PRODUCT GUIDE 2020/2021

Measurement Technology for Compressed Air and Gases

SUTO TECHNOLOGY AND SERVICES

AIR AND POWER CONSUMPTION
For system optimization

MACHINE & SYSTEM MONITORING
No straight pipe section required

PURITY MONITORING
To ensure Product quality

LEAKAGE MANAGEMENT
Cost saving in systems

DISPLAY & LOGGER TECHNOLOGY
Smart graphical, statistical analysis

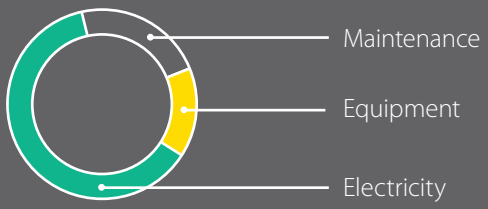
SUPPORT SERVICES AND CALIBRATION
For optimal performance

REDUCE COSTS BY IMPROVING PERFORMANCE

Quantitative measuring helps you to discover exactly where money can be saved. Some companies make the mistake of only measuring the energy consumption of the compressor while a smarter method is to measure the air consumption.

For example, a modern compressor converts ~90% of the electrical power into heat and only 10% into compressed air. This makes compressed air ten times more expensive than electricity. To assure the efficiency and effectiveness of a compressed air system, the measurement of flow is crucial.

Cost distribution in compressed air systems



WORLD-WIDE INDUSTRIAL SUPPORT SERVICES

SUTO is committed to the success of your business.
We offer world-wide service with our test and calibration labs in Germany, Hong Kong and China.
We are dedicated to technical expertise and precision in all of our products and services.

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SUTO is a leader and trusted global partner for reliable measurement and monitoring solutions for compressed air and gas systems.

Our wide range of products play a vital role in system processes of leading companies around the world.

Since our foundation in 2005, we offer our customers outstanding service and solutions and continue to innovate dependable measurement technology.

THERMAL MASS FLOW SENSORS
S401 / S421

Measure consumption
and flow —
optimize process efficiency

S421 inline type

S401 insertion type

S401 / S421 FEATURES

SMARTPHONE ANDROID APP
For remote configuration

ACCURATE RESULTS
Very fast response time

EASY PROCESS MONITORING
Effective and inexpensive measurements

TOTAL FLOW
High accuracy and reliable measurements

Optional color display for online values, consumption counter and sensor settings. 10-digit counter (1 999 999 999)

S401 / S421 FEATURES AT A GLANCE

- Measures standard flow, mass flow and consumption
- 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 or Modbus/TCP interface
- Selectable gas type (Some gases require real gas calibration!)
- Sensor can be calibrated in 2 different gases

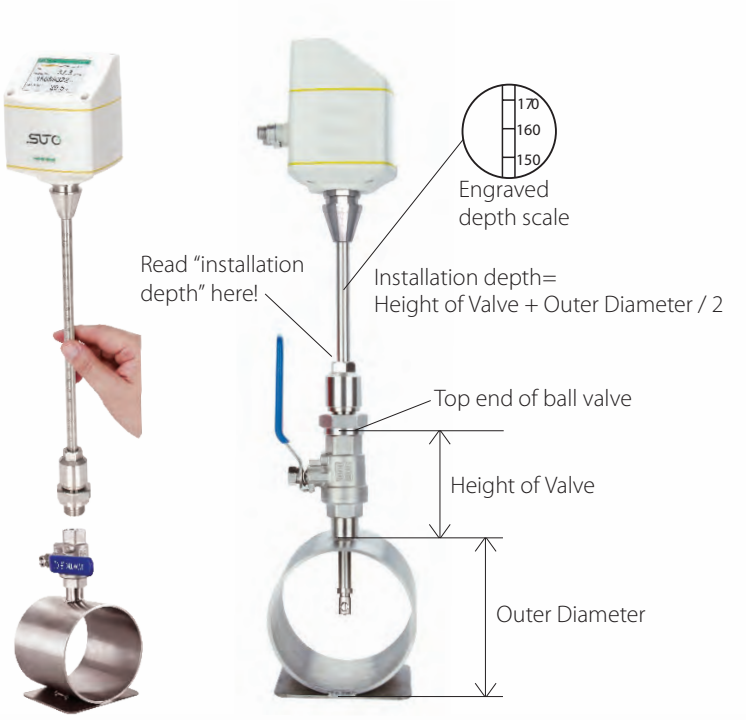
S401 BENEFITS

- 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

S421 BENEFITS

- Pipes sizes available: DN15, DN20, DN32, DN40, DN50, DN65, DN80
- Fits your needs: various process connections available (R-thread, EN 1092-1 flange or ANSI flange)
- Exchangeable sensor unit (easy sensor swap)
- Optional flow conditioner, no need for a straight inlet anymore

S401 / S421 INSTALLATION AND SENSOR REMOVAL

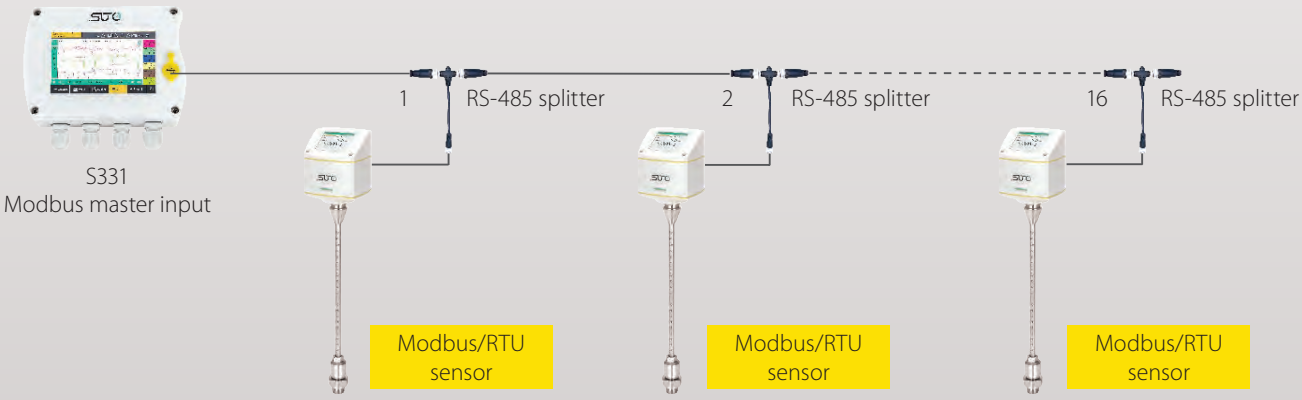


S401 can be installed under pressure through a 1/2" ball valve.
The sensor tip must be in the pipes center.

The S421 sensor unit can be easily removed for calibration. (Closing cap separately available)

Optional flow conditioner eliminates the straight pipe inlet requirement

Wireless connection allows the user to read the measurement values and change the configuration



Sensors can be easily integrated into a Modbus/RTU network (daisy chain)

S401 / S421 TECHNICAL DATA

General Specifications	
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
Medium conditions:	-30 ... +140 °C / relative humidity < 90% no condensation
Transport Temperature:	-30 ... +70 °C
Material:	Metal parts 1.4404 (SUS 316L) Casing PC + ABS Sensor: Ceramic with glass coating
Classification:	IP65
Electrical connection:	2 x M12, 5 poles (2 x M12 plug with screw terminals included)
Approvals:	CE, RoHS, FCC
Operating temperature	-30 ... +140 °C fluid temperature -30 ... +70 °C casing -10 ... +50 °C casing with display
Operating pressure	**S401**: 0 ... 5.0 MPa (>1.6 MPa need installation device) **S421**: 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 output	Isolated RS-485 with Modbus/RTU protocol or Modbus/TCP output
Power supply	15 ... 30 VDC / 200 mA

Volumetric flow ranges		S401				S421
Inch	DN	Di (mm)	S401-S (m^3/h)	S401-M (m^3/h)	S401-H (m^3/h)	Measuring range from to
½″	DN15		-	-	-	0.5 ... 90 m^3/h
¾″	DN20		-	-	-	0.9 ... 170 m^3/h
1″	DN25	27.3	0.5 ... 147.7	0.6 ... 294.7	0.6 ... 356.9	1.5 ... 290 m^3/h
1¼″	DN32	36.0	0.9 ... 266.3	1.2 ... 531.5	1.2 ... 643.5	2 ... 500 m^3/h
1½″	DN40	41.9	1.2 ... 366.7	1.5 ... 731.9	1.5 ... 886.2	3 ... 700 m^3/h
2″	DN50	53.1	2.0 ... 600.1	2.5 ... 1197.6	3.0 ... 1450.0	4 ... 1000 m^3/h
2½″	DN65	68.9	3.5 ... 1026.5	5.0 ... 2048.6	5.0 ... 2480.4	6 ... 1500 m^3/h
3″	DN80	80.9	5.0 ... 1424.4	7.0 ... 2842.7	7.0 ... 3441.9	8 ... 2500 m^3/h
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	

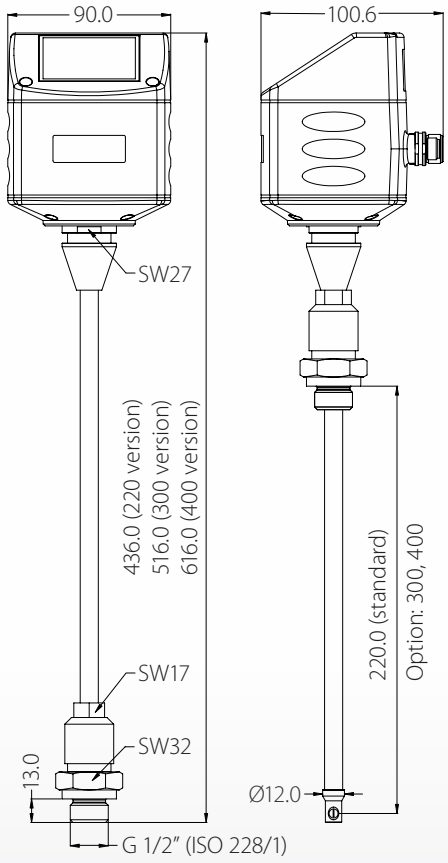
Stated measuring ranges under following conditions:

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

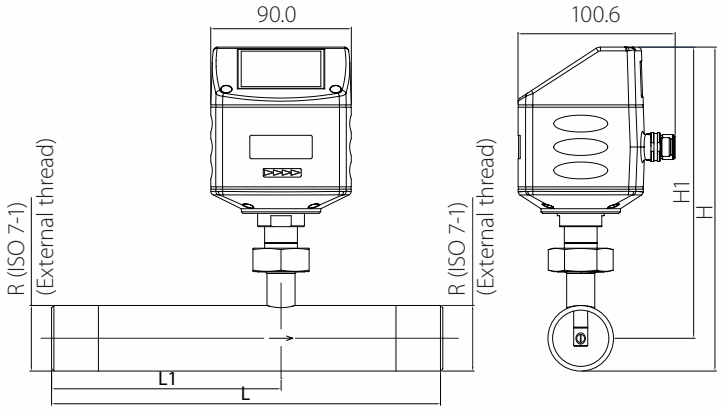
The table above shows the air flow ranges for pipe sizes up to DN300 at standard conditions. At other reference conditions and gas types the flow range may vary, please contact your local sales support.
Furthermore it is possible to measure the air flow in bigger pipes (> DN300), for this please contact your local sales support.

S401 / S421 DIMENSIONS

S401

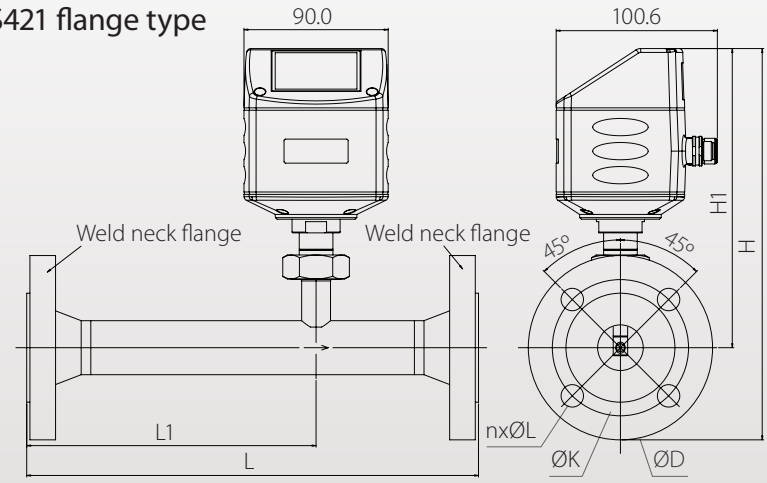


S421 thread type



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	R ½"
¾" (DN20)	475	275	200.2	186.7	R ¾"
1"(DN25)	475	275	203.6	186.7	R 1"
1¼"(DN32)	475	275	207.9	186.7	R 1¼"
1½"(DN40)	475	275	210.9	186.7	R 1½"
2"(DN50)	475	275	216.9	186.7	R 2"
2½"(DN65)	475	275	232.7	194.6	R 2½"
3"(DN80)	475	275	245.5	201.0	R 3"

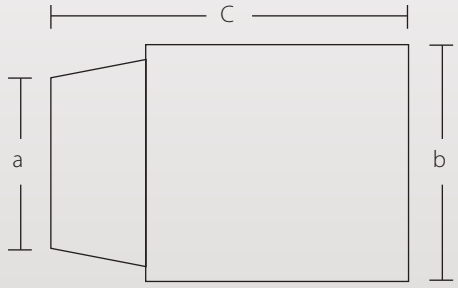
S421 flange type



Pipe nominal size inch / (DN)	L total length (mm)	L1 total length (mm)	H total height (mm)	H1 from pipecenter to casing top (mm)
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

Optional flow conditioner

No more straight inlet requirements



Order No.	Dimensions	a	b in mm	c in mm
A 1070	DN15	R 1/2"	24	64
A 1071	DN20	R 3/4"	32	69
A 1072	DN25	R 1"	37	75
A 1073	DN32	R 1.25"	45	92
A 1074	DN40	R 1.5"	54	92
A 1075	DN50	R 2"	68	105
A 1076	DN65	R 2.5"	80	128
A 1077	DN80	R 3"	95	142

S401 / S421 ORDERING

Please use the following tables to assist in placing your order with our sales staff.

S401 Thermal Mass Flow Meter (Insertion type)		
Order No.	**Code**	**Description**
S695 4100	**S4010**	S401 Flow sensor, 220mm shaft
S695 4101	**S4011**	S401 Flow sensor, 300mm shaft
S695 4102	**S4012**	S401 Flow sensor, 400mm shaft
S695 4103	**S4013**	S401 Flow sensor, 160mm shaft
Connection thread		
	A	G 1/2" **Standard**
A1006	**B**	PT 1/2" Adapter
A1005	**C**	NPT 1/2" Adapter
Gas type 1		
A1007	**A**	Air
A1008	**B**	CO_2
A1009	**C**	O_2 (Oil- & grease-free cleaned)
A1010	**D**	N_2
A1011	**E**	N_2O
A1012	**F**	Argon
A1013	**G**	Natural Gas
A1014	**H**	H_2 (real gas calibration)
A1015	**I**	Other gas (Please specify)
A1016	**J**	He (real gas calibration)
A1017	**K**	C_3H_8
	Z	No Second Gas
Gas type 2 (same selections as above)		
Range		
	A	Standard range version (92,7 m/s)
A1401	**B**	Max range version (185 m/s), only for S401
A1402	**C**	High speed range version (220 m/s), only for S401
A1403	**D**	Low range version (1/3 or standard range)
A1407	**F**	Vacuum / Atmospheric range (1/3 of standard range)
Calibration		
	A	Standard calibration
A1405	**C**	Bi-directional calibration, only for S401
A1404	**E**	High accuracy calibration (1 % ± 0.3 %F.S.)
Output		
A1410	**A**	Analog 4 ... 20 mA, Pulse output
A1411	**B**	Modbus/RTU output
A1413	**C**	Analog 4 ... 20 mA, Pulse output compatible to S400
A1424	**D**	Modbus/TCP output (including 5 m M12-cable with RJ45 Plug)
Display		
	A	Without display
A1420	**B**	With display

Example: S4010AAZBAAB
S401, 220 mm shaft, G 1/2", Air, no second gas, max range, standard calibration, analog 4 ... 20 mA and Pulse output, display

Attention:
- Measuring section connection and size must be combined to get the order number. Exmaple: A1306 = R-thread DN50

S421 Thermal Mass Flow Meter (Inline type)		
Order No.	**Code**	**Description**
S695 4120	**S4210**	S421 Flow sensor, in-line type, 1.6 MPa version
S695 4121	**S4211**	S421 Flow sensor, in-line type, 4.0 MPa version
Measuring section connection *		
A130X	**A**	R-thread (IOS-7-1)
A132X	**B**	Flange, EN 1092-1, PN40
A134X	**C**	Flange ANSI 16.5
Measuring section size *		
1	**A**	DN15 (1/2")
2	**B**	DN20 (3/4")
3	**C**	DN25 (1")
4	**D**	DN32 (1.25")
5	**E**	DN40 (1.5")
6	**F**	DN50 (2")
7	**G**	DN65 (2.5")
8	**H**	DN80 (3")
Gas type 1		
A1007	**A**	Air
A1008	**B**	CO_2
A1009	**C**	O_2 (Oil- & grease-free cleaned)
A1010	**D**	N_2
A1011	**E**	N_2O
A1012	**F**	Argon
A1013	**G**	Natural Gas
A1014	**H**	H_2 (real gas calibration)
A1015	**I**	Other gas (Please specify)
A1016	**J**	He (real gas calibration)
A1017	**K**	C_3H_8
	Z	No Second Gas
Gas type 2 (same selections as above)		
Range		
	A	Standard range version
A1403	**D**	Low range version (1/3 of standard range)
A1407	**F**	Vacuum / Atmospheric range (1/3 of standard range)
Calibration		
	A	Standard calibration
A1404	**E**	High accuracy calibration (1 % ± 0.3 %F.S.)
Output		
A1410	**A**	Analog 4 ... 20 mA, Pulse output
A1411	**B**	Modbus/RTU output
A1413	**C**	Analog 4 ... 20 mA, Pulse output compatible to S400
A1424	**D**	Modbus/TCP output (including 5 m M12-cable with RJ45 Plug)
Display		
	A	Without display
A1420	**B**	With display
Flow conditioner (optional)		
A107X	**A**	R-thread flow conditioner

Example: S4210AFBDAEBB
S421, R-thread, DN50, CO_2, N_2, standard range, high accuracy calibration, Modbus/RTU output, display

THERMAL MASS FLOW METERS
S415 / S418

Monitor your flow — **optimize process efficiency**

S415 / S418 FEATURES

SMARTPHONE ANDROID APP
For remote configuration

POINT-OF-USE INSTALLATION
No straight pipe section required

COMPACT DESIGN
Can be installed anywhere

TOTAL FLOW
No bypass measurement

EASY PROCESS MONITORING
Effective and inexpensive recording

ACCURATE RESULTS
Integrated flow conditioner

The more accurate you can monitor gas flow, the more likely you will discover weak points in the process flow, thus ensuring continuity and profitability.

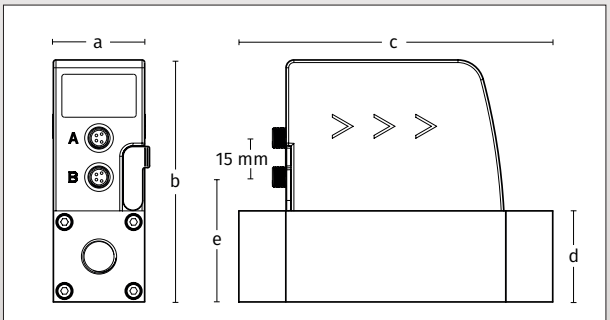
Asymmetric velocity profiles, swirl, and other factors caused by bends in pipes can lead quickly to inaccurate readings. And it is often not possible to place flow meters at hard-to-reach places.

The solution is our new generation of compact, easy-to-install, reliable and cost-effective flow and consumption meters: the S415 and the S418.

S415 / S418 BENEFITS

- Convenient installation, great flexibility, can be installed anywhere
- Available as DN8, DN15, DN20 and DN25 (G female thread)
- Eco version S415: Accuracy of 3 % o.RDG, measuring volume 50: 1
- Pro version S418: Accuracy of 1.5 % o.RDG, measuring volume 100: 1
- Pro version S418: Integrated data logger and integrated pressure sensor

S415 / S418 DIMENSIONS



Dimensions in mm	a	b	c	d	e
DN8/DN15	35.0	93.0	120.4	35.0	48.0
DN20/DN25	48.0	106.0	178.0	48.0	61.0

S415 / S418 TECHNICAL DATA

General Specifications		
Inner thread	DN8, DN15, DN20, DN25	
Process connection	G inner thread (ISO 228-1)	
Pressure range	0 ... 1.0 MPa	
Ambient / Transport temperature	0 ... +50 °C / -30 ... +70 °C	
Medium conditions	0 ... +50 °C / rH < 90 % no condensation	
Power supply	18 ... 30 VDC / 120 mA	
Output signal	(A) Analogue 4 ... 20 mA, pulse (B) RS-485 (Modbus/RTU) (C) Digital M-Bus	
LED display	4-Digit / S415: Flow / S418: Flow + Pressure (option)	
Material	Process connection: aluminium alloy Wetted parts: aluminium alloy Top casing: PC + ABS	
Classification	IP54	
Electrical connection	2 x M8, 4 poles	
Approvals	CE, RoHS	
Configuration	**S415 (Eco)**	**S418 (Pro)**
Turndown ratio	50:1	100:1
Accuracy (at 6 bar, 20°C, rH < 40%)	3 % of reading	1.5 % of reading
Measured gas	Air, N_2	Non-corrosive gases, up to 2 calibrated gases
Response time (T90)	1 sec	0.1 sec
Interface	Wireless for Service App	Wireless for Service App, USB for logger readout
Data logger	None	Memory size: 8,000,000 samples Channels: up to 4 channels (Flow, Consumption, Temperature, Pressure) Sampling rate: 1 sec ... 1 h
Pressure sensor option	None	Range: 0 ... 1.0 MPa Accuracy: 1 % F.S.

Calibrated Gas Types	S415 (Eco)		S418 (Pro)	
The S415 can be calibrated for Air or N_2 The S418 can be calibrated for up to two gases. Standard is Air.	**A**	Air	**A**	Air
	D	N_2	**B**	CO_2
			C	O_2 (oil & grease free)
			D	N_2
			E	N_2O
			F	Ar
			G	Natural gas
			H	H_2 (real gas calibration)
			I	Other gas (specify)
			J	He (real gas calibration)
			K	C_3H_8
			Z	No gas

Thread / Measuring Range	Standard Configuration			
Process connection	DN8	DN15	DN20	DN25
Standard range (S) in l/min	250	1000	2000	3500
Low range (L) in l/min	50	200	400	700

Stated measuring ranges under following conditions:

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

S415 / S418 ORDERING

Please use the following tables to assist in placing your order with our sales staff.

S415 Thermal Mass Flow Meter (Eco Version)		
Order No.	**Code**	**Description**
S695 415	**S415**	S415 mass flow meter G inner thread, 3 % o. RDG, 24 VDC Gas types Air or N_2 Measuring range (S)* 5 m cable with M8 connector and open ends included
Size		
S695 415	**0**	DN8 G thread connection
S695 415	**1**	D15 G thread connection
S695 415	**2**	D20 G thread connection
S695 415	**3**	D25 G thread connection
Range		
	S	Standard range version
A1453	**L**	Low range version
Output		
A1450	**A**	Analog 4 ... 20 mA, Pulse Output
A1451	**B**	Modbus/RTU output
A1452	**C**	M-Bus output
Gas type		
A1007	**A**	Air
A1010	**D**	N_2
Units		
	A	with SI units
A1458	**B**	with imperial units instead of SI units

Example: S4150SBAB
Pressure sensor, DN8, Standard range, Modbus/RTU, Air, imperial units

S415/418 Accessories	
Order No.	**Description**
A554 3315	T-BOX for S415 / S418 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 / S418 to S551, 5 m
M599 7020	S4A data analysis software, for data logger S418

S418 Thermal Mass Flow Meter (Pro Version)		
Order No.	**Code**	**Description**
S695 418	**S418**	S418 mass flow meter with integrated data logger G inner thread, 1.5 % o. RDG, 24 VDC Gas types A-K and B-Z Measuring range (S)* 5 m cable with M8 connector and open ends included
Size + Pressure sensor option		
S695 418	**0**	DN8 G thread connection
S695 418	**1**	DN15 G thread connection
S695 418	**2**	DN20 G thread connection
S695 418	**3**	DN25 G thread connection
S695 418	**5**	DN8 G thread connection, Pressure sensor 10 barg 1 % F.S
S695 418	**6**	DN15 G thread connection, Pressure sensor 10 barg 1 %
S695 418	**7**	DN20 G thread connection, Pressure sensor 10 barg 1 % F.S
S695 418	**8**	DN25 G thread connection, Pressure sensor 10 barg 1 %
Range		
	S	Standard range version
A1453	**L**	Low range version
Output		
A1455	**A**	Analog 4 ... 20 mA, Pulse Output
A1456	**B**	Modbus/RTU output
A1457	**C**	M-Bus output
Gas type 1		
A1007	**A**	Air
A1008	**B**	CO_2
A1009	**C**	O_2 (Oil- & grease-free cleaned)
A1010	**D**	N_2
A1011	**E**	NO_2
A1012	**F**	Argon
A1013	**G**	Natural Gas
A1014	**H**	H_2 (Real gas calibration)
A1015	**I**	Other Gas (Please specify)
A1016	**J**	He (Real gas calibration)
A1017	**K**	C_3H_8
	Z	No Second Gas
Gas type 2 (same selections as above)		
Units		
	A	with SI units
A1459	**B**	with imperial units instead of SI units

Example: S4187LBAZA
Pressure sensor, DN20, Low range, Modbus/RTU, Air, No Second Gas, SI units

VACUUM FLOW METER S418-V

Monitoring Vacuum Pumps — **optimize process efficiency**

S418-V FEATURES

SMARTPHONE ANDROID APP
For remote configuration

POINT-OF-USE INSTALLATION
No straight pipe section required

COMPACT DESIGN
Can be installed anywhere

TOTAL FLOW
No bypass measurement

EASY PROCESS MONITORING
Effective and inexpensive recording

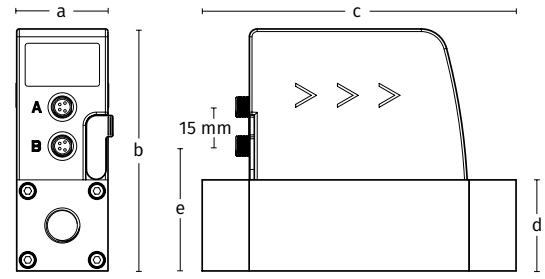
ACCURATE RESULTS
Integrated flow conditioner

S418-V BENEFITS

- Convenient installation, great flexibility, can be installed anywhere
- Available as DN8, DN15, DN20 and DN25 (G female thread)
- Measures actual flow and absolute pressure
- Data logger integrated
- Absolute pressure sensor always integrated

For performance monitoring of vacuum pumps SUTO iTEC offers the S418-V. This inline flow meter measures the actual flow and absolute pressure on the low pressure side of vacuum pumps.

S418-V DIMENSIONS



Dimensions in mm	a	b	c	d	e
DN8/DN15	35.0	93.0	120.4	35.0	48.0
DN20/DN25	48.0	106.0	178.0	48.0	61.0

S418-V TECHNICAL DATA

General Specifications	
Inner thread	DN8, DN15, DN20, DN25
Process connection	G inner thread (ISO 228-1)
Pressure range	0.01 ... 1.60 bar(a)
Ambient / Transport temperature	0 ... +50 °C / -30 ... +70 °C
Medium conditions	0 ... +50 °C / rH < 90 % no condensation
Power supply	18 ... 30 VDC / 120 mA
Output signal	(A) Analogue 4 ... 20 mA, pulse (B) RS-485 (Modbus/RTU) (C) Digital M-Bus
LED display	4-Digit Flow + Pressure
Material	Process connection: aluminum alloy Wetted parts: aluminum alloy Top casing: PC + ABS
Classification	IP54
Electrical connection	2 x M8, 4 poles
Approvals	CE, RoHS
Configuration	
Turndown ratio	100:1
Accuracy	1.5 % of reading
Measured gas	Air
Response time (T90)	0.1 sec
Interface	Wireless for Service App, USB for logger readout
Data logger	Memory size: 8,000,000 samples Channels: up to 4 channels (Flow, Consumption, Temperature, Pressure) Sampling rate: 1 sec ... 1 h
Pressure sensor	Range: 0.01 ... 1.60 bar(a) Accuracy: 1 % F.S.

S418-V VACUUM FLOW RANGES

Thread / Measuring Range	Standard Configuration				
Process connection	DN8	DN15	DN20	DN25	Absolute Pressure (mbar)
Standard flow in l/min	50	200	400	700	1000

The following table is used to find the appropriate flow meter size depending on the vacuum flow.
Example:
Absolute line pressure = 300 mbar
Vacuum flow = 750 l/min

Thread / Measuring Range	Standard Configuration				
Process connection	DN8	DN15	DN20	DN25	Absolute Pressure (mbar)
Vacuum flow in l/min	56	222	444	778	900
	63	250	500	875	800
	71	286	571	1000	700
	83	333	667	1167	600
	100	400	800	1400	500
	125	500	1000	1750	400
	167	557	1333	2333	300
	250	1000	2000	3500	200
	500	2000	4000	7000	100

Stated measuring ranges under following conditions: Air at +20 °C

S418-V ORDERING

Please use the following tables to assist in placing your order with our sales staff.

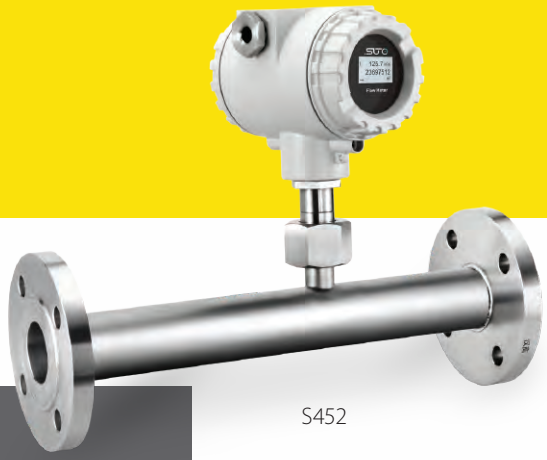
S418-V Thermal Mass Flow Meter		
Order No.	**Code**	**Description**
S695 419	**S418-V**	S418-V, vacuum flow meter, G inner thread, 1.5% o. RDG, with integrated absolute pressure sensor, 24 VDC supply voltage, Air, 5 m cable with M8 connector and open ends included
Connection thread		
S695 419	**0**	DN8 G thread connection
S695 419	**1**	DN15 G thread connection
S695 419	**2**	DN20 G thread connection
S695 419	**3**	DN25 G thread connection
Output		
A1450	**A**	Analog 4 ... 20 mA, Pulse Output
A1451	**B**	Modbus/RTU output
A1452	**C**	M-Bus output
Units		
	A	with SI units
A1459	**B**	with imperial units instead of SI units
Accessories		
A554 3315	T-BOX 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 to S551, 5 m	
M599 7020	S4A data analysis software	

Example: S418-V1BB

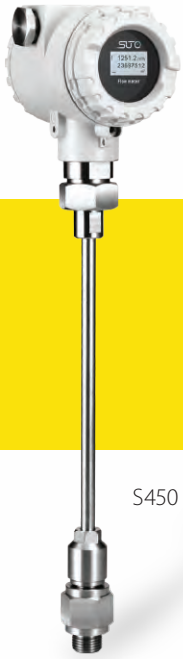
DN15, Modbus/RTU, imperial units

HEAVY DUTY INDUSTRY FLOW/CONSUMPTION SENSOR S450 / S452

Monitor your flow — **optimize process efficiency**



S452



S450

S450 / S452 FEATURES

INDUSTRIAL DESIGN
For outdoor applications

WIRELESS INTERFACE TO SENSOR SETTINGS

ATEX, IECEX AND GB EX APPROVAL

EASY TO CLEAN
All wetted parts stainless steel

S450 / S452 OPERATION PRINCIPLE

The SUTO flow sensor S450 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 S450 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 dioxide, natural gas, hydrogen, methane, etc.. Basically any gas mixture can be measured as long the mixing ratio and its components are known and constant.

S450 / S452 FEATURES AT A GLANCE

- 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 inline 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 outdoor 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
    GB Ex
  - Bi-directional measurement
  - Flow conditioner for R-thread measuring sections

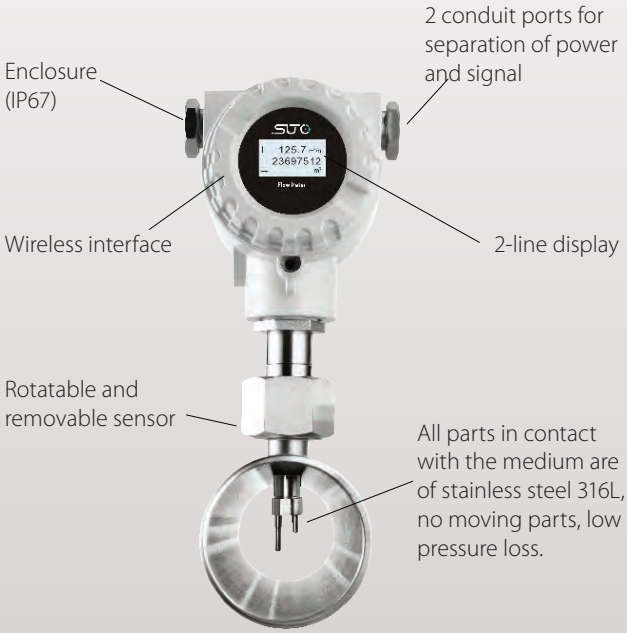
S450 / S452 TECHNICAL DATA

General Specifications	
Measuring range:	0.4 ... 92.7 sm/s (standard range calibration) 0.8 ... 185 sm/s (max range calibration) 1.0 ... 224 sm/s (high speed 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: DN15 ... DN1500 Inline type: DN15 ... DN80
Process connection:	Insertion type: ½" G-type thread (ISO 228-1) Inline type: 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 ... +150 °C (medium temp. insertion type) -40 ... +100 °C (medium temp. inline type) -40 ... +65 °C (ambient temperature)
Operating pressure:	S450: 0 ... 1.6 MPa / S452: 0 ... 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

Insertion type installation through ball valve

Inline type installation through flanges or R thread

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



S450 / S452 VOLUMETRIC FLOW RANGES

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

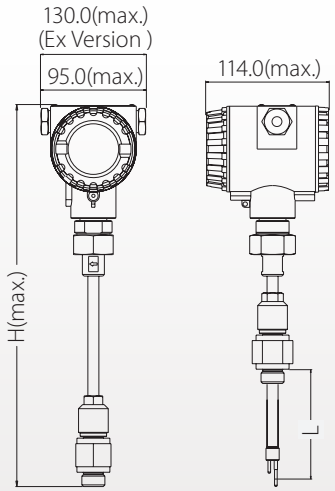
Stated measuring ranges under following conditions:

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

At other standard conditions and in other gases flow ranges are different and data are available on request.

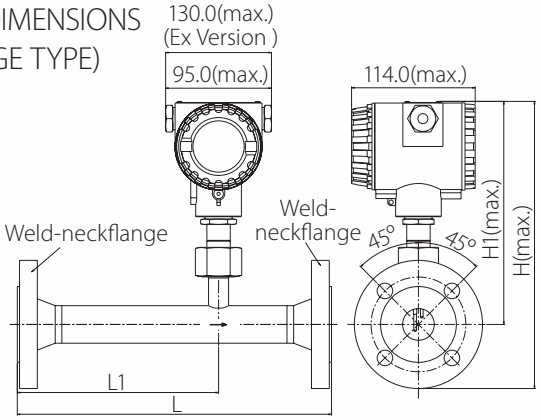
In larger pipe diameters flow can also be measured.

S450 DIMENSIONS



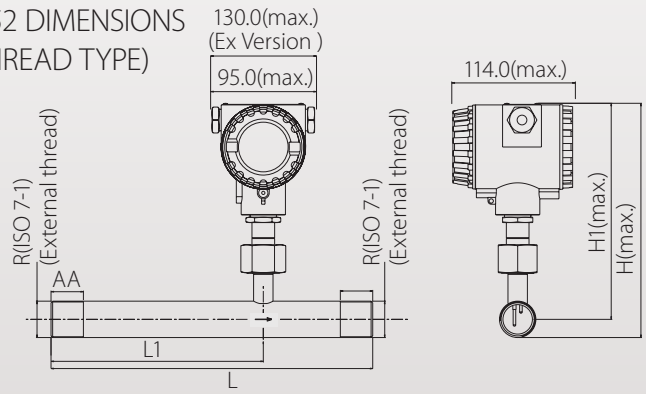
Shaft option	L (mm)	H (mm)
A	220	469
B	160	409
C	300	549

S452 DIMENSIONS (FLANGE TYPE)

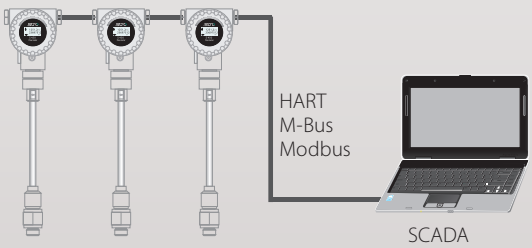


Pipe nominal size inch / (DN)	L total length (mm)	L1 inlet length (mm)	H total height (mm)	H1 from pipe center to casing top (mm)
1/2″ (DN15)	300	210	247.65	200.15
3/4″ (DN20)	475	275	252.65	200.15
1″ (DN25)	475	275	257.65	200.15
1¼″ (DN32)	475	275	270.15	200.15
1½″ (DN40)	475	275	275.15	200.15
2″ (DN50)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

S452 DIMENSIONS (THREAD TYPE)



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
1/2″ (DN15)	300	210	210.8	200.15	R 1/2″
3/4″ (DN20)	475	275	213.6	200.15	R 3/4″
1″ (DN25)	475	275	217.0	200.15	R 1″
1¼″ (DN32)	475	275	221.35	200.15	R 1¼″
1½″ (DN40)	475	275	224.3	200.15	R 1½″
2″ (DN50)	475	275	230.3	200.15	R 2″



Industrial communication through Modbus, M-Bus, HART

S450 / S452 ORDERING

Please use the following tables to assist in placing your order with our sales staff.

S450 Flow sensor (Insertion type)			
Order No.	**Code**	**Description**	
S695 0450	**S0450**	S450, flow sensor insertion type	
Shaft length			
A1200	**A**	220 mm	**Standard**
A1201	**B**	160 mm	
A1202	**C**	300 mm	
Process connection			
	A	G 1/2"	**Standard**
A1006	**B**	PT 1/2" Adapter	
A1005	**C**	NPT 1/2" Adapter	
Gas type			
A1007	**A**	Air	
A1008	**B**	CO_2	
A1009	**C**	O_2 (Oil- & grease-free cleaned)	
A1010	**D**	N_2	
A1011	**E**	N_2O	
A1012	**F**	Argon	
A1013	**G**	Natural Gas	
A1014	**H**	H_2 (real gas calibration)	
A1015	**I**	Other gas (please specify)	
A1016	**J**	He (real gas calibration)	
A1017	**K**	C_3H_8	
A1041	**L**	O_2, Ar, CO_2 (real gas calibration)	
Range			
	A	Standard	
A1271	**B**	Max range	
A1272	**C**	Bi-directional standard range	
A1273	**D**	Bi-directional max. range	
A1274	**E**	High speed	
Hazardous area approval			
A1279	**A**	None	
A1280	**B**	ATEX / GB3836 / IECEx	
Output			
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	
Display			
A1294	**A**	Without display	
A1295	**B**	With display	

S452 Flow sensor (In-line type)		
Order No.	**Code**	**Description**
S695 0452	**S0452**	S452, flow sensor, inline type
Process connection *		
A130X	**A**	R-thread (IOS-7-1)
A132X	**B**	Flange EN 1092-1, PN40
A134X	**C**	Flange ANSI 16.5
Measuring section size *		
1	**A**	DN15 (1/2")
2	**B**	DN20 (3/4")
3	**C**	DN25 (1")
4	**D**	DN32 (1.25")
5	**E**	DN40 (1.5")
6	**F**	DN50 (2")
7	**G**	DN65 (2.5")
8	**H**	DN80 (3")
Gas type		
A1007	**A**	Air
A1008	**B**	CO_2
A1009	**C**	O_2 (Oil- & grease-free cleaned)
A1010	**D**	N_2
A1011	**E**	N_2O
A1012	**F**	Argon
A1013	**G**	Natural Gas
A1014	**H**	H_2 (real gas calibration)
A1015	**I**	Other gas (please specify)
A1016	**J**	He (real gas calibration)
A1017	**K**	C_3H_8
A1041	**L**	O_2, Ar, CO_2 (real gas calibration)
Range		
	A	Standard
A1271	**B**	Max range
A1274	**E**	High speed
Hazardous area approval		
A1279	**A**	None
A1280	**B**	ATEX / GB3836 / IECEx
Output		
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
Display		
A1294	**A**	Without display
A1295	**B**	With display

Attention:

* Measuring section connection and size must be combined to get the order number. Example: A1306 = R-thread DN50

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

PITOT TUBE FLOW / CONSUMPTION SENSOR S430

Measures air delivery at compressor discharge — **ideal flow meter for compressor performance tests**

S430 FEATURES

SMARTPHONE ANDROID APP
For remote configuration

ACCURATE RESULTS
Very fast response time

EASY PROCESS MONITORING
Effective and inexpensive measurements

TOTAL FLOW
High accuracy and reliable measurements

S430 FEATURES AT A GLANCE

- Flow and consumption measurement in wet air or high mass flow / velocity applications
- Measurement at compressor outlet
- Tube diameters of 1.25" 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 230 °C
- No mechanical wear parts
- All parts which are in contact with flow medium are made of stainless steel
- Compressor-FAD-Measurement
- Measures Flow, Consumption, Temperature and Pressure

S430 BENEFITS

The S430 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 turndown 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 pressurized.

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

S430 TECHNICAL DATA

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

Flow Ranges

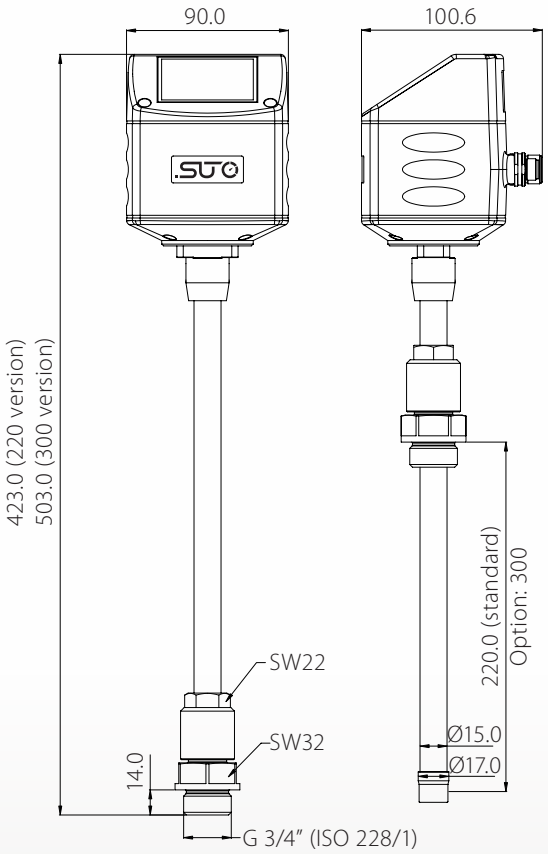
Tube		Volumetric Flow					
Inch	mm	m^3/h		m^3/min		cfm	
		Min	Max	Min	Max	Min	Max
1	27.3	23	229	0.38	3.8	13	135
1¼"	36.0	51	507	0.85	8.5	30	298
1½"	41.9	76	756	1.26	12.6	45	445
2"	53.1	130	1298	2.16	21.6	76	764
2½"	68.9	227	2274	3.79	37.9	134	1338
3"	80.9	318	3175	5.29	52.9	187	1869
4"	100.0	488	4880	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

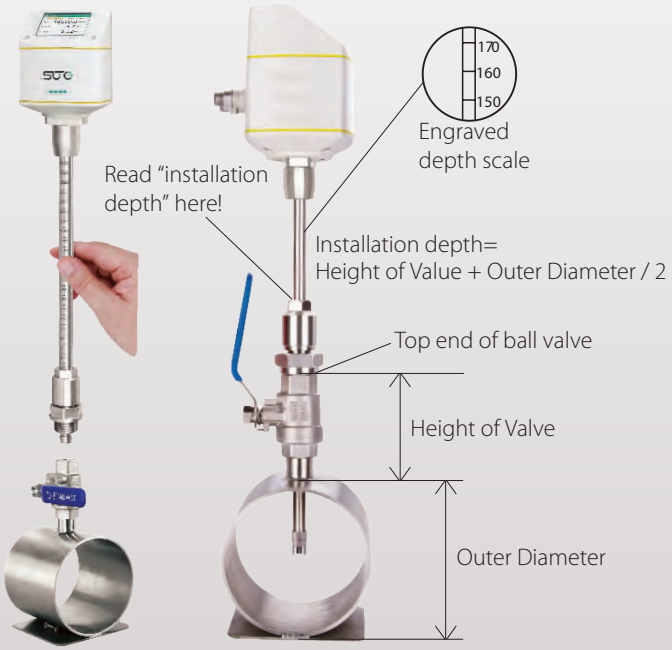
Stated measuring ranges under following conditions:

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

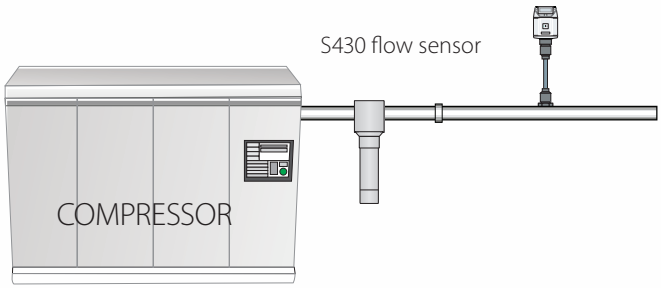
Dimensions



Installation



S430 Installation through a ball valve



Compressor air delivery measurement and FAD calculation

Colour graphic display for online values and sensor settings

S430 ORDERING

Please use the following tables to assist in placing your order with our sales staff.

S430 Pitot Tube Flow Sensor, Insertion Type, 220 mm Shaft		
Order No.	**Code**	**Description**
S6954300	**S4300**	S430, pitot tube flow sensor, insertion type, 220 mm shaft
Connection thread		
	A	G ¾″ standard
A1068	**B**	PT ¾″ adaptor
A1069	**C**	NPT ¾″ adaptor
Gas type		
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_2O
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
Fieldbus		
A1061	**A**	Modbus/RTU
A1062	**B**	Analog, Pulse
A1063	**C**	M-Bus
A1064	**D**	Modbus/TCP (including 5 m M12 cable with RJ45 plug)
Range		
	A	Standard
A1066	**B**	Bi-directional standard
A1067	**C**	High speed: Max flow increased by 30 %
Display		
	A	Without Display
A1060	**B**	With Display

S430 Pitot Tube Flow Sensor, Insertion Type, 300 mm Shaft		
Order No.	**Code**	**Description**
S695 4302	**S4302**	S430, pitot tube flow sensor, insertion type, 300 mm shaft
Connection thread		
	A	G ¾″ standard
A1068	**B**	PT ¾″ adaptor
A1069	**C**	NPT ¾″ adaptor
Gas type		
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_2O
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
Fieldbus		
A1061	**A**	Modbus/RTU
A1062	**B**	Analog, Pulse
A1063	**C**	M-Bus
A1064	**D**	Modbus/TCP (including 5 m M12 cable with RJ45 plug)
Range		
	A	Standard
A1066	**B**	Bi-directional standard
A1067	**C**	High speed: Max flow increased by 30 %
Display		
	A	Without Display
A1060	**B**	With Display

VORTEX STEAM FLOW METER
S435

Measures saturated steam consumption

S435 FEATURES

INTEGRATED TEMPERATURE SENSOR
Automatic density adjustment

ACCURATE RESULTS
Very fast response time

EASY PROCESS MONITORING
Effective and inexpensive measurements

TOTAL FLOW
High accuracy and reliable measurements

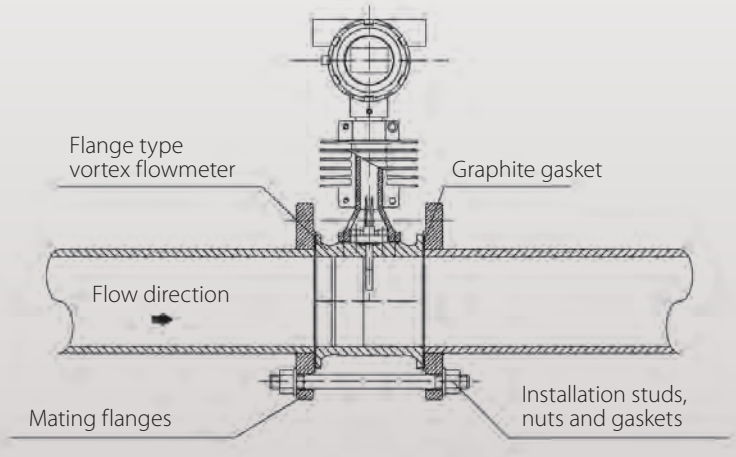
S435 BENEFITS

- Measures saturated steam
- Integrated temperature sensor
- Shows instant flow and consumption
- Display and keys for settings
- Small pressure loss
- Robust industrial design, high protection level
- Analog and Modbus output
- Wafer type — easy for installation
- No moving parts

Vortex flow meters are the ideal choice for steam measurements due to their robust design, without any moving parts and high temperature/pressure resistance. S435 provides mass flow and consumption measurements in saturated steam with automatic density compensation. This guarantees always accurate results. Parameter settings can be done through the user interface (keys and display) at the flow meter directly. Connection to a SCADA system is through the Modbus/RTU interface or the analog output available.

Please ensure that the steam parameters such as temperature, pressure and nominal flow are within the specification of S435.

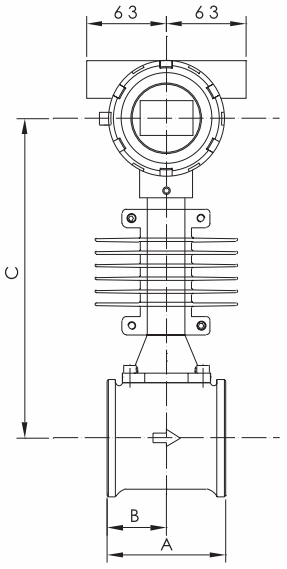
S435 INSTALLATION



Use double bolts and nuts. We provide gaskets and bolts.

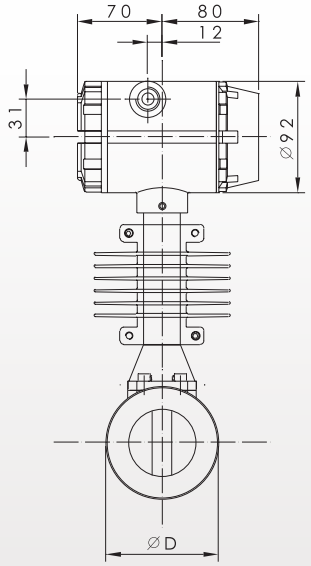
S435 DIMENSIONS

VORTEX STEAM FLOW METER S435				
DN	Vortex Flow Meter dimension rated pressure 1.6 Mpa unit: mm			
	A	B	C	D
40	100	50	256	75
50	110	55	256	87
65	110	55	262	109
80	110	55	267	120
100	120	60	271	149
125	133	73	291	175
150	160	90	304	203
200	185	115	331	259
250	210	140	357	312
300	240	165	383	363



S435 TECHNICAL DATA

General Specifications	
Measured fluid	Saturated Steam
Nominal diameter (mm)	DN40...DN300 wafer type
Operating pressure	1.6 MPa (Optional: 2.5 MPa, 4.0 MPa)
Medium temperature	-40 ... 250 °C
Measuring range	Refer to the table below
Ambient temperature	-10 ... 60 °C
Accuracy	±1.5 % of reading
Repeatability	0.5 %
Display	Instant flow rate/ Total flow rate/ Frequency/ Percentage of flow range
Signal output	Pulse output/ 4 ... 20 mA/ Modbus/RTU
Protection level	IP65
Electrical connection	1/2" -14NPT
Installing type	Wafer type
Wetted parts material	304 stainless steel
Process control material	Carbon steel/ 304/ 316/ 316L(Flange/Wafer)
Detector probe	316 Stainless steel
Connecting rod	304 Stainless steel
Radiator	Aluminium alloy
Turn down ratio	10:1



S435 MEASURING RANGES

Saturated Steam Mass Flowrate (Unit: t/h)												
DN (mm)	0.20 Mpa		0.50 Mpa		0.60 Mpa		0.70 Mpa		1.00 Mpa		1.50 Mpa	
DN40	(28.8 ~ 329.8 kg/h)		(39.9 ~ 633.0 kg/h)		(42.9 ~ 732.5 kg/h)		0.05	0.83	0.05	1.13	0.06	1.61
DN50	0.04	0.52	0.06	0.99	0.07	1.14	0.07	1.29	0.08	1.76	0.1	2.52
DN65	0.08	0.87	0.11	1.67	0.11	1.93	0.12	2.18	0.14	2.97	0.17	4.26
DN80	0.12	1.32	0.16	2.53	0.17	2.93	0.18	3.3	0.21	4.5	0.25	6.45
DN100	0.18	2.06	0.25	3.96	0.27	4.58	0.28	5.16	0.33	7	0.4	10.08
DN125	0.28	3.22	0.39	6.18	0.42	7.15	0.44	8.06	0.52	11	0.62	15.76
DN150	0.4	4.64	0.56	8.9	0.6	10.3	0.64	11.61	0.75	15.83	0.9	22.69
DN200	0.72	8.25	1	15.83	1.07	18.31	1.14	20.64	1.33	28.14	1.59	40.34
DN250	1.12	12.88	1.56	24.73	1.68	28.61	1.78	32.25	2.1	44	2.49	63.03
DN300	1.62	18.55	2.24	35.61	2.41	41.2	2.56	46.45	3	63.3	3.58	90.76

S435 ORDERING

Please use the following table to assist in placing your order with our sales staff.

S435 Vortex Flow Meter	
Order-No.	**Description**
S695 4359	S435 Vortex Flow Meter DN40, wafer type
S695 4350	S435 Vortex Flow Meter DN50, wafer type
S695 4351	S435 Vortex Flow Meter DN65, wafer type
S695 4352	S435 Vortex Flow Meter DN80, wafer type
S695 4353	S435 Vortex Flow Meter DN100, wafer type
S695 4354	S435 Vortex Flow Meter DN125, wafer type
S695 4355	S435 Vortex Flow Meter DN150, wafer type
S695 4356	S435 Vortex Flow Meter DN200, wafer type
S695 4357	S435 Vortex Flow Meter DN250, wafer type
S695 4358	S435 Vortex Flow Meter DN300, wafer type
A695 0001	Blind pipe for uninstallation - DN40&DN50
A695 0002	Blind pipe for uninstallation - DN65
A695 0003	Blind pipe for uninstallation - DN80
A695 0004	Blind pipe for uninstallation - DN100
A695 0005	Blind pipe for uninstallation - DN125
A695 0006	Blind pipe for uninstallation - DN150
A695 0007	Blind pipe for uninstallation - DN200

Notes:

All Flow meters: Wafer connection (Companion flange, bolt and gasket included), temperature compensation, local display, medium temperature <250 ºC, 4-20 mA signal output, 1/2-14 NPT electric connection, IP65, accuracy +1.5 %, 24 VCD, Modbus/RTU, Pulse, for saturated steam only

ULTRASONIC FLOW METER
S460

Measure liquid flow and consumption

S460 FEATURES

TRANSIT TIME CORRELATION TECHNIQUE

SENSOR
PT100, 3wire

PORTABLE
Connectable to S551

STATIONARY
Connectable to S330 / S331 series

S460 BENEFITS

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

S460 OPERATION PRINCIPLE

The S460 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 S330 / S331 series of displays and data loggers where the portable model is connectable to the S551.

S460-W, wall mountable controller

S460 TECHNICAL DATA

General Specifications	
Velocity range	0.03 ... 20 m/s
Repeatability	0.2 % of reading
Accuracy	±1 % of reading
Temperature sensor	PT100 3-wire
Output	4 ... 20 mA
Communication	Modbus/RTU, Modbus ASCII
Pipe sizes	32 ... 6000 mm (depending on transducer type, inner diameter)
Operating Temperature	Controller: -20 ... +60 °C Transducer: -30 ... +90 °C (Standard) -30 ... +160 °C (High temperature)
Physical units	Selectable
Supply	24 VDC / 1.5 W (S460-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

To calculate the flow range please use this formula:
$Q=Di^2 * 0.01979$
Q [m³/h]
Di [mm]

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

Complete wall mountable set: S460-W + transducer pair
(metal stretcher and coupling agent are included in S460-W)

Ultrasonic transducer pair, screw terminals

S460 ORDERING

Please use the following table to assist in placing your order with our sales staff.

	Ultrasonic flow meter controller, wall mountable	
	D554 0074	S460-W, ultrasonic flow meter controller, wall mountable, including 5 m connection cable to transducers, metal stretcher and coupling agent
	Ultrasonic transducer pair	
	S694 4606	Ultrasonic transducer pair, DN32 ... DN100, screw terminals, for stationary, TS-2
	S694 4607	Ultrasonic transducer pair, DN100 ... DN700, screw terminals, for stationary, TM-1
	S694 4608	Ultrasonic transducer pair, DN300 ... DN6000, screw terminals, for stationary, TL-1
	Portable ultrasonic controller for liquid flow sensor	
	P554 0070	S460-P, ultrasonic controller for liquid flow sensor, connectable to S551, including 5 m connection cable to S551 and to transducers, metal stretcher and coupling agent
Optional	**Ultrasonic transducer pair**	
	S694 4603	Ultrasonic transducer pair, DN32 ... DN100, socket terminals, for portable, TS-2
	S694 4604	Ultrasonic transducer pair, DN100 ... DN700, socket terminals, for portable, TM-1
	S694 4605	Ultrasonic transducer pair, DN300 ... DN6000, socket terminals, for portable, TL-1
	Transducer cable pair	
	A553 0124	Transducer cable pair, red and blue connector, 5 m (included in P554 0070)
	Transducer cable pair	
	A553 0127	Transducer cable pair, open wire, 2 poles, outer diameter 7 mm, shielding (2 x 5 m included in D554 0074)
	Sensor cable, 6 poles	
	A553 0121	Sensor cable, 6 poles, AWG22, 7.5 mm outer diameter, w/ shielding, black [per meter] (for connection to S330 / S331 displays)
	Coupling agent	
	A554 0075	Coupling agent, ultrasonic transducers, 100 g, temporary installations (included in P554 0070)
	Metal stretcher	
	A554 0077	Metal stretcher for installations of transducers (2 pieces) (2 pieces included in D554 0074 + P554 0070)
	Coupling agent	
	A554 0078	Coupling agent, ultrasonic transducers, 100 g, permanent installations (included in D554 0074)
	Temperature sensor, Pt100	
	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)

FLOW DIRECTION SWITCH FOR COMPRESSED AIR/GASES S409

Detect your flow direction —
Easy and efficient

S409 FEATURES

NO MECHANICAL WEAR PARTS

EASY INSTALLATION
Under pressure

S409 BENEFITS

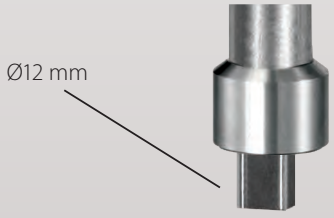
- Detects smallest changes < 0.1 m/s referred to 20 °C and 1000 hPa
- No mechanical wear parts
- Easy installation under pressure

S409 OPERATION PRINCIPLE

The thermal mass flow direction switch S409 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.



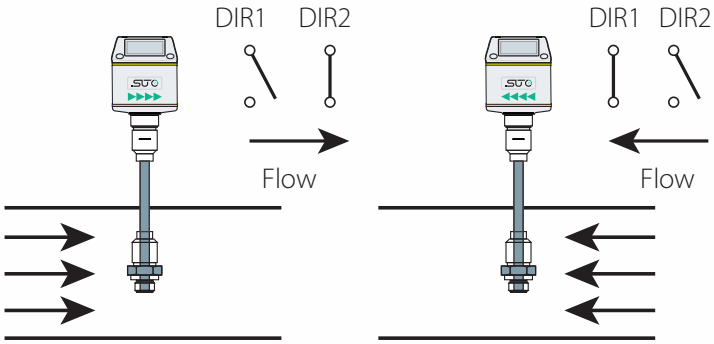
Thermal mass flow sensor element

S409 TECHNICAL DATA

General Specifications	
Detection range	0.02 ... 25 m/s @ 7 barg, 20 °C
Sensor	2 x Pt 1000
Medium	air, gases
Medium humidity	< 100 % (no condensation)
Medium temp.	-20 ... +80 °C
Ambient temp.	-20 ... +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)

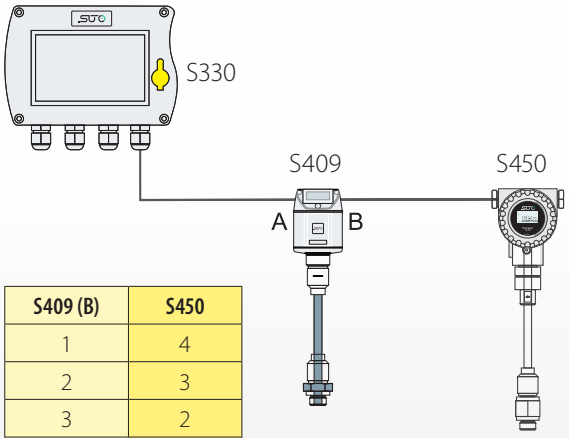
S409 FLOW DIRECTION SWITCH

Relay output at switch



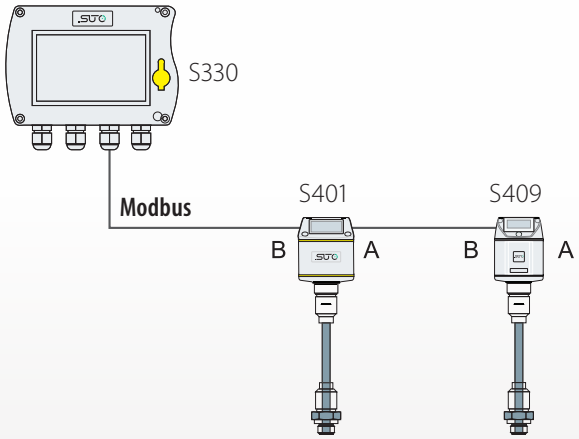
Pin arrangement of flow switch					
	Pin1	Pin2	Pin3	Pin4	Pin5
A	SDI	-VB	+VB	DIR1	DIR1
B	SDI	-VB	+VB	DIR2	DIR2

Connection of S330 to S450 via flow switch



S409 (B)	S450
1	4
2	3
3	2
4	5
5	6
Connection between S409 and S450 / S452	

Connection of S330 to S401 via flow switch



Attention: Flow sensors S450 / S401 need to have the bi-directional calibration option to operate in both directions

S409 ORDERING

Please use the following table to assist in placing your order with our sales staff.

S409 FLOW DIRECTION SWITCH	
Order No.	**Description**
S695 0409	S409, flow direction switch, insertion type
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)

DEW POINT SENSOR (-100 ... 0 °C Td)
S220

Very fast response time —
ensures safe and reliable measurements

S220 FEATURES

COMPACT DESIGN
Makes it easy to fit into the application

PRECISE MEASUREMENT
Unique QCM sensor technology

LOW DEW POINT
Measures down to -100 °C Td

PRESSURE SENSOR
Integrated as option

S220 FEATURES AT A GLANCE

- Small size makes it ideal for dryer installations
- Measures dew points down to -100 °C Td
- 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

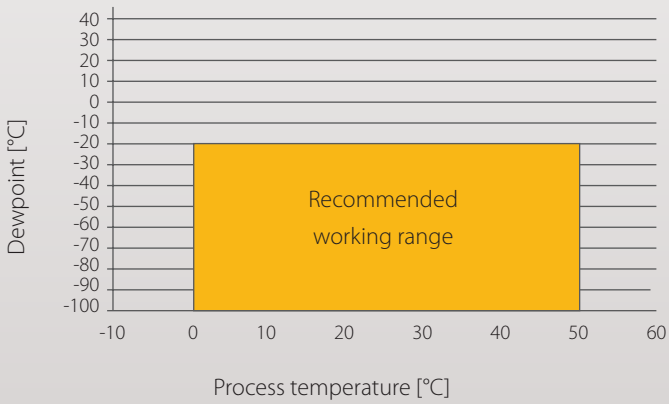
S220 SENSOR TECHNOLOGY

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

Recommended working range S220

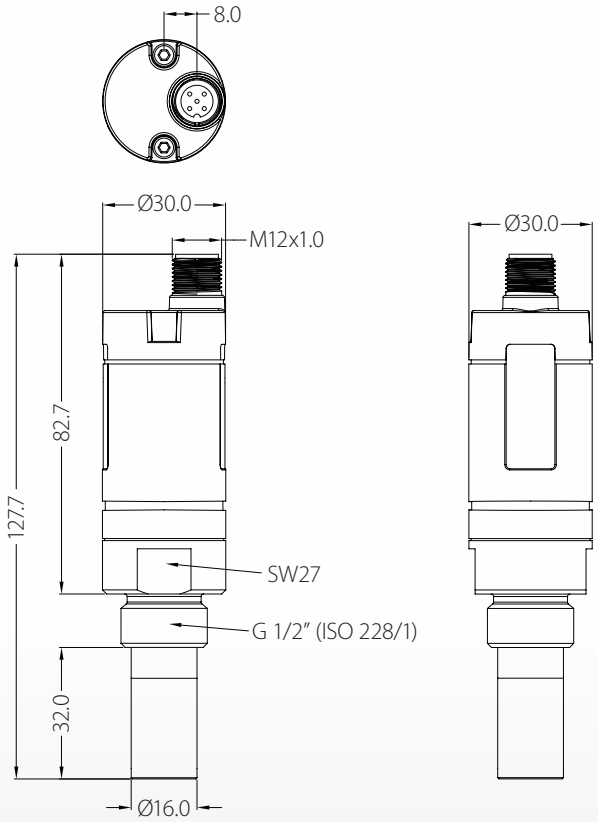


S220 TECHNICAL DATA

General Specifications	
Measurement range	Dew point -100 ... 0 °C Td Temperature -30 ... +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 Td Temperature 0.3 °C Pressure 0.05 bar
Operating Pressure	-0.1 ... 1.6 MPa
Operating Temperature (Medium)	-30 ... +70 °C
Measured gases (Medium)	Air, Argon, O_2, N_2, CO_2*
Response Time t90 (@ 4 l/min)	-80 °C Td -> -20 °C Td = 20 sec -20 °C Td -> -80 °C Td =180 sec
Ambient Temperature	0 ... +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 poles
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 ... +70 °C
Storage Temperature	-20 ... +50 °C
Weight	204 g

* To support CO_2, the S220 must be configured ex-works or the SFA software must be used. SFA software can be downloaded from the SUTO website.

Dimensions



S220 BENEFITS

The SUTO dew point sensor S220 provides long term stable and reliable dew point measurements at very low dew points in industrial applications.

The sensor technology used in the sensor is developed by SUTO and offers superior measurement signals at very low moisture applications, allowing reliable measurements down to -100 °C.

The included sinter cap protects the sensor from dust and other particles, this ensures a stable measurement and low maintenance at the same time.

The measured sensor data is transmitted via different signals. Depending on the selected model multiple measurement values, like dew point and pressure can be output at the same time. The various analog output options or digital Modbus outputs make the S220 the prefect dew point sensor to fit into any low moisture application.

S220 ORDERING

Please use the following table to assist in placing your order with our sales staff.

S220 DEW POINT SENSOR (-100 ... 0 °C Td)	
Order No.	**Description**
S699 0220-X	S220, dew point sensor, -100 ... 0 °C Td, G 1/2" thread, 16 bar, 1 x 4 ... 20 mA
S699 0221-X	S220, dew point sensor, -100 ... 0 °C Td, G 1/2" thread, 16 bar, 2 x 4 ... 20 mA, dew point and temperature
S699 0222-X	S220, dew point sensor, -100 ... 0 °C Td, G 1/2" thread, 16 bar, RS-485 (Modbus)
S699 0223-X	S220, dew point sensor, -100 ... 0 °C Td, G 1/2" thread, 16 bar, incl. pressure, 2 x 4 ... 20 mA, dew point and pressure
S699 0224-X	S220, dew point sensor, -100 ... 0 °C Td, G 1/2" thread, 16 bar, incl. pressure, RS-485 (Modbus)
S699 0225-X	S220, dew point sensor, -100 ... 0 °C Td, G 1/2" thread, 16 bar, loop powered 4 ... 20 mA
Accessories	
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

DEW POINT SENSOR (-50 ... +20 °C Td)
S212

Very fast response time —
ensures safe and reliable measurements

S212 FEATURES

COMPACT DESIGN
Makes it easy to fit into the application

PRECISE MEASUREMENT
Long term stable results

LOW DEW POINT
Measures down to -50 °C Td

ANALOG OUTPUT
4 ... 20 mA 3-wire

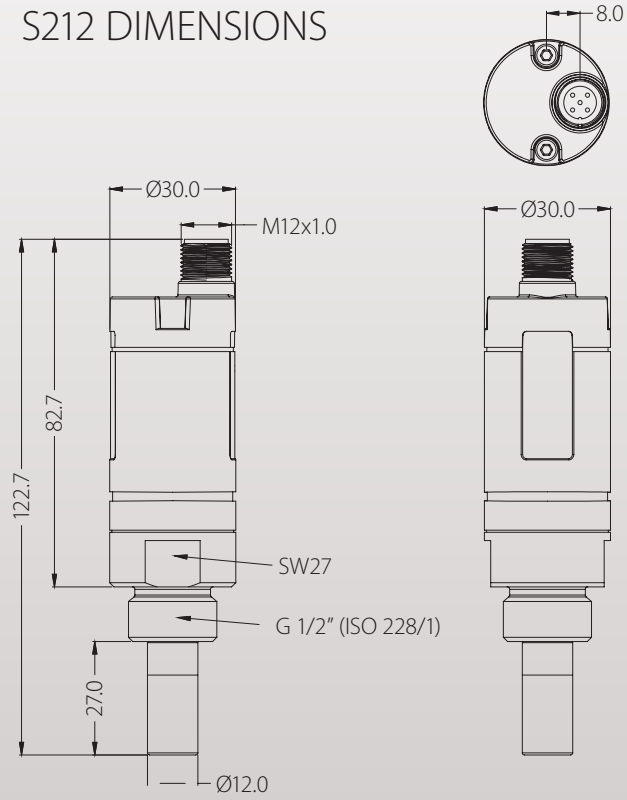
S212 BENEFITS

- Dew point sensor for low dew point applications down to -50 °C Td
- 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 S212 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.

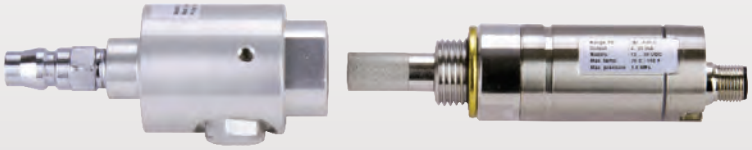
S212 DIMENSIONS



S212 TECHNICAL DATA

General Specifications	
Measuring range	Dew point -50 ... +20 °C Td Temperature -30 ... +70 °C
Dew point sensor	Polymer
Temperature sensor	Pt100
Pressure sensor	N/A
Accuracy	Dew point ±2 °C Td Temperature 0.3 °C
Operating Pressure	-0.1 ... 5.0 MPa
Operating Temperature (Medium)	-30 ... +70 °C
Measured gases (Medium)	Air, Argon, O_2, N_2, CO_2*
Response Time t90 (@ 4 l/min)	-50 °C Td -> 0 °C Td = 20 sec 0 °C Td -> -50 °C Td = 180 sec
Ambient Temperature	-20 ... +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 poles
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 ... +70 °C
Storage Temperature	-20 ... +50 °C
Weight	195 g

* Please note for CO_2 the measurement range is limited to -40 °C Td.



Connection of S212 with measuring chamber to compressed air

S212 ORDERING

Please use the following table to assist in placing your order with our sales staff.

S212 DEW POINT SENSOR (-50 ... +20 °C Td)	
Order No.	**Description**
S699 0412	S212, dew point sensor including M12 connector (straight type), -50 ... +20 °C Td, G ½" thread
A699 4003	High pressure option 35 MPa (350 bar)

DEW POINT SENSOR (-20 ... +50 °C Td)
S215

Ensure your dry air —
monitor the dew point

S215 FEATURES

COMPACT DESIGN
Makes it easy to fit into the application

PRECISE MEASUREMENT
Long term stable results

DEW POINT
Measures down to -20 °C Td

ANALOG OUTPUT
4 ... 20 mA loop powered

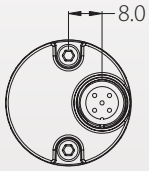
S215 BENEFITS

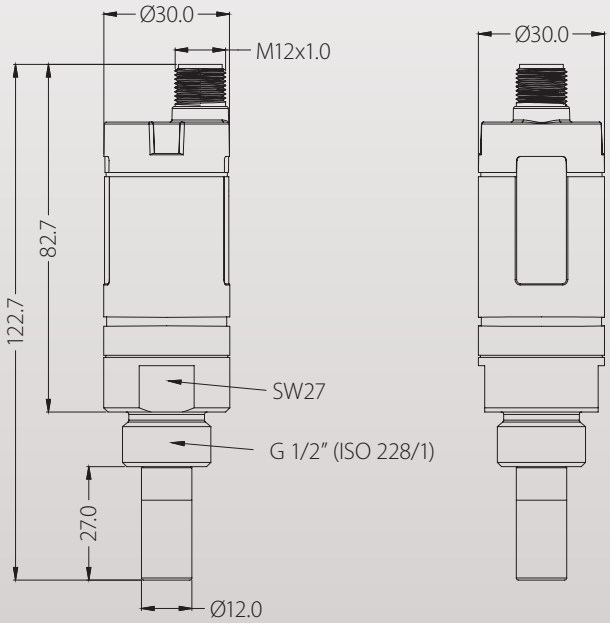
- Affordable dew point sensor for mid range applications such as refrigerant dryer monitoring
- Long term stability
- IP65 casing provides robust protection in rough industrial environment
- Fast response time ensures safe and reliable indication whenever dew points are out of valid ranges
- Can be installed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

The SUTO dew point sensor S215 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.

S215 outputs the measurement value through the loop powered 4 -20 mA signal.

S215 DIMENSIONS





S215 TECHNICAL DATA

General Specifications	
Measuring range	Dew point -20 ... +50 °C Td Temperature -30 ... +70 °C
Dew point sensor	Polymer
Temperature sensor	NTC
Pressure sensor	N/A
Accuracy	Dew point ±2 °C Td Temperature 0.3 °C
Operating Pressure	-0.1 ... 5.0 MPa
Operating Temperature (Medium)	-30 ... +70 °C
Measured gases (Medium)	Air, Argon, O_2, N_2, CO_2
Response Time t90 (@ 4 l/min)	-20 °C Td -> +20 °C Td = 20 sec +10 °C Td -> -20 °C Td = 60 sec
Ambient Temperature	-20 ... +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 poles
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 ... +70 °C
Storage Temperature	-20 ... +50 °C
Weight	195 g

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

S215 ORDERING

Please use the following table to assist in placing your order with our sales staff.

S215 DEW POINT SENSOR (-20 ... +50 °C Td)	
Order No.	**Description**
S699 0415	S215, dew point sensor including M12 connector (straight type), -20 ... +50 °C Td, G ½" thread
A699 4003	High pressure option 35 MPa (350 bar)

DEW POINT SENSOR (-100 ... +20 °C Td)
S230 / S231

Unique dual sensor system —
Outstanding accuracy and wide range

S230 / S231 FEATURES

ATEX, IECEX AND GB EX APPROVAL

PRECISE MEASUREMENT
Unique QCM sensor technology

LOW DEW POINT
Measures down to -100 °C Td

DUAL SENSOR SYSTEM
High precision over the whole range

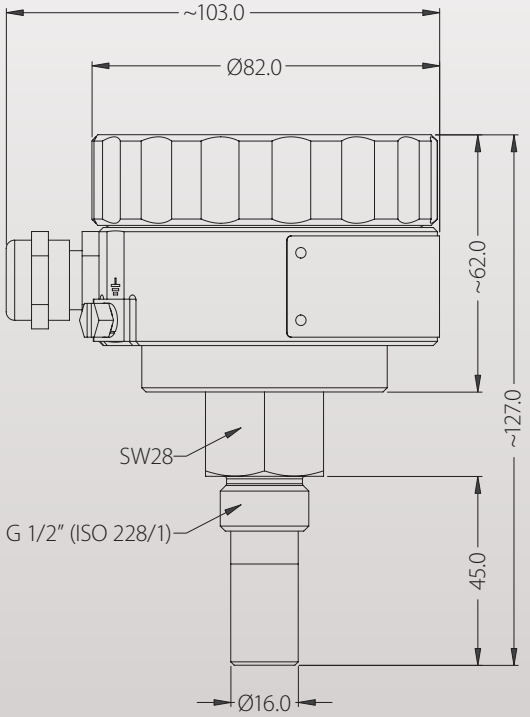
The SUTO S230 / S231 dew point sensors provide reliable, long term stable dew point monitoring in industrial or hazardous applications. SUTO's unique dual sensor technology optimizes sensor sensitivity and accuracy by automatically selecting the ideal sensor type for the situation.

The S230 / S231 comes ready to use and simple to install with your choice of 4-20 mA or Modbus/RTU (RS485) outputs. If required, parameters can quickly and easily be configured through the SUTO service software.

S230 / S231 BENEFITS

- Dew point sensor with optional ATEX, IECEx approval
- Dual sensor technology for high accuracy of 2 °C Td over the whole range from –100 ... +20 °C Td
- Two outputs available: 4 ... 20 mA, RS-485 (Modbus/RTU).
- IP65 casing provides robust protection in rough industrial environment
- G 1/2" Process connection

S230 / S231 DIMENSIONS



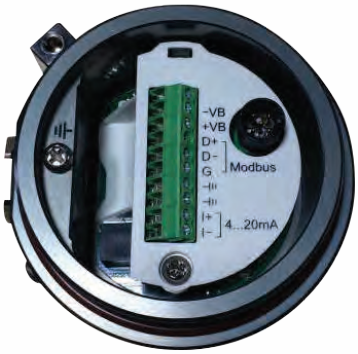
S230 / S231 TECHNICAL DATA

General Specifications	
Measurement range (model depending)	Dew point -100 ... +20 °C Td (S230) -50 ... +20 °C Td (S231) Temperature -30 ... +70 °C
Dew point sensor	QCM & Polymer
Temperature sensor	NTC
Pressure sensor	N/A
Accuracy	Dew point ±2 °C Td Temperature 0.3 °C
Operating Pressure (model depending)	-0.1 ... 1.6 MPa (S230) -0.1 ... 35 MPa (S231)
Operating Temperature (Medium)	0 ... +50 °C
Measured gases (Medium)	Non-corrosive gases
Response Time t90 (@ 4 l/min)	-20 °C Td -> -60 °C Td = < 240 sec -60 °C Td -> -20 °C Td = < 30 sec
Ambient Temperature	0 ... +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	Aluminum 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

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

Cable connection



Screw terminals with signal labels inside the connection chamber

Accessories

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

S230 / S231 ORDERING

Please use the following tables to assist in placing your order with our sales staff.

S230 DEW POINT SENSOR (-100 ... +20 °C Td)	
Order No.	**Description**
S699 0230	Dew point sensor, -100 ... +20 °C Td, G 1/2" thread, 1.6 MPa, 1 x 4 ... 20 mA, RS-485 (Modbus)
A1480	Ex option ATEX (to be ordered for hazardous environment)
A1481	Ex option IECEx (to be ordered for hazardous environment)
A1482	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

S231 DEW POINT SENSOR (-50 ... +20 °C Td)	
Order No.	**Description**
S699 0231	Dew point sensor, -50 ... +20 °C Td, G 1/2" thread, 35 MPa, 1 x 4 ... 20 mA, RS-485 (Modbus)
A1480	Ex option ATEX (to be ordered for hazardous environment)
A1481	Ex option IECEx (to be ordered for hazardous environment)
A1482	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

DEW POINT SENSOR WITH DISPLAY AND ALARM (-60 ... +20 °C Td) S201

Your process under control —
fast and easy dew point monitoring

S201 FEATURES

INTEGRATED DISPLAY
For on site values

PRECISE MEASUREMENT
long term stable sensor element

DEW POINT
Measures down to -60 °C Td

ALARM RELAY
React if your dew point changes

S201 BENEFITS

- Dew point sensor for low dew point applications down to -60 °C Td
- Long term stability
- Graphic display
- Relay output for alarms
- 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

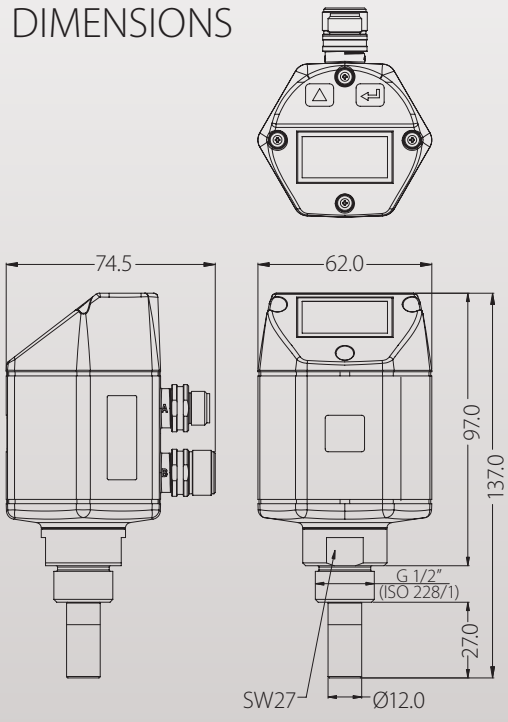
The SUTO dew point sensor S201 provides reliable and long term stable dew point monitoring in industrial applications. The newly developed sensor features improved signal and stability in demanding industrial applications.

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.

S201 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.

S201 DIMENSIONS



S201 TECHNICAL DATA

General Specifications	
Measuring range	Dew point -60 ... +20 °C Td Temperature -30 ... +70 °C
Dew point sensor	Polymer
Temperature sensor	Pt100
Pressure sensor	N/A
Accuracy	Dew point ±2 °C Td Temperature 0.3 °C
Operating Pressure	-0.1 ... 5.0 MPa
Operating Temperature (Medium)	-30 ... +70 °C
Measured gases (Medium)	Non-corrosive gases
Response Time t90 (@ 4 l/min)	-60 °C Td -> -20 °C Td = 20 sec 0 °C Td -> -60 °C Td = 180 sec
Ambient Temperature	-20 ... +50 °C
Ambient Humidity	0 ... 100 % 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 poles
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 ... +70 °C
Storage Temperature	-20 ... +50 °C
Weight	226 g

Alarm adjustment at dew point sensor

S201 ORDERING

Please use the following table to assist in placing your order with our sales staff.

S201 DEW POINT SENSOR WITH DISPLAY AND ALARM (-60 ... +20 °C Td)	
Order No.	**Description**
S699 0406	S201, dew point sensor including 2 x M12 connectors (straight type) -60 ... +20 °C Td, G ½" thread
A699 4003	High pressure option 35 MPa (350 bar)

DEW POINT MONITOR (-50 ... +20 °C Td / -20 ... +50 °C Td) S305

Know your air quality —
Plug & Play

S305 FEATURES

PLUG & PLAY
Simply connect your compressed air

DEW POINT MEASUREMENT
-50 ... +50 °C Td depending on the model

PRECISE MEASUREMENT
± 2 °C Td accuracy

ALARM INDICATION
With internal relays or alarm units

S305 FEATURES AT A GLANCE

- 2 models: -50 ... +20 °C Td and -20 ... +50 °C Td
- 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 Td
- 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

S305 BENEFITS

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 S305 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.

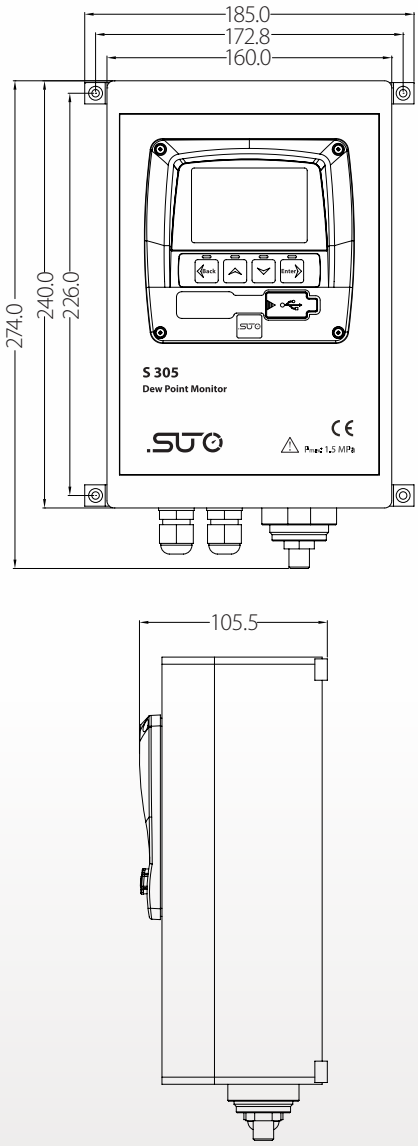
S305 TECHNICAL DATA

General Specifications	
Measuring range (model depending)	Dew point -50 ... +20 °C Td -20... +50 °C Td
Dew point sensor	Polymer
Temperature sensor	NTC
Pressure sensor	N/A
Accuracy	Dew point ±2 °C Td Temperature 0.3 °C
Operating Pressure	0.3 ... 1.5 Mpa
Operating Temperature (Medium)	-30 ... +70 °C
Measured gases (Medium)	Non-corrosive gases
Response Time t90 (@ 4 l/min)	-50 °C Td -> -20 °C Td = 20 sec 0 °C Td -> -40 °C Td = 120 sec
Ambient Temperature	-10 ... +40 °C
Ambient Humidity	0 ... 100 % 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
Casing material	ABS, Aluminium alloy
Classification	IP65
EMC	IEC 61326-1
Approval	-
Sensor protection	Sinter filter
Transport Temperature	-30 ... +70 °C
Storage Temperature	0 ... +40 °C
Weight	520 g

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

S305 DIMENSIONS



optional alarm unit mounted on the housing

S305 ORDERING

Please use the following table to assist in placing your order with our sales staff.

S305 DEW POINT MONITOR (-50 ... +20 °C Td / -20 ... +50 °C Td)	
Order No.	**Description**
D699 3050	S305, dew point monitor, -20 ... +50 °C Td, 6 mm quick connector, 15 bar, 1 x 4 ... 20 mA, 100 ... 240 VAC, 2 relay outputs
D699 3051	S305, dew point monitor, -20 ... +50 °C Td, 6 mm quick connector, 15 bar, 1 x 4 ... 20 mA, 24 VDC, 2 relay outputs
D699 3052	S305, dew point monitor, -50 ... +20 °C Td, 6 mm quick connector, 15 bar, 1 x 4 ... 20 mA, 100 ... 240 VAC, 2 relay outputs
D699 3053	S305, dew point monitor, -50 ... +20 °C Td, 6 mm quick connector, 15 bar, 1 x 4 ... 20 mA, 24 VDC, 2 relay outputs
Accessories	
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 S305 to trigger the alarm)
A554 0025	Alarm unit, 100 ... 240 VAC, red light and buzzer alarm, mounted at S305 casing (unit is using the relay outputs of S305 to trigger the alarm)
A553 0106	Power cable with mains plug, 1.8 m

BREATHING APPARATUS FILLING STATION MONITOR S307

Made for your application —
designed to fit your needs

S307 FEATURES

COMPACT DESIGN
Makes it easy to fit into the application

SIGNAL INPUTS
Digital and analog input

EASY TO USE
User-friendly design

ALARM RELAY
React if your humidity changes

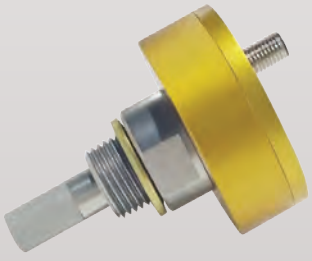
S307 BENEFITS

- Monitors filling pressure up to 35 MPa
- Monitors humidity of filling air
- Monitors CO level of filling air (option)
- Relay output to stop compressor
- Counts total operating hours and filter operating hours
- Power supply: 100 ... 240 VAC
- Panel mountable (optional wall mountable)
- Customizable: Compressor company logo and service information
- IP65 casing provides robust protection in rough environment
- Pressure, humidity and CO Alarm settings
- Easy sensor replacement by service people

The filling station monitor S307 is used to monitor and control breathing apparatus filling stations in regards of pressure, humidity and CO level. Through programmed alarm settings the display indicates reached limits and activates relays to stop the compressor.

The pressure and humidity sensor are installed into the high pressure pipe. The CO sensor requires a pressure reduction to ambient conditions. The display unit is available in the panel or wall mountable version. Under regular operating conditions the optional CO sensor has a life time of 2 years. Sensors can be easily replaced by service personnel.

The display can be customized in regards of startup screen (company logo) and service contacts.



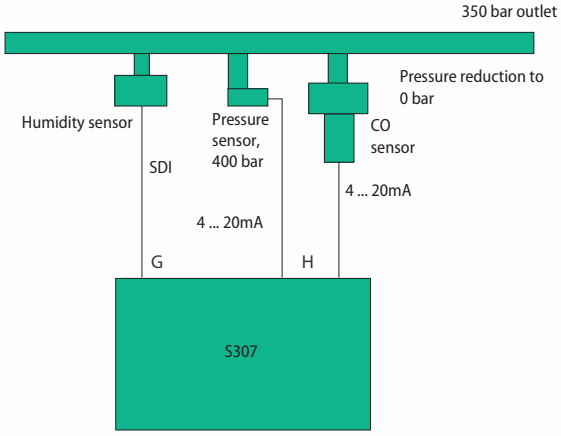
S217-HP

CO Sensor

S307 TECHNICAL DATA

General Specifications	
Response time t90	< 10 sec
Output signal	2 x relay, 240 V / 5 A
Sensor input signals	2 × 4 ... 20 mA and 1 × SDI
Cable glands	4 cable glands for supply and sensor cables
Casing	Panel size: 92 x 92 mm Wall mount size: 118 x 115 x 98 mm Material: ABS
Classification	IP65
EMC	According to IEC 61326-1
Measuring range	Pressure: 0 ... 400 bar Humidity: 0 ... 100 mg/m³ CO: 0.1 ... 20 ppm
Accuracy	Pressure: 1 % F.S. Humidity: 2 % F.S. CO: 1 ppm
Sensor life time	CO sensor: 2 years
Power supply:	100 ... 240 AC / 10 VA
Medium temperature	-20 ... 50 °C
Ambient conditions	0 ... 50 °C
Transport temperature	-30 ... +70 °C
Max. pressure	35 MPa

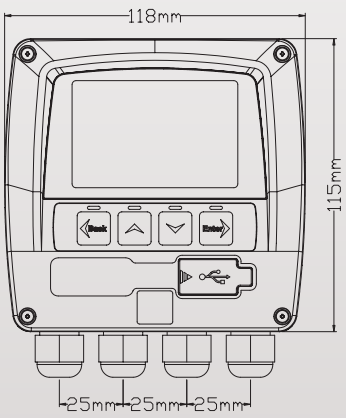
S307 SYSTEM OVERVIEW

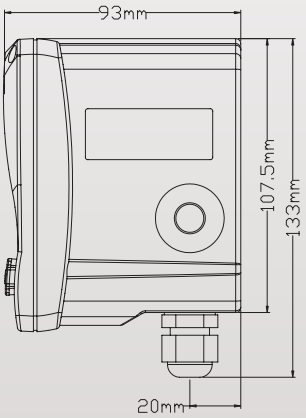


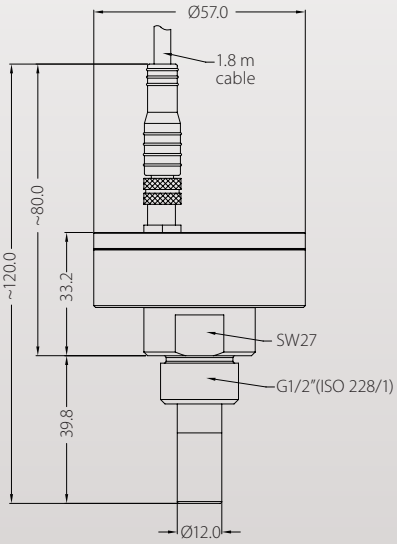
S307 PANEL INSTALLATION

The instrument can be mounted into the compressor casing. The back cover protects against water and dust.

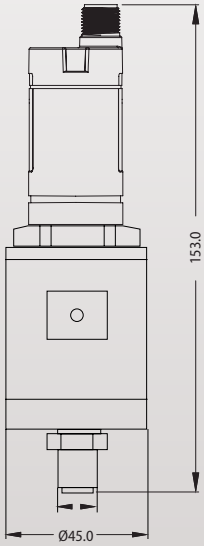
S307 DIMENSIONS







S217-HP



CO Sensor

S307 ORDERING

Please use the following table to assist in placing your order with our sales staff.

S307 Breathing Apparatus Filling Station Monitor	
Order No.	**Description**
D500 3070	S307, filling station monitor, panel version, 100 ... 240 VAC, 2 relay outputs
0660 0153	S217-HP, humidity sensor, 4 ... 20 mA (3-wire), 0 ... 100 mg/m^3, G 1/2'' thread, 350 bar, M8
S604 3071	CO sensor, 0 ... 20 ppm, 4 ... 20 mA, 24 VDC
S694 3560	Pressure sensor, 400 bar, 4 ... 20 mA, 24 VDC, G 1/4" thread
0660 0153-X	Replacement service for the S217-HP humidity sensor
S365 3071	CO sensor cell, 0 ... 20 ppm
A1645	Wall mountable casing with 4 cable glands
A1649	Back cover casing for panel version, 4 cable glands

PORTABLE DEW POINT METER (-100 ... +50 °C Td) S505

Ultra portable —
all in one single handheld

S505 FEATURES

DATA LOGGER
To save and print your measurements

PORTABLE UNIT
Handheld unit within a rugged case

LOW DEW POINT
Measures down to -100 °C Td

PRESSURE SENSOR
Always integrated

S505 BENEFITS

- Measures dew point, temperature and pressure (all in one instrument)
- 3 sensor solutions available:
  - Q : -100 ... -30 °C Td sensor for trace moisture applications
  - P : -50 ... +50 °C Td 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

With the S505 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 S505 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.

S505 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 Td down to –100 °C Td. Sensor P is for high moisture applications from -50 ... +50 °C Td where the SUTO polymer sensor is more suitable. Both sensors can be easily exchanged.

Additional features unique to the S505 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. S505 comes in a robust transport casing including measuring chamber, battery charger, USB cable and a PTFE hose allowing for quick connection to the compressed air system and immediate measurements.

S505 TECHNICAL DATA

General Specifications		
Measuring range	Sensor Q: Sensor P: Pressure*: Temperature:	-100 ... -30 °C Td -50 ... +50 °C Td -0.1 ... 1.5 MPa -30 ... +50 °C
Accuracy	Dew point: Pressure: Temperature:	±2 °C Td ±0.005 MPa ±0.3 °C
	(Stated uncertainty at: Ambient / process temperature of 23 °C ±3 °C and ambient humidity of < 95 % rH, no condensation)	
Measured gas	Non-corrosive gases	
Ambient conditions	Ambient temp.: Storage temp.: Ambient humidity: EMC:	0 ... +50 °C -40 ... +65 °C 0 ... 80 % rH, no condensation IEC / EN 61326
Response time t90	-50 °C Td -> -10 °C Td = < 10 seconds -10 °C Td -> -50 °C Td = < 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 measurements below 0.3 MPa choose the optional bypass measuring chamber A699 3501

Option: wireless printer used to print the measurement results on site. Perfect solution for quick audits.

The included transport case protects the measurement instrument. At the same time it holds all accessories.

Detail views

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

USB port SD card slot

Unique measuring / parking chamber for fast sensor response

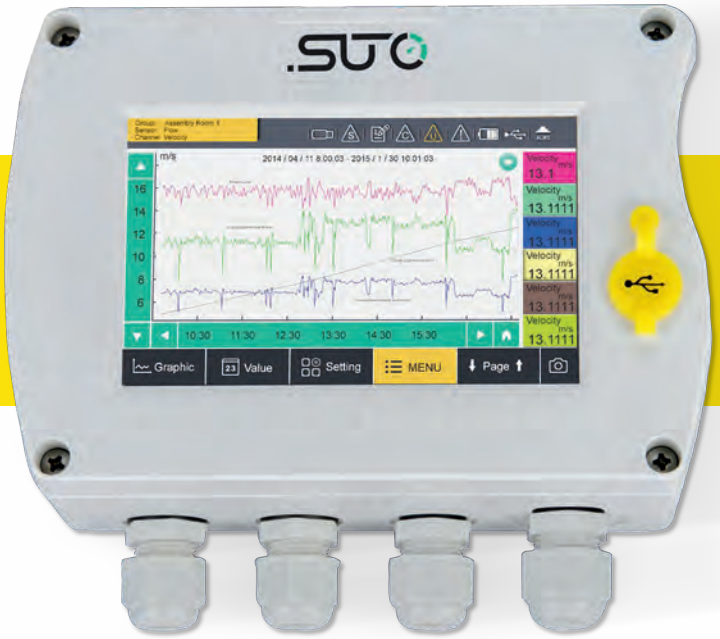
PTFE hose with quick-connect

S505 ORDERING

Please use the following table to assist in placing your order with our sales staff.

S505 PORTABLE DEW POINT METER (-100 ... +50 °C Td)	
Order No.	**Description**
P600 0505	S505-1 Set consisting of: - Handheld meter with data logger and S4A software - Sensor unit P -50 ... +50 °C Td - Parking/Measuring chamber - PTFE hose and quick connector - USB charger with USB cable - Transport case
P600 0506	S505-2 Set consisting of: - Handheld meter with data logger and S4A software - Sensor unit Q -100 ... -30 °C Td - Parking/Measuring chamber - PTFE hose and quick connector - USB charger with USB cable - Transport case
P600 0507	S505-3 Set consisting of: - Handheld meter with data logger and S4A software - Sensor unit P -50 ... +50 °C Td - Sensor unit Q -100 ... -30 °C Td - Parking / Measuring chamber - PTFE hose and quick connector - USB charger with USB cable - Transport case S505, L400 x W300 x H130 mm
Options / accessories	
A554 0020	SUTO mobile printer for printouts on site

DISPLAY AND DATA LOGGER
S330 / S331



Your system values —
All displayed and stored in one place

S330 / S331 FEATURES

IIoT SUPPORT
Connection to S4M software

TOUCH SCREEN
5" large color LCD

VERSATILE CONNECTION
Up to 16 sensors inputs

TIGHT PROTECTION
IP65

WEB SERVER
Access from world wide

DATA LOGGER
100 million values

S330 / S331 OPERATION PRINCIPLE

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.

S330 / S331 BENEFITS

- 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 (20 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 (S331 only): 100 million values
- Alarm monitoring with 2 relay outputs
- Integrated web server for remote monitoring
- Quick set up
- Various options for system extension
- Monitor compressor run time

The SUTO S330 / S331 is a powerful yet cost effective local display, sensor interface and data logging (S331 only) solution for virtually any application. Up to 16 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. S330 / S331 also provide IoT settings to connect with SUTO S4M software IoT version. Alternately locally logged data can be downloaded onto a USB memory card or directly to a computer through the USB port.

The S330 / S331 can display virtually any parameter from the connected sensors and with its 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.

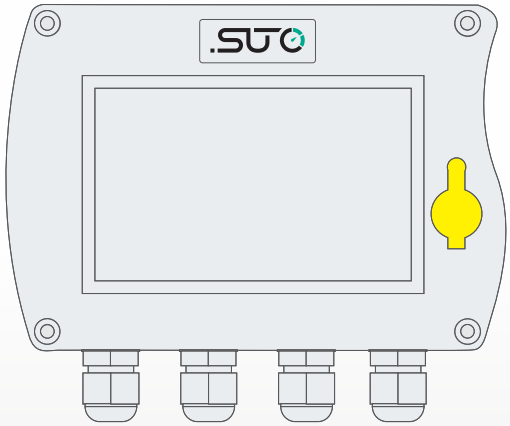
S330 / S331 SYSTEM OVERVIEW

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

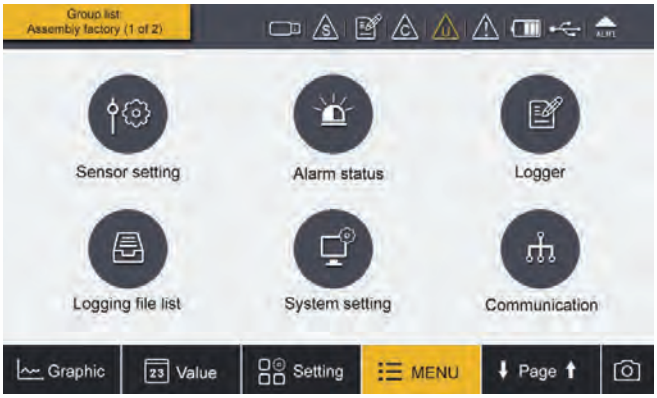
S330 / S331 AVAILABLE VARIATIONS

Panel installation

2 different size wall mountable casings

Hat rail option

S330 / S331 TOUCH SCREEN OPERATION



The S330 / S331 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.

S330 / S331 TECHNICAL DATA

General Specification	
Casing size	Size: 120 x 173 x 67 mm
Power supply	A: 100 ... 240 VAC, 20 VA B: 18 ... 30 VDC, 20 W
Interface	USB RS-485 Ethernet
Alarm output	2 relay, 230 VAC, 3 A, NC
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: 0.01 V Pulse: ±1 digit
Display	size: 5" Resolution: 800 x 480 px
Operating temperature	0 ... +50 °C
Storage temperature	-20 ... +70 °C
Protection	IP65

Back view with connection terminals

SENSORS CONNECTABLE TO S330 / S331

The S330 / S331 has 2 digital inputs, 2 analogue inputs and can connect up to 16 Modbus sensors.

Flow / Consumption sensors

S401 S421 S450 S452 S430 S415 / S418

S330 / S331 can power maximum one S450 / S452.

If more than one S450 / S452 is connected a separate power supply has to be added.

(see accessories for S330 / S331)

Dew point sensors

S220 S201 S212 / S215 / S217 S230

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

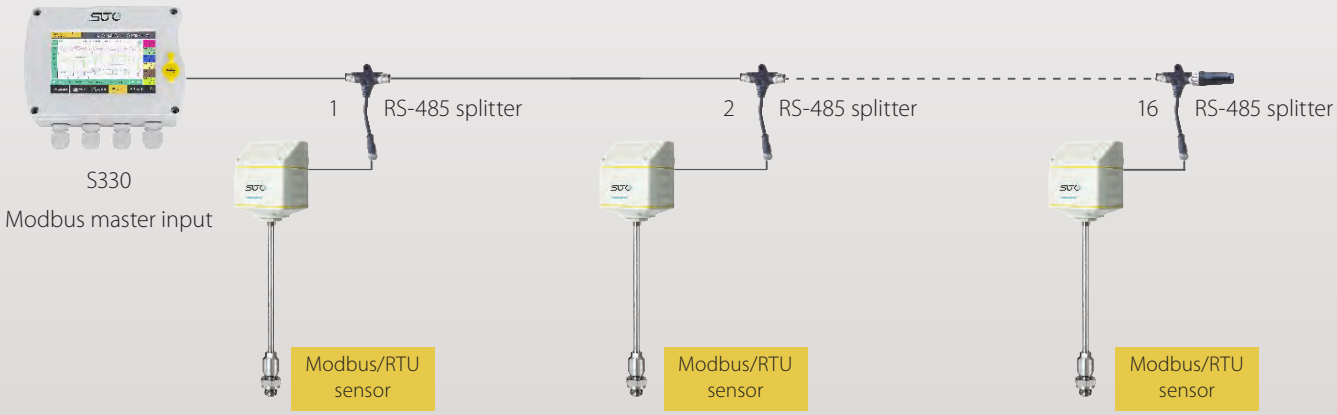
Third party sensors

Following third party sensors are connectable to S330 / S331:

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

Modbus-Master input for Modbus/RTU sensors

The S330 / S331 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.)



S330 / S331 ORDERING

Please use the following tables to assist in placing your order with our sales staff.

Order No.	Option	Power supply	Casing		Description
D500 0333					S330, panel version, 2 digital inputs, Ethernet, RS-485, USB
D500 0331					S331, 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 S330 / S331
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 2031	S4M, data acquisition and analyzes software
A1102	Add-on Energy Manager for S4M
Others	
D554 0130	Power meter S110, hat rail mountable, Modbus/RTU
D554 0031	8-channel current input module, 0 ... 20 mA, Modbus/RTU
D554 0032	Pulse meter, 7 channels, Modbus/RTU
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

DISPLAY
S320

Convenient data reading from difficult-to-access sensors

S320 FEATURES

EASY TO USE
User-friendly design

POWER SUPPLY
Flexible power supply

USB INTERFACE
For configuration with S4C software

EASY INSTALLATION
Wall or panel mountable casing

ALARM
Optional alarm settings

SIGNAL INPUTS
Digital and analog input

S320 OPERATION PRINCIPLE

The S320 local display provides a simple, cost effective solution for applications where information from a single difficult-to-access sensor is required.

S320 TECHNICAL DATA

General Specifications	
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 ... +50 °C
Sensor input 1	1 sensor: S401, S421, S430, S450, S452, S220, S201, S212, S215
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 ... +50 °C
Storage temperature	-20 ... +70 °C
Protection	IP65

1) Accuracy of sensor not included

S320 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

S320 ORDERING

Please use the following tables to assist in placing your order with our sales staff.

S320 Display			
Order No.	**Power supply**	**Casing**	**Description**
D500 0320			S320 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

COMPRESSED AIR ANALYZER S551

The ideal data logger for energy analysis (ISO 50001) and air audits (ISO 11011)

Integrated web server for remote monitoring

S551 FEATURES

AUTO DETECT
SDI or Modbus-based SUTO sensors

TOUCH SCREEN
5" large color LCD

VERSATILE CONNECTION
Up to 24 sensors inputs

TIGHT PROTECTION
IP65

WEB SERVER
Access from world wide

BACK-UP POWER
Battery as back-up power

Easy to use

- Just connect the sensor and start the recording, no configuration and programming required
- Easy operation through color-touch display
- Integrated web server for remote monitoring

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

Efficient

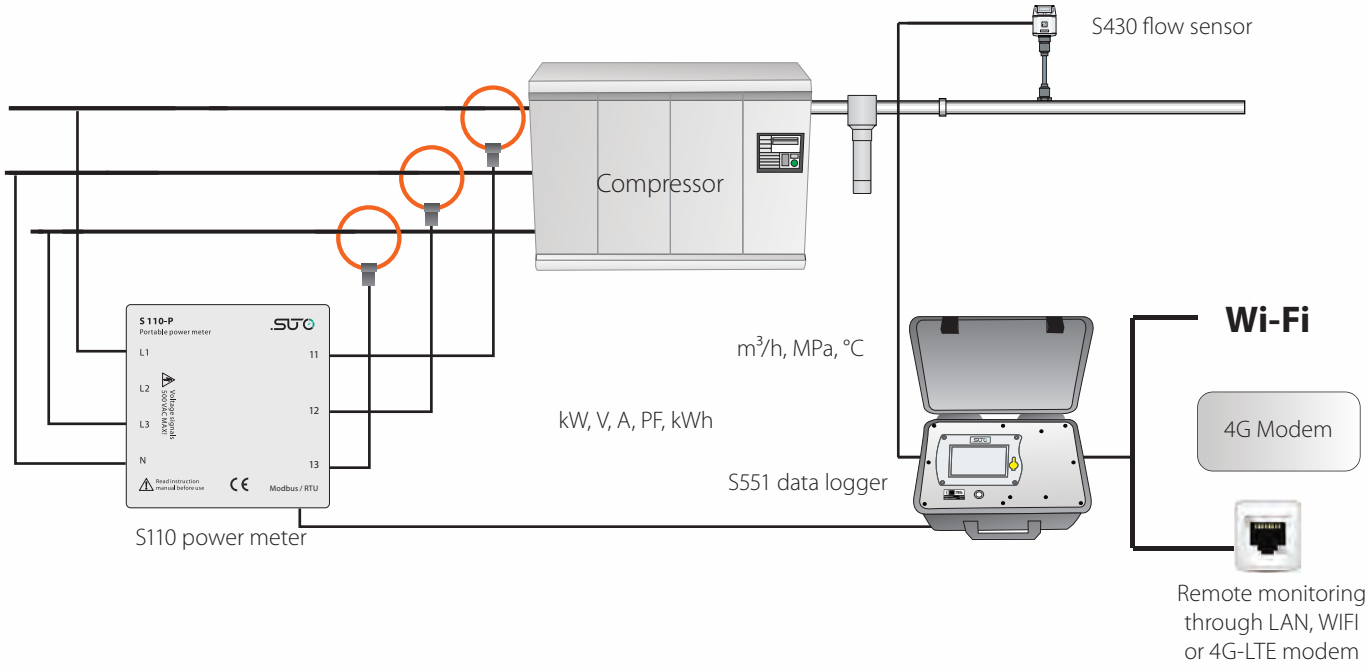
- S551 logs data on site
- Data is analyzed in the office
- Cost effective solution
- Full software package includes:
  - S4A for basic analyzes
  - CAA for compressed air audit analyzes

Safe

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

S551 APPLICATION

Measurement setup for data logging on the supply side



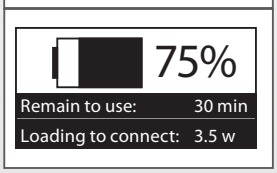
S551 CONNECTIONS

Ethernet port

Sensor connection though 5 poles locking connectors and mains connector

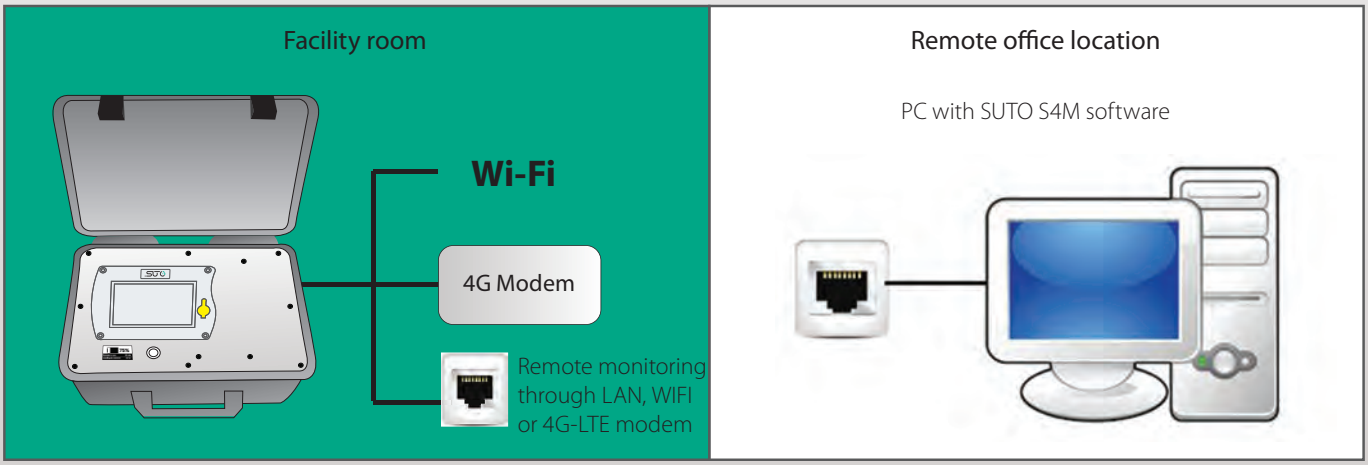
Portable Modbus splitter box

4G Modem and/or WiFi Modem

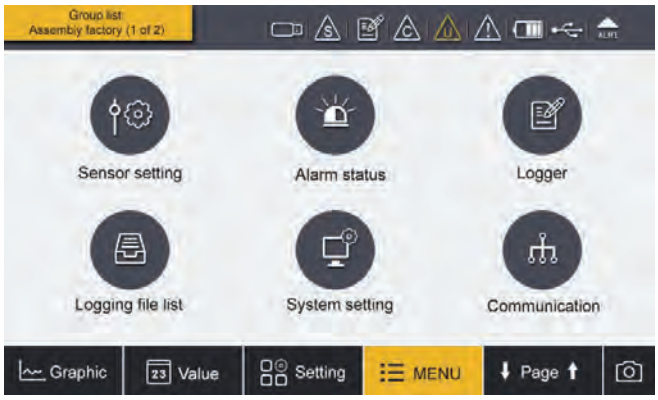


Battery gauge indicating remaining battery power and life time

The S551 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.



S551 TOUCH SCREEN OPERATION



The S551 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.

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

S551 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.

S551 ORDERING

Please use the following table to assist in placing your order with our sales staff.

	Data logger	
	P560 5100	S551-P4, portable data recorder, 4 digital input channels, power cord, USB cable, S4A software, CAA software
	P560 5101	S551-P6, portable data recorder, 4 digital input channels and 2 analog, power cord, USB cable, S4A software, CAA software
	Flow sensors	
	S601 0401	S401-M, insertion type flow sensor, DN15 ... DN300, Modbus/RTU, 5 m cable with connector
	S601 0430	S430 pitot tube flow sensor, DN25 ... DN250, 220 mm shaft, SDI, Modbus/RTU, 5 m cable with connector
	Dew point sensor	
	S601 0215	S215 dew point sensor, -20 ... +50 °C Td, measuring chamber, 5 m cable with connector
	S601 0212	S212 dew point sensor, -50 ... +20 °C Td, measuring chamber, 5 m cable with connector
	S601 0220	S220 dew point sensor, -100 ... 0 °C Td, measuring chamber, 5 m cable with connector
	Pressure sensors	
	S694 1886	Pressure sensor, 0 ... 1.6 MPa(g), 5 m cable with connector for S551
	S694 0356	Pressure sensor, 0 ... 4.0 MPa(g), 5 m cable with connector for S551
	Amp sensor	
	S554 0156	SUTO current sensor, 1000 A, 100 mm diameter, including connector to S551
	S554 0157	SUTO current sensor, 3000 A, 150 mm diameter, including connector to S551
	Temperature sensor	
	S693 0005	Temperature transmitter, -50 ... +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 S110-P, Modbus/RTU, including 4 test leads, 4 test clips, 5 m cable with connector to S551
	S554 0160	SUTO current sensor for S110-P, 1000 A, 100 mm diameter, 1.8 m cable, connector to S110-P
	S554 0161	SUTO current sensor for S110-P, 3000 A, 150 mm diameter, 1.8 m cable, connector to S110-P
	S554 0162	SUTO current sensor for S110-P, 100 A, 160 mm diameter, 1.8 m cable, connector to S110-P

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

S551 ORDERING

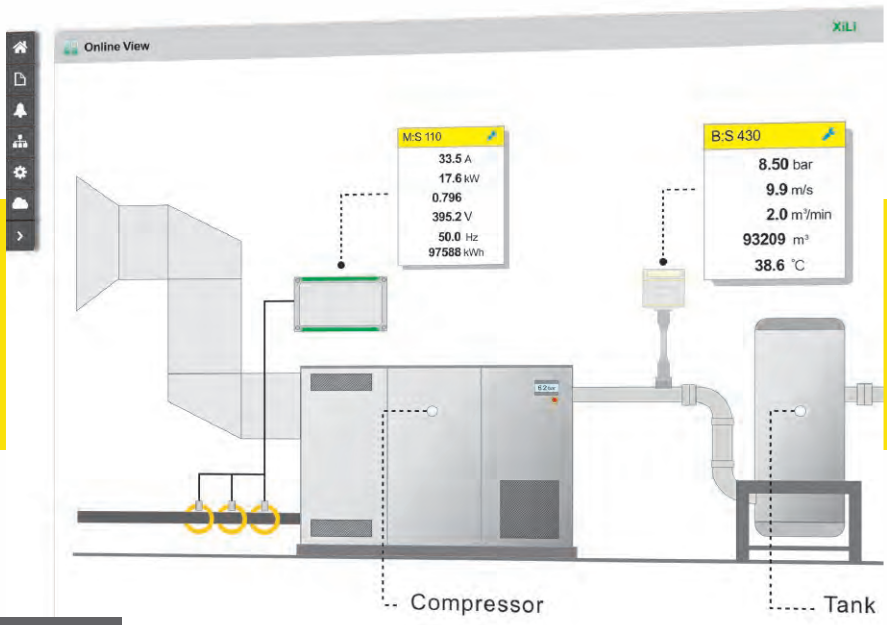
Please use the following table to assist in placing your order with our sales staff.

	Liquid flow meter (clamp on ultra sound)	
	P554 0070	Ultrasonic controller for liquid flow sensor, connectable to S551, including 5 m connection cable to S551 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 S551, 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 S551
	A554 0035	Transport case S551 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 S110-P, 3 Rogowski coils, 4 x test leads, 4 x test clips, 1 x S430

* Please contact us for further accessories and details.

SMART MONITORING SYSTEM S4M

Your complete system — **monitored and logged in a single software**



S4M FEATURES

REMOTE ACCESS
Client needs only a web browser

REPORT FUNCTION
Easy report generation

EASY INSTALLATION
Wizard guided installation

UNDER CONTROL
Alarm definition at a click

DATA BASE
Data logging on server

AUTO DETECT
System integration within seconds

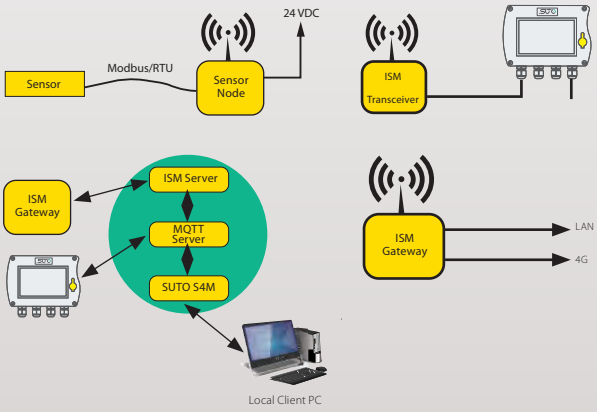
S4M is the complete monitoring solution for your energy management. It delivers real-time analytics of installations and can identify potential issues before they happen. S4M intelligently gathers, compares and analyses data to help compressed air users increase maintenance and service efficiency, make energy savings easy, quick and rewarding.

By server installation, and using the latest web technology, S4M is designed to provide cloud based service or local server installation, which allows user to monitor and collect granular, real-time energy consumption data of individual compressed air system anywhere at any time.

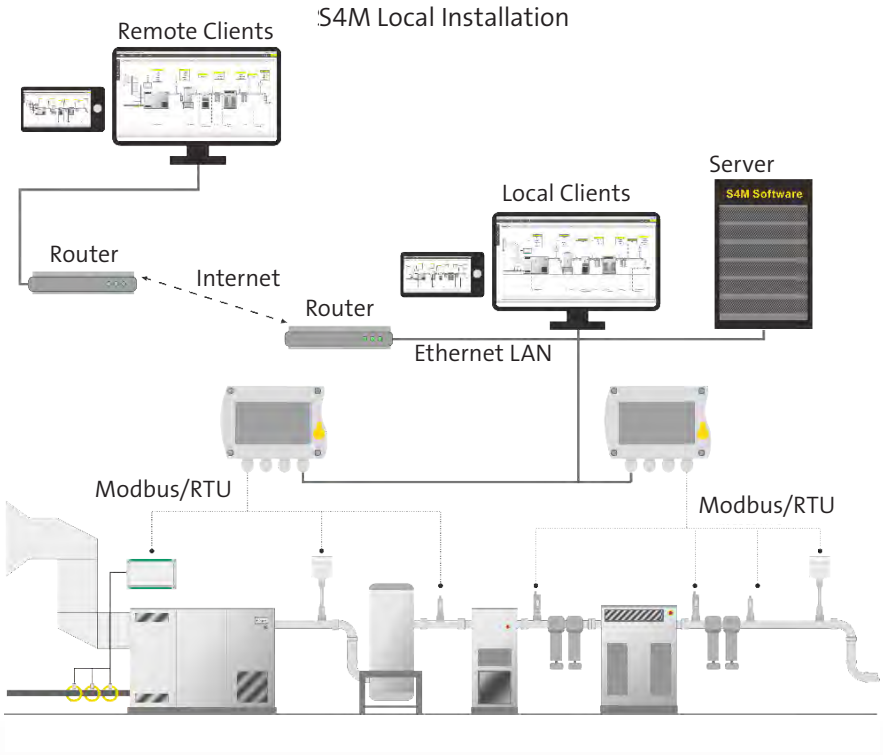
S4M BENEFITS

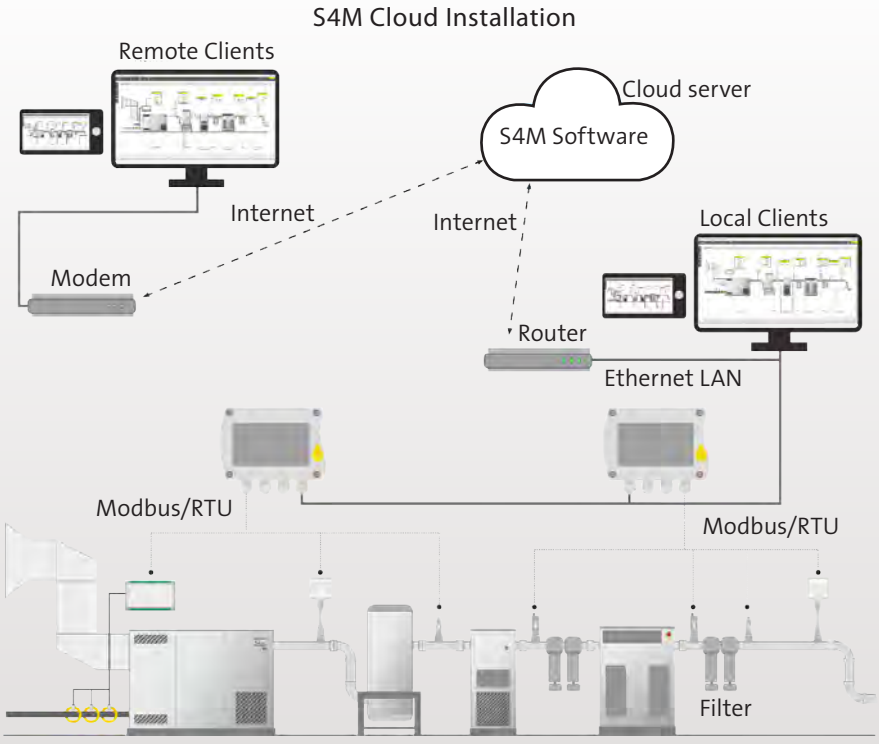
- Easy to use monitoring solution
- Simple installation with installation wizard
- Browser / Server Architecture. Client is independent from any operation system.
- Alarm monitoring and indications on screen, relay, e-mail and SMS
- Graphical data analysis
- Multiple languages
- Third-party support
- Scalable to fit your application

S4M used for low power wide-area network solution



S4M-your plant under control





S4M helps you to keep your plant under your control. Gathering the date of all installed sensors and measurement system. Combining them into a single software solution which enables you to take back the control of your system.

You want to try S4M?

Simply scan the code or visit **https://s4m.suto-itec.asia** to experience S4M.

username: **sutovisitor** password: **sutovisitor**

S4M SYSTEM REQUIREMENTS

Category	Minimum	Recommended
Processor	Intel Core I5 processor 3.0 GHz	Intel Core I7 processor 3.0 GHz
RAM (main memory)	2 G	>8 G
Free disk space for installation	1.5 G	>2 G
Free disk space for measurement data in database	10 G	>100 G
Network card	Yes	YES

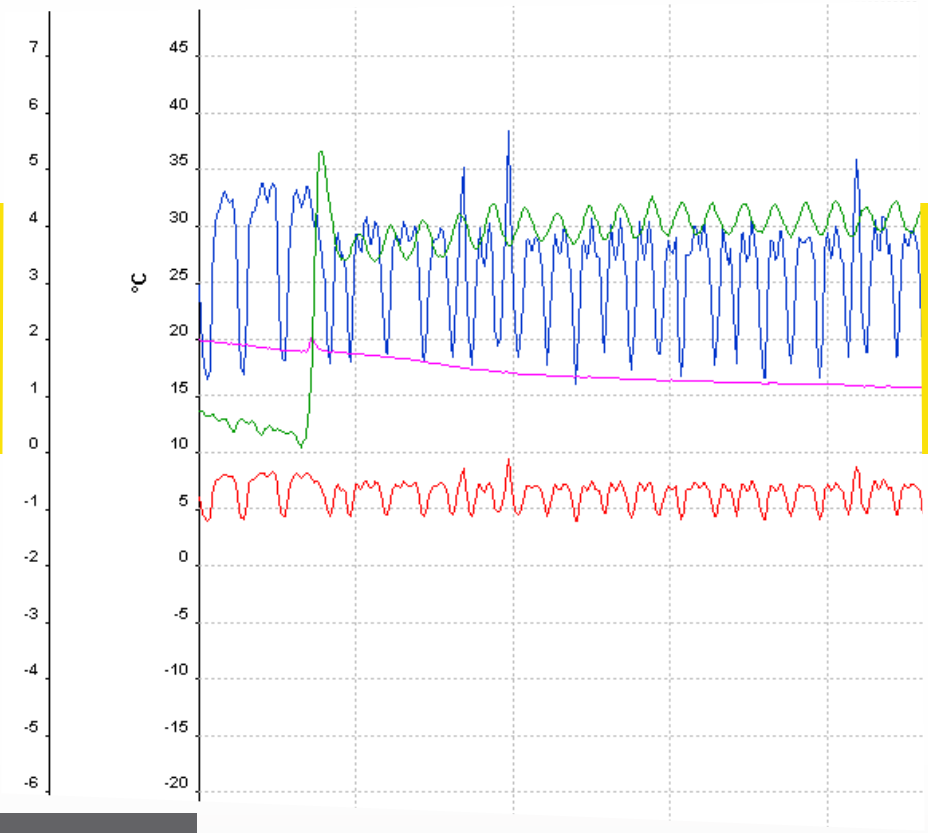
S4M ORDERING

Please use the following table to assist in placing your order with our sales staff.

S4M SMART MONITORING SYSTEM							
Order No.	Description	Details					
		Operating System		Supported Protocol(s)			
		Windows	Linux	SUTO	Modbus RTU	Modbus TCP	IIoT
M599 2031	S4M, local installation, data acquisition and analysis software, 50 measuring channels	●		●	●	●	●
M599 2032	S4M, local installation, data acquisition and analysis software, 100 measuring channels	●		●	●	●	●
M599 2033	S4M, local installation, data acquisition and analysis software, unlimited measuring channels	●		●	●	●	●
M599 2034	S4M, cloud installation, data acquisition and analysis software, 50 measuring channels		●				●
M599 2035	S4M, cloud installation, data acquisition and analysis software, 100 measuring channels		●				●
M599 2036	S4M, cloud installation, data acquisition and analysis software, unlimited measuring channels		●				●
Optional products or service							
A1102	Add-on Energy Manager to S4M						
M599 9000	Software setup, configuration and training						
A554 0027	GSM modem for SMS notifications, connectable to Windows server						

DATA ANALYSIS SOFTWARE S4A

The Data Analyzer —
Easy to use, but powerful!



S4A FEATURES

GRAPHIC ANALYSIS
Powerful graphic analysis

ONLINE READING
Real time data reading with USB or Ethernet connection

ANALYSIS ON EXPORTED FILES
Export data to the .XLSX and .CSV file

READOUT OF SCREENSHOTS
Read screenshots from SUTO S331

S4A is a stand alone software used to analyze measurement data recorded by SUTO data loggers. In addition, the S4A also supports real time on-line reading of a SUTO device via a USB or Ethernet connection.
It comes with powerful graphic tools allowing in-depth analyzes of the data and prepare reports. The integrated export function offers data exchange in .xlsx and .csv format.
Easy to use, but powerful.

S4A BENEFITS

- Quick analysis through powerful graphs and exported tables
- On-site real time analysis through online data reading
- Easy installation with installation wizard
- Multiple languages available

S4A ORDERING

Please use the following table to assist in placing your order with our sales staff.

S4A DATA ANALYSIS SOFTWARE	
Order No.	**Description**
M599 7020	S4A data analysis software, support USB/Ethernet connection

FLOW SENSOR CONFIGURATION
S4C-FS

The mobile app — **Wireless Configuration**

S4C-FS is a free mobile App that enables you to view measurement readings and change sensor settings for SUTO flow sensors. Just use your Android phone or tablet to download the APP on Google Play Store (play.google.com) or SUTO website (www.suto-itec.com), and then install it, same as you do for any other Apps.

S4C-FS FEATURES

MOBILE APP FOR CONFIGURATION
Android smart phones and tablets applicable

WIRELESS CONNECTION
Through BlueTooth

SCAN QR CODE FOR CONFIGURATION
Scan QR code to enable the configuration of a sensor

CALIBRATION
Zero flow/pressure calibration

S4C-FS BENEFITS

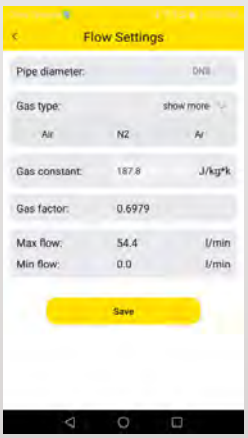
- Android-based App, easy to install and use
- Quick access to sensor configuration by scanning QR code
- Easy configuration for sensors in places difficult to reach
- Supports multiple languages: English, German, and Chinese.
- Supports multiple SUTO flow sensors
- Provides varieties of sensor settings: Flow settings, units settings, reference conditions, factory settings, counter settings, and output settings

S4C-FS supports the following SUTO flow sensors:

- S415 / S418 / S418-V
- S401 / S421
- S430

Online measurement values

Select a sensor to connect

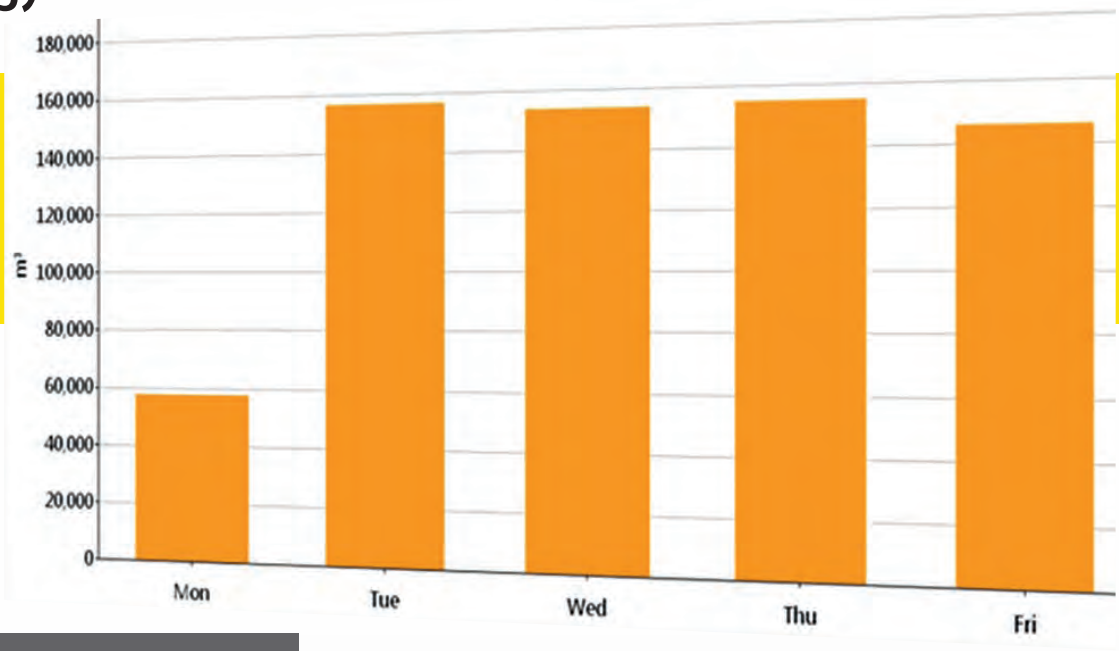


Flow settings of a sensor

ENERGY MANAGER (EM)

Improve efficiency of your processes and reduce energy cost

Track your power consumption — **save money**



EM FEATURES

FLEXIBLE EXTENSION
Add-on for S4M

REPORT DISPLAY
In the from of graphic or table

REPORT EXPORT
PDF and Excel

CUSTOMIZED REPORT
Define company name, logo etc.

MULTIPLE TYPES OF REPORTS
Consumption, flow power, pressure etc.

COST ANALYSIS
Calculate consumption cost

EM 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

Energy Manager is an add-on to the SUTO S4M software, it provides comprehensive energy management, offers information and analytics to improve efficiency and profitability of your energy system. From compressed air to electricity and water, many industries can benefit from EM software.

Consumption Report
Monthly Report Feb 2019

	Group 1				Group 2				
	S401	S401		S401	S401	S401	S401		S401
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
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

OIL VAPOR SENSOR S120

Intelligent sensor system — **helps you to identify impurities**

S120 FEATURES

ACCURATE RESULTS
Latest PID senor technoloygy

TOUCH SCREEN
For easy operation

COMPACT DESIGN
Fits into your application

DATA LOGGER
Integrated as option

The S120 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 S551. For best accuracy and long term stability, the S120 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 S120 the ideal choice when oil vapor content needs to be measured and monitored.

- 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.

S120 BENEFITS

- 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)
- Version with integrated pump for ambient measurements

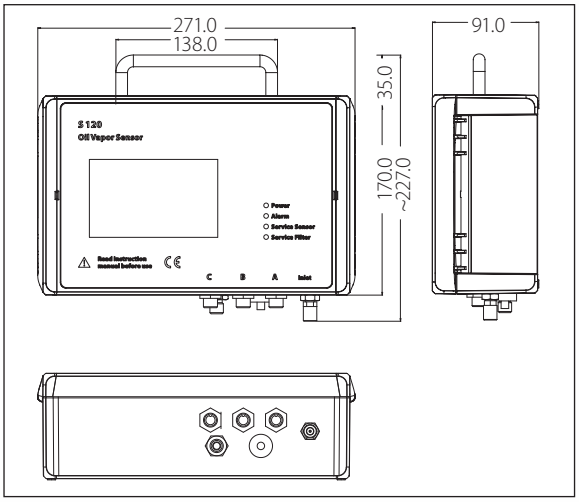
S120 APPLICATIONS

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

S120 TECHNICAL DATA

General Specifications	
Measuring medium	Compressed air and gases free of corrosive, aggressive, caustic and flammable constituents
Measuring range	0.003 ... 10.00 mg/m³ (based on 1000 hPa (a), 20 °C, 0 % relative humidity)
Resolution	0.001 mg/m³
Sensor type	PID (photoionization detector)
Detection limit	0.003 mg/m³
Accuracy	5 % of reading ±0.003 mg/m³
Operating pressure	3 ... 15 barg (higher pressure on request) 600 ... 1070 hPa abs. (ambient version only)
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 ... +50 °C (at inlet)
Ambient conditions	-20 ... +50 °C
Transport temperature	-30 ... +70 °C
Output signal	4 ... 20 mA (0 ... 10 mg/m³) 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

S120 DIMENSIONS



S120 ORDERING

Please use the following table to assist in placing your order with our sales staff.

S120 OIL VAPOR SENSOR	
Order No.	**Description**
S604 1201	S120, oil vapor sensor, 0.003 ... 10 mg/m³, 4 ... 20 mA output, RS-485, alarm output, 24 VDC supply, incl. power supply
S604 1202	S120-P, oil vapor sensor, 0.003 ... 10 mg/m³, 4 ... 20 mA output, RS-485, alarm output, connectable to S551, transport case, incl. power supply
S604 1203	S120, oil vapor sensor, 5" touch screen, 0.003 ... 10 mg/m³, 4 ... 20 mA output, RS-485, alarm output, 24 VDC supply, incl. power supply
P604 1205	S120-P, oil vapor sensor, 5" touch screen, 0.003 ... 10 mg/m³, 4 ... 20 mA output, RS-485, alarm, 24 VDC supply, incl. power supply and transport case
P604 1215	S120-Ambient portable oil vapor sensor for ambient air, 5" touch screen with data logger, 0.003 ... 10.000 mg/m³, 4 ... 20 mA, RS-485 (Modbus RTU), Ethernet (Modbus TCP), alarm output, integrated pump, supply voltage 24 VDC, incl. power supply and transport case
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 S120
A554 1203	Zero test filter for S120, 15 barg, with quick connection at both ends

LASER PARTICLE COUNTER
S130 / S132

Measures particle counts in compressed air and in ambient — **meets the requirements in ISO 8573-4**

S130 / S132 FEATURES

PARTICLE MEASUREMENT
According ISO-8573

ECO VERSION S130
Smallest channel 0.3 < d ≤ 0.5 µm

VERSION WITH INTERNAL PUMP
For ambient measurements

PRO VERSION S132
Smallest channel 0.1 < D ≤ 0.5 µm

S130 / S132 APPLICATION

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

S130 / S132 BENEFITS

- Easy connection to compressed air through 6 mm quick-connector
- Can be used as portable as well as stationary instrument
- Particle sizes range d: 0.1 < d ≤ 5.0 µm
- Optional integrated 5" touch screen with data logger
- Measures according to ISO 8573-4
- Output signals:
  - RS-485, Modbus/RTU
  - Relay switch (NO)
- Connectable to SUTO displays and data loggers as well as third parties displays and control units

S130 is also available as a variant for indoor air measurement. An internal vacuum pump is used for this commitment.

The S130 / S132 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.

In an alternative version all models are also available for measurements under ambient conditions by means of an internal vacuum pump. These instruments 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.

S130 / S132 TECHNICAL DATA

General Specifications			
Measuring medium	Compressed air and gases free of corrosive, aggressive, caustic and flammable constituents		
Models: S130 S132	S130 particle counter, 3 channels, size range d: 0.3 < d ≤ 5.0 µm, 2.83 l/min S132 particle counter, 3 channels, size range d: 0.1 < d ≤ 5.0 µm, 2.83 l/min		
Channel sizing d: S130: S132:	Channel 1 0.3 < d ≤ 0.5 0.1 < d ≤ 0.5	Channel 2 0.5 < d ≤ 1.0 0.5 < d ≤ 1.0	Channel 3 1.0 < d ≤ 5.0 1.0 < d ≤ 5.0
Counting efficiency	50 % for smallest size and 100% for particles 1.5 times bigger (per JIS)		
System pressure	0.3 ... 1.5 MPa (for compressed air version)		
Flow rate	2.83 l/min, internal flow control		
Sampling rate	One sample per minute		
Measuring unit	Particle counts per ft^3 or m^3		
Gas connection	6 mm quick connect (pressurized version), barb connection (ambient version)		
Electrical connection	M12 connector		
Medium	Compressed air / ambient air, 0 ... +40 °C, < 40 % relative Humidity, no condensation		
Ambient conditions	+10 ... +40 °C		
Transport temperature	-30 ... +70 °C		
Output signal	RS-485, Modbus/RTU 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 S130: 271 x 205 x 91 mm S132: 300 x 240 x 120 mm		
Classification	IP65		
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)		

Isokinetic sampler with stand and hose

S130 / S132 ORDERING

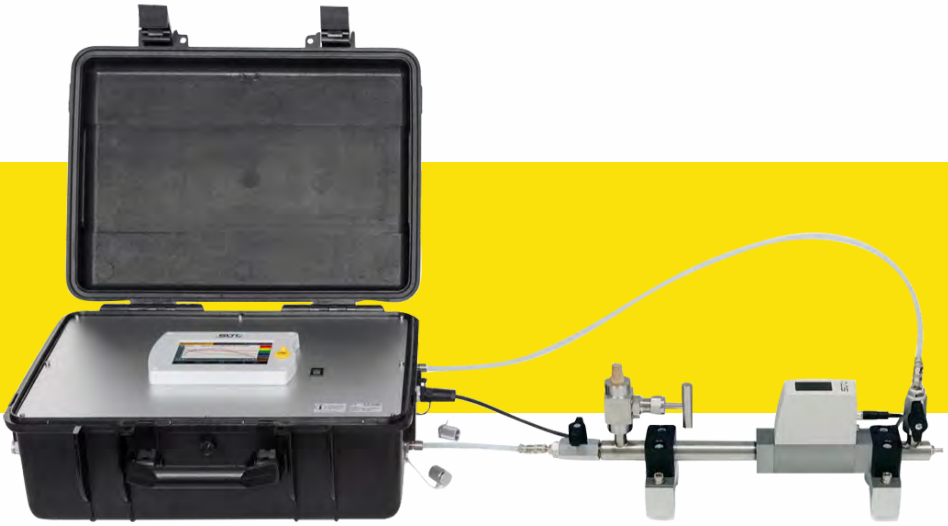
Please use the following tables to assist in placing your order with our sales staff.

Particle Counter for Compressed Air: P = 0.3 … 1.5 MPa	
Order No.	**Description**
S604 1303	S130, particle counter for compressed air, size range d: 0.3 < d ≤ 5.0 µm, 2.83 l/min
S604 1305	S130, particle counter for compressed air, size range d: 0.3 < d ≤ 5.0 µm, 2.83 l/min, display, logger
S604 1308	S132, particle counter for compressed air, size range d: 0.1 < d ≤ 5.0 µm, 2.83 l/min
S604 1309	S132, particle counter for compressed air, size range d: 0.1 < d ≤ 5.0 µm, 2.83 l/min, display, logger
Accessories	
A554 0120	Transport case S120 / S130
A554 0116	Transport case S132
A554 1204	Zero count filter
R200 0130	Calibration particle counter S130
R200 0131	Calibration particle counter S132

Particle Counter for Ambient condition with integrated pump	
Order No.	**Description**
S604 1313	S130-A particle counter for ambient air, channels 0.3, 0.5, 1.0, 5.0 µm, 2.83 l/min
S604 1315	S130-A particle counter for ambient air, channels 0.3, 0.5, 1.0, 5.0 µm, 2.83 l/min, display, logger
Accessories	
A554 0115	Isokinetic sampler with stand and hose for ambient conditions
A554 0120	Transport case S120 / S130
A554 1204	Zero count filter
R200 0130	Calibration particle counter S130

COMPRESSED AIR PURITY ANALYZER S600

Smart measurement —
save precious time



S600 FEATURES

ALL IN ONE
Dew point, particle and oil vapor

PRECISION
Accurate measurements

TOUCH SCREEN
Easy operation

COMPACT DESIGN
Makes it unique

PORTABLE
Can be carried with one hand

USB INTERFACE
For data transfer

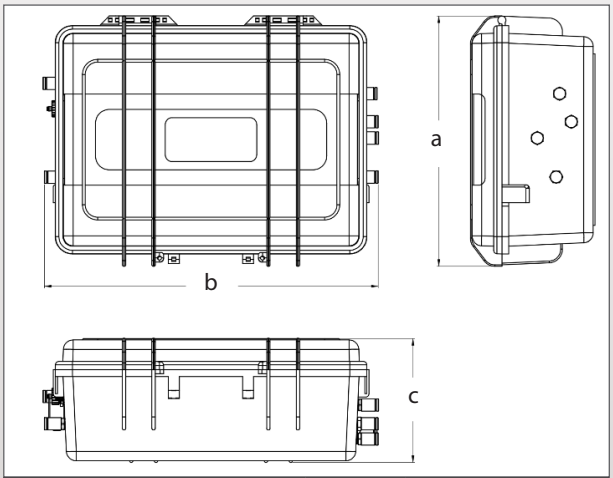
ISO 8573 compliant purity quantifications of compressed air systems are bound to time-consuming installations and long-lasting test runs ... It's time for a revolution: The S600 is unlike its competition.

It combines the latest sensor technology, software-guided measurements and a time-saving setup into a handy, touch-screen controlled multi-tool. With our S600 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.

S600 BENEFITS

- All-in-one device measures Particle concentration, dew point and oil vapor
- Measures additionally the temperature and pressure
- Software guided measurement makes it easy to generate reliable results
- Report generator creates PDFs for audits
- Ultra portable and compact design
- Compressed air connection via 6 mm tube
- Integrated data logger saves data for later analysis
- Dew point measurement from -100 ... +20 °C Td
- Oil vapor measurement from 0.003 ... 10.000 mg/m³
- Particle measurement from 0.1 < d ≤ 5.0 µm

S600 DIMENSIONS



Dimensions in mm	a	b	c
S600	365	490	181

S600 APPLICATIONS

The S600 is the portable multi-tool for compressed air purity measurements. It measures, records and validates quality parameters like particles, dew point, oil vapor contents, temperature and the pressure of compressed air systems.

0.1 < d ≤ 5.0 µm

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

-100° ... +20°C Td

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 Td

0.003... 10.000 mg/m³

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

0.3 ... 1.5 MPa

PRESSURE MEASUREMENT

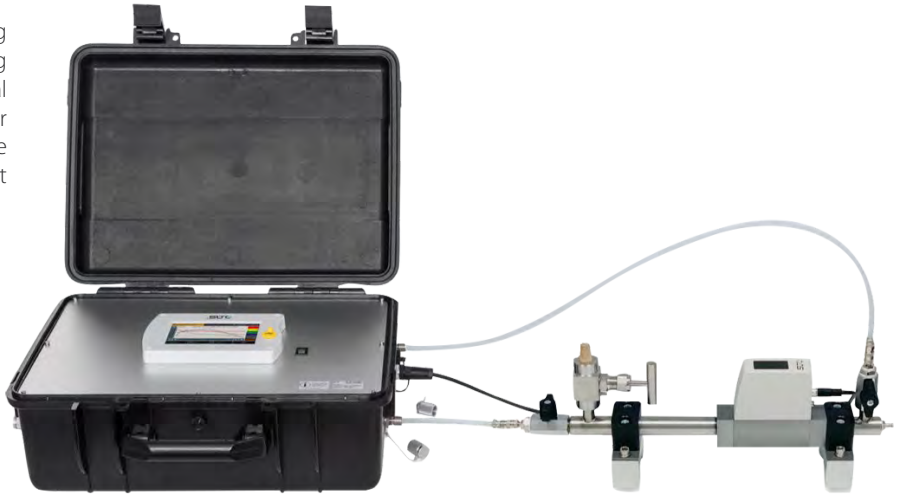
+ State of the art sensor technology
+ Additional quality data about the compressed air system

Log & Report

PLUG & PLAY MEASUREMENTS WITH A TOUCH

+ Integrated data logger records all channels in parallel for later analysis
+ 5" touchscreen allows you to interact with the device on site. There is no need for a PC to manage the device.

For particle measurements according to ISO 8573 an isokinetic sampling tube has been designed. This optional equipment enables you to monitor and adjust the air flow of the particle measurement to ensure the correct isokinetic sampling.



S600 with the isokinetic sampler attached

S600 TECHNICAL DATA

General Specifications	
Measuring unit	5" colour touchscreen with data logger, guided measurement and report generator function. All combined and integrated with the multiple sensor system.
Process connection	Micro quick connector, full passthrough, male (1.5 m hose with coupling included)
Operating pressure	0.3 ... 1.5 MPa
Ambient temperature	0 ... +50 °C
Storage & Transport temperature	-10 ... + 70 °C
Medium	Compressed Air, Nitrogen N2, Carbon dioxide CO2 (software setting)
Medium temperature	0 ... + 40 °C
Medium humidity	< 40 % rH, no condensation
Reference settings	ISO1217 20 °C 1000 mbar
UV lamp lifetime (oil vapor sensor)	1 year or 6000 working hours, whichever comes first
Power supply	Mains supply adapter (AC/DC) Input: 100 ... 240 VAC, 50/60 Hz, 1.4 A Output: 24 VDC, 2.5 A, 60 W max.
Data logger	100 mio. values, Integrated report generator for PDF export
Measured values	Temperature, Pressure, Oil vapor, Dew point, Particle concentration
Interface	USB, Ethernet (Modbus/TCP)
Display	Touchscreen, Size: 5", Resolution: 800 x 480 px
Dew point sensor	Dual-sensor technology (QCM & Polymer)
Particle sensor	Laser optical detection
Oil vapor sensor	PID (Photoionisation detector)
Measurement duration	min. 35 minutes (no upper limit)
Sampling rate	1 sample / sec.
Classification	IP65 (cover lid closed)
Casing material	PC + ABS, Al alloy
Weight	9.8 kg
EMC	IEC 61326-1
Measurement Specifications	
Measurement range Particle counter	0.1 < d ≤ 0.5 µm ; 0.5 < d ≤ 1.0 µm ; 1.0 < d ≤ 5.0 µm
Measurement range Dew point sensor	-100 ... +20 °C Td
Measurement range Oil vapor sensor	0.003 ... 10.000 mg/m³
Detection limit oil vapor sensor	0.003 mg/m³
Resolution oil vapor sensor	0.001 mg/m³
Accuracy Particle measurement	50 % @ 0.1 < d ≤ 0.15 µm 100 % @ 0.15 µm > d per JIS
Accuracy Dew point measurement	±2 °C Td
Accuracy Oil vapor measurement	5 % of value ± 0.003 mg/m³
General Specifications Isokinetic sampling device	
Measuring unit	Sampling pipe with integrated isokinetic sampling tube, flow regulation and control by integrated flow sensor, to be used for particle measurements according to ISO8573
Process connection	Micro quick connector, full passthrough, male (1.5 m hose with coupling and connection hoses to S600 included)
Operating pressure	0.3 ... 1.5 MPa
Ambient temperature	0 ... +50 °C
Storage & Transport temperature	-10 ... +70 °C
Flow sensor	Thermal mass flow, only for isokinetic flow setup, no system-flow measurement
Interface	Communication interface for S600, cable included, M8
Accuracy	3 % o. RDG
Purge flow	Regulated by needle valve, setup guided by S600

S600 ORDERING

Please use the following table to assist in placing your order with our sales staff.

S600 Portable Compressed Air Purity Analyzer	
Order No.	**Description**
P560 0600	S600 Portable compressed air analyser Touch screen interface, data logger, guided measurement, PDF report generator, USB port and Ethernet port with Modbus/TCP Particle d: 0.1 < d <= 0.5 µm 0.5 < d <= 1.0 µm 1.0 < d <= 5.0 µm Dew point: -100 ...+20 °C Td Oil vapor: 0.003 ... 10.000 mg/m^3 Including: - Portable compressed air analyzer in a hand carry case with handle and shoulder belt - USB OTG memory stick - Purge filter for pre-measurement (test kit) - Power supply, 230 VAC / 24 VDC 50/60 Hz - 2 x Connection hose 1.5 m, one end quick coupling, one end compressed air coupling - Certificate of calibration - Operation and instruction manual
A554 0600	Isokinetic sampling device for particle measurement according to ISO 8573 Including: - Isokinetic sampling pipe - Flow sensor mounted on pipe - Certificate of calibration - Connection cable to S600 - Connection hose 150 mm, both ends quick coupling - Connection hose 700 mm, both ends quick coupling - Connection hose 1.5 m, one end quick coupling, one end compressed air coupling - Transport case to carry the device, hoses and cables

COMPRESSED AIR PURITY ANALYZER S601

Smart measurement -
all values in one place

S601 FEATURES

COMPACT DESIGN
Can be installed anywhere

PRECISION
Accurate measurements

TOUCH SCREEN
5" large colour LCD

ALL IN ONE
Dew point, particle and oil vapor

The S601 combines three major quality measurements into a single wall mountable device. Optimized to be used as Plug & Play system, the S601 helps users to identify the air quality at a glance.

The robust cabinet makes is well suited for rough industrial applications. A stainless steel cabinet is offered on request, which is suited for pharmaceutical and medical applications.

The S601 combines the latest sensor technology and a time-saving setup into a one of its kind multi-tool. Mount it, power it, connect it and measure. Trust us, it is that easy.

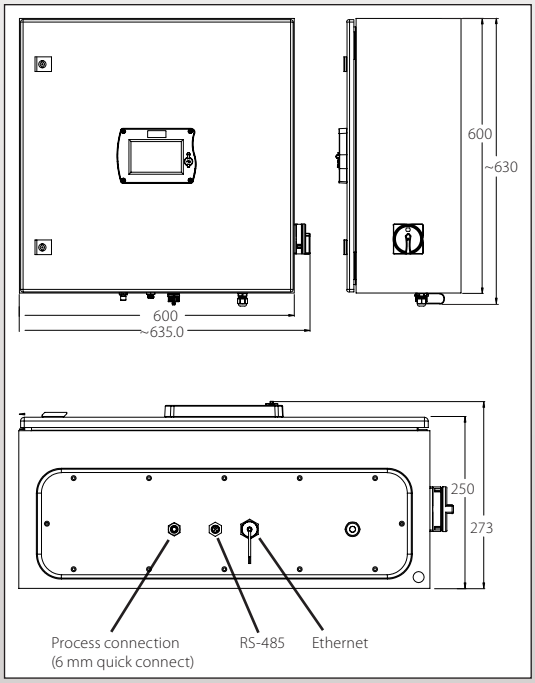
S601 BENEFITS

- All-in-one device measures particle concentration, dew point and oil vapor
- Measures additionally the temperature and pressure
- Open protocol outputs integrate it into your management system
- Modbus/RTU (RS 485) and Modbus TCP (Ethernet) included
- Compact design and easy setup
- Compressed air connection via 6 mm tube
- Integrated data logger saves data for later analysis
- Dew point measurement from -100 ... +20 °C Td
- Oil vapor measurement from 0.003 ... 10.000 mg/m³
- Particle measurement in two versions:

  A1260: 0.3 < d ≤ 5.0 µm

  A1263: 0.1 < d ≤ 5.0 µm

S601 DIMENSIONS



S601 FEATURES

The S601 is the stationary multi-tool for compressed air purity measurements. It measures, records and validates quality parameters like particles, dew point, oil vapor contents, temperature and the pressure of compressed air systems. It offers different signal outputs to seamlessly integrate it into your system. The integrated logger stores the recorded values safely.

0.1 < d ≤ 5.0 µm

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

-100° ... +20°C Td

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 Td

0.003... 10.000 mg/m³

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

0.3 ... 1.5 MPa

PRESSURE MEASUREMENT

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

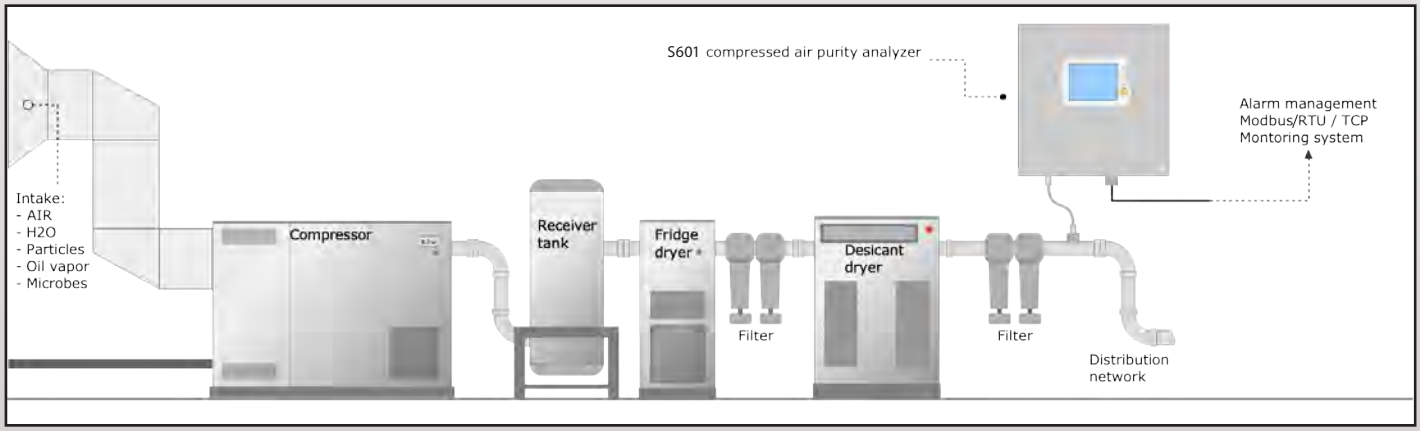
Log & Report

PLUG & PLAY MEASUREMENTS WITH A TOUCH

+ Integrated data logger records all channels in parallel for later analysis
+ 5'' touchscreen allows you to interact with the device on site. There is no need for a PC to manage the device.

The S601 is based on a modular concept which enables the client to decide which type of measurement needs to be performed. This makes the S601 customizable and flexible to offer the end-user the best suited instrument to finish the desired measurement tasks.

S601 application in a compressed air system



S601 TECHNICAL DATA

General Specifications					
Pressure range	0.3 ... 1.5 MPa				
Power supply	100 ... 240 VAC / 50 VA				
Measured gas	Air				
Medium humidity	< 40 % relative humidity				
Ambient conditions	0 ... 50 °C				
Transport Temp.	-10 ... +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 poles (RS-485) 1 x RJ45 (Ethernet) 1 x mains cable with plug				
Process connection	6 mm quick connect				
Approvals	CE, RoHS				
S601 - Measurement specs	**Sensor type**	**Range**		**Accuracy**	
Particles	Laser optical detection	Option A1260	Option A1263	Option A1260	Option A1263
		0.3 < d ≤ 0.5 µm 0.5 < d ≤ 1.0 µm 1.0 < d ≤ 5.0 µm	0.1 < d ≤ 0.5 µm 0.5 < d ≤ 1.0 µm 1.0 < d ≤ 5.0 µm	50 % @ 0.3 < d ≤ 0.45 µm 100 % @ 0.45 µm < d per JIS	50 % @ 0.1 < d ≤ 0.15 µm 100 % @ 0.15 µm < d per JIS
Oil vapor	Photoionisation detector PID	0.003 ... 10.000 mg/^{3}		5 % of value ± ... 0.003 mg/m^3	
Dew point	Dual-sensor technology (QCM + Polymer)	-100 ... +20 °C Td		± 2 °C Td	

S601 ORDERING

Please use the following table to assist in placing your order with our sales staff.

S601 Stationary compressed air analyzer	
Order No.	**Description**
D500 0601	S601 compressed air analyzer Touch screen interface, data logger , metal cabinet for wall mounting Supply voltage 100 ... 240 V AC, Inlet pressure 0 .. 1.0 MPa Including: - Dew point measurement rig -100 ... +20 °C Td - 2 m PTFE hose - 1.5 m PTFE hose with quick connector - Purge unit for measuring point cleaning - USB OTG memory stick - S4A Software for logger read out and analysis - 1 x PTFE hose adapter - Certificate of calibration
Particle counter	
A1260	Integrated particle counter rig, 0.3 < d ≤ 0.5 µm, 0.5 < d ≤ 1.0 µm, 1.0 < d ≤ 5.0 µm, 2.83 l/min
A1263	Integrated particle counter rig, 0.1 < d ≤ 0.5 µm, 0.5 < d ≤ 1.0 µm, 1.0 < d ≤ 5.0 µm, 2.83 l/min
Oil vapor measurement	
A1267	Integrated oil vapor sensor rig, 0.003 ... 10.000 mg/m³

LEAK DETECTOR FOR PNEUMATIC SYSTEMS S530

Find possible leaks —
save costs of running compressors

S530 FEATURES

EASY TO USE
Find leaks in minutes

NOISE ISOLATED HEADSET
Inaudible signals easily to be heard

LASER POINTER
To spot the leak

LONG BATTERY LIFE

COMPACT DESIGN
Can be used anywhere

Leaks in compressed air systems can significantly increase the cost of compressed air.

The detection of leaks is an important maintenance requirement which can be done by soapy water or in a more convenient way with ultrasonic leak detectors like S530.

S530 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

S530 OPERATION PRINCIPLE

When gases are leaking through tubes and tanks, an ultrasonic sound is produced which can be detected by the S530 even from several meters away. The S530 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.

Contents of Set

Option: Ultrasonic tone generator to be used in pressure less systems. The generator emits ultrasonic waves which can be detected by the S530.

S530 ORDERING

S530 Leak Detector	
Order No.	**Description**
P601 0103	**S530 Leak Detector set consisting of:**
P560 0102	S530 Leak Detector
S605 0001	Sensor unit
A554 0114	Noise isolated headset
A530 0101	Focus tube and focus tip
A554 0113	Battery charger
A554 0101	Transport case S530
	Additional accessories not included in the set:
A554 0103	Ultrasonic tone generator

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

Ultrasonic Leak Detector S530

Leak detection with focus tube

Leak detection from distance with the integrated laser pointer

ULTRASONIC LEAK DETECTOR S531

Find possible leaks —
leak detector for pneumatic systems

S531 FEATURES

Touch Screen
High resolution 3.5" color touch screen

Mass Storage
Almost unlimited memory for leak records, photos and voice recording

Wireless Connection
Wireless connection to headset

Data transmission through Wi-Fi
Wi-Fi to upload/download survey data and settings

Photograph leak parts
Build in camera to take photo of leak locations

Voice Recording
Voice recorder for voice memos

Laser
Pinpoint locations with laser pointer

Detect from distance
Finds leaks in compressed air system easily even from distance

Analysis
Records leak information for statistics and repair

Loss calculate
Calculates air loss in m3/h or in local currency

Noise reduction
Integrated noise reduction

Long Working Hours
Battery capacity for up to 6 hours

S531 APPLICATION

S531 is an ultrasonic leak detector that helps users quickly find and record leakages in compressed air or any gas systems. The built-in touch screen assists the user easy operation in leak detecting. Photographing and voice recording make leak surveys more flexible and efficient.

S531 is designed to work with SUTO LMS (Leak Management System) to enable companies to properly manage their leakage detection and repair activities, either through cloud based service or local server installation.

Scope of delivery

Option: Ultrasonic tone generator to be used in pressure less systems. The generator emits ultrasonic waves which can be detected by the S531.

S531 BENEFITS

- Finds leaks in compressed air system easily even from distance
- Full support for Leak Surveys with the SUTO Leak Management System (LMS)
- The perfect tool for professional leak detection
- Fast return on investment
- Easy to use, but powerful in performance

Ultrasonic Leak Detector S531

Leak detection with focus tube

Leak detection from distance with the integrated laser pointer

S531 TECHNICAL DATA

General Specifications	
Principle of measurement	Ultrasonic leak detection
Measuring medium	Compressed Air, refrigerants and any compressed gases
Measurement bandwidth	35 – 45 kHz
Plug	3.5 mm stereo phone jack for head set
Operating temperature	0 ... 40 °C
Battery life	About 8 hours
Charging temperature	10 ... 45 °C
Charging time	Around 3 hours
Housing material	PC + ABS
Interface	Wireless connection to headset USB for charging and data exchange Wi-Fi
Display	3.5" colour LCD
Laser pointer	Wavelength: 640 ... 660 nm Output power: < 1.0 mV
Camera	5.0 Mega Pixel
Headset	Noise isolated, wireless

S531 ORDERING

Please use the following table to assist in placing your order with our sales staff.

S531 ULTRASONIC LEAK DETECTOR	
Order No.	**Description**
P601 0104	**S531 Leak Detector Set, Battery charger and accessories in transport case**
P560 0104	S531 Leak Detector
A554 0119	Noise isolate/canceling headset, wireless
A530 0101	Focus tube and focus tip for accurately pinpointing
A554 0123	Trumpet for locating leaks over longer distances
A554 0117	Battery charger
A554 0118	Transport case S531
A554 0122	Leak tags to mark found leaks, 100 pieces
Additional accessories not included in the set:	
A554 0103	Ultrasonic tone generator
R200 0070	Calibration S531

LEAK MANAGEMENT SYSTEM (LMS)

Identify your air leakage — **safe compressed air costs**

If you are a company providing leak services to your customers or a facility manager who is responsible for energy saving and interrupt-free operations, LMS will help you manage your compressed air leaks and save your time. It supports you to calculate the potential savings in m^3 or in money terms, provide impressive reports for customer or management, and guide you in the entire leak fixing process.

A software tool that pays off in no time!

LMS FEATURES

Powerful Management
Multiple customers, sites and surveys can be managed

User Management
Multi-user support

Data Exchange
Data exchange with leak detector unit S531 for site/survey data and settings

Remote Access
Access LMS from anywhere

Flexible Deployment
Installation on site as well as in cloud

Part Management
Spare part order management

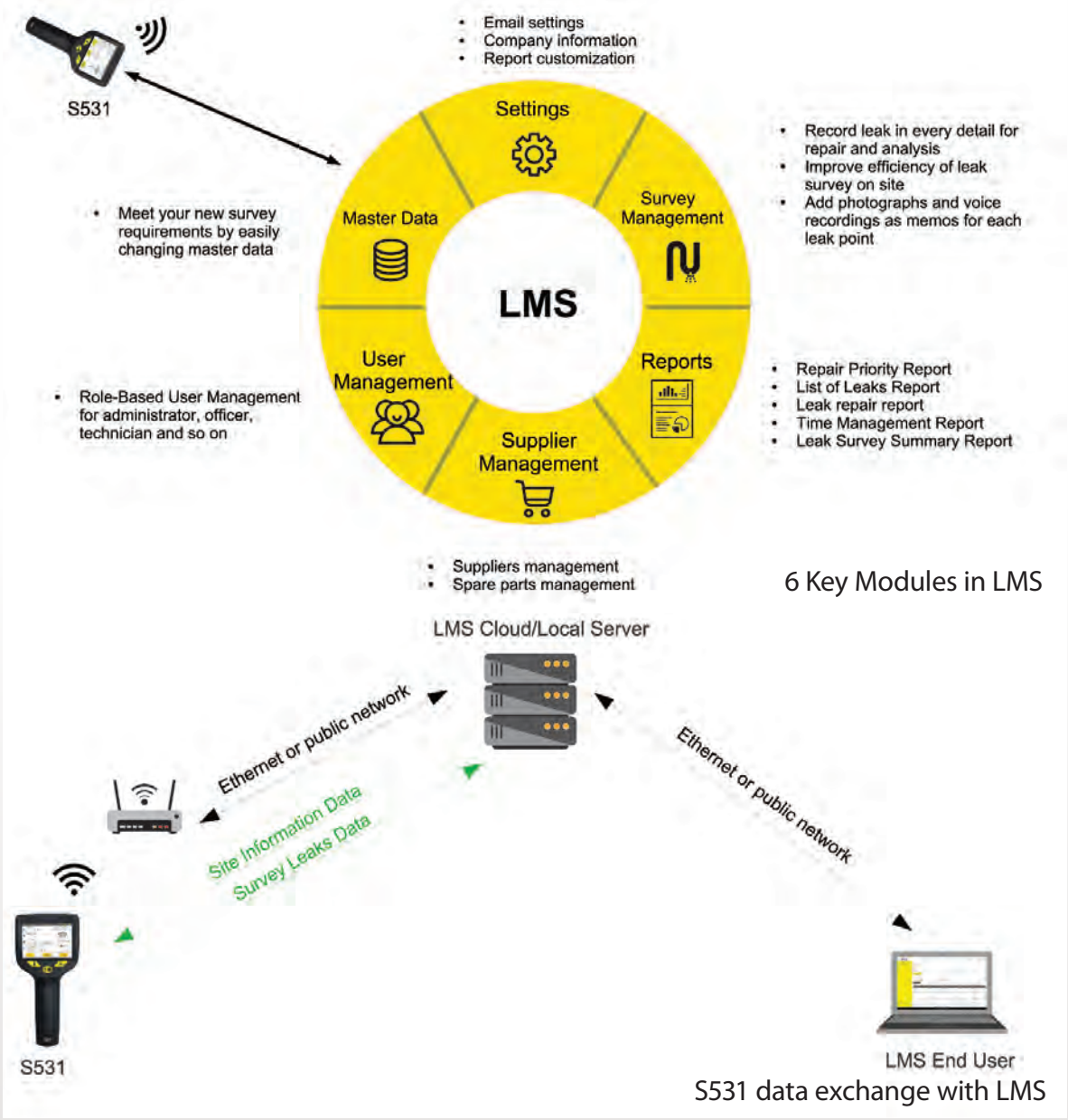
Browser Based Operation
Runs on any operation system

Report
Powerful report generator

LEAK MANAGEMENT SYSTEM (LMS)

Are you wasting countless hours creating reports and documenting leaks with EXCEL? Now it's time to change that !
SUTO LMS will assist you to generate comprehensive reports and more than that.

Web based SUTO LMS (Leak Management System) is designed to work with S531 to provide management on leak survey, ordering parts and repair activities, allowing quantification of leaks, prioritization of repairs, statistics of leaks and savings. Either through cloud based service or local server installation, LMS allows remote access by mobile phones , tablets or PCs at any time.



LEAK MANAGEMENT SYSTEM (LMS) ORDERING

Please use the following table to assist in placing your order with our sales staff.

Leak Management System (LMS)	
Order No.	**Description**
M599 7040	Leak Management System(LMS), local installation, max to 2 users, annual subscription
M599 7041	Leak Management System(LMS), local installation, max to 5 users, annual subscription
M599 7042	Leak Management System(LMS), local installation, max to 10 users, annual subscription
M599 7043	Leak Management System(LMS), cloud installation, max to 2 users, annual subscription
M599 7044	Leak Management System(LMS), cloud installation, max to 5 users, annual subscription
M599 7045	Leak Management System(LMS), cloud installation, max to 10 users, annual subscription

POWER METER S110

Power Meter S110 — **monitors the power consumption and power quality**

S110 hat rail mountable

S110 FEATURES

MULTIFUNCTION POWER METER
3-phase, 1-phase

ROGOWSKI COILS
Wide range, highly accurate

MODBUS/ RTU INTERFACE
Connects to any Modbus-Master

S110 OPERATION PRINCIPLE

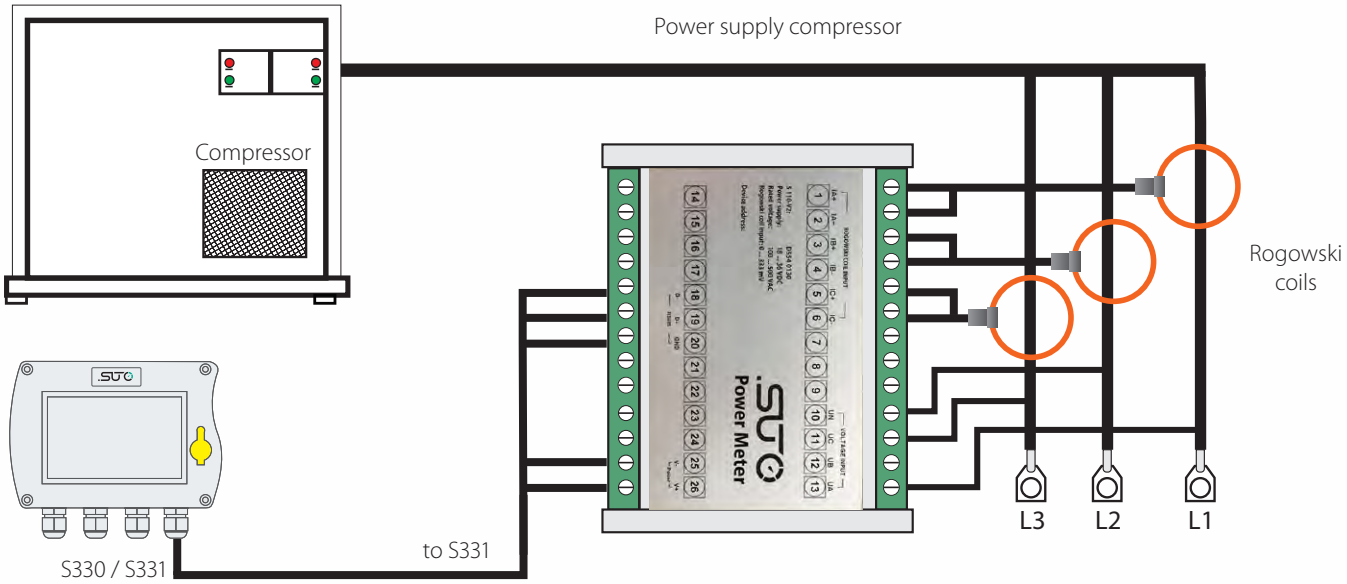
The S110 Power Meters are designed for easy installation and high accuracy. They measure the actual power consumption in kW and accumulate the Energy consumption in kWh of a 3-phase load.

The S110 can measure other parameters such as current, voltage, cos phi etc. Hat rail, wall mountable and portable versions are available.

S110 TECHNICAL DATA

General Specifications		
Nominal voltage (L-N, L-L)	100 ... 500 VAC	
Voltage measurement	3PH4W, 3PH3W, 1PH2W	
Clamp sensor input range	(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	S110 1W S110-P 2W
Operating Temperature	-25 ... +55 °C	
Dimensions	Hat rail version Portable	122 x 87 x 23 mm 177 x 177 x 60 mm

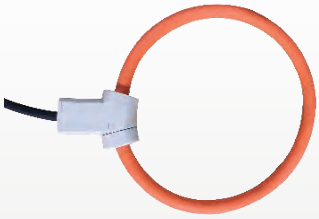
S110 INSTALLATION



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 S110 power meter to the S330 / S331 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 S110 power meter.

S330 / S331 can be used as stationary display of up to 16 power meters

S110-P, portable solution power meter, to be connected to the S551



Rogowski coil with wide measuring range, high accuracy and easy installation
(Note: for each phase you must order 1 coil)

S110 ORDERING

Please use the following table to assist in placing your order with our sales staff.

S110 Power Meter	
Order No.	**Description**
Stationary	
D554 0130	S110 power meter, hat rail, Modbus/RTU, 24 VDC supply
S554 0140	SUTO current sensor for S110, 1000 A, 100 mm diameter, 1.8 m cable, open ends
S554 0141	SUTO current sensor for S110, 3000 A, 150 mm diameter, 1.8 m cable, open ends
S554 0142	SUTO current sensor for S110, 100 A, 16 mm diameter, 1.8 m cable, open ends
Portable	
P554 0134	Portable power meter S110-P, Modbus/RTU, including 4 test leads, 4 test clips, connection cable to S551
S554 0160	SUTO current sensor for S110-P, 1000 A, 100 mm diameter, 1.8 m cable, connector to S110-P
S554 0161	SUTO current sensor for S110-P, 3000 A, 150 mm diameter, 1.8 m cable, connector to S110-P
S554 0162	SUTO current sensor for S110-P, 100 A, 16 mm diameter, 1.8 m cable, connector to S110-P

PRESSURE SENSORS

Pressure Sensors —
monitor your compressed air pressure

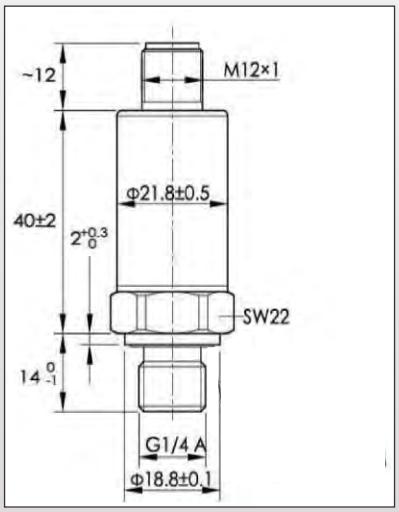
PRESSURE SENSOR APPLICATIONS

- Compressors
- Mechanical engineering
- Plant construction
- Industrial pneumatics

PRESSURE SENSOR FEATURES

- Reliably
- Economically
- Universally applicable

PRESSURE SENSOR DIMENSIONS



PRESSURE SENSOR TECHNICAL DATA

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

Modbus version:
Baud rate: 19.200
Framing/Parity/Stop: 8, N, 1
Device address: 1 (default), Please specify the needed Modbus parameters on your order, the parameters can only be set in our works

PRESSURE SENSOR ORDERING

Please use the following table to assist in placing your order with our sales staff.

Pressure Sensor	
Order No.	**Description**
S694 3557	Pressure sensor, 1.6 MPa, 4 ... 20 mA loop powered, M12 connector
S694 3558	Pressure sensor, 4.0 MPa, 4 ... 20 mA loop powered, M12 connector
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

TEMPERATURE SENSOR

Temperature Sensor —
the compact sensor solution with 4 ... 20 mA output

TEMPERATURE SENSOR FEATURES

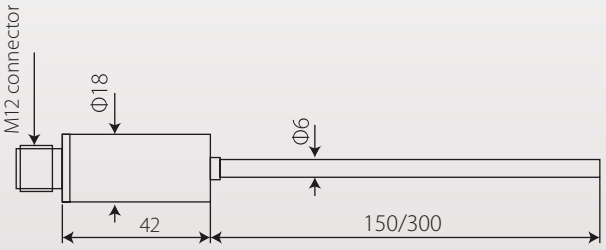
- Easy installation in compressed air systems
- 4 ... 20 mA transmitter

TEMPERATURE SENSOR INSTALLATION

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

Temperature sensor with 4 ... 20 mA output

TEMPERATURE SENSOR DIMENSIONS



Compression fitting

TEMPERATURE SENSOR TECHNICAL DATA

General Specifications	
Measuring range	-50 ... +200 °C
Sensor	Pt1000, class A
Supply	16 ... 30 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	IP65
Ambient temperature (electronics)	-40 ... +90 °C

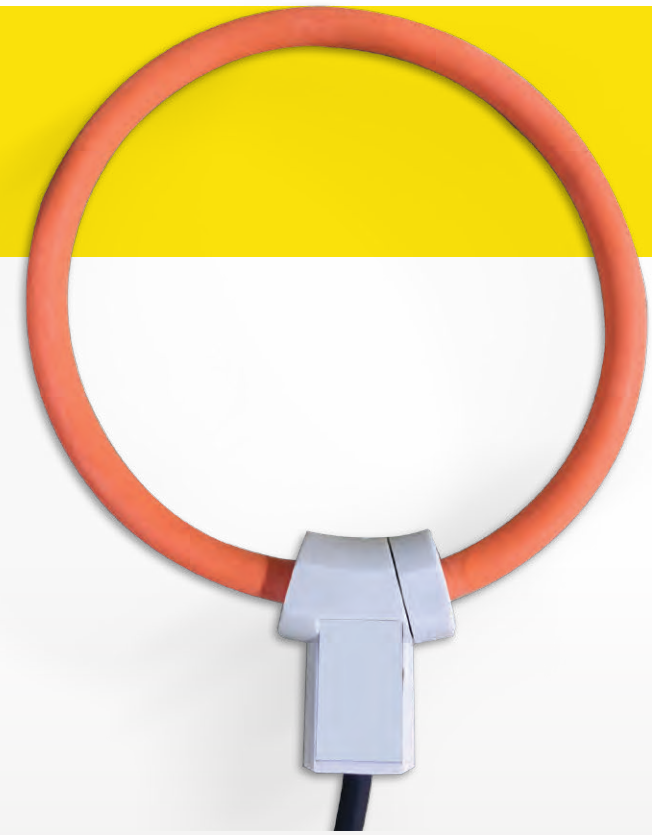
TEMPERATURE SENSOR ORDERING

Please use the following table to assist in placing your order with our sales staff.

Temperature Sensor	
Order No.	**Description**
S693 0003	Temperature transmitter, -50 ... +200 °C, 4 ... 20 mA loop powered, 6 x 150 mm sensor tube
S693 0004	Temperature transmitter, -50 ... +200 °C, 4 ... 20 mA loop powered, 6 x 300 mm sensor tube
A554 6003	Compressor fitting 6 mm, G 1/2", PTFE ring, 0.6 MPa
A554 6004	Compressor fitting 6 mm, G 1/2", metal ring, 1.6 MPa
A553 0104	Sensor cable 5 m, with M12 connector, open wires, AWG24 (0.2 mm^2)

SUTO CURRENT SENSOR

SUTO current sensor — **Rogowski Coil for wide range at high accuracy**



SUTO current 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.

SUTO CURRENT SENSOR APPLICATION

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

SUTO CURRENT SENSOR FEATURES

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

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

SUTO CURRENT SENSOR TECHNICAL DATA

General Specifications	S554 0155 / S554 0156	S554 0157 / S554 0158
Measuring range	10 ... 1000 A AC	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	4 ... 20 mA DC 0 A AC = 4 mA DC 3000 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	

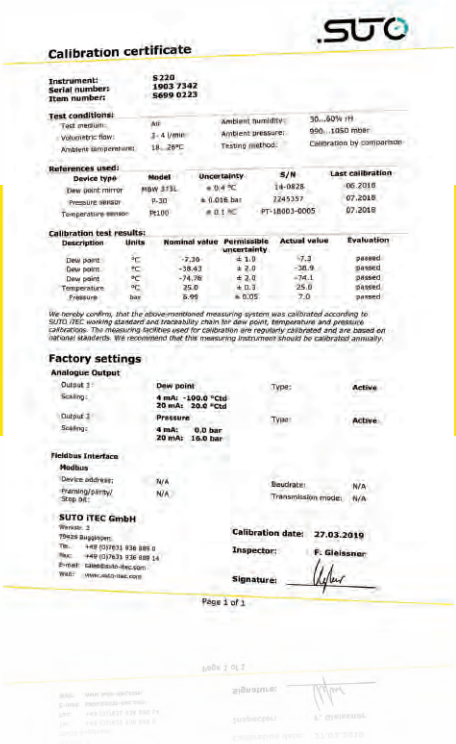
SUTO CURRENT SENSOR ORDERING

Please use the following table to assist in placing your order with our sales staff.

Current Sensor	
Order No.	**Description**
S554 0156	SUTO current sensor, 1000 A, 100 mm diameter, including connector to S551
S554 0155	SUTO current sensor, 1000 A, 100 mm diameter, open wire ends
S554 0157	SUTO current sensor, 3000 A, 150 mm diameter, including connector to S551
S554 0158	SUTO current sensor, 3000 A, 150 mm diameter, open wire ends

TEST AND CALIBRATION

Regular Calibration — **comply with Quality Standards, ensure Product Safety and Energy Saving**



Calibration certificate

Instrument: S220
Serial numbers: 1903 7342
Item numbers: 5699 0223

Test conditions:
Test medium: Air
Volumetric flow: 3 - 4 l/min
Ambient temperature: 18...26°C
Ambient humidity: 30...60% rH
Ambient pressure: 990...1050 mbar
Testing method: Calibration by comparison

References used:

Device type	Model	Uncertainty	S/N	Last calibration
Dew point mirror	MBW 373L	± 0.4 °C	14-0828	06.2018
Pressure sensor	P-30	± 0.016 bar	1245357	07.2018
Temperature sensor	Pt100	± 0.1 °C	PT-18003-0005	07.2018

Calibration test results:

Description	Units	Nominal value	Permissible uncertainty	Actual value	Evaluation
Dew point	°C	-7.39	± 1.0	-7.3	passed
Dew point	°C	-38.43	± 2.0	-38.9	passed
Dew point	°C	-74.78	± 2.0	-74.1	passed
Temperature	°C	25.0	± 0.3	25.0	passed
Pressure	bar	6.99	± 0.05	7.0	passed

We hereby confirm, that the above-mentioned measuring system was calibrated according to SUTO iTEC working standard and traceability chain for dew point, temperature and pressure calibrations. The measuring facilities used for calibration are regularly calibrated and are based on national standards. We recommend that this measuring instrument should be calibrated annually.

Factory settings

Analogue Output
Output 1: Dew point — Type: Active
Scaling: 4 mA: -100.0 °Ctd, 20 mA: 30.0 °Ctd
Output 2: Pressure — Type: Active
Scaling: 4 mA: 0.0 bar, 20 mA: 16.0 bar

Fieldbus Interface
Modbus
Device address: N/A — Baudrate: N/A
Framing/parity/Stop bit: N/A — Transmission mode: N/A

SUTO iTEC GmbH
Calibration date: 27.03.2019
Inspector: F. Gleissner
Signature:

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CALIBRATION SERVICE FOR:

- FLOW
- PARTICLES
- DEW POINT
- PRESSURE
- OIL VAPOUR
- ENERGY CURRENT VOLTAGE

ON-SITE TESTING

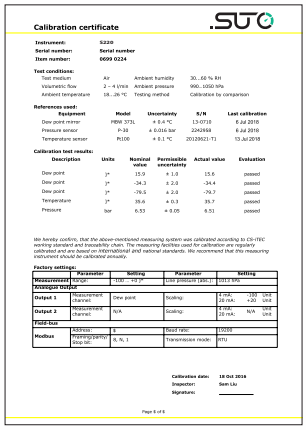
For on-site testing we can offer:

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

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 °C Td
- Calibration range: -75 ... +15 °C Td
- Reference: Dew point mirror MBW 373



Calibration certificate

Instrument: S220
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	960...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 2016
Pressure sensor	P-30	± 0.016 bar	2242468	6 Jul 2016
Temperature sensor	Pt100	± 0.1 °C	20133921-T1	13 Jul 2018

Calibration test results:

Description	Units	Nominal value	Permissible uncertainty	Actual value	Evaluation
Dew point	°F	15.0	± 1.0	15.6	passed
Dew point	°F	-24.3	± 2.0	-24.4	passed
Dew point	°F	-76.5	± 2.0	-76.7	passed
Temperature	°F	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 CSI-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 ... +6 °F	Low pressure (abs.):	2013 hPa
Analogue Output				
Output 1	Measurement channel:	Dew point	Scaling:	4 mA: -100 °F 20 mA: +20 °F	Unit:
Output 2	Measurement channel:	N/A	Scaling:	4 mA: N/A 20 mA: N/A	Unit:
Field bus				
Modbus	Address:	1	Baud rate:	19200
	Framing/parity/ stop bit:	8, N, 1	Transmission mode:	RTU

Calibration date: 18 Oct 2018
Inspector: Sam Liu
Signature:

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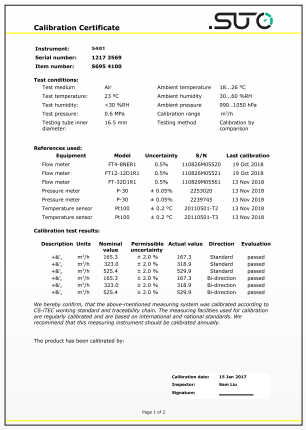
FLOW CALIBRATION SERVICE

- Accuracy: 0.65 % of reading
- Pressure: 0 ... 0.6 MPa
- Medium: Air, other gases on request
- Calibration range: 0 ... 4000 sm^3/h
- Pipe diameter: DN8 ... DN100
- Reference: Sonic Nozzles, Laminar Flow Elements, Turbine meters



Calibration Certificate

Instrument: S601
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	960...1050 hPa
Test pressure:	0.6 MPa	Calibration range	m³/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
q_{Air}	m³/h	165.3	± 2.0 %	167.3	Standard	passed
q_{Air}	m³/h	323.0	± 2.0 %	318.9	Standard	passed
q_{Air}	m³/h	525.4	± 2.0 %	529.9	Standard	passed
q_{Air}	m³/h	165.3	± 2.0 %	167.3	Bi-direction	passed
q_{Air}	m³/h	323.0	± 2.0 %	318.9	Bi-direction	passed
q_{Air}	m³/h	525.4	± 2.0 %	529.9	Bi-direction	passed

We hereby confirm, that the above-mentioned measuring system was calibrated according to CSI-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:

Page 1 of 2

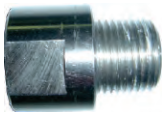
TEST AND CALIBRATION ORDERING

Please use the following table to assist in placing your order with our sales staff.

Test and Calibration	
Order No.	**Description**
R200 0001	Flow calibration with certificate
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 S120
R200 0030	Pressure sensor calibration 16 bar(g) type, at 3 points
R200 0600	**S600 calibration and service:** - General inspection of the unit - Replacement of tubes and fittings - Cleaning of components - Assembly and test of unit
R699 3396	Dew point sensor calibration
R200 0050	Dew point calibration, one additional point, freely selectable in the range -75 ... +20 °C Td
R200 0130	Calibration for Particle Counter S130
R200 0131	Calibration for particle counter S131
R200 0601	S601 Main unit exchange including dew point sensors
R200 0602	S601 Oil vapor sensor exchange
R200 0603	S601 Particle counter 0.3 µm type exchange
R200 0604	S601 Particle counter 0.1 µm type exchange
R200 0005	Oil-& grease-free cleaning option for flow sensors (For Oxygen, it is already included in A1009.)

ACCESSORIES ORDERING

Please use the following table to assist in placing your order with our sales staff.

	C190 0002	
	Description	Closing cap for S421/S452 material: 1.4404
	Application	To close the measuring sections in case the sensor unit is removed
	**C190 0060**	
	Description	Thread adaptor, G 1/2" internal to PT 1/2" external, SUS303
	Application	Used to adapt S401 or S450 to a PT thread ball valve
	C190 0065	
	Description	Thread adaptor, G 1/2" internal to NPT 1/2" external, SUS303
	Application	Used to adapt S401 or S450 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 S400/S401-220 mm * A530 1106 - High pressure installation device for S450-220 mm * A530 1111 - High pressure installation device for S400/S401-400 mm * A530 1113 - High pressure installation device for S450-400 mm
	A530 1108	
	Description	SUTO spot drilling device G 1/2" for S401, S450 and S409
	Application	This drilling tool is used to drill holes into compressed air pipes under pressure through a ball valve
	A530 1205	
	Description	HT20 G 3/4" hot tapping tool, for S430
	Application	Drill 3/4" holes into compressed air pipes under pressure through ball valves
	A553 0121	
	Description	Sensor cable, 6 poles, AWG22, 7.5 mm outer diameter, w/ shielding, black (per meter)
	Application	Sensor cable for S450 sensor, US flow meter and power meter
	A553 0122	
	Description	Sensor cable, 5 poles, 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 poles with shielding, AWG 24
	Application	RS-485 connection cable

ACCESSORIES ORDERING

Please use the following table to assist in placing your order with our sales staff.

	A553 0104	
	Description	Sensor cable 5 m, with M12 connector, open wires, AWG24 (0.2 mm^2)
	Application	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 mm^2)
	Application	Used to connect SUTO sensors to a PLC or power supply
	A553 0146	
	Description	Sensor cable 5 m, with M12 and RJ45 connectors, PoE supported, AWG24 (0.2 mm^2)
	Application	Used to connect SUTO flow sensors to the Ethernet network via router, switch and etc.
	A554 0009	
	Description	Power supply for hat rail, input: 85 ... 264 VAC, output: 24 VDC, 60 W
	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, 15 W, 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 S401 / S450
	A554 0010	
	Description	¾" G type ball valve
	Application	This is a proper ball valve for the installations of flow sensors S430
	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, 0.5 A for S401 / S201 series, 2 m cable
	Application	Simple power supply for a portable S421 or S401 solution (Special plug on request)

ACCESSORIES ORDERING

Please use the following table to assist in placing your order with our sales staff.

	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
	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 S505
	Application	The sample gas/air is connected to the chamber through a 6 mm PTFE hose The chamber is mounted to the S505 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 S505
	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 S505 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 PTFE hose The chamber is mounted to stationary S2XX 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

ACCESSORIES ORDERING

Please use the following table to assist in placing your order with our sales staff.

	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 dew point, oil and particle
	Dew point sensor protection caps	
	Application	Protection caps are used to protect the dew point sensor element from mechanical 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	S51 panel meter, with 4-20 mA input and 2 alarm outputs, 85 ... 265 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
	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.

ACCESSORIES ORDERING

Please use the following table to assist in placing your order with our sales staff.

	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	8-channel current input module, 0 ... 20 mA, Modbus/RTU
	Application	For connecting up to 8 sensors with 0 ... 20 mA / 4 ... 20 mA signal via RS-485 to S330 / S331.
	D554 0032	
	Description	Pulse meter, 7 channels, Modbus/RTU
	Application	For connection up to 7 sensors with pulse output signal via RS-485 to S330 / S331.
	A554 0087	
	Description	USB OTG memory stick
	Application	USB memory drive for transferring data between SUTO data loggers (S331 / S551 / S120 with display / S130 with display) and a PC. The USB drive has a USB-A and a Micro-USB connector.

OVERVIEW OF SENSOR POWER CONSUMPTION

When setting up a system in which sensors and devices need to be supplied by an external power supply, please refer to the following power consumption table to select the correct power supply.

Sensor / Device	P/N	Power [W]
S401/S421	S595 4XXX	**3.0**
S415	S695 415X	**3.0**
S418	S695 418X	**3.0**
S418-V	S695 419X	**3.0**
S450/S452	S695 045X	**5.0**
S430	S695 430X	**3.0**
S435	S695 435X	**3.0**
S460	P554 007X	**1.5**
S409	S695 0409	**1.0**
S220	S699 022X	**1.0**
S212/S215	S699 041X	**1.0**
S217	S699 217X	**1.0**
S230/S231	S699 0230 / S699 0231	**1.0**
S201	S699 0406	**1.3**
S305 (24 VDC)	D699 3051	**5.0**
S305 (100... 240 VAC)	D699 3050	**5.0**
S330/S331	D500 033X	**10.0**
S320	D500 03XX	**5.0**
S120 (without display)	S604 120X	**5.0**
S130/S132 (without display)	S604 130X	**S130: 3.0** **S132: 15.0**
S120 (with display)	S604 120X	**10**
S130/S132 (with display)	S604 130X	**S130: 8.0** **S132: 23.0**
S601	D500 0601	**50**
S110	D554 0030	**4.5**
Pressure sensor	S694 XXX	**0.5**
Temperature sensor	S693 000X	**0.5**
Current sensor	S554 015X	**1.0**

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