Fuel Metering for Diesel Engines

Temperature Compensated for Accuracy

Description

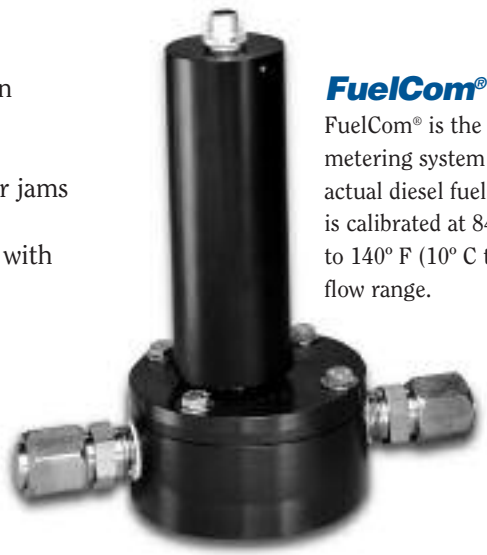
The FuelCom® System is designed to provide accurate and reliable flow measurement of #2 diesel fuel. For net flow applications, the typical system will consist of two flowmeters, two temperature-compensated sensors, and an indicator or data logger to provide net rate and total. The four available sizes are consistent with the ranges needed to provide flow measurement for most large diesel engines (500HP+). Since fuel costs account for the single largest cost of ownership, accurate fuel metering is critical. It is a key indicator of engine performance, it provides the best method for scheduling maintenance, and allows for compliance to environmental regulations. In addition, for engine manufacturers, it may be used as a tool for warranty and service contracts.

Benefits

- Simple to install and maintain
- Only two moving parts means reliability you can count on
- Designed specifically for #2 diesel fuel
- Built-in inlet flow conditioner
- Non-clogging design prevents starving engine if flowmeter jams
- Temperature-compensated to provide the best accuracy
- Withstands vibrations and pressure pulsations associated with diesel engines

Applications

- Users include Caterpiller, EMD, Detroit Diesel, Wartsilla and others
- Engine sizes — 500HP to 6,000HP, typical
- Marine
- Power generation
- Locomotive
- Construction & mining

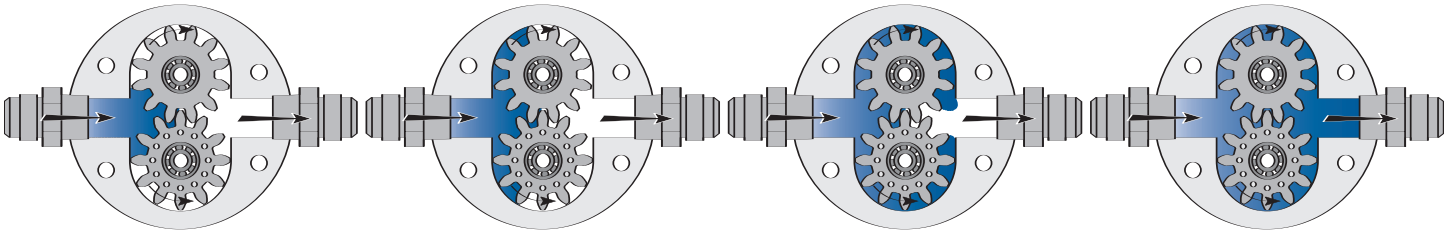


FuelCom®

FuelCom® is the ONLY diesel fuel metering system to be calibrated using actual diesel fuel where each flowmeter is calibrated at 84 data points from 50° F to 140° F (10° C to 70° C) over the full flow range.

Protected by one or more U.S. Patents: 4641522, 4798092, 4815318, 5027653

Principle of Operation



FuelCom® flowmeters use two rotating impellers driven by the flowing fuel. Magnets imbedded in the impellers activate a non-intrusive sensor which generates a pulsed output signal. Each pulse represents a known volume of fuel that is captured between the lobes of the impellers. The current fuel temperature is also measured by the non-intrusive sensor. Both the pulse and temperature data are sent to a microprocessor in the FuelCom FC900 transmitter. The pulse data is then compensated for the temperature effects on the fuel viscosity, thereby providing a highly linearized output signal. The unique design of the FuelCom® flowmeters makes them impervious to pressure pulsations caused by engine fuel injectors.

FuelCom® System

Flowmeter Specs

Standard Operating Fuel Temperature 50° F to 160° F (10° C to 70° C)

Operating Pressure 250psig (1724kPa), standard

Turndown Ratio *(Based on maximum rated flow)* > 7:1 standard

Calibration 50° F to 160° F (10° C to 70° C) #2 Diesel Fuel

Reference Accuracy ±1% of Net Fuel Consumption from 50° F to 160° F (10° C to 70° C) for two-meter system (Supply/Return) Temperature Compensated to 60° F API

Note: Accuracy statement is based on output option "4", RS-485 serial communication and NPN open collector output.

Construction Materials

Flowmeter Body	Anodized Aluminum
Shafts	316 Stainless Steel
Impellers	Teflon® Anodized Aluminum
Ball Bearings	440C
O-ring	Viton®
Shims	300 Series Stainless Steel

Electronic Specs

Supply Voltage

Standard:	12–36 VDC
Remote:	15–32 VDC

Supply Current 150mA @ 15 VDC

Operating Frequency 10–720kHz

Output

4	RS–485C 2-wire serial communication and NPN open collector with pull-up provided, sink up to 100mA
5	4–20mA current loop and NPN open collector with pull-up provided, sink up to 100mA
RT Configuration	RS-232, 4–20mA, 0–5V frequency

Temperature Range

Sensor	3° F to 185° F (-16° C to 85° C)
Cable	-40° F to 212° F (-40° C to 100° C)

Sensor Body Anodized Aluminum

Cable 5-Pin Micro-Change® Connectors, 22 AWG, PVC Jacket

Housing Fiberglass NEMA 4X, UL94V-SV (RT Configuration only)

Output Configuration

The flowrate-spanning range of the 4–20mA output is not user-adjustable. It is set by the factory at the time the calibration parameters are programmed. Factory standard ranges are shown in the table at right. Values differing from these are available.

Optionally, the scaling may be spanned over the range of 3.5mA to 21.5mA.

Please discuss these options when ordering.

Meter Size	4mA	20mA
1/4" (02)	0 gph	180 gph
3/8" (03)	0 gph	360 gph
1/2" (05)	0 gph	500 gph
1" (10)	0 gph	1250 gph

Model Numbering System

Meter Part Number F C ☐ ☐ – ☐ – ☐

Nominal Size
02 = 1/4"
03 = 3/8"
05 = 1/2"
10 = 1"

O-ring Material
1 = Viton®

Fitting Type
1 = SAE 37° Flare w/ integral Flow Conditioner

Integral Transmitter F C 9 0 0 – ☐ – 1

Output Type
4 = RS-485/Open Collector
5 = 4–20mA/Open Collector

Remote Transmitter F C 8 0 0 – 4 – R T

* Includes 2 RS-90-QD Sensors. Cable ordered separately.

Signal Cable 7 5 5 – 7 5 – ☐ ☐ ☐

Connector
7 = Female 5-pin Micro-C
5 = Male 5-pin Micro-C

Connector 2
0 = Bare
5 = Male 5-pin Micro-C
7 = Male 7-pin Micro-C (For use with FC800 Remote Transmitter)

Length
010 = 10 feet
020 = 20 feet
050 = 50 feet
100 = 100 feet
150 = 150 feet
200 = 200 feet

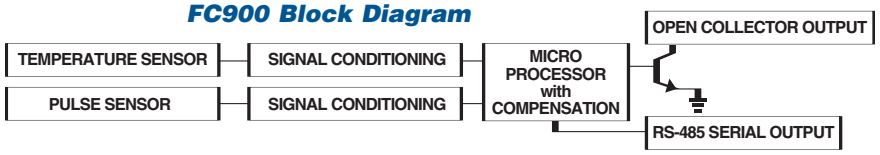
Specifications are for reference only and are subject to change without notice.

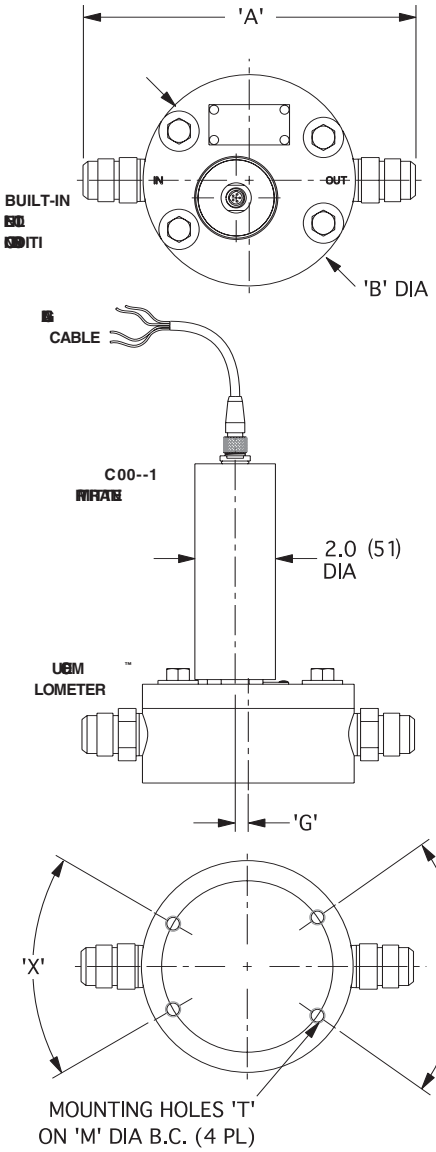
Model Specs.	Fitting Size	Flow Rate gph (L/hr)		Pressure Drop, psig (kPa) @ 50° F (10° C)		Pressure Drop, psig (kPa) @ 160° F (70° C)		Recommended Mesh Size		Weight
	SAE 37° Flare	Minimum	Maximum	@ Max Flow	@ 70% Flow	@ Max Flow	@ 70% Flow	Sieve #	Micron	lbs (kg)
FC02	8	25 (95)	180 (681)	5.6 (39)	2.5 (18)	4.2 (29)	1.6 (11)	100	150	1.8 (0.8)
FC03	10	50 (189)	360 (1363)	5.2 (36)	2.4 (17)	4.1 (28)	1.6 (11)	80	177	2.3 (1.0)
FC05	12	100 (379)	500 (1893)	4.9 (34)	2.4 (17)	3.8 (26)	1.8 (13)	70	210	5.3 (2.4)
FC10	20	200 (757)	1250 (4732)	4.9 (34)	2.8 (20)	3.9 (27)	1.8 (13)	60	250	9.0 (4.1)

Dimensions *inches (mm)*

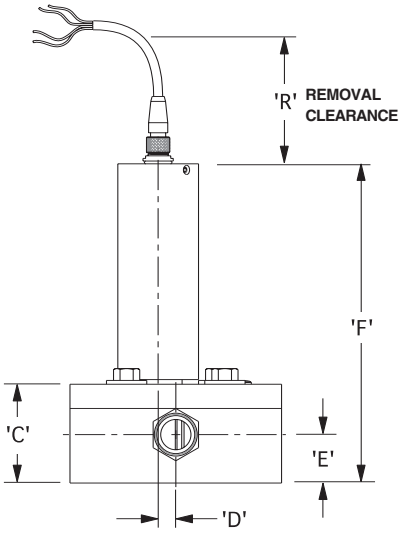
Model	'A'	'B'	'C'	'D'	'E'	'F'	'G'	'M'	'T'	'R'	'X'	'Y'
FC02	6.13 (156)	4.00 (102)	1.47 (38)	0.36 (9)	0.66 (17)	6.94 (176)	0.29 (7)	3.38 (86)	1/4-20UNC x .5 DP	2.5 (64)	80°	90°
FC03	6.71 (170)	4.00 (102)	1.95 (50)	0.43 (11)	0.90 (23)	7.42 (188)	0.37 (9)	3.38 (86)	1/4-20UNC x .5 DP	2.5 (64)	80°	90°
FC05	8.26 (210)	5.25 (133)	2.45 (62)	0.44 (11)	1.20 (30)	7.77 (197)	0.33 (8)	4.25 (108)	3/8-16UNC x .5 DP	2.5 (64)	60°	70°
FC10	9.88 (251)	6.25 (159)	3.15 (80)	0.51 (13)	1.35 (34)	8.27 (210)	0.40 (10)	4.90 (125)	1/2-13UNC x .5 DP	2.5 (64)	60°	70°

FC900 Block Diagram



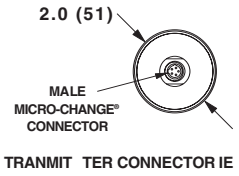


FC900-X-1 Integral Transmitter

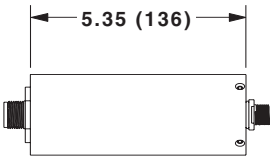


WIRING

Pulse Output		
White	---	Signal
Red	---	(+) VDC in
Black	---	DC Common
Green	---	DC Common
Shield	---	Earth Gnd
RS485 Output		
White	---	(+) RS485
Red	---	(+) VDC in
Black	---	DC Common
Green	---	(-) RS485
Shield	---	Earth Gnd

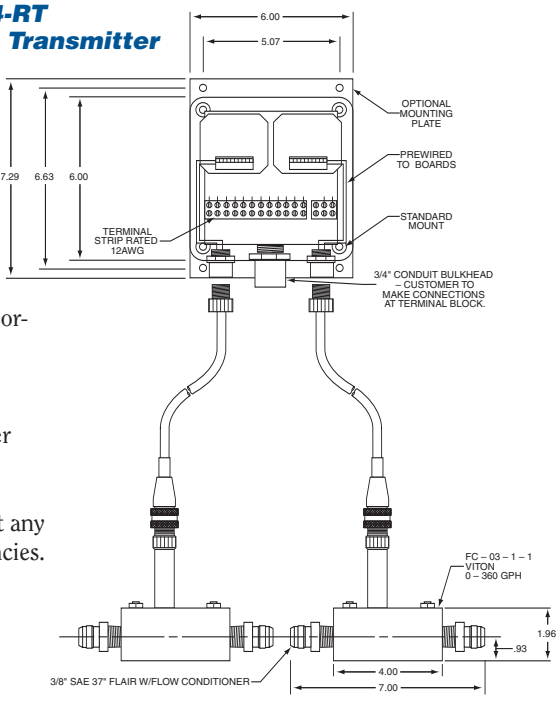


TRANMIT TER CONNECTOR IE



INTEGRAL FLOW TRANSMITTER

FC800-4-RT Remote Transmitter



Other FuelCom® Products

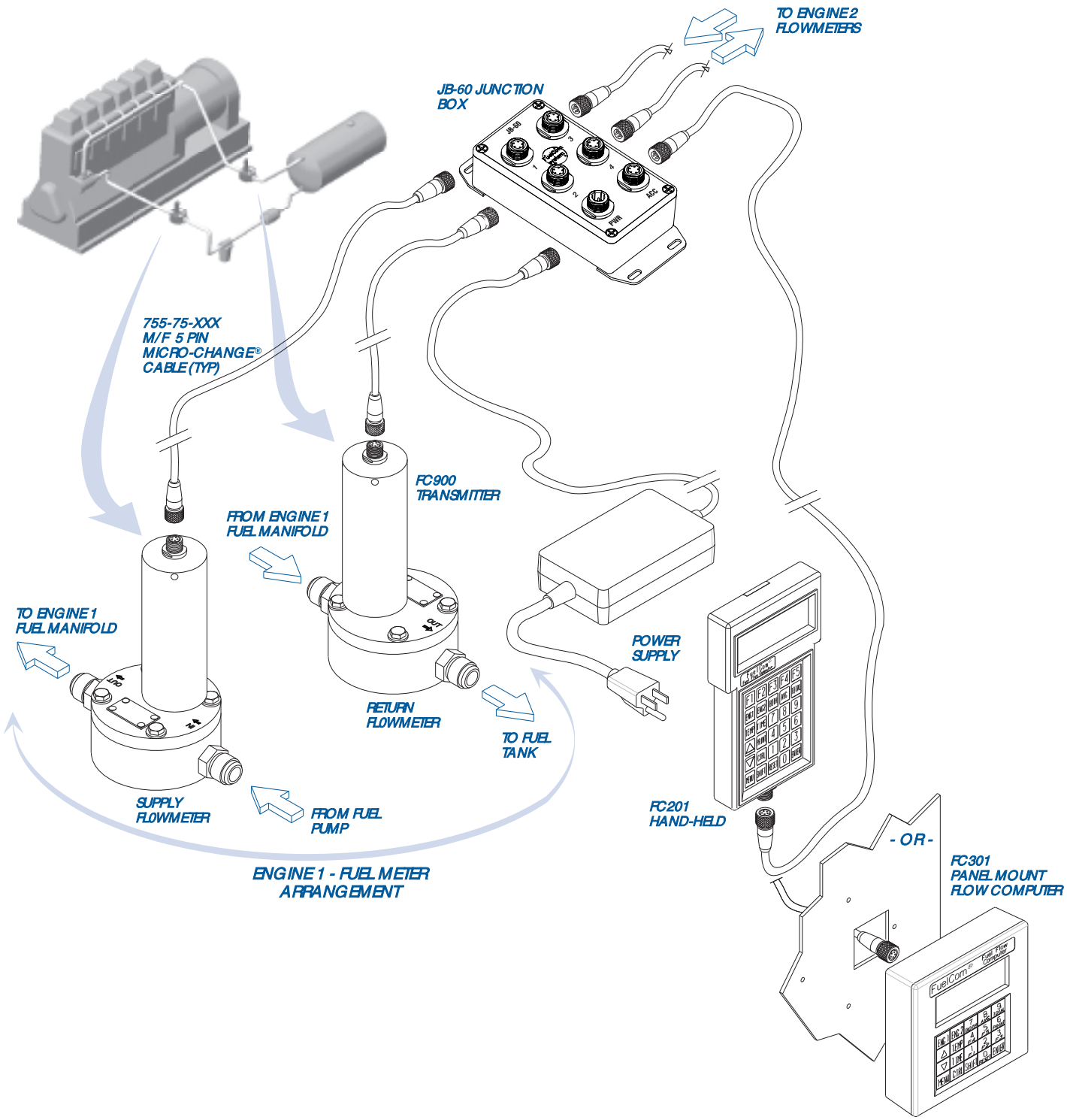
FC201/FC301 Hand-held and Panel-mount Flow Computers: Powerful microprocessor-based flow computers for display and data-logging of up to three engines.

JB-60 RS-485 Serial Communications Junction Box: Custom-designed, fully factory-wired junction box to connect multiple flowmeters to a flow computer and power supply.

PS1/PS2 AC-to-DC and DC-to-DC Power Supplies: Designed to interface with almost any power standard, these power supplies accept a wide range of voltages and frequencies.

FCP Complete FuelCom Portable System: The ultimate in portable precision. A complete FuelCom system — including flowmeters, junction box, flow computer, power supplies (AC and DC) and cables — for one engine, all in a rugged, watertight traveling case.

FuelCom® Fuel Metering System



Local Representative:

8930 S. Beck Avenue, Ste 107, Tempe, Arizona 85284 USA
Tel: (480) 240-3400 • Fax: (480) 240-3401 • Toll Free: 1-800-528-4225
E-mail: ftimarket@ftimeters.com • Web: www.ftimeters.com

DB 65159 Rev C