ENGINEERING
TOMORROW

User Manual

# PLUS+1®
# Service Tool

www.danfoss.com

## Revision history

*Table of revisions*

| Date | Changed | Rev |
|---|---|---|
| January 2024 | Supports 2024.1 | 1701 |
| September 2023 | Supports 2023.3 | 1601 |
| March 2023 | Supports 2023.1 | 1501 |
| October 2022 | Supports 2022.3 | 1401 |
| June 2022 | Supports 2022.2 | 1301 |
| March 2022 | Supports 2022.1 | 1201 |
| June 2021 | Supports 2021.1 | 1101 |
| February 2021 | Supports 12.2 | 1003 |
| May 2020 | Supports 12.1 | 1002 |
| | Changed document number from 'AQ00000194' and 'L1307770' to 'AQ152986484649' | 1001 |
| November 2019 | Supports 12.0 | 0901 |
| April 2019 | Supports 11.1 | 0801 |
| November 2018 | Supports 11.0 | 0701 |
| May 2018 | Supports 10.1 | 0601 |
| October 2017 | Supports 10.0 | 0501 |
| March 2017 | Supports 9.1 | 0401 |
| October 2016 | Supports 9.0 | 0301 |
| August 2015 | Supports 7.2.x and later | 0200 |
| October 2014 | Supports 7.1.x and later | BA |
| September 2014 | Conversion to Danfoss layout | AB |
| November 2013 | First edition | AA |

## Contents

## Contents

# General information

## Introduction

### About this manual

This manual describes the PLUS+1® Service Tool.

Some functions require an add-on license. The functions are described in respective section.

To buy an add-on license, see PLUS+1® Software License Manager Help, **AQ152886482086**.

For short information about the add-on functions, see Data Sheet PLUS+1® Service Tool Add-on licenses, **AI00000254**.

#### *Intended use*

In PLUS+1® GUIDE you build your application with drag-and-drop logical components or software blocks in the graphical interface. It is engineered to accelerate your development process and bring higher quality machines to market faster.

Use the PLUS+1® Service Tool to download the built application to a controller. You can download parameters to a controller, then you can log and tune the controller performance.

### Safety definitions and reading information

#### *Safety definitions*

#### Warning information

Warning information points out potential dangers which can, if the warnings are not followed, result in personal injury or product damage.

**Warning**

Situation that may result in death or serious personal injury if the instruction is not followed.
Do not to proceed until all stated conditions are met and clearly understood.

**Caution**

Situation that may result in damage to the product if the instruction is not followed.
Do not to proceed until all stated conditions are met and clearly understood.

#### Important information

Important information that is marked as below shall facilitate the work process, operation/handling or increases understanding of the information.

Information that is important without being safety related.

#### *Reading information*

Software items are identified by bold text: **Manager panel**.

To separate menu levels an arrow is used: **File** > **Open** refers to the **File** menu and the **Open** command.

Code and file paths are identified by this font: `\Danfoss\PLUS1\`.

Command name are identified by this font: `Ctrl+D`.

## General information

### IEC 61508:2010 support tool certification references

Contact and reference material are available regarding which versions of PLUS+1® Service Tool carry the IEC 61508:2010 support tool certification.

Please contact the PLUS+1® Helpdesk.

*https://www.danfoss.com/en/products/software/dps/plus1-software-services-support-and-training/plus1-support-and-services*

For complete details regarding PLUS+1® GUIDE and PLUS+1® Service Tool IEC 61508:2010 support tool certificates, see:

*PLUS+1® GUIDE Safety management overview*, **BC415552583577**

*https://www.danfoss.com/en/search/?filter=type%3Adocumentation%2Csegment%3Adps*

### Important information to reduce risk

Your responsibility when designing a PLUS+1® Service Tool application is to include the checking and the error handling needed to reduce risks in normal and abnormal operating conditions.

The applications that you create with the PLUS+1® Service Tool typically control heavy, powerful, and mobile off-road equipment such as tractors, cranes, and harvesters.

The PLUS+1® Service Tool has no automatic protections against the risks, such as from bugs in the PLUS +1® Service Tool software, errors in the PLUS+1® Service Tool user guides, or incompatibilities between software versions of the PLUS+1® Service Tool.

You must design and test your application to reduce these risks.

## General information

### Fault checking and error handling

The following are some items to consider when developing fault checking and error handling for your application.

Consider:

- How the machine is normally used.
- Possible operator errors and their consequences.
- Industry safety standards and legal requirements.
- Input and output failures and their consequences including:
  - Joystick, sensor, and other inputs suddenly going to 100 % or to 0 %.
  - Outputs that control machinery direction, speed, and force suddenly changing direction or going to 100 % or to 0 %.
- Decide how likely each failure is:
  - The more likely a failure, the more you need protect against the consequences of the failure.
- The sequence of events and consequences of a fault or error.
- The sequence of events and consequences of an emergency stop.

**Warning**

Under normal operating conditions, using this type of machinery always involves risk of personal injury and equipment damage. Abnormal operating conditions increase the risk of personal injury and equipment damage.

### Downloading and testing your applications

Once you have created an application, you have the responsibility to download and test the application.

You should only download your application to hardware or change software parameters while the vehicle is not in operation. After downloading, test application operation under normal and abnormal operating conditions.

You should make sure that:

- Individual inputs produce expected outputs.
- Combinations of inputs do not produce unexpected or dangerous outputs.
- Fault handling and error checking work as designed.

## General information

### Learning about the PLUS+1® Service Tool

After successfully creating your first controller application using the PLUS+1® GUIDE, you need to put it to use now.

Use the PLUS+1® Service Tool to:

- Download an application to a controller
- Log and tune controller performance
- Write parameters to a controller

This manual will help you to understand the following concepts and processes:

- The overall concept of the PLUS+1® Service Tool
- How to download an application file to a controller application
- How to run log pages
- How to change controller parameters

### Getting ready

Individual requirements to work with the applications in this manual:

- Fully functional versions of the PLUS+1® GUIDE and PLUS+1® Service Tool programs installed on PC
- A completed controller application to use within the PLUS+1® Service Tool
- The following hardware to download these controller applications:
  - One PLUS+1® CG150-2 or PLUS+1® DP series display (or a similar third party CAN communication device)
  - One 12 to 24 VDC 55 mA power supply
- Working knowledge of the PLUS+1® GUIDE environment, including an understanding to use the full capabilities of the PLUS+1® Service Tool

Proper hardware has be to connected and installed on a computer before you can use the PLUS+1® Service Tool. Connect the controller to the CAN communication device.

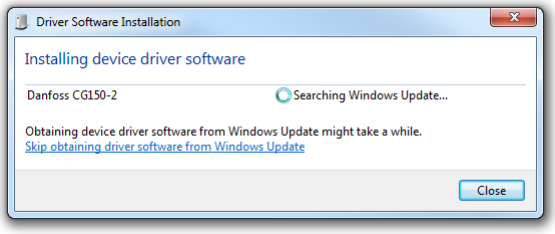
The graphical images in this manual may appear slightly different, depending on which version of the PLUS+1® Service Tool is in use.

## PLUS+1® hardware setup

### CAN hardware installation

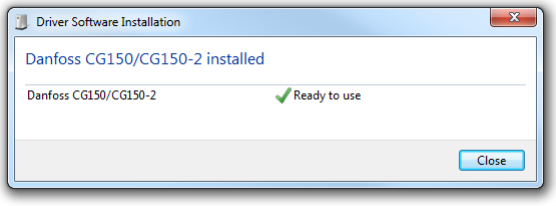
It is necessary to install CAN driver software before using the PLUS+1® Service Tool.

1. Plug in the PLUS+1® CG150-2 USB cable to the PC USB port. The Hardware Wizard searches for and installs CAN software. This may take several minutes.




2. Click Close to close the Driver Software Installation dialog.

   The following message appears when installation is complete.

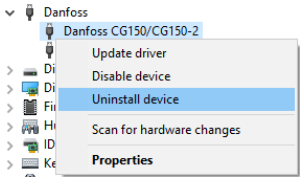



USB drivers can be found in the directory: `<Program Files>\Danfoss\PLUS1\<Service Tool Version>\Misc\.`

### CAN hardware installation troubleshooting

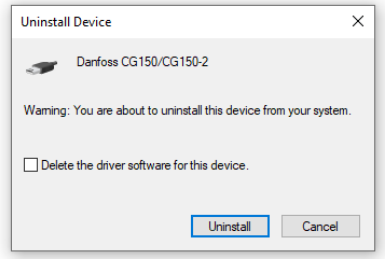
To resolve issues related to the Danfoss PLUS+1®CG150-2 CAN/USB gateway interface communicator, perform the following procedure:

1. Close the PLUS+1® Service Tool.
2. Enter the Device Manager in Windows® operating system by selecting: **Control Panel** > **System** > **Device Manager**.
3. Select PLUS+1® CG150-2 or PLUS+1® Display under the Danfoss > Device Manager.
4. Right-click Danfoss CG150-2 or Display and select **Uninstall**.



## PLUS+1® hardware setup

5. Ensure that the **Delete the driver software for this device** option is unchecked, then click **OK**.



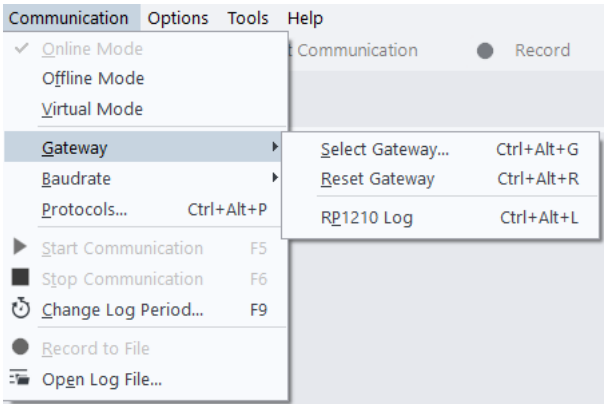

6. Unplug the PLUS+1® CG150-2 then plug it back into PC USB port.

   The **Found New Hardware** balloon should appear in the Windows® taskbar. Complete the driver installation wizard and start the PLUS+1® Service Tool to re-establish connection with the PLUS+1® CG150-2.

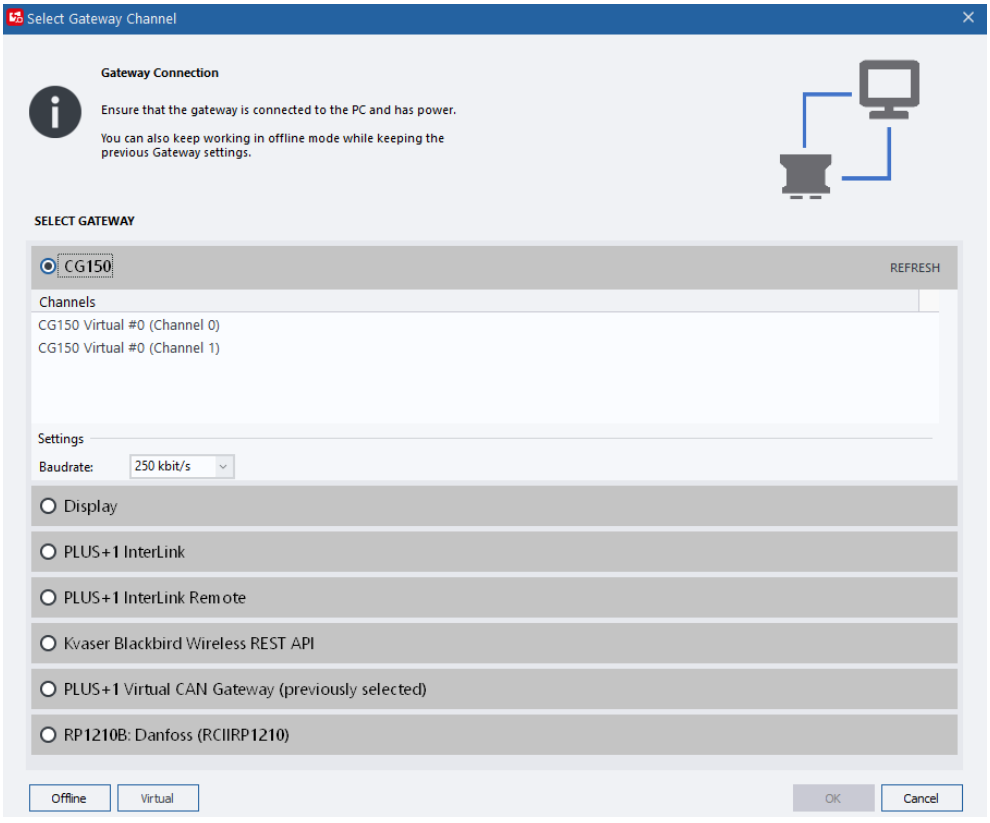
## PLUS+1® hardware setup

### Using the PLUS+1® CG150-2 USB/CAN Gateway Interface Communicator

1. Select **Communication** > **Gateway** > **Select Gateway...** from the PLUS+1® Service Tool window menu.




2. Select **CG150** from list of available gateways.



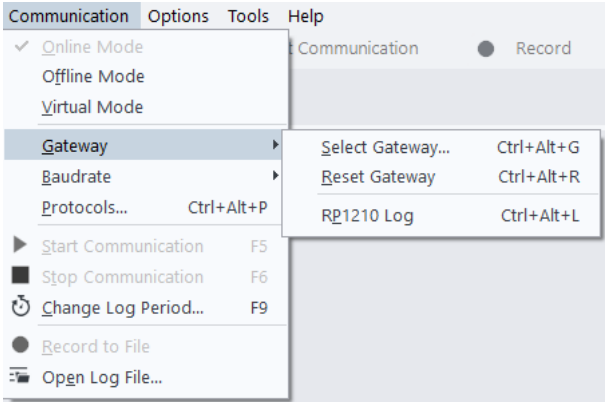

### Using the PLUS+1® DP Series Display USB/CAN gateway

PLUS+1® DP Series Displays with USB connectivity can be used as a CAN gateway.

Make sure that the display is connected using a supported USB cable (see product documentation).

### PLUS+1® hardware setup

1. Select **Communication** > **Gateway** > **Select Gateway...** from the PLUS+1® Service Tool window menu.

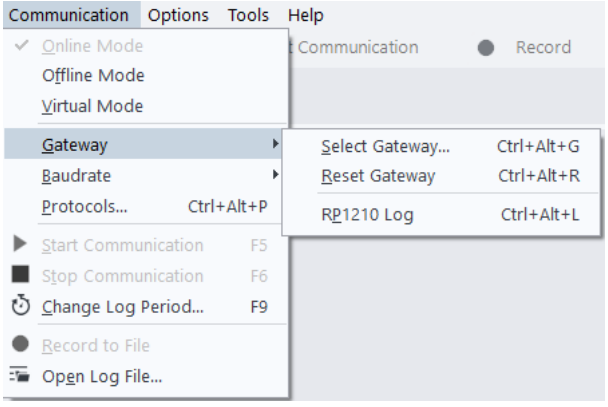



2. Select **Display** from list of available gateways.

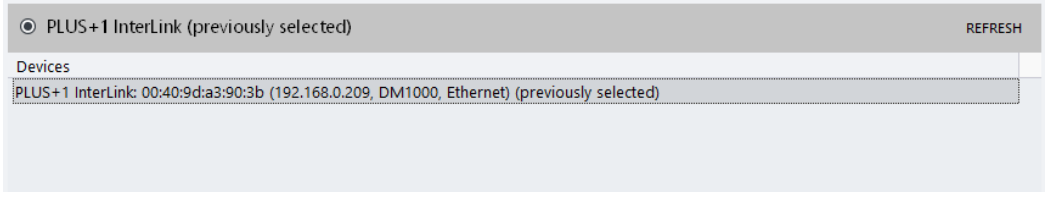
### Using the PLUS+1® InterLink gateway

PLUS+1® products with PLUS+1® InterLink capabilities can be used as a gateway.

1. Make sure that the device is accessible through Wi-Fi/Ethernet/Bluetooth/USB (see product documentation).
2. Select **Communication** > **Gateway** > **Select Gateway...** from the PLUS+1® Service Tool window menu.



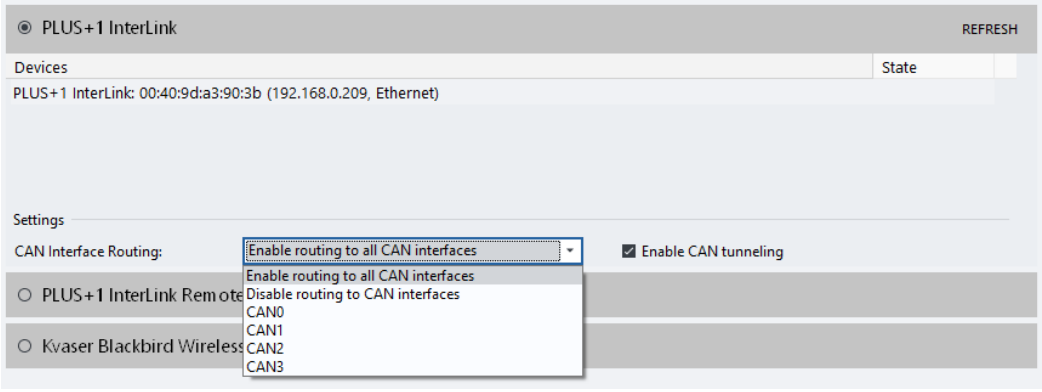

3. Select **PLUS+1 InterLink** from list of available gateways.




The PLUS+1® Service Tool will search for available PLUS+1® InterLink devices, and these devices will be available as channels.

## PLUS+1® hardware setup

4. Select gateway settings.




*PLUS+1 InterLink settings*

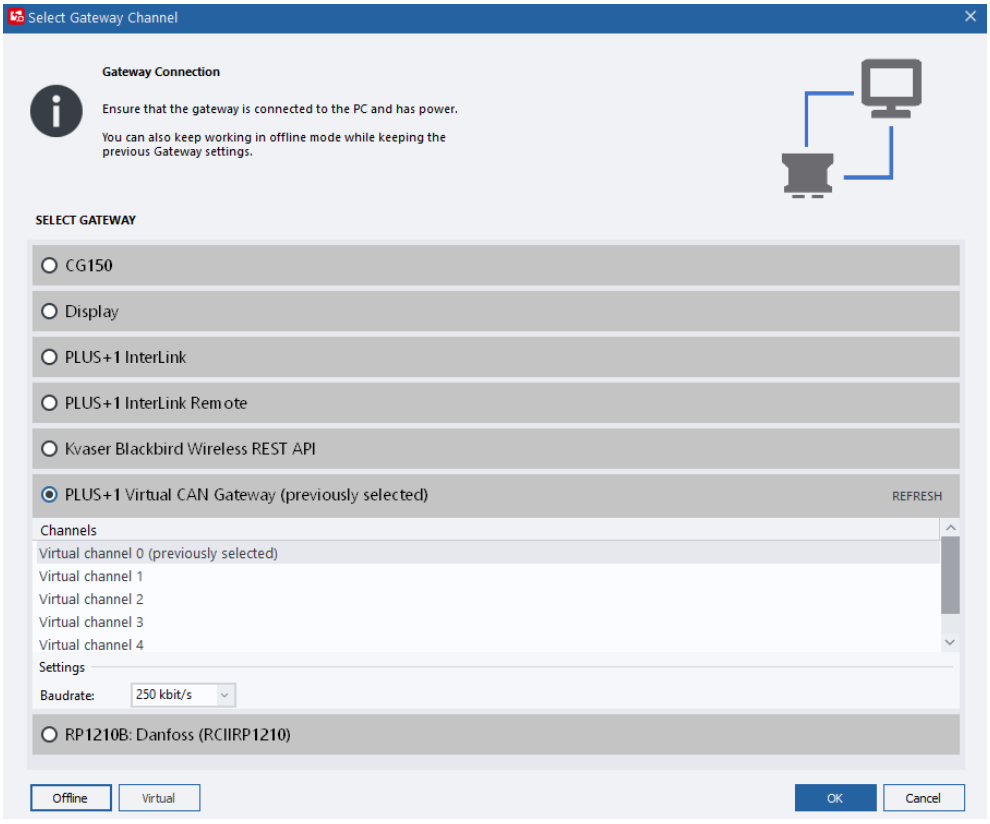
| | |
|---|---|
| **CAN Interface Routing** | Determine which CAN port(s) of the PLUS+1 InterLink gateway should participate in routing of CAN messages. |
| **Enable CAN tunneling** | Select to enabled reception of CAN messages from the PLUS+1 InterLink gateway. CAN tunneling needs to be enabled for CAN messages to be displayed in CAN Monitor and to use CAN Xplorer protocol. |

5. After selecting the desired channel, a **Gateway Password** dialog will show up if the gateway is password protected. Enter the correct password and press the **Connect** button to connect.
6. Check the **Remember password** check box to save the password.

## Using the PLUS+1® Virtual CAN gateway

### PLUS+1® hardware setup

1. Select **Communication** > **Gateway** > **Select Gateway...** from the PLUS+1® Service Tool.
2. Select **PLUS+1® Virtual CAN Gateway** from list of available gateways.

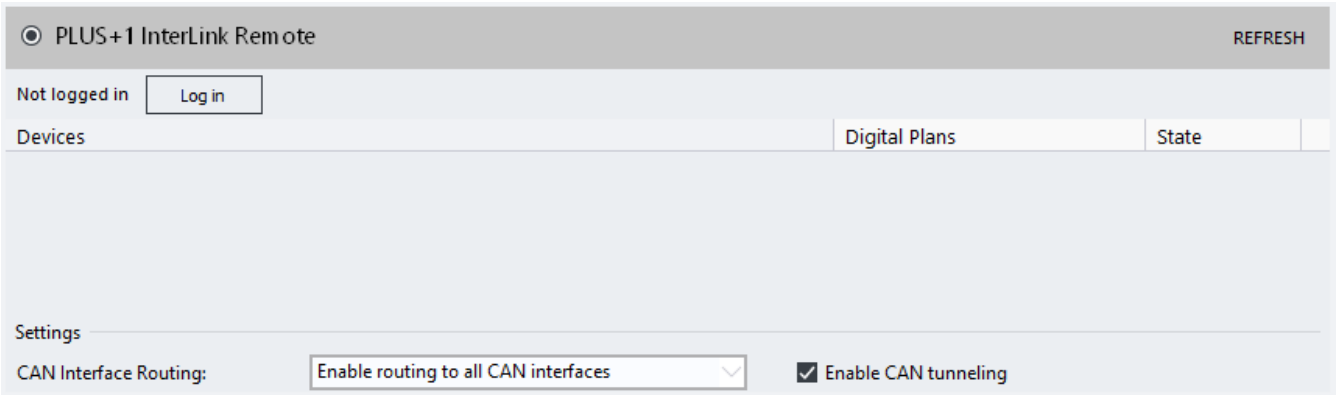



For further information, see PLUS+1® GUIDE User Manual.

### Using the PLUS+1® InterLink Remote gateway

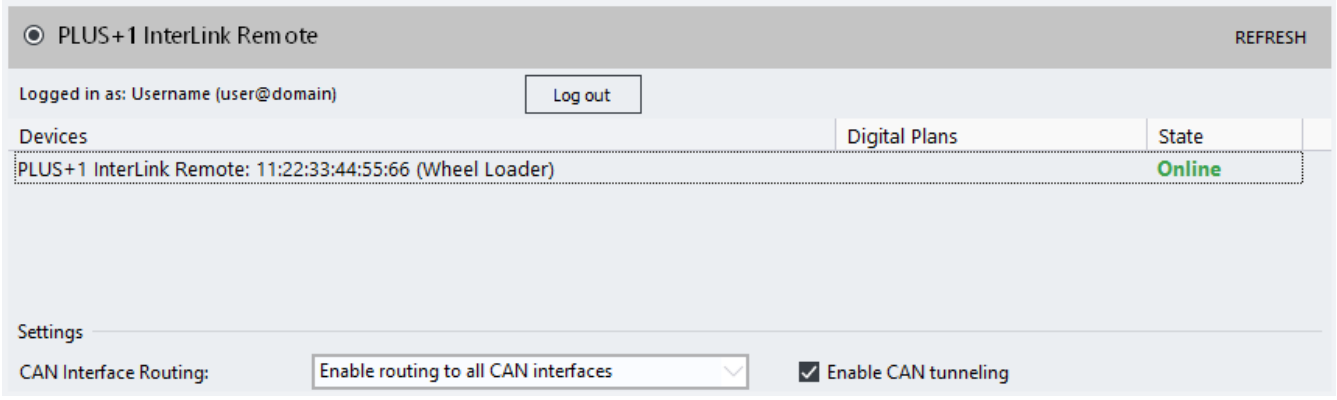
PLUS+1® products with PLUS+1® InterLink Remote capabilities can be used as a gateway.

1. Select **Communication** > **Gateway** > **Select Gateway...** from the PLUS+1® Service Tool window menu.
2. Select **PLUS+1 InterLink Remote** from list of available gateways.
3. Click **Log in** to log in or sign up for a Danfoss Profile. Once authenticated the device list will display the list of your PLUS+1® InterLink Remote devices and the state of each device. Click **Refresh** to the update the state of the available devices.



## PLUS+1® hardware setup

4. Click **OK** to connect to the selected device.




By default, routing to all CAN interfaces is enabled. This means that any PLUS+1® device connected to the CAN interfaces of the remote gateway will be accessible in PLUS+1® Service Tool. This functionality can be configured in the **CAN Interface Routing** list before connecting to the device.

### Using the third party Gateway devices via the RP1210 standard

The PLUS+1® Service Tool supports the generic communication standards RP1210B & RP1210A for any compliant third party gateway. These recommended practice standards were written by the Technology and Maintenance Council (TMC).

- **RP1210B** gateways may not support all baudrates that the built-in gateways support.
  - RP1210B gateways can be used if they support the generic CAN protocol.
- **RP1210A** gateways only supports baudrates equal to 250k.

  RP1210A gateways can be used if they:
  - Support the generic CAN protocol
  - Support blocking calls
  - Use the same endianness (byte order) for CAN messages as RP1210B
- Activate RP1210 gateways by selecting the appropriate **DeviceID** in the submenu under the gateway submenu. All possible device IDs will be listed for selection. Devices do not need to be connected to the computer to be listed.

### Connection

When an RP1210B or RP1210A gateway has been properly installed, it will be automatically added to the list of installed gateways under **Communication** > **Gateway** after the PLUS+1® Service Tool is restarted.

The name of the new gateway consists of the name of the standard implemented (RP1210B or RP1210A) plus the name of the gateway vendor as written in the vendor supplied `.ini` file. The order of gateways in the list is determined by the global `RP121032.ini` file.

### Diagnosing gateway warnings and errors using the RP1210 standard

Configure an RP1210 gateway using its .ini file. It is important that the .ini file follows the standard.

If the PLUS+1® Service Tool has problems reading the .ini file, an error or a warning message will occur. If an error is found, it will not be possible to use the gateway from the PLUS+1® Service Tool. If warnings are found it will still be possible to use the gateway, but a communication slowdown will occur. This slowdown can be overridden by the user. See *Using Reset Gateway in advanced settings* on page 16 to fix a gateway error manually.

**Diagnose** will be a choice under **Gateway** to select to examine any detected errors and warnings.

## PLUS+1® hardware setup

Advanced users may wish to use the **View RP1210 parse** log to troubleshoot RP1210 gateways that may not be working well with the PLUS+1® Service Tool.

Select **Communication** > **Gateway** > **Advanced** > **RP1210 Log** from the PLUS+1® Service Tool window menu.

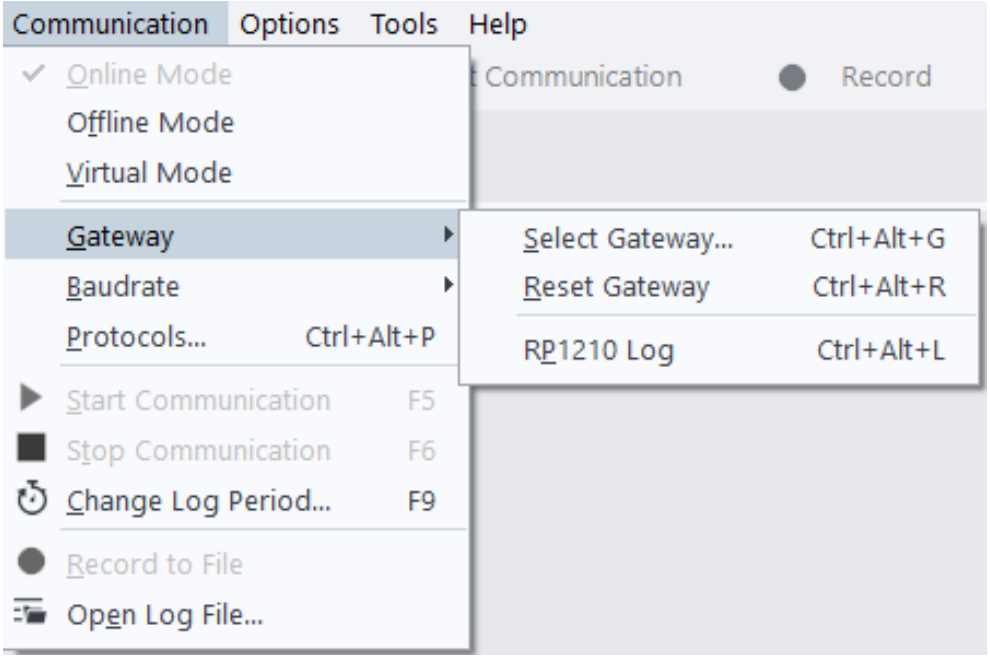
The contents shown in the **RP1210 Parse Results** window is generated from the code and never stored in a specific file.

A gateway that does not implement RP1210B, but only RP1210A will generate a warning message.

### Using Reset Gateway in advanced settings

**Reset Gateway** can be used to:

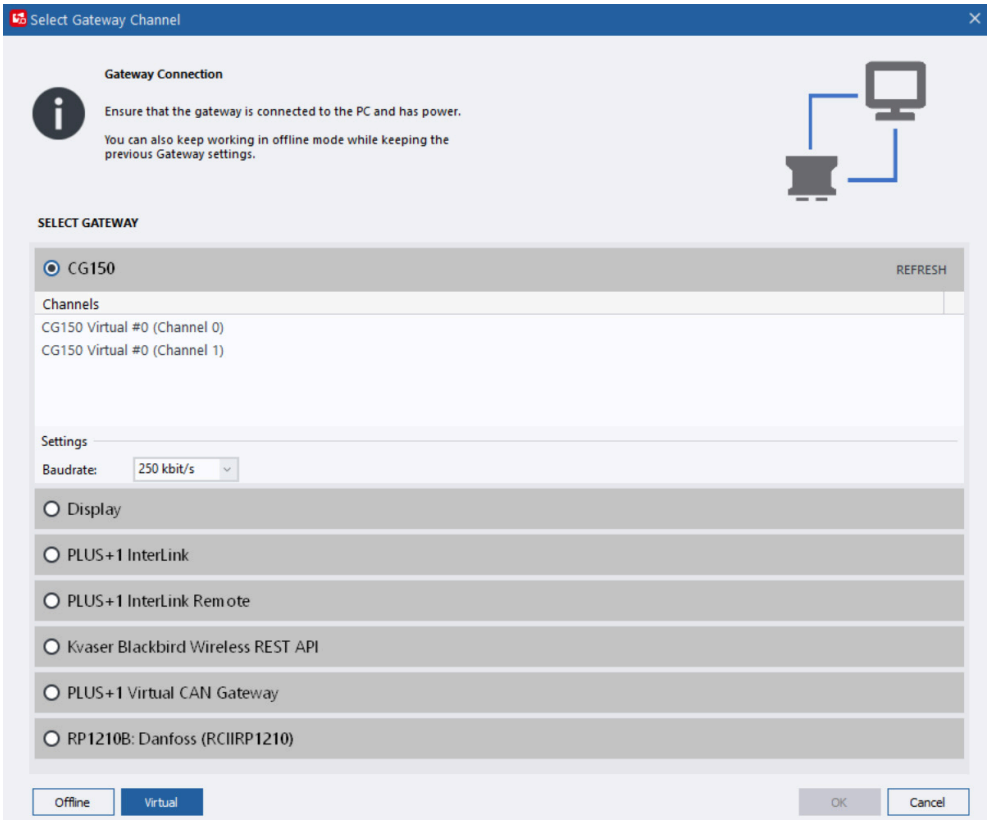
- Search for gateway changes
- Manually fix a gateway error that is not automatically detected




### Virtual Mode

The **Virtual** button in **Communication** > **Gateway** > **Select Gateway...** changes to Virtual mode directly.

## PLUS+1® hardware setup




For further information about Virtual Mode, see PLUS+1® Service Tool Service Tool Design Manual.

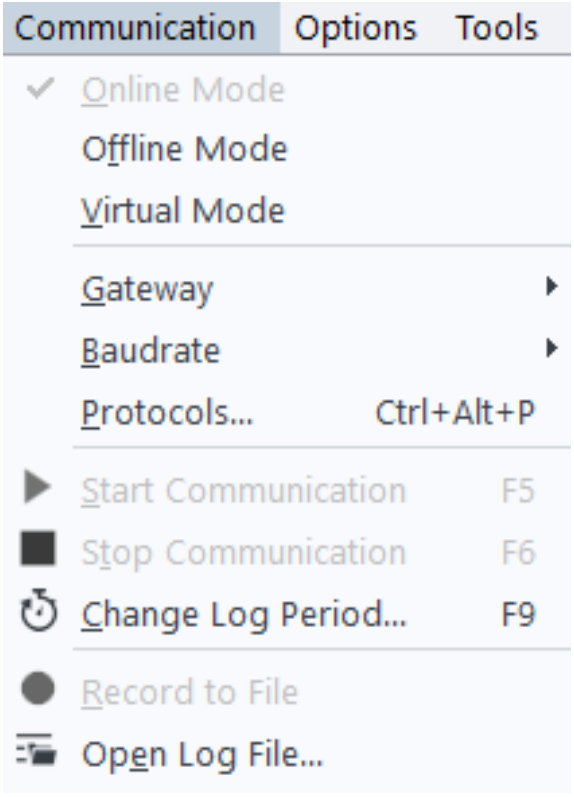
## Managing protocols

### Managing Protocols values

Protocols must be installed and selected before they can be used. This can be done in the **Manage Protocols** window. More than one protocol can be used at a time.

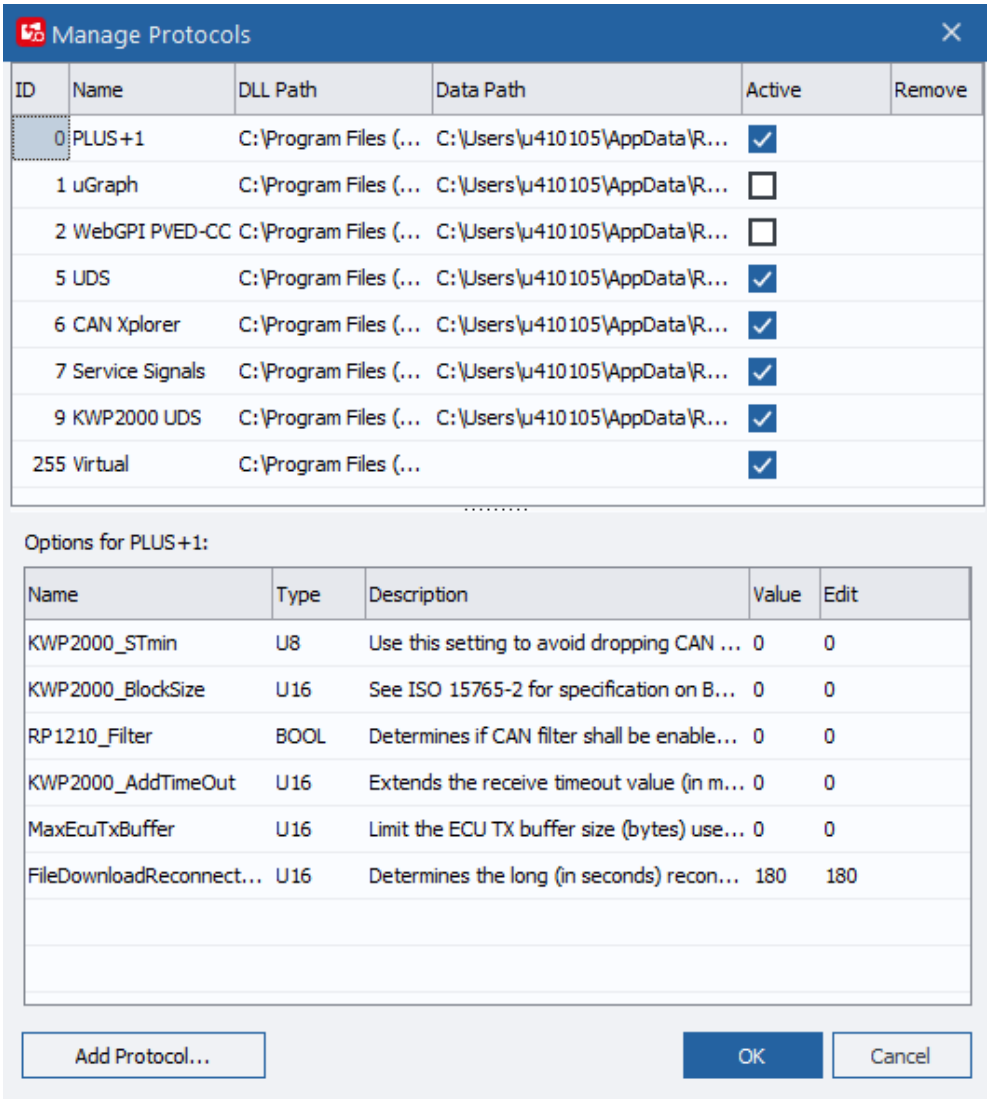
The PLUS+1® Service Tool also supports the use of communication protocols other than the standard PLUS+1® protocol, but not all PLUS+1® features may be functional if a different protocol is used.

To manage communication protocols, select: **Communication** > **Protocols...**.




This opens the **Manage Protocols** window, see below:

## Managing protocols




Selecting **Add Protocol** opens the window, where all installed protocols can be seen and managed. The **Manage Protocols** window displays the following values:

*Manage Protocols Values*

| | |
|---|---|
| **ID** | All protocols have an assigned ID number from 0 to 255. PLUS+1® protocol is always 0 and Virtual is always 255. |
| **Name** | Protocol name. |
| **DLL Path** | Location folder of actual DLL file. |
| **Data Path** | Location of a created folder where protocol-related information can be stored. This location can be changed by the user. |
| **Active Selection Box** | Check box checked: protocol is active. |
| **Remove** | Link to remove protocol from system. |

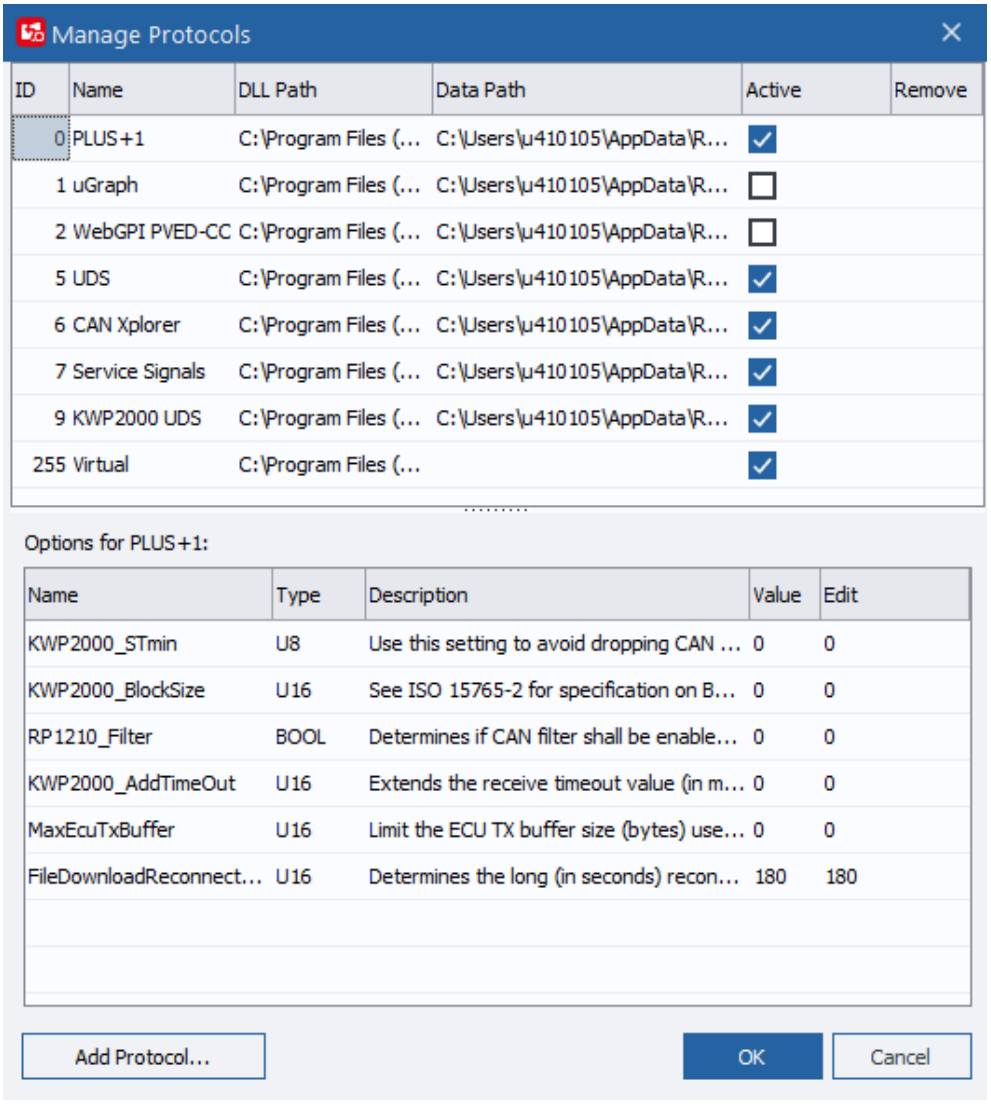
## Managing protocols

### Add new protocols

1. Add new protocols by clicking the **Add Protocol** button in the lower left corner of the Manage Protocols window.
2. Select a protocol DLL in the Select Protocol DLL dialog and click **Select** to confirm the choice.

   The added protocol will now appear in the protocols list of the Manage Protocols window with an assigned ID number.
3. Use the **Manage Protocols** window to check data path, activate, remove or modify options for the protocol. When finished, click **OK**.

   The protocol is added and ready for use.




When using multiple protocols in a system, make sure that the protocols will not interfere with each other. High bus load may occur when using many protocols at the same time.

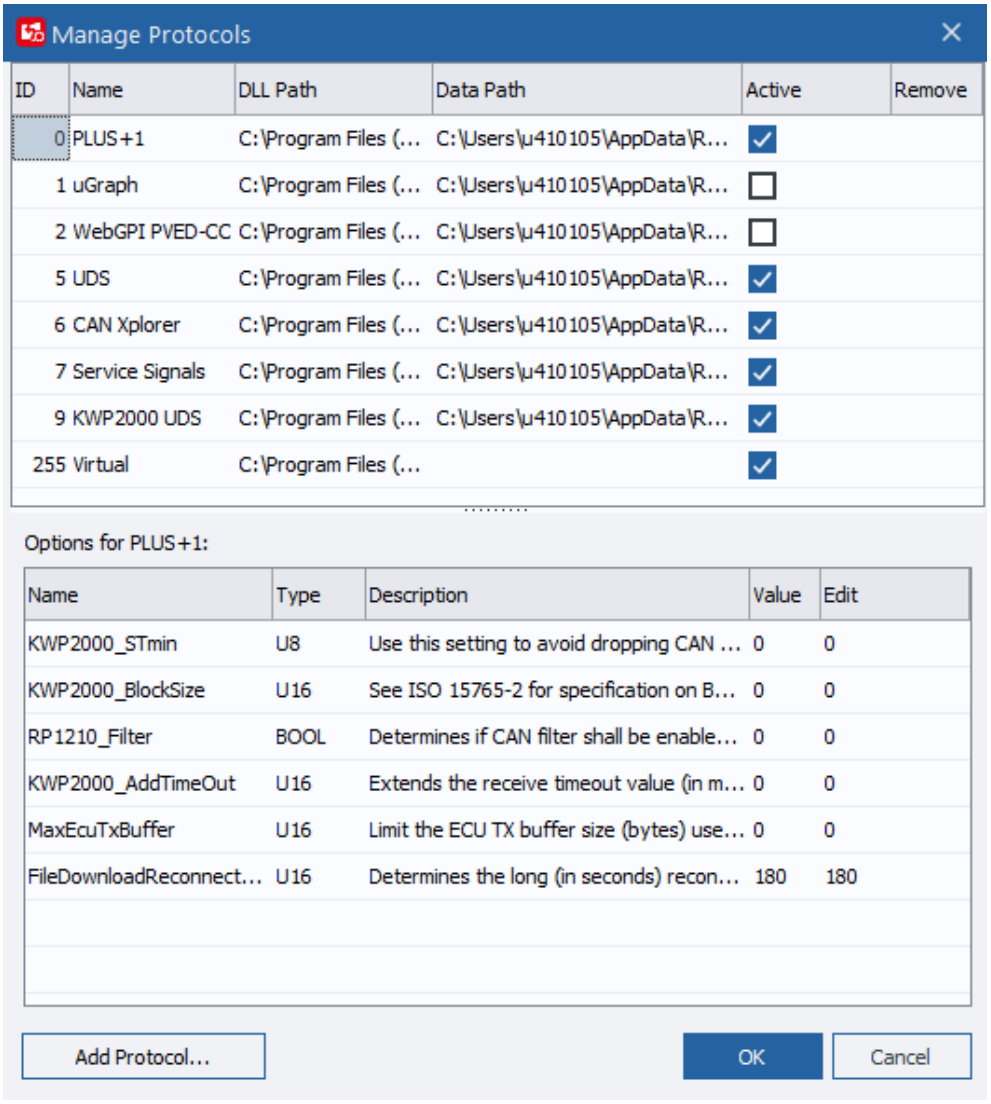
## Managing protocols

### Protocol options

Protocol option values can be changed.

1. In the **Manage Protocols** window, select a protocol in the list to view the protocol options displayed in the bottom part of the dialog.

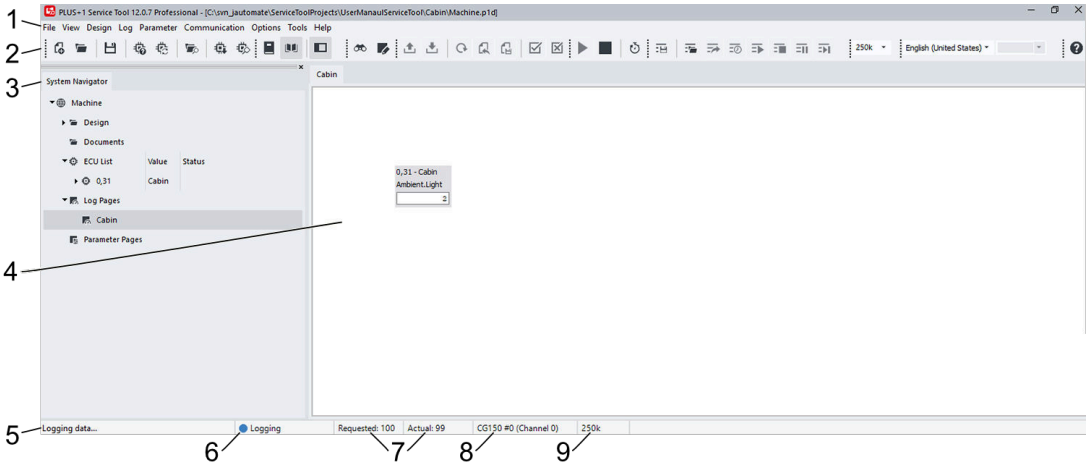
   The options and information for each protocol will vary.
2. Click the value in the **Edit** field to edit the option value.
3. Click **OK** to save and use the updated option values.




*Options for protocol window*

| | |
|---|---|
| **Name** | The name of the option. |
| **Type** | Setting type. |
| **Description** | A short description of the setting. |
| **Value** | The current value of the setting. |
| **Edit** | The editable properties of the setting. If field is empty, the setting is not editable (see editing properties for more information). |

## PLUS+1 Service Tool window



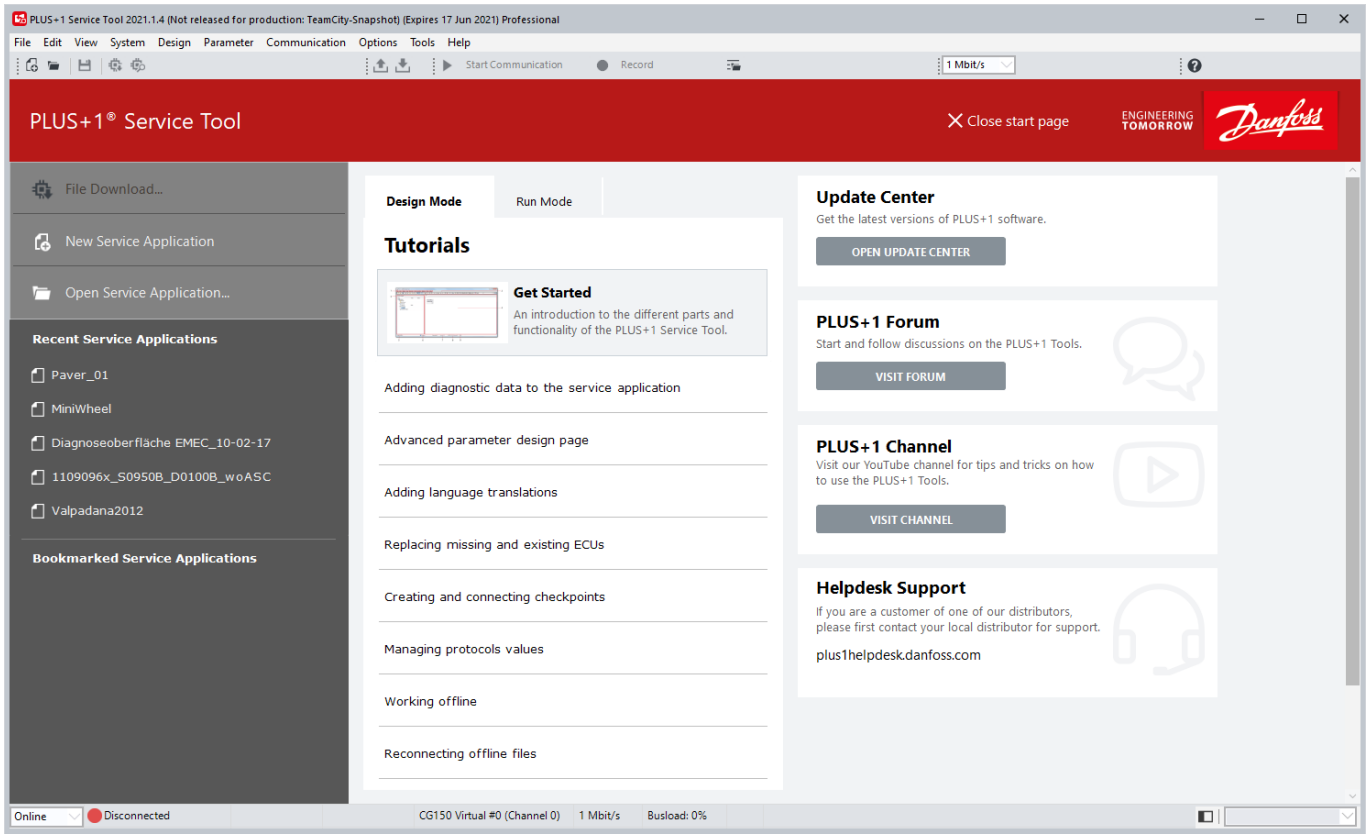

*PLUS+1® Service Tool Window Description*

| Item | Name | Description |
|---|---|---|
| 1 | Menu bar | Use to access PLUS+1® Service Tool commands and information. |
| 2 | Toolbar | Use to access common PLUS+1® Service Tool commands and information. |
| 3 | System Navigator | Use to show a tree view of all hardware and software applications within the PLUS+1® Service Tool. |
| 4 | Work area | The area where all PLUS+1® Service Tool functions are performed. |
| 5 | Service function status | Displays information of current PLUS+1® Service Tool function. |
| 6 | Controller connection status | • **Green** — Controller connected<br>• **Blue** — Logging or Downloading<br>• **Yellow** — Searching for connection<br>• **Red** — Controller disconnected or gateway error |
| 7 | Log period status | Displays the requested and actual log period settings in the application. |
| 8 | CAN device information | Displays connected CAN/USB gateway interface communicator information. |
| 9 | CAN baudrate | Displays the baudrate setting for the CAN/USB gateway interface communicator. |

## PLUS+1 Service Tool window

### Start page

The start page is available by default when no Service Application is open in PLUS+1® Service Tool. It can be disabled in Options under General (or new page number if changed).




*PLUS+1 Service Tool start page*

| Item | Description |
|---|---|
| File Download… | Displays the Open Download File dialog. Once a file is selected, the Download File dialog is displayed. |
| New Service Application | Creates a new empty Service Application. |
| Open Service Application... | Displays the Open Service Application dialog. Use this dialog to locate and open Service Application files. |
| Recent Service Applications | A list of recently opened Service Applications. Select a Service Application to open from this list. |
| Bookmarked Service Applications | A list of bookmarked Service Applications. Select a Service Application to open from this list. |
| Tutorials | A list of tutorial links into the HTML version of the user and design manuals. |
| Update Center | Shortcut to start the PLUS+1® **Update Center**. |
| PLUS+1® Forum | Shortcut to the PLUS+1® Forum online. |
| PLUS+1® Channel | Shortcut to the PLUS+1R YouTube channel. |
| Helpdesk Support | Contact information to PLUS+1® Helpdesk. |

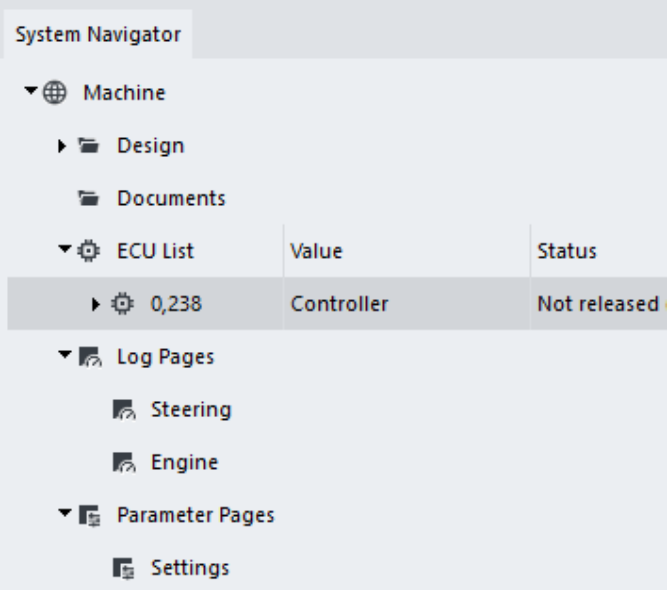
## PLUS+1 Service Tool window

### System Navigator features

The System Navigator section of the PLUS+1® Service Tool window contains and displays important information for the PLUS+1® Service Tool.

It is possible to copy the ECU list information to the clipboard, by right-clicking the ECU List node and selecting the menu item **Copy ECU List to clipboard**.

The System Navigator area is the starting point for all PLUS+1® Service Tool functions.




Use the System Navigator to:

- Set and display system information
- Store and access documents (right click on Documents icon to add, remove or hide documents in Normal view)
- Set and display ECU information
- Display Net, node and hardware information
- Create, open and arrange Log and Parameter pages
- Store and display PLUS+1® Service Tool activity history

Information in the System Navigator is arranged in a hierarchical style. Sections can be expanded or minimized as needed.

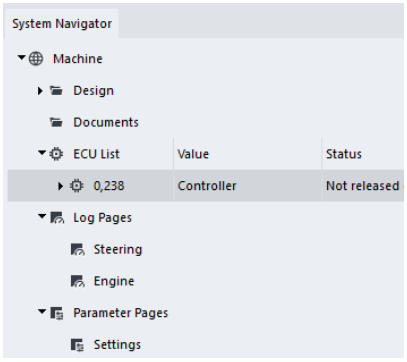
### Locking and unlocking Diagnostic Navigator pane

Unlock the Diagnostic Navigator pane:

## PLUS+1 Service Tool window

1. Drag the pane by the undocking bar to separate it from the main window.

   *Drag to unlock (docked)*

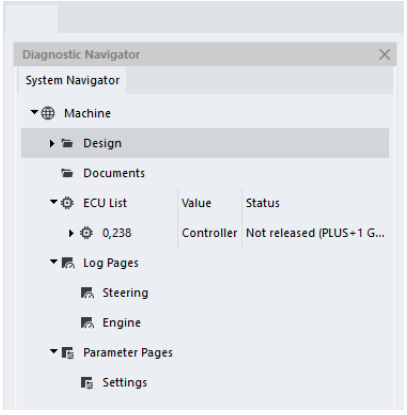



Lock the Diagnostic Navigator pane:

2. Double-click on the title bar at the top of the window.

   The Navigator pane snaps to its default position.

   *Double-click to dock (undocked)*




Hide the Diagnostic Navigator pane:

3. Toggle either the Diagnostic Navigator button in the status bar or Diagnostic Navigator in the View menu.

Display the Diagnostic Navigator pane:

4. Move the mouse cursor to the left side of the PLUS+1® Service Tool window or click the System Navigator button on the toolbar again.

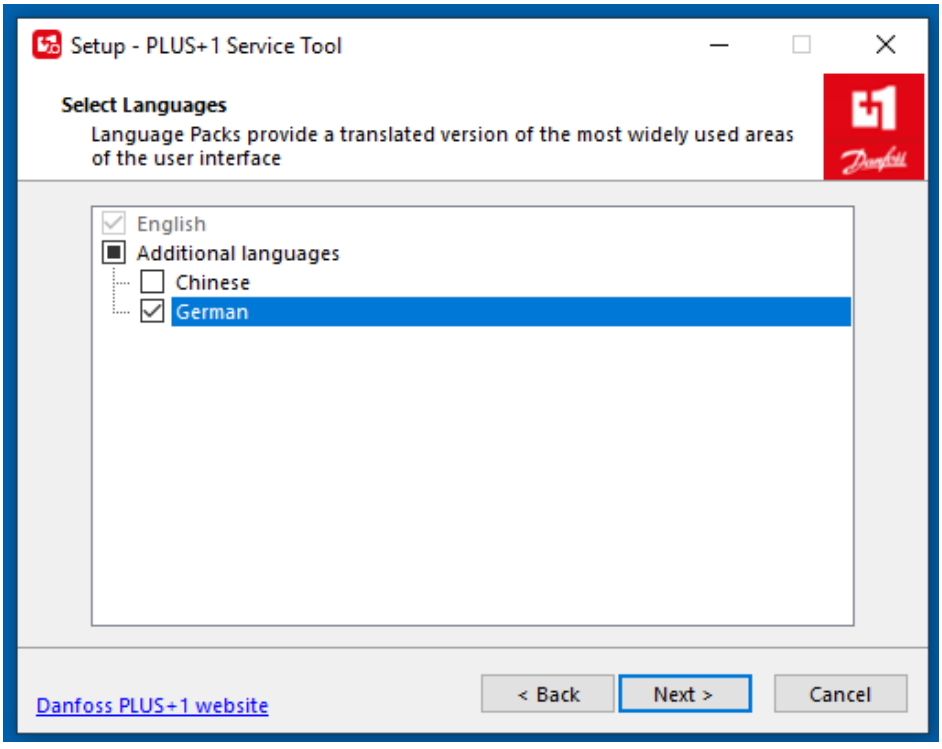
## Restoring default layouts

Select **View** > **Default Layout** to restore the PLUS+1® Service Tool window settings to the default layout.

## PLUS+1® Service Tool languages

### Installing tool languages during setup

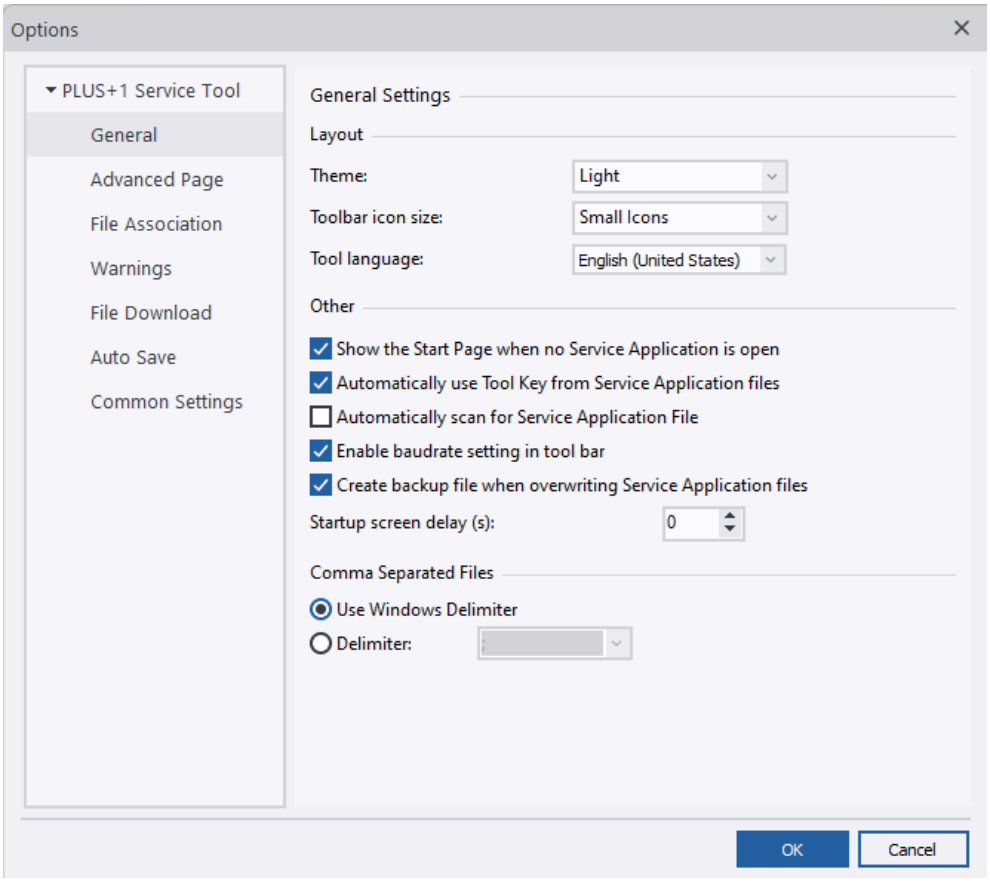
When setting up the PLUS+1® Service Tool, install additional languages in the **Select Languages** page.




### Selecting the PLUS+1® Service Tool language

To select the preferred PLUS+1® Service Tool language, select **Tool language** in the General Settings.

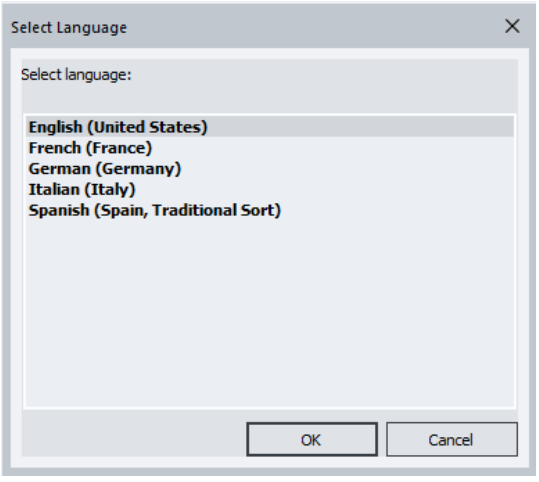
## PLUS+1® Service Tool languages




To select the default language (English), select **Options** > **Language** > **Default Tool Language**.
This can also be done by selecting `Ctrl+Alt+F`.

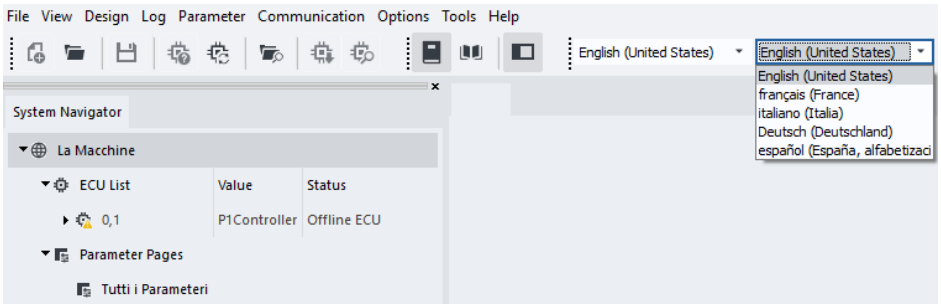
### Selecting the Service Application language

When a multilingual Service Application is active and the tool is in Normal View, select **Options** > **Language** > **Select Service Application Language**.




Alternatively, you can select the preferred language in the drop-down list of the toolbar.

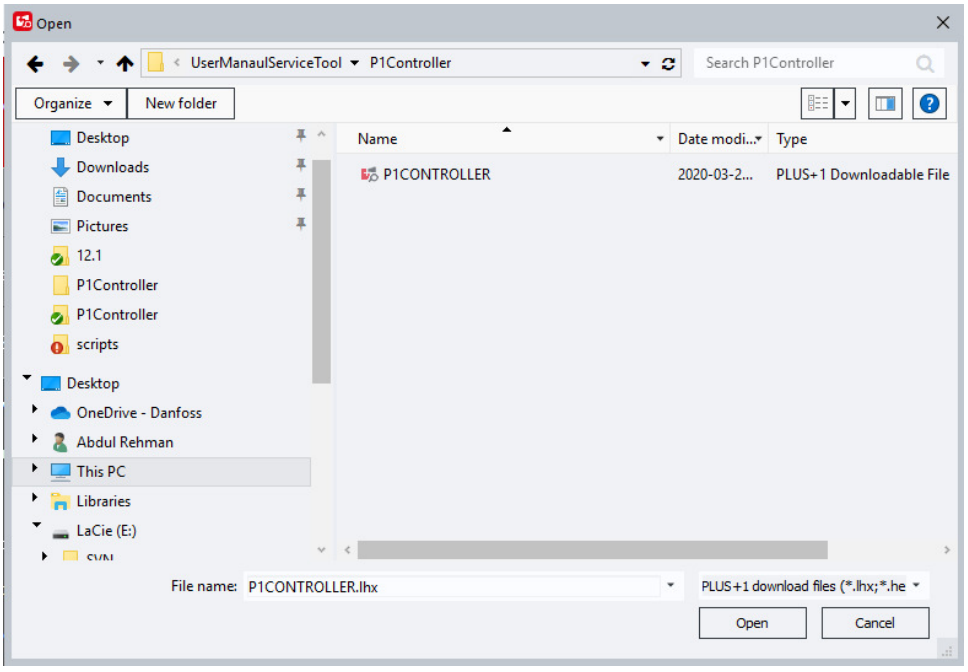
## PLUS+1® Service Tool languages



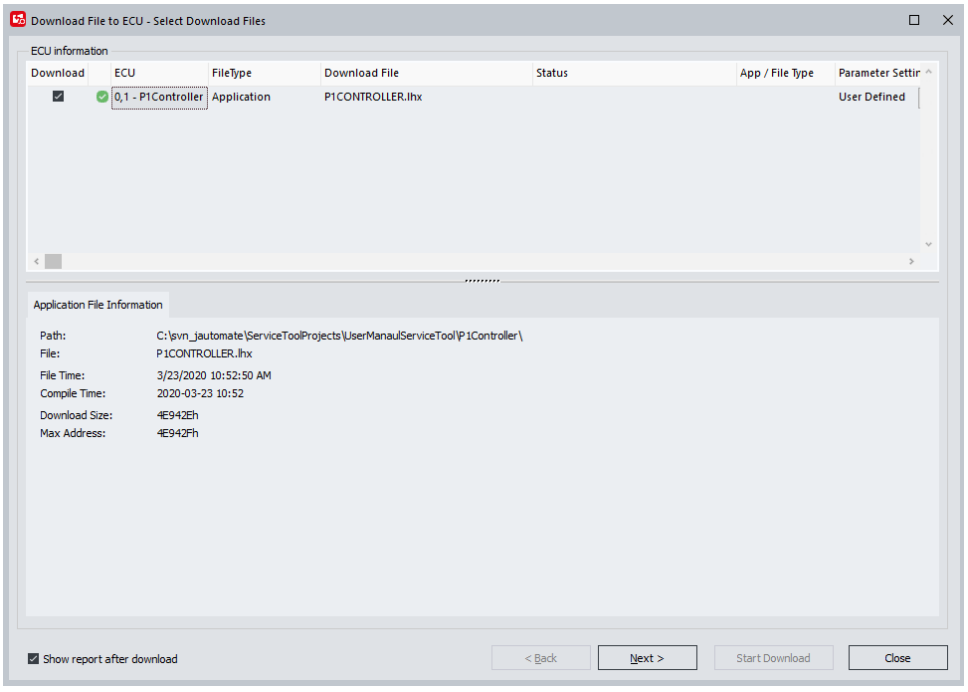
## Downloading the application

### Preparing to Download the Application File to the Controller

1. Click the **File Download** button in the PLUS+1® Service Tool window toolbar.
   This can also be done by selecting **System** > **File Download** or `Ctrl+D` command.
2. Browse in the **Open** dialog box and click the file name of your application, then click **Open**.
   It is possible to select multiple download files.




3. Select the target ECU in the **ECU** drop-down list and click **Next**.

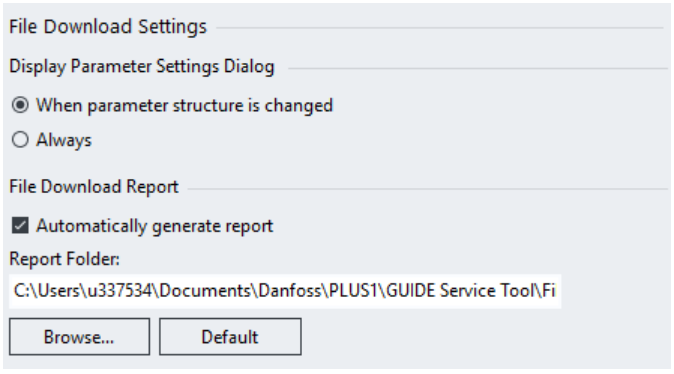



The download file is now ready for downloading.

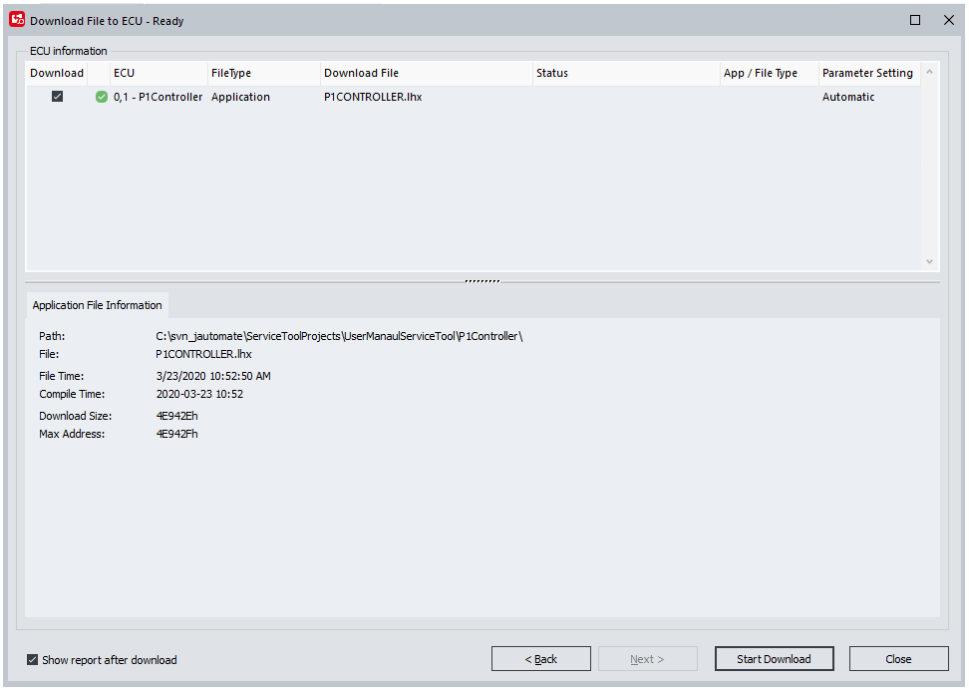
## Downloading the application

4. Check the **Show report after download** checkbox to get a report of the download.

   It is possible to configure the PLUS+1® Service Tool to automatically save download reports to a specific folder. If this functionality is enabled, the **Show report after download** checkbox will not be available.

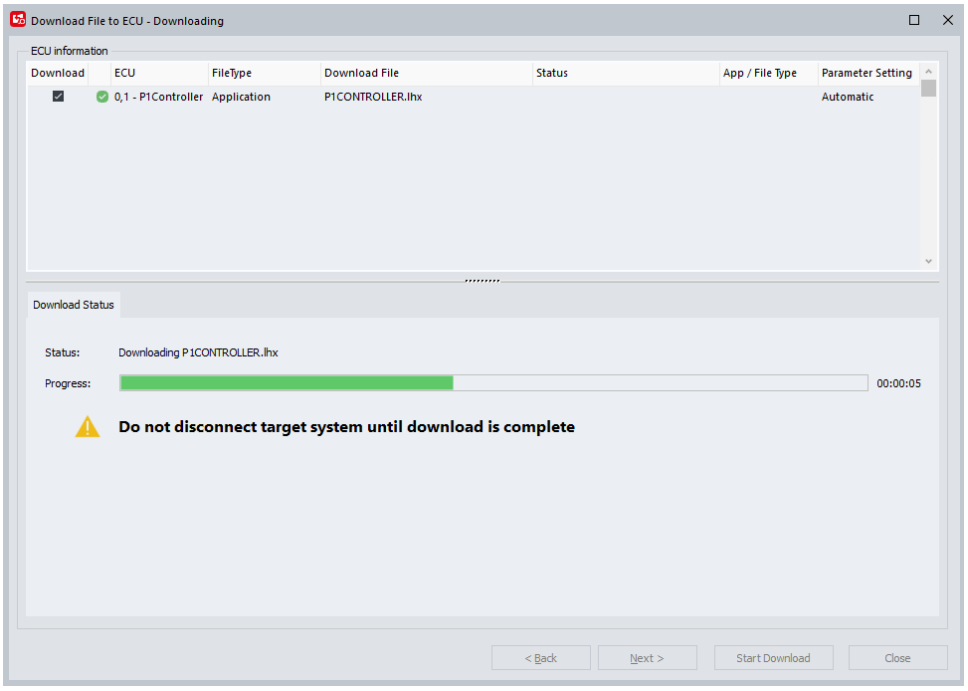



5. Click **Start Download** to download the application.



## Downloading the application

*A progress bar is shown while downloading*




It is recommended that there are no other applications running on your PC while downloading the application file. This will speed the file transfer process up and help to avoid possible system and application conflicts.

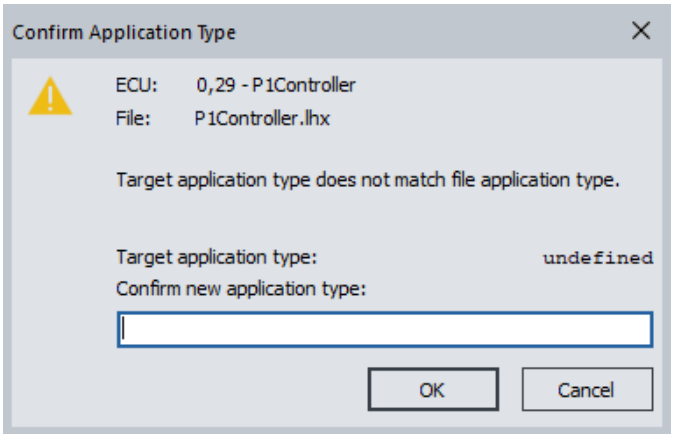
**Caution**

To avoid possible system and application conflicts, do not disconnect or power off the system during the download process. The PLUS+1® Service Tool will automatically rescan the controller when the download is completed.

- If the target OS version does not match the file OS version when attempting to download, a warning message will be shown in the Application File Information in the Download File to ECU window:


- If the target application file type does not match the file application type for the file that is to be downloaded, a warning message dialog box will appear:

### Downloading the application

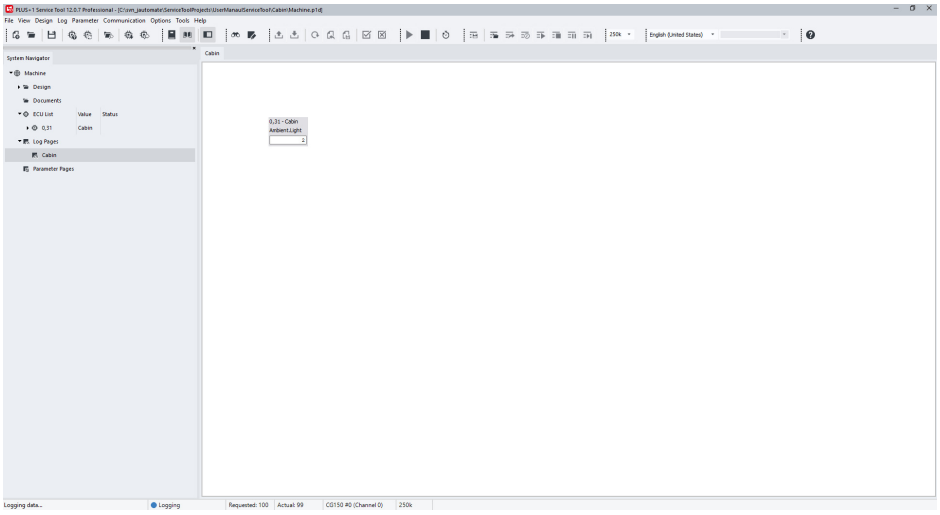



When the download is completed, the application is ready for testing.

6. Click the **Save Report** button when the download is finished to create a report file.

### Downloading system download packages

When using system download packages, there will be a list of individual downloads (1-∞) in the list. It is possible to check/uncheck individual downloads, depending if they are mandatory or not.

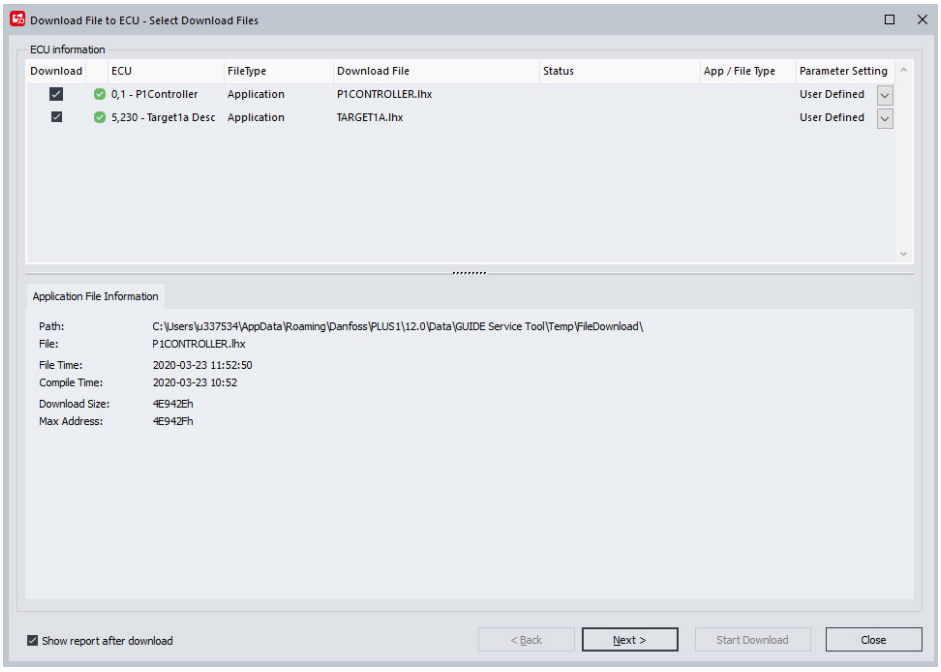


1. Click **Next** to see eventual parameter settings.
2. Click **Start Download** to start all downloads.

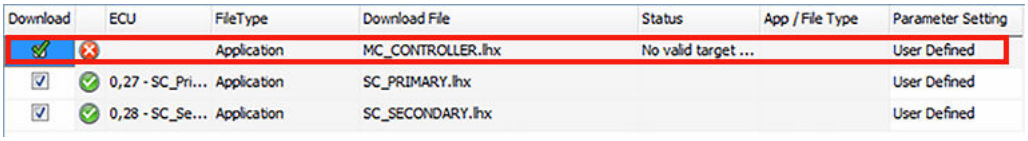
#### Mandatory applications/missing ECUs

Applications might be mandatory in a package. It is not possible to deselect these applications during the download sequence.

## Downloading the application




If no valid ECU is found for the mandatory application, it will not be possible to continue the system download.

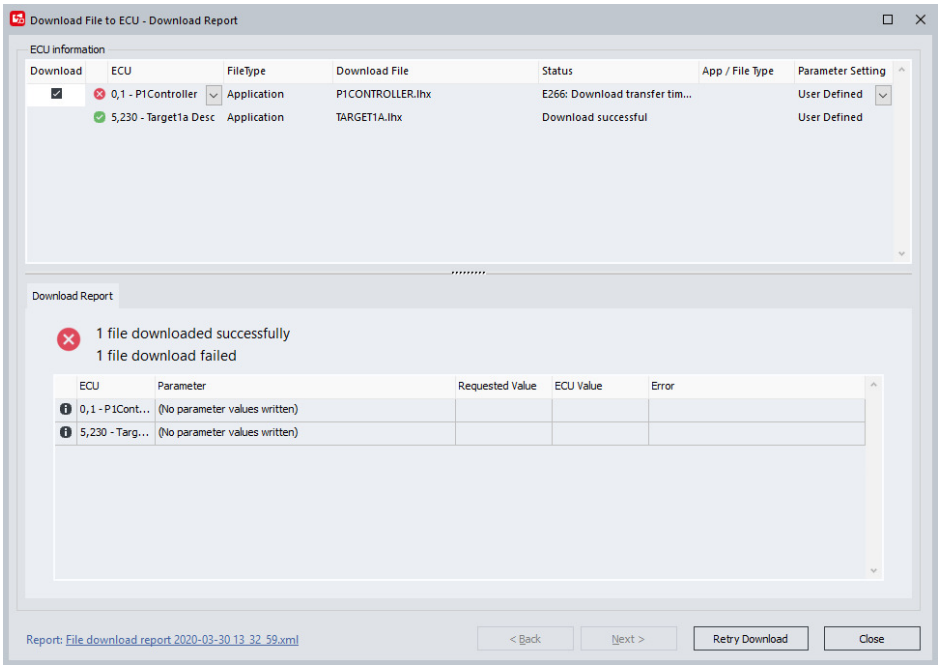



### Retry downloads

It is possible to retry a failed download. The successful downloads will be unchecked by default, and the failed download will remain checked.

## Downloading the application

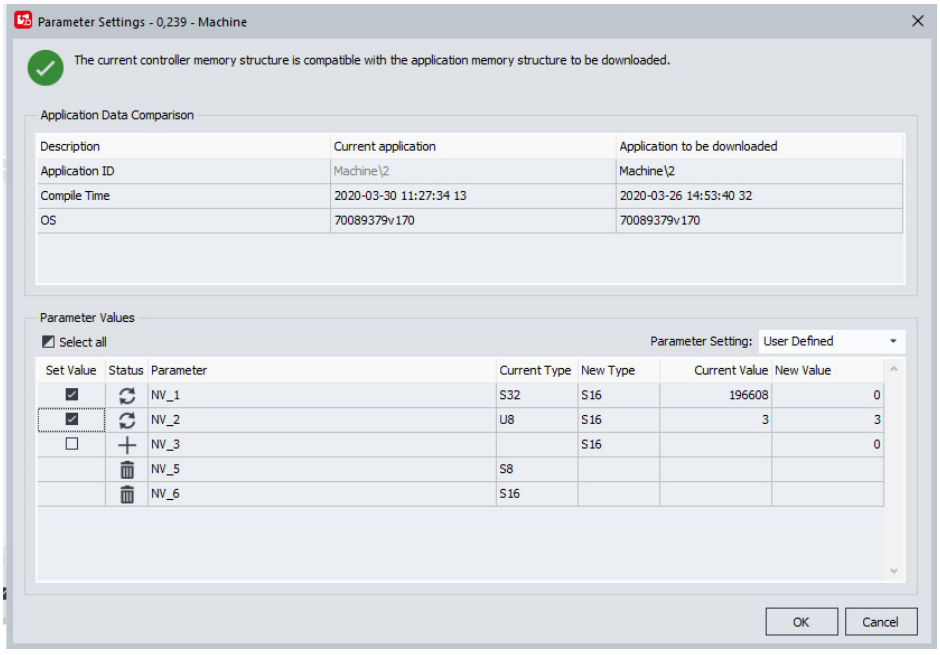
Press the **Retry Download** button to retry the failed downloads.




## Parameter settings during the application download

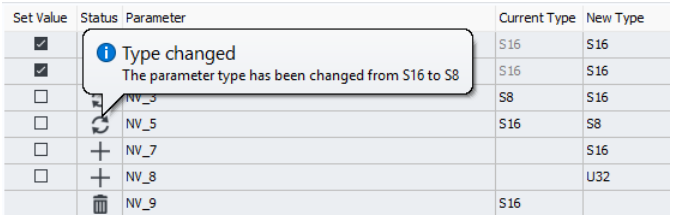
**Parameter Settings - Values** dialog window will appear when downloading applications with common parameters.

- The upper field shows information about the current application and the application to be downloaded.
- The lower field shows changes in the parameter structure.

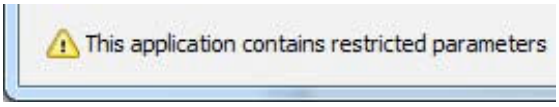



The **Status icons** display more detailed information about the parameter. Only parameter values that are checked in the Parameter Values dialog box will be downloaded during file download.

## Downloading the application

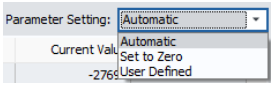



If restricted parameters exist, a warning message will be displayed.



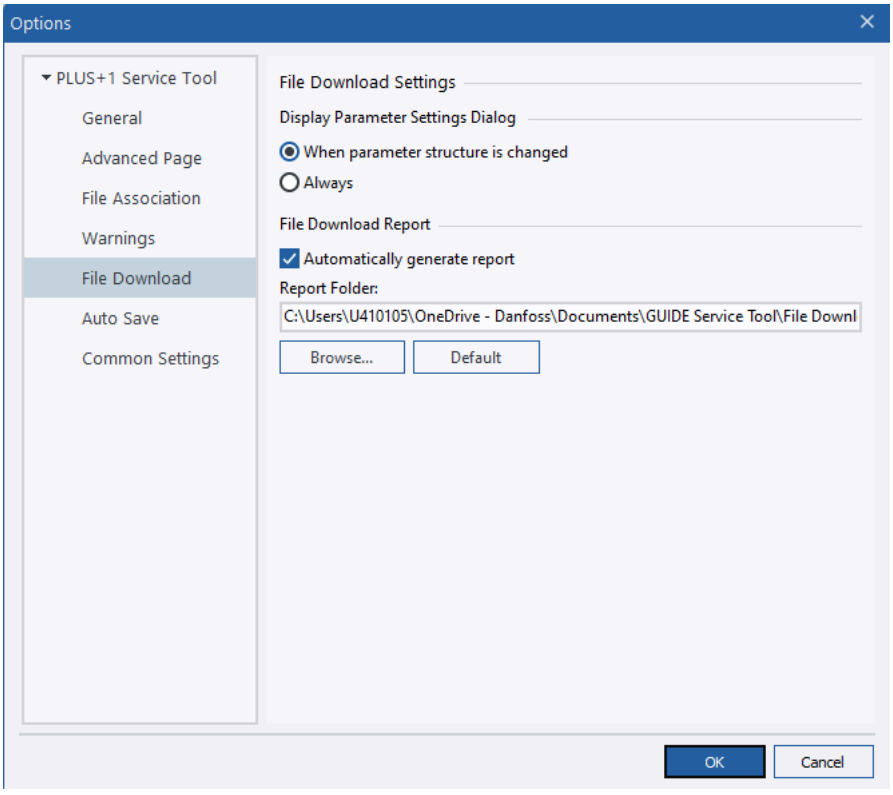

- Restricted parameters will be transferred automatically.
- New restricted parameters will be set to zero.
- Restricted parameters with changed parameter type will be transferred if the value is valid within the new parameter type; otherwise the parameter value will be set to zero.

Use the **Parameter Setting** pull-down selection to define parameter setting behavior:



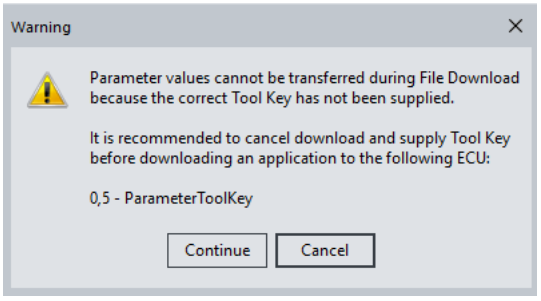

- **Automatic** selection will transfer values where the memory locations have been changed.
- **Set to Zero** will set all parameter values to zero (parameter values with restricted access will be transferred to the new application).
- **User Defined** is automatically selected when custom changes are made. All fields that are white (not grey) are possible to change manually.

An option is available whether to always display the parameter settings dialog, or only when the parameter structure is changed.

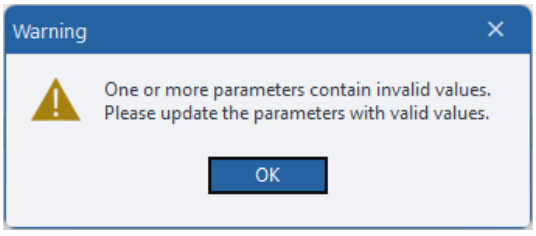


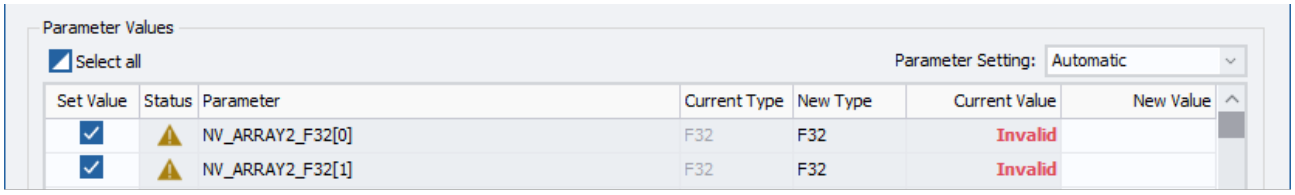
## Downloading the application

The correct Tool Key for the current application must be supplied before the download to be able to transfer the parameter values automatically. If not, a warning dialog will be displayed. If you continue the download, parameter values will not be transferred to the new application.



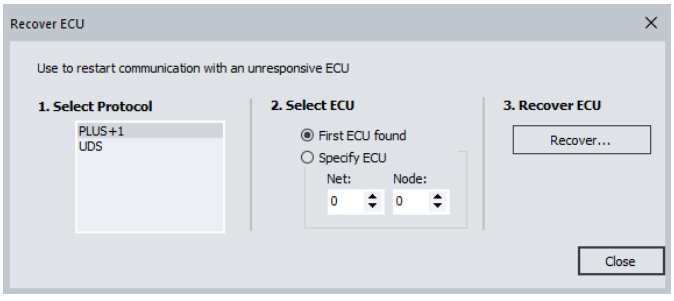

A warning message will be displayed if the target ECU contain parameters with invalid parameter values. Valid values need to be supplied in the **Parameter Setting** dialog for the parameters to be written during the file download.



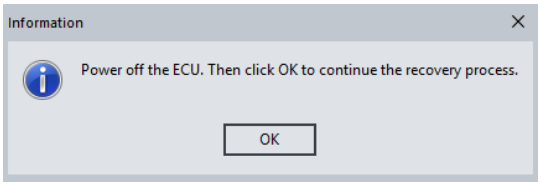

## Recover ECU functions

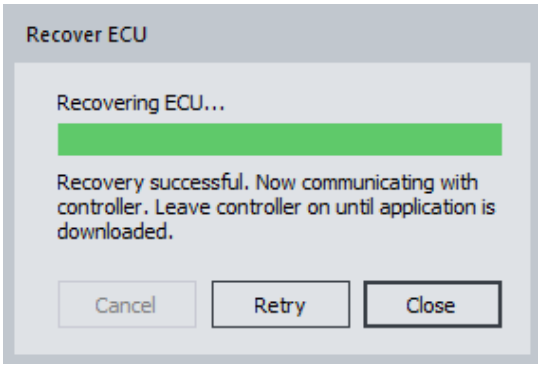
The **Recover ECU** is available for all protocols (where supported), and not only the PLUS+1® protocol. A protocol field is available in the Recover ECU dialog.




It is also possible to install diagnostic data files for all protocols (where supported).

### Downloading the application




To use the Recover ECU functionality with a display or RP1210 gateway it is required to have at least 3 units attached to the CAN Bus: The diagnostic interface, the ECU to recover, and at least one hardware that can do acknowledge on the CAN messages sent by the PLUS+1® Service Tool.

## Working with service application files

### Introduction to service application files

In order to interface with an ECU application, a service application file is needed. Service application files can contain both Log and Parameter pages.

There are two ways to open service application files in the PLUS+1® Service Tool application.

- Manual load service application files
- Scan for service application files

#### Log page

Use the Log page to:

- Monitor application activity
- Enable data logging to file
- Export log data to Microsoft Excel®

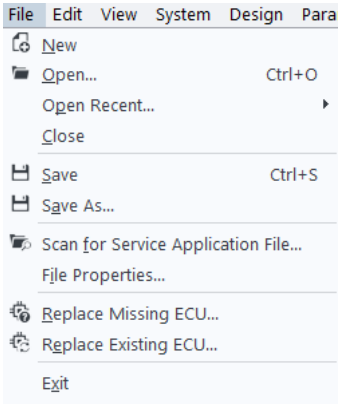
#### Parameter page

Use the Parameter page to:

- Read and write PLUS+1® GUIDE profiles and parameters
- Import and export created parameter files
- Generate database reports of parameter values

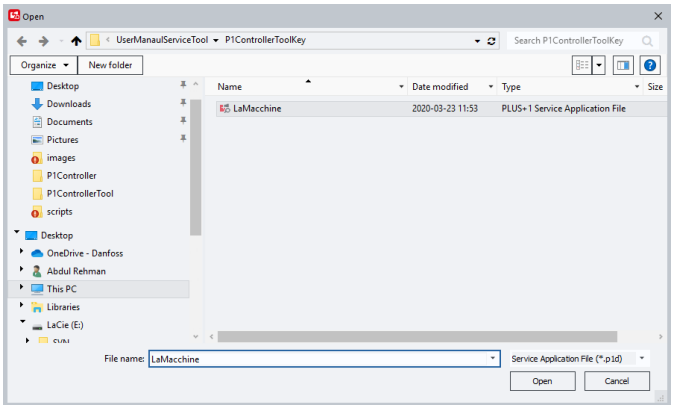
#### Manual Load of Service Application Files

1. Select **File** > **Open**



## Working with service application files

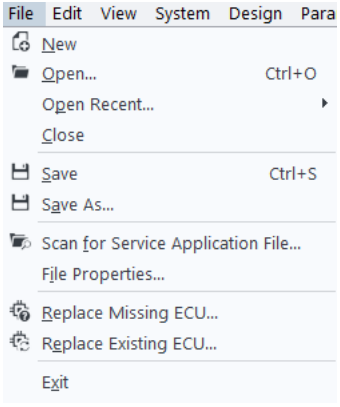
2. Select System Application files to load to the System Navigator.




### Scanning for service application files

Use **Scan for Service Application File...** to load service application files:

1. Select **File** > **Scan for Service Application File...**




If the connected system contains a System ID, that System ID will be used to find matching service application files. All service application files that contain an exact matching System ID will be displayed in the results dialog.

If only one matching file is found, this file will be opened automatically.

Matching files are added to the list while searching.

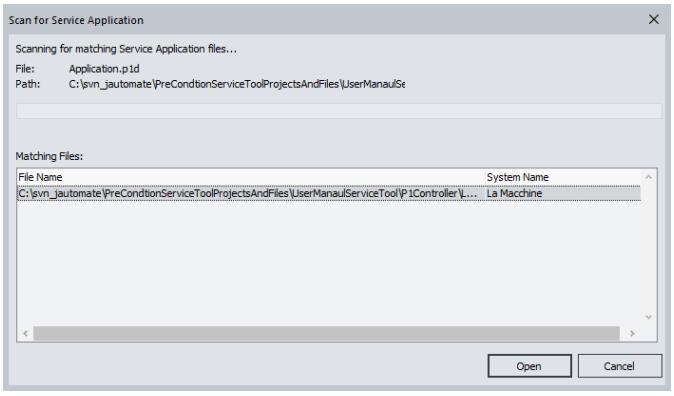
2. To open a matching file and close the search dialog, select the desired file in the list and select **Open**.

Refer to the *PLUS+1® GUIDE User Manual*, **AQ152886483724** for instructions how to enter System IDs into PLUS+1® GUIDE.

The PLUS+1® Service Tool will search for service application files in the following locations:

## Working with service application files

- Any service application file that has been previously opened
- Files in the `My Documents Danfoss\PLUS1\GUIDE Service Tool\Service Application Files Folder`

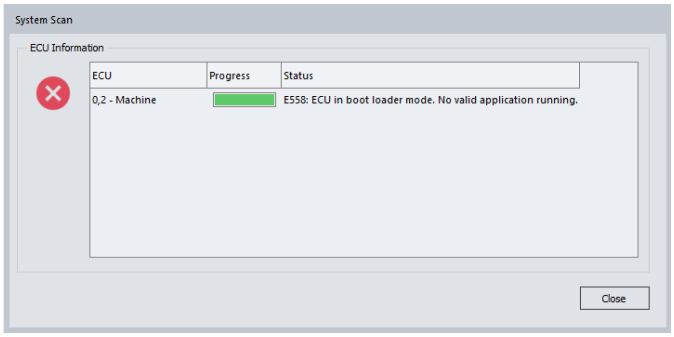



If no System ID is available in the connected system, files will be matched using the Net/Node Number, Application ID, and Application Type of the file and connected system. An exact match of all ECUs in the file and system is required.

## Boot loader mode

After downloading an application, the system is scanned for new diagnostic data to load.

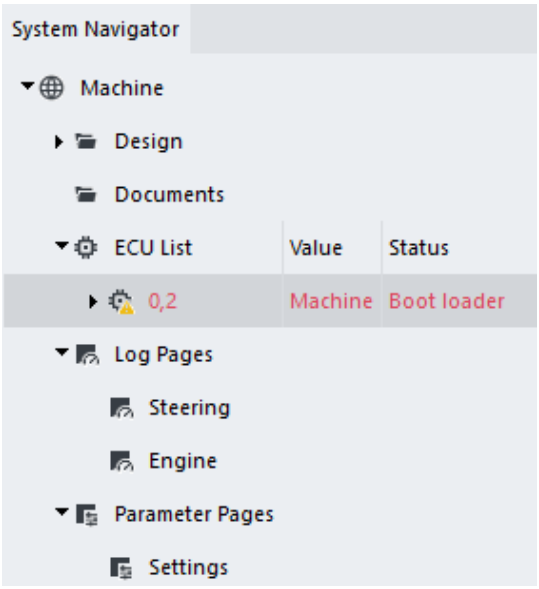
If the connection is broken during the application download, the ECU will go into boot loader mode.




When the ECU is in boot loader mode the ECU will be displayed red in the System Navigator.

Downloading a valid application will take the ECU out of boot loader mode.

## Working with service application files




### Automatic scan for service application files

The PLUS+1® Service Tool can be set to automatically open the correct P1D after scanning the system in normal view.

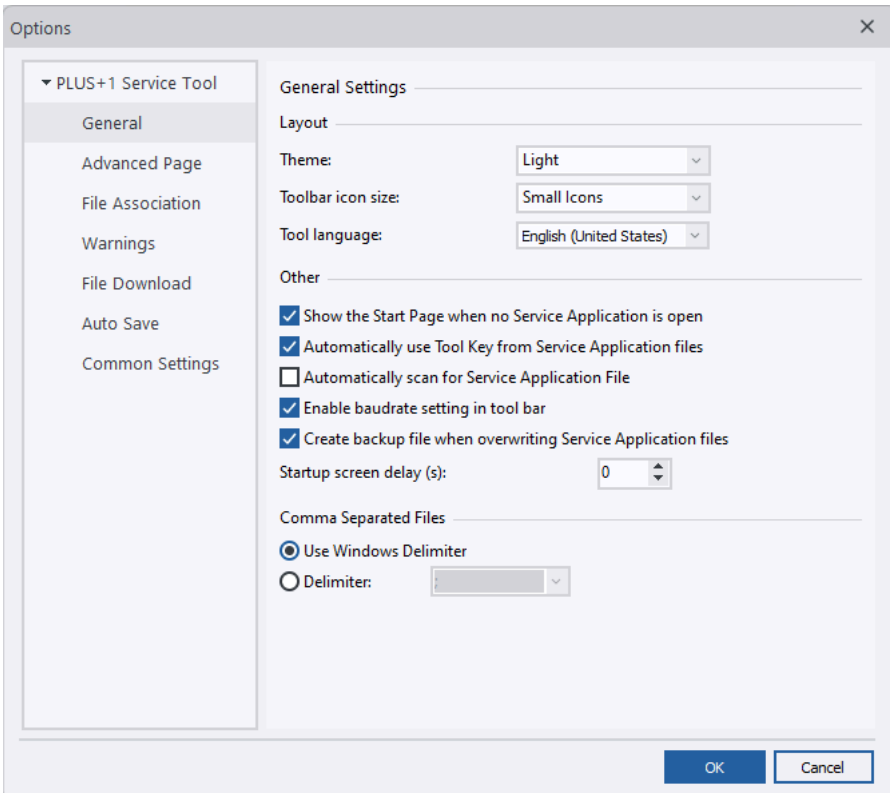
The option **Automatically scan for Service Application File** must be enabled in the PLUS+1® Service Tool settings for this feature to be active.

When enabled, the **Scan for Service Application File** function on the File Menu will be activated after each system scan.

1. Enable the feature by selecting **Automatically scan for Service Application File** in the General section of the Options dialog box.

### Working with service application files

2. Click **OK** to save your selection and close the Options dialog box.



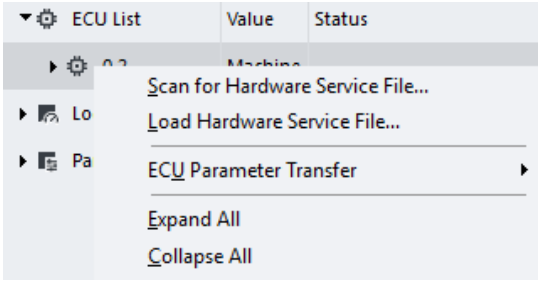

The **Automatically Scan for Service Application File** will only be activated if the connected system contains a System ID.

### Opening hardware service files

There are two ways to open hardware service files in the PLUS+1® Service Tool application:

- The PLUS+1® Service Tool can scan for hardware service files
- Files can be manually loaded

1. Open the PLUS+1® Service Tool.
2. In the System Navigator, right-click on the ECU and select option.
   - **Scan for Hardware Service File...**
   - **Load Hardware Service File...**



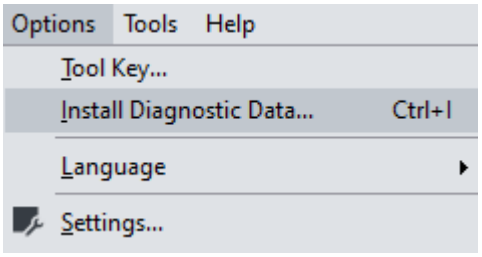

### Manual installation of diagnostic data files

In the PLUS+1® Service Tool, diagnostic data files are automatically installed when a P1H/P1D or LHX file is opened.

### Working with service application files

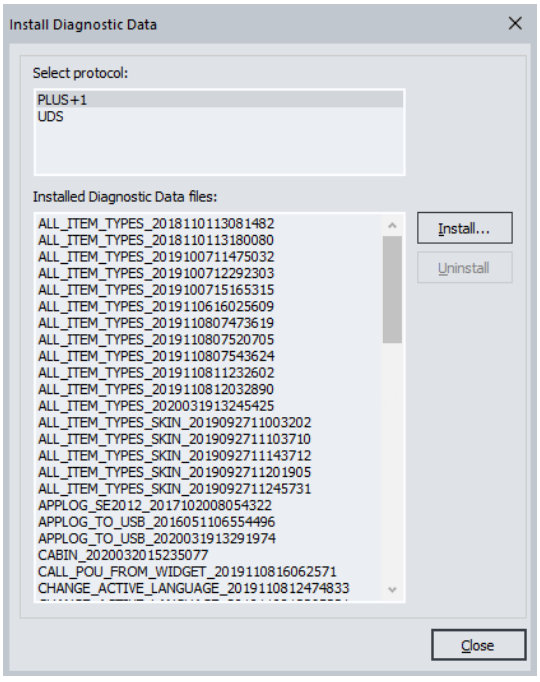
Diagnostic data files can also be installed manually by selecting **Options** > **Install Diagnostic Data**.

1. Click **Install Diagnostic Data...**
   Active communication protocols that support Install Diagnostic Data files are listed.



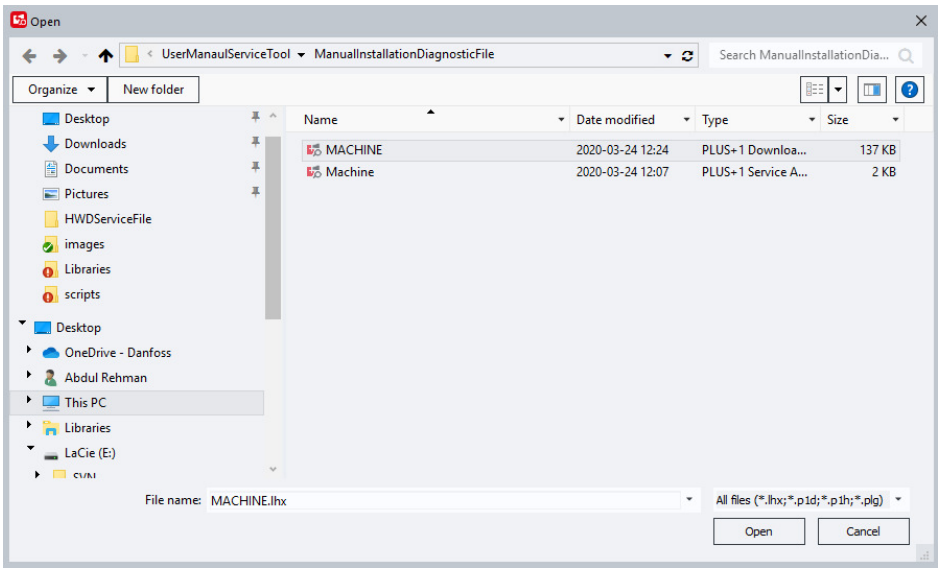

2. Select from the list of active protocols to display the installed diagnostic data files.
3. Select a data file to install or uninstall.

   A new file can be added by leaving all selections unchecked and clicking **Install**.



## Working with service application files

4. After clicking install, select a file to install from the **Open** window. Click **Open** to install.

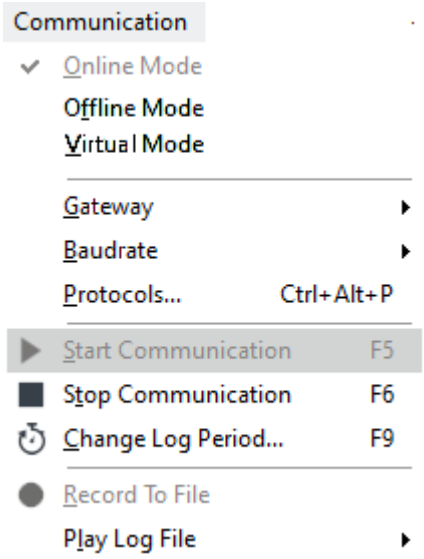



An installation dialog window will confirm the status of the file installation. Unsuccessful installations will be shown in red with the reason for the failed installation.

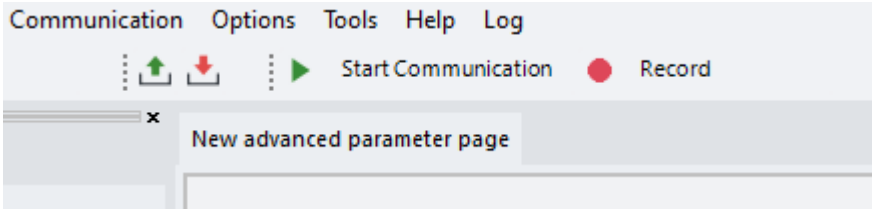
## Using log pages

### Logging controls

1. In the menu bar of the main PLUS+1® Service Tool window, select **Communication** > **Start Communication** to begin log activity.
2. To stop logging, select **Communication** > **Stop Communication**.
3. Logging can be monitored in any or all of the four log file views chosen in the Design Diagnostic Page. Click through the tabs to change log views.




4. Logging controls can also be accessed through the button controls above the **Log** view work area.




*Button controls above the Log view area*

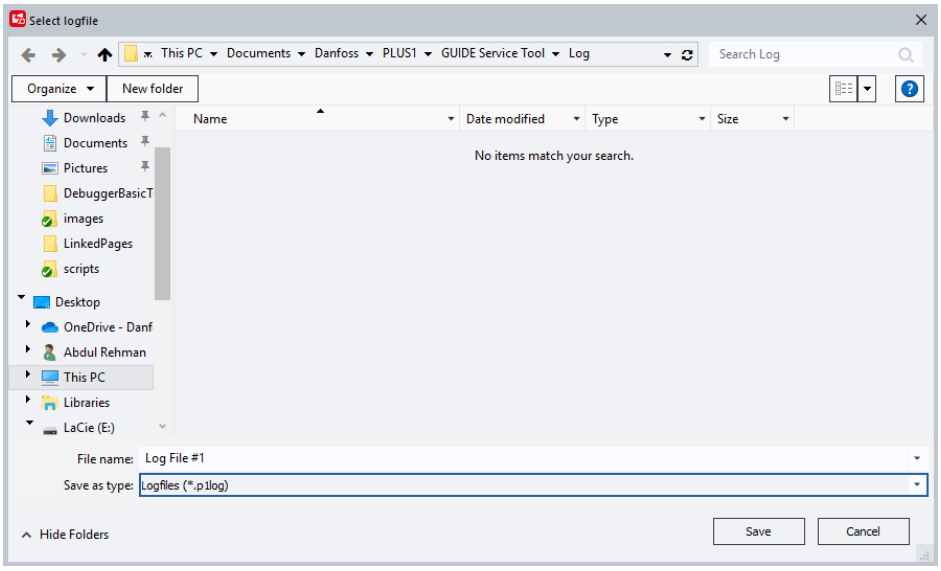
| Button | Description |
|---|---|
| / | Start logging / Stop logging toggle button |
| | Record to file |

### Recording log files

1. Record log files by using the record to file function. Select **Communication** > **Record to File** from the PLUS+1® Service Tool window menu. When the recording has been started, log data recording will be automatically saved.

## Using log pages

**2.** When recording is stopped, select or create a log file to save in the **Select logfile** window.




Any logging activity will be recorded in a log file. **Logfiles (*.LDF)** for basic pages will be stored as LDF/LHF files.

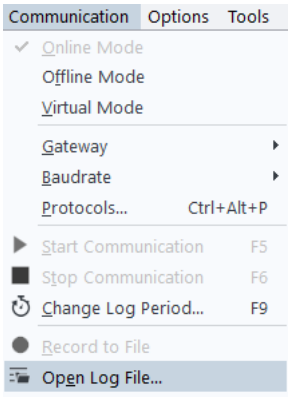
Log files for advanced pages will be stored as LDF/GEN files in the selected log folder.

## Monitor log files

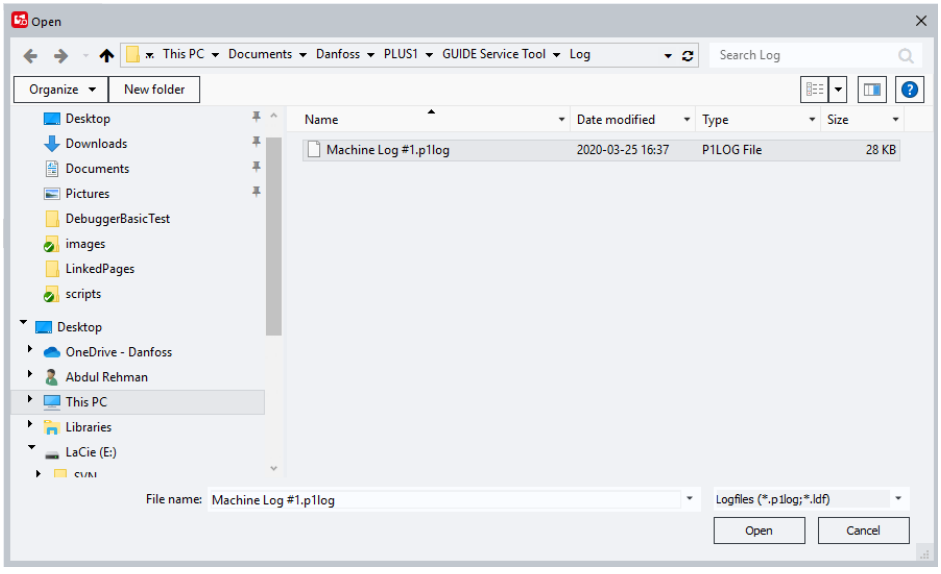
**1.** Verify **Log to File** activity by monitoring Log status box in lower left hand of PLUS+1® Service Tool window.

## Using log pages

2. To play saved log files select **Communication** > **Open Log File...** from the PLUS+1® Service Tool window menu bar or click the **Open Log File** icon from the PLUS+1® Service Tool window toolbar.




3. Select the file from the Open dialog window and click **Open.**




## Log file playback

Click the **Play** icon in the PLUS+1® Log File Viewer window toolbar.

Only data is displayed during playback of basic log pages. Images, if added, are not displayed.

Log file playback information (activity status, file name, date and time stamp) is displayed in the bottom left-hand corner of the PLUS+1® Log File Viewer window.

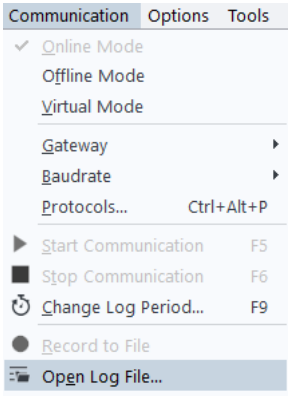
Log file playback can be controlled by using the Position Slider, Play, Stop, Pause and Step Forward in Log File controls.

## Log file process

There are two ways to open logged file:

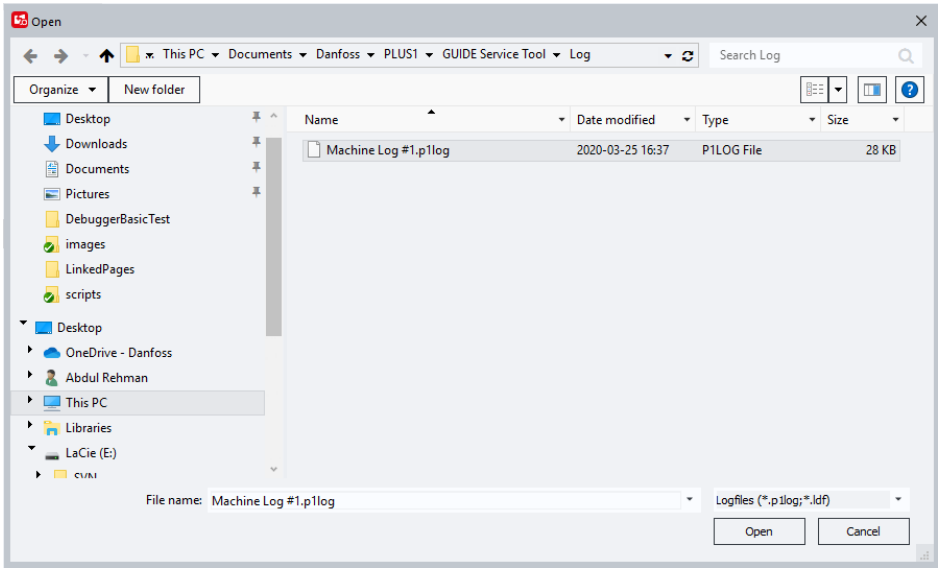
## Using log pages

1. Select from the PLUS+1® Service Tool window menu **Communication** > **Open Log File...**




2. Click from the Communication toolbar **Open** > **Log File**

3. Select Log File in the **Open** dialog box, and click **Open**.




The Log File is now open in the PLUS+1® Log File Viewer window. Multiple log files may be opened at the same time.

## Exporting log files to spreadsheet

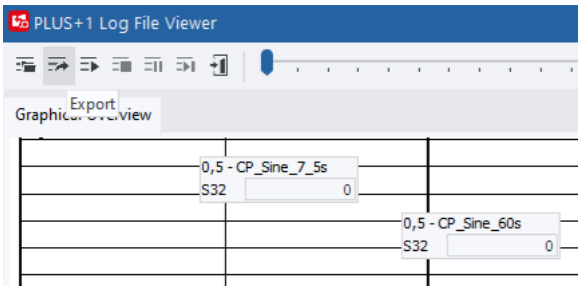
Log files can be exported to any **CSV** format spreadsheet program (such as, Microsoft Excel® and Google Docs™). The PLUS+1® Service Tool defaults to Microsoft Excel® csv delimiters for exporting database files.

Default delimiter:

1. In the PLUS+1® Service Tool, select **Communication** > **Open Log file...**

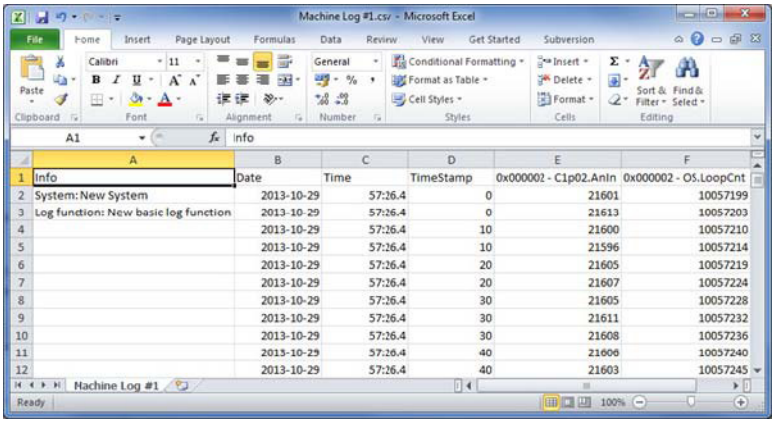
## Using log pages

2. In the **Log File Viewer**, select **Export**




3. **Save As** dialog box , click Select the file for export in the **Save.**
   The file will be exported and saved as a `.csv` file to the Log folder of the application.
4. Click **OK**.


The file is now ready to be opened with Microsoft Excel®.

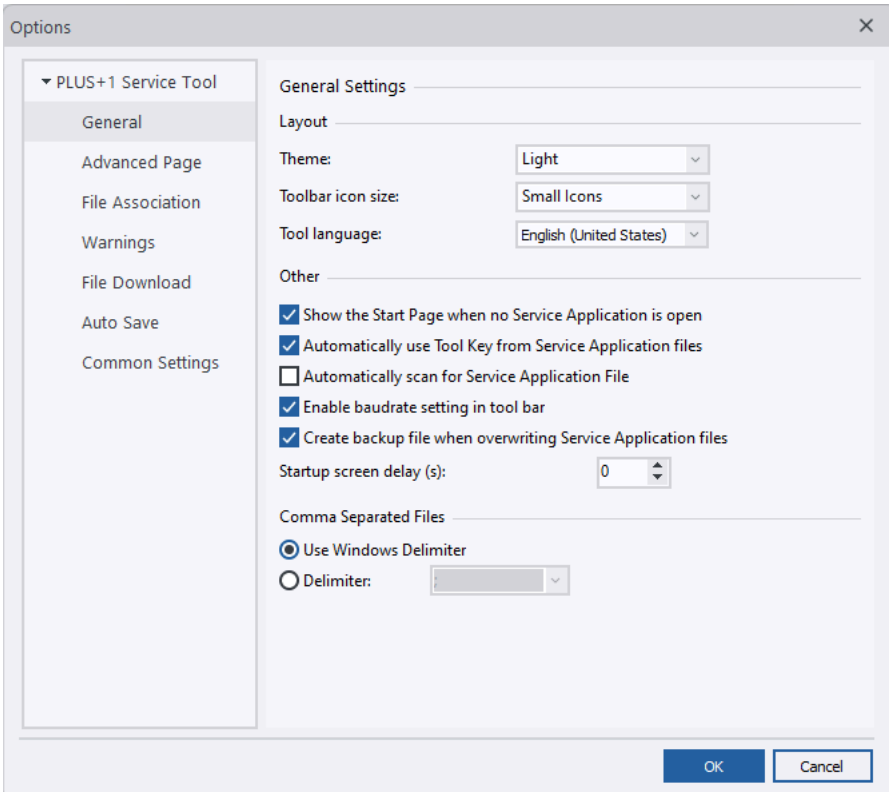



| | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| 1 | Info | Date | Time | TimeStamp | 0x000002 - C1p02.AnIn | 0x000002 - OS.LoopCnt |
| 2 | System: New System | 2013-10-29 | 57:26.4 | 0 | 21601 | 10057199 |
| 3 | Log function: New basic log function | 2013-10-29 | 57:26.4 | 0 | 21613 | 10057203 |
| 4 | | 2013-10-29 | 57:26.4 | 10 | 21600 | 10057210 |
| 5 | | 2013-10-29 | 57:26.4 | 10 | 21596 | 10057214 |
| 6 | | 2013-10-29 | 57:26.4 | 20 | 21605 | 10057219 |
| 7 | | 2013-10-29 | 57:26.4 | 20 | 21607 | 10057224 |
| 8 | | 2013-10-29 | 57:26.4 | 30 | 21605 | 10057228 |
| 9 | | 2013-10-29 | 57:26.4 | 30 | 21611 | 10057232 |
| 10 | | 2013-10-29 | 57:26.4 | 30 | 21608 | 10057236 |
| 11 | | 2013-10-29 | 57:26.4 | 40 | 21606 | 10057240 |
| 12 | | 2013-10-29 | 57:26.4 | 40 | 21603 | 10057245 |

Selecting a different delimiter:

In the PLUS+1® Service Tool, select **Options** > **Settings**.

## Using log pages



## Using parameter pages

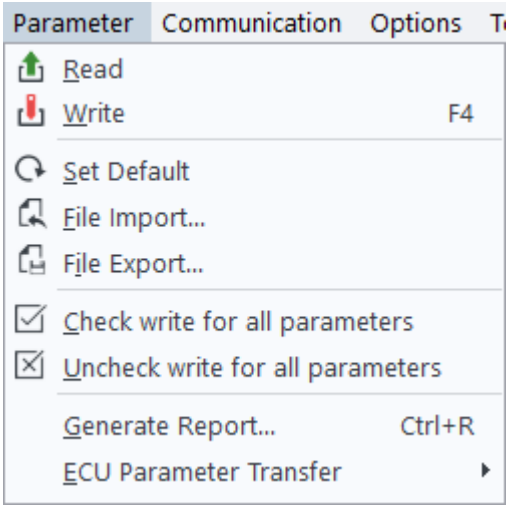
### Manual parameter upload and download

1. Use the Parameter Read and Parameter Write functions to enter and verify operating values to the controller.
2. Read parameter values to the PLUS+1® Service Tool from the controller by selecting **Parameter** > **Read** from the PLUS+1® Service Tool window menu.

   Parameters can also be read using the **Read** button from the toolbar.
3. Write parameter values from the PLUS+1® Service Tool to the controller by selecting **Parameter** > **Write** in the PLUS+1® Service Tool window menu.

   Parameters can also be written using the **Write** button from the toolbar.

   In a basic parameter, controller values are updated in the ECU values fields of the **Design Screen (Basic)** pane of the PLUS+1® Service Tool window.



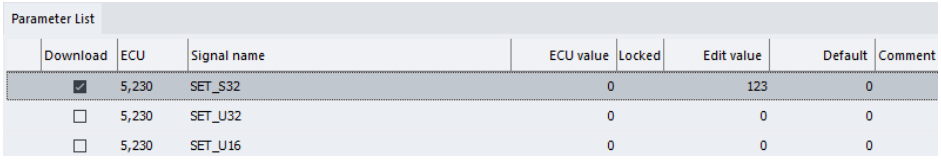

*Upload or Download parameters from or to ECU*

Only Parameters selected for writing will be written.

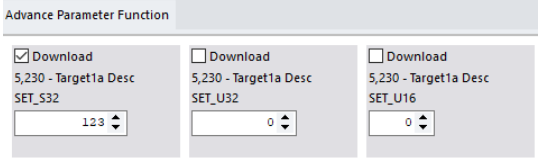
### Selecting parameter for writing

1. Download parameter values by checking the **Write** check box for each parameter to write, and press the **Write parameters** button in the toolbar.

   *Basic Parameter List view*




   *Advanced Parameter Page view*




   When changing a parameter value, the check box will automatically be checked.

## Using parameter pages

Unchecked parameter values will not be written.

2. Press the **Check All** button to check all parameters in the list.
3. Press the **Uncheck All** button to uncheck all parameters in the list.
4. Press the **Set default** button to set all parameter values to the default value (specified in design mode).

Use a period (.), a comma (,) or the decimal symbol from the Windows regional settings when entering decimal values.

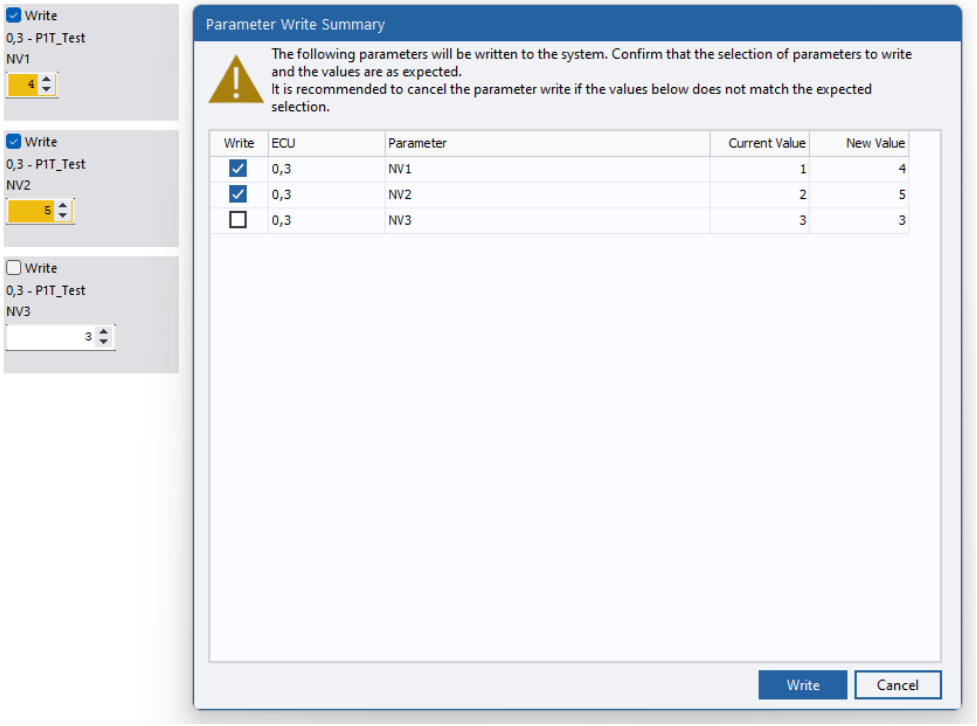
### Importing parameter values

When importing parameters, an error dialog will show up if any values (from file) are not within the parameter range set by the designer.

### Parameter Write Summary

If **Parameter Write Summary** is enabled for the page, a summary dialog will be shown before writing parameter values to the ECU(s).

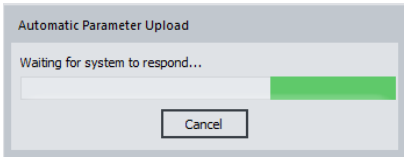
The summary contains a list of all parameters on the specific page with write status, current parameter values and the values that are about to be written. Make sure that the new values are correct before pressing the **Write** button.




It is not possible to edit the write status or the values that are about to be written in the summary dialog. If the values are not correct, press **Cancel** to return to the page to correct the values.

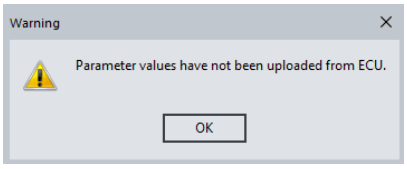
### Automatic parameter read function

ECU parameter values are automatically read when a parameter page is selected.



## Using parameter pages

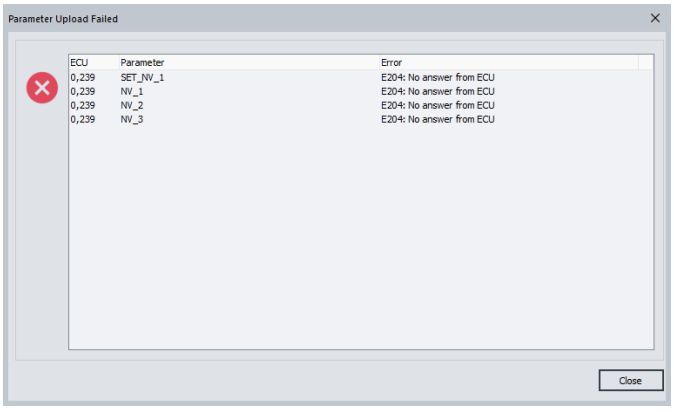
If **Cancel** is selected, parameter values will be set to the default settings. A notification message will be displayed.



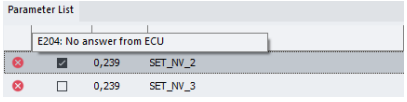

If the ECU is not connected, parameters will not be automatically read.

### Parameter read and write error messages

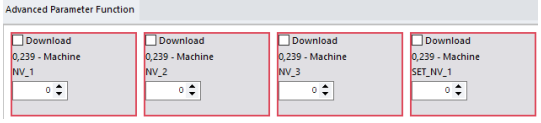
If errors occur during parameter read and/or write, error messages will be displayed.



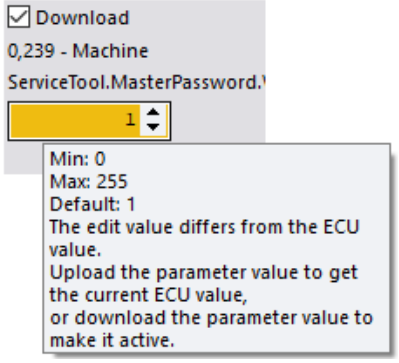

In basic pages, parameters containing errors will be marked by red exclamation circle.




In advanced pages, parameters components containing errors will be shown in the tool tip.



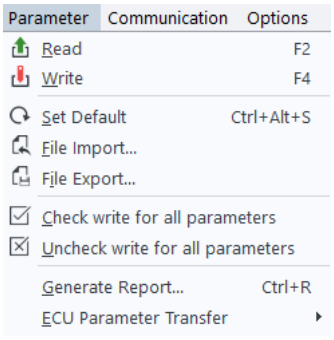

If the property “Indicate changed value” has been enabled by the designer, the parameter edit field background will turn yellow when the edit value differs from the current ECU value.



## Using parameter pages

### Parameter file export

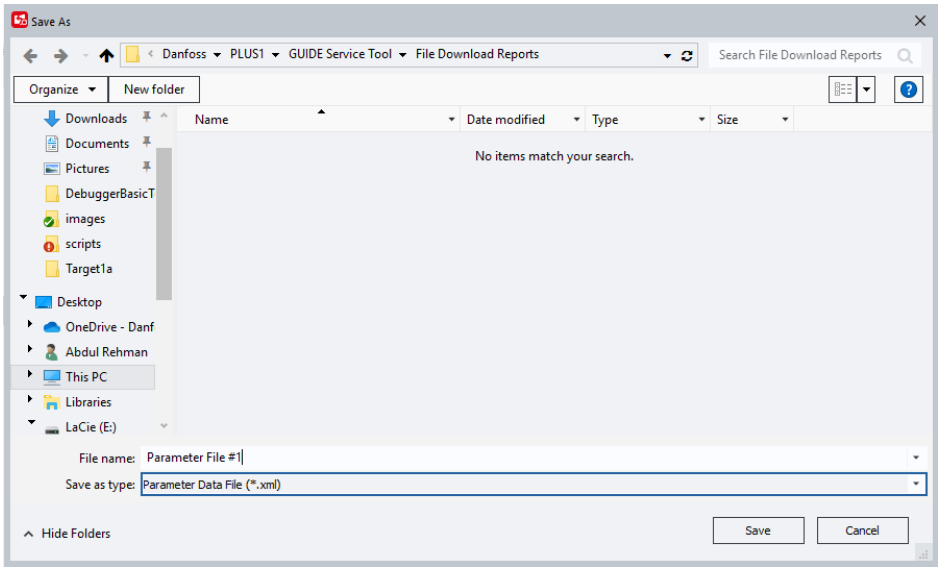
1. Created parameter files can be imported or exported from a local PC. To export, select **Parameter** > **File Export**.




These files are called parameter data files and are saved in a `xml` file format.

Parameter data files contain the ECU, signal name and value together with a version number on the file format.

2. Save the parameter data file using the **Save As** dialog box:

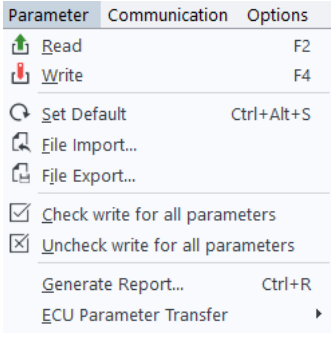



Only the currently displayed and available parameter values can be saved.

If the user does not have access to the parameter, the parameter cannot be saved.

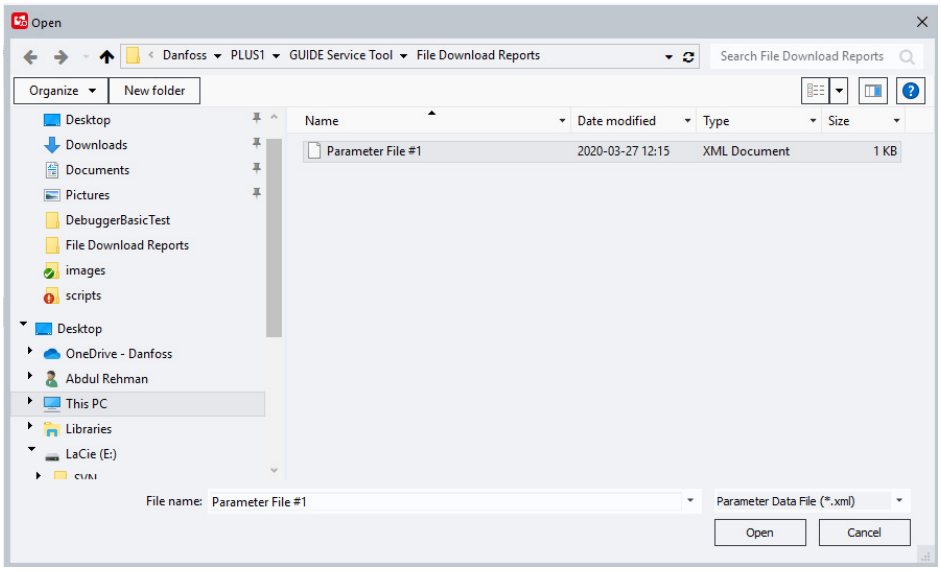
### Parameter file import

1. Import files by selecting **Parameter** > **File Import**.



## Using parameter pages

2. Select the desired file for value import.




Only values for displayed signal names in the current parameter page will be changed.

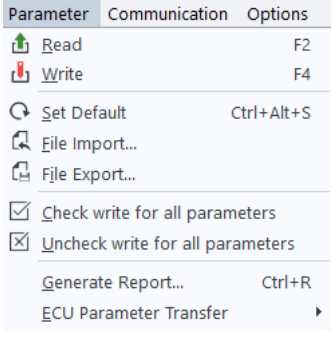
The imported file data uses signal names to reference imported value locations.

If no signal name match is found, data will remain unchanged. Parameter values that are locked will remain unchanged.

## Generating parameter reports

Database readable reports of parameter activity can be generated using the **Generate Report** function.

1. In the PLUS+1® Service Tool window menu, select **Parameter** > **Generate Report** or press **Ctrl + R**.

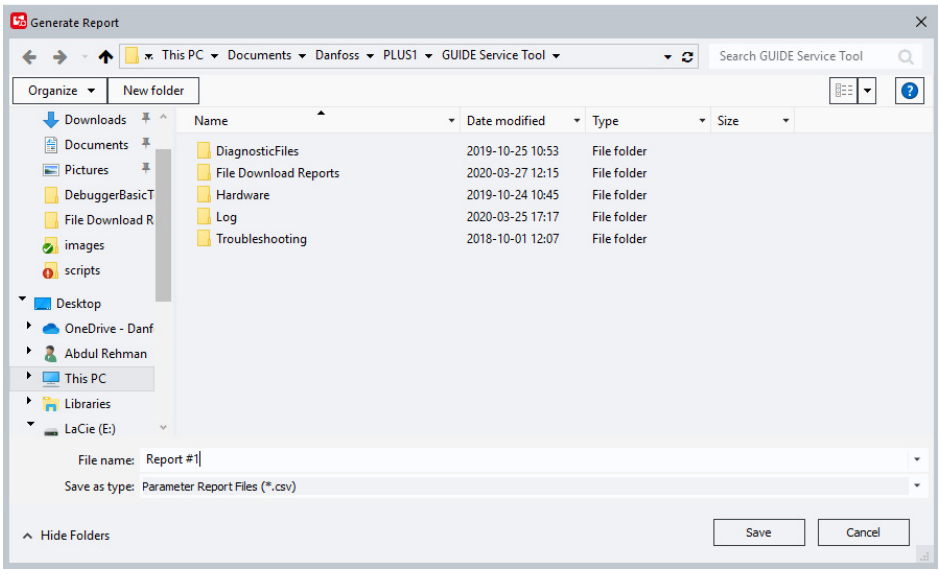



or

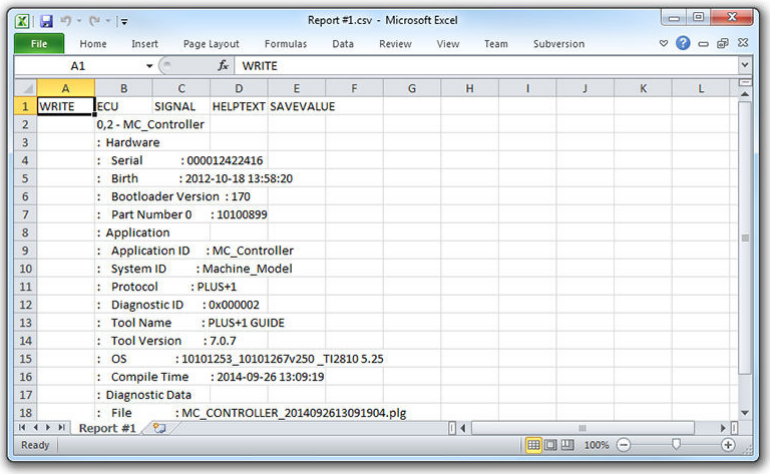
2. Name the file in the **Generate Report** dialog box.

   The file will be saved as a `.csv` file.

## Using parameter pages




The file can be opened by many common database applications, such as Microsoft Excel®.




### Parameter memory transfer

Parameter memory values can be transferred from one controller to another using the Parameter memory transfer feature.

All parameters referenced in the diagnostic data (except those that are write-protected) can be read and written regardless of user access level.

The memory value that is transferred is from the NV (non-volatile) memory value and not the VAL (value) signal.

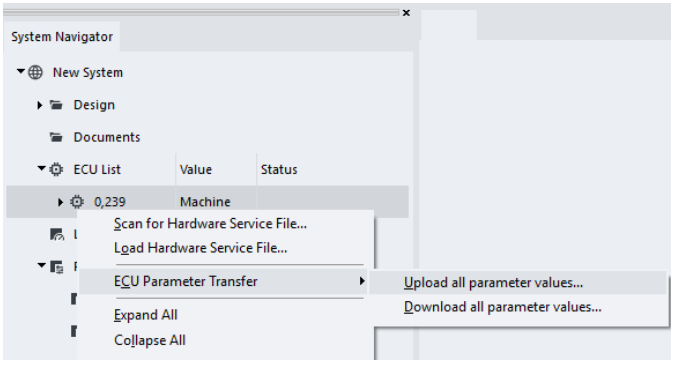
For more information on the difference between NV and VAL values, reference the *PLUS+1® GUIDE User Manual*, **AQ152886483724**.

### Read parameter values

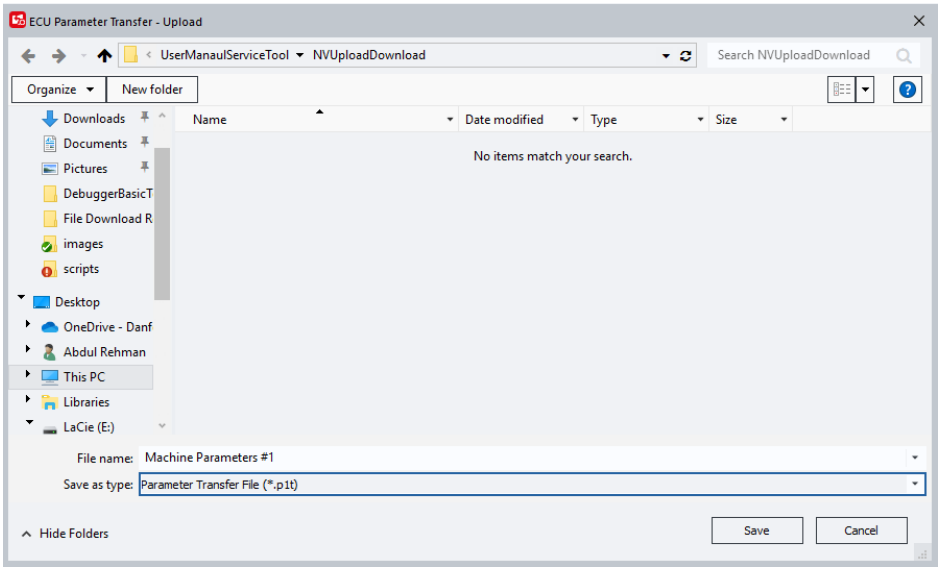
1. Right-click the current ECU of an open application in the PLUS+1® Service Tool window. Select **ECU Parameter Transfer** to open a submenu.

## Using parameter pages

2. Select **Read all parameter values**.

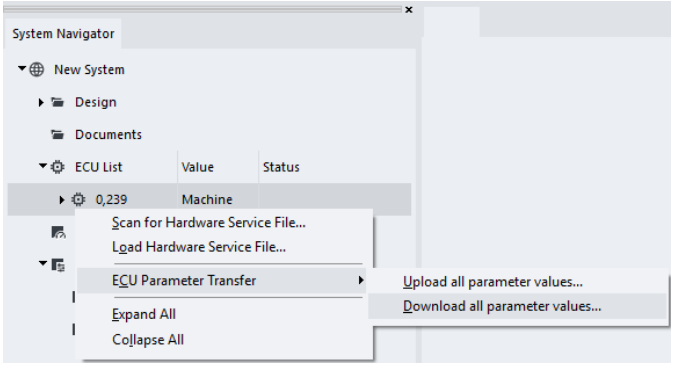



3. In the **ECU Parameter Transfer - Read** dialog window name the file and click **Save**. The parameters will be stored as a `.P1T` file.



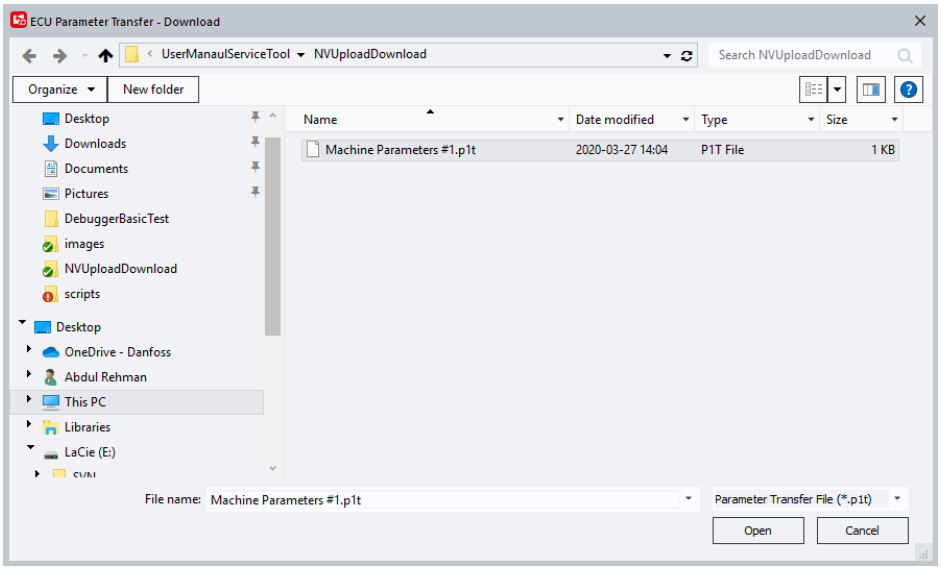

## Write parameter values

1. Right-click the current ECU and select **ECU Parameter Transfer**.
2. Select **Write all parameter values**.



## Using parameter pages

3. In the **ECU Parameter Transfer - Write** dialog window select desired `.P1T` file and click **Open**. The parameter values will then be transferred to the current ECU.




This will write all available parameters into the current ECU.

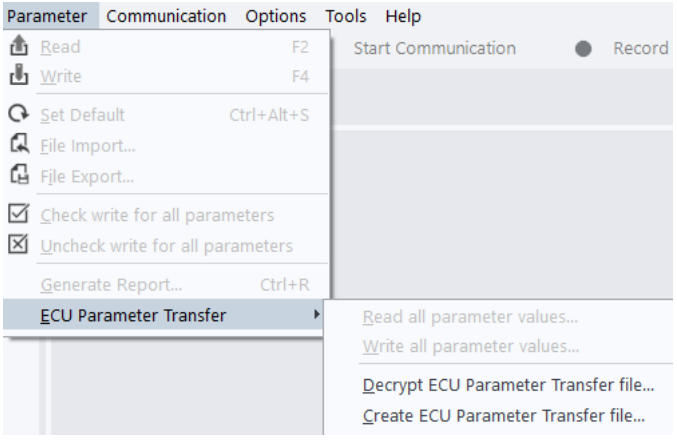
It is only possible to write parameter values to an application which matches the parameter set in the `.P1T` file.

If a parameter cannot be read or written, a **Parameter Read/Parameter Write Error** dialog window will be displayed. Specific parameter and error information will be listed.

## Decrypting P1T files

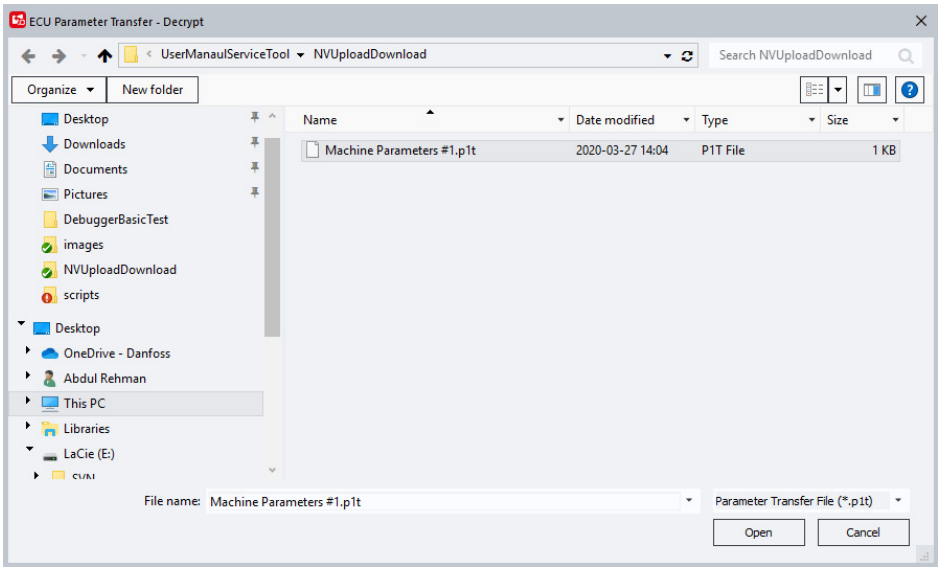
Only `.P1T` files created in PLUS+1® Service Tool 10.0 or later can be decrypted.

1. Decrypt a `.P1T` file to view the ECU and parameter information by selecting the menu item **Parameter** > **ECU Parameter Transfer** > **Decrypt ECU Parameter Transfer file...**

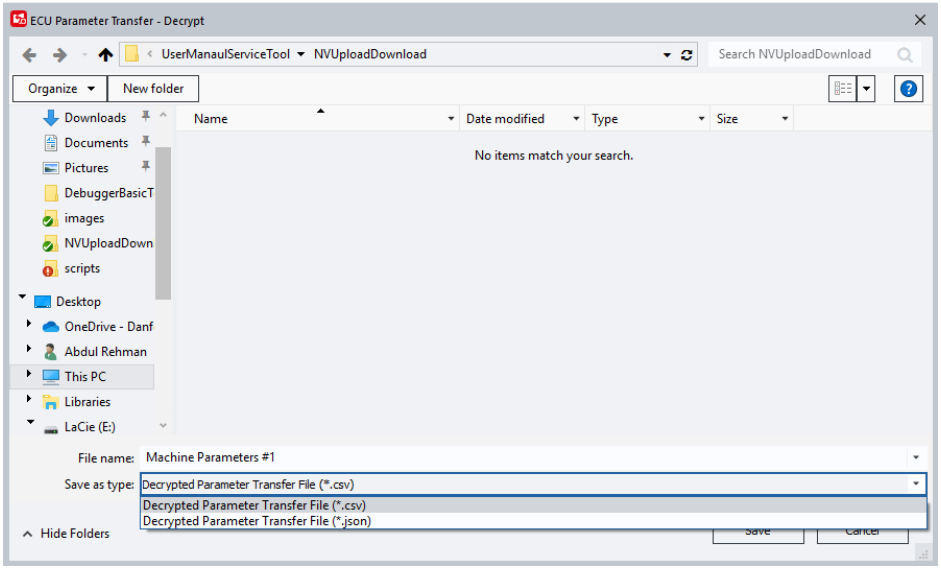


## Using parameter pages

2. In the **ECU Parameter Transfer - Decrypt** dialog window select desired `.P1T` file and click **Open**.




3. In the next **ECU Parameter Transfer - Decrypt** dialog window name the file and click **Save**. Two output formats are available, `.CSV` and `.JSON`.




If the ECU application, from which the `.P1T` file was created, required a Tool Key, then the same Tool Key must be active in the PLUS+1® Service Tool to be able to decrypt the `.P1T` file.

The content in the decrypted information will depend on the access levels in the active license.

## Using parameter pages

### Decrypted P1T file types

Parameter Transfer files (`P1T`), can be decrypted into two different formats, `JSON` and `CSV`.

#### Adding matching criteria

When decrypting a `P1T` file, the decrypted file with contain a placeholder for matching criteria. This can be used to specify/limit which ECU or application the `P1T` can be written to. Two types of matching criteria can be specified, ECU information and parameter values. If a certain or a certain set of ECU information items are selected as matching criteria, this information must be matched in the ECU/application to allow the created `P1T` being written to the ECU. If parameter values are added to the matching criteria, the parameter values will be read from the ECU, and if the parameters are available in the ECU and the values are correct according to the file, the file can be written to the ECU. The two types can be combined.

The following ECU info are valid as ECU info matching criteria:

- Node address
- Application ID
- Application type
- Application version
- Compile time
- OS family
- OS software
- OS info
- Tool version
- Bootloader version
- EAN
- Serial number
- Manufacture date
- Part number 0
- Part number 1
- Part number 2
- Part number rev 0
- Part number rev 1

## Using parameter pages

### JSON format

JSON file example:


```
{
    "formatVersion": "1.0.0",
    "comment": "",
    "ecuInfo": {
        "nodeAddress": "3",
        "appId": "Example",
        "systemId": "",
        "appType": "",
        "appVersion": "",
        "compileTime": "2023-08-16 11:15:29 51",
        "os": "10101829_10101468v270 _TI2812 6.49",
        "osFamily": "10101829",
        "osSoftware": "10101468v270",
        "osInfo": "TI2812 6.49",
        "ean": "",
        "serialNumber": "000004490484",
        "manufactureDate": "2004-12-03 11:51:56 59",
        "bootloaderVersion": "130",
        "partNo0": "0001020304",
        "partNo1": "0111213141",
        "partNo2": "",
        "partNoRev0": "06",
        "partNoRev1": "71",
        "toolVersion": "2022.3.7",
        "accessRightsControlledByApplication": "0",
        "licenseReadAccess": "0",
        "licenseWriteAccess": "0",
        "toolKey": "",
        "matchingCriteria": [
        ],
        "parameterInfo": [
            {
                "name": "NV1",
                "type": "U8",
                "value": "1",
                "readAccess": "9",
                "writeAccess": "9",
                "flags": "APP",
            },
            {
                "name": "NV2",
                "type": "U16",
                "value": "2",
                "readAccess": "9",
                "writeAccess": "9",
                "flags": "APP",
            },
            {
                "name": "NV3",
                "type": "U32",
                "value": "3",
                "readAccess": "9",
                "writeAccess": "9",
                "flags": "APP",
            }
        ]
    }
}
```

## Using parameter pages

***Matching criteria example***

In this example, a matching criterion has been created which requires the appId and osFamily to match, and the values of PARAMETER1 and PARAMETER2 must match.

```
"matchingCriteria": [
          "appId",
          "osFamily",
          {
            "parameters": [
              {
                "name": "PARAMETER1",
                "value": "123"
              },
              {
                "name": "PARAMETER2",
                "value": "456"
              }
            ]
          }
        ]
```

**CSV format**

CSV file example:

```
ECU Information:
NodeNumber;ApplicationID;ApplicationType;ApplicationVersion;SystemID;C
ompileTime;OS;OSFamily;OSSoftware;OSInfo;EAN;SerialNumber;ManufactureD
ate;BootloaderVersion;PartNumber0;PartNumber1;PartNumber2;PartNumberRe
v0;PartNumberRev1;ToolVersion;AccessRightsControlledByApplication;Lice
nseReadAccess;LicenseWriteAccess;ToolKey;DiagnosticSession;Comment
3;Example;;;;2023-08-16 11:15:29 51;10101829_10101468v270 _TI2812
6.49;10101829;10101468v270;TI2812 6.49;;000004490484;2004-12-03
11:51:56 59;130;0001020304;0111213141;;06;71;2022.3.7;0;0;0;;;

Matching Criteria:

MatchingCriteria;Name;Value

Parameter Information:

ParameterName;ParameterType;ParameterValue;ParameterReadAccess;Paramet
erWriteAccess;ParameterFlags;ParameterAddress
NV1;U8;1;9;9;APP;
NV2;U16;2;9;9;APP;
NV3;U32;3;9;9;APP;
```

***Matching criteria example***

In this example, a matching criterion has been created which requires the appId and osFamily to match, and the values of PARAMETER1 and PARAMETER2 must match.

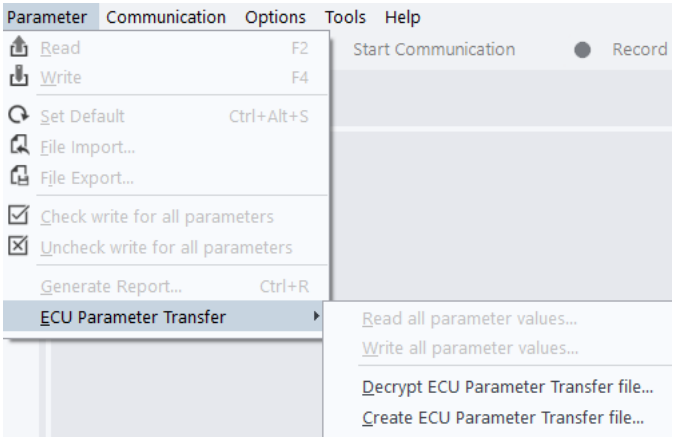
```
matchingCritera;Name;Value
appId;"";""
osFamily;"";""
parameters;"PARAMETER1";"123"
parameters;"PARAMETER2";"456"
```

## Using parameter pages

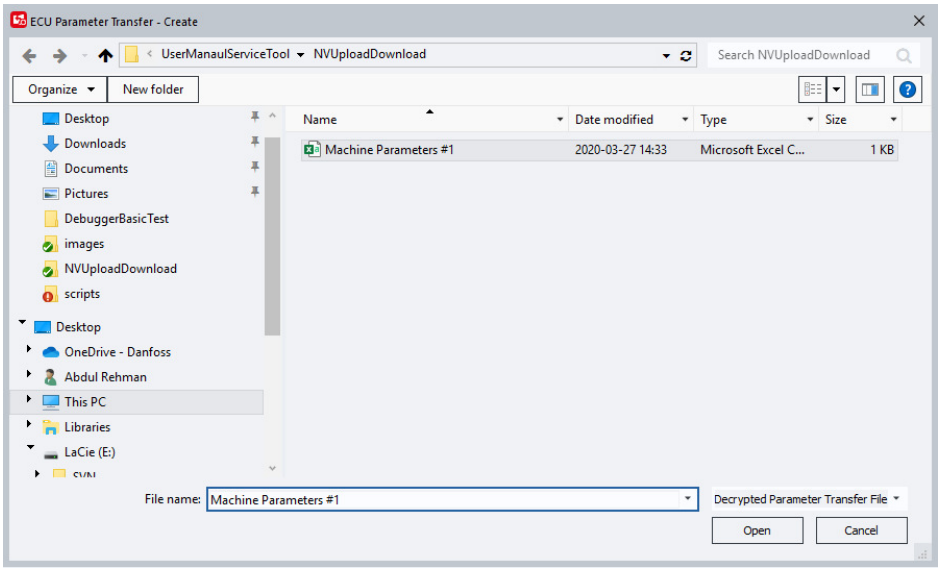
### Creating P1T files

`P1T` files can be created based on a decrypted `.CSV` or `.JSON` file.

1. Select the menu item **Parameter** > **ECU Parameter Transfer** > **Create ECU Parameter Transfer file…**

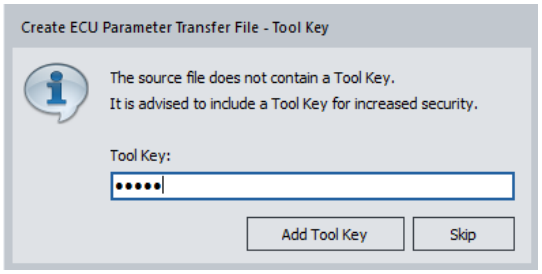



2. In the **ECU Parameter Transfer - Create** dialog window select desired `.CSV` or `.JSON` file and click **Open**.

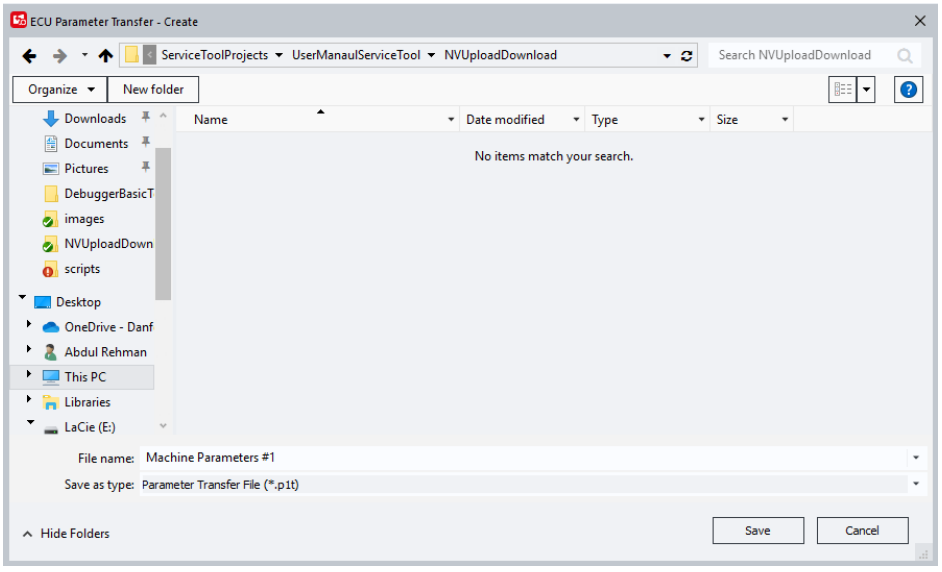



If the input file does not contain a Tool Key (or if it is invalid) a dialog will show up, where a Tool Key can be added (recommended).

## Using parameter pages




3. In the next **ECU Parameter Transfer - Create** dialog window name the file and click **Save**.



## Using contextual help in service applications

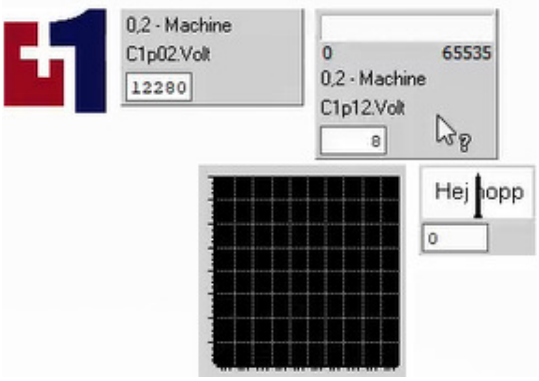
### Contextual help feature

Service applications may contain contextual help. Contextual help is available when the screen cursor is placed over an advanced page component subject and a question mark is displayed.

Press F1 to display the help topic relevant to the "context" in which the user pressed the key.

For example, pressing F1 in an editor could display a topic on editing, pressing F1 in a configuration dialog could display a topic on the features of that dialog.

*Tool Key Set Up*



## Using the Tool Key

### Tool Key function

Use the Tool key function to provide customized application protection. For information on license embedded Tool Key options, consult your nearest Danfoss technical sales representative.

There are three ways to set up the Tool Key:

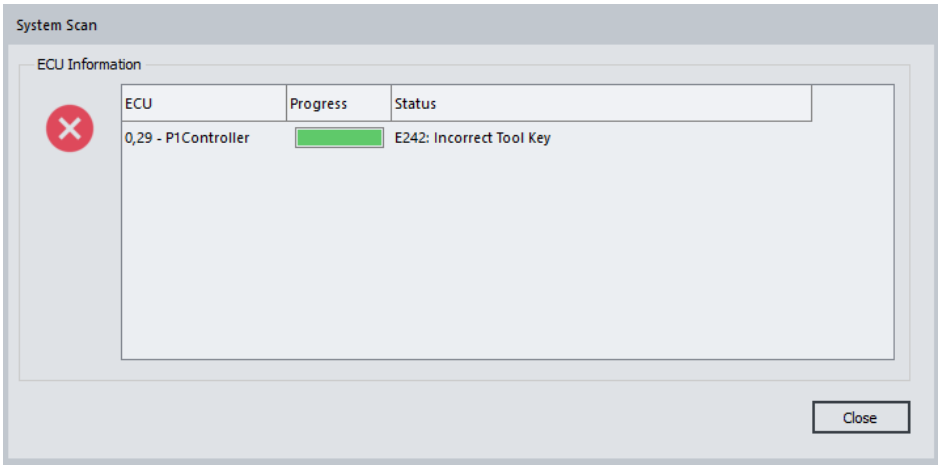
- Manually entered
- Included or embedded in the Service Application File (P1D)

  (See PLUS+1 Service Tool Design Manual for information about setting up Tool Keys in the P1D)
- License embedded

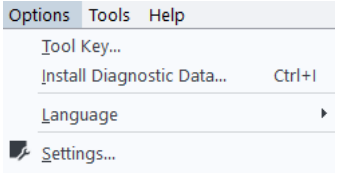
#### Set up Tool Key information

When downloading the application with Tool Key for the first time it will be necessary to set up the Tool Key information in the PLUS+1® Service Tool.

1. When no Tool key information is found when attempting a download, the following warning messages will appear:



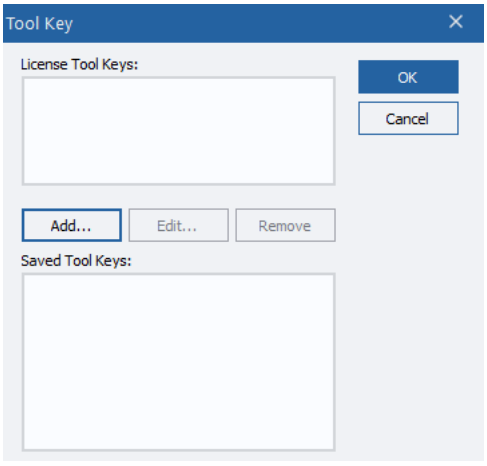

2. Enter Tool Key information by first clicking **OK** to close the Incorrect Tool Key error message.
3. Next, select **Options** > **Tool Key...** from the PLUS+1® Service Tool window menu to open the Tool Key dialog box.



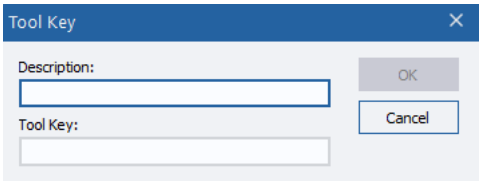
## Using the Tool Key

### Manually entered Tool Key set up

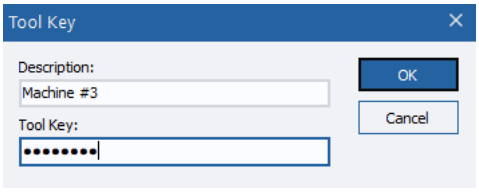
1. In the Tool Key dialog box select **Add**.




A sub dialog box appears.

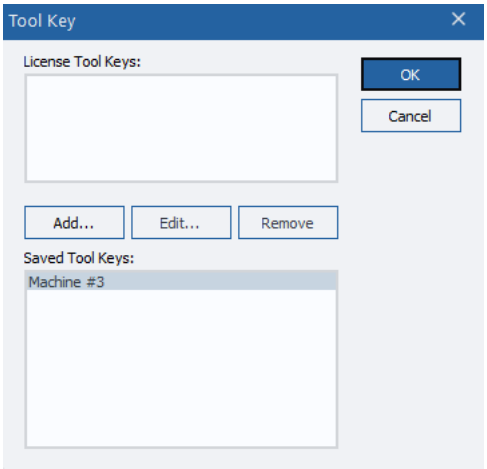



2. Enter the Tool Key name (description) and the Tool Key password that was created in the PLUS+1® GUIDE application. Click **OK** to close box.




The Tool Key has successfully been entered.

3. Select **OK** to save and close.

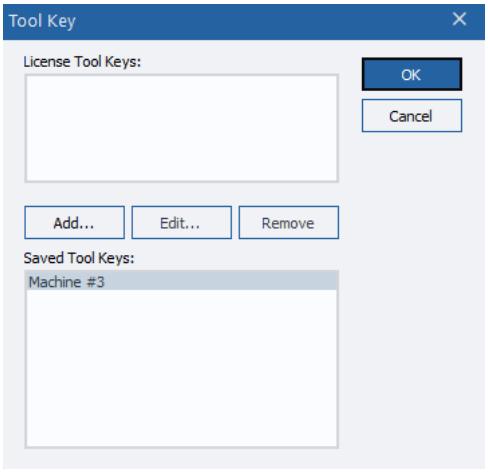


## Using the Tool Key

### License embedded Tool Key set up

Tool keys embedded in the active license will appear in the **License Tool Keys** field of the **Tool Key** dialog box.

1. Select Tool Key and click **OK** to activate the selected Tool Key.



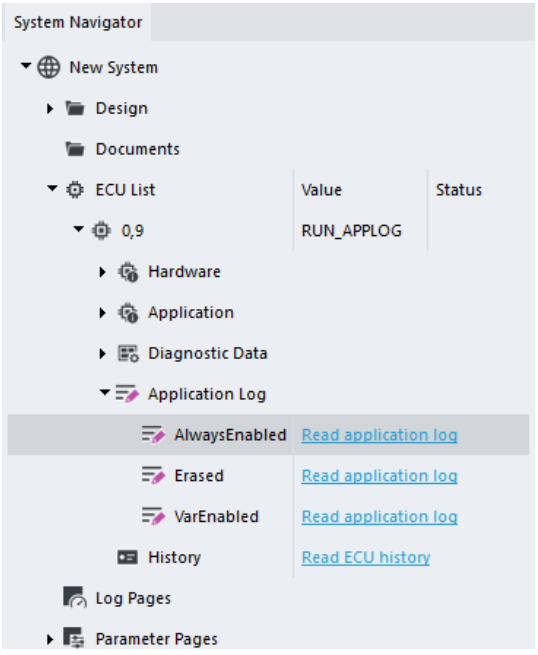

2. Select **Add...**.
   The Tool key is now active.

## Working in normal view

### Application log

Record application activity for supported applications and controllers in the Application log function of the PLUS+1® Service Tool. The Application Log writes application-specified information to a flash memory file (PLA file) that can be accessed in the Diagnostic Navigator section of the PLUS+1® Service Tool.

Application data logging writes data to the memory of a Danfoss PLUS+1® controller. The PLUS+1® Service Tool program accesses this data. The program writes data first to an encrypted .p1a (PLUS+1® application data log) file and then, with proper access rights, writes to a CSV (comma-separated value) file.



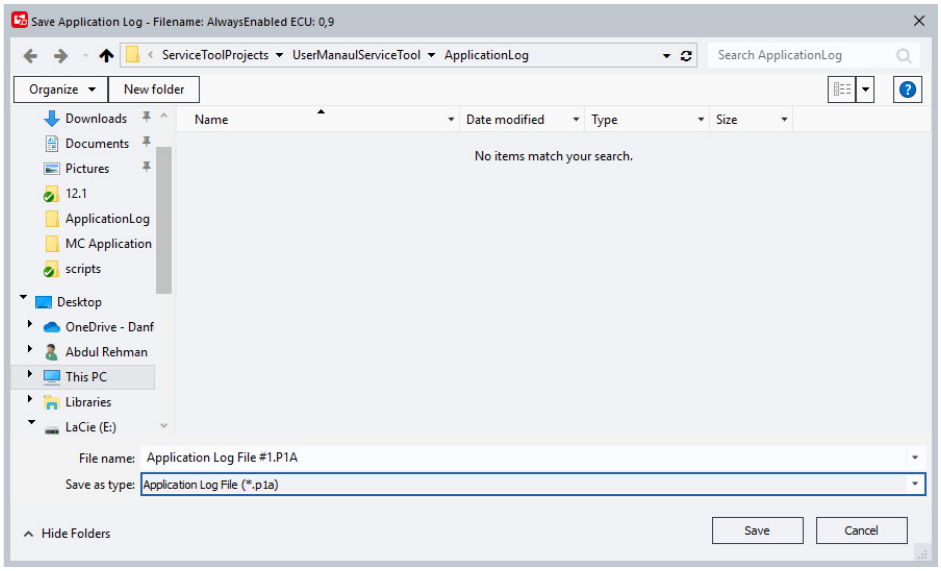

Access to application log information can be controlled within the PLUS+1® GUIDE software program. You can use access components to restrict the PLUS+1® Service Tool program's access to the application data log and its contents.

For more information, see the Application Data Logging chapter of the *PLUS+1® GUIDE User Manual*, **AQ152886483724**.

## Working in normal view

### Application log file

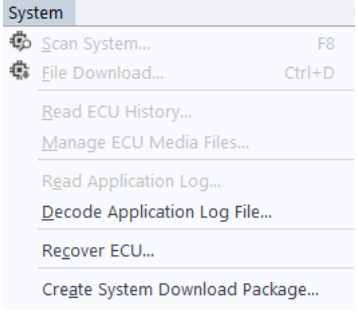
1. Double-click to open the encrypted log file.




The file will automatically decode to create and save to an ASCII file.

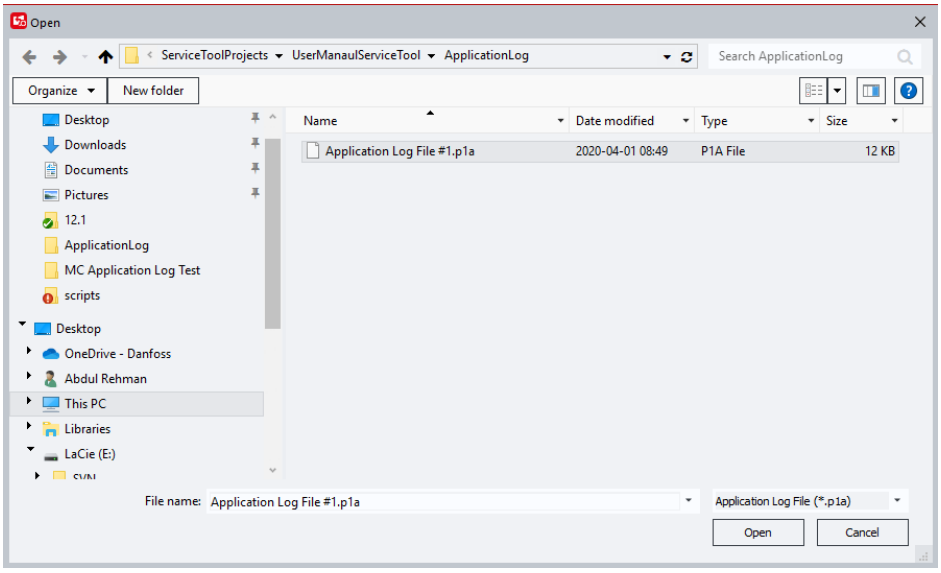
The Application Log file can now be decoded into a csv file that can be accessed by many spreadsheet applications.

2. Select in the PLUS+1® Service Tool window menu bar: **System** > **Decode Application Log File...**

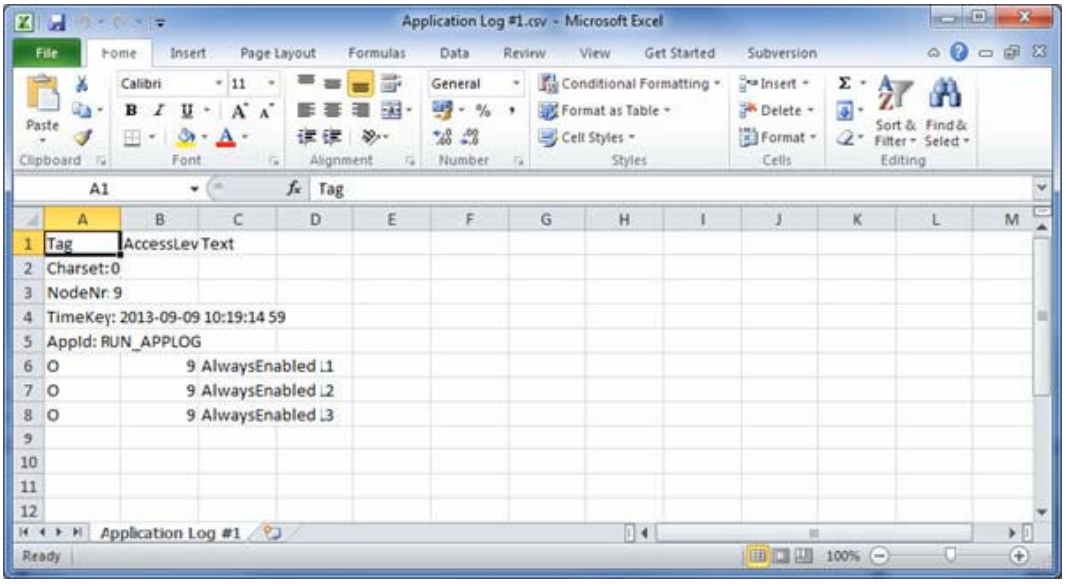


## Working in normal view

**3.** Select the file to be decoded.




An Application Log File that matches the user access level is created.




## Signal Logger

**Signal Logger** is a diagnostic tool used to log signals to a buffer in the PLUS+1® controller RAM. The logged data is displayed in a graph and can be exported to a CSV (comma-separated value) file. The buffer can be logged from a connected ECU device or loaded from a CSV file containing pre-logged data.

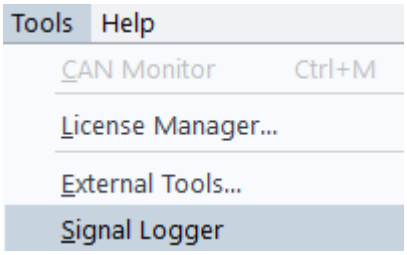
It is possible to a configurable subset of all signals that are accessible to the PLUS+1 Service Tool e.g Kernel API signals and Application signals defined by NY, Check Point, Set Value and Set Pulse components in PLUS+1 Guide. It is possible to configure the sampling rate, given a defined set of possible fundamental sampling periods. It is also possible to configure a **Maximum duration** defining for how long the **Signal Logger** will continue to capture data frames after the trigger condition occurred.

The Signal Logger has a trigger function and it is possible to configure:

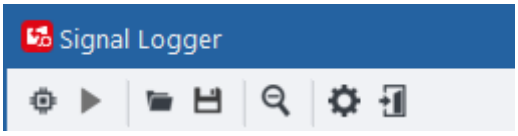
## Working in normal view

- A trigger condition that defines when the capturing of data frames starts.
- A buffer which contains data frames captured before the trigger condition occurred.

1. To open the **Signal Logger** window, go to **Tools** and select **Signal Logger**.




From the **Signal Logger** toolbar you can access the **Signal Logger** commands.



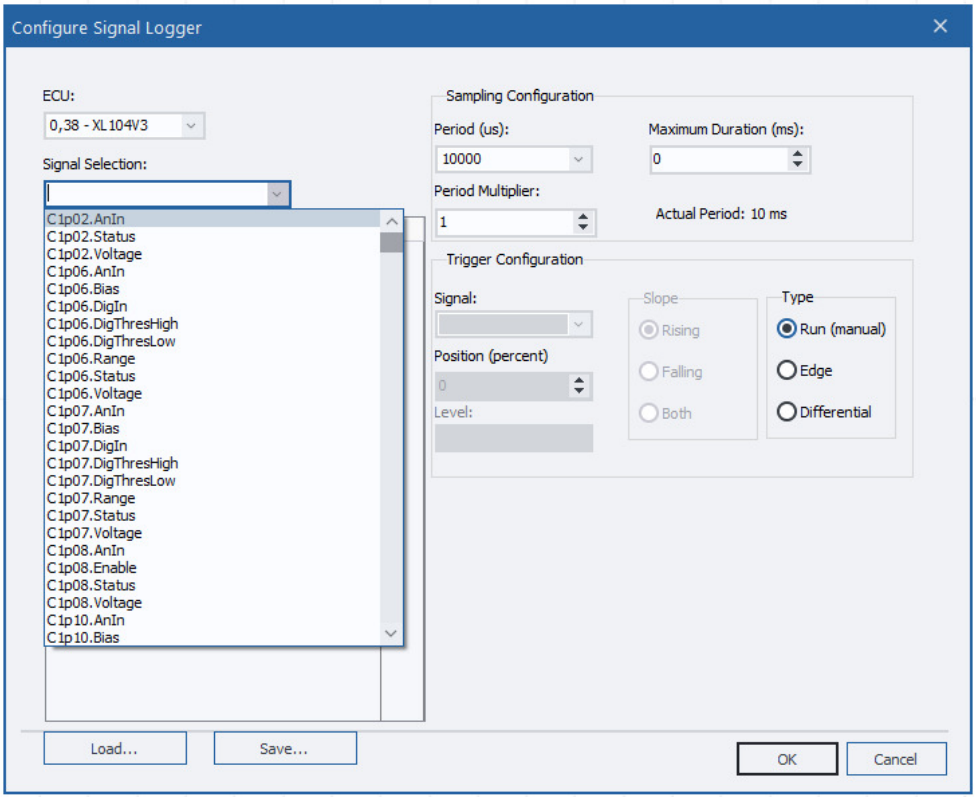

*Signal Logger toolbar*

| Item | | Description |
|---|---|---|
| | **Configure ECU** | Opens the **Configure Signal Logger** window. Here you can select ECU, sampling signals, configure sampling and trigger events. |
| | **Start Logging** | Starts logging data to the buffer. |
| | **Load from file** | Loads a previously saved configuration file (`.xml`). |
| | **Save** | Saves the configuration file (`.xml`). |
| | **Reset Zoom** | Resets the zooming of the graph. |
| | **Options** | Opens the **Options** window. Here you can choose the settings for the graph. |
| | **Close** | Closes the **Signal Logger** window. |

2. To configure a signal, select **Configure ECU** in the **Signal Logger** toolbar.

## Working in normal view

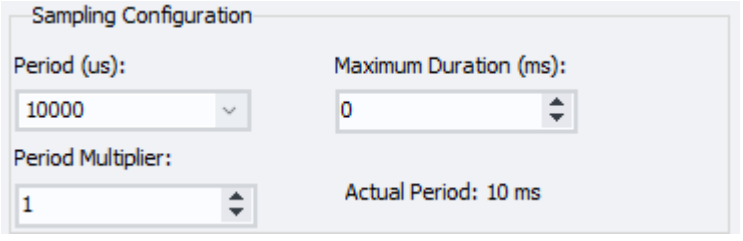
**3.** In the **Configure Signal Logger** entry fields, select the connected ECU and signals to log.




You can also choose settings for **Sampling Configuration** and **Trigger Configuration**.

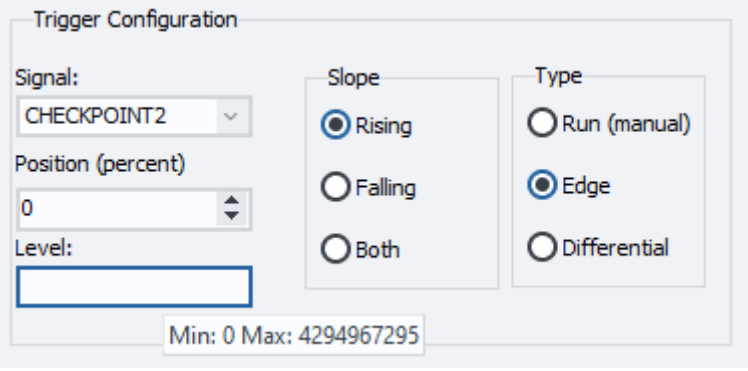
The **Sampling Configuration** field let you configure the sampling of signals and define parameters such as **Period**, **Maximum Duration** and **Period Multiplier** of the sampling.

The sampling **Period** is a list of available periods in the Kernel. When selecting a **Period** it is then multiplied by **Period Multiplier** . The **Maximum Duration** is defined in milliseconds and when the logging of signals starts (see Trigger below) it will continue for the defined duration or until the log buffer is full or the **Signal Logger** is stopped, whichever comes first.




In the **Trigger Configuration** field you can define the trigger event for one of the signals. The trigger type may be configured as **Run**, **Differential** or **Edge**. The slope may be set to **Rising**, **Falling** or **Both**.

### Working in normal view



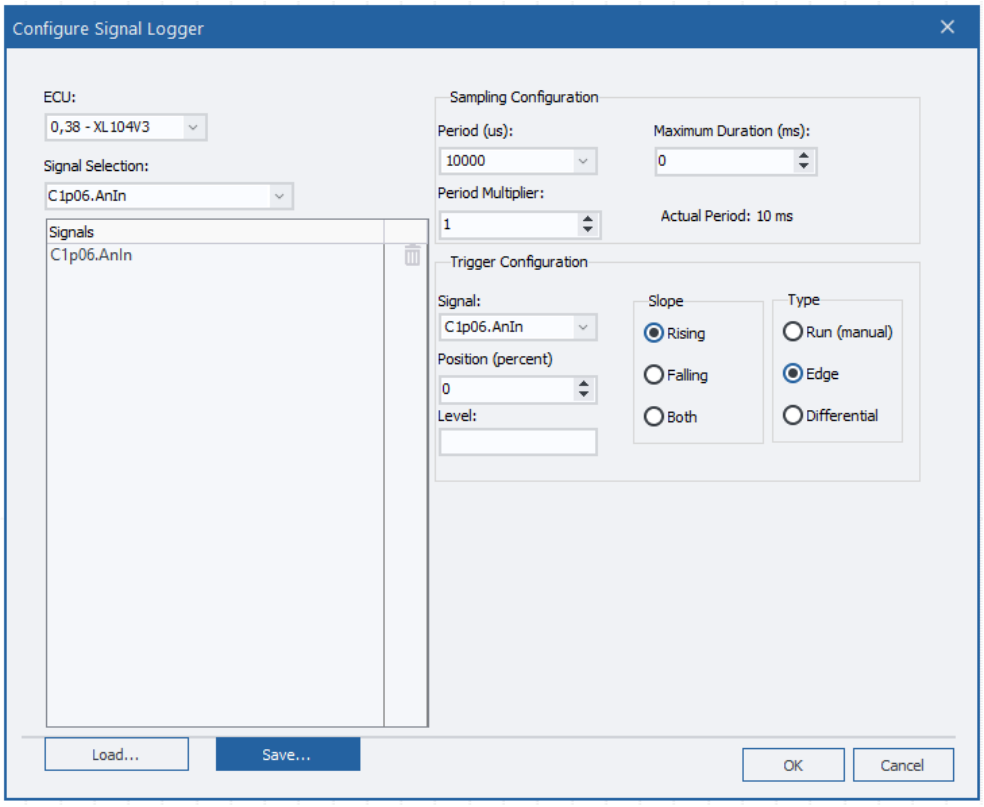

*Trigger Configuration settings*

| Item | Description |
|---|---|
| **Type** | |
| **Run (manual)** | The trigger will occur immediately when logging is enabled (manual start). |
| **Edge** | The trigger will occur when the trigger threshold is crossed (rising edge, falling edge or both. |
| **Differential** | The trigger will occur when the difference between two consecutive samples is detected. |
| **Slope** | |
| **Rising** | The trigger will occur on positive edge only when the threshold is crossed from below.<br>*For boolean values threshold won't be taken into account.* |
| **Falling** | The trigger will occur on negative edge only when the threshold is crossed from above.<br>*For boolean values threshold won't be taken into account.* |
| **Both** | The trigger will occur on both edges when crossing the threshold.<br>*For boolean values threshold won't be taken into account.* |
| **Differential** | |
| **Positive Difference** | The trigger will occur when a positive difference between two consecutive samples is detected.<br>*For boolean values this method is undefined/unsupported.* |
| **Negative Difference** | The trigger will occur when a negative difference between two consecutive samples is detected.<br>*For boolean values this method is undefined/unsupported.* |
| **Both** | The trigger will occur when either a negative or a positive difference between two consecutive samples is detected.<br>*For boolean values this method is undefined/unsupported.* |

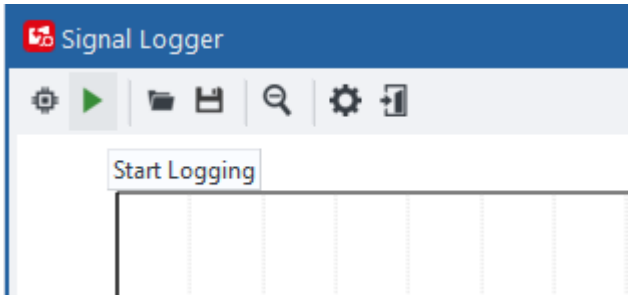
If a trigger is defined, enter the size of the pre-buffer in percent in the **Position (percent)** field. If no trigger is defined, the trigger happens directly when the logging is enabled.

### Working in normal view

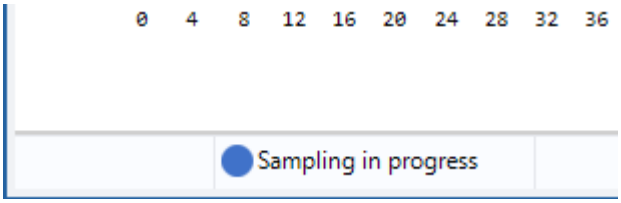
4. To save the signal configuration file, select **Save** or **Load** to load a previously saved file.




5. Select **OK** to close the **Configure Signal Logger** window.
6. To log the sampling, select **Start Logging** in the **Signal Logger** toolbar.




The logging process is shown in the lower left of the **Signal Logger** window.



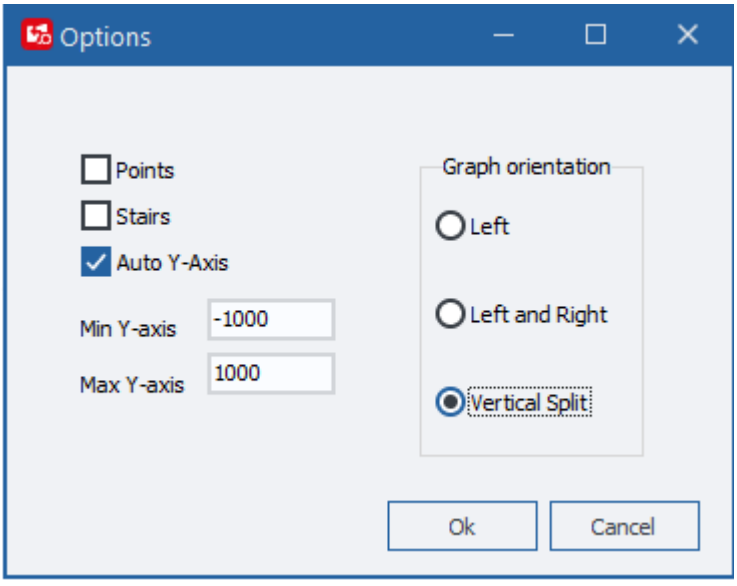

The status for logging is set to **Ready**. If no trigger events are defined, the status changes to **Sampling in progress**. After finishing reading the data in the buffer, the status changes to **Complete**, indicating that the logging is completed.

## Working in normal view

*Logging statuses*

| Item | Description |
|---|---|
| **Off/Ready** | The logger is disabled and no data is available in the buffer |
| **Init** | The logger is enabled and applying the configuration |
| **Waiting for trigger** | The logger is enabled and capturing pre-buffer data frames while waiting for a trigger condition to happen |
| **Sampling in progress** | The logger is enabled and are capturing data frames after a trigger condition has happen. |
| **Complete** | The logger is disabled, and the buffer contains data. The buffer is either full or the sampling duration time is reached or the logger has been stopped. |
| **Configuration error** | The logger is disabled because the configuration settings was not valid |

Signals are displayed on a Y- and X-axis graph. To configure the appearance of the signals on the graph, go to **Options** in the toolbar.



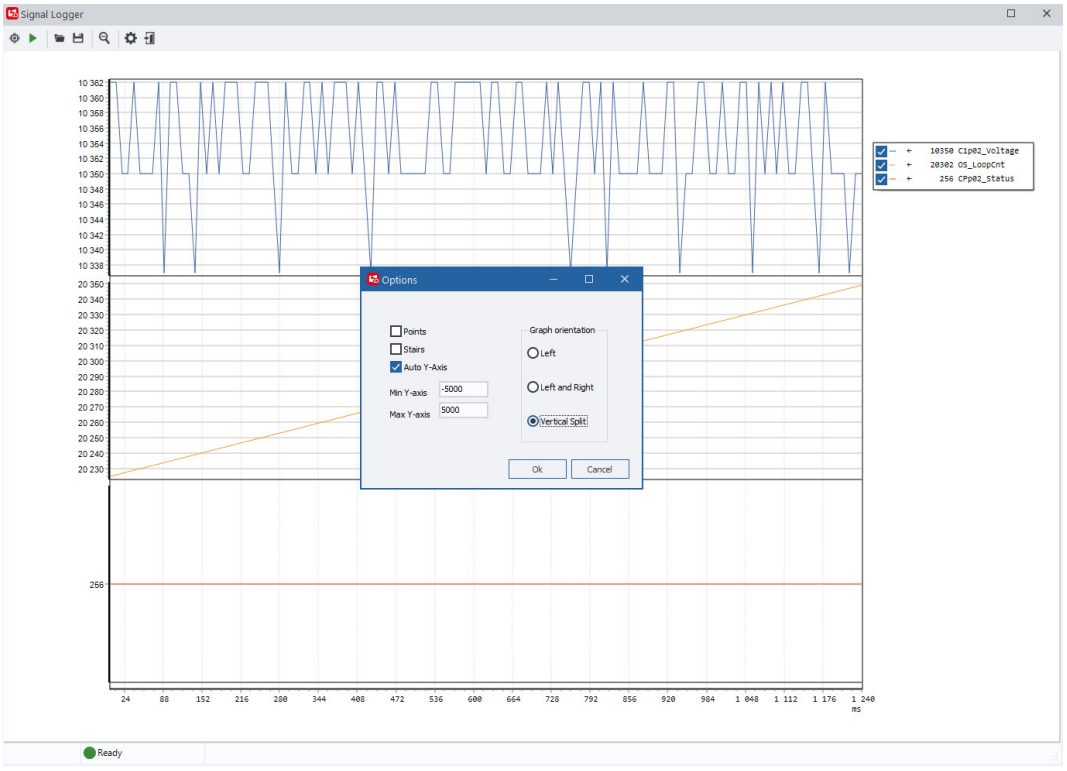

*Graph settings*

| Item | Description |
|---|---|
| **Points** | Display signal values as points on the graph. |
| **Stairs** | Display signal values as stairs on the graph. |
| **Auto Y-Axis** | Automatically scale the Y-axis for all signals. |
| **Min Y-axis** | Minimum scale value for Y-axis. |
| **Max Y-axis** | Maximum scale value for Y-axis. |
| **Graph orientation** | |
| **Left** | All signals have a common left Y-axis. |
| **Left and Right** | First signal is attached to the left Y-axis and all other signals are attached to the right Y-axis. |
| **Vertical split** | Each signal gets its own *swim lane*. |

You can enable and disable signals on the graph to make them visible or invisible by clicking the checkboxes in the text legend.

It is also possible to change which axis the signals are attached to, or to display all signals with their own *swim lane*.

## Working in normal view



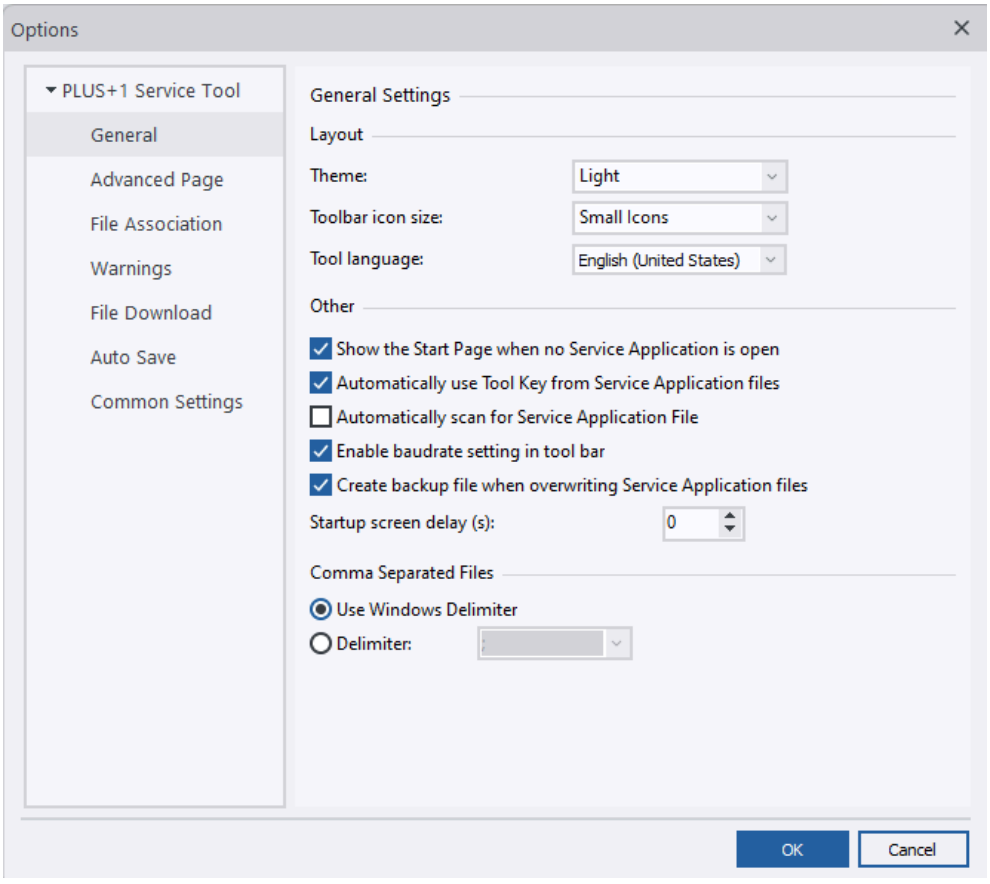

## PLUS+1® Service Tool settings options

Use PLUS+1® Service Tool settings to access general and advanced page setting options. In the main menu bar select **Options** > **Settings** to open the **Options** window.

### General

Use the **General** settings screen to set Tool Key, setup screen display, PLUS+1® Service Tool background color, and Export Log options.

## Working in normal view



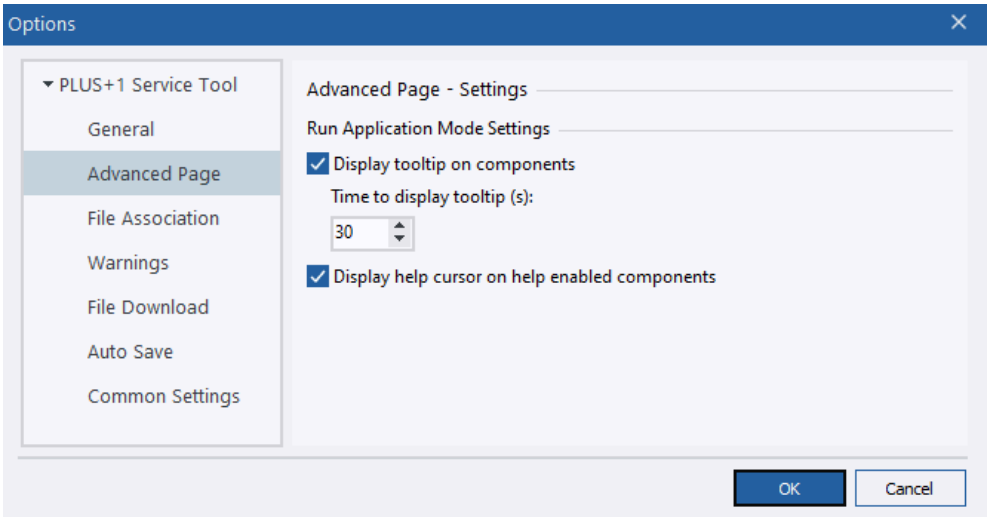

*General settings options*

| | |
|---|---|
| **Theme** | Use to select light or dark appearance in user interface. |
| **Toolbar icon size** | Use to select icon size displayed in tool bar. |
| **Tool language** | Select PLUS+1® Service Tool language. |
| **Show the Start Page when no Service Application is open** | Select check box to display the start page when no Service Application is open. |
| **Automatically use Tool Key from Service Application files** | Select check box to always use the tool key embedded in the *.P1D file. |
| **Automatically scan for Service Application File** | Select to automatically scan for service application files after automatic system scan is completed. |
| **Enable baudrate setting in status bar** | Select to enable manual baudrate setting. |
| **Create backup file when overwriting Service Application files** | Select check box to automatically create a *.P1D backup file. |
| **Startup screen delay** | Enter time that startup screen will be display at start up. |
| **Export log file** | Select to choose delimiter for log file export. The default is Windows |

### Advanced Screen

In the Advanced Page Design - Settings select **Display tooltip on components** and **Display help cursor on help enabled components** cursor options.

## Working in normal view

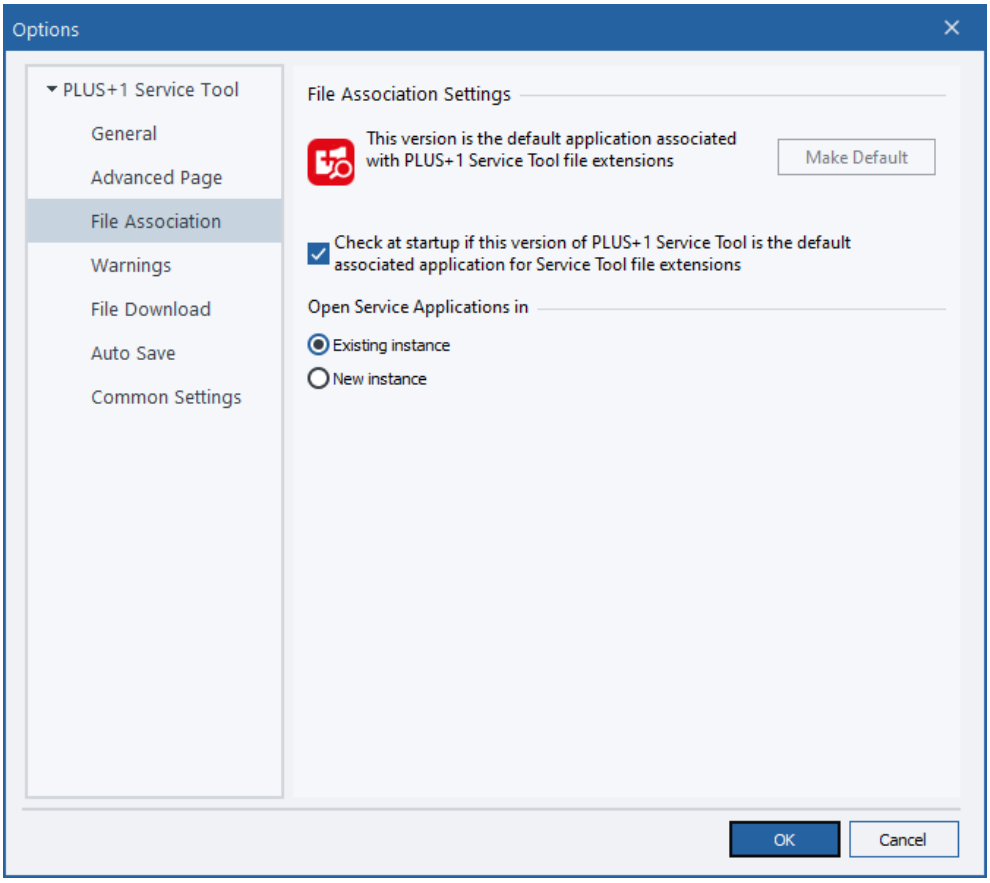



*Advanced page setting options*

| | |
|---|---|
| **Display tooltip on components** | Select to enable visible tooltip functionality when mouse is over tool tip function screen items. |
| **Time to display tooltip(s)** | The time the tool tip is shown (1 to 60 seconds). |
| **Display help cursor on help enabled components** | Select to display help cursor hand image when mouse is over help enabled components. |

## Working in normal view

### File association



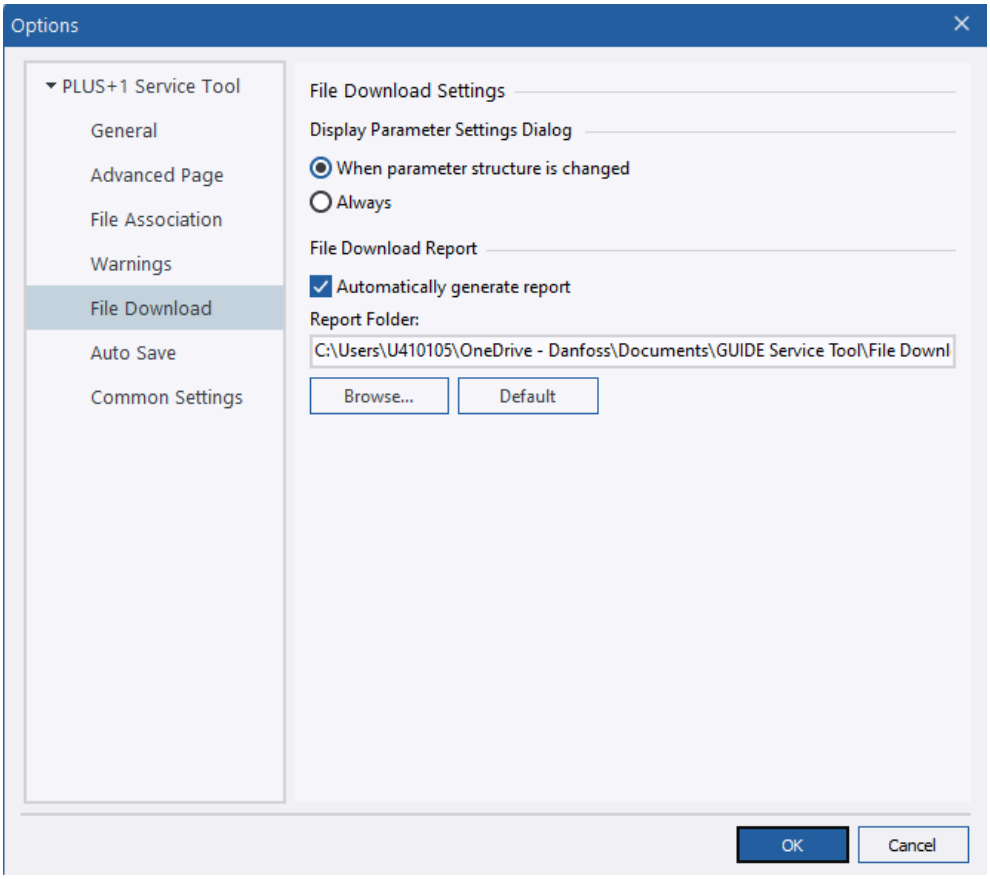

*File association setting options*

| | |
|---|---|
| **Check at startup if this version...** | If checked, will check at startup if this version of PLUS+1® Service Tool is the default associated application for P1D, P1H, and LHX file extensions. |
| **Open Service Applications in...** | Whether to open Service Applications in an existing instance, or in a new instance. |

### File download

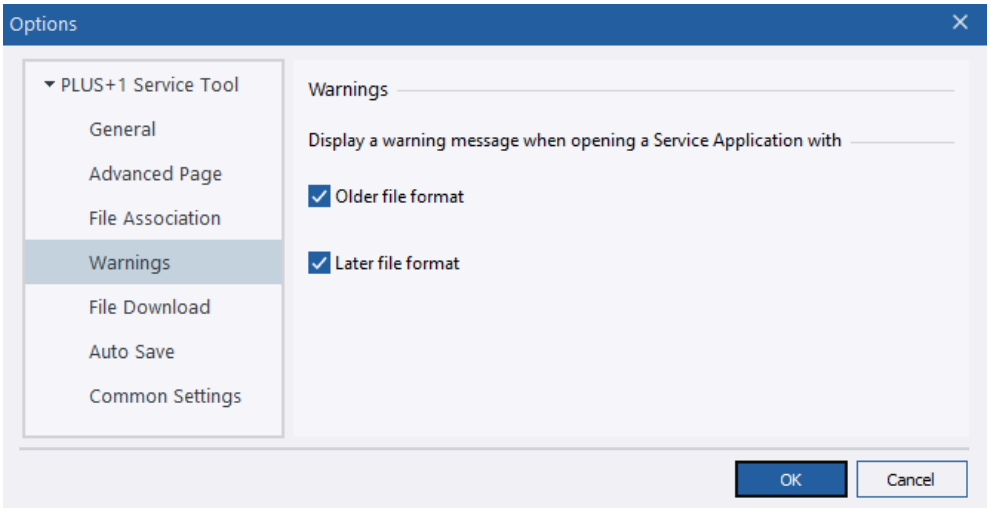
Use the File Download setting to select either to always display a parameter settings message or to only display a message when downloading a file.

### Working in normal view




#### Warnings

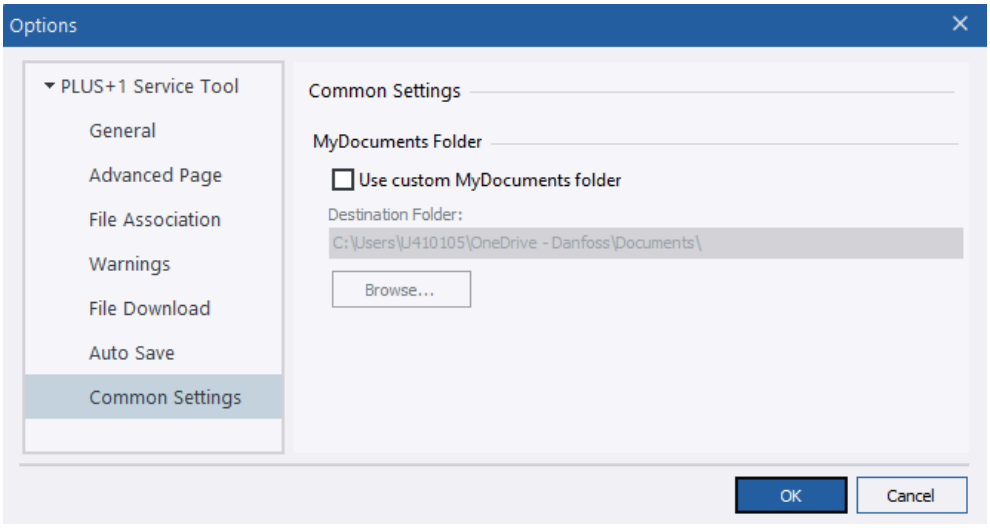
Check box to display a warning message if opening a P1D/P1H file with an older file format.




#### Common settings

Settings common for the PLUS+1 GUIDE, PLUS+1 Service Tool and PLUS+1 Update Center.

## Working in normal view




*Common settings options*

| | |
|---|---|
| **Use custom MyDocuments folder** | If checked the custom MyDocuments folder will be used. |
| **Browse** | Browse can be used to select the custom folder path if the checkbox is checked. |

## Monitoring the CAN bus

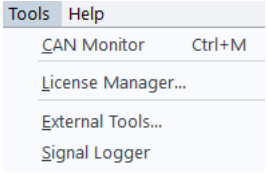
Use the CAN Monitor to monitor all CAN bus messages and bus load. Messages are displayed in either decimal or hexadecimal format and can be logged to a file.

CAN Monitor is a basic general-purpose CAN bus log tool, it is not a substitute for a full-scale CAN analyzer tool.

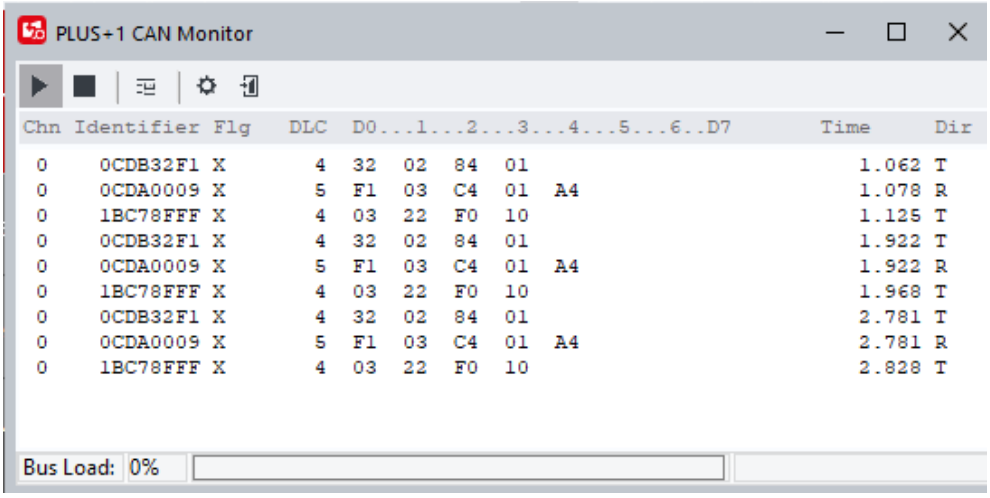
To use the CAN Monitor you need to have an Express or Professional license installed in the License Manager.

### Monitor CAN bus messages and bus load

1. Select menu item **Tools** > **CAN Monitor**




The PLUS+1® **CAN Monitor** is a standalone window that can be used along side the PLUS+1® Service Tool.




*Tool Bar buttons*

| | | |
|---|---|---|
|  | Start | Start monitoring the CAN bus. |
|  | Stop | Stop monitoring the CAN bus. |
|  | Log to file | Log all CAN bus messages to file. The current settings will be applied to the file content. |
|  | Options | Open the Options dialog. |
|  | Close | Close the CAN Monitor window. |

*CAN messages in main log panel*

| | |
|---|---|
| **Chn** | Active channel ID in the PLUS+1® Service Tool. |
| **Identifier** | CAN message identifier. |

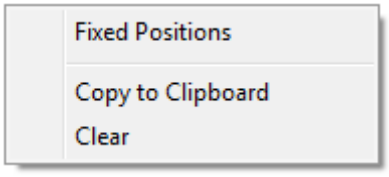
## Monitoring the CAN bus

*CAN messages in main log panel (continued)*

| | |
|---|---|
| **Flg** | CAN message flag, empty for standard CAN messages, **X** for extended. |
| **DLC** | Data length code, the amount of data bytes in the message. |
| **D... 0...1...2...3...4...5...6...D...7** | The content in the CAN message data bytes. |
| **Time** | The CAN message time stamp, displayed in seconds since the logging was started. |
| **Dir** | The CAN message direction **R**, when received by the PLUS+1® Service Tool and **T** when sent from the PLUS+1® Service Tool. |

The status bar shows the current bus load.

2. Right-click the main panel to show a menu where you can switch to **Fixed Positions** mode, (for more information, see *Options* on page 85), copy the logged content to clipboard and clear the log window.

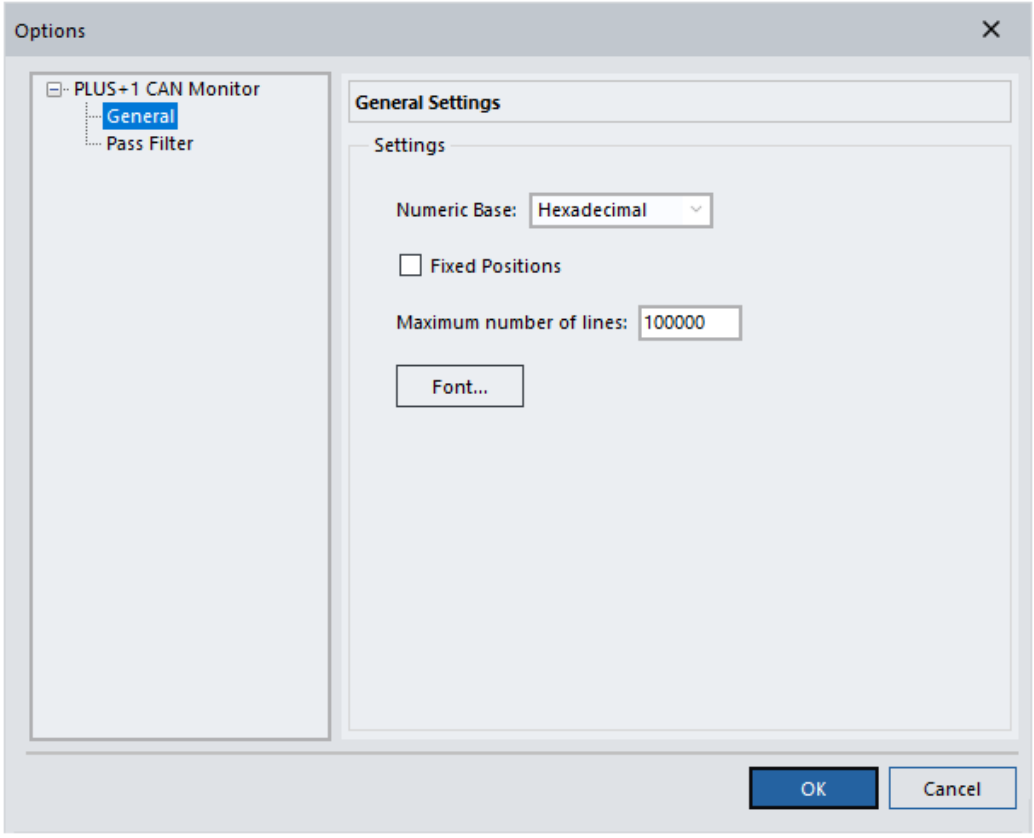


## Monitoring the CAN bus

### Options

Press the **Options** button to display the **Options** dialog.

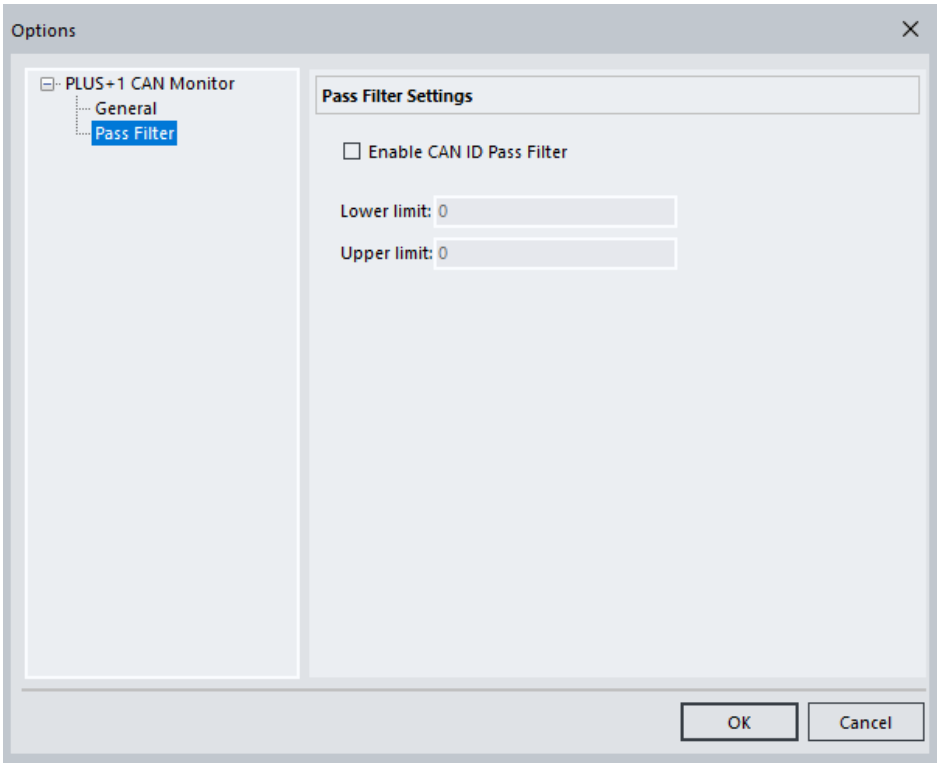
#### General options




| Option | Description |
|---|---|
| Numeric base | Select decimal or hexadecimal format. |
| Fixed Positions | Check option to enable **Fixed Positions** mode. In this mode, each CAN ID will be displayed on a single line and change the content each time a message with the same CAN ID is received/sent. |
| Maximum number of lines | Select the maximum number of lines of CAN messages displayed. |
| Font | Select font for the CAN message data. |

## Monitoring the CAN bus

### Pass filter options




| Enable CAN ID pass filter | Check option to enable the pass filter |
|---|---|
| Lower limit | Lower limit of CAN message ID's that shall pass the filter. |
| Upper limit | Upper limit of CAN message ID's that shall pass the filter. |

Lower and Upper limits can be entered in either decimal or hexadecimal (for example '$FF' or '0xFF') format.

## PLUS+1® Service Tool command line mode

Use the PLUS+1® Service Tool command line interface to perform tasks, such as testing a continuous integration (CI) build agent.

### P1Diagnostics

The executable is named `P1Diag.exe` and it can be found in the `/P1Tools/P1Diagnostics` installation folder.

P1Diag can be run in 3 modes: GUI, CLI and GUI+CLI.

*EXE modes*

| Modes | Description |
|---|---|
| GUI | PLUS+1® Service Tool will provide a standard Windows desktop user interface. |
| CLI | PLUS+1® Service Tool will provide a command line interface, without graphical elements. |
| GUI+CLI | PLUS+1® Service Tool will provide a combined interface where information will be provided both in the graphical and the command line interfaces. |

## Command, Configuration, and Command Modifier Parameters

*Command Parameters*

| Name | Description |
|---|---|
| -run-script <*P1J file*> <*Script function*> | Run the specified script function and then terminate.<br>This command requires exactly two parameters, a `P1J` file and a script function.<br>If the script is run successfully, then the exit code will be zero (0).<br>Otherwise, the exit code will be one (1). |
| -download-file-to-ecu <*Application file*> | Download the specified file to the connected system and then terminate.<br>The application(s) will automatically be matched to the available ECU(s). No attempt to download any file will be done unless the mapping is clear.<br>This command requires exactly 1 application download file.<br>If file download succeeds, then the exit code will be zero (0).<br>Otherwise, the exit code will be one (1). |
| -decrypt-p1t <*P1T file*> <*Decrypted output file*> | Decrypt the `P1T` file and then terminate.<br>This command requires exactly 2 parameters, a `P1J` file and a `CSV`/`JSON` output file.<br>If the decryption succeeds, then the exit code will be zero (0).<br>Otherwise, the exit code will be one (1). |
| -create-p1t <*Decrypted input file*> <*P1T file*> | Create a `P1T` file and then terminate.<br>This command requires exactly 2 parameters, a `CSV`/`JSON` input file and a `P1T` output file name.<br>If the creation succeeds, then the exit code will be zero (0).<br>Otherwise, the exit code will be one (1). |

## PLUS+1® Service Tool command line mode

*Command Parameters (continued)*

| Name | Description |
|---|---|
| -export-p1log-to-csv <*Input file*> <*Output file*> | Export the specified `P1log/LDF` file to CSV format and then terminate.<br>This command requires exactly 2 parameters, a `P1log` or `LDF` file and a CSV output file.<br>If the export succeeds, then the exit code will be zero (0). Otherwise, the exit code will be one (1). |
| -extract-application-xml <*Input p1d file*> <*Output path*> | Extracts the application file from the specified p1d file to xml format.<br>This command requires exactly 2 parameters, a `P1D` file and a output path where the application `XML` file is stored.<br>If the export succeeds, then the exit code will be zero (0). Otherwise, the exit code will be one (1). |
| *--version* | Prints the PLUS+1® Service Tool version.<br>Must not be combined with any other parameter. |
| */?--help* | Prints information about CLI usage.<br>Must not be combined with any other parameter. |

*Configuration Parameters*

| Name | Description |
|---|---|
| -use-gateway <*Gateway name*> | Specifies which gateway to select when starting the PLUS +1® Service Tool. |
| -use-channel <*Channel name*> | Specifies which gateway channel to select when starting the PLUS+1® Service Tool. |
| -use-baudrate <*Baud rate*> | Starts the PLUS+1® Service Tool in normal view. |
| -normal-view | Starts the PLUS+1® Service Tool in normal view. |
| -design-view | Starts the PLUS+1® Service Tool in design view. |
| -online-mode | Starts the PLUS+1® Service Tool in online mode. |
| -offline-mode | Starts the PLUS+1® Service Tool in offline mode. |

*Command Modifier Parameters*

| Name | Description |
|---|---|
| -headless | Run the PLUS+1® Service Tool in CLI mode only.<br>Can only be used in combination with a command. |
| -keep-cli | The CLI window will not be hidden.<br>May be used in combination with a command, or just a Service Application file. |
| -silent | Run the PLUS+1® Service Tool in silent mode.<br>In silent mode, the PLUS+1® Service Tool will not output to stdout.<br>May be used in combination with a command, or -keep-cli. |
| -very-silent | Run the PLUS+1® Service Tool in very silent mode.<br>In very silent mode, the PLUS+1® Service Tool will not output to either stdout or stderr.<br>Should normally only be used in combination with -headless. |

### Examples

Download a file to ECU from command line:

## PLUS+1® Service Tool command line mode

"C:\Program Files (x86)\Danfoss\PLUS1\11.0\P1Tools\P1Diagnostics\P1Diag.exe"-headless -download-file-to-ecu "C:\Projects\DownloadPackage.mlhx"

Run a script function from command line (Add-On license required: 'ST_Pro'*):

"C:\Program Files (x86)\Danfoss\PLUS1\11.0\P1Tools\P1Diagnostics\P1Diag.exe"-headless -run-script "C:\Projects\ScriptFunctions.p1j" "MyScriptFunction"

Decrypt a P1T file from command line:

"C:\Program Files (x86)\Danfoss\PLUS1\11.0\P1Tools\P1Diagnostics\P1Diag.exe"-headless -decrypt-p1t "C:\Projects\EcuParameterTransferFile.p1t" "C:\Projects\DecryptedTransferFile.json"

Create a P1T file from command line:

"C:\Program Files (x86)\Danfoss\PLUS1\11.0\P1Tools\P1Diagnostics\P1Diag.exe"-headless -create-p1t

"C:\Projects\DecryptedTransferFile.json" "C:\Projects\EcuParameterTransferFile.p1t"

Export a P1log file to CSV from command line:

"C:\Program Files (x86)\Danfoss\PLUS1\11.0\P1Tools\P1Diagnostics\P1Diag.exe"-headless -export-p1log-to-csv "C:\Projects\MachineLogFile.p1log" "C:\Projects\MachineLogFile.csv"

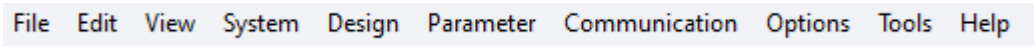
Use a specific gateway, channel and baud rate:

"C:\Program Files (x86)\Danfoss\PLUS1\11.0\P1Tools\P1Diagnostics\P1Diag.exe"-headless <command> -use-gateway "CG150" -use-channel "CG150 #0 (Channel 0)" -use-baudrate "250000"

## Menu bar

### Menu descriptions

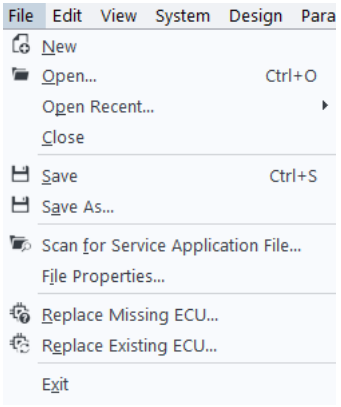
#### Menu bar




*Menu bar description*

| | |
|---|---|
| **File** | Use the commands in this menu to create, open, save, scan for and download service application file. |
| **Edit** | |
| **View** | Use the commands in this menu to select and change the PLUS+1® Service Tool on-screen environment. |
| **System** | |
| **Design** | Use the commands in this menu to design, create and modify log and parameter functions in the PLUS+1® Service Tool. |
| **Parameter** | Use the commands in this menu to read and write parameter values to the PLUS+1® GUIDE and generate parameter reports. |
| **Communication** | Use the commands in this menu to select online or offline modes and Toolbar settings. |
| **Options** | Use the commands in this menu to select system scan settings, access the Tool Key dialog box and select background color and startup screen delay settings. |
| **Tools** | Use the command in this menu to access License Manager. |
| **Help** | Use the command in this menu to access help and information about the PLUS+1® Service Tool. |

#### File menu




*File menu description*

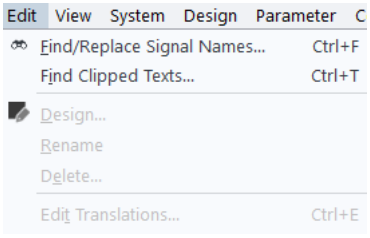
| | |
|---|---|
| **New** | Creates a new service application file within the diagnostic navigator tab window. |
| **Open** | Displays the Open dialog box. Use this dialog box to open existing P1D format application files. |
| **Open Recent** | Displays list of five recently opened P1D files for quick access. |
| **Close** | Closes the current program files to its previously selected file location. |
| **Save** | Saves the current program files to its previously selected file location. This selection is disabled in Normal view. |
| **Save As...** | Displays the Save service application dialog box. Use this dialog box to save current service application file. This selection is disabled in Normal view. |
| **Scan for Service Application File...** | Displays the Scan Connected System dialog box. The dialog box will automatically scan for P1D service application files. |

## Menu bar

*File menu description (continued)*

| | |
|---|---|
| **File Properties...** | Select the view Service Application file details. |
| **Replace Missing ECU...** | Select this option for program to scan application for any missing ECU in all log and parameter functions. |
| **Replace Existing ECU...** | Select this option for program to scan application for unused ECU available for replacement in log and parameter functions. |
| **Exit** | Closes the PLUS+1® Service Tool. |

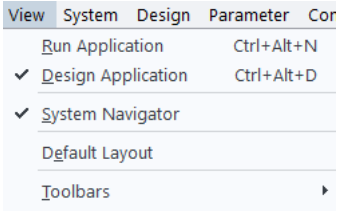
### Edit menu




*Edit menu description*

| | |
|---|---|
| **Find/Replace Signal Names...** | Find, replace or insert signal names in all or part of selected ECUs. |
| **Find Clipped Texts...** | |
| **Design...** | |
| **Rename** | Select this option to rename selected log and parameter functions. |
| **Delete...** | Select this option to delete log and parameter functions. |
| **Edit Translations...** | |

### View menu

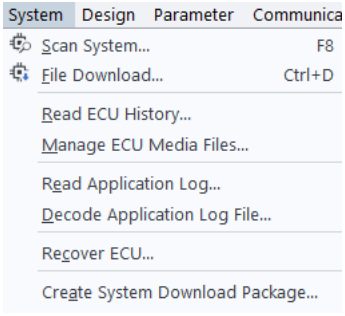



*View menu description*

| | |
|---|---|
| **Run Application** | Select this option to use the PLUS+1® Service Tool without the log and parameter design functions. |
| **Design Application** | Select this option to use the PLUS+1® Service Tool with log and parameter design functions. |
| **System Navigator** | Select this option to show or hide the **System Navigator**. |
| **Default Layout** | Select this option to use the PLUS+1® Service Tool with all menus and tool bar options available. |
| **Toolbars** | Use this dialog box to select tool bar icons to for display in tool bar. Use the tool bar buttons to quickly access frequently used service and diagnostic functions |

## Menu bar

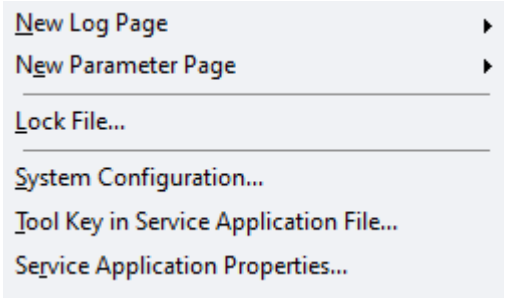
### System menu




*System menu description*

| | |
|---|---|
| **Scan System...** | Displays the Scan Connected System dialog box. The dialog box will automatically scan system for connected equipment. |
| **File Download...** | Displays the Application File Download dialog box. Use this dialog box to download file programs into the PLUS+1® Service Tool. |
| **Read ECU History...** | Select to show ECU history in log form. |
| **Manage ECU Media Files...** | |
| **Read Application Log...** | Select to read saved application log data. |
| **Decode Application Log File...** | Use to convert application log files into a CSV file format for spreadsheet view. |
| **Recover ECU...** | |
| **Create System Download Package...** | |

### Design menu

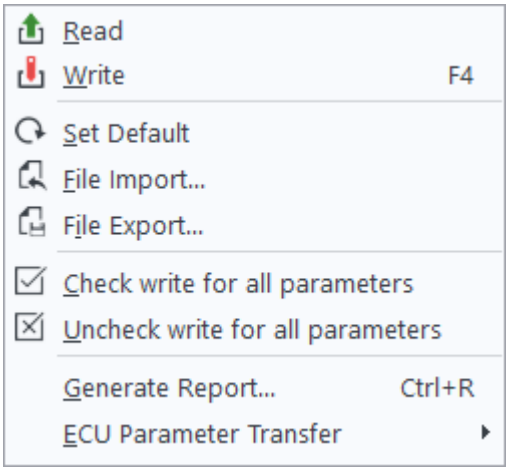



*Design menu description*

| | |
|---|---|
| **New Log Page** | Creates a new log function in the diagnostic navigator pane of the PLUS+1® Service Tool window. Select basic or advanced log design function |
| **New Parameter Page** | Creates a new parameter function in the diagnostic navigator pane of the PLUS+1® Service Tool window. Select basic or advanced parameter design function. |
| **Lock File...** | Select to permanently lock P1D and P1H files. |
| **System Configuration...** | Define display style, scan options and tooltip information for a selected system. |
| **Tool Key in Service Application File...** | Create a tool key for customized application protection. |
| **Service Application Properties...** | |

## Menu bar

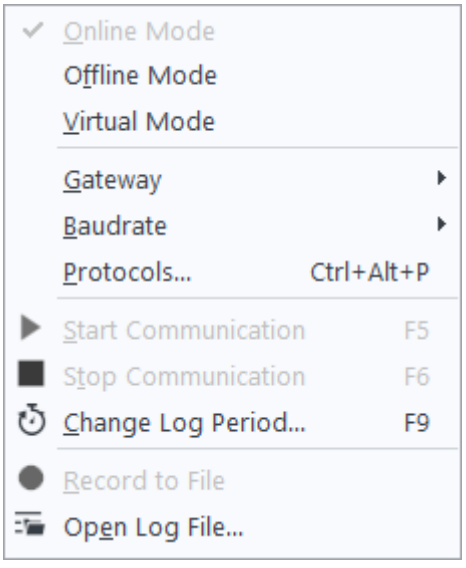
### Parameter menu




*Parameter menu description*

| | |
|---|---|
| **Read** | Select Read to read parameter settings from controller to the PLUS+1® Service Tool. |
| **Write** | Select Write to write parameter settings from the PLUS+1® Service Tool to the controller. |
| **Set Default** | Select to reset default parameter values. |
| **File Import...** | Select to import parameter files. |
| **File Export...** | Select to export parameter values. |
| **Check write for all parameters** | Choose to select all parameters for writing. |
| **Uncheck write for all parameters** | Choose to unselect all parameters for writing. |
| **Generate Report...** | Select Generate Report to save parameter report to PLUS+1® Service Tool. |
| **ECU Parameter Transfer** | Select to read or write parameter values to or from another location. |

### Communication menu

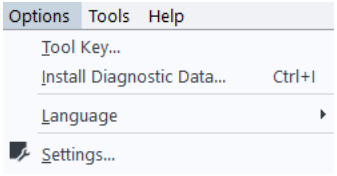


## Menu bar

*Communication menu description*

| | |
|---|---|
| **Online Mode** | Toggle this menu option to work in online mode. |
| **Offline Mode** | Toggle this menu option to work in offline mode. |
| **Virtual Mode** | Toggle this menu option to work in virtual mode. |
| **Gateway** | Select connection device to enable CAN communication and specific channel selections. |
| **Baudrate** | Select preferred baudrate (default baudrate is 250k). |
| **Protocols...** | Select communication protocols. |
| **Start Logging** | Select this option to begin logging. |
| **Stop Logging** | Select this option to stop logging. |
| **Change Log Period...** | Select this option to open Change Log period dialog box. Use this dialog box to change log frequency (in millisecond increments). |
| **Record to File** | Record to file. |
| **Open Log File...** | Use to play saved log file. |

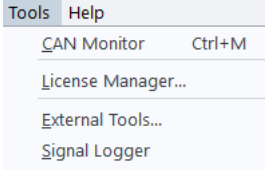
### Options menu




*Options menu description*

| | |
|---|---|
| **Tool Key...** | Use to lock log and parameter files. |
| **Install Diagnostic Data...** | Select to manually install diagnostic data files. |
| **Language** | Tool and Service Application language settings. |
| **Settings...** | Displays the Settings dialog box. Use dialog box to select general and advance screen settings options. |

### Tools menu

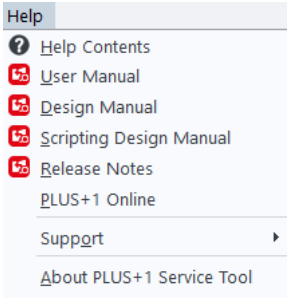



*Tools menu description*

| | |
|---|---|
| **CAN Monitor** | |
| **License Manager** | Displays the License Manager dialog box. Use this dialog box to add a PLUS+1® Service Tool, delete a license, activate a license or get a license. |
| **Customize...** | Use to create custom toolbar button options. |

## Menu bar

### Help Menu




*Help menu description*

| | |
|---|---|
| **Help Contents** | Opens in-application help file. |
| **User Manual** | Opens PDF User Manual. |
| **Design Manual** | |
| **Scripting Design Manual** | |
| **Release Notes** | Last minute news and notes. |
| **PLUS+1® Online** | Select to visit the PLUS+1® website. |
| **Support** | Use Support to access the PLUS+1® support website, create a troubleshooting file for diagnosis or to open your desktop for PLUS+1® Help desk access. |
| **About PLUS+1® Service Tool** | Select to view PLUS+1® Service Tool and license information. |

## Toolbar

### Toolbar descriptions

*Toolbar*


| | | |
|---|---|---|
| **1** | New Service Application | Creates a new service application file within the diagnostic navigator tab window. |
| **2** | Open Service Application | Displays the Open dialog box. Use this dialog box to open existing P1D format application files. |
| **3** | Save Service Application | Saves the current program files to its previously selected file location. |
| **4** | File Download | Displays the Application File Download dialog box. Use this dialog box to download file programs into the PLUS+1® Service Tool. |
| **5** | Scan System | Displays the **Scan Connected System** dialog box. The program will automatically scan system for connected equipment. |
| **6** | Run Application / Design Application | Switch between design mode and run mode. |
| **7** | Read Parameters from ECU | Select to read all parameter values from the ECU. |
| **8** | Write Parameters to ECU | Select to write all parameter values to the ECU. |
| **9** | Start Communication / Stop Communication | Select to begin logging or stop logging. |
| **10** | Record / Stop Recording | Select to record a log file, or stop recording and save the log file. |
| **11** | Open Log File | Open a recorded log file. |
| **12** | Baud rate | View/change current baud rate. |
| **13** | Help | View help content. |

ENGINEERING
TOMORROW

**Products we offer:**

- Cartridge valves
- DCV directional control valves
- Electric converters
- Electric machines
- Electric motors
- Gear motors
- Gear pumps
- Hydraulic integrated circuits (HICs)
- Hydrostatic motors
- Hydrostatic pumps
- Orbital motors
- PLUS+1® controllers
- PLUS+1® displays
- PLUS+1® joysticks and pedals
- PLUS+1® operator interfaces
- PLUS+1® sensors
- PLUS+1® software
- PLUS+1® software services, support and training
- Position controls and sensors
- PVG proportional valves
- Steering components and systems
- Telematics

**Hydro-Gear**
www.hydro-gear.com

**Daikin-Sauer-Danfoss**
www.daikin-sauer-danfoss.com

**Danfoss Power Solutions** is a global manufacturer and supplier of high-quality hydraulic and electric components. We specialize in providing state-of-the-art technology and solutions that excel in the harsh operating conditions of the mobile off-highway market as well as the marine sector. Building on our extensive applications expertise, we work closely with you to ensure exceptional performance for a broad range of applications. We help you and other customers around the world speed up system development, reduce costs and bring vehicles and vessels to market faster.

Danfoss Power Solutions – your strongest partner in mobile hydraulics and mobile electrification.

**Go to www.danfoss.com for further product information.**

We offer you expert worldwide support for ensuring the best possible solutions for outstanding performance. And with an extensive network of Global Service Partners, we also provide you with comprehensive global service for all of our components.

Local address:

**Danfoss**
**Power Solutions (US) Company**
2800 East 13th Street
Ames, IA 50010, USA
Phone: +1 515 239 6000

**Danfoss**
**Power Solutions GmbH & Co. OHG**
Krokamp 35
D-24539 Neumünster, Germany
Phone: +49 4321 871 0

**Danfoss**
**Power Solutions ApS**
Nordborgvej 81
DK-6430 Nordborg, Denmark
Phone: +45 7488 2222

**Danfoss**
**Power Solutions Trading (Shanghai) Co., Ltd.**
Building #22, No. 1000 Jin Hai Rd
Jin Qiao, Pudong New District
Shanghai, China 201206
Phone: +86 21 2080 6201