

# Instruction and operation manual

# S 120

## Oil vapor sensor



Dear Customer,  
thank you for choosing our product.

The operating instructions must be read in full and carefully observed before starting 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.

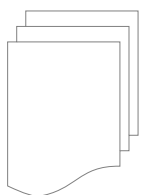
SUTO offers no guarantee for the suitability for any other purpose. SUTO is also not liable for consequential damage resulting from the delivery, capability or use of this device.

## Table of contents

1. Safety instructions.....	5
2. Application.....	7
3. Features.....	7
4. Technical Data.....	8
4.1 General.....	8
4.2 Electrical Data.....	8
4.3 Output-Signals.....	8
4.4 Accuracy .....	8
5. Dimensional drawing.....	9
6. Installation .....	10
6.1 Installation Requirements.....	10
6.2 Installation Procedure.....	10
6.3 Electrical connection .....	12
7. Configuration .....	13
7.1 Configuration without display .....	13
7.2 Configuration with external display .....	13
7.3 Configuration with internal display.....	14
8. Operation with internal display .....	14
8.1 User interface .....	14
8.2 Main menu .....	15
8.3 Description of display icons in status bar .....	15
8.4 Sensor settings .....	16
8.4.1 Basic setting.....	16
8.4.2 Analog output .....	17
8.4.3 Modbus settings.....	18
8.4.4 Alarm settings.....	18
8.4.5 Status.....	19
8.5. Logger.....	20
8.6 Files.....	21
8.7 Service info .....	21
8.8 System settings .....	22
8.9 Communication .....	22
9. LED indicators at front panel .....	23
9.1 S 120 error indications and display indications .....	23
10. Signal outputs.....	24
10.1 Analog output .....	24
10.2 Digital output .....	24
10.3 Alarm output .....	25
11. Optional extra accessories.....	25
11.1 Sensor display (optional).....	25
11.2 Service kit .....	25

12. Calibration.....25  
13. Maintenance.....25  
14. Disposal or waste.....25  
15. Warranty.....26

## 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 have to be observed before and during installation, operation and maintenance. Therefore this instruction manual has to be read carefully by the technician as well as by the responsible user / qualified personnel.

This instruction manual has to be available at the operation site of the oil vapor sensor at any time. In case of any obscurities or questions, regarding this manual or the product, please contact the manufacturer.

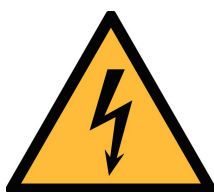


### **WARNING!**

#### **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 (see sensors label).
- Only use pressure tight installation material.
- Avoid that persons get hit 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 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.
- 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.
- Always use spanner to mount the product properly.

**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  $-30^{\circ}\text{C}$ ...  $70^{\circ}\text{C}$ .
- 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  $-20^{\circ}\text{C}$ ...  $50^{\circ}\text{C}$ .
- Avoid direct UV and solar radiation during storage.

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

## 2. Application

The S 120 is an oil vapor sensor which is designed to monitor oil contents of compressed air and gases within the permissible operating parameters. These parameter can be found in the technical data section.

The S 120 oil vapor sensor is not developed to be used in explosive areas. For the use in explosive areas please contact the manufacturer.

The S 120 oil vapor sensor is mainly used in compressed air systems in industrial environment.

## 3. Features

- Measures oil vapor contents in compressed air and other gases.
- Easy connection through sampling hose and quick connect.
- Can be used for permanent or in portable applications.
- Measures dorm to 0.001 mg/m<sup>3</sup>.
- PID sensor for highest accuracy.
- Service and alarm indication through LED.
- Connectable to display and data logger of the manufacturer as well as third parties displays and control units.
- IP65 casing provides robust protection in rough industrial environment.
- Optional display directly on the sensor, showing the actual values.



## 4. Technical Data

### 4.1 General

<b>CE</b>	
Parameters	Standard unit oil vapor contents: mg/m <sup>3</sup>
Principle of measurement	Photo ionization
Sensor	PID (photo ionization detector)
Measuring medium	Compressed air and gases free of corrosive, aggressive, caustic and flammable constituents
Measuring range	0.001... 10 mg/m <sup>3</sup>
Sample flow range	< 2 l/min, measuring gas is released to ambient
Operating temperature	-20°C... 50°C
Humidity of the meas. medium	< 40% rel. humidity, no condensation
Operating pressure	3... 15 barg (higher pressure on request)
Housing material	PC, Al alloy
Protection class	IP65
Dimensions	See dimensional drawing on the next page
Display (optional)	5" graphic display with touch interface
Weight	2.4 kg
Sensor durability	6000 operating hours

### 4.2 Electrical Data

Power supply	24 VDC ± 5%, 10W
--------------	------------------

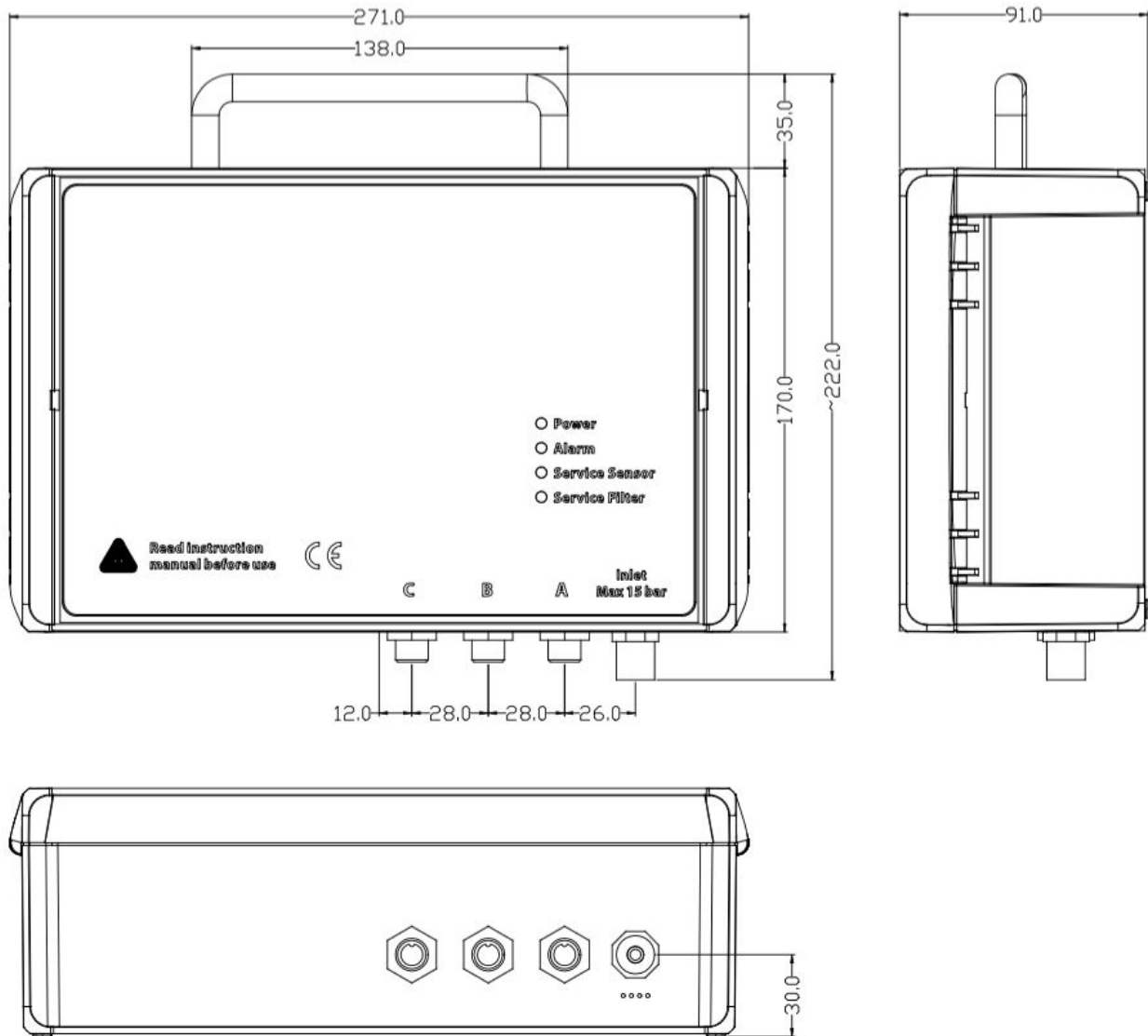
### 4.3 Output-Signals

Analogue output	4... 20 mA
Digital output	RS-485, Modbus / RTU
Alarm output	Relay, NO, 60V, 1A

### 4.4 Accuracy

Accuracy	5% of reading ± 0.003 mg/m
----------	----------------------------

### 5. Dimensional drawing



## 6. Installation

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

Qty	Description
1	S120 oil vapor sensor
3	M12 connectors
1	1.5 m teflon hose with fast connector
1	Coalescing filter
1	Mounting brackets
1	Instruction manual
1	Calibration certificate

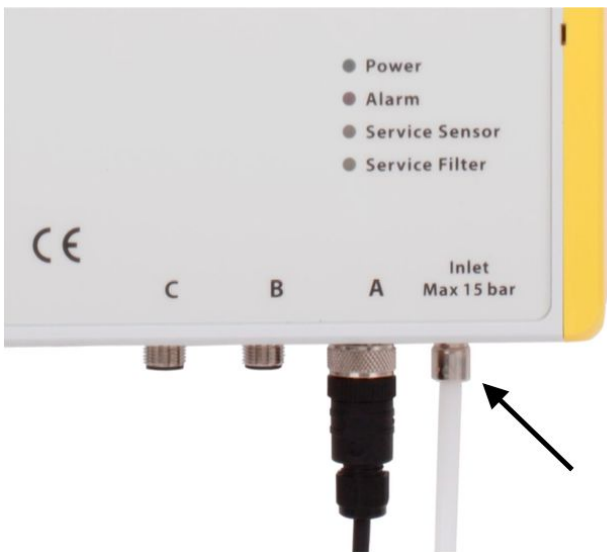
### 6.1 Installation Requirements

There is two versions of the S 120:

- S 120 for stationary use. The stationary version comes with four mounting brackets which can be mounted from the backside of the instrument at each corner. This allows an easy installation at a wall.
- S 120-P for portable use. The portable version comes in a transport case.

### 6.2 Installation Procedure

The following steps explain the procedure of an appropriate installation.



1. Connect the teflon hose with the inlet of the S 120 like shown in the picture.



2. Connect the other end of the teflon hose with a quick connector. The teflon hose with quick connector is used to connect the S 120 to the process.

Please consider the following recommendations for a successful measurement result:

- All components from the sampling point to the S 120 must be 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 must 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!**

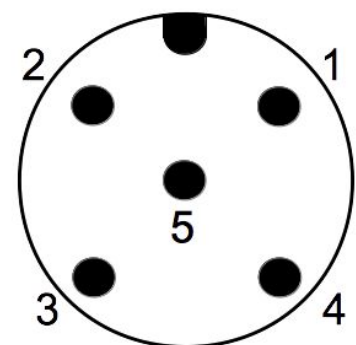
### 6.3 Electrical connection

#### Connection to the following external display units

S 120		Colour code	S 330 / 331		S 320	
Pin	Signal		Terminal	Pin	Terminal	Pin
A.1	SDI	brown	A	1	G	6
A.2 / B.2	-V <sub>b</sub>	white		2		7
A.3 / B.3	+V <sub>b</sub>	blue		3		8
A.4 / C.4	+D	black		4		
A.5 / C.5	-D	grey		5		
B.1	PE	brown		GND		
A.1	SDI	brown	B	1		
A.2 / B.2	-V <sub>b</sub>	white		2		
A.3 / B.3	+V <sub>b</sub>	blue		3		
A.4 / C.4	+D	black		4		
A.5 / C.5	-D	grey		5		
B.1	PE	brown		GND		

#### Connection to third party displays and control units

Connector	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5
A	SDI	-V <sub>b</sub>	+V <sub>b</sub>	+D	-D
B	PE	-V <sub>b</sub>	+V <sub>b</sub>	+I	-I
C	Relay	Relay	GND	+D	-D
	brown	white	blue	black	grey



#### Legend to pin assignment

SDI Digital signal (internal use)

-V<sub>B</sub> Negative supply voltage

- +V<sub>B</sub> Positive supply voltage
- +I Positive 4...20 mA signal
- I Negative 4...20 mA signal
- +D RS-485, modbus / RTU
- D RS-485, modbus / RTU
- Relay Alarm output
- PE Earth connection
- GND Communication ground

## 7. Configuration

The S 120 is delivered with standard ex-work configuration or with specific customer settings according to the order.

### Standard ex-work configuration

Scaling :4 mA = 0.000 mg/m<sup>3</sup>  
 20 mA = 10.000 mg/m<sup>3</sup>

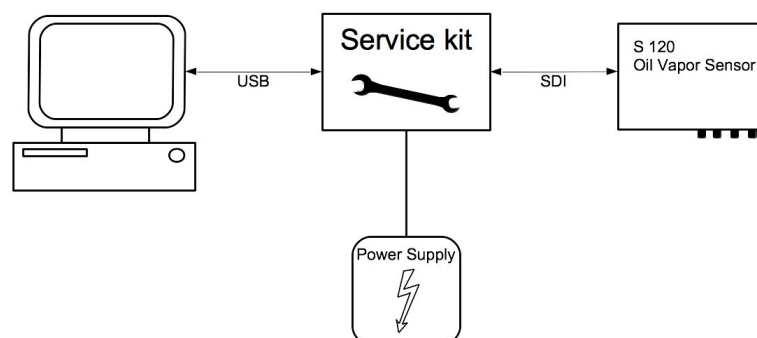
Alarm :1.000 mg/m<sup>3</sup>, up

Oil type :Synthetic oil

Modbus :Device address = 1  
 Baudrate = 19200  
 Framing/parity/Stop bit = 8, N, 1  
 Transmission mode = RTU

### 7.1 Configuration without display

Other configurations as the ex-work configuration can be programmed by the service kit.



## 7.2 Configuration with external display

Please see the instruction manual of the S 330/331.

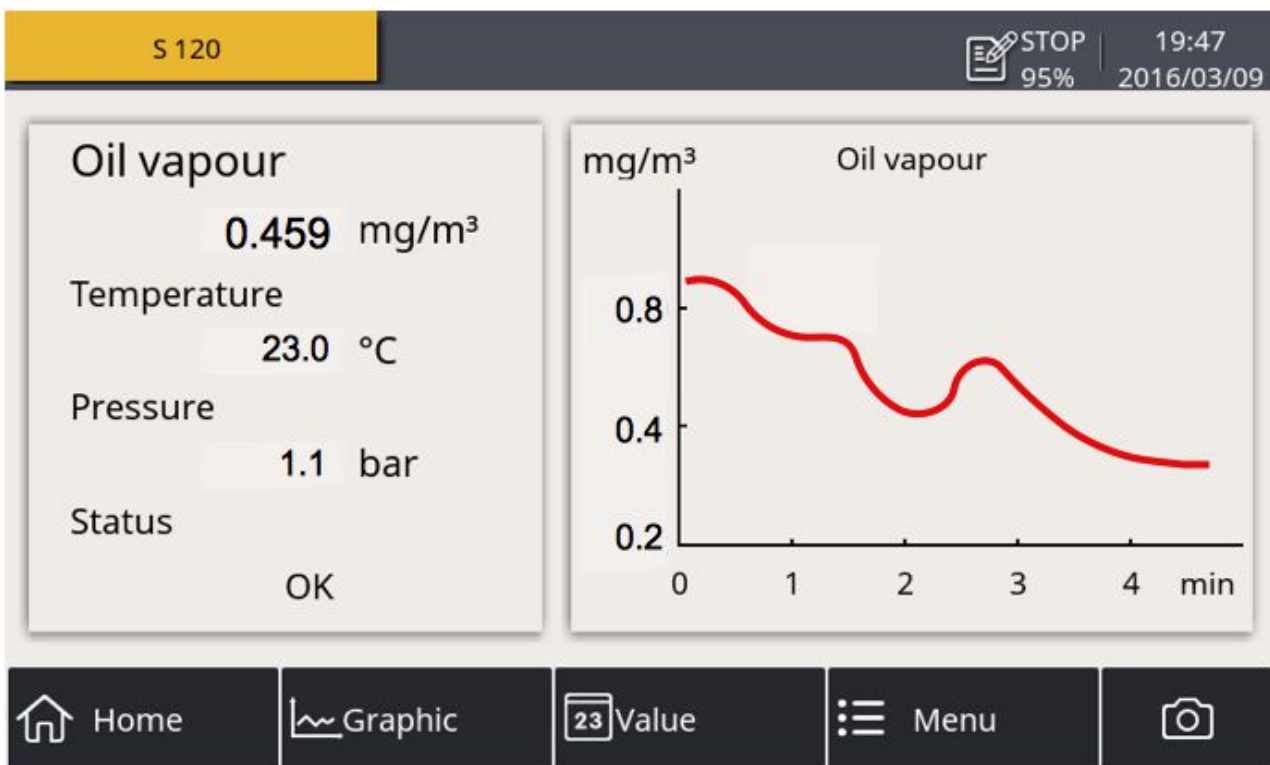
## 7.3 Configuration with internal display

Please see sensor settings in the next chapter.

# 8. Operation with internal display

## 8.1 User interface

The screen below shows the user interface of the S 120.

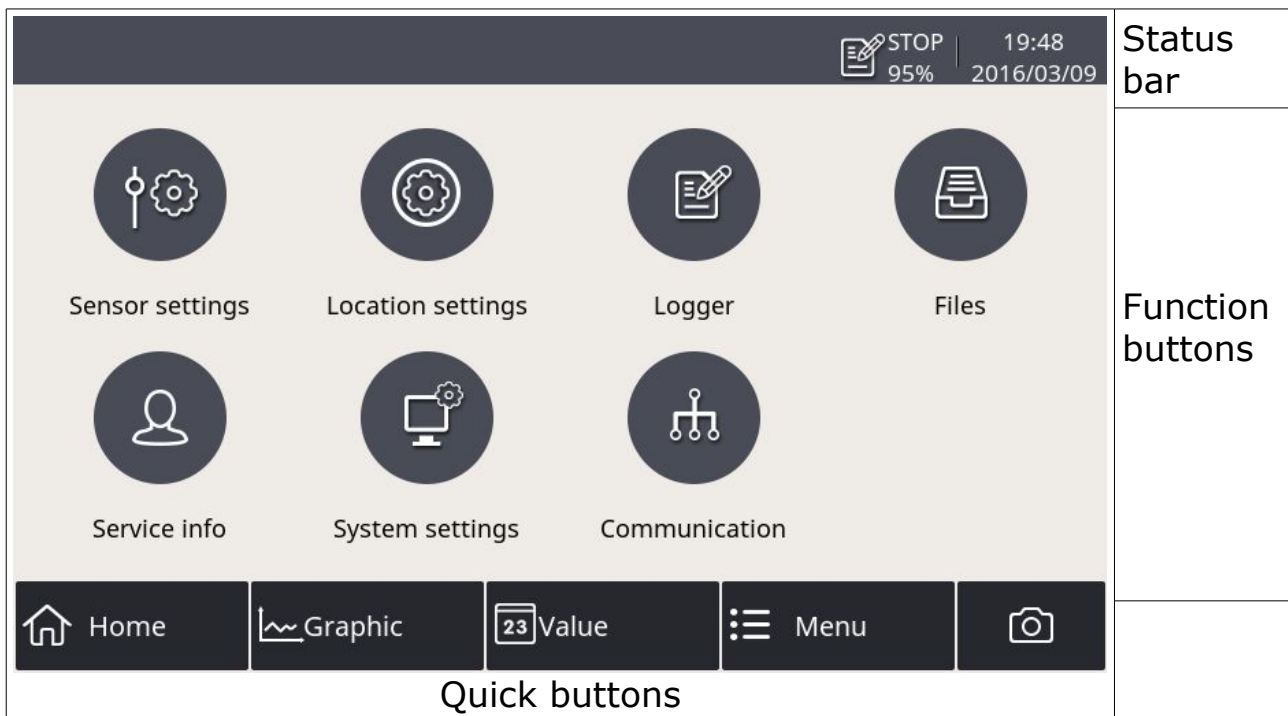


1. On the left site the online measuring result is shown:
  - **Oil vapor:** oil vapor content per cubic meter at reference condition
  - **Temperature:** sensor casing temperature
  - **Pressure:** pressure at the sensor
  - **Status:** sensor status (for service)
2. On the right site the online graphic view is shown
3. Press the "**Home**" button to get back to the home view which is shown above.



4. Press the "**Graphic**" button to show the graphic in full screen.
5. Press the "**Value**" button to show the values in full screen.
6. Press the "**Menu**" button for further operations. Please see main menu in the next chapter.
7. Press the screenshot button to create an image of the current screen which is stored inside of the memory and can be read out through CSM-S software.

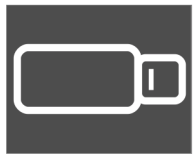
## 8.2 Main menu



The menu consists of the following sub-menus:

<b>Sensor settings</b>	Settings related to the connected sensors.
<b>Location setting</b>	Settings are fixed.
<b>Logger</b>	S 210 data logger settings.
<b>Files</b>	All recorded files and the memory status can be checked.
<b>Service info</b>	Useful information in case of a service issue.
<b>Service setting</b>	Many different settings are under this menu.
<b>Communication</b>	Modbus master, field bus RS-485

### 8.3 Description of display icons in status bar



USB stick connected



System error



Sensor connection has changed, not matching with configuration



Sensor unit is not matching with configuration



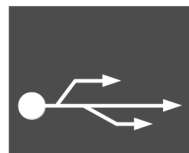
Logger version S 331



RTC backup battery status



Sensor calibration is expired



USB to PC connected



Alarm triggered

### 8.4 Sensor settings

This chapter describe the available settings for the S120. After selecting of "sensor setting", the next screen will show the following available setting:

### 8.4.1 Basic setting

The screenshot displays the 'Basic setting' interface. On the left is a vertical menu with the following items: 'Basic setting', 'Analog output', 'Modbus settings', 'Alarm settings', 'Status', and 'Sensor info'. The main content area is titled 'Basic setting' and contains the following fields:

- Altitude:  m
- User slope:  (0.5...1.5)
- Compressor oil: Synthetic Oil ...
- Response factor:  (0.1...15)
- Output unit: mg/m<sup>3</sup> ...

A green 'Save' button is located at the bottom right of the main content area. The top status bar shows 'STOP 95%' and '19:50 2016/03/09'. The bottom bar shows '← A: S 120' and camera/home icons.

1. Altitude: Please enter the Altitude.
2. User slope: please adopt the value in which is shown in the picture.
3. Compressor oil: Choose the oil of your compressor. If your oil is not available please choose custom oil and input the response factor (for further assistance please contact the manufacturer of your oil). If it is not sure which oil is in use please choose synthetic oil.
4. Output unit: Choose the desired output unit.
5. Click save.

### 8.4.2 Analog output

Please set scaling of analog output and click save. Whenever the output unit is changes, it is recommended to adjust the scaling of the analog output.

STOP 19:50  
95% 2016/03/09

← A: S 120

Basic setting

**Analog output**

Modbus settings

Alarm settings

Status

Sensor info

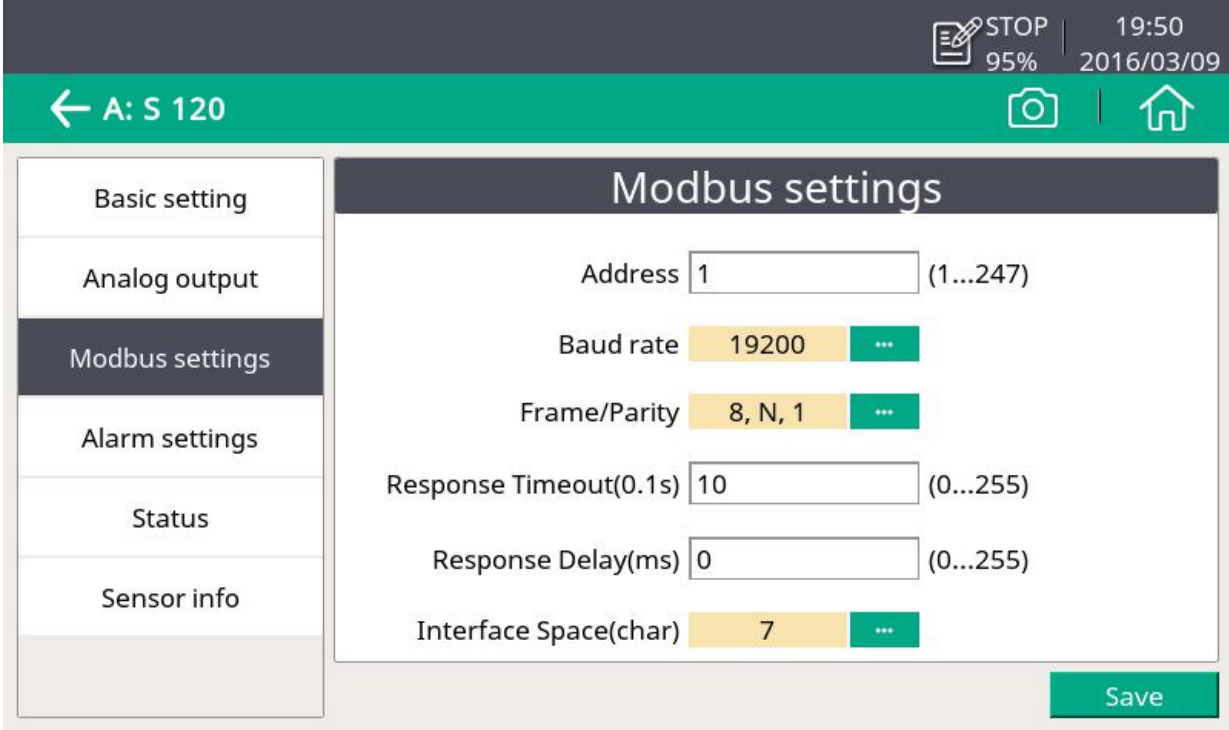
### Analog output

4 mA =	<input type="text" value="0.000"/>	mg/m <sup>3</sup>
20 mA =	<input type="text" value="10.000"/>	mg/m <sup>3</sup>
0.001 mA =	<input type="text" value="0.000625"/>	mg/m <sup>3</sup>

Save

### 8.4.3 Modbus settings

Please do not change the modbus settings.



STOP 95% | 19:50  
2016/03/09

← A: S 120

Basic setting

Analog output

**Modbus settings**

Alarm settings

Status

Sensor info

### Modbus settings

Address  (1...247)

Baud rate  ...

Frame/Parity  ...

Response Timeout(0.1s)  (0...255)

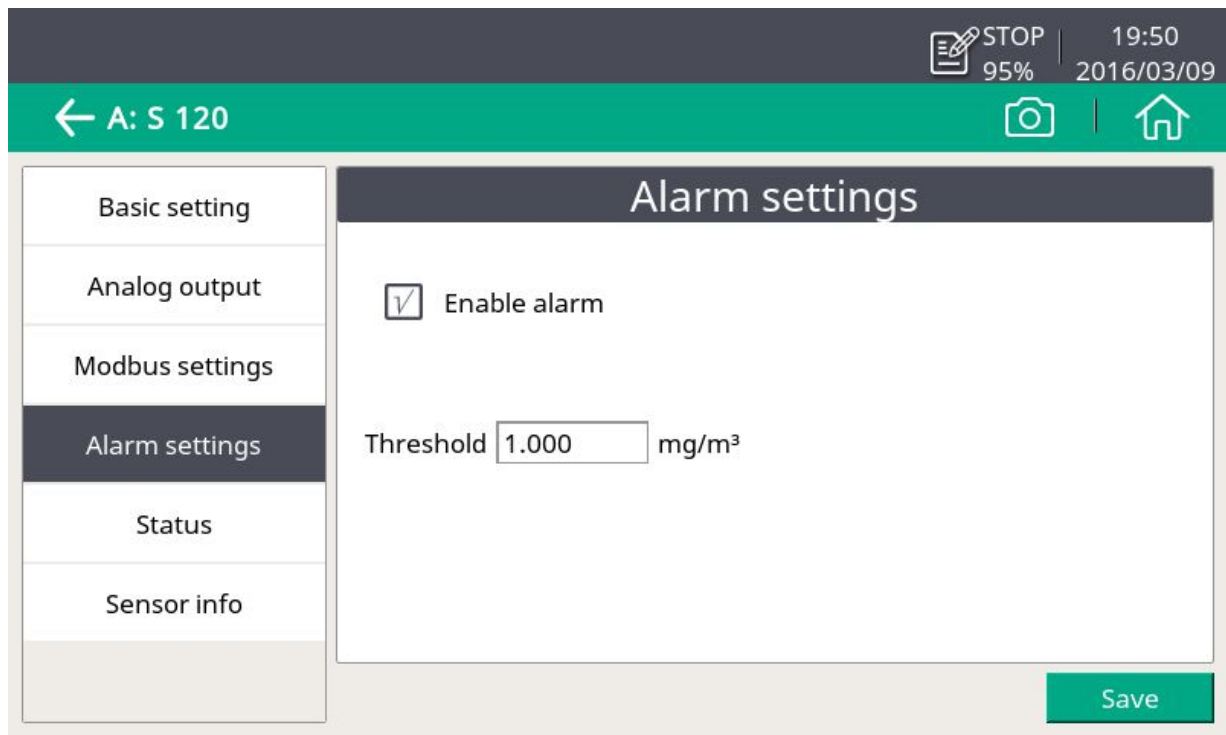
Response Delay(ms)  (0...255)

Interface Space(char)  ...

Save

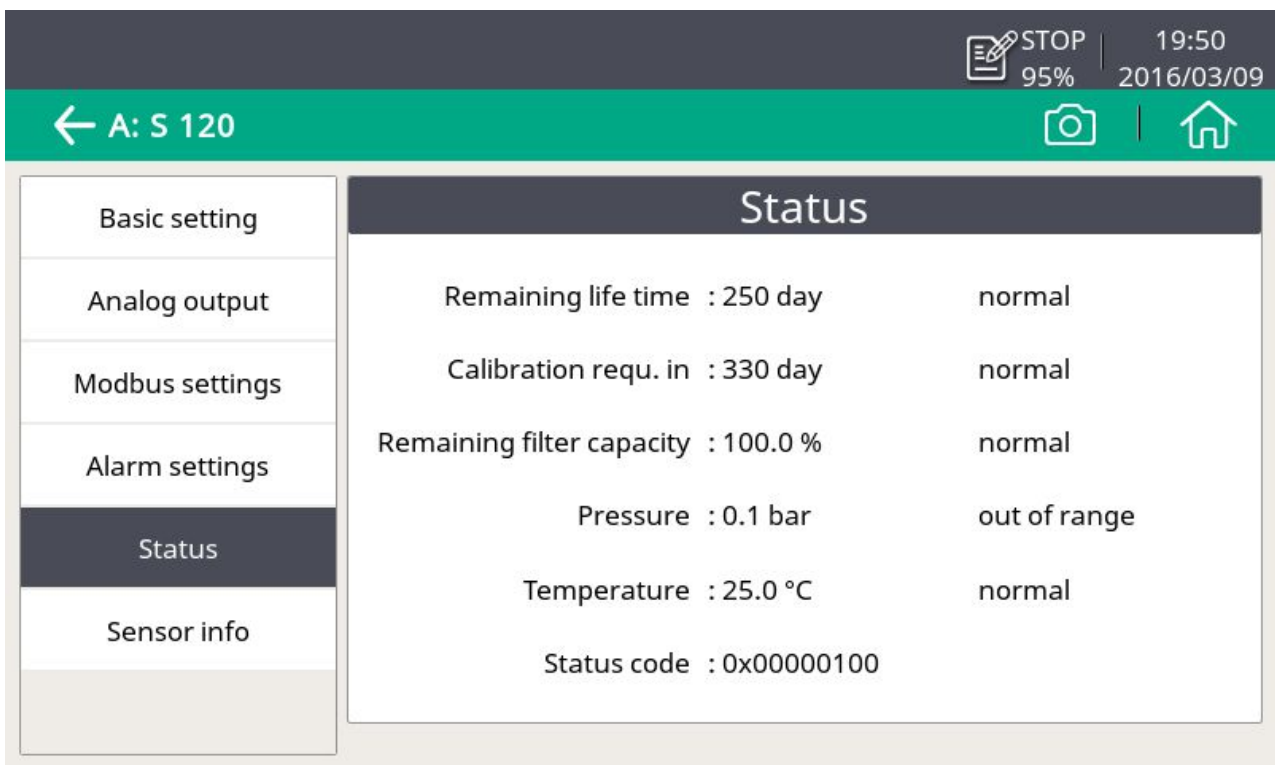
### 8.4.4 Alarm settings

Please enter the desired threshold of oil vapor to activate the alarm.



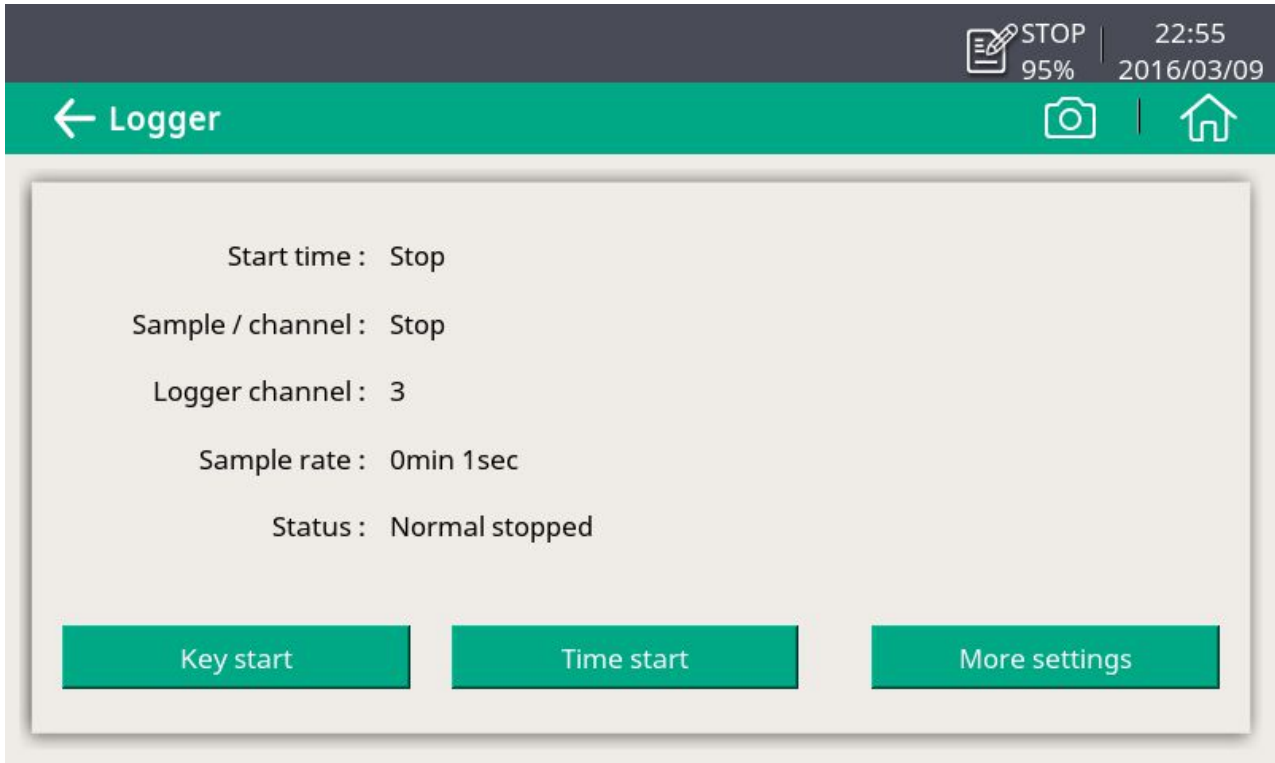
### 8.4.5 Status

The status show you useful information in case of s service issue.



## 8.5. Logger

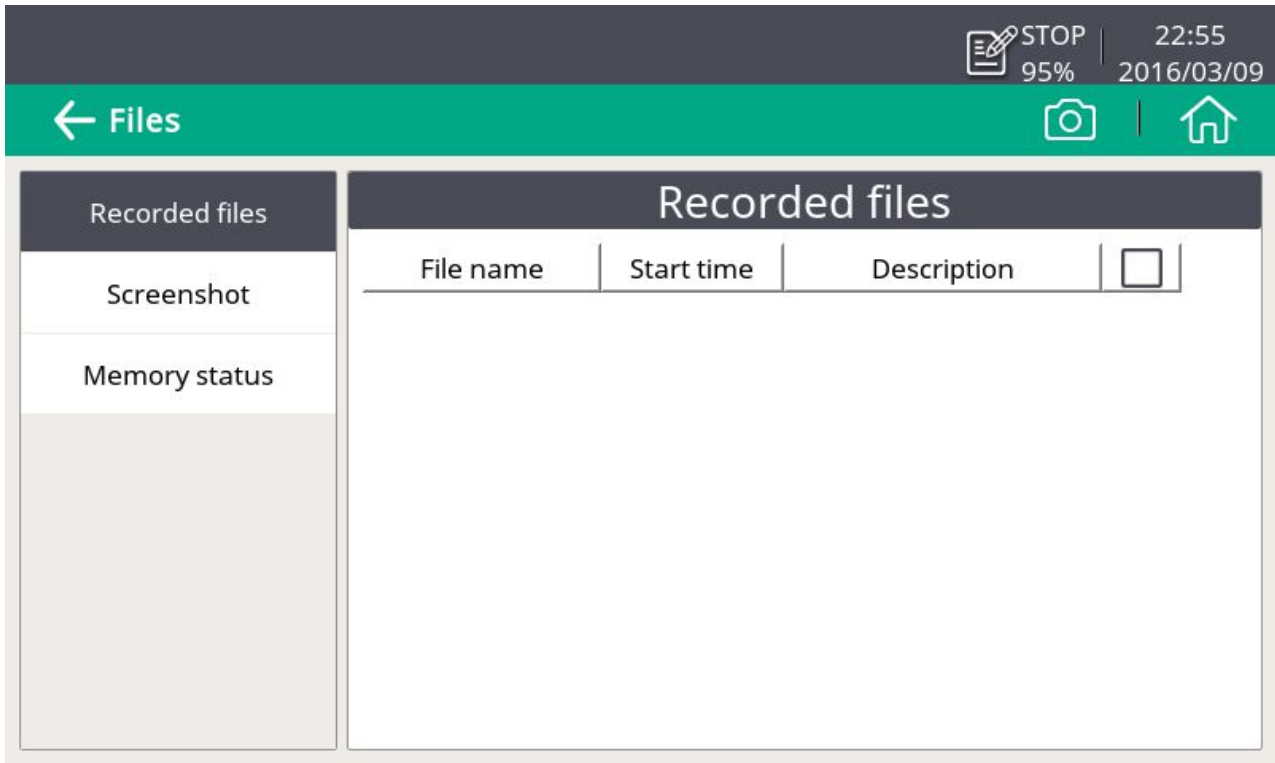
In this sub-menu the logger status can be seen and programmed.



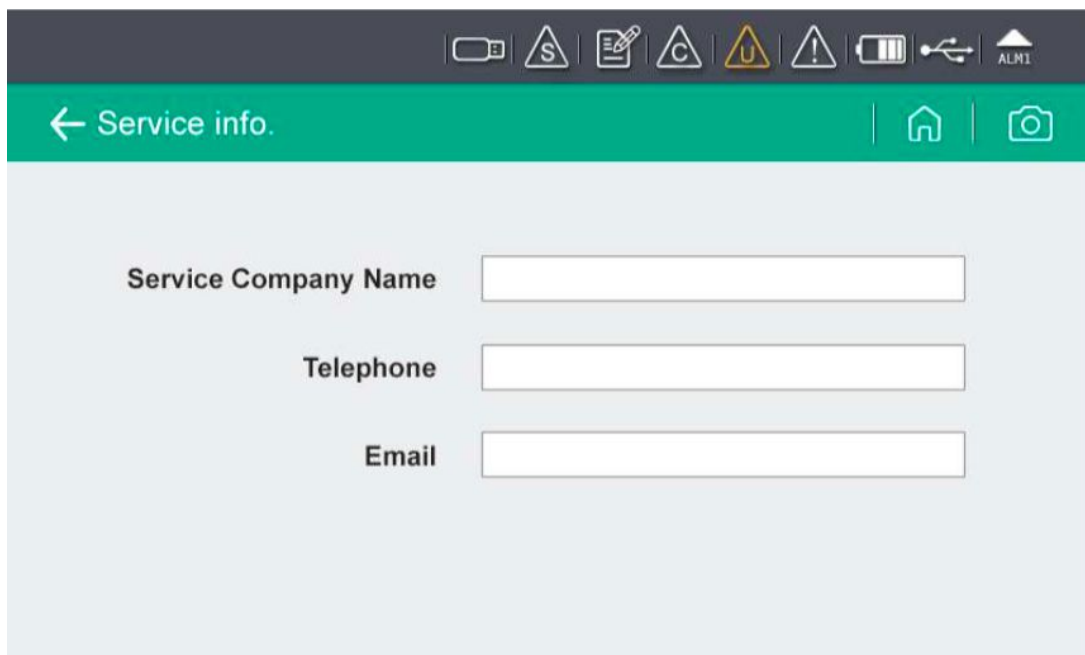
<b>Start time</b>	Logger start time
<b>Sample / Channel</b>	Recorded sample number per logging channel
<b>Logger channel</b>	Total recording channel number
<b>Sample rate</b>	Recording interval
<b>Status</b>	Logger status

### 8.6 Files

This menu shows all recorded files. Single files can be selected for some recording details or can be deleted. Memory status inform about available memory.

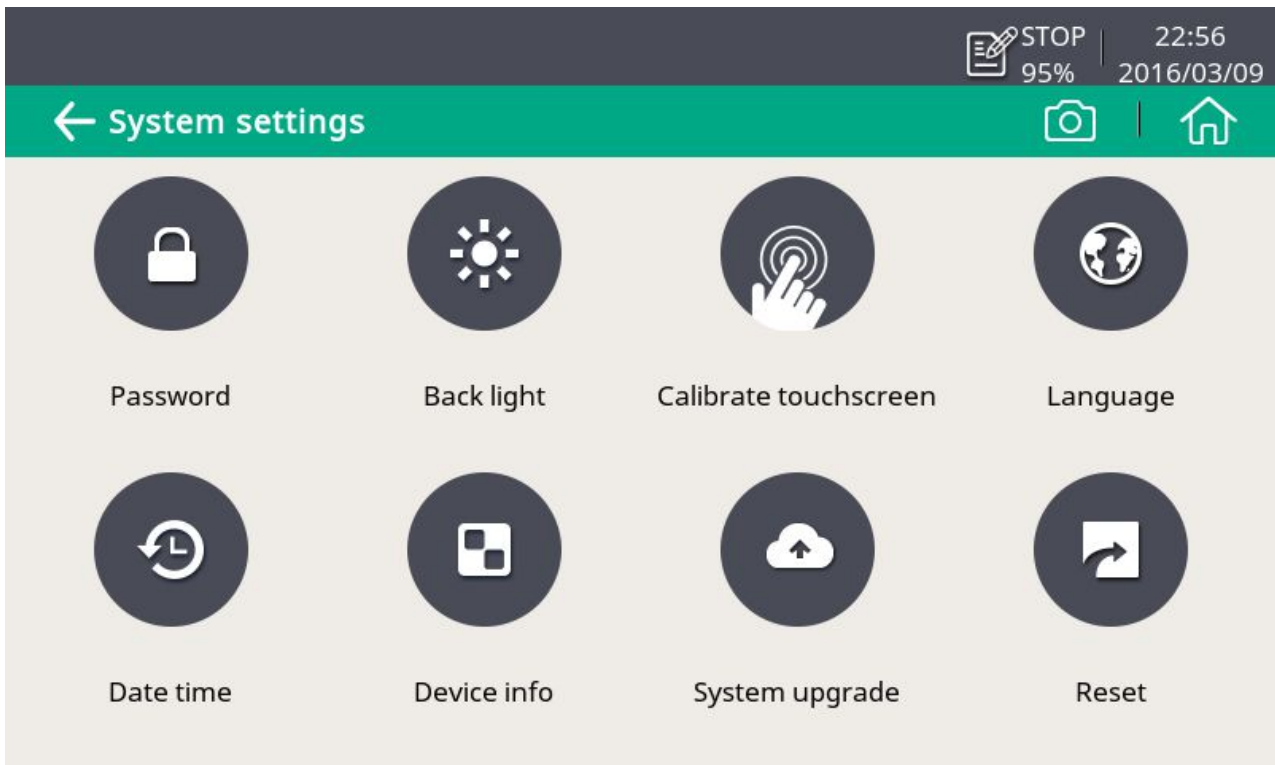


### 8.7 Service info





## 8.8 System settings



<b>Password</b>	Set password to protect some critical operations e.g.
<b>Back light</b>	Adjust brightens and dimming time out.
<b>Calibrate touch screen</b>	Calibrate touch accuracy
<b>Language</b>	Select user interface language
<b>Date time</b>	Set date time
<b>Device info</b>	Information for service cases
<b>System upgrade</b>	Upgrade the system
<b>Reset</b>	Reboot the display

## 8.9 Communication

No function.

## 9. LED indicators at front panel



The LEDs start blinking if pre-set alarms are reached or if service is needed. The service indications start blinking 4 weeks before expiring and are turned on permanently when service is immediately required.

### 9.1 S 120 error indications and display indications

Alarm LED on/ Service LED on / Relay open:

- Internal filter is used up
- Sensor calibration is expired

Alarm LED on/ Service LED on / Relay open / Analog output 3.5 mA:

- Auto calibration procedure failed
- Inner communication error

Alarm LED on/ Relay open:

- Measurement value above programmed alarm threshold

Alarm LED on/ Relay open / Analog output 3.5 mA:

- Supplied pressure is out of valid range
- The sample gas temperature is below -20°C

Alarm LED on/ Relay open / Analog output 21 mA:

- The sample gas temperature is above +50°C
- Measurement value over range

Alarm LED on/ Service LED blink:

- Sensor calibration expiry date is below 30 days

Service LED blink:

- Internal filter capacity is below 10%

- UV lamp lifetime is below 30 day

Service LED on/ Relay open:

- UV lamp lifetime is expired

## 10. Signal outputs

### 10.1 Analog output

The S 120 has an analog output range of 4... 20 mA. This output is scaled to:

- 4 mA = 0.000 mg/m<sup>3</sup>
- 20 mA = 10.000 mg/m<sup>3</sup>

### 10.2 Digital output

#### Modbus operation

Index	Channel description	Unit	Resolution	Format	Length	Modbus address
0	Gas temperature	°C	0,1	FLOAT	4 Byte	0
1	Oil vapor content	mg/m <sup>3</sup> ppm	0,001	FLOAT	4 Byte	2
2	Pressure	bar	0,1	FLOAT	4 Byte	4
3	Remaining life time	day	1	FLOAT	4 Byte	6
4	Remaining filter capacity	%	0,1	FLOAT	4 Byte	8
5	System status		1	UNIT32 U	4 Byte	10
6	Sensor output	mV	0,001	FLOAT	4 Byte	12

#### Remarks

- All numbers are in little-endian format.

#### Interpretation of system status

Bit	Description	Bit	Description
0	Alarm triggered at oil vapor channel	8	Pressure too low

- |                                      |                               |
|--------------------------------------|-------------------------------|
| 1 Oil vapor content over range       | 9 Pressure too high           |
| 2 Calibration will overdue soon      | 10 Temperature too low        |
| 3 Calibration overdue                | 11 Temperature too high       |
| 4 Sensor life time will overdue soon | 12 Inner communication failed |
| 5 Sensor overdue                     | 13 Sensor signal is too small |
| 6 Filter will overdue soon           | 14 Sensor signal is too high  |
| 7 Filter overdue                     |                               |

### 10.3 Alarm output

The S 120 has an relay output with a 60 V / 1 A rating. It is possible to monitor e.g. the oil vapor content and give an alarm at a particular value.

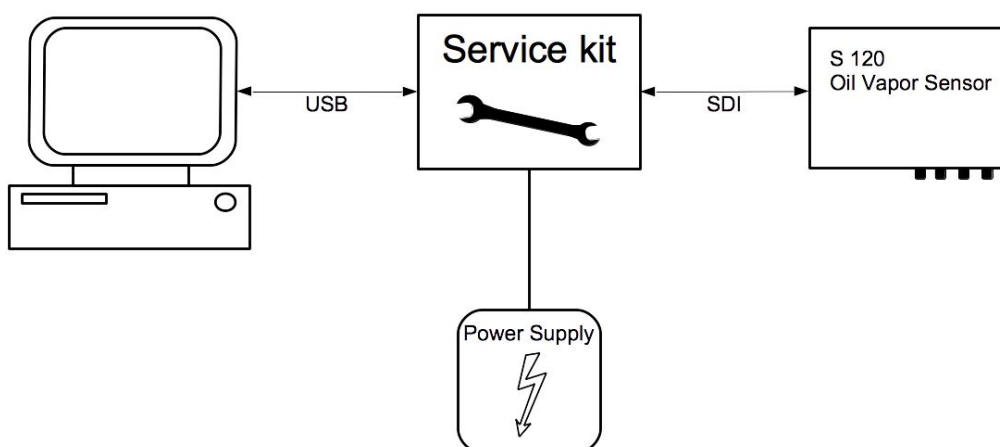
## 11. Optional extra accessories

### 11.1 Sensor display (optional)

With the Sensor display it is possible to show the actual values, to change settings and it shows error messages.

### 11.2 Service kit

The diagram below shows the connection when using the optional service kit. Please ensure that also in this case the power supply of either S 120 or of the service kit is connected because the USB port is not supplying enough power.



## 12. Calibration

It is recommended to calibrate respectively adjust the sensor annually. For this please contact the manufacturer. Please check the date of the last calibration in the attached calibration certificate.

## 13. 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!**

## 14. Disposal or waste

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

The sensor, 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.

## 15. 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 month.**

---

## SUTO iTEC GmbH

Werkstr. 2  
79426 Buggingen  
Germany

Tel: +49 (0) 7631 936889-0

Fax: +49 (0) 7631 936889-19

Email: [sales@SUTO-itec.com](mailto:sales@SUTO-itec.com)

Website: <http://www.SUTO-itec.com>

## SUTO iTEC Co., Ltd.

Room 10, 6/F, Block B, Cambridge Plaza  
188 San Wan Road, Sheung Shui, N.T.  
Hong Kong

Tel: +86 (0) 755 8619 3164

Fax: +86 (0) 755 8619 3165

Email: [sales@SUTO-itec.asia](mailto:sales@SUTO-itec.asia)

Website: <http://www.SUTO-itec.com>