

CLARK

210 Series Vortex Flow Transmitter

Frequency & Analog Output , 1/4" to 1.0" Pipe Sizes, Rugged PPA Construction

DESCRIPTION

The flow sensor type 210 is based on the Kármán vortex trail principle. In comparison to the OEM flow sensor type 200, the type 210 is available with an increased range of power supply and output signals all with and without temperature measurement.

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.



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
- Drinking water approval KTW, W270, ACS, WRAS

APPLICATIONS

- **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.

SPECIFICATIONS

GENERAL

Flow ranges	From 0.24 to 39.6 GPM (0.9 ... 150 litres per minute) ** See Table 3	
Temperature measurement	Optional PT1000 RTD imbedded in flow sensor bluff	
	Measure range -40°F to +302°F (-40 to > +150 °C)	
	1000.00 Ohm @ 32°F (0 °C)	
Temperature	Ambient	5° to 185°F (-15 to + 85 °C)
	In storage	-22° to 185°F (-30 to + 85 °C)
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/6L, Grivory 40%GF	
Response time	100 ms	
Electrical connection	3-pole connector (without temperature output) RAST 2.5 (AMP DUO PLUG 2.5™ is recommended mating connector.) M12x1 5-pole circular receptacle provided for temperature output option. See accessories for cable assembly offerings	
Polarity reversal protection	Short circuit, reverse voltage and external voltage protected within the admissible supply voltage.	
Protection class	IP20, IP65 (M12x1 only)	
Piping connection fittings	** See tables 6, 7 & 8 for standard selection of types & sizes 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	

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

POWER/OUTPUT OPTIONS

Table 2.

	Square Pulse Frequency Output	Voltage Output	Current Output
Power (U_{in})	4.75-33 VDC	11.5-33 VDC	8-33 VDC
Signal	<0.5...> U_{in} -0.5 V	0-10 V	4-20 mA
Load Against GND	<1 mA/<100 nF	<6 mA/<100 nF	<(U_{in} -8 V)/20 mA
Current Consumption	<2 mA	<5 mA	

TEMPERATURE MEASUREMENT ACCURACY:

PT 1000 for DIN EN 60751 Class B
 $\pm 0.80^{\circ}\text{F}$ @ 68o ($\pm 0.45^{\circ}\text{C}$ @ 20 °C)
 $\pm 1.40^{\circ}\text{F}$ @ 190oF ($\pm 0.75^{\circ}\text{C}$ @ 90 °C)

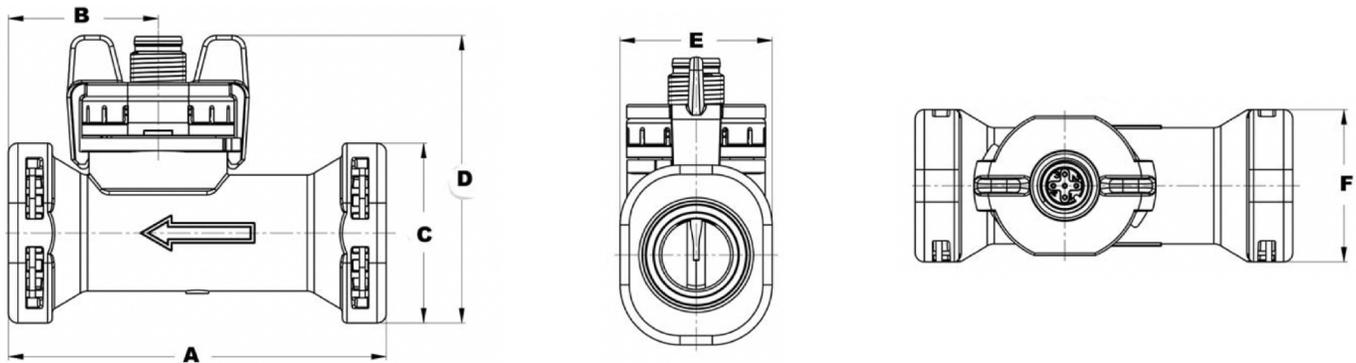
PACKAGING:

Packaged singly (standard) or in multiple blister packs Blister packs:
 DN 8, 10 and 15 Blister packs each containing 30 pcs
 DN 20 and 25 Blister packs each containing 20 pcs

Table 3 - Model Size Selection

Size	Pipe Size	Full Scale Range (Gal/min)	Full Scale Range (l/min)	Approximate Frequency Range (Hz)	Calibration Factor/Formula Q= volume flow in LPM f=Hz	Approx. Weight (Without End Fittings)
DN8	1/4"	0.238 to 3.96	0.9 to 15.0	31 to 399	$Q=0.0383*f-0.3$	0.1 lbs (47g)
DN10	3/8"	0.476 to 8.45	1.8 to 32.0	24 to 383	$Q=0.0841*f-0.2$	0.13 lbs (57 g)
DN15	1/2"	0.925 to 13.20	3.5 to 50.0	20 to 270	$Q=0.1861*f-0.2$	0.15 lbs (68 g)
DN20	3/4"	1.32 to 22.50	5.0 to 85.0	14 to 227	$Q=0.3751*f-0.3$	0.20 lbs (92 g)
DN25	1"	2.38 to 39.6	9.0 to 150.0	12 to 204	$Q=0.7370*f-0.2$	0.22 lbs (100 g)

DIMENSIONS DN 8, 10, 15, 20



** Dimensions for Dn 25 (Table 5) available upon request

Table 4

Dimensions do not include fittings- see following tables for standard fitting offerings						
Size	A inches(mm)	B inches(mm)	C inches(mm)	D inches(mm)	E inches(mm)	F inches(mm)
DN8	2.83 (72)	1.16 (29.5)	1.30 (32.9)	2.32 (59)	1.19 (30.2)	1.14 (28.9)
DN10	3.03 (77)	1.28 (32.5)	1.30 (32.9)	2.26 (57.3)	1.19 (30.2)	1.14(28.9)
DN15	3.23 (82)	1.28 (32.5)	1.54 (39)	2.46 (62.4)	1.19 (30.2)	1.30 (33)
DN20	4.13 (105)	1.55 (39.3)	1.19 (43)	2.61 (66.3)	1.19 (30.2)	1.47 (37.4)

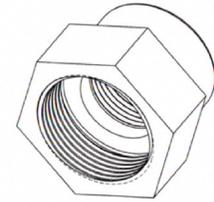
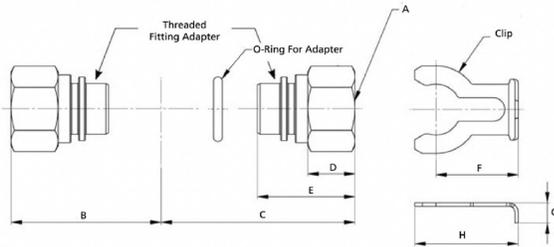
PIPING CONNECTIONS

The 210 series offers great flexibility with respect to 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



Brass Solder Adapters (See Table 7)

NPT Adapters (See Table 8)

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)	ADS 1/4	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"

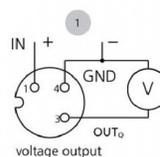
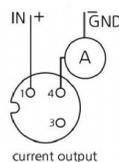
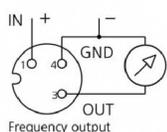
Table 8: DN25 BSP to NPT Adapters

*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

WIRING

3-pole circular connection M12x1 without temperature measurement



Pin	Colour
1	brown
3	blue
4	black
1	brown
2	white
3	blue
4	black
5	gray

** 5-pole circular connection available upon request

ORDERING INFORMATION

1) Order flow sensor model from table 9 - ABCDEF

Example: 21091044

2) Order End Connection adapters, O-rings and adapter clips (table 10)

Table 9 Flow Sensor Order Table					
A Model	B Version	C Size	D Output	E Electrical Connection	F Seal Material
210	9=Flow 8=Flow & Temperature (1000 Ohm RTD)	08=DN8	2=Frequency 3= 0-10V 4= 4-20 mA	4= 2 or 3 Pole M12X1 5= 4 or 5 Pole M12X1	DN8 to DN20- Order Separately from Table 10
		10=DN10			1=EPDM (Included with DN25)
15=DN15	25=DN25				

Table 10 Flow Sensor End Connections Order Table			
Size	Connection Adapter (Two Required)	O-rings (Two Required)	Adapter Clips (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	
114604	M12x1 straight circular connector, 3 pole plug with 78.7" (200 cm) cable
114564 (Replaces ECM125)	M12x1 straight circular connector, 5 pole plug with 78.7" (200 cm) cable
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