



**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
<b>Digital I/O</b>	Reset relays, totals or both remotely via the 6 available I/O ports.
<b>Scaled Outputs</b>	Fully configurable outputs that can be assigned to rates or totals.
<b>Relay Outputs</b>	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.
<b>Display Properties</b>	Adjustable contrast and brightness for readability and controlling power consumption.
<b>Stored or Custom Units of Measure</b>	Select from a list of standardized units of measure, or complete the customized option with labels and quantity assignments.
<b>Passcodes</b>	User-defined passcodes to manage advanced configuration parameters and reset functions.
<b>Sensor Inputs</b>	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.

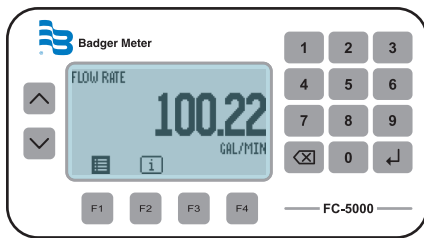
Additionally, dedicated analog or frequency output channels provide scaled outputs that are assignable to parameters such as flow rate and flow total. A user defined damping function can be applied for improved stability of the flow readings.

### FLEXIBILITY

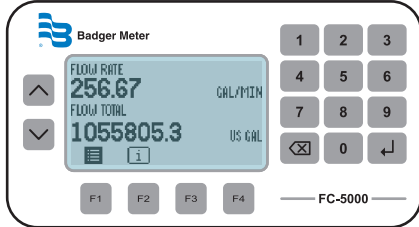
- Non-volatile memory preserves all configured settings and totalization values during power failure
- Low voltage AC/DC power
- Dynamic menu selection and programming reduces potential programming errors
- Ability to restore to factory programmed settings

## VIEWING CAPABILITIES

### Single Input Configurations

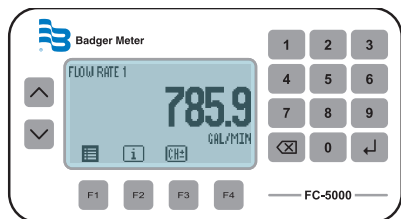


- Flow Rate
- Flow Total

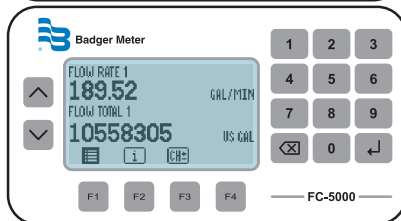


- Flow Rate and Flow Total

### 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.

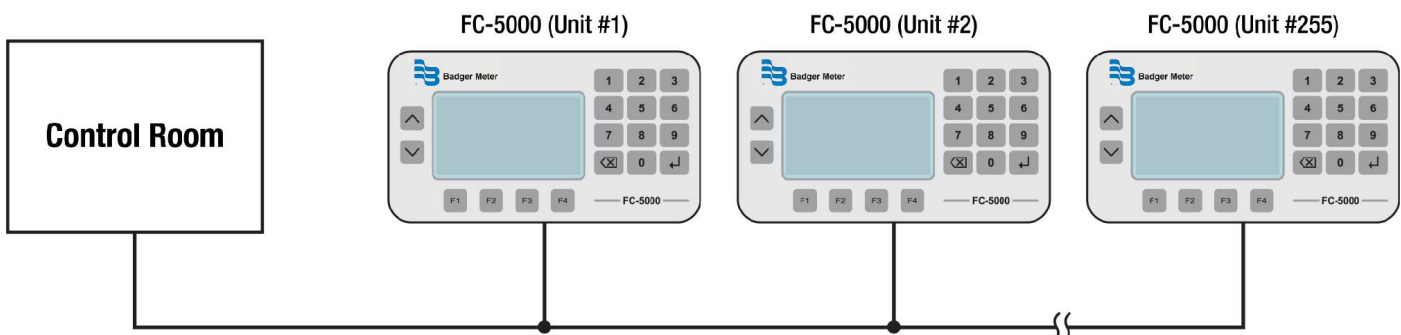
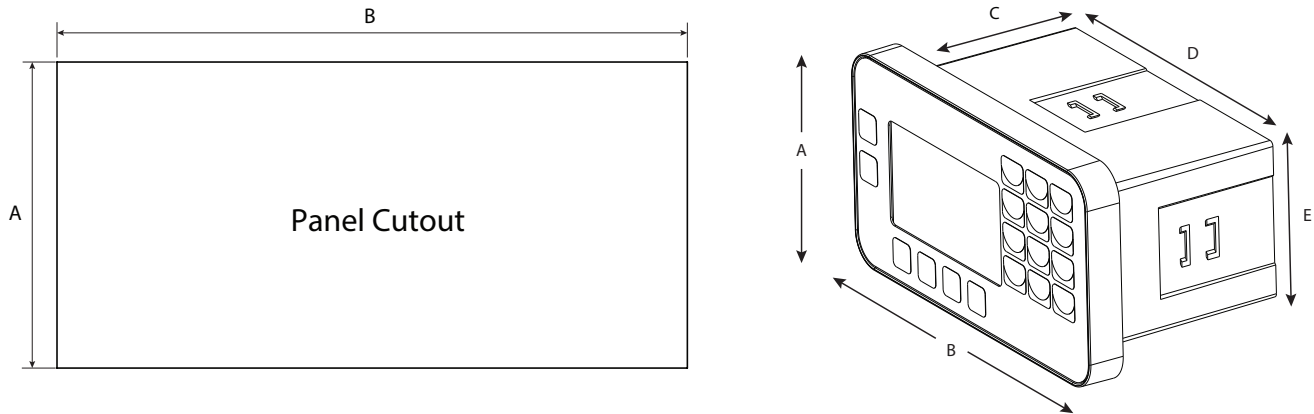


Figure 1: Daisy-chained units

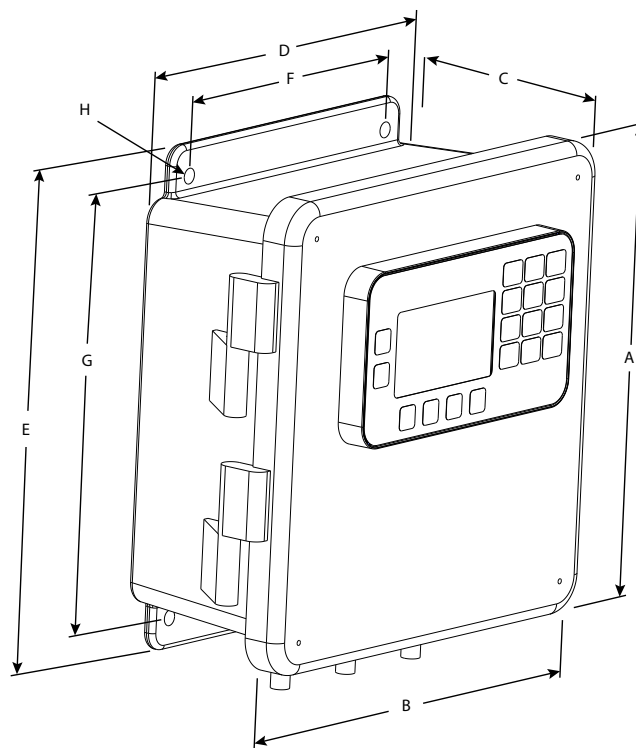
## DIMENSIONS

### 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

<b>Power Supply</b>	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		
<b>Flow Meter Input</b>	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		
	<b>Excitation Output</b>	12V DC source	
	<b>Voltage</b>	Low: -0.3...1.85V DC	
		High: 2.5...25V DC	
	<b>Impedance</b>	Pullup to 12V DC	
<b>VDC Current</b>	±50 mA, short circuit current		
<b>Response</b>	100 µs/3.5 ms min pulse (high/low speed)		
<b>Scaled Outputs</b>	Two (2) independent channels		
	Isolated from power ground		
	Over-voltage, transient and reverse polarity protected		
	Output is multiplexed on the process out pins		
	<b>Analog Output (option A)</b>	Configurable to 0...5V, 0...10V or 4...20 mA	
		Uncertainty: ±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	
	<b>Frequency Output (option F)</b>	TTL, 1...4000 Hz, square wave	
Uncertainty: ±0.01% reading			
Resolution: 0.01 Hz			
<b>Digital I/O</b>	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 µF		
<b>Calculations</b>	<b>Flow Calculation</b>	± 0.01% uncertainty	
		Adjustable FIR/IIR filtering	

<b>Relay Outputs</b>	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			
	<b>Form C Relay</b>	<b>Load</b>	Resistive	
		<b>Rated Carry Current</b>	5 A (N.C. or N.O.)	
		<b>Maximum Switching Voltage</b>	250V AC, 30V DC	
		<b>Minimum Permissible Load</b>	10 mA at 5V DC	
		<b>Coil Rating</b>	5...24V DC	
		<b>Life Expectancy</b>	5,000,000 operations	
	<b>Form A Relay</b> (N.O. SPST)	<b>Switching Speed</b>	On (0.25 ms), Off (0.02 ms)	
		<b>Current Rating (I<sub>o</sub>)</b>	1 A	
		<b>Maximum Output Voltage (V<sub>o</sub>)</b>	60V	
		<b>Output On-Resistance (R<sub>ON</sub>)</b>	0.5 Ohms (Ω) @ I <sub>F</sub> = 5 mA, I <sub>o</sub> = 1 A	
	<b>Output Withstand Voltage (V<sub>O(OFF)</sub>)</b>	60-65V @ V <sub>F</sub> = 0.8V, I <sub>o</sub> = 250 μA, T <sub>A</sub> = 77° F (25° C)		
<b>Network Communications</b>	<b>Network Types/Communication Protocols</b>	Modbus RTU, Modbus ASCII or BACnet		
	<b>Physical Layer</b>	EIA-485 (RS-485)		
	<b>Baud Rates</b>	1200...115.2K		
	Two-wire (half-duplex)			
	Over-voltage/ESD Protection			
	Isolated from power ground			
<b>USB Communications</b>	<b>USB (HOST)</b>	Type-A Receptacle   Currently not supported		
	<b>USB (DEVICE)</b>	Mini-B Receptacle (used for field updates)		
	Over-voltage/ESD/transient protected			
<b>Display/User interface</b>	<b>Keypad</b>	Membrane overlay, domed tactile response keys		
	<b>Display</b>	128 × 64 pixel LCD graphical display, LED backlit		
	Protected from EMI/RFI			
	Keypad interface is protected from ESD			
<b>Environmental Ratings</b>	<b>Pollution Degree</b>	2		
	<b>Altitude Restriction</b>	Up to 2000 m (6561 ft)		
	<b>Over-Voltage Rating</b>	Category II (CAT II)		
	<b>Ambient Temperature Range</b>	32...130° F (0...55° C)		
	<b>Storage Temperature Range</b>	-40...160° F (-40...70° C)		
	<b>Humidity</b>	0...85%, non-condensing		
<b>Weights (Approx.)</b>	<b>Panel Mount</b>	1.25 lb (0.57 kg)		
	<b>Wall Mount (Including Unit)</b>	4.54 lb (2.06 kg)		
<b>Operator Functions</b>	Unlatch Relays, Reset Totalizers, Unlatch Relays and Reset Totalizers			
<b>Parameters</b>	<b>Maximum Displayed Digits</b>	<b>Rates</b>	Max 8 (7 with decimal)	
		<b>Totals</b>	Max 9 (8 with decimal)	
	<b>Resolution/Display Precision</b>	Configurable, 0...4		
	<b>Volumetric Flow Rate Units</b> <b>Seconds (S), Minute (MIN), Hour (H), Day (D)</b>	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 (M <sup>3</sup> ), Cubic Feet (FT <sup>3</sup> ), Acre Feet (AC-FT), Oil Barrels (OBBL), Liquid Barrels (LBBL), US Ounces (US OZ), Imperial Ounces (I OZ), Custom (user-specified)		
	<b>Volumetric Flow Total Units</b>			

**PART NUMBER CONSTRUCTION**

**FC-5000 Flow Display**



Frequency Output

**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; BACnet; USB

A

**MOUNTING METHOD**

Panel Mount

P

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

W

**FC-5000 Flow Display**



Analog Output

**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; BACnet; 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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