

**HUBA****212 Series Vortex Flow/Temp. Transmitter With Display**

4-20 mA Output, 1/4" to 1.0" Pipe Sizes, Rugged PPA Construction

**DESCRIPTION**

Flow transmitter type 212 is based on the Vortex trail principle and incorporates a piezoelectric sensor element. The unit has a digital display indicating flow rate and the media temperature (when ordered with the optional temperature sensor).

With no moving parts, the flow sensor is not sensitive to debris, has marginal pressure loss and high accuracy.

Versions with a 1000 Ohm RTD temperature sensor built-in to the bluff are available.

**SPECIFICATIONS**

**Medium:** Suitable for water & water glycol based heat exchange systems with the usual additives and other fluids compatible with the materials of construction (consult factory). For media with viscosity greater than 2 millipascal seconds (2 centipoise), higher flow rates are required to form vortices raising the minimum measurable flow rate value.

**Flow ranges:** From 0.24 to 39.6 GPM (0.9 ... 150 litres per minute). See Table 3.

**Temperature measurement:** Optional sensor imbedded in flow sensor bluff  
Measuring range: -4°F to +185°F (-20 to +85 °C)  
Output: 4 to 14.5 mA  
Accuracy: ±1°C

**Temperature:** Ambient: 4° to 122°F (-20 to +50 °C)  
Media: < +185°F (+85 °C)

In storage: -22° to 176°F (-30 to +80 °C)

**Max. pressures and medium temperature:**

Table 1

| psi | bar | °F  | °C  | Duration  |
|-----|-----|-----|-----|-----------|
| 174 | 12  | 104 | 40  | Lifetime  |
| 87  | 6   | 212 | 100 | Lifetime  |
| 58  | 4   | 257 | 125 | 600 hours |
| 58  | 4   | 284 | 140 | 2 hours   |

**Max. test pressure:** 261 psi/18 bar at 104°F/40 °C

**Loss of pressure / cavitation:** A minimum inlet pressure of 10.2 psi (0.7 bars) is required to avoid cavitation issues at maximum flow.

**Wetted materials:**

Sensor vane: ETFE

Sealing material: EPDM

Flow sensor and bluff:

ASTM- PPA, Polyphthalamide

ISO-PA6T/6I, Grivory 40%GF

**Power/Output Options:**

Table 2

|                     | Flow Output             | Temperature Output        |
|---------------------|-------------------------|---------------------------|
| Power ( $U_{in}$ )  | 10-30 VDC               | 10-30 VDC                 |
| Signal              | 4-20 mA                 | 4-14.5 mA                 |
| Load Against GND    | <( $U_{in}-10V$ )/20 mA | <( $U_{in}-10V$ )/14.5 mA |
| Current Consumption | <50 mA                  |                           |

**Features**

- Low cost product with high levels of accuracy
- Temperature insensitive measuring principle
- Excellent media resistance (measuring element not in contact with the media)
- Minimal pressure loss
- Measuring element not sensitive to debris
- Direct temperature measurement in the medium

**Response time:**

Signal delay: < 2s

Response time: <500 ms

Display update rate: <500 ms

**Electrical connection:** 5-pole M12x1, circular receptacle

**Polarity reversal protection:** Short circuit, reverse voltage and external voltage protected within the admissible supply voltage.

**Protection class:** IP65 (M12x1)

**Mounting position:** In principle universal. We recommend that, when the sensor is mounted in horizontal pipe runs that the electrical connection/sensor assembly be mounted off vertical (3 o'clock or 9 o'clock best).

**Piping connection fittings:** See tables. Body style G has integral molded BSPP external threads supplied with EPDM seals. Body style N has field insertable fittings that are offered in a range of NPT threads and tube fittings. Special fittings can be produced by Clark or the customer.

**Accuracy:**

Accuracy specifications are valid for media with a viscosity <2 centipoise (2 millipascal seconds).

For water in temperature range 41 to 212°F (5 to 100°C) or for water with maximum 20% glycol at ≥77°F (≥25°C)

Up to 50% fs: ≤ 1% fs

From 50% fs: ≤ 2% of measured value

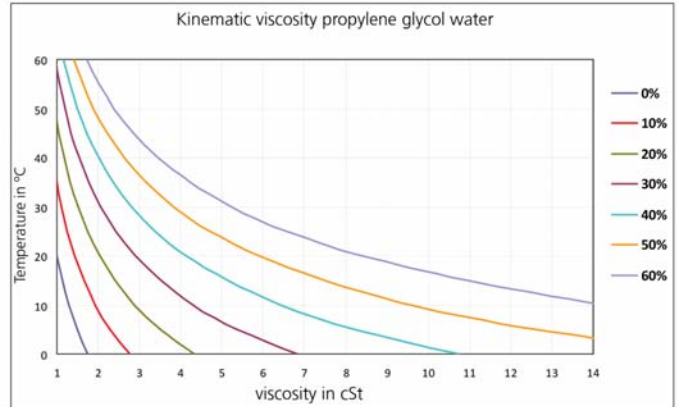
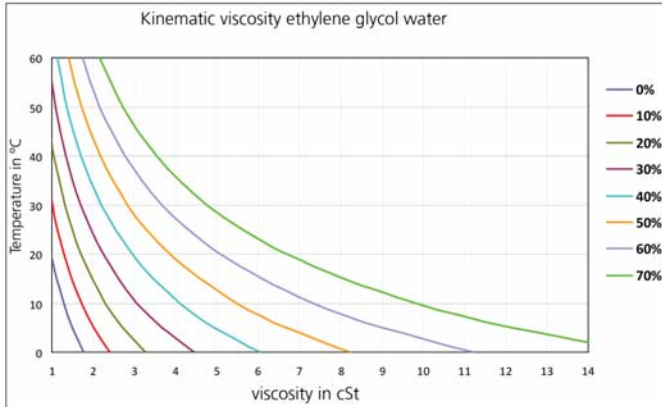
**Packaging:**

Packaged singly (standard) or in multiple packs

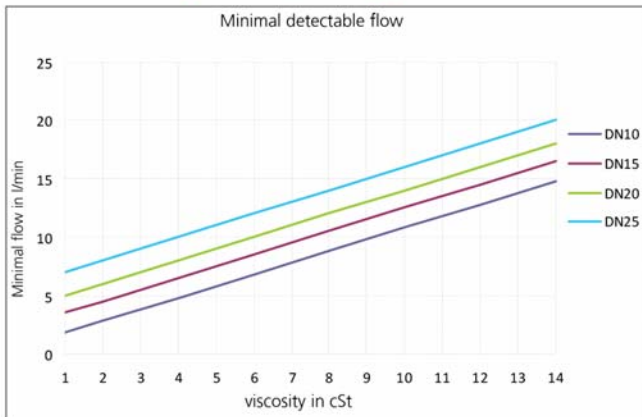
**Table 3- Model Size Selection**

| Size | Pipe Size | Full Scale Range (Gal/min) | Full Scale Range (l/min) | K <sub>1</sub> (l/min/mA) | Approx, Weight    |
|------|-----------|----------------------------|--------------------------|---------------------------|-------------------|
| DN8  | 1/4"      | 0.238 to 3.96              | 0.9 to 15.0              | 0.938                     | 0.2 lbs (90g)     |
| DN10 | 3/8"      | 0.265 to 10.6              | 1.8 to 32.0              | 2.000                     | 0.23 lbs (105 g)  |
| DN10 | 3/8"      | 0.528 to 10.6              | 2.0 to 40.0              | 2.500                     | 0.23 lbs (105 g)  |
| DN15 | 1/2"      | 0.925 to 13.20             | 3.5 to 50.0              | 3.125                     | 0.25 lbs (115 g)  |
| DN20 | 3/4"      | 1.32 to 22.50              | 5.0 to 85.0              | 5.313                     | 0.30 lbs (135 g)  |
| DN25 | 1"        | 2.38 to 39.6               | 9.0 to 150.0             | 9.375                     | 2.54 lbs (1150 g) |

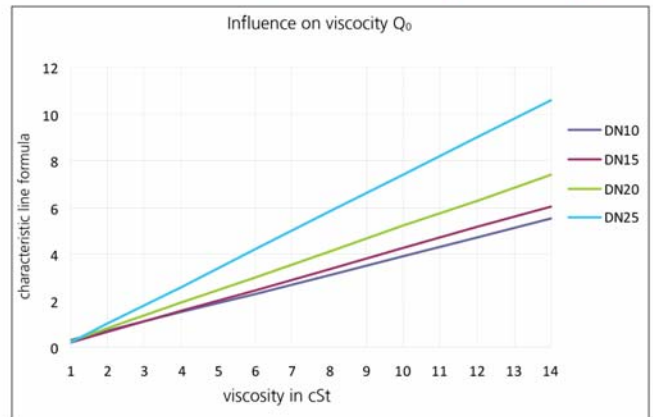
**Influence of Glycol:** Following definitions correct the influence of media with higher viscosity than water (media viscosity (v) > 1.8 cSt. Corrections result in measuring accuracy of 3% FS in range of 1.8-4 cSt & 4% FS in the range of 4-14 cSt.



**Definition of respond threshold Q<sub>min</sub>**



**Definition of characteristic line formula Q = k \* f - Q<sub>0</sub>**



Response threshold Q<sub>min</sub> (minimum flow in l/min)

DN 10: Q<sub>min</sub> = v + 0.8

DN 15: Q<sub>min</sub> = v + 2.5

DN 20: Q<sub>min</sub> = v + 4

DN 25: Q<sub>min</sub> = v + 6

(Multiply liters x 0.264 to convert to gallons)

Formula characteristic line for Q > Q<sub>min</sub> in l/min

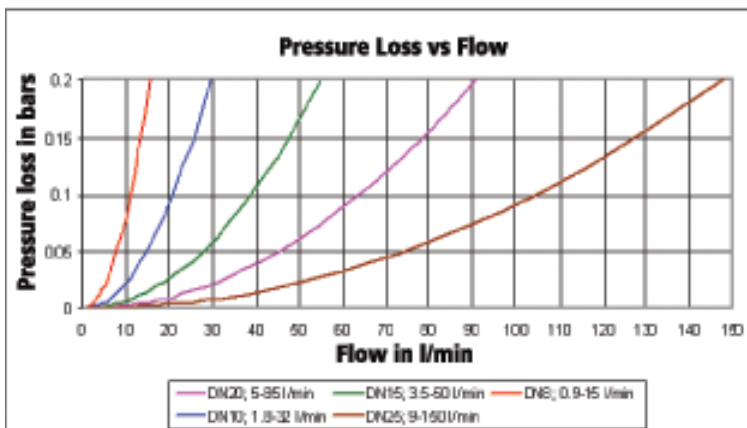
Current output 4 ... 20 mA (I in mA)

DN10: Q = K<sub>1</sub> \* (I - 4 mA) - 0.40v + 0.40

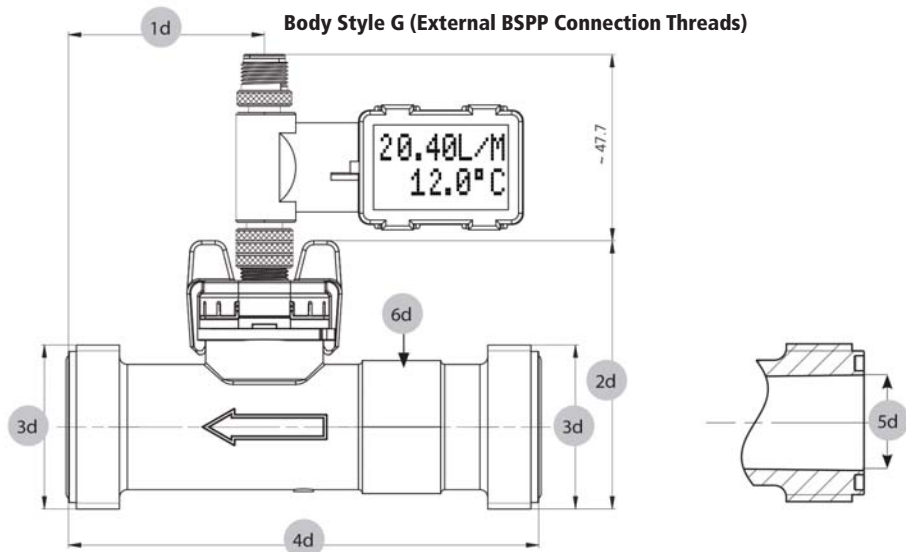
DN15: Q = K<sub>1</sub> \* (I - 4 mA) - 0.45v + 0.45

DN20: Q = K<sub>1</sub> \* (I - 4 mA) - 0.55v + 0.55

DN25: Q = K<sub>1</sub> \* (I - 4 mA) - 0.80v + 0.80

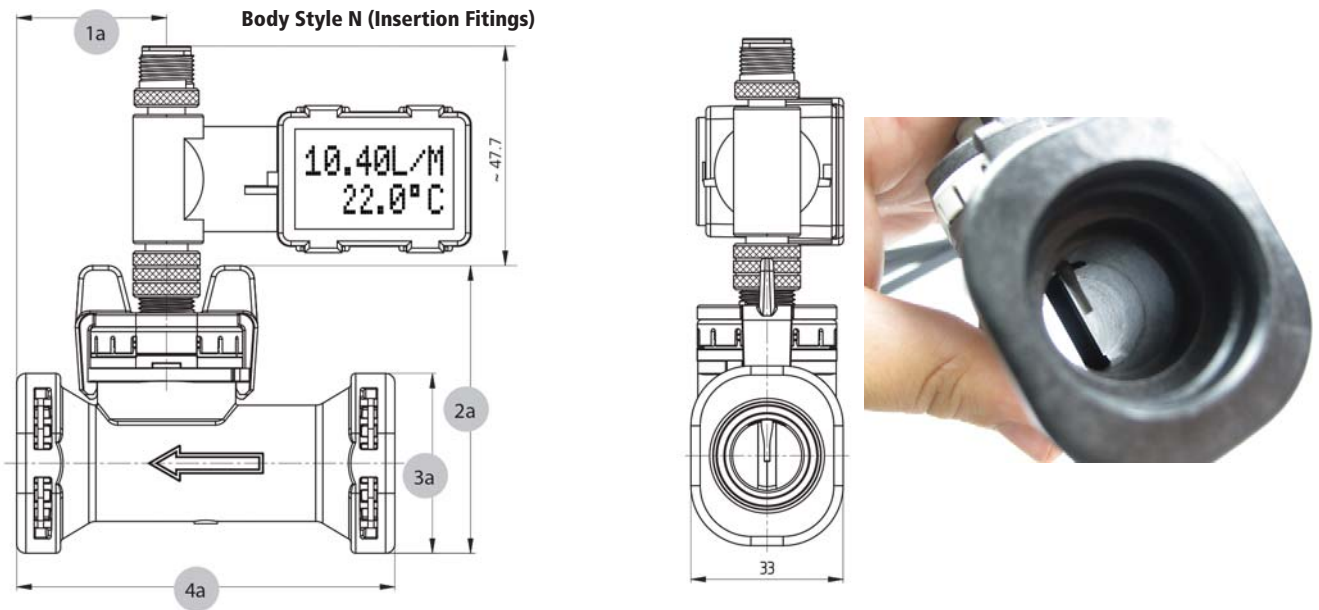


## DIMENSIONS (MM)



**Table 4**

| Size | 1d (mm) | 2d (mm) | 3d BSPP Male Pipe Thread | 4d (mm) | 5d (mm) | 6d Wrench Flat (mm) | Min./Max Locking Torque (Nm) |
|------|---------|---------|--------------------------|---------|---------|---------------------|------------------------------|
| DN8  | 48.2    | 55.7    | G3/4                     | 86      | 11.5    | 12                  | 1/12                         |
| DN10 | 39.5    | 54.1    | G3/4                     | 90      | 11.5    | 19                  | 1/12                         |
| DN15 | 41.6    | 59.5    | G1                       | 97      | 16      | 22                  | 2/12                         |
| DN20 | 42.6    | 65.8    | G1-1/4                   | 117     | 20      | 27                  | 2.5/15                       |
| DN25 | 56.0    | 71.3    | G1-1/4                   | 132     | 26      | 34                  | 2.5/15                       |



**Table 5**

| Size | 1a (mm)                      | 2a (mm) | 3a (mm) | 4a (mm) | 5a (mm) |
|------|------------------------------|---------|---------|---------|---------|
| DN8  | 29.5                         | 59.0    | 32.9    | 72      | 28.9    |
| DN10 | 32.5                         | 57.3    | 32.9    | 77      | 28.9    |
| DN15 | 32.5                         | 62.4    | 39.0    | 82      | 33.0    |
| DN20 | 39.3                         | 66.3    | 43.0    | 105     | 37.4    |
| DN25 | Not available (G style only) |         |         |         |         |

## N STYLE BODY PIPING CONNECTIONS & DN25 NPT ADAPTERS

The 212 series offers simple to install piping connections. Inserting and removing fittings for pipe sizes to 3/4" is easy. A clip secures the end fitting to the flow sensor and an o-ring provides the seal. OEM clients may wish to produce fittings according to their own design needs.

The 1" size (DN25) has metric G1 1/4 male threads molded integral to the sensor body and is supplied with two EPDM sealing o-rings. 1" NPT 303 SS and polypropylene adaptors are available (see Table 7).

### THREADED ADAPTERS

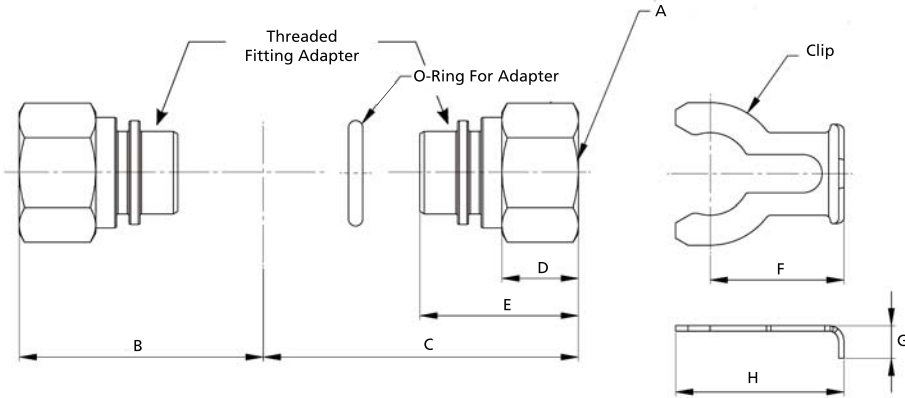


Table 6: Stainless Threaded Adapters (1/4"-3/4" NPT) & Clip Table

| Size | Clip Part Number | O-Ring Part Number (Material) | Threaded Adapter Part Number | *Material | A        | B inches (mm) | C inches (mm) | **D inches (mm) | E inches (mm) | F inches (mm) | g inches (mm) | H inches (mm) |
|------|------------------|-------------------------------|------------------------------|-----------|----------|---------------|---------------|-----------------|---------------|---------------|---------------|---------------|
| DN8  | C810             | R810E (EPDM)                  | ADS1/4                       | 303 SS    | 1/4" NPT | 1.76 (44.65)  | 2.27 (57.65)  | 0.551 (14)      | 1.14(29)      | 0.965 (24.5)  | 0.236 (6)     | 1.21 (30.8)   |
| DN10 | C810             | R810E (EPDM)                  | ADS3/8                       | 303 SS    | 3/8" NPT | 1.87 (47.55)  | 2.35 (59.65)  | 0.551 (14)      | 1.142 (29)    | 0.965 (24.5)  | 0.236 (6)     | 1.21 (30.8)   |
| DN15 | C15              | R15E (EPDM)                   | ADS1/2                       | 303 SS    | 1/2" NPT | 1.97 (50.05)  | 2.64 (67.05)  | 0.646 (16.4)    | 1.260 (32)    | 1.1 (28)      | 0.191 (4.85)  | 1.36 (34.5)   |
| DN20 | C20              | R20E (EPDM)                   | ADS3/4                       | 303 SS    | 3/4" NPT | 2.32 (58.85)  | 3.36 (85.25)  | 0.731(18.6)     | 1.499 (37.8)  | 1.1 (28)      | 0.315 (8)     | 1.36 (34.5)   |

\*Contact us for other materials or details on how to make your own fittings

\*\*The overall length of the flow sensor is increased by approximately twice this value

Table 7: Brass Solder Adapters

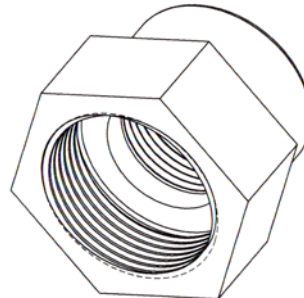
| Size | Clip Part Number | O-Ring Part Number (Material) | Adapter Part Number | Material  | Standard Tubing Size (For Use With Type K & Type L Copper Tubing) |
|------|------------------|-------------------------------|---------------------|-----------|---|
| DN8  | C810             | R810E (EPDM)                  | SADB1/4             | 360 Brass | 1/4"  |
| DN10 | C810             | R810E (EPDM)                  | SADB3/8             | 360 Brass | 3/8"  |
| DN15 | C15              | R15E (EPDM)                   | SADB1/2             | 360 Brass | 1/2"  |
| DN20 | C20              | R20E (EPDM)                   | SADB3/4             | 360Brass  | 3/4"  |



Table 8: DN25 BSP to NPT Adapters

| *Model   | Description                     | Material            |
|----------|---------------------------------|---------------------|
| ADSG1NPT | Adapter G1-1/4 to 1" NPT Female | 303 Stainless Steel |
| ADPG1NPT | Adapter G1-1/4 to 1" NPT Female | Polypropylene       |

\* Two R25E EPDM sealing o-rings are supplied with model DN25



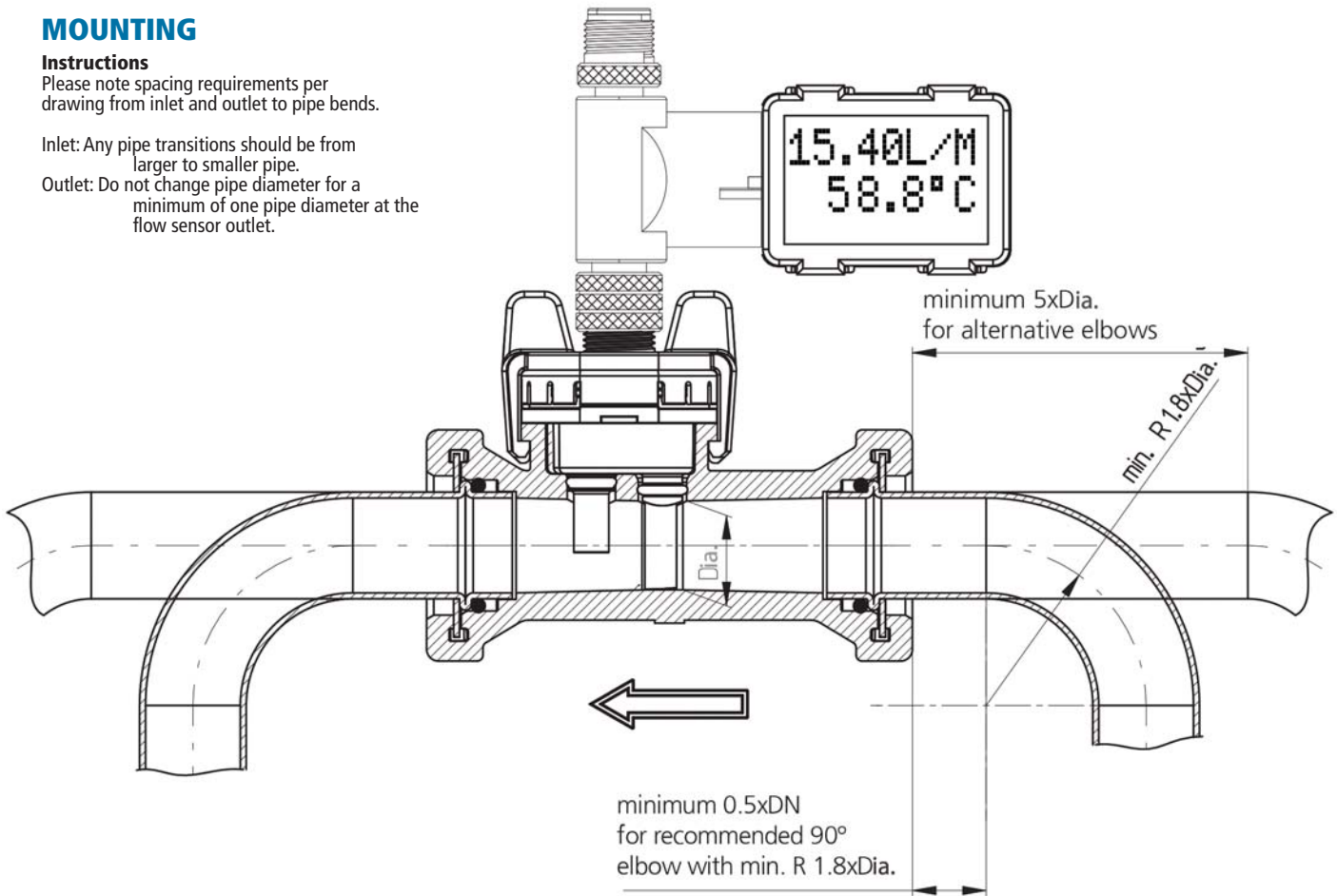
## MOUNTING

### Instructions

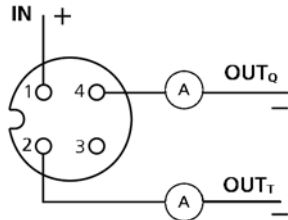
Please note spacing requirements per drawing from inlet and outlet to pipe bends.

**Inlet:** Any pipe transitions should be from larger to smaller pipe.

**Outlet:** Do not change pipe diameter for a minimum of one pipe diameter at the flow sensor outlet.



## WIRING



Pin 3 & Pin 5 - not connected (Pin 5 not shown)

Connect pin 1 and pin 4 to ensure the power supply of the internal electronics.

## ORDERING INFORMATION

1) Order flow sensor model from table 9 - A.B.C.D.E.F.G.H.I

Example: 212.9.15.4.2.0.M.1.K

2) Order End Connection adapters, O-rings and adapter clips separately for N Connections. See table 10.

| A Model | B Version                      | C Size  | D Output   | E Display  | F Temp. Units                         | G Flow Units       | H Seals         | I Connections   |
|---------|--------------------------------|---|--|--|---------------------------------------|--------------------|-----------------|---|
| 212     | 9=Flow<br>8=Flow & Temperature | 08=DN8<br>10=DN10 (1.8 to 32 l/min)<br>11=DN10 (2.0 to 40 l/min)<br>15=DN15<br>20=DN20<br>25=DN25 | 4= 4-20 mA (Flow)<br>5= 4-20 mA (Flow & Temperature) | Flow Only<br>2= 1 Line<br>Flow & Temperature<br>0= 2 lines<br>1= 1 line alternating (2s) | 0= None (Flow Only)<br>C= °C<br>F= °F | M= l/min<br>S= l/s | 1=EPDM<br>2=FPM | K= Outside Metric Threads (G)<br>N= Adapter Fittings (Table 10) |

| Table 10 Flow Sensor End Connections Order Table |                                      |   |                                 |
|--|--------------------------------------|---|---------------------------------|
| Size   | Connection Adapter<br>(Two Required) | O-rings<br>(Two Required)   | Adapter Clips<br>(Two Required) |
| DN8  | Select from Table 6 or Table 7       | Select from Table 6 or Table 7  | Select from Table 6 or Table 7  |
| DN10   |                                      |   |                                 |
| DN15   |                                      |   |                                 |
| DN20   |                                      |   |                                 |
| DN25   | Select from Table 8                  | Two R25E o-rings supplied standard with flow sensor, adapter clips not used on this model |                                 |

| Table 11 Component Parts |  |
|--------------------------|--|
| Part Number              | Description  |
| Electrical               |  |
| 115024                   | Straight-wire box for connector M12x1, 5 pole plug with 78.7" (200 cm) cable |
| 114564                   | Straight-wire box for connector M12x1, screw terminal, 5 pole                |
| Fitting Clips            |  |
| C810                     | For DN8 and DN10   |
| C15                      | For DN15   |
| C20                      | For DN20   |
| O-Rings                  |  |
| R810E                    | EPDM, AS568-113  |
| R15E                     | EPDM, AS568-909  |
| R20E                     | EPDM, AS568-118  |
| R25E                     | EPDM, 31 mm dia. x 3 mm wall   |

| Component Parts                       |   |
|---------------------------------------|---|
| Part Number                           | Description   |
| Connection Adapter Fittings- Threaded |   |
| ADS1/4                                | Model DN8 Stainless Steel Adapter, 1/4" NPT Female  |
| ADS3/8                                | Model DN10 Stainless Steel Adapter, 3/8" NPT Female |
| ADS1/2                                | Model DN15 Stainless Steel Adapter, 1/2" NPT Female |
| ADS3/4                                | Model DN20 Stainless Steel Adapter, 3/4" NPT Female |
| ADSG1NPT                              | Stainless Steel Adapter G1-1/4 to 1" NPT Female     |
| ADPG1NPT                              | Polypropylene Adapter G1-1/4 to 1" NPT Female       |
| Connection Adapter Fittings- Soldered |   |
| SADB1/4                               | Model DN8 to 1/4" copper tubing                     |
| SADB3/8                               | Model DN10 to 3/8" copper tubing                    |
| SADB1/2                               | Model DN15 to 1/2" copper tubing                    |
| SADB3/4                               | Model DN20 to 3/4" copper tubing                    |