HW4 Software version 3

Device Manager
HygroLab C1 Humidity Temperature Indicator

Table of contents

1   ORGANIZATION OF THE HW4 MANUALS

The HW4 manuals are organized in separate books so as to limit the size of the individual documents. A list of the HW4 manuals is provided in document **E-M-HW4v3-DIR**

HW4 Manuals	Contents
HW4 Main Book	General software description Installation, start-up and settings Device connection methods Functions common to all devices used with HW4
Device Specific Functions 1 (separate book for each device type or model)	Legacy devices (original HygroClip technology): o HygroLog NT data logger o HygroFlex 2, HygroFlex 3 and M3 transmitters (same icon in device tree) o HygroLab 2 and HygroLab 3 bench indicators o HygroPalm 2 and HygroPalm 3 portable indicators o HygroClip DI digital interface o HygroClip Alarm programmable logic o HygroStat MB Device Manager (device configuration) and other device specific functions
Probe Adjustment 1	Humidity and temperature adjustment function common to all legacy devices (original HygroClip technology)
Device Specific Functions 2 (separate book for each device type or model)	Devices based on the AirChip 3000 technology: o HygroClip 2 (HC2) probes o HF3 transmitters and thermo-hygrostats o HF4 transmitters o HF5 transmitters o HF6 transmitters o HF7 transmitters o HF8 transmitters o HL20 and HL21 data loggers o HP21, HP22 and HP23 hand-held indicators o HygroLab C1 table-top indicator o LOG-RC Wireless Data Loggers o Custom designed OEM products Device Manager (device configuration) and Data Logging functions
Probe Adjustment 2	Humidity and temperature adjustment function common to all devices based on the AirChip 3000 technology
Data Recording	Data recording function common to all devices based on the AirChip 3000 technology

Both the HW4 manuals (software) and device specific manuals (hardware) are available from the HW4 CD. The manuals can also be downloaded from several of the ROTRONIC web sites.

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2   OVERVIEW

This section of the HW4 manual covers only the following HW4 module:

HW4 Functional Modules for the HygroLab C1	Usage
Device Manager	o HygroLab C1 user configurable settings and functions

o   HW4 functions that are not device dependent are covered in the HW4 manual **E-M-HW4v3-Main**.

2.1   *Functions and settings overview*

By itself, the HC2 probe (HygroClip 2) used with the HygroLab C1 indicator is already a full-fledged measuring instrument that can be used as a stand-alone device. The role of the HygroLab C1 indicator is to provide power to the HC2 probe and to offer additional functionality and features such as: local data display, local keypad for accessing most settings and functions, calculation of additional psychrometric parameters, manual data capture, automatic data recording, water activity measurement and probe adjustment.

It is important to note that when used together, the HygroLab C1 indicator and HC2 probe (HygroClip 2) constitute a 2-component system. Each system component has its own microprocessor, firmware and functions. Some of these functions are unique to each system component. Other functions are found in both components.

The functions and settings of the HygroLab C1 indicator and HygroClip 2 probe (HC2) operate together as indicated below:

Function / Setting	HygroLab C1	HC2	Notes
Device protection	X	X	Individual to the HygroLab C1 and HC2 probe
Device Name	X	X	User defined description The device name of the HC2 probe is not displayed by HW4 and is replaced with the HygroLab C1 Input Name
Calculation	X	X	Psychrometric calculation HygroLab C1 setting overrides HC2 probe setting
Fixed pressure value	X		Barometric pressure used for some psychrometric calculations
Simulator function	X	X	Generates fixed humidity and / or temperature value When enabled, HygroLab C1 settings override the HC2 probe settings
Unit system	X	X	HygroLab C1 setting overrides HC2 setting regarding the HygroLab C1 HC2 probe settings still apply at the level of the probe
Out-of-limits value alarm	X	X	HygroLab C1 settings are independent from the HC2 probe settings. The HygroLab C1 does not monitor out-of-limit values defined at the level of the probe. Out-of-limit values should be defined at the level of the HygroLab C1
Display	X		No effect on the HC2 probe

| Function / Setting	HygroLab C1	HC2	Notes
Automatic RH sensor test and compensation		X	The sensor status can be read with HW4 but not with the HygroLab C1 display
Sensor alarm and sensor failure mode		X	The HC2 probe can be configured to trigger an alarm when the RH sensor test returns a bad result. Independently of the RH sensor test, the HC2 probe will trigger an alarm in the event of a major failure of either the RH or temperature sensor (shorted or open sensor). Additionally, the HC2 probe can be configured to generate a fixed value for humidity and temperature whenever a sensor alarm is triggered. The HygroLab C1 will display an alarm when the RH sensor test returns a bad result and will also do so for any shorted or open sensor.
Data capture (AW Mode only)	X		The end result of each Aw measurement can be automatically captured by the HygroLab C1 to a data bin (one data bin per probe input / 500 values per data bin)
Aw Measurement	X		The AW Mode can be enabled, disabled and configured from the HygroLab C1 keypad.

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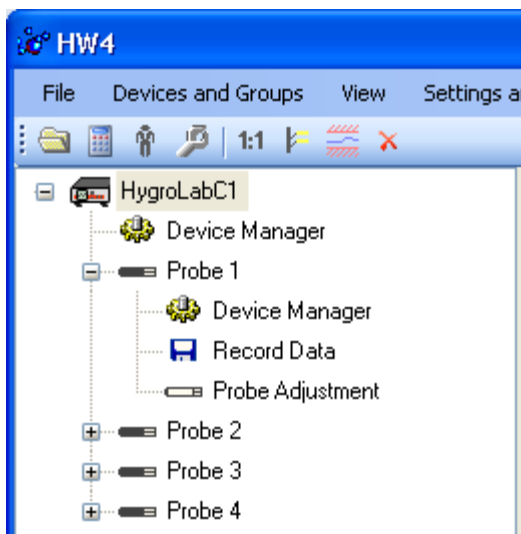## 2.2   *Detecting the HygroLab C1 indicator with HW4*

Use a USB cable to connect the USB connector located on the back panel of the HygroLab C1 indicator to the HW4 PC. Unless already installed, you should install the ROTRONIC USB driver on the PC before running HW4. As an alternative you can connect the HygroLab C1 to the same LAN as the HW4 PC if the HygroLab is equipped with an Ethernet port (RJ45 located on the back panel). In both cases proceed as indicated in document **E-IN-HW4v3-Main** to detect the HygroLab C1.

After being detected by HW4, the HygroLab C1 appears as an icon in the left pane of the HW4 main screen.
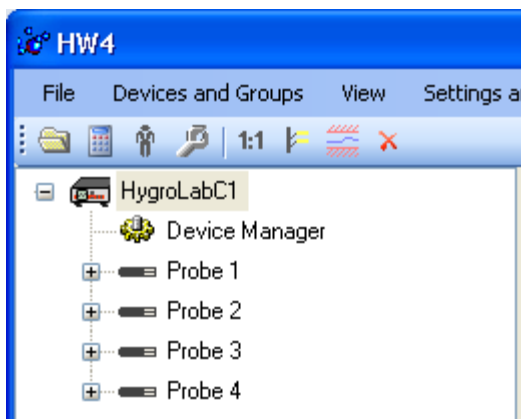
Click on the + sign to the left of the HygroLab C1 icon to display the HygroLab C1 Device Manager module as well as 4 probe icons (one for each of the HygroLab C1 inputs).
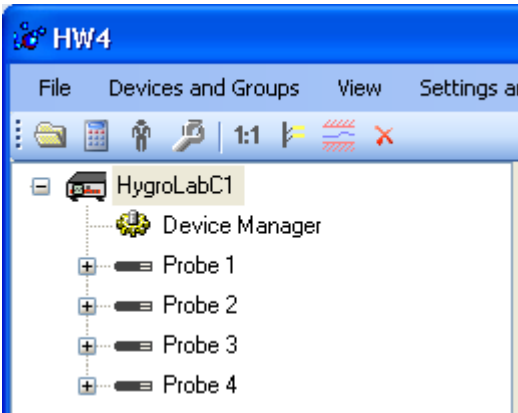
Click on the + sign to the left of a probe icon to display a list of the available functional modules for the probe.

3   DEVICE MANAGER

Device Manager is used to configure the HygroLab C1.

To select the Device Manager for the HygroLab C1, click on it with the left mouse button. HW4 opens the Device Manager form.

Device Manager automatically interrogates the HygroLab C1 and downloads its current configuration.

The different sub-forms that are available within the Device Manager form are listed in a tree located on the left pane of the form. To select a sub-form, click on it with the left mouse button.

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3.1   *Device Manager Menu Bar*

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

File

The file menu is used to save to the PC, or to retrieve from the PC, the configuration settings of the HygroLab C1. The settings are saved in an XML file with the extension DAT. Saving the configuration settings to a file is useful for several reasons:

-   provides a backup when the device configuration has been changed in error
-   provides a means of quickly configuring a replacement device in the exact same manner as the original device
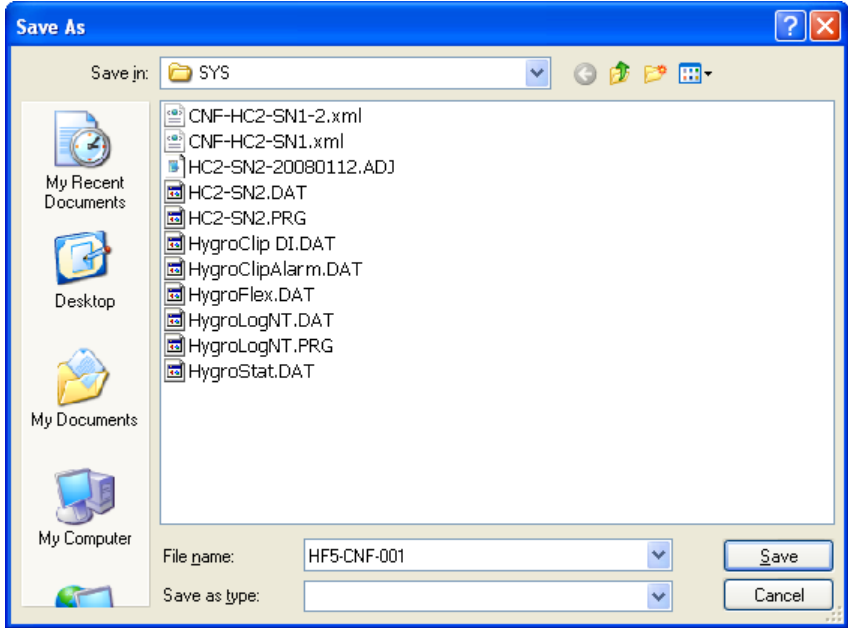-   provides a means of quickly configuring a number of identical devices

Open: opens the device configuration folder specified in HW4 Global Settings - File Locations Tab - and displays all available probe and device configuration files (extension DAT). Select the appropriate file and click on Open in the explorer form. The contents of the configuration file are loaded to the Device Manager form. Review the contents of the Device Manager sub-forms. Click on the Device Manager OK button to write the configuration settings to the device or click on the Cancel button to leave the device unchanged.
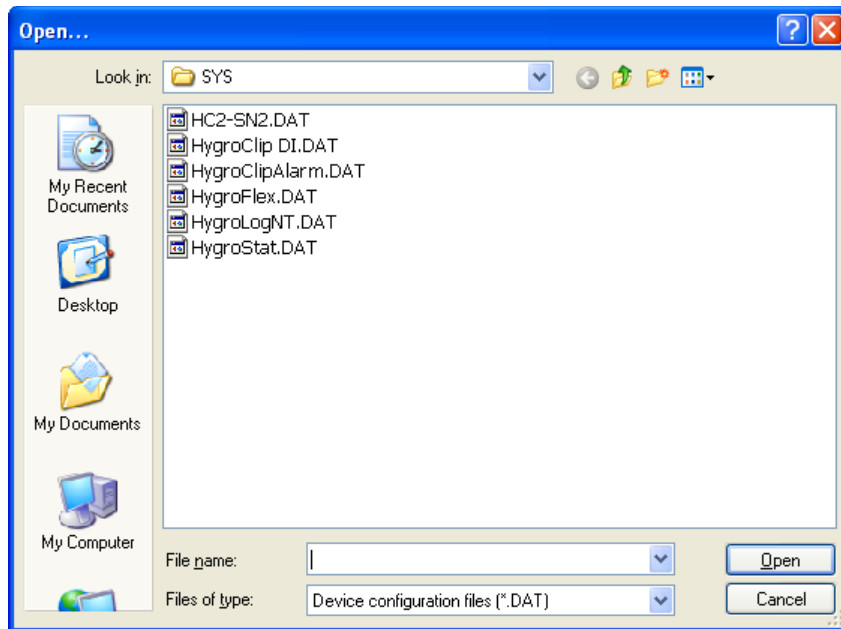
Save As: saves the current configuration to an XML file with the extension DAT) in the device configuration folder specified in HW4 Global Settings - File Locations Tab. If so desired, any directory and any file type may be specified.

Exit: exits Device Manager

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Tools

Firmware Update: This tool is used to update the firmware of the HygroLab C1 after downloading a new firmware file from the ROTRONIC website to your PC. Firmware files are given a name that shows both to which device the file applies and the version number of the firmware. All firmware files have the extension HEX. The ROTRONIC website will publish firmware updates as required.

The tool opens a form that allows you to specify the folder where the firmware update file is located and to select the file. Click on OPEN to start the update process.
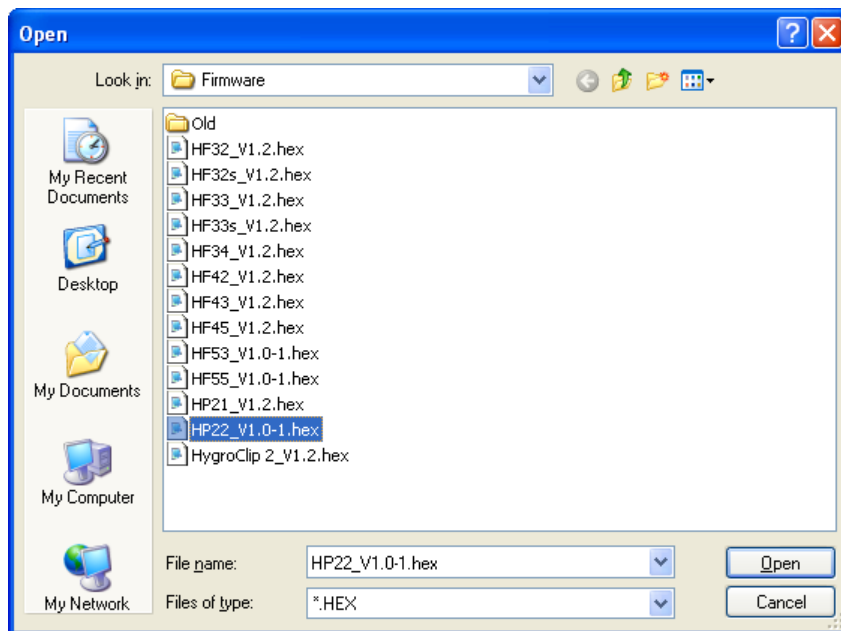
IMPORTANT: the HygroLab C1 must be powered during the entire process. Loss of power when the transmitter is being updated may have unexpected results and prevent future operation of the HygroLab C1.

Generate Protocol: generates a Device Configuration Protocol. This text file is automatically saved in the folder specified in HW4 Global Settings - File Locations Tab. If so desired, any directory and any file type may be specified. This action is not recorded in the User Event file.

Help:

HW4 Help: Opens HW4 Help

About HW4: Displays the version number and ID number of HW4

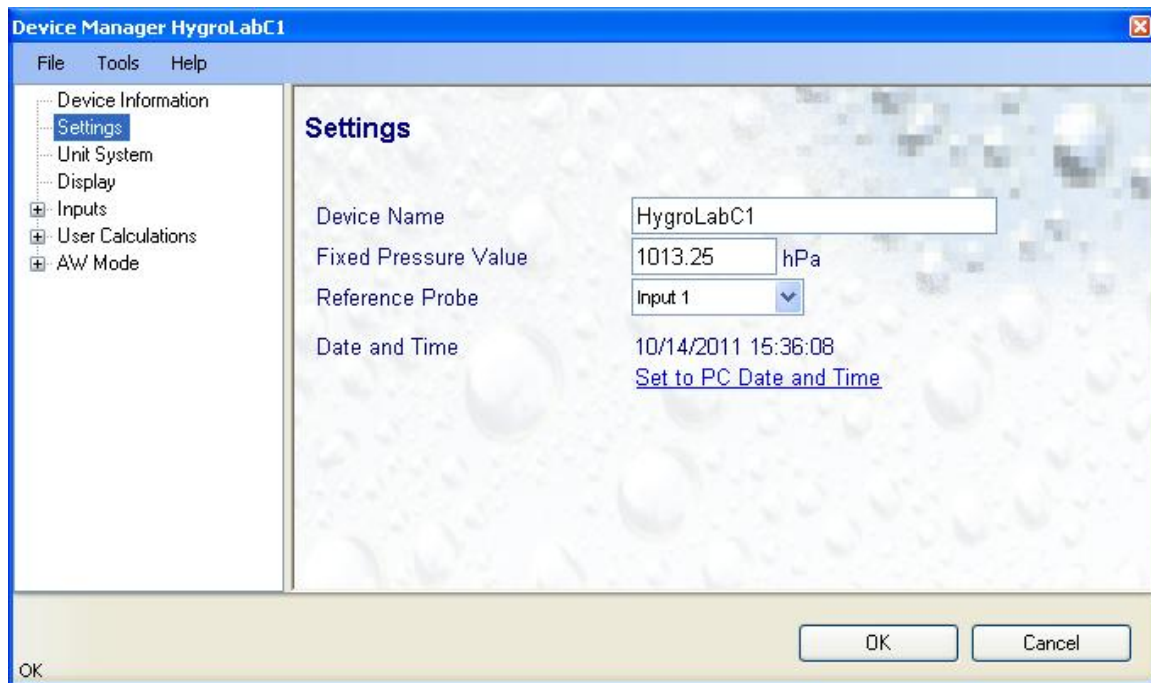| E-M-HW4v3-F2-019_10 | Rotronic AG |
	Bassersdorf, Switzerland
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3.2   *Device Information*

o **Write Protection**: This function is used to prevent unauthorized access to critical functions such as configuration changes, humidity and temperature adjustment, etc Click on the underlined link next to Device Protection. HW4 opens the following form where a password can be entered (maximum 8 characters):

Click on the Device Manager OK button to write the new protection settings to the HygroLab C1.

FORGOT THE PASSWORD? - Power down the HygroLab C1. After powering up the HygroLab C1, you have about one minute to use the default password **!resume!** (include the exclamation marks). After one minute the default password is no longer accepted.

3.3   *Settings*

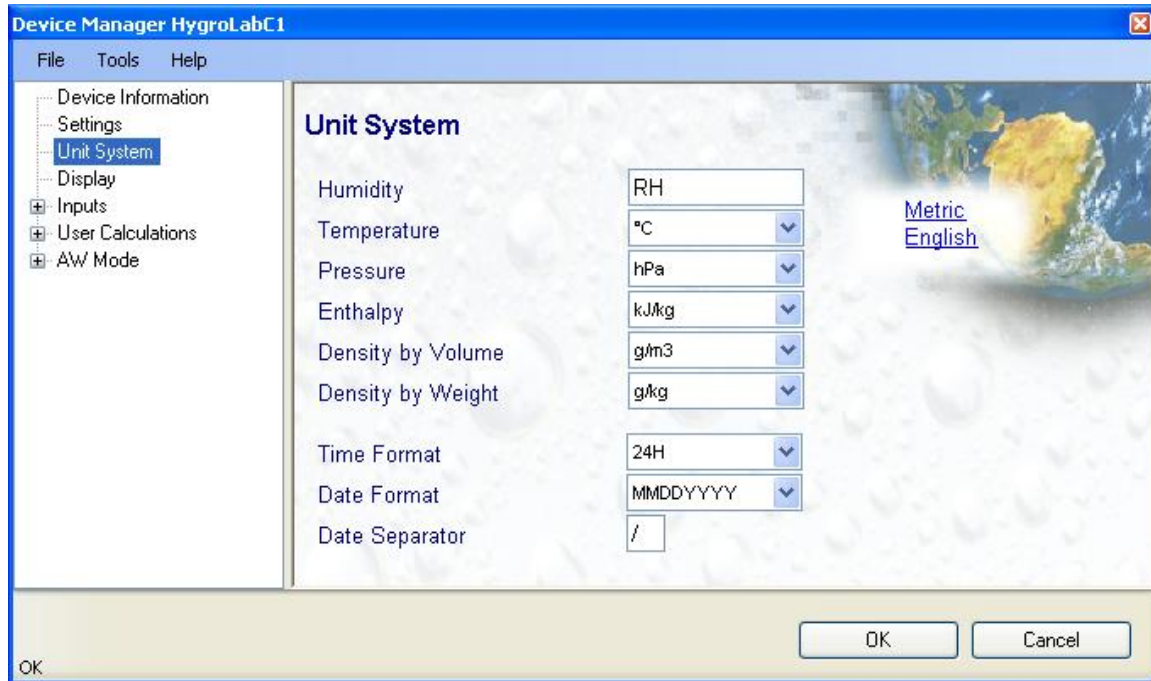**Device Name**: As far as possible use a unique device name (maximum 12 characters)

Fixed Pressure Val.: enter here the fixed numerical value to be used for barometric pressure when calculating the following parameters: Wet bulb temperature, Enthalpy, Specific humidity and Mixing ratio by weight. This numerical value should correspond to the typical barometric pressure at your elevation (or in your process) and should be consistent with the unit system that is being used. Note: when one of the probe inputs is set for an analog pressure probe, the probe measurements are used instead of the fixed pressure value.

Reference Probe: the HygroLab C1 offers the option of calibrating up to 3 probes against a fourth probe that is used as a reference (see hardware manual E-M-HyLabC1 – Probe Calibration and Adjustment Procedures). Use this setting to designate to which probe input the reference probe will be connected.

Set to PC Date and Time: click on this link to immediately set the clock of the HygroLab C1 to the date and time of the PC. Do not use this link when the HygroLab C1 is in the process of measuring water activity.

3.4   *Unit System*

 Humidity: enter here the letters to be used after the "%" symbol used for relative humidity

Temperature and other parameters: Left click on the arrow to the right of the text box and select the engineering unit.
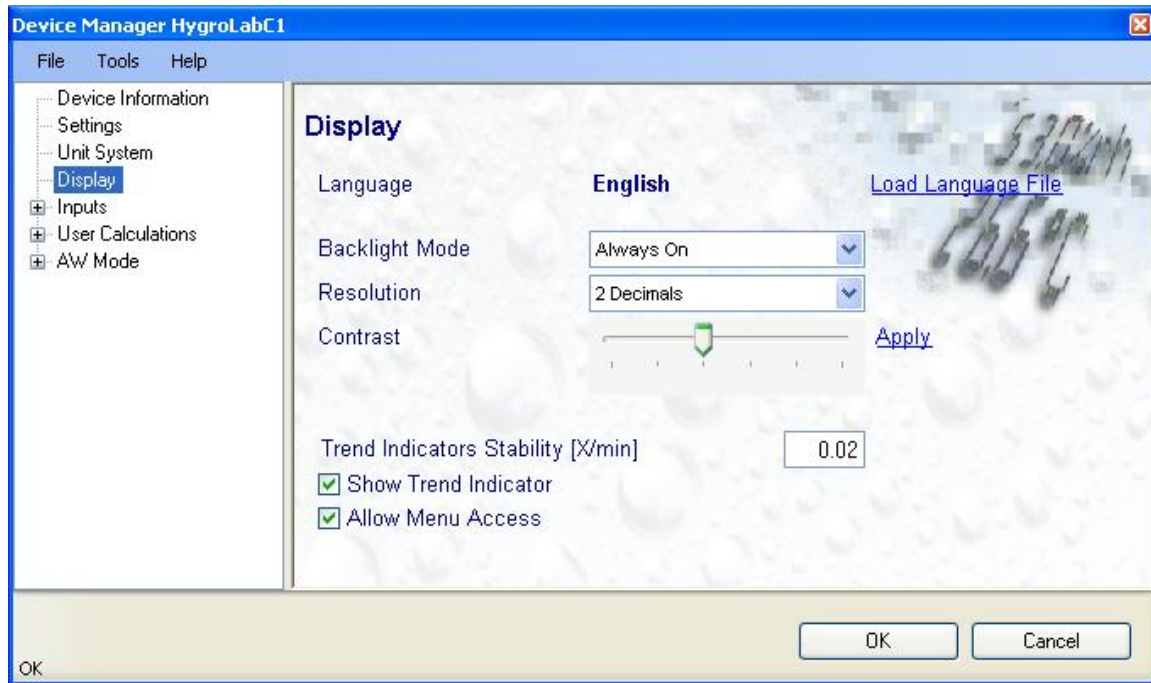
Click with the mouse on the blue links labeled Metric or English to globally set the unit system for all parameters.

Time Format, Date Format, Date Separator: these settings can be changed to match your preferences practices

Note: For both HW4 and the local HygroLab C1 display, the unit system selected for the HygroLab C1 overrides the unit system selected for the probe.

3.5 *Display*

Load Language File: click on this link to change the language of the HygroLab C1 internal menu by writing to the HygroLab C1 the contents of a language file present on your PC

Backlight Mode: click on the arrow to the right of the box and select from Always off, Always on or On Key Press

Resolution: select from the following options one or two decimals

Contrast: use the slider to adjust the contrast of the LC display and click on the Update link to change the contrast. Click on the Update link to write the new contrast setting to the HygroLab C1.
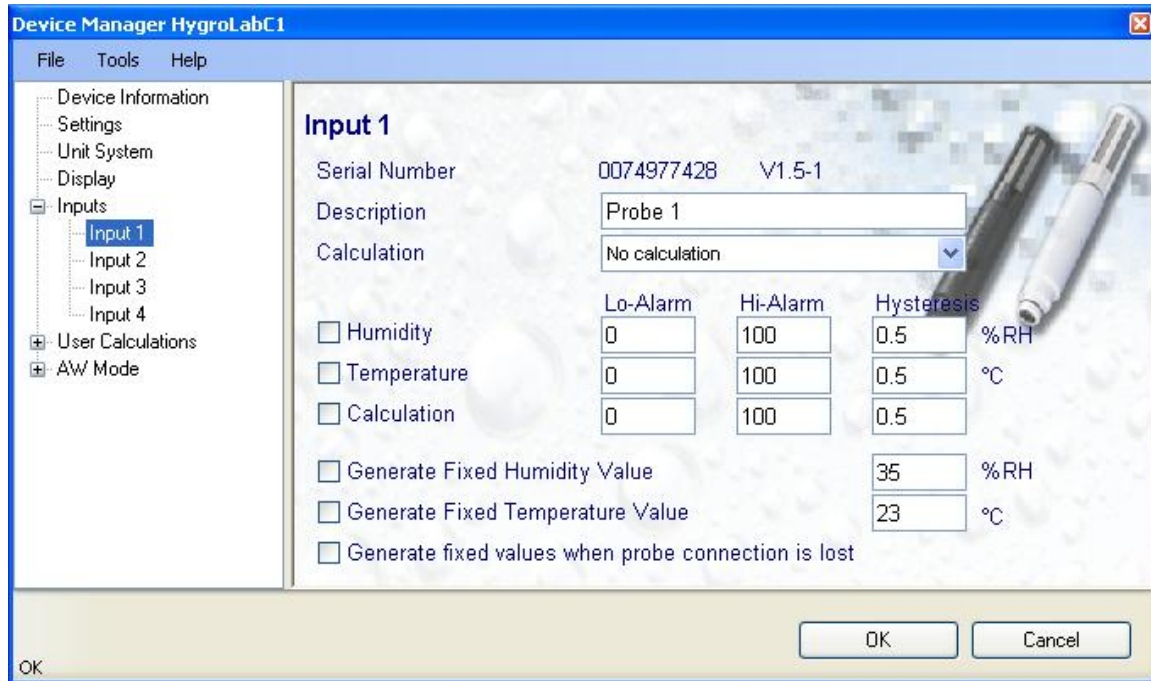
Trend Indicator Stability: enter in this text field the stability criteria used by the trend indicators. A value of 0.01 means that when the rate of signal change is less than 0.01 units per minute, the signal is shown as stable.

Show Trend Indicator: check this box to enable the trend indicators on the optional local display. Trend indication within the HW4 Current Values tab is a Global Setting of HW4 (HW4 Main Menu > Settings and Tools > View tab)

Allow Menu Access: put a check mark in this box to allow access to the internal menu of the HygroLab C1 from the keypad.
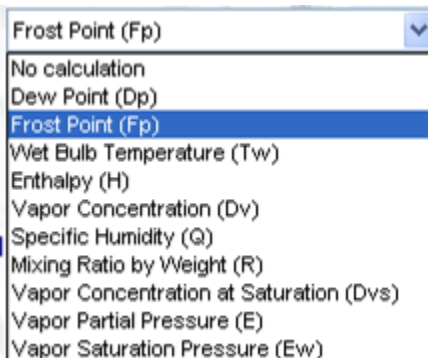
3.6   *Input 1 / Input 2 / Input 3 / Input 4*

Description: enter here a description for the probe input (maximum 12 characters). This text can be displayed in the HW4 current Values tab.

Calculation: Left click on the arrow to the right of the text box and select from one of the available psychrometric calculations:

Notes:

Dew Point: calculates the dew point above and below freezing

Frost Point: calculates the frost point below freezing and the dew point above freezing

Lo-Alarm, Hi-Alarm, Hysteresis: 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. The value specified for the alarm function hysteresis is used for both the low and the high alarm.

All versions of HW4 show an out-of-limits value alarm by using red characters on the monitor screen. In addition, HW4 Professional can be configured (HW4 global settings - Alarm settings tab) to display an alarm table and generate a report whenever an out-of-limits condition occurs.

Note: in general, enable this alarm function only at the level of the HygroLab C1 and not at the level of the probe

Generate Humidity Fixed Value / Generate Temperature Fixed Value: place a check mark in these boxes to make the HygroLab C1 generate fixed humidity and temperature values instead of reporting the actual measurements.

The fixed values must be within the following limits: -999.99 and 9999.99

Whenever the humidity and/or temperature signal is set to a fixed value, this is reported on the HW4 main screen (current Values tab) as shown below. In addition, an entry is made in the Alarm Table (HW4 Professional) provided that the device is associated with an alarm trigger set that includes "Device set to generate fixed values"

Simulator Action table

HygroLab C1 simulation	Probe simulation	HW4 and local HygroLab C1 display
enabled	enabled or disabled	HygroLab C1 simulated values
disabled	enabled	Probe simulated values
disabled	disabled	Actual measurement values

Generate fixed values when probe connection is lost: place a check mark in this box to make the HygroLab C1 generate fixed humidity and temperature values whenever communication with the probe is lost. The fixed values are the same as specified under **Generate Humidity Fixed Value / Generate Temperature Fixed Value**.

HygroClip 2 Probe Alarms – Action Table

HW4 and the HygroLab C1 monitor the alarms generated at the level of the HygroClip 2 probe as indicated in the table below:

HC2 probe alarm	HW4	HygroLab C1
Out-of-limit value	Not monitored	Not monitored
RH sensor test result = Bad	- Warning appears on monitor screen - Entry in alarm table - When the probe sensor failure mode is enabled, the parameter corresponding to the faulty sensor takes fixed value as per the HC2 probe settings	- Sensor Alarm appears at the bottom of local display - When probe sensor failure mode is enabled, the parameter corresponding to the faulty sensor takes fixed value as per the HC2 probe settings.
Major sensor failure (shorted or open sensor)	- Warning appears on monitor screen - Entry in alarm table - When the probe sensor failure mode is enabled, the parameter corresponding to the faulty sensor takes a fixed value as per the HC2 probe settings.	- Sensor Alarm appears at the bottom of local display - When the probe sensor failure mode is enabled, the parameter corresponding to the faulty sensor takes a fixed value as per the HC2 probe settings.

3.7   *User Calculation 1 / 2 / 3 / 4*

The HygroLab C1 can perform and display a user defined calculation for each of its 4 inputs. When this function is enabled, the user defined calculation appears on the HW4 main screen in the column labeled "Calculation" and replaces any psychrometric calculation that may be associated with the probe input. The user defined calculation also appears on the HygroLab C1 local display and replaces any psychrometric calculation that may be associated with the probe input.

To enable the user defined calculation function, select User Calculation 1, 2, 3 or 4 and click on the box labeled "Enable" to turn on this function. A check mark appears in the box.
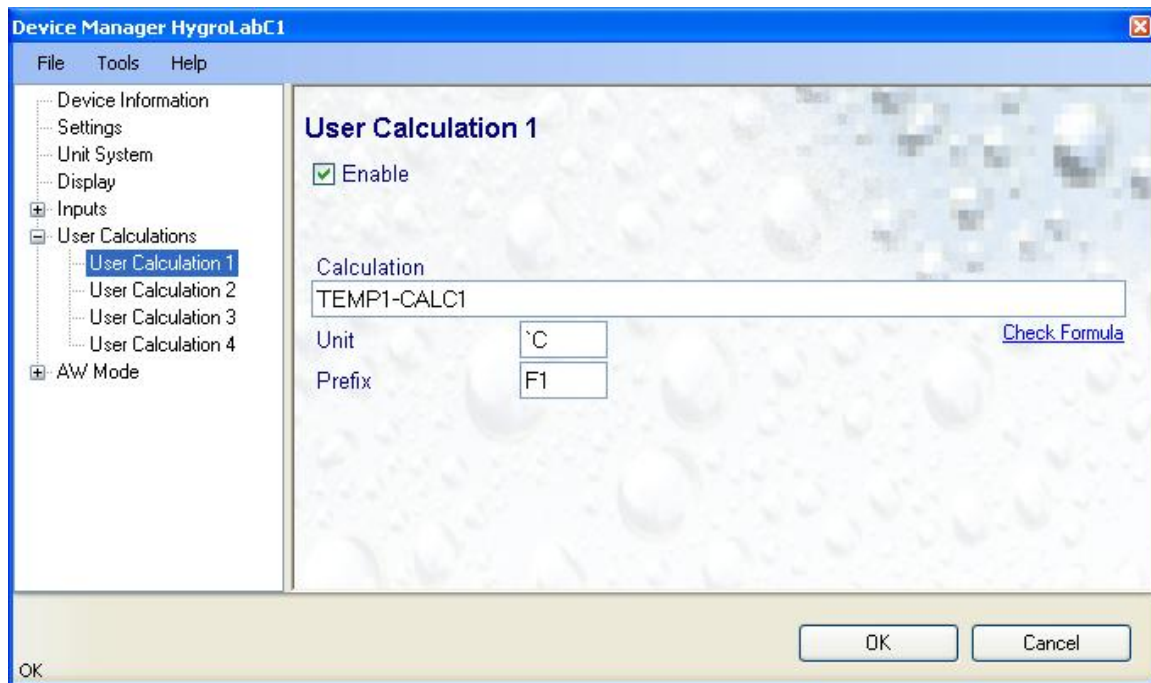
Calculation Rules and Syntax

● Formulas can be made of up to 64 characters and can contain the variables, constants and operators defined below as well as up to 10 levels of nested parenthesis.

● Variables are measured or calculated values from input 1 to input 4

    o   Temperature Input 1 to 4   :TEMP1, TEMP2, TEMP3, TEMP4
    o   Humidity Input1 to 4:   :HUMI1, HUMI2, HUMI3, HUMI4
    o   Calculated Parameter Input 1 to 4 :CALC1, CALC2, CALC3, CALC4
    o   Water Activity Input1 to 4   :AWHU1, AWHU2, AWHU3, AWHU4 (water Activity mode only)
    o   Temperature Input 1 to 4   :AWTE1, AWTE2, AWTE3, AWTE4   (water Activity mode only)

● Operators and operator symbols:

    o   Addition   : +
    o   Subtraction   : -
    o   Multiplication : *
    o   Division   : /

Comparisons and conditional branching are not supported.

● Examples

  o HUMI1 – HUMI2: humidity input 1 less humidity input 2
  o (TEMP1 + TEMP2) / 2: average temperature input 1 and input 2
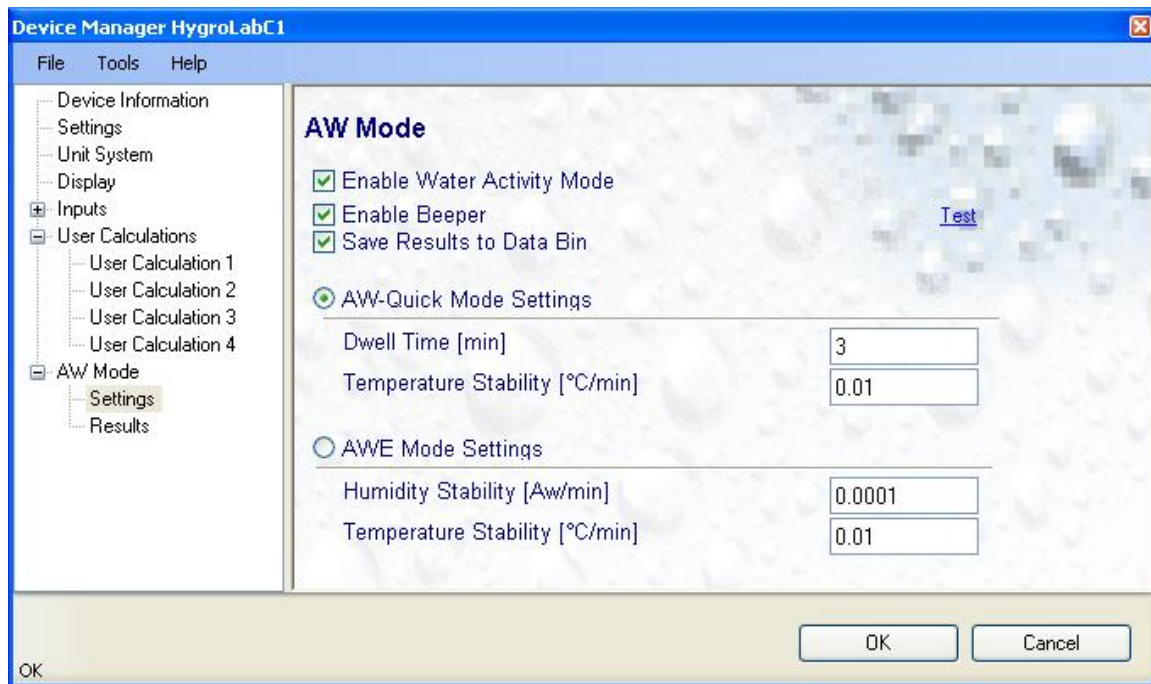 o TEMP2 - CALC2: difference between the temperature and dew point input 2 (assuming DP is calculated)

● A prefix (maximum 2 characters) as well as an engineering unit (maximum 4 characters) can be associated with each calculation. Both the prefix and engineering unit are shown on the HygroLab C1 display.

Notes:

  o In order to enter °C or °F in the unit field, press the ALT key and type 096 (not 248) on the numerical keypad, release the ALT key and type C or F.

  o Click on the blue link labeled "Check Formula" to verify the syntax

3.8   *Aw Mode - Settings*

Enable Water Activity Mode: check this box to enable the Aw mode. In this mode, both HW4 and the the HygroLab C1 automatically display humidity for all probe inputs as A_w (1.00 a_w = 100 %RH)

Enable Beeper: when this box is checked, the HygroLab C1 gives an acoustic signal during 5 seconds at the end of each Aw measurement

Save Results to Data Bin: when this box is checked, the HygroLab C1 automatically saves the water activity value, the temperature value as well as the date and time at the end of each measurement. Probe 1 is always saved to AwBin1, probe 2 to AwBin2, etc. (up to 500 records per probe).

AwQuick Mode Settings: Click on the radio button to select the AwQuick option. This option accelerates the measurement of water activity. With most products the time required to measure water activity is reduced to typically 5 minutes. The measurement starts simultaneously for all probe inputs and is ended automatically.

Settings:

- o   Dwell Time (minutes): initial time during which the AwQuick algorithm does not run
- o   Temperature Stability (˚C/ min): defines the temperature stability requirement during the measurement

AwE Option: Click on the radio button to select the AwE option or conventional water activity measurement, the HygroLab C1 waits for full equilibration of the measured product. The measurement starts simultaneously for all probe inputs. The HygroLab C1 automatically detects full equilibrium conditions and ends the measurement at that time.

Settings:

- o   Humidity Stability (a_w / min): the measurement ends when this requirement is met.
- o   Temperature Stability (˚C/ min): the measurement carries on as long as this stability requirement is not met

3.9   *Aw Mode - Results*
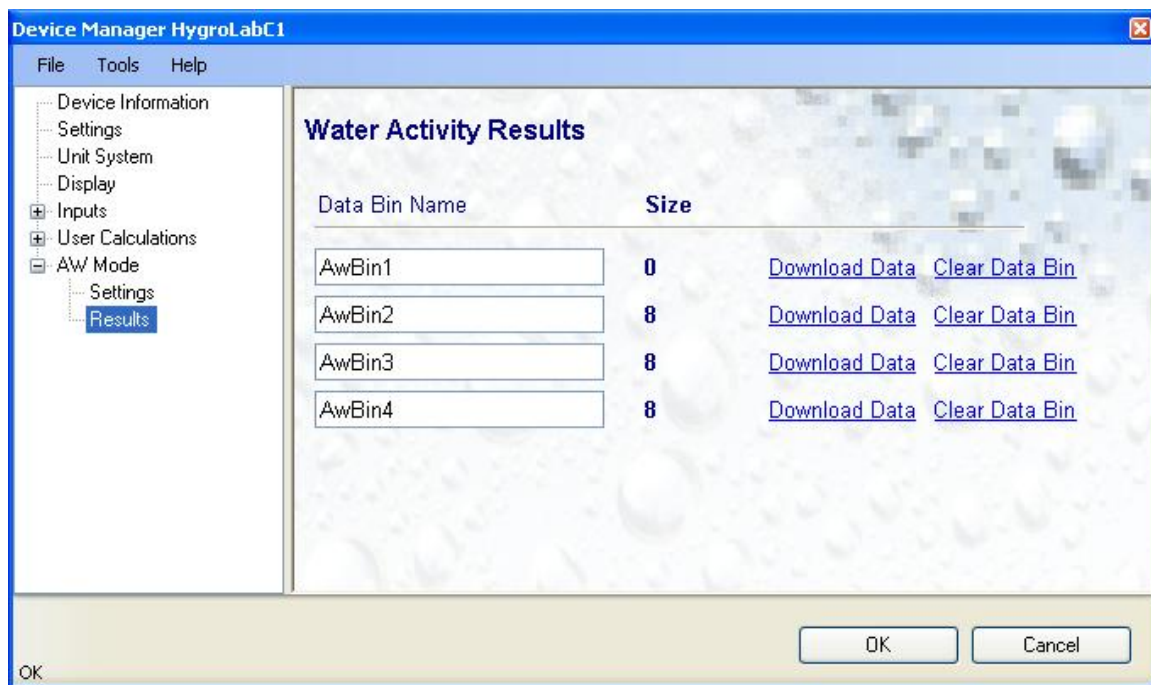
When enabled to do so (Aw Mode – Settings) the HygroLab C1 automatically saves the water activity value, the temperature value as well as the date and time at the end of each measurement. Probe 1 is always saved to AwBin1, probe 2 to AwBin2, etc. (up to 500 records per probe).

Use the form shown above to download the contents of any data bin to the HW4 PC in the form of a text file. The following is reported for each measurement: date, time, end result for water activity, temperature at the end of the measurement, method of measurement (AWQ = AwQuick, AWE = conventional measurement). See example below:

```
AwBin1_20111019_143310.txt - Notepad
File  Edit  Format  View  Help
[#I]Device Description
HygroLabC1

[#P]Process Description
AwBin1

[#S]Device Info
Version = V1.0a
Serial Number = 1111111110
File Name = AwBin1_20111019_143310.txt

[#1]
Humidity = Aw
Low Alarm = -.-
High Alarm = -.-
[#2]
Temperature = °C
Low Alarm = -.-
High Alarm = -.-

[#H]
Date      Time      Humidity         Temperature

[#D]
10/19/2011      12:33:46         0.443    22.65      AWQ
10/19/2011      12:51:47         0.443    22.70      AWQ
10/19/2011      13:40:26         0.445    22.66      AWE
```
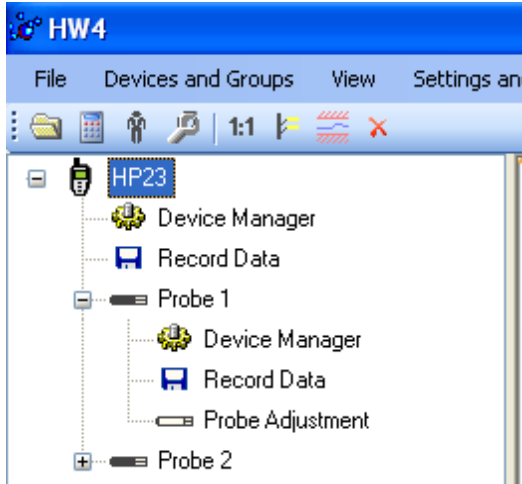
4 PROBES

NOTE: we recommend using the same humidity symbol and the same temperature unit (°C or °F) for both the probe and HygroLab C1.

Click on the + sign to the left of a probe icon to display a list of the available functional modules for the probe.

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

o The **Device Manager** module is used to configure the HygroClip 2 probe connected to the HygroLab C1 indicator and is separately described in the HW4 manual **E-M-HW4v3-F2-001**

o The **Record Data** module is common to all probes and instruments based on the AirChip 3000 technology and is separately described in the HW4 manual **E-M-HW4v3-DR-001**

o The **Probe Adjustment** module is used calibrate and adjust the probe humidity and temperature signals. This module is common to all probes and instruments based on the AirChip 3000 technology and is separately described in the HW4 manual **E-M-HW4v3-A2-001**

o HW4 functions that are not device dependent are covered in the HW4 manual **E-M-HW4v3-Main**.

5 DOCUMENT RELEASES

Release	Software Ver.	Date	Notes
_10	3.1.0	Nov. 3, 2011	Original release