# VA 520 - Inline flow meter

Modbus-RTU output

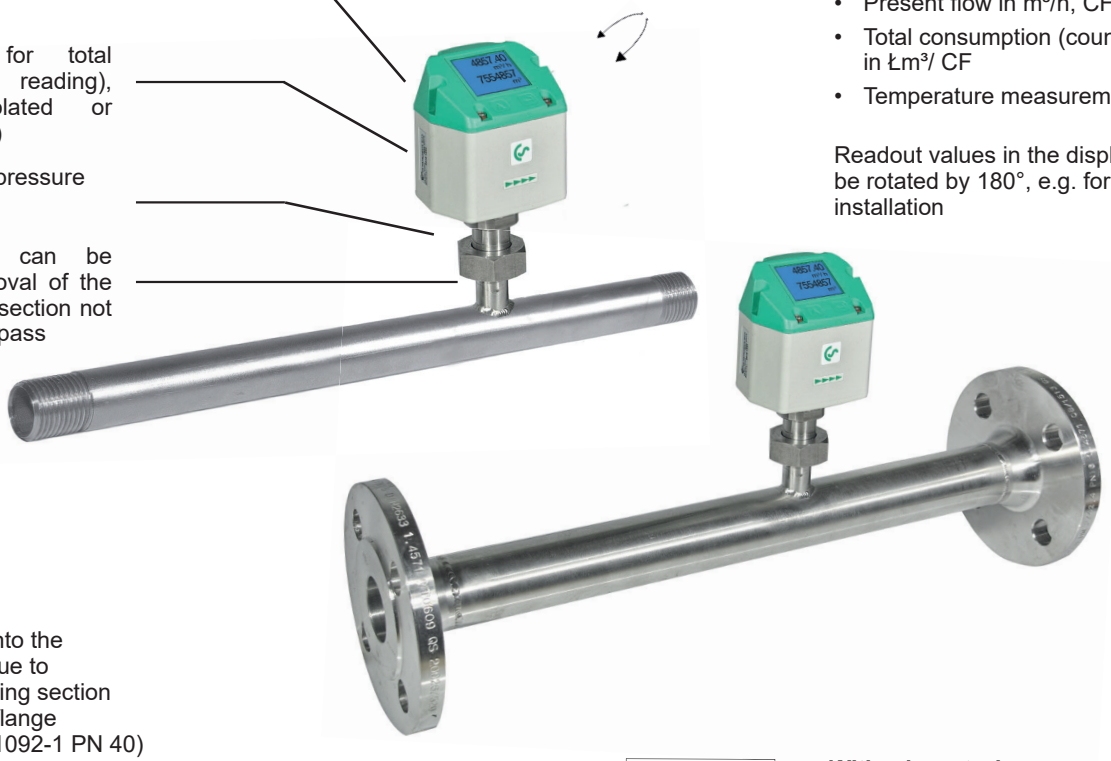
4...20 mA output for present flow

Pulse output for total flow (counter reading), galvanically isolated or M-Bus (optionally)

**NEW:** Integrated pressure sensor (optional)

Measuring unit can be unscrewed: Removal of the entire measuring section not necessary, no by-pass necessary

Display head rotatable by 180 ° e.g. in case of reverse flow direction



**Display shows 2 values at the same time:**

- Present flow in m³/h, CFM,...
- Total consumption (counter reading) in Łm³/ CF
- Temperature measurement

Readout values in the display can be rotated by 180°, e.g. for overhead installation

Easy installation into the existing pipeline due to integrated measuring section and welded neck flange (according to EN 1092-1 PN 40)

High measuring accuracy via the integrated measuring section defined measuring section (inlet and outlet section)

The sensor can be removed and cleaned


**With a key stroke:**

- Reset counter reading
- Select units
- Zero-Point adjustment, leak flow volume suppression

**Option:**

Bi-directional measurement. Blue or green arrows in the display indicate the direction of flow.
A meter reading is available for each flow direction.

**Application-technological features of the flow meters VA 520:**

- Digital interfaces such as Modbus-RTU, Ethernet (PoE) and M-Bus enable connection to higher-level systems such as energy management systems, building management systems, PLC,...
- Easy and cost-effective installation
- Units freely selectable via keys on the display CF, lbs, CFM
- Compressed air counter up to 1,999,999,999 m³ can be reset to “zero” via keypad
- Analog output 4...20 mA, pulse output (electrically isolated)
- High measuring accuracy even in the lower measuring range (ideal for leakage measurement)
- Negligible pressure loss
- Calorimetric measuring principle, no additional pressure and temperature measurement necessary, no mechanically moved parts
- Comprehensive diagnostic functions can be read out on the display or remote access via Modbus-RTU such as exceeding max./min values °F, calibration cycle, error codes, serial number. All parameters can be read out and changed via Modbus

For further accessories refer to pages 116 to 120

## Measuring range - Flow VA 520

| | | 1/4“ | 3/8“ | 1/2" | 3/4" | 1" | 1 ¼" | 1 ½" | 2" | 2 ½" | 3" |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | l/min (cfm) | m³/h (cfm) | m³/h (cfm) | m³/h (cfm) | m³/h (cfm) | m³/h (cfm) | m³/h (cfm) | m³/h (cfm) | m³/h (cfm) | m³/h (cfm) |
| **Reference conditions DIN 1945 / ISO 1217: 68 °F, 14 psi** | | | | | | | | | | | |
| **Air** | Low-Speed (164 ft/s) | 25 (0.9) | 225 Nl/min (8) | 20 (14) | 45 (25) | 75 (45) | 140 (80) | 195 (115) | 320 (190) | 550 (325) | 765 (450) |
| | Standard (304 ft/s) | 50 (1.8) | 25 (14.7) | 45 (25) | 85 (50) | 145 (85) | 265 (155) | 365 (215) | 600 (350) | 1025 (600) | 1420 (835) |
| | Max (607 ft/s) | 105 (3.6) | 50 (29.4) | 90 (50) | 175 (100) | 290 (170) | 530 (310) | 730 (430) | 1195 (700) | 2050 (1205) | 2840 (1670) |
| | High-Speed (735 ft/s) | 130 (4.5) | 60 (35.3) | 110(60) | 215 (125) | 355 (210) | 640 (375) | 885 (520) | 1450 (850) | 2480 (1460) | 3440 (2025) |
| **Setting to DIN 1343: 32 °F, 14.7 psi** | | | | | | | | | | | |
| **Argon (Ar)** | Low-Speed (164 ft/s) | 45 (1.5) | 330 Nl/min (11.7) | 35 (20) | 75 (40) | 120 (70) | 220 (130) | 305 (180) | 505 (295) | 865 (510) | 1200 (705) |
| | Standard (304 ft/s) | 85 (3) | 35 (20.5) | 70 (40) | 135 (80) | 230 (135) | 415 (245) | 570 (335) | 935 (550) | 1605 (945) | 2225 (1310) |
| | Max (607 ft/s) | 170 (6) | 75 (44.1) | 140 (80) | 275 (160) | 460 (270) | 830 (485) | 1140 (670) | 1870 (1100) | 3205 (1885) | 4440 (2615) |
| | High-Speed (735 ft/s) | 205 (7.2) | 95 (55.9) | 170 (100) | 335 (195) | 555 (325) | 1005 (590) | 1385 (815) | 2265 (1330) | 3880 (2285) | 5380 (3165) |
| | | | | | | | | | | | |
| **Carbondi-oxide (CO2)** | Low-Speed (164 ft/s) | 25 (0.9) | 225 Nl/min (7.9) | 20 (14) | 45 (25) | 75 (45) | 140 (80) | 195 (115) | 320 (185) | 545 (320) | 760 (445) |
| | Standard (304 ft/s) | 50 (1.8) | 25 (14.7) | 45 (25) | 85 (50) | 145 (85) | 260 (155) | 360 (210) | 590 (345) | 1015 (595) | 1405 (825) |
| | Max (607 ft/s) | 105 (3.6) | 50 (29.4) | 90 (50) | 175 (100) | 290 (170) | 525 (305) | 720 (425) | 1185 (695) | 2030 (1190) | 2810 (1655) |
| | High-Speed (735 ft/s) | 130 (4.5) | 60 (35.3) | 105 (60) | 210 (125) | 350 (205) | 635 (370) | 875 (515) | 1430 (840) | 2455 (1445) | 3405 (2000) |
| | | | | | | | | | | | |
| **Nitrogen (N2)** | Low-Speed (164 ft/s) | 25 (0.9) | 205 Nl/min (7.2) | 20 (13) | 40 (25) | 70 (40) | 130 (75) | 180 (105) | 295 (175) | 505 (300) | 705 (415) |
| | Standard (304 ft/s) | 50 (1.5) | 20 (11.7) | 40 (20) | 80 (45) | 135 (75) | 240 (140) | 335 (195) | 550 (320) | 945 (555) | 1305 (770) |
| | Max (607 ft/s) | 100 (3.3) | 45 (26.4) | 80 (45) | 160 (95) | 270 (155) | 485 (285) | 670 (395) | 1100 (645) | 1885 (1110) | 2610 (1535) |
| | High-Speed (735 ft/s) | 120 (4.2) | 55 (32.3) | 100 (55) | 195 (115) | 325 (190) | 590 (345) | 815 (475) | 1330 (780) | 2280 (1340) | 3165 (1860) |
| | | | | | | | | | | | |
| **Oxygen (O2)** | Low-Speed (164 ft/s) | 25 (0.9) | 215 Nl/min (7.5) | 20 (13) | 45 (25) | 75 (40) | 135 (80) | 185 (110) | 305 (180) | 525 (310) | 730 (430) |
| | Standard (304 ft/s) | 50 (1.8) | 20 (11.7) | 40 (25) | 80 (45) | 140 (80) | 250 (145) | 345 (205) | 570 (335) | 980 (575) | 1355 (795) |
| | Max (607 ft/s) | 100 (3.6) | 45 (26.4) | 85 (50) | 165 (95) | 280 (165) | 505 (295) | 695 (410) | 1140 (670) | 1955 (1150) | 2710 (1590) |
| | High-Speed (735 ft/s) | 125 (4.2) | 55 (32.3) | 105 (60) | 205 (120) | 340 (200) | 610 (360) | 845 (495) | 1380 (810) | 2365 (1390) | 3280 (1930) |
| | | | | | | | | | | | |
| **Nitrous oxide (N2O)** | Low-Speed (164 ft/s) | 25 (0.9) | 220 Nl/min (7.7) | 20 (14) | 45 (25) | 75 (45) | 140 (80) | 190 (110) | 315 (185) | 540 (320) | 750 (440) |
| | Standard (304 ft/s) | 50 (1.8) | 20 (11.7) | 40 (25) | 85 (50) | 140 (85) | 260 (150) | 355 (210) | 585 (345) | 1005 (590) | 1395 (820) |
| | Max (607 ft/s) | 105 (3.6) | 45 (26.4) | 85 (50) | 170 (100) | 285 (170) | 520 (305) | 715 (420) | 1170 (690) | 2010 (1180) | 2785 (1640) |
| | High-Speed (735 ft/s) | 125 (4.5) | 60 (35.3) | 105 (60) | 210 (120) | 345 (205) | 630 (370) | 865 (510) | 1420 (835) | 2435 (1430) | 3375 (1985) |
| | | | | | | | | | | | |
| **Natural gas (NG)** | Low-Speed (164 ft/s) | 15 (0.6) | 130 Nl/min (4.5) | 14,4 (8) | 25 (15) | 45 (25) | 85 (50) | 115 (65) | 190 (110) | 325 (190) | 450 (265) |
| | Standard (304 ft/s) | 30 (0.9) | 14 (8.8) | 25 (15) | 50 (30) | 85 (50) | 155 (90) | 215 (125) | 355 (205) | 605 (355) | 840 (495) |
| | Max (607 ft/s) | 60 (2.1) | 25 (14.7) | 50 (30) | 105 (60) | 170 (100) | 310 (185) | 430 (250) | 705 (415) | 1210 (710) | 1680 (985) |
| | High-Speed (735 ft/s) | 75 (2.7) | 35 (20.5) | 65 (35) | 125 (70) | 210 (120) | 380 (220) | 520 (305) | 855 (500) | 1465 (865) | 2035 (1195) |

**Optional: Connection to different Bus systems**

There are different options available for connection to modern Bus systems:

- Ethernet interface Modbus TCP/Modbus PoE
- M-BUS
- Modbus-RTU
- Profibus DP interface
- Profinet interface
- HART

Ethernet Modbus TCP

M12 Ethernet port, x-coded

For further accessories refer to pages 116 to 120

# VA 520 - Inline flow meter

Example order code VA 520:
0695 xxxx_B1_C1_E1_F1_G1_H1_K1_L1_M1_N1_O1_R1_Y1

| Measuring range (see table) | |
|---|---|
| B1 | Max version (607 ft/s) |
| B2 | Low-speed version (164 ft/s) |
| B3 | Standard version (304 ft/s) |
| B4 | High-speed version (735 ft/s) |

| Process connection | |
|---|---|
| C1 | R male thread |
| C2 | NPT male thread (only in 1.4404) |
| C3 | Flange DIN EN 1092-1 |
| C4 | Flange ANSI 16.5 Class 150 lbs |
| C5 | Flange ANSI 16.5 Class 300 lbs |

| Option signal outputs / bus connection | |
|---|---|
| E1 | 1 x 4…20 mA analog output (not electrically isolated), pulse output, RS 485 (Modbus-RTU) |
| E2 | M-Bus, 1 x 4…20 mA analog output (not electrically isolated), RS 485 (Modbus-RTU) |
| E4 | Ethernet interface (Modbus / TCP), 1 x 4...20 mA analog output (not electrically isolated), RS 485 (Modbus-RTU) |
| E5 | Ethernet interface PoE (Power over Ethernet) (Modbus/ TCP), 1 x 4…20 mA analog output (not electrically isolated), RS 485 (Modbus-RTU) |

| Adjustment/calibration | |
|---|---|
| F1 | No real gas adjustment - gas type configuration per gas constant |
| F2 | Real gas adjustment in the gas type selected below |

| Gas type | |
|---|---|
| G1 | Compressed air |
| G2 | Nitrogen (N2) |
| G3 | Argon (Ar) |
| G4 | Carbon dioxide (CO2) |
| G5 | Oxygen (O2) |
| G6 | Nitrous oxide (N2O) |
| G7 | Natural gas (NG) |
| G8 | Helium (He) (real gas adjustment **F2** required) |
| G9 | Propane (C3H8) (real gas adjustment **F2** required) |
| G10 | Methane (CH4) |
| G12 | Further gas / please indicate gas type (on request) |
| G13 | Gas mixture / please indicate mixture ratio (on request) |

| Reference standard | |
|---|---|
| H1 | 20 °C, 1000 mbar |
| H2 | 0 °C, 1013,25 mbar |
| H3 | 15 °C, 981 mbar |
| H4 | 15 °C, 1013,25 mbar |

| Maximum pressure | |
|---|---|
| K1 | 16 bar (232 psi) |
| K2 | 40 bar (580 psi) |

| Surface conditon | |
|---|---|
| L1 | standard version |
| L2 | Special cleaning - oil and grease free (e. g. for oxygen applications and so on) |
| L3 | Silicone-free version including special cleaning oil- and grease-free |

| Accuracy class | |
|---|---|
| M1 | ± 1.5% of the measured value ± 0.3% f.s. (standard) |
| M2 | ± 1% of the measured value ± 0.3% f.s. (precision) |

| Approvals | |
|---|---|
| N1 | Non-explosive area - no approval |
| N3 | DVGW approval for natural gas (max. pressure 232 psi) |

| Bi-directionale measurement | |
|---|---|
| O1 | without |
| O2 | with (2x 4...20 mA analog output, pulse output)<br>Above omitted with Ethernet and M-Bus |

| Special measuring range | |
|---|---|
| R1 | Special measuring range (please specify when placing order) |

| Option pressure measurement<br>(only with: G1, G2, G3, K1, L1, N1, O1) | |
|---|---|
| Y1 | without pressure sensor |
| Y2 | with integrated pressure sensor 0...232 psi(g)<br>(Output only via digital interfaces) |
| Y3 | with integrated pressure sensor 145...29.01psi<br>(Output only via digital interfaces) |

# Order no. VA 520

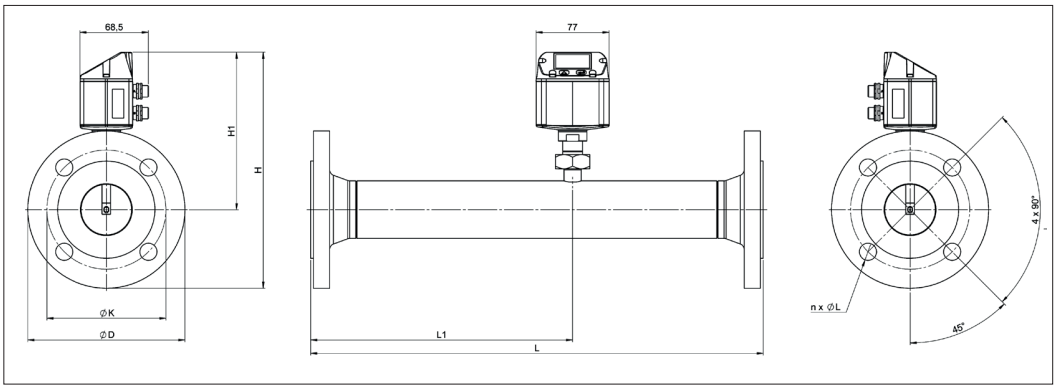
| DESCRIPTION (Flange version) / Stainless steel 1.4404 | ORDER NO. |
|---|---|
| VA 520 flow meter with integrated DN 15 measuring section with flange | 0695 2521 |
| VA 520 flow meter with integrated DN 20 measuring section with flange | 0695 2522 |
| VA 520 flow meter with integrated DN 25 measuring section with flange | 0695 2523 |
| VA 520 flow meter with integrated DN 32 measuring section with flange | 0695 2526 |
| VA 520 flow meter with integrated DN 40 measuring section with flange | 0695 2524 |
| VA 520 flow meter with integrated DN 50 measuring section with flange | 0695 2525 |
| VA 520 flow meter with integrated DN 65 measuring section with flange | 0695 2527 |
| VA 520 flow meter with integrated DN 80 measuring section with flange | 0695 2528 |

| DESCRIPTION | ORDER NO. Stainless steel 1.4404 NPT | ORDER NO. Stainless steel 1.4301 BSP |
|---|---|---|
| VA 520 flow meter with 1/4" measuring section | 0695 1520 | 0695 0520 |
| VA 520 flow meter with 3/8" measuring section | 0695 1527 | 0695 0527 |
| VA 520 flow meter with 1/2" measuring section | 0695 1521 | 0695 0521 |
| VA 520 flow meter with 3/4" measuring section | 0695 1522 | 0695 0522 |
| VA 520 flow meter with 1" measuring section | 0695 1523 | 0695 0523 |
| VA 520 flow meter with 1 1/4" measuring section | 0695 1526 | 0695 0526 |
| VA 520 flow meter with 1 1/2" measuring section | 0695 1524 | 0695 0524 |
| VA 520 flow meter with 2" measuring section | 0695 1525 | 0695 0525 |

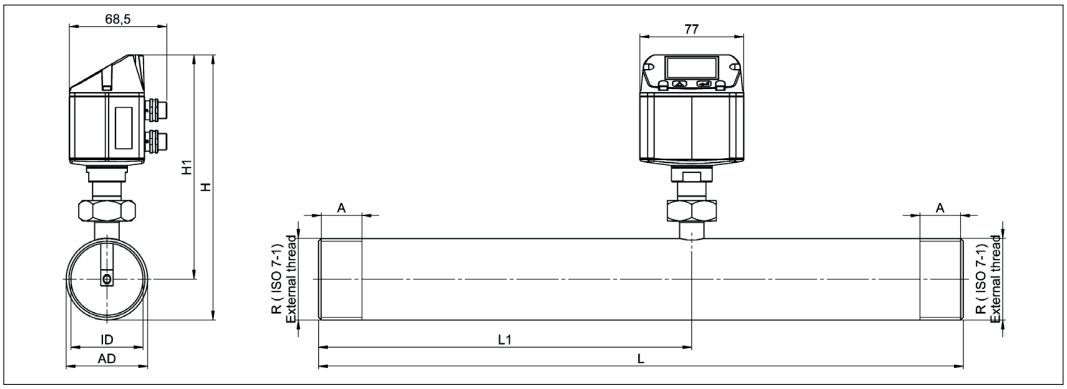
| ACCESSORIES | ORDER NO. |
|---|---|
| ISO calibration certificate (5 calibration points) for VA sensors | 3200 0001 |
| Additional calibration curve stored in the sensor | Z695 5011 |
| Certificate of origin | Z695 5012 |
| Closing cap for measuring section in aluminium | 0190 0001 |
| Closing cap for measuring section stainless steel 1.4404 | 0190 0002 |
| Connection cable for VA/FA series,16 ft | 0553 0104 |
| Connection cable for VA/FA sensors, 32 ft | 0553 0105 |
| Ethernet connection cable length 16 ft<br>M12 plug x-coded (8 pin) to RJ 45 plug | 0553 2503 |
| Ethernet connection cable length 32 ft<br>M12 plug x-coded (8 pin) to RJ 45 plug | 0553 2504 |

For further accessories refer to pages 106-120

| TECHNICAL DATA VA 520 | |
|---|---|
| **Parameters:** | m³/h, CFM (1000 mbar, 20 °C) in case of compressed air or Nm³/h, Nl/min (1013 mbar, 0 °C) in case of gases |
| **Units adjustable via keys at display:** | m³/h, m³/min, CFM, l/s, ft/min, cfm, m/s, kg/h, kg/min, g/s, lb/min, lb/h |
| **Sensor:** | Thermal mass flow sensor |
| **Measured medium:** | Air, gases |
| **Gas types are adjustable over CS service software or CS data logger:** | Air, nitrogen, argon, CO2, oxygen |
| **Measuring range:** | See table above |
| **Accuracy:**<br>**(o. M. V. = of measured value)**<br>**(o. F. S. = of full scale)** | ± 1.5% of m.v. ± 0.3% of f.s.<br>on request:<br>± 1% of m.v. ± 0.3% of f.s. |
| **Operating temperature:** | -22...176 °F<br>-25...349 °F with pressure sensor |
| **Operating pressure:** | -14.5 to 232 psi optionally up to PN 40 |
| **Digital output:** | RS 485 interface, (Modbus-RTU), optional: Ethernet interface PoE), M-Bus |
| **Analog output:** | 4…20 mA for CFM |
| **Pulse output:** | 1 pulse per CF or per litre electrically isolated. Pulse weight can be set on the display. Alternatively, the pulse output can be used as an alarm relay |
| **Supply:** | 18…36 VDC, 5 W |
| **Burden:** | < 500 Ω |
| **Housing:** | Polycarbonate (IP 65) |
| **Measuring section:** | Stainless steel, 1.4404 or 1.4301 |
| **Mounting position:** | any |




| VA 520 - Flange | | | | | | | | | Flange DIN EN 1092-1 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Measuring section | Outer pipe | | Inner pipe | | L | L1 | H | H1 | ØD | ØK | n x ØL |
| | mm | Inch | mm | Inch | Inch | Inch | Inch | Inch | mm | mm | |
| 1/2” | 21.3 | 0.84 | 16.1 | 0.63 | 11.8 | 8.27 | 8.3 | 6.5 | 95 | 65 | 4 x 14 |
| 3/4” | 26.9 | 1.06 | 21.7 | 0.85 | 18.7* | 10.83 | 8.5 | 6.5 | 105 | 75 | 4 x 14 |
| 1” | 33.7 | 1.34 | 27.3 | 1.07 | 18.7* | 10.83 | 8.7 | 6.5 | 115 | 85 | 4 x 14 |
| 1 1/4” | 42.4 | 1.67 | 36.0 | 1.41 | 18.7* | 10.83 | 9.2 | 6.5 | 140 | 100 | 4 x 18 |
| 1 1/2” | 48.3 | 1.90 | 41.9 | 1.65 | 18.7* | 10.83 | 9.4 | 6.5 | 150 | 110 | 4 x 18 |
| 2” | 60.3 | 2.37 | 53.1 | 2.09 | 18.7* | 10.83 | 9.7 | 6.5 | 165 | 125 | 4 x 18 |
| 2 1/2” | 76.1 | 3.0 | 68.9 | 2.71 | 18.7* | 10.83 | 10.5 | 6.9 | 185 | 145 | 8 x 18 |
| 3” | 88.9 | 3.5 | 80.9 | 3.19 | 18.7* | 10.83 | 10.8 | 6.9 | 200 | 160 | 8 x 18 |
| *Attention: Shortened inlet section. Please observe the recommended minimum inlet section (length = 15 x inner diameter) on site. | | | | | | | | | | | |




| VA 520 - Thread | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Connection thread | Outer pipe | | Inner pipe | | L | L | L1 | L1 | H | H | H1 | H1 | A | A |
| | mm | Inch | mm | Inch | Inch | mm | Inch | mm | Inch | mm | Inch | mm | Inch | mm |
| R 1/4″ | 13.7 | 0.54 | 8.9 | 0.35 | 7.6 | 194 | 5.3 | 137 | 6.8 | 174.7 | 6.5 | 165.7 | 0.5 | 15 |
| R 3/8” | 17.2 | 0.68 | 12.5 | 0.49 | 11.8 | 300 | 7.9 | 200 | 6.9 | 175 | 6.5 | 165.7 | 0.5 | 15 |
| R 1/2″ | 21.3 | 0.84 | 16.1 | 0.63 | 11.8 | 300* | 8.2 | 210 | 6.9 | 176.4 | 6.5 | 165.7 | 0.7 | 20 |
| R 3/4″ | 26.9 | 1.06 | 21.7 | 0.85 | 18.7 | 475* | 10.8 | 275 | 7.0 | 179.2 | 6.5 | 165.7 | 0.7 | 20 |
| R 1″ | 33.7 | 1.34 | 27.3 | 1.07 | 18.7 | 475* | 10.8 | 275 | 7.1 | 182.6 | 6.5 | 165.7 | 0.9 | 25 |
| R 1 1/4″ | 42.4 | 1.67 | 36.0 | 1.41 | 18.7 | 475* | 10.8 | 275 | 7.3 | 186.9 | 6.5 | 165.7 | 0.9 | 25 |
| R 1 1/2″ | 48.3 | 1.90 | 41.9 | 1.65 | 18.7 | 475* | 10.8 | 275 | 7.3 | 186.9 | 6.5 | 165.7 | 0.9 | 25 |
| R 2″ | 60.3 | 2.37 | 53.1 | 2.09 | 18.7 | 475* | 10.8 | 275 | 7.7 | 195.9 | 6.5 | 165.7 | 1.1 | 30 |
| *Attention: Shortened inlet section. Please observe the recommended minimum inlet section (length = 15 x inner diameter) on site! | | | | | | | | | | | | | | |