

# ROC312 Remote Operations Controller

The ROC312 Remote Operations Controller (ROC) is a microprocessor-based controller that provides the functions required for a variety of field automation applications. The ROC312 provides remote monitoring, measurement, data archival, and control. The ROC312 is ideally suited to applications requiring flow computation; continuous and batch measurement calculations; Proportional, Integral, and Derivative (PID) control; and logic/sequencing control.

The ROC312 is available either in a standard version (Class I, Division 2 approval) or in a Measurement Canada version, which includes Class I, Division 2 approval.

The ROC312 uses a single-board design that places the main circuitry, including five process inputs and two process outputs (I/O), on a common circuit board. In addition, the ROC312 can accommodate six plug-in I/O modules of any type and in any combination.



ROC312 Remote Operations Controller

The ROC312 consists of these components and features:

- FlashPAC module (standard).
- Three analog inputs.
- Two discrete inputs or pulse inputs.
- One discrete output and one auxiliary output.
- Connections for operator interface.
- Status indicators and diagnostic inputs.
- Expansion slots for six I/O modules.
- Mounting provisions for an optional communications card and HART® Interface Card.

The FlashPAC module contains the operating system, ROC communications protocol, and applications firmware. The applications firmware consists of built-in functions, such as American Gas Association (AGA) flow calculations; Proportional, Integral, and Derivative (PID) loop control; and Function Sequence Table (FST) control. The ROC312 also maintains an audit trail per American Petroleum Institute (API) Chapter 21.1. The FlashPAC module also provides additional battery-backed RAM for user programs.

The ROC312 offers 1992 AGA flow calculations contained in the firmware.

The ROC312 has a 16-bit CMOS microprocessor that can address up to one MB of memory space. The ROC312 comes standard with 128 KB of on-board, battery-backed Static Random Access Memory (SRAM) for storing alarm/event logs and history data, plus 8 KB of Electrically Erasable Programmable Read-Only Memory (EEPROM) for storing configuration parameters.

Three analog inputs, two discrete or pulse inputs, and two discrete outputs are built in and available for interfacing to measurement and control instrumentation. The parameters for these I/O channels are configured using ROCLINK™ 800 Configuration Software.

One of the two built-in discrete outputs is designated as an auxiliary output; its terminals are located next to the power input terminals. This can be used to switch power to auxiliary devices, such as a radio.

Six slots for I/O modules are located in the upper cover of the ROC312. Any type and any combination of I/O modules can be plugged into the slots. The I/O modules are configured in the same way as the built-in I/O channels.

The Local Operator Interface port (LOI) provides a direct link between the ROC312 and a personal computer. With the computer running ROCLINK™ 800 Configuration Software, the user can configure the functionality of the ROC312 and monitor its operation.

The display port (labeled DSPL) is dedicated to the Local Display Panel accessory, which mounts in the door of a ROC enclosure. Through this panel, you can access information stored in the ROC312.

Communications card expansion sockets allow a communications card, as well as a HART card, to be added to the ROC312. The communications card uses the COMM port for external communications.

LED indicators show the operation status of the ROC and the activation states of the discrete I/O channels. Two internal diagnostic inputs are dedicated to monitoring the input power and circuit board temperature.

The ROC312 has a metal case that helps protect the electronics from physical damage. For protection from outdoor environments, the unit must be placed in a housing, such as a freestanding or a mountable ROC enclosure.

## Options

The ROC312 supports these options:

- Communications or Multi-Variable Sensor (MVS) combination card.
- HART Interface Card.
- I/O modules.

The **communications card** provides an additional port for communicating with the ROC312. One card of the following types can be accommodated:

- EIA-232 (RS-232) for point-to-point asynchronous serial communications.
- Remote MVS Interface, which combines MVS remote sensor communications with EIA-232 (RS-232) serial communications.
- EIA-422/EIA-485 (RS-422/RS-485) for point-to-point and multiple-point, respectively, asynchronous serial communications.
- Radio modem for communications to a radio.
- Leased-line modem for communications over customer-owned or leased lines.
- Dial-up modem for communications over a telephone network.

The **HART interface card**, which requires that a communications card be present to permit its installation, is available to provide communications with devices using the HART protocol.

**I/O modules** can be added to satisfy a wide variety of field I/O requirements. The types of modules that can be used are:

- Analog Input (loop, differential, or source).
- Analog Output.
- Discrete Input (source or isolated).
- Discrete Output (source or isolated).
- Pulse Input (normal, slow, or low-level).
- Relay Output.
- RTD Input.
- HART Interface Module (can be used instead of the HART interface card).
- Serial I/O (Daniel Gas Chromatograph application).

## Accessories

A number of accessory items are available for the ROC312 that provide environmental housing, power, communications, local monitoring, and I/O lightning protection. Contact your local sales representative for more information.

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**ROC312 Remote Operations Controller Specifications**


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**PROCESSOR**

16-bit running at 8 MHz.

**MEMORY**

**On-Board:** 128KB battery-backed SRAM for data. 8 KB EEPROM for configuration.

**FlashPAC:** Plug-in module with 512 KB of Flash ROM (352 KB used) and 512 KB of battery-backed static RAM (SRAM).

**Memory Reset:** RESET switch (not available on Measurement Canada version) enables a cold start initialization when used during power-up.

**OPERATOR INTERFACE PORT**

EIA-232D (RS-232D) serial format for use with portable operator interface. Baud is selectable from 300 to 9600 bps. Asynchronous format, 7 or 8-bit (software selectable). Parity can be odd, even, or none (software selectable). 9-pin, female D-shell connector provided.

**TIME FUNCTIONS**

**Clock Type:** 32 KHz crystal oscillator with regulated supply, battery-backed. Year/Month/Day and Hour/Minute/Second.

**Clock Accuracy:** 0.01%.

**Watchdog Timer:** Hardware monitor expires after 1.2 seconds and resets the processor. Processor restart is automatic.

**DIAGNOSTICS**

These items are monitored: analog input mid-scale voltage, power input voltage, and board temperature.

**POWER**

**Input:** 8 to 30 V dc. 1 watt typical, excluding I/O power.

**AI Loop:** 23 V dc minimum, 4 to 20 mA provided for transmitter loop power from internal power converter. Available at "T" terminals on built-in analog input channels.

**DI/PI Source:** Input power is routed to discrete input "S+" terminal.

**ANALOG INPUTS (BUILT-IN)**

**Quantity/Type:** Three, single-ended voltage-sense (current loop if scaling resistor is used).

**Terminals:** "T" loop power, "+" positive input, "-" negative input (common).

**Voltage:** 0 to 5 V dc, software configurable. 4 to 20 mA, with 250  $\Omega$  resistor (supplied) installed across terminals "+" and "-".

**Accuracy:** 0.1% over operating temperature range.

**Impedance:** One M $\Omega$ .

**Filter:** Double-pole, low-pass.

**Resolution:** 12 bits.

**Conversion Time:** 30 microseconds.

**Sample Period:** 50 milliseconds minimum.

**DISCRETE/PULSE INPUTS (BUILT-IN)**

**Quantity/Type:** Two isolated or sourced discrete inputs. Inputs software-configurable as two medium-speed pulse counters.

**Terminals:** "S+" source voltage, "S-" source voltage common, "+" positive input, "-" negative input.

**Signal Voltage:** 7 to 30 V dc in the active (on) state, 0 to 4 V dc in the inactive (off) state.

**Frequency:** 50 Hz maximum for discrete inputs; 1000 Hz maximum for pulse inputs.

**Sample Period:** Discrete inputs, 10 millisecond minimum; pulse inputs, 50 millisecond minimum.

**DISCRETE OUTPUTS**

**Quantity/Type:** Two dry-contact SPST relay outputs, one of which is designated "AUX" or auxiliary.

**Terminals:** "NO" normally-open contact; "COM" common.

**Contact Rating:** 30 V dc or 125 V ac, 5 A maximum.

**Isolation:** 4000 volts.

**Frequency:** 10 Hz maximum.

**EXPANSION I/O**

Six slots are provided for I/O modules. Any type and combination of I/O modules can be used.

**ENVIRONMENTAL**

**Operating Temperature:** -40 to 75°C (-40 to 167°F).

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

**Operating Humidity:** To 95% non-condensing.

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## ROC312 Remote Operations Controller Specifications

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