S451 / S453

.SUTO

Be smart. **Measure it.**

Thermal Mass Flow Meter
for Heavy Duty and Ex Applications

Insertion / In-line

S453

S451

	INDUSTRIAL DESIGN For outdoor applications		**WIRELESS INTERFACE** User friendly sensor settings		**NO MECHANICAL WEAR PARTS** Long term stability
	EXPLOSION PROOF Use in Ex-area applications		**EASY TO CLEAN WETTED PARTS** Stainless steal or nickel plated metal		**ACCURATE MEASUREMENT** Digital control loop and data processing

Benefits

- ✓ Perform accurate thermal mass flow measurements and directly measure mass flow, standard flow, consumption, pressure and temperature
- ✓ Rugged metal housing designed for harsh outdoor environments
- ✓ Easy access to measurement data via the integrated data logger using the free S4C-FS smartphone app
- ✓ All components in contact with the medium are made of stainless steel or nickel-plated metal
- ✓ Mechanical design with no moving parts for clog-free operation
- ✓ Vacuum application actual flow measurements

1 Robust Materials

- The IP67 housing allows applications in harsh industrial environment as well as outdoor applications.
- All parts which come into contact with the measurement medium are made of stainless steel or nickel-plated metal. This makes the sensors robust and guarantees a reliable measurement.

2 Color Display

- The display shows all relevant measurement values on site. This allows the user to verify readings easy and quickly during installation and use.
- The pressure-tight encapsulation protects the display from external influences and ensures that it is always clearly visible.
- 3 optical buttons allow configuration at sites where mobile phones are not allowed

3 Flexible and easy Installation

- The S451 and S453 can be used in a wide range of pipe sizes. Insertion type sensor for bigger pipe diameters and the in-line type for smaller pipes.
- Smartphone app for Android and iOS enables convenient and wireless configuration, online readings and logger data download.

4 Outputs and Data Logger

- Modbus/RTU & 2 x 4 ... 20 mA + Pulse/Alarm output
- Modbus/TCP over Ethernet & 2 x 4 ... 20 mA + Pulse/Alarm output
- Integrated data logger to record and store measurement data

S451 / S453 Flow and Consumption Meter

Integrated Data Logger

Experience operational excellence with our advanced thermal mass flowmeter integrated with a data logger. Seamlessly monitor real-time flow rates, temperatures and pressures for informed decision making. This logger is designed to efficiently collect and store measurement data to provide unparalleled insight into your processes and compressed air system.

Data can be easily downloaded wirelessly to your smartphone using the free S4C-FS app.
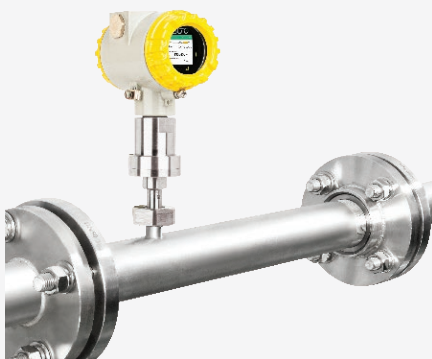
Installation

S451
Insertion type sensor for installations under pressure through ball valve

S453
In-line type with measuring section.
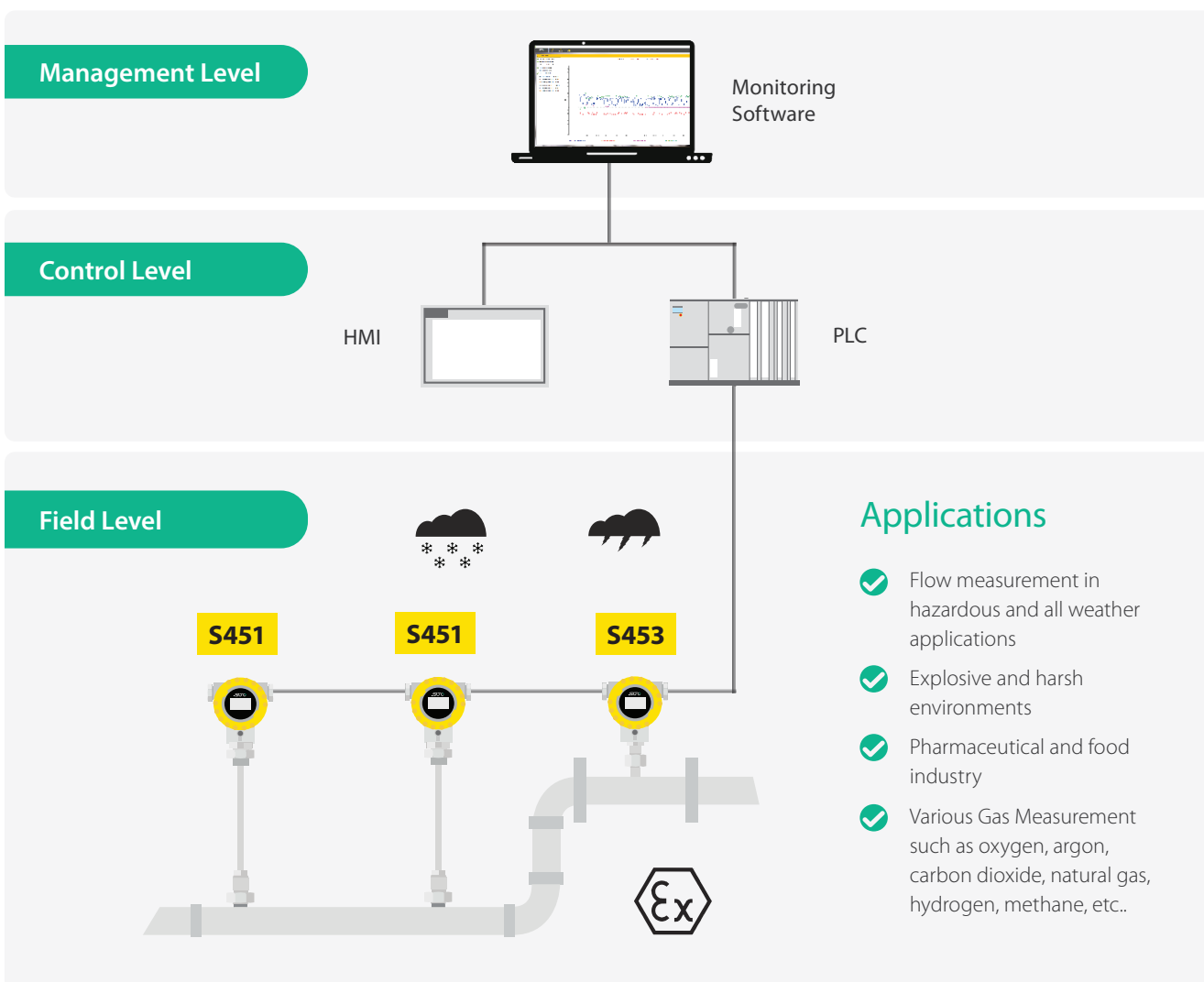Process connection through flanges or R-thread

Rotation

Achieve effortless customization during installation by effortlessly rotating the sensor head 180°. This simple adjustment ensures optimum visibility of the display exactly where it is needed, requiring only the removal of 4 screws from the main body.
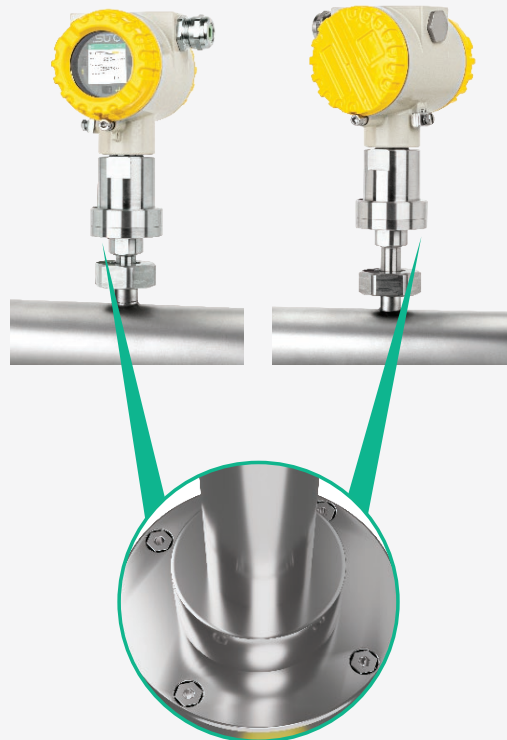
Industrial Communication

Enhance your connectivity with the advanced functionality of industrial communication via Modbus/RTU, while harnessing the power of Modbus/TCP over Ethernet networks for seamless data exchange across your plant.

Applications

- ✓ Flow measurement in hazardous and all weather applications
- ✓ Explosive and harsh environments
- ✓ Pharmaceutical and food industry
- ✓ Various Gas Measurement such as oxygen, argon, carbon dioxide, natural gas, hydrogen, methane, etc..

Volumetric Flow Ranges

Tube		S451 Volumetric Flow Ranges		
DN	Inch	Low (m³/h)	Standard (m³/h)	Max (m³/h)
DN25	1"	0.2 ... 48	0.8 ... 191	1.5 ... 382
DN32	1¼"	0.3 ... 86	1.4 ... 345	2.8 ... 689
DN40	1½"	0.5 ... 119	1.9 ... 475	3.8 ... 949
DN50	2"	0.8 ... 194	3.1 ... 777	6.2 ... 1,554
DN65	2½"	1.3 ... 332	5.3 ... 1,329	10.6 ... 2,658
DN80	3"	1.8 ... 461	7.4 ... 1,843	14.7 ... 3,686
DN100	4"	2.8 ... 707	11.3 ... 2,826	23 ... 5,653
DN125	5"	4.4 ... 1,107	17.7 ... 4,427	35 ... 8,853
DN150	6"	6.4 ... 1,596	26 ... 6,382	51 ... 12,764
DN200	8"	11.4 ... 2,843	45 ... 11,373	91 ... 22,746
DN250	10"	18 ... 4,448	71 ... 17,791	142 ... 35,583
DN300	12"	26 ... 6,413	103 ... 25,650	205 ... 51,300

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DN40	1½"	0.5 ... 119	1.9 ... 475	3.8 ... 949
DN50	2"	0.8 ... 194	3.1 ... 777	6.2 ... 1,554
DN65	2½"	1.3 ... 332	5.3 ... 1,329	N/A
DN80	3"	1.8 ... 461	7.4 ... 1,843	N/A

Stated measuring ranges under following conditions:

- Standard flow in air
- Reference pressure: 1000 hPa, reference temperature: +20 °c
- At other conditions and other gases the flow range is different. Please use flow range calculator on SUTO website for calculation.
- Flow measurement in pipes larger than DN300 are also supported, by using the 100 mm insertion depth setting.
- Vacuum version flow range refer low range option also can use flow range calculator on SUTO website for calculation
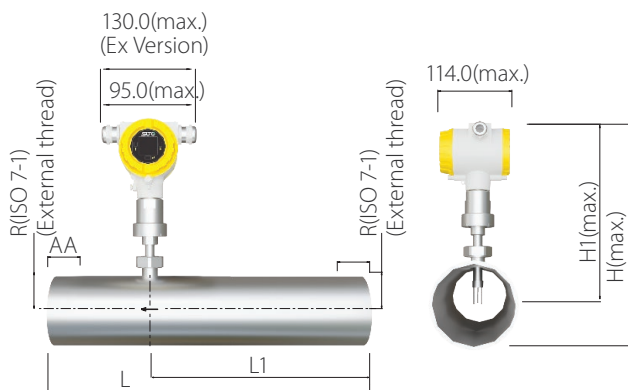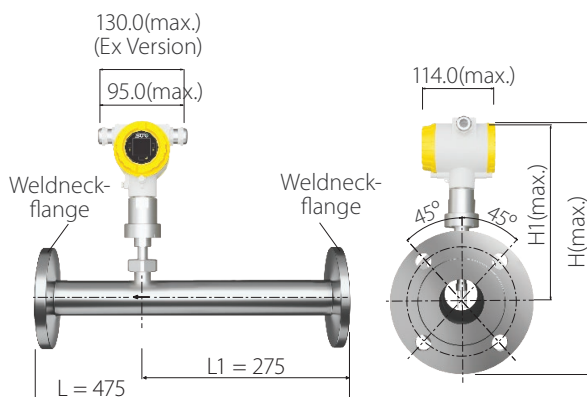
S451 / S453 Flow and Consumption Meter
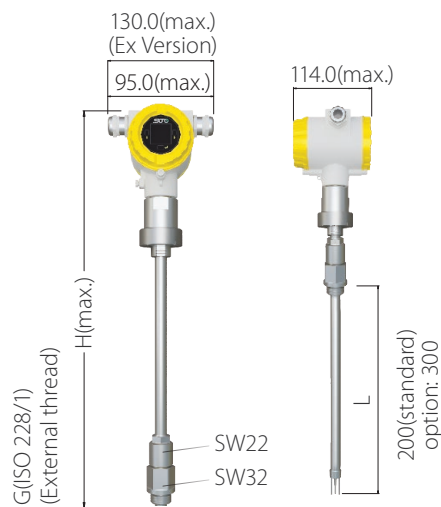
S451 Dimensions

Shaft option (mm)	H (mm)	Diameter (mm)	SW
200	471	15	G 3/4"
300	571	15	G 3/4"

S453 Dimensions (Thread Type)

Pipe inch / (DN)	L (mm)	L1 (mm)	H (mm)	H1 (mm)	R
1" (DN25)	475	275	299	282	R 1"
1¼" (DN32)	475	275	303	282	R 1¼"
1½" (DN40)	475	275	306	282	R 1½"
2" (DN50)	475	275	312	282	R 2"
2½" (DN65)	475	275	320	282	R 2½"
3" (DN80)	475	275	326.5	282	R 3"

S453 Dimensions (Flange Type)

Pipe inch / (DN)	L (mm)	L1 (mm)	H (mm)	H1 (mm)
1" (DN25)	475	275	339.5	282
1¼" (DN32)	475	275	352	282
1½" (DN40)	475	275	357	282
2" (DN50)	475	275	364.5	282
2½" (DN65)	475	275	374.5	282
3" (DN80)	475	275	382	282

Technical Data

Measurement

Flow

Accuracy	±(1.5 % of reading + 0.3 % full scale)
Selectable units	m³/h, m³/min, l/min, l/s, cfm, kg/h, kg/min, kg/s
Repeatability	0.25 % o.RDG
Sensor	Thermal mass flow sensor
Sampling rate	3 samples / sec
Turn-down ratio	200:1
Response time (t90)	0.5 sec

Consumption

Selectable units	m³, ft³, t, lb, l, kg

Pressure

Accuracy	0.5 % FS
Selectable units	bar, psi, kPa, MPa
Measuring range	0 ... 1.6 MPa (g) or 0 ... 5.0 MPa (g) or 0 ... 0.2 MPa (a)
Sensor	Piezzo resistive sensor

Temperature

Accuracy	0.5 °C
Selectable units	°C, °F
Measuring range	-40 ... +120 °C
Sensor	Pt1000

Reference conditions

Selectable conditions	20 °C 1000 mbar (ISO1217), 0 °C 1013 mbar (DIN1343) freely adjustable

Signal / Interface & Supply

Analog output

Signal	2 x 4 ... 20 mA (4-wire), isolated
Scaling	0 ... max flow, freely adjustable
Load	Max. 400 Ohm
Update rate	Value updated ever 1 sec

Pulse/Alarm output

Signal	Switch output, normally open, max. 30 VDC, 200 mA
Scaling	1 pulse per consumption unit (selectable)
Alarm	Channel and threshold freely setable

Fieldbus

Protocol	Modbus/RTU, Modbus/TCP

Supply

Voltage supply	16 ... 30 VDC
Current consumption	200 mA

General data

Configuration

Wireless	S4C-FS App for Android and iOS
Others	3 touch button at display

Display

Integrated	Color graphics display

Material

Process connection	Stainless steel 1.4404 (SUS 316L)
Housing	Al alloy
Sensor	Stainless steel 1.4404 (SUS316L), 4J50 nickel plated, glass
Metal parts	Stainless steel 1.4404 (SUS 316L)

Miscellaneous

Electrical connection	Screw terminals
Protection class	IP67, Ex option: IP65
Approvals	CE, RoHS, FCC
	IECEx / GB :
	Ex db ib IIC T4 Gb
	Ex ib tb IIIC T135°C Db
	ATEX:
	II 2G Ex db ib IIC T4 Gb
	II 2D Ex ib tb IIIC T135°C Db
Process connection	S451: G3/4" (ISO 228/1)
	S453: Measuring section with R-thread or Flange
Weight	S451 300mm: 2.15kg
	S451 200mm: 2.08kg
	S453 without section: 1.86kg

Operating conditions

Medium	Air, N₂, O₂, CO₂ and other non corrosive gases
Medium temperature	S451: -30 ... +140 °C (applicable for Non-Ex-Option) -30 ... +90 °C (applicable for Ex-Option) S453: -30 ... +90 °C
Medium humidity	< 90 %, no condensation
Operating pressure	S451: 0 ... 5.0 MPa for Non-Ex-and Ex Option* S453: 0 ... 4.0 MPa for Non-Ex-and Ex Option *For pressure above 1.5 MPa use the installation device A530 1119 or A530 1120 to install S451.
Ambient temperature	-40 ... +65 °C
Storage temperature	-40 ... +70 °C
Transport temperature	-40 ... +70 °C
Pipe sizes	S451: >= DN25 S453: DN25 ... DN80

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

S451 Thermal Mass Flow Meter (Insertion type)

Order No.	Description
S695 4510	S451 Thermal mass flow meter (Insertion Type), incl. Display, Data Logger, 200 mm shaft
S695 4511	S451 Thermal mass flow meter (Insertion Type), incl. Display, Data Logger, 300 mm shaft
Pressure Measurement (integrated)	
A1558	Integrated pressure sensor, 0 ... 1.6 MPa(g) [16 bar(g)]
A1559	Integrated pressure sensor, 0 ... 5.0 MPa(g) [50 bar(g)]
A1566	Integrated pressure sensor, 0 ... 0.2 MPa(a) [2 bar(a)]
Flow Medium	
A1007	Air
A1008	CO_2
A1009	O_2 (Oil- & grease-free cleaned)
A1010	N_2
A1011	N_2O
A1012	Argon
A1013	Natural Gas
A1014	H_2 (real gas calibration)
A1015	Other gas (please specify)
A1016	He (real gas calibration)
A1017	C_3H_8
A1041	O_2, Ar, CO_2 (real gas calibration)
A1042	CH_4, NG, N_2O (real gas calibration, please consult with manufacturer for this option in advance)
Range	
A1555	Low Range (30 Sm/s)
A1554	Standard Range (120 Sm/s)
A1550	Max Range (240 Sm/s)
A1565	Vacuum/Atmospheric Range (30 Sm/s)
Calibration	
A1553	Standard Calibration
A1551	High accuracy calibration (1% o. rdg +- 0.3% FS)
A1552	Bi-directional calibration
Output	
A1560	2 x 4 ... 20 mA, Pulse/Alarm, Modbus/RTU
Ex-Approval	
A1557	No Ex-Approval
A1556	ATEX / IECEx / GB3836

S451 Accessories

Order No.	Description
R200 0005	Oil- & grease-free cleaned option for flow sensors (for Oxygen it is already included in A 1009)
A530 1119	High pressure installation device S451, 200 mm (to be used if pressure above 1.5 MPa)
A530 1120	High pressure installation device S451, 300 mm (to be used if pressure > 1.5 MPa)
A554 3321	Modbus/RTU to HART converter, DIN rail mountable, requires 24 VDC power supply (not included)
A554 3322	Modbus/RTU to Modbus/TCP converter, DIN rail mountable, requires 24 VDC power supply (not included)
A553 0165	Sensor Cable, 5 pole, AWG 24 (0.2 mm²), 50 m
A553 0166	Sensor Cable, 5 pole, AWG 24 (0.2 mm²), 100 m

Ordering Example

Example	S451 200 mm shaft, Integrated pressure sensor 0 ... 1.6 MPa, Flow Medium Air, Max Range, Standard Calibration, 2 x 4 ... 20 mA, Pulse/Alarm, Modbus/RTU, No Ex Approval
Order Code	S695 4510.A1558.A1007.A1550.A1553.A1560.A1557

Ordering

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

S453 Thermal Mass Flow Meter (In-line type)

Order No.	Description
S695 4530	S453 Thermal mass flow meter (In-Line Type), incl. Display, Data Logger
Measuring Section Connection	
A152X	R-thread (ISO 7-1)
A153X	Flange, EN 1092-1, PN40
A154X	Flange ANSI B16.5, class 300
Measuring Section Size	
3	DN25 (1")
4	DN32 (1.25")
5	DN40 (1.5")
6	DN50 (2")
7	DN65 (2.5")
8	DN80 (3")
Pressure Measurement (integrated)	
A1558	Integrated pressure sensor, 0 ... 1.6 MPa(g) [16 bar(g)]
A1559	Integrated pressure sensor, 0 ... 5.0 MPa(g) [50 bar(g)] Attention: S453 Operating pressure limited to 4.0 MPa(g)
A1566	Integrated pressure sensor, 0 ... 0.2 MPa(a) [2 bar(a)]
Flow Medium	
A1007	Air
A1008	CO_2
A1009	O_2 (Oil- & grease-free cleaned)
A1010	N_2
A1011	N_2O
A1012	Argon
A1013	Natural Gas
A1014	H_2 (real gas calibration)
A1015	Other gas (please specify)
A1016	He (real gas calibration)
A1017	C_3H_8
A1041	O_2, Ar, CO_2 (real gas calibration)
A1042	CH_4, NG, N_2O (real gas calibration, please consult with manufacturer for this option in advance)
Range	
A1555	Low Range (30 Sm/s)
A1554	Standard Range (120 Sm/s)
A1550	Max Range (240 Sm/s)
A1565	Vacuum/Atmospheric Range (30 Sm/s)
Calibration	
A1553	Standard Calibration
A1551	High accuracy calibration (1% o. rdg +- 0.3% FS)
Output	
A1560	2 x 4 ... 20 mA, Pulse/Alarm, Modbus/RTU
Ex-Approval	
A1557	No Ex-Approval
A1556	ATEX / IECEx / GB3836

S453 Accessories

Order No.	Description
R200 0005	Oil- & grease-free cleaned option for flow sensors (for Oxygen it is already included in A 1009)
A554 3321	Modbus/RTU to HART converter, DIN rail mountable, requires 24 VDC power supply (not included)
A554 3322	Modbus/RTU to Modbus/TCP converter, DIN rail mountable, requires 24 VDC power supply (not included)
A553 0165	Sensor Cable, 5 pole, AWG 24 (0.2 mm²), 50 m
A553 0166	Sensor Cable, 5 pole, AWG 24 (0.2 mm²), 100 m

Ordering Example

Example	S453, R-thread, DN50 Measuring section, Integrated pressure sensor 0 ... 1.6 MPa, Flow Medium Air, Standard Range, Standard Calibration, 2 x 4 ... 20 mA, Pulse/Alarm, Modbus/RTU, ATEX / IECEx / GB3836
Order Code	S695 4530.A1526.A1558.A1007.A1554.A1553. A1560.A1556

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