testo Smart Probe user manual

Chapter 1 Project overview

Testo Smart probe project involve development on APP and eight types of probe which APP can get measurement data from probe and also realize extend function on refrigerant/VAC/heating system.

Product name	Model No.
Testo 115i	0560 2115
Testo 405i	0560 1405
Testo 905i	0560 1905
Testo 605i	0560 2605
Testo 549i	0560 2549
Testo 410i	0560 1410
Testo 805i	0560 1805
Testo 510i	0560 1510

Chapter 2 Product description

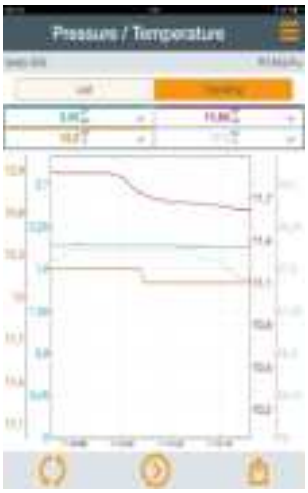
2.1 Smart Probe App

Main Features & Benefits

Control of the Smart Line instrument via smartphone / tablet
Check measured data wireless on smartphone / tablet
Do trendings as graph or table on smartphone / tablet
Send measured values in protocol as .pdf or excel file

Technical Product Data

Wireless connection	Bluetooth Low Energy
Range	20 m (unobstructed field), 5m for handhold probe
Compatibility	Android 4.3 or higher / iOS 7.0 or higher



2.1 Smart Probe testo 405i

Main Features & Benefits

Measures air velocity, volume flow and temperature
Easy set up for volume flow measurement via APP
Easy determination of timed or multi-point average via APP
Telescopic probe that can be extended up to 400 mm
Determine BTUh in combination with testo 605i
Check measured data wireless on mobile device
Send measured values in protocol as .pdf or excel file

Technical Product Data

Measuring range	0 to 20 m/s / 0 to 3940 fpm -20 to 60 °C / -4 to 140 °F
Accuracy	±(0.05 m/s + 2.5% o. mv.) (0 … +2 m/s) ±(0.15 m/s + 2.5% o. mv.) (2 … +15 m/s) ±(10 fpm + 2.5% o. mv.) (0 … +394 fpm) ±(29.5 fpm + 2.5% o. mv.) (394 … +3.940 fpm) ±0.5 °C / ±0.9°F
Resolution	0.01 m/s / 1 fpm 0.1 °C / 0.1 °F
Dimensions	200mm x 30 mm x 41 mm Extendable telescope up to 400 mm
Measuring cycle	1/sec
Battery life	15 h
Battery type	3x AAA
Operating temperature	-20 °C … + 50 °C / -4 to 122 °F
Storage temperature	-20°C to 60°C / -4 to 140 °F

2.2 Smart Probe testo 410i

Main Features & Benefits

Measures air velocity, volume flow and temperature
Easy set up for volume flow measurement via APP
Easy determination of timed or multi-point average via APP
Comparison of volume flows of different registers on one screen for balancing
Check measured data wireless on mobile device
Send measured values in protocol as .pdf or excel file

Technical Product Data

Measuring range	0,4 to 30 m/s / 78.74 to 5905.51 fpm -20 to 60 °C / -4 to 140 °F
Accuracy	±(0.2 m/s + 2% of mv) (0,4 to 20 m/s) '±(40 fpm + 2% of mv) (80 to 4.000 fpm) ±0.5 °C / ±0.9°F
Resolution	0.1 °C / 0.1 °F 0.1 m/s / 1 fpm
Dimensions	154mm x 43mm x 21mm 40mm vane diameter
Measuring cycle	1/sec
Battery life	140 h
Battery type	3x AAA
Operating temperature	-20 °C … + 50 °C / -4 to 122 °F
Storage temperature	-20°C to 60°C / -4 to 140 °F

2.3 Smart Probe testo 510i

Main Features & Benefits

Can be used to determine differential pressure, air velocity and volume flow
Easy set up for volume flow measurement via APP
Easy determination of timed or multi-point average via APP
Menu to perfom tightness / leak test on gas pipes
Check measured data wireless on mobile device
Do trendings as graph or table on mobile device
Send measured values in protocol as .pdf or excel file

Technical Product Data

Measuring range	0 … 150 hPa / 60 in wc
Accuracy	±0.05 hPa (0 ... 1.00 hPa) / ±0.02 in wc (0 ... 0.4 in wc) ±0.2 hPa + 1.5 % o. mv. (1.01 ... 150 hPa) ±0.08 in wc + 1.5 % o. mv. (0.41 ... 60 in wc)
Resolution	0.01 hPa / 0.01 inch wc
Dimensions	148mm x 36mm x 23mm
Measuring cycle	2/sec
Battery life	130 h
Battery type	3x AAA
Operating temperature	-20 °C … + 50 °C / -4 to 122 °F
Storage temperature	-20°C to 60°C / -4 to 140 °F

2.4 Smart Probe testo 549i

Main Features & Benefits

No / minimal refrigerant loss due to no hoses required
Fast and easy installation
Work on systems with pressure ports that have larger distance in between
Automatic calculations of vapor and saturation temperature on smartphone
Calculate all necessary refrigeration parameters in App in combination with smart temperature probes
Check measured data wireless on mobile device
Do trendings as graph or table on mobile device
Send measured values in protocol as .pdf or excel file

Technical Product Data

Measuring range	0 … 60 bar / 0 … 870 psi
Accuracy	0.5% full scale
Resolution	0.01 bar / 0.1 psi
Dimensions	125mm x 32 mm x 31mm 1x 7/16" UNF female connection
Measuring cycle	2/sec
Battery life	130 h
Battery type	3x AAA
Operating temperature	-20 °C … + 50 °C / -4 to 122 °F
Storage temperature	-20°C to 60°C / -4 to 140 °F
Refrigerants	CFC, HFC, HCFC, N, H20, CO2 as pressure media

2.5 Smart Probe testo 605i

Main Features & Benefits

Automatic calculation of wet bulb and dew point in App
Determine BTU/H in combination with testo 405i
Check measured data wireless on mobile device
Do trendings as graph or table on mobile device
Send measured values in protocol as .pdf or excel file

Technical Product Data

Measuring range	-20 to 60 °C, -4 to 140°F, 0 to 100 %rH
Accuracy	±1.8 %rH + 3% of rdg. at +25 °C (5 to 80 %rH) ±0.03 %rH / K (0 to 60 °C) ±0.8 °C (-20 … 0 °C) / ±1.44 °F (-4 … 32°F) ±0.5 °C (0 … +60 °C) / ±0.9 °F (32 … 140°F)
Resolution	0.1 °F / 0.1 °C 0.1 %rH
Dimensions	243mm x 30mm x 24mm 100mm probe tip
Measuring cycle	1/sec
Battery life	280 h
Battery type	3x AAA
Operating temperature	-20 °C … + 50 °C / -4 to 122 °F
Storage temperature	-20°C to 60°C / -4 to 140 °F

2.6 Smart Probe testo 115i

Main Features & Benefits

Work on systems with measuring points for temperature that have big distance in between
Calculate all necessary refrigeration parameters in App in combination with smart temperature probes
Check measured data wireless on mobile device
Do trendings as graph or table on mobile device
Send measured values in protocol as .pdf or excel file

Technical Product Data

Measuring range	-50 to 150°C / -58 to 302 °F
Accuracy	± 1.3 °C (-20…85 °C) ± 2.34 °F (--4…185 °F)
Resolution	0.1 °C / 0.1 °F
Dimensions	183mm x 90 mm x 30mm max. 35mm pipe diameter
Measuring cycle	1/sec
Battery life	240 h
Battery type	3x AAA
Operating temperature	-20 °C … + 50 °C / -4 to 122 °F
Storage temperature	-20°C to 60°C / -4 to 140 °F

2.7 Smart Probe testo 905i

Main Features & Benefits

Check measured data wireless on mobile device
Do trendings as graph or table on mobile device
Send measured values in protocol as .pdf or excel file

Technical Product Data

Measuring range	-50 to 150°C / -58 to 302 °F
Accuracy	±1 °C / ±.1.8 °F
Resolution	0.1 °C / 0.1 °F
Dimensions	222mm x 30mm x 24mm 100mm probe tip / Diameter: 4mm
Measuring cycle	1/sec
Battery life	190 h
Battery type	3x AAA
Operating temperature	-20 °C … + 50 °C / -4 to 122 °F
Storage temperature	-20°C to 60°C / -4 to 140 °F

2.8 Smart Probe testo 805i

Main Features & Benefits

Diffractive optic as laser marker (laser circle)
Picture with temperature marking can be generated in App for documentation
Check measured data wireless on mobile device
Send measured values in protocol as .pdf or excel file

Technical Product Data

Measuring range	-30°C to 250 °C / -22 to 482 °F
Accuracy	±1.5 °C or ±1.5 % of m.v. (rest) ±2.0 °C (-20.0 to -0.1 °C) ±2.5 °C (-30.0 to -20.1 °C) ±2.7 °F or ±1.5 % of m.v. (rest) ±3.6 °F (--4 to 32 °F) ±4.5 °F (-22 to --4 °F)
Resolution	0.1 °C / 0.1 °F
Optics	10:1
Laser Sighting	Diffractive optics (laser circle)
Measuring cycle	2/sec
Dimensions	140mm x 36mm x 25mm
Battery life	25 h
Battery type	3x AAA
Operating temperature	-10 °C … + 50 °C / 14 to 122 °F
Storage temperature	-20°C to 60°C / -4 to 140 °F

Chapter 3 Safety

3.1 Safety with testo 510i and testo 605i

⚠ WARNING

Magnetic field!
May be harmful to those with pacemakers.

- Keep a minimum distance of 10 cm between pacemaker and instrument.

3.2 Safety with testo 549i

⚠ WARNING

Risk of injury caused by pressurized, hot, cold or toxic refrigerants/media!
- Only to be used by qualified staff.
- Wear protective goggles and safety gloves.
- Before applying pressure to the measuring instrument: always fix the instrument tightly onto the pressure connection.
- Comply with the permissible measuring range (0 to 60 bar). Pay particular attention to this in systems with R744 refrigerant, since these are frequently operated with higher pressures!
- Use with A2L refrigerants

Testo measuring instruments (as of July 2020) can be used in compliance with the prescribed laws, standards, directives and safety regulations for refrigeration systems and refrigerants as well as regulations of the manufacturers of refrigerants of safety group A2L as per ISO 817.
Regional standardization and interpretation must always be observed.
For example, DIN EN 378-Part 1-4 applies to the scope of the EN standards.
During maintenance work, the employer must ensure that a hazardous explosive atmosphere is prevented (see also
TRBS1112, TRBS2152 VDMA 24020-3).
A hazardous and potentially explosive atmosphere must be anticipated during maintenance and repair work on refrigeration systems with flammable refrigerants (e.g. those of category A2L and A3).
Maintenance, repairs, removal of refrigerants and commissioning of systems may only be carried out by qualified personnel.

3.3 Safety with testo 805i

⚠ CAUTION	
	Laser radiation! Class 2 laser. - Do not look into the laser beam!

Chapter 4 Operation principle

4.1 App operation principle

App which install in smart phone shall be received and display measurement value from Smart probes when it's opening via Bluetooth. Customer also can configure units or other parameters by App.

4.2 testo 405i operation principle

testo 405i has a NTC sensor, which shall change resistant value related ambient temperature. Circuit is response for detect NTC's resistant and calculate ambient temperature through NTC's feature by MCU ..

Then MCU control the Bluetooth module to send data to smart phone via Bluetooth and also received parameter changed and action protocol from smart phone.

Key is use for start ,stop and hold value.

Led is use for indicate status of device.
Red : warning, such as low battery level
Yellow: finding App in smart phone via Bluetooth
Green: communication success.

4.3 testo 410i operation principle

testo 410i has a vane, which can recognize flow velocity by vane's speed of revolution. Speed's analog signal from vane can transform to digital signal for MCU deal.

Then MCU control the Bluetooth module to send data to smart phone via Bluetooth and also received parameter changed and action protocol from smart phone.

Key is use for start ,stop and hold value.

Led is use for indicate status of device.
Red : warning, such as low battery level
Yellow: finding App in smart phone via Bluetooth
Green: communication success.

4.4 testo 510i operation principle

testo 510i has a differential pressure sensor, which can recognize differential pressure signal from gas pipes. Sensor can transform Pressure signal to electronic signal automatically, and transform analog signal from sensor to digital signal for MCU by A/D.

Then MCU control the Bluetooth module to send data to smart phone via Bluetooth and also received parameter changed and action protocol from smart phone.

Key is use for start ,stop and hold value.

Led is use for indicate status of device.
Red : warning, such as low battery level
Yellow: finding App in smart phone via Bluetooth
Green: communication success.

4.5 testo 549i operation principle

testo 549i has a high pressure sensor, which can recognize high pressure from gas pipe. Sensor can transform Pressure signal to electronic signal automatically, and transform analog signal from sensor to digital signal for MCU by A/D.

Then MCU control the Bluetooth module to send data to smart phone via Bluetooth and also received parameter changed and action protocol from smart phone.

Key is use for start ,stop and hold value.

Led is use for indicate status of device.
Red : warning, such as low battery level
Yellow: finding App in smart phone via Bluetooth
Green: communication success.

4.6 testo 605i operation principle

testo 605i has a temperature senor and humidity sensor, which can recognize ambient temperature and humidity in air. Sensors can transform temperature and humidity signals to electronic signal automatically, and transform analog signal from sensor to digital signal for MCU by A/D.

Then MCU control the Bluetooth module to send data to smart phone via Bluetooth and also received parameter changed and action protocol from smart phone.

Key is use for start ,stop and hold value.

Led is use for indicate status of device.
Red : warning, such as low battery level
Yellow: finding App in smart phone via Bluetooth
Green: communication success.

4.7 testo 115i operation principle

testo 605i has a NTC sensor in clamp, which shall change resistant value related surface temperature. Circuit is response for detect NTC's resistant and calculate surface temperature of pipe, which clamp catch, through NTC's feature by MCU.

Then MCU control the Bluetooth module to send data to smart phone via Bluetooth and also received parameter changed and action protocol from smart phone.

Key is use for start ,stop and hold value.

Led is use for indicate status of device.
Red : warning, such as low battery level
Yellow: finding App in smart phone via Bluetooth
Green: communication success.

4.8 testo 905i operation principle

testo 905i has a TC sensor, which shall change electronic capability value related ambient temperature. Circuit is response for detect TC's capability and calculate ambient temperature in air through TC's feature by MCU.

Then MCU control the Bluetooth module to send data to smart phone via Bluetooth and also received parameter changed and action protocol from smart phone.

Key is use for start ,stop and hold value.

Led is use for indicate status of device.
Red : warning, such as low battery level
Yellow: finding App in smart phone via Bluetooth
Green: communication success.

4.9 testo 805i operation principle

testo 805i has a IR sensor, which can recognize surface temperature by IR reflect. Analog signal from sensor shall be transformed to digital signal by ADC for MCU.

Laser shall be turn on automatically when measuring.

Then MCU control the Bluetooth module to send data to smart phone via Bluetooth and also received parameter changed and action protocol from smart phone.

Key is use for start ,stop and hold value.

Led is use for indicate status of device.
Red : warning, such as low battery level
Yellow: finding App in smart phone via Bluetooth
Green: communication success.

Testo SE & Co. KGaA
Celsiusstr. 2, 79822 Titisee-Neustadt, Germany
Tel.: +49 7653 681-0
E-Mail: info@testo.de
www.testo.com

Approval and Certification

Product 产品名称	testo 805i
Mat.-No. 型号	0560 1805
Date 日期	06.27.2022

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.

Country	Comments	
Australia		E 1561
Canada	testo 805i: IC: 6127B-05601805 see IC Warnings	
Europa + EFTA (Länderliste einfügen)	CE The EU Declaration of Conformity can be found on the testo homepage www.testo.com under the product specific downloads. **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	
United Kingdom (UK)	UKCA The UK Declaration of Conformity can be found on the testo homepage www.testo.com under the product specific downloads.	
USA	testo 805i: WAF-05601805 See FCC Warnings	
Korea	see KCC Warning testo 805i: R-R-te2-05601805	

Japan	Bluetooth module: R 201-200983 See Japan information
Bluetooth® Information 蓝牙信息	Feature / 特征与参数 — Values / 数值 Bluetooth® range 范围 — typical 80 m 80 米无障碍场地 radio type 型号 — Bluetooth® Low Energy (BLE) 4.2 Bluetooth® company 制造商 — Lierda Science & Technology Group Co., Ltd RF Band 射频频段 — 2402 – 2480MHz power output [E.I.R.P] 输出功率 — 8.29dBm
Bluetooth® SIG Listing	Feature — Values Declaration ID — D043363 member company — Testo SE & Co. KGaA

IC Warnings

CAN ICES-003(B)/NMB-003(B):
This Class B digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

RSS-Gen & RSS-247 statement:
This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s).
Operation is subject to the following two conditions:
(1) this device may not cause interference, and
(2) this device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:
(1) L'appareil ne doit pas produire de brouillage
(2) l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Caution: Radio Frequency Radiation Exposure
The product comply with the Canada portable RF exposure limit set forth for an uncontrolled environment and are safe for intended operation as described in this manual. The further RF exposure reduction can be achieved if the product can be kept as far as possible from the user body or set the device to lower output power if such fuction is available.

Co-Location:
This device must not be co-located or operated in conjunction with any other antenna or transmitter.

Attention : exposition au rayonnement de radiofréquences
Le produit est conforme aux limites d'exposition pour les appareils portables RF pour les Etats-Unis et le Canada établies pour un environnement non contrôlé.

Le produit est sûr pour un fonctionnement tel que décrit dans ce manuel. La réduction aux expositions RF peut être augmentée si l'appareil peut être conservé aussi loin que possible du corps de l'utilisateur ou que le dispositif est réglé sur la puissance de sortie la plus faible si une telle fonction est disponible.

Co-location
Ce dispositif ne doit pas être utilisé à proximité d'une autre antenne ou d'un autre émetteur.

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 B 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.

Caution: Radio Frequency Radiation Exposure
The device has been evaluated to meet general RF exposure requirement, The device can be used in portable exposure condition without restriction. Federal Communication Commission (FCC) Radiation Exposure Statement Power is so low that no RF exposure calculation is needed.

Co-Location:
This device must not be co-located or operated in conjunction with any other antenna or transmitter.

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。

KCC Warning
해당 무선 설비는 운용 중 전파혼신 가능성이 있음