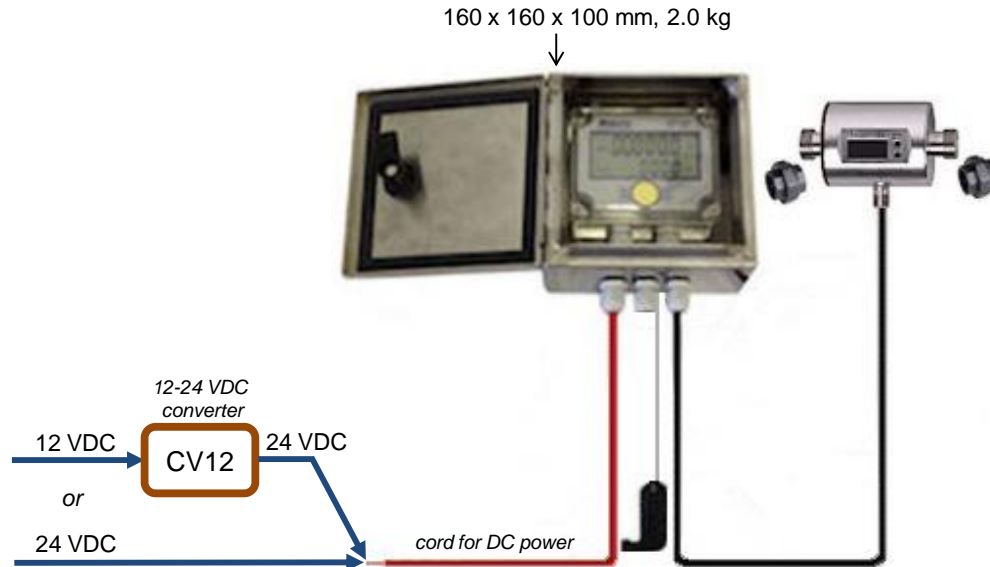


SCS-MM: LIQUID ADMIX SHOTCRETE MEASUREMENT SYSTEM

Congratulations on choosing a **ManuFlo**®™ (Manu Electronics) liquid admixture magflow shotcrete measurement system. You will now join many thousands of satisfied customers worldwide.



Your system comprises:

- FRT303-D-E-BL: IP65 Flowrate/Totaliser Indicator with backlit LED display
- CV12: 12 to 24 VDC converter (*optional*)
- MM15/20/25: IP67 electromagnetic flowmeter with couplings. 1600 kPa maximum pressure. Has on-board LED flowrate display.
- -SSB: Stainless Steel key lockable IP64 outer enclosure with hinged lid and 3 outlets (1 outlet gland is for optional outputs), all wired with 5-metre cable to flowmeter and 1-metre power cord.

Information sheets included:

1. FRT303 Indicator
2. MM15/20/25 magflow
3. Schematic wiring diagram and guide

Prior to installation:

- A. Consider a good viewing AND operating position for the system.
- B. Wire the system to 12 VDC (via CV12 12-24VDC converter) or straight to a 24 VDC power source.
- C.
 - Install the flowmeter as per the installation guide found on the flowmeter brochure.
 - Make sure the cable to the flowmeter is looped downward to prevent any possible water ingress in gland and that pipe is full of liquid at all times at flowmeter measurement point.
 - Ensure that operating pressure is under 1600 kPa (16 bar), else damage to flowmeter may result.
- D. 5-metres of low voltage signal cable is supplied from the FRT303 to the MM flowmeter.

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Flow Measurement & Control Products

Rev: 1411/1

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Operation/Specifications:

Power supply to the system is either from 12 VDC (via CV12 12-24 VDC converter) or straight from a 24 VDC power source.

The FRT303 has a special LED backlight to illuminate the LCD display.

The FRT303 is connected to the MM magflow via a 5-metre lead and M12 plug.

The FRT303 Indicator is housed in a rugged IP64 Stainless Steel Enclosure.

The FRT303 display:

- shows flowrate in LITRES/MINUTE to 1 decimal place,
- has a resettable Totaliser in LITRES, and
- a non-resetable Grand Total in KILOLITRES.

The flowrange measurement is

- with MM15 flowmeter: 0.1 - 25 Litres/minute
- with MM20 flowmeter: 0.2 - 50 Litres/minute
- with MM25 flowmeter: 0.3 - 100 Litres/minute

The MM electromagnetic flowmeter has a LED display that shows flowrate in Litres/minute.

A 4-20mA and Pulse re-transmission output is available via the FRT303-D-E-BL for PLC controlled systems.

If unsure on any aspect of installation or operation, call ManuFlo or your local installer.

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FRT303 - Flowrate Totaliser LCD Indicator

FEATURES

- Displays Flowrate, Resetable Total, and Grand Total.
Easy reset of Total.
- Power options: Internal Lithium Battery, external 5 - 25 VDC, external 240 vac.
- High and low setpoints, Pulse and 4-20mA output options.
- IP65 enclosure with cover to protect LCD.
Mounting lugs for wall mounting.
- Fully programmable functions.
- Australian-made, by Manu Electronics.



The FRT303 Flowrate Totaliser is designed to operate with a wide range of pulse/signal output or coil output flowmeters, providing an instantaneous flowrate reading with a resetable Total display and Grand Total display. To toggle the display between the Total and the Grand Total, simply touch the front panel button once. To reset the Total, touch the front panel button twice.

Power is via either: an internal Lithium battery which has a life of up to 10 years; optional external 5-25 VDC; or optional external 240 vac. The FRT303 will accept flowmeter input pulses from 0.2 to 2000 Hz (Note: for steady flowrate calculations, need at least 2 Hz input). A filter factor is programmable, to smooth the flowrate reading for pulsating flows.

The unit has other fully programmable optional features including pulse output, 4-20mA output, and Hi-Low flow setpoint outputs. All functions are entered via internal keypads and a menu display.

The LCD can be programmed to show flowrate and totals in a number of different units. All application parameters will be pre-programmed according to your requirements, including display unit preferences and the flowmeter K-factor.

The FRT303 is provided in a compact IP65 Polycarbonate enclosure with molded mounts, allowing it to be used in a wide range of field applications.

Order Code	Power Option	Input to FRT from Flowmeter			Outputs					
		Coil	Reed Switch or Open Collector	Pulse/NAMUR	Pulse Output (isolated)	Pulse Output (non-isolated)	High/Low Flowrate indication	4-20mA current output (isolated)	4-20mA current output drive	Tradewaste 6-pin MIL spec plug
FRT303-B	Battery	Y	Y							
FRT303-B-P	Battery	Y	Y			Y				
FRT303-D	DC External power	Y	Y	Y						
FRT303-D-P	DC External power	Y	Y	Y	Y					
FRT303-D-E	DC External power	Y	Y	Y	Y		Y		Y	
FRT303-A-P	AC External power	Y	Y	Y	Y					
FRT303-A-E	AC External power	Y	Y	Y	Y		Y		Y	
FRT303-A-TW	AC External power	Y	Y	Y	Y		Y		Y	Y

Order Code	OPTIONS
-BL	Backlit LED display (for DC and ac models only)
-SSB	Stainless Steel outer enclosure. Hinged lid. Lockable.
SCS-MM15	Shotcrete System complete. Includes FRT303-D-E-BL Flowrate/Totaliser Indicator with backlit LED display, -SSB Stainless Steel outer enclosure, all wired with 5-metre cable to flowmeter and 1-metre power cord.

Technical/Electrical Specifications

Display

- Flowrate
- Total (resetable)
- Grand Total

- LCD
- 6 digits, up to 3 decimal places, in Litres, Kilolitres per sec, min, hr.
- up to 7 digits, up to 3 decimal places, in Litres, Kilolitres, Megalitres.
- 7 digits up to 3 decimal places, in Litres, Kilolitres, Megalitres.

Power Options

- Battery
- External power

- 3.6v Lithium battery (typical 5-10yrs life), 10µA dormant state, with automatic sleep mode to preserve battery power.
- +5 to 25 VDC option; 240 vac option.

Pulse Input

- 0.2 to 2000 Hz (at least 2Hz for steady flowrate display)

Output Options

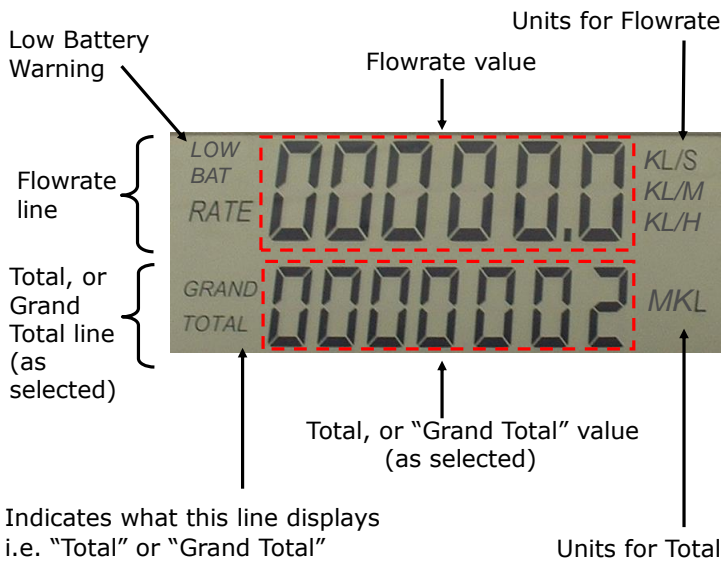
- Pulse output
- Current output
- High/Low Flowrate Setpoint

- (all scalable via program)**
- open collector 5-25 VDC. 50% duty cycle @ 100 Hz.
 - 100Hz maximum. 5ms fixed pulsewidth
 - 4 to 20mA
 - open collector 5-25 VDC contact output.

Enclosure

- Dimensions (mm)
- Rating IP66 waterproof
- Access
- Electrical connection

- 120 W, 95 H, 60 D
- Sealed Polycarbonate enclosure with hinged lid and screw lugs for mounting.
- 4 stainless steel screws to access internal programming and wire-up.
- 1 to 3 IP67 cable gland entries, plug-in screw terminals.



Elements of the LCD Display



SCS-MM15 Shotcrete System

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

MM MiniMag – Electromagnetic Flowmeter

15, 20 and 25mm

Improved!

FEATURES

- Very compact and light weight design, in sizes:
 - 15mm connection (8mm bore)
 - 20mm connection (12mm bore)
 - 25mm connection (15mm bore)
- Flowrange @ $\pm 2\%$ accuracy: to 25/50/100/120 Litres/minute
- Repeatability of rate: $<0.2\%$
- Measures liquids of conductivity $> 20\mu\text{S/cm}$
- Process range to 70°C
- Display shows non-resetable Total (Litres) or Flowrate (Litres/min).
- NPN Pulse Output
- 4-20mA output, endpoints programmable in 0.1 Litres/min increments.
- Robust construction for industrial use to IP67.
- Stainless Steel Body, PEEK liner, SS316 electrodes with integrated grounding electrodes.
- Fast and easy installation or removal with BSP male threaded end connections.
- No moving parts. Obstructionless bore. Virtually maintenance free.
- Suitable with a wide range of conductive liquids from $20\mu\text{S/cm}$. Accuracy unaffected by varying viscosity or specific gravity.
- 19–30 VDC powered (standard), optionally with 12–24 VDC power converter.

Higher pressure -- to 1600 kPa

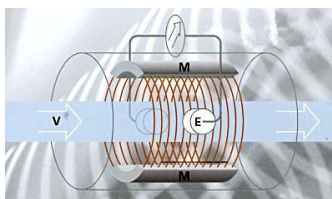


INTRODUCTION

The MiniMag is a low-cost Electromagnetic Flowmeter, suitable for flowrate and totaliser metering and batching. Liquids with an electrical conductivity of at least $20\mu\text{S/cm}$ can be measured. The converter/processor is inbuilt on the flowmeter sensor primary. These two elements form a very compact package.

With no moving parts and an obstruction-free bore, this type of flowmeter is ideal for measuring a wide range of conductive liquids (that are chemically aggressive, or dirty) up to a temperature of 70°C , with minimal head losses and virtually no ongoing maintenance. MiniMag is ideal for measurement of admixtures, and providing flowrate or total display for shotcreting and process batching/monitoring applications. The MiniMag can be used in conjunction with a remote ManuFlo FRT-303 Indicator or Batch Controller, or can be connected to PLCs via 4-20mA or pulse output.

The operation of electromagnetic flow meters is based on Faraday's Law of Induction. A voltage is induced in a conductor as it moves through a magnetic field. This principle is applied in the MiniMag design. The voltage induced in the flowing liquid is measured at two electrodes, and is proportional to the average flow velocity. The microprocessor then scales this signal voltage to read in digital units.



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Flow Measurement & Control Products

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TECHNICAL DATA

Accuracy	± 2% of range
Repeatability	± 0.2% of rate
Protection class	IP67
Liquid Temp.	-10 °C to 70 °C
Ambient Temp.	-25 °C to 50 °C
Liquid Conductivity	≥ 20µS/cm
Liquid Viscosity	< 70mm/s @ 40°C
Approvals	IEC 1000

Max. Pressure	1600 kPa (18 kPa pressure loss @ 25 Litres/min)
Housing & Electrodes	Stainless Steel 316 (EDPM seal)
Liner Material	PEEK (polyether-etherketone)
Supply Power	19 - 30 VDC (120mA @ 24 VDC)

Optional converter pack: 12 VDC to 24 VDC.

Pulse Output	NPN open collector. Pulse width standard 0.05 to 2 seconds.
Current Output	4 to 20 mA; load ≤ 500 Ω. Measuring range scalable.
Display	4-digit LED, shows:

- non-resetable Total in Litres or m³; or
- Flowrate in Litres/min; resolution to 0.05 Litres/min.

Damping time	0.0 to 5.0 sec (for pulsating flows), factory programmable.
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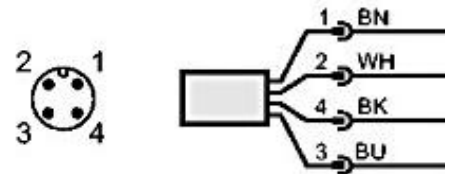
If there is Empty Pipe Detection, then pulse output stops if pipe is not full.

Order Code:	MM15	MM20	MM25	MM25-S
Connection size	15 mm	20 mm	25 mm	25 mm
Bore size	8 mm	12 mm	15 mm	15mm
Thread G BSP male	½"	¾"	1"	1"
Flowrange Litres/min	0.1-25	0.2-50	0.3-100	0.3-120
Pulse output Pulses/Litre	100	100	100	1000
Empty Pipe Detection #	no	no	no	yes
Body Band Colour	orange	orange	orange	black

ELECTRICAL CONNECTIONS

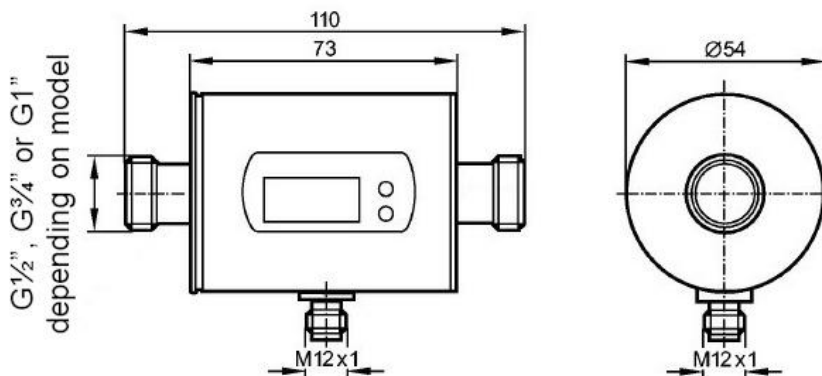
Via M12 4-pin screwed socket and plug connector. 5-metre bare lead.

Pin designations	MM25-S only	all other models
Power Connection : Positive = +	Pin 1, Brown (BN)	Pin 1, Brown (BN)
: Negative = --	Pin 3, Blue (BU)	Pin 3, Blue (BU)
Pulse output NPN optocoupler = P	Pin 2, White (WH)	Pin 4, Black (BK)
Current output 4 – 20 mA = I	Pin 4, Black (BK)	Pin 2, White (WH)



INSTALLATION

- The flowmeter should not be installed in the vicinity of strong electromagnetic fields.
- It is essential that the flowmeter tube be always completely filled with liquid. Partial filling results in measurement errors.
- Must have at least 5x diameter of straight pipe before (upstream of) flowmeter, and 2x diameter of straight pipe after (downstream of) flowmeter. The pipe bore diameter should be the same as the flowmeter itself.
- Valves or other shutoff devices should be installed downstream from the flowmeter.
- Can be installed in horizontal or vertical orientation.
- When installed in a horizontal pipeline, the imaginary line between the two electrodes should be horizontal if at all possible to prevent air bubbles from affecting the flow signal which is measured at the electrodes.



Due to continuous product improvement, specifications may change without notice.

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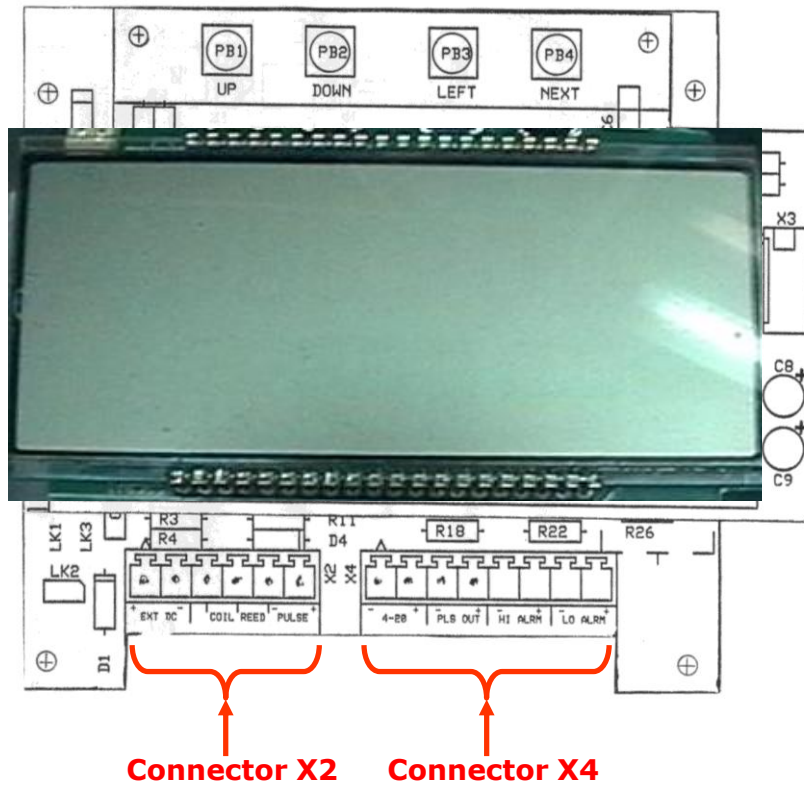
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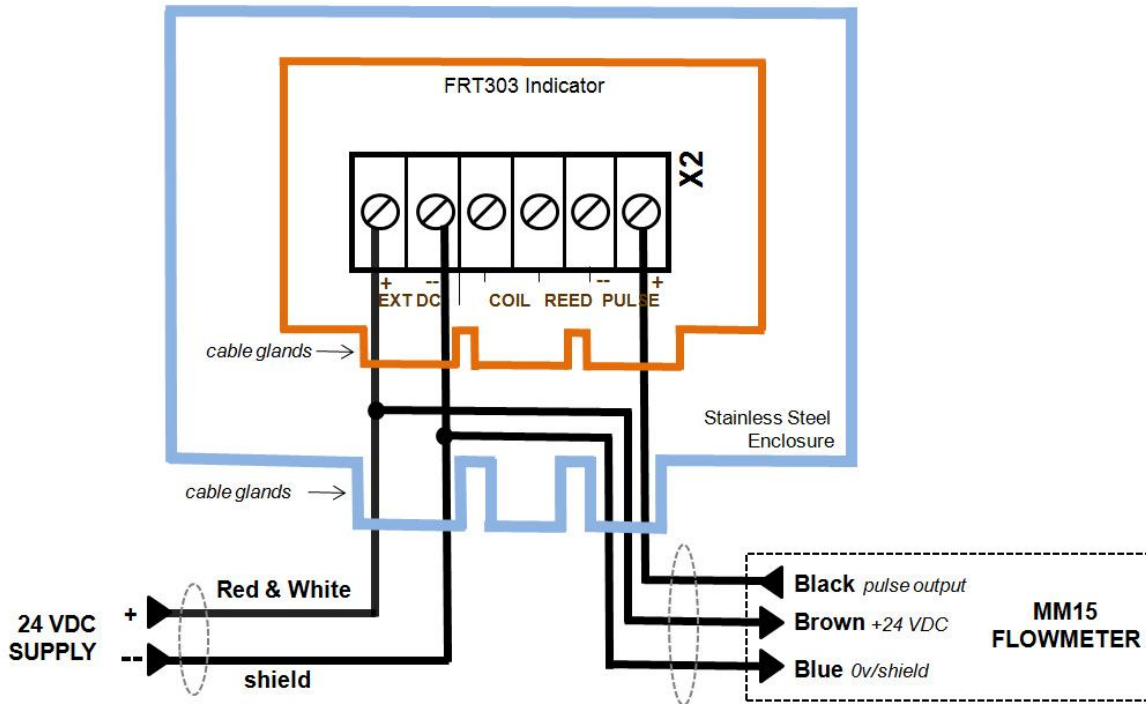
SCS-MM15 Wiring Information



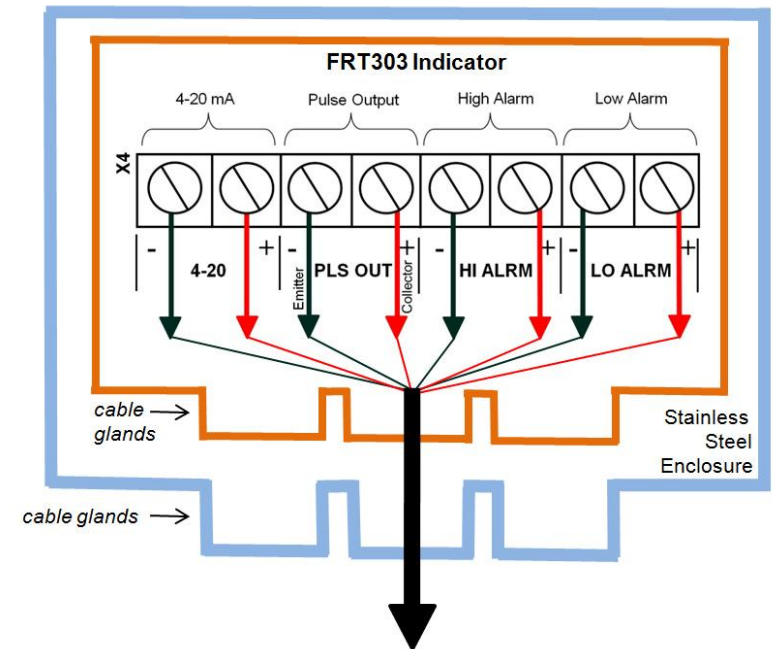
FRT303 INDICATOR - INTERNAL VIEW



SCS-MM15 Wiring Information



Connecting MM15 Flowmeter, Pulse and 24 VDC supply via Connector X2



Connecting optional 4-20mA, Pulse and Alarm outputs via Connector X4