

# HUMOR 20

## High Accuracy 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.

A software package included in the scope of supply allows the user to record the calibration process and to adjust the HUMOR 20. The connection to a PC is realised over a typical RS232 interface (COM port).

### Operation:

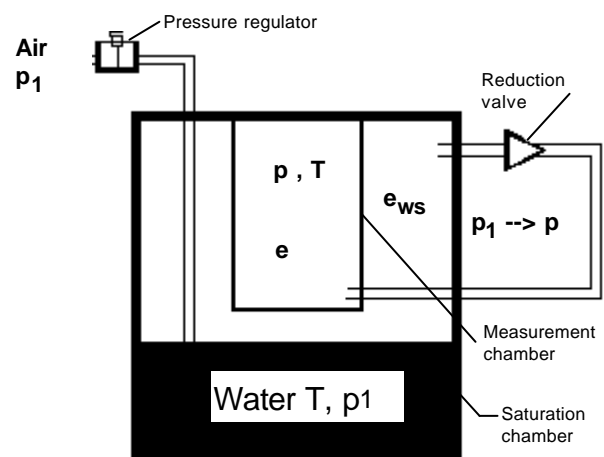
The operation of the HUMOR 20 is based on a fundamental two-pressure process and thus is similar to instruments used in national bureaus for standards. Air or nitrogen at a pressure  $p_1$  is led through a water-filled saturation chamber and saturated to 100% RH at  $p_1$ . By means of a reduction valve, 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:

$$e = e_{ws} \cdot p / p_1$$

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

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



Schematic Illustration of a Two-pressure Reactor

## Practical Software Tools

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

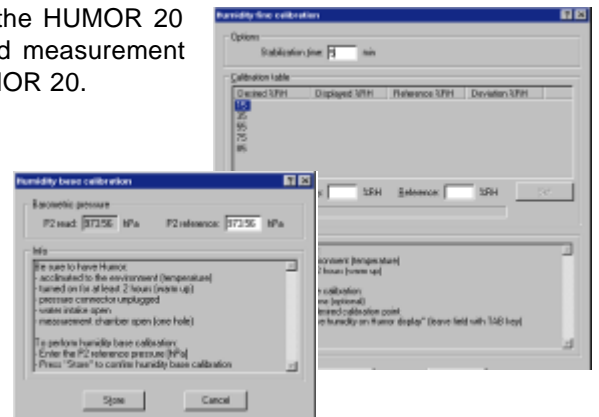
### Measurement Software - Features:

Creation and print-out of clear, professional calibration protocols with:

- Specimen number
- Calibration date
- Reference and actual values

### Configuration Software - Features:

- Temperature display on the HUMOR 20 can be switched between degC and °F
- 1-point customer humidity calibration of the HUMOR 20
- 6-point customer humidity fine calibration of the HUMOR 20
- 1-point customer temperature calibration
- Reset of HUMOR 20 to factory calibration



## Calibration and Adjustment using HUMOR 20

The construction of the measuring chamber allows the calibration and adjustment of cylindrical sensor probes with a diameter of 8-25.5 mm (hand-held instruments, duct-mounted versions, ...) as well as of cubic measuring units (room transmitters, data loggers, ...) with maximum dimensions of 100x85x40 mm or 95x95x40 mm. For the electrical power supply of the specimen, 24 VDC is available on the instrument. In addition, 2 measurement inputs for voltage or current outputs from transmitters are available on the HUMOR 20.

### Transmitters with seperated sensor probe

Depending on construction and size of the specimen, up to 3 instruments can be calibrated simultaneously. For precise calibration, the diameter of the cover feedthrough has to match the probe diameter. For this purpose, various probe diameters are available for corresponding cover configurations. Due to the typical response time of capacitive sensor probes, a stabilisation time of approximately 20 minutes per measuring point should be allowed.



### Compact room transmitters

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.



## Typical Applications

calibration laboratories  
reference device  
bureau of standards  
manufacturers of measurement instruments

## Features

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

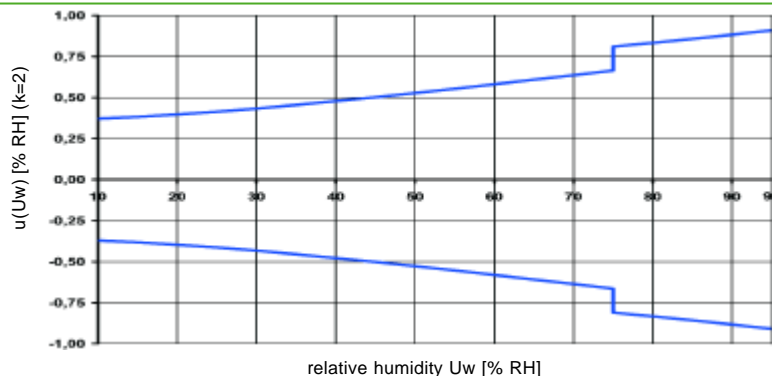
## Technical Data

### General

Function principle two-pressure-reactor

Working range 10...95% RH

Inaccuracy of measurement<sup>1) 2)</sup>



Inaccuracy temperature measure-

ment in measuring chamber<sup>2)</sup> typ.  $\pm 0.3$  degC

Power supply 90...230V AC

Work equipment

- compressed air, filtered and free of oil or nitrogen N<sub>2</sub> 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: < 30 $\mu$ A

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)

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

<sup>2)</sup> Valid for the standard cover

## Accessories

### Compressor with oil separator

#### 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.

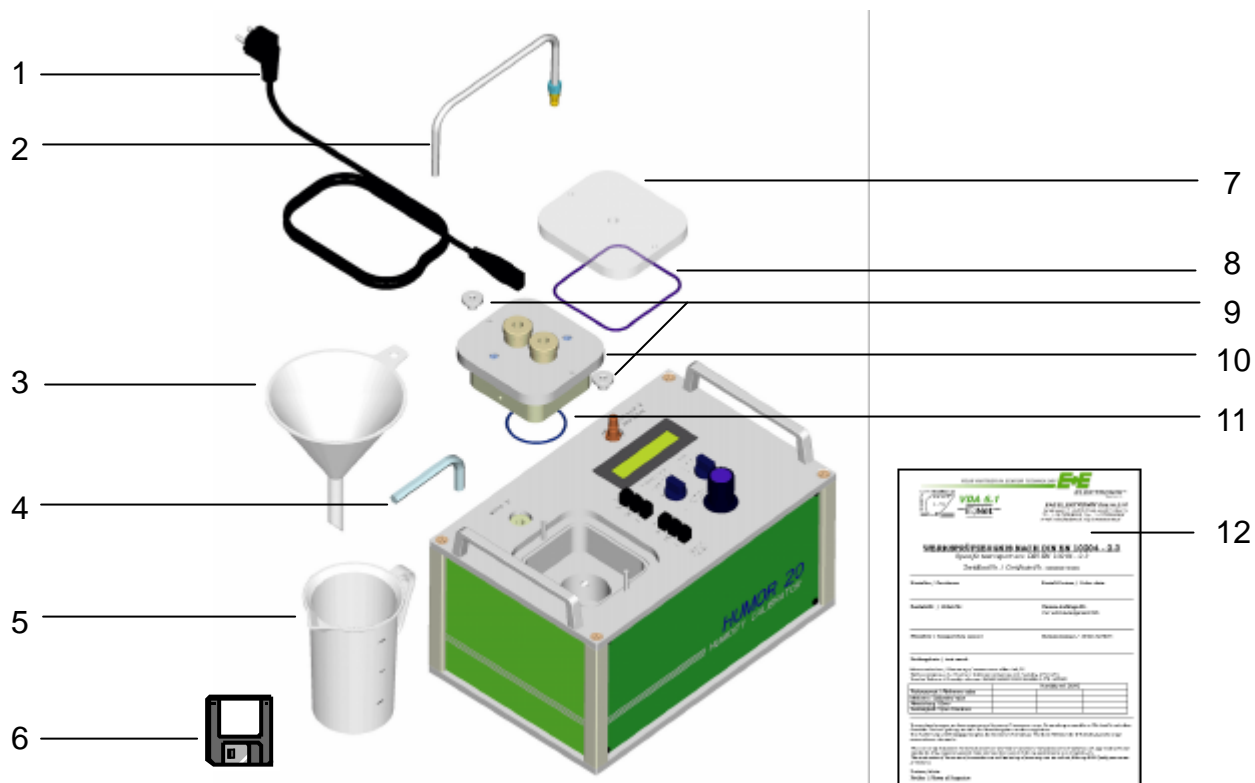
This OEKD accreditation guarantees the following measuring uncertainty:

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)



## HUMOR 20 - Scope of Supply



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

### HUMIDITY CALIBRATOR

HUMOR 20

HUMOR20

### ACCESSORIES

Compressor with oil seperator for 220V power supply	HA 02 01 01
Compressor with oil seperator for 110V power supply	HA 02 01 02
Cover for measuring chamber for 8 - 12mm probe diameter	HA 02 02 04
Cover for measuring chamber for 12 - 16mm probe diameter	HA 02 02 01
Cover for measuring chamber for 16 - 20.5mm probe diameter	HA 02 02 02
Cover for measuring chamber for 20.5 - 25.5mm probe diameter	HA 02 02 03
OEKD calibration certificate	HA 02 03 01