Flo-tech™

Activa™, Ultima, Classic and Quad Turbine Flow Sensors

Installation & Operating Instructions

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I. INTRODUCTION

Flo-tech turbine flow sensors measure the flow rate of hydraulic fluid and compatible liquids. Built to withstand rigorous hydraulic applications, these flow sensors are available in anodized aluminum and zinc plated Stressproof® steel bodies. Port types vary by body material, but include a choice of SAE, BSPP, Code 61 and Code 62, 4-bolt flanged options.

Typical applications for the turbine flow sensors include:

- Fluid characteristic measurement on test stands
- Stationary hydraulic system monitoring
- Feedback for hydraulic system control
- Advance warning of impending component failure
- Mobile hydraulic system diagnosis

Flo-tech offers four different flow sensor models. Each of these models is available in a wide selection of flow ranges and port sizes.

Activa™ Sensor Array

Features:

- Four flow ranges
- Four port sizes
- Accuracy of ±1% reading @ 32 cSt
- Pressures up to 5800 PSI (400 Bar)
- Temperatures up to 300 °F (150 °C)
- 4-20 mA or 0-5 VDC output for flow
- 4-20 mA output for pressure and temperature

Classic Flow Sensor

Features:

- Eight flow ranges
- Eight port sizes
- Accuracy of ±1% full scale
- Pressures up to 6000 PSI (414 Bar)
- Temperatures up to 300 °F (150 °C)
- Frequency output for flow

Ultima Sensor Array

Features:

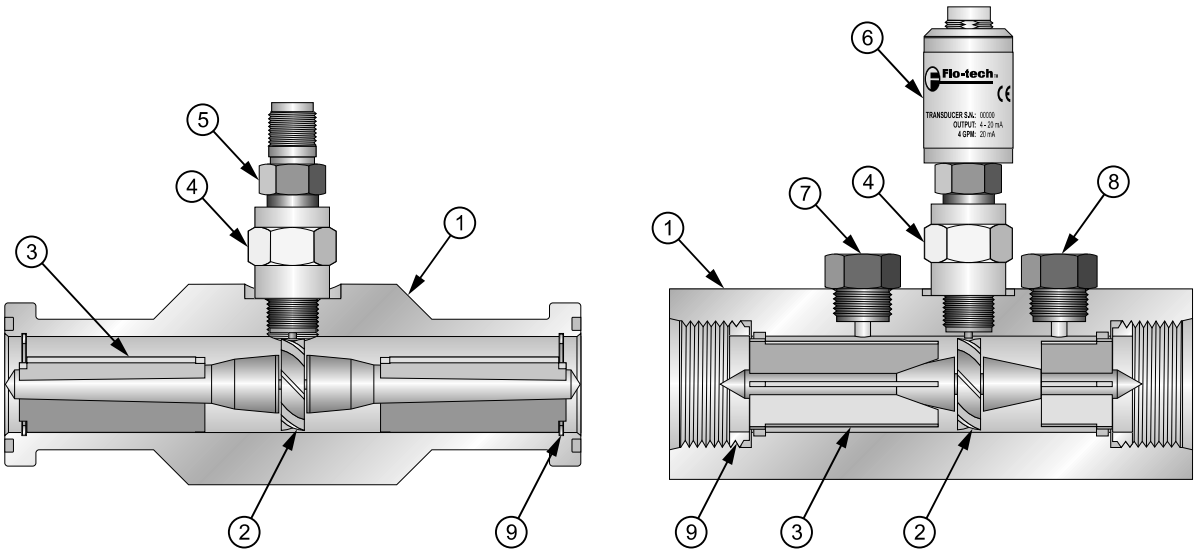
- Four flow ranges
- Four port sizes
- Accuracy of ±1% full scale
- Pressures up to 5800 PSI (400 Bar)
- Temperatures up to 300 °F (150 °C)
- Frequency output for flow
- 4-20 mA output for pressure and temperature

Quad Flow Sensor

Features:

- Four flow ranges
- Two port sizes
- Accuracy of ±1% full scale
- Pressures up to 6000 PSI (414 Bar)
- Temperatures up to 300 °F (150 °C)
- Frequency output for flow

II. OPERATING PRINCIPLE



1 – Housing
2 – Turbine Rotor
3 – Rotor Supports
4 – Lock Nut
5 – Magnetic Pick-up (frequency output)
6 – Signal Converter (analog output)
7 – Pressure Port Adapter
8 – Temperature Port Adapter
9 – Retaining Rings

Turbine flow sensors measure the flow rate of hydraulic fluid and compatible liquids. As fluid flows through the sensor it turns the turbine rotor, and as the turbine blades pass the magnetic pick-up a frequency signal is generated. This frequency signal is proportional to the flow rate and can be transmitted to Flo-tech's digital displays or converted to an analog output. Optional sensors allow measurement of pressure and temperature.

III. SPECIFICATIONS

Activa™ and Ultima Sensor Arrays

Material

Housing:	6013-T651 Anodized aluminum
Turbine Rotor:	T416 Stainless steel
Rotor Supports:	6061-T6 Aluminum, C360 Brass for ¼" models
Rotor Shaft:	T303 Stainless steel
Ball Bearings:	440 C Stainless steel
Hub Cones:	6061-T6 Aluminum alloy
Retaining Rings:	6061-T6 Aluminum alloy
Adapters/Plugs:	6061-T6 Anodized aluminum
Seals:	Buna N standard Viton® and EPR optional
Magnetic Pick-up:	
Body	12L14 Steel, electroless nickel finish
Nut	12L14 Steel, electroless nickel finish
IFC (Intelligent Frequency Converter), Activa only:	
Body	6061-T6 Aluminum, nickel plate
Connector	Brass, nickel plate
Temperature Probe:	12L14 Steel, electroless nickel finish
Pressure Sensor:	
Case	300 Series stainless steel
Diaphragm	17-4 PH stainless steel
Ports:	SAE Straight thread O-ring boss, female, J1926/1; ISO1179 (BSPP)

Dimensions See Appendix, page 16

Performance

Flow Accuracy:	
Activa	±1% of reading @ 32 cSt
Ultima	±1% of full scale
Repeatability:	±0.2%
Pressure Rating:	5800 PSI (400 Bar) maximum, 5000 PSI (345 Bar) maximum for 1-¼" models
Pressure Drop:	See Δ P charts on page 17
Turbine Response:	≤200 ms
Fluid Temperature:	-4 to +300 °F (-20 to +150 °C)
Ambient Temperature:	-4 to +131 °F (-20 to +55 °C)

Electrical

Activa	**4-20 mA**	**0-5 VDC**
Power:	Loop-powered, 6V insertion loss max 10-30 VDC supply	10-26 VDC
Inputs:	Mag pick-up	Mag pick-up
Frequency	0-3500 Hz	0-3500 Hz
Trigger Sensitivity	30 mV p-p	30 mV p-p
Freq Meas Accuracy	±1%	±1%
Analog Out:	4-20 mA current loop	0-5 VDC
Resolution	1:4000	1:4000
Temp Drift	50 ppm/°C max	50 ppm/°C max
Environmental:		
Ambient Temp	-22 to +158 °F (-30 to +70 °C)	-22 to +158 °F (-30 to +70 °C)
Humidity	0-90% non-condensing	0-90% non-condensing

Ultima

Magnetic Pick-up:	Self-generating alternating pulse; 100 mV RMS (100 Hz) minimum,
F6202 & F6222 only	10 mV RMS (200Hz) minimum

Calibration

Flow sensors are calibrated with 0.876 specific gravity, 140 SUS (32 cSt) hydraulic oil. Standard calibration is done using 3-points and is traceable to NIST, ISO 9001/ANSI Z540-1 & MIL-STD 45662A.

Model Number Information

Nominal Port Size	Flow Rate	Model	IFC Converter or Mag Pick-up	Seals	Sensor Ports	
					Temperature	Pressure
SAE 8	0.4 - 7 GPM	**F6202**	**Activa Models:** **AI** 4-20 mA Out **AV** 0-5 VDC Out **Ultima Models:** **F** Frequency Out	**B** Buna N **V** Viton **E** EPR	**T** with Sensor **N** ¼ NPT(F) Plugged **S** SAE 2 Plugged **G** G ¼ Plugged **D** SAE 4 Plugged	**1** 1000 PSI **3** 3000 PSI **5** 5000 PSI **6** 6000 PSI * **N** ¼ NPT(F) Plugged **S** SAE 2 Plugged **F** G ¼ Plugged * Not available with Models F6208 or F6228
SAE 12	2 - 40 GPM	**F6204**				
SAE 16	4 - 80 GPM	**F6206**				
SAE 20	8 - 160 GPM	**F6208**				
G ¼	1.5 - 26 LPM	**F6222**				
G ¾	7.5 - 151 LPM	**F6224**				
G 1	15 - 302 LPM	**F6226**				
G 1-¼	30 - 605 LPM	**F6228**				

Examples:

F6204-AIB-T6 = SAE 12 ports, 2-40 GPM flow range
Buna N seals, Temperature sensor
6000 PSI (414 Bar) pressure sensor

F6208-FV-TN = SAE 20 ports, 8-160 GPM flow range
Viton seals, Temperature sensor
1/4 NPT (F) plugged pressure port

Classic Flow Sensors

Material

Housing:	
FSC, FSB	6013-T651 Anodized aluminum
FSD	Stressproof® steel, zinc plate
Turbine Rotor:	T416 Stainless steel
Rotor Supports:	
FSC-375, 500, 750	C360 Brass
FSC-1000, 1005	6061-T6 Aluminum
FSD	Tungsten carbide
Rotor Shaft:	
FSC, FSB	T303 Stainless steel
FSD	Tungsten carbide
Bearings:	
FSC, FSB	440 C Stainless steel ball bearings
FSD	Tungsten carbide
Hub Cones:	
FSC, FSB	6061-T6 Aluminum alloy
Retaining Rings:	
FSC	T303 Stainless steel
FSC-500, 750, 1000, 1005;	
FSB; FSD	Steel, zinc plate
Adapters/Plugs:	6061-T6 Anodized aluminum
Seals:	Buna N standard
	Viton® and EPR optional
Magnetic Pick-up:	
Body	12L14 Steel, electroless nickel finish
Nut	12L14 Steel, electroless nickel finish
IFC (Intelligent Frequency Converter):	
Body	6061-T6 Aluminum, nickel plate
Connector	Brass, nickel plate

Ports:
SAE Straight thread O-ring boss, female, J1926/1;
Code 61 and Code 62: SAE J518

Dimensions See Appendix, page 16

Performance

Flow Accuracy:	
Standard Magnetic Pick-up	±1% of full scale
IFC Converter Option	±1% of reading @ 32 cSt
Repeatability:	±0.2%
Pressure Rating:	
FSC, FSB	5000 PSI (345 Bar) maximum,
FSD	6000 PSI (414 Bar) maximum
Pressure Drop:	See Δ P charts on page 17
Turbine Response:	≤200 ms
Fluid Temperature:	-4 to +300 °F (-20 to +150 °C)
Ambient Temperature:	-4 to +131 °F (-20 to +55 °C)

Electrical

Magnetic Pick-up: Self-generating alternating pulse; 100 mV RMS (100 Hz) minimum,
FSC-375 only: 10 mV RMS (200 Hz) minimum

IFC Converter:	**4-20 mA**	**0-5 VDC**
Power:	Loop-powered, 6V insertion loss max 10-30 VDC supply	10-26 VDC
Inputs:	Mag pick-up	Mag pick-up
Frequency	0-3500 Hz	0-3500 Hz
Trigger Sensitivity	30 mV p-p	30 mV p-p
Freq Meas Accuracy	±1%	±1%
Analog Out:	4-20 mA current loop	0-5 VDC
Resolution	1:4000	1:4000
Temp Drift	50 ppm/°C max	50 ppm/°C max
Environmental:		
Ambient Temp	-22 to +158 °F (-30 to +70 °C)	-22 to +158 °F (-30 to +70 °C)
Humidity	0-90% non-condensing	0-90% non-condensing

Calibration

Flow sensors are calibrated with 0.876 specific gravity, 140 SUS (32 cSt) hydraulic oil. Standard calibration is done using 3-points and is traceable to NIST, ISO 9001/ANSI Z540-1 & MIL-STD 45662A.

Model Number Information

Nominal Port Size	Flow Rate	Series	Model with Frequency Out	Model with 4 - 20 mA Out	Model with 0 - 5 Vdc Out
SAE 8	0.4 - 7 GPM	FSC-375	**F2945-ASCM**	**F2945-ASCI**	**F2945-ASCV**
SAE 12	1 - 15 GPM	FSC-500	**F2082-ASCM**	**F2082-ASCI**	**F2082-ASCV**
SAE 12	2 - 25 GPM	FSC-750	**F2083-ASCM**	**F2083-ASCI**	**F2083-ASCV**
SAE 16	3 - 60 GPM	FSC-1000	**F2084-ASCM**	**F2084-ASCI**	**F2084-ASCV**
SAE 16	4 - 85 GPM	FSC-1005	**F2084-ASCM8**	**F2084-ASCI8**	**F2084-ASCV8**
SAE 20, Code 61	5 - 100 GPM	FSB-1250	**F2085-ASBM**	**F2085-ASBI**	**F2085-ASBV**
SAE 24, Code 61	7 - 200 GPM	FSB-1500	**F2086-ASBM**	**F2086-ASBI**	**F2086-ASBV**
SAE 20, Code 62	5 - 100 GPM	FSD-1250	**F2085-SCDM**	**F2085-SCDI**	**F2085-SCDV**
SAE 24, Code 62	7 - 200 GPM	FSD-1500	**F2086-SDCM**	**F2086-SCDI**	**F2086-SCDV**
SAE 32, Code 62	10 - 350 GPM	FSD-2000	**F2998-SCDM**	**F2998-SCDI**	**F2998-SCDV**

Quad Flow Sensors

Material

Housing:	6013-T651 Anodized aluminum
Turbine Rotor:	T416 Stainless steel
Rotor Supports:	6061-T6 Aluminum
Rotor Shaft:	T303 Stainless steel
Bearings:	440 C Stainless steel ball bearings
Hub Cones:	6061-T6 Aluminum alloy
Retaining Rings:	Steel, zinc plate
Seals:	Buna N standard Viton® and EPR optional
Magnetic Pick-up:	
Body	12L14 Steel, electroless nickel finish
Nut	12L14 Steel, electroless nickel finish

Ports: SAE Straight thread O-ring boss, female, J1926/1;

Dimensions See Appendix, page 16

Performance

Flow Accuracy:	±1% of full scale
Repeatability:	±0.2%
Pressure Rating:	5000 PSI (345 Bar) maximum,
Pressure Drop:	See Δ P charts on page 17
Turbine Response:	≤200 ms
Fluid Temperature:	-4 to +300 °F (-20 to +150 °C)
Ambient Temperature:	-4 to +131 °F (-20 to +55 °C)

Electrical

Magnetic Pick-up: Self-generating alternating pulse; 100 mV RMS (100 Hz) minimum

Calibration

Flow sensors are calibrated with 0.876 specific gravity, 140 SUS (32 cSt) hydraulic oil. Standard calibration is done using 3-points and is traceable to NIST, ISO 9001/ANSI Z540-1 & MIL-STD 45662A.

Model Number Information

Nominal Port Size	Flow Rate	Series	Model
SAE 12	1 - 15 GPM	FSC-2005	**F2082-ASCQ4**
SAE 12	2 - 25 GPM	FSC-2075	**F2083-ASCQ4**
SAE 16	3 - 60 GPM	FSC-2100	**F2084-ASCQ4**
SAE 16	4 - 85 GPM	FSC-2150	**F2085-ASCQ4**

IV. INSTALLATION

⚠ CAUTION

This product should be installed and serviced by technically qualified personnel trained in maintaining industrial class flow instrumentation and processing equipment.

⚠ CAUTION

Read instructions thoroughly before installing the flow sensor. If you have any questions regarding product installation or maintenance, call your local supplier or the factory for more information.

⚠ WARNING

Do not use male pipe threads (NPT) into SAE straight thread ports. Using male pipe threads (NPTF) with a flow sensor possessing SAE straight thread O-ring ports will not create a proper seal and is potentially dangerous. Pipe threads inserted into an SAE straight thread port only allow the engagement of one or two threads. No amount of tightening or thread seal will stop the leaking or make the installation safe. Failure to follow these instructions could result in serious personal injury or death and/or damage to the equipment.

Installation Recommendations

The in-line flow sensor is a simple device to install. However, the following measures are recommended for reliable, trouble-free operation:

DO - Provide at least 10 port diameters of upstream straight pipe with no obstructions to the flow sensor and at least 5 diameters of downstream pipe. The pipe should be of the same diameter as the nominal port size.

Example:
An FSC-1000 has a one inch (25.4 mm) port. The unobstructed upstream length should be at least 10 inches (254 mm) and the downstream length should be at least 5 inches (127 mm).

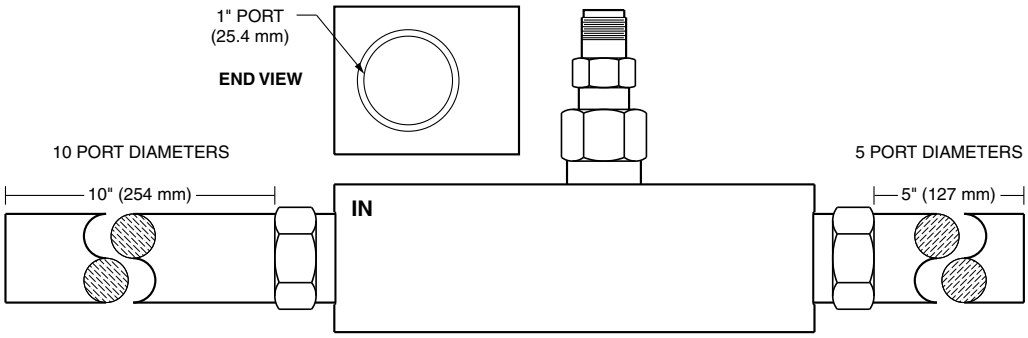


FIGURE 1
Upstream and Downstream Pipe Diameters

DO - Choose a position for the flow sensor that will not be at the lowest level in the system. Placing the flow sensor at a higher elevation in the system will avoid collection of debris, sediment and dirt in the flow sensor.

DO - Use a filter. All applications should be filtered to at least 40 micron.

DON'T - Locate a flow sensor directly in-line with the outlet of a pump, as pressure pulsations can react with the turbine. Locate the sensor after another component, observing the 10 port diameter rule.

DON'T - Adjust the magnetic pick-up on the flow sensor. This is calibrated at the factory. Further adjustment will cause a decrease in performance or damage to the sensor.

DON'T - Exceed the working temperature range of –4 °F to +300 °F (–20 °C to +150 °C). Higher temperatures will damage the magnetic pick-up and lower temperatures will limit the rotation of the turbine.

Electrical Connections - Standard Magnetic Pick-up

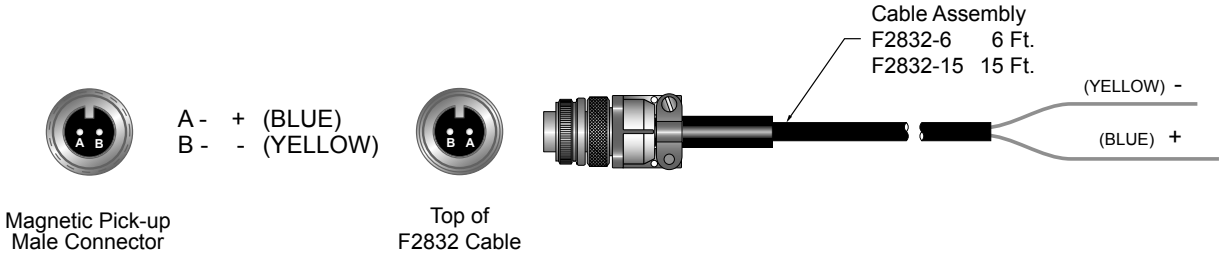


FIGURE 2
Standard Magnetic Pick-up with Frequency Output – 2-pin Connector

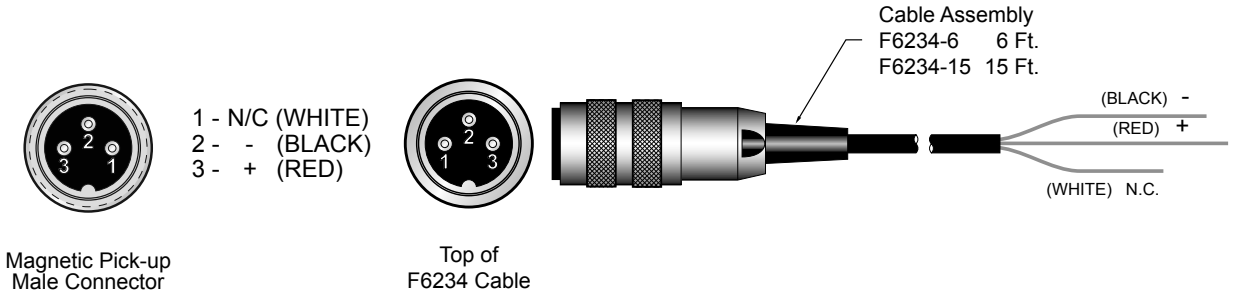


FIGURE 3
Standard Magnetic Pick-up with Frequency Output – 3-pin Connector

Electrical Connections - IFC (Intelligent Frequency Converter)

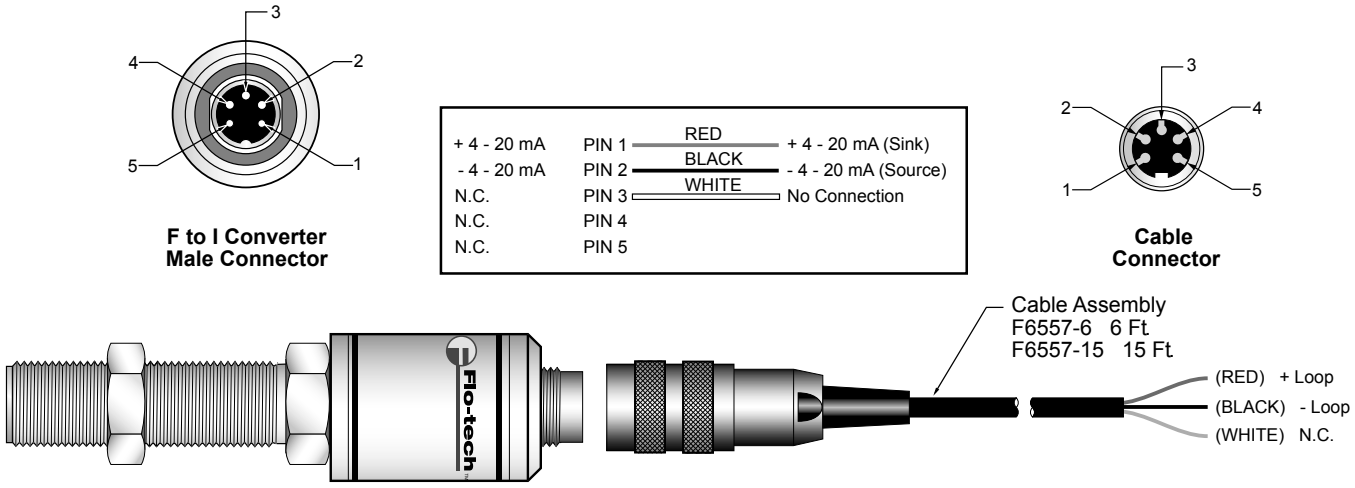


FIGURE 4

IFC with 4-20 mA Output (F to I) – 5-pin Connector

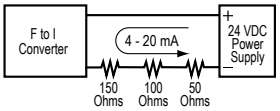
The 4-20 mA output can drive auxiliary devices (resistive loads) such as displays, recorders and computers, provided that the voltage supplied by the power supply is adequate. Devices must be wired in series with the F to I converter and power supply. The voltage drop across the load(s) and the 6 Vdc minimum needed to drive the F to I converter determine the minimum voltage required from the power supply.

Determine the necessary voltage required to adequately drive the F to I converter and auxiliary device(s).

The F to I converter acts as a current controlling device. Thus, the current output remains the same even if the power supply voltage fluctuates or the load resistance changes. The current varies only with respect to the flow rate from the turbine flow sensor, as long as the voltage drop across the F to I converter is at least 6 Vdc.

The load(s) in the circuit will generally have some electrical resistance, 100 Ohms for this example. The 4-20 mA loop current will produce a voltage drop across each load. The maximum voltage drop across a load(s) will exist when the loop current is 20 mA. The power supply must provide enough voltage for the load(s) plus the 6 Vdc minimum insertion loss of the F to I converter.

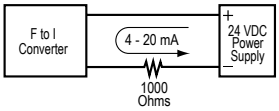
Example 1
Sufficient Power Supply Voltage



Total Load Resistance = 300 Ohms
At 20 mA loop current, the voltage drop across the load(s) is 6 volts:
300 Ohms × 20 mA = 6,000 mV or 6 volts

Subtract 6 volts from the 24 volt source to determine that 18 volts is available to power the F to I converter. The 18 volts is within the specified 10 to 30 volt range and is sufficient to power the F to I converter.

Example 2
Insufficient Power Supply Voltage



Total Load Resistance = 1000 Ohms
At 20 mA loop current, the voltage drop across the load(s) is 14 volts:
1000 Ohms × 20 mA = 20,000 mV or 20 volts

Subtract 20 volts from the 24 volt source to determine that 4 volts is available to power the F to I converter. The 4 volts is below the specified 10 to 30 volt range and is not adequate to power the F to I converter. If for example, the power supply voltage was 30 volts instead of 24 volts, the voltage available to power the F to I converter would be 10 volts and within the specified range.

FIGURE 5

Power Supply Voltage Examples

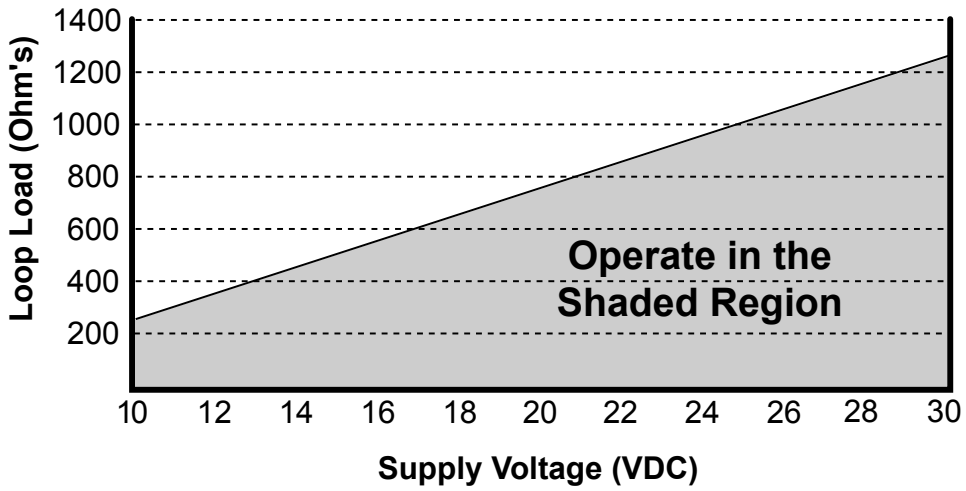


FIGURE 6
Loop Resistance Chart

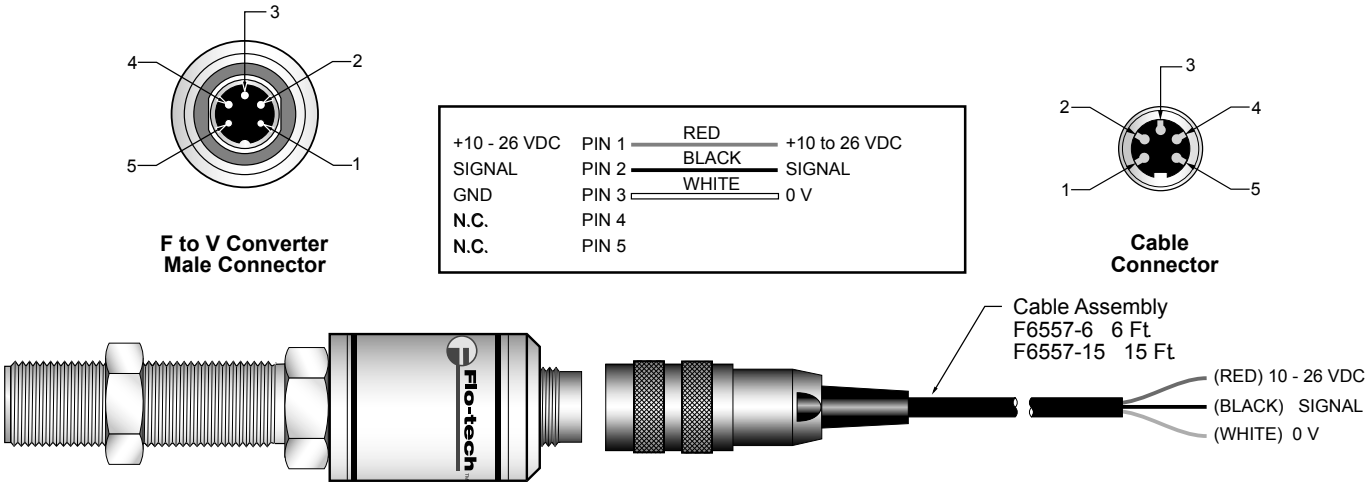


FIGURE 7
IFC with 0-5 Vdc Output (F to V) – 5-pin Connector

Electrical Connections - Optional Pressure and Temperature Sensors

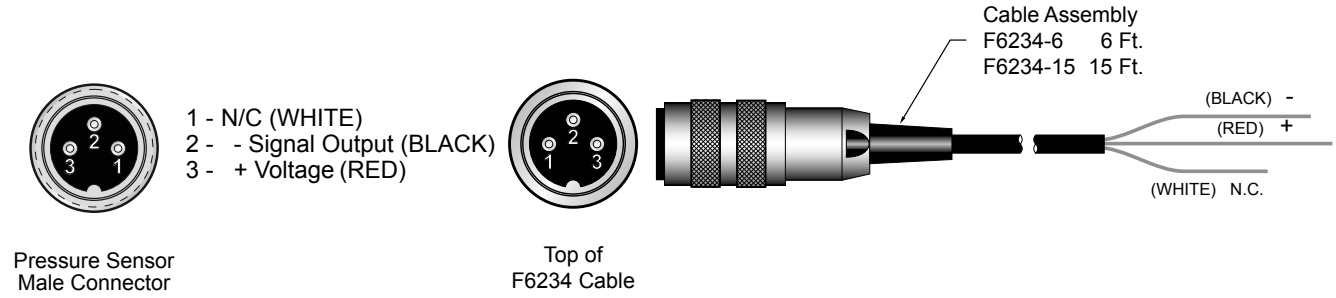


FIGURE 8
Pressure Sensor, Optional – 3-pin Connector

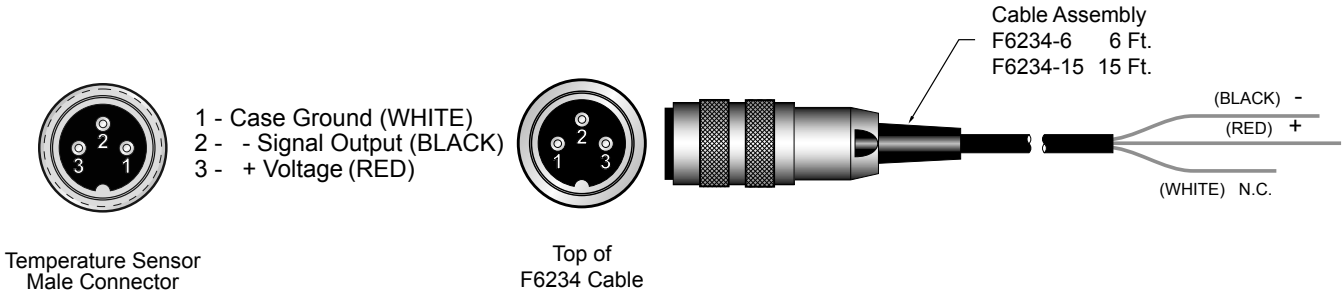


FIGURE 9
Temperature Sensor, Optional – 3-pin Connector

V. OPERATION

General

WARNING

Do not exceed allowable pressure ratings. Pressure in excess of the maximum allowable ratings may cause the turbine body to fail. Failure to follow these instructions could result in serious personal injury or death and/or damage to the equipment.

DO - Allow fluids to warm to operating temperatures before critical measurements are taken.

DO - Maintain a flooded condition in the flow sensor at all times. Air and turbulence will result in erroneous readings.

DON'T - Exceed the working temperature range of –4 °F to +300 °F (–20 °C to +150 °C). Higher temperatures will damage the magnetic pick-up and lower temperatures will limit the rotation of the turbine.

Flow Sensors with IFC Option

As soon as power is applied, the IFC will begin to output an analog value representative of the measured frequency from the turbine meter.

Refer to the wiring diagram that corresponds to the IFC being utilized. See pages 11 and 12.

VI. MAINTENANCE

WARNING

Always disconnect the primary power source before inspection or service. Failure to follow these instructions could result in serious personal injury or death and/or damage to the equipment.

1. A schedule for maintenance checks should be determined based upon environmental conditions and frequency of use. Inspect at least once a year.
2. Perform visual, electrical and mechanical checks on all components.
   a. Visually check for undue heating evidenced by discoloration of wires or other components, damaged or worn parts, or excessive corrosion of the device.
   b. Electrically check to make sure that all connections are clean and tight and that the device is operating properly.

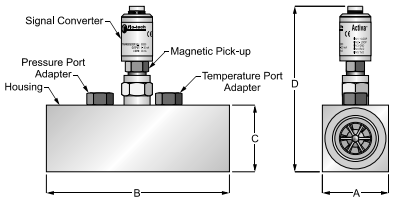
VII. TROUBLESHOOTING

TROUBLE	POSSIBLE CAUSE	REMEDY
Sensor indicates higher than actual flow rate	• Cavitation • Debris on straightening section • Build-up of foreign material on sensor bore • Gas in liquid	• Increase back pressure • Clean sensor • Clean sensor • Install gas eliminator ahead of sensor
Sensor indicates lower than actual flow rate	• Debris on turbine • Worn bearing	• Clean sensor and add filter • Have sensor serviced and add filter
Erratic indications on readout	• Any of the above • Ground loop problem • Turbulence in fluid stream	• Any of the above • Be sure only one system ground is present. Reroute cables away from electrical noise • Redo plumbing per instructions
Readout shows flow when pumps are not running	• Mechanical vibration or pump dither causes turbine to oscillate even though there is no flow	• Isolate flow sensor
No flow indication at any flow rate	• Foreign material stopping turbine rotation • Damaged turbine and/or bearing • Magnetic pick-up stopping turbine rotation • Magnetic pick-up shorted or open	• Clean sensor and add filter • Have sensor serviced • Readjust magnetic pick-up away from turbine • Have magnetic pick-up replaced
Erratic indications at low flows, but good indications at high flows	• Foreign material wrapped around turbine	• Clean sensor and add filter
System works except readings are lower than expected	• Flow is being bypassed • System has a leak	• Repair or replace faulty valves • Find and repair any system leaks
No current output	• Low or missing supply voltage • Broken / disconnected wires • Incorrect wiring polarity	• Check polarity of the current loop connections for proper orientation • Make sure receiving device is configured to provide loop current
Analog output reads a constant reading all the time	• Electrical noise in vicinity • Damaged electronics	• Make sure there is flow in the system • Verify that the rotor inside the turbine meter turns freely • Check shield • Remove noise producing device
Analog output is not stable	• Electrical noise in vicinity • Entrained gas in liquid • Damaged meter rotor • Foreign matter lodged in turbine	• External noise is being picked up by the sensor. Keep all AC wires separate from DC wires. • Check for radio antenna in close proximity. This usually indicates a weak signal. • Clean meter • Recalibrate meter

VIII. APPENDIX

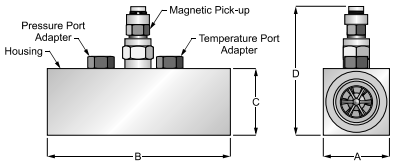
Dimensions

Activa Series



SERIES	A WIDTH IN (mm)	B LENGTH IN (mm)	C HEIGHT IN (mm)	D HEIGHT IN (mm)	WEIGHT LBS (KG)
F6202 / F6222	1.23 (31.2)	4.72 (120.0)	1.47 (37.3)	5.74 (145.6)	1.60 (0.73)
F6204 / F6224	1.48 (37.6)	5.08 (129.0)	1.80 (45.7)	6.04 (153.0)	1.90 (0.86)
F6206 / F6226	1.98 (50.3)	5.87 (149.0)	2.20 (56.0)	6.50 (164.0)	2.80 (1.27)
F6208 / F6228	2.46 (62.5)	6.81 (173.0)	2.48 (63.0)	6.74 (171.0)	4.20 (1.91)

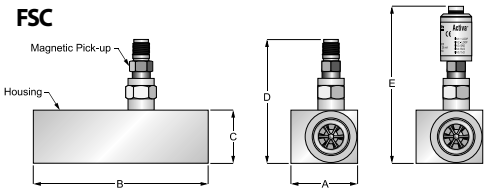
Ultima Series



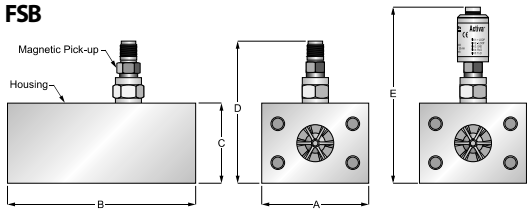
SERIES	A WIDTH IN (mm)	B LENGTH IN (mm)	C HEIGHT IN (mm)	D HEIGHT IN (mm)	WEIGHT LBS (KG)
F6202 / F6222	1.23 (31.2)	4.72 (120.0)	1.47 (37.3)	5.74 (145.6)	1.60 (0.73)
F6204 / F6224	1.48 (37.6)	5.08 (129.0)	1.80 (45.7)	6.04 (153.0)	1.90 (0.86)
F6206 / F6226	1.98 (50.3)	5.87 (149.0)	2.20 (56.0)	6.50 (164.0)	2.80 (1.27)
F6208 / F6228	2.46 (62.5)	6.81 (173.0)	2.48 (63.0)	6.74 (171.0)	4.20 (1.91)

Classic Series

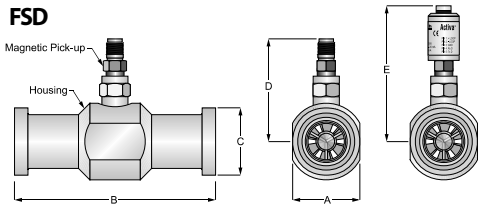
FSC



FSB

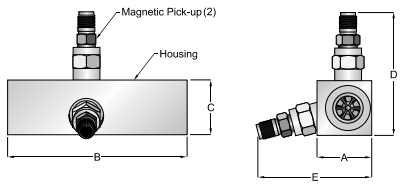


FSD



SERIES	A WIDTH IN (mm)	B LENGTH IN (mm)	C HEIGHT IN (mm)	D W/MAG IN (mm)	E W/IFC IN (mm)	WEIGHT LBS (KG)
FSC-375	1.25 (32)	5.00 (127)	1.50 (38)	3.91 (99)	5.48 (139)	1.25 (0.57)
FSC-500	2.00 (51)	6.50 (165)	2.00 (51)	4.16 (106)	5.84 (148)	2.75 (1.25)
FSC-750	2.00 (51)	6.50 (165)	2.00 (51)	4.25 (108)	5.93 (151)	2.87 (1.30)
FSC-1000	2.50 (64)	6.50 (165)	2.00 (51)	4.34 (110)	5.97 (152)	3.25 (1.48)
FSC-1005	2.50 (64)	6.50 (165)	2.00 (51)	4.34 (110)	5.97 (152)	3.25 (1.48)
FSB-1250	4.00 (102)	7.00 (178)	3.00 (76)	4.94 (126)	6.43 (165)	7.75 (3.52)
FSB-1500	4.00 (102)	7.00 (178)	3.00 (76)	5.10 (130)	6.59 (167)	7.40 (3.36)
FSD-1250	2.12 (54)	7.50 (190)	2.125 (54)	4.50 (114)	5.17 (131)	6.12 (2.78)
FSD-1500	2.50 (64)	7.50 (190)	2.500 (64)	4.85 (123)	5.34 (135)	6.75 (3.06)
FSD-2000	3.12 (79)	8.25 (209)	3.125 (79)	5.39 (137)	5.45 (138)	8.55 (3.88)

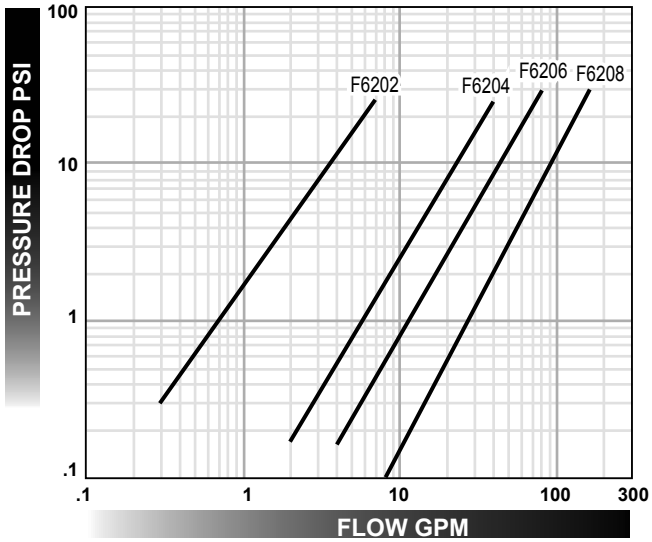
Quad Series

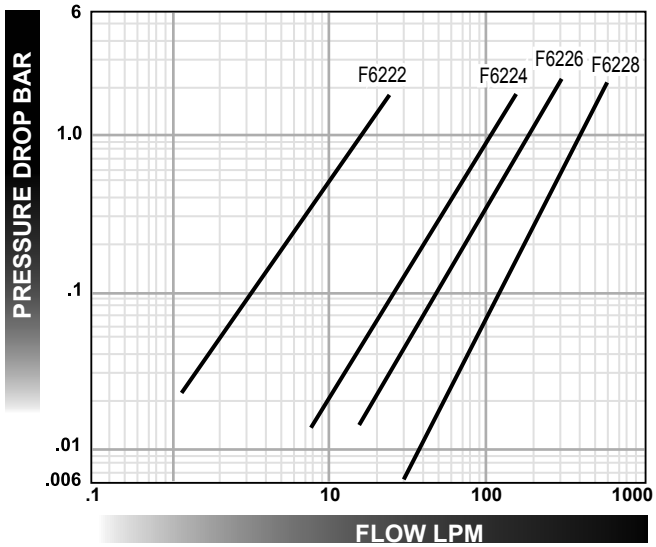


SERIES	A WIDTH IN (mm)	B LENGTH IN (mm)	C HEIGHT IN (mm)	D W/MAG IN (mm)	E W/MAG IN (mm)	WEIGHT LBS (KG)
FSC-2005	2.00 (51)	6.50 (165)	2.00 (51)	4.16 (106)	4.05 (102)	2.75 (1.25)
FSC-2075	2.00 (51)	6.50 (165)	2.00 (51)	4.25 (108)	4.05 (102)	2.87 (1.30)
FSC-2100	2.50 (64)	6.50 (165)	2.00 (51)	4.34 (110)	4.59 (117)	3.25 (1.47)
FSC-2150	2.50 (64)	6.50 (165)	2.00 (51)	4.34 (110)	4.59 (117)	7.75 (3.52)

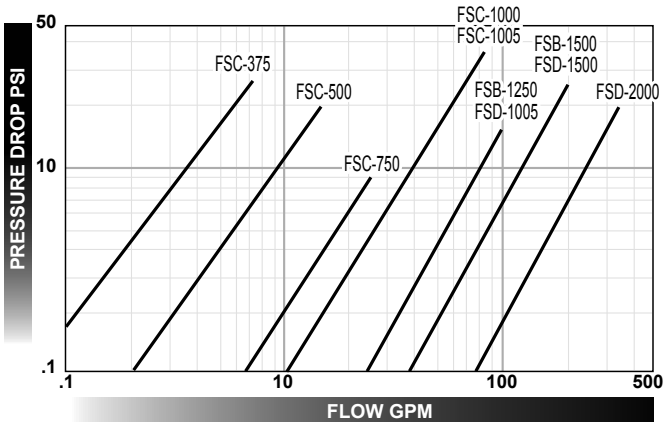
Flow vs Pressure Drop Charts

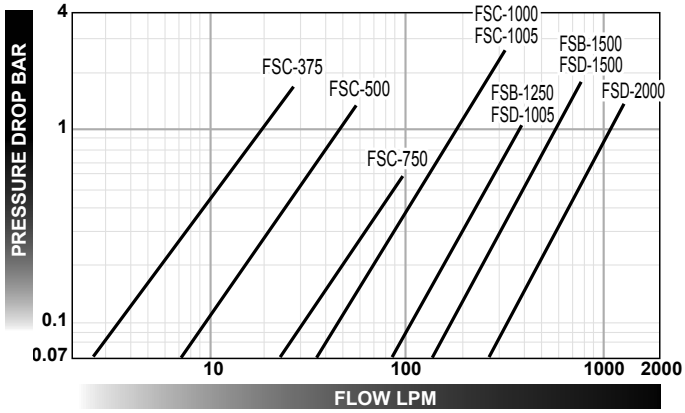
Activa and Ultima Series



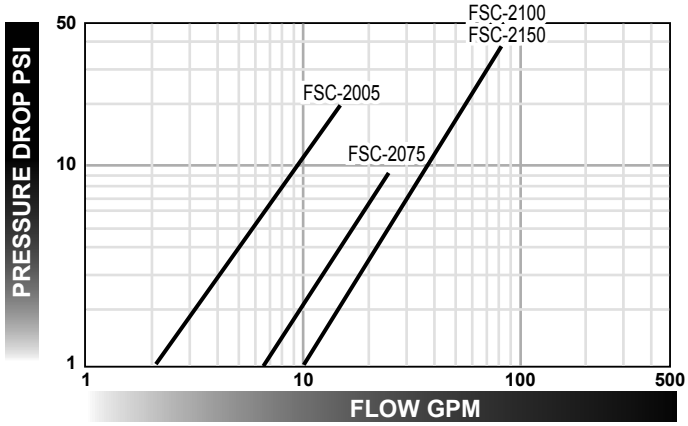


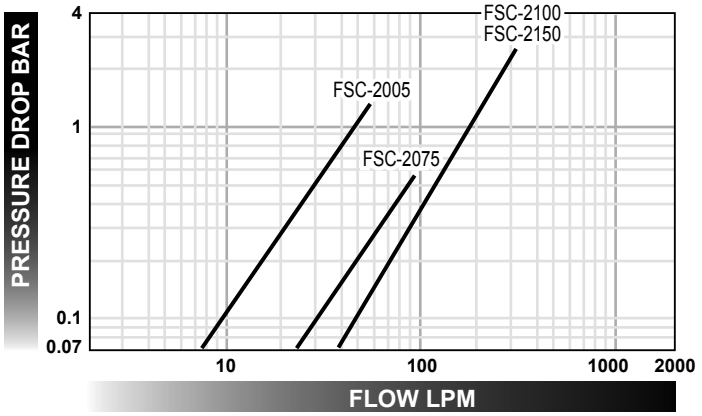
Classic Series





Quad Series





Return Goods Authorization

When returning equipment for service, a Returned Goods Authorization (RGA) number must be obtained from our Service Department. Please contact them by phone at 800-433-5263 or 262-639-6770 or by e-mail to flo-techsales@racinefed.com.

All returns go to the following address and must include the RGA number on the outside of the box:

Flo-tech
Division of Racine Federated Inc.
8635 Washington Avenue
Racine, WI 53406-3738 USA
Attn: RGA # xxx-xxxx

Waste and Electronic Equipment (WEEE) Directive

In the European Union, this label indicates that this product should not be disposed of with household waste. It should be deposited at an appropriate facility to enable recovery and recycling.

For information on how to recycle this product responsibly in your country, please visit:
www.racinefed.com/recycle/

Flo-tech

Division of Racine Federated Inc.

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Flo-tech, Division of Racine Federated Inc. warrants to the end purchaser, for a period of one year from the date of shipment from the factory, that all flow meters manufactured by it are free from defects in materials and workmanship. This warranty does not cover products that have been damaged due to misapplication, abuse, lack of maintenance, or improper installation. Flo-tech's obligation under this warranty is limited to the repair or replacement of a defective product, at no charge to the end purchaser, if the product is inspected by Flo-tech and found to be defective. Repair or replacement is at Flo-tech's discretion. A returned goods authorization (RGA) number must be obtained from Flo-tech before any product may be returned for warranty repair or replacement. The product must be thoroughly cleaned and any process chemicals removed before it will be accepted for return.

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