testo 557 · 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. ... 2. ...	Action: more steps, the sequence must be followed.
> ...	Action: a step or an optional step.
- ...	Result of an action.
Menu	Elements of the instrument, the instrument display or the program interface.
[OK]	Control keys of the instrument or buttons of 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.

> Electrostatic charging can destroy the device. Integrate all the components (system, manifold's valve block, refrigerant bottle etc.) into the potential equalisation (earthing). Please see the safety instructions for the system and the refrigerant used.

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 557 is a digital manifold for maintenance and service work on refrigeration systems and heat pumps. The device is only to be used by qualified expert personnel.

With its functions the testo 557 replaces mechanical manifolds, thermometers and pressure/temperature charts. Pressures and temperatures can be applied, adapted, tested and monitored.

The testo 557 is compatible with most of the non-corrosive refrigerants, water and glycol. The testo 557 is not compatible with ammoniac refrigerants.

Then product must not be used in explosive environments!

3.2. Technical data

Feature	Values
Measurement parameters	Pressure: psi/ kPa/MPa/bar Temperature: °F/°C/K Vacuum: Micron / inHg / inH_2O / hPa / mbar/ Torr / Pa
Sensing element	Pressure: 2 x pressure sensors Temperature: 2 x NTC
Measuring cycle	0.75 s
Interfaces	Pressure connections: 3 x 7/16" UNF, 1x 5/8" UNF NTC measurement
Measurement ranges	Pressure measurement range HP/LP: -14.7…725 psi / -100…5000 kPa / -0.1…5 MPa / -1…50 bar (rel) Temperature measurement range: -58…302 °F / -50…+150 °C Measurement range vacuum (rel): -14.7…0 psi / -1…0 bar
Overload	754 psi, 52 bar, 5200 kPa, 5.2 MPa

Feature	Values
Resolution	Resolution pressure: 0.1 psi / 0.01 bar / 1 kPa / 0.001 MPa Resolution temperature: 0.1 °F / 0.1 °C / 0.1 K Vacuum resolution: 500 Micron / 0.02 inHg / 0.5 inH_2O / 1 hPa / 1 mbar / 0.5 Torr / 100 Pa
Accuracy (nominal temperature 71.6 °F / 22 °C)	Pressure: ±0.5% of final value (±1 digit) Temperature (-40…302 °F / -40…+150 °C): ±0.9 °F (±1 digit), ±0.5 K (±1 digit), ±0.5 °C (±1 digit) Vacuum: 1% of final value (±1 digit)
No. of refrigerants	40
Selectable refrigerants	No refrigerant, R12, R22, R123, R134a, R227, R290, R401A, R401B, R402A, R402B, R404A, R406A, R407A, R407C, R408A, R409A, R410A, R411A, R413A, R414B, R416A, R417A, R420A, R421A, R421B, R422A, R422B, R422D, R424A, R427A, R434A, R437A, R438A, R502, R503, R507, R600, R600a, R718, R744 (only in permissible measurement range up to 50 bar), R1234yf (Display: T8)
Measurable media	Measurable media: all media that is stored in the testo 557. Not measurable: ammonia (R717) and other refrigerants which contain ammonia
Ambient conditions	Operating temperature: -4…122 °F / -20…50 °C Storage temperature: -4…140 °F / -20…60 °C Humidity in area of use: 10… 90 %rF
Housing	Material: ABS / PA / TPE Dimensions approx. 280 x 135 x 75 mm Weight: approx. 1200 g (without batteries)
IP-class	42 (position in use hanging down)
Power supply	Current source: Rechargeable batteries / batteries 4 x 1.5V type AA / Mignon / LR6 Battery lifetime: approx. 150 h (display illumination off)

Feature	Values
Display	Type: Illuminated LCD Response time: 0.5 s
Directives, standards and tests	EC Directive: 2004/108/EC
Warranty	Duration: 2 years Terms of warranty: see website www.testo.com/warranty

4 Product description

4.1. Overview

Display and control elements

1 Sensor socket Mini-DIN for NTC-temperature sensor, with socket cover

2 Suspension attachment, foldable (backside).

3 Display. Instrument status icons:

Icon	Meaning
	Battery capacity: >75% / >50% / >25% / <10%
	Select measuring mode, see Choosing the measuring mode page 14

4 Battery compartment. The rechargeable batteries cannot be charged inside the instrument!

5 Control keys:

Key	Function
[Set]	Set units
[R, Start/Stop]	Select refrigerant / Start-Stop leak test
[Mode]	Switch between measuring modes
[Min/Max/Mean]	Show min, max, mean values
[▲]	Up-key: Change display view.
[p=0]	Pressure zeroing
	Light key: switches display light on/off.
[▼]	Down-key: changes display view.
[⏻]	Switch the instrument on/off

6 Inspection glass for refrigerant flow.

7 4 x valve actuators

8 4 x hose brackets for refrigerant hoses

9 Connection 7/16" UNF, brass.
High pressure, for refrigerant hoses with quick release screw fitting, passage for valve actuator lockable.

10 Connection 5/8" UNF, brass, for vacuum pump

11 Connection 7/16" UNF, brass, for e.g. refrigerant cylinders, with screw cap.

12 Connection 7/16" UNF, brass.
Low pressure for refrigerant hoses with quick release screw fitting, passage for valve actuator lockable.

5 First steps

Inserting batteries/rechargeable batteries

1. Unfold the suspension attachment and open the battery compartment (clip lock).
2. Insert the batteries (scope of delivery) or rechargeable batteries (4 x 1.5 V, type AA / Mignon / LR6) into the battery compartment. Observe the polarity!
3. Close the battery compartment.

When not in use for long period: Take out the batteries / rechargeable batteries.

Recharge the rechargeable batteries completely before using the instrument.

Switching the instrument on

> Press **[⏻]**.

- Initializing phase:
  - All display segments light up (duration: 2 s).
- Start mode **----** flashes.
- Measurement view is opened.

Performing settings

1. Press **[Set]**.

- The configuration menu is opened and the adjustable parameter flashes.

2. Set parameter:

Key functions

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

Adjustable parameters

Representation	Explanation
°C, °F	Set unit for temperature.
bar, kPa, MPa, psi	Set unit for pressure.

Representation	Explanation
Pabs, Prel or **psia, psig**	Depending on the chosen unit for pressure: Change between absolute and relative pressure displays.
Micron, inHg, Pa, hPa, Torr, inH2O, mbar	Set pressure unit for vacuum.
Pabs, Prel or **psia, psig**	Depending on the chosen unit for pressure: Change between absolute and relative pressure displays in vacuum.
/ /	Select the measuring mode, see Choosing the measuring mode page 14

– The settings will be accepted once the last selection has been made.

Operating the valve actuators

With respect to the refrigerant flow path the digital manifold behaves just like a conventional four-way manifold. The passages are opened by opening the valves. The applied pressure is measured with the valves closed and the valves opened.

> Open the valve: Turn valve actuator anticlockwise.

> Close the valve: Turn valve actuator clockwise.

WARNING

Tighten the valve actuator only hand-tight. Do not use any tools for tightening, this could damage the thread.

6 Using the product

6.1. Preparing for measurement

6.1.1. Connecting the temperature sensor

Sensors must be connected before the measuring instrument is switched on, so that they are recognised by the instrument.

Surface temperature sensor

An NTC temperature sensor (accessory) must be connected for measuring the pipe temperature and for automatic calculation of superheating and subcooling.

Deactivating the surface compensation factor for insertion and air temperature sensor

A surface compensation factor has been set in the measuring instrument to reduce the measuring errors in the main field of applications. This reduces measuring errors when using surface temperature sensors.

If the measuring instrument testo 557 is used in combination with insertion or air temperature sensors (accessories), this factor must be deactivated.:

> Press and hold the keys **SET** + **MODE** together and switch on the measuring instrument **[⏻]**.

\- The instrument shows the message **Fact off**.

The surface compensation factor becomes active every time the measuring instrument is switched on.

6.1.2. Switching the instrument on

> Press **[⏻]**.

Zeroing the pressure sensors

Zero the pressure sensors before every measurement.

✓ All connections must be pressureless (ambient pressure).

> Press key **[P=0]** and execute zeroing.

Connecting the refrigerant hoses

Before each measurement check whether the refrigerant hoses are in flawless condition.

✓ The valve actuators are closed.

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

WARNING

The measuring instrument dropping down or any other comparable mechanical load can cause breakage of the pipe pieces in the refrigerant hoses. The valve actuators may also suffer damage, which in turn could result in further damage inside the measuring instrument, which may not be detectable from outside.

> For your own safety you should return the measuring instrument to the Testo Service for technical inspection.

> You should therefore always replace the refrigerant hoses with new ones after the measuring instrument has dropped down or after any comparable mechanical loading.

Setting the refrigerant

1. Press **[R, Start/Stop]**.

- This opens the refrigerant menu and the currently selected refrigerant flashes.

2. Setting the refrigerant:

Key functions

Representation	Explanation
[▲] or **[▼]**	Changing the refrigerant
[R, Start/Stop]	Confirm the setting and exit the refrigerant menu.

Available refrigerants

Representation	Explanation
R...	Refrigerant number of refrigerant acc. to ISO 817
T...	Special Testo designation for certain refrigerants (T8 = T1234yf)

Representation	Explanation
---	no refrigerant selected.

Example: Setting refrigerant R401B

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

Quitting the refrigerant selection

> Press **[R, Start/Stop]** or automatically after 30 s, if no other key has been pressed.

6.1.3. Choosing the measuring mode

1. Press **[Set]** several times
2. Press **[▲]** or **[▼]** to select the function.
3. Saving settings: Press **[Set]**.

- The measuring mode is displayed.

Display	Mode	Function
	Refrigeration system	Normal function of the digital manifold
	Heat pump	Normal function of the digital manifold
	Automatic mode	When automatic mode is activated the digital manifold testo 557 automatically reverse the display of high and low pressure. This automatic reversal occurs when the pressure in the low pressure side is 1 bar higher than the pressure in the high pressure side. This switching over is indicated by **----** flashing in the display. This mode is particularly suitable for air conditioning systems that provide cooling and heating.

6.2. Performing the measurement

⚠ WARNING

Risk of injury caused by pressurized, hot, cold or toxic refrigerants!

> Wear protective goggles and safety gloves.

> Before applying pressure to the measuring instrument: Always fasten the measuring instrument on the suspension attachment to prevent it from falling down (danger of breakage)

> Before each measurement check the refrigerant hoses for flawless condition and correct connection. Do not use any tools to connect the hoses, tighten hoses only hand-tight (max. torque 5.0 Nm / 3.7 ft*lb).

> Comply with the permissible measuring range (-14.7…725 psi / -1…50 bar). Pay particular attention in systems with refrigerant R744, since these are frequently operated with higher pressures.

Measuring

✓ The actions described in the chapter “Preparing for measurement” have been performed.

1. Apply pressure to the measuring instrument.
2. Read the measuring values.

With zeotropic refrigerants, the evaporation temperature to/Ev is displayed after the complete evaporation / the condensation temperature tc/Co is displayed after complete condensation.

The measured temperature must be assigned to the superheating or subcooling side (t_{oh} <--> t_{cu}). Dependent on this assignment, the display will show t_{oh}/T1 resp. Δt_{oh}/SH or t_{cu}/T2 resp. Δt_{cu}/SC, depending on the selected display.

- Reading and display illumination are flashing.
  - 12 psi/1 bar before the critical pressure of the refrigerant is reached,
  - when the max. permissible pressure of 754 psi/52 bar is exceeded.

Key functions

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

Possible display combinations:

Evaporation pressure **Refrigerant evaporation temperature** to/Ev	**Condensation pressure** **Refrigerant condensation temperature** tc/Co

or (only with inserted temperature sensor)

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

or (only with inserted temperature sensor)

Evaporation pressure **Superheating** Δt_{oh}/SH	**Condensation pressure** **Subcooling** Δt_{cu}/SC

With two inserted NTC sensors Δt is additionally displayed.

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

Leak test / pressure drop test

The temperature compensated leak test can be used to check the leak tightness of systems. For this purpose both the system pressure and the ambient temperature are measured over a defined period of time. For this purpose a temperature sensor to measure the ambient temperature may be connected (recommendation: Deactivate the surface compensation factor (see page 12) and use NTC air sensors Art.-No. 0613 1712). This provides information about the temperature compensated differential pressure and about the temperature at the beginning/end of the test as a result. If no temperature sensor is connected, you may also perform the leak test without temperature compensation.

✓ The actions described in the chapter “Preparing for measurement” have been performed.

1. Press **[Mode]**

- The leak test view is opened. **ΔP** is displayed.

2. Start the leak test: Press **[R, Start/Stop]**.
3. End the leak test: Press **[R, Start/Stop]**.

- The result is displayed.

4. Confirm the message: Press **[Mode]**.

- Automatic jump to the evacuation / vacuum display.

Evacuation / vacuum display

	The measurement takes place in the low pressure side.

5. Press **[Mode]**.
- The display shows VAC
6. Press **[Mode]**.
- Main menu display.

Vacuum measurement

In order to achieve optimal measuring accuracy in vacuum measurement, the measuring instrument must be zeroed at ambient pressure.

	Zeroing at ambient pressure must be performed for each vacuum measurement.

✓ The desired units have been set, see **Performing settings** page 10.

1. Press **[⏻]**.
2. Zero the measuring instrument at ambient pressure **[p=0]**.
3. Press **[Mode]** 2 times.
- The instrument is in vacuum mode **Vac**.
4. Start evacuation.

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 and soap suds may be used.

Keeping connections clean

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

Removing oil residues

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

Ensuring the measuring accuracy

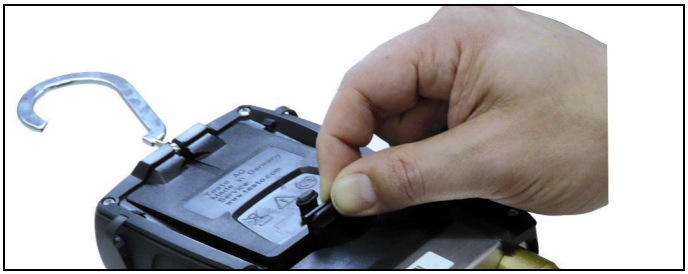
Testo Customer Service would be glad to further assist you if you so wish.

> 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
Δtoh	SH	Superheating, evaporation pressure
Δtcu	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

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**.

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

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

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