testo

hygrotest 500/600/650

hygrotest humidity transmitters

NEW

% RH

°C/°F

°Ctd/°Ftd

g/kg

g/m³

°C/°F
Wet bulb

The complete product family

Stationary humidity measurement technology from testo

In many industrial processes, the measurement of humidity is indispensible to the maintenance of process stability and product quality. Testo offers a complete family of high-quality humidity and temperature transmitters for use in production, in storage areas, on test benches or in cleanrooms.

hygrotest 500

The basic transmitter for ventilation and air conditioning applications. The well-being of employees depends on the climatic conditions at the workplace. This is why it is important to monitor and control humidity and temperature. Other typical applications are in warehouses (e.g. leather, paper), museums, nurseries, IT rooms and stables.

hygrotest 600

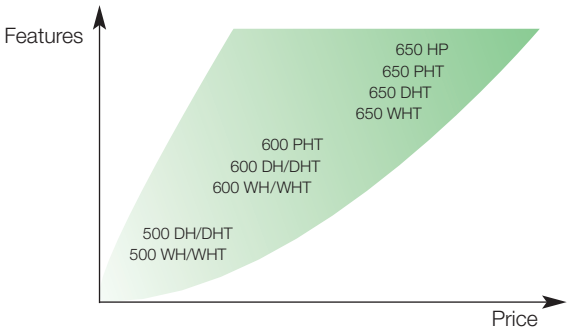
The standard transmitter. Wherever stable measurement and regulation of humidity and temperature are required, hygrotest 600 series humidity and temperature transmitters from testo come into their own. Typical uses are in dehumidifier systems, painting plants, air conditioning, climatic chambers, food production and warehousing.

hygrotest 650

The industrial transmitter. In many industrial processes, precise and reliable measurements of temperature and humidity are decisive for quality. The testo hygrotest 650 series industrial transmitters are outstandingly robust precision instruments. Typical applications are in cleanrooms, semiconductor production, the automotive industry, engine test beds, painting plants, drying systems and fuel cells.

Abbreviations used to designate products and accessories

W	Wall-mounted version
D	Duct-mounted
P	Probe on cable
H	Humidity analogue output
T	Temperature analogue output
HP	Heated Probe



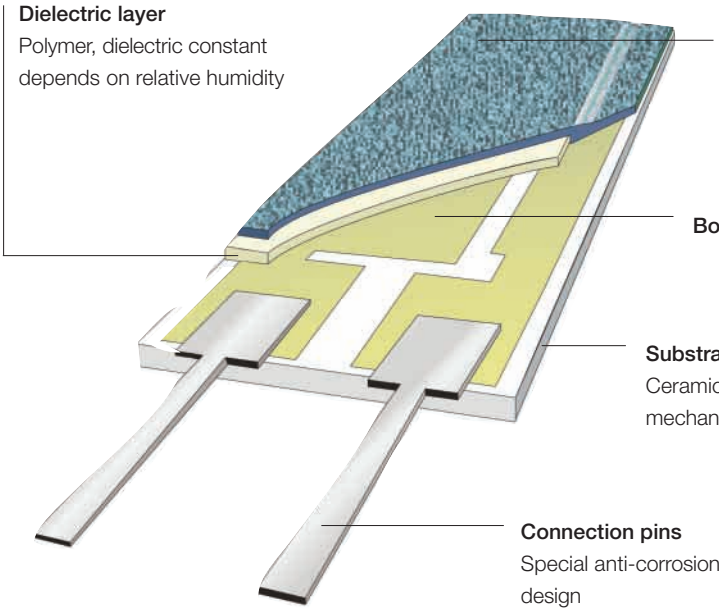
Wood drying: Hygrotest helps in obtaining optimum results, even under extreme condititons.

Production air quality: Painting lines and the manufacture of paper and granulates require constant humidity.

Drying of ceramics and tiles: Hygrotest guarantees a controlled drying process.

Cleanrooms: The semiconductor and pharmaceutical industries require climatic conditions within narrow limits.

The key component of hygrotest: the best humidity sensor in the world



Condensation-proof and robust

The testo humidity sensor

With its humidity sensor, developed more than 10 years ago and since then continually improved, testo has succeeded in extending significantly the range of applications of capacitive sensors. This has made operating tempratures up to +180 °C possible. The humidity sensor guarantees long-term measuring stability, even under extreme conditions, and remains very precise at high humidities (> 90 % RH), where the testo innovation “heated sensor” (cf. p. 10) comes into its own.

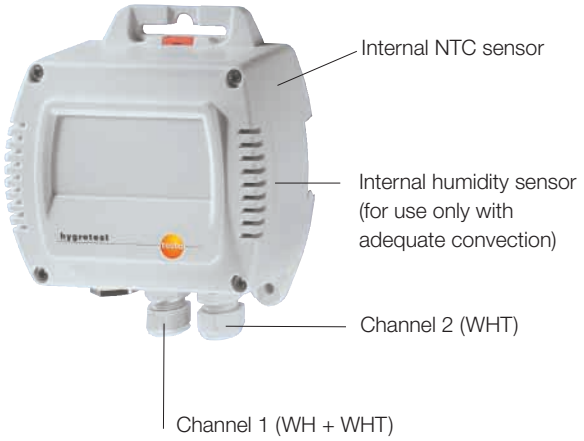
Reliability = long-term stability

A number of testo humidity sensors were tested in a large-scale ring test at the PTB in Berlin, the NIST in the USA, the French CETIAT national institute, in the Italian national institute, INTA, at the JQA in Japan, at Kriss in Korea, at the NRCCRM in Beijing and in the testo DKD calibration laboratory. All the measurement results confirmed the precision of 1% RH quoted by Testo. Furthermore, numerous long-term tests have confirmed the long-term stability not only of the testo humidity sensor, but also of the hygrotest transmitter.

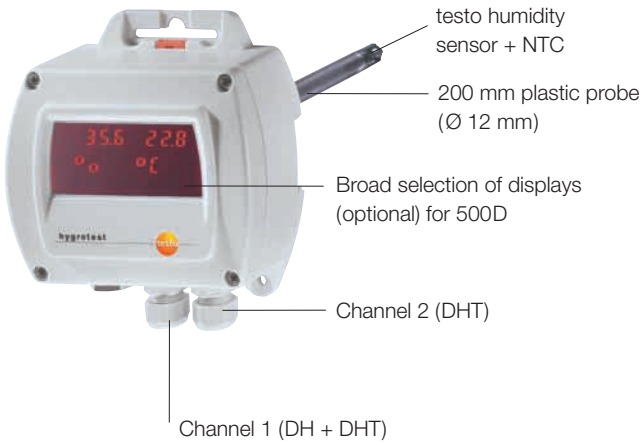
5-year ring test, less than 1% measurement uncertainty

hygrotest 500

W - Wall-mounted



D - Duct-mounted



All hygrotest units are configured to customer specification.
From the options below, please select the solution that meets your requirements, for example, a hygrotest 500 with duct probe, stainless steel filter, H1 display, 0..100 % rel. humidity as channel 1 output and 0..90 °F as channel 2 output.

hygrotest 500 DHT -20/70 / G1 / H1 / K1 / M2 / 0 / 90 / N2

0555.0500 hygrotest 500

Versions

Wall-mounted, output % RH	WH
Wall-mounted, outputs % RH + T	WHT-20/70
Duct-mounted, output % RH	DH
Duct-mounted, outputs % RH + T	DHT -20/70

Filters/caps		**WH/WHT**	**DH/DHT**
Sintered stainless steel filter	G1		
Wire mesh filter	G2		
Sintered teflon filter	G3		
Open metal protective cap	G4		
Open plastic (ABS) cap	G5		

Scaling, channel 2

M1 Standard scale, channel 2 (4 ..20 mA = -20 ..70 °C)

M2 Special scale, channel 2 (4 ..20 mA = min ..max) + N1°C

(e.g. “M2 30 ..60 N2” for 30 ..60 °F) N2°F

Scaling, channel 1

K1 Standard scale, channel 1 (4 ..20 mA = 0 ..100 % RH)

K2 Special scale, channel 1 (4 ..20 mA = min ..max) + L1

(e.g. “K2 10..40 L1” for 10..40 % RH)

Display versions (cf. p. 14)	H1	H2	H3	H4	H5	H6
Loop-fed display	x		x			
External display supply		x		x	x	x
2 x 2 relay outputs					x	x
Analogue outputs	x	x		x	x	x
RS 485			x	x	x	

hygrotest 500

Basic transmitter for undemanding applications,
hygrotest 500 is the ideal option if simple and reliable humidity and temperature measurement technology is required. The series is available in two versions: a wall-mounted version for climate monitoring in rooms, with internal humidity and temperature sensor and a duct-mounted version with duct probe for monitoring in air conditioning ducts. The wall-mounted versions, hygrotest 500 WH and hygrotest 500 WHT -20/70 can be easily fitted to a DIN rail.

Reliable humidity and temperature monitoring in air conditioning systems.

Technical data, hygrotest 500	
Housing:	
Material:	ABS, colour grey (RAL 7035)
Size:	130 x 140 x 53 mm
Protection type:	IP 65 (DH/DHT), IP 20 (WH/WHT)
Screw fittings:	2 x M16 x 1.5 (ABS)
Ambient temperature:	-20...+70 °C
Storage temperature:	-40...+80 °C
Sensor:	
Humidity:	Testo humidity sensor
Temperature:	NTC
Measuring range:	
Humidity:	5...95 % RH *
Temperature:	-20...+70 °C
Accuracy:	
Humidity:	± 3 % RH (in the range 5...95 % RH)
Temperature:	± 0.4 °C (-20...+50 °C), 1.5 % of value (> 50 °C)
Analogue outputs:	
Humidity and temperature:	4...20 mA (2-wire system)
Analogue output humidity:	
Resolution:	0.02 mA
Drift:	0.001 mA/K
Analogue output temperature:	
Resolution:	0.02 mA
Drift:	0.003 mA/K
Supply:	
Supply:	24 V DC (10...30 V DC)
Supply with display H1:	minimum 20 VDC
Max. load:	at 10 V 100 Ω, at 18...30 V 500 Ω
Max. load with display H1:	at 20...30 V, 50 Ω
Typical temperature coefficients of outputs:	± 0.002 mA/°C (referred to 25 °C)
Response time:	t90 approx. 10...20 sec. (for very fast analogue pen recorders or PLC inputs, an integration time of 1 sec. is recommended)
EMC:	in accordance with directive 89/336 EEC
Further data, hygrotest 500 DH/500 DHT -20/70 Probe:	
Probe tube material:	Plastic (PC)
Probe tube length:	200 mm, incl. sensor protection cap
Diameter:	12 mm
Temperature resistance:	
Probe:	-20 to + 70 °C
All data relate to a nominal temperature of +25 °C.	

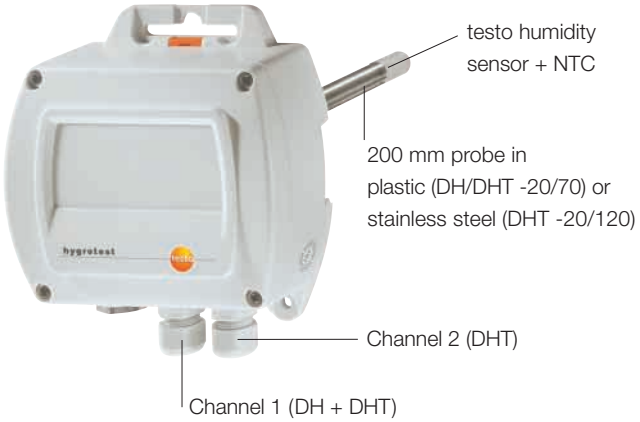
* For continuous use in high humidity (RH > 90 %), select the Hygrotest 650 PHT or 650 HP.

	Channel 1	Channel 2
Measured value	% RH	T
Range	5 ... 95 %	-20 ... +70 °C
Output	4 ... 20 mA	4 ... 20 mA
	Freely scalable e.g. 5 ... 45 % RH	Freely scalable e.g. 10 ... 40 °C

hygrotest 600

W - Wall-mounted

D - Duct-mounted



All hygrotest units are configured to customer specification.
From the options below, please select the solution that meets your requirements, for example, a hygrotest 600 with probe on cable, standard cable length (2 metres), standard probe length (210 mm), teflon filter, H5 display, -30..+50 °Ctd (dew point) as channel 1 output and -20...120 °C as channel 2 output.

hygrotest 600 PHT -20/120 / C1 / D1 / G3 / H5 / K2 / -30 / 50 / L2 / M1

0555.0600 hygrotest 600

Versions

Wall-mounted, output % RH	WH
Wall-mounted, outputs % RH + T	WHT-20/70
Duct-mounted, output % RH	DH
Duct-mounted, outputs % RH + T	DHT -20/70
Duct-mounted, outputs % RH + T	DHT -20/120
Probe version, outputs % RH + T	PHT -20/70
Probe version, outputs % RH + T	PHT -20/120

Probe and cable length

Standard probe length (W: 65 mm, D: 200 mm, P: 210 mm)	C1
Special length, stainless steel probe (DHT -20/120: 100..800 mm) (PHT -20/120: 150..800 mm)	C2
Standard cable length (only P versions, 2 m)	D1
Special cable length (0.25 ..2 m, P versions)	D2

Filters/caps — WH/WHT DH/DHT/PHT

Sintered stainless steel filter	G1
Wire mesh filter	G2
Sintered teflon filter	G3
Open metal protective cap	G4
Open plastic (ABS) cap	G5

Scaling, channel 2

M1 Standard scale, channel 2 (4 ..20 mA = -20 ..70/120 °C)
M2 Special scale, channel 2 (4 ..20 mA = min ..max) + N1 °C
(e.g. "M2 30 ..60 N2" for 30 ..60 °F) N2 °F

Scaling, channel 1

K1 Standard scale, channel 1 (4 ..20 mA = 0 ..100 % RH)
K2 Special scale, channel 1 (4 ..20 mA = min ..max) + L1 % RH
(e.g. "K2 20...80 L1" for 20..80 % RH) L2 dew point °C
L3 dew point °F

Display versions (cf. p. 14)	H1	H2	H3	H4	H5	H6
Loop-fed display	x		x			
External display supply		x		x	x	x
2 x 2 relay outputs					x	x
Analogue outputs	x	x		x	x	x
RS 485			x	x	x	

P - Probe with cable

The hygrotest 600

A professional instrument, the hygrotest 600 is applied in industrial processes and air conditioning systems, wherever long-term stability is required. The various versions allow for wall-mounting for measurement in rooms and similar areas, for duct-mounting for measurement in ducts and for location of the probe up to 2 metres from the housing (connected by a cable). Instead of the relative humidity, the dew point temperature can be output.

Monitored warehousing of paper, textiles, granulates and pharmaceuticals.

Technical data, hygrotest 600			
Housing:			
Material:	ABS, colour grey (RAL 7035)		
Size:	130 x 140 x 53 mm		
Screw connections:	2 x M16 x 1.5 (ABS)		
Ambient temperature:	-20...+70 °C		
Storage temperature:	-40...+80 °C		
Protection type:	IP 65		
Sensor:			
Humidity:	Testo humidity sensor		
Temperature:	NTC		
Measuring range:			
Humidity:	0...100 % RH *		
Temperature:	**Version**	**Operating temperature range**	
	600 WH	-	
	600 WHT -20/70	-20...+80 °C (scale set at +70°)	
	600 DH	-	
	600 DHT -20/70	-20...+80 °C (scale set at +70°)	
	600 DHT -20/120	-20...+120 °C	
	600 PHT -20/70	-20...+80 °C (scale set at +70°)	
	600 PHT -20/120	-20...+120 °C	
Accuracy:			
Humidity:	±2 % RH (within a range of 0...90 % RH), ±3 % RH (90...100 % RH)		
Temperature:	± 0.3 °C (-20...+50 °C), 1.5 % of value (> 50 °C)		
Analogue outputs:			
Humidity and temperature:	4...20 mA (2-wire system)		
Analogue output, humidity:			
Resolution:	0.02 mA		
Drift:	0.001 mA/K		
Analogue output, temperature:			
Resolution:	0.02 mA		
Drift:	0.003 mA/K		
Supply:			
Supply:	24 V DC (10...30 V DC)		
Supply with display H1:	minimum 20 VDC		
Max. load:	at 10 V 100 Ω, at 18...30 V 500 Ω		
Max. load with display H1:	at 20...30 V, 50 Ω		
Typical temperature coefficients of the outputs:	±0.002 mA/°C (referred to 25 °C)		
Response time:	t90 approx. 10...20 sec.		
EMC:	in accordance with directive 89/336 EEC		
All data relate to a nominal temperature of +25 °C.			

Probes: (diameter 12 mm)

Version	**Material**	**Overall length, incl.protection cap**	**Min./ Max. probe length**	**Sensor protection cap, standard**
600 WH	PC	65 mm	-	ABS slotted
600 WHT -20/70	PC	65 mm	-	ABS slotted
600 DH	PC	200 mm	-	sintered stainless steel cap
600 DHT -20/70	PC	200 mm	-	sintered stainless steel cap
600 DHT -20/120	Stainless steel	200 mm	100/800 mm	sintered stainless steel cap
600 PHT -20/70	PC	100 mm	-	sintered stainless steel cap
600 PHT -20/120	Stainless steel	210 mm	150/800 mm	sintered stainless steel cap

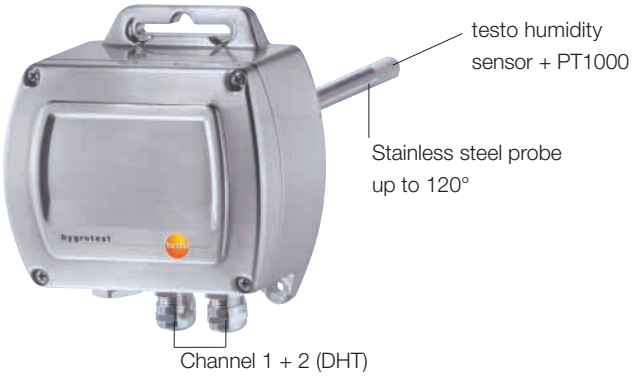
* For continuous use in high humidity (RH > 90 %), select the Hygrotest 650 PHT or 650 HP.

	Channel 1	Channel 2
Measured value	% RH, °Ctd, °Ftd	T
Range	0 ... 100 %	-20 ... +70/120 °C
Output	4 ... 20 mA	4 ... 20 mA
	Freely scalable e.g. 20..100 %	Freely scalable e.g. 10..40 °C

hygrotest 650

W - Wall-mounted

D - Duct-mounted



All hygrotest units are configured to customer specification.
From the options below, please select the solution that meets your requirements, for example, a hygrotest 650 with probe on cable, output signal 0..20 mA, 150 mm long probe, 8 m long cable, measurement uncertainty 1 % RH, open metal protective cap, H6 display, channel 1: 0..45 g/m³, channel 2: 20..160 °C

hygrotest 650 PHT -20/180 / B4 / C2 / 150 / D2 / 8000 / F2 / G4 / H6 / K2 / 0 / 45 / L5 / M2 / 20 / 160 / N1

0555.0650 hygrotest 650

Versions

Wall-mounted, output % RH + T	WHT-20/70
Duct-mounted, outputs % RH + T	DHT -20/120
Probe version, output % RH + T	PHT -40/80
Probe version, output % RH + T	PHT -40/120
Probe version, output % RH + T	PHT -20/180
Heated vers. (cf. p.10) O/P % RH + T	HP -20/120

Analogue outputs

4..20 mA (2-wire system) (not for HP)	B1
0.. 1 V (4-wire system)	B2
0.. 10 V (4-wire system)	B3
0.. 20 mA (4-wire system)	B4
4.. 20 mA (4-wire system, only for HP)	B5

Probe and cable length

Standard probe length (W: 65 mm, D/P/HP: 210 mm)	C1
Special probe length (80..800mm, W/D/P versions)	C2
Standard cable length (only P and HP versions, 2 m)	D1
Special cable length (0.25 ..10 m, P versions)	D2
Humidity calibration, 2% RH (not for HP)	F1
Humidity calibration, 1% RH (not for HP)	F2
Humidity calibration, 2.5% RH (only for HP)	F4

Filters/caps

		WHT	DHT/PHT	HP
Sintered stainless steel filter	G1			
Wire mesh filter	G2			
Sintered teflon filter	G3			
Open metal protective cap	G4			

Scaling, channel 2

M1 Standard scale, channel 2 (min ..max = -20 ..70/120/180 °C)

M2 Special scale, channel 2 (min ..max) * +

(e.g. "M2 30 ..60 N2" for 30 ..60 °F)

* Give values!

N1 °C N2 °F N3 °Ctd N4 °Ftd N5 g/kg N6 g/m³ N7 WB°C N8 WB°F

Scaling, channel 1

K1 Standard scale, channel 1 (min ..max = 0 ..100 % RH)

K2 Special scale, channel 1 (min ..max) * +

(e.g. "K2 20..80 L1" for 20..80 % RH)

* Give values!

L1 % RH L2 °Ctd L3 °Ftd L4 g/kg L5 g/m³ L6 WB°C L7 WB°F

Display versions

	H1	H2	H3	H4	H5	H6
Loop-fed display	x		x			
External display supply		x		x	x	x
2 x 2 relay outputs					x	x
Analogue outputs	x	x		x	x	x
RS 485			x	x	x	

P - Probe with cable

The industrial transmitter, hygrotest 650

Optionally the transmitters of the hygrotest 650 series are available with a precision of ±1 % RH. The very robust, easy-to-clean metal housing optimally protects the transmitter from environmental influences. The length of the cables and probes can be adapted to suit customer requirements. Probes and sensors are heat resistant up to temperatures of +180 °C. Various humidity variables such as dew point, absolute humidity, relative humidity or psychrometer humidity temperature can be calculated and displayed with the help of the integrated Mollier diagram.

Constant humidity in cleanrooms avoids static charges and short-circuits.

	Channel 1	Channel 2
Measured value	% RH	T
	°Ctd, g/kg, g/m³, WB	T
	% RH	°Ctd, g/kg, g/m³, WB
Output	0/4 .. 20 mA	0/4 .. 20 mA
	0.. 1/10 V	0.. 1/10 V
	Freely scalable	Freely scalable

The three possible combinations.

Technical data, hygrotest 650		
Housing:		
Material/colour:	Die-cast zinc, nickel-plated, brushed, varnished	
Dimensions:	130 x 140 x 54 mm	
Screw connection:	2 x M 16 x 1.5 stainless steel screw connection	
Electrical connections:	2 x 4-pole screw connector in housing	
Protection type:	IP 65	
Operating temperature		
Electronic system (housing):	-20...+70 °C	
Display:	-20...+60 °C	
Ambient conditions:		
Probe operating pressure range:	-1...+10 bar	
Storage temperature:	-40...+80 °C	
Probe flow resistance:	30 m/s with sintered stainless steel filter	
Sensor:		
Humidity:	Testo humidity sensor	
Response time:	t90 10...20 sec.	
Temperature:	Pt 1000, class A	
Measuring range:		
Humidity:	0...100 % RH	
Humidity calibration points:	11.3 % RH, 75.3 % RH at 25 °C	
Temperature:	hygrotest 650 WHT	-40...+80 °C
	hygrotest 650 DHT	-40...+120°C
	hygrotest 650 PHT	-40...+180 °C
	hygrotest 650 HP	-20...+120 °C (cf. p. 10)
Accuracy:		
Humidity:	± 2 % RH, optional ± 1 % RH (between 10 & 90 % RH in the range +15...+30 °C)	
	For 650 HP: ± 2.5% RH	
Temp. coefficient of humidity:	± 0.03 % RH/K (at temperatures other than 25 °C)	
Temperature:	±0.2 °C in accordance with DIN EN 60751, class A	
Resolution:	0.1 % RH and 0.1 °C	
Outputs:		
Analog output:	4…20 mA (2-wire system) 0…20 mA (4-wire system) 0…1 V (4-wire system) 0…10 V (4-wire system) 4…20 mA (4-wire system, only for HP)	
Resolution:	5 µA (0...20 mA; 4...20 mA) 250 µV (0…1 V) 2.5 mV (0…10 V)	
Drift (analog):	0.35 µA/K (0...20 mA; 4...20 mA) 17.5 µV/K (0…1 V) 75 µV/K (0…10 V)	
Zero shift: (analogue)	30 µA (0...20 mA) and HP version (4...20 mA/0..20 mA) 1.5 mV (0…1 V) 15 mV (0…10 V)	
2 x 2 switch outputs:	Optional in combination with H5 or H6 display	
Digital output:	RS232 output RS485 output, optional in combination with H3, H4 or H5 display	
Supply:	24 VDC (12...30 VDC)	
Max. load without display or with display H2/H4/H5/H6	500 ohms (0...20 mA); 500 ohms (4...20 mA)	
Max. load with H1 display	50 ohms (0...20 mA); 50 ohms (4...20 mA) Supply voltage, min. 20 VDC	
Power consumption:	Max. 2 x 21 mA (4…20 mA) Max. 2 x 22 mA (0…20 mA; 0…1 V; 0…10 V)	
EMC:	according to directive 89/336 EEC	
All data relate to a nominal temperature of +25 °C.		
Probe:		

Version	Material	Diameter	Length incl. protection cap	Sensor protection cap
650 WHT -20/70	Stainless steel	12 mm	65 mm	Open stainless steel protective cap
650 DHT -20/120	Stainless steel	12 mm	200 mm	Sintered stainless steel filter
650 PHT -40/80	Stainless steel	12 mm	210 mm	Sintered stainless steel filter
650 PHT -40/120	Stainless steel	12 mm	210 mm	Sintered stainless steel filter
650 PHT -20/180	Stainless steel	12 mm	210 mm	Sintered stainless steel filter
650 HP -20/120	Stainless steel	12 mm	210 mm	Teflon filter
Temperature probe for hygrotest 650 HP (cf. p. 10): Plain 1.4571 stainless steel, length 210 mm, Ø 3 mm				
Probe cable length, 2 m standard or special cable length, 0.8..10 m (on request)				

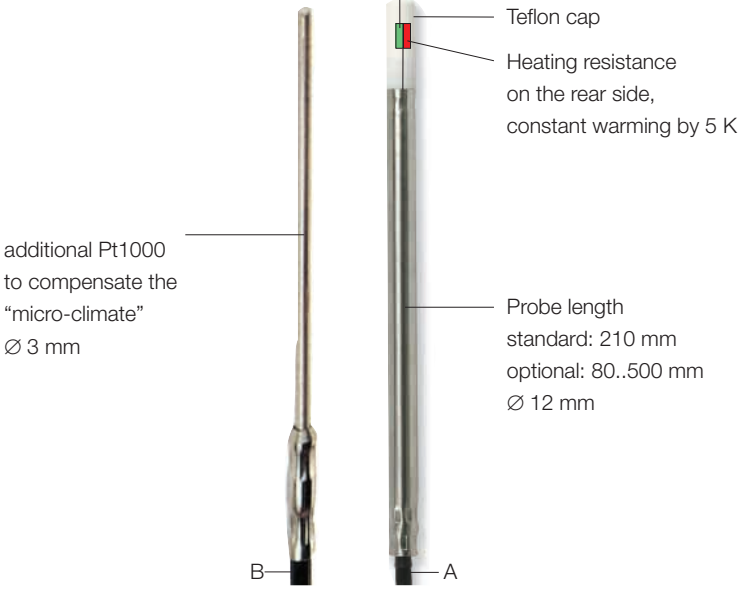
Heated sensor for high humidity

High-humidity processes are the most demanding

In many industrial processes, the working conditions are extremely humid with relative humidity near the 100 % limit at which the air can no longer retain its moisture and condensation is formed. The critical point in the regulation loop is then the humidity measurement. While today's high-quality humidity transmitters are capable of exact measurement, even at high humidities, the reaction time becomes very much longer if the sensor spends hours and days working near the dew point.

Hygrotest 650 HP -20/120

2 analogue outputs
(0..20 mA, 4..20 mA,
0..1 V, 0..10 V), all 4-wire

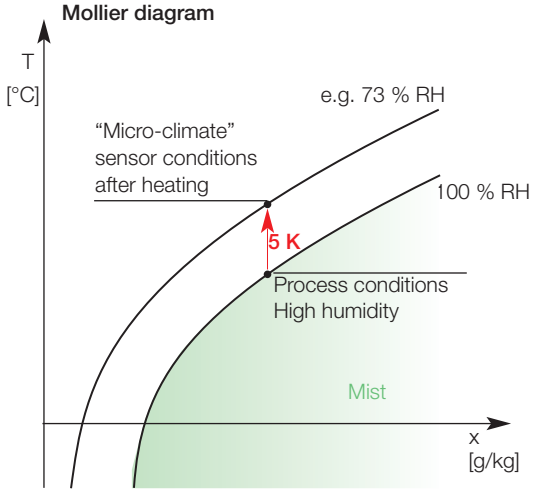


The innovative testo solution for high-humidity measurements

With the hygrotest 650 HP, the testo humidity sensor is heated on the rear side, creating a "micro-climate" around the sensor that is a constant 5 kelvin warmer than the actual process conditions. As can be seen in the Mollier diagram, this reduces the relative humidity at the sensor from the region of 100 % to a lower value, e.g. 73 %. In this range, the *reaction time* of the sensor is sensibly shorter than in the condensation region and the *risk of corrosion* is reduced.

The actual process temperature is measured by a separate, high-precision temperature probe (Pt 1000, class A). On this basis, the microprocessor embedded in the transmitter calculates the actual process humidity conditions. Analogue outputs are available not only as 4..20 mA, but also in the versions 0..20 mA and 0..1/0..10 V, all in 4-wire system.

Mollier diagram



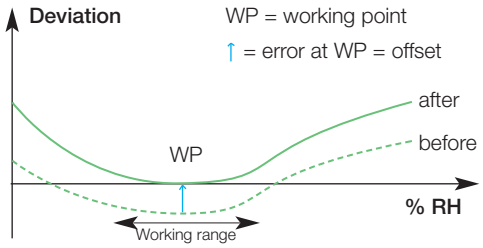
Simplest on-site checking and calibration

Simplest on-site checking

Using the testo 400 or testo 650 reference measuring devices, it can be checked very quickly and easily whether temperature and humidity are “in the green zone”. This is done by subjecting the reference probe and the hygrotest probe to the same conditions (in the process or in the laboratory). The hygrotest and the testo 400/650 communicate with one another via a ribbon cable. The display of the testo 400 or 650 clearly shows the reference values alongside the hygrotest values. You can see at a glance whether the values are correct.

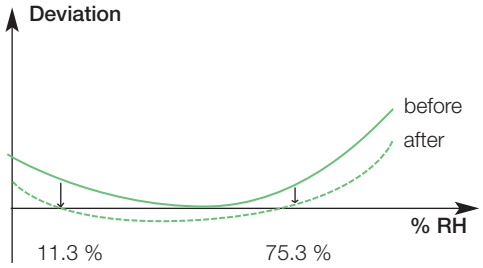
Single-point adjustment (offset)

Also using the testo 400 or 650, a single-point adjustment can be carried out at the touch of a button. Via the ribbon cable, the humidity or temperature characteristic curve of the hygrotest is corrected at the working point (the current humidity or temperature) by an offset. This adjustment method is always recommended if the process remains in the proximity of the working point, for instance, in the range 20..60 % RH where the working point is at 40 % RH.



Two-point adjustment with reusable salt solutions

Adjustment with two salt solutions can also be used on site. In the outer chamber of these “adjustment pots” is a solution of salts in water. The air in the inner chamber into which the sensor is inserted settles after a stabilisation period to a given humidity level. The levels for the two standard solutions are 11.3 % and 75.3 % RH. With two point callibration, the average error is less than with single-point adjustment, especially when working over a wide range. Furthermore, the testo adjustment pots can be reused many times, which minimises costs.



Calibration with traceable calibration standards

testo also offers calibration in accredited testo laboratories. Where quality assurance requirements must be met (ISO 9001, QS900, GMP, FDA, HACCP, ...), *ISO calibration* (laboratory accredited in accordance with ISO 17025) is the ideal solution. Where the highest reliability is required, for instance for manufacturing standards, assessors, public authorities or for critical applications, *DKD calibration* is recommended.

System overview

①

Adjustment of the transmitters with a Testo reference system

The transmitters can be adjusted using a Testo calibrated reference system such as the testo 650 with reference humidity probe. The reference humidity sensor is placed directly alongside the transmitter probe and the hand unit is connected by a flat cable to the transmitter. If the value has stabilised on both units, adjustment can be carried out using the hand unit. An offset value is stored in the transmitter *(see also page 11)*.

②

Simple adjustment of the transmitter humidity using salt solutions

The re-usable control and adjustment pots, 11.3 % RH and 75.3 % RH, make it easy to control and adjust the transmitters on site. The user screws the adjustment pot onto the probe by means of an adapter and waits for 90 minutes until the value has stabilised. He can then press the adjustment buttons for the lower or upper value on the circuit board. Adjustment can be carried out easily on the display. The transmitter is now re-calibrated *(see also page 11)*.

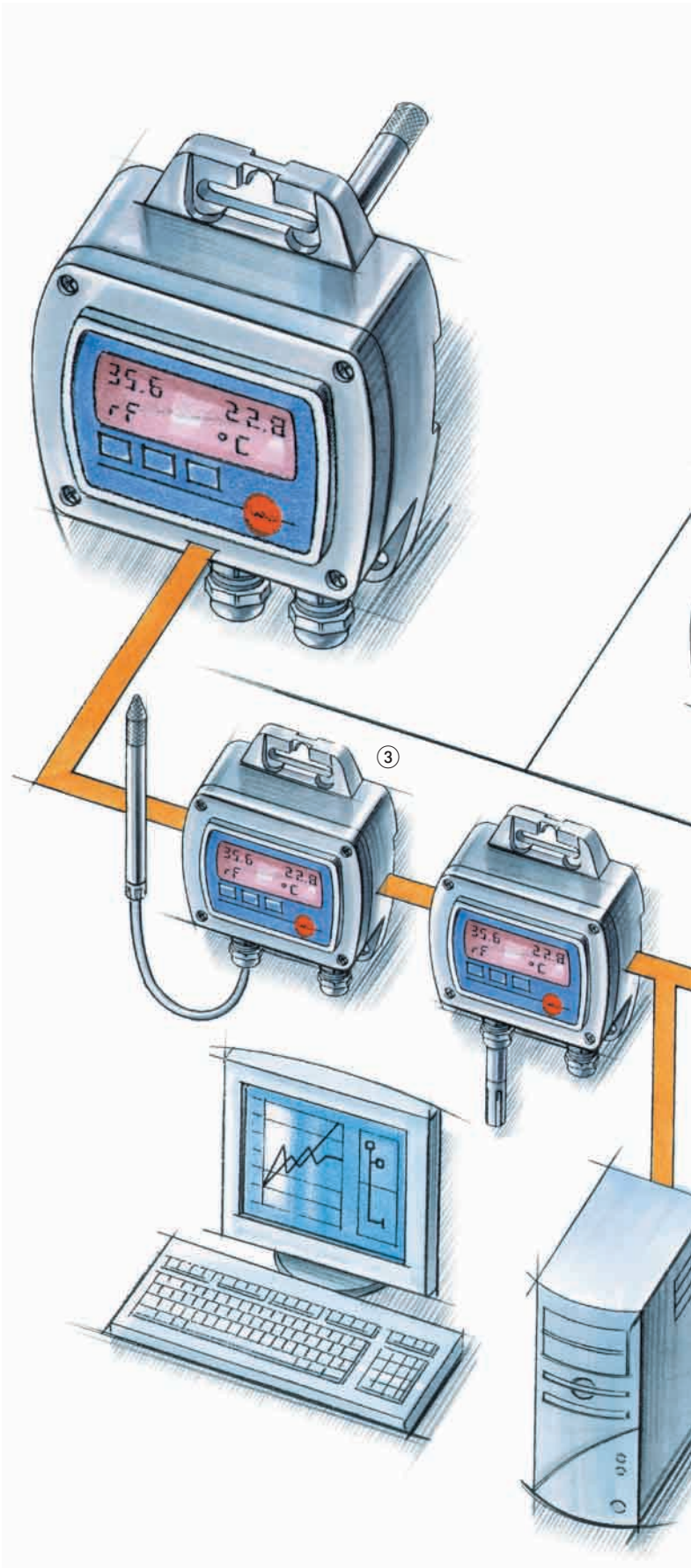
③

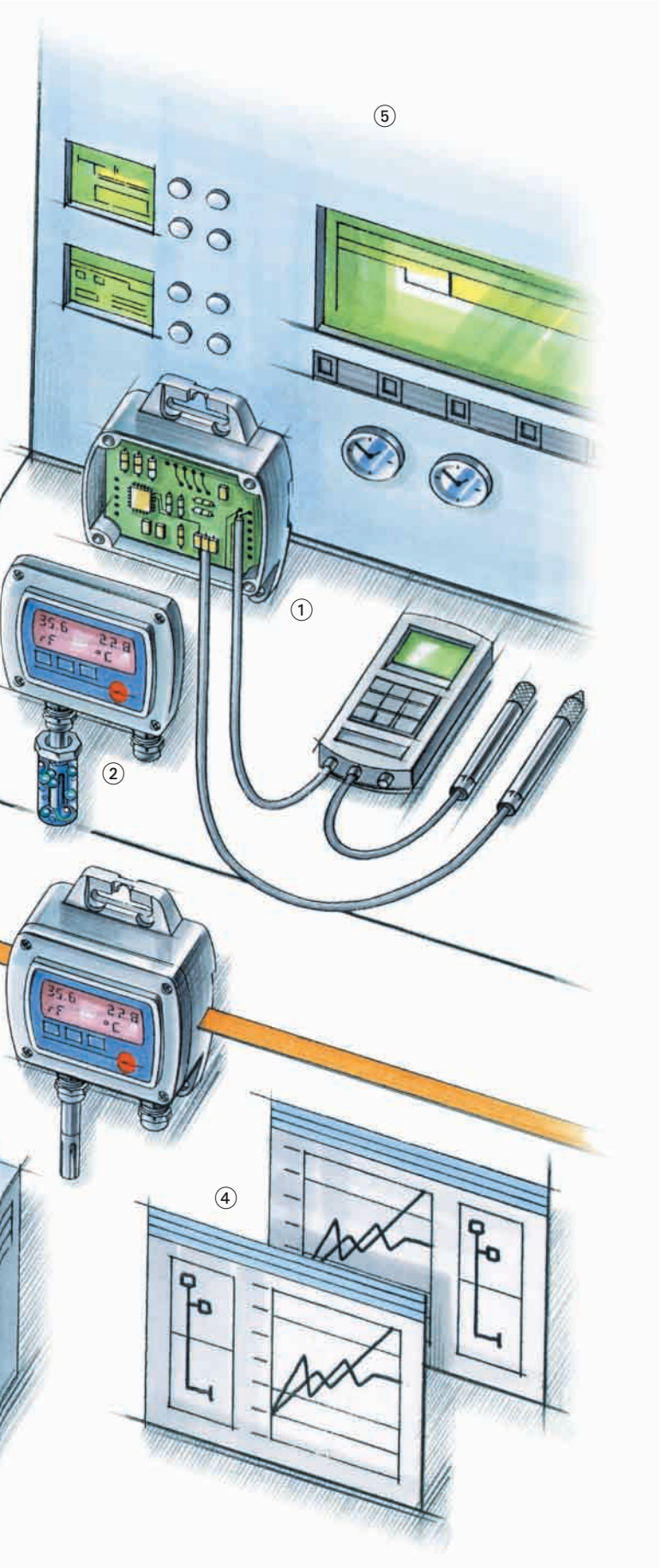
RS485 digital output

In combination with an H3, H4 or H5 display, the transmitters can output digital values. The standardised RS485 protocol can be read with Testo ComSoft 3 software or the values can be integrated into a PLC.

Networking with RS485

Up to 32 transmitters can be connected with each other via the RS485 bus and the data queried centrally *(see also page 15)*.





④

ComSoft 3

The ComSoft 3 software records the values online and saves them automatically in a file. For analysis, there is an extensive range of graphical representations with calculation capabilities such as mathematical smoothing, statistical functions and limit value display. The integral tree structure and free directory creation make for simple and clear management of measurement data.

⑤

Remote display with testo 54

Using the testo 54 displays, the measured values can be displayed at locations remote from the point of measurement. The display units are freely programmable and have a switch output (optional).

Two sizes are available for the DIN standard control panel cut-outs, 48 x 24 mm and 96 x 48 mm.

Display and control menu

Display and communication boards

All hygrotest transmitters (except hygrotest 500 W) can be ordered or retrofitted with a selection of display and communication circuit boards. The following table shows the six versions, H1 ..H6. If neither RS 485 nor relay outputs are required, the choice is between H1 and H2: H1 (supplied from the 4..20 mA loop of channel 1) can be used where the external load is < 50 Ω; otherwise, H2 must be selected (separate display supply).

Display versions	H1	H2	H3	H4	H5	H6
Loop-fed display	x		x			
Separate display supply		x		x	x	x
2 x 2 relay outputs (p. 15)					x	x
Analogue outputs (4 ..20 mA)	x	x		x	x	x
RS 485 (p.15)			x	x	x	

The display versions H1 to H6 have 3 control buttons.

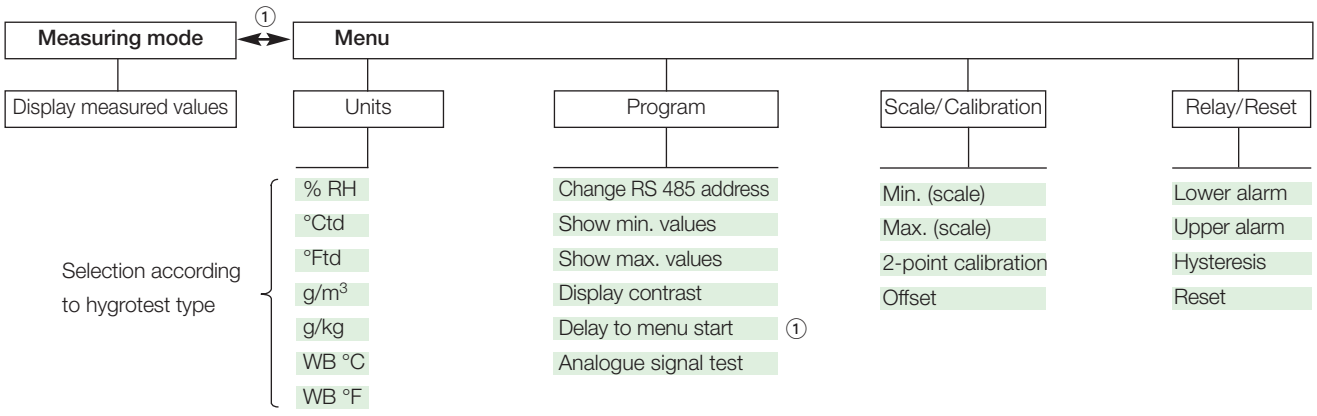
The control buttons of the hygrotest 500D and 600 are inside the casing.

The control buttons of the hygrotest 650 are presented externally.

Using the menu

With the display and communication circuit boards, H1 to H6, it is possible to set up the hygrotest on site. By means of an easy-to-use menu, the physical unit can be changed, the scaling can be adjusted, minimum and maximum values can be read, a single-point or 2-point calibration can be carried out and much more. A password and the variable delay of the menu start ① offer protection against unauthorised access.

Summary of the setting options in the menu

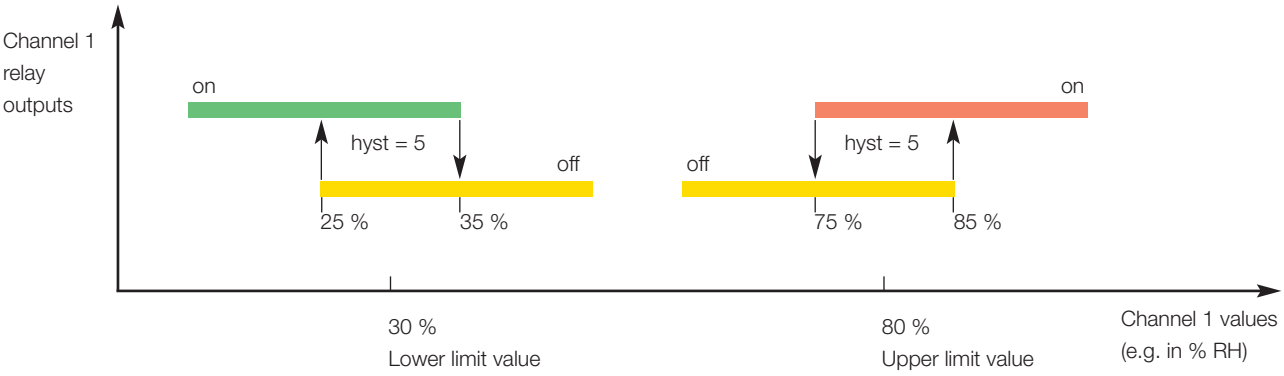


Integrated relay outputs, networking

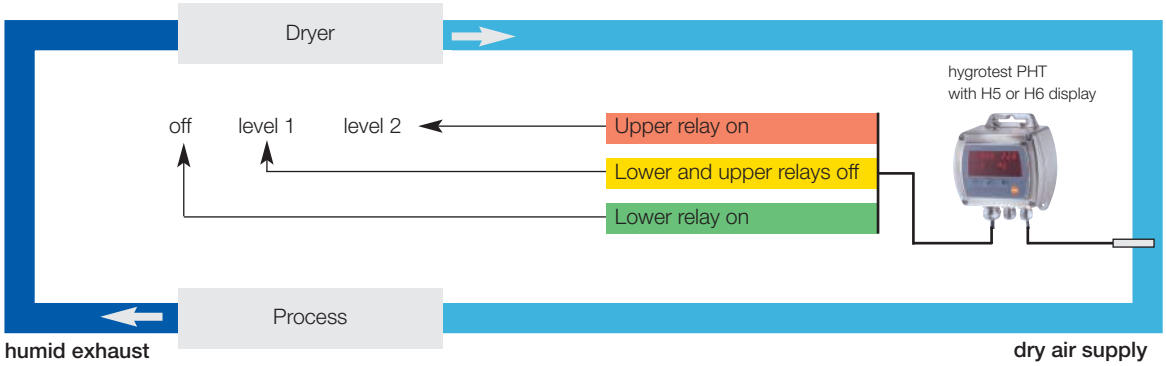
The H5 and H6 displays make two relay outputs available per channel

With the H5 and H6 display versions, the hygrotest has two contact outputs per channel. Above the upper limit value, the input level (10 ..28 V DC) is switched through and likewise below the lower limit value. Hysteresis avoids contact chatter. The limit values and hysteresis can be freely programmed. This makes it possible to control, for example, a drying process without needing a PLC.

The following application example uses the two relay outputs of channel 1

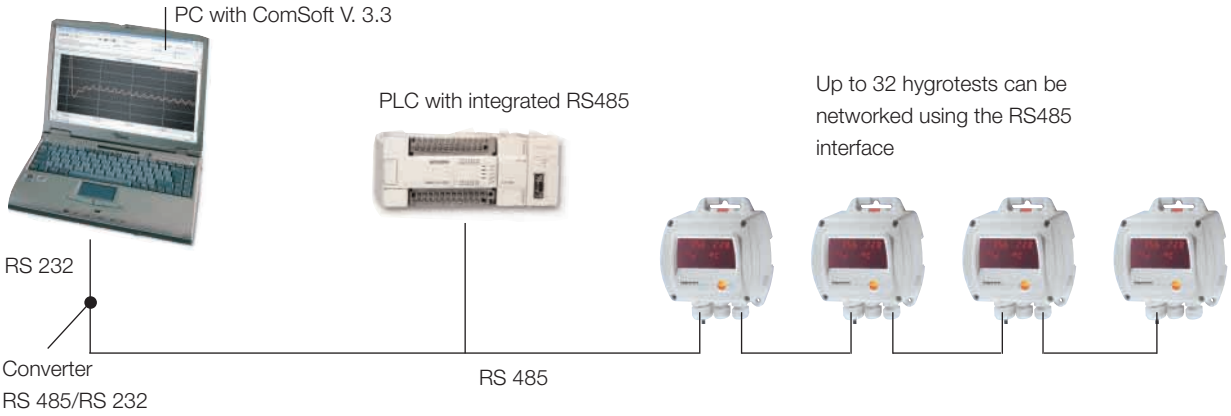


The relays control the dryer without the need for a PLC



Networking a number of hygrotests via RS 485

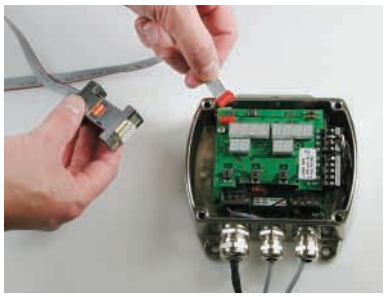
With the H3, H4 and H5 display versions, digital communication is possible using the open RS 485 protocol. This enables a number of hygrotests to be connected to a PC with the ComSoft software installed with a minimum of cabling. ComSoft provides optimum administration and presentation of the process data. The hygrotest data can also be fed directly to a PLC.



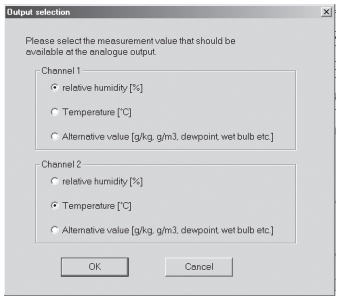
Professional service tool

The scaling adapter, the professional service tool

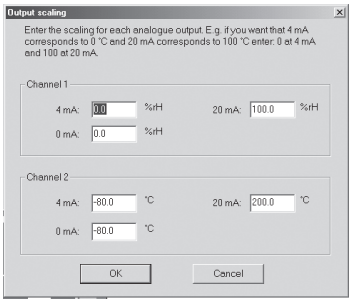
Using the scaling adapter and associated software, hygrotest transmitters can be comprehensively configured. In addition, all available information can be read out of the hygrotest. It is possible not only to change the physical unit and scaling but also to test the analogue output, to calibrate the probes and even to calibrate the analogue output (see below, calibration of the entire signal chain). The powerful tool for on-site service that is at once simple and comprehensive.



Selection of units



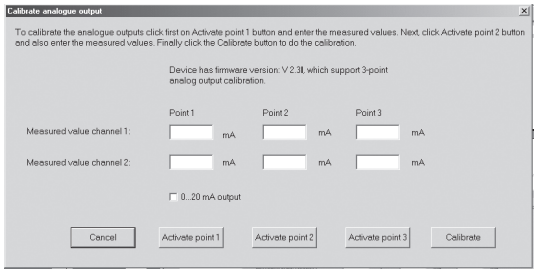
Scaling of the channels



Only testo provides on-site calibration of the entire signal chain

At first glance, the “calibrated” plug-in probes of some competitors may seem attractive. Upon closer examination, it becomes clear that only a part of the signal chain is “factory calibrated”, while the transmitter, with its D/A converter and other electronics remains unaffected. However, this is just where aging and temperature influences should be taken seriously. With its service tool (scaling adapter) and using a precision multimeter, testo provides for proper on-site calibration of the entire signal chain, from the process to the analogue output.

3-point calibration of the analogue output



The signal chain

testo: on-site calibration of the entire signal chain, including transmitter

Competitors: “calibrated” plug-in probes leave transmitter errors out of consideration

Process → Sensor → Digital signal → D/A converter → Analogue signal

2-point calibration at 11.3 % & 75.3 % RH (with salt pots or humidity generator)

2-point calibration of analogue output (using a precise multimeter)

Hygrotest accessories

①
Simple single-hole duct screw fitting in plastic (for hole Ø 21 mm)

Pressure-tight screw fitting G1/2" (stainless steel)
③ Stainless steel cutting ring
④ Teflon ring (see photo)

⑤
Stainless steel flange for screw fittings according to DIN 2576 (with ③ or ④)

⑧
Sintered stainless steel filter

⑨
Wire-mesh filter

⑩
Sintered teflon filter

⑪
Metal protection cap (open)

⑫
Teflon protection cap (sintered filter) with 1.5 mm hole

⑦
Condensation protector (aluminium)

⑥
Wall bracket (painted aluminium) for PHT

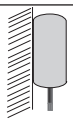
⑬
Adjustment set, consisting of 11.3 % RH and 75.3 % RH saturated salt solutions

hygrotest accessories

Ordering No.	Description
Fastenings, screw fittings for PHT versions	
0554 1793	① Simple one-hole duct screw fitting in plastic
0554 1794	② Duct screw fitting (aluminium/PVC)
0554 1795	③ Pressure-tight screw fitting G1/2" (stainless steel) with cutting ring up to 10 bar
0554 1796	④ Pressure-tight screw fitting G1/2" (stainless steel) with cutting ring up to 6 bar
0554 1797	⑤ Stainless steel flange for screw fittings according to DIN 2576 (with ③/④)
0554 1798	⑥ Wall bracket (painted aluminium) for PHT
Sensor protection filters/caps	
0554 0166	⑦ Condensation protector (aluminium) protects the sensor from condensate, e.g. in drying systems
0554 0647 ≙ G1	⑧ Stainless steel protection cap (sintered filter) Pore size 100 µm Sensor protection in dusty atmospheres or high flow velocities
0554 0757 ≙ G2	⑨ Wire-mesh filter protects sensor from coarse particles
0554 0756 ≙ G3	⑩ Teflon protection cap (sintered filter), pore size 100 µm protects sensors in high humidity and aggressive atmospheres
0554 0755 ≙ G4	⑪ Metal protection cap (open) Short reaction time for velocities < 7 m/s (not suitable for dusty atmospheres)
0554 9913	⑫ Teflon protection cap with 1.5 mm condensate drain hole, ideal with condensation protection 0554 0166 for high humidity
Calibration equipment	
0554 0660	⑬ Adjustment set, consisting of 11.3 % RH and 75.3 % RH saturated salt solutions, reusable
0699 3556/20	Reference set for adjusting the transmitter, consisting of: testo 650 hand unit, 1 % RH humidity/temperature probe with certificate, connecting cables and service case
0409 0214	Connecting cable for calibration of transmitter with testo 650 or testo 400 hand unit, cable length 1.5 m
Interface and software	
0554 0842	ComSoft 3 for hygrotest transmitter for measured data management, including database, evaluation and graphics functions, data analysis, trend curves and automatic saving of the measured values. The package includes the software and an RS485 to RS232 level converter. Only usable in combination with a display with RS485 output (H3, H4 or H5)
0551 0167	Description of the RS232 interface of hygrotest with connecting cable from transmitter to RS232
0554 9915	Scaling adapter for hygrotest, consisting of: RS 232 cable, scaling software and instructions for use
0554 9912	RS485 to RS232 level converter
Supply	
0554 1742	Power supply 230 VAC - 24 V DC
Display retrofit set	
	Retrofit set for displays, consisting of display board, stand-off bolts, housing cover with window and detailed user instructions
Calibration	
0520 0076	ISO calibration certificate for humidity at 11.3 % RH & 75.3 % RH
0520 0246	DKD calibration certificate for humidity at 11.3 % RH & 75.3 % RH
0520 0151	ISO calibration certificate for temperature, -18; 0; 60 °C
0520 0261	DKD calibration certificate for temperature, -20; 0; 60 °C

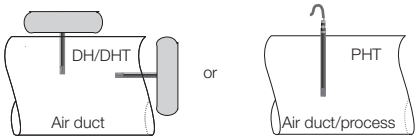
Mounting and filter selection

WH/WHT wall-mounted



Filter selection ⑪
Filter G4 (metal grid, open)
Filter G5 (plastic grid, open)

DH/DHT/PHT - Duct/probe mounting - without risk of condensation

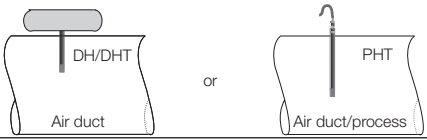


Application area of the various protection caps

Filter selection	Particles in process: none	fine	coarse
Air velocity < 7 m/s	⑪	⑩	⑨
Air velocity > 7 m/s	⑧	⑧ *	⑨ *

* additional mounting of a deflector plate in the duct by the customer.

DH/DHT/PHT - Duct/probe mounting - with risk of condensation (% RH > 85 %)

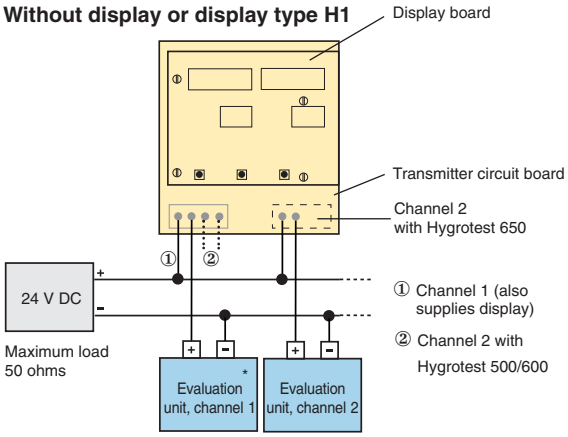


Filter selection
Filter ⑩ + ⑦ for constant temperatures
Filter ⑫ + ⑦ for fluctuating temperatures

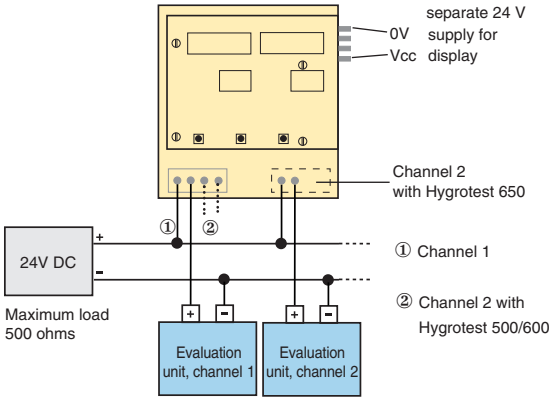
Electrical connections and dimensional drawings

2-wire connection (4...20 mA) of individual hygrotest

Without display or display type H1

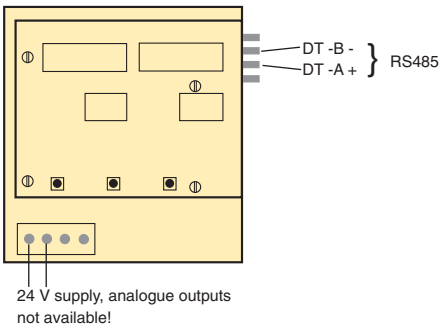


Display type H2

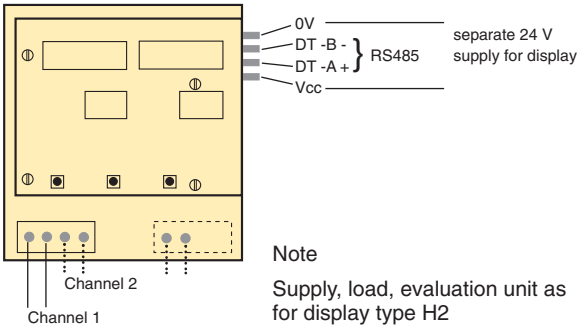


* Evaluation unit = analogue input card (PLC) or external display

Display type H3



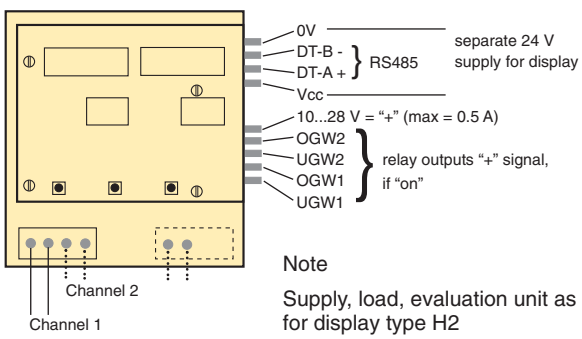
Display type H4



Note

Supply, load, evaluation unit as for display type H2

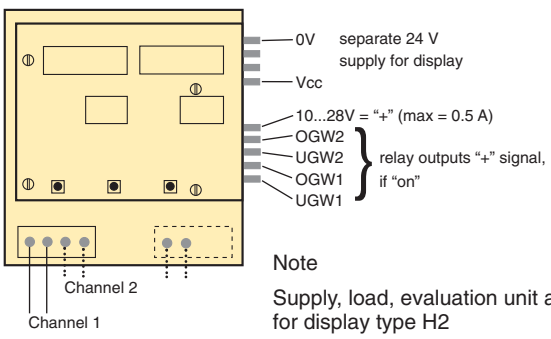
Display type H5



Note

Supply, load, evaluation unit as for display type H2

Display type H6



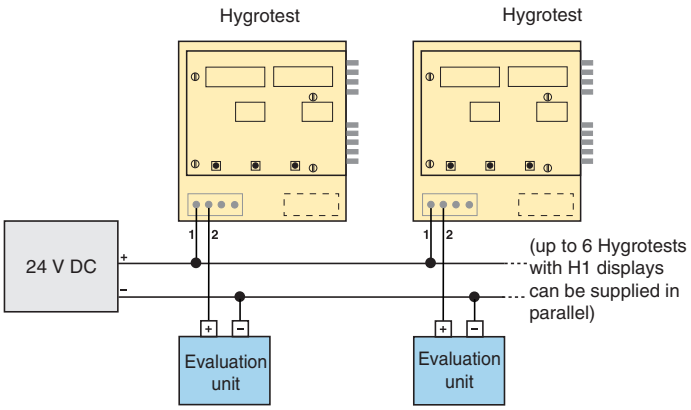
Note

Supply, load, evaluation unit as for display type H2

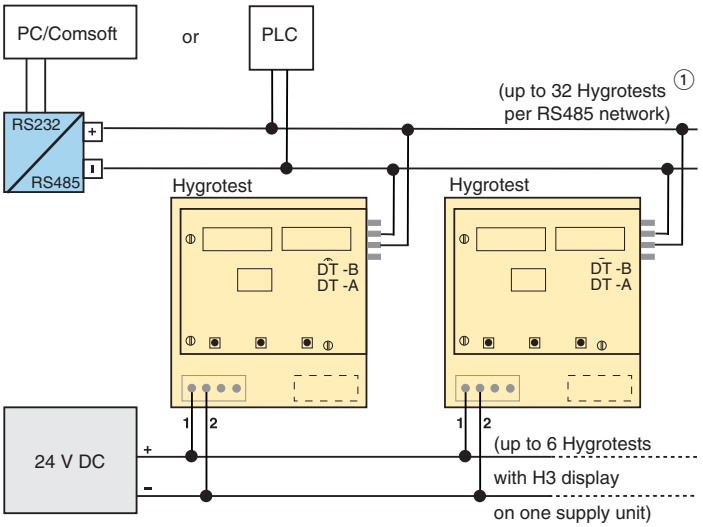
2-wire connection of a number of hygrotests

(only channel 1 evaluation units are shown)

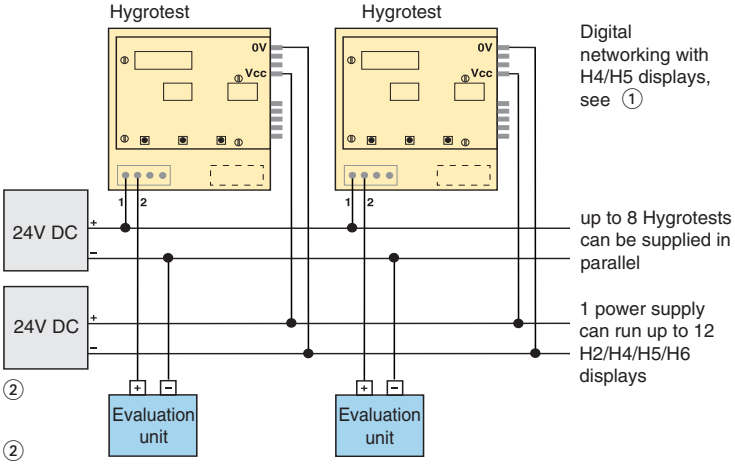
H1 displays



H3 displays



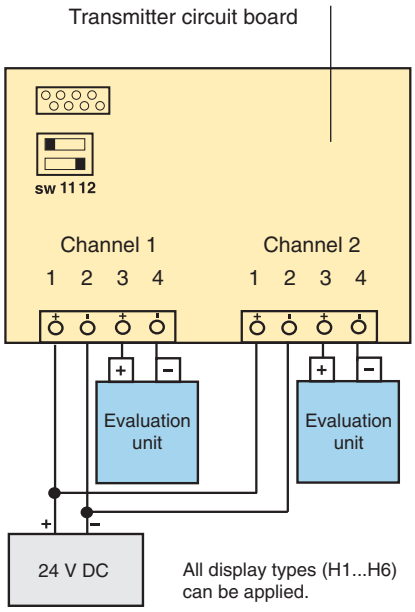
H2/H4//H5/H6 displays



(The additional supply is recommended where the PLC input card is not galvanically separated.)

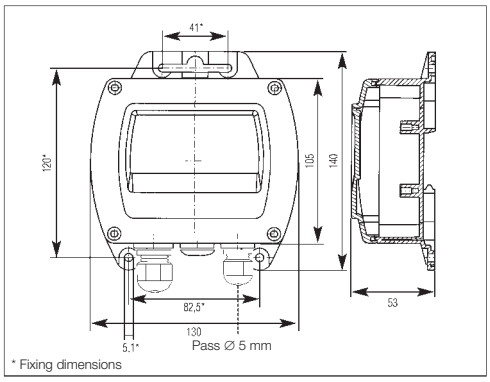
4-wire connection only with hygrotest 650

(0..20 mA/0..1 V DC/0..10 V DC). With 650 HP also 4...20 mA.

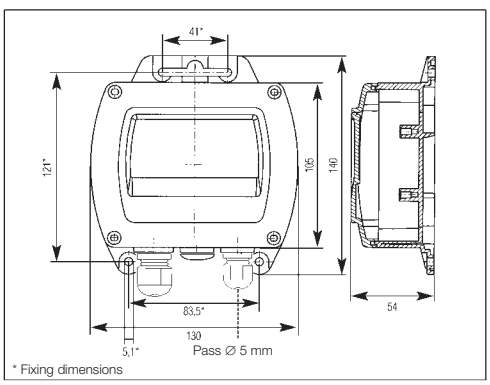


All display types (H1...H6) can be applied.

Dimensions, hygrotest 500/600



Dimensions, hygrotest 650



0981.2964/5/hd/07.2003