DI-BUS

Digital Humidity - Temperature Transmitter

INSTRUCTION MANUAL

in-dibus-v1.1 / 20070910

CONTENTS

DOCUMENT RELEASE TABLE

Version	Date	Notes
1.0	June 14, 2006	Original release. Firmware version 1.0
1.1	Sept. 10 2007	Enhanced description for module installing

IMPORTANT NOTE

The current version of this manual is limited to a product compatible with the Profibus system.
A version of the manual covering additional bus systems will be published in the near future.

OVERVIEW

DI-BUS is a digital humidity temperature transmitter built in a robust housing and designed for “plug and play” integration with the following industrial bus systems: Profibus, DeviceNet, CANopen and Modbus-RTU.

The DI-BUS transmitter features a single probe input, suitable for use with any industrial HygroClip digital probe [1], and a plug-in module that provides the bus system interface. Both the probe and the interface module should be ordered separately from the DI-BUS transmitter and are installed / connected by the user. Compatibility with a specific bus system is determined by the type of plug-in interface module installed in the DI-BUS.

The DI-BUS automatically transmits the following signals: relative humidity, temperature and a user selectable calculated parameter such as dew point.

Depending on the model of HygroClip probe, the DI-BUS can be used in applications where conditions at the probe are within the range of 0 to 100 %RH and -50 to 200°C (-58 to 392°F).
The DI-BUS is available in two basic models:

DI-BUS : transmitter without local display
DI-BUS-D : transmitter with local display

[1] The DI-BUS transmitter is not compatible with the ROTRONIC HygroClip intrinsically safe (Ex) probes.

GENERAL DESCRIPTION

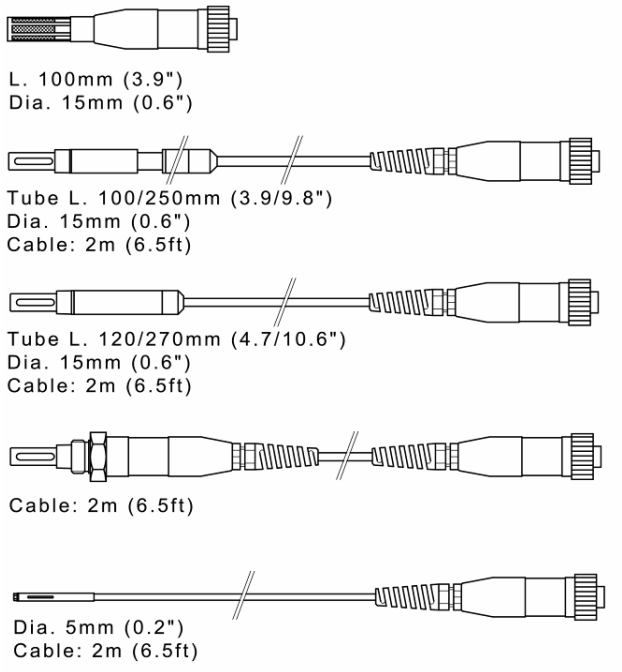
Power supply

The DI-BUS requires a voltage source within the range of 12…24 VDC – 200 mA. There is no significant current consumption difference when the optional LC display is installed.

HygroClip digital probes

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

The ROTRONIC HygroClip digital probes are available in different configurations so as to meet the requirements of each application:



HygroClip IW
for surface mount (area monitoring)
max. 85°C (185°F) – wire mesh filter
observe temperature limits of transmitter electronics

HygroClip IC-1 (100mm) / IC-3 (250mm)
for through-wall installation
max. 200°C (392°F) - wire mesh filter

HygroClip IM-1 (120mm) / IM-3 (270mm)
for through-wall installation in high humidity applications
max. 200°C (392°F) - wire mesh filter

HygroClip IE-1 (G ½") / IE-2 (NPT ½")
for compressed air (max. 50 bar / 725 PSI)
max. 85°C (185°F) – sintered steel filter
to avoid errors, temperature should be the same on both sides of the mounting wall

HygroClip IC-05
for measurement in tight spaces
max. 100°C (212°F)

Note: the DI-BUS transmitter is not compatible with the ROTRONIC HygroClip intrinsically safe (Ex) probes and with the AC1616 extension cable with signal booster.

Plug-in interface module

The plug-in interface module is supplied separately from the DI-BUS transmitter and must be installed by the user. Instructions are provided in the installation section of this manual.

IMPORTANT: the current version of this manual covers only the interface module model DI-BUS-AB6200, designed for the Profibus system.
After setting the bus address of the DI-BUS with the internal DIP switch located on the DI-BUS PCB, the DI-BUS is immediately ready for use.

Unit system

By default, the DI-BUS is factory programmed to use the metric system. After establishing the connection with the bus, the unit system can easily be changed by the user to the English system (see Appendix 2).

Optional display

The optional display is a monochrome 3-line graphic LC display. The display shows the relative humidity and temperature measured by the probe as well as the calculated parameter selected by the user (for example: dew point). The display uses the unit system (metric or English) selected by the user.

Operating limits

The DI-BUS can survive 0 to 99 %RH non-condensing and -40 to 70°C / -40 to 158°F at the electronics. With the optional display, temperature at the electronics should not exceed 60°C / 140°F.

Temperature limits at the probe depend on the probe model (see HygroClip digital probes). For all probe models, the maximum humidity limit is as follows:

. 100 %RH up to 80°C / 176°F
. 90 %RH at 90 °C / 194 °F
. 50 %RH at 120 °C / 248°F
. 25 %RH at 150 °C / 302°F

Operating the transmitter and/or its probe outside of the operating limits can result in permanent damage and is not covered under the warranty.

As far as possible, avoid sudden condensation at the sensors. When measuring at high humidity, condensation may occur on the humidity sensor when sensor temperature is lower than the temperature of its environment. At temperatures below 80 °C / 176°F this does not damage the sensor. However, this will cause the humidity signal to stay at its maximum value for as long as condensation is present on the humidity sensor. To ensure meaningful readings in high humidity applications, be sure to provide tight temperature control and limit the rate at which temperature can increase.

INSTALLATION

Each DI-BUS transmitter is shipped in an individual box, separately from the probe and interface module. The shipping box has a label with the following information: instrument type, main specifications and serial number. An identical label is located inside of the transmitter enclosure.

Installation and removal of the bus interface module

Prior to using the DI-BUS transmitter, you should install the bus interface module. When installed, the bus interface module is held in place by a light gray frame located on the DI-BUS PCB and is latched to two square holes located on the PCB.

To install the bus interface module:

Remove the top cover before installing the module in order to insert the module properly!

- Retract the two module latches by turning counter-clockwise with a Torx key # 8 the two latch control screws (see below).
- Slide the module in the frame and align the pins carefully.
- Now gently press the module all the way in to make contact with the frame connector.
- Be careful not to bend or break connector pins.
- Turn clockwise the two screws to deploy the module latches
- Verify that the module is held firmly in place.

To remove the bus interface module, proceed in the opposite order.

Bus interface module

Latch control screw (x2)

Probe installation guidelines

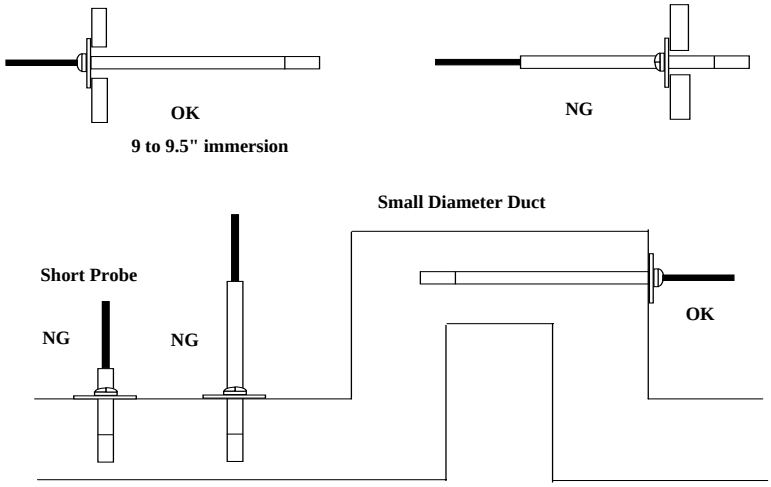
Do not remove the dust filter or slotted cap from the probe. Both sensors can easily be damaged when not protected.

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 measurement performance. For best results, please observe the following guidelines:

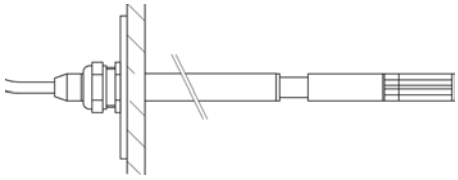
- Install the probe at a location where humidity, temperature and pressure conditions are representative of the environment or process to be measured. Avoid the following: (a) Close proximity of the probe to a heating element, a cooling coil, a cold or hot wall, direct exposure to sun rays, etc. (b) Close proximity of the probe to a steam injector, humidifier, direct exposure to precipitation, etc. (c) Unstable pressure conditions resulting from excessive air turbulence.

- If possible, choose a location that provides good air movement at the probe: air velocity of at least 1 meter/second (200 ft/ minute) facilitates adaptation of the probe to changing temperature.

- When installing the probe through a wall, immerse as much of the probe as possible in the environment to be measured.



Position the probe so as to 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.



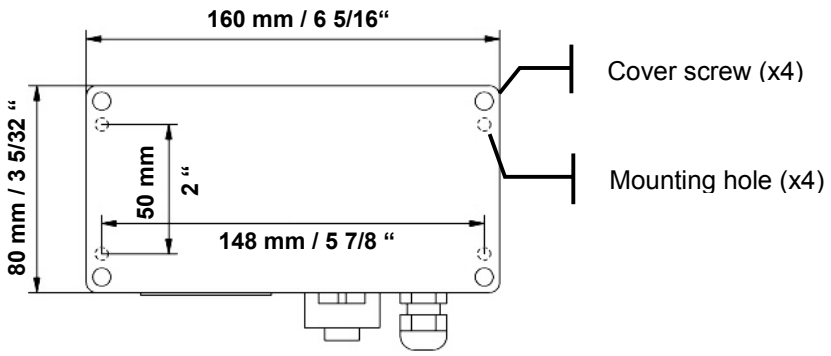
Depending on the probe model, a probe holder (mounting flange with a compression fitting) can facilitate installation through a wall.

Future maintenance can be made easier by providing next to the probe a calibration access orifice. During maintenance, this permits the insertion of a reference probe (calibrator).The calibration access orifice should have the same size as the orifice used to install the probe and can be equipped with a probe holder.

Attaching the housing to a wall

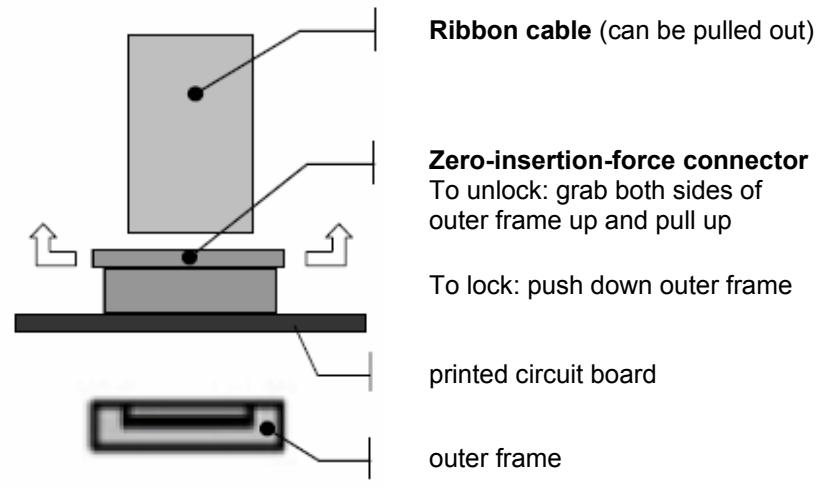
To access the 4 holes used to attach the housing to a wall, remove the housing cover. Use # 6 machine screws. The position, location and dimensions of the mounting holes are shown on the diagram below.

If the surface of the mounting wall is at a temperature of more than 100°F, use an insulating spacer (not provided) between the transmitter enclosure and the wall or duct. This spacer should be at least 1" thick.



Ribbon cable for the optional display

The optional front cover display is connected to the main circuit board by a ribbon cable. When removing the front cover, this cable can easily become detached.

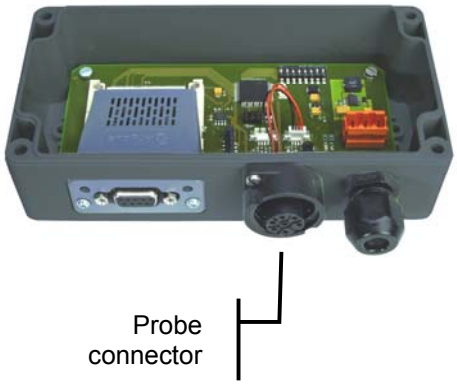


To re-attach the ribbon cable, unlock the connector (see above) and slide the cable back into the connector as indicated below. Lock the connector in place and verify the cable is firmly held in place.

Each end of the ribbon cable has a contact side and a blue insulated side. When inserting the cable in the connector, position the contact side of the flat ribbon cable to the opposite of the connector outer frame.

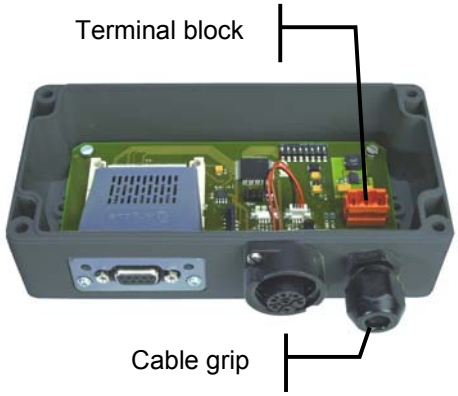
Note: disconnecting and reconnecting the ribbon cable while the DI-BUS is powered may cause the display to remain blank. In that case, un-power and power again the transmitter.

Probe connection



After attaching the housing to a mounting surface, connect the probe to the 7-pin connector

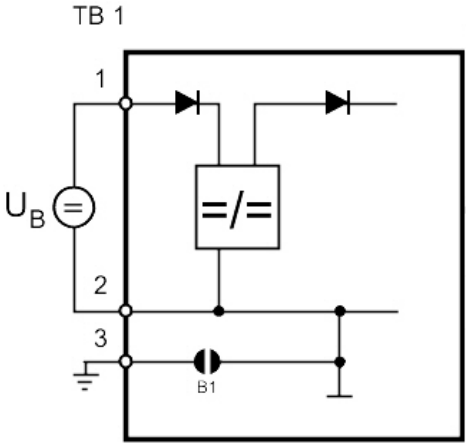
Electrical connections



The cable grip provides effective sealing only with cables having the proper outside diameter. Preferably, use a cable with an outside diameter of 6 to 7mm (0.236 to 0.275 inch) and with 18 AWG wires. Avoid running the cable powering 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.

Terminal block position	Function
1	+ 12 to 24 VDC
2	Negative
3	Ground (see wiring diagram)

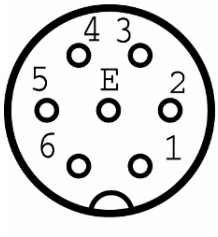
Wiring diagram (supply voltage)



Note: to ground the DC negative, close solder pad B1 located on the PCB just below the terminal block.

Probe connector pin-out diagram

Note: the contact side of the female connector is the same as the solder side of the matching male connector.



TUCHEL T7 (7-pin female shown from contact side)

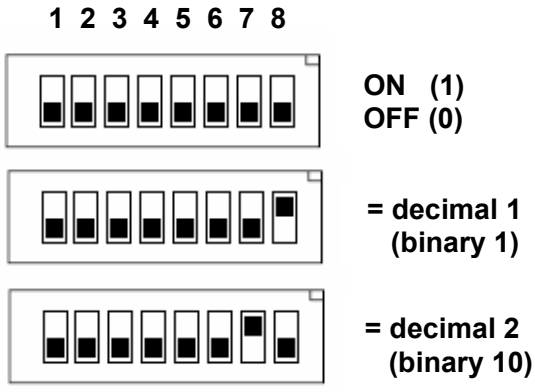
Pin #	Function	Pin # on PCB connector DIO
E	GND (-)	4
1	Not used	
3	DIO (digital)	3
5	5 VDC±0.5 VDC	1
6	Not used	

OPERATION

Setting the bus address

Prior to connecting the DI-BUS to the bus system and powering up, use the 8-position DIP switch to give the DI-BUS a unique decimal address between 1 and 254 (avoid using the addresses 0 and 255). Note that the address is to be entered in binary format with the LSB [1] assigned to pos 8 of the DIP switch: for example the factory default decimal address 60 is entered as binary 111100, “0” being the LSB (DIP switch pos 8 = OFF).

► PLEASE NOTE THAT THE ORIENTATION OF THE DIAGRAMS BELOW CORRESPONDS TO THE DI-BUS WITH CONNECTORS POINTING DOWNWARDS.



[1] LSB = Least Significant Bit

Connecting to the bus system

After setting the bus address, connect the probe to the DI-BUS, connect the DI-BUS to the bus system and power up the DI-BUS. After 10 to 20 s, the green LED located to the right of the interface module should be on. As soon as the device is initialized by the bus system, the green LED located to the left of the module is on and the communication is active.

At this point, you should configure the DI-BUS to use either the metric (factory default) or English unit system and set which parameter (dew point - the factory default - or other) should be calculated by the DI-BUS (see Appendix 2).

MAINTENANCE

Cleaning or replacing the probe dust filter

The probe sensors are protected by a dust filter. This filter is either a slotted cap with a wire mesh insert or a metal base with a removable filter cartridge attached to the base with a screw. Depending on the conditions of measurement, the filter should be checked from time to time.

Probe with filter cartridge: the filter cartridge can be easily removed for cleaning or for replacement. Leave the metal base on the probe.

Corroded, discolored or clogged filters or filter cartridges should be replaced.

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.

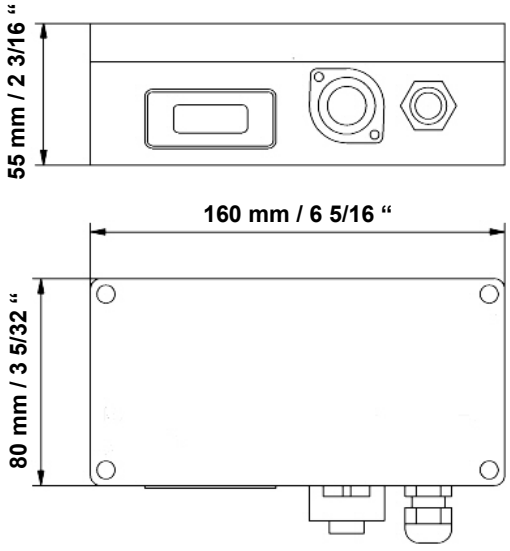
Two methods are available for adjusting the probe:

- Adjustment with the probe connected to the DI-BUS, using commands sent directly via the bus system (see Appendix 4).
- Adjustment of the probe disconnected from the DI-BUS (see Appendix 5).

Note: the DI-BUS itself does not require any field calibration.

SPECIFICATIONS

Humidity temperature probe	Interchangeable HygroClip industrial probe with Tuchel 7-pin connector (order separately)
Maximum operating limits at probe	-50…200°C / -58…392°F (actual limits depend on probe model) 100 %RH up to 85°C / 185°F 90 %RH at 90°C / 194°F 50 %RH at 120°C / 248°F 25 %RH at 150°C / 302°F
Sensor protection (standard)	Wire mesh filter
Max air velocity at probe	20 m /s (3900 ft / min)
Maximum Accuracy at 20..25°C / 68..77°F	± 1.0 %RH and ± 0.3°C / ± 0.5°F (depends on probe)
Operating limits at electronics	Recommended: normal room humidity and temperature Survival: 0...99%RH non condensing and -40...70°C / -40...158°F (-40...60°C / -40...140°F with optional display)
Psychrometric calculation	User selectable: dew point, frost point, wet-bulb temperature, enthalpy, vapor concentration, specific humidity, mixing ration, saturation vapor concentration, vapor partial pressure, vapor saturation pressure
Unit system	User selectable (metric / English)
Bus system compatibility	Depends on bus interface module (order separately): DI-BUS-AB6200: Profibus DI-BUS-AB6201: DeviceNet DI-BUS-AB6202: CANopen DI-BUS-AB6203: Modbus-RTU
Supply voltage	12..24VDC, 200 mA
Electrical connections (power)	Plug-in terminal block and cable grip
Housing material	Polycarbonate
Protection grade	IP65 / NEMA 4 (without optional display)
Housing Dimensions	80 (H) x 160 (W) x 55 (D) mm (3 5/32 x 6 5/16 x 2 3/16")
Weight	240 g / 8.5 oz
CE conformance	EN61000-6-1; 2001, EN61000-6-2:2001 EN61000-6-3; 2001, EN61000-6-4:2001



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.

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: Profibus data mapping

Note: All data read or written to the DI-BUS is in binary format. All numerical values of the Float type are floating point binary numbers (single precision) as per the IEEE 754 format. Data format: LSB first and Low Byte first.

Read Process Data

The following table describes the process data normally transmitted from the DI-BUS to the host

Type	Length	Description
Float	4 Byte	Humidity
Float	4 Byte	Temperature
Float	4 Byte	Calculated Value
Boolean	1 Byte	Probe Status (1 = OK, 0 = no communication with probe)

Write Process Data

The DI-BUS does not normally require any process data from the host.

Solicited data requests and settings (Slot 0)

Index	Access	Type (Length)	Default	Description
0	R	Float (4 Byte)		Humidity
1	R	Float (4 Byte)		Temperature
2	R	Float (4 Byte)		Calculated value
3	R	Boolean (1 Byte)		Probe status (1 = OK, 0 = no communication with probe)
4	R	Long (4 Byte)		Probe serial number
5	R	Word (2 Byte)		Probe firmware version

Index	Access	Type (Length)	Default	Description
6	R/W	Byte (1 Byte)	0	Engineering unit of the calculated value (see Unit System Table and Note 1)
7	R/W	Byte (1 Byte)	3	Temperature Unit (see Unit System Table and Note 2)
8	R/W	Byte (1 Byte)	0	Type of calculated value (see Calculated Value Table)
9	R	Long (4 Byte)		DI-BUS serial number
10	R	Word (2 Byte)		DI-BUS firmware version
11	R/W	Word (2 Byte)	0	Probe adjustment command (see Probe Adjustment Commands)
12	R/W	Float (4 Byte)	0	Reference value for probe adjustment
13	R/W	Float (4 Byte)	1013.25	Fixed pressure value used for calculated value [hPa]

Note 1: be sure that the selected unit is appropriate for the selected calculated value.

Note 2: use only Celsius (3) or Fahrenheit (4).

Calculated Value Table

#	Calculation	Units
0	No calculation	No unit
1	Dew point (Dp)	°C, °F
2	Frost point (Fp)	°C, °F
3	Wet-bulb temperature(Tw)	°C, °F
4	Enthalpy (H)	kJ/kg, BTU/lb
5	Vapor concentration (Dv)	g/m3, gr/cu ft
6	Specific humidity (Q)	g/kg, gr/lb
7	Mixing ratio (R)	g/kg, gr/lb
8	Saturation vapor concentration (Dvs)	g/m3, gr/cu ft
9	Vapor partial pressure (E)	hPa, Inch Hg, PSI
10	Vapor saturation pressure (Ew)	hPa, Inch Hg, PSI

Unit System Table

#	Unit
0	No unit
1	Humidity %
2	Humidity Aw
3	Temperature °C
4	Temperature °F
5	Pressure hPa
6	Pressure Inch HG
7	Pressure PSI
8	Enthalpy kJ/kg
9	Enthalpy BTU/lb
10	Concentration g/m3
11	Concentration gr/cu ft
12	Concentration g/kg
13	Concentration gr/lb

Probe Status

0	No Probe detected
1	Probe ok

Probe Adjustment Commands Table

Decimal / Hex Value	Description
12560 / 0x3110	Temperature single point
12561 / 0x3111	Temperature multiple point
12562 / 0x3112	Humidity single point
12563 / 0x3113	Humidity multiple point

Adjustments should be carried one at a time as per the instructions provided in Appendix 4.

Appendix 3: Probe adjustment basics

IMPORTANT: any adjustment of the probe temperature should be done prior to adjusting the probe humidity. This sequence must be observed because the probe firmware compensates the effect of temperature on the humidity sensor.

Temperature adjustment / calibration

Note: the stability of the Pt100 RTD sensor used to measure temperature is such that a temperature adjustment in the field is seldom required.

In order to be able to correctly evaluate the accuracy of the temperature measurements provided by the probe, you should be able to meet the following requirements:

a) Both the probe and a reference thermometer should be ventilated with the same stream of air. Any dust filter used to protect the sensors should be carefully removed from the probe. If the probe has a protective slotted cap, this may be left on the probe.

b) Air velocity at the sensor should be within the limits of 200 to 500 feet/minute (1 to 2.5 meters/second). Any comparison between two instruments at a velocity under 200 feet/minute may not be valid. Air velocity above 500 feet/minute may damage the unprotected humidity sensor.

c) The temperature of the air stream should be practically constant.

If you cannot meet the above requirements, you should not attempt to adjust or calibrate temperature.

Humidity adjustment / calibration

As an alternative to using a humidity-temperature generator such as the ROTRONIC HygroGen, ROTRONIC provides easy-to-use, certified humidity standards. To use these standards, you will need a calibration device that is suitable for your probe (see Appendix 6: Accessories for the DI-BUS and probe).

Calibration Device

The calibration device is a small airtight container that fits on the probe and seals around the humidity sensor. During calibration, a known reference humidity is produced inside the calibration device by means of a humidity standard (usually an aqueous salt solution).

Certified Humidity Standards

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

Each box of standards comes with a certificate that provides statistical information on the manufacturing batch of the standard. Information on the effect of temperature on each standard is provided on the cover of each box of standard. When calibrating with the HygroPalm or HygroLab

indicator or with the HW3 software, the effect of temperature on the standards is compensated by the firmware / software and no further correction is required. The value of the standards is not affected by altitude.

Instructions for using the Standards

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

General Recommendations

During calibration, temperature stability is the single most important requirement. If possible, calibrate the probe is room temperature (18 to 25°C). Room temperature should be stable to ± 0.25°C or better during the period of time required for each calibration point. Do not calibrate close to an air vent or a heater, in direct exposure to sun rays, etc.

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

Appendix 4: Adjustment of the probe connected to the DI-BUS

Adjustment of the probe connected to the DI-BUS can be done using commands sent via the bus system. For a description of the commands and procedure to be followed, see Appendix 2, Probe Adjustment Commands Table.

Single point adjustment

A single point adjustment has the effect of adding an offset to all measurements. A single point adjustment may be done using any reference value within the probe measuring range.

When the probe is at equilibrium with the reference environment, write to the DI-BUS the appropriate probe adjustment command first (index 11: 2 bytes binary word) and then write the reference value (index 12: 4 bytes floating point single precision binary number as per the IEEE 754 format).

After completing the procedure, read the adjusted parameter to verify the results.

Multiple point adjustment

A multiple point adjustment consists in an offset and a gain adjustment (2-point adjustment). In the case of humidity, up to 2 additional linearity adjustments can be done at low humidity values. The DI-BUS firmware compares the reference value with predefined brackets to decide if the adjustment is an offset, a gain or a linearity adjustment. Therefore, it is important to follow both the procedure and sequence described below.

a) When adjusting temperature, always begin with the low value first. The DI-BUS is programmed to use the low temperature value to compute the offset and the high temperature value to compute the gain.

T-low < 40 °C (104°F) : used to compute the adjustment offset
T-high ≥ 40 °C (104 °F) : used to compute the adjustment gain

For best accuracy, we recommend using a T-low value close to 20°C (68°F).

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 and 0.5%RH. When using a reference other than the ROTRONIC humidity standards, use reference values that are within the following brackets and observe the following sequence:

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

[1] For best accuracy, we recommend using values close to 35 %RH (point 1) and 80 %RH (point 2)

When the probe is at equilibrium with the reference environment, write to the DI-BUS the appropriate probe adjustment command first (index 11: 2 bytes binary word) and then write the reference value (index 12: 4 bytes floating point single precision binary number as per the IEEE 754 format).

After completing each procedure, read the adjusted parameter to verify the results.

Appendix 5: Adjustment of the probe separated from the DI-BUS

The following choices are available to adjust the probe when separated from the DI-BUS:

a) Connect the probe to a HygroPalm or HygroLab indicator by means of a **T7-03-B5** adapter cable (the procedure to be followed is described in the HygroPalm or HygroLab instruction manual).

b) Connect the probe to the COM port of a PC with the ROTRONIC HW3 software, using the **T7-03-WIN** calibration cable (the procedure to be followed is described in the software instruction manual).

Appendix 6: Accessories for the DI-BUS and probes

Order Code	Description
DI-BUS-AB6200	Profibus interface module
DI-BUS-AB6201	DeviceNet interface module
DI-BUS-AB6202	CANopen interface module
DI-BUS-AB6203	Modbus-RTU interface module
HW3	HW3 software (CD ROM) – used for adjusting the probe when separated from the DI-BUS
T7-03-WIN	Calibration cable HygroClip probe with T7 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). Includes 115 VAC / 9VDC adapter to power probe and cable electronics.
HygroPalm 3	HygroPalm 3, field calibrator
T7-03-B5	Adapter cable for connecting a probe with the T7 connector to a HygroPalm. Cable length 3 meter (9.8 ft), 5 meter (16.4 ft) on request
AC1618/35	probe simulator 35%RH / 77°F(25°C) - used for measurement loop validation
AC1618/50	probe simulator 50%RH / 77°F(25°C) - used for measurement loop validation
AC1618/80	probe simulator 80%RH / 77°F(25°C) - used for measurement loop validation
EA00-SCS	0%RH humidity std, SCS cert., pack of 5
EA05-SCS	5%RH humidity std, SCS cert., pack of 5
EA10-SCS	10%RH humidity std, SCS cert., pack of 5
EA20-SCS	20%RH humidity std, SCS cert., pack of 5
EA35-SCS	35%RH humidity std, SCS cert., pack of 5
EA50-SCS	50%RH humidity std, SCS cert., pack of 5
EA65-SCS	65%RH humidity std, SCS cert., pack of 5
EA80-SCS	80%RH humidity std, SCS cert., pack of 5
EA95-SCS	95%RH humidity std, SCS cert., pack of 5
ERV-15	calibration device for type ‘IW’ probes
ER-15	calibration device for 15mm diameter probes
ER-05	calibration device for 5mm diameter probes
EM-G	calibration device for type ‘IE’ probes