Application User Manual

Tennant Service Diagnostics LE Industrial

Controls Group

Version 3.0.2.x

Revision Number 1.21

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1 INTRODUCTION

1.1 BACKGROUND

This user manual describes the features and use of the Service Diagnostic software application. The software is required for select control board installations on machines requiring configuration. See the instructions with the service kit for more information about when to use this service tool.

1.2 SUPPORTED MODELS

Tennant	Nobles	Alfa
M17		
M20		
M30		
T17		
T20		
Sentinel		

1.3 SYSTEM REQUIREMENTS

Operating System	Windows 7 or later .NET 4.5 or later
Display	1024 x 768 or higher
Hardware	USB Port USB Type A to Mini-B Cable

1.4 INSTALLATION

1.4.1 Software

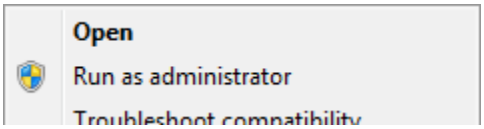
The software installer is available in the MyAccount section of the www.tennantco.com website. Login to MyAccount and locate the Service Application Software section under the Internal Resources section.

NOTE: Check the website often to make sure the latest version is installed. Version information can be found in the application title bar after "Service Diagnostics LE".

If there are multiple user profiles on the computer, then any older versions of the software need to be uninstalled for all users before installing the new version.

Download the installer and unzip the folder to a location on the computer. Make sure the user is an administrator or run the installer as admin to complete the installation.

NOTE: *Windows 10 will not allow the software to be installed unless it is both unzipped and installed with administrator privileges. This requires right-clicking on the setup icon and select "Run as administrator" from the menu even if logged in to the computer as an administrator.*

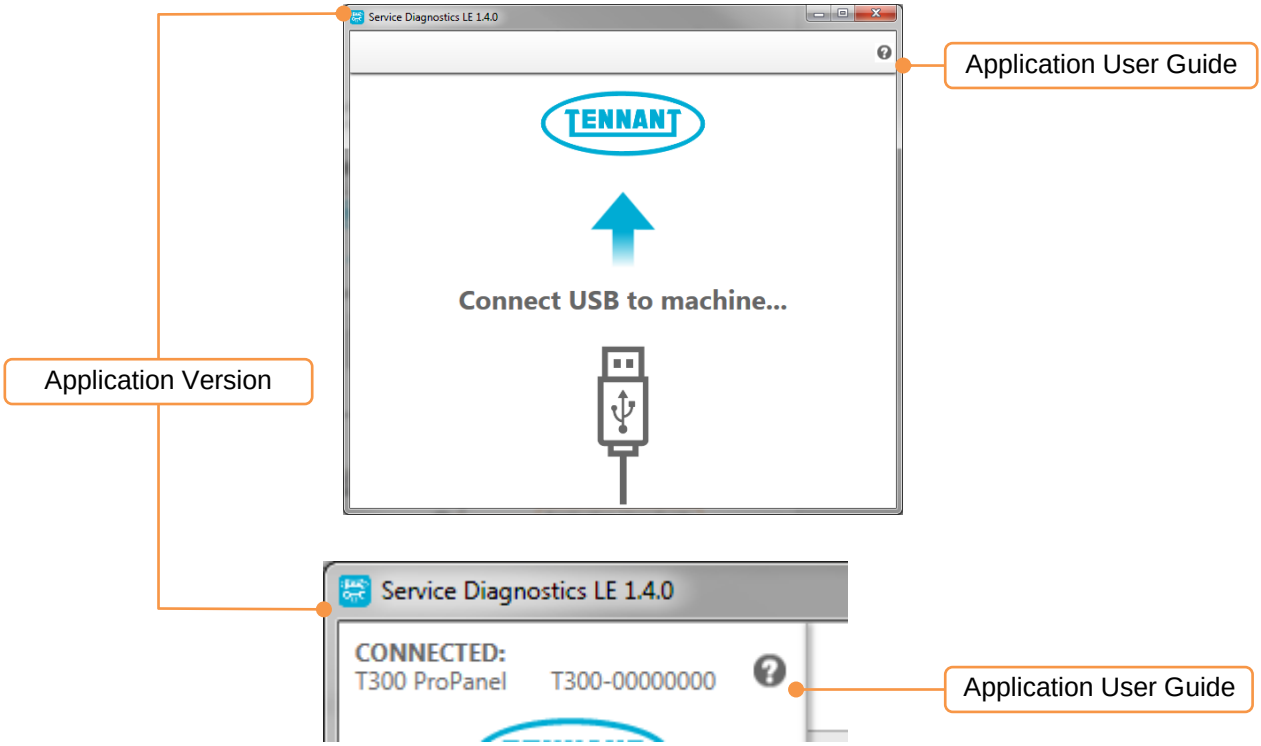


1.4.2 USB Driver

Tennant machine supported via the application use the default Windows Human Interface Driver (HID). When a machine model is connected to the computer for the first time, the driver installs. From that point on, that machine model does not install again. The driver may take up to a few minutes to install. Internet connection is NOT required to obtain the driver as it uses the generic Windows HID driver. Allowing Windows to search Windows Update is not necessary. For issues installing the driver, see section 5 for Troubleshooting at the end of this document.

1.5 HELP AND TECHNICAL SUPPORT

This help document is directly available within the application. Look for the question mark button on the screen to open this document from within the application for future reference.



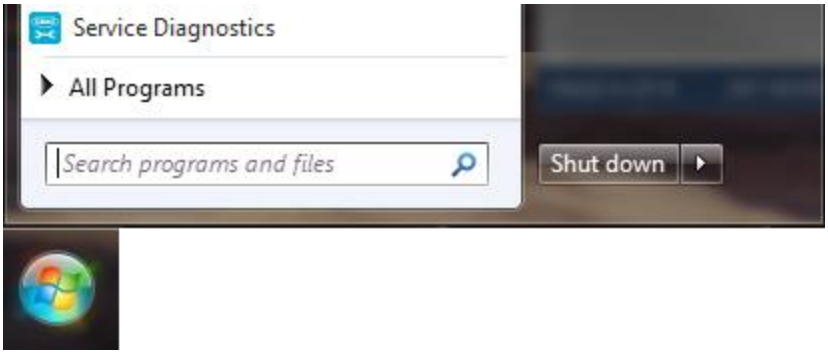
If there are issues running the application, see the troubleshooting section at end of this guide. If still having issues, contact Tennant Company technical services.

2 GETTING STARTED

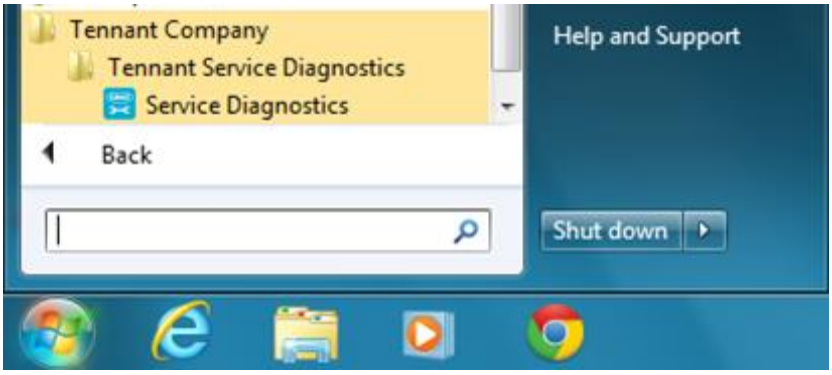
2.1 START SOFTWARE

1. Power on the Tennant equipment.
2. Connect the USB cable between the computer and the Tennant equipment.
3. If this is the first time the machine model has been connected to the computer, Windows will install the USB driver. The driver may take up to a few minutes to install. Internet connection is NOT required to obtain the driver as it uses the generic Windows HID driver. Wait for the driver installation to complete.
   Note: Windows may report the driver did not install successfully for a ProPanel equipped machine. Some portions of the driver that are attempted to install are not needed. See section 5 Troubleshooting for more information.
4. Locate the installed software on your computer. There are several ways to access the application.
   a. Icon on the desktop

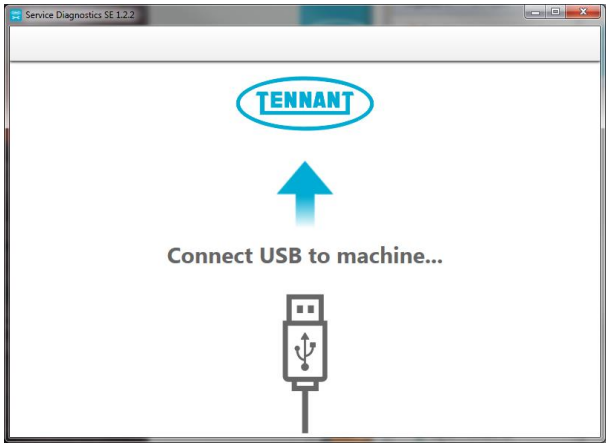
   b. In the start menu



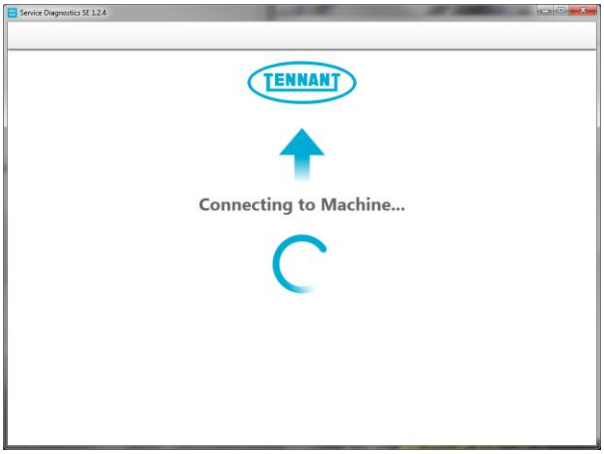
   c. In Start Menu -> All Programs -> Tennant Company -> Tennant Service Diagnostics



5. Run the application. After starting up, the following screen should present briefly.



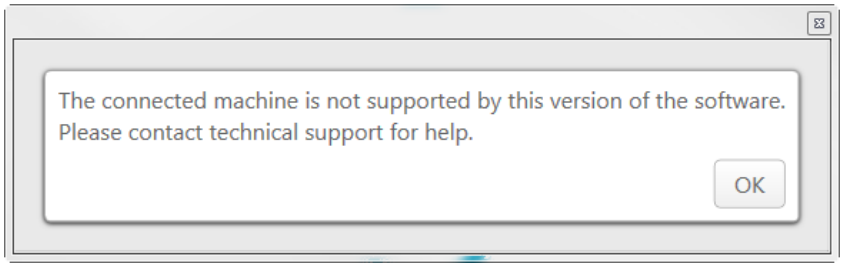
6. Then the application will connect to the machine.



7. If the application remains on the connecting screen, see the Troubleshooting section as the app is having difficulty connecting to the machine and may be driver related. Otherwise you should be taken to the Home Screen.

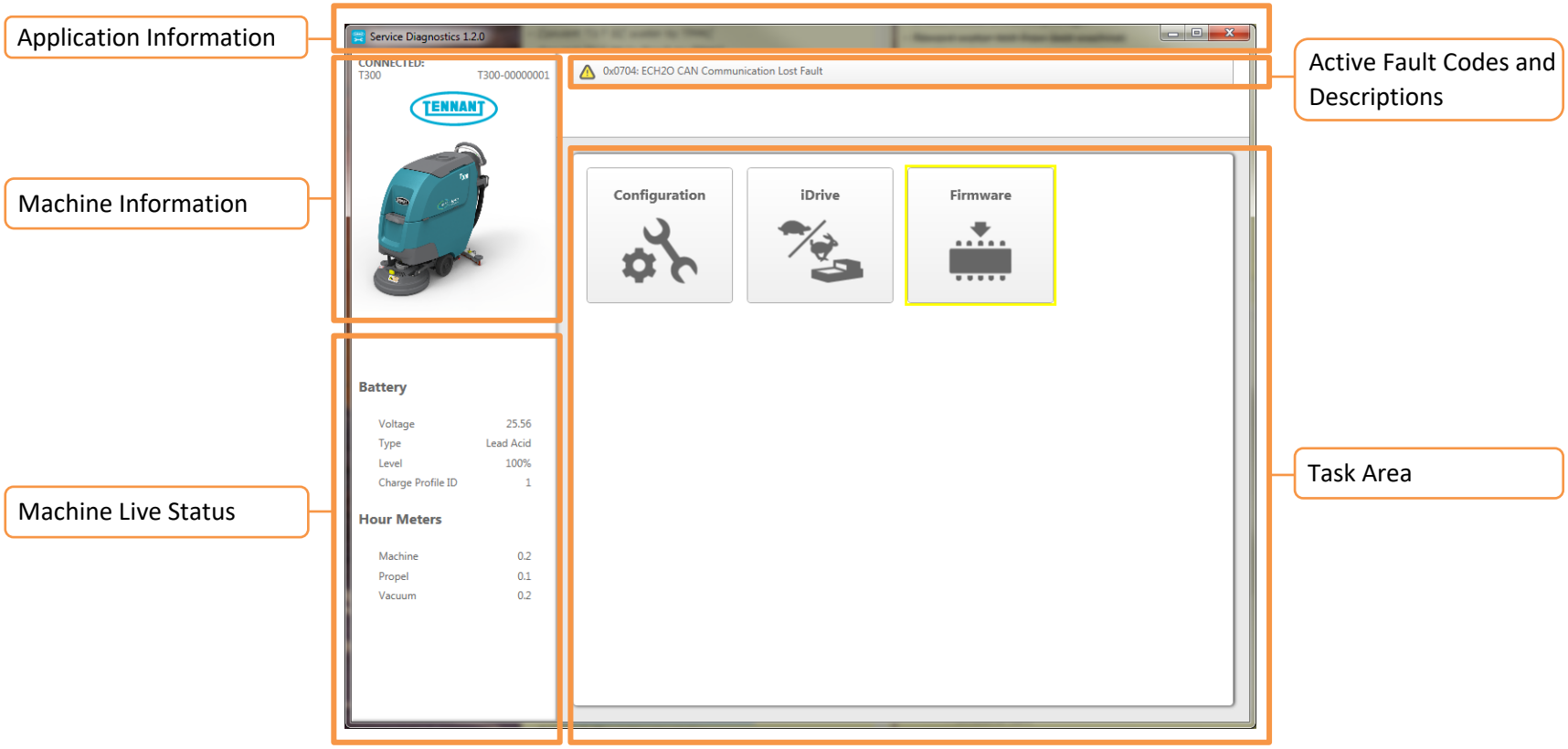
2.2 COMPATIBLE EQUIPMENT

The application is only compatible with select Tennant manufactured equipment. If the machine is not supported by the service tool, a dialog box pops up with a warning. If this warning is believed to be incorrect, contact technical support. Otherwise, refer to the specific machine service manual for equipment service options, troubleshooting and procedures.



2.3 APPLICATION HOME SCREEN

Once the application has successfully connected, a home screen will come up similar to the image below. The window is divided into sections as defined below.



2.3.1 Application Information

The name of the application and version number are displayed in the window title bar. This information may be critical when troubleshooting application issues.

2.3.2 Machine Information

The machine information section displays a representative picture of the connected equipment. Also included is the brand logo, machine model and machine serial number. Verify machine model and serial number matches the equipment label. If it does not, see section 3.5 to correct the machine.

2.3.3 Machine Live Status

The machine live status presents a brief overview of key machine metrics such as battery voltage, battery level (BDI), configured battery type and charger profile. The battery voltage and BDI update periodically while connected to the machine and therefore display the internal levels.

The machine may have one or more electronic hour meters that are tracked within the machine. Since the hour meters are tracked internally, it may not directly match a mechanical hour meter on equipped machines. If the USB control board (module) is replaced, the internal hour meters start over. A new machine may not show any meters until it has reached at least 0.1 or one tenth of an hour of use.

2.3.4 Active Fault Codes and Descriptions

The application reports live fault codes as they happen in this bar at the top of the home screen. The fault bar is only displayed when a fault occurs. For more information on this, see section Fault Codes and Descriptions.

2.3.5 Action Task Area

This area of the application is used to perform tasks specific to the connected equipment. This area may change depending on machine model, design, and installed features.

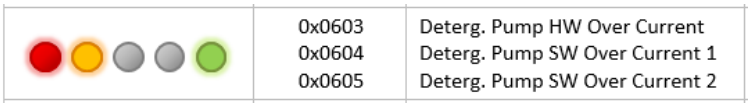
3 USING THE TOOL

The following sections describe the details of the application functions and behavior.

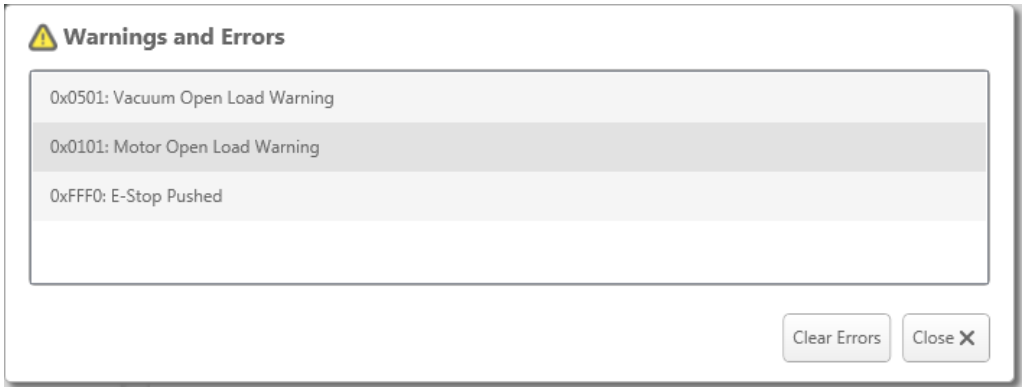
3.1 FAULT CODES AND DESCRIPTIONS

The application reports live fault codes as they happen in a bar at the top of the home screen when an error or warning exists. This is particularly helpful when the machine is reporting an error or warning indicator with a blinking light pattern. The application reports the specific fault code and a short description.

On some machines, multiple codes may be assigned to a single display pattern. The example below is from a T300 machine. In this case, the app reports which of the three possible errors specifically tripped.



Another condition that may occur is multiple fault codes may be present on the machine. For some machines, only a single highest priority fault displays on the machine. The application reports all active fault codes in the fault bar by scrolling through them. Every few seconds, the next fault will show and continuously cycle through the list. Click on the bar to open the full list of active faults and descriptions without waiting for scrolling. The image below is an example of multiple faults on a B5 model.

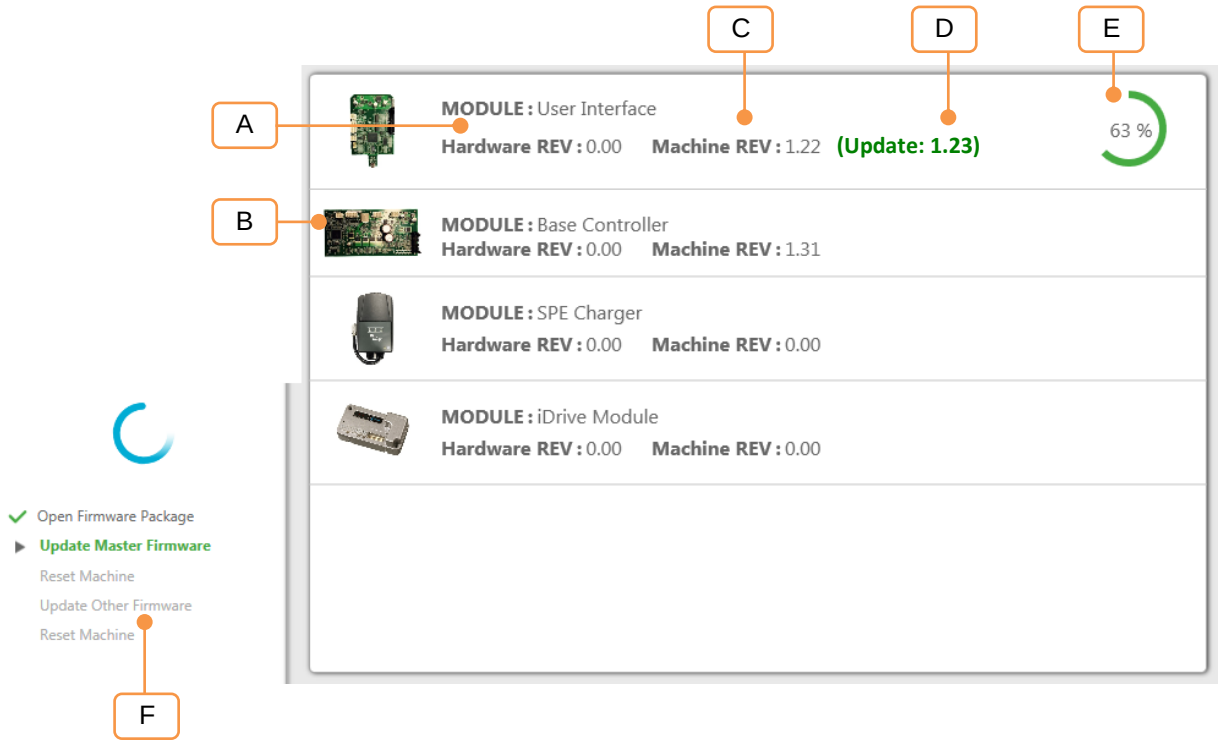


One final note about fault is the application is able to report hidden faults that may not report on the machine in a typical manner. One example on the T300 model is a machine equipped with a detergent tank for Severe Environment mode. The application reports if the tank is empty to help identify and troubleshoot why the Severe Environment mode may not be functioning.

3.2 MACHINE FIRMWARE UPDATES

Firmware updates may be available from time to time in order to ensure the Tennant equipment runs at peak performance. This application is capable of viewing and updating machine firmware. The software displays the firmware task button (depicted at left) provides this function. When the button is highlighted with a yellow border, then a firmware update is available. If the box is not highlighted, then selecting the Firmware button in the Task Area displays the current firmware versions on the machine.

3.2.1 Screen Descriptions



Descriptions are provided below explaining the features of the configuration screen.

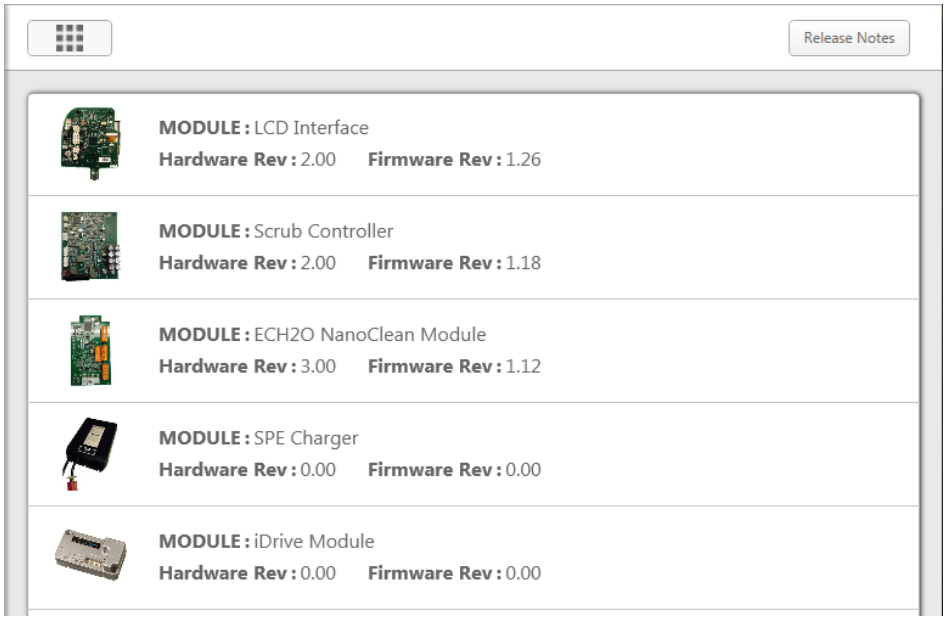
A. Description of the machine module.
B. Representational image of the module.
C. Reported firmware version from the machine.
D. New version available for install.
E. When firmware update present, Progress indicator showing the modules installation status.
F. When firmware update present, Process indicator of the steps the application performs through the process.

3.2.2 View Firmware Revisions

If the firmware task button is not highlighted, the application allows viewing the machine firmware revisions.

1. Click the Firmware task button on the Home Screen.

2. A new screen will appear listing modules the machine contains. Not all modules listed can be updated or are able to report firmware revisions.

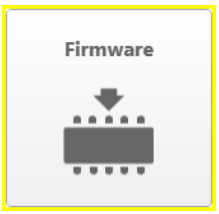


3. Additionally, a “Release Notes” button may be available on select models to review historical updates.

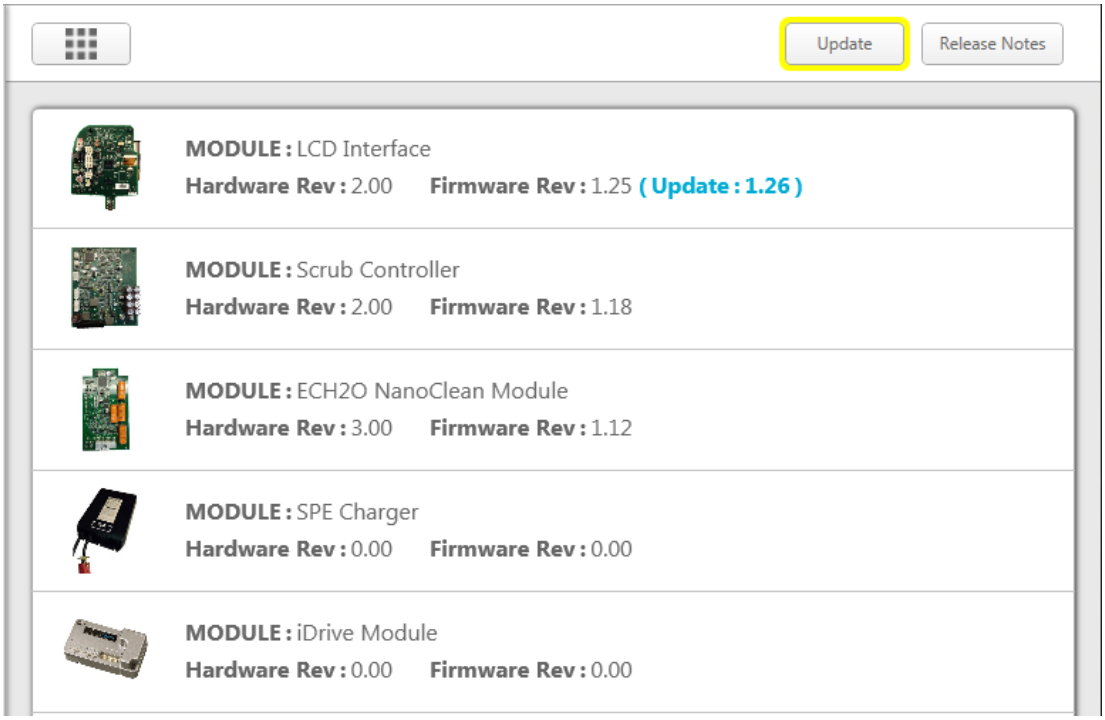
3.2.3 Firmware Update Procedure

The application does most of the work in updating firmware.

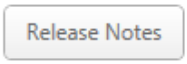
1. If a new firmware version is available to install, the application alerts with a yellow box around the firmware task button on the home screen. If this is seen at any time, it is recommended to perform the machine firmware update to ensure best machine performance. Depending on the connected machine and firmware update, it may take several seconds for the application to determine the firmware state.



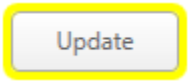
2. New in version 1.4.x and later, click this button to enter the firmware display. The list of modules firmware and hardware revisions are provided. Some modules are not firmware updatable but are listed to indicate they are installed (or should be) on the machine. The module(s) with new updates display the new update to the right of the current firmware revision as shown below.



3. There optionally may be a button called “Release Notes” in the top right corner. Click this button to see the change log for the specific model for more information about the updates. This feature may be available in some models.

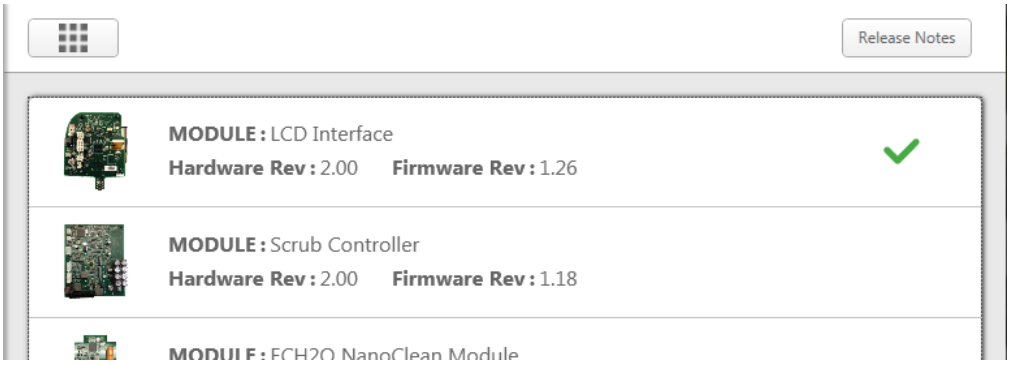


4. To continue with the firmware update process, click the yellow highlighted “Update” button at the top of the screen.



5. Once a module has been successfully updated, a check mark displays in place of the progress indicator. The machine update progress is displayed on the left side toolbar.

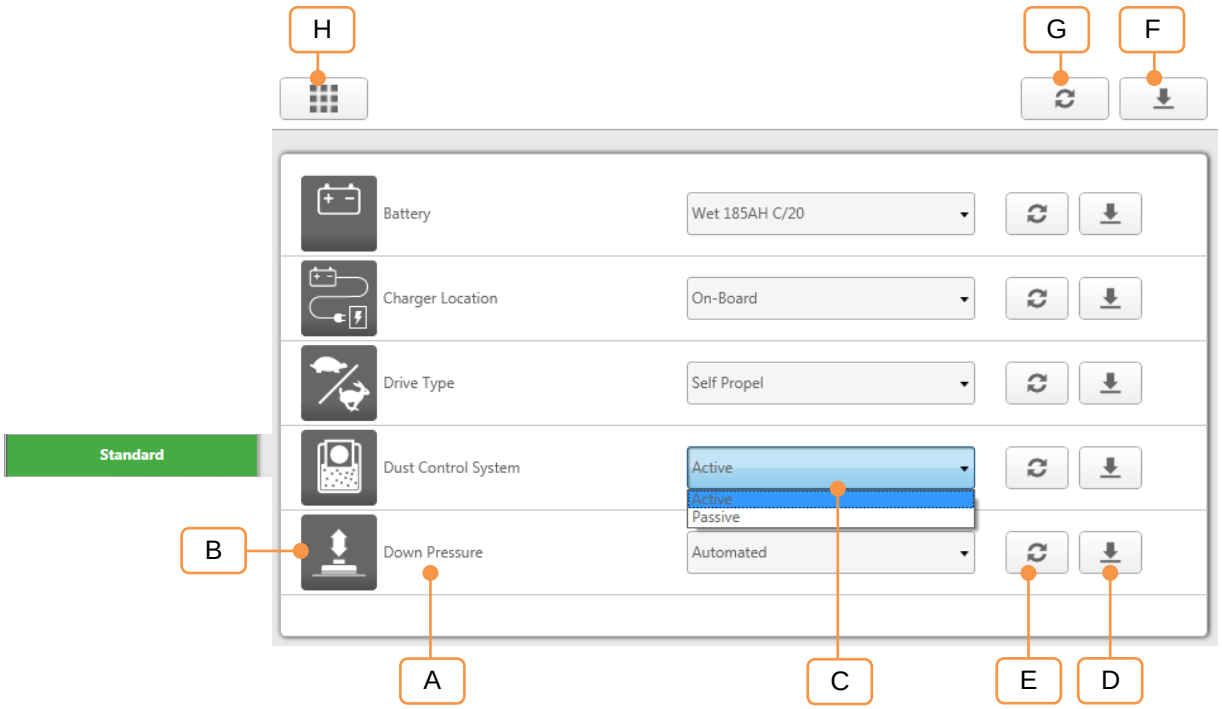
6. Follow the on screen instructions if prompted for action such as a key power cycle.



3.3 MACHINE CONFIGURATION

The application provides a method to program various configuration options on the Tennant equipment. Locate the configuration button matching the image depicted on the left to enter machine configuration. The options presented are specific to the model of machine connected. In the example screen below, the options for a B5 are listed.

3.3.1 Screen Descriptions



Descriptions are provided below explaining the features of the configuration screen.

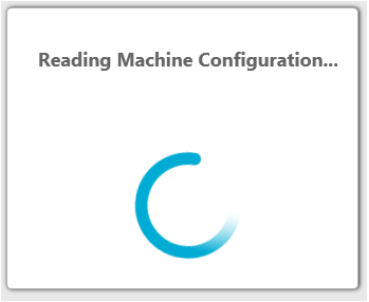
A. Configuration Parameter Name. Provides the description of an available configuration option.
B. Parameter Icon. Provides a **representational** image of the type of data the configuration parameter controls. Some icons may be on/off but others may represent just one selection of a longer list.
C. List of possible selection options for the configuration parameter.
D. Program (Download) Single Configuration button. Press this button to program only one configuration change.
E. Refresh Single Configuration button. Press this button to re-read the currently programmed machine setting. This is used if the selection may have been changed from the original setting but ***NOT*** yet programmed to the machine.
F. Program (Download) All Configuration button. Pressing this button programs all the configuration settings selected in the list.
G. Refresh All Configuration button. This forces the software to query the machine for all the configuration options displayed.
H. Return to Home Screen button. Click this button to leave the configuration screen.

3.3.2 Configuration Procedure

Configuration options on a machine may include anything from battery type selection to variant configuration build options.

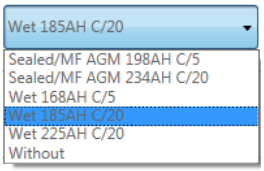
1. **Important**! Prior to starting this process, ensure the machine has the latest firmware version for best compatibility with the application. See Section 3.2 for more information.
2. On the home screen, locate and click the Configuration task button to enter Machine Configuration.

3. The application reads the current configuration from the machine.



NOTE: It is possible that if the machine firmware has not been updated, there may be some parameters that error out because they are not understood yet by the machine.

4. The list of options for the specific machine are listed with the current value. Change the configuration options as desired from the drop down boxes.
NOTE: If a drop down box is blank, the current machine setting may not match an application definition. This may occur when a new firmware update is applied. Select the option from the drop down menus.
WARNING: If a machine is configured with an option it does not have, the machine may throw fault codes that the option is not working properly. Inspect machine carefully when changing configuration. For battery options ensure the technology is the same and select the closest amp-hour (AH) rating to the installed set.



5. Program the machine with the Program All button or Program Single button(s). A check appears next to the program button once the parameter programs successfully.

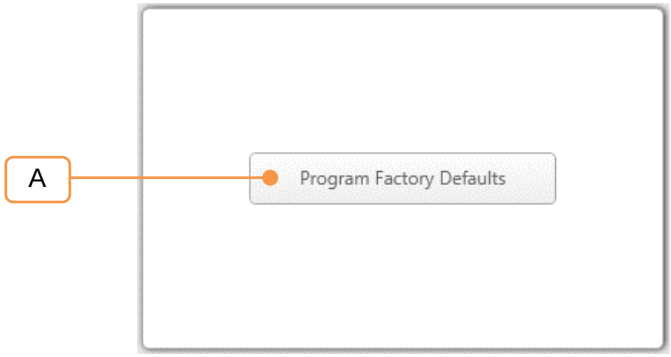
6. Once any configuration value has been programmed, the application alerts the machine requires a key cycle to complete the process. The key cycle icon is maintained in the application window by the machine image if the machine is not key cycled before returning to the home screen. If the USB cable becomes disconnected, the application will not know any longer if the machine was power cycled or not.

7. Key cycle the machine to apply the new configuration settings.

3.4 IDRIVE PROGRAMMING

Select Tennant equipment contains a module labelled iDrive for self-propelled operation. When installing a new propel module, it must be programmed to operate on the machine. The installation instructions included with the service kit indicates whether the module requires this application to program the module and complete the installation process.

3.4.1 Screen Descriptions



iDrive Module Picture

Descriptions are provided below explaining the features of the configuration screen.

A. Programming Button.

3.4.2 Configuration Procedure

Configuration options on a machine may include anything from battery type selection to variant configuration build options.

1. On the home screen, locate and click the iDrive task button to enter Programming screen.

2. Click the Program button to complete.

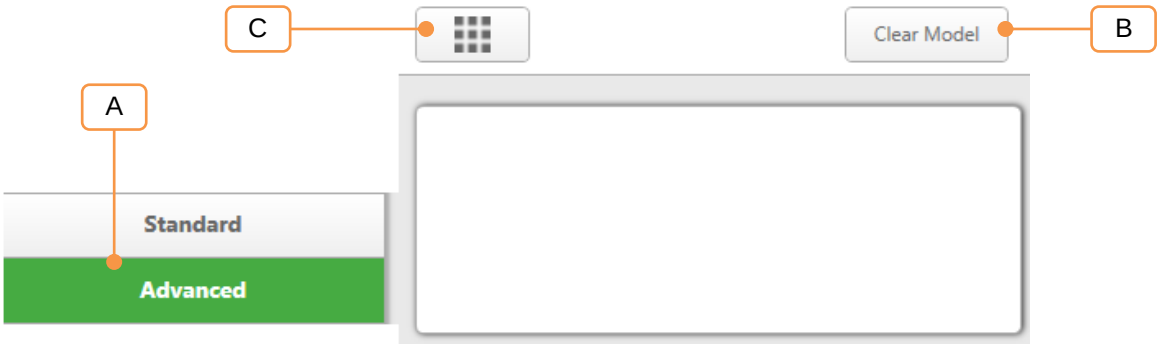
3. Programming begins and takes several seconds.

4. Follow instructions if prompted for key cycle to complete the programming.

3.5 Clearing Machine Identity

In a rare situation, it may be necessary to clear the machine identity from the control board and assign a new one. This may be due to a mistake made in the New Board Wizard or a board that was tested and configured in a previous machine. This section explains the tools and steps needed to perform the process.

3.5.1 Screen Descriptions



Descriptions are provided below explaining the features of the configuration screen.

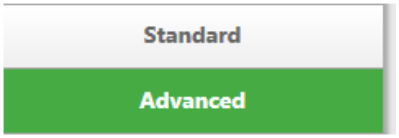
A. Tab for Standard and Advanced Configuration options.
B. Clear Model button. Clears the current machine identity information.
C. Return to Home Screen.

3.5.2 Erase Identity Procedure

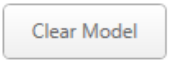
Configuration options on a machine may include anything from battery type selection to variant configuration build options.

1. On the home screen, locate and click the Configuration task button to enter Machine Configuration.

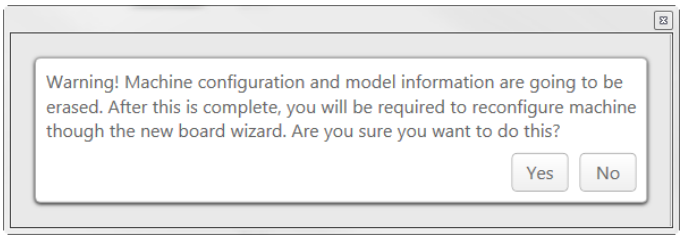
2. Select the Advanced tab.



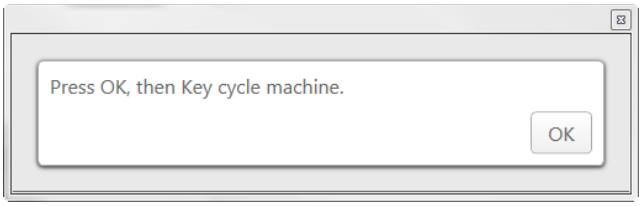
3. Locate and click the Clear Model button



4. A dialog box will pop up with the following prompt. To confirm this action and run the New Board Wizard, select 'Yes'.



5. The application will erase the board settings and display a message.



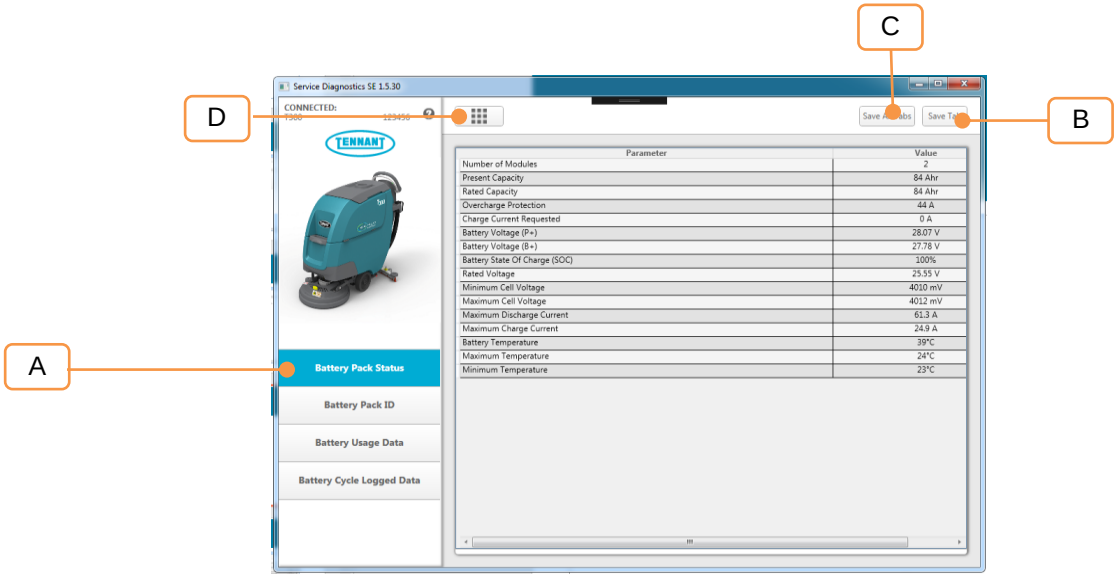
6. Key cycle the machine.
7. Follow the New Board Wizard process in the Control Board Installation section (4.1.2) to complete the remaining steps in this procedure.

3.6 LITHIUM ION BATTERY SYSTEM (OPTIONAL)

If the machine has Lithium Ion Battery System installed, the LiB System icon should show up with the rest of the icons. Otherwise, the icon would not show up if the BMS is not installed, and the module of the battery is not installed. Once the icon is clicked; the program takes several seconds to load all the status report.

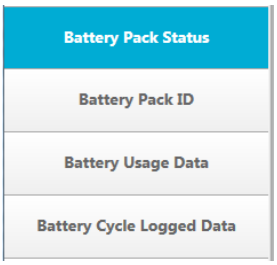
NOTICE: There is nothing show up after the icon has been clicked, it could be possible that the machine configuration does not set up correctly. Contact technical support to get the issue resolve.

3.6.1 Screen Description



Descriptions are provided below explaining the features of the configuration screen.

A. There are four options to select:



a. **Battery Pack Status**: this section reports the basic information about the lithium ion battery status (Table 1 for more details).

b. **Battery Pack ID**: this section shows the manufacturing date, serial number of the BMS, and individual module that it is currently installed in the machines (Table 1 for more details).

c. **Battery Usage Data**: this section shows all the information regarding the number of charging cycles and total operation time.
d. **Battery Cycle Logged Data**: This section reports all the battery fault, and logs the number of faults count of the battery module. (Table 1 for more details).

B. Save current report into csv file. (More details on section 3.6.2)
C. Save all status reports at once. (More details on section 3.6.3)
D. Return to Home Screen.

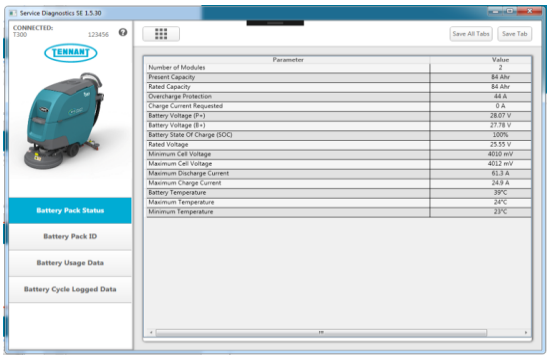
3.6.2 Saving current tab

The “Save Tab” button

is designed for saving the current tab selection into CSV file. For example, if the current selction tab is selected “Battery Pack Status”, the “Save Tab” button saves all the current status report from “Battery Pack Status” into CSV file format.

3.6.2.a How to use “Save Tab” button

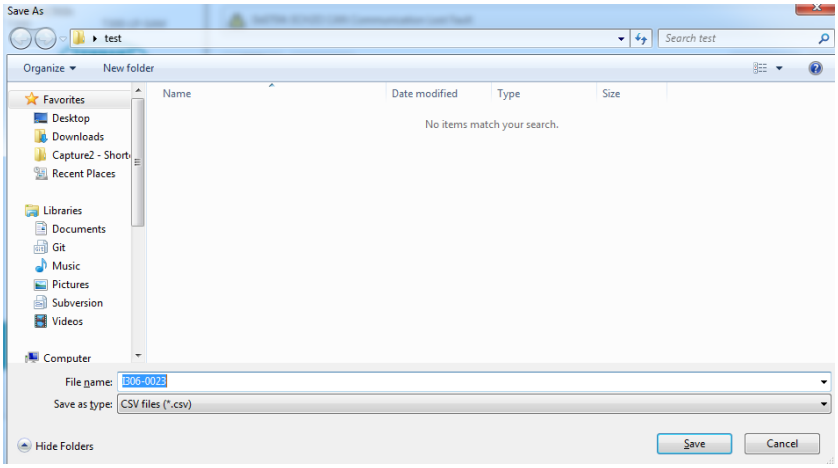
Step 1. Select the Tab you want to save. For this example, the “Battery Pack Status” is currently selcted as shown below.



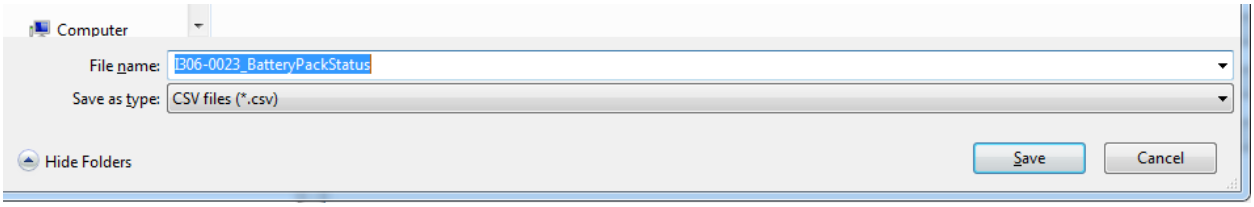
Step 2. Click “Save Tab” button. The saving screen dialog will pop up.

Notice: the serial number of the BMS should show up in “File name” textbox.

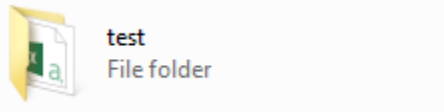
Step 3. Navigate to your folder where you want to store your file. For example, the folder called “test” was created in the desktop location as shown below.



Step 4. Give your file a name after the serial number. In this case, “BatteryPackStatus” is added after the serial number.

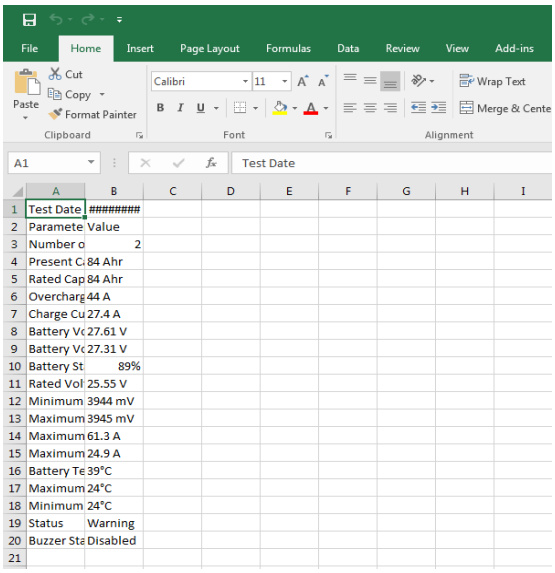


Step 5. Open the folder where you keep your file. In this case, the folder “test” is where it stores the file.

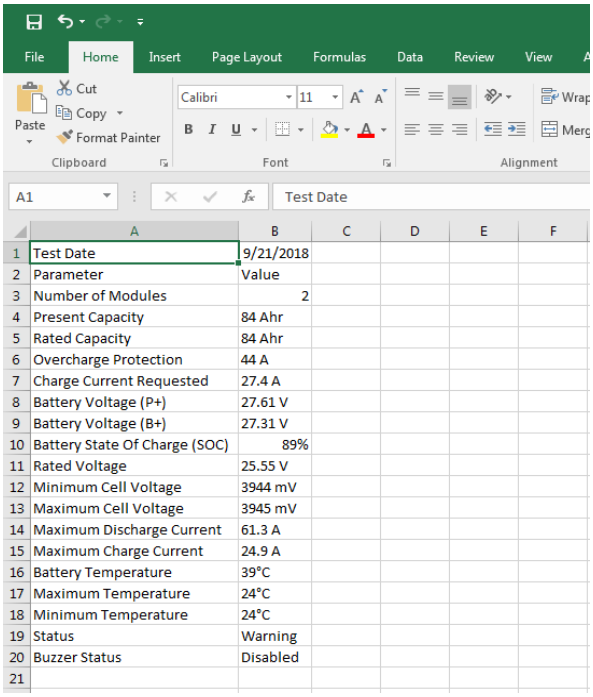


Step 6. Double click the file (Your computer must have Microsoft Excel to execute the file).

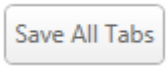
Step 7. Once the file is open. The file should display all the parameters and value as shown below.



Step 7. Double click the line between column A and column B to show full resolution of the parameters. Double click the line between B and column C to show full resolution of the value.



3.6.3 Saving all tabs

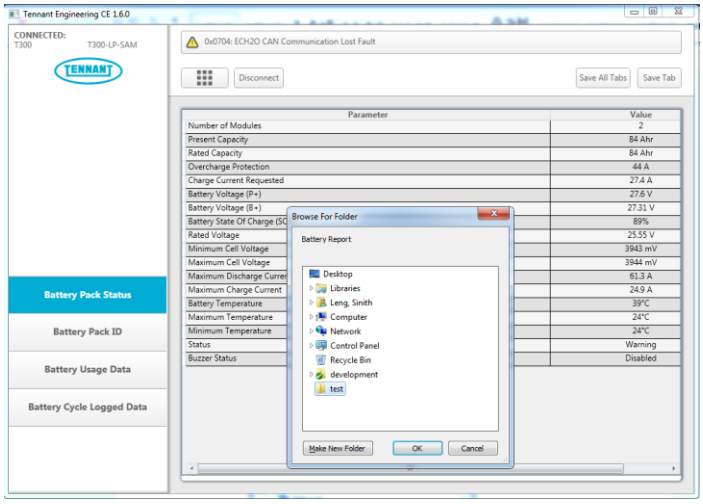
The 

button is designed to design all the status tab on the side bar at once in csv file format. The button itself is almost the same thing as “Save Tab”; except, you do not need to select each tab and save the file each time. You can press the “Save All Tab” button on any tab and get all the file at once.

3.6.3.a How to use “Save All Tab” button

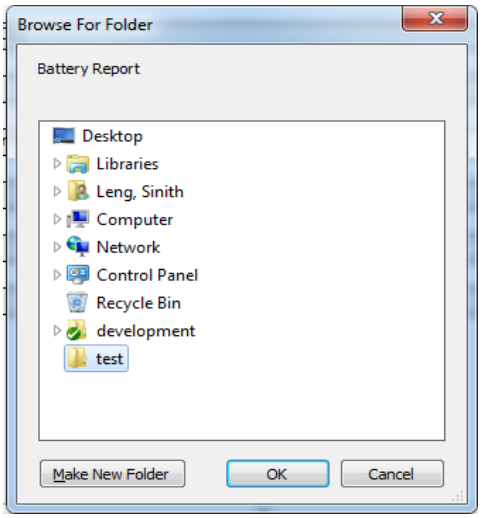
Step1. Once the status report screen shows up; click

button. The saving dialog file should show up as you can see the picture below.

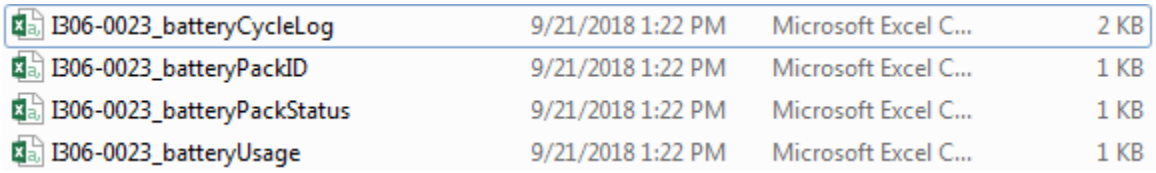


Step2. Create a folder or find a folder where you wan to store all the data. For example, the “test” folder was created in the desktop location.

Step3. Click “ok” to save all the files into destination folder.



Step4. All the files should inside the folder should look the same but they have different serial numbers.



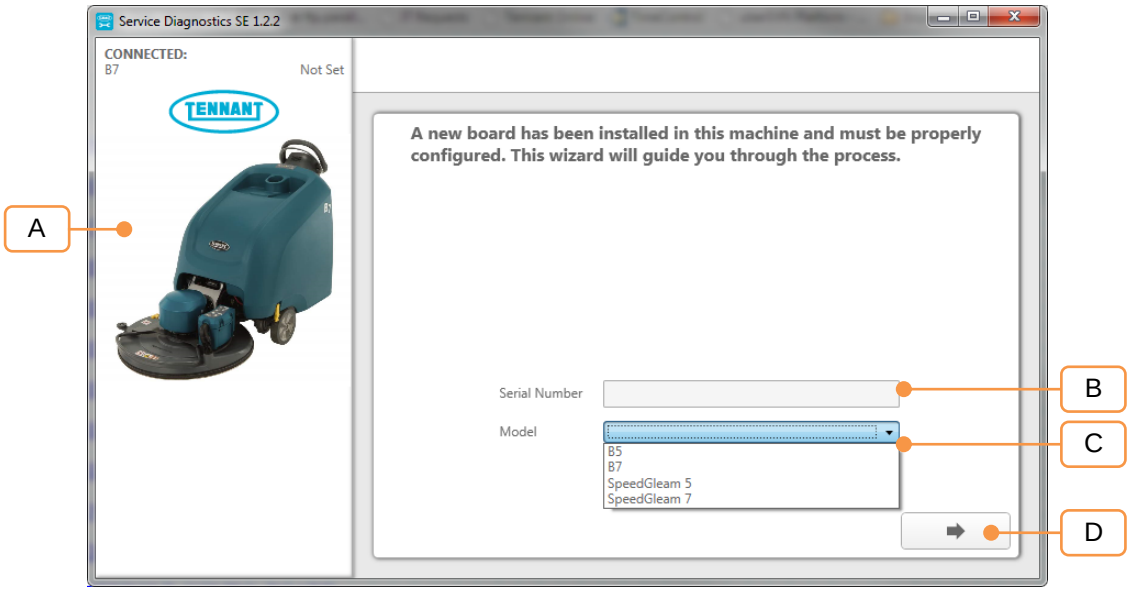
4 CONTROL MODULE INSTALLATION

Some control modules on Tennant equipment may require configuration in order to work properly after installation. See the service manual or installation kit instructions to determine if configuration is required using this software application.

Connect to the machine with this Service Diagnostic application. The software may automatically detect a new control board installed with the following wizard. The wizard must be completed before additional Action Tasks are available.

If the wizard is not presented, verify the configuration settings after module installation for the machine are correct from Section 3.3 and verify there are no available firmware updates for the machine from Section 3.2.

4.1.1 Screen Descriptions



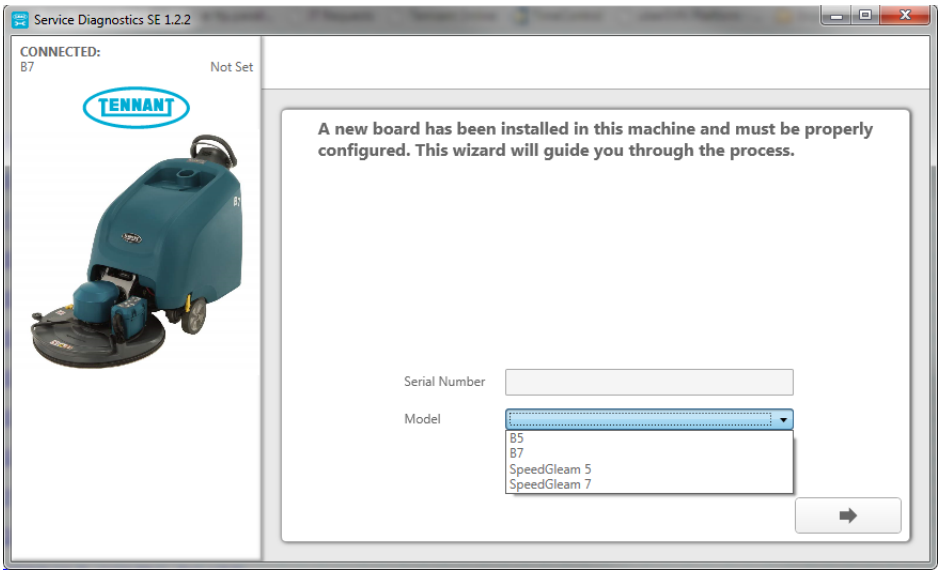
Descriptions are provided below explaining the features of the configuration screen.

A. Representational image. This image represents a machine type that the control board should be installed in.
B. Machine Serial Number entry.
C. Model Selection entry.
D. Next Button.

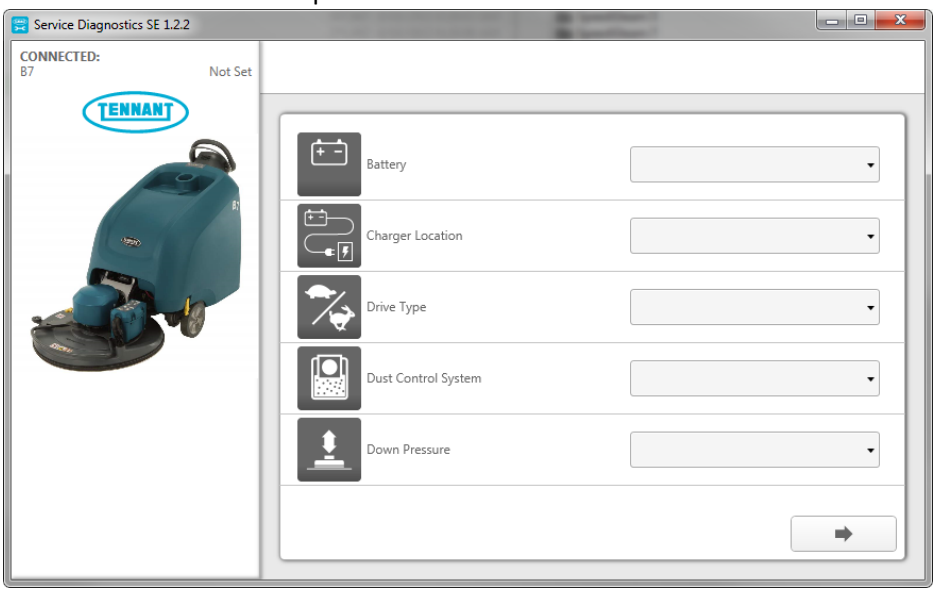
4.1.2 New Board Wizard

Configuration options on a machine may include anything from battery type selection to variant configuration build options.

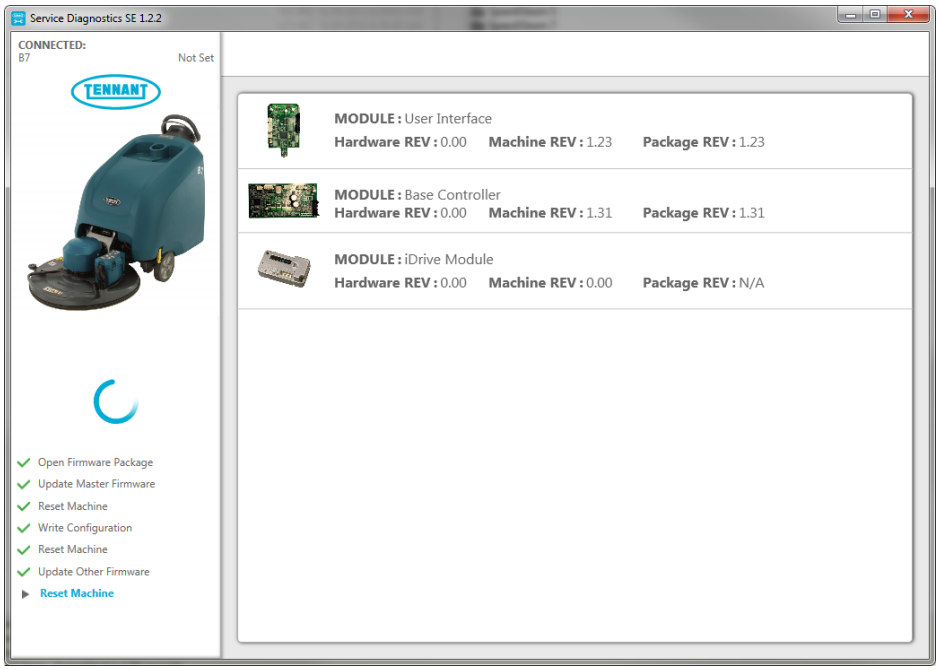
1. Enter the machine serial number from the equipment label.



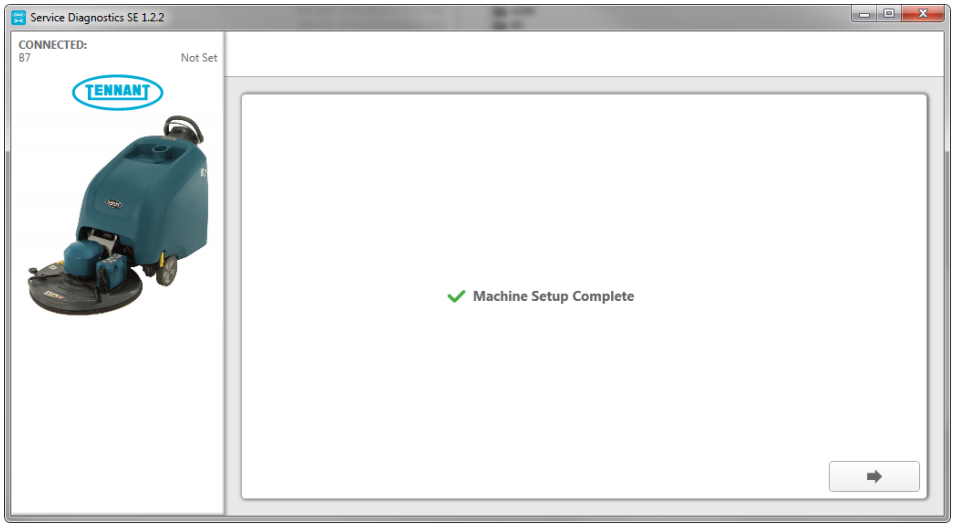
2. Select the machine model from the drop down box. If the machine model is not displayed in the box, then the control board is not for the machine. Ensure the correct model is selected to save time and prevent faults.
3. Press the Arrow button for next step.



4. Select the correct installed options for the machine. This may require additional inspections in and around machine to verify installed settings.
5. Press the arrow button to continue.



6. The application will begin the process of configuring the new board. It will perform any firmware updates on the machine if needed. The update and configuration process status on the left side of the window.
7. During the process, the application may prompt for key cycles. Turn the key off, wait a few seconds and then turn back on again to continue.
8. Once complete, a message appears on the screen.



9. Press the Arrow button to return to the Home Screen. The machine is ready for operation.
10. Test to ensure all features are functioning and no error codes are reported due to misconfiguration. If the machine is not performing as expected, see Section 3.3 to make changes.

5 TROUBLESHOOTING

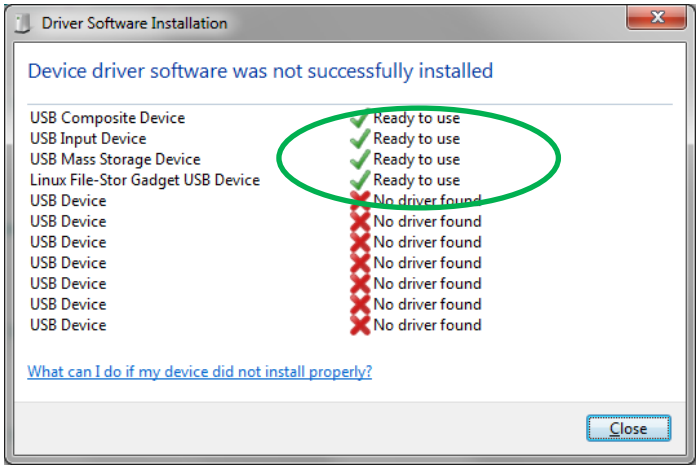
5.1 MACHINE DRIVER INSTALLATION

This section provides troubleshooting help for driver installation.

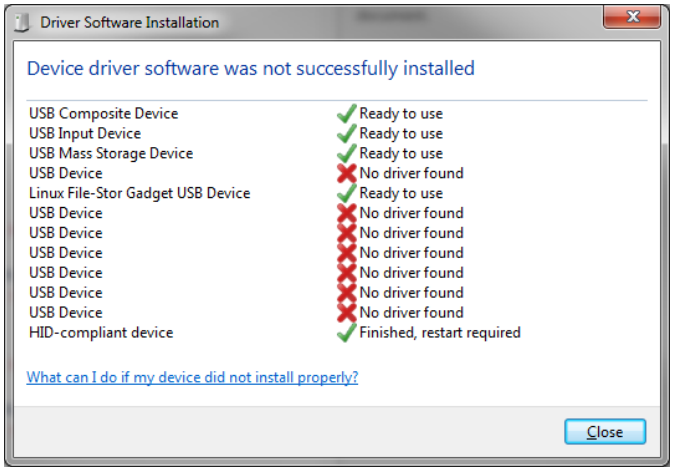
5.1.1 ProPanel

For ProPanel equipped machines, there may be a message from Windows indicating “Device driver software was not successfully installed.” In most situations, the four necessary drivers install correctly. The image below shows the result of the Windows driver installation that worked on a Pro-Panel® equipped machine. No more action is needed for the driver.

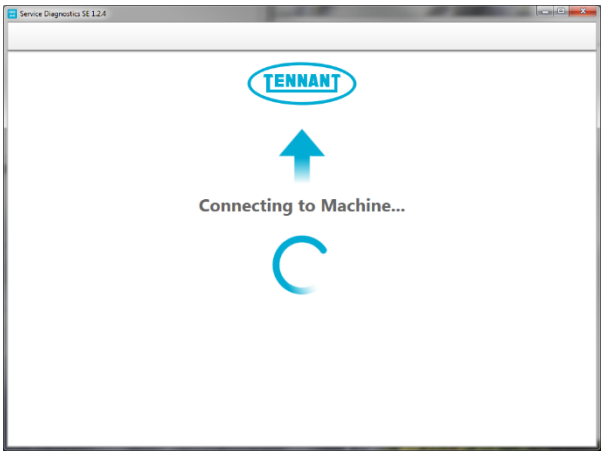
If the Service Diagnostic application is running, close the application and then restart. If the application fails to connect to the machine, restart the computer to complete the driver install.



In some install situations, the driver may request a computer restart to finish. Restart the computer and then run the software application. The example ProPanel below requires a computer reboot to finish. Note the four drivers that are needed did install correctly and are ready to use after the restart.



5.2 SOFTWARE CAN'T FIND MACHINE



If the application fails to connect to the machine (sits on connecting screen with spinning wheel) due to a required driver install issue, try connecting the machine to another USB port on the computer.

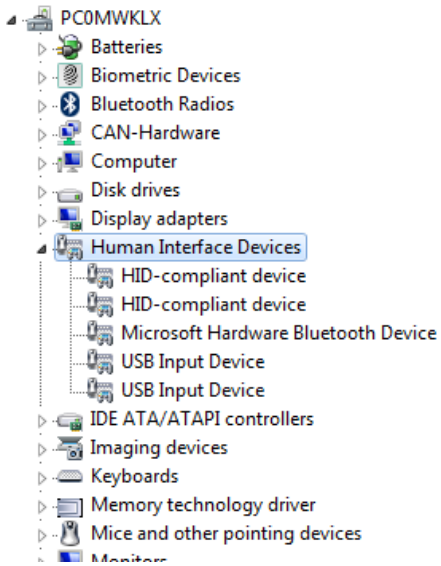
If it still doesn't work, reboot the computer. As a last resort, uninstall the driver. To uninstall the driver, the machine must be connected to the computer.

Uninstall the drivers by one of the two following procedures. For a Pro-Panel® equipped machine, see Section 5.2.2 Removing Touchscreen Drivers or Section 5.2.1 Removing Standard Drivers for all other machines.

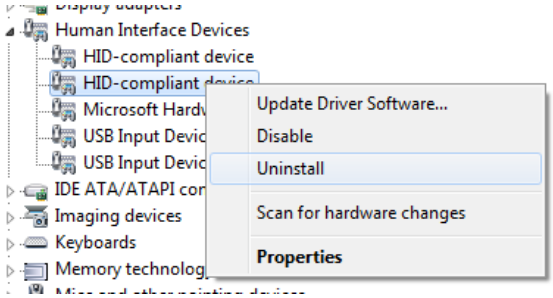
5.2.1 Removing Standard Drivers

Note: Follow the order carefully as these drivers are nested and must uninstall in proper order. The instructions are written for Windows 7 and therefore a newer version of Windows may look slightly different.

1. Connect the USB to the computer and the Tennant equipment.
2. Power on the Tennant machine.
3. Close the Service Diagnostics application.
4. Open Device Manager on the computer.
5. Open Human Interface Devices section.

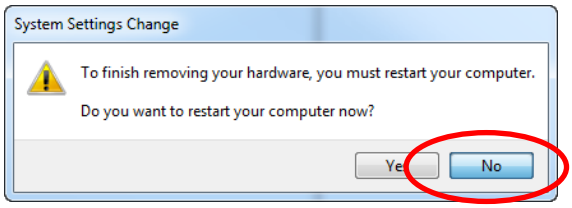


6. If available, right-click on “HID-compliant device” to Uninstall. If more than one is listed, locate the device with matching VID of 0x27DC. See Section 5.3 for how to check Vendor ID of the device.

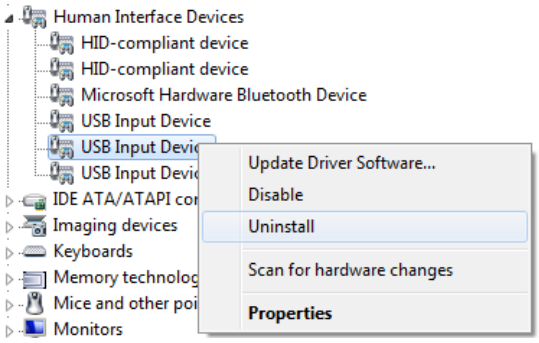


7. Select “OK” to uninstall on the dialog box.

8. Once the driver is finished removing, select “No” if prompted to restart now.



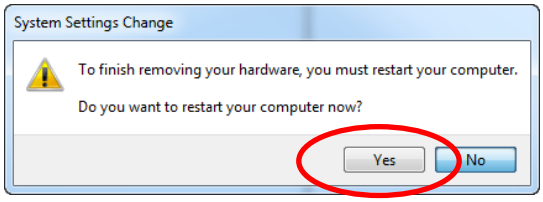
9. If available, right-click on “USB Input Device” and select Uninstall. If more than one is listed, locate the device with matching VID of 0x27DC. See Section 5.3 for how to check Vendor ID of the device.



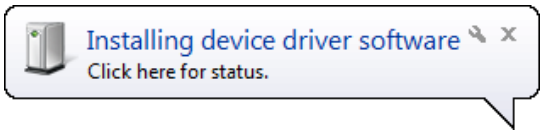
10. Select OK to uninstall the device.

11. When the dialog box for computer restart comes up, unplug the USB cable from the machine.

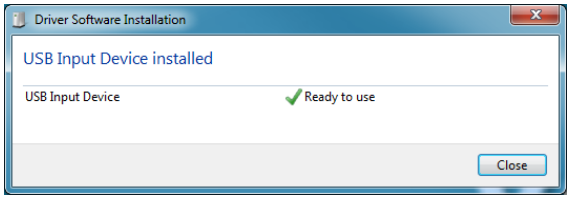
12. If prompted, select “Yes” to restart the computer.



13. Once the computer has rebooted, plug in the USB and allow Windows to install the drivers. Do not turn off the machine or unplug USB cable during this time. It may take a few minutes to complete and Internet connectivity is NOT required for the install.



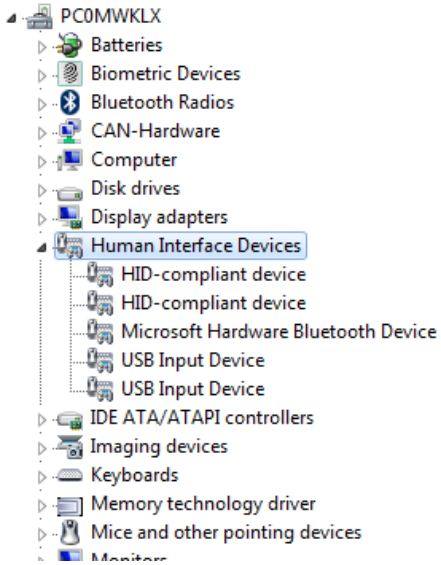
Clicking on the install balloon will show the status of the drivers installing and when the process is completed.



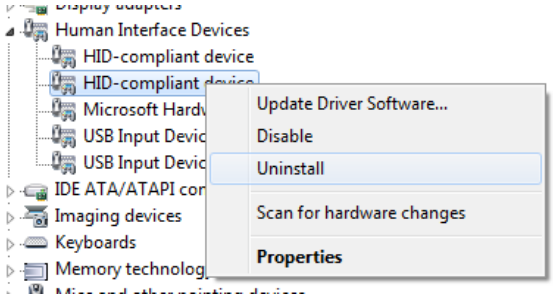
5.2.2 Removing Touchscreen Drivers

Note: To remove a corrupted touchscreen driver from the machine, there are several steps to go through. Follow the order carefully as these drivers are nested and must uninstall in proper order. The instructions are written for Windows 7 and therefore a newer version of Windows may look slightly different.

1. Connect the USB to the computer and the Tennant equipment.
2. Power on the Tennant machine.
3. Close the Service Diagnostics application.
4. Open Device Manager on the computer.
5. Open Human Interface Devices section.

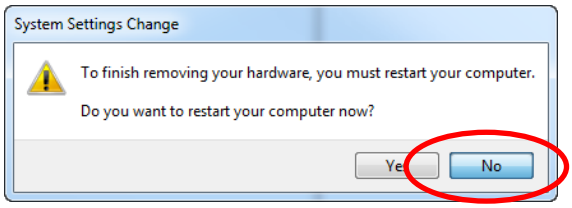


6. If available, right-click on "HID-compliant device" to Uninstall. If more than one is listed, locate the device with matching VID of 0x27DC. See Section 5.3 for how to check Vendor ID of the device.

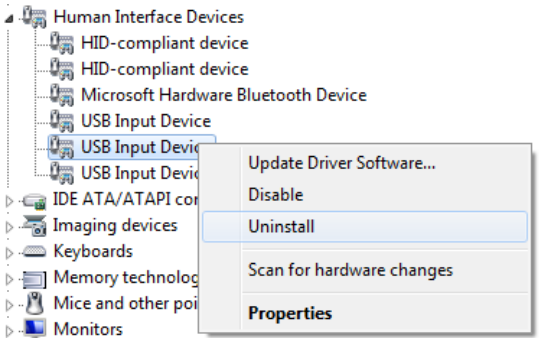


7. Select "OK" to uninstall on the dialog box.

8. Once the driver is finished removing, select No if prompted to restart now.

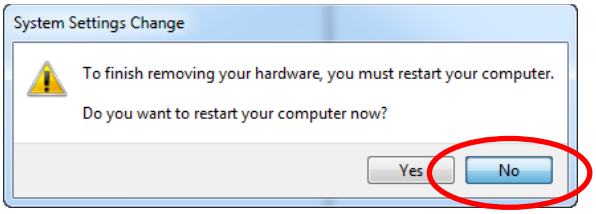


9. If available, right-click on “USB Input Device” and select Uninstall. If more than one is listed, locate the device with matching VID of 0x27DC. See Section 5.3 for how to check Vendor ID of the device.



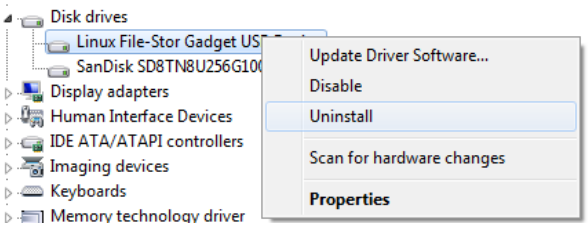
10. Select OK to uninstall the device.

11. If prompted, select “No” to a computer restart.

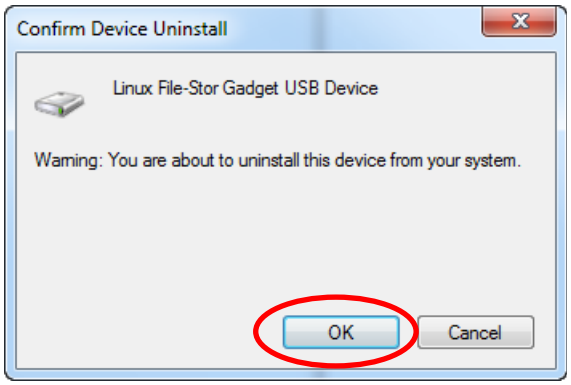


12. Next, go to the Disk Drives section.

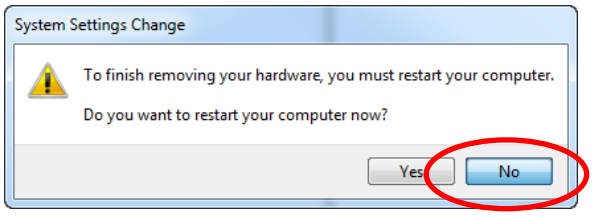
13. If available, right-click “Linux File-Stor Gadget USB Device” and select Uninstall.



14. Select OK when prompted to remove the device.

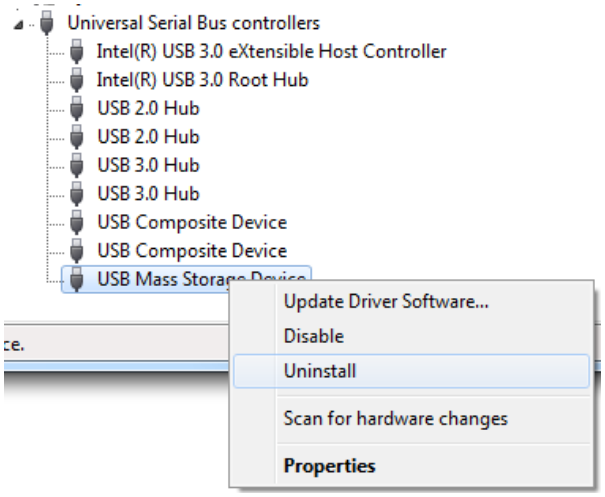


15. If prompted, select “No” to a computer restart.



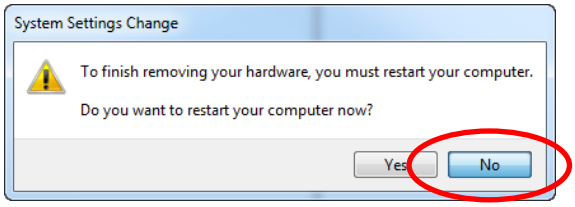
16. Next, open the "Universal Serial Bus controllers" section.

17. If available, right-click "USB Mass Storage Device" and select Uninstall. . If more than one is listed, locate the device with matching VID of 0x27DC. See Section 5.3 for how to check Vendor ID of the device.

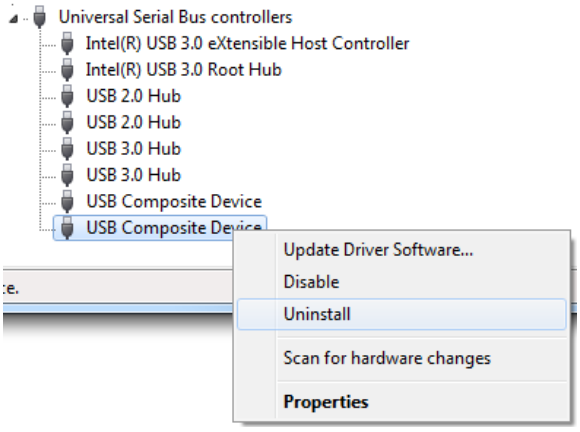


18. Select "OK" to remove device.

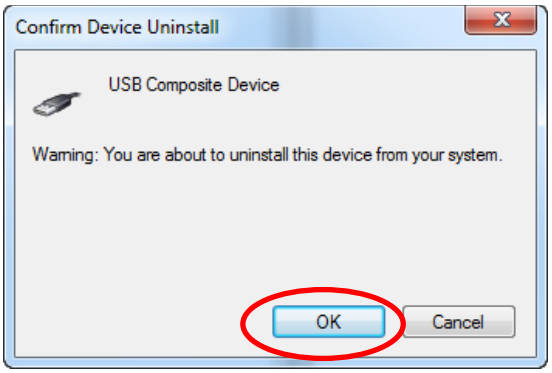
19. If prompted, select "No" to a computer restart.



20. Right-click "USB Composite Device" and select Uninstall. . If more than one is listed, locate the device with matching VID of 0x27DC. See Section 5.3 for how to check Vendor ID of the device.

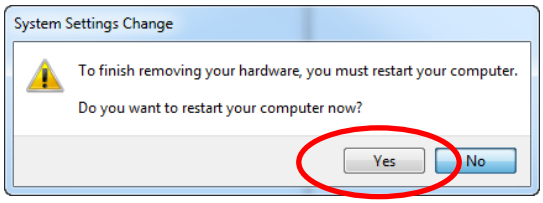


21. Select "OK" when prompted to remove.

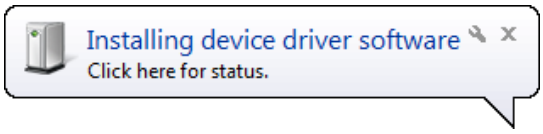


22. When the dialog box for computer restart comes up, unplug the USB cable from the machine.

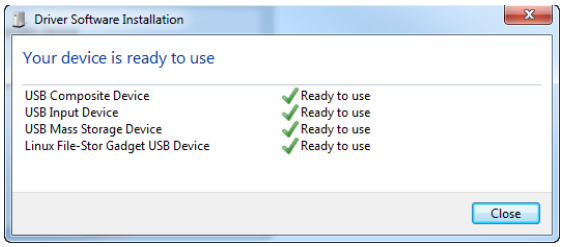
23. If prompted, select "Yes" to restart the computer or manually restart computer.



24. Once the computer has rebooted, plug in the USB and allow Windows to install the drivers. Do not turn off the machine or unplug USB cable during this time. It may take a few minutes to complete and Internet connectivity is NOT required for the install.



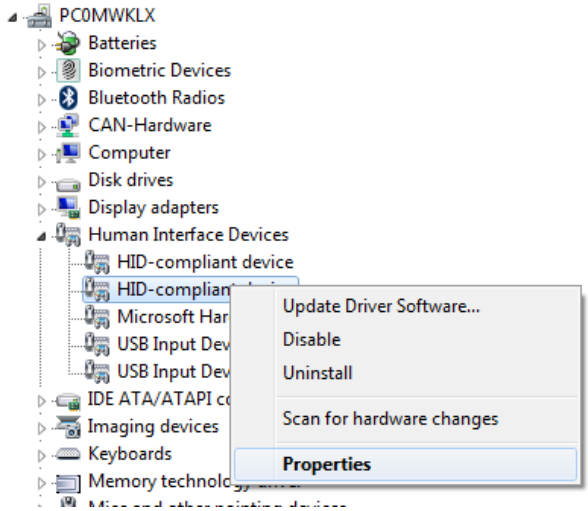
Clicking on the install balloon will show the status of the drivers installing and when the process is completed.

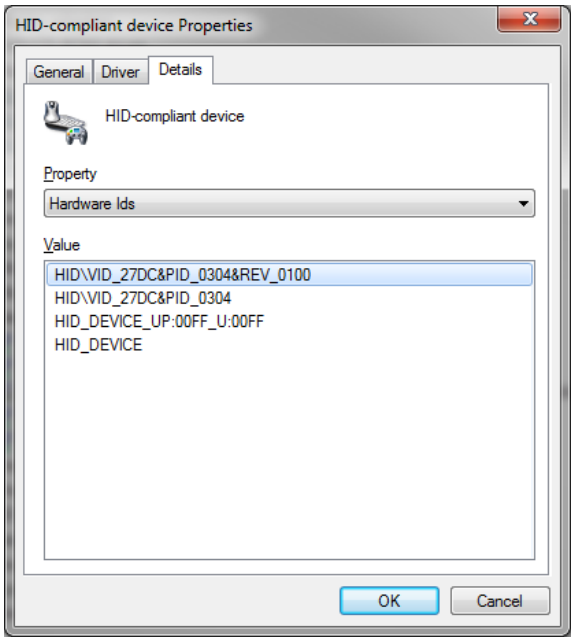


5.3 VERIFY DRIVER FOR TENNANT EQUIPMENT

The drivers are located under HID or Human Interface Devices. There may be other HID devices listed there so locate the drivers with Tennant Vendor ID 0x27DC. This can be obtained by looking at the Driver Properties->Details.

In this example, the HID-Compliant device and the last USB Input Device make up the driver.





Select “Hardware Ids” from the drop down menu and look for VID_27DC in the string list. This will be the Tennant device.

5.4 MACHINE CONFIGURATION READ

This error message appears when there is a configuration in the application not understood by the machine. This message typically occurs when the machine firmware is out of date. Verify firmware is latest version. If it is the latest version, this message can be ignored.

The error may also show if the control board has failed. Check that the machine is saving other parameters. If all parameters remain at the default values after attempting to change them, then the control board may be damaged.