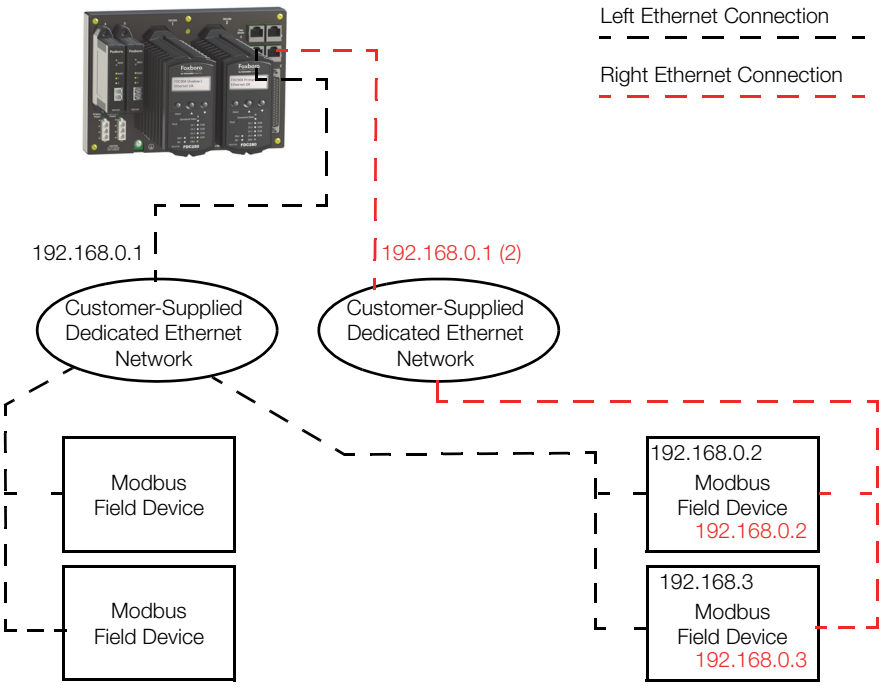
Foxboro™ DCS

Modbus Client TCP Driver for Field Device Controller 280

PSS 41S-3FDCMBDV

Product Specification

February 2023



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Legal Information

Overview

The Modbus Client TCP Driver for the Field Device Controller 280 (FDC280) interfaces Foxboro DCS with field devices that use the Modbus TCP protocol over Ethernet IEEE standard 802.3 (supporting TCP/IP), connected over 10/100 Mbps or 1 Gbps copper Ethernet via customer-supplied switches.

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 download of the Modbus Client TCP Driver to the Field Device Controller 280 (FDC280) enables you to exchange data between the Modbus field devices and Foxboro DCS, thus taking advantage of both the power of the Foxboro DCS 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, 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) Product Specification* (PSS 31H-2FDC280).

To maintain separation between the control processes and the external device communication 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 Support

Foxboro DCS supports the Modbus TCP protocol over Ethernet IEEE standard 802.3 (supporting TCP/IP), which facilitates the transfer of data to and from the Modbus field devices.

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 DCS System Manager.

Communications

The FDC280 connects to the Modbus field devices over a customer-supplied network using various Ethernet network configurations, shown in *Field Device Controller 280 (FDC280)* (PSS 31H-2FDC280), to connect with supported field devices. The FDC280 can connect directly to field devices with Ethernet I/O, or to field devices with serial I/O via a protocol-specific gateway which performs the Ethernet-to-serial I/O bridging.

The Modbus TCP driver has been qualified with the following Schneider Electric gateways and bridges:

- To enable connection to serial Modbus server devices, use an Ethernet to Serial Gateway (e.g., Schneider Electric's TSXETG100).
- To enable connection to serial Modbus Plus devices, use a Schneider Electric Modbus Plus Ethernet Bridge, part number 174CEV20040.

Features

Features of the Modbus Client TCP Driver are:

- Integration of Modbus field devices into Foxboro DCS over Ethernet
- Field Device Integration support for Modbus TCP. Refer to *Modbus TCP Client Driver for FDC280 User's Guide* (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 Foxboro DCS Control HMI software.
- Support for reading and writing of multiple points in a single TCP/IP message

Hardware

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

Software

The Modbus Client TCP Driver is compatible with all releases of the Foxboro DCS Control Core Software starting with V9.3 and Control Software V7.1.1 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 for incorporation 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

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

Depending on the type of installation required, installation of the driver may require either a download operation that does not disrupt the rest of Foxboro DCS or an operation that involves full, double-sided reboot of the FDC280.

Product Support

The Modbus Client TCP Driver can be ordered from BuyAutomation. The product includes media and documentation. Engineering assistance can be provided through the normal channels.

Specifications

Number of Devices	Up to 256 field devices maximum. 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 Client TCP Driver, supports the Foxboro DCS Equipment Control Block (ECBs) and DCI blocks.
ECBs Supported by the Modbus Client TCP Driver	• ECBP: Primary ECB, representing the FDC280's Ethernet port • ECB200: Parent ECB, representing the Modbus TCP Client Driver • ECB201: Child ECB, representing a Modbus field device
DCI Blocks Supported by the Modbus Client TCP 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
DCI Blocks Supported by the Modbus Client TCP Driver	• 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

Modbus Function Codes Supported

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 references).
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 references) and writes the values into multiple registers (6x references).

Related Documents

PSS 31H-2FDC280	*Field Device Controller 280 (FDC280) Product Specification*
N/A	*Modbus Application Protocol Specification V1.1b3 http://www.modbus.org/docs/Modbus_Application_ Protocol_V1_1b3.pdf*
N/A	*Modbus Messaging On TCP/IP Implementation Guide V1.0b http://www.modbus.org/docs/Modbus_Messaging_ Implementation_Guide_V1_0b.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/.

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