English

Instruction and operation manual

S600

Portable compressed air purity analyzer

Dear Customer,

Thank you for choosing our product.

Before starting up the device, please read the manual in full and observe the operating instructions stated. The manufacturer cannot be held liable for any damage which occurs as a result of non-observance or non-compliance with this manual.

Should the device be tampered with in any manner other than a procedure which is described and specified in the manual, the warranty is cancelled and the manufacturer is exempt from liability.

The device is designed exclusively for the described application.

SUTO offers no guarantee for the suitability for any other purpose. SUTO is also not liable for consequential damage resulting from the delivery, capability or use of this device.

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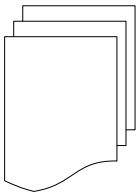
1. Safety instructions



Please check if this instruction manual accords to the product type.

Please observe all notes and instructions indicated in this manual. It contains essential information which must be observed before and during installation, operation and maintenance. Therefore this instruction manual must be read carefully by the technician as well as by the responsible user / qualified personnel.

This instruction manual must be available at the operation site of the instrument at any time. In case of any obscurities or questions, regarding this manual or the product, please contact the manufacturer or your customer support.

WARNING!

Compressed air!

Any contact with quickly escaping air or bursting parts of the compressed air system can lead to serious injuries or even death!

- Do not exceed the maximum permitted pressure range (see sensors label and/or the specifications written in this manual).
- Only use pressure tight installation material.
- Avoid that persons get hit by escaping air or bursting parts of the instrument.
- The system must be pressure less during maintenance work.

- **WARNING!**
- **Voltage used for supply!**
- **Any contact with energized parts of the product, may lead to a electrical shock which can lead to serious injuries or even death!**

- Consider all regulations for electrical installations.
- The system must be disconnected from any power supply during maintenance work.

ATTENTION!

Permitted operating parameters!

Observe the permitted operating parameters, any operation exceeding this parameters can lead to malfunctions and may lead to damage on the instrument or the system.

- Do not exceed the permitted operating parameters as specified in the data sheet, this manual or written on the instrument.
- Make sure the product is operated in its permitted limitations.
- Do not exceed or undercut the permitted storage and operation temperature, pressure and humidity.

The product should be maintained and calibrated frequently, at least annually. For more information, please contact the customer support.

General safety instructions

- It is not allowed to use the product in explosive areas.
- Please observe the national regulations before/during installation and operation.

Remarks

- It is not allowed to disassemble the product.
- Always check the compressed air connectors in terms of stability and tightness before any operation.

ATTENTION!

Measurement values can be affected by malfunction!

The product must be installed properly and frequently maintained, otherwise it may lead to wrong measurement values, which can lead to wrong results.

- The instrument must be operated within or better than compressed air quality Class 4.5.4 according to the ISO8573-1. If the air quality cannot reach the specified Class, the device may show wrong measurement values or even may get damaged.
- Do not exceed the maximum operation temperature or pressure.
- Avoid condensation inside the instrument caused by the supplied air or gas because it harms the instrument and affects the

accuracy

- It is recommended that before any operation you examine the instrument in terms of the measurement accuracy and deviations. To do this, you may use high efficiency filters for oil vapor and particle, and the instrument should show low values close to zero. Additionally, it is recommended you examine the dew point measurement to ensure it is working correctly. To do this, you may use a dry gas with a defined dew point value which should be reached within several minutes. Or you may use any reference meter. Only after doing these examinations, you can rely on the measurement results after the instrument have been used for other measurement cycles.
- Always perform a visual inspection in prior to every measurement before connecting compressed air. If any loose objects are found, do not connect the compressed air because it may lead to a damage or injuries.

Storage and transportation

- Make sure that the transportation temperature is between -10 ... 70°C.
- For transportation it is recommended to use the packaging which comes with the sensor.
- Please make sure that the storage temperature of the sensor is between -10 ... 50°C.
- Avoid direct UV and solar radiation during storage.
- For the storage the humidity must be < 90%, no condensation.
- During transportation the instrument should always be handled with care, otherwise the internal sensors may get damaged and the measurement results may differ.

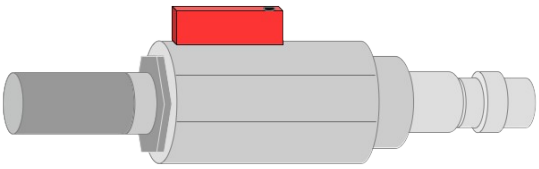
ATTENTION!

Equipment may get damaged!

Please make sure, that your measuring point is free of excessive contamination/dirt. This should maintained before every measurement.

- Observe the measuring point always before measurement if it is free of contamination like water drops, oil drops or other rough contaminations.

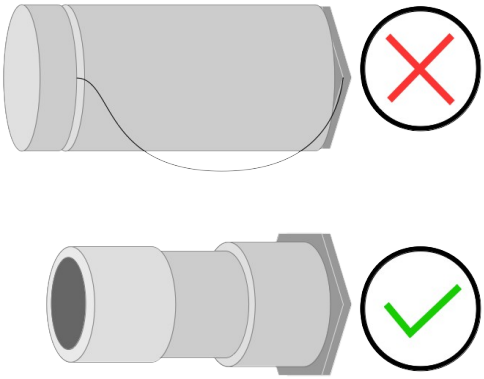
- Should water hit the inner electronics, the senors could be seriously damaged.
- Any rough contamination of particles, water, oil or other impurities may damage the instrument or affect the accuracy.
- Check your measurement point with the enclosed test kit, by purging air in prior to the use of the instrument through the test kit. A clean tissue may help to identify oil, water or any other lubricants in the air.



ATTENTION!

Overpressure!

Remove always all protection caps before connecting the compressed air to the inlet.



2. Application

The portable compressed air purity analyzer S600 can measure, record and verify the quality parameters including particle quantity, dew point, temperature, pressure, oil vapor content in a compressed air system.

The S600 is mainly used in industrial environments, and is not developed to be used in explosive areas.

3. Features

- High-resolution 5” color touchscreen display and interface.
- Software guided measurement.
- USB port for transferring the data to a USB-OTG memory drive.
- Ethernet (Modbus / TCP and SUTO-Bus) interface for transferring the data to a SCADA systems.
- Data logger with the capacity of 100 million values.
- Integrated report generator for compressed air audits, used to generate PDF files and copy them to a USB memory drive.
- All-in-one portable hand carried measurement device.
- Multi-dew-point measurement system for a wide range of measurement and a very high accuracy.
- Latest PID sensor technology for oil vapor measurement.
- Laser particle counter for particle detection.
- All-in-One device measuring five parameters in a single device: Particle counter, dew point/humidity, oil vapor, temperature and pressure.
- Isokinetic sampling device for particle measurement according to ISO8573-4 as an option.

4. Technical data

4.1 General data

<table>
<tr><td colspan="2">CE</td></tr>
<tr><td>Data logger</td><td>Internal, 100-million values</td></tr>
<tr><td>Parameter</td><td>
<table>
<tr><th>Measuring parameter</th><th>Range</th><th>Reference</th></tr>
<tr><td>Particle</td><td>0.1 < d <= 0.5 µm
0.5 < d <= 1.0 µm
1.0 < d <= 5.0 µm</td><td>Annex 1 /
DIN 14644
(with isokinetic sampling device DIN 8573)</td></tr>
<tr><td>Dew point</td><td>-100 ... +20°C Td</td><td>DIN 8573</td></tr>
<tr><td>Oil vapor</td><td>0.003 ... 10.000 mg/m^3</td><td>ZLG/
AIM 07120604</td></tr>
<tr><td>Pressure</td><td>0.3 ... 1.5 MPa
43.5 ... 217.6 psig</td><td>DIN 1301</td></tr>
<tr><td>Temperature</td><td>0 ... +50 °C</td><td>DIN 60751</td></tr>
</table>
</td></tr>
<tr><td>Reference settings</td><td>ISO 1217, 20°C 1000 mbar</td></tr>
<tr><td>Measurement principle</td><td>
<table>
<tr><th>Parameter</th><th>Principle</th></tr>
<tr><td>Particle quantity</td><td>Laser optical detection</td></tr>
<tr><td>Dew point</td><td>Ceramic humidity sensor, oscillating crystal</td></tr>
<tr><td>Oil vapor</td><td>PID</td></tr>
<tr><td>Volume flow</td><td>Thermal mass flow (Anemometer)</td></tr>
</table>
</td></tr>
<tr><td>Medium</td><td>Compressed air, non corrosive components</td></tr>
<tr><td>Humidity of the medium</td><td>< 40%, non condensation</td></tr>
<tr><td>Temp. of the medium</td><td>0 ... +50°C</td></tr>
</table>

Operation pressure	0.3 ... 1.5 MPa 43.5 ... 217.6 psig
Oil vapor sensor durability	6000 operating hours (UV Lamp lifetime)
Housing material	PC + ABS, Aluminum
Protection class	IP 65 (cover closed)
Dimension	Please observe the drawings on the next page
Display	5” color graphic display, 800 x 4800 Pixels with touchscreen interface
Weight	6.80 kg

4.2 Electrical data

Power supply	Mains supply adapter (AC/DC) Input: 100 ... 240 VAC, 50/60 Hz, 1.4 A Output: 24 VDC, 2.5 A, 60 W max.

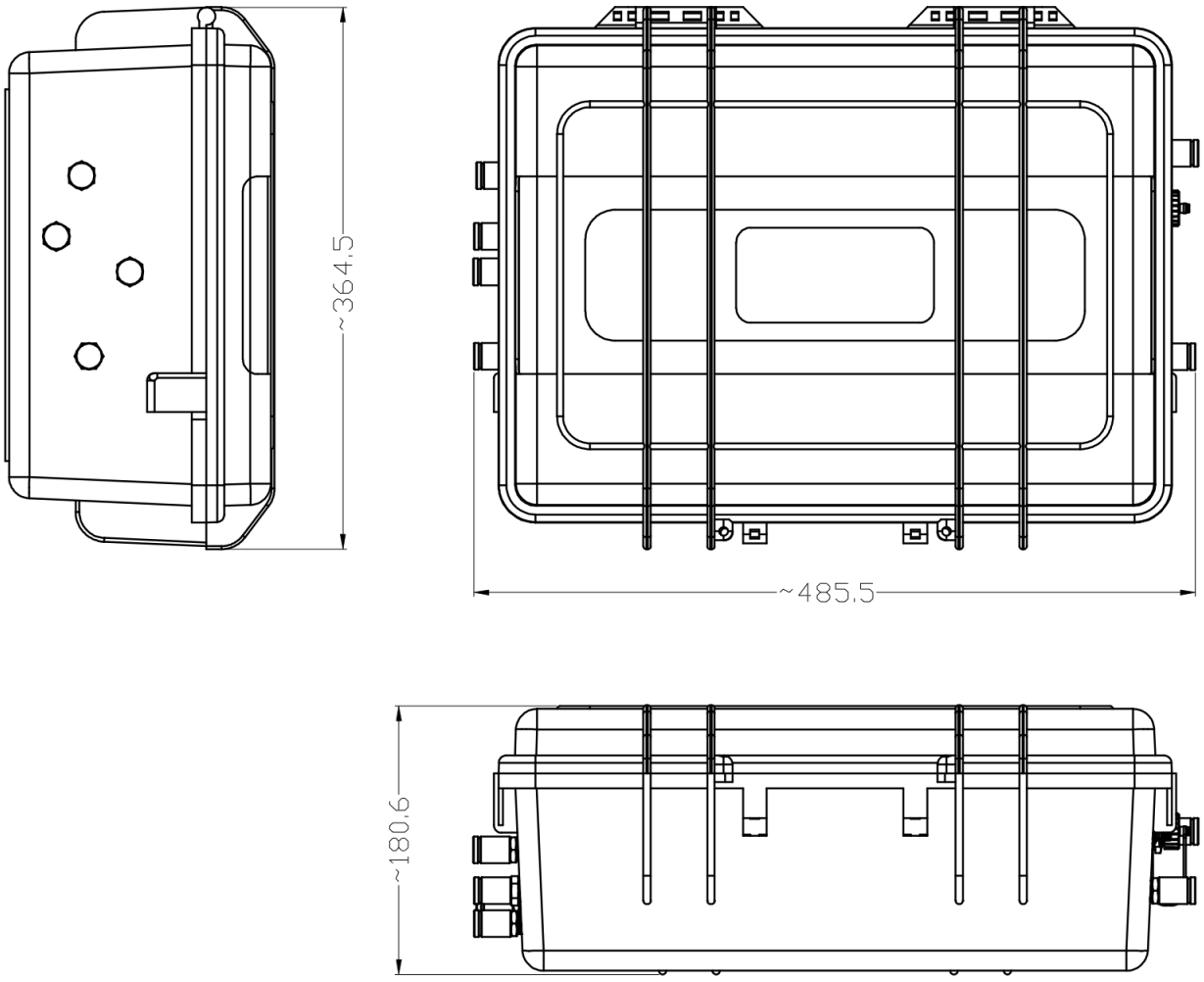
4.3 Accuracy

Accuracy

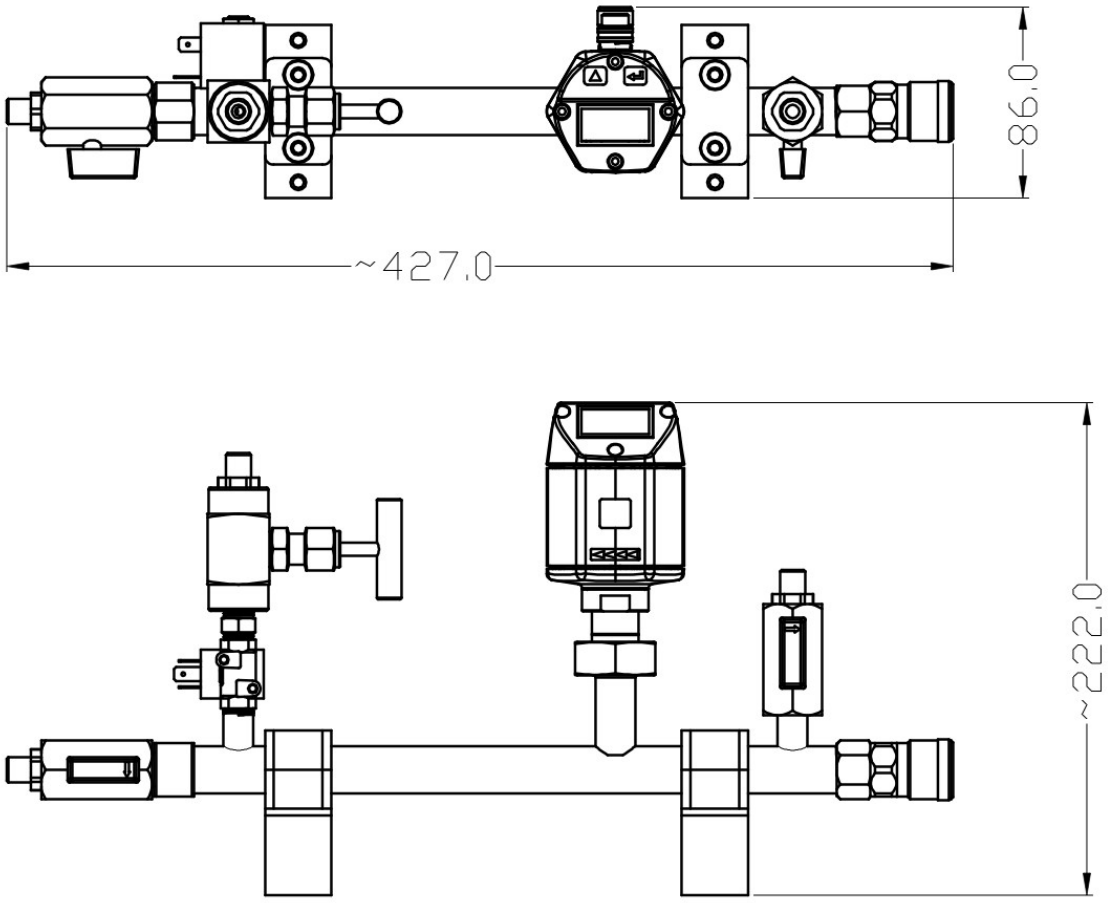
Parameter	Accuracy
Particle quantity per JIS	50% @ 0.1 < d ≤ 0.15 µm 100% @ 0.15 µm < d
Dew point	± 2°C Td
Oil vapor	5% of value ± 0.003 mg/m^3
Volume flow	± (2% of value + 0.3% of range) (isokinetic sampling device only)
Temperature	±0.1 K
Pressure	±0.08 bar / ±1.1603 psi

5. Dimensions

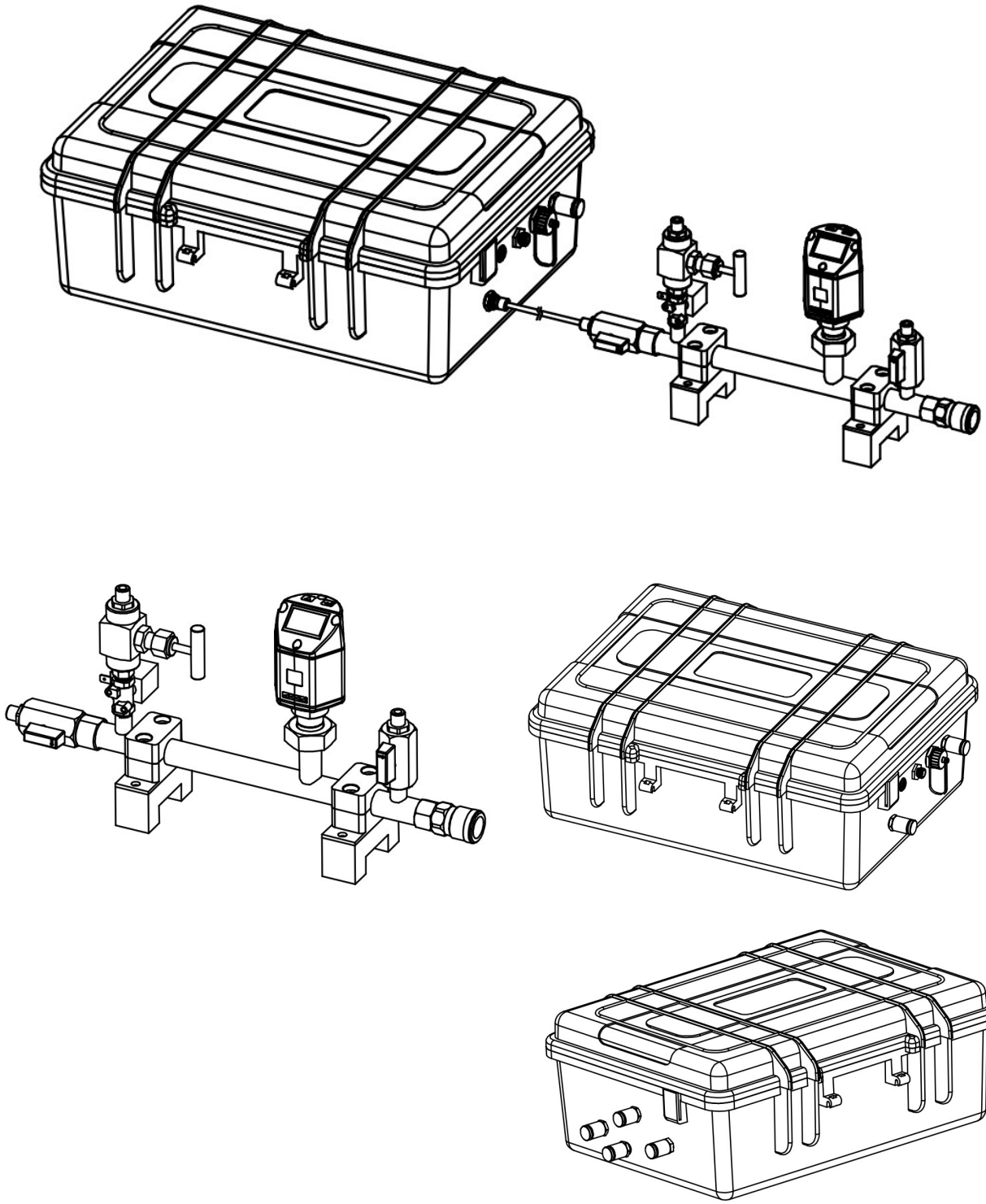
Dimensions of S600 in mm (cover closed):



Dimensions of isokinetic sampling device (optional) in mm:



3D view of the S600 and the isokinetic sampling device:



6. Installation on site

Please make sure that all components listed below are included in your package.

Qty.	Description	Item No.
1	S600 portable compressed air analyzer in a hand carry case with handle and shoulder belt	P560 0600
1	USB OTG memory stick	A554 0087
1	Operation and instruction manual	No P/N
1	Purge filter for pre-measurement (test kit)	A554 0604
5	6mm Teflon hose adapter, stainless steal	C219 0197
1	Power supply, 230 VAC / 24 VDC	A554 0086
1	2 m Teflon hose, 6 OD x 4 ID mm, free adjustable	C193 0002
1	1.5 m Teflon hose with quick connector	A554 0003
1	Certificate of calibration	No P/N

The following items are included only if you have ordered the isokinetic sampling device (A554 0600)

1	Isokinetic sampling device, including a flow sensor	A554 0600
1	M12 connection cable for isokinetic sampling device	A553 0134
1	Certificate of calibration	No P/N

If you need replacement materials for items in the preceding list or if you need further useful accessories, please contact the manufacturer or your local distributor.

6.1 Installation requirements

The device needs to be set up next to the measuring point. Please make sure that the device is put on a flat surface. In case you are using the additional isokinetic sampling devices, you must make sure that it is also standing on a flat surface next to the S600.

The tubes should be not bended heavily and should be installed with a big curve radius to avoid turbulence in the air flow.

The isokinetic sampling device must be set up next to the S600 to get a straight and short connection. Please observe the following chapter, connecting the isokinetic sampling device to the S600.

Please connect the S600 to the power during the measurement, and make sure that the device is not turned off or plugged off during the measurement because data will then be lost and not saved.

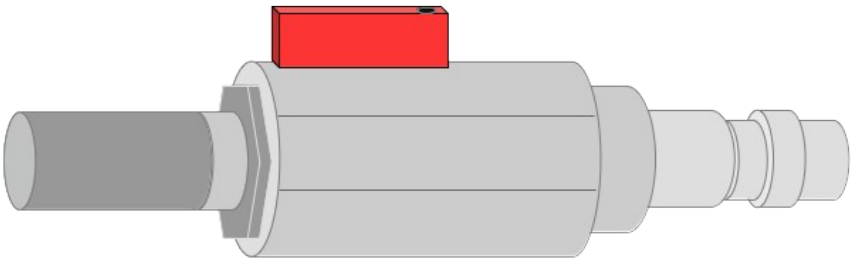
ATTENTION!

If the device is not installed properly it may lead to wrong measurement results.

- The device is designed to be operated indoors only. To use the device outdoors, please protect the device from direct sunlight and rain.

ATTENTION!

Before you connect the device to your point of measurement, make sure that there is no rough contamination like water/oil drops or heavy dust. This may damage the sensor units. For this please use the purge filter test kit.

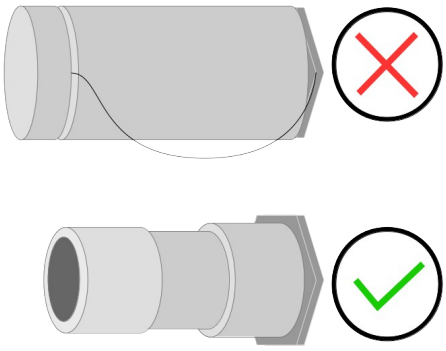


Before you start the measurement, check your point of measurement:

1. Connect the purge filter test kit onto your measuring point first. Open the purge valve on the test kit and purge air for a short period.
2. Check the filter in the test kit to see if it shows high contamination of water, oil or dust.
3. If the filter is contaminated severely, stop using the S600 for measurement because this may lead to serious damage to the device. In case you are not sure, please contact the manufacturer.

ATTENTION!

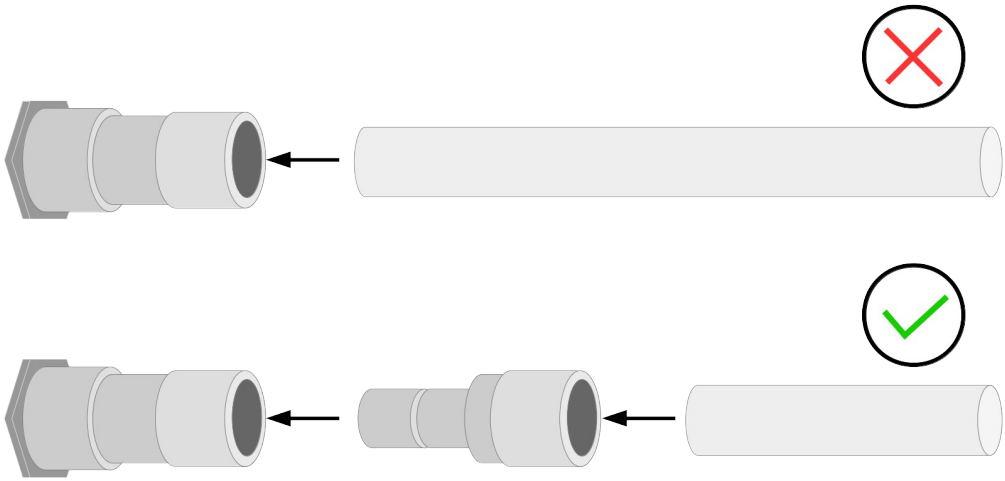
Before connecting the compressed air, make sure that all protection caps are opened/removed!



Remove the protection caps from all parts of both sides of the instrument. If not removed, the device may get damaged and the risk of bursting parts under high pressure can even lead to personal injuries. All exhaust outlets will pass air during the measurement, if not, please contact the manufacturer.

ATTENTION!

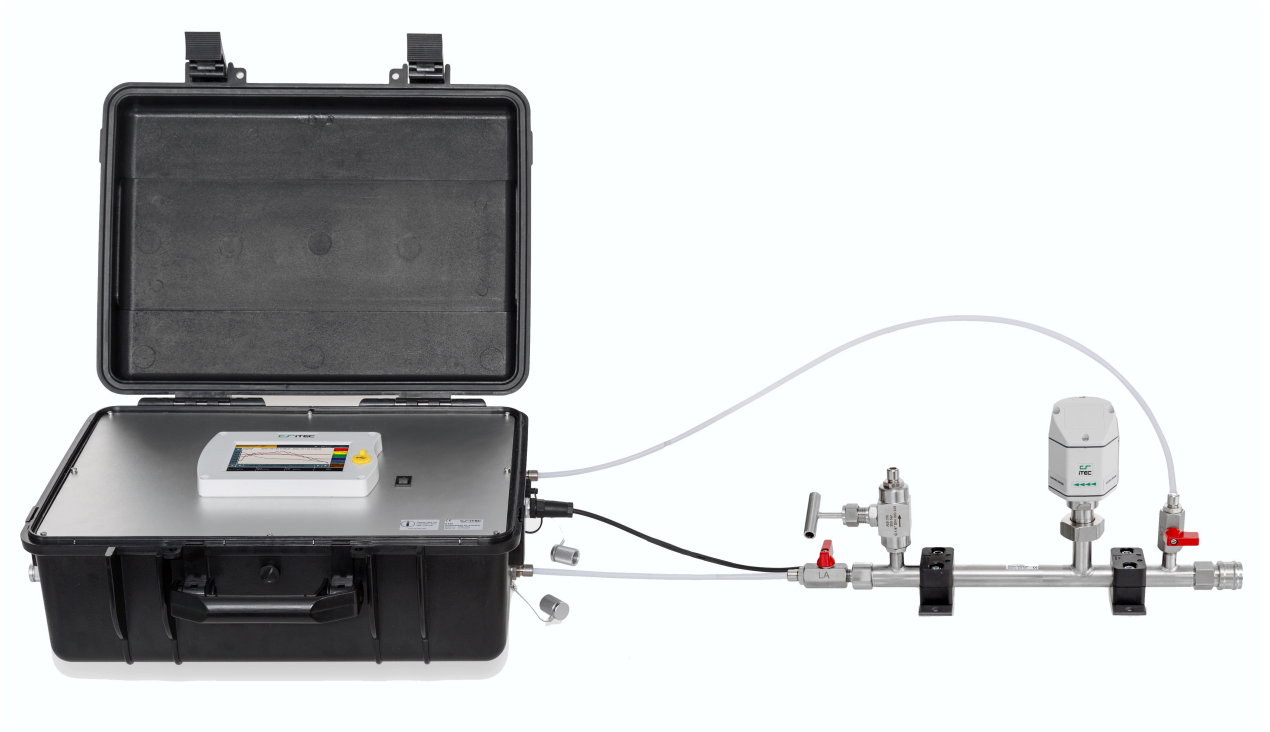
Always use the 6 mm Teflon hose adapter to connect the teflon hoses to the S600 and to the isokinetic sampling device! You may damage the device if not used.



Directly plugging and pulling the teflon hose more than once may lead to particle contamination, which can affect the measurement. To avoid this problem, please use the included adapter plugs and keep them on your tubes.

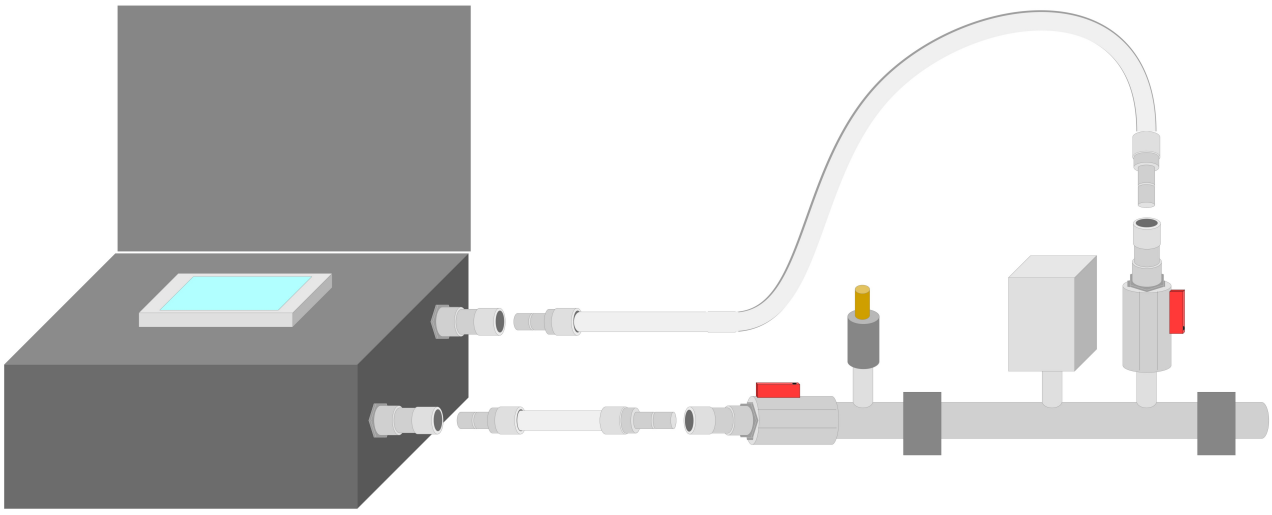
6.2 Connection with the optional isokinetic sampling device

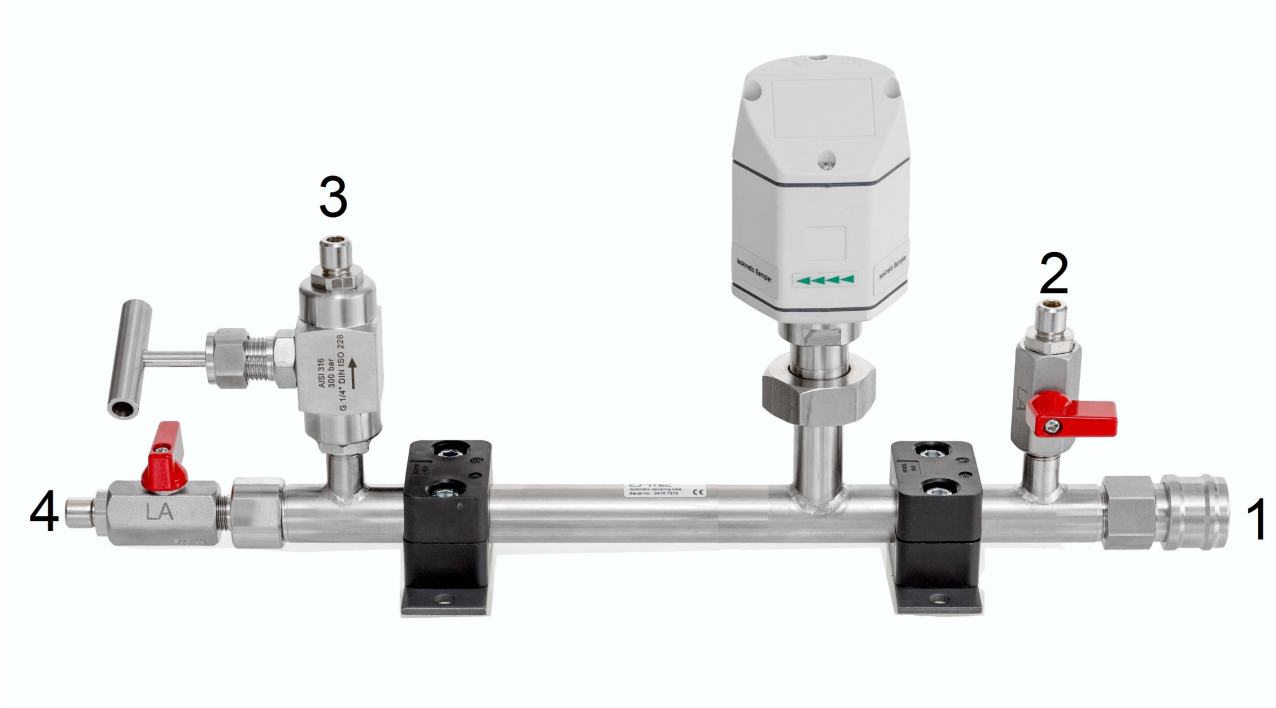
The picture above shows the S600 setup with the isokinetic sampling device connected.



Please connect the isokinetic sampling device using the teflon hose delivered with the device. On the next page you can find the detailed description of the sampling device. Also you can find which outlets of the sampling device need to be connected to which input at the S600.

The following diagrams help you better understand the setup connection.





1. Before connecting the S600 and/ or the isokinetic sampler to your compressed air, make sure ball valve **2** and **4 are closed**.
2. Close **the needle valve 3** fully.
3. The connection to your compressed air system is achieved through the correct fitting (quick connector, teflon hose, etc.). **Connect your compressed air** system to the **inlet 1** of the isokinetic sampling device using the correct fitting.
4. Connect the outlet valve **2** to the inlet for **dew point and oil vapor** measurement at the S600 using a teflon hose with the supplied hose adapters.
5. Connect the isokinetic outlet **4** with the inlet for the **particle counting** at the S600 using the supplied 6 mm tube and the hose adapters.
6. Now open outlet valve **2** and **4** to pressurize the instrument. Always open the valves slowly and carefully. In case that you hear or see any damage on the device, please close the valves and disconnect the compressed air supply.

6.3 Connection without the isokinetic sampling device

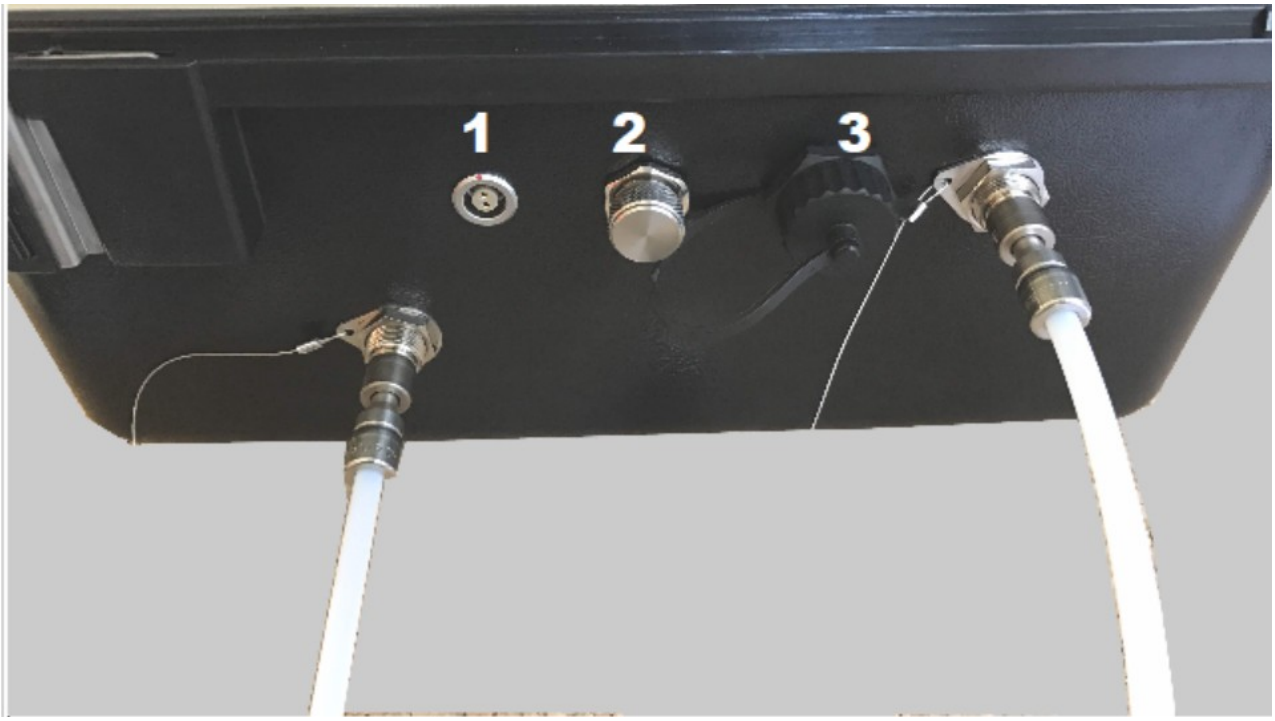
Connect your compressed air system using two teflon hoses to the corresponding inlets at the S600. They are marked: *Gas inlet Oil / Dew point measurement* and *Gas inlet Particle measurement.* Make sure you

are using clean and oil-free components when connecting the instrument. Always use the supplied teflon hose adapters to prevent damage on the instrument.

The compressed air supply should always be applied carefully. In case you are using ball valves, open them carefully and slowly. If any unexpected noise or air leakage is observed, shut down the compressed air supply immediately and disconnect the device.

6.4 Electrical connections

The S600 offers three types of electrical connections. The **power supply connector 1**, the **communication port for the isokinetic sampling device 2** and an **Ethernet port 3** to communicate with network devices.



ATTENTION!

Only use the power supply which comes with the S600! If any other supply is used, the instrument may get damaged.

6.5 Compressed air connections (inlet and outlet)

The S600 offers two compressed air inputs on the right side of the housing. The inlets are shown on the picture above and are marked respectively to their functions: *Gas inlet Oil / Dew point measurement* and *Gas inlet Particle counter measurement.*

ATTENTION!

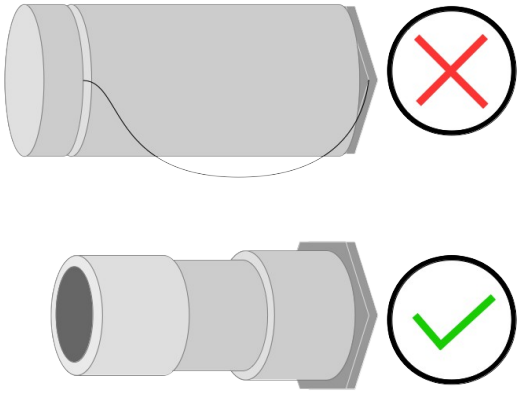
Permissible pressure!

Please observe the maximum permissible inlet pressure. It must be in between 3 and 15 barg. If the pressure exceeds this range, it will damage the device. If the pressure is too low, the volumetric flow will not be high enough which will lead to wrong results.

The picture below shows the left side of the housing where the gas outlets can be found. The calibration outlets *Gas outlet Dew point measurement* and *Gas outlet Oil vapor measurement* are used to connect the internal sensors to references during calibration. These calibration outlets must be opened all the time during a compressed air supply is connected and the device is pressurized. Also the other two outlets need to be opened before connecting the instrument to the compressed air supply.

Note!

All gas outlets of the measurement device must stay opened during the complete usage of the device.



7. Setup and configuration

The S600 is configured ex-works and ready to work out of the box. The S600 provides a guided measurement procedure to take you through device setup for each measurement parameter. All these setup settings are automatically saved into the device even on a power failure.

Note!

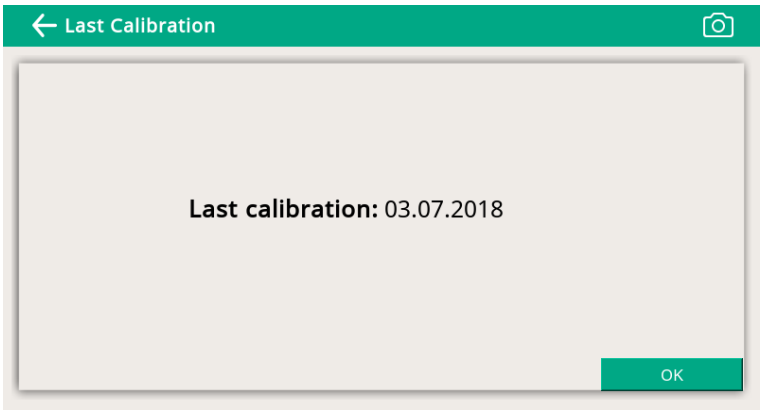
If you are facing problems setting up you device, contact the manufacturer or your local dealer for assistance.

If a power loss occurs during the measurement, the measurement data will not be saved!

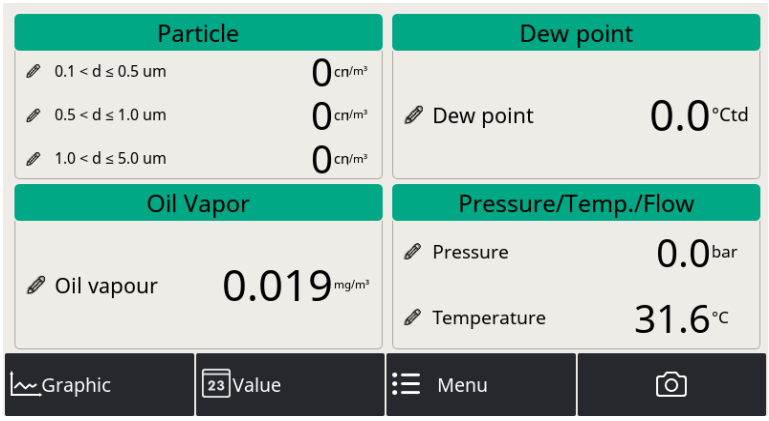
8. Operation

After the S600 is powered on, the initialization screen is displayed with an active progress bar.

During the initialization, the device configures the sensors and runs initialization routines.



After the initialization is completed, the date of the last calibration date is shown. Click **OK** to proceed.



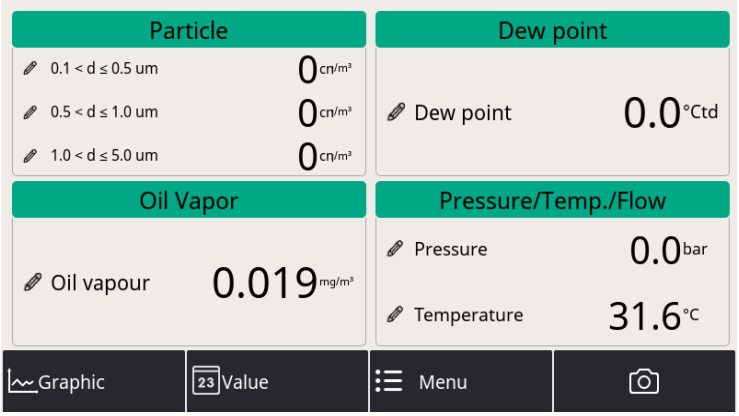
The value screen appears, as shown on the left.

Quick buttons on the bottom bar are described as follows:

- Graphic: To switch to the graphic view.
- Value: To switch to the value view.
- Menu: To access the operation sub-menus.
- The camera icon: To take a screenshot.

8.1 Value view

In this view, the S600 shows all measured values in real-time.



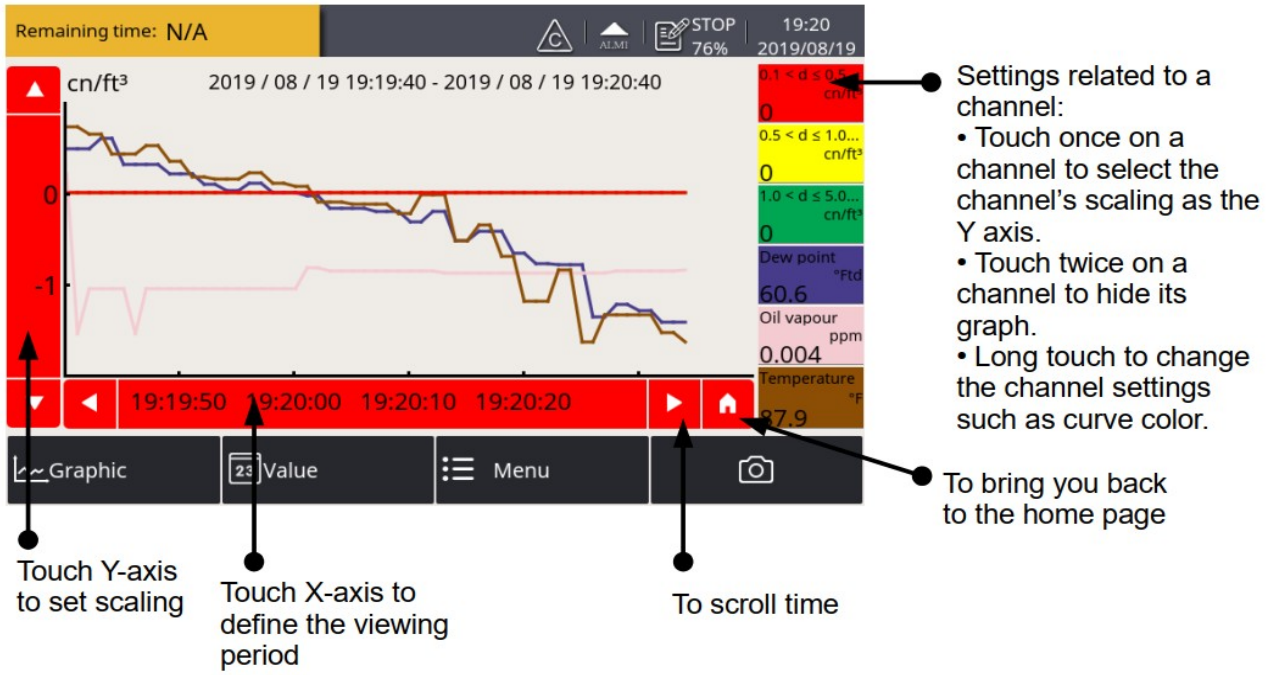
To switch to the value view, click **Value** in the bottom.

Note: During the first five minutes, the S600 performs a purge process to ensure any remaining particles in the system are blown out. During this period, the counting numbers on the *Particle* pane appear green and blinking.

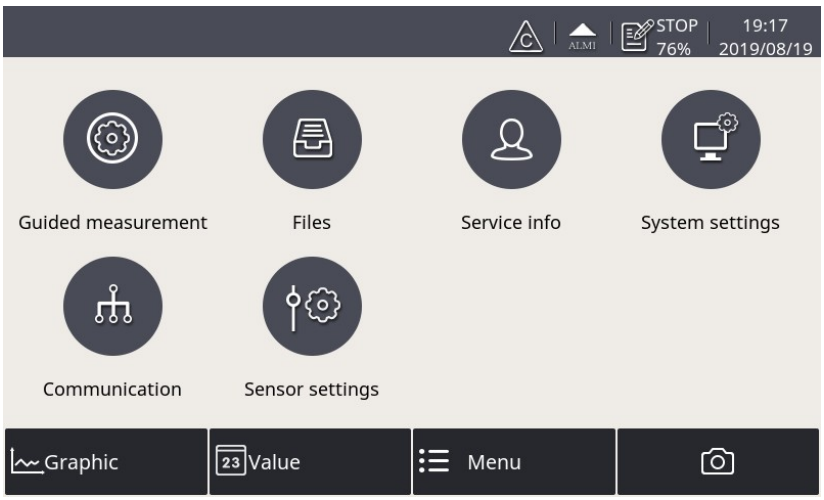
8.2 Graphic view

The graphic view is pre-configured in the factory, and you do not need to change anything.

In case that you need to make changes, follow the instructions indicated in the following figure.



8.3 Main menu



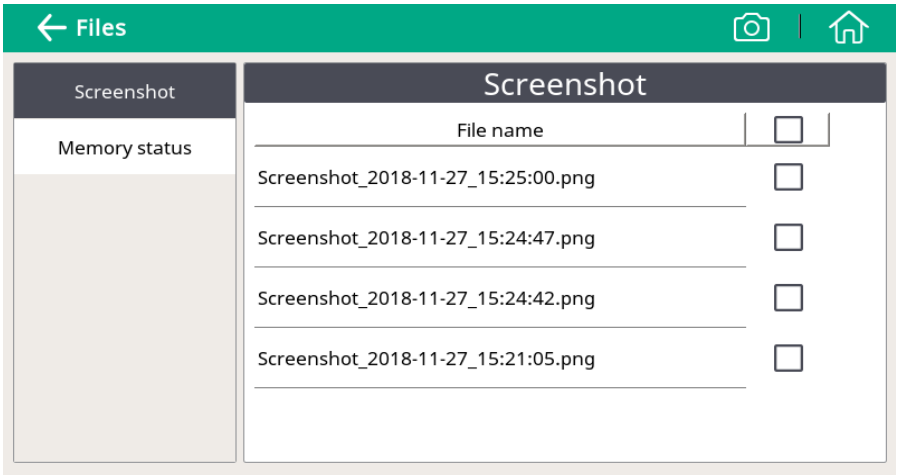
Access the main menu by clicking Menu in the bottom bar.
The screen with sub-menus is shown.

The main menu contains the following sub-menus.

Guided Measurement	To start the guided measurements, which lead you through a complete measurement cycle. For more information, see Chapter 9. Guided measurement.
Files	To access the stored screenshots and check the memory usage.
Service info	To show contact information for technical support.
System settings	To perform general settings on date, time and language and so on. To view information such as the serial number.
Communication	To perform field bus settings and configure communication parameters.
Sensor settings	To change units for the measured parameters.

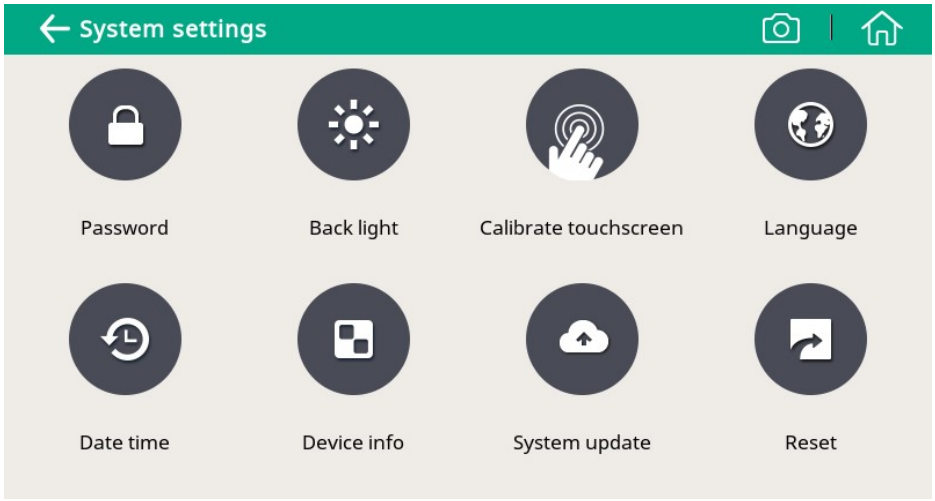
8.3.1 Files

Shows all screenshots. You can view, export, and delete them and check the memory status.



8.3.2 System Setting

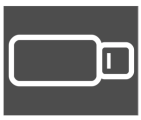
Enables you to perform general settings.



Password	To set a password to protect the settings menu from unauthorized access.
Back light	To configure the brightness and the auto dimming function of the screen.
Calibrate touch screen	To calibrate the touch screen if it does not respond to user inputs correctly or precisely.
Language	To select the interface language.
Date time	To configure date and time.
Device info	To view device information such as serial number.

System update	To perform a system update.
Reset	To restart the device (User settings will be saved).

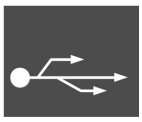
8.4 Icons in the status bar



USB memory stick is connected. By pressing the icon, the stick can be disconnected.

System errors occur. Press this icon to get further information.

Calibration is overdue, please. Contact the manufacturer of your local dealer.



The S600 is connected to a PC by the USB cable.

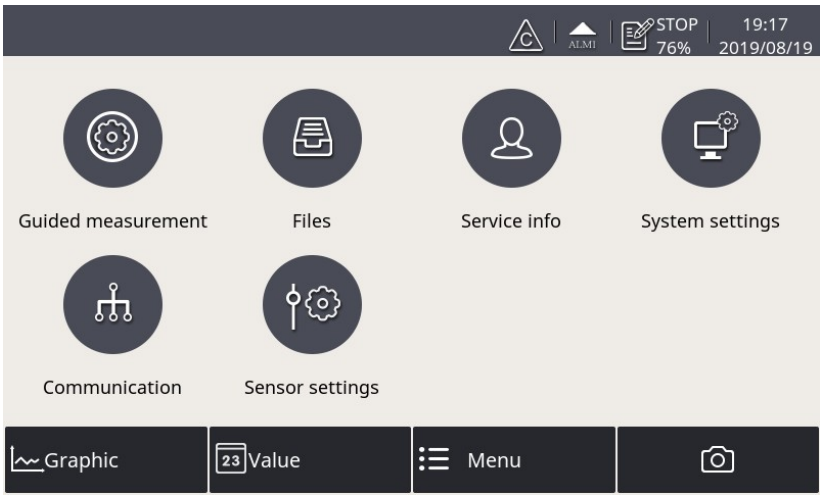
Data logger status:
- STOP—Indicates that the data logger is not running.
- LOG—Indicates that the data logger is running.

9. Guided measurement

The S600 provides a software-based guided measurement which takes you through the complete measurement. This leads to a simplified measurement process and prevents you from wrong measurements.

To start a guided measurement, do the following:

1. Click **Menu** > **Guided measurement**.



2. Select the type of measurement that you want to perform.

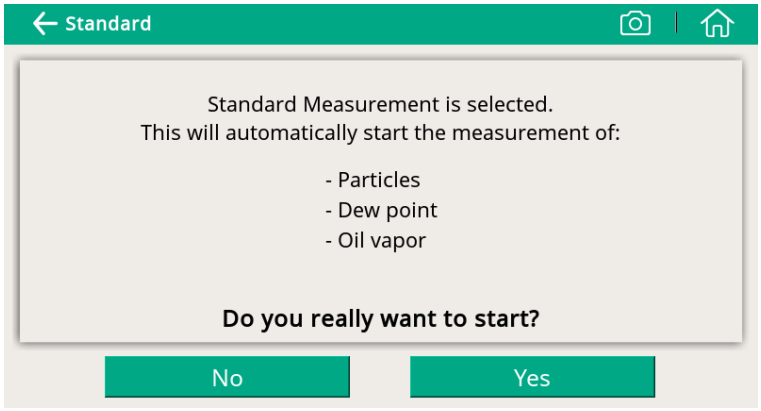
   - **Monitoring with programmed time out**: It starts a measurement with a user-programmed period of measurement time. You can set the measurement time during the process of measurement preparation. The system will then, after finishing the programmed measurement duration, stop the measurement automatically and save the data. This mode is ideally used for audits where you must measure at several points. You can program for each point a duration of e.g. 2 hours and then you can compare the measurements.

- **Monitoring with manual stop**: It starts the measurement without a programmed stop time. You can click it to start the measurement and stop it whenever you want. Then you can decide if you want to save or delete the data. This can be used to monitor changes in values.

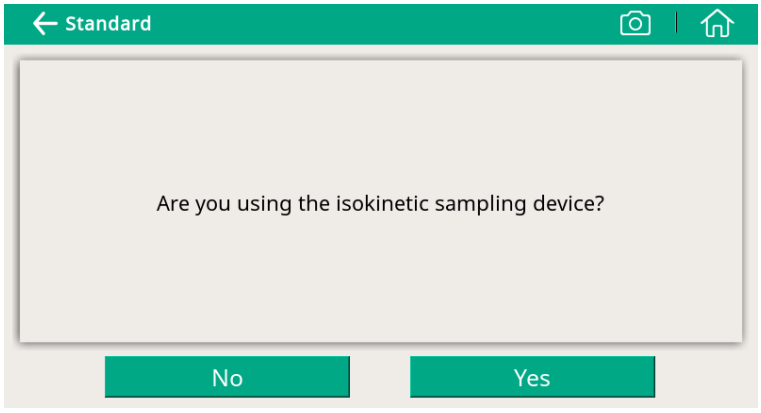
3. Perform the guided measurement following the onscreen instructions. For more information, see section 9.1 Steps for guided measurement.
4. To view and manage the measurement files generated, click **Report Manager**. For more information, see section 9.2 Reports for guided measurements

9.1 Steps for guided measurement

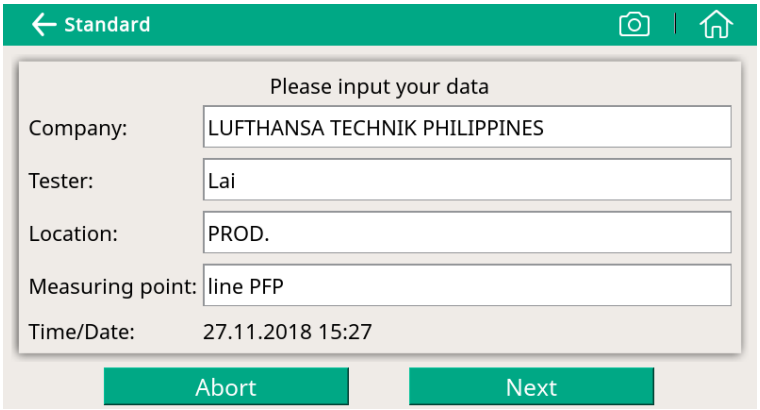
After you start a guided measurement, follow below steps to go through the whole process.



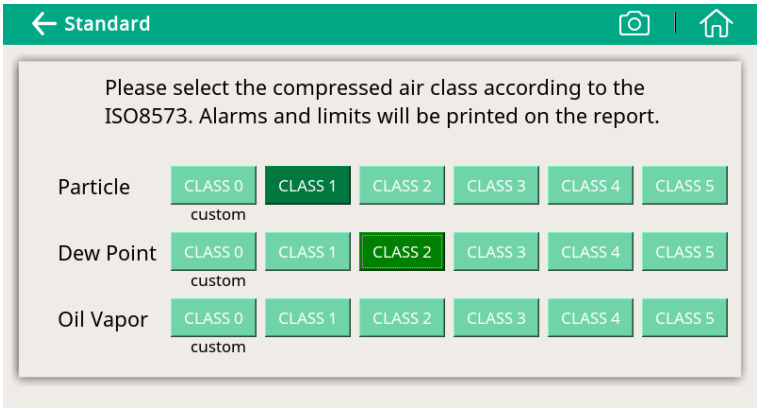
1. An overview is given about the selected measurement types. Click **Yes** to start.



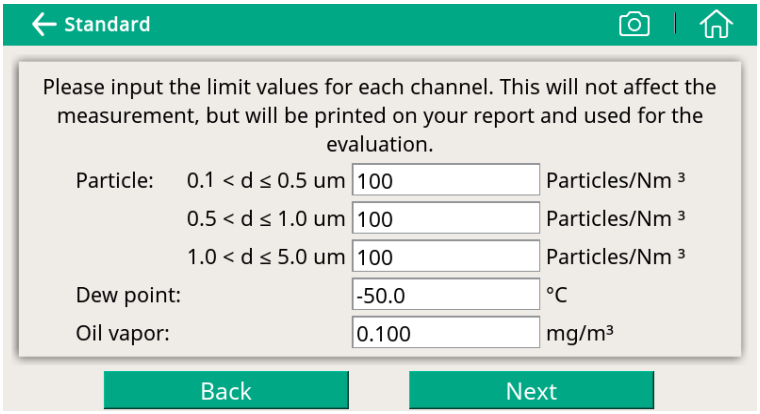
2. The system asks if you are using the isokinetic sampling device, and this will affect the further steps and instructions.
   Select **Yes** if you have the isokinetic sampling device connected. Otherwise, click **No**.



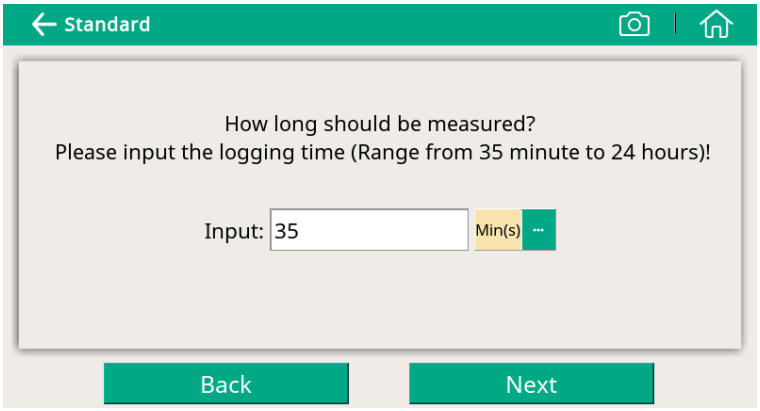
3. Input the data (for example, your customer's data), which will be then shown on the report.



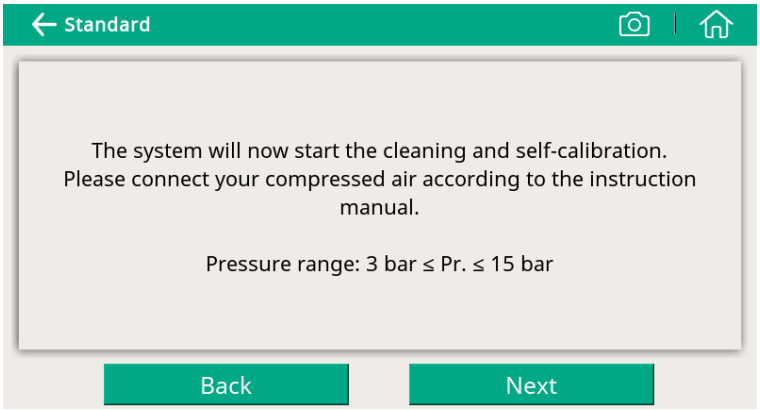
4. Select your compressed air class, which will then select the corresponding alarms according to the ISO8573.
   - CLASS 0: To customize alarm settings.



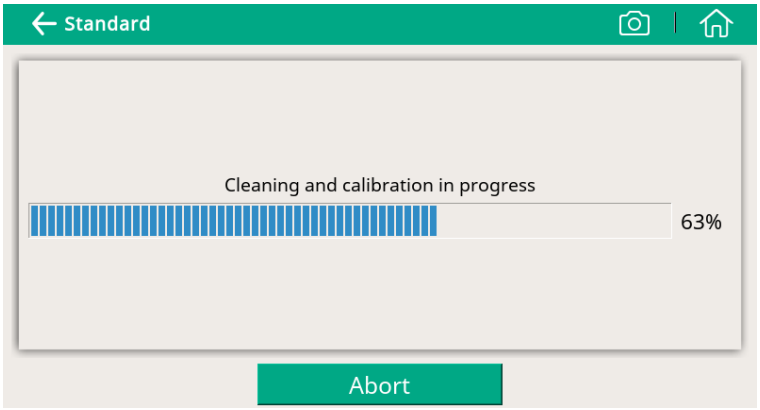
5. If you selected CLASS 0, enter the limit values for each measurement channel, through which you define different alarm settings for the quality management.



6. Enter how long the measurement will take. The longer it takes, the more stabilized the values will be and the more exactly it will represent the system conditions.

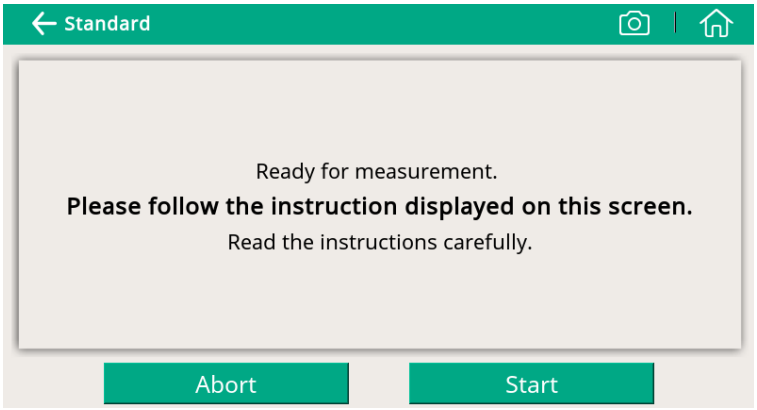


7. The system checks whether the pressure is in the valid range.

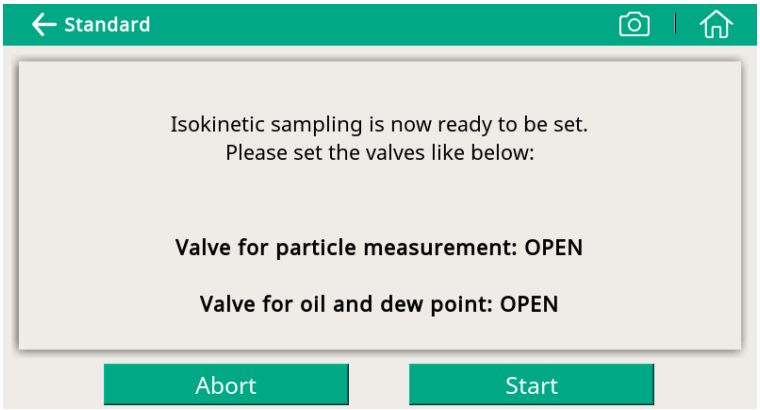


8. The system performs the self-calibration cycles and cleans the internal sensor components.

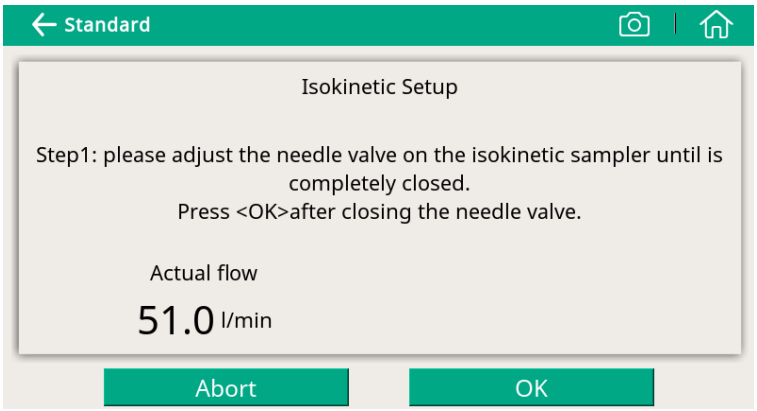
The following 3 steps only apply if you select Yes for the isokinetic sampling device, otherwise skip the next 3 steps



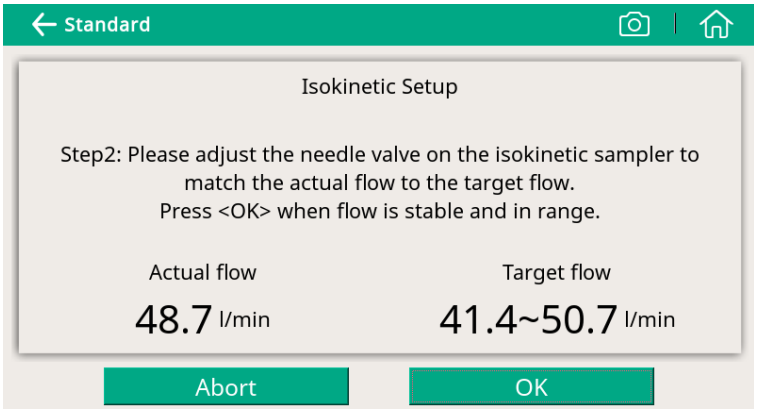
1. The S600 is now ready for measurement. Please read the instructions shown on the screen carefully, and then click **Start**.



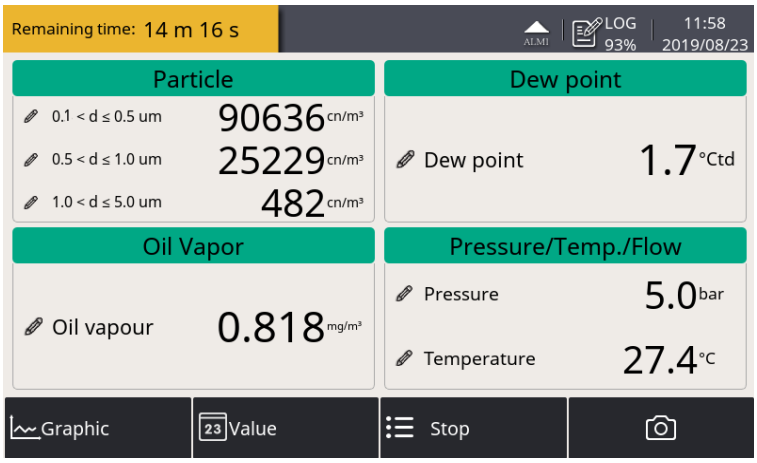
2. Follow the onscreen instructions to proceed.



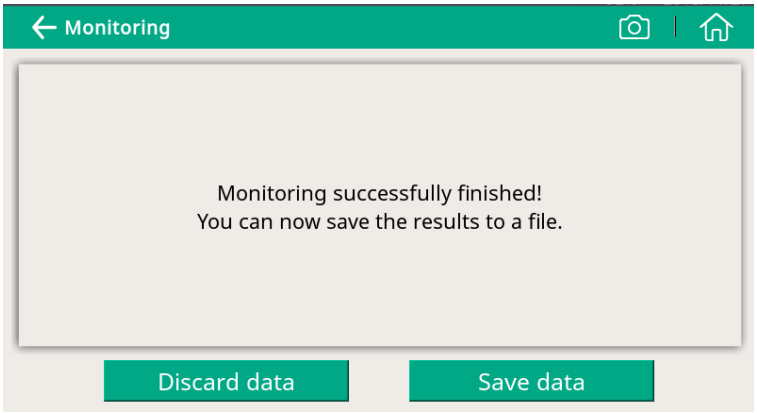
3. Perform Isokinetic Setup as instructed on the screen.



Now the device is well set up and starts to measure data. The remaining time is shown on the top left corner.



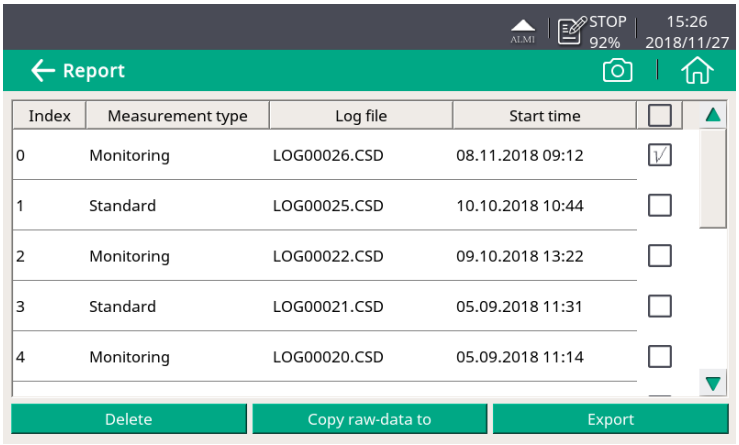
During the measurement, you can see the Data logger status icon on the status bar switched from STOP to LOG. The remaining time is displayed in the upper left corner.
Please wait. The system will stop the measurement automatically.



When the measurement is successfully completed, the left screen appears. You can choose discard or save the measurement data.

9.2 Reports for guided measurements

After performing guided measurements, you can view and manage measurement files through **Guided Measurement** > **Report Manager**.



In the report screen:

- To view the measurement results, click on the file (not the check box on the right). A window appears showing the PDF for your preview.
- To copy, export , or delete files, select the file check boxes, and then click the corresponding button at the bottom.

10. Optional accessories

To purchase optional accessories, please contact the manufacturer or your local dealer:

- Isokinetic sampling device, for particle sampling according to ISO 8573.
- Teflon hoses and sorts of adapters.

11. Maintenance

Use a moist fabric to clean the device. For the use in GMP areas, the device must be disinfected through wipe disinfection. For more information, please contact the manufacturer or your local dealer.

ATTENTION!

Please dry the device after cleaning using a clean and dry fabric. Always take care, that the fabric for cleaning is not to wet as water could get into the device and lead to damage.

12. Calibration

The S600 unit is calibrated ex work. The exact calibration date is printed on the certificate which is supplied together with the unit. The accuracy of the unit is regulated by the onsite conditions, and parameters like high oil, high humidity or other impurities can affect the calibration and furthermore the accuracy. However we recommend to calibrate the instrument at least once per year. The calibration is excluded from the instruments warranty. For this please contact the manufacturer.

13. Disposal or waste

Electronic devices are recyclable material and do not belong in the household waste.
The sensor, the accessories and its packing must be disposed according to your local statutory requirements.
The dispose can also be carried by the manufacturer of the product, for this please contact the manufacturer.

14. Warranty

SUTO provides a warranty for this product of 24 months covering the material and workmanship under the stated operating conditions from

the date of delivery. Please report any findings immediately and within the warranty time. If faults occur during the warranty time SUTO will repair or replace the defective unit, without charge for labour and material costs but there is a charge for other service such as transport and packing costs.
Excluded from this warranty is:

- Damage caused by:
  - Improper use and non-adherence to the instruction manual.
  - Use of unsuitable accessories.
  - External influences (e.g. damage caused by vibration, damage during transportation, excess heat or moisture).
- Sensor lifetime, which is determined by the operating hours (6,000-hour sensor durability).
- Filter capacity, which is determined by the operating hours (8,640-hour or 360-day lifetime).

The warranty is cancelled:

- If you open the measurement instrument without a direct request written in this instruction manual.
- If repairs or modifications are undertaken by third parties or unauthorized persons.
- If the serial number has been changed, damaged or removed.
- If the warranty sealing is removed or damaged.

Other claims, especially those for damage occurring outside the instrument are not included unless responsibility is legally binding.

Warranty repairs do not extend the period of warranty.

ATTENTION!

Batteries have a reduced warranty time of 12 months.

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