less than 60, the system will reset this value on reboot to 60 seconds.

"resetoff" Please refer to command "f", described above. This will reset the offset on the optical channel.

"t" Returns the current temperature reading. "---.-" is displayed when no valid temperature is available. All temperatures are returned in ºC or ºF unit, as specified by the "u" command.
ex: "t [ENTER] ", with the Nomad-*Touch* thermometer, will return:
+24.3 [ENTER]
*

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 a 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 [ENTER] "
where i is the channel number, and xxx.x is the temperature reading (signed number).

"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 [ENTER] ", to select ºC (Celsius).

"wd:yyyy/mm/dd" This will reset the system date of the Nomad to a provided valid value. This value will be used in system and temperature logs. The system date is persistent even after a prolonged power down of the device. To view the current system date, refer to the "rd" command.

"wt:hh:mm" This will reset the system clock of the Nomad to provided hour and minute values. The system time is persistent even after a prolonged power down of the device. To view the current system time, refer to the "rd" command.

"wr[n]" Write logging rate.

n	*Logging rate*
1,2,3,4,5	*1,2,5,10,30 sec*
6,7,8,9	*1,5,10,30 min*
10	*1 hour*

A logging rate less than once per minute is considered abnormal and is automatically reset to once per minute following a reboot. Log files can be listed with the "l" command and downloaded with the "d:xxxxx" command. Entering this command will also force implicitly the command "logging+". Entering the command "logging-" will force the "snap" mode to become active.

"wtune[i]" This command can be used to increase the optical integration time to force the Nomad system 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. 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.

"y" The "y" command can be used to confirm the signal strength 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. A complete discussion on how to interpret the "y" command, refer to Section 6.5 below.
Ex: "y [ENTER] ", with the Nomad thermometer, will return:
CH1: 98%, ratio:2.01**, lamp: 200, CCD: 250 ms (auto*) +23.5 [ENTER]

*: 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.

6.5 Interpretation of "y" command results

The Neoptix Nomad-*Touch* systems are fitted with a function that gives an evaluation about probe signal strength or signal quality index; in Neoptix jargon, this is called the "y" command. The easiest method to access this command is to use Windows' HyperTerminal or QLink. This information is also displayed on the main window of the Nomad-*Touch* color screen.

Typically, the "y" command will return the following information:

```
CH01:  100%, ratio:2.38, lamp:160, CCD: 100, (auto) +23.5
```

CH01 indicates the channel number (always 1 for a Nomad system)
2.05 indicates the power strength (ratio) and can span from about +0.3 to +2.8. You can interpret it approximately as follows:

- 0.3 to 1.07: no probe is detected
- 1.07 to 1.25: a probe is probably present, but exhibits a very weak signal; its reading is usually rejected, as it is considered as unreliable
- 1.25 to 2.7: a good probe is present (the higher the ratio the healthier the probe).

Lamp attenuation: gives an indication about the white light lamp intensity for this channel. It ranges from 250 (weak lamp) to 0 (strong or intense lamp). A weak lamp is usually preferred and indicates a "healthy" probe.
CCD time, in millisec: this is the CCD (charge couple device) optical integration time in millisecond; it can range from 50 to 500 ms. A weak probe will normally have a long integration time.

(auto) means that the wtune feature is enabled. If wtune is disabled, this information is not present.

To summarize, a very good probe is characterized by a good quality index ratio (>1.8), then by a high lamp attenuation (>150) and finally by a short integration time (<200ms). Also, dirty connectors will contribute to lower probe strength; always assure that all fiber connections are clean before evaluating probe performance.

This Nomad includes a convenient "Power%" feature that makes probe strength interpretation easier. The "Power%" is only available when the "wtune" feature is enabled. For additional information regarding the interpretation of this percentage parameter, especially when dealing with power transformer applications, whereby an OFT and an extension cable is used, please refer to the Neoptix Probe Installation Guide, part number g1009rxx; this guide is available from Neoptix.

Warning: These values are approximate and will change slightly from system to system.

Note: For transformer T2 probes, as they are normally going to be used with a feedthrough and an outside extension cable, it is recommended that a probe (when measured directly, without feedthrough) is to be considered healthy when its Power % reading is at 100% (probe alone, no feedthrough, no extension cable); with a feedthrough and extension cable, the minimum acceptable and recommended percent level is 65%. If the 1-meter short extension cable is used in addition, then these 2 values should be lowered by 10%, respectively to 90% and 55%.

6.6 Typical temperature reading sequence

Once all parameters have been set, the following sequence should normally be followed to extract temperature information from your Neoptix thermometer. 2 procedures can be used for this purpose. The first method consists in using the "ta" command (preferred), while the second sequence would be:

a) The host computer should send the "t" command, followed by a ENTER character.
b) The thermometer responds by echoing the requested temperature values, as indicated above; the transmission is terminated by a "*" character.
c) When the "*" character is received, it is suggested to immediately terminate the dialog session by having the host computer issue the "r" command followed by a ENTER character.

7 ERROR CODES

The following error messages are displayed under certain error conditions:

RS-232	Display	Description
Err2	Err2	Internal memory checksum error. Memory corruption. Message "Corrupted Memory" will be displayed on LCD display. If this happens, use caution in reading temperatures, as these readings may be in error. Contact Neoptix.
"- - . -"*	"- - - - -"	Temperature out of maximum instrument limits or no signal
Err5		Argument out of range
Err6		Unrecognized command

*: In case of anomalies, the following values are returned (USB serial interface):
-999.99: Temperature too high
-999.66: Temperature error (- - . - is displayed)
-999.55: Channel is disabled
-999.44: Internal error (slave timeout)
-999.33: Internal error (slave error)
-999.11: Temperature too low.

Note that these error codes are not applicable when using the QLink software package. These high-level software packages are programmed to automatically handle all types of errors, as outlined in the next section.

8 QLINK SOFTWARE DESCRIPTION

QLink is particularly interesting for users of the non-Ethernet versions of the Nomad-*Touch*, as it offers a friendlier procedure to load various parameters, such as relay and optical channel parameters that would otherwise require to be set by hand using the instrument 4-button keypad. The goals and purposes of this software package are as follows:

- Display temperature information, for up to 16 channels per instrument, for up to 4 instruments (maximum of 64 channels). This information can be seen in either digital or graphical forms. Data can be logged to a file, if desired.
- Acquired temperature information can be presented in graphical form.
- Data can be presented in punctual format, or with minimum, maximum and average (for a long sampling period).
- Initialize and manage Nomad-*Touch* optical channel and associated control parameters.
- Upload new Nomad-*Touch* firmware (software upgrade).
- Download data and event logging files from the Nomad-*Touch*, and other files.

QLink can simultaneously support up to 4 Neoptix T/Guard instruments, either through their serial COM ports. Currently, this tool supports the T/Guard-408, T/Guard-408XT, T/Guard-2B, Nomad-*Touch*, T/Guard-405 and T/Guard-Link-RevB.

QLink will connect to your Noamd-*Touch* through its USB port, which is effectively an emulation of a serial Com port. Before using QLink, you must insure that the software driver has been installed correctly; please refer to chapter 4 for more information.

QLink has been introduced to replace the older OptiLink-II software. All references to OptiLink-II has been removed from this user guide.

This guide shows screenshots that have been done mostly with a *408* instrument; your screen may look a little bit different if you are using another instrument model, but the philosophy of the program remains the same.

8.1 Installation and Initial Operation

To download QLink version 1.0 or above, click this link to download the latest version (no passwords required): http://neoptix.com/directdownload/DVD/Software_QLink/QLink-Setup.zip. Simply execute this application, and QLink will be installed on your PC. The QLink tool is installed using a standard Microsoft Windows setup.exe package. Double-click on setup.exe to launch and accept the usual Windows Security warning to proceed.

This release of QLink is compatible with Windows versions ranging from Vista to Windows 10 (XP is not supported). “InstallShield” will manage the installation procedure, and will install Microsoft .NET Framework version 4.0 or above if required. A PC reboot may be necessary. You may need administrator rights to install this software on your PC.

Very important: The current version of QLink will work correctly with the Nomad-*Touch* that has the firmware version the 3.0 or later. If your Nomad-*Touch* has an earlier version, you will get an information message with instructions on how to update your instrument; see section 8.4 for instructions on how to perform the firmware update. In case of questions, do not hesitate to contact Neoptix support team.

On the . Make sure your serial port parameters are correct and that your cable matches your port duplex settings! Neoptix protocol serial settings are baud 9600, Parity None and Stop bits 1.

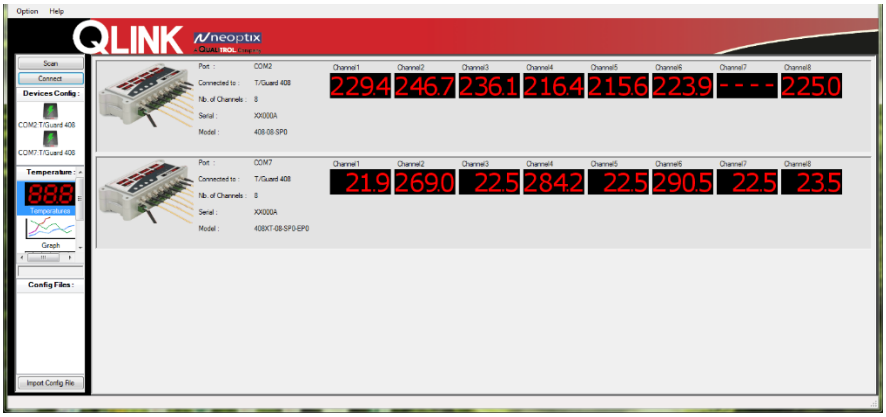
Warning: To reinstall the software, or install a new version, it is mandatory to first uninstall the older version. This must be done by using the "Program and Features", found in Windows Control Panel.

After installing all the required software, you can execute QLink. This window will appear. Normally, a scan of all "active" COM ports will automatically try to "find" compatible instruments; you can also click again "Scan" to perform a new COM port scan, or click "Connect" to connect to a specific COM port.

If you have one instrument connected to your PC, the following window will appear[2]:

To connect additional instruments, click "Connect", and click on one COM button once you know the wiring and hardware for this COM port are correctly set up. For example, if 2 *408* instruments have been connected to QLink, you will get this:

[2] If you get a message saying that your instrument firmware is not compatible with QLink, please refer to section 8.4. It may also be possible that you get this message even though your firmware it up-to-date; in this case, we suggest you cancel this window and try to connect again.



Once an instrument is connected, it will automatically save all temperature data in the PC memory; this data is saved every second (sampling rate is 1 second), for up to 72 hours; this data can be viewed either in graphical form. Note that temperature can be logged only if the logging process is explicitly started (data prior to starting the logging process cannot be saved to a logging file).

8.2 What is new in QLink

QLink is a replacement for OptiLink and OptiLink-II. QLink offers a number of improvements; here is an overview of the main changes:

- The Neoptix communication protocol has been completely revamped with the idea of making it much more robust, more resilient to communication errors.
- This new protocol has the implication that QLink will not work with old firmware versions; if you get a message stating that your instrument is not compatible with QLink, see upgrade instructions in section 8.4 below; contact Neoptix for additional instructions in case of problems.
- Parameters that would require HyperTerminal to be changed as they were not included in OptiLink-II can now all be changed using QLink.
- Temperature data is kept in the PC memory from the time an instrument is connected to the PC. Default acquisition interval is one second. Old data is kept in memory for a period of 72 hours. Any saved data can later be displayed on graphic form. Please note that old data cannot be saved later to a file; if you want to log temperature values to a file, you must open a file and logging will then start.
- The graphic tool has been completely changed.
- It is now possible to modify and even create a configuration file without having an actual instrument connected to your PC.

8.3 Overview of QLink

Here are some of the steps or tasks one will do in QLink on its first use:

- Make sure the instrument you want to connect is corrected wired to your PC, through its RS485 port. You can test your link with HyperTerminal or Tera Term. Click “Connect” to connect to this instrument, if not already connected.
- Click on “Temperatures” to see the Acquire Temperature window (Zone 3, as illustrated in the figure below).
- To configure your instrument, refer to Zone 2. Click on the instrument logo you want to configure, and the you can configure everything you want here, from relay settings to optical channel configuration. Do not forget to click “Save to Device”!

- To download files, such as temperature logs (internal to the instrument), or the status file, Click "Download" from the menu items available from Zone 2.

You can experiment with the other menu items, to explore the multiple functionalities that have been built-in in QLink. The remaining sections in this chapter present in more details these functionalities.
This figure presents the main menu items available in QLink.

Zone 1 — Scan and Connect: To connect instruments to QLink.

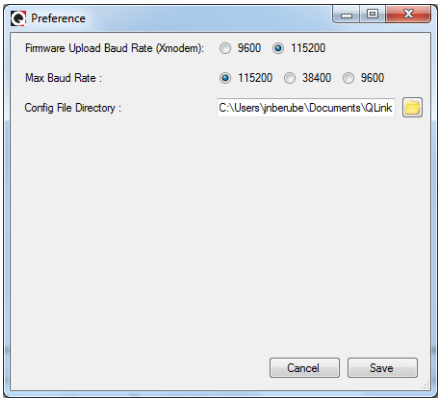
Zone 2 — Your connected instruments are listed here (up to 4).
Click on one of the listed instruments to open the configuration windows. You can configure only one instrument at a time.
Right click on an instrument, and select "Disconnect" to remove this instrument from QLink.

Zone 3 — This section allows to display, to graph and to log temperature data. You will be able to see simultaneously all data for all connected instruments.

Zone 4 — "● Logging" will be flashing when temperature data is being saved to a file.

Zone 5 — This section allows to generate and edit configuration files remotely, without having an instrument connected in real time to QLink. These files are stored in a predefined directory, that can be changed in the "Preference" window.
Click a file to open its configuration window.
This allows to import to the QLink directory any configuration that could be saved elsewhere in your PC.

To improve the user friendliness of QLink, a "Preference" page is available. This is illustrated here. Make sure you set your preferences, so QLink becomes easier to use. This page can only be accessed from QLink menu bar.



A help menu is also available.

8.4 Firmware Upgrade Procedure

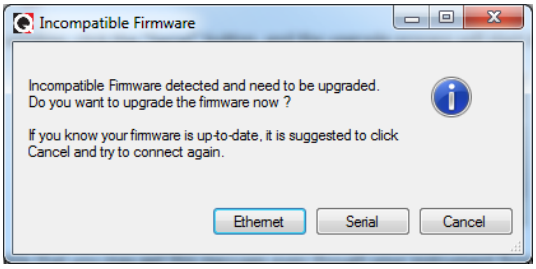
When QLink tries to connect to a compatible instrument, it will check the compatibility that particular instrument. Depending on the particular model of instrument you have, you will be offered to perform the upgrade either via the Ethernet port or the serial port; if available, the upgrade via the Ethernet port would be preferred because the process would take much less time (about 10 minutes with the Ethernet port, or more than 3 hours with the RS485 port).

Please note that it is also possible to perform a firmware update as you wish using the update function built in QLink; see section 8.8 for more information.

8.4.1 Upgrade Procedure, with Serial Port

When QLink is started, and upon detection of a compatible instrument, QLink will confirm the compatibility of QLink and the firmware version currently running in the instrument. If both are found to be incompatible, QLink will propose to perform an update of the instrument firmware. QLink is always shipped with firmware files that can be used to upgrade your instrument; these are files with the extension *.s19.

When you get this window, click the “Serial” button, and the upgrade process will start by itself.

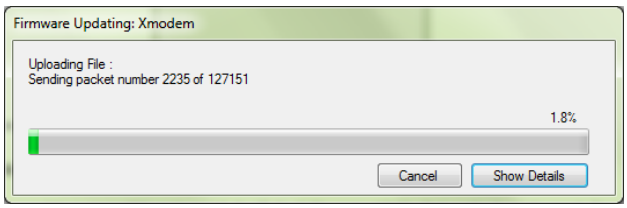


Warning: It is possible that you may get this message even though your instrument firmware is up-to-date. This is due to a known software bug, not resolved at this time. If this is the case, click the “Cancel” button, and try to connect again.

Warning: The best serial hardware configuration is full duplex (4 wires). Also, make sure the wiring between your computer and the instrument is short, less than 1 meter if possible.

Warning: The upgrade using the serial port will take up to 3 hours to perform, and should not be stopped. The downloaded file size is about 0.5 megabyte for the Nomad-*Touch*.

The following window shows in real time the download and upgrade status.

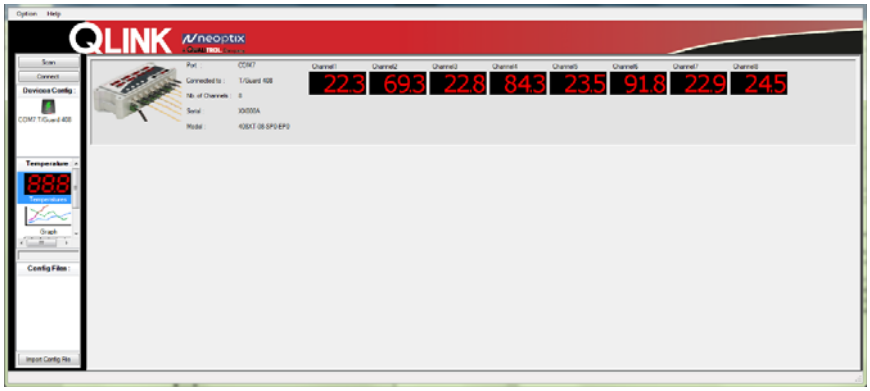


At the end of this upgrade process, it is strongly suggested to exit QLink and to restart it. Then, QLink should start normally.

This upgrade process uses the standard XModem file transfer protocol. To work correctly, it requires a good and reliable serial port link; many USB-RS485 converters have shown to have problems; Neoptix recommends converters with the brand name "B&B Electronics", see website http://www.bb-elec.com/Products/USB-Connectivity/USB-to-Serial-Adapters/In-line-USB-to-Serial-Converters/USOPTL4.aspx.

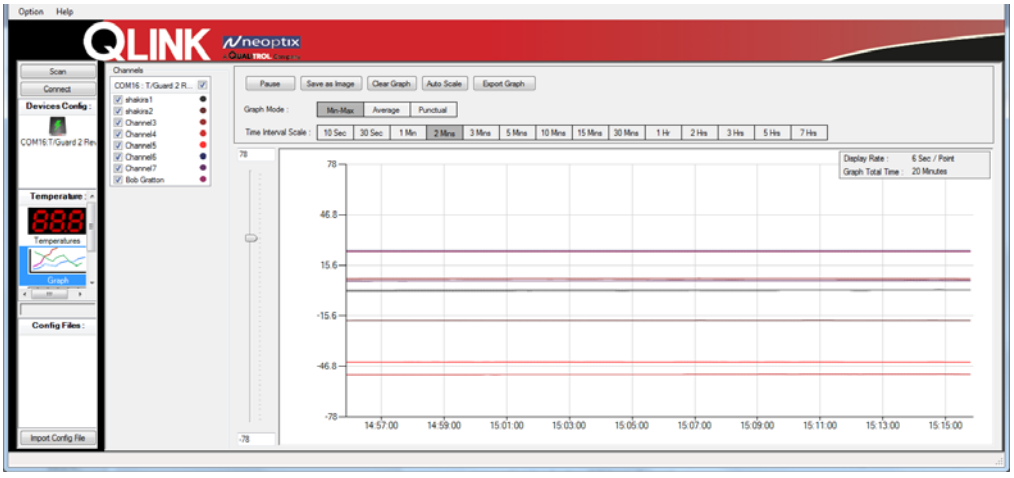
8.5 Acquire and Display Temperature Data

The "Acquire Temperatures" application will display up to 64 temperatures (16 temperatures for up to 4 instruments), as follows. Click on "Temperatures" (in Zone 3, as shown in the above figure, section 8.3).



The temperature for up to 64 channels can be shown in this window.

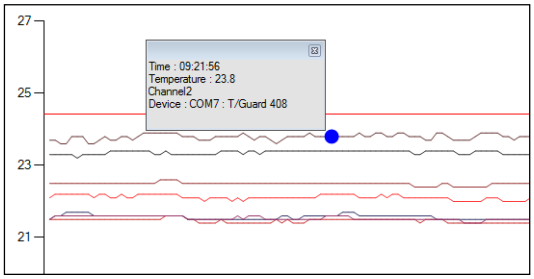
To see a graphic of the same data as it is being acquired, click on "Graph". You get the following window.



The graphic window will display a total of 200 to 300 temperature data points horizontally.

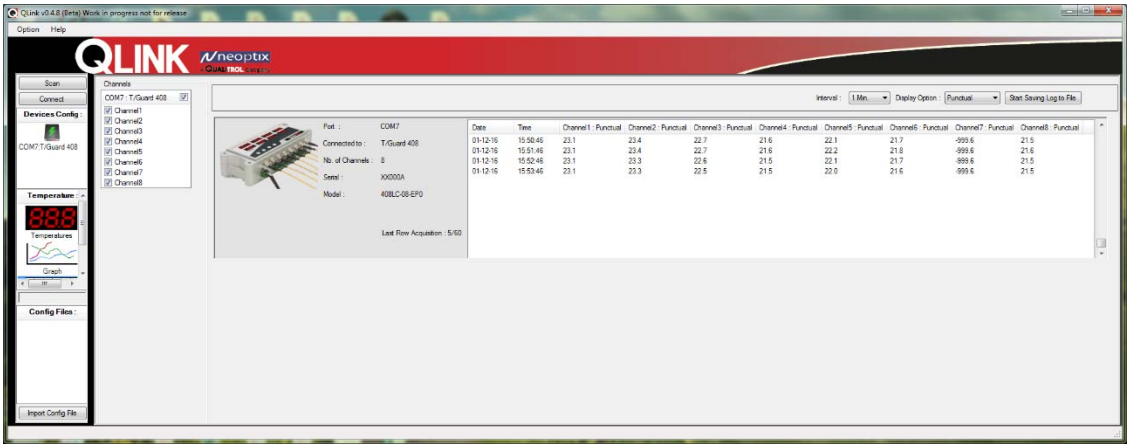
Various options are available when you are showing a graphic. Most are obvious, but some need some explanations:

- Curves can be shown in either “Punctual” mode, or Average and Min-Max modes. In Min-Max mode, the thickness of the curve will grow to show graphically the minimum and maximum temperatures observed within the sampling period.
- The parameter “Time Interval Scale” corresponds to the time interval between two time intervals on the time scale. This means that the total graph time is always 10 times the “Time Interval Scale”.
- As mentioned earlier in this chapter, the graphic can show data that has been acquired and saved in memory since the instrument was connected to QLink. This saved data is stored with a time resolution of 1 second, and for a period of up to 72 hours (that is about 260,000 data points). Please note that the average and min-max data points are always “calculated” from this saved historic data; so you are free to modify the display format as you wish, as the original saved data is always preserved (up to a duration of 72 hours of course).
- Graphical data can be saved to a file in two ways:
    - “Save as Image”. This will save a bmp or jpg file. This is simply an image of what you see on your screen.
    - “Export Graph”. This will save a data file. This is an Excel compatible file (csv or tem extension). One data point on the graph will generate one line in your spreadsheet.
- To know the value of any point in the graphic, simply click on that point with the cursor, and the following information will be displayed (the blue dot is shown only in punctual mode; in average or min-max modes, the area of the curves pointed by your cursor is colored in blue):



8.6 Logging Data to a File

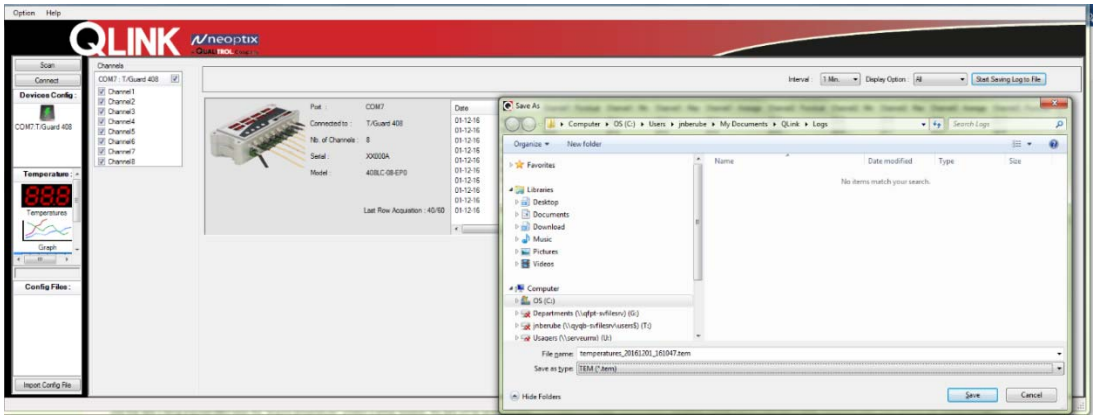
To save temperature data to a file, click on “Logs” (in Zone 3, as shown in the above figure, section 8.3). You will get this:



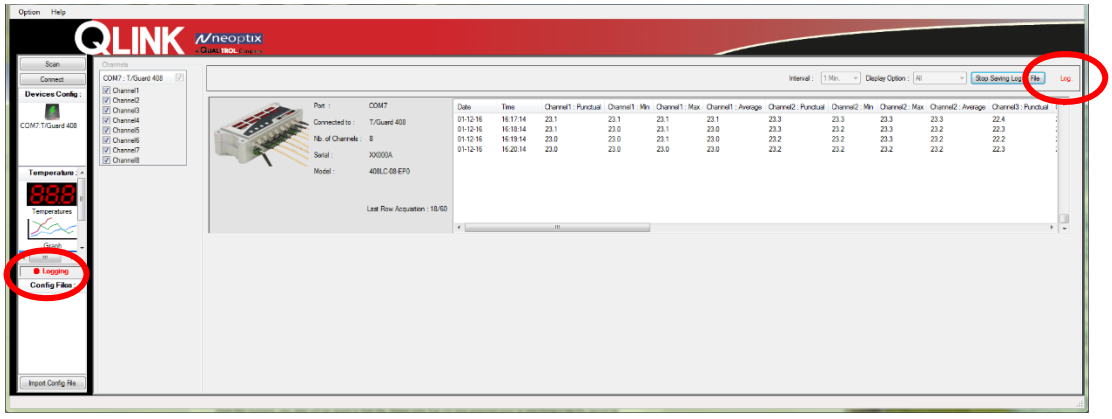
In this initial window, the data is shown in tabular form, in either Punctual, Min-Max or Average modes. These 4 modes of displaying the data are explained here:

- Punctual. This is the temperature values that were sampled at the beginning of each sampling period
- Min-Max. These are the minimum and maximum values of observed temperature during the sampling period. The raw data is sampled every second, which means for example that a requested interval of 1 minute will use 60 values to evaluate the minimum and maximum temperatures for that interval of 1 minute.
- Average. This is the average temperature observed during the requested interval. As for the minimum and maximum values, this average is calculated based on raw data sampled every second.

To save data to a file, you must first specify a file where the data will be saved. Click on “Start Saving Log to File”, and enter or select a file name of your choice. Available file formats are .csv and .tem; both are compatible with Excel; “.tem” is a tab delimited file where numbers are saved as xxx.xx; “.csv” is similar but uses Windows regional setting for number formatting; the extension “.tem” is the Neoptix standard. Click “Save”.

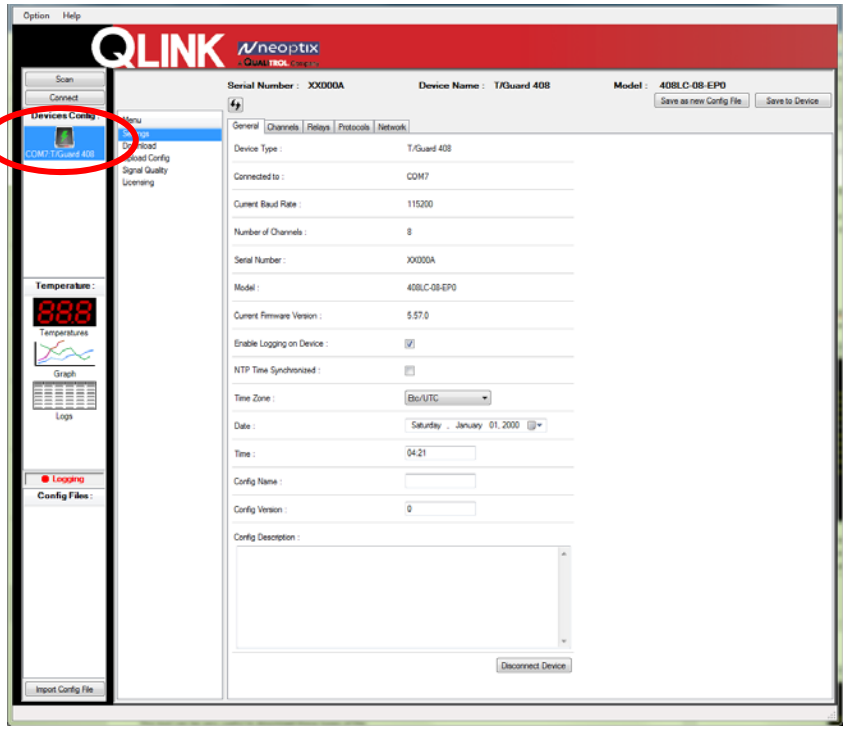


From this moment, new data will be saved to that file. Please note that old data acquired prior to specifying a log file cannot be saved to a file. During logging, two red dots will flash, confirming the logging operation. This is shown here.



8.7 Configuration Tool

QLink allows for configuring an instrument simply and quickly. To access the configuration pages, click on an instrument icon, as highlighted in this figure:



The information given in this page (General tab) are mostly informative. However, the following settings can be done:

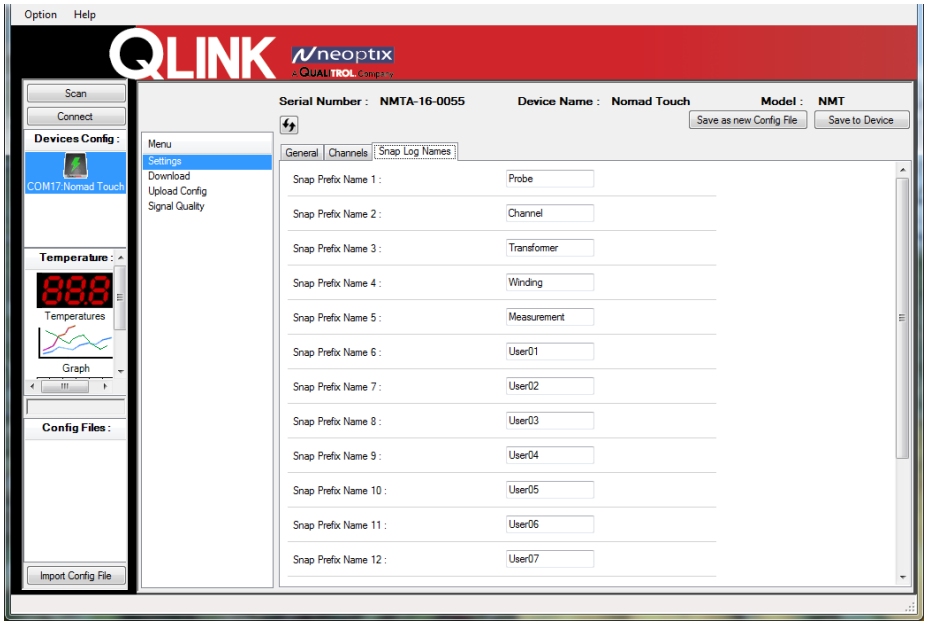
- Date, time zone and time can be set.
- You can give a name to your instrument configuration, which can be saved on your hard disk. This file can be later open and edited, and then uploaded to this instrument or another compatible instrument (of similar type).

The 2 buttons at the top right of this window allow you to either save your modifications to the connected instrument, or to a file (extension .cfg). Saving a configuration to a file would be very useful for eventual transfer of that file to another instrument, to duplicate the same configuration, so these instruments have the same configuration. See section 8.8 for more information.

For the Nomad-Touch instrument, there is an additional configuration item: Snap Prefixes. Information about these prefixes is given elsewhere in this guide.

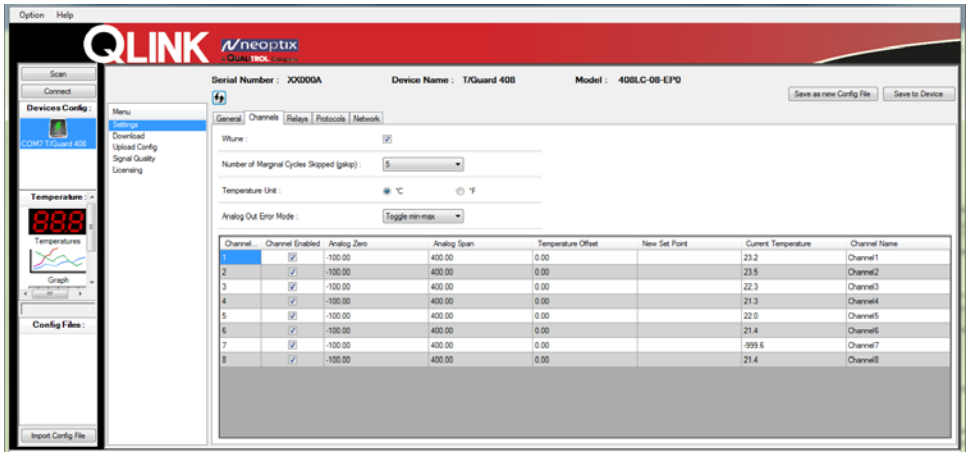
8.7.1 Configuration of Snaplog Prefixes

For Nomad users, QLink allows you to configure up to 10 prefixes which could be later user when saving temperature information using the snap tool. This is illustrated here:



8.7.2 Optical Channel Setting

Click on the “Channels” tab to access the page where you can set names, offsets and analog output parameters. This is shown here:



8.7.3 Offline Configuration Tool

With QLink, it is possible to generate configuration files for any compatible instruments, even it none are physically connected to your PC. For this purpose, QLink comes with default (with parameters set to their factory defaults) configuration files that you can use to build a configuration for your unconnected or future instrument. One such file is provided for each type of instrument (*408*, *408XT*, *405*, *T/Guard-Link-RevB*, Nomad-*Touch* and *OEM* board). Any of these default files can be loaded in QLink; see “Zone 5” in Section 8.3. These default files are read-only, and thus must be saved under a different name (the “Save” button cannot be used; you must save your modified file to a new file. Once your instrument is later connected to your PC, you will be able to upload this new configuration file to that instrument.

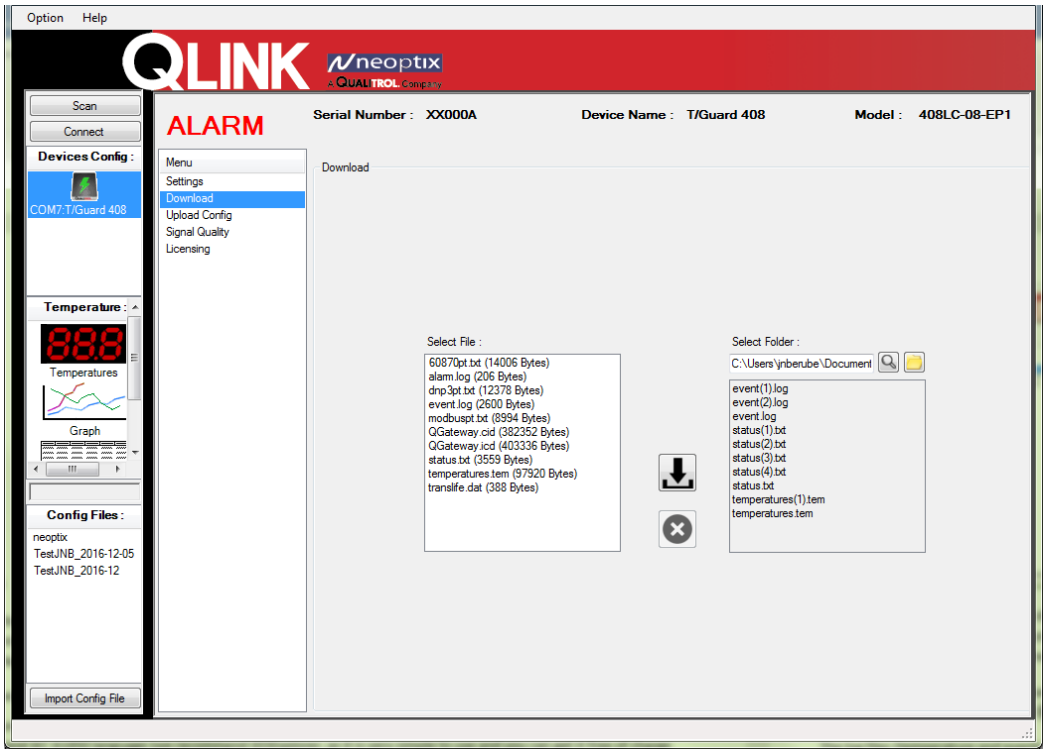
Warning: When uploading a new configuration file, you need to realize that all parameters then present in that instrument will be overwritten.

8.7.4 Download Files Tool

This tool can be very useful to download these types of file:

- Status.txt: This is the status file described elsewhere in this document. It essentially gives an overview of all parameters of your system, that can easily be e-mailed or printed.
- Temperatures.tem: This is the current logging file for temperature information. When this files reaches 65,000 lines long, it will be archived using the current date and time as a prefix to generate temperatures.tem file name, and a new temperatures.com file will open.
- Event.log: This is the same as the temperatures.com files, but for event information (alarms).
- Logging files, both for temperatures and for events; these files are best read with Excel. These files are limited to a total length of 65,000 lines.
- Smart protocol related files, for Modbus (modbuspt.txt), DNP3 (dnp3pt.txt), IEC 60870-5 (60870pt.txt) and IEC 61850 (*.cid and *.icd); these files are text files, and can be read easily with Notepad or WordPad. These files will appear in the list only if the corresponding protocols are active.
-

The download tool is shown here:



By default, the files are saved in the directory "…My Documents\QLink\Download"; you can change this as you wish. When you download a file, its name is fixed. If you download the same file multiple times, the file name is appended with "(1)", "(2)", etc. Downloading large files can take some time… the download rate is approximately 5 kilobytes per second.

Take note that this tool cannot be used to download an instrument configuration file; a configuration file should be saved to file using the procedure given in section 8.7.

The log files (temperature and event) can be deleted, by clicking the Delete button. Read-only files cannot be deleted.

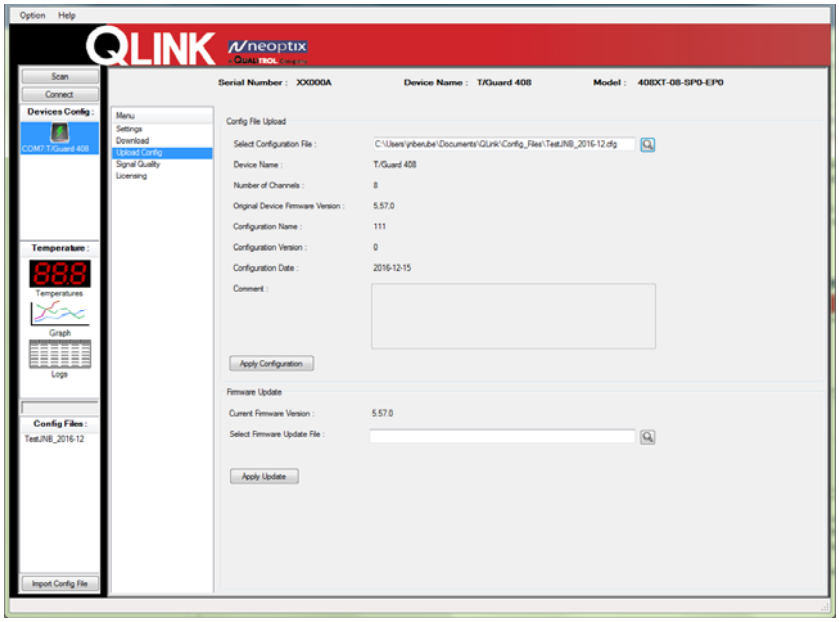
Warning: The download tool includes safeguards to trap communication errors. If there is an error that is detected, the file name will be appended with the word "_ERROR"; if this happens, you can still use the file, but exercise caution regarding the validity of its content. In any case, please send the displayed error information to Neoptix (support@neoptix.com) to allow us to improve future versions of QLink.

8.8 Upload files Tool

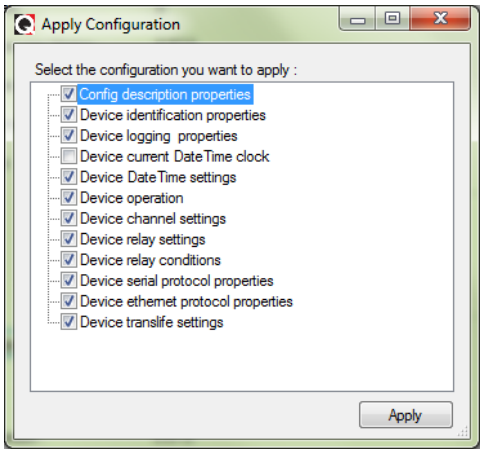
This tool is useful to transfer an instrument configuration file that was previously saved in your PC to the instrument now connected to QLink.

The configuration file that could be uploaded should have been generated from an existing instrument, as described in section 8.7. It is also possible to upload a configuration file that could have been modified offline, see section 8.10.

Any configuration upload should be done with great care, as all parameters in the connected instrument will be replaced by the ones included in the file that you will upload. Once uploaded, there is no coming back!



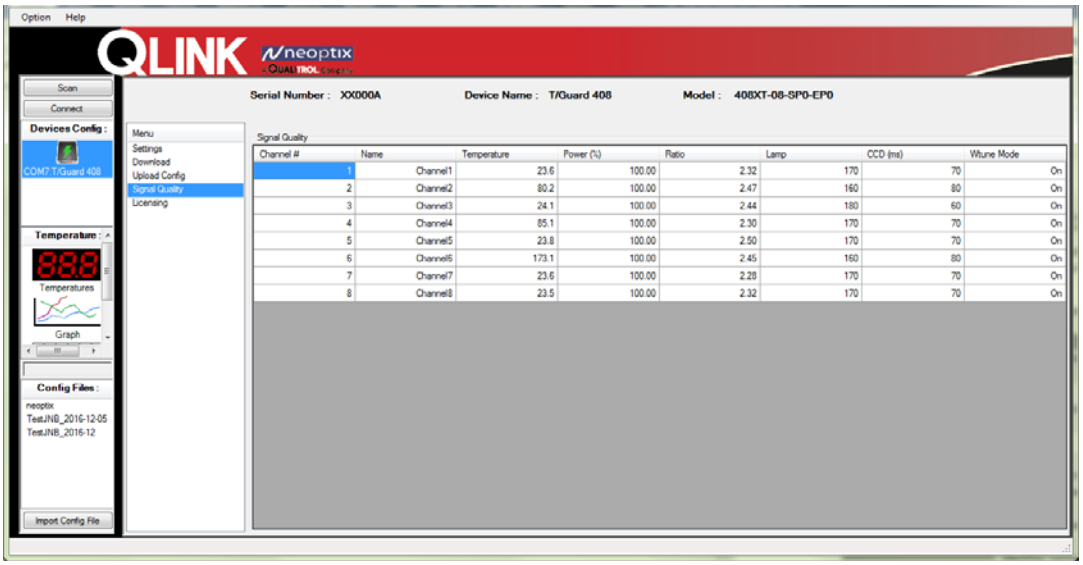
Click "Apply Configuration" to upload this configuration to the connected instrument. The following window will appear, where you can select the type of parameters that will be uploaded. Click "Apply" to proceed and "Yes" to the confirmation window.



From this tool, you can also perform a firmware update of your choice. If you have received a ".s19" file, you can perform the upgrade here. The tool allows you to perform the upgrade using the RS485 serial port. The upgrade procedure is described in details in section 8.4 above.

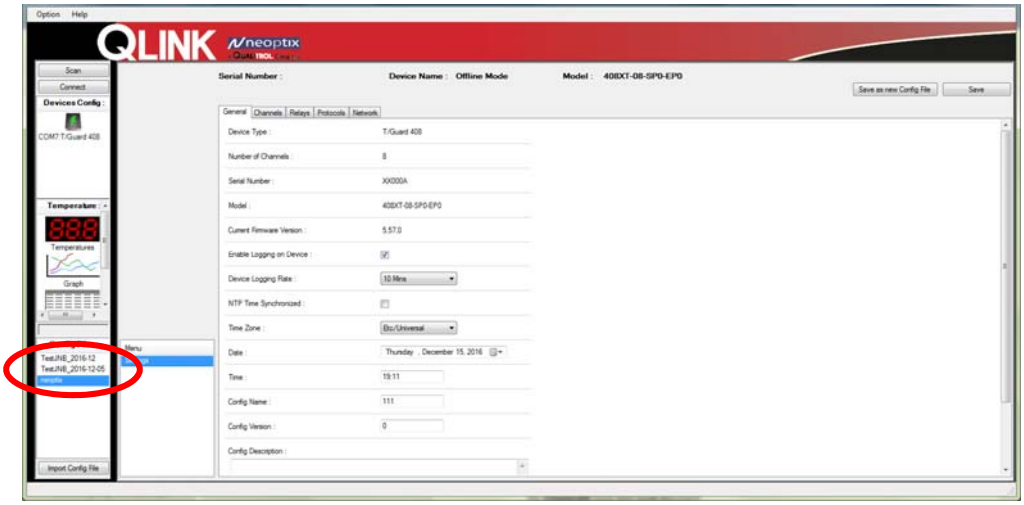
8.9 Signal Quality Information

This window is useful to display the "health" status of the optical probes connected to your instrument. This is show here. The information presented in this page is given to help you "debug" your probes; the information is updated in real-time.



8.10 Working on Configuration Files, with no Live Instrument

With QLink, it is possible to create or modify a configuration with no instrument connected to your PC (offline).



The best way to create a new configuration file is to first connect QLink to an instrument, and save its configuration to a file, such as “neoptix.cfg”; see section 8.7 for instructions on how to do this. Click on this file name “neoptix.cfg”, as illustrated above in the red circle. Then all parameters that are available for this configuration file are given in the main pane of this window; see section8.7 above for specific details on how to work a configuration. Once you are done with your configuration, you can either save it to the same file, or save it to a new configuration file (if you click “Save as New Config File”).

In order to be able to work on an existing configuration file, you must first import it to the directory where QLink normally stores this type of files, normally “My Documents\Qlink\Config_Files”. These import operations can be done by clicking “Import Config File”, found at the bottom left of the main window. It is possible to change this target directory from the “Preference” window (select “Option” and then “Preference” from the menu bar.

8.11 Troubleshooting

Here are some tricks you can try to fix any problems you may have with QLink, especially when starting the program:

1- Make sure the FTDI serial protocol software driver is installed correctly. See this website for more help:http://www.ftdichip.com/Support/Documents/AppNotes/AN_119_FTDI_Drivers_Installation_Guide_for_Windows7.pdf

2- Make sure the serial protocol on the is set to “Neoptix”.

3- Make sure the COM port is listed correctly in the Windows Device Manager. Check the port properties.

4- When trying to connect to an instrument, and if you get a message saying that you should upgrade the instrument firmware and you know very well that your firmware is up-to-date, then you should cancel the process, and try to connect again.

5- Try connecting to the port with a HyperTerminal client (or Tera Term) to see if it is responsive.

6- This version of QLink requires that the firmware version be 3.0 or above. If your firmware is older, consider upgrading it. Some functions could crash QLink if you try to use it with an older firmware version.

7- Try rebooting Windows.

8- Try re-installing your USB to serial port drivers on Windows.

9- When reinstalling QLink, you must first manually uninstall the current version; this can be done through the Programs and Features facility in Control Panel of Windows.

8.11.1 An example of status file

Here is an example of a typical status file. The content of this file gives an instantaneous “picture” of your Nomad-*Touch* system. When contacting Neoptix for support, try to email a copy of this file with your request.

```
Nomad Touch  -  Status Report
2015/03/23 08:32:51

Serial Number: NMT003B
Firmware version: 0.07
```

```
Hardware code: 1
Calibration date: 15/3/20
Up time: 0 day, 0 hour, 20 minutes, 26 seconds

----- Serial Interface -----
Baud rate: 9600
Parity: None
Stop bits: 2

----- Temperature Data Logging -----
Logging Enabled: yes
Logging rate: 120 seconds

List of files:
>temperatures.tem (446.304 KB)
Total: 1 files, 446.304 KB

----- Acquisition -----
Wtune: ON
Gskip: 5
Calibration type: Neoptix probe
Unit: Celsius

----- Offset Setting -----
0.0

----- Signal Quality -----
CH01: 100, ratio:2.35, lamp:160, CCD:100ms    (auto)    22.21 C

Snap Log Prefix Name List :
Probe   (active)
Channel
Transformer
Winding
Measurement
User01
User02
User03
User04
User05
User06
User07
User08
User09
User10
List end#
*

(Status Report end)
```

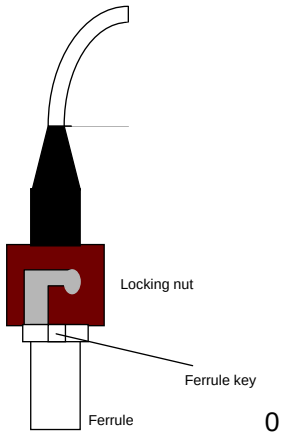
9 USING TEMPERATURE PROBES

9.1 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.

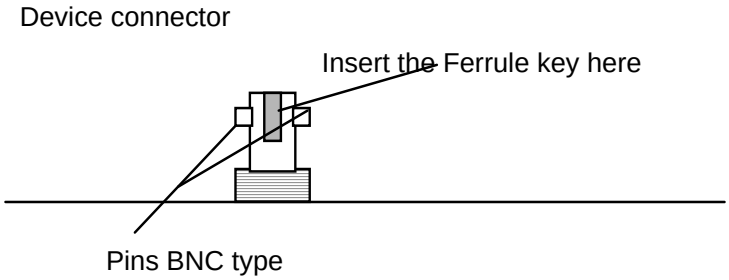
Occasionally, clean the inside of the bulkhead connector (attached to the thermometer) with a wipe or cotton swab dipped in alcohol (2.5 mm mini foam swabs work best).



For very dirty connectors, acetone can also be used, but should be used very carefully, as it is a very strong solvent. Care should be exercised so you do not apply any on plastic materials, etc.

9.2 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.

9.3 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.

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.

9.4 Working with cryogenic probes

The use of a cryogenic probe required 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 Nomad thermometer will require a special factory calibration to be used at cryogenic temperatures (below -80°C). Consult Neoptix for more information.

10 INDEX