

testo 550 · Digital manifold

Instruction manual



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2 Safety and the environment

2.1. About this document

Use

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

Symbols and writing standards

Representation	Explanation
	Warning advice, risk level according to the signal word: Warning! Serious physical injury may occur. Caution! Slight physical injury or damage to the equipment may occur. > Implement the specified precautionary measures.
	Note: Basic or further information.
1. ...	Action: more steps, the sequence must be followed.
2. ...	
> ...	Action: a step or an optional step.
- ...	Result of an action.
Menu	Elements of the instrument, the instrument displays or the program interface.
[OK]	Elements of the instrument, the instrument displays or the program interface.
... ...	Functions/paths within a menu.
“...”	Example entries

2.2. Ensure safety

- > Do not operate the instrument if there are signs of damage at the housing, mains unit or feed lines.
- > Do not perform contact measurements on non-insulated, live parts.
- > Do not store the product together with solvents. Do not use any desiccants.
- > Carry out only the maintenance and repair work on this instrument that is described in the documentation. Follow the prescribed steps exactly. Use only original spare parts from testo.
- > The objects to be measured or the measurement environment may also pose risks: Note the safety regulations valid in your area when performing the measurements.
- > If the measuring instrument falls or another comparable mechanical load occurs, the pipe sections of the refrigerant hoses may break. The valve positioners may also be damaged, whereby further damage to the interior of the measuring instrument may occur that cannot be identified from the outside. The refrigerant hoses must therefore be replaced with new, undamaged refrigerant hoses every time the measuring instrument falls or following any other comparable mechanical load. Send the measuring instrument to Testo Customer Service for a technical check for your own safety.

2.3. Protecting the environment

- > Dispose of faulty rechargeable batteries/spent batteries in accordance with the valid legal specifications.
- > At the end of its useful life, send the product to the separate collection for electric and electronic devices (observe local regulations) or return the product to testo for disposal.
- > Refrigerant gases can harm the environment. Please note the applicable environmental regulations.

3 Specifications

3.1. Use

The testo 550 is a digital manifold for maintenance and servicing work at refrigeration systems and heat pumps. It must only be used by qualified authorized personnel.

The testo 550 replaces mechanical manifolds, thermometers and pressure/temperature tables by means of its functions. Pressures and temperatures can be loaded, adjusted, tested and monitored.

The testo 550 is compatible with most non-corrosive refrigerants, water and glycol. The testo 550 is not compatible with refrigerants that contain ammonia.

The product must not be used in areas at risk of explosion!

3.2. Technical data

Characteristic	Values
Parameters	Pressure: kPa / MPa / bar / psi Temperature: °C/°F/K
Sensor	Pressure: 2 x pressure sensor, temperature: 2 x NTC
Pressure media	FCKW, FKW, N, H ₂ O
Meas. cycle	0.75 s
Measurement channels	Quantity: 4
Interfaces	Pressure connections: 3 x 7/16" UNF NTC measurement
Measuring ranges	Pressure measuring range HP/LP: -1 to 40 bar (rel)/-14.7 to 580 psi (rel)/ 100 to 4000 kPa (rel)/0.1 to 4 MPa (rel) Temperature measuring range: -50 to +150 °C/-58 to 302 °F
Humidity application range	10 to 90 % RH
Overload	60 bar, 6000 kPa, 6 MPa, 870 psi

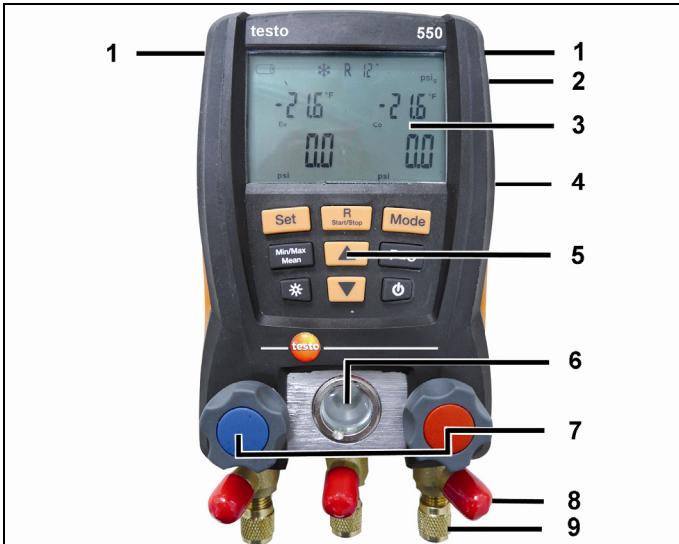
Characteristic	Values
Resolution	Pressure resolution: 0.01 bar/0.1 psi/ 1 kPa/0.001 MPa Temperature resolution: 0.1 °C/0.1 °F
Accuracy (nominal temperature 22 °C/71.6 °F)	Pressure: ±0.75 % of final value (±1 digit) Temperature: ±0.5 K (±1 digit)
No. of refrigerants	34
Selectable refrigerants	No refrigerant, R12, R22, R123, R134a, R290, R401A, R401B, R402A, R402B, R404A, R406A, R407A, R407C, R408A, R409A, R410A, R414B, R416A, R417A, R420A, R421A, R421B, R422A, R422B, R422D, R424A, R427a, R434A, R437A, R502, R503, R507, R718 (H ₂ O), R744 (only in permissible measuring range up to 40 bar)
Measurable media	Measurable media: All media that are stored in the testo 550. Not measurable: Ammonia (R717) and other refrigerants which contain ammonia
Ambient conditions	Operating temperature: -10 to 50 °C/ 14 to 122 °F Storage temperature: -20 to 60 °C/ -4 to 140 °F
Housing	Material: ABS/PA/TPU Dimensions: 265 x 135 x 75 mm Weight: approx. 1000 g (without batteries)
Power supply	Current source: Rechargeable batteries/batteries 4x 1.5 V, type AA/mignon/LR6 Battery life: approx. 40 h (display light off)
Display	Type: Illuminated LCD Updating of readings: 1 s Response time: 0.5 s
Directives, standards and tests	EC Directive: 2004/108/EC

Characteristic	Values
Warranty	Duration: 2 years Warranty conditions: see website www.testo.com/warranty

4 Product description

4.1. Overview

Display and control elements





- 1 Mini-DIN probe socket for NTC temperature probe, with socket cover
- 2 Foldable suspension device, with eyelet for padlock (on rear)
- 3 Display. Instrument status icons:

Icon	Significance
	Battery capacity: >75 %/>50 %/>25 %/<10 %
	Select measuring mode (see Selecting the measuring mode, page 14)

- 4 Battery compartment. It is not possible to charge rechargeable batteries in the instrument!

5 Control keys:

Key	Function
[Set]	Set units
[R, Start/ Stop]	Select refrigerant/ Start/stop / Tightness test
[Mode]	Switching measuring mode
[Min/Max/Mean]	Display min./max./mean values
[▲]	Up key: Change display view
[p=0]	Pressure zeroing
	Light key: Switch display light on/off
[▼]	Down key: Change display view
	Switching the instrument on/off

6 Sight glass for refrigerant flow

7 2 x valve positioner

8 3 x hose parkers for refrigerant hoses

9 3 x connections 7/16" UNF, brass

Left/right: Low pressure/high pressure, for refrigerant hoses with quick connect fitting, passage can be locked via valve positioner. Centre: for refrigerant bottles, for example, with sealing cap.

5 First steps


Inserting batteries/rechargeable batteries

1. Fold out the suspension device and open the battery compartment (clip lock).
2. Insert batteries (included in delivery) or rechargeable batteries (4x 1.5 V, type AA/Mignon/LR6) in the battery compartment. Observe the polarity!
3. Close the battery compartment.

i When not in use for long period: Remove batteries/rechargeable batteries.

i Completely charge rechargeable batteries before using the instrument.

Switching the instrument on

- > Press .
- Initialization phase:
 - All display segments are lit (length of time: 2 s).
- Measurement view is opened.




Performing settings

1. Press **[Set]**.
 - The configuration menu is opened and the adjustable parameter flashes.
2. Set parameters:

Key functions

Representation	Explanation
[▲] or [▼]	Change parameter, select unit
[Set]	Select units/parameters

Adjustable parameters

Representation	Explanation
°C, °F	Set temperature unit.
bar, kPa, MPa, psi	Set unit of pressure.
Pabs, Prel or psia, psig	Depending on the selected unit of pressure: Switch between absolute and relative pressure display.
29.92 inHg/ 1.013 bar	Set current absolute pressure (see table)
 /  / 	Select measuring mode (see Selecting the measuring mode, page 14)

- Settings will be applied following the final selection.

Operating valve positioner

The digital manifold acts like a conventional two-way manifold with regard to the refrigerant path: The passages are opened by opening the valves. The adjacent pressure is measured with valves closed as well as with them open.

- > Open valve: Turn valve positioner anticlockwise.
- > Close valve: Turn valve positioner clockwise.

 **WARNING**

Only tighten valve positioner with your hand! Do not use any tools when tightening as otherwise the thread may be damaged.

6 Using the product

6.1. Preparing for measurement

6.1.1. Connecting the temperature probe

For measurement of the pipe temperature and for the automatic calculation of overheating and undercooling, an NTC temperature probe (accessory) must be connected.

Probes must be connected before the measuring instrument is switched on so that they are recognized by the measuring instrument.

6.1.2. Switching the instrument on

> Press .

Zeroing pressure sensors

Carry out a zeroing of the pressure sensors before every measurement.

✓ The connections of the low-pressure and high-pressure side must be depressurized (ambient pressure).

> Press **[P=0]** button to perform zeroing.

Connecting the refrigerant hoses

✓ The valve positioners are closed.

1. Connect refrigerant hoses for low-pressure side (blue) and high-pressure side (red) to the measuring instrument.
2. Connect refrigerant hoses to the system.

WARNING

If the measuring instrument falls or another comparable mechanical load occurs, the pipe sections of the refrigerant hoses may break. The valve positioners may also be damaged, whereby further damage to the interior of the measuring instrument may occur that cannot be identified from the outside.

- > Send the measuring instrument to Testo Customer Service for a technical check for your own safety.
- > The refrigerant hoses must therefore be replaced with new, undamaged refrigerant hoses every time the measuring instrument falls or following any other comparable mechanical load.

Setting the refrigerant

1. Press **[R, Start/Stop]**.
 - The refrigerant menu is opened and the currently selected refrigerant flashes.
2. Set the refrigerant:

Key functions

Representation	Explanation
[▲] or [▼]	Change refrigerant
[R, Start/Stop]	Confirm setting and leave the refrigerant menu.

Refrigerant that can be set

Representation	Explanation
R...	Refrigerant number of the refrigerant in accordance with ISO 817
...T	testo special designation for certain refrigerants
---	No refrigerant selected.

Example "Set refrigerant R401B"




1. Press **[▲]** or **[▼]** repeatedly until **R401B** flashes.
2. Press **[R, Start/Stop]** to confirm the setting.

Ending the refrigerant selection

- > Press **[R, Start/Stop]** or automatically after 30 s if no button was pressed.

6.1.3. Selecting the measuring mode

1. Press **[Set]** several times
 2. Select function with **[▲]** or **[▼]** .
 3. Save setting: press **[Set]** .
- Measuring mode is displayed.

Display	Mode	Function
	Refrigeration system	Normal functionality of the digital manifold
	Heat pump	Normal functionality of the digital manifold
	Automatic mode	<p>If the automatic mode is activated, the testo 550 digital manifold automatically changes the display of the high and low pressure. This automatic change occurs when the pressure on the low-pressure side is 1 bar higher than the pressure on the high-pressure side. During the change, Load (2 s) is shown in the display.</p> <p>This mode is especially suited to air conditioning systems which cool and heat.</p>

6.2. Performing the measurement

WARNING

Risk of injury caused by refrigerant that is at high pressure, hot, cold, or poisonous!

- > Wear safety goggles and protective gloves.
- > Before pressurizing the measuring instrument: Always fasten the measuring instrument at the suspension device in order to prevent it from falling (risk of breakage)
- > Check if the refrigerant hoses are intact and connected correctly before each measurement. Do not use a tool to connect the hoses. Only tighten the hoses by hand (max. torque 5.0 Nm/3.7 ft*lb).
- > ~~Measures with the occurrence of danger.~~
- > Maintain permissible measuring range (0 to 40 bar). Pay particular attention with systems with refrigerant R744, as these are often operated with higher pressures.

Measuring

- ✓ The steps described in the chapter "Preparing for measurement" have been completed.
- 1. Pressurize the measuring instrument.
- 2. Read off readings.



With zeotropic refrigerants, the evaporation temperature $t_{o/Ev}$ is displayed after the complete evaporation/the condensation temperature $t_{c/Co}$ is displayed after the complete condensation.

The measured temperature must be assigned to the superheating or the subcooling side ($t_{oh} \leftrightarrow t_{cu}$). Depending on this assignment, $t_{oh}/T1$ or $\Delta t_{oh}/SH$ or $t_{cu}/T2$ or $\Delta t_{cu}/SC$ is shown depending on the selected display.

- Reading and display illumination flash:
 - 1 bar before reaching the critical pressure of the refrigerant,
 - upon exceeding the max. permissible pressure of 40 bar.

Key functions

> **[▲]** or **[▼]**: Change the reading display.

Possible display combinations:

Evaporation pressure Refrigerant evaporation temperature t_{o}/Ev	Condensation pressure Refrigerant condensation temperature t_{c}/Co
--	--

or (only with connected temperature probe)

Evaporation pressure Measured temperature $t_{oh}/T1$	Condensation pressure Measured temperature $t_{cu}/T2$
--	---

or (only with connected temperature probe)

Evaporation pressure Superheating $\Delta t_{oh}/SH.$	Condensation pressure Subcooling $\Delta t_{cu}/SC$
--	--

With two connected NTC probes, Δt is also shown.

> **[Mean/Min/Max]**: Record readings, display min./max. readings, mean values (since switching on).

Tightness test/pressure drop test

Systems can be tested for tightness with the temperature-compensated tightness test. The system pressure and the ambient temperature are measured over a defined period for this. A temperature probe can be connected that measures the ambient temperature for this (recommendation: NTC air probe, art. no. 0613 1712). Information about the temperature-compensated differential pressure and about the temperature at the beginning/end of the test exists as a result. If no temperature probe is connected, the tightness test can be performed without temperature compensation.

- ✓ The steps described in the chapter "Preparing for measurement" have been completed.
- 1. Press **[Mode]** (leakage test view).
- 2. Start the leakage test: Press **[R, Start/Stop]**.
- 3. End the leakage test: Press **[R, Start/Stop]**.
 - Result is displayed.
- 4. Confirm message: Press **[Mode]**.
 - You automatically jump to the evacuation/vacuum display menu.

Evacuation/vacuum display



The measurement is performed on the low-pressure side.

5. Press **[Mode]**.
 - Result is displayed on the low-pressure side.
6. Press **[Mode]**.
 - The measuring mode is displayed.

7

Maintaining the product

Cleaning the instrument

- > If the housing of the instrument is dirty, clean it with a damp cloth.

Do not use any aggressive cleaning agents or solvents! Weak household cleaning agents or soap suds can be used.

Keeping connections clean

- > Keep screw connections clean and free of grease and other deposits, clean with a moist cloth as required.

Exchanging refrigerant hoses regularly



WARNING

If the measuring instrument falls or another comparable mechanical load occurs, the pipe sections of the refrigerant hoses may break. The valve positioners may also be damaged, whereby further damage to the interior of the measuring instrument may occur that cannot be identified from the outside.

- > Send the measuring instrument to Testo Customer Service for a technical check for your own safety.
- > The refrigerant hoses must therefore be replaced with new, undamaged refrigerant hoses every time the measuring instrument falls or following any other comparable mechanical load.

Removing oil residues

- > Carefully blow out oil residues in valve block using compressed air.

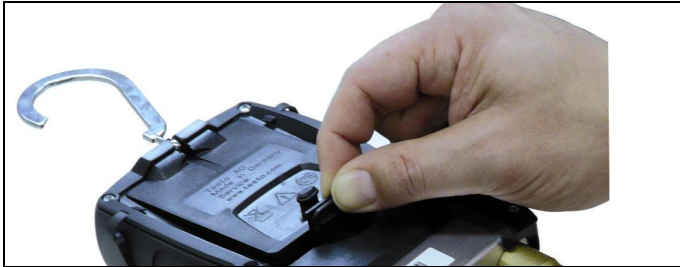
Ensuring the measuring accuracy

Testo Customer Service would be glad to further assist you if you so wish.

- > Check instrument regularly for leaks (recommended: annually).
Keep to the permissible pressure range!
- > Calibrate instrument regularly (recommended: annually).

Changing batteries/rechargeable batteries

- ✓ Instrument is switched off.



1. Fold out the suspension device, loosen the clip and remove the cover of the battery compartment.
2. Remove empty batteries/rechargeable batteries and insert new batteries/rechargeable batteries (4x 1.5 V, type AA, Mignon, LR6) in the battery compartment. Observe the polarity!
3. Set on and close cover of the battery compartment (clip must engage).
4. Switch the instrument on.

Changing the valve or valve positioner handle


WARNING

Change of the valve positioners and valves by the customer is not permissible.

- > Send the measuring instrument to the Testo Customer Service.

8 Tips and assistance

8.1. Questions and answers

Question	Possible causes/solution
 flashes	Batteries are almost empty. > Change batteries.
The instrument switches off automatically.	Residual capacity of the batteries is too low. > Change batteries.
uuuu lights up instead of the parameter display	The permissible measuring range has been undershot. > Keep to the permitted measuring range.
oooo lights up instead of the parameter display	The permissible measuring range has been exceeded. > Keep to the permitted measuring range.

8.2. Measurement parameters

Name		Description
Δ toh	SH	Superheating, evaporation pressure
Δ tcu	SC	Subcooling, condensation pressure
to	Ev	Refrigerant evaporation temperature
tc	Co	Refrigerant condensation temperature
toh	T1	Measured temperature, evaporation
tcu	T2	Measured temperature, condensation

8.3. Error reports

Question	Possible causes/solution
---- is lit up instead of measurement parameter display	Sensor or cable defective > Please contact your dealer or Testo Customer Service
Display EEP FAIL	Eeprom defective > Please contact your dealer or Testo Customer Service

8.4. Accessories and spare parts

Description	Article no.
Clamp probe for temperature measurement at pipes	0613 5505
Pipe wrap probe with Velcro tape for pipe diameters of up to max. 75 mm, Tmax. +75 °C, NTC	0613 4611
Watertight NTC surface probe	0613 1912
Precise, robust NTC air probe	0613 1712
Transport case for measuring instrument, probe and hoses	0516 5505

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

If you have any questions, please contact your dealer or Testo Customer Service. The contact details can be found on the back of this document or on the Internet at www.testo.com/service-contact.

