

MEASUREMENT
TECHNOLOGY YOU
CAN RELY ON



 German Precision
and Quality

Flow & Consumption Meters



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.

THERMAL MASS FLOW SENSORS

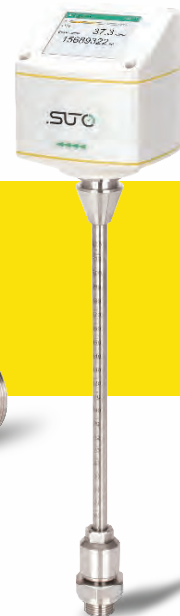


S401 / S421

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

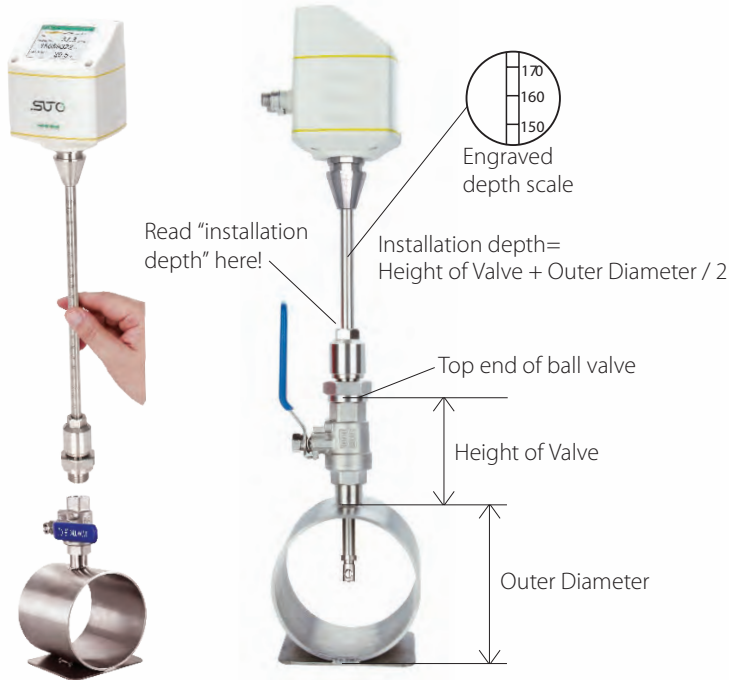
S401 BENEFITS

- 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.



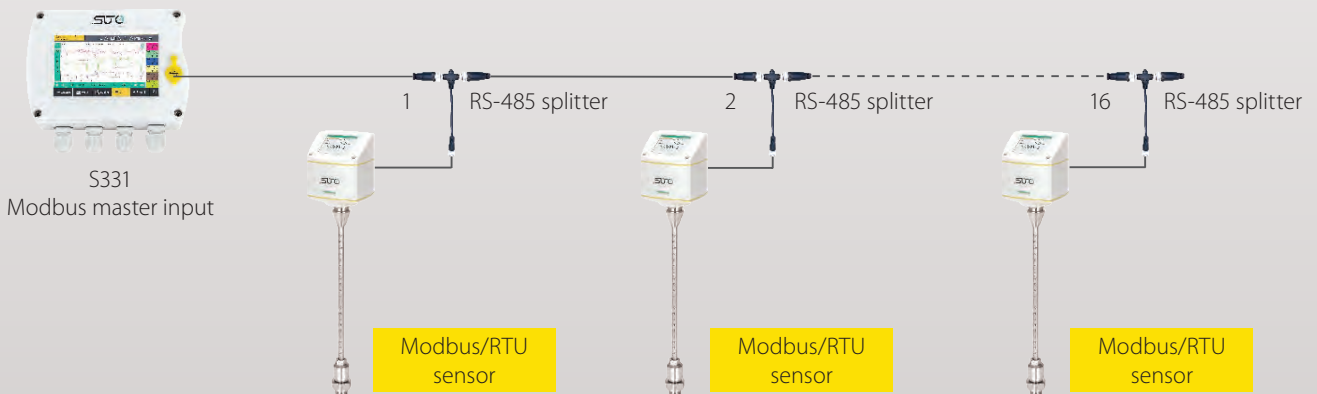
The S421 sensor unit can be easily removed for calibration. (Closing cap separately available)



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:

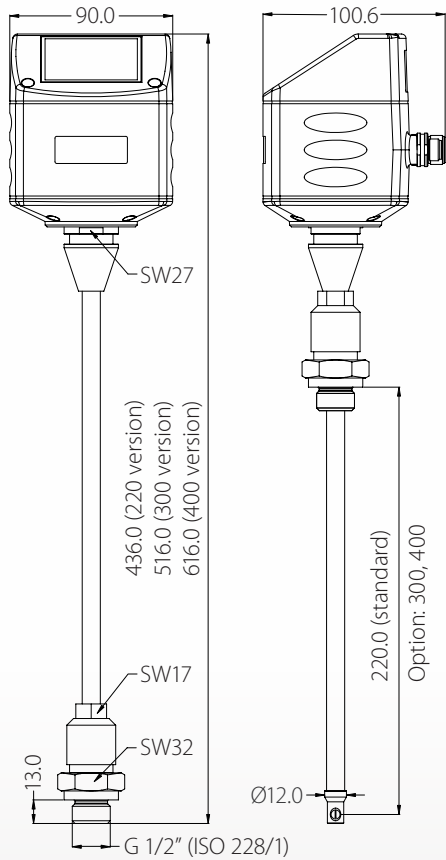
- Standard flow in air
- Reference pressure: 1000 hPa
- Reference Temperature: +20 °C

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.

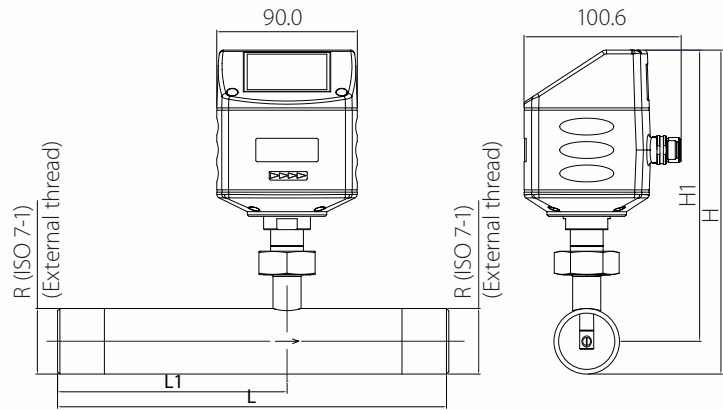
Furthermore it is possible to measure the air flow in bigger pipes (> DN300), for this please contact your local sales support.

S401 / S421 DIMENSIONS

S401



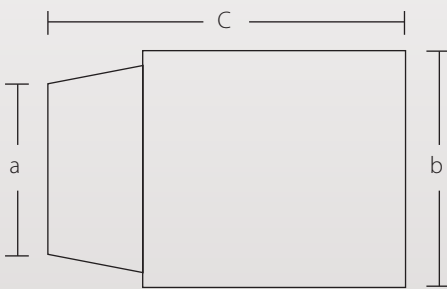
S421 thread type



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
1/2"(DN15)	300	210	197.4	186.7	R 1/2"
3/4"(DN20)	475	275	200.2	186.7	R 3/4"
1"(DN25)	475	275	203.6	186.7	R 1"
1 1/4"(DN32)	475	275	207.9	186.7	R 1 1/4"
1 1/2"(DN40)	475	275	210.9	186.7	R 1 1/2"
2"(DN50)	475	275	216.9	186.7	R 2"
2 1/2"(DN65)	475	275	232.7	194.6	R 2 1/2"
3"(DN80)	475	275	245.5	201.0	R 3"

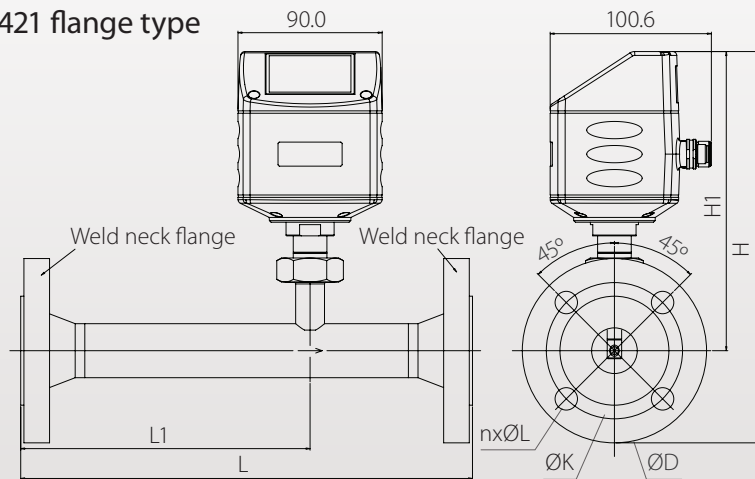
Optional flow conditioner

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

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)
1/2"(DN15)	300	210	234.2	186.7
3/4"(DN20)	475	275	239.2	186.7
1"(DN25)	475	275	244.2	186.7
1 1/4"(DN32)	475	275	256.7	186.7
1 1/2"(DN40)	475	275	261.7	186.7
2"(DN50)	475	275	269.2	186.7
2 1/2"(DN65)	475	275	287.1	194.6
3"(DN80)	475	275	301.0	201.0

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 ₂ O
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 ₃ H 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. Example: 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 ₂ O
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 ₃ H 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, CO₂, N₂, standard range, high accuracy calibration, Modbus/RTU output, display

THERMAL MASS FLOW METERS



S415 / S418

Monitor your flow —
optimize process efficiency



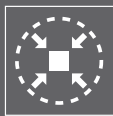
S415 / S418 FEATURES



SMARTPHONE ANDROID APP
 For remote configuration



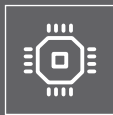
POINT-OF-USE INSTALLATION
 No straight pipe section required



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.

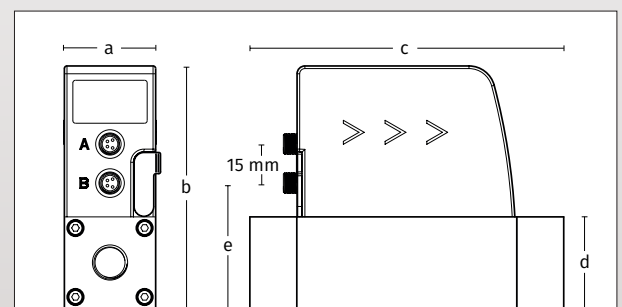
Asymmetric velocity profiles, swirl, and other factors caused by bends in pipes can lead quickly to inaccurate readings. And it is often not possible to place flow meters at hard-to-reach places.

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	A Air	A Air
	D N ₂	B CO ₂
The S418 can be calibrated for up to two gases. Standard is Air.		C O ₂ (oil & grease free)
		D N ₂
		E N ₂ O
		F Ar
		G Natural gas
		H H ₂ (real gas calibration)
		I Other gas (specify)
		J He (real gas calibration)
		K C ₃ H 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 ₃ H 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



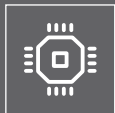
**POINT-OF-USE
INSTALLATION**
No straight pipe
section required



**COMPACT
DESIGN**
Can be installed
anywhere



**TOTAL
FLOW**
No bypass
measurement



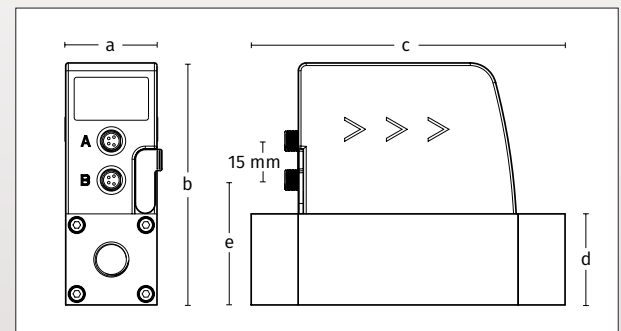
**EASY PROCESS
MONITORING**
Effective and
inexpensive recording



**ACCURATE
RESULTS**
Integrated flow
conditioner

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 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

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	

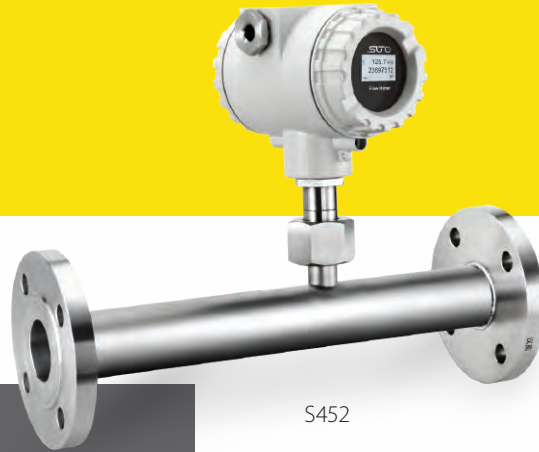
Example: S418-V1BB

DN15, Modbus/RTU, imperial units

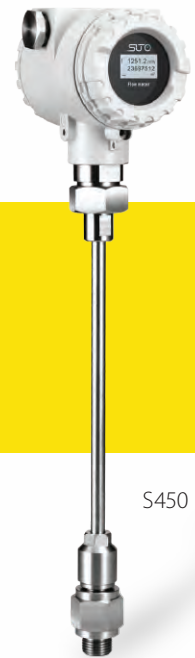
HEAVY DUTY INDUSTRY FLOW/CONSUMPTION SENSOR S450 / S452



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.

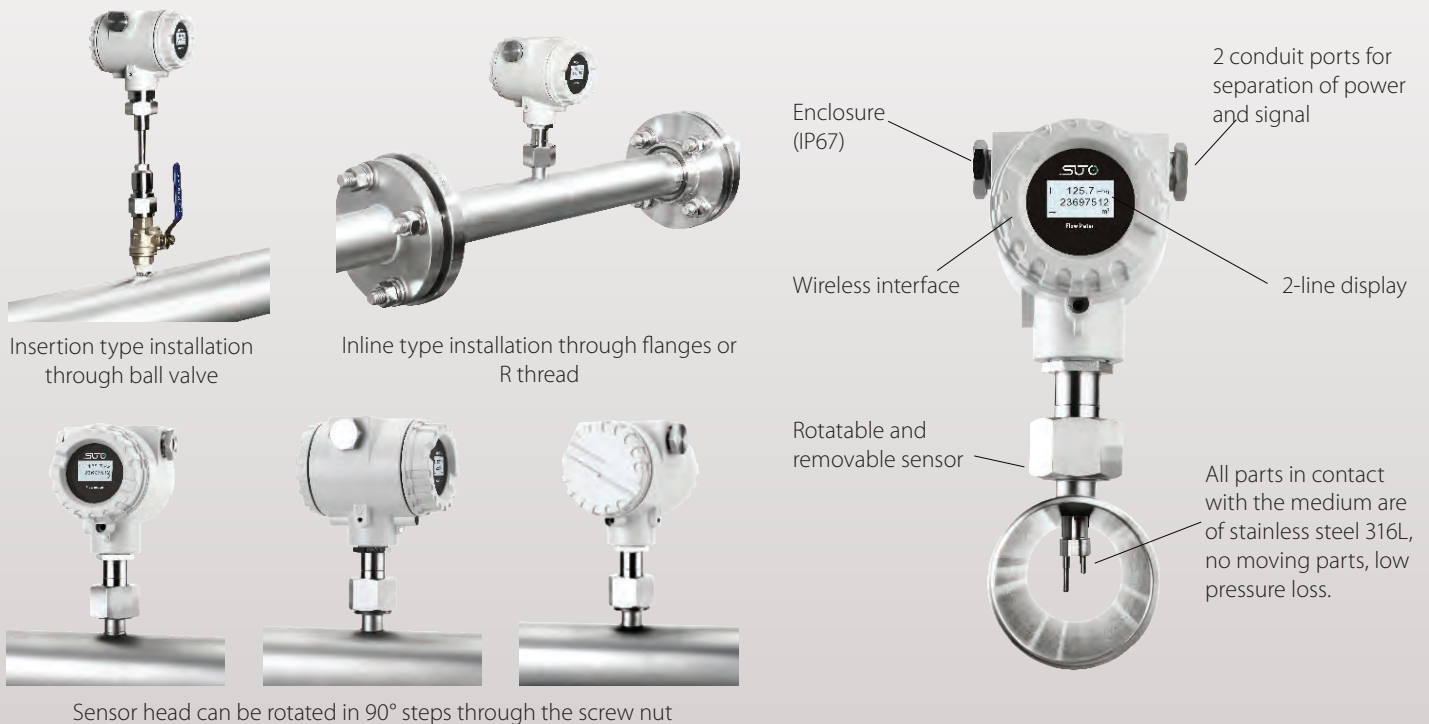
The IP67 casing allows all-weather applications. All parts which come into contact with the measurement medium are made of stainless steel 316L. This allows applications in pharmaceutical and food industry, but also the measurement of corrosive and contaminated gas. Installations in explosive environments 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



S450 / S452 VOLUMETRIC FLOW RANGES

Inch	DN	S-Range (m³/h)	M-Range (m³/h)	HS-Range (m³/h)
1/2"	DN15	0.2 ... 45.6	0.4 ... 91.0	0.48 ... 110.16
3/4"	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
1 1/2"	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
2 1/2"	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

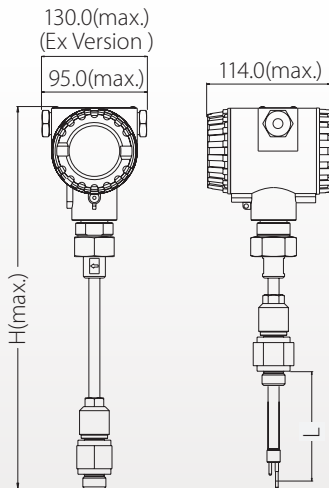
Stated measuring ranges under following conditions:

- 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.

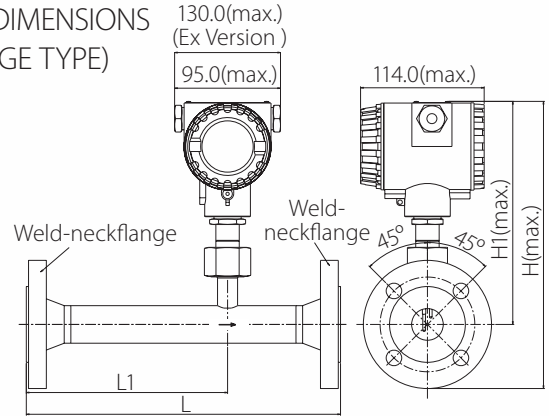
In larger pipe diameters flow can also be measured.

S450 DIMENSIONS



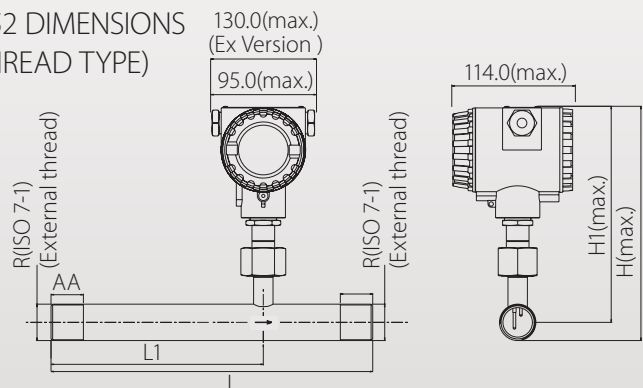
Shaft option	L (mm)	H (mm)
A	220	469
B	160	409
C	300	549

S452 DIMENSIONS (FLANGE TYPE)

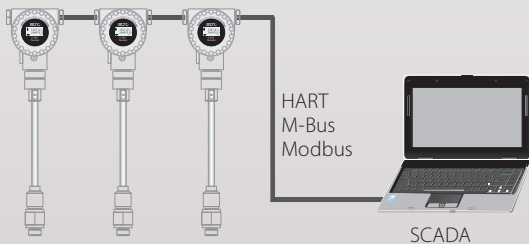


Pipe nominal size inch / (DN)	L total length (mm)	L1 inlet length (mm)	H total height (mm)	H1 from pipe center to casing top (mm)
1/2" (DN15)	300	210	247.65	200.15
3/4" (DN20)	475	275	252.65	200.15
1" (DN25)	475	275	257.65	200.15
1 1/4" (DN32)	475	275	270.15	200.15
1 1/2" (DN40)	475	275	275.15	200.15
2" (DN50)	475	275	282.65	200.15
2 1/2" (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"
1 1/4" (DN32)	475	275	221.35	200.15	R 1 1/4"
1 1/2" (DN40)	475	275	224.3	200.15	R 1 1/2"
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 ₂ O
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 ₃ H 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

Attention:

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

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 ₂ O
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 ₃ H 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

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.

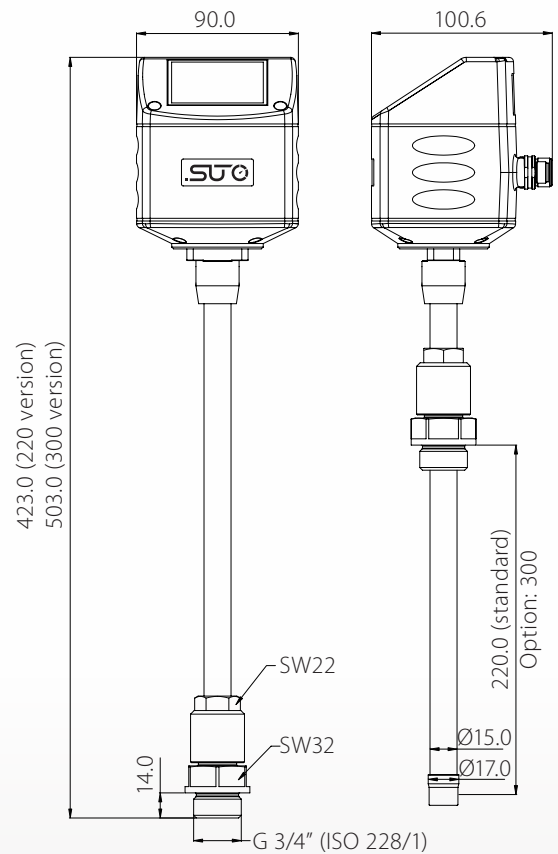
S430 TECHNICAL DATA

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	m³/h		m³/min		cfm	
		Min	Max	Min	Max	Min	Max
1	27.3	23	229	0.38	3.8	13	135
1¼"	36.0	51	507	0.85	8.5	30	298
1½"	41.9	76	756	1.26	12.6	45	445
2"	53.1	130	1298	2.16	21.6	76	764
2½"	68.9	227	2274	3.79	37.9	134	1338
3"	80.9	318	3175	5.29	52.9	187	1869
4"	100.0	488	4880	8.13	81.3	287	2872
5"	125.0	763	7625	12.71	127.1	449	4488
6"	150.0	1099	10993	18.32	183.2	647	6470
8"	200.0	1961	19611	32.69	326.9	1154	11543
10"	250.0	3064	30642	51.07	510.7	1804	18035
12"	300.0	4412	44125	73.54	735.4	2597	25971
Flow range for Air at 6 barg, 50 °C and 90 % humidity. For other gas and condition please download Flow Range software from www.suto-itec.com							

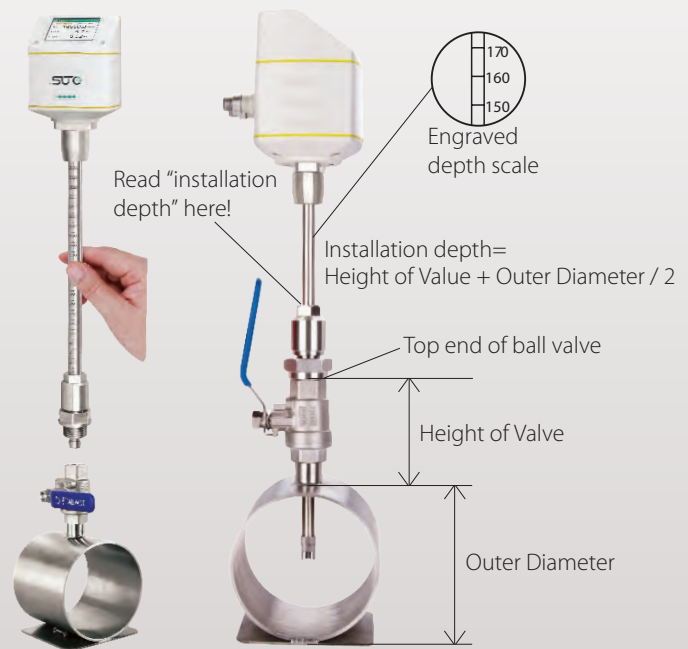
Stated measuring ranges under following conditions:

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

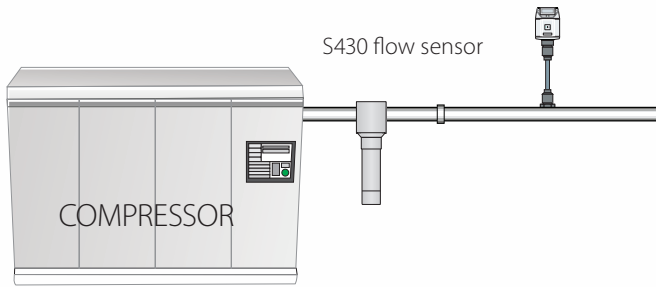
Dimensions



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 3/4" standard
A1068	B	PT 3/4" adaptor
A1069	C	NPT 3/4" 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 ₂ O
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 3/4" standard
A1068	B	PT 3/4" adaptor
A1069	C	NPT 3/4" 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 ₂ O
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

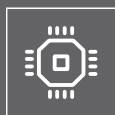
S435 FEATURES



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

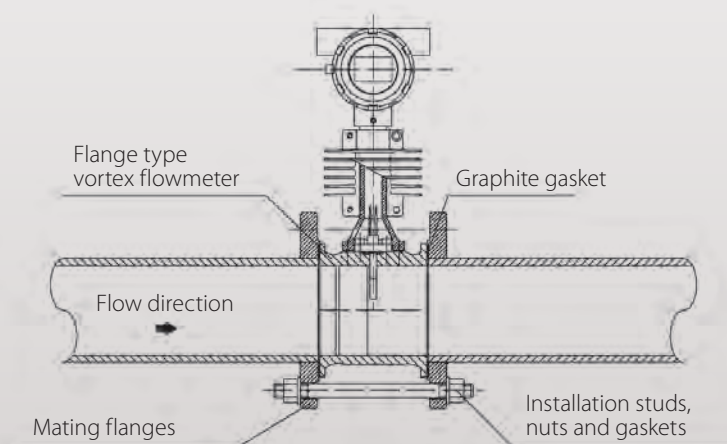
Vortex flow meters are the ideal choice for steam measurements due to their robust design, without any moving parts and high temperature/pressure resistance. S435 provides mass flow and consumption measurements in saturated steam with automatic density compensation. This guarantees always accurate results. 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 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

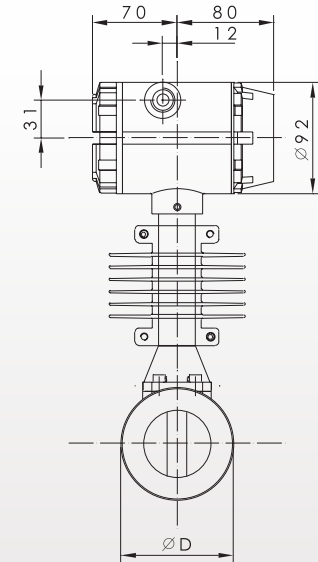
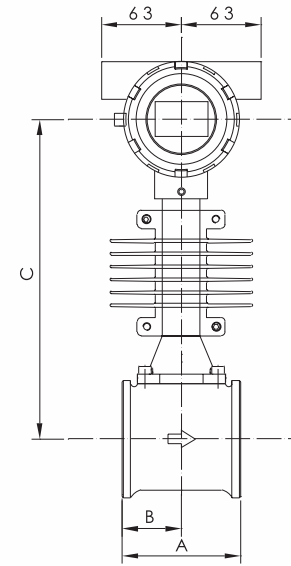
S435 INSTALLATION



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 uninstillation - DN40&DN50
A695 0002	Blind pipe for uninstillation - DN65
A695 0003	Blind pipe for uninstillation - DN80
A695 0004	Blind pipe for uninstillation - DN100
A695 0005	Blind pipe for uninstillation - DN125
A695 0006	Blind pipe for uninstillation - DN150
A695 0007	Blind pipe for uninstillation - DN200

Notes:

All Flow meters: Wafer connection (Companion flange, bolt and gasket included), temperature compensation, local display, medium temperature <250 °C, 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



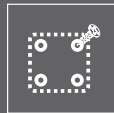
**TRANSIT TIME
CORRELATION
TECHNIQUE**



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



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

To calculate the flow range please use this formula:

$$Q = Di^2 * 0.01979$$

Q [m³/h]

Di [mm]














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
	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

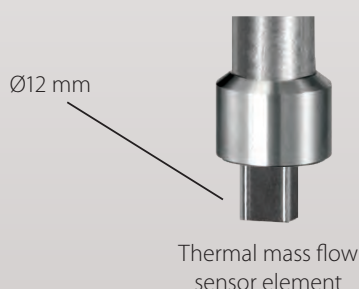
- Detects smallest changes < 0.1 m/s referred to 20 °C and 1000 hPa
- No mechanical wear parts
- Easy installation under pressure

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.

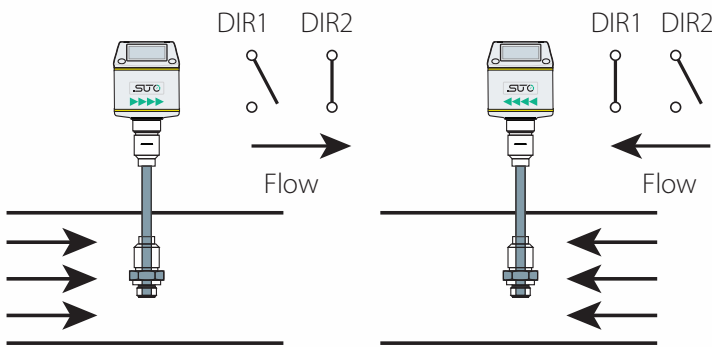


S409 TECHNICAL DATA

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)

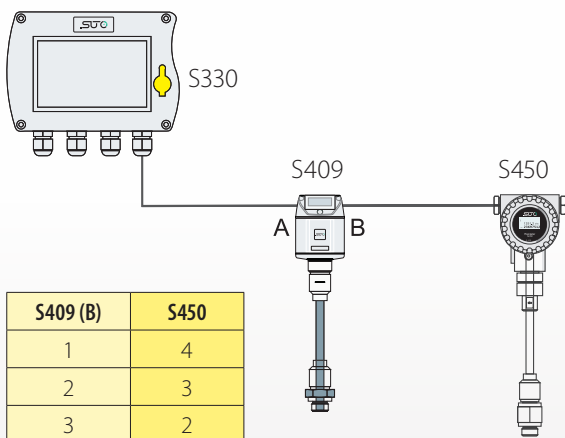
S409 FLOW DIRECTION SWITCH

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

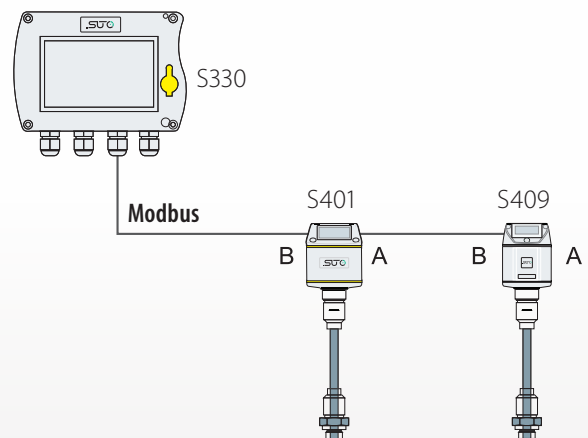
Connection of S330 to S450 via flow switch



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)