

FEATURES

- $\pm 2.5\%$ accuracy @ velocity range 0.5 to 8.5 m/sec.
 $\pm 1.5\%$ accuracy over linear range 0.7 to 7.0 m/sec.
- Repeatability of rate $\pm 1.0\%$.
- Inductive coil pulse output (**built in op-amp circuit**) for low current applications (Ideal for dataloggers and other battery powered devices)
- Maximum process temperature 60°C.
- Simple installation and maintenance.
- Voltage supply range of 2.7 to 5 VDC.
- Large range of pipe adapter fittings:
Standard in sizes 15 to 100mm, Long Stem version 110 - 315mm (upto 500mm)
- Stainless Steel 17-4PH paddlewheel rotor without magnets.



The **RPFS-L-O** inserts directly into a large range of pipe adapter fittings available in PVC, Galvanized Iron, Brass, Stainless Steel or Polypipe materials, covering pipe sizes 15 to 100mm (standard sizes), RPFS-L-O-LS for sizes 110-500mm. This makes the RPFS-LO series units suitable for a wide range of liquid flow measurement, monitoring and batching for battery powered or low current requirement applications.

With only one moving part and limited intrusion into the pipe, and combined with its flow-through design, the paddlewheel allows accurate measurement of liquid flows with virtually no head losses.

Each of the 4 blades of the rotor (paddlewheel) extends approximately one centimetre into the flowing liquid. The RPFS-L-O sensor generates a square wave pulse with the frequency output proportional to flow velocity and proportional to pipe diameter.

Magnets are not used, thereby eliminating iron particles jamming the rotor. The alloy rotor used also makes the RPFS less susceptible to interference from turbulence and particles hitting the rotor, thereby giving superior flow results.

SENSOR SPECIFICATIONS

RPFS-L-O

Model	RPFS-L-O (Standard)	RPFS-L-O-LS (Long Stem Version)
Type of pulse	Near 50% duty cycle pulse	Near 50% duty cycle pulse
Cable type & length	M12 Plug and socket, 5 mtr cable	1/ M12 Plug and socket, 5 mtr cable or 2/ Two mtr flying cable lead
Cable conductors	2-core shielded (3 wire)	2-core shielded (3 wire)
Fluid temperature	80 °C max.	80 °C max.
Weather rating	IP67	IP67
Pressure rating	150psi	400psi
Accuracy statement	$\pm 2.5\%$ for 0.5 to 8.5 m/s, $\pm 1\%$ for 0.7 to 7.0 m/s,	$\pm 2.5\%$ for 0.5 to 8.5 m/s, $\pm 1\%$ for 0.7 to 7.0 m/s,
Repeatability statement	+/- 0.6%	+/- 0.6%
For Pipe Sizes	15 to 100mm standard,	110 to 315mm (via ManuFlo saddle clamps) > 110 to 500mm (via BSPB-LS & connect to customer supplied 1" BSP-f entries on pipe.

PERFORMANCE RPFS-L-O (op-amp circuit)

RPFS-L-O

	INPUT VOLTAGE DC	
	@3V	@5V
Standby Current (mA)	5 micro-amps	5 micro-amps
Pulsing Current (mA)	“ “	“ “
Pulse switching max.	30mA	30mA
Pulse Vpp	0 – 3 VDC	0 – 5 VDC
Duty Cycle	50%	50%
Waveform	Square wave	Square wave

Model	RPFS-L-O	RPFS-L-O-LS (Long Stem)
Body	Delron	Brass
O-rings x 2	Neoprene	Neoprene
Rotor	Stainless Steel 17-4PH	Stainless Steel 17-4PH
Bushes	Delron	Delron
Axle	Tungsten Carbide	Tungsten Carbide
Lockcap	PVDF	PVDF
Dimensions Overall (approx.)	135L x 30W mm	200L x 30W mm

APPLICATIONS

Since the RPFS Flow Sensor was first manufactured in 1984, over 30,000 units are now in use worldwide. They are used in a large variety of applications, including measurement of fresh and recycled water in concrete batch plants, measurement of water irrigation, salt water, chlorinated water and countless other low viscosity liquid measurement processes (Note: is not suitable for pulsating flows).

The RPFS-L-O inductive coil sensors are energy misers suitable for low current requirements and are ideal for battery powered applications using FRT303 or ME5 or other battery powered Indicators (up to 150m away). The RPFS-L-O was specially developed for use with 3rd party loggers where battery draw or solar powered apps require low current draws is an issue.

SPARE PARTS

Order Code	Description	
PW	Paddlewheel, with bushes	
PWAH	Axle for paddlewheel	
BS020	Neoprene O-ring	
LC	Locking Cap	
PC5	M12 Plug-in cable 6m length	
BSPB BSPSS	Standard Brass nipple adaptor Standard SST nipple adaptor with locating key and locknut	
BSPB-LS	Long stem adapter nipple with locating key and locknut	
SLC	Sealer Locking Cap	

SELECTION OF PIPE DIAMETER

Pipe size (mm)	Flowrange (Litres/min)		Pulses/Litre (approx.) (1)(2)
	Min	Max	
20	13	160	116
25	20	250	75
32	30	410	46
40	50	640	30
50	90	1000	20
63	132	1580	11.7
65	120	1690	12
75	180	2250	8.3
80	190	2560	7.3
90	244	3240	5.7
100	300	4005	4.6
110	343	4845	3.8
125	426	6255	3.0
140	516	7850	2.4
150	600	9010	2
160	650	10200	1.8
195	900	15200	1.22
200	950	16000	1.16
250	1480	25000	0.7
280	1850	31400	0.6
315	2280	39720	0.46

(1) For >315mm diameter pipes:

$$\text{Pulses per Litre} = 50273 / [(\text{Pipe diameter in mm})^{2.016}]$$

(2) NOTE: Due to gravitational forces, the pulse output value can differ up to 6% between a vertical flow that is upwards or downwards. Where possible, perform a calibration check to determine pulse rate given the pipe diameter and flow conditions. Once calibrated, meter will give linear and repeatable results within the flow range.

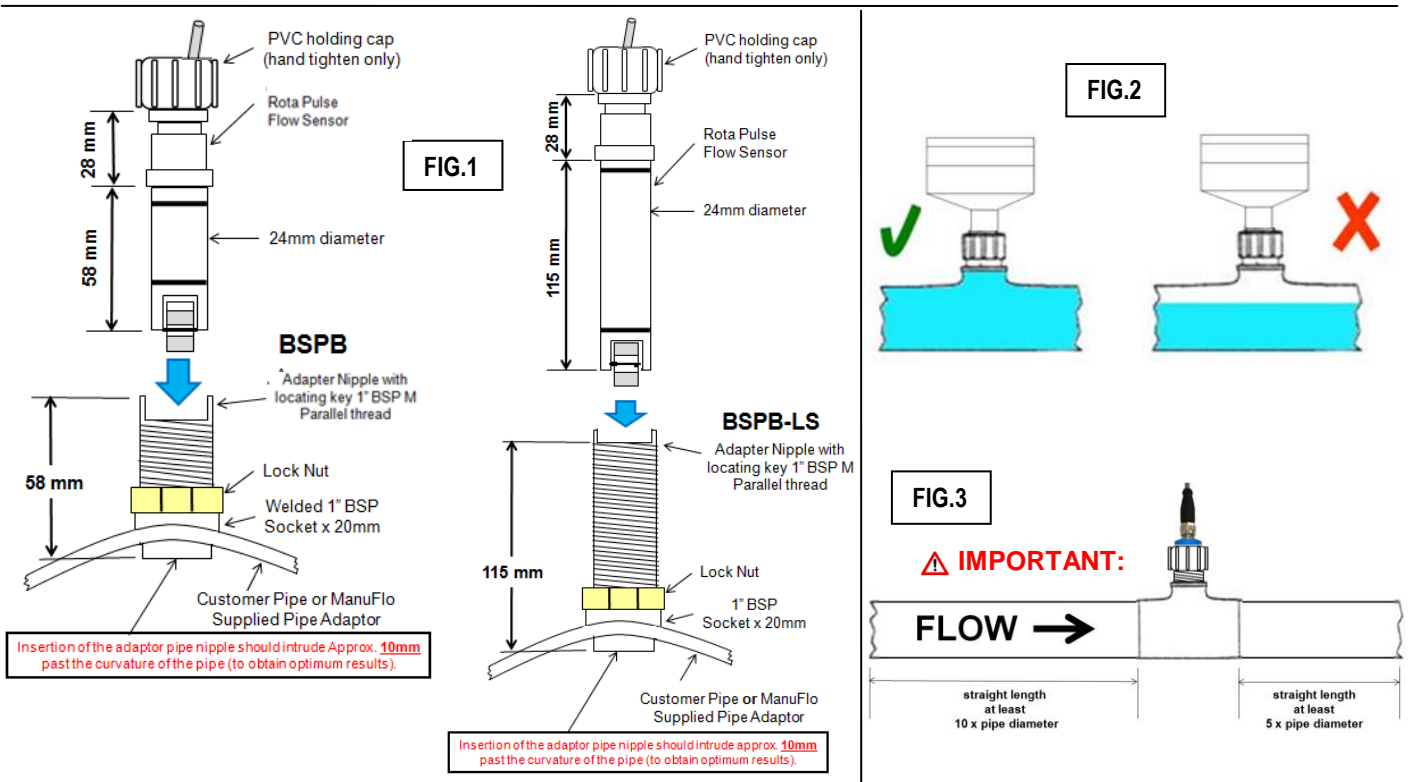
Adapter Tee keyway fittings are available in:

1. PVC Class 18 Cat. 19 Slip tees (F-glug-ends) pressure pipe, Sizes: 20, 25, 32, 40, 50, 65, 80 & 100 mm.
PVC high pressure saddle clamps: 40, 50, 80 and 100mm.
2. Galvanized Iron threaded connections: BSP (F): pipe sizes 25, 32, 40 & 50 mm; BSP (M) pipe sizes 80 & 100mm.
3. Gunmetal BSP(m) threaded connection end pipe tube tees 20 mm.
4. Polypipe saddle clamps in pipe sizes 40, 50, 63, 75, 90, 110 mm
5. PVC saddles 40, 50, 80 and 100mm.
6. Stainless steel 25mm, others fabricated on request.
7. FOR PIPE SIZES 110mm and larger refer to the RPFS-LS model ****Further custom made fittings are available on request.**

Use ManuFlo **BSPB** or **BSPB-LS** (Long Stem) Brass or **BSPSS** Stainless Steel pipe adapter keyway nipple - with locknut, which has a 1" OD BSP thread for screwed insertion into 1"(female BSP) half-sockets which can be welded directly to pipe, the BSPB fittings can be coupled to any 1" BSP female entries including saddle clamps (Fig 1)

Installation Conditions

- **IMPORTANT:** A minimum of 10x pipe diameter before (upstream of) the sensor and at least 5x pipe diameter after sensor of straight pipe section must be fitted, with no bends, reductions, enlargements, restrictions, valves etc within this section. This will help eliminate flow turbulence to ensure optimum accuracy performance (Fig 3 below)
- The RPFS sensor must measure in a full pipe flow section (Fig 2)
- Can be installed in a horizontal, inclined or vertical pipe position. (Note: If mounted in horizontal or inclined pipe, make sure insertion position of sensor is at top or 45° from top, not on the underside).



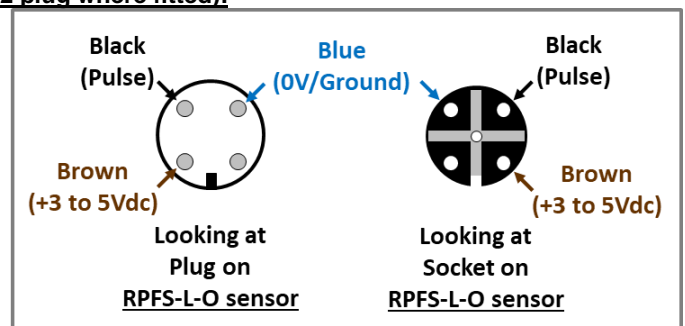
ELECTRICAL INSTALLATION / DATA Cable connection (M12 plug where fitted):

RPFS-L-O (M12 PLUG VERSION)

- Black = Pulse
- Brown = +3 to 5Vdc
- Blue = 0V / Ground

RPFS-L-O (FLY WIRE VERSION)

- White = Pulse
- Red = +3 to 5Vdc
- Shield = 0V / Ground



If connecting to non-ManuFlo equipment, a 2K2 pull-up resistor may be required between (+) and Pulse.

For extra cable length, use shielded cable only!

⚠ WARNING: To avoid electrical interference the RPFS-L-O should not be installed within 30cm of any AC fields, otherwise 50Hz could be detected and create oscillations.

Recommended Periodic Checks:

With clean liquids, sensor check of the paddle wheel is recommended once every year. In applications with reclaimed or contaminated fluids, regular quarterly maintenance checks are recommended.

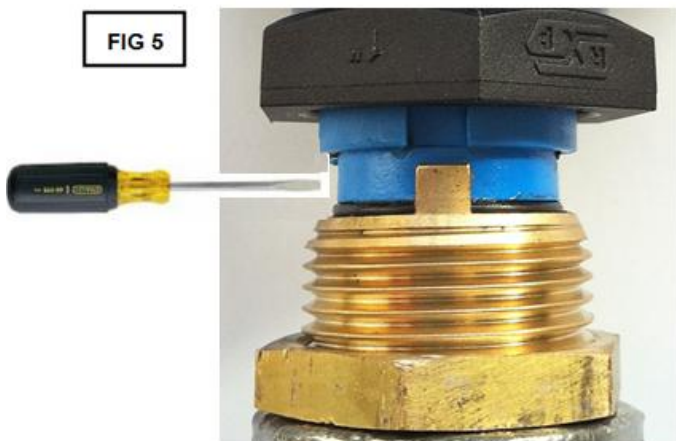
Removal of RPFS from Pipe adaptor Fitting ‘Square’ Keyway Type Nipple Adaptor:(see FIG 5)

- 1 - Unscrew the black PVC locking cap (anti-clockwise).
- 2 - Place a small to medium sized flat thin bladed screwdriver in the join where the insertion sensor body meets the nipple adaptor (See FIG 4), twist the screw driver to prize the two apart till the slots clear the keyways, then pull or twist upwards until the sensor is released (never pull via the cable).

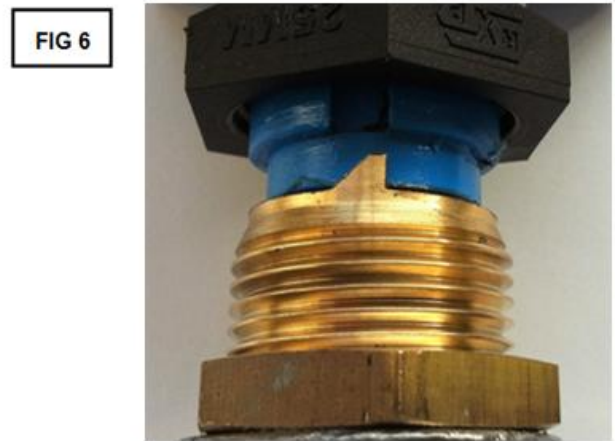
Removal of RPFS from Pipe adaptor Fitting ‘Triangular’ Keyway Type Nipple Adaptor:(see FIG 6)

- 1 - Unscrew the black PVC locking cap (anti-clockwise).
- 2 - Hold the neck of the Tee piece in your left hand, grasp the RPFS body with your right hand and turn slowly anti-clockwise until the sensor hydraulically raises out of slot then pull upwards out of the socket (never by the cable).

**When returning the sensor to nipple adaptor insert so the keyway and slots line up then then push down until they locate. Screw the black locking cap clockwise to hold the sensor in place (hand tightened only).



Standard fitting ‘Square’ Keyway



New ‘Triangular’ turn replace fitting

Cleaning:

- 1 - If the paddlewheel (rotor) and or sensor body is coated with scale, immerse the sensor section in diluted hydrochloric acid, scour gently if required.
- 2 - **For ease of removal or refitting of sensor we strongly recommend to lubricate the body O-rings using petroleum jelly.**
- 3 - If the paddlewheel requires servicing, push out the axle using a small hole punch or similar implement, remove the paddle wheel and service or replace rotor and/or axle as required (spare parts available from ManuFlo).

Fault Diagnosis & Rectification:

- If the RPFS sensor ceases to count, the paddlewheel may be blocked, remove inspect and clean as described above.
- If the RPFS pulses when there is no flow, a nearby 50Hz AC field is probably causing these false counts. Move the flow sensor away from the 50Hz field, or move the source of the field if practical.
- If the standard cable length supplied is not sufficient and needs extending contact ManuFlo for suitable ‘screened’ cable and never run extended cable across or near to other cables that are potential EMF sources.

Material	GAL	PVC	PVC	Polypropylene	Polypropylene	STAINLESS	BRASS	BRASS
Type	T-Piece	slip T-piece	Saddle Clamp	Saddle Clamp	Saddle Clamp	T-Piece	T-piece	Socket
For	Gal pipe	Pressure pipe	Pressure pipe	Pressure pipe	Poly Pipe Black	S/Steel pipe	Brass pipe	
20 mm		PVC20					BRA20	
25 mm	GAL25 (-T2)	PVC25				SS25	BRA25	
32 mm	GAL32	PVC32						
40 mm	GAL40	PVC40	PVC40SC	SCP40	SC40			BSOC: 1" BSP Brass pipe socket adaptor for 25-100mm pipes also BSPB & BSPSS nipple adaptor
50 mm	GAL50	PVC50	PVC50SC	SCP50	SC50			
63 mm					SC63			
65 mm		PVC65		SCP65				
75 mm					SC75			
80 mm	GAL80	PVC80	PVC80SC	SCP80	SC80			
80 mm	GAL80-F (Table D flanged)							
90 mm					SC90			
100 mm	GAL100	PVC100	PVC100SC	SCP100				
100 mm	GAL100-F (Table D flanged)							
110 mm					SC110-LS			BSOC: 1" BSP Brass pipe socket adaptor for 100-500 mm pipes also BSPB-LS Long Stem nipple adaptor
125 mm				SCP125-LS	SC120-LS			
140 mm					SC140-LS			
150 mm			PVC150SC-LS	SCP150-LS				
160 mm					SC160-LS			
200 mm			PVC200SC-LS	SCP200-LS	SC200-LS			
225 mm				SCP225-LS	SC225-LS			
250 mm				SCP250-LS	SC250-LS			
280 mm					SC280-LS			
300 mm			PVC300SC-LS	SCP300-LS				
315 mm					SC315-LS			
500 mm								



Galvanized iron threaded ends BSP (female) 2000 kPa
Note: 25mm can be supplied with straight pipe sections already fitted (Part GAL25-T2)

PVC T-piece Class 18 Cat 19 Glue-in (female) 1100 kPa

PVC 1400 kPa

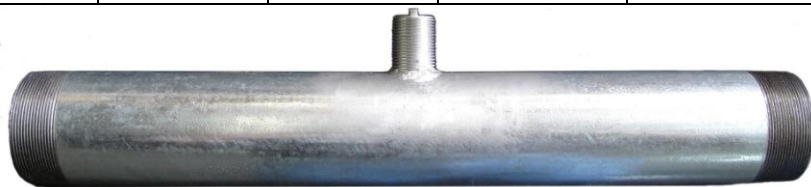
PVC
≤ 150mm: 1600 kPa
> 150mm: 1000 kPa

Poly-pipe agricultural Saddle Clamps
≤ 150mm: 1600 kPa
> 150mm: 1000 kPa

Stainless Steel 316 T-piece.
BSP (female) threaded entry
2000 kPa

Brass T-piece
BSP (female) threaded entry
2000 kPa

1" BSP Brass pipe socket adaptor & BSPB BSPB-LS BSPSS nipple adaptors (see Fig 1 Page 3)



GAL80 - 80mm Galvanized Iron pipe adapter (80mm φ x 600mm long)



BSPSS Stainless Steel adapter nipple for 25-100mm pipes



BSPB brass adapter nipple for 25-100mm pipes

Due to continuous product improvement, specifications are subject to change without notice.

**** Pipe fitting options for the RPFS are as per the table however other fitting types may also be available on request****