

4 EC Motors

Modbus RTU Interface

Application

The EVO/ECM-Modbus allows an industrial or building automation system to monitor and control high efficiency EC motors over an industry standard Modbus Remote Terminal Unit serial data link. Each EVO/ECM-Modbus interface connects up to four EC motors.

EC motors are high efficiency fractional horsepower motors featuring an internal microprocessor to provide exceptional efficiency, performance and motor life. Many EC motors may be programmed for constant flow, allowing the automation system to set and maintain air balance.

Modbus is an industry standard communications protocol allowing connection to most industrial and building automation systems.

The EVO/ECM-Modbus allows the automation system to control each motor's output and on/off, monitor each motor's RPM and control status, and set default values used during power up and communications interruptions.

A four conductor low voltage control cable connects each motor to the interface. Motor control cables may be up to 100' long.

Low voltage on/off control is provided over the control cable by direct connection to the motor. External relays or starters are not required for EC motors.

The EVO/ECM-Modbus allows adjustment of the motor output from 0% to 100% of the programmed flow control range. The EC motor sends a signal from its tachometer output circuit to the interface. The interface translates this signal to a 0-1500 RPM value.

During the course of operation, the automation system may dynamically change motor outputs, and turn motors on and off to meet current operating needs. Should communications from the automation system fail, the EVO/ECM-Modbus can be set to hold the last commanded values from the automation system, or revert to defaults stored in the interface's non-volatile memory.



Defaults are invoked on power up, and remain active until communications is established and sends dynamic values to the interface.

Each motor has a default action flag, on/off flag, and percent output.

If the default action flag for a motor is set, defaults will be restored to the motor if communication from the automation system ceases for five minutes.

Specifications

Power NEC Class II Only
~24V ± 20% 50/60 Hz
5 Watt , 7 VA

Input ECM Aux Out Must Be
Programmed for RPM

Excitation:
1K82Ω Pulled to +5V
36 200µs Pulses / Turn

Outputs Go & Vspd
+24V @ 20 mA

*Motor Must Be Programmed For Vspd Mode
Signal Supports Autoswitch Function*

Thermal Stability >0.01%/°C
Operating Environment -13 F to 130 F (-25 C to 55 C)
10-90% rh

Modbus RTU Protocol

The physical path is an industry standard RS-485 half-duplex, two wire bus topology. Each bus can connect up to 31 EVO/ECM-Modbus interfaces.

The EVO/ECM-Modbus recognizes three Modbus RTU commands to address 14 registers. The read command (03) brings data from all 14 registers to the automation system. The write registers command (16) writes dynamic operating values to the motors. The automation system uses the Write Single Register command to individually change registers containing default values. Writing to a default register automatically stores the new data in non-volatile E2PROM. The E2PROM also stores the unit address and baud rate selection.

Communications Specification

| | |
|----------------|--|
| Physical Layer | Optically Isolated EIA RS-485 full load Half Duplex/Two Wire |
| Transport | 8 bit asynchronous No parity, 1 stop bit 38.4, 19.2, 9.6, 4.8 or 2.4kb |

Ordering

| | |
|--|--|
| Controller: | EVO/ECM-Modbus |
| Cables: | See <i>ECM Cable Datasheet</i> for Details |
| Motor Cable Custom Lengths To 100' | ECM-CBL_ _ Substitute the length in feet for the last two digits. |

Mounting

Mount the EVO/ECM-Modbus inside a metal control cabinet or enclosure. All external connections are made to one side of the board. Make a rectangular cutout in the side of the enclosure when the application requires external plug in of motor and communication cables. Tightly fasten the control mounting posts to a grounded metal surface. Remove paint or other insulating materials around the area where the mounting posts contact the metal mounting surface.

Wiring

Power the EVO/ECM-Modbus with a ~24V 50/60 Hz low voltage power source. Connect the earthed/neutral side of the power source to the com (common) connection. Connect the hot side of the power source to the ~24V connection. Observe all building and electrical code requirements concerning low voltage power sources and wiring to insure a safe, reliable installation.

A four conductor cable connects each motor to the EVO/ECM-Modbus. Plug the motor end of the cable into the motor connection 1, 2, 3, or 4 on the EVO/ECM-Modbus. These cables are prefabricated, with an EC motor connector on one end, and a small 4 pin circuit board connector on the other. Some applications may not be suitable for prefabricated cables. Cut a short cable in half, and splice cable in between as needed for the application. Cable can be field fabricated using the parts and tooling listed on the ECM cable datasheet.

A single trunk routes from one EVO/ECM-Modbus to the next, connecting up to 31 interfaces to the automation master. The trunk cable field terminates to a plug-in connector at each interface.

