

S450 / S452

Thermal Mass Flow Meter for Heavy Duty and Ex Applications

Insertion / Inline



S452

S450



INDUSTRIAL DESIGN
For outdoor applications



WIRELESS INTERFACE
User friendly sensor settings



NO MECHANICAL WEAR PARTS
Independent of pressure and temperature



EXPLOSION PROOF
Use in Ex-area applications



EASY TO CLEAN
All wetted parts stainless steel



ACCURATE RESULTS
Very fast response time



Benefits

- ✓ Robust metal enclosure suitable for outdoor applications in harsh environment
- ✓ All parts which come into contact with the measurement medium are made of stainless steel 316L
- ✓ No moving parts, non clogging
- ✓ Direct measurement of mass flow and standard flow without the need of pressure compensation
- ✓ Low maintenance costs due to stable 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 316L. This makes the sensors robust and guarantees a reliable measurement.

2 Display

- The display shows all relevant measured values on site. This allows the user to install the flowmeter easily and quickly.
- The pressure-tight encapsulation protects the display from external influences and ensures that it is always clearly visible.

3 Flexible and easy Installation

Wide range of tube sizes are supported with insertion type for big pipe diameters and inline types for small pipe diameters.

4 Outputs

S450 and S452 offer different signal outputs for flexible installation. Analog 4 ... 20 mA 2/3-wire, pulse; Modbus/RTU; HART



Applications

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

Installation



S450

Insertion type installation through ball valve



S452

Inline type installation through flanges or R thread

Available Options

- ✓ Fieldbus interface: HART, M-Bus und Modbus/RTU
- ✓ Ex-Approvals:
 - IECEx
 - GB Ex
- ✓ Bi-directional measurement
- ✓ Flow conditioner for R-thread measuring sections

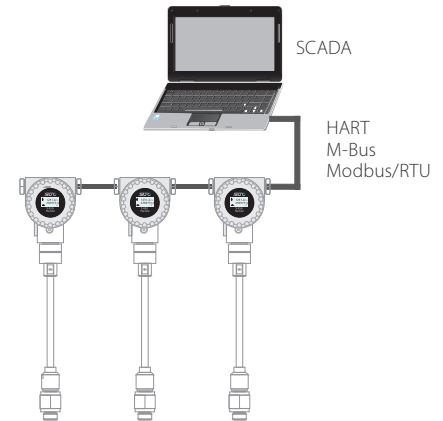
Rotation

Sensor head can be rotated in 90° steps through the screw nut. This allows the display to be turned into the best viewing position.



Industrial Communication

Industrial communication through Modbus/RTU, M-Bus, HART



Volumetric Flow Ranges

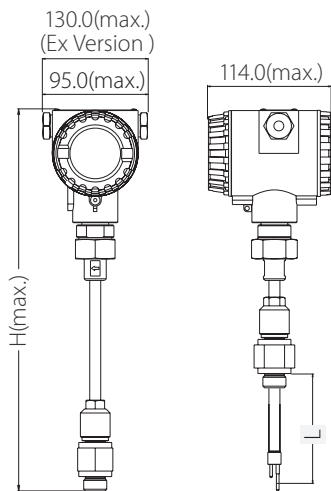
| Tube | | S450 Volumetric Flow Ranges | | |
|------|-------|-----------------------------|----------------|-------------------|
| Inch | DN | S-Range (m³/h) | M-Range (m³/h) | HS-Range (m³/h) |
| ½" | DN15 | 0.2 ... 45.6 | 0.4 ... 91.0 | 0.48 ... 110 |
| ¾" | DN20 | 0.4 ... 89.1 | 0.9 ... 178 | 1.09 ... 215 |
| 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 | | 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 |
| ¾" | DN20 | 0.4 ... 89.1 | 0.9 ... 178 | 1.09 ... 215 |
| 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:

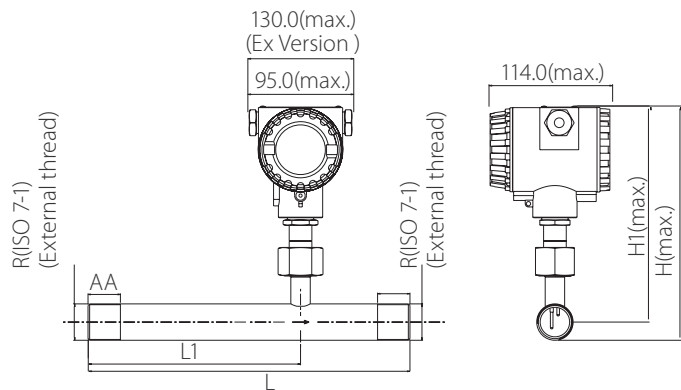
- Standard flow in air
- Reference pressure: 1000 hpa reference temperature: +20 °c
- At other standard conditions and in other gases Flow ranges are different and data are available on request.
- In larger pipe diameters flow can also be measured.

S450 Dimensions



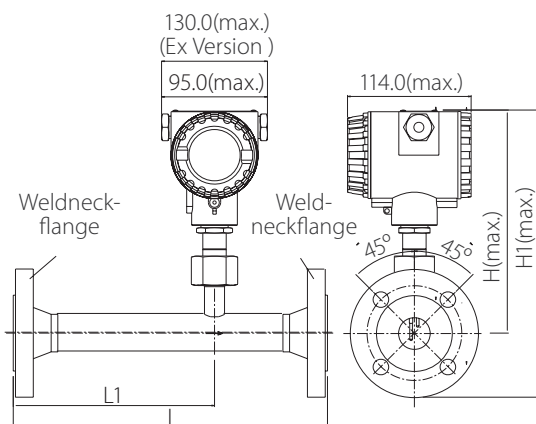
| Shaft option | L (mm) | H (mm) |
|--------------|--------|--------|
| A | 220 | 469 |
| B | 160 | 409 |
| C | 300 | 549 |

S452 Dimensions (Thread Type)



| Pipe nominal size inch / (DN) | L total length (mm) | L1 inlet length (mm) | H total height (mm) | H1 pipe center to 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" |
| 2½" (DN65) | 475 | 275 | 246.15 | 208.15 | R 2½" |
| 3" (DN80) | 475 | 275 | 259.15 | 214.65 | R 3" |

S452 Dimensions (Flange Type)



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

Technical Data

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

Pulse output

| | |
|---------|---|
| Signal | Switch output, normally open, max. 30 VDC, 200 mA |
| Scaling | 1 pulse per consumption unit (selectable) |

Fieldbus

| | |
|----------|-------------------------|
| Protocol | Modbus/RTU, HART, M-Bus |
|----------|-------------------------|

Supply

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

General data

Configuration

| | |
|-------------|----------------------------|
| PC Software | USB Service Kit + Software |
|-------------|----------------------------|

Display

| | |
|------------|-----|
| Integrated | LCD |
|------------|-----|

Material

| | |
|--------------------|-----------------------------------|
| Process connection | Stainless steel 1.4404 (SUS 316L) |
| Housing | Al alloy |
| Sensor | Stainless steel 1.4404 (SUS 316L) |
| Metal parts | Stainless steel 1.4404 (SUS 316L) |

Miscellaneous

| | |
|-----------------------|--|
| Electrical connection | Screw terminals |
| Protection class | IP67 |
| Approvals | CE, RoHS, FCC, Ex-Options |
| Process connection | S450: G1/2" (ISO 228/1) S452: Measuring section with R-thread or Flange |
| Weight | S450: 1.75 kg S452: 1.25 kg (without measuring section) |

Operating conditions

| | |
|-----------------------|---|
| Medium | Air, N ₂ , O ₂ , CO ₂ and other non corrosive gases |
| Medium temperature | S450: -40 ... +150 °C S452: -40 ... +100 °C |
| Medium humidity | < 90 %, no condensation |
| Operating pressure | S450: 0 ... 1.6 MPa (applicable for option A1280) 0 ... 5.0 MPa (applicable for option A1279)* S452: 0 ... 4.0 MPa *For pressure above 1.5 MPa use the installation device A530 1106 or A530 1113. |
| Ambient temperature | -40 ... +65 °C |
| Storage temperature | -30 ... +70 °C |
| Transport temperature | -30 ... 70 °C |
| Pipe sizes | S450: ½" ... 12" (bigger pipes on request) S452: ½" ... 3" |

Ordering

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

S450 Thermal Mass Flow Meter (Insertion type)

| Order No. | Description |
|--------------------------------|---|
| S695 0450 | S450, Thermal Mass Flow Meter insertion type |
| Shaft length | |
| A1200 | 220 mm |
| A1201 | 160 mm |
| A1202 | 300 mm |
| Process connection | |
| A1006 | PT 1/2" Adapter |
| A1005 | NPT 1/2" Adapter |
| Gas type | |
| A1007 | Air |
| A1008 | CO ₂ |
| A1009 | O ₂ (Oil- & grease-free cleaned) |
| A1010 | N ₂ |
| A1011 | N ₂ O |
| A1012 | Argon |
| A1013 | Natural Gas |
| A1014 | H ₂ (real gas calibration) |
| A1015 | Other gas (please specify) |
| A1016 | He (real gas calibration) |
| A1017 | C ₃ H ₈ |
| A1041 | O ₂ , Ar, CO ₂ (real gas calibration) |
| Range | |
| A1275 | Standard |
| A1271 | Max range |
| A1272 | Bi-directional standard range |
| A1273 | Bi-directional max. range |
| A1274 | High speed |
| A1276 | Low range version (1/3 of standard range) |
| Hazardous area approval | |
| A1279 | None |
| A1280 | IECEX / GB3836 Ex |
| Output | |
| A1284 | 2 x 4 ... 20 mA + pulse |
| A1285 | 1 x 4 ... 20 mA + HART + pulse |
| A1286 | 1 x 4 ... 20 mA + Modbus + pulse |
| Display | |
| A1294 | Without display |
| A1295 | With display |

Attention:

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

S452 Thermal Mass Flow Meter (In-line type)

| Order No. | Description |
|---------------------------------|---|
| S695 0452 | S452, Thermal Mass Flow Meter, inline type |
| Process connection * | |
| A130X | R-thread (ISO 7-1) |
| A132X | Flange EN 1092-1, PN40 |
| A134X | Flange ANSI 16.5 |
| Measuring section size * | |
| 1 | DN15 (1/2") |
| 2 | DN20 (3/4") |
| 3 | DN25 (1") |
| 4 | DN32 (1.25") |
| 5 | DN40 (1.5") |
| 6 | DN50 (2") |
| 7 | DN65 (2.5") |
| 8 | DN80 (3") |
| Gas type | |
| A1007 | Air |
| A1008 | CO ₂ |
| A1009 | O ₂ (Oil- & grease-free cleaned) |
| A1010 | N ₂ |
| A1011 | N ₂ O |
| A1012 | Argon |
| A1013 | Natural Gas |
| A1014 | H ₂ (real gas calibration) |
| A1015 | Other gas (please specify) |
| A1016 | He (real gas calibration) |
| A1017 | C ₃ H ₈ |
| A1041 | O ₂ , Ar, CO ₂ (real gas calibration) |
| Range | |
| A1275 | Standard |
| A1271 | Max range |
| A1274 | High speed (DN15 ... DN50) |
| A1276 | Low range version (1/3 of standard range) |
| Hazardous area approval | |
| A1279 | None |
| A1280 | IECEX / GB3836 Ex |
| Output | |
| A1284 | 2 x 4 ... 20 mA + pulse |
| A1285 | 1 x 4 ... 20 mA + HART + pulse |
| A1286 | 1 x 4 ... 20 mA + Modbus + pulse |
| Display | |
| A1294 | Without display |
| A1295 | With display |

Accessories

| Order No. | Description |
|-----------|--|
| R200 0005 | Oil- & grease-free cleaned option for flow sensors (for Oxygen it is already included in A 1009) |
| A530 1106 | High pressure installation device S450, 220 mm (to be used if pressure above 1.5 MPa) |
| A530 1113 | High pressure installation device S450, 400 mm (to be used if pressure above 1.5 MPa) |



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