testo 6740

Humidity Monitoring in Compressed Air

Increase safety - Cut costs

°C tpd

°F tpd

°C td_{atm}

°F td_{atm}

% RH

ppm_V

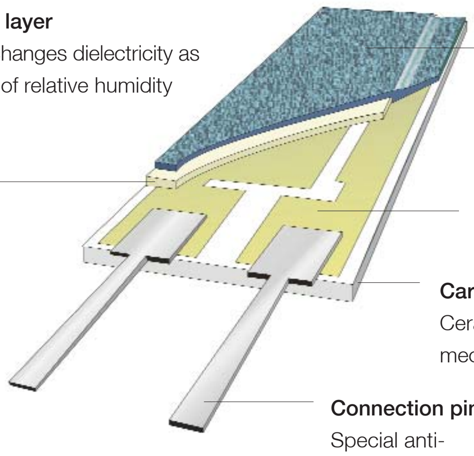
mg/m^3

°C / °F

The humidity sensor

Optimal for trace humidity measurement

The testo humidity sensor is generally calibrated at several points to ensure minimum deviations. For trace humidity measurement, a high-precision reference measurement (dewpoint mirror) is used to help carry out a calibration at -40 °CtP (pressure dewpoint).
To demonstrate the accuracy of testo's humidity sensors, five sensors were extensively tested in a large number of international calibration institutes over a 5-year period. All the measurement results confirmed the high accuracy of 1% RH.



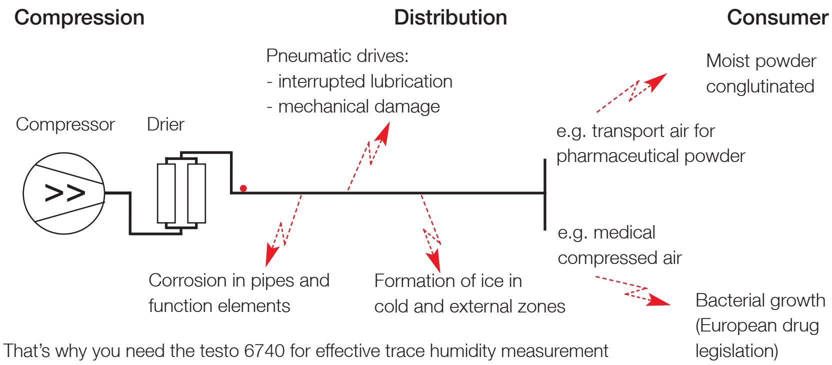
Granulate drying: dry air is a requirement for product quality

Compressed air systems: drier monitoring to avoid damage caused by humidity

Monitor trace humidity, avoid damage

Dry air, compressed air and dry gases are used in all areas of industry. Humidity is normally undesirable because it can cause damage or impair the quality of the end product, as the graphic underneath shows.

Medical compressed air: minimum humidity as a hygiene requirement



• That's why you need the testo 6740 for effective trace humidity measurement

Gas engineering: humidity causes damage and reduces the value of the gas in the system

Safeguard quality - Cut costs

What is compressed air quality?

The international standard ISO 8573 defines seven classes of compressed air quality and lays down the humidity, the oil content, the particle content etc. which the compressed air is allowed to have. Class 1 represents the highest requirements. Class 4 is satisfied if, for instance, the pressure dewpoint does not exceed 3 °CtP or 37 °FtP or an absolute humidity of 6 g water vapour per m^3 or 8,150 ppm_V (parts per million, relative to the volume).

The main way of ensuring compliance with a quality class involves installing a suitable drier. Its monitoring and, where appropriate, its control (see below), is handled by the testo 6740.

How can costs be reduced?

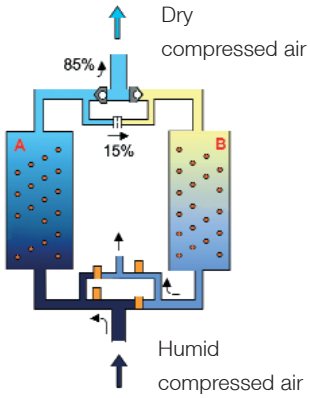
Of course, the main reason for using the testo 6740 is to monitor and avoid excessive humidity in the system so as to avoid damage (cf. p. 2 below). In addition, dryer operating costs can be reduced sharply.

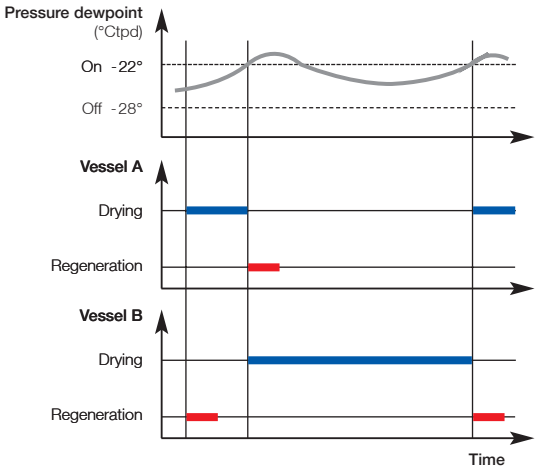
ISO 8573	Trace humidity				Typical application
Class	°Ctpd	°Ftpd	g/m^3	ppm_V	
1	-70	-94	0.003	4	Semi-cond. prod.
2	-40	-40	0.12	163	Granulate drier
3	-20	-4	0.88	1200	Transport air
4	3	37	6	8150	Pneu. tube conveyor
5	7	44	7.8	10600	Vacuum eng.
6	10	50	9.4	12800	Working/energy air
7	-	-	-	-	Blow air

Equipment	Compressed air drier
Monitoring/ Control	testo 6740

Adsorption driers:

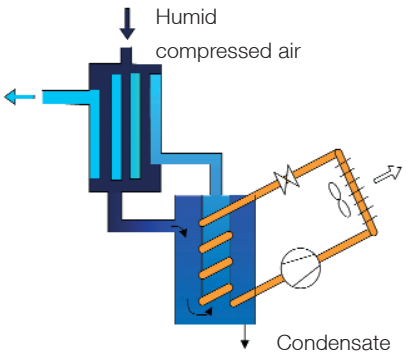
If chamber switchover is humidity-controlled using the testo 6740 rather than being time-controlled (see diagram on the right), the dry phases (blue) are normally much longer than the regeneration phases (red). During this time no regeneration air must be generated, so that the compressors can be reduced from 100% to about 85% volumetric flow rate. This results in significant savings in operating costs.

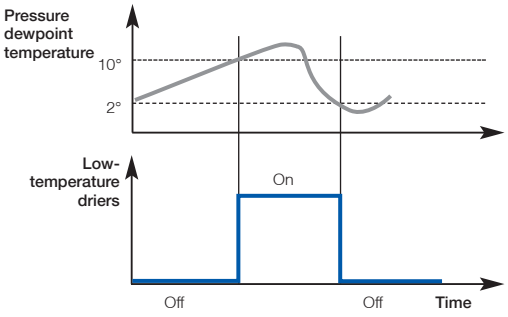




Cooling driers:

In non-critical systems, low-temperature driers can be switched off completely when air humidity is low (e.g in the winter). The testo 6740 supplies the humidity measurement here as well. If the humidity surges that occur when the low-temperature driers are switched on are to be avoided, a downstream low-temperature drier can be kept in continuous operation to trap this humidity. This results in tangible savings in operating costs.





Features and benefits

- **Maximum reliability**
  - Long-term stability, testo humidity sensor applied 100,000 times over
  - Demonstrably correct indication of measurement ranges and data
  - Highest manufacturing quality
- **Calculation of the most important trace humidity variables**
  - e.g. °Ctpd, °Ctd atmospheric, ppm_v
- **Calibration protocol**
- **Convenient operation**
  - Via the display menu without additional aids
  - Without display via the internal interface and scaling adapter software (cf. p. 6)
  - Local 1-point calibration

- **Analog output** 4 .. 20 mA (2-wire)
- 2 limit signal outputs (optional)
  - Pre- and main alarm as floating contact
  - 2 LEDs displaying the alarm status

Bright 7-segment **display** (optional)
- Housing can be rotated by 350°

The long-term stable **testo humidity sensor** with protocolled precision calibration at residual humidity -40 °Ctpd

Ultra-easy **menu operation** (cf. p.6) via buttons
- Select the humidity variable
- Change the scaling
- Set alarms, incl. hysteresis
- Carry out local 1-point calibration
- Test analog signal and alarm outputs
- Call up historic min./max. values

The right **process connection**
- G $^1/_2$ or NPT $^1/_2$“
- Pressure-tight up to 50 bar
- With optional measurement chamber

Technical data testo 6740

Housing	
Material	Plastic, polyacrylamide
Dimensions	199.5x37x37 (with analog output plug) 203.5x37x37 (with limit signal output plug)
Ambient temperature	–20 ... 70 °C
Storage temperature	–40 ... 80 °C
Protection type	IP 65
Rotation of housing	By 350° (to align display)
Sensor and sensor protection	
Humidity sensor	testo humidity sensor with protocolled trace humidity adjustment at –40° Ctpd
Temperature sensor	NTC
Sensor guard	Sintered stainless steel cap
Meas. uncertainty	
Humidity	+/– 1 K at 0 °Ctpd +/– 3 K at –20 °Ctpd +/– 4 K at –40 °Ctpd
Temperature	+/– 0.5 K (0 ...50 °C)
Limit signal outputs (optional, 0554.3302)	
Contacts	2 floating NO contacts, max. 30 V/0.5 A
Operating points	Standard: 4 °/12 °CtP, with freely programmable display

Measuring range	
Pressure dewpoint temperature (trace humidity)	– 60 to +30 °Ctpd at pressure dewpoints < 0 °Ctpd display of frost point, at > 0 °Ctpd of dewpoint
Temperature	0 ... 50 °C
Atmospheric dewpoint (cf. diagram on p.7)	– 80 ... – 15 °Ctd (at 30 bar rel.) – 70 ... + 10 °Ctd (at 3 bar rel.) – 60 ... + 30 °Ctd (at 0 bar rel.)
Pressure resistance	testo 6740: Up to 50 bar absolute Measurement chamber 0554.3303: Up to 15 bar absolute
Analog output	
Signal	4 ... 20 mA, two–wire
Scaling	Freely scalable via display/buttons Standard: 4 ...20 mA = –60 ... +30 °Ctpd
Output variables	°Ctpd, °Ftpd, °CtA (atm. dewpoint), °FtA, %RH, ppm_v, mg/m^3, °C, °F
Resolution	12 Bit
Accuracy	+/– 40 µA
Supply	
Voltage 24 VDC (10 ... 30 VDC allowed);	with alarm plug (0554 3302) 20 to 28 VDC
Max. load	10 VDC: 100 Ohm, 30 VDC: 950 Ohm, cf. p.7
EMC	According to Directive 89/336 EEC

System components, ordering details

Customised combinations

Every measuring point can be optimally configured. With or without a display, with European G 1/2 thread or American NPT 1/2" thread. With or without limit signal output. Directly assembled, with measurement chamber or with cooling coil. All combinations are possible, ensuring your needs are met optimally.

The 4 types of the testo 6740 family

	without display	with display
G 1/2	0555.6741	0555.6743
NPT 1/2"	0555.6742	0555.6744

Standard: Analog output
4 ..20 mA (2-wire)

Optional (0554 3302):
2 limit signal outputs integrated
Analog output 4 ..20 mA (2-wire)
+ 2 limit signal outputs (floating)
+ 2 LEDs

Ordering data testo 6740	Order no.
Basic instrument (incl. plug for analog signal output)	
testo 6741, G 1/2 thread, without display	0555 6741
testo 6742, NPT 1/2" thread, without display	0555 6742
testo 6743, G 1/2 thread, with display	0555 6743
testo 6744, NPT 1/2" thread, with display	0555 6744
Accessories	
Cable connection plug for analog output 4 ... 20 mA, with	
2 floating switch contacts and 2 LEDs	0554 3302
Measurement chamber (for 6741, 6742), up to 15 bar	0554 3303
Cooling coil (up to 200 °C, use only with measurement chamber)	0554 3304
Scaling adapter for testo 6741 / 6742 incl. software	0554 3305
ISO calibration certificate, two calibration points (–10 °/–40 °Ctp at 6 bar)	0520 0136
ISO calibration certificate, pressure dewpoint (–40 °...0 °Ctpd at 6 bar)	
Basic costs	0520 0116
Per calibration point (please indicate)	0520 0116
External display testo 54–2AC, 2 limit signal outputs (up to 300 VAC, 3 A), supply 230 VAC	5400 7553
2 m teflon tube with compressed air connections	0669 2824/4
Power supply (bench unit) 90...264 VAC / 24 VDC (350 mA)	0554 1748
Power supply (DIN rail mounting) 90...264 VAC / 24 VDC (3 A)	0554 1749

Selection advice: choosing the right components for your application

A For process temperatures > 50 °C (up to 200 °C), use a cooling coil (0554.3304) & measurement chamber (0554.3303).

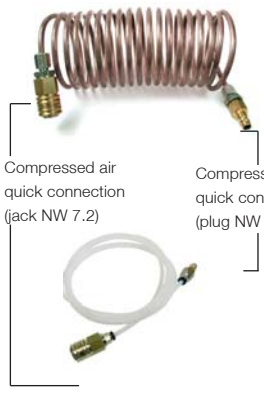
B Use a measurement chamber (0554.3303) for rapid assembly (no depressurising before installation) and better response time from the sensor (flow past sensor can be infinitely adjusted)

A B For dirty, oily media, connect a 40 µm filter upstream

C If neither A nor B is required: just screw directly into the G1/2 or NPT 1/2" thread. Depressurised tube required during installation.

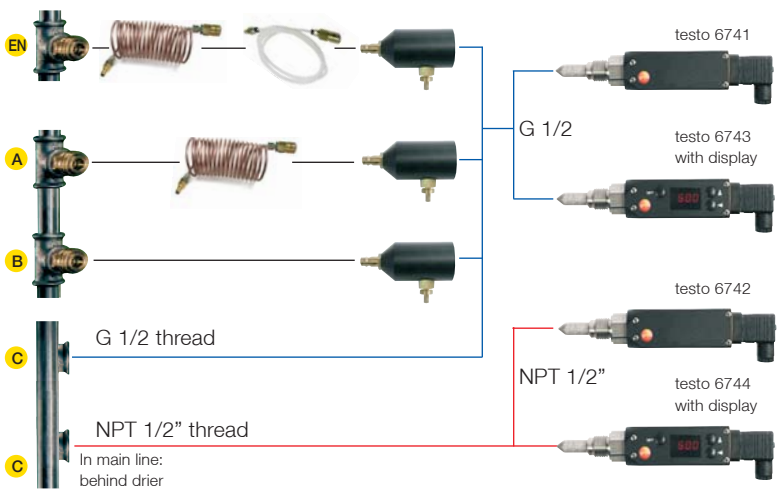
EN For atmospheric dry air (e.g. granulate driers), a teflon tube is used and the valve of the measuring chamber is opened fully. At process temperatures > 50 °C, connect a cooling coil upstream.

Measurement chamber (0554 3303) for optimal flows past the sensor (valve can be infinitely adjusted) and quick installation



Cooling coil (0554 3304) for process temperatures 50 ...200 °C (only with measurement chamber)

Teflon tube (0669 2824/4) for dry air



The ideal operating concept

Easy to operate with or without a display

Does the unit have to be changed from °Ctpd to ppm_V or do the operating points need to be corrected? These and many other settings can be easily configured via the display. Or - and this is particularly advantageous for OEM customers such as manufacturers of compressed air driers - these adjustments can be handled by a PC running the scaling adapter software 0554.3305, even without a display.

With display, testo 6743, testo 6744

Without display, testo 6741, testo 6742

The display and buttons enable ultra-easy menu operation with maximum convenience for the user

- Change units
- Change scaling
- Single-point calibration
- Reset

cf. below "The display menu"

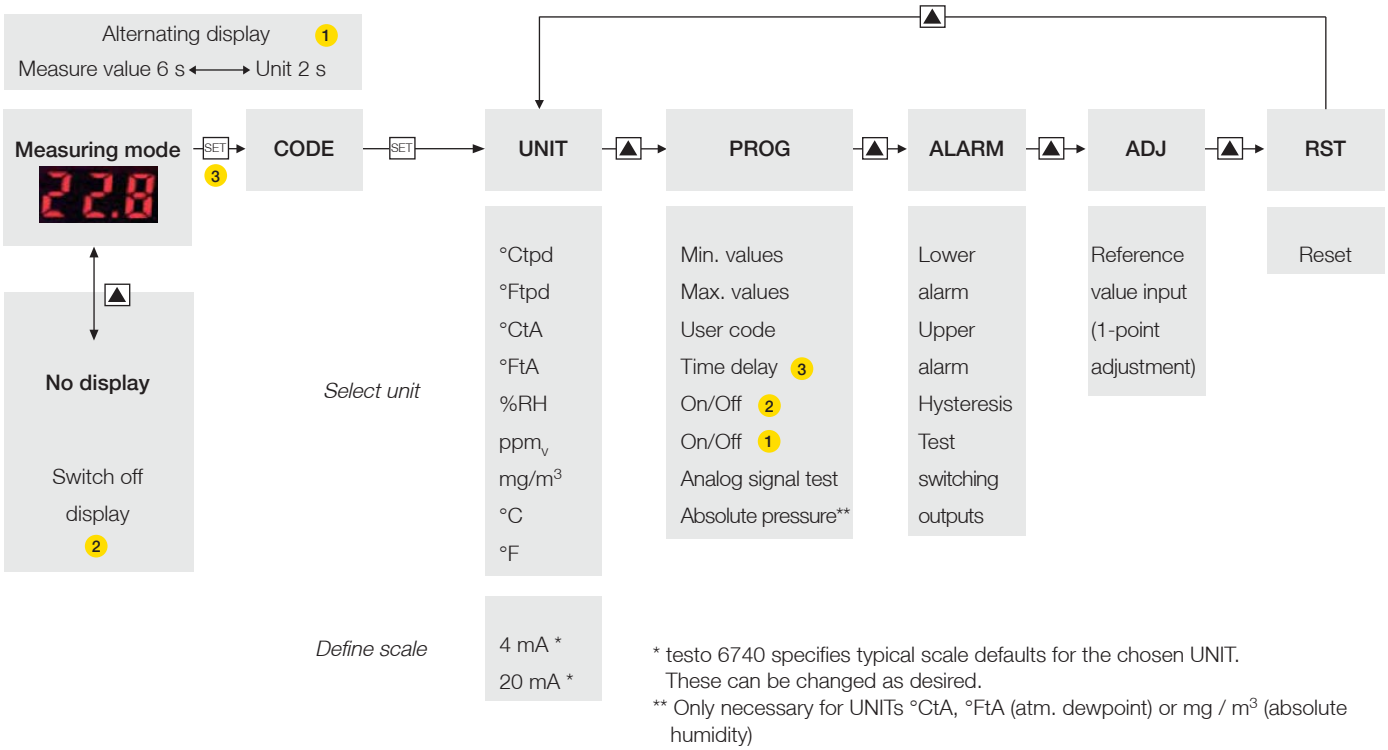
- Set absolute pressure
- Display min./max. value
- Test analog output
- Set/test limit signal output etc.

The scaling adapter software permits mobile access, perfect for OEM or service personnel

- Firmware version
- Digital values
- Keyboard test
- Further information

The display menu

Fully oriented to field requirements: Alternating display value and unit, option of switching off the display, password protection, unit selection, etc. Try it out! You will certainly appreciate the intuitive operation.



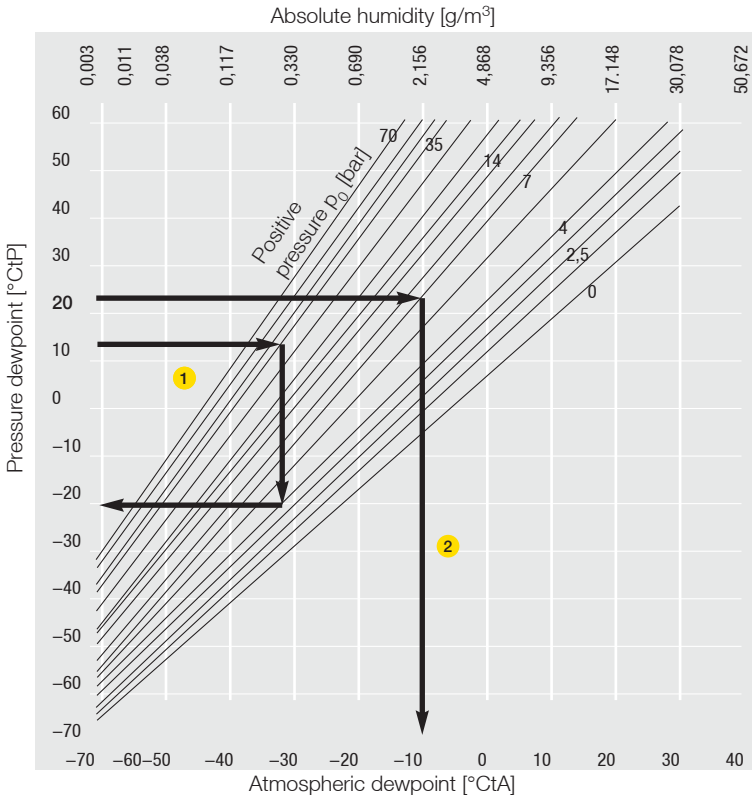
* testo 6740 specifies typical scale defaults for the chosen UNIT. These can be changed as desired.

** Only necessary for UNITs °CtA, °FtA (atm. dewpoint) or mg / m^3 (absolute humidity)

Pressure dewpoint or atmospheric dewpoint? - Wiring

Pressure dewpoint or atmospheric dewpoint?

Atmospheric air is able to store more water vapour than compressed air. If the compressed air is cooled down, it reaches its dew point ("pressure dewpoint" in °CtP or °FtP) at higher temperatures, while atmospheric air can be cooled down further until condensate is first produced ("atmospheric dewpoint" in °CtA or °FtA).
Only the pressure dewpoint is relevant to the monitoring of compressed air systems for trace humidity because this indicates how far away the "danger threshold" (= dewpoint) is. Since some users are accustomed to working with an atmospheric dewpoint, however, the testo 6740 allows the option of outputting both the pressure dewpoint and the atmospheric dewpoint (the absolute process pressure is input for the latter).

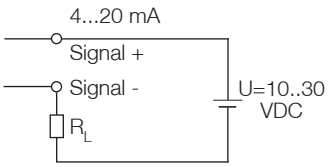


1 Pressure dewpoint (35 bar) is relieved to 4 bar. The pressure dewpoint thus falls from 10 °CtP to -23 °CtP

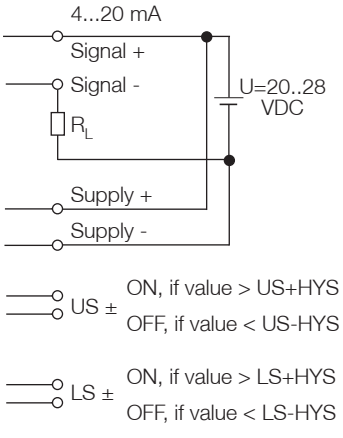
2 Compressed air (7 bar) has a pressure dewpoint of 20 °CtP. This corresponds to an atmospheric dewpoint of -8 °CtA.

The electrical wiring

Standard plug (4..20 mA, 2-wire)



With switch contact plug
Order no. (0554 3302)
(4..20 mA, 2-wire plus 2 floating switch contacts):
8-core cable



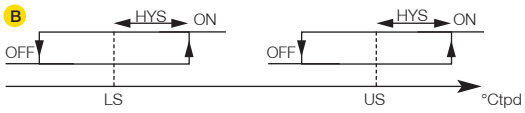
What is R_L?

The total resistance of the 2-wire connection, consisting of the line, and possibly an external display and control unit

R_L = Load impedance, external load

U	A	B
10 V	300 Ohm	-
24 V	650 Ohm	650 Ohm
30 V	950 Ohm	-

LS = Lower Switch US = Upper Switch



Subject to change without notice.

0981.2194/hd/AC/11.2003