![SUTO logo]

Instruction and operation manual

S 131

Laser particle counter

.SUC

Dear Customer,

Thank you for choosing our product.

Please read the operating instructions in full and carefully observe them before you start up the device. 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.
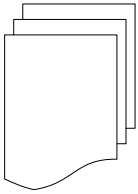
The device is destined exclusively for the described application.

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.

Table of contents

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 laser particle counter at any time. In case of any obscurities or questions, regarding this manual or the product, please contact the manufacturer.

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.

• Only use pressure tight installation material.

• Avoid that persons get hit by escaping air or bursting parts of the instrument.

• The system must be pressureless during maintenance work.

WARNING!

Voltage used for supply!

Any contact with energized parts of the product, may lead to an 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.

• Any electrical work on the system is only allowed by authorized qualified personal.

WARNING!

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.

- Make sure the product is operated in its permitted limitations.

- Do not exceed or undercut the permitted storage and operation temperature and pressure.

- The product should be maintained and calibrated frequently, at least annually.

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.

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.

Storage and transportation

- Make sure that the transportation temperature of the device is between -30 °C... 70 °C.

- For transportation it is recommended to use the packaging which comes with the device.

- Please make sure that the storage temperature of the device is between -10 °C... 50 °C.

- Avoid direct UV and solar radiation during storage.

- For the storage the humidity must be <90%, no condensation.

ATTENTION!

Equipment may get damaged!

Please make sure, that your measuring point is free of excessive contamination and 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 contamination.

- Should water hit the inner electronics, the senors could be seriously damaged.

- Check your measurement point with the enclosed test kit.
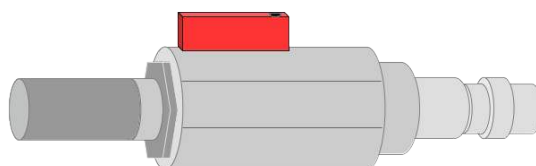
ATTENTION!

Always use the 6 mm Teflon hose adapter to connect the teflon hoses to the S 131 and to the isokinetic sampling device! You may damage the device if not used.
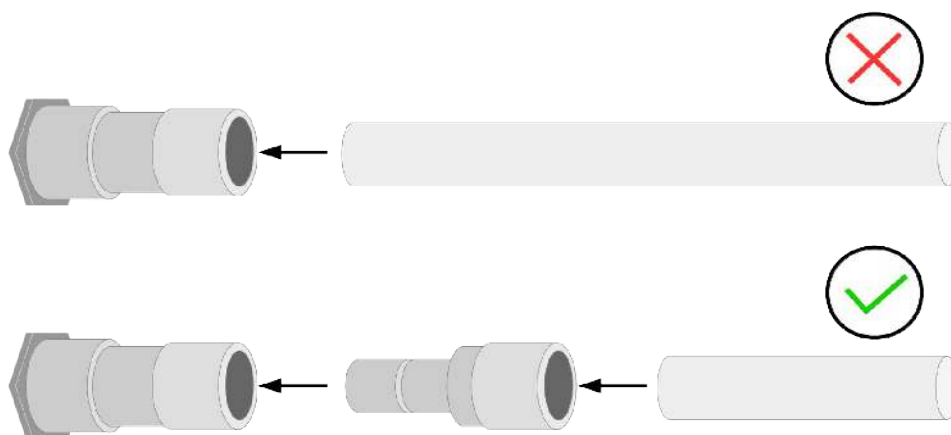
Directly plugging and pulling a telfon hose more than once may lead to particle contamination which can affect the measurement. For this please use the included adapter plugs and keep them on your tubes.

2. Application

The S 131 is a laser particle counter which is designed to measure particles in compressed air and gases within the permissible operating parameters. These parameters can be found in the technical data section.

The S 131 can show measurement values in the unit of ft^3, l or m^3 or alternately in $\mu g/m^3$.

The S 131 laser particle counter is mainly used in compressed air systems in industrial environment. It is not developed to be used in explosive areas. For the use in explosive areas please contact the manufacturer.

3. Features

- Measures particle content in compressed air and other gases.

- Measures particle sizes from 0.1 ... 5.0 µm (depending on model).

- Measures according to ISO 8573-4.

- Easy connection through sampling hose and quick connector.

- Applicable to permanent or portable applications.

- IP65 casing provides robust protection in rough industrial environment.

4. Technical data

4.1 General

CE	
Parameters	Particle counts per ft^3, l or m^3, selectable concentration µg/m^3
Principle of measurement	Laser detection
Sensor	LED-laser
Measuring medium	Compressed air and gases free of corrosive, aggressive, caustic and flammable constituents
Measuring range	Channel difference mode: 0.1 ... 0.5 µm 0.5 ... 1.0 µm 1.0 ... 5.0 µm >= 5.0 µm	Direct count mode: >= 0.1 µm >= 0.5 µm >= 1.0 µm >= 5.0 µm
Sampling range	28.3 l/min
Input flow	The input flow rate depends on the inlet pressure: ~ 50 l/min @ 0.5 MPa ~ 100 l/min @ 1.0 MPa
Operating temperature	10 °C ... 40 °C
Humidity of the meas. medium	< 40% rel. humidity, no condensation
Operating pressure	0.4 ... 1.0 MPa
Housing material	PC, Al alloy
Protection class	IP65
Display (optional)	5" graphic display, 800 x 480 pixels with touch interface
Weight	10.5 kg

4.2 Electrical data

Power supply	100 ... 240 VAC, 80 VA

4.3 Output-signals

Digital output	Modbus/RTU

4.4 Accuracy

Accuracy	0.1 ... 50% per JIS; > 0.3 ... 100 % per JIS

5. Installation

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

Qty	Description	Item No.
1	S 131 laser particle counter	S604 1304
3	M12 connectors	C219 0059
1	1.5 m teflon hose with fast connector	A554 0003
1	Instruction manual	no P/N
1	Calibration certificate	no P/N

5.1 Installation requirements

The S 131 is for portable use and comes in a transport case. For the installation, it should be placed on a horizontally table or floor.

5.2 Installation procedure

The following steps explain the procedure of an appropriate installation.

1. Unscrew the protection caps at inlet and outlet.

   The first picture shows the Sample gas inlet and the power cable connection. The second picture shows the sampling gas outlet.

2. Connect the teflon hose with the inlet of the S 131.

3. Connect the other end of the teflon hose with a quick connector. The teflon hose with quick connector is used to connect the S 131 to the process.

Please consider the following recommendations for a successful measurement result:

- All components from the sampling point to the S 131 must oil and grease free.

- Ambient and gas temperature must be within the specified ranges.

- The inlet gas must be pressurized with the valid ranges.

- The sampling gas mus be dry (< 40% RH) and clean.

- Ensure that valves at the sampling point are not lubricated.

ATTENTION!

Avoid contamination with oil or grease!

**It will lead to very slow measurement or impossible measurement results!**

4. Before using the particle counter please make sure that the outlet is uncapped.

5. As soon the gas connection is done, the power supply can be connected and the system will start up automatically.

6. After use please put the caps on the inlet and outlet to prevent the sensitive instrument from contaminations.

6. Configuration and operation

With the touchscreen display, the S 131 enables users to configure custom-specific settings and to perform daily operations such as view particle counts, start data logging, and download logger files.

6.1 User interface

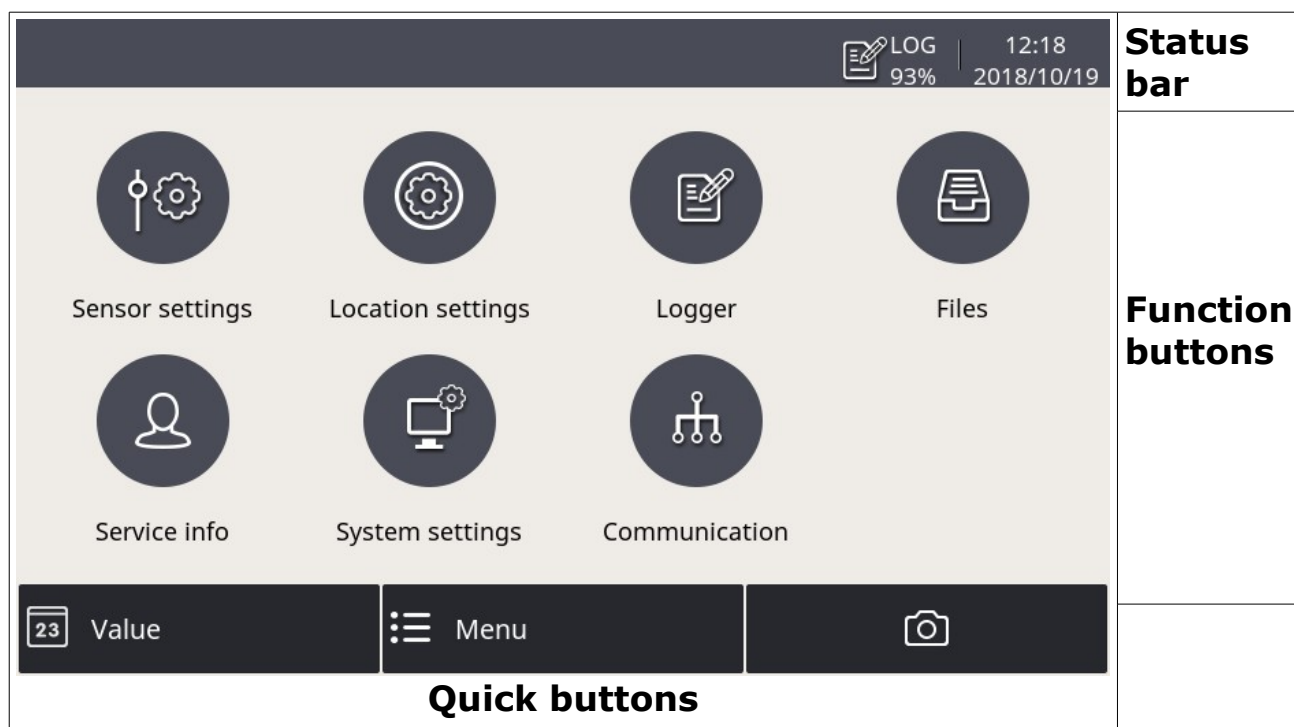The screen below shows the user interface of the S 131.
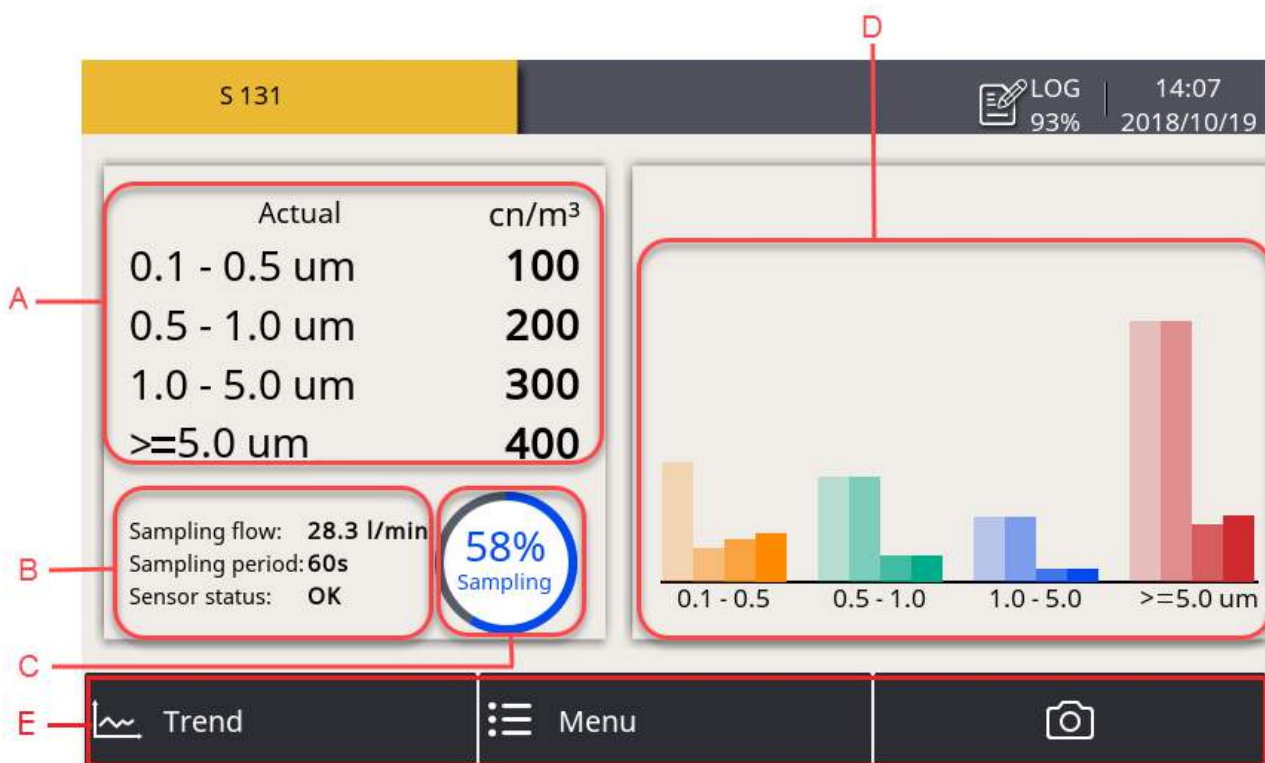
The main screen shows the online measuring result and consists of the following areas.

Area	Description
A	Shows actual sampling results in all sizing channels.
B	Shows the sampling status:
	Sampling flow — Shows the flow rate for the sampling flow (28.3 l/min).
	Sampling period — Fixed to 60 seconds
	Sensor status — Shows the sensor status: OK: Indicates that everything is normal. Service: Indicates that a service on this product is required and you should contact the customer service. **Note:** "Service" may also be shown if the air is supplied with high concentration of particles or the supply pressure is below the required minimum pressure. In such cases it's recommended you operate in the specified pressure range and have sample air purged through the device for about 10 minutes. If the

Area	Description
	service indication is still shown, please contact the customer service.
C	Progress indicator for the sampling or purging period. The S 131 instrument purges sampled data in the first five minutes after powered on. During this period, the progress of "Purging" instead of "Sampling" is displayed.
D	Shows a bar graph, which indicates the last 4 samples of each channel.
E	Quick buttons: **Trend**: Click to switch to the graphic screen that displays the 4 channels and their values in a line graph. **Menu**: Click to enter operation menus. For more information, please see 6.2 Main menu. **Screenshot**: Click to save an image of the current screen into the memory, which can be read out through the USB interface.

6.2 Main menu

After you press the **Menu** button, the following main menu screen appears.

LOG 93% 12:18 2018/10/19	**Status bar**
Sensor settings Location settings Logger Files Service info System settings Communication	**Function buttons**
Value Menu 📷 **Quick buttons**	

The menu consists of the following sub-menus:

Sub-menu	Function
Sensor settings	To change settings of the particle counter sensor.
Location settings	To enter description for the measurement point. Useful when the S 131 is connected to the S4M software for data monitoring.
Logger	To start data logging using the following ways: • Key start: To start logging immediately. • Time start: To set the start time for a scheduled logging.

Files	• To view or delete recorded files or copy them to USB disk as needed. The files include:
	  • Recorded files: Refer to the logger files
	  • Screenshot
	• To view the memory usage by clicking Memory status.

Service info	To view contacts of the service provider.
System setting	To view and change settings related to the S 131 system.
Communication	Not applicable

6.3 Display icons in the status bar

 USB stick connected

 System error

 Sensor connection has changed, not matching with configuration

 Sensor unit is not matching with configuration

 Logger status

 RTC backup battery status

 Sensor calibration is expired

 USB to PC connected

 Alarm triggered

6.4 Sensor settings

In the main menu screen, click **Sensor settings** to enter the Sensor setting sub-menu where you can change the sensor related settings.
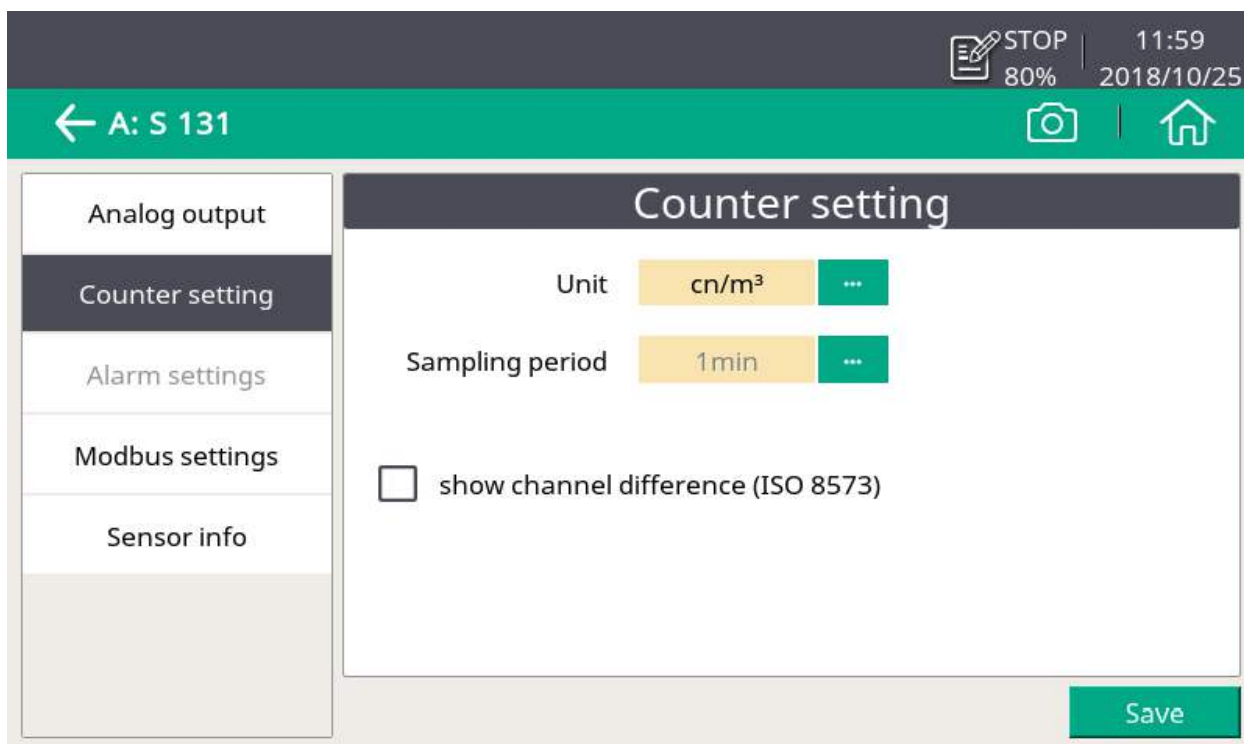
Detailed description for sensor settings are described as follows.

Menu name	Function
Analog output	Not applicable
Counter setting	The S 131 can display the count values as Sigma (cumulative or so-called "direct count") or Delta (Show channel difference (ISO 8573)). • The **Sigma** reading is the count of all particles from that specific size channel and greater. • The **Delta** readings are the values for the size channel named, up to but not including the next larger size channel. By default, S 131 shows readings in the "channel difference" mode. To set S 131 readings to the "direct count" mode, un-tick the "show channel difference (ISO 8573)".
Alarm settings	Not applicable
Modbus settings	To set address, baud-rate and parity of Modbus communication.
Sensor info	To view the sensor information for service inquiries

7. Signal outputs

Modbus operations are described as follows.

Index	Channel description		Unit	Res.	Format	Length	Modbus address
0	Device status			1	UNIT32	R	0
1	Count channel	Channel 1	cn/m^3	1	FLOAT	R	2
2		Channel 2	cn/m^3	1	FLOAT	R	4
3		Channel 3	cn/m^3	1	FLOAT	R	6
4		Channel 4	cn/m^3	1	FLOAT	R	8
5	Weight channel	Channel 1	µg/m^3	0.001	FLOAT	R	10
6		Channel 2	µg/m^3	0.001	FLOAT	R	12
7		Channel 3	µg/m^3	0.001	FLOAT	R	14
8		Channel 4	µg/m^3	0.001	FLOAT	R	16
9	Original channel	Channel 1	cn/2.83 l	1	UNIT32	R	64
10		Channel 2	cn/2.83 l	1	UNIT32	R	66
11		Channel 3	cn/2.83 l	1	UNIT32	R	68
12		Channel 4	cn/2.83 l	1	UNIT32	R	70

Interpretation of system status

Bit   Description

0   Laser alert status:
       0 = laser is good, 1 = laser alert

1   Flow alert status:
       0 = flow rate is good, 1 = flow rate alert

2   Particle overflow status:
       0 = no overflow, 1 = over flow

3   Instrument service status:
       0 = working correctly. 1 = malfunction

4   Particle threshold exceeded status:
       0 = threshold not exceeded, 1 = threshold exceeded

5   Alarm status
       0 = normal, 1 = alarm triggered

15   Communication status
       0 = communication OK, 1 = communication failed

8. Calibration

The sensor is calibrated ex work. The exact calibration date is printed on the certificate which is supplied together with the sensor. The accuracy of the sensor is regulated by the on site conditions, parameters like 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.

9. Maintenance

To clean the sensor and its accessories it is recommended to use moist cloth only.

ATTENTION!

Do not use isopropyl alcohol to clean the display!

10. Disposal or waste

Electronic devices are recyclable material and do not belong in the household waste.

The device, the accessories and its packings 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.

11. 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 occurring 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).

The warranty is cancelled:

- If the user opens the measurement instrument without a direct request written in this instruction manual.

- If repairs or modifications are undertaken by third parties or unauthorised persons.

- If the serial number has been changed, damaged or removed.

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.

SUTO

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