

Instruction and operation manual

S601

Stationary compressed air purity analyzer



Dear Customer,

Thank you for choosing our product.

Please read the manual in full and carefully observe operating instructions stated before you start up the device. The manufacturer cannot be held liable for any damage that 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 canceled and the manufacturer is exempt from liability.

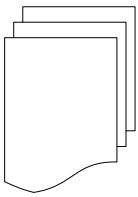
The device is destined exclusively for the described application.

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.....	4
2	Registered trademarks.....	7
3	Application.....	8
4	Features.....	8
5	Technical Data.....	9
5.1	General data.....	9
5.2	Electrical data.....	10
5.3	Accuracy.....	10
6	Dimensions.....	11
7	Installation on site.....	12
7.1	Selecting the installation location.....	12
7.2	Mounting the unit at the wall.....	13
7.3	Electrical connections.....	14
7.3.1	Power supply.....	14
7.3.2	RS-485 networking (Modbus RTU).....	15
7.3.3	TCP/IP networking (Modbus TCP).....	16
7.3.4	Alarm outputs.....	16
7.4	Compressed air connection.....	17
8	Setup.....	19
9	Operations and configurations.....	20
9.1	Main screen.....	21
9.1.1	Quick buttons and icons.....	21
9.1.2	Icons in the status bar.....	21
9.2	Value screen.....	22
9.3	Graphic screen.....	23
9.4	Menu.....	23
9.4.1	Sensor settings.....	24
9.4.2	Alarm setting.....	25
9.4.3	Logger setting.....	25
9.4.4	Files.....	26
9.4.5	Service info	27
9.4.6	System setting.....	27
9.4.7	Communication.....	28
9.5	Configuring S601 using S4C-Display.....	29
9.5.1	RS-485 settings.....	29
9.5.2	Ethernet settings.....	30
10	Software Installation.....	32
11	Optional accessories.....	32
12	Maintenance.....	32
13	Disposal or waste.....	32
14	Calibration.....	33

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 flow sensor at any time. In case of any obscurities or questions, regarding this manual or the product, please contact the manufacturer.

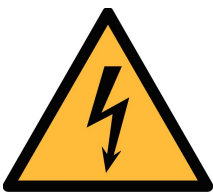


WARNING!

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 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.
- 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 check the compressed air connectors in terms of stability and tightness.

**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.

- Always observe the direction of the flow when installing the sensor. The direction is indicated on the housing.
- Do not exceed the maximum operation temperature at the sensors tip.
- Avoid condensation on the sensor element as this will affect the accuracy enormously.

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.

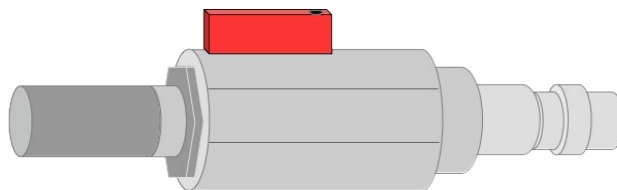


ATTENTION!

Equipment may get damaged!

Please make sure, that your measuring point is free of excessive contamination/dirt. This should be 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 sensors could be seriously damaged.
- Check your measurement point with the enclosed test kit.



2 Registered trademarks

SUTO®	Registered trademark of SUTO iTEC
MODBUS®	Registered trademark of the Modbus Organization, Hopkinton, USA
HART®	Registered trademark of the HART Communication Foundation, Austin, USA
PROFIBUS®	Registered trademark of the PROFIBUS User Organization, Karlsruhe, Germany
Android™, Google Play	Trademarks of Android™, Google Play

3 Application

The compressed air purity analyzer S601 is a compact wall-mounted device that measures and records three major quality parameters of compressed air (particle quantity, dew point and temperature).

The S601 is mainly used in industrial environments, and not developed to be used in explosive areas.

4 Features

- All-in-one device measures particle concentration, dew point and oil vapor
- Measures additionally the temperature and pressure
- Open protocol outputs enables the integration with your management system
- Modbus/RTU (RS 485) and Modbus TCP (Ethernet) included
- Compact design and easy setup
- Compressed air connection via 6 mm tube
- Integrated data logger saves data for later analysis
- Dew point measurement from -100 ... +20°C Td
- Oil vapor measurement from 0.003... 10.000 mg/m³
- Particle measurement in two versions:
 - A1260: $0.3 < d \leq 5.0 \mu\text{m}$
 - A1263: $0.1 < d \leq 5.0 \mu\text{m}$

5 Technical Data

5.1 General data

CE			
Data logger	Internal, 100-million values		
Parameter	Measuring parameter	Range	Reference
	Particle	Option A: 0.3 < d ≤ 0.5 μm 0.5 < d ≤ 1.0 μm 1.0 < d ≤ 5.0 μm	Annex 1 / DIN 14644
		Option D: 0.1 < d ≤ 0.5 μm 0.5 < d ≤ 1.0 μm 1.0 < d ≤ 5.0 μm	
	Dew point	-100 ... +20°C Td	DIN 8573
	Oil vapor	0.003 ... 10.000 mg/m ³	ZLG/AIM 07120604
	Pressure	0.3 ... 1.5 MPa	DIN 1301
	Temperature	0 ... +50°C	DIN 60751
	Reference settings	ISO 1217, 20°C 1000 mbar	
Measurement principle	Parameter	Principle	
	Particle quantity	Laser optical detection	
	Dew point	Ceramic humidity sensor, oscillating crystal	
	Oil vapor	PID	
Medium	Compressed air, non corrosive components		
Humidity of the medium	< 40% rH, non condensation		
Temp. of the medium	0 ... +50°C		
Operation pressure	0.3 ... 1.5 MPa / 43.5 ... 217.6 psig		

UV lamp lifetime (oil vapor)	6,000 working hours or 1 year, whichever comes first
Housing material	Sheet steel, powder-coated on the outside
Protection class	IP54
Dimension	Please observe the drawings on the next page
Display	5" graphics color display, 800 x 480 Pixel with touch screen interface
Weight	15 kg

5.2 Electrical data

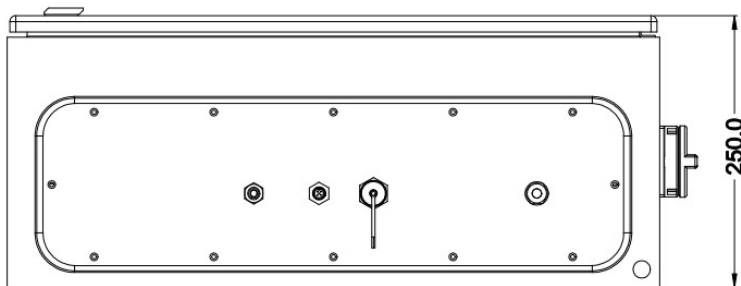
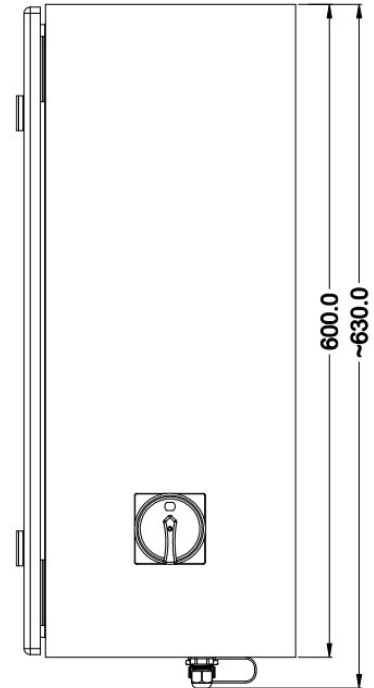
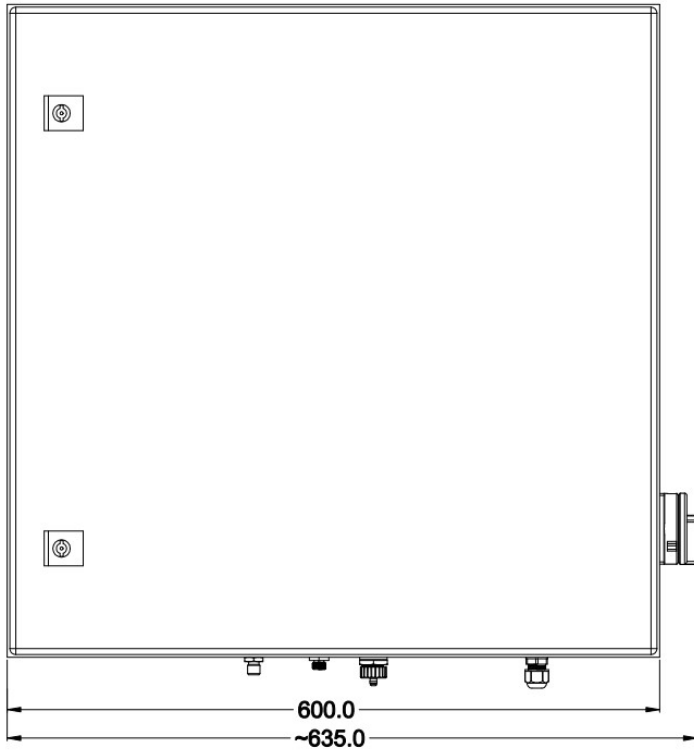
Power supply	Input: 100 ... 240 VAC, 50/60 Hz, 120 VA
--------------	--

5.3 Accuracy

Parameter	Accuracy
Particle	
Option A	50% @ $0.3 < d \leq 0.45 \mu\text{m}$ per JIS 100% @ $0.45 \mu\text{m} < d$ per JIS
Option D	50% @ $0.1 < d \leq 0.15 \mu\text{m}$ per JIS 100% @ $0.15 \mu\text{m} < d$ per JIS
Dew point	$\pm 2^\circ\text{C Td}$
Oil vapor	5% of value $\pm 0.003 \text{ mg/m}^3$
Temperature	$\pm 0.2 \text{ K}$
Pressure	$\pm 0.08 \text{ bar}$

6 Dimensions

Dimensions in mm:



7 Installation on site

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

Qty.	Description	Item No.
1	S601 compressed air analyzer in a wall mountable cabinet	D500 0601
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
1	6mm Teflon hose adapter, stainless steel	C219 0197
1	1.5 m Teflon hose with quick connector	A554 0003
1	M12 connector	C219 0059
1	Certificate of calibration	No P/N

If you need replacement materials from the list above or need further useful accessories, please contact the manufacturer or your local distributor.

7.1 Selecting the installation location

The device needs to be set up next to the measuring point.

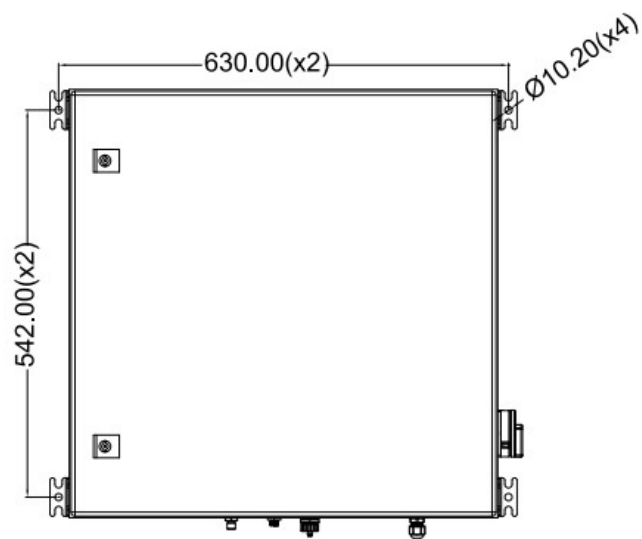
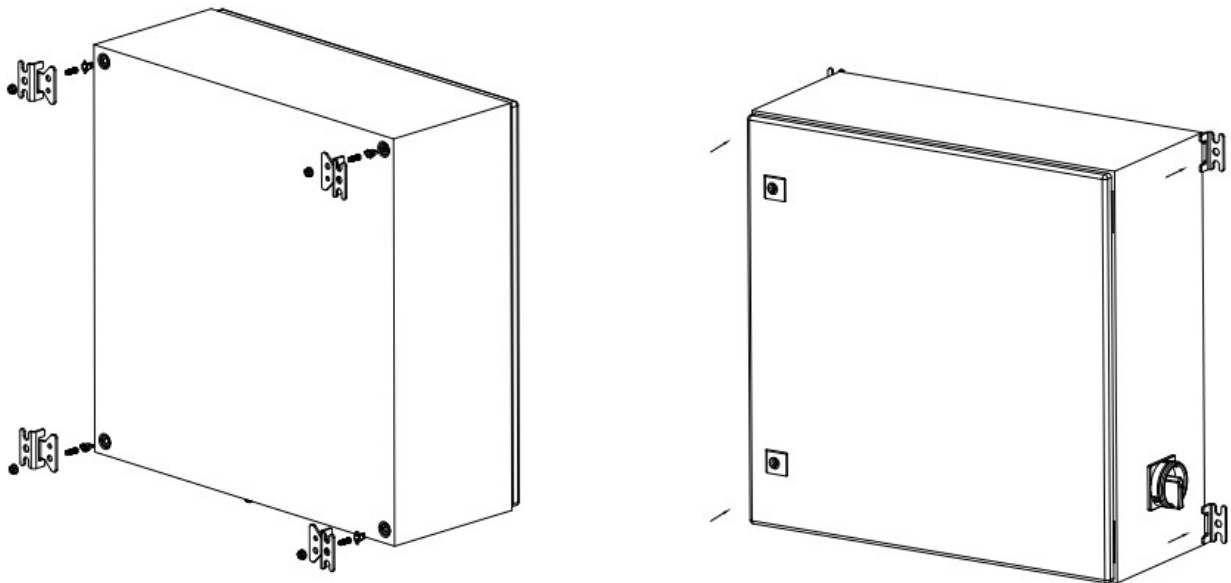
The air supply tube should not be bended too strongly and should be installed with a big curve radius.



ATTENTION!

The device is designed to be operated indoors only

7.2 Mounting the unit at the wall

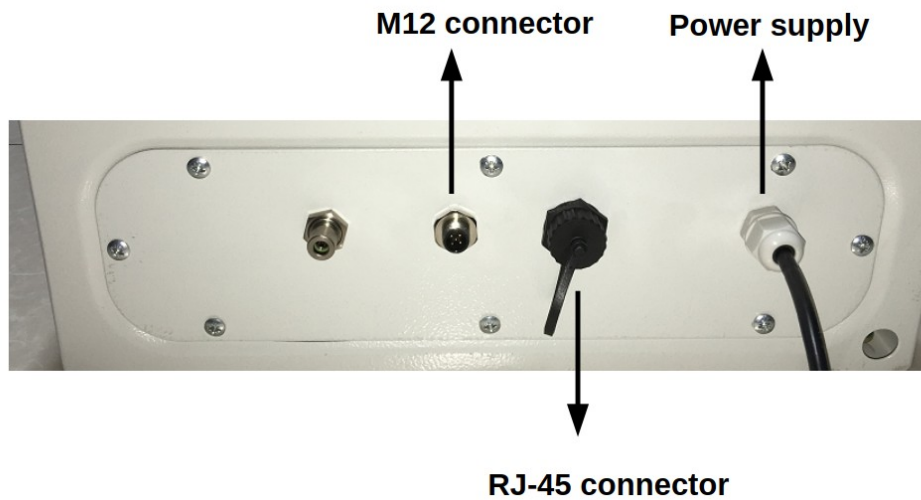


7.3 Electrical connections

The S601 provides the following electrical connectors:

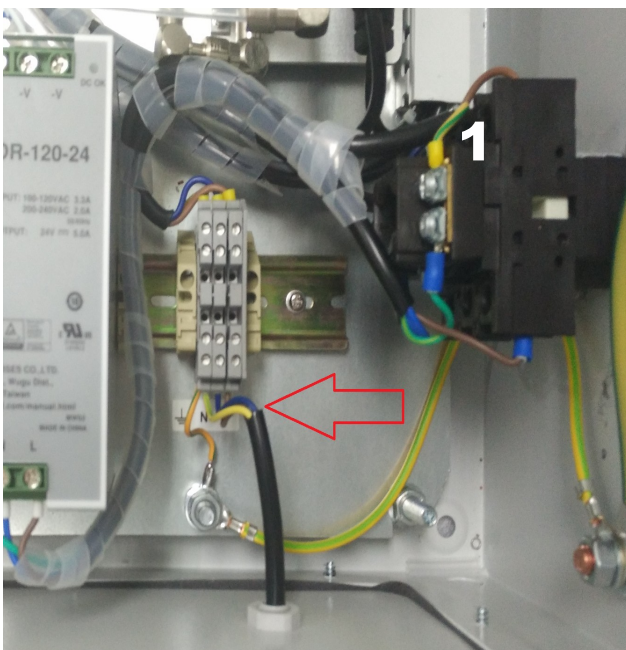
- A power supply connector (The cable is inserted through a PG plug and wires are connected to the internal screw terminals.)
- An M12 RS-485 connector: To connect S601 to a RS-485 network
- A RJ-45 Ethernet connector: To connect S601 to a TCP/IP network

In addition, two alarm output relays are provided inside the S601 cabinet.



S601 bottom view

7.3.1 Power supply



The power cable for the 230 VAC is connected to the terminals inside of the cabinet, as shown in the picture on the left.

**ATTENTION!**

Please observe voltage ranges and power levels!

7.3.2 RS-485 networking (Modbus RTU)

Through the M12 connector at the bottom, the S601 can be connected to the RS-485 network over the Modbus RTU protocol.

The RS-485 network requires a termination resistor at both far ends of the RS-485 bus. Please set them up correctly.

The RS-485 networking uses the following 3 pins in the M12 connector. The pin functions are described below.

	Pin No.	Pin name	Function
	4	Data +	Data + signal
	5	Data -	Data - signal
	1	GND RS-485	Ground of RS-485

RS-485 cable

Only cables according to the recommendations of EIA 485 standard should be used. A maximum of 30 devices may be connected to one segment. The bus cable must be laid at a distance of at least 20 cm from other cables. It should be laid in a separate, conductive, and earthed cable trunk. It must be ensured that no potential differences occur between the individual devices on the bus.

RS-485 cable specification

- Impedance: 135 – 165 Ohm @ 3 to 20 Mhz
- Cable capacity: < 30 pF/m
- Cable diameter: > 0.64 mm
- Cross section: > 0.34 mm², conforms to AWG 22
- Loop resistance: < 110 Ohm/km
- Screening: Cu shielding braid or shielding braid and shielding foil
- Outer diameter for power and sensor cable: 4.5 ... 8 mm

7.3.3 TCP/IP networking (Modbus TCP)

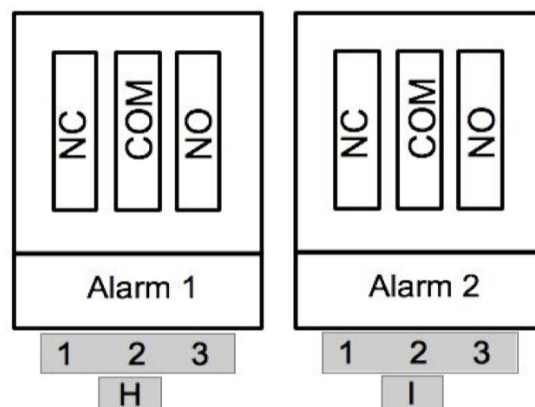
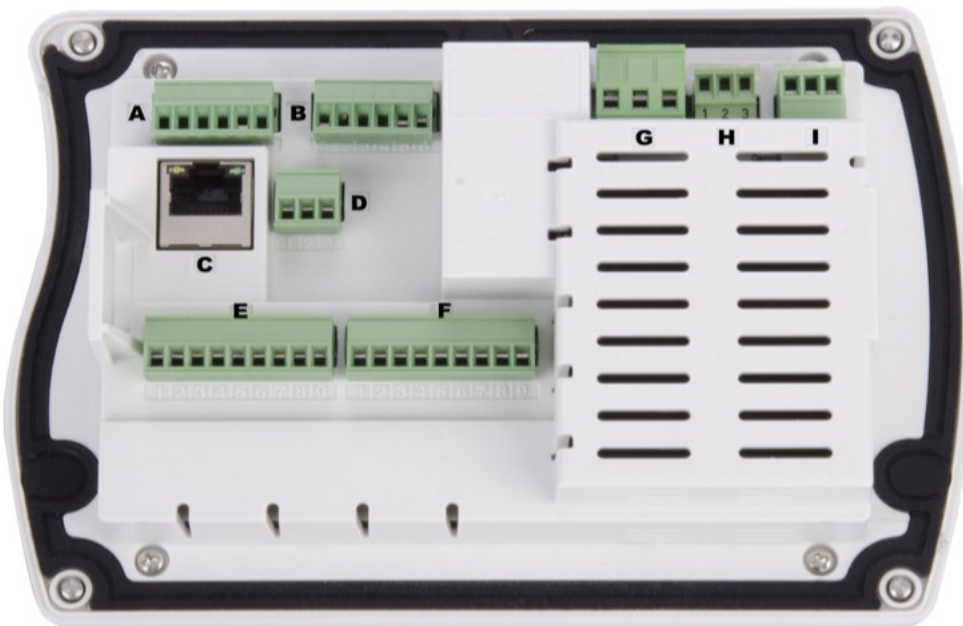
Through the RJ-45 connector at the bottom, the S601 can be connected to the TCP/IP network over the Modbus TCP protocol.

Remove the protection cap and plug in the network cable (RJ-45).

7.3.4 Alarm outputs

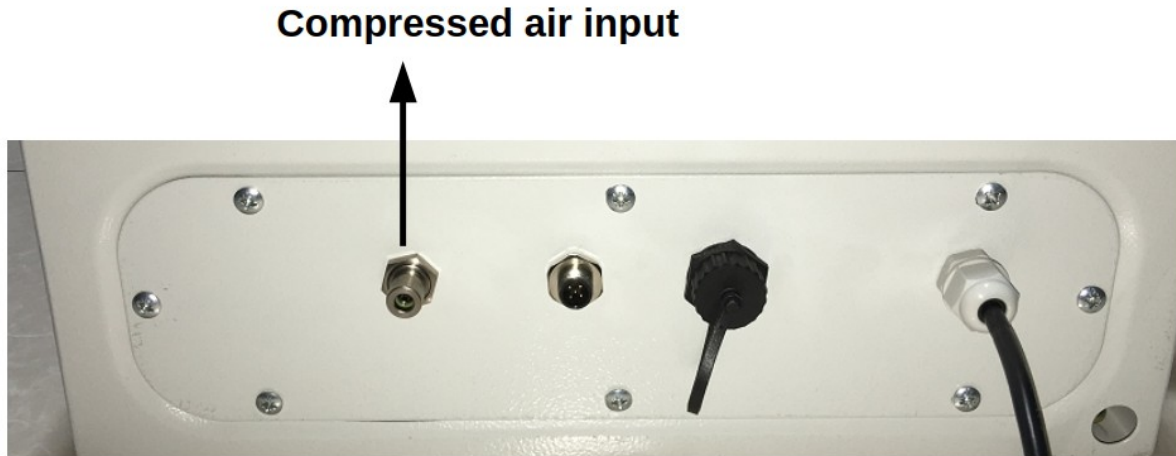
S601 provides two relays for alarm outputs (230 VAC, 3 A) in the S601 cabinet.

The following figure shows the back of the S601 display where the two alarm output relays (terminals G and I) are housed.



7.4 Compressed air connection

The S601 offers a compressed air input at the bottom of the cabinet, next to the electrical connectors.



Installation precautions



ATTENTION!

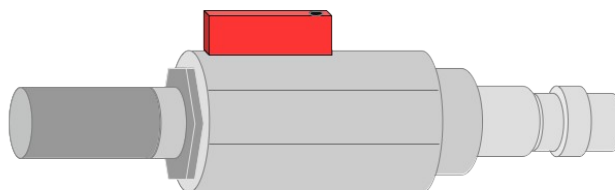
Permissible pressure!

Please observe the maximum permissible incoming pressure. It must be in between 0.3 and 1.5 MPa. If the pressure exceeds, it will damage the device. If the pressure is too low, the volume flow will not be high enough, which will lead to wrong results.



ATTENTION!

Before you connect the device to your point of measurement, make sure that there is no rough contamination such as water / oil drops or heavy dust. This could damage the sensor units. Please use the purge filter test kit to check the contamination.



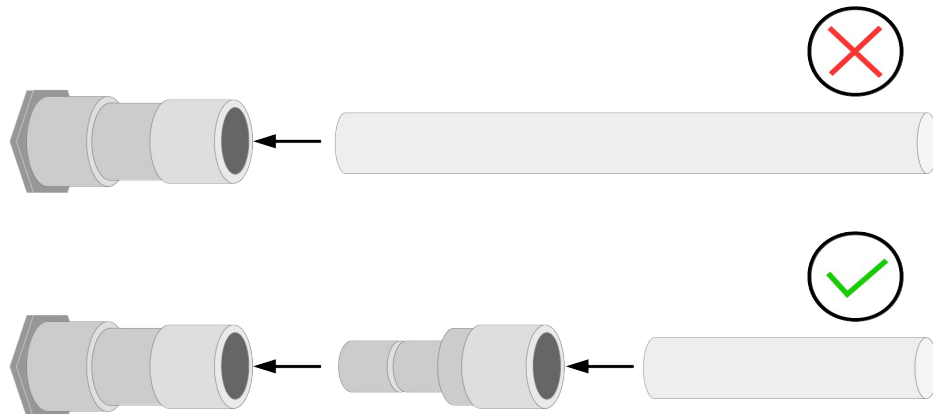
To check the measuring point, do the following:

1. Connect the purge filter test kit onto your measuring point.
2. Open the purge valve on the test kit and purge some air for a short period.
3. Check the filter in the test kit for high contamination of water, oil or dust.
4. If the filter is contaminated severely, stop using the S601 to measure because this may lead to serious damage. In case you are not sure, please contact the manufacturer.



ATTENTION!

Always use the 6 mm Teflon hose adapter to connect the Teflon hoses to the S601! Otherwise, you may damage the device.



Using a quick connector more than once may lead to particle contamination which can affect the measurement. For this please use the included adapters and keep them on your tubes.

8 Setup

The S601 is configured ex-work and ready to measure out of the box. The setup settings are saved in the device and will not be lost even after a power failure.

To ensure an accurate measurement, before measurement, configure the altitude where the device is placed. The device also enables you to change the ex-work settings. For more information, see section 8.4.



ATTENTION!

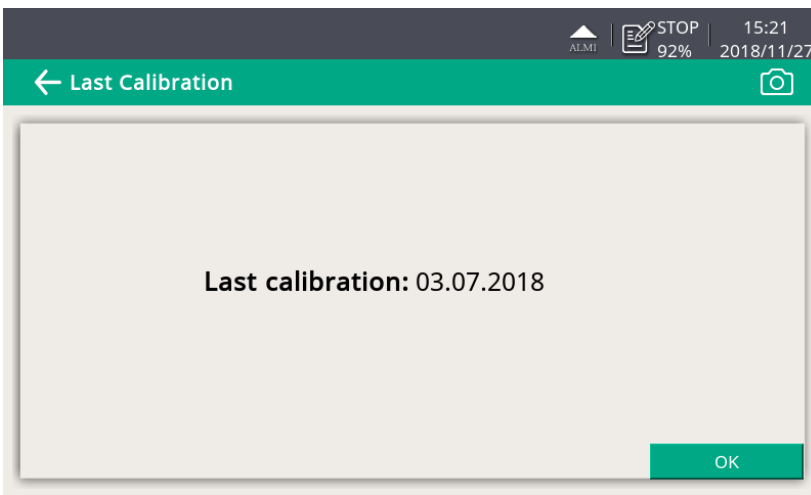
If you have problems setting up your device, feel free to contact the manufacturer or your local dealer for assistance.

If a power failure occurs during the measurement, the measurement data will not be saved.

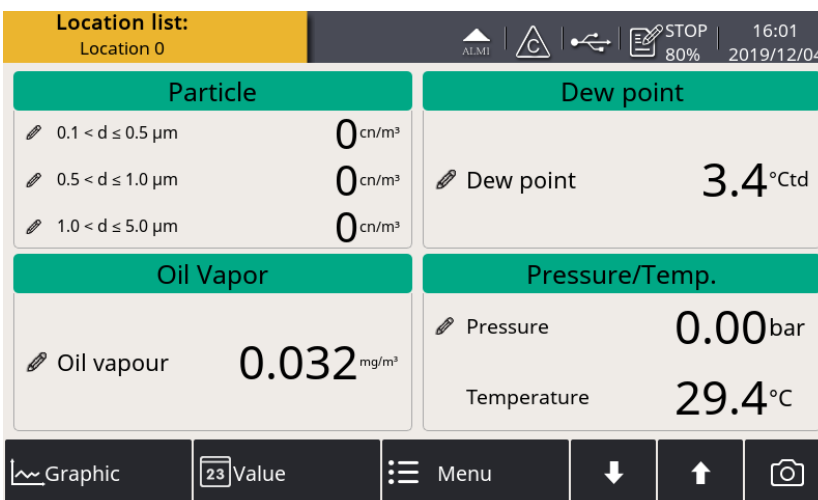
9 Operations and configurations



When the S601 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.



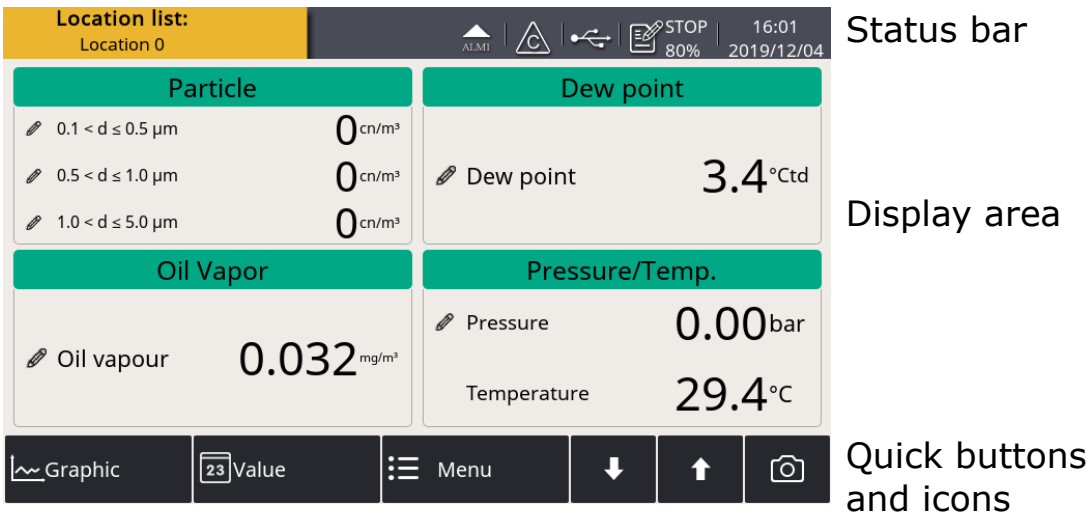
After the initialization is completed, the date of the last calibration is shown. Click **OK**.



The value screen appears, as shown on the left.

9.1 Main screen

The following figure shows the main screen in the value view.



9.1.1 Quick buttons and icons

Buttons and icons	Description
	To switch to the graphic view of measurement data
	To switch to the value view of measurement data
	To access the operation menus
	To scroll down and up the screen
	To take a screenshot

9.1.2 Icons in the status bar

	USB stick connected. Press the icon to disconnect the stick.		System errors occur. Press this icon to get further information.
	Type of the connected sensor does not match with the sensor type configured in the device		Sensor unit is not matching with configuration



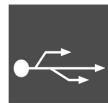
Logger status



RTC backup battery status



Calibration is expired. Please contact the manufacturer or your local dealer.



Connected to a PC through the USB port.



Alarm triggered

9.2 Value screen

Shows the measured values in real time.

Location list:		ALM1		STOP 80%		16:01	
Location 0		ALM1		80%		2019/12/04	
Particle				Dew point			
0.1 < d ≤ 0.5 μm		0 cn/m ³		Dew point		3.4 °Ctd	
0.5 < d ≤ 1.0 μm		0 cn/m ³					
1.0 < d ≤ 5.0 μm		0 cn/m ³					
Oil Vapor				Pressure/Temp.			
Oil vapour		0.032 mg/m ³		Pressure		0.00 bar	
				Temperature		29.4 °C	
Graphic		Value 23		Menu		↓ ↑	

To view the value screen, press **Value** in the bottom bar.

Note: During the first five minutes, the S601 automatically 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 blink.

9.3 Graphic screen

Shows the dynamic graphs of all measurements. To view the graphic screen, press **Graphic** in the bottom bar.

The graphic view is pre-configured in the factory. You can view the S601 measurement graph without configuring anything. In case that you want to manipulate the graph, follow the instructions indicated in the following figure.

Annotations for the Graphic screen:

- Touch Y-axis to set scaling
- Touch X-axis to define the viewing period
- To scroll time
- To bring you back to the home page
- Settings related to a channel:
 - Touch once on a channel to select the channel's scaling as the Y axis.
 - Touch twice on a channel to hide its graph.
 - Long touch to change the channel settings such as curve color.

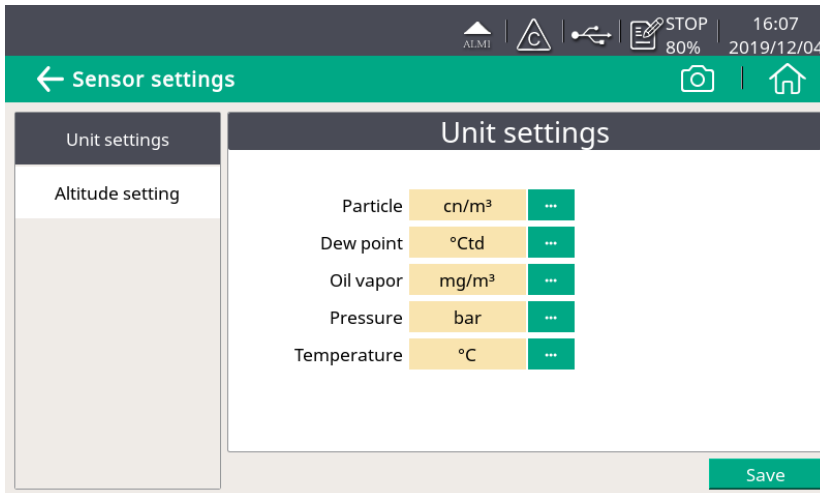
9.4 Menu

Enables you to change the S601 settings.

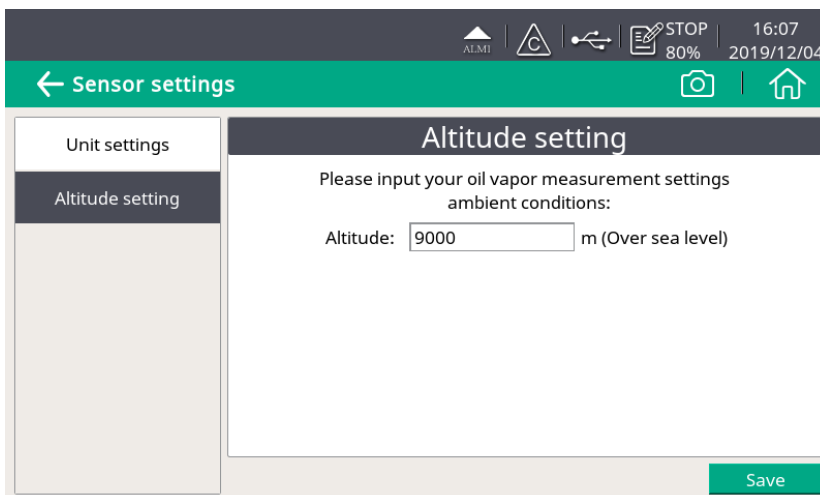
You can enter the main menu by pressing **Menu** in the quick buttons bar at the bottom.

9.4.1 Sensor settings

Enables you to configure the measurement units and altitude for the S601.



To change the measurement units.

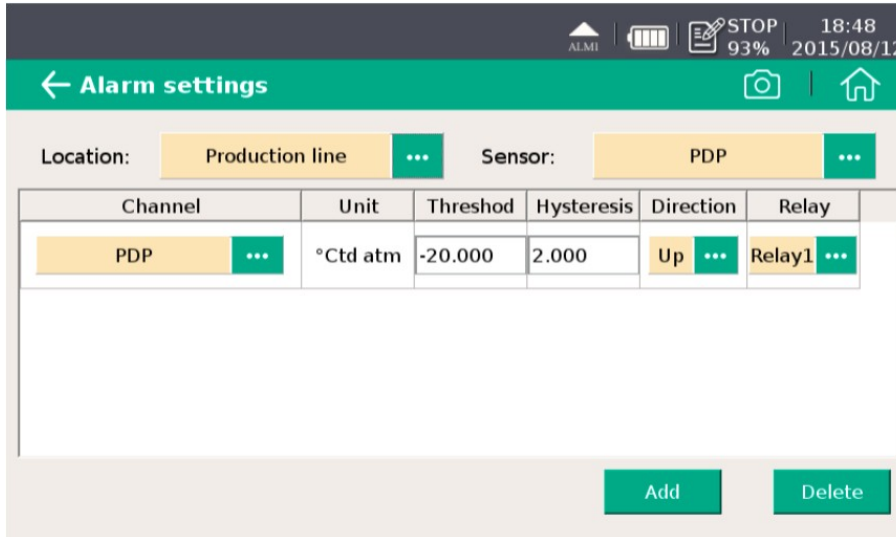


To ensure an accurate oil vapor measurement, enter the altitude where the S601 is placed. The valid values can be positive only.

If the S601 is placed at a negative altitude, please enter 0 instead of the actual negative value.

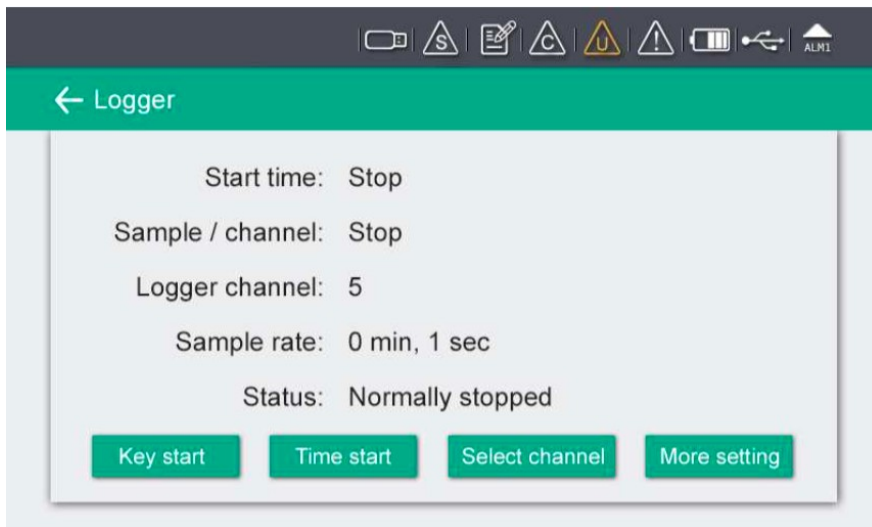
9.4.2 Alarm setting

Enables you to define alarms in the S601. The S601 offers two alarm relay outputs and an optical alarm indication (flashing value).



9.4.3 Logger setting

Enables you to start and stop the logger and view logger status.

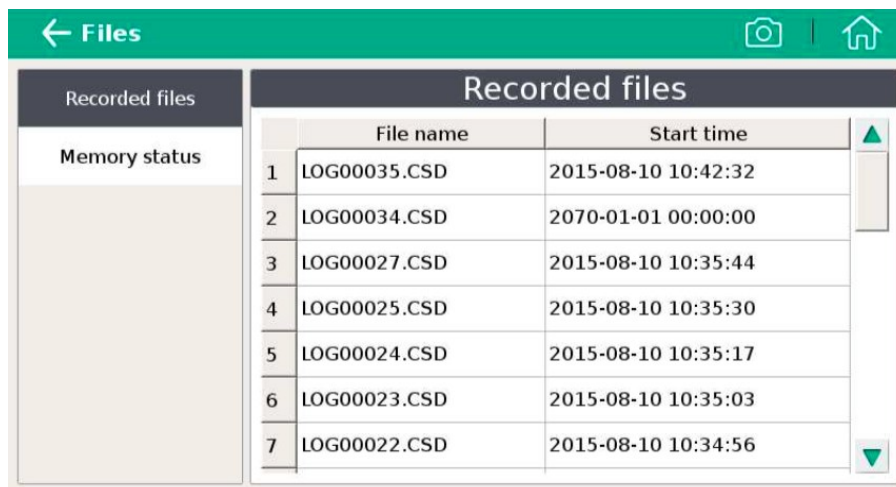


Start time	Shows Logger start time.
Sample / Channel	Show the number of recorded samples per logging channel.
Logger channel	Shows the total number of the recorded channel.
Sample rate	Shows the sampling rate. To change the sampling rate, click More settings .
Status	Shows the logger status.

Key start	Click to start logging immediately.
Time start	Click to configure a scheduled start for logging.
Select channel	Click to select the channel to log for.
More setting	<p>Click to configure the logging interval, logging mode, and memory mode.</p> <ul style="list-style-type: none"> • Average: Turning Average on means to log the average value during an interval; turn the average off means the logged value is an instantaneous one. • Memory mode: Choose a mode as needed. <ul style="list-style-type: none"> ◦ Full stop: Logging stops if the memory is full. ◦ Wrap around: If the memory is full, new logging data overwrites the oldest data.

9.4.4 Files

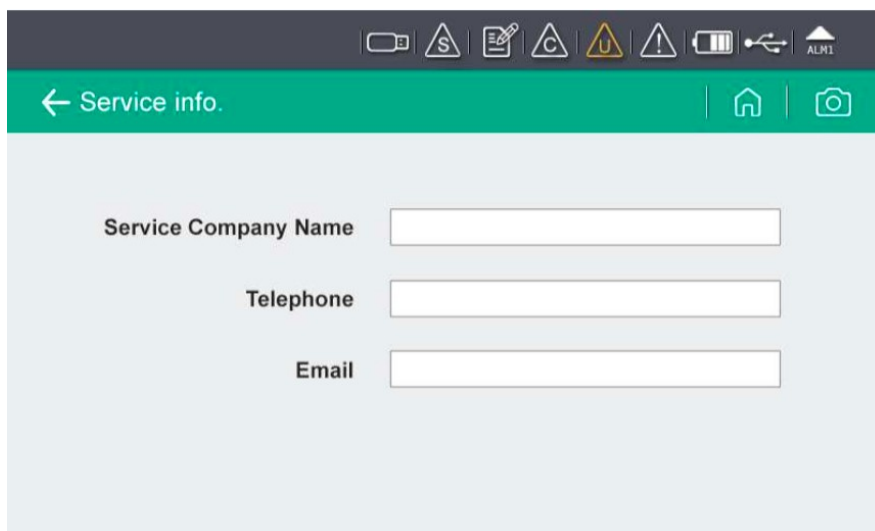
Shows all recorded log files and screenshots as well as memory status. You can select a log file to view log details or to delete the file.



9.4.5 Service info

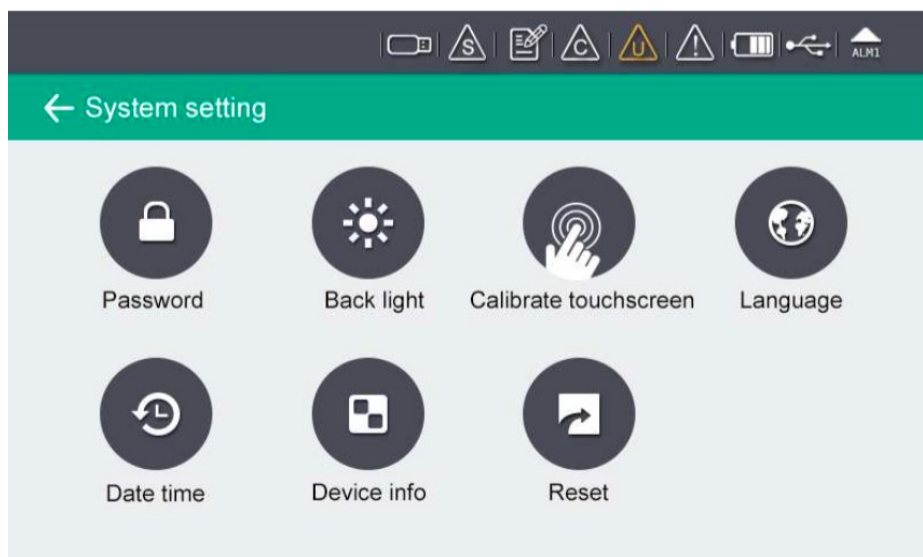
Enables you to view the contacts of the service provider, which can be input using the S4C-Display software.

For more information about how to use S4C-Display, see section 9.5Configuring S601 using S4C-Display



9.4.6 System setting

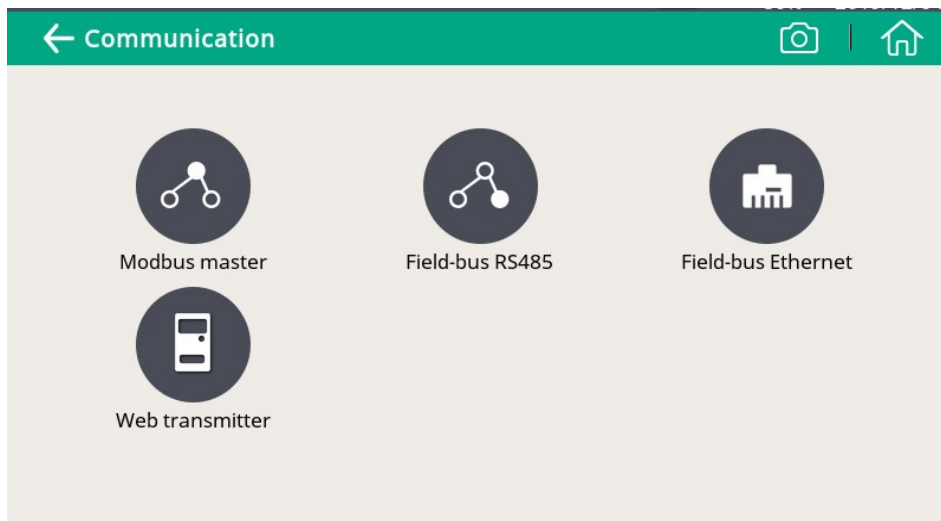
Enables you to configure the S601 general settings.



Password	To configure a password to protect the S601 from unauthorized operations.
Back light	To adjust the back light brightness and the dimming timeout.
Calibrate touch screen	To calibrate the touch accuracy.
Language	To select the user interface language.
Date time	To configure the date and time.
Device info	<ul style="list-style-type: none"> • To view the device software and hardware information, such as S/N and firmware versions of the system and the sensors. • To update the new sensor S/N after an exchange service.
Reset	To reboot the display.

9.4.7 Communication

The menu enables to configure the communication settings for S601. Click the desired button and follow the instruction shown on the display.



Modbus master	S601 works as the Modbus master. Enter the Modbus communication parameters for S601 to communicate with Modbus slaves.
Field-bus RS485	S601 works as the slave. Enter the port (1-247) that S601 uses to communicate with the master.
Field-bus Ethernet	Enter an IP address for the S601 or select DHCP for the S601 to be assigned with a

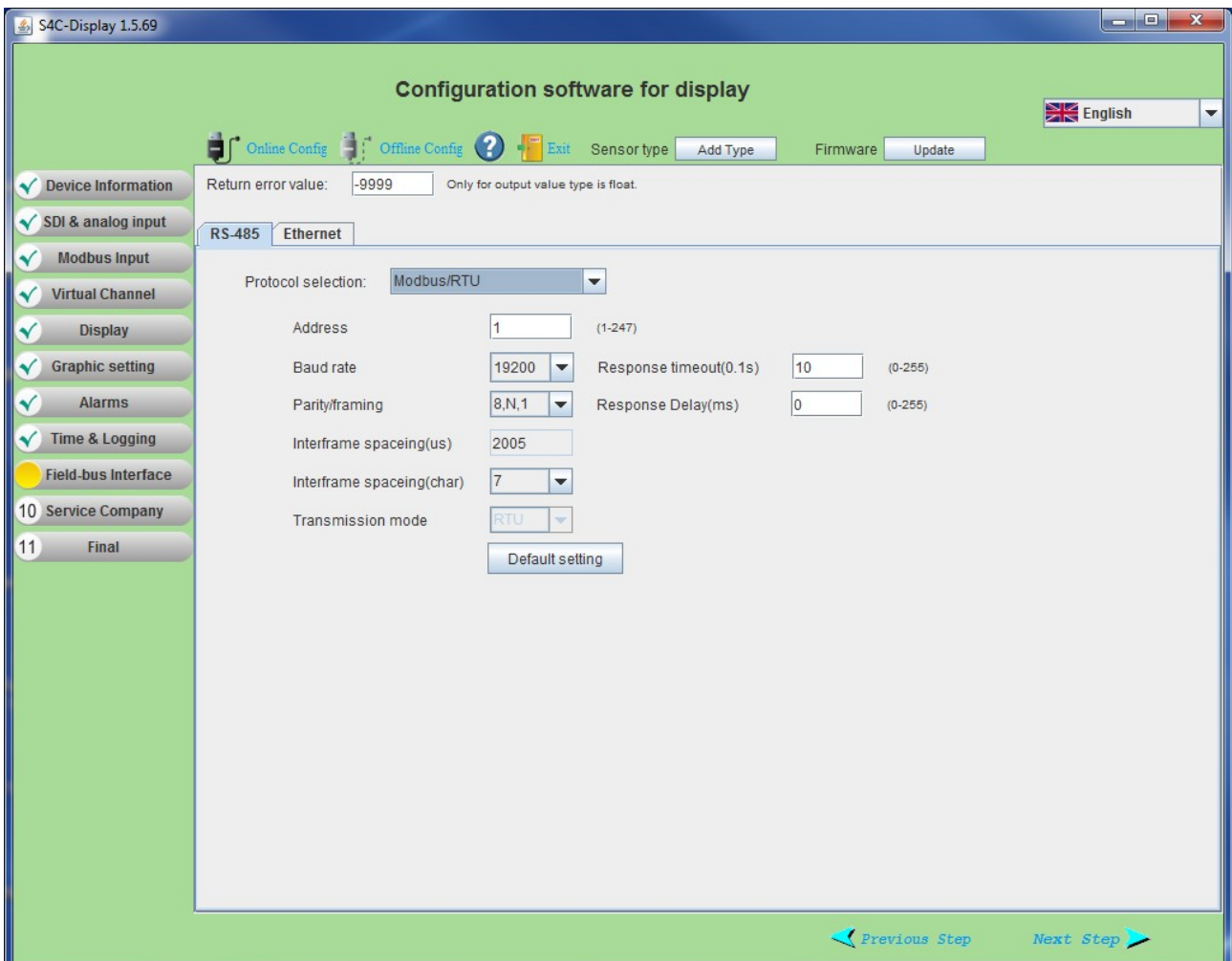
	dynamic IP address.
Web transmitter	Enter the IP address or domain name of the S4M server.

9.5 Configuring S601 using S4C-Display

To change the S601 settings, in addition to the S601 display, you can use the configuration software S4C-Display. You can download S4C-Display for free from the SUTO web page at www.suto-itec.com.

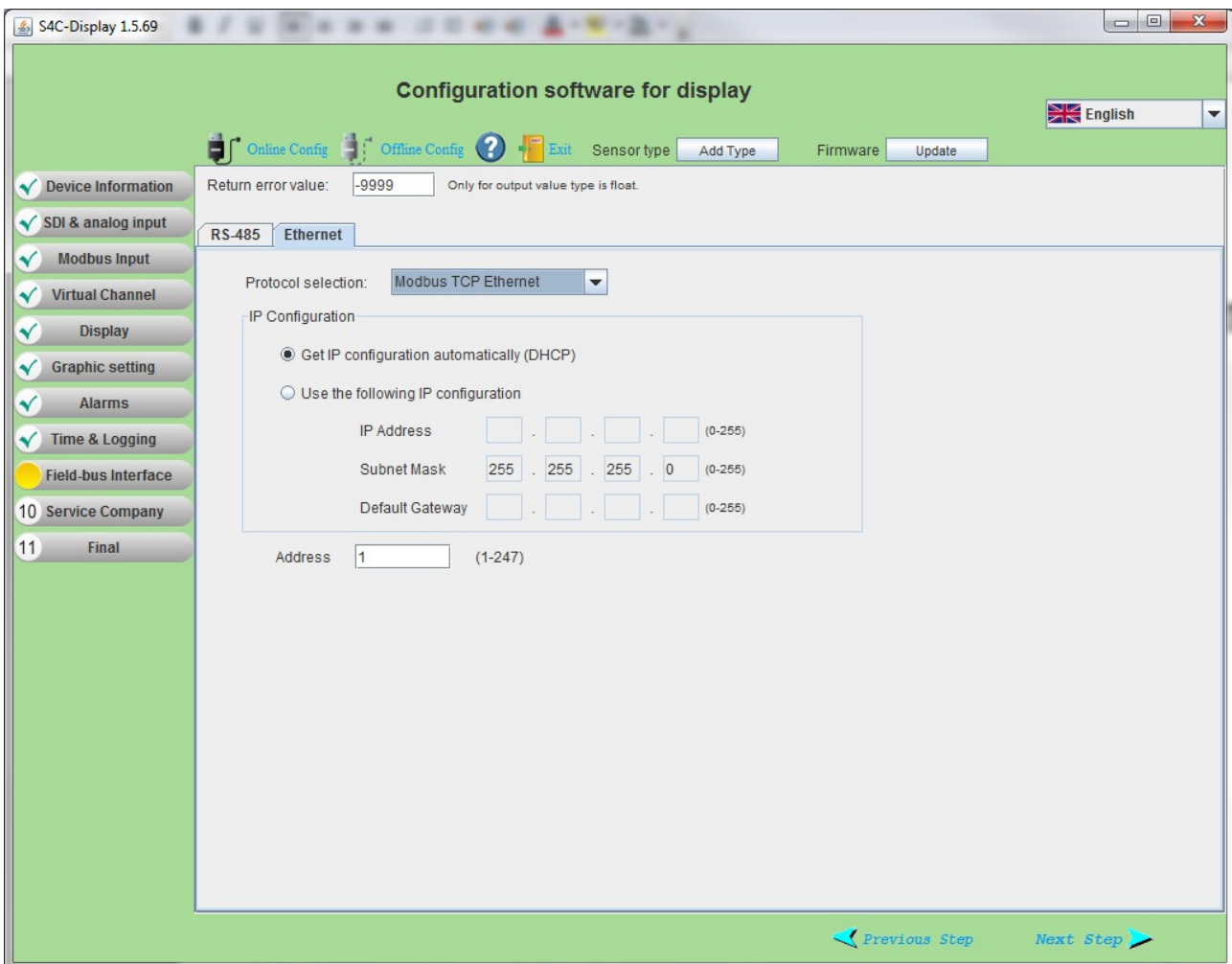
The following sections describe how to change the settings using the S4C-Display software, but focus on the Field Bus Interface settings.

9.5.1 RS-485 settings



Setting	Description
Return error value	Is the value the slave device will return as a measurement value in case of any error condition.
Protocol selection	<ul style="list-style-type: none"> Choose SUTO Protocol if the peer device is using SUTO software. Choose Modbus if the S601 is connected to a Modbus network.
Address	Each device on the RS-485 network needs to have a unique device address. Please ensure that address 0 is not used and that there are no duplicated addresses.

9.5.2 Ethernet settings



Setting	Description
Return error value	Is the value the slave device will return as a measurement value in case of any error condition.
Protocol selection	Please choose SUTO Protocol if using SUTO software, chose Modbus if device is connected to a Modbus network.
Get IP config automatically	After you select this option, the network router will dynamically assign the S601 an IP address. This is convenient but not recommended in industrial networks. We recommend you assign a static IP address to the S601.
Use the following IP...	Enter the static IP address for the S601.

Modbus holding register table

Sensor Description	Channel Description	Holding register	Data type	No. of byte	Unit	Res.	R/W	Func Code
Dew point sensor	Temperature	2	FLOAT_L	4	°C	0.1	R	3
	Dew point	4	FLOAT_L	4	°C Td	0.1	R	3
	Serial number sensor 1	10	UINT32_L	4		1	R	3
	Serial number sensor 2	12	UINT32_L	4		1	R	3
	Device status Dew point	14	UINT32_L	4		1	R	3
Particle counter	0.1 < d ≤ 0.5 um	20	FLOAT_L	4	cn/m ³	1	R	3
	0.5 < d ≤ 1.0 um	22	FLOAT_L	4	cn/m ³	1	R	3
	1.0 < d ≤ 5.0 um	24	FLOAT_L	4	cn/m ³	1	R	3
	0.3 < d ≤ 0.5 um	26	FLOAT_L	4	cn/m ³	1	R	3
	Serial number	30	UINT32_L	4		1	R	3
	Device status particle	32	UINT32_L	4		1	R	3
Oil vapor sensor	Oil vapor	40	FLOAT_L	4	mg/m ³	0.001	R	3
	Pressure	42	FLOAT_L	4	bar	0.01	R	3
	Serial number sensor	48	UINT32_L	4		1	R	3
	Device status oil vapor	50	UINT32_L	4		1	R	3
Display unit	Serial number display	60	UINT32_L	4		1	R	3
	Serial number sensor rack	62	UINT32_L	4		1	R	3
	Device status display	64	UINT32_L	4		1	R	3

Remarks:

- Device status information will be defined in a later state.
- Display unit serial number is the same number as the serial number of the complete S601 unit.

10 Software Installation

Following software is available for download from www.suto-itec.com:

S4C-Display	Free configuration software
S4A	Free logger readout and data analysis software
S4M	Multiple-device data acquisition and analysis software

After download, please follow the onscreen instructions to install the software.

11 Optional accessories

To buy the following optional accessories, please contact the manufacturer or your local dealer.

- Teflon hoses
- Sorts of adapters.

12 Maintenance

Use a moist fabric to clean the device. For the use in GMP-area, it is possible to disinfect through wipe disinfection. For this 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 too wet because water could get into the device and cause damage.

13 Disposal or waste

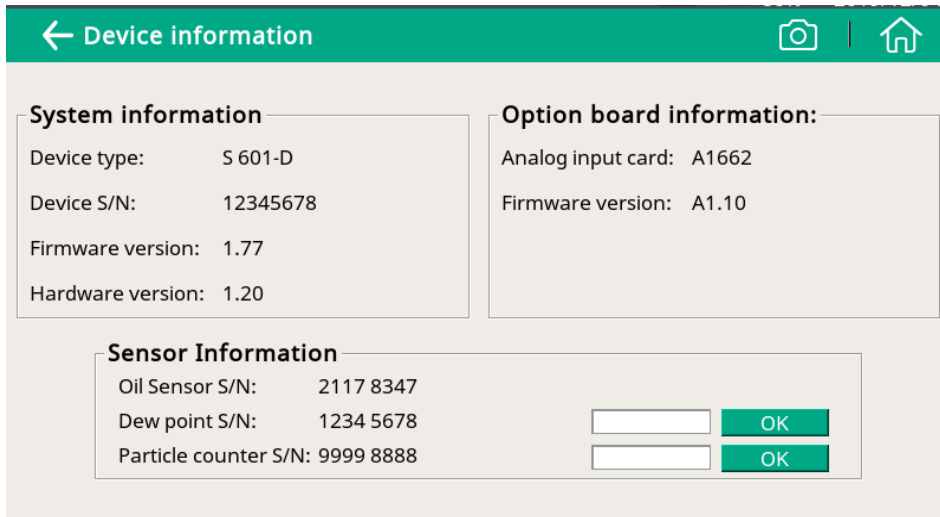


Electronic devices are recyclable material and do not belong in the household waste. The sensor, the accessories and its packing must be disposed according to your local statutory requirements. The dispose can also be carried by the manufacturer of the product, for this please contact the manufacturer.

14 Calibration

For calibration we recommend you use our exchange service, where the complete sensor unit is exchanged with a newly-calibrated unit. This saves time and costs.

After you exchange a new sensor unit, remember to input its serial number to the S601 through Menu > System Setting > Device info.



SUTO iTEC GmbH

Grißheimer Weg 21
D-79423 Heitersheim
Germany

Tel: +49 (0) 7634 50488 00
Fax: +49 (0) 7634 50488 19
Email: sales@suto-itec.com
Website: <http://www.suto-itec.com>

SUTO iTEC (ASIA) Co., Ltd.

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

Tel: +852 2328 9782
Fax: +852 2671 3863
Email: sales@suto-itec.asia
Website: <http://www.suto-itec.com>

All rights reserved ©

Modifications and errors reserved

S601_im_en_2019-2
