

FloBoss™ 104 Flow Manager

The FloBoss 104 Flow Manager (FB104) measures, monitors, and provides control of gas flow for a single rotary meter or turbine meter, using a Pulse Interface Module. This economical flow computer reliably and accurately performs gas flow calculations, data archival, and remote communications.

The FB104 Flow Manager has an explosion proof, weather-tight enclosure, with an optional window and LCD display. This self-contained flow computer has a processor circuit board, internal batteries, a termination board, terminal wiring for a 2- or 3-wire RTD, optional I/O points, and an optional communication card.

The FB104 unit consists of the following components and features:

- A 32-bit main microprocessor with 128 KB of flash boot ROM, 2 MB for flash ROM, and 512 KB of RAM data storage.
- Pulse Interface Module for pulse counts and pressure measurement.
- Support for a 100 ohm, platinum RTD.
- Weather-tight enclosure.
- Local Operator Interface port (LOI).
- EIA-485 (RS-485) Communications Port.

Firmware

The FB104 firmware provides the following functionality. For more information about the firmware, refer to *Product Data Sheet FB100:FW1*.

- AGA7 flow calculations (with user-selectable AGA8 compressibility) for a single rotary or turbine meter.
- Memory logging of 240 alarms and 240 events.
- Standard History Archival of 35 days of hourly data for up to 35 points.
- Extended History Archival for up to 15 points at a configurable interval.
- Radio power control.
- Closed-loop PID control capabilities.
- Logic and sequencing control using two user-defined Function Sequence Table (FST) programs.
- Alarm call-out to a host, known as Spontaneous Report By Exception (SRBX).
- ROC and Modbus protocol support.
- User C programs support for alternate measurement standards and specialty applications. Contact your local sales representative for available programs.
- Pass-Through communications on multiple ports.

The FB104 unit calculates gas flow in accordance with the American Gas Association (AGA) and American Petroleum Institute (API). The FloBoss unit performs AGA7 flow calculations, using AGA8 compressibility methods. Pulse counts and pressure measurement come from the Pulse Interface Module, and flowing temperature is acquired directly from a RTD probe.

The FloBoss unit maintains API Chapter 21.1 compliant historical archives.

Configuration Software

The field I/O, pulse count inputs, flow calculation, history logging, and all other functions are accessed and configured using ROCLINK™ 800 Configuration Software (see *Product Data Sheet RL800*).

Termination Board

The termination board provides terminations for the RTD input, the LOI communications port, the EIA-485 (RS-485) communications port, the optional communications card, and a power supply.



FloBoss 104 Flow Manager (shown with optional 2-watt solar panel)

The Local Operator Interface (LOI) port provides a direct, local link between the FloBoss unit and a personal computer (PC). A PC on the LOI port running ROCLINK 800 software can configure the functionality of the FloBoss unit and monitor its operation. In addition, a host computer can remotely configure the FloBoss unit through the optional communications port.

Diagnostics

Four diagnostic inputs in the FloBoss unit are dedicated to monitoring internal voltage, battery voltage, charge input voltage, and enclosure temperature.

Pulse Interface Module

The Pulse Interface Module consists of two parts: a pulse counter interface and optional pressure transducers.

- When used with a rotary meter, the Pulse Interface Module creates and measures electrical signals (pulses) from the rotary meter and raw pressure inputs from the pressure transducers. The module automatically interprets the direction of rotation (CW or CCW) without any extra parts. The module has a resolution of 1000 pulses per revolution.
- When used with a turbine input, the pressure is measured by the pressure transducers and pulses from the turbine meter are measured by the Pulse Input on the optional I/O board.

The Pulse Interface Module makes the readings available to the processor board. The pressure inputs are read from Analog Inputs, while the pulse counts are read as a Pulse Input.

The optional integral pressure transducers provide the measurement of the line pressure (P1) and can optionally measure auxiliary pressure (P2).

The Pulse Interface Module mounts to the base of the FloBoss 104 unit. The Pulse Interface Module has a non-contact interface to the mechanical interface of the meter.

The FB104 assembly has holes on the base of the Pulse Interface Module housing that allow the FB104 to be mounted directly and easily on a rotary or turbine meter.

Housing

The explosion-proof, type 4 enclosure protects the electronics from physical damage and harsh environments. The enclosure allows the FB104 to be located in Class I, Div. 1 areas, when properly installed with conduit seals and a plug in the top of the housing. When the optional solar panel mast is attached, the enclosure must only be located in Class I, Div. 2 or non-hazardous areas.

The caps at either end of the enclosure can be unscrewed to allow field maintenance. The enclosure has two 3/4-inch pipe

threaded holes for field wiring, communications or panel access.

Mounting

The Pulse Interface Module housing has bracket holes that allow assembly to mount to pipestand or bracket.

Options

Liquid Crystal Display (LCD) - Through the optional LCD display, you can view selected data stored in the FloBoss unit. The LCD is typically used to display flow data, time and date, real-time parameters and user-specified parameters. The LCD displays two lines: the top line has 8 numeric characters and the bottom line has 5 alpha-numeric characters. The display scrolls through the configured list of items, when activated by the user.

Dial-up Modem Card, EIA-232 (RS-232) or EIA-485 (RS-485) Serial Communications Card - Optional communications cards (installed on the Com2 port) provide the ability to send and receive data remotely via a dial-up modem card, EIA-232 (RS-232) serial communications card, or an EIA-485 (RS-485) serial communications card.

6 Points of Expansion I/O - The termination board provides terminations for six optional I/O points. Five of the six points of I/O are selectable. The six points of I/O consists of one Discrete Output (non-selectable), two Analog Input/Discrete Input (software-selectable), one Analog Output/Discrete Output (jumper-selectable), and two Pulse Input/Discrete Input (software-selectable). See *Specification Sheet 5.3:IO6*.

Solar Panel Mast Assembly - Optional solar panels with mast and mounting hardware provide either 2 or 5 watts of power for the FB104. As shown on page 1, the solar panel mast assembly mounts to the top of the FB104 enclosure. See the approval section for installation.

Internal Batteries - The optional internal, rechargeable, lead-acid batteries provide 6.2 volts dc to the FB104 unit. The batteries are re-chargeable by means of the charger board. See the approval section for installation.

Warning: Connecting the FB104 to a continuous power source without removing the battery charger module may result in battery overcharging and failure. See *Section 3.5.1, Overcharging Potential in the FloBoss 103 and 104 Flow Manager Instruction Manual* (part D301153X012).

Accessories

Accessories available for the FB104 include a Local Operator Interface cable (required for local configuration). Contact your local sales representative for more information.

FloBoss™ 104 Flow Manager

CPU Module		
Processor	32 bit, running at 3.68 MHz	
Memory	Program	2 MB flash EPROM (programmable) for firmware and configuration
	Data	512 KB SRAM
	Boot	128 KB Flash EPROM
Clock	Real Time. Year/Month/Day and Hour/Minute/ Second. Battery Backed. ±5 second/year accuracy	
Diagnostics	These conditions are monitored and alarmed: Pulse Interface Module and RTD point fail; battery, charger and internal voltages; internal temperature.	
Communications		
Ports on CPU module	LOI (Local Operator Interface)	EIA-232 (RS-232C), Software configurable, 1200 to 19,200 bps rate selectable
	COM1	EIA-485 (RS-485), software configurable, 1200 to 19,200 bps rate selectable
	COM2 (Host)	EIA-232 (RS-232), EIA-485 (RS-485), or 2400 baud Dial-up Modem. EIA-232, EIA-485, or Modem requires optional communications card.
Protocols	ROC or Modbus Slave or optional Modbus Host (ASCII or RTU) on all ports	
Inputs/Outputs		
RTD Input	Quantity	1
	Type	2 or 3-wire RTD element with alpha of 0.00385.
	Terminals	“RTD+” current source, “RTD+” signal positive input, and “RTD RET” signal negative input
	Sensing Range ¹	-40 to +240 °C (-40 to +464 °F) (default)
	Accuracy ¹	±0.2 °C (0.64 °F) over sensing range (includes linearity, hysteresis, repeatability)
	<p>1. The accuracy depends on the span calibrated for the sensing range of the RTD Input. The sensing range is the difference between the calibrated zero and calibrated span. The sensing range may be changed from the defaults during calibration. When the sensing range is less than or equal to 300 °C, the accuracy is 0.2°C. When the sensing range is greater than 300 °C, the accuracy is 0.5 °C. Sensing range limits are -40 to +800 °C.</p>	
	Ambient Temperature Effects per 28°C (50°F)	±0.50 °C (0.90 °F) for process temperatures from -40 to +240 °C (-40 to +464 °F)
	Filter	Band-pass hardware filter
	Resolution	16 bits
	Sample Period	1 second minimum
Power		
Internal Batteries	Lead-acid. Rechargeable. Nominal 6.2 V dc, 2.5 amp-hour. Battery life with no charging input and no communications: 1 week.	
External Power Charging Input	8-28 V dc. Reverse Polarity Protection.	

Input Power	10-15 mA nominal. 20 mA at 100% duty cycle (battery charging not included)		
Solar Panel (optional)	2 Watts Output	9 V nominal	
		Size	114 mm by 159 mm (4.5 in. by 6.25 in.)
	5 Watts Output	9 V nominal	
		Size	222 mm by 229 mm (8.75 in. by 9 in.)

Physical

Dimensions	160 mm H by 148 mm W by 216 mm D (6.3 in H by 5.8 in W by 8.5 in D), excludes mounting flange and interface. Depth, D, is end cap to end cap dimension.		
Weight	4.3 kg (9.5 lbs) approximate, with Pulse Interface Module		
Enclosure	Housing and Cap	Die-cast aluminum alloy with iridite plating and paint	

Environmental

Operating Temperature	-40 to +75 °C (-40 to +167 °F)		
	LCD Display	-20 to +75 °C (-4 to +167 °F)	
Storage Temperature	-50 to +85 °C (-58 to +185 °F)		
Operating Humidity	5 to 95%, non-condensing		
Radiated/Conducted Transmissions	Meets requirements of IEC 61326 Electrical Equipment for Measurement, Control and Laboratory Use, Industrial locations		
Radiated Emissions	Meets FCC Part 15, Class A		
Vibration	Meets SAMA PMC 31.1		

Pressure Transducer Input


Type	Sealed gauge		
Range Options	0 – 6.9 bar (0 – 100 psi) 0 – 20.7 bar (0 – 300 psi) 0 – 69.0 bar (0 – 1000 psi)		
Operating Temperature	-40 °C to +70 °C (-40 °F to +158 °F)		
Accuracy (includes linearity, hysteresis, and repeatability)	Range	0 – 6.9 bar (0 – 100 psi)	±0.35% of URL
		0 – 20.7 bar (0 – 300 psi)	±0.35% of URL
		0 – 69.0 bar (0 – 1000 psi)	±0.35% of URL
Ambient Temperature Effect	Range	0 – 6.9 bar (0 – 100 psi)	±0.35% of URL per 50°F (28°C) over the operating temperature range
		0 – 20.7 bar (0 – 300 psi)	±0.35% of URL per 50°F (28°C) over the operating temperature range
		0 – 69.0 bar (0 – 1000 psi)	±0.35% of URL per 50°F (28°C) over the operating temperature range



Physical (Pulse Input Module)

Construction	Interface housing	6061 aluminum, painted
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	Pressure Transducers	SST
	Mounting flange	6061 aluminum
Process Connections	1/4-18 NPT, located on sides of interface.	

Approvals

Product Markings for Hazardous Locations	CSA C-US	<p>Certified by CSA</p> <p>Model W40106 Class I Division 1, Groups C & D Explosion-proof Type 4 enclosure</p> <p>Model W40106 Class I, Division 2, Groups A, B, C, & D Temperature Code T3 Non-incendive Type 4 enclosure</p> <p>Model W40112 Class 1, Division 2, Groups A,B,C, & D Temperature Code T3 Non-incendive (T_{amb} = 75°C) Type 4 enclosure</p>
		
Evaluated per Approval Standards		<p>CAN/CSA-C22.2 No. 0-M91 CAN/CSA-C22.2 No. 94-M91 CSA-C22.2 No. 30-M1986 CSA-C22.2 No. 142-M1987 CSA-C22.2 No. 213-M1987 UL No 50 (11th Edition) UL No. 1203 (4th Edition) UL No. 1604 (3rd Edition) ANSI/UL No 508 (16th Edition) ANSI/ISA No. 12.12.01-2007 ISA No. 12.27.01-2003</p>

ATEX	Certified by LCIE
	<p>Model W40116 Cert LCIE 03 ATEX 6221 X X/05 EX II 2 G Ex d IIB T5 Gb (T_{amb} = 75°C) Type d or Flameproof (Zone 1) IP66 enclosure</p> <p>Model W40116 Cert LCIE 13 ATEX 1033 X EX II 3 G Ex nA IIC T3 Gc (T_{amb} = 75°C) Type n (Zone 2) IP66 enclosure</p>
	
	<p>Evaluated per Approval Standards EN60079-0:2012(Flameproof) EN60079-1:2007(Flameproof) EN60079-15:2010(Type N) EN60079-0:2012(Type N) IEC 60529</p>
IECEX	Certified by IECEX
	<p>Model W40149 Cert IECEX LCI 08.0039X Ex d IIB T5 Gb (T_{amb} = 75°C) Type d or Flameproof (Zone 1) IP66 enclosure</p> <p>Model W40149 Cert IECEX LCI 08.0015 Ex nA IIC T3 Gc (T_{amb} = 75°C) Type n (Zone 2) IP66 enclosure</p> <p>Model W40150 Cert IECEX LCI 08.0015 Ex nA IIC T3 Gc (T_{amb}=75°C) Type n (Zone 2) IP66 enclosure</p>
	<p>Evaluated per Approval Standards IEC 60079-0:2011 Edition 6.0 IEC 60079-1: 2007 Edition 6.0 IEC 60079-15:2010 Edition 4 IEC 60529</p>
Miscellaneous Approvals	RoHS2
	<p>RoHS (2) EU Directive 2011/65/EU: This product may be considered out-of-scope when used for the intended design purpose in a Large Scale Fixed Installation (LSFI). Consult https://www.emerson.com/compliance for up-to-date product information.</p>
	RoHS (China)
	

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