

# FloBoss 407 Operating System Firmware

The FloBoss™ 407 Operating System Firmware provides a complete operating system for either the standard or the Measurement Canada Version of the FloBoss 407 Flow Manager. The firmware supports:

- Task Execution.
- Real-Time Clock.
- Input/Output Database.
- Historical Database.
- Log Databases.
- User Interface.
- Communications.
- Applications Firmware.
- Security.
- Self-Tests.
- Calibration.
- Custom Displays.

The firmware is contained in flash ROM and makes extensive use of configuration parameters, which are configured using ROCLINK™ 800 Configuration Software (version 1.50 or greater). See Specification Sheet 4:RL800.

**Task Execution** – The operating system is structured around ten tasks that are executed on a 100-millisecond cycle. The tasks are executed in a priority order. The ten tasks are: Input/Output (I/O) scanning; scaling Engineering Units (EUs); Proportional, Integral, and Derivative (PID) control; American Gas Association (AGA) calculations; communications; database updates; Function Sequence Tables (FSTs); two user program tasks; and the wait task. The communications task handles up to three user programs, and each user program task can run two user programs.

**Real-Time Clock** – The real-time clock can be set by the user for year, month, day, hour, minute, and second. It provides time stamping of database values. The clock firmware tracks the day of the week and corrects for leap year.

**Input/Output Database** – The number of input or output points supported by the operating system firmware includes the built-in inputs, Multi-Variable Sensor (MVS) inputs, and any I/O modules. The firmware automatically determines the type and location of each installed I/O module.

Each input and output is assigned a point in the database; this point includes configuration parameters for assigning values, statuses, or identifiers as appropriate. The firmware scans each input, placing the values into the respective database point. These values are made available for display and historical archiving.

**Historical Database** – The historical database provides archiving of measured and calculated values for on-demand viewing or saving to a file. Each point in the historical database (up to 50 points) can be configured to archive values under various schemes (such as averaging or accumulating), as appropriate for the type of database point. Four types of historical databases are maintained: Min/Max, Minute, Hourly, and Daily (based on a configurable contract day start).

**Log Databases** – The Event Log records the last 240 parameter changes and power on/off cycles. The Alarm Log records the last 240 occurrences of alarms (set or clear). The Audit Log (Measurement Canada Version only) records the last 240 parameter changes affecting the audit trail of AGA flow calculations. The event and alarm logs can be viewed, saved to a disk file, or printed using ROCLINK 800 software.

The firmware provides an audit trail per API Chapter 21.1.

**User Interface** – Dedicated support is provided for the display and keypad located on the front of the FloBoss. The display and keypad can be used to view database values gathered and stored by the operating system and to edit numerical configuration parameters and perform calibrations. This user interface is password protected.

**Communications** – The operating system uses ROC protocol to support serial communications and radio or telephone modem communications to local or remote devices, such as a host computer.

The FloBoss also supports other communications protocols, such as the Modbus protocol. This allows the FloBoss to be easily integrated into host driver systems.

**Application Firmware** – The operating system firmware supports the application-specific firmware supplied in the flash ROM. The application firmware includes:

- AGA Flow calculations.
- PID Control.
- Function Sequence Tables (FSTs).
- Radio Power Control.
- Spontaneous-Report-by-Exception (SRBX) Communications Enhancement.

**Note:** Turbine meter (AGA7) calculations support Pulse Input frequencies up to 2.3K Hertz. In applications with an input frequency above 2.3K Hertz an incorrect total may be archived for raw pulses in hourly and daily history logs. Accumulated flow and energy totals are not affected.

**Security** – A maximum of 16 log-on identifiers (IDs) for operators may be stored in the operating system. Each ID is associated with a user access level. IDs and passwords are shared for LCD and comm port security. For the unit to communicate, the log-on ID supplied to the ROCLINK 800 Configuration Software must match one of the stored IDs in the FloBoss unit. Security protection can be enabled individually for each communications port. By default, security is disabled on all ports.

**Self-Tests** – The operating system firmware supports diagnostic tests on the FloBoss 407 hardware, such as RAM integrity, real-time clock operation, input power voltage, board temperature, watchdog timer, and analog input A/D conversion accuracy.

**Custom Displays** – Displays can be created and accessed using ROCLINK software. Two displays can be stored in FloBoss memory. Custom displays are used to view or edit parameters and database values.

**Calibration** – The operating system firmware supports calibration of Analog Inputs by a prompted procedure in ROCLINK 800 Configuration Software. This includes “5-point” calibration (high, low, and up to three mid-point readings).

**FloBoss 407 Operating System Firmware Specifications**

**SYSTEM VARIABLES (DEVICE INFORMATION)**

**Configurable:** Contract hour, Device group, Device address, station name, active PIDs, active AGAs.

**Monitor-only:** Firmware version, time created, serial number, MPU loading, history database points.

**MVS INPUT PARAMETERS**

**Configurable:** Sensor tag, sensor address, sensor configuration, poll mode, sensor status, sensor alarms, DP values, pressure values, temp. values, DP full scale, calibrate command.

**Monitor-only:** Point number, sensor voltage, pressure and temp. full scale, DP minimum scale, pressure minimum scale, temp. minimum scale, static pressure effect, manual DP, AP, and PT.

**ANALOG INPUT PARAMETERS**

**Configurable:** Point tag, units name, scan period, filter value, A/D converter 0%, A/D converter 100%, low-reading EU, high-reading EU, alarm limits (low, high, low-low, high-high, rate), alarm deadband, filtered EUs, mode (manual, report-by-exception, averaging enable).

**Monitor-only:** Point number, alarm state.

**ANALOG OUTPUT PARAMETERS**

**Configurable:** Point tag, units, adjusted D/A 0% and 100% values, low-reading EU, high-reading EU, value in EUs, mode (manual, report-by-exception, clear-on-reset).

**Monitor-only:** Point number, alarm state, D/A output value.

**DISCRETE INPUT PARAMETERS**

**Configurable:** Point tag, input filtering, input status, modes (manual, report-by-exception, time duration input, latched input, inversion), TDI alarm limits, accumulated value, on/off counter, 0% and 100% count.

**Monitor-only:** Point number, alarm state, TDI count.

**DISCRETE OUTPUT PARAMETERS**

**Configurable:** Point tag, time on, output status, mode (manual, toggle, momentary, or TDO), accumulated value, units name, cycle time, 0% count, 100% count, low-reading EU, high-reading EU, EU value.

**Monitor-only:** Point number, alarm state.

**PULSE INPUT PARAMETERS**

**Configurable:** Point tag, units name, rate or accumulation, rate period, scan period, conversion, alarm limits, alarm deadband, value in EUs, mode (manual, report-by-exception, conversion), accumulated value, today's total.

**Monitor-only:** Point number, alarm state, current rate, yesterday's total.

**DATABASE LOGGING**

**Min/Max Database:** Archives min/max values of selected variables for the current and previous day.

**Minute Database:** Archives minute values for the past 60 minutes.

**Hourly Database:** Archives 35 days of hourly values.

**Daily Database:** Archives 35 days of daily values.

**Alarm Logs:** Records 240 alarms.

**Event Logs:** Records 240 events (such as parameter changes and power cycling).

**Audit Logs (Measurement Canada Version only):** Records 240 flow-related parameter changes.

**COMMUNICATIONS PARAMETERS**

**Configurable:** Port tag, baud rate, stop bits, data bits, parity, mode, key-on delay, key-off delay, retry count, retry time, SRBX comm, Store and Forward comm.

**Monitor-only:** Status, retry counter.

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