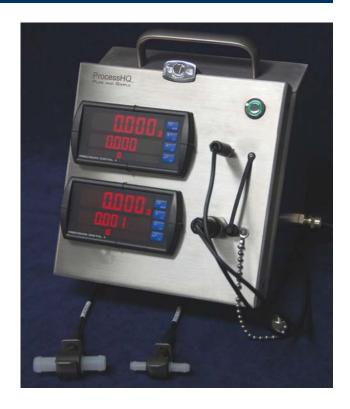# Disposable Flow Meter Monitor / Controller

The BioTek Systems Series 100 Flow Monitors are specifically designed to meet the demanding requirements of bio-pharmaceutical processes. They complement perfectly the Equflow single-use turbine flow meters and together, offer the most versatile and cost-effective flow measurement solution for single-use bioprocess applications. Offered in single and dual channel configurations, these monitors are factory configured to match the Equflow flow meter models of your choice, enabling turn-key operation: just plug-in the flow meter electronics, connect the flow sensor to the fluid path and you are ready to measure flow and totalize.

Key Features and Benefits

- Versatile single or dual independent channel design
- Large, bright dual line 6-digit readout for simultaneous flow rate and total display in a choice of engineering units
- Rate display per Second, Minute, Hour or Day
- 9-Digit Totalizer including Total, Grand Total or Non-Resettable Grand Total with Overflow feature
- Password protection for Total Reset available
- Programmable Displays and Function keys
- Angled consolette enclosure for easy viewing and illuminated power switch
- Liquid tight quick connect receptacles for flow meter electronics and control options
- NEMA 4X Stainless Steel construction with non-skid feet and ergonomic carrying handle for wet, corrosive environments
- Optional 2 or 4 relay (per channel) may be assigned to rate or total for pump/valve control, alarming or signaling
- Optional 4-20mA analog signal retransmission proportional to flow rate or total for connectivity to PLC/SCADA
- Optional RS232, RS-422/485 Serial Communications with Modbus® RTU Protocol

Specifications

General

Display: Upper display: 0.60" (15 mm) high. Lower display: 0.46" (12 mm) high. Both displays are 6 digits (-99999 to 999999), red LEDs with leading zero blanking.

Display Intensity: Eight user selectable intensity levels

Display Update Rate: 5/second (200 ms)

Overrange: Display flashes 999999

Underrange: Display flashes -99999

Display Assignment: The upper and lower displays may be assigned to rate, total, grand total, alternate rate & total, max/min, units (small display only), set points, or Modbus input.

Noise Filter: Programmable from 2 to 199 (0 will disable filter)

Filter Bypass: Programmable from 0.1 to 99.9% of calibrated span

Dimensions: 8" x 7.5" x 8.5" (203mm x 190mm x 216mm) (W x D x H)

Ingress Protection: NEMA 4X, IP65

Environmental: Operating temperature range: -40 to 65°C. Storage temperature range: -40 to 85°C. Relative humidity: 0 to 90% non-condensing.

Agency Approval: UL

Power: 120 VAC / 60 Hz, 40 W maximum

Specifications Continued

Power Cord: 6 feet (2m), US plug

Rate Input

Inputs: Field selectable: Pulse or square wave 0-5 V, 0-12 V, or 0-24 V @ 30 kHz; TTL; open collector 4.7 kΩ pull-up to 5 V @ 30 kHz; NPN or PNP transistor, switch contact 4.7 kΩ pull-up to 5 V @ 40 Hz; Coil (sine wave) 40 mVp-p min @ 10 kHz; Modbus PV (Slave)

Low Voltage Mag Pickup (Isolated): Sensitivity: 40mVp-p to 8Vp-p

Minimum Input Frequency: 0.001 Hz - Minimum frequency is dependent on high gate setting.

Maximum Input Frequency: 30,000 Hz (10,000 for Low Voltage Mag Pickup)

Input Impedance: Pulse input: Greater than 300 kΩ @ 1 kHz. Open collector/switch input: 4.7 kΩ pull-up to 5 V.

Accuracy: ±0.03% of calibrated span ±1 count

Display Update Rate: Total: 10/sec, Rate: 10/sec to 1/1000 sec

Temperature Drift: Rate display is not affected by changes in temperature.

Multi-Point Linearization: 2 to 32 points

Low-Flow Cutoff: 0-999999 (0 disables cutoff function)

Decimal Point: Up to five decimal places or none: d.ddddd, dd.dddd, ddd.ddd, dddd.dd, ddddd.d, or dddddd.

Calibration: May be calibrated using K-factor, scale using internal calibration, or calibrate by applying an external calibration signal.

K-Factor: Field programmable K-factor converts input pulses to rate in engineering units. May be programmed from 0.00001 to 999,999 pulses/unit.

Calibration Range: Input 1 signal may be set anywhere in the range of the meter; input 2 signal may be set anywhere above input 1 setting.

Filter: Programmable contact de-bounce filter, 40 to 999 Hz maximum input frequency allowed with low speed filter.

Time Base: Second, minute, hour, or day

Low Gate: 0.1-99.9 seconds; this function determines how often the incoming pulses are calculated and the rate display is updated.

High Gate: 2.0-999.9 seconds; this function determines how long to wait for pulses before the display goes to zero. This function is used to display slow pulse rates.

Rate / Totalizer

Display Assignment: The upper and lower displays may be assigned to rate, total, grand total, alternate R & T, units, and set point.

Rate Display Indication: 0 to 999999, lead zero blanking. "R" LED illuminates while displaying rate.

Total Display & Total Overflow: 0 to 999,999; automatic lead zero blanking. "T" LED is illuminated while displaying total and "GT" for grand total. Up to 999,999,999 with total-overflow feature. "oF" is displayed to the left of total overflow and ▲ LED is illuminated.

Alternating Display: Either display may be programmed to alternate between rate and total or rate and grand total every 10 seconds.

Total Decimal Point: Up to five decimal places or none: d.ddddd, dd.dddd, ddd.ddd, dddd.dd, ddddd.d, or dddddd. Total decimal point is independent of rate decimal point.

Totalizer: Calculates total based on rate and field programmable multiplier to display total in engineering units. Time base must be selected according to the time units in which the rate is displayed.

Total Conversion Factor: 0.00001 to 59,999

Totalizer Rollover: Totalizer rolls over when display exceeds 999,999,999. Relay status reflects the display value.

Total Overflow Override: Program total reset for automatic with 0.1 second delay and set point 1 for 999,999

Totalizer Presets: Up to eight, user selectable under Setup menu. Any set point can be assigned to total and may be programmed anywhere in the range of the meter for total alarm indication.

Programmable Total Reset Delay: 0.1 to 999.9 seconds; applied to the first relay assigned to total or grand total. If the meter is programmed to reset total to zero automatically when the preset is reached, then a delay will occur before the total is reset.

Total Reset: Via front panel button, external contact closure on digital inputs, automatically via user selectable preset value and time delay, or through serial communications.

Total Reset Password: Total and grand total passwords may be entered
to prevent resetting the total or grand total from the front panel.

Non-Resettable Total: The grand total can be programmed as a non-resettable total by entering the password "050873". *Caution: Once the Grand Total has been programmed as "non-resettable" the feature cannot be disabled.*

Relays

Rating: 2 or 4 SPDT (Form C) internal and/or 4 SPST (Form A) external; rated 3 A @ 30 VDC and 125/250 VAC resistive load; 1/14 HP (approx. 50 W) @ 125/250 VAC for inductive loads

Noise Suppression: Noise suppression is recommended for each relay contact switching inductive loads.

Relay Assignment: Relays may be assigned to rate, total, or grand total.

Deadband: 0-100% of span, user programmable

High or Low Alarm: User may program any alarm for high or low trip point. Unused alarm LEDs and relays may be disabled (turned off).

Relay Operation: automatic (non-latching), latching (requires manual acknowledge), sampling (based on time), pump alternation control (2 to 8 relays), off (disable unused

relays), and manual on/off control mode.

Relay Reset: User selectable via front panel buttons, digital inputs, or PC

   1. Automatic reset only (non-latching), when input passes the reset point or total is reset to zero.

   2. Automatic + manual reset at any time (non-latching).

   3. Manual reset only, at any time (latching).

   4. Manual reset only after alarm condition has cleared (latching).

Note: Front panel button or digital input may be assigned to acknowledge relays programmed for manual reset.

Deadband: 0-100% of span, user programmable

Time Delay: 0 to 999.9 seconds, on & off relay time delays. Programmable and independent for each relay.

Fail-Safe Operation: Programmable and independent for each relay.

Note: Relay coil is energized in non-alarm condition. In case of power failure, relay will go to alarm state.

Auto Initialization: When power is applied to the meter, relays will reflect the state of the input to the meter.

Isolated 4-20 mA Transmitter Output

Output Source: Rate/process, total, grand total, max, min, set points 1-8, manual control setting, or Modbus input

Scaling Range: 1.000 to 23.000 mA for any display range

Calibration: Factory calibrated: 4.000 to 20.000 = 4-20 mA

Analog Output Programming: 23.000 mA maximum for all parameters: Overrange, underrange, max, min, and break

Accuracy: ± 0.1% FS ± 0.004 mA

Temperature Drift: 0.4 µA/°C max from 0 to 65°C ambient, 0.8 µA/°C max from -40 to 0°C ambient

Note: Analog output drift is separate from input drift.

Isolated Transmitter Power Supply: Terminals I+ & R: 24 VDC ± 5% @ 40 mA maximum, may be used to power the 4-20 mA output or other devices. Present on both AC & DC powered units.

External Loop Power Supply: 35 VDC maximum

Output Loop Resistance:

Power supply	Minimum	Maximum
24 VDC	10Ω	700Ω
35 VDC (external)	100Ω	1200Ω

Ordering Information

Contact

PART NUMBER: FM100 – CHANNEL1 – CHANNEL2

CHANNEL SPECIFICATION:
   {FLOW METER} {CONNECTOR}{OPTIONS}

   FLOW METER:
      4 (Equflow 0045 model)
      8 (Equflow 0085 model)
      X (3rd party field configured)
      BLANK (Channel 2 only)

   CONNECTOR:
      J (3.5mm jack, Equflow standard)
      Q (liquid tight quick connect, female, 3P nano for 0045, 4P micro for 0085)

   OPTION1:
      A (4-20mA rate proportional output, 5P micro)
      B (2 Relays)
      C (4 Relays)
      D (4-20mA + 2 Relays)
      E (4-20mA + 4 Relays)
      Above options are mutually exclusive
      F (RS-232)
      G (RS-422/485)
      BLANK (None)

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