

FEATURES:-

- Slip insertion paddle rotor sensor design with locking cap allows simple removal from pipeline for service or replacement.
- Displays Flowrate, Resettable Total & Accumulative Grand Total.
- LCD has Large digits easy to read from longer distance.
- Easy touch reset total button on front panel.
- Power options: Internal Lithium battery with up to 10 year life span Or Externally powered +5-30 VDC
- Optional High and Low set point, pulse and 4-20mA outputs.
- IP66 Polycarb enclosure with flip up lid to protect from weather.
- User friendly and fully programmable functionality.
- Maximum process ambient Temperature 90°C, ambient to 60°C.
- Made in Australia by ManuFlo.
- $\pm 2.5\%$ accuracy, 0.7-8.5 m/s flow velocity, Repeatability: $\pm 1.0\%$
- Easy installation via wide range of pipe fittings/adapters, for pipe sizes from 20 to 100 mm (short stem version) or 110 to 500mm (long stem version)
- Optional pulse output, via M12 IP67 plug set
- Wide range of engineering display units; Litres/KL per sec/min/hr, Total Litres, KL, ML



Instantaneous Flow Rate + Resettable + non-resettable Totals

MRT303: Ideal in Irrigation and many other general water measurement and batching applications. Incorporating the widely used RPFS sensor design.



MRT303 with PVC Pressure Pipe Adaptor Fittings



MRT303 with Saddle Clamp Fittings for PVC or PP Rural

The **MRT303** insertion rotor flowmeter with versatile multi-functional large LCD indicator is designed and manufactured in Australia by ManuFlo. The **MRT303** has a unique 'quick release' slip insertion stem section designed to be inserted to the ManuFlo proprietary nipple adaptors (part BSPB etc) which allows the meter to be fitted to most 1" BSP female entries. Usually, the **MRT303** is pre-fitted and wet test calibrated with a ManuFlo 'T' piece or saddle clamp pipe adapter. Adapters are available for a range of pipe sizes from 20 to 315 mm diameters, and the adapter range also includes SS316 or Galvanized Iron tees, Class18 Cat19 PVC high pressure tees, and saddle-clamp agricultural poly-pipe and PVC fittings. The **MRT303** is pre-calibrate on our NMI certified test rig (sizes 20mm - 150mm) to obtain the best K-factor value. Or optionally you may purchase our BSPSS, BSPB or BSPB-LS pipe adaptor nipples (1" BSP-M external thread) in brass or optional 316-SS material.

The **MRT303** is suitable for medium to high flow range liquid flow measurement applications. The base model is internally battery powered, which is ideal in situations where no external power supply is accessible, making them totally portable flowrate indicators with resettable total and grand totalizer flowmeters. Externally powered models are also available with optional signals to data logger or PLC including scaled pulse, 4-20mA and hi/lo setpoint alarms.

The flowmeter's only moving part (a stainless steel marine alloy rotor which turns as liquid flows past it) allows registration of 2 x 7 digit counters in Litres (L), Kilolitres (KL) or Megalitres (ML). One counter is resettable for batching, the other a permanent 'Grand Total'. In addition a 6 digit Flow Rate display in Litres per minute (L/M) or Litres per second (L/S) all with programmable decimal places. The main body component, consisting of the electronic counter board, is housed in a robust Polycarbonate UV & water resistant IP66 enclosure.

To operate press the circular button on the front panel and the Liquid Crystal Display is zeroed ready for a new batch measurement (batched total to zero), press a second time will indicate the 2nd 'Grand Total' while the flow rate indicator is a permanent on screen reading in the engineering units of choice. Standard version with internal lithium battery has a typical life span in excess of 8 years depending on environmental conditions.

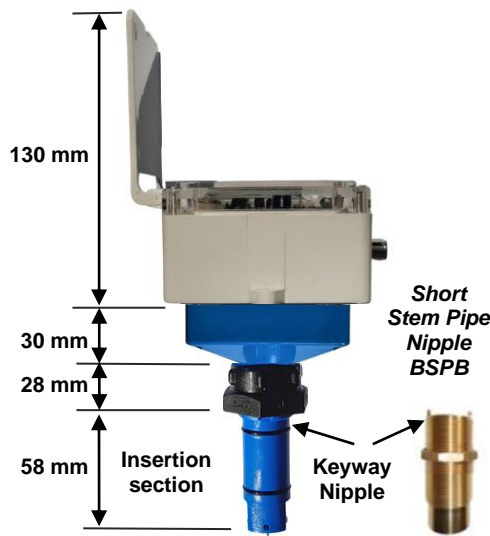
Display Type	LCD, dual line 7 segment
Display Readout Flowrate	6 digits (17mm x 7mm) up to 3 decimal places, in Litres/second , Litres/minute, Kilolitres/minute, Kilolitres/second or Kilolitres/hour. (with filter setting)
Display Readout Reset Total	up to 7 digits (13mm x 6mm), up to 3 decimal places, in Litres, Kilolitres or Megalitres.
Display Readout Grand Total	7 digits (13mm x 6mm) up to 3 decimal places, in Litres, Kilolitres or Megalitres
Programming and Calibration	Via 4 internal push buttons
Display Power Supply Options	Option 1: (Default) +3.6v ½AA replaceable lithium battery (typically + 8 year life) Option 2: +3.6v AA lithium battery -JST plugable (12+ year life) Option 3: +5-30 VDC
Display Housing Ingress	IP66 waterproof, Sealed Polycarbonate enclosure with flip lid & 4 x 316S/S screws.
Temperature Range Ambient	-20 to +60°C max. Process
Temperature Range Process	90°C (standard 'Short Stem' body version) or 120 °C with 'Long Stem' version
Pulse Output	Open collector 5-25VDC. 5ms fixed pulse width, 50Hz max. (sink pls for -B-P bat.pwr option)
Current Output	4 - 20 mA (avail. With -DE version only)
High/Low Flowrate Setpoints	Open collector 5-25 VDC contact output. (avail. With -DE version only)
Enclosure Dimensions:	95mm (H) x 120mm (W) x 60mm (D)
Electrical connection	Via IP67 M12 plug set inc. 5 metre long PUR cable (optional 15 metre)
Weight (unpacked)	0.6 kg (not including selected pipe adapter)
Flow range and Accuracy	±2.5% (0.7 - 8.5 m/sec velocity) ±1.5% (0.7 - 7.0 m/sec velocity, 10:1 flow curve), repeatability ±1%
Max. Pressure	1180 kPa (Special higher pressure version up to 1600kPa on request).
External Reset Input (optional)	Passive input via 2 wire volt free contact for PLC or external totaliser reset switch.

MATERIALS:	SHORT STEM BODY	LONG STEM BODY
MRT303 Electronics Housing	Polycarbonate & 316 SST Screws (x4)	
Viewing Window	Polycarbonate-UV	
Housing Gasket	Neoprene	
Sensor Body	Delrin / Delrin	Bronze / Delrin
Sensor O-Rings	Nitrile BSO20	
Rotor / Bush	Stainless Steel 17-4PH / Delrin	
Axle	Tungsten Carbide	
Lock Cap	Polypropylene	
Nipple Adaptor	Brass or 316 SST	Brass
Pipe Fitting Range	Refer Page 6	

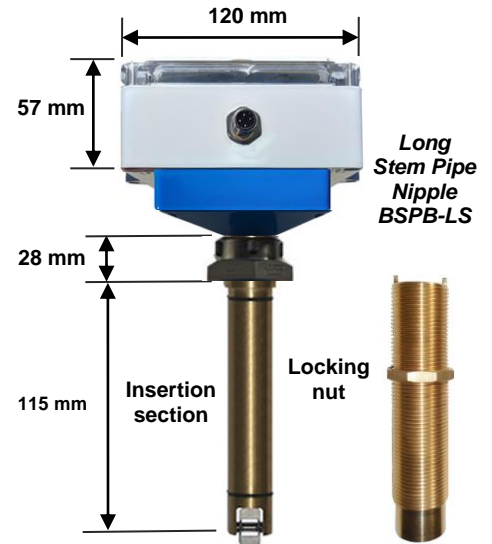
Selection of pipe diameter:

(For best results, use the table below):

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

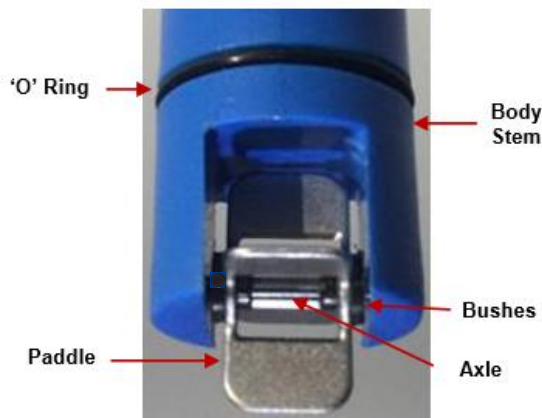


Standard 'Short Stem' body version, pipe ID up to 100mm ID Side view dimensions



'Long Stem' body version (-LS) for pipe sizes > 110mm ID

Rotor section



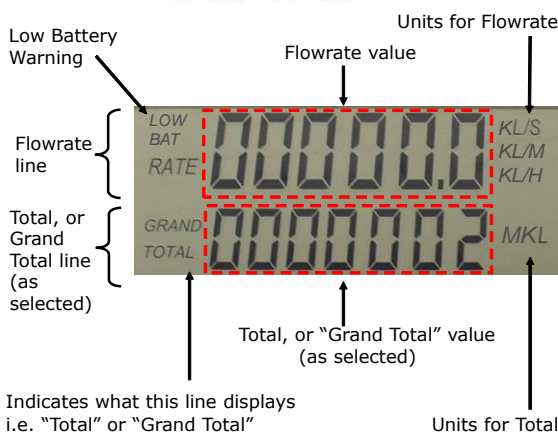
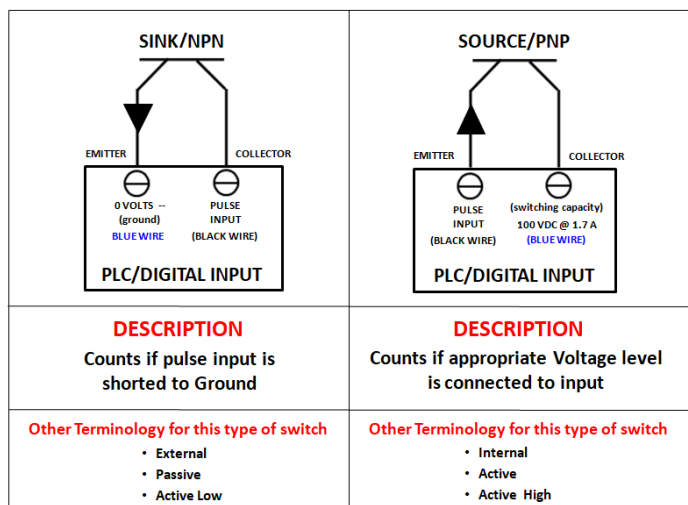
CAUTION: Pulse out 50Hz max. 1/10/100/1000 ltrs./pls. not to exceed max.flow.



With optional IP67-rated Pulse Output plug set.
 ≤ 100mm : 1 pulse / Litre ; > 100mm : 1 pulse / 10 Litres

Pulse Output cabling:
 BLACK = pulse (Collector)
 BLUE = 0.V. (Emitter)

PULSE OUTPUT VIA OPEN COLLECTOR (OPEN DRAIN)



Display options

Adapter Tee keyway fittings are available in:

1. PVC Class 18 Cat. 19 (glue-ends) pressure pipe sizes: 20, 25, 32, 40, 50, 65, 80 & 100 mm.
PVC high pressure saddle clamps: 40, 50, 80, 100, 150, 200 and 300mm.
2. Galvanized Iron threaded connections:
BSP(F): pipe sizes 25, 32, 40 and 50 mm; BSP(M) pipe sizes 80 & 100mm (includes 600mm length of same diameter pipe).
3. Copper/Brass BSP (male) threaded connection end process pipe tube tees 20 & 25 mm.
4. Polypipe saddle clamps in pipe sizes 50, 63, 75, 90, 110 mm, up to 315mm. PVC saddles 40, 50, 80, 100, 150, 200 and 300mm.
5. Stainless steel 25, 32, 40 & 50mm, others fabricated on request.

**Further custom made fittings are available on request.

Insertion to Pipe (see FIG 1 below):

Ideally the *MRT303* is purchased factory fitted, and calibrated on our test rig with the chosen pipe adapter fitting (listed above) however should you wish to mount to your own pipe fittings, you must ensure the ManuFlo nipple adaptor option is mounted correctly so that the *MRT303* rotor is in line with flow direction and the end of the nipple adaptor is protruding approx. 0.5-1.0 centimeter (5 to 10mm) past the Internal Diameter of the pipe so that when the sensor is inserted in to the nipple adaptor it resides at the optimum position to capture flow.

For Tapping into Existing or Larger Pipe Works (see Fig. 1 below):

Use ManuFlo **BSPB**, **BSPB-LS** (Long Stem) Brass or **BSPSS** Stainless Steel pipe adapter keyway nipple - with locknut, which has a 1" OD BSP-male 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.

Installation Conditions:

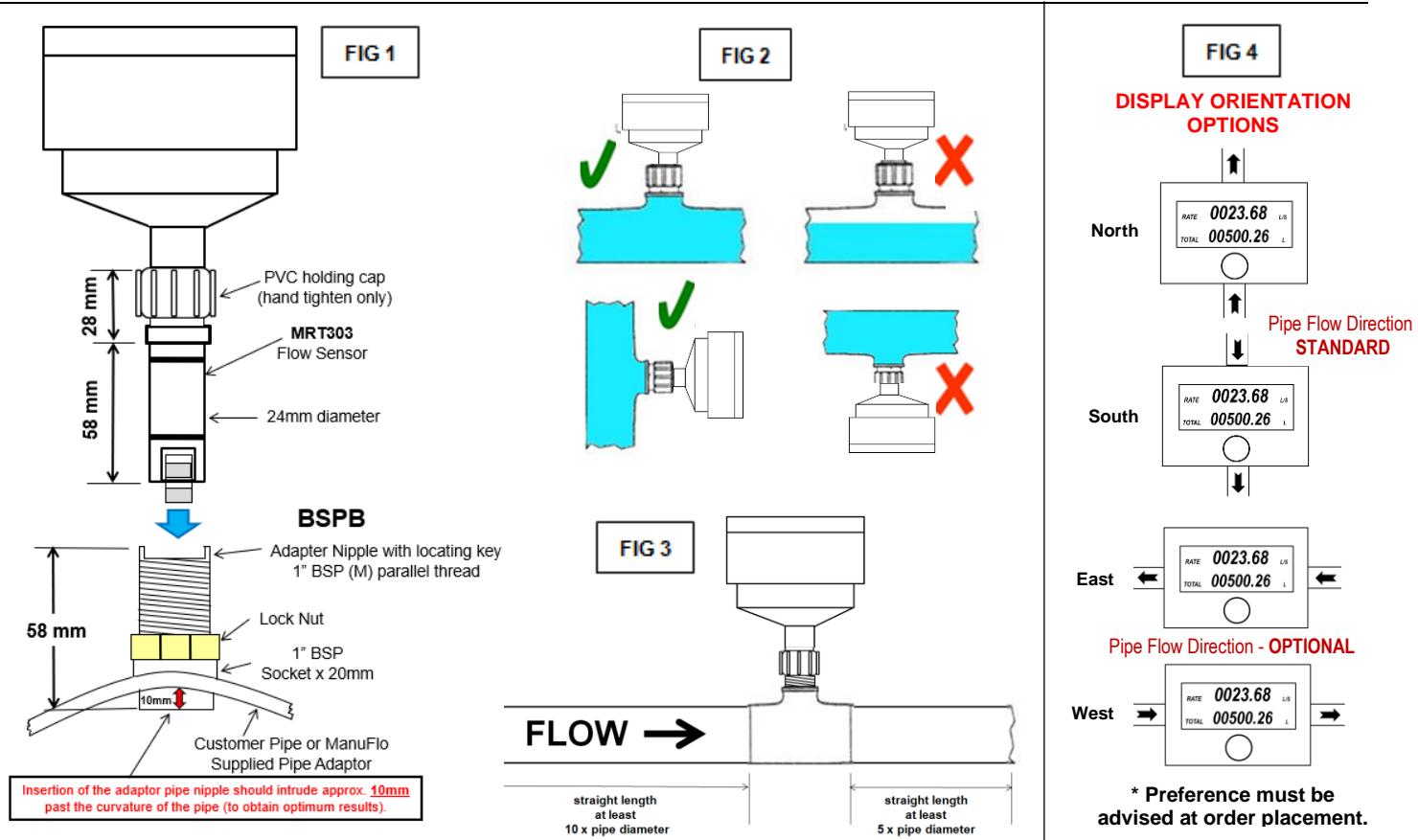
1. Hydraulic conditions must ensure the *MRT303* flowmeter has a **full pipe** flow section when measuring (see FIG 2 below).
2. To maintain the stated accuracy curve, lengths of **straight pipe section** (i.e. without any restrictions bends, taps or valves), of the same diameter as the pipe adapter fitting, must be in place for a minimum **10 x pipe diameters** on the incoming (upstream) side, and **5 x diameters** on the exit (downstream) side, of the flowmeter. This will help eliminate flow turbulence to ensure optimum accuracy performance. (see FIG 3).
3. The *MRT303* can be installed in horizontal, inclined or vertical pipe positions. (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).

Exposure to Sunlight:

To prevent LCD fading due to prolonged exposure in direct sunlight **close lid after viewing**.

Display Head Orientation:

The *MRT303* LCD indicator is available to be viewed in any in orientation to obtain optimum viewing angle (see FIG 4). However it is important that the preferred orientation is **requested at order placement** since this has to be done in the factory prior to shipping.



Recommended Periodic Checks:

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

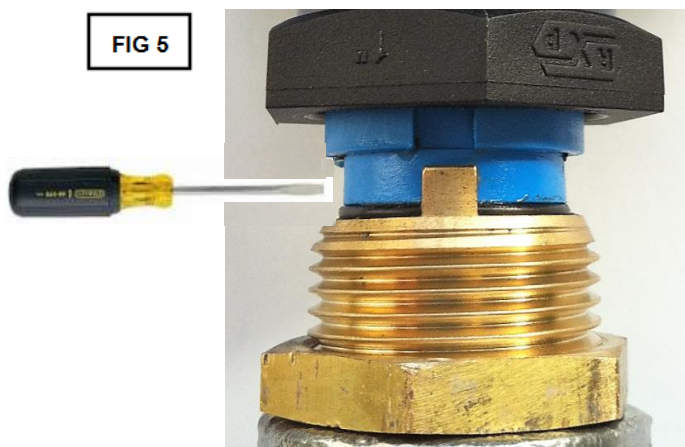
Removal of MRT303 from Pipe adaptor Fitting 'Square' Keyway Type Nipple Adaptor:(see FIG 5)

- 1 - Unscrew the black PVC locking cap (anti-clockwise).
- 2 - Hold the neck of the Tee piece in your left hand grasp the enclosure firmly with your right hand and pull upwards (do not twist) until the sensor pops out of the fitting. If the sensor won't release go to step 3.
- 3 - Place a small to medium sized flat thin bladed screwdriver in the join where the sensor meets the nipple adaptor (See FIG 5), twist the screw driver to prize the two apart then pull upwards again until the sensor is released.

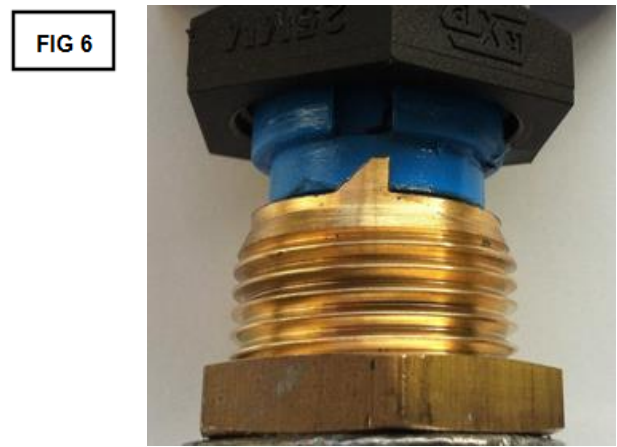
Removal of MRT303 from Pipe adaptor Fitting 'Triangular' Keyway Type Nipple Adaptor:(see FIG 6)

- 1 - Unscrew the black PVC locking cap (anti-clockwise).
- 2 - Hold the neck of the Tee piece in your left hand grasp the enclosure with your right hand and turn slowly anti-clockwise until the sensor pops out of slot then pull upwards out of socket.

**When returning the sensor to nipple adaptor insert so the keyway and slots line up then pull down until they locate. Screw the black lock nut 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/rotor 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 LCD display is blank, the MRT303 may be in sleep mode because it is not receiving input pulses from the paddlewheel. The LCD is reawakened once flow restarts, or by closing and re-opening the lid.
- If the flowmeter ceases to count, the paddlewheel may be blocked, remove inspect and clean as described above.
- If the MRT303 counts when there is no flow, a nearby (within 0.5mtrs) 50Hz AC field is probably causing false counts. Move the flowmeter away from the 50Hz field, or move the source of the field if practical.
- "Low battery" ideally return to ManuFlo or To access the internal electronic display board to replace the Lithium battery:
 - Refer to "Re-calibration" section for instructions to open the MRT303 to access the PCB.
 - Two screws secure the PCB - unscrew them and remove the PCB to access the battery on underside.
 - Replace battery with an equivalent unit, Re-insert the PCB,
 - Replace the viewing screen and hand tighten the 4 x SS screws to re-seal the unit.
- When not in use, the outer lid should be closed. If prolonged direct exposure to sunlight causes the LCD to fade or discolour, return the MRT303 to ManuFlo for servicing.

***For re-calibration of the MRT303 flowmeter please refer separate operation manual for FRT303 digital indicator available @ http://www.manuelectronics.com.au/pdfs/frt303_userman.pdf**

**** Pipe fitting options for the MRT303 are as per the following table however other fitting types may also be available on request****

Material Type For	GAL T-Piece Gal pipe	PVC slip T-piece Pressure pipe	PVC Saddle Clamp Pressure pipe	Polypropylene SaddleClamp PVC Irrigation pipe	Polypropylene SaddleClamp Poly Pipe Black	STAINLESS T-Piece S/Steel pipe	BRASS T-piece Brass pipe	BRASS Socket
20 mm		PVC20					BRA20	
25 mm	GAL25 (-T2)	PVC25				SS25	BRA25	
32 mm	GAL32	PVC32				SS32		
40 mm	GAL40	PVC40	PVC40SC	SCP40	SC40	SS40		BSOC: 1" BSP Brass pipe socket adaptor for 32-500mm pipes also BSPB & BSPSS nipple adaptor
50 mm	GAL50	PVC50	PVC50SC	SCP50	SC50	SS50		
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			BSOC: 1" BSP Brass pipe socket adaptor for 32-500 mm pipes also BSPB-LS Long Stem nipple adaptor
125 mm	Special Saddles			SCP125-LS	SC125-LS			
140 mm	Ductile Iron + AC				SC140-LS			
150 mm	PVC150SC-2-LS		PVC150SC-LS	SCP150-LS				
160 mm				SCP180-LS	SC160-LS			
200 mm	PVC200SC-2-LS		PVC200SC-LS	SCP200-LS	SC200-LS			
225 mm				SCP225-LS	SC225-LS			
250 mm	PVC250-SC-2-LS			SCP250-LS	SC250-LS			
280 mm					SC280-LS			
300 mm	PVC300-SC-2-LS		PVC300SC-LS	SCP300-LS				
315 mm					SC315-LS			
500 mm								
								
	Galvanised 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)

IMPORTANT:

The display head is factory programmed according to the pipe size, and the display head and its pipe adapter are calibrated together to operate as one unit.

DO NOT remove the flowmeter and place it on a different sized pipe adapter, otherwise the display will require re-calibration before it can measure correctly on the new pipe size.

