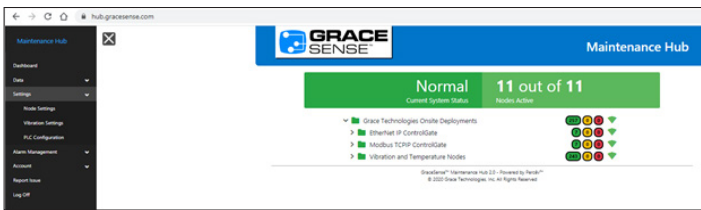


This guide is used to output an L5X XML Configuration file from the Maintenance Hub to be uploaded in Studio 5000 for an EtherNet/IP™ integration or using our Configuration Tool or ControlGate™ Embedded Web Server for a Modbus TCP/IP integration. These files assist in automating the integration process by creating custom data types, descriptive tags, and organizing data so that it makes process easier for our users to get their data where they would like it.

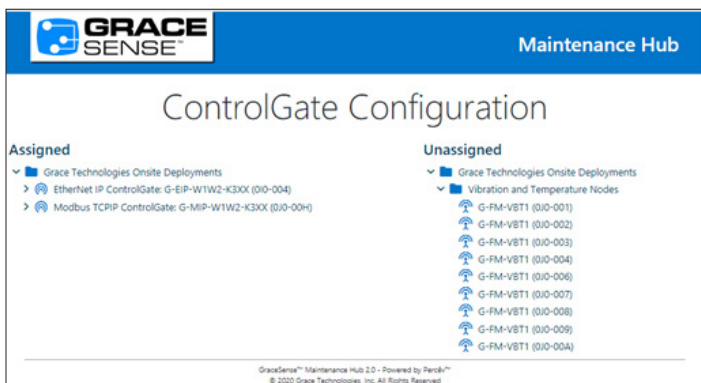
See the below accompanying files for more information:

- ControlGate™ Communication Configuration Guide
- EtherNet/IP™ Integration Guide - Studio 5000
- Modbus TCP/IP Integration Guide

1. Visit <http://hub.gracesense.com> and log in
2. Using the menu on the left of the screen, navigate to Settings > PLC Configuration



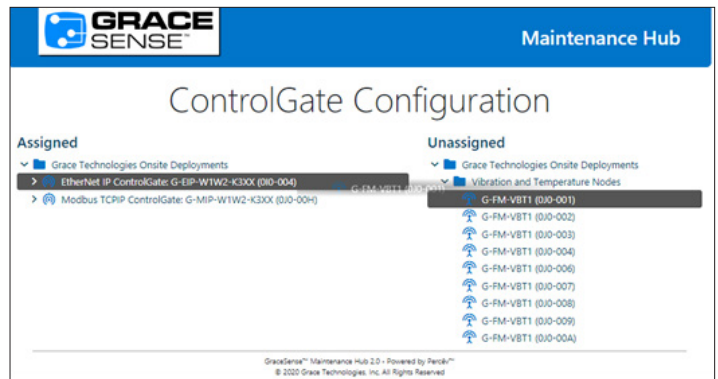
3. This will take you to the ControlGate™ Configuration page. You will see two columns: Assigned and Unassigned. If this is your first time configuring your system for PLC integration, you will have available ControlGate™s on the left in the Assigned column and Nodes that do not have control integration capability onboard on the right in the Unassigned Column.



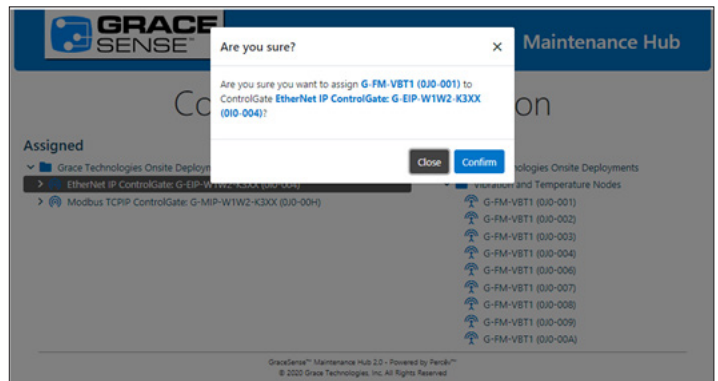
This case has one EtherNet/IP™ ControlGate™ and one Modbus TCP/IP ControlGate™ and 9 Vibration and Temperature Nodes. Your screen will vary in quantity of nodes and names used.

4. To configure your system, first the parent-child relationships must be established. To do this, simply drag and drop the node from the Unassigned column to the ControlGate™ in the Assigned column that will be its parent and be used to provide its information to the control system.

Note: In a Control Integration, Nodes (children) must be assigned to a specific ControlGate™ (parent) due to how the memory maps work within the control system. This is done automatically when establishing the parent-child relationship. Nodes cannot be autoassigned and removes the self-healing network that is typically employed in a cloud-only solution.



5. Upon releasing your mouse button, the below message will appear asking you if you are sure that you want to make the assignment. Click the Confirm button if the changes are correct.



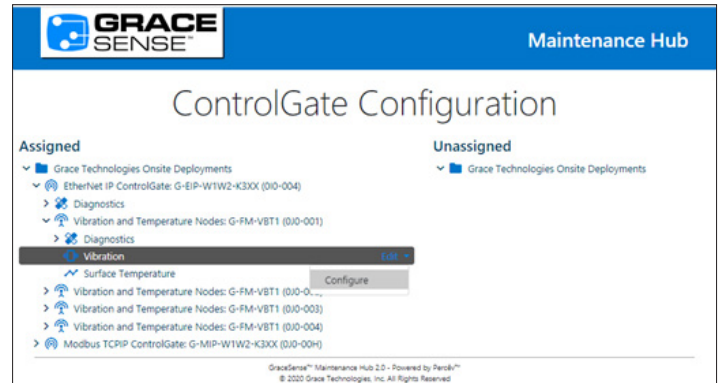
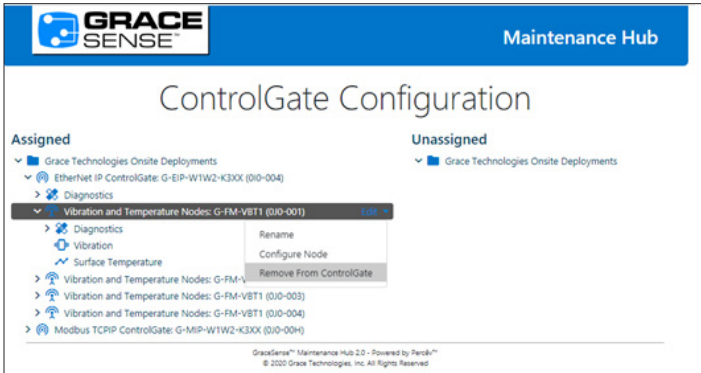
6. Complete steps 4 and 5 for all nodes that you are configuring.

Warning: Verify an electrical conductor has been de-energized using an adequately rated test instrument before working on it. Follow appropriate Energy Control (Lockout/Tagout) procedures as per OSHA Subpart S. © Grace Technologies, Inc. All rights reserved. Specifications are subject to change with/without notice.

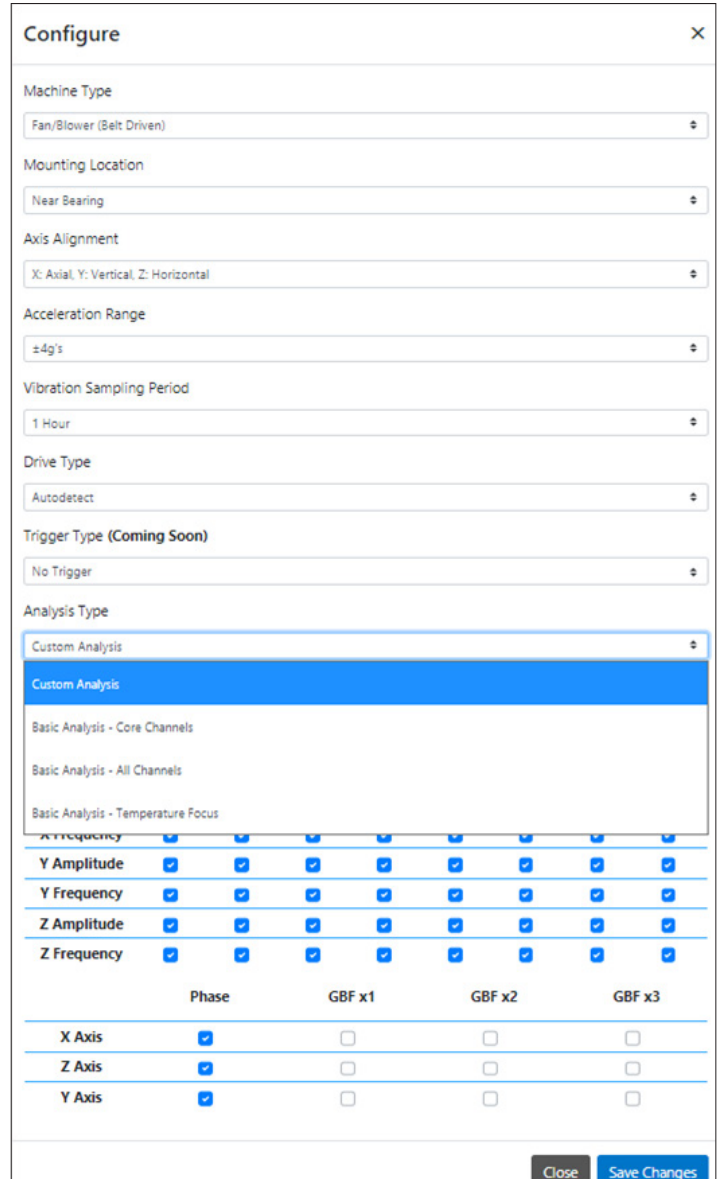
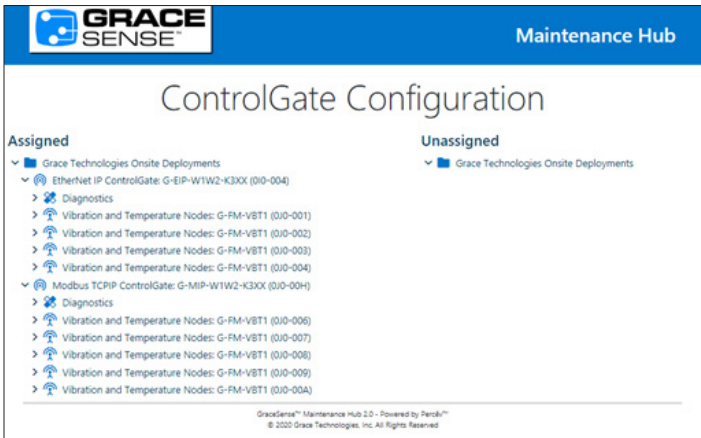
(Continued)

GS-L5XXML-AN-EN 2008

7. If you have incorrectly assigned a node at any stage in the process or you would like to remove it from the ControlGate™, this can be done by hovering over the node and clicking the “Remove from ControlGate™ Option”. You will be asked if you are sure you would like to remove the node, click the Confirm button.



8. Once complete, your node tree will look something like the below. In this case, Nodes 0J0-001 through 0J0-004 were assigned to the EtherNet/IP™ ControlGate™ 0I0-004. Nodes 0J0-006 through 0J0-00A were assigned to the Modbus TCP/IP ControlGate™ 0J0-00H. All nodes were assigned so the Unassigned column is empty.



9. If you have not already configured the node settings to what you would like, including check-in period, vibration configuration, sampling rates, etc., now would be the time to do that. You can edit the settings of any node just like you would on the Node Settings page.

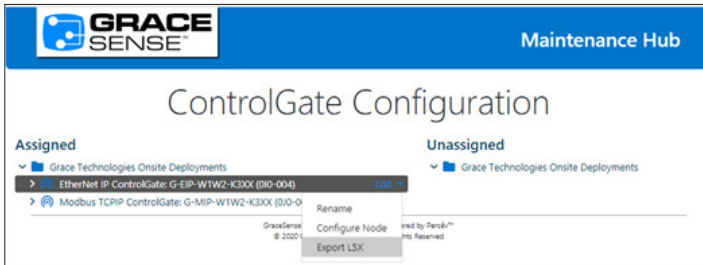
In the next column we are showing how to configure the vibration settings, specifically the analysis type, as these have the largest impact on the capabilities and quantities of nodes are available.

Note: The way nodes are configured will impact the total number of nodes that are allowed within the Control System due to configuration and data structure size limits. See the below section entitled “Node Settings and Impact on Configuration” for more information.

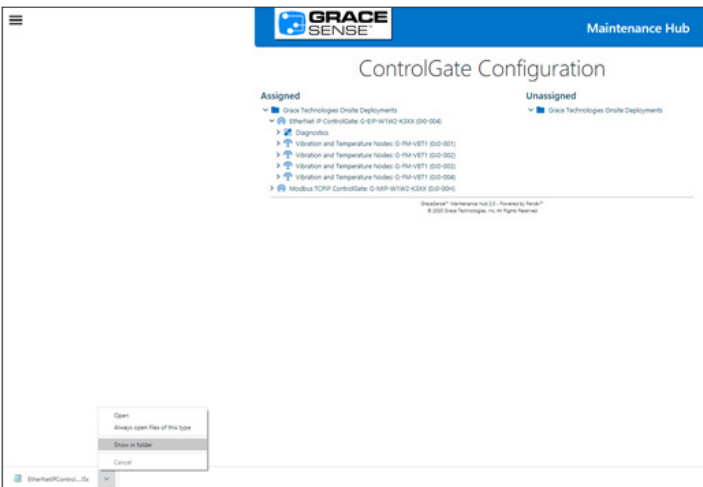
(Continued)

10. Export the L5X XML Configuration file for each ControlGate™ after all system configuration is complete by hovering over and clicking Edit > Export L5X

Tip: It is advised to complete all modifications to the system in the Maintenance Hub and download a new L5X XML configuration if needing to modify the system. This ensures invalid properties are not entered.



11. The download will occur and it will appear in the bottom left-hand corner of the screen. Once complete, click on the arrow next to the XML file and select "Show in Folder". This will most likely be your downloads folder. Move the file to an appropriate location that you will remember in the future if desired.



12. Your L5X XML Configuration via the Maintenance Hub is now complete! See the EtherNet/IP™ Integration Guide - Studio 5000 for an EtherNet/IP™ ControlGate™ or Modbus TCP/IP Integration Guide for a Modbus TCP/IP ControlGate™.

ADDITIONAL INFORMATION: NODE SETTINGS AND IMPACT ON CONFIGURATION

The way a node is configured will directly impact the L5X XML file that is exported from the database. Configuration of the system include channels of interest, sampling rate, channel naming, and more. The L5X takes a very manual process of mapping unnamed tags/registers to a spreadsheet and simplifies it with tags/registers that are named so that they are easy to understand and find channels of interest and place them within your program.

Before exporting an L5X XML file, you will want to ensure that your system is configured exactly as you would like it as it is easier to edit from the Maintenance Hub (and advised only to make changes from the Maintenance Hub unless if the user

fully understands ramifications of tag/register modification of all fields). These include renaming the nodes or channels, setting sampling rate, and enabling/disabling channels.

Note: This guide does not go into detail on what each setting is within the Maintenance Hub, only that which pertains to the control integration. For more information, review the GraceSense Maintenance Hub User Guide (**LINK**).

There is currently one Analysis Type for ControlGates™ and Panel Mount Nodes that is dependent upon the number of sensing channels. There are 5 different Analysis Types for Vibration and Temperature Nodes. See these different options listed below and details about each. Depending on what data channels you would like to bring into your control system, the amount of configurability, and the number of nodes needed per ControlGate™, one of these options should meet your needs. If you do have any questions or would like to see if there is a custom option for your application, feel free to reach out to us at Sales@GraceTechnologies.com.

The following information goes through each analysis type and gives typical use case scenarios, functionality, and number of nodes of this type that can be under one ControlGate™. The two charts at the bottom show a general abbreviated register/tag returns for the Configuration and Data connections within the ControlGate™.

NODE TYPE 1: ADVANCED – CUSTOM PANEL-MOUNT NODE

- Allows for near-complete configurability of Panel-Mount Nodes
- All data channels must be collected and sent on the same period
- Variable number of maximum connected Panel Mount Nodes:
 - o 6 for a Panel Mount Node with the highest number of inputs (12)
 - o 25 for a Panel Mount Node with the fewest inputs (1)
 - o 14 for a typical Panel Mount Node Configuration with 4 Inputs
- This analysis type applies to ControlGates™ as well

NODE TYPE 2: BASIC – CORE CHANNELS VIBRATION AND TEMPERATURE NODE

- Returns X, Y, & Z Overall Vibration Amplitude, Surface Temperature, and RPM (5 Data Channels)
- All data channels are collected and sent on the same period
- Allows for a maximum of 34 Vibration and Temperature Nodes per ControlGate™

NODE TYPE 3: BASIC - TEMPERATURE-FOCUSED VIBRATION AND TEMPERATURE NODE

- Returns X, Y, and Z Overall Amplitude, Surface Temperature, and RPM (5 Data Channels)
- Temperature and Diagnostic Data is collected and sent on configurable sampling period, vibration data is collected and sent hourly (not configurable)
- Allows for a maximum of 34 Vibration and Temperature Nodes per ControlGate™

(Continued)

NODE TYPE 4: BASIC – LOW FREQUENCY VIBRATION AND TEMPERATURE NODE

- Returns Basic – Core Channels plus X, Y, Z FFT Bands Sub-Synchronous – Bearing Amplitude Channels (20 Data Channels)
- All data channels are collected and sent on the same period
- Allows for a maximum of 14 Vibration and Temperature Nodes per ControlGate™

NODE TYPE 5: INTERMEDIATE VIBRATION AND TEMPERATURE NODE

- Geared towards Fan, Pump, and Gearbox Applications with input for Blade/Vane/Tooth Count
- Returns Basic – Low Frequency Channels plus and X, Y, Z Gear Mesh/Blade Pass Frequencies 1 – 3 Amplitude
- All data channels are collected and sent on the same period
- Allows for a maximum of 6 Vibration and Temperature Nodes per ControlGate™

NODE TYPE 6: ADVANCED – CUSTOM ANALYSIS VIBRATION AND TEMPERATURE NODE

- Allows near-complete configurability of a Vibration and Temperature Node
- User can define exactly which channels they would like to return, which affects the maximum number of nodes allowed in the configuration
- All data channels are collected and sent on the same period
- Allows for a maximum of 17 Vibration and Temperature Nodes per ControlGate™ (although oftentimes will return less than that with many configurations)

CONFIGURATION CHANNELS

Channels	Basic - Core	Basic - Temp Focus	Basic - Low Frequency	Intermediate - Gearbox, Pump, Fan	Advanced - Custom Analysis	Advanced - Panel Mount Node
Serial Number	X	X	X	X	X	X
Max Transmit Retry Rate	X*	X*	X*	X*	X*	X*
Class 1 CXN Housing Data	X	X	X	X	X	X
Gear Tooth Count				X*	X*	
Acceleration Range				X*	X*	
Offset of First CH Data Point	X	X	X	X	X	X
Seconds Btwn Data Captures	X*	X**	X*	X*	X*	X
Rotational Speed				X*	X*	
Low RPM Bound (Hz)	X*	X*	X*	X*	X*	
High RPM Bound (Hz)	X*	X*	X*	X*	X*	
X Amplitude Enable Register					X*	
Y Amplitude Enable Register					X*	
Z Amplitude Enable Register					X*	
X Frequency Enable Register					X*	
Y Frequency Enable Register					X*	
Z Frequency Enable Register					X*	
Expanded Enable Register				X*	X*	
Number of Data Channels						X
Channel 1 - Channel X ID						X
Channel 1 - Channel X Config						X*

* Configurable from the PLC

** For Temperature Focus Configuration, Changing the Seconds Between Data Captures is for Temperature Sampling Only. Vibration is Not Configurable and is Set to 1 Hour

(Continued)

DATA CHANNELS

Channels	Basic - Core	Basic - Temp Focus	Basic - Low Frequency	Intermediate - Gearbox, Pump, Fan	Advanced - Custom Analysis	Advanced - Panel Mount Node
Diagnostics						
Node_Status_Register	X	X	X	X	X	X
Node_Battery	X	X	X	X	X	X
Node_RSSI	X	X	X	X	X	X
Node_Connectivity	X	X	X	X	X	X
Data Channels					***	***
Temperature	X	X	X	X	X	
RPM	X	X	X	X	X	
X,Y,Z Overall Amplitude	X	X	X	X	X	
X,Y,Z Overall Frequency					X	
X,Y,Z Sub-Synch Amplitude			X	X	X	
X,Y,Z Sub-Synch Frequency					X	
X,Y,Z 1X Amplitude			X	X	X	
X,Y,Z 1X Frequency					X	
X,Y,Z 2X Amplitude			X	X	X	
X,Y,Z 2X Frequency					X	
X,Y,Z 3X Amplitude			X	X	X	
X,Y,Z 3X Frequency					X	
X,Y,Z BRG Amplitude			X	X	X	
X,Y,Z BRG Frequency					X	
X,Y,Z Hlo Amplitude				X	X	
X,Y,Z Hlo Frequency					X	
X,Y,Z Hhi Amplitude				X	X	
X,Y,Z Hhi Frequency					X	
X,Y,Z Phase				X	X	
X,Y,Z GBF x 1				X	X	
X,Y,Z GBF x 2				X	X	
X,Y,Z GBF x 3				X	X	
Data Channels 1 - X						X

*** Advanced Analysis Types for Vibration and Temperature and Panel Mount Nodes Allow for Customization of Returned Channels. This Will Affect the Max Number of Nodes and What Data is Available to the Control Network