

# OPERATION MANUAL



## Humidity temperature sensor with serial interface

### Description



### Characteristics features

- Combined Temperature and Humidity measurement
- Sensor in Stainless steel casing with Sinterfilter
- Resolution 0.01 % RH, 0.01 °C
- Accuracy 2 % RH, 0.3 °C
- Calibration possibility with salt reference cells

### Areas of application

- Monitoring of stock rooms, in food industry, quality assurance. in air conditioning systems

### Windows-Software

- Calculation and display of dew point, absolute humidity, vapour pressure, saturated vapour pressure and enthalpy
- Tabular representation of measured values
- Storing of data on hard disk

### Technical data

<b>Humidity measurement</b>	
Humidity measuring range	0 ... 100 % RH
Humidity resolution	0.01 % RH
Typical accuracy	±2 % RH (at 23 °C)
<b>Temperature measurement</b>	
Temperature measuring range	-40 ... +80 °C
Temperature resolution	0.01 °C
Accuracy	±0.3 °K between 0 ... +40 °C
<b>Module</b>	
Operating voltage DC	9...15 V DC, reverse polarity protected, 40 mA
Operating current	30 mA approx.
Interface	RS 232 compatible, 4800 Baud, 8 N 1
Sensor dimensions	150 x Ø12 mm
CE-Conformance	2014/30/EU
EMV-Noise emission:	EN 61000-6-3:2011
EMV-Noise withstanding:	EN 61000-6-2:2011
Plug connector	Data DB9-Female, Pin 2 & 5
Power supply	Jack 3.5 mm
Scope of supply	Humidity sensor in stainless steel casing, interface adaptor with PC connection cable and extensive documentation

### Description

The product offers an efficient measurement and display system for temperature and relative humidity. The compact measurement sensor with overall dimensions of Ø12 x 150 mm is housed in a stainless steel casing. The interface converter, covered in the scope of supply, enables direct operation with a PC or any customer specific control and regulation system.

The front area of the sensor is provided with a polyethylene-sinter filter for protection against sprinkling water and mechanical damages. An accurate NTC has been used as temperature sensor. The humidity measurement operates with a durable and stable capacitive polymer sensor.

The micro controller of the interface converter compensates the linearity error and temperature drift of the sensor elements. The applied mathematical procedures guarantee outstanding measuring accuracy and long term stability, also under extreme operating conditions.

The current measured values are sent as ASCII string to the connected PC through the serial interface (RS232 compatible). The display and graphical representation of the measured values appear on the PC. The easy to use Windows software for display of measured values and data representation is for free in our download center.

The ASCII-protocol for data communication is documented and enables integration with user developed programs. More such modules can



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be operated with a PC, provided more free COM-ports are available at our disposal. The measurement sensor is supplied in calibrated condition. With the help of reference cells available as accessories, the accuracy of the sensing element can be checked by the user himself. Further calibration is also possible.

### Connection to PC

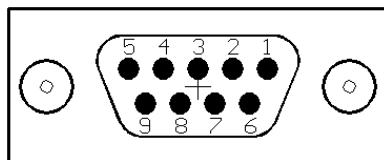
The interface converter is provided with a one meter long connection cable which can be directly inserted into the COM port of PC. The humidity-temperature sensor is connected at the 6-pin female western connector (RJ12).

The software RECORDER, which is covered in the scope of supply, enables display and storing of measured values and calculation of secondary climate values after installation with the PC.

Plug details DB 9-pin female connector

PIN	Function
1,3,4,6,7,8,9	unused
2	Serial Communication
RS232, 4800 Bd, 8N1	
5	GND, Ground
Housing	Shielding

DB9F



### Power supply plug details

Jack plug 3.5 mm, centre pin positive and outer connection is negative of the operating voltage. The operating voltage range is around 9 ... 15 V DC / 40 mA approx. The circuit is protected against wrong polarity.

### WINDOWS-Software RECORDER

With the help of this program, the measured values can be received through the interfaces and displayed on the PC. The displayed data is compatible with any desired spread sheet program, with which it is possible to further process the measured values for statistical evaluation and interpretation.

In addition, the PC-Software also calculates the dew point, absolute humidity, enthalpy and vapour pressure from the measured values of relative humidity and temperature. The calculated figures can also be stored.

### Installation

The program should be first installed under Windows 98, NT, 2000 or XP system. Place the attached diskette in your drive and run the program "setup.exe" either by selecting "Run" from the START menu or through the windows explorer. Then follow the instructions of the installation program. The setup program creates a new program group "HYGROSENS INSTRUMENTS" in the folder "programs". After successful installation, the software can be accessed and executed through the START menu.

### First time operation

Connect the cable of interface adapter to a free serial port on the PC. After first time run of the software, in the menu option "settings", select device type as "HYTE-LOG" and also the serial interface used (for example, COM1) under "connections". The remaining settings (Data rate, Parity, Start and Stop bit) are automatically selected and need not be changed. In case, the connection hangs, refer to data communication in the terminal window. Then select "Close". The current settings will be stored.

If you are not able to establish data link between PC and the measuring device and/or the measuring adaptor, then first please check the power supply and also the cable connection to the PC.

### Data recording

First activate all the measurement channels that are to be recorded. In 'Text 1' and 'Text 2', you can enter a description, which has to appear as heading on the top of data file. The selected separator appears between the individual data elements. Enter the recording interval in seconds in the Field "Every". The data is recorded in the file which is entered as path in the 'Start' button. The recording begins with the 'Start' button.

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### EXCEL™

If you want to use EXCEL for evaluation, then operate the control button EXCEL before start of recording, so that suitable decimal separation characters and field separators are inserted. The created file is compatible with CSV-Format. In order to display the measured data, you can use graphic tools, for example, the diagram-assistant. However, other programs can also be used to evaluate the measured data.

### Calibration



The module is supplied in calibrated condition. The accuracy at 23 °C is of the order of  $\pm 0.3$  °K and  $\pm 2\%$  RH. Under normal operating conditions, it is not necessary to again calibrate the module. The measuring accuracy of humidity measurement portion can be done by the end user with the salt reference cells available as special accessories. The checkup must be done in temperature stable environment. In case, the measured value does not match with the desired value of the cell, the device should be sent to our calibration laboratory for checkup.

### Format of data transfer

The interface works at a data rate of 4800 Baud, 8 data-bits, no parity and one stop bit.

The transfer of useful data takes place in lines. All characters are ASCII coded. All information is sent continuously without separation characters. In a line, only information of one channel is transferred. At the end of the line, the last two ASCII characters are sent for the check sum (CRC) of the current line. Each line closes with the character 'Carriage return' '<CR>'. Several lines form a data-block. A data-block can have the following contents, for example:

```
@<CR>
I01010100B00725030178<CR>
V010892A1<CR>
I02020100B00725030148<CR>
V0216B0EA<CR>
$<CR>
```

The data block has a following structure:

- A synchronization pattern for the beginning of a Data block. For synchronization, the sequence '@<CR>' is used.

- The configuration data ('Identifier') of a channel. The data line begins with the character 'I', followed by the logical channel number, and then followed by configuration data and the Sensor serial number. The line is closed with the check sum and the character '<CR>'.  
• The measured values of a channel. The data line begins with the character 'V', followed by the logical channel number, followed by useful data. Only numerical measurement values and the check sum (CRC) at the end of the line, are transferred. All other information like number format, number of characters, physical unit, etc. are contained in the configuration data (sensor coding).  
• The configuration data and measurement values follow the same scheme for all other channels.  
• The continuation character '\$<CR>' is sent at the end of a data-block.

### Structure of configuration dataline

The configuration data line contains all information of the sensor working on the corresponding channel. The line has a following structure:

- Identification character 'I' at the beginning of the line.
- 8 bits (two ASCII characters) logical channel number. The logical channel number is used to co-relate configuration data with the measured values. In the Humidity-Temperature module, the temperature values are transmitted through channel 01 and humidity values are transmitted through channel 02.
- 8 bits (two ASCII characters) physical sensor coding. Based on sensor coding, the number format, scale, physical unit and allowable range of values are specified. For the described device, sensor coding is 01 for temperature channel and 02 for humidity channel.
- 8 bits (two ASCII characters) hardware coding (type of the measurement sensor). The Temperature/Humidity module has the code number 01.
- 48 bits (twelve ASCII characters) serial number of the sensor. Each serial number is allotted only once.
- 8 bits (two ASCII characters) CRC (check sum)
- '<CR>' as line termination

### Structure of measured values datalines

The measured value dataline contains the current measurements of the sensor operating on the corresponding channel. All information are represented in binary and is transferred in ASCII coded format without separation characters. For the sensor marking 01, the line has following a structure:

- Identification character 'V' at the beginning of the line

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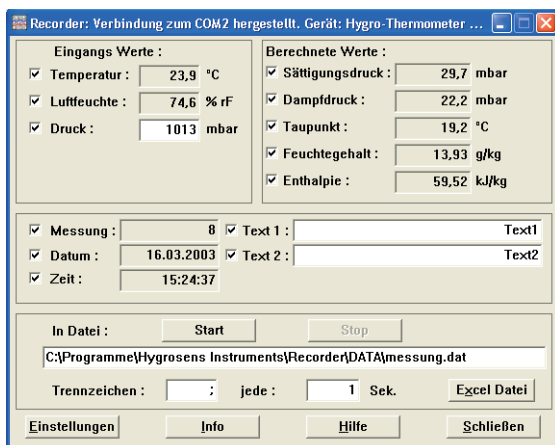


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- 8 bits (two ASCII characters) logical channel number (01 for temperature, 02 for humidity)
- 2 Byte (4 ASCII-characters) measurement data. For the temperature with 0.01 °C resolution. The hexadecimal value is to be converted into a decimal number and to be divided by 100. With this, the temperature value is obtained in °C with two decimals. For the humidity value with 0,005% resolution. The hexadecimal value is to be converted into a decimal number and to be divided by 200. With this, the relative humidity RH value is obtained in % with two decimals.
- 8 bits (two ASCII characters) check sum (CRC)
- ' <CR>' as line termination

As per the opposite column in the given example, the measured temperature is equal to 21.94 °C and humidity of air is 29.04 % RH.

View of the Software "RECORDER"



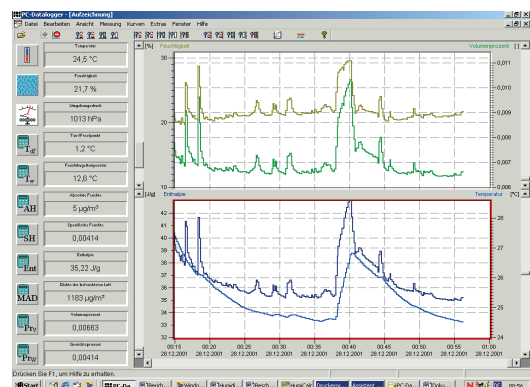
### Accessories (Optional)

### Software PCLOG

Besides storing data on hard disk, the software offers a most important feature of graphical representation of all measured and recorded channels in the form of a temperature Vs time chart (online scriber function). By means of Drag & Click, the window section can be enlarged and the time or temperature axis can be scaled as desired. Besides the graphic view, the representation is also possible in the form of a table. The Windows scratchpad is used for capturing measured data series into a spreadsheet program (for example EXCEL™) or into WORD™. All tables and graphic representations can be printed out in color. In addition, simple monitoring and regulation functions are also integrated in the software. Limits can be set for each channel. An acoustic signal (Wave file) is given when the values are exceeded. Control of up to eight external actuators is possible by a relay card, to

be attached at the parallel port.

A speciality of the program is the hx-calculator. This further calculates 15 other figures like the dew point, absolute humidity, enthalpy, the wet bulb temperature, the vapour pressure and saturated vapour pressure etc.



### Software Profilab

With this software, professional measurement projects can be realized in a simple, graphics based development platform. You can simply draw the wiring diagram of the measurement circuit and do the project design. Without any knowledge of programming, the measurement values of temperature and humidity can be easily used in the measurement circuit. Arithmetic and logical components take care of linking and processing of the measured values. Modules like impulse generators, timers and relay cards etc. provide extensive possibilities for control and regulation. Various instruments, scribes and tables serve as the storage and representation of measured values and you can monitor the measurement system with display and control elements. The system is operated through a self designed front panel, on which you can arrange switches, potentiometers, displays, LEDs, instruments etc. The software also enables compilation of the project into an EXE-file, which can run without "Profilab".



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### Humidity reference cells



The B+B Humidity reference cells provides specific humidity conditions, in order to create stable humidity values for experimental purposes or for calibration of the measuring device. The accuracy possible under stable temperature environment conditions is in the range of 1% relative humidity. The working principle is based on a saturated salt solution, over which a specific relative humidity value adjusts itself. The cells also contain a semi-permeable Teflon membrane (diaphragm) through which the salt solution is separated from the measurement area.

### Index to ordering numbers

Humidity-Temp. Module with Stainless steel sensor, RS 232	HYTELOG-RS232
AC power supply 12 V / 670 mA	NG 12V-670MA
Software	
Windows-Software PCLOG	PCLOG-TELOG
Windows-Software PROFILAB EXPERT	PROFILAB
Accessories	
* Humidity reference cells, various values	ag. order

### Attention

Please avoid extreme mechanical and inappropriate exposure.

The device/product is not suitable for potential explosive areas and medical-technical applications.