

Instruction and operation manual

S 551

Compressed air analyser



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.

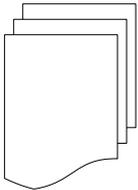
CS-iTEC offers no guarantee for the suitability for any other purpose. CS-iTEC is also not liable for consequential damage resulting from the delivery, capability or use of this device.

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 Input-Signals.....	8
4.4 Output-Signals.....	8
5. Installation	9
5.1 Installation Requirements.....	9
5.2 Installation Procedure	9
5.3 Electrical connection	10
6. Configuration	13
7. Operation	13
7.1 Value screen.....	13
7.2 The main menu	14
7.3 Description of display icons in status bar	15
7.4 Graphic screen.....	16
7.5 Sensor setting	16
7.5.1 Dew point setting	17
7.5.2 Flow sensor setting	18
7.5.3 Oil vapor sensor setting	20
7.5.4 Analog input setting	20
7.5.5 Power meter S 110-P setting.....	22
7.5.6 Analog extension module.....	22
7.5.7 Laser particle counter S 130.....	22
7.5.8 Ultrasound liquid flow meter S 460.....	22
7.6 Logger	22
7.7 Files.....	23
7.8 Service info.....	23
7.9 System setting.....	24
7.10 Communication	24
8. Signal inputs	25
8.1 Digital inputs.....	25
8.2 Analog input	25
9. Signal outputs.....	26
9.1 Interface	26
10. Optional extra accessories.....	26
11. Calibration.....	26
12. Maintenance.....	26
13. Disposal or waste.....	26

14. Warranty.....27

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 compressed air analyser 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.

**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 -20°C... 50°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°C... 50°C.
- Avoid direct UV and solar radiation during storage.
- For the storage the humidity has to be <90%, no condensation.

2. Application

The S 551 is a compressed air analyser which is designed to display and record all relevant parameters of compressed air and gases within the permissible operating parameters. These parameters can be found in the technical data section.

The S 551 can analyse for example the flow, dew point, pressure, temperature, power consumption and many more.

The S 551 compressed air analyser is not developed to be used in explosive areas. For the use in explosive areas please contact the manufacturer.

The S 551 compressed air analyser is mainly used in compressed air systems in industrial environment.

3. Features

- Connectable sensors for all required measurement tasks (air flow, air consumption, power consumption, pressure, temperature and many more).
- Up to 24 inputs through extension boxes and modbus.
- Several loggers can be combined: no need to have long cables from the sensor to the logger.
- Third party sensors can be easily connected.
- IP65 casing provides robust protection in the industrial environment.
- High resolution 5" colour touch screen interface.
- Because of the battery backup power, power glitches and cuts wont effect the performance.
- Full software package is included:
 - CSM-S for basic analyses
 - CAA for compressed air audit analysis

4. Technical Data

4.1 General

CE	
Data logger	4 GB, up to 100 million values
Operating temperature	0°C... 50°C
Housing material	PC + ABS
Protection class	IP 65
Dimensions	365 mm x 270 mm x 169 mm
Display	5" high resolution graphic display, 800 x 480 pixels with touch interface
Weight	4 kg

4.2 Electrical Data

Power supply	100... 240 VAC / 50 VA, 47-60 Hz
Internal battery	Rechargeable for up to 8 hours operation. Charging time ca. 3 hours

4.3 Input-Signals

Analog input	0... 1 V, 0... 10 V, 0...20 mA, 4... 20 mA
Digital input	2 x SDI Sensors 16 x RS 485 Modbus RTU Sensors

4.4 Output-Signals

Communication Interface	Ethernet, USB
-------------------------	---------------

5. Installation

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

Qty	Description	Item No.
1	S 551-P4 / S 551-P6	P560 5100/5101
1	USB cable	A553 0130
1	Instruction manual	No P/N
1	Calibration certificate	No P/N

5.1 Installation Requirements



ATTENTION!

Wrong measurement is possible, if the device is not installed correctly.

- The device is for indoor use only! At an outdoor installation, the device must be protected from solar radiation and rain.
- It is strongly recommend not to install S 551 permanently in wet environment as it exists usually right after a compressor outlet.

5.2 Installation Procedure

Because of the casing the S 551 no need a costly installation. Just connect the sensors like described in the chapter electrical connection.

5.3 Electrical connection

Please connect all sensors before switch on the S 551. Flow / dew point sensors are detected automatically when connected. The same extension modules (power meter, US flow meter, analog extension) which are connected to terminal M.

Process signals can not be detected automatically. The user has to select the appropriate sensor type from the sensor selection menu. For details please refer to chapter 7.5.4 analog input setting.

Connection on the casing



Channel Sensor type / Description

1 + 2	Flow and dew point sensors
3 + 4	Process signals
M + M	Modbus sensor modules
5	Ethernet port
6	Mains supply

To connect the different sensors please have a look to the designed

terminal on the next page.

Signal	Connector 1/2	Signal	Connector M/M	Signal	Colour	Connector 3/4	Connector 3/4
	Dew point / flow sensor		Modbus / RTU			Pulse active	Pulse passive
SDI	1 	N/A	1 	+I / Pulse	brown		
-V	2 	-V	2 	20 mA	white		
+V	3 	+V	3 	+V	blue		
N/A	4 	+D	4 	-V	black		
N/A	5 	-D	5 	+S	grey		

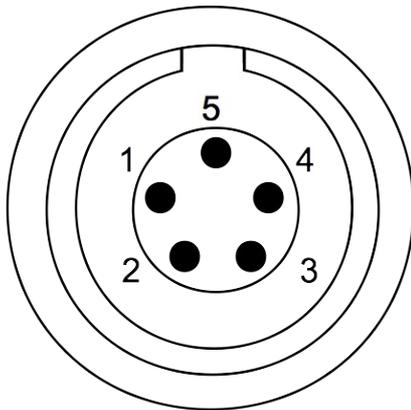
Signal	Colour	Connector 3/4				
		Ampere sensor	Pressure	1 V... 10 V	20 mA active	20 mA passive
+I / Pulse	brown	1 	1 	1 	1 	1
20 mA	white	2 	2 	2 	2 	2
+V	blue	3 	3 	3 	3 	3
-V	black	4 	4 	4 	4 	4
+S	grey	5 	5 	5 	5 	5

In case the user want to connect other analog sensors such as 0...20

mA, 4... 20 mA, 0... 1 V, 0... 10 V and pulse types, this can be done through connector 3-4 according to pinning shown in the table above.

The S 551 can also supply the external sensor with 24 VDC. Please ensure that the power drawn is within the allowed limits.

Connection pins connector plug M12



Connection pins
(view from the clamping side)

Pin	1	2	3	4	5
Colour code	brown	white	blue	black	grey

Sensors powered by S 551

The S 551 can supply 24 VDC to external sensors and a total power of 20 W. All sensors connected to S 551 and supplied by S 551 must not exceed this power limit. To determine the power consumption please use the table below:

Sensor	Power [W]
S 450 / 452	5.0
S 400 / 420	3.0
Dew point sensor	1.0
Pressure sensor	5.0
Analog input extension (8 Ch.)	1.3
Power meter S 110-P	0.5
US flow meter controller S 460-P	1.5
Oil vapor sensor S 120-P	8.0

Laser particle counter S 130

5.0

6. Configuration

The S 551 is delivered with specific customer settings according to the order. All settings are stored permanently inside of the S 551. For changes please see Sensor settings in chapter 7.5.

7. Operation

The On / Off switch has following function:

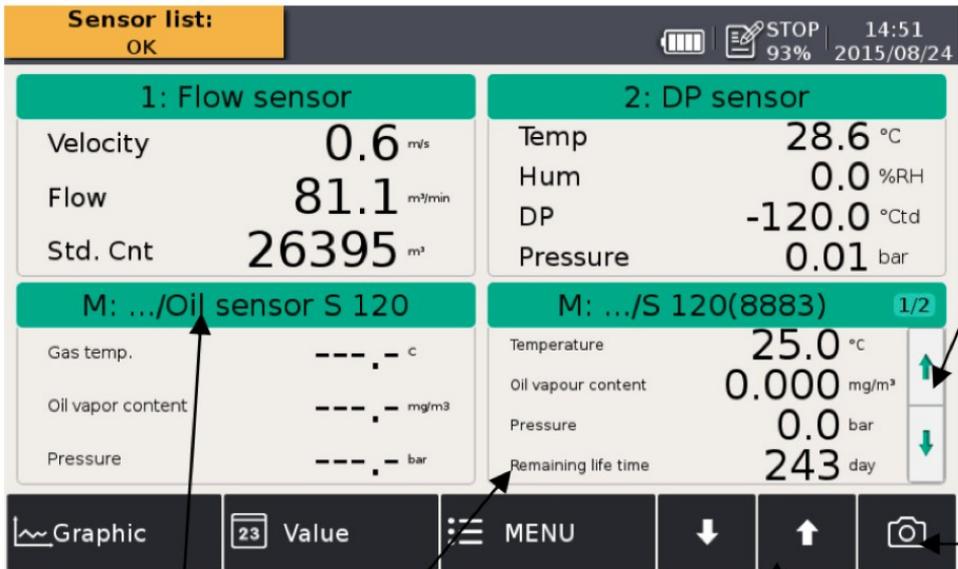
- A short pressing of the button will activate the battery gauge display and the charging status can be read.
- Keep the button pressed for 2 seconds and the device will start up.
- To switch off the device keep the button pressed for 2 seconds at least.



When the S 551 starts up it will display the start up screen for a few seconds. During this time the sensor connections are established and a few other initialisation tasks are performed.

7.1 Value screen

The S 551 will connect automatically to the connected sensors and starts to display the real time measurement values. The measurement values may be displayed on more than one page. To see another page, just touch the arrow buttons on the screen.



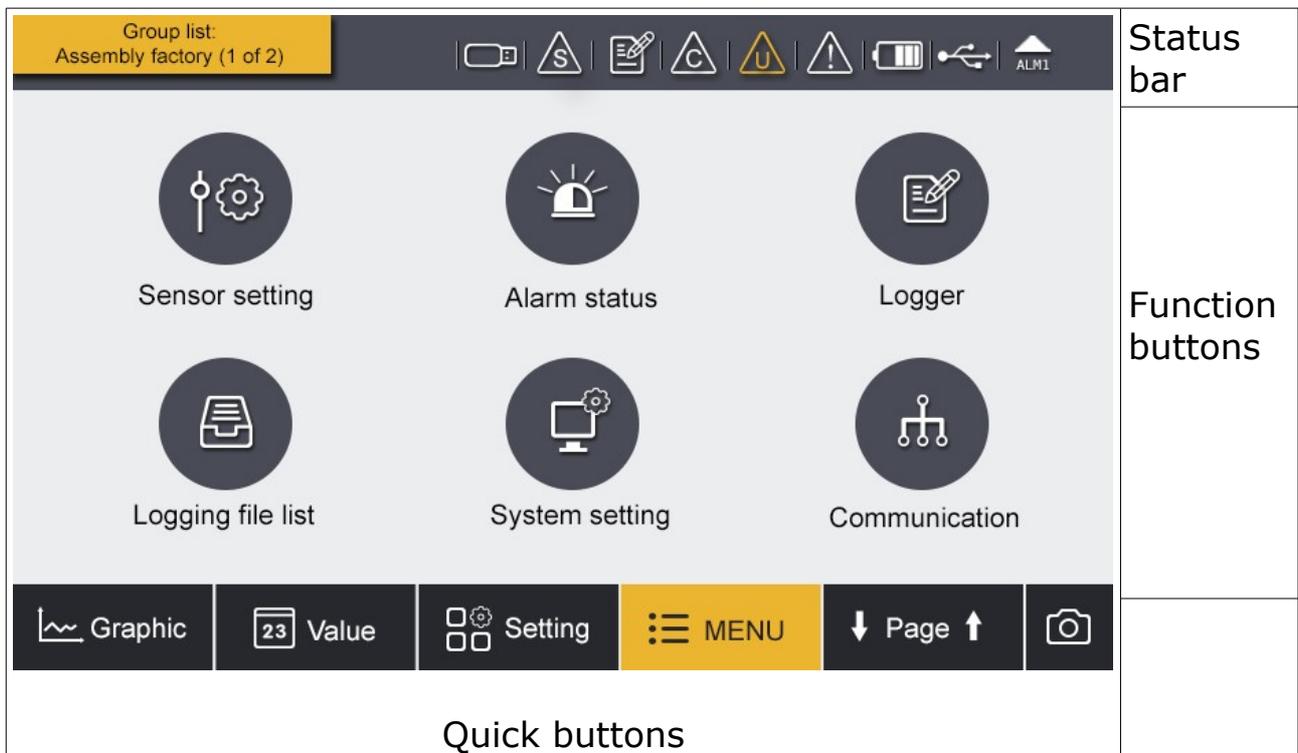
If there are more than 4 channels user can scroll through these buttons

Screen shot. Stores screen in PNG file

Sensor name and channel name

Up to 4 sensors can be shown on one page. Use page button to scroll up and down.

7.2 The main menu



Status bar

Function buttons

Quick buttons

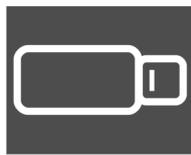
The menu consists of the following sub-menus:

Sensor settings

Settings related to the connected sensors.

Logger	S 551 data logger settings.
Files	All recorded files and the memory status can be checked.
Service info	Useful information in case of a service issue.
Service setting	Many different settings are under this menu.
Communication	Modbus master, field bus RS-485 or Ethernet communication settings.

7.3 Description of display icons in status bar



USB stick connected



System error



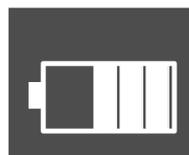
Sensor connection has changed, not matching with configuration



Sensor unit is not matching with configuration



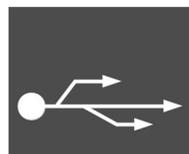
Logger status



RTC backup battery status



Sensor calibration is expired

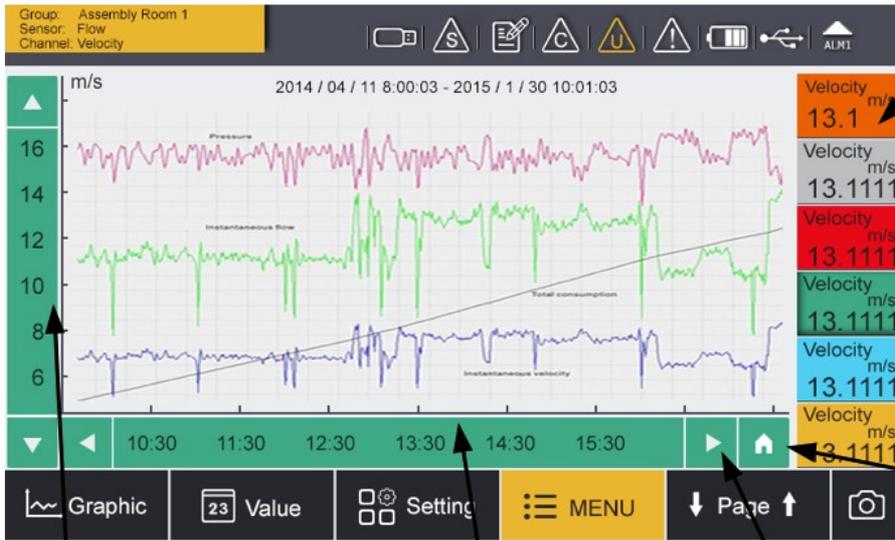


USB to PC connected



Alarm triggered

7.4 Graphic screen



Selected channels and Y-axes:

- 1 touch select Y-axes
- Next touch disables channel
- Long touch is for settings

Home button: brings you back to the current time

Touch Y-axes to scale it

Touch X-axes to define viewing period

Time scrolling

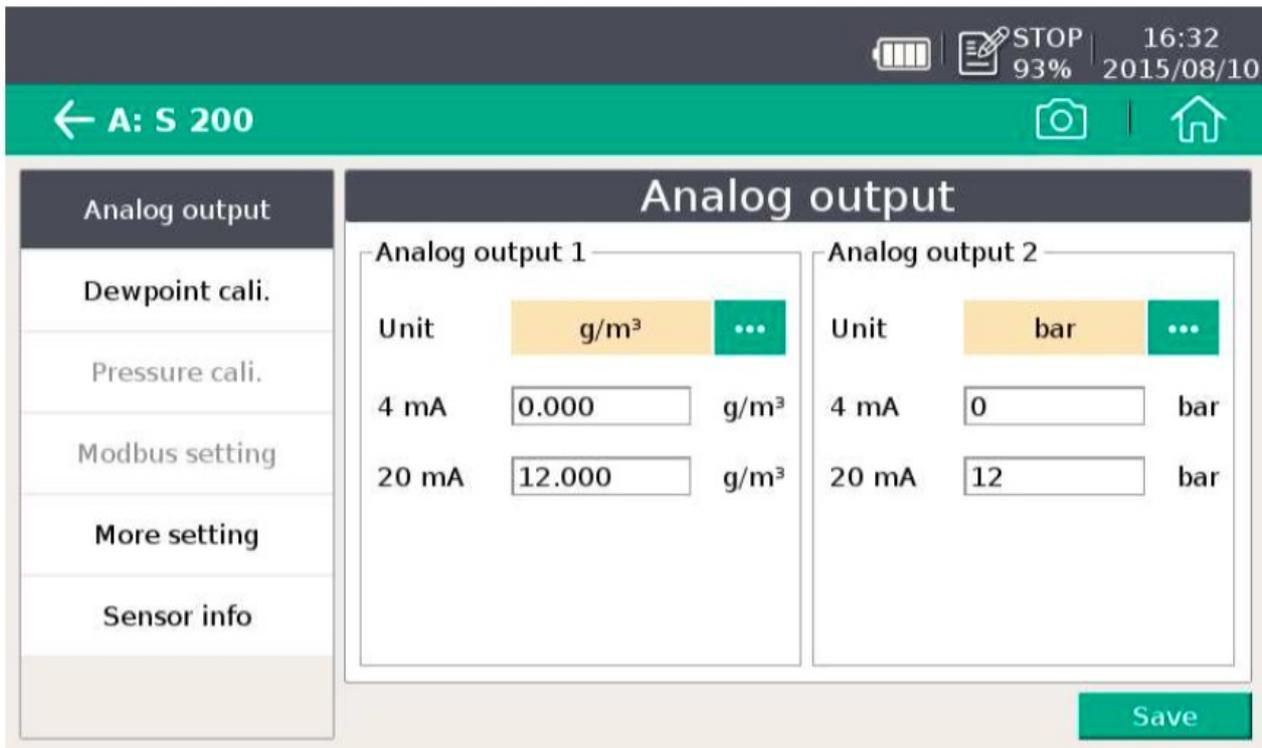
7.5 Sensor setting

The following chapters describe the available settings of the different sensors. The sensor setting menu allows specific settings at the connected sensor. After selecting of "Sensor setting", the next screen will show which kind of sensors are programmed. Changes can be done individually for each sensor, by selecting the related sensor.

Remarks

- Connected sensors of the manufacturer will be detected automatically and the standard settings are done by the unit.

7.5.1 Dew point setting



Analog output Select physical moisture unit and set scaling of analog output:

whenever moisture unit is changes, it is recommended to adjust the scaling of the analog output. The S 551 will recommend a standard scaling. The scaling is used to express the moisture through a 4... 20 mA signal, which than can be transferred to a PLC or SCADA system.

Set moisture unit: ppm (V), g/m^3 , mg/m^3 and atmospheric dew point requires to enter a reference pressure.

Dew point cali. Dew point sensor can be adjust at one point a reference value. We recommend to do this calibration only below -40°C dew point and by using a reliable reference.

Pressure calibration Some dew point sensor have integrated pressure sensors which can be calibrated in the dialogue.

Modbus setting Some sensors have Modbus interface. Communication parameters can be set here.

More setting

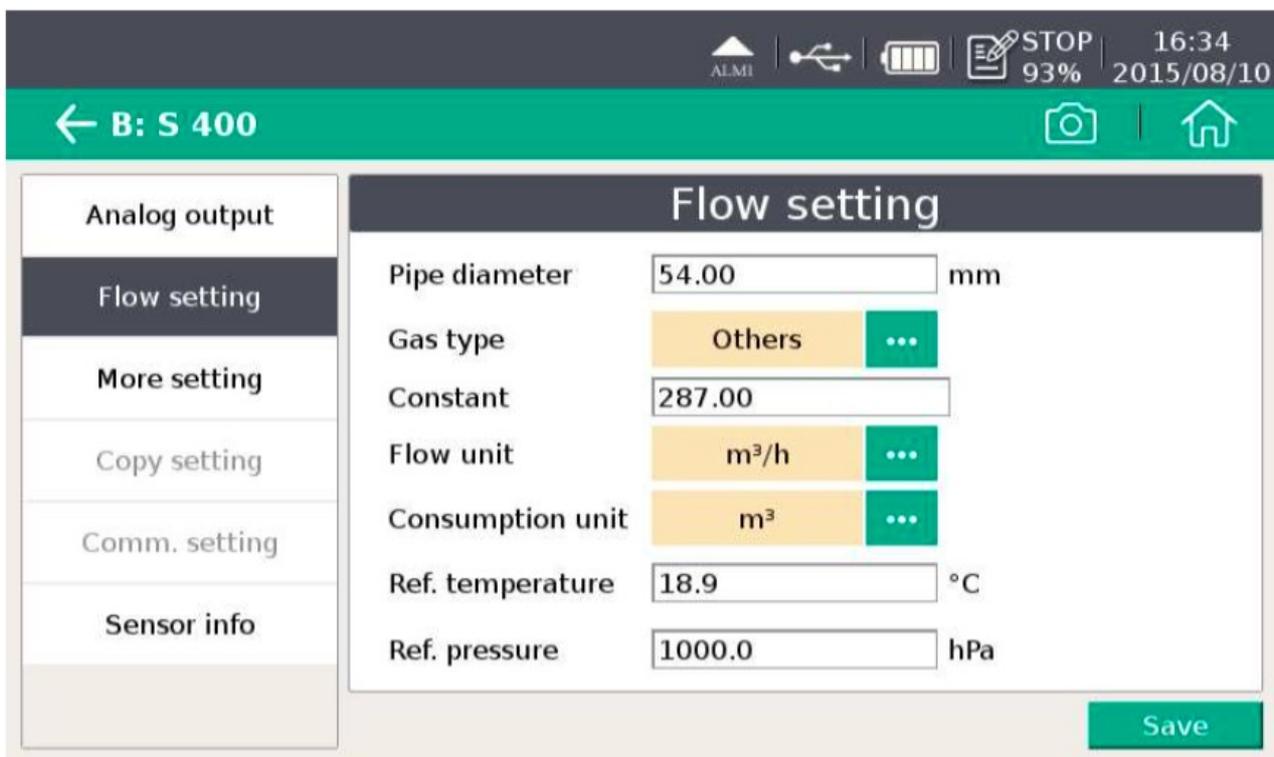
- Filters can be activated to dampen the output signal.

- Auto cali setting allows the activation of an auto calibration function.
- Absolute pressure required for g/m^3 , mg/m^3 , $ppm[V]$ and atmospheric dew point calculation. The pressure has to be entered as absolute pressure (not gauge pressure!). For the unit atmospheric dew point and $ppm[V]$, the line pressure (absolute) has to be entered. For the unit g/m^3 , mg/m^3 , if the calculate should be done under line pressure conditions, s reference pressure of 1013 hPa has to be entered.

Sensor info Shows specific sensor information. Important for service inquiries.

Changes on the sensor settings are downloaded immediately into the sensor as soon as the changes are confirmed by pressing "Save".

7.5.2 Flow sensor setting



Analog output Select physical flow unit and set scaling of analog output: whenever the flow unit is changes, it is recommended to adjust the scaling of the analog output. The S 551 will recommend a standard scaling. The scaling is

used to express the flow through a 4... 20 mA signal, which then can be transferred to a PLC or SCADA system.

Some sensors support active and passive analog outputs.

Flow setting

Pipe diameter: for flow calculation

Gas type: select the gas type (some gases require real gas calibration, please contact the manufacturer).

Gas constant: showing gas constant of selected gas, or inputing gas constant for mixed gas or not-listed gas.

Flow unit: selection of the desired flow unit.

Consumption unit: selection of the desired consumption unit.

References pressure: in order to calculate the standard flow.

Reference temperature: in order to calculate the standard flow.

More setting

Std: consumption: set the internal consumption counter.

Rev. consumption: some sensors support bi-directional flow measurement. This is the counter for the reverse direction.

Altitude: please enter the altitude level, default is 0.

User slope: allows a correction of the flow by a factor.

Temperature coefficient: by default temperature.

Copy setting

Only function for S 551-P6.

Comm. setting

Some sensors have modbus interface. Communication parameters can be set here.

Sensor info

Shows specific sensor information. Important for service inquiries.

Remark

Reference pressure and reference temperature are not related to the actual process pressure or temperature. They are used to calculate the standard flow at standard conditions, for example: 1000 hPa, 20°C.

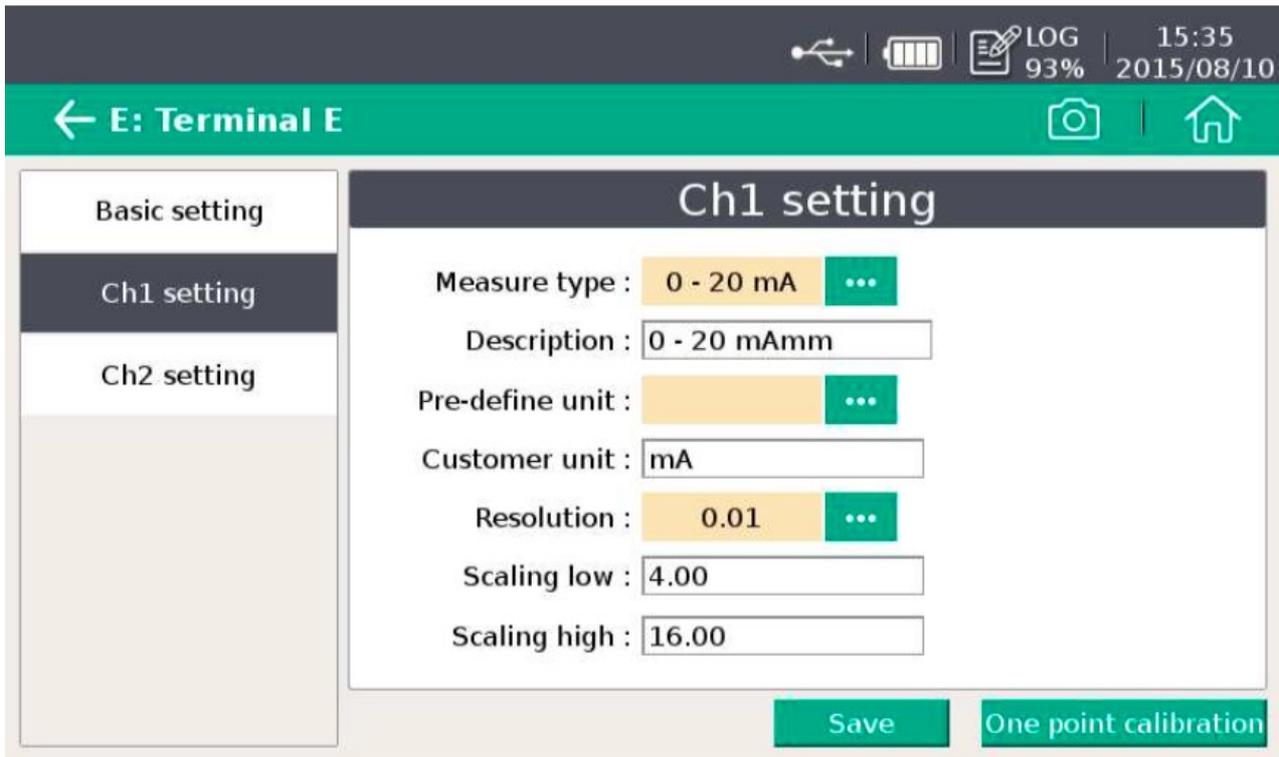
7.5.3 Oil vapor sensor setting

- Basic setting**
- Altitude:** please enter the altitude level, default is 0.
 - User slope:** allows a correction of the oil content by a factor.
 - Compressor oil:** select oil type, which is under measurement.
 - Output unit:** select unit of oil content.
- Analog output** Set scaling of analog output (4... 20 mA).
- Modbus setting** Set address, baud-rate and parity of modbus communication.
- Alarm setting** Enable or disable alarm function and set the alarm threshold.
- Status** Shows the PID sensor lifetime, valid calibration time, remaining filter capacity (the filter is consumable component used for auto zero calibration). Gas temperature and pressure will also be displayed here. There is an indication at each line if value is normal or not.

7.5.4 Analog input setting

The S 551 has optional two analog input channel for various analog signals (4... 20 mA, 0... 10 V, etc.). These channel have to be prepared

by CSC software. The following settings are available on the interface of S 551:



Basic setting

Sensor description: enter a sensor name.

CH 1 setting

Measure type: mA or voltage etc.

Description: enter a sensor name.

Predefine unit: select a physical unit.

Customer unit: free text for measurement unit.

Resolution: value resolution (how many digits behind the decimal point)

Scaling: define the scaling to calculate from the original value to the display value.

One point calibration: The instrument provides an one-point system calibration, which can eliminate accuracy failures of instrument and sensor. If an accurate reference is available (e.g. calibration lab), the system can be calibrated at one point to this reference. The calibration is stored inside the S 551. This calibration offset is applied to every sensor connected to the terminal which was used for calibration. Make sure if other sensors are connected, that the calibration offset is deleted.

Ch 2 setting

Measure type: only counter is selectable.

- (counter only) Description:** enter a channel name.
Predefine unit: select a physical unit.
Customer unit: free text for measurement unit
Count/pulse: one pulse is equal to how many consumption units.

7.5.5 Power meter S 110-P setting

S 110-P has modbus output. Please connect it to connector M of S 551.

- Sensor type** Choose the right CT type (200 A, 500 A, 1000 A)
Sensor status This menu will provide sensor information about the connection. Please check here for details in case the displayed values are shown as "-- -.-". Mostly its caused by a wrong connection of the CTs or voltages.

7.5.6 Analog extension module

Extension module has modbus output. Please connect it to connector M of S 551. The analog extension module offers additional 8 x 0... 20 mA channels. Similar to the analog input channels on connector 3-4, the sensor type can be assigned through the user interface in the menu "Sensor setting".

7.5.7 Laser particle counter S 130

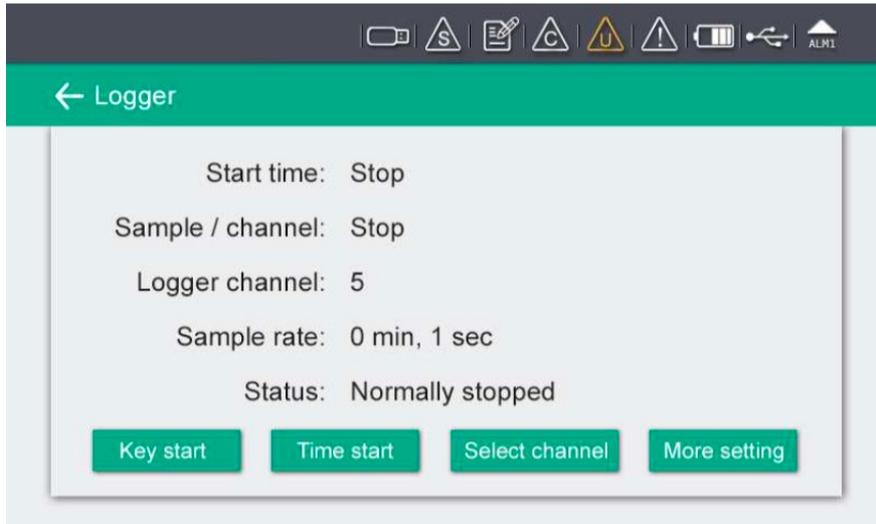
S 130 has SDI and modbus output. Please connect it to connector 1 / 2 or to connector M of S 551.

7.5.8 Ultrasound liquid flow meter S 460

There is a separate instruction manual for the operation and installation of the ultrasonic flow meter S 460. Please refer to manual number 0970 0069.

7.6 Logger

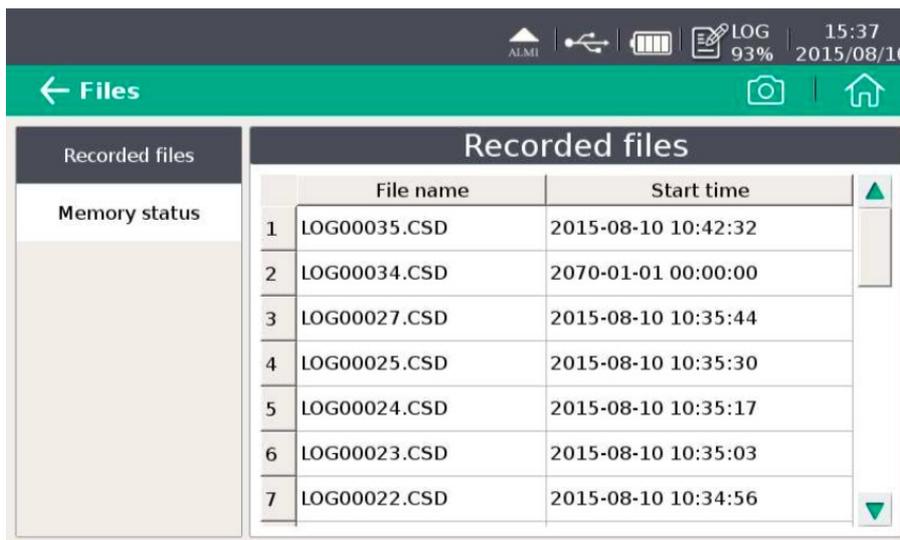
In this sub-menu the logger status can be seen and programmed.



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

7.7 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.



7.8 Service info

Contact information of service company can be set via CSC software

Service info.

Service Company Name

Telephone

Email

7.9 System setting

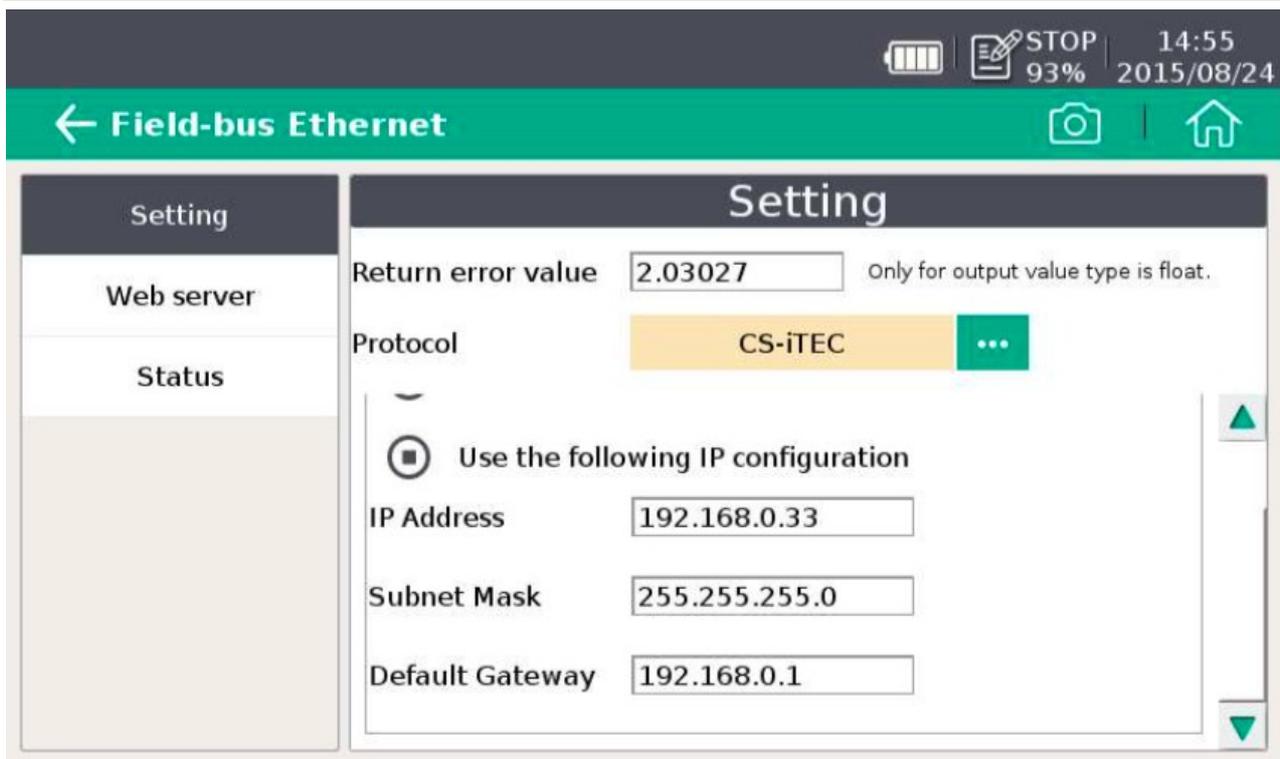
Varicose system settings can be done under this menu. Just click press related buttons and following the instruction.

Password	Set password to protect some critical operations
Back light	Adjust brightens and dimming time out.
Calibrate touch screen	Calibrate touch accuracy
Language	Select user interface language
Date time	Set date time
Device info	Information for service cases
System-Updates	Updates for the systems
Reset	Reboot the display

7.10 Communication

The S 551 is equipped with an ethernet port. It can be used in combination with CSC software and CSM-S for configurations or to read the data logger. It supports the following two modes of communication:

- Same network.
- Connect the S 551 to PC directly. In this mode both PC and S 551 must have static IP address. The PC and the S 551 must be in the same network segment. For example, S 551 has static IP address of 192.168.0.33 while PC has 192.168.0.133.



Web server

The S 551 can send out actual measurement and status information to a PC with fix domain name or IP address. By using our CSM-2G software on this PC a remote monitoring of the system can be achieved. Please contact your retailer or the manufacturer for further information.

8. Signal inputs

8.1 Digital inputs

The analyser has two different digital inputs:

- 2 x SDI Sensors
- 16 x RS 485 Modbus RTU Sensors

8.2 Analog input

In case the user want to connect other analog sensors the analyser has two optional analog / pulse inputs:

- 2 x analog (0... 20 mA / 4... 20 mA / 0... 1 V / 0... 10 V)
- 2 x pulse

9. Signal outputs

9.1 Interface

The data can be transmitted via Ethernet to a data collection system or software. Alternatively the data can also be transferred via USB stick or USB cable.

10. Optional extra accessories

It is possible to order also following extra accessories:

- 8 channel analog input extension, connectable to S 551, including 5 m cable with connector
- Portable modbus splitter box
- Extension cable, 5 m, male-female connectors
- Open wire cable, 5 m cable with connector
- Sensor cable, M12, 5 m with connector to S 551
- Transport case S 551 for sensors and cables, (560 x 450 x 160) mm

11. Calibration

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

12. Maintenance

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



ATTENTION!

Do not use isopropyl alcohol to clean the display!

13. 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.

14. Warranty

CS-iTEC 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 CS-iTEC 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

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

CS-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@cs-itec.asia

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