
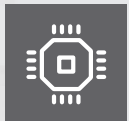


# THERMAL MASS FLOW SENSORS S401 / S421



**SMARTPHONE ANDROID APP**  
For remote configuration



# 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

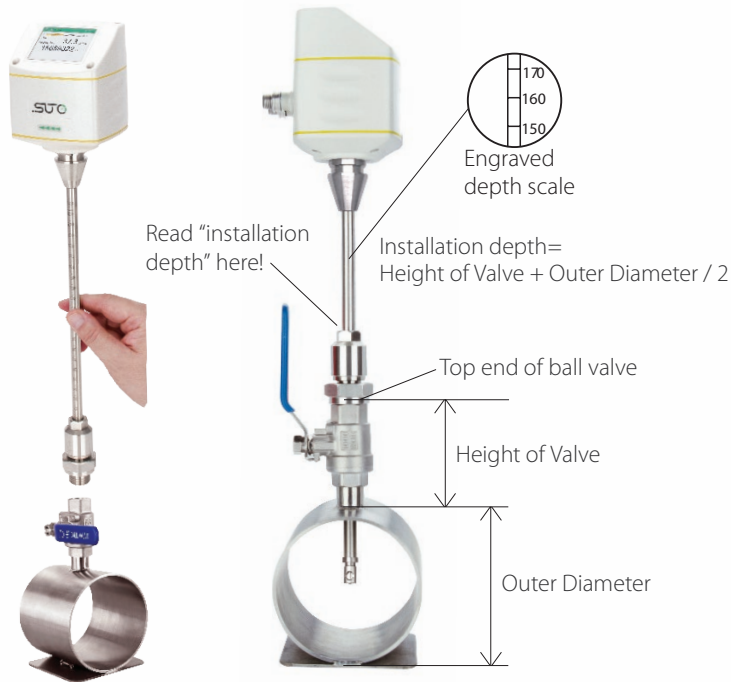
## S401 BENEFITS

- Tube diameters of DN25 and above
- 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.



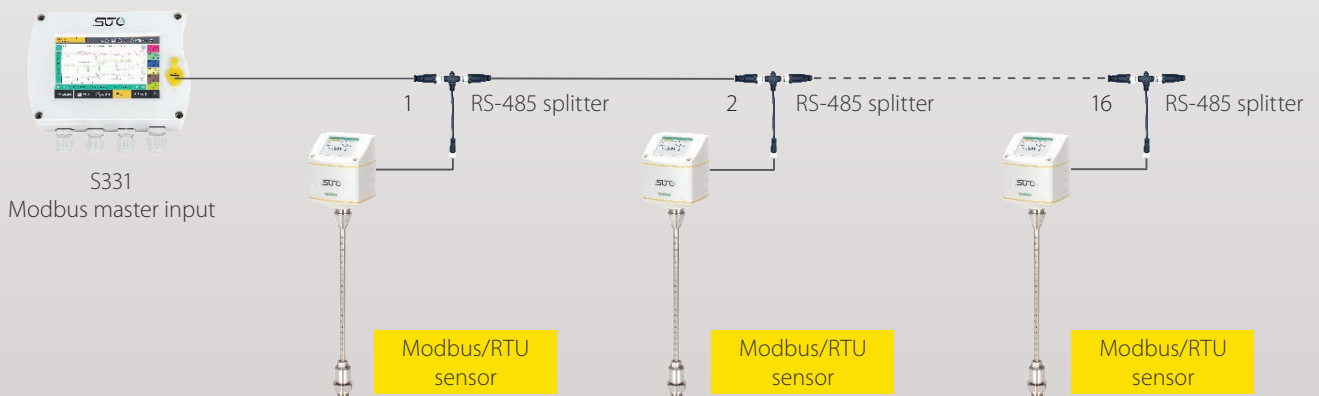
The S421 sensor unit can be easily removed for calibration. (Closing cap separately available)



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)<br>Casing PC + ABS<br>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<br>-30 ... +70 °C casing<br>-10 ... +50 °C casing with display              |         |                |                |                   |                         |
| Operating pressure     | <b>S401:</b> 0 ... 5.0 MPa (>1.6 MPa need installation device) <b>S421:</b> 0 ... 1.6 MPa (Optional: 4.0 MPa) |         |                |                |                   |                         |
| Analogue output        | Signal: 4 ... 20 mA, isolated<br>Scaling: 0 ... max flow<br>Max load: 250R                                    |         |                |                |                   |                         |
| Pulse output           | Signal: Isolated switch output, normally open, Max 30 VDC, 20 mA<br>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) | S 401-S (m³/h) | S 401-M (m³/h) | S 401-H (m³/h)    | Measuring range from to |
| ½"                     | DN15  |         | -              | -              | -                 | 0.5 ... 90 m³/h         |
| ¾"                     | DN20  |         | -              | -              | -                 | 0.9 ... 170 m³/h        |
| 1"                     | DN25  | 27.3    | 0.5 ... 147.7  | 0.6 ... 294.7  | 0.6 ... 356.9     | 1.5 ... 290 m³/h        |
| 1¼"                    | DN32  | 36.0    | 0.9 ... 266.3  | 1.2 ... 531.5  | 1.2 ... 643.5     | 2 ... 500 m³/h          |
| 1½"                    | DN40  | 41.9    | 1.2 ... 366.7  | 1.5 ... 731.9  | 1.5 ... 886.2     | 3 ... 700 m³/h          |
| 2"                     | DN50  | 53.1    | 2.0 ... 600.1  | 2.5 ... 1197.6 | 3.0 ... 1450.0    | 4 ... 1000 m³/h         |
| 2½"                    | DN65  | 68.9    | 3.5 ... 1026.5 | 5.0 ... 2048.6 | 5.0 ... 2480.4    | 6 ... 1500 m³/h         |
| 3"                     | DN80  | 80.9    | 5.0 ... 1424.4 | 7.0 ... 2842.7 | 7.0 ... 3441.9    | 8 ... 2500 m³/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:

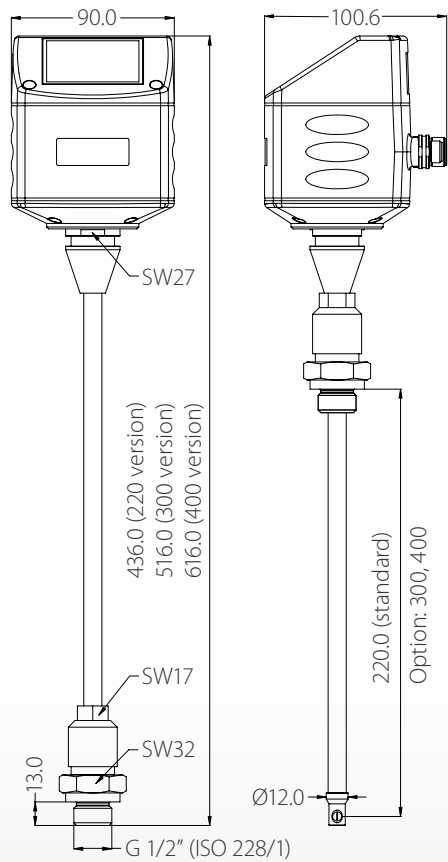
- Standard flow in air
- Reference pressure: 1000 hPa
- Reference Temperature: +20 °C

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.

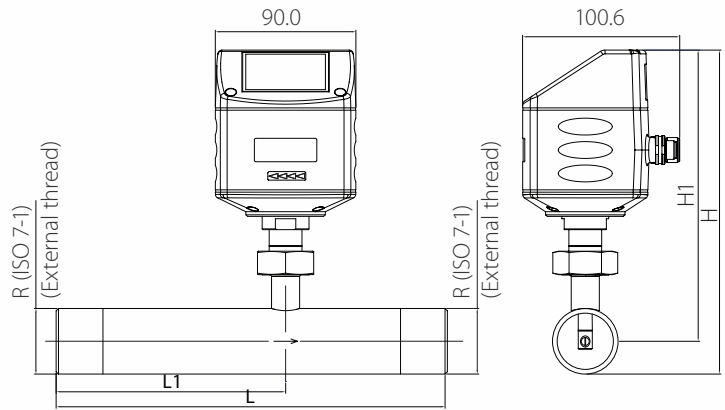
Furthermore it is possible to measure the air flow in bigger pipes (> DN300), for this please contact your local sales support.

# S401 / S421 DIMENSIONS

## S401



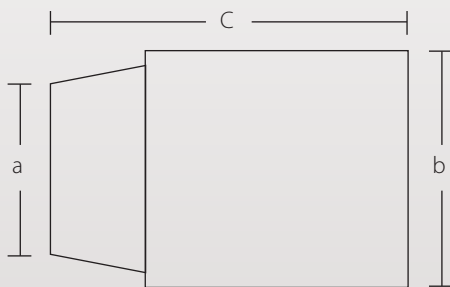
## S421 thread type



| 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"              |

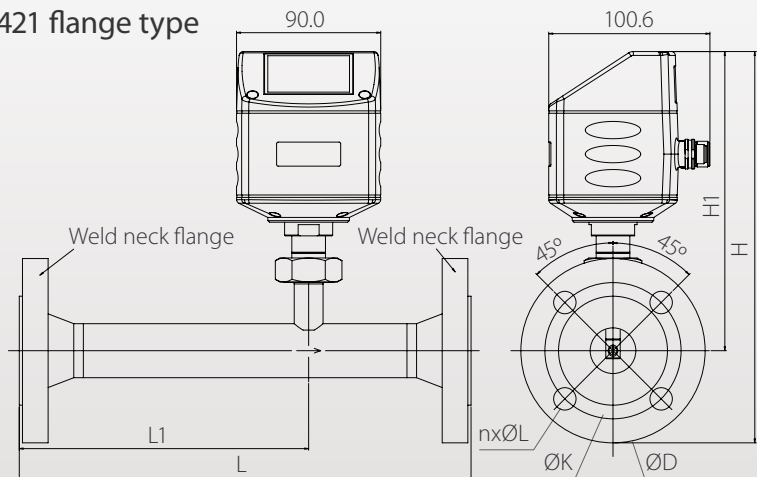
## Optional flow conditioner

No more straight inlet requirements



| Order No. | Dimensions | a       | b in mm | c in mm |
|-----------|------------|---------|---------|---------|
| A1071     | DN15       | R 1/2"  | 24      | 64      |
| A1072     | DN20       | R 3/4"  | 32      | 69      |
| A1073     | DN25       | R 1"    | 37      | 75      |
| A1074     | DN32       | R 1.25" | 45      | 92      |
| A1075     | DN40       | R 1.5"  | 54      | 92      |
| A1076     | DN50       | R 2"    | 68      | 105     |
| A1077     | DN65       | R 2.5"  | 80      | 128     |
| A1078     | 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



Visit our website or e-mail us:  
[www.suto-itec.com](http://www.suto-itec.com)  
[sales@suto-itec.com](mailto:sales@suto-itec.com)

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                             |       |  |
| Standard                                      | A     | G 1/2"   |
| A1006   | B     | PT 1/2" Adapter  |
| A1005   | C     | NPT 1/2" Adapter   |
| Gas type 1                                    |       |  |
| A1007   | A     | Air  |
| A1008   | B     | CO <sub>2</sub>  |
| A1009   | C     | O <sub>2</sub> (Oil- & grease-free cleaned)                |
| A1010   | D     | N <sub>2</sub>   |
| A1011   | E     | N <sub>2</sub> O   |
| A1012   | F     | Argon  |
| A1013   | G     | Natural Gas  |
| A1014   | H     | H <sub>2</sub> (real gas calibration)                      |
| A1015   | I     | Other gas (Please specify)                                 |
| A1016   | J     | He (real gas calibration)                                  |
| A1017   | K     | C <sub>3</sub> H <sub>8</sub>                              |
|   | 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 <b>Standard</b>                            |
| 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 (ISO 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 <sub>2</sub>  |
| A1009                                      | C     | O <sub>2</sub> (Oil- & grease-free cleaned)                |
| A1010                                      | D     | N <sub>2</sub>   |
| A1011                                      | E     | N <sub>2</sub> O   |
| A1012                                      | F     | Argon  |
| A1013                                      | G     | Natural Gas  |
| A1014                                      | H     | H <sub>2</sub> (real gas calibration)                      |
| A1015                                      | I     | Other gas (Please specify)                                 |
| A1016                                      | J     | He (real gas calibration)                                  |
| A1017                                      | K     | C <sub>3</sub> H <sub>8</sub>                              |
|  | 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 <b>Standard</b>                            |
| A1420                                      | B     | With display   |
| Flow conditioner (optional)                |       |  |
| A107X                                      | A     | R-thread flow conditioner                                  |

Example: S4210AFBDAEBB

S421, R-thread, DN50, CO<sub>2</sub>, N<sub>2</sub>, standard range, high accuracy calibration, Modbus/RTU output, display