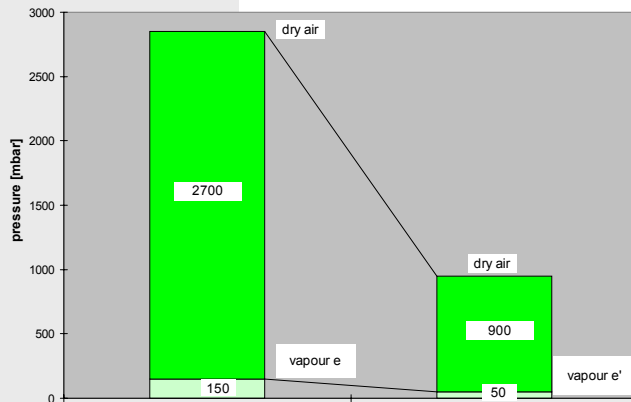
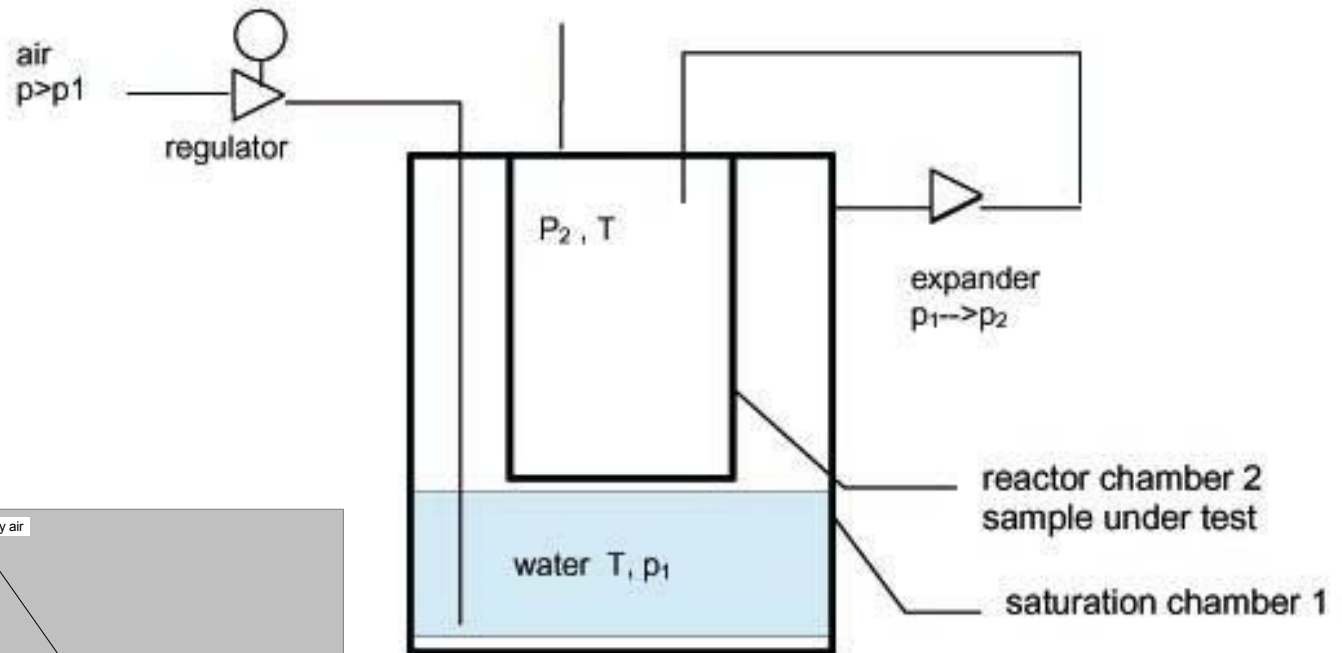


HUMIDTIY



CALIBRATION

Schematic Construction:



$$RH = \frac{p_2}{p_1} * \frac{f(p_1)}{f(p_2)}$$

$T_1 = T_2 = T = \text{const}$ – realized by a thermal high conductive construction of the humidity generator

THE NEXT STEP IN HUMIDITY CALIBRATION

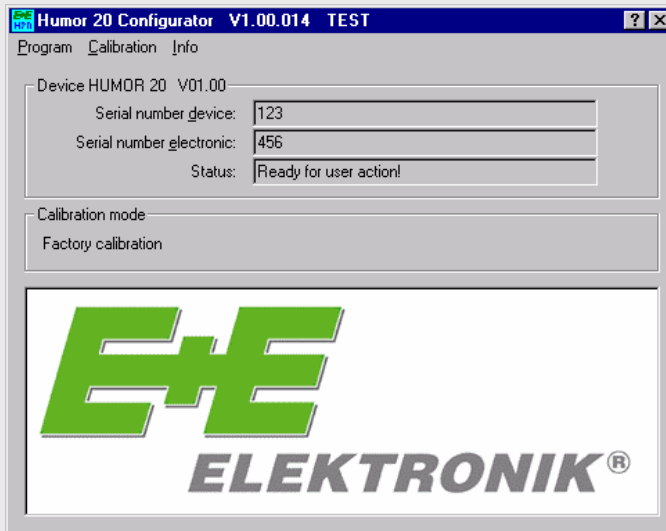


HUMOR 20
Easy maintenance as a main goal!

HUMOR 20

Easy Configuration & External Calibration

HUMOR 20



convenient communication by using

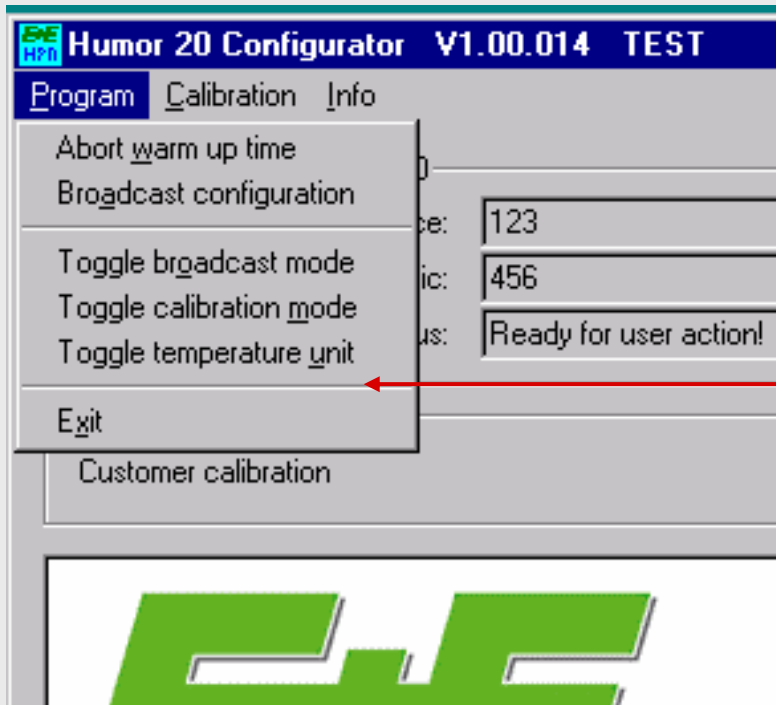
HUMOR 20

configuration - software



The Configuration

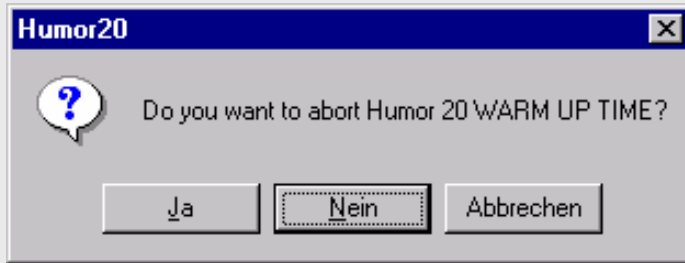
HUMOR 20



Functions:

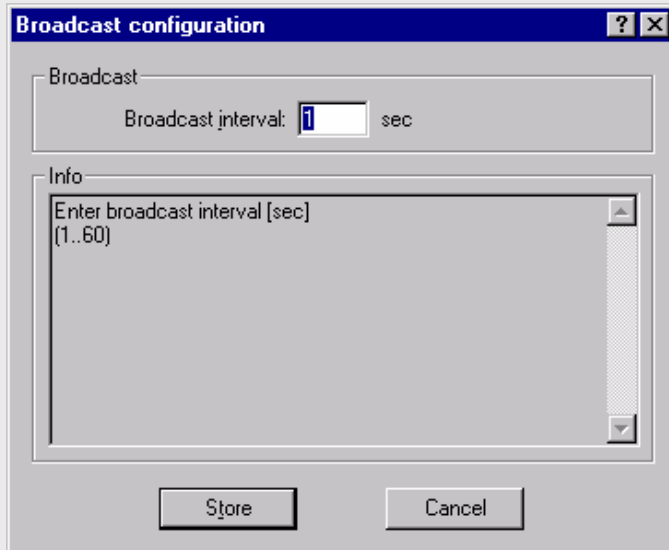
- abort warm up time
- broadcast configuration
- toggle broadcast mode
- toggle calibration mode
- toggle temperature mode

Abort Warm Up Time:



ends the warm up time immediately –
useful for presentations and exhibitions...

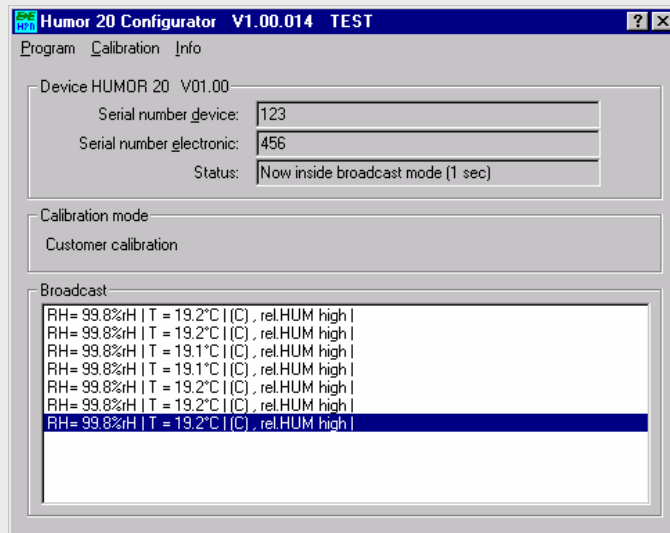
Broadcast Configuration:



measurement data will be indicated on
the screen as well as stored in a log –
file according the selected broadcast
interval

Toggle Broadcast Mode:

switch from config./calibration mode to broadcast mode and back again

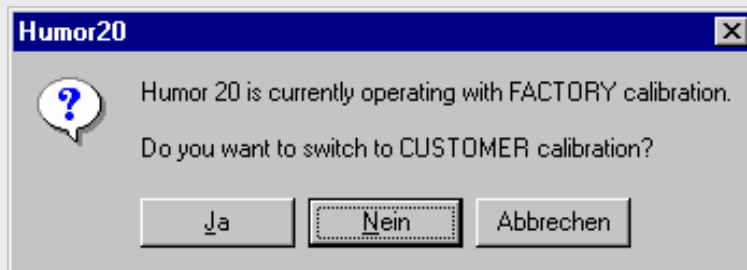


broadcast mode:

measurement data (RH, T, warnings) will be displayed on your PC and stored in a log-file frequently.

(acc. broadcast interval)

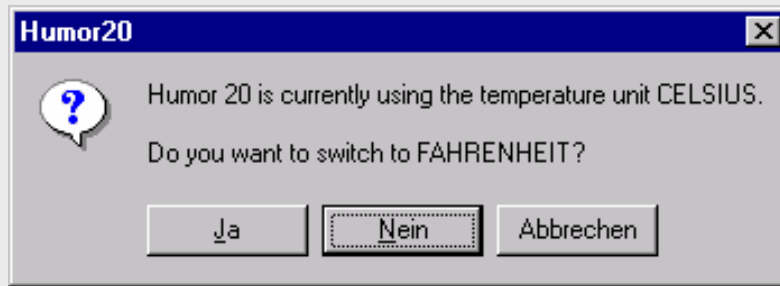
Toggle Calibration Mode:



switch between **FACTORY** and **CUSTOMER** calibration and back again

the current mode is visible on the display showing either **F** or **C**

Toggle Temperature Mode:

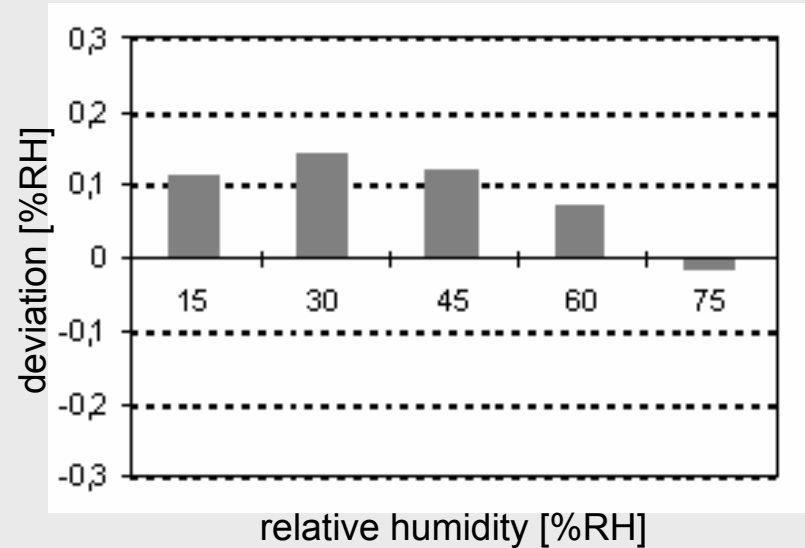


switch between temperature units –
degrees CELSIUS or FAHRENHEIT

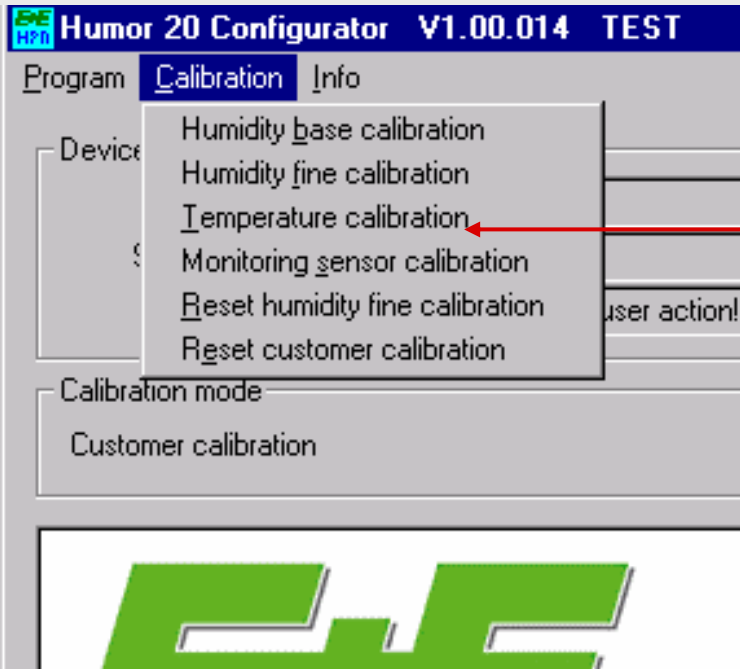
RECALIBRATION

Recalibration Interval?

- industrial purpose:
we recommend approx. 2 years
- metrological purpose:
according local legislation
- for a period of 1 year a stability better than 0,5% RH is expected



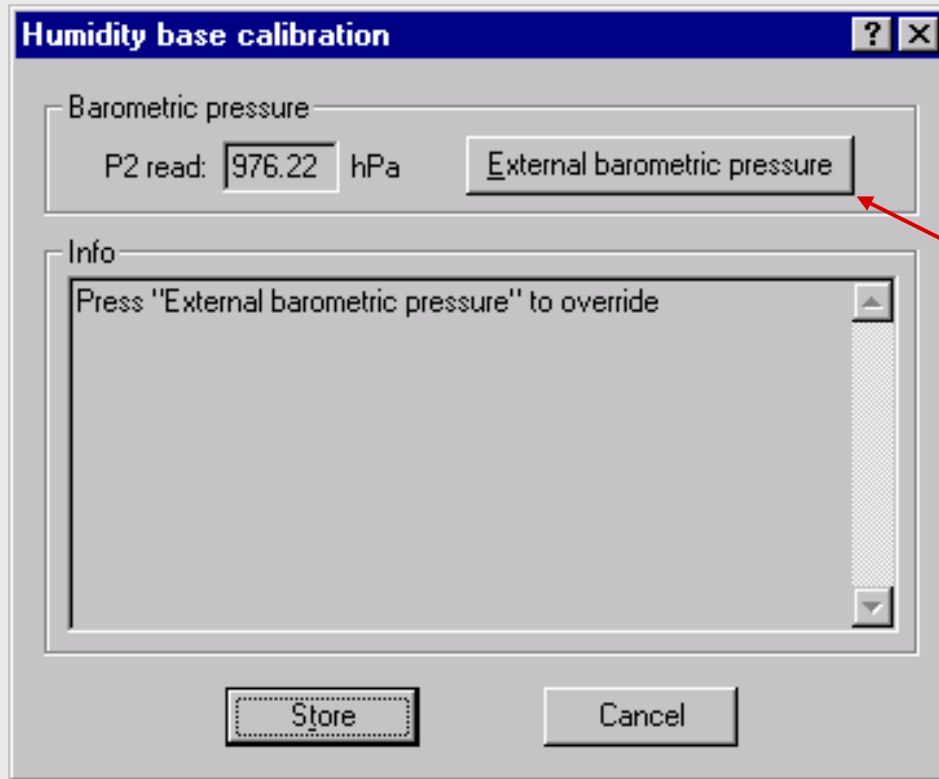
HUMOR 20 - External Recalibration



Functions:

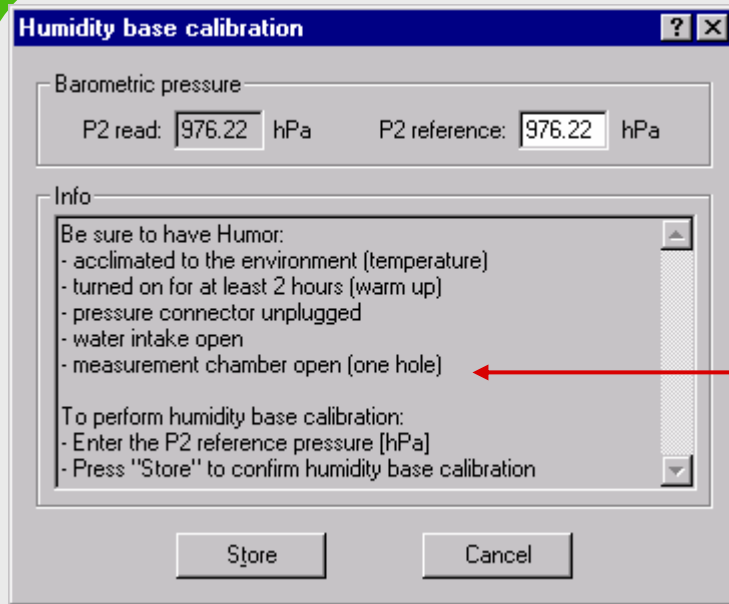
- Humidity basic calibration:
- Humidity fine calibration
- Temperature calibration
- Monitoring sensor calibration
- Reset humidity fine calibration
- Reset customer calibration

Humidity Base Calibration:



External pressure ref. has to be highly accurate, otherwise results will be worse than without one!!

Before basic calibration all these requirements have to be fulfilled!!



During basic calibration entire system has to be un-pressurized !!

Function principle:

Step 1 (optional): The offset absolute pressure transmitter P2 read (measuring chamber - 0...2.000 hPa) will be rebalanced to the entered reference value. Without any reference P2 will be considered as reference value.

Step 2: The offset of absolute pressure transmitter P1 (saturation chamber – 0...20.000 hPa) will be balanced to P2 read = P2 reference

The Result:

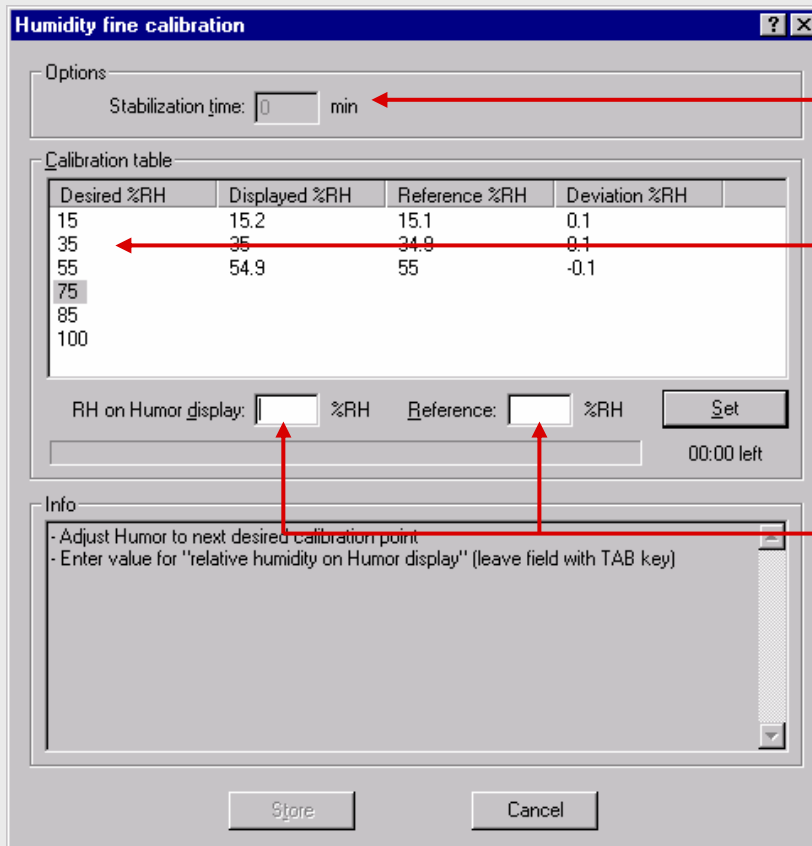
$$RH = \frac{p_2}{p_1} \times 100\% = \frac{\cancel{980\text{ hPa}}}{\cancel{980\text{ hPa}}} \times 100\% = 100\%$$

After offset correction of both pressure transmitter even without external reference the accuracy of the HUMOR 20 will be better than $\pm 0,75\%$!

!! In general a basic calibration is sufficient!!

Humidity Fine Calibration:

Possibility to adjust the HUMOR 20 characteristic according an **highly accurate external reference** (certified dew point mirror...) in 6 points!



Desired %RH	Displayed %RH	Reference %RH	Deviation %RH
15	15.2	15.1	0.1
35	35	34.9	0.1
55	54.9	55	-0.1
75			
85			
100			

adjust set point to the desired value!

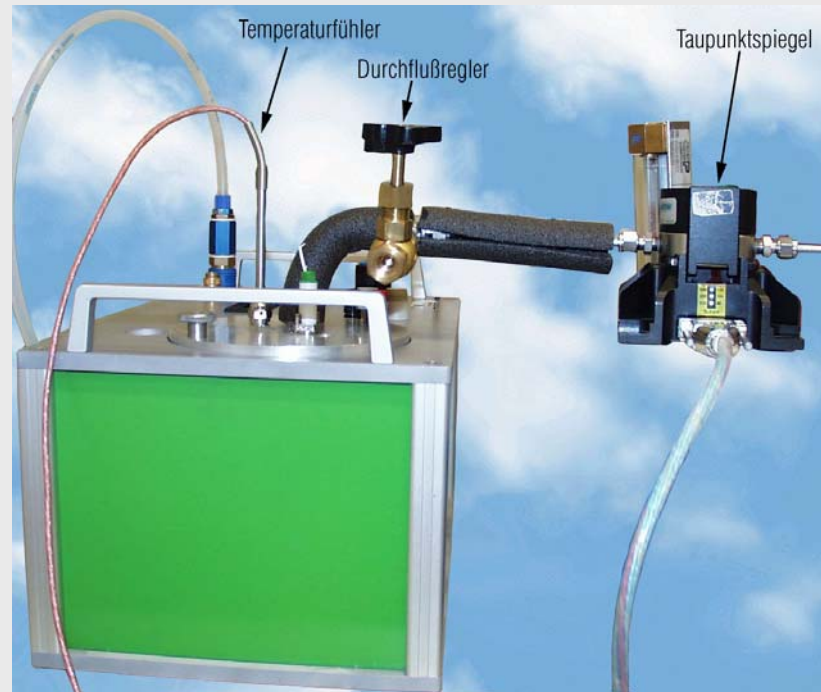
After the selected stabilization time

displayed RH- and reference value have to be entered.

Remarks:

- Before starting a fine calibration, a basic calibration has to be done.
- At 100% RH set point the HUMOR 20 has to be un – pressurized – remove pressure connector, open water intake, open measuring chamber (1whole).
- **To reach outstanding accuracy highly accurate references are needed (certified dew point mirror) !**

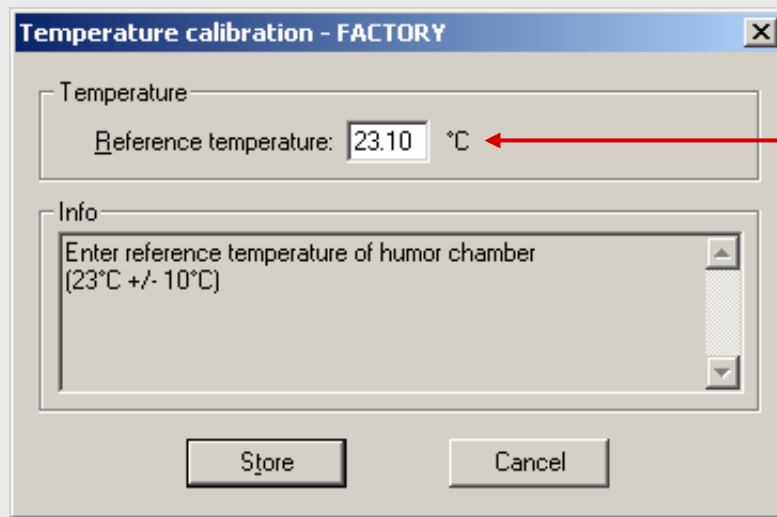
To implement a certified dew point mirror additional instrumentation is necessary !!



Main Advantage:

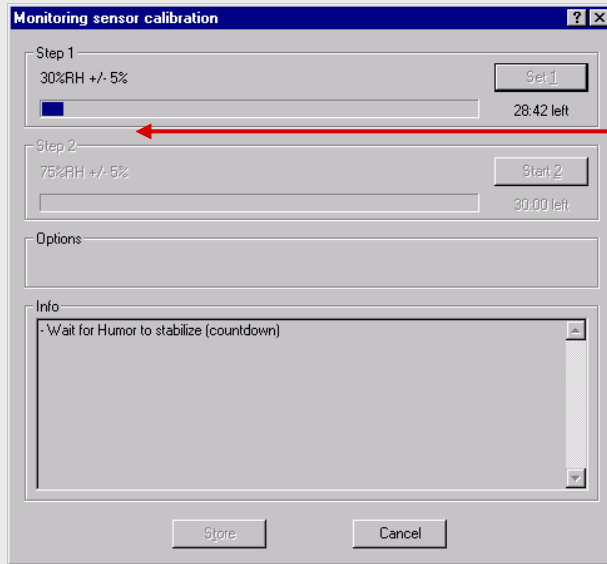
- Customers (standardization & metrological institutes) are able to alter the characteristics of the HUMOR 20 to their prevailing standards!

Temperature Calibration:



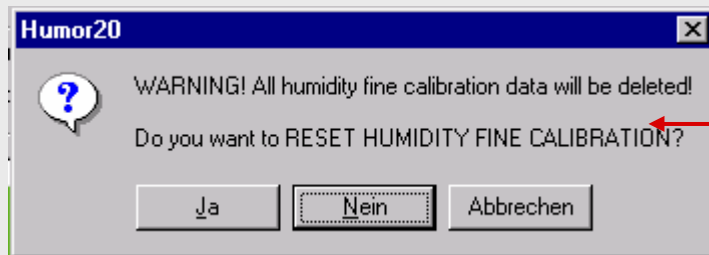
The temperature measurement of the HUMOR 20 can be adjusted by entering the announced value of an accurate external reference in the restricted area of 23 degC +/-10 degC

Monitoring Sensor Calibration:



Adjust given set point – wait for stabilisation time - enter reference value !!

Reset Humidity Fine Calibration:



Humidity fine calibration data will be deleted?

Mechanical Improvements

Measuring Chamber: from circular...



previous:

d = 120 mm



Rectangular Measuring chamber !



dimensions:

100 x 110 mm



Main Advantage:

- **HUMOR 20 matches the dimensions of room transmitters and data loggers**

Internal Construction:

A HUMOR 20 **filled** with DI water can be tilt up to 20°

angle up to
20 °



Main Advantage:



→ Portable while ready for user action (loop calibration!)

Inaccuracy of Measurements:

data sheet:

10 < RH ≤ 45 %RH - ±0,5 %RH

45 < RH ≤ 70 %RH - ±0,7 %RH

70 < RH ≤ 85 %RH - ±0,9 %RH

85 < RH ≤ 95 %RH - ±1,3 %RH

remark: extended inaccuracy of measurement results from the standard inaccuracy increased with a multiplying factor K=2

ÖKD accreditation guarantees: (at 25 degC ± 3 degC)

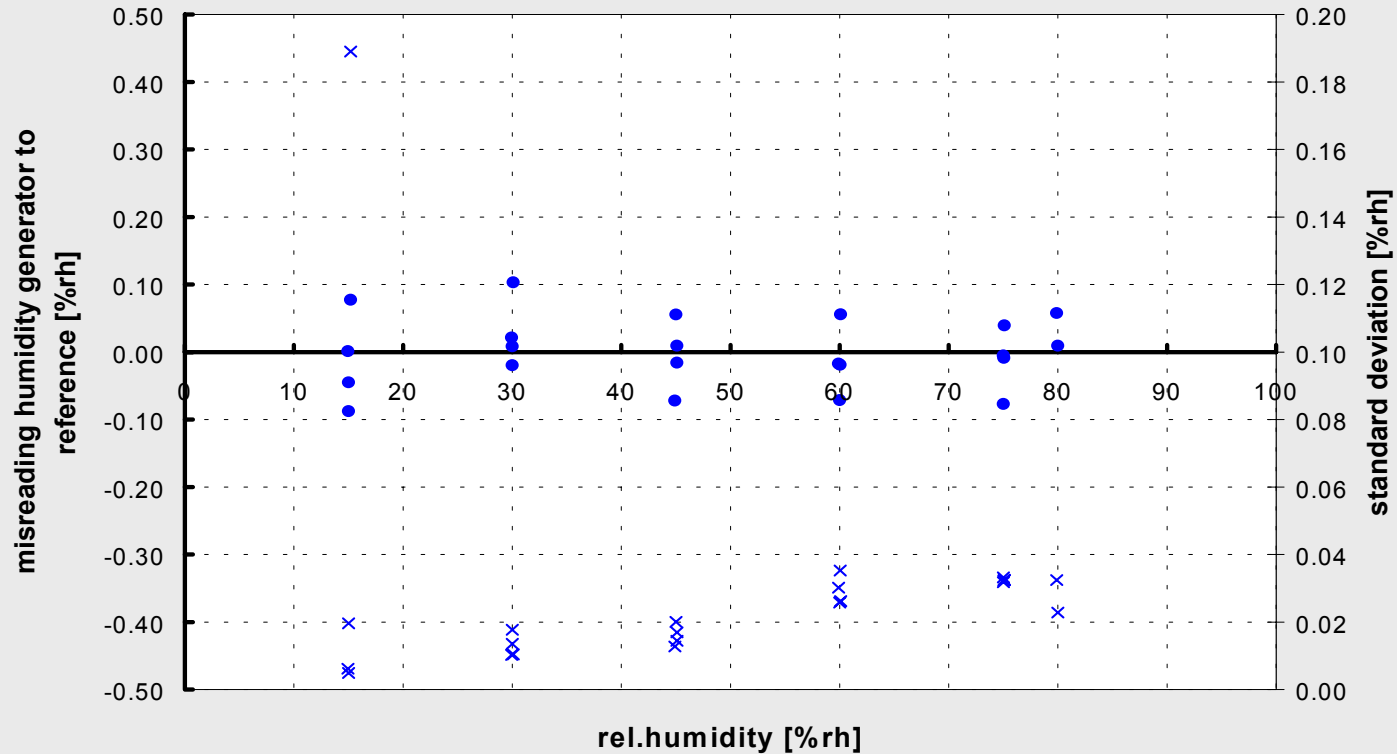
10 < RH ≤ 45 %RH - ±0,2%RH

45 < RH ≤ 70 %RH - ±0,35 %RH

70 < RH ≤ 85 %RH - ±0,5 %RH

After Customer Calibration:

misreading humidity generator



Humidity generator in comparison with a certified dew point mirror –
deviation stored as a correction function -

Achieved accuracy depends only on the used humidity reference !

Calibration - Certificate

ÖSTERREICHISCHER KALIBRIERDIENST

AKKREDITIERT DURCH DAS
BUNDESMINISTERIUM FÜR WIRTSCHAFTLICHE ANGELEGENHEITEN



Kalibrierlaboratorium für die Messgrößen Relative Feuchte und Temperatur
Calibration laboratory for measuring relative humidity and temperature

YOUR PARTNER IN SENSOR TECHNOLOGY
E+E ELEKTRONIK



Kalibrierschein
Calibration Certificate

Objekt Object	Feuchtemeßgerät Humidity measuring device	Die Kalibrierung erfolgt auf die gesetzlichen Grundlagen der 18 und 19 des Maß- und Einheitensystems BGM Nr. 152/1993 in gültiger Fassung. The calibration is performed in accordance with the law concerning legal metrology, Federal Law No. 152/1993 in its amended version. This calibration certifies documents, the repeatability to national standards, which realize the international units of measurement according to the international system of Units (SI). The user is obliged to keep the object recalibrated at appropriate intervals.
Hersteller Manufacturer	E+E Elektronik	Hersteller-Kalibrierschein dokumentiert die Eignung der Messgröße auf gesetzliche Normale mit Berücksichtigung der physikalischen Einflüsse in Abhängigkeit der Messgröße und dem Messumfeld. The calibration is performed in accordance with the law concerning legal metrology, Federal Law No. 152/1993 in its amended version. This calibration certifies documents, the repeatability to national standards, which realize the international units of measurement according to the international system of Units (SI). The user is obliged to keep the object recalibrated at appropriate intervals.
Typ Type	HRMOR 10 S	
Herstellernummer Serial number	P11160_72.02	
Auftraggeber Customer	E+E Elektronik	
Kalibriernummer Order No.		
Anzahl der Seiten des Kalibrierscheins Number of pages of the certificate	3	
Datum der Kalibrierung Date of calibration	26-02-2002	

Dieser Kalibrierschein darf nur vollständig und unverändert weiterverleihen werden. Anträge oder Änderungen sind unzulässig.
This calibration certificate may not be reproduced either alone or full. Calibration certificates without signature and seal are not valid.

Stempel Seal	Datum Date	Zustimmungsbescheinigung Authorized person	Bereitsteller Person in charge
	26-02-2002	DI Christl Pöp	DI Christl Pöp

E+E Elektronik Ges.m.b.H. Langenstein 1, A-4210 Engelbrechts-C. Austria, Tel. +43 (725) 605-0,
Fax +43 (725) 605-383, FN 1637311 Landgericht Linz, UID-Nr.: ATU4849181, DWR 0962789

KALIBRIERSCHEIN
Kalibrierlaboratorium 23

Nummer Number	KAW0043	43
Spezialnummer Special number		ÖKD 21
Einzelgegenstand Individual Calibration	HRMOR 10 S, S.Nr.: P11160_72.02	02-02
Datum Date	26-02-2002	
Seite Page		Seite 2

Größe Size	Feuchtemessung Feuchte Humidity	Referenzwert mit Feuchte Reference value with humidity	Abweichung Prüfwertabweichung von Referenzwert Deviation from reference value	Unsicherheit der Messung Measurement uncertainty
Output value	(%)	(%)	(%)	(%)
18.00	18.00	-0.15	0.2	
20.00	20.00	-0.27	0.28	
25.10	25.10	-0.20	0.28	
75.10	75.10	-0.42	0.6	
84.85	84.85	-0.83	0.8	

gr. während der Prüfung
in condition

Kalibrierstemperatur: 25 ± 0.3 °C
Temperature of calibration

erfahren
in procedure

Standardabweichungsverfahren von E+E Elektronik „Anweisung für die Kalibrierung von Feuchtemessern“
Standard calibration procedure of E+E Elektronik „Anweisung für die Kalibrierung von Feuchtemessern“
(„Instruction for calibration of Humidity Calibrators“)

issued in house by our
ÖKD accredited
calibration laboratory!

Main Advantage:

- traceable to international standards
- reduced delivery periods (shipment to PTB not longer necessary)