



Badger Meter

Industrial Flow Computer

FC-5000 Flow Display

DESCRIPTION

The Badger Meter® FC-5000 is a microprocessor-driven device designed for flow monitoring. The FC-5000 Flow Display is configurable to accept outputs from one or two flow meters and is compatible with the complete line of Badger Meter industrial flow meters, creating a solution to monitor flow rate and totals. Many years of experience in the industrial market has allowed Badger Meter to incorporate features indispensable in control operations.

Features	Benefits
Large, backlit graphical display	Enhanced viewing capabilities, near and far from the device
Integrated softkeys and full numerical keypad	Promotes intuitive navigation and programming
Sensor data display screen	View raw and calculated flow data, both to and from the device, including flow data, relay, output and digital I/O statuses
10-point linearization	Electronically corrects for variances in K-factor over the flow meter's usable range
Plug-and-play terminals	Easier, user-friendly installation
User-programmable relay configuration	Enables alarms or totalizing output capabilities for flow rates or totals
User-programmable scaled outputs	Transmit rate and total data via dedicated output channels
Robust enclosure, keypad and mechanical relays	Application ruggedness

PROGRAMMABILITY

Features	Programming Options
Digital I/O	Reset relays, totals or both remotely via the 6 available I/O ports.
Scaled Outputs	Fully configurable outputs that can be assigned to rates or totals.
Relay Outputs	Fully configurable relays that can be assigned to rates or totals as either a totalizing output or alarm indication. Option to enable/disable latching functionality.
Display Properties	Adjustable contrast and brightness for readability and controlling power consumption.
Stored or Custom Units of Measure	Select from a list of standardized units of measure, or complete the customized option with labels and quantity assignments.
Passcodes	User-defined passcodes to manage advanced configuration parameters and reset functions.
Sensor Inputs	Provides accurate and fast programming of flow sensors with preprogrammed selection lists.



OPERATION

Input signal—in the form of sine waves or pulses from open collector transistors or dry contact closures—can be scaled to any unit of measure for totalization and instantaneous rate-of-flow indication. Flow rate and flow total are examples of parameters that can be viewed on the panel display or through a communications protocol such as Modbus.

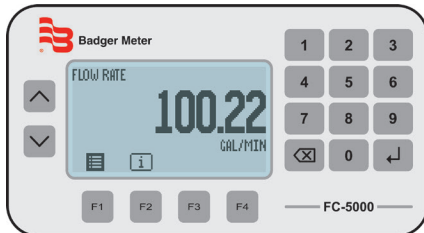
Additionally, dedicated analog or frequency output channels provide scaled outputs that are assignable to parameters such as flow rate and flow total. A user defined damping function can be applied for improved stability of the flow readings.

FLEXIBILITY

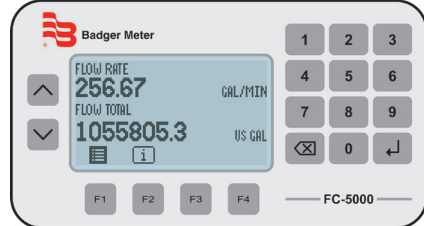
- Non-volatile memory preserves all configured settings and totalization values during power failure
- Low voltage AC/DC power
- Dynamic menu selection and programming reduces potential programming errors
- Ability to restore to factory programmed settings

VIEWING CAPABILITIES

Single Input Configurations

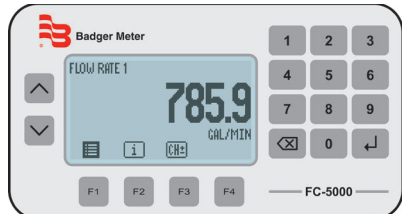


- Flow Rate
- Flow Total

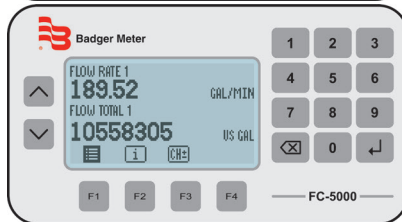


- Flow Rate and Flow Total

Dual Input Configurations



- Flow Rate 1 or Flow Rate 2
- Flow Total 1 or Flow Total 2



- Flow Rate 1 and Flow Total 1
- Flow Rate 2 and Flow Total 2

EIA-485 (RS-485) NETWORK

All FC-5000 Flow Displays come equipped with an EIA-485 (RS-485) physical layer, and use Modbus RTU protocols, selectable and programmed in the firmware. Up to 255 FC-5000 products can be run on a single daisy-chain network and be individually queried for flow rate, positive flow accumulator and other information.

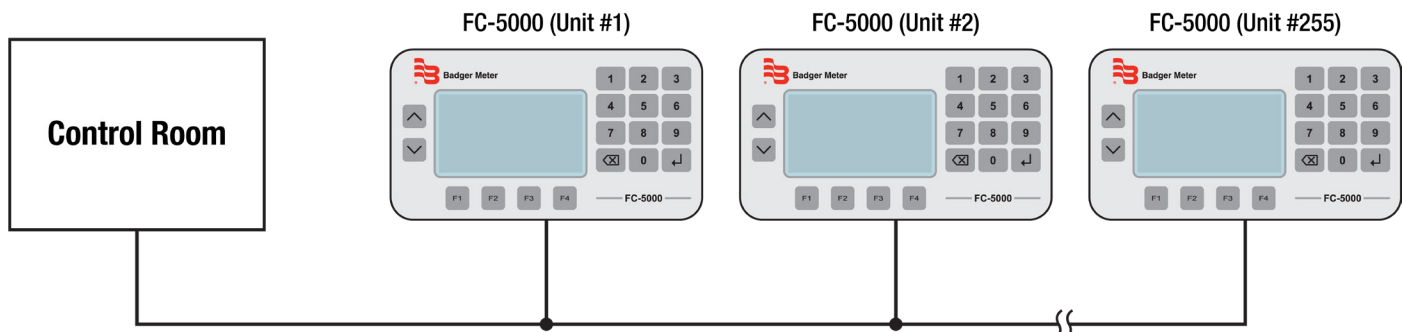
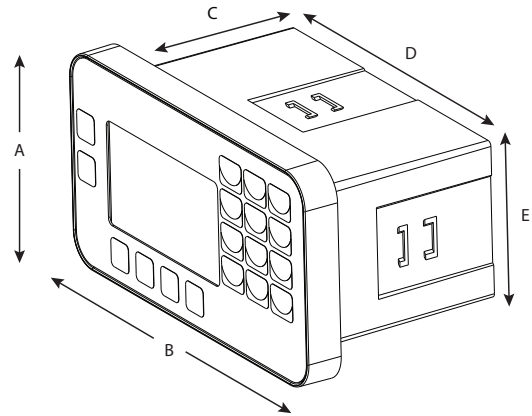
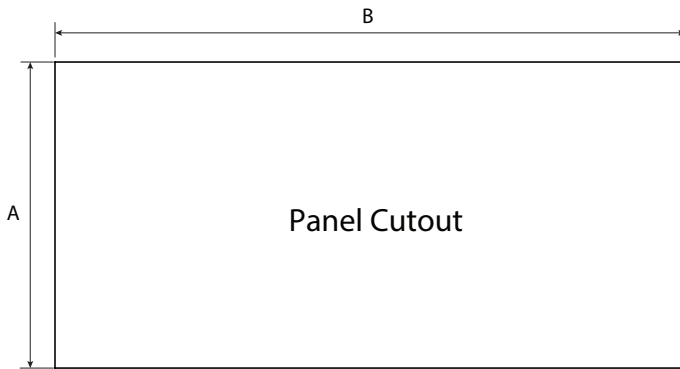


Figure 1: Daisy-chained units

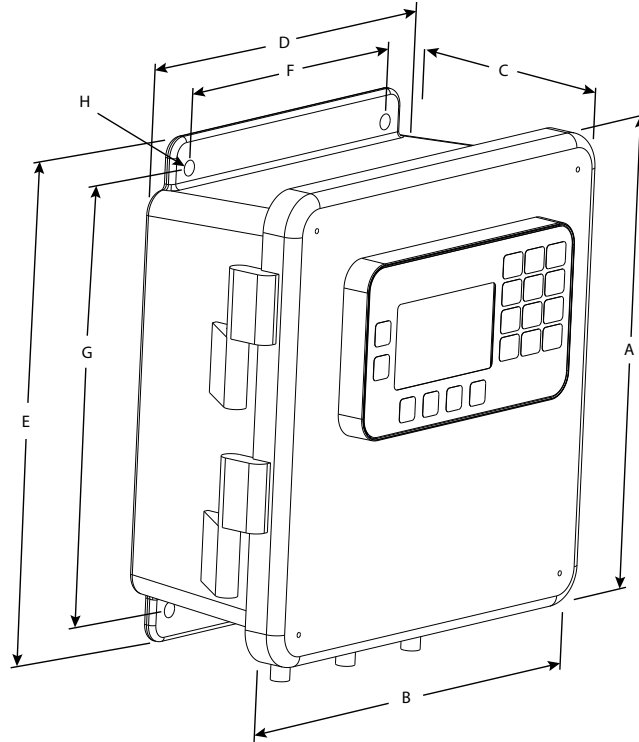
DIMENSIONS

Panel Mount Unit

Mounting clips can accommodate a maximum panel thickness of 1.5 in (38.1 mm).



Wall Mount Unit



	A	B	C	D	E	F	G	H
	Height in. (mm)	Width in. (mm)	Depth in. (mm)	Width in. (mm)	Height in. (mm)	Width in. (mm)	Height in. (mm)	Hole Dia. in. (mm)
Panel Cutout	2.65 (67.31)	5.40 (137.16)	—	—	—	—	—	—
FC-5000 Unit	3.50 (89.00)	6.22 (158.00)	3.07 (78.00)	5.38 (136.65)	2.54 (64.52)	—	—	—
Wall Mount Unit	9.38 (238.25)	9.38 (238.25)	4.88 (123.95)	8.00 (203.20)	9.56 (242.83)	6.00 (152.40)	8.75 (222.25)	0.31 (7.87)

SPECIFICATIONS

Power Supply	Input range: 10...40V DC and 9...28V AC RMS (50...60 Hz)	
	Maximum power consumption: 8 Watts (power supply must provide 8 watts at minimum)	
	Isolated from power ground	
	Over-voltage, transient and reverse polarity protected	
Flow Meter Input	Input Range: 0.3 Hz...10 kHz	
	One (1) or two (2) independent channels	
	Configurable as square wave 0...30V pulse with 2.5V threshold	
	Configurable as sine wave, zero-centered with 45 mV threshold	
	Configurable debounce	
	Excitation Output	12V DC source
	Voltage	Low: -0.3...1.85V DC
		High: 2.5...25V DC
	Impedance	Pullup to 12V DC
Scaled Outputs	Two (2) independent channels	
	Isolated from power ground	
	Over-voltage, transient and reverse polarity protected	
	Output is multiplexed on the process out pins	
	Analog Output (option A)	Configurable to 0...5V, 0...10V or 4...20 mA
		Uncertainty: $\pm 0.1\%$ of reading
		16-bit resolution (0...10V and 4...20 mA), 15-bit resolution (0...5V)
		200 ms, 90-10% step response
		Sourcing analog output signal
	Frequency Output (option F)	TTL, 1...4000 Hz, square wave
		Uncertainty: $\pm 0.01\%$ reading
		Resolution: 0.01 Hz
Digital I/O	Six (6) independent channels	
	Isolated from power ground	
	Over-voltage, transient and reverse polarity protected	
	0...30V as input	
	Debounce	
	0...5V, TTL, 200 ms 90-10% step response, driving $< 0.1 \mu\text{F}$	
Calculations	Flow Calculation	$\pm 0.01\%$ uncertainty
		Adjustable FIR/IIR filtering

Relay Outputs	Configuration Option "C"		Two (2) Form C Mechanical Relays	
	Configuration Option "A"		One (1) Form C Mechanical Relay and One (1) Form A Solid State Relay	
	Isolated coil drivers			
	Over-voltage, transient and reverse polarity protected			
	Form C Relay	Load	Resistive	
		Rated Carry Current	5 A (N.C. or N.O.)	
		Maximum Switching Voltage	250V AC, 30V DC	
		Minimum Permissible Load	10 mA at 5V DC	
		Coil Rating	5...24V DC	
		Life Expectancy	5,000,000 operations	
	Form A Relay (N.O. SPST)	Switching Speed	On (0.25 ms), Off (0.02 ms)	
		Current Rating (I _o)	1 A	
		Maximum Output Voltage (V _o)	60V	
Output On-Resistance (R _(ON))		0.5 Ohms (Ω) @ I _F = 5 mA, I _o = 1 A		
Output Withstand Voltage (V _{O(OFF)})		60-65V @ V _F = 0.8V, I _o = 250 μA, T _A = 77° F (25° C)		
Network Communications	Network Types/Communication Protocols		Modbus RTU or Modbus ASCII	
	Physical Layer		EIA-485 (RS-485)	
	Baud Rates		1200...115.2K	
	4-wire interface/half duplex			
	Over-voltage/ESD Protection			
	Isolated from power ground			
USB Communications	USB (HOST)		Type-A Receptacle Currently not supported	
	USB (DEVICE)		Mini-B Receptacle (used for field updates)	
	Over-voltage/ESD/transient protected			
Display/User interface	Keypad		Membrane overlay, domed tactile response keys	
	Display		128 × 64 pixel LCD graphical display, LED backlit	
	Protected from EMI/RFI			
	Keypad interface is protected from ESD			
Environmental Ratings	Pollution Degree		2	
	Altitude Restriction		Up to 2000 m (6561 ft)	
	Over-Voltage Rating		Category II (CAT II)	
	Ambient Temperature Range		32...130° F (0...55° C)	
	Storage Temperature Range		-40...160° F (-40...70° C)	
	Humidity		0...85%, non-condensing	
Weights (Approx.)	Panel Mount		1.25 lb (0.57 kg)	
	Wall Mount (Including Unit)		4.54 lb (2.06 kg)	
Operator Functions	Unlatch Relays, Reset Totalizers, Unlatch Relays and Reset Totalizers			
Parameters	Maximum Displayed Digits		Rates	Max 8 (7 with decimal)
			Totals	Max 9 (8 with decimal)
	Resolution/Display Precision		Configurable, 0...4	
	Volumetric Flow Rate Units Seconds (S), Minute (MIN), Hour (H), Day (D)		US Gallons (US GAL), Imperial Gallons (I GAL), Mega US Gallons (US MGAL), Mega Imperial Gallons (I MGAL), Liters (L), Mega Liters (ML), Cubic Meters (M³), Cubic Feet (FT³), Acre Feet (AC-FT), Oil Barrels (OBBL), Liquid Barrels (LBBL), US Ounces (US OZ), Imperial Ounces (I OZ), Custom (user-specified)	
	Volumetric Flow Total Units			

PART NUMBER MATRIX

FC-5000 Flow Display

Frequency Output

FC5	-	FD	-		-	F		6	A	-	
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FUNCTION

Flow Display

FD

SENSOR INPUTS

One Pulse

P0

Two Pulse

P3

SCALED OUTPUTS

Two Frequency Outputs

F

RELAY OUTPUTS

One Form C Relay / One Form A Relay

A

Two Form C Relays

C

DIGITAL INPUTS/OUTPUTS

Six Programable Inputs/Outputs

6

COMMUNICATIONS

EIA-485(RS-485); Modbus; USB

A

MOUNTING METHOD

Panel Mount

P

Wall Mount | Includes NEMA 4X (IP67) Rated Enclosure

W

FC-5000 Flow Display

Analog Output

FC5	-	FD	-		-	A		6	A	-	
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FUNCTION

Flow Display

FD

SENSOR INPUTS

One Pulse

P1

Two Pulse

P2

SCALED OUTPUTS

Two Analog Outputs

A

RELAY OUTPUTS

One Form C Relay / One Form A Relay

A

Two Form C Relays

C

DIGITAL INPUTS/OUTPUTS

Six Programable Inputs/Outputs

6

COMMUNICATIONS

EIA-485(RS-485); Modbus; USB

A

MOUNTING METHOD

Panel Mount

P

Wall Mount | Includes NEMA 4X (IP67) Rated Enclosure

W

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Control. Manage. Optimize.

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