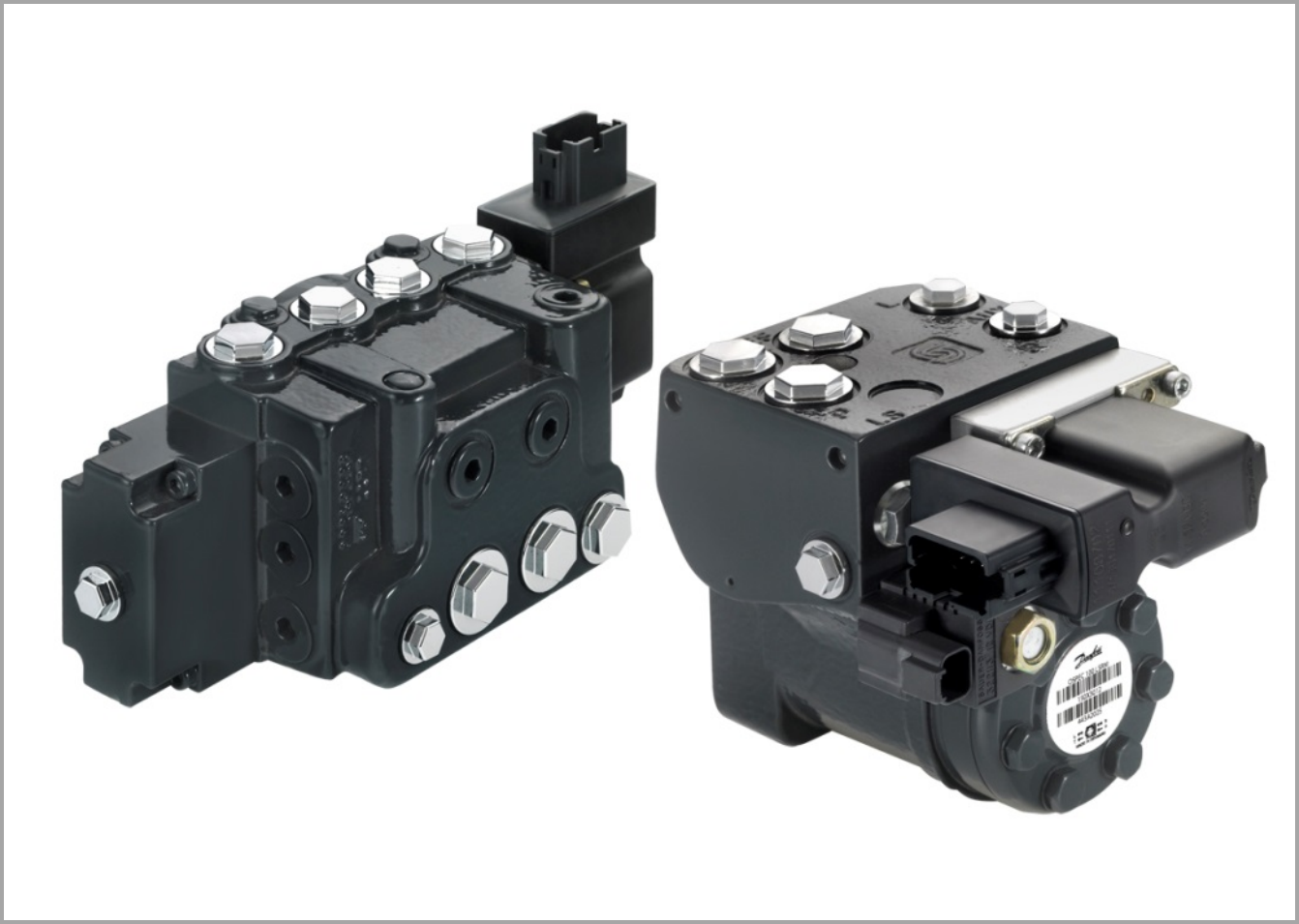
PLUS+1 GUIDE Service Tool 11.1.5 User Guide



Important User Information

Danfoss is not responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included for illustration purposes. Due to the many variables and requirements associated with any particular installation, Danfoss cannot assume responsibility or liability for the actual used bases on the examples and diagrams.

Reproduction of whole or part of the contents of this PLUS+1 Guide Service Tool User guide is prohibited.

The following notes are used to raise awareness of safety considerations.

Warning	Identifies information about practices or circumstances that can cause a hazardous situation, which may lead to personal injury or death, damage or economic loss.
Attention	Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence.
Important	Identifies information that is critical for successful application and understanding of the product.
Recommendation	Identifies a typical use of a functionality or parameter value. Use recommendations as a starting point for the final configuration process of the system.

Revisions and references

Revision history

Date	Change	Revision
23 January 2014	Document created	1.0
30 March 2015	Updated for service tool 7.1	1.1
30 March 2015	Updated section for How to download bootloader/application in CLS	1.2
23 October 2015	Updated for service tool 7.2 Updated section for How to download bootloader/application in CLS	1.3
3 February 2016	Updated section for How to download bootloader/application .mlhx files in CLS	1.4
24 June 2016	Updated section How to download, How to Install and How to download bootloader/application to download service tool 7.2.10 from archives. Renamed document to User Guide.	1.5
20 September 2016	Updated for service tool 8.1.2	1.6
21 September 2016	Added sections How to use Parameter File Interface OEM page, How to use Parameter File Interface VPS page and How to use Clone PVED-CLS page.	1.7
04 October 2016	Updated Guidelines for using Parameter File Interface Service pages.	1.7.1
06 September 2017	Updated for service tool version 9.1.6	1.8
28 February 2018	Added Note in Guidelines for using Parameter File Interface Service pages section.	1.9
29 March 2018	Updated Note in Guidelines for using Parameter File Interface Service pages section.	2.0
04 April 2018	Updated Screenshots for OEM and Clone pages in Parameter file interface section. Updated Note in Guidelines for using Parameter File Interface Service pages section.	2.1
11 April 2018	Updated for service tool version 10.0.7	2.2
23 April 2018	Updated for service tool version 10.0.8	2.3
30 April 2018	Updated Note in Guidelines for using Parameter File Interface Service pages section. (Changed 2.01 P1D Version to Rev D)	2.4
15 January 2019	Updated for service tool version 11.0.7 Updated Note in Guidelines for using Parameter File Interface Service pages section. (Included 2.02 A P1D Version)	2.5
12 February 2019	Updated for service tool version 10.1.7 and included OEM data in the Guidelines for using Parameter File Interface Service pages section.	2.6
21 February 2019	Updated website screenshot and Font of the User guide Header	2.7
13 March 2019	Updated Note in Guidelines for using Parameter File Interface Service pages section. (Changed 2.02 P1D Version to Rev B) Fixed Review comments	2.8
22 July 2019	Updated User Guide for N-axis 1.00 Service pages.	2.9
12 August 2019	Deleted upgrade procedure section from user guide.	2.9
5 September 2019	Updated the P1d version from 1.00 Rev B to 1.00 Rev C in Section 7	3.0

References

Literature
http://powersolutions.danfoss.com
Document: USER MANUAL: License Manager Help PLUS+1 (L1019779 • Rev CA • Dec 2013)

Definitions and Abbreviations

AD	**Analog to digital converter**
AUX	**Auxiliary**
CAN	**Controller Area Network**
CRC	**cyclic redundancy check**
COV	**Cut-off valve**
DTC	**Diagnostic trouble code**
FDA	**Fault Detection Algorithm**
FMI	**Failure mode Identifier**
GMC	**Guidance machine command**
GMS	**Guidance machine status**
MAIN UC	**main micro-controller, the one controlling the proportional valve**
MMI	**Man machine interface**
L2L	**Lock to lock ratio (Number of steering wheel revolution for steering the wheels from max right to max left and vice versa)**
LVDT	**Linear variable differential transformer**
PAE	**Product application engineer**
PGN	**Page group number**
PSM	**Program sequence monitoring**
PVED	**Proportional Valve Electronic Digital**
PVED-CLS	**a special type of PVED being developed for new steering applications**
SAFETY UC	**the micro-controller in the safety related channel, the one controlling the cut-off valve**
SASA	**Steering angle sensor absolute**
SEHS	**Safe EH Steering**
SPN	**Suspect Parameter Number**
STW	**steering wheel**
TBD	**to be defined**
UC	**micro-controller**
VSP	**vehicle speed**
WA	**wheel angle**
WAS	**Wheel angle sensor**

Table of Contents

1. Introduction

1.1 Purpose of the Document

The purpose of the document is to give the guidelines to Download, Install and activate license for PLUS1+GUIDE Service Tool.
By reading this document, anyone will be able to Download, install and activate license the Service Tool.

1.2 System Requirements

Please refer release note.

System requirements

	Service Tool Minimum	GUIDE Minimum	GUIDE/Service Tool Recommended
CPU*	1.5 GHz, 32-bit (x86), 1 core, 2008 or later		3.0 GHz, 64-bit (x64), 4 cores, 2012 or later
OS	32-bit Windows 7		64-bit Windows 7/8.1/10
UAC	Local Administrator Access		
RAM	1 GB		3 GB
HD	>1 GB Free, HDD		>2 GB Free, SSD
Resolution	1024 x 768		1920 x 1080
Email	For license registration		
PDF	Any recent standards compliant pdf reader		
Web	Any recent standards compliant web browser (for HTML based F1 help)		
XML	MSXML 4.0 Service Pack 2 (Microsoft XML Core Services)		
.Net	N/A	Version 4 (Full) is needed for PLC code support in GUIDE	

* The CPU should be intended for at least laptop use. Processors designed for netbooks, tablets or similar are not recommended.

1.3 Errata information

The latest errata information is always available on the Danfoss homepage via following link:
WWW.DANFOSS.COM
It contains errata information for:

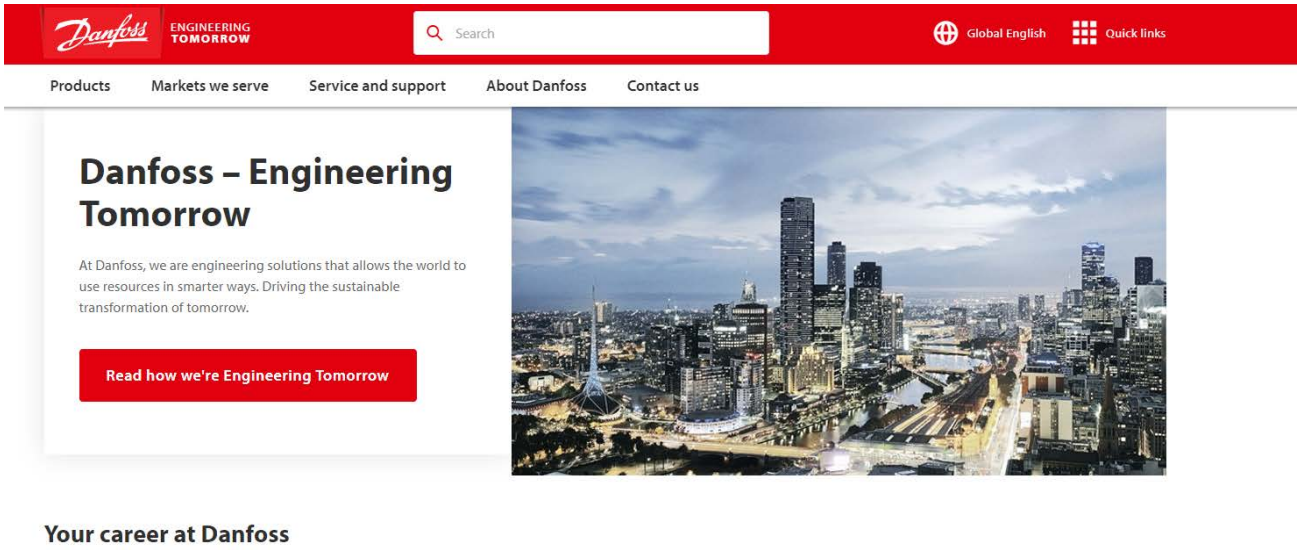
- PVED-CLS boot loader
- PVED-CLS application
- Documentation
- PLUS+1 Service tool
- Other topics related to the steering system

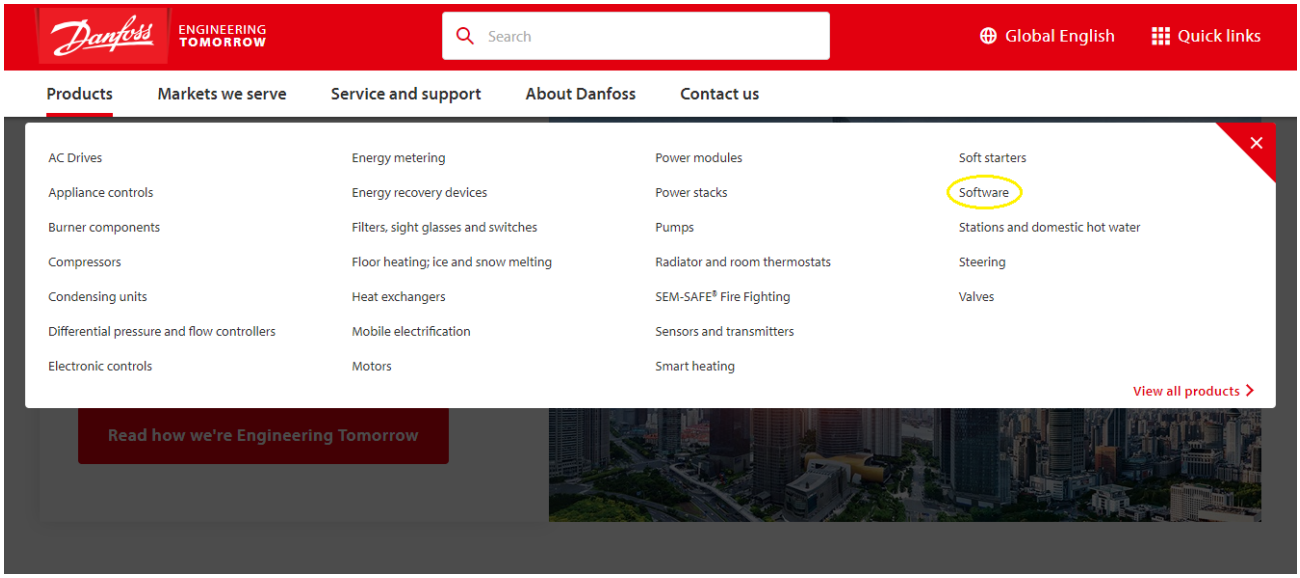
If further information to any errata is required, contact your nearest Danfoss Product Application Engineer

Attention	The system integrator and/or responsible for the target system is advised to periodically observe the errata information as new information will be added as needed. It is recommended that system integrators and/or responsible for the system, after commissioning, sign up for the email notification service.

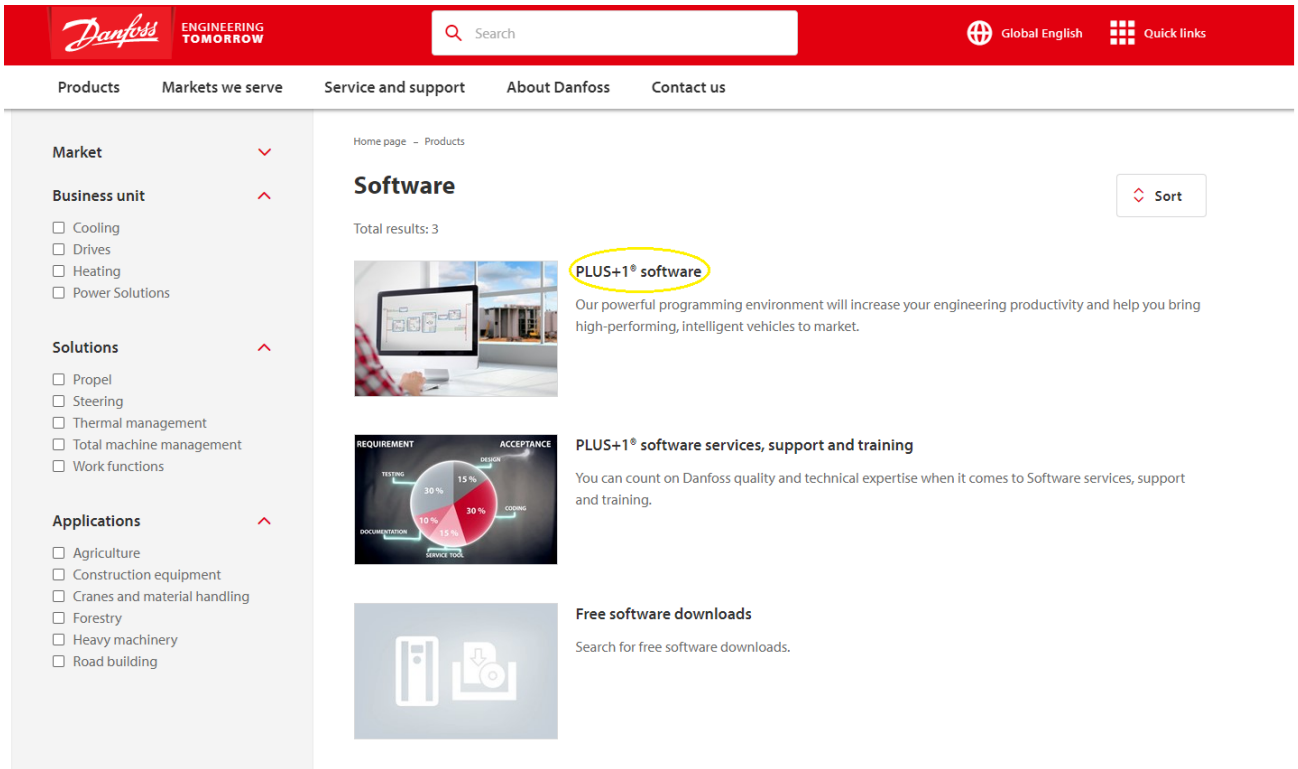
2. How to Download

Open Web page: https://www.danfoss.com/

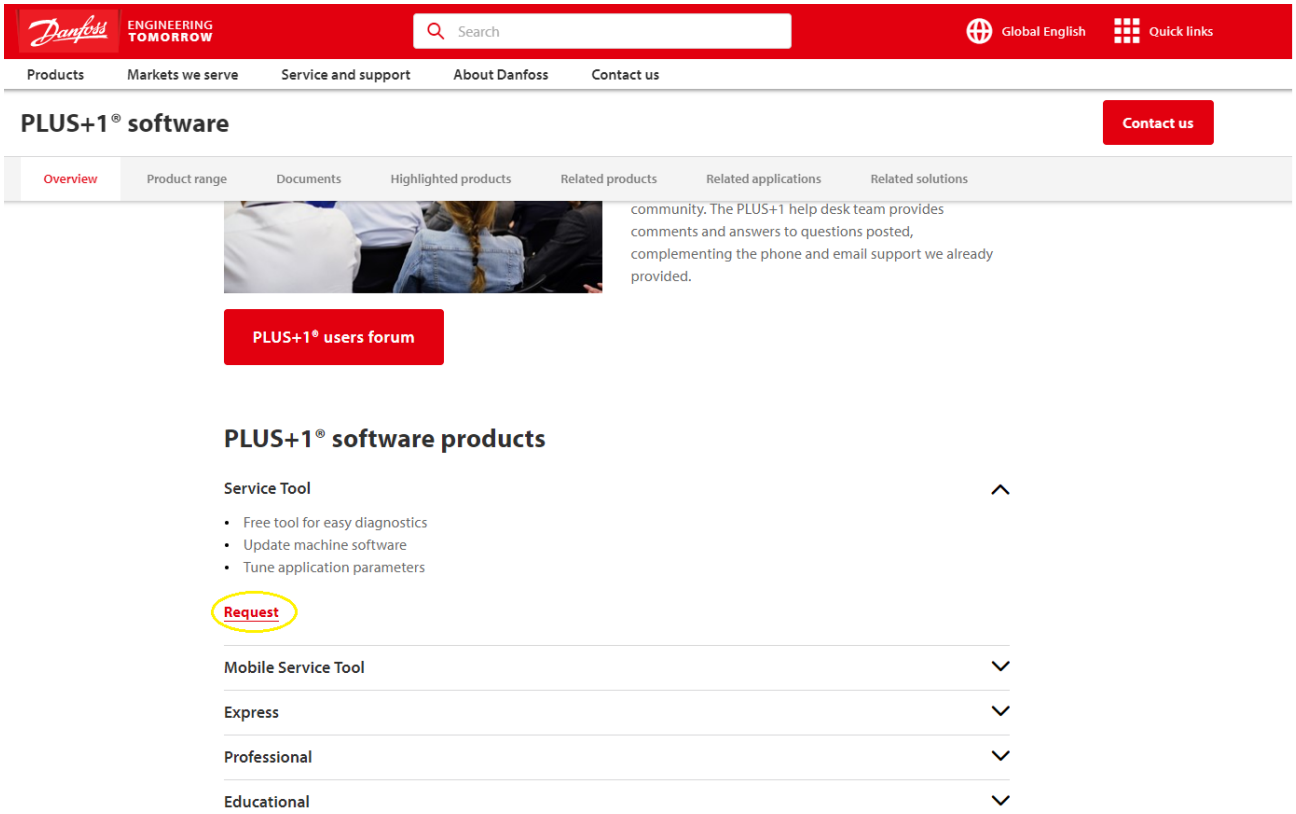




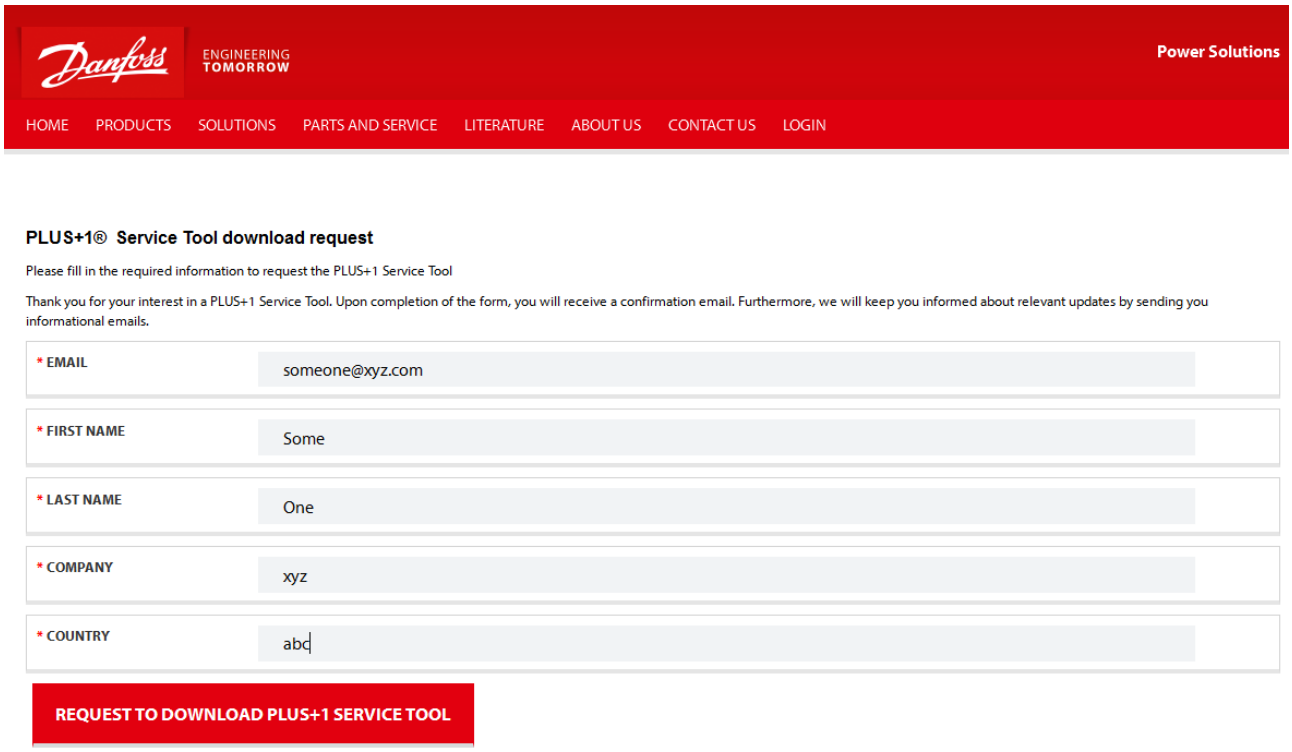
- Click on Products.
- Click on Software



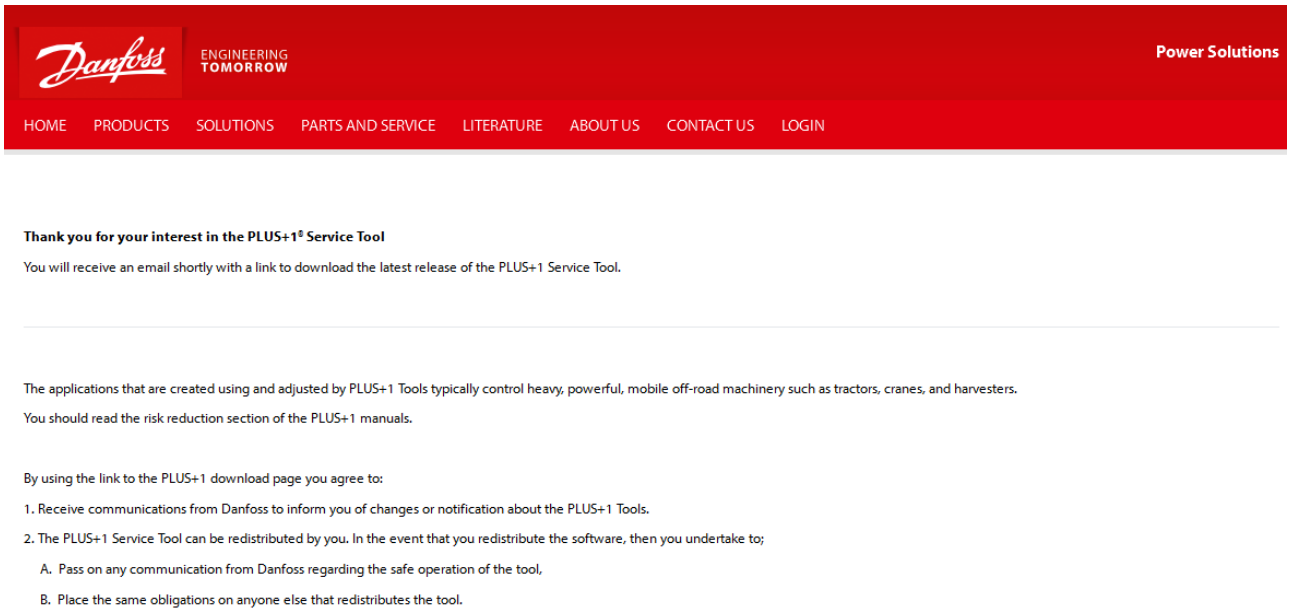
- Click on PLUS+1 Software.



- Select Service Tool under Plus+1 software products.
- Click on Request



- Enter valid following details like Email Address, First name, last name, Company name and Country.
- Click on “Request to Download PLUS+1 Service tool”.



Thank you for your interest in the PLUS+1® Service Tool

Please use the link below to download the latest release of the PLUS+1 Service Tool. The PLUS+1 Service tool is a free application for flashing PLUS+1 hardware, adjusting parameters, and running machine diagnostic applications. Professional machine designers can create customized service applications with the PLUS+1 Service Tool Design interface, which is also included with PLUS+1 GUIDE.

- **Download applications of PLUS+1 programmable hardware**
- **Run service applications for tuning and parameter updating**
- **Record and save machine log data for advanced troubleshooting**

Relevant links:
>PLUS+1 Service Tool Download
>PLUS+1 Service Tool application files

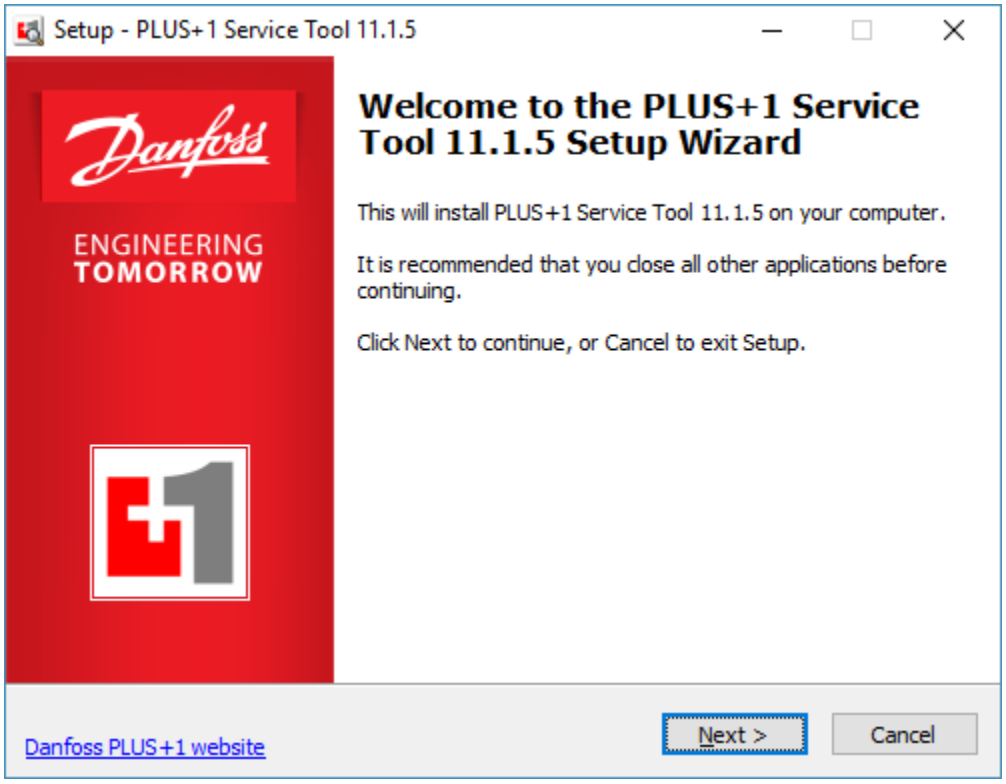
Interested in creating your own customized machine applications?
>Download the latest release of PLUS+1 GUIDE today!

Best regards,
Danfoss Power Solutions
2800 E 13th St
Ames, IA 50010

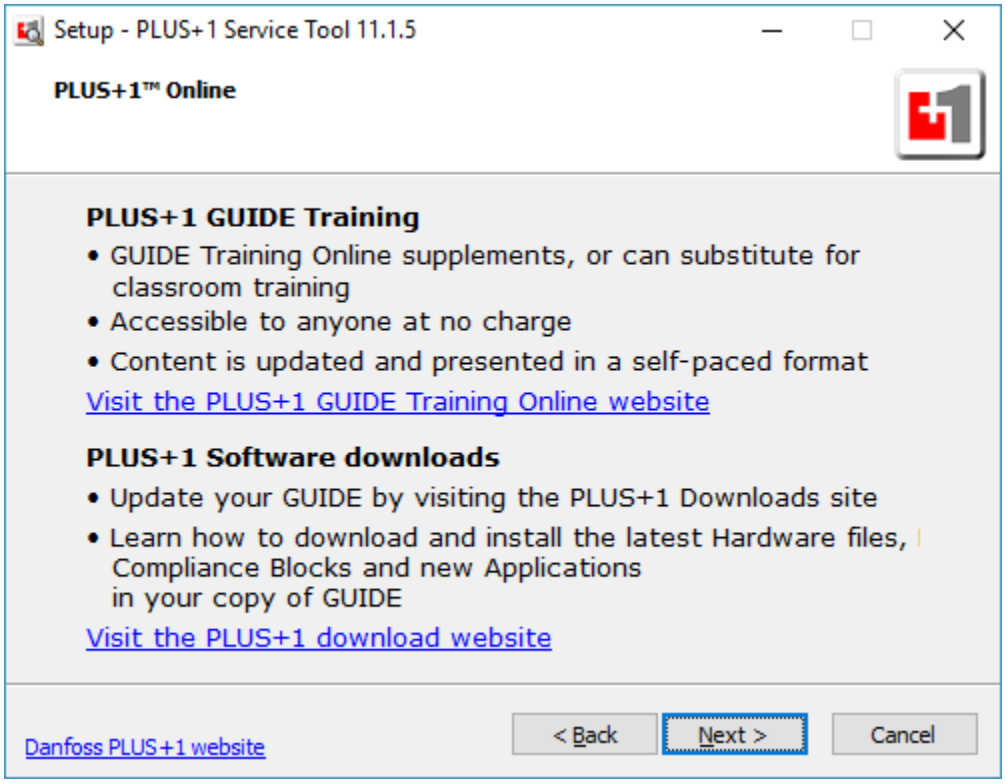
- Click on the Download link sent in the mail.
- Save the latest Plus+1 service tool version.

3. How to Install

- Double click on setup file: PLUS+1 Service Tool 11.1.5 setup.exe and Click on Run.

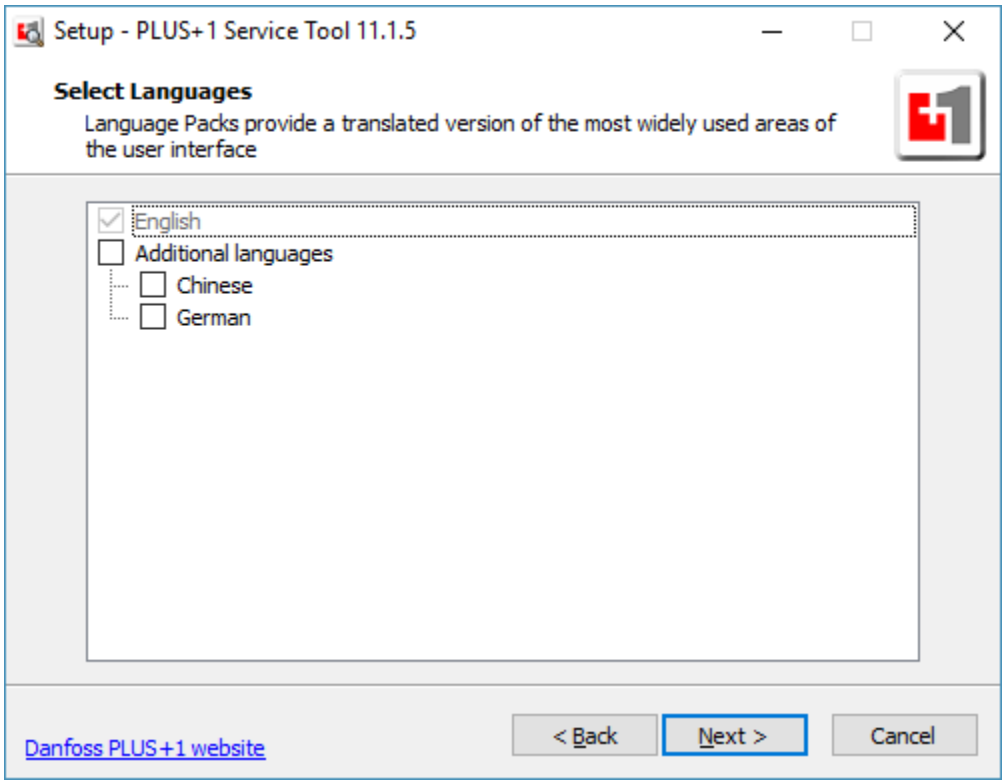


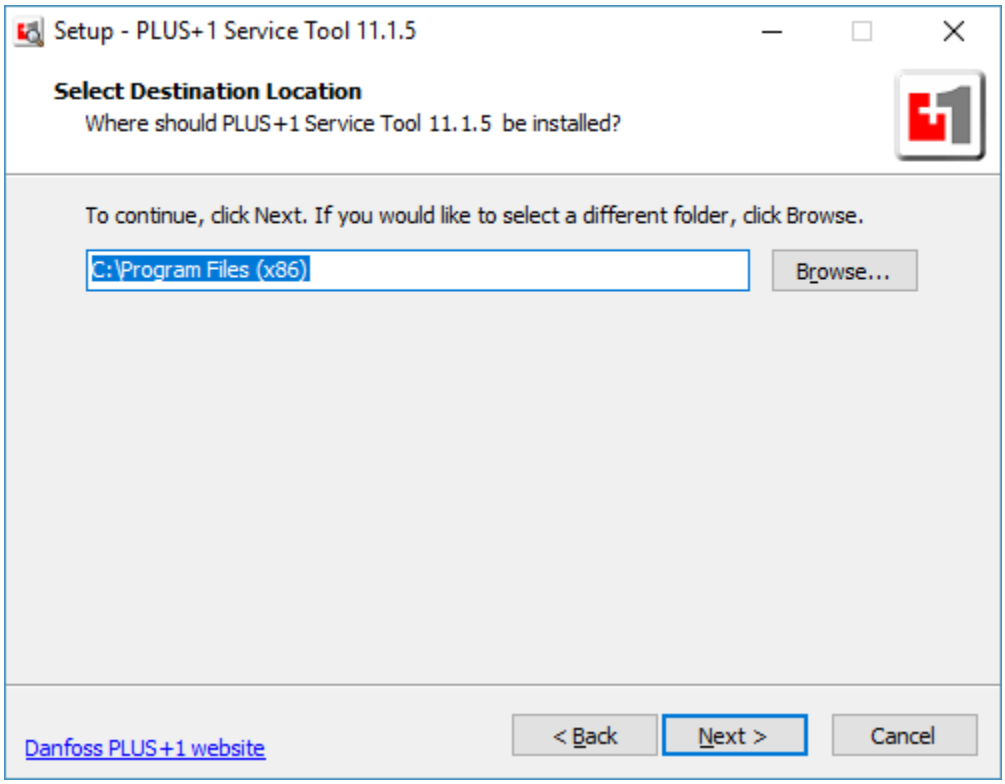
- Click on Next.



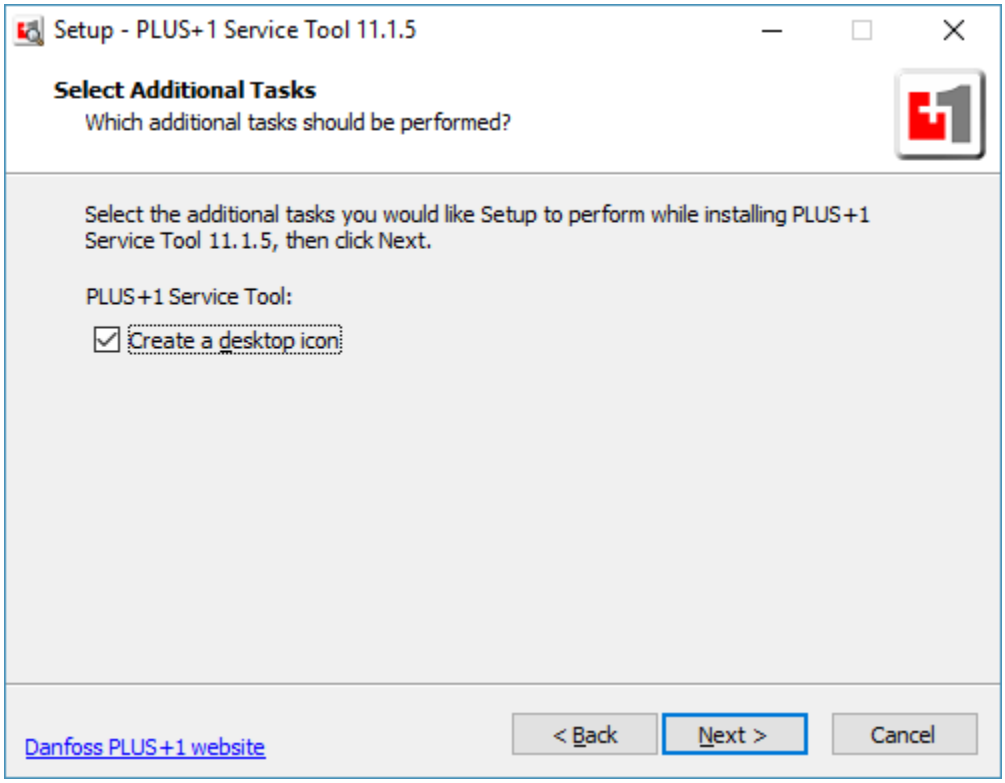
- Click on Next

- Select additional languages if required.
- Click on Next.

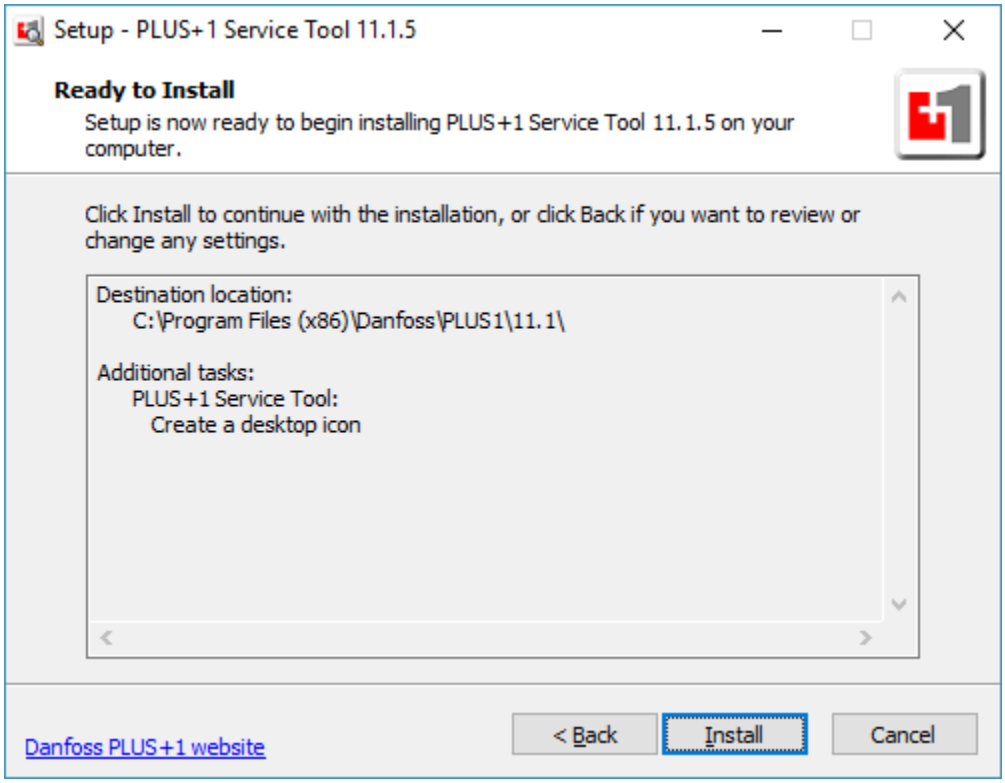




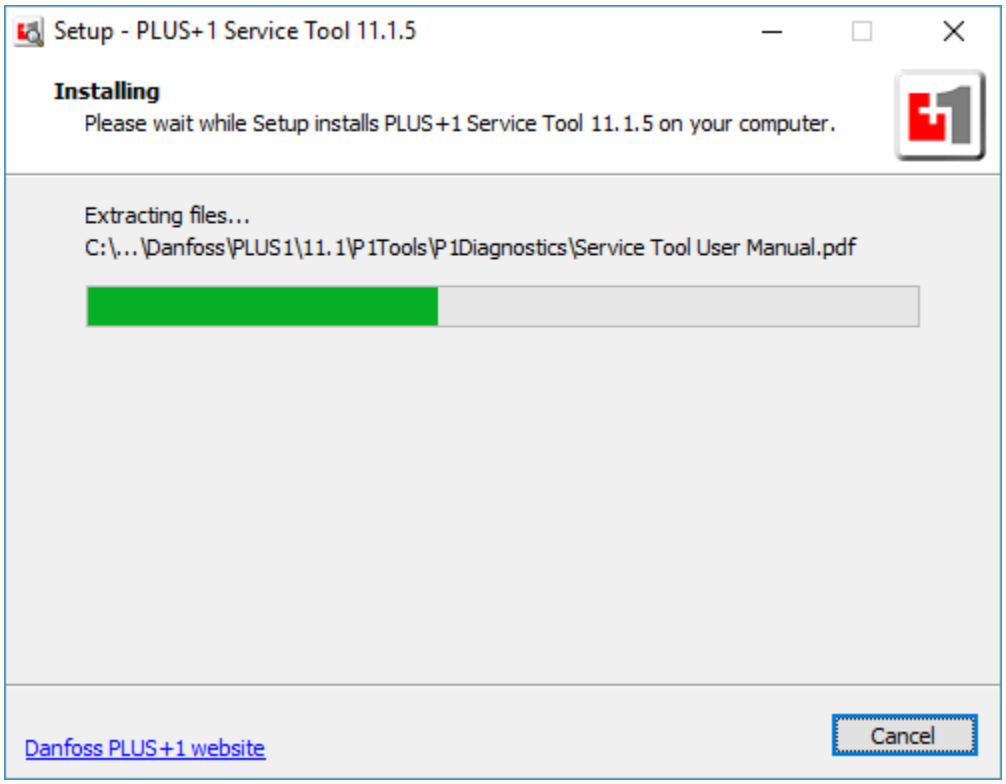
- Select Location where to install setup.
- Click on Next.



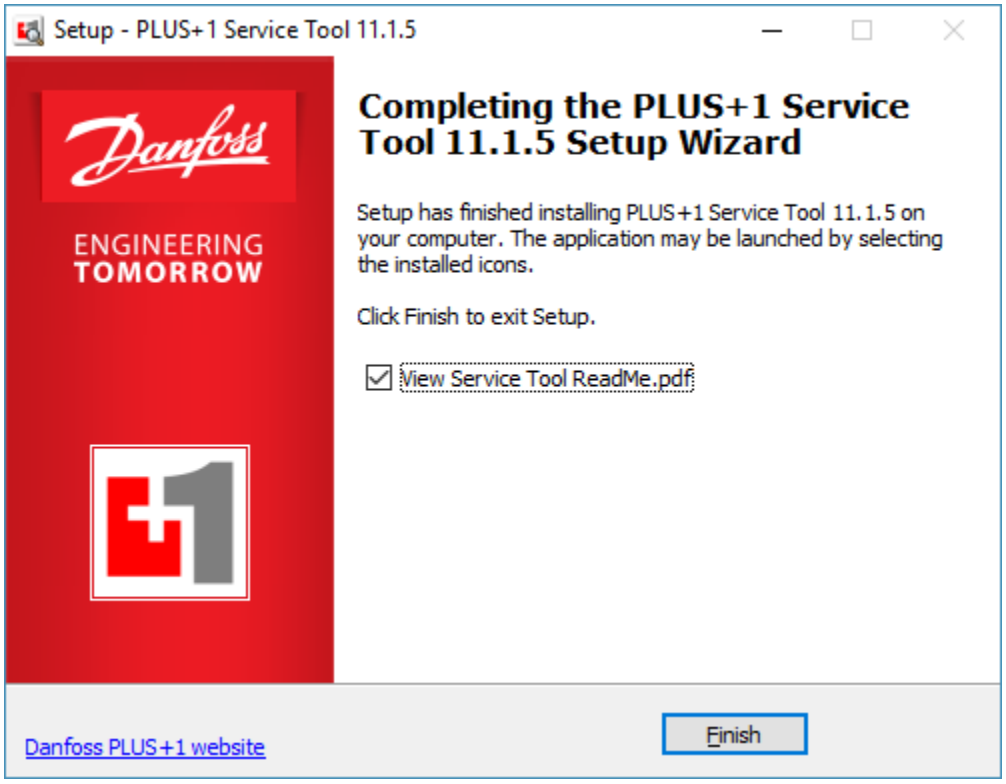
- Click on Next.



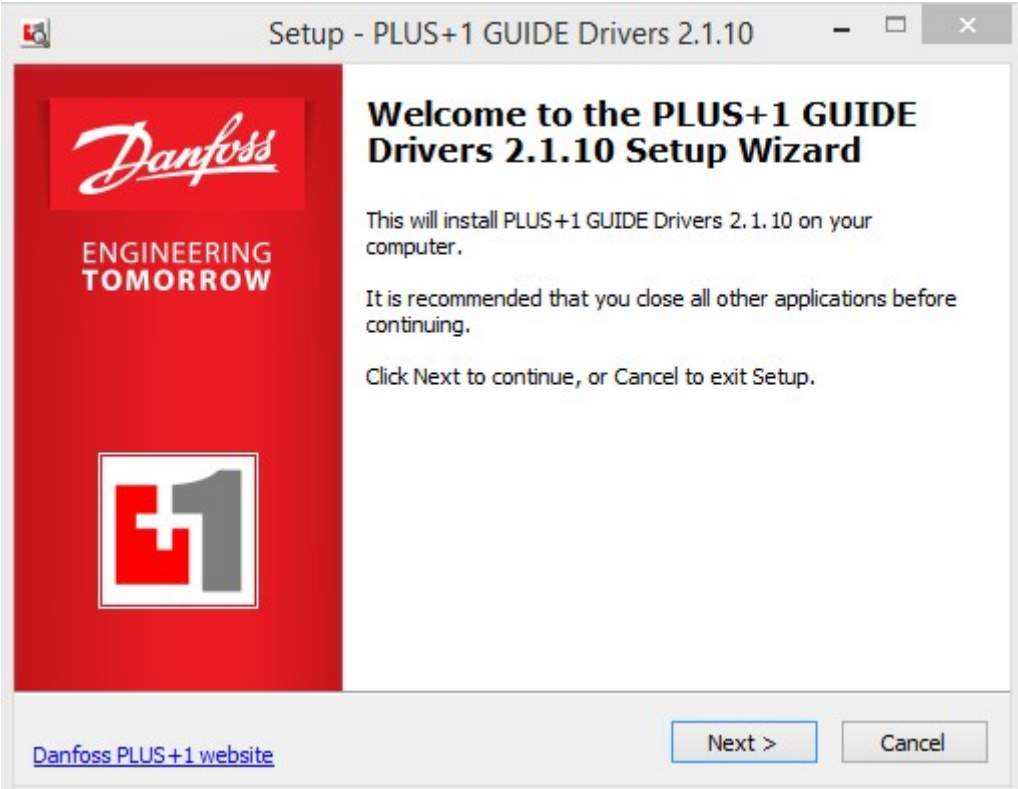
- Click on Install



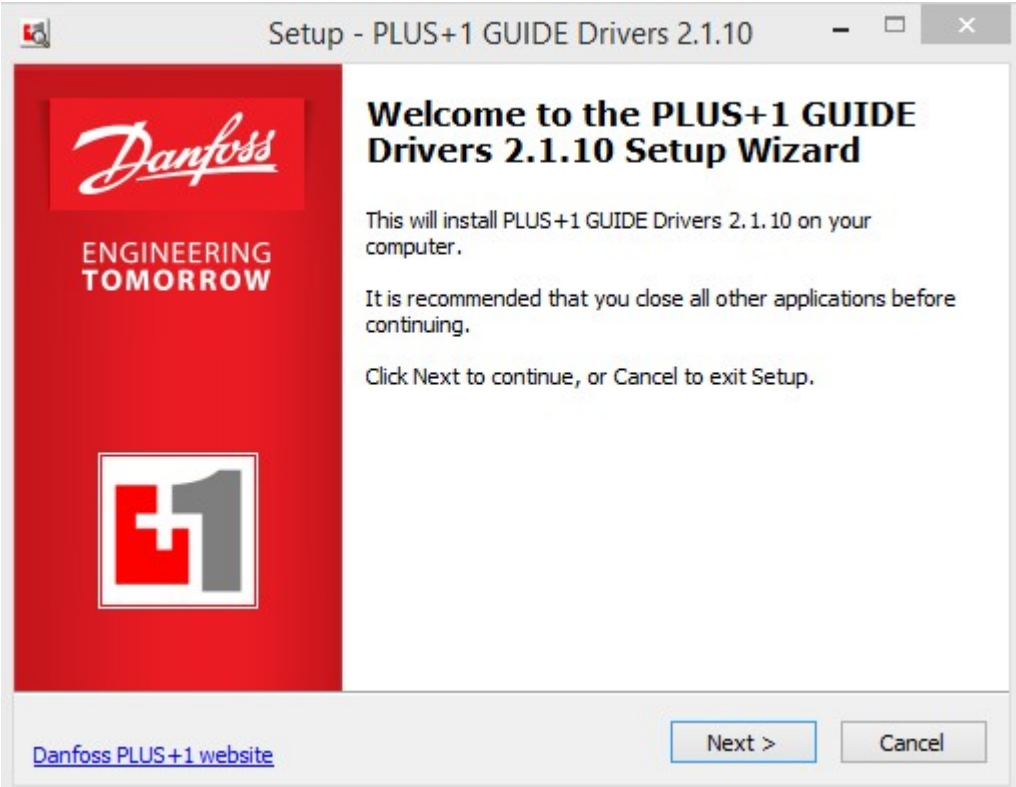
- Wait to install PLUS+1 Service tool.



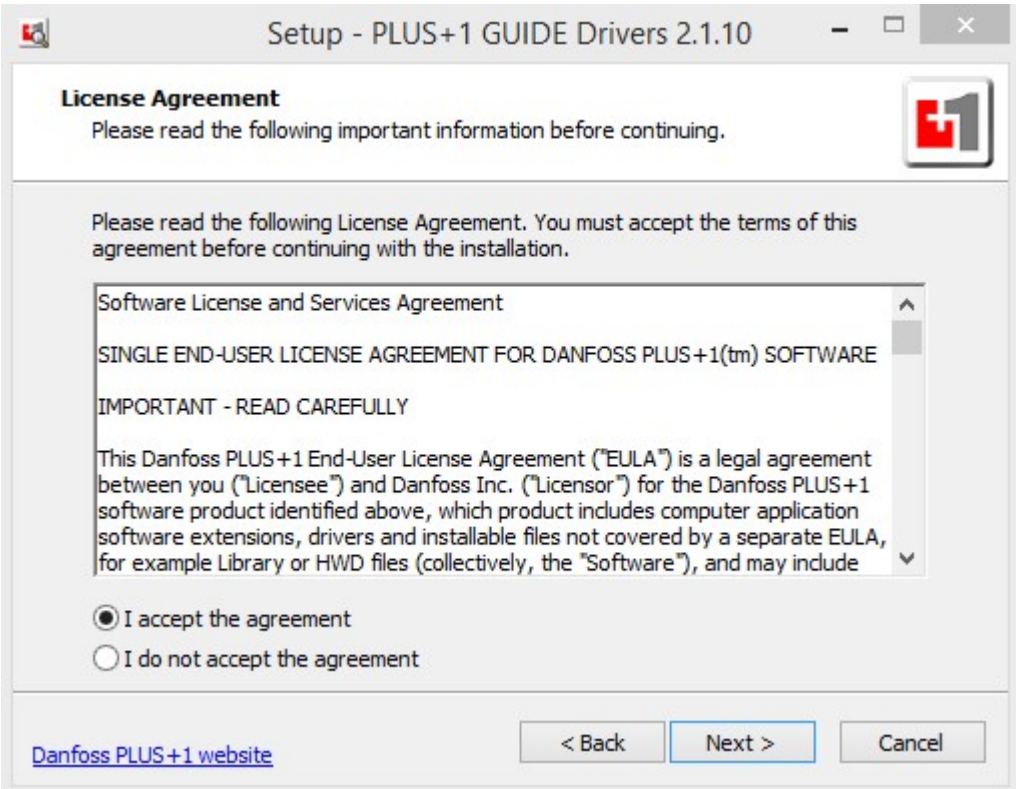
- Click on Finish.



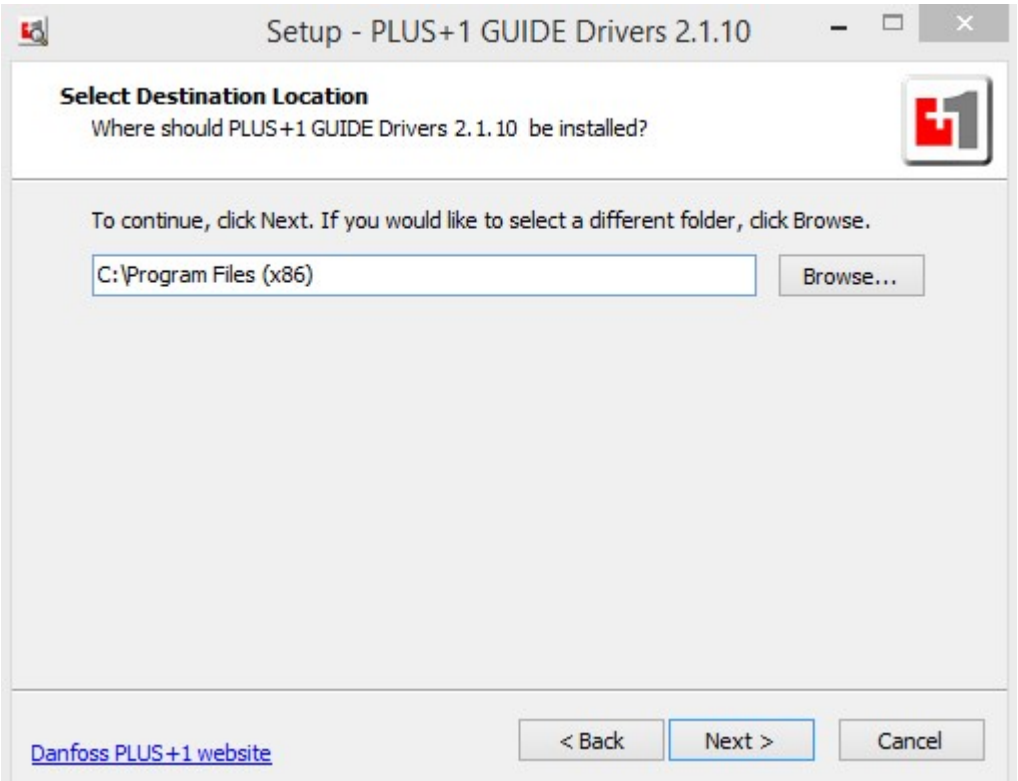
- Click on Next.



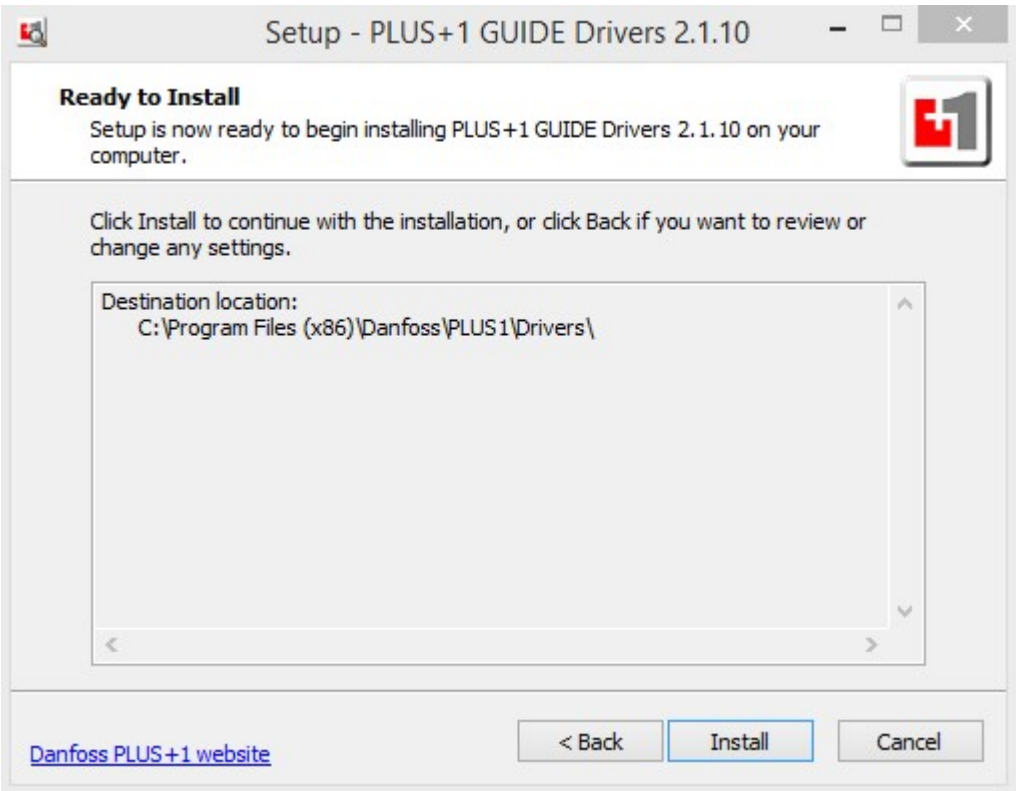
- Click on Next.



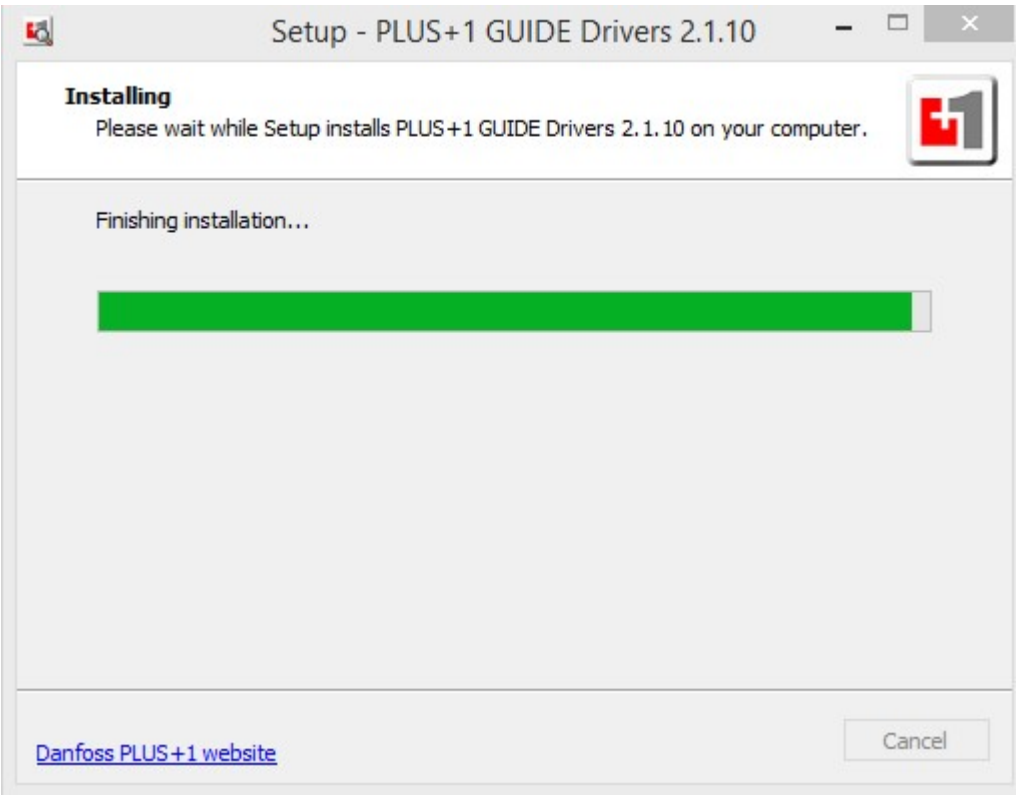
- Accept agreement.
- Click on Next.



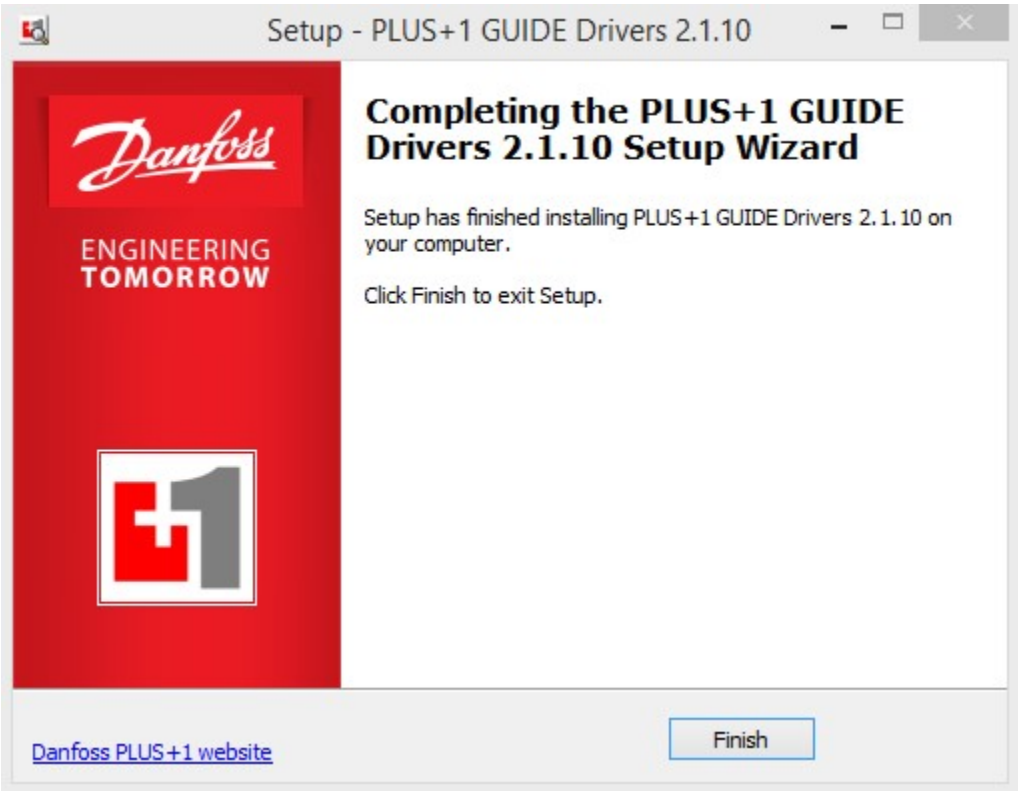
- Select Location where to install setup.
- Click on Next.



- Click on Install.

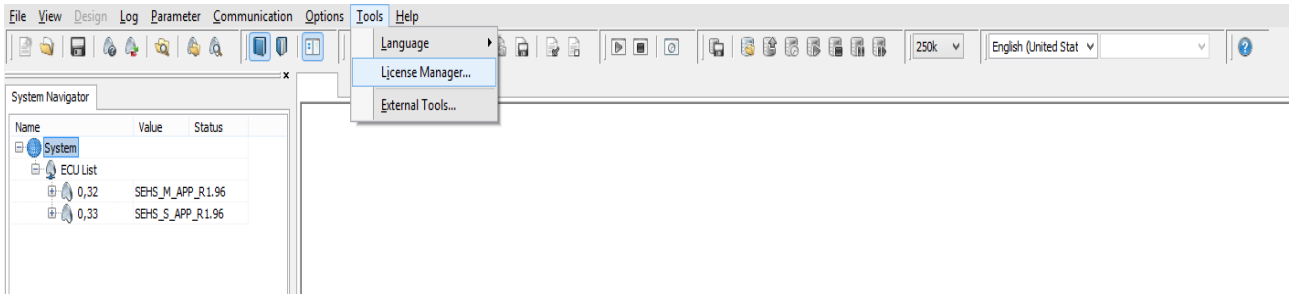


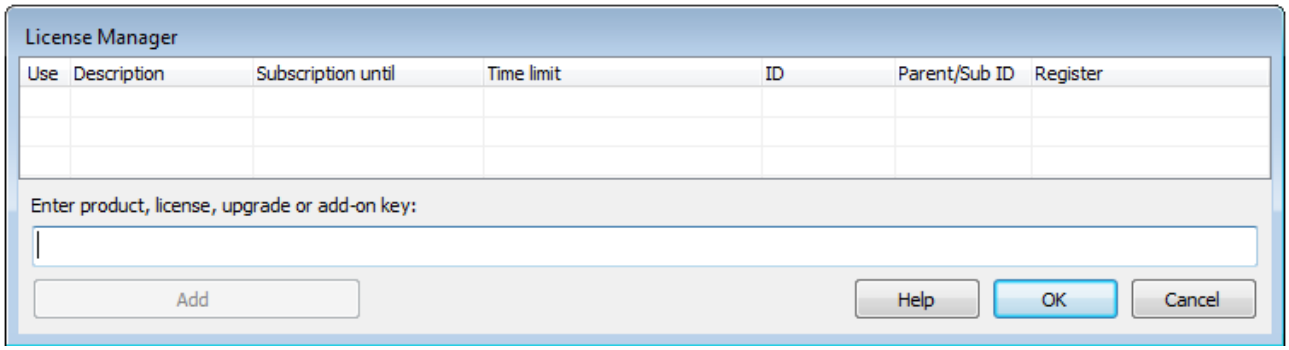
- Wait to install PLUS+1 GUIDE Drivers.



4. Adding a product Key

1. If you do not have a PLUS+1 License, please order your PLUS+1 license through your local Danfoss sales person. You will be sent an email with a Product Key that will allow you to activate a License Key.
2. Start PLUS+1 Guide Service Tool, a message box appears with the option to launch the License Manager. The License Manager can also be launched from the PLUS+1 GUIDE Tools menu.



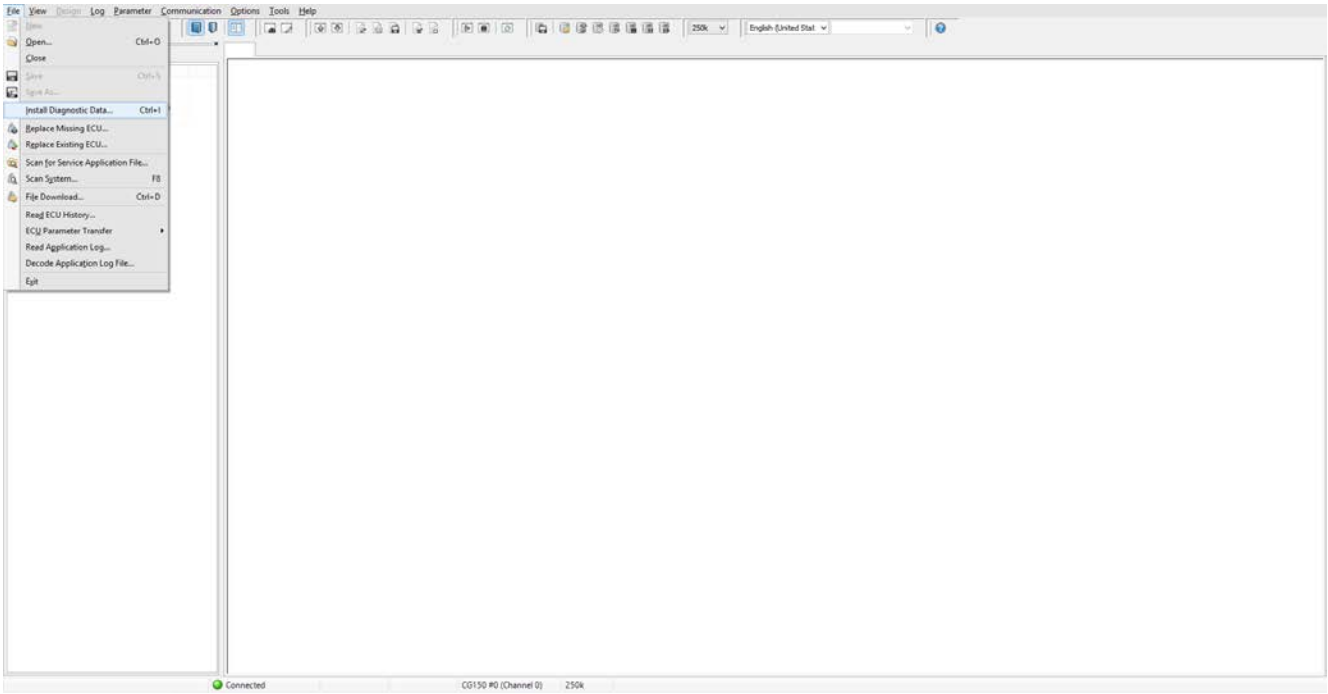


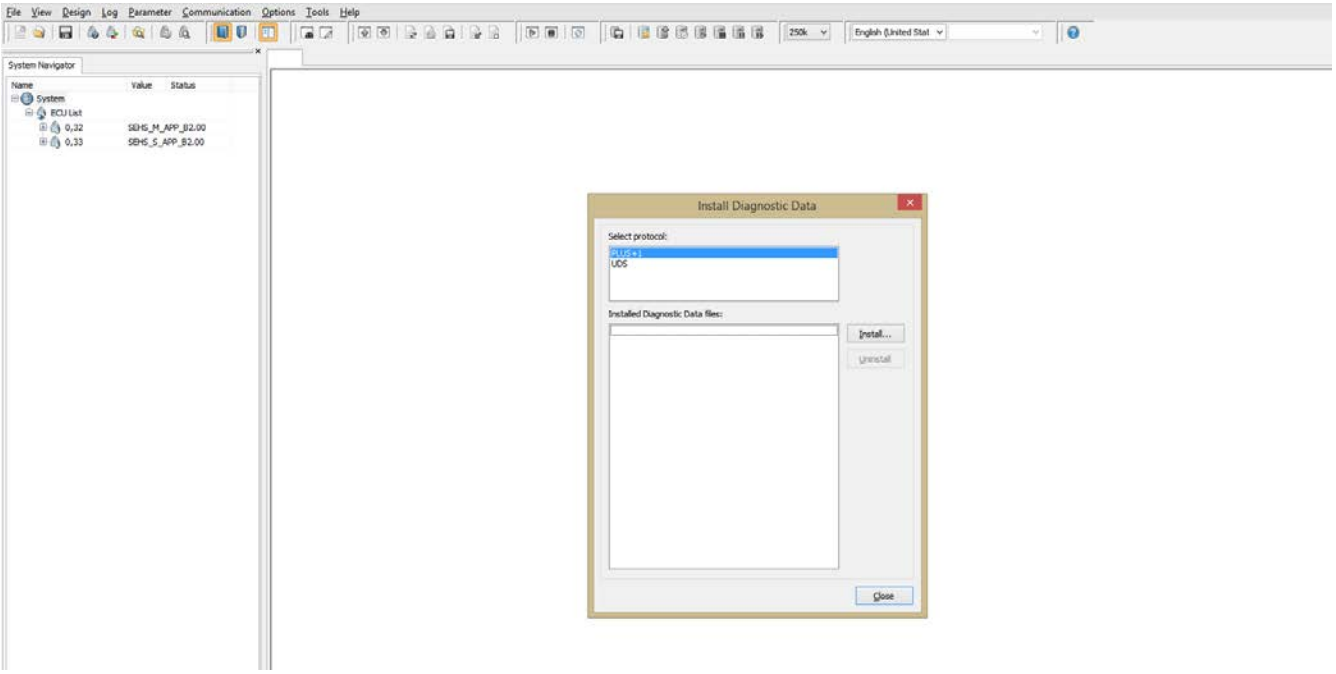
3. Enter product key, or copy and paste from the PLUS1license-AutoActivation@danfoss.com email into Enter product, license, upgrade, or add-on key, then click Add Product Key. Tool can immediately be used for a 7 day time limit without activating license.
4. Click Activate in the column Register of the License Manager window.
5. Activate License window opens, select product key under Product or license key then click E-mail registration.
6. Dialog window will appear, read and then click OK.
7. The Activation pre-written email to PLUS1license-AutoActivation@danfoss.com will appear in the active user's default email-client. Send the email.
8. The automatic activation server will reply with an e-mail containing the activated license key.
9. Enter license key, or copy & paste from an e-mail under Enter product, license, upgrade, or add-on key, then click Add License Key.
10. PLUS+1 license is activated.

5. How to download bootloader/application in CLS

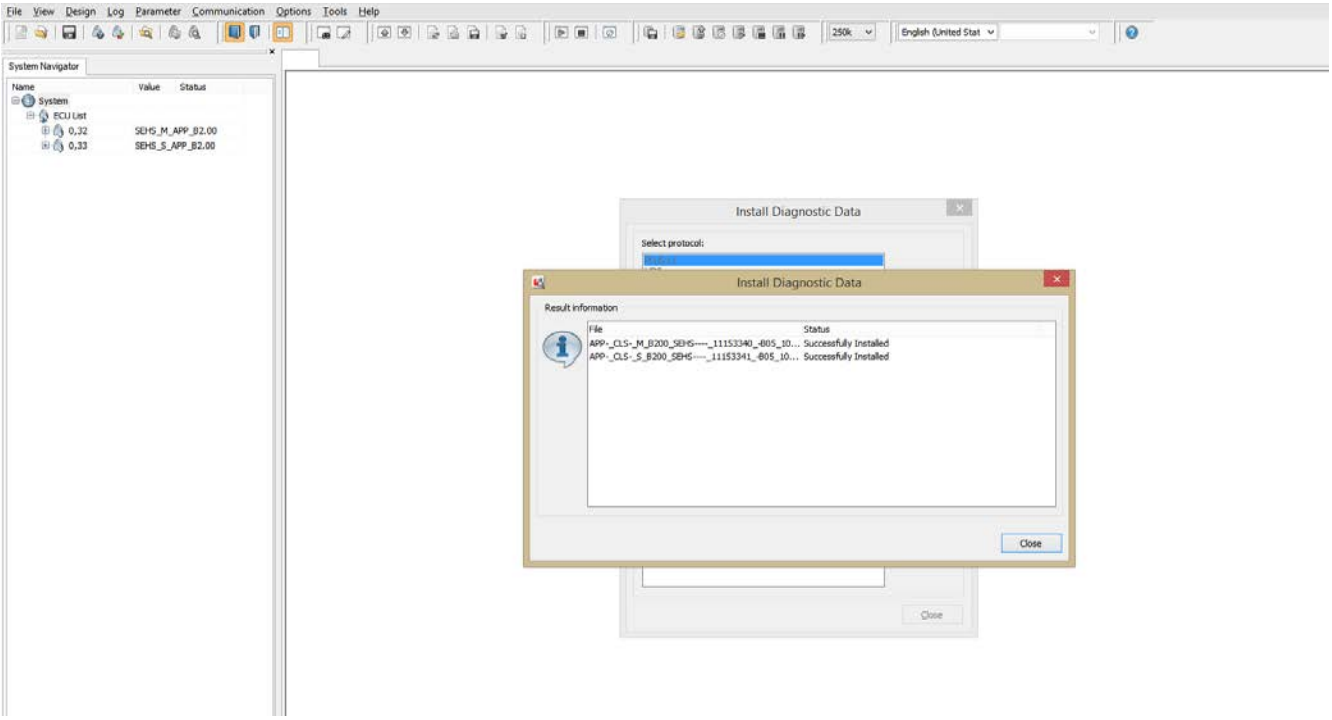
5.1 Install Diagnostic data files

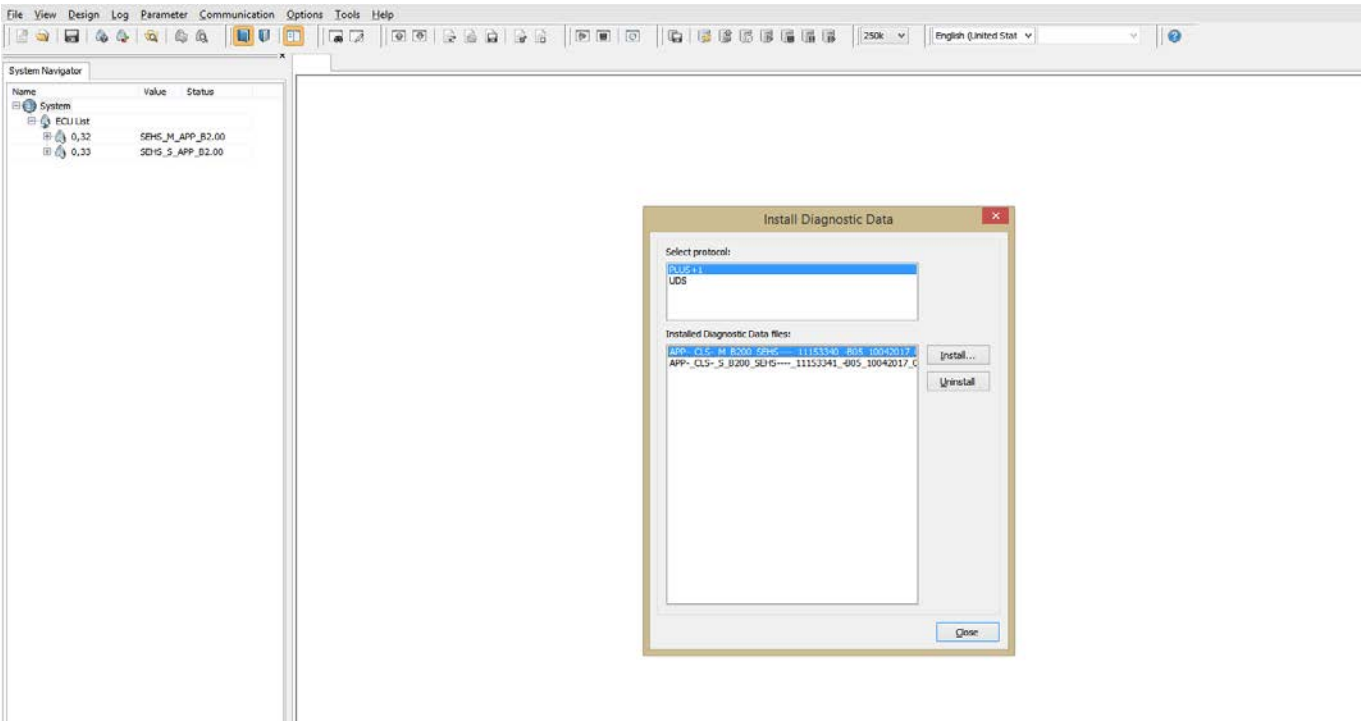
- Select File Menu -> Install Diagnostic Data





- Click on Install button and select .plg files (install plg files for bootloader as well as application).

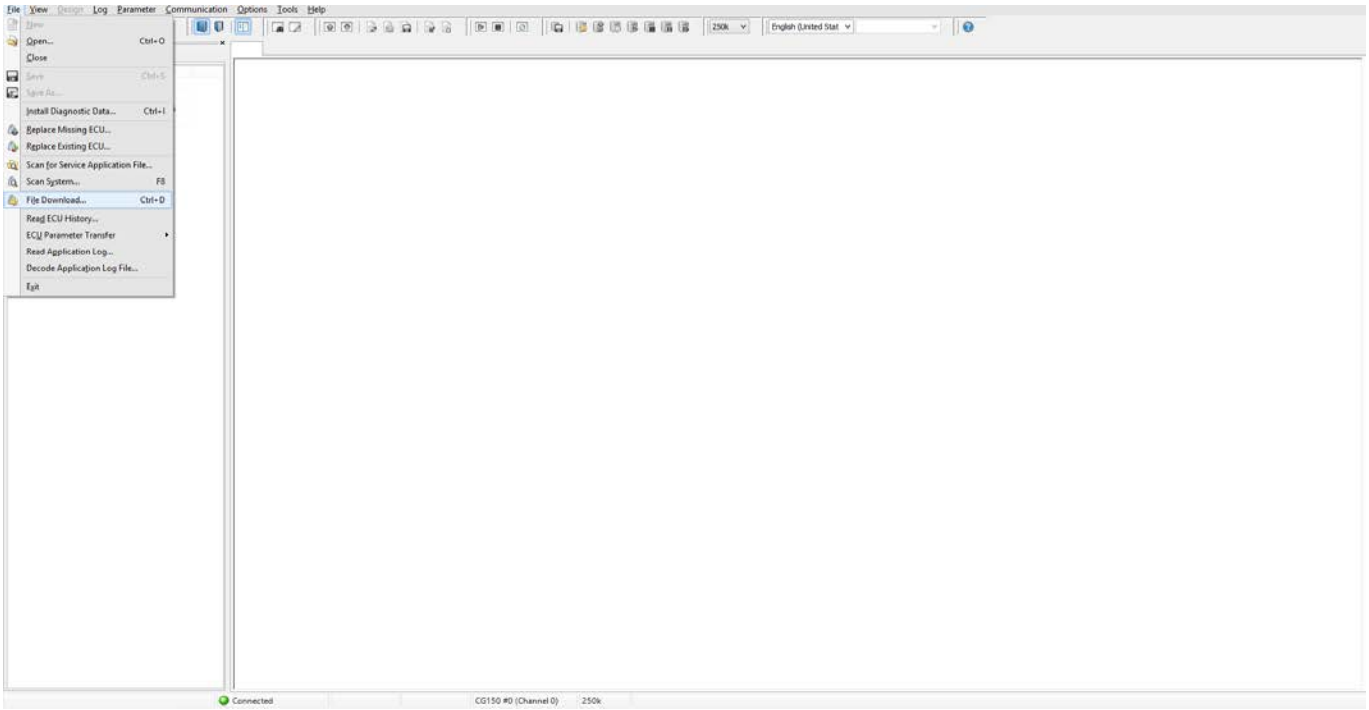




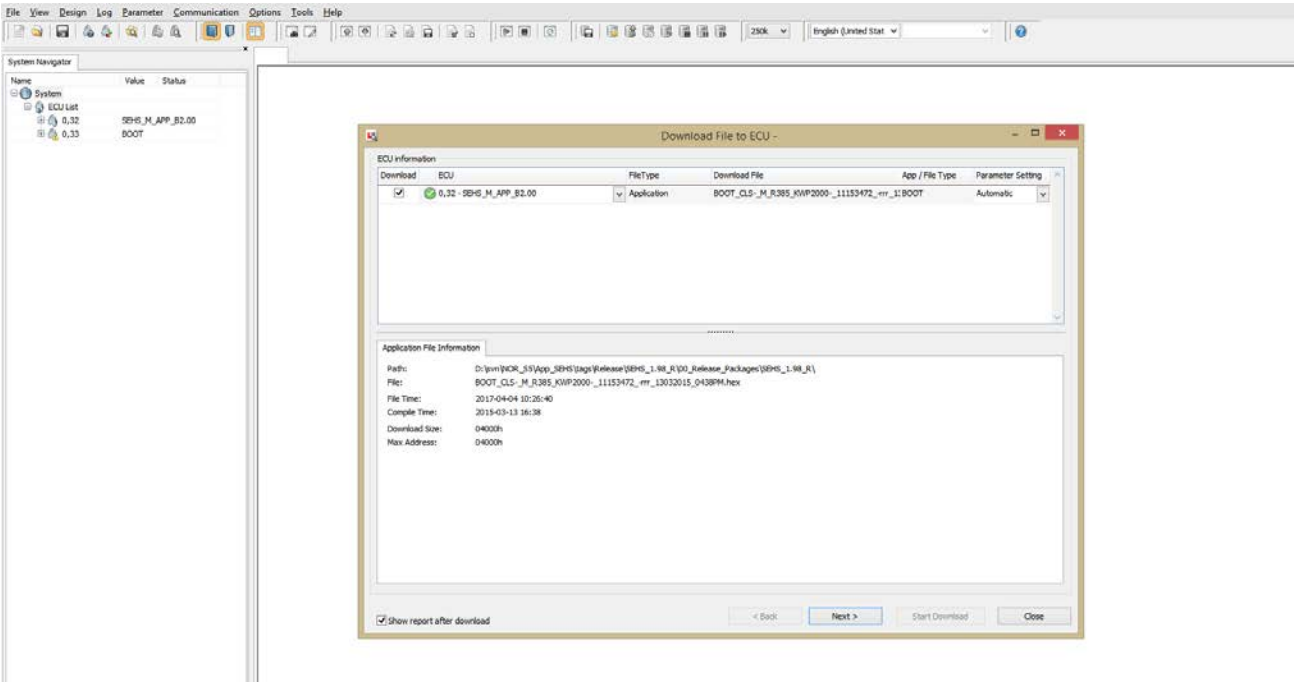
- The installed files can be seen under “Installed Diagnostic Data Files” section.
- Click on Close button.

5.2 Download Bootloader

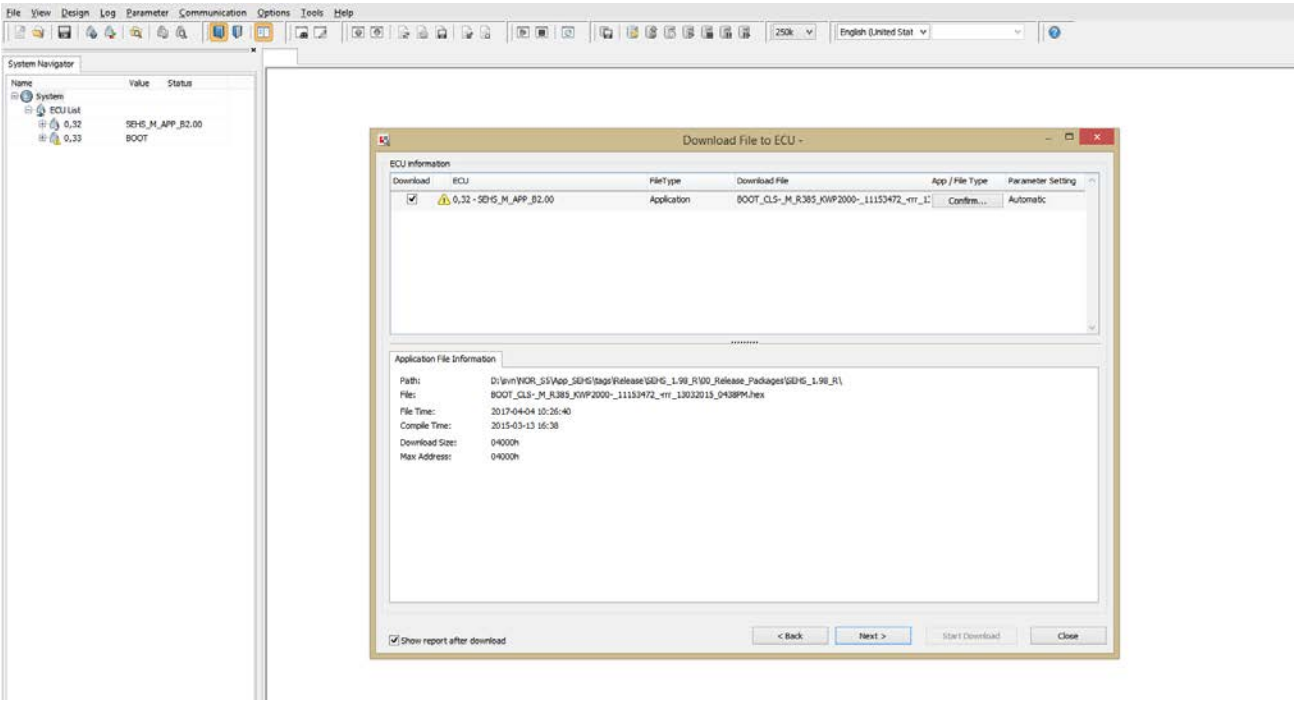
- Select File Menu -> File Download.



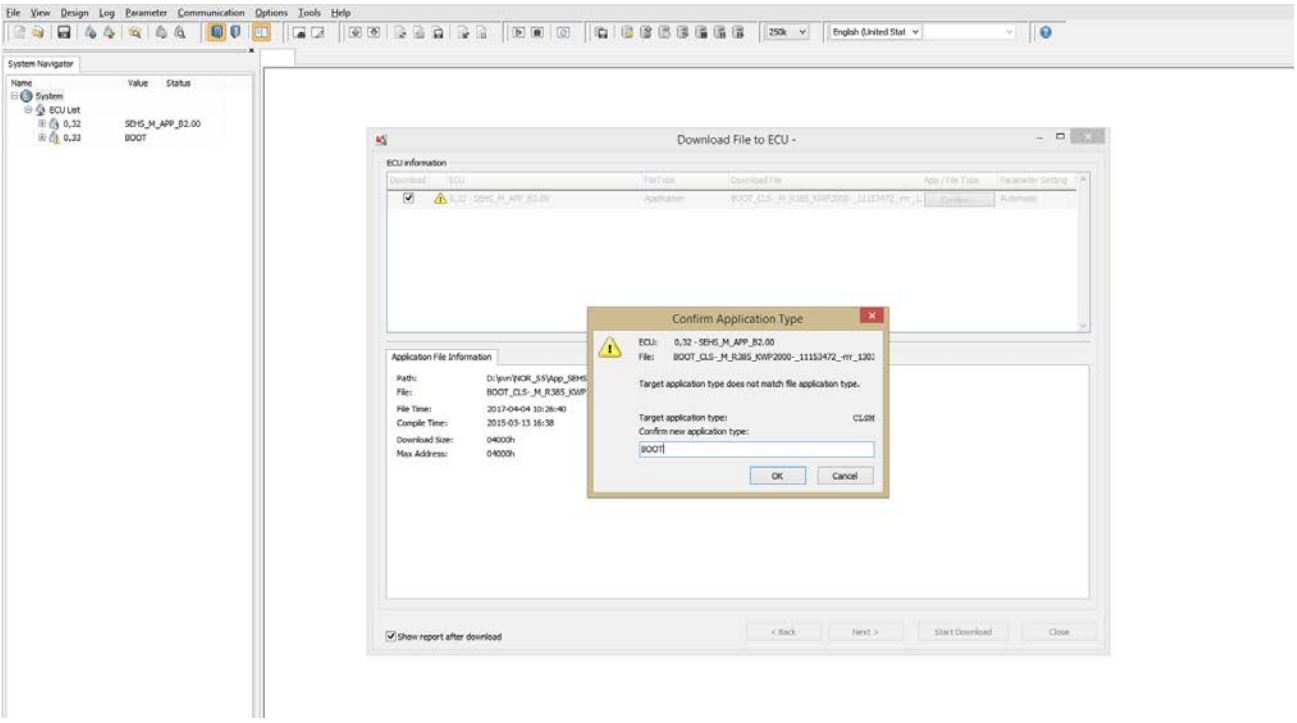
- Select .hex file to download bootloader.



- Change ECU if needed.
- Click on Next button.



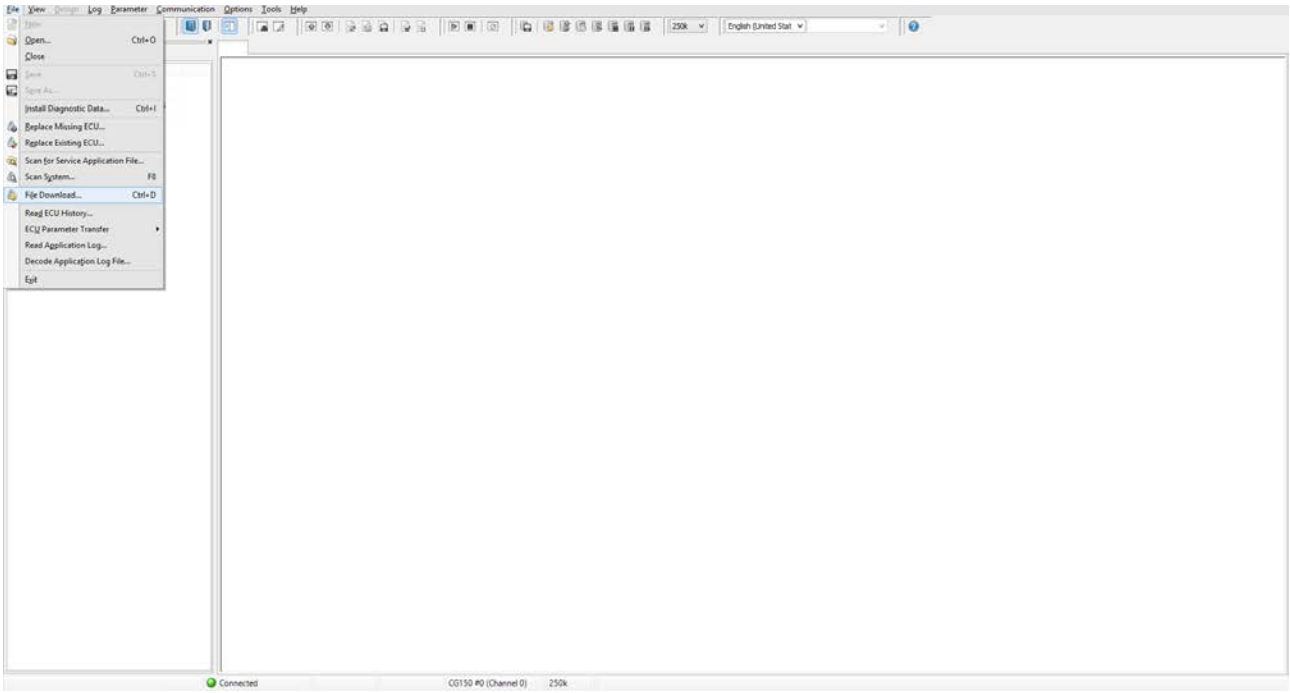
- Change App/File Type. Click on Confirm Button.



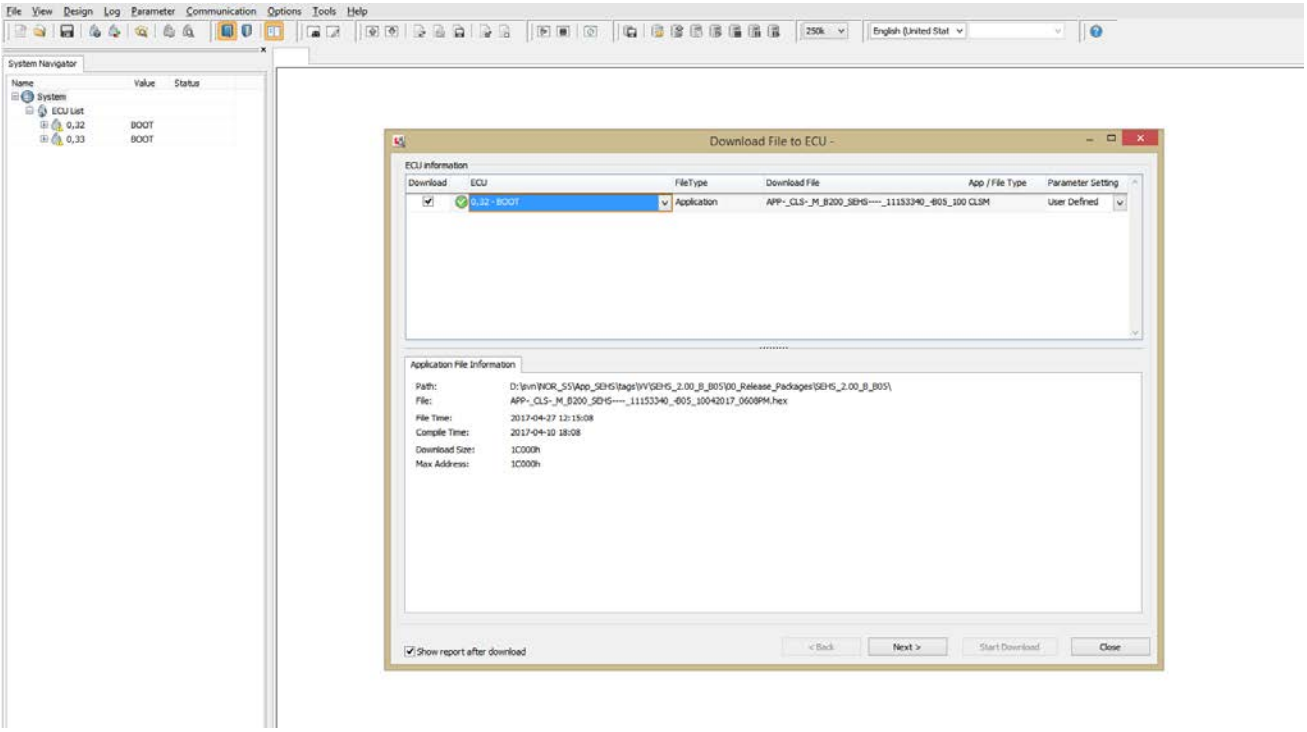
- Enter Application Type as “BOOT”.
- Click on Ok button.
- Click on Start download button.
- Click on Close button.

5.3 Download Application

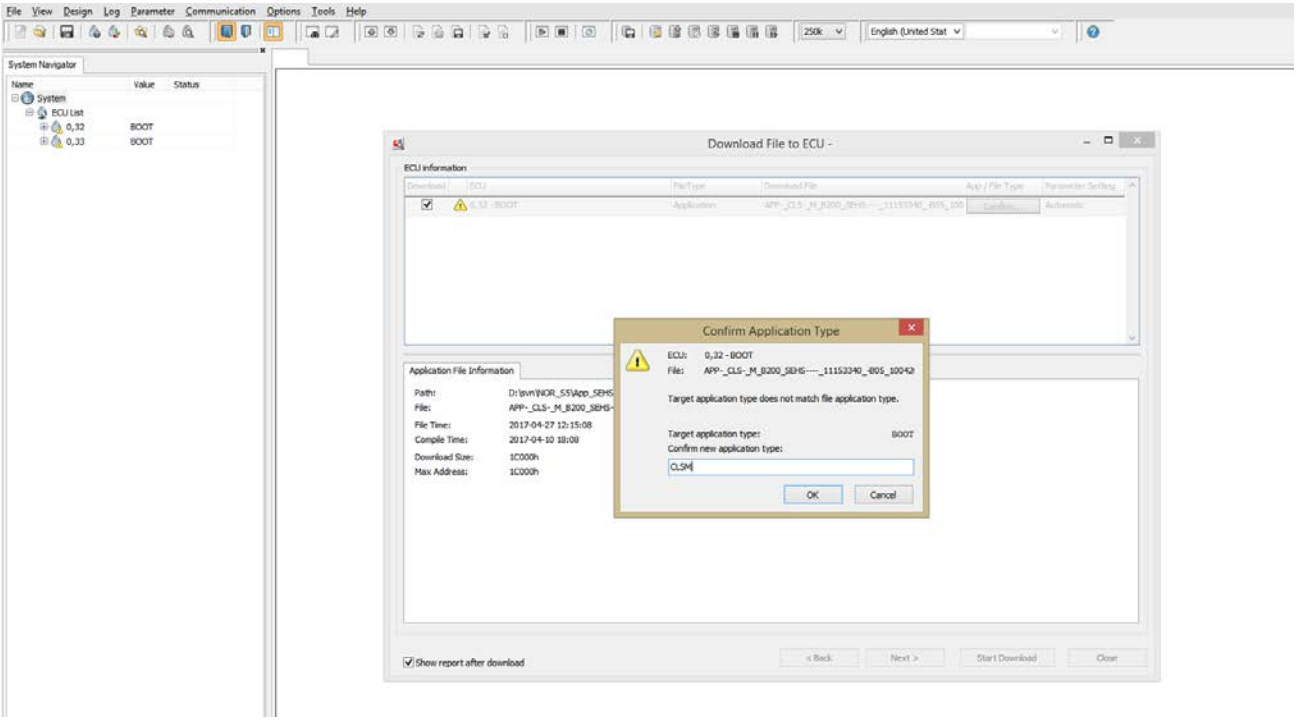
- Select File Menu -> File Download.



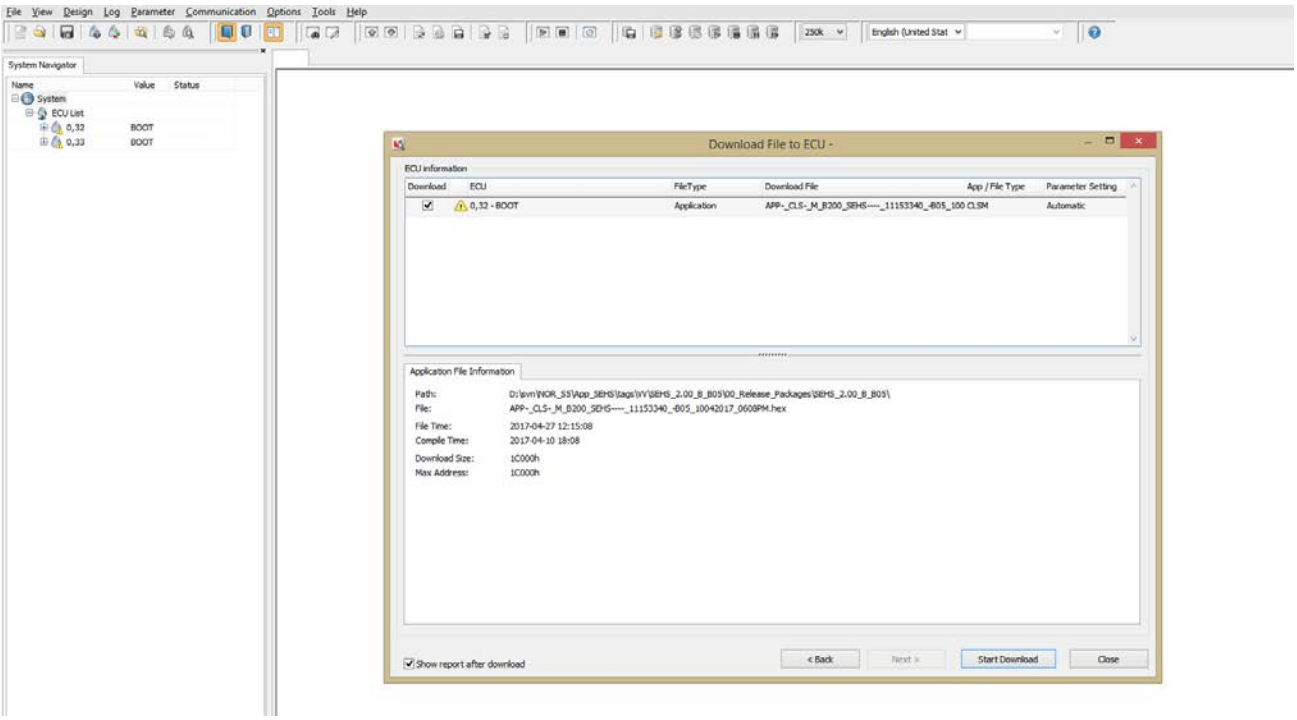
- Select .hex file to download an application.



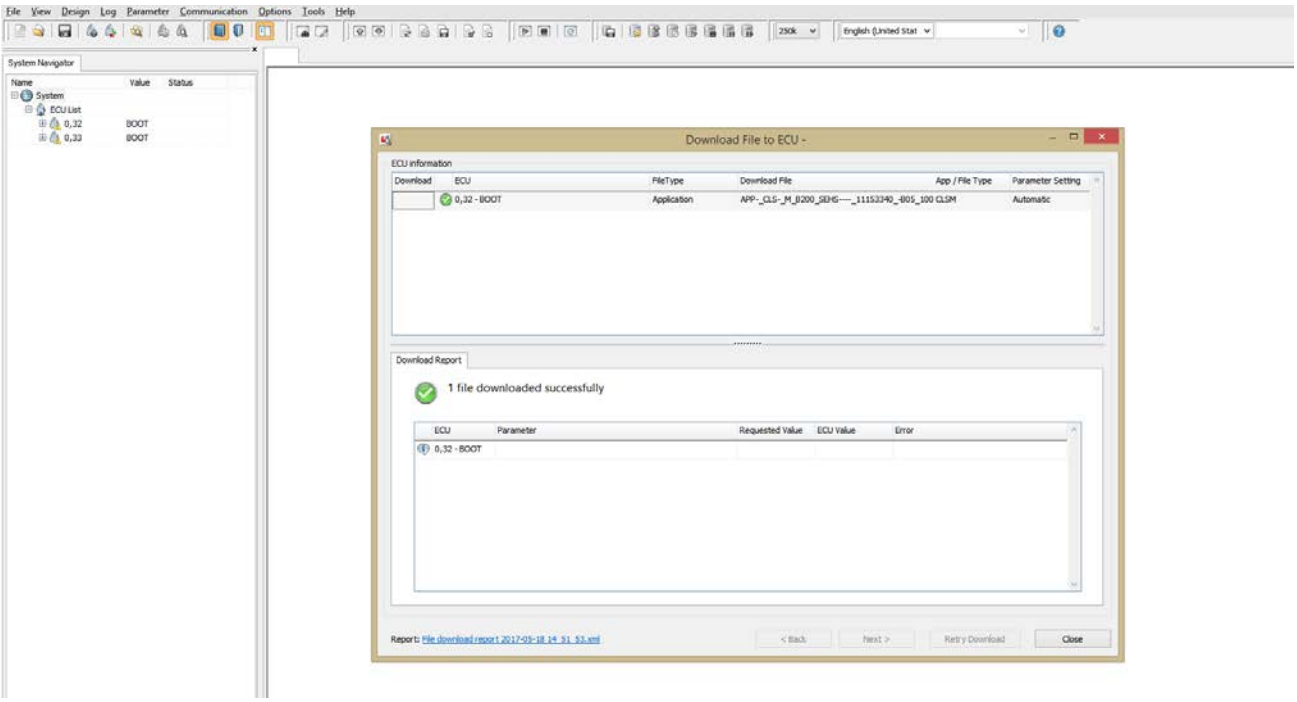
- Click on Next button.
- Enter Application type as “CLSM” for MainUC and “CLSS” for SafetyUC.



- Click on Ok button.



- Click on Start Download button.



- Click on Close button. The Status will show OK during System scan if Application downloaded correctly.

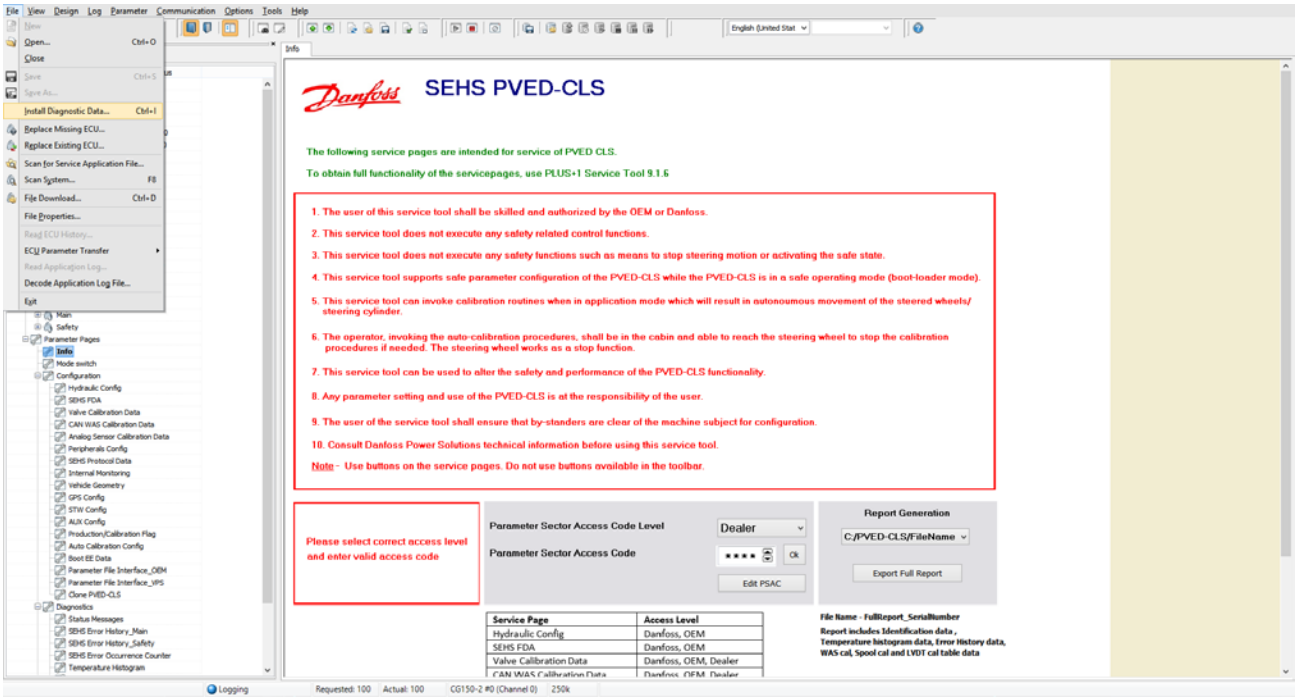
6. How to download .mlhx files

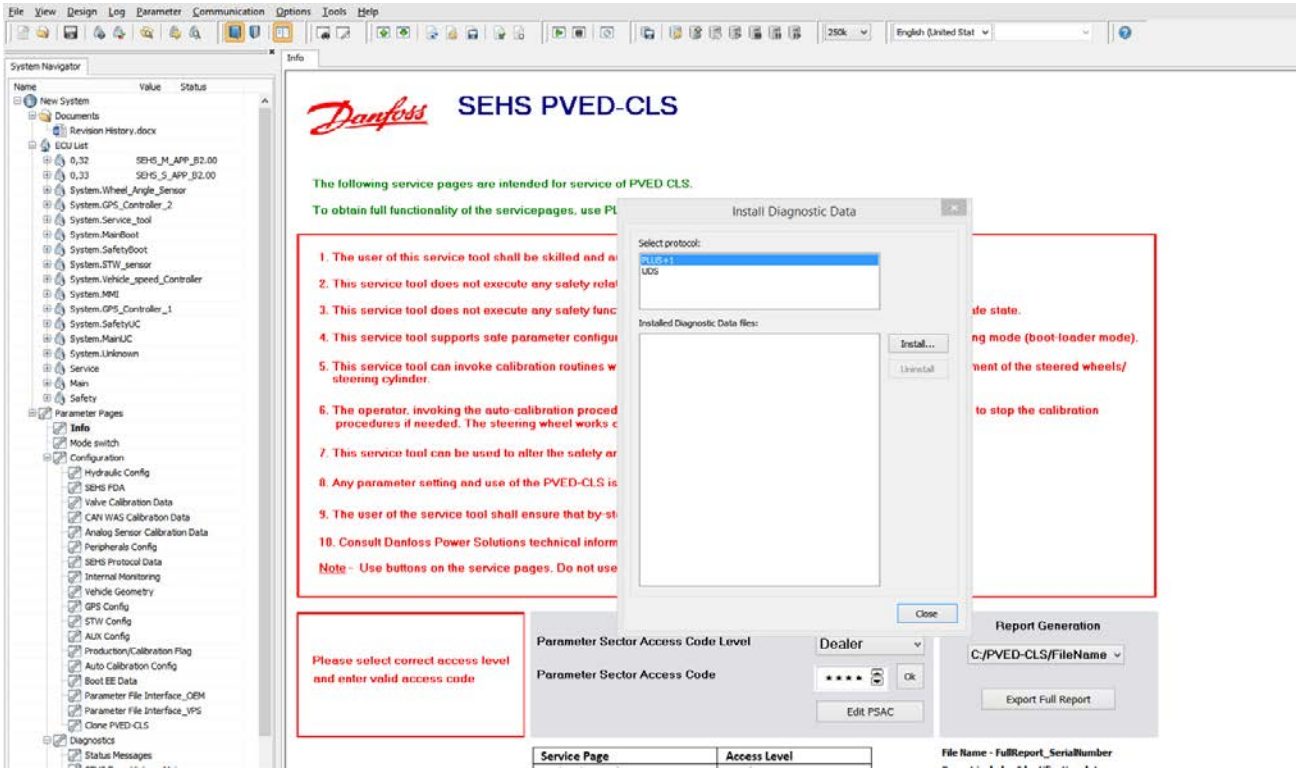
Important

The .mlhx files support boot node ID's 8, 19 and 32 for Main controller and 33 and 90 for Safety controller. If other boot node ID's are used, software download has to be done according to section 5.

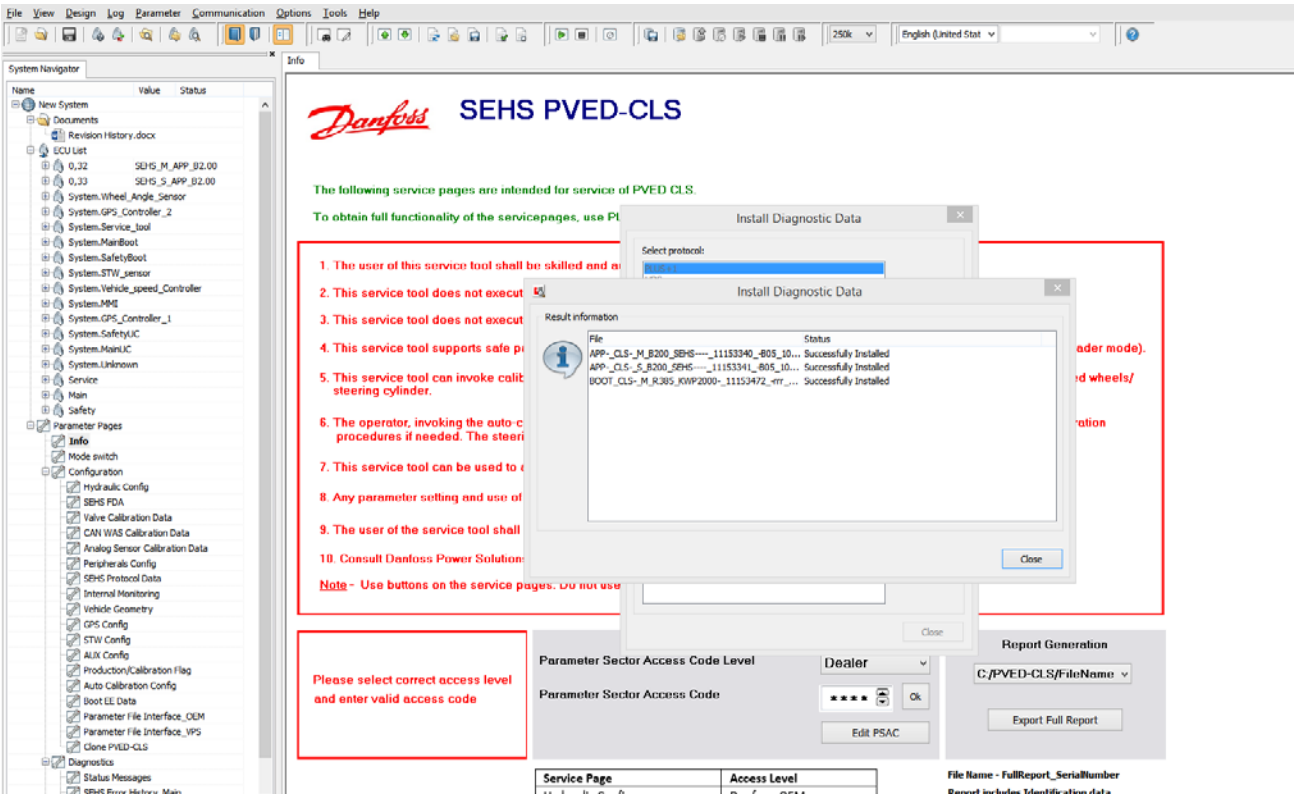
6.1 Install Diagnostic data files

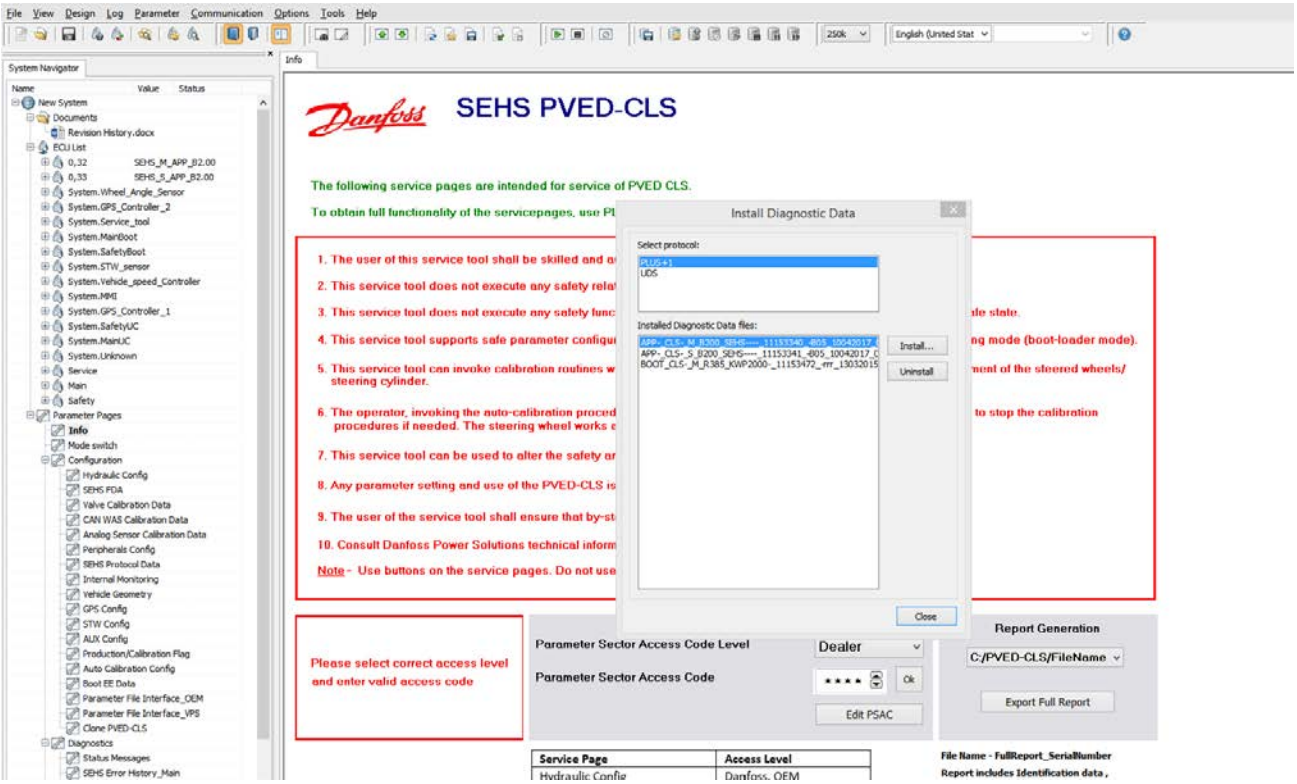
- Select File Menu -> Install Diagnostic Data.





- Click on Install button and select .plg files (install plg files for bootloader as well as application).



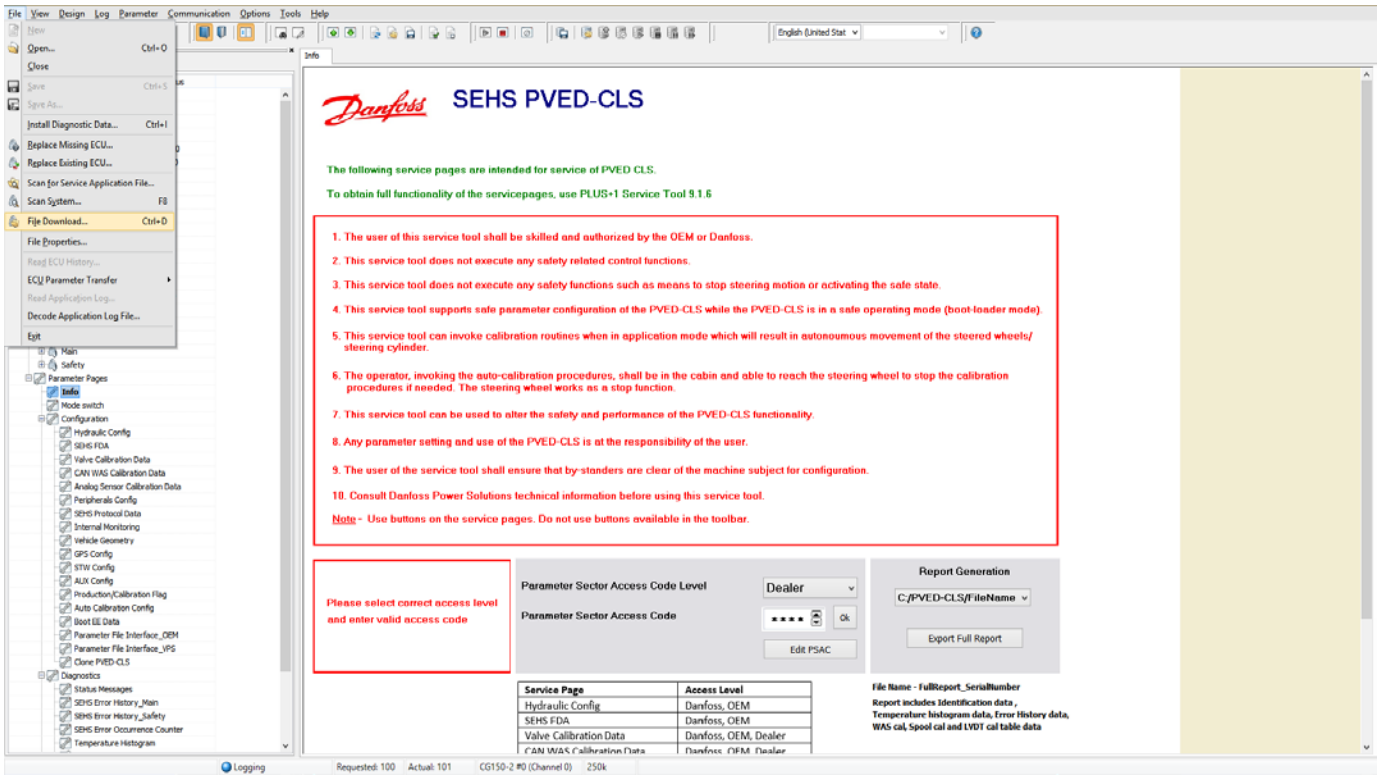


- The installed diagnostic data files can be reviewed under “Installed Diagnostic Data Files” section.

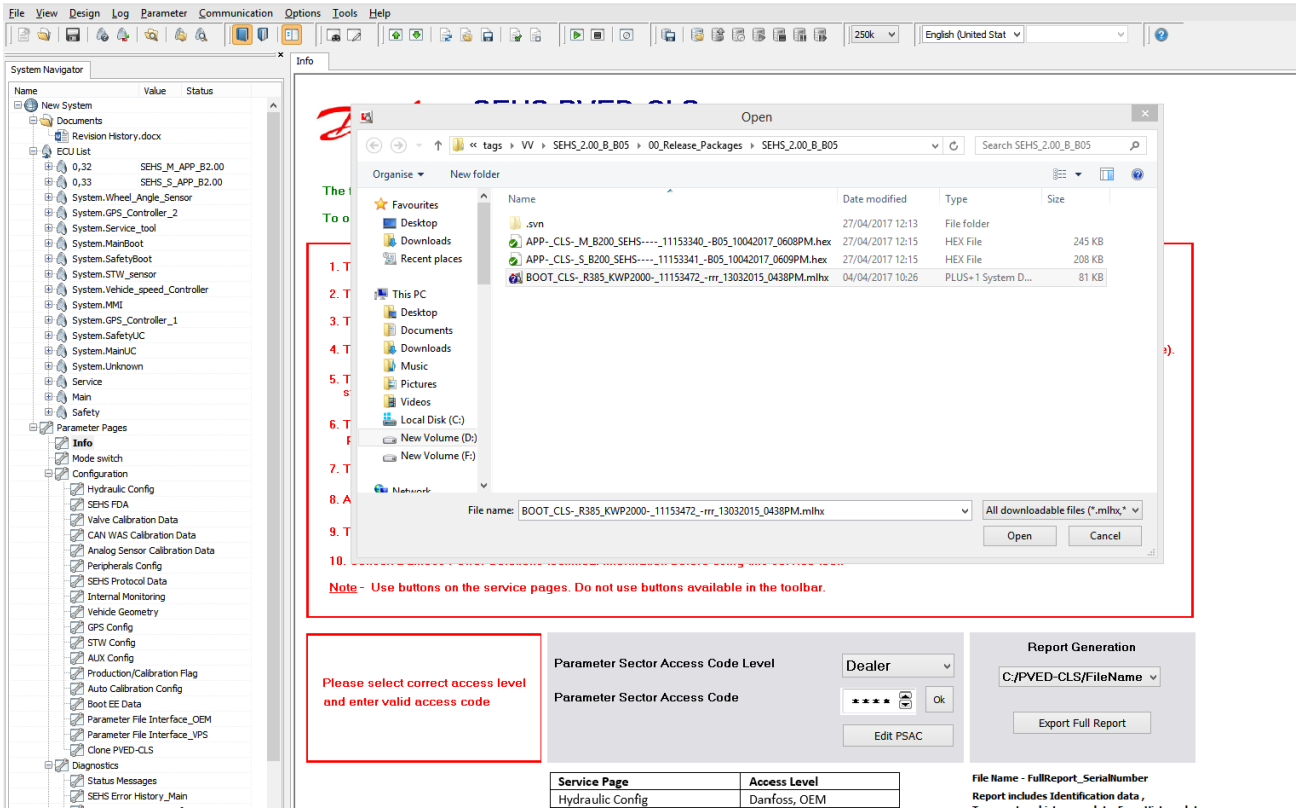
- Click on Close button.

6.2 Download Bootloader .mlhx file

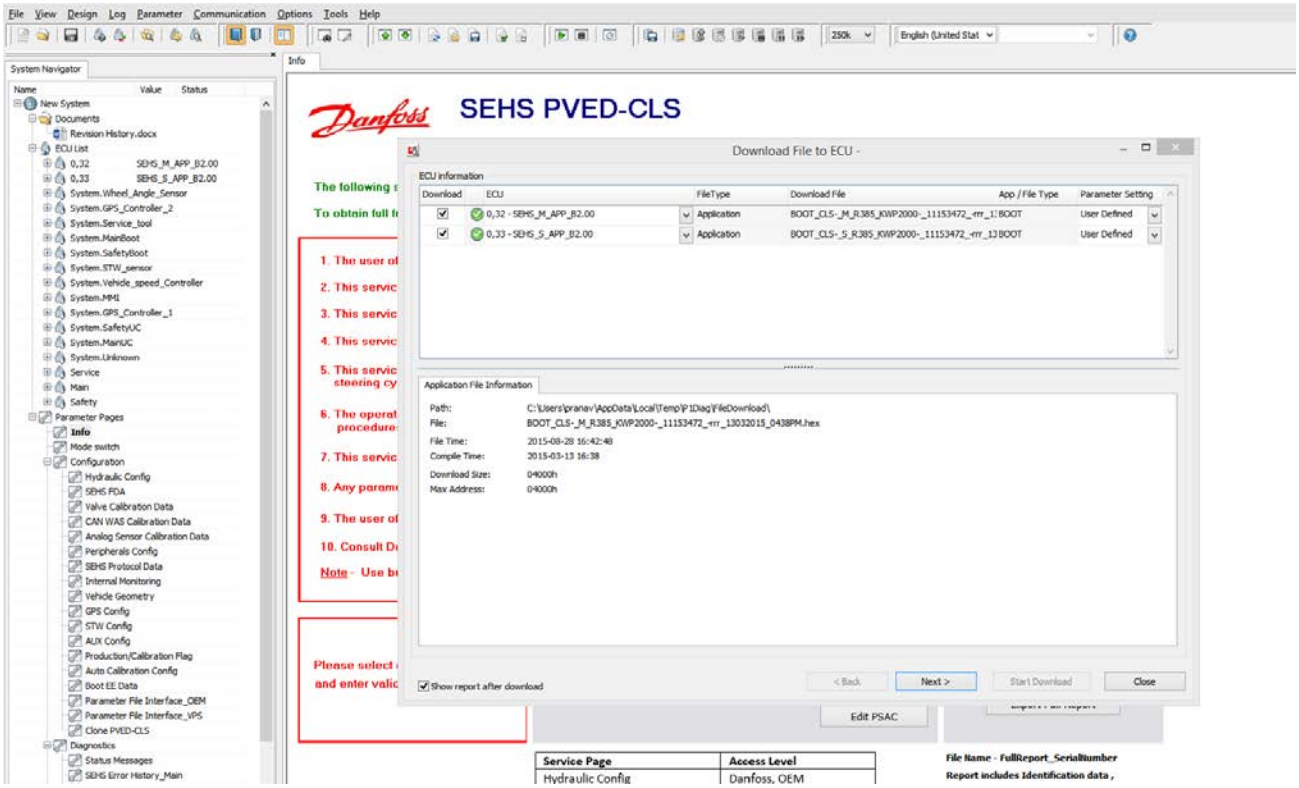
- Select File Menu -> File Download.



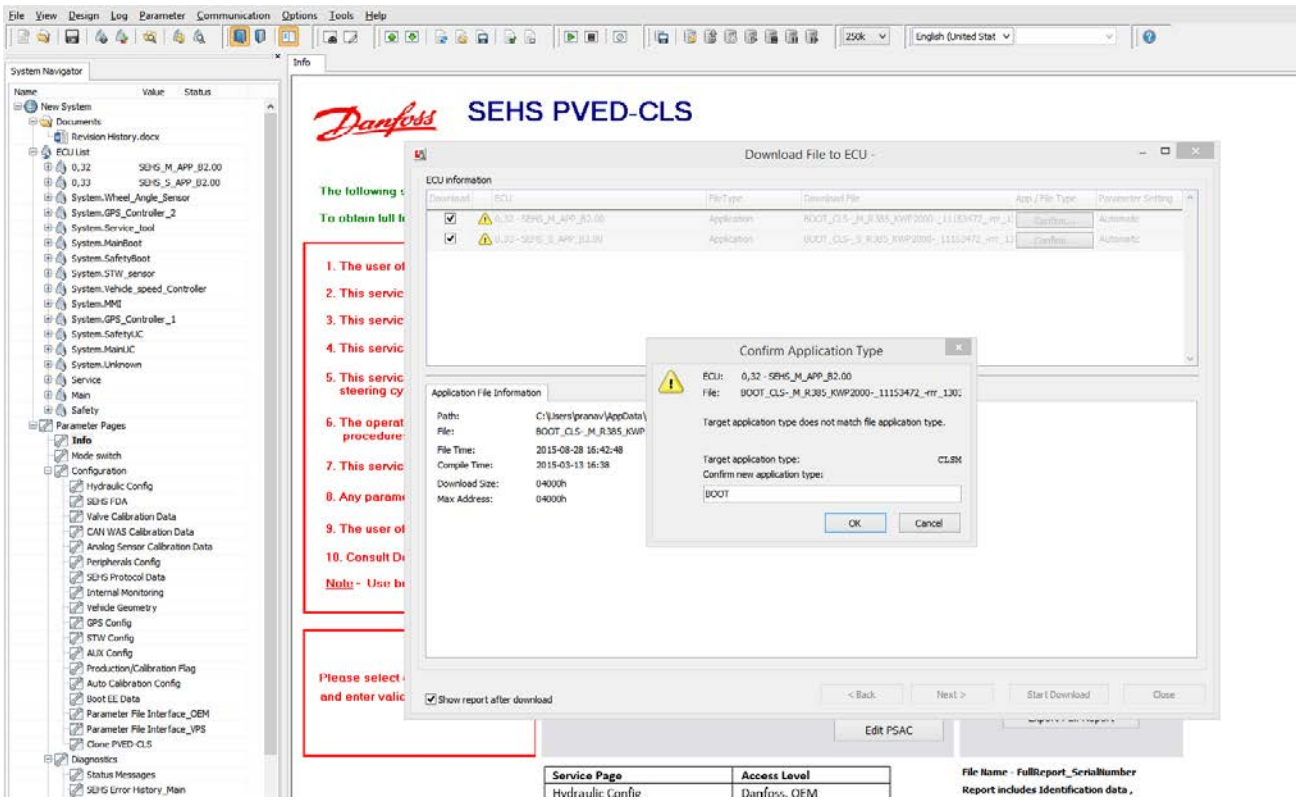
- Select bootloader .mlhx file to download.



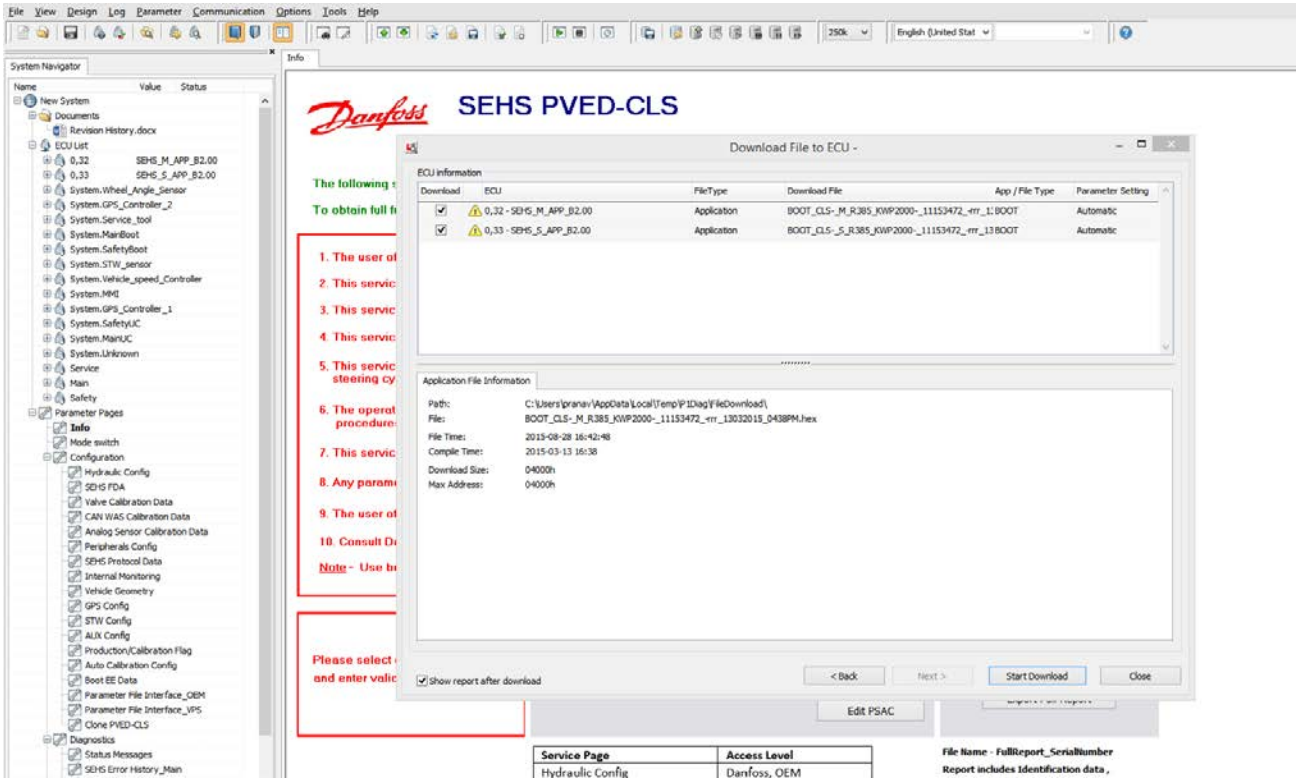
- Click on Next button.



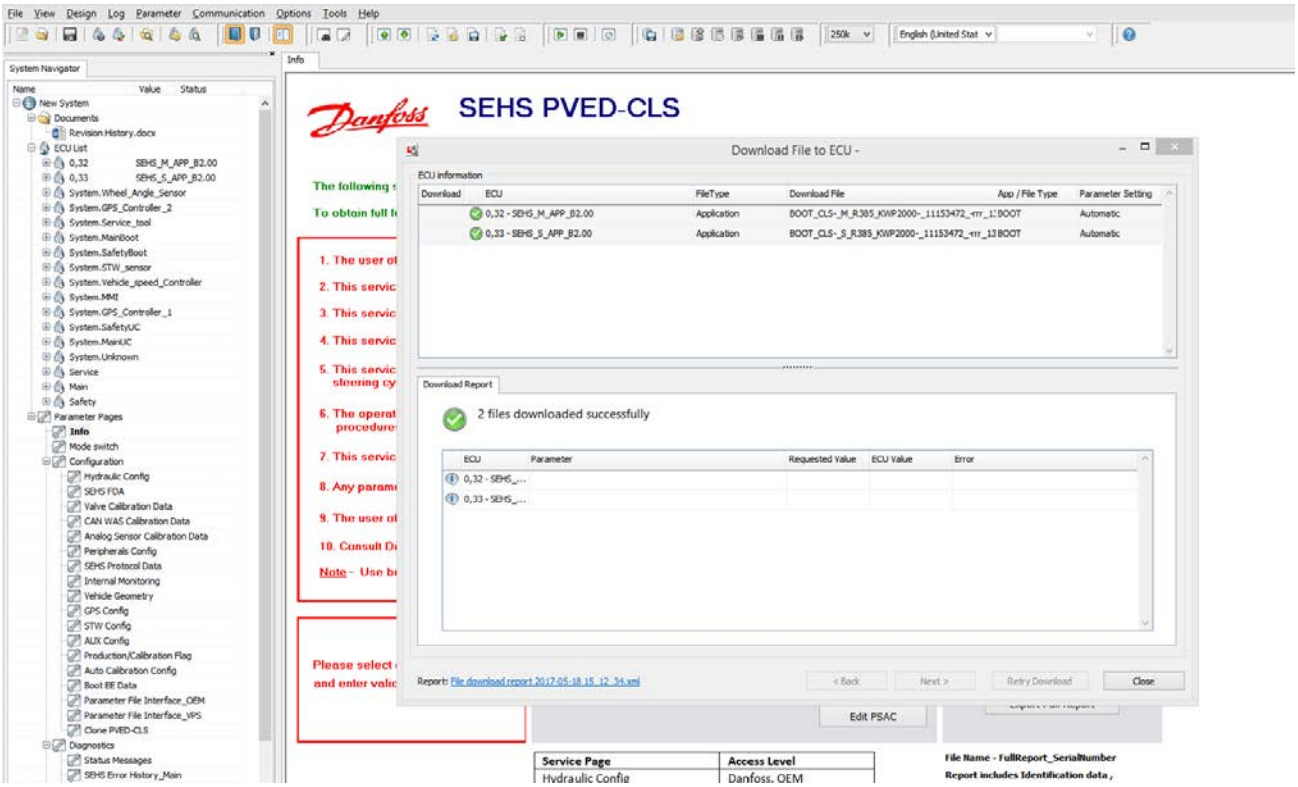
- Change App/File Type. Click on Confirm Button.



- Enter Application Type as “BOOT”.
- Click on Ok button.



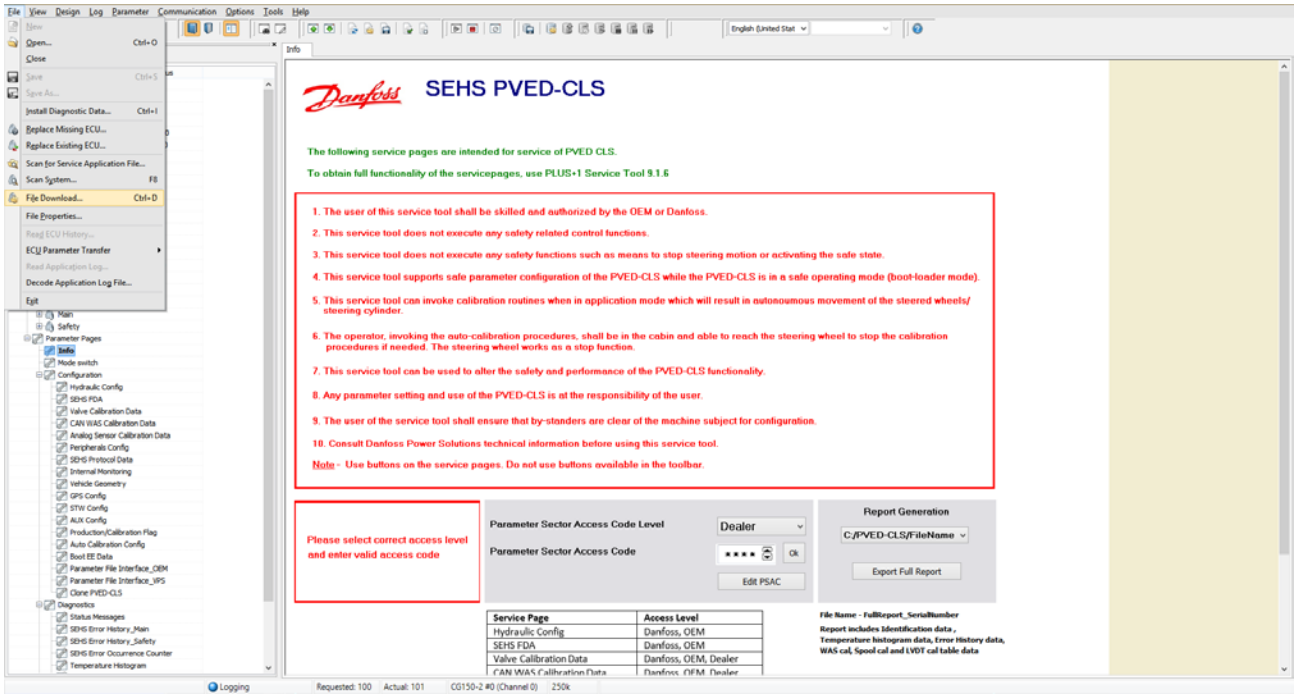
- Click on Start download button.



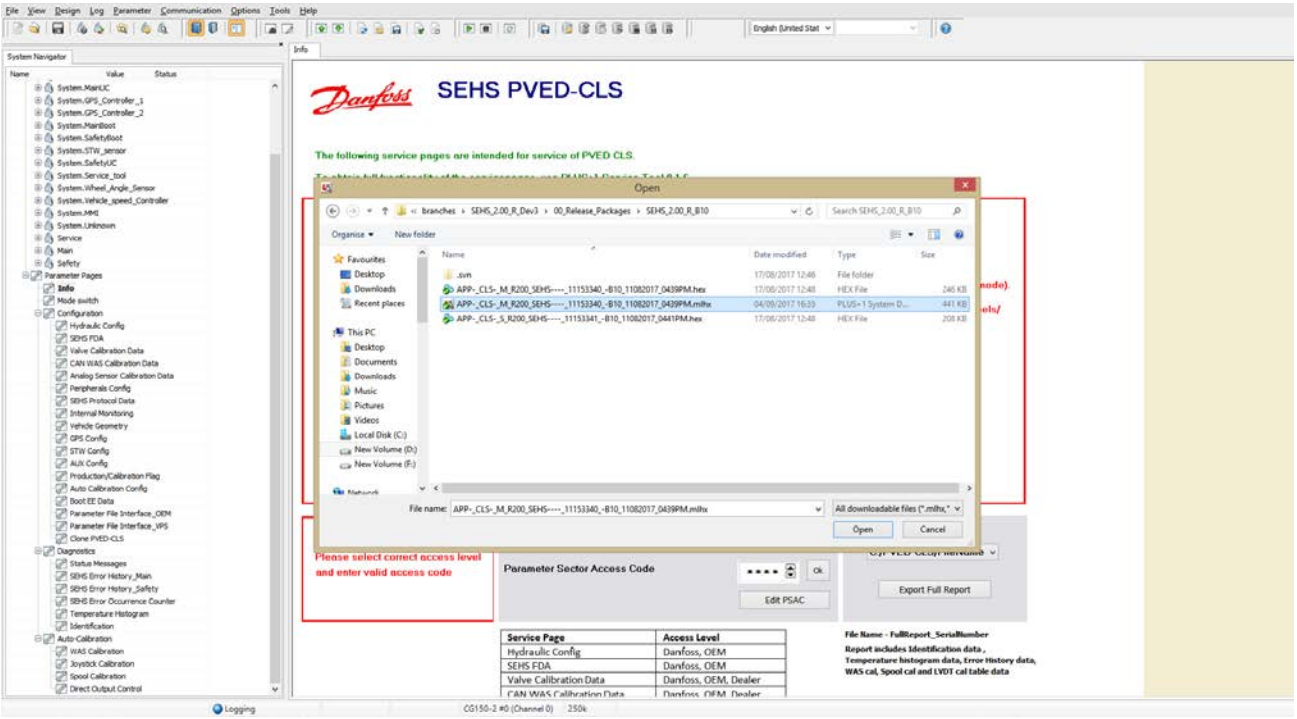
- Click on Close button.

6.3 Download Application .mlhx file

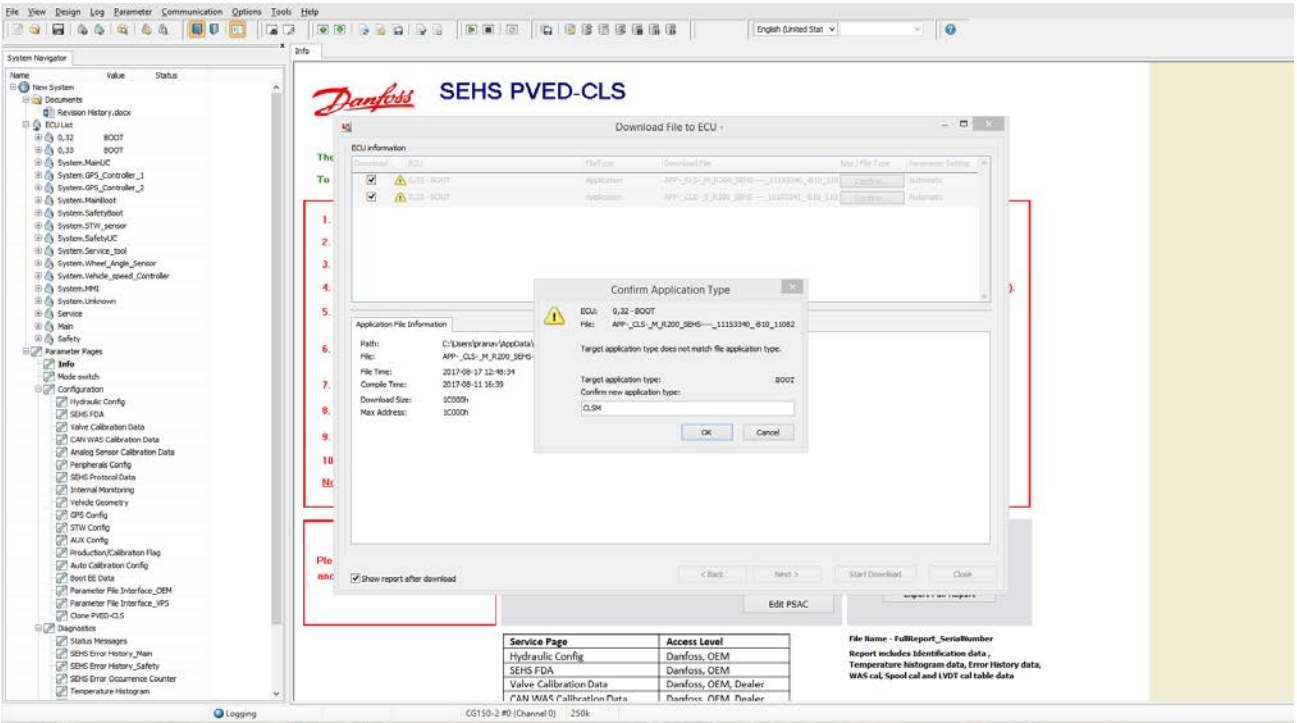
- Select File Menu -> File Download.



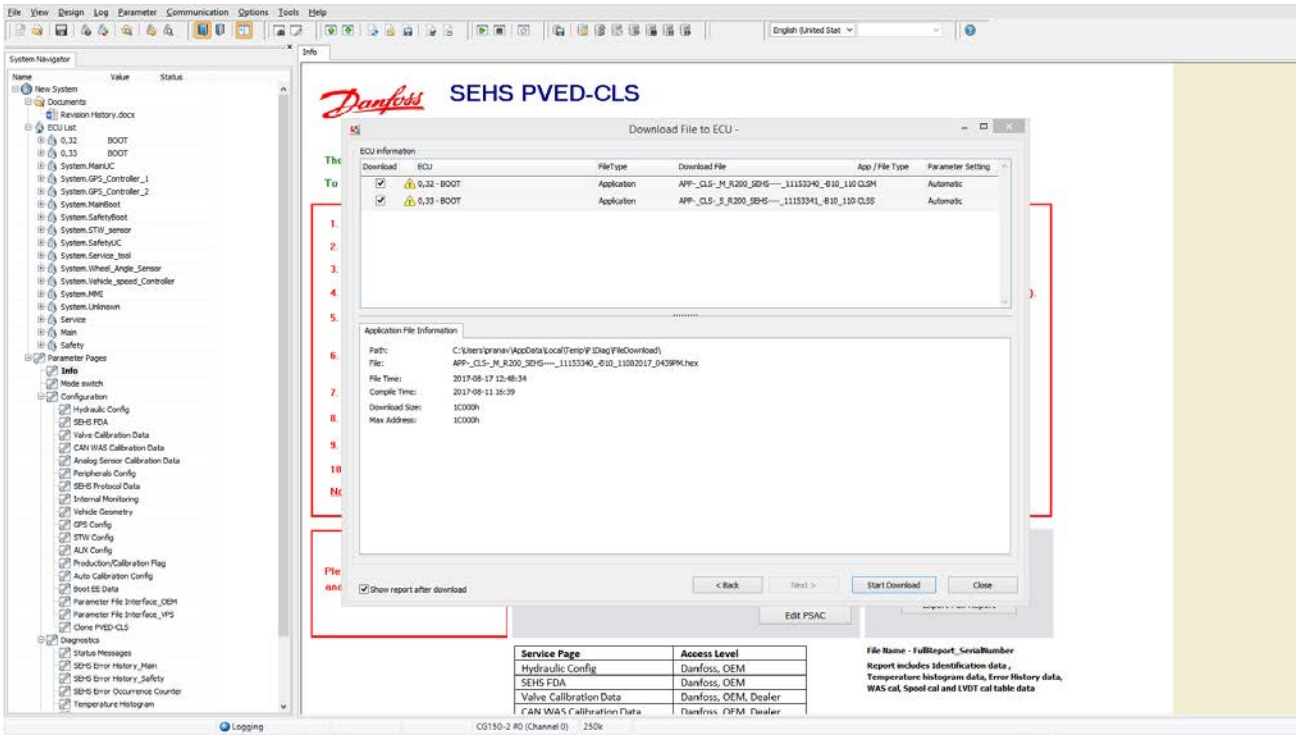
- Select application .mlhx file to download.



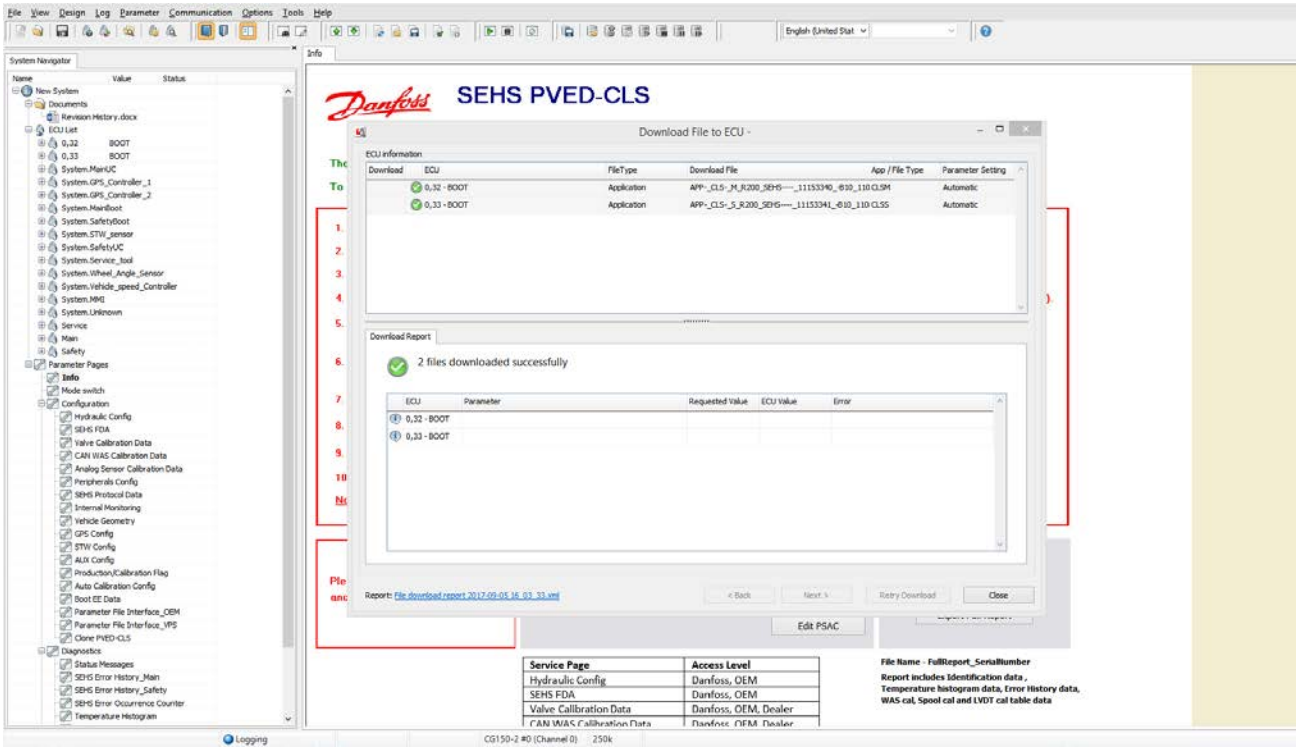
- Click on Next button.
- Enter Application type as “CLSM” for MainUC and “CLSS” for SafetyUC.



- Click on Ok button.



- Click on Start Download button.



- Click on Close button. The Status will show OK during System scan if Application downloaded correctly.

7. Guidelines for using Parameter File Interface Service pages

Note: The Parameter file interface service pages are only applicable for P1D versions 1.97_rev_D, 1.98_rev_A, 2.00_rev_D, 2.01_rev_D, 2.02_rev_B, 2.10_rev_F and 1.00_rev_C.

7.1 Parameter File Interface OEM page:

1)OEM's can use this page to get the parameter values of all (PAE + VPS) parameters or of those PAE parameters which have been modified with respect to their default values.
2) However, there is no restriction for dealer to use this page.
3) Files exported from this page cannot be imported and downloaded.

7.2 Parameter File Interface VPS page:

1) Manufacturer (Danfoss) can use this page. The following sectors are VPS parameters
- Boot EE Data
- SVC Params
- Control Data

2) VPS parameter file button can only be used for importing VPS parameters and parameters not belonging to any of the above sectors are ignored while downloading parameters from this file.
3) The VPS parameter file should always contain CRC and signature CRC values for the parameter(s) and the service tool will not perform automatic CRC and signature calculation of the data.

Attention

The VPS parameter file contains control algorithm parameters of PVED-CLS. These shall only be modified by Danfoss. Using incorrect VPS parameter file can make the unit inoperable or can alter the device behavior.

7.3 Clone PVED-CLS page:

1) OEM's as well as Dealers can use Clone PVED-CLS page for cloning PVED-CLS.
2) By cloning PVED-CLS, it is possible to transfer the configuration from one PVED-CLS to another PVED-CLS. The exported file contains the following calibration sectors:
- Hydraulic Config
- Peripherals Config
- N-axis Protocol Data
- Internal Monitoring
- Auto Calibration Config sector
- N-Axis Config
- OEM Data

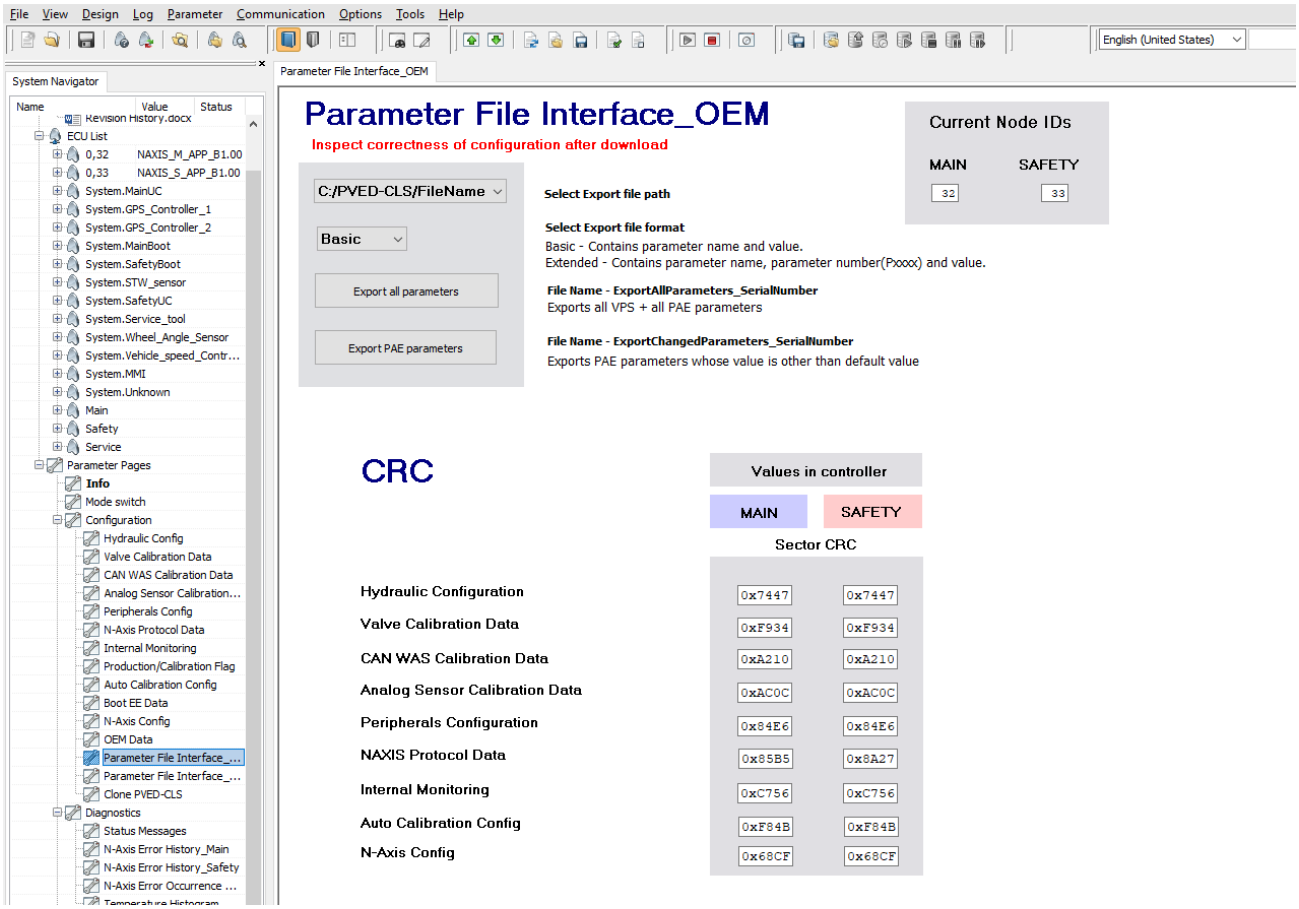
The file excludes the following calibration sectors, as these will not be valid for a new unit.
- Valve Calibration Data
- CAN WAS Calibration Data
- Analog Sensor Calibration Data
- Production/Calibration Flag

Attention

When cloning a PVED-CLS, it must be calibrated to ensure the optimum performance.

7.4 How to use Parameter File Interface OEM page

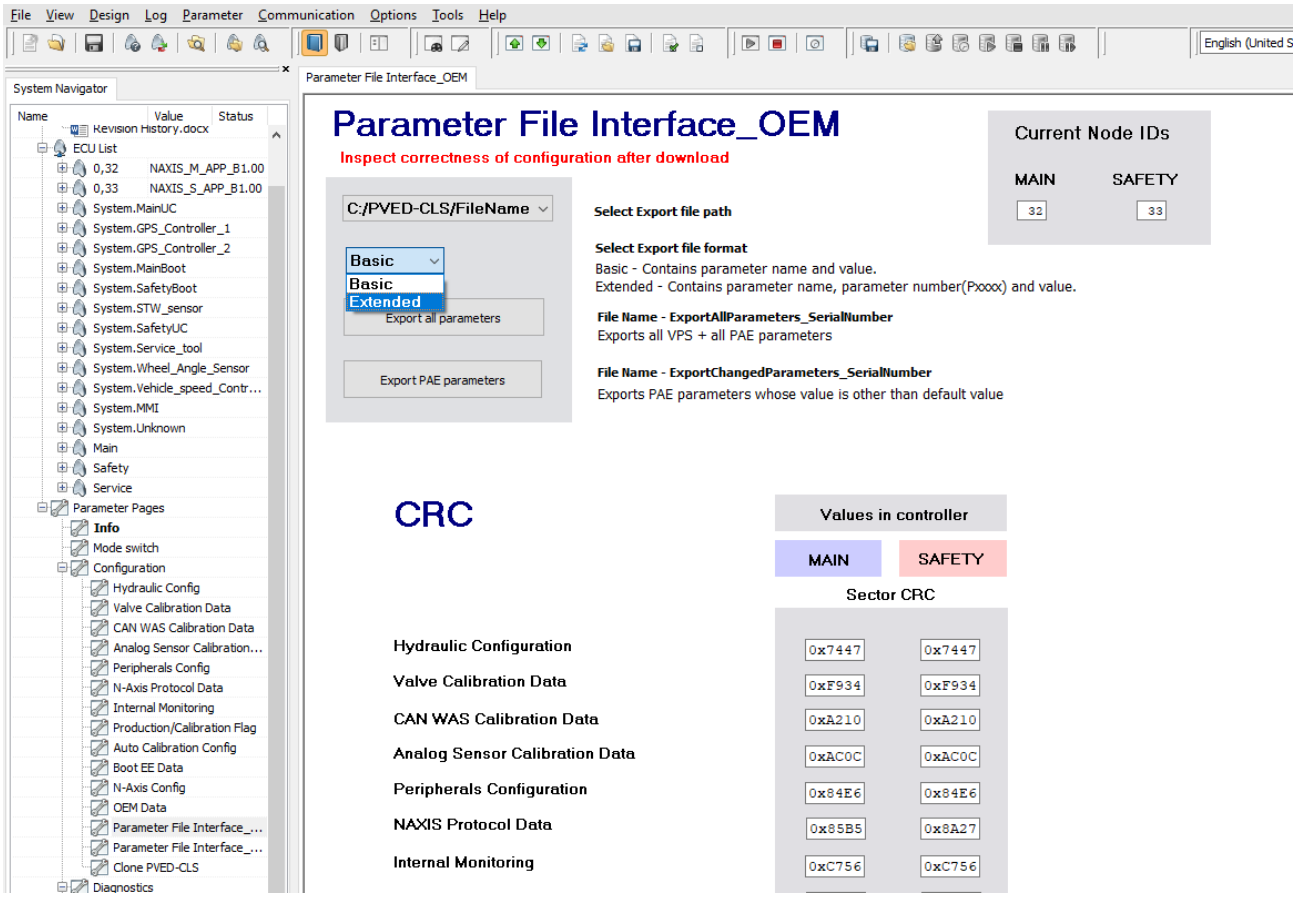
- Go on Parameter File Interface_OEM page of P1D.



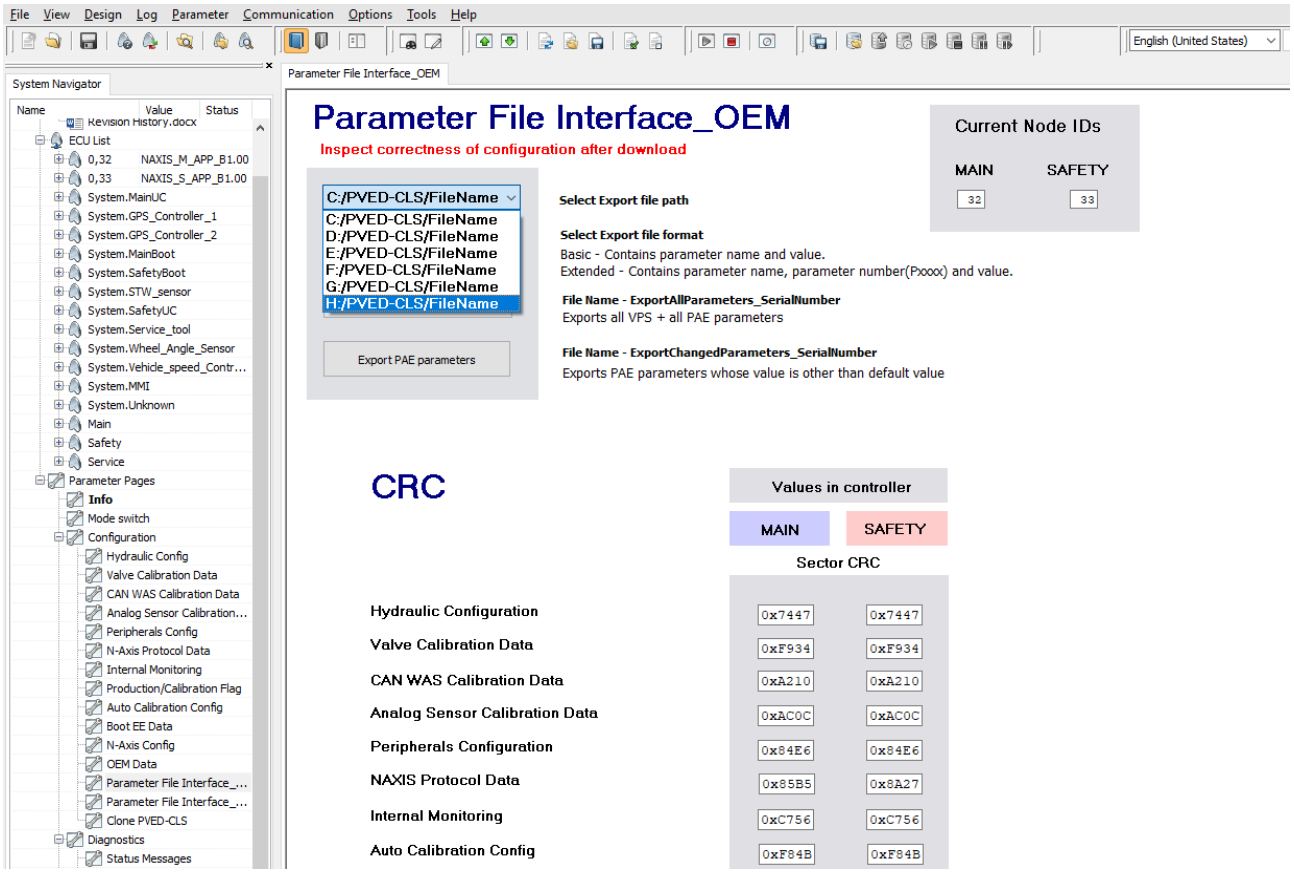
- Select Export file format: Basic or Extended

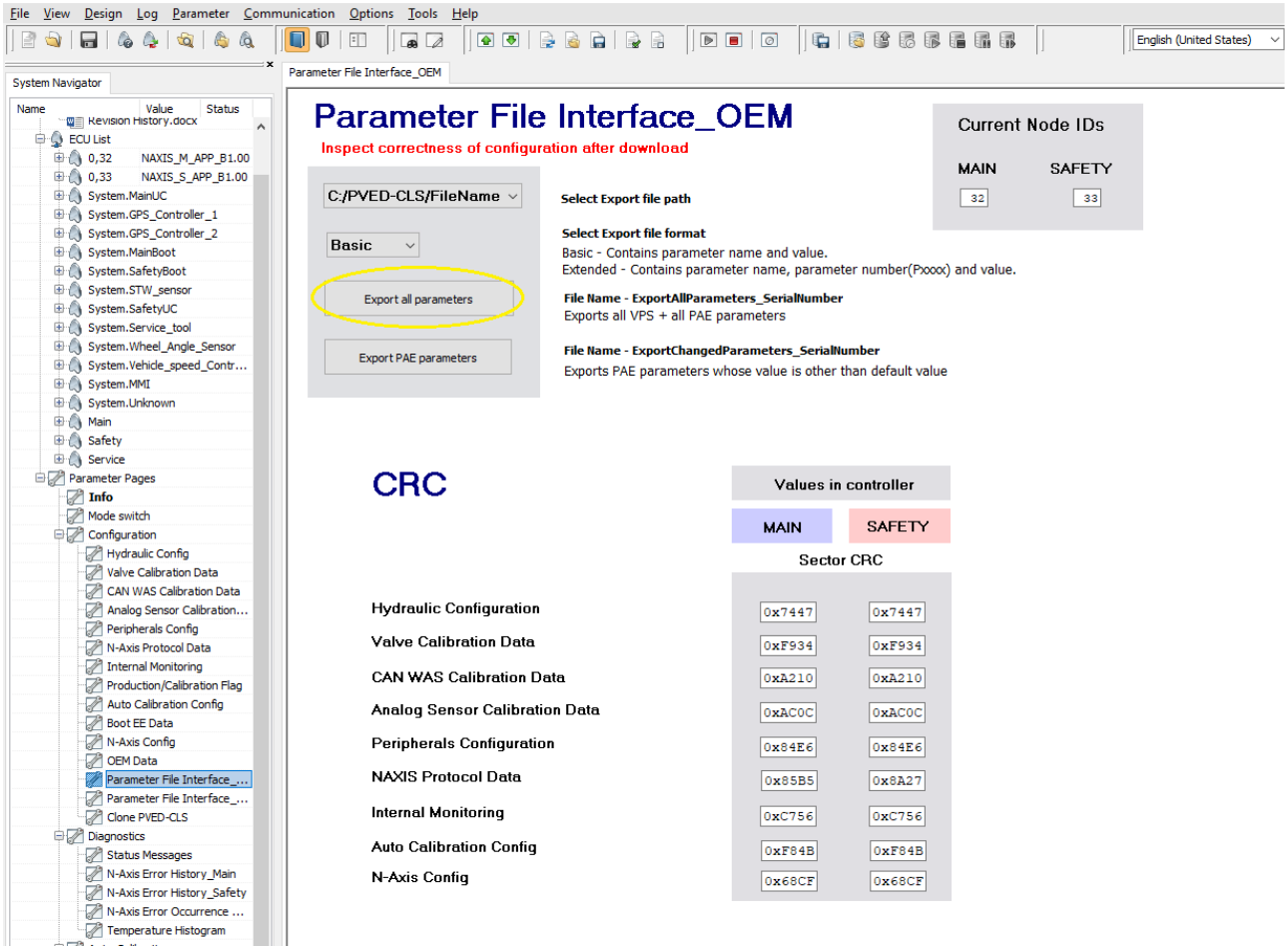
  Basic: Exported file contains parameter name and value.

  Extended: Exported file contains parameter name, parameter number (Pxxxx) and value.

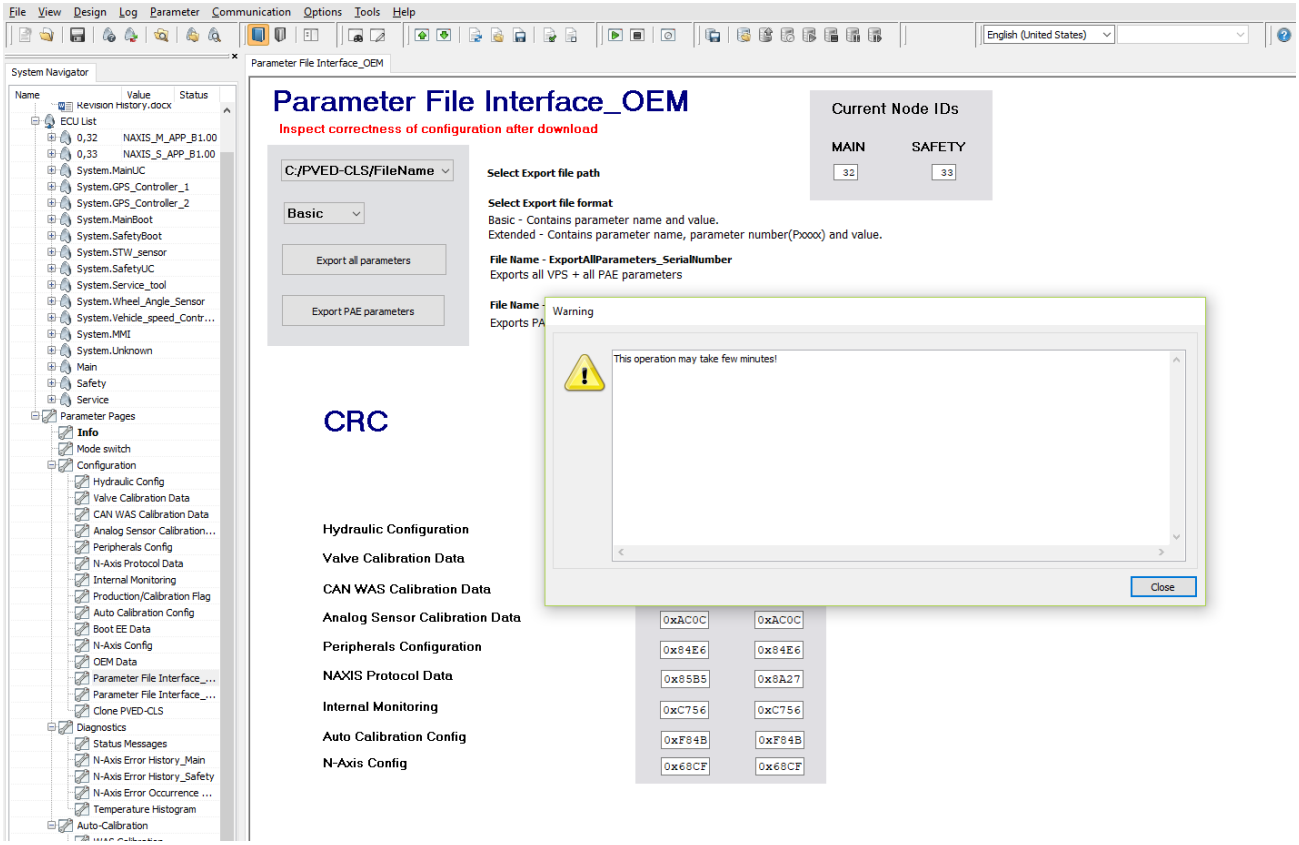


- Select path of the xml file where it is to be exported to.

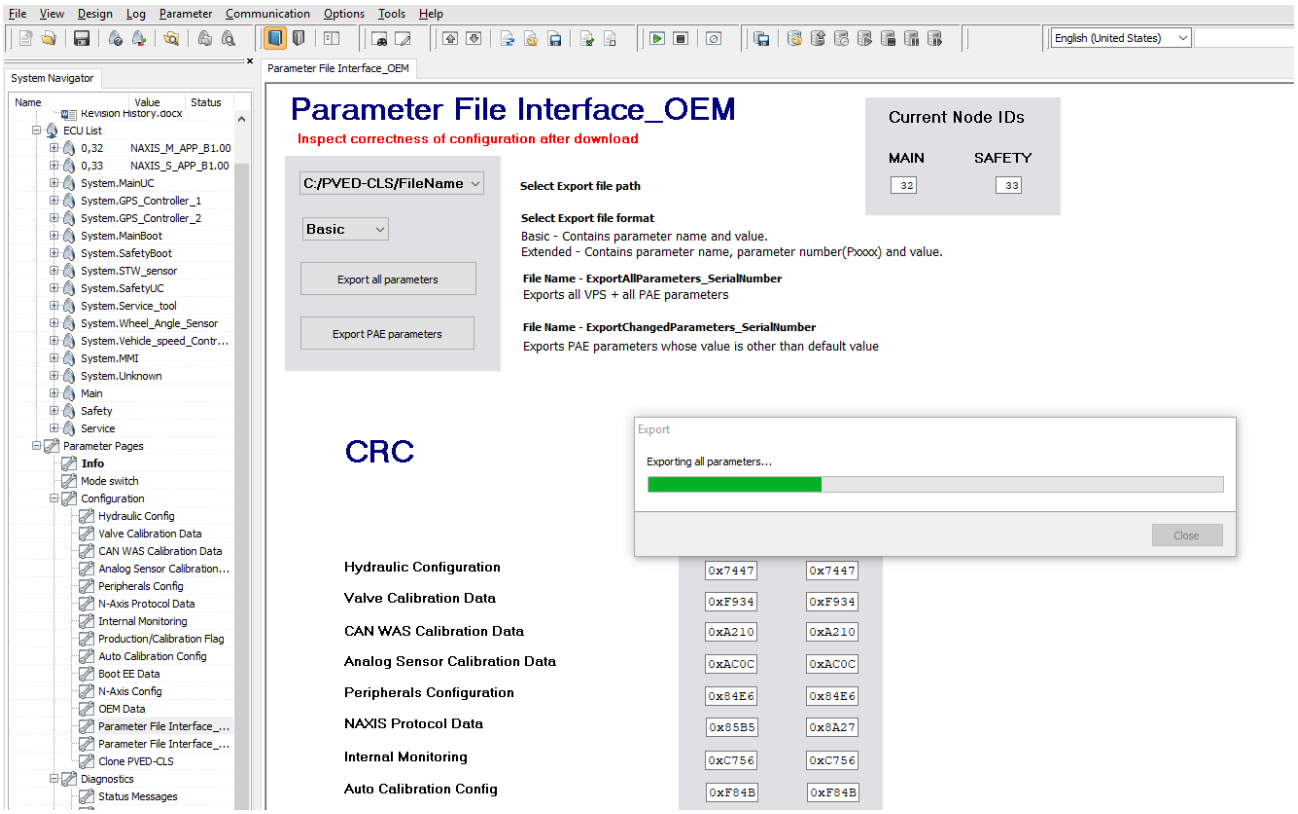




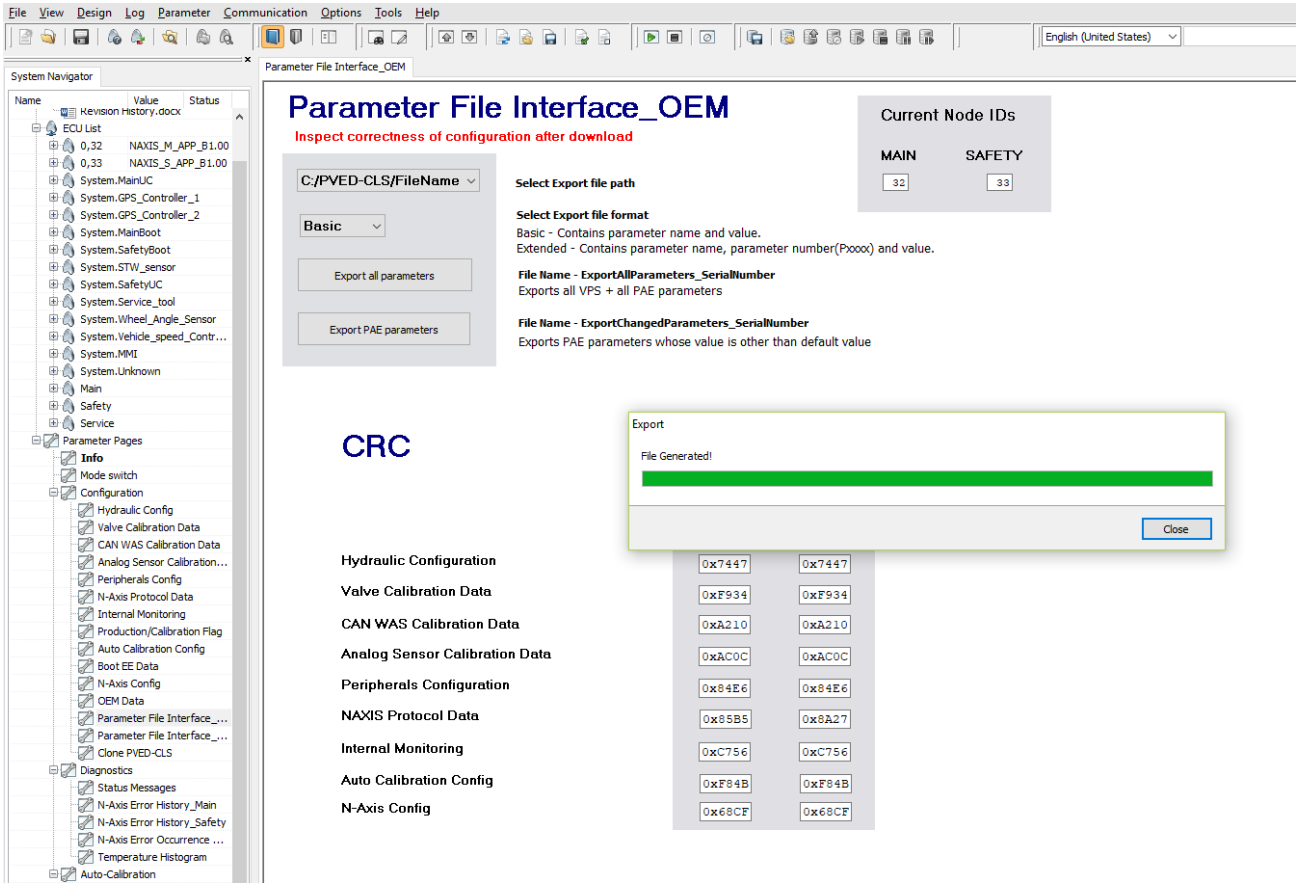
- Export file format is selected as “Basic”
- Click on “Export all parameters” to export all VPS + PAE parameters to the xml file.



- Click on close.



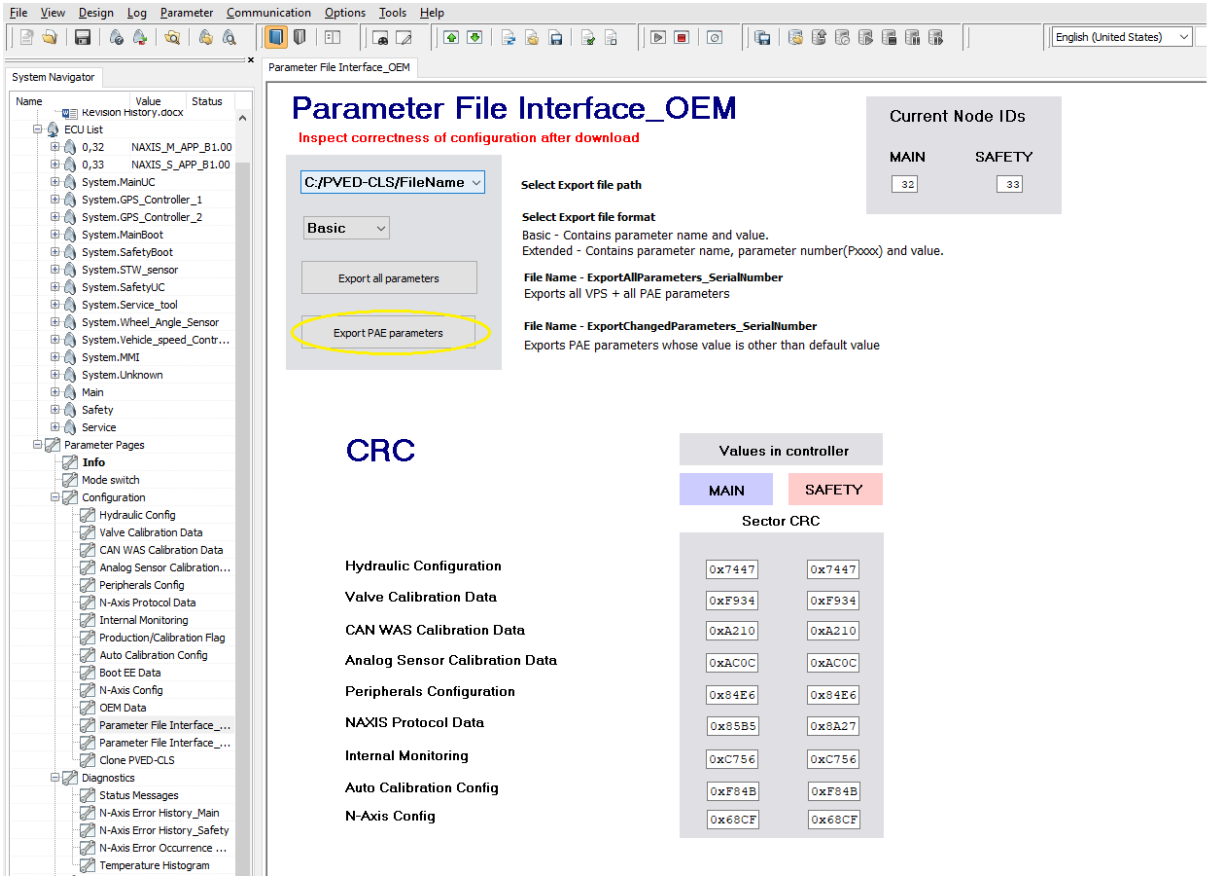
- All parameter values will be exported this way into an xml file.



- Click on “close” and the xml file with the values of all VPS + all PAE parameters will be generated at the given path.

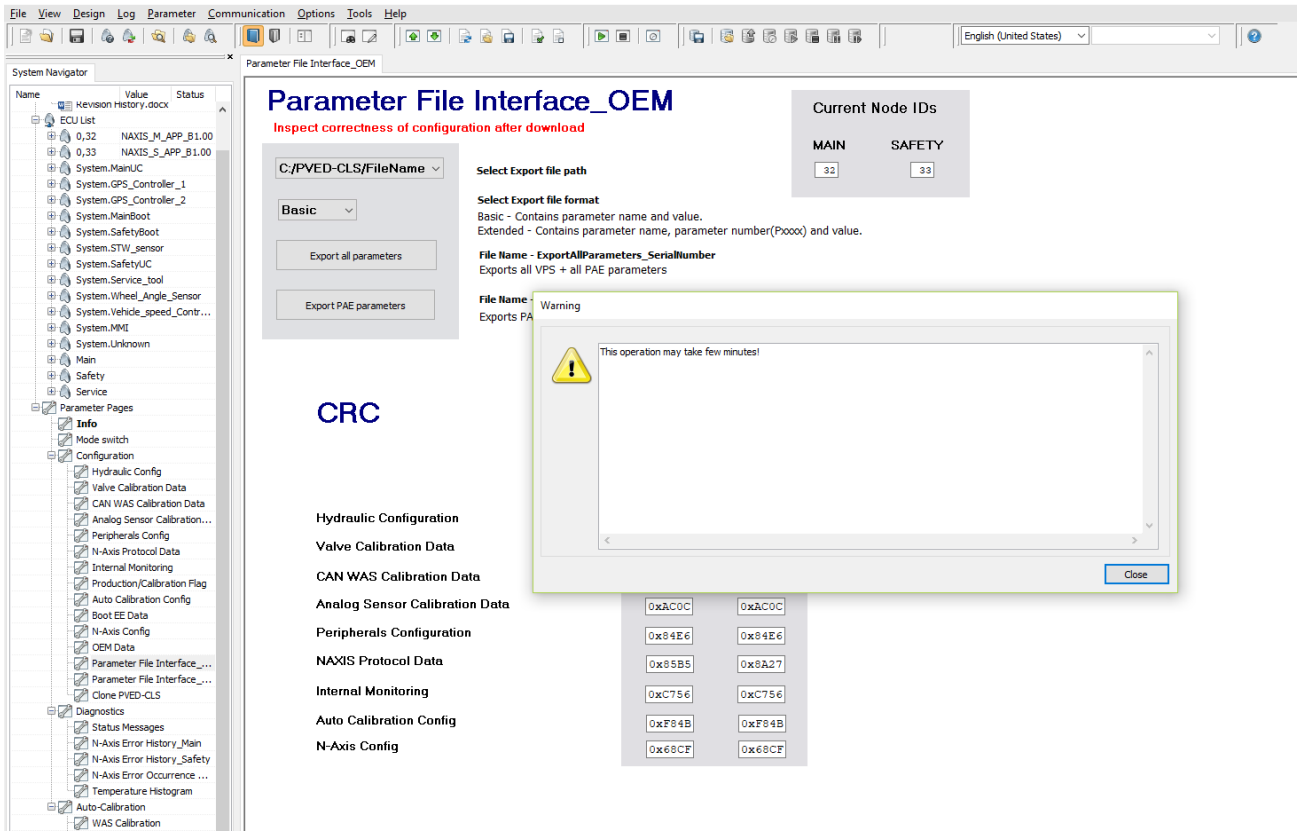
Important

If there is any existing file with same name at same location then it will be replaced.

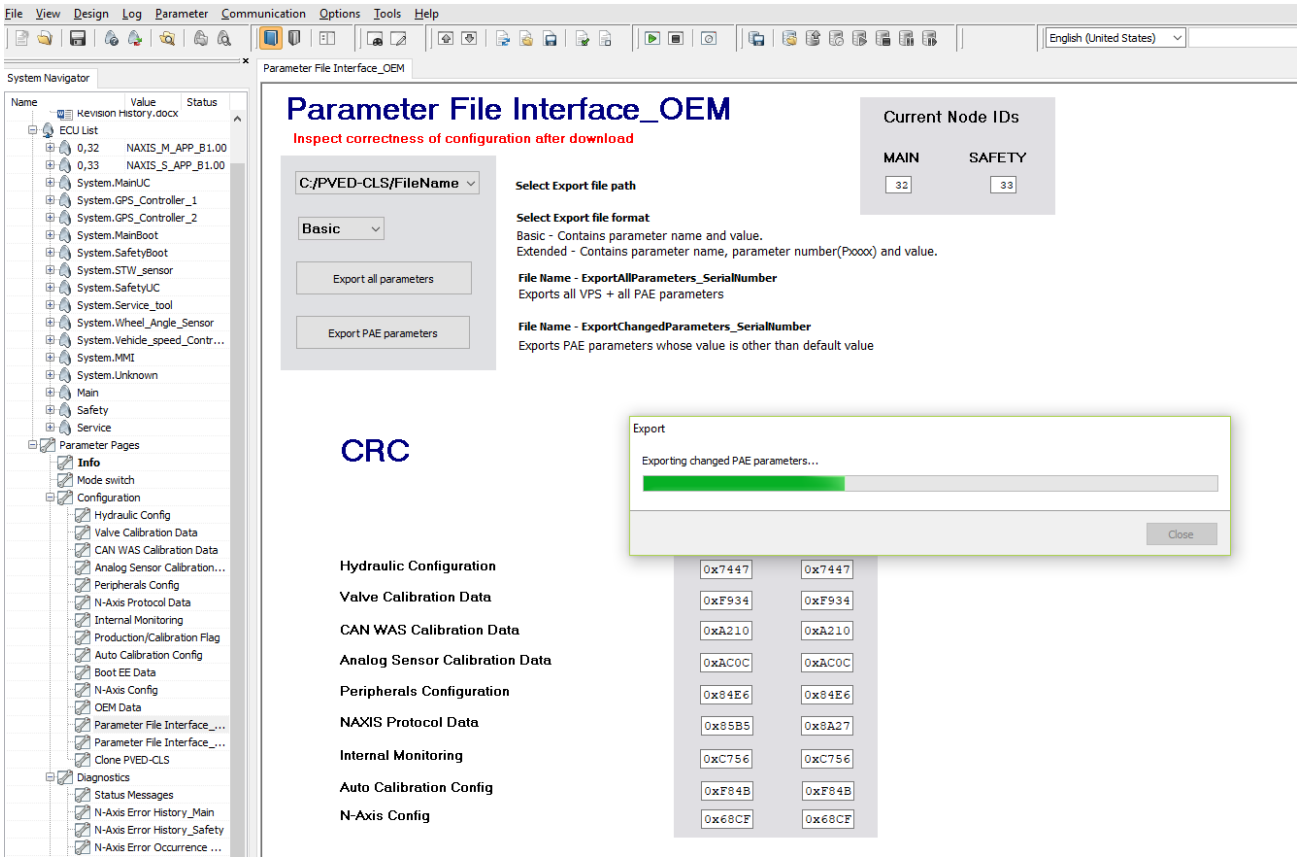


- Click on “Export PAE parameters” button to export PAE parameter values of following sectors which have been modified with respect to their default values.

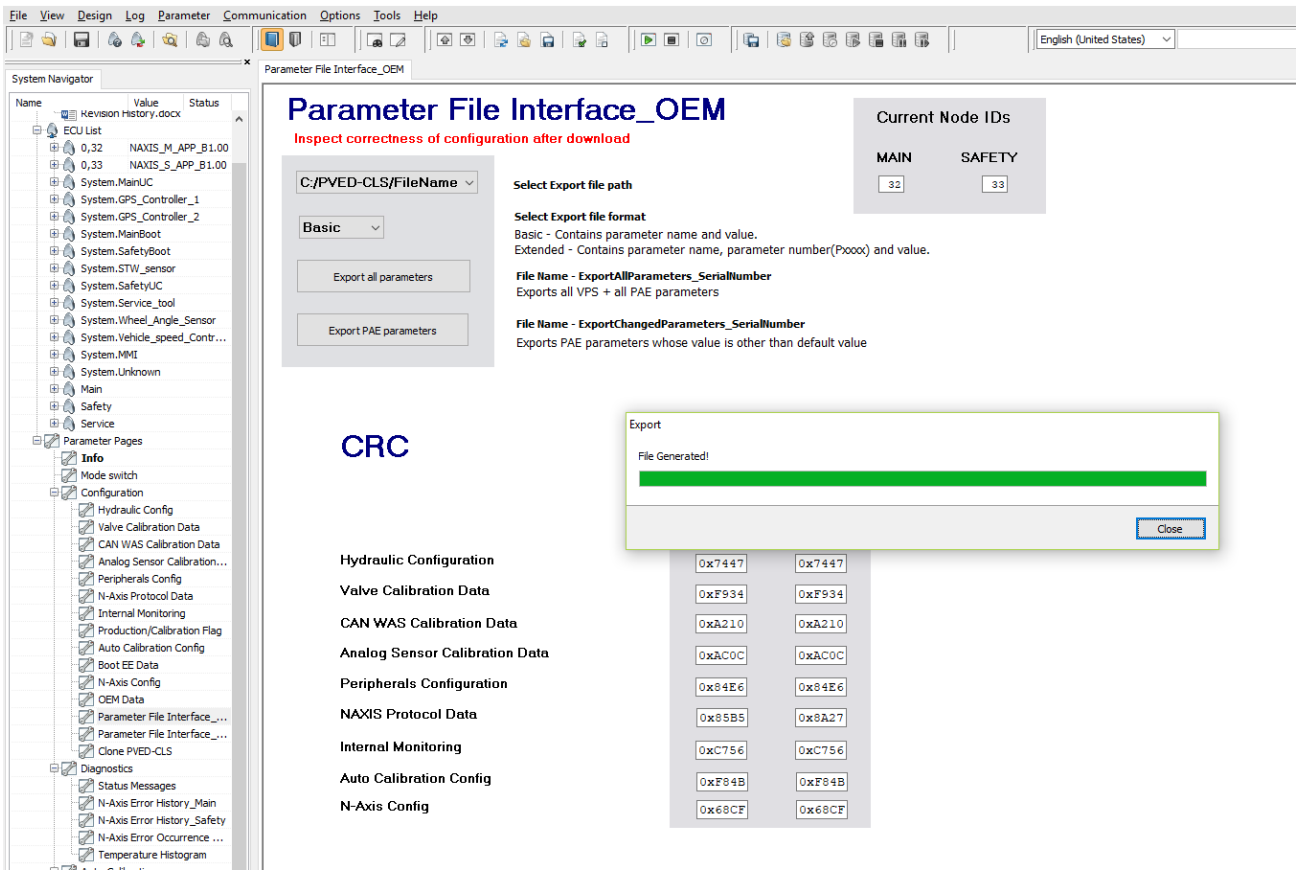
  - Hydraulic Config
  - Valve calibration data
  - CAN Wheel Angle Sensor Calibration data
  - Analog Sensor calibration data
  - Peripherals Config
  - N-axis Protocol Data
  - Internal Monitoring
  - Production/Calibration Flag
  - Auto Calibration Config sector
  - OEM Data
  - N-axis Config



- Click on “close” button.



- The progress window for exporting PAE parameters into an xml file will appear this way.



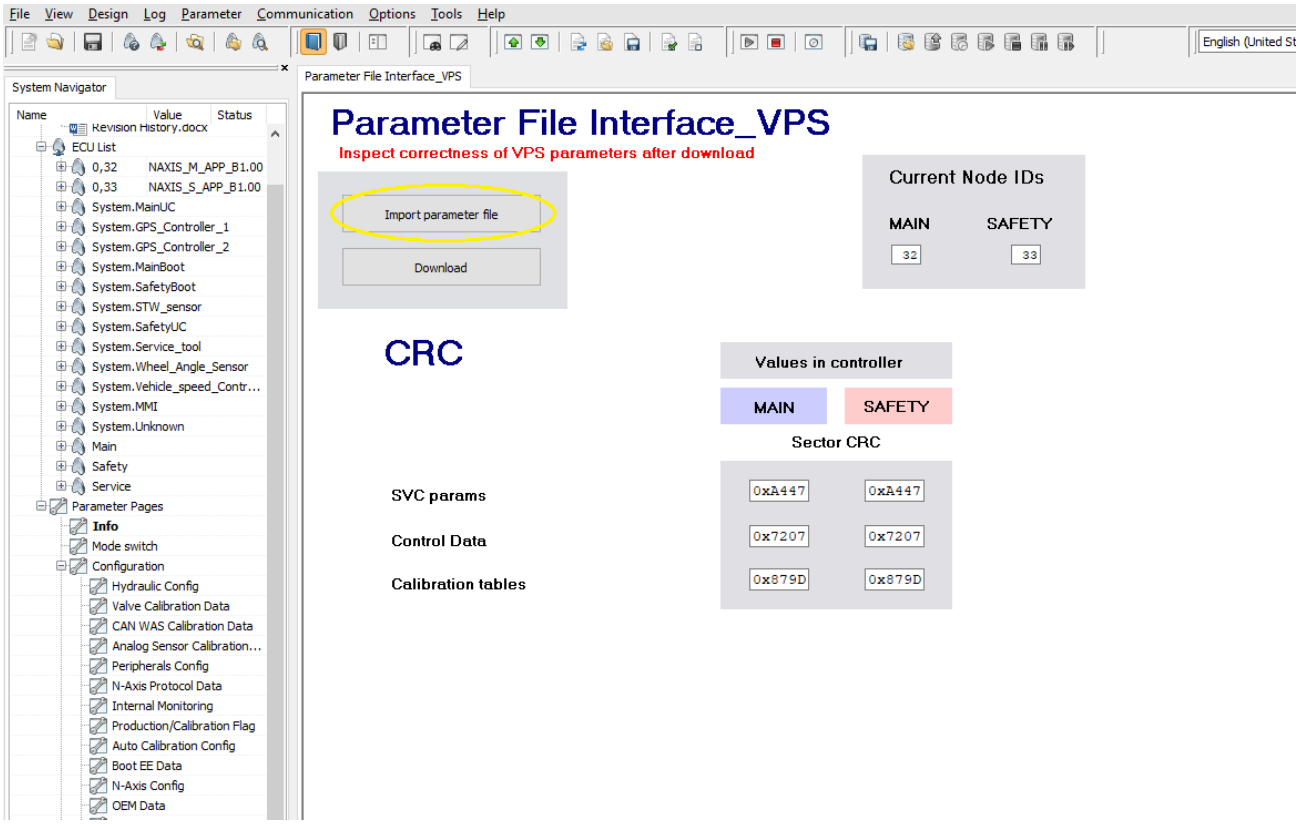
- Click on “close” button and the xml file with the PAE parameters values that have been modified with respect to their default values will be generated at the given path.

Important

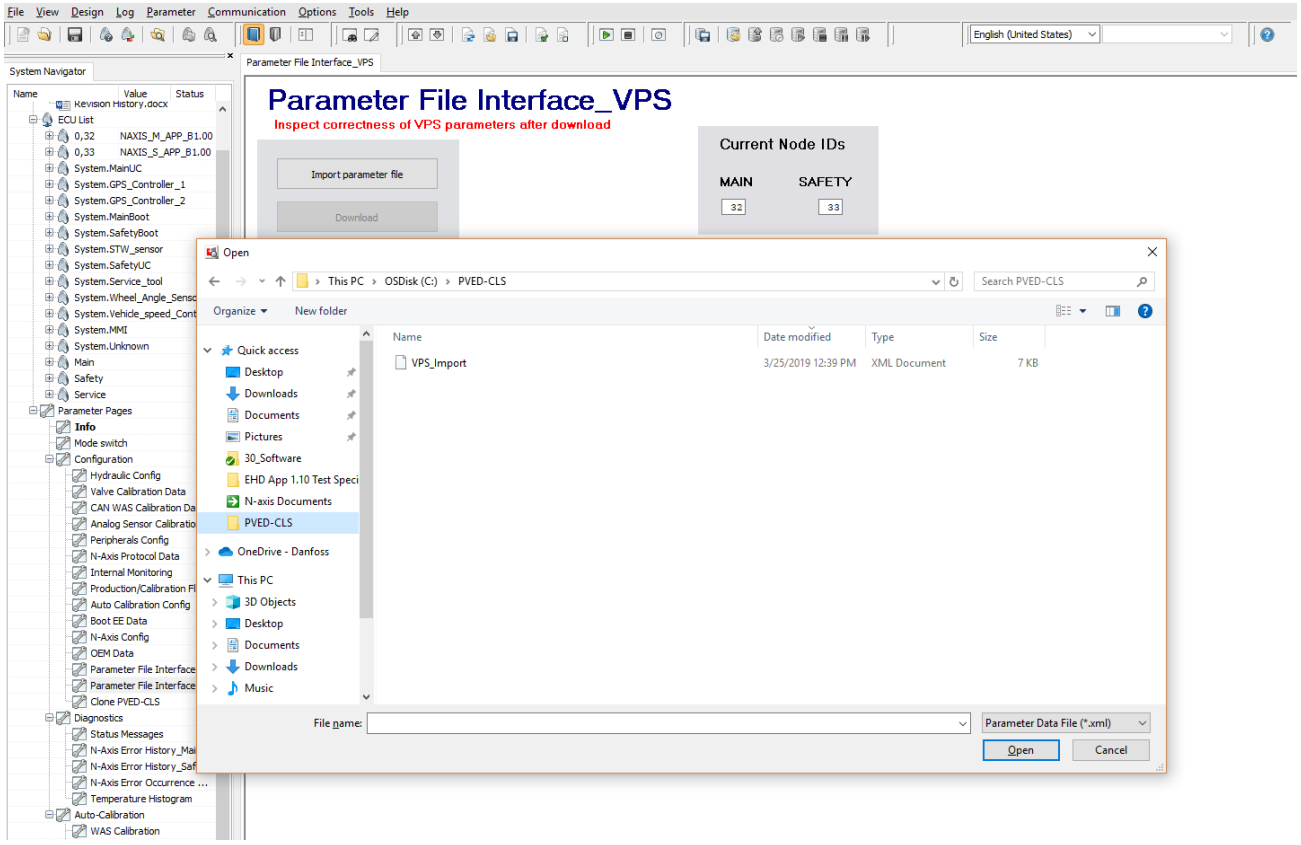
If there is any existing file with same name at same location then it will be replaced.

7.5 How to use Parameter File Interface VPS page

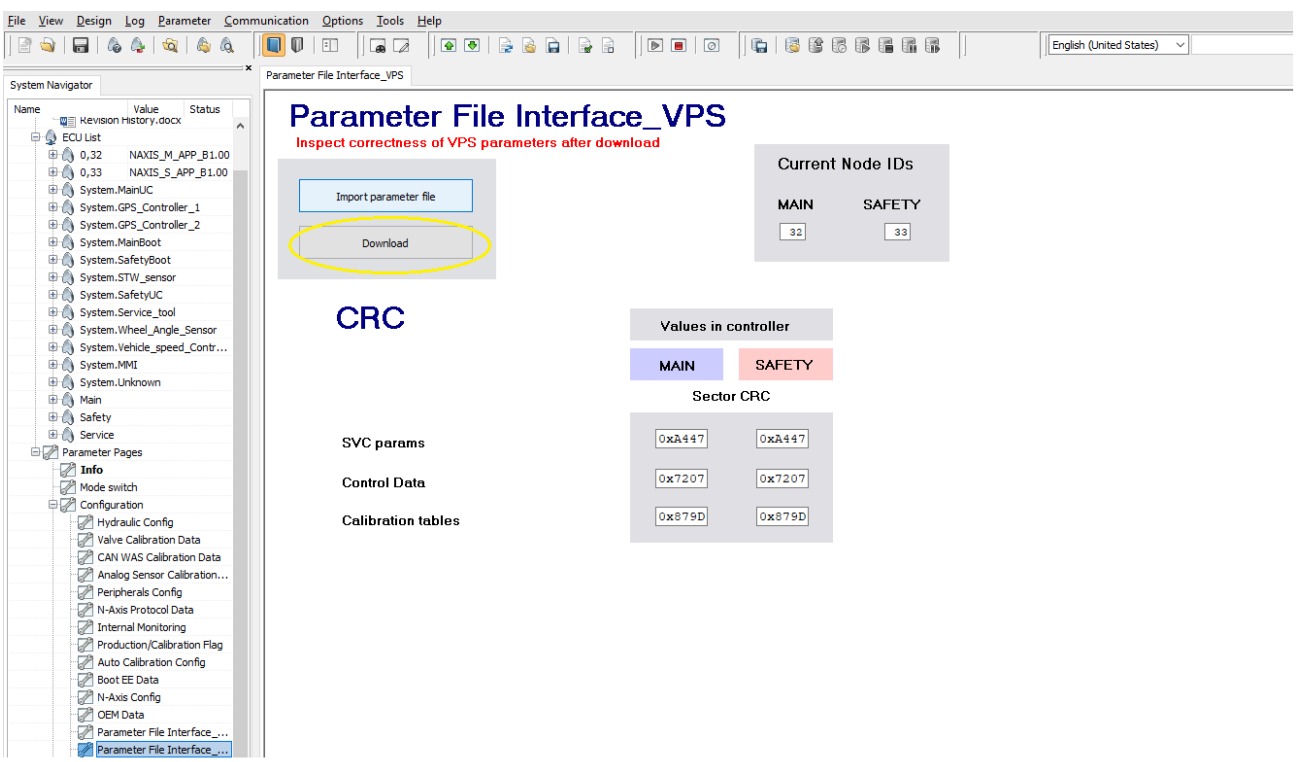
- Go on Parameter File Interface_VPS page of P1D.



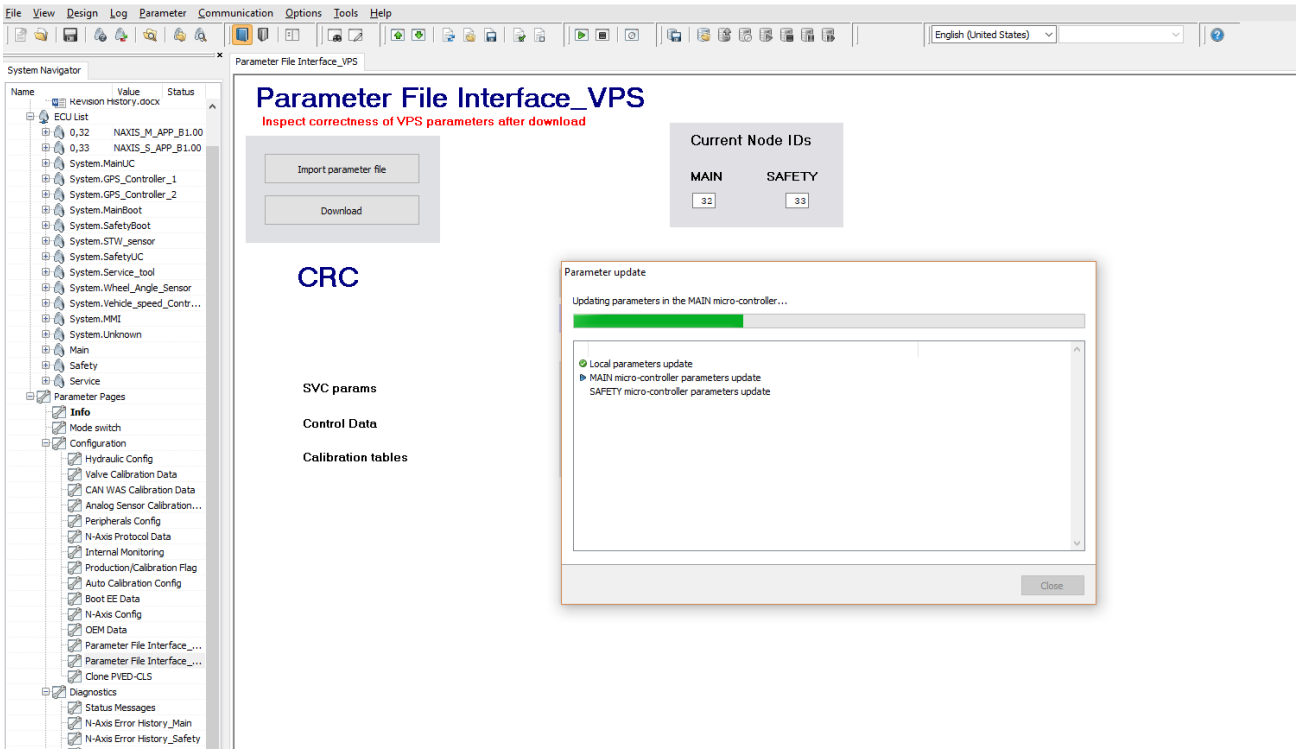
- Click on “Import parameter file” button to import VPS parameter values from xml.



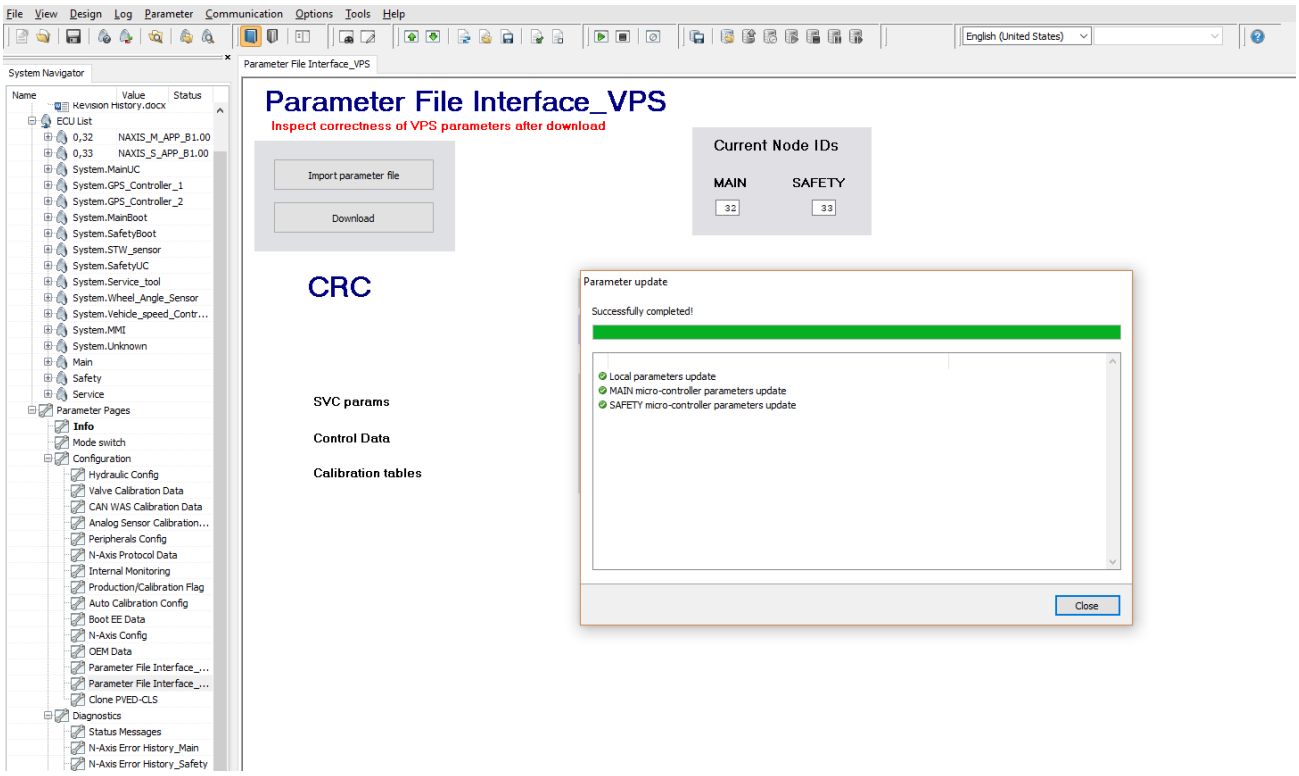
- Select the xml file that contains VPS parameter values.



- Click on “Download” button to download the VPS parameters into the PVED-CLS.



- The progress window for download will appear as shown above.



- Click on close button once the VPS parameters are downloaded into the main and safety controllers.

7.6 How to use Clone PVED-CLS page

- Go on Clone PVED-CLS page of P1D.

Important

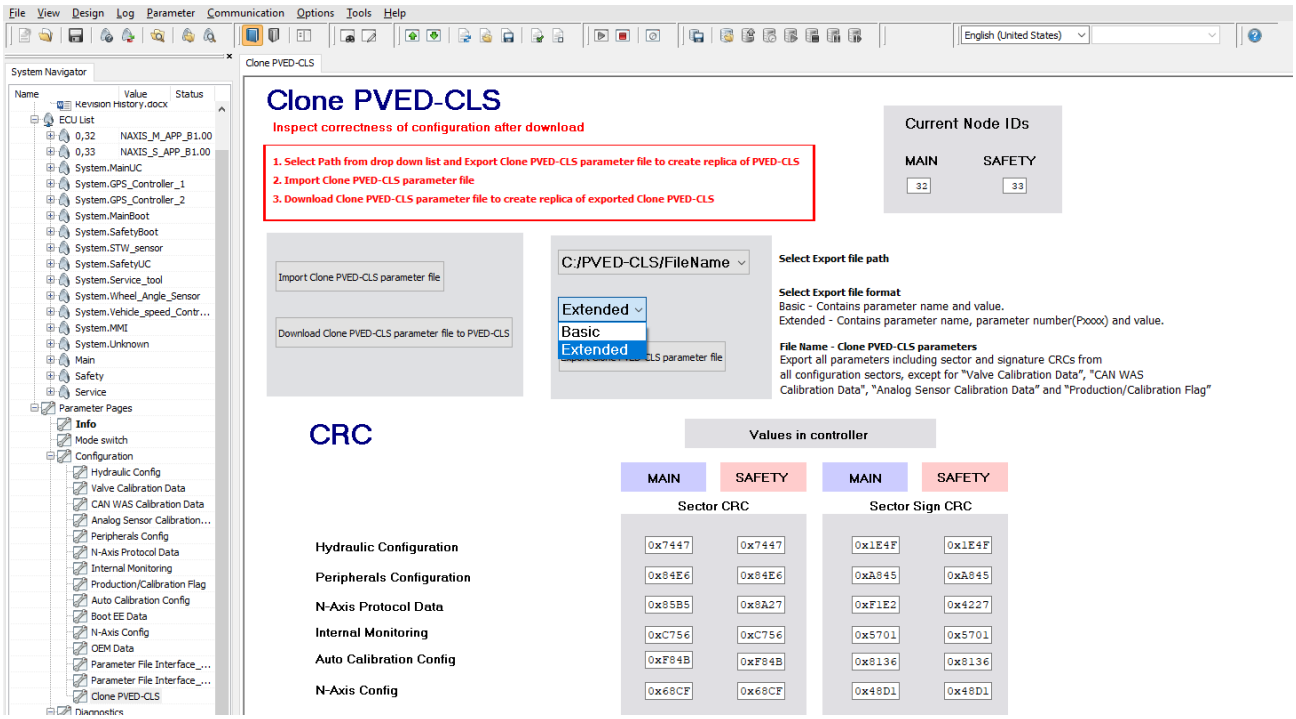
The export button of this page will export all PAE parameters including sector and signature CRC's from the following configuration sectors:

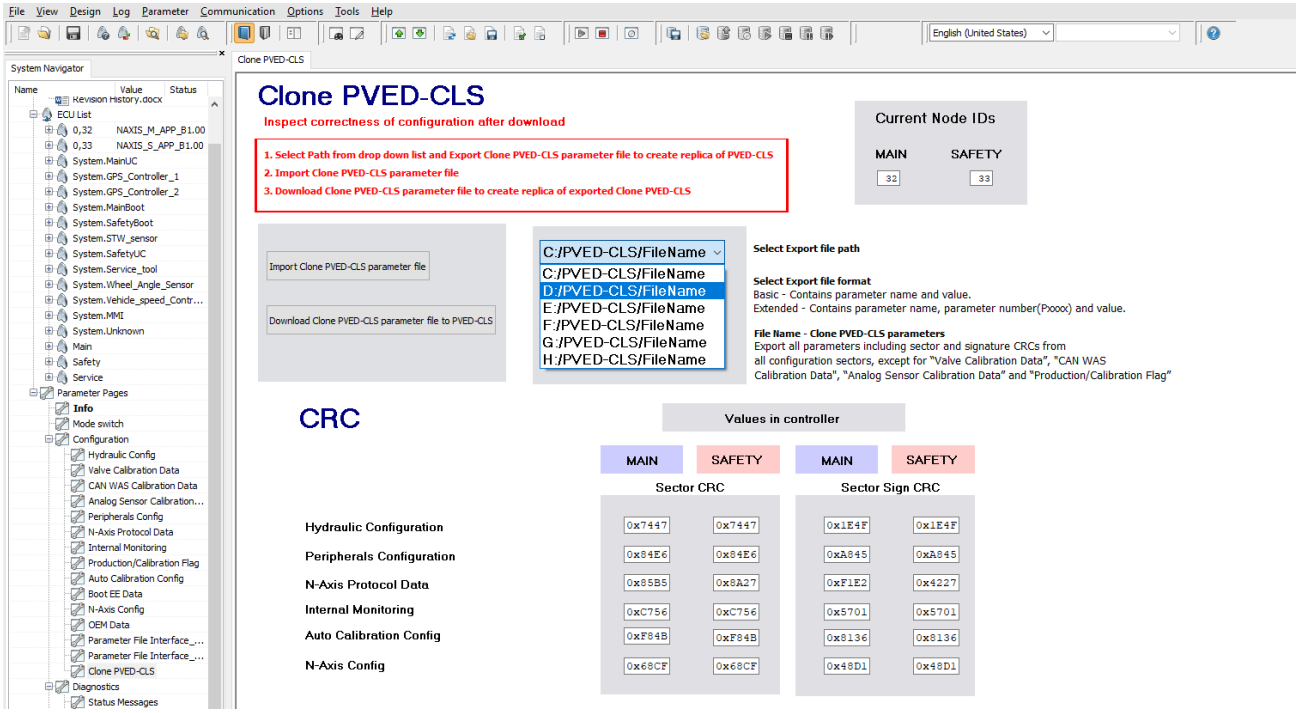
- Hydraulic Config
- Peripherals Config
- N-axis Protocol Data
- Internal Monitoring
- Auto Calibration Config sector
- OEM Data
- N-axis Config

- Select Export file format: Basic or Extended

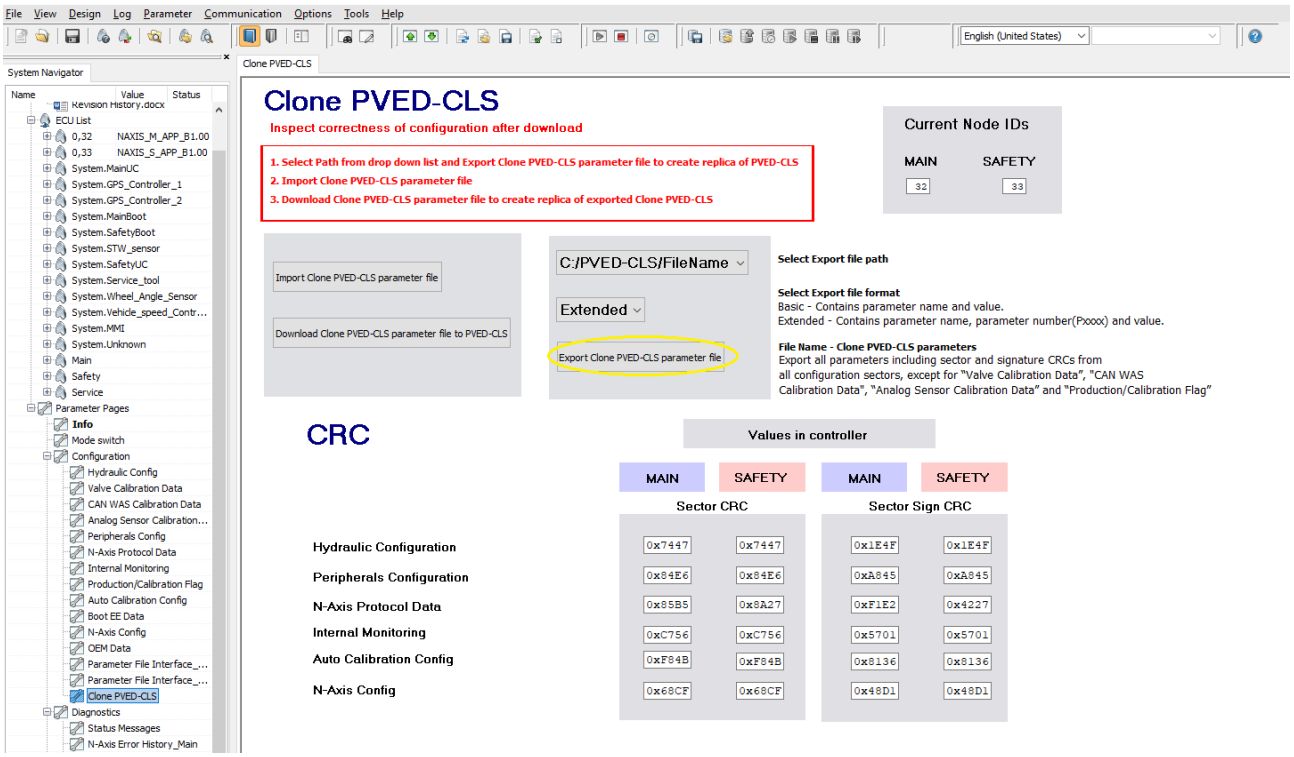
  Basic: Exported file contains parameter name and value.

  Extended: Exported file contains parameter name, parameter number (Pxxxx) and value.

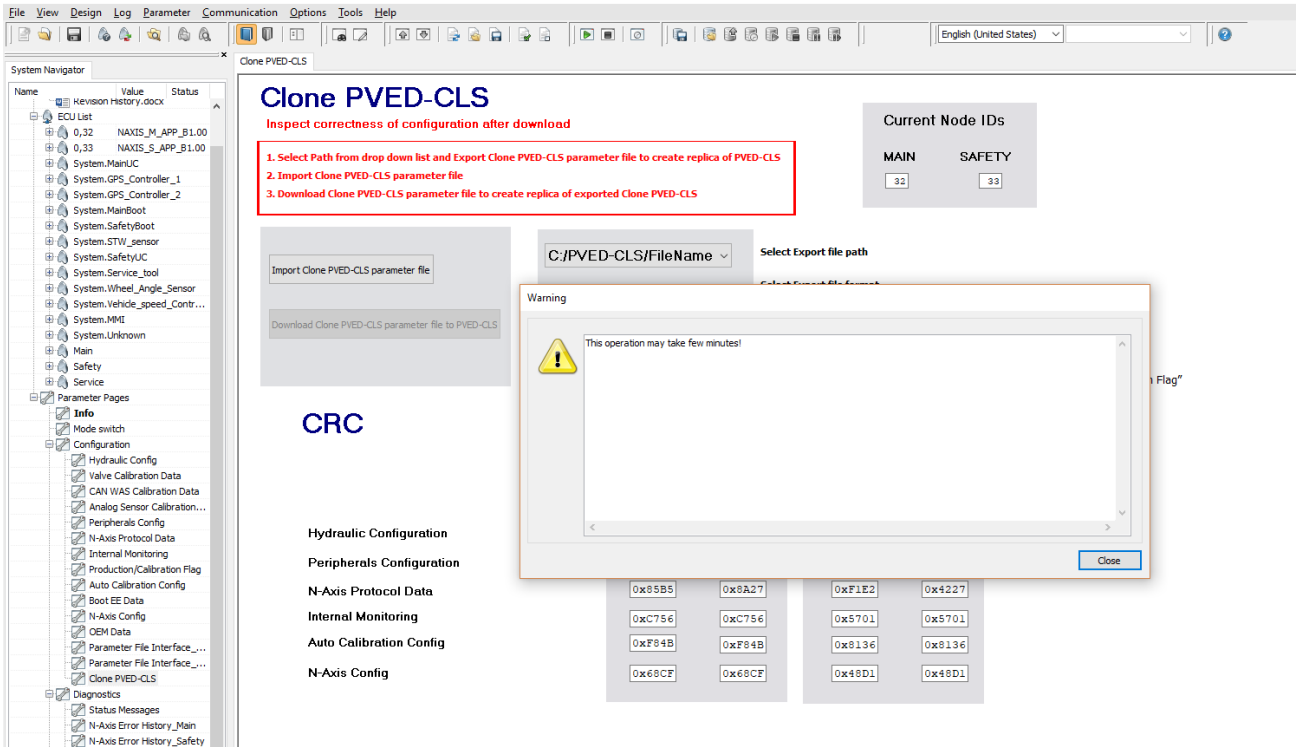




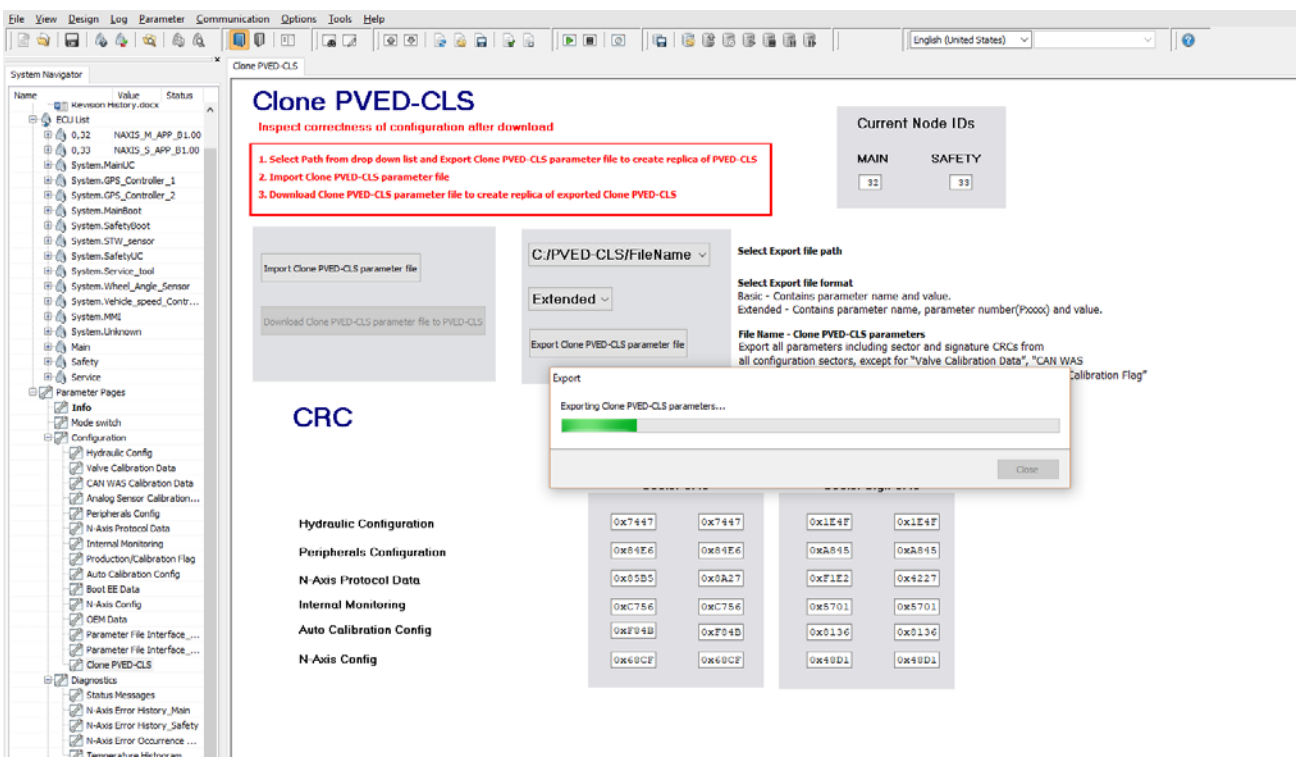
- Select the path of the xml file where it is to be exported to.



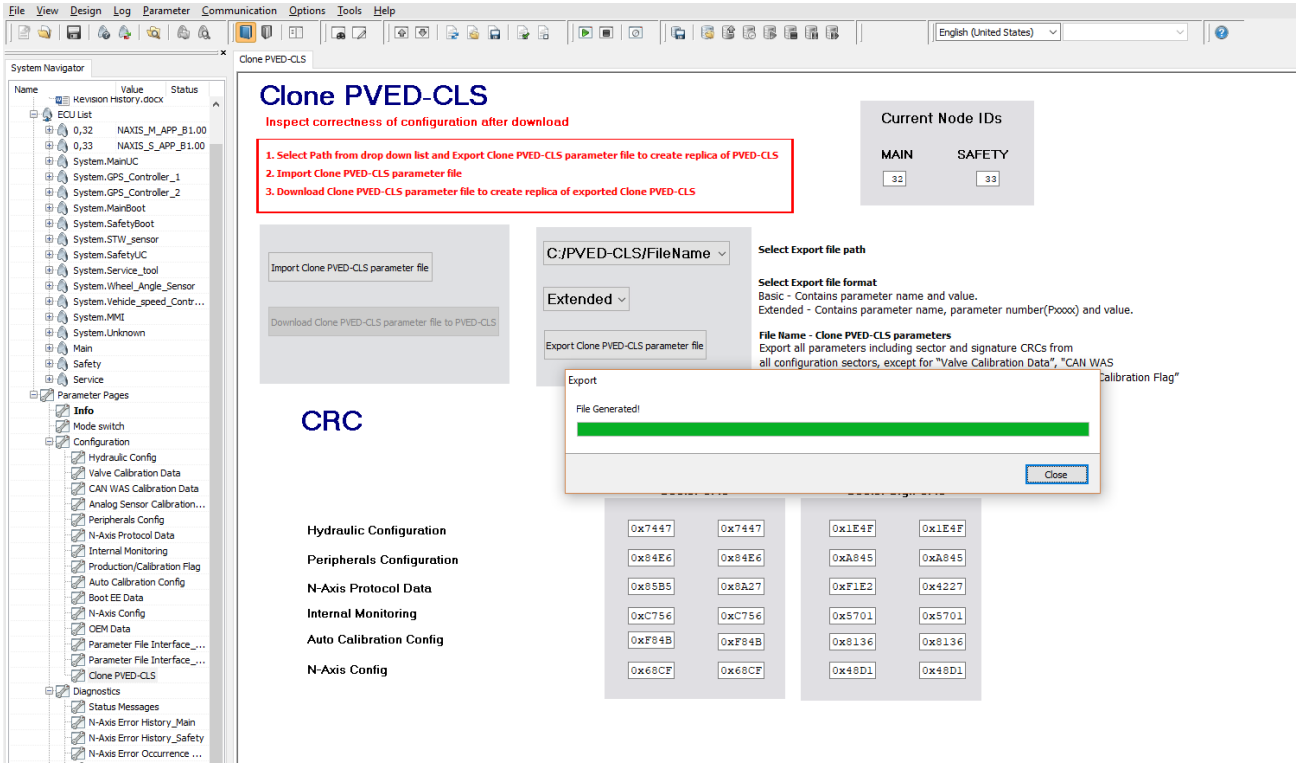
- Export file format is selected as "Extended"
- Click on "Export Clone PVED-CLS parameter file" button.



- Click on “close” button.



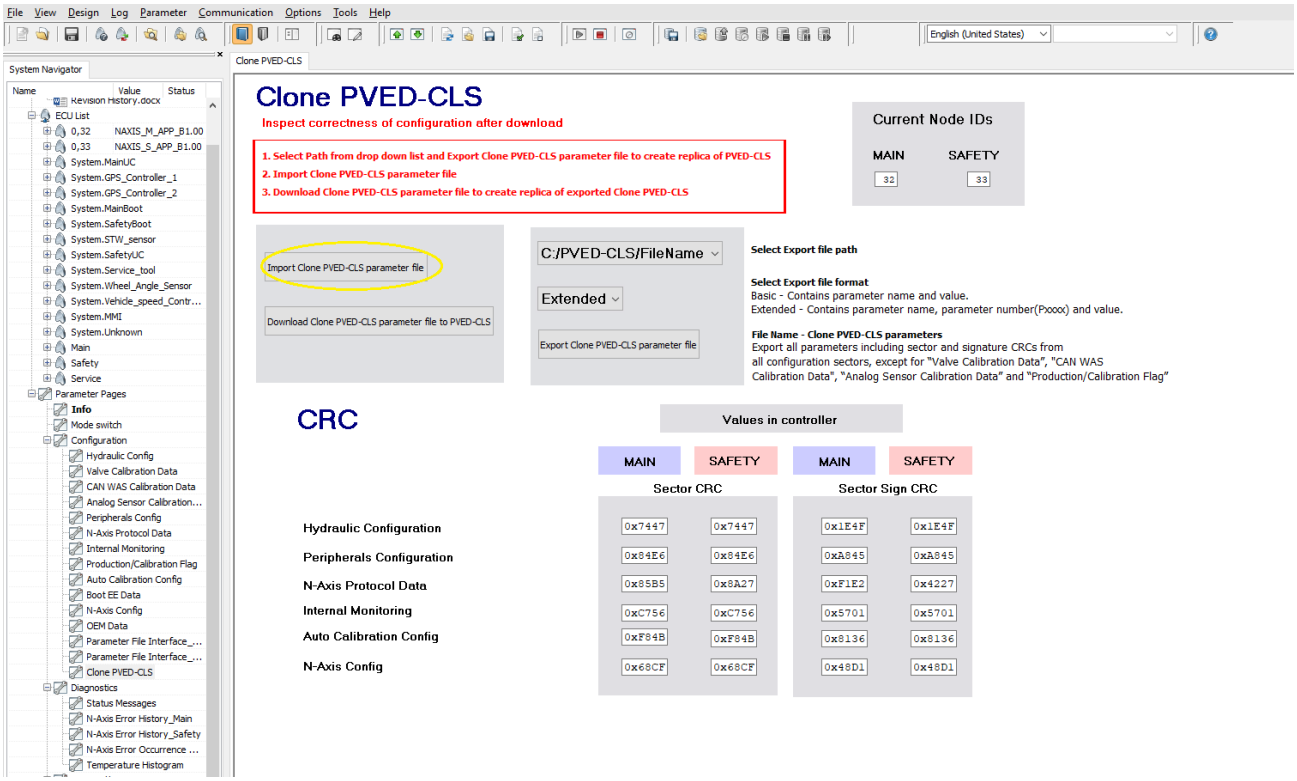
- The progress bar for exporting xml parameter file will be seen as above.



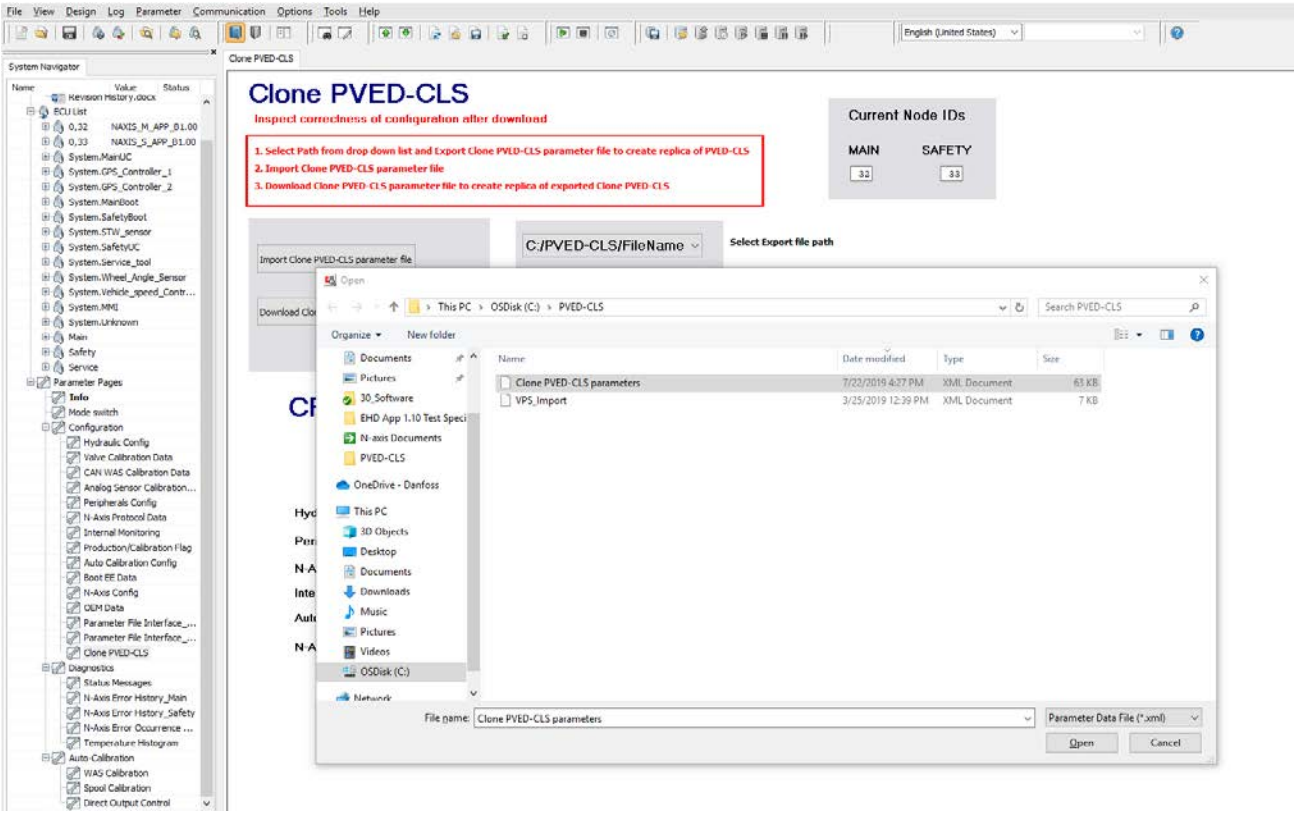
- Click on close button and the xml file will be generated at the specified location.

Important

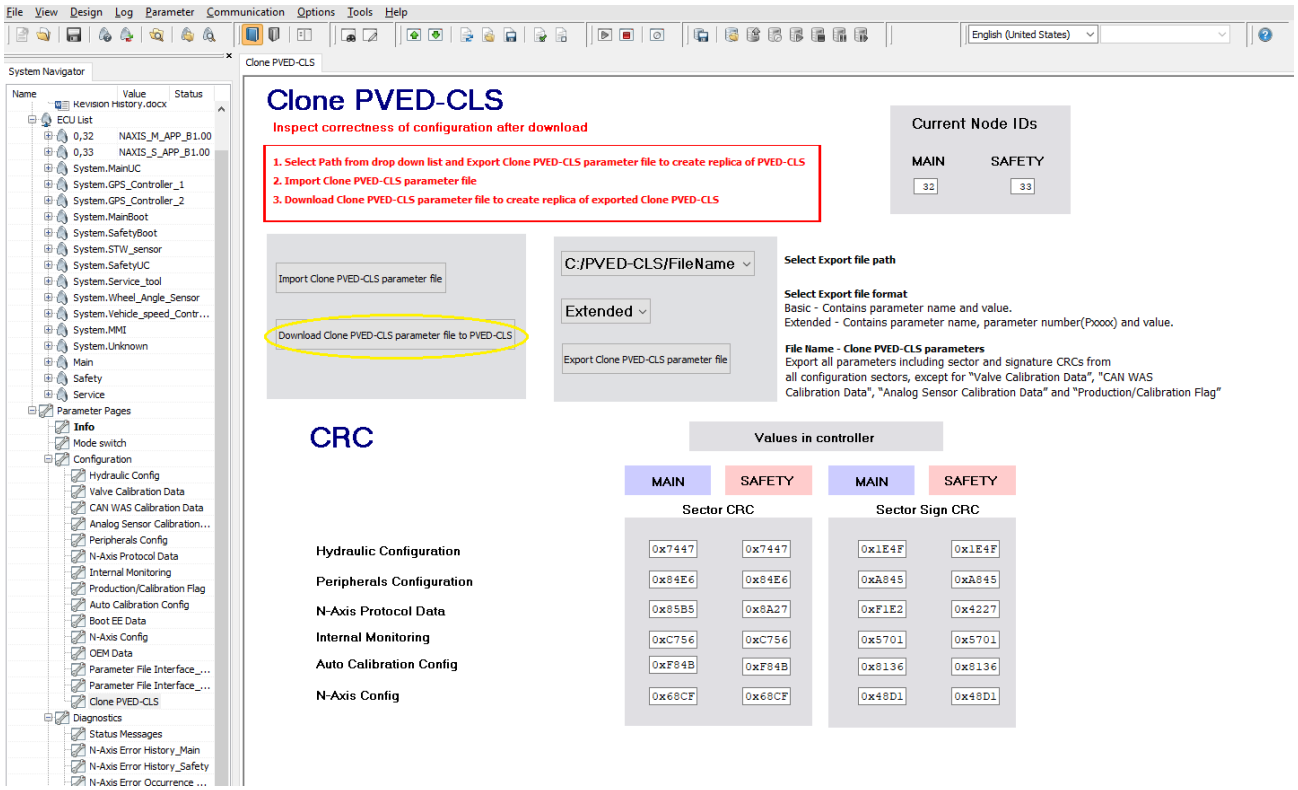
If there is any existing file with same name at same location then it will be replaced.



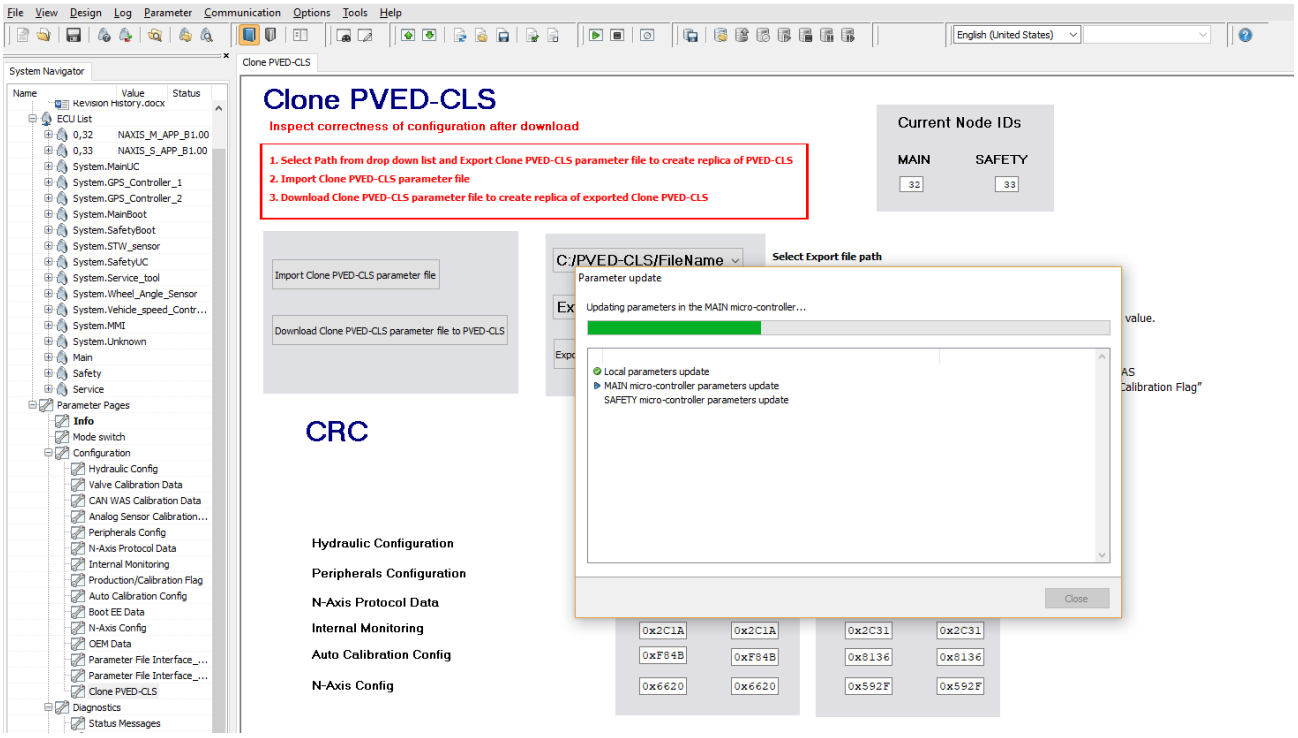
- To import an xml file that contains required parameter values, click on “Import Clone PVED-CLS parameter file” button.



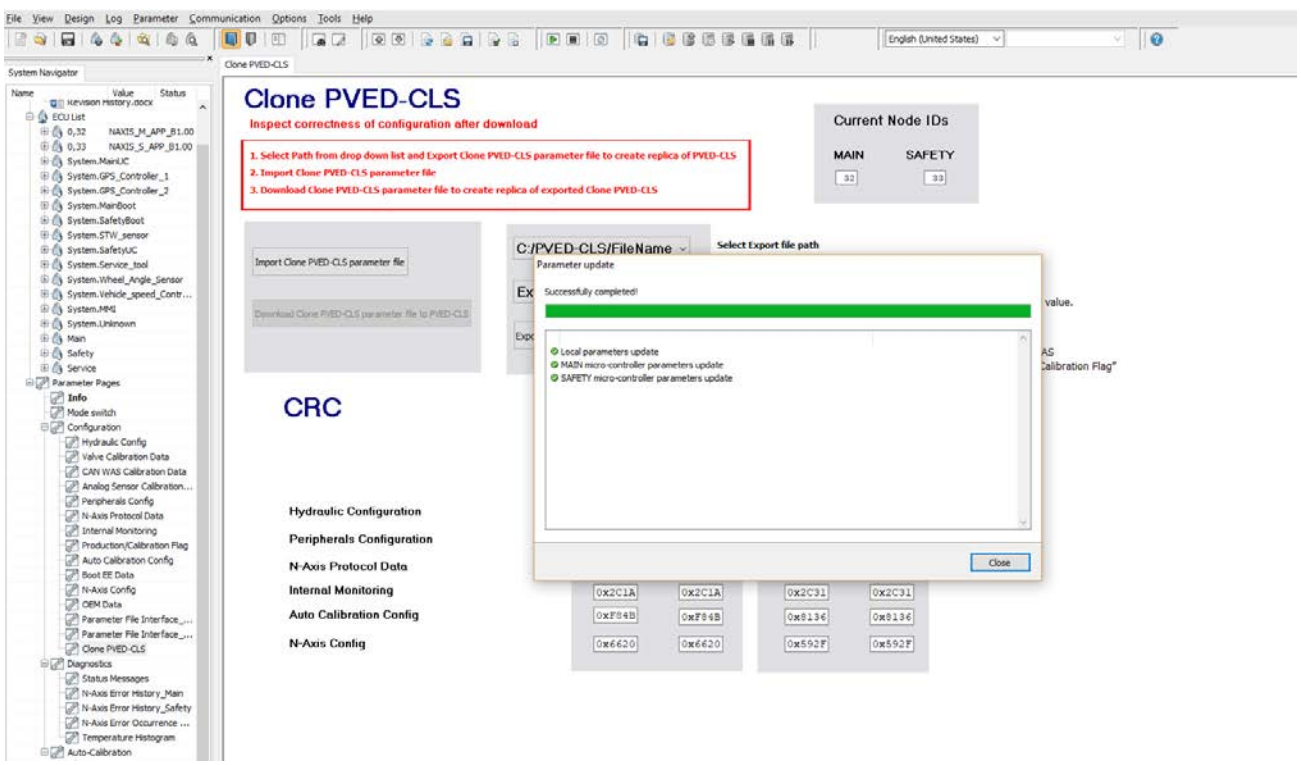
- Select the xml file that is to be imported.



- Click on "Download Clone PVED-CLS parameter file to PVED-CLS" button to download the xml file that was imported before.



- The progress bar for downloading into Main and Safety micro-controllers can be seen as shown above.



- Click on close button and the required parameter values will be downloaded to the Main and Safety micro-controllers.

8. Contact

In case of questions, contact your nearest Danfoss Product Application Engineer.