



testo 420 · Flow Hood

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.

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.

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.

3.1. Use

3.2. 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.

3.2.1. Bluetooth module

Feature	Values
Bluetooth	Range >20 m (free field)
Bluetooth type	LSD Science & Technology Co., Ltd L Series BLE module (08 May 2013) based on TI CC254X chip
Qualified Design ID	B016552
Bluetooth radio class	Class 3
Bluetooth company	10274

3.2.2. General technical data

Feature	Values
Measurement parameters	Temperature: °C / °F Humidity: %RH / %rF / td°C / WB°C 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 / mmH ₂ O / inH ₂ O
Measuring cycle	1/sec
Interfaces	Probe interface Mini DIN Micro USB

Measuring ranges	<p>Temperature: -20 to +60 °C / -4 to 140 °F</p> <p>Humidity: 0 to 100% RH</p> <p>Flow velocity: 0 to 14 m/s / 0 to 2750 ft/min</p> <p>Volume flow: 40 to 4000 m³/h / 25 to 2300 cfm / 11 to 1100 l/s</p> <p>Pressure (absolute pressure): 700 to 1100 hPa</p> <p>Pressure (differential pressure): - 120 to +120 Pa</p>
Resolution	<p>Temperature: 0.1 °C / 0.1°F</p> <p>Humidity: 0.1% RH</p> <p>Flow velocity: 0.01 m/s</p> <p>Volume flow: 1 m³/h / 1 cfm</p> <p>Pressure (absolute pressure): 0.1 hPa / 0.1 mbar / 0.01 kPa</p> <p>Pressure (differential pressure): 0.001 Pa / 0.00001 hPa / 0.00001 mbar / 0.0001 mm H₂O / 0.000001 inH₂O</p>
Accuracy (nominal temperature 22°C/71.6°F)	<p>Temperature: ±0.5 °C (0 to +70 °C) / ±0.8 °C (-20 to 0 °C)</p> <p>Humidity: ±1.8% RH +3% of m.v. at +22 °C (5 to 80% RH) (longer high humidity application can result in a temporary sensor drift)</p> <p>Flow velocity: no accuracy specification since calculated variable</p> <p>Volume flow ¹: ±3% of m.v. +12 m³/h at +22 °C, 1013 hPa (85 to 3500 m³/h) ±3% +7 cfm (50 to 2,100 cfm)</p> <p>Error absolute pressure compensation: ±0.04% of m.v. / hPa deviating from 1013 hPa</p> <p>Pressure (absolute pressure): ± 3 hPa</p> <p>Pressure (differential pressure): ±2% of m.v. + 0.5 Pa (at 22°C, 1013 hPa)</p> <p>Error absolute pressure compensation: ±0.04% of m.v. / hPa deviating from 1013 hPa</p>

¹ All accuracy specifications apply under laboratory conditions or with necessary compensation (correction factor) with the standard hood 610x610 mm. Minimum outlet size of 360x360 mm

Temperature coefficient	<p>Humidity: $\pm 0.03\%$ RH / K (deviating from 22°C, in the range 0 to 60 °C)</p> <p>Volume flow: $\pm 0.02\%$ of m.v. / K (deviating from 22 °C, in the range 0 to 60 °C)</p> <p>Pressure (absolute pressure): $\pm 0.02\%$ of m.v. / K (deviating from 22 °C, in the range 0 to 60 °C)</p> <p>Pressure (differential pressure): $\pm 0.02\%$ of m.v. / K (deviating from 22 °C, in the range 0 to 60 °C)</p>
Response time t90	<p>Temperature: approx. 45 s</p> <p>Humidity: approx. 15 s</p> <p>Flow velocity: approx. 1 s</p> <p>Volume flow: approx. 1 s</p> <p>Pressure (absolute pressure): approx. 1 s</p> <p>Pressure (differential pressure): approx. 1 s</p>
Operating and ambient conditions	<p>Storage temperature: -20 to +60 °C / -4 to 140 °F</p> <p>Operating temperature: -5 to +50 °C/+23 - +122°F</p> <p>Humidity: 0 to 100% RH</p> <p>Pressure range: 800 to 1100 hPa</p>
Housing / measurement setup	<p>Measuring instrument housing material: ABS</p> <p>Body material: PP</p> <p>Standard hood material: Nylon</p> <p>Measuring instrument dimensions: 150x85x35 mm</p> <p>Body dimensions: 490x970x610 mm</p> <p>Dimensions of measurement setup with standard hood: 610x970x610 mm</p> <p>Weight of entire measurement setup approx. 2900 g</p>

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
Warranty	Duration: 2 years Warranty terms: see website www.testo.com/warranty

4 Product description

4.1. Overview

4.1.1. Measurement setup



- 1 Volume flow hood (standard hood 610x610 mm)
- 2 Actuator for manual measurement
- 3 Measuring instrument testo 420
- 4 Measurement base with differential pressure cross
- 5 Integrated flow straightener

4.1.2. 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)
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.

Icon	Meaning
Standard	Standard volume flow: The standard settings for temperature and barometric pressure (21 °C / 1013 hPa) 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: <ul style="list-style-type: none"> • 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
	Switch instrument on/off (press and hold down) Switch illumination on/off (press briefly)






5 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.

i 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
Pressure only	--	
Measuring Program	Single Measurement	--
	Continous Measurement ²	--

² Maximum of 15 minutes

1. Menu Level	2. Menu Level	3. Menu Level
	Continous/Punctual measurement (nur für Staurohr)	measuring duration ³
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	--	--

³ Maximum of 25 points and 1 minute per point.

6 Using the product

6.1. Switching Bluetooth® on and off

i 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.

i 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.

6.2. Settings for the measurement


6.2.1. 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.


6.2.2. 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.

6.2.3. 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.

6.3. Volume flow measurement setup

Standard hood
(610x610 mm, scope of delivery; 360x360, accessories)



1. Pull the lower end of the hood over the measurement base.
2. Attach the hood at two corners using the snap fasteners.
3. Tighten the closure.
4. Push the support rods through the hood, along the markings and into the funnel in the measurement base.
5. Push the support rods on the top of the hood into the brackets.
 - The hood is installed.

**Large hood
(1220x610 and 1220x305, accessories)**



1. Install the aluminium frame and stretch the fabric hood over the framework, so that the elastic band lies in the recess of the frame. Make sure that the elastic band fits correctly, especially at the corners.
2. Pull the lower end of the hood over the measurement base.
3. Attach the hood at two corners using the snap fasteners.
4. Tighten the closure.
5. Push the support rods through the hood, along the markings and into the funnel in the measurement base.
6. Push the support rods on the top of the hood into the brackets.
 - The hood is installed.





Attaching the measuring instrument






1. Push the testo 420 completely into the instrument holder, pay attention to the catch on the right-hand and left-hand side in the bracket.

6.4. Measuring




6.4.1. Volume flow measurement

- ✓ The volume flow hood is fitted.
- 1. Switch on the instrument.
- 2. In the instrument settings, set the application volume flow hood and also the required measurement program:
Single measurement or Continuous measurement.
- 3. Press ,  on the testo 420, or the trigger on the measurement base to hold or start and stop 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.

6.4.2. Pitot tube measurement

- 1. Remove the testo 420 from the measurement base.
- 2. Connect the hoses to the testo 420 and to the Pitot tube.
- 3. Press  -> **Application** -> **Pitot tube** and there set the duct geometry, the Pitot tube factor and the temperature, and choose between actual and standard.
- 4. Select the required measurement program.
- 5. Carry out the measurement.
- 6. 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.



6.4.3. Differential pressure measurement

1. Remove the testo 420 from the measurement base.
2. Connect the hoses to the testo 420 at + and -.
3. Press  -> **Application** -> **Pressure only**.
4. Carry out the measurement.
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.


6.5. 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**.

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.

i 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.

Total Volume Flow

i If data from single measurements is saved within a folder, the total volume flow of all measurements can be displayed using this function.

1. Using the arrow keys, navigate to the required folder and press .
2. Select the menu item **Total Volume Flow** and confirm with .
 - The single measurements and the total volume flow are displayed.
3. Press .
 - The result of the total volume flow is saved.

6.6. Transferring measurement data to the PC

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

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.

7 Maintaining the product

7.1. Cleaning the instrument

i 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.

8 Tips and assistance

8.1. 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.	<ul style="list-style-type: none"> • 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.
<ul style="list-style-type: none"> • [▶, ▢] on the instrument does not work. • Warning message Function not available in Bluetooth mode. 	<ul style="list-style-type: none"> • 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.

8.2. Accessories and spare parts

Description	Article no.
Flow hood 360x360 mm	0554 4200
Flow hood 305x1220 mm	0554 4201
Flow hood 610x1220 mm	0554 4202
Fabric cover for the hood 610x610	0400 4200
Aluminium frame for the hood 610x610	0440 4204
Tripod, extendable to 4 m	0554 4209
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, \varnothing 7 mm, stainless steel, for measuring flow velocity (Connection hose required)	0635 2045
Pitot tube, length 350 mm, \varnothing 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
Tension rod	0440 4201

For a complete list of all accessories and spare parts, please refer to the product catalogues and brochures or visit our website

If you have any questions, please contact your dealer

9 Authorizations

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

European Union, EFTA countries



EG-Konformitätserklärung

EC declaration of conformity

Für die nachfolgend bezeichneten Produkte:

We confirm that the following products:

testo 420

Best. Nr.: / Order No.: 0563 4200

wird bestätigt, daß sie den wesentlichen Schutzanforderungen entsprechen, die in der Richtlinie des Rates zur Angleichung der Rechtsvorschriften der Mitgliedstaaten über die elektromagnetische Verträglichkeit (2014/30/EU) festgelegt sind und bei bestimmungsmäßiger Verwendung den grundlegenden Anforderungen gemäß Artikel 3 der R&TTE-Richtlinie 1999/5/EG entspricht.
Zur Beurteilung der Erzeugnisse hinsichtlich elektromagnetischer Verträglichkeit wurden folgende Normen herangezogen:

corresponds with the main protection requirements which are fixed in the EEC "Council Directive 2014/30 EU on the approximation of the laws of the member states relating to electromagnetic compatibility" and comply with the essential requirements of Article 3 of the R&TTE 1999/5/EC Directive.
The declaration applies to all samples of the above mentioned product.
For assessment of the product following standards have been called upon:

Störaussendung/ Pertubing radiation:
Störfestigkeit: / Pertubing resistance:

DIN EN 61326-1:2013 class B
DIN EN 61326-1:2013 table 1
EN 300 328 V1.8.1: 2012
EN 301 489-1 V1.9.2: 2011
EN 301 489-17 V2.2.1: 2012
EN 60950-1:2006+A11:2009+A1:2010+A12:2011
EN 62479:2010

Sicherheits-Richtlinie:
Health Assessment:

Diese Erklärung wird für:

This declaration is given in responsibility for:

Testo AG
Postfach / P.O. Box 1140
79849 Lenzkirch / Germany
www.testo.com

abgegeben durch / by:

Dr. Rolf Merte
(Name / name)

Wolfgang Schwörer
(Name / name)

Head of Research & Development
(Stellung im Betrieb des Herstellers)
(Position in the company of the manufacturer)

Head of Firmware & Electronics
(Stellung im Betrieb des Herstellers)
(Position in the company of the manufacturer)

Lenzkirch, 20.07.2015
(Ort, Datum / place, date)

ppa
(Rechtsgültige Unterschrift)
(Legally valid signature)

i.V.
(Rechtsgültige Unterschrift)
(Legally valid signature)



Der Hersteller betreibt ein zertifiziertes Qualitätssicherungssystem nach DIN ISO 9001

The manufacturer operates a certified quality assurance system according to DIN ISO 9001

USA / Canada

IC ID: 12231A-05600420

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.

Japan



R 201-150304

Australia



E 1561

China

CMIIT ID: 2015DP4400

Korea



Certification No. MSIP-CMM-Toi-420

해당 무선 설비는 운용 중 전파혼신 가능성이 있음

Turkey

Authorized.

Hongkong

Authorized.