



Badger Meter

Industrial Flow Computer

FC-5000 BTU Monitor

DESCRIPTION

The Badger Meter® FC-5000 is a microprocessor-driven device designed for energy/BTU and flow monitoring. The FC-5000 BTU Monitor is compatible with the complete line of Badger Meter industrial flow meters and temperature sensors, creating a solution to monitor hydronic energy usage, 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, energy usage and temperature readings. Additionally, users can see relay, output and digital I/O statuses
Plug-and-play terminals	Easier, user-friendly installation
User-programmable relay configuration	Enables alarms or totalizing output capabilities for rates, totals and temperatures
User-programmable scaled outputs	Transmit rate, total or temperature data via dedicated output channels
Robust enclosure, keypad and mechanical relays	Application ruggedness

PROGRAMMABILITY

Features	Programming Options
Fluid Properties	Custom fluid characteristics can be stored for calculations and reference.
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, totals and temperature.
Relay Outputs	Fully configurable relays that can be assigned to rates, totals and temperature 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 and temperature sensors with preprogrammed selection lists.

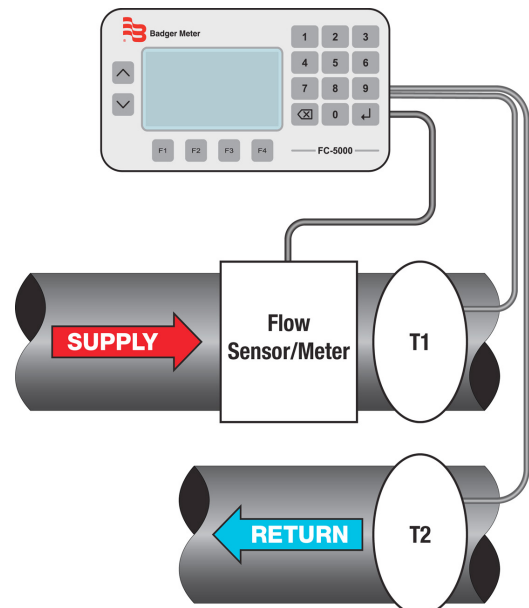


OPERATION

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. Energy rate and flow totals are examples of parameters that can be viewed on the panel display or through communications protocols such as BACnet or Modbus.

Two temperature sensor inputs can be configured to read RTDs or thermistors and are fully customizable to adapt to application needs. When used in conjunction with fluid flow, hydronic energy rates and total usage are achieved, while conforming to EN1434 standards.

Additionally, dedicated analog or frequency output channels provide scaled outputs that are assignable to parameters such as energy rate, total and temperature. 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

Quickly toggle views on the *Home* screen to switch between:

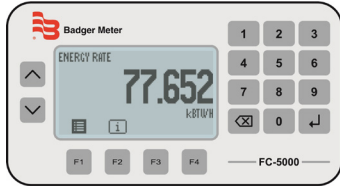


Figure 1: Single display

- Flow Rate
- Flow Total
- Energy/BTU Rate
- Energy/BTU Total

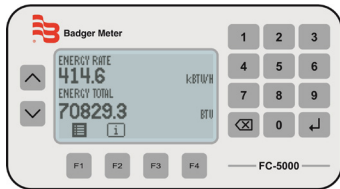


Figure 2: Dual display

- Flow Rate and Flow Total
- Energy/BTU Rate and Energy/BTU Total

ACCESSORIES

RTDs

Part No.	Description
RTD-100	Replacement RTD Element
RTD-106B	1/4 in. NPT; BR; ADJ Depth; 6 in. Leads
RTD-116B	3/4 in. NPT; BR TW; 1-5/8 in. Depth; 1/2 in. Conduit Conn.
RTD-116S	3/4 in. NPT; SS TW; 1-5/8 in. Depth; 1/2 in. Conduit Conn.
RTD-125	3/4 in. NPT; SS TW; 2-1/2 in. Depth; 1/2 in. Conduit Conn.
RTD-140	3/4 in. NPT; SS TW; 4 in. Depth; 1/2 in. Conduit Conn.
RTD-160	3/4 in. NPT; SS TW; 6 in. Depth; 1/2 in. Conduit Conn.

Thermistors

Part No.	Description
T106B	1/4 in. NPT; BR Thermistor; ADJ Depth
T106S	1/4 in. NPT; SS Thermistor; ADJ Depth
T116B	3/4 in. NPT; BR Thermowell; 1-5/8 in. Depth
T116S	3/4 in. NPT; SS Thermowell; 1-5/8 in. Depth
T125	3/4 in. NPT; SS Thermowell; 2-1/2 in. Depth
T140	3/4 in. NPT; SS Thermowell; 4 in. Depth
T160	3/4 in. NPT; SS Thermowell; 6 in. Depth
T180	3/4 in. NPT; SS Thermowell; 8 in. Depth
67002	Replacement Thermistor Element

Consult the factory or your local representative for availability, pricing and delivery estimates for additional parts and accessories.

EIA-485 (RS-485) NETWORK

All FC-5000 BTU Monitors come equipped with an EIA-485 (RS-485) physical layer, and use BACnet or 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/energy rate, positive flow/energy accumulator, supply temperature, return temperature and other information.

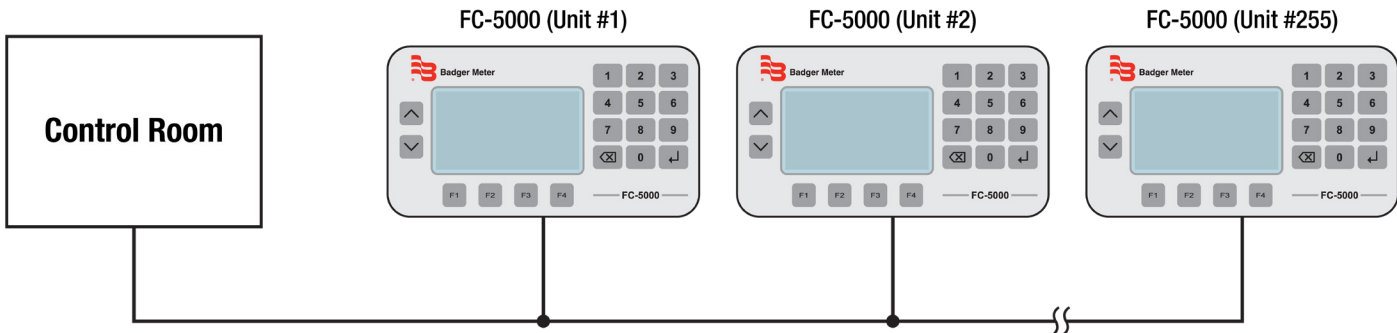
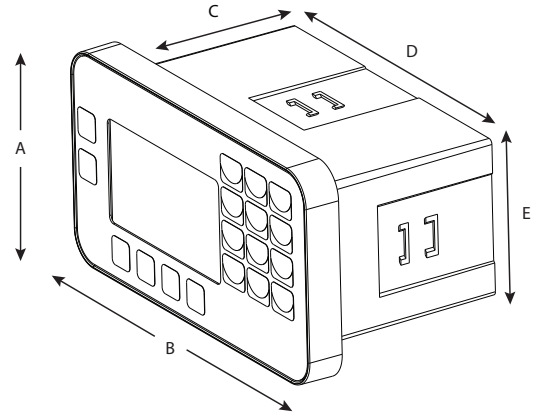
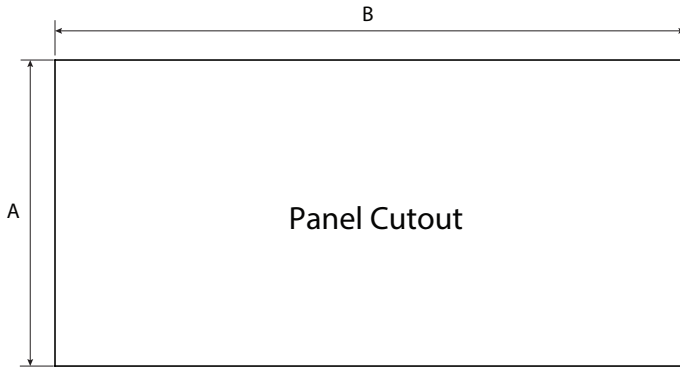


Figure 3: Daisy-chained units

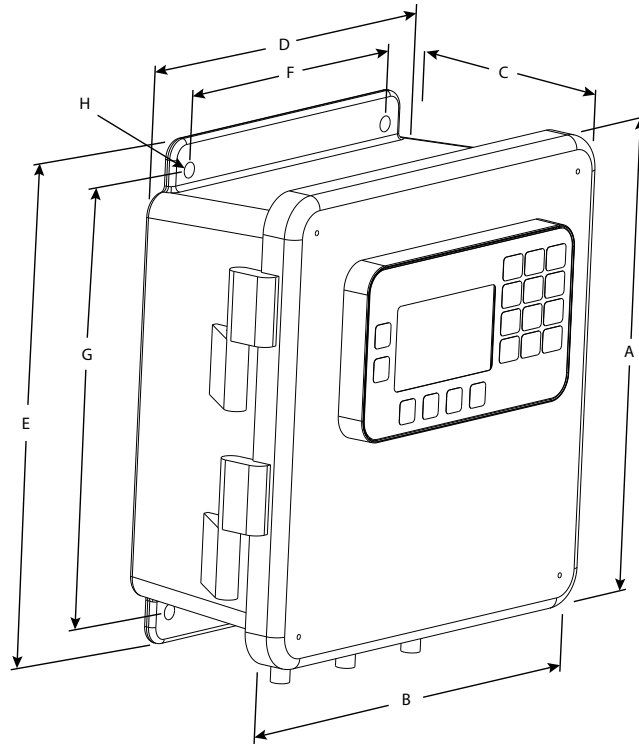
DIMENSIONS

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 8 Watts power consumption		
	Isolated from power ground		
	Over-voltage, transient and reverse polarity protected		
Flow Meter Input	Input Range: 0.3 Hz...10 kHz		
	One independent channel		
	Configurable as square wave 0...30V pulse with 2.5V threshold		
	Configurable as sine wave, zero-centered with 200 mV amplitude and 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	
VDC Current	±50 mA, short circuit current		
Response	100 µs/3.5 ms min pulse (high/low speed)		
Temperature Inputs	2 independent channels		
	RTD Specifications	50 µA/1000 µA Excitation current source	
		Up to 4-wire	100 and 1000 Ohm PT RTDs or Custom
		Callendar-Van Dusen or two-point temperature calculations	
	Thermistor Specifications	Impeller (Data Industrial) Thermistors or Customizable Steinhart-Hart calculations	
Scaled Outputs	Two 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)	0...5V, 0...10V or 4...20 mA	
		Uncertainty ±0.1% of RDG	
		16-bit resolution (0...10V and 4...20 mA), 15-bit resolution (0...5V)	
		200 ms, 90-10% step response	
Frequency Output (option F)	Sourcing analog output signal		
	TTL, 1...4000 Hz, square wave		
	Uncertainty ±0.01% RDG		
	Resolution 0.01 Hz		
Digital I/O	6 independent channels		
	Isolated from power ground		
	Over-voltage, transient and reverse polarity protected		
	0...30 Volts as input		
	Debounce		
	0...5V, TTL, 200 ms 90...10% step response, driving < 0.1 µF		
Calculations	Flow Calculation	± 0.01% uncertainty Adjustable FIR/IIR filtering	
	BTU Calculation	Meets EN 1434 requirements	
Relay Outputs	2 Form C mechanical relays		
	Isolated coil drivers		
	Over-voltage, transient and reverse polarity protected		
	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		

Network Communications	Network Types/ Communication Protocols	Modbus RTU, Modbus ASCII and BACnet
	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
	Over-voltage/ESD/transient protected	
Display/User interface	Keypad	Membrane overlay, domed tactile response keys
	Display	128 x 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)
	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	7
	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 (M ³), Cubic Feet (FT ³), 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	US Ounces (US OZ), Imperial Ounces (I OZ), Custom (user-specified)
	Energy Units	kBTU, BTU, KW, TONS (RT), Custom (user-defined)
	Temperature Units	° F (Fahrenheit), ° C (Celsius), R (Rankine) or K (Kelvin)

PART NUMBER MATRIX

	FC5	BM	P1		C	6	A	
Function								
BTU Monitor		BM						
Sensor Inputs								
One Pulse / Two Temp			P1					
Scaled Outputs								
Two Analog Outputs					A			
Two Frequency Outputs					F			
Relay Outputs								
Two Form "C" Relays					C			
Digital Inputs/Outputs								
Six Programmable Inputs/Outputs						6		
Communications								
EIA-485 (RS-485); Modbus; BADnet; USB							A	
Mounting Method								
Panel Mount								P
Wall Mount - Includes NEMA 4X(IP67) rated enclosure								W

INTENTIONAL BLANK PAGE

Control. Manage. Optimize.

Trademarks appearing in this document are the property of their respective entities. Due to continuous research, product improvements and enhancements, Badger Meter reserves the right to change product or system specifications without notice, except to the extent an outstanding contractual obligation exists. © 2018 Badger Meter, Inc. All rights reserved.

www.badgermeter.com

The Americas | **Badger Meter** | 4545 West Brown Deer Rd | PO Box 245036 | Milwaukee, WI 53224-9536 | 800-876-3837 | 414-355-0400
México | **Badger Meter de las Americas, S.A. de C.V.** | Pedro Luis Ogazón N°32 | Esq. Angelina N°24 | Colonia Guadalupe Inn | CP 01050 | México, DF | México | +52-55-5662-0882
Europe, Eastern Europe Branch Office (for Poland, Latvia, Lithuania, Estonia, Ukraine, Belarus) | **Badger Meter Europe** | ul. Korfantego 6 | 44-193 Knurów | Poland | +48-32-236-8787
Europe, Middle East and Africa | **Badger Meter Europa GmbH** | Nurtinger Str 76 | 72639 Neuffen | Germany | +49-7025-9208-0
Europe, Middle East Branch Office | **Badger Meter Europe** | PO Box 341442 | Dubai Silicon Oasis, Head Quarter Building, Wing C, Office #C209 | Dubai / UAE | +971-4-371 2503
Slovakia | **Badger Meter Slovakia s.r.o.** | Racianska 109/B | 831 02 Bratislava, Slovakia | +421-2-44 63 83 01
Asia Pacific | **Badger Meter** | 80 Marine Parade Rd | 21-06 Parkway Parade | Singapore 449269 | +65-63464836
China | **Badger Meter** | 7-1202 | 99 Hangzhong Road | Minhang District | Shanghai | China 201101 | +86-21-5763 5412
Switzerland | **Badger Meter Swiss AG** | Mittelholzerstrasse 8 | 3006 Bern | Switzerland | +41-31-932 01 11