



F3.20 High Pressure Paddlewheel Flow Sensor

INSTRUCTION MANUAL

EN 12-02

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1. Introduction



CAUTION

1.1. Safety Instructions

General Statements

- ❑ The sensor F3.20.X.XX has only been designed to measure the flow of liquids.
- ❑ Do not install and service the sensor without following the Instruction Manual.
- ❑ This sensor is designed to be connected to other instruments which can be hazardous if used improperly. Read and follow all associated instrument manuals before using with this sensor.
- ❑ Sensor installation and wiring connections should only be performed by qualified staff.
- ❑ Do not modify product construction.

Installation and Commissioning Statements

- ❑ Remove power to the sensor before wiring any connection.
- ❑ Depressurize and vent the system before installing or removing the sensor.
- ❑ Check and confirm the chemical compatibility of the materials in contact with the liquid.
- ❑ Do not exceed maximum temperature/pressure data.
- ❑ To clean the sensor, use only chemical compatible products.

1.2. Unpacking

Please verify that the product is complete and without any damage. The following items must be included:

- F3.20 Paddlewheel Flow Sensor
- Instruction Manual for F3.20 Flow Sensor

2. Description

2.1. Design

The simple and reliable paddlewheel flow sensor type F3.20 is designed for use with every kind of solid-free liquids and to be installed on high pressure plants. The sensor can measure flow from 0.15 m/s (0.5 ft/s) producing a frequency output signal highly repeatable. A rugged construction and a proven technology guarantee exceptional performances with little or no maintenance required. A specially designed family of fittings ensures an easy and quick installation into all pipe materials in sizes from DN40 to DN200 (1 ½" to 8").

2.2. Operating Principle

The flow sensor consists of a transducer and a five-blade open cell paddlewheel using insertion technology. The paddlewheel is equipped with a permanent magnet integrated into each blade. As the magnet passes close to the transducer a pulse is generated. When liquid flows into the pipe, the paddlewheel is set in rotation producing a square wave output signal. The frequency is proportional to the flow velocity. The sensor is installed into the pipe using a wide range of insertion type fittings supplied by the flow sensor manufacturer.

2.3. Connections to FlowX3 Instruments

FlowX3 Sensors	FlowX3 Instruments						F9.50	F9.51	PLC
	F9.00	F9.01	F9.02	F9.30	F9.20				
F3.20.H	X	X	X	X			X	X	
F3.20.P									X

* with Output KIT mounted

3. Specifications

3.1. Technical Data

Pipe Size Range: DN40 to DN200 (1 ½" to 8") . Refer to Installation Fittings section for more details

Flow Rate Range: 0.15 to 8 m/s (0.5 to 25 ft./s)

Linearity: ± 0.75 % of full scale

Repeatability: ± 0.5 % of full scale

Minimum Reynolds Number Required: 4500

Temperature : 120 °C (248 °F)

Pressure : 110 bar (1600 psi)

Enclosure: IP68

Wetted Materials:

Sensor Body: 316L SS

Flat Gasket : graphite

Rotor: ECTFE (Halar®)

Shaft: 316L SS

Standards & Approvals

Manufactured under ISO 9002

CE

Specific for F3.20.H

Supply voltage: 5 to 24 VDC regulated

Supply current: < 30 mA @ 24 VDC

Output signal: square wave

Output frequency: 45 Hz per m/s nominal (13.7 Hz per ft/s nominal)

Output type: transistor NPN open collector

Output current: 10 mA max.

Cable length: 8 m (26.4 ft) standard, 300 m (990 ft) maximum

Specific for F3.20.P

Supply voltage: 12 to 24 VDC regulated

Supply current: < 30 mA @ 24 VCC

Output signal: square wave

Output frequency: 45 Hz per m/s nominal (13.7 Hz per ft/s nominal)

Output type : Push – Pull (digital input NPN or PNP)

Output current : I_{Out} Max < 20 mA

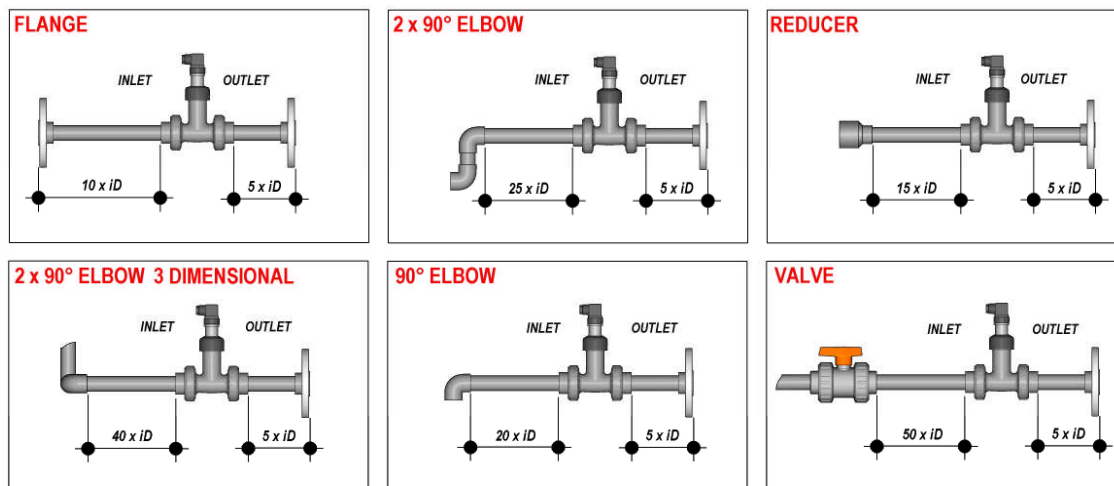
Cable length: 8 m (26.4 ft) standard, 300 m (990 ft) maximum

4. Installation

4.1. Location

Different pipe configurations and obstacles in the flow line such as valves, elbows, pipe bends and strainers create variations on the flow profile.

Whenever possible follow the EN ISO 5167-1 installation recommendations to locate the sensor.



Always maximize distance between flow sensor and pump.

4.2. Mounting Position

Make sure the pipeline is always full.

- Horizontal pipe runs:
 - Fig. 1: installation with no sediments present
 - Fig. 2: installation with no air bubbles present
 - Fig. 3: installation if sediments or air bubbles may be present
- Vertical pipe runs:
 - Install sensor in any orientation. Upward flow is preferred to ensure full pipe.

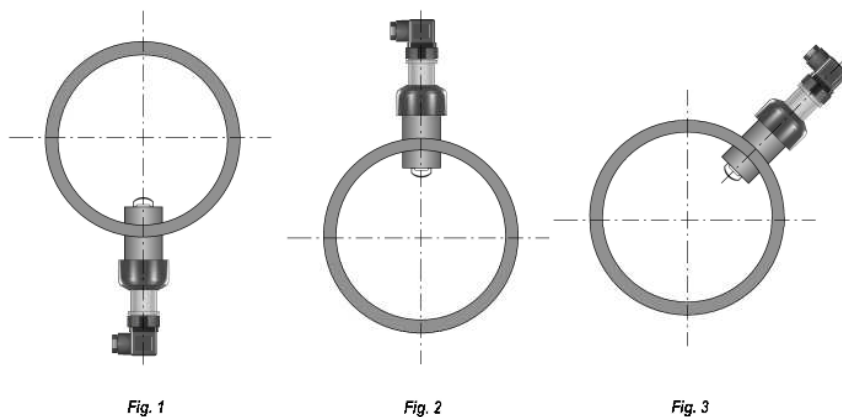
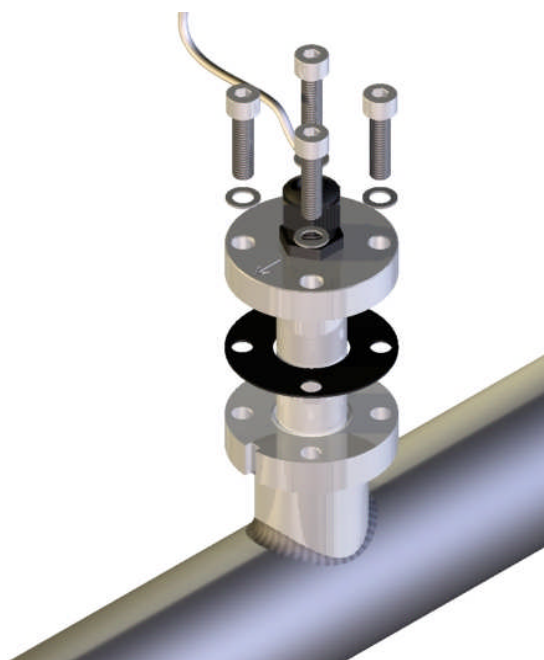


Fig. 1

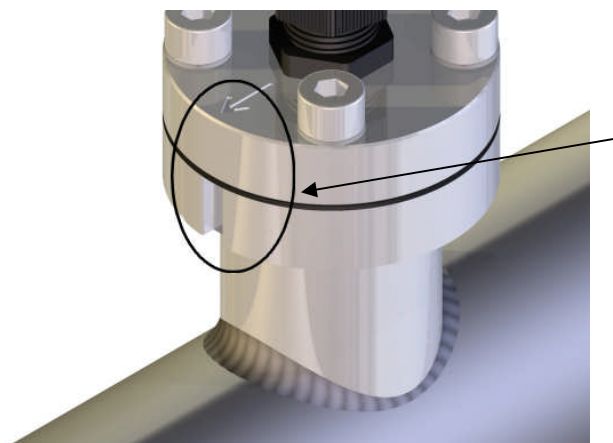
Fig. 2

Fig. 3

4.3. Process Connection



1. Place the flat gasket, sensor, and the screws with washers making sure that the arrow is in line with the slot milling of the weld on adapter
2. tighten the screws with a force equal to 15 Nm

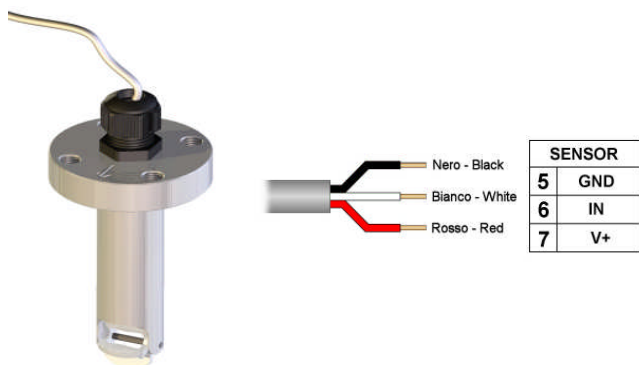


N.B. The slot milling of the weld on adapter must be parallel to the flow. The arrow on the sensor must be close to the milling weld on adapter.

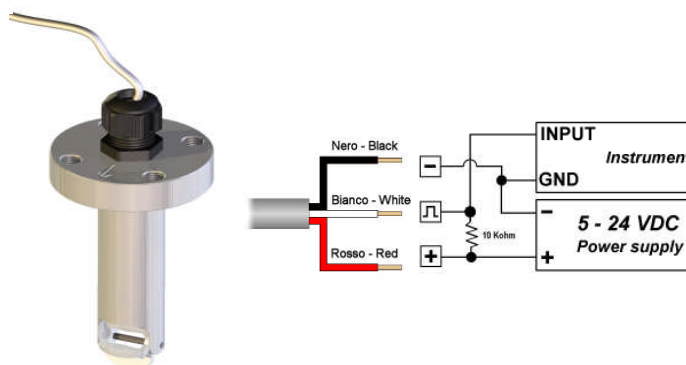
4.4. Wiring

- ❑ Always ensure the power supply is switched off before working on the sensor.
- ❑ Always use a high quality (regulated) DC voltage supply.

F3.20.H IP68 Sensor Connection to FlowX3 Instruments

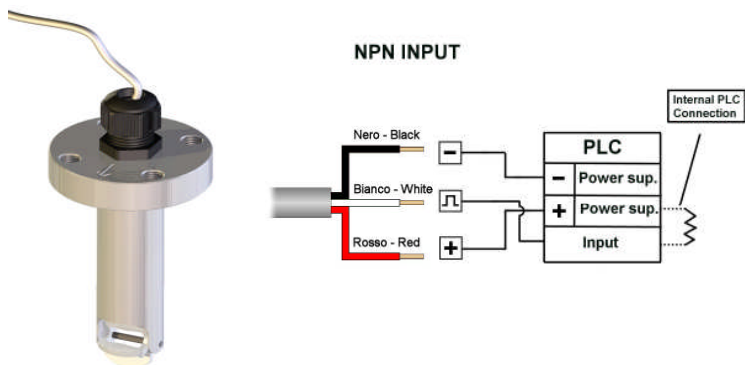


F3.20.H IP68 Sensor Connection to Other Brand Instruments

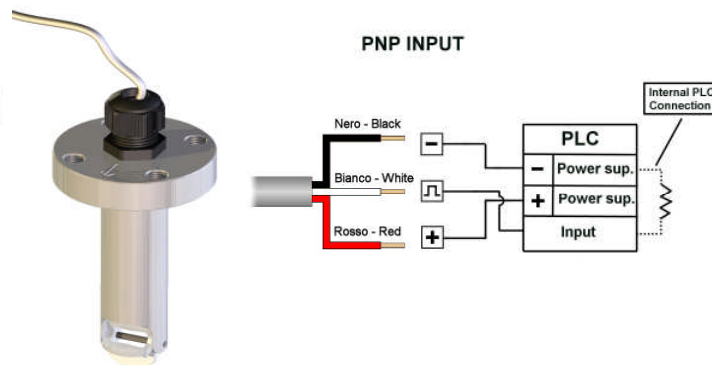


2.7Kohm Pull-up resistor may be required.


F3.20.P IP68 Sensor to PLC with NPN Input



F3.20.P IP68 Sensor to PLC with PNP Input



5. Installation Fittings

	Type	Description
	316L SS Weld-on Adapters	<ul style="list-style-type: none"> Size: DN 40 to DN 200 (1 ½" to 8")

6. K-Factor Tables

K-Factor is the number of pulses a sensor produces for one liter of fluid measured. Here all K-Factors for water at ambient temperature are listed.

K-Factor values can depend upon the installation conditions.

Please contact your dealer for K-Factor values not included in the tables.

316L SS Weld-on Adapters mounted on Cast Iron pipes			316L SS Weld-on Adapters mounted on Other Metal pipes		
Part No.	DN	K-Factor	Part No.	DN	K-Factor
WAIXL0	40	-----	WAIXL0	40	36,17
WAIXL0	50	-----	WAIXL0	50	23,71
WAIXL0	60	19,78	WAIXL0	60	-----
WAIXL0	65	-----	WAIXL0	65	13,93
WAIXL0	80	10,22	WAIXL0	80	9,61
WAIXL0	100	6,01	WAIXL0	100	5,22
WAIXL0	110	-----	WAIXL0	110	-----
WAIXL0	125	3,64	WAIXL0	125	3,31
WAIXL0	150	2,46	WAIXL0	150	2,22
WAIXL0	175	-----	WAIXL0	175	-----
WAIXL0	200	1,28	WAIXL0	200	1,23

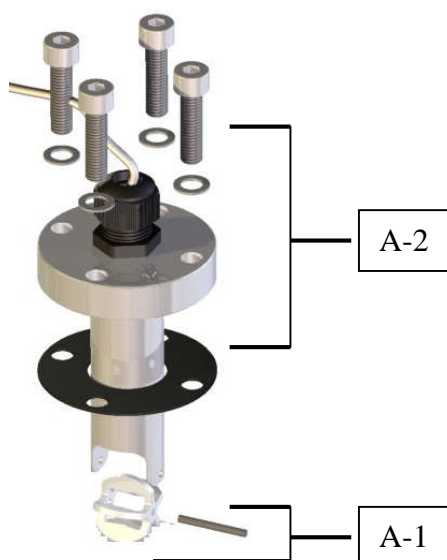
7. Ordering Data

FlowX3 F3.00.H.XX (Remote version)

Part No.	Version	Power supply	Length	Body	Enclosure
F3.20.H.01	Hall	5 - 24 VDC	L0	INOX	IP68
F3.20.P.01	Push-Pull	12 - 24 VDC	L0	INOX	IP68

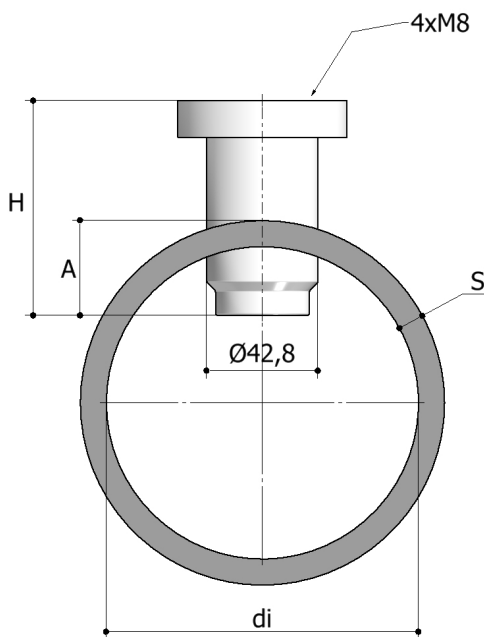
Spare Parts

Item	Part No.	Description
A-1	F3.SP4.3	ECTFE (Halar) rotor with Inox Shaft
A-2	F3.SP8	flat gasket + screws



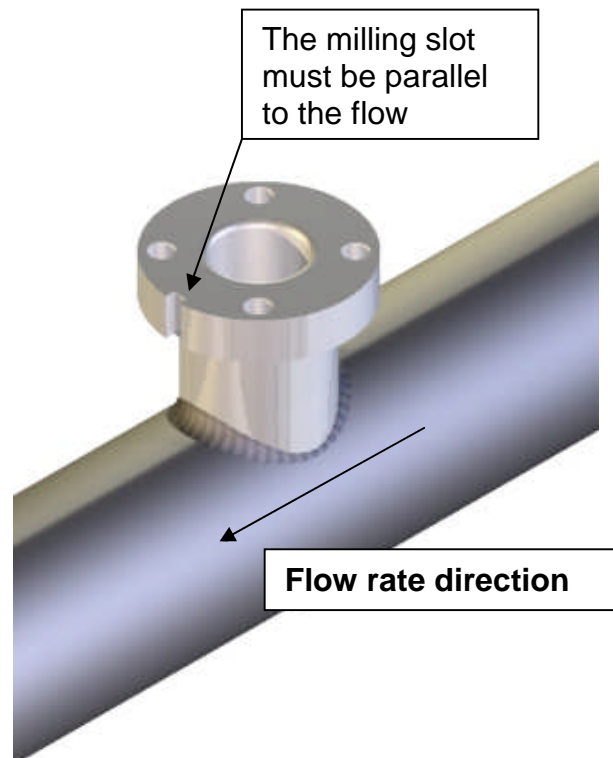
8. Weld-on Adapters installation procedure

- Calculate the length A and mark it on the adapter.
- Measure the adapter diameter at the mark level and drill the hole in the pipe with such diameter.
- Insert the adapter into the pipe and to be sure that the milling slot is parallel to the flow (see drawing n°2)
- Weld the adapter at the above mark reference.
- See drawing n°1.



$$A = 0.12 \times di + 3.5 + S$$

Drawing n°1



Drawing n°2

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