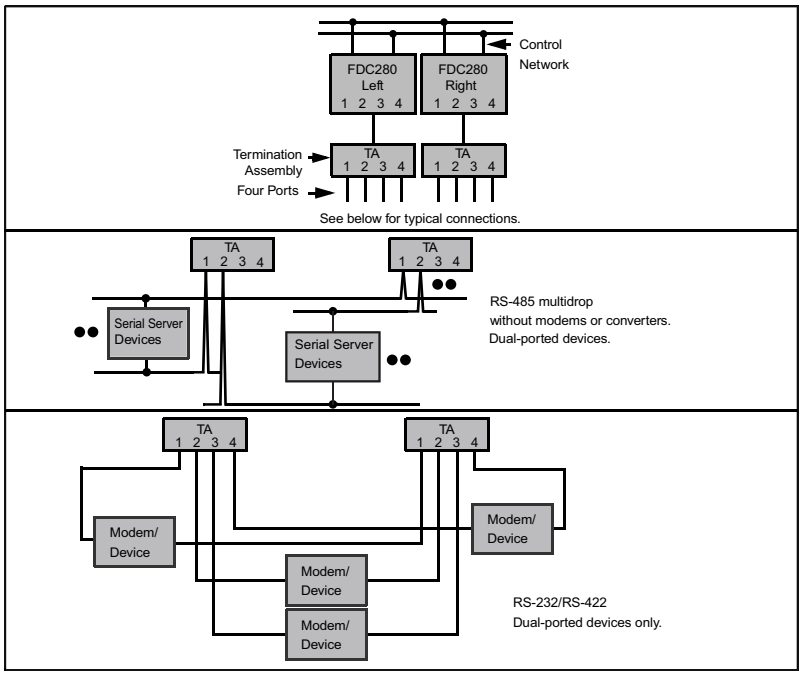
Foxboro™ DCS

Modbus Client RTU Serial Driver for Field Device Controller 280

PSS 41S-3FDCMBRT

Product Specification

February 2023



https://www.se.com

Legal Information

Overview

The Modbus Serial RTU and ASCII Driver media for Foxboro™ DCS Field Device Controller 280 (FDC280) interfaces Foxboro DCS 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 DCS support and redundancy options.

Ease of Integration

A simple download of the Modbus Client RTU Driver to the FDC280 enables you to exchange data between the Modbus field devices and Foxboro DCS, thus taking advantage of both the power of Foxboro DCS 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, Foxboro DCS 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 41H-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 DCS System Support

Foxboro DCS 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 DCS software also provides standard plant management functions and operator displays for these devices, in addition to startup and communication fault-detection and display using Foxboro™ 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 41H-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

- Integration of Modbus field devices into Foxboro DCS 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 Client 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 DCS plant management functions and operator displays
- Monitoring of status for Modbus field devices using System Manager
- Support for reading and writing 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 Client RTU Driver can be downloaded to the FDC280, which is described in the *Field Device Controller 280 (FDC280)* Product Specification (PSS 41H-2FDC280).

Software

The Modbus Client RTU Driver is compatible with all releases of the Foxboro DCS Control Core Services V 9.3 and above. It is also compatible with CS V 7.1.1 and above.

Operation

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

Installation and Download

The two types of driver installation (Major and Minor Image Update) are explained in the *Field Device Controller 280 (FDC280)* Product Specification (PSS 41H-2FDC280).

- Minor Image Update requires a download operation and does not affect the control status of Foxboro DCS 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 DCS that uses the FDC280 connected devices.

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

Product Support

The Modbus Client 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, see *Field Device Controller 280 (FDC280) Sizing Guidelines and Excel Workbook* (B0700GS).
Number of Points	The FDC280 can support up to 8,000 I/O points, depending on sizing.
Control Block Support	The FDC280, used with the Modbus Client RTU Driver, supports the Foxboro DCS Equipment Control Block (ECBs) listed in Table 1 and the DCI blocks listed in Table 2.

Table 1 - ECBs Supported by the Modbus Client 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

Table 2 - DCI Blocks Supported by the Modbus Client 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

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).

Related Documents

Document Number	Description
PSS 41H-2FDC280	*Field Device Controller 280 (FDC280)*
B0700GQ	*Field Device Controller 280 (FDC280) User's Guide*
B0700GT	*FDC280 Modbus Client 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*

⚠ **WARNING**: This product can expose you to chemicals including lead and lead compounds, which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information, go to www.p65warnings.ca.gov/.

Schneider Electric Systems USA, Inc.
70 Mechanic Street
Foxboro, Massachusetts 02035–2040
United States of America

Global Customer Support: https://pasupport.se.com

As standards, specifications, and design change from time to time, please ask for confirmation of the information given in this publication.

PSS 41S-3FDCMBRT, Rev C