The industrial humidity transmitter

testo 6681 + probe
series testo 661x

- Optimum adjustment concept thanks to adjustability of the entire signal chain incl. analog adjustment
- Ethernet, relay and analog outputs allow optimum integration into individual automation systems
- Self-monitoring and early warning guarantee high system availability
- Calculation and presentation of all relevant humidity parameters
- P2A software for parameterization, adjustment and analysis saves time and costs in commissioning and maintenance
- Display with multi-language display
- Robust, easy-to-clean metal housing

Industrial humidity measurement demands absolute professionalism. Not only in running the system, but also in the measuring technology used. The industrial humidity transmitter testo 6681, combined with the probe series testo 661x fulfils these high demands. The testo 6681 has a number of additional features, above and beyond the properties and benefits of a conventional transmitter, which will delight practitioners. This and other reasons make the testo 6681 the first choice in drying technology, trace humidity and compressed air process technology, as well as in demanding air conditioning technology, e.g. in cleanrooms.
# Technical data testo 6681

## Measurement parameters

### Humidity
- **Selectable units**: Dependent on probe, available are: relative humidity %RH; normed atm. dewpoint in °Ctd/°Ftd; dewpoint in °Ctd/°Ftd; absolute humidity in g/m³ (gr/ft³); degree of humidity in g/kg (gr/lb); enthalpy in kJ/kg (BTU/lb); psychrometer temperature in °Ctw/°Ftw; water vapour partial pressure in hPa/H2O; water content in ppmV; mixture dewpoint H2O2 in °Ctm/°Ftm; %RH acc. to WMO; temperature in °C/F

<table>
<thead>
<tr>
<th>Measuring range</th>
<th>0 to 100 %RH</th>
</tr>
</thead>
</table>

### Trace humidity
- **Selectable units**: Dewpoint in °Ctd/°Ftd
- **Measuring range**: -60 to +30 °Ctd / -76 to +86 °Ftd (only with testo 6610 L15)

### Temperature
- **Selectable units**: Temperature in °C/F
- **Measuring range**: Dependent on probe (testo 661x)

## General technical data

### Design
- **Material**: Metal
- **Dimensions**: 122 x 162 x 77 mm (without probe)
- **Weight**: 1.960 kg (without probe, without Ethernet module)

### Display
- **Display**: Optional: 2-line LCD with clear text line and relay status display
- **Resolution**: 0.1 %RH / °Ctd / °Ftd / °Ctw / °Ftw or 0.01 °C/F 1 g / kg / g/m³ / ppm

### Operation
- **Parameterization**: 4 operating buttons for display / P2A software

### Installation
- **Probe connection**: Digital probe connection

### Miscellaneous
- **Protection class**: IP65
- **EMC**: 2004/108/EG

## Inputs and outputs

### Analog outputs
- **Quantity**: 2 channels (analogue signal type uniform for both channels, decided when ordering), additional 3rd channel (optional)
- **Output type**: 0/4 to 20 mA (2-wire/4-wire), 0 to 1/5/10 V (4-wire)
- **Measurement rate**: 1/s
- **Galvanic isolation**: Galvanic isolation of the output signals (2-wire and 4-wire), isolation of supply from outputs (4-wire)
- **Resolution**: 12 bit
- **Accuracy of the analog outputs**: 0/4 to 20 mA ± 0.03 mA, 0 to 1 V ±1.5 mV, 0 to 5 V ±7.5 mV, 0 to 10 V ±15 mV
- **Max. load**: 2-wire: 12 VDC: max. 100 Ω / 24 VDC: max. 500 Ω / 30 VDC: max. 625 Ω; 4-wire: 500 Ω

### Further outputs
- **Ethernet**: Optional: module can be fitted as intermediary layer
- **Relays**: Optional: 4 relays (free allocation to measurement channels or as collective alarm with operating menu/PsA software), up to 250 V AC/DC / 3 A (NO/NC)
- **Other outputs**: Mini DIN for Testo P2A software

### Supply
- **Voltage supply**: 2-wire: 24 VDC ±10 %, 4-wire: 20 to 30 VAC/DC
- **Current consumption**: max. 300 mA

## Operating conditions

### Operating temperature (with integrated relay)
- Without display: -40 to +60 °C
- With display: -40 to +70 °C / -40 to +158 °F

### Storage temperature
- Without display: -40 to +80 °C / -40 to +176 °F
- With display: 0 to +50 °C / +32 to +122 °F

### Measurement medium
- Air, nitrogen

## Measurement parameters

### Inputs and outputs

#### Analog outputs
- **Quantity**: 2 channels (analogue signal type uniform for both channels, decided when ordering), additional 3rd channel (optional)
- **Output type**: 0/4 to 20 mA (2-wire/4-wire), 0 to 1/5/10 V (4-wire)
- **Measurement rate**: 1/s
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- **Resolution**: 12 bit
- **Accuracy of the analog outputs**: 0/4 to 20 mA ± 0.03 mA, 0 to 1 V ±1.5 mV, 0 to 5 V ±7.5 mV, 0 to 10 V ±15 mV
- **Max. load**: 2-wire: 12 VDC: max. 100 Ω / 24 VDC: max. 500 Ω / 30 VDC: max. 625 Ω; 4-wire: 500 Ω

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- **Ethernet**: Optional: module can be fitted as intermediary layer
- **Relays**: Optional: 4 relays (free allocation to measurement channels or as collective alarm with operating menu/PsA software), up to 250 V AC/DC / 3 A (NO/NC)
- **Other outputs**: Mini DIN for Testo P2A software

### Supply
- **Voltage supply**: 2-wire: 24 VDC ±10 %, 4-wire: 20 to 30 VAC/DC
- **Current consumption**: max. 300 mA

## General technical data

### Design
- **Material**: Metal
- **Dimensions**: 122 x 162 x 77 mm (without probe)
- **Weight**: 1.960 kg (without probe, without Ethernet module)

### Display
- **Display**: Optional: 2-line LCD with clear text line and relay status display
- **Resolution**: 0.1 %RH / °Ctd / °Ftd / °Ctw / °Ftw or 0.01 °C/F 1 g / kg / g/m³ / ppm

### Operation
- **Parameterization**: 4 operating buttons for display / P2A software

### Installation
- **Probe connection**: Digital probe connection

### Miscellaneous
- **Protection class**: IP65
- **EMC**: 2004/108/EG

## Operating conditions

### Operating temperature (with integrated relay)
- Without display: -40 to +60 °C
- With display: -40 to +70 °C / -40 to +158 °F

### Storage temperature
- Without display: -40 to +80 °C / -40 to +176 °F
- With display: 0 to +50 °C / +32 to +122 °F

### Measurement medium
- Air, nitrogen
# Technical data probe range testo 6610

<table>
<thead>
<tr>
<th>Type</th>
<th>testo 6611</th>
<th>testo 6612</th>
<th>testo 6613</th>
<th>testo 6614</th>
<th>testo 6615</th>
<th>testo 6617</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating range</td>
<td>Room climate probe wall mounting</td>
<td>Process humidity probe duct mounting</td>
<td>Process humidity probe flexible with cable</td>
<td>Humidity probe for high humidity applications / when risk of condensation</td>
<td>Humidity probe for trace humidity / dewpoint (with self-adjustment)</td>
<td>Humidity probe with self-monitoring for sensor-damaging media</td>
</tr>
</tbody>
</table>

## Measurement parameters

### Humidity

<table>
<thead>
<tr>
<th>Measuring range***</th>
<th>0 to 100 %RH</th>
<th>see trace humidity</th>
<th>0 to 100 %RH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement uncertainty* (+25 °C)**</td>
<td>testo 6611/12/13: $a(1.0 + 0.007 \times mv)$ %RH for 0 to 100 %RH / $a(1.4 + 0.007 \times mv)$ %RH for 90 to 100 %RH; testo 6614: $a(1.0 + 0.007 \times mv)$ %RH for 0 to 100 %RH; testo 6617: $a(1.2 + 0.007 \times mv)$ %RH for 0 to 90 %RH / $a(1.6 + 0.007 \times mv)$ %RH for 90 to 100 %RH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selectable units</td>
<td>%RH; °C/°F; g/m² / gr/ft²; g/kg / gr/lb; BTU/lb; °Ctw/°Ftw; hPa; inch H₂O₂; ppm vol %; %vol; °Ctm (H₂O₂)/ °Ftm (H₂O₂)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repeatability</td>
<td>better than ±0.2 %RH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensor</td>
<td>Testo capacitive humidity sensor, plug-in</td>
<td>Testo capacitive humidity sensor; soldered</td>
<td></td>
</tr>
<tr>
<td>Response time</td>
<td>590 max. 10 sec.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Temperature

<table>
<thead>
<tr>
<th>Measuring range</th>
<th>°C/°F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selectable units</td>
<td>°C/F</td>
</tr>
<tr>
<td>Measuring range</td>
<td>-20 to +70 °C/ -4 to +158 °F</td>
</tr>
<tr>
<td>Measurement uncertainty* (at +25 °C / +77 °F)</td>
<td>±0.15 °C / 0.27 °F (Pt1000 Class AA)</td>
</tr>
</tbody>
</table>

### Trace humidity

| Trace humidity | -60 to +30 °Ctd / -76 to +86 °Ftd |
| Measurement uncertainty | ±1 K at 0°Cj, ±2 K at -20°Cj, ±4 K at -50°Cj |

## General technical data

### Probes

| Probe shaft | Stainless steel |
| Cable | FEP coated |
| Plug | Plastic ABS |
| Probe dimensions (diameter) | 12 mm |
| Probe dimensions (probe shaft length) | 70/200 mm, 200/300/500/800 mm, 120/200/300/500/800 mm, 200/500 mm |
| Cable length | — specially for duct versions | — |
| — | 1/2/5/10 m |

## Operating conditions

<table>
<thead>
<tr>
<th>Pressure tightness</th>
<th>1 bar positive pressure (probe tip)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probe tip</td>
<td>PN 10 (probe tip)</td>
</tr>
</tbody>
</table>

* Other accuracies apply for wall probe length 70 mm combined with a current output (P07): Operation: 2 channels at 12 mA, without display illumination, relay off, additional measurement error to above values at +25 °C (+77 °F), humidity ± 2.5 % RH

**The determination of measurement uncertainty takes place according to GUM (Guide to the Expression of Uncertainty in Measurement)**

For the determination of measurement uncertainty, the accuracy of the measuring instrument (hysteresis, linearity, reproducibility), the uncertainty contribution of the test site as well as the uncertainty of the adjustment site (works calibration) are taken into account. For this purpose, the value of k=2 of the extension factor, which is usual in measurement technology is used as a basis, which corresponds to a trust level of 95%.

***For continuous applications in high humidity (>80 %RH at ≤30 °C for >12 h, >60 %RH at >30 °C for >12h), please contact us via www.testo.com. testo 6614 is suitable for high humidity applications.
Technical drawings

Transmitter testo 6681
Cable probe testo 6615/6617
Transmitter testo 6681
Cable probe testo 6614
Transmitter testo 6681
Wall probe testo 6611
Transmitter testo 6681
Duct probe testo 6612
Transmitter testo 6681
Cable probe testo 6613

L = Probe length
L–A = Probe length – length protective cal
A = 35 mm
Connection plan

Connection plan 2-wire technology
(4 to 20 mA)

Connection plan 4-wire technology
(0 to 20 mA / 4 to 20 mA / 0 to 1 V / 0 to 5 V / 0 to 10 V)
## Options / Ordering example

The following options can be specified for the testo 6681:

<table>
<thead>
<tr>
<th>Bxx</th>
<th>Analog output / supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cxx</td>
<td>Display / menu language</td>
</tr>
<tr>
<td>Dxx</td>
<td>Cable entry</td>
</tr>
<tr>
<td>Exx</td>
<td>Ethernet</td>
</tr>
<tr>
<td>Fxx</td>
<td>Humidity / temperature unit</td>
</tr>
<tr>
<td>Gxx</td>
<td>Humidity / temperature unit</td>
</tr>
<tr>
<td>Hxx</td>
<td>Relay</td>
</tr>
<tr>
<td>Ixx</td>
<td>Humidity / temperature unit (optional)</td>
</tr>
</tbody>
</table>

### Analog output / supply
- **B01**: 4 to 20 mA (2-wire, 24 VDC), not possible with relay, Ethernet module or probe testo 6614/6615
- **B02**: 0 to 1 V (4-wire, 24 VAC/DC)
- **B03**: 0 to 5 V (4-wire, 24 VAC/DC)
- **B04**: 0 to 10 V (4-wire, 24 VAC/DC)
- **B05**: 0 to 20 mA (4-wire, 24 VAC/DC)
- **B06**: 4 to 20 mA (4-wire, 24 VAC/DC)

### Display / menu language
- **C00**: without display / without operating menu
- **C02–C08**: Clear text language. Operating menu only available with display.

### Cable entry
- **D01**: Cable entry M16 (relay: M20)
- **D02**: Cable entry NPT ½''
- **D03**: Cable contact via M plug connection for signal and supply (for optional relay: M20 cable entry)

### Ethernet
- **E00**: Without Ethernet module
- **E01**: With Ethernet module

### Humidity / temperature unit
- **F01**: %RH / min / max
- **F02**: °C / min / max
- **F03**: °F / min / max
- **F04**: °Ctd / min / max
- **F05**: °Ftd / min / max
- **F06**: g/kg / min / max
- **F07**: gr/lb / min / max
- **F08**: g/m³ / min / max
- **F09**: gr/ft³ / min / max
- **F10**: ppmV / min / max
- **F11**: °Cwb / min / max
- **F12**: °Fwb / min / max
- **F13**: kJ/kg / min / max
- **F14**: hPa / max
- **F15**: inch H₂O / min / max
- **F16**: °Ctm / mixture dewpoint for H₂O
- **F17**: °Ftm / mixture dewpoint for H₂O
- **F18**: %Vol.

### Relay (not with B01)
- **H00**: Without relay
- **H01**: 4 relay outputs, limit value monitoring
- **H02**: 4 relay outputs, limit values Channel 1 + collective alarm

### Humidity / temperature unit (optional)
- **I00**: no optional 3rd analog output
- **I01**: %RH / min / max
- **I02**: °C / min / max
- **I03**: °F / min / max
- **I04**: °Ctd / min / max
- **I05**: °Ftd / min / max
- **I06**: g/kg / min / max
- **I07**: gr/lb / min / max
- **I08**: g/m³ / min / max
- **I09**: gr/ft³ / min / max
- **I10**: ppmV / min / max
- **I11**: °Cwb / min / max
- **I12**: °Fwb / min / max
- **I13**: kJ/kg / min / max
- **I14**: hPa / min / max
- **I15**: inch H₂O / min / max
- **I16**: °Ctm / mixture dewpoint for H₂O
- **I17**: °Ftm / mixture dewpoint for H₂O
- **I18**: %Vol.

### Ordering example

Order code for transmitter testo 6681 with the following options:
- Housing with display with menu setting English
- 4 to 20 mA (4-wire)
- Cable entry M16/M20
- Ethernet module
- Factory configuration Channel 1: °Ctd with scaling min 0 °Ctd, max 100 °Ctd
- Factory configuration Channel 2: °C with scaling min -10 °C/-14 °F
- with relay
- without 3rd channel

```
0555 6681 A01 B06 C02 D01 E01 F03 0 100 G02 -10 +70 H01 I00
```
Options / Ordering example

The following options can be specified for the probe testo 661x:

<table>
<thead>
<tr>
<th>Lxx</th>
<th>Probe version</th>
</tr>
</thead>
<tbody>
<tr>
<td>L11</td>
<td>Probe 6611 (wall version)</td>
</tr>
<tr>
<td>L12</td>
<td>Probe 6612 (duct version up to 150 °C)</td>
</tr>
<tr>
<td>L13</td>
<td>Probe 6613 (duct version up to 180 °C)</td>
</tr>
<tr>
<td>L14</td>
<td>Probe 6614 (heated cable version)</td>
</tr>
<tr>
<td>L15</td>
<td>Probe 6615 (trace humidity cable version)</td>
</tr>
<tr>
<td>L17</td>
<td>Probe 6617 (self-monitored cable version)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mxx</th>
<th>Protective cap</th>
</tr>
</thead>
<tbody>
<tr>
<td>M01</td>
<td>Stainless steel protective cap</td>
</tr>
<tr>
<td>M02</td>
<td>Wire mesh protective filter</td>
</tr>
<tr>
<td>M03</td>
<td>PTFE protective cap</td>
</tr>
<tr>
<td>M04</td>
<td>Metal protective cap, open</td>
</tr>
<tr>
<td>M06</td>
<td>PTFE protective cap with condensate drip hole</td>
</tr>
<tr>
<td>M07</td>
<td>PTFE protective cap with condensation protection and condensate drip hole</td>
</tr>
<tr>
<td>M08</td>
<td>Protective cap for H2O2 atmospheres</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nxx</th>
<th>Cable length / length mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>N00</td>
<td>Without cable (only L11)</td>
</tr>
<tr>
<td>N01</td>
<td>Cable length 1 m (not for L11, L12)</td>
</tr>
<tr>
<td>N02</td>
<td>Cable length 2 m (not for L11, L12)</td>
</tr>
<tr>
<td>N05</td>
<td>Cable length 5 m (not for L11, L12)</td>
</tr>
<tr>
<td>N10</td>
<td>Cable length 10 m (not for L11, L12)</td>
</tr>
<tr>
<td>N23</td>
<td>Cable length 0.6 m, specially for duct versions (only L12)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pxx</th>
<th>Probe length / length mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>P07</td>
<td>Probe length 70 mm (only L11)</td>
</tr>
<tr>
<td>P12</td>
<td>Probe length 120 mm (only L13)</td>
</tr>
<tr>
<td>P20</td>
<td>Probe length 200 mm</td>
</tr>
<tr>
<td>P30</td>
<td>Probe length 300 mm (only L12, L13, L14)</td>
</tr>
<tr>
<td>P50</td>
<td>Probe length 500 mm (not with L11)</td>
</tr>
<tr>
<td>P80</td>
<td>Probe length 800 mm (only L12, L13)</td>
</tr>
</tbody>
</table>

Ordering example

Order code for probe testo 6613 with the following options:
- Cable probe, -40 to +180 °C
- Sintered stainless steel filter
- Cable length 2 m
- Probe length 300 mm

0555 6610 L13 M01 N02 P30