HUMOR 20

HUMIDITY CALIBRATOR

Manual
Hardware

YOUR PARTNER IN SENSOR TECHNOLOGY

E+E ELEKTRONIK® Ges.m.b.H.

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HARDWARE

1 FOREWORD

E+E Elektronik® Ges.m.b.H. has developed this instrument for the precise description of the relative air humidity (U_W). You are now the owner of a professional instrument for high-quality representation of the physical parameters mentioned above. The manufacturer has invested its entire current knowledge into the development, construction, and productionof this instrument.
Furthermore, the manufacturer is convinced that the humidity calibrator HUMOR 20 meets all requirements and expectations that you might have as the buyer of a new instrument. With proper handling and regular maintenance, the instrument should operate reliably for many years.

The Manual is a part of the scope of supply and serve for guaranteeing proper handling and optimum functioning of the instrument. For this reason, the Manual must be read before start-up.
In addition, the operating instructions are for all personnel who require knowledge concerning transport, setup, operation, maintenance, and repair.

These operating instructions should not be used for the purpose of competition without our written consent and should also not be forwarded to third parties. Copies for your own personal use are permitted.
All information, technical data, and illustrations contained in these instructions are based on information available at the time of publication.

E+E Elektronik® Ges.m.b.H. maintains the right to change the technical data or make other technical modifications at any time and without prior announcement, without being obligated to retrofit models that were manufactured before the date of such a change.

General

These operating instructions represent a part of the scope of supply and serve for guaranteeing optimum operation and functioning of the instrument.
In order to guarantee problem-free functioning, these operating instruction must be read very carefully before start-up.

Explanation of symbols

This symbol indicates a safety tip.
These safety tips must be observed. The manufacturer is not responsible for violations of these tips. The user alone bears the full risk.

This symbol indicates a tip.
In order to achieve optimum function of the instrument, these tips are to be observed.

2 EG DECLARATION OF CONFORMITY

The manufacturer declares that the instrument designated below corresponds to the relevant basic safety and health requirements of the EG guidelines in terms of its design and construction, as well as in the configuration put into circulation by the manufacturer.
If the instrument is changed without the consent of the manufacturer, this declaration is no longer valid.

Manufacturer

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Designation of the Instrument

HUMOR 20

The HUMOR 20 is a professional instrument that describes relative air humidity used to test (calibrate, adjust) humidity instruments.

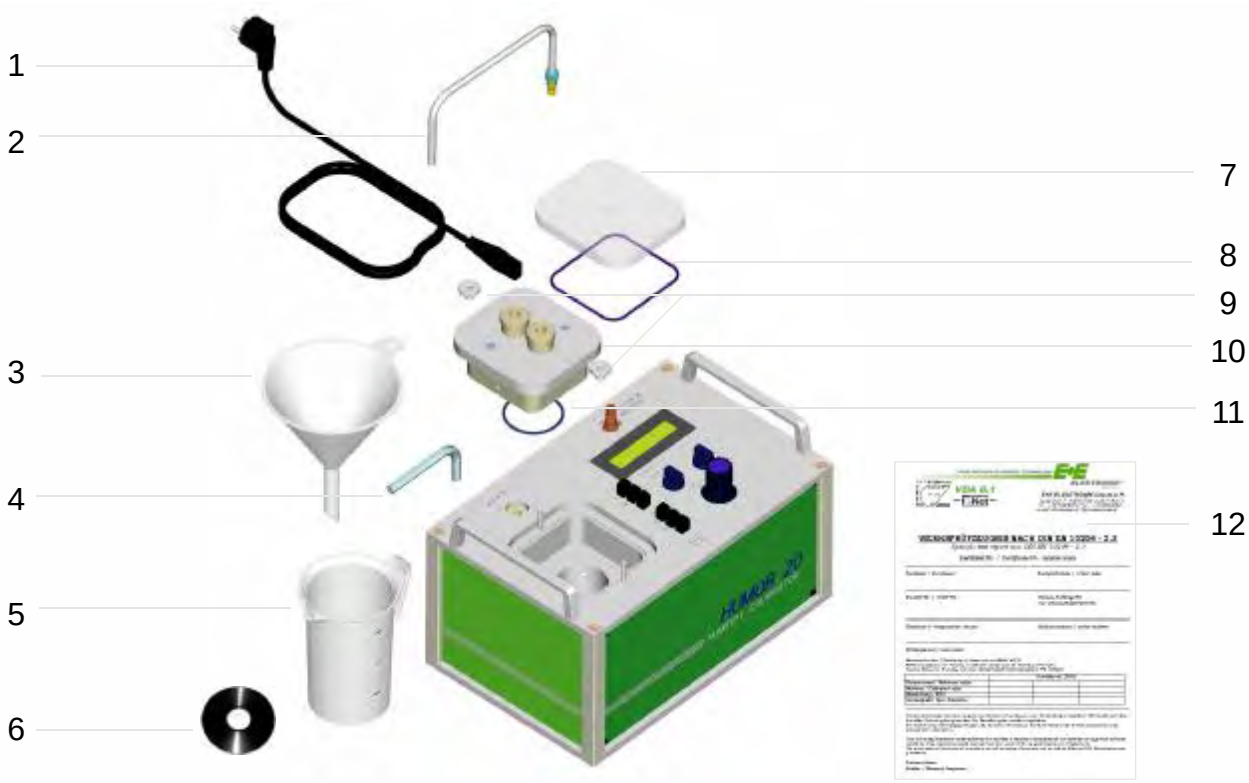
The instrument corresponds to

EG guideline Electromagnetic Compatibility (89/336/EWG)
EG guideline Low Voltage (73/23/EWG)

Applied harmonized standards

EN 61000-6-3
EN 61000-6-4
EN 61000-6-2
EN 61326-1 +A1 +A2
EN 61010-1

3 SCOPE OF SUPPLY



1 Power supply cable IEC Europe (230V)
+ power supply cable IEC Northamerica (110V)
2 Water drain pipe with connector
3 Funnel
4 Allen key (10 mm)
5 Measuring beaker
6 Measuring and calibration software
7 Plexiglas cover for room transmitter testing
8 O-ring for room transmitter
9 Knurled nut
10 Cover for humidity sensor with 12 mm probe diameter
11 O-ring
12 Works certificate according to DIN EN 10204-2.3

4 SAFETY INSTRUCTIONS

4.1 General

The instrument HUMOR 20 is built according to the current state of the art and it will operate reliably if it is free from faults and if it is properly operated and maintained.
The instrument can present a risk if it is used improperly or not according to specifications by unqualified personnel!

This can result in:
- damage to the instrument itself, to other assets of the user, as well as to the operating personnel.
- inefficient and imprecise operation of the instrument.

For the sake of your own safety, the following tips in particular are to be observed:

- Only qualified or specially trained personnel should be tasked with operating or working with the humidity calibrator. Unauthorized changes or modifications to the instrument are not permitted or require the express authorization of the manufacturer.

- Carefully read through the operating instructions before starting up the instrument. Furthermore, the supplied operating instructions must always be accessible to all personnel concerned with the transport, setup, start-up, operation, and maintenance. (Be very careful when lending or disposing of the instrument to third parties)

- The instrument should only be operated in a fault-free state. Possible defects must be repaired either by authorized persons or by the customer service department of E+E Elektronik® Ges.m.b.H before starting up the instrument.

4.2 HUMOR 20

- Check whether the details for the supply voltage on the nameplate agree with the local mains supply.

- Only use a grounded plug to connect the humidity calibrator to power (protective measures).

- Before opening the water inlet, guarantee that the humidity calibrator is no longer under pressure. (Controller turned all the way to the left, if HUMOR is already in operation, display RH > 90%)

- The HUMOR should only be operated with distilled (deionized) water.

- Before connecting the compressed air, guarantee that the controller is turned all the way to the left.

- The instrument should only be operated with filtered compressed air maximum contamination level < 0.03 g/m³.

- The media supply should not exceed an absolute pressure of max. 10 bar. (Manometer and safety valve in the supply line)

- **A humidity calibrator that is ready for operation and that is filled with water must not be tilted more than 20 degrees !**
  Otherwise empty HUMOR 20 totally --> page 27 : chapter 8.2

- **Disconnect compressed air after power off (running risk of condensation in the pipes because of switched off heating).**

5 OPERATING ELEMENTS

5.1 HUMOR 20

6 GENERAL USER TIPS

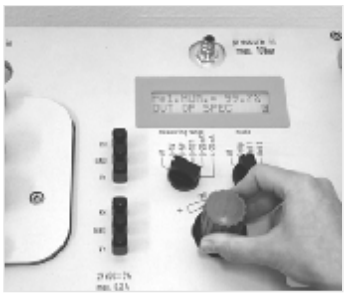
6.1 Setup:

The humidity calibrator is designed for operation in rooms with a temperature range of 10...40 degC and a humidity content of 10...80% RH.
Measurements under direct sunlight as well as under the effects of other external heat sources are not allowed.
Furthermore, the HUMOR 20 is neither to be operated in areas with explosives nor is it to be subjected to mechanical vibrations.
A humidity calibrator that is ready for operation and that is filled with water must not be tilted more than 20°!

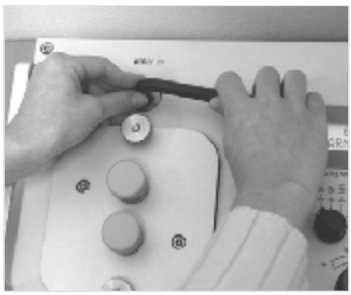
6.2 Start-up:

6.2.1 Establish power supply.
Insert power supply cable into instrument and into the grounded socket.

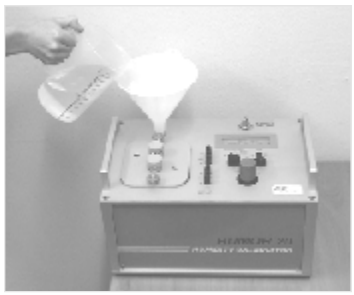
6.2.2 Turn on main switch.



6.2.3 Turn humidity controller all the way to the left.

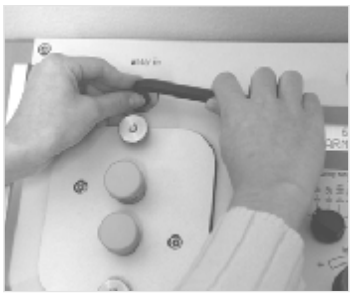


6.2.4 Open water container.
Open screw plug with the help of the included Allen key.



6.2.5 Fill with distilled water.
Fill the humidity calibrator with max. 1300 ml distilled (deionized) water. If the max. fill lever is exceeded, Water - Level high is displayed on the display and water must be removed until the message disappears. (see Item 8.2)

During filling, pay special attention that no water enters into the measuring chamber.

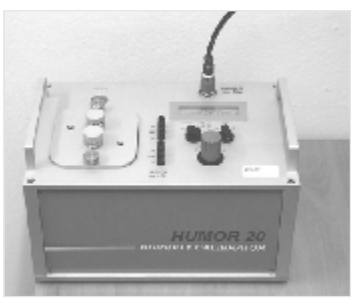


6.2.6 Close water container.
Close screw plug with the help of the included allen key.

6.2.7 Wait through warm-up phase.
Observe 20 min warm-up phase (Display: WARM UP TIME).

6.2.8 Establish media supply (oil-free compressed air or N2).
Establish media supply and charge humidity - generator with pressure.

(p < 10 bar see safety tips)



6.2.9 HUMOR is ready for operation.

7 CALIBRATION AND ADJUSTMENT PROCESS HUMOR 20

The special construction of the measuring chamber allows the calibration and adjustment of a wide variety of measurement value sensors. From sensor probes with a diameter of 8 - 25.5 mm (hand-held instruments, duct mounting versions, ...) as well as those for compact (room) transmitters, data loggers, etc. with max. dimensions 100 x 85 x 40 mm resp. 95 x 95 x 40 mm.

7.1 Compact room transmitter

With the use of the Plexiglas cover of the measuring chamber included in the scope of supply, the HUMOR 20 can also be used for the calibration and adjustment of room devices.
Due to thermal coupling with the outside, additional measurement errors are to be considered depending on the used humidity and the position of the specimen in the measuring chamber. (see data sheet)

1. Apply supply voltage.
2. Position specimen in the measuring chamber.
3. Insert O-ring in the groove provided in the measuring chamber.
4. Pass connection cable through the threaded joint of the Plexiglas cover.
5. Place cover and fasten both knurled nuts tight.
6. Connect specimen to the supply connections of the HUMOR 20 (24V DC) or to an external power supply section.
7. Apply output signal of the specimen to the internal measurement inputs of HUMOR 20 (Unit1 RH, Unit2 RH).
8. Select the measuring range according to the output signal of the specimen.
   Additionally the temperture of the measuring chamber can be displayed by selecting it with the measuring range switch.
9. Wait through stabilization time (ca. 20 min.).
10. Select the desired humidity - desired value with the controller.
11. Compare the values shown on the display with the output signal of the measurement transmitter.

7.2 Transmitter with sensor probe:

Due to its working principle, the HUMOR 20 has a slightly higher temperature than the surroundings. Therefore, for the measurement, make sure that the probe temperature can be aligned with the measuring chamber temperature.
For precise measurements, the cover-feedthrough should be adapted to the probe diameter as much as possible. In order to guarantee this fit, there are various cover-feedthroughs available for selection (see Appendix Accessories).

1. Place suitable measuring chamber cover (watch position and diameter of the feedthrough) and tightly fasten both knurled nuts.

2. Introduce specimen(s) through the feedthrough(s) into the measuring chamber and tightly fasten threaded joint(s).

3. If feedthroughs are not equipped with a probe, these feedthroughs are to be sealed by included blind plugs.

4. Connect specimen(s) to the power connections of the HUMOR 20 (24V DC) or to an external power supply section.

5. Apply output signal of the specimen to the internal measurement inputs of HUMOR 20 (Unit1 RH, Unit2 RH).

6. Select the measuring range according to the output signal of the specimen.
   Additionally the temperture of the measuring chamber can be displayed by selecting it with the measuring range switch.

7. Select desired humidity - desired value with the controller.

8. The typical deviations and stabilization times for the specimen must be taken from documentation of the manufacturer (we advise min. 15 min.).

9. Compare the values shown in the display with the output signal of the measurement transmitter.

7.3 Interruption of power supply during the measurement process

For longer loss of power (>5 min.), the rotating head must be released (pulled up) and turned all the way to the left. Furthermore, the media supply should be clamped. After restoration of power and execution of the warm-up phase, the measurement can be started again.

7.4 Ending the calibration or adjustment process

1. Release the rotating head of the controller (pull up) and turn all the way to the left and wait until RH >= 90% is displayed.
2. Remove the media supply (compressed air / N2).
3. If long downtimes are expected, it is recommended to completely empty the distilled (deionized) water. For the steps for this procedure, see Maintenance - Removing water.
4. Turn off the main switch.

8 MAINTENANCE

The distilled (deionized) water should be changed periodically every 8 weeks. If the instrument is not used for long periods, it is recommended to completely remove the water.

rel. HUM. =100.0%
WATERLEVEL LOW

8.1 Adding water (for fault message: Water - Level low)

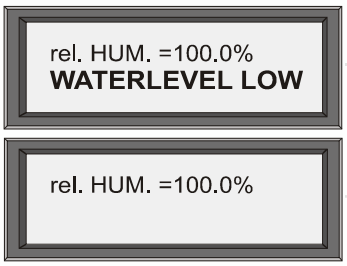
1. Turn humidity - controller all the way to the left and wait until the display indicates “OUT OF SPEC”.
2. Open screw plug.
3. Fill with distilled (deionized) water (when the display indicates Water - Level low, max. 1000 ml can be filled).
4. Close screw plug.
5. If the max. filling level is exceeded, the display indicates Water - Level high and water must be removed until the fault message disappears from the display.
6. After filling, wait for a stabilization time of ca. 20 min (the greater the temperature difference of the deionized water relative to the humidity - generator, the longer the stabilization time should be).
7. HUMOR is ready for operation.

rel. HUM. =100.0%
WATERLEVEL HIGH

8.2 Removing water (for fault message: Water - Level high, long downtimes or for transport)

1. Turn humidity - controller all the way to the left and wait for the display to show “rel.HUM high”.
2. Water drain pipe with connector to drain connection piece.
3. Turn humidity - controller slowly to the right until water flows out.
   a.) Until Water - Level high disappears.
   b.) Until the saturation chamber is completely empty. In order to achieve a totally dry chamber, let air flow through for a short time.
4. To end the drainage process turn the controller all the way to the left again.
5. Close compressed air and water drain pipe.
6. HUMOR can now be turned off.

9 WARNINGS / ERROR MESSAGE ON THE DISPLAY

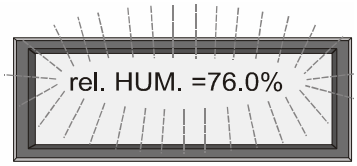


1. Line: Display Humidity () or Error ()
2. Line: Status line () or at HUMOR 20 current measuring value of the selected specimen

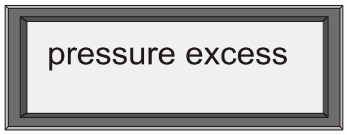
Your humidity calibrator is equipped with a self-diagnosis system. According to the operating state or the error that has occurred, different operating or fault messages are reported and these messages should be followed according to the following means:

CAUSE	SOLUTION

9.1 Humidity - Display blinks

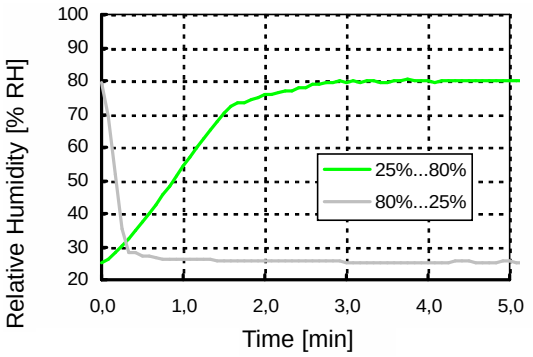


1. After a rapid change of the desired value, the measuring chamber did not reach the desired value. As soon as the difference of the relative humidity described in the measuring chamber and the desired value exceeds a defined range, the display starts to blink.	Wait through stabilization time (after some minutes, the display should stop blinking by itself).
2. Water in the measuring chamber or in the internal lines. Is usually caused by the transport of a HUMOR 20 filled with water or by the connection of the compressed air for a humidity - controller that is not turned all the way to the left.	Dry the measuring chamber with an absorbent cloth. Empty water completely and let medium flow through for a long time. This is reached by a desired value setting of 75% on the humidity - controller. During the flushing process (drying), the display blinks and shows the warning WATER LEVEL LOW. The drying process lasts ca. 48h and should be monitored with a specimen. The drying is successfully completed as soon as the specimen shows a relative humidity of < 15%. The length of this drying process is accelerated by the use of dry compressed air or by the use of dry nitrogen.

	CAUSE	SOLUTION
	**9.2 Warning: OUT OF SPEC**	
	A humidity range > 95% RH was given, or < 10% RH was selected.	HUMOR is operated out of specified range.
	**9.3 Warning: WATER LEVEL HIGH**	
	The maximum filling level with distilled (deionized) water was exceeded.	The water must be emptied again until the fault message disappears.
	**9.4 Warning: WATER LEVEL LOW**	
	The minimum filling level was not reached.	Distilled (deionized) water must be filled.
	**9.5 Fault message: heat defect**	
	The HUMOR does not achieve its operating temperature.	Contact the customer service department of E+E Elektronik® Ges.m.b.H.
	**9.6 Fault message: pressure excess**	
	A humidity - desired value < 8% RH was selected. The humidity - generator can be damaged by the high pressure. The indicated accuracy of the measurements can no longer be guaranteed.	Contact the customer service department of E+E Elektronik® Ges.m.b.H.
	9.7 Humidity - display is not correct	
	Incorrect display, e.g. due to an error in the electronics.	Test the HUMOR. Turn the controller all the way to the left and close the compressed air. After a stabilization time of 2h, the display should show 100 ± 2% RH. If this is not the case, contact the customer service department of E+E Elektronik® Ges.m.b.H.

9.8 Stabilization time too long

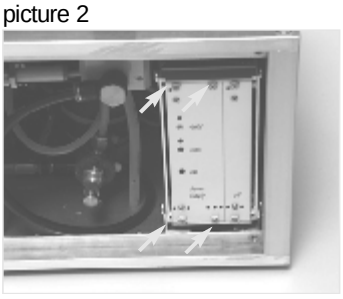
The chart shows the stabilisation time of the HUMOR 20 at a humidity step from 25 to 80% RH and 80 to 25% RH. The stabilisation time at low humidity is approx. **1 min**., at high humidity approx. **3 min**.
The total stabilisation time is defined by the specimen. We recommend to allow a total stabilisation time of min. 20 min/measuring point.



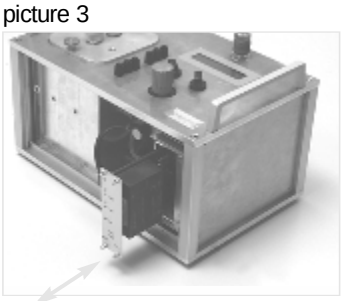
CAUSE	SOLUTION
Valve defect.	Test the flow. 1. Empty the water completely and then fill the humidity calibrator again with exactly 1000 ml distilled water. 2. Set a humidity - desired value of exactly 20% RH. 3. Turn the humidity - controller completely to the left and measure the time until display reaches 80% RH. - If the measured time < 80 sec. then the flow is completely fine and within the range of operation. - If the process takes considerably longer, contact the customer service department of E+E Elektronik® Ges.m.b.H.

picture 1

picture 2



picture 3



9.9 Electronic defect

Several	Electronic - replacement: 1. Disconnect the humidity calibrator from power supply. 2. Open screws (see picture 1). 3. Open recessed head screw on 19” rack (see picture 2). 4. Pull out the electronic (see picture 3). 5. Push in replacement electronic and close the housing. 6. Calibration HUMOR 20.

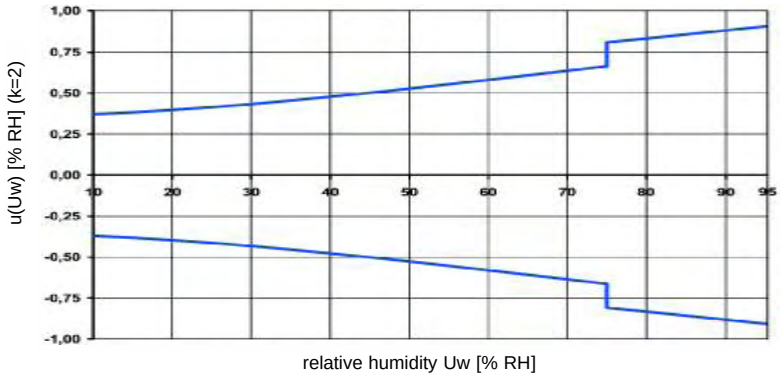
Factory calibration disapears by an electronic replacement!

If you have any questions contact the customer service department of E+E Elektronik® Ges.m.b.H.

10 TECHNICAL DATA

Technical Data

General

Function principle	two-pressure-reactor
Working range	10...95% RH
Inaccuracy of measurement[1) 2)]	
Inaccuracy temperature measurement in measuring chamber[2)]	typ. ±0.3 degC
Power supply	90...230V AC
Work equipment	• compressed air, filtered and free of oil or nitrogen N_2 with max. 10 bar • distilled water
Stabilisation time HUMOR 20	< 3 min/measuring point
Stabilisation time specimen	typ. 20 min/measuring point
Integrated power supply	24V DC, max. 200mA
Number of measuring inputs	2 (switchable between 4...20mA / 0...20mA / 0...1V / 0...5V / 0...10V)
Typ. error for display inputs	Voltage measuring: < 5mV Current measuring: < 30µA
Display	Dot-matrix display with backlight
Gas flow	3 l/min for RH > 85% the gas flow is reduced to 1.5 l/min at 95% RH
Recommended interval for recalibration	1 year
Interface for PC connection	RS232 (COM port)
System requirements for software tools	MS Windows 98 / ME / NT 4.0 with SP 6a MS Windows 2000 with SP 2 / Windows XP
Environmental conditions	temperature: 10...40 degC humidity: 10...80% RH
Applied harmonised standards	EN 61000-6-3 EN 61000-6-4 EN 60068-2-6 EN 61000-6-2 EN 61010-1 EN 60068-2-29 OEVE EN 61326-1+A1+A2
Dimensions	400 x 260 x 240 mm
Weight	about 23kg (HUMOR 20) about 36.5kg (HUMOR 20 incl. packaging)

1) The extended inaccuracy of measurement results from the standard inaccuracy increased by a multiplying factor of K=2.

2) Valid for metall covers

11 ACCESSORIES

Accessories

Compressor with oil seperator

Technical data

Max. operation pressure	12 bar
Supply voltage	230V AC or 115V AC
Working temperature	-10 ... +70 degC

Optional covers for the measuring chambers

The standard scope of supply of HUMOR 20 includes a measuring chamber cover that can accommodate two sensors with a diameter of 12mm (E+E standard sensor). Additional measuring chamber covers for sensor tube diameters of 8-25.5mm are available as accessories.

PROBE DIAMETER [mm]	NUMBER OF FEEDTHROUGHS	TYPE
8 - 12	3	HA 02 02 04
12 - 16	2	HA 02 02 01
16 - 20.5	1	HA 02 02 02
20.5 - 25.5	1	HA 02 02 03

Calibration certificate

To meet with the requirements of Quality Management Systems such as ISO9001 regarding calibration and certification of measurement and test instrumentation, the HUMOR 20 is supplied with a factory works certificate according to DIN EN 10204 - 2.3.
Optionally the HUMOR 20 is available with an official OEKD accredited calibration certificate.
This OEKD accreditation guarantees the following measuring uncertainty:

RH range	Measuring uncertainty (at 25 degC ± 3 degC)
< 35% RH	±0.2% RH
35...60% RH	±0.35% RH
60...95% RH	±0.5% RH

(for dew point temperature -10 degC...60 degC and measuring temperature 0 degC...70 degC)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ÖKD

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