hygropin

Operating Instructions

Moisture Meter

proceq

Made in Switzerland

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1. Safety and Liability

1.1 Safety and usage precautions

This manual contains important information on the safety, use and maintenance of the Hygropin. Read through the manual carefully before the first use of the instrument. Keep the manual in a safe place for future reference.

1.2 Liability and warranty

Proceq's "General Terms and Conditions of Sale and Delivery" apply in all cases. Warranty and liability claims arising from personal injury and damage to property cannot be upheld if they are due to one or more of the following causes:

- Failure to use the instrument in accordance with its designated use as described in this manual.
- Incorrect performance check for operation and maintenance of the instrument and its components.
- Failure to adhere to the sections of the manual dealing with the performance check, operation and maintenance of the instrument and its components.
- Unauthorized structural modifications to the instrument and its components.
- Serious damage resulting from the effects of foreign bodies, accidents, vandalism and force majeure.

All information contained in this documentation is presented in good faith and believed to be correct. Proceq SA makes no warranties and excludes all liability as to the completeness and/or accuracy of the information.

1.3 Safety instructions

The instrument is not allowed to be operated by children or anyone under the influence of alcohol, drugs or pharmaceutical preparations. Anyone who is not familiar with this manual must be supervised when using the instrument.

1.4 Correct Usage

- The instrument is only to be used for its designated purpose as describe herein.
- Replace faulty components only with original replacement parts from Proceq.
- Accessories should only be installed or connected to the instrument if they are expressly authorized by Proceq. If other accessories are installed or connected to the instrument then Proceq will accept no liability and the product guarantee is forfeit.

2. Tutorial

The Hygropin is a multifunction hand-held indicator with data logging capability that can be used for identifying, diagnosing and monitoring potential moisture problems. Each of the two probe inputs can be configured independently. The integrated real time clock keeps track of date and time while recording data.

Practical advice for measuring humidity

The most common source of error when measuring relative humidity is a difference between the temperature of the probe and the temperature of the environment. At a humidity condition of 50 %RH, a temperature difference of 1°C (1.8 °F) typically results in an error of 3 %RH on relative humidity.

When using Hygropin, it is good practice to monitor the display for temperature stability. The probe should be given sufficient time to come to equilibrium with the environment to be measured. The larger the initial temperature difference between the probe and the environment, the more time is required for temperature equilibrium.

In extreme situations, condensation may occur on the sensors when the probe is colder than the environment. As long as the humidity / temperature limits of the humidity sensor are not exceeded, condensation does not alter the calibration of the sensor. However, the sensor has to dry out before it can provide a valid measurement.

3. Getting started

3.1 Insert Battery

3.2 Contact In-Situ and/or Ambient Probe

3.3 Overview Keypad

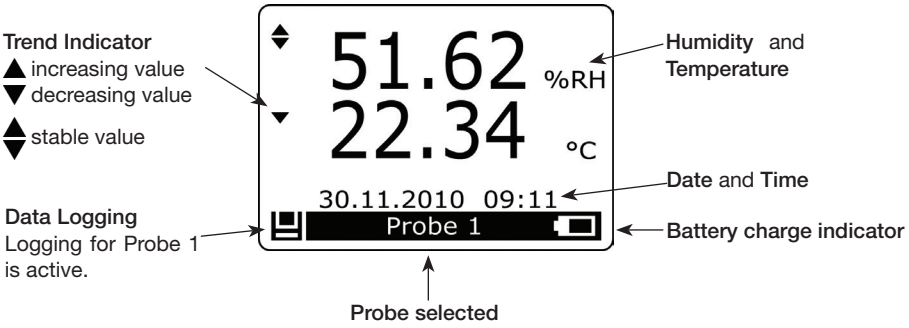
⏻	ON / OFF	Turns the instrument “on” or “off”.
MENU	MENU	Activates the internal menu. Press this key again to go back.
▲	UP	Change data displayed, navigate through menu, make a selection or change values.
▼	DOWN	
ENTER	ENTER	Confirm a selection and data capture.

3.4 Standard Display

Depending on the settings the Hygropin is able to display:

- relative humidity and temperature measured by two probes
- calculate psychrometric parameters like dew / frost point etc. for both probes
- difference between the values measured by the two probes

Press slightly ⏻ button to turn the Hygropin on:



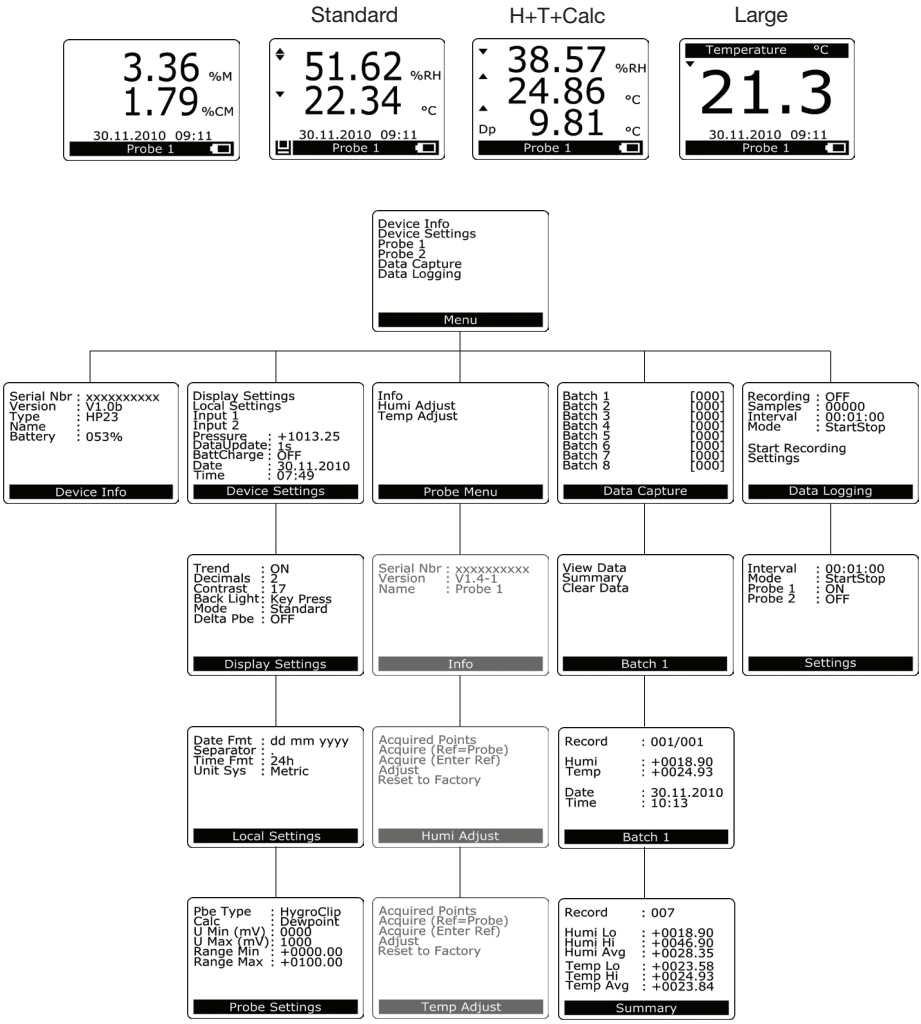
Change probe that is displayed or scroll through the measuring values using the ▼ or ▲ button.

The ⏻ key activates / deactivates the HOLD-function.

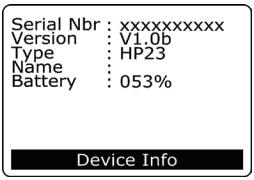
By pressing ENTER the temperature and humidity values of the selected probe are stored. More information can be found in the Data Capture chapter.

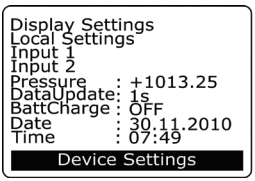
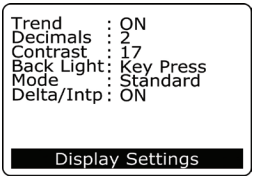
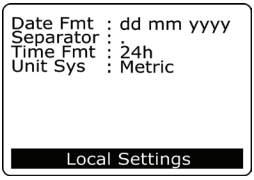
Enter the Menus and Settings screens by pressing the MENU key:

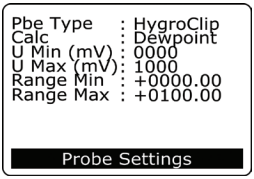
3.5 Overview Screens & Menu Structure



3.6 Detailed Menu Structure & Settings

Device Info		
	Serial Number	
	Software Version	
	Device Type	
	Device Name	
	Battery Charge Status	

Device Settings		
	Submenu Display Settings	
	Submenu Local Settings	
	Submenu Input 1 / Input 2 Settings	
	Barometric pressure for calculations	see “Calculated Parameters”
	Display refresh interval	1 s / 10 s / 1 min / 10 min
	Battery charge via USB	ON / OFF
	Manual date setting	
	Manual time setting	
Submenu Display Settings		
	Trend indicator on display	ON / OFF
	Decimal display resolution	0.x / 0.xx
	Display contrast adjustment	0..50
	Back light mode	ON / OFF / Key pressed
	Display Mode	Standard / H+T+Calc / Large
	Shows %CM and %M for Probe 1	ON / OFF
Submenu Local Settings		
	Date format	dd mm yyyy mm dd yyyy yyyy mm dd
	Date separator	“.” or ”/”
	Time format	24 h / 12 h
	Unit system	Metric / English
	Real time clock does not auto adjust for daylight saving time.	

Submenu Probe Settings		
	Probe Type	HygroClip / Analog / Pressure
	Calculation (digital probe only)	See “Calculated Parameters”
	Output Voltage (analog probe)	
	…	
	Measuring Range (analog probe)	
	…	

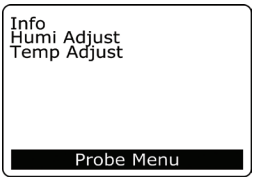
Calculated Parameters

The Hygropin can calculate any of the following psychrometric parameters based on humidity and temperature:

- Dew point (Dp) above and below freezing
- Frost point (Fp) below freezing and dew point above freezing
- Wet bulb temperature (Tw)
- Enthalpy (H)
- Vapor concentration (Dv)
- Specific humidity (Q)
- Mixing ratio by weight (R)
- Vapor concentration at saturation (Dvs)
- Vapor partial pressure (E)
- Vapor saturation pressure (Ew)

Any of the above parameters can be set in the submenu “Probe Setting”.

Calculating some of these parameters requires barometric pressure as an input parameter. A fix barometric pressure value can be specified in the “Device Settings” Menu.

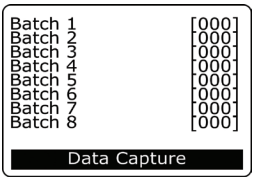
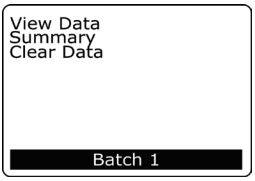
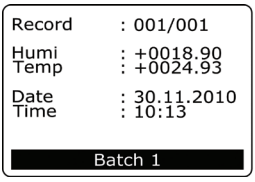
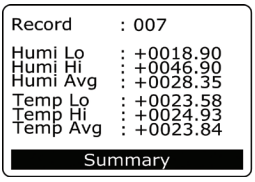
Probe Menu	
	Submenu detail information digital probe
	Submenu Humidity Adjustment
	Submenu Temperature Adjustment
	These functions are for service and calibration purpose only.

Data Capture

Up to 250 relative humidity and temperature records can be manually captured and organized in each of the 8 data batches (non-volatile memory). The captured data is automatically date and time stamped. The calculated parameter cannot be captured.

Capturing Data:

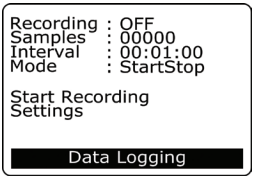
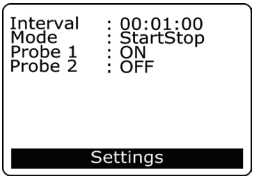
- Use the ▲ or ▼ key to select the probe
- Press ENTER
- Select the target data batch with the ▲ or ▼ key
- Press ENTER to trigger the Data Capture function
- Data capture is confirmed on the Hygropin display

Data Capture	
	Data Batch 1 [Numbers of Records] … Data Batch 8 [Numbers of Records] Select data batch to be viewed
Submenu Batch 1..8	
	Submenu View Data Submenu View Summary Batch Clear Data Batch
Submenu View Data	
	View individual data records inclusive date and time stamp.
Submenu Summary	
	View the maximum, minimum and average values of each batch.

Data Logging

The Hygropin can automatically record up to 10,000 humidity-temperature values measured by a single probe. Each record is stamped for date and time. The calculated parameter cannot be recorded. When recording data from two probes at the same time, the recording capacity per probe is cut in half.

The Hygropin features two data logging mode: start-stop (recording ends when the memory is full) and loop (when the memory is full, the oldest record is dumped to make room for a new record) Data logging can be started and stopped from the keypad. The HygroLink software allows the downloading of the recorded data for further analysis.

Data Logging		
	Status Data logging	ON / OFF
	No. of sample taken	max. 10'000 H+T
	Status Logging Interval	5s…1h
	Status Logging Mode	StartStop / Loop
	Start / Stop Recording	
	Submenu Settings	
Submenu Settings		
	Interval setting	5s..1h
	Logging Mode setting	StartStop / Loop
	Logging Probe 1	ON / OFF
	Logging Probe 2	ON / OFF
	Cannot be changed while the Hygropin is recording data.	

4. HygroLink

Installation

To start the installation wizzard of the software & driver package execute HygroLink_Setup.exe on the included CD ROM.

Remove the red cover cap and connect the USB cable to the connector.

1. Establish connection to Hygropin
2. Download all data from the Hygropin in Excel-Files
3. Delete all data on the Hygropin
4. Disconnect Hygropin
5. Check for updates HygroLink

5. Step by Step Guide
"Relative Humidity Testing according to ASTM F2170"

For details please check the ASTM F2170-09 standard.

Step 1: **Check the correct functionality of the instrument** (Chapter 8, ASTM F2170-9)
- Recalibrate probes annually
- Check periodically the correct functionality of instrument and probe with the humidity standard tube (780 10 470)

Step 2: **Conditioning** (Chapter 9, ASTM F2170-9)
Concrete floor slab and air space surrounding slab shall be at service temperature / humidity for at least 48 hours.

Step 3: **Define number of test holes** (Chapter 10.1, ASTM F2170-9)
- 3 test holes for the first 1000 ft^2 / 100 m^2
- at least 1 additional test hole for each additional 1000 ft^2 / 100 m^2

Step 4: **Define depth of test holes** (Chapter 10.2, ASTM F2170-9)
- 40% of slab thickness if slab is drying from top only
- 20% of slab thickness if slab is drying from top and bottom

Step 5: **Drill and prepare test holes** (Chapter 10.3, ASTM F2170-9)

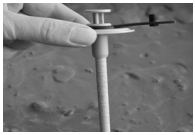
Drill hole using a 8mm / 5/16in drill bit

Clean test hole

Cut sleeve according to measuring depth

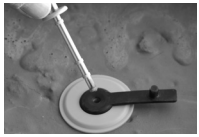
Insert sleeve in test hole and close cap

Cast holes (Chapter 10.4, ASTM F2170-9)

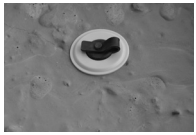


Use "Add-on for wet concrete" (780 10 370)

Cut sleeve and rod according to measuring depth



Remove rod after concrete hardens

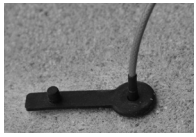


Close cap

Step 6: **Wait 72 hours for moisture equilibrium** (Chapter 10.3.4, ASTM F2170-9)

Step 7: **Measurements** (Chapter 10.5, ASTM F2170-9)

Insert In-Situ probe into sleeve



Wait for temperature equilibrium

Check for stable value (trend indicator) before record data

Measure ambient condition

Step 8: **Report** (Chapter 11, ASTM F2170-9)
Use the Test Report template (chapter 6) to record and report all necessary information.

6. Example of Test Report

Name and address of structure:	Identify floor:

Area: ..... ☐ m^2 ☐ ft^2 No. Holes	Slab thickness: ..... ☐ mm ☐ inch

Test Location (use room number or building grid)	Depth from top of slab ☐ mm ☐ inch	Relative Humidity in concrete, %	Temperature in concrete, ☐ °C ☐ °F	Ambient Temperature, ☐ °C ☐ °F	Ambient Relative Humidity %	Notes:

Instrument used: Make, Model, Serial number	Instrument used: Last calibration date of probe

Test performed: Name	Test performed: Date
Test performed: Company name	Test performed: Company address

Location Map

Instructions: Indicate sensor locations with symbol and number of test hole. Show doors, rooms, columns or other location indicators.

7. Technical Specifications

Display Unit	
Power Supply	
Battery	9 V alkaline (standard)
	Ni-MH 8.4V, 170…250mAh (rechargeable via USB)
Mains	Via USB charger
General	
Probe input	Two separate digital probe inputs
Real time Clock	Yes
Psychrometric Calculations	Yes
Start-up time	3 s
Data refresh rate	1 s
Interface type	USB
Data Logging	
Memory	Max. 10’000 readings
Interval	5 s to 1 h
Display	
Display	Pixel graphic LCD
	Backlight
Display modes	% RH and temperature, date and time
	% RH, temperature and calculated parameter
	%CM (calcium carbide method), %M (Darr method)
Mechanical	
Dimension	270 x 70 x 30 mm (10.63 x 2.76 x 1.17”)
Weight	Ca. 198 g (7.0 oz)
IP classification	IP 40
Environmental conditions	
Operating temperature	-10 °C to 60 °C (14 °F to 140 °F)
Humidity	0 to 100% RH, no condensing
In-Situ Probe	
Measuring range	0 to 100% RH - 40 °C to 85 °C (-40 °F to 185 °F)
Accuracy	± 1.5 % RH / ± 0.3 K
Response time	< 15 s
Dimension	Ø 5 mm (Ø 0.2 in.)
Cable length	200 cm (79 in.)
Maximum air velocity at probe	20 m/s (3,935 ft /min)

Standards and Regulations applied

CE / EMC immunity
- EMC Directive 2004/108/EG:
- EN 61000-6-1: 2001
- EN 61000-6-2: 2005
- EN 61000-6-3: 2005
- EN 61000-6-4: 2001 + A11

Technical Standard
- ASTM F 2170-09

Special note NIST traceability:

All probes for the Hygropin are factory calibrated referring to the Swiss Calibration Service (SCS). An individual calibration certificate is included with each probe. SCS is accredited with the Swiss Federal Office of Metrology which is a signatory of the BIPM (http://www.bipm.org/) Under the Mutual Recognition Agreement NIST recognizes all registered in the BIPM database.

8. Part Numbers and accessories

8.1 Units

Part No.	Description
780 10 000	Hygropin Unit consisting of: Instrument incl. In-situ probe, carrying case and accessories (10pcs measuring sleeves, CD incl. HygroLink, documentation)

8.2 Parts and Accessories

780 10 400	In-Situ Probe
780 10 450	Ambient Probe
780 10 470	Humidity Standard 75%RH
780 10 350	Set of Measuring Sleeves 20pcs
780 10 360	Set of Measuring Sleeves 100pcs
780 10 370	Add-on for Wet Concrete 10pcs

9. Maintenance and Support

9.1 Support Concept

Proceq is committed to providing a complete support service for this instrument. It is recommended that the user registers the product on the www.proceq.com to obtain valuable information on available updates and other useful information.

9.2 Standard Warranty and Extended Warranty

The standard warranty covers the electronic portion of the instrument for 24 month and the mechanical portion of the instrument for 6 month. An extended warranty for one, two or three years for the electronic portion of the instrument may be purchased up to 90 days of purchase.

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