

HW4 Instruction Manual

Overview.....	4
HW4 requirements.....	5
Connecting a single instrument to the PC.....	5
Connecting multiple instruments to the PC.....	9
RS232 or USB port.....	9
Ethernet Local Area Network.....	10
Automatic RS-485 address generation.....	10
Installing HW4.....	11
Installation step by step.....	11
Starting HW4 for the first time.....	14
Uninstalling HW4:.....	16
HW4 main screen overview.....	17
Left pane.....	18
Right pane with individual instrument selected.....	19
Current Values Tab.....	19
On-line Buffer Tab.....	21
Log to PC Tab.....	21
Start logging data to the PC.....	22
Stop logging data to the PC.....	24
Right pane with an instrument group selected.....	24
Main Screen Menu Bar.....	25
File.....	25
Devices and Groups.....	25
View.....	25
Settings and Tools.....	26
Help.....	26
Shortcut Buttons.....	27
Settings and Tools.....	28
HW4 Global Settings.....	28
View Tab.....	28
General Tab.....	30
Language/Unit System Tab.....	32
File Locations Tab.....	33
Graph Settings Tab.....	34
Events Tab.....	35
Users and Passwords (HW4 Professional).....	36
Psychrometric Conversion Tool.....	38
FDA / GAMP Compliance (HW4 Professional).....	39
Required settings and selections.....	39
Log Files.....	39
Event Files.....	40
HW4 events.....	40
User events.....	40
Logger events.....	40
Instrument configuration and programming protocols.....	41
Probe adjustment protocols.....	41
Cross referencing files.....	42
HygroLog NT - Functions.....	44
Device Manager.....	44
Device Manager Menu Bar.....	45
File.....	45
Settings.....	45
Data Logger Configuration.....	47
User Information.....	47
Device Information.....	48
Language / Unit System.....	49
Memory Card.....	50
Input.....	51

Display	52
LEDs	53
Keypad	54
Sounds	55
Power Source	56
Docking Station	57
Optional Input	57
Data Logging	58
Menu Bar	58
How to Log Data	59
Access Data	60
HW4 Explorer Overview	60
Menu Bar	62
Files located on the PC	63
Files located on the logger	64
HW4 View Data	66
HW4 View Data Menu Bar	66
HW4 View Data Toolbar	68
Graph Tab	68
Table Tab	71
Probe Adjustment	72
Overview	72
Menu Bar	72
Adjusting a probe	73
Probe Adjustment Basics	75
Temperature	75
Humidity	75
Calibration device	75
ROTRONIC certified humidity standards	76

Overview

The HW4 software was developed by ROTRONIC AG for use with the ROTRONIC line of digital instruments and devices. However, at this time HW4 can be used only with the data loggers of the HygroLog NT series. HW4 is available in two versions:

HW4 Standard Edition

HW4 Standard Edition is meant for single users and for a single instrument.

- On-line display of the measured and calculated values (dew point or other).
- Automatic retention of the most recent data in a temporary on-line buffer.
- Logging of measured and calculated values to the PC.
- Easy-to-read graphs and data tables.
- Statistical data tools: mean, standard deviation, minimum and maximum.
- Data print-out (table or graph)
- Automatic device/instrument recognition and identification
- Device/instrument configuration
- Access to the data recorded by a data logger and data transfer to the PC
- Adjustment (calibration) of the HygroClip digital probes
- Psychrometric Conversion Tool
- Built-in security to protect against data manipulation

HW4 Professional Edition

HW4 Professional Edition meets the FDA / GAMP requirements. This version of HW4 allows multiple users, with either administrator or standard rights and password protection. In the middle of 2004, near future, this version will permit the networking of up to 64 instruments, each with multiple probes.

- All the functionality of HW4 Edition
- Networking of an unlimited number of devices/instruments (depends on capabilities of PC)
- RS-485 multi-dropped sub-networks of up to 64 devices/instruments per sub-network
- User Event Logging: automatically records user main operations.
- Multiple users distributed into two groups: administrator and standard, each with different rights
- Self Event Logging: automatically records any software problem to facilitate troubleshooting
- Logger Event Logging: automatically records the data logger internal events and configuration changes.
- Automatic creation of protocols detailing instrument configuration and programming changes as well as and probe adjustments.
- Audit trail: monitors the life cycle of devices/instruments
- Password protected log-in
- Meets the requirements of FDA 21CFR Part II for electronic records and electronic signatures
- Meets the EU GMP requirements regarding pharmaceuticals.

In addition, the following functions will be available before the end of 2004 with HW4 Professional:

- Alarm functions monitoring the measured and calculated values
- Optical or acoustical indication of an alarm condition and possibility of sending an e-mail or SMS
- Automatic reading and archiving of log files

HW4 requirements

Computer/Operating System Requirements:

The following are the minimum values required to install and run HW4 on a computer. It is highly recommended to exceed these values.

- Processor: Pentium II, 450 MHz
- RAM: 128 MB
- Available hard disk space: 50 MB
- Monitor: SVGA, 1024 x 768, 256 colors
- Ports: one free serial (COM) port or one free USB port

Operating System Compatibility:

- Windows 98, XP, NT4 with SP 6a or higher
- Windows 2000 with SP 2 or higher
- Windows Server 2003

HW4 was written for the Microsoft .NET framework and requires this framework to be installed on the computer.

The .NET framework offers significant improvements in the areas of networking and user security. When new software is being installed, the .NET framework also eliminates the potential problem of conflicting dynamic library files (DLL). According to Microsoft, the .NET framework will be used by all future Microsoft operating systems.

Connecting a single instrument to the PC

All versions of HW4 are compatible with the following PC interfaces:

Serial port (COM 1 to COM 255)
USB port
Network Interface Adapter (Ethernet).

HW4 Standard Edition can be used with only one device (instrument or docking station) at a time. HW4 Professional Edition can communicate simultaneously with several devices using any combination of the above mentioned PC interfaces.

- **Serial connection:** connect the device directly to an available COM port on the PC. No driver needs to be installed. When started, HW4 will automatically detect the device.
- **Ethernet connection:** connect the instrument or docking station directly to an available Ethernet port (RJ45) or to the Network Adapter Card on the PC. No driver needs to be installed. When started, HW4 will automatically detect the instrument.
- **USB connection:** prior to running HW4, connect the device directly to an available USB port on the PC. The PC will automatically detect the USB connection and ask for a driver to be installed. The HW4 CD-ROM includes the required driver (see instructions below).

Note: USB connections are akin to a network. Each device with USB port is identified by its VID number. Each time that you use a different ROTRONIC USB device, you will be asked to install the corresponding USB driver, even if you have already done so for an identical device.

Installing the HW4 USB driver

Do not run HW4 when installing the USB driver on the PC.

The following example shows how to create a USB connection with Windows XP.

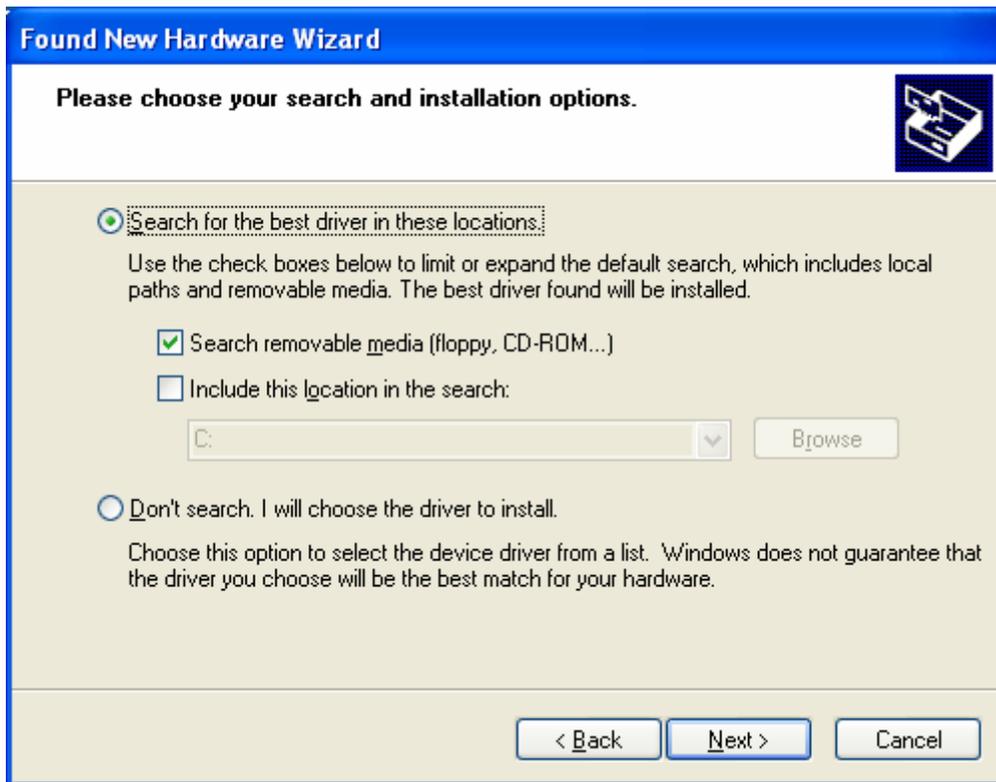
1. Prior to connecting the device to the PC, insert the HW4 CD-ROM in any available PC drive. The HW4 installation screen starts automatically. Exit this screen.
2. Connect the instrument to any available USB port. Upon detecting the presence of a device connected to the USB port, Windows XP automatically starts the following wizard:



If you have not already installed the HW4 USB driver, select “Install from a list or specific location” and click on Next.

If you have already installed the HW4 USB driver and are simply connecting a different ROTRONIC USB device, select “Install the software automatically”

3. Select "Search for the best driver in these locations". Note that at this time the HW4 CD_ROM should have been already inserted in the PC.

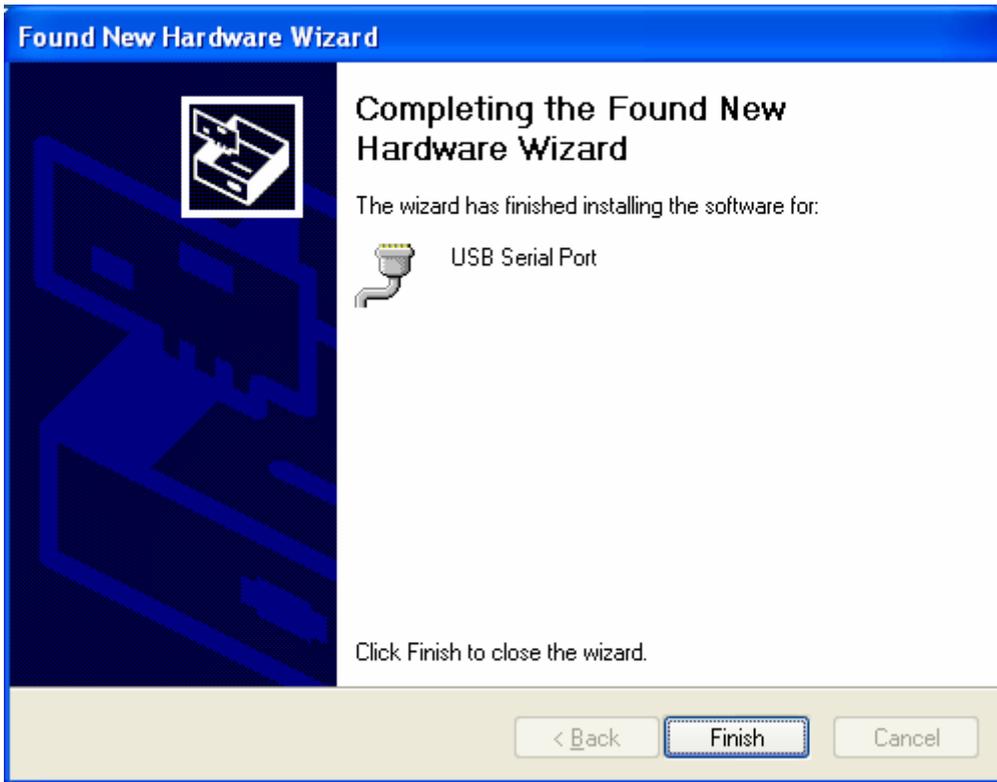


Click on Next

4. You will receive the following warning. Disregard this warning and click on "Continue anyway".



5. Windows will copy the USB driver located on the HW4 CD-ROM and display the following message when done:



Click on "Finish" to complete the process.

HW4 will automatically detect the instrument upon start-up.

Note: If your device has only a serial port and the PC has no COM port, you may want to install a USB Serial Adapter on one of the PC USB ports. Install the driver supplied with the USB serial adapter (not the driver supplied with HW4) and connect the device to this adapter.

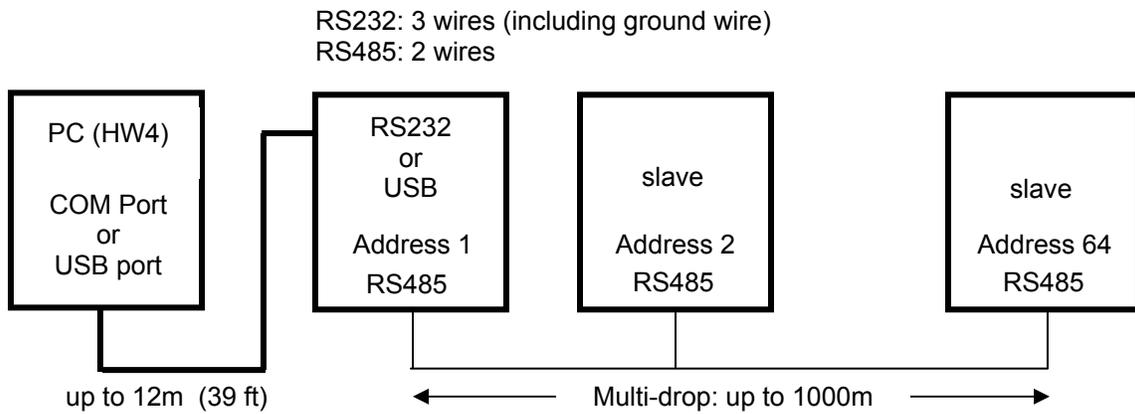
Connecting multiple instruments to the PC

Note: the following applies only to HW4 Professional Edition.

RS232 or USB port

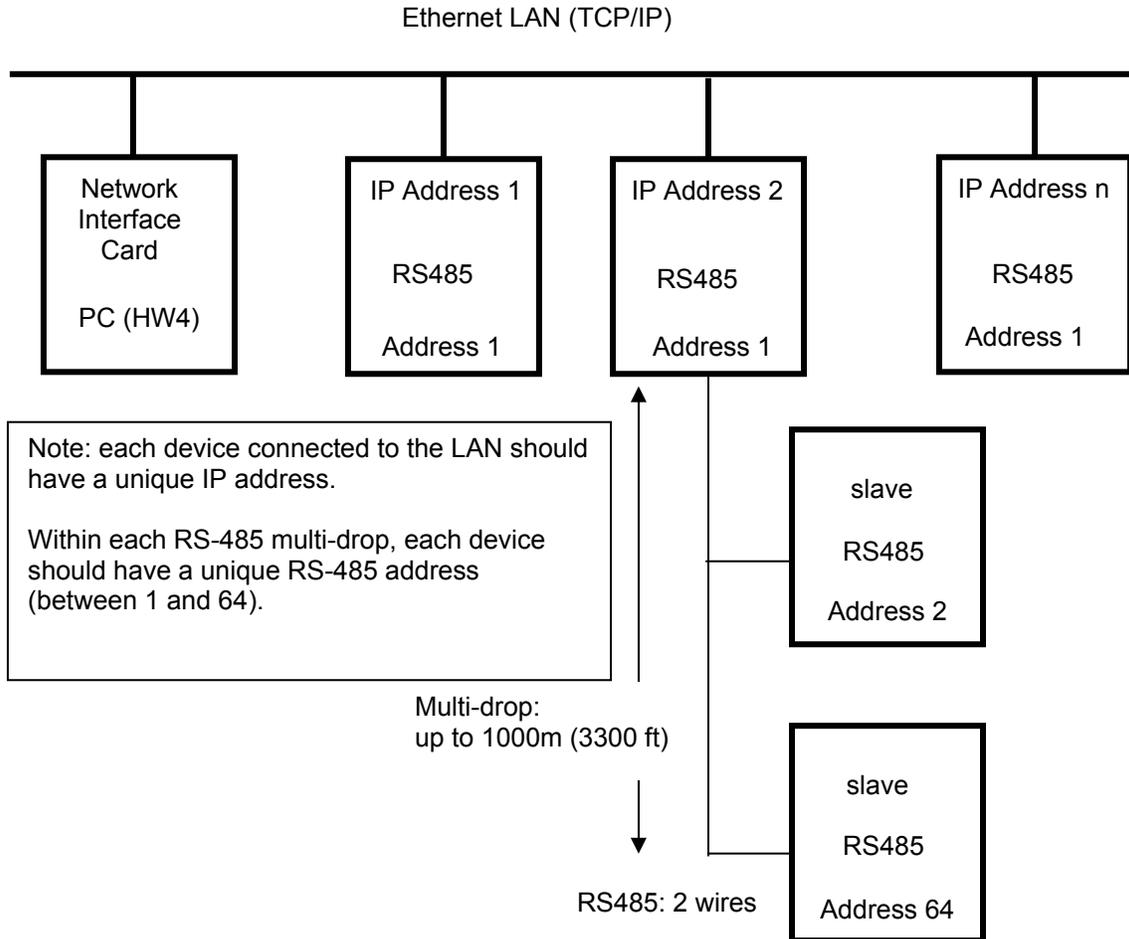
The number of devices that can be directly connected to a PC depends on the number of physical serial and USB ports available on the PC.

To overcome this limitation, one or several RS-485 multi-dropped networks can be used to connect up to 64 devices to each RS-232 or USB port.



Ethernet Local Area Network

In principle, using a Local Area Network (or a remote network by way of the Internet) allows an unlimited number of devices to be individually connected. One or several RS-485 sub-networks can also be used in conjunction with an Ethernet connection as illustrated below.



Automatic RS-485 address generation

Devices compatible with HW4 have an internal RS-485 address. This address is used to identify each device in the case of a multi-dropped RS-485 network. The RS-485 address is part of the communications protocol used by HW4 and is always included in the command sent to a device and in the device response.

The factory default for the RS-485 is 00. HW4 automatically changes the RS-485 address from 00 to 01 of any new device that is detected as being directly connected to the PC (master). As a result, all masters have the same RS-485 network address (01). In the situation where a multi-drop RS-485 network is also detected, HW4 automatically gives each slave within the multi-drop a unique network address ranging from 02 to 64. The same address range (02 to 64) is used again when there is more than one multi-drop RS485 network.

IMPORTANT:

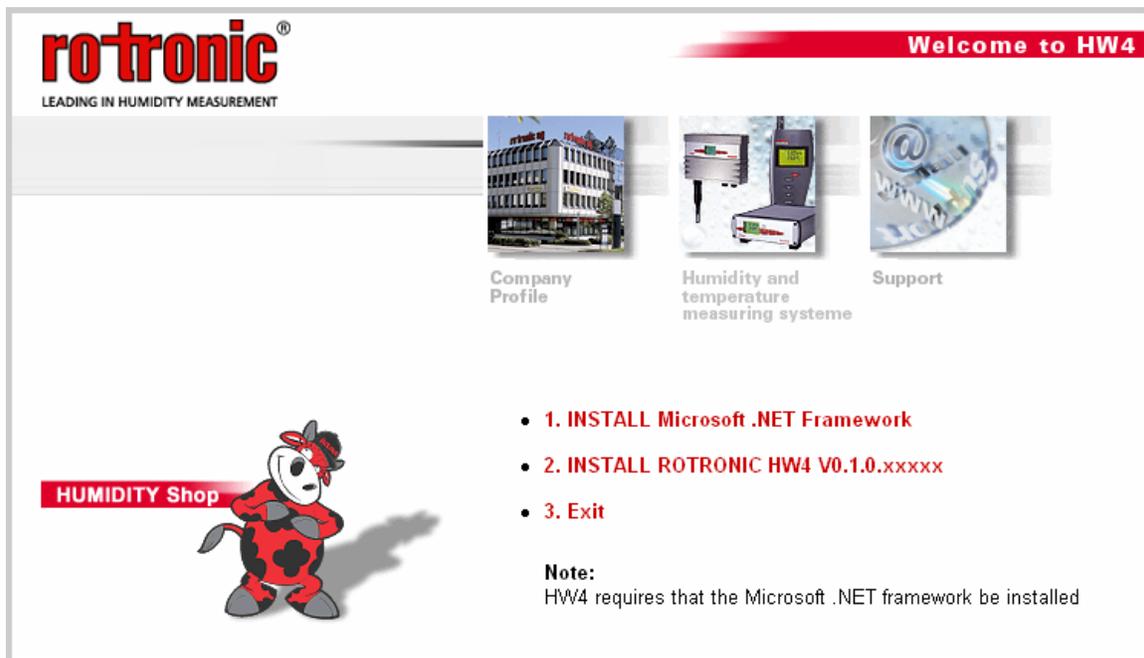
If you change an instrument that was previously connected from a master (direct connection the PC or direct Ethernet connection) to an RS-485 slave, be sure to change the RS address of the instrument to 00 before establishing the RS-485 connection (same address as a new instrument from the factory). Not doing so may prevent HW4 from detecting the instrument. After detecting the instrument, HW4 will automatically change the RS address to 02 or higher.

In all other situations, do not use address 00 as this address number will eventually be changed by HW4.

Installing HW4

Installation step by step

Insert the HW4 CD-ROM into the CD drive or your PC. The installation program should start automatically. If the installation program does not start, use My Computer in Windows to open the CD drive and double click on the file start.exe located in the root directory of the CD.

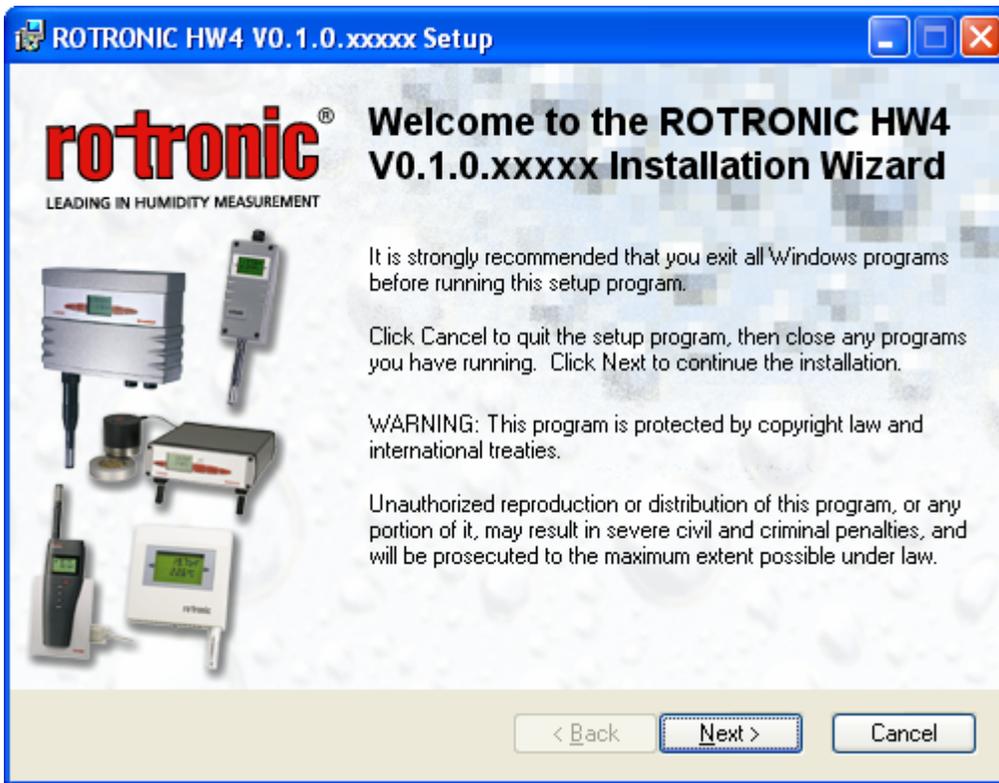


IMPORTANT: HW4 operates together with Microsoft .NET Framework. If the Microsoft .NET Framework is not already installed on your PC, please click with the mouse on step 1 to install it.

Note: save your work and close all open files because the computer will have to restart to complete the installation process.

After installing the Microsoft .NET Framework, click on step 2 with the mouse to install HW4.

Installation begins with the following form:



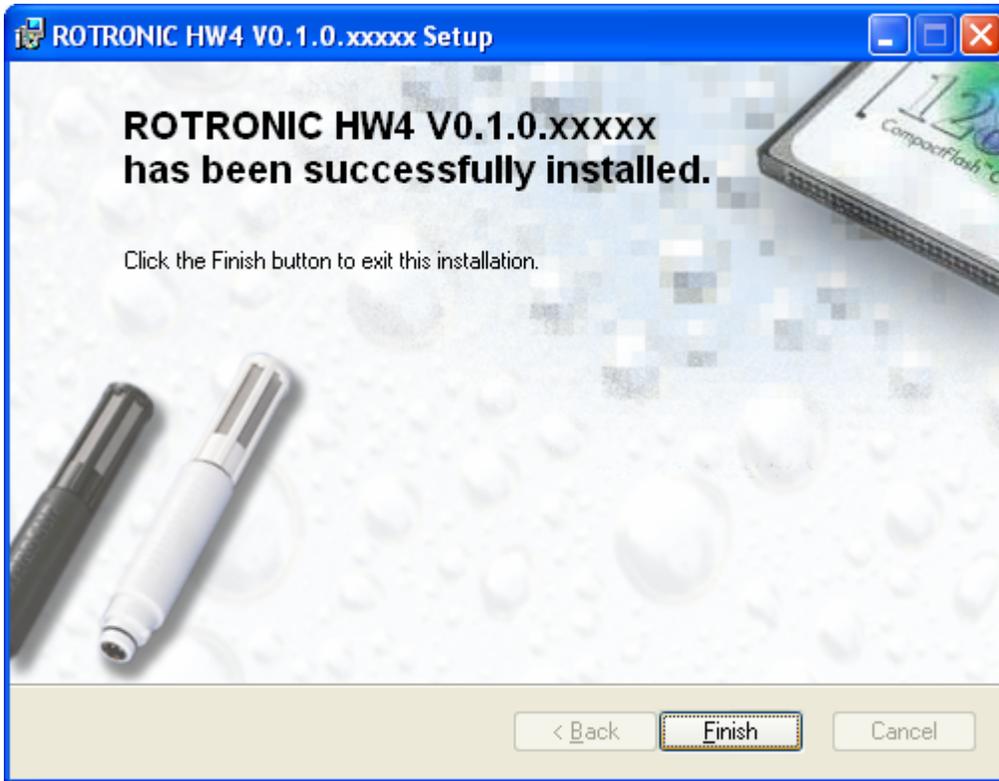
Click on the NEXT button to move through the different installation steps and follow the instructions provided on the screen.

The default installation directory is C:\Program Files\HW4 and can be changed during installation.

In Windows XP, the following items are automatically created during installation:

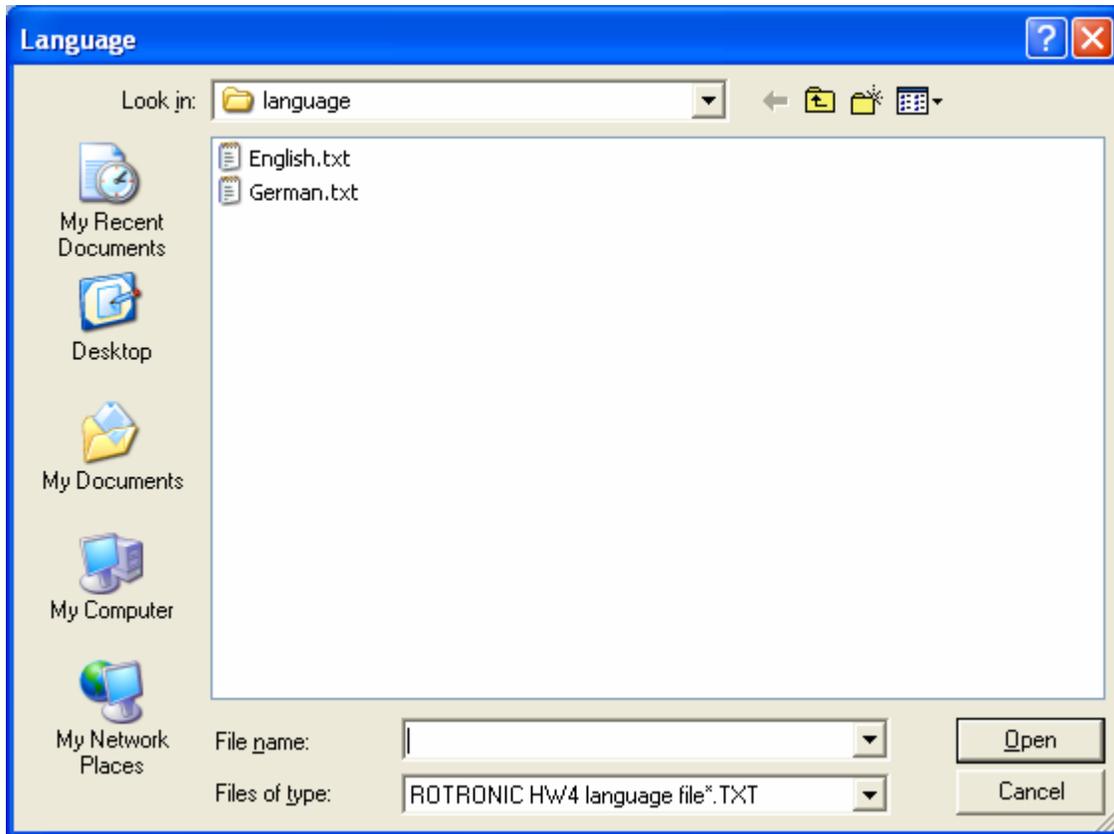
- HW4 shortcut (on the desktop)
- Rotronic_HW4 folder under C:\Documents and Settings\XXXX\Application Data, where XXXX is your user name

When installation is complete, the following screen should appear:



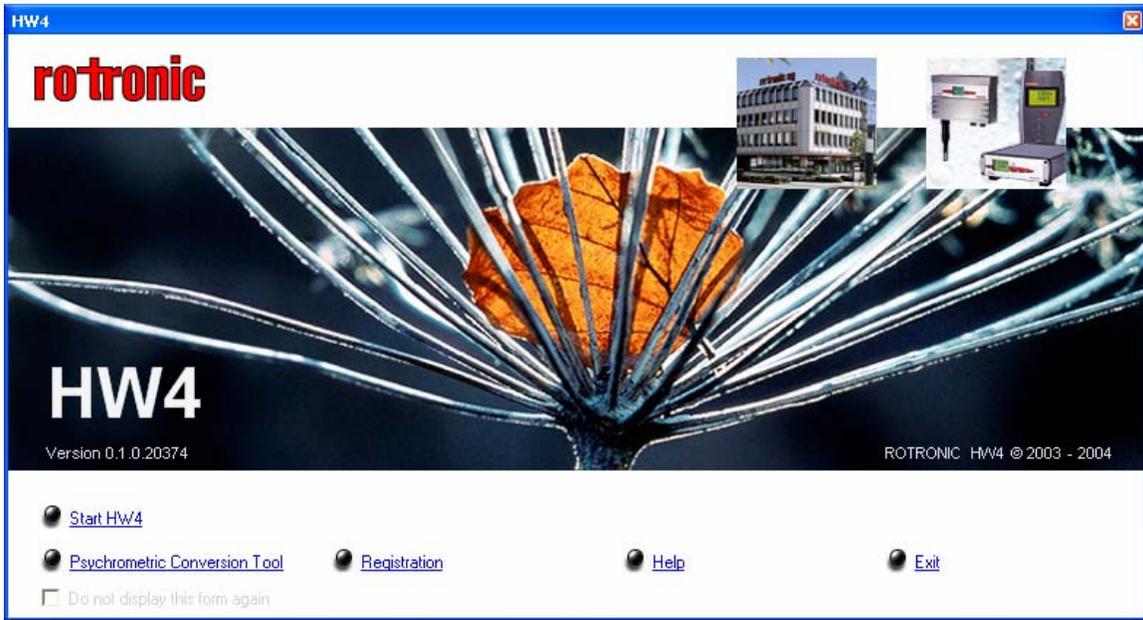
Starting HW4 for the first time

To start using HW4, click on the HW4 shortcut created on your desktop by the installation program. When HW4 is used for the first time, the following form should open:



This form lists the different language files available within HW4. Use the mouse to highlight the desired language and click on Open.

The next form is the HW4 start-up form:

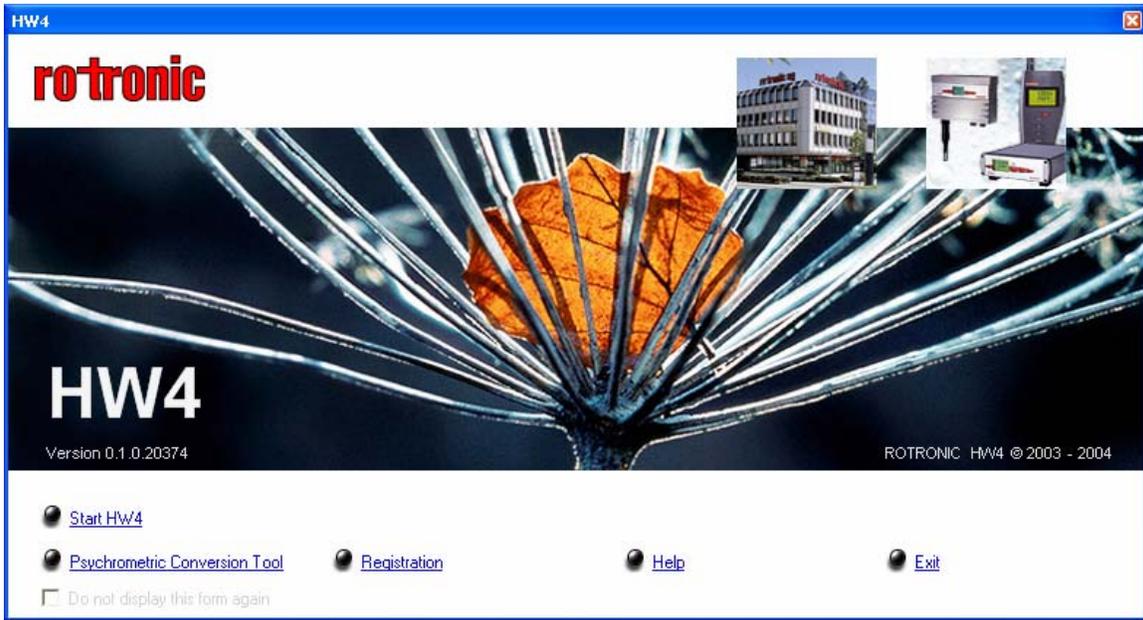


First Time Users: HW4 requires you to register and you should now click with the mouse on the underlined Registration link. This opens the following form:

Enter the HW4 product key, which is printed on a sticker affixed to the protective cover of the HW4 CD. Fill in the required information. If the box Register on-line is checked, clicking on Continue will connect you to the ROTRONIC web site, where your registration data will be automatically entered. If you do not have an internet connection, uncheck the Register on-line box and click on Continue.

Registering on-line offers benefits such as free updates / patches and product information.

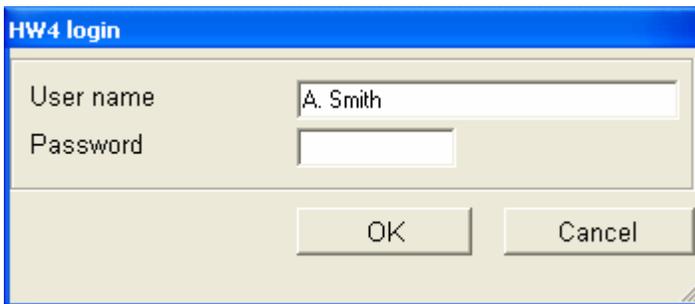
Upon completing the registration, HW4 returns to the Start-up Screen.



IMPORTANT: prior to starting HW4, you should connect at least one instrument to your computer.

With at least one instrument connected to your computer, click on the underlined link Start HW4 to open the HW4 Main Screen.

IMPORTANT: if you are using HW4 Professional, you should create at least one user with password in order to comply with the FDA / GAMP requirements. See, Main Screen Menu Bar, Users and passwords. Once the first user has been created, you will need to log in each time that you open HW4.



Uninstalling HW4:

To properly uninstall HW4 and remove its main components, you should click on Start in Windows and open the Control Panel. Select Add or Remove Programs. ROTRONIC HW4 should be listed as one of the installed programs. Select ROTRONIC HW4 and click on the Remove button.

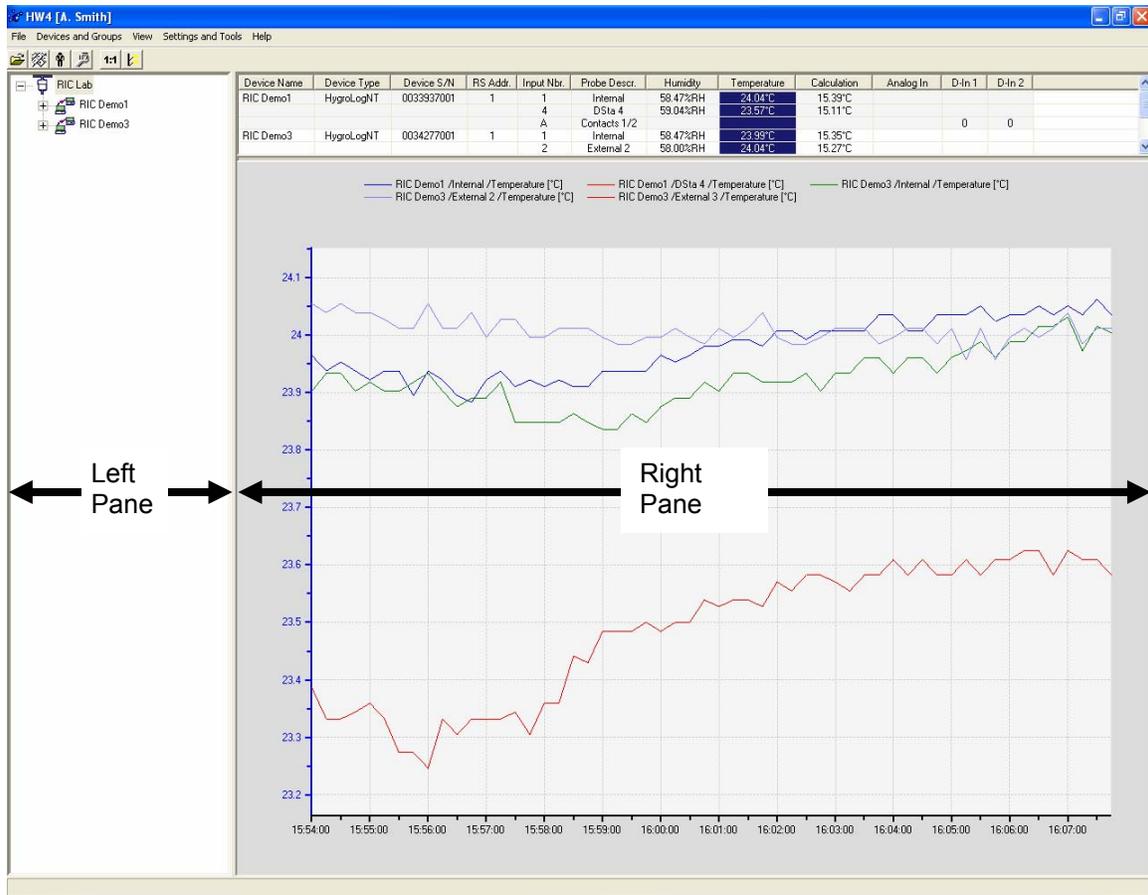
To complete uninstall: go to C:\Documents and Settings\XXXX\Application Data, where XXXX is your Windows login name, and delete the ROTRONIC_HW4 folder.

IMPORTANT: Not following this procedure may result in problems if HW4 is installed again.

HW4 main screen overview

The HW4 main screen depends on which HW4 version was purchased. The following description applies to the Professional edition which has more menu items and screens than the standard edition.

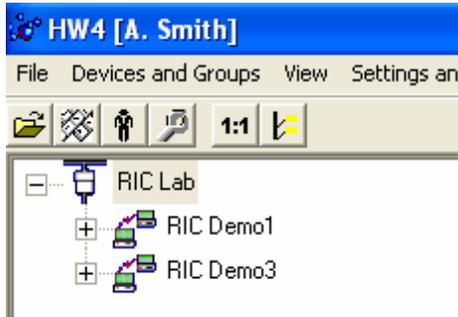
The HW4 main screen is subdivided into two panes. To adjust the width of a pane, bring the mouse cursor over the vertical edge separating the two panes. When the mouse cursor changes, left click, hold and drag to the desired location.



The HW4 main screen can be customized. For details, see Settings and Tools, HW4 Settings.

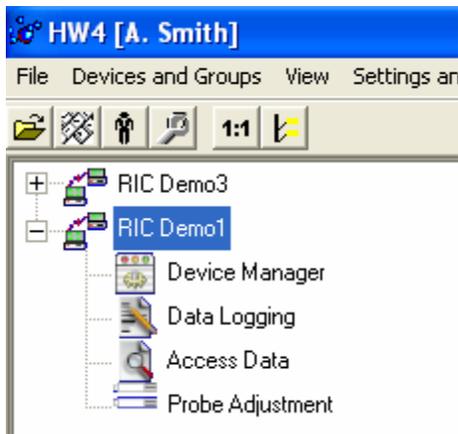
Left pane

The left pane displays a tree listing the instruments detected by the PC. HW4 can display each individual instrument or it can display instrument distributed in groups defined by the user.



HW4 allows the creation of groups of instruments. When one or more groups of instruments have been defined by the user (example RIC Lab), the left pane displays a tree listing the groups and the instruments within each group (example RIC Demo1, RIC Demo2).

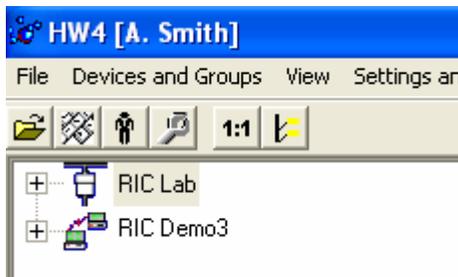
The functions available for each instrument are also shown when the tree is expanded. These functions are specific of each type of instrument. To select a group, an instrument or a function, click on it with the left mouse button.



When no group has been defined, each individual instrument is displayed in the left pane.

The functions available for each instrument are also shown when the tree is expanded. These functions are specific of each type of instrument.

To select an instrument or a function, click on it with the left mouse button.

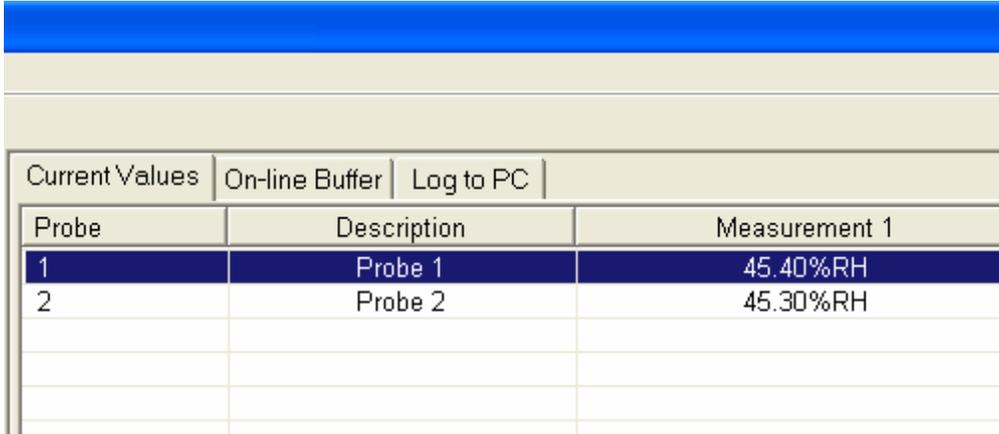


The left pane can also display one or several groups of instruments as well as individual instruments that are not part of a group.

Note: instruments appear in the tree regardless of the manner in which they are connected to the PC (direct connection with RS-232 or USB, Ethernet connection or RS-485 multi-dropped network).

Right pane with individual instrument selected

When an individual instrument is selected in the left pane, the top portion of the right pane features 3 tabs: Current Values, On-line Buffer and Log to PC. To select a tab, click on the corresponding label with the mouse left button.



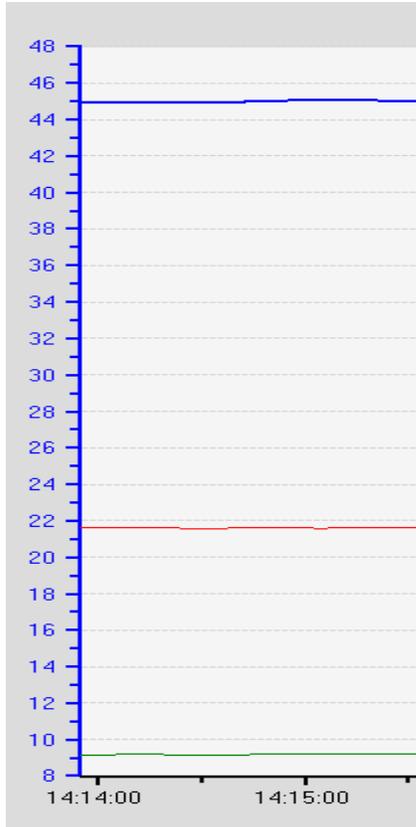
Current Values	On-line Buffer	Log to PC
Probe	Description	Measurement 1
1	Probe 1	45.40%RH
2	Probe 2	45.30%RH

Current Values Tab

When this tab is selected, the top of the right pane displays a table of the most recent value of the measured and calculated parameters. The values are constantly updated. The table shows data from each probe connected to the instrument, using one line per probe.

Probe	Description	Measurement 1
1	Probe 1	45.40%RH
2	Probe 2	45.30%RH

By default, the bottom of the right pane displays data in graphic form. The graph is constantly updated as new data is being received and retained in the on-line buffer. The scale of the graph is automatically selected by HW4.



The following selections can be made with the mouse:

- To display all the parameters associated with a probe; left click on the desired probe number in the table located above the graph.
- To display only one probe parameter at a time, left click on the desired parameter in the table.
- To display only one parameter for all probes, left click on the header of the parameter.

If so desired, the graph can be hidden so as to provide more room for the probe data table.

To adjust the height of the data table and the height of the graph, bring the mouse cursor over the horizontal edge separating the graph and the table. When the symbol appears, left click, hold and drag to the desired location.



Click on this button to show or hide the Data Cursor on the graph. The Data Cursor displays numerical data from the graph. Move the mouse cursor to any location in the graph. Click to make the Data Cursor jump to that location. Bring the mouse cursor to the left or to the right of the graph. The Data Cursor moves with each mouse click.

To zoom in: left click with the mouse and hold to draw a rectangle in the graph. Click on the 1:1 button to restore the graph to its original scale.

On-line Buffer Tab

When this tab is selected, the right pane changes into a table that shows the most recent historical data, one probe at a time. The number of lines in the table depends on how many data points are retained by the PC (this can be specified in HW4 Global Settings). The probe to be displayed is selected from the text box located on top of the data table (left click on the arrow to the right of the box to display a list of the probes available with the selected instrument).

When the table is full, the oldest data are dumped from the bottom of the table as the most recent data is added to the top of the table. The graph located on the Current Values Tab is based on the content of the on-line buffer table.

Current Values On-line Buffer Log to PC				
Probe 1				
Date	Time	Humidity %RH	Temperature °C	Calculation [Dp] °C
11/12/2003	14:41:35	44.84	21.61	9.1297
11/12/2003	14:41:25	44.80	21.61	9.1181
11/12/2003	14:41:15	44.80	21.61	9.1181
11/12/2003	14:41:05	44.82	21.61	9.1259
11/12/2003	14:40:55	44.88	21.63	9.1594
11/12/2003	14:40:45	44.89	21.66	9.1881

Note: the contents of the on-line buffer are lost upon exiting HW4.

Log to PC Tab

This tab is used to record data on the PC. The log interval and the logging mode (for example one file per day) are entered from within this tab. The data file name, its path, and the type of the file (protected or unprotected) are also entered here. When the instrument selected in the left frame has several probes (or inputs), data from more than one probe / input can be recorded simultaneously using a different file for each individual probe / input.

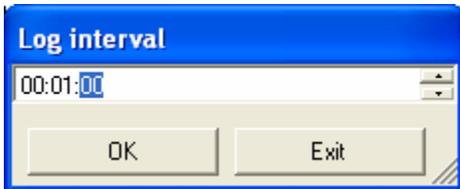
Current Values On-line Buffer Log to PC					
Probe	Description	Log Interv...	Log File	File	File location
<input type="checkbox"/> 1	Internal	00:01:00	Loop mode		
<input type="checkbox"/> 2	not connected	00:00:15	Loop mode		
<input type="checkbox"/> 3	not connected	00:00:15	Loop mode		

Start logging data to the PC

1. Click on the field "Log Interval" in the line corresponding to the probe. The following dialog box opens.

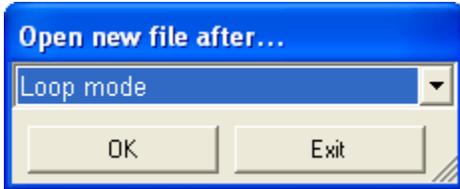


Click on the hours, minutes or seconds to highlight. In the following example, the seconds are highlighted. At this time, click on either the up or the down arrow to the right of the box to change the value.



Click on OK when done.

2. Click on the field "Log File" in the line corresponding to the probe. The following dialog box opens.

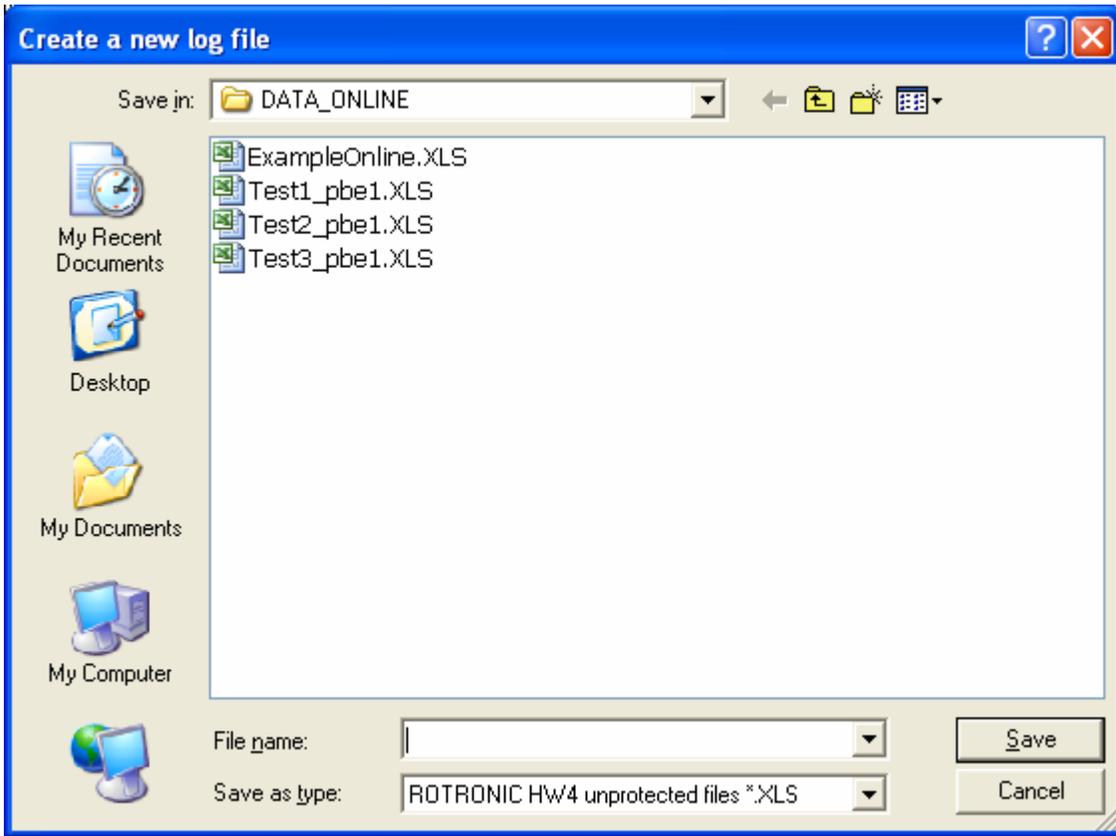


Click on the arrow to the right of the box to display a pull down menu of the available log modes:

- . Loop mode: log file of unlimited size (must be closed manually)
- . Every hour: the log file will be closed an hour after the beginning of recording. **)
- . Every day: the log file will be closed a day after the start of recording. **)
- . Every week: the log file will be closed a week after the start of recording. **)
- . Every month: the log file will be closed a month after the start of recording. **)

**) After closing the file, HW4 automatically starts a new file. The name of the new file is automatically generated by HW4 by appending a 3-digit number to the original file name.

3. To start logging, click on the box located to the left of the line corresponding to the probe. The following box opens:



Enter the file name and select the file type: XLS for an unprotected data file or LOG for a protected (binary encoded) data file that meets FDA / GAMP requirements.

Note: if you attempt to use the name of an open or active file (logging in progress), you will get a warning from HW4.

Unprotected files (XLS) are not verified when they are opened with HW4. These files can also be opened and altered with an editor or with Microsoft Excel. Protected files (LOG) can be opened with HW4 but not with an editor or with Microsoft Excel. When opening a protected file, HW4 verifies that the file has not been tampered with. Note that protected binary files use less disk space than unprotected files.

When logging is active, a check mark appears in the box corresponding to the probe or probes.

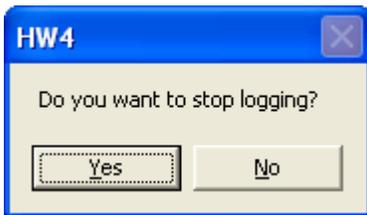
Probe	Description	Log Interv...	Log File	File	File location
<input checked="" type="checkbox"/> 1	Internal	00:00:05	Every hour	Test2_pbe1.XLS	C:\Documents and Settings\J
<input type="checkbox"/> 2	not connected	00:00:15	Loop mode		
<input type="checkbox"/> 3	not connected	00:00:15	Loop mode		
<input type="checkbox"/> 4	not connected	00:00:15	Loop mode		
<input type="checkbox"/> 5	not connected	00:00:15	Loop mode		

A diskette symbol also appears to the left of the probe in the Current Values tab.

Probe	Description	Measurement 1	Measurement 2	Calculati
 1	Internal	20.59%RH -	22.63°C =	Dp-1.0607

Stop logging data to the PC

In the Log to PC tab, click on the line corresponding to the probe. The following dialog box opens:



Click on Yes.

Note: if you attempt to exit HW4 while Log to PC is active, you will get a warning from HW4.

Right pane with an instrument group selected

This view is available only with HW4 Professional Edition when one or several groups of instruments have been created by the user.

When a group of instruments is selected in the left pane, the top portion of the pane shows data from the instruments in the group.

Device Name	Device Type	Device S/N	RS Addr.	Input Nbr.	Probe Descr.	Humidity	Temperature
RIC Demo1	HygroLogNT	0033937001	1	1	Internal	47.23%RH	23.34°C
				4	DSta 4	46.31%RH	23.30°C
				A	Contacts 1/2		
RIC Demo3	HygroLogNT	0034277001	0	1	Internal	47.86%RH	22.93°C
				2	External 2	47.94%RH	22.92°C

To select the fields to be displayed (column headers), click on View in the main screen menu bar and click on Field Selection (Group). Click and drag a column header with the mouse to change in which order fields are being displayed.

Click on the header of a data field (such as Humidity) to display data in graphic form for all instruments and probes in the group. The graph is constantly updated as new data is being received and retained in the on-line buffer. The scale of the graph is automatically selected by HW4.

Main Screen Menu Bar

The main menu bar is located at the top of the HW4 main screen.

File

- **Open** open any file present on the PC
- **Exit** exits HW4

Note: if you attempt to exit HW4 while Log to PC is active, you will get a warning from HW4.

Devices and Groups (HW4 Professional)

Note: the instruments listed in the left pane tree can be grouped together so as to make the tree easier to read and to manage. Instruments do not have to be connected to the same port in order to be put in the same group.

- Search for Masters: HW4 searches for devices directly connected to the PC or Ethernet
- Search for RS-485 Slaves: HW4 searches for RS-485 multi-dropped networks
- Search for All
- Add Group: creates a new empty group of instruments in the left pane tree (see below)
- Delete Group
- Delete Device: deletes a device from the left pane tree. Use this menu item after device has been disconnected

Renaming a group

After creating a group, the group can be renamed. To do this, right click on the group and select Rename Group.

Adding an instrument to a group

To add an instrument to a group, left click on the instrument and drag it on top of the group. Instruments within a group are displayed in the reverse order in which they were added to the group.

Removing an instrument from a group

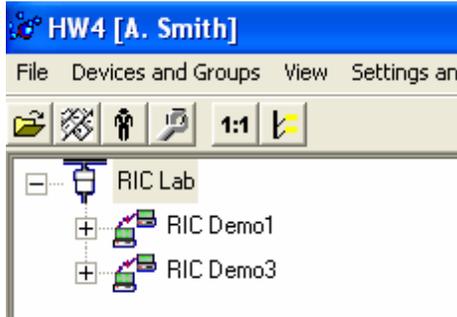
To remove an instrument from a group, left click on the instrument and drag it outside of the group.

View

- Field Selection (Group) - selects the fields to be displayed in Group view (right pane)
- Expand All - expands all items in the tree (left pane)
- Collapse All - collapse all items in the tree (left pane)
- Device Name - show the device name in the tree (left pane)
- Device Type - show the device type in the tree (left pane)
- RS Address - show the device port / IP address and RS-485 address in the tree (left pane)
- Device Serial Number - show the device serial number in the tree (left pane)

Example:

View Device Name



The instrument named RIC Demo1 has the RS address 01 and is connected to a USB port of the PC. The instrument named RIC Demo3 is connected by RS-485 to RIC Demo1 and has the RS address 02.

In the first picture, both instruments are identified by their name.

In the second picture, the tree on the left shows the same two instruments identified by their RS address:

View RS Address



USB 0 [1]
RS485 Slave [2]

Settings and Tools

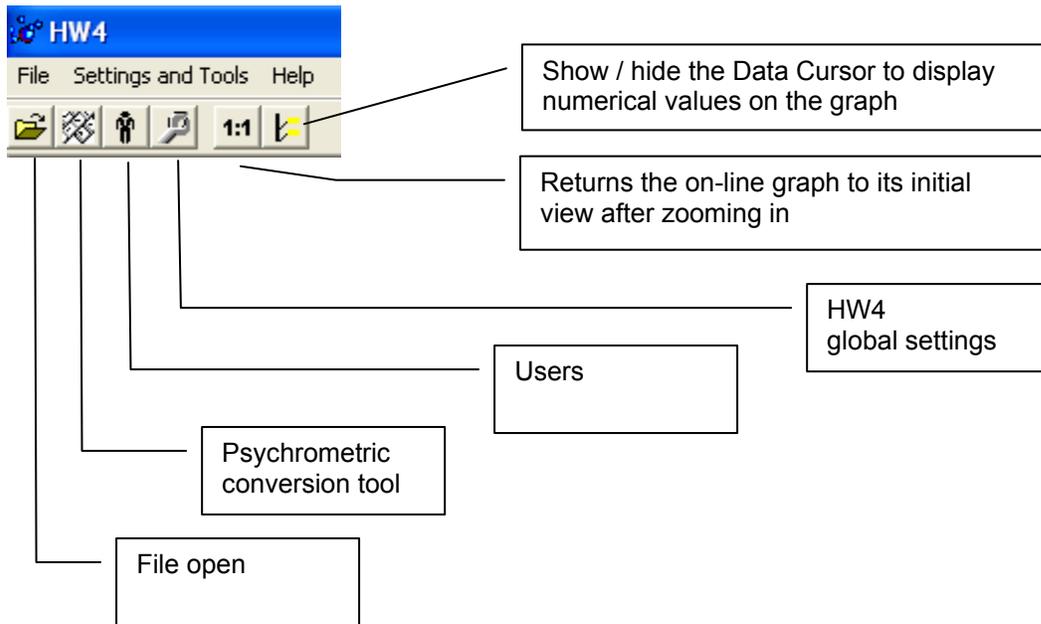
- HW4 Global Settings
- Users and Passwords **)
- Most recent user events **)
- Psychrometric Conversion Tool

**) available only with HW4 Professional

Help

- **HW4 Help:** Opens HW4 Help
- **On-line Services:** When an internet connection is available, this menu item accesses the ROTRONIC web site where technical support, updates and product information are available.
- **About HW4:** Displays the version number and ID number of HW4

Shortcut Buttons



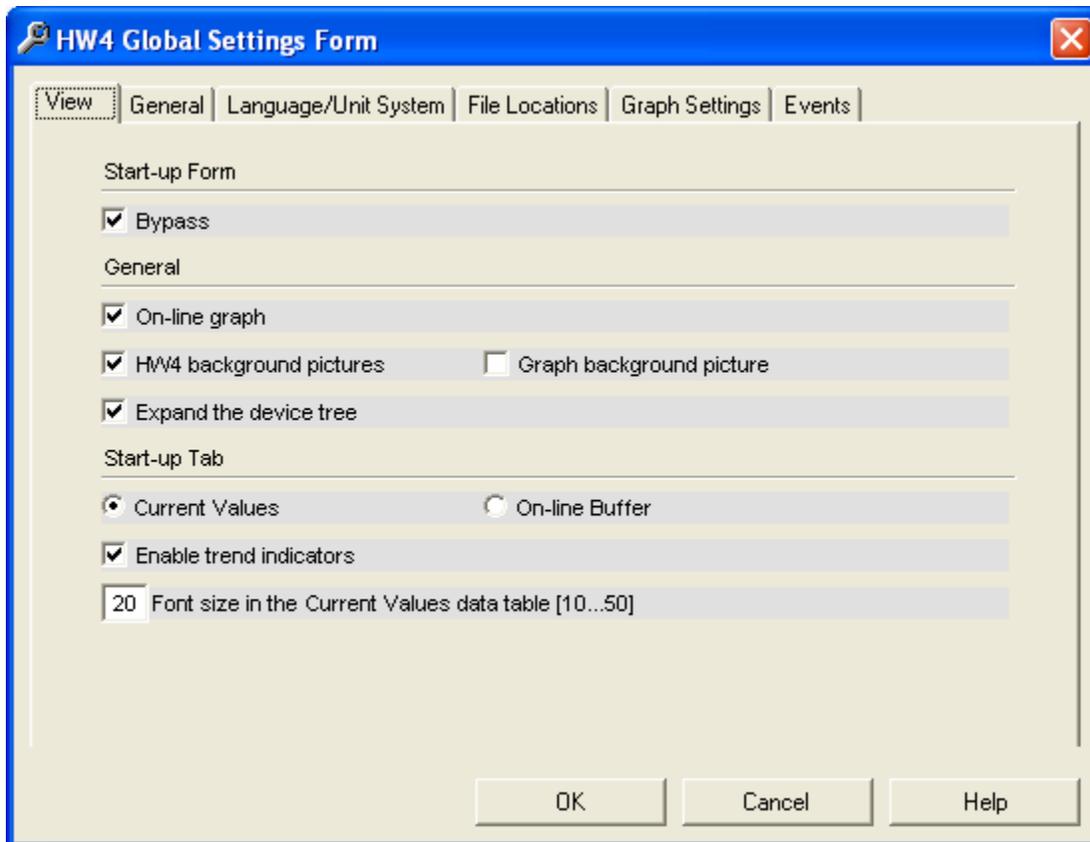
Settings and Tools

Settings and tools are accessed from the HW4 main menu bar.

HW4 Global Settings

This menu item opens the HW4 Global Settings Form.

View Tab



Start-up Form:

- Bypass: display or bypass the HW4 start-up form (log-in with password is still required)

General:

- On-line graph: shows or hide the graph in the Current Values tab
- HW4 background pictures: select or deselect to modify the appearance of several forms used in Device Manager, HW4 Explorer, etc.
- Graph background picture: select or deselect to modify the appearance of all graphs
- Expand the device tree: this box has an effect only when the tree displays at least 3 devices. When this box is checked, HW4 expands each device in the tree to display the device functions. With a large number of devices, you may want to uncheck this box to shorten the tree. The device functions can still be seen by clicking on the + sign located to the left of each device in the tree.

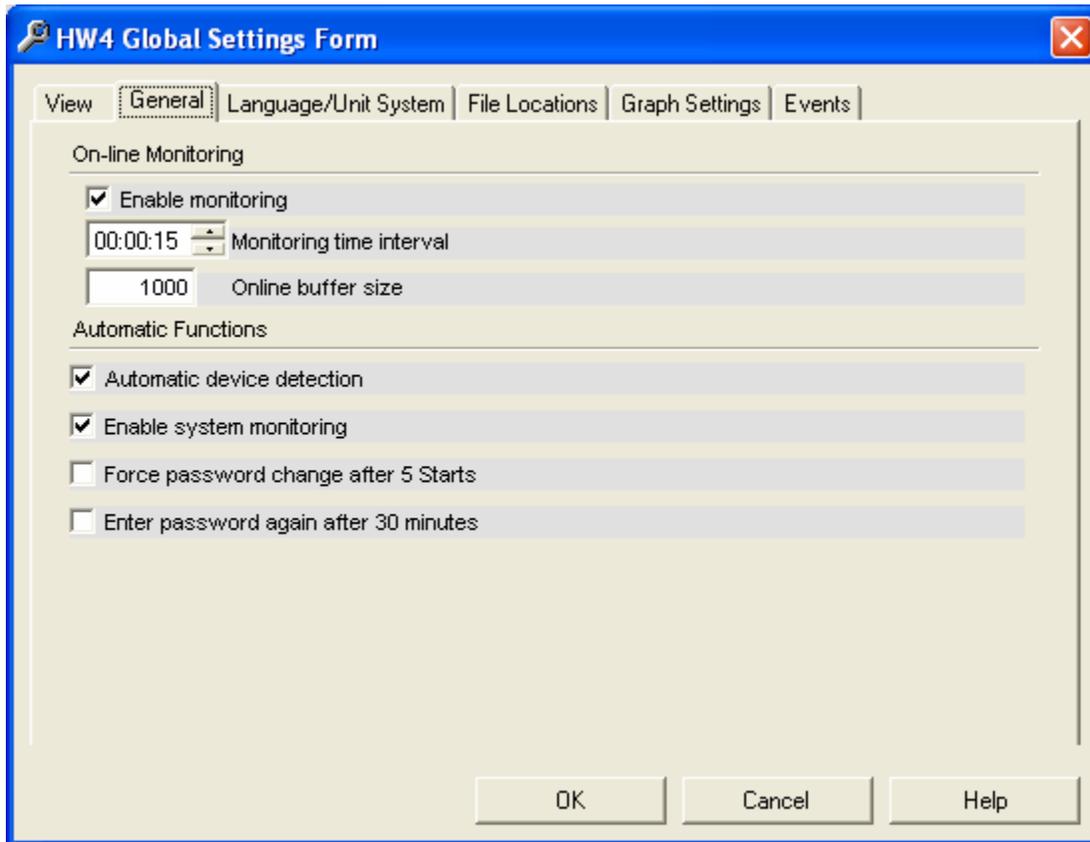
Start-up Tab:

- Current Values / On-line Buffer: select the desired default tab for the right pane of the HW4 main screen
- Trend Indicators: HW4 can display to the right of each current value an indicator that shows if the value is stable (equal symbol), increasing (up arrow) or decreasing (down arrow). The status of this indicator is read by HW4 directly from the device/instrument being monitored.
- Font Size in the Current Values data table: the default value is value 10. Use a value of 20 or larger to make it easier to read the PC monitor from a distance. Use the mouse to resize each column of the data table as required.

Probe	Description	Measurement 1
1	Probe 1	45.40%RH
2	Probe 2	45.30%RH

Probe	Description	Measurement 1
1	Probe 1	45.60%RH
2	Probe 2	46.29%RH

General Tab



On-line Monitoring:

- Check the box “enable monitoring” to have HW4 read data from the instruments present in the devices tree at regular intervals of time as specified under “Monitoring time interval”. This data is used to populate the right pane of the HW4 main screen (Current Values and On-line buffer). If you are just configuring or programming a single instrument, you may want to uncheck this box. HW4 will stop monitoring the devices in the tree and the right pane of the HW4 main screen will be blank.
- Monitoring time interval: specify here the time interval used by HW4 to read data from the instruments present in the device tree. The minimum value for the time interval is 5 seconds. Both the on-line buffer and on-line graph are updated based on this time interval. This time interval has no effect on the different logging functions (log to logger and log to PC).

Note: the value of the monitoring time interval does affect the lifetime of the HygroLog NT battery. Avoid using a short time interval unless the HygroLog NT is powered with an external AC adapter.

- On-line buffer size: specify here the number of lines for the on-line buffer. The size of the on-line buffer also determines the amount of data shown in the on-line graph.

Automatic Functions:

- Automatic device detection: by default, HW4 automatically refreshes the device tree when starting-up. With a large number of instruments, and when there has been no change to the instruments since the last HW4 session, you may want to save time at start-up by disabling this feature.
- Enable system monitoring: check this box to have HW4 keep a record of any software problem that may occur. Keeping this type of record is an FDA / GAMP requirement. HW4 event files have the extension ERR and are usually located in the folder C:\Documents and Settings\your Windows login name\Application Data\ROTRONIC_HW4\EVENT. When support is required from ROTRONIC, troubleshooting the problem is greatly facilitated when the corresponding HW4 event file is available.
- Force password change: this feature is only available with HW4 Professional. Enable this feature to force users to change their password on a regular basis.
- Enter password again after ...: this feature is only available with HW4 Professional. Enable this feature to force users to enter their password again after the time indicated. This is an FDA / GAMP requirement which provides additional protection in the event that HW4 is running and left unattended for a period of time.

Language/Unit System Tab

The screenshot shows the 'HW4 Global Settings Form' with the 'Language/Unit System' tab selected. The form is divided into several sections: 'Language' with a link to 'English'; 'Unit System' with dropdown menus for Humidity (%), Temperature (Celsius), Pressure (hPa), Enthalpy (kJ/kg), Density per volume (g/m³), Density per weight (g/kg), and Elevation (ref. sea level) (m). To the right of these dropdowns are two underlined links: 'Use metric system' and 'Use English system'. Below these is a 'Constants' section with a text box for 'Fixed pressure value' set to '1013.25'. At the bottom are 'OK', 'Cancel', and 'Help' buttons.

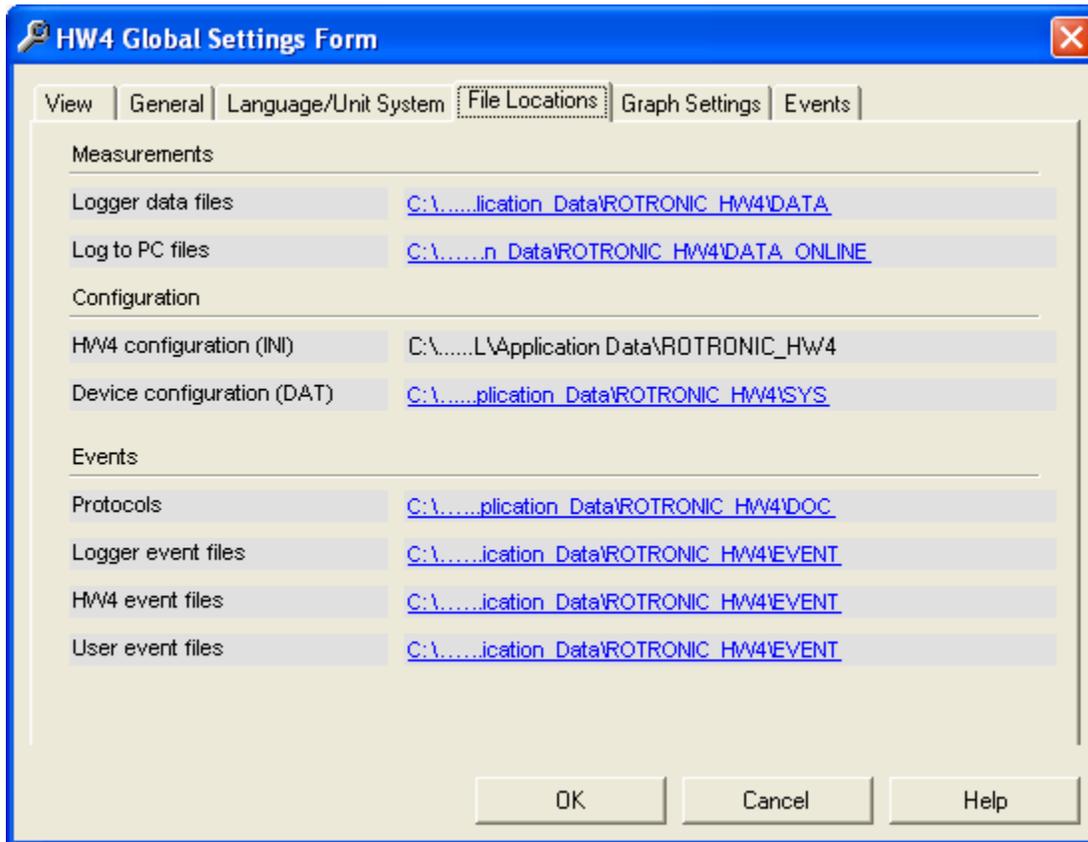
The selections made here are only for the HW4 menus and Psychrometric Conversion Tool. The selections have no effect on the instruments and devices in the tree. When HW4 displays or records (Log to PC) the measured values and calculated parameter for any instrument, the unit system in use is that of the instrument. Similarly, the fixed pressure value use for some calculations is the value that was specified when configuring the instrument.

- Language: click on the underlined link to change the language used in the HW4 menus and forms to one of the available languages. The link opens the folder where the language files are located (these files have the extension .txt as in English.txt). To change the language, simply click on the appropriate file. The selection made here has no effect on the devices in the tree.
- Unit System: use the underlined links to the right of the form to globally change the unit system used within the HW4 Psychrometric Conversion Tool. If the unit system offers several choices such as In Hg or PSI for pressure, choose a unit by clicking on the arrow to the right of each text box.

Relative humidity: the symbol to be used after the % symbol (RH) should be typed in the text box.

- Constants: enter here the default fixed pressure value that will be used within the HW4 Psychrometric Conversion Tool to compute calculated parameters such as wet-bulb temperature, mixing ratio, etc. The barometric pressure value can be temporarily changed from within the Tool but it reverts to the default value each time the Tool is opened. Note that the numerical value entered here should be consistent with the pressure unit that was selected under Unit System.

File Locations Tab

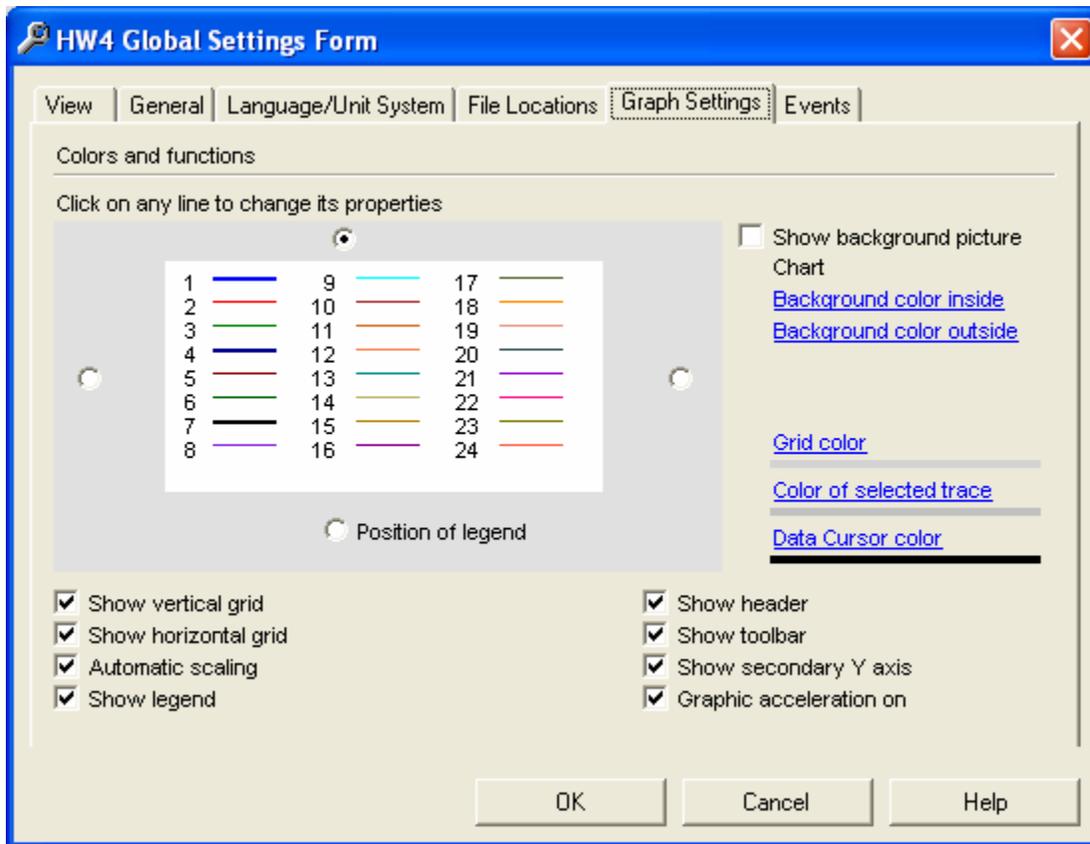


Use this tab to review or change the location of the files created by HW4. Bring the mouse cursor on top of any file path to display the full path. Left click on any file path to open HW4 Explorer and change the path.

- Logger data files: log files copied from the logger to the PC. These files have either the extension XLS (unprotected) or LOG (protected binary format)
- Log to PC files: log files directly recorded on the PC. These files have either the extension XLS (unprotected) or LOG (protected binary format)
- HW4 configuration: this file has the extension INI and is the internal HW4 configuration file (do not change)
- Device configuration: these files have the extension DAT and are used to retain typical instrument configuration data so as to be able to quickly configure a number of instruments.
- Protocols: these files have the extension TXT and keep track of configuration changes to an instrument, instrument programming (such as data logging) and probe adjustments.
- Logger event files: these files have the extension EVT and are generated by the data logger to keep track of the main internal logger events.
- HW4 event files: these files have the extension ERR and keep track of any problem encountered by HW4.

- User event files: these files have the extension EVT and keep track of the main operations performed by each HW4 user (HW4 Professional only).

Graph Settings Tab



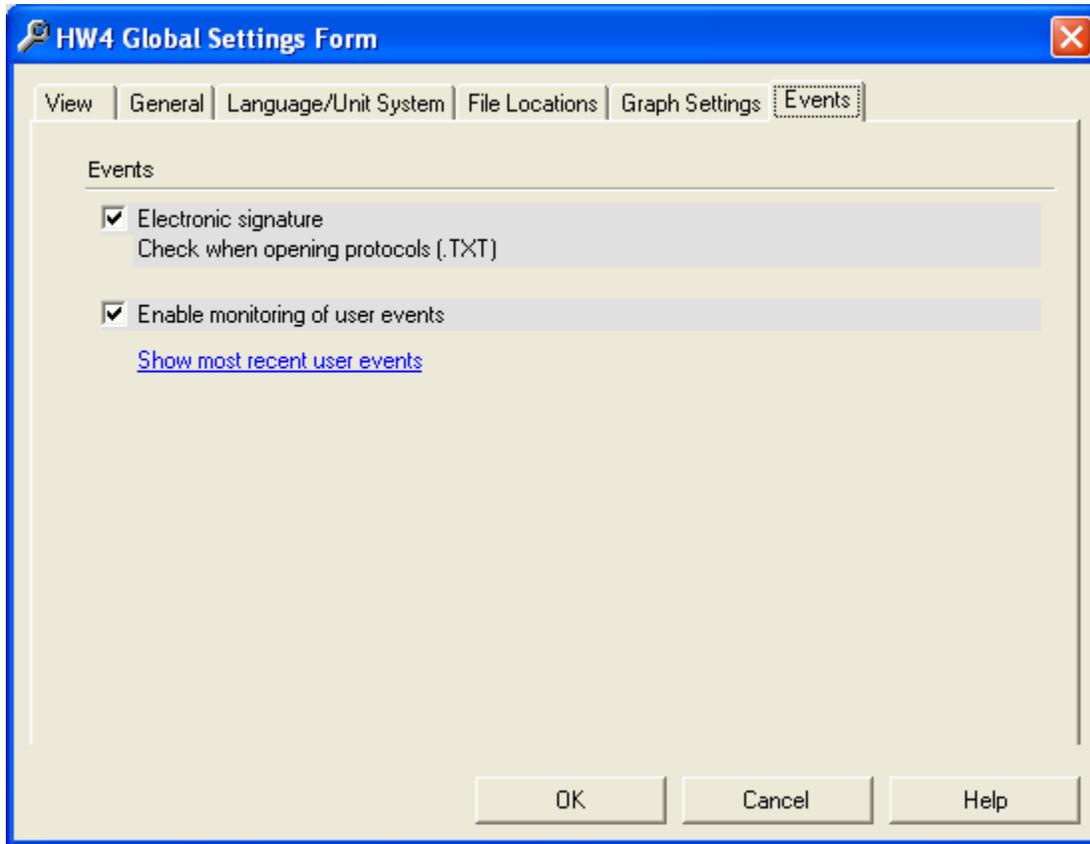
Use this tab to customize the appearance of the graphs generated from log files. Most of the settings in this tab do not apply to the on-line graph displayed in the Current Values tab.

Show Background Picture: enables the background picture.

- Line box: when generating a graph, HW4 uses lines 1 to 24 as follows: line 1 = humidity probe 1, line 2 = temperature probe 1, line 3 = calculated parameter probe 1, line 4 = humidity probe 2, etc. If a probe is not connected or if a parameter is not present on the graph, HW4 does not make use of the corresponding line. The properties of each line (type, color, weight, etc.) can be customized after right clicking on the line.
- When the box Show legend is checked, use one of the four radio buttons around the line box to set the position of the legend on the graph.

Events Tab

This tab is available only with HW4 Professional.



- **Electronic signature:** HW4 Professional automatically generates an electronic signature at the end of protocols and this signature is cross referenced in the user event files. Check this box to have HW4 validate the electronic signature when opening a protocol (file with the extension TXT): instrument configuration, instrument programming and probe adjustment. HW4 uses the electronic signature to verify that the protocol file has not been altered.
- **Enable monitoring of user events:** check this box to have HW4 keep track of the main operations performed by any user. This is a requirement of both FDA and GAMP.

Users and Passwords (HW4 Professional)

HW4 Professional allows several unique users each with a password. HW4 keeps track of changes made by each user. Users are distributed among two groups: Administrator and Standard User, each with the following rights:

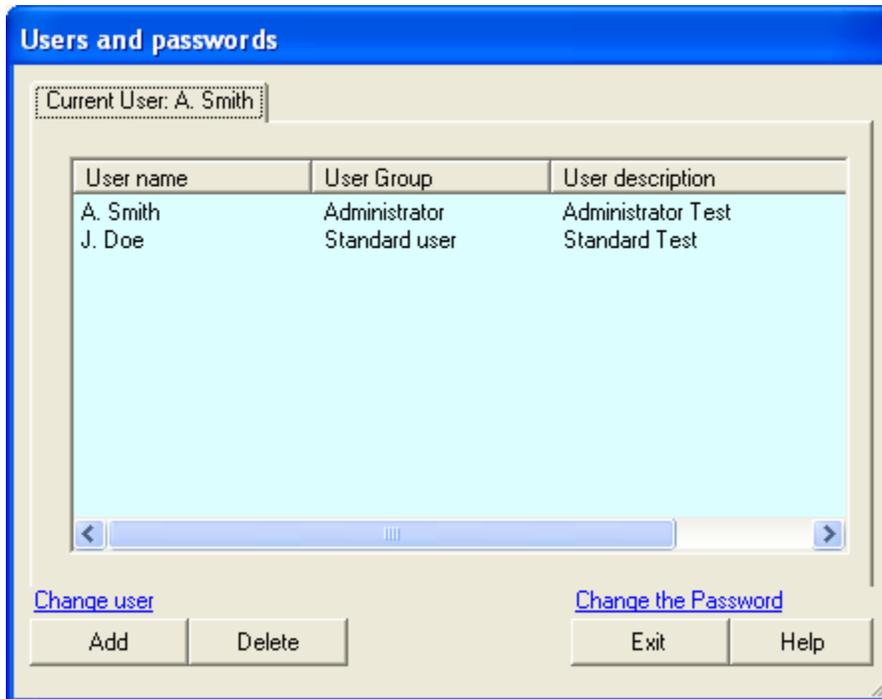
Administrator rights: all operations available within HW4

Standard user rights: (a) HW4 Global Settings, (b) open data files that are on the PC - but not on a data logger, and (c) read instrument status and configuration. Standard users cannot delete, move or copy data and other files. Any function or operation that changes the settings/configuration of the instruments (including probe adjustment) is not available to standard users. Standard users can change the HW4 user (password required) but cannot add or delete users.

Note: HW4 Professional can be opened without any user having logged in. Typically, this is the situation right after installing HW4. In order to meet both FDA and EU GMP requirements, HW4 should not be used without creating at least one user. Any user that is created must have a password that is at least 8 characters long. As soon as one or more users have been created, HW4 automatically requires that a user to log in and that a password be used.

The Users and Passwords form is shown below. This form lists the users that have been created in HW4 and is used to:

- Add or remove users (available to administrators only).
- Change the current user (available to all users with a proper password)
- Change the current user password



- **To add a user:** click on Add to open the following form:

Users and passwords

Current User: A. Smith

User name

User description

Password

Password confirmation

Administrator

Standard user

OK Cancel

Change user

Add Delete

Change the Password

Exit Help

Each user name must be unique. Note that each user, administrator or standard, must have a log-in password. No blank password is allowed and a password must be at least 8 characters long.

IMPORTANT: if a user name was created and then subsequently deleted, HW4 will not allow this user name to be used again.

- **To remove a user:** select the user from the list and click on Delete. A message box appears asking you to confirm the deletion.

Note: only administrators can delete a user.

- **To change the current user:** clicking on the underlined link **Change user**. This opens the HW4 login form:

New user

User name A. Smith

Password 12345678

OK Cancel

Note: after creating the very first user, click on the link "Change user" to activate this user.

Psychrometric Conversion Tool

This menu item opens a form that can be used to convert humidity parameters. To change the parameter to be converted, click on Input Parameter and choose from the list.

Parameter	Symbol	Value	Unit
Humidity	H	35.00	%RH
Temperature	T	23.00	°C
Pressure	P	1013.25	hPa
<hr/>			
Humidity	H	35.00	%RH
Temperature	T	23.00	°C
Pressure	P	1013.25	hPa
Elevation (ref. sea level)		-2.14	m
Wet-bulb temperature	Tw	13.98	°C
Psychr. difference	T-Tw	9.02	°C
Dew point	Dp	6.73	°C
Frost point	Fp	N/A	°C
Vapor concentration (moist)	Dv	7.19	g/m ³
Specific humidity (moist)	Q	6.06	g/kg
Mixing ratio by Wt. (dry)	R	6.09	g/kg
Vapor partial pressure	E	9.83	hPa
Vapor saturation pressure	Ew	28.08	hPa
Saturation vapor concentration	Dvs	20.54	g/m ³
Enthalpy	H	38.60	kJ/kg
Volume Mixing Ratio (dry)		9795.44	ppm

Calculation : WMO, World Meteorological Organization
Status: OK

- Click on the blue arrow to compute
- Click on the diskette symbol to transfer the results to the default Windows text editor (such as Notepad) and eventually save the data to a text file.

Note: to change the unit system, go to the HW4 main screen. In the menu bar, click on Settings and Tools and on HW4 Global Settings. In the HW4 Global Settings form, select the tab "Language / Unit System".

FDA / GAMP Compliance (HW4 Professional)

Required settings and selections

The following settings and selections are required in order to comply with FDA / GAMP requirements regarding electronic records, electronic signatures (data integrity) and the tracking of software problems.

- Main Screen Menu Bar – Users and Passwords: create at least one user with administrative rights.
- HW4 Global Settings – General Tab: Enable system monitoring (tracking of software problems)
- HW4 Global Settings – Events Tab: Enable electronic signatures and enable the monitoring of user events.
- Device Manager – Settings (menu bar): enable protocols
- Device Manager – User Information: include user information in log file header
- Device Manager – Keypad: disable the MENU key of the HygroLog NT
- Log file type: select the file extension LOG for the log (data) files recorded either with HW4 on the PC or with the HygroLog NT. For the HygroLog NT, the file type is selected from the Device Manager – Memory Card. For the files recorded by HW4 to the PC, the selection is done in the Log to PC Tab of the Main Screen at the time the file name is entered.

Log Files

Both HW4 and the HygroLog NT offer the choice of two different types of file format to record the measured data. Both file types have two main sections: the file header and the measurement data.

- Binary Files (LOG): the header section of this type of file can be read with a regular text editor. The data section is in binary format and cannot be read with a text editor or imported into a program such as Microsoft Excel. Both the header and data sections are protected against alterations. If the file contents are modified, HW4 will display an error message when trying to open the file.

For maximum protection of the recorded data, use the LOG file type.

- Text Files (XLS): these files are entirely in text format and can be read with a regular text editor. This type of file is easily imported into Microsoft Excel. Like all the other files created by HW4, files with the XLS extension are saved with the Read Only attribute. This attribute provides a protection against inadvertent file operations such as file delete, file move and saving the file under the same name and location (eventually after altering the file contents). Since it is possible to remove the Read Only attribute, this attribute does not provide any real protection against intentional alterations. If a file with the XLS extension is altered, this will not be automatically detected by HW4.

As an additional protection, HW4 keeps track of the date and time when a log file is created or copied to the PC. This information is kept in the protected user event file and can be compared with the file creation / file modification date and time recorded by Windows.

Event Files

Both HW4 Professional and the HygroLog NT maintain a number of files to keep track of major events. With the exception of the HW4 event file (extension ERR), these files are protected and altering the contents of these files will produce an error message within the text of the file when the file is opened with HW4.

HW4 events

A record is generated whenever HW4 encounters a problem. Each record is kept in a file with the extension ERR, normally located in the directory C:\Documents and Settings\your Windows login name\Application Data\ROTRONIC_HW4\EVENT

Example: ErrorHW4Event2004_1_18_20_0_50.ERR

Both the date and time are part of the file name.

User events

A file is generated for each user session and a record is entered in this file each time the user performs a major operation. User event files have with the extension EVT and are normally located in the directory C:\Documents and Settings\your Windows login name\Application Data\ROTRONIC_HW4\EVENT

Example: HW4USR_2004_1_18_20_0_49.EVT

Both the date and time are part of the file name.

Typical examples of user events:

- User login / logout
- Changes to the HW4 Global Settings
- Instrument configuration and programming
- Log to PC
- Probe adjustment
- File operations such as copying a file from the logger to the PC or deleting a file

Logger events

A record is generated internally by the logger each time a user performs a major operation and /or each time something important changes in the logger itself (e.g. low battery). In order to be able to identify each person using the logger, you should configure the logger so as to disable at least the MENU key. Records are kept in files with the extension EVT, normally located on the logger memory card. When HW4 Explorer is used to copy this type of file to the PC, the copy is normally placed in the directory C:\Documents and Settings\your Windows login name\Application Data\ROTRONIC_HW4\EVENT

Example: 1111111111.EVT

The serial number of the logger is part of the file name.

Instrument configuration and programming protocols

Each time that the logger is configured or programmed, a protocol is generated. Protocols are files with the extension TXT and are normally located in the directory C:\Documents and Settings\your Windows login name\Application Data\ROTRONIC_HW4\DOC

Example of a configuration protocol file name: 1111111111_CNF_3.txt

Example of a programming protocol file name: 1111111111_PROG_0.txt

The serial number of the logger and a sequential number are part of the file name.

Configuration and programming protocols are protected with an electronic signature automatically generated by HW4. HW4 verifies the validity of the electronic signature when opening this type of file.

Probe adjustment protocols

Each time a probe is being adjusted, a protocol is generated. Protocols are files with the extension TXT and are normally located in the directory C:\Documents and Settings\your Windows login name\Application Data\ROTRONIC_HW4\DOC

Example of a probe adjustment protocol file name: 1111111111_ADJ_3.txt

The serial number of the logger and a sequential number are part of the file name.

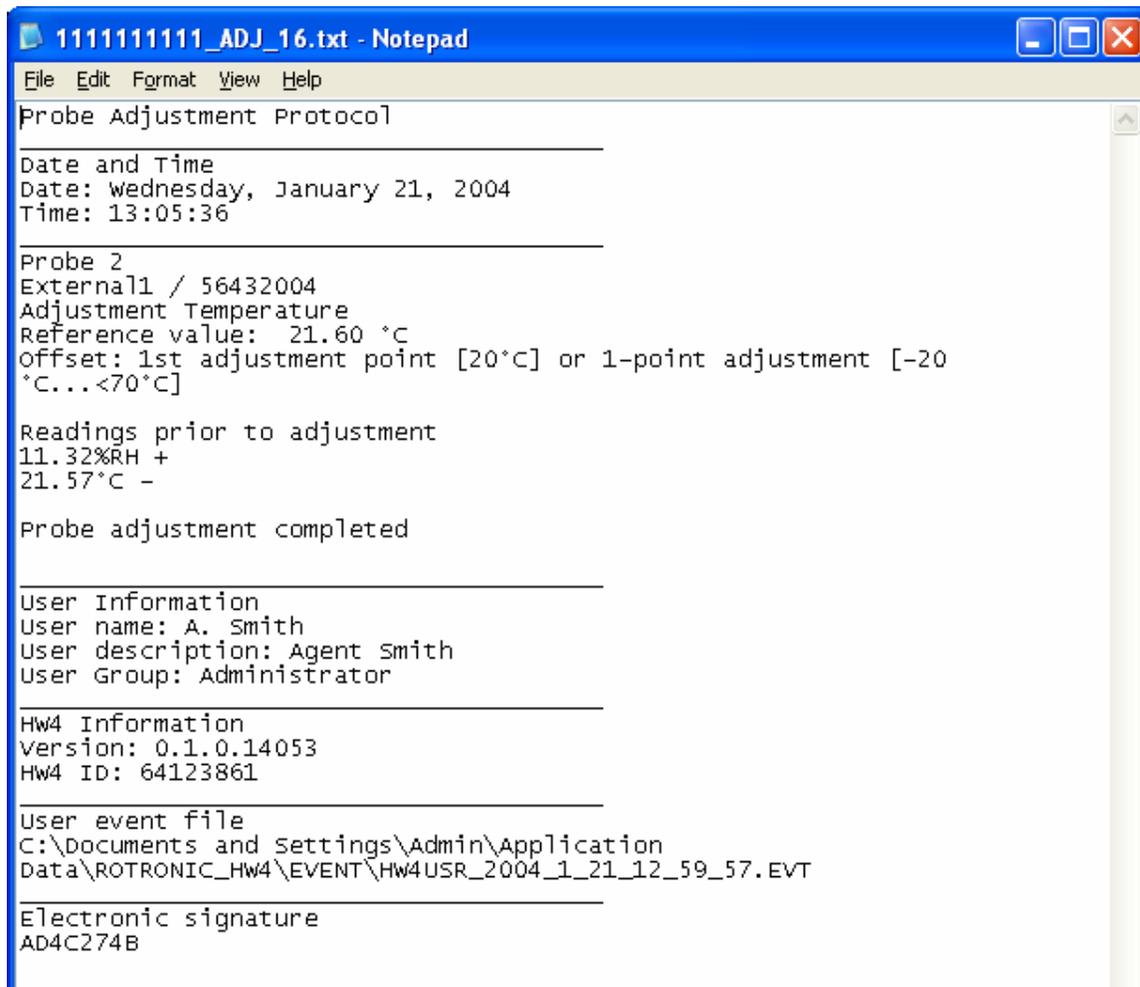
Probe adjustment protocols are protected with an electronic signature automatically generated by HW4. HW4 verifies the validity of the electronic signature when opening this type of file.

Cross referencing files

By cross referencing the date and time of log files - or the date, time and electronic signature of the event files and protocols, it is possible to keep track of events and to identify which user was logged in HW4 at the time of the event.

Example: cross referencing a probe adjustment protocol with a user event file

a) Open the probe adjustment protocol:

A screenshot of a Notepad window titled "111111111_ADJ_16.txt - Notepad". The window contains the following text:

```
Probe Adjustment Protocol
-----
Date and Time
Date: Wednesday, January 21, 2004
Time: 13:05:36
-----
Probe 2
External1 / 56432004
Adjustment Temperature
Reference value: 21.60 °C
Offset: 1st adjustment point [20°C] or 1-point adjustment [-20
°C...<70°C]

Readings prior to adjustment
11.32%RH +
21.57°C -

Probe adjustment completed

-----
User Information
User name: A. Smith
User description: Agent Smith
User Group: Administrator

-----
HW4 Information
Version: 0.1.0.14053
HW4 ID: 64123861

-----
User event file
C:\Documents and Settings\Admin\Application
Data\ROTRONIC_HW4\EVENT\HW4USR_2004_1_21_12_59_57.EVT

-----
Electronic signature
AD4C274B
```

The following information is located at the end of the probe adjustment protocol:

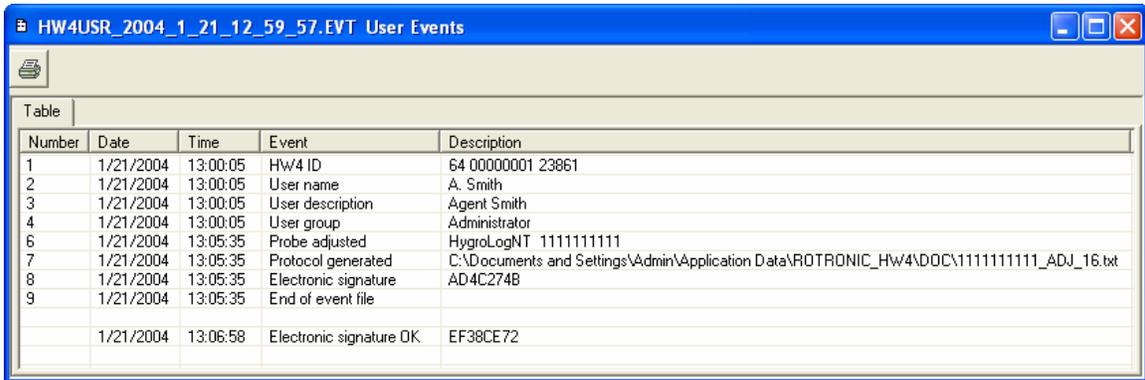
User information

HW4 information

User event file: path and name (allows to find the corresponding file)

Electronic signature for the protocol.

b) Open the user event file referenced in the probe adjustment protocol:



The screenshot shows a Windows window titled "HW4USR_2004_1_21_12_59_57.EVT User Events". The window contains a table with the following data:

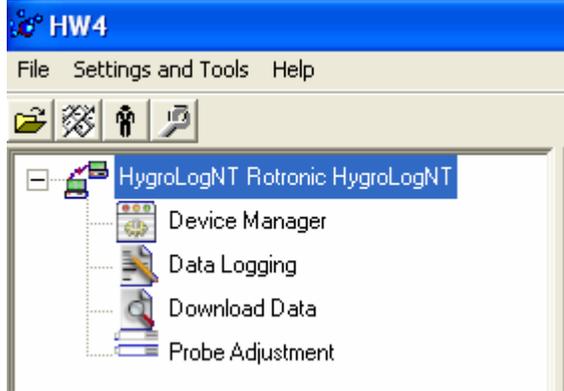
Number	Date	Time	Event	Description
1	1/21/2004	13:00:05	Hw4 ID	64 0000001 23861
2	1/21/2004	13:00:05	User name	A. Smith
3	1/21/2004	13:00:05	User description	Agent Smith
4	1/21/2004	13:00:05	User group	Administrator
6	1/21/2004	13:05:35	Probe adjusted	HygroLogNT 1111111111
7	1/21/2004	13:05:35	Protocol generated	C:\Documents and Settings\Admin\Application Data\ROTRONIC_HW4\DOC\1111111111_ADJ_16.txt
8	1/21/2004	13:05:35	Electronic signature	AD4C274B
9	1/21/2004	13:05:35	End of event file	
	1/21/2004	13:06:58	Electronic signature OK	EF38CE72

Look for the event "Probe adjusted" (in this example, line 6 of the user event file). Since there could be several such events, make use of the date and time of the probe adjustment protocol to find the correct event. Compare the following information with the information located at the end of the probe adjustment protocol:

User name, description and group

Lines 6 and 7 of the user event file report that a probe connected to the HygroLog NT S/N 1111111111 was adjusted and that a protocol was generated. The date and time should match the date and time of the probe adjustment protocol. The electronic signature on line 8 of the user event file should match the electronic signature of the probe adjustment protocol.

HygroLog NT - Functions

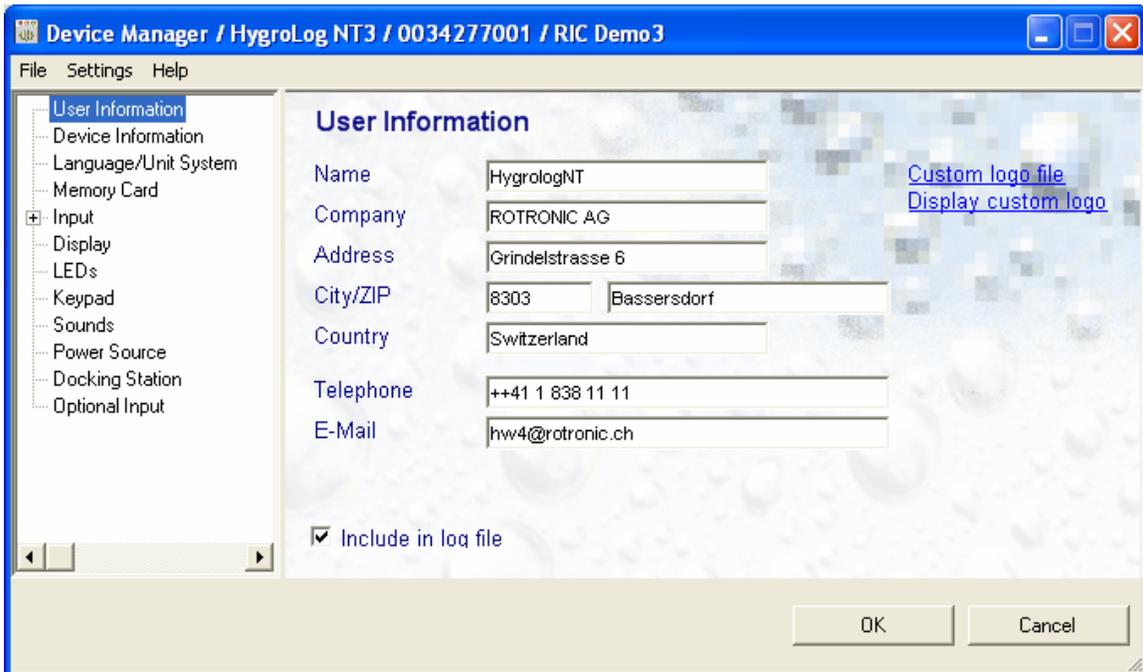


When just one HygroLogNT is connected to the PC, the device and its available functions appear in the left pane of the HW4 main screen as illustrated here.

To select a function, click on it with the left mouse button.

Device Manager

The Device Manager is used to configure the HygroLog NT and to read instrument specific information (but not the data recorded by the logger). When Device Manager is started, it automatically interrogates the instrument and downloads its current configuration.



The functions that are available within the Device Manager are listed in a Function Tree located on the left pane of the Device Manager form. To select a function, click on it with the left mouse button.

Device Manager Menu Bar

The Device manager menu bar is located at the top of the form.

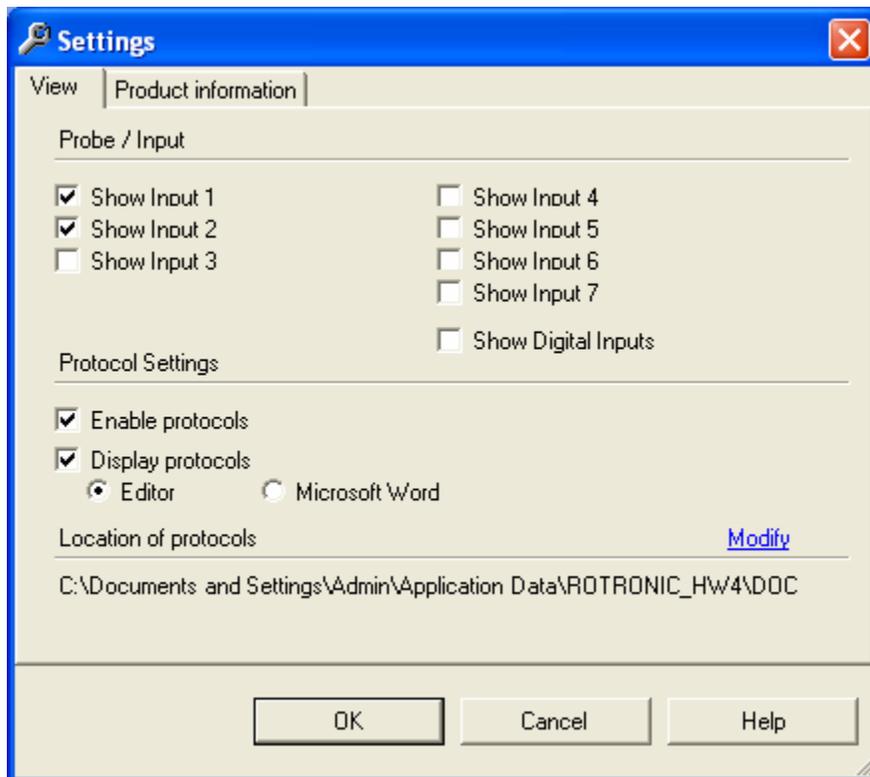
File

- **Open** opens the device configuration directory specified in the HW4 Settings Form - File Locations Tab - and displays all available device configuration files (extension .DAT). Any device configuration file that was previously saved can be opened to quickly configure an instrument. If so desired, any directory and any file type may be opened.
- **Save As** saves the current configuration to a file (extension .DAT) in the device configuration directory specified in the HW4 Settings Form - File Locations Tab. If so desired, any directory and any file type may be specified.
- **Exit** exits Device Manager

Settings

Clicking on Settings and then on Device Manager Settings opens the following form:

View Tab



- Input 1 to 3: these are the inputs that are directly located on the HygroLog NT (up to 3 probes, depending on model). Select here the default for displaying standard and optional inputs in Device Manager for this instrument.
- Input 4 to 7 and digital inputs: these are the inputs (or digital input signals) that are connected to the optional docking station.

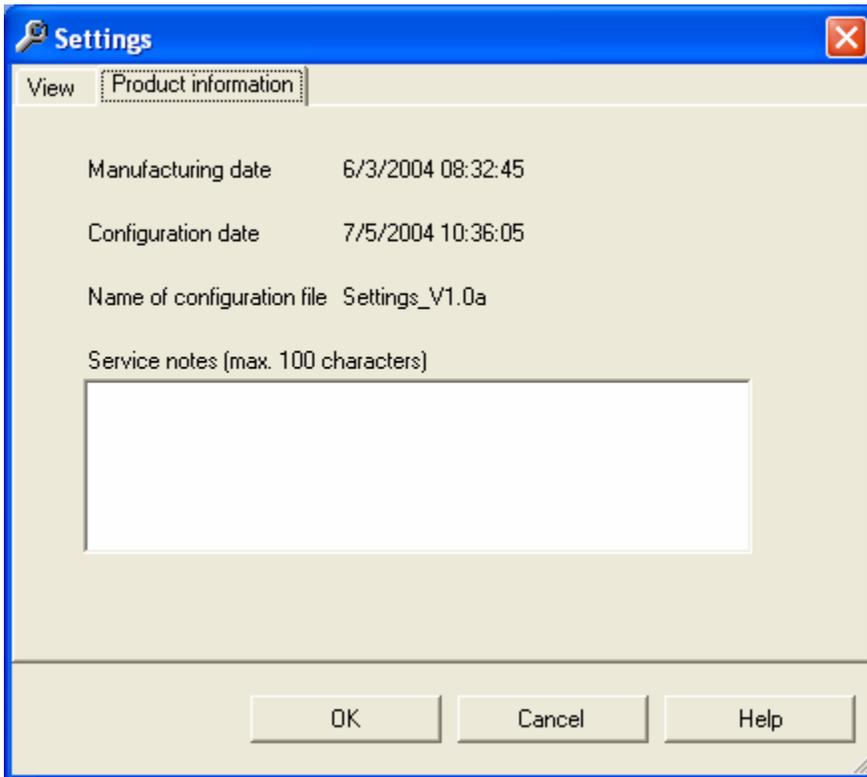
Note: the selections made here have no effect on the right half of the HW4 Main Screen and have no effect on the instrument itself.

Protocol Settings:

- **Enable protocols:** check this box to have HW4 generate (a) protocols keeping track of configuration and programming changes to this instrument and (b) a protocol after any probe adjustment. This is a requirement of both the FDA and GAMP. Protocol files have the extension .TXT and are automatically saved in the protocol directory specified under "Location of protocols" in HW4 Global Settings. To change the location of the protocol files for this particular instrument only, click on the underlined link "Modify".
- **Display protocols:** select this box to have HW4 automatically display the protocol right after creating it. Choose between the computer default text editor (see below) and Microsoft Word.

The default text editor is Windows setting. In the menu bar of My Computer select Tools, Folder Options and File Types. Look for the TXT file extension and for the associated program (Notepad or other).

Product Information Tab



This tab provides additional product information that may have been entered by the factory.

Help

The Help menu consists of:

- **HW4 Help:** Opens HW4 Help
- **About HW4:** Displays the version number and ID number of HW4

Data Logger Configuration

The Device Manager Function Tree is located on the left pane of the Device Manager form. Use the Function Tree to configure the data logger.

User Information

The screenshot shows a software window titled "Device Manager / HygroLog NT3 / 0034277001 / RIC Demo3". The window has a menu bar with "File", "Settings", and "Help". On the left is a "Function Tree" with the following items: "User Information" (selected), "Device Information", "Language/Unit System", "Memory Card", "Input", "Display", "LEDs", "Keypad", "Sounds", "Power Source", "Docking Station", and "Optional Input". The main area is titled "User Information" and contains the following fields:

Name	HygrologNT	Custom logo file
Company	ROTRONIC AG	Display custom logo
Address	Grindelstrasse 6	
City/ZIP	8303 Bassersdorf	
Country	Switzerland	
Telephone	++41 1 838 11 11	
E-Mail	hw4@rotronic.ch	

At the bottom left of the main area, there is a checked checkbox labeled "Include in log file". At the bottom right, there are "OK" and "Cancel" buttons.

User information will be included in the log file when the corresponding box is checked. This is a requirement of both FDA and GAMP.

Fields marked with * are required fields.

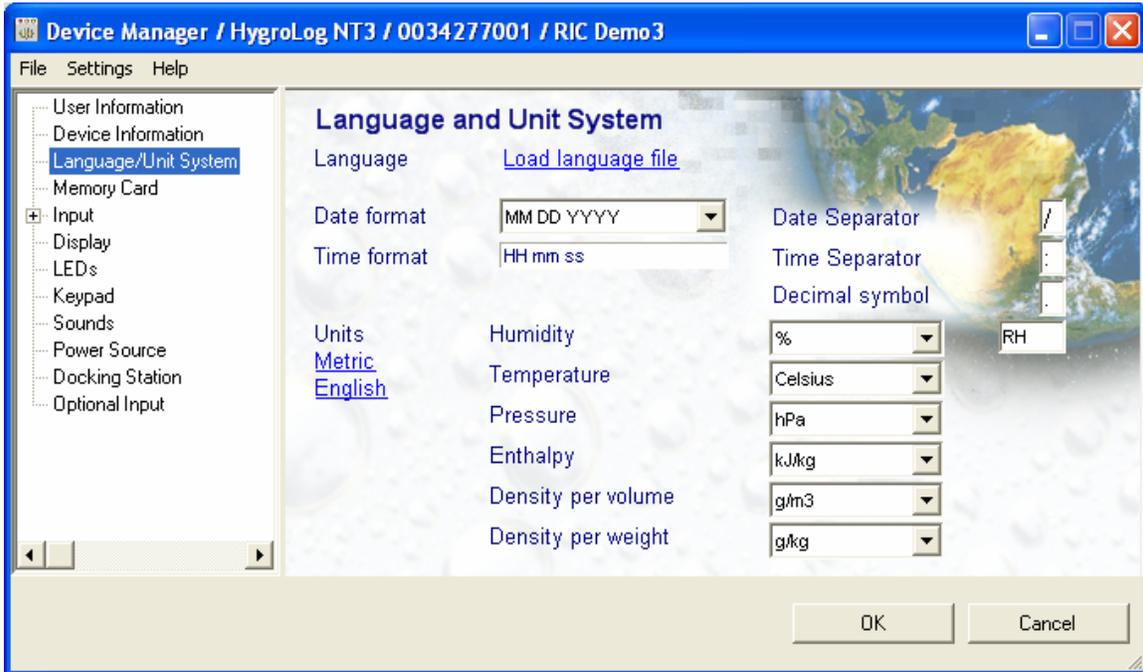
Device Information



- **User text:** this text will be displayed next to the instrument model information.
- **Network address:** click on the underlined link to change the instrument network address. Each network address should be unique and within the values of 0 to 63.
- **Adjust device to PC time:** click on the underlined link to set the instrument date and time to match the PC.

Note: the device date and time are automatically synchronized with the PC each time that the log function is being programmed.

Language / Unit System



- **Language:** click on the underlined link to change the language used in the local instrument menus and files to one of the available languages. The link opens the folder where the language files are located (these files have the extension .LNG as in English.LNG). To change the language, simply click on the appropriate file.
- **Units:** use the underlined links to the right of the form to globally change the unit system used by the instrument. If the unit system offers several choices such as In Hg or PSI for pressure, choose a unit by left clicking on the arrow to the right of each text box.

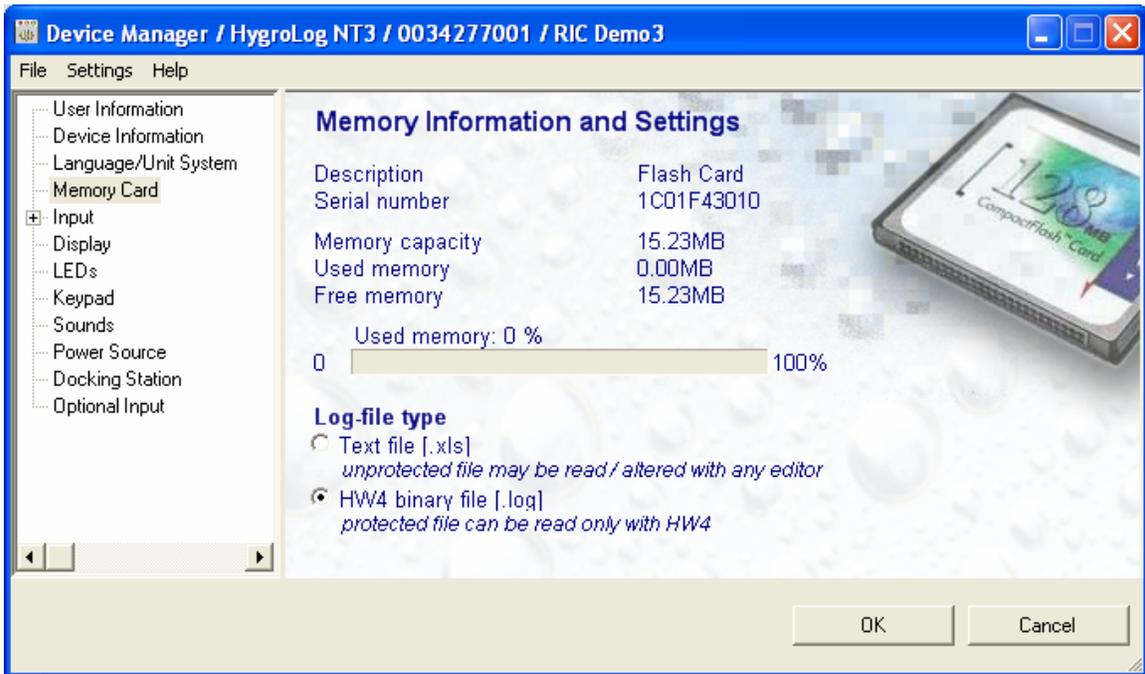
Relative humidity: the symbol to be used after the % symbol (RH) should be typed in the text box.

Note: density per volume and density per weight apply to vapor concentration and specific humidity.

IMPORTANT:

- Do not change the language / units settings while either the logger or the PC is recording data.
- Make sure that the date format and separator symbols are identical to format and separators used on the PC. Not doing so may prevent you from reading log files.

Memory Card



- Log-file type:

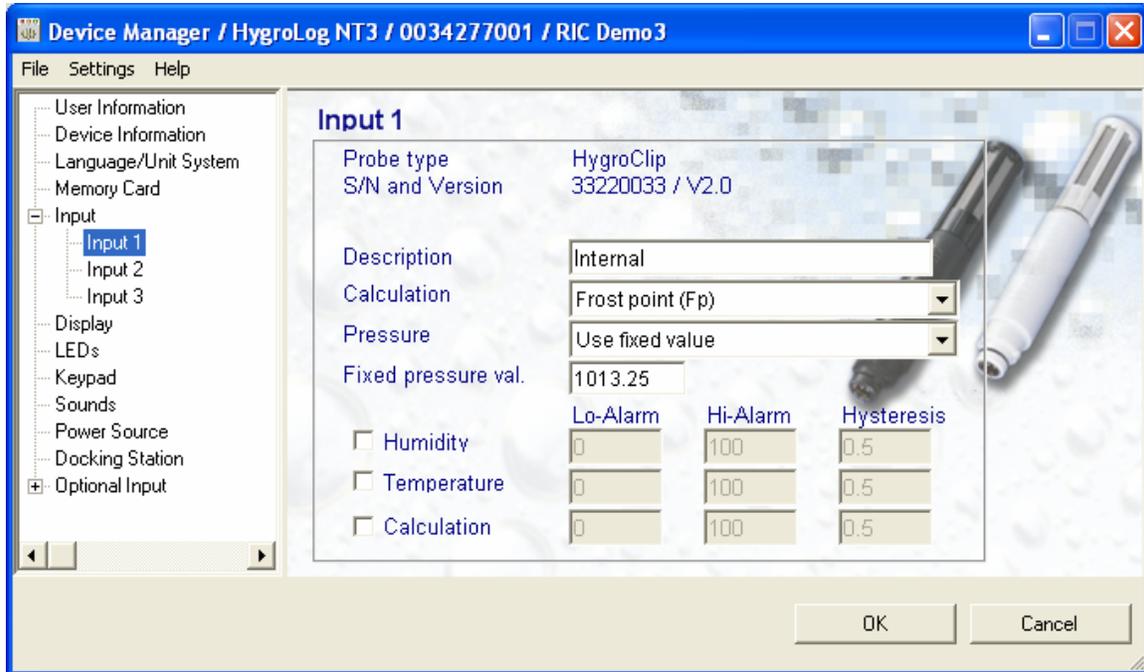
Text file (XLS): HW4 does not verify this type of file when opening the file.

HW4 binary file (LOG): files of this type can be opened with HW4 but not with an editor or with Microsoft Excel. When opening a protected file, HW4 verifies that the file has not been tampered with. Note that protected binary files use less disk space than unprotected files.

Select HW4 binary file to meet the FDA / GAMP requirements.

Input

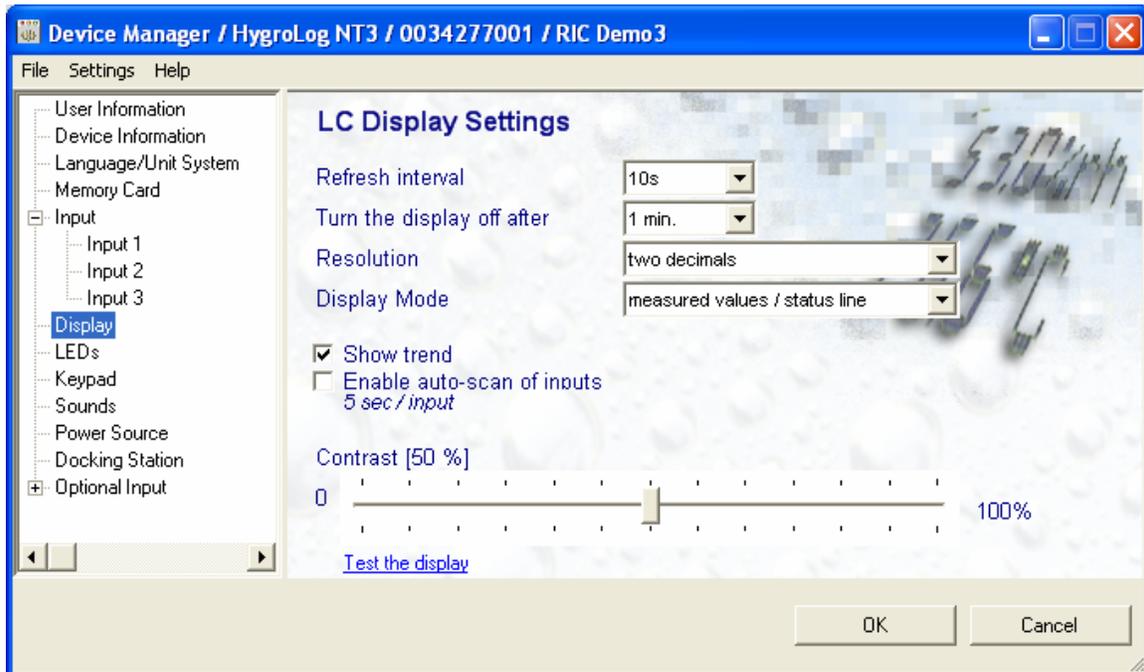
Click on Input to expand the tree and display all logger inputs that have been selected to be visible under Settings in the menu bar.



- **Description:** use a maximum of 12 characters
- **Calculation:** left click on the arrow to the right of the list box and select the parameter to be calculated by the HygroLog NT for this particular probe. This is also the calculated parameter that HW4 will display for this probe

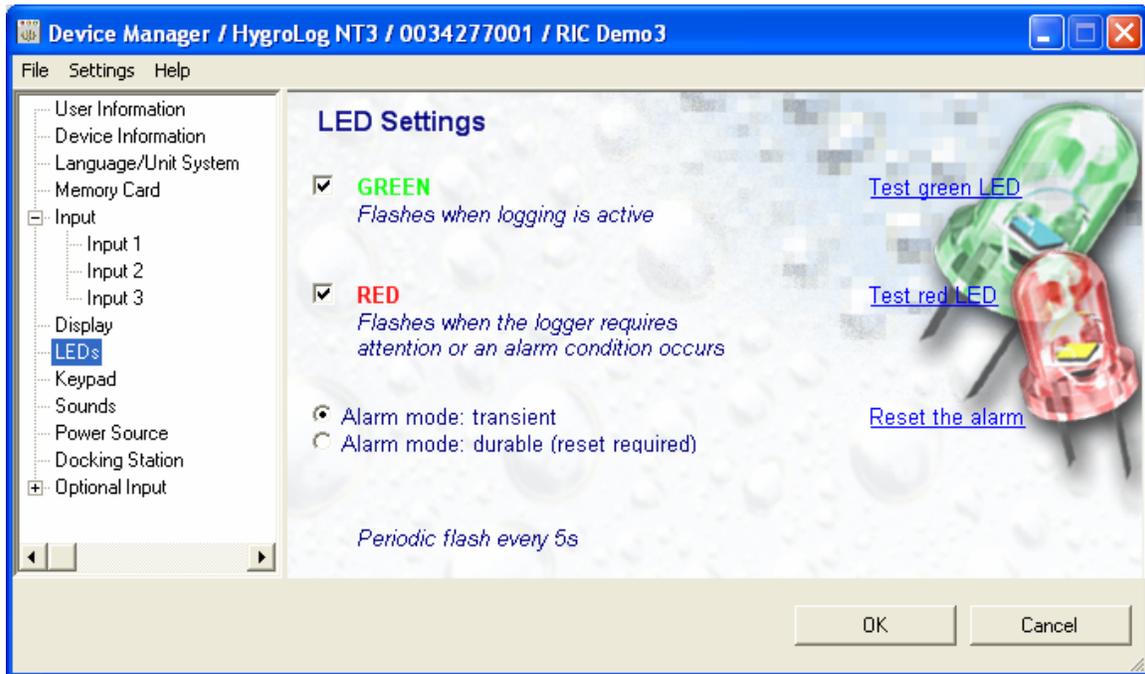
Dew point (Dp) or Frost point (Fp): depending on the selection made here, both the HygroLog NT and HW4 will display either the symbol Dp or the symbol Fp. The symbol Fp indicates that any value below freezing is a frost point as opposed to a dew point. When selected, the symbol Fp is also be displayed for values above freezing. This of course is to be understood as being the same as dew point.
- **Pressure:** left click on the arrow to the right of the list box and select which barometric pressure will be used by the HygroLog NT to compute parameters such as wet-bulb, mixing ratio, etc. The HygroLog NT can use a fixed pressure value or read the actual barometric pressure when a pressure probe is connected to an option port.
- **Fixed pressure value:** enter here the fixed pressure value that will be used by the HygroLog NT. Note that this numerical value should be consistent with the pressure unit that was selected under Language / Unit System.
- **Alarm:** alarm conditions can be defined for humidity, temperature and the calculated parameter. Values that are below the low alarm value or above the high alarm value will trigger an alarm. A value can be specified for the alarm function hysteresis. This value is used for both the low and the high alarm.

Display



- **Refresh interval:** left click on the arrow to the right of the list box and select the refresh interval for the display of the HygroLog NT. Values range from 5 seconds to 60 minutes. To conserve battery power, use a high setting.
- **Turn the display off after:** use this item enable the Display Sleep function so as to extend the battery lifetime. Left click with the mouse on the arrow to the right of the list box and select one of the available choices. The display of the HygroLog NT goes blank after the specified time period, when no key is being pressed or when there is no communication with the PC.
- **Resolution:** left click on the arrow to the right of the list box and select the number of decimals to be used on the display of the HygroLog NT.
- **Display mode:** left click on the arrow to the right of the list box and select the type of contents for the display of the HygroLog NT. Status line causes the HygroLog NT to display the date and time as well as which input source is providing the displayed data.
- **Show trend:** when this box is checked a trend indicator is displayed to the left of the measured values and calculated parameter. This indicator shows if the values are increasing, decreasing or stable. The status of each trend indicator is read directly from the HygroLog NT.
- **Enable auto-scan of probe inputs:** check this box to make the display automatically switch between probe inputs every 5 seconds.
- **Contrast:** drag the slider to adjust the contrast of the display
- **Test the display:** click on the underline link to turn on all pixels. If the LC display is good, this should cause the display to become uniformly black (no white areas) for a few seconds.

LEDs



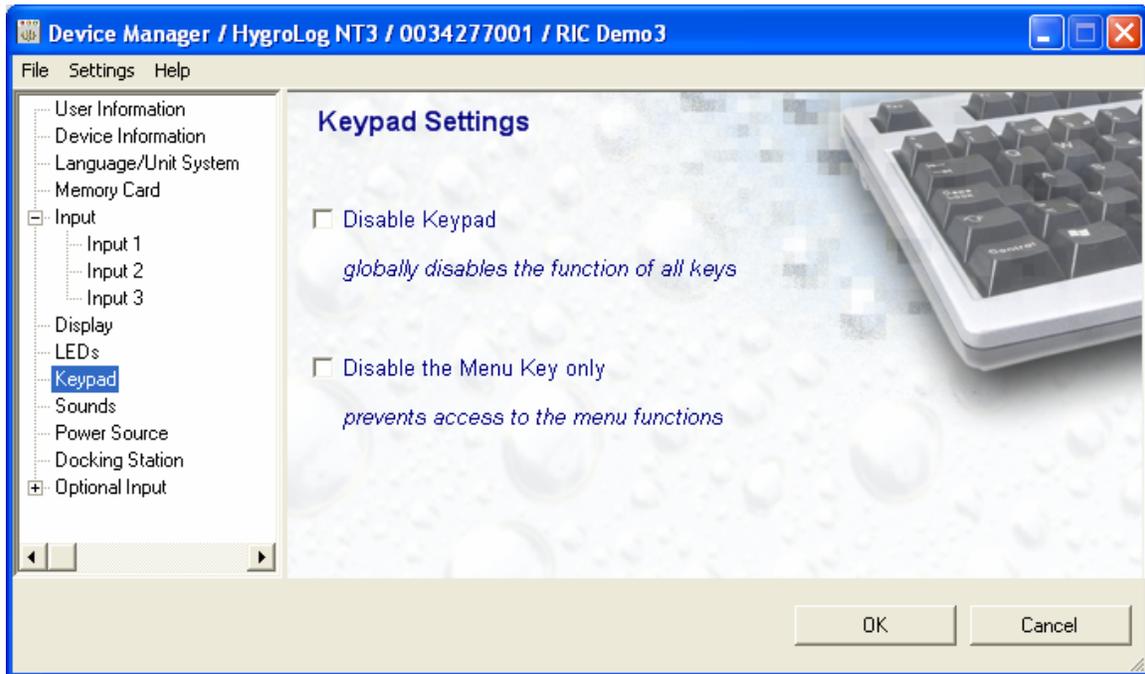
Each of the two LEDs of the HygroLog NT can be enabled or disabled. Each LED can be tested by clicking on the corresponding underlined link. During the test, the LED stays on for a few seconds.

The red LED can be programmed to flash when there is an alarm condition (see below) and / or when the logger requires attention (low battery, memory card full, etc.).

- Alarm mode:

In the transient alarm mode, the red LED flashes for only as long as the data from a probe corresponds to an alarm condition. In the durable alarm mode, the red LED stays on even after the alarm condition has disappeared. When the LED is set to provide a durable alarm, it can be reset by clicking on the underlined link [Reset the alarm](#).

Keypad



To prevent tampering with the logger or to prevent changes resulting from the accidental pressing of keys, the keypad can be completely disabled.

As an alternative, only the menu key may be disabled to protect both the logger and its probes.

IMPORTANT: you should at least disable the MENU key to comply with FDA CFR21 Part II.

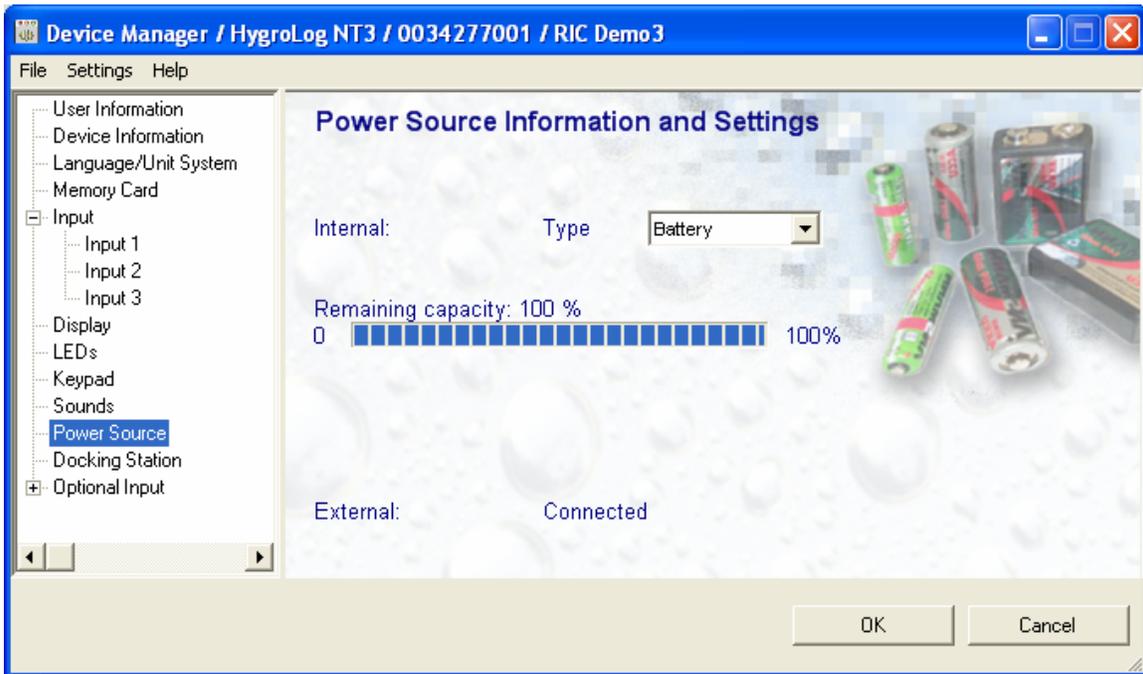
Sounds



- **Keystroke:** check this box to enable a clicking feedback sound when pressing any key of the keypad.
- **System Error:** check this box to have the HygroLog NT emit a non-repeating 5 seconds sound in the event of an internal error in the HygroLog NT.
- **Alarm:** check this box to have the HygroLog NT emit a non-repeating 5 seconds sound when an alarm condition occurs.

The pitch of the sound can be set by left clicking on the arrow located to the right of the list box and by selecting the desired pitch. To test the sound function, click on the underlined link.

Power Source

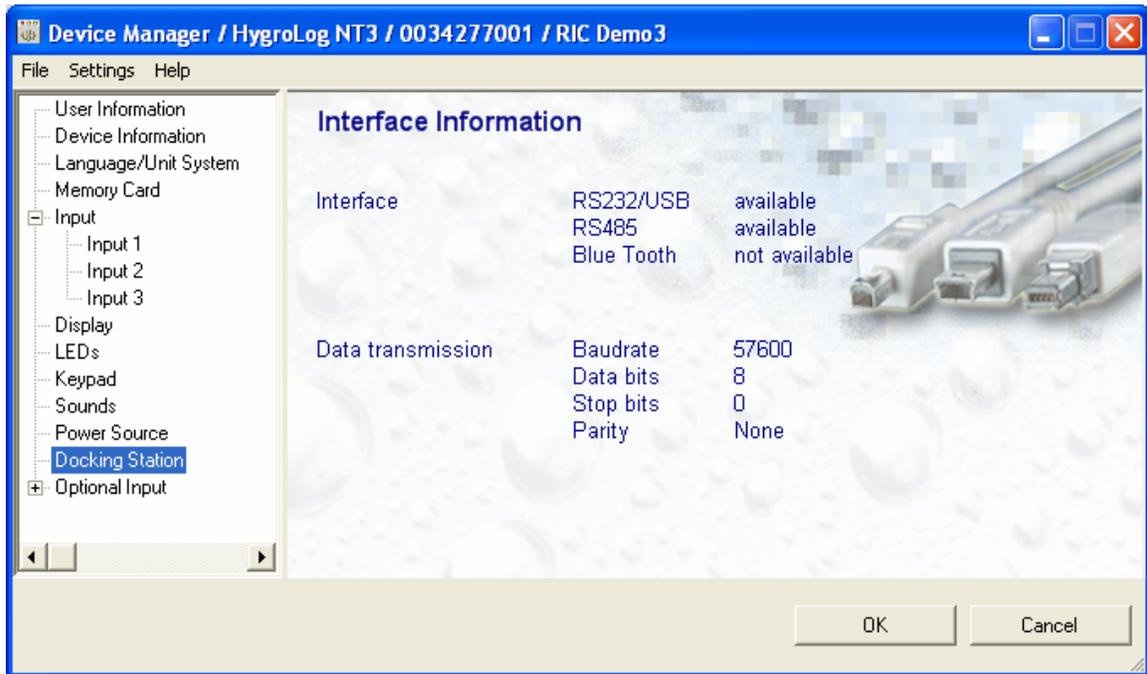


- Type of internal power source: click on the arrow located to the right of the list box and choose between battery and accumulator (rechargeable battery). Note that trying to recharge a regular battery is potentially dangerous and may damage the instrument. **Do not select accumulator if using a regular battery since this would allow the HygroLog NT to attempt recharging the battery when an external power source is connected.**

Note: the only other way to totally power down the HygroLog NT is to disconnect the battery.

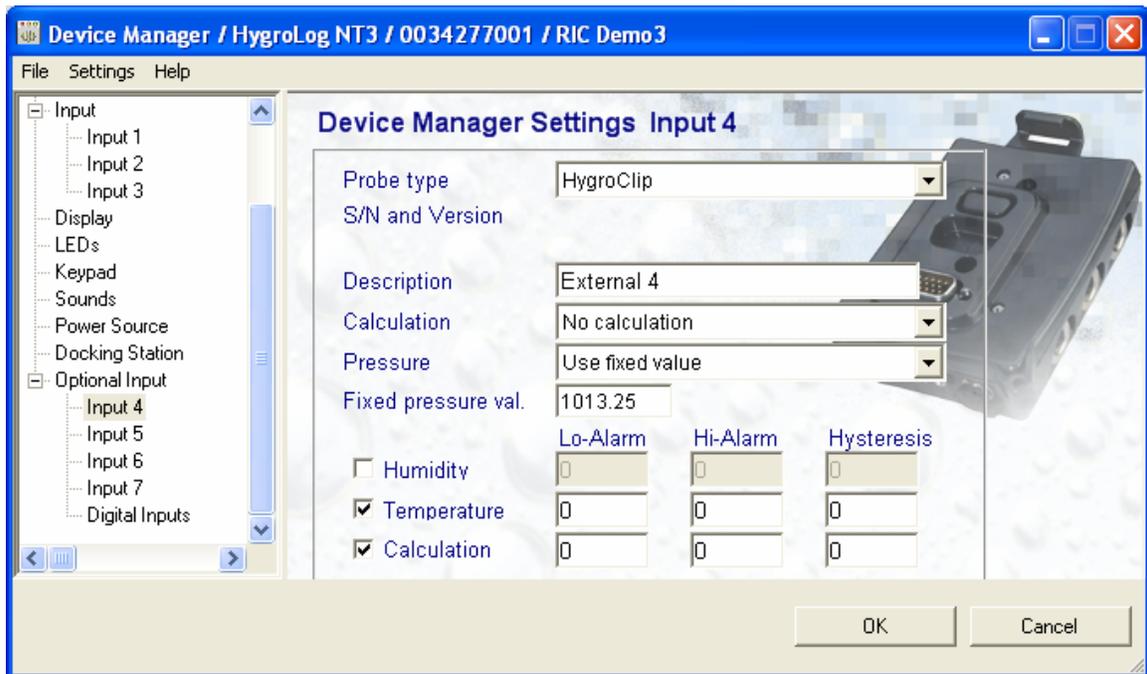
- External Power Source: an external power source is automatically detected by the HygroLog NT

Docking Station



This form is purely informative and does not permit any change.

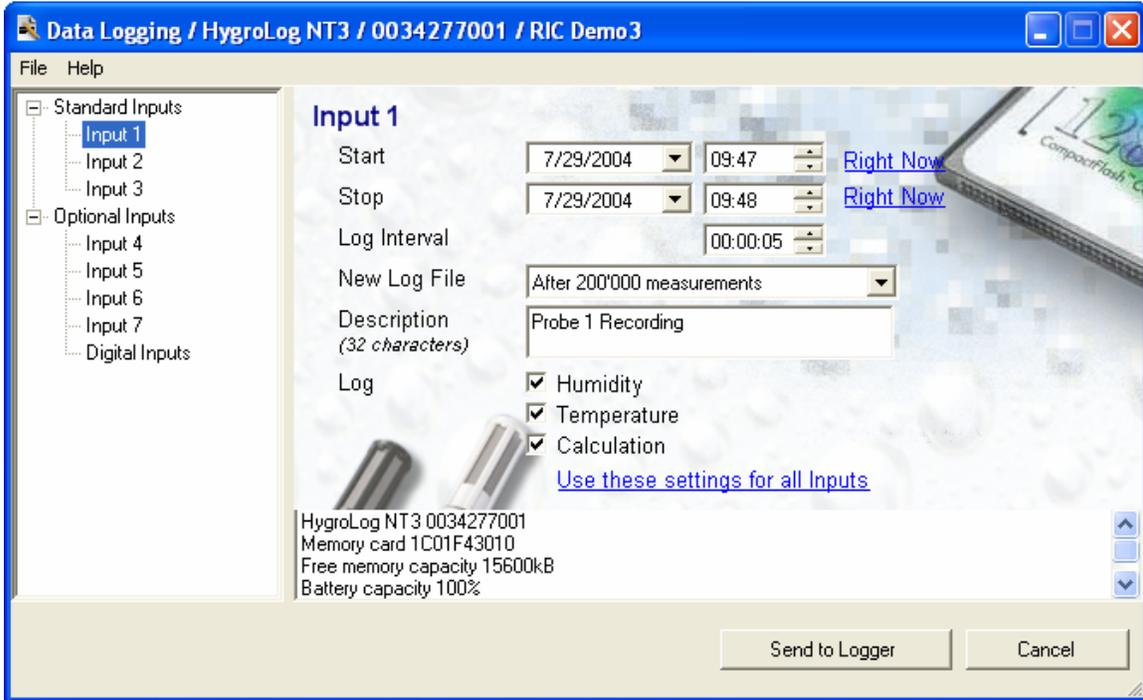
Optional Input



Data Logging

The Data Logging form is used to start or stop logging data from each input of the HygroLog NT and to define how this is to be done.

Note: this form is not used to define the type of log file (text or binary). The type of log file is common to all probes and inputs and is defined from within Device Manager / Memory Card.



Both the standard and optional inputs are listed in tree located to the left of the dialog box. To select an input, click on it with the left mouse button.

Menu Bar

The menu bar is located at the top of the form.

File

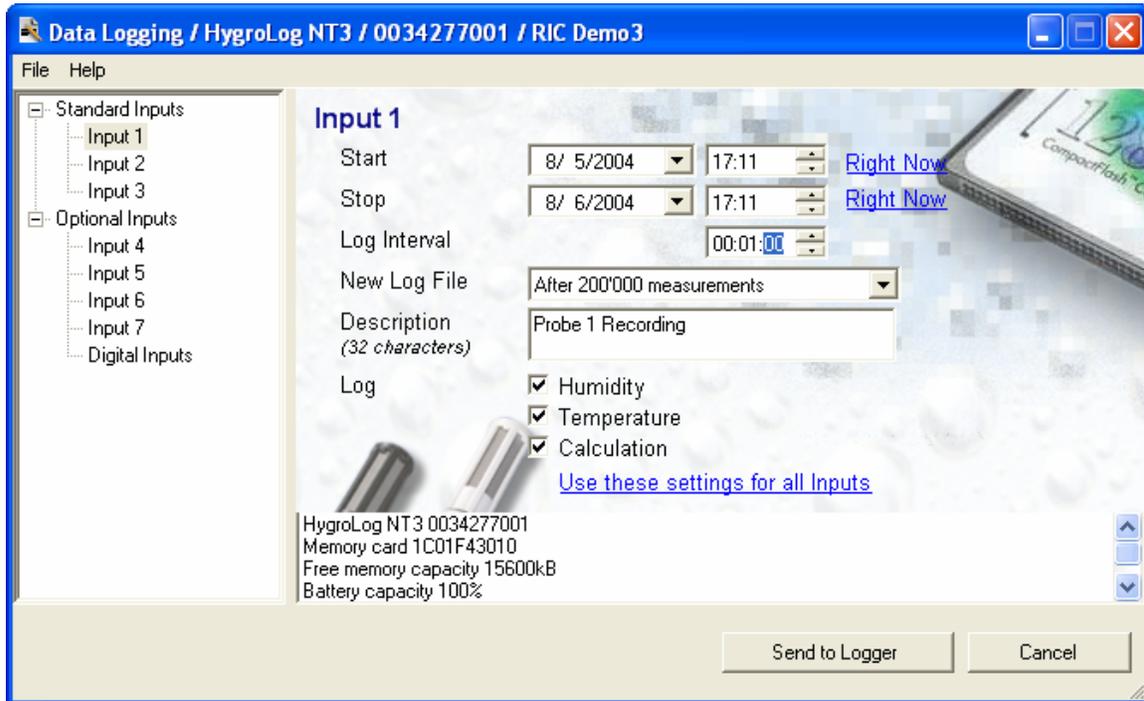
- **Exit** exits the Data Logging form without making any changes.

Help

- **HW4 Help:** Opens HW4 Help
- **About HW4:** Displays the version number and ID number of HW4

How to Log Data

To start or stop logging data, select first with the mouse a probe input (here: probe 1).



- **Start:** enter the start date and the start time in each text box. To start logging immediately, click on the Right Now underlined link.
- **Stop:** enter the stop date and the stop time in each text box. When logging is active, click on the Right Now underlined link to stop logging immediately.
- **Log Interval:** highlight one of the following: hours, minutes or seconds. Use the up or the down arrow to set the log interval to the desired value.
- **Log File:** the size of the log files should not be unlimited. This list box is used to tell the logger when to finish logging to the current file and when to start a new file. Click on the arrow located to the right of the list box to display a list of available options.

Note: the HygroLog NT creates a separate log file for each probe or input to be logged.

- **Description:** use up to 32 characters to enter a description / identification for the log file. This will be part of the file header.
- **Log:** check the box corresponding to each parameter to be logged (up to 3 parameters).

Notes:

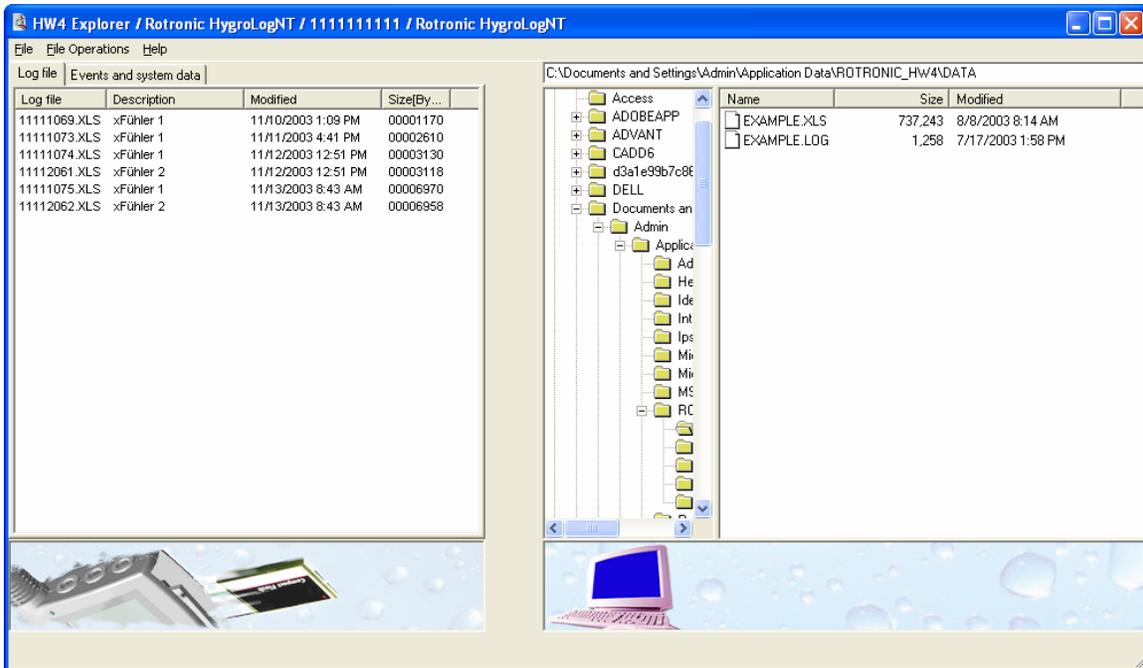
- Selections made for one probe can be used for all other probe and inputs. Alternatively, each probe or input can be individually programmed.
- If the probe is a digital HygroClip probe, the serial number of the probe is displayed at the bottom of the form.

Proceed in the same manner for the other probes or inputs. When done, click with the mouse on the Program button. The HygroLog NT will start executing the log commands.

Access Data

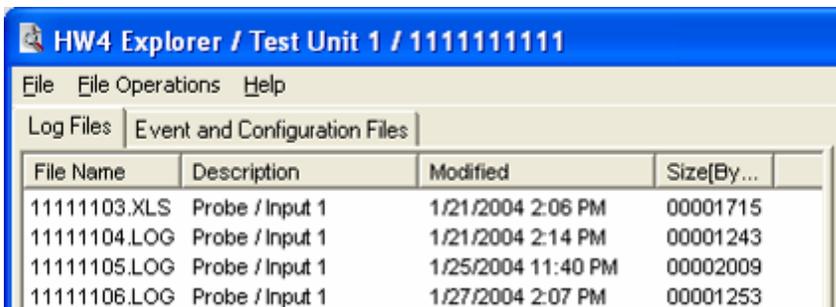
HW4 Explorer Overview

To retrieve the data recorded by the HygroLog NT, click with the mouse on Access Data on the left side of the HW4 main screen. This opens the HW4 Explorer.



- **Left Pane:** the left pane of the HW4 Explorer provides a list of the files currently present in the memory card of the HygroLog NT. Select the Log file tab to view log files. Select the Events and system data tab to view the logger event file (extension .EVT) and the logger configuration file (extension .DAT).

Log files

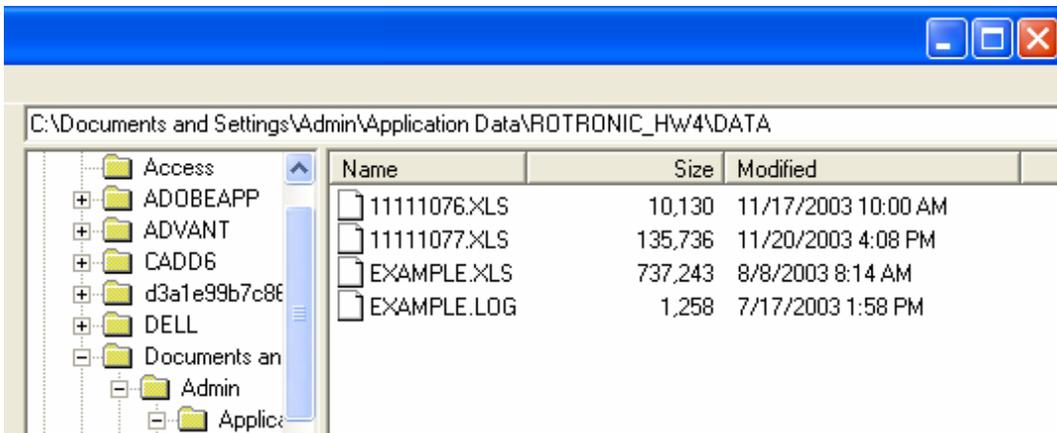


Logger event and logger configuration files



A file with the extension .EVT and one with the extension .DAT are always present in the memory card. These files cannot be deleted with HW4.

- **Right pane:** the right pane of the HW4 Explorer provides a list of the log files, protocols, event files and configuration files currently present on the PC. The location of these files depends on the directory that was specified for each type of file in HW4 Global Settings / File Locations.



Any file present in the memory card can be opened, copied or moved to the computer, or deleted from the memory card. The logger event and logger configuration files are also present in the internal EEPROM of the HygroLog NT. If not present, these two files will be automatically written to the memory card by the logger. Files that are on the computer can be either opened or deleted. These files cannot be copied or moved to the memory card.

Menu Bar

The menu bar is located at the top of the HW4 Explorer form.

File

- **Open** opens any file that is highlighted either in the left pane of the Explorer (memory card) or in the right pane (computer)
- **Exit** exits the HW4 Explorer

File Operations

Note: highlight the file first.

- **Move** copies the file from the memory card to the computer and deletes the file from the memory card (except for event and configuration files).
- **Copy** copies the file from the memory card to the computer and leaves the file in the memory card.
- **Delete** deletes the from the memory card or from the computer (except for event and configuration files located on the memory card).

Note: these functions are also directly available by right clicking with the mouse on the file.

Help

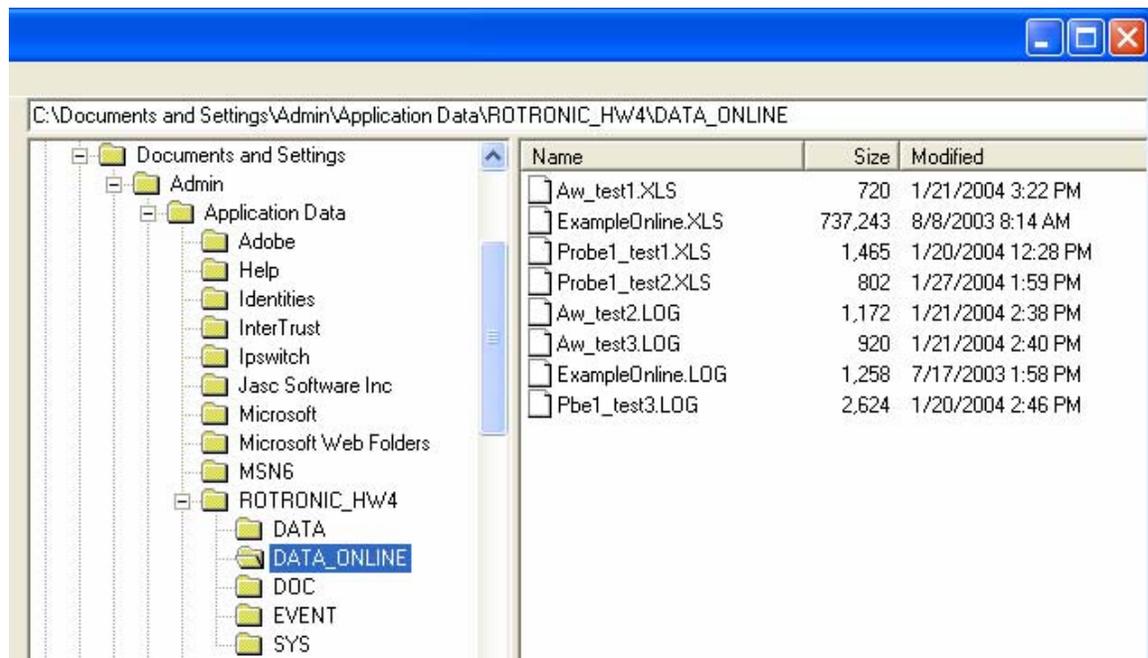
The Help menu consists of:

- **HW4 Help:** Opens HW4 Help
- **About HW4:** Displays the version number and ID number of HW4

Files located on the PC

In the right pane of HW4 Explorer, highlight the appropriate folder in C:\Documents and Settings\your Windows login name\ROTRONIC_HW4:

- DATA: this folder holds the log files that have been copied or transferred (moved) from the data logger to the PC.
- DATA_ONLINE: this folder holds the log files directly created on the PC (Log to PC).
- DOC: this folder holds protocol files (logger configuration, logger programming and probe adjustment).
- EVENT: this folder holds user event files as well as HW4 event files (used for troubleshooting software problems).
- SYS: this folder holds instrument configuration files, as used by Device Manager



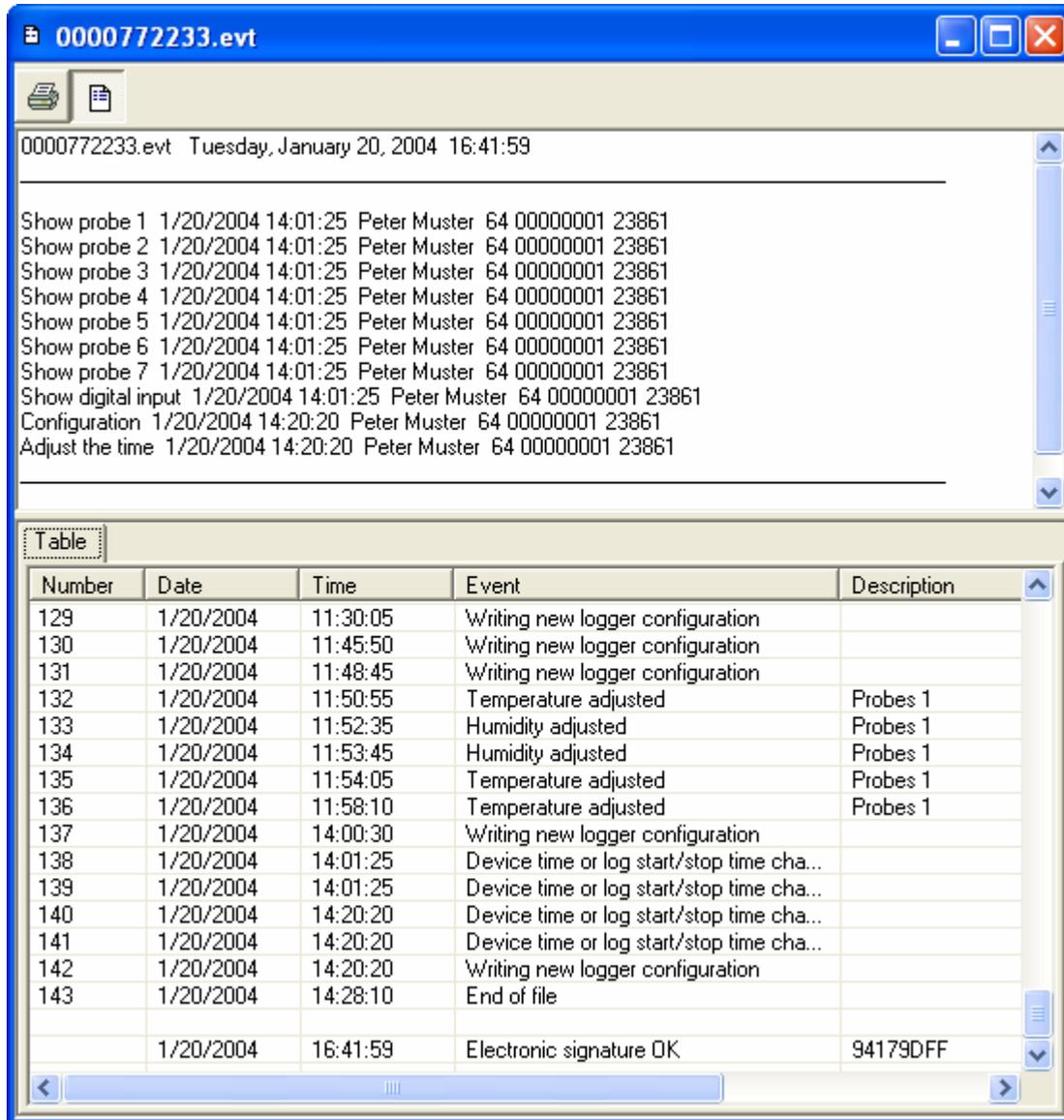
Highlight one of the files present in the folder. To open or delete the file, click on File Operations in the HW4 explorer menu bar or right click on the file to open a small menu next to the file name.

Files located on the logger

- Event and Configuration files

In the left pane of HW4 Explorer, select the Events and Configuration Files tab and right click on any file. This opens a small menu box next to the file name. Select with the mouse the desired file operation.

Example of a logger event file (file extension .EVT)



0000772233.evt Tuesday, January 20, 2004 16:41:59

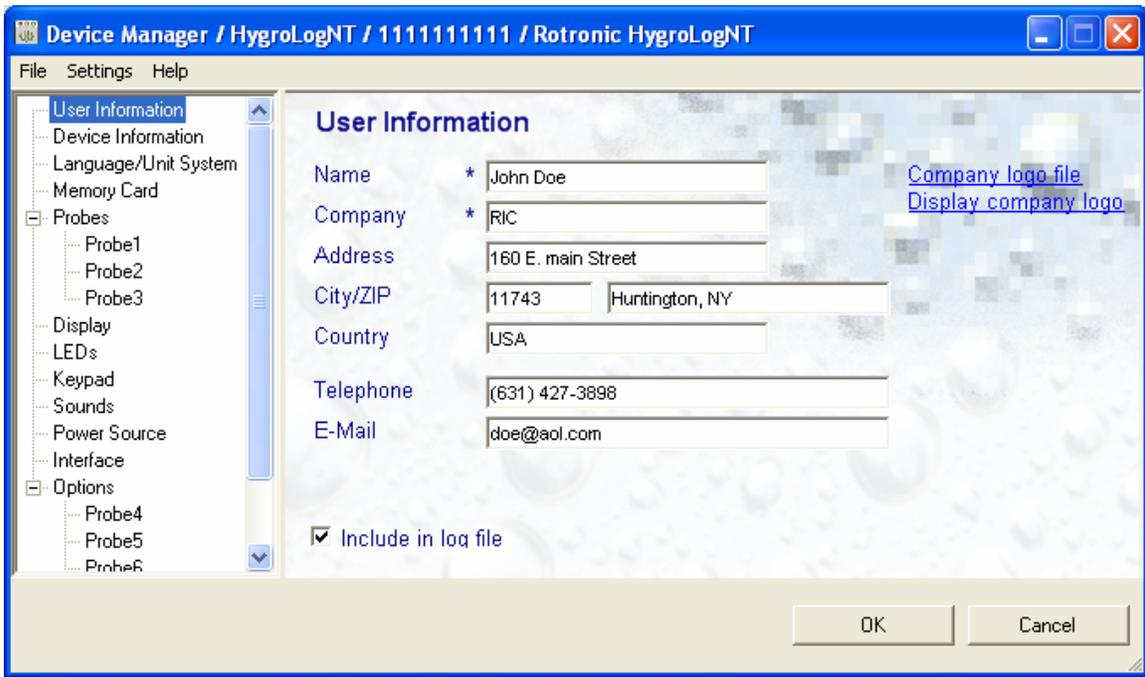
Show probe 1 1/20/2004 14:01:25 Peter Muster 64 00000001 23861
Show probe 2 1/20/2004 14:01:25 Peter Muster 64 00000001 23861
Show probe 3 1/20/2004 14:01:25 Peter Muster 64 00000001 23861
Show probe 4 1/20/2004 14:01:25 Peter Muster 64 00000001 23861
Show probe 5 1/20/2004 14:01:25 Peter Muster 64 00000001 23861
Show probe 6 1/20/2004 14:01:25 Peter Muster 64 00000001 23861
Show probe 7 1/20/2004 14:01:25 Peter Muster 64 00000001 23861
Show digital input 1/20/2004 14:01:25 Peter Muster 64 00000001 23861
Configuration 1/20/2004 14:20:20 Peter Muster 64 00000001 23861
Adjust the time 1/20/2004 14:20:20 Peter Muster 64 00000001 23861

Number	Date	Time	Event	Description
129	1/20/2004	11:30:05	Writing new logger configuration	
130	1/20/2004	11:45:50	Writing new logger configuration	
131	1/20/2004	11:48:45	Writing new logger configuration	
132	1/20/2004	11:50:55	Temperature adjusted	Probes 1
133	1/20/2004	11:52:35	Humidity adjusted	Probes 1
134	1/20/2004	11:53:45	Humidity adjusted	Probes 1
135	1/20/2004	11:54:05	Temperature adjusted	Probes 1
136	1/20/2004	11:58:10	Temperature adjusted	Probes 1
137	1/20/2004	14:00:30	Writing new logger configuration	
138	1/20/2004	14:01:25	Device time or log start/stop time cha...	
139	1/20/2004	14:01:25	Device time or log start/stop time cha...	
140	1/20/2004	14:20:20	Device time or log start/stop time cha...	
141	1/20/2004	14:20:20	Device time or log start/stop time cha...	
142	1/20/2004	14:20:20	Writing new logger configuration	
143	1/20/2004	14:28:10	End of file	
	1/20/2004	16:41:59	Electronic signature OK	94179DFF

The HygroLog NT keeps internally track of the last 170 operations, events and configuration changes in its internal EEPROM memory as well as in the .EVT file located on the memory card.

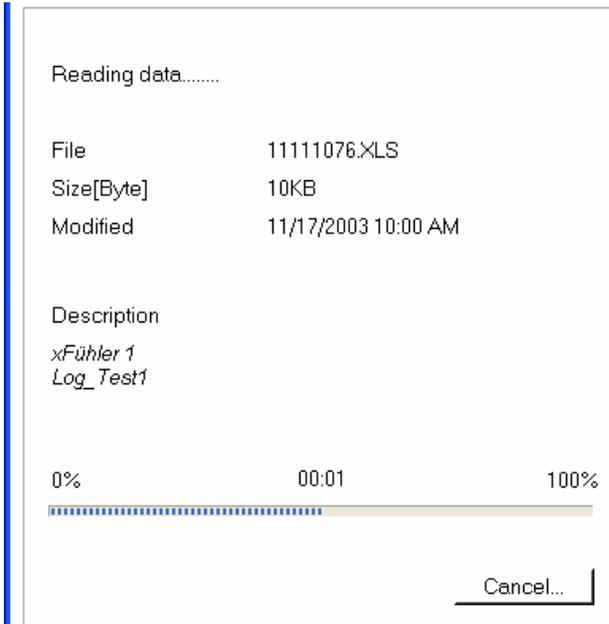
Example of a logger configuration file (file extension .DAT)

The contents of a logger configuration files are displayed using the Device Manager (for details, see Device Manager)



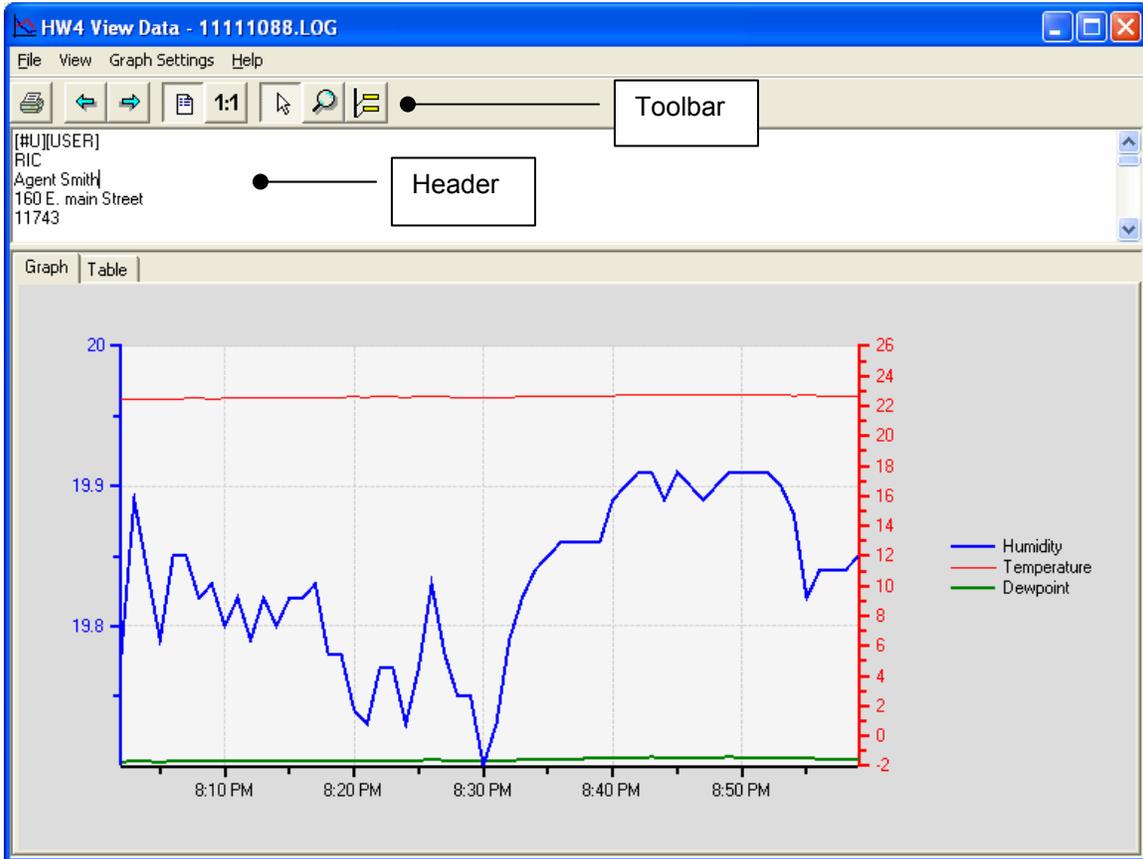
- Data files

In the left pane of HW4 Explorer, select the Log Files tab and right click on the file. This opens a small menu box next to the file. Click with the mouse on Open. HW4 first downloads the file:



HW4 View Data

To open a data file from the logger or PC, HW4 uses the View Data form:



Click with the mouse on the Graph tab to view the data in a graph or click on the Table tab to view the data in a table.

HW4 View Data Menu Bar

File

- **Save:** if the file is located on the computer, this saves the file to its original location under the original file name.
- **Save As:** saves the file to any location on the computer, under any name.
- **Print graph / Print table:** the text for this command depends on which tab (Graph or Table) is selected in HW4 View Data. The command opens the Windows printer form and prints the graph or table on the specified printer.

Print graph: the log file name is added to the top of the graph when the graph is being printed.

Print table: the full header is printed before the table. It is possible to select with the mouse a number of line from the table, prior to printing. The header and the only the selected lines can be printed.

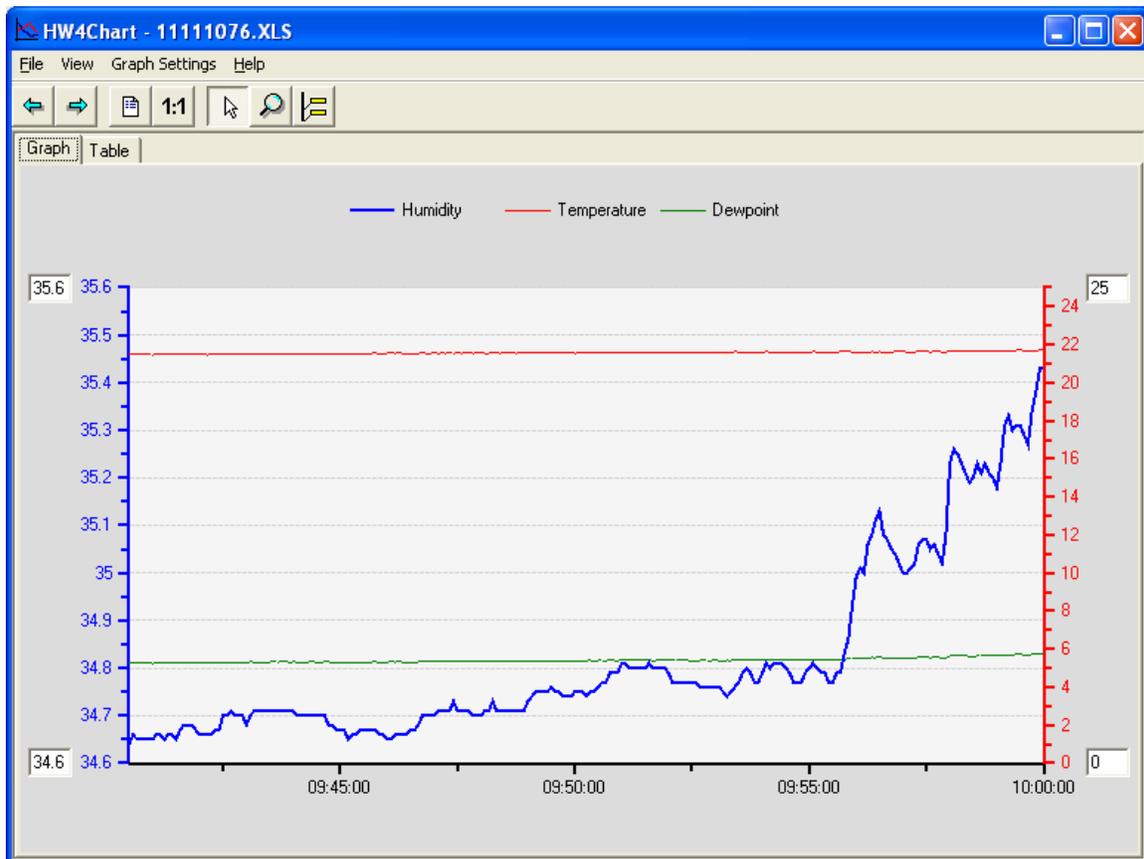
- **Exit:** exits HW4 View Data

View

- **Toolbar:** shows or hides the toolbar (used only with the graph).
- **Header:** shows or hides the header area of the form.
- **Data Summary:** adds the following information to the header: average, minimum, maximum and standard deviation for each parameter recorded in the file.

Graph Settings

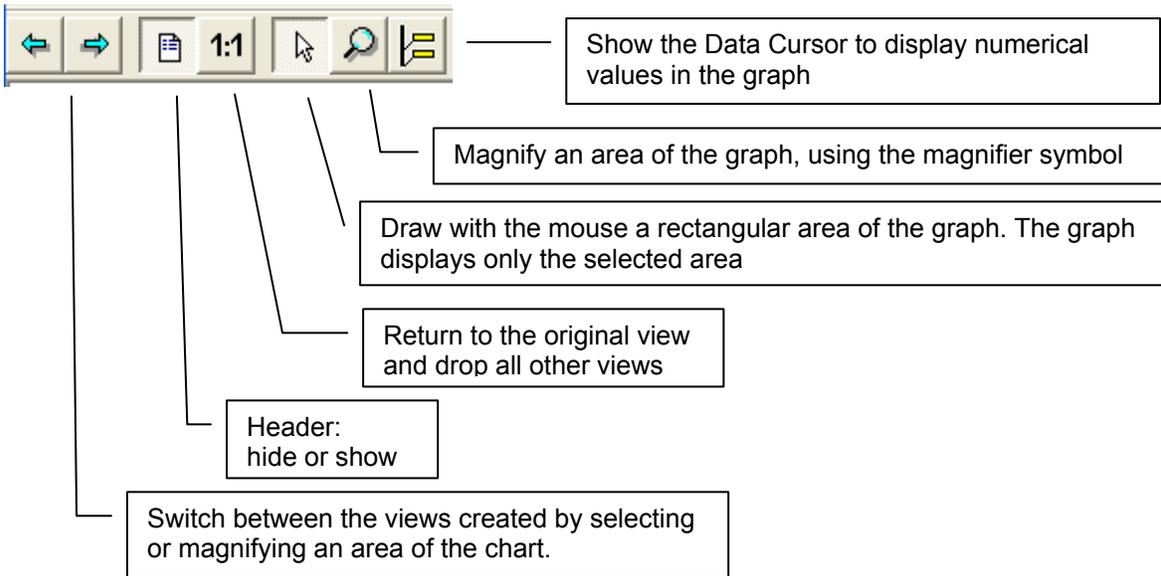
- **Legend:** hides or shows the graph legend. The legend can be shown on top of the graph, below the graph, or to the left or right of the graph.
- **Show secondary Y axis:** when this option is selected HW4 adds a second Y axis to the graph. The primary axis is always used for relative humidity (or water activity). The other parameters share the secondary axis.
- **Manual scale:** select this item to specify the scale of each axis in the graph. The minimum and maximum values of each axis can be typed directly into the text boxes located next to the top and bottom of each axis. HW4 automatically redraws the graph.



Help

- **HW4 Help:** opens HW4 Help.
- **About HW4:** displays the version number and ID number of HW4.

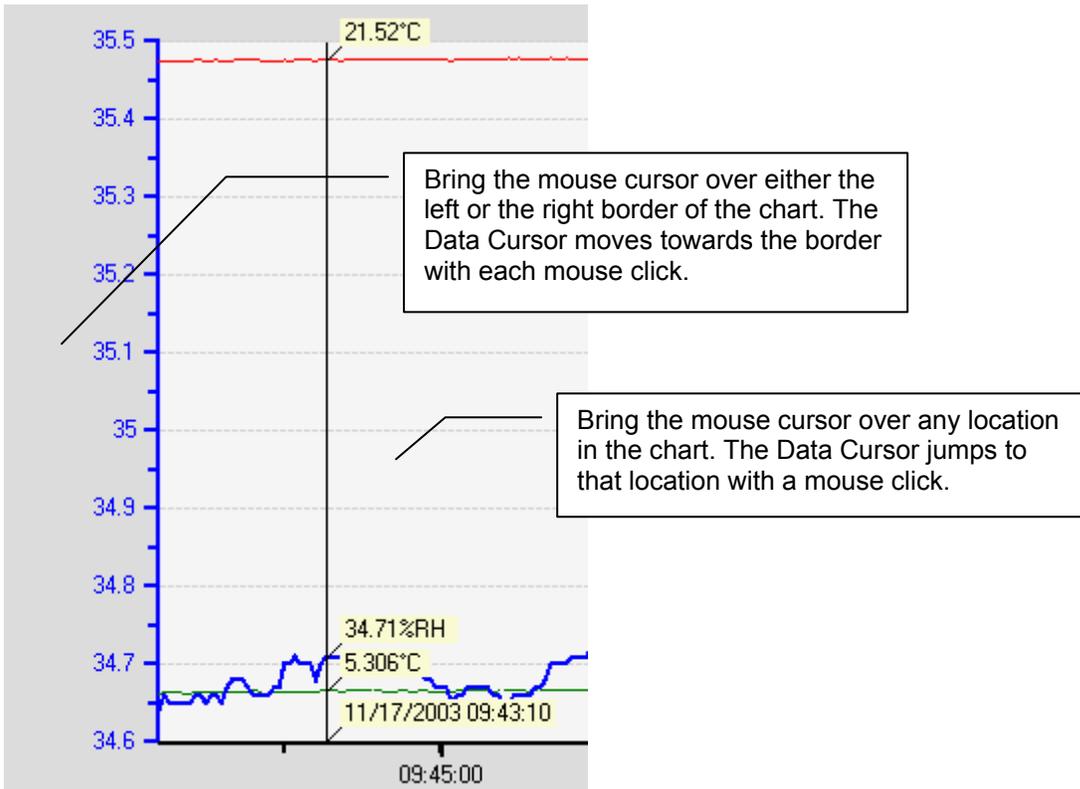
HW4 View Data Toolbar



Graph Tab

Using the Data Cursor

In the toolbar, left click on the Data Cursor button. The Data Cursor appears as a vertical bar on the graph.



Selecting which trace to show on the graph

Right clicking with the mouse over any area of the graph opens the following menu:

- Insert text box (see Adding text notes, further down)
- Show all traces: displays all available traces on the graph

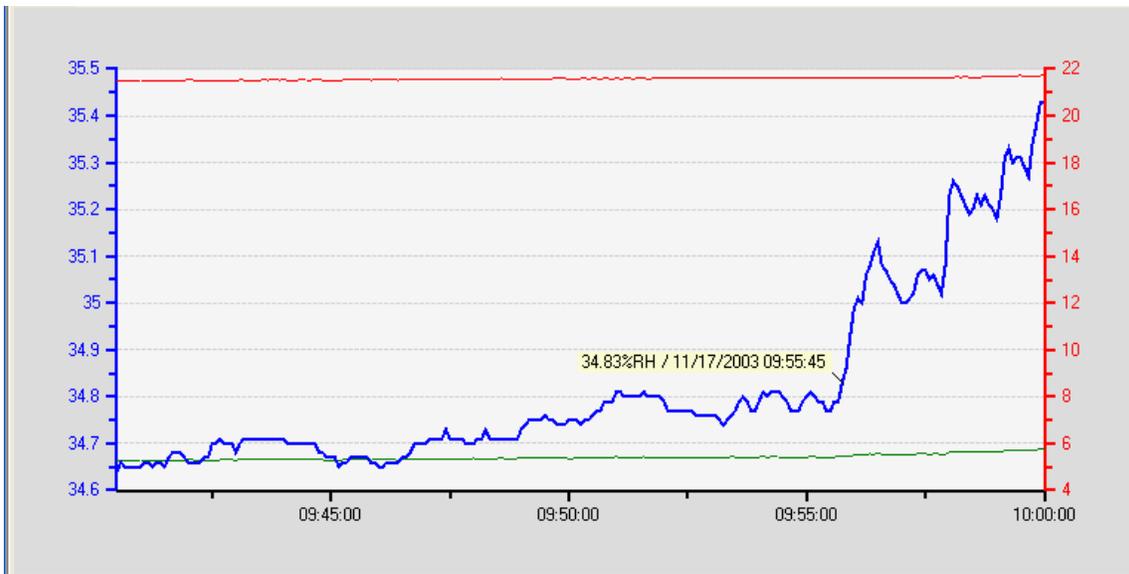
To select a trace, bring the mouse cursor over one of the chart traces. The cursor changes to a hand. Right click with the mouse to select the trace. The color of the trace changes and the following menu opens:

- Hide this trace
- Show this trace only
- Show alarm band: shows on the graph the alarm settings (if any) for the selected trace. The alarm band can be displayed only for one trace at a time. The alarm band appears as two shaded areas of the same color as the trace. To hide, deselect the menu item.
- Attach text/data box (see further down)
- Show all traces

Note: when the scale of the graph is in the automatic mode, showing the alarm band for one of the traces usually results in a different scale. If the new scale is inconvenient, select "Manual scale" under "Graph Settings" in the HW4 View Data menu bar.

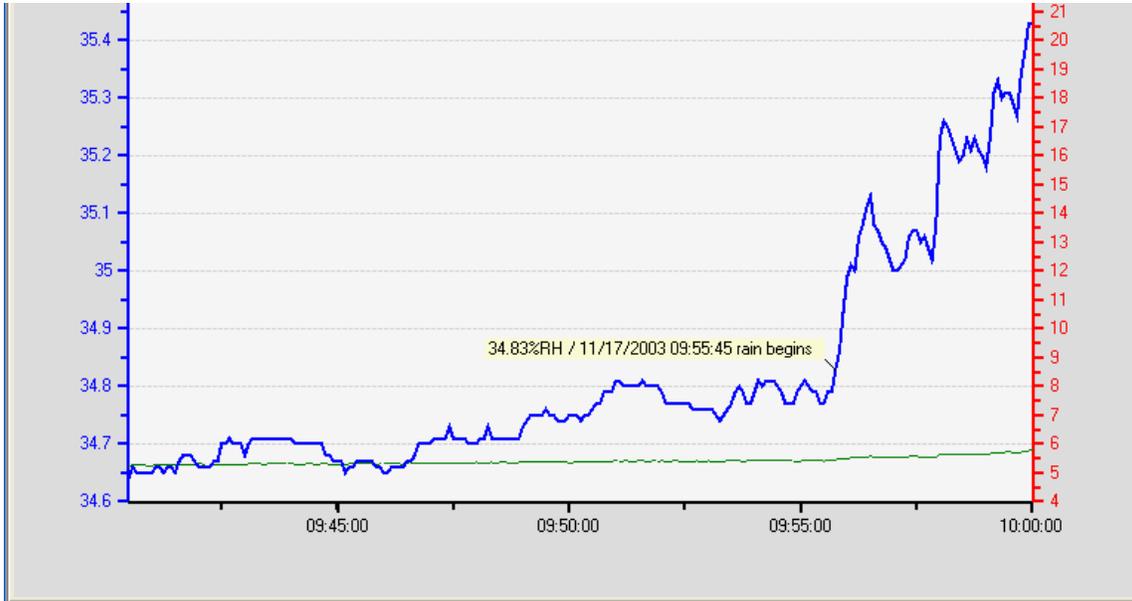
Attaching a text / data box to a trace

This menu item creates a text / data box that is attached to a specific location of the selected trace. Upon selecting this menu item, the mouse cursor changes to a cross. By default, HW4 fills the text box with data corresponding to the location of the mouse cursor. Move the mouse cursor (cross) to any location on the trace. The data in the box changes as the box moves along the trace. To attach the text box, left click with the mouse when the cursor is at the desired location. The mouse cursor jumps inside the text box and the text inside the box is highlighted (edit mode). Left click with the mouse to edit the contents of the box. Use the keyboard arrow keys to move the cursor to a location where text is to be inserted or added. When done, left click with the mouse anywhere in the graph.



Bringing the mouse cursor over the text box makes the cursor change into a hand. At that time, right clicking with the mouse opens another menu:

- Edit text box: use to add text after the numerical data or to replace the numerical data with text
- Delete text box
- Orientation: use one of the available options to place the text box at a convenient location



Adding text notes directly in the graph

To create a text note that is not attached to any specific trace, use the following two steps:

- a) Create and position the text box: bring the mouse cursor to the location of the graph where you want to add a text note. Right click with the mouse. This opens a small menu. In this menu, select Insert Text Box. The mouse cursor changes to a cross and a textbox is created with the text: "Enter text here". Move the cross to the desired location of the text box and left click with the mouse.
- b) Enter the text: right click with the mouse on the text box. This opens a small menu. Select Edit Text Box and type the text in the blue area. When done, left click with the mouse

Deleting a text note

Bring the mouse cursor over the text box. The cursor changes to a hand. Right click with the mouse. This opens a small menu. Select Delete Text Box and left click with the mouse

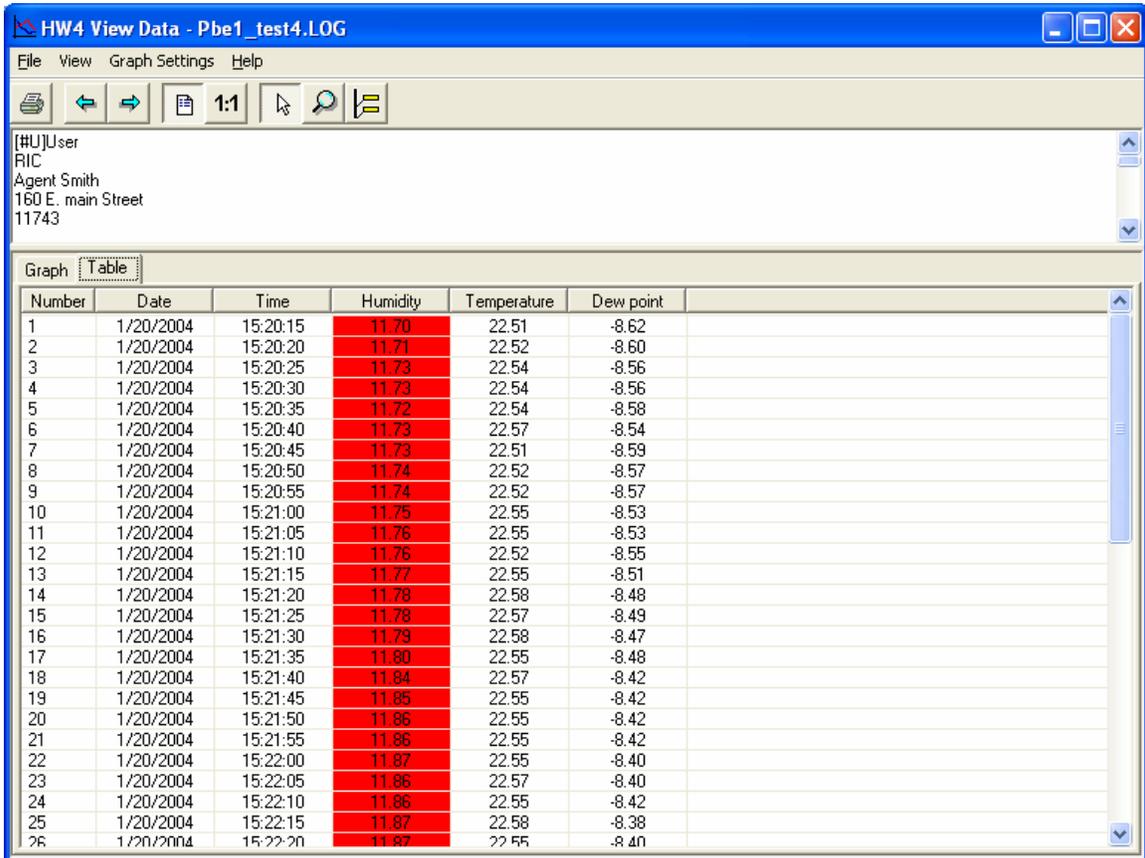
Including Statistical Data in the File Header

When the log file header is being displayed, it can be made to include the following information for each parameter recorded in the log file:

- Average
- Minimum
- Maximum
- Standard deviation

To include statistical data in the header, proceed as follows: in the HW4Chart menu bar, click with the mouse on View in the HW4 View Data menu bar. Click on Data Summary (a check mark will appear).

Table Tab



The screenshot shows the HW4 View Data application window for file 'Pbe1_test4.LOG'. The window has a menu bar (File, View, Graph Settings, Help) and a toolbar with icons for printing, navigation, and zooming. Below the toolbar, there is a text area containing user information: '[#U]User', 'RIC', 'Agent Smith', '160 E. main Street', and '11743'. Below this, there are tabs for 'Graph' and 'Table', with 'Table' selected. The table displays the following data:

Number	Date	Time	Humidity	Temperature	Dew point
1	1/20/2004	15:20:15	11.70	22.51	-8.62
2	1/20/2004	15:20:20	11.71	22.52	-8.60
3	1/20/2004	15:20:25	11.73	22.54	-8.56
4	1/20/2004	15:20:30	11.73	22.54	-8.56
5	1/20/2004	15:20:35	11.72	22.54	-8.58
6	1/20/2004	15:20:40	11.73	22.57	-8.54
7	1/20/2004	15:20:45	11.73	22.51	-8.59
8	1/20/2004	15:20:50	11.74	22.52	-8.57
9	1/20/2004	15:20:55	11.74	22.52	-8.57
10	1/20/2004	15:21:00	11.75	22.55	-8.53
11	1/20/2004	15:21:05	11.76	22.55	-8.53
12	1/20/2004	15:21:10	11.76	22.52	-8.55
13	1/20/2004	15:21:15	11.77	22.55	-8.51
14	1/20/2004	15:21:20	11.78	22.58	-8.48
15	1/20/2004	15:21:25	11.78	22.57	-8.49
16	1/20/2004	15:21:30	11.79	22.58	-8.47
17	1/20/2004	15:21:35	11.80	22.55	-8.48
18	1/20/2004	15:21:40	11.84	22.57	-8.42
19	1/20/2004	15:21:45	11.85	22.55	-8.42
20	1/20/2004	15:21:50	11.86	22.55	-8.42
21	1/20/2004	15:21:55	11.86	22.55	-8.42
22	1/20/2004	15:22:00	11.87	22.55	-8.40
23	1/20/2004	15:22:05	11.86	22.57	-8.40
24	1/20/2004	15:22:10	11.86	22.55	-8.42
25	1/20/2004	15:22:15	11.87	22.58	-8.38
26	1/20/2004	15:22:20	11.87	22.55	-8.40

Values that correspond to an alarm condition (if any was specified for the probe in Device Manager) are shown over a red background.

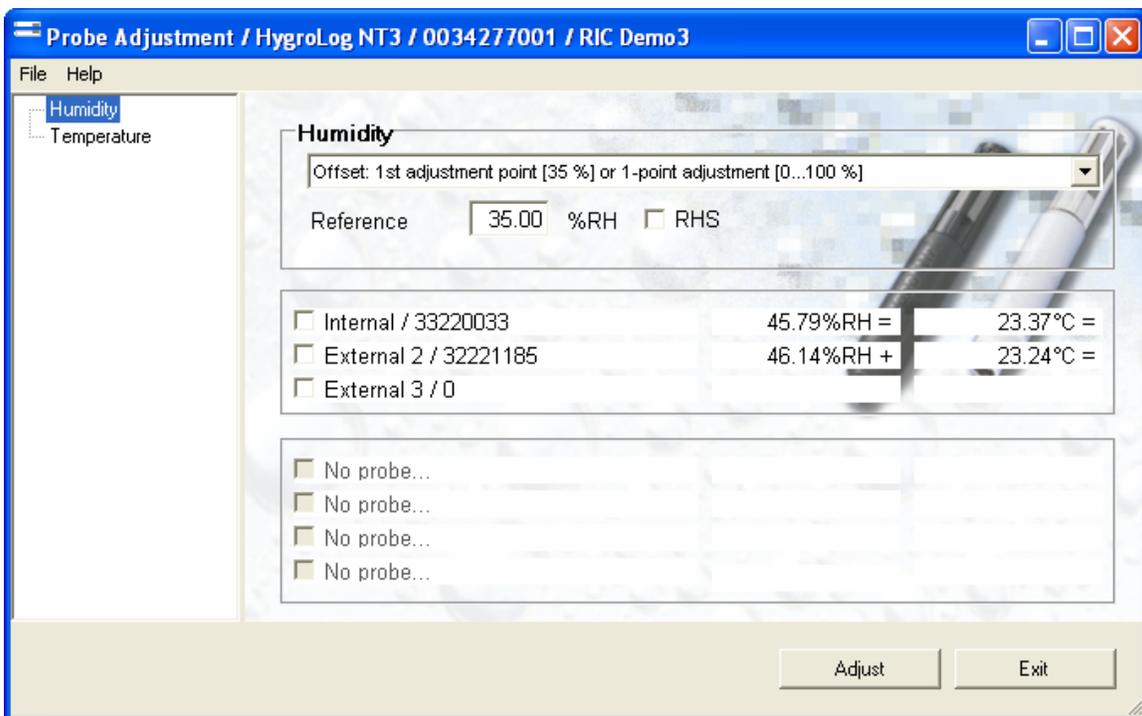
Probe Adjustment

Overview

This function is used to adjust against reference humidity and temperature conditions any HygroClip digital probe connected to the HygroLog NT. HW4 cannot be used to adjust ROTRONIC analog probes or probes from third parties. One probe can be adjusted at a time or all probes connected to the instrument can be simultaneously adjusted.

IMPORTANT:

- Do not interrupt the adjustment process while HW4 and the instrument are communicating as this may give unexpected results.
- Adjustment of a probe is not recommended when data logging of any kind is in progress.



Menu Bar

The menu bar is located at the top of the Probe Adjustment form.

File

- **Exit:** exits the Adjust Form

Help

- **HW4 Help:** Opens HW4 Help
- **About HW4:** Displays the version number and ID number of HW4

Adjusting a probe

IMPORTANT:

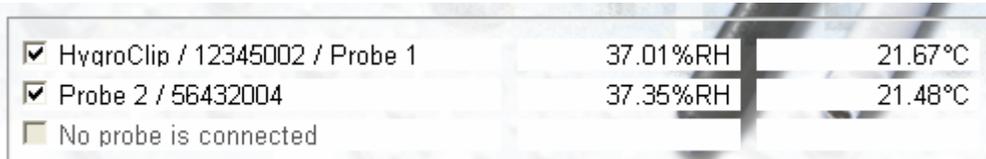
The HygroClip probes compensate the effect of temperature on the humidity sensor. For this reason, any temperature adjustment should be done before adjusting humidity.

HW4 can be used to do either a 1-point probe adjustment or a multi-point adjustment against a known reference environment. During a multi-point adjustment, it is essential to observe the prescribed sequence since each adjustment point influences the next.

The Adjust form displays a list of the instrument probe inputs. Unused inputs can be hidden to simplify the appearance of the form (use Settings in the Device Manager menu bar)

- Select the probe or probes

From the list of probes, check the box to the left of the probe or probes to be adjusted.

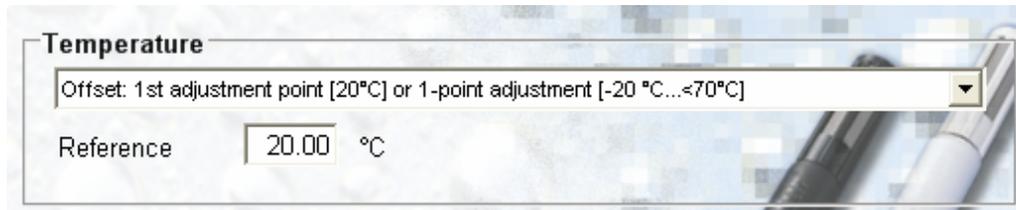


<input checked="" type="checkbox"/>	HygroClip / 12345002 / Probe 1	37.01%RH	21.67°C
<input checked="" type="checkbox"/>	Probe 2 / 56432004	37.35%RH	21.48°C
<input type="checkbox"/>	No probe is connected		

- Temperature adjustment

a) Select Temperature in the left pane of the form.

b) Select the type of adjustment by clicking on the arrow located to the right of the list box shown below. **In the case of a 2-point adjustment, it is important to follow the sequence provided further down.**



Temperature

Offset: 1st adjustment point [20°C] or 1-point adjustment [-20 °C...<70°C]

Reference °C

2-point adjustment sequence

Adjust at the low temperature value first. HW4 uses the low temperature value to compute the offset and the high temperature value to compute the gain.

- 1: < 70 °C (158°F) offset adjustment or 1-point calibration (at any value)
- 2: ≥ 70 °C (158 °F) gain adjustment

For best accuracy, we recommend using a temperature low value close to 20°C (68°F). Preferably, the difference between the high and low values should be at least 50 °C (90 °F).

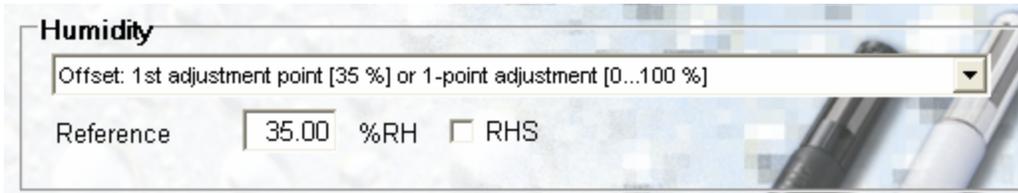
c) Enter the value of the reference temperature in the Reference box.

d) When the probes to be adjusted shows stable temperature readings, click with the mouse on the Adjust button.

- Humidity adjustment

a) Select Humidity in the left pane of the form.

b) Select the type of adjustment by clicking on the arrow located to the right of the list box shown below. **In the case of a multi-point adjustment, it is important to follow the sequence provided further down.**



Multi-point adjustment sequence

Adjust according to the sequence indicated below:

- 1: 35 %RH ¹⁾ offset adjustment or 1-point calibration (at any value)
- 2: >55 %RH ¹⁾ gain adjustment
- 3: >1 %RH...≤25 %RH sensor linearity adjustment (optional)
- 4: ≤ 1 %RH sensor linearity adjustment (optional)

1) For best accuracy, we recommend using values close to 35 %RH and 80 %RH

c) Enter the value of the reference humidity in the Reference box. If using a ROTRONIC certified humidity standard, check the RHS box (RHS: ROTRONIC certified humidity standard)

When the RHS box is checked, the effect of temperature on the standard is automatically compensated and no further correction is required. Information on the effect of temperature on each standard is provided on the cover of each box of standards. The value of the standards is not affected by barometric pressure (site elevation).

d) When the probe to be adjusted shows stable humidity readings, click with the mouse on the Adjust button.

Probe Adjustment Basics

Temperature

Note: the stability of the Pt100 RTD sensor used to measure temperature is such that temperature adjustment in the field is seldom required. In order to be able to correctly evaluate the accuracy of the temperature measurements provided by the probe, you should be able to meet the following requirements:

- Both the probe and a reference thermometer should be ventilated with the same stream of air. Any dust filter cartridge used to protect the sensors should be removed from the probe. If the probe has a protective slotted cap, this should be left on the probe.
- Air velocity at the sensor should be within the limits of 200 to 500 ft/minute (1 to 2.5 m/sec). Any comparison between two instruments at a velocity under 200 ft/minute may not be valid. Air velocity above 500 ft/minute may damage the unprotected humidity sensor.
- The temperature of the air stream should be practically constant.

Humidity

- Temperature stability is the single most important requirement. If possible, adjust the probe at room temperature (18 to 25°C). Room temperature should be stable to $\pm 0.25^{\circ}\text{C}$ or better during the period of time required for each adjustment. Do not adjust close to an air vent or a heater, in direct exposure to sun rays, etc.

If using a humidity generator to calibrate the probe, make sure that the probe is as fully immersed in the generator as possible to minimize temperature effects.

ROTRONIC provides easy-to-use, certified humidity standards (RHS) for users who do not have access to a humidity generator. To use these standards, you will need a calibration device that is suitable for the probe.

Calibration device

A calibration device is a small airtight container that fits on the probe and seals around the humidity sensor. During calibration, known reference humidity is produced inside the calibration device by means of a humidity standard (usually an aqueous salt solution). To find out which model of calibration device is suitable for a specific probe, please consult the probe documentation.



ROTRONIC certified humidity standards

The ROTRONIC certified standards are available in boxes of 5 glass ampoules of the same value, which can be stored indefinitely. Standards in the range of 5 to 95 %RH are non-saturated aqueous salt solutions that are precisely titrated at our factory for the right concentration. The 0 %RH humidity standard is made of small granules of a highly porous ceramic that have been dried at a high temperature. A Material Safety Data Sheet is available for each standard. Since most standards are a salt solution, parts which have come in contact with the liquid should be cleaned after each use.

Each box of standards comes with a certificate that provides statistical information on the manufacturing batch of the standard. Information on the effect of temperature on each standard is provided on the cover of each box of standard. When calibrating with the HW4 software (RHS box checked), the effect of temperature on the standards is compensated by the software and no further correction is required. The value of the standards is not affected by barometric pressure (site elevation).



Using the ROTRONIC humidity standards

- Install the calibration device on the probe so that the receptacle (or solution holder) is under the probe. Check for a tight fit and remove the receptacle from the calibration device. Place one fiber disc (each box of standards includes 5 discs) in the receptacle of the calibration device. The purpose of this disc is to prevent accidental spilling of the solution inside the calibration device or on the humidity sensor.
- Tap the top of the ampoule so that all liquid drops to the bottom of the ampoule. Snap off top and empty contents on fiber disc. Since the ampoule is made of glass, exercise proper caution (gloves, safety glasses) when snapping off the top.
- Put the receptacle back on the calibration device and make sure that the solution does not come in contact with the sensor: The solution inside the calibration device should never be on top of the probe sensors.
- Allow at least 60 minutes insuring that the calibration device, the solution and the sensor are in a state of equilibrium. This is verified by monitoring the values being displayed.
- After adjusting the probe, remove the receptacle from the calibration device. Throw away the wet disc (non reusable). Thoroughly wash and dry the receptacle, removing all traces of the humidity standard.