



testo 420 · Differential Pressure Instrument

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 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.
- > Dangers may also arise from the systems being measured or the measuring environment: Note the safety regulations valid in your area when performing the measurements.



Testo guarantees the functionality of its products when used in accordance with their intended purpose. This guarantee does not apply to features of Testo products in combination with unauthorised third-party products. Competitor products are not authorised by Testo.

As is common practice, Testo generally excludes support, warranty or guarantee claims relating to functionality that has not been guaranteed by Testo as part of the product offered. Claims shall also be excluded in the event of improper use or handling of the products, e.g. in combination with unauthorised third-party products.

For products with Bluetooth®

Changes or modifications that have been made without the explicit consent of the responsible approval authority, may cause the retraction of the type approval.

Data transfer may be disturbed by equipment that uses the same ISM-band, e.g. WLAN, microwave ovens, ZigBee.

The use of radio communication links is not permitted in aeroplanes and hospitals, among others. For this reason the following points must be ensured before entering:

- > Switch off the instrument.
- > Disconnect control unit from all external power sources (mains cable, external rech. batts., ...).

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).

3 Specifications

The testo 420 is used for volume flow measurements (main application), Pitot tube measurements and pressure measurements for air conditioning and ventilation systems. Thanks to its interchangeable flow hoods, the testo 420 can be used for air inlets and outlets of various sizes.

With the additional App (Android/iOS), the readings can be conveniently displayed on a tablet or smartphone, and in addition a measurement can be started, stopped and saved via the App.

4 Technical data



The use of the wireless module is subject to the regulations and stipulations of the respective country of use, and the module may only be used in countries for which a country certification has been granted. The user and every owner has the obligation to adhere to these regulations and prerequisites for use, and acknowledges that the re-sale, export, import etc. in particular in countries without wireless permits, is his responsibility.

Feature	Values
Measurement parameters	Flow velocity : m/s / ft/min Volume flow: m³/h / cfm / l/s Pressure (absolute pressure): hPa / mbar / kPa Pressure (differential pressure): Pa / hPa / mbar / mmH₂O / inH₂O
Measuring cycle	1/sec
Interfaces	Probe interface Mini DIN (testo 420 Set) Micro USB

Feature	Values
Measuring ranges	Flow velocity: 0 to 14 m/s / 0 to 2750 ft/min Pressure (absolute pressure): 700 to 1100 hPa Pressure (differential pressure): - 120 to +120 Pa
Resolution	Flow velocity: 0.01 m/s Volume flow: 1 m ³ /h / 1 cfm Pressure (absolute pressure): 0.1 hPa / 0.1 mbar / 0.01 kPa Pressure (differential pressure): 0.001 Pa / 0.00001 hPa / 0.00001 mbar / 0.0001 mm H ₂ O / 0.000001 inH ₂ O
Accuracy (nominal temperature 22°C/71.6°F)	Flow velocity and Volume flow: no accuracy specification since calculated variable Error absolute pressure compensation: ±0.04% of m.v. / hPa deviating from 1013 hPa Pressure (absolute pressure): ± 3 hPa Pressure (differential pressure): ±2% of m.v. + 0.5 Pa (at 22°C, 1013 hPa) Error absolute pressure compensation: ±0.04% of m.v. / hPa deviating from 1013 hPa
Temperature coefficient	Pressure (absolute pressure): ± 0.02% of m.v. / K (deviating from 22 °C, in the range 0 to 60 °C) Pressure (differential pressure): ± 0.02% of m.v. / K (deviating from 22 °C, in the range 0 to 60 °C)
Response time t ₉₀	Flow velocity: approx. 1 s Volume flow: approx. 1 s Pressure (absolute pressure): approx. 1 s Pressure (differential pressure): approx. 1 s

4 Technical data

Feature	Values
Operating and ambient conditions	Storage temperature: -20 to +60 °C / -4 to 140 °F Operating temperature: -5 to +50 °C/+23 - +122°F Humidity: 0 to 100% RH Pressure range: 800 to 1100 hPa
Housing / measurement setup	Measuring instrument housing material: ABS Measuring instrument dimensions: 150x85x35 mm
Power supply	4 x 1.5 V rechargeable/non-rechargeable batteries Type AA / alkaline manganese, mignon Battery lifetime: approx. 40h (eroing interval 10 seconds, display illumination off, Bluetooth off)
Display	Type: Dot matrix Dimensions: 3.5 inches
Directives, standards and tests	EU guideline: 2014/30/EU

5 Product description

5.1. Overview

Overview of testo 420



- 1 Battery compartment, on rear of the instrument
- 2 Display
- 3 Control keys
- 4 Probe socket Mini-DIN (only for use on the measurement base)
- 5 Micro-USB port
- 6 Connection for pressure measurement

Instrument status icons:

Icon	Meaning
	Battery capacity
	Bluetooth
	Measuring mode: Pressure measurement, Pitot tube, volume flow (air pressure from above into the hood / suction outlet)

Icon	Meaning
Actual	Actual volume flow: The current ambient conditions are used to calculate the volume flow. The actual barometric pressure is measured with the internal sensor. In applications with volume flow hood, the temperature is measured by the integrated temperature/humidity sensor, with Pitot tube measurement the actual temperature needs to be input manually.
Standard	Standard volumetric flow: The standard settings for temperature and barometric pressure (21 °C / 1013 hPa in accordance with the standard conditions of the NIST, National Institute of Standards and Technology) are used to calculate the volume flow.
K-factor	Factor by which the current reading is multiplied. Depends on which outlet measurements are being taken at.
Pitot Tube factor (P-factor)	The Pitot tube factor for Pitot tubes is generally the same and must be entered: • Pitot tubes from Testo: 1.00 • Pitot tubes from other manufacturers: the Pitot tube factor can be found in the instruction manual or you should ask your supplier.

Control keys

Key	Function
	Menu
	Holds / starts / stops a measurement
[ESC]	Switches to the previous view / to the measurement view
	Saves the measured values
	Navigation within the menu
	Confirms a selection

Key	Function
	Switch instrument on/off (press and hold down) Switch illumination on/off (press briefly)

6 First steps

Inserting batteries/rechargeable batteries

1. Open the battery compartment.
2. Insert the batteries or rechargeable batteries (scope of delivery includes 4x 1.5V Type AA/ LR6).
3. Close the battery compartment.



When not in use for a long period of time, take the batteries/rechargeable batteries out.

Implementing settings

1. Press  to access the menu.
2. Select the menu item you require using , , , .

Key functions

Display	Explanation
	Change parameter, select unit
	Confirm input

1. Menu Level	2. Menu Level	3. Menu Level
Application	Flow Hood	K-factor
		Actual/Standard
	Pitot tube	Duct
		Pitot tube factor
		Pitot Temperature
		Actual/Standard
	Pressure only	--

1. Menu Level	2. Menu Level	3. Menu Level
Measuring Program	Single Measurment	--
	Continous Measurement ¹	--
	Continous/Punctual measurement (nur für Staurohr)	measuring duration ²
Memory	New Folder	--
	T420 folder	--
Display	Volume Flow	on/off
	Diff.Pressure	on/off
	Temperature	on/off
	Velocity	on/off
	Humidity	on/off
	Abs.Pressure	on/off
Device Settings	Language	English/German/Italian/French/Spanish
	Backlight Auto Off	On/Off
	Auto Off	On/Of
	Bluetooth	On/Off
	Date&Time	Date Format
		Time Format
		Set Date&Time
	Gliding average	5 – 20 sec
	Hood adjustment	Supply Air
		Exhaust Air
	Zeroing int	1-20 sec
Reset Device	--	--

¹ Maximum of 15 minutes, measuring cycle 1 second

² Maximum of 25 points and 1 minute per point.

7 Using the product

7.1. Switching Bluetooth® on and off



In order to be able to establish a connection via Bluetooth, you need a tablet or smartphone with the Testo App **testo 420** already installed on it.

You can get the App for iOS instruments in the App Store or for Android instruments in the Play Store.

Information about compatibility can be found in the relevant App Store.



Measurements can be performed and saved with App into the instruments memory. Measuring mode and save function on the instrument itself is not available during Bluetooth communication is established with a mobile device.

Switching on Bluetooth

1. Hold down for 3 seconds.
 - Once the Bluetooth icon is shown on the display, Bluetooth is switched on.
 - If no connection is established, Bluetooth switches off after 10 mins.
- or
1. Press -> **Device Settings** -> **Bluetooth**, and using / -> select Off. Confirm with .
 - Once the Bluetooth icon is shown on the display, Bluetooth is switched on.
 - If no connection is established, Bluetooth switches off after 10 mins.

Display	Explanation
flashes	There is no Bluetooth connection, or a potential connection is being searched for.
is permanently displayed	There is a Bluetooth connection.
is not displayed	Bluetooth is disabled.

7.2. Settings for the measurement

7.2.1. Damping (Gliding Average)

If the readings fluctuate widely, it is advisable to damp the readings. The time range for the damping can be set manually between 5-20 seconds.

1. Press , then select **Device settings** and **Gliding average**.
 - The damping can be set between 5-20 seconds.

7.2.2. Hood Calibration

This input is provided for the filing of calibration data by the relevant calibration laboratory. The flow hood-specific adjustment data can be input manually for supply air and exhaust air and has a direct effect on the measurement results. Input option of 0.001-9.999.

1. Press , then select **Device settings** and **Hood adjustment**.
 - Calibration of the hood can be set for supply air and exhaust air.

7.2.3. Zeroing Interval (Automatic Zeroing)

The pressure sensor carries out automatic zeroing at regular intervals. These intervals can be set via the automatic zeroing.

1. Press , then select **Device settings** and **Zeroing int**.
 - The zeroing interval can be set between 1-20 seconds.

7.3. Measuring

7.3.1. Pitot tube measurement

1. Connect the hoses to the testo 420 and to the Pitot tube.
2. Press  -> **Application** -> **Pitot tube** and there set the duct geometry, the Pitot tube factor and the temperature, and choose between actual and standard.
3. Select the required measurement program.
4. Carry out the measurement.



With a timed/multi-point measurement program, the required number of measuring points can be recorded using  . To end the measurement, press and hold down   for at least 3 s. At least one measuring point must be recorded before the measurement can be terminated.

5. Press  to save the measurement data. Unsaved measurement data is lost once you carry out the next measurement.
- The target folder and file name are displayed, confirm with  to save the measurement data under this name and in the selected folder.



The Pitot tube factor for Pitot tubes is generally the same and must be entered:

Pitot tubes from Testo, Pitot tube factor: 1.00

Straight Pitot tubes from Testo, Pitot tube factor: 0.67

Air flow velocity matrix 0699.7077, Pitot tube factor: 0.82

For Pitot tubes from other manufacturers, refer to the instruction manual for the Pitot tube factor or ask your supplier.

7.3.2. Differential pressure measurement

1. Connect the hoses to the testo 420 at + and -.
2. Press  -> **Application** -> **Pressure only**.
3. Carry out the measurement.
4. Press  to save the measurement data. Unsaved measurement data is lost once you carry out the next measurement.
- The target folder and file name are displayed, confirm with  to save the measurement data under this name and in the selected folder.

7.4. Saving



A maximum of 99 measurements can be saved in one folder.

- >  -> **Memory** -> 
- The folder overview is shown on the display. Create a new folder via **New Folder**.



A maximum 100 folders can be created.

Open folder

- > Using the arrow keys, navigate to the required folder and press .
- The selected folder is opened and the individual files are displayed.

Delete folder

1. Using the arrow keys, navigate to the required folder and press .
2. Select the menu item **Delete Folder** and confirm with .
 - The folder that you want to delete is shown on the display.
3. Confirm once again with  in order to delete the folder, or cancel by pressing **Esc**.

Set as Logging Folder

This setting establishes which folder is to be specified as the standard storage location for saving the measurements.



The folder which is set as the standard storage location is marked in black.

1. Using the arrow keys, navigate to the required folder and press .
2. Select the menu item **Set as Logging Folder** and confirm with .
 - The selected folder is set as the standard storage location.
 - The stored location can be changed during the saving process.

7.5. Transferring measurement data to the PC



No Bluetooth connection is possible while there is a connection to the PC. The existing Bluetooth connection is aborted.



The PC identifies the testo 420 as a removable medium. In the event of any formatting, please make sure that the FAT format is always selected under the file system.

1. Connect the testo 420 to your PC using the USB cable.
 - The testo 420 switches on automatically, a window appears on the PC, select **Open folder** here. The folders and files saved on your testo 420 are displayed. The files are available in the file format *.txt.

8 Maintaining the product

8.1. Cleaning the instrument



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

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

9 Tips and assistance

9.1. Questions and answers

Question	Possible causes/solution
For selected parameters, no values are shown on the instrument display (-----)	No temperature/humidity probe is connected, for instance.
Warning message Can not turn on! when selecting certain parameters in the Display menu.	• This parameter is not available for the application currently selected. • Four parameters are already displayed. Disable the display of one parameter to enable another one.
• [▶, ▢] on the instrument does not work. • Warning message Function not available in Bluetooth mode.	• Bluetooth connection is active, the instrument is connected to a Tablet or Smartphone via Bluetooth and the App is active. • Fully close the App or end the Bluetooth connection.

9.2. Accessories and spare parts

Description	Article no.
Connection hose, silicone, length 5 m, maximum load capacity 700 hPa (mbar)	0554 0440
Connection hose, silicone-free, for differential pressure measurement, length 5 m, maximum load capacity 700 hPa (mbar)	0554 0453
Pitot tube, length 500 mm, Ø 7 mm, stainless steel, for measuring flow velocity (Connection hose required)	0635 2045
Pitot tube, length 350 mm, Ø 7 mm, stainless steel, for measuring flow velocity (Connection hose required)	0635 2145
Pitot tube, 1,000 mm long, stainless steel, measures flow velocity (Connection hose required)	0635 2345
Connection hose	0554 0453

For a complete list of all accessories and spare parts, please refer to the product catalogues and brochures.

If you have any questions, please contact your dealer.

10 Authorizations

Please note the following country-specific information for the product authorization.

Product	Testo 420	
Mat.-No.	0560 0420	
Country	Comments	
Australia		E1561
	RCM mark	Supplier identification
New Zealand	Authorized	
Turkey	Authorized	
Canada	Product IC ID: 12231A-05600420 IC Warnings	
China	CMIIT ID: 2015DP4400	
USA	Product FCC ID: 2ACVD05600420 FCC Warnings	
Korea	 MSIP-CMM-Toi-420 KCC Warning	
South Africa	Radio Equipment Type approval numer: TA-2016/3100	

Europa + EFTA	  EU countries: Belgium (BE), Bulgaria (BG), Denmark (DK), Germany (DE), Estonia (EE), Finland (FI), France (FR), Greece (GR), Ireland (IE), Italy (IT), Latvia (LV), Lithuania (LT), Luxembourg (LU), Malta (MT), Netherlands (NL), Austria (AT), Poland (PL), Portugal (PT), Romania (RO), Sweden (SE), Slovakia (SK), Slovenia (SI), Spain (ES), Czech Republic (CZ), Hungary (HU), United Kingdom (GB), Republic of Cyprus (CY). EFTA countries: Iceland, Liechtenstein, Norway, Switzerland
Japan	Radio   201-150304 Japan Information
Brazil	 00599-16-04701  (01)07898921395441 <i>Este equipamento opera em caráter secundário, isto é, não tem direito à proteção contra interferência prejudicial, mesmo de estações do mesmo tipo e não pode causar interferência a sistemas operando em caráter primário.</i>
Taiwan	NCC: CCAB16LP2190T1

Bluetooth SIG List	Feature	Values
	Bluetooth®	Range 15 m (free field) (varies with the used mobile device)
	Bluetooth® type	LSD Science & Technology Co., Ltd L Series BLE Module (08 Mai 2013) based on TI CC254X chip
	Qualified Design ID	B016552
	Bluetooth® radio class	Class 3
	Bluetooth® company ID	10274

IC Warnings

This instrument complies with Part 15C of the FCC Rules and Industry Canada RSS-210 (revision 8). Commissioning is subject to the following two conditions:

- (1) This instrument must not cause any harmful interference and
- (2) this instrument must be able to cope with interference, even if this has undesirable effects on operation.

Cet appareil satisfait à la partie 15C des directives FCC et au standard Industrie Canada RSS-210 (révision 8). Sa mise en service est soumise aux deux conditions suivantes :

- (1) cet appareil ne doit causer aucune interférence dangereuse et
- (2) cet appareil doit supporter toute interférence, y compris des interférences qui provoquerait des opérations indésirables.

FCC Warnings

Information from the FCC (Federal Communications Commission)

For your own safety

Shielded cables should be used for a composite interface. This is to ensure continued protection against radio frequency interference.

FCC warning statement

This equipment has been tested and found to comply with the limits for a Class C digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Caution

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. Shielded interface cable must be used in order to comply with the emission limits.

Warning

This device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions:

- (1) this device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

KCC Warning

해당 무선 설비는 운용 중 전파혼신 가능성이 있음

Japan Information

当該機器には電波法に基づく、技術基準適合証明等を受けた特定無線設備を装着している。