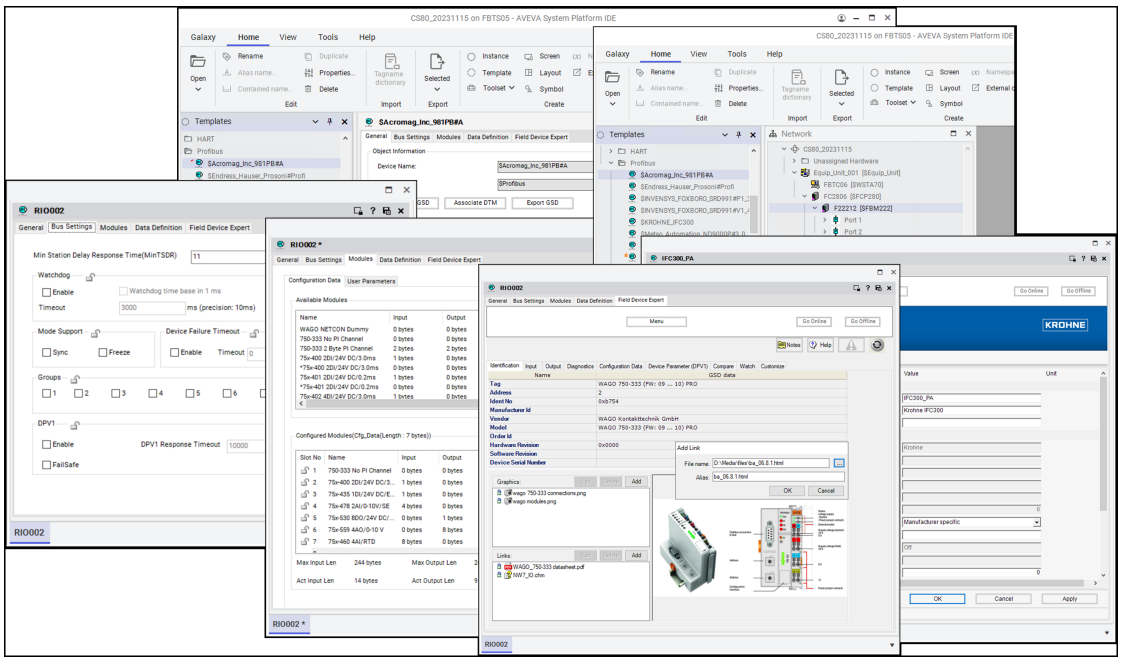
Foxboro™ DCS

Field Device Expert for PROFIBUS-DP Devices

PSS 41S-10FDMPB

Product Specification

February 2024



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Features

Key features of the Field Device Expert for PROFIBUS-DP Devices include:

- Lifecycle coverage of the field device tasks such as configuration, commissioning, maintenance, and diagnostics are in one comprehensive tool set.
- Integration of the device configuration into the control database.
- GSD-informed editing tools for bus configuration, module selection, and I/O data definition.
- Built-in universal PROFIBUS device type manager (DTM) providing online access to device data and diagnostic messages.
- Option to run the device manufacturer's DTM within Field Device Expert for configuration and/or device maintenance.
- Device templates that enable re-use of engineering for multiple tags of the same device type.
- Convenient links to editors for the host control station and Fieldbus Module.
- Watch screens that provide data history using tables and trend displays.
- Compare screens that enable download and upload of DPV1 parameter values to align the host database with the device.
- User-configured links to documents, photos, drawings, help files and other device-related resources.
- Ability to create custom screens for viewing device data and diagnostic messages, and for downloading DPV1 device parameters.
- Access based on log-in authentication and assigned Field Device Technology (FDT) roles.
- Integration with the Control Editors' Network View and other application windows, which enable quick creation, assignment, tagging and deployment of devices.
- Available Instrument Workshop edition for calibration, testing, and/or pre-commissioning of devices before plant installation.

Managing PROFIBUS-DP Devices

This Field Device Expert allows Engineers and Technicians to change and maintain the configuration of PROFIBUS-DP devices from a remote location, typically the system's Engineering Workstation. There is a tremendous saving in labor and setup time as there is no scaffolding to erect and no hot pipe work. The Field Device Expert also provides the ability to troubleshoot the Field devices while the plant is in startup or in operation.

The Field Device Expert for PROFIBUS-DP Devices is a software application that adds on to the EcoStruxure™ Foxboro DCS Control Editors to provide configuration support for PROFIBUS DP and PA devices, and integration of PROFIBUS networks into the EcoStruxure™ Foxboro DCS system. The PROFIBUS devices are connected to the control system via the FBM222 Redundant PROFIBUS Communication Interface.

The Field Device Expert's graphical user interface opens inside the Control Editors, and provides easy-to-use bus configuration, module selection and data definition tools based on the device's General Slave Device (GSD) file. The device configuration is maintained in a Galaxy database, where it is integrated with other control system elements such as compounds, strategies and Distributed Control Interface (DCI) blocks.

Field Device Expert's built-in universal PROFIBUS DTM provides highly customizable diagnostic displays and watch screens that facilitate deployment of the device and validation of the control strategy.

Engineering Setup for PROFIBUS Instrumentation

The Field Device Expert helps to assist a plant in starting up faster during that phase of its life cycle by automating detection, configuration, commissioning, testing and reporting.

During normal operation, it helps to analyze and diagnose PROFIBUS instrumentation in a running plant.

During the maintenance phase of a plant's lifecycle, it assists with replacement of existing devices with new devices.

The benefits of the Field Device Expert are maximized by customizing the run time interaction displays that are part of the PROFIBUS device template. This document, therefore, starts from that point and walks through the PROFIBUS capability from the beginning of the lifecycle. The first step is populating Field Device Expert with PROFIBUS instrument templates for each instrument model type, each template linked to the corresponding Device Description. If the manufacturer or vendor of the instrument also makes available an EcoStruxure™ Foxboro™ DCS Field Device Tool (FDT) DTM for diagnostic analysis of the instrument, it also gets linked to the template during template creation.

This table lists the advantages of the Field Device Expert during each phase of a plant's lifecycle:

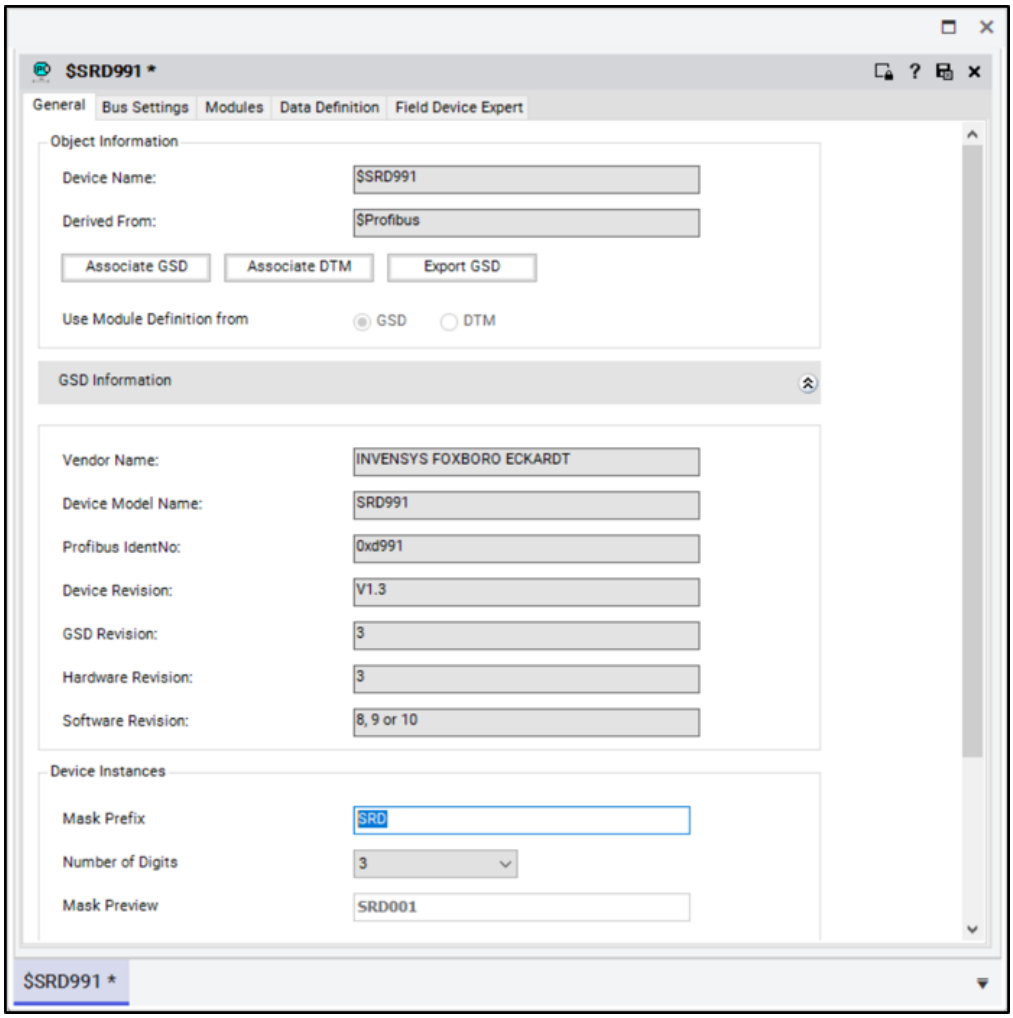
Table 1 - Advantages of the Field Device Expert During Each Phase Of A Plant's Lifecycle

Lifecycle Stage	Advantages
Startup	• Create and customize PROFIBUS field devices • Create PROFIBUS instrument instances • Develop customizable device configuration screens • Device Commissioning Wizard - automates setting the instrument tags, downloading the configured parameter settings, and making certain the instrument tags and the Galaxy database are synchronized • Run DD methods • Synchronize the device and host databases
Normal operations	• Analyze and diagnose PROFIBUS field devices, particularly any suboptimal PROFIBUS Instrument conditions detected
Maintenance	• Assists in replacement of PROFIBUS field devices

Templates and Device Inheritance

Field Device Expert is GSD-based. You can import a GSD file into a copy of a PROFIBUS device template. The GSD file, which is bound to the template, informs the choices for bus settings, module selection and user parameters for each instance of the field device type used in the plant. The template also includes controls for specifying tags for devices derived from the template.

Figure 1 - Device Template for a PA Positioner



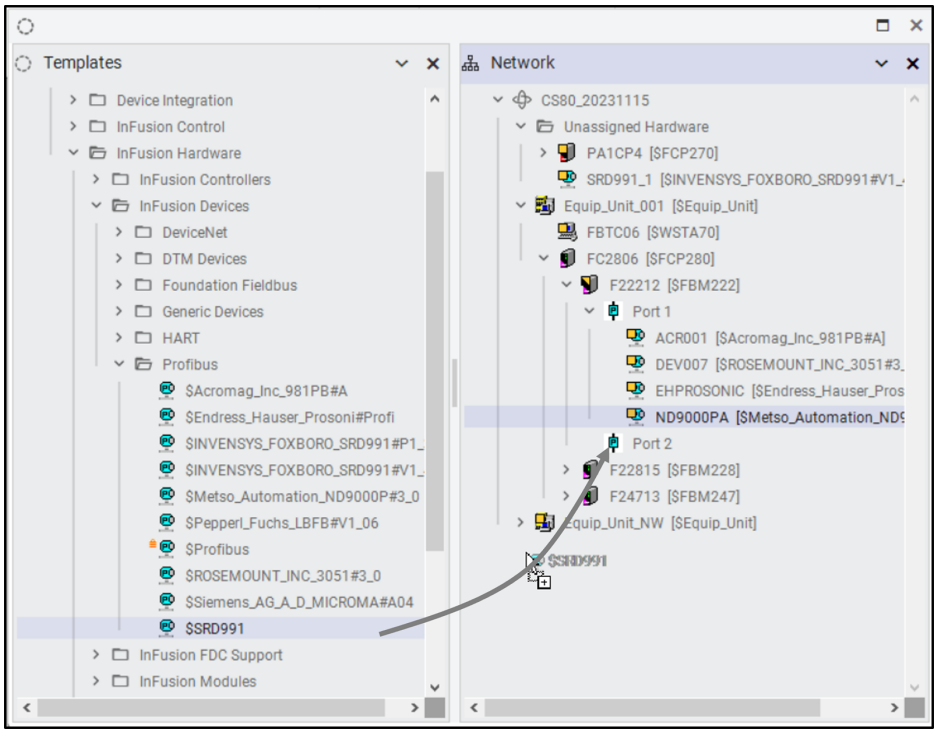
You can also define a device type by associating the device manufacturer's DTM with the template, in which case the GSD information is extracted from the DTM and bound to the template. You can then access the device specific DTM in the Vendor DTM tab to configure and maintain the devices.

The device templates provide the ability to engineer a typical field device type once, and propagate the configuration to multiple instances of the same device type, achieving optimum reusable engineering. Individual parameter values set in the template can be locked such that they cannot be changed in the device instances, or they can remain unlocked allowing you to edit individual device configurations, overriding selections copied from the template. Changes made at the template level to locked parameters are propagated to the devices that have already been created from the template.

Creating a PROFIBUS Device

To create a PROFIBUS device in the Control Editors, you can simply drag the device template to the host FBM222 and drops the template on one of the two EcoStruxure™ Foxboro Fieldbus Module ports.

Figure 2 - Adding a PROFIBUS Device



Double-click the new device to open it in the Field Device Expert, set the device address, and then view and modify the bus settings, module selection, and other configuration choices inherited from the template.

As part of the device creation, the Control Editors set up an equipment control block (ECB201) that represents the device in the EcoStruxure™ Foxboro™ DCS Control Software. The Field Device Expert General tab provides a hotlink to an editor for the device ECB, where you can specify block display settings, configure parameters for collection by the Control Software History application, and set runtime access permissions.

Configuration Tools

The Field Device Expert provides tabbed pages for editing bus settings (Editing Device Bus Settings, page 7), selecting modules and user parameters (Configuring Modules in a Remote I/O Device, page 8), and defining device I/O (Parameters Configured in the Template Can be Edited at the Device Level, page 9).

Figure 3 - Editing Device Bus Settings

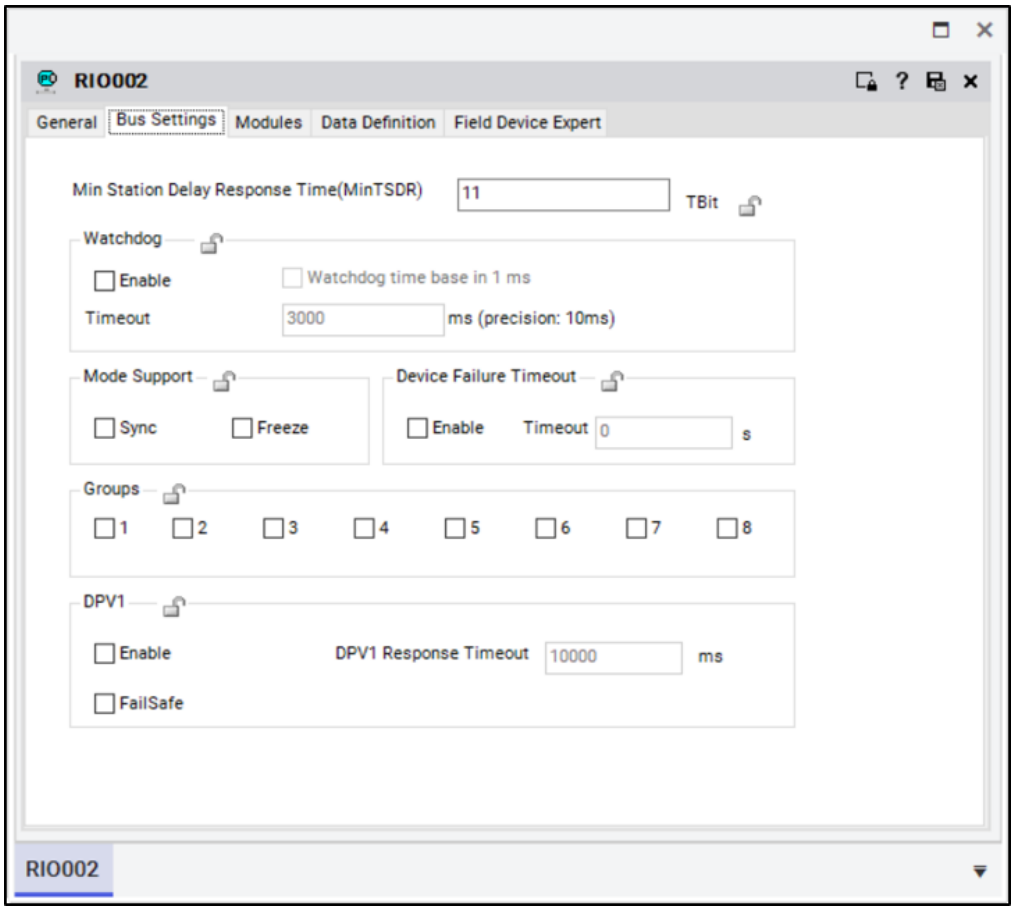


Figure 4 - Configuring Modules in a Remote I/O Device

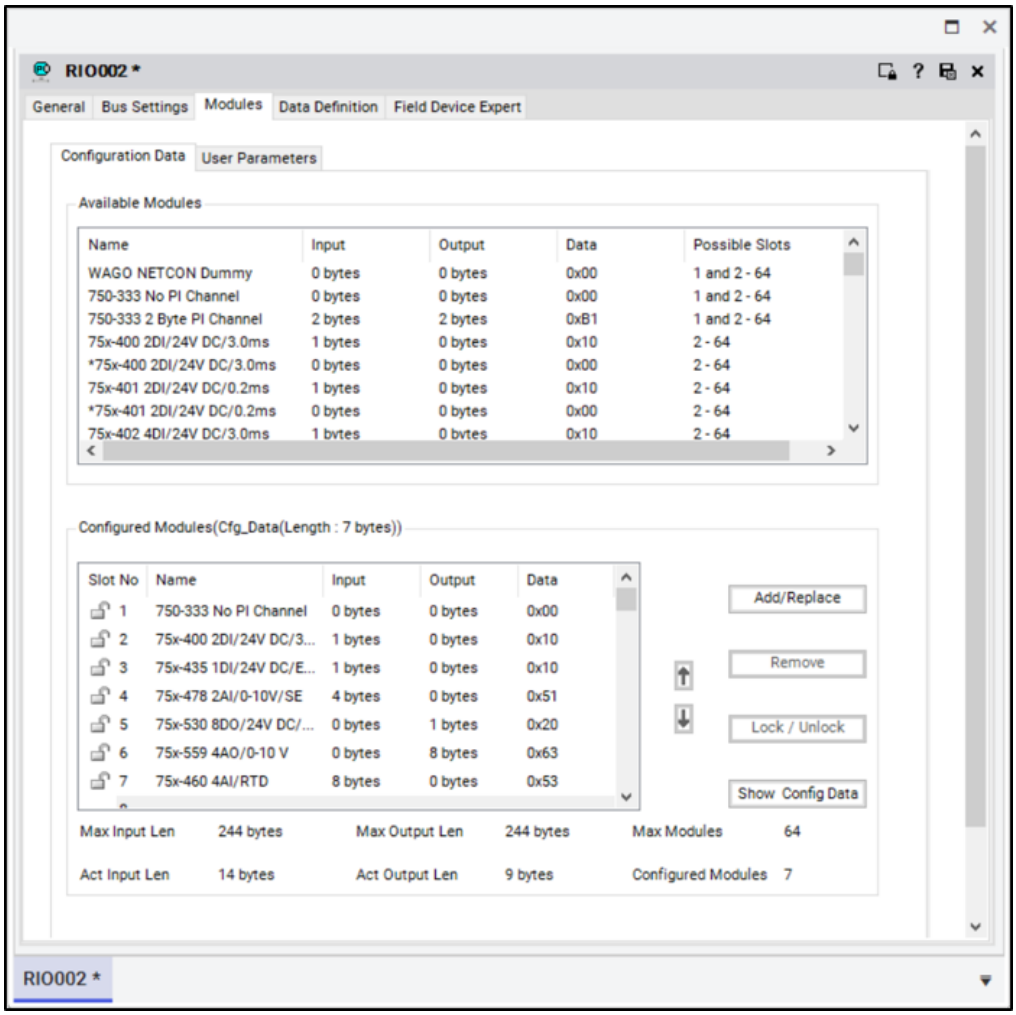
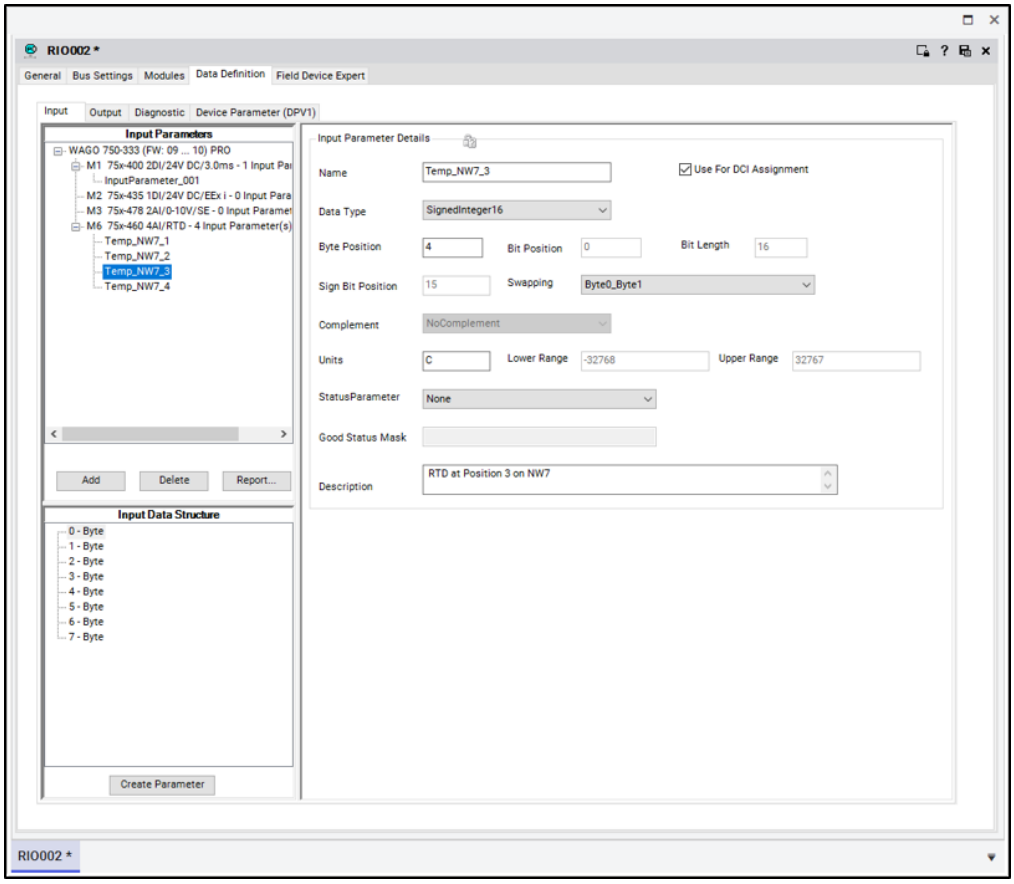


Figure 5 - Parameters Configured in the Template Can be Edited at the Device Level



Configuration choices, whether made at the device template level or in an individual device, are device-appropriate by default as the device configuration remains linked to the GSD for device description. Once the modules have been selected, the Data Definition tab enables the creation of input and output parameters, diagnostic messages and parameters, and if the device supports DPV1 functionality, DPV1 device parameters. Parameter definitions include starting byte and bit position, bit length, data type, optional byte-swapping, complement definition, and plain-language names and descriptions for easy identification.

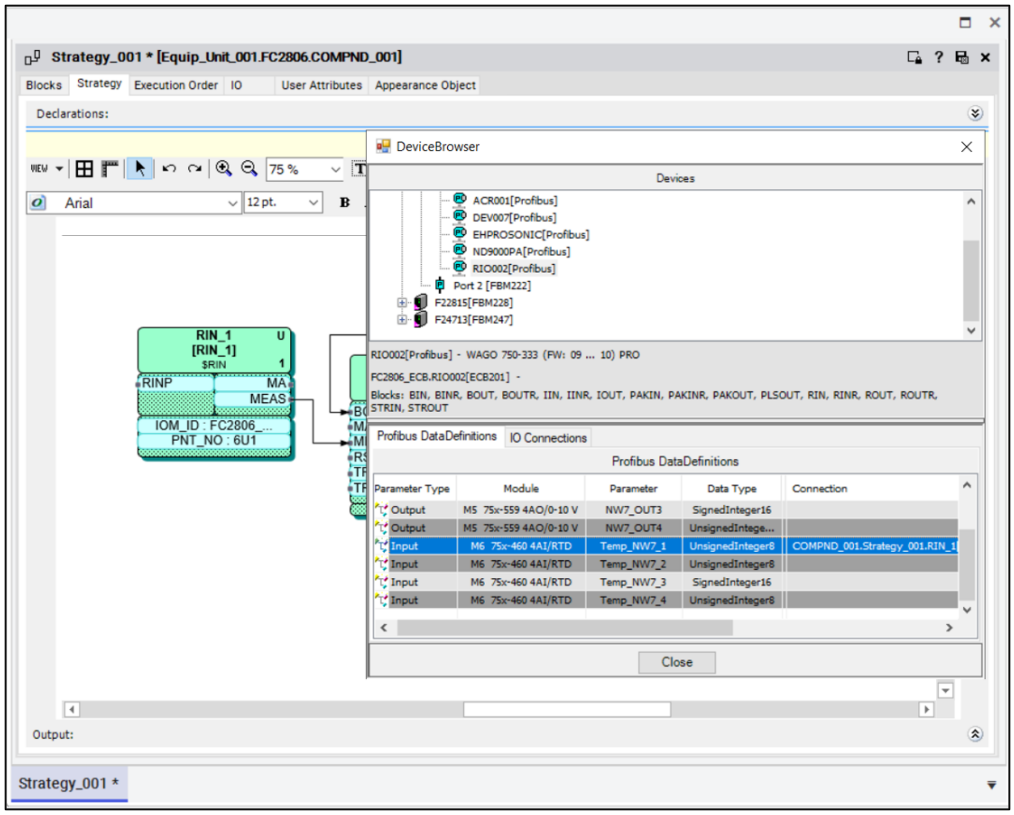
The parameters can be selected for display in the various standard and user-defined screens in Field Device Expert. The parameters are also shown in the Control Editors' browsers that enable quick and accurate specification of point number syntax in the control strategy DCI blocks.

Control Configuration

PROFIBUS devices are connected to Foxboro DCS control blocks using DCI blocks. DCI block types include single and redundant input and output blocks for common data types such as integer and real. The DCI blocks are mapped to PROFIBUS data of the different PROFIBUS data types.

The Control Editors' Strategy Editor provides graphical tools for adding DCI blocks to a control strategy, linking them to control blocks, and specifying the block execution order within the strategy. You can then open a Device Browser in the editor to map the DCI blocks to the slave devices and their parameters created in the Data Definition tab.

Figure 6 - Strategy Editor Device Browser Connects DCI Blocks to Slave Device Data

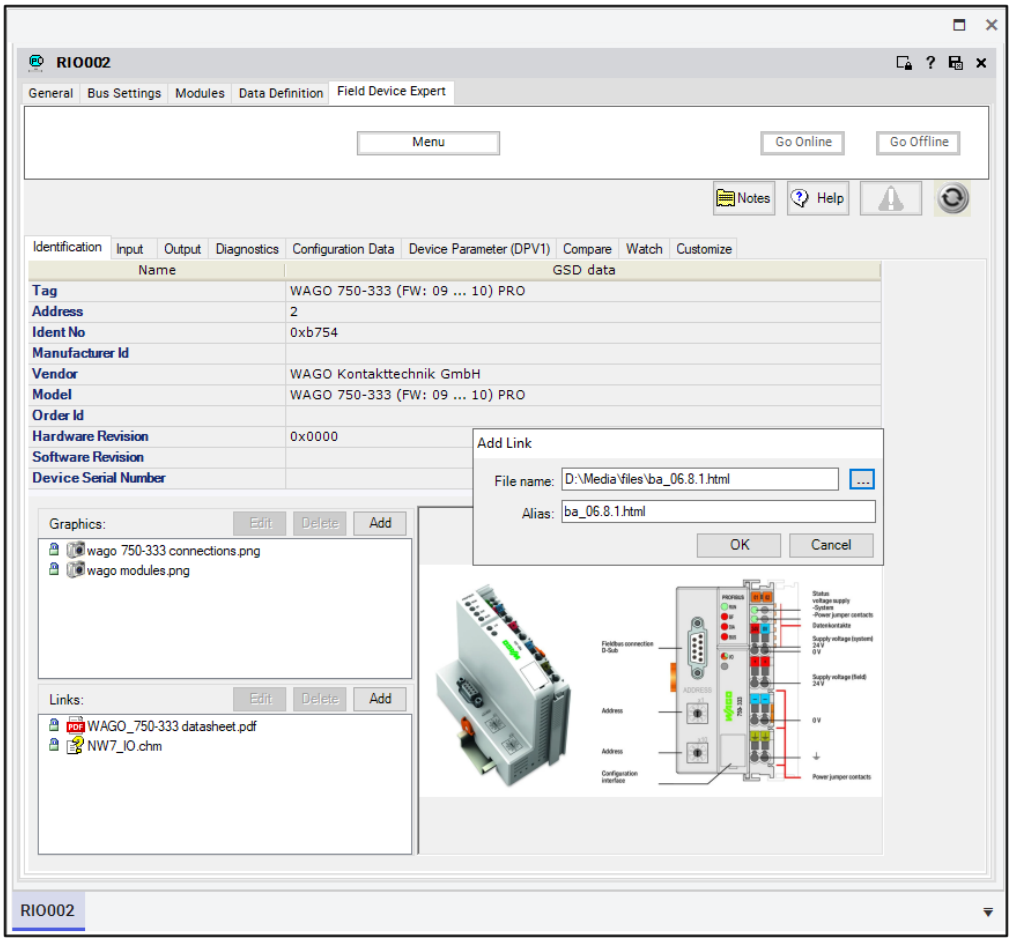


Universal PROFIBUS DTM

Field Device Expert's built-in PROFIBUS DTM includes these set of standard tab pages:

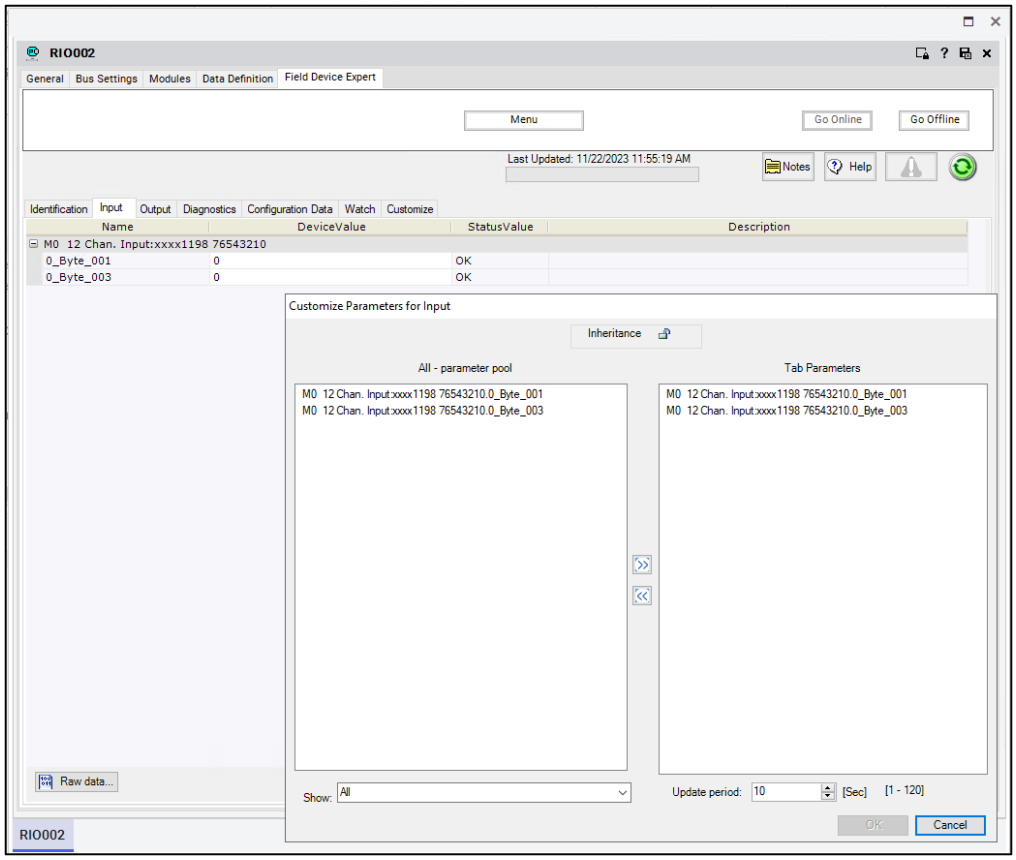
- Identification tab displays information about the specific device such as the device manufacturer and type, and hardware and software versions. The tab also provides user-configured links for quick and easy access to any document or image useful in engineering or maintaining the field device. The documents images can be linked to the Identification tab in the template or a device instance.

Figure 7 - Hyperlinks to Documents and Drawings Can be Made on the Identification Tab



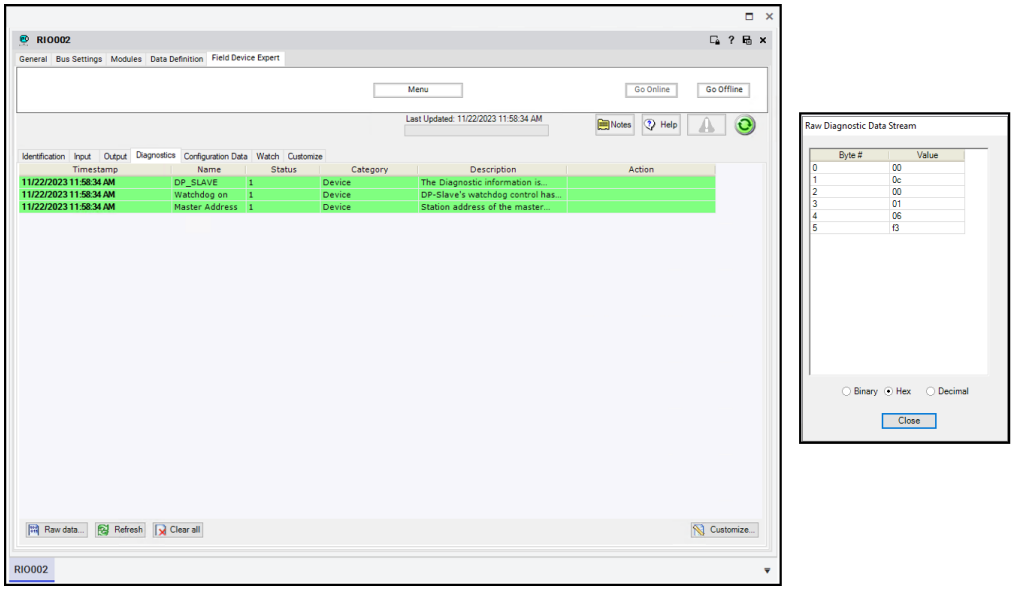
- Input tab and Output tab provide real-time displays of the parameters defined in the Data Definition tab (or the Vendor DTM if the parameters were configured with the device manufacturer's DTM).

Figure 8 - Selecting Input Parameters for Online Display in Field Device Expert



- Diagnostics tab displays diagnostic messages specified in the GSD and those which you define in the Data Definition tab based on either device diagnostics or DPV1 device parameters.

Figure 9 - Field Device Expert Displays Diagnostics Messages as well as Raw Device Diagnostic Data



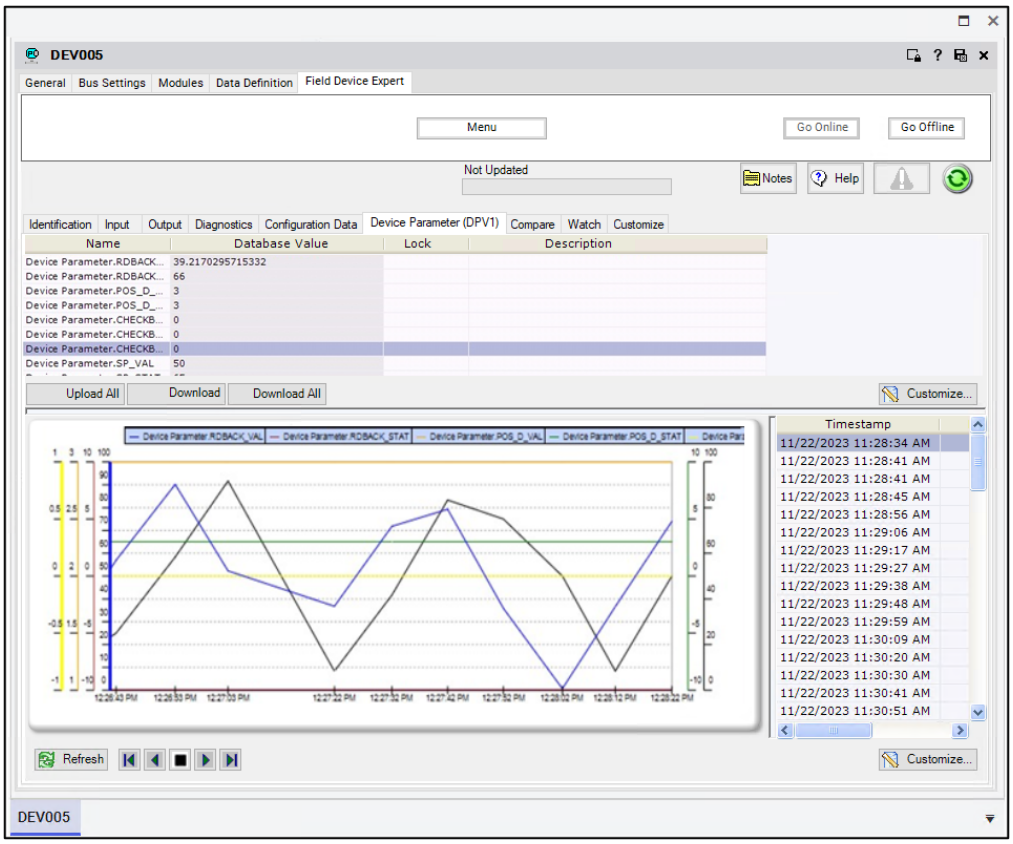
- Watch tab allows you to track up to eight parameters with a data table and a trend display.

- Configuration Data tab, which is displayed only when the Field Device Expert is online to the device, compares the configuration data in the device with the data set in the Galaxy database.
- Customize tab provides tools for adding custom tabs and parameter groups, setting access permissions for Field Device Expert functions based on the user's log-in information, and setting up downloads to selected devices.

Field Device Expert also displays these tabs for devices that support DPV1 functions:

- Device Parameter (DPV1) tab displays selected device parameters in a grid format and a trend display. The tab enables upload and download of parameters that are defined as writable.

Figure 10 - The Device Parameter (DPV1) Tab Enables Downloads to DPV1 Devices and Trend Displays of Up to Eight Device Parameters



- Compare tab enables you to identify differences between DPV1 device parameter values in the Galaxy database and the values read from the device, and then reconcile the two sources by either uploading or downloading selected parameters.

The Tab Configuration dialog box, which is accessed from the Customize tab, enables addition of other tabs using one of three formats: Input/Output, Watch and Device Parameter (DPV1). Whether a tab is visible and enabled depends on the FDT roles assigned to each user and the access specified for those roles in the Set Permissions dialog box.

Device Identification Page and Device Info Templates

You can build a "home page" for each field device, shown first when the device is invoked in Field Device Expert.

Field Device Expert provides a toolset for building this Device Identification page for each field device, displaying key attributes identifying the device, and system

management parameters for the device. The details for each page are stored in a device info template, which can include items such as:

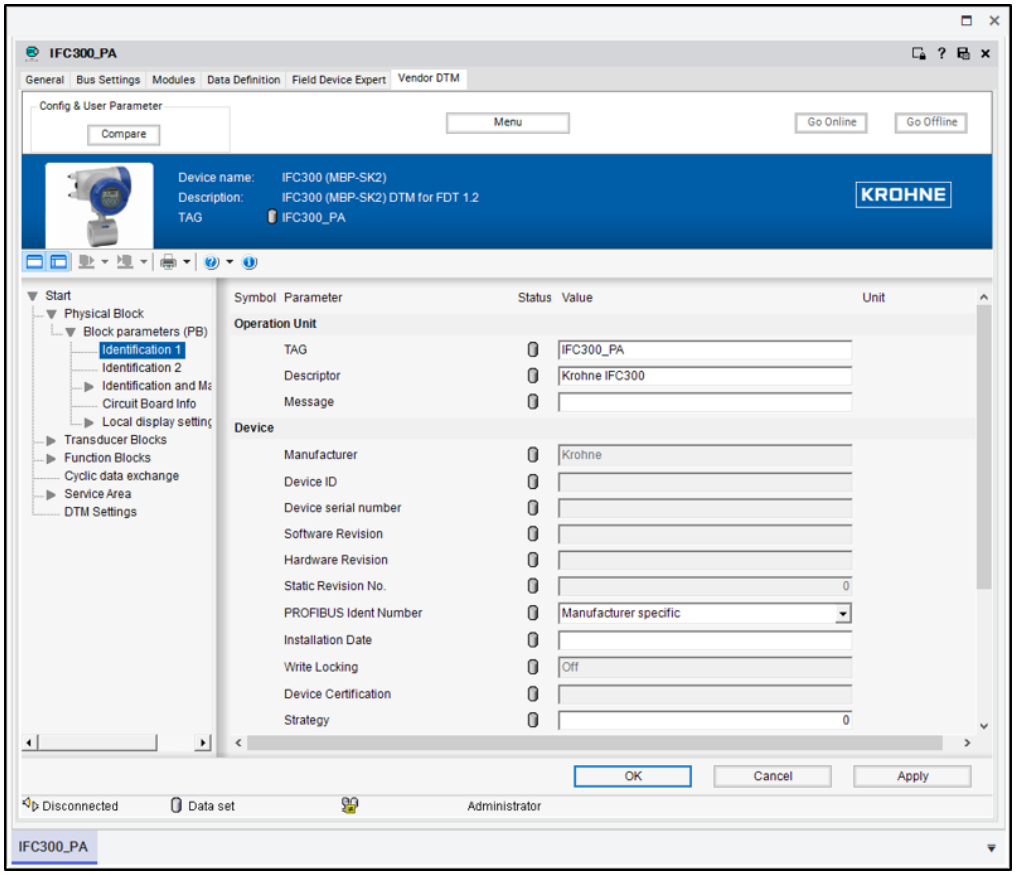
- Graphics and document links to provide configuration guidelines, troubleshooting tips and other help to users.
- Notes that will be inherited by the derived devices. An electronic notepad can be used to provide specific instructions about deploying the device, certain configuration steps, or list tests needed for deployment. For device instances, you can view notes entered at the template level and record information about the specific device.

Using a Device-Specific DTM

Field Device Expert provides the option of using a DTM supplied by the device manufacturer to configure and maintain the device. Selection of the device-specific DTM is made at the template level, at which point GSD information is extracted from the DTM and bound to the device template.

When the device DTM is associated with the device template, the manufacturer's user interface is made available for the template and derived devices in Vendor DTM tab in Field Device Expert.

Figure 11 - The Device Manufacturer's DTM is Opened in the Vendor DTM Tab for Configuring and Maintaining Devices



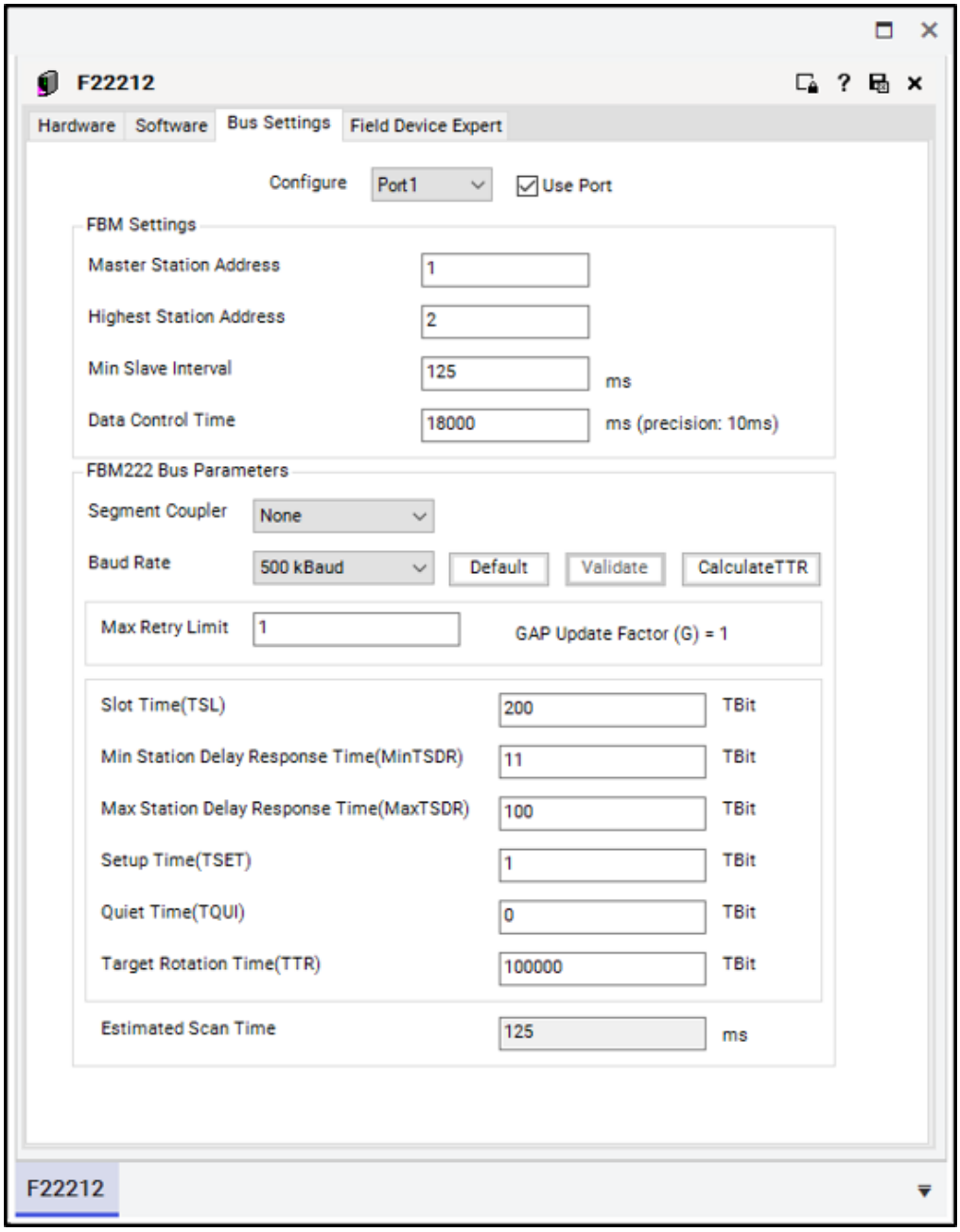
You have a choice of configuring the device template and the derived device instances using the device DTM or the Control Editors configurators in other Field Device Expert tabs. Whichever tool is selected, both the vendor DTM and the universal PROFIBUS DTM are available for managing devices as they are brought online.

NOTE: Manufacturer-supplied DTMs can vary in their compliance with PROFIBUS and FDT specifications. Confirm the applicability of vendor-supplied DTMs for your project. Field Device Expert Frame Application is FDT v2.0 compliant.

Master Bus Settings

The Field Device Expert is also used to configure the master bus settings for each port in the host FBM222.

Figure 12 - Setting Master Bus Parameters



When you select a baud rate for the port from a pull-down list and press the Default button, the editor supplies the appropriate values for various timing parameters such as minimum station response time, which can be edited individually as needed. With a click of the Validate button, you can verify the bus settings of the FBM and the

connected PROFIBUS devices on the port using the definitions in the GSD files. The CalculateTTR button on Bus Settings tab allows you to optimize the target token rotation time for each port.

Deployment

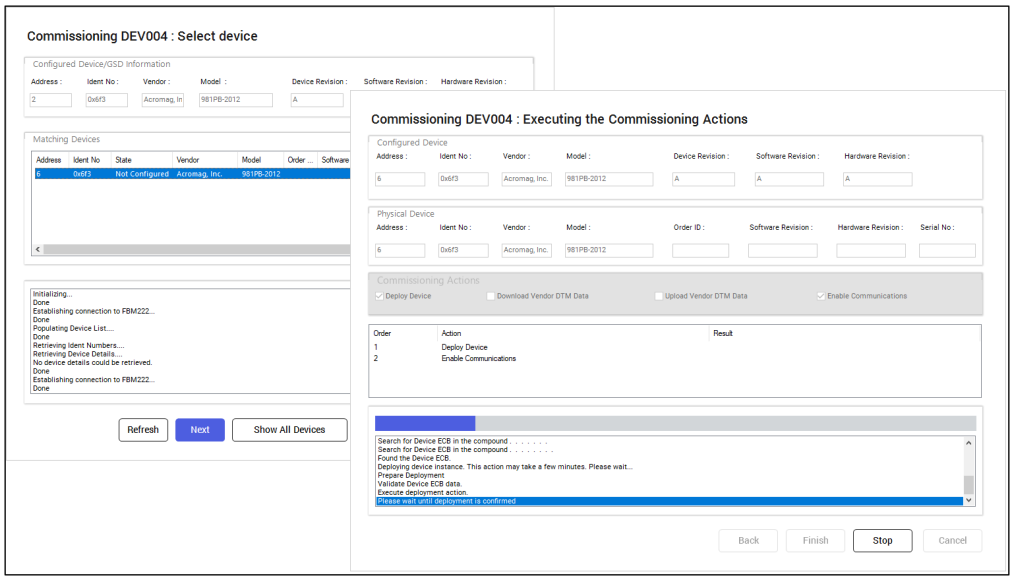
The device configurations can be deployed to The Foxboro DCS system as part of a control database deployment, which also downloads the host FBM222 configuration and the DCI and control blocks contained in the various control strategies. The FBM222 uses the downloaded configurations to initialize the connected devices and manage cyclic and acyclic data exchange between the devices and the control station. After the initial deployment, the Control Editors provide a more selective deployment in which subsequent changes to the device configurations can be made with minimal interruption to the process.

The Control Editors provide a variety of tools for monitoring the device as it is brought online and initialized from the FBM222 master. The Field Device Expert for the FBM222 includes a communication DTM that provides diagnostics and live lists for each port, while Field Device Expert for the device offers online displays of device data and screens that compare the physical device to the configuration database.

Commissioning Wizard

You can also deploy devices using the Control Software Commissioning Wizard. The wizard matches a physically connected slave device with a configuration in the Galaxy database (Figure 13, left window) and enables you to take one or more of these commissioning actions (see the right window):

Figure 13 - The Commissioning Wizard Provides for Device Deployment, Download and Upload of DPV1 Device Parameters, and Device Initialization



- Deploy the device, that is, download the device ECB to the Foxboro DCS system.
- Download to a device DPV1 device parameters that were configured with a vendor DTM.
- Upload from a device DPV1 device parameters to a vendor DTM and the Galaxy database.

- Bring the device online to the control system and begin cyclic and acyclic data exchange.
- Change the device address.

Field Device Expert Workshop Edition

The Control Room edition of Field Device Expert has the features previously described. This edition is used on workstations running the Control Software with Foxboro® control processors and FBM222s. In addition, the Control Editors and Field Device Expert (without the universal PROFIBUS DTM) are offered in a bundled Instrument Workshop edition. This off-platform edition uses a third-party interface card and communication DTM to provide DPV1 communication with the devices, and the device manufacturer's DTM to calibrate, pre-commission, and test instrumentation prior to installation and connection to the FBM222.

Upgrading Legacy FBM223 to FBM222 With the Control Editors

When configuring an FBM222 to replace a legacy FBM223 in the Control Editors, the FBM223's database, port configuration files (*.PMA), slave device configuration files (*.PSL), and GSD files can be used for the FBM222 as is.

For instructions on performing this upgrade, see the "FBM223 to FBM222 Upgrade Procedure" appendix in *PROFIBUS Networks Implementation Guide* (B0750BE).

Hardware and Software Requirements

These are the hardware and software requirements for Field Device Expert for PROFIBUS.

Control Room Edition Requirements

Computer

- Follow the hardware requirements for the Control Editors as specified in *Control Editors* (PSS 41S-10EDITOR).

System Hardware

- The EcoStruxure™ Foxboro DCS Control Network-connected station committed as AW70, WP70, WSTA70, or WSRV70 at I/A Series® software v8.7-v8.8 and EcoStruxure™ Foxboro DCS Control Core Services v9.0 or later.
- EcoStruxure™ Foxboro DCS FCP280 at Control Core Services software v9.0 or later with FBM222.
- ZCP270 or FCP270 at I/A Series software v8.7-v8.8 and Control Core Services software v9.0 or later with FBM222.

Field Device Expert needs an S39 FCS Platform License.

Instrument Workshop Edition Requirements

- Laptop, desktop, or server class computer with 2.18 Ghz (or faster) Intel Pentium® 4 processor (or higher), minimum of 16.0 GB free hard disk space, and minimum of 2.0 gigabytes RAM.
- DVD/CD drive
- Video Graphic Accelerator Card: 32 MB of memory
- Communications Network: 100 MHz TCP/IP Ethernet
- Compatible third-party interface card for one PROFIBUS port
- Third-party PROFIBUS communication DTM
- PROFIBUS junction devices, power supplies, and fieldbus terminations as necessary to connect the field devices.

Sizing Guidelines

The Field Device Expert for PROFIBUS along with the FBM222 provide these capacity limitations:

- 125 PROFIBUS slave devices assigned to an FBM222 port.

For additional information on the FBM222, see *FBM222, Redundant PROFIBUS Communication Module* (PSS 41H-2S222).

⚠ **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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PSS 41S-10FDMPB, Rev B