FloBoss™ 503 Flow Manager

The FloBoss™ 503 Flow Manager measures, monitors, and manages gas flow for a single meter run using orifice plate (differential pressure) techniques. This economical flow computer reliably and accurately performs gas flow calculations, data archival, and remote communications.

The FloBoss has a weather-tight enclosure with a cover-protected window for a Liquid Crystal Display (LCD). The enclosure contains a processor circuit board with built-in Inputs/Outputs (I/O), along with mounting provisions for batteries, a radio, optional I/O cards, and optional communication cards.

The built-in I/O consists of a Dual-Variable Sensor (DVS) port, a direct 4-wire Resistive Temperature Device (RTD) interface, and a Discrete Output (DO) capable of directly driving a sampler or odorizer.

The FloBoss contains a 32-bit Complementary Metal Oxide Semiconductor (CMOS) microprocessor, which has multiple low-power operating modes. The FloBoss comes standard with 512 KB of built-in Static Random Access Memory (SRAM) for storing data and history. A super capacitor provides backup power for the SRAM. The FloBoss has 512 KB of programmable read-only memory (flash ROM) for storing operating system firmware, configuration parameters, and applications firmware.

FloBoss 503 Flow Manager

The FloBoss consists of the following components and features:

- 32-bit main microprocessor, with 512 KB of flash ROM and 512 KB of static RAM storage.
- Built-in RTD Input and Discrete Output.
- Extensive applications firmware.
- Weather-tight enclosure with covered display.
- Space for up to four 7-Amp-hour batteries.
- Local Operator Interface (LOI) port.
- Port for optional host communications card (Comm1).
- Provision for optional I/O cards.
- Optional Dual-Variable Sensor (DVS) for static pressure and differential pressure measurement.
- Optional bracket for internally mounted radio.
- Optional Low-Current Power Supply and battery charger.

The **firmware** provides:

- 1992 AGA-3 flow calculations (orifice metering plus compressibility factors) for a single meter run.
- Memory logging of 240 alarms and 240 events.
- Archival of data for up to 15 history points.
- Power cycling control for a radio through Data Terminal Ready (DTR) signal or switching feature of EIA-232 (RS-232) communications card.
- Closed-loop Proportional, Integral, and Derivative (PID) control capabilities.
- Modbus slave protocol.
- Logic and sequencing control using two user-defined Function Sequence Table (FST) programs.
- Alarm call-in to a host using Spontaneous-Report-by-Exception (SRBX).
- Security access levels.

The firmware also provides an audit trail per American Petroleum Institute (API) Chapter 21.1.

The FloBoss 503 calculates gas flow in accordance with the American Gas Association (AGA) and API. The FloBoss performs 1992 AGA3 orifice flow calculations, using AGA8 compressibility. Differential pressure and static pressure come from the DVS, and flowing temperature is acquired directly from an RTD probe.

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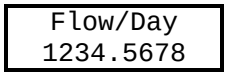
Use ROCLINK™ 800 Configuration Software to set up and configure the field I/O (including DVS inputs), flow calculation, history logging, and all other functions.

The Local Operator Interface (LOI) port provides a direct, local link between the FloBoss and a personal computer. With the personal computer running ROCLINK software, you can configure the functionality of the FloBoss and monitor its operation. In addition, a host computer can remotely configure the FloBoss through the host communications port (Comm1).

Through the LCD on the front panel, you can view selected data stored in the FloBoss. You can configure up to 16 items for viewing and the display scrolls through the configured list of items.



Sample FloBoss Display

Screw terminals on the processor board provide terminations for DC power, the RTD input, a discrete output, and non-switched radio power. Three diagnostic inputs monitor input power, battery voltage, and enclosure temperature.

The steel enclosure protects the electronics from physical damage and harsh environments. The enclosure has a hinged and gasketed door that is secured by a lockable hasp. The enclosure also has mounting flanges that allow the enclosure to be fastened to a wall or panel, or mounted on a pipestand. A swing-up cover protects the display.

Options

The FloBoss 503 supports the following options:

- FloBoss 500-Series Communications Cards.
- FloBoss 500-Series I/O Cards.
- Radio Bracket.
- Intrusion Switch.
- Low-Current Power Supply.
- Dual-Variable Sensor (DVS).
- Remote Multi-Variable Sensor (MVS) Interface.

The **Intrusion Switch** provides a closed contact whenever the door is opened. A discrete input contact on the optional I/O card monitors and alarms the FloBoss.

The **FloBoss 500-Series Communication Cards** provide an interface for the host communications port (Comm1) on the processor board. The FloBoss can use one of any of the following types of cards:

- EIA-232 (RS-232) for asynchronous serial communications, such as used with a radio.
- EIA-485 (RS-485) for asynchronous serial communications.
- Dial-up modem for communications over a telephone network.

The **FloBoss 500-Series I/O Cards** provide additional inputs and outputs for expanded monitoring and control applications. The boards contain Analog Inputs, Discrete Inputs, Pulse Inputs, Discrete Outputs, and Analog Outputs. The IOB1 board has 10 I/O points, and the IOB2 board has 24 I/O points. For the quantity of each type of I/O and other details, refer to Specification Sheets 3:IOB1 and 3:IOB2.

The **DVS** uses the proven Rosemount capacitance cell technology to sense differential pressure. It also uses piezoresistive, silicon sensor technology to sense static pressure and provide extremely accurate, stable and repeatable readings. A dedicated microprocessor in the DVS linearizes and corrects the raw sensor signals using characterization data stored in non-volatile memory.

The DVS bottom consists of a Rosemount-designed Coplanar™ flange, which provides drain/vent valves and process connections. The DVS is factory-attached to the FloBoss 503 enclosure using a flanged coupler. For more information, refer to *Specification Sheet 2.5:DVS205*.

A CR1 communication package allows connection to an external **Remote MVS** sensor, instead of the integral DVS sensor. This allows measurement in hazardous Class I Div. 1 locations.

The internal **Low-Current Power Supply** converts Alternating Current (AC) line power to Direct Current (DC) power for use with the FloBoss and accessories. The power supply, which is installed in the left-most battery position, also functions as a battery charger.

The **Radio Bracket** allows a radio up to 57.15 millimeters (2.25 inches) high to mount securely above the battery compartment inside the FloBoss enclosure.

FloBoss 503 Flow Manager Specifications

PROCESSOR INFORMATION

Motorola 32 bit, running at 14.7 MHz.

Program Memory: 512 KB flash ROM (electrically programmable) for firmware and configuration.

Data Memory: 512 KB SRAM, super capacitor-backed for up to four weeks.

Memory Reset: A reset jumper enables a cold start initialization when used during power-up.

TIME FUNCTIONS

Clock Type: 32 kHz crystal oscillator with regulated supply, super capacitor-backed. Year/Month/Day and Hour/Minute/Second, with Daylight Savings Time control.

Clock Accuracy: 0.01%.

Watchdog Timer: Hardware monitor expires after one second and resets the processor.

DIAGNOSTICS

These conditions are monitored and alarmed: SRAM validity/operation, sensor and RTD point fail, battery and charging voltages, and internal temperature.

COMMUNICATIONS

Operator Interface: EIA-232 (RS-232D) format. Software configured, 600 to 19,200 bps baud rate selectable. Screw-cap protected connector.

Host: Serial or modem interface, when optional communications card is installed.

POWER

Battery Input: 10 to 15 V dc (normally 10.8 V dc to start up). 0.2 W typical, including sensor power, but excluding power for discrete output load, communications card, and I/O card.

Charging Input: 14 to 22 V dc. Charge current internally limited to 1.0 Amp.

Power Supply (Optional): 105 to 132 or 207 to 264 V ac, 47 to 63 Hz.

LOCAL DISPLAY

Two line by 16 character Liquid Crystal Display (LCD). Continually updates approximately every three seconds.

RTD INPUT (BUILT-IN)

Quantity / Type: Single input for a 2, 3, or 4-wire RTD element with alpha of 0.00385.

Terminals: “REF” current source, “+” signal positive input, “–” signal negative input, and “RET” return (common).

RTD INPUT (BUILT-IN) (CONTINUED)

Sensing Range: –50 to 100°C (–58 to 212°F).

Accuracy: ±0.56°C (1.0°F) over sensing range (includes linearity, hysteresis, repeatability).

Ambient Temperature Effects per 28°C (50°F): ±0.50°C (0.90°F) for process temperatures from –40 to 100°C (–40 to 212°F).

Filter: Band-pass hardware filter.

Resolution: 16 bits.

Conversion Time: 100 microseconds.

Sample Period: 1 second minimum.

DISCRETE OUTPUT (BUILT-IN)

Quantity / Type: One sourced, high-side switched output.

Terminals: “+” positive output, “–” negative (common).

Voltage: Same as applied to battery input minus 0.7 volts.

Frequency: 1.5 Hz maximum.

Sample Period: 200 milliseconds minimum.

Current Limit: 300 mA, automatic reset.

I/O CARD (OPTIONAL)

See Specification Sheets 3:IOB1 and 3:IOB2.

ENVIRONMENTAL

Operating Temperature: –40 to 75°C (–40 to 167°F), excluding LCD display, which is –20 to 70°C (–4 to 158°F).

Storage Temperature: –50 to 85°C (–58 to 185°F).

Operating Humidity: 5 to 95%, non-condensing.

Vibration: Tested to SAMA 31.1 Condition 3, with an abbreviated endurance dwell test.

Radiated / Conducted Transmissions: Complies with requirements for Class A Information Technology Equipment per EN 55022 (1995) and CISPR 22 (1993). Also complies with FCC Part 15 Class A and with ICES-003 of the Canadian Interference-Causing Equipment Regulations.

Voltage Surge Immunity: Designed to meet IEC 801-4 and IEC 801-5, as required by EN 50082-2.

ENCLOSURE

Construction: Powder-coated (gray polyurethane) 14-gauge carbon steel with lockable hasp and gasketed door. All unpainted hardware is stainless steel. Meets CSA Type 4 rating (NEMA 4 equivalent).

Wiring Access: Three 0.88-inch pre-punched holes in bottom.

FloBoss 503 Flow Manager Specifications

DIMENSIONS

Overall: 451 mm H by 350 mm W by 184 mm D (18.12 in. H by 13.80 in. W by 7.25 in. D). Height includes top mounting flange and sensor.

Wall Mounting: 350 mm H by 72 mm W (13.80 in. H by 2.81 in. W) between mounting hole (0.38 in. diameter) centers.

Pipestand Mounting: Mounts on 2-inch pipe with U-bolt mounting kit (supplied).

WEIGHT

13.0 kg (28.5 lb) nominal, including sensor and coupler, but excluding batteries (not supplied). Low-Current Power Supply adds 0.82 kg (1.8 lb).

INTRUSION SWITCH (OPTIONAL)

SPST, normally-closed, hermetically-sealed. Uses discrete input on optional I/O card.

APPROVALS

Approved by CSA as Model W40079 for hazardous locations Class I, Division 2, Groups A, B, C, and D, C US.

Accessories

Accessories available for the FloBoss include the remote MVS interface and an operator interface cable (required for local configuration). Contact your local sales representative for additional information.

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