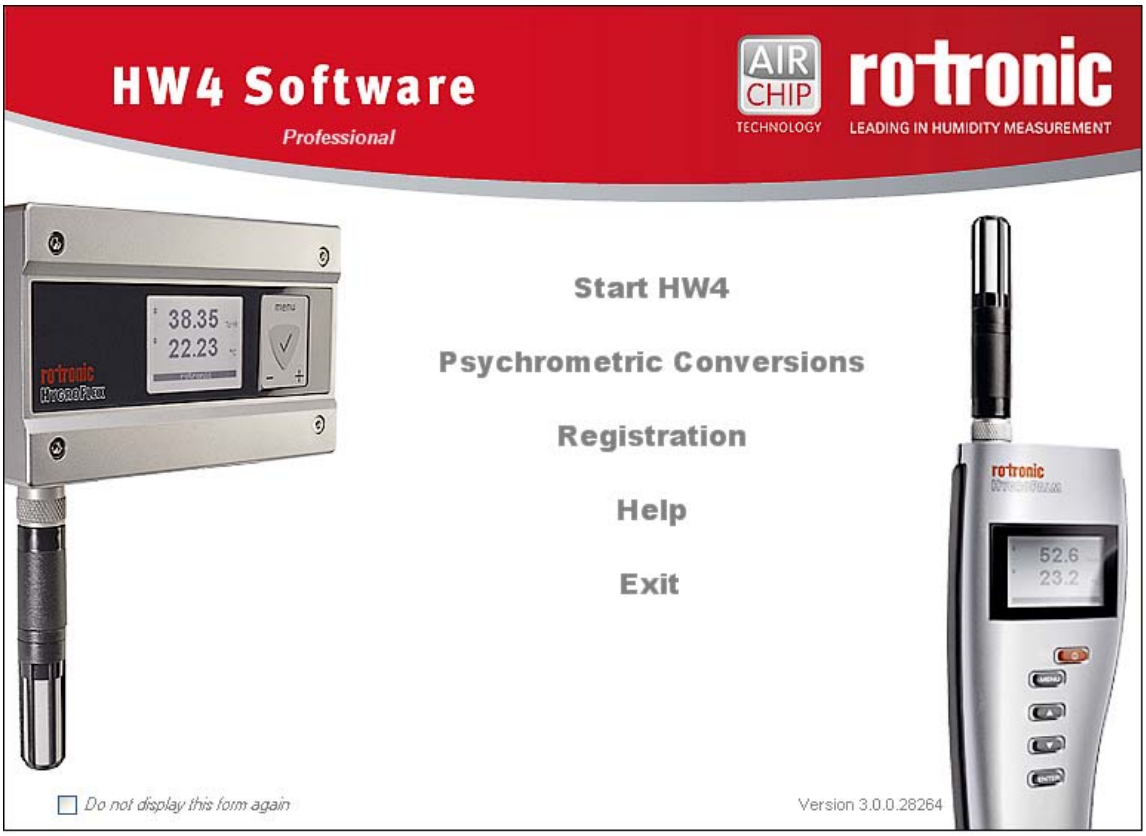
HW4 Software version 3

Probe Adjustment function Legacy devices



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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 HL20 and HL21 data loggers o HP21, HP22 and HP23 hand-held indicators 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 Function	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 on the HW4 CD. The manuals can also be downloaded from several of the ROTRONIC web sites.

2 OVERVIEW

This section of the HW4 manual covers the HW4 probe adjustment functions that apply to the following devices:

- HygroLog NT data logger
- HygroFlex 2, HygroFlex 3 and M3 transmitters (same icon in device tree)
- HygroLab 2 and HygroLab 3 bench indicators
- HygroPalm 2 and HygroPalm 3 portable indicators
- HygroClip DI digital interface
- HygroClip Alarm programmable logic
- HygroStat MB

HW4 functions that are not device dependent are covered in document **E-IN-HW4v3-Main**.

3 SINGLE PROBE ADJUSTMENT

The Probe Adjustment function is used to adjust against reference humidity and temperature conditions any HygroClip digital probe connected to any instrument or docking station. When several probes are connected to the instrument or docking station, each probe can be adjusted individually or all probes can be simultaneously adjusted.

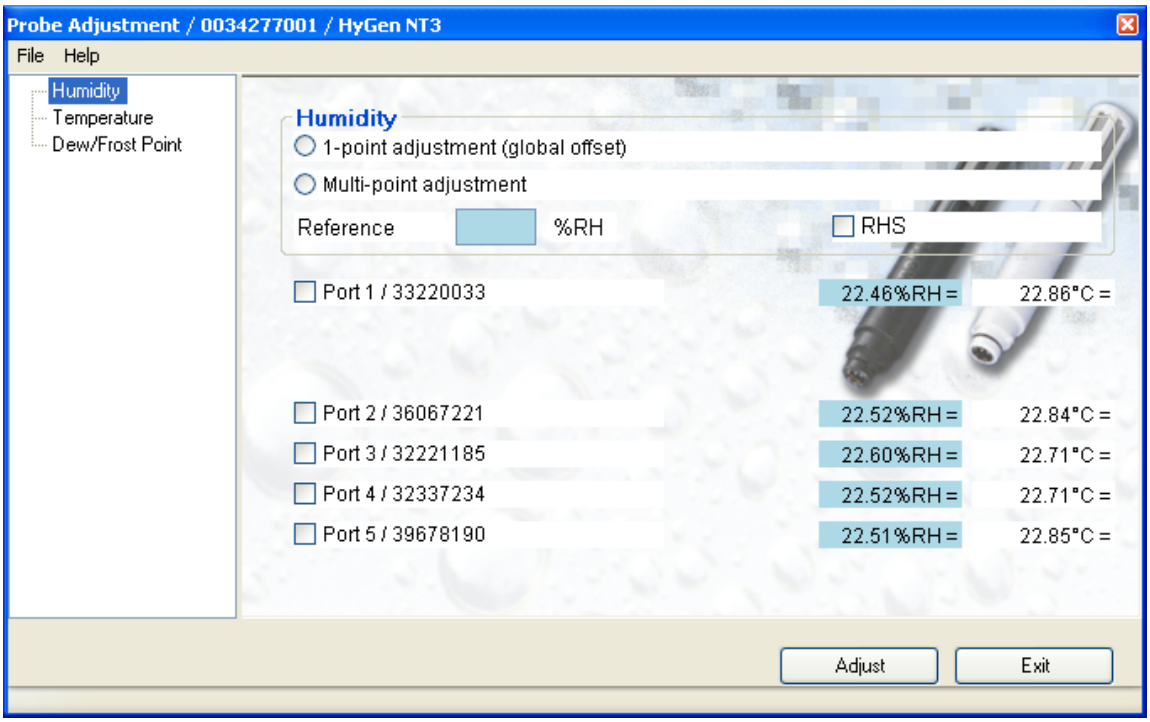
When HW4 has discovered a HygroLog NT or any other type of legacy instrument, the device appears in the left pane of the HW4 main screen. Expanding the device displays a list of the available device functions.

To select the Probe Adjustment function, click on it with the left mouse button. HW4 opens the Probe Adjustment form.

HW4 cannot be used to adjust ROTRONIC analog probes or probes from third parties.

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 while data is being logged.



3.1 *Overview*

The HW4 probe adjustment function matches closely the probe adjustment function built in the firmware of our instruments. In fact, HW4 does very little other than to collect instructions and reference values from the user and to pass these to the instrument. The instrument is where all the necessary calculations are made to adjust a probe. The exception is the adjustment of relative humidity against a reference dew or frost point. When this type of adjustment is selected, HW4 calculates the reference relative humidity based on the value of the dew or frost point and on the temperature measured by the probe.

IMPORTANT:

- **Be sure that the reference environment is stable and that the probe to be adjusted has equilibrated with the environment.**
- **Always verify that the probe temperature indication is accurate. If necessary, adjust temperature prior to any humidity adjustment.**
- HW4 can be used to do either a 1-point probe adjustment (global offset) or a multi-point adjustment (offset, slope and linearization) 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 Probe Adjustment form displays a list of the instrument probe inputs. Unused inputs can be hidden to simplify the appearance of the form (to hide or show probe inputs, select the instrument in the device tree and use the View tab in the right pane of the HW4 main screen).

3.2 *Menu Bar*

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

File

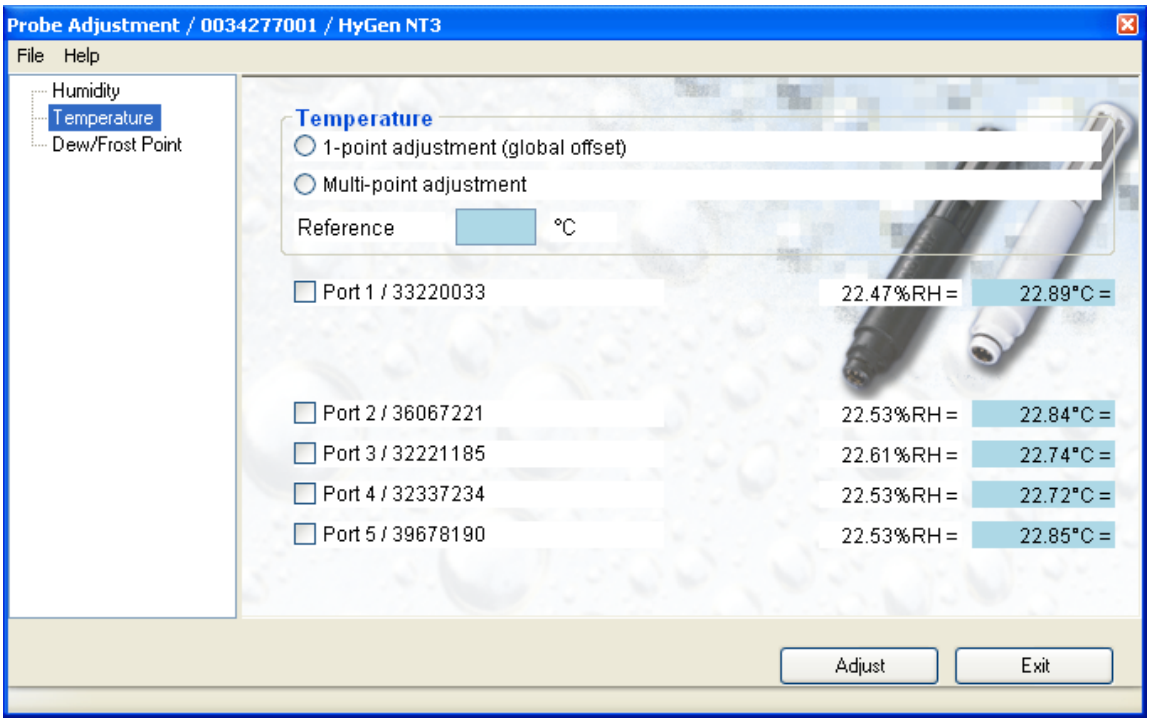
- **Exit:** closes the Probe Adjustment form

Help

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

3.3 *Temperature adjustment*

- **Select Temperature** (click with the mouse in the left pane of the Probe Adjustment form)



The form displays the humidity and temperature data from each probe connected to the instrument. The temperature data is shown on a blue background indicating that this parameter will be adjusted.

The data is updated with each polling interval. If enabled in HW4 Global Settings – View tab, a trend indicator is shown next to each parameter.

● Select the type of adjustment

Click with the mouse on one of the radio buttons located to the left of 1-point adjustment and Multi-point adjustment.

● Enter the reference temperature value

Click with the mouse on the text box labeled Reference and type in the reference temperature value. Regarding the reference value, please observe the following:

1-point temperature adjustment

For a 1-point adjustment, use a reference value that is within the limits allowed by the firmware version of your instrument (consult your instrument manual). Depending on the firmware version, the limits for the temperature reference are either ≥ -20°C / -4°F and < 40°C / 104°F or for older versions ≥ -20°C / -4°F and < 70°C / 158°F.

Note: this is the only adjustment available in the case of RTD probes used with any of the following HygroLog NT docking stations: DS-PT-2, DS-PT-4 and DS-PT-4-WL.

Multi-point (2-point) temperature adjustment

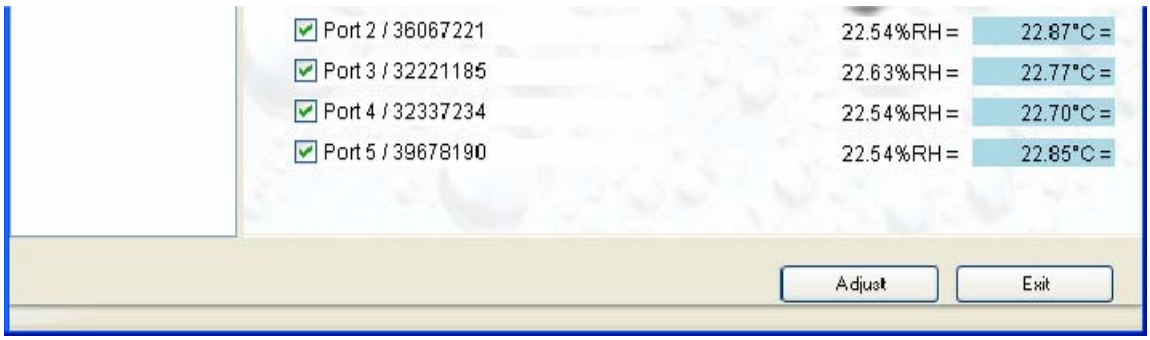
Be sure to observe the following sequence: Adjust the probe first at the low value (T-low). As far as possible, use a reference temperature of 20°C / 68°F [1]. The second adjustment value (T-high) should be above the minimum required by the firmware version of your instrument (consult your instrument manual). Depending on the firmware version, this minimum is either ≥ 40°C / 104°F or for older versions ≥ 70 °C / 158 °F.

[1] Based on the high temperature value, the instrument firmware computes the gain using 20°C as a fixed pivot point. Because of this, T-low should be as close as possible to 20°C / 68°F so as not to introduce an error.

Note: when the reference value used for the second adjustment point is lower than the minimum programmed in the instrument firmware, the result of the adjustment is the same as with a 1-point adjustment.

● Select the probe or probes to be adjusted

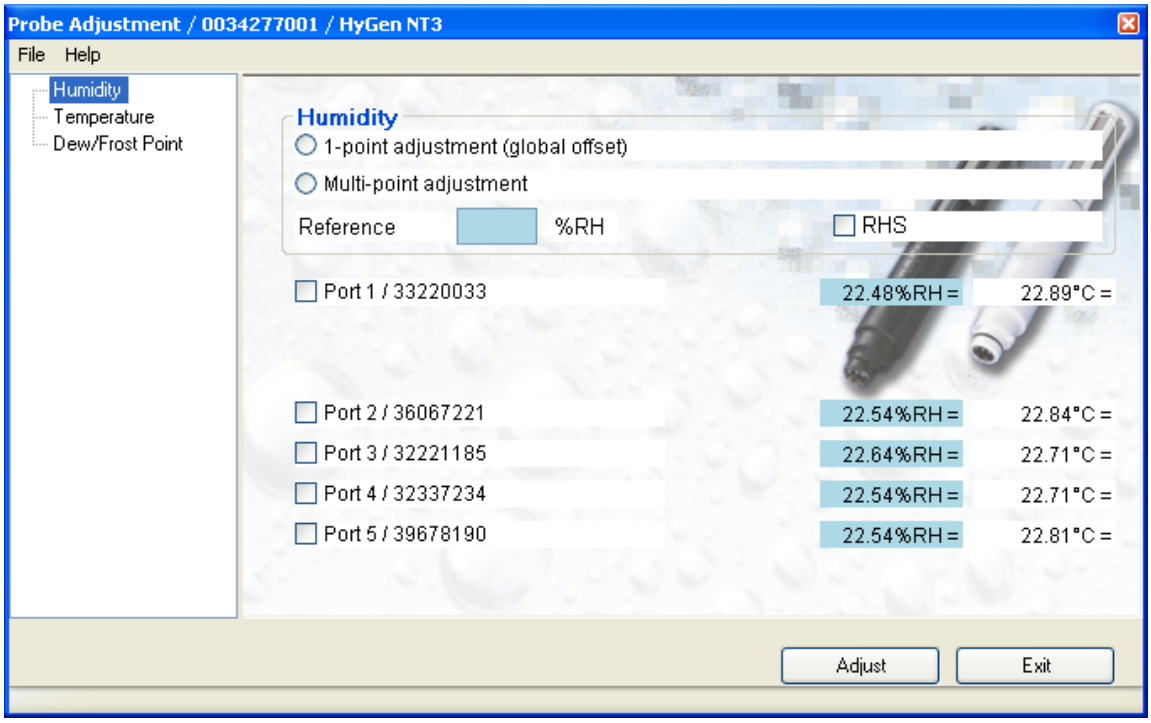
In the list of probes, use the mouse to check the box to the left of the probe or probes to be adjusted.



● Click on the Adjust button

3.4 *Adjustment against a reference relative humidity value*

● **Select Humidity** (click with the mouse in the left pane of the Probe Adjustment form)



The form displays the humidity and temperature data from each probe connected to the instrument. The relative humidity data is shown on a blue background indicating that this parameter will be adjusted.

The data is updated with each polling interval. If enabled in HW4 Global Settings – View tab, a trend indicator is shown next to each parameter.

● **Select the type of adjustment**

Click with the mouse on one of the radio buttons located to the left of 1-point adjustment and Multi-point adjustment.

● **Enter the reference relative humidity value**

Click with the mouse on the text box labeled Reference and type in the reference relative humidity value. Regarding the reference value, please observe the following:

1-point humidity adjustment

For a 1-point adjustment, you may use any a reference value.

Multi-point humidity adjustment (2, 3 or 4 points)

In the case of a multi-point adjustment, be sure to observe the following sequence as each adjustment point influences the next adjustment point:

When adjusting against the ROTRONIC humidity standards (2, 3 or 4 points), always follow the sequence 35 %RH, 80 %RH, 10 %RH or 5 %RH, 0.5 %RH.

When using a reference other than the ROTRONIC humidity standards, use reference humidity values that are within the following brackets:

35 %RH : used to compute the adjustment offset [1]
>55 %RH : used to compute the adjustment gain
>1 %RH…≤25 %RH : sensor linearity adjustment
≤ 1%RH : sensor linearity adjustment

[1] Based on the second humidity adjustment, the instrument firmware computes the gain using 35 %RH as a fixed pivot point. Because of this, the first reference value should be as close as possible to 35 %RH so as not to introduce an error.

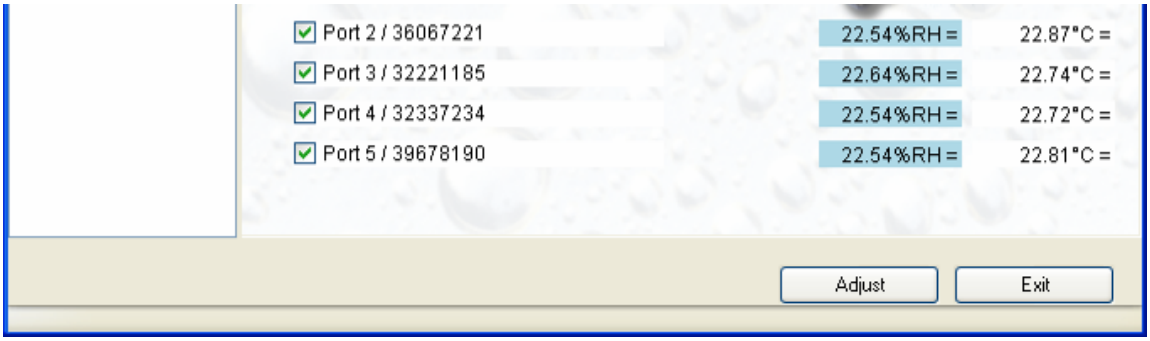
Note: The action taken by the instrument firmware is based on comparing the reference humidity value with the brackets programmed in the firmware. For example, using a reference value between 25 %RH and 55 %RH for the second adjustment point has the same effect as doing a 1-point adjustment.

- **When using a ROTRONIC humidity standard as the reference, check the box labeled RHS**

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 (altitude or site elevation).

- **Select the probe or probes to be adjusted**

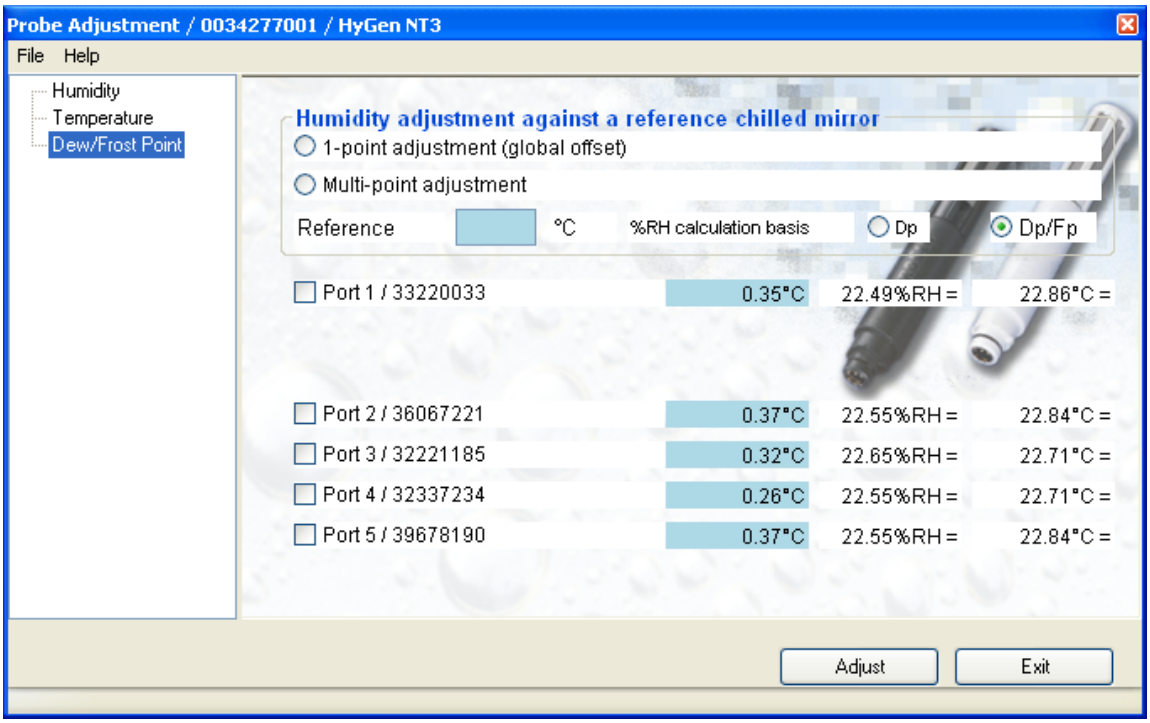
In the list of probes, use the mouse to check the box to the left of the probe or probes to be adjusted.



- **Click on the Adjust button**

3.5 *Adjustment against a reference chilled mirror*

● **Select Dew/Frost Point** (click with the mouse in the left pane of the Probe Adjustment form)



The form displays the dew/frost point, humidity and temperature data from each probe connected to the instrument. The dew or frost point data is shown on a blue background indicating that this parameter will be adjusted.

The data is updated with each polling interval. If enabled in HW4 Global Settings – View tab, a trend indicator is shown next to each parameter.

● **Select the type of adjustment**

Click with the mouse on one of the radio buttons located to the left of 1-point adjustment and Multi-point adjustment.

● **Enter the reference dew or frost point**

Click with the mouse on the text box labeled Reference and type in the reference dew or frost point. Regarding the reference value, please observe the following:

1-point adjustment against a chilled mirror

For a 1-point adjustment, you may use any a reference value.

Multi-point adjustment against a chilled mirror (2, 3 or 4 points)

In the case of a multi-point adjustment, be sure to observe the following sequence as each adjustment point influences the next adjustment point:

When using a chilled mirror instrument as the reference, use a reference value that corresponds to a relative humidity value within the following brackets:

35 %RH : used to compute the adjustment offset [1]
>55 %RH : used to compute the adjustment gain
>1 %RH…≤25 %RH : sensor linearity adjustment
≤ 1%RH : sensor linearity adjustment

[1] Based on the second humidity adjustment, the instrument firmware computes the gain using 35 %RH as a fixed pivot point. Because of this, the first reference value should be as close as possible to 35 %RH so as not to introduce an error.

Note: The action taken by the instrument firmware is based on comparing the reference humidity value with the brackets programmed in the firmware. For example, using a reference value between 25 %RH and 55 %RH for the second adjustment point has the same effect as doing a 1-point adjustment.

● **Specify the calculation basis for the reference %RH**

When the radio button labeled Dp is checked, HW4 calculates the reference humidity value, based on the assumption that the chilled mirror provides a dew point, even at values below freezing.

When the radio button labeled Dp/Fp is checked, HW4 calculates the reference humidity value, based on the assumption that the chilled mirror provides a frost point at values below freezing.

HW4 uses the reference dew or frost point and the temperature read by each individual probe to calculate the corresponding relative humidity value.

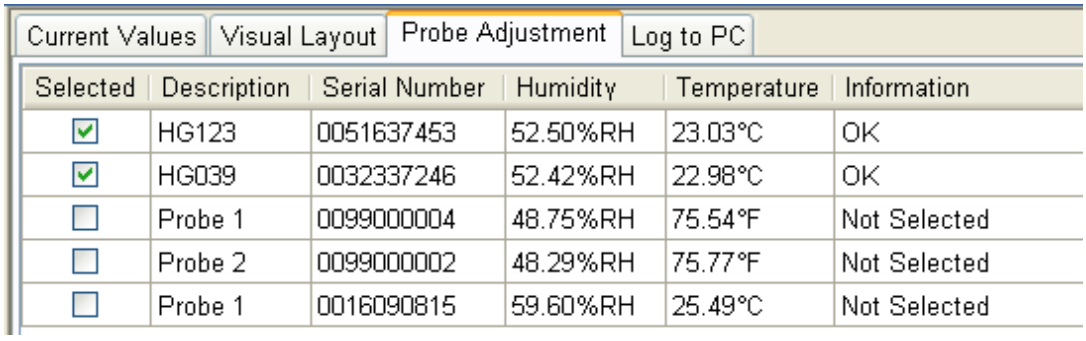
● **Select the probe or probes to be adjusted**

In the list of probes, use the mouse to check the box to the left of the probe or probes to be adjusted.

● **Click on the Adjust button**

4 GROUP ADJUSTMENT

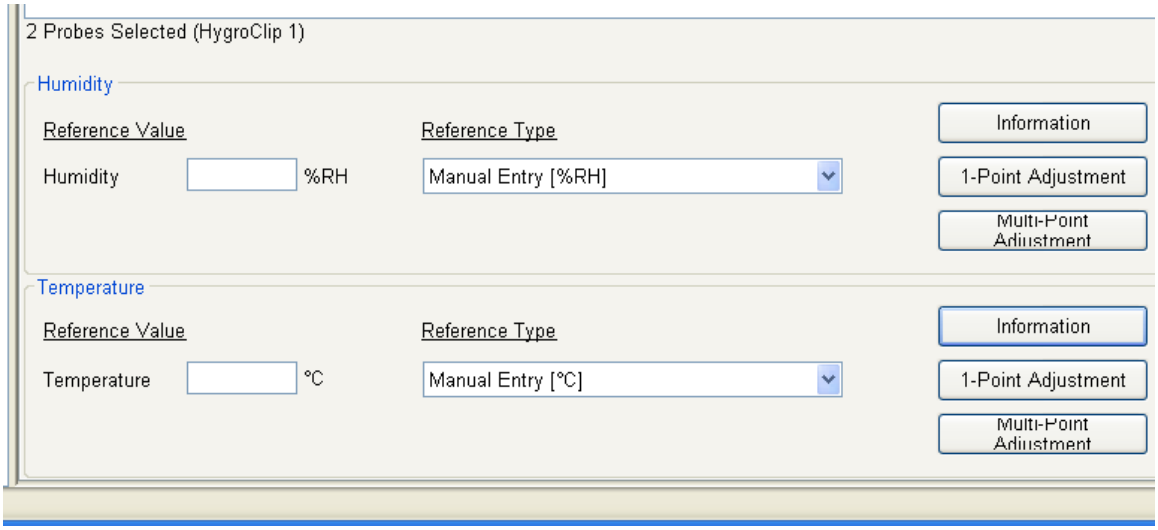
HW4 Professional allows the user to group probes and devices (see document E-M-HW4v3-Main). When a group is selected in the device tree (left pane of the HW4 main screen, the right pane includes a tab labeled Probe Adjustment. This tab allows the metrology laboratory to calibrate and adjust the probes within a group against a reference environment or against a reference probe. Any number of probes can be simultaneously selected.



IMPORTANT:

- Depending on the temperature unit selected in HW4 Global Settings > Language/Unit System tab, calibration reference values such as temperature, dew point or frost point are entered either in °C or in °F.
- Close and restart HW4 after changing the temperature unit in HW4 Global settings.
- Do not include in the selection any probe or device that does not use the same temperature unit as HW4
- Due to differences in both the calibration and adjustment process, probes based on the HygroClip 1 technology (legacy) cannot be selected at the same time as probes based on the HygroClip 2 technology

The contents of the screen bottom depend on the type of probe that is selected:



- **Reference Type**: HW4 allows calibrating either against a known reference environment (Manual Entry) or against any probe (reference probe) that is already part of the group.

  In the case of a humidity calibration, the reference environment can be defined as a %RH value, a dew point value or a frost point value. When using a dew point or a frost point value be sure that the temperature measured by the probe is as accurate as possible since the temperature value will be used by HW4 to convert the dew or frost point into a relative humidity value. The %RH [RHS] option is meant to be used with the Rotronic humidity standards. Enter the nominal value of the standard as per the certificate provided with the standard. The effect of temperature on the standard is automatically compensated by HW4.

- **Reference Value**: when calibrating against a reference environment (Manual Entry), use this field to specify the humidity or temperature value of the environment When calibrating against reference probe, HW4 automatically enters in this field the humidity or temperature value measured by the reference probe.

► **Procedures**:

1) After selecting the probes, click on the button labeled “Information”. HW4 verifies that it is communicating with the probe and writes OK in the table
2) After entering the value of the reference environment or selecting the reference probe, click on either the “1-Point Adjustment” button or on the “Multi-Point Adjustment” button.

► **General Limitations**:

- Access to the functions available in this tab is subject to the user having the required rights
- Probes based on the HygroClip 1 technology (legacy) cannot be selected at the same time as probes based on the HygroClip 2 technology
- When configured to do so (HW4 Global Settings > Events Tab > Generate and Save Protocols), HW4 generates a report that covers all selected probes as opposed to generating a separate report for each individual probe

5 DOCUMENT RELEASES

Release	Software Ver.	Date	Notes
_10	3.0.0	Jun. 16, 2010	Original release