HygroClip M23 Series

3-wire
humidity temperature transmitter
with microprocessor

Instruction Manual

v3

20030318

Contents

Version number: this manual is valid for instruments of version number 3.x, where 3.x can be 3.0, 3.1, etc. (see Function Menu, SYS STATUS). Changes in the last digit of the version number reflect minor changes in the internal software of the instrument that do not affect the manner in which the instrument should be operated.

Note: functions such as instrument configuration with a PC as well as the calibration of HygroClip probes with a PC require the optional HW3 software. Instructions for using the HW3 software are not included in this manual. These instructions are shipped separately on the same CD ROM as the HW3 software.

Overview

The HygroClip M23 series are 3-wire humidity temperature transmitters designed for use in industrial and scientific applications within the temperature limits of -40 to 85°C (-40 to 185 °F) at the probe. Humidity and temperature are measured with the HygroClip S digital plug-in probe. The combination of microprocessor based electronics and digital probe, provides the M23 with unparalleled accuracy, stability and versatility.

Main Features:

- relative humidity and temperature measurement
- fully interchangeable ROTRONIC HygroClip S digital plug-in probe
- software-based probe calibration and transmitter configuration (except output signal type)
- two linearized analog outputs, signal type (mA, V) configurable by means of solder pad [1)]
- test connector for configuration with a PC (RS232) or for calibration with the HygroPalm 3 indicator [2)]
- optional LC display

1) 0..1V, 0..5V, 0..10V, 0..20 mA, 4..20 mA - corresponding to relative humidity and temperature
2) allows the HygroPalm 3 to read the transmitter and / or calibrate the probe

The M23 series features a unique installation method that is both convenient and problem free. Each M23 series transmitters includes a base plate and a plug-in electronics module. During installation, the base plate is mounted first and wired without the electronics module. This is done at the same time as general electrical work. During that time, the electronics module and probe can safely be stored away.

The M23 series was designed for simple field maintenance and to minimize any downtime:

- Operation of the M23 transmitter can be easily verified in the field by connecting a HygroPalm 3 indicator to the M23 service connector. This is done without interrupting the output signals.

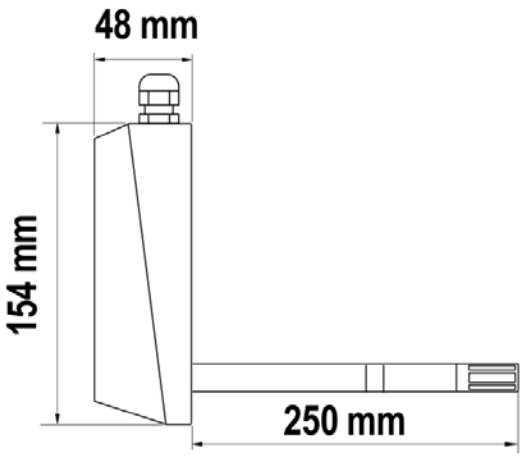
- Calibration is entirely digital, without any potentiometer. In addition, the HygroClip S digital probe is 100% interchangeable: calibration data, sensor characteristics, serial number, etc. are retained within a non-volatile memory. Should the probe require maintenance, it can be replaced in seconds without any loss of accuracy and without requiring a recalibration of the M23 transmitter. ROTRONIC offers easy-to-use software and accessories for in-house calibration of the HygroClip S. If you do not wish to calibrate, or if the HygroClip S has to be replaced, use our unique exchange program. This plan is supported by the ROTRONIC worldwide distribution network. The replacement probe is either a brand new HygroClip S or a reconditioned probe with a brand new humidity sensor and dust filter.

- Should the electronic module develop a problem, it can easily be removed from the base plate and replaced with another module without any wiring work.

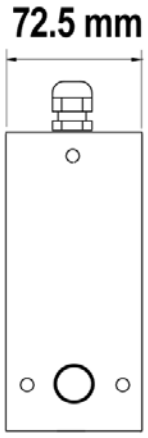
The M23 series is available in the following configurations:

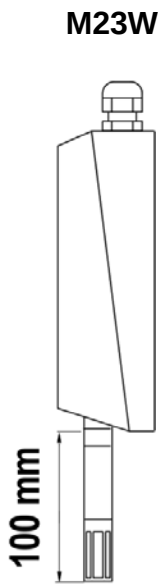
Model	Measurement	Circuit Type	Installation
M23W	%RH + Temperature	3-Wire	Wall mount (surface) or remote probe *)
M23D	%RH + Temperature	3-Wire	Duct mount (through Wall)

*) the probe can be remoted with an extension cable (see accessories)



M23D





General Description

Power requirements

The M23 series operates with 15 … 35 VDC (maximum 65 mA) or with 24 VAC.

HygroClip S digital probe

HygroClip S

operating range -40 to 85ºC (-40 to 185ºF)
wire mesh filter [1)]
length: 100mm (3.9"), d: 15mm (0.6")

1) Special environments may require using a foam filter (consult ROTRONIC).

M33W

The HygroClip S measures relative humidity with a ROTRONIC HYGROMER™ C94 capacitive humidity sensor. This well proven sensor offers exceptional durability and stability in all kinds of environments. Temperature is measured with a precision RTD Pt100 sensor.

The ROTRONIC HygroClip S digital probe is highly accurate and is calibrated entirely by means of software (no adjustment potentiometers). Because calibration and other data are stored in the probe non-volatile memory, the probe is fully interchangeable. When the probe requires calibration or has to be repaired, it can be replaced with another probe in a few seconds.

With the M23W (wall mount model), the probe can be separated from the transmitter with extension cable MOK-xx-DAT05: (xx = 2 or 5 meters / 6.5 or 16.4 ft). The maximum separation is 5 meter.

Temperature operating range and limits

The M23 series can operate within -40 to 60°C (-40 to 140°F) at the electronics. Units with the optional LC display operate within -30 to 60°C (-22 to 140°F)

The temperature operating range of the HygroClip S probe is -40…85°C (-40…185°F).

Operating the transmitter and/or its probe outside of the temperature limits can result in permanent damage.

Humidity limits

As far as possible, avoid sudden condensation at the sensors. When measuring at high humidity, condensation may occur on the humidity sensor due to a sudden difference in temperature with the environment. This does not damage the sensor. However, this will produce an overflow reading (an output signal of more than 100 %RH) for as long as condensation is present on the humidity sensor.

Temperature compensation of the humidity sensor

Practically every make of relative humidity sensor requires a compensation for the effect of temperature on the humidity output signal in order to measure accurately over a wide range of temperature conditions. In the specific case of an instrument using a capacitive sensor, compensation is required because the dielectric characteristics of both the water molecule and the hygroscopic polymer used in the sensor vary with temperature.

The HygroClip S probe uses the temperature data from the Pt100 RTD to provide automatic compensation for the effect of temperature on the humidity sensor. The temperature compensation uses normal room temperature as a reference. Because of this, calibration of the HygroClip S is done at normal room temperature rather than at the temperature of operation at the sensor.

Analog outputs

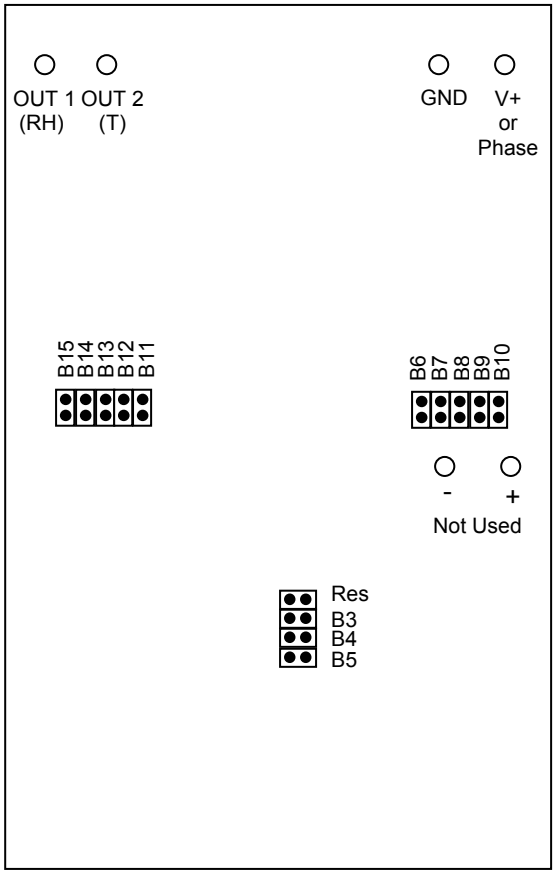
The two analog outputs of the M23 series (OUT 1 and OUT 2) are factory configured depending on the type of signal, scale and temperature unit specified when ordering (see identification labels (a) on shipping box and (b) inside electronics module under the printed circuit board). The analog output signals are linear and are consistent with the requirements of most data/signal processing instrumentation (panel meter, controller, computer card, etc.).

analog outputs [1)]	Two analog outputs corresponding to the following: Output 1: relative humidity Output 2: temperature
output signals [2)] configurable with solder pads	0…1 V 0…5 V 0…10 V 0…20 mA 4…20 mA
D/A output resolution	Output 1: 13-bit Output 2: 16-bit

1) The output scaling and temperature unit of the M23 can be changed with the optional HW3 software.

2) Both outputs provide the same type of signal (4 .. 20 mA or 0 ..5 V, etc.). The type of output signal is set at the factory according to the type specified when ordering. The type of signal can be changed with the solder pads located on the M23 circuit board.

Changing the type of analog output signal



The **type of output signal** is the same for both outputs and can be selected by means of solder pads located on the PCB of the electronics module.

The solder pads are accessible after separating the electronics module from the base plate.

Solder Pad Settings														
	B3	B4	B5	Res	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15
0 .. 1V	X			X	X				X	X			X	
0 .. 5 V		X		X		X			X		X		X	
0 .. 10V	X	X					X		X			X	X	
0 .. 20 mA			X	X	X			X		X				X
4 .. 20 mA	X		X		X			X		X				X

Changing the scale of the outputs and the temperature unit

The scale of each output as well as the temperature unit (°C or °F) can be reconfigured by the user. Reconfiguration requires a PC with the Rotronic HW3 software installed as well as service cable ACML232 (see **Accessories**) to connect the service connector of the transmitter (see **Maintenance**) to the COM port of the PC.

Instructions are provided in a separate manual which is on the HW3 CD.

Installation

Do not unnecessarily remove the dust filter that protects the sensors on the HygroClip S probe. The sensors can easily be damaged when not protected.

General recommendations

Relative humidity is extremely dependent on temperature. Proper measurement of relative humidity requires that the probe and its sensors be at exactly the temperature of the environment to be measured. Because of this, the location where you choose to install the probe can have a significant effect on the performance of the instrument. The following guidelines should guarantee good instrument performance:

a) **Select a representative location**: install the probe where humidity, temperature and pressure conditions are representative of the environment to be measured.

b) **Provide good air movement at the probe**: air velocity of at least 200 ft/ minute (1 meter/second) facilitates adaptation of the probe to changing temperature.

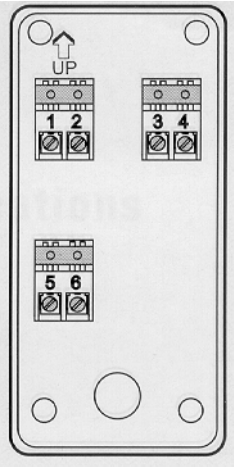
c) **Avoid the following:** (1) Close proximity of the probe to a heating element, a cooling coil, a cold or hot wall, direct exposure to sun rays, etc. (2) Close proximity of the probe to a steam injector, humidifier, direct exposure to precipitation, etc. (3) Unstable pressure conditions resulting from excessive air turbulence.

d) **Immerse as much of the probe as possible in the environment to be measured.**

e) **Prevent the accumulation of condensation water at the level of the sensor leads**. Install the probe so that the probe tip is looking downward. If this is not possible, install the probe horizontally.

Installation and wiring of the base plate

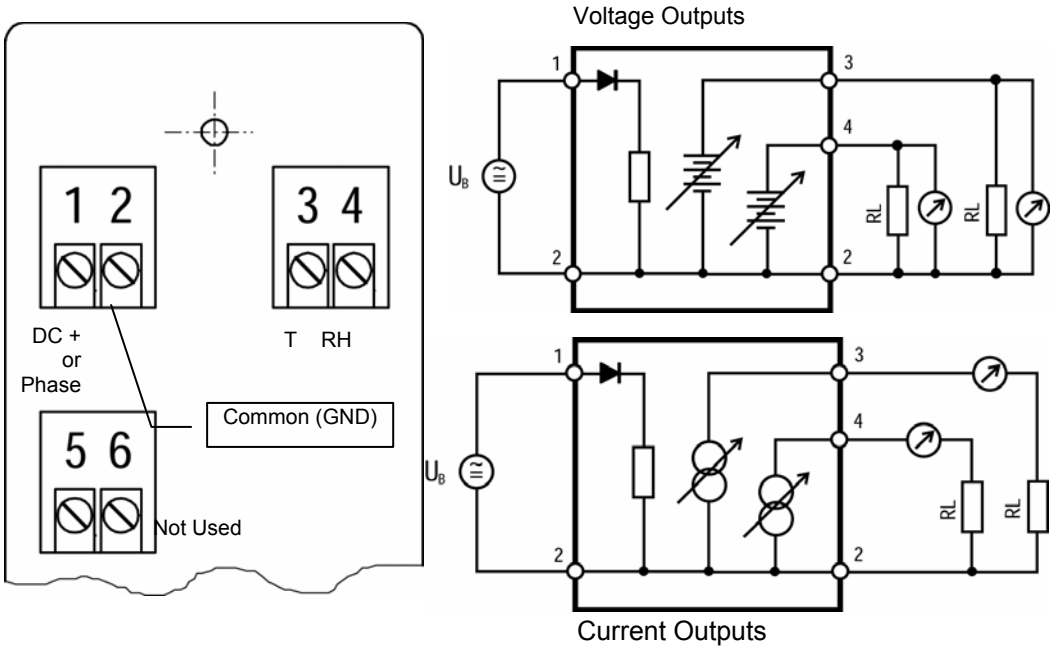
The base plate should be installed first, using screws with an approximate diameter of 5/32".



Installation Note (through wall installation)

You may want to provide an orifice at a distance of about 3” from the probe of the transmitter for future use by a reference probe and HygroPalm indicator.

The base plate of the M23 transmitter is supplied with one sealing cable grip (normally, the base plate is installed with the cable grip on top). This cable grip provides effective sealing only with cables having the proper outside diameter. Preferably, use a cable with an outside diameter of 0.236 to 0.275 inch (6 to 7 mm) and with 18 AWG wires. Avoid running the cables connecting the unit in the same conduit as 110 VAC power cables. Depending on the installation, you may have to use a cable with twisted pairs or a shielded cable to avoid electromagnetic interference.



Base Plate Terminals	Description
1	10…35 VDC (+) or 24 VAC
2	common (-) [1]
3	Temperature (+) / Output 2
4	Humidity (+) / Output 1
5 (+) and 6 (-)	Not Used

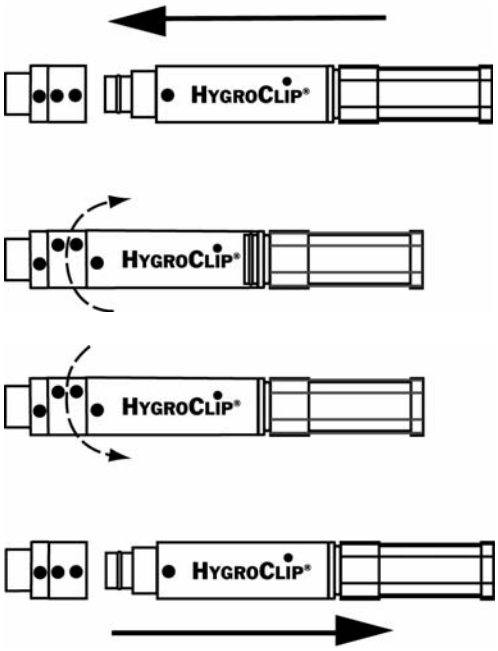
1) We generally recommend grounding, especially if the electronics will be subjected to a low humidity environment (35 %RH or less).

In order to determine the maximum length of cable that can be used to connect the transmitter to other devices, the first step is to find out what is the resistance per unit of length of the cable that you plan on using.

. Current outputs: the maximum permissible cable length, connecting the unit to other devices, is determined by the total resistance resulting from the addition of the cable resistance and that of the devices connected in series with the unit. This resistance should not exceed 250 ohms.

. Voltage outputs: the maximum cable length can be determined under consideration of the voltage drop caused by the current flowing to the devices connected to the unit. The voltage drop in the cable depends both on cable resistance and on the equivalent resistance of the devices connected in parallel to the unit. The total resistance connected to each unit output must at least be equal to 1000 ohms. Cable resistance should not be more than 1/1000 of the load resistance.

Installation and removal of the HygroClip S probe



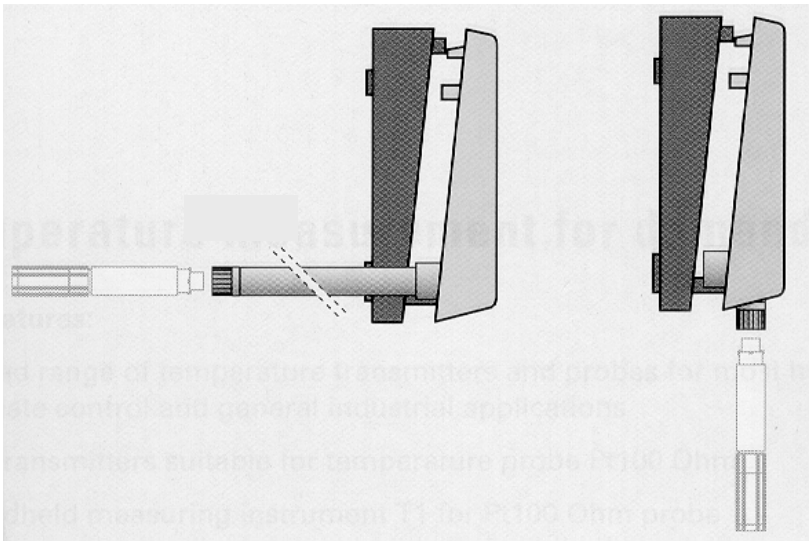
Both the HygroClip S and the base of the connector on the transmitter are marked with a dot. The locking ring is marked with 2 dots.

The probe can be inserted straight into the connector (or removed from the connector) when all dots are aligned. If necessary, rotate the locking ring to align the 2 dots of the ring with the dot at the base of the connector.

WARNING: do not rotate the HygroClip as this may damage the connector.

After inserting the probe, turn the locking ring clockwise to secure the probe.

Installation of the electronics module



Once the base plate has been installed and wired, the electronics module can be inserted and secured with the screws provided. The transmitter is ready to operate.

Maintenance

Cleaning or replacing the dust filter of the HygroClip S

The dust filter should be cleaned from time to time, depending on the conditions of measurement. Cleaning should be done without removing the filter from the probe. Clean the filter with a fine brush. If this is not sufficient, the filter should be replaced. To do this, unscrew the filter from the probe.

Before putting on a new dust filter, check the alignment of both sensors with the probe. The wires that connect the sensors to the probe are very thin and bend easily. If this happens, correct the alignment by holding the sensor very gently with a pair of small flat nosed pliers.

Periodic calibration check of the probe

Long term stability of the ROTRONIC Hygromer humidity sensor is typically better than 1 %RH per year. For maximum accuracy, calibration of the probe should be verified every 6 to 12 months. Applications where the probe is exposed to significant pollution may require more frequent verifications.

Both the Pt 100 RTD temperature sensor and associated electronics are very stable and should not require any calibration after the initial factory adjustment.

For routine calibration checks, the probe should be verified at one or two values of humidity. For more details, see **Appendix 2** - **Calibration** and **Remote Mode functions – ADJUST M.PT, ADJUST 1PT and ADJUST REF**.

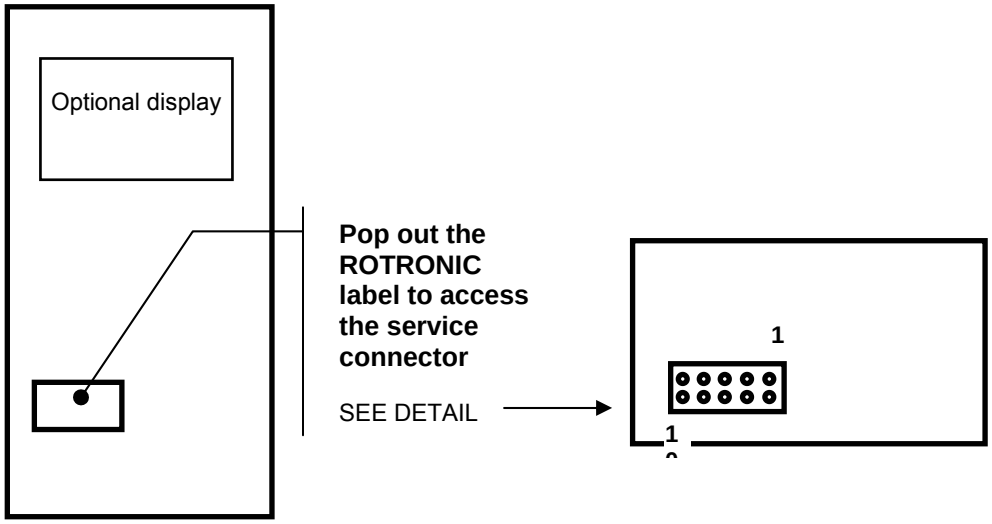
Note: the electronics module of the M23 transmitter should not require any field calibration and it can be easily validated by using a probe simulator (see **accessories**). The electronics module cannot be serviced in the field and should be returned to the factory if there is any problem.

Service connector

The M23 features a keyed 10-pin service connector which can be accessed by popping out the ROTRONIC label which covers the service window. Depending on the model of service cable, this connector allows:

a) RS232 communication with a PC (only for configuration of the M23). Separate instructions are provided in the HW3 manual located on the HW3 CD ROM.

b) communication with the HygroPalm 3 indicator (probe input 2) for field calibrations and other functions. See Appendix 3: Remote mode as well as Accessories and Options



Service Connector Pin #	Signal
1	T / OUT 2 Lo [1)]
2	T / OUT 2 Hi [1)]
3	%RH / OUT 1 Lo [1)]
4	%RH / OUT 1 Hi [1)]
5	Ground
6	V^+ (power to service cable)
7	TX (RS232)
8	GND
9	RX (RS232)
10	DIO

1) see note below:

Voltage outputs: pins 1 and 2 have the same voltage to ground and this is equal to the voltage of the temperature signal / output 2 (same for pins 3 and 4 and humidity signal / output 1).

Current Outputs: pins 1 and 2, as well as pins 3 and 4, are connected to each side of a precision 49.9 ohm resistor (0.1%) which is in series with the output current. In the case of a 4 .. 20 mA current output the voltage measured across pins 1 and 2 (or pins 3 and 4) is within the range of 200 … 998 mV

In both cases, the signals can be measured with a DVM.

For cables matching the service connector, see **Accessories and Options – Service cable and Configuration cable.**

Errors and Status Messages

The following is a list of coded messages (101, etc.) that may appear on the bottom line of the optional LC display or on the PC screen when the M23 is connected by way of the service connector.

Errors:		
101	checksum error	the checksum test did not pass during RS-communication.
102	bad command	an unknown command was received
103	disallowed command	a command was received that is reserved for production and service
104	unknown probe input	reference was made to a non-existing analog or digital probe input
105	argument error	error in the number of the arguments in the command or in the value of one of the arguments
106	HygroClip communication error	the HygroClip probe does not answer or is not connected
107	calibration error	the difference between the probe reading and the calibration point is larger than the maximum allowed by the INI command.
108	calibration error (overflow)	internal probe error (or the difference between the probe reading and the calibration value is too large)
110	unknown reference probe	the reference probe is not connected or the reference probe input does not exist
111	Temperature error	During humidity calibration, temperature should be within the limits of 0 and 80°C (32 and 176°F)

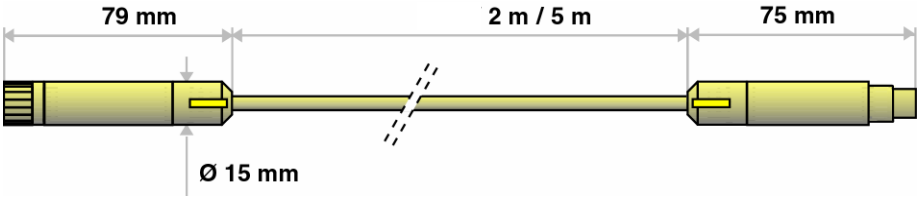
Warnings:		
120	no adjustment	calibration
121	No HygroClip probe is connected	

Status:		
130	the probe was adjusted	calibration

Accessories and Options

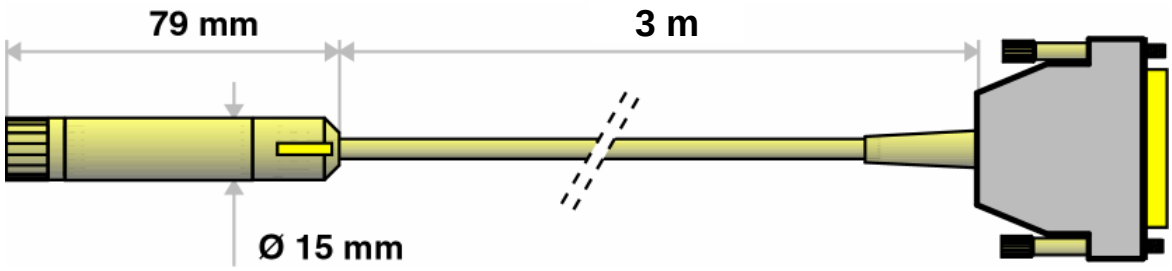
Extension cable for the HygroClip S (for use with M23W)

MOK-xx-DAT05: (xx = 2 or 5 meters)



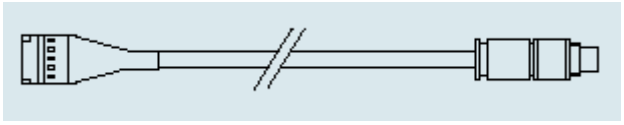
Calibration cable for the HygroClip S

The MOK-03-WIN cable is used to connect the HygroClip S probe to the COM port of a PC. This cable is shipped together with the ROTRONIC HW3 software which is used to read and calibrate the probe when it is removed from the M23 transmitter (can be used to rotate a stock of spare probes).

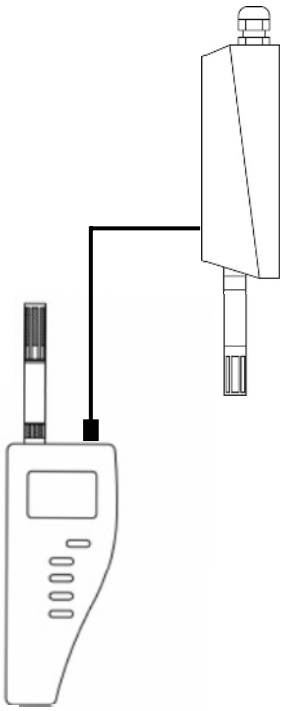


For customers who do not have a humidity generator, ROTRONIC offers a wide range of certified humidity standards and a calibration chamber that fits the HygroClip S.

Service cable



Service cable ACRLXB5 is used to connect the service connector of the M23 transmitter to probe input 2 of the HygroPalm 3 portable indicator. As soon as the two instruments are connected, the HygroPalm detects the transmitter and enters in the “remote mode” (see Appendix 3). The remote mode is indicated by a flashing star on each side of the HygroPalm LC display.



The ACRLXB5 service cable allows to do any of the following:

a) Display locally the signals of the M23 transmitter with the HygroPalm 3. This makes it possible to validate the entire measuring loop: probe, transmitter, wiring and central processing unit. If so desired, the HygroClip probe can be replaced with a certified probe simulator that generates known fixed humidity and temperature values.

Note: the HygroPalm should be configured to read temperature in the same unit as the M23 transmitter. This can be done directly on the HygroPalm.

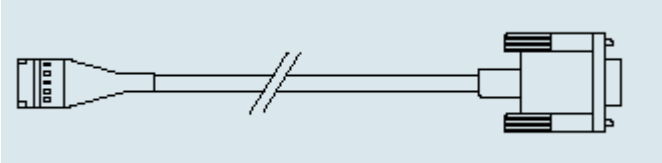
b) 1-point adjustment of the HygroClip S probe with the HygroPalm 3 or single/multi-point adjustment against a reference environment.

A 1-point adjustment can be done against a reference probe connected to probe input 1 of the HygroPalm. See separate HygroPalm manual for detailed instructions.

A known reference environment is required for a multi-point adjustment. In that case it is not necessary to connect a reference probe to the HygroPalm. See separate HygroPalm manual for detailed instructions.

Note: both probe inputs of the HygroPalm should be configured for a digital HygroClip probe.

Configuration cable



Cable ACML232 is used to connect the service connector of the M23 transmitter to the COM port of a PC on which the HW3 software has been installed. The cable has a SUB D9 connector on the PC side. HW3 allows changing the unit system and range of the output signals. Changing the type of analog signal is done with solder pads located on the M23 circuit board.

Probe simulators

For validation purposes, a probe simulator can be plugged in place of the HygroClip S probe to generate fixed humidity and temperature values.

In principle, any combination of humidity and temperature can be ordered. The following are some of the most common combinations:

HygroClip S35/25: 35%RH and 25°C (77°F).
HygroClip S50/25: 50%RH and 25°C (77°F).
HygroClip S80/25: 80%RH and 25°C (77°F).

Like the HygroClip S probe, the probe simulators provide both digital and analog output signals. Prior to shipment, the digital signal is verified with the validated HW3 software. The analog outputs are verified with a traceable voltmeter.

HW3 software

Use of the Rotronic HW3 software provides additional functionality such as:

- instrument configuration: unit system and output scaling (requires cable ACML232)
- calibration of the ROTRONIC HygroClip digital probes independently from the transmitter, using the MOK-03-WIN cable to connect the probe to the COM port of a PC.

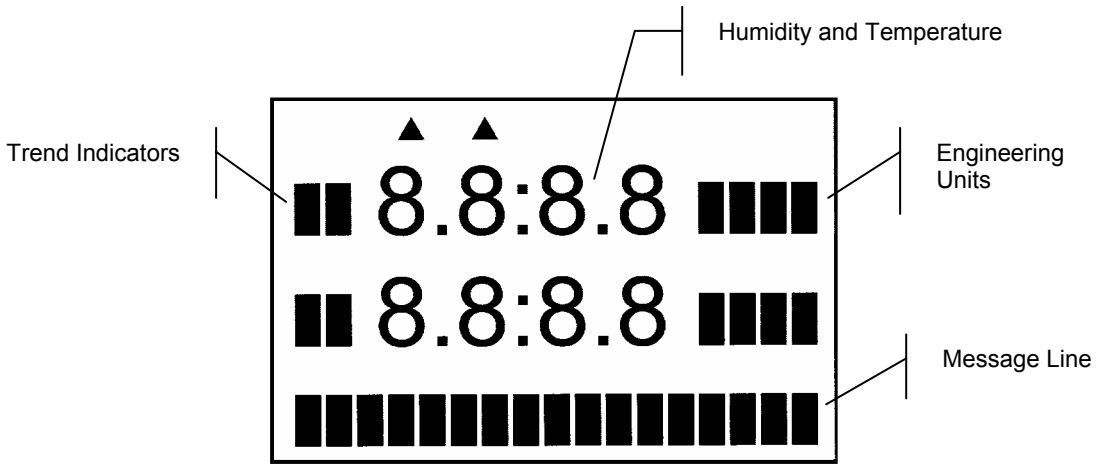
The requirements for using HW3 are as follows:

PC	Pentium 233MHz or better
Windows ®	95/98,Me, XP or NT or 2000®
Memory	64MB
Disk Space	20MB free
Drives	CD ROM drive required
Monitor	VGA or Super VGA
Resolution	1024 x 768 or higher (set to small fonts)
	High Color 16Bit (256 Color minimum)
COM Port	RS232 (COM 1-4)
Software	HW3 (includes - MSIE 4.0 Browser - Adobe® Acrobat Reader)
	MS Internet Explorer: for best viewing, set fonts to smallest

For more details see separate instruction manual provided with the HW3 software.

Optional display

The optional LC display shows humidity and temperature with the associated engineering unit. When relevant, the message line provides additional information.



Specifications

Operating Voltage		15 to 35 VDC / 65 mA max. or 12 to 24 VAC
Operating limits at electronics		0…99 %RH (non condensing)
	w/o LC display	-40...60°C (-40...140°F)
	with LC display	-30…60°C(-22…140°F)
Measured parameters [1]		
relative humidity	typical range	0…100 %RH
	indication range	0.0 to 100.0 %RH
temperature	typical ranges	0…100 °C, 0…50°C, -30…70°C 0…100 °F, 0…200°F, -50…150°F
	indication range	-99.9 to 999.9 °C or °F
System accuracy at 23°C/73°F		± 1.5%RH
with HygroClip probe & 4-point calibration		± 0.3°C / 0.5°F
Number of probe inputs		1
Probe type		ROTRONIC HygroClip S digital probe
Analog outputs (scalable)		2: relative humidity and temperature
Analog signals (user selectable)		0…1V, 0…5V, 0…10V 0…20 mA, 4…20 mA
Minimum load for voltage outputs		1000 ohm
Maximum load for current outputs		250 ohm
Serial output		RS232 (service connector)
Electrical Connections	power / outputs	cable grip and terminals [2]
	probe input	connector
Optional LC display		alphanumerical, 0.000…9999
Housing Material		ABS
Housing Dimensions (w/o probe)		154 x 72.5 x 48 mm (6.06 x 2.86 x 1.89”)
Weight		292 g (10.3 oz)
Protection grade		IP65 / NEMA 4

1) The range of the output signal may be different from the application limits of the product. These are 0 to 100%RH and -40 to 85°C / -40 to 185°F at the probe. Specify engineering units and range when ordering (both can be changed by user with optional HW3 software).
2) Recommended cable for cable grip: 7..9 mm diameter (0.275..0.354”) with 18 AWG wires. Cable for output signals should preferably be shielded.

Appendix 1: 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 the probe is mounted through a wall, avoid temperature errors by inserting as much of the probe as possible in the environment to be measured. Whenever there is a large temperature difference across the wall, you may have to insert not only the probe itself but also some of the probe cable (cables do conduct temperature).

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.

Non-moving air is an excellent insulator. When there is no air movement, surprising differences in temperature and humidity can noted over short distances. Air movement at the probe generally results in measurements that are both faster and more accurate.

Appendix 2: Calibration

The following choices are available to calibrate the probe used with the M23 transmitter:

a) Calibration of the probe connected to the M23 transmitter:

This requires a HygroPalm 3 indicator and service cable **ACRLXB5** (see accessories – service cables).

Power up the M23. Connect cable ACRLXB5 to the service connector of the M23 and to probe input 2 of the HygroPalm 3. This automatically triggers the remote mode of the HygroPalm (see Appendix 3: Remote Mode). When in the remote mode, select probe 1 on the display of the HygroPalm. In the remote mode, the HygroPalm displays the readings of the probe connected to the M23 transmitter as opposed to displaying the readings of any probe that might be connected to probe input 1 of the HygroPalm.

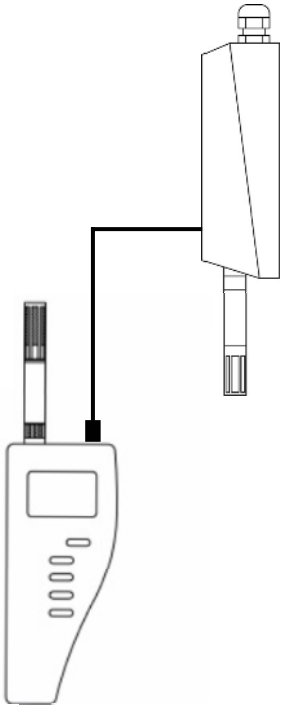
Press the MENU key of the HygroPalm to access the function menu of the transmitter and use the UP and DOWN keys to navigate the function menu. Selections are confirmed by pressing the ENTER key. Select one of the calibration functions: ADJUST M-PT, ADJUST 1-PT or ADJUST REF (see Remote Mode). Detailed calibration instructions are provided separately in the HygroPalm manual.

b) Calibration of the probe removed from the M23 transmitter:

This requires a PC with the optional HW3 software and the **MOK-03-WIN** calibration cable (separate instructions are provided with the HW3 software).

Appendix 3: Remote Mode

To initiate the Remote Mode, use service cable **ACRLXB5** to connect the service connector of the M23 transmitter to probe input 2 of the HygroPalm 3 indicator. **Note that for the remote mode to work, probe input 2 of the HygroPalm must be configured for a digital probe**.



As soon as the two instruments are connected, the HygroPalm detects the transmitter and this is indicated by a flashing star on each side of the HygroPalm LC display. **At that time, the display of the HygroPalm shows data from the transmitter and can no longer be used to access local data from the HygroPalm. Similarly, the function keys of the HygroPalm control the transmitter and not the HygroPalm itself.** To exit the Remote Mode, simply disconnect the two instruments.

Notes:

Using the Remote Mode does not affect the output signals (analog or digital) of the transmitter. The outputs keep being normally updated.

While in the Remote Mode, the HygroPalm cannot be turned off and it cannot communicate with a PC. Disconnect the transmitter and the HygroPalm if you need to turn off the HygroPalm.

If the transmitter is equipped with the optional LC display, this display repeats the information shown on the display of the HygroPalm.

The following options are available when in the Remote Mode:

1) Display the Transmitter Measurements on the HygroPalm

As soon as the Remote Mode is initiated, the HygroPalm displays the measurements (internal digital values) from the transmitter. This is especially useful when the transmitter does not have the optional LC display.

2) Access the Function Menu of the Transmitter

Press the MENU key of the HygroPalm to access the function menu of the transmitter and use the UP and DOWN keys to navigate the function menu. Selections are confirmed by pressing the ENTER key. The following functions are available:

OUTPUT

Definition

This function displays the values sent to each analog output. The display shows the values at the time the menu key was pressed and these values are not updated to the display as long as the function is active. This allows the values to be correctly compared. The analog output signals keep being updated.

Procedure

When entering the function, analog output 1 is displayed first. Use the UP or the DOWN key to display the other output.

ADJUST M.PT (2- to 4-point adjustment against a reference environment)

Definition

The Adjust M.PT function permits to calibrate and adjust the ROTRONIC HygroClip digital probe that is connected to the transmitter against a known reference environment. This function is designed to permit calibration at up to 2 temperature values and up to 4 relative humidity values. *To prevent unauthorized or accidental changes, lock the keypad (software configuration with HW3) to block out access to this function from the HygroPalm calibrator.*

Selections

The Adjust M.PT function offers the following choices (use the UP and DOWN keys):

RHS: Humidity calibration using the ROTRONIC Humidity Standards [1)]
Humidity: Humidity calibration using any suitable reference environment
Temperature: Temperature calibration using any suitable reference environment

1) For humidity calibration, ROTRONIC offers convenient, certified humidity standards to generate known humidity values (for more details, see Appendix 2 - Humidity Calibration).

Procedure

When using the Adjust M.PT function, it is important to observe the following rules:

a) Always calibrate temperature first (if temperature needs to be calibrated)

b) When calibrating temperature (2 points), always calibrate at the low value first. The instrument is programmed to use the low temperature value to compute the offset and the high temperature value to compute the gain.

   T-low < 70 °C (158°F) : used to compute the calibration offset
   T-high ≥ 70 °C (158 °F) : used to compute the calibration gain

   For best accuracy, we recommend using a T-low value close to 20°C (68°F). Preferably, the difference between T-high and T-low should be at least 50 °C (90 °F). Because calibration is digital, it is possible to calibrate even at values that are not within the range of the transmitter analog temperature output.

c) When calibrating relative humidity (2, 3 or 4 points) with the ROTRONIC humidity standards, always follow the sequence 35 %RH, 80 %RH, 10 %RH or 5 %RH, 0 %RH. When using a reference other than the ROTRONIC humidity standards, use reference conditions that are within the following brackets and observe the sequence:

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

   The transmitter is programmed to automatically recognize these brackets.

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

When the probe is at equilibrium with the reference environment, activate the Adjust M.PT function and make the appropriate selections:

1) **RHS**: press the ENTER key to select this item. The LC display of the HygroPalm shows the value read by the probe at the time the ENTER key was pressed. The letters "RHS" are displayed on the message line. Use the UP or the DOWN key to change the humidity value to match the mean value (at 23°C) written on the certificate supplied with the standard. For a faster change, keep the key pressed down. Press the ENTER key when done.

   Note: in the RHS mode, the software automatically compensates for the effect of temperature on the humidity standard. No additional correction is required.

2) **Humidity or Temperature**: press the ENTER key to select. The LC display of the HygroPalm shows the value read by the probe at the time the ENTER key was pressed. The word "humidity" or "Temperature" is shown on the message line. Use the UP or the DOWN key to change the humidity or temperature value to match the value of the reference environment. For a faster change, keep the key pressed down. Press the ENTER key when done.

After pressing the ENTER key, the message "sure?" should appear on the LC display. Press ENTER to confirm. Next, the LC display will confirm that the probe adjustment has been successfully completed. At that time, press ENTER to exit or MENU to return to the function Adjust M.PT and do another calibration point.

Carry on in the same manner for each calibration point, following the sequence described above.

Note: you can exit the function at any time (without calibrating the probe) by pressing the MENU key.

ADJUST 1PT (1-point adjustment against a reference environment)

Definition

The Adjust 1PT function permits to do a 1-point adjustment (offset adjustment) of the ROTRONIC HygroClip digital probe against a known reference environment. This function is limited to a simple offset adjustment that is applied across the entire measuring range. *To prevent unauthorized or accidental changes, lock the keypad (software configuration with HW3) to block out access to this function from the HygroPalm calibrator.*

Warning: a 1-point adjustment is no substitute for an adjustment at 2 or more points. Adjusting the probe at only one value can improve accuracy over a narrow range of conditions and may also be detrimental to accuracy at other conditions.

Selections

The Adjust 1PT function offers the following choices (use the UP and DOWN keys):

RHS: Humidity calibration using the ROTRONIC Humidity Standards [1)]
Humidity: Humidity calibration using any suitable reference environment
Temperature: Temperature calibration using any suitable reference environment

1) For humidity calibration, ROTRONIC offers convenient, certified humidity standards that generate known humidity values (for more details, see Appendix 2 - Humidity Calibration).

Procedure

When the probe is at equilibrium with the reference environment, activate the Adjust 1PT function and make the appropriate selections:

a) **RHS**: press the ENTER key to select this item. The LC display shows the value read by the probe at the time the ENTER key was pressed. The letters “RHS” are displayed on the message line. Use the UP or the DOWN key to change the humidity value to match the mean value (at 23°C) written on the certificate supplied with the standard. For a faster change, keep the key pressed down. Press the ENTER key when done.

   Note: in the RHS mode, the software automatically compensates for the effect of temperature on the humidity standard. No additional correction is required
   .

b) **Humidity or Temperature**: press the ENTER key to select. The LC display shows the value read by the probe at the time the ENTER key was pressed. The word “humidity” or “Temperature” is shown on the message line. Use the UP or the DOWN key to change the humidity or temperature value to the value of the reference environment. For a faster change, keep the key pressed down. Press the ENTER key when done.

After pressing the ENTER key, the message “sure?” should appear on the LC display. Press ENTER to confirm. Next, the LC display will confirm that the probe adjustment has been successfully completed. At that time, press ENTER to exit.

Note: you can exit the function at any time (without calibrating the probe) by pressing the MENU key.

ADJUST REF

In the Remote Mode, the function Adjust REF can be used to do a 1-point adjustment of the transmitter against a **reference HygroClip probe connected to input 1 of the HygroPalm indicator** (be sure that probe input 1 of the HygroPalm is configured for a digital HygroClip probe). The function adjusts both humidity and temperature simultaneously to match the readings of the reference probe.

Note: when no probe is detected, the message “connect fail” will be displayed.

Press MENU and use the UP or the DOWN key to access Adjust REF from the function menu. Press ENTER to select this function.

After pressing the ENTER key, the display of the HygroPalm shows the relative humidity and temperature data from the reference probe (connected to the HygroPalm). The message REF = PALM should also appear on the LC display. The data on the display is the data read by the reference probe at the time the ENTER key was pressed. This data is not updated while the function Adjust REF is active (see Notes below).

Press the ENTER key to accept the reference data. The message “sure ?” should appear on the LC display. Press ENTER to do the 1-point adjustment of both humidity and temperature or press MENU to abort and exit this process. When the message “Adjust OK” appears, press ENTER to exit.

Notes:

Expose both probes to be to the same stable environment. Ventilation of both probes is highly recommended. Observe the readings from both probes for complete equilibration (this can be done by entering and exiting a few times the function Adjust REF so as to check both probes prior to adjusting).

If the transmitter has its own display, it simply repeats the data or commands shown on the display of the HygroPalm.

PROBE

Definition

This function displays the version number and serial number of the ROTRONIC HygroClip digital probe connected to the transmitter.

Procedure

When entering the function, the version number of the probe is displayed first. Use the UP or the DOWN key to display the serial number of the probe.

SETTINGS

Definition

This function is used to do the following:

- turn the trend indicators on or off (applies only to units with the optional display)
- change the symbol used for relative humidity

Procedure

Trend: use the UP or the DOWN key to enable or disable the trend indicators. Press ENTER when done and ENTER again to confirm.

The trend of humidity and temperature is shown on the display by an arrow (up or down) to the left of the measured value. Both arrows are shown to indicate stable conditions. Stable conditions are defined as rate of change of less than 0.02 %RH / min or °C / min.

Signal stability is first evaluated after 60 seconds into the measurement and is updated every 30 seconds.

Note: when the trend indicator is enabled, the symbol for the calculated parameter (e.g. Dp for dew point) is no longer displayed to the left of the numerical value.

Humi Unit: use the UP or the DOWN key to select the desired symbol for relative humidity. Press ENTER when done and ENTER again to confirm.

SYS STATUS

Definition

This function displays the software version of the instrument, the RS232 configuration (baud rate, parity, bits and stop bit), the network address, any user defined description for the instrument and the serial number of the instrument.

This information is for display only. Some parameters such as the network address can be changed with the HW3 software, after connecting the instrument to a PC.

Procedure

When entering the function, the software version number is displayed first. Use the UP or the DOWN key to display the other data.

Appendix 4: Accessories for the M23 Series

Order Code	Description
HW3	HW3 software (CD ROM)
HygroPalm 3	HygroPalm 3, field calibrator
ACRLXB5	Cable: service connector M23 to HygroPalm 3 (probe input 2 – remote mode)
ACML232	Cable: service connector M23 to PC COM port (transmitter configuration only)
MOK-xx-DAT05	Probe extension cable for M23W (xx = 2 or 5 meter)
MOK-03-WIN	Calibration cable HygroClip probe with DAT05 connector to PC. Terminated with a 25-pin SUB D connector. Converter 25-pin to 9-pin is supplied. Cable length 3 meter (9.8 ft). 9VDC adapter may be required (consult your local distributor)
HygroClip Sxx/yy	HygroClip S probe simulator where xx = relative humidity in %RH and yy = temperature in °C (fixed values)
EAxx-SCS	humidity std, SCS certified, pack of 5 where xx = 00 (0 %RH) = 05 (5 %RH) = 10 (10 %RH) = 11 (11 %RH) = 20 (20 %RH) = 35 (35 %RH) = 50 (50 %RH) = 65 (65 %RH) = 75 (75 %RH) = 80 (80 %RH) = 95 (95 %RH)
ER-15	calibration device for HygroClip S probe