Condition Monitoring Device Library

Release v1.00

Allen-Bradley
by ROCKWELL AUTOMATION

Reference Manual

Original Instructions

Important User Information

Read this document and the documents listed in the additional resources section about installation, configuration, and operation of this equipment before you install, configure, operate, or maintain this product. Users are required to familiarize themselves with installation and wiring instructions in addition to requirements of all applicable codes, laws, and standards.

Activities including installation, adjustments, putting into service, use, assembly, disassembly, and maintenance are required to be carried out by suitably trained personnel in accordance with applicable code of practice.

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

No patent liability is assumed by Rockwell Automation, Inc. with respect to use of information, circuits, equipment, or software described in this manual.

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Throughout this manual, when necessary, we use notes to make you aware of safety considerations.

WARNING: Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.

ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence.

IMPORTANT Identifies information that is critical for successful application and understanding of the product.

These labels may also be on or inside the equipment to provide specific precautions.

SHOCK HAZARD: Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.

BURN HAZARD: Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.

ARC FLASH HAZARD: Labels may be on or inside the equipment, for example, a motor control center, to alert people to potential Arc Flash. Arc Flash will cause severe injury or death. Wear proper Personal Protective Equipment (PPE). Follow ALL Regulatory requirements for safe work practices and for Personal Protective Equipment (PPE).

The following icon may appear in the text of this document.

Identifies information that is useful and can help to make a process easier to do or easier to understand.

Device Object Libraries Overview

Our Device Object Libraries enable you to easily interface with Rockwell Automation® intelligent devices like drives, motion, network switches, sensors, IO and more. The libraries contain tested, documented, and lifecycle-managed objects which can be used with machine builder, process, and packaged libraries or as standalone components. Device objects include HMI faceplates for FactoryTalk® View ME/SE and Studio 5000 View Designer® software and provide a user interface that seamlessly integrates with the products.

HMI faceplates are standard display files that provide a common user interface. These are HMI pop-up screens used to display detailed information related to a specific instruction or device. In systems that follow ISA 101.1 design guidelines, faceplates are often referred to as Level 4 displays.

Pre-configured Device Objects include an Add-On Instruction Rung/Routine and an HMI Faceplate providing the following benefits:

- Collect, Process and Deliver Data between Smart Devices and Application Logic
- Detailed Device Data Collection and Delivery
- Enhanced Device Status and Diagnostics
- Common Control Interfaces maximizing Flexible Automation Device Selection & Application Code Reuse

Device Object Use Cases:

- Basic Device Maintenance and Diagnostics
- Virtual Device Operations for Startup and Commissioning
- Operator and Program Control for Velocity Machine and Process Applications

Device Object Libraries may be downloaded from the Product Compatibility and Download Center. Search for "Library".

Application Code Manager

Studio 5000® Application Code Manager is a tool that can be used with Device Object Libraries to streamline project and machine development. This bulk coding tool allows you to easily design and standardize functionality with reusable application code.

Enable more efficient project development with reusable libraries of code:

- Quickly create and deploy projects through our Application Content Libraries
- Import Rockwell provided application content libraries to expedite system development

- Build your own reusable code that can be managed and deployed across your entire enterprise
- Easily configure objects in bulk with reusable code to increase application development, no additional programming is necessary
- Consolidate content for Studio 5000 Logix Designer®, FactoryTalk® View Studio, FactoryTalk® Alarms & Events, FactoryTalk® Historian to configure an object a single time and generate content for each of those software packages.

See the section on Using the Library with Application Code Manager for more details.

Other Application Code Libraries

This Device Object Library may be used in harmony with other Application Code Libraries including other Device Object Libraries (Network, IO, IO-Link, Safety Device Libraries) or Application Libraries (PlantPAx® Process Objects library, Machine Builder Libraries). All libraries are intended to follow similar design philosophies to provide a consistent experience for operators and maintenance staff.

A complete list of Application Code Libraries from Rockwell Automation® follows.

Item	Description
PlantPAx® Process Library	Rockwell Automation® Library of Process Objects provides application templates, Endress + Hauser library objects, Application Code Manager library objects, and tools and utilities for PlantPAx® DCS applications. Includes the following: • Graphics for built-in instructions • HMI images and Help files • Logix diagnostic objects • Process objects • Control strategies • Sequencer objects • PlantPAx® Configuration Tools for Tags, Alarms and Historian • Color Change • Historian -- Asset Framework template and objects
Machine Builder Libraries	Tested, documented and life-cycle managed library objects and faceplates for use with Studio 5000® Application Code Manager for use primarily with OEM and discrete machine applications.
Common Application Libraries	Commonly used application library objects and faceplates for use with Studio 5000® Application Code Manager including basic functions like unit conversion and data collection.
Independent Cart Technology Libraries	ICT Libraries for iTRAK® and MagneMotion® including MagneMover® Lite™ and QuickStick® for Studio 5000® Application Code Manager
I/O Device Library	Provides objects for Rockwell Automation® 1756, 1769, 1734, 1794, 1738, 1732E, 1719, 5069, 5094 I/O modules including pre-configured status and diagnostic faceplates
IO-Link Device Library	Provides IO-Link master and sensor objects including pre-configured status and diagnostic faceplates
Network Device Library	Provides objects for Stratix® switch and Device Level Ring network objects
Power Device Library	Provides objects for discrete, velocity, motion, and power monitor devices
Safety Device Library	Provides safety objects to interface with safety I/O
Electrical Protection Device Library	Provides a standard to represent protection devices within your electrical distribution system

Libraries can be accessed from the Product Compatibility and Download Center.

Software and Firmware Upgrades

When you update software or firmware revisions, we recommend that you verify the impact on performance and memory utilization before implementing the upgrade on the production system. For FactoryTalk® View or ControlLogix® platforms, we recommend that you review the release notes and verify the impact of the upgrade on performance and memory utilization.

You can also verify the compatibility of the upgrade with the installed software and operating systems in use on your system. See the Product Compatibility and Download Center.

Rockwell Automation® Services and Support

System Support offers technical assistance that is tailored for control systems. Some of the features include the following:

- Highly experienced team of engineers with training and systems experience
- Use of online remote diagnostic tools
- Access to otherwise restricted TechConnect℠ Knowledgebase content
- 24-hour, 7 days per week, 365 days per year of phone-support coverage upgrade option

For more information, contact your local distributor or Rockwell Automation® representative or see http://www.rockwellautomation.com/support.

You can view or download publications at http://www.rockwellautomation.com/literature. To order paper copies of technical documentation, contact your local Allen-Bradley distributor or Rockwell Automation® sales representative.

Rockwell Automation® Condition Monitoring Device Library

The Condition Monitoring Device Library is a tested, documented, and life cycle managed object library. The Device Library provides pre-configured status and diagnostic faceplates and AOI sets for Rockwell Automation® condition monitoring devices and applications. The Condition Monitoring Device Objects may be used with Machine Builder, Process, and Packaged Libraries or as standalone components. Condition Monitoring Device Library add-on instructions objects collect, process, and deliver data between hardware devices and application logic.

The Condition Monitoring Device Library includes Add-On Instructions (AOIs) and HMI Faceplates for Allen-Bradley® condition monitoring products including Dynamix™ 1444 Integrated Condition Monitoring Systems. Objects in this library are used to monitor and configure the hardware as it relates to specific machinery applications such as motor-pump combinations.

This document includes the functional requirements of the Dynamix™ 1444 device objects.

The Condition Monitoring Device Library may be downloaded from the Product Compatibility and Download Center. Search for Condition Monitoring Device Library.

Compatibility

Compatible Software

- Studio 5000 Logix Designer® v33+ for PAC Application Development
- Studio 5000® Application Code Manager v4.01 and later for bulk code configuration
- FactoryTalk® View Studio and FactoryTalk® View SE v12 and later for FactoryTalk View SE Station and Distributed Applications

Compatible Hardware

- ControlLogix® 5570/5580 controller or CompactLogix™ 5370/5380 Controller v33 or later
- Dynamix™ 1444 Integrated Condition Monitoring System 1444-DYN04-01RA v4.007 or later

IMPORTANT FactoryTalk View HMI faceplates are not compatible with FactoryTalk® ViewPoint

Compatible Application Code Libraries

- PlantPAx® Process Objects Library v5.00.00 or later.
- Machine Builder Libraries v2.00 or later

Summary of Changes

This publication contains the following new or updated information. This list includes substantive updates only and is not intended to reflect all changes.

Topic	Page
Initial release	all

Footprint

Each instruction requires memory footprint within the Logix controller. The following characteristics apply:

- **Definition:** Estimated memory required to store the object definition, including all dependents
- **Instance:** Estimated memory required per object instantiated including the hardware module definition.
- **Execution (L85):** Estimated execution time / scan footprint evaluated in 1756-L85 PAC

Device Object Footprint

Device Object	Definition (kB)	Instance (kB)	Execution (µs)
raC_Dvc_DYN1444_PumpREB	322	192	146

Additional Resources

For a complete understanding of Rockwell Automation® condition monitoring applications it is recommended to review the following documents.

Resource	Description
Dynamix-1444 Series Monitoring System User Manual 1444-UM01	This manual describes the Dynamix™ 1444 Series dynamic measurement module. The information in the following chapters discusses installation, configuration, and operation of the module.
Applying Condition Monitoring to Various Machinery Application Technique 1444-AT001	This application guide is intended to provide general guidance in how to apply a Dynamix™ 1444 Series condition-monitoring system to various types of machinery.
1443 Accelerometer Selection Guide, publication 1443-TD001.	Details about sensors.
Eddy Current Probe Selection Guide, publication 1442-TD001.	Details about sensors.
Rockwell Automation Library of Process Objects Reference Manual PROCES-RM200	Describes the Add-On Instructions, PlantPAx instructions, and associated faceplates that are available to develop applications.
Application Code Manager User Manual LOGIX-UM003	Studio 5000® Application Code Manager user manual.

Library Components

The Condition Monitoring Device Library is a tested, documented, and life cycle managed object library. The Device Library provides pre-configured status and diagnostic faceplates and AOI sets for Rockwell Automation® condition monitoring devices and applications. The Condition Monitoring Device Objects may be used with Machine Builder, Process, and Packaged Libraries or as standalone components. Condition Monitoring Device Library add-on instructions objects collect, process, and deliver data between hardware devices and application logic.

Condition Monitoring Device Instructions

The Condition Monitoring Device Library includes instructions to interface with Dynamix™ 1444 Integrated Condition Monitoring Systems and specific machinery monitoring applications. The instructions included are as follows:

- Dynamix 1444 - Pump with Rolling Element Bearings

One type of instruction is used in this library:

- Device (Dvc): instruction used for devices. (e.g. DYN1444)

Condition Monitoring Device Instructions

Instruction	Version	Instruction Description
raC_Dvc_DYN1444_PumpREB	1.00	Dynamix 1444 Module in Pump with Rolling Element Bearings application

Library Folders and Files

When you extract the library from the downloaded .zip folder, you will find the following folder and file structure. Note that some items are generalized with *TYPE* (e.g. Dvc, Opr, Tec) and *OBJECT* (e.g. DCS, CROUT, etc). The major and minor versions are represented by X and Y respectively.

Level 1	Level 2	Level 3	File Type	Description
Application Example			**Folder**	**Application Example Files**
	ConditionMonitoringApplication_ACM.xlsx		XLSX	Application Code Manager Project
	Project_ConditionMonitoringApplication.ACD		ACD	Logix Designer Example Project
	ConditionMonitoringApplication_SE.apa		APA	FT View SE Project Archive
ApplicationCodeManagerLibraries			**Folder**	**Application Code Manager files**
	Attachments (.HZ1 and .txt files)		Folder	ACM Object Attachments
	(RA-LIB)_Device_Device_ConditionMonitoring_raC_LD_*OBJECT*_(X.Y).HSL4		HSL4	ACM Device Object

HMI - FactoryTalk View SE			**Folder**	**FactoryTalk® View SE Files**
	Displays - gfx		Folder	FT View SE display files
		(raC-X_YY-SE) raC_*TYPE_OBJECT*-faceplate.gfx	GFX	Object Faceplate display
	Global Objects - ggfx		Folder	FT View SE Global Object files
		(raC-X-SE) Graphic Symbols - LIBRARY.ggfx	GGFX	Graphic Symbol/Launch Button global objects
		(raC-X-SE) Toolbox - LIBRARY.ggfx	GGFX	Toolbox global objects
HMI FactoryTalk View Images - png			**Folder**	**FT View ME/SE image files**
	images.png		PNG	FTView ME/SE images
Reference Manuals			**Folder**	**Manuals**
	DEVICE-RM600A-EN-P.pdf		PDF	Reference manual
Studio 5000 Logix Designer Files - L5X			**Folder**	**Studio 5000® AOI and RUNG import files**
	raC_*TYPE_OBJECT*_X.YY_RUNG.L5X		L5X	Object rung import
	raC_*TYPE_OBJECT*_X.YY_AOI.L5X		L5X	Object AOI import
Videos			**Folder**	**How-to and Operational Overview Videos**
	How_To_Import_and_Configure_ConditionMonitoring_Device_Objects_in_FTView.mp4		MP4	How-to Video
	How_To_Import_and_Configure_ConditionMonitoring_Device_Objects_in_LogixDesigner.mp4		MP4	How-to Video
	How_To_Import_and_Configure_ConditionMonitoring_Device_Objects_in_ACM.mp4		MP4	How-to Video
	Operational_Overview_of_ConditionMonitoring_Device_Object_Faceplate.mp4		MP4	Operational Overview video
ReadMe.txt			TXT	Explanation of setup.cmd
SetUp.cmd			CMD	Application Code Manager setup script to register library

See the files in the *Application Example* folder to see a functional application that uses all of the Condition Monitoring Device Library instructions. These files are referenced in the Programming Examples for each instruction. The files include a Studio 5000 Logix Designer® controller file, a Studio 5000® Application Code Manager project back-up, and an HMI project for FactoryTalk® View SE Local Station.

Visualization Files

Each Add-On Instruction has associated visualization files that provide a common user interface. The Condition Monitoring Device Library supports FactoryTalk® View SE (Site Edition).

FactoryTalk® View Visualization Files

You must import these files in the following order:

- Images (.png files)
- Global Objects(.ggfx file type)
- HMI faceplates (.gfx file type)

File Type Abbreviations	FactoryTalk® View SE	Description
Images (.png)	All .png files in the *HMI FactoryTalk View Images - png* folder. **IMPORTANT:** FactoryTalk® View application renames PNG files when they are imported with a .bmp file extension, but the files retain a .png format.	Common icons that are used in the Global Objects and standard displays for all objects.
Global objects (.ggfx)	(raC-1-SE) Graphic Symbols - Condition Monitoring Device.ggfx	Graphic symbols or launch buttons used to open faceplate displays from other displays.
	(raC-1-SE) Toolbox - Condition Monitoring Device.ggfx	Common objects used across multiple device faceplates.
Standard displays (.gfx)	(raC-1_XX-SE) precedes name of the display.	e.g. (raC-1_00-SE) raC_Dvc_DYN1444_PumpREB-Faceplate.gfx

Global object files contain Graphic Symbols that are created once and referenced multiple times on multiple displays in an application. When changes are made to a global object, all instances in the application are automatically updated.

Global objects serve two purposes:

- Toolbox files contain common elements that are used to build faceplate displays.
- Graphic Symbols files contain device symbols or launch buttons that you can use to build your application displays. Select the symbol to open the corresponding faceplate display.

Standard display files, commonly called faceplates, provide a common user interface.

Basic Faceplate Attributes

Faceplates consist of tabs, and each tab consists of one or more pages. The Home tab is displayed when the faceplate is initially opened. The faceplate provides the means for operators, maintenance personnel, engineers, and others to interact with a device or instruction instance, which includes a view of its status and values. Select the appropriate icon on the left of the faceplate to access a specific tab. This section provides an overview of the faceplate attributes that are common across the objects. More details are supplied in the individual section for each object.

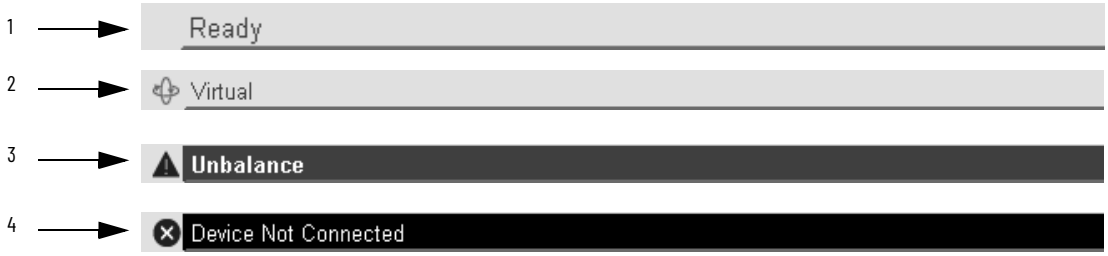
Common Status Banner

At the top of all device object faceplates there is a common status banner which provides the following information:

- Ready status. Shown if the device is connected and ready in physical mode with no active warning or faults.

- Virtual status. Note that if the device is in virtual mode and a warning is active, the warning will take precedence. The virtual status icon will be shown beside the Motor RPM on the home tab.
- Warning status and reason.
- Fault/Not Ready status and reason.

.



Item	Description
1	Ready state displays "Ready" text with no icons on light gray background
2	Ready and virtual state shows "Virtual" text and virtual icon on light gray background
3	Ready with Warning state shows Warning reason text and warning icon on dark gray background
4	Faulted/Not Ready state shows faulted/not ready reason text and faulted icon on black background

Faceplate Navigation

All device object faceplates have navigation tabs on the left side of the faceplate. Navigation tabs may vary based on device type. The active tab will show as a light gray, while an inactive tab will show as a dark gray.


Active Tab


Inactive Tab

The common tabs are shown below.


Home Tab


Bar Graphs Tab

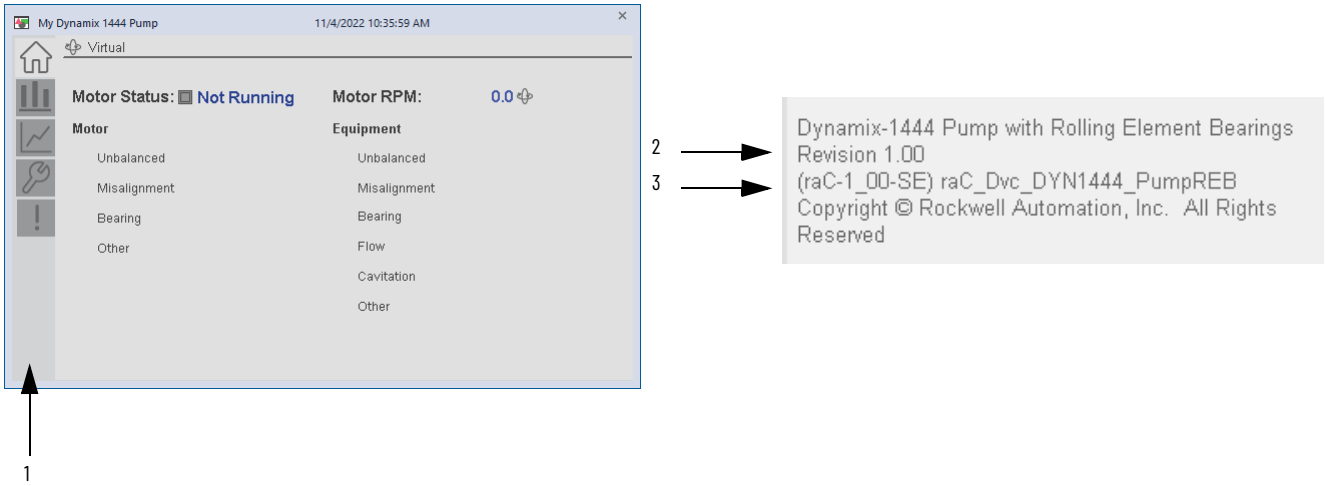

Trend Tab


Configuration Tab

Fault Tab

Faceplate Revision Notes

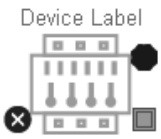
By clicking on the open space near the bottom left corner of the faceplate you can momentarily view revision notes and details of the active faceplate. This may be useful in troubleshooting or when communicating with Rockwell Automation® Tech Support.



Item	Description
1	Click near the bottom left corner to temporarily open up the revision notes dialogue
2	Revision number
3	Faceplate display name

Launch Buttons

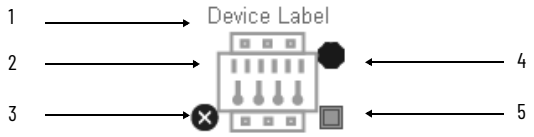
Launch buttons are provided in Global Display (GGFX) files for FactoryTalk View® ME/SE as well as in Studio 5000 View Designer® projects. These are used to open HMI faceplate displays or pop-ups. Two types of launch buttons are provided:

Launch Button Style	Image Examples	Usage
Basic Text Button		Simple launch button with diagnostic information.
Graphical Button		Graphic button can be used in schematic style displays where a system/network diagram is shown. When available, basic module diagnostics and a live value is displayed.

Diagnostic Icons

Diagnostic icons may be displayed on the graphic buttons for compatible modules. Safety modules are designated with a small guard icon.

Icon	Image	Visible Condition
Communications Failure		Connection Faulted
Fault		Any device fault active (module hardware issue)
Warning		Any machinery warning
Not Ready		Device Not Ready
Virtual		Device in virtual mode (not physical)
Stopped		Device inactive/stopped
Running		Device active/running



Item	Description	Options
1	Device label. Set to tag.@Description by default. Set to Global Parameter #104 for custom label.	
2	Device Fault/Warning Status	
	Warning (e.g. Vibration Condition present)	
	Fault (e.g. Device fault)	
3	Device communication failure/Virtual Mode status	
	Communication Failure	
	Virtual Mode Active	
4	Device not ready status	

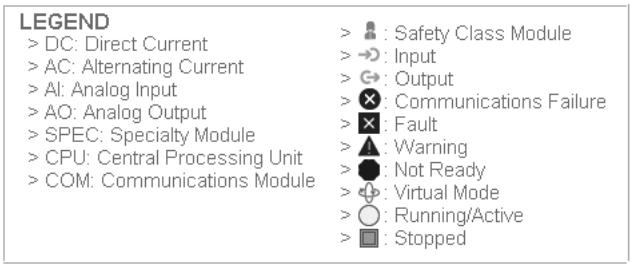
Item	Description	Options
5	Device running (active)/stopped (inactive) status	
	Stopped (inactive)	
	Running (active)	

Schematic Display Configuration

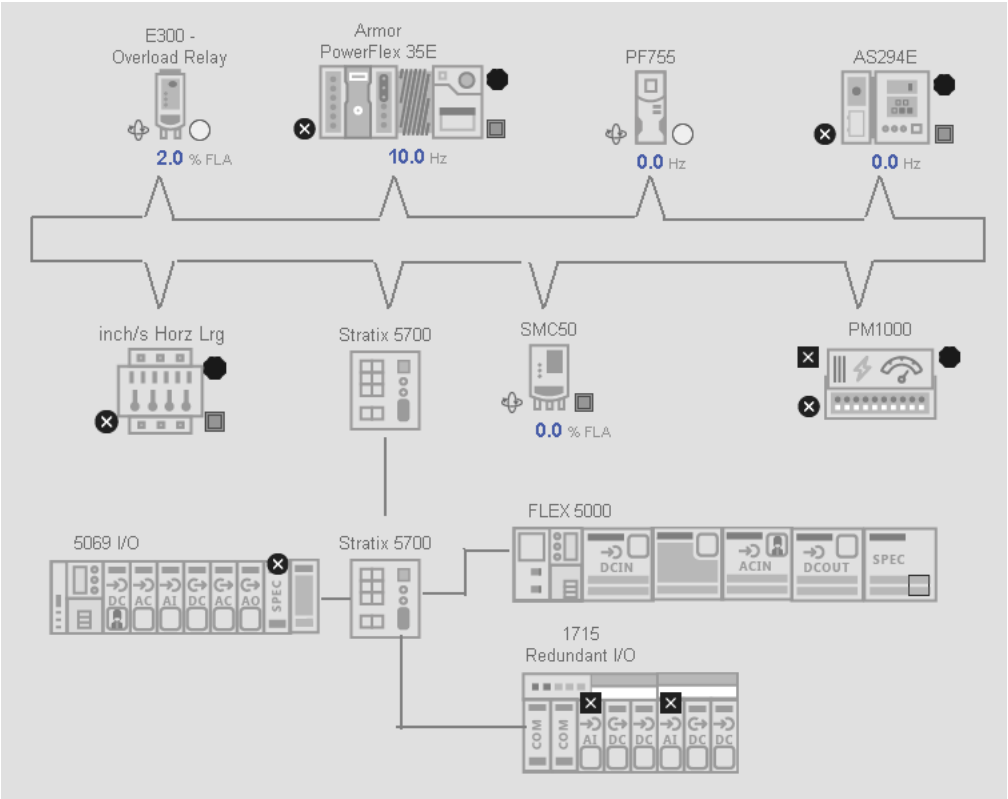
These icons can be used together to allow users to build schematic diagrams. The Condition Monitoring Device Library graphics can also be used along with similar buttons available in the Network Device Library v12.01, Power Device Library v3.02, and IO Device Library v5.01.

It is recommended set the Grid Snap ON with settings *z = 4; y = 4* when using the graphic symbols in FactoryTalk View® SE. This will make it easier to align modules in a chassis configuration.

A legend is provided in the FactoryTalk View® SE global object displays *(raC-1-SE) Graphic Symbols - Condition Monitoring Device.*

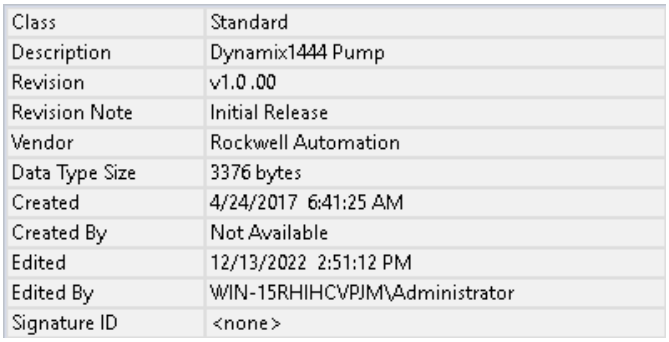
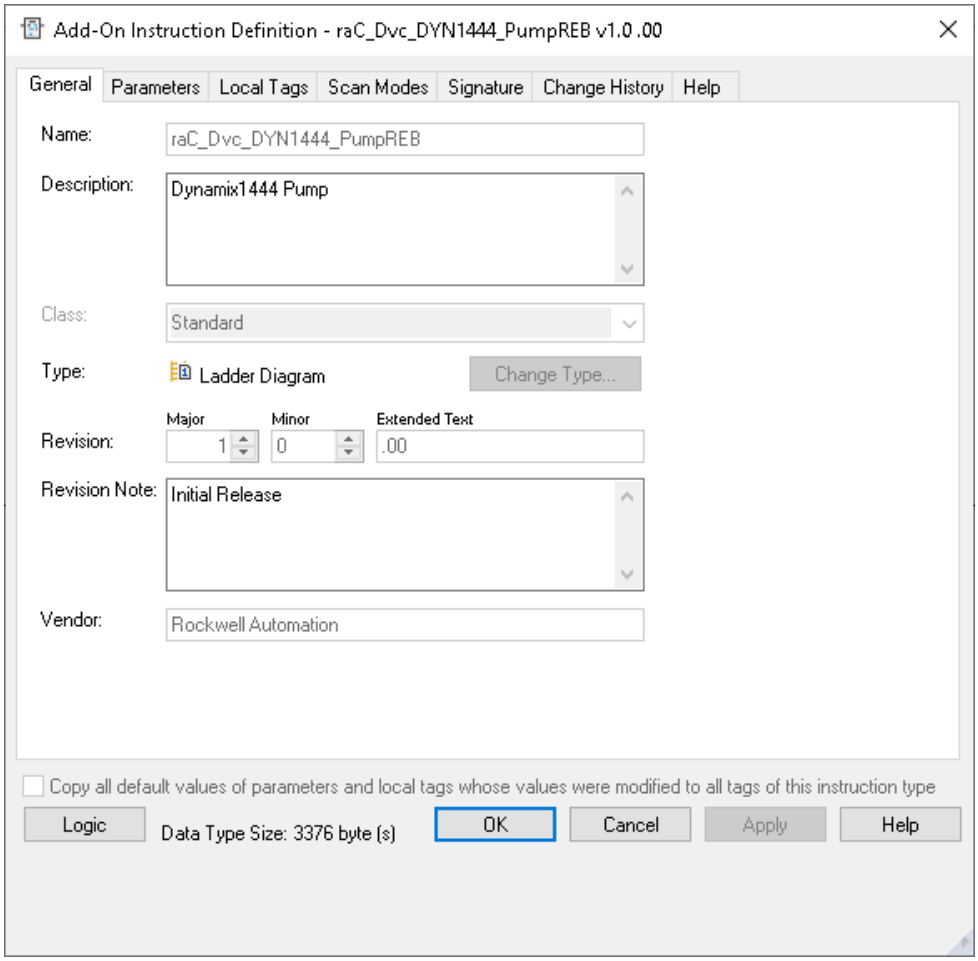
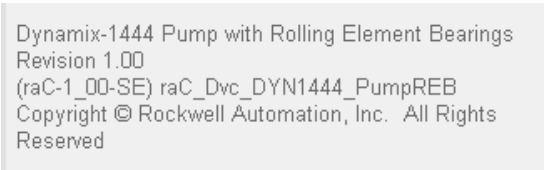
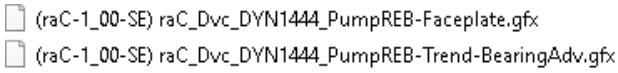


An example of a complete system is shown below. This system includes objects from the Condition Monitoring Device Library, IO Device Library, Network Device Library and Power Device Library.



Library Versions

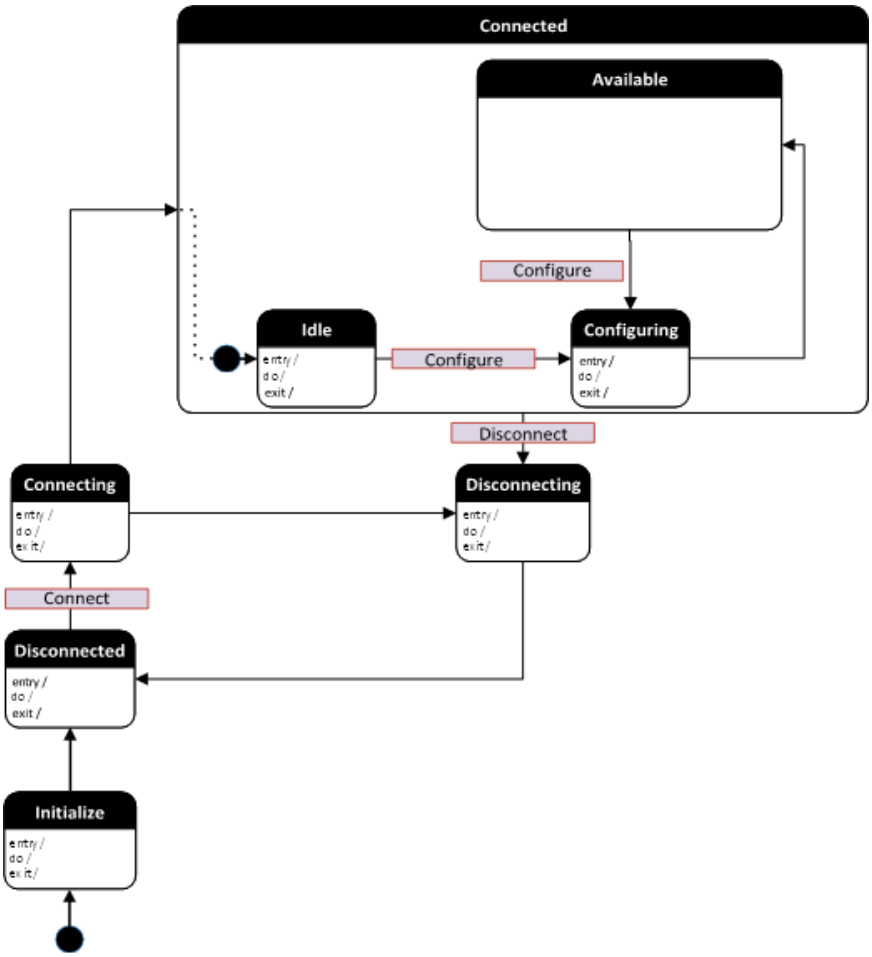
Each library object has a revision x.yy where: x is the Major Revision number and yy is the Minor Revision number. Each release of the library comes with release notes that describe the changes that were made since the last release. You can find the revision number of the object in a number of locations as shown in the following table.

Component	Example
The Add-On Instruction in Logix Designer application has revision information visible when the instruction is selected in the Controller Organizer.	
The Add-On Instruction Definition General tab shows the revision number along with basic revision notes. Refer to the release notes for complete revision notes.	
The faceplate in FactoryTalk® View software has revision information visible when the pointer is clicked just inside the lower left corner of the faceplate.	
The revision number is shown in the file names for GFX, ACM.HSL4, AOI.L5X, and RUNG.L5X files.	

State Model

The following section will discuss the state model for Device Object. The figure below shows the core logic states.

By default, each state is active for a minimum of 256us to allow for evaluation of state outside of the ADO instance in the user program



Application Code Manager

Architectural Overview

Unlike some other device libraries, the objects in the Condition Monitoring Device Library use a single Device Implement Object. This is because the module configuration is integral to the machinery monitoring application configuration. This object includes the controller tags, add-on instructions, data types, and attachments such as HMI content and documentation along with all application code and related configuration of the asset. This also includes the required controller tags, programs, modules, and FactoryTalk® View SE symbols. These are found under the *(RA-LIB) Device > Device* folder and have names like *raC_LD_Dvc_DYN1444_xxx* is the device name. LD stands for Library Designer.

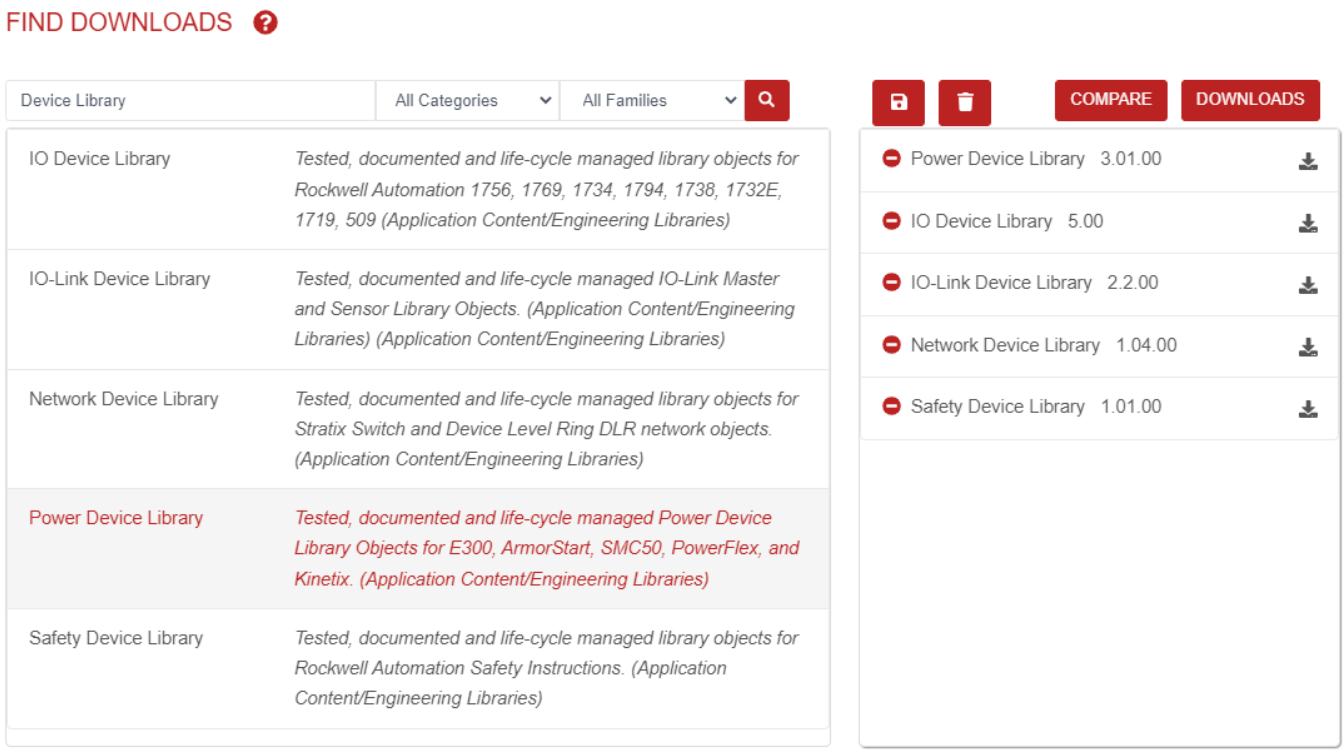
Using the Library

Install the Library

Download the Library

For the latest compatible software information and to download the Rockwell Automation® Library, see the Product Compatibility and Download Center.

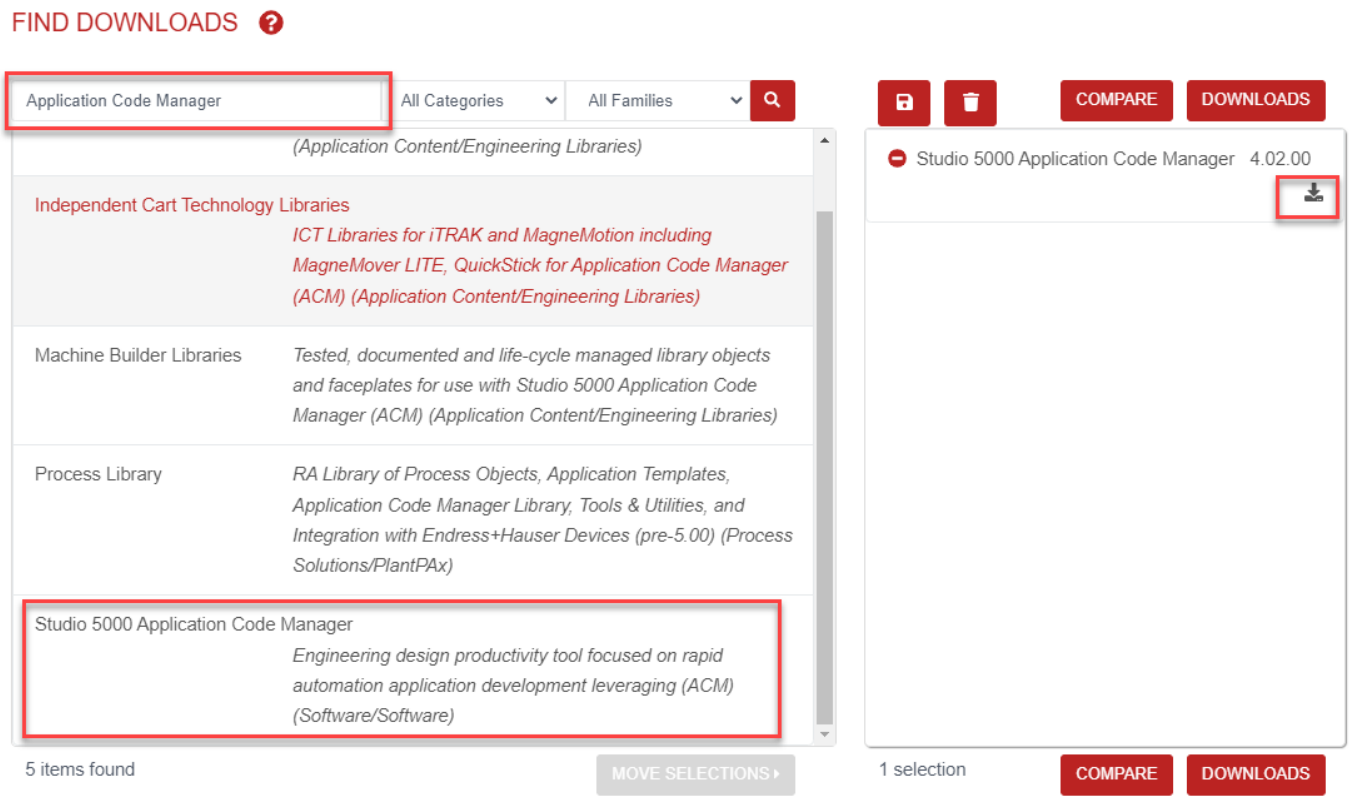
Search "Device Library" or filter on Application Content to quickly find the library.



Download & Install Studio 5000® Application Code Manager

Studio 5000® Application Code Manager is free to install from Rockwell Automation's Product Compatibility and Download Center.

Search "Application Code Manager" and select the item to download.



Extract the downloaded .zip file by running the *4.xx.00-Studio5000_ACM-DVD.exe* executable file. This will extract a new folder containing a *Setup.exe* file which can be run to begin product installation.

Follow the prompts from the splash screen until installation is complete. Note that a SQL server is required for Application Code Manager. SQL Server Express is offered for free and is included in the Application Code Manager installer.

Register Libraries in Studio 5000® Application Code Manager

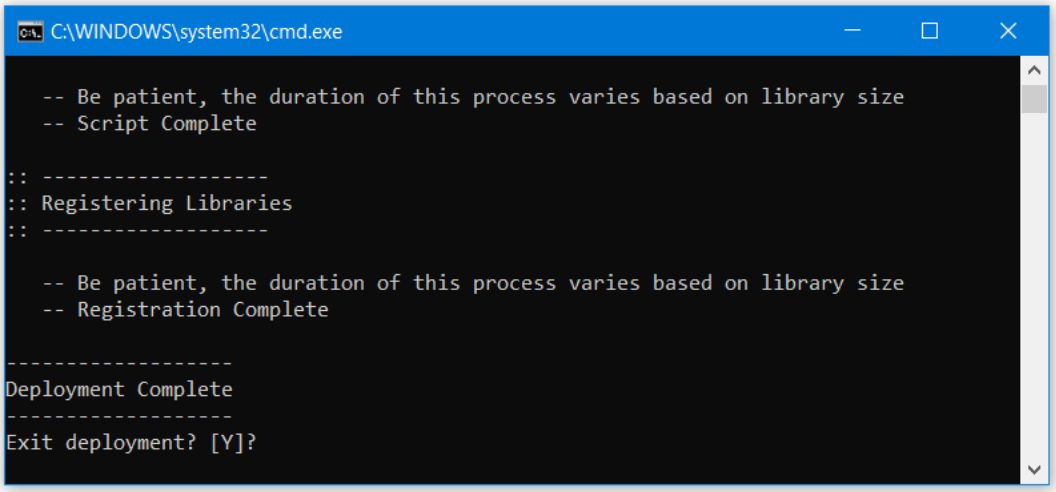
It is recommended that you use Studio 5000® Application Code Manager or the Studio 5000® "Import Library Objects" Plug-In Wizard to import device library objects into a Logix 5000 controller project. To use the library in Application Code Manager you must first register the libraries.

Using Studio 5000® Application Code Manager is not mandatory although it is highly recommended to reduce the likelihood of configuration errors and simplify the workflow. Alternatively, you can import the RUNG.L5X files directly into a Studio 5000® project.

The *Lite* version of Studio 5000® Application Code Manager is free of charge and can be downloaded from the Product Compatibility and Download Centre. None of the features included in the Standard (paid) version are required to use Device Object Libraries.

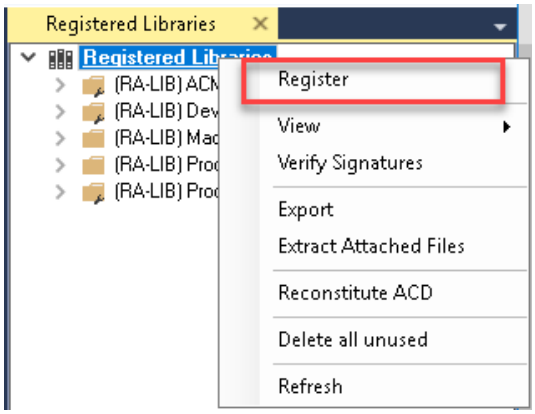
Register Complete Library Automatically

To automatically register the entire library, find and run the *setup.cmd* file in the root folder of the library files. You will see a windows console appear as the script runs. When it is complete it will display “Deployment Complete”. Enter “Y” to exist the console.



Register Individual Library Objects Manually

As an alternative to registering the entire library using the setup.cmd script, you can manually register one or multiple library objects in Studio 5000® Application Code Manager. Open up Application Code Manager and view the Registered Libraries panel on the right. Right-click on *Registered Libraries* and select *Register*. Browse to the *ApplicationCodeManagerLibraries* folder within the library files and select any HSL4 files that you would like to register. Note you may select more than one at a time. Once you complete registering the desired objects they will be shown under the *(RA-LIB) Device* solution folder.



Importing Logic into Studio 5000® Projects

There are multiple methods to using the logic in a Studio 5000® application. For projects that are being developed from scratch using Application Code Manager along with other Application Code Libraries such as the PlantPAx® Process Objects Library or the Machine Builder Library, you can continue to use the Device Object Libraries in Application Code Manager. For existing applications where devices are being added, it is recommended to use the Studio 5000® Plug-In "Import Library Objects" Wizard. Alternatively you can import the RUNG.L5X files into your program and configure them manually.

In the Library there is a folder named *Videos* which contains many How-To and Operational Overview Videos which walk step-by-step through each process. You can refer to the following videos for this section:
"How_To_Import_and_Configure_ConditionMonitoring_Objects_in_LogixDesigner"

It is not recommended to simply import the AOI.L5X files and attempt to build your own logic rung. Doing so will increase the likelihood of configuration errors and likely miss logic that is required outside of the Add-On Instruction.

AOI files should only be imported when updating an existing application from a previous version of a Device Object Library to a newer one.

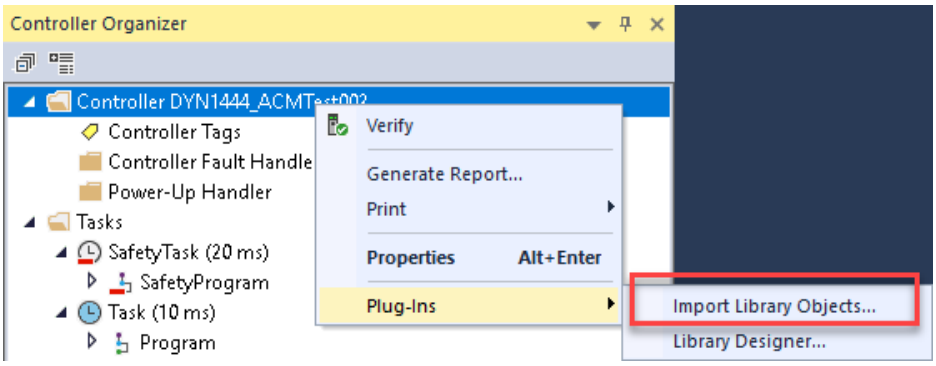
Below is a table to capture recommendations on when to use which tool or workflow when importing and configuring device objects.

Tool/Workflow	Description of when to use	Software Requirements
Application Code Manager (full application)	Project is developped from scratch using Application Code Manager along with PlantPAx® or Machine Builder libraries.	Studio 5000 Logix Designer® Studio 5000® Application Code Manager (Lite)
Studio 5000® Plug-In "Import Library Objects" Wizard	Application Code Manager is installed but not required for the entire project. Application has already been developed but some Device Objects need to be added.	Studio 5000 Logix Designer® Studio 5000® Application Code Manager (Lite)
Import RUNG.L5X File	Application Code Manager is not installed. Application has already been developed but some Device Objects need to be added. Familiar with rung import workflow.	Studio 5000 Logix Designer®
Import AOI.L5X File	Updating existing application that contains an older version of a Device Object AOI.	Studio 5000 Logix Designer®

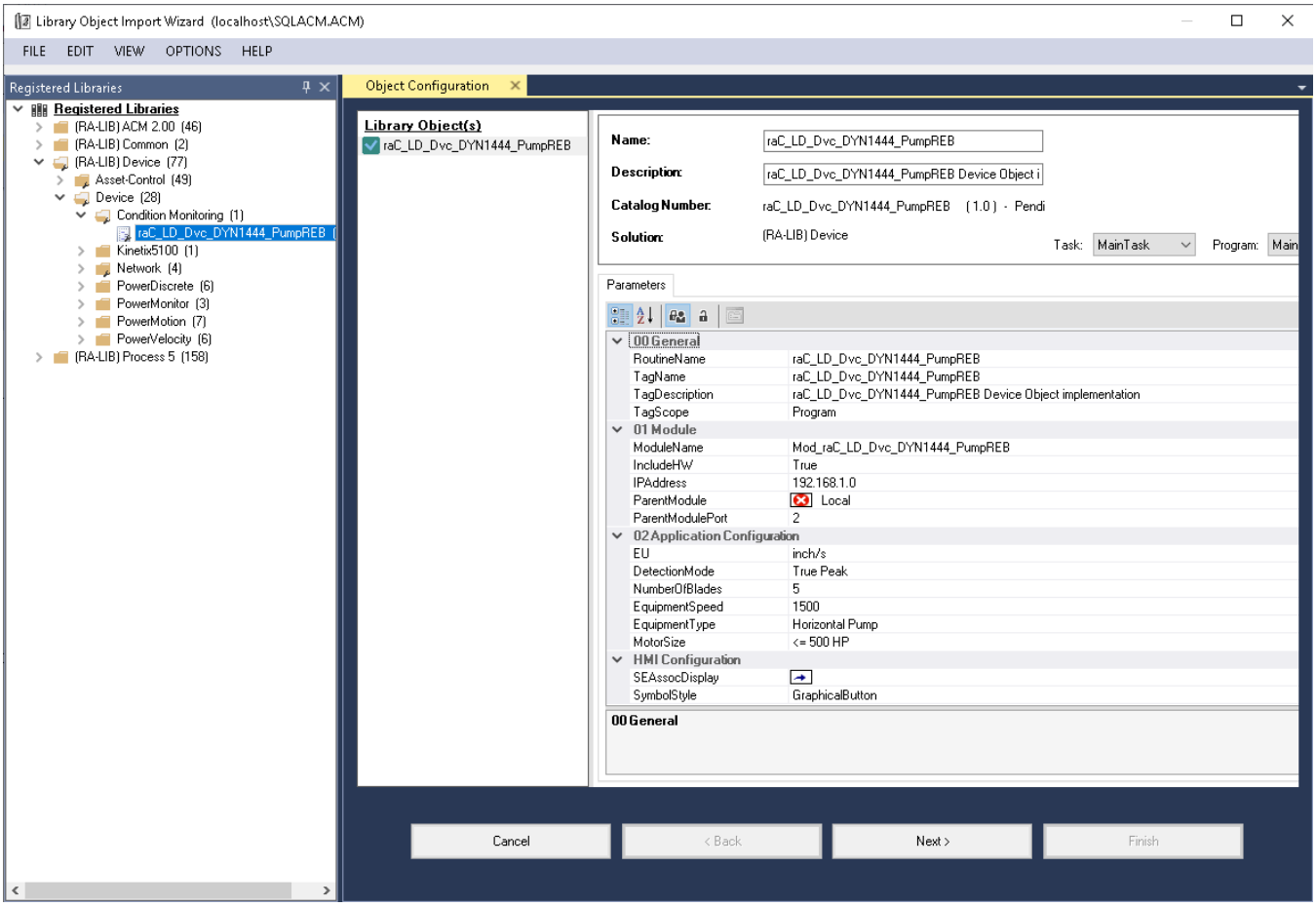
Import Library Objects Wizard

The most simple way to import a Device Object into an existing application is to use the Studio 5000® Plug-In "Import Library Objects" wizard. This plug-in requires Application Code Manager to be installed but does not require it to be open or have a project created.

Right click on an item (e.g. Controller, Task, Program, etc) in the Controller Organizer and select *Plug-Ins > Import Library Objects...*



This will launch a small wizard version of Application Code Manager inside of your Studio 5000 Logix Designer® Project. In the Registered Libraries panel on the left, find your desired object under *Registered Libraries* > *(RA-LIB) Device* > *Device* and drag it into the Library Object(s) list in the Object Configuration Tab.



Perform the following configuration:

00 General:

- Enter a **name** and **description**. Maximum name length can be 22 characters. Note that other parameters such as the RoutineName, TagName, etc will auto-complete based on these fields.

- Assign the **Task** and **Program**. Note these are pre-assigned if you added the object to a specific program by right-clicking in the *Controller Preview* pane.
- Assign a **TagScope** to be *Program* or *Controller* scoped. For PlantPAx applications it is recommended to use *Controller* scoped tags.

01 Module:

- The *ModuleName* will default to Mod_*ObjectName*
- Set *IncludeHW* to True to allow Application Code Manager to create the Dynamix 1444 Module.
- Assign *IPAddress* along with the *ParentModule* and *ParentModulePort* addressing. Note that *ParentModule* may show a red 'x' when using "Local" or an ethernet adapter that is not created in the Application Code Manager project. "Local" is used for embedded ethernet ports such as in the L8xE controller family. In most cases *ParentModulePort* will remain set as '2' unless you are using a 5380 or 5480 series controller.

02 Application Configuration:

- Assign *EU* (Engineering Units) to either "inch/s" or "mm/s". This will configure the module properties accordingly.
- Assign DetectionMode to the desired FFT Band and overall detection mode: RMS, True Peak or True Peak-Peak.
- Set *NumberOfBlades* according to the machinery that you are monitoring (e.g. pump/fan blades). This information is used to assign the FFT band limits in the module properties.
- Set *EquipmentSpeed* in RPM according to the machinery that you are monitoring. For variable speed systems it is recommended to use an average or most common speed of the equipment. This information is used to assign the FFT band limits in the module properties.
- Set *Equipment Type* (Horizontal Pump/Vertical Pump) and *MotorSize* (<= 500 HP/> 500 HP) according to the pump-motor combination that is being monitored. This information is used to assign the FFT band warning/danger limits in the appropriate engineering units set by *EU*.

The HMI Configuration options are not used in the Plug-In Wizard and can be ignored. Click Finish to complete the import.

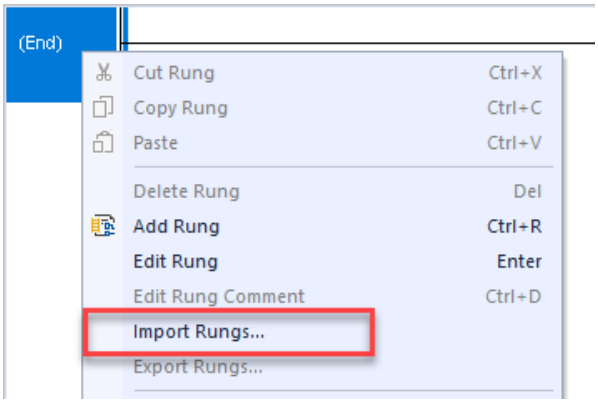
Import Rung Logic

An Add-On Instruction is defined once in each controller project, and can be instantiated multiple times in your application code. To use pre-engineered logic, import each desired RUNG.L5X file into a controller project.

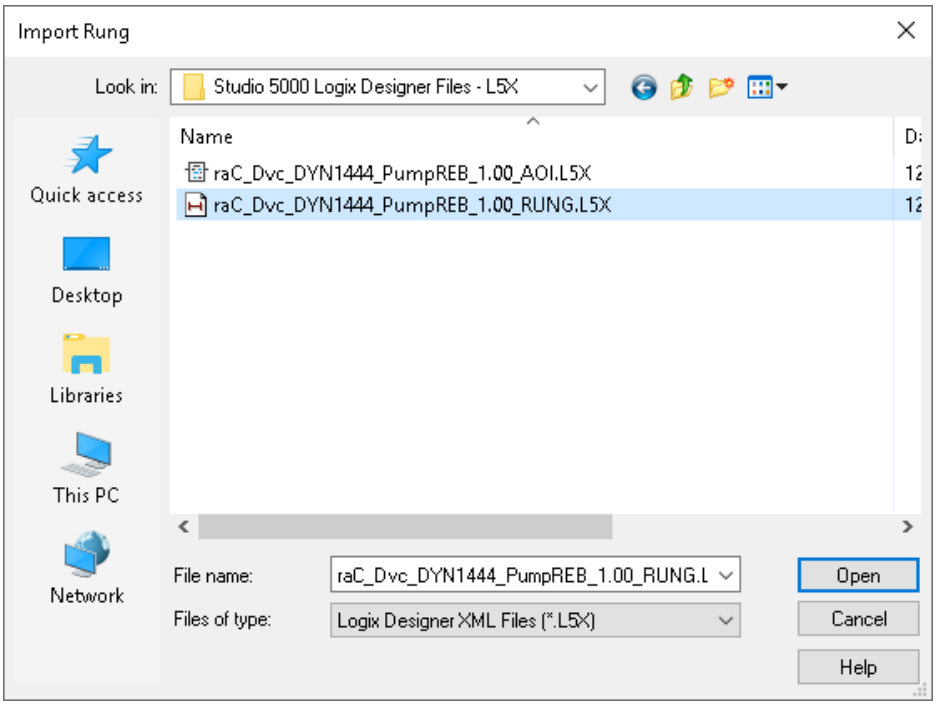
1. In the Studio 5000 Logix Designer® application, open a new or existing project.

IMPORTANT Add-On Instruction definitions can be imported, but not updated, online.

2. Choose or create a new ladder routine to open. Right-click in the routine ladder and choose Import Rungs...



3. Select the desired RUNG and Select Import. The file will have a name like *raC_Dvc_DYN1444_PumpREB_1.00_RUNG.L5X.*



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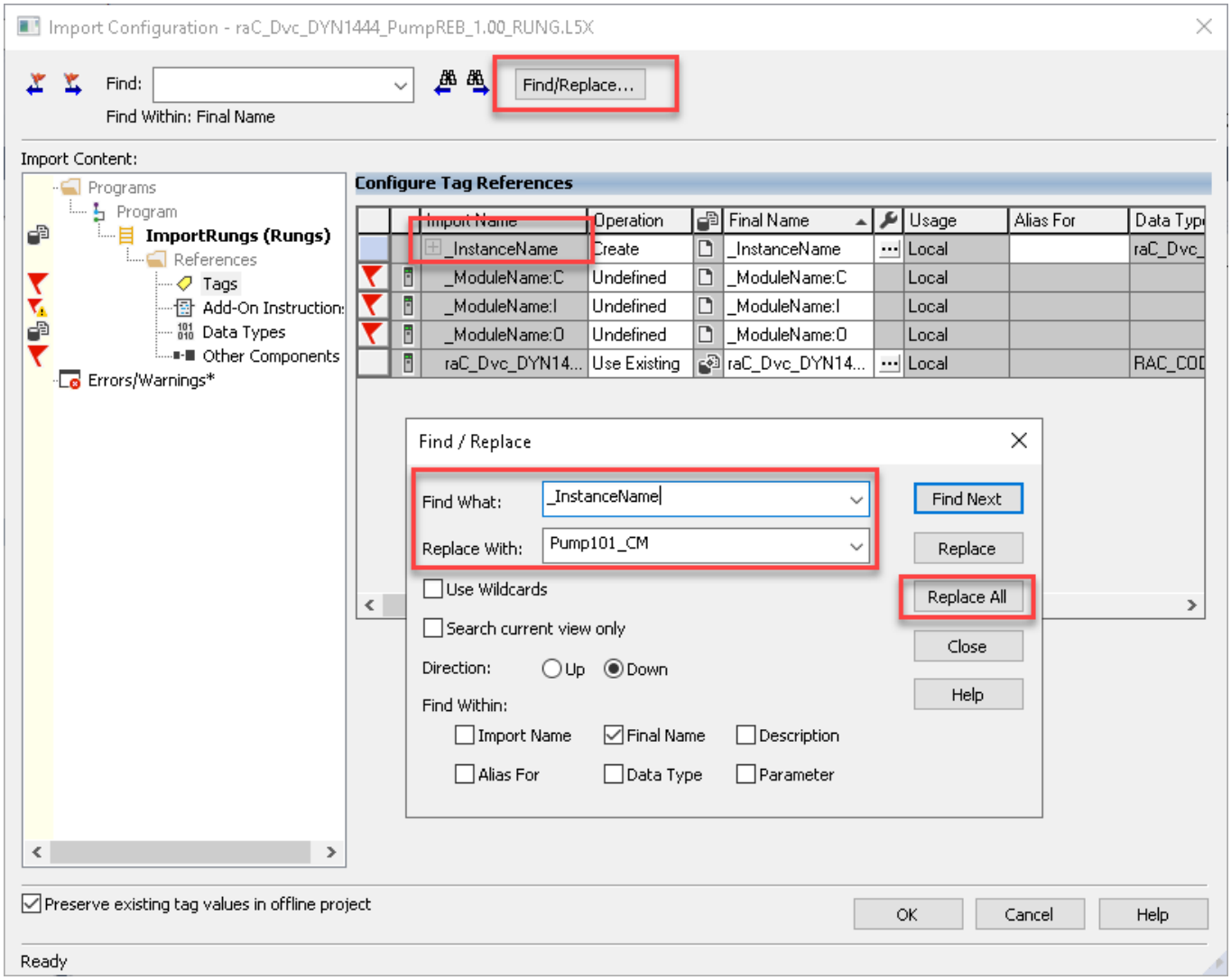
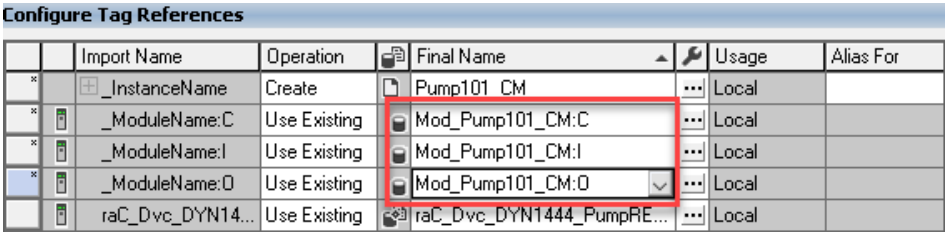
Both "RUNG" and "AOI" .L5X files are provided. Import the RUNG file to get all required additional tags, data types, and message configurations.

4. An *Import Configuration* dialogue window will open and display generic Import names which include "_InstanceName". Click the *Find/Replace...* button and replace all instances of "_InstanceName" with your desired device name (e.g. "Pump101_CM").

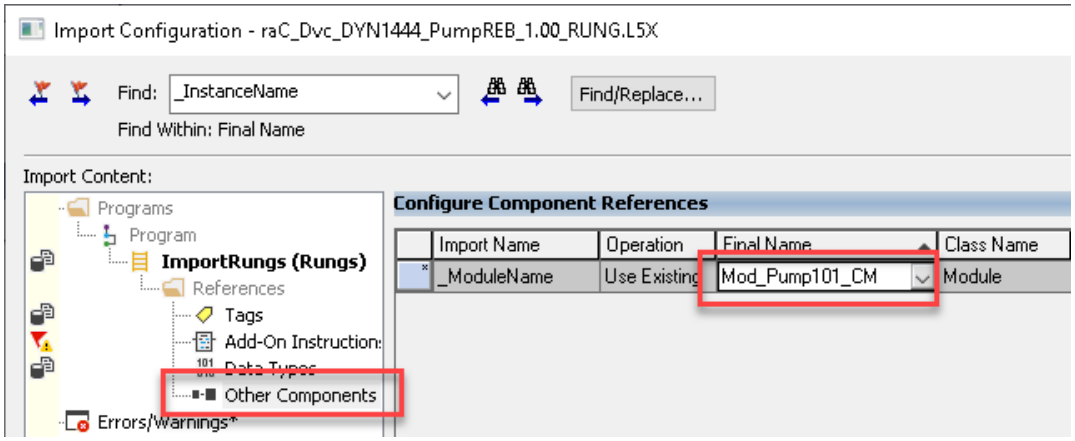


5. You will need to point the new object to the correct 1444-DYN04-01RA module in your project. You can type in or browse for the correct input (:I), Output (:O) and Configuration (:C) tags in your project. In this example our module is called Mod_Pump101_CM.

The 1444-DYN04-01RA Module must already be created in your project to link to it. The module definition must have the exact configuration as defined in this manual in order to allow the project to compile without errors. Alternatively you can link these tags after importing the logic. You can instead use the Import Library Objects method to automatically create the module along with the ladder logic.



6. Click on the *Other Components* section and type or browse to the name of the module. In this example our module is called Mod_Motor101.



7. The rung will now be imported into your ladder routine.

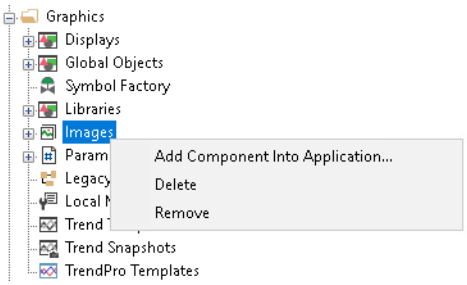
Using FactoryTalk® View Studio

Import FactoryTalk® View Visualization Files

There are several components to import for the visualization files. You import files from the downloaded Rockwell Automation® library files via FactoryTalk® View SE.

In the Library there is a folder named *Videos* which contains many How-To and Operational Overview Videos which walk step-by-step through each process. You can refer to the following videos for this section:
"How_To_Import_and_Configure_ConditionMonitoring_Objects_in_FTView"

All image and display items can be imported either by right-clicking in FactoryTalk® View on the Graphic sub-folder (e.g. Displays, Global Objects, Images) or simply dragging and dropping the files into the application.



Import files in this order:

1. Import HMI Images files.

   Select all the images in the *\HMI FactoryTalk® View Images - png* folder and Open.

2. Import Global Object files

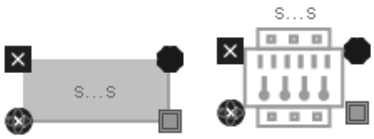
Select the global object (.ggfx) files from the *\HMI - FactoryTalk® View ME\Global Objects - ggfx* or *\HMI - FactoryTalk® View SE\Global Objects - ggfx* folder

3. Import HMI Faceplates

Select the faceplate (.gfx) files from the *\HMI - FactoryTalk® View SE\Displays - gfx* folder

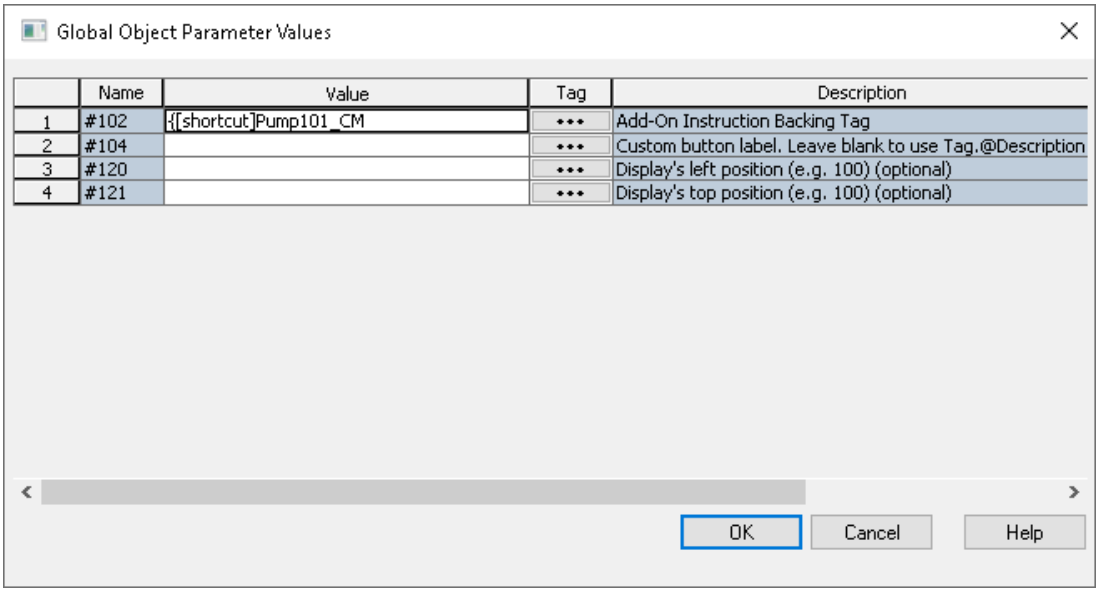
Configuring FactoryTalk® View Objects

Once the files have been imported into the FactoryTalk® View Studio project, you can begin using them in your application. Open the *Global Display (raC-1-SE) Graphic Symbols - Condition Monitoring Device*. Copy the desired launch button style and paste it into a display in your application where you would like to open the faceplate. For more information on graphic symbols, refer to the Graphic Symbols section of the specific device type chapter in this manual.



Alternatively, faceplates may also be launch from related instructions such as the navigate to more faceplate buttons in the Process Library PVSD/PMTR faceplate. Refer to Using the Power Device Library with PlantPAx® Applications or Using the Power Device Library with Machine Builder Applications for more information.

To configure the graphic symbol launch button, right-click and select *Global Object Parameter Values*. The Global Object Parameter value for the Backing Tag (#102) is mandatory while the Custom Button Label (#104), and display position values (#120, #121) are optional. You can browse for the tag in your controller project by clicking '...' or manually type them in. These parameters may vary depending on the graphic symbol used, please refer to the Graphic Symbols section of the device type for detailed information.



These Global Object Parameter Values are automatically configured when you use Studio 5000® Application Code Manager to design and configure your project. Refer to Using Studio 5000® Application Code Manager for more information.

Library Upgrades

Add-On Instruction Upgrades

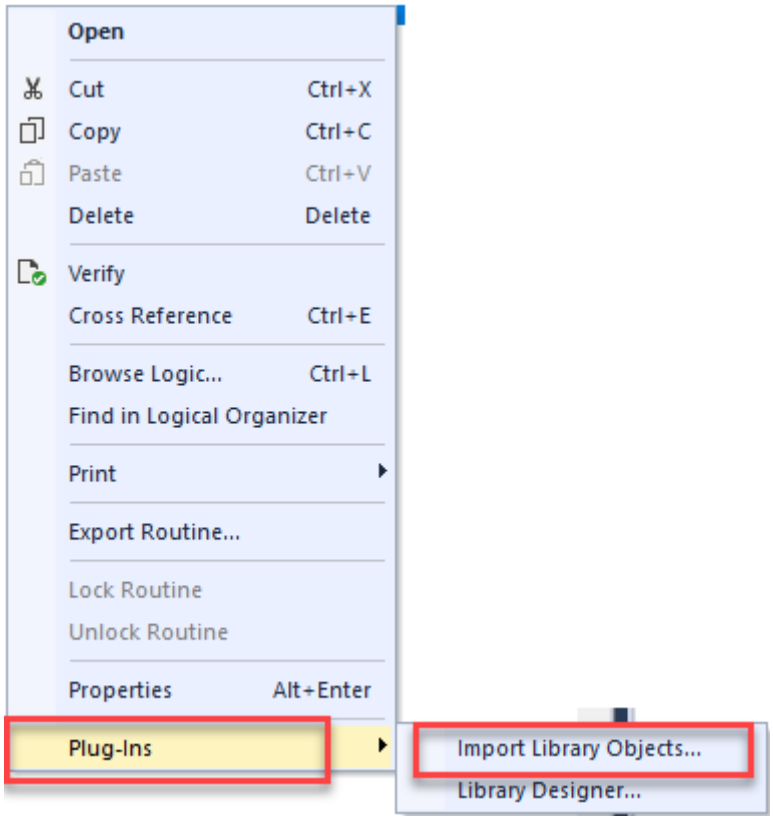
There are two methods to upgrading existing device object add-on instructions in a project. You can do this either by using the Studio 5000® Plug-In *Import Library Objects* Wizard or by importing individual add-on instruction AOI.L5X files. Using the Studio 5000® Plug-In *Import Library Objects* Wizard is the preferred method to reduce the risk of errors or compatibility issues. Both methods are described in the following sections.

Note that all updates to Add-On Instructions must be done with Studio 5000 Logix Designer® in OFFLINE mode and a download to the controller is required.

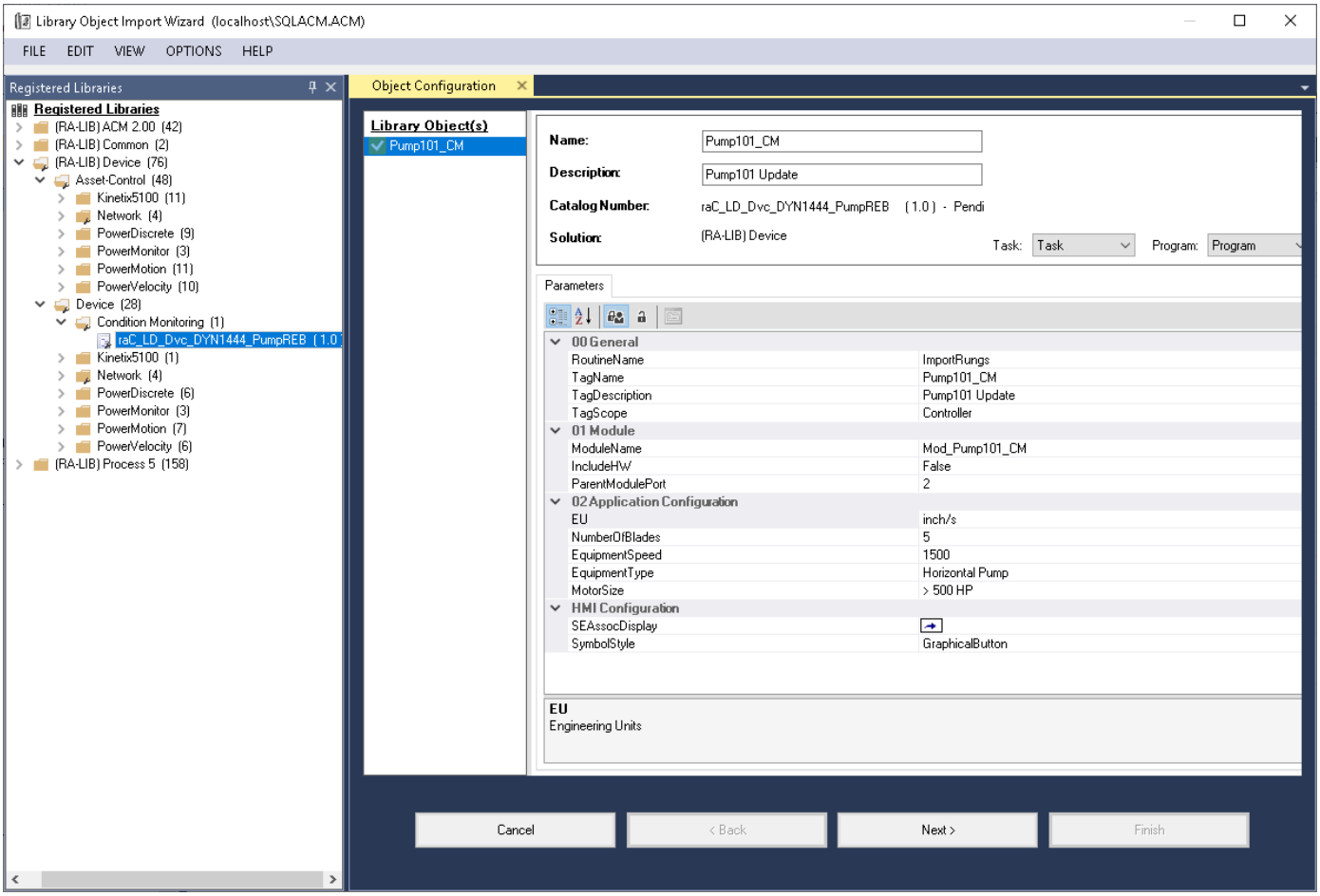
Upgrades Using Studio 5000® Plug-In to Import Library Objects

If Studio 5000® Application Code Manager is installed, you can use the Studio 5000® Plug-In *Import Library Objects* Wizard to update existing Add-On Instructions. For complete information on Studio 5000® Application Code Manager, refer to the section Using Application Code Manager.

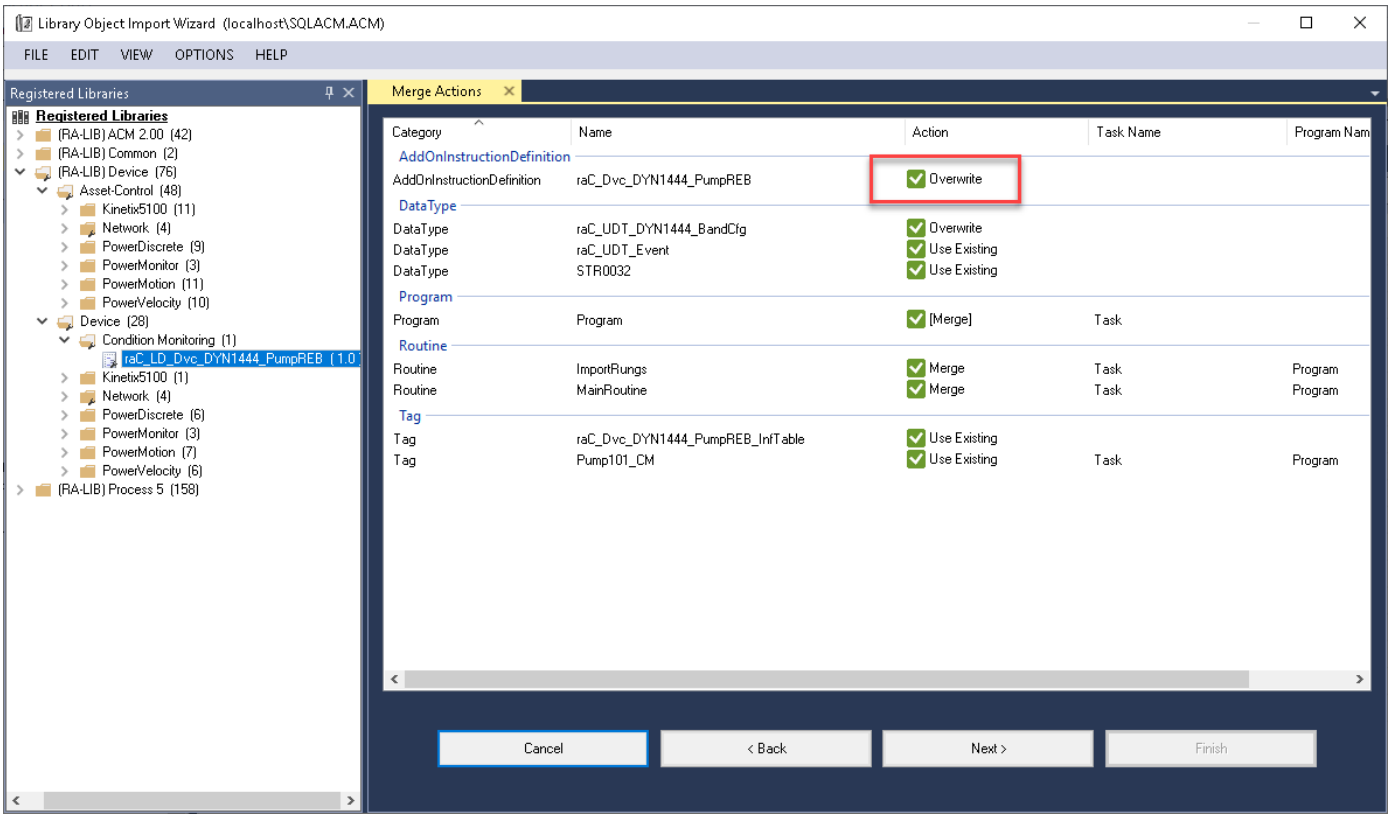
Right-click in your controller organizer or within a routine to access *Plug-Ins > Import Library Objects...*



The *Library Object Import Wizard* dialogue window will open. Under *Registered Libraries* expend *(RA-LIB) Device > Device* and find the desired object and version. Drag the object into the *Object Configuration* window on the right. You will need to configure the object the same way that it had previously been configured (task, program, name, application configuration, etc).



In the *Merge Actions* window, select the *Action* for the *AddOnIntructionDefinition* to *Overwrite*. This will update any existing instance of the object to the newer version. You may also choose to overwrite any other DataTypes or Tags. Review the release notes of the latest library release to understand what may be impacted. Click next and finish to complete the process.



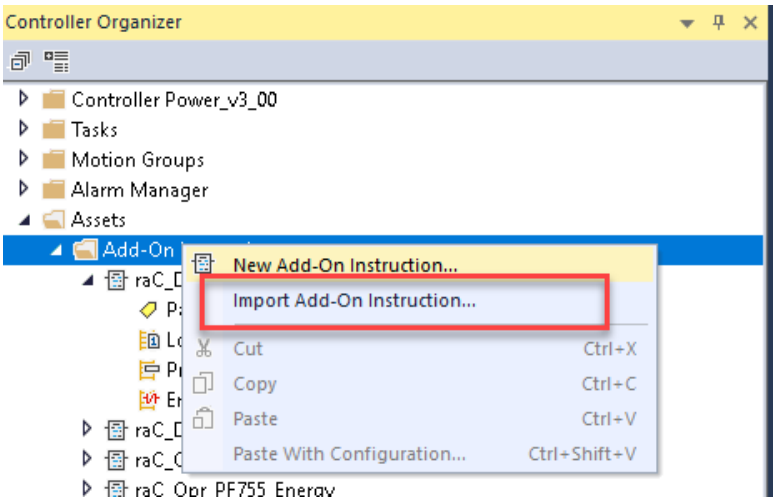
Upgrades by Importing AOI.L5X Files

To upgrade or migrate a project that uses a previous library version to a newer one, the add-on instruction L5X files are supplied.

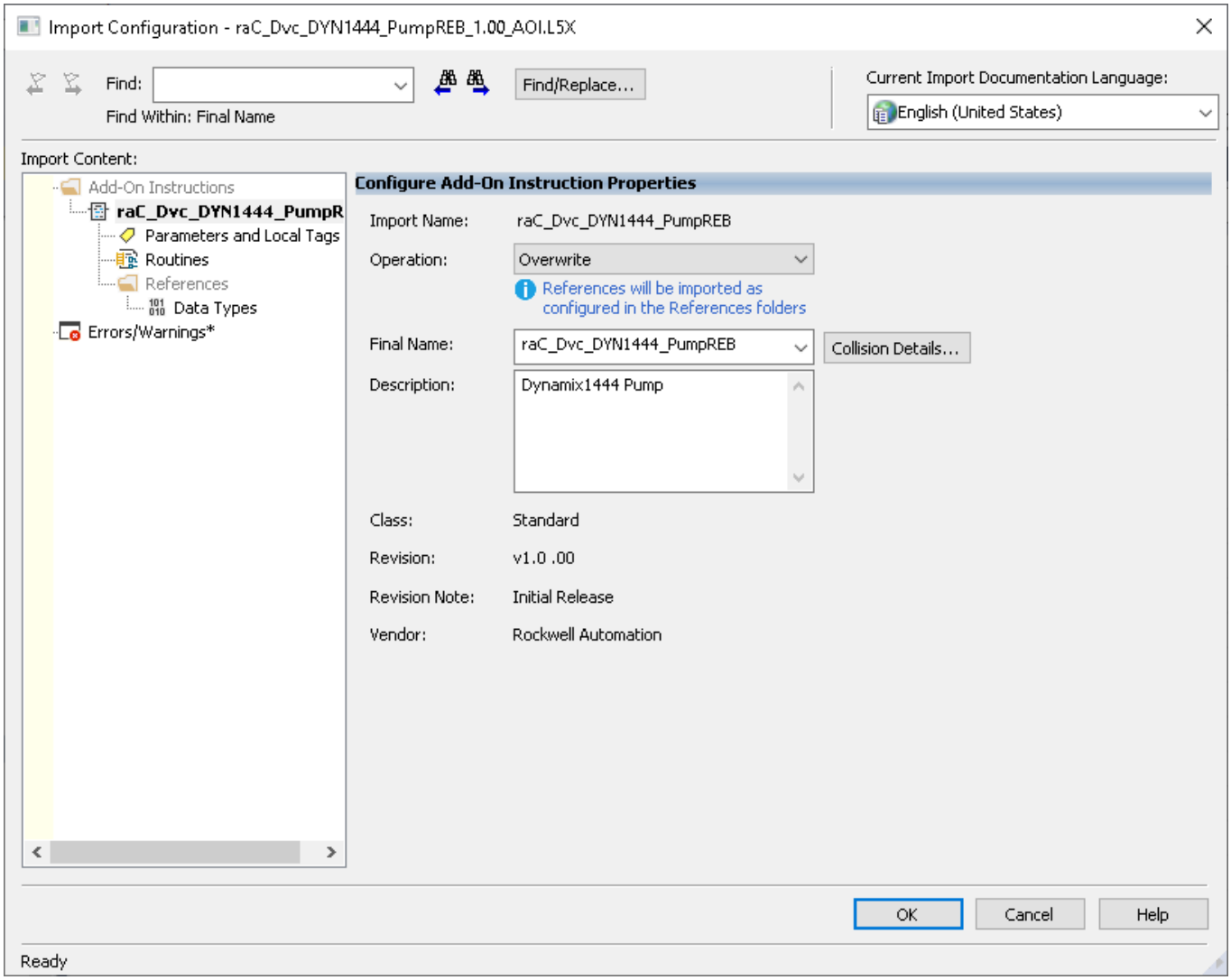
IMPORTANT In newly released versions of this library, it is possible that modifications or improvements have been made to items such as tags, faults tables, etc that are outside of the Add-On Instruction. To ensure all items are updated use the Studio 5000® Import Library Objects plug-in method or import RUNG.L5X files. Read the library release notes to understand what has been updated in the latest version of the library.

To perform an upgrade to an object perform the following steps:

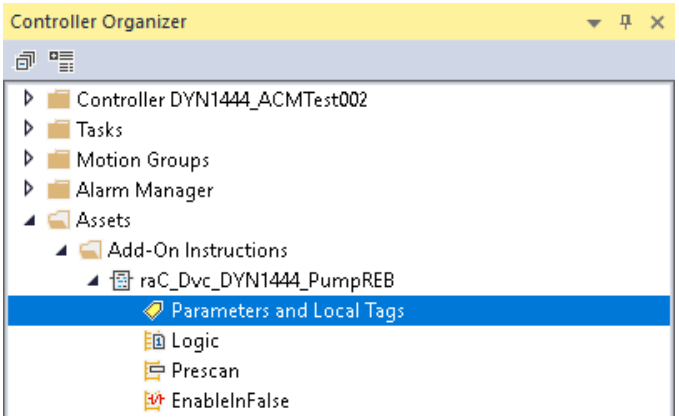
- Open the controller file. Note changes must be done offline.
- In the *Controller Organizer* pane right-click on *Assets > Add-On Instructions* and select *Import Add-On Instruction*. Navigate to the AOI.L5X file in the *Studio 5000 Logix Designer Files - L5X* and Open.



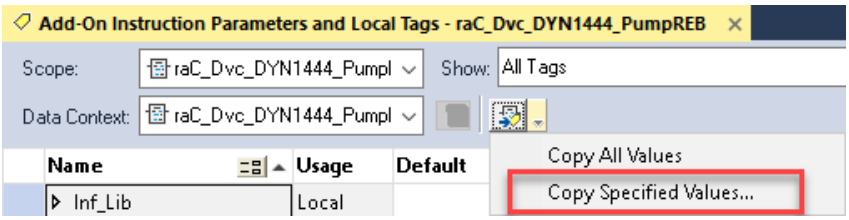
- You will be prompted that there is an existing version of the instruction that is different. Choose *Overwrite* as the operation and select OK once you have read and understood the warnings. Your existing logic will be updated with the new add-on instruction. Verify that your code compiles and test adequately.

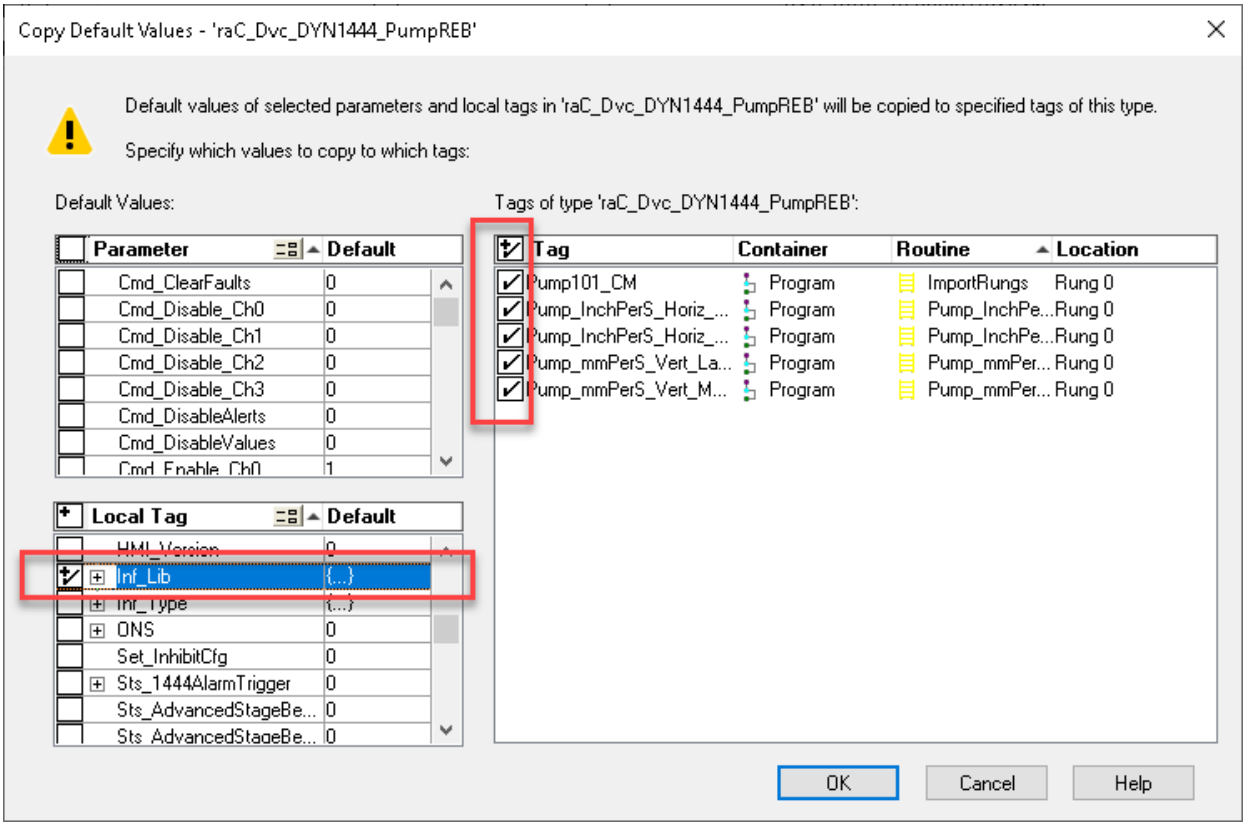


- In order to ensure the HMI faceplate still works properly you will need to update the object's library information stored in the Inf_Lib tag. In the *Controller Organizer* pane under *Assets > Add-On Instructions* expend the device object that was updated. Double-click on *Parameters and Local Tags* to open up the instructions tags.

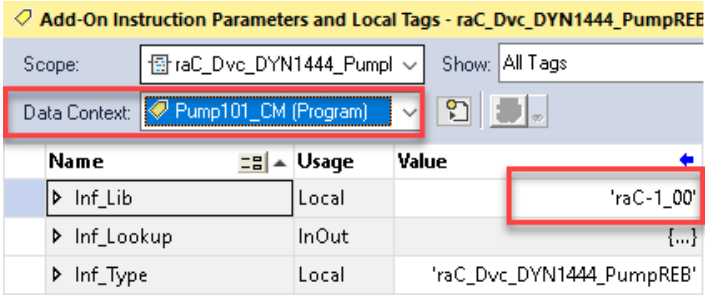


- In the *Add-On Instruction Parameters and Local Tags* window, you may notice that the Inf_Lib tag in the add-on instruction definition matches the new library revision number. Click on the down-arrow to the right of the copy button and select *Copy Specified Values...*





- In the *Copy Default Values* window, be sure to **first uncheck all Parameters and Local Tags** by clicking the +/- box in the top right. Failure to do so may result in overwriting settings in the existing objects.
- Check only *Inf_Lib* in the *Local Tag* area. On the right, all affected objects should be selected. Click OK.
- You can now confirm that the *Inf_Lib* tag has been updated to the current library (e.g. 'raC-1_01') by changing the *Data Context* drop-down to a specific device object.



FactoryTalk® View Upgrades

To upgrade a device object in a FactoryTalk® View SE application, simply import the new faceplate .gfx display file into the application. If any global objects or images have been added or modified, you may need to import these as well. Any unused displays from previous versions may be removed or deleted from the application.

Note that the reference to the faceplate version is set in the Add-On Instruction Local Tag *Inf_Lib* so there does not need to be other modifications to the HMI application.

Using Application Code Manager

Overview of Application Code Manager

Studio 5000® Application Code Manager is a tool that enables more efficient project development with libraries of reusable code. Application Code Manager creates modular objects with customizable configuration parameters using the reusable content. Application Code Manager can also create the associated visualization, historical and alarming elements for a project.

Studio 5000® Application Code Manager can be easily used along with Rockwell Automation® application code libraries such as the PlantPAx® Process Objects Library, Machine Builder Library, and Device Object Libraries. For more information on Studio 5000® Application Code Manager, refer to the Application Code Manager User Manual.

In the Library there is a folder named *Videos* which contains many How-To and Operational Overview Videos which walk step-by-step through each process. You can refer to the following video for this section: "How_To_Import_and_Configure_ConditionMonitoring_Device_Objects_in_ACM"

Creating a New Project

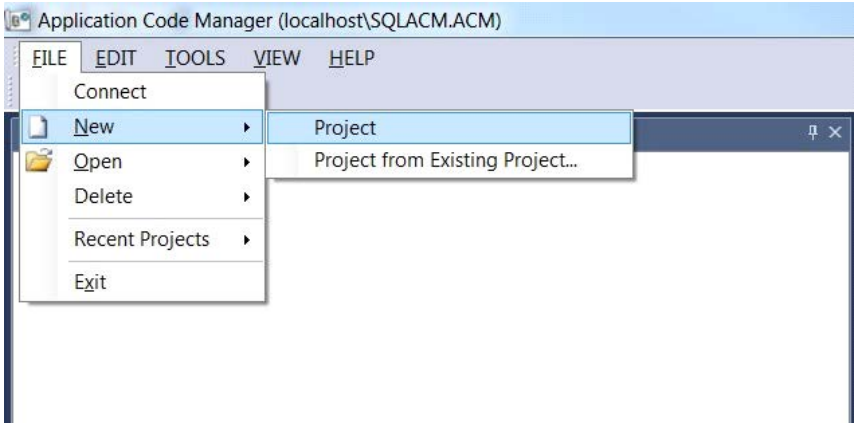
Begin by opening Application Code Manager.

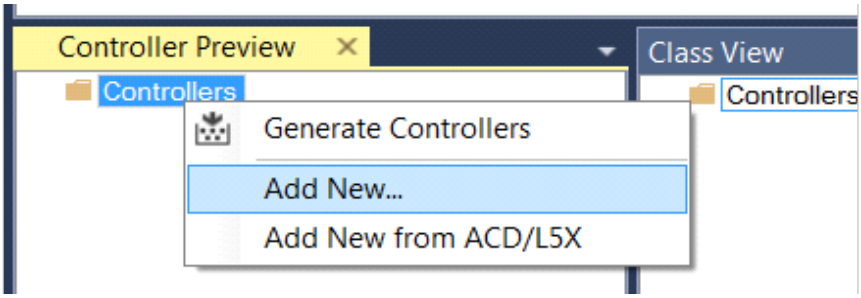
Note: the last project (if any) is opened by default; otherwise a blank screen is displayed.

Create a New Project or open an existing project. Navigate to *File > New > Project*.

Select the desired project type (e.g. (*RA-LIB) ACM 2.00 Project - Basic_Project*) and fill in the *Name* and *Description*.

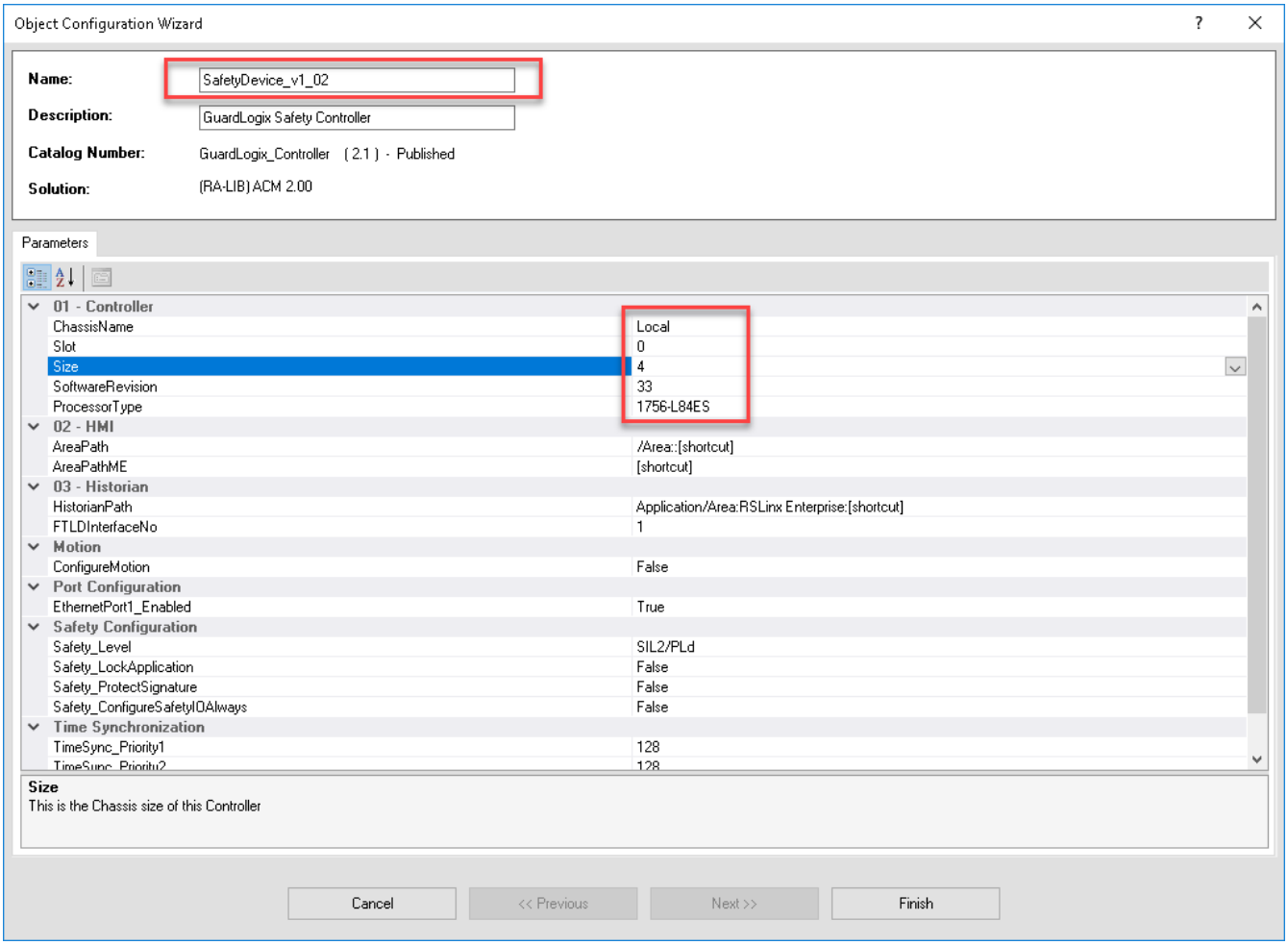
To add a new controller to a project, in the *Controller Preview* window, right-click on *Controllers* and select *Add New...*



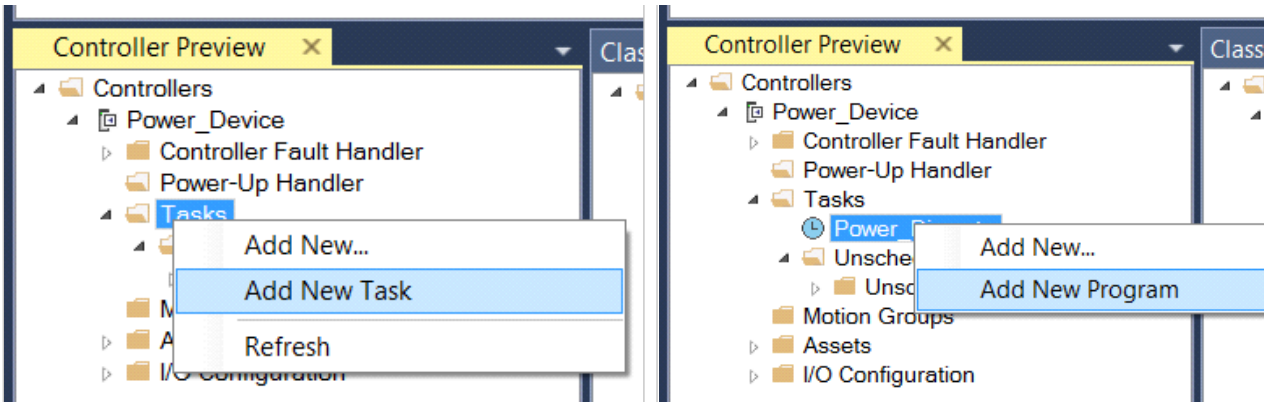


Select the desired controller type (e.g. *ControlLogix_Controller, GuardLogix_Controller, CompactLogix_Controller, etc*). Enter a *Name* and *Description* for the controller. Select the appropriate Chassis and Processor configurations.

You can also configure the HMI *AreaPath* parameters which will be referenced if you use Application Code Manager to generate FactoryTalk® View SE displays with graphic symbol launch buttons.



You can now add in any desired tasks and programs to your controller. Right-Click on the *Tasks* folder underneath your controller in the *Controller Preview* and *Add New Task*. Similarly, right-click on any Task and select *Add New Program*. Complete the desired parameters for Tasks and Programs such as name, type, period, etc.

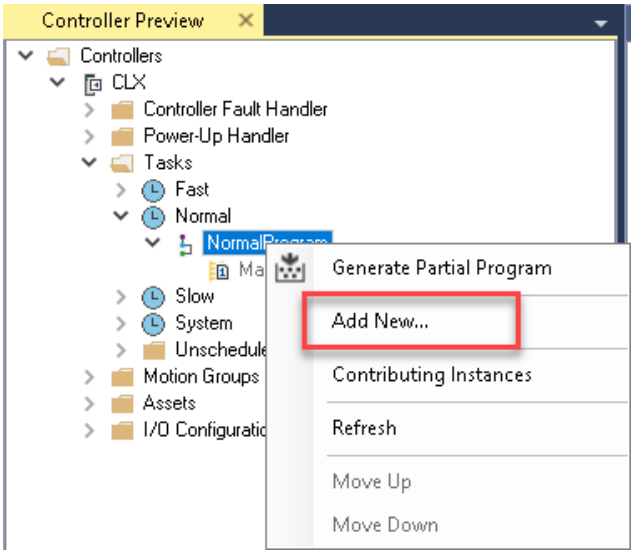


Adding & Configuring Device Objects

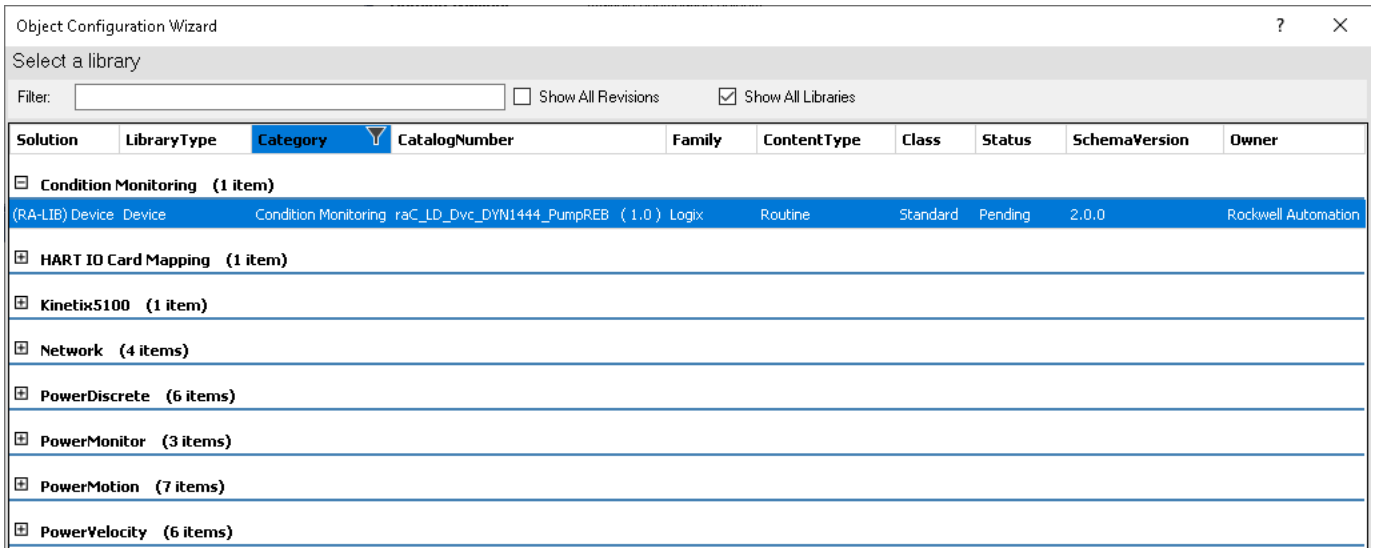
Prior to adding in any Device Objects, ensure you have registered the library in Application Code Manager. Refer to Registering Libraries in Studio 5000® Application Code Manager for details.

Adding Condition Monitoring Device Objects

To add a Condition Monitoring Device Object into a project, right-click on a Program and *Add New...*



Select the Device Object that you wish to import. You can click on the *Category* heading to group items by category and easily find *Condition Monitoring* devices.



Fill in all of the required configuration parameters for the device object. The following example shows a configuration of the raC_LD_Dvc_Dyn1444_PumpREB object.

Perform the following configuration:

00 General:

- Enter a **name** and **description**. Maximum name length can be 22 characters. Note that other parameters such as the RoutineName, TagName, etc will auto-complete based on these fields.
- Assign the **Task** and **Program**. Note these are pre-assigned if you added the object to a specific program by right-clicking in the *Controller Preview* pane.
- Assign a **TagScope** to be *Program* or *Controller* scoped. For PlantPAx applications it is recommended to use *Controller* scoped tags.

01 Module:

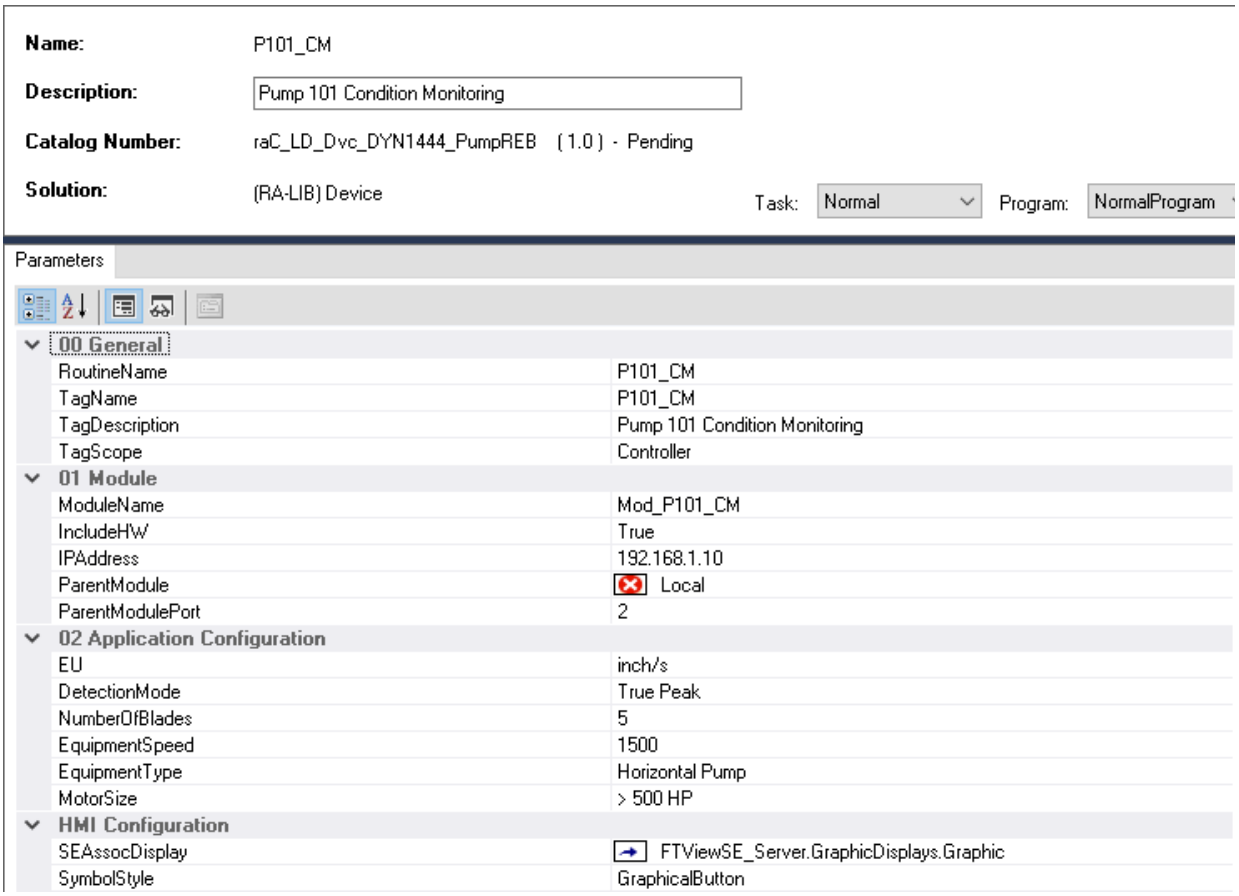
- The *ModuleName* will default to Mod_*ObjectName*
- Set *IncludeHW* to True to allow Application Code Manager to create the Dynamix 1444 Module.
- Assign *IPAddress* along with the *ParentModule* and *ParentModulePort* addressing. Note that *ParentModule* may show a red 'x' when using "Local" or an ethernet adapter that is not created in the Application Code Manager project. "Local" is used for embedded ethernet ports such as in the L8xE controller family. In most cases *ParentModulePort* will remain set as '2' unless you are using a 5380 or 5480 series controller.

02 Application Configuration:

- Assign *EU* (Engineering Units) to either "inch/s" or "mm/s". This will configure the module properties accordingly.
- Assign DetectionMode to the desired FFT Band and overall detection mode: RMS, True Peak or True Peak-Peak.
- Set *NumberOfBlades* according to the machinery that you are monitoring (e.g. pump/fan blades). This information is used to assign the FFT band limits in the module properties.
- Set *EquipmentSpeed* in RPM according to the machinery that you are monitoring. For variable speed systems it is recommended to use an average or most common speed of the equipment. This information is used to assign the FFT band limits in the module properties.
- Set *Equipment Type* (Horizontal Pump/Vertical Pump) and *MotorSize* (<= 500 HP/> 500 HP) according to the pump-motor combination that is being monitored. This information is used to assign the FFT band warning/danger limits in the appropriate engineering units set by *EU*.

HMI Configuration:

- Set *SEAssocDisplay* to a FactoryTalk® View SE display configured in the project if you plan on generating displays using Studio 5000® Application Code Manager.
- Set the desired *SymbolStyle* to either "GraphicalButton" to use the graphical style launch button for schematic/system displays; or "GenericTextButton" to use a simple rectangular text button. For more information on HMI Configuration refer to Configuring Displays.

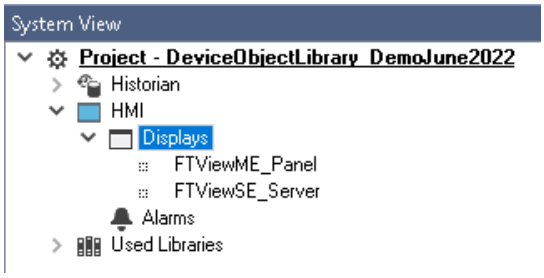


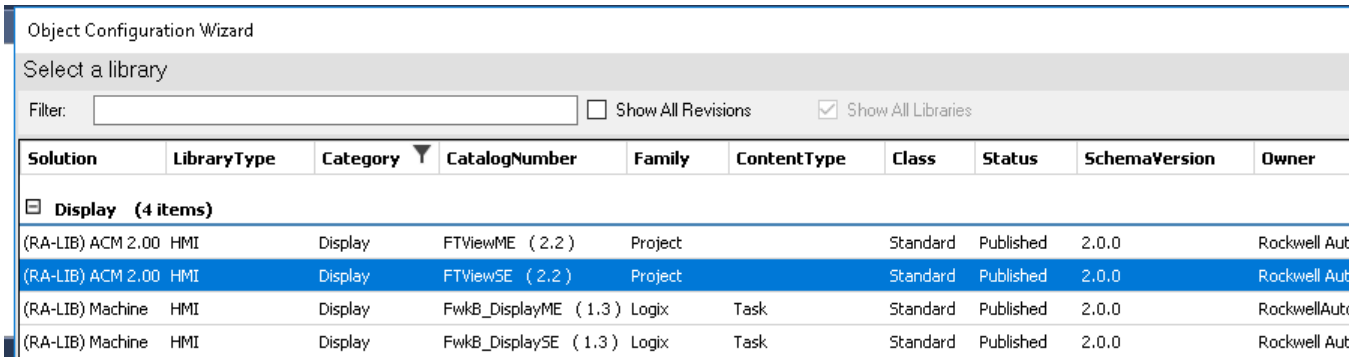
Click Finish to complete the import. For specific devices details, refer to the appropriate chapter in this manual.

Configuring Displays

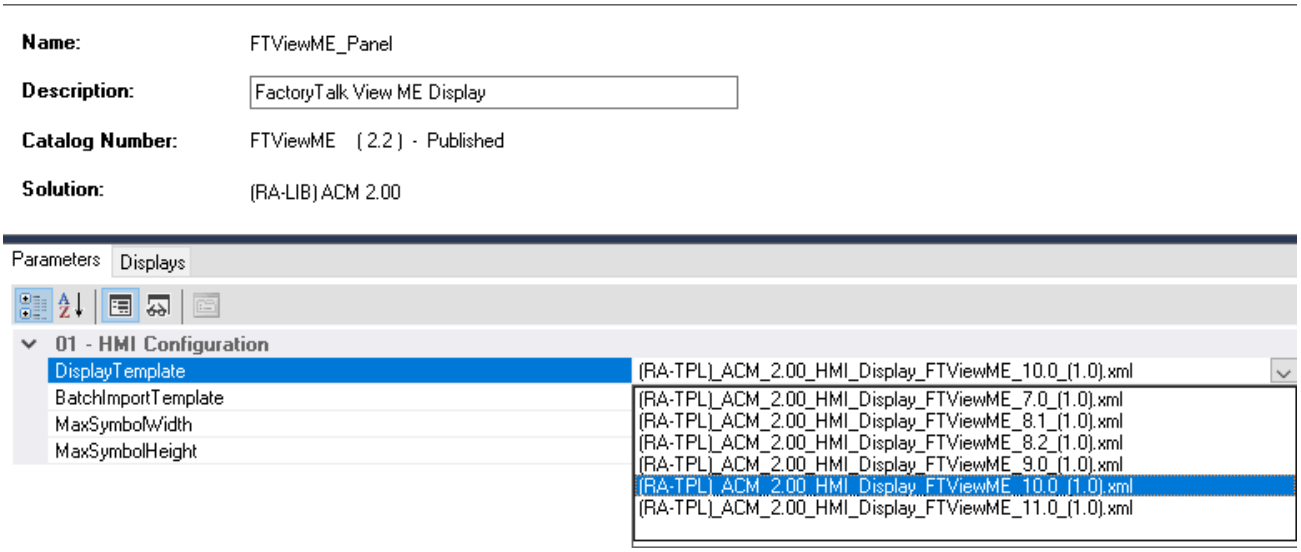
Application Code Manager can be used to automatically configure graphic symbol launch buttons for device objects In FactoryTalk® View ME or SE. Note that Application Code Manager is not compatible with Studio 5000 View Designer® applications.

First you must add Displays to your project. Under the *System View* panel expand *HMI* and right-click on *Displays* to select *Add*. Choose the type of display (e.g. *FTViewME* or *FTViewSE* depending on your project requirements.

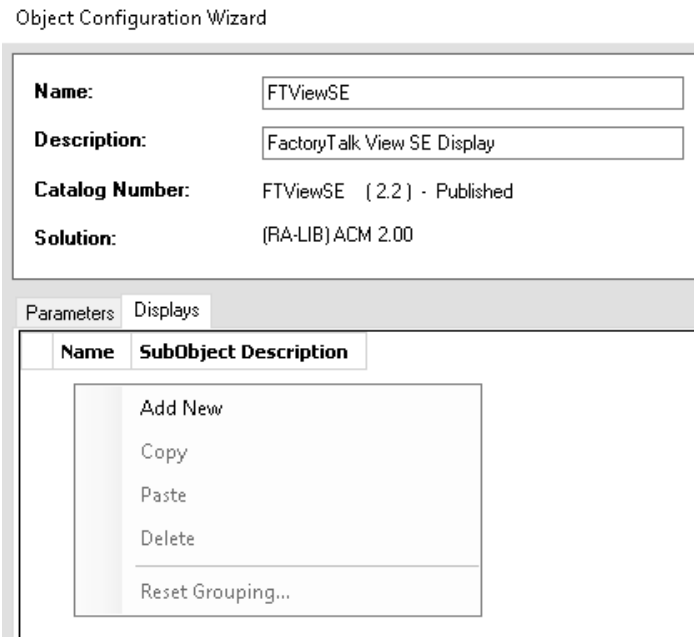




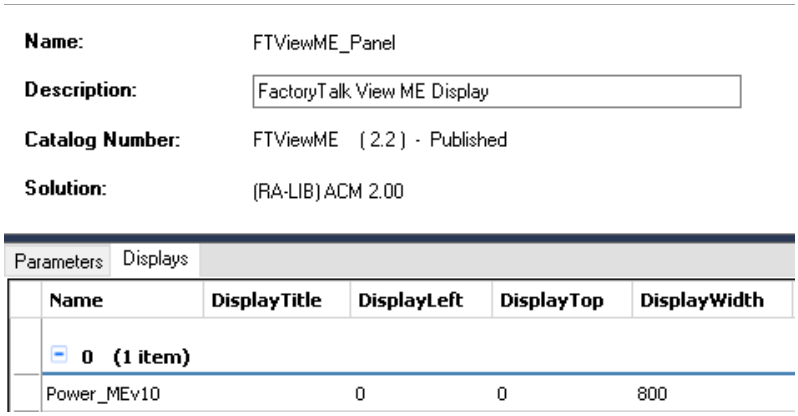
In the display object parameter configuration, you must select the *DisplayTemplate* type to match the version of FactoryTalk® View application that you are using.



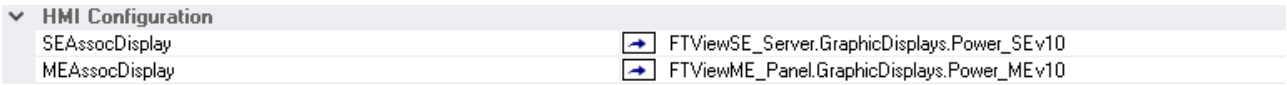
Navigate to the *Displays* tab where you can right-click and *Add New* display.

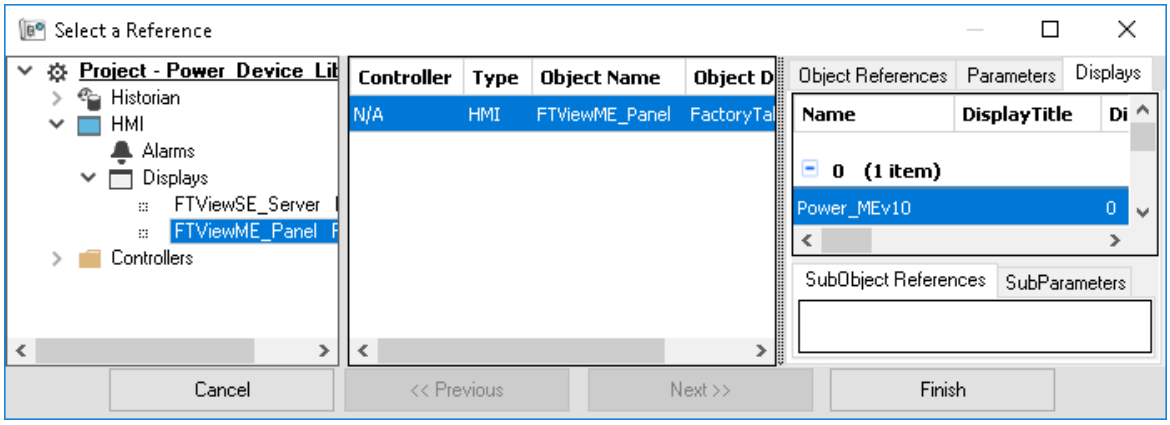


Set the desired name and display parameters. Generally all display parameters aside from *Name* can be left as default since this will often be used as a temporary display where object launch buttons are copied from.



Return to your device object configuration and view the *HMI Configuration* section of the parameters. You can browse or type in the HMI_Server_Name.HMI_Display_Name.



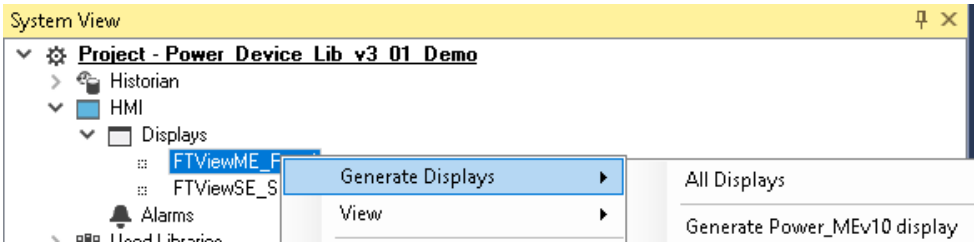


If you browse for the display, select the desired display server in the left panel, then click on the *Display* tab in the right panel and select the specific display. Click finish.

This workflow can be followed for either FactoryTalk® View ME or SE depending on the project requirements.

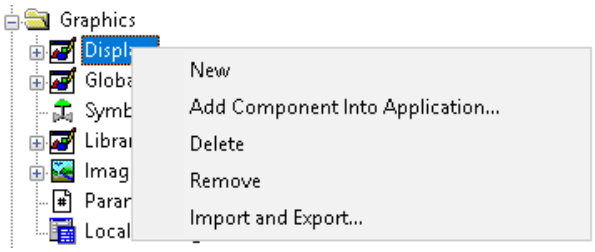
Generating Displays

Once you have assigned displays to all of the device objects, you can generate the displays. In the *System View* highlight the desired display server under *HMI > Display* and right-click to select *Generate Displays > All Displays* or select individual displays. Choose a place to save the generated files and take note of it.



Importing Displays into FactoryTalk® View Studio

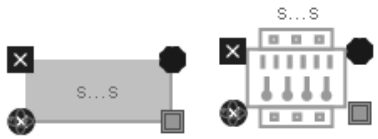
To import the configured displays, open your FactoryTalk® View ME/SE project in FactoryTalk® View Studio. Right-click on *Graphic > Displays* and select *Import and Export...*



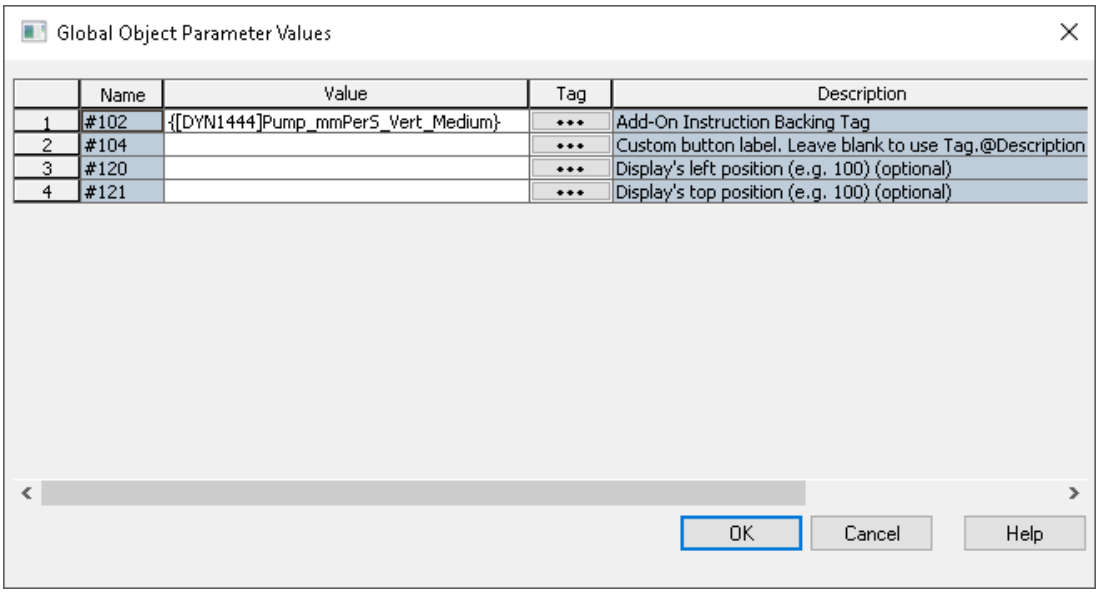
Follow the required prompts:

- Import graphic information into displays
- Choose whether or not to backup displays
- Choose either a *Single display import file* (must have an existing or blank display to import into) or *Multiple displays batch import file* if *All Displays* was used to Generate Displays.
- If this is the first time it is recommended to import *Multiple displays batch import file* and then *Create new objects on the display*.
- If you have done this before and are updating the imported display after modifying your Application Code Manager project, you can choose *Update existing objects on the display*.
- Browse for the BatchImport.xml file or individual display.xml file.

Open up the newly imported display. Notice that there are graphic symbol launch buttons labeled and configured for each item that was configured in Application Code Manager.



Right-click on the object and select *Global Object Parameters* to view that all of the parameters have been pre-configured for you.

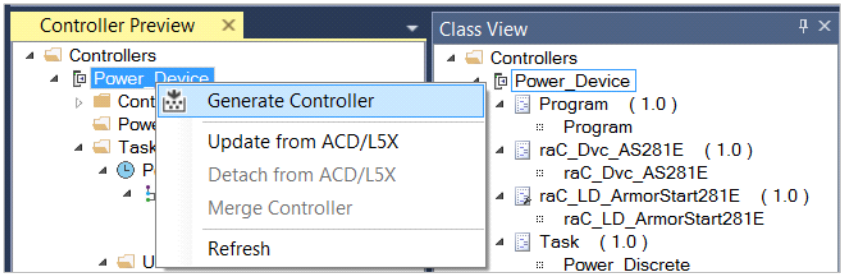


You may not copy and paste this graphic symbol onto any other display in your application.

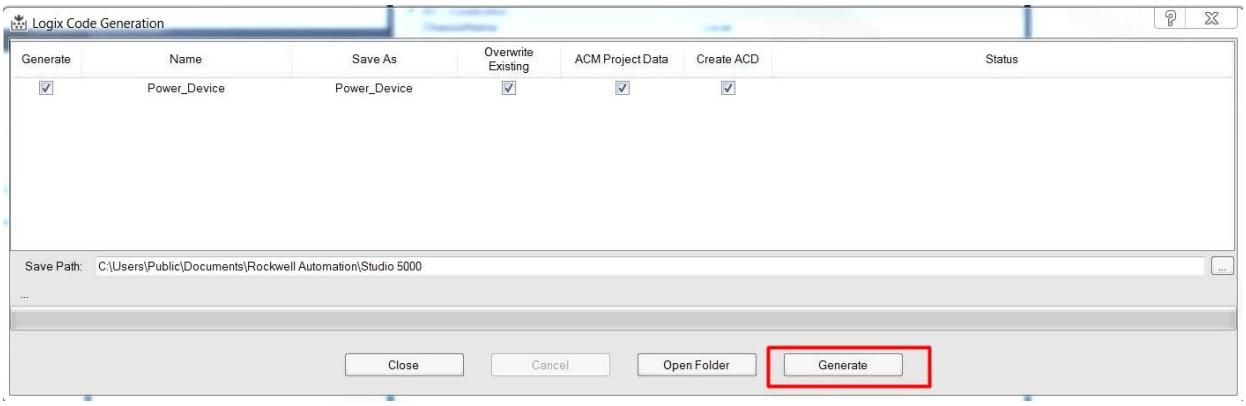
Generating Controller Files

Once you have completed configuring your project in Studio 5000® Application Code Manager, you can generate the controller file for use in Studio 5000 Logix Designer®.

In the *Controller Preview* pane right-click on the controller name within the *Controllers* folder and select *Generate Controller.*



In the *Logix Code Generation* dialogue window you will need to check *Create ACD*. You ma also need to check *Overwrite Existing* if this is not the first time generating the controller code.



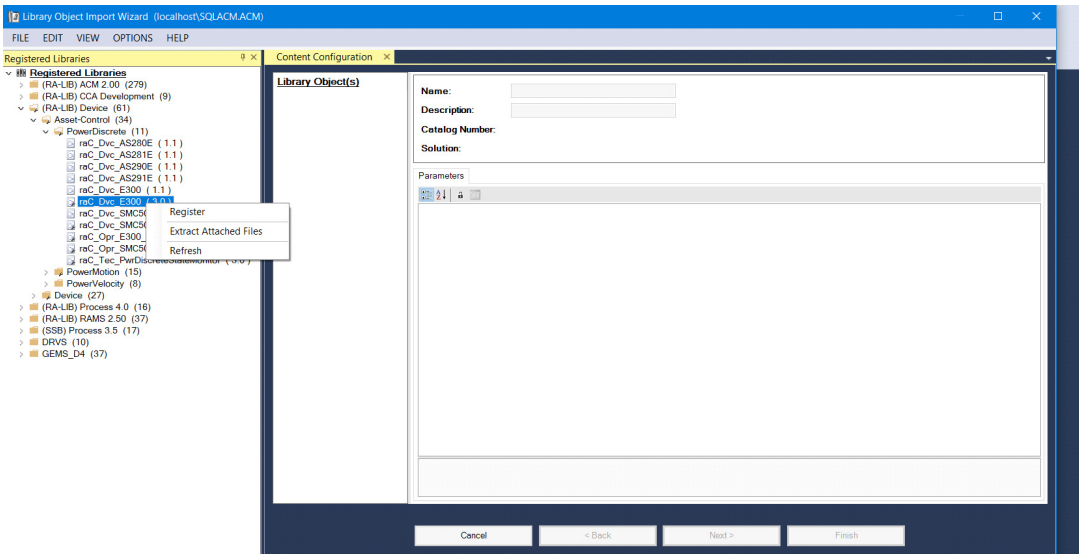
Once the controller file is generated, you can navigate to the location set in *Save Path* and open your file. Note that all of the configuration that was done in Application Code Manager is now shown in your Logix Designer ACD file.

Exporting Attachments

Application Code Libraries not only contain Logix code, but also contain Visualization collateral and associated documentation. Every Asset library contains at least a reference manual (RM). Those libraries which have associated Visualization content also have all required global objects (GO), images, static displays and View Designer applications added as attachments. In this manner the user can generate only the necessary visualization and documentation for the objects included in the project.

In Application Code Manager, all of the attachments are associated with the device objects in the *(RA-LIB) Device > Asset-Control* folder. These can be accessed both through the full Application Code Manager software, or via the Studio 5000 Plug-In “Import Library Objects”.

To access the attached files, right click on the objects (e.g. raC_Dvc_DCS) and select *Extract Attached Files*.



Select the destination folder on your computer, and select OK. An Extract Attachments dialog will show the extraction status.

The extracted folder will contain the following:

- Reference Manual
- Required Images
- FactoryTalk® View Site Edition Display
- FactoryTalk® View Site Edition Global Objects.

Using the Condition Monitoring Device Library with Other Application Code Libraries

Application Code Libraries

The Condition Monitoring Device Library is commonly used alongside other Application Code Libraries. Commonly the Machine Builder Library and PlantPAx® Process Object Library application-level library objects are used interact with the device-level objects in the Condition Monitoring Device Library.

Using Condition Monitoring Device Objects with PlantPAx® Process Objects Library

The Condition Monitoring Device Library is compatible with PlantPAx® v5.xx. These device objects can be paired with Process Objects PMTR (Motor) and PVSD (Variable Speed Drive) instructions respectively where rotating equipment is being monitored for abnormal conditions. Note that PlantPAx® v5.xx+ requires a minimum controller firmware and Logix Designer® software version of v33 or greater.

To integrate Condition Monitoring Device Objects with Process Library Objects is to use the *Has More* feature in Process Library Objects. The *Has More* feature is a simple way to navigate to any other object faceplate from the '...' navigation button on a Process Library faceplate such as a PMTR or PVSD object.

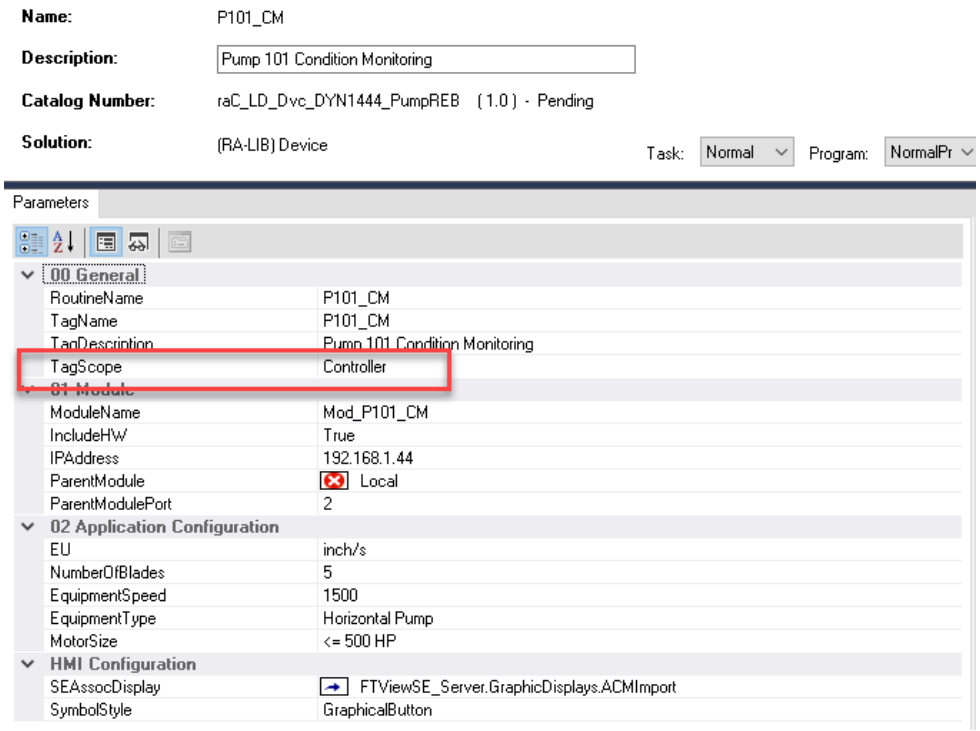
To easily integrate Condition Monitoring Device Objects with Process Object instructions you can either use Application Code Manager or import Control Strategies from the Process Library and manually configure the *Cfg_HasMore* tag in the PMTR/PVSD object properties. At this time there are no Process Library Control Strategies containing Condition Monitoring Device Objects. Control Strategies containing PMTR and PVSD are found in the PlantPAx® Process Library under */Process Library/Control Strategies - L5X/* and have folder names like CS_PVSD. Inside of each Control Strategy folder you will find two routine files:

Notes when using Application Code Manager

You can use Studio 5000® Application Code Manager to create both Condition Monitoring Device Objects and Process Objects (PMTR/PVSD) and easily link them together in an application. First create the Condition Monitoring Device object. Refer to the Using Application Code Manager section of this manual for complete details.

When using Studio 5000® Application Code Manager or the Studio 5000® Plug-In Import Library Objects Wizard, it is recommended to set the *TagScope*

parameter to *Controller* as shown in the following screenshot. This ensures the Add-On Instruction is a controller scoped tag.

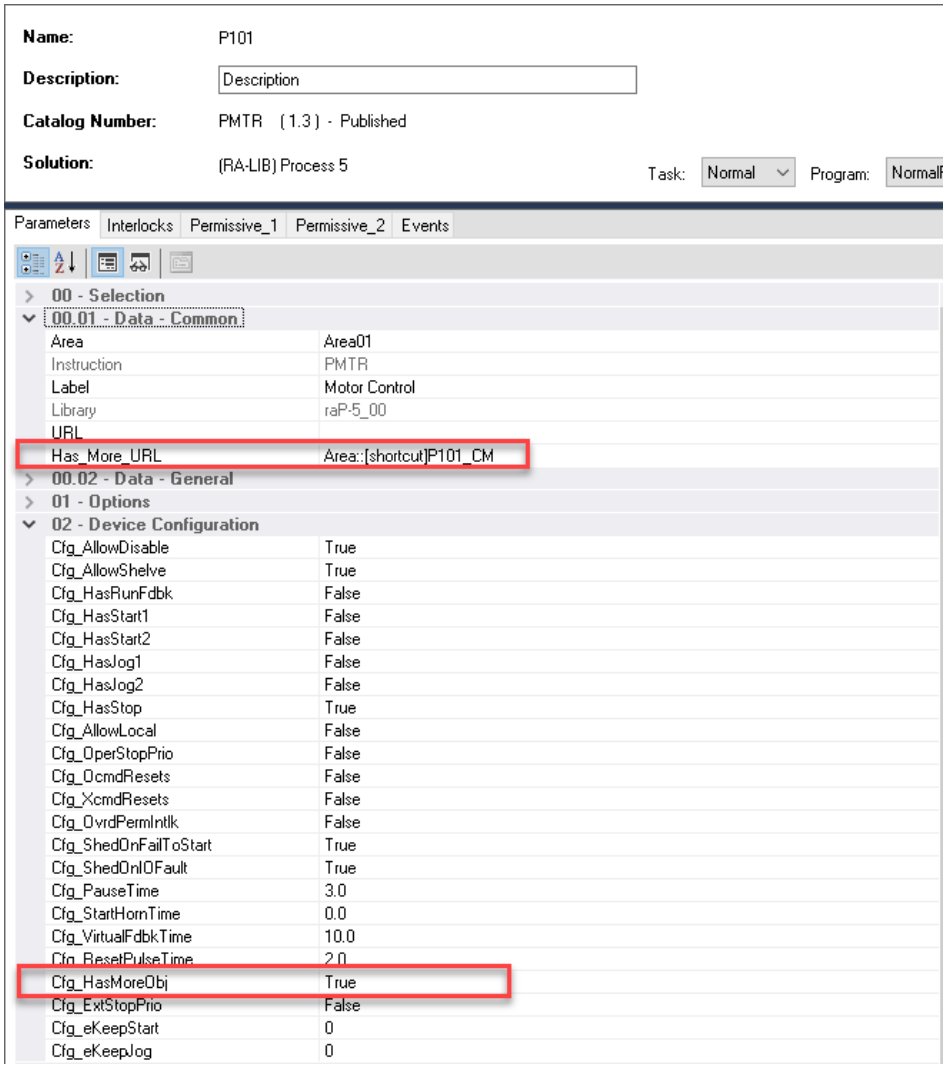


Once your Condition Monitoring device objects have been created, you can create the Process Objects (PMTR/PVSD) and link them to the device objects. Configuration is done the same in both PMTR and PVSD objects.

Set *Cfg_HasMoreObj* to True. Set the *Has_More_URL* parameter to the path to the Condition Monitoring device object instance as shown in the following screenshot. The path should be from the perspective of the HMI server including the *Area* and *Controller Shortcut*. e.g. /Area::[shortcut]Object where:

- Area: HMI area name
- [shortcut]: HMI communications server controller shortcut name
- Object: Device Object name (e.g. P101_CM where the base PMTR object is named P101)

Setting these parameters in the Application Code Manager configuration of the PlantPAx® PMTR or PVSD Process Objects enables navigation to the Condition Monitoring Device faceplate using the '...' *HasMore* button on the home tab of the PMTR/PVSD faceplates.



This completes the link between Process Objects (PMTR/PVSD instructions) and Condition Monitoring Device Objects in Application Code Manager.

Process Object Navigation Configuration

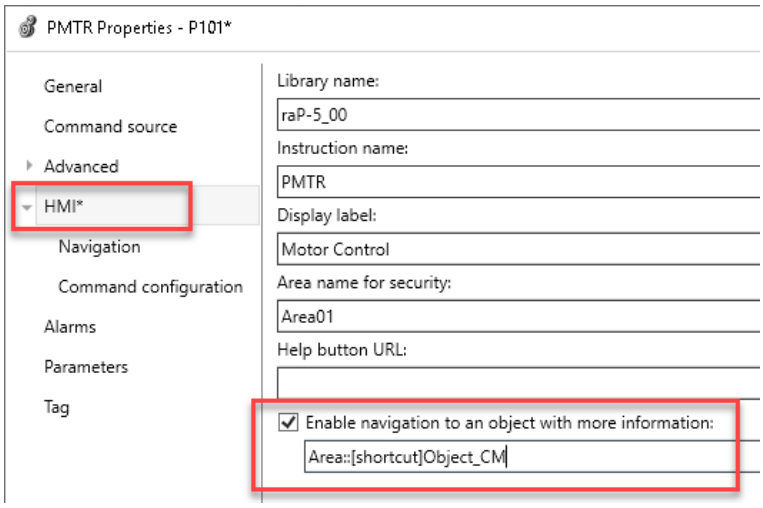
To enable navigation from the Process Object faceplate to the Condition Monitoring Device Object faceplate, you must configure the HMI Navigation in the Process Object instruction properties.

This is done automatically when using Studio 5000® Application Code Manager to generate controller code as explained in the previous section.

As shown in the following image, browse to the *HMI* tab of the PMTR/PVSD instance properties. Check the *Enable navigation to an object with more information* checkbox and assign the *URL* to the path of the Condition Monitoring Device Object. The path should be from the perspective of the HMI

server including the *Area* and *Controller Shortcut*. e.g. /Area::[shortcut]Object where:

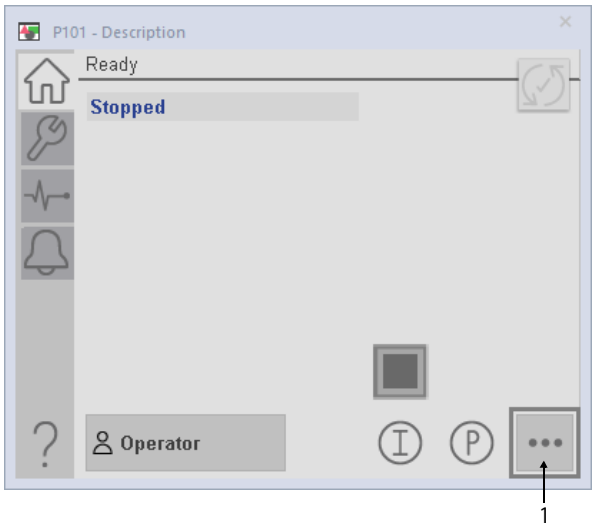
- Area: HMI area name
- [shortcut]: HMI communications server controller shortcut name
- Object: Device Object name (e.g. P101_CM where the base PMTR object is named P101)



HMI Faceplate Navigation

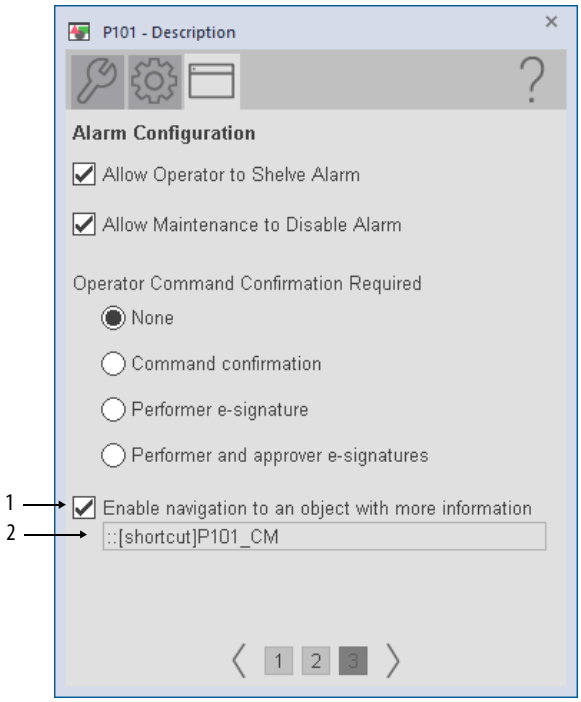
In the FactoryTalk® View SE HMI client you can navigate to the Condition Monitoring Device Object faceplates from the Process Object Faceplate. From the maintenance tab of the PMTR/PVSD faceplate you can navigate to the device by clicking on the Open Device Object Faceplate icon in the top right.

Please refer to the PROCESS-RM200 manual (Chapter 20) for complete details on the Process Objects Library.



Item	Description
1	Select to open the navigate to Has More object. **IMPORTANT**: This option is only available if 'Enable navigation to on object with more information' on the HMI Configuration tab page 3 is checked.

The navigation configuration can also be seen and modified from the Advanced Maintenance faceplate on page 3of the HMI configuration tab.



Item	Description
1	Select to allow navigation to the Has More device object.
	Enter path to device object

Extended Properties

Some extended properties must be configured when used with PlantPAx® applications to allow proper navigation from PVSD and PMTR objects. Note that this is done automatically when using Condition Monitoring Device Library RUNG.L5X import files or when using Application Code Manager to import Condition Monitoring Device Library objects. In the event that Add-On

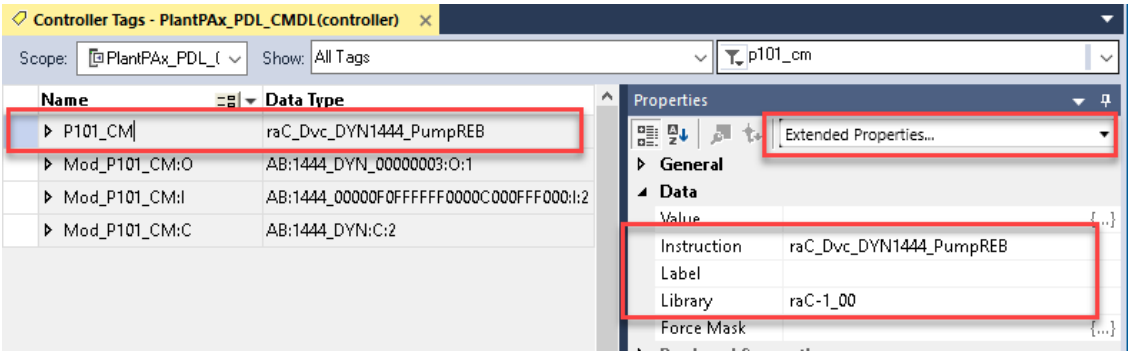
Instructions are imported on their own, these extended properties will need to be manually filled out.

Use the Studio 5000® Plug-In *Import Library Objects* Wizard or import RUNG.L5X files to complete this step automatically.

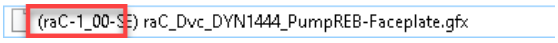
To verify Extended Properties, highlight the instance of the Condition Monitoring Device Object in the *Controller Tags* or Program *Parameters and Local Tags*. The *Properties* window will be visible on the left of the screen. Both the *Instruction* and *Library* parameters must be filled out for the device object navigation to function properly.

PlantPAx® 5.xx Applications along with the .@Instruction and .@Library Extended Tag Properties require a minimum controller firmware version of v33. When using Studio 5000 Logix Designer® v33 or later and these extended tag properties are not shown, click the *Extended Properties...* drop-down menu inside of the *Properties* pane and enable the checkboxes beside both Instruction and Library.

See the following screenshot for reference.



- **Instruction:** Set to match the instruction Data Type (e.g. raC_Dvc_DYN1444_PumpREB)
- **Library**: Set to match the Library and version number of the FactoryTalk® View SE faceplate gfx filename. (e.g. raC-1_00) This is shown in the following example in a selection of display files.



Using Condition Monitoring Device Objects with Machine Builder Library

The Condition Monitoring Device Library is compatible with Machine Builder Libraries; however at this time there are no direct integrating points between the two libraries. You may use Condition Monitoring Device objects in parallel with Machine Builder Objects such as raM_Dvc_Motor_VSD. Navigation between objects will be separately and there is no recommended way to navigate directly from one faceplate to the other.

Dynamix™ 1444 Pump with Rolling Element Bearings Objects (raC_Dvc_DYN1444_PumpREB)

Overview

The Dynamix™ 1444 Pump with Rolling Element Bearings device object is used with Dynamix™ 1444 Integrated Condition Monitoring System modules in applications monitoring vertical or horizontal mounted pumps with rolling element bearings and medium (<= 500HP) or large (>500HP) motors.

In the Library there is a folder named *Videos* which contains many How-To and Operational Overview Videos which walk step-by-step through each process. You can refer to the following videos for this section:
"Operational_Overview_of_ConditionMonitoring_Device_Object_Faceplate"

Supported devices include:

Device	Machinery Application	Object Name
Dynamix™ 1444	Pump with Rolling Element Bearings	raC_Dvc_DYN1444_PumpREB

Functional Description

The Dynamix™ 1444 Pump with Rolling Element Bearings pre-configured Device Objects:

- Collect, Process and Deliver Data between Smart Devices and Application Logic
- Provide Device Status & Diagnostics Faceplates for Machine Startup, Commissioning, Operations, and Maintenance
- Include Common HMI Faceplate Components, Device States, and Control Interfaces providing Application Development and Operation Efficiency

All these features provide quick feedback, shorten recovery time, and simplify implementation.

Required Files

Device Objects include Add-On Instructions (AOIs) and HMI faceplates. The revision number (e.g. 1.00) used in filenames can change as new revisions are created.

Controller Files

Add-On Instructions are reusable code objects that contain encapsulated logic that can streamline implementing your system. This lets you create your own

instruction set for programming logic as a supplement to the instruction set provided natively in the ControlLogix® firmware. An Add-On Instruction is defined once in each controller project, and can be instantiated multiple times in your application code as needed.

The Add-On Instruction must be imported into the controller project to be used in the controller configuration. These can be imported as Add-On Instruction files, or as part of the Rung Import or Import Library Objects wizard.

All Add-On Instruction and Rung Import files can be found in the */Studio 5000 Logix Designer Files - L5X*.

It is not recommended to simply import the AOI.L5X files and attempt to build your own logic rung. Doing so will increase the likelihood of configuration errors and likely miss logic that is required outside of the Add-On Instruction.

AOI files should only be imported when updating an existing application from a previous version of a Device Object Library to a newer one.

See Importing Logic into Studio 5000® Projects for more details.

Device	Machinery Application	Add-On Instruction	Rung Import
Dynamix™ 1444	Pump with Rolling Element Bearings	raC_Dvc_DYN1444_PumpREB_1.00_AOI.L5X	raC_Dvc_DYN1444_PumpREB_1.00_RUNG.L5X

FactoryTalk® View HMI Files

FactoryTalk® View SE applications require importing the desired device faceplates in addition to all Global Object (ggfx) files and all images located in the */HMI FactoryTalk® View Images - png/* folder of the library. FactoryTalk® View SE files are stored in the */HMI - FactoryTalk® View SE/* library folder.

Device/Item	Type	FactoryTalk® View SE Faceplate
Dynamix™ 1444 Pump with Rolling Element Bearings	Display	(raC-1_00-SE) raC_Dvc_DYN1444_PumpREB-Faceplate.gfx
Trend - Bearing Advanced FFT Bands	Display	(raC-1_00-SE) raC_Dvc_DYN1444_PumpREB-Trend-BearingAdv.gfx
Trend - Bearing Cage FFT Bands	Display	(raC-1_00-SE) raC_Dvc_DYN1444_PumpREB-Trend-BearingCage.gfx
Trend - Bearing Early FFT Bands	Display	(raC-1_00-SE) raC_Dvc_DYN1444_PumpREB-Trend-BearingEarly.gfx
Trend - Bearing Late FFT Bands	Display	(raC-1_00-SE) raC_Dvc_DYN1444_PumpREB-Trend-BearingLate.gfx
Trend - Cavitation FFT Bands	Display	(raC-1_00-SE) raC_Dvc_DYN1444_PumpREB-Trend-Cavitation.gfx
Trend - Flow FFT Bands	Display	(raC-1_00-SE) raC_Dvc_DYN1444_PumpREB-Trend-Flow.gfx
Trend - Misalignment x1 FFT Bands	Display	(raC-1_00-SE) raC_Dvc_DYN1444_PumpREB-Trend-Misalign1.gfx
Trend - Misalignment x2 FFT Bands	Display	(raC-1_00-SE) raC_Dvc_DYN1444_PumpREB-Trend-Misalign2.gfx
Trend - Misalignment x3 FFT Bands	Display	(raC-1_00-SE) raC_Dvc_DYN1444_PumpREB-Trend-Misalign3.gfx
Trend - Overall	Display	(raC-1_00-SE) raC_Dvc_DYN1444_PumpREB-Trend-Overall.gfx
Trend - Unbalance FFT Bands	Display	(raC-1_00-SE) raC_Dvc_DYN1444_PumpREB-Trend-Unbalance.gfx
Graphic Symbols	Global Object	(raC-1-SE) Graphic Symbols - Condition Monitoring Device.ggfx
Toolbox	Global Object	(raC-1_00-SE) Toolbox - Condition Monitoring Device.ggfx

Studio 5000® Application Code Manager Files

Studio 5000® Application Code Manager (ACM) can be optionally used if it is installed. All devices can be easily registered in the ACM repositories by running the *setup.cmd* file located in the root folder of the library.

Individual HSL4 files are provided as an alternative to running the setup.cmd to allow users to manually register specific implementation objects. Each object has two files - an Asset Control file and a Device file. The Asset Control files include attachments of all required files for that object. The Device files are used to actually add that device into a Studio 5000® project and these reference the Asset Control files.

All Studio 5000® Application Code Manager files can be found in the /*ApplicationCodeManagerLibraries*/ folder of the library. The files included are as follows:

Implementation Object	Device File (.HSL4)
Dynamix™ 1444	(RA-LIB)_Device_Device_ConditionMonitoring_raC_LD_Dvc_DYN1444_(1.0)

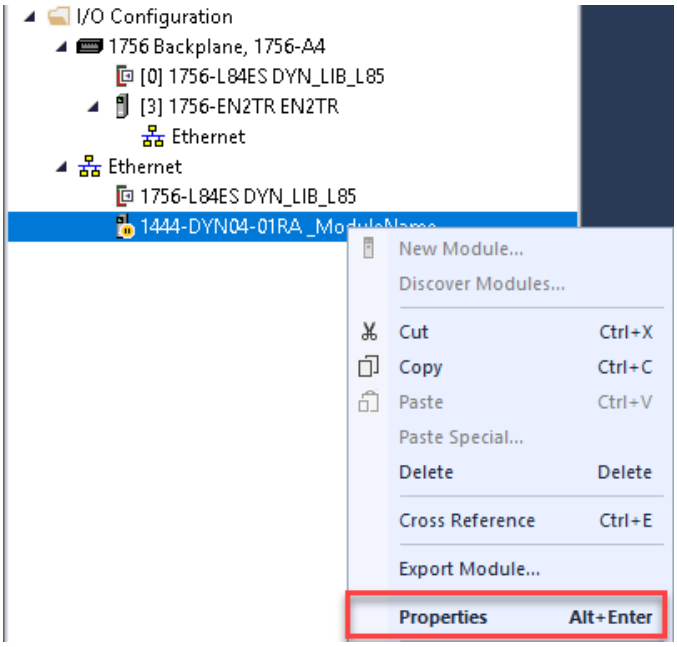
Device Definition

The device (ie: Dynamix™ 1444) *1444-DYN04-01RA* module must be configured with the correct device definition and configuration for this application. If the module definition is incorrect the code will not compile.

Note that this configuration is completed automatically when using Application Code Manager or the Studio 5000® Import Library Objects wizard plug-in.

To verify the device definition:

- Find the device in the *Controller Organizer* pane in Studio 5000 Logix Designer® and open the *Module Properties* by double-clicking or right-click and select *Properties*.

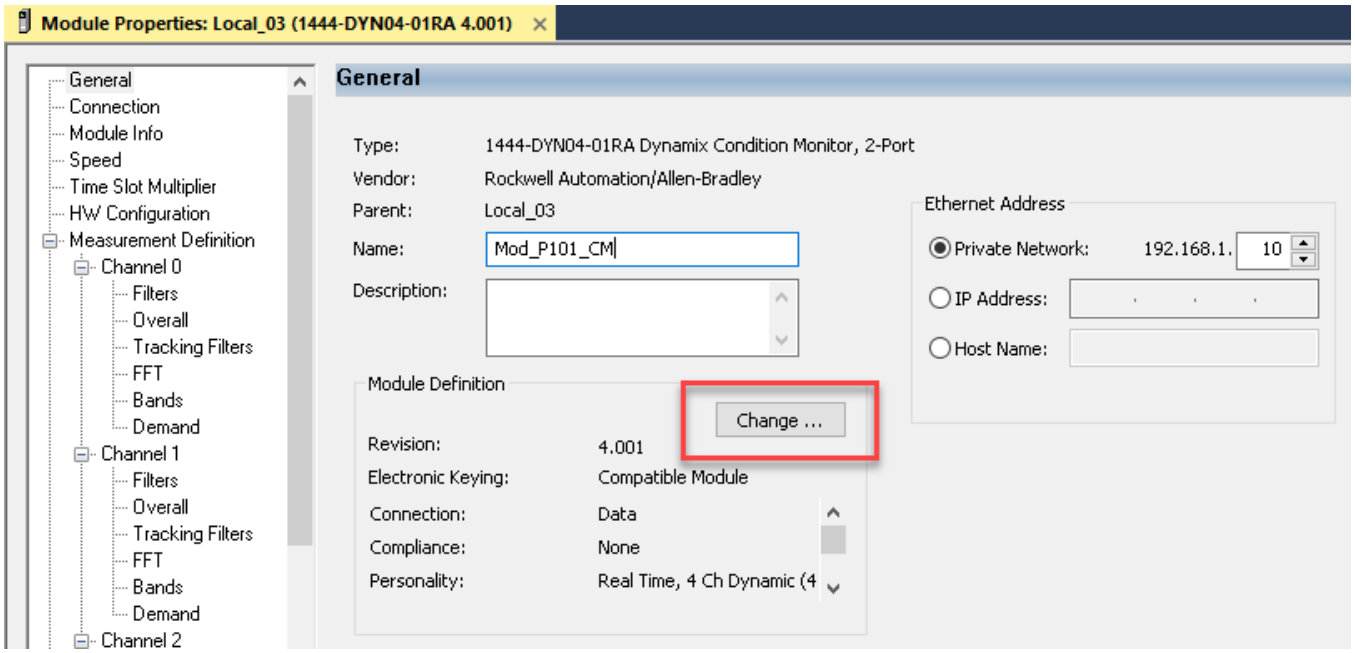


- Refer to the following sections for specific device configuration.

Module Definition

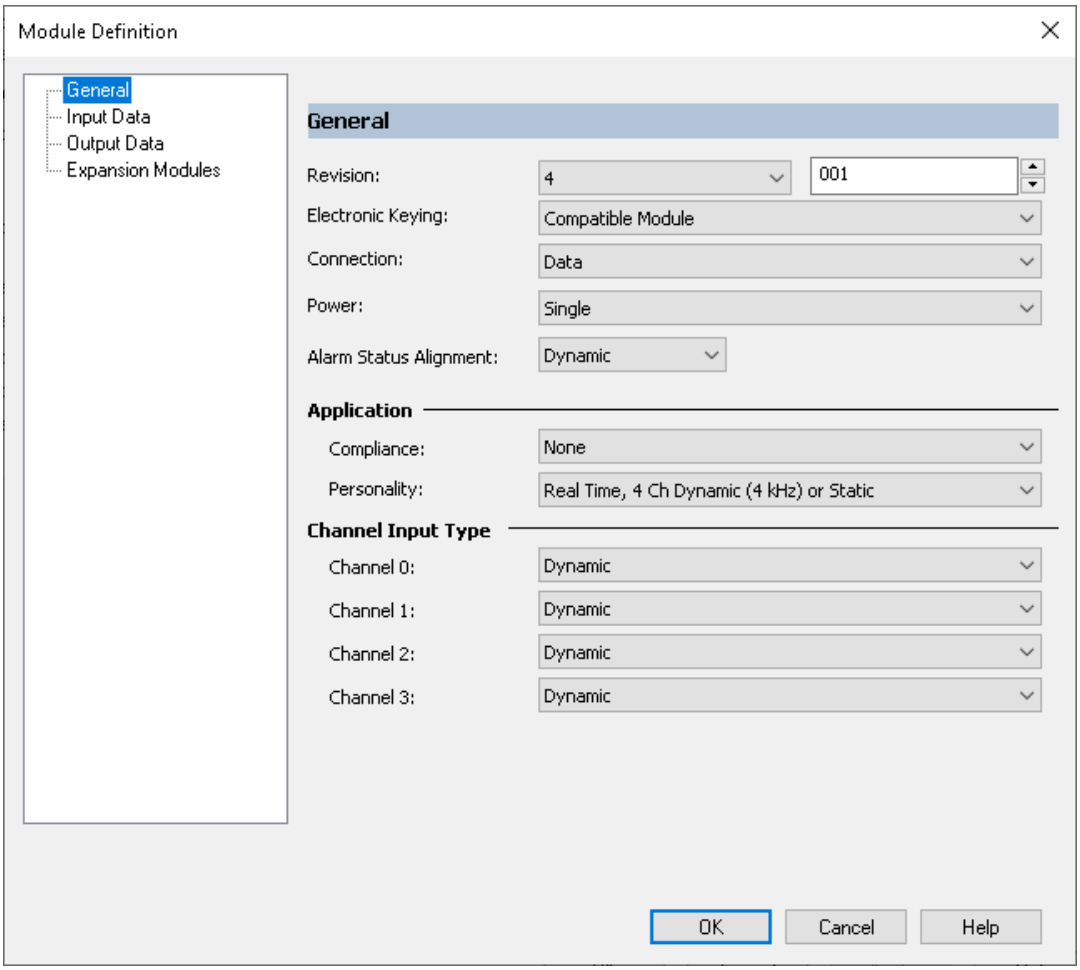
IMPORTANT The correct module definition is required in order to generate specific input (:I), output (:O), and configuration (:C) data types. Failure to configure the module definition properly will result in not being able to compile the project. Follow these steps carefully, or use Studio 5000® Application Code Manager or the Import Library Objects plug-in to automatically import a properly configured module.

To modify or review the Module Definition, first open up the module's properties window or Add-On Profile (AOP) and click on the *Change* button.



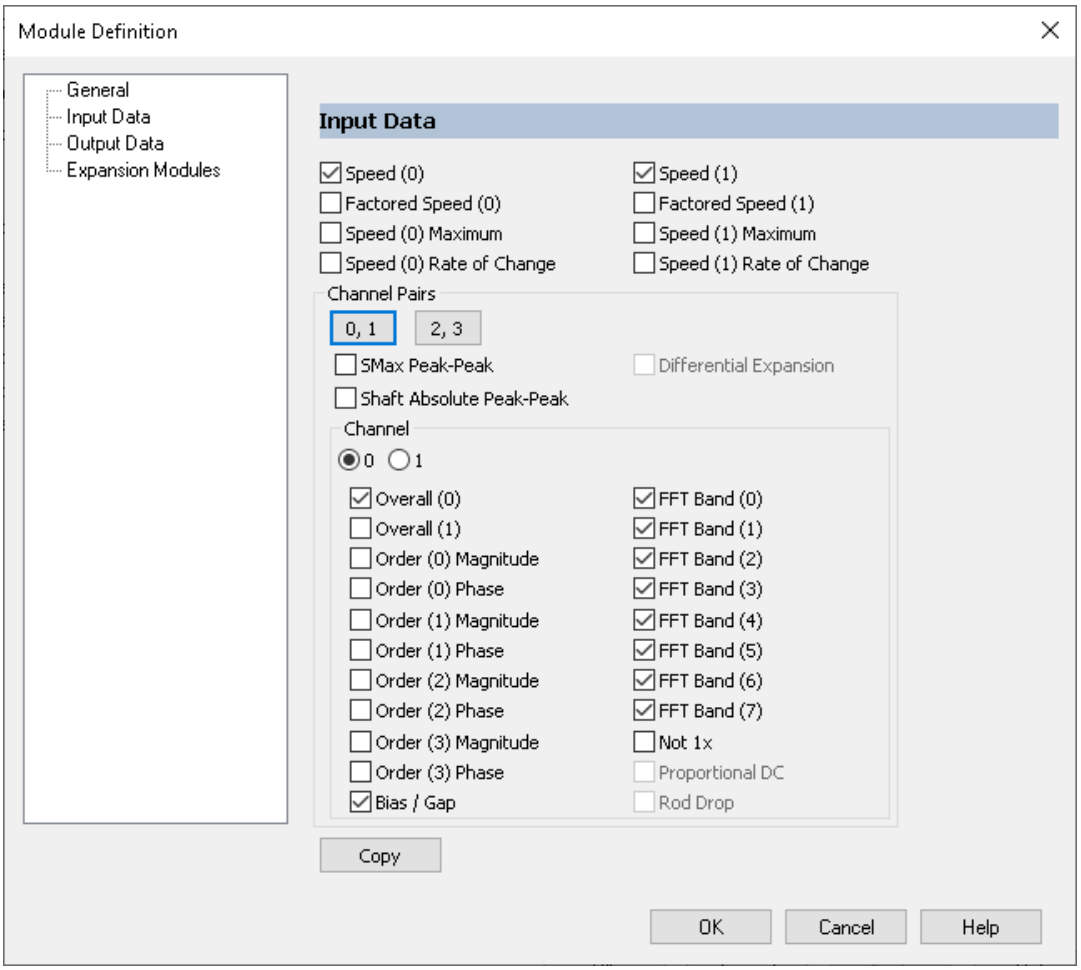
General

Assign the configurations as shown below.



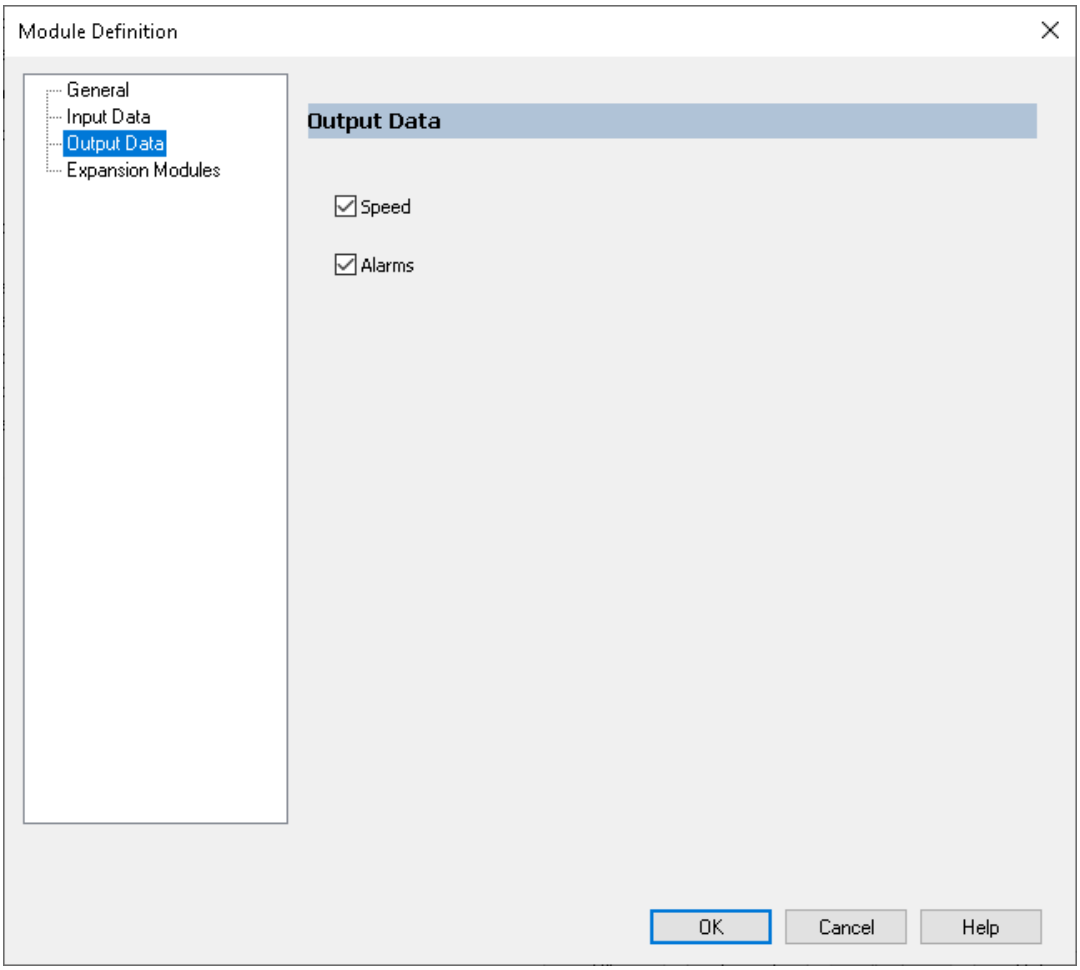
Input Data

Assign the configurations as shown below. Channel pairs 0,1 and 2,3 are configured identically. Only channel pair 0,1 is shown below. You can use the *Copy* function to copy the channel configuration from channel 0 to channels 1, 2, and 3. Enable Speed (0), Speed (1), Overall (0) and Bias/Gap. Enable FFT Band (0) through (7).



Output Data

Assign the configurations as shown below. Enable Speed and Alarms.



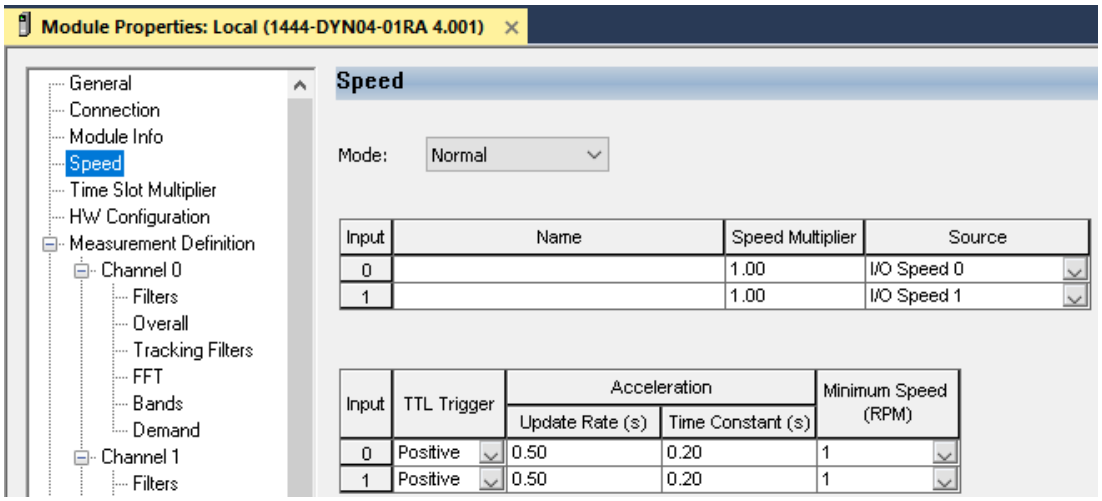
Expansion Modules

Expansion modules are not used or required for this application.

Module Properties

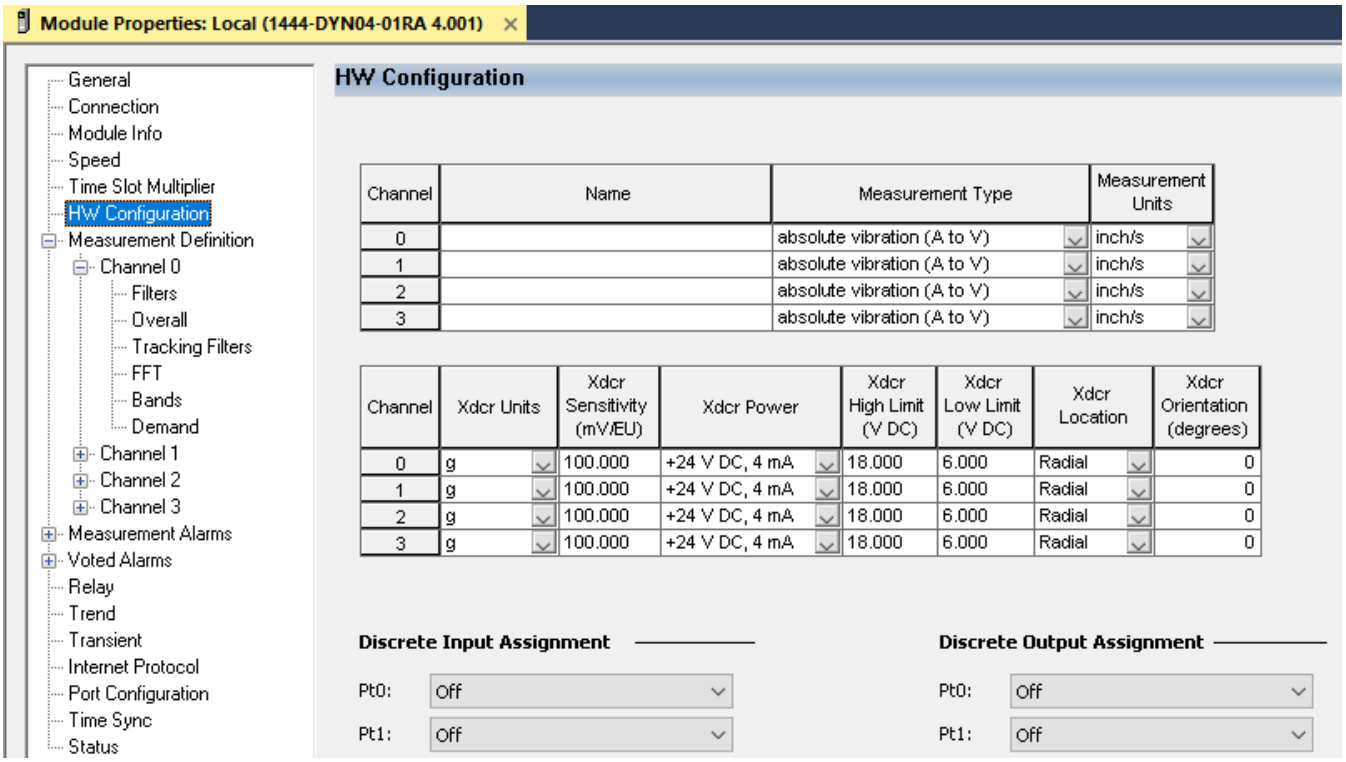
Speed

Configure Speed as shown below. Generally the *Source* is set to *I/O Speed 0 and 1* to use controller tags. Names can be entered optionally.



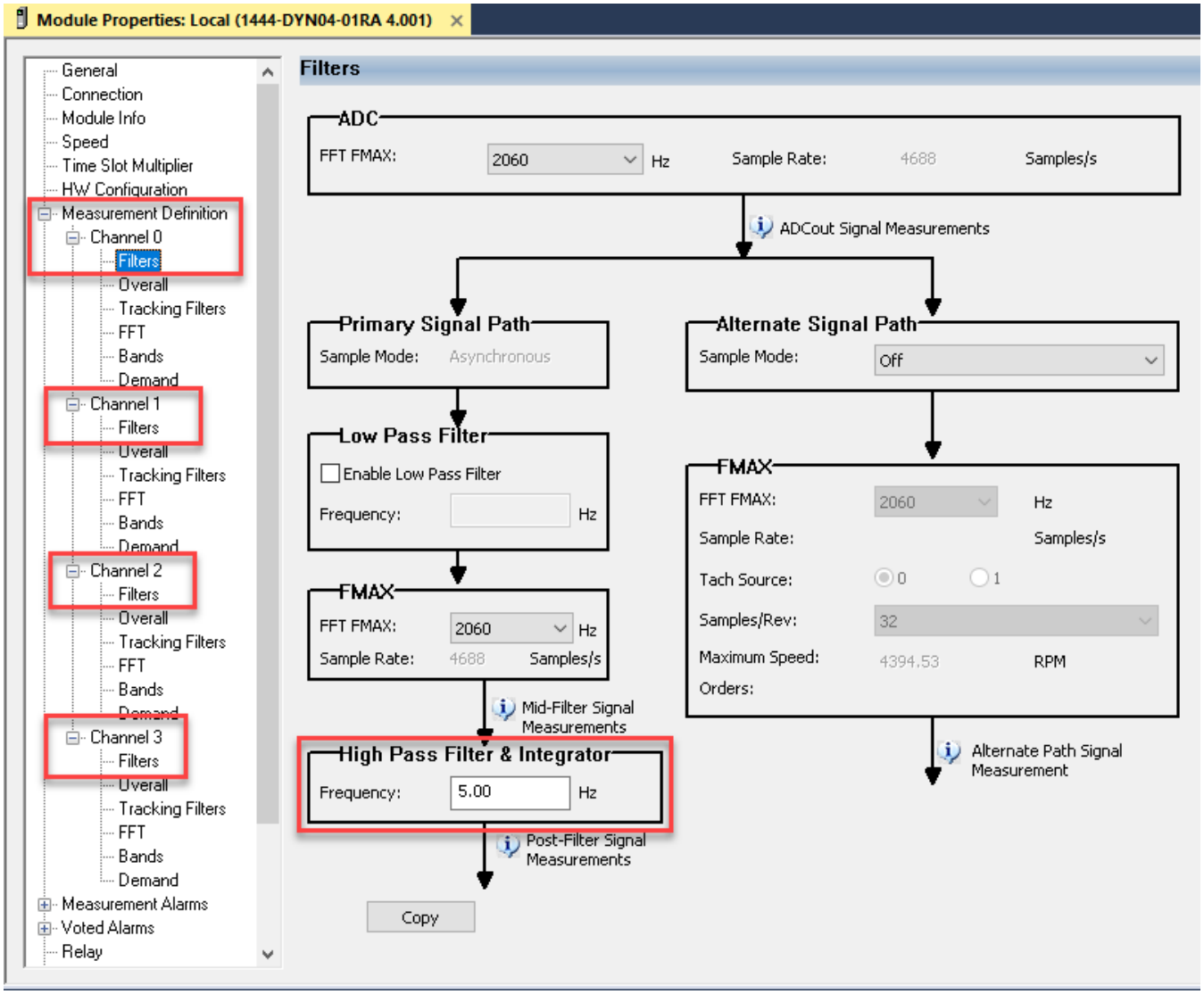
HW Configuration

Configure HW Configuration as shown below. Names can be entered optionally. Set the *Measurement Type* to *absolute vibration (A to V)* and the *Measurement Units* to either *inch/s* or *mm/s* depending on your preference.



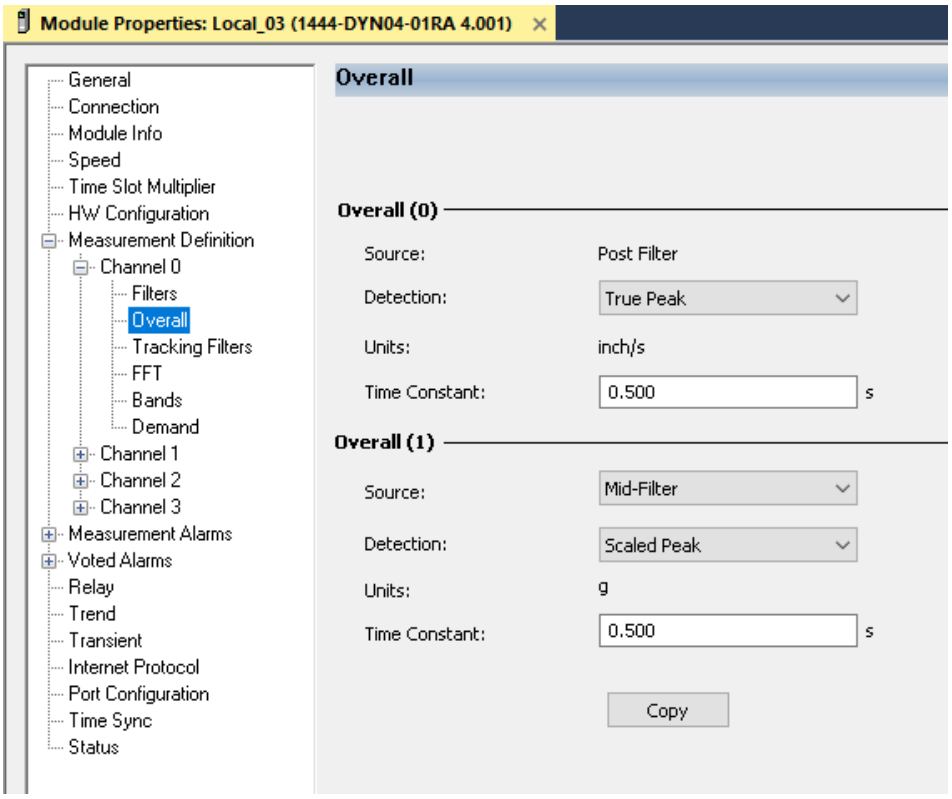
High Pass Filter & Integrator

A *High Pass Filter & Integrator* frequency setting is available in *Measurement Definitions, Channel 0-3,* and *Filters.* It is recommended to set this to 5.00 Hz for all channels and filters. Set the *FFT FMAX* to 2060 Hz. The *FFT FMAX* setting will also be used in the FFT Band settings.



Channel - Overall

For each channel 0-3 you can set the *Overall* configuration for *Overall(0)* and *Overall(1)*. Note that in this application we are only using *Overall(0)*. For each channel set the *Detection* to your preference of *RMS, True Peak or True Peak-Peak* and the *Time Constant* to 0.500 s as shown below. Note that alert and danger setpoints are based off of the detection type and units.



Bands

It is recommended to review the Application Technique 1444-AT001 Applying Condition Monitoring to Various Machinery to understand how each FFT band is configured. You can refer to the following sections for the monitoring philosophy of pumps with rolling element bearings:

- Rolling Element Bearings (pg 17)
- Medium Electric Motors - 15...375 KW (20...500 HP) (pg 37)
- Large Electric Motors - 375 KW (500 HP) and Above (pg 39)
- Pumps - Horizontal Mount (pg57)
- Pumps - Vertical Mount (pg 62)

The following FFT bands and warnings should be configured for best use with the HMI faceplates supplied in this library.

Note that this configuration is completed automatically when using Application Code Manager or the Studio 5000® Import Library Objects wizard plug-in.

FFT bands are defined based on the machinery being monitored. For this application Channels 0 and 1 monitor a medium or large electric motor; and

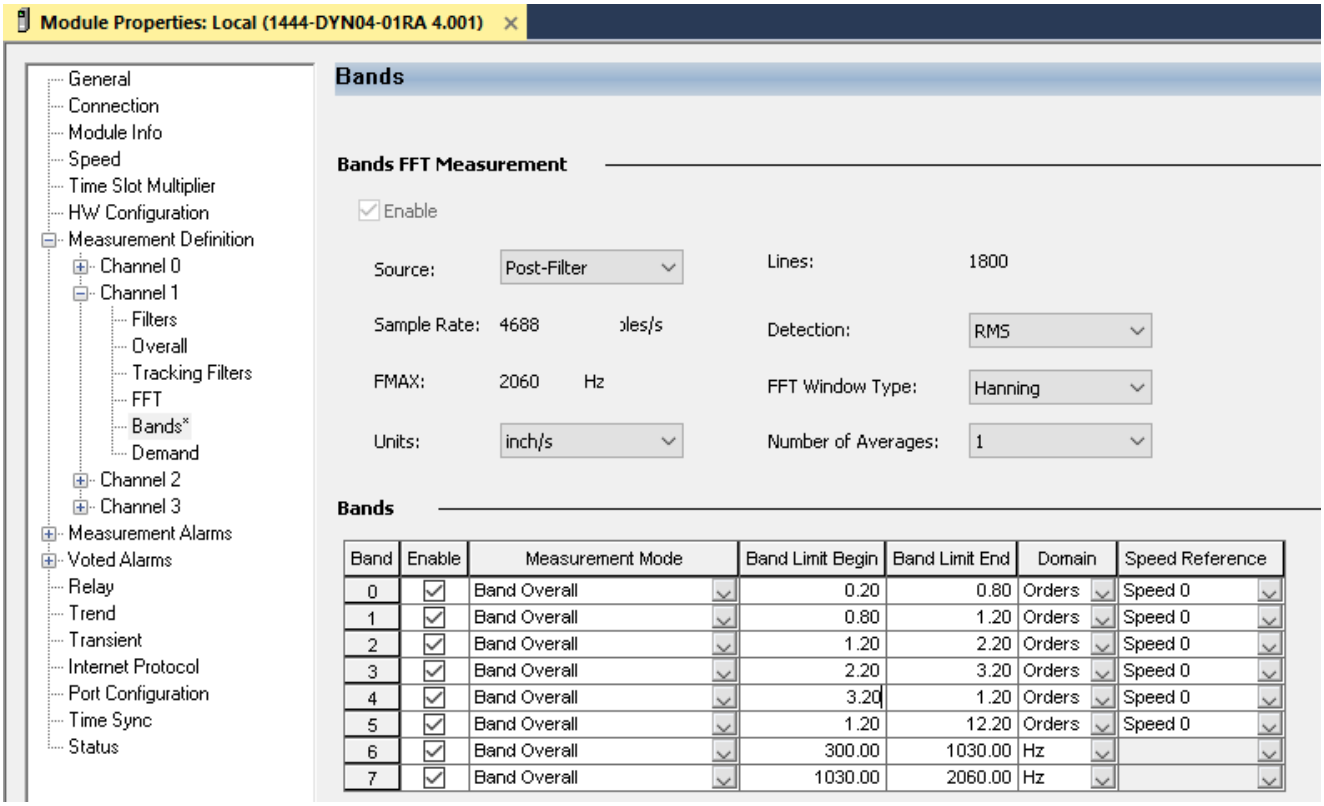
Channels 2 and 3 monitor a horizontal or vertical mount pump. Assign the *Units* to the desired engineering units *inch/s* or *mm/s* and set the *Detection* to *RMS*.

Channel 0 and 1 - Motor Outboard/Inboard FFT Bands

Band	Indicated Fault	Enable	Measurement Mode	Band Limit Begin	Band Limit End	Domain	Speed Reference
0	Bearing Cage Anomalies	Yes	Band Overall	0.20	0.80	Orders	Speed 0
1	Unbalance	Yes	Band Overall	0.8	1.20	Orders	Speed 0
2	Misalignment, Looseness	Yes	Band Overall	1.20	2.20	Orders	Speed 0
3	Misalignment, Looseness	Yes	Band Overall	2.20	3.20	Orders	Speed 0
4	Blade Pass Frequency	Yes	Band Overall	3.20	4.20	Orders	Speed 0
5	Bearing Fundamental Frequencies	Yes	Band Overall	4.20	12.20	Orders	Speed 0
6	Bearing Lower Harmonic Frequencies	Yes	Band Overall	12.2* Motor Speed RPM ÷ 60 min/s	50% * FMAX	Hz	
7	Bearing High Harmonic and Natural Frequencies	Yes	Band Overall	50% * FMAX	FMAX	Hz	

An example configuration is shown below where *FMAX* is the recommended 2060.00 Hz and 300 Hz is used for the lower limit of Band 6 based on the static or average speed of the motor where:

Band 6 Limit Begin (Hz)= 12.2* Motor Speed RPM ÷ 60 min/s; *e.g. 300 Hz = 12.2 * 1475 RPM ÷ 60 min/s*



Channel 2and 3 - Pump Inboard/Outboard FFT Bands

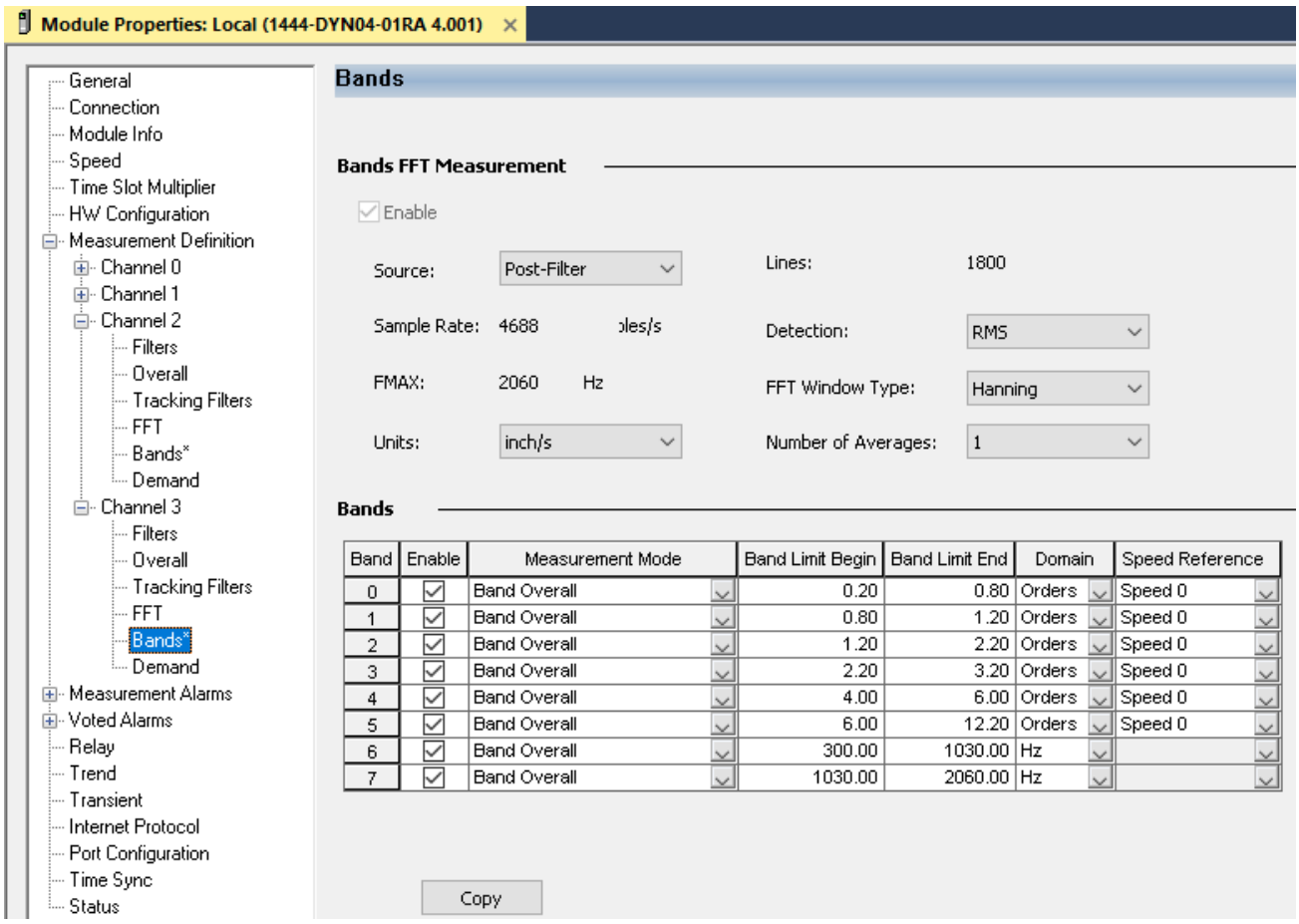
Band	Indicated Fault	Enable	Measurement Mode	Band Limit Begin	Band Limit End	Domain	Speed Reference
0	Bearing Cage Anomalies	Yes	Band Overall	0.20	0.80	Orders	Speed 0
1	Unbalance	Yes	Band Overall	0.8	1.20	Orders	Speed 0
2	Misalignment, Looseness	Yes	Band Overall	1.20	2.20	Orders	Speed 0
3	Misalignment, Looseness	Yes	Band Overall	2.20	3.20	Orders	Speed 0
4	Blade Pass Frequency	Yes	Band Overall	0.80 * BPF	1.2 * BPF	Orders	Speed 0
5	Bearing Fundamental Frequencies	Yes	Band Overall	1.2 * BPF	12.20	Orders	Speed 0
6	Bearing Lower Harmonic Frequencies	Yes	Band Overall	12.2* Motor Speed RPM ÷ 60 min/s	50% * FMAX	Hz	
7	Bearing High Harmonic and Natural Frequencies	Yes	Band Overall	50% * FMAX	FMAX	Hz	

An example configuration is shown below where *FMAX* is the recommended 2060.00 Hz, average speed of the motor = 1475 RPM, and BPF or number of pump impeller blades is set to 5.

Band 4 Limit Begin (Orders) = 0.8 * # of Impeller Blades; *e.g. 4.00 = 0.8 * 5*

Band 5 Limit Begin (Orders) = 1.2 * # of Impeller Blades; *e.g. 6.00 = 1.2 * 5*

Band 6 Limit Begin (Hz)= 12.2* Motor Speed RPM ÷ 60 min/s; *e.g. 300 Hz = 12.2 * 1475 RPM ÷ 60 min/s*



FFT Band Alarm Configuration

The included Add-On Instruction can be used to create warning events for abnormal machinery conditions.

Note that this configuration is completed automatically when using Application Code Manager or the Studio 5000® Import Library Objects wizard plug-in.

It is recommended to review the Application Technique 1444-AT001 Applying Condition Monitoring to Various Machinery to understand how each FFT band is configured. You can refer to the following sections for the monitoring philosophy of pumps with rolling element bearings:

- Rolling Element Bearings (pg 17)
- Medium Electric Motors - 15...375 KW (20...500 HP) (pg 37)
- Large Electric Motors - 375 KW (500 HP) and Above (pg 39)
- Pumps - Horizontal Mount (pg57)
- Pumps - Vertical Mount (pg 62)

Each FFT Band has two alarm setpoints:

- Alarm 1/Alert: Lower threshold indication of a potential abnormal condition
- Alarm 2/Danger: Higher threshold indication of a potential abnormal condition

Setpoints depend on the following factors:

- Engineering units: inch/s or mm/s
- Channel 0 and 1 machinery monitored: Medium Large Motor
- Channel 2 and 3 machinery monitored: Horizontal or Vertical Pump

Setpoints are assigned to local tags in the raC_Dvc_DYN1444_PumpREB Add-On Instruction. The User-defined Data-Type (UDT) *raC_UDT_DYN1444_BandCfg* is used for each Band 0...7 of each Channel 0...3. These local tags are called *Cfg_ChX_BandY* where *X* is a placeholder for the Channel number and Y is a placeholder for the Band number. Likewise *Cfg_ChX_Overall* is used for Overall(0) of each Channel. The UDT has the following members:

Name	Description	Datatype
Cfg_Danger	Band Danger High Limit	REAL
Cfg_Alert	Band Alert High Limit	REAL
Cfg_Min	Band Minimum Setting	REAL
Cfg_Max	Band Maximum Setting	REAL
Cfg_Delay	Band Alert/Danger Delay Setting (ms)	DINT

Ch0 and Ch1 Motor Alarm Limits

Assign the FFT Band 0...7 *Cfg_Alert* (Alarm 1) and *Cfg_Danger* (Alarm 2) settings according to the table below based on the equipment Engineering Units (mm/s or inch/s) and equipment type (Medium Electric Motor <= 500 HP or Large Electric Motor > 500 HP).

Attributes		Band 0	Band 1	Band 2	Band 3	Band 4	Band 5	Band 6	Band 7
Band Name	Fault Frequency	<1x	1x	2x	3x	4x	4.5,,,12x (typically)	12x...~1kHz (typically)	~1...2 kHz (typically)
	Indicated Fault or Fault Qualification	Bearing Cage Anomalies	Unbalance	Misalignment, Looseness	Misalignment, Looseness	Misalignment, Looseness	Bearing Fundamental Frequencies	Bearing Lower Harmonic Frequencies	Bearing High Harmonic and Natural Frequencies
% of Overall Level		15%	90%	35%	35%	60%	25%	20%	15%
Medium Electric Motor <= 500 HP	Alarm 1 mm/s	0.42	2.52	0.98	0.98	0.7	0.7	0.56	0.42
	Alarm 2 mm/s	0.63	3.78	1.47	1.47	1.05	1.05	0.84	0.63
	Alarm 1 in/s	0.023	0.140	0.054	0.054	0.039	0.039	0.031	0.023
	Alarm 2 in/s	0.035	0.210	0.082	0.082	0.058	0.058	0.047	0.035
Large Electric Motor > 500 HP	Alarm 1 mm/s	0.68	4.05	1.58	1.58	1.125	1.125	0.9	0.675
	Alarm 2 mm/s	1.01	6.08	2.36	2.36	1.6875	1.6875	1.35	1.0125
	Alarm 1 in/s	0.037	0.225	0.087	0.087	0.062	0.062	0.05	0.037
	Alarm 2 in/s	0.056	0.338	0.132	0.132	0.094	0.094	0.075	0.056

Assign the Channel Overall *Cfg_Alert* (Alarm 1) and *Cfg_Danger* (Alarm 2) settings according to the table below based on the equipment Engineering Units (mm/s or inch/s) and equipment type (Medium Electric Motor <= 500 HP or Large Electric Motor > 500 HP).

Pumps	Overall Alarm Limits	mm/s	Inch/s
Medium Electric Motor <= 500 HP	Alarms 1	2.80	0.156
	Alarms 2	4.20	0.234
Large Electric Motor > 500 HP	Alarm 1	4.50	0.250
	Alarm 2	6.75	0.376

Ch2 and Ch3 Pump Alarm Limits

Assign the FFT Band 0...7 *Cfg_Alert* (Alarm 1) and *Cfg_Danger* (Alarm 2) settings according to the table below based on the equipment Engineering Units (mm/s or inch/s) and equipment type (Horizontal Pump with Medium/Large Motor or Vertical Pump).

Attributes		Band 0	Band 1	Band 2	Band 3	Band 4	Band 5	Band 6	Band 7
Band Name	Fault Frequency	<1x	1x	2x	3x	1x BPF	4.5,,,12x (typically)	12x...!1kHz (typically)	~1...2 kHz (typically)
	Indicated Fault or Fault Qualification	Bearing Cage Anomalies	Unbalance	Misalignment, Looseness	Misalignment, Looseness	Blade Pass Frequency	Bearing Fundamental Frequencies	Bearing Lower Harmonic Frequencies	Bearing High Harmonic and Natural Frequencies
% of Overall Level		15%	90%	35%	35%	60%	25%	20%	15%
Horizontal Pumps	Alarm 1 mm/s	0.81	4.86	1.89	1.89	3.24	1.35	1.08	1.125
	Alarm 2 mm/s	1.22	7.29	2.84	2.84	4.86	2.025	1.62	1.125
	Alarm 1 in/s	0.045	0.270	0.105	0.105	0.180	0.075	0.060	0.045
	Alarm 2 in/s	0.068	0.406	0.158	0.158	0.271	0.113	0.090	0.068

Attributes		Band 0	Band 1	Band 2	Band 3	Band 4	Band 5	Band 6	Band 7
Veritcal Pumps	Alarm 1 mm/s	1.065	6.39	2.49	2.49	4.26	1.78	1.42	1.065
	Alarm 2 mm/s	1.60	9.59	3.73	3.73	6.39	2.66	2.13	1.60
	Alarm 1 in/s	0.059	0.356	0.138	0.138	0.237	0.099	0.079	0.059
	Alarm 2 in/s	0.089	0.534	0.208	0.208	0.356	0.148	0.119	0.089

Assign the Channel Overall *Cfg_Alert* (Alarm 1) and *Cfg_Danger* (Alarm 2) settings according to the table below based on the equipment Engineering Units (mm/s or inch/s) and equipment type (Medium Electric Motor <= 500 HP or Large Electric Motor > 500 HP; Horizontal or Vertical Pump).

Pumps	Overall Alarm Limits	mm/s	In/s
Horizontal Centrifugal Pumps up to 500 HP	Alarms 1	2.80	0.156
	Alarms 2	4.20	0.234
Horizontal Centrifugal Pumps Greater than 500 HP	Alarm 1	5.40	0.300
	Alarm 2	8.10	0.451
Vertical Pumps	Alarm 1	7.10	0.395
	Alarm 2	10.65	0.593

FFT Band Min/Max

The FFT Band Min/Max (*Cfg_Min/Cfg_Max)* settings are used for two reasons:

- Restrict the upper/lower limit of setpoint changes from the Configuration tab of the HMI faceplate
- Scale the min/max bar graph limits on the Bar Graph Tab.

Warning Delay Configuration

Each FFT Band configuration has a warning delay setting *Cfg_Delay*. This is a setting in ms which delays the warning events to filter out noise or random spikes. By default this is set to 1000 ms.

Operations

The Dynamix™ 1444 Pump with Rolling Element Bearings objects provide two modes of operation - physical and virtual.

Physical Device Operation

The following functions are applied when device object is selected as physical.

- **Device Faults:** Device faults such as communication or module hardware faults are monitored and reported to the faceplate.
- **Machinery Warnings:** Machinery warnings such as bearing conditions are monitored and reported to the faceplate.

Virtual Device Operation

The following functions are applied when device object is selected as virtual.

- **Device Faults:** Device faults such as communication or module hardware faults are not monitored or reported to the faceplate.
- **Machinery Warnings:** Machinery warnings such as bearing conditions are monitored and reported to the faceplate.

Faults & Warnings

- **First Warning:** This function helps in capturing the first warning triggered in the device. Display the respective description in faceplate.
- **First Fault:** Capture the first fault from device. Display the respective description in faceplate.
- **Event log:** Log Warning and Fault the last 4 events in a log queue. The queue contains fault code, description, and time stamp. Display the same in faceplate.

Execution

The following table explains the handling of instruction execution conditions.

Condition	Description
EnableIn False (false rung)	Processing for EnableIn False (false rung) is handled the same as if the device were taken out of service by Command. The device outputs are de-energized and the device is shown as Program Out of Service on the HMI. All alarms are cleared.
Powerup (prescan, first scan)	On prescan, any commands that are received before first scan are discarded. The device is de-energized. On first scan, the device is treated as if it were returning from Hand command source: the instruction state is set based on the position feedback that is received from the device. If the feedback is valid for one position, the device is set to that position. If the device does not have position feedback or the position feedback is invalid, the device is set to the 'unknown/powerup' state. The command source is set to its default, either Operator or Program (unlocked).
Postscan	No SFC Postscan logic is provided.

Add-On Instruction I/O Data

InOut Data

InOut	Function / Description	DataType
Ref_Module	Reference to module in I/O tree	MODULE
Inp_Dynamix_1444	Dynamix 1444 Module Input Assembly	AB:1444_00000F0FFFFFF0000C000FFF000:I:2
Out_Dynamix_1444	Dynamix 1444 Module Output Assembly	AB:1444_DYN_00000003:O:1
Cfg_Dynamix_1444	Dynamix 1444 Module Configuration Assembly	AB:1444_DYN:C:2
Inf_Lookup	Code / Description List Entry	raC_UDT_LookupMember_STR0082[40]

Input Data

Input	Function/Description	DataType
EnableIn	Enable Input - System Defined Parameter	BOOL
Set_InhibitCmd	Set Inhibit External Commands: 1 = Inhibited	BOOL
Set_InhibitSet	Set Inhibit External Setpoints: 1 = Inhibited	BOOL
Cmd_ResetWarn	Clear Warnings Command. 1 = Reset	BOOL
Cmd_ClearFaults	Clear Faults Cmd: 1 = Clear	BOOL
Cmd_Physical	Physical device cmd: 1 = Device will operate as a 'physical' device	BOOL
Cmd_Virtual	Virtual device cmd: 1 = Device will operate as a 'virtual' device	BOOL
Cmd_EnableValues	Enable live values Command: 1 = Enable	BOOL
Cmd_DisableValues	Disable live values Command: 1 = Disable	BOOL
Cmd_EnableAlerts	Enable Alerts and Dangers Command: 1 = Enable	BOOL
Cmd_DisableAlerts	Disable Alerts and Dangers Command: 1 = Disable	BOOL
Cmd_Enable_Ch0	Enable Channel Command: 1 = Enable	BOOL
Cmd_Disable_Ch0	Disable Channel Command: 1 = Disable	BOOL
Cmd_Enable_Ch1	Enable Channel Command: 1 = Enable	BOOL
Cmd_Enable_Ch1	Disable Channel Command: 1 = Disable	BOOL
Cmd_Enable_Ch2	Enable Channel Command: 1 = Enable	BOOL
Cmd_Disable_Ch2	Disable Channel Command: 1 = Disable	BOOL
Cmd_Enable_Ch3	Enable Channel Command: 1 = Enable	BOOL
Cmd_Disable_Ch3	Disable Channel Command: 1 = Disable	BOOL

Output Data

Output	Function/Descritpion	DataType
Sts_Warning	Device warning status: 1 = an active alarm or warning exists	BOOL
Sts_Virtual	Virtual device status: 1 = Device is operating as a 'virtual' device	BOOL
Sts_Ready	Device ready status: 1 = ready to activate power structure	BOOL
Sts_Warning	Device warning status: 1 = an active alarm or warning exists	BOOL
Sts_Faulted	Device faulted status: 1 = an active fault exists	BOOL
Sts_Connected	Device is connected to the Programmable Controller	BOOL
Sts_bNotReady	Bitwise device 'not ready' reason 0 = Reserved 1 = Device not connected 2 = Device not available 3 = Device Faulted 4 - 31 = Reserved	DINT
Sts_Available	Device is available for interaction with user code	BOOL
Sts_Active	Device active status: 1 = output power structure is active	BOOL
raC_Dvc_DYN1444_PumpREB	Unique Parameter Name for auto - discovery	BOOL
EnableOut	Enable Output - System Defined Parameter	BOOL
Sts_eState	Enumerated state value: 0=Unused, 1=Initializing, 2=Disconnected, 3=Disconnecting, 4=Connecting, 5=Idle, 6=Configuring, 7=Available	DINT
Sts_eCmdFail	Enumerated command failure code	DINT
Sts_InhibitCmd	Sts_InhibitCfg	BOOL
Sts_InhibitSet	Disable Setting inputs from external sources	BOOL
Sts_InhibitCfg	Configuration inhibited from faceplate: 1 = Inhibited	BOOL

Output	Function/Descritpion	DataType
Sts_Motor_Unbalance	Motor - Unbalance Status Summary: 0 = Normal, 1 = Alert, 2 = Danger; Unbalance: 1 = Danger; Check rotor for uneven build-up and clean or balance rotor.	DINT
Sts_Equipment_Unbalance	Equipment - Unbalance Status Summary: 0 = Normal, 1 = Alert, 2 = Danger; Unbalance: 1 = Danger; Check rotor for uneven build-up and clean or balance rotor.	DINT
Sts_Unbalance	Unbalance Status Summary: 0 = Normal, 1 = Alert, 2 = Danger; Unbalance: 1 = Danger; Check rotor for uneven build-up and clean or balance rotor.	DINT
Sts_Motor_Misalignment	Motor - Misalignment or Looseness: 0 = Normal, 1 = Alert, 2 = Danger; check for loose mounting bolts, inspect coupling, check alignment.	DINT
Sts_Equipment_Misalignment	Equipment - Misalignment or Looseness: 0 = Normal, 1 = Alert, 2 = Danger; check for loose mounting bolts, inspect coupling, check alignment.	DINT
Sts_Misalignment	Misalignment or Looseness: 0 = Normal, 1 = Alert, 2 = Danger; check for loose mounting bolts, inspect coupling, check alignment.	DINT
Sts_Motor_HighVibration	Motor - High Vibration Status Summary: 0 = Normal, 1 = Alert, 2 = Danger; 2 or more transducers. Shutdown machine	DINT
Sts_Equipment_HighVibration	Motor - High Vibration Status Summary: 0 = Normal, 1 = Alert, 2 = Danger; 2 or more transducers. Shutdown machine	DINT
Sts_HighVibration	High Vibration Status Summary: 0 = Normal, 1 = Alert, 2 = Danger; 2 or more transducers. Shutdown machine	DINT
Sts_Motor_BearingSummary	Motor - Bearing Status Summary (Bearing Cage/Early/Late/Advanced); 0 = Normal, 1 = Alert, 2 = Danger	DINT
Sts_Equipment_BearingSummary	Equipment - Bearing Status Summary (Bearing Cage/Early/Late/Advanced); 0 = Normal, 1 = Alert, 2 = Danger	DINT
Sts_Equipment_BearingSummary	Motor - Bearing Cage Status Summary: 0 = Normal, 1 = Alert, 2 = Danger; Possible lubrication problem. Check Lube levels or replace bearing.	DINT
Sts_Equipment_BearingCage	Equipment - Bearing Status Summary (Bearing Cage/Early/Late/Advanced); 0 = Normal, 1 = Alert, 2 = Danger	DINT
Sts_BearingCage	Bearing Cage Status Summary: 0 = Normal, 1 = Alert, 2 = Danger; Possible lubrication problem. Check Lube levels or replace bearing.	DINT
Sts_EarlyStageBearing	Early Stage Bearing Status Summary: 0 = Normal, 1 = Alert, 2 = Danger; Continue monitoring for changes. If problem persists plan on changing the bearing in the next 3 to 6 months.	DINT
Sts_Motor_LateStageBearing	Early Stage Bearing Status Summary: 0 = Normal, 1 = Alert, 2 = Danger; Continue monitoring for changes. If problem persists plan on changing the bearing in the next 3 to 6 months.	DINT
Sts_Equipment_LateStageBearing	Early Stage Bearing Status Summary: 0 = Normal, 1 = Alert, 2 = Danger; Continue monitoring for changes. If problem persists plan on changing the bearing in the next 3 to 6 months.	DINT
Sts_LateStageBearing	Late Stage Bearing Status Summary: 0 = Normal, 1 = Alert, 2 = Danger; Change bearing ASAP	DINT
Sts_Motor_AdvanceStageBearing	Late Stage Bearing Status Summary: 0 = Normal, 1 = Alert, 2 = Danger; Change bearing ASAP	DINT
Sts_Equipment_AdvancedStageBearing	Late Stage Bearing Status Summary: 0 = Normal, 1 = Alert, 2 = Danger; Change bearing ASAP	DINT
Sts_AdvanceStageBearing	Late Stage Bearing Status Summary: 0 = Normal, 1 = Alert, 2 = Danger; Change bearing ASAP	DINT
Sts_Flow	Flow Status Summary: 0 = Normal, 1 = Alert, 2 = Danger; Check for obstructions in discharge path.	DINT
Sts_Cavitation	Flow Status Summary: 0 = Normal, 1 = Alert, 2 = Danger; Check for obstructions in discharge path.	DINT
Sts_Motor	Flow Status Summary: 0 = Normal, 1 = Alert, 2 = Danger; Check for obstructions in discharge path.	DINT
Sts_ExpBus_or_Module_Fault	Flow Status Summary: 0 = Normal, 1 = Alert, 2 = Danger; Check for obstructions in discharge path.	BOOL
Sts_Module_Power_OK	Flow Status Summary: 0 = Normal, 1 = Alert, 2 = Danger; Check for obstructions in discharge path.	BOOL
Sts_SpeedCh0_Fault	Speed/Tach Channel Fault Status: 1 = Faulted	BOOL
Sts_SpeedCh1_Fault	Speed/Tach Channel Fault Status: 1 = Faulted	BOOL
Sts_ValuesEnabled	Speed/Tach Channel Fault Status: 1 = Faulted	BOOL
Sts_ValuesDisabled	Speed/Tach Channel Fault Status: 1 = Faulted	BOOL
Sts_AlertsEnabled	Speed/Tach Channel Fault Status: 1 = Faulted	BOOL
Sts_AlertsDisabled	Alerts and Dangers are disabled: 1 = Disabled	BOOL
Sts_AnyCh_AlertOrDanger	Alerts and Dangers are disabled: 1 = Disabled	BOOL
Sts_AnyCh_Alert	Alerts and Dangers are disabled: 1 = Disabled	BOOL
Sts_AnyCh_Danger	Alerts and Dangers are disabled: 1 = Disabled	BOOL

Output	Function/Descritpion	DataType
Sts_Ch0_Disabled	Channel Disabled Status; 1 = Disabled	BOOL
Sts_Ch0_EU	Channel Engineering Units: 1 = mm/s, 0 = inch/s	BOOL
Sts_Ch0_EU	Ch0 Motor Outboard - Calibration Failure: 1 = Failed	BOOL
Sts_Ch0_Fault	Channel Fault Status: 1 = Faulted	BOOL
Sts_Ch0_WireOffDetected	Channel Wire Off Detected: 1 = Fault	BOOL
Sts_Ch0_TransducerFault	Channel Transducer Fault Status: 1 = Faulted	BOOL
Sts_Ch0_AlertOrDanger	Ch0 Motor Outboard - Alert or Danger: 1 = Active	BOOL
Sts_Ch0Overall0_Alert	Ch0 Motor Outboard - Overall Vibration Alert: 1 = Alert	BOOL
Sts_Ch0Overall0_Danger	Ch0 Motor Outboard - Overall Vibration Alert: 1 = Alert	BOOL
Sts_Ch0FFTBand_Alert	FFT Band Bitwise Alert: 1 = Alert	USINT
Sts_Ch0FFTBand_Alert	FFT Band Bitwise Danger: 1 = Danger	USINT
Sts_Ch1_Disabled	Channel Disabled Status; 1 = Disabled	BOOL
Sts_Ch1_EU	Channel Engineering Units: 1 = mm/s, 0 = inch/s	BOOL
Sts_Ch1_EU	Ch1 Motor Inboard - Calibration Failure: 1 = Failed	BOOL
Sts_Ch1_Fault	Channel Fault Status: 1 = Faulted	BOOL
Sts_Ch1_WireOffDetected	Channel Wire Off Detected: 1 = Fault	BOOL
Sts_Ch1_TransducerFault	Channel Transducer Fault Status: 1 = Faulted	BOOL
Sts_Ch1_AlertOrDanger	Ch1 Motor Inboard - Alert or Danger: 1 = Active	BOOL
Sts_Ch1Overall0_Alert	Ch1 Motor Inboard - Overall Vibration Alert: 1 = Alert	BOOL
Sts_Ch1Overall0_Danger	Ch1 Motor Inboard - Overall Vibration Alert: 1 = Alert	BOOL
Sts_Ch1FFTBand_Alert	FFT Band Bitwise Alert: 1 = Alert	USINT
Sts_Ch1FFTBand_Alert	FFT Band Bitwise Danger: 1 = Danger	USINT
Sts_Ch2_Disabled	Channel Disabled Status; 1 = Disabled	BOOL
Sts_Ch2_EU	Channel Engineering Units: 1 = mm/s, 0 = inch/s	BOOL
Sts_Ch2_EU	Ch2 Equipment Inboard - Calibration Failure: 1 = Failed	BOOL
Sts_Ch2_Fault	Channel Fault Status: 1 = Faulted	BOOL
Sts_Ch2_WireOffDetected	Channel Wire Off Detected: 1 = Fault	BOOL
Sts_Ch2_TransducerFault	Channel Transducer Fault Status: 1 = Faulted	BOOL
Sts_Ch2_AlertOrDanger	Ch2 Equipment Inboard - Alert or Danger: 1 = Active	BOOL
Sts_Ch2Overall0_Alert	Ch2 Equipment Inboard - Overall Vibration Alert: 1 = Alert	BOOL
Sts_Ch2Overall0_Danger	Ch2 Equipment Inboard - Overall Vibration Alert: 1 = Alert	BOOL
Sts_Ch2FFTBand_Alert	FFT Band Bitwise Alert: 1 = Alert	USINT
Sts_Ch2FFTBand_Alert	FFT Band Bitwise Danger: 1 = Danger	USINT
Sts_Ch3_Disabled	Channel Disabled Status; 1 = Disabled	BOOL
Sts_Ch3_EU	Channel Engineering Units: 1 = mm/s, 0 = inch/s	BOOL

Output	Function/Descritpion	DataType
Sts_Ch3_EU	Ch3 Equipment Outboard - Calibration Failure: 1 = Failed	BOOL
Sts_Ch3_Fault	Channel Fault Status: 1 = Faulted	BOOL
Sts_Ch3_WireOffDetected	Channel Wire Off Detected: 1 = Fault	BOOL
Sts_Ch3_TransducerFault	Channel Transducer Fault Status: 1 = Faulted	BOOL
Sts_Ch3_AlertOrDanger	Ch3 Equipment Outboard - Alert or Danger: 1 = Active	BOOL
Sts_Ch3OverallO_Alert	Ch3 Equipment Outboard - Overall Vibration Alert: 1 = Alert	BOOL
Sts_Ch3OverallO_Danger	Ch3 Equipment Outboard - Overall Vibration Alert: 1 = Alert	BOOL
Sts_Ch3FFTBand_Alert	FFT Band Bitwise Alert: 1 = Alert	USINT
Sts_Ch3FFTBand_Alert	FFT Band Bitwise Danger: 1 = Danger	USINT
Val_SpeedO	Speed O Value	REAL
Speed O Value	Speed O Value	REAL
Val_ChODCV	Channel O Bias/Gap Value	REAL
Val_ChOOverallO	Channel O OverallO (Post-Filter) Value	REAL
Val_ChOFFTBandO	Channel O FFT Band O Value	REAL
Val_ChOFFTBand1	Channel O FFT Band 1 Value	REAL
Val_ChOFFTBand2	Channel O FFT Band 2 Value	REAL
Val_ChOFFTBand3	Channel O FFT Band 3 Value	REAL
Val_ChOFFTBand4	Channel O FFT Band 4 Value	REAL
Val_ChOFFTBand5	Channel O FFT Band 5 Value	REAL
Val_ChOFFTBand6	Channel O FFT Band 6 Value	REAL
Val_ChOFFTBand7	Channel O FFT Band 7 Value	REAL
Val_Ch1DCV	Channel 1 Bias/Gap Value	REAL
Val_Ch1OverallO	Channel 1 OverallO (Post-Filter) Value	REAL
Val_Ch1FFTBandO	Channel 1 FFT Band O Value	REAL
Val_Ch1FFTBand1	Channel 1 FFT Band 1 Value	REAL
Val_Ch1FFTBand2	Channel 1 FFT Band 2 Value	REAL
Val_Ch1FFTBand3	Channel 1 FFT Band 3 Value	REAL
Val_Ch1FFTBand4	Channel 1 FFT Band 4 Value	REAL
Val_Ch1FFTBand5	Channel 1 FFT Band 5 Value	REAL
Val_Ch1FFTBand6	Channel 1 FFT Band 6 Value	REAL
Val_Ch1FFTBand7	Channel 1 FFT Band 7 Value	REAL
Val_Ch2DCV	Channel 2 Bias/Gap Value	REAL
Val_Ch2OverallO	Channel 2 OverallO (Post-Filter) Value	REAL
Val_Ch2FFTBandO	Channel 2 FFT Band O Value	REAL
Val_Ch2FFTBand1	Channel 2 FFT Band 1 Value	REAL

Output	Function/Descritpion	DataType
Val_Ch2FFTBand2	Channel 2 FFT Band 2 Value	REAL
Val_Ch2FFTBand3	Channel 2 FFT Band 3 Value	REAL
Val_Ch2FFTBand4	Channel 2 FFT Band 4 Value	REAL
Val_Ch2FFTBand5	Channel 2 FFT Band 5 Value	REAL
Val_Ch2FFTBand6	Channel 2 FFT Band 6 Value	REAL
Val_Ch2FFTBand7	Channel 2 FFT Band 7 Value	REAL
Val_Ch3DCV	Channel 3 Bias/Gap Value	REAL
Val_Ch3OverallO	Channel 3 OverallO (Post-Filter) Value	REAL
Val_Ch3FFTBand0	Channel 3 FFT Band 0 Value	REAL
Val_Ch3FFTBand1	Channel 3 FFT Band 1 Value	REAL
Val_Ch3FFTBand2	Channel 3 FFT Band 2 Value	REAL
Val_Ch3FFTBand3	Channel 3 FFT Band 3 Value	REAL
Val_Ch3FFTBand4	Channel 3 FFT Band 4 Value	REAL
Val_Ch3FFTBand5	Channel 3 FFT Band 5 Value	REAL
Val_Ch3FFTBand6	Channel 3 FFT Band 6 Value	REAL
Val_Ch3FFTBand7	Channel 3 FFT Band 7 Value	REAL

Data Types

The following Dynamix™ 1444 Pump with Rolling Element Bearings Common user defined data-types (UDTs) are included to support object functionality.

raC_UDT_DYN1444_BandCfg

The raC_UDT_DYN1444_BandCfg user defined data-type is used within the DYN1444 Add-On Instruction to manage FFT related configuration data.

Member	Description	Data Type
Cfg_Danger	Band Danger High Limit	REAL
Cfg_Alert	Band Alert High Limit	REAL
Cfg_Min	Band Minimum Setting	REAL
Cfg_Max	Band Maximum Setting	REAL
Cfg_Max	Band Alert/Danger Delay Setting	REAL

raC_UDT_Event

An array of size 4 is to be used to log the FirstWarning and FirstFault capture. The data should be FIFO order. The same should be displayed on the Faceplate.

Member	Description	Data Type
Type	Event type: 1 = Status, 2 = Warning, 3 = Fault, 4...n = User.	DINT
ID	User definable event ID.	DINT
Category	User definable category (Electrical,Mechanical,Materials,Utility,etc.).	DINT
Action	User definable event action code.	DINT
Value	User definable event value or fault code.	DINT
Message	Event message text.	STRING
EventTime_L	Timestamp (Date/Time format).	LINT
EventTime_D	Timestamp (Y,M,D,h,m,s,us).	DINT[7]

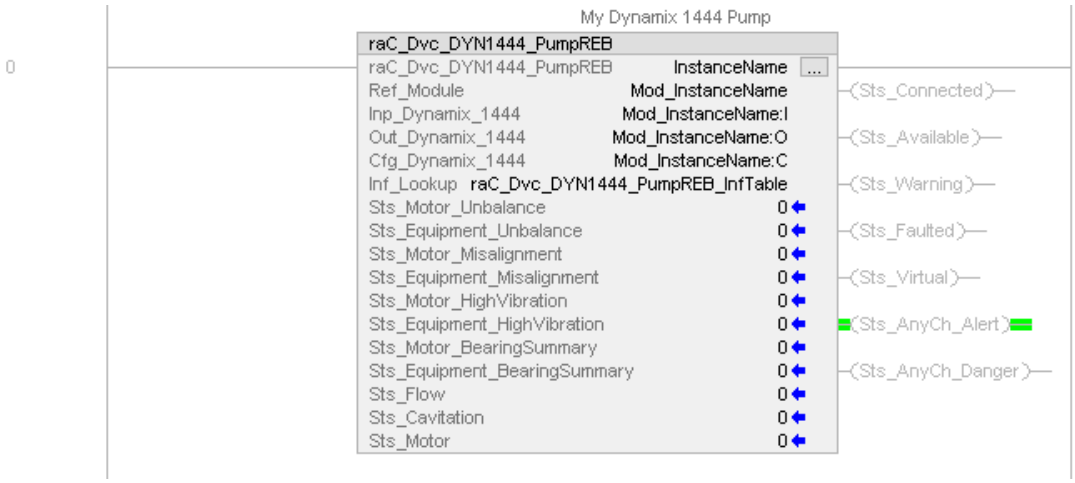
raC_UDT_LookupMember_STR0082

Member	Description	Data Type
Code	Code	DINT
Desc	Code Description	STRING

Programming Example

Fully configured device on a rung is provided below for reference. The first rung is required and the others are optional. This example includes the device and extensions objects for a Dynamix™ condition monitoring application (raC_Dvc_DYN1444_PumpREB).

Note that this programming example is the same code that is imported when either importing the supplied rung .L5X files or when using Application Code Manager or the Studio 5000® Import Library Objects wizard plug-in.



The device (ie: Dynamix™ 1444) must also be configured with the correct device definition. Note that this configuration is completed automatically when using Application Code Manager or the Studio 5000® Import Library Objects wizard plug-in. For details on setting up the device, refer to the Device Definition section.

Graphic Symbols

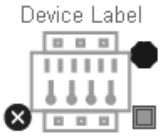
Graphic Symbols are used as launch buttons within HMI applications to open up faceplate displays. Alternatively, faceplates may also be launch from related instructions using the *more* button in the Process Library PMTR faceplate or the Machine Builder Library raM_Dvc_Motor_Disc faceplate.

All icons display the following information:

- - Device label (Tag.@Description or custom label entered in parameter #104)
- - Connection Fault/Virtual Indication
- - Device Warning/Fault Indication
- - Device not ready indication
- - Device Active (running)/Inactive (stopped) indication

See Launch Buttons for more general information on launch button diagnostics and usage.

FactoryTalk® View ME/SE Graphic Symbols

Graphic Symbol Name	Graphic Symbol	Description	Global Object Parameter Values
GOLaunchFP		Faceplate navigation button with string tag label. This launch button graphic object allows the user to navigate to the device object faceplate.	#102: Backing Tag (e.g. {::[PAC]Program::Program._InstanceName}) #104: Custom button label. Leave blank to use Tag.@Description #120: Display's left position (e.g. 100, optional) #121: Display's top position (e.g. 100, optional)
GO_LaunchDYN1444_TagString		Use with Dynamix 1444 Module Objects	

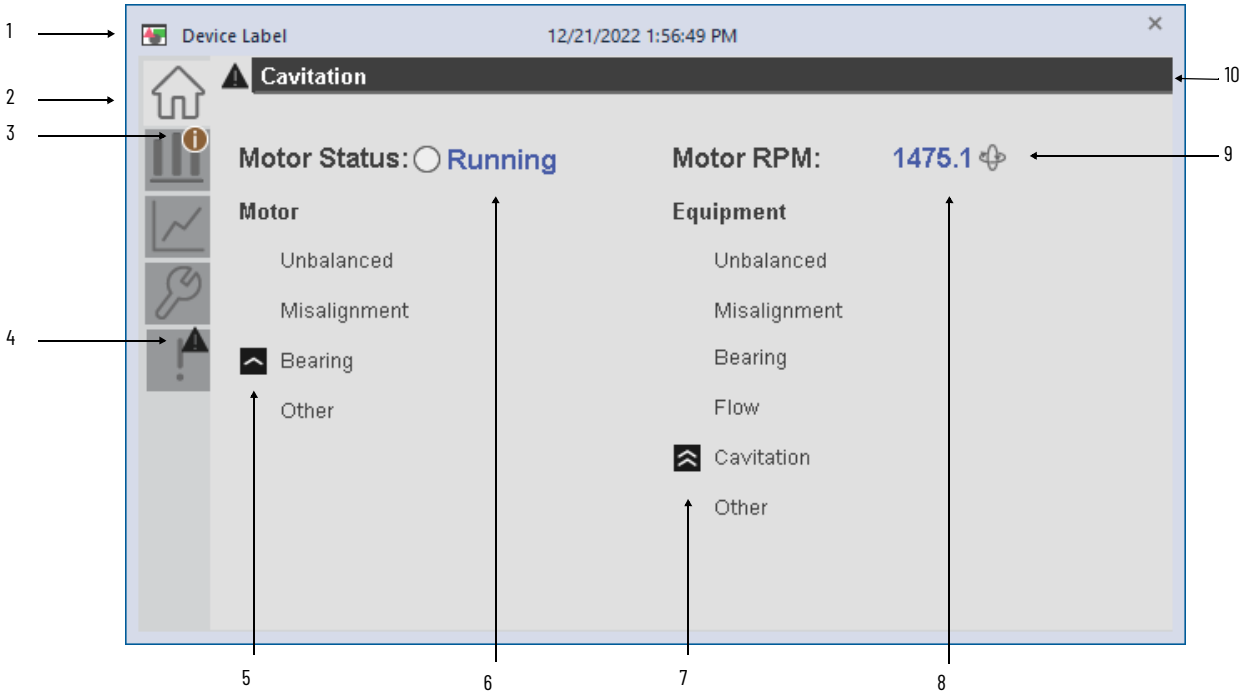
Faceplates

There are basic faceplate attributes that are common across all instructions. See Basic Faceplate Attributes on page 15.

Home

The Home tab is the main tab of the faceplate. It displays a summary of any machinery warning (Alarm 1) or danger (Alarm 2) conditions. Machinery conditions are grouped by Motor and Equipment (Pump). The motor run status and speed are also shown on the home tab.

At the top of the display is the device status banner which displays any active device faults or machinery condition warnings.



Item	Description	State Indicators
1	Faceplate Title - Display's Tag.@Descritpion extended property	
2	Tab navigation. Active tab shown in light gray; inactive tab shown in dark gray.	
3	Information indication. One or more FFT bands is beyond the alarm threshold. View the Bar Graph Tab for more information.	
4	Active fault/warning indication.	
	Warning	
	Fault	
5	Motor Outboard/Inboard Condition Indications	
	Alert (Alarm 1) Active	
	Danger (Alarm 2) Active	
6	Motor Running Status	
	Stopped (inactive)	
	Running (active)	
7	Equipment (Pump) Inboard/Outboard Condition Indications	
	Alert (Alarm 1) Active	
	Danger (Alarm 2) Active	
8	Motor RPM Reading	
9	Device Virtual Indication	
10	Status Banner	

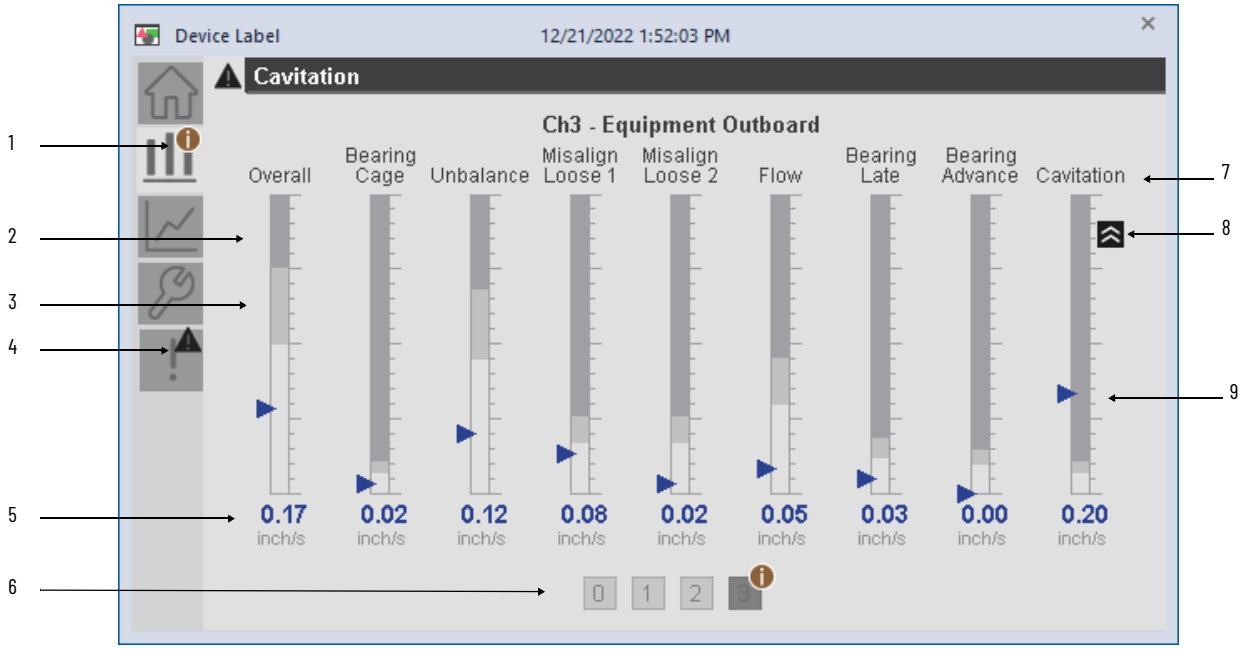
Bar Graph Tab

The Bar Graph Tab displays the current vibration readings for all channels including overall and FFT bands 0-7. A page selection at the bottom allows users to navigate to the desired channel. Channels with currently active conditions show an information icon on the page selector. Pages correlate to channel numbers as follows:

- Ch0: Motor Outboard
- Ch 1: Motor Inboard
- Ch 2: Equipment (Pump) Inboard
- Ch 3: Equipment (Pump) Outboard

Each FFT Band is labeled with the appropriate condition that it is set to monitor (e.g. Unbalance). Alert (Alarm 1) and Warning (Alarm 2) conditions are displayed using indicators.

The Alert (Alarm 1) and Warning (Alarm 2) levels are shown on the bar graph for each FFT Band using gray and dark gray fill. The current reading is shown using a navy blue arrow indicator.

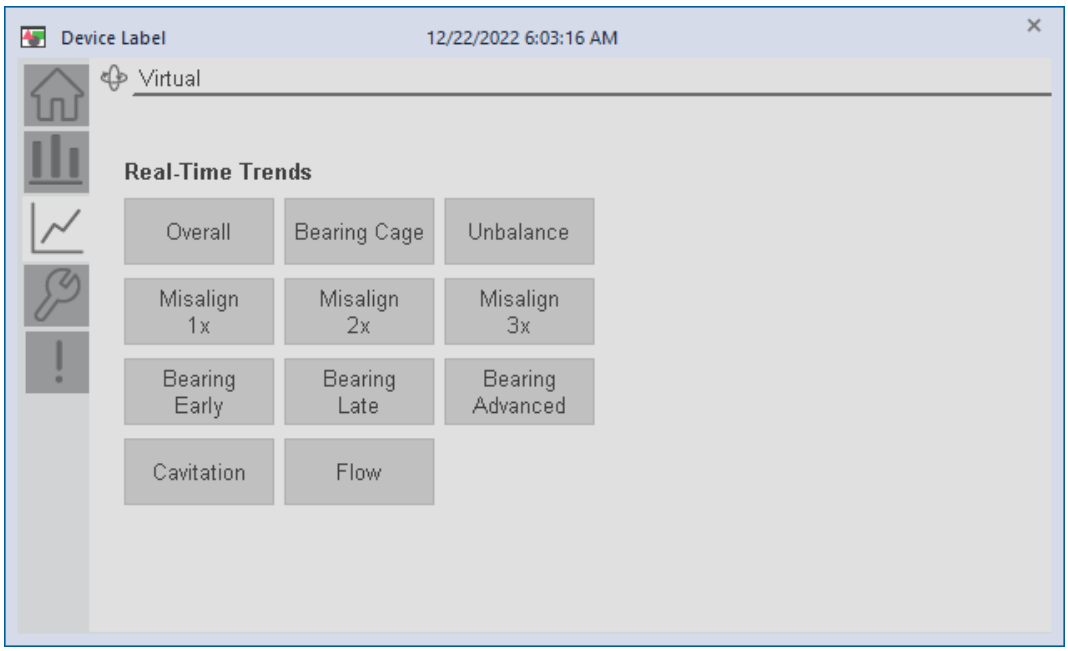


Item	Description	State Indicators
1	Information indication. One or more FFT bands is beyond the alarm threshold. View the Bar Graph Tab for more information.	
2	FFT/Overall band Alert (Alarm 1) Limit shown as medium gray on bar graph.	
3	FFT/Overall band Danger (Alarm 2) Limit shown as dark gray on bar graph	
4	Active fault/warning breadcrumb shown on fault tab navigation button when active.	
	Warning	
	Fault	
5	FFT/Overall Band Live Value	

Item	Description	State Indicators
6	Page navigation buttons. Information indication shown on any channels with one or more FFT bands beyond the alarm threshold. Page numbers correlate to the channel number. Ch0: Motor Outboard Ch1: Motor Inboard Ch2: Equipment (Pump) Inboard Ch3: Equipment (Pump) Outboard	
7	FFT Band Description Label.	
8	FFT/Overall Band Condition Indications	
	Alert (Alarm 1) Active	
	Danger (Alarm 2) Active	
9	FFT/Overall Band Live Value shown on bar graph as navy blue triangle indicator	

Trend Tab

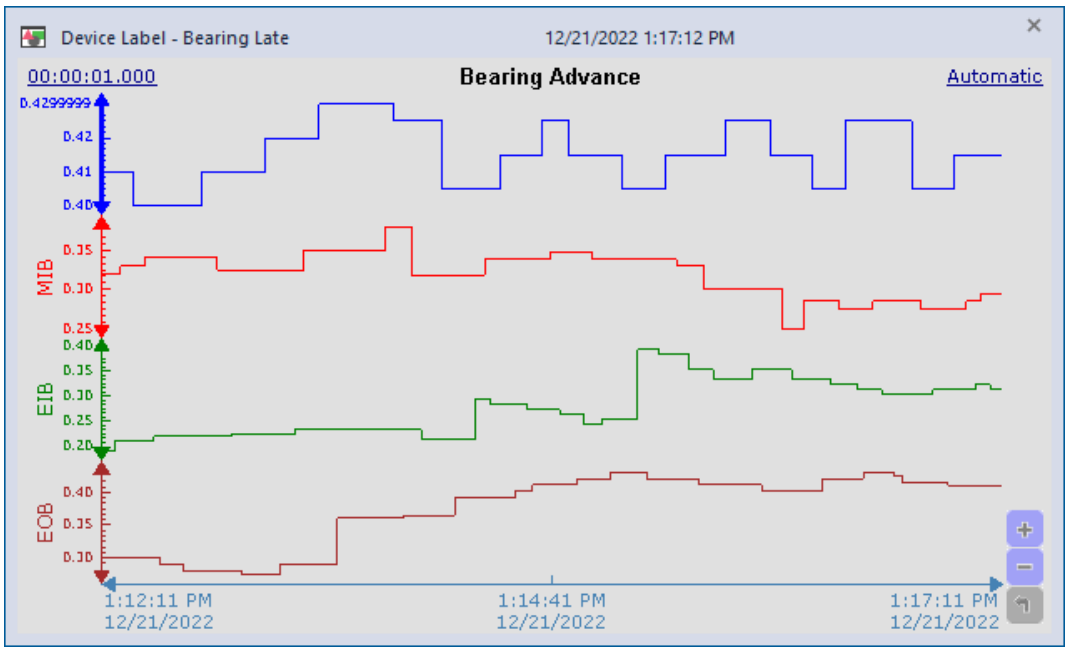
The trend tab contains navigation buttons use to launch addition display files containing real-time data trends for each condition. Each trend displays a 5 minute interval by default. All trends display 2 to 4 pens with stacked y-axis which are each automatically scaled based on each pen's min/max values over the displayed time period.



The following trends are provided:

Navigation Button Label	Display File	Pens Displayed
Bearing Cage	(raC-1_00-SE) raC_Dvc_DYN1444_PumpREB-Trend-BearingCage.gfx	Ch0 - Band 0 Ch1 - Band 0 Ch2 - Band 0 Ch3 - Band 0
Unbalance	(raC-1_00-SE) raC_Dvc_DYN1444_PumpREB-Trend-Unbalance.gfx	Ch0 - Band 1 Ch1 - Band 1 Ch2 - Band 1 Ch3 - Band 1
Misalign x1	(raC-1_00-SE) raC_Dvc_DYN1444_PumpREB-Trend-Misalign1.gfx	Ch0 - Band 2 Ch1 - Band 2 Ch2 - Band 2 Ch3 - Band 2
Misalign x2	(raC-1_00-SE) raC_Dvc_DYN1444_PumpREB-Trend-Misalign2.gfx	Ch0 - Band 3 Ch1 - Band 3 Ch2 - Band 3 Ch3 - Band 3
Misalign x3	(raC-1_00-SE) raC_Dvc_DYN1444_PumpREB-Trend-Misalign3.gfx	Ch0 - Band 4 Ch1 - Band 4
Flow	(raC-1_00-SE) raC_Dvc_DYN1444_PumpREB-Trend-Flow.gfx	Ch2 - Band 4 Ch3 - Band 4
Bearing Late	(raC-1_00-SE) raC_Dvc_DYN1444_PumpREB-Trend-BearingLate.gfx	Ch0 - Band 5 Ch1 - Band 5 Ch2 - Band 5 Ch3 - Band 5
Bearing Advanced	(raC-1_00-SE) raC_Dvc_DYN1444_PumpREB-Trend-BearingAdv.gfx	Ch0 - Band 6 Ch1 - Band 6 Ch2 - Band 6 Ch3 - Band 6
Bearing Early	(raC-1_00-SE) raC_Dvc_DYN1444_PumpREB-Trend-BearingEarly.gfx	Ch0 - Band 7 Ch1 - Band 7
Cavitation	(raC-1_00-SE) raC_Dvc_DYN1444_PumpREB-Trend-Cavitation.gfx	Ch2 - Band 7 Ch3 - Band 7
Overall	(raC-1_00-SE) raC_Dvc_DYN1444_PumpREB-Trend-Overall.gfx	Ch0 - Overall Ch1 - Overall Ch2 - Overall Ch3 - Overall

Each trend looks similar to the one shown below:

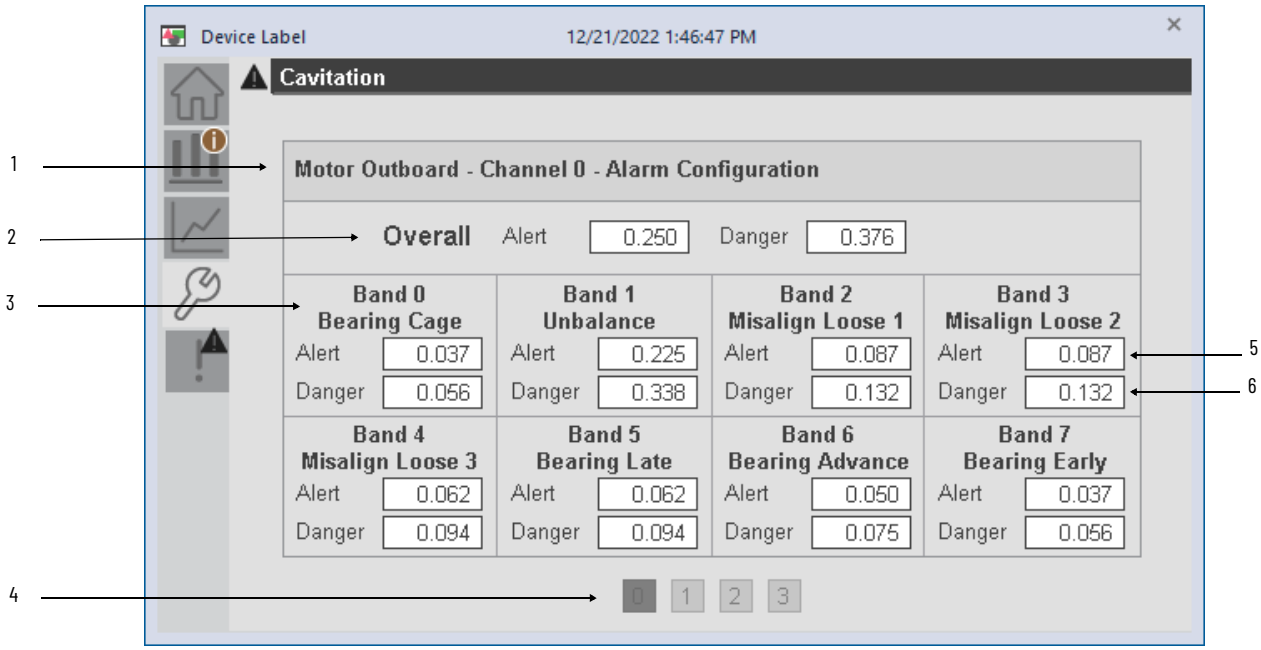


The following abbreviations are using in the Y-axis pen names:

- MOB: Motor Outboard (Channel 0)
- MIB: Motor Inboard (Channel 1)
- EIB: Equipment (Pump) Inboard (Channel 2)
- EOB: Equipment (Pump) Outboard (Channel 3)

Configure Tab

The Configure tab contains configuration parameters related to condition monitoring alarm limits. Each channel 0-3 has its own configuration page. Each page has numeric input boxes for the warning (alarm 1) and critical (alarm 2) thresholds for each FFT band 0-7 and overall.



Item	Description
1	Channel label
2	Overal vibration warning/critical threshold setpoints
3	FFT Band number and label.
4	Page navigation buttons. Information indication shown on any channels with one or more FFT bands beyond the alarm threshold. Page numbers correlate to the channel number. Ch0: Motor Outboard Ch1: Motor Inboard Ch2: Equipment (Pump) Inboard Ch3: Equipment (Pump) Outboard
5	FFT Band Warning (Alarm 1) threshold numeric input
6	FFT Band Critical (Alarm 2) threshold numeric input

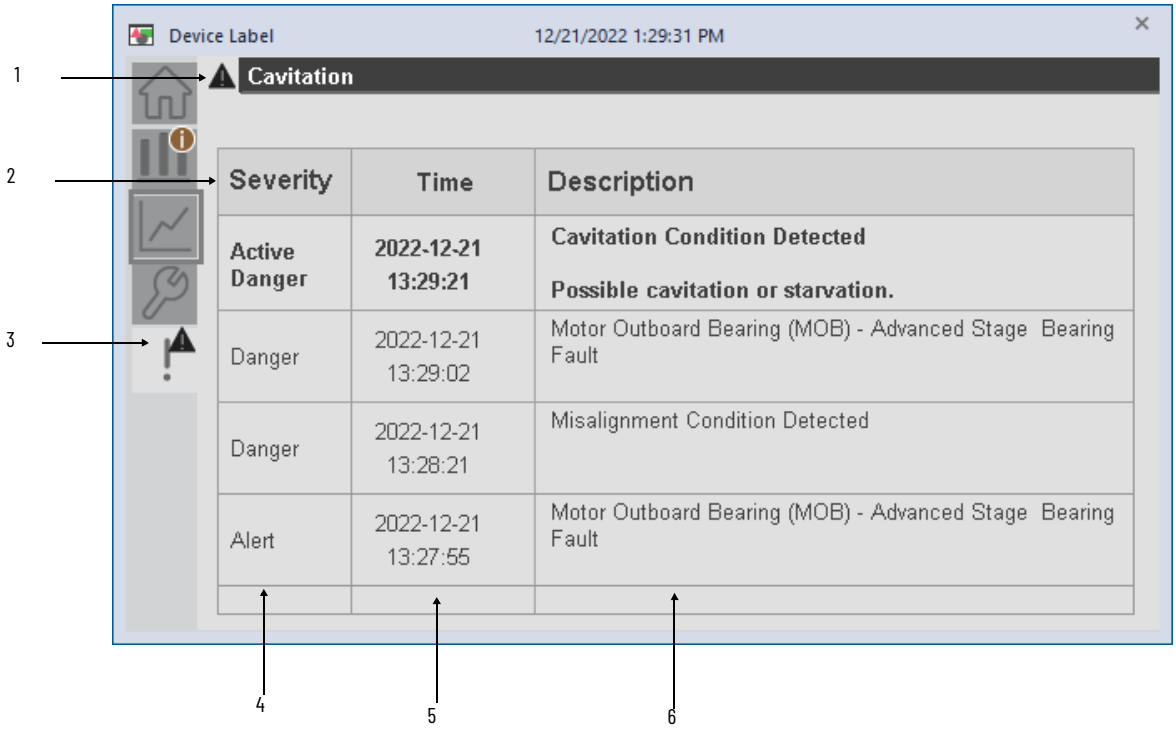
Fault Warning Tab

The Fault Warning tab displays information for up to four faults for the device. The fault table displays the Severity level (Fault, Warning or Active Fault), time (and date) and a description of the fault.

Note, only row 1 will display the "Active Fault" in the severity column if there is a current active fault, else it will display the last fault. Rows 2-4 only display past faults and warnings, not an active fault.

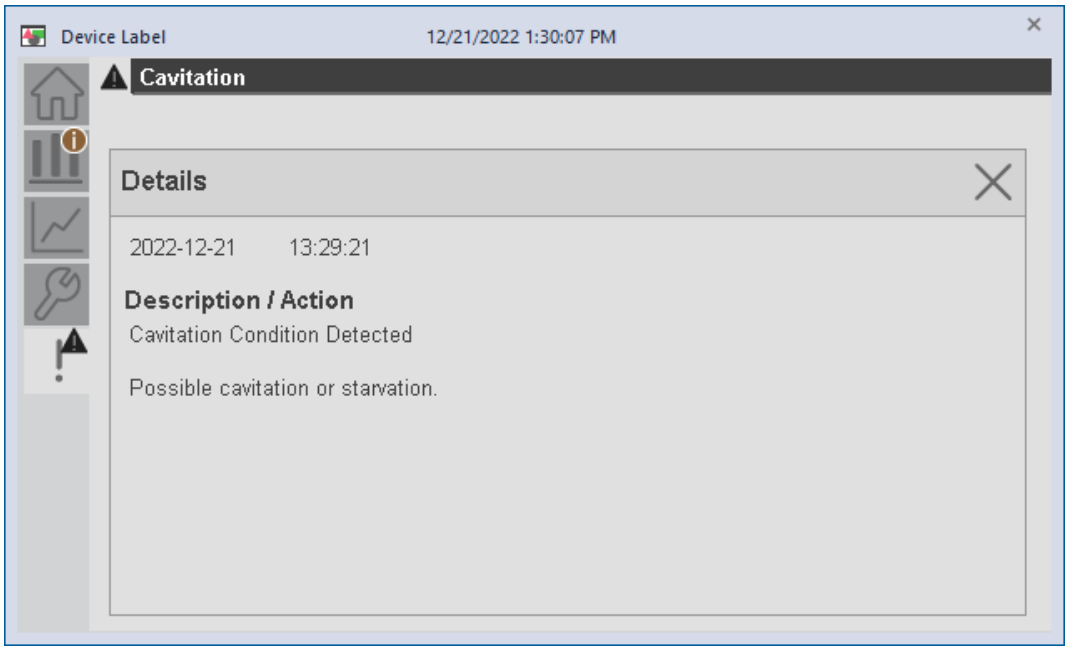
Faults and warnings are defined as follows:

- Fault: Hardware related issue such as module or communications failure.
- Warning: Machinery condition beyond alert/critical threshold setpoint



Item	Description
1	Warning/Fault Banner
2	Last warning/fault is in first row and show in bold if active
3	Warning/Fault icon visible when a fault is active
4	Warning/Fault severity. Active shown if the event condition remains active. - Danger: Machinery Danger warning limit exceeded - Alert: Machinery Alert warning limit exceeded - Fault: H/W Module Fault
5	Fault event time
6	4 most recent fault/warning event messages

Click on any row in the fault table to view Fault Details. The Details window provides a more detailed description and possible action steps to remedy condition.



Application Code Manager

Dynamix™ 1444 device objects can be configured for bulk code generation using Studio 5000 Application Code Manager. The following section defines the common parameters.

Refer to the section Using Application Code Manager for complete details.

Implementation Object: raC_LD_Dvc_DYN1444_PumpREB

This object contains the AOI and module definition. The following configuration parameters are provided:

Parameter Name	Default Value	Instance Name	Definition	Description
RoutineName	{ObjectName}	{RoutineName}	Routine	Enter Routine name. Routine will be created and Object implement rung(s) inserted. A JSR will be inserted in MainRoutine. If routine name already exists, then object will be inserted into existing routine. By default, parameter is set to Object Name.
TagName	{ObjectName}	{TagName}	Backing Tag	Enter the backing tag of the main AOI. This will serve as the base tag name for other tags in this object that are derived from the base.
TagDescription	{ObjectDescription}	{TagDescription}		Tag Description of the main AOI backing tag

Parameter Name	Default Value	Instance Name	Definition	Description
TagScope	Program		Input Parameter	Tags will be created at the assigned scope
ModuleName	Mod_{ObjectName}	{ModuleName}	Input Parameter	Enter the Module Name. This is the name for the module that appears in the Controller Organizer tree.
IncludeHW	1			Allow ACM to create the Hardware Module (e.g. 1444-DYN04-01RA). If the module already exists in the Controller Organizer, select False or existing module properties will be overwritten.
IPAddress	192.168.1.0		Input Parameter	Enter a valid network address for the hardware module. It must be of form X.X.X.X
ParentModule	Local	[ParentModule]	Input Parameter	Select the Parent Module. This represents the name of the communication adapter this module will communicate through. If connecting to a non-library object module, enter the name of the module only. If the module is connected directly to the controller ethernet port, enter "Local". Note: entering non-library object modules will result in the parameter displaying a red X. This will still generate properly as long as the entered name exists in the project.
ParentModulePort	2	[ParentModulePortID]	Input Parameter	Parent module port ID#. Local/Linear/DLR=2; 5380 Dual-Port A1=3. 5280 Dual-Port A2=4; 5480 Dual-Port A1=4; 5480 Dual-Port A2=5.
EU	inch/s		Input Parameter	Engineering units - inch/s - mm/s
DetectionMode	True Peak		Input Parameter	Detection Mode used in FFT overall and bands. True Peak/True Peak-Peak/RMS. Generally RMS used with mm/s and peak or peak-peak used with inch/s.
NumberOfBlades	5		Input Parameter	Number of blades in monitored equipment
EquipmentSpeed	1500		Input Parameter	Static or average speed (RPM) of rotating equipment used for FFT band calculations.
EquipmentType	Horizontal Pump		Input Parameter	Type of equipment/machinery monitored. - Horizontal Pump - Vertical Pump
MotorSize	<= 500 HP		Input Parameter	Size of motor that is being monitored - <= 500 HP - > 500 HP
SEAssocDisplay			Input Parameter	Associated HMI SE Display. Used to generate displays.
SymbolStyle			Input Parameter	FTView Launch Button Symbol Style - GraphicalButton - GenericTextButton

Configured HMI Content

HMI Content	Instance Name	Description
Launch Button	{ObjectName}_GO_LaunchFP	Global Object configured callout instance using GenericTextButton
Launch Button	{ObjectName}_GO_LaunchDYN1444	Global Object configured callout instance using GraphicalButton

Attachments

Name	Description	File Name	Extraction Path
V1_raC_Dvc_Global	Graphic Symbols SE	(raC-1-SE) Graphic Symbols - Condition Monitoring Device.ggfx	{ProjectName}\Visualization\FTViewSE\Global Object - ggfx
V1_raC_Dvc_Global	Toolbox SE	(raC-1-SE) Toolbox - Condition Monitoring Device.ggfx	{ProjectName}\Visualization\FTViewSE\Global Object - ggfx

V1_raC_Dvc_DYN1444_PumpREB	Faceplate SE	(raC-1_xx-SE) raC_Dvc_DYN1444_PumpREB-Faceplate.gfx	{ProjectName}\Visualization\FTViewSE\Displays - gfx
V1_raC_Dvc_CM	Reference Manual	DEVICE-RM600A-EN-P.pdf	{ProjectName}\Visualization\Reference Manuals
V1_CM_Images	HMI Image Set	ConditionMonitoring_Images.zip	{ProjectName}\Visualization\Images - png
V1_raC_Dvc_DYN1444_PumpREB_Trend	Trend SE	(raC-1_xx-SE) raC_Dvc_DYN1444_PumpREB-Trend-BearingAdv.gfx	{ProjectName}\Visualization\FTViewSE\Displays - gfx
V1_raC_Dvc_DYN1444_PumpREB_Trend	Trend SE	(raC-1_xx-SE) raC_Dvc_DYN1444_PumpREB-Trend-BearingCage.gfx	{ProjectName}\Visualization\FTViewSE\Displays - gfx
V1_raC_Dvc_DYN1444_PumpREB_Trend	Trend SE	(raC-1_xx-SE) raC_Dvc_DYN1444_PumpREB-Trend-Misalign1.gfx	{ProjectName}\Visualization\FTViewSE\Displays - gfx
V1_raC_Dvc_DYN1444_PumpREB_Trend	Trend SE	(raC-1_xx-SE) raC_Dvc_DYN1444_PumpREB-Trend-Misalign2.gfx	{ProjectName}\Visualization\FTViewSE\Displays - gfx
V1_raC_Dvc_DYN1444_PumpREB_Trend	Trend SE	(raC-1_xx-SE) raC_Dvc_DYN1444_PumpREB-Trend-Misalign3.gfx	{ProjectName}\Visualization\FTViewSE\Displays - gfx
V1_raC_Dvc_DYN1444_PumpREB_Trend	Trend SE	(raC-1_xx-SE) raC_Dvc_DYN1444_PumpREB-Trend-Flow.gfx	{ProjectName}\Visualization\FTViewSE\Displays - gfx
V1_raC_Dvc_DYN1444_PumpREB_Trend	Trend SE	(raC-1_xx-SE) raC_Dvc_DYN1444_PumpREB-Trend-BearingEarly.gfx	{ProjectName}\Visualization\FTViewSE\Displays - gfx
V1_raC_Dvc_DYN1444_PumpREB_Trend	Trend SE	(raC-1_xx-SE) raC_Dvc_DYN1444_PumpREB-Trend-BearingLate.gfx	{ProjectName}\Visualization\FTViewSE\Displays - gfx
V1_raC_Dvc_DYN1444_PumpREB_Trend	Trend SE	(raC-1_xx-SE) raC_Dvc_DYN1444_PumpREB-Trend-Overall.gfx	{ProjectName}\Visualization\FTViewSE\Displays - gfx
V1_raC_Dvc_DYN1444_PumpREB_Trend	Trend SE	(raC-1_xx-SE) raC_Dvc_DYN1444_PumpREB-Trend-Unbalance.gfx	{ProjectName}\Visualization\FTViewSE\Displays - gfx
V1_raC_Dvc_DYN1444_PumpREB_Trend	Trend SE	(raC-1_xx-SE) raC_Dvc_DYN1444_PumpREB-Trend-Cavitation.gfx	{ProjectName}\Visualization\FTViewSE\Displays - gfx

Rockwell Automation Support

Use these resources to access support information.

Technical Support Center	Find help with how-to videos, FAQs, chat, user forums, and product notification updates.	rok.auto/support
Knowledgebase	Access Knowledgebase articles.	rok.auto/knowledgebase
Local Technical Support Phone Numbers	Locate the telephone number for your country.	rok.auto/phonesupport
Literature Library	Find installation instructions, manuals, brochures, and technical data publications.	rok.auto/literature
Product Compatibility and Download Center (PCDC)	Get help determining how products interact, check features and capabilities, and find associated firmware.	rok.auto/pcdc

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Waste Electrical and Electronic Equipment (WEEE)

At the end of life, this equipment should be collected separately from any unsorted municipal waste.

Rockwell Automation maintains current product environmental information on its website at rok.auto/pec.

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