

FLS F6.30

PADDLEWHEEL FLOW TRANSMITTER



SAFETY INSTRUCTIONS

General Statements

- Do not install and service the product without following the Instruction Manual.
- This item 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 it.
- Product installation and wiring connections should only be performed by qualified staff.
- Do not modify product construction.

Installation and Commissioning Statements

- Remove power to the instrument before wiring input and output connections.
- Do not exceed maximum specifications using the instrument.
- To clean the unit, use only chemical compatible products.

PACKING LIST

Please verify that the product is complete and without any damage.

The following items must be included:

- F6.30 Paddlewheel Flow Transmitter
- Instruction Manual for F6.30 Paddlewheel Flow Transmitter
- USB pen drive with interface software
- USB cable for instrument/PC interface

DESCRIPTION

The new FLS F6.30 is a blind transmitter based on paddlewheel. It can be applied for the measurement of every kind of solid-free liquids. The F6.30 can provides different output options using a 4-20 mA and a Solid State Relay. Analog output can be used for long distance transmission and SSR can be set as an alarm or as a volumetric pulse output. F6.30 Paddlewheel Flow Transmitter is provided with an USB interface and a dedicated software (present on USB pen drive or freely downloadable from FLS web site) which allows to easily calibrate instrument and to intuitively set outputs by a PC. The specific design allows an accurate flow measurement over a wide dynamic range in pipe sizes from DN15 (0.5") to DN600 (24").

TECHNICAL DATA

General

- Pipe Size Range: DN15 to DN600 (0.5" to 24")
Please refer to Installation Fittings section on FLS catalogue 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
- Enclosure: IP65
- Wetted Materials:
 - sensor Body: CPVC, PVDF, Brass or 316L SS
 - o-rings: EPDM or FPM
 - rotor: ECTFE (Halar®)
 - shaft: Ceramic (Al_2O_3)/ 316L SS (only for metal sensors)
 - bearings: Ceramic (Al_2O_3)

Electrical

- Power Supply:
 - 12 to 24 VDC $\pm 10\%$ regulated (reverse polarity and short circuit protected)
 - maximum current: consumption: 150 mA
 - protective earth: $< 10 \Omega$
- 1 X Current output:
 - 4-20 mA, isolated
 - max. loop impedance: $800 \Omega @ 24 \text{ VDC} - 250 \Omega @ 12 \text{ VDC}$
- 1 X Solid State Relay output:
 - user selectable as MIN alarm, MAX alarm, Volumetric, Pulse Out, Window alarm, Off
 - optically isolated, 50 mA MAX sink, 24 VDC MAX pull-up voltage
 - max pulse/min: 300
 - hysteresis: User selectable

Environmental

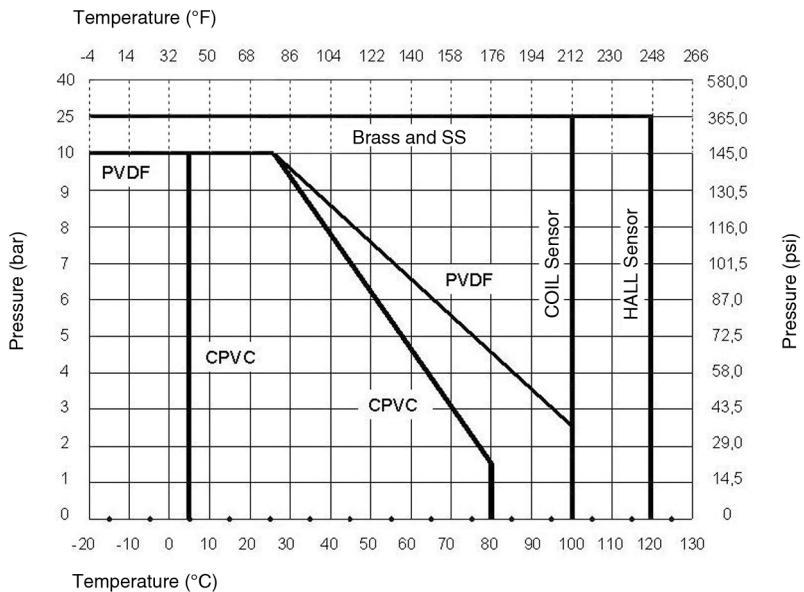
- Operating temperature: -20 to $+70^\circ\text{C}$ (-4 to 158°F)
- Storage temperature: -30 to $+80^\circ\text{C}$ (-22 to 176°F)
- Relative humidity: 0 to 95% not condensing

Standards & Approvals

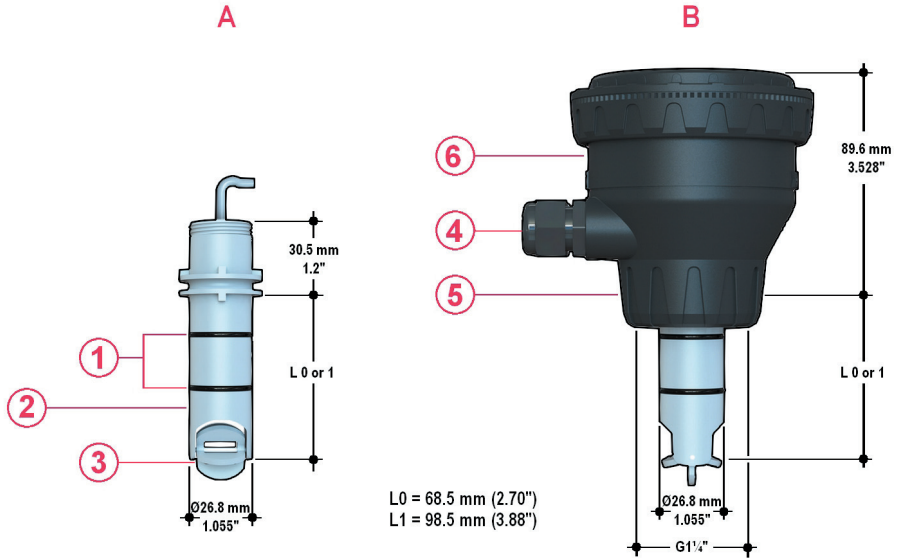
- Manufactured under ISO 9001
- Manufactured under ISO 14001
- CE
- RoHS Compliant
- GOST R

Maximum Operating Pressure / Temperature (25 years lifetime)

- CPVC body:
 - 10 bar (145 psi) @ 25°C (77°F)
 - 1,5 bar (22 psi) @ 80° C (176°F)
- PVDF body:
 - 10 bar (145 psi) @ 25°C (77°F)
 - 2,5 bar (36 psi) @ 100°C (212°F)
- Brass or SS body:
 - 25 bar (363 psi) @ 100°C (212°F)



DIMENSIONS



INSTALLATION

Pipe Location

- The six most common installation configurations shown in fig. 1 help in selecting the best location in the pipeline for paddlewheel flow sensor as well for magmeter flow sensor.
- The three configurations in fig. 2 ensure that the pipe is always full: for a correct measurement the sensor can NOT be exposed to air bubbles at any time.
- The three installations in Fig. 3 should be avoided unless you are absolutely sure the sensor is not exposed to air bubbles.
- In gravity-flow systems the connection to the tank must be designed so the level does not drop below the outlet: this to avoid pipe to draw air in from the tank causing an inaccurate measurement of sensor (see Fig. 4).
- For more information, please refer to EN ISO 5167-1.
- Always maximize distance between flow sensors and pumps.

Fig.1

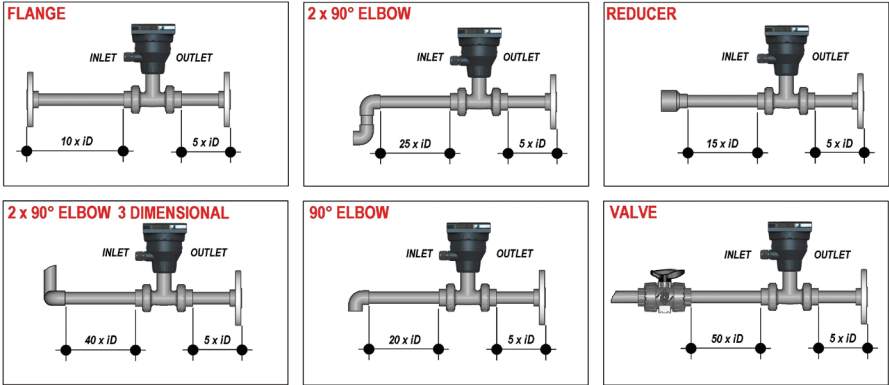


Fig.2

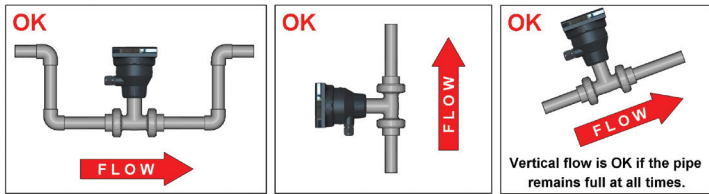


Fig.3

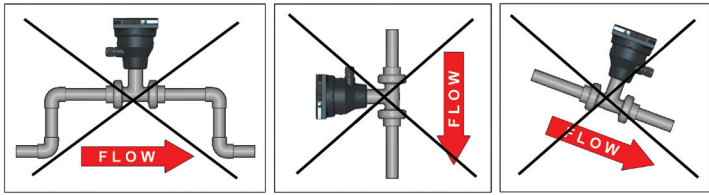
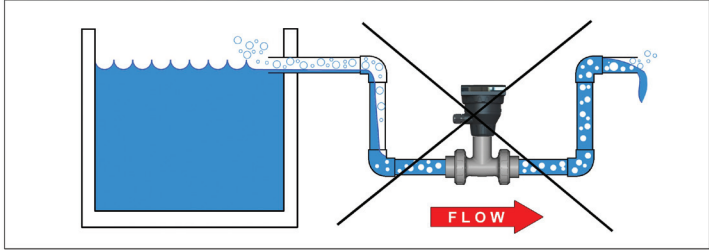


Fig.4



Mounting position

Measuring part of sensor (rotor for paddlewheel and pins for magmeter) should be positioned at 12% of ID where, basing on insertion theory, average velocity can be measured.

The reading accuracy of insertion flow sensors can be affected by:

- air bubbles;
- sediments;
- friction between shaft and bearings (only for paddlewheel).

In a horizontal pipe runs, the mounting position to get the best performances is at a 45° angle (Fig. 3) to avoid air bubbles as well sediments. Vertical position (Fig. 2) can be chosen in case air bubbles are not present. Do not mount the sensor on the bottom of the pipe (Fig. 1) if sediments are likely. Do not mount paddlewheel at 90° otherwise friction can affect measurement.

Installation in a vertical pipe runs can be done fixing any orientation. Upward flow is preferred to ensure full pipe.

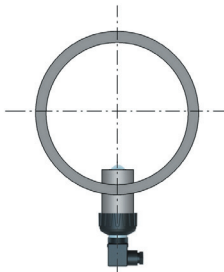


Fig. 1

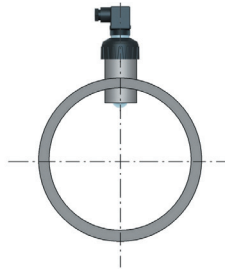


Fig. 2

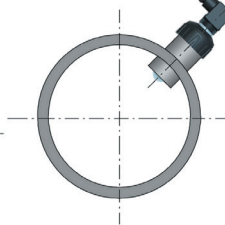
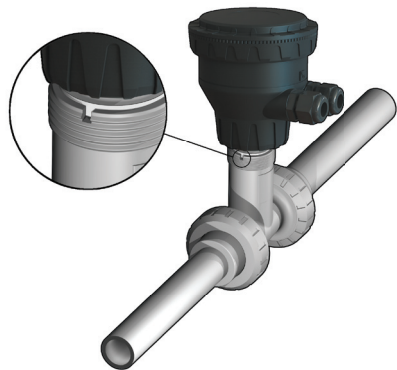


Fig. 3

Process connection

1. Lubricate the sensor O-rings with a silicone lubricant. Do not use any petroleum based lubricant that may damage the O-rings.
2. Lower the sensor into the fitting making sure the alignment tab is seated in the fitting notch.
3. Hand tighten the sensor cap. Do not use any tool otherwise cap and/or fitting threads may be damaged.



WIRING



General recommendation

Always ensure the power supply is switched off before working on the device.
Make wiring connections according to wiring diagrams.

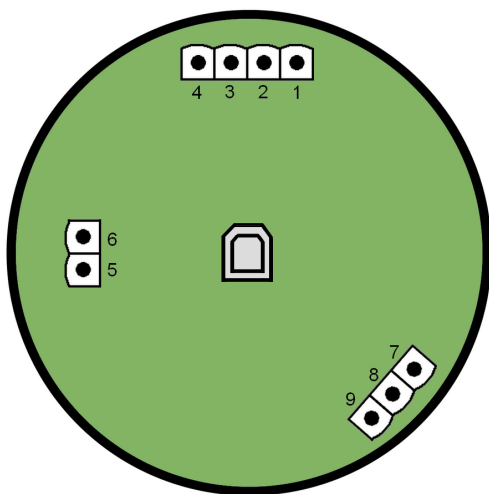
- Terminals accept 26 to 12 AWG (0.08 to 2.5 mm²)
- Strip around 10 mm (0.4") of insulation from the wire tips and tin bare ends to avoid fraying.
- Ferrules are suggested when connecting more than one wire to a single terminal.
- Remove the upper part of the terminals for an easy cabling.
- Insert wire tip or ferrule completely into the terminal and fix with the screw until finger tight.
- Do not route the sensor, DC power, or 4-20mA cables in conduit containing AC power wiring. Electrical noise may interfere with sensor signal.
- Routing the sensor cable in grounded metal conduit can help prevent electrical noise and mechanical damage.
- Seal the cable entry points to prevent moisture damage.

Specific info

Pull the electrical cables through liquid tight connectors.
Use electrical cables with the proper external diameter for the liquid tight connector.

PG11/PG9: external diameter between 2-7 mm (0.079-0.276")

REAR TERMINAL VIEW



1	+VDC
2	+LOOP
3	-LOOP
4	-VDC

Power Supply

6	COM
5	NO

SSR

7	GND
8	FREQ IN
9	+V

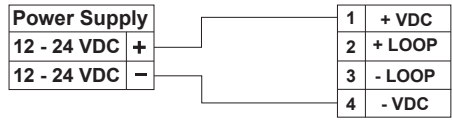
Flow Sensor

Flow Sensor Connection

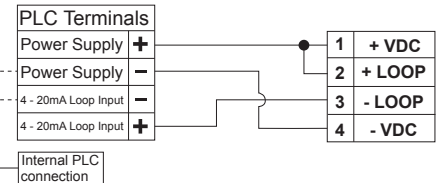
- 7 GND = Brown Wire
- 8 FREQ IN = Green Wire
- 9 +V = White Wire

POWER/LOOP WIRING DIAGRAM

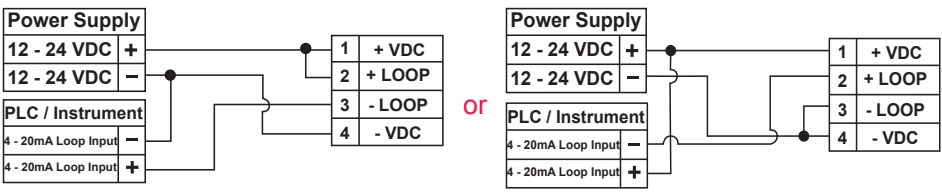
Stand-alone application,
no current loop used



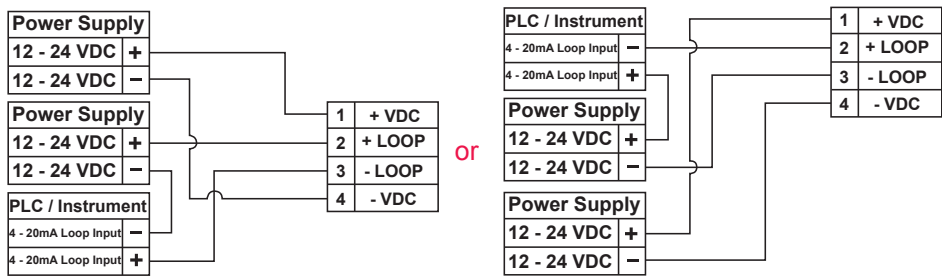
Connection to a PLC with built-in
power supply (3 wire connection)



Connection to a PLC/Instrument with ONE separate power supply

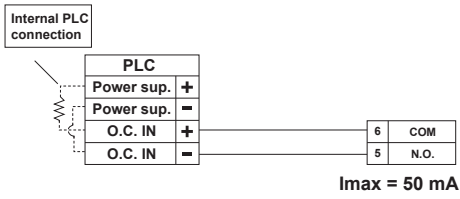


Connection to a PLC / Instrument with TWO separate power supplies

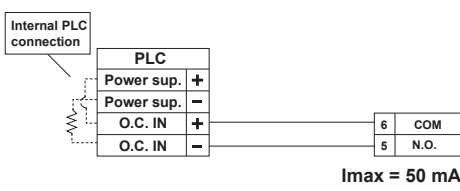


SOLID-STATE RELAY WIRING DIAGRAM

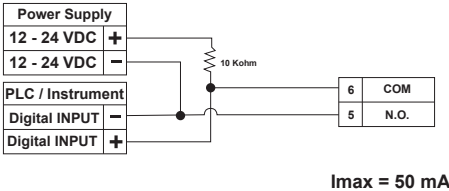
Connection to a PLC with NPN input



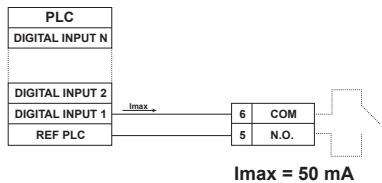
Connection to a PLC with PNP input



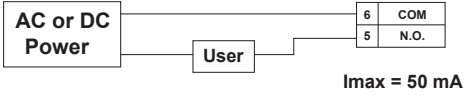
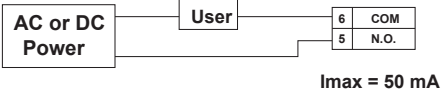
Connection to a PLC / Instrument digital input with separate Power Supply



Connection to a PLC / Instrument digital input for Voltage Free Contacts (REED)

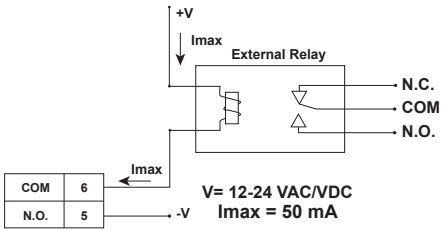


Connection to an User



Connection to an User

The alarm is off during normal operation and goes ON according to Relay setting.
If $I_{max} > 50 \text{ mA}$ use external Relay.



CALIBRATION

The F6.30 paddlewheel blind transmitter needs to be connected to a PC and operator can calibrate instrument and set all parameters using dedicated software on USB pen drive (software can be downloaded freely from FLS website also).

Procedure for setting

- plug FLS Pen Drive into a USB port of PC
- open FLS Pen Drive folder
- install Java software: a internet connection is required. Installer software is able to search for updated Java version automatically. In case of troubles, please contact Technical Assistance at info@flsnet.it
- install FLS Calibration software
- launch FLS Calibration software
- power the F6.30
- plug USB on the F6.30 PCB
- plug USB into a USB port of PC
- FLS Calibration software recognizes the F6.30 PCB

Software structure

The FLS Calibration software features following sub-views:

- Settings
- Calibration
- Output mA
- Digital Output
- Simulation
- View Data
- Download Data

Excluding View Data and Download Data, in each previous sub-view you can set different parameters and the following actions are allowed:

- Update: for data updating
- Reset: for default data backing
- Help: for functions explanation and for undertaking the Remote Assistance procedure (internet connection is required)

View Data sub-view summarizes status of measurement, analog output, digital output including a Volume Totalizer.

Download Data sub-view summarizes instrument parameters and allowed actions are:

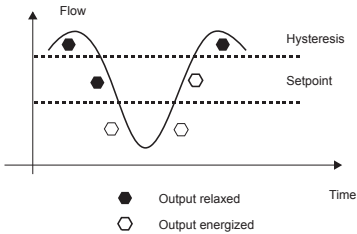
- Download Data: to update instrument with new settings
- Download Default: to reload Default settings
- Save: to generate a file containing all set parameters
- Load: to load directly a file containing a instrument configuration

OUTPUT MODE

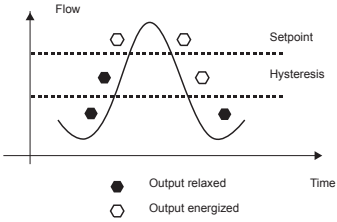
The F6.30 paddlewheel flow transmitter features 1 solid state relays and 1 analog output 4-20mA.

Digital output can be set in the following way:

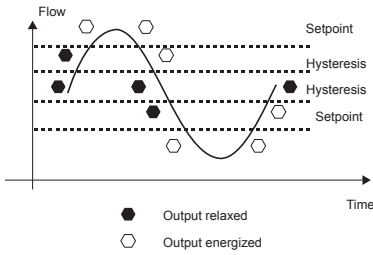
MIN MODE



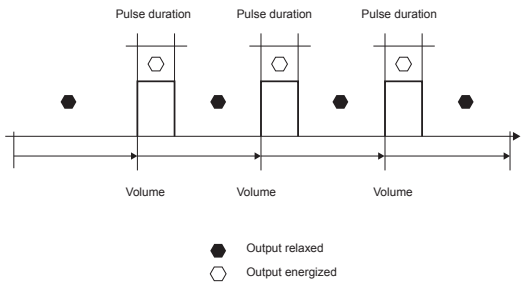
MAX MODE



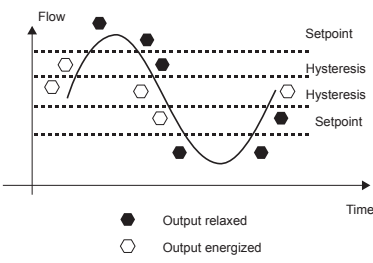
WINDOW OUT MODE



PULSE MODE



WINDOW IN MODE



ORDERING DATA

Part No.	Version	Power supply	Length	Main wetted materials	Enclosure	Flow Rate Range	Weight (gr.)
F6.30.01	Hall	12 - 24 VDC	L0	CPVC/EPDM	IP65	0.15 to 8 m/s (0.5 to 25 ft./s.)	750
F6.30.02	Hall	12 - 24 VDC	L0	CPVC/FPM	IP65	0.15 to 8 m/s (0.5 to 25 ft./s.)	750
F6.30.03	Hall	12 - 24 VDC	L1	CPVC/EPDM	IP65	0.15 to 8 m/s (0.5 to 25 ft./s.)	800
F6.30.04	Hall	12 - 24 VDC	L1	CPVC/FPM	IP65	0.15 to 8 m/s (0.5 to 25 ft./s.)	800
F6.30.05	Hall	12 - 24 VDC	L0	PVDF/EPDM	IP65	0.15 to 8 m/s (0.5 to 25 ft./s.)	750
F6.30.06	Hall	12 - 24 VDC	L0	PVDF/FPM	IP65	0.15 to 8 m/s (0.5 to 25 ft./s.)	750
F6.30.07	Hall	12 - 24 VDC	L1	PVDF/EPDM	IP65	0.15 to 8 m/s (0.5 to 25 ft./s.)	800
F6.30.08	Hall	12 - 24 VDC	L1	PVDF/FPM	IP65	0.15 to 8 m/s (0.5 to 25 ft./s.)	800
F6.30.09	Hall	12 - 24 VDC	L0	316SS/EPDM	IP65	0.15 to 8 m/s (0.5 to 25 ft./s.)	950
F6.30.10	Hall	12 - 24 VDC	L0	316SS/FPM	IP65	0.15 to 8 m/s (0.5 to 25 ft./s.)	950
F6.30.11	Hall	12 - 24 VDC	L1	316SS/EPDM	IP65	0.15 to 8 m/s (0.5 to 25 ft./s.)	1000
F6.30.12	Hall	12 - 24 VDC	L1	316SS/FPM	IP65	0.15 to 8 m/s (0.5 to 25 ft./s.)	1000
F6.30.13	Hall	12 - 24 VDC	L0	BRASS/EPDM	IP65	0.15 to 8 m/s (0.5 to 25 ft./s.)	950
F6.30.14	Hall	12 - 24 VDC	L0	BRASS/FPM	IP65	0.15 to 8 m/s (0.5 to 25 ft./s.)	950
F6.30.15	Hall	12 - 24 VDC	L1	BRASS/EPDM	IP65	0.15 to 8 m/s (0.5 to 25 ft./s.)	1000
F6.30.16	Hall	12 - 24 VDC	L1	BRASS/FPM	IP65	0.15 to 8 m/s (0.5 to 25 ft./s.)	1000

SPARE PARTS

Part No.	Name	Description	Weight (gr.)
F6.KC1	Compact mounting kit	Plastic adapter with compact cap and locking nut	137
M9.SP4.1	PG 11	PG 11 complete cable gland (2 o-rings and cap)	12
F3.SP3.1	O-Rings	EPDM Sensor body O-Rings	4
F3.SP3.2	O-Rings	FPM Sensor body O-Rings	4
F6.30. SP1.S	Electronic device	Electronic device with 4-20 mA output and freq./volumetric pulse output for paddlewheel flow sensor	180
F3.01.H.01	Paddlewheel Flow Sensors (Compact version)	Paddlewheel Flow Sensors (Compact version) version Hall with sensor body in CPVC and EPDM o-rings (length L0)	250
F3.01.H.02	Paddlewheel Flow Sensors (Compact version)	Paddlewheel Flow Sensors (Compact version) version Hall with sensor body in CPVC and FPM o-rings (length L0)	250
F3.01.H.03	Paddlewheel Flow Sensors (Compact version)	Paddlewheel Flow Sensors (Compact version) version Hall with sensor body in CPVC and EPDM o-rings (length L1)	300
F3.01.H.04	Paddlewheel Flow Sensors (Compact version)	Paddlewheel Flow Sensors (Compact version) version Hall with sensor body in CPVC and FPM o-rings (length L1)	300
F3.01.H.05	Paddlewheel Flow Sensors (Compact version)	Paddlewheel Flow Sensors (Compact version) version Hall with sensor body in PVDF and EPDM o-rings (length L0)	250
F3.01.H.06	Paddlewheel Flow Sensors (Compact version)	Paddlewheel Flow Sensors (Compact version) version Hall with sensor body in PVDF and FPM o-rings (length L0)	250
F3.01.H.07	Paddlewheel Flow Sensors (Compact version)	Paddlewheel Flow Sensors (Compact version) version Hall with sensor body in PVDF and EPDM o-rings (length L1)	300
F3.01.H.08	Paddlewheel Flow Sensors (Compact version)	Paddlewheel Flow Sensors (Compact version) version Hall with sensor body in PVDF and FPM o-rings (length L1)	300
F3.01.H.09	Paddlewheel Flow Sensors (Compact version)	Paddlewheel Flow Sensors (Compact version) version Hall with sensor body in 316SS and EPDM o-rings (length L0)	600
F3.01.H.10	Paddlewheel Flow Sensors (Compact version)	Paddlewheel Flow Sensors (Compact version) version Hall with sensor body in 316SS and FPM o-rings (length L0)	600
F3.01.H.11	Paddlewheel Flow Sensors (Compact version)	Paddlewheel Flow Sensors (Compact version) version Hall with sensor body in 316SS and EPDM o-rings (length L1)	650
F3.01.H.12	Paddlewheel Flow Sensors (Compact version)	Paddlewheel Flow Sensors (Compact version) version Hall with sensor body in 316SS and FPM o-rings (length L1)	650
F3.01.H.25	Paddlewheel Flow Sensors (Compact version)	Paddlewheel Flow Sensors (Compact version) version Hall with sensor body in BRASS and EPDM o-rings (length L0)	600
F3.01.H.26	Paddlewheel Flow Sensors (Compact version)	Paddlewheel Flow Sensors (Compact version) version Hall with sensor body in BRASS and FPM o-rings (length L0)	600
F3.01.H.27	Paddlewheel Flow Sensors (Compact version)	Paddlewheel Flow Sensors (Compact version) version Hall with sensor body in BRASS and EPDM o-rings (length L1)	650
F3.01.H.28	Paddlewheel Flow Sensors (Compact version)	Paddlewheel Flow Sensors (Compact version) version Hall with sensor body in BRASS and FPM o-rings (length L1)	650

NOTE



FIP - Formatura Iniezione Polimeri S.p.A.

Loc. Pian di Parata
16015 Casella
Genova - Italy
Tel. +39 010 96211
Fax +39 010 9621209
www.flsnet.it