S451 / S453

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

- Accurate thermal mass flow measurements and directly measure mass flow, standard flow, consumption, pressure and temperature with the integrated pressure sensor
- 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
- Budget-friendly maintenance through consistent, rugged and reliable 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 ... 0 mA + Puls/Alarm output
- Modbus/TCP over Ethernet/APL & 2 x 4 ... 20 mA + Puls/Alarm output
- Integrated data logger to record and store measurement data

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

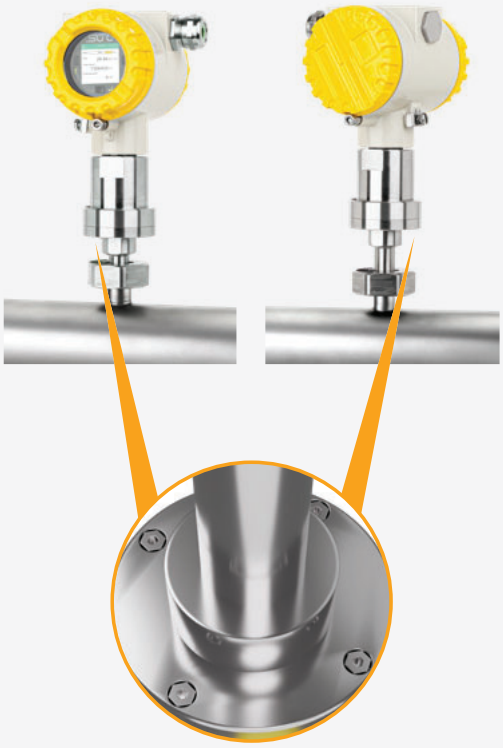
Insertion type sensor for installations under pressure through ball valve

S453

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

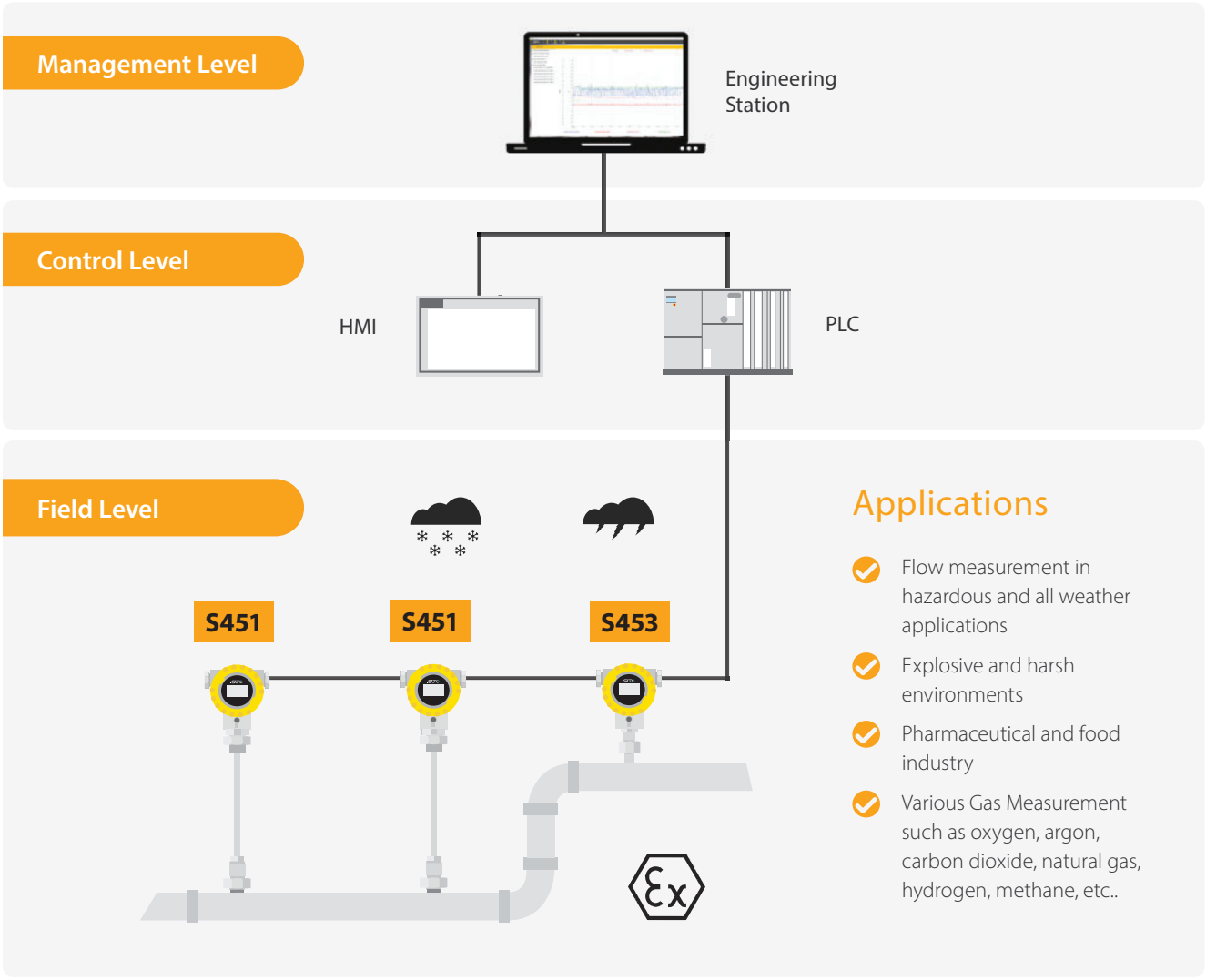
Rotation

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/APL 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

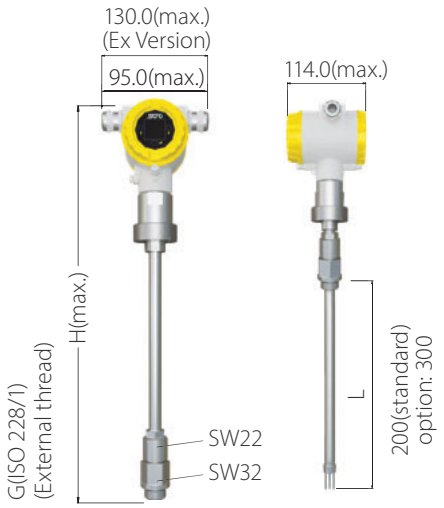
Tube		**S451** Volumetric Flow Ranges		
Inch	**DN**	**Low** (m^3/h)	**Standard** (m^3/h)	**Max** (m^3/h)
1″	DN25	0.6 ... 148	1.2 ... 295	1.82 ... 357
1½″	DN40	1.5 ... 367	2.9 ... 732	4.36 ... 886
2″	DN50	2.4 ... 600	4.8 ... 1,198	7.26 ... 1,450
2½″	DN65	4.1 ... 1,027	8.2 ... 2,049	12.1 ... 2,480
3″	DN80	5.7 ... 1,424	11.4 ... 2,841	16.9 ... 3,442
4″	DN100	8.7 ... 2,183	17.4 ... 4,357	24.2 ... 5,275
5″	DN125	20 ... 3,419	38 ... 6,824	45.9 ... 8,263
6″	DN150	20 ... 4,930	39 ... 9,839	70.18 ... 11,913
8″	DN200	35 ... 8,786	70 ... 17,533	106.48 ... 21,229
10″	DN250	55 ... 13,744	110 ... 27,429	165.77 ... 33,210
12″	DN300	79 ... 19,815	158 ... 39,544	239.58 ... 47,880

Tube		**S453** Volumetric Flow Ranges		
Inch	**DN**	**Low** (m^3/h)	**Standard** (m^3/h)	**Max** (m^3/h)
1″	DN25	0.6 ... 148	1.2 ... 295	1.82 ... 357
1½″	DN40	1.5 ... 367	2.9 ... 732	4.36 ... 886
2″	DN50	2.4 ... 600	4.8 ... 1,198	7.26 ... 1,450
2½″	DN65	4.1 ... 1,027	8.2 ... 2,049	N/A
3″	DN80	5.7 ... 1,424	11.4 ... 2,841	N/A

Stated measuring ranges under following conditions:

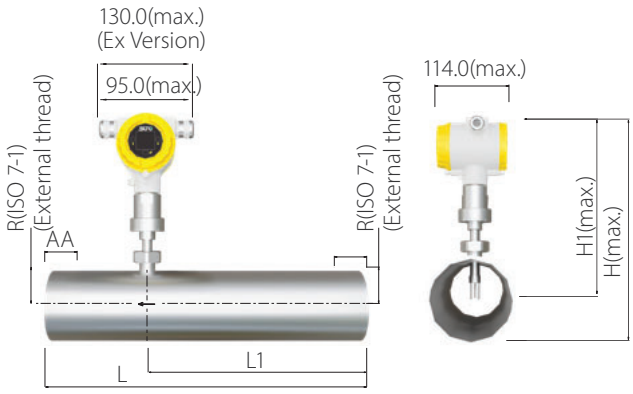
- Standard flow in air
- Reference pressure: 1000 hPa, reference temperature: +20 °c
- At other conditions and other gases the flow range is different. Please use flow range calculator on SUTO website for calculation.
- Flow measurement in pipes larger than DN300 are also supported, by using the 100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

S451 Dimensions



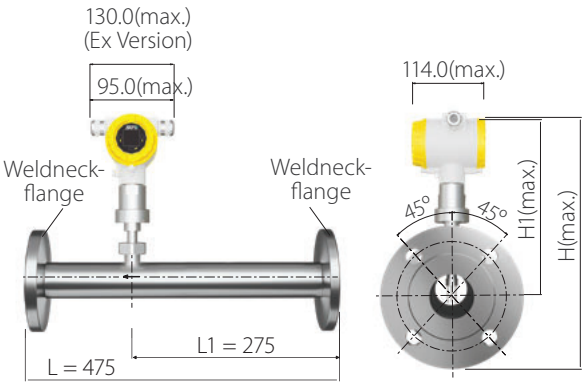
Shaft option (mm)	H (mm)	Diameter (mm)	SW
200	471	15	G 3/4"
300	571	15	G 3/4"

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	m^3/h, m^3/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	m^3, ft^3, l, kg
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, Ex-Options	
Process connection	S451: G3/4" (ISO 228/1) S453: Measuring section with R-thread or Flange	
Weight	S451 300mm: S451 200mm: S453 with section:	2.15kg 2.08kg 1.86kg
Operating conditions		
Medium	Air, N_2, O_2, CO_2 and other non corrosive gases	
Medium temperature	S451: -40 ... +100 °C S453: -40 ... +100 °C	
Medium humidity	< 90 %, no condensation	
Operating pressure	0 ... 1.6 MPa applicable for Ex-Option 0 ... 5.0 MPa applicable for Non-Ex-Option* *For pressure above 1.5 MPa use the installation device A530 1106 or A530 1113 to install S451.	
Ambient temperature	-40 ... +65 °C	
Storage temperature	-30 ... +70 °C	
Transport temperature	-30 ... 70 °C	
Pipe sizes	S451: >= DN25 S453: DN25 ... DN80	

Ordering

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
KA66S6954510	S451 Thermal mass flow meter (Insertion Type), incl. Display, Data Logger, Flow Medium 1: Air, 200 mm shaft
KA66S6954511	S451 Thermal mass flow meter (Insertion Type), incl. Display, Data Logger, Flow Medium 1: Air, 300 mm shaft
Pressure Measurement (integrated)	
KA66000A1558	Integrated pressure sensor, 0 ... 1.6 MPa(g) [16 bar (g)]
KA66000A1559	Integrated pressure sensor, 0 ... 5.0 MPa(g) [50 bar (g)]
Flow Medium 2	
KA66000A1003	No Second Gas
KA66000A1008	CO_2
KA66000A1009	O_2 (Oil- & grease-free cleaned)
KA66000A1010	N_2
KA66000A1011	N_2O
KA66000A1012	Argon
KA66000A1013	Natural Gas
KA66000A1014	H_2 (real gas calibration)
KA66000A1015	Other gas (please specify)
KA66000A1016	He (real gas calibration)
KA66000A1017	C_3H_8
KA66000A1041	O_2, Ar, CO_2 (real gas calibration)
KA66000A1042	CH_4, NG, N_2O (real gas calibration, please consult with manufacturer for this option in advance)
Range	
KA66000A1555	Low Range (30 sm/s)
KA66000A1554	Standard Range (120 sm/s)
KA66000A1550	Max Range (240 sm/s)
Calibration	
KA66000A1553	Standard Calibration
KA66000A1551	High accuracy calibration (1% o. rdg +- 0.3% FS)
KA66000A1552	Bi-directional calibration
Output	
KA66000A1560	2 x 4 ... 20 mA, Pulse/Alarm, Modbus/RTU
KA66000A1561	2 x 4 ... 20 mA, Pulse/Alarm, Modbus/TCP over Ethernet APL
Ex-Approval	
KA66000A1557	No Ex-Approval
KA66000A1556	ATEX / IECEx / GB3836

Accessories

Order No.	Description
KA66R2000005	Oil- & grease-free cleaned option for flow sensors (for Oxygen it is already included in A 1009)
KA66A5301106	High pressure installation device S451, 200 mm (to be used if pressure above 1.5 MPa)
KA66A5301113	High pressure installation device S451, 300 mm (to be used if pressure > 1.5 MPa)

Ordering Example

KA66S6954510	S451 Thermal mass flow meter (Insertion Type), incl. Display, Data Logger, Flow Medium 1: Air, 200 mm shaft
KA66000A1003	No Second Gas
KA66000A1554	Standard Range (120 sm/s)
KA66000A1553	Standard Calibration
KA66000A1560	2 x 4 ... 20 mA, Pulse/Alarm, Modbus/RTU
KA66000A1557	No Ex-Approval

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
KA66S6954530	S453 Thermal mass flow meter (In-Line Type), incl. Display, Data Logger, Flow Medium 1: Air
Measuring Section Connection	
KA66000A152X	R-thread (ISO 7-1)
KA66000A153X	Flange, EN 1092-1, PN40
KA66000A154X	Flange ANSI 16.5
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)	
KA66000A1558	Integrated pressure sensor, 0 ... 1.6 MPa(g) [16 bar(g)]
KA66000A1559	Integrated pressure sensor, 0 ... 5.0 MPa(g) [50 bar(g)]
Flow Medium 2	
KA66000A1003	No Second Gas
KA66000A1008	CO_2
KA66000A1009	O_2 (Oil- & grease-free cleaned)
KA66000A1010	N_2
KA66000A1011	N_2O
KA66000A1012	Argon
KA66000A1013	Natural Gas
KA66000A1014	H_2 (real gas calibration)
KA66000A1015	Other gas (please specify)
KA66000A1016	He (real gas calibration)
KA66000A1017	C_3H_8
KA66000A1041	O_2, Ar, CO_2 (real gas calibration)
KA66000A1042	CH_4, NG, N_2O (real gas calibration, please consult with manufacturer for this option in advance)
Range	
KA66000A1555	Low Range (30 sm/s)
KA66000A1554	Standard Range (120 sm/s)
KA66000A1550	Max Range (240 sm/s)
Calibration	
KA66000A1553	Standard Calibration
KA66000A1551	High accuracy calibration (1% o. rdg +- 0.3% FS)
Output	
KA66000A1560	2 x 4 ... 20 mA, Pulse/Alarm, Modbus/RTU
KA66000A1561	2 x 4 ... 20 mA, Pulse/Alarm, Modbus/TCP over Ethernet APL
Ex-Approval	
KA66000A1557	No Ex-Approval
KA66000A1556	ATEX / IECEx / GB3836

Accessories

Order No.	Description
KA66R2000005	Oil- & grease-free cleaned option for flow sensors (for Oxygen it is already included in KA66000A1009)

Ordering Example

KA66S6954530	S453 Thermal mass flow meter (In-Line Type), incl. Display, Data Logger, Flow Medium 1: Air
KA66000A1526	R-thread (ISO 7-1), DN50 (2")
KA66000A1558	Integrated pressure sensor, 0 .... 16 bar(g)]
KA66000A1003	No Second Gas
KA66000A1554	Standard Range (120 sm/s)
KA66000A1553	Standard Calibration
KA66000A1560	2 x 4 ... 20 mA, Pulse/Alarm, Modbus/RTU
KA66000A1556	ATEX / IECEx / GB3836

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