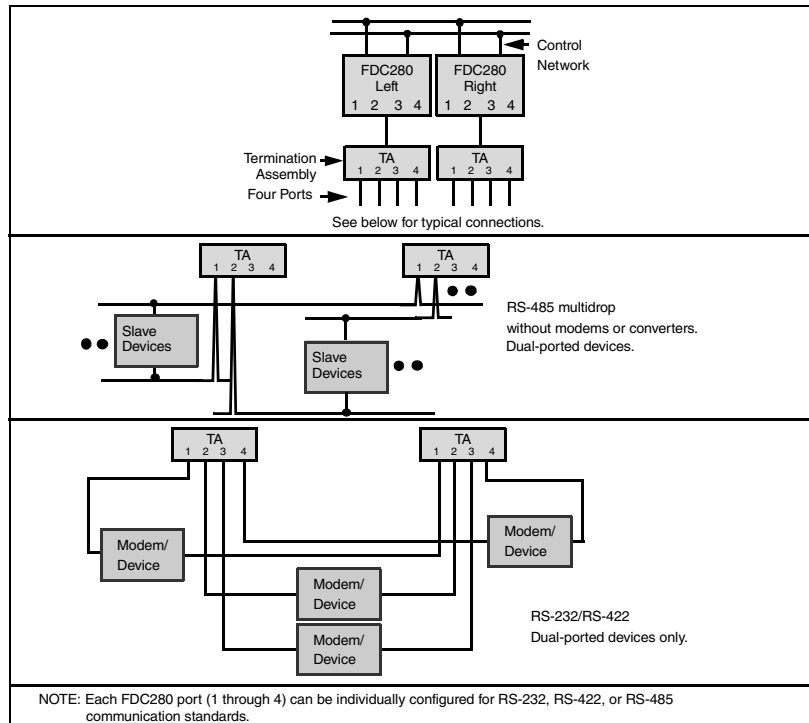


Modbus Master RTU Serial Driver for Field Device Controller 280



The Modbus Serial RTU and ASCII Driver media for FDC280 enables the Field Device Controller 280 (FDC280) to integrate Modbus devices into the Foxboro Evo system over a serial interface via the standard Modbus and ASCII protocols.

OVERVIEW

The Modbus Serial RTU and ASCII Driver media for FDC280 (FDC280) interfaces the Foxboro Evo system with field devices that use the Modbus RTU protocol over Serial RS-232, RS-422, or RS-485 interface standards.

The driver supports devices that fully implement the Modbus protocols as well as those that are more restrictive. This flexibility allows you to support many different device capabilities simultaneously.

The driver provides ease of integration, full Foxboro Evo support and redundancy options.

Ease of Integration

A simple download of the Modbus Master RTU Driver to the Field Device Controller 280 (FDC280) enables you to exchange data between the Modbus field devices and the Foxboro Evo system, thus taking advantage of both the power of the Foxboro Evo system and the flexibility of the Modbus field devices.

The FDC280 has the intelligence to optimize device communications by grouping points into single Modbus requests, thereby reducing the device load. By utilizing the FDC280's ability to manage different scan rates for different groups of points within a

single device, the Foxboro Evo system can be tuned for optimum performance.

The driver is downloaded to an FDC280 for any of the configurations shown in *Field Device Controller 280 (FDC280)* (PSS 31H-2FDC280).

To maintain separation between the control processes and the external device communications processes, the Modbus driver is run on Core 2 of the FDC280's CPU and communicates to the control process running on Core 1 via an internal bus.

Foxboro Evo System Support

The Foxboro Evo system supports the Modbus RTU protocol over RS-232, RS-422, and half-duplex RS-485 standards, which facilitates the transfer of data to and from the Modbus field devices. The FDC280 includes four serial ports, each of which can be configured to communicate with a different RS standard.

Foxboro Evo software also provides standard plant management functions and operator displays for these devices, in addition to startup and communication fault-detection and display using System Manager.

Communications

The FDC280 connects to the Modbus field devices over a customer-supplied network of serial devices, shown in *Field Device Controller 280 (FDC280)* (PSS 31H-2FDC280).

Connection to the field devices requires a simplex serial termination assembly (RH926GH) and Type 5 termination cables, as discussed in the section "FDC280 Simplex Serial Termination Assembly Installation" in *Field Device Controller 280 (FDC280) User's Guide* (B0700GQ).

FEATURES

Features of the Modbus Master RTU Driver are:

- ▶ Integration of Modbus field devices into the Foxboro Evo system over serial
- ▶ Supports Modbus ASCII mode
- ▶ Configurable communication to serial devices using 8- or 7-bit characters; odd, even or no parity, and 1 or 2 stop bits
- ▶ Configurable transmission rates of 300, 600, 1200, 2400, 4800, 9600, 38400, 57600 or 115200 baud
- ▶ Scanning groups of points at different scan rates for the same device
- ▶ Scanning different devices on the same RS-485 bus with different scan rates
- ▶ Supports Diagnostic Application for diagnosing communication issues with serial devices with no physical disruption to device interfaces. The Diagnostic Driver can be configured to send all device exchanged messages to an I/O Ethernet network workstation application. The Diagnostic Driver in the FDC280 sends the diagnostic data to a workstation connected to the Ethernet port, running an FDC specific diagnostic application. Refer to the *Field Device Controller 280 (FDC280) User's Guide* (B0700GQ).
- ▶ Field Device Integration support for Modbus RTU. Refer to *FDC280 Modbus Master Drivers (Serial and TCP/IP)* (B0700GT) for details.
- ▶ Non-redundant or redundant operation of FDC280 controllers over the I/O network to the field devices
- ▶ Availability of standard Foxboro Evo plant management functions and operator displays
- ▶ Monitoring of status for Modbus field devices using System Manager

- ▶ Support for reading and writing of multiple points in a single RTU message
- ▶ Support for interfacing to devices on RS-232 radio links through early RTS assertion and late RTS negation
- ▶ Support for both single and dual ported devices from fault tolerant FDC280s

HARDWARE

The Modbus Master RTU Driver can be downloaded to the FDC280, which is described in *Field Device Controller 280 (FDC280)* (PSS 31H-2FDC280).

SOFTWARE

The Modbus Master RTU Driver is compatible with all releases of the Foxboro Evo Control Core Services v9.3 and v9.4 after installing Maintenance Pack MP47481162 and later versions without installing the maintenance pack. It is also compatible with Control Software v7.1.1.

OPERATION

The FDC280 collects the required data from the devices, performs the necessary conversions, and then stores the converted data in its database for incorporation into the Foxboro Evo plant management functions and operator displays. Data may also be written out to the individual devices from the Foxboro Evo system.

Installation and Download

There are two types of driver installation (Major and Minor Image Update) which are explained in *Field Device Controller 280 (FDC280)* (PSS 31H-2FDC280).

Minor Image Update requires a download operation and does not affect the control status of the Foxboro Evo system or the FDC280 connected devices; a normal role switch of the FDC280 is the only outcome.

Major Image Update requires rebooting the FDC280 and results in a loss of communications with the FDC280 connected devices for the reboot period. It may require shutting down the Foxboro Evo control system, which uses the FDC280 connected devices.

A Major Image Update is required when initially adding this driver to the FDC280.

PRODUCT SUPPORT

The Modbus Master RTU Driver can be ordered from BuyAutomation. The product includes media (K0177CV) and documentation. Engineering assistance can be provided through the normal channels.

SPECIFICATIONS

Number of Devices

Up to 256 field devices maximum when serial and Ethernet devices are connected concurrently. Each of the four serial ports supports a maximum of 32 RS-485 devices, or 128 RS-485 serial devices total per FDC280. The serial ports support one RS-232 device or one RS-422 device each, as those standards do not support multidrop.

The actual number of field devices is performance and configuration dependent. (For sizing guidelines, refer to *Field Device Controller 280 (FDC280) Sizing Guidelines and Excel Workbook* (B0700GS).)

Number of Points

The FDC280 can support up to 8000 I/O points, depending on sizing.

Control Block Support

The FDC280, used with the Modbus Master RTU Driver, supports the following Foxboro Evo Equipment Control Block (ECBs) listed in Table 1 and the DCI blocks listed in Table 2.

Table 2. DCI Blocks Supported by the Modbus Master RTU Driver

RIN	Real Input DCI block
RINR	Redundant Real Input DCI block
ROUT	Real Output DCI block
BIN	Binary Input DCI block
BINR	Redundant Binary Input DCI block
BOUT	Binary Output DCI block
IIN	Integer Input DCI block
IINR	Redundant Integer Input DCI block
IOUT	Integer Output DCI block
PAKIN	Packed Input DCI block
PAKINR	Redundant Packed Input DCI block
PAKOUT	Packed Output DCI block
PLSOUT	Pulse Output DCI Block

Table 1. ECBs Supported by the Modbus Master RTU Driver

ECBP	Primary ECB, representing the FDC280 serial port
ECB200	Parent ECB representing Modbus RTU driver
ECB201	Child ECB, representing a Modbus RTU device

RELATED DOCUMENTATION

For reference purposes, Table 3 lists the documentation for additional hardware and software elements in the 200 Series subsystem.

Table 3. Related Documentation

Document Number	Title
PSS 31H-2FDC280	Field Device Controller 280 (FDC280)
B0700GQ	Field Device Controller 280 (FDC280) User's Guide
B0700GT	FDC280 Modbus Master Drivers (Serial and TCP/IP)
N/A	Modbus Application Protocol Specification V1.1b3 http://www.modbus.org/docs/Modbus_Application_Protocol_V1_1b3.pdf
N/A	Modbus over Serial Line Specification Implementation Guide V1.02 http://www.modbus.org/docs/Modbus_over_serial_line_V1_02.pdf

MODBUS FUNCTION CODES SUPPORTED

Table 4. Supported Modbus Function Codes

Function Code	Function Name	Description
1	Read Coil Status	Reads the ON/OFF status of discrete outputs (0x references, coils)
2	Read Input Status	Reads the ON/OFF status of discrete inputs (1x references)
3	Read Holding Registers	Reads the binary contents of holding registers (4x references).
4	Read Input Registers	Reads the binary contents of input registers (3x references)
5	Force Single Coil	Forces a single coil (0x reference) to either ON or OFF
6	Preset Single Register	Presets a value into a single holding register (4x reference).
8	Diagnostic	Sub Function 00 only
15	Force Multiple Coils	Forces each coil (0x reference) in a sequence of coils to either ON or OFF.
16	Preset Multiple Registers	Presets values into a sequence of holding registers (4x references).
23	Read Write Multiple Register	Reads the binary contents of multiple input registers (5x reference) and writes the values into multiple registers (6x reference).



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