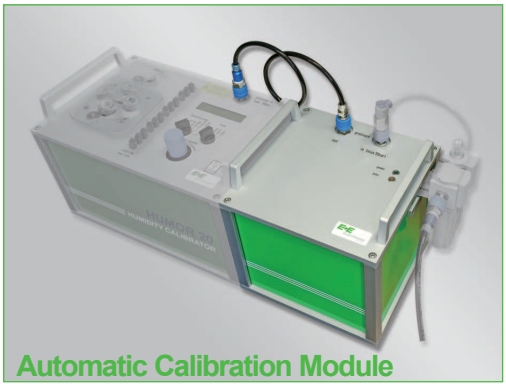
HUMOR 20

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.

HUMOR 20

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.


Automatic Calibration Module

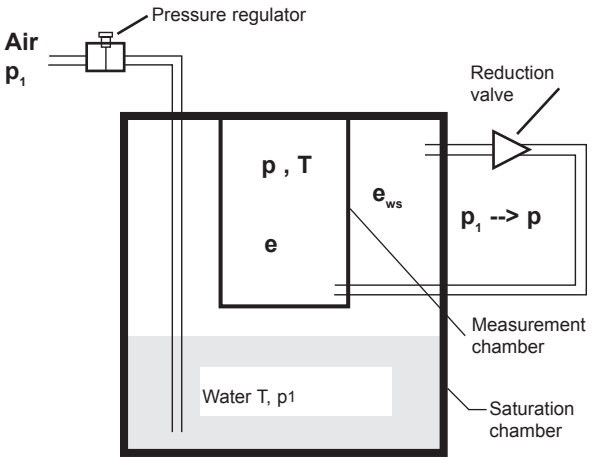
The HUMOR 20 is traceable to international standards and can be delivered with an official, internationally recognised OEKD calibration certificate. Due to its high accuracy, the HUMOR 20 is the basis for accredited calibration laboratories for relative humidity.

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.

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 $\mathbf{p_1}$ is led through a water-filled saturation chamber and saturated to 100% RH at $\mathbf{p_1}$. 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 $\mathbf{e_{ws}}$ is reduced at the same ratio as the total pressure.
Essentially, the following applies:

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



Schematic Illustration of a Two-pressure Reactor

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

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 $\mathbf{p_1}$ the relative humidity is brought to the desired value in the measurement chamber.

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.

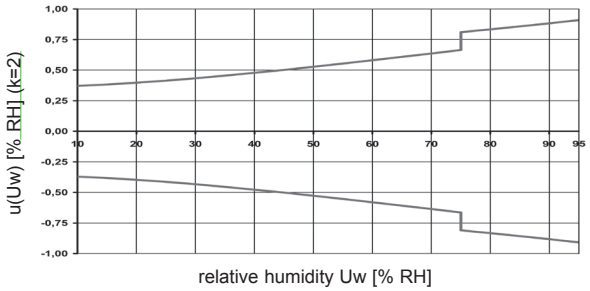
The software which is included in the scope of supply allows the user to record measurement values in a log file, to print out calibration protocols and to configure or to readjust the HUMOR 20.

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

Technical Data

General

Function principle	two-pressure-reactor
Working range	10...95% RH
Protection class	I
Protection type	IP40
Surge voltage category	II
Installation altitude	up to 2000 m above sea level
Application	Indoors
Accuracy of measurement[1) 2)]	
Accuracy temperature measurement in measuring chambe[2)]	typ. ±0.3°C (±0.54°F)
Power supply	100...230V AC, 50/60Hz, max. 20W
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/Messpunkt
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 or 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 mit SP 2 / Windows XP / Windows Vista
Environmental conditions	temperature: 10...40°C (50...104°F) humidity: 10...80% RH
CE conformity	EN61000-6-3:2007 EN61326-1:2006 EN61000-6-2:2006 EN61010-1:2010
Additional Standards	EN60068-2-6 EN60068-2-29
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)

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

Accessories

Oil-free compressor

Technical Data:

Max. operation pressure	12bar (174psi)
Supply voltage	230V AC // 50 or 60Hz
Noise level	57 dB(A)/lm
Dimensions (l x w x h)	410 x 410 x 500 mm (16 x 16 x 20“)
Weight	21kg (46lbs)

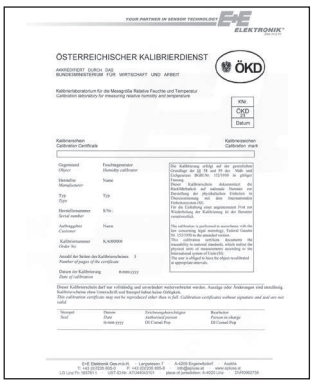
Optional covers for the measuring chambers

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
Humor cover 12 - 16mm (0.5 - 0.6”) plane	for 2 Probes	HA020201
Humor cover 16 - 20.5mm (0.6 - 0.8”) plane	for 1 Probe	HA020202
Humor cover 20.5 - 25.5mm (0.8 - 1”) plane	for 1 Probe	HA020203
Humor cover 8 - 12mm (0.3 - 0.5”) plane	for 3 Probes	HA020204
Humor cover 12 - 13mm (0,5 - 0,52”) conic	for 4 Probes	HA020205
Humor cover 12 - 16mm (0.5 - 0.6”) bevelled	for 4 Probes	HA020207
Humor cover 16 - 20.5mm (0.6 - 0.8”) bevelled	for 4 Probes	HA020208
Humor cover 30mm (1,2”) plane	for 1 Probe	HA020209
Adapter for EE33 - modell J[1)]		HA020401

1) only useable in combination with HA020204 or HA020201

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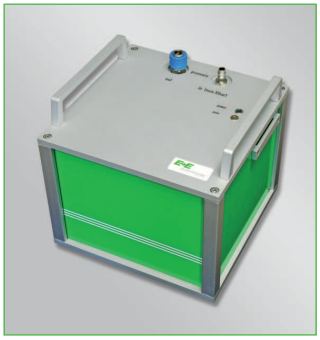
To meet the requirements of Quality Management Systems such as ISO9001 regarding calibration and certification of measurement and test instrumentation, the HUMOR 20 is available with an official OEKD accredited calibration certificate.

Automatic Calibration Module

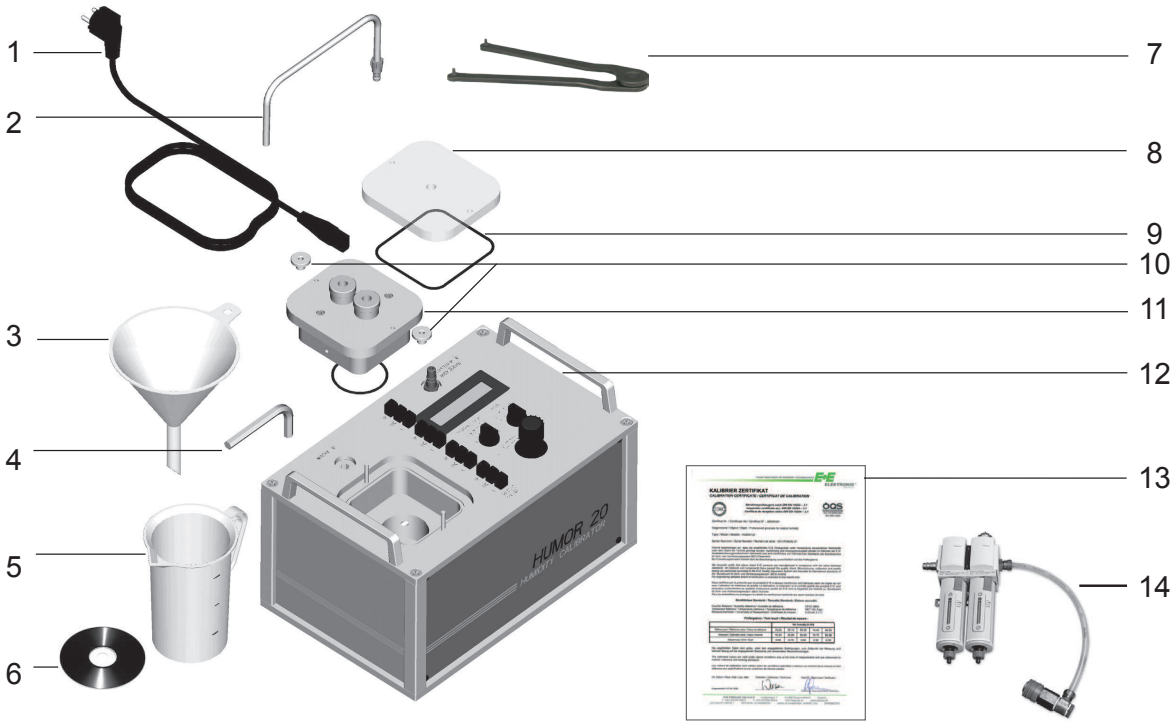
For the fully automatic measurement of the characteristics of a transmitter.

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	100...230V AC, 50/60 Hz max. 15W	
Interface to PC	RS232 (COM Port)	
Compressed air supply	min. 9.8bar (142psi); max. 12bar (174bar); filtered oil-free compressed air, max. size of particle: 5µm	
Protection type	IP40	
Protection class	I	
Pollutional index	2	
Surge voltage category	II	
Installation altitude	up to 2000 m above sea level	
Application	Indoors	
CE conformity	EN61000-6-3:2007 EN61000-6-2:2006	EN61326-1:2006 EN61010-1:2010
Additional Standards	EN60068-2-6	EN60068-2-29

HUMOR 20 - 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 (10mm / 0.4")
5 Measuring beaker
6 Measuring and calibration software
7 Face pin wrench
8 Plexiglas cover for room transmitter testing
9 O-ring for room transmitter
10 Knurled nut
11 Cover for measuring chamber (ordering code HA0202xx) (not inlcuded in the scope of supply HUMOR 20)
12 Fixing bracket for filter set (pre-mounted)
13 Works certificate acc. DIN EN 10204-3.1
14 Filter set with oil separator

Ordering Information

HUMIDITY CALIBRATOR	
HUMOR 20	HUMOR20
Automatic Calibration Module	HA020301

COVER FOR MEASURING CHAMBER			
Humor cover 12 - 16mm (0.5 - 0.6") plane	-	for 2 Probes	HA020201
Humor cover 16 - 20,5mm (0.6 - 0.8") plane	-	for 1 Probe	HA020202
Humor cover 20,5 - 25,5mm (0.8 - 1") plane	-	for 1 Probe	HA020203
Humor cover 8 - 12mm (0.3 - 0.5") plane	-	for 3 Probes	HA020204
Humor cover 12 - 13mm (0,5 - 0,52") conic	-	for 4 Probes	HA020205
Humor cover 12 - 16mm (0.5 - 0.6") bevelled	-	for 4 Probes	HA020207
Humor cover 16 - 20,5mm (0.6 - 0.8") bevelled	-	for 4 Probes	HA020208
Humor cover 30mm (1,2") plane	-	for 1 Probe	HA020209
Adapter for EE33 - modell J[1)]			HA020401

1) only useable in combination with HA020204 or HA020201

ACCESSORIES	
Oil-free compressor for 230V power supply	HA020101
ÖKD-calibration certificate	OEKD20/xH
USB <=> RS232 converter	HA020110
Face pin wrench adjustable	HA020402