Cox® Turbine Flow Meters

Flow Computer

FC30

DESCRIPTION

The Cox FC30 is a multi-functional flow computer, providing users with linearized and temperature compensated flow rates and totals. Several features enhance flow meter accuracy and usability, in both gas and liquid applications. The FC30 is offered with 40 point linearization, Strouhal-Roshko compensation, batching routines and inferred mass measurement capability. Both pressure and temperature sensor inputs also come standard for display as well as compensation calculations.

This versatile flow computer provides users with an easy to read display, programmable front panel and an intuitive firmware menu structure. Soft key assignments are user defined for the various inputs and outputs to meet application requirements. When ordered with a flow meter, the FC30 is factory programmed to customer specifications.

Features	Benefits
EIA-232/485 Serial Communication	Data log, print or communicate with a host PC.
Multiple Isolated Outputs	Analog and pulse outputs are isolated to protect flow data from electrical noise.
10 Selectable Fluid Tables	Preset tables allow for multiple fluid selections to minimize downtime between fluid changes.
Precision Temperature Compensation Methods	Temperature fluid viscosity compensation and bore diameter corrections are accomplished using Strouhal/Roshko equations.
Service/Test Mode	During a start-up, users can print out the system configuration, monitor inputs and exercise outputs.
Batching	Several batching functions are available to provide compensation options in the batching process.

APPLICATION

The FC30 Flow Computer was designed for gas and liquid applications with potentially varying process conditions. The ability to program the flow computer with universal viscosity curve (UVC) calibrations with a temperature input provides compensation by means of Strouhal-Roshko algorithms. Having the capability of these advanced compensation techniques makes the FC30 versatile in a variety of fluid and temperature environments. The FC30 is preloaded with several types of fluids, but any fluid property can be entered into the selection menu.

- Water
- Skydrol® 500B-4
- 50/50 Ethylene Glycol/Water
- Air
- Gaseous Propane
- MIL-PRF-7024
- MIL-PRF-5606
- MIL-PRF-23699
- JET A-1
- Diesel
- Menthol

Badger Meter

CXX-DS-01164-EN-02 (November 2021)

Product Data Sheet

OPERATION

The FC30 accepts all types of pulse generating flow meters. Linearized volumetric flow rates, totals, temperature, pressure and density are examples of flow parameters that can be viewed on the panel display or through serial communications.

Varying fluid temperature and viscosity conditions can be compensated for by means of a universal viscosity curve. In addition, Strouhal-Roshko algorithms are applied for a more comprehensive compensation method, taking into consideration all the secondary effects, of which the meter is sensitive, like the expansion and contraction of the meter bore diameter. Inferred mass is achieved by taking the volumetric flow measurement, multiplied by the density of the fluid medium, derived from actual temperature and pressure readings. In addition, to displaying and transferring rates and totals, the FC30 is programmable to provide several different batching routines with alarms.

SOFTWARE

The setup program provides users with a means of configuring, monitoring and controlling the FC30 over the EIA-232/485 serial ports. The software consists of several menu tabs, which are organized in groups containing like configuration and monitoring functions. The software program is capable of resetting alarms and totalizers, while also monitoring outputs in real-time.

INSTALLATION

The FC30 is a panel mounted flow computer. It should be located in an area with a clean, dry atmosphere which is relatively free of shock and vibration. Also, it should be mounted in an area within the environmental ratings of the enclosure. See "Dimensions" for proper mount spacing.

SPECIFICATIONS

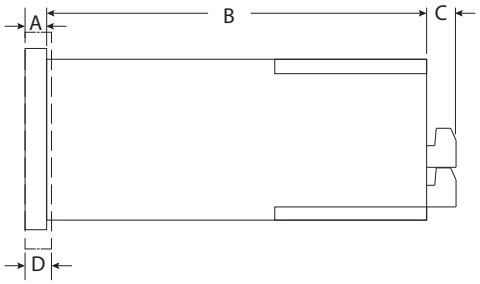
CE Compliant, UL/CUL Listed

Power Requirements	**110V AC**	85…127V rms at 50/60 Hz
	220V AC	170…276V rms at 50/60 Hz
	10…14V DC	300 mA Max
	14…28V DC	
Linearization	40-point linearization table	
Internal Equations	Strouhal-Roshko, API 2540 and AGA-7	
Environmental	**Operating Temp**	32…122° F (0…50° C)
	Storage Temp	-40…185° F (-40…85° C)
	Humidity	0…95%, non-condensing
	Panel Rating	NEMA 4 (IP66)
Display	**Type**	2 x 20 character display, backlit LCD or VFD
	Character Size	0.2 inches
	Keypad	16-Key Membrane
Excitation Voltage	5, 12 or 24V DC at 100 mA	
Relay Outputs	Two (four optional), form C contacts. The relay outputs are menu assignable to (individually for each relay) low rate alarm, high rate alarm, pre-warning alarm, preset alarm or general purpose warning (security).	
Flow Input (Pulse)	One input available for single rotor turbine flow meters	
	Input Impedance	10 KΩ nominal
	Pull-up Resistance	10 K Ω to 5V DC (menu selectable)
	Pull-down Resistance	10 K Ω to common
	Trigger Level (Menu Selectable)	High Level Input: Logic On (3…30V DC), Logic Off (0…1V DC) Low Level Input (Mag Pickoff): Sensitivity (10 or 100 mV)
	Minimum Count Speed	Menu Selectable
	Maximum Count Speed	Menu Selectable: 40, 3000 or 20,000 Hz
	Overvoltage Protection	50V DC

Control Inputs	Switch Inputs are menu selectable for *Start*, *Stop*, *Reset*, *Lock*, *Inhibit*, *Alarm Acknowledge*, *Print,* or *Not Used*.		
	Input Scan Rate	10 per second	
	Logic 1	4…30V DC	
	Logic 0	0…0.8V DC	
	Input Impedance	100 k Ohms	
	Control Activation	Positive Edge or Pos. Level based on product definition for switch usage	
Auxiliary/ Compensation Input	Two auxiliary/compensation inputs are available and are menu selectable for temperature, pressure and density or not used. These inputs are used for calculating compensated flow output. It can also be used as a general purpose input for display and alarming.		
	Accuracy	± 0.02% of Full Scale at 68° F (20° C)	
	Input Ranges	Voltage	0…10V DC, 0…5V DC or 1…5V DC
		Current	4…20 MA or 0….20 mA
	Operation	Ratiometric	
	Resolution	16-bit	
	Refresh Rate	1 per second minimum	
	Automatic Fault Detection for signal over-range and under-range, broken current loop, RTD shot, RTD open, user defined fault modes		
	Fault Protection	Reverse Polarity	No ill effects
		Over-Voltage Limit	50V DC
	Temperature Resolution	0.01° C	
	RTD	100 Ohm, 3-Wire DIN RTD	
Serial Communication	EIA-232 and EIA-485 available for use in printing, data recording and communication with a computer		
Isolated Analog Output	The analog output is menu assignable to correspond to the uncompensated volume rate and corrected volume rate, mass rate, temperature, pressure, density, volume total, corrected volume total or mass total.		
	Accuracy	0.05% of Full Scale at 68° F (20° C)	
	Ranges	4…20 mA or 0…20 mA	
	Resolution	12 bit	
	Refresh Rate	1 per second minimum	
	Temperature Drift	<200 ppm/°C	
	Maximum Load	1000 Ohms	
	Averaging	User entry of damping constant to cause a smooth control action	
Isolated Pulse Output	The isolated pulse output is menu assignable to uncompensated volume total and compensated volume total or mass total		
	Form	Open Collector	
	Maximum on Current	25 mA	
	Maximum on Voltage	30V DC	
	Saturation Voltage	1V DC	
	Maximum off Current	0.1 mA	
	Pulse Duration	10 mS or 100 mS (user selectable)	
	Pulse Output Buffer	256	
	Fault Protection	Reverse polarity: shunt diode	

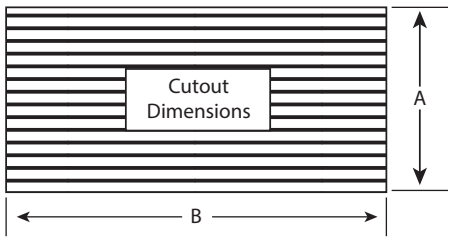
DIMENSIONS

Top View



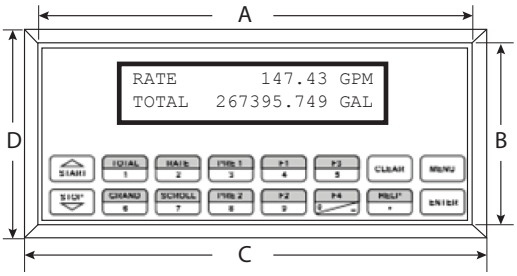
A	0.28 in. (7.2 mm)
B	6.15 in. (156 mm)
C	0.5 in. (13 mm)
D	0.4 in. (10 mm)

Cutout



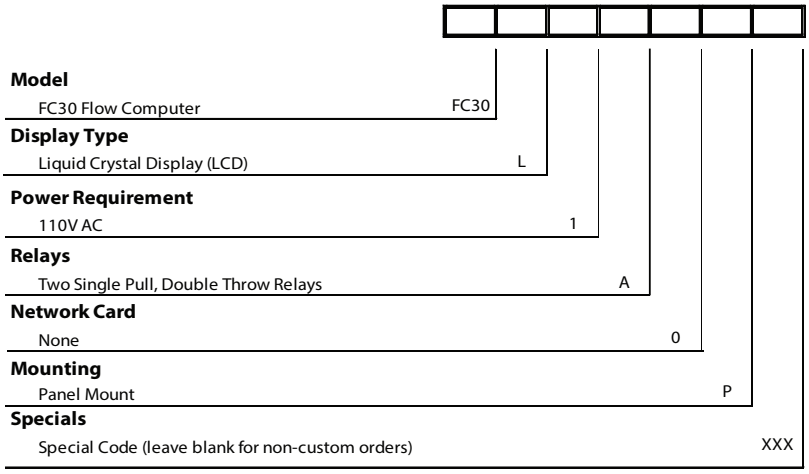
A	2.68 in. (68 mm)
B	5.43 in. (138 mm)

Front View



A	5.67 in. (144 mm)
B	2.83 in. (72 mm)
C	6.18 in. (157 mm)
D	3.43 in. (87 mm)

MODEL NUMBER



Control. Manage. Optimize.

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