



testo 454

Data logger



Instruction Manual





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1 Applications

testo 454 -The handy measuring instrument

Nearly all of the probes from the Testo range can be connected to the universal hand-held instrument. The automatic probe recognition function facilitates quick control measurements. In air conditioning technology several parameters can be quickly measured on location e.g. temperature, humidity, velocity and pressure. The probe designs are fully adapted to the respective applications.

testo 454 - The powerful data logger

All of the boundary conditions for an independent long-term measurement are programmable: start of measurement, end of measurement, location name and alarm outputs are determined by selectable starting criteria. The six freely assignable channels and three measuring programs make the data logger very versatile. There are various additional special functions available for air conditioning and ventilation technology: averaging, volume flow display, Pitot tube calculation etc.

testo 454 - Independent application

The rechargeable, environment friendly rechargeable battery makes the user independent of the power supply. Power can also be supplied from a car battery.

testo 454 - User-friendly operation

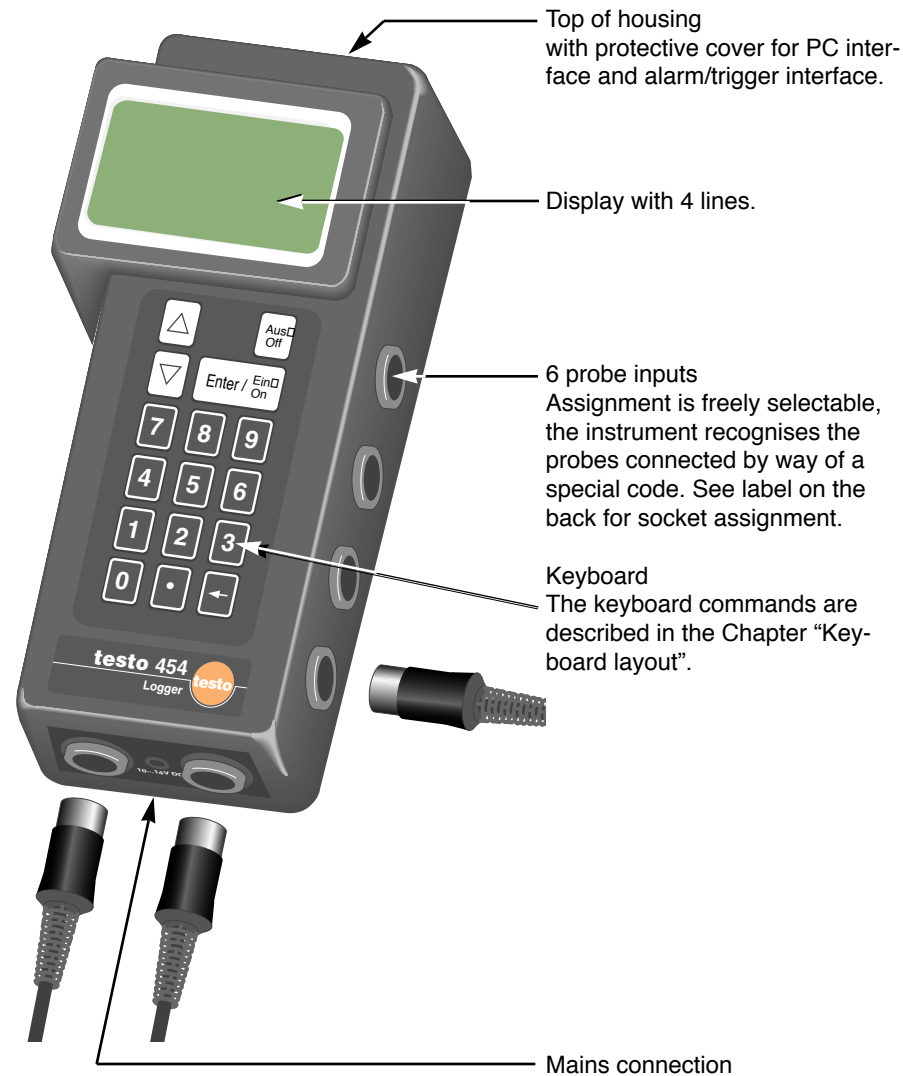
The housing is ergonomic and ideal for practical operation and is made of robust ABS. The large, illuminated display can be easily read and can display three different parameters. The menu-driven user operation via the sealed keyboard makes the instrument easy to use.

testo 454 - Configuring and data processing on the PC

If a PC and the Comfort software are connected you can take full advantage of the benefits offered by the data logger. All of the settings in the data logger are prepared first in the PC and are then loaded into the data logger. Only the measurement is started on the measuring location. The processing of saved measured in the PC is just as uncomplicated as configuring.

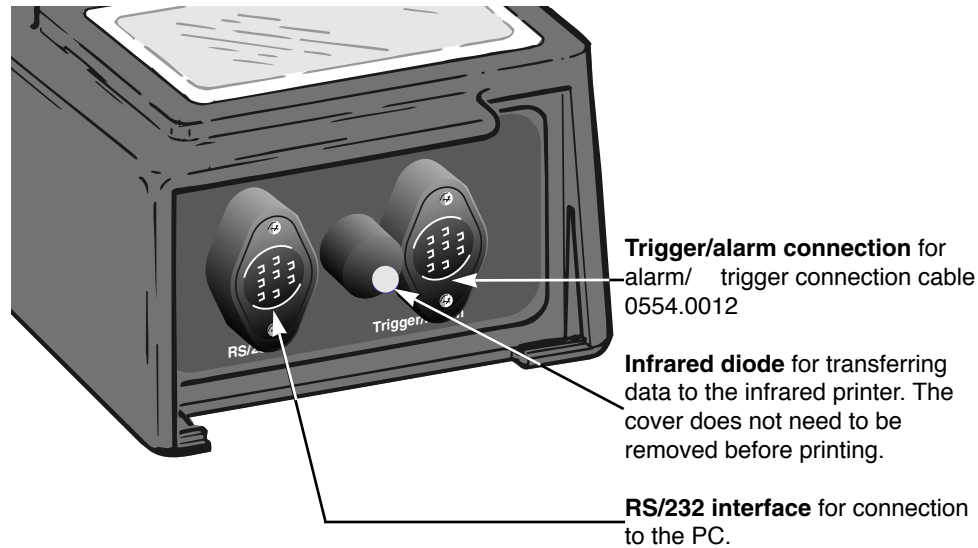


2 Description of instrument



Measuring instrument conforms with
EN 50 082-1 / EN 55 011 Group 1 Class A

2 Description of instrument



3 Warning

Please read before using instrument



Do not measure on live parts.

Observe permissible storage and transport temperatures and the permissible operating temperature (e.g. protect measuring instrument from direct sunlight)!

Switch off the instrument when changing the configuration (e.g. probe change, plugging in the V24 cable) because the values specific to the probes can only be read after the instrument is switched on.

If the instrument is opened, improperly handled or force is used the warranty rights are cancelled.

In the case of temperature probes which come into contact with metal, there may be an electric discharge caused by the different potential between metal and the surface probe. Please apply adhesive tape to the point of measurement during this type of application. In this way a discharge which could limit the functioning of the instrument is prevented.



4 Keyboard layout

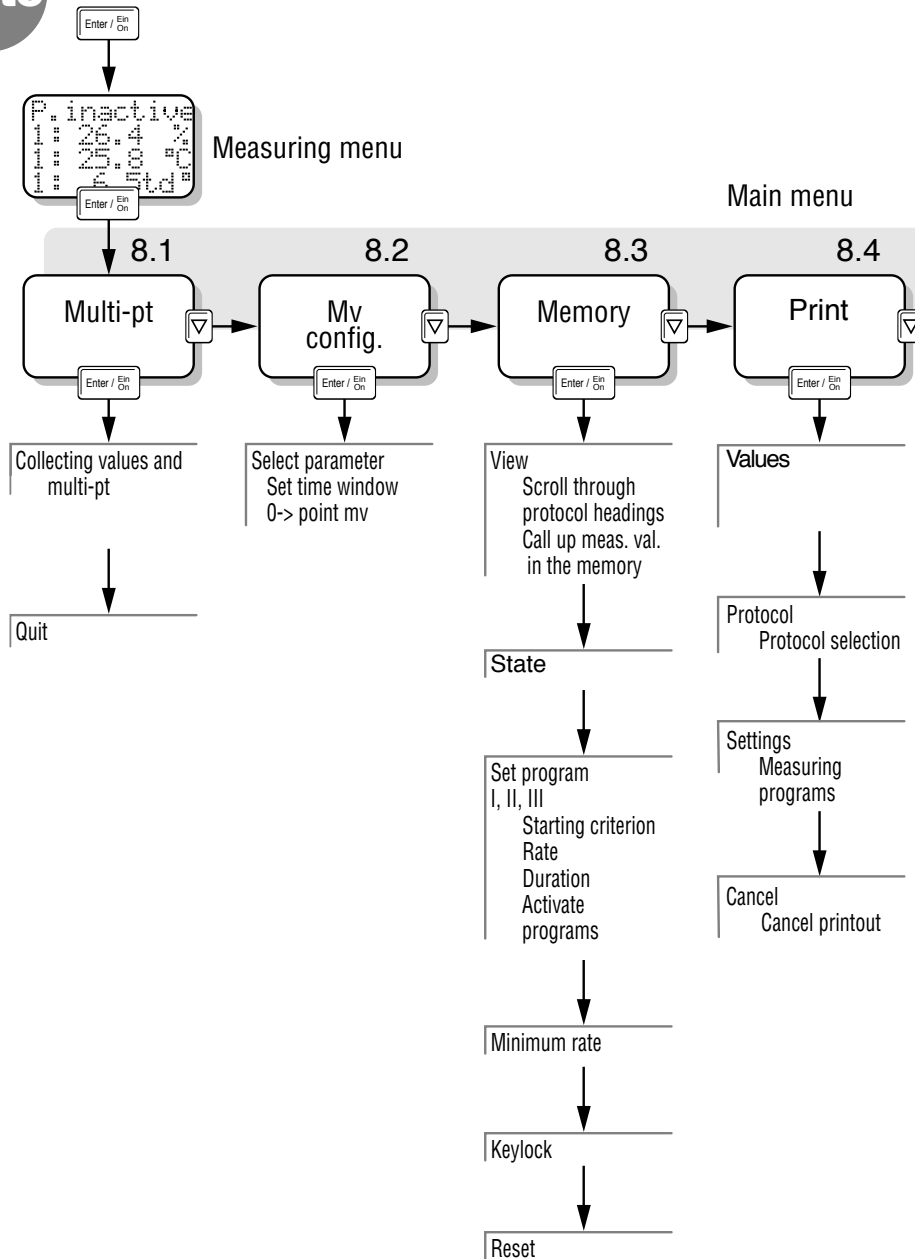
Key	Text	Function
	<Enter>	Switches on instrument Opens selected menu Confirm entry
	<Up>	Moves cursor (■) upward in the display Scrolls display Selects letters
	<Down>	Moves cursor (■) downward in the display Scrolls display Selects letters
	<Off>	Switches off instrument
	<Point>	Decimal point Hot key function
	<Arrow>	ESC key Returns to a higher level Inquiry on the hot key function (in the meas. menu)
 . . . 	<0>...<9>	Enters numbers Hot key function

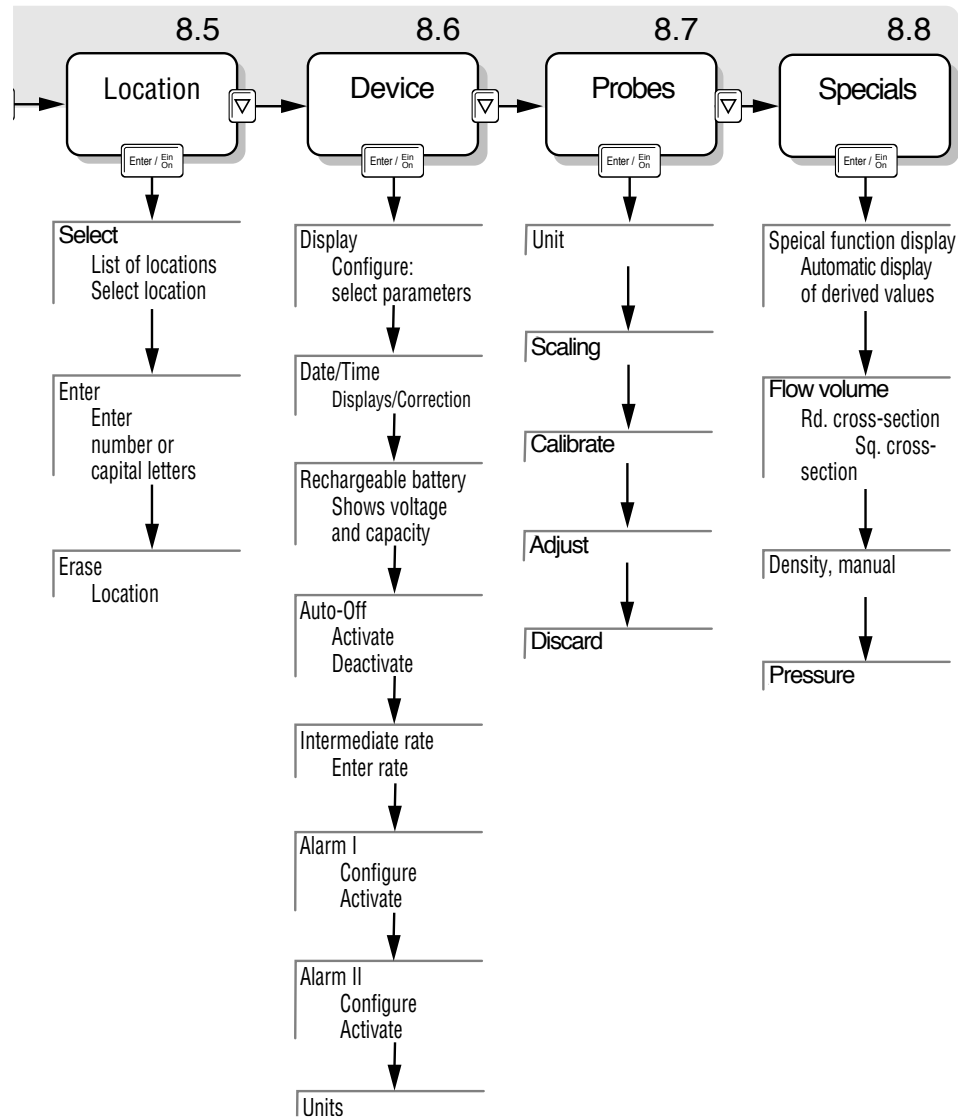
4 Keyboard layout

4.1 Hot keys

Hot key functions are short commands which make it possible to activate submenus directly without having to select them by scrolling through the menu tree. The hot key functions, marked with black bars (■), are only active parallel to the measuring menu.

Key	Text	Text in display Function when key is pressed
	<Point>	Pkt.Msg (Point measurement) Files single measuring blocks in the memory.
	<0>	Backl. (Backlight) Background light on/off
	<1>	P1 I/O Start/stop programming 1
	<2>	P2 I/O Start/stop programming 2
	<3>	P3 I/O Start/stop programming 3
	<4>	Location Selects from list
	<5>	View Activates protocol overview
	<6>	Print Activates print menu
	<7>	P1 set Defines programming 1
	<8>	P2 Set Defines programming 2
	<9>	P3 Set Defines programming 3
 + 	<Point>+<Enter>	Displays version number
 + 	<Up>+<Enter>	“Zeroizes” pressure probe







6 Introductory training

The purpose of the introductory training is to make the operation of the instrument easier for you. Measuring, printing and saving is explained in short, easy steps.

The functions of the **testo 454** are described in detail in Chapter 8.

Before using the instrument please check if the delivery is complete and undamaged.



6.1 Measuring

Connect one or more probes to the measuring instrument.

Irrespective of which sockets are assigned the measuring instrument recognises which sockets are assigned and which probes are connected.

It is important that the probes are connected before the instrument is switched on so that the instrument can query the probe codes when switched on.

Now switch on the measuring instrument.

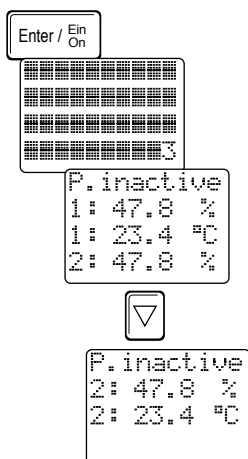
A short function test is conducted. After several seconds the instrument is in the measuring menu and the first set of information appears in the display.

The code of the respective measuring program is displayed in the top line. "P inactive" means that a measuring program was not activated (refer to Chapter 8.3.3)

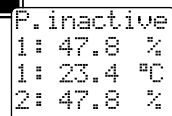
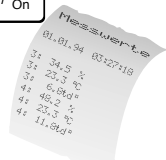
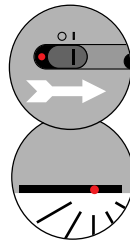
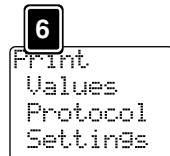
The measured values are shown in the lines below:

- the socket assignment is shown in the left column
- the measured value is in the middle column
- the unit is in the right column

If you happen to go to the wrong menu when going through the steps or if you simply do not know how to proceed press the <Arrow> key several times and you will return to the next highest menu and back to the measuring menu.



6.2 Printing the measured values on the infrared printer



From the measuring menu go to the submenu “Print” by pressing the key <6>, selection is on “**MEASURED VALUES**”.

Switch on the printer.

Position the printer and the measuring instrument such that the red control lamp is pointing in the direction of the infrared diode in the **testo 454** measuring instrument.

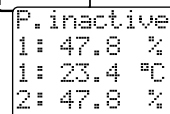
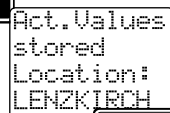
Confirm the menu point selected “**PRINT - MEASURED VALUES**” with <Enter>.

The printer immediately prints the current measured values.

Ensure that the infrared connection from the measuring instrument to the printer is not interrupted during the printing otherwise you may have an incomplete printout.

Go back to the measuring menu after printing by pressing <Arrow> twice.

6.3 Saving measured values



Save the current measured values out of the measuring menu via the <point> key.

“Act. Values stored Location: LENZKIRCH” appears in the display. The location “LENZKIRCH” is set in the factory. It is possible to change the measuring location or to set up a selection of different locations (see next page).

Return to the measuring menu by pressing <Enter>.



6 Introductory training

6.4 Setting up a location

Change from the measuring menu to the main menu by pressing <Enter>.

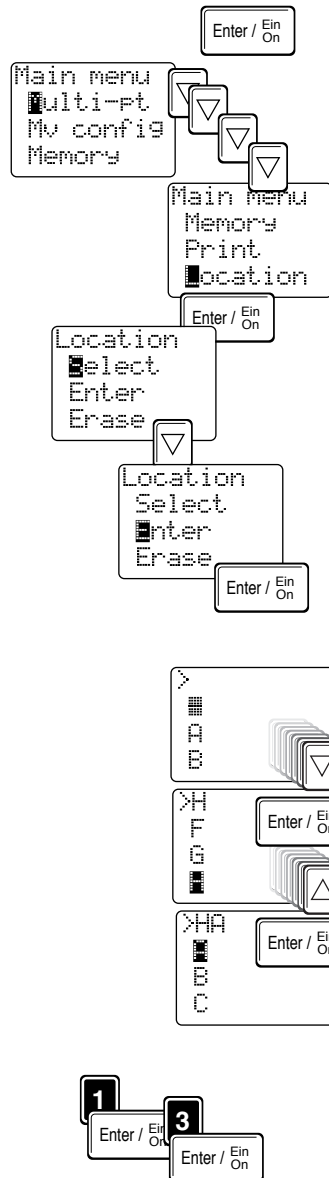
Move the cursor to “LOCATION” by pressing <down> 4 times and confirm by pressing <Enter>.

Select the submenu “ENTER” via the <down> key and activate it by pressing the <Enter> key. Now enter a location in this submenu with up to 9 characters.

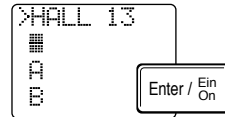
Select letters via <up><down>; the letters confirmed with <Enter> are written in the top line.

Numbers can be entered directly via the <0...9> keys.

In order to save the location in the selection the top line has to be filled right up to the 9th digit (e.g. with blanks “_”).



6.4 Setting up a location

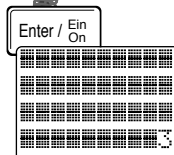


Confirm the input location with <Enter>.



You are again in the "Location" menu.

By pressing the <Arrow> key twice you go back to the measuring menu via the main menu.



P. inactive
1: 26.4 %
1: 25.8 °C
1: 6.5td°



P. inactive
1: 6.5td°
2: 48.8 %
2: 23.8 °C



Enter / Ein On
Main menu
Multi-pt
Mv config
Memory



Main menu
Print
Location
Device



Main menu
Device
Probes
Specials

Operating instructions

7.1 Measuring

When measuring the probes must be connected **before the instrument is switched on**.

Insert one or more probe plugs into the data logger socket(s). It does not matter which socket you choose as the data logger recognises the assignment of the input channels and the probes connected.

Switch on the instrument.

A short function test is carried out.

The instrument then goes to the measuring menu.

A 4 line display appears.

The first line shows the program status, in this case "P. inactive" for program inactive which means that a measurement is not activated (activated programs wait on the respective programmed starting criterion, see Chapter 8.3.3).

The current measured values are shown in the following lines. The input channel (socket no.) is shown in the left column while the current measured value is shown in the right column.

Using <up>/<down> the measured values can be scrolled up and down in the display (if more than 3 are active).

Leave the measuring menu by pressing <Enter> and change to the main menu.

The main menu includes the following submenus:

Averaging	Chapter 8.1
Mean value configuration	Chapter 8.2
Memory	Chapter 8.3
Print	Chapter 8.4
Location	Chapter 8.5
Device	Chapter 8.6
Probes	Chapter 8.7
Specials	Chapter 8.8

8.1 Averaging

The parameters, taken as a basis when averaging, are defined by you in the menu point “**Mv CONFIG**”. A measuring rate of 1 second is the basis for averaging. The time is defined in the menu “**Mv CONFIG**”.

Select “**MULTI-PT**” from the main menu.

Measurement is started via the <Point> key.



The mask gives information on the

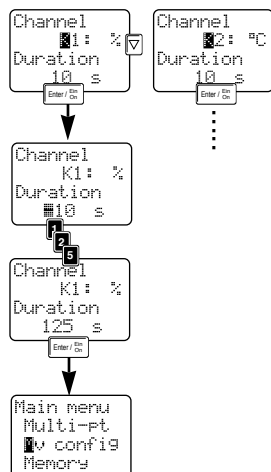
- remaining averaging time in seconds,
- number of averagings,
- parameter to be averaged (unit),
- current measured value,
- averaged measured value.

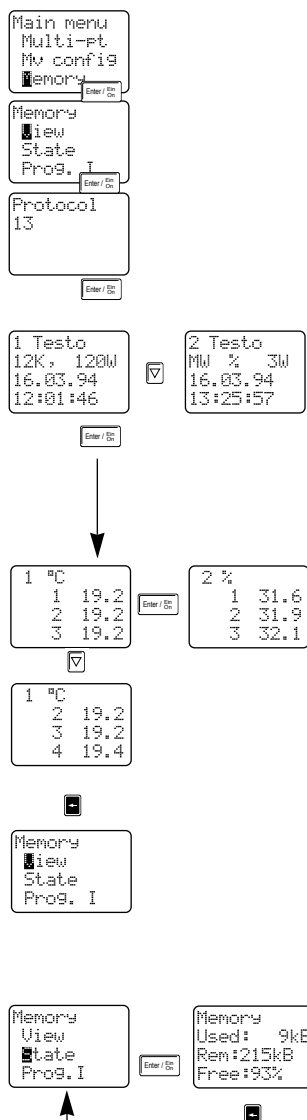
An averaging calculation which has been started can be cancelled with the <Arrow> key and the measured values are not saved. When leaving the menu by pressing <Enter> the individual mean values and the total mean values are automatically saved as a protocol with the current location. Saved mean values can be called up in the menu “**VIEW MEMORY**”.

8.2 Mean value configuration

Open the “**Mv CONFIG**” menu.

Select a channel (=Parameter) via <up>/<down>. Confirm with <Enter>, the cursor jumps to the next line. Enter the duration of the averaging in seconds (three digit value e.g. 030). Confirm with <Enter> and you return to the main menu. If you wish to check the entry or take an average directly move the cursor via <up> to “**MULTI-PT**” and confirm with <Enter>. Proceed in the “**MULTI-PT**” menu as described above.





8.3 Memory

All of the completed measuring programs and averages are saved in numerical order.

In the following masks you will see the protocol headings of the saved protocols:

3rd line: - Date
4th line: - Time (start of protocol)

The 1st line of the protocol contains information on the channel and the parameter of the listed measured values. The other channels are reached via <Enter>.

You can scroll through the measuring protocol to the last measuring value via **<up><down>** keys.

You can return to the “**MEMORY: VIEW**” menu by pressing the <arrow> key.

8.3.2 State

Select the “**STATE**” menu point from the “**MEMORY**”.

The following display includes:

2nd line: - used kByte

3rd line: - free kByte

4th line: - free memory in %

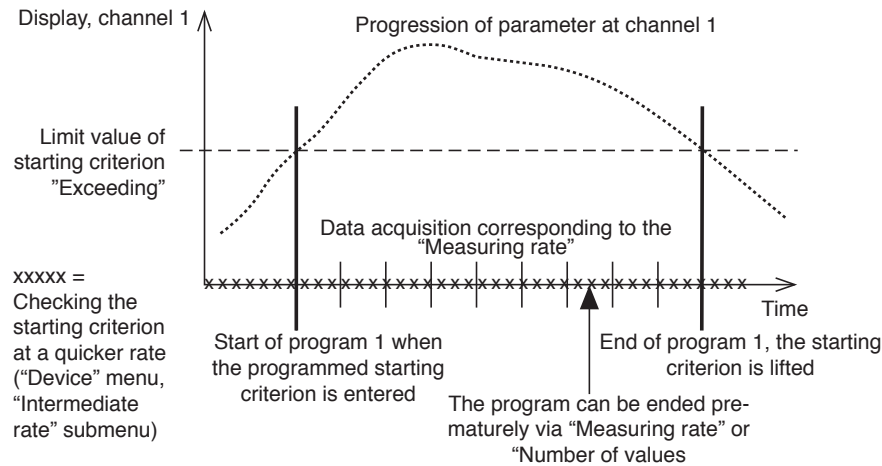
Your **testo 454** has a memory capacity of 224 kByte which corresponds to 110,000 measured values. Return to the “**MEMORY**” menu by pressing the <arrow> key and go to the measuring menu via <Enter>.

8.3 Memory

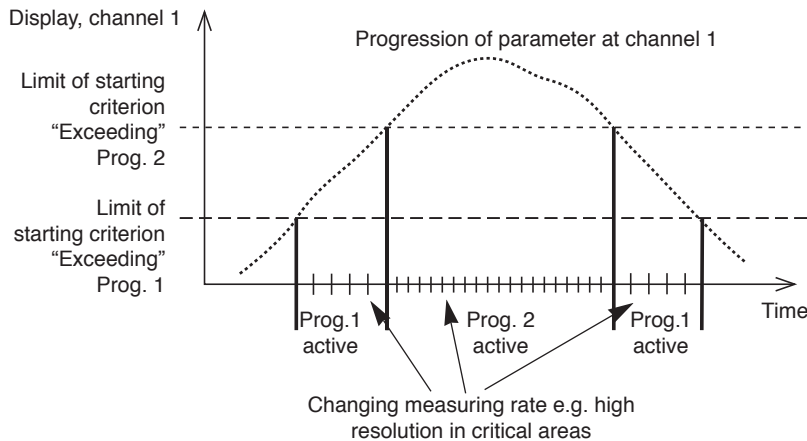
8.3.3 Programs 1-3

Measurements can be controlled via 3 freely definable measuring/saving programs. The channel, starting criteria, measuring rate, measurement duration or number of values are defined in the programs 1-3. The programs are started once the "starting criterion" is fulfilled. The starting criterion is checked at the measuring rate: if a slow rate has been set it is advisable to set a an intermediate rate when checking the starting criterion (see Chapter 8.6.5). All 3 programs can be started independently of each other, they save all of the connected probe values at the set measuring rate. "Programming 1" can be taken as an example for all 3 programmings.

Example 1: Measurement with activated "Program 1", Starting criterion: "Overrun"



Example 2: Measurement with two activated programs (Prog. 1 and Prog. 2), Starting criteria: "Exceeding"



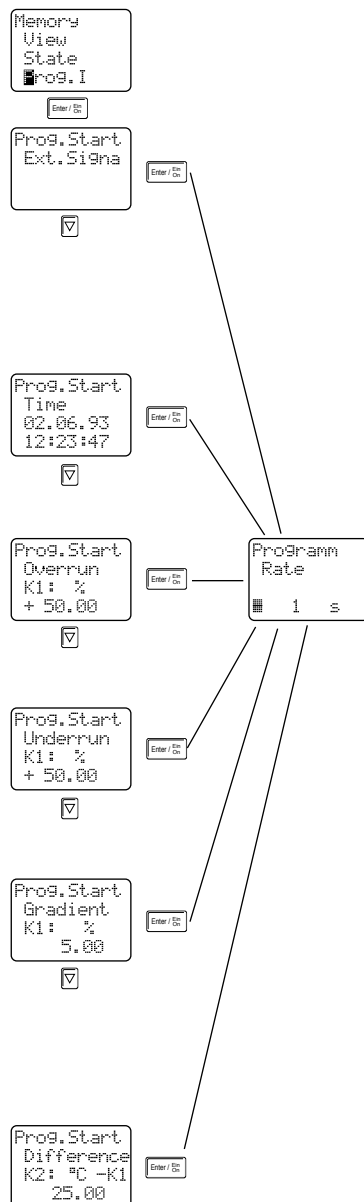


8 Main menu

8.3 Memory

8.3.3.1 Program starting criterion

Select a starting criterion:



External signal

The starting command is triggered when an external voltage signal is input. Please use the lead 0554.0012 (See Ordering data) when inputting an external voltage signal. In the case of a trigger circuit the limit values of the trigger input must be adhered to (Refer to Technical data). The trigger input in **testo 454** is electrically isolated from the other circuit.

Time

The program start is made dependent on the date and time. If the instrument is switched off the start is delayed by approximately 5 seconds until the instrument has completed the function test and probe recognition.

Overrun

Saving begins when the measured value of a parameter, defined by you, overruns on a channel specified by you. An intermediate rate is recommended to check the starting criterion frequently (see Chap. 8.6.5).

Underrun

Saving begins when the measured value of a parameter, defined by you, underruns on a channel specified by you. An intermediate rate is recommended to check the starting criterion frequently (see Chap. 8.6.5).

Gradient

The program is started once the measured value of a specified parameter in the defined channel changes quicker than that of the limit value defined by you. The specified value refers to:

$$\Delta t = 1 \text{ s}$$

$$\frac{\Delta <w>}{\Delta t}$$

The display opposite means that the program is started when the measured value changes by more than 5 %RH in 1 second.

Difference

When the differential value (of a parameter) in two of the channels specified by you is overrun measurement is started. If, for example, the temperature of K1 is 50 °C below that of K2 the program is started.

8 Main menu

8.3 Memory

```
Prog.Start  
Difference  
K2: °C -K2  
10.00
```

Note on the differential trigger programming in combined probes:

If combined probes are used for the starting criterion "Difference" there is not enough space in line 3 of the display to show clearly the channel and the parameter.

In the 3rd line of the display opposite only "K2" appears at the end of the line. The parameter is allocated correctly by numbering the key confirmations of <up> <down>.

The confirmation of a starting criterion via <Enter> triggers a jump to the "**PROGRAM RATE**" parameter.

Note:

The program end criterion is delayed in relation to the programmed start limit value (hysteresis): the program continues saving for a short time even though the programmed limit value is no longer overrun.



8.3.3.2 Rate

Specify the rate at which the measuring instrument should save the probe data during this measurement. Entries from 0.1 seconds to 24 hours are possible. Seconds can be given in fractions. Minutes and hourly rates are usually whole numbers. All values are saved according to the probes connected.

Please note that some measuring time must be allowed for each connected probe since the sockets must be serially checked.

The probe with the longest measuring time defines the minimum measuring rate.

The following is the time required for each probe:

Hum. probe °C/%RH w. dew-point	.0.3 seconds
Vanes	.0.7 seconds
Shell anemometer	.2.2 seconds
Frequency sources	.0.7 seconds
Pt100 probes	.0.1 seconds
Other	.0.2 seconds

In the menu **MIN.RATE** (See Chap. 8.3.4) the shortest measuring rate depending on the probes connected can be checked.

8.3 Memory

8.3.3.3 Activating duration and program

By confirming the input "PROGRAM RATE" with <Enter> you will go to the input mask "PROGRAM DURATION".

You have 3 ways of defining the program duration:

- 1) as a time range (= "Duration")
- 2) as a "# of values"
- 3) as an "Open End" measurement i.e. the measurement runs until the memory is full or crashes.

```
Program
Duration
0 sec
activ.off
```



```
Program
# of val.
activ.off
```



```
Program
Open End
activ.off
```

If the trigger function refers to measured values, the number of saved values can be lower than the number of values programmed to be measured. Cause: the program running was prematurely interrupted because of the following:

- a second activated program has been started or
- the starting criterion for the current program has not been fulfilled.

Confirm your entries with <Enter>.

To **activate the program**, switch the display "activ.off" to "activ.on" via <up> <down>.

The program can be activated at any time.

Enter / On

```
Program
Open End
activ.off
```



```
Program
Open End
active.on
```

Enter / On

```
Memory
View
State
Prog.I
```



```
A.P:1e
1: 24.4 %
1: 22.5 °C
1: 1.3td"
```



8 Main menu

8.3 Memory

```
A,P:1e
1: 24.4 %
1: 22.5 °C
1: 1.3td"
```

The active programmings are indicated in the measuring menu. The first line in the example opposite displays the following code:

A = active, P:1 = Program 1, e = start crit. extern. signal

A = Active
P:1 – P:3 = Active program 1 - 3
e = External trigger / external signal
t = Time trigger / time plan
w = Value trigger / Overrun/Underrun etc.
w = Difference
w = Gradient
P.2:321: = Program 2 is running, 321 values are currently saved (in this protocol)

You can start the following from the measuring menu:

- program 1 with <1> key
- program 2 with <2> key
- program 3 with <3> key.

8.3.3.4 Overview of the programming system

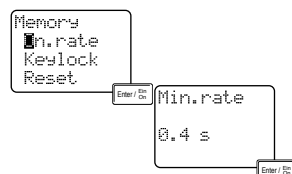
Function required	Here's how....
Start program with instrument switched on	- Select program - Switch off Auto Off function (See Chapter 8.6.4) - Check charge in rechargeable batteries or connect mains unit
Start program with instrument switched off Starting criterion: Time plan or trigger	- Carry out settings - Switch off instrument
Starting criterion: Overrun/underrun or gradient or difference	- Set limit values and parameter - Set and activate intermediate rate - Switch off instrument

Note: Activated measuring programs (P1 – P3), which take measured values as the basis for starting criterion, are executed with the instrument switched off only if the intermediate rate and the measuring rate are set at more than 1 minute. For rates of less than 60 seconds the instrument must be switched on to start the measuring program. The Auto-Off function then has to be deactivated.

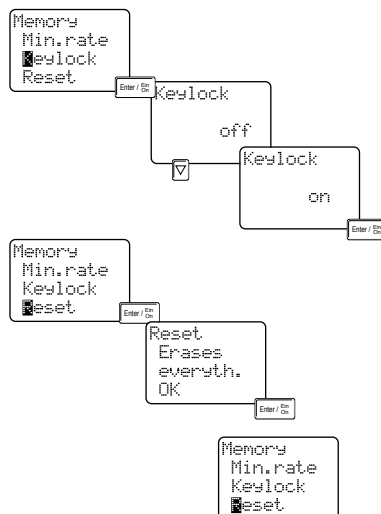
8.3.4 Minimum rate

The "MIN. RATE" menu shows the specified minimum rate of the probes connected. This value cannot be underrun when programming the instrument.

Select "MIN.RATE" from the memory menu list and confirm with <Enter>.



8.3 Memory



8.3.5 Keylock

In this submenu the hot key function for the keys <1>,<2> and <3> can be switched on or off which means that when the keylock function is switched on it is not possible to activate a program from the measuring menu via the keys <1>,<2> and <3>.

8.3.6 Reset

Beware. Overrun

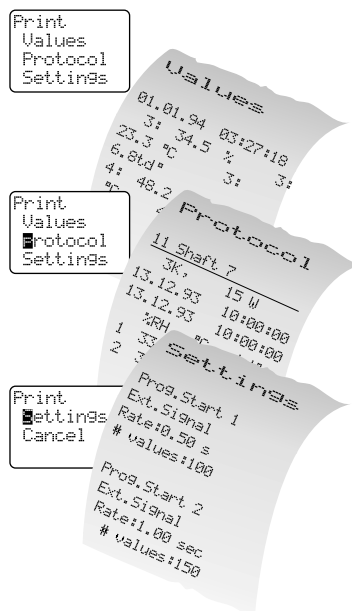
Using this command you can erase the **complete** data memory. It is not possible to delete selected protocols. Configuration, measuring programs etc. remain.

Select the submenu “**RESET**” from the menu “**MEMORY**” and press <Enter>. The whole memory is erased.

You then return to the “**MEMORY**” menu.

During the inquiry “**RESET, ERASES EVERYTH., OK**” it is possible to cancel the process with the <Point> key.

8.4 Printing

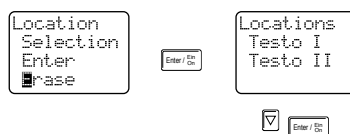
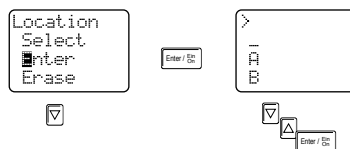
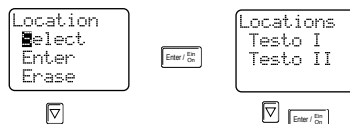


Via the print menu you can control whether you wish to print the following:

- current **measured values**
- a particular **protocol**
- activated **settings** with reference to Programming I, Programming II, Programming III, Alarm 1 or Alarm 2

Before operating the printer please read the enclosed Instruction Manual.

If “**CANCEL**” is selected the instrument completes the current (processed internally) block and printing is stopped after max. 10 lines.



8.5 Measuring location

Via the <up>/<down> key select the location relevant to the measurement from the locations saved here and confirm via <Enter>.

8.5.2 Enter

Select a letter via the <up><down> keys and confirm via <Enter>. The numbers can also be entered (e.g. "HALL 3"). The line must be filled right to the end (e.g. B. with blank). This is the only way to complete the entry before returning to the **"LOCATION"** menu. The location entered is now available via **"SELECT"**.

In order to maintain an overview it is possible to erase entries. Select the location which you want to erase via the <up>/<down> key and press <Enter> to confirm.

The sequence of screen displays for the 1000 Series is as follows:

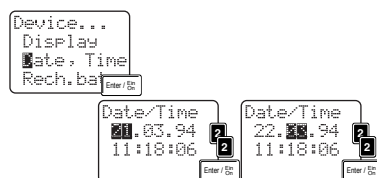
- Device ...**
 Display
 Date, Time
 Rech. bat
 (Enter / On)
- Display**
 1:K1: °C
 2:K1: °C
 3:K2: °C
 (Enter / On)
- Display**
 1:K1: °C
 2:K1: °C
 3:K2: °C
 (Enter / On)
- ...**
 (Vertical ellipsis)
- 1:K1: °C**
 Min off
 Max off
 AVG
 (Enter / On)
- 1:K1: °C**
 Min off
 Max off
 AVG
 (Enter / On)
- 1:K1: °C**
 Min on
 Max off
 AVG
 (Enter / On)
- 1:K1: °C**
 Min on
 Max off
 AVG
 (Enter / On)

The display contains the current measured values of the connected probes. In addition to the measured values the minimum, maximum and mean values can be displayed.

With **<Enter>** you also select “**MIN**”, “**MAX**” and/or “**AVG**”, switch the display “on” or “off” with **<up><down>**.

Go from the “Display” menu back to the “Device” menu by pressing <Arrow>.

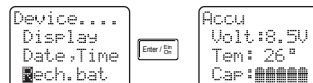
8.6 Device



8.6.2 Date/Time

Enter the date in the format DD:MM:YY, the time in the format hh:mm:ss.

Confirm the entry of the numbers with <Enter>.



8.6.3 Rechargeable battery

The battery charge is shown by the voltage available, instrument temperature and the capacity of the rechargeable batteries ([full bar chart] = Battery charged).

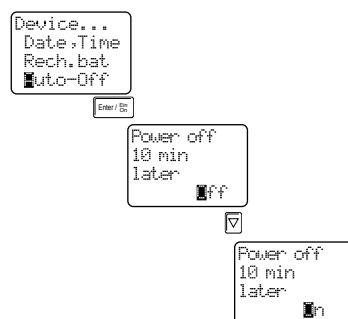
8.6.3.1 Notes on battery operation

- In order to protect the instrument from total discharge when not operating connect it for one day a month to the mains unit.
- If "Emergency" is displayed, a one-minute refresh cycle takes place which regenerates the run down rechargeable battery. The red LED lights up in the battery charger. If the cycle has been successfully completed "Charge quickly" appears in the display. If the refresher impulse was insufficient the procedure can be repeated by switching the mains unit on and off with the instrument switched off. If the instrument does not go into the fast recharging mode the rechargeable battery is defect. In order that the complete battery capacity is available the recharging cycle should be repeated 2 - 3 times following total discharge.
- A recharging cycle takes approx. three hours and is displayed by the instrument by going from "Quick" to "Conserve". The compensation charge fills the rechargeable battery completely.
- The charge is active if **testo 454** if switched off and the mains unit is connected or if the mains unit is connected when the instrument is switched off.
- If the mains unit is plugged out during rapid recharging the instrument deactivates itself within one second. Deactivation can take two minutes in the conservation mode.
- Long-term measurements should be started with a newly charged battery.
- The capacity of the rechargeable battery is correctly displayed in the instrument menu 4 hours after charging.
- The operating limits of the rechargeable battery are shown with "LowBat" or "TempOut".

8.6.3.2 Examples of the service life of testo 454

The service life depends on the probe assignment and the measuring rate. The following is a list of typical examples which influence the service life of the rechargeable battery.

Connection	Warm up time	Meas. rate	Service life approx.
1 x thermal anemometer (70 mA)	20 s	30 min	5.0 days
6 x thermocouple	None	30 min	15 days
1 x thermal anemometer (70 mA)	20 s	10 min	2.7 days
1 x digital humidity (10 mA)	2 s	10 min	9.0 days

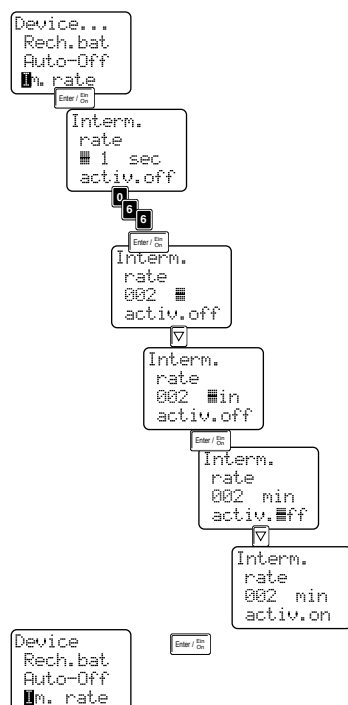


8.6.4 Auto-Off

The instrument automatically switches off after 10 minutes when not used if the Auto-off function is on. This helps to save the batteries and hence the environment. Key confirmations, serial communication, measuring programs with a measuring rate of less than one minute which have been already started keep the instrument “awake” and it is not switched off automatically.

Note: Activated measuring programs (P1 – P3) which take the measured values as a basis for the starting criteria are only executed if the intermediate rate and the measuring rate are set at longer than 1 minute. For rates less than 60 seconds the instrument should stay switched on in order to start the measuring program. The Auto-Off should then be deactivated.

Make sure to switch off the instrument when you are not using it and the auto-off function is off.



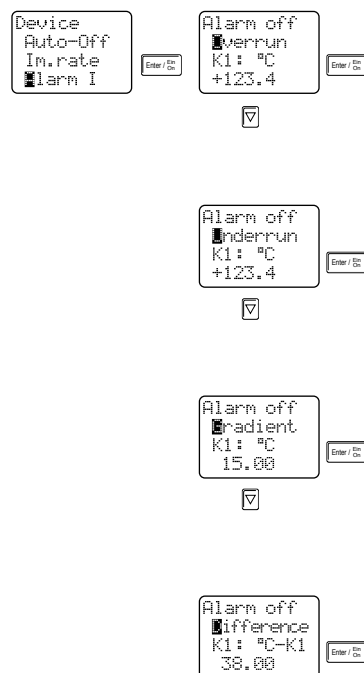
8.6.5 Intermediate rate

Indicate the time intervals within which the measuring instrument has to check the conditions for a measurement (program start at overrun or underrun of measured value or gradient). If you do not activate this input the instrument only checks the conditions if switched on or if the running program is at the set measuring rate. This input is valid for all programs and alarms.

Note: Intermediate rates in the seconds range are not possible if the measuring rate is > 50 min i.e. the minimum intermediate rate is 1 min.

8.6.6 Alarm

testo 454 offers two alarm outputs whose trigger criteria, separated from each other, can be defined in the menu “**DEVICE**”, submenu “**ALARM**”. The alarm is controlled when the measuring program is running or not running. The alarm outputs are electrically isolated from the usual wiring parts in the **testo 454** but are connected to one another. Please use the cable 0554.0012 available as an accessory. The alarm output is switched through and remains active as long as one of the following alarm criteria applies. The gradient is the exception which remains active if once activated and can only be switched off manually (“Alarm off”).



Select an alarm criterion:

Overrun

The alarm is triggered when the parameter measured value, defined by you, overruns on a specified channel. An intermediate rate is recommended to check the alarm criterion frequently (see Chapter 8.6.5).

Underrun

The alarm is triggered when the parameter measured value, defined by you, underruns on a specified channel. An intermediate rate is recommended to check the alarm criterion frequently (see Chapter 8.6.5).

Gradient

The alarm is triggered once the measured value of a specified parameter in the defined channel changes quicker than that of the limit value defined by you. The specified value refers to::

$$\Delta t = 1 \text{ s} \quad \frac{\Delta <w>}{\Delta t}$$

Difference

When a differential value (of a parameter) in two of the channels specified by you has been overrun the alarm is triggered.

Confirm your selected alarm criterion with <Enter>.

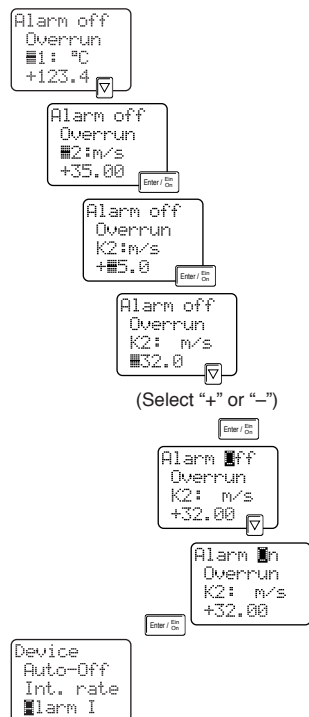


8 Main menu

8.6 Device

After having confirmed your alarm criterion select the channel required and the respective measuring units using the <up><down> keys. Confirm your input by pressing <Enter>.

Enter the limit required in the bottom line and confirm by pressing <Enter>.



Set the top line to “Alarm on” via <up><down> and confirm with <Enter>. You then return to the “DEVICE” menu.

The example opposite is representative for all alarm criteria.

The alarm remains active for as long as the measured value fulfills the alarm criteria selected.

The settings in the “Alarm 1” and “Alarm 2” settings remain even after the instrument has been switched off.

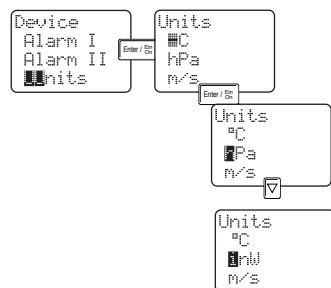
8.6.7 Units

Converting the units:

°C	⇒	°F
hPa	⇒	inW (inch Water column)
m/s	⇒	fpm

With <Enter> you can choose the parameters in the menu “UNITS”. Change the unit with <up><down> (see above).

Quit this menu by pressing <Enter>.

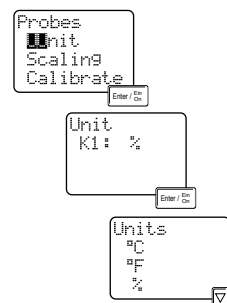


These settings apply to all channels and remain set after switching off the instrument.

8.7 Probes

Probes other than Testo probes which have a voltage output of 0 to 1 V or a current output of 0/4 to 20 mA can be connected to the **testo 454**. The current/voltage cable no. 0554.0007 is offered for this. This cable is equipped with an automatic recognition of the respective input signal, so that you can assign a unit and a scaling to this signal (as described below in the “UNIT” menu).

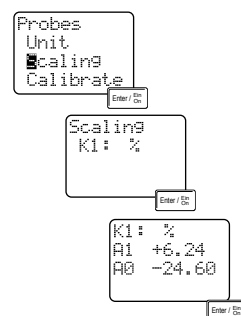
There is also the possibility to measure voltages, frequencies and resistances with the adapter cable no. 0554.0013. These parameters are not automatically recognised and have to be preprogrammed in the menu “SELECT”.



8.7.1 Unit

The probe prepared with the current/voltage cable is connected to the measuring instrument. The measuring range has to be set in the current/voltage cable before the instrument is switched on. Please observe the permissible measuring ranges.

Select the unit of your probe in the “PROBES” menu. Go back to the “PROBES” menu.



8.7.2 Scaling

In the menu “Scaling” you can change or enter the upgrade and the offset of a probe manufactured by another company or of a measuring transducer. The entry of A1 and A0 is based on the formula

$$f(x) = A1 \cdot x + A0$$

A1 is the upgrade and A0 is the offset from the zero point. The + or - signs can be changed via <up><down> and confirmed with <Enter>. Then enter the respective numerical value and confirm your entry with <Enter>.

Return to the “PROBE” menu via <Arrow>.

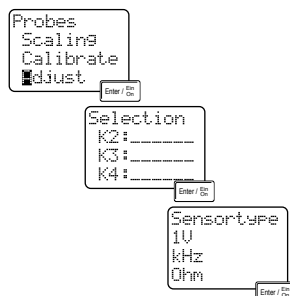


8.7.3 Calibration

Calibration is possible in this menu point if CO₂ probes are available. Please note the probe description.



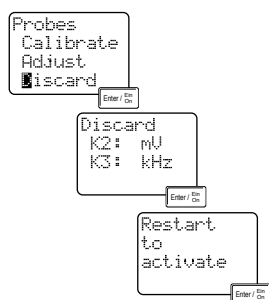
8.7 Probes



8.7.4 Adjust

When using the adapter cable no. 0554.0013 the instrument has to be told what parameter is to be measured. You can choose between voltage, frequency and resistance. Select an input channel from the non-assigned socket and confirm with <Enter>. After this you can assign the required parameter to the channel selected.

Now the corresponding unit can be determined in the “UNIT” menu and the upgrade in the “SCALING” menu.



8.7.4 Discard

Probes which were defined under “**ADJUST**” must be discarded **before a new configuration**. Otherwise the set unit is displayed on the channel selected. (even if the probes are not connected). If a probe is connected which is different to that defined the display “-Invalid configuration” appears after the instrument is switched on and all of the settings are erased. Confirm the channel input whose definition you wish to erase in the “**DISCARD**” menu. The instrument restarts and you then find yourself in the measuring menu.

8.8 Specials

8.8.1 Special functions display

Special functions, calculated from the measured values of the connected probes, are displayed in the measuring menu if they are activated in the "SPECIALS." menu.

td = Dew point (Combination probes %RH - °C)

m³/h = Volume flow (Velocity probe)

The accuracy of the volume flow display follows from the accuracy of the velocity measurement. Multiply the maximum and minimum possible velocity value in the accuracy data by the cross-section to get the permissible deviation of the volume flow measurement.

m/s = Air velocity (pressure probe)

The Pitot tube differential pressure is converted to air velocity. Here the air density is entered as a parameter (see Appendix "Probe description").

Switching on or off is carried out via <up><down> and your entry is confirmed via <Enter>.

The special functions selected are activated by a restart. The settings remain even after the measuring instrument is switched off.

8.8.2 Flow volume

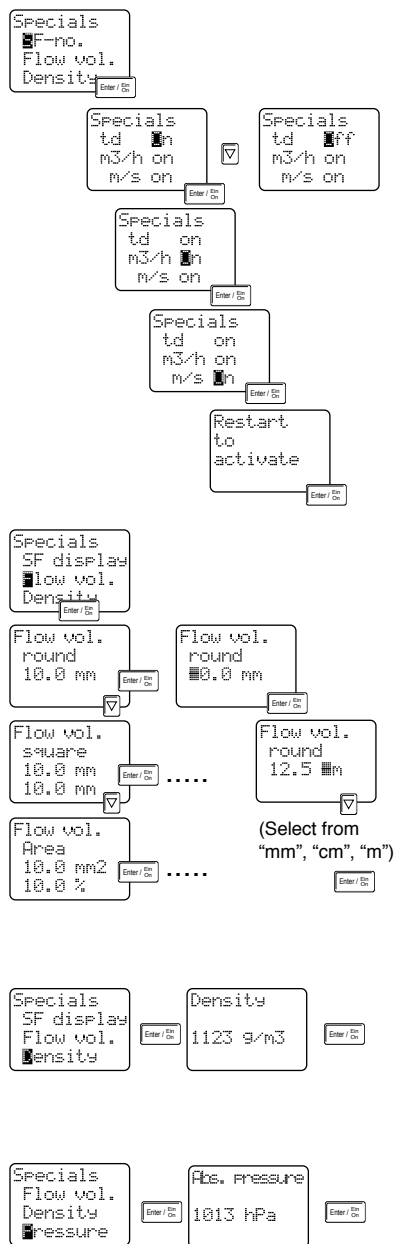
Enter the dimensions of the air channel (round, square, cross-section area). The measuring instrument calculates the flow volume set in "SF DISPLAY" (see above).

8.8.3 Density

The density is required for the conversion of the dynamic pressure into velocity. Please find the corresponding value in the enclosure **Measuring engineering**.

8.8.4 Pressure

The air pressure is required for the compensation of the CO₂ probe and the pressure probe (Pitot tube). Refer to the more detailed description in the enclosure **Measuring engineering**.





9 Error messages

Rate does
not match
the sensor
connected

Cause: The measuring rate selected with the program cannot be reached with the given probe constellation.

Remedy:

- Check min. rate
- Remove any unnecessary probes
- Slow down measuring rate
- Restart

Program
cannot
be
executed

Cause: The measured value memory is either full or blocked because a measuring protocol is being displayed or printed.

Remedy:

- Quit the running program
- Quit **"MEMORY-VIEW"**
- Wait for printing or quit **"PRINT"**

Program
running

Cause: The program running cannot be changed.

Remedy: Quit program and restart.

Program-
ming
error

Cause: The entered program start criterion cannot be fulfilled:

- Starting time in the past
- Competing trigger criteria on the same measuring channel.

Remedy: Correct entries for correctness and change if necessary e.g.

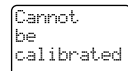
- incorrect (past) time marks
- Difference trigger when only one probe is assigned.

No
sensors
connected

Cause: No recognisable probes connected

Remedy: Connect probe to program measured value trigger.

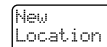
9 Error messages



Cannot
be
calibrated

Cause: Only CO₂ can be calibrated by customers. For pressure probes an offset correction (zero reset) is triggered with the key combination <up>+<Enter>. This applies to all connected differential/pressure probes. All other probes produce this display.

Remedy: Return by pressing <Enter>.



New
Location

Cause: You have just assigned a new location.

Remedy: Return by pressing <Enter>.



10 Technical data

10.1 Measuring instrument

Temperature measurement

Pt100 sensor

Measuring range	-200 to +800 °C
Resolution	0.1 °C
Accuracy	±0.1 °C (-49.9 to +99.9 °C)
	±0.4 °C (-99.9 to -50 °C and +100 to +199.9 °C)
	±1.0 °C (-200 to -100 °C and +200 to +800 °C)

NiCr-Ni sensor

Measuring range	-200 to +1370 °C
Resolution	0.1 °C
Accuracy	±0.4 °C (-100 to +200 °C)
	±1.0 °C (remaining range)

NTC sensor

Measuring range	-20 to 80 °C
Resolution	0.1 °C
Accuracy	±0.2 °C (-10 to 50 °C)
	±0.4 °C (remaining range)

PtRh-Pt sensor

Measuring range	0 to +1760 °C
Resolution	1 °C
Accuracy	±1.0 °C

FeCu-Ni sensor

Measuring range	-200 to +1000 °C
Resolution	0.1 °C
Accuracy	±0.4 °C (-150 to +150 °C)
	±1.0 °C (remaining range)

Humidity measurement

Measuring range	0 to 100 %RH
Resolution	0.1 %RH
Accuracy	See probe data

Pressure measurement

Meas. range	Resolution	Accuracy
±100 hPa	0.1 hPa	±0.1 hPa
±10 hPa	0.01 hPa	±0.01 hPa
2000 hPa	1 hPa	±2 hPa
10 bar	0.01 bar	±0.2 % of f.v.
30 bar	0.01 bar	±0.2 % of f.v.

Velocity measurement

Vane

Measuring range	0 to 60 m/s
Resolution	0.1 m/s
Accuracy	See data on probes

Therm. anemometer

Measuring range	0 to 20 m/s
Resolution	0.01 m/s (0 to 4 m/s)
	0.1 m/s (remaining range)
Accuracy	±0.01 m/s (0 to 1.99 m/s)
	±0.02 m/s (2 to 4.9 m/s)
	±0.04 m/s (5 to 10 m/s)

Frequency measurement

Measuring range	30 Hz to 300 kHz
Resolution	0.01 kHz
Accuracy	±0.01 kHz

Current measurement

Measuring range	Resolution	Accuracy
0 to 20 mA	0.01 mA	±0.04 mA

Voltage measurement

Measuring range	Resolution	Accuracy
0 to ±1 V	1 mV	±1 mV
0 to ±10 V*	0.01 V	±0.01 V

* only with current/voltage cable 0554.0007!

Resistance measurement

Measuring instrument	Resolution	Accuracy
100 Ω to 300 kΩ	0.01 kΩ	±1 % of mv

CO2 measurement

Measuring range	Accuracy
0 to 10,000 ppm	±5 % of m.v. or 50 ppm
0 to 1 Vol%	±5 % of m.v. or 50 ppm

Accuracies ±1 digit

Memory space

256 kB (corresponds to approx. 110,000 measured values)

Alarm output

Electrically isolated open-collector outputs

max. load current	50 mA (internal limit)
max. permissible power	240 mW
max. permissible voltage	30 V
	(6V with polarity reversal)

Trigger

max. permissible voltage	10 V
Actuating shaft	4 to 10 V
Input load	20 mA (at 10 V)

Programmable channel settings

- Unit
- Scaling
- Calibration

Probe assignment

- Max. 6 probes simultaneously
- Max. 4 probes simultaneously when ball velocity probes are connected

Power supply

- 6 cell rechargeable battery, built-in
- or via 12 V mains unit

Battery life

Continuous oper. with 6 thermocouple probes	8 h
10 minute measuring rate	11 days

Language versions

G and E

Operating temperature

0 to +50 °C
short-term 0 to +60 °C

Storage and transport temperature

-25 to +60 °C

Connection

Standard flange socket

Weight

650 g (incl. rechargeable battery)

Other

- Automatic recognition of all connected probes
- Housing material ABS

10.2 Infrared printer

Printer type	<i>Infrared controlled thermal printer, adjustable contrast</i>
Print capacity	<i>Approx. 300 printouts per roll</i>
Reception radius	<i>Max. 2 m</i>
Operating temperature	<i>0 to +50 °C</i>
Storage and transport temperature	<i>-40 to +60 °C</i>
Dimensions	<i>186 x 91 x 61 mm</i>
Weight	<i>0.43 kg (incl. batteries)</i>
Power supply	<i>4 round cell batteries 1.5 V or NC rechargeable batteries</i>

10.3 Comfort software – 454 module

Graphic measured data analysis under the modern user environment WINDOWS®.

Multi-windows *Different measurement files are shown and analysed in several windows*

Functions

- *User-friendly zoom functions*
- *Mathematical smoothing function*
- *Statistical calculation functions (average, variance...)*

Printout of the measured data *In table or graphic form*

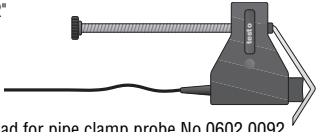
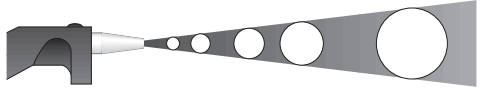
Prerequisites

- *Computer min. 386*
- *DOS from 3.1*
- *WINDOWS from 3.1*

Other

- *Simplest operation using a mouse*
- *Coloured fading-in of freely selectable limit values*

Surface probes

	Measuring range	Sensor	t ₉₉ (s)	Length of probe pipe	Ø Meas. tip
1) Robust Pt100 sensor with widened measuring tip for measurements on flat surfaces 	-50 to +400 °C	Pt100 (Class B)	40	150 mm	8 mm
2) Robust NiCr-Ni sensor with widened measuring tip for measurements on flat surfaces 	-200 to +600 °C	NiCr-Ni	25	150 mm	4 mm
3) High temperature surface probe with sprung thermocouple band 	-200 to +700 °C	NiCr-Ni (Class 2)	3	200 mm	8 mm
4) Velcro strip probe to attach to pipes etc., for long-term measurements 	-50 to +150 °C	Pt100	40		
5) Magnetic probe for higher temp. a) Adhesion approx. 10 N b) Adhesion approx. 20 N 	-50 to +400 °C -50 to +170 °C	NiCr-Ni NiCr-Ni (Class 2)	– –		25 mm 25 mm
6) Pipe clamp probe for temperature measurements on pipes with diameters of up to 2"  Spare measuring head for pipe clamp probe No.0602.0092	-60 to +130 °C	NiCr-Ni (Class 2)	5	130 mm	65 mm
7) Infrared probes for non-contact temperature measurements on live, inaccessible and rotating parts Ø Meas. spot 5 7.5 14 21 33 mm  Meas. distance 16 25 50 76 130 mm	-18 to +260 °C	Infrared sensor	2	Probe length 180 mm	–

10.4 Probes

Immersion probe

8) Probe for measurements in liquids and powder substances



	Measuring range	Sensor	t ₉₉ (s)	Length of probe pipe	ø probe pipe
a)	-200 to +600 °C	NiCr-Ni	1	150 mm	1.5 mm
b)	-200 to +600 °C	Pt100	20	150 mm	3 mm

Penetration probe

9) Waterproof probe with sharpened meas. tip, boil-proof



	Measuring range	Sensor	t ₉₉ (s)	Length of probe pipe	ø Meas. tip
	-200 to +600 °C	Pt100	30	150 mm	3 mm

Air probes

10) Rapid-action probe for measurement in liquids and gases



	Measuring range	Sensor	t ₉₉ (s)	Length of probe pipe	ø Meas. tip
	-200 to +600 °C	NiCr-Ni	9	150 mm	0,5 mm

11) Highly accurate probe for air/gas and temp. measurements



	Measuring range	Sensor	t ₉₉ (s)	Length of probe pipe	ø Meas. tip
	-40 to +130 °C	NTC	60	150 mm	9 mm
	-25 to 80 ±0.2 °C				

12) Ball thermometer for measuring radiation heat



	Measuring range	Sensor	t ₉₉ (s)	Length of probe pipe	ø Meas. tip
	-50 to +200 °C	Pt100			ø Ball approx. 150 mm

Thermocouples and adapters

13) Adhesive thermocouples for surface measurements
Carrier material: aluminium foil



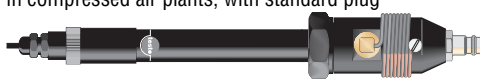
	Max. temp.	Dimensions	Attachment to meas. location	Quantity delivered
	+200 °C	Thickness 0.1 mm ø Extension 2.0 x 0.2 mm	With common glues or with silicon heat paste Order no. 0554.0004	Packs of two

14) Adapter to connect thermocouples and probes to open ends of wires

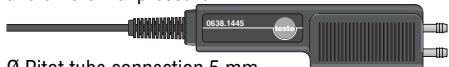
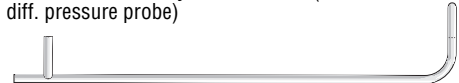


All of the data on Pt100 according to DIN IEC 751, Class A.
For thermocouples the technical data according to DIN IEC 584 Part 2, Class 1.
Temperature probe with PtRh-Pt or FeCu-Ni sensors on request.

Humidity probes

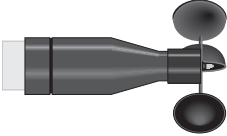
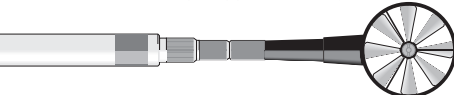
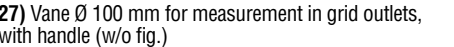
	Measuring range	Sensor	t ₉₀ (s)	Length	ø
15) Air probe for humidity and temperature measurements  Spare sensors: % RH 0420.0019 / °C 0420.1243	0 to 100 %RH (Probe tip) -20 to +70 °C	Capacitive NTC	10	Total length 245 mm	21 mm
16) High temperature humidity probe, for measurement e.g. in channels or bulk material  Spare sensors: % RH 0420.0023 / °C 0420.1242	0 to 100 %RH -20 to +140 °C	Capacitive NTC	20	Probe pipe 300 mm	Probe pipe 12 mm
17) Flexible humidity probe for measurement in inaccessible places  Spare sensors: %RH 0420.0023 / °C 0420.1242	0 to 100 %RH -20 to +140 °C	Capacitive NTC	20	Probe pipe 1500 mm	Tip 12 mm
18) Pressure-proof humidity probe for measurements in compressed air plants, with standard plug  Spare sensors: % RH 0420.0023 / °C 0420.1242 System accuracy for 15) - 18): ±2 %RH(2 to 98 %RH) ±0.4 °C (0 to 50 °C) ±0.5 °C (remaining range)	0 to 100 %RH Pressure dew point t _{pd} : -50 to +40 °C	Capacitive NTC		Total length 300 mm Connection via standard plug	

Pressure probes

	Measuring range	Measuring system	Accuracy	
19) Differential pressure probes a) and b) for measuring velocity (in connection with Pitot tube) and differential pressure  Ø Pitot tube connection 5 mm Absolute pressure probe c) for measuring abs. pressure	a) ±100 hPa b) ±10 hPa c) 2 bar	Differential pressure Diff. pressure Abs. pressure	±0.1 hPa (0 to 20 hPa) ±0.5 % v. Mw. (20 to 100 hPa) ±0.03 hPa ±5 hPa	
	Material	Temp. max	Length	ø
20) Pitot tubes in various lengths, diameters and materials, for velocity measurement (in connection with diff. pressure probe) 	a) Brass b) Brass c) Stainless steel	350 °C 350 °C 500 °C	500 mm 350 mm 300 mm	7 mm 7 mm 4 mm

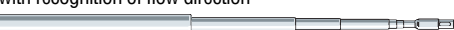
10.4 Probes

Vane probes

(System accuracy with instrument)	Measuring range	Sensor	Accuracy	Length of probe	Ø Tip
21) Combined vane/temperature probe (plug-in)*, Ø 25 mm 	0.4 to 40.0 m/s -30 to +140 °C	Vane NiCr-Ni	±1 % of final val.	180 mm	25 mm
22) Combined vane/temperature probe (plug-in)*, Ø 16 mm 	0.4 to 60.0 m/s -30 to +140 °C	Vane NiCr-Ni	±0.4 m/s (to 40 m/s)	180 mm	16 mm
23) Low temperature anemometer probe with handle, application range -20 to +60 °C 	0.6 to 40.0 m/s	Vane	±2 % of final val.	190 mm	16 mm
24) High temperature probe for long-term measurements up to +350 °C Short-term meas. possible up to +500 °C 	0.6 to 20.0 m/s -40 to +350 °C	Vane NiCr-Ni	±2.5 % of final val.	560 mm	25 mm
25) Semi shell anemometer 	0.5 to 35 m/s	Vane	±0.3 ms ±5 % of f.v.		
26) Vane Ø 60 mm for measurements in channel outlet, with extendable telescope, application range -20 to +60 °C 	0.25 to 20.0 m/s	Vane	±0.2 m/s ±2 % of f.v.	440 to 1100 mm	60 mm
27) Vane Ø 100 mm for measurement in grid outlets, with handle (w/o fig.) 	0.2 to 15 m/s	Vane	±0.3 m/s	280 mm	100 mm

* A handle or telescope is required for plug-in probes (See Ordering data)

Thermal velocity probes

	Meas. range	Sensor	Length of probe	Ø Tip
28) Low-price, robust probe for measurements in the lower velocity range 	0 to 10.00 m/s -20 to +70 °C	Hot ball NTC	150 mm	4 mm
29) Robust probe with telescope for measurements in the lower velocity range 	0 to 10.00 m/s -20 to +70 °C	Hot ball NTC	190 to 850 mm	4 mm
30) Rapid-action probe for measurements in the lower velocity range, with recognition of flow direction 	0 to 20.00 m/s -20 to +70 °C	Hot wire NTC	160 to 760 mm	

Accuracy of hot ball: ±0.03 m/s, +5 % of meas. value (0 to 10 m/s)

Accuracy of hot wire: ±0.03 m/s, +4% of meas. value (0 to 20 m/s)



10 Technical data

10.4.1 Connection cables for probes

Parameter	Maximum cable extensions
NiCr-Ni FeCu-Ni PtRh-Pt	30 m
NTC	20 m
Pt100	50 m
% RH	10 m
10 hPa 100 hPa 2 bar	5 m *
Vane 16, 25, 60, 100	13 m
Therm. anemometer Ball probe	5 m *
Therm. anemometer Hot wire	5 m *
Resistance	20 m
Frequency	50 m
Current	50 m
Voltage	30 m

The special cables marked “*” are only available from the factory.
Additional extensions to the standard probe using the extension cable 0409.0063 are not possible.

Errors due to specific resistance during NTC temperature measurement			
Temp. °C	5 m	10 m	20 m
- 20	0.00	0.00	0.00
20	0.00	0.00	0.04
50	0.04	0.10	0.17
70	0.10	0.20	0.40

	Description	Order no.
Measuring instrument	testo 454 6 channel logger	0560.4540
	Comfort software V2 "Light", incl. 454 module, for graphic analysis of measured data under WINDOWS®	0554.0279
	ACCESSORIES	
	12 V mains unit, for mains operation and for charging rechargeable batteries	0554.0085
	Carrying case (leather), with strap	0516.0291
	System case for testo 454, infrared printer, probes and accessories	0516.4540
	Protective case for testo 454, lockable	On request
	Adapter for Pt100 / Humidity	0554.0454
	Rech. battery connection cable, to connect rechargeable batteries made by other companies	0409.0012
	Interface cable RS 232, connection cable between PC and testo 454	0409.0154
	Alarm/trigger cable	0554.0012
	Electrical isolation RS 232	0554.0006
	XT/AT adapter	0554.0072
	Infrared printer	
	Infrared printer, thermal printer for wireless printout of measured values, incl. 4 round cell batteries and 1 roll of thermal paper	0554.0345
Probe °C	ACCESSORIES	
	Recharger, incl. 4 NC rechargeable batteries for an infrared printer	0554.0110
	Spare thermal paper, 6 rolls	0554.0115
	SURFACE PROBES	
	1) Robust Pt100 probe with widened measuring tip	0605.9977
	2) Robust NiCr-Ni probe with widened measuring tip	0600.9993
	3) High temperature surface probe, with sprung thermocouple band	0600.0394
	4) Velcro strip probe, to attach to pipes etc.	0605.4677
	5a) Magnetic probe, adhesive power approx. 10 N	0600.4893
	5b) Magnetic probe, adhesive power approx. 20 N	0600.4793
	6) Pipe clamp probe	0600.4593
	7) Infrared probe	0600.0750
	IMMERSION PROBES	
	8a) NiCr-Ni probe for measurements in liquids and powder substances	0600.0493
	8b) Pt100 probe for measurements in liquids and powder substances	0605.0777
Probe % RH	PENETRATION PROBES	
	9) Robust probe with sharpened measuring tip, waterproof and boil-proof	0605.2577
	AIR PROBES	
	10) Rapid action probe, for measurements in liquids and gases	0600.9794
	11) Highly accurate probe, for air and gas temperature measurement	0610.9714
	12) Ball thermometer, for measuring radiation heat	On request
	THERMOCOUPLES AND ADAPTER	
	13) Adhesive thermocouples, for surface measurements	0644.1607
	14) Adapter, to connect thermocouples and probes to open ends of wires	0600.1693
	ACCESSORIES	
	Spare measuring head for pipe clamp probe	0602.0092
	Silicon heat paste (14 g), for temperature surface probe	0554.0004
	Extension cable, 5 m long	0409.0063
	15) Air probe, for humidity and temperature measurement	0636.9767
	16) High temperature humidity probe, for measurements in channels and bulk good	0636.2167
	17) Flexible humidity probe*, for measurements in inaccessible places	0636.2260
	18) Pressure-proof humidity probe*, for measurements in compressed air plants	0636.9880

* Also order adapter 0554.0454



	Description	Order no.
Probes % RH	ACCESSORIES	
	Sintered cap (PTFE), for air probes 0636.9767	0554.0666
	Sintered cap (stainless steel), for air probes 0636.9767	0554.0640
	Control and calibration set (11,3 % RH, 75,3 %RH)	0554.0660
	Control and storage humidity (33 %RH)	0554.0636
	Extension lead, 5 m long	0409.0063
Probes hPa	19a) Pressure probe 100 hPa, for measurement of velocity and differential pressure	0638.1545
	19b) Pressure probe 10 hPa, for measurement of velocity and differential pressure	0638.1445
	19c) Pressure probe 2 bar, for measurement of absolute pressure	0638.1645
	ACCESSORIES	
	20a) Pitot tube, brass, chromium-plated (max. 350 °C), Ø 7 mm, L = 500 mm	0635.2045
	20b) Pitot tube, brass, chromium-plated (max. 350 °C), Ø 7 mm, L = 350 mm	0635.2145
	20c) Pitot tube, stainless steel (max. 500 °C), Ø 4 mm, L = 300 mm	0635.2245
	Silicon hose, 5 m long, to connect Pitot tube and pressure probe	0554.0440
	Magnetic clamp for pressure probes	0554.0225
	VANE PROBES	
Probes m/s	21) Combined vane/temperature probe (plug-in)*, Ø 25 mm	0635.9640
	22) Combined vane/temperature probe (plug-in)*, Ø 16 mm	0635.9540
	23) Low temperature anemometer probe, with handle	0635.9345
	24) High temperature probe, for long-term meas. up to 350 °C, short-term meas. up to +500 °C	0635.6045
	25) Semi shell anemometer	0635.9045
	26) Vane Ø 60 mm, for measurement in channel outlet, with telescope	0635.9449
	27) Vane Ø 100 mm, for integrating measurements in grid outlets, with handle	0635.9349
	THERMAL VELOCITY PROBES	
	28) Low-priced, robust probe, for measurements in the lower velocity range	0635.1549
	29) Robust probe with telescope, for measurements in the lower velocity range	0635.1049
	30) Rapid-action probe with telescope, with recognition of direction of flow	0635.1041
Meas. cable	ACCESSORIES	
	Volume flow funnel, for measuring the extraction power of air-conditioning installations, measuring range 20 to 400 m³/h, Ø 190 mm	0554.0400
	Volume flow funnel, for measuring the extraction power of air-conditioning installations, measuring range 20 to 400 m³/h, Ø 350 mm	0554.0410
	Handle for plug-in vane probes	0430.3545
	Telescope for plug-in vane probes, max. 1 m long	0430.0945
	Swan neck, flexible connection between probe and connecting part	0430.0001
	Connection cable, plug-in, 1.5 m long, for vane probes	0409.0045
	Extension lead, plug-in, 5 m long, for vane probes	0409.0063
	Set of holding devices, for vane probes	0554.0430
	Test hole drill, Ø 25.4 mm	0554.0099
	Cover for test holes, Ø 25.4 mm (50 off)	0554.4001
	Measuring cable with free soldered ends, for measurement of voltage, frequency and resistance and for connection to Pt100 probes manufactured by other companies	0554.0013
	Current/voltage cable (±1 V, ±10 V, 20 mA)	0554.0007

12 Warranty from Testo Germany

***Even after the
warranty time has run
out***

our customer service will look after you. Send us your measuring instrument with a brief description of the fault. Include your telephone number should we need to contact you.

Dear Customer,

Thank you for your confidence in Testo which you have shown by buying this measuring instrument. You have made the right choice in choosing a quality product.

The warranty time is

- **3 years for display instruments,**
- **1 year for probes.**

Warranty services do not extend the warranty time.

The warranty is not valid for the following:

- All working parts such as rechargeable batteries, measuring cells, filters, measuring elements etc.
- Fragile parts,
- Damage caused by improper use
- Damage caused by non-adherence to the Instruction Manual,
- Measuring instruments which have been opened after purchase provided this is not described in the Instruction Manual for maintenance purposes
- Instruments whose serial number have been changed, damaged or removed

We will repair any fault **free of charge**, if

- it can be proven that they are manufacturing faults
- the faults are reported immediately,
- the faults are reported within the warranty time.

You will be charged for any additional repairs, adjustments or similar carried out by us and not under warranty. There is also a charge for transport and packaging.

Other claims, in particular those for damage occurring outside the instrument, will not be accepted unless legally binding.



Testo Germany