

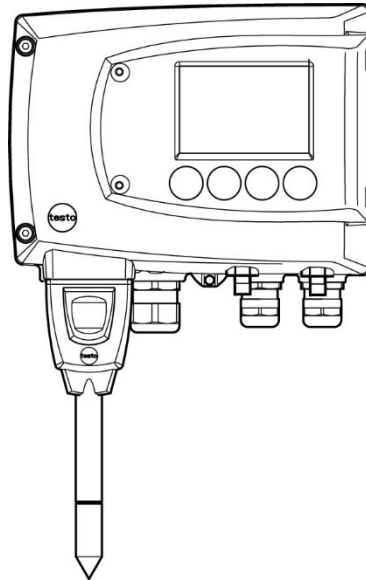


testo 6381 · differential pressure transmitter

testo 6610 · Probes

P2A software · Parameterizing, adjusting and analyzing software

Instruction manual Volume 1



1 Safety and the environment

Avoiding electrical hazards

- > Never use the instrument and connected probes to measure on or near live parts!
- > Damaged mains cables must only be replaced by authorized personnel.
- > Only have the transmitter wired and connected by authorized personnel with the voltage disconnected.
- > You must always comply with the regulations applicable in your country for opening and repairing electrical equipment.

Avoiding personal injury and damage to equipment

- > Installation, setting and calibration work must only be carried out by qualified and authorized personnel!
- > Only open the instrument when this is expressly described in the instruction manual for installation, maintenance or repair purposes.
- > Observe the permissible storage, transport and operating temperature.
- > Do not store the product together with solvents. Do not use any desiccants.
- > Do not use the instrument for control purposes at the same time as operating or servicing the transmitter.
- > Only operate the product properly, for its intended purpose and within the parameters specified in the technical data. Do not use any force.
- > Carry out only the maintenance and repair work on this instrument that is described in the documentation. Follow the prescribed steps exactly. Use only original spare parts from Testo.

Any additional work must only be carried out by authorized personnel. Otherwise testo will not accept any responsibility for the proper functioning of the instrument after repair and for the validity of certifications.



Protecting the environment

- > At the end of its useful life, send the product to the separate collection for electric and electronic devices (observe local regulations) or return the product to Testo for disposal.


2 About this document

Use

- > Please read this documentation through carefully and familiarize yourself with the product before putting it to use. Pay particular attention to the safety instructions and warning advice in order to prevent injuries and damage to the products.
- > Keep this document to hand so that you can refer to it when necessary.
- > Hand this documentation on to any subsequent users of the product.

 WARNING	Indicates potential serious injuries
 CAUTION	indicates potential minor injuries

Symbols and writing standards

Representation	Explanation
	Note: Basic or further information.
1. ...	Action: more steps, the sequence must be followed.
2. ...	
> ...	Action: a step or an optional step.
- ...	Result of an action.
Menu	Elements of the program interface.
[OK]	Buttons of the program interface.
... ...	Functions/paths within a menu.
"..."	Example entries

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4 Transmitter

4.1. Specifications

4.1.1. Functions and use

The testo 6381 transmitter is used together with the plug-in, adjusted probes from the testo 6610 family.

Please refer to volume 2, 6. testo 6610 probes for information about commissioning, operating and maintaining the testo 6610 probe.

The testo 6381 transmitter is suitable for the following applications, amongst others:

- Clean rooms
- Test benches
- Drying processes
- Filling processes
- Painting systems
- Monitoring flow velocities or volumetric flow rates in air conditioning systems

4.1.2. Scope of delivery

The scope of delivery of the testo 6381 transmitter includes the following:

- Key cover
- Rear panel bracket
- Instruction manual
- Calibration report

4.1.3. Accessories

The following accessories are available for the testo 6381 transmitter, amongst others:

- Protection caps for probes
- Mains unit
- P2A software (parameterizing, adjusting and analyzing software)
- Assembly accessories



Information about accessories and their order numbers can be found in volume 2, 8.2 **Accessories and spare parts** or on the website at www.testo.com.

4.1.4. Technical data

Parameters

- Differential pressure
- Temperature
- Humidity

Differential pressure accuracy

i The specifications are only valid if the positive pressure is applied at the positive pressure connection.

- 0.5 % of measuring range, additional 0.3 Pa intrinsic error ¹
- $T_{K \text{ slope drift}} = 0.02\%$ of measuring range per degree Kelvin of deviation from nominal temperature 22 °C
- $T_{K \text{ zeroing drift}} = 0\%$, as zeroing with solenoid valve²

Humidity and temperature accuracy

- Depends on probe

Humidity and temperature measuring range

- Depends on probe

Pressure measuring range, resolution and overload of differential pressure

Pressure measuring range depending on version ordered	Resolution	Overload
0 to 50 Pa	0.1 Pa	20,000 Pa
0 to 50 Pa	0.1 Pa	20,000 Pa
0 to 100 Pa	0.1 Pa	20,000 Pa

¹ Measuring uncertainty in accordance with GUM: $\pm 0.8\%$ of measuring range final value ± 0.3 Pa.

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%.

² Minor mixtures of the media may occur at the positive and negative pressure side due to the automatic zeroing cycle.

Pressure measuring range depending on version ordered	Resolution	Overload
0 to 500 Pa	0.1 Pa	20,000 Pa
0 to 10 hPa	0.01 hPa	200 hPa
0 to 50 hPa	0.01 hPa	750 hPa
0 to 100 hPa	0.1 hPa	750 hPa
0 to 500 hPa	0.1 hPa	2500 hPa
0 to 1000 hPa	1 hPa	2500 hPa
-10 to 10 Pa	0.1 Pa	20,000 Pa
-50 to 50 Pa	0.1 Pa	20,000 Pa
-100 to 100 Pa	0.1 Pa	20,000 Pa
-500 to 500 Pa	0.1 Pa	20,000 Pa
-10 to 10 hPa	0.01 hPa	200 hPa
-50 to 50 hPa	0.01 hPa	750 hPa
-100 to 100 hPa	0.1 hPa	750 hPa
-500 to 500 hPa	0.1 hPa	2500 hPa
-1000 to 1000 hPa	1 hPa	2500 hPa



Upon delivery and following a factory reset the readings are shown in the display in the unit that was ordered via the KMAT option Fxx, see 8.2.1. Ordering options for 6381 transmitter (0555 6381).

Humidity and temperature resolution

- 0.1 % RH or 0.01 °C/0.01 °F

Meas. cycle

- 1/sec

Interface

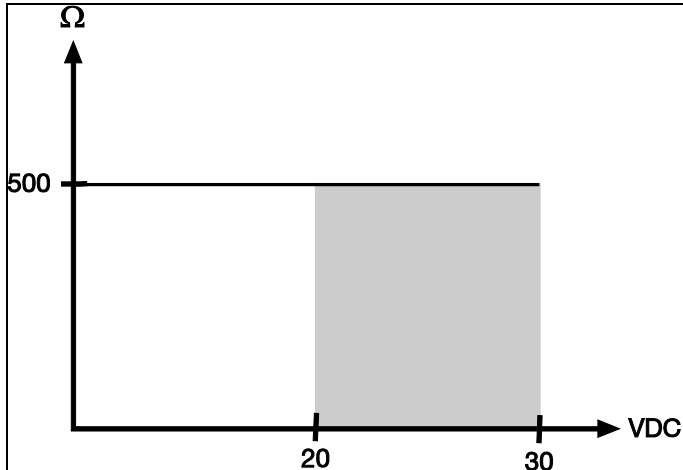
- Mini-DIN for P2A software (parameterizing and adjusting software) and handheld testo 400/650
- optional: Ethernet module

Voltage supply

- 4-wire (separate signal and supply lines): 20 to 30 V AC/DC, 300 mA power consumption

Maximum load

- 4-wire: 500 Ω (power output)



Maximal load

- 4-wire: 10 k Ω (voltage output)

Analog output

- 0 to 1 V \pm 1.5 mV (4-wire) or
- 0 to 5 V \pm 7.5 mV (4-wire) or
- 0 to 10 V \pm 15 mV (4-wire) or
- 0 to 20 mA \pm 0.03 mA (4-wire) or
- 4 to 20 mA \pm 0.03 mA (4-wire)

Resolution of analog output

- 12 bit

Relay

- 4 relays, 250 V AC/DC, 3 A (optional)

Display

- 2-line LCD with plain text line (optional)

Operating temperature

- -5 to 50 $^{\circ}$ C/23 to 122 $^{\circ}$ F

Storage temperature

- -20 to 60 $^{\circ}$ C/-4 to +140 $^{\circ}$ F

Process temperature

- -20 to 65 °C/-4 to 149 °F

Oper. humidity

- 0 to 90 % RH

Housing, weight

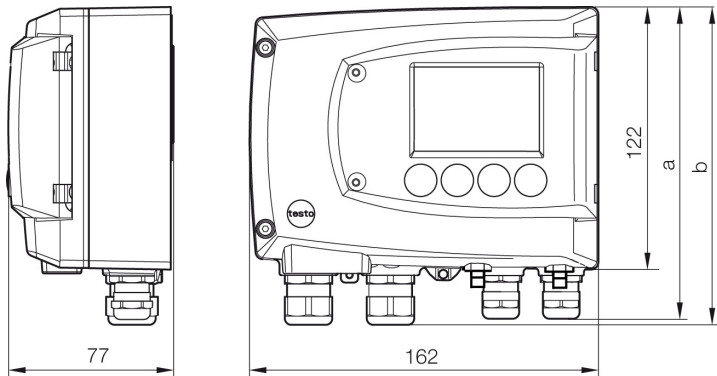
- Metal, 1.960 kg
- Optional Ethernet module: 0.610 kg

Protection class

- IP 65 only if the transmitter is wired and/or sealing plugs are inserted

Directives, standards and tests

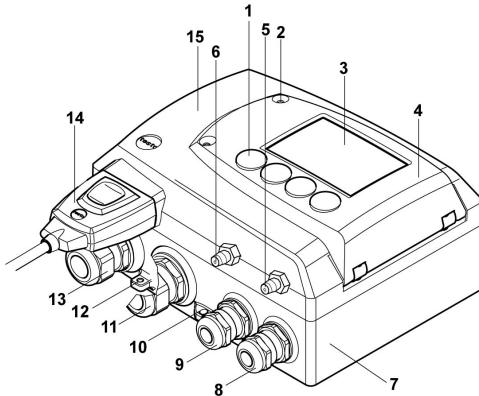
- EC Directive: 2014/30/EU

4.1.5. Dimensions

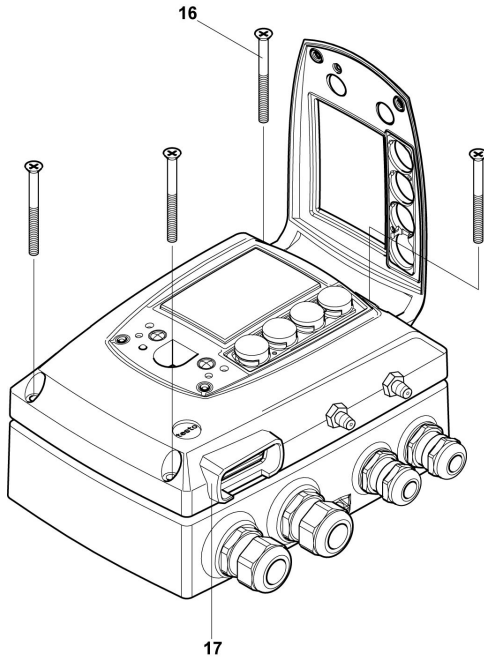
Dimensions in mm	a	b
with M20 cable couplings	144	147
With NPT cable coupling	144	144
With M plug-in connection	143	

4.2. Product description

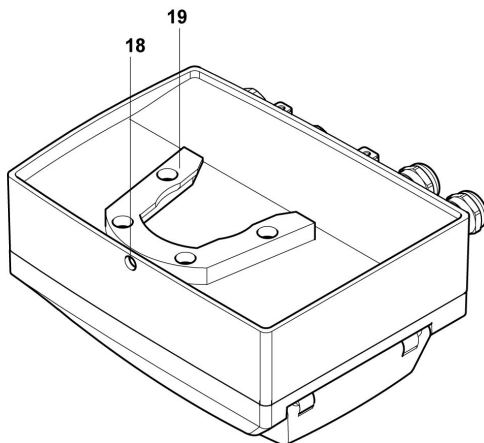
4.2.1. At a glance



- 1 Keys (only with optional display)
 - 2 Service flap screw connection (self-locking, 2 pcs.)
 - 3 Display (optional)
 - 4 Service flap
 - 5 Negative pressure connection
 - 6 Positive pressure connection, marked with a red washer
 - 7 Lower part of housing
 - 8 M 16 x 1.5 screw connection*, e.g. analog outputs
 - 9 M 16 x 1.5 screw connection*, e.g. voltage supply
 - 10 Earthing/PE connection
 - 11 M 20 x 1.5 screw connection*, e.g. R3 and R4 relays
 - 12 Eyelet for measuring point panel
 - 13 M 20 x 1.5 screw connection*, e.g. R1 and R2 relays
 - 14 Probe connector (testo 6610)
 - 15 Upper part of housing
- * Alternatively, NPT cable couplings or M plug-in connections are available



- 16 Housing screws
- 17 Socket for probe connector
- 18 Hole for fastening to rear panel bracket (M3 x 6 screw)



- 19 Plastic bracket for assembly on rear panel

4.2.2. Usable probes

The testo 6381 transmitter can be used with the following probes:

Probes	Article no.	Characteristic
testo 6611	0555 6610-L11	Wall probe version; accuracy to ± 1 % RH; temperature range -20 to +70 °C/-4 to +158 °F, sensor plugged in
testo 6612	0555 6610-L12	Duct probe version; accuracy to ± 1 % RH; temperature range -70 to +150 °C/-94 to +356 °F, sensor soldered
testo 6613	0555 6610-L13	Cable probe version; accuracy to ± 1 % RH; temperature range -70 to +180 °C/-94 to +356 °F, sensor soldered
testo 6614	0555 6610-L14	Heated cable probe version; accuracy to ± 1.0 % RH; temperature range -40 to +180 °C/-40 to +356 °F, sensor soldered
testo 6615	0555 6610-L15	Trace humidity cable probe version; accuracy ± 1 K at 0 °Ctd/+32 °Ftd; temperature range -40 to 120 °C/-40 to +248 °F, sensor soldered
testo 6617	0555 6610-L17	Cable with cover electrode monitoring probe version; accuracy to ± 1.2 % RH; temperature range -40 to 180 °C/-40 to +356 °F, sensor soldered

4.2.3. Display and keypad

The display option allows operation of the testo 6381 transmitter via the display and four keys.

The LCD display consists of two 7-segment lines for displaying readings and units and of an information line (for status messages, for example).

The brightness and contrast of the display and the background lighting (permanent or off) can be changed via the user menu or the P2A software.

4.2.4. Service interface

The parameterizing socket (mini-DIN) is located behind the service flap as an interface to the P2A software or Testo handheld instrument (testo 400/testo 650).

4.2.5. Relay board (option)

This has a floating switch capacity of 250 V AC/3 A. The switching limits and hysteresis as well as the function as relay for the collective alarm can be set via the display or the P2A software.

Further features include:

- Function of changeover contacts (NC/NO contacts) freely selectable
- 12 terminals for a total of 4 relays.



If no relays are available, settings for monitoring limit values or alarms can still be controlled via the display. The alarm status will be shown on the display.



Only have the transmitter wired and connected by authorized personnel with the voltage disconnected.

4.2.6. Analog outputs

As analog outputs, the testo 6381 has either

- 1 or optionally 3 current outputs of 0 to 20 mA (4-wire)⁴ to 20 mA (4-wire) or
- 1 or optionally 3 voltage outputs of 0 to 1 V/0 to 5 V/0 to 10 V (4-wire).

The transmitter can be ordered with three analog outputs as an option.

The optional three channels are galvanically isolated.

4.2.7. Parameters

The following parameters are displayed

- Differential pressure in Pa, hPa, kPa, mbar, bar, mmH₂O, kg/cm², PSI, inch HG, inch H₂O
- Volumetric flow rate³ in m³/h, l/min, Nm³/h, NI/min
- Flow⁴ in m/s, ft/min
- Relative humidity in % RH (technical)
- Relative humidity in % WMO* (calculation according to the WMO standard)
- Degree of humidity in g/kg and gr/lb

³ Calculated

⁴ To prevent fluctuating flow rate values at the zero point (depressurized), the flow rate values are only calculated as of differential pressures > 0.2 Pa or > 0.1 % of the respective measuring range (whichever is the greater). With smaller differential pressures, the flow rate value remains at 0.00 m/s.

- Absolute humidity in g/m^3 and gr/ft^3
- Water content in ppm (vol) and % vol
- Psychrometer temperature in $^{\circ}\text{C}_{\text{tw}}$ and $^{\circ}\text{F}_{\text{tw}}$
- Enthalpy in kJ/kg and BTU/lb
- Water vapour partial pressure in hPa and H_2O
- Dewpoint temperature in $^{\circ}\text{C}_{\text{td}}$ and $^{\circ}\text{F}_{\text{td}}$
- Standardized dewpoint in $^{\circ}\text{C}_{\text{tdA}}$, standardized at atmospheric pressure (1013 hPa); precondition: Absolute process pressure.
- * It is possible that condensation appears as of a displayed humidity starting from 70 % and is shown on the display. This unit is used in meteorology, amongst others. When calculating the relative humidity the Magnus coefficient with undercooled water is used in accordance with WMO.

i Calculated humidity variables correspond to the medium of air. With other gases/gas compositions, deviations may occur, e.g. with the enthalpy.

- Dewpoint of H_2O_2 mixture in $^{\circ}\text{C}_{\text{tm}}$ and $^{\circ}\text{F}_{\text{tm}}$
- Mixture humidity H_2O_2 in $\% \text{RH}_{\text{m}}$
- Temperature $^{\circ}\text{C}$ and $^{\circ}\text{F}$

4.2.8. Scaling

There are three types of min./max. values:

- 1 The measuring range: The maximum sensor performance is in this range. Values outside of the measuring range are displayed via messages, for example. Measuring range, see table (below).
- 2 Standard scaling: The output signals are assigned to this measuring range as standard:
 - during delivery if no entries are made in the order code
 - after exchanging the unit, the measuring range recorded in the instrument is applied as standard.

i The transmitter even retains its scaling with the voltage disconnected.

Measuring range, see table (below).

- 3 The maximum settings for the manual scaling
 - The maximum limits can be calculated as follows:
X = difference between MIN. and MAX. value of the standard scaling
(Max. value of standard) + (50 % of X)
(Min. value of standard) - (50 % of X)

- It is thus possible to scale beyond the measuring range, e.g. for the adjustment of the scaling limits to standard values of a PLC.

With the alarm definition, however, the physical measuring range limits are decisive.

Measuring range/standard scaling	Maximum scaling
0 to 50 Pa	-5 to 15 Pa
0 to 50 Pa	-25 to 75 Pa
0 to 100 Pa	-50 to 150 Pa
0 to 500 Pa	-250 to 750 Pa
0 to 10 hPa	-5 to 15 hPa
0 to 50 hPa	-25 to 75 hPa
0 to 100 hPa	-50 to 150 hPa
0 to 500 hPa	-250 to 750 hPa
0 to 1000 hPa	500 to 1500 hPa
-10 to 10 Pa	-20 to 20 Pa
-50 to 50 Pa	-100 to 100 Pa
-100 to 100 Pa	-200 to 200 Pa
-500 to 500 Pa	-1000 to 1000 Pa
-10 to 10 hPa	-20 to 20 hPa
-50 to 50 hPa	-100 to 100 hPa
-100 to 100 hPa	-200 to 200 hPa
-500 to 500 hPa	-1000 to 1000 hPa
-1000 to 1000 hPa	-2000 to 2000 hPa

Parameter	Unit	Probes	Physical measuring range at 1013 hPa		Standard scaling of transmitter measuring range	
			MIN	MAX	MIN	MAX
Temperature	°C	6611	-20	+70	-20	+70
	°F	6611	-4	+158	-4	+158
	°C	6612	-30	+150	-30	+150
	°F	6612	-22	+302	-22	+302

4 Transmitter

Parameter	Unit	Probes	Physical measuring range at 1013 hPa		Standard scaling of transmitter measuring range	
	°C	6613	-70	+180	-70	+180
	°F	6613	-94	+356	-94	+356
	°C	6614, 6617	-40	+180	-40	+180
	°F	6614, 6617	-40	+356	-40	+356
	°C	6615	-40	+120	-40	+120
	°F	6615	-40	+248	-40	+248
Dewpoint	°C _{td}	6611	-20	+70	-80	+100
	°F _{td}	6611	-4	+158	-112	+212
	°C _{td}	6612, 6613, 6614, 6617	-20	+100	-80	+100
	°F _{td}	6612, 6613, 6614, 6617	-4	+212	-112	+212
	°C _{td}	6615	-60	+30	-80	+100
	°F _{td}	6615	-76	+86	-112	+212
Absolute humidity	g/m ³	all probes	0	600	0	2000
	gr/ft ³	all probes	0	250	0	800
relative humidity ⁵	% RH	all probes	0	100	0	100
WMO relative humidity	% RH		0	100	0	100

⁵ For constant use in high humidity (> 80% rF at ≤ 30°C for > 12 h, > 60% rF at > 30°C for > 12 h), please contact us via www.testo.com/service-contact

Parameter	Unit	Probes	Physical measuring range at 1013 hPa		Standard scaling of transmitter measuring range	
Mixture humidity H ₂ O ₂	%RH _m		0	100	0	100
Mixture dewpoint (H ₂ O ₂)	°C _{tm}		-20	+100	-20	+100
	°F _{tm}		-4	+212	-4	+212
Degree of humidity	g/kg	all probes	0	13300	0	9500
	gr/lb	all probes	0	93000	0	66500
Enthalpy	kJ/kg		-40	99999	-40	8000
	BTU/lb		-18	43000	-18	3500
Psychrometer temperature	°C _{tw}		-40	100	-40	180
	°F _{tw}		-58	210	-40	356
Water content	ppm (vol) H ₂ O		0	99999	0	99999
	% vol		0	100	0	100
Water vapour partial pressure	hPa		0	1000	0	7000
	inchH ₂ O		0	400	0	2800

4.2.9. Alarm handling

For upper and lower alarm limits, individual alarms as well as collective alarms can be specified. If the collective alarm function is activated, an alarm is triggered as soon as the alarm limit of an alarm is exceeded, if this alarm is assigned to the collective alarm.

The testo 6381 monitors limit values with the help of relays. If a reading is outside the limit values, a relay to be specified by the user is switched.

If the reading reverts to more than a specified hysteresis below or above the limit value, the alarm is cancelled.

In addition, information about the occurrence of error/status messages can be provided by means of a collective alarm relay, see 4.5. Status, warning and error messages.



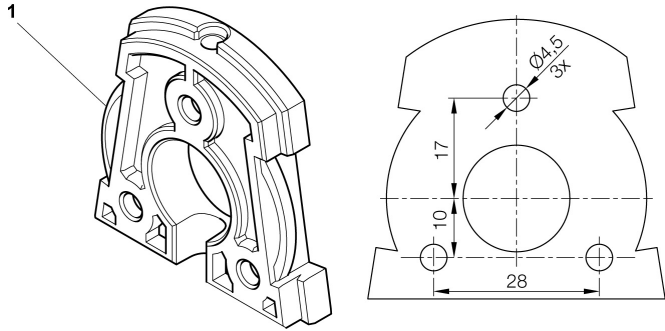
If multiple alarm messages are activated at the same time, the last alarm is shown. If the alarm is cancelled again, the previous messages are no longer shown.

4.3. Commissioning

4.3.1. Assembling the instrument

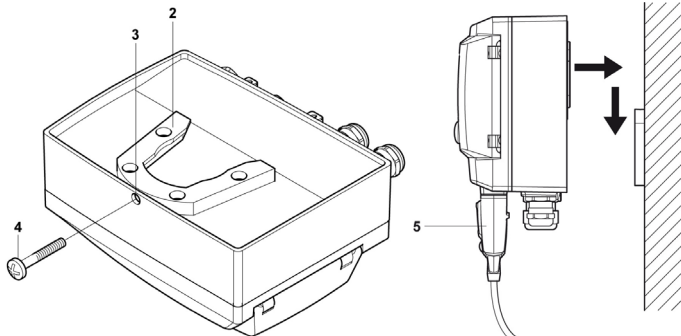
4.3.1.1. Wall mounting (for testo 6611, 6613, 6614, 6615, 6617 probes)

Attaching rear panel bracket



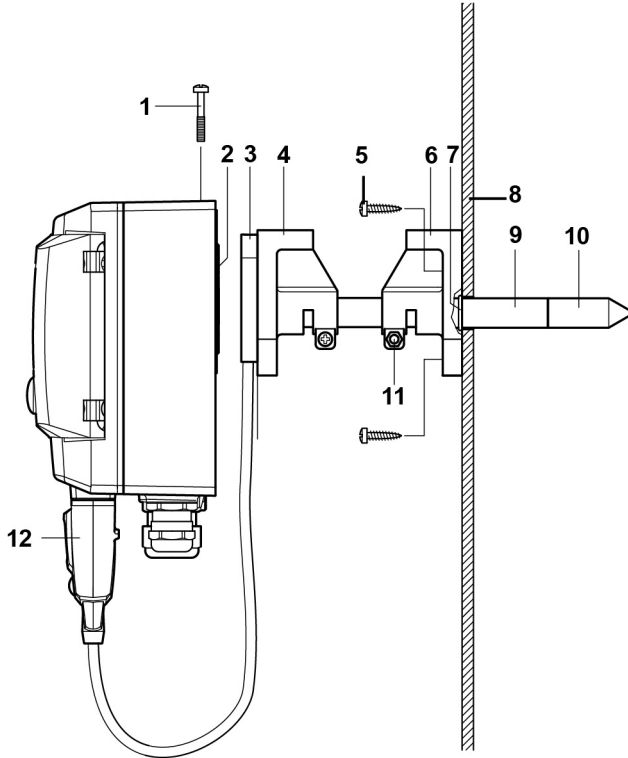
1. Remove locking screw (see item (4) of drawing below) and detach rear panel bracket from plastic bracket (see item (2) of drawing below).
2. Hold rear panel bracket in assembly position and mark the three drill holes.
3. Drill three holes (\varnothing 5 mm) and insert dowels where necessary.
4. Screw on rear panel bracket.
Remember that the clamping brackets (1) must face the wall.

Fastening instrument to rear panel bracket



1. Slide plastic bracket (2) on the back of instrument onto rear panel bracket until it engages (see arrows).
2. Insert screw (4) through hole (3) and screw into rear panel bracket.
3. Insert probe connector (5) into socket until it engages.

4.3.1.2. Duct mounting (for testo 6612 probes)



1. Hold wall/duct bracket (order no. 0554 6651) (6) against duct wall (8) and mark drill holes for wall/duct bracket and probe shaft.
2. Drill a hole (\varnothing 12.5 mm) in the duct wall to feed through the probe shaft.
3. Fasten wall/duct bracket (6) to duct wall with screws (5).
4. Push probe shaft (9) with filter (10) through the middle hole of the mounting bracket.

i The wall/duct bracket (6) has an O-ring (7) to seal it against the duct. Feed the probe shaft (9) carefully through the wall/duct bracket so that the O-ring is not damaged.

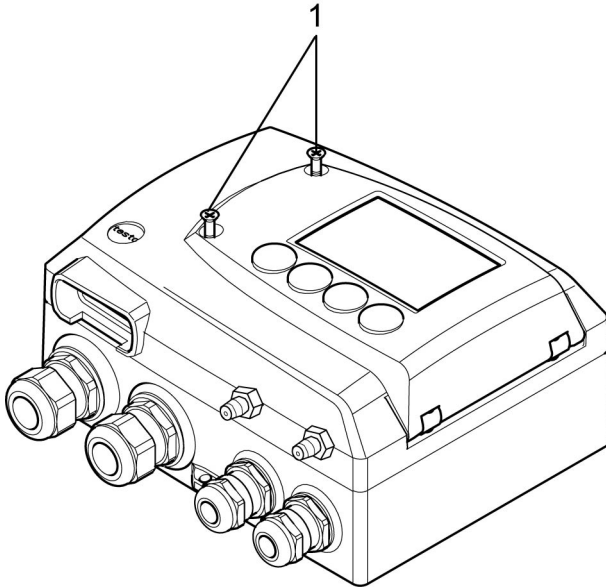
5. Fix the correct position of the probe shaft (9) with screw (11) and mark (insert probe shaft as far as possible).
 6. Slide plastic bracket (2) on the back of the transmitter onto bracket (3, 4) until it engages.
-

i Take the weight of the transmitter into account. Ensure that the brackets (4, 6) are fastened securely.

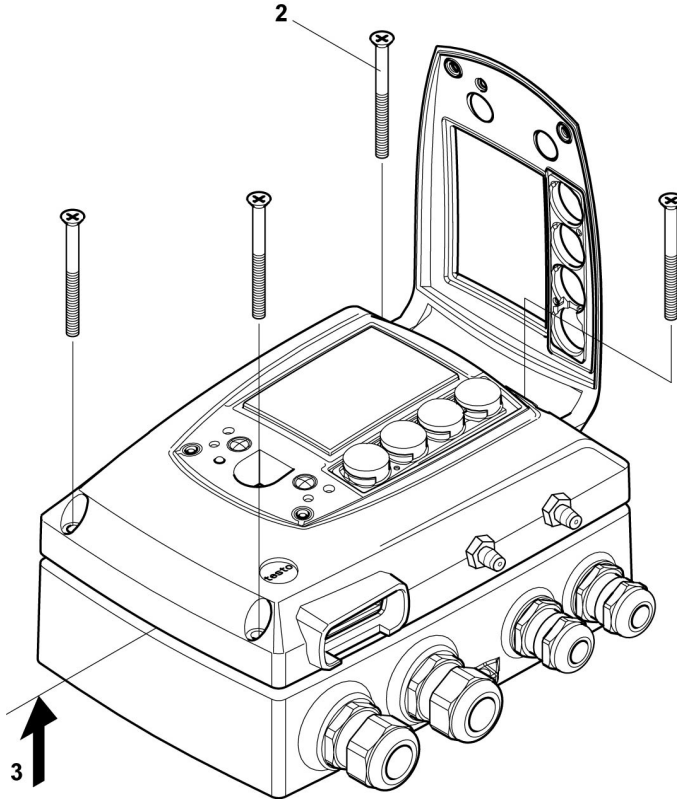
7. Insert screw (1) through the hole on the top of the instrument and screw into bracket (3).
8. Insert probe connector (12) into socket until it engages.

4.3.2. Connecting the instrument

Opening the instrument



1. Loosen screw connection (1) of service flap and open the flap.



2. Loosen and remove housing screws (2).
3. Remove upper part of housing from lower part (3) and place on a clean surface.

⚠ WARNING

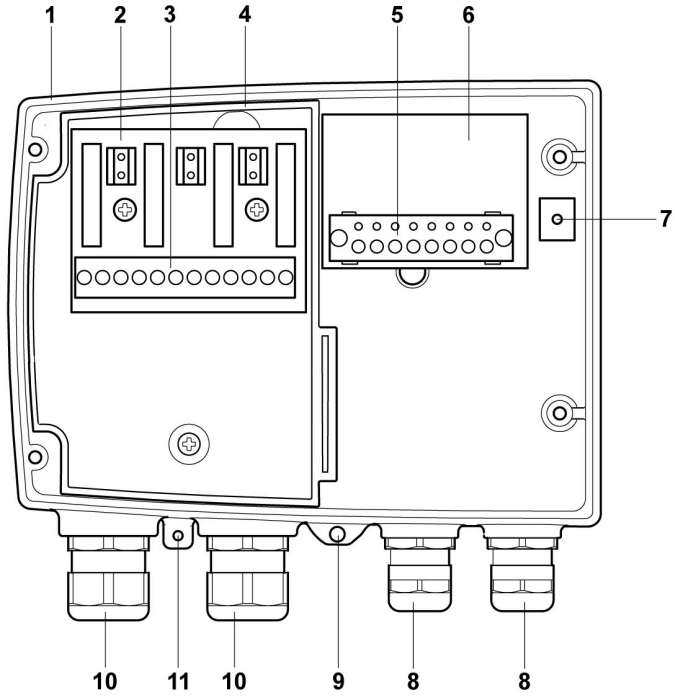
**Electrical voltage
Danger of injury!**

- > De-energize the mains connection before connecting the transmitter.



Only have the transmitter wired and connected by authorized personnel with the voltage disconnected.

4.3.2.1. Overview of terminals

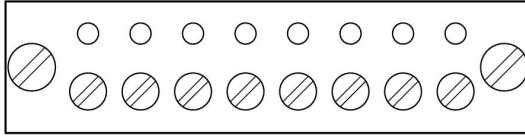


- | | |
|--|---|
| 1 Lower part of housing | 7 Earthing terminal (internal) |
| 2 Relay board (option) | 8 M 16 x 1.5 screw connection* |
| 3 Relay terminals | 9 Earthing terminal (external) |
| 4 Insulating trough for relay board | 10 M 20 x 1.5 screw connection* |
| 5 Terminal strip for voltage supply and analog outputs | 11 Eyelet for measuring point panel |
| 6 Terminal board | * Alternatively, NPT cable coupling or M plug-in connection |

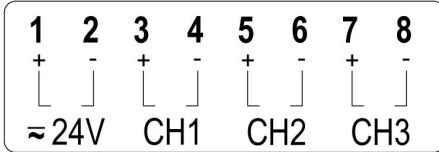


The following description of the terminals refer to this overview and its numbering.

4.3.2.2. Connecting voltage supply and analog outputs

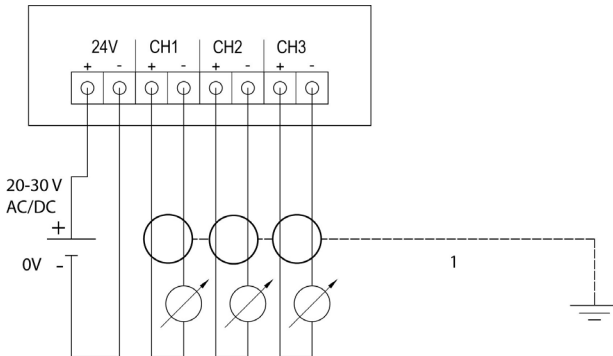


Terminal strip for voltage supply and analog outputs, item (5) of 4.3.2.1. overview of terminals



1. Feed cable with voltage supply and analog signal lines through opened M 16 x 1.5 screw connection (item (8) in the 4.3.2.1. overview of terminals).
2. Strip the cable ends, clamp wire end ferrules on and screw down onto voltage terminals.
3. Close M 16 x 1.5 screw connection (item (8) in the 4.3.2.1. overview of terminals).

Wiring diagram for 4-wire system (0 to 20 mA/4 to 20 mA/0 to 1 V/0 to 5 V/0 to 10 V)



1 1 or 3 channels,
0 to 20 mA/4 to 20 mA max.
load per 500 Ω
0 to 1 V/0 to 5 V / 0 to 10 V



Requirement for the connecting cable of the supply:

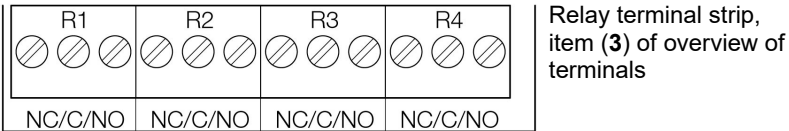
- Insulated with cross-section of at least 0.25 mm², maximum 2.7 mm² without wire end sleeves.
- The supply line must be secured against exceeding 0.5 A.
- An OFF switch must be installed in an easily accessible position close by and be marked as such.

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1. Feed connection cables of the one, or optionally three, channels through opened M 16 x 1.5 screw connection (item **(8)** in the 4.3.2.1. overview of terminals).
2. Strip the cable ends, clamp wire end ferrules on and screw to channel terminals as shown in diagram.
3. Close M 16 x 1.5 screw connection (item **(8)** in the 4.3.2.1. overview of terminals).

4.3.2.3. Connecting the relay outputs

i Only have the transmitter wired and connected by authorized personnel with the voltage disconnected.



There is the option of twelve terminals for a total of four relays. The designations NC/C/NO (normally closed contact/root or pin/normally open contact) are etched on the surface of the board.

Using PG screw connection

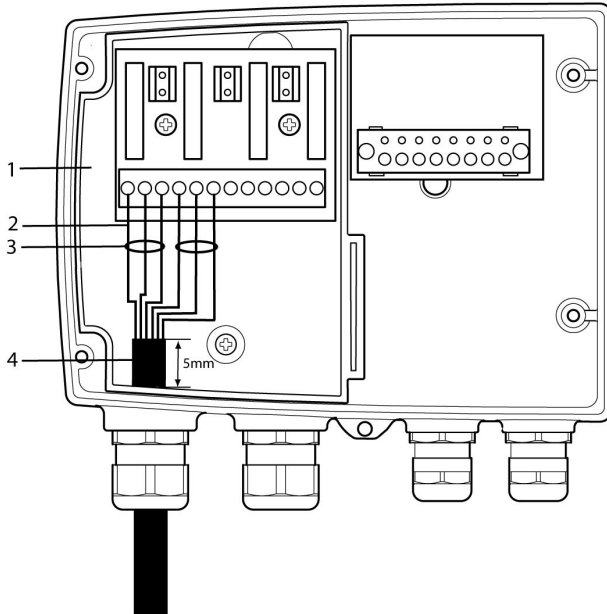
1. Feed connection cables for the relays through opened M 20 x 1.5 screw connection (item **(10)** of overview of terminals).
2. Strip cable ends and clamp on wire end ferrules.
3. Connect relays according to chosen function (NC/NO) (see diagrams below; relay 1 is shown as an example of a connection).

Using plug-in connections (optional)

i Only insert or disconnect the plug-in connection when the voltage is disconnected.

4. Clean the connector of the probe line and the coupling of any foreign matter.
-

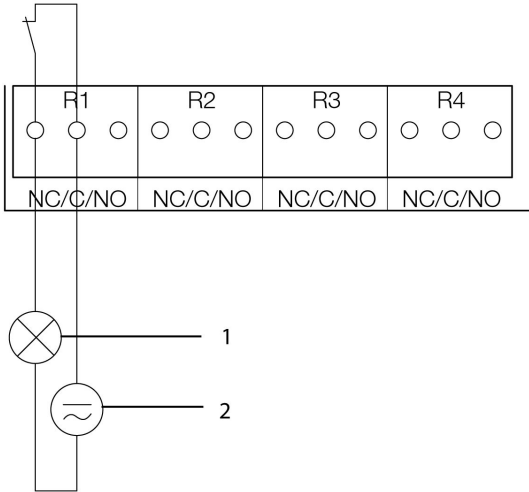
i Do not disconnect the connector of the probe line from the instrument for extended periods to protect against contamination.

Connection note**i**

- For the connection, a double-insulated mains cable (sheathed cable) with a cross-section of at least 1.5 mm² must be used.
- Cable connection (2) may not be routed in a loop within the tray (1).
- It is recommended that you always tie 3 cores to one another using a cable tie (3).
- The insulation of the cable must be fed at least 5 mm (4) into the tray.

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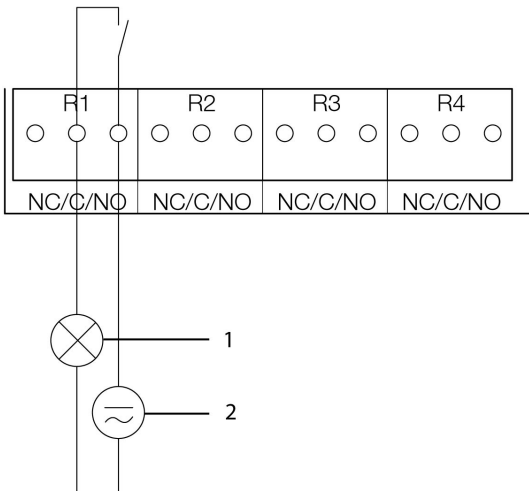
Use of relay as NC contact (NC = normally closed)



- 1 Alarm/status light (example of installation)
- 2 250 V AC/DC, 3 A

i The busy light (alarm/status light) is permanently on until the relay opens or the circuit is interrupted. This circuit can therefore be used to monitor the functionality of the alarm circuit, as a cable break, for instance, is indicated by the busy light going off.

Use of relay as NO contact (NO = normally open)



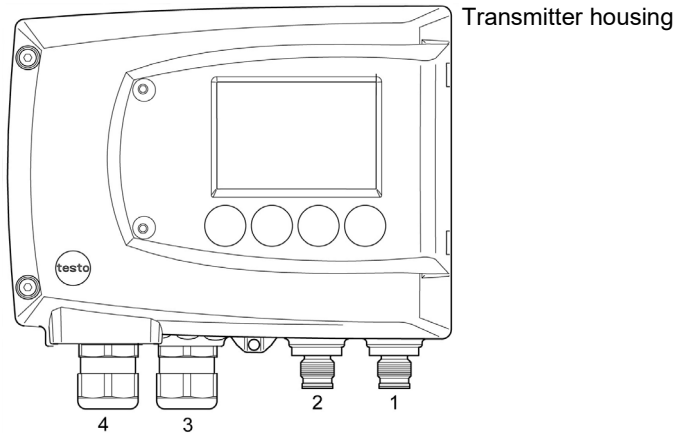
- 1 Alarm/status light (example of installation)
- 2 250 V AC/DC, 3 A

i The busy light (alarm/status light) only comes on when the relay is switched (closed). Monitoring the functionality of the alarm circuit is therefore not possible with this switching operation.

5. Close M 20 x 1.5 screw connection (item **(10)** in overview of terminals).

4.3.2.4. Plug-in connection option

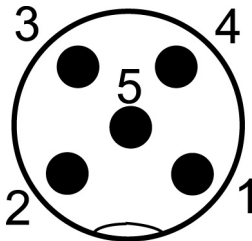
As an option, the PG screw connections of the signal and supply lines can be replaced with plug-in connections that are installed at the housing, see item 1 and 2. The relay cabling occurs via standard cable entries and PG screw connections, see item 3 and 4.



Plug-in connections for power supply and channels

M12 plug-in connection (5-pin) socket (item **1**)

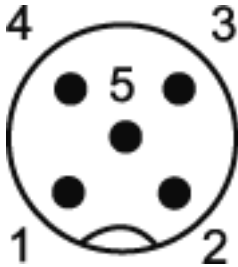
View of the plug-in connections in the installed state from outside



PIN	Assignment
1	V 24-
2	V 24+
3	+ Ch1
4	- Ch1
5	PE

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M12 plug-in connection (5-pin) connector (item 2)

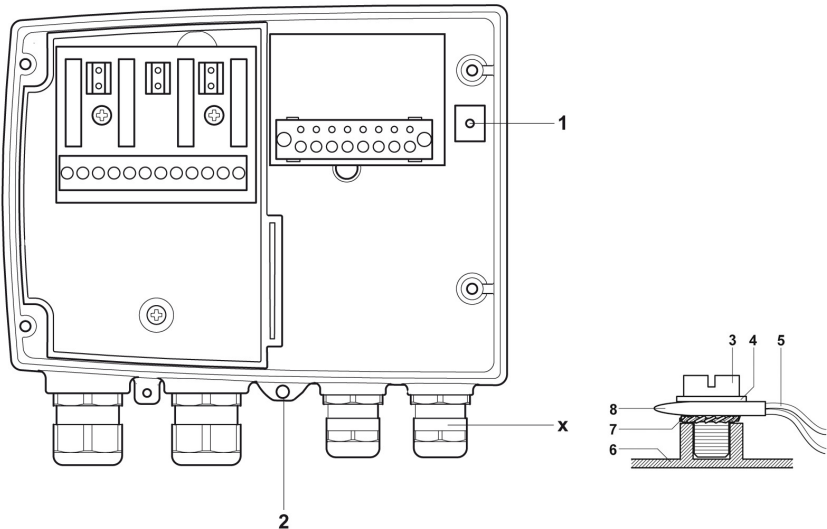


PIN	Assignment
1	- Ch2
2	+ Ch2
3	+ Ch3
4	- Ch3
5	PE

4.3.2.5. Creating the PE/earthing terminal

As the testo 6381 has a metal housing, we recommend that the instrument be earthed. This can be done using the earthing terminal within the instrument (1) or the earthing terminal outside of the instrument (2).

i Only use the external earthing terminal in dry interiors.



Using the earthing terminal within the instrument

1. Guide shielded cable (5) through the cable coupling (x) and fit cable lug (8). Fix this to the side of the instrument (6) using M 5

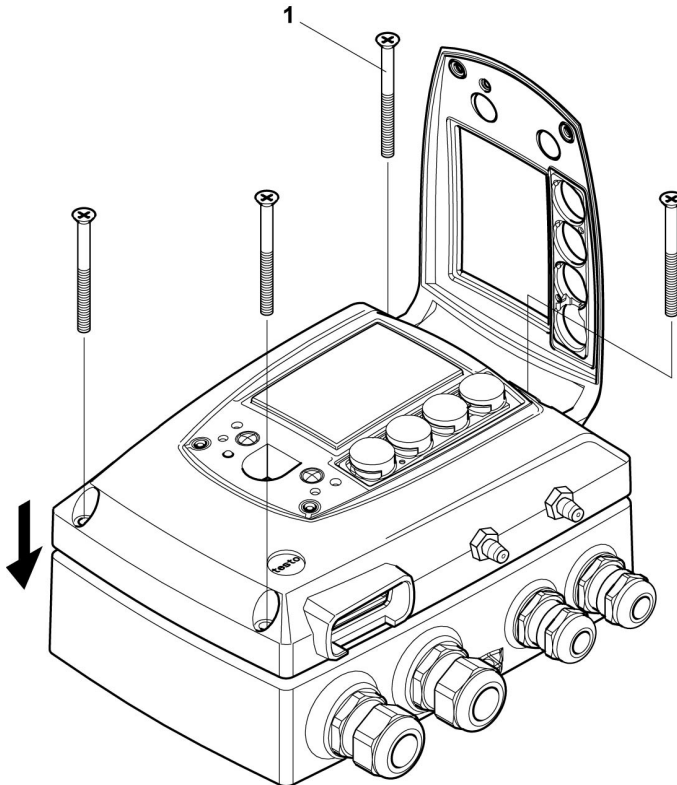
screw (3), washer (4) and snap ring (7) on the internal earthing terminal (1).

- Place the other cable end on an appropriate functional earth, e.g. an earthing bar.

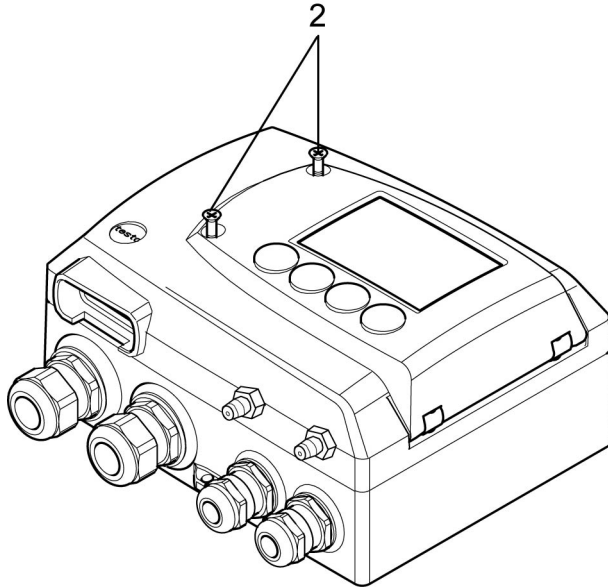
Using an earthing terminal outside of the instrument

- Use PE line (yellow-green) (5) with cable lug (8). Fix this using M 5 screw (3), washer (4) and snap ring (7) on the external earthing terminal (2).
- Place the other cable end on an appropriate functional earth, e.g. an earthing bar.

4.3.2.6. Closing the instrument



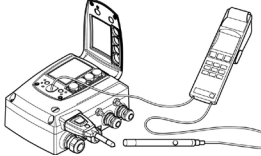
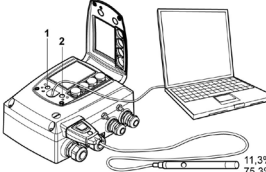
- Place upper part of instrument on top of lower part (see arrow) and fix in place with housing screws (1).

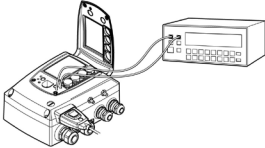
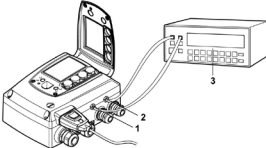


2. Close the service flap and tighten screws (2).

4.3.2.7. Adjusting the instrument

The testo adjusting concept allows the entire signal chain from the sensor signal (probe) and the digital signal (within the transmitter) through to the analog signal (transmitter output signal) to be adjusted (see diagram).

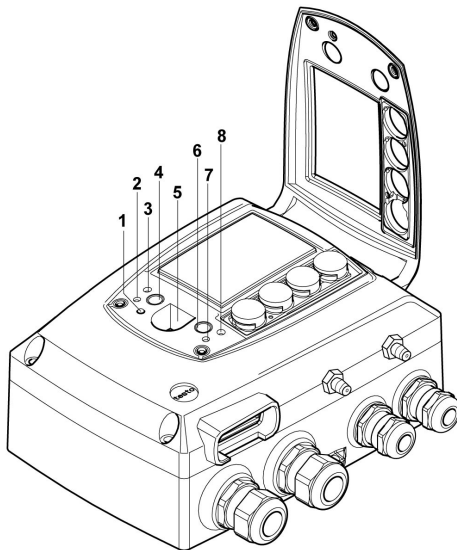
1-point adjustment	2-point adjustment
	
<p>Adjustment via</p> <ul style="list-style-type: none"> • testo 400/650 handheld instrument with adjustment adapter • P2A software • User menu 	<p>Adjustment 11.3 % RH and 75.3 % RH via</p> <ul style="list-style-type: none"> • Adjustment keys (1, 2) • P2A software <p>Adjustment 20 % rH and 80 % rH via</p> <ul style="list-style-type: none"> • User menu

Analog adjustment	n-point adjustment
	
<p>Adjustment using a precise multimeter and transmission of analog reference value in</p> <ul style="list-style-type: none"> • User menu or • P2A software 	<p>Adjustment using a precise pressure sensor and transmission of analog reference value in</p> <ul style="list-style-type: none"> • User menu or • P2A software

Either the 1-point adjustment or 2-point adjustment is suitable for adjusting the sensor signal - digital signal chain.

The testo 6381 transmitter has digital probes whose adjustment information is stored in the probes' internal memory. Both 1-point and 2-point adjustments can thus be carried out on another testo 6381 (e.g. in the calibration laboratory).

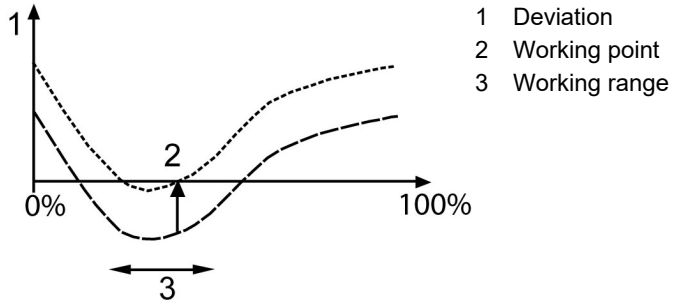
4.3.2.8. Overview: Adjustment keys and test contacts



- 1 Status LED
2. Contact ch. 1+
3. Contact ch. 1-
4. Adjust key 11.3 %
5. Service interface
- 6 Adjust key 75.3 %
7. Contact ch. 2+
8. Contact ch. 2-

4.3.2.9. 1-point adjustment (offset - humidity/temperature)

In the 1-point adjustment, the reading at the working point is raised to the reference value so that there is no longer any deviation in the working point. The reference condition can be measured using a precise handheld instrument (e.g. testo 400/650 with precision humidity probe) or be created in an air conditioning cabinet.



The advantage of the 1-point adjustment is the good measuring result in the working range. But the further away the measurement is from the working value, the greater the deviation can become. The 1-point adjustment should therefore only be used for a relatively narrow measuring range (working range), e.g. clean room applications, air conditioning applications for storage and similar.

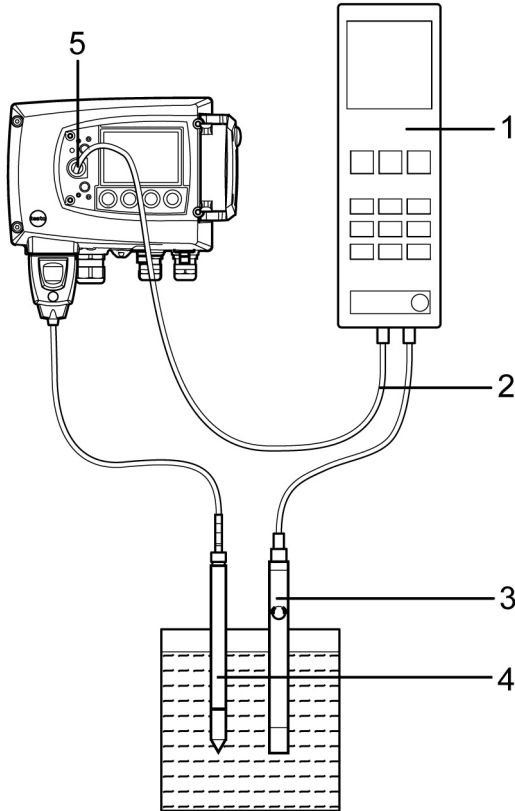
The 1-point adjustment can be performed

- via the user menu () or
- via the P2A software (see volume 2, 7.3.4.1. 1-point adjustment) or
- directly by means of a Testo handheld instrument (testo 400/650) (see description of how to proceed below).

Please note that the 1-point adjustment is generally performed on the basis of the % RH and °C/°F parameters.

Adjusting testo 6381 using testo handheld instrument

- ✓ The service flap is open, a testo 400/650 handheld instrument with a precision humidity probe is ready.



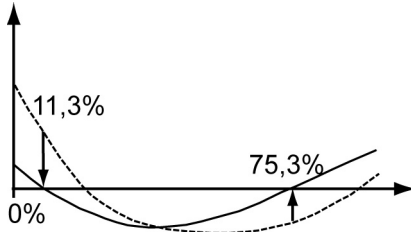
1. Connect testo handheld instrument 400/650 (1) with connected humidity reference probe (3) (order no. reference set 0699 3656/20) to the service interface (5) of the testo 6381 via the adjustment adapter (2) (connected to probe socket 1 of the handheld instrument).
2. Expose the humidity probe (4) of the testo 6381 and the reference probe (3) to the same reference conditions (e.g. in the humidity generator) and allow climatic conditions to equalize.
3. Switch on the testo 400/650. The two-part display of the handheld instrument will show the values of the transmitter on the left, and the values of the reference probe on the right. The

humidity and temperature values are adjusted to the reference probe using the **Probe > Probe Adjustment** menu item on the testo 400/650. The 1-point adjustment is performed for both the humidity and the temperature.

4. Disconnect the adjustment adapter (2) from the service interface (5).
5. Close the service flap.

4.3.2.10. 2-point adjustment (humidity/temperature)

With the 2-point adjustment, the parameter is adjusted to the reference value at the two standard adjustment points 11.3 % RH and 75.3 % RH or 20 % RH and 80 % RH. The reference conditions are created either by using testo adjustment salt pots (order no. 0554 0660, only for adjustment points 20 %RH and 80 %RH) or in the humidity generator.



In the 2-point adjustment, the deviations between the reading and the nominal value are minimized across the entire measuring range. The 2-point adjustment is therefore recommended for large working ranges.

The 2-point adjustment can be performed

- via P2A software (see volume 2, 7.3.4.2. 2-point adjustment) or
- using the adjustment keys under the service flap, see description of how to proceed below.

The 2-point adjustment for the adjustment points 20 %RH and 80 %RH is carried out via the user menu.

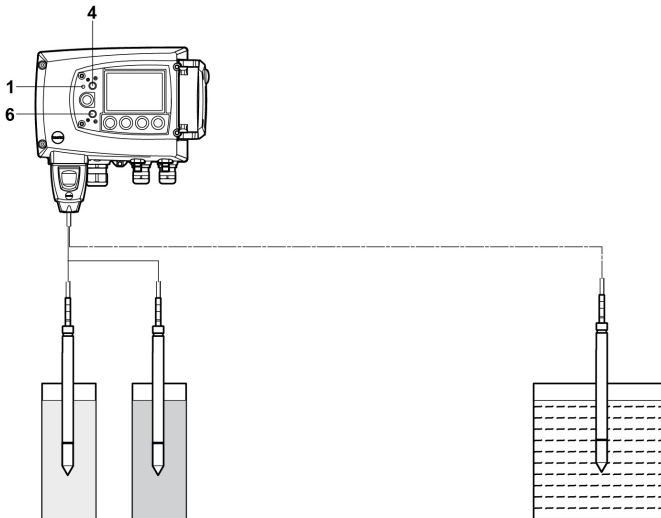


A previous 1-point adjustment is undone during a 2-point adjustment.

- i** Adjustment with the standard testo adjustment salt pots is not suitable for the testo 6614 (heated for high-humidity applications) and testo 6615 (trace humidity) probes. The reference conditions should be generated in a humidity generator to adjust these probes. In addition, these probes can also be adjusted at a third adjustment point by Testo Service.
- testo 6614: third adjustment point at 90 % RH
 - testo 6615: third adjustment point at -40 °Ctd/-40 °Ftd

Adjusting testo 6381 using adjustment keys

- i** The 2-point adjustment for the adjustment points 20 %RH and 80 %RH is carried out via the user menu.



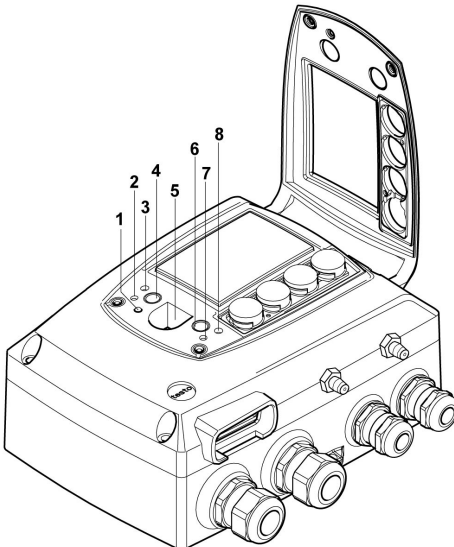
11.3 % RH ⇒ 75.3 % RH	or	11.3 % RH ⇒ 75.3 %
1.5 h		RH
(salt pots)		1.5 h
		(humidity generator)

- ✓ The service flap of the testo 6381 is open:
1. Expose the humidity probe of the testo 6381 to the reference condition of 11.3 % RH for at least 1.5 hours at 25 °C.

2. After this equalization period, press the **11.3 %** adjustment key (4) for at least 10 seconds with something like a ball-point pen that is not too sharp.
 - The LED (1) flashes when the adjustment process begins. After about 10 seconds, the **2-point adjustment 11.3 %** status message appears on the display.
 - Completion of the adjustment is signalled by the LED (1) coming on permanently and the **Probe reset** status message is shown.
3. Carry out the adjustment analogously for the reference condition 75.3 % RH. Press the **75.3 % RH** adjustment key (6) to do this.
4. Close the service flap.

4.3.2.11. Analog output adjustment

The purpose of adjusting the analog outputs is to adjust the signal chain from the digital signal (within the transmitter) to the analog outputs. The signal type that was appointed for the transmitter is adjusted respectively for each channel (e.g. 4 to 20 mA or 0 to 1 V, etc.).



- 1 Status LED
- 2 Contact ch. 1+
- 3 Contact ch. 1-
- 4 Adjust key 11.3 %
- 5 Service interface
- 6 Adjust key 75.3 %
- 7 Contact ch. 2+
- 8 Contact ch. 2-

Adjusting analog outputs 1 and 2 (optional)

- ✓ With testo 6381 with current output: Load of max. 500 Ω is connected to channel that is to be adjusted (see 4.3.2.4. Plug-in connections for power supply and channels)

- ✓ A precise multimeter (minimum requirement: resolution 6.5 digits, at least 5-times more accurate than the 6381) is available.

i If only a simple multimeter is available, the analog outputs must not be adjusted.

- ✓ The service flap is open.
1. Connect the inputs of the multimeter with the contacts **(2)** and **(3)** for channel 1 or with contacts **(7)** and **(8)** for channel 2.
 2. Transfer the reference analog value measured with the multimeter into the P2A software (see volume 2, 7.3.4.4. Adjusting the analog output) or enter it via the user menu (see 4.4.6.9. Performing the 2-Points-Adjustment for 20% RH and 80 % RH).
 3. Disconnect connections between the multimeter and the contacts of the testo 6381 and close the service flap.

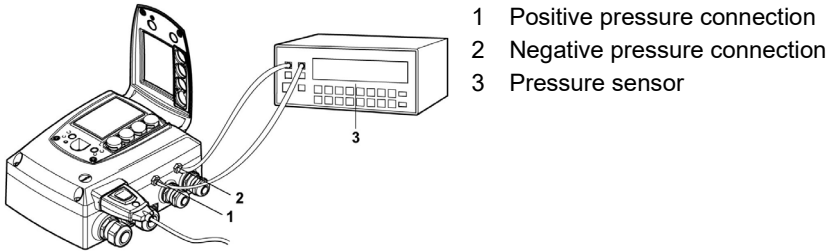
Adjusting analog output 3 (optional)

i If the optional third analog output is to be adjusted, a cable connection to measure the analog value must be installed. Do this by proceeding as follows:

1. Open transmitter (see 4.3.2. Opening the instrument).
2. Connect measuring cable to the terminals of the third analog output and guide through the cable coupling and out of the transmitter.
3. Reassemble upper part of transmitter (see 4.3.2.6. Closing the instrument).
4. Connect cable ends to the inputs of the multimeter.
5. Transfer the reference analog value measured with the multimeter into the P2A software (see volume 2, 7.3.4.4. Adjusting the analog output) or enter it via the user menu (see 4.4.6.9. Performing the 2-Points-Adjustment for 20% RH and 80 % RH).
6. Remove the upper part of the transmitter, detach the cable connections for the adjustment of the 3rd analog output and reassemble the transmitter.

4.3.2.12. n-point adjustment (pressure)

With an n-point adjustment, the parameters at the 3-6 measurement points are adjusted to the reference value. The reference conditions are obtained by using a precise pressure sensor that should be 5-times more accurate than the transmitter.

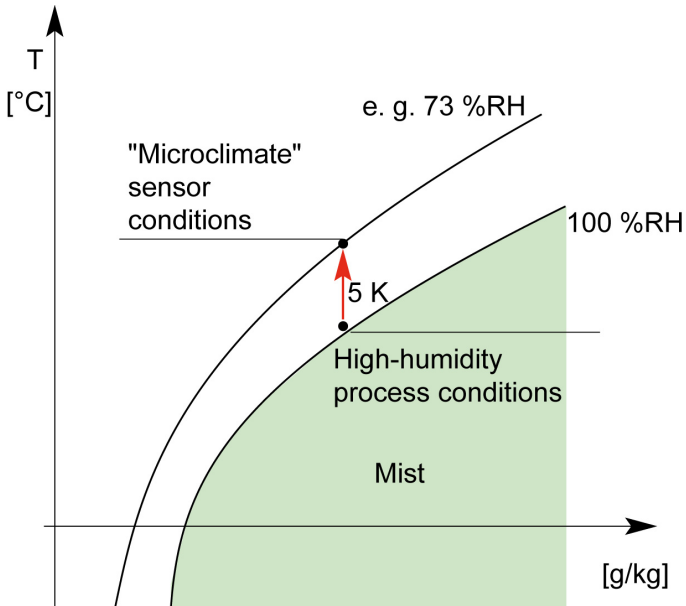


i The number of measuring points is set to 3 by the factory and can only be changed using the P2A software (see 7.3.4.3. **n-point adjustment**).

i The n-point adjustment must always be carried out to its full extent and in good time at all selected measurement points.

- ✓ A precise pressure sensor (5-times more accurate than the transmitter, e.g. DPC precision pressure sensor from testo industrial services) is available.
- 1. Connect the positive output of the pressure sensor (3) to the positive pressure connection of the transmitter (1) and the negative output of the pressure sensor (3) to the negative pressure connection of the transmitter (2).
- 2. Transfer the reference pressure value created with the pressure sensor into the P2A software (see volume 2, 7.3.4.3. n-point adjustment) or enter it via the user menu ().
- 3. Repeat step 2 for all of the measuring points.
- 4. Disconnect connections between the pressure sensor and the pressure connections of the testo 6381.

4.3.2.13. High-humidity adjustment for testo 6614



With the testo 6614, the rear of the Testo humidity sensor is heated, creating a microclimate around the sensor (within the filter) that is constantly 5 K warmer than the actual process conditions. As can be seen in the Mollier diagram, this reduces the relative humidity at the sensor from around 100 % RH to a lower value, e.g. 73 % RH. In this range, the reaction time of the sensor is noticeably shorter than in the condensation range and the risk of the sensor corroding is also reduced. Using the separate temperature probe, the testo 6381 transmitter compensates the microclimate conditions and displays the process readings.

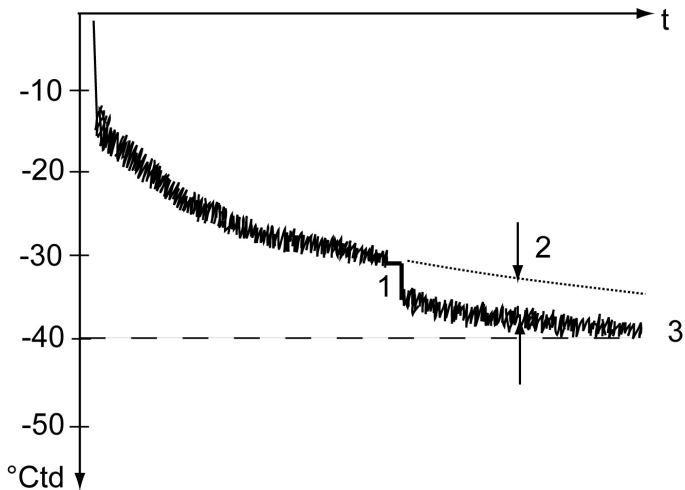
i The reference conditions (11.3 % RH and 75.3 % RH or 20 %RH and 80 %RH) for the 2-point adjustment of the testo 6614 should be generated in a humidity generator, as humidity adjustment sets cannot be used due to the heat generated.

The adjustment can also be carried out at a third adjustment point (90 % RH) by Testo Service so that optimum accuracy is also achieved in the high humidity ranges.

4.3.2.14. Self adjustment of testo 6615 trace humidity probe

Conventional trace humidity probes show a steep rise in measuring uncertainty at low humidities. In the testo 6615 trace humidity probe, these measuring uncertainties are corrected by means of an automatic self-adjustment process. This means that extremely accurate measuring results are also attained to $-60\text{ }^{\circ}\text{C}_{td}$.

To this end, a temperature sensor is fitted on the back of the testo 6615 which is used as a heater. A humidity and temperature value pair is taken in both the unheated and heated state. The deviation of the probe obtained from these pairs of values is automatically corrected.



The graph shows the effect of the self-adjustment, e.g. during the Init. phase.

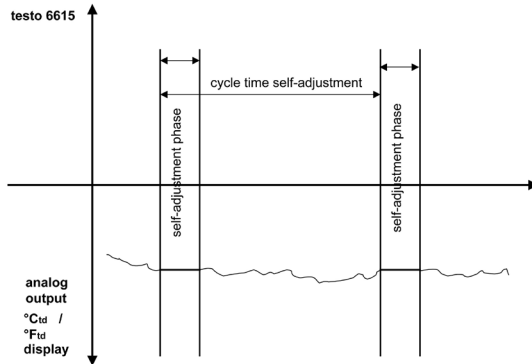
- 1 Self-adjustment
- 2 Correction of measurement value
- 3 Process dew point temperature

For the effectiveness of the self-adjustment the following prerequisites are decisive over the duration of the self-adjustment.

- The process temperature should not vary by more than 0.5K
- The dew point temperature should remain stable, as far as possible
- The process pressure should not vary excessively

i If these prerequisites cannot be fulfilled, the values obtained during the last successful self-adjustment will be maintained.

All adjustment processes are saved in the history of the transmitter, see volume 2, 7.3.5. **Transmitter history**.



i

- Deactivating the adjustment function of the testo 6615 will reduce measuring accuracy and should therefore be restricted to the shortest possible length of time.
- During the heating phase, the relay and analog outputs, the display value and output value are "frozen", see diagram above. **Self-adjustment active** is shown in the display until it has finished. The factory setting for self-adjustment time (incl. heating time, calculation time, cooling time) requires 30 minutes daily. The cycle time can be edited via the operating menu or the P2A software.
- In the factory setting, a **third adjustment point** ($-40\text{ }^{\circ}\text{C}_{td}$) is approached for the testo 6615 in addition to the 2-point adjustment. This special adjustment can be performed again by your Testo Service team if necessary.

4.4. Operation

4.4.1. Relationship between user menu and mini-DIN socket is active

The testo 6381 can be parameterized using either the user menu or the P2A software (see volume 2, 7. Parameterizing, adjusting and analyzing software (P2A software)).

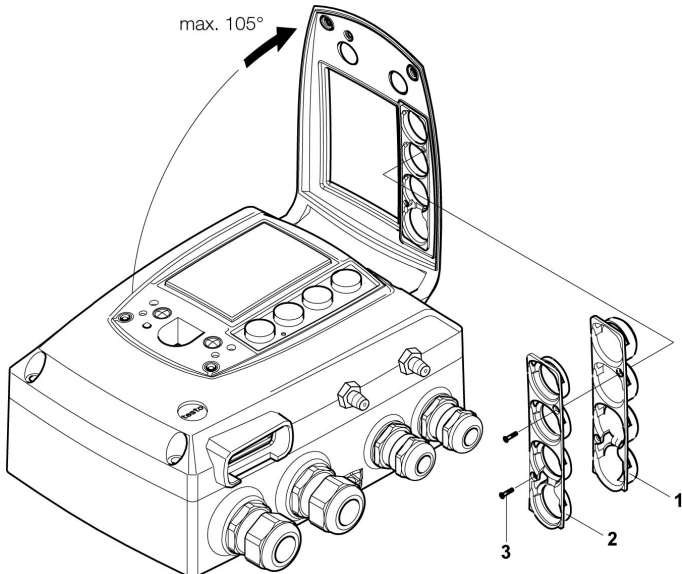
i The testo 6381 transmitter can only be operated via the display and keypad if the display option is available.
If the testo 6381 is connected to the P2A software, the user menu is blocked for the duration of the communication. The message Service plug is shown in the display of the testo 6381. As soon as the P2A software is disconnected, the user menu is accessible again.

4.4.2. Key cover

To prevent unauthorized operation of the keys, the standard key frame can be replaced with a key cover.

If the key cover has been assembled, the service flap must be opened for operation.

Attaching the key cover



- ✓ The service flap is opened, see 4.3.2. Opening the instrument.
- 1. Unscrew screws **(3)** and remove key frame **(2)**.
- 2. Insert key cover **(1)** into service flap and tighten screws **(3)**.
- 3. Close and screw down the service flap.

4.4.3. Password protection

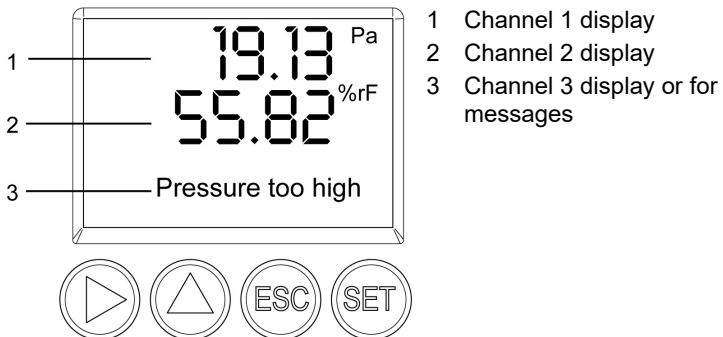
The user menu can be protected with a four-digit numerical code () so that access to the user menu is denied to unauthorized persons not familiar with this numerical code.

If the password protection is not to be used, the numerical code "0000" must be entered. This is also the status upon delivery.

4.4.4. Structure of user menu

At the main menu level, the user menu comprises the following:

- Main Menu Channel 1
- Main menu of channel 2 (if this option is available)
- Main menu of channel 3 (if this option is available)
- Main Menu Alarm
- Main Menu Settings
- Main Menu Analysis
- Main Menu Messages
- Main Menu Ident
- Main Menu Adjust
- Main Menu Reset

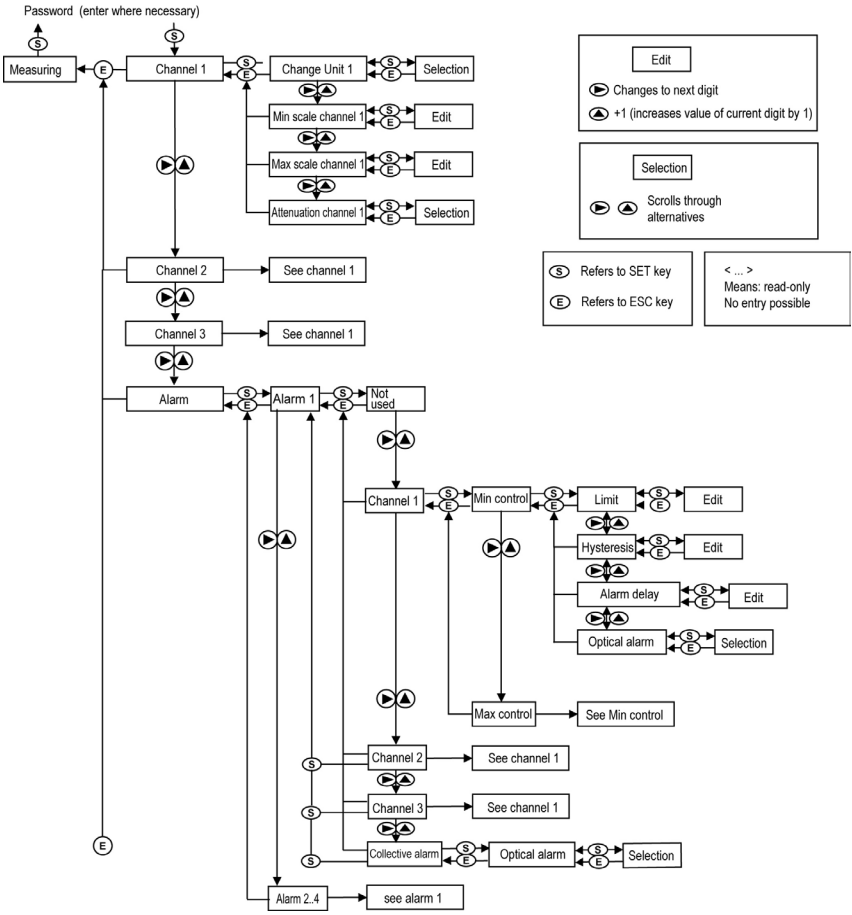


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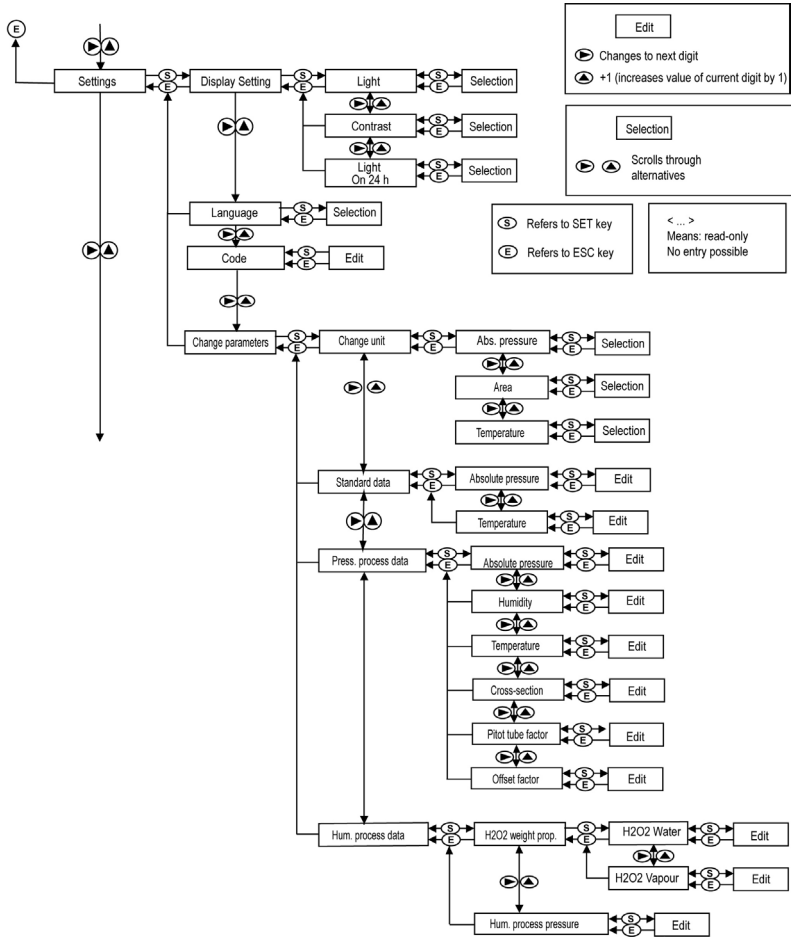
Four keys enable the user to navigate/scroll through the menus and enter/amend values and settings:

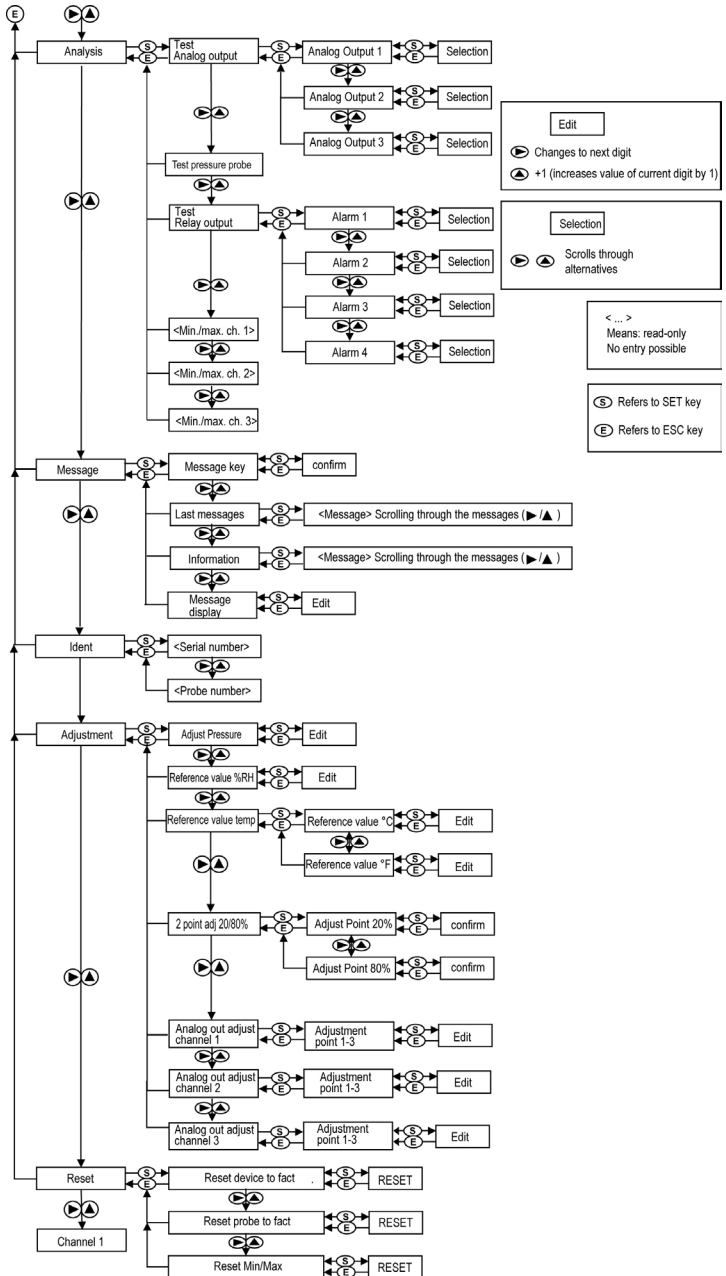
Key	Function/description
SET	<ul style="list-style-type: none">• In Measuring Mode: changes to parameterization• In Parameterizing Mode: confirms a selection or setting
ESC	<ul style="list-style-type: none">• Leaves a menu (without modifying any settings)
▶	<ul style="list-style-type: none">• Selecting: scrolls through menus (downwards) or selectable alternatives• Editing: changes to next digit (to the right)
▲	<ul style="list-style-type: none">• Selecting: scrolls through menus (upwards) or selectable alternatives• Editing: increases the value of the current digit by 1

4.4.5. Overview of the testo 6381 user menu



4 Transmitter





4.4.6. The individual main menus

4.4.6.1. Editing main menu of channel 1

An overview is given in Overview of the testo 6381 4.4.5. user menu).

You can perform basic settings for channel 1.

1. In the Measuring Mode press **SET**, select **Main Menu Channel 1** with **▶** or **▲** and confirm selection with **SET**.
One of the following parameters can now be selected using **▶** or **▲**, after which the selection must be confirmed with **SET**:
 - Channel 1 Unit
The parameter for this channel is selected.
Edit/select parameter with **▶** or **▲**, confirm with **SET** or abort entry with **ESC**.
 - Scale minimum for channel 1:
The lower scale limit is edited; Unit as selected above.
Editing the value: Scroll one digit to the right using **▶** and increase value of digit by 1 using **▲**. Confirm with **SET** or abort entry with **ESC**.
 - Scale maximum for channel 1
The upper scale limit is edited;
Unit as selected above.
Editing the value: Scroll one digit to the right using **▶** and increase value of digit by 1 using **▲**. Confirm with **SET** or abort entry with **ESC**.
 - Signal delay ("Attenuation") for channel 1
The analog signal can be delayed ("Attenuation"); a time constant is selected for this (1 = no delay; 2-15 = delay in seconds)
Edit/select parameter with **▶** or **▲**, confirm with **SET** or abort entry with **ESC**.
2. Continue to the main menu with **▶** or **▲** or return to Measuring Mode with **ESC**.

4.4.6.2. Editing Main Menu Channel 2 (if this option is available)

See channel 1.

4.4.6.3. Editing Main Menu Channel 3 (if this option is available)

See channel 1.

4.4.6.4. Editing Main Menu Alarm

With the alarm, the relays, available as options, are programmed. In addition, the alarm statuses are shown on the display (top right) (even without relays).

You can choose whether the alarm is to be used to monitor limit values or as a collective alarm. If an alarm is to be used to monitor limit values, you can choose between monitoring the minimum or maximum value and set a limit value and hysteresis for each alarm.

In addition, every alarm can be linked to a clearly visible visual alarm (display background lighting and the corresponding measurement value flash when limit values are violated).

An alarm delay between 0 and 3600 seconds can still be assigned to every alarm used for limit value monitoring so that both the corresponding relay effect and the visual alarm are delayed. If the alarm status goes out within the set alarm delay time, neither the visual alarm nor a relay connection is triggered. .

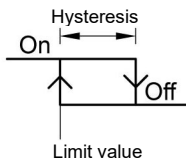
With an alarm status present, the visual alarm and all relay outputs can be reset by means of acknowledgement with any button. The triggering of a new alarm cannot be enabled until after the alarm status goes out.

1. In the Measuring Mode press **SET**, select **Main Menu Alarm** with **▶** or **▲** and confirm selection with **SET**.
 - Four alarms can be parameterized.
2. Select **Alarm x** with **▶** or **▲** and confirm selection with **SET**.

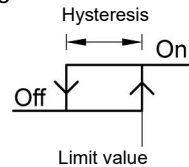
Using alarm to monitor limit values

NO contact

Monitoring minimum

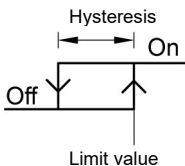


Monitoring maximum

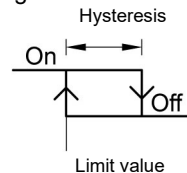


NC contact

Monitoring minimum



Monitoring maximum



3. Select **Channel x** (e.g. "Channel 1") with ► or ▲ and confirm selection with **SET**.
4. Select **Max control** or **Min control** with ► or ▲ (see graphic).
5. Press **SET** and edit **Limit value** as well as **Hysteresis**: Scroll one digit to the right using ► and increase value of digit by 1 using ▲. Confirm with **SET** or abort entry with **ESC**.
6. Select **Visual alarm** with ► or ▲. Select **YES** or **NO** with ► or ▲. Confirm with **SET** or abort entry with **ESC**.
7. Press **SET** and edit **Alarm delay**: Scroll one digit to the right using ► and increase value of digit by 1 using ▲ (0 to 3600 seconds possible). Confirm with **SET** or abort entry with **ESC**.
8. Return to **Channel x** with **ESC**.
9. Return to **Alarm x** with **ESC**.
10. Change to the other relays using ► or ▲ and perform settings in the same way.

Using alarm as collective alarm or not using it at all

If an alarm is assigned to the collective alarm, the relay is switched and a visual alarm can be issued via the display as soon as (at least) one of the warning or error messages of the testo 6381 transmitter (or the connected testo 6610 probe) becomes active.



The messages affecting the collective alarm can only be selected in the P2A software, see volume 2, 7.3. Using the software.

- ✓ Alarm is selected (see previous steps 1 and 2).
1. Use ► or ▲ to determine whether **Alarm x** should be used as a **Collective alarm** or **not used**. Confirm selection with **SET**.
 2. If collective alarm is selected: Select **Visual alarm** with ► or ▲. Select **YES** or **NO** with ► or ▲. Confirm with **SET** and return to **Alarm x**.
 3. Change to another alarm using ► or ▲ and perform settings in the same way.
 4. Return to **Main Menu Alarm** with **ESC**.
 5. Continue to **Main Menu Settings** with ► or ▲ or return to Measuring Mode with **ESC**.

4.4.6.5. Editing Main Menu Settings

You can edit instrument settings and other settings.

- > In Measuring Mode, press **SET**, select **Main Menu Settings** using ► or ▲ and confirm selection with **SET**.

You can edit settings for:

- Display
- Language
- Code
- Units
 - Absolute pressure
 - Area
 - Temperature
- Standard data
 - Absolute pressure
 - Temperature
- Pressure process data
 - Absolute pressure
 - Humidity
 - Temperature
 - Cross-section
 - Pitot tube factor
 - Correction factor
- Humidity process data
 - H2O2 percentage by weight
 - Humidity process pressure

Editing display settings

You can set the brightness and contrast of the display.

1. Select **Display Settings** with ► or ▲ and confirm selection with **SET**.
2. Select **Backlight** or **Contrast** with ► or ▲ and confirm selection with **SET**.

One of the following parameters can now be selected using ► or ▲, after which the selection must be confirmed with **SET**:

- **Backlight**

The display illumination is changed.

Edit/select parameter with ► or ▲, confirm with **SET** or cancel entry with **ESC** (the effect of the change in parameter can be seen during input).

- **Contrast**

The brightness difference between the display background and the displayed values is changed.

Edit/select parameter with ► or ▲, confirm with **SET** or cancel entry with **ESC** (the effect of the change in parameter can be seen during input).

- **Backlight 24h on**
Select **On** or **Off** using ► or ▲ and confirm with **SET**.
Off: The display light switches off automatically if no button was pressed for 10 seconds.
On: The display light is activated
- 3. Return to **Display Settings** with **ESC** and use ► or ▲ to continue to **Language**.

Selecting language

You can select the language for the plain text line in the display.

- > Press **SET**, select required language with ► or ▲, confirm selection with **SET** and return to language.



Only choose a language that you can understand well.

Editing code settings

You can set the access code (password).



If a code other than "0000" (factory setting) is set, the transmitter can only be operated once this code has been entered via the menu.

1. Select **Code** with ► or ▲ and confirm selection with **SET**.
2. Scroll one digit to the right using ► and increase value of digit by 1 using ▲. Confirm with **SET** or abort entry with **ESC**.
3. Return to **Code** with **ESC** and use ► or ▲ to continue to **Change parameters**.

Select unit (Change unit)

This setting affects the displayed unit of all readings.

1. Select **Change parameters** with ► or ▲, confirm selection with **SET** or cancel with **ESC**.
2. Select **Change unit** with ► or ▲, confirm selection with **SET** or cancel with **ESC**.
3. Select the required variable (absolute pressure/temperature) with ► or ▲, confirm selection with **SET** or cancel with **ESC**.
4. Select the required unit with ► or ▲, confirm selection with **SET** or cancel with **ESC**.
5. Return to **Change unit** with **ESC** and continue to **Standard data** with ► or ▲.

Editing standard data

Setting individual values for the standard data to calculate the volumetric flow rate.

1. Select **Standard data** with ► or ▲, confirm selection with **SET** or cancel with **ESC**.
2. Select the required variable (absolute pressure/temperature) with ► or ▲, confirm selection with **SET** or cancel with **ESC**.
3. Scroll one digit to the right using ► and increase value of digit by 1 using ▲. Confirm with **SET** or abort entry with **ESC**.
4. Return to **Standard data** with **ESC** and use ► or ▲ to continue to **Pressure process data**.

Editing pressure process data

Setting of the process data for the Pitot tube calculation.

1. Select **Pressure process data** with ► or ▲ and confirm selection with **SET**.
2. Select the required variable (absolute pressure/humidity/temperature/cross-section/Pitot tube factor/correction factor) with ► or ▲, confirm selection with **SET** or cancel with **ESC**.
3. Scroll one digit to the right using ► and increase value of digit by 1 using ▲. Confirm with **SET** or abort entry with **ESC**.
4. Return to **Pressure process data** with **ESC** and use ► or ▲ to continue to **Humidity process data**.

Editing Humidity process data

This menu is only used to parameterize humidity measurements in H₂O₂ atmospheres (e.g. in sterilization processes) and determines whether °C_{tm}, °F_{tm} or %rH_m is the output parameter.

1. Select **Humidity process data** with ► or ▲ and confirm selection with **SET**.
2. Select **H2O2 weight prop.** with ► or ▲, confirm selection with **SET** or cancel with **ESC**.
The selection **H₂O₂ passively vaporized** or **H₂O₂ actively vaporized** in the submenu describes whether H₂O₂ is generated by means of evaporation or is actively vaporized in the process.
3. Select **H₂O₂ passively vaporized** or **H₂O₂ actively vaporized** with ► or ▲ and confirm with **SET**.
4. Edit proportion by weight of the H₂O₂ in % (% H₂O₂ proportion by weight in the liquid initial solution): Scroll one digit to the right using ► and increase value of digit by 1 using ▲. Confirm with **SET** or abort entry with **ESC**.
5. Return to **H2O2 weight prop.** with **ESC** and use ► or ▲ to continue to **Humidity process pressure**.
6. Select **Humidity process pressure** with ► or ▲ and confirm selection with **SET**.

7. Edit humidity process pressure: Scroll one digit to the right using ► and increase value of digit by 1 using ▲. Confirm with **SET** or abort entry with **ESC**.
8. Return to **Change parameters** with **ESC**.
9. Return to **Main Menu Settings** with **ESC**.

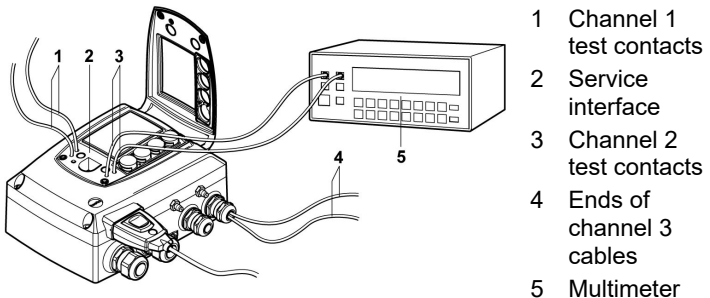
4.4.6.6. Editing Main Menu Analysis

You can test the functionality of analog and relay outputs. In addition, you can read off the minimum and maximum values (since the last voltage supply or reset of the min./max. values).

Testing functionality of analog outputs

i This function affects the analog outputs directly, not only the test contacts.

1. In the Measuring Mode press **SET**, select main menu **Analysis** with ► or ▲ and confirm selection with **SET**.
- **Test Analog Output** is shown.
2. Press **SET** and choose between **Analog output 1, 2, 3** with ► or ▲.
3. Press **SET**, scroll one digit to the right using ► and increase value of digit by 1 using ▲. Any analog output value can be predefined, e.g. for an analog output of 4 to 20 mA, the value "6.0 mA". Confirm with **SET** or abort entry with **ESC**.
4. Accept setting by pressing **SET** and test with multimeter (minimum requirement: resolution 6.5 digits, at least 2-times more accurate than the 6381) as follows:
Analog output 1 or 2: Via test contacts under service flap, see diagram.



Analog output 3: Connect measuring cables to terminals for channel 3, guide measuring cables out of housing and perform measurement outside of the transmitter, see diagram.

6. Return to **Test Analog Output** with **ESC** and use ► or ▲ to continue to Test Relay Output.

Testing functionality of the pressure sensor (Test pressure sensor)



This function is only required to calibrate the pressure sensor.

Testing functionality of relay outputs

1. Press **SET** and choose between **Alarm 1, 2, 3, 4** with ► or ▲.
2. Press **SET**.

The relay can now be tested. You can choose between **OFF** and **ON** using ► or ▲. If **ON** is chosen, the NO contact is closed, the NC contact opened. If **OFF** is chosen, the NC contact is closed, the NO contact opened.
3. To test, route a measuring cable from the relay terminals (see 4.3.2.3. Connecting the relay outputs) out of the transmitter to a multimeter (resistance measurement) or continuity tester.
4. Return to **Test Relay Output** with **SET** (starts relay test) or **ESC** (exits the menu without relay test).

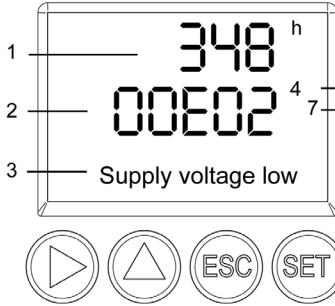
Reading off min./max. values of channels

To reset the max./min. values, see 4.4.6.10. Editing Reset main menu.

1. Read off the min./max. values of the three channels in succession with ► or ▲ and return to the Main Menu Analysis with **ESC**.
2. Continue to **Main Menu Message** with ► or ▲ or return to Measuring Mode with **ESC**.

4.4.6.7. Editing Message main menu

Messages can be confirmed/acknowledged, the last messages can be called up and the display of the messages can be switched on or off.



- 1 Operating hours at the time of message
- 2 Message code (see 4.5. Status, warning and error messages).
- 3 Message text
- 4 Message number (example: "4/7" refers to the fourth of seven messages)
- 5 Number of messages present (example: "4/7" refers to the fourth of seven messages)

i Using the P2A software (see volume 2, 7. Parameterizing, adjusting and analyzing software (P2A software)) you can predefine whether messages are to be shown in the display.

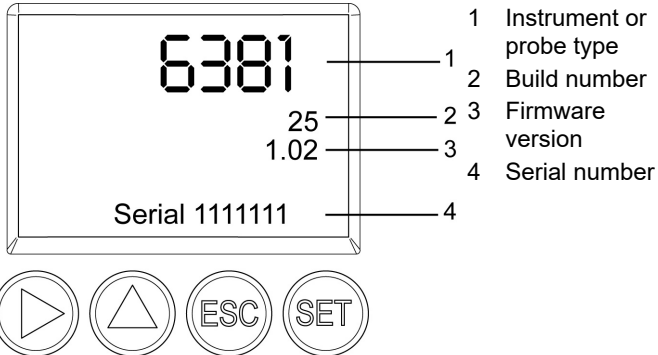
1. In the Measuring Mode press **SET**, select **Main Menu Message** with **▶** or **▲** and confirm selection with **SET**.
2. Confirm **Confirm message** using **SET**.
3. Select **Last messages** with **▶** or **▲** and confirm with **SET**.
4. Scroll between the warning and error messages recorded so far using **▶** or **▲** and return to **Last messages** using **ESC**.
5. Select **Information** with **▶** or **▲** and confirm with **SET**.
6. Scroll between the status messages recorded so far using **▶** or **▲** and return to **Information** using **ESC**.
7. Continue to **Display of message** with **▶** or **▲**.
ON: Measurements are shown on the display in Measuring Mode.
OFF: No messages shown on display.
8. Select **ON** or **OFF** with **▶** or **▲** and confirm selection with **SET**.
9. Return to **Main Menu Message** with **ESC**.

10. Continue to **Main Menu Ident** with **▶** or **▲** or return to Measuring Mode with **ESC**.



An overview of the messages can be found in 4.5. Status, warning and error messages.

4.4.6.8. Calling up Main Menu Ident



The serial numbers of the transmitter and probe can be read off.

1. In the Measuring Mode press **SET**, select **Main Menu Ident** with **▶** or **▲** and confirm selection with **SET**.
 - The type, firmware version, build number and serial number of the transmitter are displayed.



This information is required when servicing.

2. Return to **Main Menu Ident** with **ESC** or read off the type, firmware release, build number and serial number of the probe with **▶** or **▲** and then return to **Main Menu Ident** with **▶** or **▲**.
3. Continue to **Main Menu Adjust** with **▶** or **▲** or return to Measuring Mode with **ESC**.

4.4.6.9. Editing Main Menu Adjust

A reference value can be entered for both relative humidity (RH) and temperature (°C/°F) for the 1-point adjustment. Please refer to the description in 4.3.2.9. 1-point adjustment (offset - humidity/temperature).

Reference values for pressure can be entered for the n-point adjustment. Please refer to the description in 4.3.2.12. n-point adjustment (pressure).

In addition, the analog outputs can be adjusted. Also see 4.3.2.11. Analog output adjustment, for instructions on how to do this.



The 2-point adjustment for the adjustment points 20 %RH and 80 %RH is carried out via the user menu.

For the adjustment points 11.3 %RH and 75.3 %RH, the 2-point adjustment is carried out via the adjustment buttons or the P2A software, see 4.3.2.10. 2-point adjustment (humidity/temperature), or volume 2, 7.3.4.2. 2-point adjustment.

Enter reference value for 1-point adjustment

Please also refer to 4.3.2.9. 1-point adjustment (offset - humidity/temperature)

1. In the Measuring Mode press **SET**, select main menu **Adjust** with **▶** or **▲** and confirm selection with **SET**.
 - **Reference value % RH** is displayed.
2. Press **SET**, edit value: Scroll one digit to the right using **▶** and increase value of digit by 1 using **▲**. Confirm with **SET** or abort entry with **ESC**.
3. Continue to **Reference value temp** with **▶** or **▲**.
4. Press **SET**, **Reference value °C** or **Reference value °F** is displayed.
5. Press **SET**, edit value: Scroll one digit to the right using **▶** and increase value of digit by 1 using **▲**. Confirm with **SET** or abort entry with **ESC**.
6. Continue to **Analog Adj. Ch. 1** with **▶** or **▲**.
7. Continue with the adjustment of the analog outputs (see below, step 2) or press **ESC** to return to main menu **Adjust**.
8. Continue to main menu **Reset** with **▶** or **▲** or return to Measuring Mode with **ESC**.

Performing the 2-Points-Adjustment for 20% RH and 80 % RH

1. In the Measuring Mode press **SET**, select main menu **Adjust** with **▶** or **▲** and confirm selection with **SET**.
2. Continue to **2Pt Adjust 20/80%** with **▶** or **▲**.
3. Press **SET**.
4. Continue to **Adj. Point 20%** or **Adj. Point 80%** with **▶** or **▲**.
5. Confirm selection with **SET**
 - The red LED **ADJ** flashes
 - In the display **2Pt Adjust 20/80%**, **1-point adjustment**, **Probe reset** appears consecutively.
 - The adjusted measurement values appear after probe reset

Performing analog adjustment

Please refer to 4.3.2.11. Analog output adjustment.

1. In the Measuring Mode press **SET**, select main menu **Adjust** with **▶** or **▲** and confirm selection with **SET**.



Each channel is adjusted at three points in the analog range (at 10 %; 50 %; 90°% of the analog scale).

2. Select **Analog Adj. Ch. 1** with **▶** or **▲** and confirm with **SET**.
3. Use **▶** or **▲** to select **Adj. Point 1**.
4. Press **SET**. Read off multimeter display (e.g. 5601 mA) and enter this value in the user menu. Do this by scrolling one digit to the right using **▶** and increasing the value of digit by 1 using **▲**. Confirm with **SET** or abort entry with **ESC**.
5. Use **▶** or **▲** to select **Adj. Point 2**.
6. Press **SET**. Read off multimeter display (e.g. 12,001 mA) and enter this value in the user menu. Do this by scrolling one digit to the right using **▶** and increasing the value of digit by 1 using **▲**. Confirm with **SET** or abort entry with **ESC**.
7. Use **▶** or **▲** to select **Adj. Point 3**.
8. Press **SET**. Read off multimeter display (e.g. 18,401 mA) and enter this value in the user menu. Do this by scrolling one digit to the right using **▲** and increasing the value of digit by 1 using **▶**. Confirm with **SET** or abort entry with **ESC**.
9. With **▶** or **▲** continue to **Analog Adj. Ch. 2 or 3** (repeat steps 3 to 8).
10. Return to main menu **Adjust** with **ESC**.
11. Continue to main menu **Reset** with **▶** or **▲** or return to Measuring Mode with **ESC**.

Performing the pressure adjustment

Please refer to 4.3.2.12. n-point adjustment (pressure).

1. In the Measuring Mode press **SET**, select main menu **Adjust** with **▶** or **▲** and confirm selection with **SET**.



The pressure adjustment can be performed at 3 to 6 adjustment points.

2. Select **Adjust Pressure** with **▶** or **▲** and confirm with **SET**.
3. Use **▶** or **▲** to select **Adj. Point 1**.
4. Press **SET**. Read off pressure sensor display (e.g. 30.1 Pa) and enter this value in the user menu. Do this by scrolling one digit to the right using **▶** and increasing the value of digit by 1 using **▲**. Confirm with **SET** or abort entry with **ESC**.
5. Repeat steps 1 to 4 for adjustment points 2 to 6.
6. Return to main menu **Adjust** with **ESC**.

7. Continue to main menu **Reset** with ► or ▲ or return to Measuring Mode with **ESC**.

4.4.6.10. Editing Reset main menu

You can reset the factory settings for the following:

- Instrument
- Sensor/probe
- Min./max. values



Resetting to the factory settings means resetting to the order specification, i.e. the specific condition at the time of supply to the customer.

1. In the Measuring Mode press **SET**, select **Main Menu Reset** with ► or ▲ and confirm selection with **SET**.
 - **Reset Device** to factory settings is displayed.
2. Select the setting to be reset using ► or ▲ and confirm selection with **SET**.
 - **Reset Completed** is displayed.
3. Return to the reset setting with **ESC** or **SET** and return to **Main Menu Reset** with **ESC**.
4. Continue to **Main Menu Channel 1** with ► or ▲ or return to Measuring Mode with **ESC**.

4.5. Status, warning and error messages

To achieve optimum operational reliability (machine availability), the transmitter shows the following via the user menu or the P2A software

- Status messages
- Warning messages
- Error messages

The status and warning messages for the respective testo 6610 probes connected to the transmitter can be evaluated via the P2A software.

All messages are stored in the transmitter with an operating hours stamp. Use the user menu (see 4.4.6.7. Editing Message main menu) or the P2A software (see volume 2, 7.3.5. Transmitter history) to view the message history.

In the transmitter, the last 60 status messages and the last 120 error and warning messages are stored in a ring memory. There is no limit in the P2A software.

4.5.1. Status messages

Status messages show the current operating status of the testo 6381.

Message	Display	Description
02506	Sensor initialization	Message appears while the transmitter is starting up. If the message disappears, the transmitter is ready for operation.
01D19	Service plug	The Mini-DIN socket is connected to: the USB adapter for P2A software, the adjustment adapter or the service plug (is not recorded/no number)
00300	New limit value	The limit value has been changed or shifted
00301	Scaling changed	The scaling has been changed
00500	Transmitter reset	The transmitter was reset to the factory settings and is restarted.
0052F	Reset Min/Max	Resets all saved Min/Max values for all channels
02518	Probe reset	Probe reset: The probe performs a reset
00503	Reset device to fact	A factory reset of the transmitter was performed
02503	Reset probe to fact	A factory reset of the probe was performed
00530	Change solenoid valve	The solenoid valve should be changed
00307	User Setting Change	User Setting Change: General settings were changed for the transmitter.
00117	Adjustment DeltaP	An n-point adjustment was performed.
02104	Analog adjustment	An analog adjustment has been made
02101	1-point adjustment	A 1-point adjustment is performed.

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Message	Display	Description
02102	2-point adjustment 11.3 %	As part of the 2-point adjustment, an adjustment is performed at 11.3 % RH
02103	2-point adjustment 75.3 %	As part of the 2-point adjustment, an adjustment is performed at 75.3 % RH
02120	2-point adjustment 20 %	As part of the 2-point adjustment, an adjustment is performed at 20 % RH
02130	2-point adjustment 80 %	As part of the 2-point adjustment, an adjustment is performed at 80 % RH
02105	Self-adjustment active	For testo 6615 probe only: The probe performs an automatic self-adjustment

4.5.2. Warning messages

Warning messages show an early warning or a current malfunction which may negatively impact measuring.

Message	Display	Cause	Remedying of fault
00809	Pressure too high**	The process pressure exceeds the pressure intended for the transmitter	Remove the transmitter from the process and take any necessary measures to lower the pressure
00E00	T ambient high**	The ambient temperature exceeds the permissible temperature for the transmitter	Take necessary measures to lower ambient temperature, e.g. through venting or cooling
00E01	T ambient low**	The ambient temperature is below the permissible temperature for the transmitter	Take necessary measures to raise ambient temperature, e.g. through heating
00E04/00E05	Supply voltage low**	The supply voltage is below the minimum voltage required for the transmitter	Take measures to ensure sufficient voltage supply

Message	Display	Cause	Remedying of fault
02822	T process high**	The process temperature exceeds the temperature designated for the probe	Remove the probe from the process and take any necessary measures to lower the process temperature
02821	T process low**	The process temperature is below the temperature designated for the probe	Take necessary measures to raise process temperature
0081C	Alarm 1**	Depending on the parameterization of the relays	Depending on the parameterization of the relays
0081D	Alarm 2**	Depending on the parameterization of the relays	Depending on the parameterization of the relays
0081E	Alarm 3**	Depending on the parameterization of the relays	Depending on the parameterization of the relays
0081F	Alarm 4**	Depending on the parameterization of the relays	Depending on the parameterization of the relays
02900	2-point adjustment drift*	In the 2-point adjustment, corrections repeatedly occur in the same direction; this may indicate a sensor drift	Send the probe into Testo Service
02806	Condensation*	100 % RH has been reached, condensation developing	Take measures to reduce process humidity
02807	Values less than 0 % RH**	The adjustment or sensor is faulty	Check adjustment (via P2A adjustment history, perform 2-point adjustment where necessary). If the problem persists, contact Testo Service

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Message	Display	Cause	Remedying of fault
02809	Sensor early warning*	For testo 6617 probe only: The cover electrode of the sensor is damaged; this may soon cause the sensor to break	Carry out visual inspection. If the mirror-like surface of the sensor is dirty or damaged, contact Testo Service

* Early warning

** Current malfunction

4.5.3. Transmitter error messages

Error messages show a current malfunction.

Message	Display	Cause	Remedying of fault
03401	No probe signal	The probe communication is interrupted	Ensure that the probe connector is fully engaged in the transmitter. If communication still cannot be established, contact Testo Service
03508	Wrong probe	The connected probe is not compatible with the present transmitter	Use a compatible probe Note: Probe 661x for transmitter 638x
01505	Watchdog error	Due to a processor error, the transmitter performs an automatic restart	If the problem occurs frequently, contact Testo Service
0300A	% RH short-circuit	Short-circuit in humidity sensor	Contact Testo Service
0300B	% RH sensor broken	The humidity sensor is damaged (sensor broken)	Contact Testo Service
0300C	T short-circuit	Short-circuit in temperature sensor	Contact Testo Service
0300D	T sensor broken	The temperature sensor is damaged (sensor broken)	Contact Testo Service

Message	Display	Cause	Remedying of fault
03105	Self-adjustment error	For testo 6615 probe only: The automatic self-adjustment was faulty	Contact Testo Service
03106	Adjustment error	The adjustment of the probe was faulty	Contact Testo Service
01115	Low adjustment temperature	The ambient temperature is too low during the pressure adjustment	Take necessary measures to raise ambient temperature, e.g. through heating
01116	High adjustment temperature	The ambient temperature is too high during the pressure adjustment	Take necessary measures to lower ambient temperature, e.g. through venting.
03000	Heat function defective	For testo 6614 probe only: Heat function defective	Contact Testo Service

4.5.4. Handling alarm messages

Shown on the display ⁶	Can be used for collective alarm ⁷	Additional message end ⁸
New limit value	x	
Scaling changed	x	
Pressure too high	x	x
Delta p adjustment	x	
Alarm 1		x
Alarm 2		x
Alarm 3		x

⁶ If multiple messages/alarms are activated at the same time, only the last message/alarm is shown. If this is cancelled, the other messages that are still active are no longer displayed.

⁷ The message can be assigned the collective alarm function, which means that the collective alarm is activated as soon as at least one of the messages assigned to it is activated. The collective alarm can be assigned to each of the 4 optional relays. The collective alarm is then always the same, as it can only be defined once.

⁸ The message is shown upon the occurrence of the event causing the message as well as when closing. Two entries appear in the history in the P2A software: Message text_start and Message text_end.

4 Transmitter

Shown on the display⁶	Can be used for collective alarm⁷	Additional message end⁸
Alarm 4		x
Transmitter reset	x	
Reset Min/Max		
Transmitter refresh	x	
User Setting Change		
Analog adjustment	x	
1-point adjustment	x	
2-point adjustment 11.3%	x	
2-point adjustment 75.3 %	x	
Probe reset	x	
2-point adjustment drift	x	
T ambient high	x	x
T ambient low	x	x
Supply voltage low	x	x
T process high	x	x
T process low	x	x
Condensation	x	x
Values less than 0 % RH	x	x
Sensor early warning	x	
No probe signal	x	
Watchdog error	x	
% RH short-circuit	x	x
% RH sensor broken	x	x
T short-circuit	x	x
T sensor broken	x	x
Heat function defective	x	x

Perform the **Confirm message** function (acknowledgement of the alarm via the control keys on the transmitter):

- The message/alarm is no longer shown on the display and the optical alarm goes out, where applicable. If multiple messages/alarms are active at the same time, all are reset simultaneously.
- If at least one message is assigned to the collective alarm, the collective alarm is reset. If the collective alarm is set on a relay, the relay is also reset, meaning switched to its neutral position.

4.5.5. Namur fault conditions

If the faults named in the following table occur, the analog outputs output special values that enable a general fault warning in the higher-level control system. The values correspond to the "Namur" industry standard.

Status message in the display	Display value in display	Class	Analog output				
			0 to 20 mA	4 to 20 mA	1 V	5 V	10 V
No probe signal	None	Error	21 mA	21 mA	1.1 V	5.5 V	11 V
Wrong probe	None	Error	21 mA	21 mA	1.1 V	5.5 V	11 V
Values < 0 %RH	uuuuu	Underrange	0 mA	3.8 mA	0 V	0 V	0 V
Condensation	ooooo	Overrange	20.5 mA	20.5 mA	1.1 V	5.5 V	11 V
% RH short-circuit	-----	Error	21 mA	21 mA	1.1 V	5.5 V	11 V
% RH sensor broken	-----	Error	21 mA	21 mA	1.1 V	5.5 V	11 V
T short-circuit	-----	Error	21 mA	21 mA	1.1 V	5.5 V	11 V
T sensor broken	-----	Error	21 mA	21 mA	1.1 V	5.5 V	11 V
T process low	uuuuu	Underrange	0 mA	3.8 mA	0 V	0 V	0 V
T process high	ooooo	Overrange	20.5 mA	20.5 mA	1.1 V	5.5 V	11 V
Probe disconnected	None	Error	21 mA	3.8 mA	1.1 V	5.5 V	11 V

4 Transmitter

Status message in the display	Display value in display	Class	Analog output				
Watchdog error	Previous value stops	Error	21 mA	3.8 mA	1.1 V	5.5 V	11 V
Value below min. scale	Reading	Underrange	0 mA	3.8 mA	0 V	0 V	0 V
Value above max. scale	Reading	Overrange	20.5 mA	20.5 mA	1.1 V	5.5 V	11 V
Pressure too high	oooo	Overrange	20.5 mA	20.5 mA	1.1 V	5.5 V	11 V
Heat function defective	-----	Error	21 mA	21 mA	1.1 V	5.5 V	11 V

4.6. Maintenance and cleaning

4.6.1. Maintaining the instrument

We recommend that the adjustment and settings of the transmitter be checked at regular intervals using the

- User menu (4.4. Operation) or
- P2A software (volume 2, 7. Parameterizing, adjusting and analyzing software (P2A software))

Convenient "remote monitoring" of the transmitter can be implemented, for example by using a relay as a collective alarm (see 4.4.6.4. Using alarm as collective alarm or not using it at all) whose messages are forwarded to a local alarm transmitter (horn, light) or PLC.

4.6.2. Cleaning the instrument

- Only clean the instrument carefully with a moist cloth.
- Do not use aggressive cleaning agents.
- Do not use any solvents.



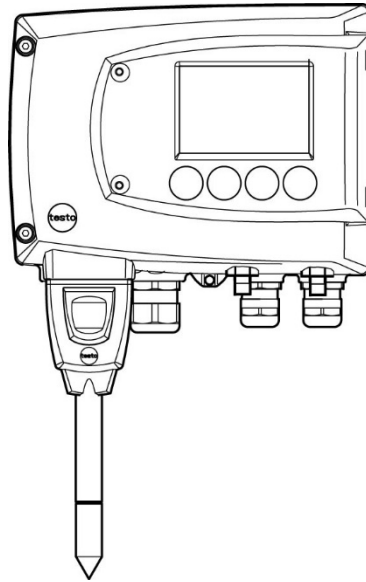


testo 6381 · differential pressure transmitter

testo 6610 · Probes

P2A software · Parameterizing, adjusting and analyzing software

Instruction manual Volume 2





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6 testo 6610 probes

6.1. Specifications

6.1.1. Functions and use

The plug-in, adjusted probes from the testo 6610 family are used together with the testo 6381 transmitter.

These measuring units are suitable for the following applications, for example:

- Process instrumentation
- Clean rooms
- Test benches
- Drying processes
- Production and storage air quality
- Complex room climate applications.

6.1.1.1. Digital probes:

The probes are adjusted in the factory and transmit their adjustment data to the internal memory of the testo 6381 transmitter. The information is only transmitted between the probes and transmitter digitally. The probes can therefore be disconnected from the transmitter for adjustment or servicing while the transmitter itself can remain at the measuring point.



Hint: We recommend in this case that a probe of the same type be inserted into the transmitter immediately in order to be able to continue measuring with minimal interruption.

The transmitter identifies the probe and records that a probe was connected in the history.



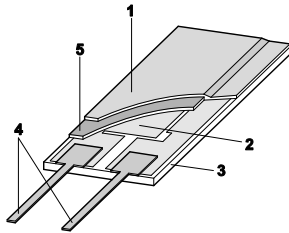
The testo 6381 transmitter can only be used with testo 6610 probes.

6.1.1.2. The Testo humidity sensor

With the Testo humidity sensor, which has been in successful use and continually improved for more than ten years, the focus has from the very beginning been on both accuracy parameters, namely measuring uncertainty and long-term stability.

The capacitive humidity sensor is in principle a plate capacitor consisting of two electrically conductive plates (electrodes **(1)** and **(2)**, see diagram below) opposite each other.

A humidity-sensitive polymer (**5**) serves as the dielectric. The special feature lies in the perfect way the individual layers are matched to each other. This is evident particularly in the top electrode, which has to perform two tasks that, at first glance, appear contradictory: it must be completely permeable to the water vapour that is to be fed into the polymer dielectric, but at the same time it must be impervious, smooth and repellent to condensate, oil and dirt in order to protect the sensor.



- 1 Cover electrode
- 2 Bottom electrode
- 3 Substrate (ceramic substrate for mechanical protection)
- 4 Connections (protected against corrosion)
- 5 Dielectric layer



The humidity sensor cannot be exchanged by the customer (except for 6611). The humidity sensor may not be damaged or touched. Contamination and damage lead to an impairment of the measurement and the measuring accuracy.

6.1.1.3. Self-diagnosis

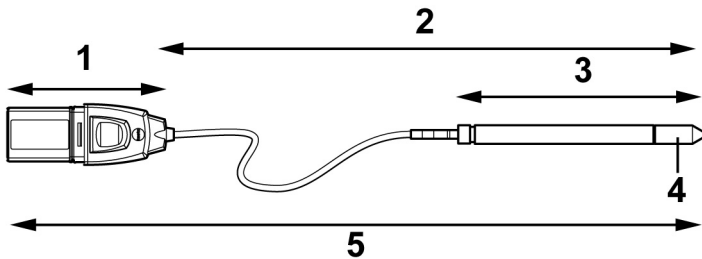
The probes in the testo 6610 range monitor their functionality themselves and report the following faults:

- Sensor breaks
- Sensor short-circuit
- Condensation
 - The condensation message is issued at a reading of 100 % RH and deactivated once the readings are within the valid range.
- Error message with drift at the adjustment points
- Value for relative humidity less than 0 % RH.
 - The trigger threshold is set at -2 % RH. This means that an error message is only issued once a clear effect is discernible.
- Early warning when sensor corrosion is starting to develop
 - The testo 6617 probe is able to signal the first signs of corrosion. The probe can thus be changed at an early stage without interrupting the machine availability.
- Self-adjustment (testo 6615 only)
- Excess temperature
 - Error message if permissible process temperature is exceeded

6.1.2. Design of the probe

The probes of the testo 6610 family are made up of the following components (included in delivery):

- Probe connector
- Probe shaft with protection cap and sensors (% RH and °C or °F)
- Mounting bracket (for testo 6612 duct version)
- Probe cable (testo 6612 to 6617 duct and cable versions), bend radius minimum \varnothing 50 mm.



- 1 Probe connector
- 2 Probe length
- 3 Probe
- 4 Protection cap, sensor underneath
- 5 Probe

6.1.3. Accessories

The following accessories are available for the probes from the testo 6610 family:

- Filters and protection caps ().
- Calibration certificate in accordance with ISO and DAkkS (see 8.2. Accessories and spare parts).

6.2. Product description

6.2.1. Overview of probe and filter types

6.2.1.1. Probe version

A detailed description of the probe versions can be found from testo 6611 6.2.2. wall probe, onwards.

The following probe versions are available for the testo 6381 transmitter:

Version	Article no.	Characteristic
testo 6611	0555 6610-L11	Wall probe version; accuracy to ± 1 % RH; temperature range -20 to +70 °C/-4 to +158 °F, plug-on sensor
testo 6612	0555 6610-L12	Duct probe version; accuracy to ± 1 % RH; temperature range -30 to +150 °C/-22 to +302 °F, sensor soldered
testo 6613	0555 6610-L13	Duct probe version; accuracy to ± 1 % RH; temperature range -70 to +180 °C/-94 to 356 °F, sensor soldered
testo 6614	0555 6610-L14	Heated cable probe version; accuracy to ± 1 % RH; temperature range -40 to +180 °C/-40 to 356 °F, sensor soldered
testo 6615	0555 6610-L15	Trace humidity cable probe version; accuracy to ± 6 K at -60 °Ctd; temperature range -40 to +120 °C/-40 to +248 °F, sensor soldered
testo 6617	0555 6610-L17	Cable with cover electrode monitoring probe version; accuracy to ± 1.2 % RH; temperature range -40 to +180 °C/-40 to +356 °F, sensor soldered

6.2.1.2. Determining the accuracy/measuring uncertainty

The entries for the measuring uncertainty for the probe are determined in accordance with GUM (Guide to the Expression of Uncertainty in Measurement/DIN V ENV 13005).

All parts that make up the measuring uncertainty given by Testo are listed below. When comparing the measuring uncertainty/accuracy between manufacturers, which components are included is to be taken into account. In many cases, not all elements that contribute to measuring uncertainty are assessed, for

example if the error contribution of the production adjustment for some manufacturers is shown separately or not at all.

The measuring uncertainty of the probe includes the sensor and its electronics as well as the output of the digital measuring signal:

- | | | |
|---|-----------------------------|---|
| 1 | Linearity including scatter | Systematic error and scattering of the components (due to manufacturing tolerances) |
| 2 | Hysteresis | Hysteresis indicates the maximum deviation of the readings that are obtained when you set the same value for the parameter, once coming from a smaller value, once coming from a larger value (humidity sensors actually have no hysteresis, but rather very slow adjustment effects that appear to be hysteresis when considered only for a short period.) |
| 3 | Reproducibility | Repeatability (scattering of the readings in the event of the same parameter being entered successively) |
| 4 | Production adjustment area | The measuring uncertainty of the reference instruments of the adjustment area (including the reference instrument) in production |
| 5 | Uncertainty of the testing | Uncertainty of the procedure for determining points 1 and 2 |

6.2.1.3. Ordering options for testo 6610 probe (0555 6610)

Order code	Characteristic
Lxx Probe type	
L11	Probe 6611
L12	Probe 6612
L13	Probe 6613
L14	Probe 6614
L15	Probe 6615
L17	Probe 6617
Mxx Protection caps	
M01	Protection cap made of stainless steel
M02	Protection cap made of wire mesh

Order code	Characteristic
M03	Protection cap made of PTFE
M04	Metal protection cap (open)
M06	PTFE protection cap with condensate drip hole
M07	Protection cap made of PTFE with condensate drip hole and condensation protector
M08	Protection cap for H ₂ O ₂ atmospheres
Nxx Cable length	
N00	Without cable (testo 6611)
N01	1 m cable length (testo 6613, 6614, 6615, 6617)
N02	2 m cable length (testo 6613, 6614, 6615, 6617)
N05	5 m cable length (testo 6613, 6614, 6615, 6617)
N10	10 m cable length (testo 6613, 6614, 6615, 6617)
N23	Cable length specifically for duct versions (testo 6612)
Pxx Probe length	
P12	Probe length approx. 120 mm (testo 6613)
P20	Probe length approx. 200 mm (testo 6611, 6612, 6613, 6614, 6615, 6617)
P30	Probe length approx. 300 mm (testo 6612, 6613, 6614)
P50	Probe length approx. 500 mm (testo 6612, 6613, 6614, 6615, 6617)
P80	Probe length approx. 800 mm (testo 6612, 6613)

6.2.1.4. Protection caps

One of the following protection caps can be used for each probe version:

Filter*	Article no. **	Characteristic	Length A (mm)
M01	0554 0647	Protection cap made of stainless steel	33

6 testo 6610 probes

Filter*	Article no. **	Characteristic	Length A (mm)
M02	0554 0757	Protection cap made of wire mesh	40.3
M03	0554 0759	Protection cap made of PTFE	35
M04	0554 0755	Metal protection cap (open)	35
M06	0554 9913	PTFE protection cap with condensate drip hole	35
M07	0554 9913 + 0554 0166	Protection cap made of PTFE with condensate drip hole and condensation protector	35 55
M08	0554 6000	Protection cap for H ₂ O ₂ atmospheres	35

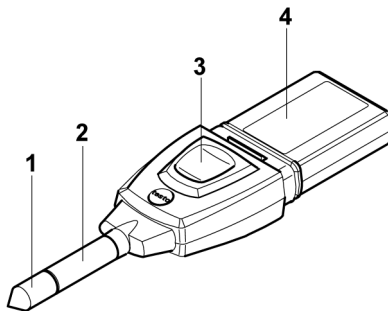
* When ordering the probe, please use this protection cap code, cf. Ordering options for testo 6.2.1.4. 6610 probe (0555 6610).

** When purchasing a replacement (protection cap only), please use this order number.

6.2.2. testo 6611 wall probe

The wireless testo 6611 probe is inserted into the testo 6381 transmitter mounted on the wall and ready-wired.

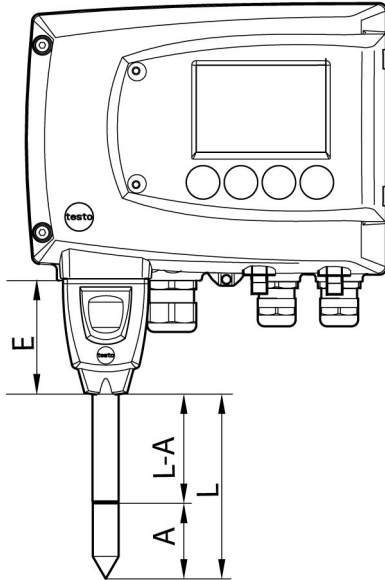
At a glance



- 1 Protection cap
- 2 Probe shaft
- 3 Key
- 4 Connector

Application

- Monitoring and regulating the production and storage air quality when manufacturing and storing hygroscopic products
- Meeting the top accuracy requirements
- Clean room applications for which a metal housing is required



Technical data

Parameters

- Humidity (% RH/°C_{td}/°F_{td}) etc.
- Temperature

Measuring range

- Humidity: 0 to 100 % RH⁹
- Temperature: -20 to +70 °C/-4 to +158 °C

Material

- Probe shaft: Stainless steel
- Connector: ABS plastic

Accuracy (at 25 °C/77 °F)*

- **Length 200 mm**
- Humidity
 - ±1.0 % RH / drift per year
 - ± (1.0 % RH + 0.007 x reading) for 0 to 90 % RH
 - ± (1.4 % RH + 0.007 x reading) for 90 to 100 % RH

⁹ For constant use in high humidity (> 80% rF at ≤ 30°C for > 12 h, > 60% rF at > 30°C for > 12 h), please contact us via www.testo.com/service-contact

- 0.02 % RH/K, dependent upon the process temperature (with a deviation of 25 °C/+77 °F)
- 0.02 % RH/K, dependent upon the electronics temperature (with a deviation of 25 °C/+77 °F)
- Temperature
 - ± 0.15 °C (0.27 °F) with slope PT1000 class AA
 - * Refer to the charts below for the correlation between temperature and accuracy.

Reproducibility

- Better than ± 0.2 % RH

Sensor

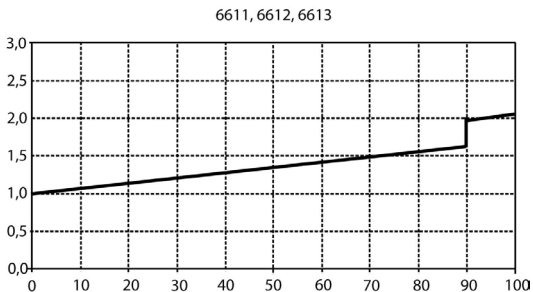
Response time without protective filter: t 90 max. 15 sec.

Probe dimensions

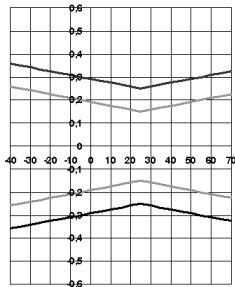
- Diameter of probe shaft: 12 mm
- E = 55 mm
- L = 200 mm
- L – A = 165 mm
- A, see 6.2.1.4. Table Protection caps

Measuring accuracy of testo 6611 wall probe

Humidity error, absolute $|\pm\% \text{ RH}|$ as a factor of process humidity (% RH)



Temperature error as a factor of process temperature and temperature of electronics



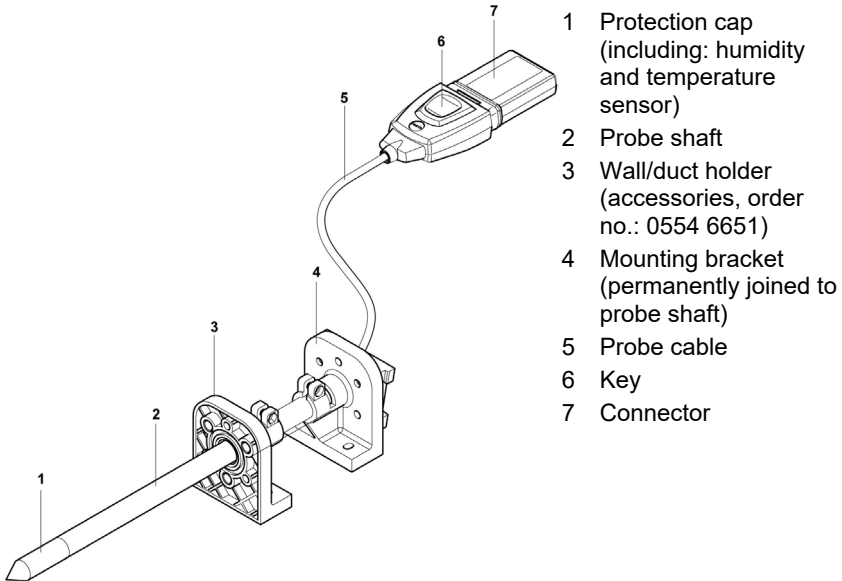
Grey line: System error 6381 + probe, electronics 25 °C/+77 °F

Black line: System error 6381 + probe, electronics -25 to 70 °C/-13 to 158 °F

6.2.3. testo 6612 duct probe

The testo 6612 probe measures the humidity and temperature in air ducts.

At a glance



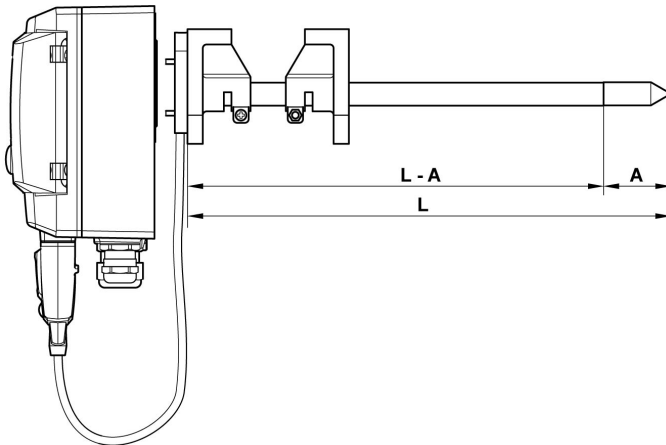
WARNING

In the event of overpressures, the probe may become a projectile.

- > Mount the probe pressure-tight (see pressure resistance under Technical data)

Application

- Monitoring and regulating the production and storage air quality in air ducts when manufacturing and storing hygroscopic products
- Meeting the top accuracy requirements
- Air duct applications for which a metal housing is required



Technical data

Parameters

- Humidity
- Temperature

Measuring range

- Humidity: 0 to 100 % RH ¹⁰
- Temperature: -30 to +150 °C/-22 to +302 °F

¹⁰ For constant use in high humidity (> 80% rF at ≤ 30°C for > 12 h, > 60% rF at > 30°C for > 12 h), please contact us via www.testo.com/service-contact

Material

- Probe shaft: Stainless steel
- Line: Sheathed, FEP
- Connector: ABS plastic

Accuracy (at 25 °C/77 °F)*

- Humidity
 - ± 1.0 % RH / drift per year
 - $\pm (1.0$ % RH + 0.007 x reading) for 0 to 90 % RH
 - $\pm (1.4$ % RH + 0.007 x reading) for 90 to 100 % RH
 - 0.02 % RH/K, dependent upon the process temperature (with a deviation of 25 °C/+77 °F)
 - 0.02 % RH/K, dependent upon the electronics temperature (with a deviation of 25 °C/+77 °F)
- Temperature
 - ± 0.15 °C (0.27 °F) with slope PT1000 class AA

* Refer to the charts below for the correlation between temperature and accuracy.

Reproducibility

- Better than ± 0.2 % RH

Sensor

- Response time without protective filter: t 90 max. 15 sec.

Probe dimensions

- Diameter of probe shaft: 12 mm
- L = approx. 200/300/500/800 mm
- L – A = 165/265/465/765 mm
- A, see 6.2.1.4. Table Protection caps

Cable length incl. probe shaft and filter

- Customized for duct version

Pressure resistance

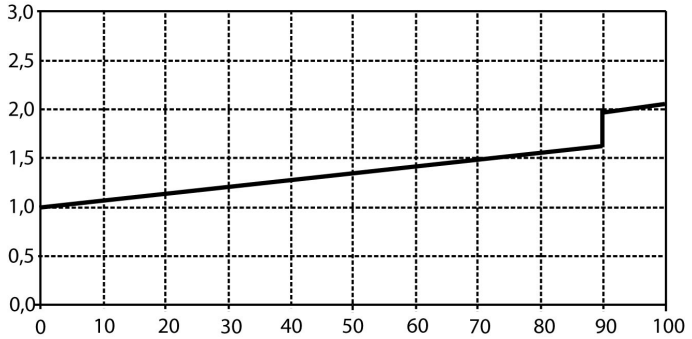
- PN 10 (probe tip)**

** If installing probe under pressure, use cutting ring screw connection (order no. 0554 1795).

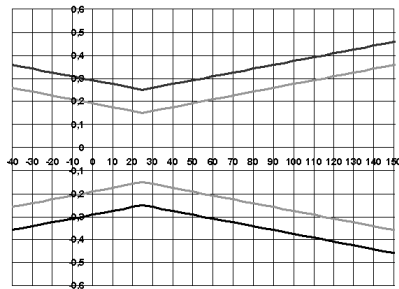
Measuring accuracy of testo 6612 duct probe

Humidity error, absolute $|\pm\% \text{ RH}|$ as a factor of process humidity (% RH)

6611, 6612, 6613



Temperature error as a factor of process temperature and temperature of electronics



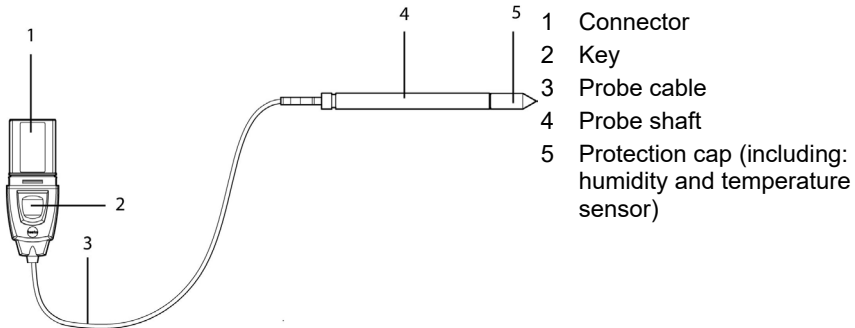
Grey line: System error 6381 + probe, electronics 25 °C/+77 °F

Black line: System error 6381 + probe, electronics -25 to 70 °C/-13 to 158 °F

6.2.4. testo 6613 cable probe

The testo 6613 probe is used when the spatial separation of the transmitter and probe is required.

At a glance



⚠ WARNING

In the event of overpressures, the probe may become a projectile.

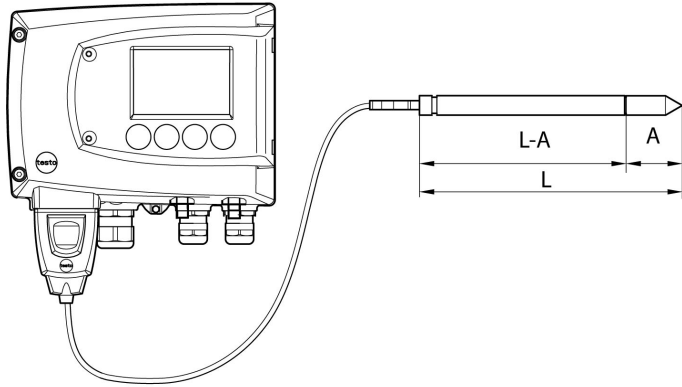
- > Mount the probe pressure-tight (see pressure resistance under Technical data)

Application

- Monitoring and regulating industrial humidity processes (apart from high-humidity processes), e.g. food production, storing fruit
- Monitoring the production and storage air quality when manufacturing and storing hygroscopic products
- Meeting the top accuracy requirements
- Clean room applications
- Applications for which a sturdy metal housing is required.



Testo recommends that the testo 6614 (heated) probe be used for continuous high-humidity processes.



Technical data

Parameters

- Humidity
- Temperature

Measuring range

- Humidity: 0 to 100 % RH¹¹
- Temperature: -70 to +180 °C/-94 to +356 °F

Material

- Probe shaft: Stainless steel
- Line: Sheathed, FEP
- Connector: ABS plastic

Accuracy (at 25 °C/77 °F)*

- Humidity
 - ± 1.0 % RH / drift per year
 - $\pm (1.0$ % RH + 0.007 x reading) for 0 to 90 % RH
 - $\pm (1.4$ % RH + 0.007 x reading) for 90 to 100 % RH
 - 0.02 % RH/K, dependent upon the process temperature (with a deviation of 25 °C/+77 °F)
 - 0.02 % RH/K, dependent upon the electronics temperature (with a deviation of 25 °C/+77 °F)
- Temperature
 - ± 0.15 °C (0.27 °F) with slope PT1000 class AA

¹¹ For constant use in high humidity (> 80% rF at ≤ 30 °C for > 12 h, > 60% rF at > 30 °C for > 12 h), please contact us via www.testo.com/service-contact

* Refer to the charts below for the correlation between temperature and accuracy.

Reproducibility

- Better than ± 0.2 % RH

Sensor

- Response time without protective filter: t 90 max. 15 sec.

Probe dimensions

- Diameter of probe shaft: 12 mm
- L = approx. 120/200/300/500/800 mm
- L – A = 85/165/265/465/765 mm
- A, see 6.2.1.4. Overview of probe and filter types.

Probe length incl. probe shaft and filter

- 1/2/5/10 m

Pressure resistance**

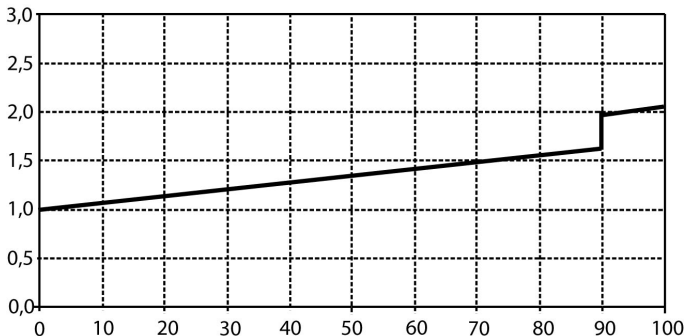
- PN 10 (probe tip)
- PN 1 (if end of probe/cable is involved in process)

** If installing probe under pressure, please use cutting ring screw connection (order no. 0554 1795).

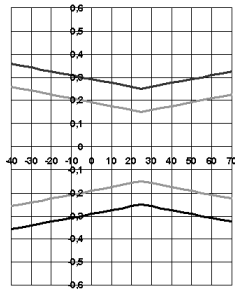
Measuring accuracy of testo 6613 cable probe

Humidity error, absolute $|\pm\% \text{ RH}|$ as a factor of process humidity (% RH)

6611, 6612, 6613



Temperature error as a factor of process temperature and temperature of electronics



Grey line: System error 6381 + probe, electronics 25 °C/+77 °F

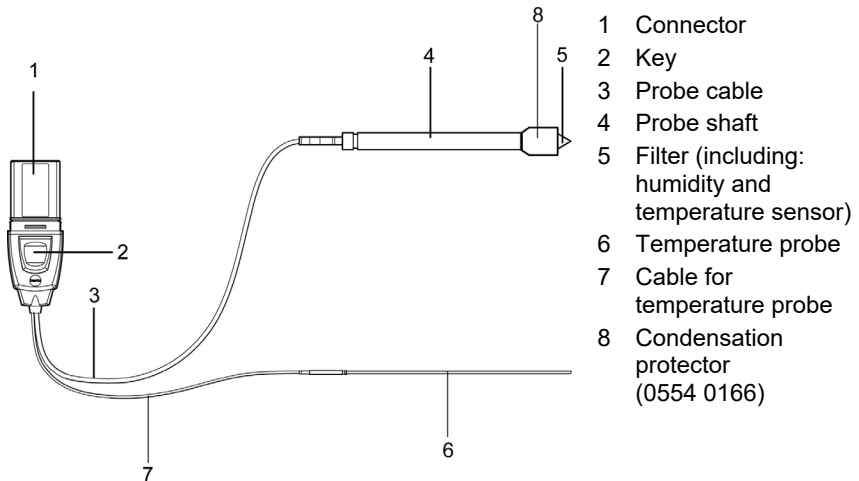
Black line: System error 6381 + probe, electronics -25 to 70 °C/-13 to 158° F

6.2.5. testo 6614 heated cable probe

The testo 6614 heatable probe is suitable for use in high-humidity processes in which there is the possibility of condensation for the probe.

i Also see volume 1, 4.3.2.13. High-humidity adjustment for testo 6614, for the functional principle of the testo 6614.

At a glance



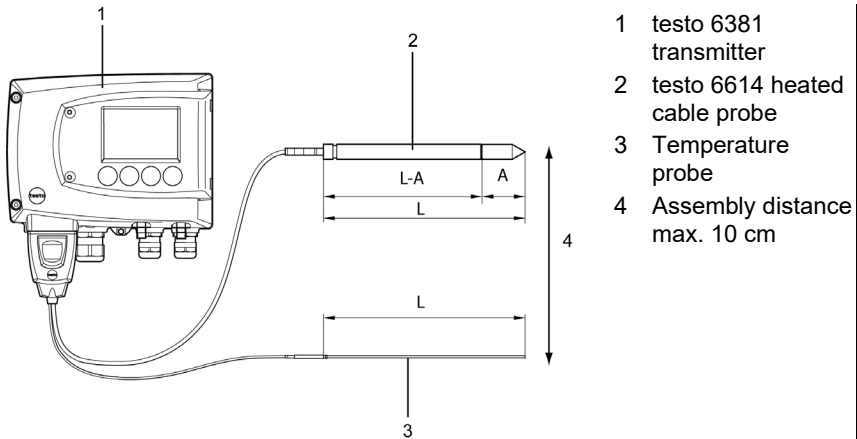
⚠ WARNING

In the event of overpressures, the probe may become a projectile.

- > Mount the probe pressure-tight (see pressure resistance under Technical data)

Application

- Monitoring and regulating high-humidity processes, e.g. drying (ceramics, tobacco, wood, food) and maturing (cheese, fruit).
- At flow velocities > 1 m/s, an additional measuring uncertainty, not higher than +1.5 % RH, is to be expected. To prevent this error and ensure the highest measuring accuracy: Use condensation protector 0554 0166.



Technical data

Parameters

- Humidity
- Temperature

Measuring range

- Humidity: 0 to 100 % RH
- Temperature: -40 to + 180 °C/-40 to 356 °F

Material

- Probe shaft: Stainless steel
- Line: Sheathed, FEP
- Connector: ABS plastic

Accuracy (at 25 °C/77 °F)*

- Humidity (values valid when using condensation protector 0554 0166)
 - ± 1.0 % RH / drift per year
 - $\pm (1.0$ % RH + $0.007 \times$ reading) for 0 to 100 % RH
 - 0.02 % RH/K, dependent upon the process temperature (with a deviation of 25 °C/+77 °F)
 - 0.02 % RH/K, dependent upon the electronics temperature (with a deviation of 25 °C/+77 °F)
 - Temperature
 - ± 0.15 °C (0.27 °F) with slope PT1000 class AA
- * Refer to the charts below for the correlation between temperature and accuracy.

Reproducibility

- ± 0.2 % RH better

Sensor

- Response time without protective filter: t 90 max. 15 sec.

Probe dimensions

- Diameter of probe shaft: 12 mm
- Diameter of temp. probe: 3 mm
- L = approx. 200/500 mm
- L – A = 165/465 mm
- A see 6.2.1.4. Overview of probe and filter types.

Probe length incl. probe shaft and filter

- 1/2/5/10 m

Pressure resistance**

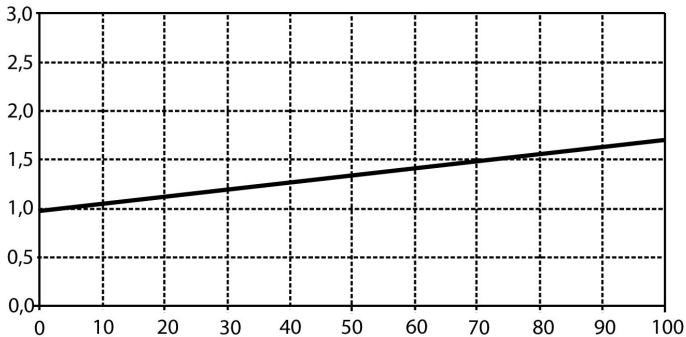
- PN 10 (probe tip)
- PN 1 (if end of probe/cable is involved in process)

** If installing probe under pressure, please use cutting ring screw connection (order no. 0554 1795).

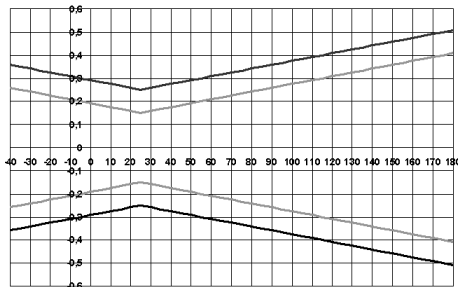
Measuring accuracy of heated testo 6614 cable probe

Humidity error, absolute $|\pm\% \text{ RH}|$ as a factor of process humidity (% RH)

6614



Temperature error as a factor of process temperature and temperature of electronics



Grey line: System error 6381 + probe, electronics 25 °C/+77 °F

Black line: System error 6381 + probe, electronics -25 to 70 °C/-13 to 158° F

6.2.6. testo 6615 trace humidity cable probe (self-adjustment)

The testo 6615 probe corrects deviations in measurements by means of self-adjustment. This has a particular significance with low humidity values (in dewpoint range).

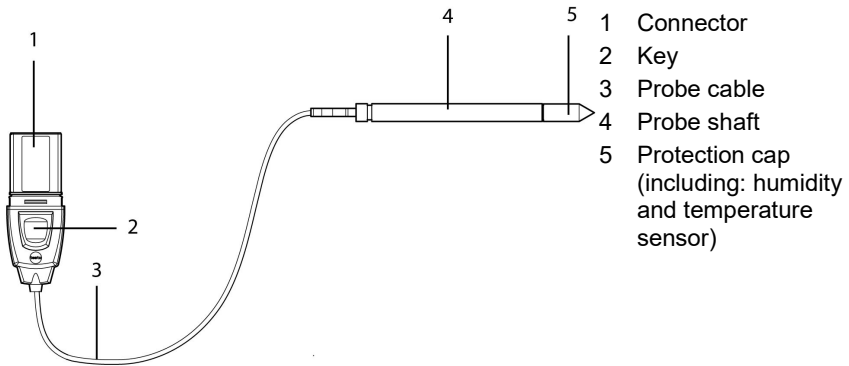


Also see volume 1, 4.3.2.14. **Self adjustment of testo 6615 trace humidity probe**, for the functional principle of the testo 6615.

Only use testo 6615 with sintered PTFE protection cap (art. no. 0554 0759) or sintered stainless steel protection cap (art. no. 0554 0647).

During the self-adjustment phase the signal values of the analog outputs remain on hold, meaning they are frozen for the duration.

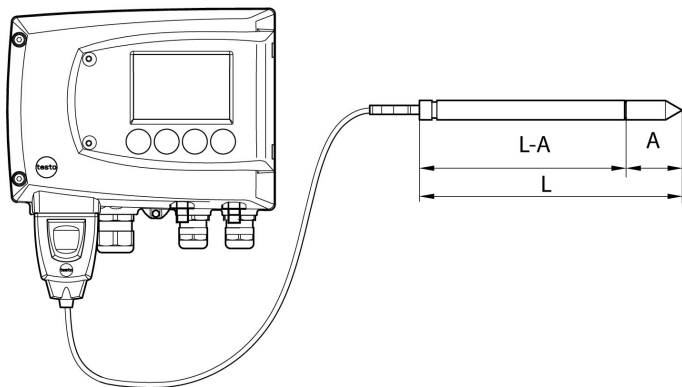
At a glance



⚠ WARNING
In the event of overpressures, the probe may become a projectile.
> Mount the probe pressure-tight (see pressure resistance under Technical data)

Application

- Monitoring and regulating trace humidity processes (compressed air with adsorption or membrane driers and plastic granulate driers)
- Used when spatial separation of transmitter and probe is required.



Technical data**Parameters**

- Dewpoint
- Temperature

Measuring range

- Dewpoint: -40 to + 30 °C_{td}/-148 to +212 °F_{td}
- Temperature: -40 to ±120 °C/-40 to +248 °F
- (Temp. durability up to +180 °C/+356 °F)

Material

- Probe shaft: Stainless steel
- Line: Sheathed, FEP
- Connector: ABS plastic

Accuracy (at 25 °C/77 °F)*

- Humidity
 - ±1.0 % RH / drift per year
 - Dewpoint
 - ± 1 K at 0 °C_{td}/+32 °F_{td}
 - ± 2 K at -40 °C_{td}/-40 °F_{td}
 - ± 4 K at -50 °C_{td}/-58 °F_{td}
 - ± 6 K at -60 °C_{td}/-76 °F_{td}
 - Dependent on the process temperature (deviation of 25 °C / 77 °F)
 - ± 0.1 Ktd/K at -40 °C to 25 °C/-40 °F to +77 °F
 - ± 0.2 Ktd/K at 25 °C to 50 °C/77 °F to 122 °F
 - ± 0.4 Ktd/K at 50 °C to 120 °C/122 °F to 248 °F
 - Temperature
 - ±0.15 °C (0.27 °F), slope PT1000 class AA
- * Refer to the charts below for the correlation between temperature and accuracy.

Sensor

- Response time without protective filter: t 90 max. 15 sec.

Probe dimensions

- Diameter of probe shaft: 12 mm
- L = approx. 200/500 mm
- L – A = 165/465 mm
- A see 6.2.1.4. Overview of probe and filter types.

Cable length incl. probe shaft and filter

- 1/2/5/10 m

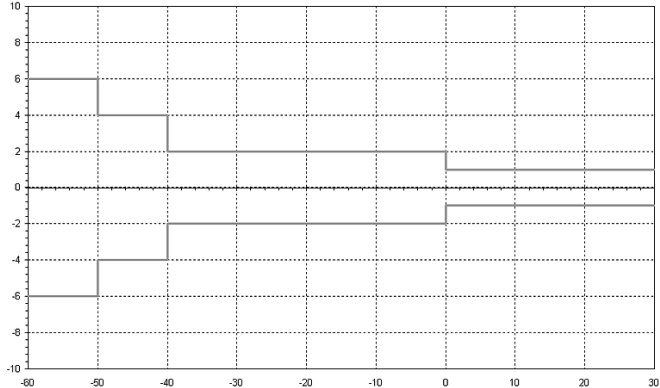
Pressure resistance

- PN 16 (probe tip)**

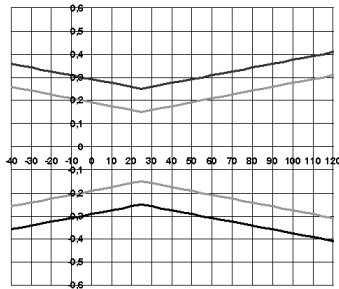
** If installing probe under pressure, please use cutting ring screw connection (order no. 0554 1795).

Measuring accuracy of testo 6615 trace humidity cable probe

Dewpoint error, absolute $|\pm\% \text{ RH}|$ as a factor of process dewpoint ($^{\circ}\text{C}_{\text{td}}$)



Temperature error as a factor of process temperature and temperature of electronics

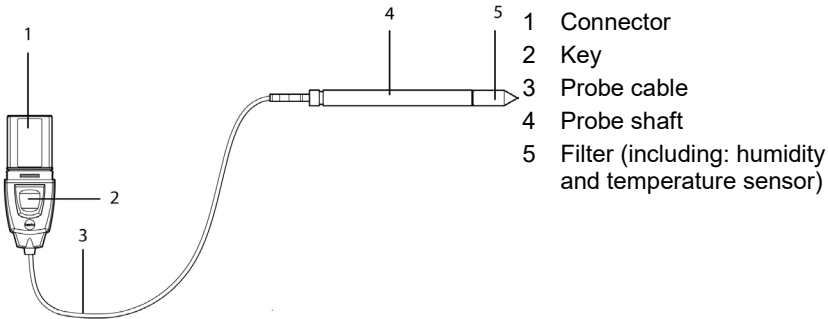


Grey line: System error 6381 + probe, electronics 25 °C/+77 °F

Black line: System error 6381 + probe, electronics -25 to 70 °C/-13 to 158 °F

6.2.7. testo 6617 cable probe (self-monitoring)

The testo 6617 probe is used if spatial separation of the transmitter and probe is required, particularly for media (gases, vapours) which can jeopardize/damage the humidity sensor (the testo 6617 has a self-monitoring and early-warning function for such applications).

At a glance**⚠ WARNING**

In the event of overpressures, the probe may become a projectile.

- > Mount the probe pressure-tight (see pressure resistance under Technical data)

Application

- Monitoring and regulating industrial humidity processes involving corrosive media (apart from high-humidity processes) with the exception of applications with HCL, HF and other acids and acidifiers in larger concentrations (SO₂, SO₃, NO₂)
- Meeting the top accuracy requirements
- Applications for which a sturdy metal housing is required

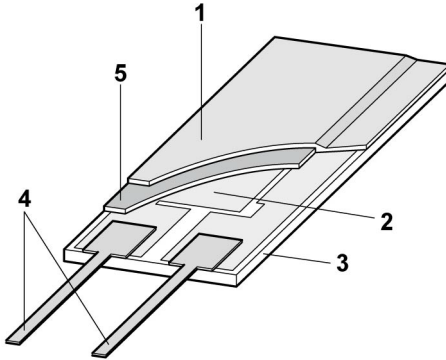


This probe does NOT have a longer life with exposure to aggressive media than the testo 6613, for example. However, early warning of damage to the sensor is given so that machine failures can be avoided.

6.2.7.1. Self-monitoring of cover electrode

Use in harsh ambient conditions with aggressive media in some cases incurs the risk of damage to the sensor.

Damage to the sensor is generally reflected by incorrect readings which occur a long time before the sensor is wrecked. If this damage to the sensor is not spotted until too late, high costs can be incurred due to unusable readings or machine shutdowns and waiting times until the sensor is replaced.



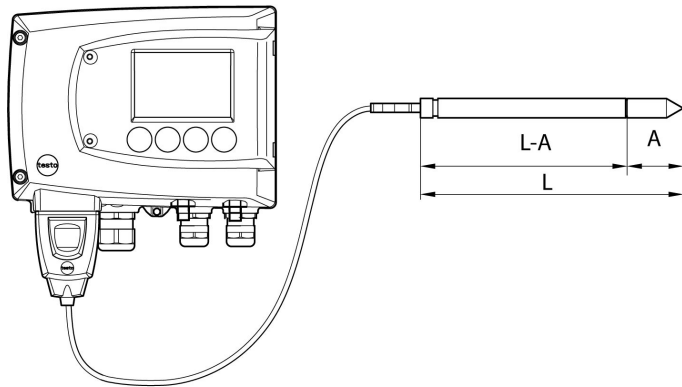
- 1 Cover electrode
- 2 Bottom electrode
- 3 Substrate (ceramic substrate for mechanical protection)
- 4 Connections (protected against corrosion)
- 5 Dielectric layer

The testo 6617 has a unique self-monitoring function.

This allows early detection of damage to the sensor, e.g.:

- Mechanical damage (e.g. scratches)
- Damage from aggressive gases (e.g. acids in aerosol form)
- Swelling or detachment of polymer layer due to effects of solvents

Once the self-monitoring reaches the specific limit value, the probe warning message "Sensor early warning" is issued.



Technical data

Parameters

- Humidity (% RH/°C_{td}/°F_{td})
- Temperature

Measuring range

- Humidity: 0 to 100 % RH¹²
- Temperature: -40 to +180 °C/-40 to 356 °F

Material

- Probe shaft: Stainless steel
- Line: Sheathed, FEP
- Connector: ABS plastic

Accuracy (at 25 °C/77 °F)*

- Humidity
 - ±1.0 % RH / drift per year
 - ± (1.2 % RH + 0.007 x reading) for 0 to 90 % RH
 - ± (1.6 % RH + 0.007 x reading) for 90 to 100 % RH
 - 0.02 % RH/K, dependent upon the process temperature (with a deviation of 25 °C/+77 °F)
 - 0.02 % RH/K, dependent upon the electronics temperature (with a deviation of 25 °C/+77 °F)
- Temperature
 - ±0.15 °C (0.27 °F) with slope PT1000 class AA

* Refer to the charts below for the correlation between temperature and accuracy.

Reproducibility

- Better than ±0.2 % RH

Sensor

- Response time without protective filter: t 90 max. 15 sec.

Probe dimensions

- Diameter of probe shaft: 12 mm
- L = approx. 200/500 mm
- L – A = 165/465 mm
- A see 6.2.1.4. Overview of probe and filter types.

Probe length incl. probe shaft and filter

- 1/2/5/10 m

Pressure resistance

- PN 10 (probe tip)**

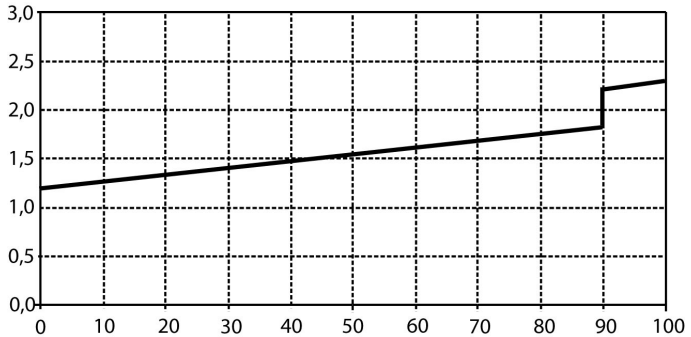
** If installing probe under pressure, please use cutting ring screw connection (order no. 0554 1795).

¹² For constant use in high humidity (> 80% rF at ≤ 30°C for > 12 h, > 60% rF at > 30°C for > 12 h), please contact us via www.testo.com/service-contact

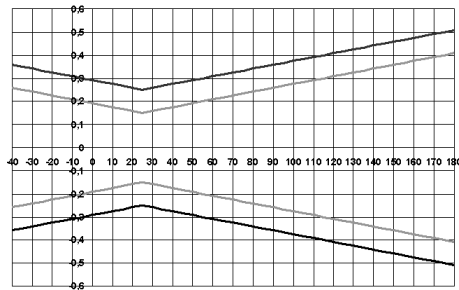
Measuring accuracy of testo 6617 cable probe (self-monitoring)

Humidity error, absolute $|\pm\% RH|$ as a factor of process humidity (% RH)

6617



Temperature error as a factor of process temperature and temperature of electronics



Grey line: System error 6381 + probe, electronics 25 °C/+77 °F

Black line: System error 6381 + probe, electronics -25 to 70 °C/-13 to 158 °F

6.3. Commissioning

6.3.1. Installing the probe

6.3.1.1. Installing the testo 6611 wall probe

The testo 6611 probe (wall version) simply has to be inserted into the socket of the testo 6381 transmitter.

6.3.1.2. Installing the testo 6612 duct probe

A description of the duct mounting of the testo 6612 probe can be found in volume 1, 4.3.1.1. Duct mounting (for testo 6612 probes).

6.3.1.3. Installing testo 6613/6614/6615/6617 probes

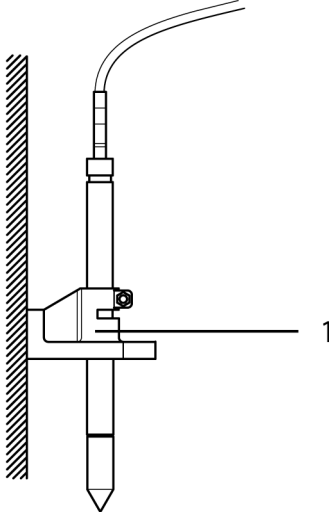
If used with these probes, the testo 6381 transmitter is mounted on the wall, see volume 1, 4.3.1.1. Wall mounting (for testo 6611, 6613, 6614, 6615, 6617 probes).

Install probe according to the application and the measuring and spatial conditions, cf. cases A1 to C below



In processes with which condensate forms at the humidity probe, install the probe vertically (filter points downwards).

A 1 Wall mounting of probe

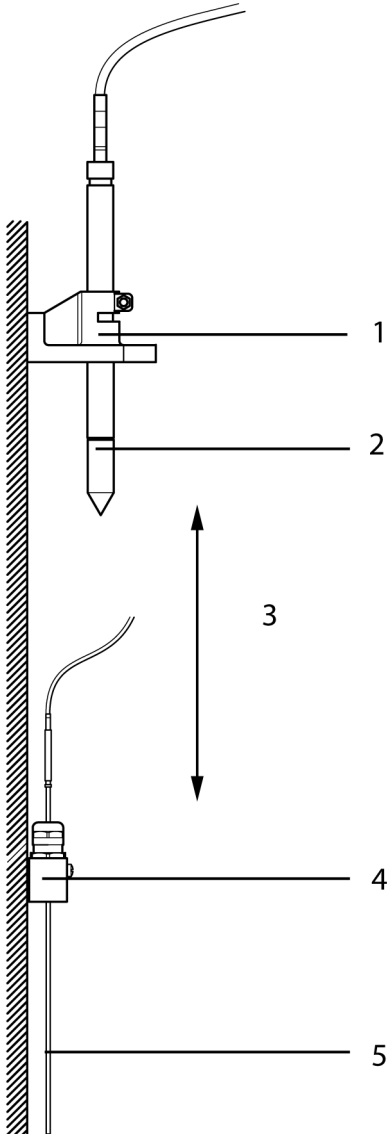


1 Wall/duct holder (order no. 0554 6651)

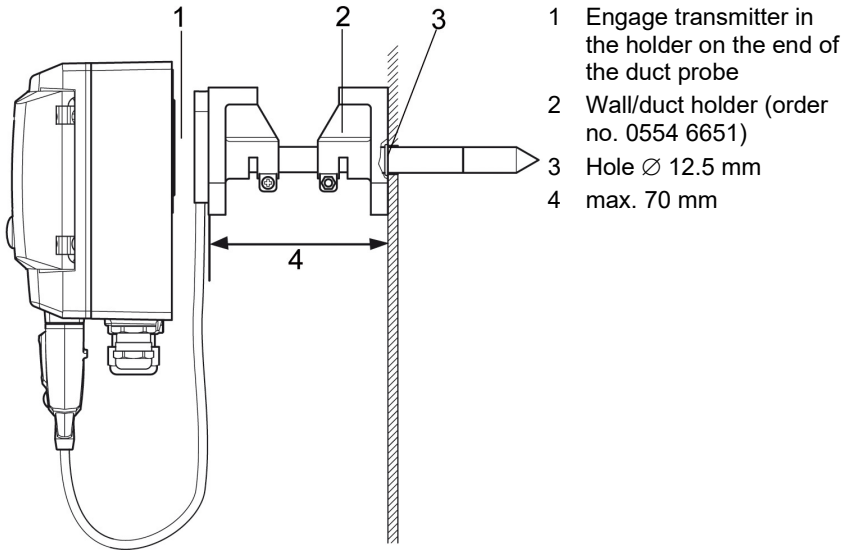
A 2 Wall mounting of testo 6614 heated probe

When mounting the testo 6614 heated probe version, the temperature probe must be secured as close to the humidity probe as possible (max. 10 cm). An appropriate assembly tool is supplied with the testo 6614.

6 testo 6610 probes



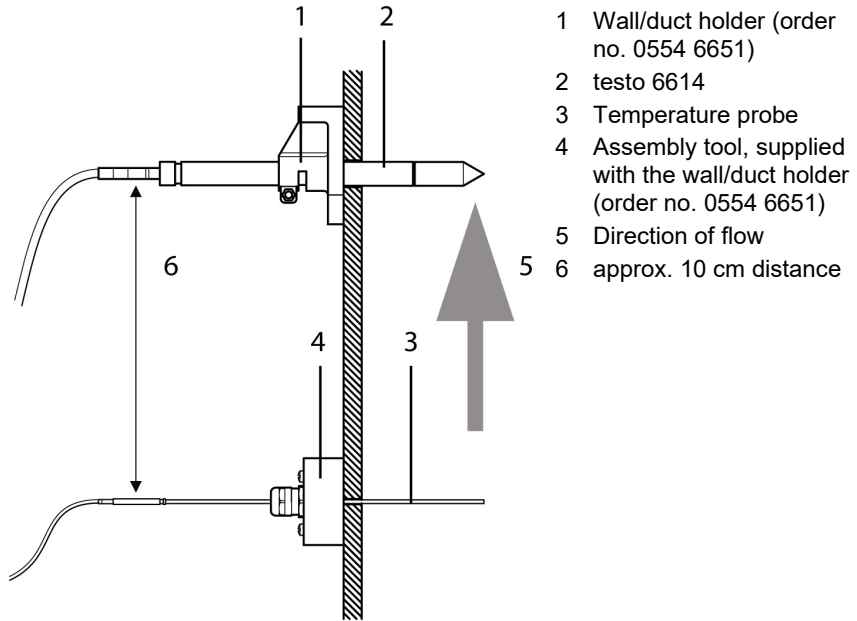
- 1 Wall/duct holder (order no. 0554 6651)
- 2 testo 6614
- 3 Distance of probe tips of humidity probe - temperature probe: As close as possible, but without touching (distance between probe tips max. 10 cm)
- 4 Assembly tool, supplied with the wall/duct holder (order no. 0554 6651)
- 5 Temperature probe

B1 Duct mounting of probe

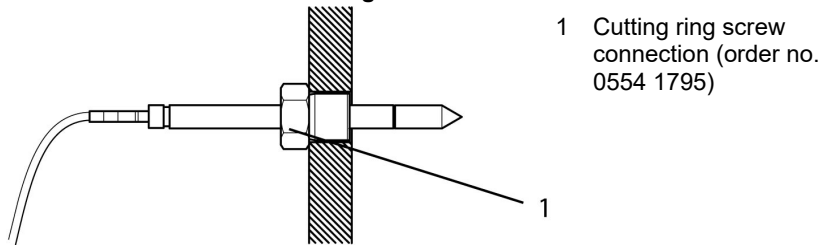
Only atmospheric processes up to approx. 1000 hPa positive pressure. Alternatively, the single-hole duct holder (order no. 0554 1793) can also be used.

B 2 Duct mounting of testo 6614 heated probe

When mounting the testo 6614 heated probe version, the temperature probe must also be secured at a distance of approximately 10 cm from the humidity probe. An appropriate assembly tool is supplied with the testo 6614.



C Process mounting



During installation, ensure that the probe cannot be damaged during operation.

i For the testo 6614 (heated probe version), please use the cutting ring screw connection, order no. 0400 6193, to assemble the temperature probe.

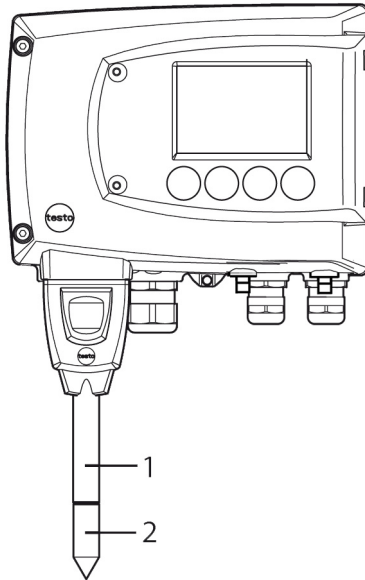
6.3.2. Connecting/removing the probe to/from the transmitter

- Insert probe connector into socket of testo 6381 until it engages. The testo 6381 identifies which probe is connected.
- To remove the probe, the lock release button on the probe must be pressed so that this can be removed.

6.4. Maintenance and cleaning

6.4.1. Replacing filters/protection caps

6.4.1.1. Replacing the filter/protection caps for testo 6611 wall version

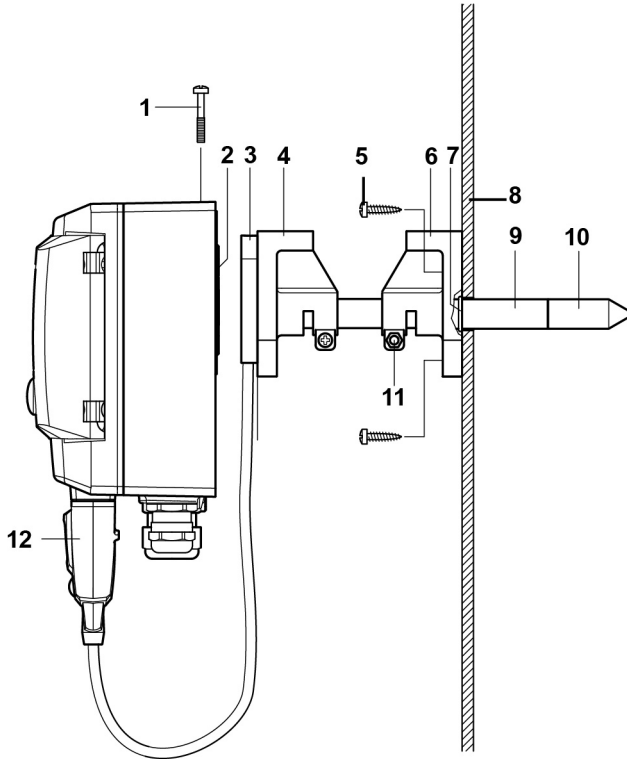


i Do not damage the sensors when exchanging the filter/the protection cap and do not touch their surfaces!

1. Unscrew defective filter/protection cap (2) from probe shaft (1).
 2. Screw new filter/protection cap onto probe shaft.
-

i Screw on protection cap by hand, i.e. do not tighten it using a tool.

6.4.1.2. Replacing the filter/protection cap for testo 6612 duct version



i Do not damage the sensors when exchanging the filter/the protection cap and do not touch their surfaces!

i Hint:
Mark the insertion length of the probe shaft near the screw (11).

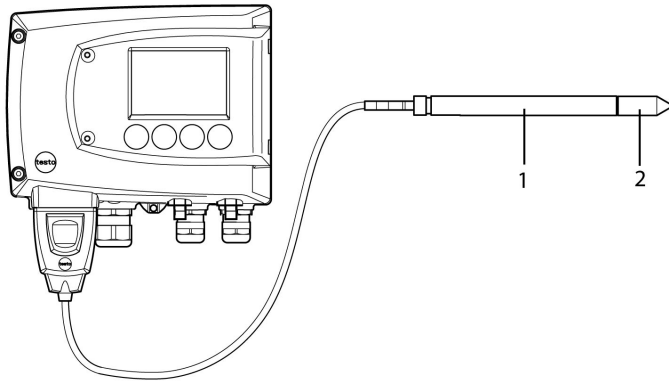
1. Undo screw (11) and pull shaft probe (9) together with filter/protection cap (10) from the wall/duct holder (6).
 2. Unscrew defective filter/protection cap from probe shaft and screw on new filter/protection cap.
-

i Screw on protection cap by hand, i.e. do not tighten it using a tool.

3. Replace O-ring (7) if necessary. Push probe shaft into duct as far as the marking and fix position with screw (11).

6.4.1.3. Replacing the filter/protection cap for duct versions

- i** The following descriptions applies to these probes:
- testo 6613
 - testo 6614
 - testo 6615
 - testo 6617



- i** Do not damage the sensor when exchanging the filter/the protection cap and do not touch its surface!

1. Unscrew defective filter/protection cap (2) from probe shaft (1).
2. Screw new filter/protection cap onto probe shaft.

- i** Screw on protection cap by hand, i.e. do not tighten it using a tool.

6.4.2. Cleaning the instrument and filter/protection cap

- Only clean the instrument carefully with a moist cloth.
- Do not use aggressive cleaning agents.
- Do not use any solvents.
- Unscrew cap or protection cap to clean, clean with compressed air and replace. Take care not to damage the sensor!

6.4.3. Replacing the sensor

Thanks to the probe concept (digital, plug-in), all probes can be changed in situ within seconds if necessary, generally without any interruption to the operation of the machine.

- i** To maintain the extremely high accuracy of the testo 6610 probe, it is not possible for customers to change the sensor. Please contact your Testo Service team for this.

7 Parameterizing, adjusting and analyzing software (P2A software)

7.1. Specifications

The P2A software is used for the parameterizing, adjustment and analysis of testo transmitters. The following applies:

- Generally, all newer testo transmitters (as of 2007) are supported.
- For each newly purchased Testo transmitter, a free software upgrade must be installed, containing the instrument drivers for all transmitters which are connectable at that time.
- This upgrade can be downloaded free of charge at any time from the Testo homepage www.testo.com/download-center (requires registration).

The software must only be bought one time, even for owners of several testo transmitters.

7.1.1. Functions and use

In the P2A software, two different file types are used: The instrument and the parameter file.

Instrument file

The parameters of a particular transmitter are stored in its so-called instrument file. Using this file, the parameters can be edited and the instrument can be tested and adjusted.

Instrument files also contain the respective histories in addition to the parameter data, i.e. "log books" are kept for the previous parameterizations, adjustments and messages (see 7.3.5. Transmitter history).



Instrument files are ".cfm" format files.

Parameter file

Parameter files are not tied to a specific individual transmitter and contain only parameter data/no history data.

If you use various instruments of the same type, you can create parameter files once (e.g. by saving the appropriate instrument file as the parameter file) and transmit these onto the other instruments.



Parameter files are ".cfp" format files.

7.1.2. System requirements

Operating system

- Windows® 7
- Windows® 8
- Windows® 10

Computer

The computer must fulfil the requirements of the respective operating system. The following requirements must additionally be fulfilled:

- Interface USB 1.1 or higher
 - Graphic resolution min. 1024 x 768
-



Date and time settings are automatically taken over from the computer. The administrator must ensure that the system time is regularly synchronized with a reliable time source, in order to guarantee the authenticity of the data.

Software

The P2A software must be purchased and installed separately from the transmitter. If it is a new software version, the transmitter is already supported completely. Older P2A software versions can be updated via the P2A software upgrade.

7.1.3. Scope of delivery

Included in the scope of delivery are:

- P2A software
 - USB driver
-



When working with the parameterizing, adjusting and analyzing software (P2A software), previous knowledge of Windows® operating systems is assumed.

7.2. First steps

7.2.1. Installing the software/driver



Administrator rights are required for installation.

7.2.1.1. Installing P2A software

i Without the input of a licence key, the software will run only as a demo version (time limit 30 days).

1. You can download the software under the following link: <https://www.testo.com/download-center>. If the installation program does not start automatically: > Open download folder and start P2A.exe.
2. Follow the instructions of the installation wizard.
3. Click on [Finish] to complete the software installation.

7.2.1.2. Installing USB driver

1. You can download the USB driver under the following link: <https://www.testo.com/download-center> (Testo USB driver) If the installation program does not start automatically: > Open download folder and start USBDriver.exe.
2. Follow the instructions of the installation wizard.
3. Click on [Finish] to complete the software installation.

7.2.1.3. P2A software upgrade

1. Download and store P2A software upgrade from www.testo.com/download-center (requires registration).
2. Select folder into which the downloaded Zip file was stored, and unzip the file.
3. Start file **P2A upgrade.exe**.
4. Follow instructions from installation assistant.

7.2.2. Starting the software

7.2.2.1. Starting the program

- > Click on **All Programs** (Windows® 7, Windows® 8, Windows® 10) | **Testo** | **P2A- Software**.
-

i In Windows 7® the window **User account control** is opened when starting the software the first time.

- > Click on **Accept**.
-

- The program window is opened (see 7.3.1. User interface).

7.2.2.2. Establishing a connection with the instrument

i The instrument works with limited functionality, if it is only supplied via the service plug. Some settings, which can be parameterized in the P2A software, will only be executed by the instrument, after it has been connected to the electric power supply.

Multiple instruments can be attached, however only one connection is active at all times.

✓ USB driver is installed (see 7.2.1.2. Installing USB driver).

1. Start the P2A software.
2. Connect adapter (supplied with the P2A software) to the service interface of the instrument (see volume 1, 4.2.4. Service interface).
3. Connect instrument/adapter to the PC via the USB interface.
 - The instrument file of the attached instrument is shown in the file list.

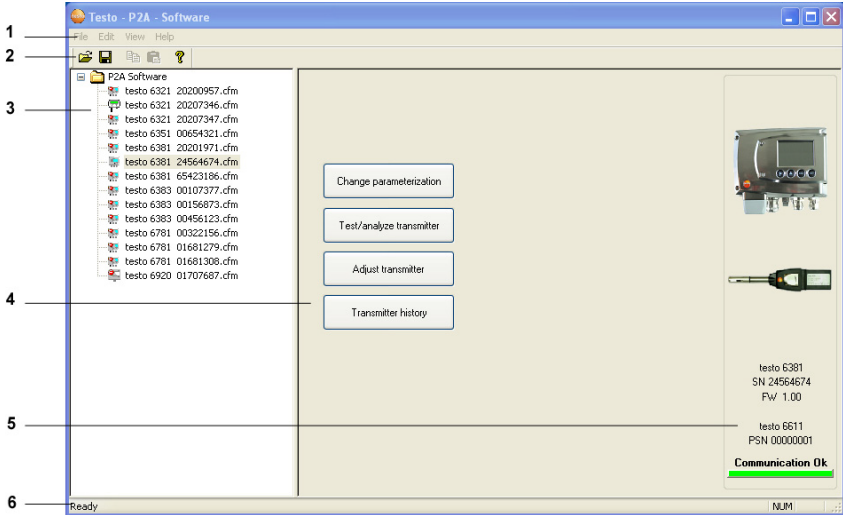
7.2.2.3. Activating the connection with the instrument

- > Click on the desired instrument file.
- The selected file is marked in colour and the connection with the instrument is activated.

If a connection with the instrument is established when the program is started, the corresponding instrument file is marked automatically.

7.3. Using the software

7.3.1. User interface



1 Menu bar:




Menu	Command	Explanation
File	Open	Shows the Windows dialogue for searching and opening files.
	Save as	Saves the parameters of an instrument or parameter file under a new name.
Edit	Copy	Copies the parameters of the marked instrument or parameter file in the cache.
	Paste	Pastes the parameters from the cache in the marked instrument or parameter file.
View	Toolbar Status bar	Activates/deactivates the toolbar or status bar.

7 Parameterizing, adjusting and analyzing software (P2A software)

Menu	Command	Explanation
?	Check instrument connections	Checks the connections to a connected instrument without the instrument having to be activated.
	Service	A text file with the most important information on the computer and the software is opened via Display service data .
	Information	Shows the version number of the P2A software.

2 Toolbar: Shows the Windows-compliant icons for editing.

3 File:

Icon	File	Explanation
 Symbol shows a transmitter	Instrument file	Instrument file Connection to the instrument has been established. <Type> <Serial number>.cfm File name should not be changed.
 Symbol shows a transmitter with a red minus sign in the upper left corner	Instrument file	Instrument file Connection to the instrument has not been established.
 Symbol shows a transmitter with a white P for parameter file in the upper left corner	Parameter file	<Type> <Serial number> <Date> <Time>.cfp File name can be changed. The name can be selected freely, but it is recommended that you retain the reference to the instrument. Parameter files are always marked red; the parameter values they contain are only forwarded to the instrument after being transmitted to the instrument file.

4 Function buttons: Dialogues on editing and testing the instrument are opened by means of the buttons.

[Change parameterization] see 7.3.2.1. Changing instrument/parameter file.

[Test/analyze transmitter] see 7.3.3. Chapter Analyzing/testing the transmitter.

[Adjusting the transmitter] see 7.3.4. Chapter Adjusting the transmitter.

[Transmitter history] see 7.3.5. Transmitter history.

5 File information:

Status	Shown in the window
An instrument file is selected	Type, serial number, firmware version of the instrument.
A parameter file is selected	Type, serial number and firmware version of instrument for which the parameter file was created.
Connection status	Green = connection is active Red = connection is inactive

6 Status bar: Shows the current status when editing via the menu bar.

7.3.2. Editing instrument/parameter file

7.3.2.1. Changing instrument/parameter file

✓ The desired instrument/parameter file is marked.

1. Click on **[Change parameterization]**.

- The **Properties of <Instrument type> <Serial number>** dialogue is opened with the **Change parameterization** register.

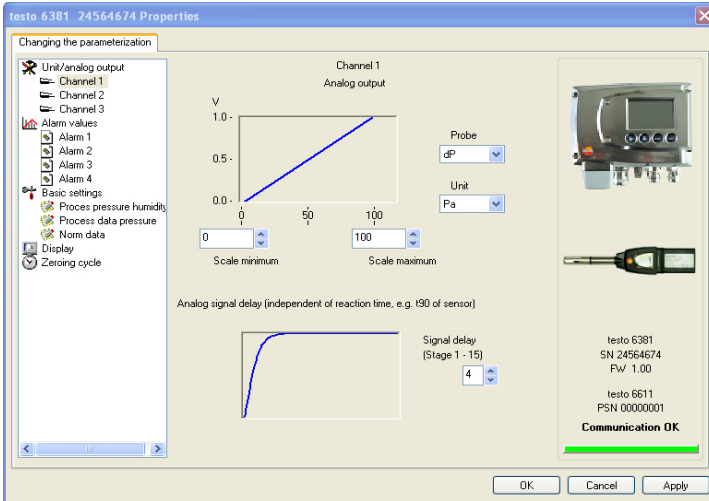
If the parameters were transmitted from other parameter files into the instrument file, a message is shown with which you can transmit the new parameters to the connected instrument using **[Yes]**.

> If the parameters should not be transmitted, click on **[No]**.

2. Change or enter parameters in the corresponding fields.

Field	Explanation
Unit/ Analog output	All analog outputs are parameterized in this mask.

7 Parameterizing, adjusting and analyzing software (P2A software)

Field	Explanation
	
Unit/analog output (graphic)	<p>Unit: 0 to 1 V/5 V/10 V or 0 to 20 mA/4 to 20 mA.</p> <p>Vertical: Current version of the analog output (cannot be changed).</p> <p>Horizontal: Min./max. scale end points of selected unit.</p> <p>The curve changes in accordance with the entered value of scale minimum and maximum.</p>
Scale minimum/maximum	<p>The endpoints of the scaling can be selected up to the stored scale minimum and maximum. In the process, scaling can take place beyond the measuring range in order to adjust the analog output to the customer system, see volume 1, 4.2.8. Scaling.</p>
Unit	<p>Selection of the physical unit.</p> <p>When changing the unit, standard values are set for scale minimum and maximum.</p> <p>Caution!</p> <p>When changing the phys. unit, the relay limit values are set to the assigned default values.</p>
Signal delay (graphic)	<p>Curve changes according to the set signal delay.</p>

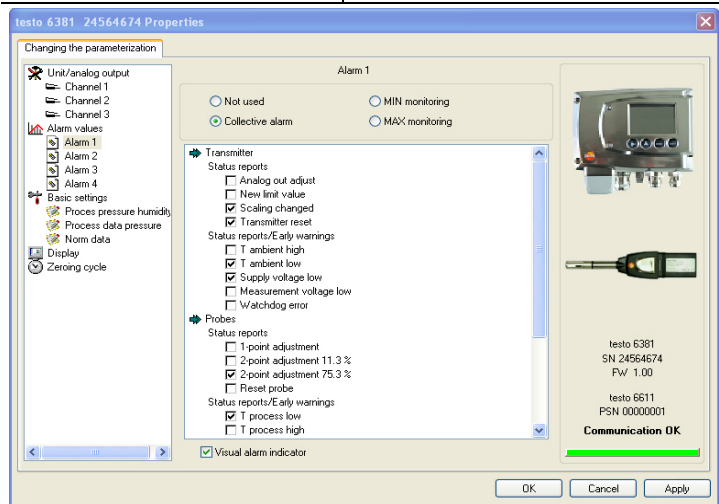
7 Parameterizing, adjusting and analyzing software (P2A software)

Field	Explanation
Signal delay	<p>Time interval in stages 1 – 15: 1 = no delay 15 = longest delay.</p> <p>The signal delay is added to the reaction time of the sensor. The signal delay shows averaging over the time interval of the selected stage in seconds:</p> <p>Example Stage 10 = average of the readings from the last 10 seconds.</p>



The delay of the signal in relation to the change in the process is also significantly influenced by the selection of the particle filter.

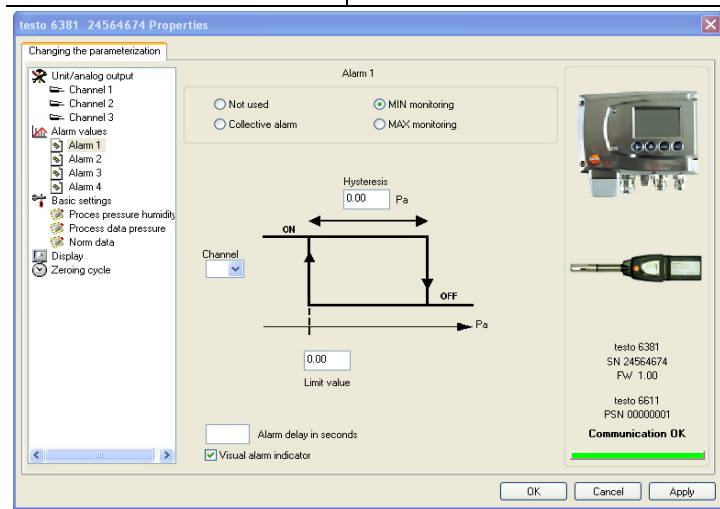
Field	Explanation
Limit values, relay 1 to 4/alarm values, alarm 1 to 4	In this mask, the relays or display alarms are parameterized.



Relay x/alarm x	Four relays or alarm values are available (optional).
Not used	Relay is not used. Hysteresis image and input options are hidden.

7 Parameterizing, adjusting and analyzing software (P2A software)

Field	Explanation
Collective alarm	A relay can be used as a collective alarm detector in the event that selected messages appear. Selection of the messages (OR linkage) by selecting the checkbox.
Min control	If switched to ON (NO contact) or OFF (NC contact) under the limit value; in the event of a subsequent exceeding of Limit value plus Hysteresis , it is switched to OFF (NO contact) or ON (NC contact).
Max control	If switched to ON (NO contact) or OFF (NC contact) above the limit value; in the event of a subsequent undershooting of Limit value minus Hysteresis , it is switched to OFF (NO contact) or ON (NC contact).

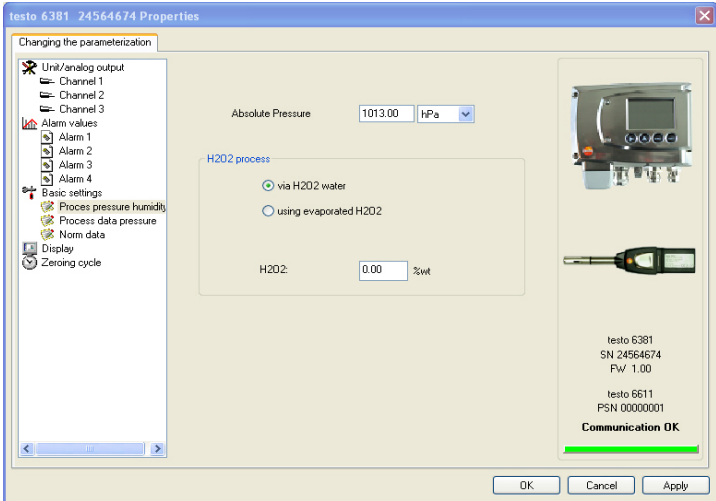


i The graphic display in the centre of the screen refers to the relay wiring as a NO contact (ON).

7 Parameterizing, adjusting and analyzing software (P2A software)

Field	Explanation
Hysteresis	To avoid switching cycles.
Channel	Selection of the channel that is to be monitored.
Limit value	Values for the limits of the unit selected in Unit/analog output ; 4 decimal places. When changing the phys. unit, the relay limit values are set to the default values.
Visual alarm display	Checkbox is activated: Upon the appearance of the selected alarm, the background lighting of the display and the corresponding measurement value flashes.
Alarm delay	The desired alarm delay for the alarms of the min/max control and the visual alarm is entered in the input field (0 to 3600 seconds possible). The alarm delay has no effect on the collective alarms.
Field	Explanation
Basic settings	Setting the absolute pressure and selection of the H ₂ O ₂ evaporation process for the parameter °C _{tm}).

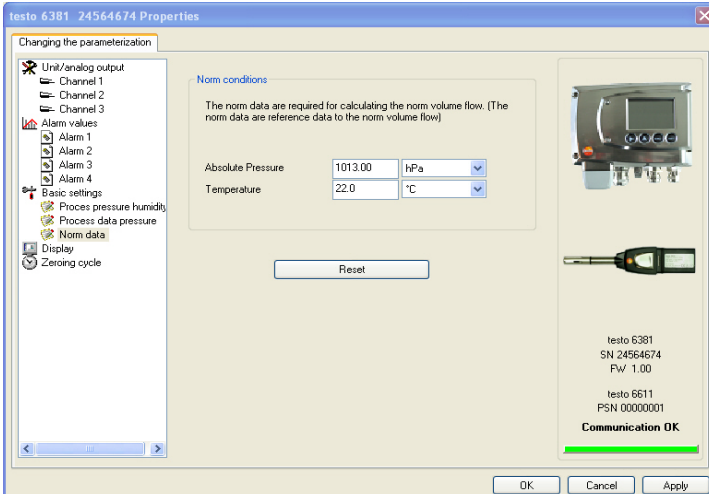
7 Parameterizing, adjusting and analyzing software (P2A software)

Field	Explanation
 <p>The screenshot shows the 'testo 6381 24564674 Properties' window. On the left is a tree view with categories like 'Unit/analog output', 'Alarm values', 'Basic settings', 'Norm data', 'Display', and 'Zeroing cycle'. Under 'Basic settings', 'Process pressure humidity' is selected. The main area shows 'Absolute Pressure' set to 1013.00 hPa. Below that, the 'H2O2 process' section has two radio buttons: 'via H2O2 water' (selected) and 'using evaporated H2O2'. An 'H2O2:' input field is set to 0.00 %wt. On the right, there are images of the testo 6381 device and a probe. At the bottom right, device information is shown: 'testo 6381 SN 24564674 Pw 1.00' and 'testo 6611 PSN 00000001'. A green bar indicates 'Communication OK'. Buttons for 'OK', 'Cancel', and 'Apply' are at the bottom.</p>	
Absolute pressure	<p>The absolute pressure is included in the calculation of the following units:</p> <ul style="list-style-type: none"> • °C_{tdA} or °F_{tdA} • g/kg or gr/lb • ppmV% vol.
H ₂ O ₂ process	<p>The calculation of the mixture dewpoint unit °C_{tm} is dependent upon the type of the evaporation process:</p> <ul style="list-style-type: none"> • with passive vaporization: H₂O₂ solution evaporates (with active vaporization) • with active vaporization: H₂O₂ solution is evaporated over a heated metal plate (with active vaporization) • Input field: Entering the weight proportion of the liquid H₂O₂ compared to water in %.
Field	Explanation
Basic settings	<p>Setting the pressure process data for Pitot tube measurement and standard data for volumetric flow rate measurement.</p>

7 Parameterizing, adjusting and analyzing software (P2A software)

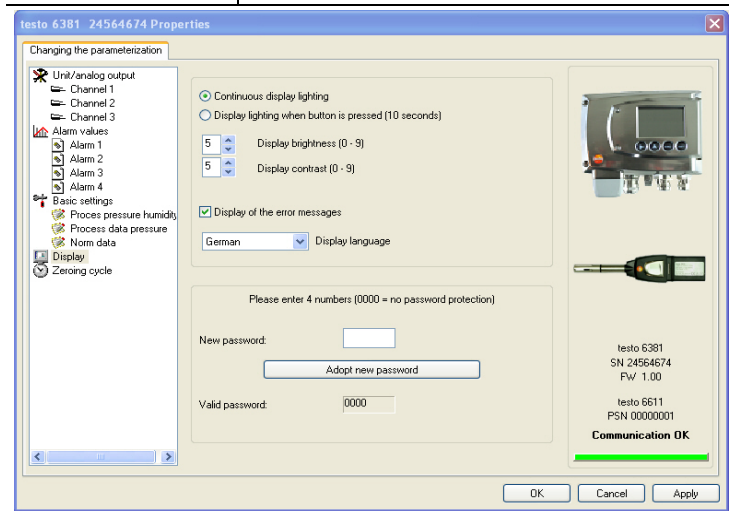
Field	Explanation
Absolute pressure	Absolute pressure existing in the process. The entered absolute pressure value is included in the Pitot tube calculation.
Temperature	Temperature existing in the process. The entered temperature value is included in the Pitot tube calculation.
Humidity	Humidity existing in the process. The entered humidity value is included in the Pitot tube calculation.
Pitot tube factor	The Pitot tube correction factor depends on the shape of the Pitot tube (see operating instructions of the Pitot tube). The entered correction factor has a direct proportional effect on the volumetric flow rate.
Cross-section of the duct	The entered value is included in the Pitot tube calculation.
Correction factor	The correction factor enables an adjustment to the flow profile in the duct. The entered correction factor is included in the Pitot tube calculation.

7 Parameterizing, adjusting and analyzing software (P2A software)

Field	Explanation
	
Absolute pressure	The entered value and the selected unit are included in the calculation of the standard volumetric flow rate.
Temperature	The entered value and the selected unit are included in the calculation of the standard volumetric flow rate.
[Reset]	Button for resetting the standard data to the factory settings.

7 Parameterizing, adjusting and analyzing software (P2A software)

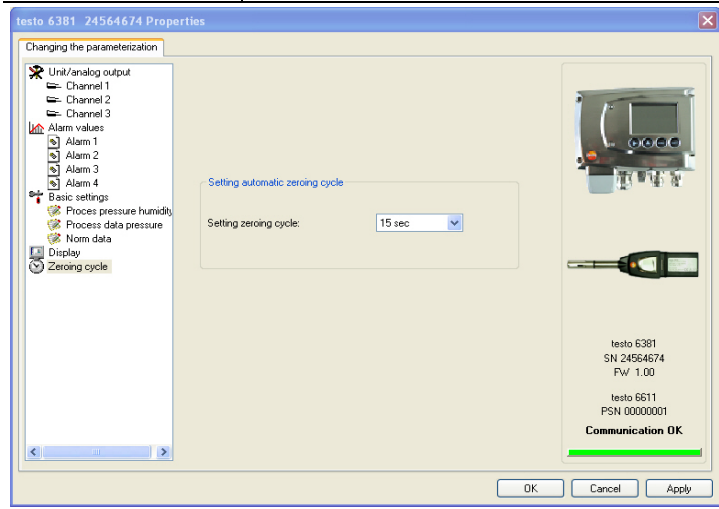
Field	Explanation
Display	Setting the display functions (if a display is available on the transmitter).



Continuous display lighting	Display lighting is permanently switched on.
Display lighting when button is pressed (10 seconds)	When a particular button on the instrument is pressed, the display lights up for 10 seconds.
Display brightness (0 to 9)	Setting the brightness between 0 and 9: 0 = dark 9 = light
Display contrast (0 to 9)	Setting the contrast between 0 and 9: 0 = low contrast 9 = high contrast
Display of the error messages	Selection of whether the error messages should be shown in the display.
Display language	Selection of the language.
New password	The password consists of four numbers, each of which must be between 1 and 9. If the password protection is not to be used, the numerical code "0000" must be entered.

7 Parameterizing, adjusting and analyzing software (P2A software)

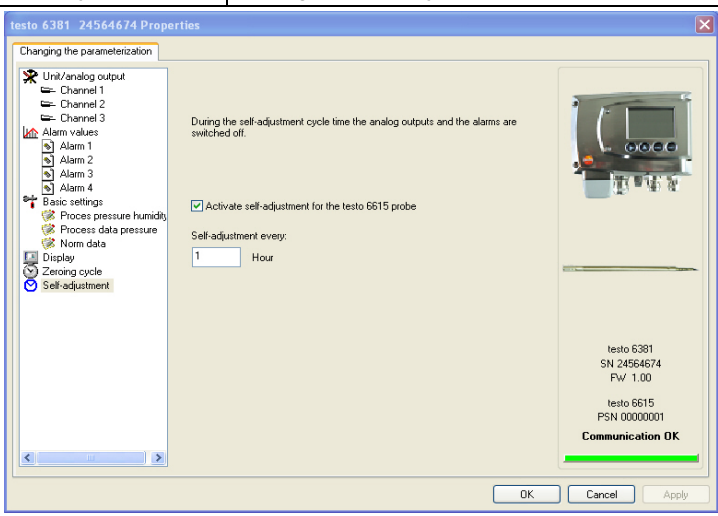
Field	Explanation
[Adopt new password]	Button for confirming the new password.
Valid password	Display of the current password.
Field	Explanation
Zeroing cycle	Setting the interval of the automatic zeroing with solenoid valve.



The accuracy specifications are only valid for the zeroing cycle of 15 sec set by the factory.

Zeroing cycle setting	Selection of the time interval after which the automatic zeroing cycle is to occur. Recommendation: 15 sec
-----------------------	---

7 Parameterizing, adjusting and analyzing software (P2A software)

Field	Explanation
Self-adjustment	Setting the self-adjustment.
	
Activate self-adjustment for the testo 6615 probe	<ul style="list-style-type: none"> • Checkbox is activated: The self-adjustment is performed in the set cycle. • Checkbox is not activated: The self-adjustment is not performed.
Self-adjustment every	<p>Setting the cycletime in which the self-adjustment is to be performed.</p> <p>i In order to receive reliable readings during the calibration or equalization period of the probe, testo recommends the shortest possible cycle time. A longer cycle time can be set in continuous operation.</p>
[Start self adjustment]	Start self adjustment at a defined time outside the cycle time.

7.3.2.2. Saving parameters

Parameters can be saved in new parameter files.

1. Mark instrument/parameter file.
 2. Click on **File > Save as** in the menu bar.
 3. Select storage location and enter the file name.
 4. Click on **[Save]**.
- The new parameter file is shown in the file list.

Only the parameters are saved from an instrument file; the history data are not adopted.



The original name (Instrument type, Serial number) is suggested with the current date/time as standard, e.g. "testo 6381 01234578 061120 1403.cfp".

For a standard installation, the files are saved under "C:\Documents and Settings\All Users\Shared Documents\P2A Software". The path can differ depending on the version of the operating system.

7.3.2.3. Opening the parameter file

All parameter files stored in the standard directory path are automatically displayed in the file list when the software is started. You can also open parameter files that are stored in other directories.

1. Click on **File > Open** in the menu bar.
 2. Select the storage location and click on the requisite file.
 3. Click on **[Open]**.
- The selected file is opened. This can be changed and saved (see 7.3.2. Editing instrument/parameter file).

7.3.2.4. Copying and pasting parameters

The parameters of a parameter file can be transmitted to an instrument file or another parameter file from the same instrument type.

1. Select file from which parameters are to be copied.
 2. Click on **Edit > Copy** in the menu bar.
 3. Select the file which is to be modified.
 4. Click on **Edit > Paste** in the menu bar.
- The parameters are transmitted to the file.



You can also use the common keyboard shortcuts for copying (CTRL+C) and pasting (CTRL+V).
Parameters can also be transmitted using drag & drop, where you drag the icon of the parameter file onto the icon of the target instrument file.

5. Connect and select corresponding instrument.
6. Click on **[Change parameterization]**.
7. Confirm confirmation request.
 - Parameter data are transferred to the instrument.

7.3.2.5. Deleting instrument/parameter file

Instrument/parameter files can be deleted from the file list.

1. Click on the file that is to be deleted with the right mouse button.
2. Select the command **Delete** in the context menu.
 - The instrument or parameter file is deleted from the list.

7.3.2.6. Creating a new instrument file

It is possible to create an instrument file without restarting the P2A software.

- ✓ Transmitter must be connected.
1. Click on **File > New connection** in the menu bar.
 - Connection to the transmitter is established.

7.3.3. Analyzing/testing the transmitter

In this section, you can test the outputs of the connected instrument, read off the limit values and reset the parameters to the factory settings.

The function is only available for instrument files.

7.3.3.1. Analyzing/testing the instrument

- ✓ The required instrument file is marked.
1. Click on **[Test/analyze transmitter]**.
 - The **Properties of <Instrument type> <Serial number>** dialogue is opened with the **Test/analyze transmitter** register.
 2. Perform action:

Action	Explanation
Carrying out factory reset	Reset the unit, limit value and hysteresis parameters to factory settings (see below).
Testing analog output	Test channel 1/optional 2/3 (see 7.3.3.1. Testing analog output).
Test switch outputs	Manually switch relays 1 to 4 to test for proper function (see 7.3.3.2. Testing switch output relays 1 to 4).
Display min./max. values	Overview of the minimum and maximum values measured since the last reset of the transmitter (see 7.3.3.3. Displaying min./max. values).

3. Click on **[OK]** or **[Cancel]** to close the dialogue.

7.3.3.2. Carrying out factory reset

- ✓ The required instrument file is marked.
- 1. Click on **[Test/analyze transmitter]**.
 - The **Properties of <Instrument type> <Serial number>** dialogue is opened with the **Test/analyze transmitter** register.
- 2. Mark transmitter test.
 - Current operating hours are shown.
- 3. Confirm control query to perform the reset.
 - The values are reset to the customer-specific factory settings.
- 4. Click on **[OK]** or **[Cancel]** to close the dialogue.

7.3.1. Analyzing/testing the transmitter

In this section, you can test the outputs of the connected instrument, read off the limit values and reset the parameters to the factory settings.

The function is only available for instrument files.

7.3.1.1. Analyzing/testing the instrument

- ✓ The required instrument file is marked.
- 1. Click on **[Test/analyze transmitter]**.
 - The **Properties of <Instrument type> <Serial number>** dialogue is opened with the **Test/analyze transmitter** register.

2. Perform action:

Action	Explanation
Carrying out factory reset	Reset the unit, limit value and hysteresis parameters to factory settings (see below).
Testing analog output	Test channel 1/optional 2/3 (see Testing analog output, page 132).
Test switch outputs	Manually switch relays 1 to 4 to test for proper function (see Testing switch output relays 1 to 4, page 134).
Display min./max. values	Overview of the minimum and maximum values measured since the last reset of the transmitter (see Displaying min./max. values).

3. Click on **[OK]** or **[Cancel]** to close the dialogue.

7.3.1.2. Carrying out factory reset

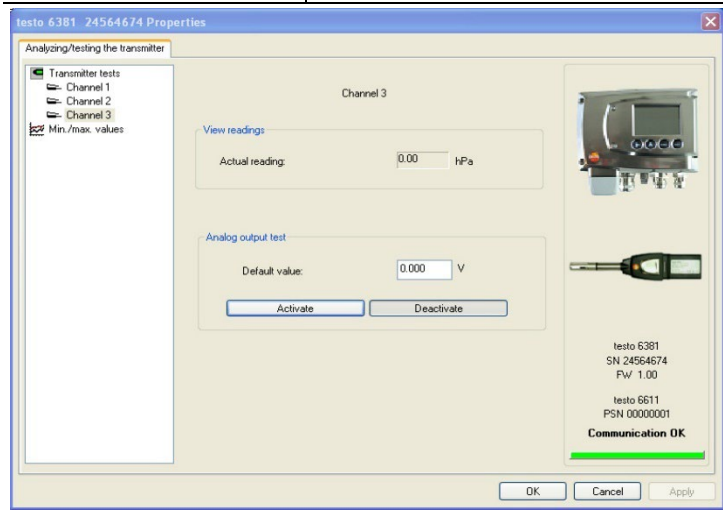
- ✓ The required instrument file is marked.
- 1. Click on **[Test/analyze transmitter]**.
 - The **Properties of <Instrument type> <Serial number>** dialogue is opened with the **Test/analyze transmitter** register.
- 2. Mark transmitter test.
 - Current operating hours are shown.
- 3. Confirm control query to perform the reset.
 - The values are reset to the customer-specific factory settings.
- 4. Click on **[OK]** or **[Cancel]** to close the dialogue.

7.3.1.3. Testing analog output

- ✓ The required instrument file is marked.
- 1. Click on **[Test/analyze transmitter]**.
 - The **Properties of <Instrument type> <Serial number>** dialogue is opened with the **Test/analyze transmitter** register.
- 2. Mark channel and test values.

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Field/button	Explanation
	Check the analog outputs (see volume 1, see Editing Main Menu Analysis).



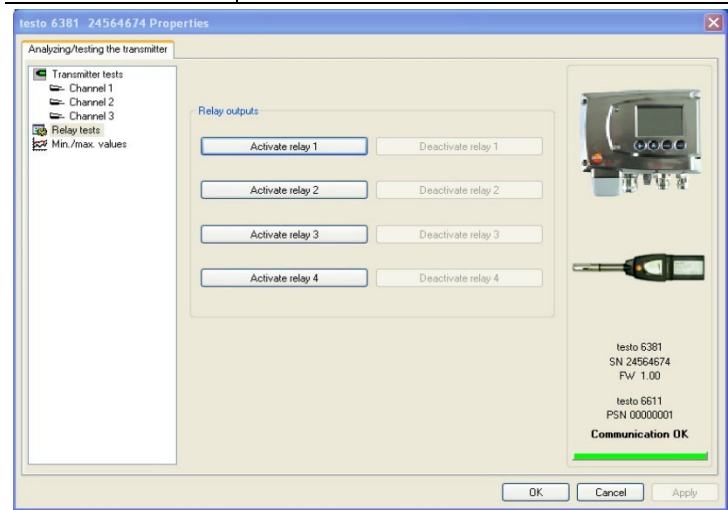
Current reading	Readings are updated every second.
Unit	Unit according to the type of analog output.
Default value	Freely definable output value for the respective type of analog output (V or mA), 1 decimal place.
[Activate]	<p>The entered default value is forwarded to the corresponding analog output and to the test contacts by clicking. A warning informs that the value is being transmitted to the connected instrument in the event of existing cabling.</p> <p>Now check the analog output using a precise multimeter.</p>
[Deactivate]	<p>Finish entering the electrical variables at the analog output.</p> <p>The analog output returns to the current reading again.</p>

3. Click on **[OK]** or **[Cancel]** to close the dialogue.
 - The analog output and the relay return to Measuring Mode again.

7.3.1.4. Testing switch output relays 1 to 4

- ✓ The required instrument file is marked.
1. Click on **[Test/analyze transmitter]**.
 - The **Properties of <Instrument type> <Serial number>** dialogue is opened with the **Test/analyze transmitter** register.
 2. Mark **Relay tests** and test the values.

Field/button	Explanation
	Test the relay function (see volume 1, 4.4.6.6. see Editing Main Menu Analysis).



[Activate relay n]	Close contact. A warning informs that the value is being transmitted to a connected PLC, external display, etc. in the event of existing cabling.
[Deactivate relay n]	Open contact. A warning informs that the value is being transmitted to a connected PLC, external display, etc. in the event of existing cabling.

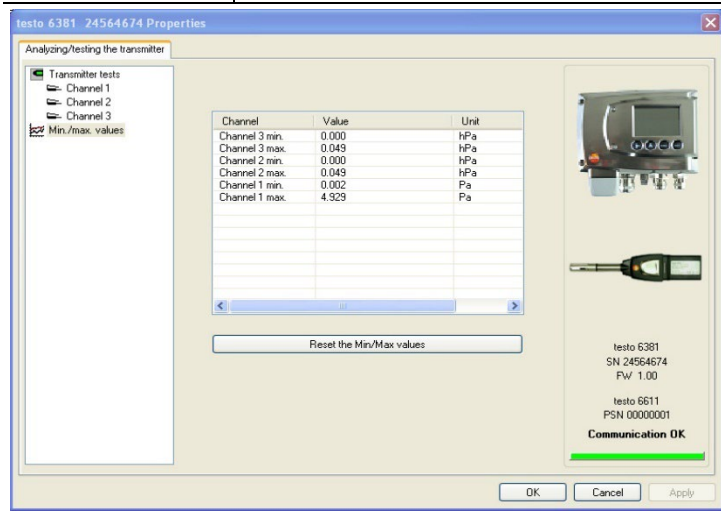
3. Click on **[OK]** or **[Cancel]** to close the dialogue.
 - The analog output returns to Measuring Mode again.

7.3.1.5. Displaying min./max. values

The transmitter saves the minimum or maximum value for each channel (measured since the last voltage supply or since the last manual reset).

- ✓ The required instrument file is marked.
- 1. Click on [Test/analyze transmitter].
 - The **Properties of <Instrument type> <Serial number>** dialogue is opened with the **Test/analyze transmitter** register.
- 2. Mark **Min./max. values**.

Field/button	Explanation
Min./max. values	View the min./max. values of each channel. Only the values within the measuring range are shown.



Channel	Min./max. of channel 1/2/3 (optional)
Value	Min. or max. value, 1 decimal place.
Unit	Unit selected in Unit/analog output .

- 3. Reset **Min./max. values**.
- 4. Click on [**Reset min./max. values**].
- 5. Confirm control query to perform the reset.
 - The values are reset to the factory settings.
- 6. Click on [**OK**] or [**Cancel**] to close the dialogue.

7.3.2. Adjusting the transmitter

This function is used to adjust an attached instrument. The following adjustments may be carried out using the software:

- 1-point adjustment (offset)
- 2-point adjustment (upper and lower adjustment point)
- Analog adjustment (entry via assistant/wizard)
- n-point adjustment (entry via assistant/wizard)

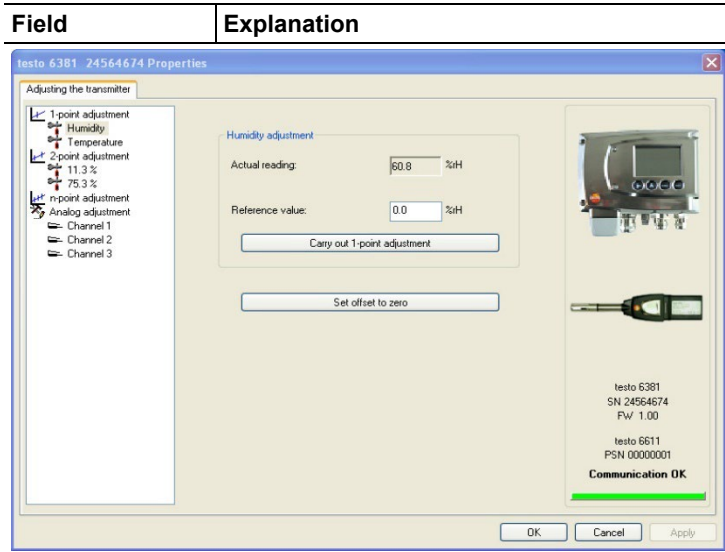
Also see volume 1, 4.3.2.7. Adjusting the instrument.

7.3.2.1. 1-point adjustment



The testo 400/650 with precision humidity probe (order no. 0636 9741) is recommended as the reference measuring instrument for 1-point adjustment (offset) (see volume 1, 4.3.2.9. Adjusting testo 6381 using testo handheld instrument).

1. Expose the reference measuring instrument and the instrument to be adjusted to the same constant conditions and wait for equalization period to lapse.
2. Mark the instrument file of the connected instrument.
3. Click on **[Adjusting the transmitter]**.
 - The **Properties of <Instrument type> <Serial number>** dialogue is opened with the **Adjusting the transmitter** register.
4. Enter reference value and click on **[Carry out 1-point adjustment]**.
5. Confirm confirmation request.
 - The adjustment is carried out.



- > Click on **[Set offset to zero]** to reset a transmitted reference value.
- The current reading is used again.
- 6. Click on **[OK]** or **[Cancel]** to close the dialogue.

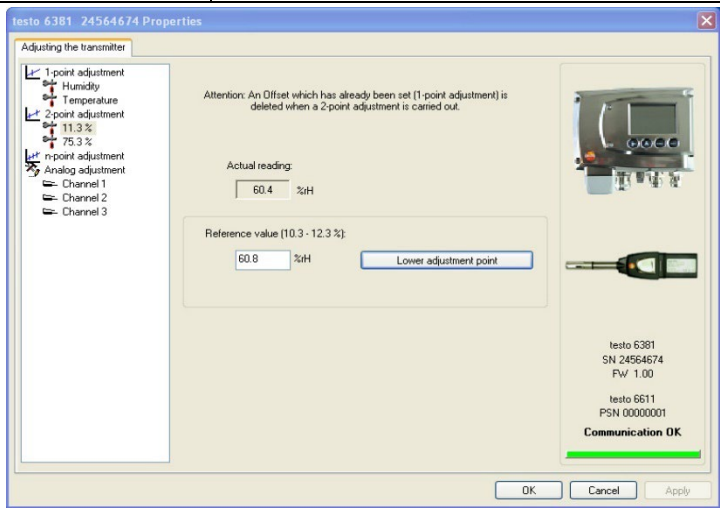
7.3.2.2. 2-point adjustment

Also see volume 1, 4.3.2.10. see 2-point adjustment (humidity/temperature).

1. Expose the reference measuring instrument and the instrument to be adjusted to the same constant conditions and wait for equalization period to lapse.
2. Mark the instrument file of the connected instrument.

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3. Click on **[Adjusting the transmitter]**.
 - The **Properties of <Instrument type> <Serial number>** dialogue is opened with the **Adjusting the transmitter** register.
4. Mark **11.3 %**, enter the reference value for the lower adjustment point and click on **[Lower adjustment point]**.
 - The adjustment is carried out.
5. Mark **75.3 %**, enter the reference value for the upper adjustment point and click on **[Upper adjustment point]**.
 - The adjustment is carried out.

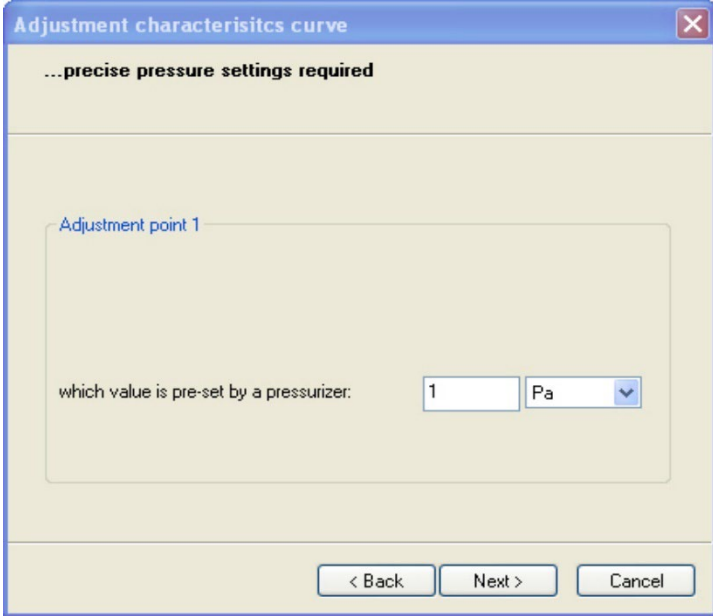
Field	Explanation
	
Current reading	Reading in % RH. Readings are updated every second.
Reference value	Entry of the read-off value from the reference measuring instrument. Permissible entries: <ul style="list-style-type: none"> • Lower adjustment point 10.3 to 12.3 % RH • Upper adjustment point 74.3 to 76.3 % RH.

6. Click on **[OK]** or **[Cancel]** to close the dialogue.

7.3.2.3. n-point adjustment

1. Connect precision pressure sensor (see volume 1, 4.3.2.12. n-point adjustment (pressure)).
2. Mark the instrument file of the connected instrument.

3. Click on **[Adjusting the transmitter]**.
 - The **Properties of <Instrument type> <Serial number>** dialogue is opened with the **Adjusting the transmitter** register.
4. Mark **n-point adjustment**.
5. Click on **[Start wizard ...]** and follow the instructions of the wizard.
 - The adjustment is performed when the wizard is closed.

Field	Explanation
	

How much pressure is actually applied | Required field: Entry of the value read off at the pressure sensor.

i The n-point adjustment must always be carried out to its full extent and in good time at all selected adjustment points.


i The number of adjustment points (3 to 6) is stored in the user menu of the transmitter and can only be changed via the P2A software.

7.3.2.4. Adjusting the analog output

1. Connect precision multimeter (see volume 1, 4.3.2.11. Analog output adjustment).
2. Mark the instrument file of the connected instrument.

7 Parameterizing, adjusting and analyzing software (P2A software)

3. Click on **[Adjusting the transmitter]**.
 - The **Properties of <Instrument type> <Serial number>** dialogue is opened with the **Adjusting the transmitter** register.
4. Click on **[Start wizard ...]** and follow the instructions of the wizard.
 - The adjustment is performed when the wizard is closed.

Field	Explanation
	
Default value	<p>The analog output value from the last performed adjustment is given at the output. Value of the factory adjustment:</p> <ul style="list-style-type: none"> • Lower adjustment point: approx. 10 % of the max. value • Centre adjustment point: approx. 50 % of the max. value • Upper adjustment point: approx. 90 % of the max. value
Measured analog value	Required field: Entry of the value read off at the multimeter.

7.3.3. Transmitter history

Parameterizations, adjustment processes and messages that have occurred are registered in the transmitter with an operating hours stamp.

In the history overviews (explained later in more detail), past processes and events can be made visible.

i For parameter changes or adjustments that are performed directly at the instrument (via the user menu), "Transmitter" is entered in the User field and only the operating hour is entered in the Date/time field instead of operating hour/date/time.

For entries that are performed using the P2A software, the name of the user logged into Windows appears in the User field, while the date/time and operating hour are shown in the Date/time field.

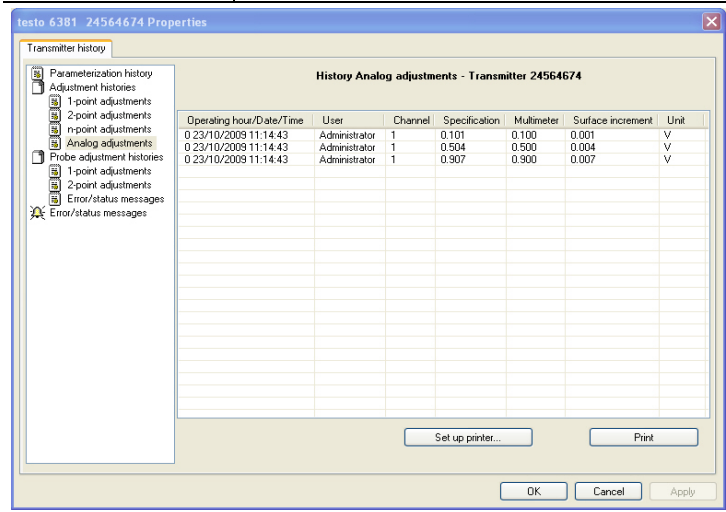
1. Mark the instrument file of the connected instrument.
2. Click on the **[Transmitter history]** button.
 - The **Properties of <Instrument type> <Serial number>** dialogue is opened with the **Transmitter history** register.
3. Click on the required entry in the list to change the display.

Field	Explanation																																																																					
	<table border="1"> <thead> <tr> <th>Operating hour/Date/Time</th> <th>User</th> <th>Comments</th> </tr> </thead> <tbody> <tr> <td>0 23/10/2009 11:07:11</td> <td>Administrator</td> <td>Signal delay for channel 1 from stage 1 to 4</td> </tr> <tr> <td>0 23/10/2009 11:07:52</td> <td>Administrator</td> <td>Alarm 1 Visual alarm indicator activated</td> </tr> <tr> <td>0 23/10/2009 11:07:52</td> <td>Administrator</td> <td>Alarm 1 From No channel to Collective alarm</td> </tr> <tr> <td>0 23/10/2009 11:07:53</td> <td>Administrator</td> <td>Collective alarm changed</td> </tr> <tr> <td>3</td> <td>Transmitter</td> <td>Parameterization was changed</td> </tr> <tr> <td>3</td> <td>Transmitter</td> <td>Parameterization was changed</td> </tr> <tr> <td>3</td> <td>Transmitter</td> <td>Parameterization was changed</td> </tr> <tr> <td>3</td> <td>Transmitter</td> <td>Parameterization was changed</td> </tr> <tr> <td>4</td> <td>Transmitter</td> <td>User settings changed</td> </tr> <tr> <td>4</td> <td>Transmitter</td> <td>User settings changed</td> </tr> <tr> <td>4</td> <td>Transmitter</td> <td>User settings changed</td> </tr> <tr> <td>4</td> <td>Transmitter</td> <td>User settings changed</td> </tr> <tr> <td>4</td> <td>Transmitter</td> <td>User settings changed</td> </tr> <tr> <td>4</td> <td>Transmitter</td> <td>User settings changed</td> </tr> <tr> <td>4</td> <td>Transmitter</td> <td>User settings changed</td> </tr> <tr> <td>4</td> <td>Transmitter</td> <td>User settings changed</td> </tr> <tr> <td>4</td> <td>Transmitter</td> <td>User settings changed</td> </tr> <tr> <td>4</td> <td>Transmitter</td> <td>Parameterization was changed</td> </tr> <tr> <td>4</td> <td>Transmitter</td> <td>Parameterization was changed</td> </tr> <tr> <td>4</td> <td>Transmitter</td> <td>Parameterization was changed</td> </tr> <tr> <td>4</td> <td>Transmitter</td> <td>User settings changed</td> </tr> <tr> <td>4</td> <td>Transmitter</td> <td>User settings changed</td> </tr> </tbody> </table>	Operating hour/Date/Time	User	Comments	0 23/10/2009 11:07:11	Administrator	Signal delay for channel 1 from stage 1 to 4	0 23/10/2009 11:07:52	Administrator	Alarm 1 Visual alarm indicator activated	0 23/10/2009 11:07:52	Administrator	Alarm 1 From No channel to Collective alarm	0 23/10/2009 11:07:53	Administrator	Collective alarm changed	3	Transmitter	Parameterization was changed	3	Transmitter	Parameterization was changed	3	Transmitter	Parameterization was changed	3	Transmitter	Parameterization was changed	4	Transmitter	User settings changed	4	Transmitter	User settings changed	4	Transmitter	User settings changed	4	Transmitter	User settings changed	4	Transmitter	User settings changed	4	Transmitter	User settings changed	4	Transmitter	User settings changed	4	Transmitter	User settings changed	4	Transmitter	User settings changed	4	Transmitter	Parameterization was changed	4	Transmitter	Parameterization was changed	4	Transmitter	Parameterization was changed	4	Transmitter	User settings changed	4	Transmitter	User settings changed
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Operating hours / date/time | Operating hour/time stamp at which the change at the instrument was performed.

7 Parameterizing, adjusting and analyzing software (P2A software)

Field	Explanation
User	Name with which the user is logged into the operating system. "Transmitter" entry if the change was performed at the instrument.
Comments	Type of parameter change, e.g. "Unit of channel 1 from Pa to hPa".

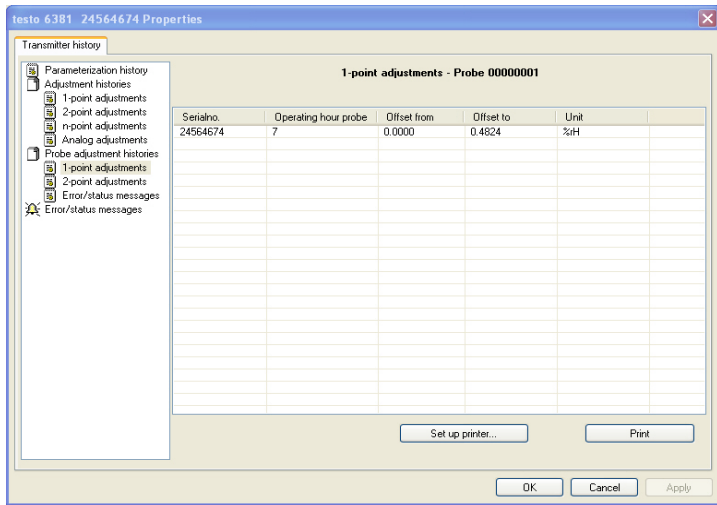


Selection of adjustment histories: **1-point adjustments** / **2-point adjustments** / **Analog adjustments** / **n-point adjustments**.

Serial no. Probes	Serial number of the probe.
Probe operating hour	Operating hour of the probe at which the change at the instrument was performed.
User	Name with which the user is logged into the operating system. "Transmitter" entry if the change was performed at the instrument.
Reference value	If no changes were performed, no value is displayed.
Unit	Unit during the adjustment.
Reading	1-point adjustment: If no changes were performed, no value is displayed.

7 Parameterizing, adjusting and analyzing software (P2A software)

Field	Explanation
Offset from	1-point adjustment: Value before the adjustment.
Offset to	1-point adjustment: Value after the adjustment.
Offset	2-point adjustment: Difference between target and actual value reported by instrument.
Pressure specification	n-point adjustment: Reference value set at the pressure sensor.
Channel	Analog adjustment: Channel 1 to n.
Specification	Analog adjustment: Actual value.
Multimeter	Analog adjustment: Reference value set at the multimeter.
Offset	Analog adjustment: Deviation at time of adjustment.



Selection of probe adjustment histories: **1-point adjustments** / **2-point adjustments** / **Error/status messages**.

Serial number	Serial number of the transmitter to which the probe was connected at the time of the adjustment.
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7 Parameterizing, adjusting and analyzing software (P2A software)

Field	Explanation
Operating hour probe	Operating hour of the probe at which the change at the instrument was performed.
Unit	Unit during the adjustment.
Offset from	1-point adjustment: Value before the adjustment.
Offset to	1-point adjustment: Value after the adjustment.
Target value	2-point adjustment: Reference value.
Reading	2-point adjustment: Value before the adjustment.
Difference	2-point adjustment: Difference determined by instrument between target value and reading.
Error/status messages	Error/status messages: The error/status messages assigned to the probe.

The screenshot shows the 'testo 6381 24564674 Properties' dialog box. The 'Error/status messages' tab is active, displaying a table of messages. The table has the following columns: Operating hour, Serialno, Message, and Type of message. The data in the table is as follows:

Operating hour	Serialno	Message	Type of message
7	00000001	Init sensor	Status reports
7	00000000	Init sensor	Status reports
7	00000001	Init sensor	Status reports
7	00000000	Init sensor	Status reports
7	00000001	Init sensor	Status reports
7	00000000	Init sensor	Status reports
7	00000001	Init sensor	Status reports
7	00000000	Init sensor	Status reports
7	00000001	Init sensor	Status reports
7	00000000	Transmitter reset	Status reports
7	00000001	Init sensor	Status reports
0	00000000	Init sensor	Status reports
0	00000000	Transmitter reset	Status reports
0	00000001	Init sensor	Status reports
0	00000000	Init sensor	Status reports
0	00000000	Transmitter reset	Status reports
7	00000001	Init sensor	Status reports
7	00000000	Init sensor	Status reports
7	00000001	Init sensor	Status reports
7	00000000	Init sensor	Status reports
7	00000001	Init sensor	Status reports
7	00000000	Init sensor	Status reports
7	00000001	Init sensor	Status reports
7	00000000	Init sensor	Status reports
0	24564674	Init sensor	Status reports
7	00000001	Init sensor	Status reports
0	24564674	Init sensor	Status reports
7	00000000	Init sensor	Status reports

The table is shown only for error and status messages that were generated in the transmitter and were transferred and saved there via the connection to the P2A software.

Operating hours	Operating hour at which the message appeared in the instrument.
Serial number	Serial number of the instrument to which the message is assigned

Field	Explanation
Message	e.g. "Scaling changed". The scaling was changed.
Type of message	e.g. early warning, status message.

> To print out the history data, click on **[Print]**.



The printing job is automatically sent to the default printer for the operating system.

With **[Set up printer ...]** a different printer can be selected or the printout can be edited.

4. Click on **[OK]** or **[Cancel]** to close the dialogue.

8 Tips and assistance

8.1. Questions and answers

Question	Possible causes/solution
Connection to instrument cannot be established	Check connection cable/plug contacts
A message appears on the display	See volume 1, 4.5.Status, warning and error messages
Malfunction (with and without display)	Analysis using the P2A software, see 7.3.5. Transmitter history
Undo adjustment	A 1-point temperature/humidity adjustment can be reset to the current readings using [Set offset to zero] The actual values before the adjustment can be read out from the corresponding history table. 2-point adjustments and analog adjustments can only be undone by means of a factory reset.
When does a stable current reading appear?	After approx. 20 seconds

If we could not answer your question, please contact your dealer or Testo Customer Service. For contact details see the rear side of this document or the web page www.testo.com/service-contact

8.2. Accessories and spare parts



An overview of the probes that can be used with the testo 6381 can be found in volume 1, 4.2.2. Usable probes.

Description	Article no.
Ethernet	
Ethernet module	0554 6656
Ethernet connector	0554 6653
Interface and software	
P2A software (parameterizing, adjusting, analyzing) incl. USB adapter	0554 6020
testo 400/650 adapter	0554 6022
Fastenings, assembly aids	
Wall/duct bracket with M3 screw for fastening the transmitter to the probe and the probe to the wall/duct	0554 6651
Single-hole plastic duct screw connection	0554 1793
Duct screw connection (aluminium/PVC)	0554 1794
Pressure-tight G 1/2" screw connection with cutting ring up to 16 bar	0554 1795
Pressure-tight G 1/2" screw connection with PTFE ring up to 6 bar	0554 1796
Stainless steel flange for screw connections in accordance with DIN 2576	0554 1797
Plug-in connections	
Set of M12 plug-in connections (connector and socket) for power and signal lines	0554 6682
Dewpoint measurement (only with testo 6615)	
Preliminary filter to protect measurement chamber and sensors against contamination	0554 3311
Precision chamber with adjustable inflow	0554 3312
Flow meter for measurement chamber for setting the specified inflow of the sensor	0554 3313

Protection caps	
Protection cap made of stainless steel	0554 0647
Woven wire filter protection cap	0554 0757
Protection cap made of PTFE	0554 0759
Metal protection cap (open)	0554 0755
PTFE protection cap with condensate drip hole	0554 9913
Protection cap made of PTFE with condensation protector and condensate drip hole	0554 0166
Protection cap for H ₂ O ₂ atmospheres	0699 5867/1
Hoses	
Silicone hose ID 4 transparent	0086 0001, sold by the metre
TYGON hose ID 4.8 transparent	0086 0031, sold by the metre
Adjustment equipment	
Humidity adjustment set (11.3/75.3 % RH)	0554 0660
Reference set (testo 650, 1 % RH probe with certificate)	0699 3556/15
Check and adjustment salt for high humidity (testo 6614)	0554 0662
Adjustment adapter (for 1-point adjustment with testo 400/650)	0554 6022
Extension and calibration cable	0554 6610
Supply	
Mains unit (desktop, wall-mounted)	0554 1748
Mains unit (top-hat rail mounting)	0554 1749
External display	
Process display for testo 54-2 AC....	5400 7553
Process display for testo 54-7 AC....	5400 7555

Description	Article no.
Calibration	
Standard ISO calibration certificate, transmitter only	0520 1000
Standard DAkkS calibration certificate, transmitter only	0520 1200
Standard ISO calibration certificate, transmitter + probes	0520 0176
Special ISO calibration certificate, transmitter + probes	0520 0066
Standard DAkkS calibration certificate, transmitter + probes	0520 0276
Special DAkkS calibration certificate, transmitter + probes	0520 0236
ISO calibration certificate humidity, probes	0520 0076
DAkkS calibration certificate temperature, probes	0520 0261

For a complete list of all accessories and spare parts, please refer to the product catalogues and brochures or look up our website at: www.testo.com

8.2.1. Ordering options for 6381 transmitter (0555 6381)

Order code	Characteristic
Axx Measuring range	
A01	0 to 50 Pa
A02	0 to 50 Pa
A03	0 to 100 Pa
A04	0 to 500 Pa
A05	0 to 10 hPa
A07	0 to 50 hPa
A08	0 to 100 hPa
A09	0 to 500 hPa
A10	0 to 1000 hPa
A21	-10 to 10 Pa
A22	-50 to 50 Pa

Order code	Characteristic
A23	-100 to 100 Pa
A24	-500 to 500 Pa
A25	-10 to 10 hPa
A27	-50 to 50 hPa
A28	-100 to 100 hPa
A29	-500 to 500 hPa
A30	-1000 to 1000 hPa
Bxx Analog output/supply	
B02	0 to 1 V (4-wire, 24 V AC/DC)
B03	0 to 5 V (4-wire, 24 V AC/DC)
B04	0 to 10 V (4-wire, 24 V AC/DC)
B05	0 to 20 mA (4-wire, 24 V AC/DC)
B06	4 to 20 mA (4-wire, 24 V AC/DC)
Cxx Display	
C00	Without display
C02	With display/English
C03	With display/German
C04	With display/French
C05	With display/Spanish
C06	With display/Italian
C07	With display/Japanese
C08	With display/Swedish
Dxx Cable entry	
D01	M16 cable entry (relay: M20)
D02	Cable entry NPT 1/2"
D03	Cable contacting via M plug-in connection for signal and supply
Exx Ethernet	
E00	Without Ethernet module
E01	With Ethernet module

8 Tips and assistance

Order code	Characteristic
Fxx Differential pressure unit¹³	
F01	Pa/Min/Max
F02	hPa/Min/Max
F03	kPa/Min/Max
F04	mbar/Min/Max
F05	bar/Min/Max
F06	mmH ₂ O /Min/Max
F07	inchH ₂ O /Min/Max
F08	inch HG/Min/Max
F09	kg/cm ² /Min/Max
F10	PSI/Min/Max
F11	m/s /Min/Max
F12	ft/min /Min/Max
F13	m ³ /h /Min/Max
F14	l/min /Min/Max
F15	Nm ³ /min /Min/Max
F16	NI/min /Min/Max
Gxx Optional analog output for humidity probe connection testo 6610/units	
G00	Without connection option for testo 6610 humidity probe
G01	% RH/Min/Max
G02	°C/Min/Max
G03	°F/Min/Max
G04	°C _{td} /Min/Max
G05	°F _{td} /Min/Max
G06	g/kg /Min/Max

¹³ Scaling 10 to 100 % of measuring range is possible, but at least 10 Pa

Order code	Characteristic
G07	gr/lb /Min/Max
G08	g/m ³ /Min/Max
G09	gr/ft ³ /Min/Max
G10	ppm (vol)/Min/Max
G11	°C _{wb} /Min/Max
G12	°F _{wb} /Min/Max
G13	kJ/kg /Min/Max (enthalpy)
G14	mbar/Min/Max (water vapour partial pressure)
G15	inch H ₂ O/Min/Max (water vapour partial pressure)
G16	°C _{tm}
G17	°F _{tm}
Hxx Relay	
H00	Without relay
H01	4 relay outputs, limit value monitoring
H02	4 relay outputs, channel 1 limit values and collective alarm
Ixx Units, channel 3 (only if optional humidity probe connection is available)¹⁴	
I00	Without testo 6610 humidity probe
I01	% RH/Min/Max
I02	°C/Min/Max
I03	°F/Min/Max
I04	°C _{td} /Min/Max
I05	°F _{td} /Min/Max
I06	g/kg /Min/Max
I07	gr/lb /Min/Max

¹⁴ Only possible if G code (as of G01) was selected

Order code	Characteristic
I08	g/m ³ /Min/Max
I09	gr/ft ³ /Min/Max
I10	ppm (vol)/Min/Max
I11	°C _{wb} /Min/Max
I12	°F _{wb} /Min/Max
I13	kJ/kg /Min/Max (enthalpy)
I14	mbar/Min/Max (water vapour partial pressure)
I15	inch H ₂ O/Min/Max (water vapour partial pressure)
I16	°C _{tm}
I17	°F _{tm}
I18	% vol

8.2.2. Ordering options for testo 6610 probes (0555 6610)

Order code	Characteristic
Lxx Probe type	
L11	Probe 6611
L12	Probe 6612
L13	Probe 6613
L14	Probe 6614
L15	Probe 6615
L17	Probe 6617
Mxx Protection caps	
M01	Protection cap made of stainless steel
M02	Protection cap made of wire mesh
M03	Protection cap made of PTFE
M04	Metal protection cap (open)
M06	PTFE protection cap with condensate drip hole

Order code	Characteristic
M07	Protection cap made of PTFE with condensate drip hole and condensation protector
M08	Protection cap for H ₂ O ₂ atmospheres
Nxx Cable length	
N00	Without cable (testo 6611)
N02	1 m cable length (testo 6613, 6614, 6615, 6617)
N03	2 m cable length (testo 6613, 6614, 6615, 6617)
N04	5 m cable length (testo 6613, 6614, 6615, 6617)
N05	10 m cable length (testo 6613, 6614, 6615, 6617)
N06	Cable length specifically for duct versions (testo 6612)
Pxx Probe length	
P12	Probe length approx. 120 mm (testo 6613)
P20	Probe length approx. 200 mm (testo 6611, 6612, 6613, 6614, 6615, 6617)
P30	Probe length approx. 300 mm (testo 6612, 6613, 6614)
P50	Probe length approx. 500 mm (testo 6612, 6613, 6614, 6615, 6617)
P80	Probe length approx. 800 mm (testo 6612, 6613)



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