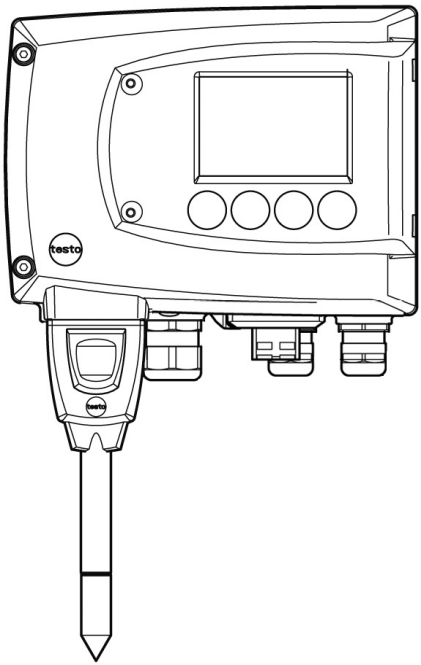
# testo 6651 Ethernet · Humidity transmitters
# testo 6600 · Probes
# P2A software · Parameterizing, adjusting and analyzing software

**Instruction manual Volume 1** **en**



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# 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 to the opening and repair of electrical equipment.

## Avoiding personal injury/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 temperatures.
- ► Never store or operate the product with solvents and 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 force.
- ► Carry out only the maintenance and repair work that is described in the documentation. Follow the prescribed steps when doing so. Use only OEM 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

- ► Send the product back to Testo at the end of its useful life. We will ensure that it is disposed of in an environmentally friendly manner.

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# About this document

- ► Please read this documentation through carefully and familiarize yourself with the product before putting it to use. 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.
- ► The following conventions are followed in this document:

| Character/ display: | Explanation/example |
|---|---|
|  | With the signal word **Warning!**:<br>Warns against hazards which could result in serious physical injury if the precautionary measures indicated are not taken, e.g.:<br>De-energize the mains connection before connecting the transmitter! |
|  | With the signal word **Caution!**:<br>Warns against hazards which could result in minor physical injury or damage to equipment if the precautionary measures indicated are not taken, e.g.:<br>Observe the permissible operating temperature! |
|  | Important information, e.g.:<br>Administrator rights are required to install the program under Windows® 2000, XP and Vista. |
| ➢ | Aim of action, e.g.:<br>➢ **Assembling the instrument at the process connection:** |
| ✓ | Requirement that must be met, e.g.:<br>✓ USB drivers are installed. |

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| | |
|---|---|
| **1** | Steps are numbered if a certain sequence of actions must be followed, e.g.:<br>**1** Loosen and remove housing screws.<br>**2** Remove the upper part of housing. |
| ▪ | A step is not numbered if there are no further steps or if the step is optional, e.g.:<br>▪ Insert probe connector into socket of testo 6651 until it engages. |
| " ... " | Example entries are in inverted commas, e.g.:<br>The value "0" results in .... |
| **Bold** type | Elements of the program interface or instrument display, e.g.:<br>The instrument designation appears in the **instrument/parameter file list**.<br>Select **Main Menu Channel 1** and confirm with SET. |
| …>… | Functions/paths within a menu, e.g.:<br>**Start** > **All Programmes** > **Testo** > **Transmitter Software**. |
| [ ] | Buttons which start an action, e.g.:<br>Confirm the software key with [OK]. |
| CAPITAL LETTERS | Keys on the instrument or keypad, e.g.:<br>Press ESC. |

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# 1 Transmitter

## 1.1 Specifications

### 1.1.1 Functions and use

The testo 6651 humidity transmitter is used in conjunction with plug-in, adjusted probes from the testo 6600 range.



Please refer to *volume 2, chapter 2, page 88* for information about commissioning, operating and maintaining the testo 6600 probe.

The testo 6651 humidity transmitter is suitable for the following applications, for example:

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

In addition to the signal transmission of the readings to a control unit via analog outputs, the measurement data can simultaneously be recorded, documented and visualized via Ethernet. Furthermore, it is possible to issue an alarm for those responsible for the process, if necessary.

### 1.1.2 Scope of delivery

The scope of delivery of the testo 6651 humidity transmitter includes the following:

- Key cover
- Rear panel bracket
- Ethernet module
- CD-ROM with catalogue files (PDF) and P2A update (this can only be used in conjunction with the P2A software, which has to be ordered separately).

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## 1.1.3 Accessories

The following accessories are available for the testo 6651 humidity transmitter:

- 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, chapter 4.2, page 149* or on the website at www.testo.com.

## 1.1.4 Technical data

**Parameters**

- Humidity (% RH/°Ctd/°Ftd)
- Temperature (°C/°F)

**Measuring range**

- Depends on probe

**Accuracy**

- Depends on probe

**Resolution**

- 0.1 % RH or 0.1 °C/0.1 °F

**Meas. cycle**

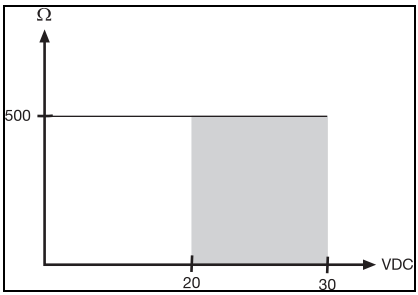
- 1/s

**Interface**

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

**Voltage supply**

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




**Analog output**

- 0 ... 1 V ± 1.5 mV (4-wire) or
- 0 ... 5 V ± 7,5 mV (4-wire) or
- 0 ... 10 V ± 15 mV (4-wire) or
- 0 ... 20 mA ± 0.03 mA (4-wire) or
- 4 ... 20 mA ± 0.03 mA (4-wire)

**Resolution of analog output**

- 12 bit

**Relay**

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

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### Display

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

### Housing operating temperature

- - 40 ... 70 °C/-40 to +158 °F, with display from 0 - 50 °C / 32 to +122 °F
- With integrated relay: -40 - +60 °C

### Operating humidity

- 0...100 %rF

### Storage temperature

- - 40 ... 80 °C/-40 to +176 °F

### Housing, weight

- Plastic, 675 g/1.49 lb
- Ethernet module: 0.610 kg

### Protection class

- IP 65 only if the transmitter is wired properly (closed cable entries), Ethernet connector, Harting PushPull connector and humidity probe are inserted and/or sealing plug is inserted.

### Directives, standards and tests

- EC Directive: 2004/108/EC
- DIN 14644-4
- EN 61000-6-2 interference immunity
- EN 61000-6-3 interference emission
- EN 61326-1+A1+A2

### Ethernet module

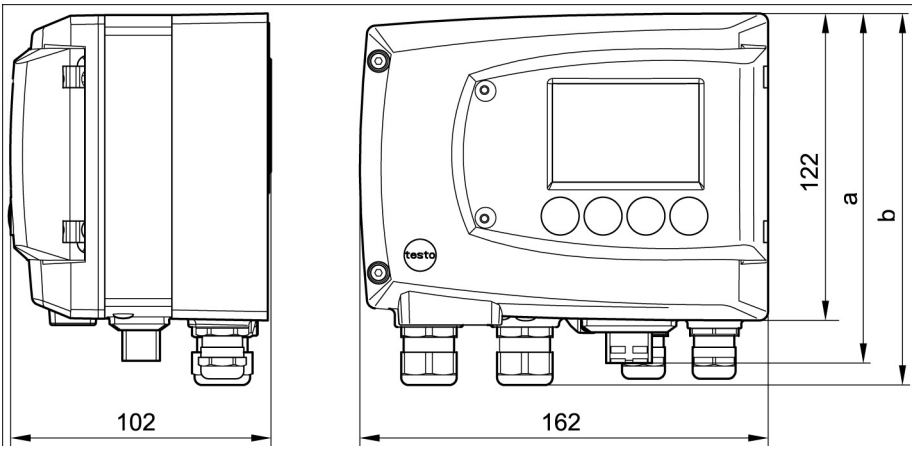
- Interface:
  1 x mini DIN
  1 x RJ45 (Ethernet 10 BatesT/100 BaseTX
- LED:
  2 x green

### Warranty

- Duration: 2 years
- Warranty conditions: See web page www.testo.com/warranty

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## 1.1.5 Dimensions

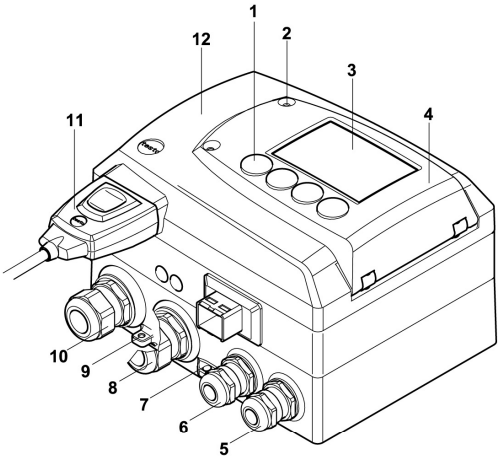



| Dimensions in mm | a | b |
|---|---|---|
| With M 20 cable couplings | 144 | 147 |
| With NPT cable couplings | 144 | 144 |
| With M plug-in connections | 143 | |

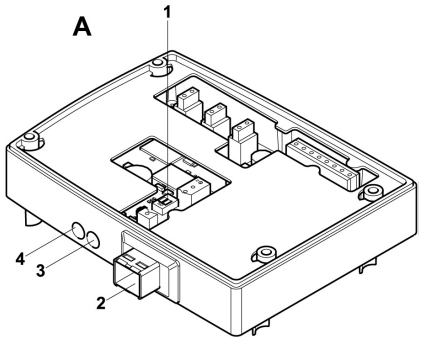
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# 1.2 Product description

## 1.2.1 At a glance



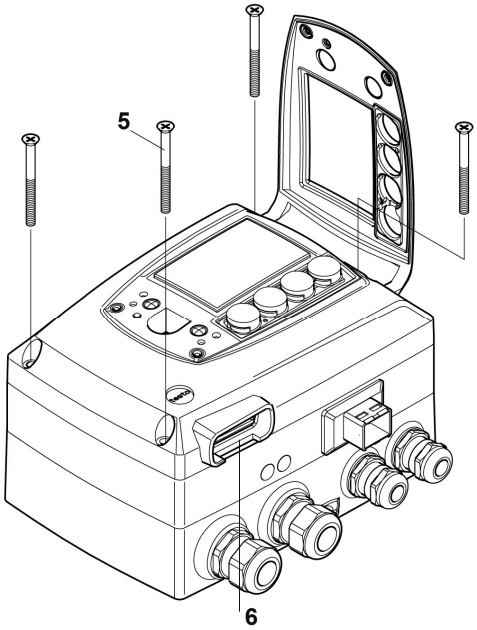

1 Keys (with optional display)
2 Service flap screw connection (self-locking, 2x)
3 Display (optional)
4 Service flap
5 M 16 x 1.5 screw connection*, e.g. analog outputs
6 M 16 x 1.5 screw connection*, e.g. voltage supply
7 Eyelet for measuring point panel
8 M 20 x 1.5 screw connection*, e.g. relay R 3 and R 4
9 Earthing/PE connection
10 M 20 x 1.5 screw connection*, e.g. relay R 1 and R 2
11 Probe connector (testo 6600)
12 Upper part of housing



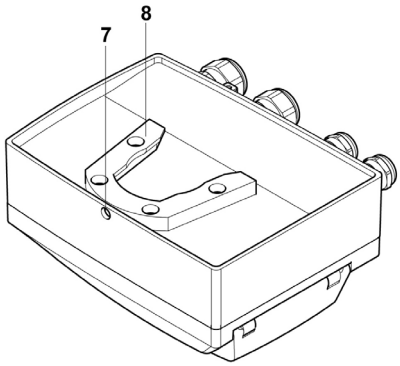

* Alternatively, NPT cable couplings or M plug-in connections are available

A Ethernet module
1 DIP switch
2 Ethernet port
3 LED: LAN connection status
4 LED: Supply

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5 Housing screws (4x)
6 Socket for probe connector
7 Hole for fastening to rear panel bracket (M3 x 6 screw)
8 Plastic bracket for assembly on rear panel




## 1.2.2 Usable probes

The testo 6651 humidity transmitter can be used with the following probes:

| probe | Article no. | Characteristic |
|---|---|---|
| testo 6601 | 0555 6600-L01 | **Wall** probe version; accuracy to ± 1.7 % RH; temperature range -20 °C to +70 °C/-4 to +158 °F, Sensor plugged |
| testo 6602 | 0555 6600-L02 | **Duct** probe version; accuracy to ± 1.7 % RH; temperature range -20 °C to +70 °C/-4 to +158 °F, Sensor plugged |
| testo 6603 | 0555 6600-L03 | **Duct** probe version; accuracy to ± 1.7 % RH; temperature range -30 °C to +120°C/-22 to +248 °F, Sensor plugged |
| testo 6604 | 0555 6600-L04 | **Cable** probe version; accuracy to ± 1.7 % RH; temperature range -20 °C to +70 °C/-4 to +158 °F, Sensor plugged |
| testo 6605 | 0555 6600-L05 | **Cable** probe version; accuracy to ± 1.7 % RH; temperature range -30 °C to +120°C/-22 to +248 °F, Sensor plugged |

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## 1.2.3 Display and keypad

The display option allows the testo 6651 humidity transmitter to be operated 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.

## 1.2.4 Service interface

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

## 1.2.5 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.



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

## 1.2.6 Analog outputs

For analog outputs, the testo 6651 has either

- 2 current outputs of 4 to 20 mA (2-wire) / 0 to 20 mA (4-wire) / 4 to 20 mA (4-wire) or
- 2 voltage outputs of 0 to 1 V/0 to 5 V/0 to 10 V (4-wire).

In 2-wire operation, channel 1 is used for the supply. The two channels are galvanically isolated in both 2- and 4-wire operation.

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The relay option and the background lighting of the optional display are only possible in 4-wire operation.

## 1.2.7 Parameters

The following parameters are calculated:

- Relative humidity in % RH and (technical)
- Relative humidity in % WMO* (calculation according to the WMO standard)
- Temperature °C and °F
- Dewpoint in °Ctd and °Ftd
- Absolute humidity in g/m³

*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, for example. According to the WMO, the Magnus coefficient is used for sub-cooled water in the calculation of relative humidity.

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

## 1.2.8 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.

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The transmitter even retains its scaling with the voltage disconnected.

Measuring range, see table (below).

3 The maximum settings for the manual scaling

- the values are not expressly given in the table. 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. However, the physical measurement range limits are the deciding factor when defining alarms.

| Parameter | Unit | probe | Measuring range physical at 1013 hPa | | Standard scaling MUF measuring range | |
|---|---|---|---|---|---|---|
| | | | MIN | MAX | MIN | MAX |
| Temperature | °C | 6601, 6602, 6604 | -20 | +70 | -20 | +70 |
| | °F | 6601, 6602, 6604 | -4 | +158 | -4 | +158 |
| | °C | 6603, 6605 | -30 | +120 | -30 | +120 |
| | °F | 6603, 6605 | -22 | +248 | -22 | +248 |
| relative humidity | % RH, | | 0 | +100 | 0 | +100 |
| WMO relative humidity | % RH | | 0 | +100 | 0 | +100 |
| Dewpoint | °Ctd | 6601, 6602, 6604 | -20 | +70 | -80 | +100 |
| at 25 °C Tmax | °Ftd | 6601, 6602, 6604 | -4 | +158 | -112 | +212 |
| | °Ctd | 6603, 6605 | -20 | +100 | -80 | +100 |
| | °Ftd | 6603, 6605 | -4 | +212 | -112 | +212 |
| Absolute humidity | g/m3 | all probes | 0 | 600 | 0 | 2000 |

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## 1.2.9 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 6651 monitors limit values using 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 *chapter 1.5, page 76*).

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.

Example

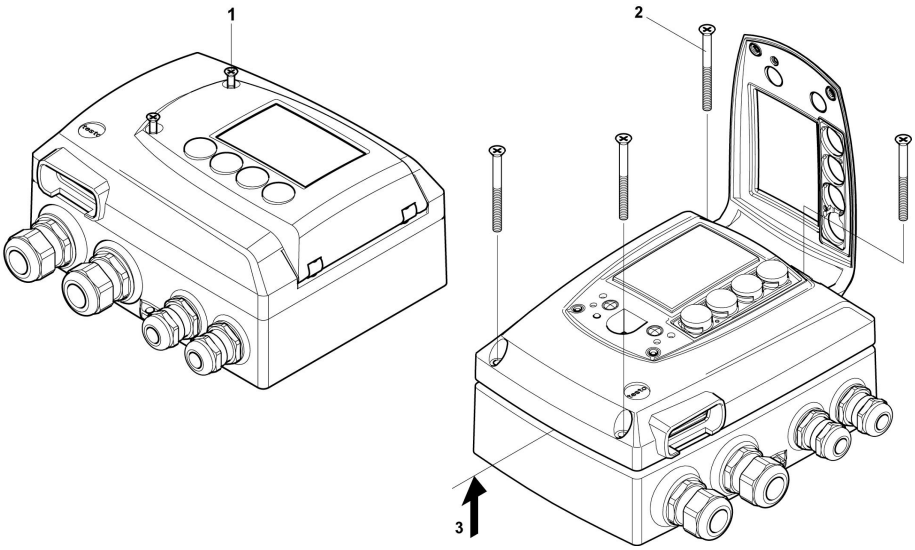
If the condensation of the probe begins, the "Condensation" message appears on the display and the "Start" status display. If the condensation is over, the status display changes from "Start" to "End".

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# 1.3 Commissioning

## 1.3.1 Insert Ethernet module (Order no. 0554 6656)

The Ethernet module can be ordered retroactively as an accessory. It can easily be installed in the testo 6651 humidity transmitter.



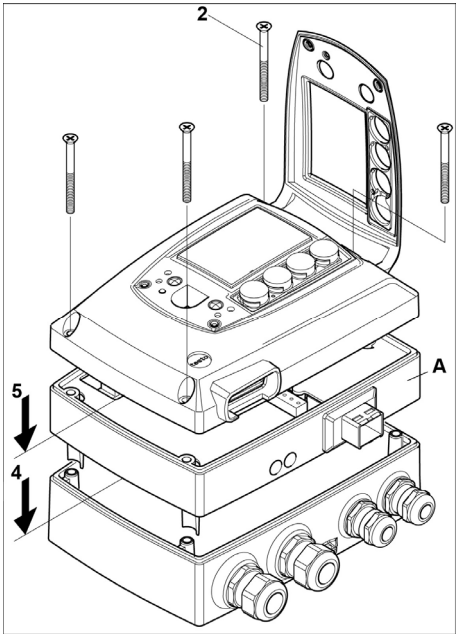

✓ The probe connector must be disconnected.

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 (3) and place on a clean surface.

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4 Place Ethernet module (A) on lower part of instrument (4).

If necessary, manually set the address using the rotary encoder switches (see *chapter 1.3.3.5, page 31* before fixing the instrument in place.

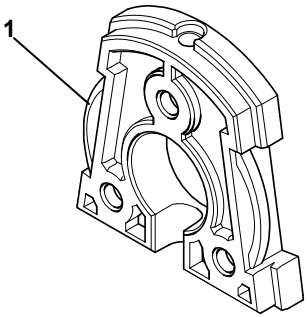
5 Set on upper part of instrument **(5)** and fix in place using housing screws **(2)**.

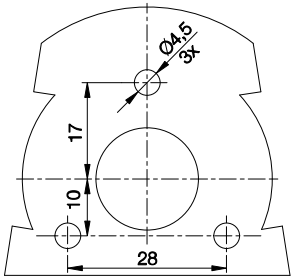
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## 1.3.2 Assembling the instrument

### 1.3.2.1 Wall mounting (for testo 6601/6604/6605 probes)

➢ **Attaching rear panel bracket**




1 Remove locking screw (item (4) of drawing on page 20) and detach rear panel bracket from plastic bracket (item (2) of drawing on page 20).

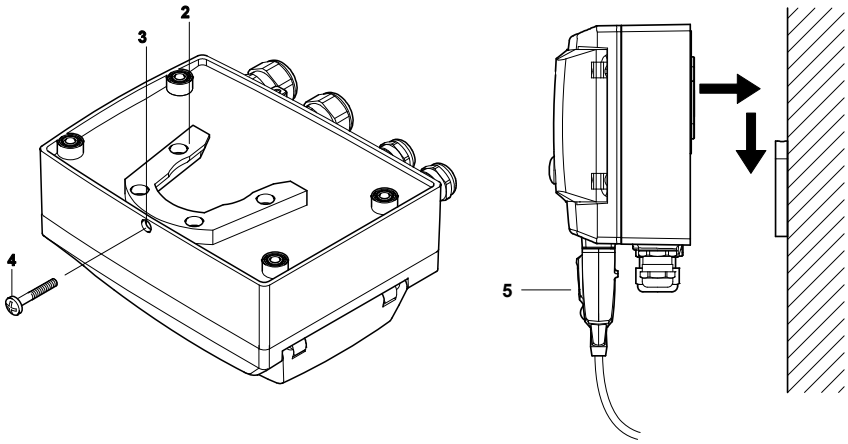
2 Hold rear panel bracket in assembly position and mark the three drill holes.

3 Drill three holes (∅ 5 mm) and insert dowels where necessary.

4 Screw on rear panel bracket.
Remember that the clamping brackets **(1)** must face the wall.

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➢ **Fastening instrument to rear panel bracket**



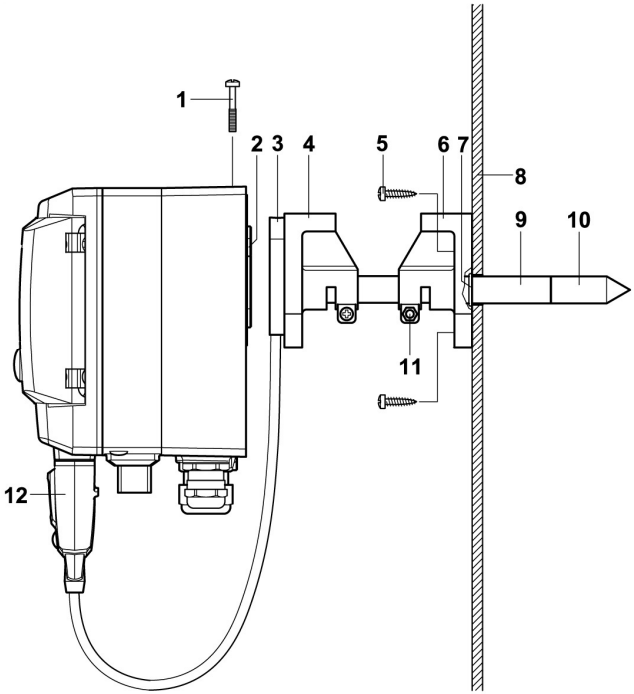

1 Slide plastic bracket (2) on the back of instrument onto rear panel bracket until it engages (see arrows).

2 Insert screw (4) through hole (3) and screw into rear panel bracket.

3 Insert probe connector **(5)** into socket until it engages.

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### 1.3.2.2 Duct mounting (for testo 6602/6603 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 (∅ 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.

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 **(8)** 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.

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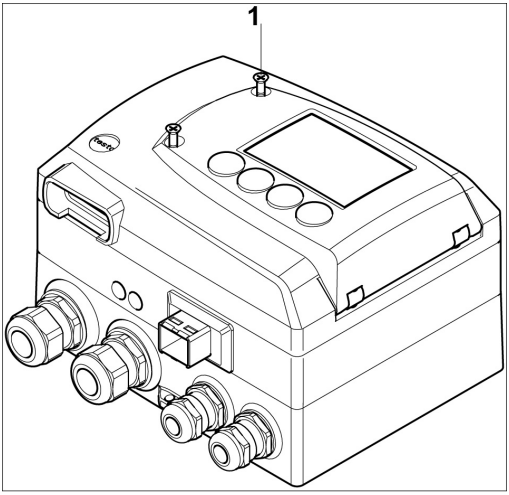
Take the weight of the transmitter into account. Ensure that the brackets **(4, 6)** are fastened securely.

7 Insert screw **(1)** through hole on the top of the instrument and screw into bracket **(3)**.

8 Insert probe connector **(12)** into socket until it engages.

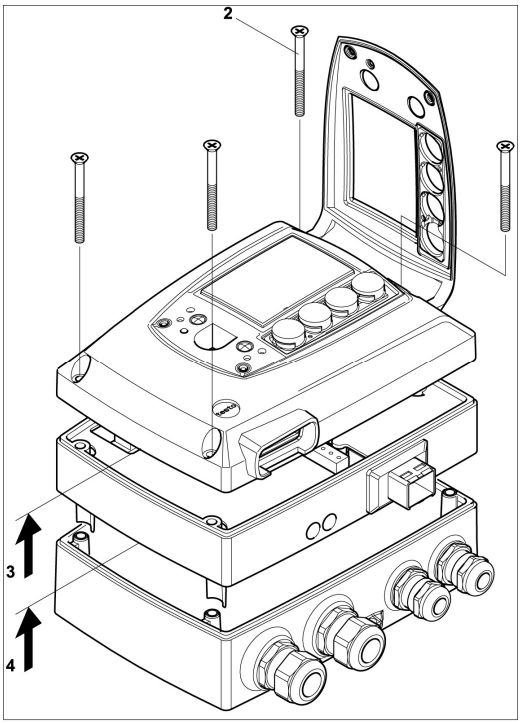
## 1.3.3 Connecting the instrument

➢ **Opening the instrument**




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

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**2** Loosen and remove housing screws **(2)**.

Important.

The Ethernet module **(A)** is already separated from the upper and lower parts of the instrument when the housing screws **(2)** are removed.

**3** Remove upper part of housing from lower part **(3)** and place on a clean surface.

**4** Remove Ethernet module **(A)** from lower part of housing **(4)** and also place on a clean surface.

**Warning!**

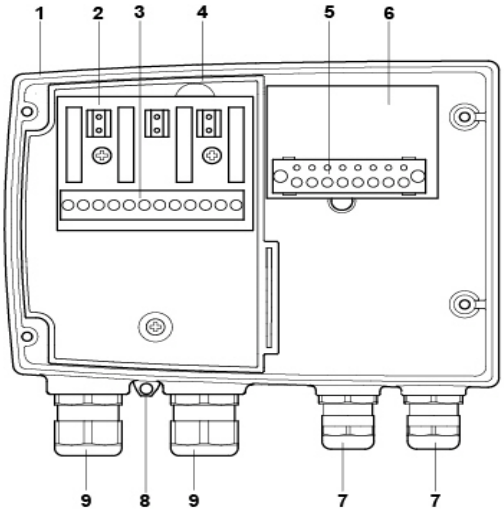
Electrical voltage.

Danger of injury!
De-energize the mains connection before connecting the transmitter!

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

### 1.3.3.1 Overview of terminals

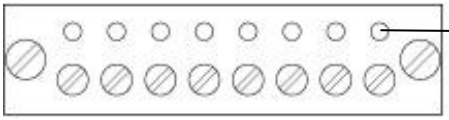



| | | | |
|---|---|---|---|
| 1 | Lower part of housing | 6 | Terminal board |
| 2 | Relay board (option) | 7 | M 16 x 1.5 screw connection* |
| 3 | Relay terminals | 8 | Eyelet for measuring point panel |
| 4 | Insulating trough for relay board | 9 | M 20 x 1.5 screw connection* |
| 5 | Terminal strip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

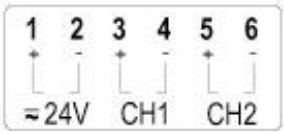
The following description of the terminals refer to this overview and its numbering.

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### 1.3.3.2 Connecting voltage supply and analog outputs

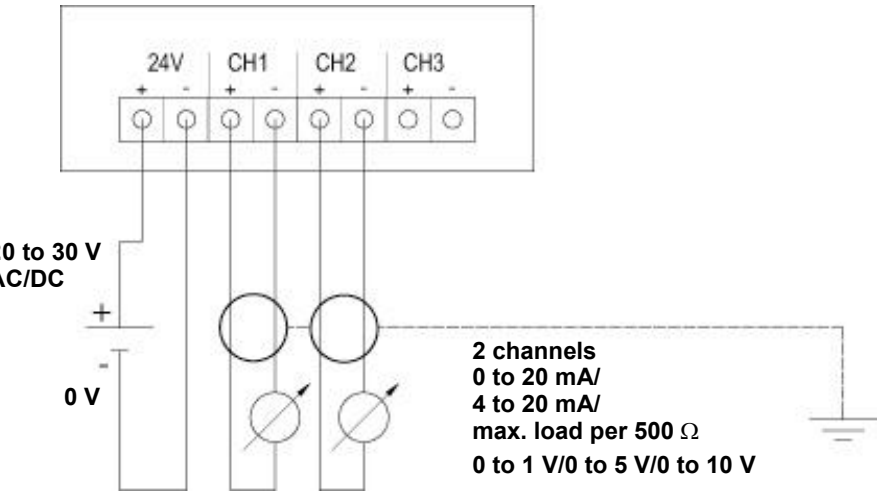


Terminal strip for voltage supply and analog outputs (item **(5)** of *Overview* of terminals*, chapter 1.3.3.1, page 24)*.




1. Feed cable with voltage supply and analog signal lines through opened M 16 x 1.5 screw connection (item **(7)** in Overview of terminals, chapter 1.3.3.1, page 24).
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 **(7)** in Overview of terminals, chapter 1.3.3.1, page 24).

**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)**




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The channel 3 shown on the circuit board cannot be used with this instrument.

Requirement for the connecting cable of the supply:

- Insulated with cross-section of at least 0.25 sq. mm.
- The supply line must be secured against exceeding 8 A.
- An OFF switch must be installed in an easily accessible position close by and be marked as such.

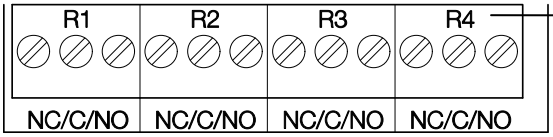
4 Feed connection cables of the two channels through opened M 16 x 1.5 screw connection (item **(7)** of *Overview* of terminals*, chapter 1.3.3.1, page 24*).

5 Strip the cable ends, clamp wire end ferrules on and screw to channel terminals as shown in diagram.

6 Close M 16 x 1.5 screw connection (item **(7)** in *Overview* of terminals*, chapter 1.3.3.1, page 24*).

### 1.3.3.3 Connecting the relay outputs

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




Relay terminal strip (item **(3)** of *Overview* of terminals*, chapter 1.3.3.1, page 24)*

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 M screw connection**

1 Feed connection cables for the relays through opened M 20 x 1.5 screw connection (item (10) of Overview of terminals, chapter 1.3.3.1, page 24).

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).

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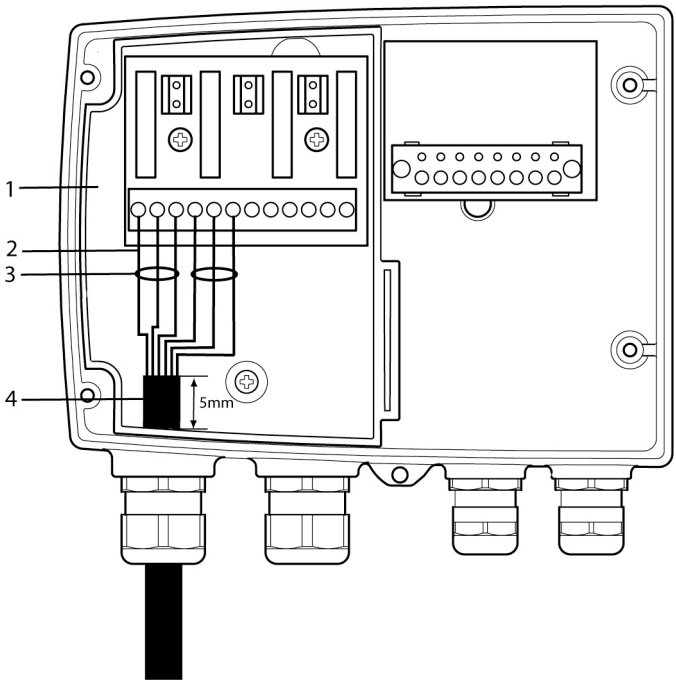
### Using plug-in connections (optional)

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

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

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

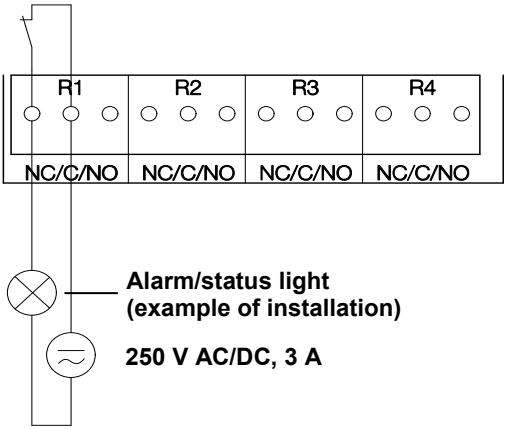
### Connection note




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- For the connection, a double-insulated mains cable (sheathed cable) with a cross-section of at least 1.5 sq. mm must be used.
- Cable connection **(2)** may not be routed in a loop within the tray **(1)**.
- In order to protect from electrical shock if the wire severs or falls out, 3 wires must always be bound together with a cable tie **(3)**.
- The insulation of the cable must be fed at least 5 mm **(4)** into the tray.

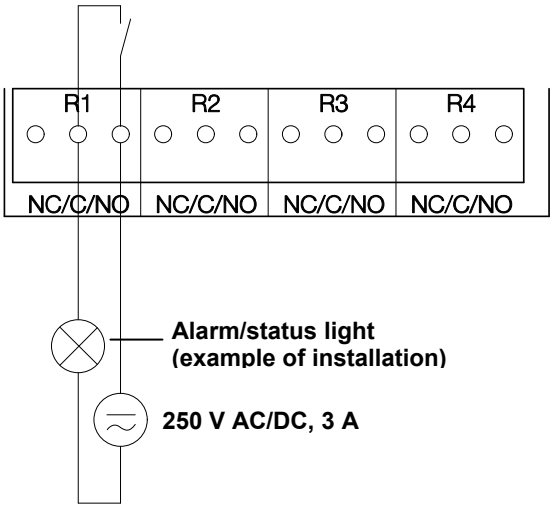
**Use of relay as NC contact (NC = normally closed)**




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.

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



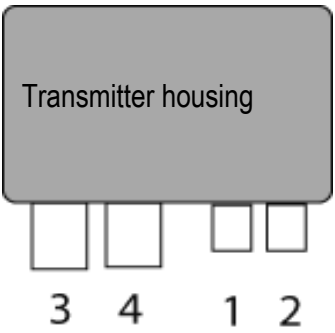

The busy light (alarm/status light) only comes on when the relay is switched (closed). Monitoring the functionality of the alarm circuit is therefore not possible with this switching operation.

2 Close M 20 x 1.5 screw connection (item (9) of Overview of terminals, chapter 1.3.3.1, page 24).

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### 1.3.3.4 Plug-in connection option

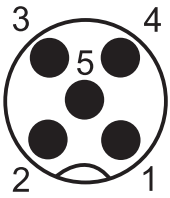
As an option, the M screw connections of the signal and supply lines can be replaced with plug-in connections that are installed at the housing (see Fig. 1 and 2). The relay cabling occurs via standard cable entries and PG screw connections, see Fig. 3 and 4




**Plug-in connections for power supply and channels**

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

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




| Pin | Assignment. |
|---|---|
| 1 | V 24 - |
| 2 | V 24 + |
| 3 | + Ch 1 |
| 4 | - Ch 1 |
| 5 | PE |

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




| Pin | Assignment. |
|---|---|
| 1 | - Ch 2 |
| 2 | + Ch 2 |
| 3 | + Ch 3 |
| 4 | - Ch 3 |
| 5 | PE |

### 1.3.3.5 Setting the Ethernet module

Using a DIP switch the Ethernet module can be switched between two main functions:

- Saveris subscriber function (DIP switch No. 1 = on)
  testo 6651 is used as a testo Saveris component.
- XML server function (DIP switch No. 1 = off)
  integration of the testo 6651 into the customer's Ethernet system.

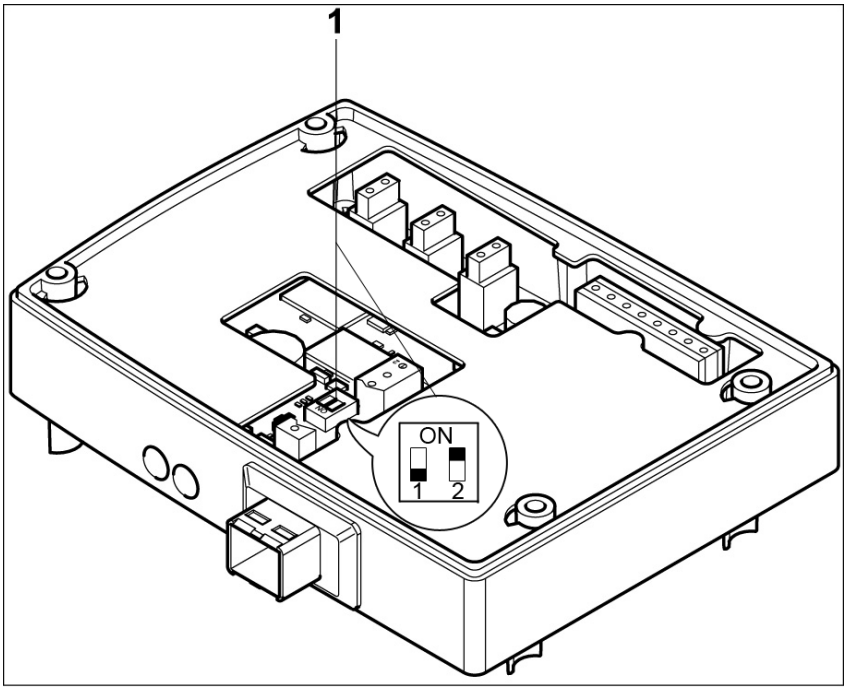
Important

The testo 6651 with Ethernet module is delivered with the switch set at "on" (Saveris setting).

✓ The testo 6651 must be disconnected from the Ethernet network.

1 Open transmitter (see *Section* Connecting the instrument*, chapter 1.3.3 page* 22*)*.

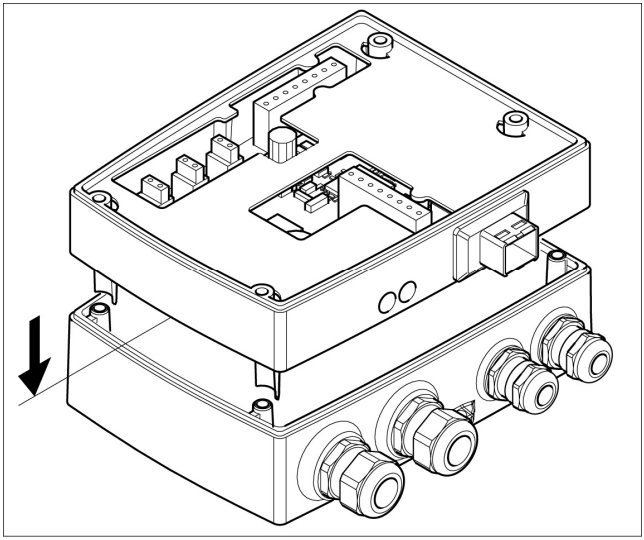
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2 Set the DIP switch no. 1 (**1**) on the Ethernet module.
In the illustration: DIP switch no. 1 off, DIP switch no. 2 on

3 Set Ethernet module on lower part of housing **(see arrow)**.

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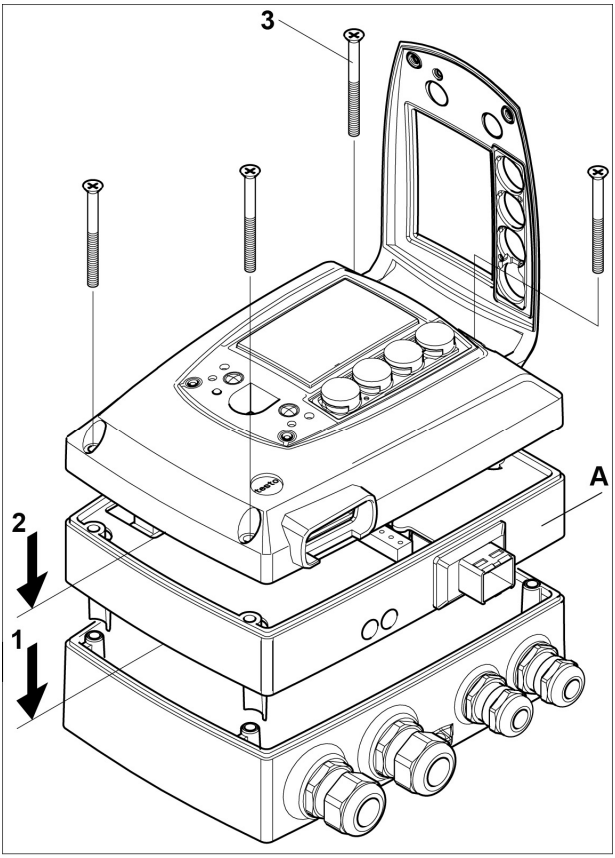


4 For the configuration of the Ethernet module, see following chapter.

5 If you do not wish to perform a configuration, close the transmitter.

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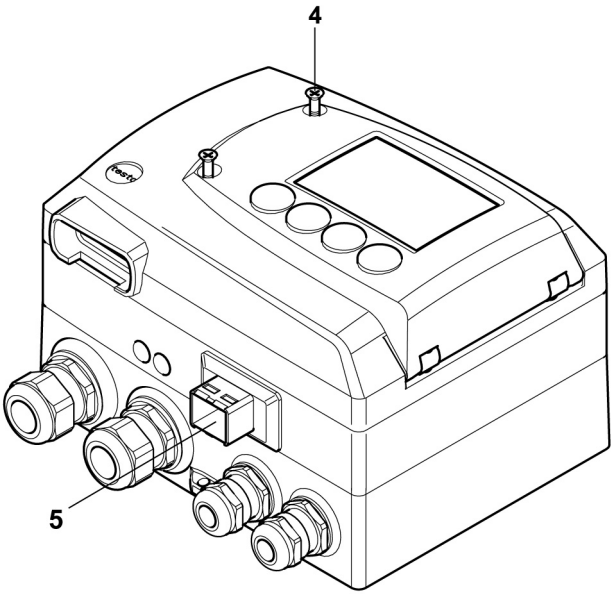
### 1.3.3.6 Closing the instrument




1 Place Ethernet module (A) on lower part of instrument (1).

2 Set on upper part of instrument (2) and fix in place using housing screws (3).

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3 Close the service flap and tighten screws **(4)**.

4 Connect the Ethernet network cable to the transmitter via the Ethernet socket **(5)**.

## 1.3.4 Ethernet communication

### 1.3.4.1 Types of operation

In general, the Ethernet module performs two functions:

- a corresponding testo 6651 becomes a Saveris subscriber
- a corresponding testo 6651 can be integrated into any Ethernet systems

### 1.3.4.2 Network connection

- Connect the Ethernet network cable to the transmitter via the Ethernet socket.

The network cable may not be connected directly to the telephone network (ISDN).

In order to guarantee the IP protection, an RJ 2.5 Harting Push-Pull plug must be used.

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### 1.3.4.3 LED status displays

| Characteristic | LED 1 | LED 2 |
|---|---|---|
| Colour | green | green |
| Status display for | Voltage supply | LAN connection |
| Status: off | No voltage supply | No LAN connection |
| Status: stays on | Voltage supply present | LAN connection present |
| Status: flashes | | Data transfer |

### 1.3.4.4 testo 6651 as Saveris subscriber

**Set the IP address**

✓ Network cable must be connected.

The IP address of the transmitter can either be set via the P2A software (transmitter accessories) or via the configuration menu of testo Saveris™ (testo Saveris™ Startup Wizard).

➢ Set IP address with the P2A software (see Chapter 117) or with the testo Saveris™ Startup Wizard (see instruction manual).

**Using Saveris**

➢ Start Saveris software (see instruction manual **Measurement data monitoring with testo Saveris**)

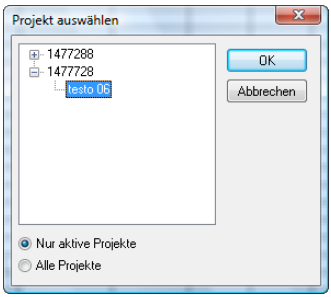
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Ensure that the Saveris software is not already open, for example in multi-user operation under Windows® Vista.

If multiple clients are installed in a network, make sure that no simultaneous changes are made to the system configuration by the clients during simultaneous operation of the clients.

1. **[Start]** | **All Programs** | **Testo** |
   - **Select Saveris Professional Client** (full version).
     The entry is available if Saveris Professional Client is installed
   - Select **Saveris Viewer** (limited functionality).
     The entry is available if Saveris Professional Viewer is installed

- - The **Testo Saveris software** program window is opened with the **Select project** dialogue.




If the software will not start, check whether the **testo tdassvcs** service is started in the service management of the operating system and restart it, if needed.

2. Select the
   - **Only active projects** option if the data from a running project should be opened
   - **All projects** option if the data from a completed project should be opened.
3. In the tree structure, select the project that is to be opened.
4. Confirm with **[OK]**.

   **1** The **Testo Saveris software** program window is shown with the selected data record in the foreground.

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### 1.3.4.5 Integration into customer's Ethernet system

**Precondition**



The user should be familiar with the structure of an XML document. Furthermore, enough knowledge should be available that this type of document can be downloaded and decoded via an Internet connection with the aid of a programming/script language

**Interface**

The communication takes place according to the client/server principle, whereby the Ethernet module takes on the role of the server:

The XML interface will be approached via a URL. The URL consists of the IP address of the Ethernet module, the path for the XML document and, depending on the URL, with a clearly defined parameter. If a parameter is missing or an incorrect value is transferred, the Ethernet module sends back a simple error message.

Example:

IP address = 254.169.100.100
URL for serialnumber.xml:
http://254.169.100.100/data/getserialnumber

If a parameter is required, a "?" (question mark) is always in the first place after the URL then the parameter is transferred to the common query string form (name=value).

Example:

IP address = 254.169.100.100
URL for / identification.xml:
http://254.169.100.100/data/getidentification?param=0 (compare table xml codes)

After calling up the compound URL, if everything was correct, an XML document is returned. With faulty parameters a simple HTML answer comes that points out the reason that an XML answer could not be given.

If an XML document is to be loaded on the server, access is provided by means of a POST request

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Example of an upload via the program wget:
IP address = 254.169.100.100
URL for / deviceident.xml:
H:/wget/wget-complete-stable/wget—post-file=
C:/usersettings.xml 193.168.1.5/config/setusersettings

The Ethernet module supports reading out of

- Readings
- Instrument type (testo 6651)
- Firmware date and version (testo 6651)
- Status and status messages (testo 6651)
- Alarm messages (testo 6651)
- Service hour counter (testo 6651 and probe)

as well as the reading and writing of the:

- Adjustment data (testo 6651)
- Configuration data of analog outputs (testo 6651)
- Configuration data of relays (testo 6651)
- User settings (testo 6651)

**XML codes (download)**

The table of xml codes is available for download at *www.testo.de/transmitter* as well as on the product CD

| URL | Description | Parameter | Answer (see Appendix) |
|---|---|---|---|
| /data/getserialnumber | Read off serial number of connected transmitter | | serialnumber.xml |
| /data/getidentification | Read off type of connected transmitter/ probe | param=0 (for transmitter)<br>param=1 (for probe) | identification.xml |
| /data/getversion | Read off firmware version of connected transmitter | | version.xml |
| /data/getfirmwaredate | Read off firmware date of connected transmitter | | firmwaredate.xml |
| /data/getonlinevalue | Read off online values of connected transmitter | | onlinevalue.xml |
| /data/getviewchannels | Read off view channels of connected transmitter | | viewchannels.xml |
| /data/getstatus | Read off status of connected transmitter | | status.xml |

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| URL | Description | Parameter | Answer (see Appendix) |
|---|---|---|---|
| /data/getlaststatusmessage | Read off last status message of connected transmitter | | laststatusmessage.xml |
| /config/gethourscount | Read off service hour counter of transmitter or probe | param=0 (for transmitter)<br>param=1 (for probe) | hourscount.xml |
| /config/getusersettings | Read off settings of transmitter | | usersettings.xml |
| /config/getcalibration | Read off adjustment data of transmitter | param=0 (adjustment set 1)<br>param=1 (adjustment set 2)<br>param=2 (adjustment set 3) | calibration.xml |
| /config/getreldefinition | Read off relay information of transmitter | param=0 (relay 1)<br>param=1 (relay 2)<br>param=2 (relay 3)<br>param=3 (relay 4) | reldefinition.xml |
| /config/getheatertime | Read off sensor heating information | | heatertime.xml |
| /config/getoptions | Read off options of transmitter | | options.xml |
| /config/getcollectivealarm | Read off alarm messages of transmitter | | collectivealarm.xml |

## Upload XML documents

| URL | Description | Parameter | Post | Answer (see Appendix) |
|---|---|---|---|---|
| /config/setusersettings | Perform settings of testo 6651 | | usersettings | usersettings.xml |
| /config/setcalibration | Set adjustment data of transmitter | param=0 (adjustment set 1)<br>param=1 (adjustment set 2)<br>param=2 (adjustment set 3) | calibration.xml | calibration.xml |
| /config/setreldefinition | Set relay information of transmitter | param=0 (relay 1)<br>param=1 (relay 2)<br>param=2 (relay 3)<br>param=3 (relay 4) | reldefinition.xml | reldefinition.xml |
| /config/setheatertime | Set sensor heating information | | heatertime.xml | heatertime.xml |
| /config/setoptions | Set options of transmitter | | options.xml | options.xml |
| /action/setresettm | Not yet implemented | | resettm.xml | |

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## Description of the XML elements

### General elements

| XML tag | Description | Type |
|---|---|---|
| measurement_value | Parent element. Contains the child elements value, unit, resolution | |
| value | Reading | Numerical, decimal number |
| unit | Unit | ASCII |
| number_values | Qty. | Numerical, whole number |

### Elements in calibration.xml

| XML tag | Description | Type |
|---|---|---|
| calibration_data | Base element. Contains the child elements unit, attenuation, cal_reserved, cal_offset, cal_scale. | |
| Unit | See general elements | |
| attenuation | Damping (0 – 15) | Numerical, whole number |
| cal_offset | Offset | Numerical, decimal number |
| cal_scale | Parent element. Contains the child elements cal_minscale, cal_maxscale | |
| cal_minscale | Scaling value | Numerical, decimal number |
| cal_maxscale | Scaling value | Numerical, decimal number |

### Elements in collectivealarm.xml

| XML tag | Description | Type |
|---|---|---|
| colalarmtable | Base element. Contains the child elements alarm_numbers, alarm | |
| alarm_numbers | Number of alarm messages | Numerical, whole number |
| alarm | Parent element. Contains the child elements alarm_event, alarm_state | |
| alarm_event | Type of alarm | ASCII |
| alarm_state | Status of the alarm<br>0 = alarm inactive<br>1 = alarm active | Numerical, whole number |

### Elements in deviceident.xml

| XML tag | Description | Type |
|---|---|---|
| ident | Base element. Contains the child element device_id | |
| device_id | ID of transmitter or probe | Numerical, whole number |

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Elements in firmwaredate.xml

| XML tag | Description | Type |
|---|---|---|
| firmware_date | Base element. Contains the child elements year, month, day | |
| year | Year | Numerical, whole number |
| month | Month | Numerical, whole number |
| day | Day | Numerical, whole number |

Elements in heatertime.xml

| XML tag | Description | Type |
|---|---|---|
| heatertime | Base element. Contains the child element heatertimeoff | |
| heatertimeoff | Time sensor heating off in min | Numerical, whole number |

Elements in hourscount.xml

| XML tag | Description | Type |
|---|---|---|
| hourcount | Base element. Contains the child element hours | |
| hours | Service hour counter in h | Numerical, whole number |

Elements in identification.xml

| XML tag | Description | Type |
|---|---|---|
| ident | Base element. Contains the child element device_id | |
| device_id | Transmitter type | Numerical, whole number |

Elements in laststatusmessage.xml

| XML tag | Description | Type |
|---|---|---|
| mufmsg | Base element. Contains the child elements msg, sn, hours | |
| msg | Status message | ASCII |
| sn | Serial number | ASCII, 8 characters |
| hours | Service hour counter in h | Numerical, whole number |

Elements in onlinevalue.xml

| XML tag | Description | Type |
|---|---|---|
| online_values | Base element. Contains the child elements number_values, measurement_value | |
| number_values | See general elements | |
| measurement_value | See general elements | |

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Elements in options.xml

| XML tag | Description | Type |
|---|---|---|
| options | Base element. Contains the child elements device_options, production_options, country_option, option_counter | |
| device_options | See device_options description | Numerical, whole number |
| production_options | See production_options description | Numerical, whole number |

Elements in reldefinition.xml

| XML tag | Description | Type |
|---|---|---|
| relay_data | Base element. Contains the child elements relay_channel, relay_number, relay_status, sw_point_character, sw_point_value, hysteresis_value | |
| relay_channel | Measurement channel linked to the relay | Numerical, whole number |
| relay_number | Relay number (0 – 2) | Numerical, whole number |
| relay_status | Status of relay<br>0 = off<br>1 = on | Numerical, whole number |
| sw_point_charact | Switch point: Switch point:<br>0 = low-limit monitoring<br>1 = high-limit monitoring | Numerical, whole number |
| sw_point_value | Switch point | Numerical, decimal number |
| hysteresis_value | Hysteresis | Numerical, decimal number |

Elements in serialnumber.xml

| XML tag | Description | Type |
|---|---|---|
| serialnumber | Base element. Contains the child element number | |
| number | Serial number | ASCII, 8 characters |

Elements in status.xml

| XML tag | Description | Type |
|---|---|---|
| mufstatus | Base element. Contains the child elements statemsg, staterel, statecounter | |
| statemsg | Status message<br>See statemsg description | Numerical, whole number |
| staterel | Status relay<br>See staterel description | Numerical, whole number |
| statecounter | Counter | Numerical, whole number |

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## Elements in usersettings.xml

| XML tag | Description | Type |
|---|---|---|
| usersettings | Base element. Contains the child elements pressure, h2o2, setting_display, backlight, contrast, language, disp_msg, h2o2_prozess | |
| pressure | Absolute pressure | Numerical, decimal number |
| h2o2 | H2O2 value | Numerical, decimal number |
| setting_display | Auto OFF background lighting<br>0 -> background lighting auto OFF<br>1 -> background lighting stays on | Numerical, whole number |
| backlight | Brightness of background lighting<br>0 – 9 (0 = off, 9 = max.) | Numerical, whole number |
| contrast | Display contrast<br>0 – 9 (0 = min., 9 = max.) | Numerical, whole number |
| language | Language<br>0 ->GERMAN<br>1->ENGLISH<br>2->FRENCH<br>3->SPANISH<br>4->ITALIAN<br>5 ->JAPANESE | Numerical, whole number |
| disp_msg | Status messages display<br>0 = off<br>1 = on | Numerical, whole number |
| h2o2_prozess | H2O2 process<br>0 = via H2O2 water<br>1 = process with evaporated H2O2 | Numerical, whole number |

## Elements in version.xml

| XML tag | Description | Type |
|---|---|---|
| firmware_version | Base element. Contains the child element version | |
| version | Firmware version: | ASCII, 6 characters |

## Elements in viewchannels.xml

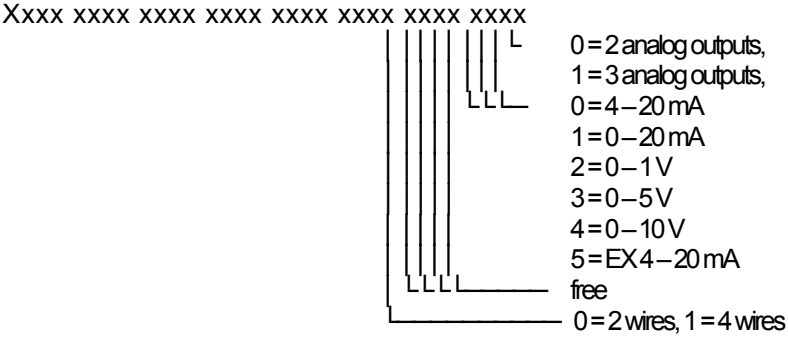
| XML tag | Description | Type |
|---|---|---|
| view_channels | Base element. Contains the child elements number_values, view_channel | |
| number_values | See general elements | |
| view_channel | Parent element. Contains the child elements channel_info, measurement_value, meas_status | |
| channel_info | Parent element. Contains the child elements connector_info, channel_type | |

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| XML tag | Description | Type |
|---|---|---|
| measurement_value | See general elements | |
| meas_status | Parent element. Contains the child elements min, max, mean | |
| connector_info | Channel (transmitter/probe) | ASCII |
| channel_type | Parameter details | ASCII |
| min. | Minimum reading | Numerical, decimal number |
| max. | Maximum reading | Numerical, decimal number |
| mean | Mean value | Numerical, decimal number |

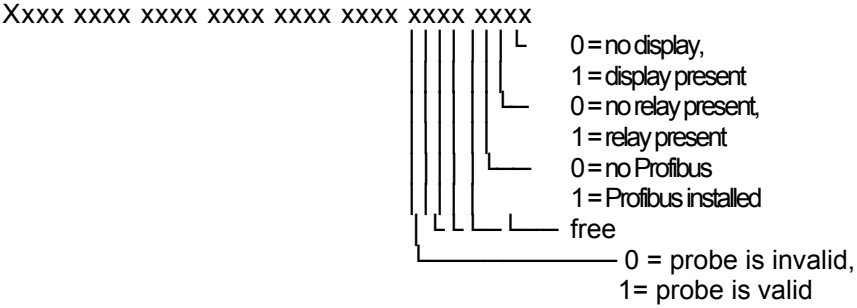
**production_options description**

Content of production_options is a double word type number (32 bit). The individual hardware options are bit-coded here.




**device_options description**

Content of device_options is a double word type number (32 bit). The individual instrument options are bit-coded here.



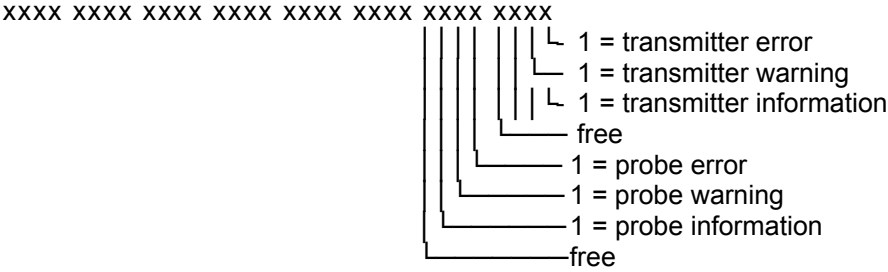

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**statemsg description**

Content of statemsg is a double word type number (32 bit). The individual status messages are bit-coded here.

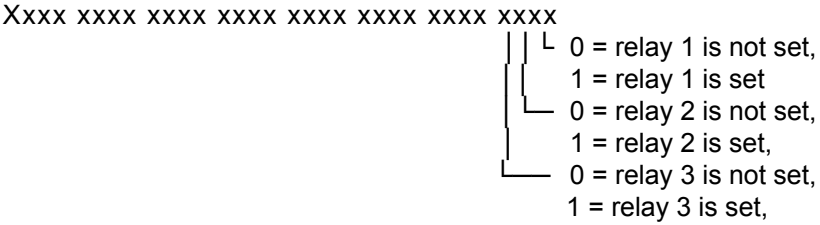
If statemsg = 0 there are no new messages.

If statemsg != 0:




**staterel description**

Content of staterel is a double word type number (32 bit). The individual relay states are bit-coded here.




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**xml files Appendix**

Note: “xxxx” = text message

calibration.xml

```
<?xml version=”1.0” encoding=”UTF-8” ?>
<calibration_data>
  <unit>%rF</unit>
  <attenuation>1</attenuation>
  <cal_offset>0.000000</cal_offset>
  <cal_scale>
    <cal_min_scale>0.000000</cal_min_scale>
    <cal_max_scale>0.000000</cal_max_scale>
  </cal_scale>
</calibration_data>
```

collectivealarm.xml

```
<?xml version=”1.0” encoding=”UTF-8” ?>
<colalarmtable>
  <alarm_numbers>4</alarm_numbers>
  <alarm>
    <alarm_event>xxxx</alarm_event>
    <alarm_state>0</alarm_state>
  </alarm>
  <alarm>
    <alarm_event>xxxx</alarm_event>
    <alarm_state>0</alarm_state>
  </alarm>
  <alarm>
    <alarm_event>xxxx</alarm_event>
    <alarm_state>0</alarm_state>
  </alarm>
  <alarm>
    <alarm_event>xxxx</alarm_event>
    <alarm_state>0</alarm_state>
  </alarm>
</colalarmtable>
```

deviceident.xml

```
<?xml version=”1.0” encoding=”UTF-8” ?>
<ident>
  <device_id>31</device_id>
</ident>
```

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| firmwaredate.xml |
| --- |
| <?xml version=”1.0” encoding=”UTF-8” ?><br><firmware_date><br><year>2008</year><br><month>3</month><br><day>28</day><br></firmware_date> |

| heatertime.xml |
| --- |
| <?xml version=”1.0” encoding=”UTF-8” ?><br><heatertime><br><heatertimeoff>60</heatertimeoff><br></heatertime> |

| hourscount.xml |
| --- |
| <?xml version=”1.0” encoding=”UTF-8” ?><br><hourcount><br><hours>68</hours><br></hourcount> |

| identification.xml |
| --- |
| <?xml version=”1.0” encoding=”UTF-8” ?><br><ident><br><device_id>31</device_id><br></ident> |

| laststatusmessage.xml |
| --- |
| <?xml version=”1.0” encoding=”UTF-8” ?><br><mufmsg><br><msg>xxxx</msg><br><serialnumber>00123456</serialnumber><br><hours>163</hours><br></mufmsg> |

| onlinevalue.xml |
| --- |
| <?xml version="1.0" encoding="UTF-8" ?><br><online_values><br><number_values>3</number_values><br><measurement_value><br><value>23.7</value><br><unit>°C</unit> |

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```
  </measurement_value>
  <measurement_value>
    <value>42.4</value>
    <unit>%rF</unit>
  </measurement_value>
  <measurement_value>
    <value>9.5</value>
    <unit>td°C</unit>
  </measurement_value>
</online_values>
```

options.xml

```
<?xml version="1.0" encoding="UTF-8" ?>
<options>
  <device_options>00000011</device_options>
  <production_options>xxxx</production_options>
</options>
```

reldefinition.xml

```
<?xml version="1.0" encoding="UTF-8" ?>
<relay_data>
  <relay_channel>0</relay_channel>
  <relay_number>0</relay_number>
  <relay_status>0</relay_status>
  <sw_point_charact>0</sw_point_charact>
  <sw_point_value>0.0</sw_point_value>
  <hysteresis_value>0.0</hysteresis_value>
</relay_data>
```

serialnumber.xml

```
<?xml version="1.0" encoding="UTF-8" ?>
<serialnumber>
  <number>0012345</number>
</serialnumber>
```

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**xml files Appendix**

<!ELEMENT serialnumber (number)>
<!ELEMENT number (#PCDATA)>

<!ELEMENT ident (device_id)>
<!ELEMENT device_id (#PCDATA)>

<!ELEMENT firmware_version(version)>
<!ELEMENT version (#PCDATA)>

<!ELEMENT firmware_date (year, month, day)>
<!ELEMENT year (#PCDATA)>
<!ELEMENT month (#PCDATA)>
<!ELEMENT day (#PCDATA)>

<!ELEMENT channel_info (connector_info, channel_type)>
<!ELEMENT connector_info (#PCDATA)>
<!ELEMENT channel_type (#PCDATA)>

<!ELEMENT online_values (number_values, (measurement_value)*)>
<!ELEMENT number_values (#PCDATA)>
<!ELEMENT measurement_value (value, unit)>
<!ELEMENT value (#PCDATA)>
<!ELEMENT unit (#PCDATA)>

<!ELEMENT view_channels (number_values, (view_channel)*)>
<!ELEMENT view_channel (channel_info, measurement_value,
meas_status)>
<!ELEMENT meas_status (min, max, mean)>
<!ELEMENT min (#PCDATA)>
<!ELEMENT max (#PCDATA)>
<!ELEMENT mean (#PCDATA)>

<!ELEMENT hourcount (hours)>
<!ELEMENT hours (#PCDATA)>

<!ELEMENT usersettings (pressure, h2o2, setting_display, backlight,
contrast, language, disp_msg, h2o2_prozess)>
<!ELEMENT pressure (#PCDATA)>
<!ELEMENT h2o2 (#PCDATA)>
<!ELEMENT setting_display (#PCDATA)>
<!ELEMENT backlight (#PCDATA)>

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<!ELEMENT contrast (#PCDATA)>
<!ELEMENT language (#PCDATA)>
<!ELEMENT disp_msg (#PCDATA)>
<!ELEMENT h2o2_prozess (#PCDATA)>

<!ELEMENT calibration_data (unit, attenuation, cal_offset, cal_scale)>
<!ELEMENT attenuation (#PCDATA)>
<!ELEMENT cal_offset (#PCDATA)>
<!ELEMENT cal_scale (cal_minscale, cal_maxscale)>
<!ELEMENT cal_minscale (#PCDATA)>
<!ELEMENT cal_maxscale (#PCDATA)>

<!ELEMENT relay_data (relay_channel, relay_number, relay_status,
sw_point_character, sw_point_value, hysteresis_value)>
<!ELEMENT relay_channel (#PCDATA)>
<!ELEMENT relay_number (#PCDATA)>
<!ELEMENT relay_status (#PCDATA)>
<!ELEMENT sw_point_character (#PCDATA)>
<!ELEMENT sw_point_value (#PCDATA)>
<!ELEMENT hysteresis_value (#PCDATA)>

<!ELEMENT heatertime (heatertimeoff)>
<!ELEMENT heatertimeoff (#PCDATA)>

<!ELEMENT options (device_options, production_options)>
<!ELEMENT device_options (#PCDATA)>
<!ELEMENT production_options (#PCDATA)>

<!ELEMENT colalarmtable (alarm_numbers, (alarm)*)>
<!ELEMENT alarm_numbers (#PCDATA)>
<!ELEMENT alarm (alarm_event, alarm_state)>
<!ELEMENT alarm_event (#PCDATA)>
<!ELEMENT alarm_state (#PCDATA)>

<!ELEMENT mufstatus (statemsg, staterel, statecounter, reserved)>
<!ELEMENT statemsg (#PCDATA)>
<!ELEMENT staterel (#PCDATA)>
<!ELEMENT statecounter (#PCDATA)>

<!ELEMENT mufmsg (msg, sn, hours)>
<!ELEMENT msg (#PCDATA)>
<!ELEMENT sn (#PCDATA)>
<!ELEMENT hours (#PCDATA)>

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status.xml

```
<?xml version="1.0" encoding="UTF-8" ?>
<mufstatus>
  <statemsg>0</statemsg>
  <staterel>0</staterel>
  <statecounter>1</statecounter>
</mufstatus>
```

usersettings.xml

```
<?xml version="1.0" encoding="UTF-8" ?>
<usersettings>
  <pressure>1013.0</pressure>
  <h2o2>0.0</h2o2>
  <setting_disp>1</setting_disp>
  <backlight>3</backlight>
  <contrast>5</contrast>
  <language>0</language>
  <disp_msg>1</disp_msg>
  <h2o2_prozess>0</h2o2_prozess>
</usersettings>
```

version.xml

```
<?xml version="1.0" encoding="UTF-8" ?>
<firmware_version>
 <version>V1.10</version>
</firmware_version>
```

viewchannels.xml

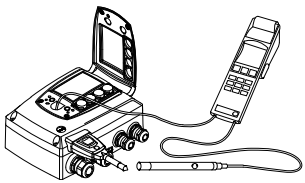
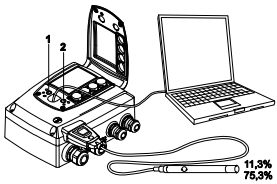
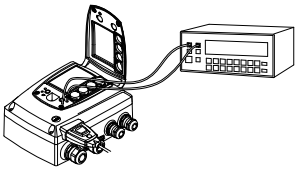
```
<?xml version="1.0" encoding="UTF-8" ?>
<view_channels>
  <number_values>2</number_values>
  <view_channel>
    <channel_info>
      <connector_info>Probe</connector_info>
      <channel_type>Temperature</channel_type>
    </channel_info>
    <measurement_value>
      <value>23.7</value>
      <unit>°C</unit>
    </measurement_value>
    <meas_status>
      <min>23.6</min>
      <max>23.7</max>
```

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```
      <mean>23.7</mean>
    </meas_status>
  </view_channel>
  <view_channel>
    <channel_info>
      <connector_info>Probe</connector_info>
      <channel_type>Humidity</channel_type>
    </channel_info>
    <measurement_value>
      <value>42.5</value>
      <unit>%rF</unit>
    </measurement_value>
    <meas_status>
      <min>41.7</min>
      <max>43.0</max>
      <mean>43.0</mean>
    </meas_status>
  </view_channel>
</view_channels>
```

## 1.3.5 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).

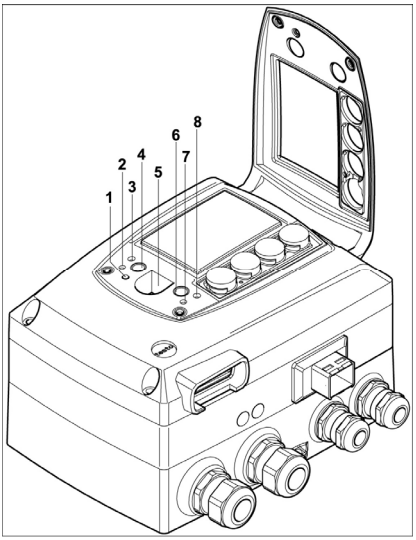
| **1-point adjustment** | **2-point adjustment** | **Analog adjustment** |
|---|---|---|
|  |  |  |
| Adjustment via<br>- testo 400/650 handheld instrument with adjustment adapter<br>- P2A software<br>- User menu | Adjustment 11.3 % RH and 75.3 % RH via<br>- Adjustment keys (**1**, **2**)<br>- P2A software<br>Adjustment 20 % rH and 80 % rH via<br>- User menu | Adjustment using a precise multimeter and transmission of analog reference value in<br>- P2A software or<br>- User menu |

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

The testo 6651 transmitter has digital probes whose adjustment information is stored in the probe's internal memory. Both 1-point and 2-point adjustments can thus be carried out on another testo 6651 (e.g. in the calibration laboratory).

### 1.3.5.1 Overview: Adjustment keys and test contacts

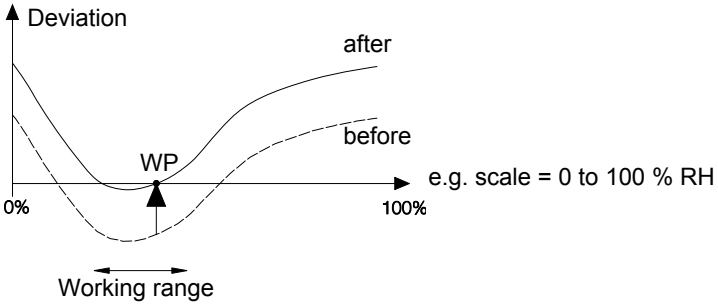



1 LED
2 Contact ch. 1 +
3 Contact ch. 1 -
4 Adjust key 11.3 %
5 Service interface
6 Adjust key 75,3 %
7 Contact ch. 2 +
8 Contact ch. 2 -

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### 1.3.5.2 1-point adjustment (offset)

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 point, 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

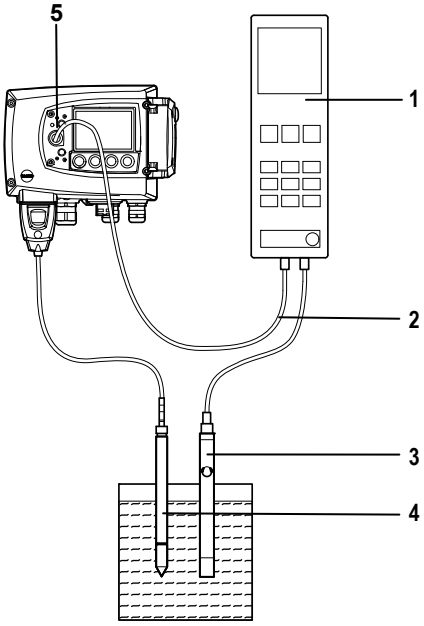
- via the user menu (see *chapter 1.4.6.8, page 72)* or
- via the P2A software (see *volume 2, Chapter 3, page 113)* or
- directly by means of a Testo handheld instrument (testo 400/650) (see description of how to proceed below).

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

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➢ **Adjusting testo 6651 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 6651 via the adjustment adapter (2) (connected to the probe socket 1 of the handheld instrument).

2 Expose the humidity probe **(4)** of the testo 6651 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.

4 The 1-point adjustment is performed for both the humidity and the temperature.

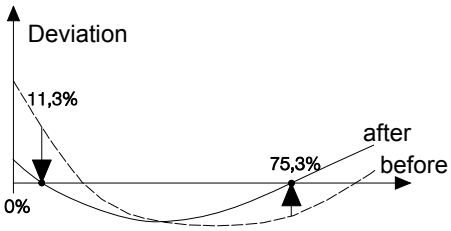
5 Disconnect the adapter **(2)** from the service interface **(5)**.

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6 Close the service flap.

### 1.3.5.3 2-point adjustment

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 humidity adjustment set (order no. 0554 0660, only for adjustment points 11.3 %RH and 75.3 %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, e.g. in drying processes.

The 2-point adjustment can be performed for the adjustment points 11.3 %RH and 75.3 %RH

- via P2A software (see *volume 2, chapter 3, page 113*) or
- using the adjustment keys under the service flap, see description of how to proceed below.

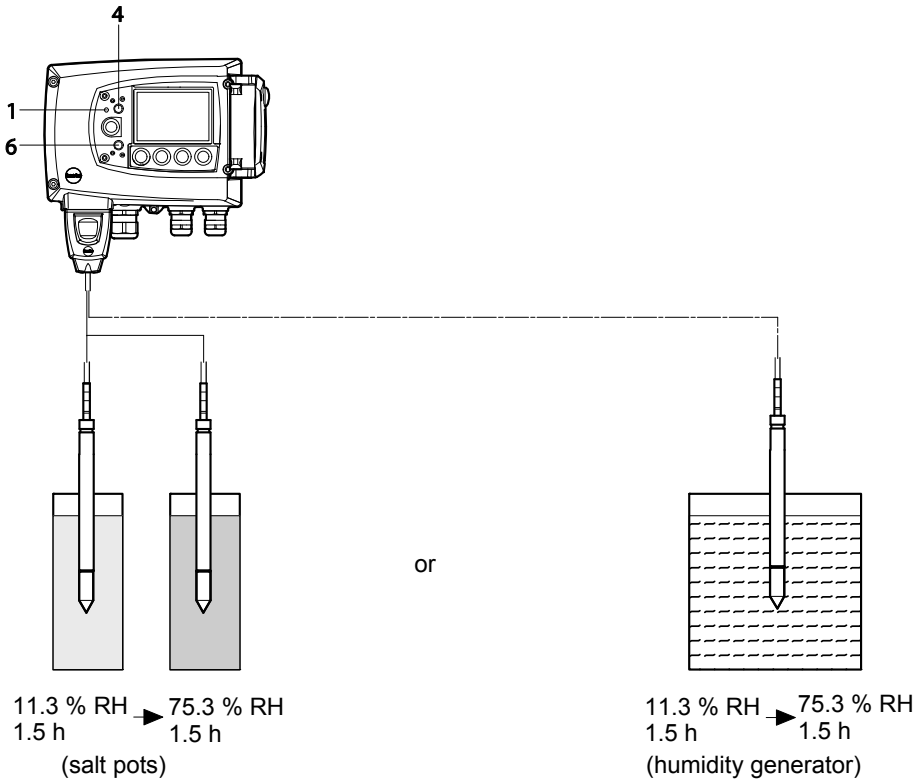
The 2-point adjustment for the adjustment points 20 %RH and 80 %RH is carried out via the user menu.

A 2-point adjustment cancels any previous 1-point adjustment.

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### ➢ Adjusting testo 6651 using adjustment keys

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




✓ The service flap of the testo 6651 is open.

1 Expose the humidity probe of the testo 6651 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. At the same time, the 2-point adjustment 11.3 % status message appears on the display

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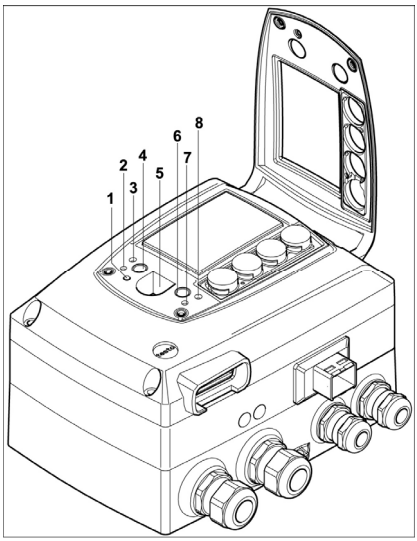
Completion of the adjustment is signalled by the LED **(1)** coming on permanently and the **Probe reset** status message is shown.

3 Carry out the adjustment analogously for the reference condition 75.3 % RH. Press on the 75.3 % RH adjustment key **(6)** to do this.

4 Close the service flap.

### 1.3.5.4 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 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 -

➢ **Adjust analog outputs**

✓ A precise multimeter (minimum resolution of 6.5 digits, accuracy of 100 µA, e.g. Agilent 34401A) is available.

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

✓ The service flap is open.

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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 to the P2A software (see volume 2, chapter 3, page 113*)* or enter it via the user menu (see chapter *1.4.6.8, page 72*).

3 Disconnect connections between multimeter and contacts of the testo 6651 and close service flap.

# 1.4 Operation

## 1.4.1 Relationship between user menu and mini-DIN socket is active

The testo 6651 can be parameterized using either the user menu or the P2A software (see *volume 2, chapter 3, page 113*).



The testo 6651 humidity transmitter can only be operated via the display and keypad if the display option is available.

If the testo 6651 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 6651. As soon as the P2A software is disconnected, the user menu is accessible again.

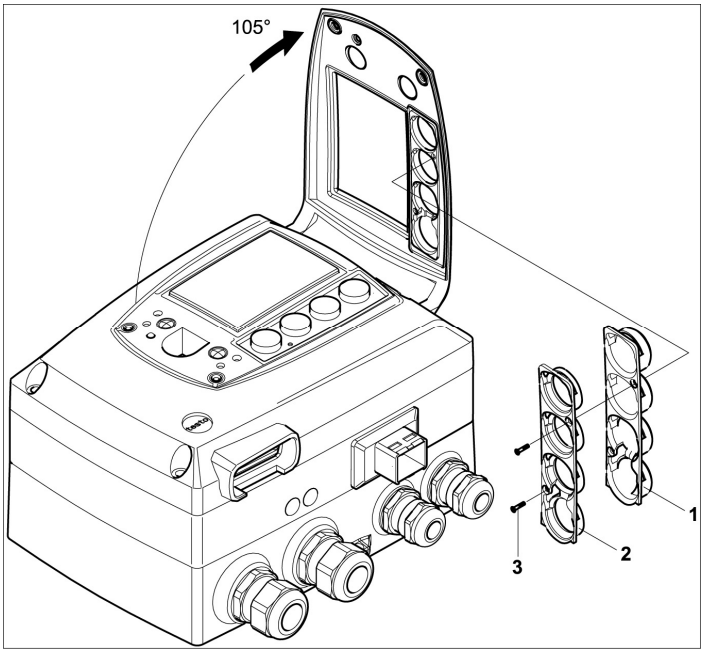
## 1.4.2 Key cover

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 (see Section *Opening the* instrument, *chapter 1.3.3, page 22)*.

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➢ **Attaching the key cover**




✓ The service flap is open (see Section *Opening the* instrument, *chapter 1.3.3, page 22*).

1 Undo 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.

## 1.4.3 Password protection

The user menu can be protected with a four-digit numerical code (see *chapter 1.4.6.4, page 67)* so that access to the user menu is denied to unauthorized persons not familiar with this numerical code.

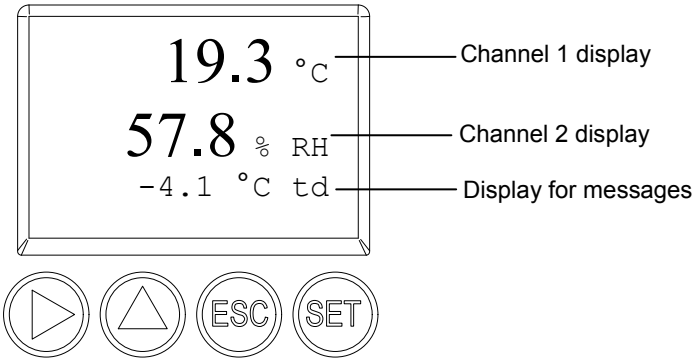
If the password protection is not to be used, the numerical code "0000" must be entered. This is also the status upon delivery.

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## 1.4.4 Structure of user menu

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

- **Main menu of channel 1**
- **Main menu of channel 2**
- **Main Menu Alarm**
- **Editing Settings main menu**
- **Analysis main menu**
- **Status main menu**
- **Ident main menu**
- **Adjustment main menu**
- **Reset main menu**

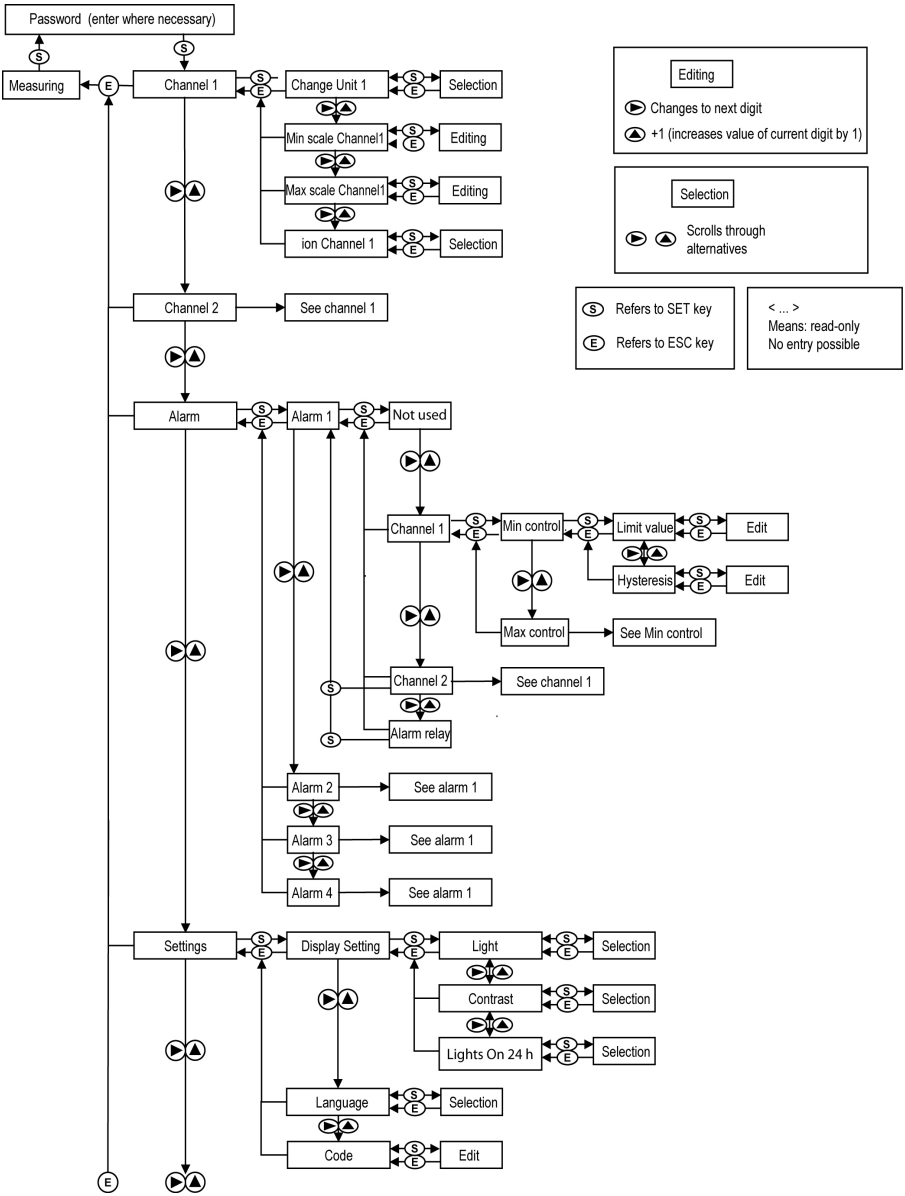



Four keys enable the user to navigate/scroll through the menus and enter/amend values and settings:

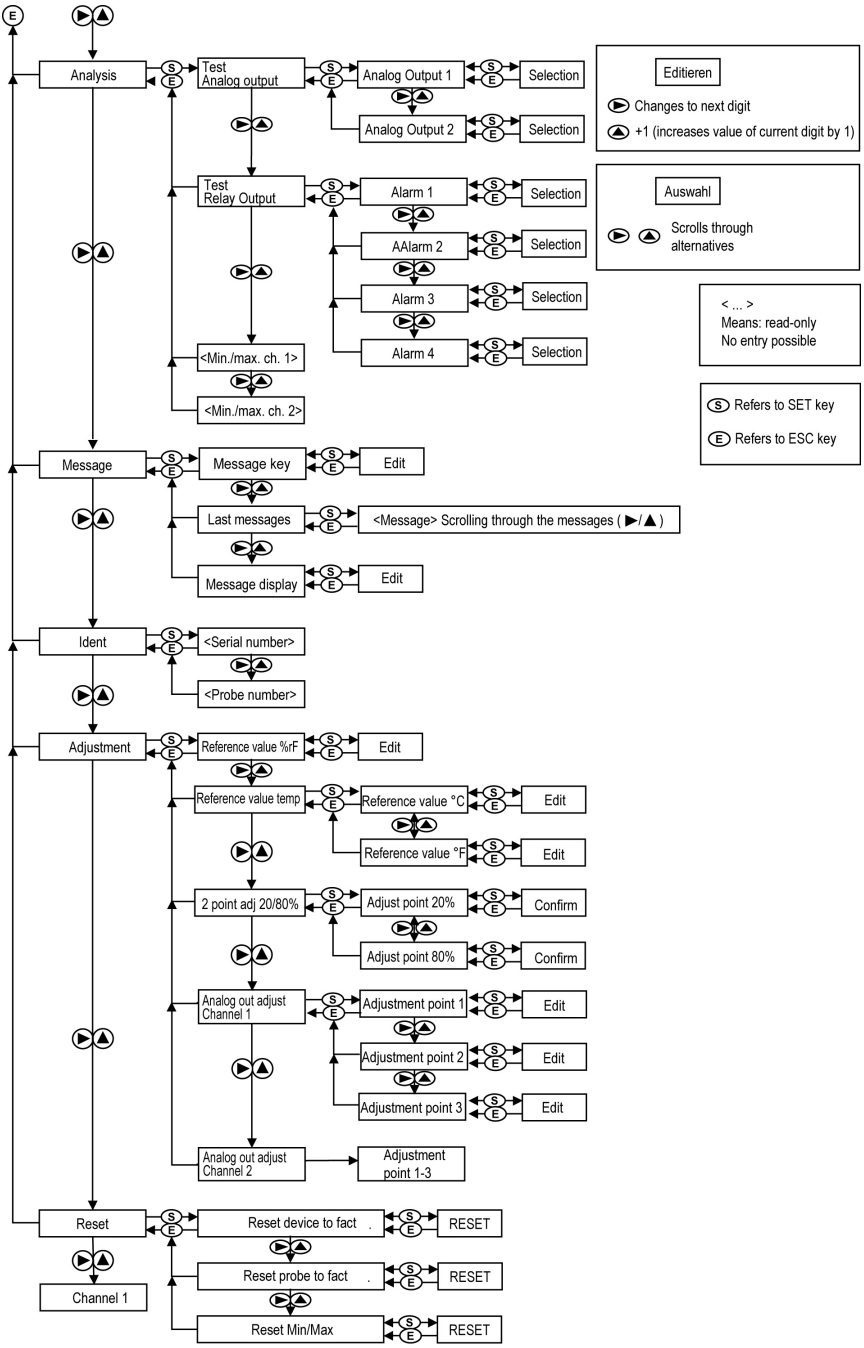
| Key | Function/description |
|---|---|
| SET | - In Measuring Mode: changes to parameterization<br>- In Parameterizing Mode: confirms a selection or setting |
| ESC | - Leaves a menu (without modifying any settings) |
| ▶ | - Selecting: scrolls through menus (downwards) or selectable alternatives<br>- Editing: changes to next digit (to the right) |
| ▲ | - Selecting: scrolls through menus (upwards) or selectable alternatives<br>- Editing: increases the value of the current digit by 1 |

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# 1.4.5 Overview of the testo 6651 user menu




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## 1.4.6 The individual main menus

### 1.4.6.1 Editing Main Menu Channel 1

An overview is given in *Overview of the testo 6651 user* menu (see *chapter 1.4.5, page 63)*.

You can perform basic settings for channel 1.

1 In Measuring Mode, press Set, select Main Menu Channel 1 using ▶ 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.
  Selection: % RH, °C, °F, °Ctd, °Ftd, g/m$^3$.
  Edit/select parameter with ▶ or ▲, confirm with SET or abort input with ESC.
- **Scale minimum for channel 1**
  The lower scale limit is edited;
  Unit as selected above (example: 4 mA = 0 % RH).
  Editing the value: Scroll one digit to the right using ▶, 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 (example: 20 mA = 100 % RH).
  Editing the value: Scroll one digit to the right using ▶, increase value of digit by 1 using ▲. Confirm with SET or abort entry with ESC.
- **Signal delay ("Damping")for channel 1**
  The analog signal can be delayed ("Damping"); a time constant is selected for this (1 = no delay; 15 = longest delay).
  Edit/select parameter using ▶ or ▲, confirm with SET or cancel entry via ESC.

2 Continue to Main Menu Channel 2 using ▶ or ▲ or return to Measuring Mode by pressing esc.

### 1.4.6.2 Editing main menu of channel 2

See channel 1.

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### 1.4.6.3 Editing Main Menu Alarm

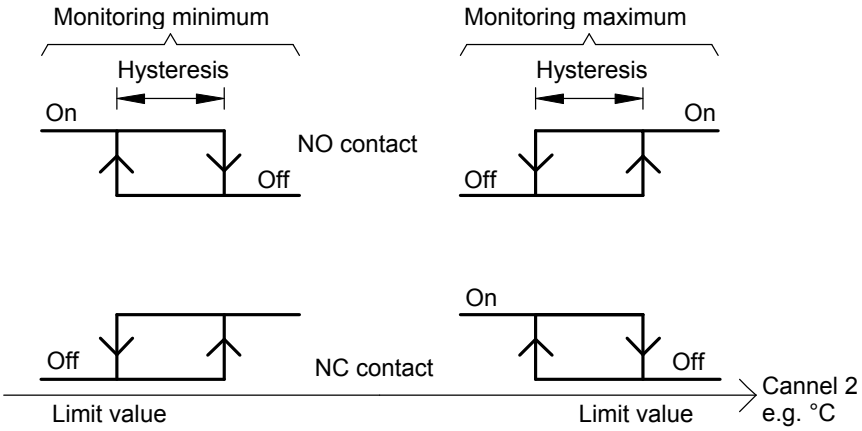
With the alarm, the relays, available as options, are programmed. In addition, the alarm statuses are shown on the display (top right) (even without relays). You can choose whether the alarm is used to monitor limit values or as a collective alarm. If an alarm is to be used to monitor limit values, you can choose between monitoring the minimum or maximum value and set a limit value and hysteresis for each alarm.

1 In Measuring Mode, press Set, select Main Menu Alarm using ▶ or ▲ and confirm selection with set.

Four alarms can be parameterized.

2 Select **Alarm x** using ▶ or ▲ and confirm selection with SET.

➢ **Using alarm to monitor limit values**




3 Select **Channel x** (e.g. "Channel 1") using ▶ or ▲ and confirm selection with SET.

4 Select **Max control** or **Min control** with ▶ or ▲ (see graphic).

5 Press SET and edit **limit value** and **hysteresis**: Scroll one digit to the right using ▶, increase value of digit by 1 using ▲. Confirm with SET or abort entry with ESC.

6 Return to **Channel x** by pressing ESC.

7 Return to **Alarm x** by pressing ESC.

8 Change to the other relays using ▶ or ▲ and perform settings in the same way.

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➢ **Using alarm as collective alarm or not using it at all**

If the collective alarm is assigned to an alarm, the relay is switched as soon as (at least) one of the warning or error messages of the testo 6651 transmitter (or the connected testo 6600 probe) is activated.

Note:

The messages affecting the collective alarm can be selected in the P2A software (see *volume 2, chapter 3, page 113*).

✓ Alarm is selected (see previous steps 1 and 2).

1 Specify with ▶ or ▲ whether **Alarm x** is to be used as the **Alarm relay** or is **not to be used**. Confirm selection with SET and return to **Alarm x**.

2 Change to another alarm using ▶ or ▲ and perform settings in the same way.

3 Continue to **Main Menu Settings** using ▶ or ▲ or return to Measuring Mode by pressing ESC.

### 1.4.6.4 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.

➢ **Editing display settings**

You can set the brightness and contrast of the display.

1 Select Display Settings using ▶ or ▲ and confirm selection with set.

2 Select **Backlight**, **Contrast** or **Backlight on 24 h** using ▶ or ▲ and confirm selection using SET.

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

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- **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 on 24 h**
  Using ▶ or ▲ select **On** or **Off** and confirm with SET.
  Off: The display light switches off automatically if no button was pressed for 30 seconds.
  On: The display light is activated

3 Go back to **Display Settings** by pressing ESC and continue to **Language** using ▶ or ▲.

➢ **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 using ▶ or ▲ and confirm selection with set.

2 Scroll one digit to the right using ▶, increase value of digit by 1 using ▲. Confirm with SET or abort entry with ESC.

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3 Continue to **Main Menu Analysis** using ▶ or ▲ or return to Measuring Mode by pressing ESC.

### 1.4.6.5 Editing Analysis main menu

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

➢ **Testing functionality of analog outputs**

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

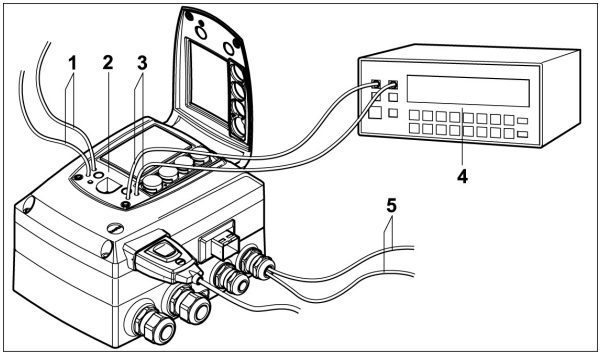
1 In Measuring Mode, press Set, select Main menu analysis using ▶ or ▲ and confirm selection using set.

**Test Analog Output** is shown. Any analog output value can be predefined, e.g. for an analog output of 4 to 20 mA, the value "6.0 mA".

2 Press SET, choose between **Analog Output 1, 2** with ▶ or ▲.

3 Press SET, scroll one digit to the right using ▶, increase value of digit by 1 using ▲. Confirm with SET or abort entry with ESC.

4 Adopt the settings using SET and test with the multimeter at the test contacts below the service flap (minimum requirement: resolution of 6.5 digits, accuracy of 100 nA):




1 Channel 1 test contacts
2 Service interface
3 Channel 2 test contacts
4 Multimeter
5 Ends of channel 3 cables

5 Return to **Test Analog Output** using ESC and continue to **Test Relay Output** using ▶ or ▲.

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➢ **Testing functionality of relay outputs**

1 Press Set, 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 *chapter 1.3.3.3, page 26*) out of the transmitter to a multimeter (resistance measurement) or continuity tester.

4 Go back to **Test Relay Output** by pressing either 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 *chapter 1.4.6.9, Editing Reset main menu, page 75*.

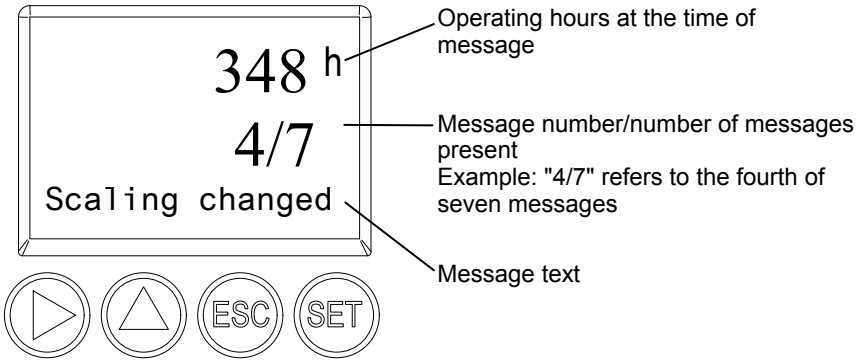
1 Read off the min./max. values of the two channels in succession by pressing ▶ or ▲ and return to Main Menu Analysis using esc.

2 Continue to **Main Menu Message** using ▶ or ▲ or return to Measuring Mode by pressing ESC.

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### 1.4.6.6 Editing Message main menu

The last messages can be called up and the display of the messages can be switched on or off.



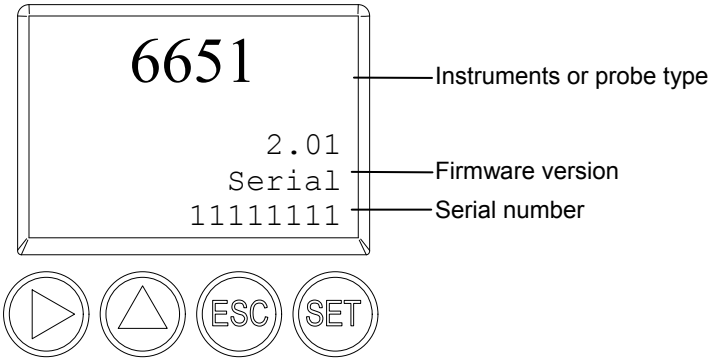

Using the P2A software (see *volume 2, chapter 3.3.2, page 119*) you can predefine which of the messages are to be shown in the display.

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

An overview of the messages can be found in *chapter 1.5, Status, warning and error messages, page 76*.

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### 1.4.6.7 Calling up Main Menu Ident




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

1 In Measuring Mode, press set, select Main Menu Ident using ▶ or ▲ and confirm selection with set.

  The type, firmware version and serial number of the transmitter are displayed.

2 Press ESC to return to the **Main Menu Ident** or read off the type, firmware version and serial number of the probe using ▶ or ▲ and then press ▶ or ▲ to return to the **Main Menu Ident**.

3 Continue to Main Menu Adjustment using ▶ or ▲ or return to Measuring Mode by pressing esc.

### 1.4.6.8 Editing Adjust main menu

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 *Chapter 1.3.5.2, 1-point adjustment (offset), page 55*.

In addition, the analog outputs can be adjusted. See *Chapter 1.3.5.4, Analog output adjustment, page 59* 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 *chapter 1.3.5.3, page 57 or volume 2, chapter 3.3.2, page 119)*.

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➢ **Enter reference value for 1-point adjustment**



Please also refer to *chapter 1.3.5.2, 1-point adjustment (offset), page 55*.

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

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➢ **Performing analog adjustment**



Please refer to *chapter 1.3.5.4, page 59.*

1 In Measuring Mode, press SET, select **Main Menu Adjust** using ▶ 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** using ▶ or ▲ and confirm with SET.

3 Select **Adj. Point 1** using ▶ or ▲.

4 Press SET. Read off multimeter display (e.g. 5.601 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 Select **Adj. Point 2** using ▶ or ▲.

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 Select **Adj. Point 3** using ▶ or ▲.

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 Continue to **Analog Adj. Ch. 2** with ▶ or ▲ (repeat steps 3 to 8).

10 Return to **Main Menu Adjust** by pressing ESC.

11 Continue to **Main Menu Reset** using ▶ or ▲ or return to Measuring Mode by pressing ESC.

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### 1.4.6.9 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 Measuring Mode, press SET, select **Main Menu Reset** using ▶ 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. Press ESC or SET to return to reset setting and press ESC to return to **Main Menu Reset**.
4. Continue to **Main Menu Channel 1** using ▶ or ▲ or return to Measuring Mode by pressing ESC.

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# 1.5 Status, warning and error messages

To achieve optimum operational reliability (machine availability), the transmitter provides the following via the user menu (see *chapter* 1.4*, page* 60) or the P2A software (see *volume 2, Chapter 3, page 113*):

- Status messages,
- Warning messages and
- Error messages

for either the testo 6651 or the connected testo 660x probe as applicable.

All messages are stored in the transmitter with an operating hours stamp. Use the user menu (see *Chapter 1.4.6.6, page 71*) or P2A software (see *volume 2, chapter 3, page 113*) to view the message history.

In the transmitter, the last 180 messages are stored in a ring memory, but there is no restriction in the P2A software.

## 1.5.1 Transmitter status messages

Status messages show the current operating mode of the testo 6651.

| Message | Display | Description |
|---|---|---|
| 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 is reset to the factory settings and is restarted. |
| 0052F | Reset Min/Max | Resets all saved Min/Max values for all channels |
| 02506 | Probe connection | A probe has been connected |
| 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) |
| 00307 | User Setting Change | User Setting Change: General settings were changed for the transmitter. |

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| Message | Display | Description |
|---|---|---|
| 02d07 | Probe disconnected | No probe is connected |
| 02104 | Analog out adjust | An analog adjustment has been made |
| 02101 | 1-point adjustment | A 1-point adjustment is performed. |
| 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 |
| 02518 | Probe reset | Probe reset: The probe performs a reset |

## 1.5.2 Transmitter warning messages

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

| Message | Display | Cause | Remedying of fault |
|---|---|---|---|
| 02101 | 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 |
| 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 |
| 00E02 | Supply voltage low** | The supply voltage is below the minimum voltage required for the transmitter | Ensure sufficient voltage supply |

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| Message | Display | Cause | Remedying of fault |
|---|---|---|---|
| 00E00 | 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 |
| 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)<br>If the problem persists, contact Testo Service |

* Early warning

** Current malfunction

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## 1.5.3 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.<br>- 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<br>Note: The 660x probes match the 665x transmitter, and the 661x probes the 668x transmitter |
| 01528 | Watchdog error | Due to a processor error, the transmitter performs an automatic restart | If the problem occurs frequently, contact Testo Service |
| 0300A | % RH sensor 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 sensor short-circuit | Short-circuit in temperature sensor | Contact Testo Service |
| 0300D | T sensor broken | The temperature sensor is damaged (sensor broken) | Contact Testo Service |

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## 1.5.4 Handling alarm messages

| Shown on the display [1] | Can be used for collective alarm [2] | Message start/end |
|---|---|---|
| Limit value | x | x |
| Scaling changed | x | x |
| Transmitter reset | x | x |
| Reset Min/Max | | x |
| Transmitter refresh | | x |
| Probe connection | | |
| Service plug | | |
| User Setting Change | | x |
| Probe disconnected | | |
| Analog out adjust | x | x |
| 1-point adjustment: | x | x |
| 2-point adjustment 11,3% | x | x |
| 2-point adjustment 75.3% | x | x |
| Probe reset | x | x |
| 2-point adjustment drift* | x | |
| T ambient high** | x | |
| T ambient low** | x | |
| Supply voltage low** | x | |
| T process high** | x | |
| Condensation*: | x | |
| Values less than 0 % RH** | x | |
| No probe signal | x | |
| Wrong probe | | |
| Watchdog error | x | |
| % RH sensor short-circuit | x | |
| %RH sensor broken | x | |
| T sensor short-circuit | x | |
| T sensor broken | x | |

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1 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.

2 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.

Execute **Confirm message** function (via control keys at transmitter):

- The message / alarm is no longer shown on the display. 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.

## 1.5.5 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.

| | | Analog output | | | | |
|---|---|---|---|---|---|---|
| **Display message** | **Class** | **0-20mA** | **4-20mA** | **1V** | **5V** | **10V** |
| No probe signal | Error | 21mA | 21mA | 1.2V | 5.5V | 11V |
| Wrong probe | Error | 21mA | 21mA | 1.2V | 5.5V | 11V |
| Watchdog error | Error | 21mA | 21mA | 1.2V | 5.5V | 11V |
| Values < 0 %RH | Underrange | 0mA | 3.8mA | 0V | 0V | 0V |
| Condensation | Overrange | 20.5mA | 20.5mA | 1.2V | 5.5V | 11V |
| %RH short-circuit | Error | 21mA | 21mA | 1.2V | 5.5V | 11V |
| %RH sensor broken | Error | 21mA | 21mA | 1.2V | 5.5V | 11V |
| T short-circuit | Error | 21mA | 21mA | 1.2V | 5.5V | 11V |
| T sensor broken | Error | 21mA | 21mA | 1.2V | 5.5V | 11V |
| Probe disconnected | Error | 21mA | 21mA | 1.2V | 5.5V | 11V |

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# 1.6 Maintenance and cleaning

## 1.6.1 Maintaining the instrument

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

- User menu (see *chapter 1.4, page 60*) or
- P2A software (see *volume 2, chapter 3, page 113)*

Convenient "remote monitoring" of the transmitter can be implemented, for example by using a relay as a collective alarm (see *chapter 1.4.6.3, page 66*) whose messages are forwarded to a local alarm transmitter (horn, light) or PLC.

## 1.6.2 Cleaning the instrument

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

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