PRODUCT GUIDE 2018/2019

Measurement Technology for Compressed Air and Gases

German Precision and Quality

International Edition (English)/V03

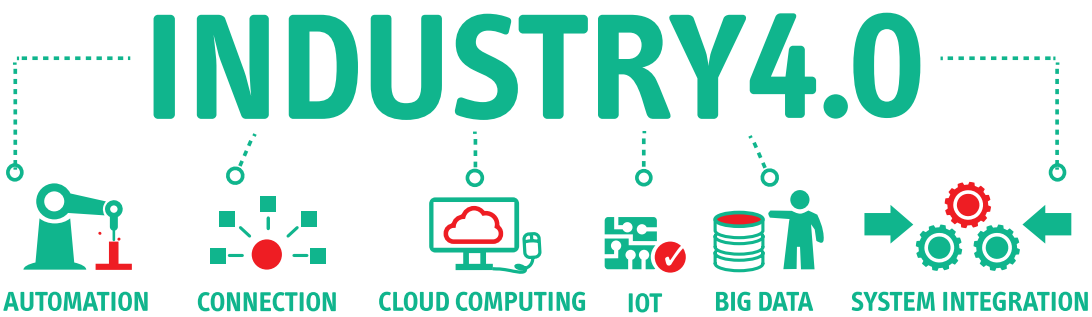
INTRODUCTION

Dear Customers,

SUTO iTEC was born from an idea that compressed air and gas systems need improvement, that end users were being starved of technology required to manage these systems and that the level of wasted energy needed to be brought under control. Since it's inception in 2005, SUTO has grown to be one of the world leaders in compressed air and gas measurement technology and is the market leader in compressed air purity monitoring equipment.

SUTO continuously strives to improve it's people, knowledge and products so that our customers can be a step ahead of their competition and always remain at peak performance. When systems are closely monitored with our equipment, operational efficiency, optimal productivity and reliability can be understood and maintained. If something goes wrong SUTO products are there to let you know.

It has been long understood that you cannot manage what you do not measure and this remains true to this day. The incredible amount of data being gathered across the world is changing every aspect of life. Around 40% of this data comes directly from sensors and with smart factories, industry 4.0 and the Industrial Internet of Things (IIoT) expected to connect an extra 21 million new devices to the internet by 2021, data analysis and management is becoming more important. It's only once insights from the data gathered are implemented that true change takes place. The challenge for most engineering and maintenance teams is to sort out the massive amount of data and turn it into something meaningful. SUTO's knowledge and experience, coupled with it's international panel of experts will help you optimise and improve the efficiency of your projects.



With innovation comes flexibility. SUTO's modular monitoring systems allows you to build and add to your network as your appetite for improvement grows. You'll be able to see the improvements made and the opportunities that lie ahead. SUTO's products can be easily integrated into your existing SCADA systems, no matter who the supplier is. Our integrated systems make sensors easy to install and operate, taking the headache out of selecting the right sensors for the job or locking you into long term maintenance agreements.

SUTO understands that with focus comes quality. As with any successful global business, we work with experts and premium suppliers across the world to ensure you are delivered the highest quality, innovative products built to exacting standards at the best possible pricing, no matter where you are in the world. Every one of our products is assembled, tested and checked in our custom built facilities in Germany, Hong Kong and China to our stringent quality standards, before being shipped to all parts of the world.

Please take your time and browse through our catalog and visit our new web page at www.suto-itec.com for more detailed information. Do not hesitate to contact us, our customer service teams are happy to assist you.

Kind regards
SUTO iTEC

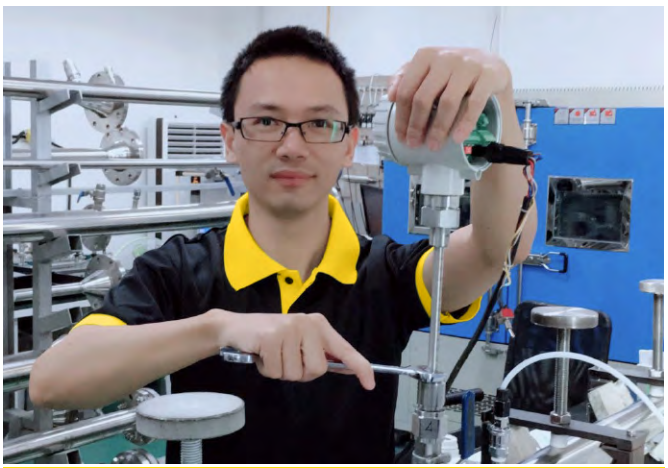
Our People at work

Product Development in international teams

Michael and Baowei **Sensor-Research**

Sensor-Production– Germany

Flow calibration at our German laboratory

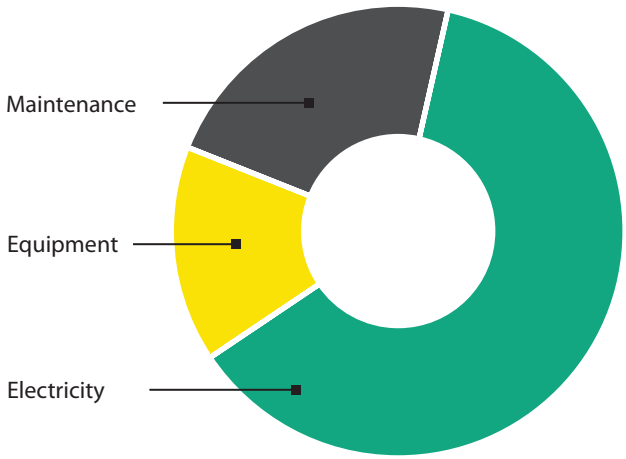


Billy **performing User Acceptance Tests**

CONTENTS

Energy conservation and environmental safeguards are of great interest to most progressive corporations.
To assure the efficiency and effectiveness of compressed air systems, the measurement of flow is crucial.

Cost distribution in compressed air systems



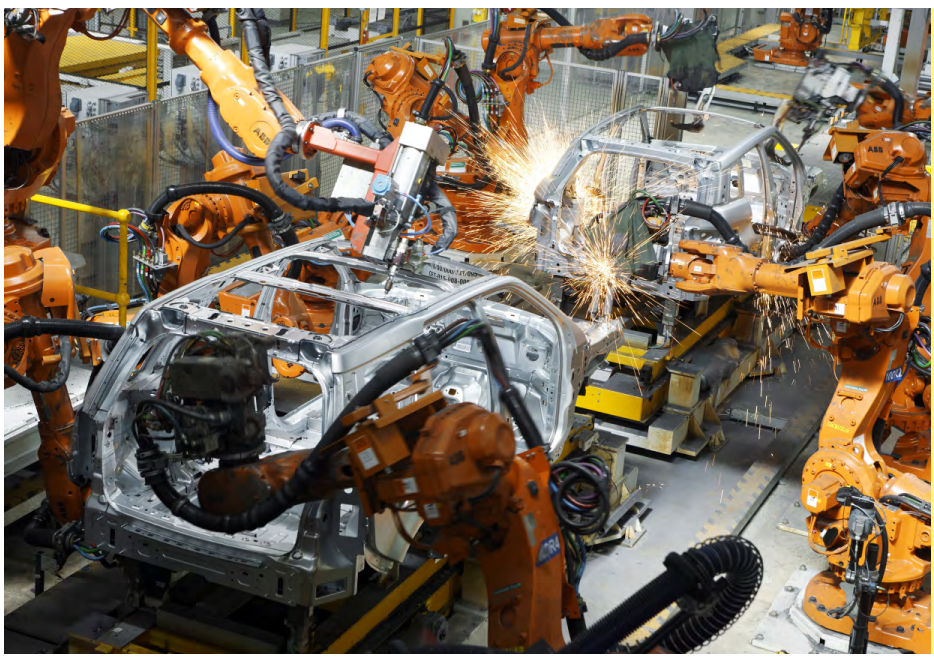
When looking at the overall costs of a typical compressed air system, the biggest costs are caused by the electrical power consumption but not by the investment or maintenance of the system.

A modern compressor converts 90% of the electrical power into heat and only 10% into compressed air. This makes compressed air 10 times more expensive than electricity. It's common to measure the consumption of electricity, but only a few corporations measure the compressed air consumption.

Not measuring means not knowing about the efficiency of the system.

SUTO empowers to:

- Access compressed air cost (... $/m^3)
- Identify + quantify leakage cost
- System efficiency control
- Neutral performance data (Compressor, Dryer, Filtration)
- Cost allocation
- Production quality control
- Data logging + analyses for corporate planning and compliance with regulations and standards
- Assure competitiveness for the future



Measurement Solutions for
Flow / consumption
Dew point, Pressure, Temperature
Power consumption
Particle counting
Oil vapor measurement
Leak detection
Displays and data logger
Software and System Integration
Calibration & Services

APPLICATION FIELDS

Assembly: Process Air + Gas

- Consumption controlling
- Assuring constant production conditions
- Cost allocation
- Online monitoring
- Recording
- Alarm

General Utilization: Compressed Air

- Dry compressed air
- Constant supply
- Cost allocation

Quality Control

- 24/7 online monitoring
- Comprehensive recording
- Analyzing + Report
- Compliance with legal and auditor requirements

Packaging + Storage

- Bottling CO_2 purging control
- Dry + clean compressed air
- Oil & odor free compressed air
- N_2 supply monitoring

Laboratory + R & D

- Constant air + gas quality

Note:
You can download different application leaflets from our website: www.suto-itec.com

The importance of flow measurement

Plant safety, constant product quality, process optimization, environmental protection and energy conservation are some of the reasons why flow measurement is becoming increasingly important in industrial instrumentation.

SUTO provides practical, state-of-the-art, high-quality thermal mass flow meters for gas flow applications such as

- Compressed air flow and distribution
- Airflow and distribution of process gases like Carbon dioxide, Argon, Nitrogen, Oxygen
- Explosive gases like Natural gas, Hydrogen, Bio gas
- Corrosive gases like Bio gas
- Fuel and air supply to burners, boilers, industrial furnaces
- Air flow in chillers
- Dosing and gas injection control

Basically any gas mixture can be measured as long the mixing ratio and its components are known and constant.

In the modern factory instrumentation needs to provide interfaces to factory automation systems. SUTO flowmeters not only support the traditional 4-20 mA outputs and pulse outputs, but also fieldbus interface for HART, Modbus and M-Bus. Since the meters are based on a modular design other fieldbus can be easily adopted.

Flow meters are used in almost all industries

- Chemicals and petrochemicals
- Petroleum (oil and gas)
- Fueling with gas
- Pharmaceuticals
- Food production
- Breweries
- Dairies
- Power plants
- Shipbuilding
- Automotive
- Mining
- Textile

S 401/421 THERMAL MASS FLOW SENSORS

S 401 insertion type sensor where easy installation and flexibility is required

Common Features S 401 / 421

- Measures standard flow, mass flow, consumption and temperature
- Thermal mass flow, independent of pressure and temperature changes
- IP65 casing provides robust protection in rough industrial environment
- Very fast response time
- High accuracy and wide measuring range
- Isolated mA and pulse output signals or Modbus RTU interface
- Selectable gas type (some gases require real gas calibration!)
- App for mobile phones and tablets for wireless sensor settings
- Sensor can be calibrated in 2 different gases

Features S 401

- Tube diameters of DN25 to DN500.
- 2 installation types: center installation and 100 mm insertion depth installation for bigger pipes (> DN250)
- Installation under pressure through 1/2" ball valve

Features S 421

- Pipes sizes available: DN15, DN20, DN32, DN40, DN50, DN65, DN80
- Process connections available: R thread, flange EN1092-1, ANSI/B16.5
- Exchangeable sensor unit (easy sensor swap)

Optional color graphic display for online values and sensor settings, consumption can have up to 1,999,999,999

S 421 inline type where high accuracy is priority

Volumetric flow ranges S 401

Inch	DN	Di (mm)	S 401-S (m^3/h)	S 401-M (m^3/h)	S 401-H (m^3/h)
1″	DN25	27.3	0.5 ... 147.7	0.6 ... 294.7	0.6 ... 356.9
1¼″	DN32	36.0	0.9 ... 266.3	1.2 ... 531.5	1.2 ... 643.5
1½″	DN40	41.9	1.2 ... 366.7	1.5 ... 731.9	1.5 ... 886.2
2″	DN50	53.1	2.0 ... 600.1	2.5 ... 1197.6	3.0 ... 1450.0
2½″	DN65	68.9	3.5 ... 1026.5	5.0 ... 2048.6	5.0 ... 2480.4
3″	DN80	80.9	5.0 ... 1424.4	7.0 ... 2842.7	7.0 ... 3441.9
4″	DN100	100.0	10 ... 2183.3	12 ... 4357.2	12.0 ... 5275.7
5″	DN125	125.0	13 ... 3419.6	18 ... 6824.4	18.0 ... 8263.1
6″	DN150	150.0	18 ... 4930.1	25 ... 9838.9	25.0 ... 11913.1
8″	DN200	200.0	26 ... 8785.6	33 ... 17533.3	42.0 ... 21229.5
10″	DN250	250.0	40 ... 13743.9	52 ... 27428.5	60.0 ... 33210.7
12″	DN300	300.0	60 ... 19814.8	80 ... 39544.1	100.0 ... 47880.4

The table shows flow ranges up to 300 mm pipe diameter at standard conditions in air. Other standard conditions and gases flow ranges are available on request.
In larger pipe diameters flow can also be measured.

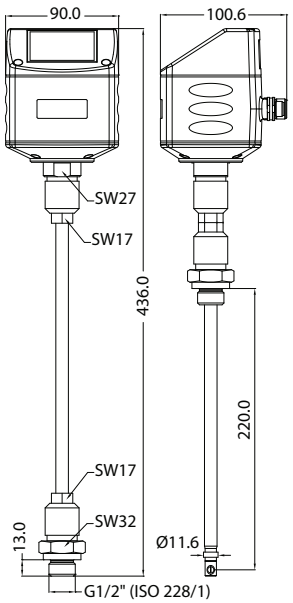
Volumetric flow ranges S 421

Inch	DN	Measuring range from to
½″	DN15	0.5 ... 90 m^3/h
¾″	DN20	0.9 ... 170 m^3/h
1	DN25	1.5 ... 290 m^3/h
1¼″	DN32	2 ... 500 m^3/h
1½″	DN40	3 ... 700 m^3/h
2″	DN50	4 ... 1000 m^3/h
2½″	DN65	6 ... 1500 m^3/h
3″	DN80	8 ... 2500 m^3/h

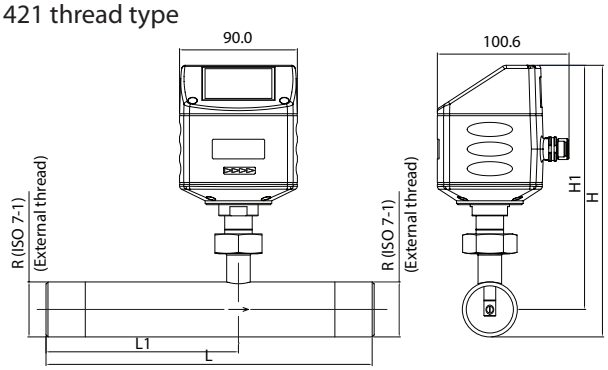
Stated flow values are at standard conditions of Ps = 0.1MPa(a) and Ts = 20°C with medium air.

Technical data S 401/421	
Accuracy	1.5% of reading + 0.3% full scale
	Optional 1% of reading
Repeatability	0.25% of reading
Sampling rate	> 10 samples / sec
Reference conditions	Can be set by user. Standard conditions are Ps = 0.1 MPa and Ts = 20°C
Operating temperature	-30°C ... +140°C fluid temperature -30°C ... +70°C casing -10°C ... +50°C casing with display
Operating pressure	S 401: 0 ... 5.0 MPa (>1.6 MPa need installation device) S 421: 0 ... 1.6 MPa (Optional: 4.0 MPa)
Analogue output	Signal: 4 ... 20 mA, isolated Scaling: 0 ... max flow Max load: 250R
Pulse output	Signal: Isolated switch output, normally open, Max 30 VDC, 20 mA Scaling: 1 pulse per consumption unit
Modbus RTU	Isolated RS-485 with Modbus RTU protocol
Power supply	15 ... 30 VDC / 200 mA
Wetted material	Stainless steel 1.4404 (SUS 316L)

S 401

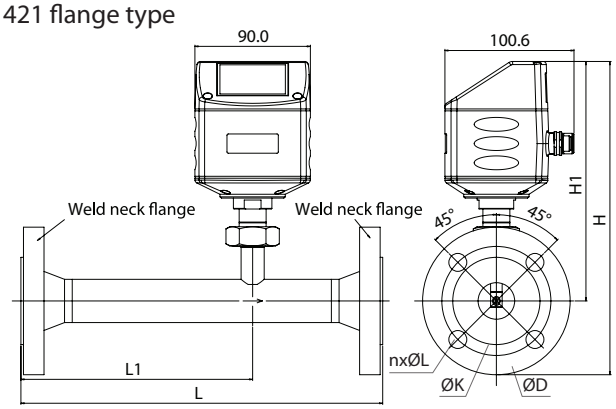


S 421 thread type



Pipe nominal size inch / (DN)	L total length (mm)	L1 total length (mm)	H total height (mm)	H1 from pipecenter to casing top (mm)	R External Thread
½"(DN15)	300	210	197.4	186.7	R½"
¾"(DN20)	475	275	200.2	186.7	R¾"
1"(DN25)	475	275	203.6	186.7	R1"
1¼"(DN32)	475	275	207.9	186.7	R1¼"
1½"(DN40)	475	275	210.9	186.7	R1½"
2"(DN50)	475	275	216.9	186.7	R2"

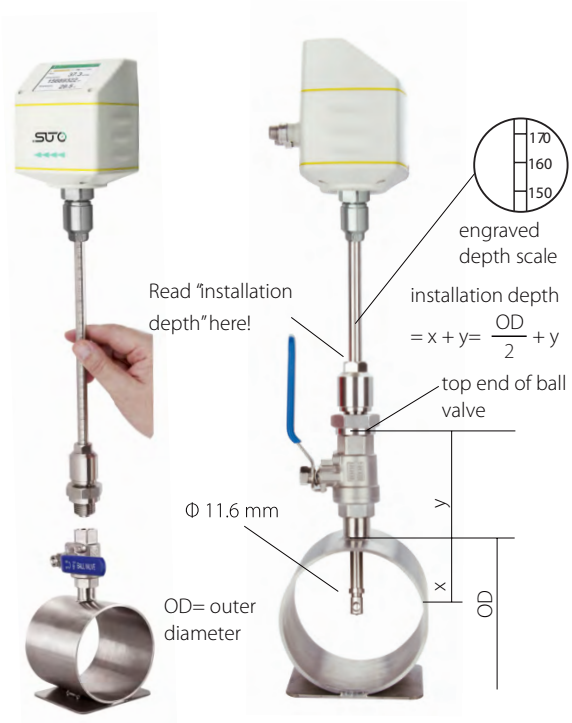
S 421 flange type



Pipe nominalsize inch / (DN)	L total length (mm)	L1 total length (mm)	H total height (mm)	H1 from pipecenter to casing top (mm)
½"(DN15)	300	210	234.2	186.7
¾"(DN20)	475	275	239.2	186.7
1"(DN25)	475	275	244.2	186.7
1¼"(DN32)	475	275	256.7	186.7
1½"(DN40)	475	275	261.7	186.7
2"(DN50)	475	275	269.2	186.7
2½"(DN65)	475	275	287.1	194.6
3"(DN80)	475	275	301.0	201.0

S 401/421 THERMAL MASS FLOW SENSORS

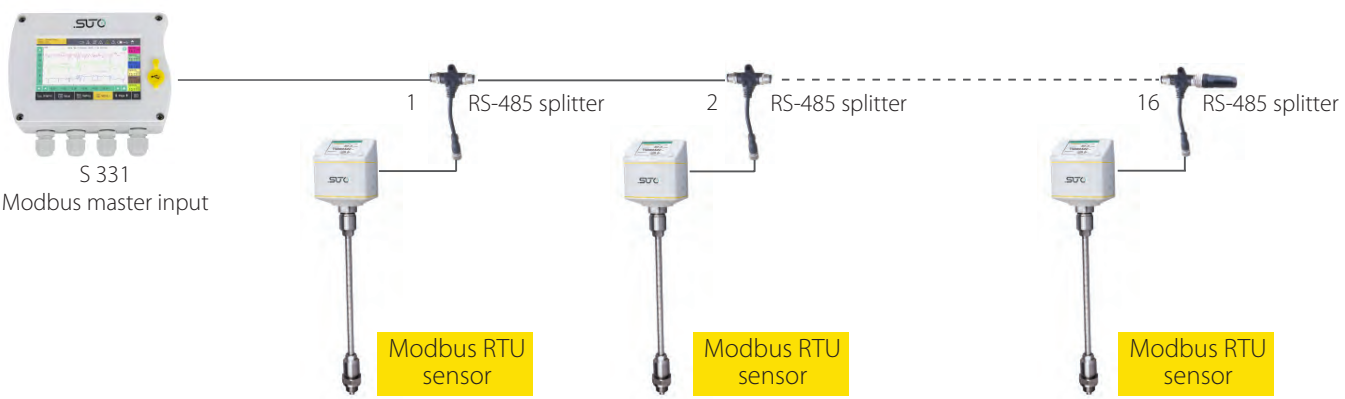
S 401 Installation



Removal of sensor unit S 421

Sensor configuration through wireless connection

Modbus connection of several sensors to a display unit



Order form

S 401/ S 421	Process connection	Size	Gas 1	Gas 2	Range	Calibration	Output	Display	Description
S695 4100									S 401, flow sensor, insertion type, 220 mm shaft
S695 4101									S 401, flow sensor, insertion type, 300 mm shaft
S695 4102									S 401, flow sensor, insertion type, 400 mm shaft
S695 4103									S 401, flow sensor, insertion type, 160 mm shaft
S695 4120									S 421, flow sensor, inline type
S695 4121									S 421, inline type flow sensor, 4 MPa version
S 401									
Standard	A								G ½",
A1006	B								PT ½" adapter
A1005	C								NPT ½" adapter
S 421									
A130X	A								R thread (ISO-7-1)
A132X	B								Flange, EN 1092-1, PN40
A134X	C								Flange ANSI 16.5
		1							DN15
		2							DN20
		3							DN25
		4							DN32
		5							DN40
		6							DN50
		7							DN65
		8							DN80
			A						Medium Air
A1008			B	B					Medium CO_2
A1009			C	C					Medium O_2 (oil & grease free cleaned)
A1010			D	D					Medium N_2
A1011			E	E					Medium N_2O
A1012			F	F					Medium Ar
A1013			G	G					Medium Natural gas (exact gas mix required)
A1014			H	H					Medium H_2
A1015			I	I					Others (please specify the gas or gas mix)
A1016			J	J					Medium He
A1017			K	K					Medium Propane C_3H_8
				Z					No 2nd gas
					A				Standard range
A1401					B				Max range (S 401 only)
A1402					C				High speed (S 401 only)
A1403					D				Low range calibration (1/3 of standard range)
A1404					E				High accuracy calibration (1% ± 0.3%FS)
						A			Standard calibration
A1405						C			Bi-directional calibration (S 401 only)
A1410							A		4 ... 20 mA + pulse
A1411							B		Modbus
A1413							C		4 ... 20 mA + pulse, compatible to S 400
								A	Without display
A1420								B	With display

Attention:

- R thread is only available from DN15 ... DN50
- Order number for connection and size of the inline type is combineed! Example: A1322 = Flange EN 1092-1, DN20

S 415/418 THERMAL MASS FLOW METER

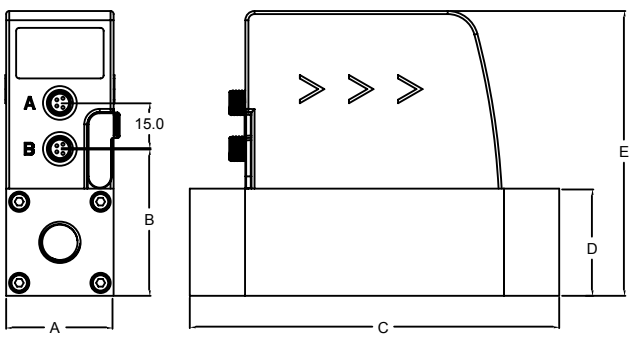
S 415 as DN8 or DN15 version

S 418 as DN20 or DN25 version

The SUTO S 415 and S 418 thermal mass flow meters offer gas flow and consumption measurement directly at the point of use. These highly economical units will help you improve system efficiency, while helping reduce compressed air usage and operating costs. Both versions come standard with Service App to help the user quickly and easily check the flow meter readings or adjust the settings via the SUTO flow meter App.

The S 415 is best suited to general process work where low cost and broad monitoring is required, while the S 418 is ideal for remote locations or high accuracy with its built in data logger and optional pressure sensing.

Dimensions



Dimensions in mm	A	B	C	D	E
DN8/DN15	35.0	48.0	120.4	35.0	93.0
DN20/DN25	48.0	61.0	178.0	48.0	106.0

Features / Benefits

- Thermal mass flow measurement, independent of pressure and temperature
- Eco Version S 415, Pro Version S 418
- Service App for setup and configuration
- Accuracy of 1.5% o. RDG (S 418) and 3% o. RDG (S 415)
- Output signal options:
  - analogue 4 ... 20 mA and pulse
  - digital Modbus
  - digital M-Bus
- Simple installation, no straight pipe required
- Measures the full flow, no bypass measurement
- 4-Digit LED display
- Available in DN8, DN15, DN20, DN25 process connection G inner thread
- S 418 comes standard with integrated data logger
- Optional pressure measurement available for S 418

Technical data	S 415	S 418
Measuring ranges	See separate table	
Accuracy	3% of reading	1.5% of reading
Turndown ratio	50:1	100:1
Pressure range	0 ... 1.0 MPa	
Power supply	18 ... 30 VDC / 120 mA	
Measured gas	Air, N_2	Non-corrosive gases, up to 2 calibrated gases
Ambient conditions	0°C ... 50°C	
Transport Temp.	-30°C ... +70°C	
Response time	T_{90} = 1 sec	T_{90} = 0.1 sec
Output signal (only 1 of it)	- 4 ... 20 mA and pulse, isolated - RS-485 (Modbus RTU)	
Interface	Wireless for Service App or USB for logger read out (S 418 only)	
Casing	Process connection: aluminum alloy Wetted parts: aluminum alloy Top casing: PC + ABS	
Classification	IP54	
Electrical connection	2 x M8, 4 poles	
Process connection	G inner thread, ISO 228-1: DN8, DN15, DN20, DN25	
Approvals	CE, RoHS	

Extra technical data S 418		
Data logger	Size: Channels: Sampling rate:	10,000,000 samples up to 3 channels 1 sec ... 1 h
Pressure option	Range: Accuracy:	0 ... 1.0 MPa 1 % F.S.

Measuring range [sl/min]				
	DN8	DN15	DN20	DN25
Size	0	1	2	3
Standard range (S)	250	1000	2000	3500
Low range (L)	50	200	400	700

Stated measuring ranges under following conditions:

- Standard flow in air
- Reference pressure: 1000 hPa
- Reference temperature: 20°C

Gas table	
	Gas type
A	Air
B	CO_2
C	O_2 (oil & grease free)
D	N_2
E	N_2O
F	Ar
G	Natural gas (mix ratio)
H	H_2 (real gas calibration)
I	Other gas (specify)
J	He (real gas calibration)
K	C_3H_8
Z	No gas

Sensors are calibrated in air. On request calibration can be performed in other gases.

S 415 order table (air and N2 only)				
Order no.	Size	Range	Output	Description
S695 415				S 415, thermal mass flow meter, 3% o. RDG., 24 VDC, cable: 5m, M8 and open ends
	0 1 2 3			DN8 G inner thread DN15 G inner thread DN20 G inner thread DN25 G inner thread
		S		Standard range version of S 415
A1453		L		Low range version of S 415
A1450			A	Analogue 4 ... 20 mA, pulse
A1451			B	Digital Modbus RTU
A1452			C	Digital M-Bus
A1458				S 415 with imperial units instead of SI units

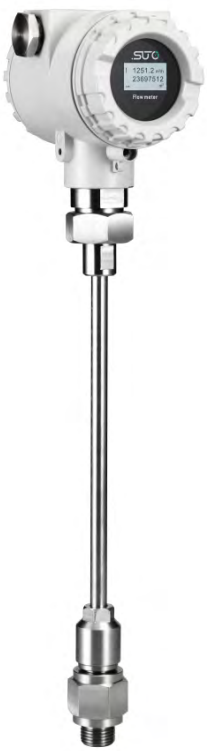
Example: S695 4152-SB: S 415, DN20, range 2000 l in Air, Modbus interface

S 418 order table						
Order no.	Size	Range	Output	Gas 1	Gas 2	Description
S695 418						S 418, thermal mass flow meter, data logger, 1.5% o. RDG, 24 VDC, cable: 5m, M8 and open ends
	0 1 2 3 5 6 7 8					DN8 G thread DN15 G thread DN20 G thread DN25 G thread DN8 G thread, pressure sensor 10 barg, 1 % F.S. DN15 G thread, pressure sensor 10 barg, 1 % F.S. DN20 G thread, pressure sensor 10 barg, 1 % F.S. DN25 G thread, pressure sensor 10 barg, 1 % F.S.
		S				Standard range version of S 418
A1453		L				Low range version of S 418
A1455			A			Analogue 4 ... 20 mA, pulse
A1456			B			Digital Modbus RTU
A1457			C			Digital M-Bus
				A-K	B-Z	See gas table above
A1459						S 418 with imperial units instead of SI units

Example: S695 4185-SAAF: S 418, DN8 with pressure sensor, range 250 l in Air, Analog and pulse output, gas 1 = Air, gas 2 = Argon

S 415/ S 418 accessories	
Order no.	Description
A554 3315	T-BOX for S 415/418 Modbus/M-Bus systems, including 2 m cable with M8 connector
A554 0109	Mains power supply 100-240 VAC / 24 VDC, 0.5 A, 2 m cable with M8 connector
A553 0137	Connection cable S415/418 to S 551, 5 m

S 450/452 HEAVY DUTY INDUSTRY FLOW/CONSUMPTION SENSOR



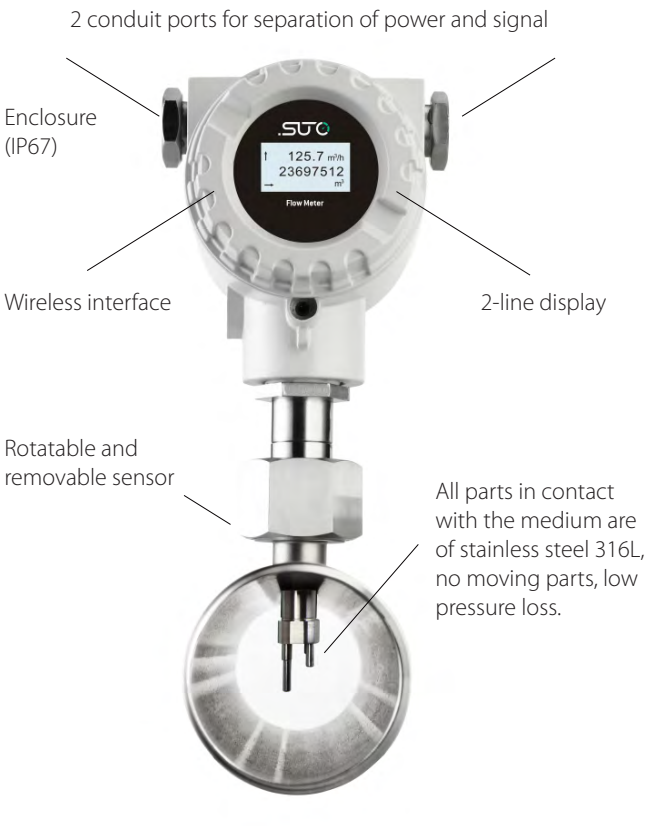
Features

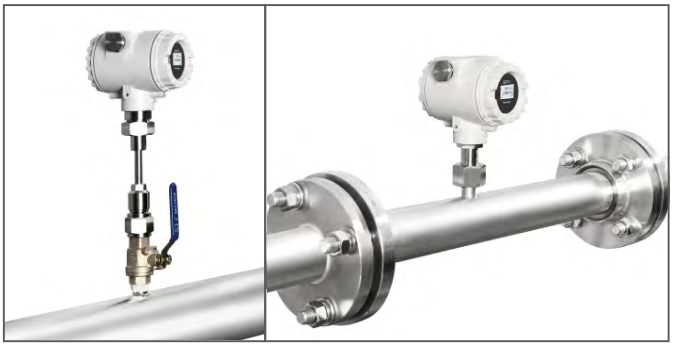
- Direct measurement of mass flow and standard flow without the need of pressure compensation
- Wide range of tube sizes are supported with insertion type for big pipe diameters and in line types for small pipe diameters
- No moving parts, non clogging
- All parts which come into contact with the measurement medium are made of stainless steel 316L
- Robust metal enclosure suitable for out-door applications in harsh environment
- Wireless interface for sensor settings on site
- Display showing flow rates, consumption, medium temperature and diagnostic results
- 2 analogue outputs (4-20 mA) and 1 pulse output
- Available options:
  - Fieldbus interface: HART, Modbus
  - Hazardous approval ATEX: II 2 G Ex d IIC T4
    IECEx approval
    GB Ex approval
  - Bi-directional measurement
  - Flow conditioning

The SUTO flow sensor S 450 is based on the thermal mass flow principle. It measures volumetric standard flow over a wide measuring range. The result is pressure and temperature independent.

The S 450 is designed specifically for harsh environments. The IP67 casing allows all-weather applications. All parts which come into contact with the measurement medium are made of stainless steel 316L. This allows applications in pharmaceutical and food industry, but also the measurement of corrosive and contaminated gas. Installations in explosive environments can be done through the optional ATEX approval. Various gases can be measured such as air, oxygen, argon, carbon dioxyde, natural gas, hydrogen, methane, etc.. Basically any gas mixture can be measured as long the mixing ratio and its components are known and constant.

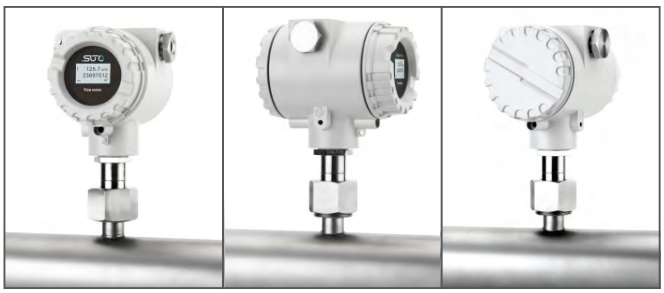
S 450/452 HEAVY DUTY INDUSTRY FLOW/CONSUMPTION SENSOR



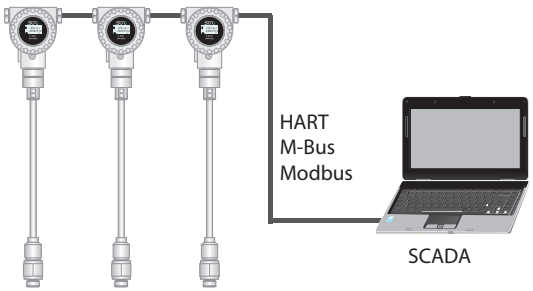


Insertion type installation through ball valve

In line type installation through flanges or R thread



Sensor head can be rotated in 90° steps through the screw nut



Industrial communication through Modbus, M-Bus, HART

Volumetric flow ranges S 450/452

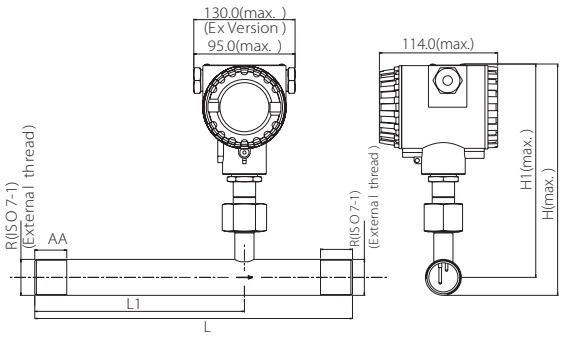
Inch	DN	S-Range (m3/h)	M-Range (m3/h)	HS-Range (m3/h)
½″	DN15	0.2 ... 45.6	0.4 ... 91.0	0.48 ... 110.16
¾″	DN20	0.4 ... 89.1	0.9 ... 177.8	1.09 ... 215.3
1″	DN25	0.6 ... 147.7	1.2 ... 294.7	1.82 ... 356.85
1½″	DN40	1.5 ... 366.7	2.9 ... 731.9	4.36 ... 886.18
2″	DN50	2.4 ... 600	4.8 ... 1198	7.26 ... 1450.04
2½″	DN65	4.1 ... 1027	8.2 ... 2049	12.1 ... 2480.44
3″	DN80	5.7 ... 1424	11.4 ... 2841	16.94 ... 3441.91
4″	DN100	8.7 ... 2183	17.4 ... 4357	24.2 ... 5275.71
5″	DN125	20 ... 3419.6	38 ... 6824.4	45.9 ... 8263.09
6″	DN150	20 ... 4930	39 ... 9839	70.18 ... 11913.10
8″	DN200	35 ... 8786	70 ... 17533	106.48 ... 21229.51
10″	DN250	55 ... 13744	110 ... 27429	165.77 ... 33210.69
12″	DN300	79 ... 19815	158 ... 39544	239.58 ... 47880.39

Stated flow values are at standard conditions of Ps = 0.1MPa(a) and Ts = 20°C with medium air.

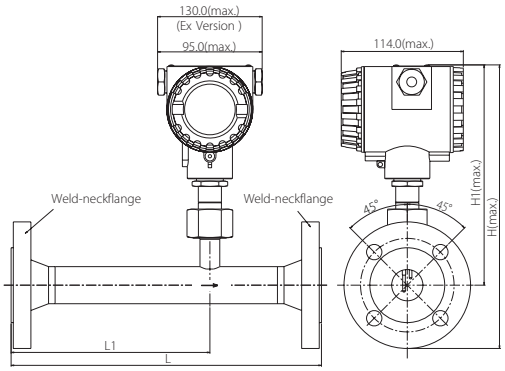
At other standard conditions and in other gases flow ranges are different and data are available on request.
In larger pipe diameters flow can also be measured.

S 450/452 HEAVY DUTY INDUSTRY FLOW/CONSUMPTION SENSOR

S 452



Pipe nominal size inch / (DN)	L total length (mm)	L1 inlet length (mm)	H total height (mm)	H1 from pipe center to casing top (mm)	R External Thread	A Thread Length (mm)
1/2″ (DN15)	300	210	210.8	200.15	R1/2″	20
3/4″ (DN20)	475	275	213.6	200.15	R3/4″	20
1″ (DN25)	475	275	217.0	200.15	R1″	25
1¼″ (DN32)	475	275	221.35	200.15	R1¼″	25
1½″ (DN40)	475	275	224.3	200.15	R1½″	25
2″ (DN50)	475	275	230.3	200.15	R2″	30

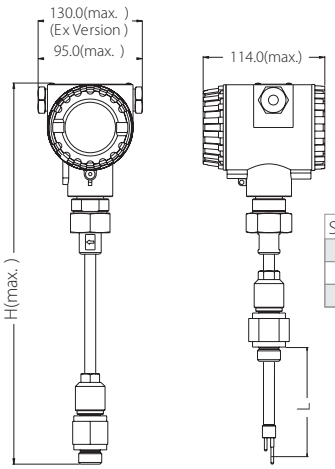


Pipe nominal size inch/(DN)	L total length (mm)	L1 inlet length (mm)	H total height (mm)	H1 from pipe center to casing top (mm)
1/2″ (DN15)	300	210	247.65	200.15
3/4″ (DN20)	475	275	252.65	200.15
1″ (DN25)	475	275	257.65	200.15
1¼″ (DN32)	475	275	270.15	200.15
1½″ (DN40)	475	275	275.15	200.15
2″ (DN50)	475	275	282.65	200.15
2½″ (DN65)	475	275	300.55	208.05
3″ (DN80)	475	275	314.45	214.45

Technical data S 450/452

Measuring range:	0.4 ... 92.7 sm/s (standard range calibration) 0.8 ... 185 sm/s (max range calibration) (refer to table for flow measurement ranges in different tube diameters) * sm/s: standard meter per second	
Accuracy:	±(1.5% of reading + 0.3% full scale)	
Stated accuracy at:	Ambient/process temperature 23°C ±3°C Ambient/process humidity <90%, no condensation Process pressure at 0.6 MPa	
Repeatability:	0.25% of reading	
Response time t95:	< 5 seconds	
Sampling rate:	Display and outputs are refreshed every 200 msec	
Tube diameter:	Insertion type: DN25 ... DN1500 In line type: DN15 ... DN80	
Process connection:	Insertion type: In line type:	½″ G type thread (ISO 228-1) R thread (ISO 7-1), Flange EN 1092-1, ANSI / B16.5, JIS B2220
Measuring medium:	Any gases where the components and the mixing ration are constant and known. See order information for a list of standard gases.	
Operating temperature:	-40°C ... +150°C (medium temp. insertion type) -40°C ... +100°C (medium temp. in line type) -40°C ... +65°C (ambient temperature)	
Operating pressure:	S 450: 0 ... 4.0 MPa (>1.6 MPa need installation device) S 452: 0 ... 1.6 MPa (Optional: 4.0 MPa)	
Analogue output:	2 x 4 ... 20 mA, up to 400 R load, active/ passive selectable, measurement channel selectable, scaling programmable	
Pulse/Alarm output:	Either alarm or pulse output. 1 pulse per 1, 10 or 100 consumption units, Alarm programmable	
Power supply:	16-30 VDC, 5 W	
Enclosure:	IP67	
Sensor material:	Stainless steel 1.4404 (SUS 316L)	
Approvals:	CE, RoHS ATEX: II 2 G Ex d IIC T4 / GB3836 / IECEx(Optional)	
Fieldbus: (Optional)	Modbus RTU HART	

S 450



Shaft option	L(mm)	H(mm)
A	220	469
B	160	409
C	300	549

Order form

* R thread only up to DN 50

S 450/ S 452	Shaft/ line size	Process connection	Gas medium	Calibration	Hazardous area approval	Output	Display	Description		
S695 0450								S 450, flow sensor insertion type		
S695 0452								S 452, flow sensor, inline type		
								S695 0450	S695 0452	
	A							A1200 220mm	DN15	*Standard*
	B							A1201 160mm	DN20	
	C							A1202 300mm	DN25	
	D								DN32	
	E								DN40	
	F								DN50	
	G								DN65	
	H								DN80	
		A						G ½"	R thread (ISO 7-1)*	*Standard*
		B						PT ½" adaptor	EN-1092-1, PN40	
		C						NPT ½" adaptor	Flange ANSI 16.5	
		D							Flange JIS B2220	
A1007			A					Medium Air		*Standard*
A1008			B					Medium CO_2		
A1009			C					Medium O_2 (oil & grease free cleaned)		
A1010			D					Medium N_2		
A1011			E					Medium N_2O		
A1012			F					Medium Ar		
A1013			G					Medium Natural gas (exact gas mix required)		
A1014			H					Medium H_2 (real gas calibration)		
A1015			I					Others (please specify the gas or gas mix)		
A1016			J					Medium He (real gas calibration)		
A1017			K					Medium Propane C_3H_8		
				A				Standard range calibration		*Standard*
A1271				B				Max range calibration		
A1272				C				Bi-directional standard range calibration (S 450 only)		
A1273				D				Bi-directional max. range calibration (S 450 only)		
A1274				E				High speed calibration		
A1279					A			None		*Standard*
A1280					B			ATEX / GB3836 / IECEx		
A1284						A		2 x 4 ... 20 mA + pulse		
A1285						B		1 x 4 ... 20 mA + HART + pulse		
A1286						C		1 x 4 ... 20 mA + Modbus + pulse		
A1294							A	Without display		*Standard*
A1295							B	With display		

Order No.	Description
R200 0005	Oil & grease free cleaned option for flow sensors (for Oxygen it is already included in A 1009)
R200 0020	Real gas calibration in selected gas to ensure best accuracy
A553 0121	Sensor cable, 6 pole, AWG22, 7.5 mm outer diameter, w/shielding, black (per meter)
A553 0123	RS-485 cable, 2 pole, AWG (per meter)

S 430 PITOT TUBE FLOW / CONSUMPTION SENSOR

The S 430 is based on the pitot tube principle to measure flow. Properly installed (refer to instruction manual for details) the sensor can measure in wet and dirty gases as occurring, for example, at the discharge of a compressor.

The sensor features long term stability, wide turn-down ratio and good temperature stability. It can be used in compressed air and non-corrosive gases.

The sensor can be installed through a ball valve while the system is pressurised.

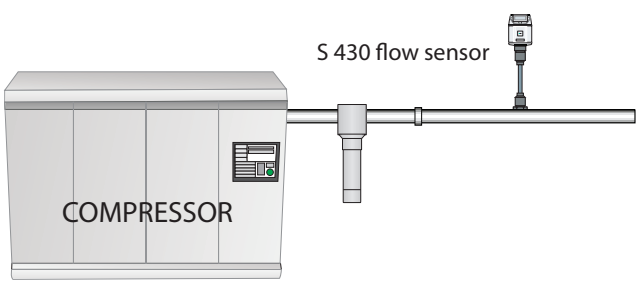
Various output signals allow the sensor to be connected to SUTO displays and/or third party displays and PLCs.

Colour graphic display for online values and sensor settings

Features

- Flow and consumption measurement in wet air or high mass flow / velocity applications
- Measurement at compressor outlet
- Tube diameters of 1" to 10" through center installation, bigger diameters through non-center installation
- Insertion type, easy installation under pressure through ball valve possible
- High temperature applications up to 200°C
- No mechanical wear parts
- All parts which are in contact with flow medium are made of stainless steel
- Compressor-FAD-Measurement
- Steam mass flow and consumption measurement

Technical data S 430		
Flow range	Refer to Instruction Manual	
Pressure range	0 ... 1.6 MPa	
Temperature range	-40°C ... +200°C	
Accuracy	Flow: Pressure: Temperature:	±(1.5%+0.3% full scale) 0.5% F.S. 0.5°C
Reference conditions	Programmable, default P = 1000 hPa(a), T = 20°C	
Medium	Wet and dry air, non-corrosive gases, steam	
Output signals	SDI (SUTO specific) 4 ... 20 mA and Pulse (optional) Modbus RTU (optional)	
Medium temp.	-40°C ... +230°C	
Ambient temp.	-20°C ... +60°C	
Power supply	24 VDC, 150 mA	
Display option	2.4" color graphics display with keypad	
Process connection	3/4" G type (ISO 228-1)	
Sensor material	Stainless steel 1.4404 (SUS 316L)	



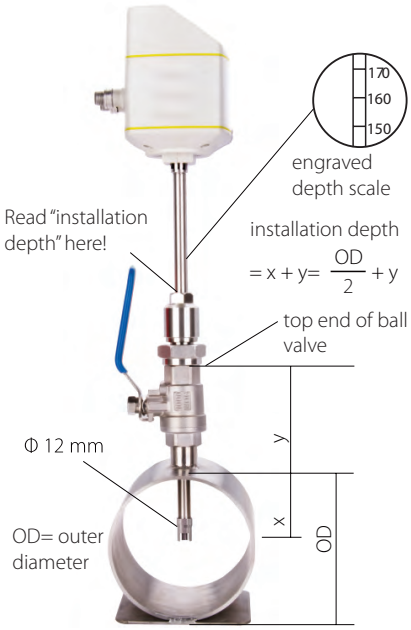
Compressor air delivery measurement and FAD calculation

Flow ranges

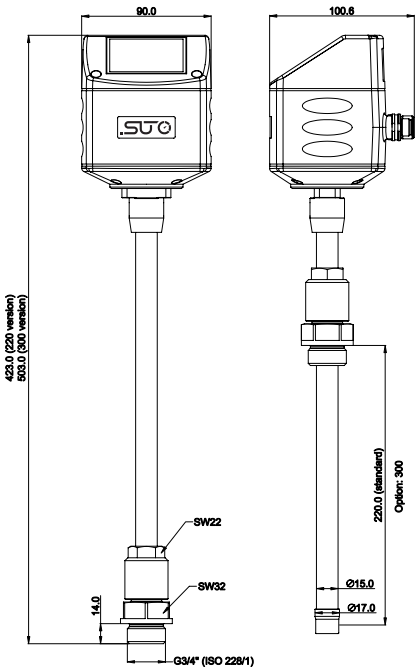
Tube		Volumetric flow					
Inch	mm	m³/h		m³/min		cfm	
		Min	Max	Min	Max	Min	Max
1	27.3	23	229	0.38	3.8	13	135
1¼"	36.0	51	507	0.85	8.5	30	298
1½"	41.9	76	756	1.26	12.6	45	445
2"	53.1	130	1298	2.16	21.6	76	764
2½"	68.9	227	2274	3.79	37.9	134	1338
3"	80.9	318	3175	5.29	52.9	187	1869
4"	100.0	488	4880	8.13	81.3	287	2872
5"	125.0	763	7625	12.71	127.1	449	4488
6"	150.0	1099	10993	18.32	183.2	647	6470
8"	200.0	1961	19611	32.69	326.9	1154	11543
10"	250.0	3064	30642	51.07	510.7	1804	18035
12"	300.0	4412	44125	73.54	735.4	2597	25971

Flow range for Air at 6 barg, 50°C and 90% humidity. For other gas and condition please download Flow Range software from www.suto-itec.com
All above flow rates are standard flows with reference to P = 1000 hPa(a) and T = 20°C.

Installation



Dimensions



S 430	Process connection	Gas medium	Fieldbus	Calibration	Display	Description
S695 4300						S 430, pitot tube flow sensor, insertion type, 220 mm shaft
S695 4302						S 430, pitot tube flow sensor, insertion type, 300 mm shaft, for steam application
	A					G ¾" *standard*
A1006	B					PT ¾" adaptor
A1005	C					NPT ¾"adaptor
A1007		A				Medium Air
A1008		B				Medium CO_2
A1009		C				Medium O_2 (oil & grease free cleaned)
A1010		D				Medium N_2
A1011		E				Medium N_20
A1012		F				Medium Ar
A1013		G				Medium Natural gas (exact gas mix required)
A1014		H				Medium H_2
A1015		I				Others (please specify the gas or gas mix)
A1016		J				Medium He
A1019		K				Steam
A1061			A			Modbus RTU
A1062			B			Analog, Pulse
A1063			C			M-Bus
				A		Standard
A1066				B		Bi-directional
A1067				C		High speed: Max flow increased by 30%
					A	Without Display
A1060					B	With Display *standard*

S 460 ULTRASONIC FLOW METER

S 460-W, wall mountable controller

Complete wall mountable set: S 460-W + transducer pair
(metal stretcher and coupling agent are included in S 460-W)

The S 460 ultrasonic flow meter uses the proven clamp-on transit-time correlation technique. The ultrasonic transducers are simply clamped onto the outside of the pipe and never come in contact with the fluid.
The transducers are connected to a controller which is available as hat rail, or portable version. The stationary models can be connected to the S 330/331 series of displays and data loggers where the portable model is connectable to the S 551.

Features

Measurement of liquid flows and consumption such as:

- Chemical addition
- Cooling and heating water
- Drinking water
- Broad range of refined hydrocarbons
- Potable water
- De-ionized and demineralized water
- Sanitary flow rate measurements
- Purified water

Technical data S 460	
Velocity range	0.03 ... 20 m/s
Repeatability	0.2%
Accuracy	±1%
Temperature sensor	PT100 3 wire
Output	4 ... 20 mA
Communication	Modbus RTU, Modbus ASCII
Pipe sizes	32 ... 6000 mm (depend on transducer type, inner diameter)
Temperature range controller transducer	 -30°C ... +80°C -30°C ... +90°C (standard) -30°C ... +160°C (High temperature)
Physical units	Selectable
Supply	24 VDC / 1.5 W (S 460-P) 230 VAC or 24 VDC (S 460-W)
Dimensions:	Wall version: 190 x 155 x 85 mm Portable version: 177 x 177 x 60 mm

Clamp on temperature sensors are used for energy calculation in heating and cooling systems

Ultrasonic transducer pair, screw terminals

To calculate the flow range please use this formula:

$Q=Di^2 * 0.01979$

Q [m3/h]

Di [mm]

Order form

D554 0074 Wall mountable

S 460-W, ultrasonic flow meter controller, wall mountable, including 5 m connection cable to transducers, metal stretcher and coupling agent

S694 4606 / S694 4607 / S694 4608

S694 4606 - Ultra sound sensor pair, DN32 ... DN100, screw terminals, for stationary, TS-2
S694 4607 - Ultra sound sensor pair, DN100 ... DN700, screw terminals, for stationary, TM-1
S694 4608 - Ultra sound sensor pair, DN 300 ... DN6000, screw terminals, for stationary, TL-1

P554 0070 Portable

S 460-P, ultrasonic controller for liquid flow sensor, connectable to S 551, including 5 m connection cable to S 551 and to transducers, metal stretcher and coupling agent

Optional

S694 4603 / S694 4604 / S694 4605

S694 4603 - Ultra sound sensor pair, DN32 ... DN100, socket terminals, for portable, TS-2
S694 4604 - Ultra sound sensor pair, DN100 ... DN700, socket terminals, for portable, TM-1
S694 4605 - Ultra sound sensor pair, DN300 ... DN6000, socket terminals, for portable, TL-1

A553 0124

Transducer cable pair, red and blue connector, 5 m
(included in P554 0070)

A553 0127

Transducer cable pair, open wire, 2 pole, outer diameter 7mm, shielding
(2 x 5 m included in D554 0074)

A553 0121

Sensor cable, 6 pole, AWG22, 7.5 mm outer diameter, w/ shielding, black [per meter]
(for connection to S 330/331 displays)

A554 0075

Coupling agent, ultrasonic transducers, 100 g, temporary installations
(included in P554 0070)

A554 0077

Metal stretcher for installations of transducers (2 pieces)
(2 pieces included in D554 0074 + P554 0070)

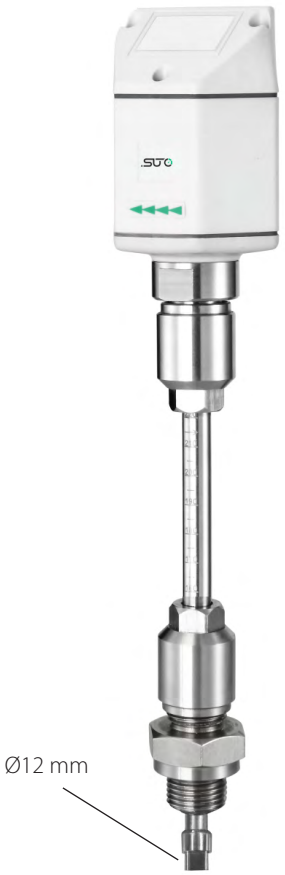
A554 0078

Coupling agent, ultrasonic transducers, 100 g, permanent installations
(included in D554 0074)

S604 0107

Temperature sensor, Pt100, 3-wire, with 2 m cable, clamp on sensor for pipes, including stretcher (2 sensors required for energy calculation / only for stationary applications)

S 409 FLOW DIRECTION SWITCH FOR COMPRESSED AIR/GASES



Features

Measurement of liquid flows and consumption such as:

- Detects smallest changes < 0.1 m/s referred to 20°C and 1000 hpa
- No mechanical wear parts
- Easy installation under pressure

Technical data S 409	
Detection range	0.02 ... 25 m/s @ 7barg, 20°C
Sensor	2 x Pt 1000
Medium	air, gases
Medium humidity	< 100% (no condensation)
Medium temp.	-20°C ... +80°C
Ambient temp.	-20°C ... +70°C
Operating pressure	0 ... 1.6 MPa
Power supply	24 VDC, 60 mA
Output	2 x Relay, 60V, 1A
Process connection	1/2" G type (ISO 228-1)
Sensor material	Stainless steel 1.4404 (SUS 316L)

The thermal mass flow direction switch S 409 allows the detection of direction of the flow. It can be used in compressed air and non-corrosive gases.

The sensor element is very robust and completely of stainless steel. Through a 1/2"G-type ball valve the switch can be inserted into the pipe under pressure.

The flow and direction information is output through 2 normally open relay switches. The signals can be transferred to the SUTO flow sensor to activate and deactivate the flow measurement depending on the flow direction.

Thermal mass flow sensor element

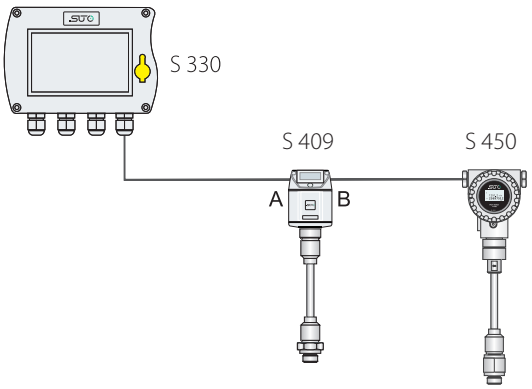
S 409 FLOW DIRECTION SWITCH FOR COMPRESSED AIR/GASES

Pin arrangement of flow switch

	Pin1	Pin2	Pin3	Pin4	Pin5
A	SDI	-VB	+VB	DIR1	DIR1
B	SDI	-VB	+VB	DIR2	DIR2

Relay output at switch

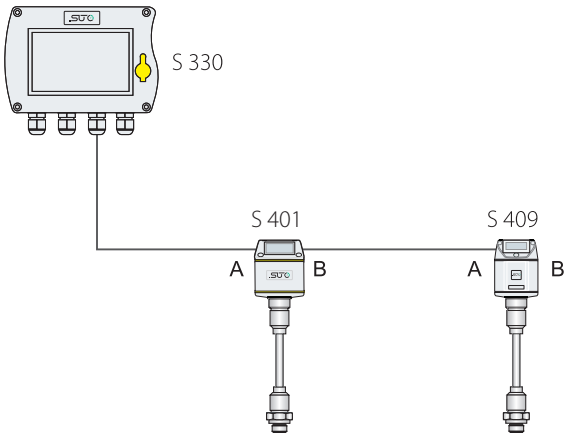
Connection of S 330 to S 450 via flow switch



S 409 (B)	S 450
1	4
2	3
3	2
4	5
5	6

Connection between S 409 and S 450/452

Connection of S 330 to S 401 with flow switch



Attention: Flow sensors S 450/S 401 need to have the bi-directional calibration option to operate in both directions

Order No.	Description
S695 0409	S 409, flow direction switch, insertion type
A554 0007	Mains unit in wall housing
A553 0104	Sensor cable 5 m, with M12 connector, open wires, AWG24 (0.2 mm²)
A553 0105	Sensor cable 10 m, with M12 connector, open wires, AWG24 (0.2 mm²)
A1005	NPT ½" adaptor
A1006	PT ½" adaptor

INTRODUCTION DEW POINT MEASUREMENT

The measurement of pressure dew point in compressed air systems or gas distribution networks has become more important recently. Manufacturers world wide are getting aware of negative effects of having too much moisture in the air / gas pipes, as it can cause:

- Corrosion in the pipes
- Reduces lifespan of pneumatic parts
- Failures in actuators
- Contamination of compressed air system in general
- Unscheduled production stops.
- Incalculable additional production costs

Dryers used to remove moisture from gas, are not always performing as they intend to do, mostly caused by poor maintenance. Dew point measurement acts as an insurance system, monitoring the dryer performance and indicating alarms whenever values are out of valid ranges. As a result it provides:

- Fast responses to failures in compressed air drying through permanent monitoring of pressure dew point.
- Increase the lifespan of compressed air system and its components.
- Makes maintenance of the compressed air system more efficient.
- Ensures stable quality of products through less problems in operation of the system.

But dew point measurement is not only restricted to applications in air / gas drying. There are many more processes in industry where a well monitored dew point is crucial for the overall process and the quality of the products.

Applications for dew point monitoring:

- Plastic injection and blow moulding
- High voltage switch gears and transformers
- Spray painting process
- Bottle filling
- Medical gases
- Pipeline drying

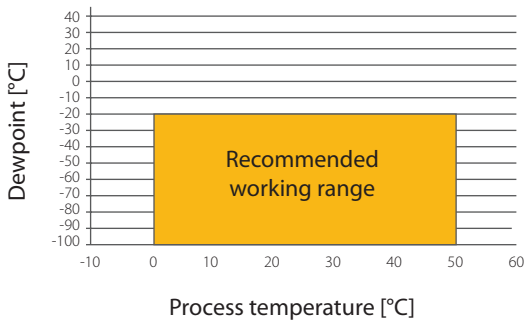
S 220 DEW POINT SENSOR (-100°C ... 0°C)

The SUTO dew point sensor S 220 provides reliable and long term stable dew point monitoring in industrial applications.
SUTO is using a new sensor technology which has superior signals at very low moisture levels thus providing reliable measurements down to -100°C.

A stainless steel sinter filter with pore sizes below 30 µm protects the sensor from particles. It's designed for applications where very low moisture levels needs to be detected.

The measured dew point is output through a 4-20 mA signal (3-wire or loop powered). Sensor parameters such as analogue output scaling, physical units, can be easily changed by using SUTO service kit.

Recommended working range S 220



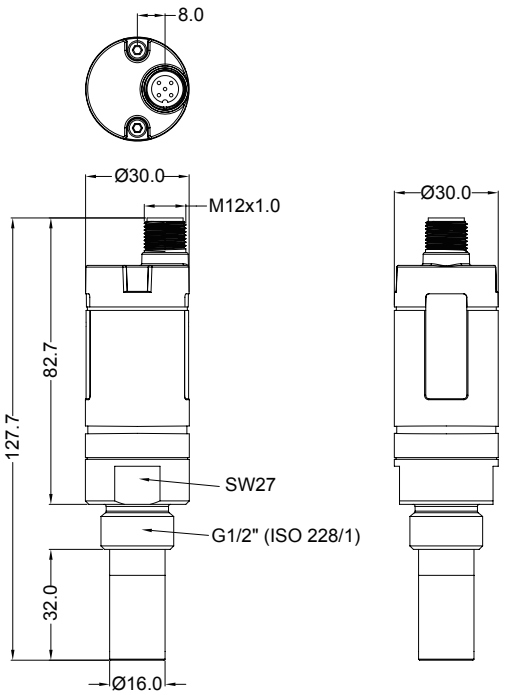
Features

- Very fast response time ensures safe and reliable indication whenever dew points are out of valid ranges
- Small size makes it ideal for dryer installations
- Measures dew points down to -100°C
- SUTO QCM sensor technology
- Version with integrated pressure measurement
- Various output versions available: 1 x 4 ... 20 mA, 2 x 4 ... 20 mA, RS-485 (Modbus), 4 ... 20 mA loop powered
- IP65 casing provides robust protection in rough industrial environment
- Can be installed directly into dryers through G 1/2" thread
- High accuracy of ±2°C dew point
- M12 connector

Technical data S 220	
Measurement range	Dew point -100°C ... 0°C Temperature -30°C ... +70°C Pressure -0.1 ... 1.6 MPa
Dew point sensor	QCM
Temperature sensor	Pt100
Pressure sensor	Piezo resistive type
Accuracy	Dew point ±2°C Temperature 0.3°C Pressure 0.05 bar
Operating Pressure	-0.1 ... 1.6 MPa
Operating Temperature (Medium)	-30°C ... +70°C
Measured gases (Medium)	Non-corrosive gases
Response Time t90 (@ 4 l/min)	-80°C-> -20°C: 20 sec -20°C-> -80°C: 180 sec
Ambient Temperature	0°C ... +50°C
Ambient Humidity	0 ... 100%rH
Supply Voltage	12 ... 30 VDC
Current consumption (model depending)	30 mA @ 24 VDC 3-Wire 20 mA @ 24 VDC 2-Wire
Output signals (model depending)	4 ... 20 mA 3-Wire 4 ... 20 mA 2-Wire Modbus RTU
Electrical connection	M12, 5 pole
Process connection	G 1/2" thread (ISO 228/1) Stainless steel 1.4301 (SUS 304)
Casing material	Zinc alloy
Classification	IP65
EMC	IEC 61326-1
Approval	-
Sensor protection	Sinter filter/perforated cap
Transport Temperature	-30°C ... +70°C
Storage Temperature	-20°C ... +50°C
Weight	204 g

S 220 DEW POINT SENSOR (-100°C ... 0°C)

Dimensions



Sensor Technology

The innovative QCM Sensor Technology used by SUTO measures moisture changes in parts per billion range.

Stated accuracy under following conditions:

- Ambient temperature 23°C ±3°C
- Process temperature 23°C ±3°C
- Ambient humidity < 95%, no condensation
- Airflow > 2 l/min at sensor tip

Order no.	Description
S699 0220-X	S 220, dew point sensor, -100°C ... 0°C, G 1/2" thread, 16 bar, 1 x 4 ... 20 mA
S699 0221-X	S 220, dew point sensor, -100°C ... 0°C, G 1/2" thread, 16 bar, 2 x 4 ... 20 mA, dew point and temperature
S699 0222-X	S 220, dew point sensor, -100°C ... 0°C, G 1/2" thread, 16 bar, RS-485 (Modbus)
S699 0223-X	S 220, dew point sensor, -100°C ... 0°C, G 1/2" thread, 16 bar, incl. pressure, 2 x 4 ... 20 mA, dew point and pressure
S699 0224-X	S 220, dew point sensor, -100°C ... 0°C, G 1/2" thread, 16 bar, incl. pressure, RS-485 (Modbus)
S699 0225-X	S 220, dew point sensor, -100°C ... 0°C, G 1/2" thread, 16 bar, loop powered 4 ... 20 mA
A554 2005	Service kit for sensor configuration including software
A699 3491	Measuring chamber for easy installation in compressed air system up to 1.5 MPa
A699 3493	Measuring chamber bypass type (in and out 6 mm hose connection)
R699 3696	Sensor calibration
C190 0193	Perforated filter cap, aluminum
C198 0008	Sinter cap, diameter 16 mm, stainless steel, 30 µm pore size

X: Select the desired sensor protection cap by adding A or B at the end of the order number.
A: stainless steel sinter filter, pore size < 30 µm (standard)
B: Perforated sensor cap (standard, requires a prefilter 0.1 µm)
Example: S699 0220-B

Find more informationn about accessories for dew point sensors at the end of this catalog

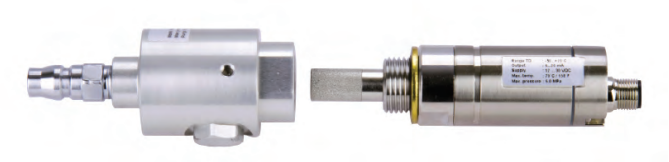
S 212 DEW POINT SENSOR (-50°C ... +20°C)

Features

- Dew point sensor for low dew point applications down to -50°C
- Long term stability
- IP65 casing provides robust protection in rough industrial environment
- Fast response time ensures safe and reliable indication whenever dew points are out of valid ranges
- Can be installed directly into dryers through G ½" thread
- High accuracy of ±2°C dew point

The SUTO dew point sensor S 212 provides reliable and long term stable dew point monitoring in industrial applications. The newly developed sensor features improved signal and stability in demanding industrial applications. It makes it an ideal choice for dew point measurements in desiccant dryers.

The measured dew point is output via a 4-20 mA signal output. The compact size of the sensor makes it an ideal choice for installations in tight environments. Sensor parameters such as analogue output scaling, alarm values, units, etc, can be easily changed by using SUTO service kit. This kit is used to connect the sensor to a PC for configuration changes.



Connection of S 212 with measuring chamber to compressed air

Technical data S 212	
Measuring range	Dew point -50°C ... +20°C Temperature -30°C ... +70°C
Dew point sensor	Polymer
Temperature sensor	Pt100
Pressure sensor	N/A
Accuracy	Dew point ±2°C Temperature 0.3°C
Operating Pressure	-0.1 ... 5.0 MPa
Operating Temperature (Medium)	-30°C ... +70°C
Measured gases (Medium)	Non-corrosive gases
Response Time t90 (@ 4 l/min)	-50°C -> 0°C: 20 sec 0°C -> -50°C: 180 sec
Ambient Temperature	-20°C ... +50°C
Ambient Humidity	0 ... 100 %rH
Supply Voltage	12 ... 30 VDC
Current consumption	30 mA @ 24 VDC
Output signals	4 ... 20 mA 3-Wire
Electrical connection	M12, 5 pole
Process connection	G 1/2" thread (ISO 228/1) Stainless steal 1.4301 (SUS 304)
Casing material	Zinc alloy
Classification	IP65
EMC	IEC 61326-1
Approval	-
Sensor protection	Sinter filter
Transport Temperature	-30°C ... +70°C
Storage Temperature	-20°C ... +50°C
Weight	195 g

Order no.	Description
S699 0412	S 212, dew point sensor including M12 connector (straight type), -50°C ... +20°C, G ½" thread
A699 4003	High pressure option 35 MPa (350 bar)

S 215 DEW POINT SENSOR (-20°C ... +50°C)

Dew point sensor ideal for refrigerant dryers. Loop powered 4 ... 20 mA output.

Features

- Affordable dew point sensor for mid range applications such as refrigerant dryer monitoring
- Long term stability
- IP65 casing provides robust protection in rough industrial environment
- Fast response time ensures safe and reliable indication whenever dew points are out of valid ranges
- Can be installed directly into dryers through G ½" thread
- High accuracy of ±2°C dew point

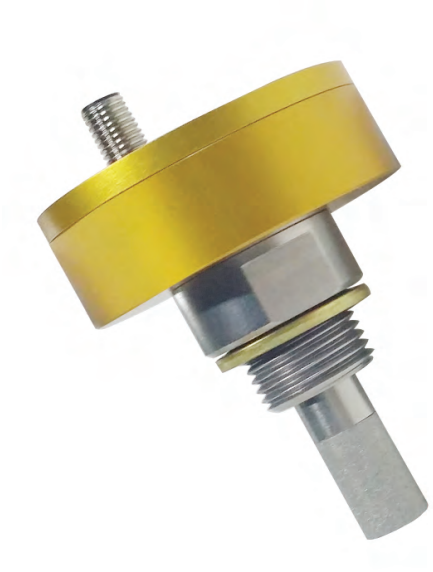
The SUTO dew point sensor S 215 provides reliable and long term stable dew point monitoring in industrial applications. With this model dew point measurement in refrigerant dryers becomes affordable and can replace traditional temperature measurement which often couldn't tell the real dew point.

S 215 outputs the measurement value through the loop powered 4 -20 mA signal.

Technical data S 215		
Measuring range	Dew point Temperature	-20°C ... +50°C -30°C ... +70°C
Dew point sensor	Polymer	
Temperature sensor	NTC	
Pressure sensor	N/A	
Accuracy	Dew point Temperature	±2°C 0.3°C
Operating Pressure	-0.1 ... 5.0 MPa	
Operating Temperature (Medium)	-30°C ... +70°C	
Measured gases (Medium)	Non-corrosive gases	
Response Time t90 (@ 4 l/min)	-20°C -> +20°C: 20 sec +10°C -> -20°C: 60 sec	
Ambient Temperature	-20°C ... +50°C	
Ambient Humidity	0 ... 100 %rH	
Supply Voltage	12 ... 30 VDC	
Current consumption	20 mA @ 24 VDC	
Output signals	4 ... 20 mA 2-Wire	
Electrical connection	M12, 5 pole	
Process connection	G 1/2" thread (ISO 228/1) Stainless steal 1.4301 (SUS 304)	
Casing material	Zinc alloy	
Classification	IP65	
EMC	IEC 61326-1	
Approval	-	
Sensor protection	Sinter filter	
Transport Temperature	-30°C ... +70°C	
Storage Temperature	-20°C ... +50°C	
Weight	195 g	

Order no.	Description
S699 0415	S 215, dew point sensor including M12 connector (straight type), -20°C ... +50°C, G ½" thread
A699 4003	High pressure option 35 MPa (350 bar)

S 217-OEM DEW POINT SENSOR (-50°C ... +50°C)



Features

- Small size makes it ideal for dryer installations
- Measures dew points down to -50°C
- 2-wire or 3-wire output
- IP65 casing provides robust protection in rough industrial environment
- Very fast response time ensures safe and reliable indication whenever dew points are out of valid ranges
- Can be installed directly into dryers through G 1/2" thread
- High accuracy of 1°C ... 2°C dew point
- Withstands condensation
- M8 / M12 connector and cable with open wires

The SUTO dew point sensor S 217 provides reliable and long term stable dew point monitoring in industrial applications. The newly developed sensor features improved signal and stability in demanding industrial applications.

It's designed for OEM applications in desiccant and refrigeration dryers. Through our new sensor technology paired with a compact casing, S 217-OEM can be offered at very attractive prices. This allows applications in smaller dryers and point of use dryers using a more energy efficient dew point control.

The measured dew point is output via the loop-powered 4 ... 20 mA signal or 3 wire 4 ... 20 mA output. Sensor parameters such as analogue output scaling, physical units, can be set ex factory.

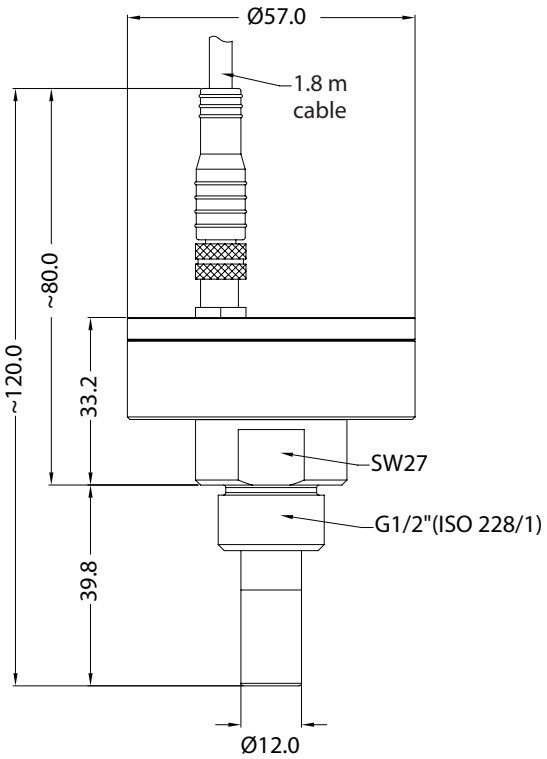
Stated accuracy under following conditions:

- Ambient temperature 23°C ±3°C
- Process temperature 23°C ±3°C
- Ambient humidity < 95%, no condensation
- Airflow > 1 l/min at sensor tip

Technical data S 217		
Measurement range (model depending)	Dew point Temperature	-50°C ... +20°C -20°C ... +50°C -30°C ... +70°C
Dew point sensor	Polymer	
Temperature sensor	NTC	
Pressure sensor	N/A	
Accuracy	Dew point Temperature	±2°C 0.3°C
Operating Pressure	-0.1 ... 5.0 MPa	
Operating Temperature (Medium)	-30°C ... +70°C	
Measured gases (Medium)	Non-corrosive gases	
Response Time t90 (@ 4 l/min)	-40°C -> -20°C: 20 sec 0°C -> -40°C: 120 sec	
Ambient Temperature	-20°C ... +5°C	
Ambient Humidity	0 ... 100 %rH	
Supply Voltage	12 ... 30 VDC	
Current consumption (model depending)	30 mA @ 24 VDC 3-Wire 20 mA @ 24 VDC 2-Wire	
Output signals (model depending)	4 ... 20 mA 3-Wire 4 ... 20 mA 2-Wire	
Electrical connection	Cable, 1.8 m, open end wire, M8 connector, 4 pole	
Process connection	G 1/2" thread (ISO 228/1) Stainless steel 1.4301 (SUS 304)	
Casing material	Aluminium alloy	
Classification	IP65	
EMC	IEC 61326-1	
Approval	-	
Sensor protection	Sinter filter	
Transport Temperature	-30°C ... +70°C	
Storage Temperature	-20°C ... +50°C	
Weight	198 g	

S 217-OEM DEW POINT SENSOR (-50°C ... +50°C)

Dimensions



Order no.	Description
S699 2170	S 217-0, dew point sensor, 4 ... 20 mA (2-wire), -50° ... +20°C, G 1/2" thread, 50 bar, M8
S699 2173	S 217-3, dew point sensor, 4 ... 20 mA (2-wire), -20° ... +50°C, G 1/2" thread, 50 bar, M8
S699 2174	S 217-4, dew point sensor, 4 ... 20 mA (3-wire), -20° ... +50°C, G 1/2" thread, 50 bar, M8
S699 2175	S 217-5, dew point sensor, 4 ... 20 mA (3-wire), -50° ... +20°C, G 1/2" thread, 50 bar, M8
A1390	S 217, customized measuring range
A1391	S 217, high pressure option 35 MPa (350 bar)
A554 2005	Service kit for sensor configuration including software
A699 3491	Measuring chamber for easy installation in compressed air system up to 15 bar
A699 3493	Measuring chamber bypass type (in and out 6 mm hose connection)
C198 0002	Sinter cap stainless steel

S 230/231 DEW POINT SENSOR (-100°C ... +20°C)

Features / Benefits

- Dew point sensor with optional ATEX, IECEx approval
- Dual sensor technology for high accuracy of 2°C over the whole range from –100°C ... +20°C
- Two outputs available: 4 ... 20 mA, RS-485 (Modbus RTU).
- IP65 casing provides robust protection in rough industrial environment

The SUTO S 230/231 dew point sensors provide reliable, long term stable dew point monitoring in industrial or hazardous applications. SUTO's unique dual sensor technology optimizes sensor sensitivity and accuracy by automatically selecting the ideal sensor type for the situation.

The S 230/231 comes ready to use and simple to install with your choice of 4-20mA or Modbus RTU (RS485) outputs. If required, parameters can quickly and easily be configured through the SUTO service software.

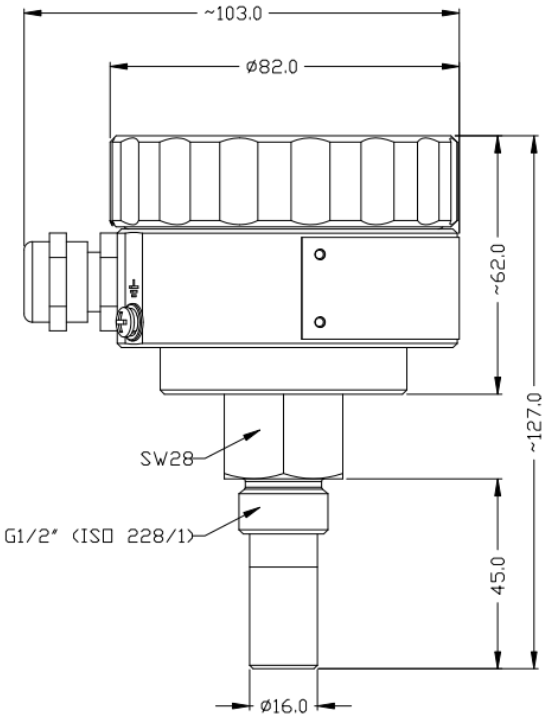
Accuracy tested under following reference conditions:

- Ambient temperature 23°C ±3°C
- Process temperature 23°C ±3°C
- Ambient humidity < 95%, no condensation
- Airflow > 2 l/min at sensor tip

Technical data S 230/231		
Measurement range (model depending)	Dew point Temperature	-100° ... +20°C (S 230) -50° ... +20°C (S 231) -30° ... +70°C
Dew point sensor	QCM & Polymer	
Temperature sensor	NTC	
Pressure sensor	N/A	
Accuracy	Dew point Temperature	±2°C 0.3°C
Operating Pressure (model depending)	-0.1 ... 1.6 MPa (S 230) -0.1 ... 35 MPa (S 231)	
Operating Temperature (Medium)	-30° ... +70°C	
Measured gases (Medium)	Non-corrosive gases	
Response Time t90 (@ 4 l/min)	< 240 sec -20°C-> -60°C < 30 sec -60°C-> -20°C	
Ambient Temperature	-20°... +50°C	
Ambient Humidity	0 ... 100 %rH	
Supply Voltage	12 ... 30 VDC	
Current consumption	40 mA @ 24 VDC	
Output signals	4 ... 20 mA (isolated) Modbus RTU	
Electrical connection	Screw terminals	
Process connection	G 1/2" thread (ISO 228/1) Stainless steal 1.4301 (SUS 304)	
Casing material	Aluminium alloy	
Classification	IP67	
EMC	IEC 61326-1	
Approval	Ex db[ib] IIC T4 Gb	
Sensor protection	Sinter filter	
Transport Temperature	-30° ... +70°C	
Storage Temperature	-20° ... +50°C	
Weight	728 g	

S 230/231 DEW POINT SENSOR (-100°C ... +20°C)

Dimensions



Accessories

Measuring chamber with inlet / outlet valve and compression fitting for gas supply

Cable connection

Screw terminals with signal labels inside the connection chamber

Order no.	Description
S699 0230	S 230, dew point sensor, -100°C ... +20°C, G 1/2" thread, 1.5 MPa, 1 x 4 ... 20 mA, RS-485 (Modbus)
S699 0231	S 231, dew point sensor, -50°C ... +20°C, G 1/2" thread, 35 MPa, 1 x 4 ... 20 mA, RS-485 (Modbus)
A1480	S 230/231: Ex option ATEX (to be ordered for hazardous environment)
A1481	S 230/231: Ex option IECEx (to be ordered for hazardous environment)
A1482	S 230/231: Ex option GB3836 (to be ordered for hazardous environment)
	Accessories
A554 2301	Measuring chamber with inlet / outlet valve and compression fittings for gas supply, 1.5 MPa
A554 2302	Measuring chamber with insertion type sampling tubes (for applications where purge losses are not acceptable), 1.5 MPa

S 201 DEW POINT SENSOR WITH DISPLAY AND ALARM (-60°C ... +20°C)

The SUTO dew point sensor S 201 provides reliable and long term stable dew point monitoring in industrial applications. The newly developed sensor features improved signal and stability in demanding industrial applications.

The measured dew point is output via a 4-20 mA signal output. The integrated display shows online measurement values and alarm status. One alarm can be programmed which will activate a relay.

S 201 features a complete dew point meter with sensor, display, keyboard and alarm.

Sensor parameters such as analogue output scaling, alarm values, units, etc, can be easily changed by using SUTO service kit.
This kit is used to connect the sensor to a PC for configuration changes.

Alarm adjustment at dew point sensor

Order no.	Description
S699 0406	S 201, dew point sensor including 2 x M12 connectors (straight type) -60°C ... +20°C, G ½" thread
A699 4003	High pressure option 35 MPa (350 bar)

Features

- Dew point sensor for low dew point applications down to -60°C
- Long term stability
- Graphic display
- Relay output
- IP65 casing provides robust protection in rough industrial environment
- Fast response time ensures safe and reliable indication whenever dew points are out of valid ranges
- Can be installed directly into dryers through G ½" thread
- High accuracy of ±2°C dew point

Technical data S 200/201	
Measuring range	Dew point -60°C ... +20°C Temperature -30°C ... +70°C
Dew point sensor	Polymer
Temperature sensor	Pt100
Pressure sensor	N/A
Accuracy	Dew point ±2°C Temperature 0.3°C
Operating Pressure	-0.1 ... 5.0 MPa
Operating Temperature (Medium)	-30°C ... +70°C
Measured gases (Medium)	Non-corrosive gases
Response Time t90 (@ 4 l/min)	-60°C -> -20°C: 20 sec 0°C -> -60°C: 180 sec
Ambient Temperature	-20°C ... +50°C
Ambient Humidity	0 ... 90 %rH
Supply Voltage	12 ... 30 VDC
Current consumption	80 mA @ 24 VDC
Output signals	4 ... 20 mA 3-Wire Alarm Relay (NO 32 VDC / 500 mA)
Electrical connection	2 x M12, 5 pole
Process connection	G 1/2" thread (ISO 228/1) Stainless steal 1.4301 (SUS 304)
Casing material	PC + ABS
Classification	IP65
EMC	IEC 61326-1
Approval	-
Sensor protection	Sinter filter
Transport Temperature	-30°C ... +70°C
Storage Temperature	-20°C ... +50°C
Weight	226 g

S 305 DEW POINT MONITOR (-50°C ... +20°C / -20°C ... +50°C)

Refrigeration dryers are the most commonly used dryer type in compressed air system around the world. If the required drying is not achieved, the impact of wet air can be serious: Rust in the pipes, failures of machines, and a negative impact on product quality.

SUTO offers with the S 305 a measuring device for dew point monitoring that kicks in alarm indications when drying values are not within the desired range.

The All-In-One dew point monitor serves as a measuring and display device. The connection to the compressed air network is via a 6-mm quick connect and corresponding connecting hose. The entire measuring unit is integrated together with the display in a rugged housing (IP65) and is available both as a panel variant or as a wall-mounted housing. Two alarm levels can be programmed (pre and main alarm), serving an optical indications or separate relay outputs. The dew point meter allows a simple and inexpensive dew point monitoring.

Stated accuracy under following conditions:

- Ambient temperature 23°C ±3°C
- Process temperature 23°C ±3°C
- Ambient humidity < 95%, no condensation
- Airflow > 1 l/min at sensor tip

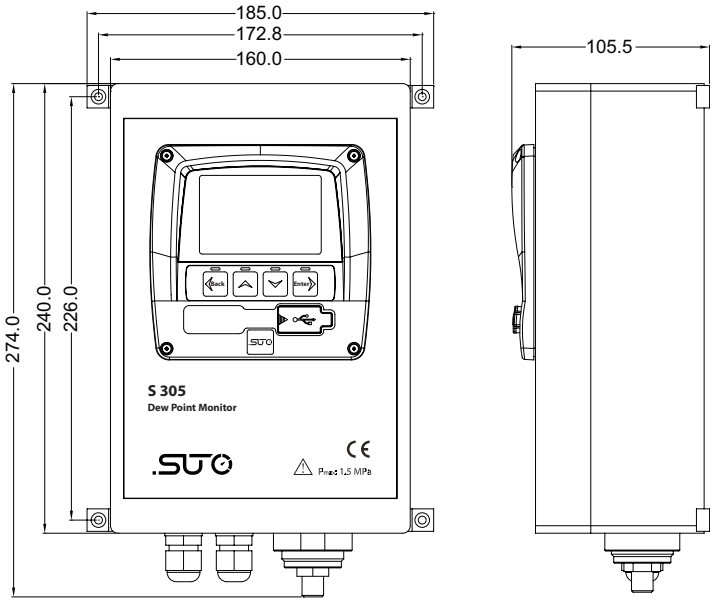
Features

- 2 models: -50°C ... +20°C and -20°C ... +50°C
- Plug & Play (complete solution)
- Compressed air supply through 6 mm Quick-Connect
- Power supply: 100 ... 240 VAC or 24 VDC
- Wall or panel mountable
- Accuracy of ±2°C
- IP65 casing provides robust protection in rough industrial environment
- 4 ... 20 mA output to PLC or SCADA system
- Pre– and Main-Alarm programmable:
  - Optical: red blinking display
  - 2 relay outputs

Technical data S 305		
Measuring range (model depending)	Dew point	-50°C ... +20°C -20°C ... +50°C
Dew point sensor	Polymer	
Temperature sensor	NTC	
Pressure sensor	N/A	
Accuracy	Dew point Temperature	±2°C 0.3°C
Operating Pressure	0.3 ... 1.5 Mpa	
Operating Temperature (Medium)	-30°C ... +70°C	
Measured gases (Medium)	Non-corrosive gases	
Response Time t90 (@ 4 l/min)	-50°C -> -20°C: 20 sec 0°C -> -40°C: 120 sec	
Ambient Temperature	-10°C ... +40°C	
Ambient Humidity	0 ... 90 %rH	
Supply Voltage (model depending)	100 ... 240 VAC 24 VDC	
Current consumption (model depending)	40 mA @ 220 VAC 120 mA @ 24 VDC	
Output signals	4 ... 20 mA 3-Wire	
Electrical connection	Screw terminals	
Process connection	6 mm quick connector Aluminium alloy	
Casing material	ABS	
Classification	IP65	
EMC	IEC 61326-1	
Approval	-	
Sensor protection	Sinter fiter	
Transport Temperature	-30°C ... +70°C	
Storage Temperature	0°C ... +40°C	
Weight	520 g	

S 305 DEW POINT MONITOR (-50°C ... +20°C / -20°C ... +50°C)

Dimensions



Alarm adjustment at dew point sensor

Order no.	Description
D699 3050	S 305, dew point monitor, -20°C ... +50°C, 6 mm quick connector, 15 bar, 1 x 4 ... 20 mA, 100 ... 240 VAC, 2 relay outputs
D699 3051	S 305, dew point monitor, -20°C ... +50°C, 6 mm quick connector, 15 bar, 1 x 4 ... 20 mA, 24VDC, 2 relay outputs
D699 3052	S 305, dew point monitor, -50°C ... +20°C, 6 mm quick connector, 15 bar, 1 x 4 ... 20 mA, 100 ... 240 VAC, 2 relay outputs
D699 3053	S 305, dew point monitor, -50°C ... +20°C, 6 mm quick connector, 15 bar, 1 x 4 ... 20 mA, 24VDC, 2 relay outputs
C198 0005	Filter cap, stainless steel, 30 µm pore size
A554 0024	Alarm unit, 100 ... 240 VAC, red light and buzzer alarm, wall mountable (unit is using the relay outputs of S 305 to trigger the alarm)
A554 0025	Alarm unit, 100 ... 240 VAC, red light and buzzer alarm, mounted at S 305 casing (unit is using the relay outputs of S 305 to trigger the alarm)
A553 0106	Power cable with mains plug, 1.8 m

S 505 PORTABLE
DEW POINT METER (-100°C ... +50°C)

- Fast response time
- Wide measuring range
- Accurate

With the S 505 SUTO has combined next generation measurement technology with modern user interface design. The experienced user knows that dew point measurement also requires the measurement of line pressure (according to ISO 8573), since dew point is pressure dependent. With the S 505 the line pressure is measured in combination with the dew point, so the user can be confident that the calculation is accurate and free from human error.

S 505 comes with two sensor units: Sensor Q uses the new QCM technology which provides fast and accurate measurement results at dew points below –30°C down to –100°C. Sensor P is for high moisture applications from -50° ... +50°C where the SUTO polymer sensor is more suitable. Both sensors can be easily exchanged.

Additional features unique to the S 505 include:

1. A modern, state of the art graphical user interface with touch screen functions for ease of operation similar to modern smart phones.

2. The data logger can record as many as 100 million values which are stored on a flash card. The card can be removed for fast transportation of the recorded information to your PC, or alternatively the information can be transferred or read via USB .

3. Using a portable printer on-site printouts can be created showing the measured values, location and date/time. Of course these values can be stored as well for report generation in your office.

4. S 505 comes in a robust transport casing including measuring chamber, battery charger, USB cable and a Teflon® hose allowing for quick connection to the compressed air system and immediate measurements.

Features

- Measures dew point, temperature and pressure (all in one instrument)
- 3 sensor solutions available:
  Q: -100°C ... -30°C sensor for trace moisture applications
  P: -50°C ... +50°C sensor for standard applications
  Q+P: covering the full range of dew point measurement
- Modern color touch screen interface
- Data logger, USB interface, wireless connection to portable printer
- Measuring / parking chamber for fast sensor response
- Application software included

Technical data S 505		
Measuring range	Sensor Q: Sensor P: Pressure: Temperature:	-100°C ... -30°C -50°C ... +50°C -0.1 ... 1.5 MPa -30°C ... +50°C
Accuracy	Dew point: Pressure*: Temperature: (Stated uncertainty at: Ambient / process temperature of 23°C ±3°C and ambient humidity of < 90%, no condensation)	±2°C dew point ±0.005 MPa ±0.3°C
Measured gas	Non-corrosive gases	
Ambient conditions	Ambient temp.: Storage temp.: Ambient humidity: EMC:	0°C ... +50°C -40°C ... +65°C < 90%, no condensation IEC / EN 61326
Response time t90	-50°C -> -10°C: < 10 seconds -10°C -> -50°C: < 5 minutes	
Charger / battery	USB charger: Battery life: Charging time:	5VDC, 2A 6 h 4 h
Data logger	Memory size: Medium:	4 GB SD card

* at least 0.3 MPa is needed for the measuring chamber supplied with the instrument. For low pressure measurings below 0.3 MPa choose the optional bypass measuring chamber A699 3501

Portable wireless printer HDT 312

Transport case: compact + safe

S 505 PORTABLE
DEW POINT METER (-100°C ... +50°C)

Details

Easy sensor module change through slide-in module with auto-connect

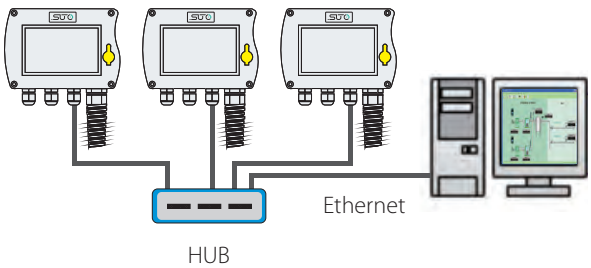
Unique measuring / parking chamber for fast sensor response

Teflon hose with quick connect

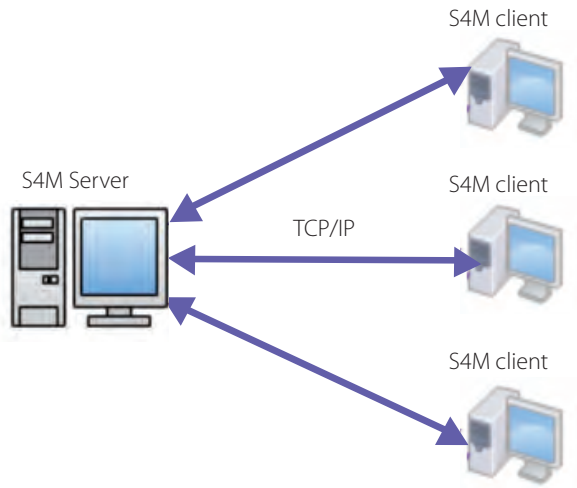
Order no.	Description
P600 0505	**S 505-1 Set consisting of:** - Handheld meter with data logger and S4A software - Sensor unit P -50°C ... +50°C - Parking/Measuring chamber - Teflon hose and quick connector - USB charger with USB cable - Transport case
P600 0506	**S 505-2 Set consisting of:** - Handheld meter with data logger and S4A software - Sensor unit Q -100°C ... -30°C - Parking/Measuring chamber - Teflon hose and quick connector - USB charger with USB cable - Transport case
P600 0507	**S 505-3 Set consisting of:** - Handheld meter with data logger and S4A software - Sensor unit P -50°C ... +50°C - Sensor unit Q -100°C ... -30°C - Parking / Measuring chamber - Teflon hose and quick connector - USB charger with USB cable - Transport case S 505, L400 x W300 x H130 mm
Options / accessories	
A554 0020	SUTO mobile printer HDT 312
A554 0021	Paper roll for HDT 312 (contains 3 rolls)
A699 3501	Parking/Measuring chamber by-pass type

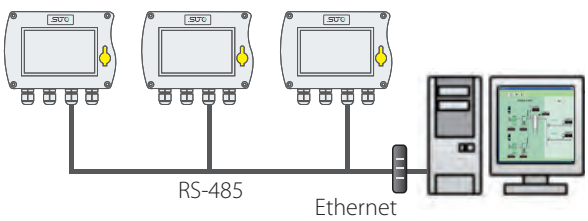
INTRODUCTION - DISPLAYS, DATA LOGGERS AND SOFTWARE

In times where energy conservation is a top priority for all progressive enterprises, the measurement of flow rates and consumption is becoming more and more important. However, measurement is just one step forward. In order to have a complete picture of the gas and compressed air consumption in a factory a permanent monitoring, graphical/statistical analyzes and convenient reporting is required.

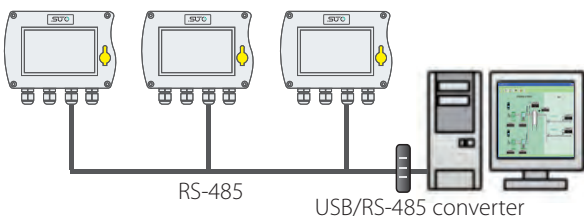


S4M acquiring measurement data through Ethernet from several remote units





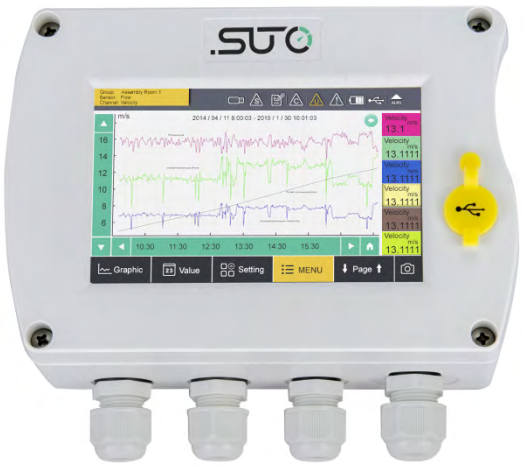
S4M acquiring measurement data through Ethernet / RS-485 gateway



S4M acquiring measurement data through RS-485 from several remote units

S 330/331 DISPLAY AND DATA LOGGER

The universal display and data logger can measure, display and record all relevant parameters (Flow, consumption, dew point, pressure, temperature, power consumption, compressor status etc.) in a compressed air system.



Features

- High resolution 5" colour touch screen interface
- All SUTO sensors and compatible third party sensors are connectable
- 16 x Modbus inputs (58 standard or optional 108 Channels)
  2 x SDI inputs (12 channels)
  2 x Analog and pulse input (4 channels)
  Plus 10 virtual channels for calculations like kW/m³/min or Differential pressure
- 2 wall casings available: 4 cable glands or 7 cable glands
- USB interface for data transfer to data stick or PC
- RS-485 (Modbus RTU) and Ethernet (Modbus TCP) interface to factory automation system
- 10 W sensor power supply (24 VDC)
- Data logger (S 331 only): 100 million values
- Alarm monitoring with 2 relay outputs
- Integrated web server for remote monitoring
- Quick set up
- Various options for system extension

The SUTO S 330/331 is a powerful yet cost effective local display, sensor interface and data logging (S 331 only) solution for virtually any application. Up to 20 sensors can be connected to a single device allowing local nodes to be setup throughout the factory. With it's easy to use, high resolution 5" touch screen, information from all the connected sensors can be accessed locally making readings easy to access for those on the ground.

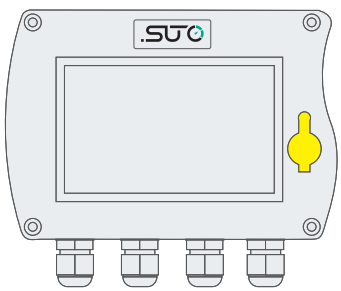
Modbus RTU or Modbus TCP output data can be transmitted into the site's ethernet network allowing information to be viewed in real time via an existing SCADA system or with the simple and easy to use SUTO S4M software. Alternately locally logged data can be downloaded onto a USB memory card or directly to a computer through the USB port.

The S 330/331 can display virtually any parameter from the connected sensors and with it's virtual channels can make calculations to help you measure and monitor efficiency or productivity, simplifying often complex tasks. Alarms can be set on each signal to your preselected parameters helping keep an eye on performance and indicating when there is a problem.

System overview

2 digital inputs:
- SDI Sensors (up to 2 SDI sensors)
- Modbus Sensors (up to 16 Modbus sensors)

2 analog inputs (option):
- 0 ... 20 mA, 4 ... 20 mA
- 0 ... 10 V
- Pulse



→ 2 Alarm relay outputs

→ Ethernet, RS-485, USB port

SUTO sensors are equipped with SDI and / or Modbus interface

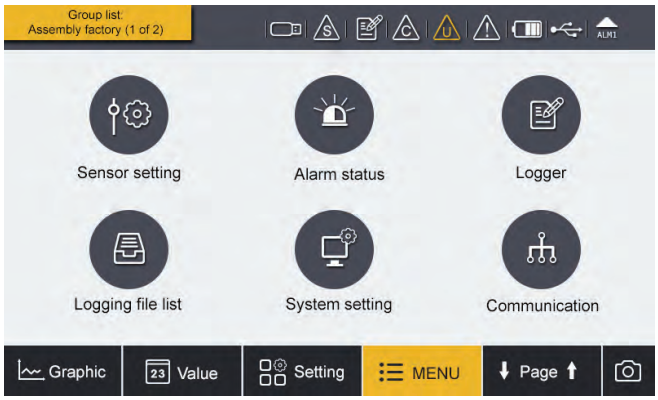
S 330/331 is available as panel version or in 2 different size wall mountable casings

Hat rail option

Back view with connection terminals

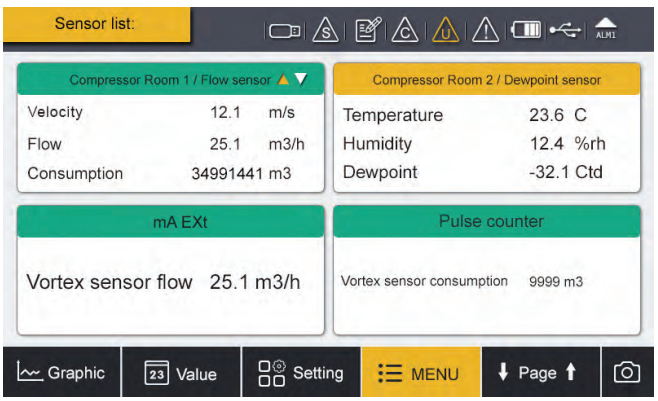
S 330/331 DISPLAY AND DATA LOGGER

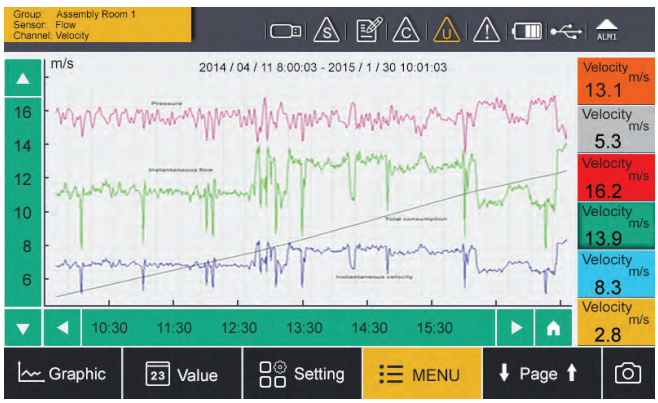
Touch screen operation



The S 330/331 comes with a high resolution 5" colour touch screen interface making the operation as simple as possible.

Up to 4 sensors can be viewed on one page and through page scrolling further sensors can be displayed.





Select which channels you want to view or analyze and the built in graphic analyzer will help you identify problems immediately.

For detailed analysis we recommend using SUTO S4M software.

Technical data S 330/331

Casing size	Size: 120 x 173 x 67 mm
Power supply	A: 100 ... 240 VAC, 20 W B: 18 ... 30 VDC, 20 W
Interface	USB RS-485 Ethernet
Alarm output	2 relay, 230 VAC, 3 A, changer
Sensor inputs	2 x SDI inputs or 1 x SDI and 1 x Modbus input (Modbus input for up to 16 sensors) 2 x analog (option)
Data logger	100 million values (option)

Accuracy	SDI, Modbus: see sensor specs Analog: 0 ... 20 mA: 0.01 mA 0 ... 10 V: 0.01V Pulse: ±1 digit
Display	size: 5" Resolution: 800 x 480 px
Operating temperature	0°C ... +50°C
Storage temperature	-20°C ... +70°C
Protection	IP65

Sensors connectable to S 330/331

The S 330/331 has 2 digital inputs, 2 analogue inputs and can connect up to 16 Modbus sensors.

Flow / Consumption sensors


S 401


S 421


S 450


S 452


S 430


S 415/S 418

S 330/331 can power maximum one S 450/452.
If more than one S 450/452 is connected a separate power supply has to be added.
(see accessories for S 330/331)

Dew point sensors


S 220


S 201


S 212 / S 215 / S217


S 230

Please refer to the detailed sensor data sheet for further information and options.

Inputs for analog sensors (2 channels)

SUTO analog sensors


Pressure sensor


Temperature sensor with 4 ... 20 mA


Current clamp sensor

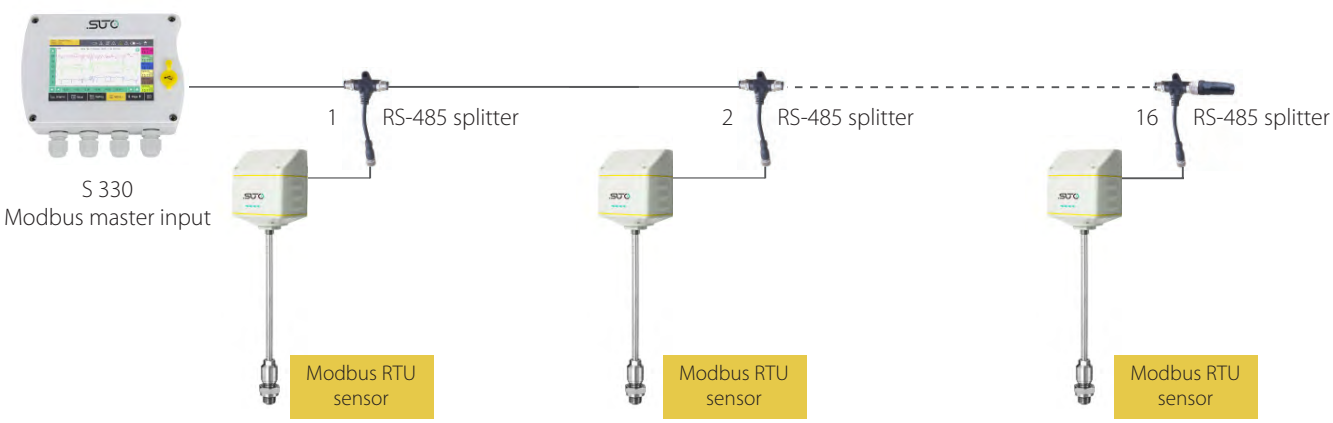
Third party sensors

Following third party sensors are connectable to S 330/331:

- 0 ... 20 mA, 4 ... 20 mA , 0 ... 1V, 0 ... 10V signals
- Pulse
- Modbus RTU

Modbus-Master input for Modbus RTU sensors

The S 330/331 includes digital inputs for SUTO sensors or Modbus RTU sensors. In order to connect the Modbus RTU sensors properly on a RS-485 bus system it's recommended to daisy-chain the sensors to one of the inputs. For this purpose we offer a RS-485 splitter to simplify the connection. Through this method you can add up to 16 sensors to the master input. (In this case additional power supply is required.)



S 330/331 DISPLAY AND DATA LOGGER

Order form

Order No.	Option	Power supply	Casing		Description
D500 0333					S 330, panel version, 2 digital inputs, Ethernet, RS-485, USB
D500 0331					S 331, panel version, 2 digital inputs, Ethernet, RS-485, USB, data logger, S4A software
	A				None
A1662	B				2 analogue inputs 0 ... 20 mA + 2 pulse inputs
A1663		A			Power supply 100 ... 240 VAC, 20 VA, 2 relay outputs for alarm
A1664		B			Power supply 18 ... 30 VDC, 20 W, 2 relay outputs for alarm
			A		None
A1665			B		Wall mountable casing with 4 cable glands
A1666			C		Wall mountable casing with 7 cable glands
A1667			D		Wall mountable casing with 3 cable glands + Ethernet
A1668			E		Wall mountable casing with 6 cable glands + Ethernet
				A	None
A1669				B	Hat rail holder (only in connection with wall mountable casing)

Further accessories

Order No.	Description
	Cables
C219 0055	M12 connector with RS-485 termination resistor, 120 Ω , for Modbus daisy chain termination
A554 3310	M12 RS-485 (Modbus) splitter
A553 0130	USB cable for S 330/331
A553 0104	Sensor cable 5 m, with M12 connector, open wires, AWG24 (0.2 mm^2)
A553 0105	Sensor cable 10 m, with M12 connector, open wires, AWG24 (0.2 mm^2)
A553 0106	Power cable with mains plug, 1.8 m
A553 0120	Ethernet cable 5 m, RJ45 plug at both ends
A553 0123	RS-485 cable, 3 pole, AWG 24 (per meter)
	Converters and gateways (Please contact our customer service for further converter/gateway options)
A554 0010	RS-485 / Ethernet gateway
A554 0012	RS-485 / Profibus gateway
A554 0013	Modbus RTU / Modbus TCP gateway
A554 0011	RS-485 repeater
A554 0331	RS-485 / USB converter
	Software
M599 2030	S4M, data acquisition and analyzes software, 20 measuring channels
M599 2033	S4M, data acquisition and analyzes software, unlimited measuring channels
A1102	Consumption report generator for S4M
	Others
D554 0030	Power meter S 110, hat rail mountable, Modbus RTU
D554 0031	Current meter, 0-20 mA, 8 channels, Modbus RTU
D554 0032	Pulse meter, 7 channels, Modbus RTU
A1661	S 330/331 with 108 Modbus-Sensor-channels [standard is 58]
A554 0007	Power supply wall mountable
A554 0009	Power supply for hat rail
A554 3311	Line filter for EMC protection
A554 3313	Connection board for looping 4-20 mA and pulse signals to PLC, mountable in wall casing A1666 or A1668

S 320 DISPLAY

The S 320 local display provides a simple, cost effective solution where information from a single difficult to access sensor is required.

Sensor inputs

1 input for SUTO flow/ dew point sensors

1 input for analog sensor (0 ... 20 mA, 0 ... 10V)

Communication Interfaces

USB port

Other Signals / Features

2 Alarm relay outputs

Technical data S 320		
Casing	Size: 118 x115 x 93 mm Panel size: 92 x 92 Protection class: IP65	
Power supply	100 ... 240 VAC, 50-60 Hz, 15 VA	
Interface	USB	
Alarm output	2 relay, 230 VAC, 3 A	
Ambient conditions	0°C ... +50°C	
Sensor input 1	1 sensor: S 401, S 421, S 430, S 450, S 452, S 220, S 201, S 212, S 215	
Sensor input 2	1 analog sensor: pressure sensors, temperature sensor, 0 ... 20 mA, 0 ... 10 V	
Accuracy 1)	Dew point:	See sensor specs.
	Flow:	See sensor specs.
	0-20 mA:	0.01 mA
	0-10 V:	0.01 V
Operation temperature	0°C ... +50°C	
Storage temperature	-20°C ... +70°C	
Protection	IP65	

1) Accuracy of sensor not included

Order Information

S 320	Power supply	Casing	Description
D500 0320			S 320 base unit, panel version, 1 input for SUTO sensor, 1 analog input.
A1640	A		Power supply 100 ... 240 VAC, 15 VA, 2 relay outputs
A1641	B		Power supply 18 ... 30 VDC, 15 VA, 2 relay outputs
		A	None
A1645		B	Wall mountable casing with 4 cable glands
Accessories			
A553 0104			Sensor cable 5 m, with M12 connector, open wires, AWG24 (0.2 mm^2)
A553 0105			Sensor cable 10 m, with M12 connector, open wires, AWG24 (0.2 mm^2)
A553 0106			Power cable with mains plug, 1.8 m

S 551 COMPRESSED AIR ANALYZER

The S 551 is the ideal data logger for energy analysis (ISO 50001) and air audits (ISO 11011).

Features

Easy to use

- Just connect the sensor and start the recording, no configuration and programming required
- Easy operation through color-touch display

Flexible

- 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

Safe

- Power glitches and cuts won't affect performance: battery backup power

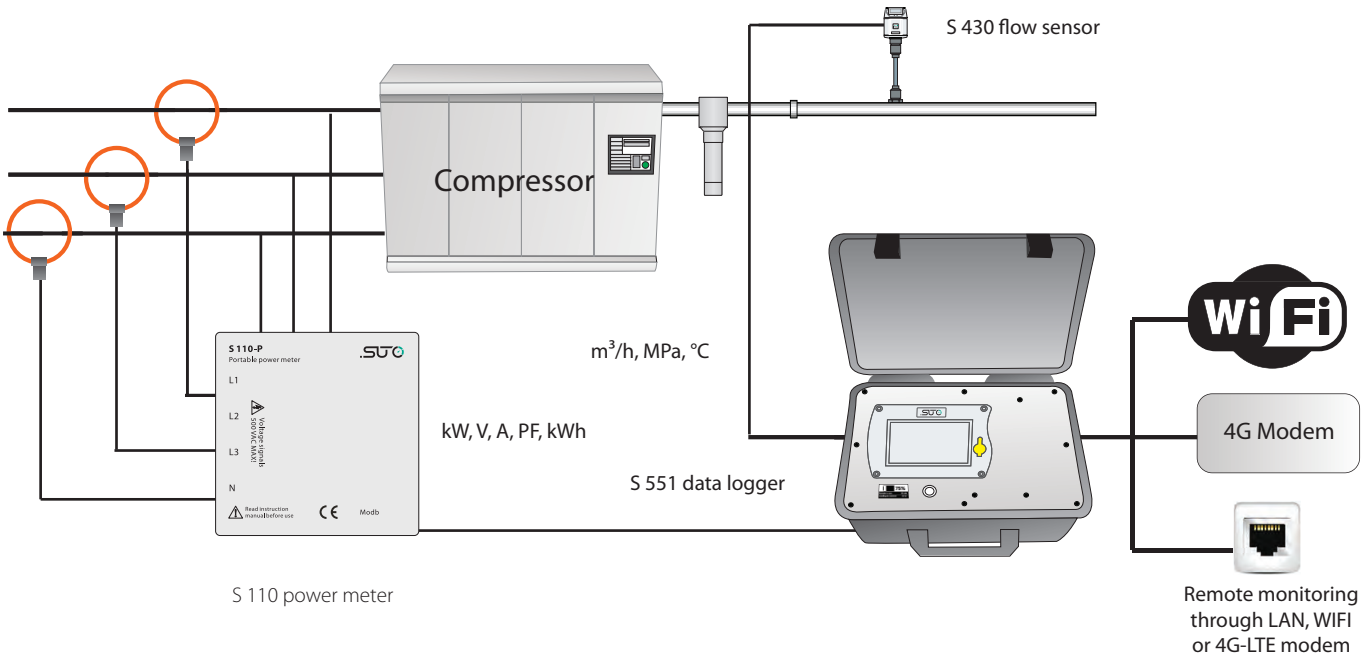
Efficient

- S 551 logs data on site
- Data is analyzed in the office
- Cost effective solution
- Full software package includes:
  - S4A for basic analyzes
  - CAA for compressed air audit analyzes

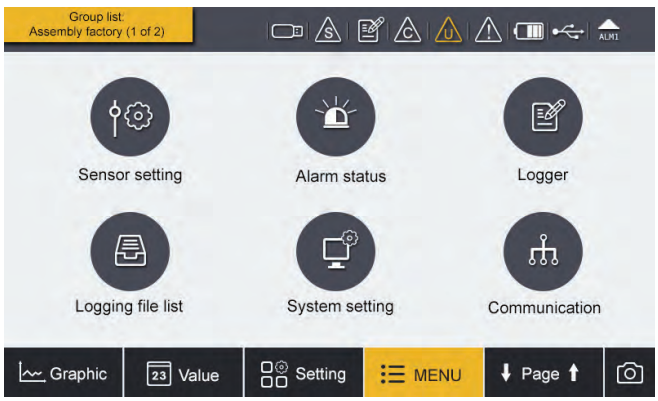
Includes SUTO Compressed Air Analyzer Software

Application

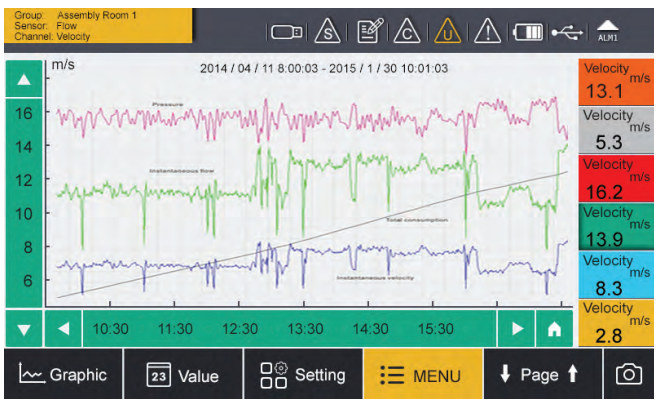
Measurement setup for data logging on the supply side



Touch screen operation

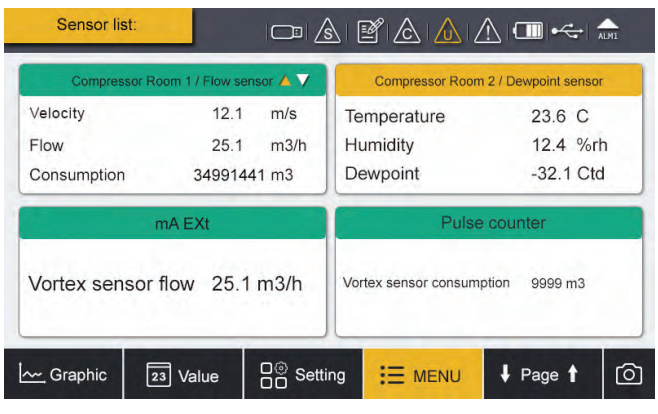


Up to 4 sensors can be viewed on one page and through page scrolling further sensors can be displayed.



The S 551 comes with a high resolution 5" colour touch screen interface making the operation as simple as possible.

SUTO intelligent sensors are detected automatically on power-up. With a few settings the data logger is ready for operations with virtually unlimited memory size.



Select which channels you want to view or analyze and the built in graphic analyzer will help you identify problems immediately.

For detailed analysis we recommend using SUTO software S4A, CAA or S4M.

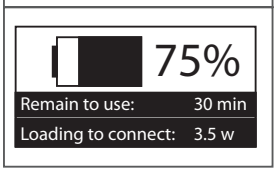
S 551 COMPRESSED AIR ANALYZER

Ethernet port

Sensor connection though 5 pole locking connectors and mains connector

Portable Modbus splitter box

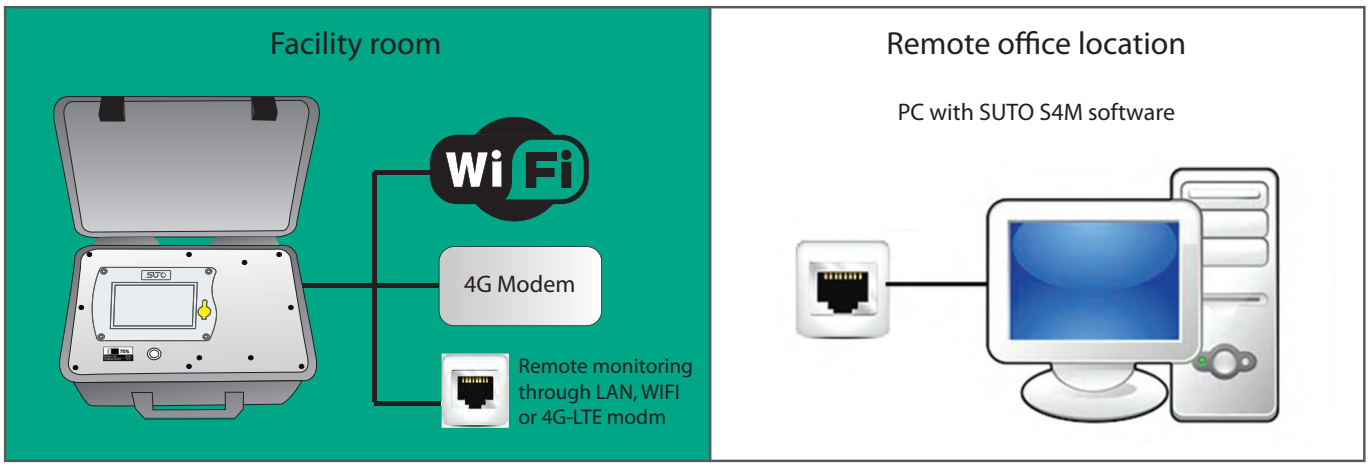
4G Modem and/or WiFi Modem



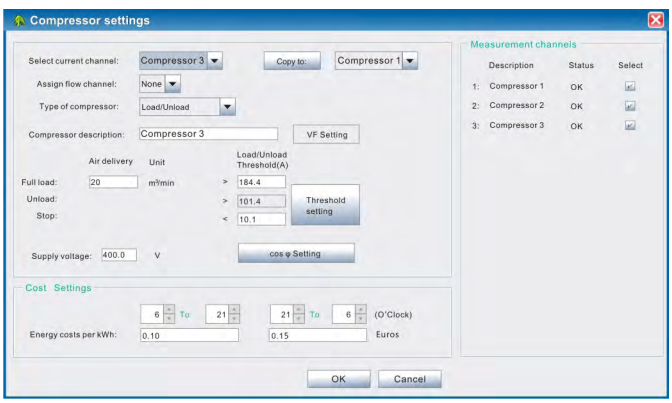
Battery gauge indicating remaining battery power and life time

Touch screen operation

The S 551 is capable of sending measurement data and status information to a remote server through the internet. This allows users to monitor the system remotely. The illustration below shows the principle setup.



Data Analysis with the Compressed Air Analyzer



Through SUTO software S4A recordings are downloaded to the PC via USB or Ethernet port. The basic analysis can be done in S4A.

For more sophisticated compressor analysis the SUTO CAA software offers many advanced features such as: performance statistics of compressors (efficiency, air delivery, load/unload cycles), leakage analysis, report generation and more. Comparisons with base line measurements from last year or last month help to identify system changes.

Order information

Data logger	
P560 5100	S 551-P4, portable data recorder, 4 digital input channels, power cord, USB cable, S4A software, CAA software
P560 5101	S 551-P6, portable data recorder, 4 digital input channels and 2 analog, power cord, USB cable, S4A software, CAA software

Flow sensors	
S601 0401	S 401-M, insertion type flow sensor, DN15 ... DN300, Modbus RTU, 5 m cable with connector
S601 0430	S 430 pitot tube flow sensor, DN25 ... DN250, 220 mm shaft, SDI, Modbus RTU, 5 m cable with connector

Dew point sensor	
S601 0215	S 215 dew point sensor, -20°Ctd ... +50°Ctd, measuring chamber, 5 m cable with connector
S601 0212	S 212 dew point sensor, -50°Ctd ... +20°Ctd, measuring chamber, 5 m cable with connector
S601 0220	S 220 dew point sensor, -100°Ctd ... 0°Ctd, measuring chamber, 5 m cable with connector

Pressure sensors	
S694 1886	Pressure sensor, 0 ... 1.6 MPa(g), 5 m cable with connector for S 551
S694 0356	Pressure sensor, 0 ... 4.0 MPa(g), 5 m cable with connector for S 551

Amp sensor	
S554 0156	SUTO current clamp sensor, 1000A, 100 mm diameter, including connector to S 551
S554 0157	SUTO current clamp sensor, 3000A, 150 mm diameter, including connector to S 551

Temperature sensor	
S693 0005	Temperature transmitter, -50°C ... +200°C, 4 ... 20 mA loop powered, 6 x 150 mm sensor tube, 5 m cable with connector
A554 6003	Compression fitting, 6 mm, G ½" thread, 0.6 MPa
A554 6004	Compression fitting, 6 mm, G ½" thread, 1.6 MPa

Power meter (for 3 phase and single phase measurement)	
P554 0134	Portable power meter S 110-P, Modbus RTU, including 4 test leads, 4 test clips, 5 m cable with connector to S 551
S554 0160	Rogowski coil for S 110-P, 1000 A, 100 mm diameter, 1.8 m cable, connector to S 110-P
S554 0161	Rogowski coil for S 110-P, 3000 A, 150 mm diameter, 1.8 m cable, connector to S 110-P
S554 0162	Rogowski coil for S 110-P, 100 A, 160 mm diameter, 1.8 m cable, connector to S 110-P

Note: For 3 phases power supply 3 Rogowski coils are needed.

S 551 COMPRESSED AIR ANALYZER

Liquid flow meter (clamp on ultra sound)

P554 0070	Ultrasonic controller for liquid flow sensor, connectable to S 551, including 5 m connection cable to S 551 and to the sensors
S694 4603	Ultra sound sensor pair, DN32 ... DN100, socket terminals
S694 4604	Ultra sound sensor pair, DN100 ... DN700, socket terminals
S694 4605	Ultra sound sensor pair, DN300 ... DN6000, socket terminals

Other sensors / extensions

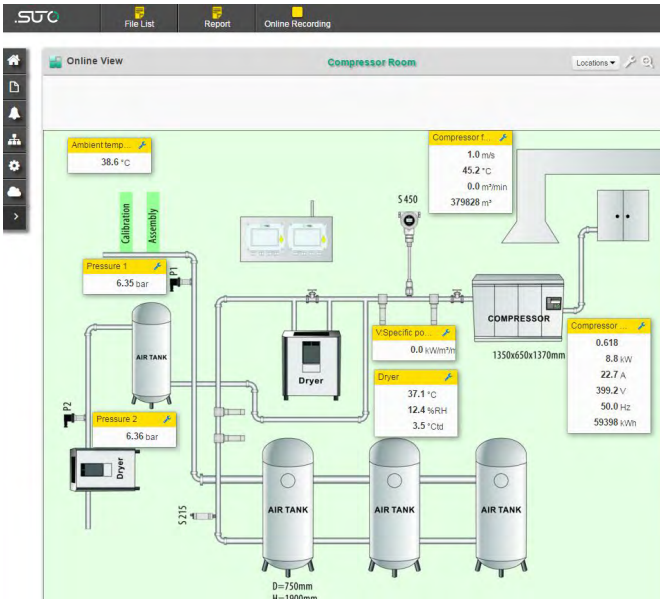
P554 0080	8 channel analog input extension, connectable to S 551, including 5 m cable with connector
A554 3314	Portable Modbus splitter box, with M12 connector

Accessories

A553 0103	Extension cable, 5 m, male-female connectors
A553 0110	Open wires cable, 5 m cable with connector
A553 0111	Sensor cable, M12, 5 m with connector to S 551
A554 0035	Transport case S 551 for sensors and cables, L560 x W450 x H160 mm (internal compartment can be arranged according to your individual sensor requirements)
A554 0036	Transport case, customized for 1 x S 110-P, 3 Rogowski coils, 4 x test leads, 4 x test clips, 1 x S 430

* Please contact us for further accessories and details.

SMART COMPRESSED AIR SYSTEM MONITORING WITH S4M



Features

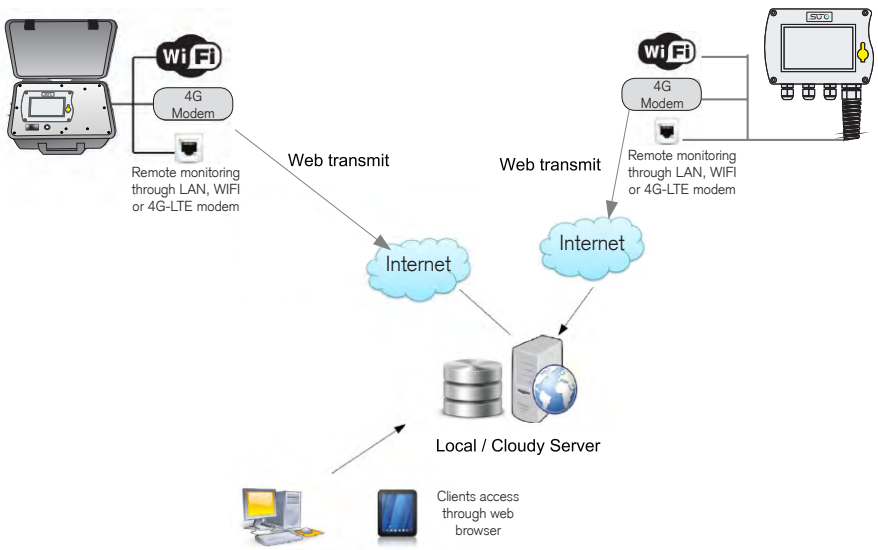
- Data acquisition of from an unlimited number of sensors from locations all over the world
- Alarm monitoring and indications on screen, relay and SMS
- Secure data storage on local hard drive in a SQL database
- Server / client architecture
- Application software installed on Windows PC
- Client access through web browser (PC, tablet, HMI terminal)
- Remote access through the Internet is possible
- Scalable customizable solution
- Communication with field devices through Modbus TCP or Modbus RTU or via web
- Multi language support
- E-mail feature for sending alarms and reports
- Consumption report (optional)

The S4M is a new generation of monitoring software designed to monitor factory or building systems of all scales. For example in a compressed air system it records and analyzes air consumption, system pressure, dew point, oil vapor contents, compressor status, particles basically everything required for a safe operation. Rich alarm monitoring with indications on screen, relay outputs and e-mail puts the user in control of the system. The S4M is not limited to compressed air systems. What can be measured and is available through a Modbus communication can be recorded and analyzed by the S4M.

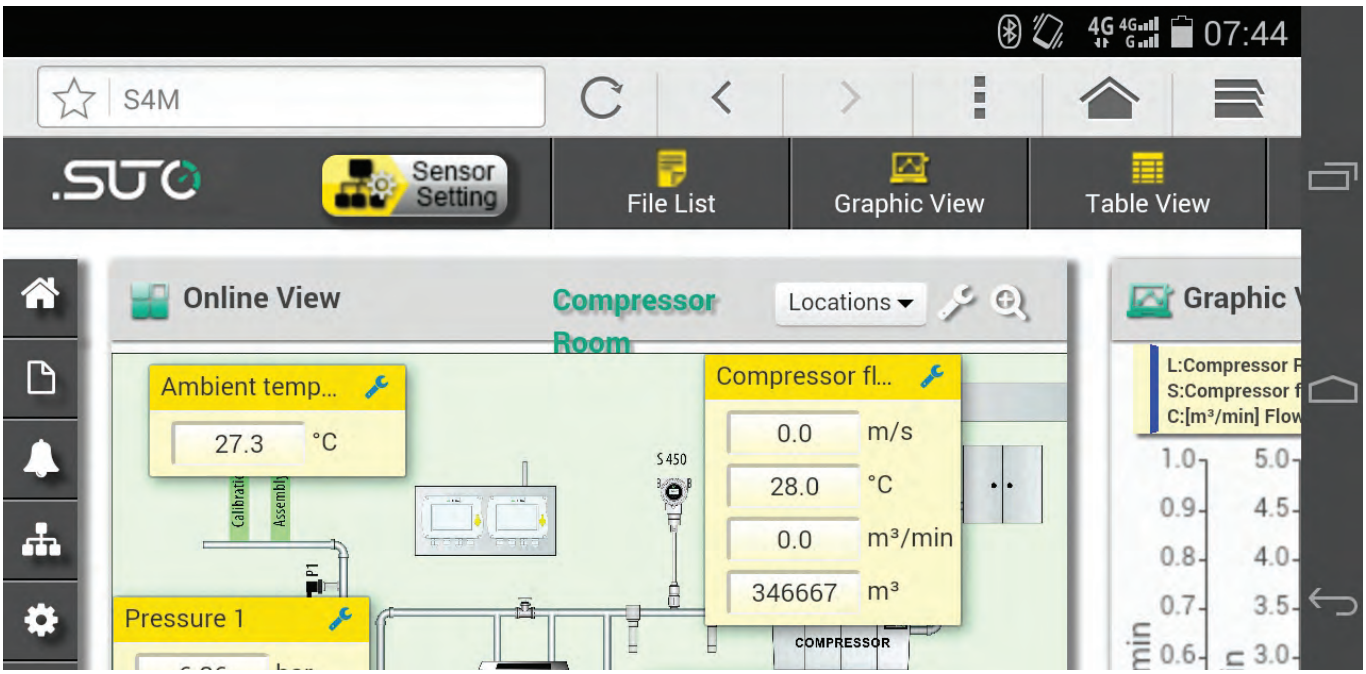
The S4M software is installed on a Windows PC (server installation). Clients operate the software through a web server and web browser. This allows hardware to be independent of client installations on a PC, tablet computers and HMI terminal

Applications

- Compressed air system monitoring
- Building monitoring
- Compressor analysis and optimization
- Monitoring of process gas consumptions
- Energy consumption monitoring (ISO 50001)
- Provide timely and thoughtful facility maintenance service for your customers
- EPC (Energy Performance Contracting) projects for energy saving in compressed air systems



SMART COMPRESSED AIR SYSTEM MONITORING WITH S4M



Above is an example show monitoring of a typical compressed air system with all relevant online parameters displayed on the screen.

Order no.	Description
A554 0027	GSM modem for SMS notifications, connectable to PC server
M599 2030	S4M, data acquisition and analyzes software, 20 measuring channels
M598 2030	Update S4M, 20 measuring channels
M599 2031	S4M, data acquisition and analyzes software, 50 measuring channels
M598 2031	Update S4M, 50 measuring channels
M599 2032	S4M, data acquisition and analyzes software, 100 measuring channels
M598 2032	Update S4M, 100 measuring channels
M599 2033	S4M, data acquisition and analyzes software, unlimited measuring channels
M598 2033	Update S4M, unlimited measuring channels
M599 9000	Software setup, configuration and training
A1102	Add-on Consumption Report

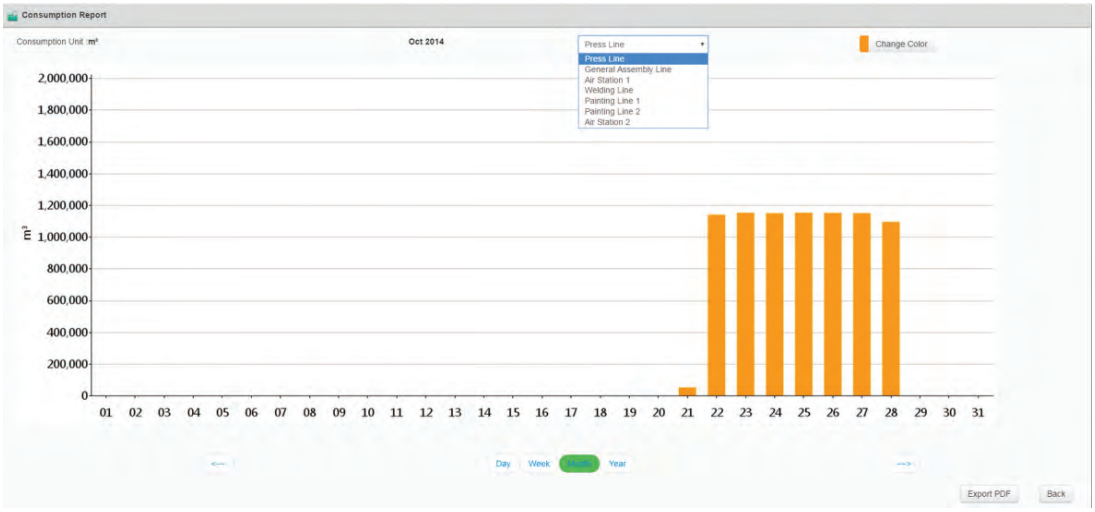
CONSUMPTION REPORT (CR)

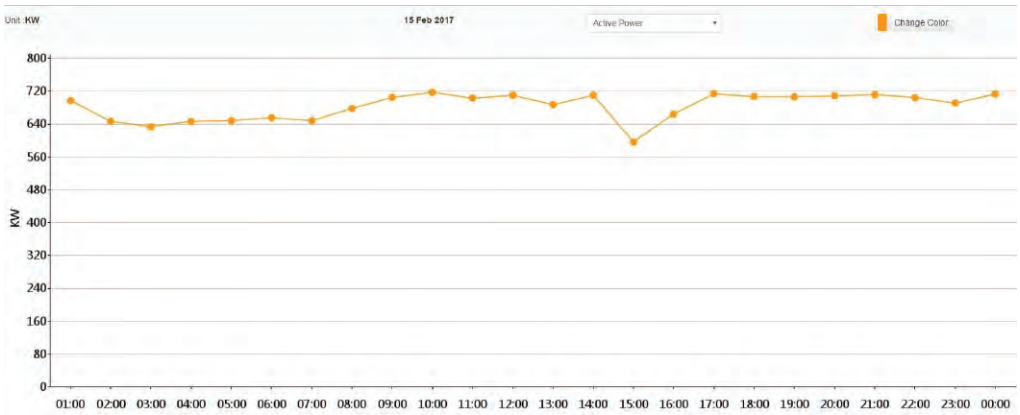
Features

- Add-on for S4M
- Report in the form of graphic or table
- Report export to PDF as well as Excel
- Programmable company information like name, logo, etc.

Applications

- Track how much energy (electricity, compressed air, water, etc.) is used during a period such as a day, week, month and year
- Cost allocation for production lines
- Comparison between main line and summary of several branch lines
- Trend analysis for any recorded data





Consumption Report
Monthly Report Feb 2018

	Group 1				Group 2				
	S 401	S 401		S 401	S 401	S 401	S 401		S 401
Day	Painting Line 2 (m^3)	Welding Line (m^3)	Sum (m^3)	Air Station 1 (m^3)	Assembly Line (m^3)	Press Line (m^3)	Painting Line 1 (m^3)	Sum (m^3)	Air Station 2 (m^3)
20	121232	57080	178312	178315	108591	54300	501298	664189	664188
21	303344	146031	449375	449376	159157	1142570	337325	1639052	1639050
22	304530	143803	448333	448333	157807	1154418	330088	1642313	1642315
23	302131	144269	446400	446400	159183	1151219	330554	1640956	1640956
24	301715	143766	445481	445477	158929	1154402	331627	1644958	1644957
25	300830	143647	444477	444480	158664	1153614	330999	1643277	1643277
26	302993	144611	447604	447605	158664	1151612	329347	1639623	1639626
27	315222	144767	459989	461438	156927	1155085	340579	1652591	1654042
28	547200	172800	720000	748800	144000	1152000	518400	1814400	1843200
Max	547200	172800	720000	748800	159183	1155085	518400	1814400	1843200
Min	121232	57080	178312	178315	108591	54300	329347	664189	664188
Total	2799197	1240774	4039971	4070224	1361922	9269220	3350217	13981359	14011611
Average	311021	137863	448885	452247	151324	1029913	372246	1553484	1556845
Cost($)	55,983.94	24,815.48	80,799.42	81,404.48	27,238.44	185,384.4	67,004.34	279,627.18	280,232.22

INTRODUCTION - AIR QUALITY INSTRUMENTS

The quality of compressed air is determined by the maximum particle size and particle counts, pressure dew point, and maximum oil content allowed. The details are defined in the international standard ISO 8573-1.

Various industries such as pharmaceutical and food and beverage industries require high quality compressed air as it can directly affect product quality and safety. This requires regular measurements of compressed air quality to avoid contaminants in products and risks for health of humans.

Compressed air is not only used in industry but also in hospitals and for filling breathing air apparatus for firefighters and scuba divers. These applications also have quality standards and require the measurement of dew point and oil vapor.

SUTO offers a range of portable and stationary air quality measuring equipment including dew point measurements, particle counters and oil vapor measurement.

Quality Classes.	Particles			Humidity		Oil Vapor Content
	0.1 µ < d ≤ 0.5 µ	0.5 µ < d ≤ 1.0 µ	1.0 µ < d ≤ 5.0 µ	Pressure Dewpoint	Residual Humidity	(Aerosols & Vapor)
	[particles / m^3]			[°C]	[g / m^3]	[mg / m^3]
0	As specified by the equipment user or supplier and more stringent than Class 1					
1	≤ 20,000	≤ 400	≤ 10	≤ -70	≤ 0.003	≤ 0.01
2	≤ 400,000	≤ 6,000	≤ 100	≤ -40	≤ 0.11	≤ 0.1
3	N. S.	≤ 90,000	≤ 1,000	≤ -20	≤ 0.88	≤ 1
4	N. S.	N. S.	≤ 10,000	≤ +3	≤ 6	≤ 5
5	N. S.	N. S.	≤ 100,000	≤ +7	≤ 7.8	N.S.
6	Cp: 0 mg / m^3 < Cp ≤ 5 mg / m^3			≤ +10	≤ 9.4	-
7	Cp: 5 mg / m^3 < Cp ≤ 10 mg / m^3			Cw ≤ 0.5 g / m^3		-
8	-			0.5 g / m^3 < Cw ≤ 5 g / m^3		-
9	-			5 g / m^3 < Cw ≤ 10 g / m^3		-
x	Cp: Cp > 10 mg / m^3			Cw > 10 g / m^3		> 5
	Maximum residual particles / m^3 of given sizes in µm in accordance with ISO 8573-4			Maximum pressure dew point in accordance with ISO 8573-3		Maximum oil vapor content in accordance with ISO 8573-2 and -5
	Reference conditions: Temperature: 20°C / Pressure: 1 bar (abs.) / H2O Pressure: 0 bar in accordance with ISO 8573-1: 2010 / Clause 4 Cp = Mass concentration; Cw = Concentration of liquid water; N. S. = Not Specified					

Table shows the quality classes according to ISO 8573-1

Limits of oil vapor

Compressed air class 1 (EN ISO 8573-1): 0.01 mg/m^3
Medical applications (EAB 407/1238): 0.1 mg/m^3
Breathing apparatus (EN 12021): 0.5 mg/m^3

The S 120 oil vapor sensor monitors the oil content of compressed air and gases permanently or for spot checks when used as portable unit in conjunction with S 551. For best accuracy and long term stability, the S 120 sensor applies an automatic calibration. Sensor contaminations and sensor life time are monitored and indicated to the user. An 'over range' detection removes the sampling air from the sensor to protect it against contamination.

The simple installation and outstanding performance makes the S 120 the ideal choice when oil vapor content needs to be measured and monitored.

Features

- Measures oil vapor contents in compressed air and other gases
- Can be used for permanent or in portable applications
- Measures down to 0.003 mg/m^3
- Easy connection through sampling hose and quick connect
- Output signals: - 4 ... 20 mA
  - RS-485, Modbus RTU
  - Relay switch (NO)
- PID sensor for highest accuracy
- Service and Alarm indication through LED
- Connectable to SUTO displays and data loggers as well as third parties displays and control units
- Integrated 5" touch screen and data logger (option)

Technical data S 120	
Measuring medium	Compressed air and gases free of corrosive, aggressive, caustic and flammable constituents
Measuring range	0.003 ... 10.00 mg/m^3 (based on 1000 hPa (a), 20°C, 0% relative humidity)
Sensor type	PID (photoionization detector)
Detection limit	0.003 mg/m^3
Accuracy	5% of reading ±0.003 mg/m^3
Operating pressure	3 ... 15 barg (higher pressure on request)
Gas humidity	< 40% rel. humidity, no condensation
Sample flow rate	< 2 l/min, measuring gas is released to ambient
Gas connection	6 mm quick connect
Electrical connection	M12 connector
Sensor life time	6000 operating hours. Will be indicated. Sensor exchange by service
Gas temperature	-20°C ... +50°C (at inlet)
Ambient conditions	-20°C ... +50°C
Transport temperature	-30°C ... +70°C
Output signal	4 ... 20 mA (0 ... 10 mg/m^3) RS-485, Modbus RTU Relay: NO, 60 VDC / 1A
Power supply	24 VDC ± 5%, 10 W
Display & data logger	5" touch screen, 100 million values (option)
Application	Downstream of activated carbon filters Downstream of oil-free compressors Wherever upstream drying and filtration is applied
Casing/dimensions	PC, Al alloy, 271 X 205 X 91 mm
Classification	IP65
EMC	According to IEC 61326-1
Settings	Various sensor settings can be performed through SUTO display units or through the related service software
Weight	2400 g
Sample rate	1 s

S 120 OIL VAPOR SENSOR

Applications

- Medical air
- Pharmaceuticals
- Breathable air for rescue workers and divers
- Food and beverage
- Semiconductor fabs
- Conveyance of hygroscopic food
- High tech processes

S 120 mounted at the wall for permanent oil vapor monitoring

Portable S 120-P with accessories connectable to S 551

- **Power**
- **Alarm**
- **Service Sensor**
- **Service Filter**

LEDs indicate if pre-set alarms are reached, or if filters and sensors need to be serviced. The service indications start blinking 4 weeks before expiring and turn on permanently when a service is immediately required.

Order no.	Description
S604 1201	S 120, oil vapor sensor, 0.003 ... 10 mg/m^3, 4 ... 20 mA output, RS-485, alarm output, 24 VDC supply, incl. power supply
S604 1202	S 120-P, oil vapor sensor, 0.003 ... 10 mg/m^3, 4 ... 20 mA output, RS-485, alarm output, connectable to S 551, transport case, incl. power supply
S604 1203	S 120, oil vapor sensor, 5" touch screen, 0.003 ... 10 mg/m^3, 4 ... 20 mA output, RS-485, alarm output, 24 VDC supply, incl. power supply
P604 1205	S 120-P, oil vapor sensor, 5" touch screen, 0.003 ... 10 mg/m^3, 4 ... 20 mA output, RS-485, alarm, 24 VDC supply, incl. transport case, power supply
R200 0120	General service and re-calibration: - General inspection of the unit - Replacement of tubes and fittings - Cleaning of lamp and sensor - Assembly and test of unit - Calibration of oil sensor S 120
A554 1203	Zero test filter for S 120, 15 barg, with quick connection at both ends.

S 130 LASER PARTICLE COUNTER

The S 130 is a new generation laser particle counter optimized for applications in compressed air or compressed gases. With quality in mind and with the knowledge of customer needs this instrument is designed for continuous operation 24 hours, 7 days a week. Depending on the selected model there is sensitivity available from 0.1 µm up to 5.0 µm. The S 130 can fulfill the requirements stipulated in the compressed air standard ISO 8573-4. Measurement values represent the particle counts per ft^3, l or m^3 or alternatively in $\mu g/m^3$. Settings can be done through the integrated display, an external SUTO display or through the service software.

Features

- Easy connection to compressed air through 6 mm quick-connector
- Can be used as portable as well as stationary instrument
- Particle sizes from 0.1 - 5.0 µm (depending on model)
- Optional display
- Measures according to ISO 8573-4
- Output signals:
  - RS-485, Modbus RTU
  - SDI (SUTO internal signal)
  - Relay switch (NO)
- Connectable to SUTO displays and data loggers as well as third parties displays and control units
- Integrated 5" touch screen and data logger (option)

Applications

- Medical air
- Pharmaceuticals
- Breathable air for rescue workers and divers
- Food and beverage
- Semiconductor fabs
- Conveyance of hygroscopic food
- High tech processes

S 130 LASER PARTICLE COUNTER

Technical data S 130

Measuring medium	Compressed air and gases free of corrosive, aggressive, caustic and flammable constituents
Models: S 130-A	2 channels: 0.3 - 0.5 µm, >0.5 µm
S 130-B	4 channels: 0.2 - 0.3 µm, 0.3 - 0.5 µm, 0.5 - 1.0 µm, >1.0 µm
S 130-C	4 channels: 0.5 - 1.0 µm, 1.0 - 3.0 µm, 3.0 - 5.0 µm, >5.0 µm
S 130-D	2 channels: 0.5 - 5.0 µm, >5.0 µm
S 130-E	4 channels: 0.3 - 0.5 µm, 0.5 - 1.0 µm, 1.0 - 5.0 µm, >5.0 µm
S 131	4 channels: 0.1 - 0.5 µm, 0.5 - 1.0 µm, 1.0 - 5.0 µm, >5.0 µm
Counting efficiency	50% (per JIS)
System pressure	0.3 ... 0.8 MPa
Flow rate	S 130: 2.83 l/min S 131: 28.3 l/min
Sampling rate	One sample per minute
Calibration	NIST traceable
Measuring unit	Particle counts per ft^3, l or m^3, selectable Concentration in $\mu g/m^3$
Gas connection	6 mm quick connect
Electrical connection	M12 connector
Gas temperature	0°C ... +40°C (at inlet)

Ambient conditions	10°C ... +40°C
Transport temperature	-30°C ... +70°C
Output signal	RS-485, Modbus RTU SDI (internal SUTO signal) 4 ... 20 mA Alarm relay: NO, 32 VDC / 500 mA
Power supply	24 VDC, 10 W
Application	Downstream of filters wherever upstream drying and filtration is applied
Casing / dimensions	PC, Al alloy, 271 X 205 X 91 mm
Classification	IP65
EMC	According to IEC 61326-1
Settings	Various sensor settings can be performed through the related service software
Weight	1900 g
Display & data logger	5" touch screen, 100 million values (option)

Order No.	Counter	Display	Description
S604 1300			S 130 particle counter base unit, 2.83 l/min, RS-485, 24 VDC/10W
A1360	A		S 130-A, particle counter, 0.3 - 0.5 µm, >0.5 µm
A1361	B		S 130-B, particle counter, 0.2 - 0.3 µm, 0.3 - 0.5 µm, 0.5 - 1.0 µm, >1.0 µm
A1362	C		S 130-C, particle counter, 0.5 - 1.0 µm, 1.0 - 3.0 µm, 3.0 - 5.0 µm, >5.0 µm
A1363	D		S 130-D, particle counter, 0.5 - 5.0 µm, >5.0 µm
A1364	E		S 130-E, particle counter, 0.3 - 0.5 µm, 0.5 - 1.0 µm, 1.0 - 5.0 µm, >5.0 µm
		A	None
A1368		B	Integrated display and data logger 5", touch screen, with USB cable and S4A software
S604 1304			S 131, particle counter, 0.1, 0.5, 1.0, 5.0 µm, 28.3 l/min, 100 ... 240 VAC,50/60 Hz, 1.4 A
A554 0105			Transport case S 120/130, L400 x W300 x H180
A554 0312			Zero count filter for counter checking
R200 0130-A			Calibration particle counter S 130-A
R200 0130-B			Calibration particle counter S 130-B
R200 0130-C			Calibration particle counter S 130-C
R200 0130-D			Calibration particle counter S 130-D
R200 0131-E			Calibration particle counter S 130-E
R200 0131			Calibration particle counter S 131

S 600 COMPRESSED AIR PURITY ANALYZER

ISO 8573 compliant purity quantifications of compressed air systems are bound to time-consuming installations and long-lasting test runs ... It's time for a revolution: **The S 600 is unlike its competition.** It combines the latest sensor technology, software-guided measurements and a time-saving setup into **a handy, touchscreen-controlled multi-tool.** With our S 600 you will finish measurement runs in much less time than with your traditional method, after that you don't ever want to leave your new comfort zone again. Trust us.

PRECISION

TOUCHSCREEN

EXCHANGE

PRESETS

10kg
PORTABLE

TÜV SÜD
CERTIFIED

0.3 ... 5.0 µm

-100° ... +20°C

0.004 ... 10.000 mg/m³

0.3 ... 1.5 MPa

Log & Report

PARTICLE CONCENTRATION MEASUREMENT

+ Measurement methods according to ISO 8573 standards (together with isokinetic sampling device)
+ Latest laser detection technology
+ Smallest particle size 50% per JIS, bigger sizes 100% per JIS

DEW POINT MEASUREMENT

+ Large ranges thanks to the unique multiple sensor technology
+ Long-term stable and well-proven measurement methods
+ High precision with an accuracy of ±2°C

OIL VAPOR MEASUREMENT

+ Latest photoionisation detector (PID) with self-calibration
+ Wide range of oil vapor concentrations
+ High precision with 5% of reading ± 0.003 mg/m³ accuracy

PRESSURE MEASUREMENT

+ State of the art sensor technology
+ Additional quality data about the compressed air system

PLUG & PLAY MEASUREMENTS WITH A TOUCH

+ Integrated data logger records all channels in parallel for later analysis and PDF reports creation
+ 5" touchscreen interface and software guidance to easily run pre-set measurement routines

S 600 COMPRESSED AIR PURITY ANALYZER

S 600 - Technical data	Order no. P560 0600
Applications	Portable multi-tool for compressed air purity measurements. Measures, records and validates quality parameters like particles, dew point, oil vapor contents, temperature and the pressure of compressed air systems.
Measuring unit	5"color touchscreen with data logger (100 mio. values), guided measurement and report generator function. All combined and integrated with the multiple sensor system.
Medium humidity	< 40% relative humidity, no condensation
Medium temperature	0°C ... +40°C
Operating pressure	0.3 ... 1.5 MPa
Ambient & Transport conditions	0°C ... +50°C / -10°C ... +70°C
Process connection	6 mm quick connect
Power supply	Adaptor: 100 ... 240 VAC, 50/60 Hz, 1.4 A
Casing & Weight	PC, Al alloy, total product weight < 10 kg

S 600 - Measurement specs	Sensor type	Range	Accuracy
Particles	Laser optical detection	0.3 ... 0.5 µm 0.5 ... 1.0 µm 1.0 ... 5.0 µm	50% @ 0.3 ... 0.4 µm per JIS 100% @ 0.4 ... 5.0 µm per JIS
Oil vapor	Photoionisation detector PID	0.003 ... 10.000 mg/m^3	5% of value ± 0.003 mg/m^3
Dew point	Dual-sensor technology (QCM + Polymer)	-100°C ... +20°C	±2°C

S 600 - Upgrades	Perfect accessories to enhance the capabilities
Isokinetic sampling device	Combine SUTO's isokinetic sampling device to enhance the experience of simplicity and measure particles according to ISO 8573 **(Order No. A554 0600)**

S 601 COMPRESSED AIR PURITY ANALYZER

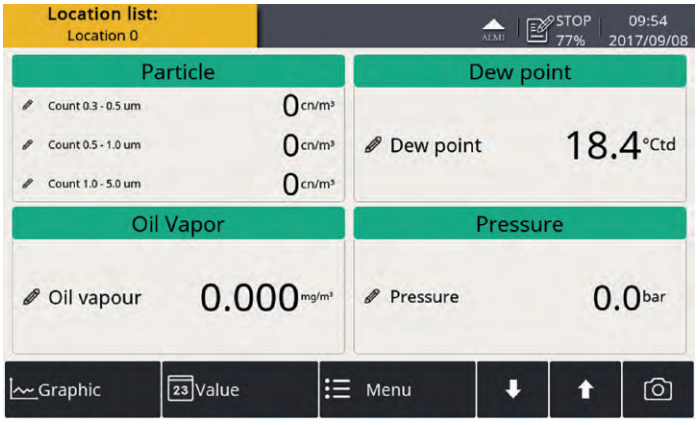
Features / Benefits

- Particle concentration measurement
  - Channel sizes: 0.3 ... 0.5, 0.5 ... 1.0, 1.0 ... 5.0 µm (A)
    0.1 ... 0.5, 0.5 ... 1.0, 1.0 ... 5.0 µm (B)
  - Laser particle counting technology
  - Counting efficiency: 50% for smallest size
    95% for all other sizes
- Oil vapor measurement
  - Latest PID sensor technology
  - Range from 0.003 ... 10.000 mg/m3
  - High precision: 5%
- Dew point measurement
  - Dual sensor technology (Polymer and QCM)
  - Wide measuring range of -100°C ... +20°C
  - High precision of ±2°C
- Pressure measurement
  - Measuring range 0.3 ... 1.5 MPa
  - Accuracy of 1% FS
- Compressed air connection through 6 mm quick connect
- Ethernet (Modbus TCP), RS-485 (Modbus RTU) and USB interface
- Low purge air loss
- 100 ... 240 VAC power supply
- 5" color touchscreen with data logger

Product contamination can ruin a business and harm its customers. The typical approach of spot checks and random testing of compressed air systems does not allow businesses to quickly react to contamination events, nor does it provide continual assurance that contamination levels are being kept under control. In the ever quickening change of production, real time monitoring is crucial to protect your products integrity. The SUTO S 601 Compressed Air Purity Analyzer, measures and monitors contaminants in real time, giving businesses security that its products and customers are protected.

The SUTO S 601 Compressed Air Purity Analyzer brings together state of the art technology in one easy to use package, allowing businesses to continuously monitor compliance to ISO 8573. The S 601 monitors particle, dew point and oil vapor contamination across the full spectrum of ISO 8573 requirements including Class 0. Real time information can be retrieved from the S 601 by SCADA systems via MODBUS outputs. The integrated color touch screen display allows users to view all information locally. The data logging function ensures records are kept intact. Alarm points can be set to trigger in the event that contaminants hit your selected limits. An optional external light or siren can be fitted to the alarm.

The S 601 is quick and easy to install, just connect the unit to power and the compressed air supply.

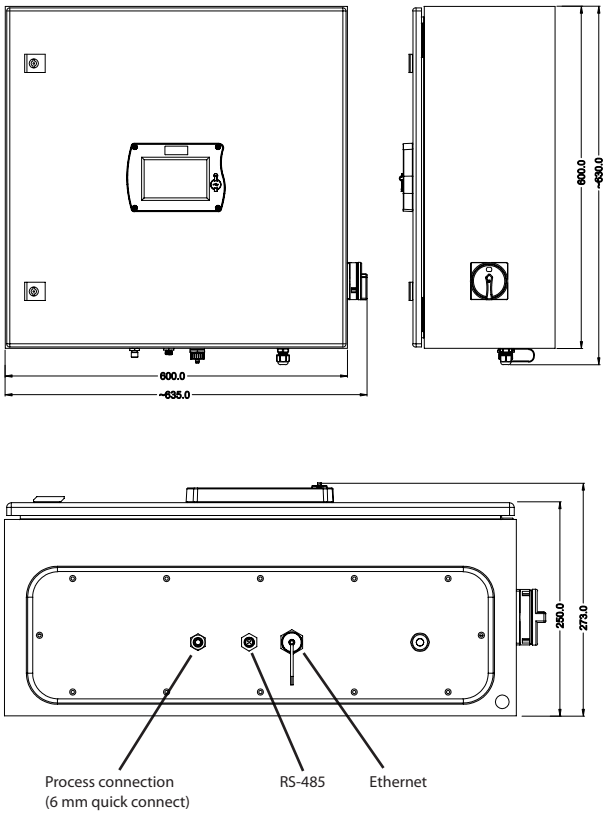


All important measurement values on screen

S 601 COMPRESSED AIR PURITY ANALYZER

Technical data	
Pressure range	0.3 ... 1.5 MPa
Power supply	100 ... 240 VAC / 50 VA
Accuracy	Dew point: ±2°C Oil vapor: 5 % o. RDG±0.003 mg/m³ Particle: 50 % for smallest size 95 % for all other sizes Pressure: . 1 % F.S
Measured gas	Air, N_2 (other gases on request)
Medium humidity	< 40% relative humidity
Ambient conditions	0°C ... 50°C
Transport Temp.	-10°C ... +70°C
Data logger	100 million samples 1 sec ... 1h sampling rate
Output signal	- Ethernet (Modbus TCP) - RS-485 (Modbus RTU) - USB
Casing	Sheet steel, powder-coated on the outside Stainless steel on request
Classification	IP54
Electrical connection	1 x M12, 5 pole (RS-485) 1 x RJ45 (Ethernet) 1 x mains cable with plug
Process connection	6 mm quick connect
Approvals	CE, RoHS

Dimensions



S 601 order table

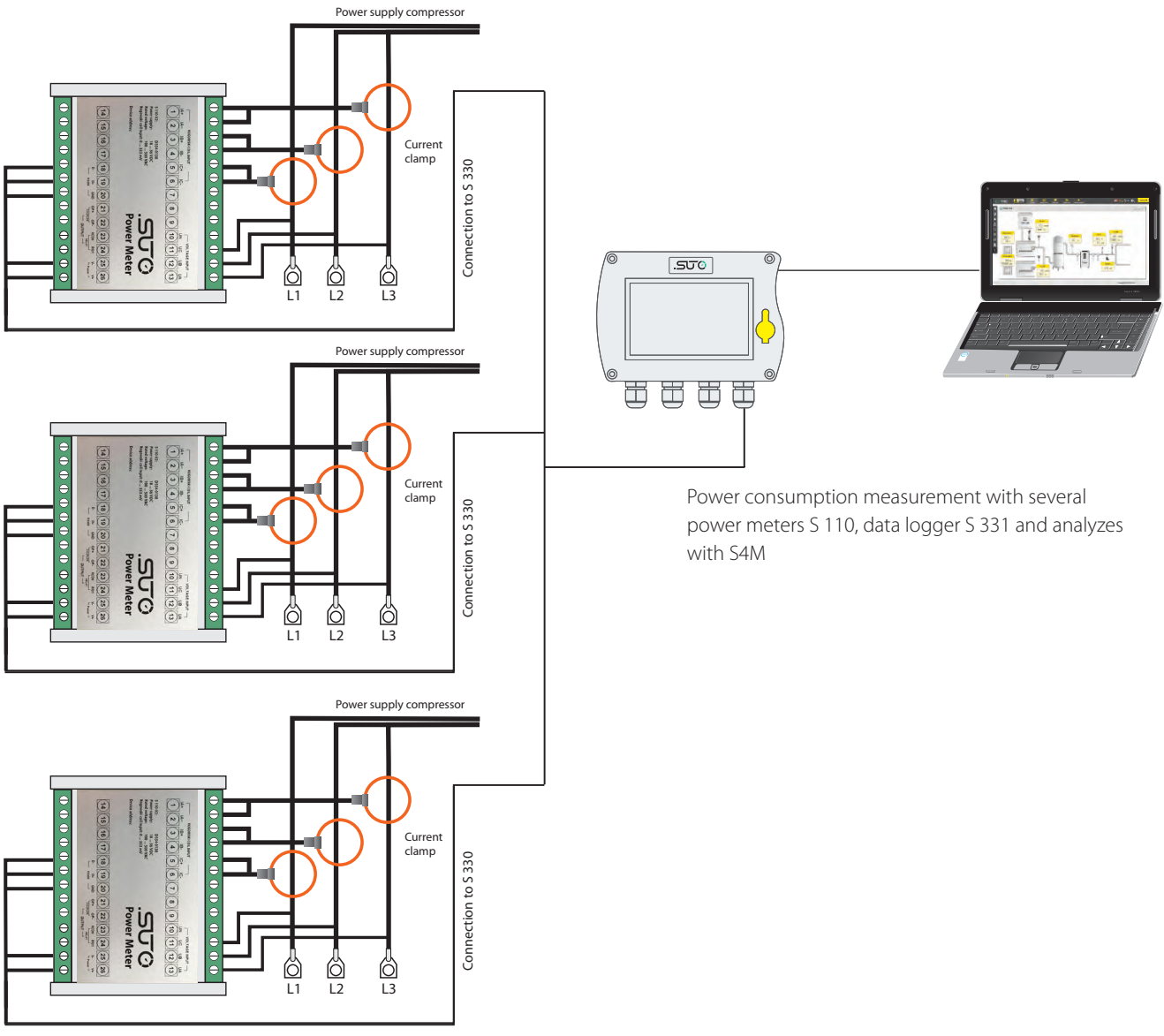
Order No.	Particle	Oil	Description
D500 0601			Base unit with dew point sensor, data logger with graphic display, metal cabinet, 100 ... 240 VAC power supply, 0 ... 1.5 MPa pressure.
A1260	A		Integrated Particle counter, 0.3, 0.5, 1.0, 5.0 µm, 0.1 cfm (2.83 l/min)
A1261	B		Integrated Particle counter, 0.1, 0.5, 1.0, 5.0 µm, 0.1 cfm (28.3 l/min)
A1267		A	Integrated oil vapor sensor unit, 0.003 ... 10.000 mg/m3
A554 0602			Purity test kit consisting of zero filters for oil vapor, particles and a desiccant cartridge for low dew point creation.

INTRODUCTION - FURTHER USEFUL SENSORS AND SYSTEMS

The following chapter is dedicated to a variety of additional sensors which can be used to provide more in depth analysis of compressed air or gas systems.

SUTO offers stationary as well as portable instruments to measure power and current consumption of compressors or any electrical power consumer.

Through the connection of the meters to our displays and data loggers and in combination with the S4M analysis software, energy consumption can be visualized.
Read more on page 48



Power consumption measurement with several power meters S 110, data logger S 331 and analyzes with S4M

S 530 LEAK DETECTOR FOR PNEUMATIC SYSTEMS

Leaks in compressed air systems can significantly increase the cost of running compressors. The detection of leaks is an important maintenance requirement which can be done by soapy water or ultrasonic sound.

Features

When gases are leaking through tubes and tanks an ultrasonic sound is produced which can be detected by the S 530 even from several meters away. The S 530 transforms these inaudible signals into a frequency which can be easily heard by using the supplied noise isolated headset. The integrated laser pointer helps to spot the leak from distance. In unpressurized systems an ultrasonic tone generator can be used whose sound will leak through small openings.

Leak detection with separated sensor

Leak detection with focus tube

Applications

- Leak detection in compressed air, refrigerants, simply of any gas!
- Insulation test of doors and windows
- Detection of partial electrical discharges causing damages on insulations

Leak detection with focus tip

S 530 LEAK DETECTOR FOR PNEUMATIC SYSTEMS

Ultrasonic Leak Detector S 530

Cost saving

Compressed air is one of the most expensive energy forms. In Germany alone, 60,000 pneumatic systems consume 14,000,000,000 kWh electricity every year. 15% to 20% of this could easily be saved (Peter Radgen, Fraunhofer Institute, Karlsruhe). A large portion of these costs are caused by leaks in compressed air systems, allowing the air to "escape" unused.

Calculation example at 0.6 MPa:

1 hole of 1mm diameter = 270 EUR/year

Contents of Set

Ultrasonic tone generator

Order no.	Description
P601 0103	**S 530 Leak Detector set consisting of:**
P560 0102	S 530 Leak Detector
S605 0001	Sensor unit
A554 0102	Noise isolated headset
A530 0101	Focus tube and focus tip
A553 0101	Cable to detach sound probe from instrument
A554 0001	Battery charger
A554 0101	Transport case S 530
	Additional accessories not included in set:
A554 0103	Ultrasonic Tone Generator

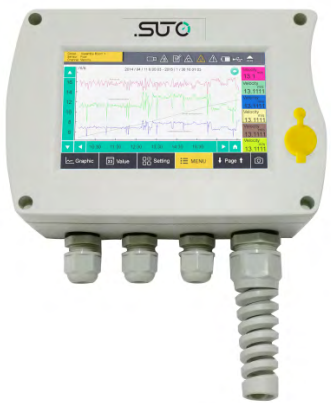
S 110 POWER METER

S 110 hat rail mountable

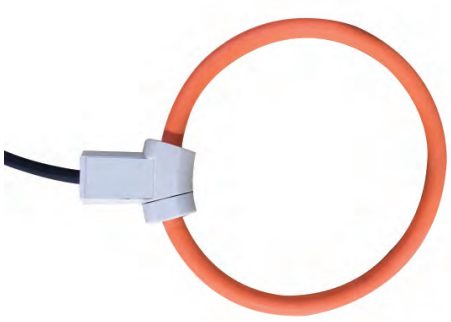
The S 110 Power Meters are designed for easy installation and high accuracy. They measure the actual power consumption in kW and accumulate the Energy consumption in kWh of a 3-phase load. The S 110 can measure other parameters such as current, voltage, cos phi etc. Hat rail, wall mountable and portable versions are available.

Technical Data S 110		
Nominal voltage (L-N, L-L)	100 ... 500 VAC	
Voltage measurement	3PH4W, 3PH3W, 1PH2W	
Clamp sensor input range	external CT (333 mV only) external Rogowski coil	
Available clamp sensors	Rogowski coil	1 ... 100 A 10 ... 1000 A 30 ... 3000 A
Power range	up to 2000 kW (depends on Rogowski coil)	
Accuracy	Voltage: Current: Clamp: Energy:	0.2% 0.5% Class 1 Class 0.5
Output	Modbus RTU	
Supply	24 V DC / 3.5 W	
Operating Temperature	-25°C ... +55°C	
Dimensions	Hat rail version: Wall version: Portable:	122 x 87 x 23 mm 190 x 155 x 85 mm 177 x 177 x 60 mm

S 110-P, for connection to S 551

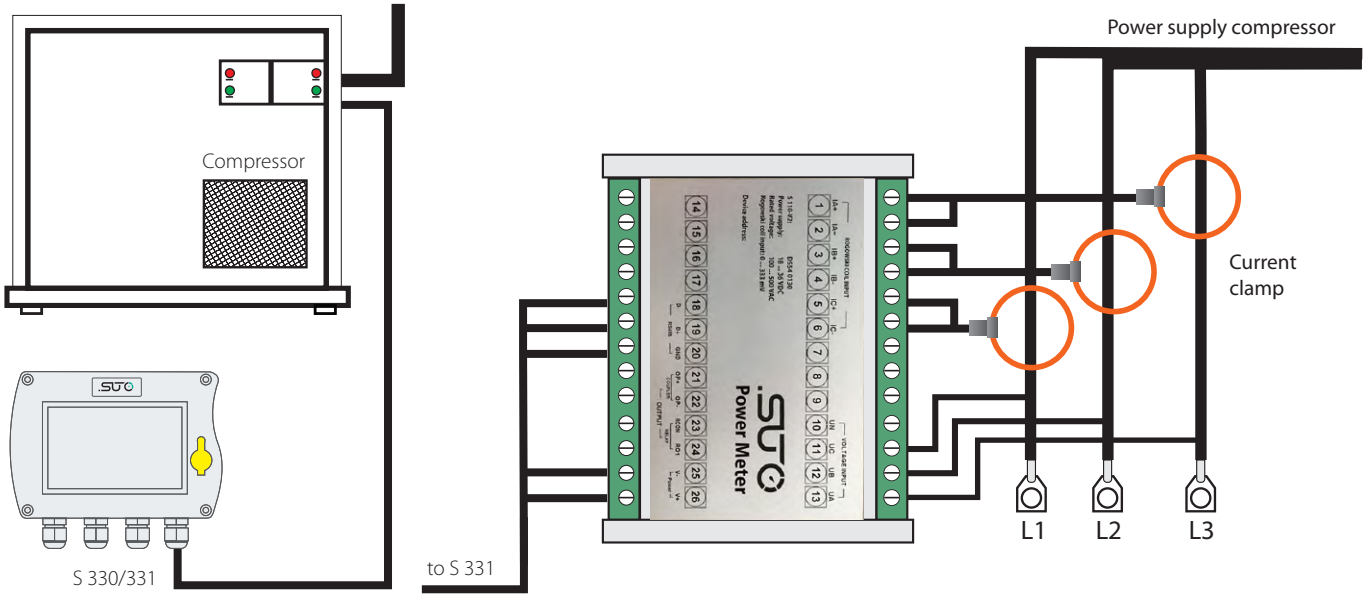


S 330/331 can be used as stationary display of up to 16 power meters



Rogowski coils with wide measuring range, high accuracy and easy installation

Installation



In above illustration a power meter is installed directly into the connection box of the compressor. The Rogowski coils can be easily fixed. The voltage connection can be drawn from other available connection points. A separate cable connects the S 110 power meter to the S 330/331 with Modbus RTU and 24 VDC power supply. The power meter could also be installed into the connection cabinet where the power supply for the compressor is coming from. If no hat rail mounting is available, there is a wall mountable version of the S 110 power meter.

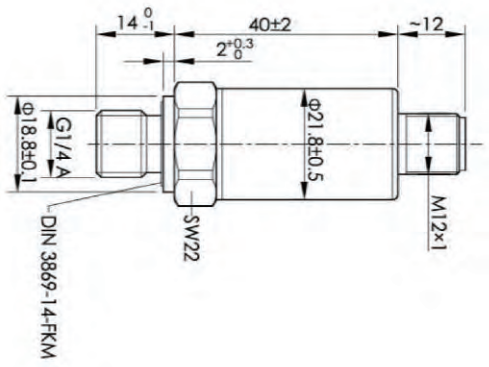
Order no.	Description
Stationary	
D554 0130	S 110 power meter, hat rail, Modbus RTU, 24 VDC supply
S554 0140	Rogowski coil for S 110, 1000 A, 100 mm diameter, 1.8 m cable, open ends
S554 0141	Rogowski coil for S 110, 3000 A, 150 mm diameter, 1.8 m cable, open ends
S554 0142	Rogowski coil for S 110, 100 A, 16 mm diameter, 1.8 m cable, open ends
Portable	
P554 0134	Portable power meter S 110-P, Modbus RTU, including 4 test leads, 4 test clips, connection cable to S 551
S554 0160	Rogowski coil for S 110-P, 1000 A, 100 mm diameter, 1.8 m cable, connector to S 110-P
S554 0161	Rogowski coil for S 110-P, 3000 A, 150 mm diameter, 1.8 m cable, connector to S 110-P
S554 0162	Rogowski coil for S 110-P, 100 A, 16 mm diameter, 1.8 m cable, connector to S 110-P
Options	
A554 0035	Transport case S 551 for sensors and cables

PRESSURE SENSORS

Features

- High accuracy and affordable industrial pressure sensor
- Excellent anti-interference capability (EMC, EMI)
- Salt-spray, temperature and humidity tested
- IP67 protection
- 4-20 mA loop powered and Modbus RTU type available

Dimensions



Applications

- Industrial equipment
- Hydraulic systems
- Pneumatic systems
- Industrial engines
- HVAC/R equipment
- Spraying systems
- Pumps
- Cooling systems

Technical data	4 ... 20mA	Modbus
Supply voltage	24VDC (12 ... 32VDC)	
Accuracy	±0.5% F.S. (typ.)	0.25% F.S.
Media temperature	-30°C ... +100°C	-40°C ... +85°C
Output signal	4 ... 20 mA, 2-wire	Modbus RTU
Casing material	Stainless steel	
Protection	IP67	IP65
Mechanical connection	G 1/4" A (ISO 228/1)	
Electrical connection	M12 connector, 4 pins	
Storage temperature	-40°C ... 100°C	-40°C ... +85°C
Operating temperature	-30°C ... +80°C	-40°C ... +85°C
Repeatability	< ± 0.25% F.S.	0.1% F.S.
Proof pressure	2 x F.S.	
Vibration resistance	IEC 60068-2-6 (5 ... 2000Hz, 10g)	
Shock resistance	IEC 60068-2-27 (50g, 11ms)	
EMC proof	IEC 61000-6-2/3/4	

Modbus version:
Baud rate: 19,200
Framing/Parity/Stop: 8, N, 1
Device address: 1 (default), please specify on order!

Order no.	Description
Stationary	
S694 3557	Pressure sensor, 1.6 MPa, 4 ... 20 mA loop powered, M12 connector, 5 m cable, open ends
S694 3558	Pressure sensor, 4.0 MPa, 4 ... 20 mA loop powered, M12 connector, 5 m cable, open ends
S694 2559	Pressure sensor, 1.6 MPa, Modbus RTU, M12 connector
A553 0105	Sensor cable 10 m, with M12 connector, open wires, 4 pole
R200 0030	Pressure sensor calibration 1.6 MPa type, at 3 points

Remarks: other ranges on request

Installation

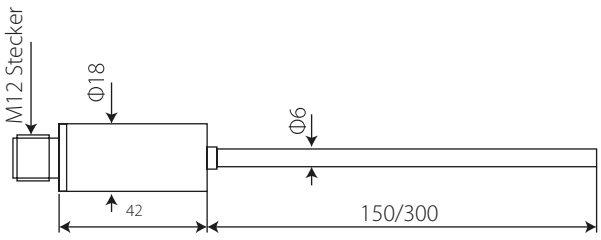
- Temperature measurement in liquids, gases and vapors
- Inlet / outlet temperature of dryers
- Outlet temperature of compressors

Features

- Easy installation in compressed air systems
- 4 ... 20 mA transmitter

Temperature transmitter 4 ... 20 mA

Dimensions



Technical data	
Measuring range	-50°C ... +200°C
Sensor	Pt1000, class A
Supply	16 ... 24 VDC
Output signal	4 ... 20 mA, 2 wire loop powered
Scaling	4 mA —> -50°C 20 mA —> +200°C
Accuracy	0.5% of reading + 0.2% FS
Connection type	M 12 connector
Tube material	Stainless steel 1.4571
Sensor diameter	6 mm
Sensor tube length	150 mm, 300 mm
Classification	IP67
Ambient temperature (electronics)	-40°C ... +90°C

Order no.	Description
S693 0003	Temperature transmitter, -50°C ... +200°C, 4 ... 20 mA loop powered, 6 x 150 mm sensor tube
S693 0004	Temperature transmitter, -50°C ... +200°C, 4 ... 20 mA loop powered, 6 x 300 mm sensor tube
A554 6003	Compressor fitting 6mm, G1/2", PTFE ring, 0.6 MPa
A554 6004	Compressor fitting 6mm, G1/2", metal ring, 1.6 MPa
A553 0104	Sensor cable 5 m, with M12 connector, open wires, AWG24 (0.2 mm^2)

CURRENT SENSOR

SUTO current clamp sensor is an AC RMS current sensor composed of a flexible active part (Rogowski coil model) connected to a compact digital converter, capable of measuring the current carried on a power conductor up to a value of 3000 A AC.

The digital converter supplies an output of 4-20 mA DC in linear proportion to the measured current.

Features

- Easy installation
- Wide measuring range
- Accurate current sensing
- 4-20 mA output signal

Applications

- Current sensing at compressors for load / unload analyzes
- Current sensing for power / energy measurement
- Evaluation of machine operation hours

Technical data	
Measuring range	30 ... 3000 A AC
Fundamental frequency	40 ... 70 Hz
Output signal	4 ... 20 mA DC 0 A AC = 4 mA DC 1000 A AC = 20 mA DC
Maximum output	21,6 mA DC
Load impedance	≤ 300 Ω
Accuracy	0.5% of reading + 0.2% of range
Power supply	10 VDC to 32 VDC
Current consumption	≤ 30 mA
Clamp diameter	100 mm (1000 A) 150 mm (3000 A)
Maximum temperature of clamped cable	≤ +80°C
Protection rating	IP67
Service voltage	≤ 1000 CAT III, 600 V CAT IV

Position sensitivity

Conductor Position	Typical Error(%)
●	<0.5%
●	<0.8%
●	<1%

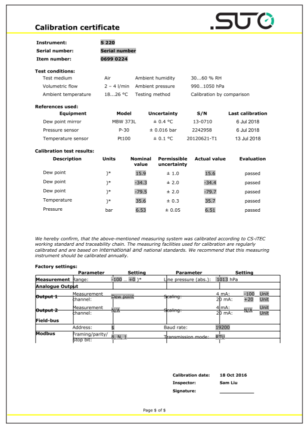
Order no.	Description
S554 0156	SUTO current clamp sensor, 1000A, 100 mm diameter, including connector to S 551
S554 0155	SUTO current clamp sensor, 1000A, 100 mm diameter, open wire ends
S554 0157	SUTO current clamp sensor, 3000 A, 150 mm diameter, including connector to S 551
S554 0158	SUTO current clamp sensor, 3000 A, 150 mm diameter, open wire ends

TESTING AND CALIBRATION

SUTO provides a calibration service for all its sensors as well as on-site testing. Please contact our service for inquiries. Dew point and flow calibration service is performed in the SUTO Test & Calibration Labs in Germany and China (Asia market). For other physical units we have contract partners in Germany. All references are traceable to national standards and are re-calibrated in regular intervals.

Dew point calibration service

- Accuracy: 0.1°Ctd
- Calibration range: -75°Ctd ... +15°Ctd
- Reference: Dew point mirror MBW 373



Calibration certificate

Instrument:	S 220
Serial number:	Serial number
Item number:	0699 0224

Test conditions:

Test medium	Air	Ambient humidity	30...60 % RH
Volumetric flow	2 – 4 l/min	Ambient pressure	990...1050 hPa
Ambient temperature	18...26 °C	Testing method	Calibration by comparison

References used:

Equipment	Model	Uncertainty	S/N	Last calibration
Dew point mirror	MBW 373L	± 0.4 °C	13-0710	6 Jul 2018
Pressure sensor	P-30	± 0.016 bar	2242958	6 Jul 2018
Temperature sensor	Pt100	± 0.1 °C	20120621-T1	13 Jul 2018

Calibration test results:

Description	Units	Nominal value	Permissible uncertainty	Actual value	Evaluation
Dew point	)*	15.9	± 1.0	15.6	passed
Dew point	)*	-34.3	± 2.0	-34.4	passed
Dew point	)*	-79.5	± 2.0	-79.7	passed
Temperature	)*	35.6	± 0.3	35.7	passed
Pressure	bar	6.53	± 0.05	6.51	passed

We hereby confirm, that the above-mentioned measuring system was calibrated according to CS-ITEC working standard and traceability chain. The measuring facilities used for calibration are regularly calibrated and are based on international and national standards. We recommend that this measuring instrument should be calibrated annually.

Factory settings:

	Parameter	Setting	Parameter	Setting
Measurement	Range:	-100 ... +0)*	Line pressure (abs.):	1013 hPa
Analogue Output				
Output 1	Measurement channel:	Dew point	Scaling:	4 mA: -100 Unit; 20 mA: +20 Unit
Output 2	Measurement channel:	N/A	Scaling:	4 mA: N/A Unit; 20 mA: Unit
Field-bus				
Modbus	Address:	$	Baud rate:	19200
	Framing/parity/stop bit:	8, N, 1	Transmission mode:	RTU

Calibration date: 18 Oct 2016
Inspector: Sam Liu
Signature:

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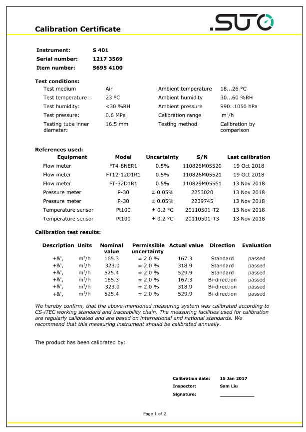
Flow calibration service

- Accuracy: 0.5% of reading
- Pressure: 0 ... 0.6 MPa
- Medium: Air
- Calibration range: 0 ... 4000 sm^3/h
- Pipe diameter: DN25 ... DN100
- Reference: Turbine flow sensors



Calibration Certificate

Instrument:	S 401
Serial number:	1217 3569
Item number:	S695 4100

Test conditions:

Test medium	Air	Ambient temperature	18...26 °C
Test temperature:	23 °C	Ambient humidity	30...60 %RH
Test humidity:	<30 %RH	Ambient pressure	990...1050 hPa
Test pressure:	0.6 MPa	Calibration range	m^3/h
Testing tube inner diameter:	16.5 mm	Testing method	Calibration by comparison

References used:

Equipment	Model	Uncertainty	S/N	Last calibration
Flow meter	FT4-8NER1	0.5%	110826M05520	19 Oct 2018
Flow meter	FT12-12D1R1	0.5%	110826M05521	19 Oct 2018
Flow meter	FT-32D1R1	0.5%	110829M05561	13 Nov 2018
Pressure meter	P-30	± 0.05%	2253020	13 Nov 2018
Pressure meter	P-30	± 0.05%	2239745	13 Nov 2018
Temperature sensor	Pt100	± 0.2 °C	20110501-T2	13 Nov 2018
Temperature sensor	Pt100	± 0.2 °C	20110501-T3	13 Nov 2018

Calibration test results:

Description	Units	Nominal value	Permissible uncertainty	Actual value	Direction	Evaluation
+&',	m^3/h	165.3	± 2.0 %	167.3	Standard	passed
+&',	m^3/h	323.0	± 2.0 %	318.9	Standard	passed
+&',	m^3/h	525.4	± 2.0 %	529.9	Standard	passed
+&',	m^3/h	165.3	± 2.0 %	167.3	Bi-direction	passed
+&',	m^3/h	323.0	± 2.0 %	318.9	Bi-direction	passed
+&',	m^3/h	525.4	± 2.0 %	529.9	Bi-direction	passed

We hereby confirm, that the above-mentioned measuring system was calibrated according to CS-ITEC working standard and traceability chain. The measuring facilities used for calibration are regularly calibrated and are based on international and national standards. We recommend that this measuring instrument should be calibrated annually.

The product has been calibrated by:

Calibration date: 15 Jan 2017
Inspector: Sam Liu
Signature:

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On-Site testing

For on-site testing we can offer:

- Dew point measurement
- Flow /consumption measurement
- Pressure measurement
- Temperature measurement
- Leak detection
- Data logging over days and weeks

DEWPOINT MEASUREMENT REPORT

Customer details:

Entrusted by:	CARLO GAVAZZI AUTOMATION(CHINA) Co., LTD.	Company:	OSRAM China Lighting Co., LTD.
Address:	1 Gongye Road, Foshan, Guangdong	Service date:	15th Dec, 2008

Instruments details:

Product:	Portable dew point sensor DP 300 set	Item number:	0560 8000
Serial number:	0512 9155	Calibration date:	5th Dec, 2008
Certificate of instrument:	Calibration certificate(see attachment)		

Field measurement:

Place: 1 Gongye Road, Foshan, Guangdong; Fluorescent tube factory of OSRAM

Position	Medium	Gas pressure	Grade of dryness
Workshop	Petroleum gas	0.105MPa	Desiccant dryer
Workshop	Oxygen	0.47MPa	Desiccant dryer
Workshop	Low pressure air	0.05MPa	No dryer
workshop	High pressure air	0.48MPa	Refrigerant dryer of Ingersoll Rand
workshop	Nitrogen	0.4MPa	Desiccant dryer

Measuring result:

Medium	Time spent	Dew point	Gas temperature	Humidity
Petroleum gas	42 minutes	-50.7°Ctd	20°C	0.184%
Oxygen	42 minutes	-45.4°Ctd	20°C	0.280%
Low pressure air	5 minutes	19°Ctd	20.1°C	93.4%
High pressure air	5 minutes	14.5°Ctd	20.2°C	69.7%
Nitrogen	20 minutes	-78.1°Ctd	19.7°C	0.004%

Result analysis:

1. High pressure air: A dew point of 14.5 is not good. A refrigerant dryer should deliver air in the range between 4 - 8 degree dew point. Too high dew points can be caused by a bad maintenance of the dryer or by extensive leaks in the pipes upstream. We recommend performing a service on this equipment. To ensure a stable operation we also recommend monitoring the dew point with a dew point sensor which indicates alarms whenever dew point is degrading.

2. Low pressure air: This is absolutely un-dried air, which is not recommended for a stable operation. As you are using several flow meters from us we are worrying that you also have flow meter installations under such conditions. If so, our flow meters must not be installed under such high humidity conditions. We have been told that our flow meters are installed in CDA conditions (clean dry air). We strongly recommend drying this air and **not using flow measurement under such conditions!**

Remark: **3. Petroleum gas:** The instrument used is not approved to measure petroleum gas. We can not guarantee the accuracy of this measurement. Please consider the results as rough indications.

Service engineer: Simon Liu | Finished date: 15th Dec, 2008

Statement: We hereby certify that the instrument used for this measurement has been tested against a calibrated reference standard (dew point mirror) and proofed that it is within the specified accuracy. The measurement at the site was done in accordance to best practice.

Signature & Seal

Order no.	Description
R200 0001	Flow calibration with certificate
R200 0005	Oil & grease free cleaned option for flow sensors (for Oxygen it is already included in A1009)
R200 0020	Real gas calibration in selected gas to ensure best accuracy
R200 0030	Pressure sensor calibration 16 bar(g) type, at 3 points
R200 0120	General service and re-calibration S 120
R200 0130-A	Calibration particle counter S 130-A
R200 0130-B	Calibration particle counter S 130-B
R200 0130-C	Calibration particle counter S 130-C
R200 0130-D	Calibration particle counter S 130-D
R200 0130-E	Calibration particle counter S 130-E
R200 0131	Calibration particle counter S 131
R200 0600	S 600 calibration and service
R699 3396	Dew point sensor calibration

ACCESSORIES

C190 0002	
Description	Closing cap for S 421/S 452 material: 1.4404.
Application	To close the measuring sections in case the sensor unit is removed.

C190 0060	
Description	Thread adaptor, G1/2' internal to PT1/2' external, SUS303.
Application	Used to adapt S 401 or S 450 to a PT thread ball valve.

C190 0065	
Description	Thread adaptor, G1/2' internal to NPT1/2' external, SUS303.
Application	Used to adapt S 401 or S 450 to a NPT thread ball valve.

C190 0116	
Description	Flow conditioner.
Application	Wafer type flow conditioners, which is flanged between two flanges 5-8 times diameter upstream of the flow meter. Please specify nominal pipe diameter and pressure.

A530 1105 / A530 1106 / A530 1111 / A530 1113	
Description	High pressure installation device. To be used for pressure > 1.5 MPa.
Application	For safety reasons we recommend using this installation device whenever the operating pressure exceeds 1.5 MPa. * A530 1105 - High pressure installation device for S 400/S 401-220mm * A530 1106 - High pressure installation device for S 450-220mm * A530 1111 - High pressure installation device for S 400/S 401-400mm * A530 1113 - High pressure installation device for S 450-400mm

A530 1108	
Description	SUTO spot drilling device.
Application	This drilling tool is used to drill holes into compressed air pipes under pressure through a ball valve.

A553 0121	
Description	Sensor cable, 6 pole, AWG22, 7.5 mm outer diameter, w/ shielding, black (per meter)
Application	Sensor cable for S 450 sensor, US flow meter and power meter

A553 0122	
Description	Sensor cable, 5 pole, AWG24, 5.0 mm outer diameter, black (per meter)
Application	Standard sensor cable for flow and dew point sensors

A553 0123	
Description	RS-485 cable 3 pole with shielding, AWG 24
Application	RS-485 connection cable

A553 0104	
Description	Sensor cable 5 m, with M12 connector, open wires, AWG24 (0.2 mm²)
Application	Cable can be used to connect SUTO sensors to a PLC or power supply.

A553 0105	
Description	Sensor cable 10 m, with M12 connector, open wires, AWG24 (0.2 mm²)
Application	Cable can be used to connect SUTO sensors to a PLC or power supply.

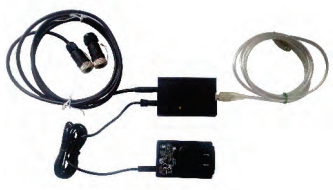
A554 0009	
Description	Power supply for hat rail, input: 85 ... 264 VAC, output: 24 VDC, 60W.
Application	This power supply can be used to supply sensors with 24 VDC/2.5A. It's mounted on a hat rail.

A554 0007	
Description	Power supply wall mountable, input: 85 ... 264 VAC, output: 24 VDC, 15W, without cable
Application	This power supply is used to supply 24 DC to sensors and other devices.

A554 0008	
Description	½" G type ball valve
Application	This is a proper ball valve for the installations of flow sensors S 401/S 450.

P554 0009	
Description	Wall thickness meter
Application	The instrument is used to measure the wall thickness of pipes. Too often the inner diameter of pipes is not exactly known, but this information is required for an accurate flow measurement. By measuring the wall thickness and the pipe size the exact inner diameter can be calculated.

A554 0107	
Description	Mains unit 100-240 VAC/24 VDC, 0.5A for S 401/S 201 series, 2 m cable
Application	Simple power supply for a portable S 421 or S 401 solution (Special plug on request)



A554 2005	
Description	Service kit for sensor configuration including software
Application	This service kit can be used for all SUTO sensors to change settings and check sensors.

For overview of sensor power consumption please refer to page 75.

A699 3491	
Description	Measuring chamber, 2 l/min @ 0.8 MPa, fast connector, without filter, max. pressure 1.5 MPa, suitable for all SUTO dew point sensors.
Application	For easy connection and disconnection to compressed air system through quick-disconnector.

A699 3493	
Description	By-pass-type chamber with 6 mm hose in and out connection up to 1.5 MPa.
Application	This chamber can be used in applications where the measured gas is by-passed through the chamber.

A699 3500	
Description	Measuring chamber, 4 l/min @ 0.8 MPa, hose fast connector, with filter, recommended pressure range 0.3 ... 1.5 MPa, convenient dew point measurement of gas/air with S 505.
Application	The sample gas/air is connected to the chamber through a 6 mm Teflon® hose. The chamber is mounted to the S 505 through the 1/2 " G-type thread connection. Parking and measurement position is selected through the handle at the chamber, which allows quick measurement results.

A699 3501	
Description	By-pass-type chamber with 6 mm hose in and out connection up to 1 MPa, convenient dew point measurement of gas/air with S 505.
Application	This chamber can be used in applications where the measured gas is by-passed through the chamber to avoid any gas/air loss. The chamber is mounted to the S 505 through the 1/2 " G-type thread connection. Parking and measurement position is selected through the handle at the chamber, which allows quick measurement results.

A699 3496	
Description	Measuring chamber for dryer installation, 2 l/min @ 0.8 MPa, hose fast connector, without filter, max. pressure 1.5 MPa
Application	The sample gas/air is connected to the chamber through a 6 mm Teflon® hose. The chamber is mounted to stationary S 2XX dew point sensors through the 1/2 " G-type thread connection. This chamber can be conveniently mounted to the frame or cabinet of a dryer.

A699 3690	
Description	Chamber for atmospheric pressure dew point.
Application	This chamber is used where the gas is supplied under pressure (up to 1.0 MPa) but the measurement should be under atmospheric conditions. The measurement result will be atmospheric dew point.

A699 3590	
Description	High pressure chamber up to 35 MPa.
Application	In applications where the pressure is exceeding 1.5 MPa, this chamber can be used. Through the adjustable valve a small purge is set to ensure a gas flow through the sensor element (response time).

A554 0054	
Description	Compressed air quick coupling, female side R ½" thread
Application	Connect this quick coupling to a 1/2" ball valve to set up a quick connector for measurement of dewpoint, oil and particle

A554 0026	
Description	Coalescing filter, with quick connect at inlet for 6 mm hose and thread nibble for connection to measuring chamber.
Application	Eliminates liquid water and oil from entering the measuring chamber and sensor unit.

Dew point sensor protection caps	
Application	Protection caps are used to protect the dew point sensor element from machanical impacts or dust. The proper cap selection depends in application. Please contact customer service

A554 0002	
Description	Test pot 11.3% RH.
Application	Is used to check dew point sensors. The pot creates a constant relative humidity of 11.3%. The resulting dew point is depending on the ambient temperature, at 25°C it is equal to -6.3°C.

D500 0005	
Description	S 51 panel meter, with 4-20 mA input and 2 alarm outputs, 85 ... 240 VAC supply, 96 x 48 mm panel
Application	Installations in dryers or similar equipment as dew point indicator

C219 0055	
Description	M12 connector with RS-485 termination resistor, 120 Ω
Application	Termination resistor for enhancing communication stability of RS-485 network. Connect it to the final device of RS-485 network

A554 3310	
Description	M12 RS-485 (Modbus) splitter
Application	Stationary Modbus splitter for easier wiring

For overview of sensor power consumption please refer to page 75.

ACCESSORIES

A554 0013	
Description	RS-485 / Ethernet gateway Protocol: - Modbus RTU - Modbus TCP
Application	Converts RS485 physical layer to Ethernet and RTU protocol to Modbus TCP protocol.

A554 0011	
Description	RS-485 Repeater
Application	A repeater is used whenever the bus length of RS-485 exceeds 500 m. After every 500 m of cable distance a repeater is recommended.

A554 0331	
Description	RS-485 / USB converter
Application	This converter brings RS-485 to the USB port of the PC.

D554 0031	
Description	Current meter, 0-20 mA, 8 channels, Modbus RTU
Application	For connecting up to 8 sensors with 0 ... 20 mA / 4 ... 20 mA signal via RS-485 to S 330 / 331.

D554 0032	
Description	Pulse meter, 7 channels, Modbus RTU
Application	For connection up to 7 sensors with pulse output signal via RS-485 to S 330 / 331.

A554 0087	
Description	USB OTG memory stick
Application	USB memory drive for transferring data between SUTO data loggers (S 331 / 551 / 120 with display / S 130 with display) and a PC. The USB drive has a USB-A and a Micro-USB connector.

OVERVIEW OF SENSOR POWER CONSUMPTION

For setting up a system in which sensor and modules need to be supplied by an external power supply please consider below consumption for selecting the correct power supply set up.

Sensor / Device	P/N	Power [W]
S 450 / 452	S695 045X	5.0
S 401 / 421	S695 4XXX	5.0
S 201	S699 041X	1.3
S 220 / 212 / 215 / 217	S699 041X	1.0
Pressure sensor	S694 XXXX	0.5
S 320 (24 VDC version)	D500 03XX	5.0
Analog input modules (8 Ch.)	D554 0031	1.3
S 110	D554 0030	3.5
Pulse input module (7 Ch.)	D554 0032	0.7
S 460	P554 007X	1.5
S 120 (without display)	S604 120X	10.0
S 130 (without display)	S604 130X	10.0
S 330 / 331	D500 033X	10.0
S 430	S695 430X	3.0
Temperature sensor	S693 000X	0.5
S 415	S695 415X	3.0
S 418	S695 418X	3.0
S 230	S699 0230 / S699 0231	1.0

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