ROC300-Series Operating System Firmware

The ROC300-Series Operating System Firmware provides a complete operating system for a ROC300-Series Remote Operations Controller. The firmware supports:

- Task Execution.
- Real-Time Clock.
- Input/Output Database.
- Historical Database.
- Event and Alarm Log Databases.
- User Interface.
- Communications.
- Applications Software.
- Self-Tests.
- ROC Displays.

The firmware, available in the FlashPAC memory module, makes extensive use of configuration parameters, which are configured using ROCLINK™ 800 Configuration Software.

Task Execution – The operating system is structured around eight or nine tasks that are executed on a 100 millisecond cycle. The tasks are executed in a priority order. The tasks are I/O scanning; Proportional, Integral, and Derivative (PID) control; American Gas Association (AGA) calculations, communications, database updates; Function Sequence Tables (FSTs); user programs; and the system task. The communications and user program tasks can each run multiple user programs, for a total of up to eight programs.

Real-Time Clock – The real-time clock can be set by the user for year, month, day, hour, minute, and second. It is used to provide time stamping of database values, event logs, and alarm logs.

Input/Output Database – The number of input or output points supported by the operating system firmware includes any built-in inputs, built-in outputs, and 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 calculated values, statuses, or identifiers as appropriate.

The firmware scans each input, placing the values into the respective database point. These values are 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 of the 87 points in the historical database 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).

American Petroleum Institute (API) Chapter 21.1 compliant historical archives are maintained for hourly and daily databases.

Event and Alarm 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 logs can be viewed, saved to a disk file, or printed by using ROCLINK 800 software.

User Interface – Dedicated support is provided for the optional ROC300-Series Local Display Panel, which mounts in the ROC enclosure door. The display panel can be used to view database values gathered by the operating system. It also allows values to be modified

Communications – The operating system uses its own specialized protocol to support serial communications and radio or telephone communications to local or remote devices like a host computer. The ROC also supports other communications, such as the Modbus protocol. This allows the ROC to be easily integrated into systems.

Applications Software – The operating system firmware supports the application-specific software (most of which is in firmware) loaded in ROC memory. The applications software, which is more fully described in other specification sheets, includes:

- AGA Flow Calculations.
- PID Control.
- Function Sequence Tables (FSTs).
- Spontaneous Report by Exception (SRBX), which allows call-out to host system for alarm notification.
- Local Display Panel Enhancement for configuration access.
- Radio Power Control.
- Support for User C programs for specialty requirement.

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

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ROC Displays – ROC displays can be created and accessed by using the ROCLINK 800 software. Two displays can be stored in ROC memory.

ROC displays can be used to view or edit parameters and database values. Access is controlled by security features.

Calibration Support – The operating system firmware supports calibration of analog inputs by means of a prompted procedure in the ROCLINK 800 software. This includes "5-point" calibration (high, low, and up to three mid-point readings).

ROC300-Series Operating System Firmware Specifications

SYSTEM VARIABLES

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

Read-only: Includes firmware version, time created, serial number, RAM installed, MPU loading, history database points.

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, clipping enable).

Read-only: Point number, alarm state, raw A/D input value.

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).

Read-only: Point number, alarm state, raw 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, accum. value, on/off counter, 0% and 100% count.

Read-only: Point number, alarm state, TDI count.

DISCRETE OUTPUT PARAMETERS

Configurable: Point tag, time on, clear-on-reset or hold-last-value, mode (manual, toggle, momentary, or TDO), accum. value, units name, and TDO mode only parameters: cycle time, 0% count, 100% count, low-reading EU, high-reading EU, and EU value.

Read-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, rate or totalizing), accumulated value, today's total.

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

HISTORICAL DATABASE

Historical Database Points: 87.

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 hourly averages or accumulations for 35 days.

Daily Database: Archives daily averages or accumulations (on contract day basis) for 35 days.

Alarm Logs: Records 240 alarms.

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

COMMUNICATIONS PARAMETERS

Configurable: Port tag, baud rate, stop bits, data bits, parity, mode, key-on delay, key-off delay, report-by- exception (RBX) communications.

Read-only: Status, retry counter.

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