HUMOR 20

High-precision Humidity Calibrator

The role of humidity calibrations that are accurate, reproducible, and documentable is becoming more and more important.

ISO quality guidelines and regulations according to FDA guidelines in the pharmaceutical industry, etc., require that humidity instruments have a traceable, accurate calibration.

The humidity calibrator HUMOR 20 developed by E+E is the ideal reference instrument for these requirements.

The HUMOR 20 can be used in the humidity range of 10-95% RH both for monitoring cylindrical sensors (transmitters, hand-held instruments,...) and also for monitoring instruments with cubic dimensions (data loggers, wall instruments,...). A temperature sensor integrated in the measurement chamber also permits the monitoring of an optional temperature output.

The HUMOR 20 is traceable to international standards and can be delivered with an official, internationally recognised OEKD calibration certificate. Due to its high accuracy, the HUMOR 20 is the basis for accredited calibration laboratories for relative humidity.

Based on its operating principle, the HUMOR 20 can be used under typical conditions in a laboratory climate. This means that expensive, fully air-conditioned rooms are not necessary. For operation HUMOR 20 requires only distilled water, filtered oil-free air with a pressure of 10 bar and a power supply between 90-230V AC. The specimen can be powered by 24V DC that is available directly on the HUMOR 20.

HUMOR 20

Automatic Calibration Module
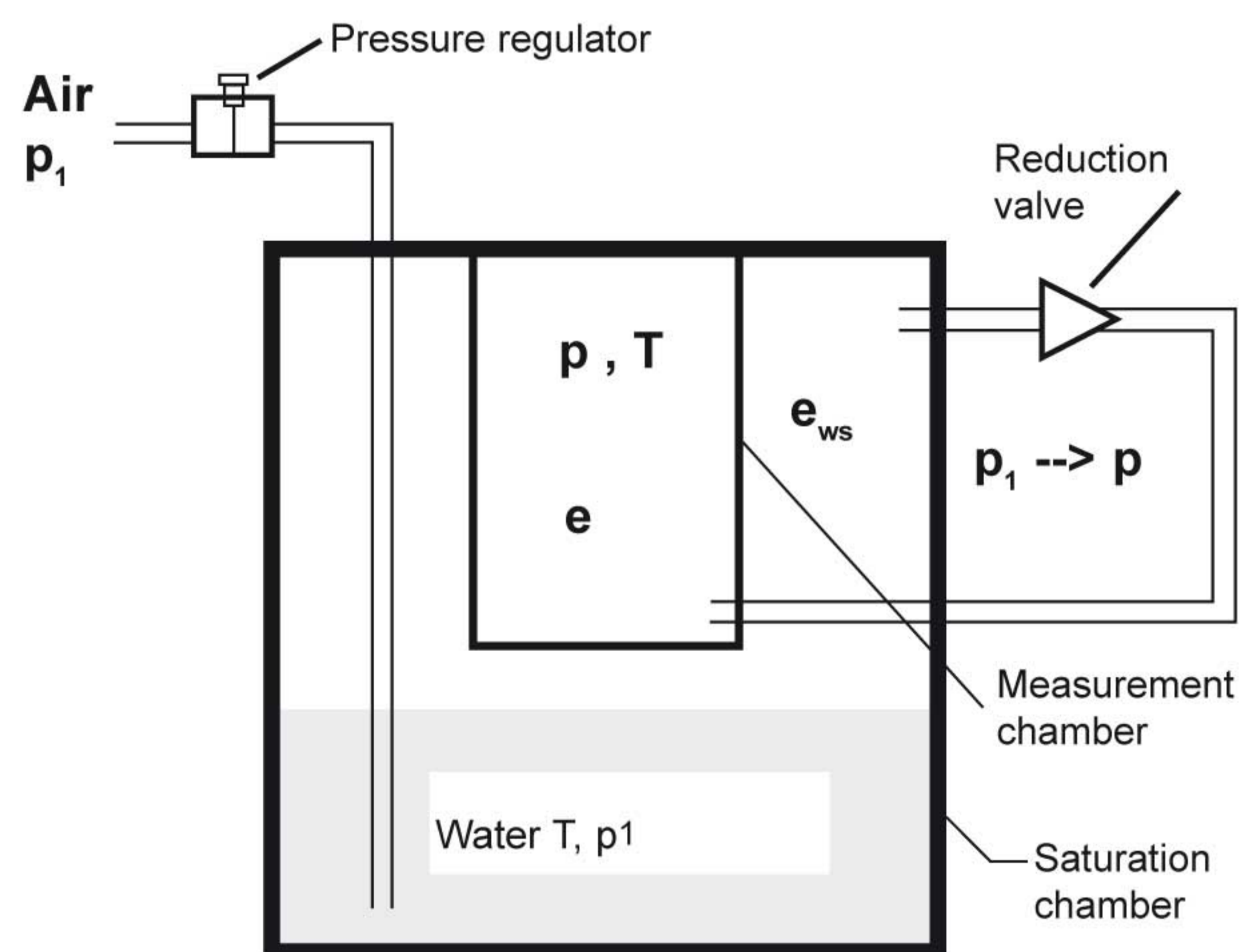
Operation

The operation of the HUMOR 20 is based on a fundamental two-pressure process and thus is similar to instruments used in national bureaus for standards.

Air or nitrogen at a pressure p_1 is led through a water-filled saturation chamber and saturated to 100% RH at p_1. By means of a reduction valve, the saturated air is reduced to the ambient pressure p and fed into the measurement chamber. Due to the construction, the saturation chamber and the measurement chamber are at the same temperature. Under these conditions, the water-vapour partial pressure e_{ws} is reduced at the same ratio as the total pressure.

Essentially, the following applies:

$$e = e_{ws} * p / p_1$$

From this it follows that: $RH = e / e_{ws} = p / p_1$

Schematic Illustration of a Two-pressure Reactor

Thus, the generated relative humidity essentially depends on the ratio of the two pressures.

Constructionspecific deviations from this ratio are corrected during factory adjustments. By adjusting the pressure p_1 the relative humidity is brought to the desired value in the measurement chamber.

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v2.9

Typical Applications

calibration laboratories
reference device
bureau of standards
manufacturers of measurement instruments

Features

highest accuracy
traceable calibration
independent of ambient temperature
easy handling
traceable to international standards
OEKD certificatable

Automatic Calibration Module

The optional available Automatic Calibration Module enables an automatic set point adjustment of the desired reference humidity. With the software, included in the scope of supply, checkpoints, stabilisation times, etc. can be set. Furthermore the instrument allows for an automatic print out of a calibration protocol for a transmitter with analogue standard interface.
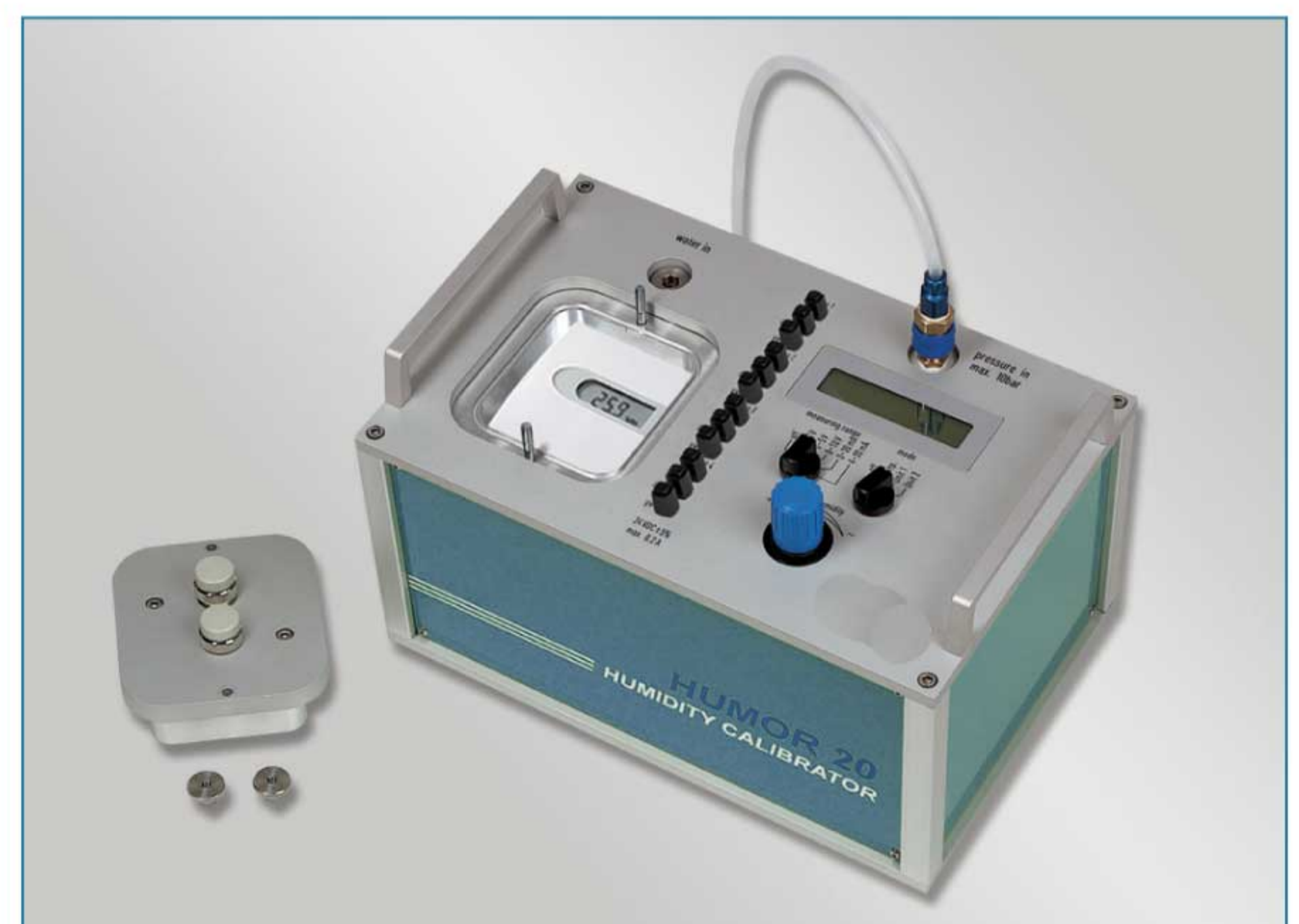
Calibration and Adjustment using HUMOR 20

24V DC electrical supply for the test sample are provided directly at HUMOR 20.
Furthermore, four inputs for the voltage or current outputs of transmitters are available when using the Automatic Calibration Module for generating calibration protocols.

The software which is included in the scope of supply allows the user to record measurement values in a log file, to print out calibration protocols and to configure or to readjust the HUMOR 20.

Software - Features:
- Freely selectable numbers of measuring points and stabilisation times when using the Automatic Calibration Module
- Creation and print out of professional calibration protocols with:
    - Specimen number
    - Calibration date
    - Reference and actual values
- Temperature display can be switched between°C and °F
- 1-point customer humidity calibration of the HUMOR 20
- 6-point customer humidity calibration of the HUMOR 20
- 1-point customer temperature calibration
- Reset of HUMOR 20 to factory calibration

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HUMOR 20

Technical Data

General

Function principle	two-pressure-reactor
Working range	10...95% RH
Accuracy of measurement[1][2] (Traceable to international standards, administrated by NIST, PTB, BEV...)	
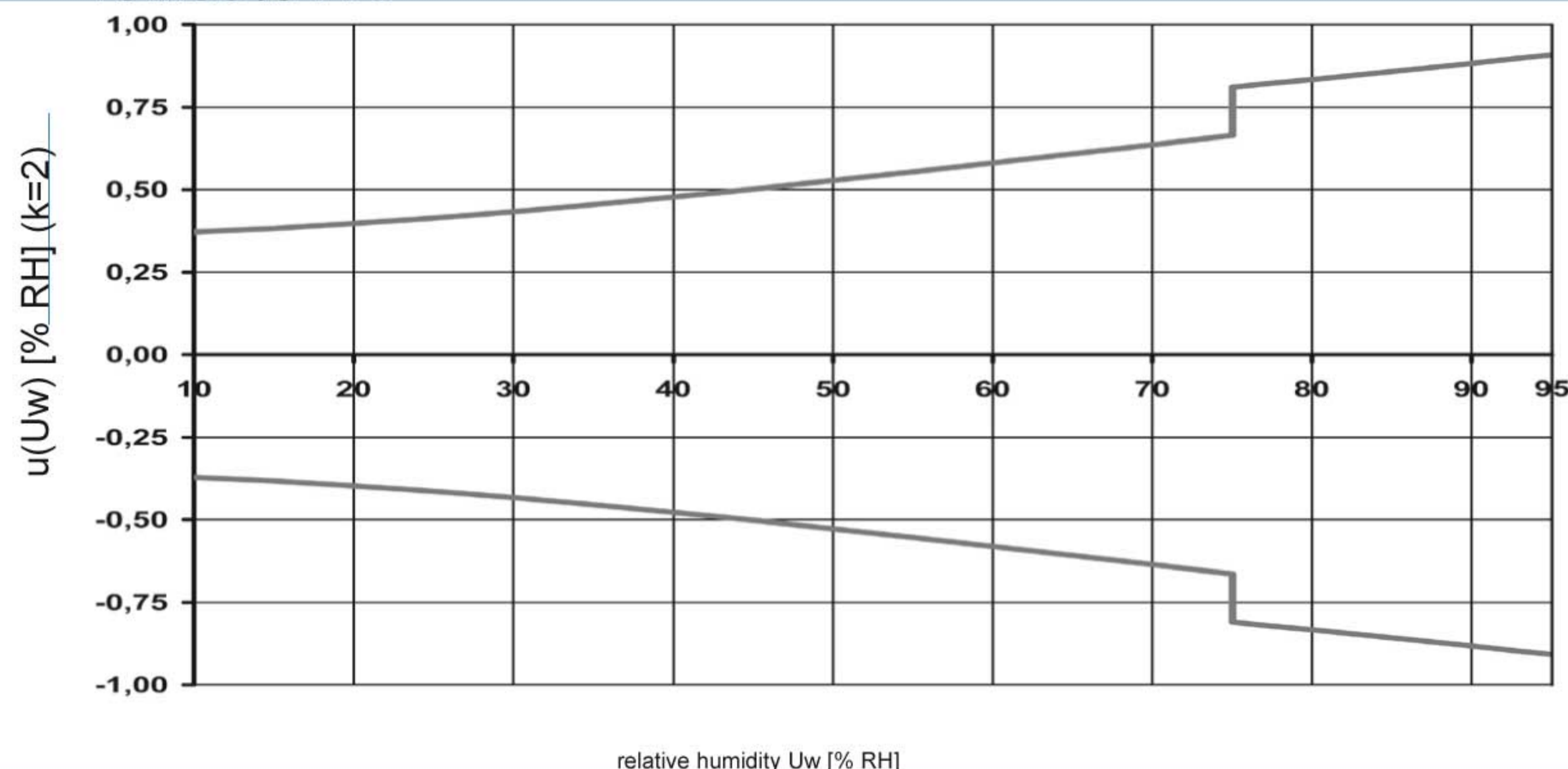
Accuracy temperature measurement in measuring chamber[2]	typ. ±0.3°C (±0.54°F)
Power supply	90...230V AC
Work equipment	• compressed air, filtered and free of oil or nitrogen N_2 with max. 10bar (145psi) • distilled water
Stabilisation time HUMOR 20	< 3 min/measuring point
Stabilisation time specimen	typ. 20 min/measuring point
Integrated power supply	24V DC, max. 200mA
Number of measuring inputs	4 (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 2000 with SP 2 / Windows XP / Windows Vista
Environmental conditions	temperature: 10...40°C (50...104°F) humidity: 10...80% RH
Applied harmonised standards	EN 61000-6-3 EN 60068-2-6 EN 61000-6-2 EN 61010-1 EN 61326-1 EN 60068-2-29
Dimensions	400 x 260 x 240 mm (15.7 x 10.2 x 9.4")
Weight	HUMOR 20: about 23kg (51 lbs) HUMOR 20 incl. aluminium transport case: about 36.5kg (80.5 lbs)

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Measuring Chamber

The construction of the measuring chamber allows the calibration and adjustment of cylindrical sensor probes with a diameter of 8-25.5mm (0.3-1") (hand-held instruments, duct-mounted versions, ...) as well as of cubic measuring units (room transmitters, data loggers, ...) with maximum dimensions of 100x85x40mm (3.9x3.3x1.6") or 95x95x40mm (3.9x3.9x1.6").

By using the Plexiglas cover (standard supply), it is possible to calibrate and adjust compact room devices (e.g., the EE10) with the HUMOR 20.

The overall accuracy of the calibration is influenced by the absence of the metal cover. The additional error depends on the position of the specimen in the chamber as well as on the relative humidity.

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

2) Valid for metal covers for the measuring chambers

Compressor with oil separator

Technical Data:

Max. operation pressure	12bar (174psi)
Supply voltage	100, 120, 200 or 230V AC // 50 or 60Hz
Noise level	45dB(A)/lm
Dimensions (l x w x h)	380 x 380 x 480 mm (15 x 15 x 18,875 ")
Weight	26kg (57lbs)

Optional covers for the measuring chambers

Various covers for the measuring chamber accommodate probes of all diameters available on the market.
With these covers up to four probes can be calibrated simultaneously.

SUITABLE FOR	NUMBER OF FEEDTHROUGHS	ORDER CODE
probe Ø 8 - 12mm (0.3 - 0.5")	3	HA020204
probe Ø 12 - 16mm (0.5 - 0.6")	2	HA020201
probe Ø 16 - 20.5mm (0.6 - 0.8")	1	HA020202
probe Ø 20.5 - 25.5mm (0.8 - 1")	1	HA020203
probe Ø 12mm (0.47 - 0.51")	4	HA020205
probe Ø 12 - 16mm (0.5 - 0.6")	4	HA020207
HUMLOG 10	-	HA020206
adapter for EE33-J [1]	1	HA020401

1) only useable in combination with HA020204 or HA020201

Calibration certificate

To meet the requirements of Quality Management Systems such as ISO9001 regarding calibration and certification of measurement and test instrumentation, the HUMOR 20 is available with an official OEKD accredited calibration certificate.
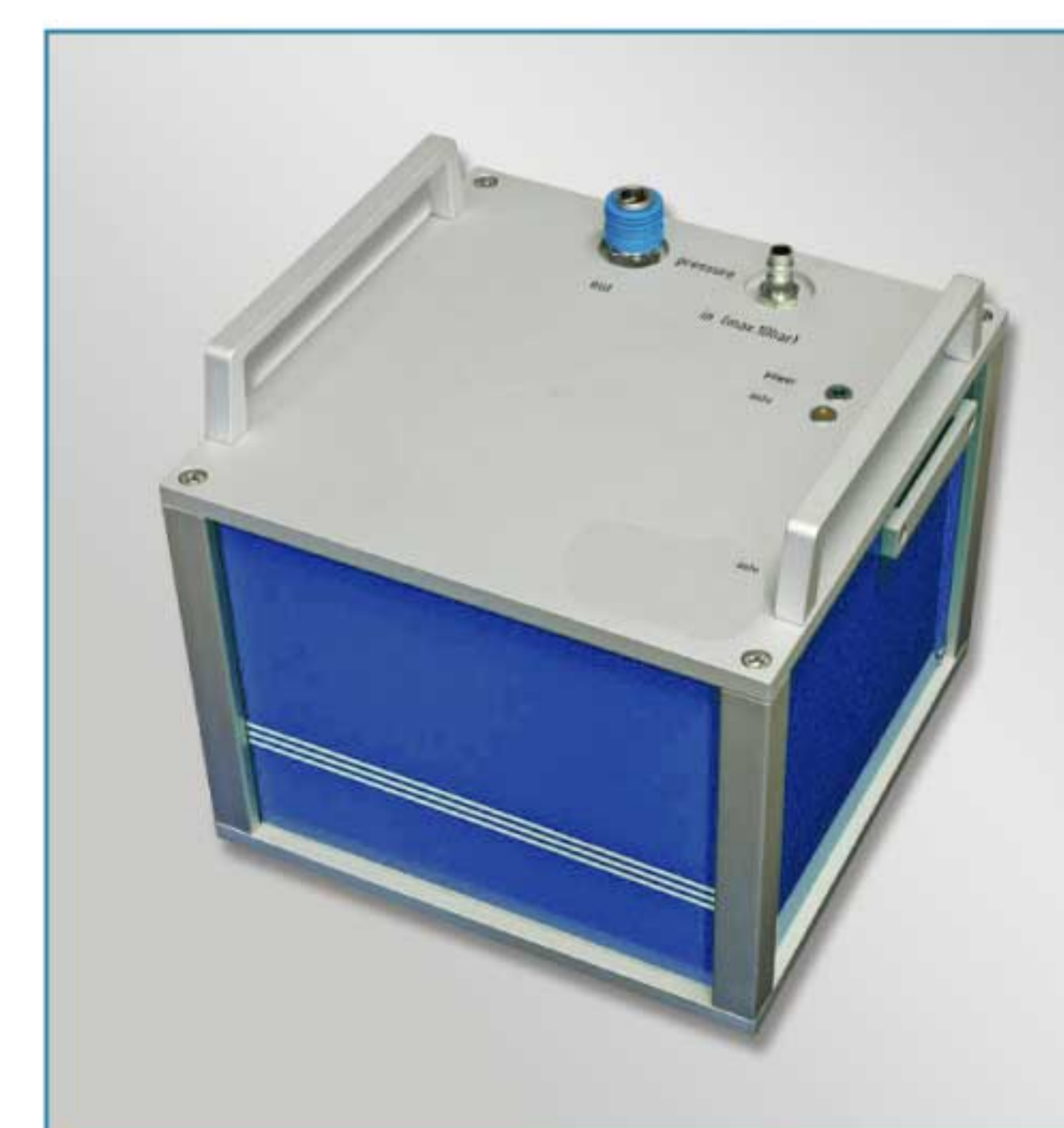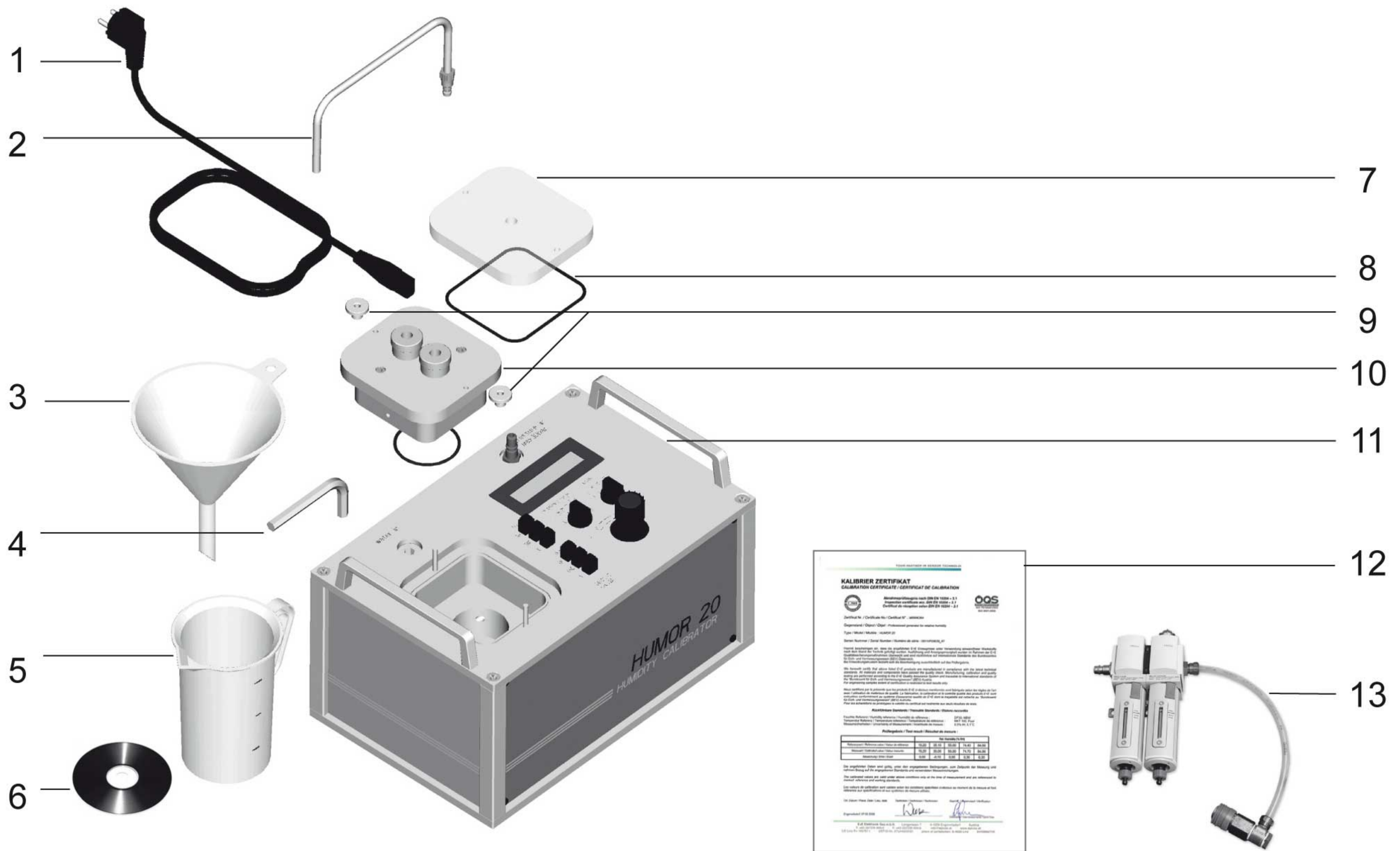
Automatic Calibration Module

For the fully automatic measurement of the characteristics of a transmitter.

Technical Data:

Weight	- weight of instrument: 9kg (20lbs) - instrument incl. aluminium transport case: 23kg (51lbs)
Dimensions	260x260x240mm (LxBxH); (10.2"x10.2"x9.4")
Supply	90...230V
Interface to PC	RS232 (COM Port)
Compressed air supply	min. 9.8bar (142psi); max. 12bar (174bar) oil-free filtered compressed air, max. size of particle: 5µm
Protection class	IP40
Scope of supply	- automatic calibration module - power supply cable IEC Europe (230V) - power supply cable IEC Northamerica (110V) - RS232 connection cable to Humor 20 - compressed air connection cable to Humor 20

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HUMOR 20 - Scope of Supply

1	Power supply cable IEC Europe (230V) + power supply cable IEC Northamerica (110V)	8	O-ring for room transmitter
2	Water drain pipe with connector	9	Knurled nut
3	Funnel	10	Cover for measuring chamber (ordering code HA0202xx)
4	Allen key (10mm / 0.4")		(not inlcuded in the scope of supply HUMOR 20)
5	Measuring beaker	11	Fixing bracket for filter set (pre-mounted)
6	Measuring and calibration software	12	Works certificate acc. DIN EN 10204-3.1
7	Plexiglas cover for room transmitter testing	13	Filter set with oil separator

Ordering Information

HUMIDITY CALIBRATOR

HUMOR 20	HUMOR20
Automatic Calibration Module	HA020301

COVER FOR MEASURING CHAMBER

for 8 - 12 mm (0.3 - 0.5") probe diameter	HA020204
for 12 - 16 mm (0.5 - 0.6") probe diameter	HA020201
for 16 - 20.5 mm (0.6 - 0.8") probe diameter	HA020202
for 20.5 - 25.5 mm (0.8 - 1") probe diameter	HA020203
for 4 probes with 12 - 13 mm (0.47 - 0.51") probe diameter	HA020205
for 12 - 16 mm (0.5 - 0.6") probe diameter	HA020207
for HUMLOG 10	HA020206
Adapter for EE33 - model J[1]	HA020401

1) only useable in combination with HA020204 or HA020201

ACCESSORIES

Compressor with oil separator for 220V power supply	HA020101
Compressor with oil separator for 110V power supply	HA020102
ÖKD-calibration certificate	OEKD20/xH
USB <=> RS232 converter	HA020110