Send and Receive MicroNet+ Tunables

System API - 2024-09-27 - Electronic Controls

Tunables are important to the operation of the MicroNet+ control system because they allow specific parameters to be modified without changing the control software. These modifications can be performed during operation when done individually or can be done in bulk when the prime mover is out of operation and I/O is locked. These parameters are often critical to successful turbine operation and are very important to document and back-up so they can be restored in case of a loss.

Tunables should be downloaded periodically by site personnel and any time that a change is made. This allows a site to restore the original tunables in case a tunable modification causes undesirable behavior. End-users should also download and send tunables to Woodward to assist with troubleshooting.

Common issues experienced by customers are tunables being lost after a power-cycle, if the user did not save tunables to EEPROM, or tunables being lost after a software load if they were not backed up properly. Proper tunable management can help avoid these issues and recover quickly from them if they do occur.

Warning: This guide is intended to be a reference for trained and experienced personnel on how to configure an SOS connection, download tunables, upload tunables, and compare tunable lists. It is not intended to cover all scenarios or replace training and experience. Woodward does not accept any liability for damage or losses caused by improper usage of this guide.

1.0 Establishing an SOS Connection

The SOS OPC server is a Woodward service tool that allows the user to create an OPC server that hosts all of the Gap block values available on the MicroNet+ control system. This is primarily used for Monitor Gap, Control Assistant Winpanel, and Control Assistant Trending functionality. This guide utilizes the SOS OPC server for the Control Assistant Winpanel functionality.

The latest version of SOS is recommended (4.12 at the time of writing), especially for recent CPUs such as the 5466-1145/1245/1510. If the latest SOS version has issues at an older site, using the version installed on the site HMI is recommended.

1.1 Creating a New OPC Connection

Launch SOS and create a new connection to the MicroNet+ using the control IP address. If the control IP address is unknown, use AppManager to auto-detect (not covered in guide).

Figure 1: SOS OPC server with no connections configured.

Figure 2: Menu selection to create a new OPC session.

Figure 3: Configuring new OPC session.

1.2 Reconnection an Existing OPC Connection

If a session for the control has already been created, but is disconnected, right-click on the session and select “Connect”.

Figure 4: SOS OPC server with session configured and disconnected.

Figure 5: Reconnecting disconnected OPC server.

1.3 Successful OPC Connection Example

Wait for the session to connect to the MicroNet+. If SOS cannot connect to the control, troubleshooting is required. This guide does not cover troubleshooting in detail, but be sure to check firewalls, IP addresses, and ping the control from the Windows command prompt.

Figure 6: New OPC connection trying to connect to MicroNet+.

Figure 7: New OPC connection successfully connected to MicroNet+.

2.0 Downloading Tunables

Downloading tunables from the control system is an important process for backing up tunables and storing a local tunable copy before a software change. Control Assistant is the Woodward service tool used to download tunables, among other features. A WinPanel is the interface in Control Assistant that is used to connect to the MicroNet+ through the SOS OPC connection established in section 2.

The latest version of Control Assistant is recommended (4.12-3 at the time of writing), especially for recent CPUs such as the 5466-1145/1245/1510. However, sites with older CPUs may need to maintain the version of Control Assistant currently on the site HMI. This determination is outside the scope of this guide.

2.1 Launch Control Assistant

Launch Control Assistant and verify that the following screen appears.

Figure 8: Control Assistant with no open windows or connections.

2.2 Create a New WinPanel

Open a new WinPanel by clicking the symbol of two eyes, as shown in the screenshot. Then select "Connect" using the default settings shown in the screenshot and verify that a WinPanel appears.

Figure 9: Select the WinPanel icon.

Figure 10: Confirm that a WinPanel should be established with the SOS OPC server.

Figure 11: WinPanel connection successfully established.

2.3 Download Tunables

With an established WinPanel, Control Assistant can communicate with the control through OPC. Download tunables by clicking the symbol of an asterisk and down arrow, as shown in the screenshot. Then select an OPC connection and let the tunables download. When the progress bar is complete, open the new tunable list.

Figure 12: Select the Download Tunables icon.

Figure 13: Select an OPC connection.

Figure 14: Tunables download dialog.

Figure 15: Successfully downloaded tunable list.

2.4 Save Tunables

Recent versions of Control Assistant automatically name tunable files with the OPC name, date, and time

of the tunable download. It is recommended to maintain this naming convention unless there are any inaccuracies present. However, it is good practice to replace the “Dbug” section of the file name with a description to explain why the tunables were downloaded. This helps to document the tunable files for later use and reference.

Figure 16: Default tunable list name.

3.0 Uploading Tunables

Tunables can be modified individually in the MicroNet+ control through Winpanel and Monitor Gap, but sometimes tunables need to be modified in bulk. This is most often done after loading new software to restore the site tunable list, but can also be done to load tunables in bulk, such as for a curve. This process has a significant amount of overlap with downloading tunables, so some of the steps from Section 3 are repeated here. However, these steps will address the additional steps required when uploading tunables after a software change.

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3.1 Verify SOS OPC Server Connection

If uploading tunables after a software change, wait for the new application to start and initialize the OPC server. Once the control is ready, the OPC server can be connected to the MicroNet+ using the steps in Section 2. Note that often a new software install will use a control name similar to “Unit_X” to indicate that the unit number has not been configured yet.

Figure 17: SOS OPC server connected to unit with name "UNIT_X".

3.2 Launch Control Assistant

Launch Control Assistant and verify that the following screen appears.

Figure 18: Control Assistant window with no open windows or connections.

3.3 Create a New WinPanel

Open a new WinPanel by clicking the symbol of two eyes, as shown in the screenshot. Then select “Connect” using the default settings shown in the screenshot and verify that a WinPanel appears.

Figure 19: Select the WinPanel icon.

Figure 20: Verify that a WinPanel should be established using an OPC server.

Fiigure 21: WinPanel OPC connection successfully established.

3.4 - Lock I/O

For safety reasons, I/O on the MicroNet+ must be locked before tunables can be uploaded. Due to this, it is not possible to upload tunables while equipment is running. Once the prime mover is offline, press the “Lock” button and enter the configuration password “1112”.

Figure 22: Lock button used to lock I/O.

Figure 23: Password "1112" required to lock I/O.

Figure 24: Prompt confirming that the password was accepted.

Figure 25: Prompt confirming that locking I/O will cause a control shutdown.

Figure 26: Prompt confirming that I/O has been locked.

3.5 Open Desired Tunable List

The appropriate tunable list must be opened in Control Assistant so that it can be uploaded to the MicroNet+.

Figure 27: Control Assistant with tunable file open for upload.

3.6 Upload Tunables to Set Unit Number

The first step in loading tunables on a new software install is to set the unit number, if applicable. If uploading on a system where this is not necessary because it is not present or already loaded, skip to step 4.8.

If the unit number does need to be set, it can either be set manually or through a tunable upload. Be aware that in either case, the tunable upload will fail when the unit number is loaded because the OPC name changes and resets the connection. Updating the control number manually is not covered in this guide, but can be found linked to the SYS_INFO block. To update the unit number through tunables, press the symbol that looks like an asterisk and up arrow, as shown in the screenshot, and then follow the prompts.

Figure 28: Select the upload tunables button.

Figure 29: Prompt showing successful tunable upload.

Figure 30: Error message occuring because the OPC server connection was reset.

3.7 Wait for OPC Connection to Re-Establish

After loading the unit number, the Control ID changes which requires the OPC session to be re-established. Wait for the session to reconnect with the updated unit name.

Figure 31: SOS OPC Server successfully reconnected and showing updated unit name, Unit 1.

3.8 Upload Tunables to Control

Now that the unit name is set correctly, right-click on the SOS session in Winpanel to force a refresh. Then select the tunable list and upload it again. When software changes are performed, sometimes tunables have been deleted and therefore will result in an error message because they cannot be uploaded. These errors are normal, but should be verified to ensure that they match the software changes and are not due to a secondary issue.

Figure 32: Right-clicking on the tree menu in WinPanel will force a refresh.

Figure 33: WinPanel successfully refreshed and showing updated unit name, UNIT_1.

Figure 34: Select tunable list and upload to MicroNet+ again.

Figure 35: Tunable upload complete.

Figure 36: Tunable upload successful and saved to control.

3.9 Restart Application to Clear I/O Lock

Once the tunables have been successfully loaded, the control must be removed from I/O lock. By design, the only way to do this is to restart the application. This can be manually initiated through AppManager, but the easiest method is through the reset option in Control Assistant. Once the control has reset, verify that the tunables are updated by verifying that the control name is correct and has not reverted to the default option.

Figure 37: Select the reset option to restart the application.

Figure 38: Read and acknowledge the warning message.

Figure 39: Confirmation of control reset issued.

Figure 40: After the reset, verify that the unit name is correct.

3.10 Verify Tunables

After uploading tunables to the control system, it is a good practice to download tunables and compare then against the uploaded list to verify that all tunables were uploaded successfully. In the case of a software change, this also helps validate the changes implemented in the software and provides an accurate current tunable list for future reference. Section 4 covers the tunable comparisons in detail.

4.0 Comparing Tunables

There are many situations where comparing tunable lists can be useful to determine what control settings have changed. One of the most common scenarios is after loading software onto the control and uploading tunables. It is a good practice to download the tunables from the control system and compare then to the tunables prior to the software change. This helps to verify that all tunables successfully loaded and any discrepancies can be evaluated.

4.1 Launch Control Assistant

Launch Control Assistant and verify that the following screen appears.

Figure 41: Control Assistant with no open windows or connections.

4.2 Open Tunable Lists

Open both tunable lists that need to be compared. In this case, sample lists “AsFound” and “As Left” are used.

Figure 42: Control Assistant window with both tunable lists open.

4.3 Open Tunable Compare Dialog

Select the “Compare” option in Control Assistant under the “Edit” menu.

Figure 43: Control Assistant compare option for tunable lists.

4.4 Compare Tunable Lists

In the tunable compare dialog, select the two tunable lists as Master and Comparison view respectively. In order to have the Addition and Deletion dialogs make sense, it is recommended to select the most recent tunable list as the “Master”, AsLeft in this example, and select the reference tunable list as the “Comparison”, AsFound in this example.

Also be sure to select all views, Differences, Additions, and Deletions. After pressing OK, these three comparison windows will appear. Carefully examine any differences present in these lists and ensure that they are intentional changes and not a result of human or computer error.

Figure 44: Tunable comparison dialog fully configured.

Figure 45: Tunable comparison windows.