Flotech
PERFORMANCE SYSTEMS

FLOBLOCK
High Accuracy Additive Injector

Installation & Operation Manual (IOM)

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Contents

CHAPTER 1 - FUNCTIONAL DESCRIPTION

The Flotech FLOBLOCK is an integrated manifold injector suitable for use with additives, dyes, agents, markers and chemicals.

The design of the FLOBLOCK accommodates the common requirements of injection systems for metering and control of a cyclical injection chemical stream.

The FLOBLOCK integrates the following into a single forged stainless-steel manifold block;

- Strainer
- Electrically operated solenoid valve
- Dual pulse flowmeter
- Flow control needle valve
- Non-return valve

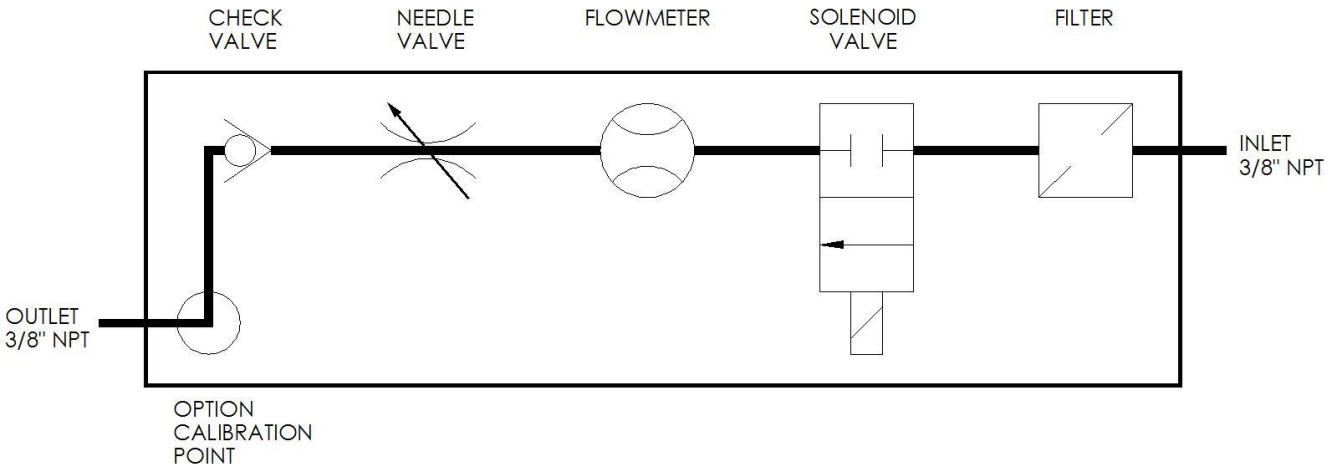


Figure 1 FLOBLOCK Schematic

Combining this functionality into a single manifold block results a more compact install and minimises potential for leakage or losses.

The FLOBLOCK can be safely and easily calibrated using a FLOCAL calibration kit. FLOCAL (available separately) incorporates a quick release connector, adjustable back pressure valve, gauge, and isolation valve.

The FLOBLOCK provides the physical device that controls injection of an additive and must be controlled by an 'additive control device', be that a Pre-set, PLC or Terminal Automation System.

The additive control device opens the solenoid valve on the FLOBLOCK and accumulates additive flow volume in the form of pulses transmitted from the meter sensor. Once sufficient volume of additive chemical has moved through the manifold, the controlling device then turns off the solenoid valve to stop flow. It is within the additive control system that the recipe, injection interval, tolerance, alarm annunciation, shutdown, etc. are configured.

The user should consult factory for more information about additive control devices.

1.1 FLOBLOCK MOUNTING

FLOBLOCK must be correctly mounted to ensure the internal shafts of the Flowmeter are in the horizontal plane (see Figure 1.1). Incorrect orientation of the FLOBLOCK will cause the weight of the flowmeter gears to bear down onto the casing resulting in loss of accuracy & repeatability, as well as reduced gear reliability.

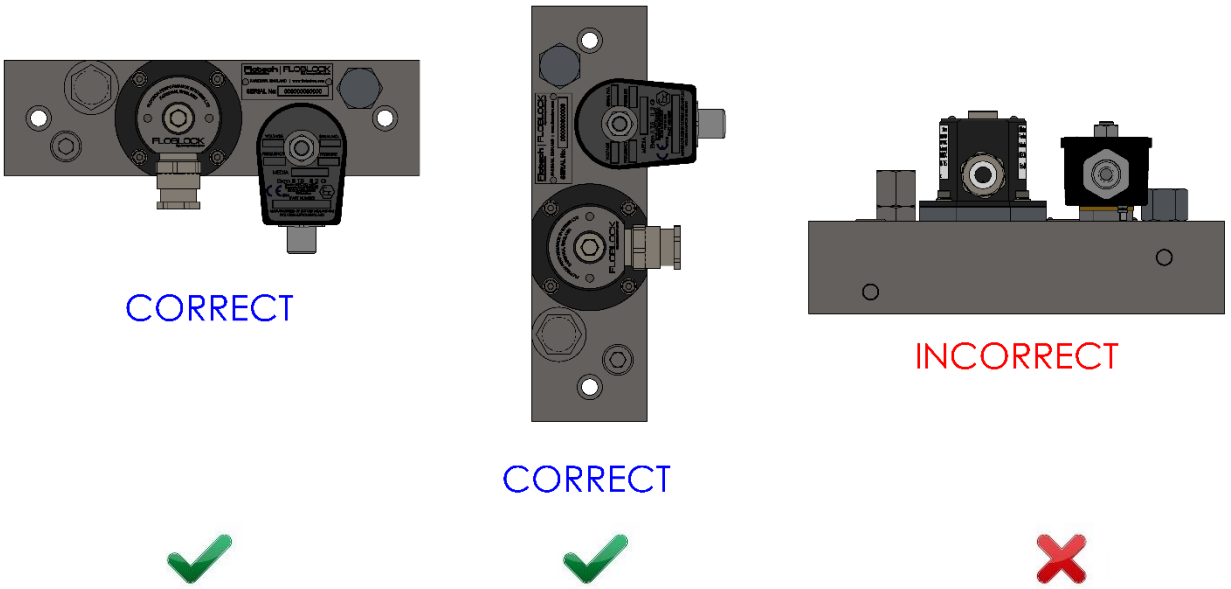


Figure 1.1 FLOBLOCK Mounting Orientation

NOTE - *FLOBLOCK should securely fixed to a suitably earthed structure to dissipate static build up.*

1.2 FLOBLOCK SOLENOID INPUT

The FLOBLOCK has a single control input via the electrical connections to the actuator coil of the solenoid valve. The coil is typically operated from AC line voltage of 115V 50Hz or 230V 50Hz. Both 12VDC and 24VDC versions are available upon request.

The required coil voltage is specified within the modelling code provided when placing an order.

The solenoid valve is normally closed, meaning that that when the coil is de-energized the valve is closed. Applying voltage to the coil opens the fluid flow path through the FLOBLOCK.

NOTE - *The Solenoid Valve shall be energised prior to opening the pipework inlet isolation valve on first start-up only to eliminate risks of operating within a Zone 0 Hazardous Area.*

1.3 FLOBLOCK SENSOR OUTPUT

The FLOBLOCK meters the additive flowing through it using two high precision oval gears mounted in a machined measuring chamber. As fluid passes through the measuring chamber it rotates the oval gears. Magnets within the gears pass over a Hall-Effect pickup mounted in the sensor housing, causing it to change state (off-on-off) as each magnet passes.

Approximately 2915 pulses are generated for each gallon (US) of fluid passing through the meter (770 pulses/litre).
When fitting pulsers, please ensure the gland is pointing directly to the base of the FloBlock.

The customer's equipment is responsible for providing a means of calibration of the meter. That is, a method of determining the exact number of pulses per gallon, litre etc. of fluid. This calibration factor is normally referred to as the "K-Factor" for the meter. The k-factor is then used by the customer's equipment for conversion of pulses received to volume dispensed.

CHAPTER 2 – ELECTRICAL CONNECTIONS

2.1 CONTROL SOLENOID

The solenoid wiring should be a minimum of #16 AWG/1.5mm² and a maximum of #14 AWG/2.5mm², type THHN or THWN wire. Good practice dictates AC and DC wiring should be run in separate conduits or multi-core cables for extended distances. Follow local codes and practices applicable to your area.

WARNING! The solenoid coil presents an inductive load to the switching device controlling it. High counter EMF voltages may be produced when removing the voltage source from such loads. Steps should be taken to ensure these high surge voltages are properly dissipated, or damage to the controlling device may occur. Consult with the manufacturer of the controlling equipment for guidance regarding the control of inductive loads. TRIAC switching is recommended.

2.2 METER SENSOR (GENERAL)

The sensor wiring can be five conductor, #18-22 AWG/0.5-1mm² shielded instrument cable, with a foil or braided wire shield. Use Belden® number 9365 or similar.

Drain or screen wires should be terminated on a DC COMMON or on a specifically assigned shield termination at the controller end only. Do not terminate shields to AC earth ground. Insulate the shield at the sensor end. Refer to wiring diagrams in this document and Annex I for specific connection details.

2.3 METER SENSOR – XP2 DUAL PULSE SIGNAL OUTPUT

The FLOBLOCK meter sensor outputs are sinking to 0V transistorised output. The Red Wire is connected to the source supply voltage and the Black wire is connected to the source 0V line. The White wire is the signal. A output. The Orange wire is the signal. B output. The Green wire must be terminated to Earth.

The term "un-sourced" means that no voltage is applied to the output from within the sensor. It must be pulled to a 'high' or 'on' or 'true' state by voltage supplied from an external source. The sensor electronics then drives the collector 'low' or 'off' or 'false' with each pulse transmitted. The output is NOT driven high internally within the sensor. This industry common scheme allows the sensor to drive external equipment supplied by its own internal transmitter power.

There must be a common connection between the DC negative of the sensor supply and the DC COMMON of the signal accumulating device. Refer to the wiring diagrams at the end of this manual for specific connection details.

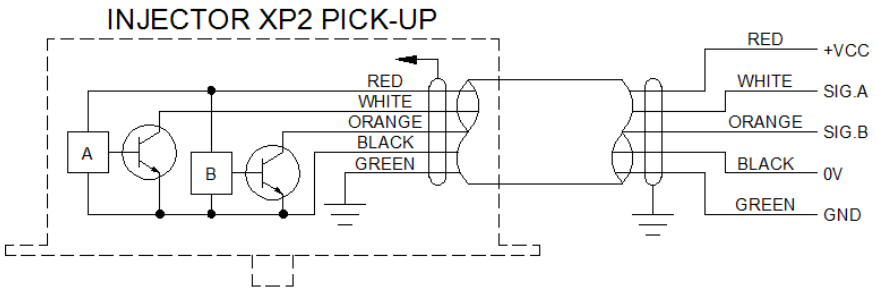


Figure 2.3 FLOBLOCK XP 2 Pick-Up Wiring Details

2.4 CUSTOMER EQUIPMENT FOR METER SENSOR INPUT

The controlling equipment used for capturing pulses from the FLOBLOCK may be of two general categories;

- Un-Sourced Inputs - having no voltage present normally on the input connection
- Sourced Inputs - having a DC pull-up voltage supplied to the input connection

Two different wiring methods are used for the two types of pulse inputs. Wiring diagrams are provided below for each type of input. Refer to the documentation of the controlling equipment for a description of the inputs to determine the type.

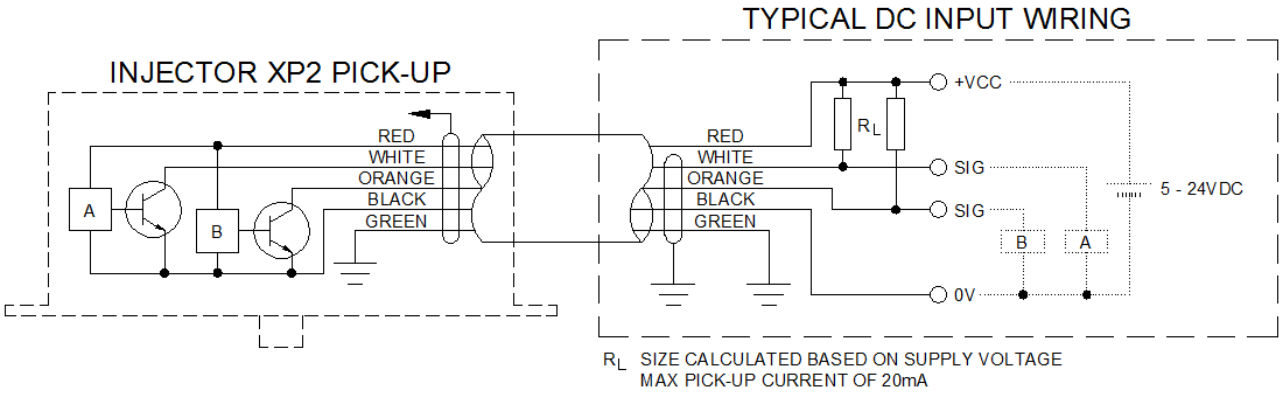


Figure 2.4a FLOBLOCK XP2 Pick-Up wiring to Sourced DC Input

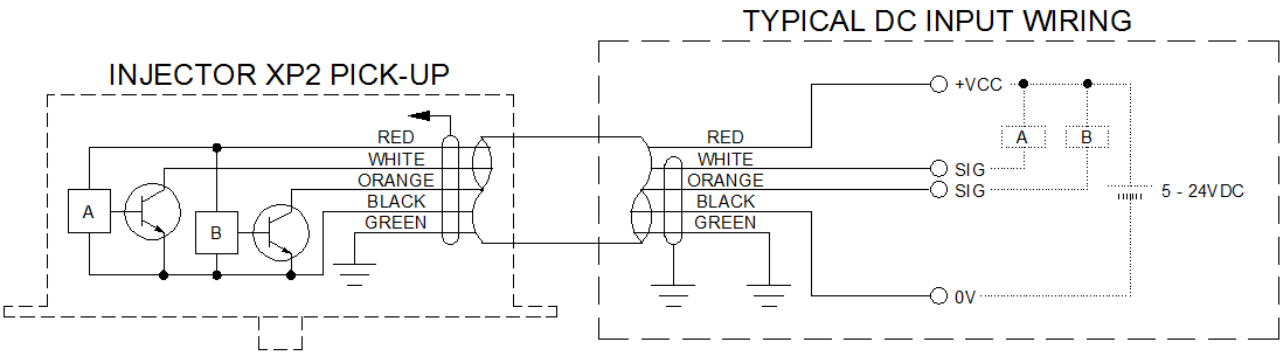


Figure 2.4b FLOBLOCK XP2 Pick-Up wiring to Unsourced DC Input

CHAPTER 3 - FLOBLOCK FLUID CONNECTIONS

3.1 FLUID INLET PIPING

Attention should be given to flow dynamics when sizing the tubing, isolation valve, and strainer components feeding the injector inlet. The minimum tubing size for flows approaching the maximum flow rate through the FLOBLOCK is ½" or 12mm. Significantly lower flow rates may allow smaller tubing dimensions. The isolation valve, feed pipe and strainer size must be increased to handle the flow required for the number of blocks being fed.

3.2 FLUID OUTLET PIPING

Stainless steel tubing is also used for piping the outlet of the FLOBLOCK manifold to the point of injection.

WARNING! A check valve and an isolation valve MUST be installed between the manifold and the point of injection. Failure to install an isolation valve will require complete fuel delivery system shutdown in the event of a need for service on the injector manifold. Failure to install a check valve in the line may result in fuel backing up into the additive chemical delivery system and may cause contamination or spill.

Good design practice dictates that an isolation valve, usually a quarter turn ball valve, be installed at the point of chemical injection into the fuel piping. This valve should meet the needs of local policies and practices regarding piping system valves.

An injection point check valve is required. This check valve should be a positive shut-off, spring closed check such as a plug or ball type. A small opening or 'cracking' pressure is acceptable, generally limited to a maximum of 15 PSI/1Bar. Cracking pressures of 1 PSI to 10 PSI/0.06 to 0.6 Bar are common in the industry. Ensure the flow characteristic (Cv) of the check valve is adequate to handle the maximum flow rate expected through the injector manifold. Although the location is not critical, it is common practice to place the check valve near the isolation valve at the point of injection.

Remember, pressure differentials across the isolation valve, check valve, tubing, manifold, strainer, etc. all accumulate and ultimately dictate the required supply pump pressure. Minimizing the individual pressure drops allow the lowering of the supply pump pressure and effectively reduces the load and wear on the system.

WARNING! Care should be exercised when connecting multiple injector manifold blocks to one common point of injection. Each manifold line MUST have its own check valve to prevent cross contamination. The length of common piping should be minimized to ensure all additive chemical being injected reaches the fuel line. Not all chemicals are compatible. If multiple additives are used simultaneously, be certain to size common piping for the combined flow.

3.3 FLOBLOCK INTEGRATED CHECK VALVE

When the solenoid is de-energized. The check valve in the block prevents reverse flow. When the additive chemical injection system is idle, any fluid expansion that occurs between the additive pumping system and the block MUST be relieved, usually back to additive storage.

NOTE - *When designing the pumping system, provision should be made to allow this thermal expansion volume to return to the additive chemical storage tank.*

CHAPTER 4 – PARTLIST AND ASSEMBLY DETAILS

4.1 FLOBLOCK EXPLODED VIEW

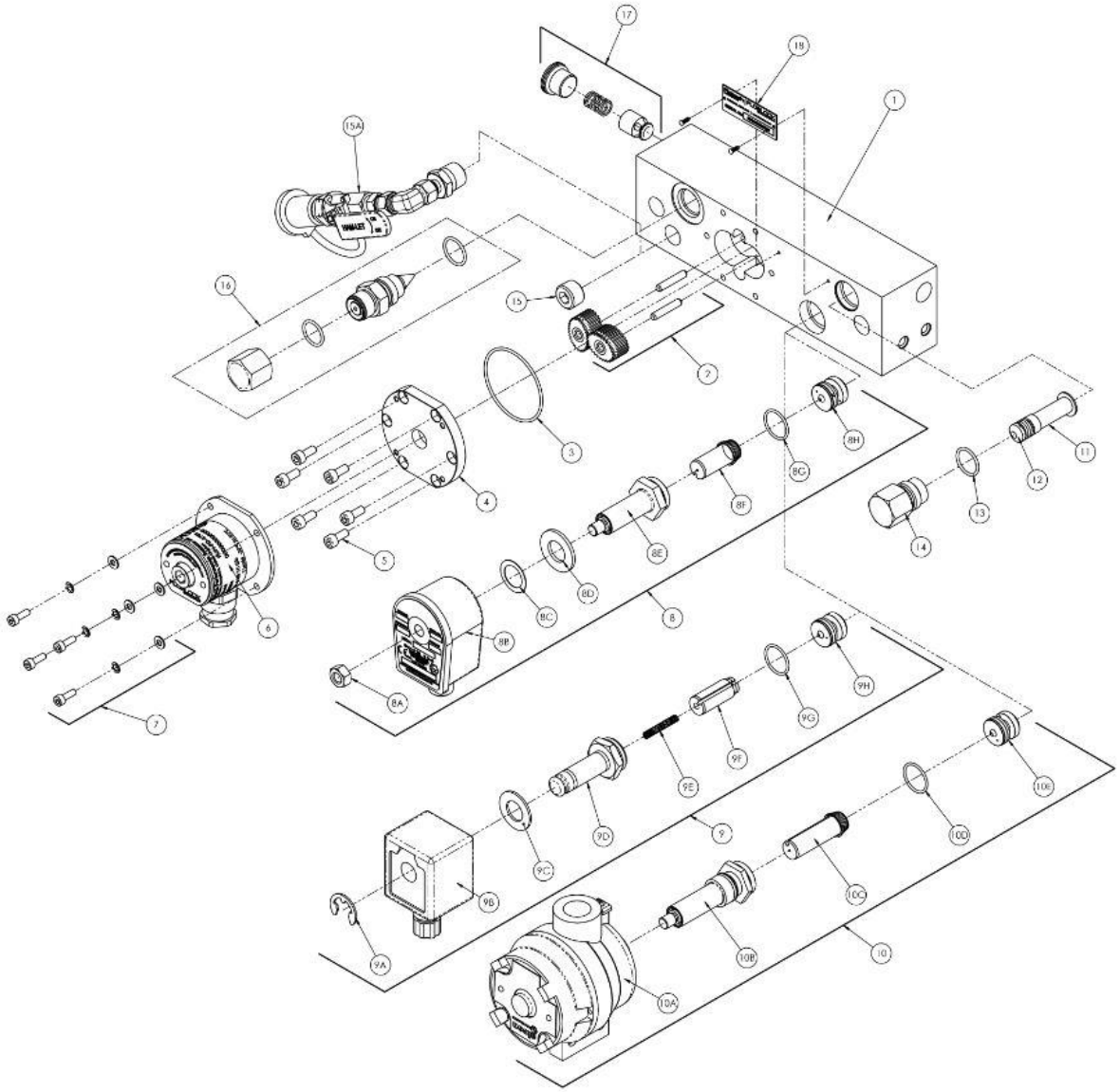


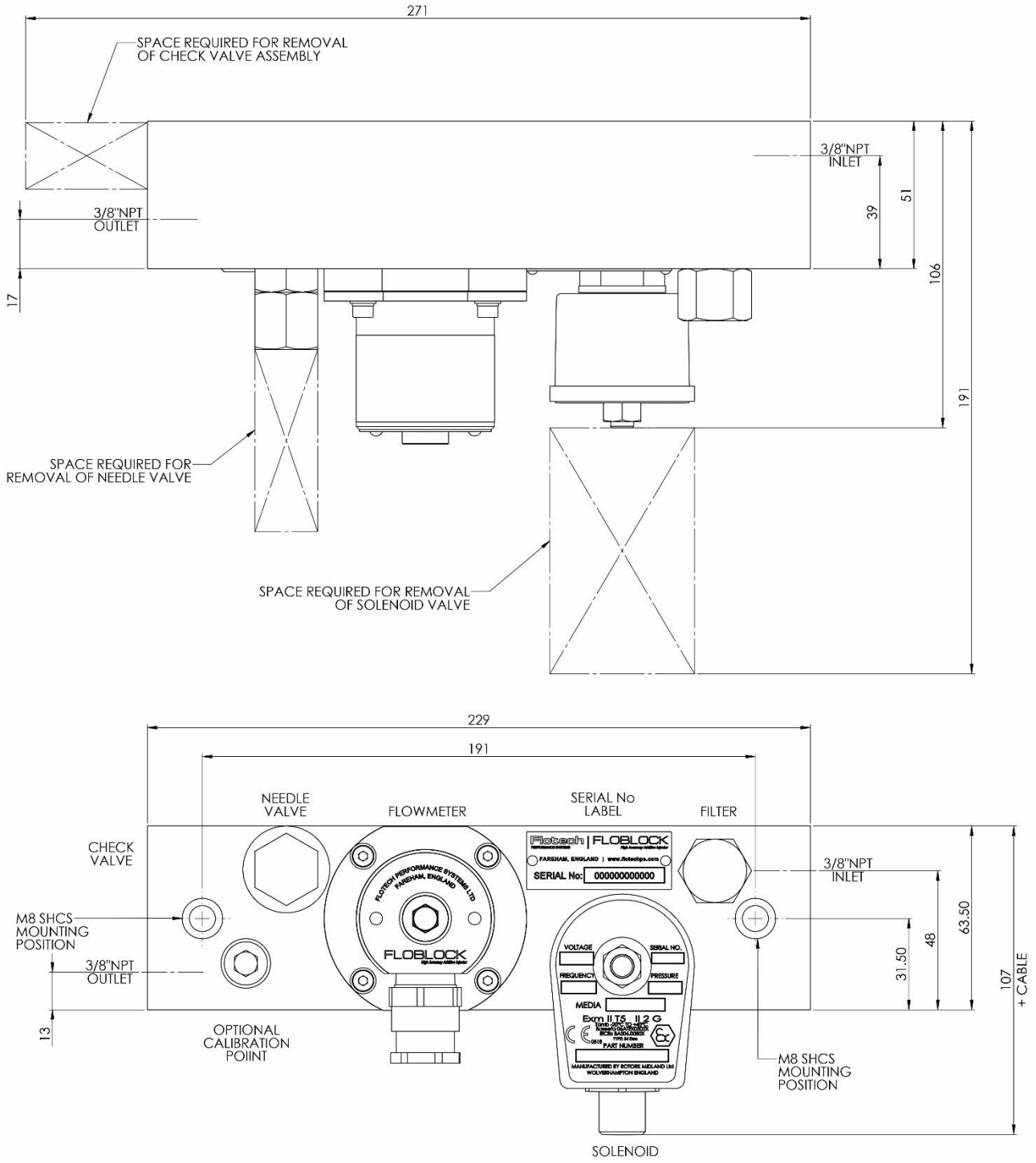
Figure 4.1 FLOBLOCK Exploded view

4.2 FLOBLOCK PARTS LIST

#	Part Number	Description	Material	QTY
1		FLOBLOCK Injector Manifold - Std Flow	Stainless Steel, AISI 304	1
		FLOBLOCK Injector Manifold - Low Flow	Stainless Steel, AISI 304	
2		Gear Set c/w Posts - Standard Flow	Ryton® (PPS), S/Steel 316	1
		Gear Set c/w Posts - Low Flow	Ryton® (PPS), S/Steel 316	
3		Flowmeter Cover O-Ring	PTFE encapsulated silicon	1
4		Flowmeter Cover	Stainless Steel, AISI 304	1
5		M5 Socket Cap Head Screw	Stainless Steel, A2	6
6		Sensor Assembly	Aluminium AW-6082 & S/Steel, AISI 316	1
7		M4 Fixing Set	Stainless Steel, A2	4
8		T5 Exm Solenoid 230v/50Hz - IsoLast Seals	Alu AW-6082, S/Steel AISI 316 & Viton	1
		T5 Exm Solenoid 110v/50Hz - IsoLast Seals	Alu AW-6082, S/Steel AISI 316 & Viton	
9		T3 Exm Solenoid 230v/50Hz - IsoLast Seals	Epoxy encapsulated, S/Steel AISI 316 & Viton	
		T3 Exm Solenoid 110v/50Hz - IsoLast Seals	Epoxy encapsd, S/Steel AISI 316 & Viton	
10		T6 Exd Solenoid 230v/50Hz - IsoLast Seals	Alu AW-6082, S/Steel AISI 316 & Viton	
		T6 Exd Solenoid 110v/50Hz - IsoLast Seals	Alu AW-6082, S/Steel AISI 316 & Viton	
11		Filter Element	Stainless Steel, AISI 316	1
12		Filter Element Spring Cap	Stainless Steel, AISI 304	1
13		Filter Cap O-Ring	Viton	1
14		Filter Cap	Stainless Steel, AISI 304	1
15		Calibration Point Plug	Stainless Steel, A2	1
15A		Calibration Point Assembly	Stainless Steel, AISI 316	1
16		Needle Valve Assembly	Stainless Steel, AISI 304	1
17		Check Valve Assembly	Stainless Steel, AISI 304	1
18		Serial No Plate	Stainless Steel, A2	1

Denotes Standard Offering (FLO-S1RI201A2)

4.3 FLOBLOCK GENERAL ARRANGEMENT DRAWING



4.3 FLOBLOCK General Arrangement Drawing

CHAPTER 5 - TECHNICAL DATA

Manifold Block General	
Mounting	2 off M8
Manifold Connections	3.8" NPTF
Assembled Weight	7 kg
Dimensions	229mm W x 63.5mm H x 51mm D
Max Design Pressure	27 Bar / 400 PSI
Temperature Range	-20 Deg C to +50 Deg C
Protection Level	ATEX II 2 Gb / FM Class1 Div1 Group C&D

Flow Data	
Nominal K-Factor	740 pulses/litre (Standard Flow Variant) - 1480 pulses/litre (Low Flow Variant)
Meter Accuracy	+/- 0.50%
Repeatability	+/- 0.25%
Max Flow Rate	12 litres/min
Min Shot Size	10cc (low flow)

Materials	
Manifold	Stainless Steel 303
Meter Gears	Ryton® (PPS) (S/Steel 316 available as an option)
Flowmeter Cap	Stainless Steel
Solenoid Seals	Isolast or PTFE
Solenoid Body	Stainless Steel, AISI 304
Block Seals	Teflon
Sensor Body	Aluminium
Filter	Strengthened Sintered Steel, 80 mesh, 180 µm

Solenoid	
Fluid Port Sizes	8mm
Maximum Working Pressure	235 PSI, 16 Bar
Maximum Differential Pressure	150 PSI, 10 Bar
General Certifications	ATEX / CE
Coil Power Requirement	8.6 Watts @ 230 Volt AC / 17.1 Watts @ 120 Volt AC
Coil Certification	ATEX, NEMA Type 3, 35, 4, 4X, 6, 6P, 7 & 9
Solenoid Voltage	230 VAC 16W 50Hz or 115 VAC 22W 50Hz (C/F for 12 VDC or 24 VDC options)
Black Wire Function	Actuator Coil
Green & Yellow Wire Function	Earth

Sensor	
Thread	1/2" x 13 S.A.E. female threads
Type	Magnetoresistive, Omni-polar, Solid State, Sinking
Power	5 - 25 VDC, 11 mA maximum
Sensor Output	Sink, 20 mA Maximum
Red Wire Function	Power
Black Wire Function	0v
Blue Wire Function	Signal
Operating Temperature Range	-40°C to +66°C, -40°F to +150°F

CHAPTER 6 – MODELLING CODE

Flow Rate	
FLO-S	Standard Flow - (740 pulses/Litre)
FLO-L	Low Flow - (1480 pulses/Litre)

Mounting & Installation Kit	
0	Not Required
1	Mounting Kit (Stand off's & Bolts Only)
2	Mounting & Installation Kit (2 x Hawke M20 Exe/Exd Glands (501/423), Stand off's, Bolts)
3	Mounting & Installation Kit (2 x Hawke M20 Exd Potted Glands (ICG 623), Stand off's, Bolts)

Flow Meter Type	
S	Single Pulse
D	Dual Pulse

Flow Meter Gear Material	
R	Ryton
S	Stainless Steel

Solenoid Seat Material	
I	Isolast
P	PTFE

Control Solenoid - Voltage and Temperature Class	
1	230 VAC 50Hz - T3 - Exm - ASCO
2	230 VAC 50Hz - T5 - Exm - ALCON
3	230 VAC 50Hz - T6 - Exd - ALCON
4	115 VAC 50Hz - T3 - Exm - ASCO
5	115 VAC 50Hz - T5 - Exm - ALCON
6	115 VAC 50Hz - T6 - Exd - ALCON
X	Other (upon request)

Blocking Solenoid - Voltage and Temperature Class	
0	Not Required
1	To same specification as Control Solenoid
X	Other (upon request)

Isolation & Flushing Options	
0	Not Required
1	Inlet & Outlet Isolation
2	Inlet & Outlet Isolation c/w 1/4" QRC

Approvals	
A	ATEX / CE
I	IECEx
F	FM
C	CSA

Cable Lengths	
2	2 Meter Flying Leads
5	5 Meter Flying Leads

FLO-S	1	S	R	I	2	0	0	A	2	Default Code

ANNEX I ALTERNATIVE PICK-UP CONNECTIONS

I.1 FLOBLOCK XP1 PICK-UP WIRING DETAILS

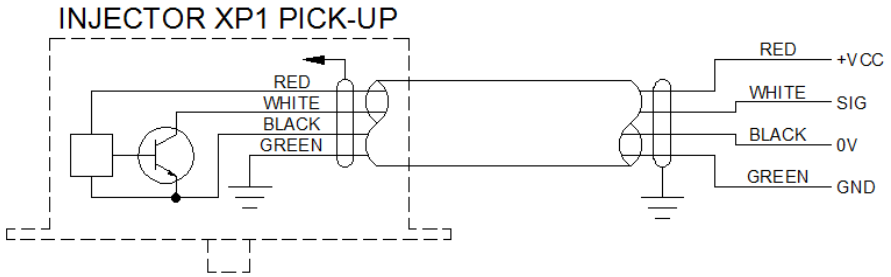


Figure I.1a FLOBLOCK XP1 Pick-Up Wiring Details

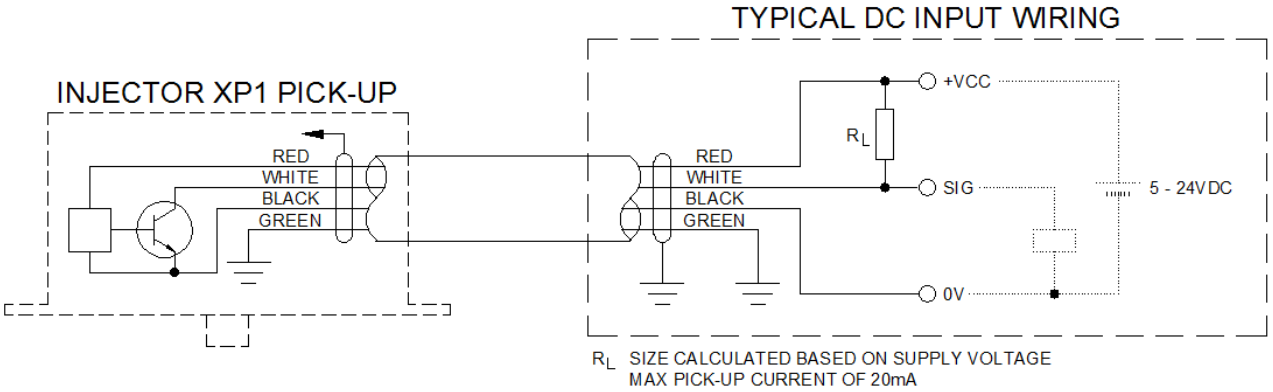


Figure I.1b FLOBLOCK XP1 Pick-Up wiring to Sourced DC Input

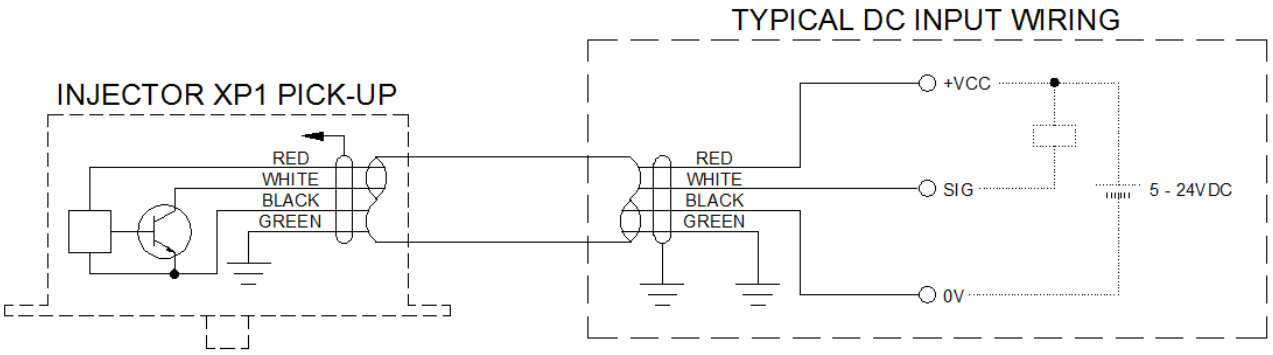


Figure I.1c FLOBLOCK XP1 Pick-Up wiring to Unsourced DC Input

I.2 FLOBLOCK HONEYWELL PICK-UP WIRING DETAILS

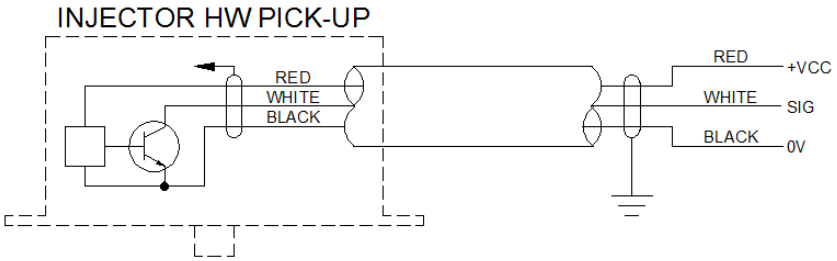


Figure I.1a FLOBLOCK Honeywell Pick-Up Wiring Details

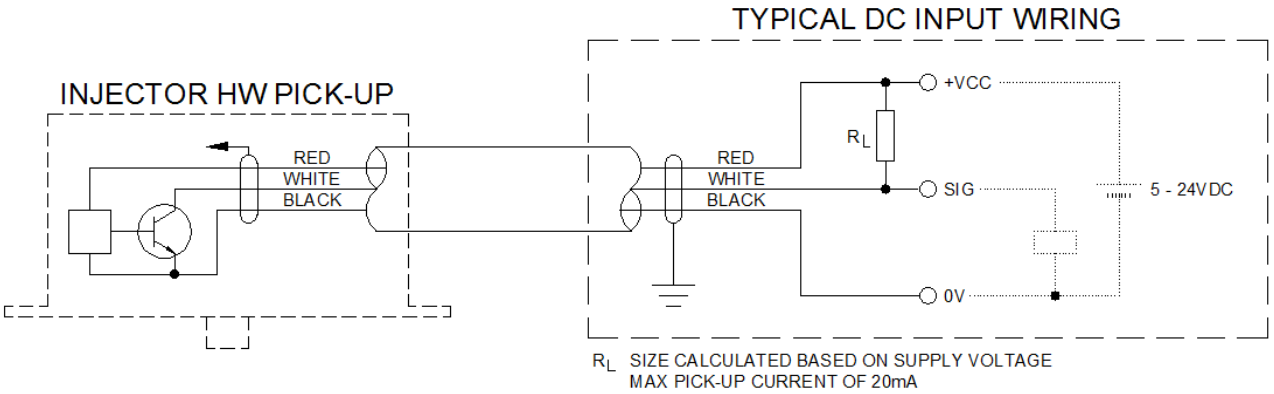


Figure I.1b FLOBLOCK Honeywell Pick-Up wiring to Sourced DC Input

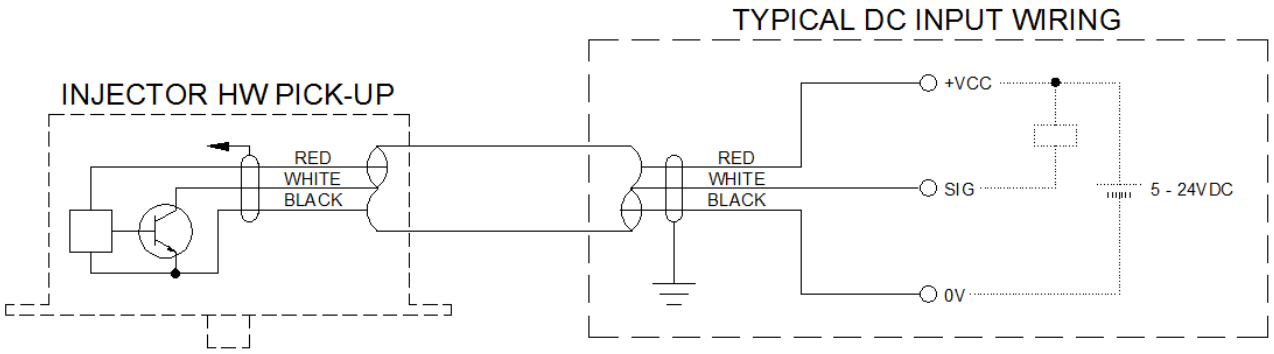


Figure I.1c FLOBLOCK Honeywell Pick-Up wiring to Unsourced DC Input

Flotech | ADDITIVE SOLUTIONS

PERFORMANCE SYSTEMS

Flotech Performance Systems Ltd

Unit 2 Salterns Lane Industrial Estate

Fareham, Hampshire,

UK, PO16 0SU

e: sales@flotechps.com

t: +44(0)1329 284145

w: www.flotechps.com