



a coesia company

5113270-04

FLEXLINK PARAMETER SETTING TOOL

USER DOCUMENTATION

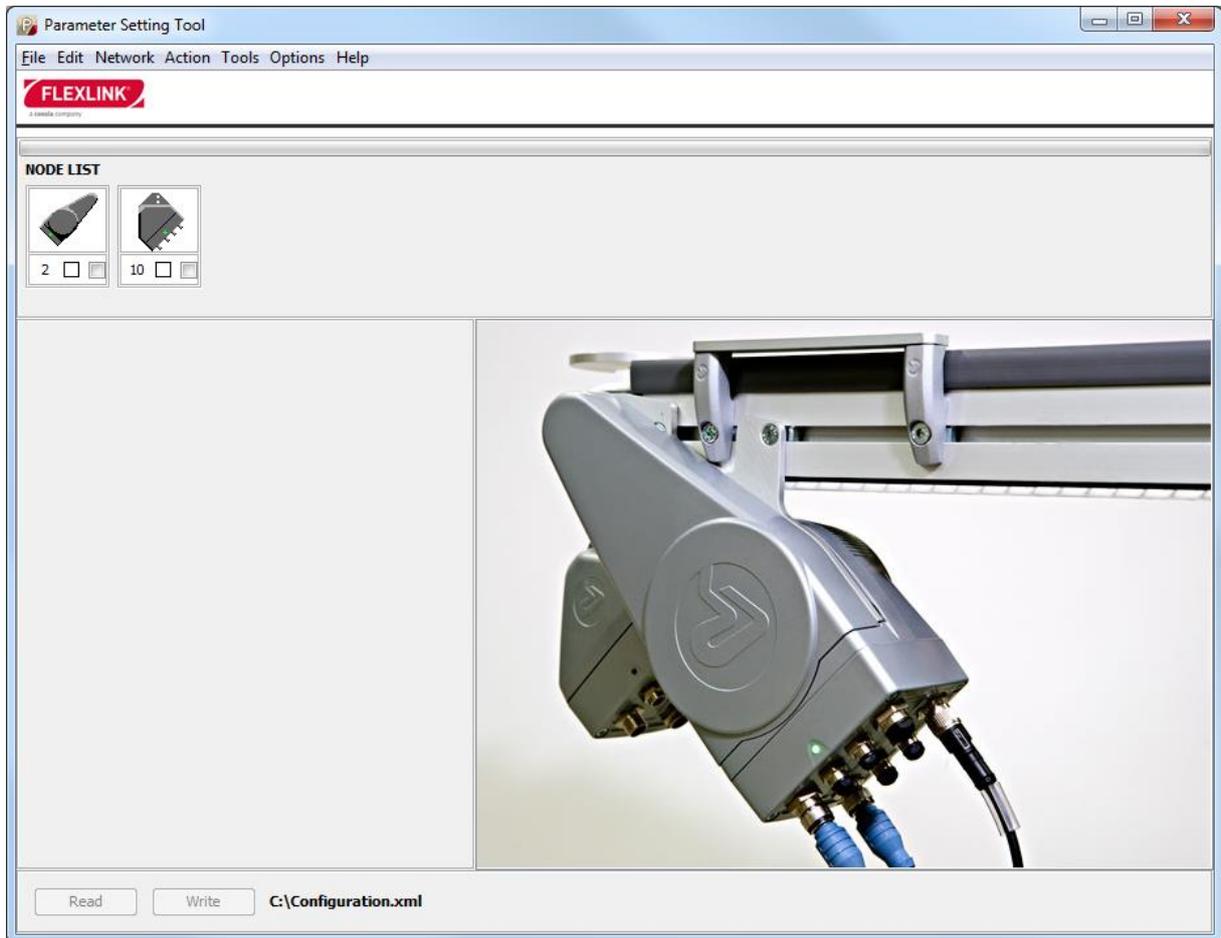


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Overview

This software is used for the connecting to the FlexLink unique integrated motor units only. It can be used for downloading application software and adjusting parameters in order to change the behaviour of the units and monitoring the motor status.

It was originally developed for the release of X45e platform in 2010 but is constantly updated for new features. It has been added a lot of communication option for the second generation of X45e units (Ethernet version),

Hardware

To be able to use this software you need a PC with following system requirements:

- Windows 7 or 10
- Minimum one USB connection (2.0)

This software can communicate with FlexLink units in a number of different alternative.

For the version of X45e units with CANbus there is a need for a special communication cable. This is a part of a FlexLink article called **Parameter setting tool kit, 5113270**. It consists of the following components:

- CAN to USB cable: Kvaser Leaf Light HS
- Adapter cable: FBA-CO-SUB-9-M12

For the newer Ethernet version of X45e it is possible to connect to the unit with a standard mini-USB cable.

- mini-USB cable

The PST software also supports communication alternative on the line level (A-Bus or ETH). Still, it is recommended to start with the option to connect individually to each unit through the options mentioned above.

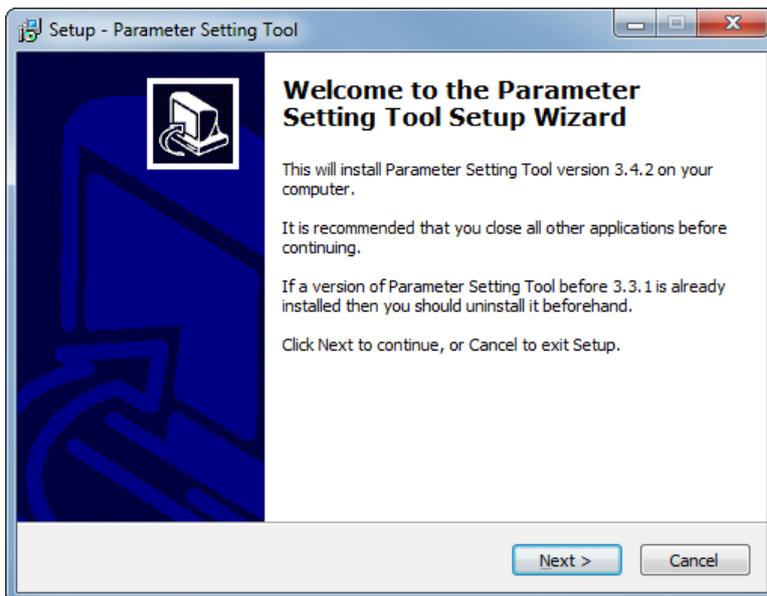
Software

The latest version of the **Parameter Setting Tool** together with a range of other useful files (motor software and documentations) can be downloaded from www.flexlink.com. (MyFlexLink -> Download Area)

Software Installation

Follow this procedure to install the PST software:

1. Copy and unzip the file PST.zip to the target computer.
2. Run **PST-x.y.z.exe** as administrator in order to start the installation procedure.
3. A pop-up windows appears stating which version of the software that is to be installed. Click **Next >** to continue.



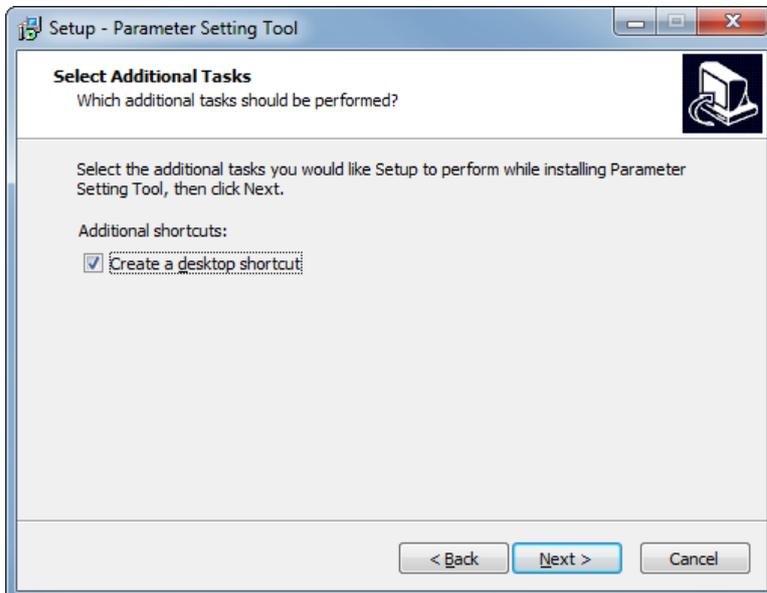
Picture: Installation – Welcome screen

4. The End-User License Agreement window has to be accepted.
Then click **Next >**.



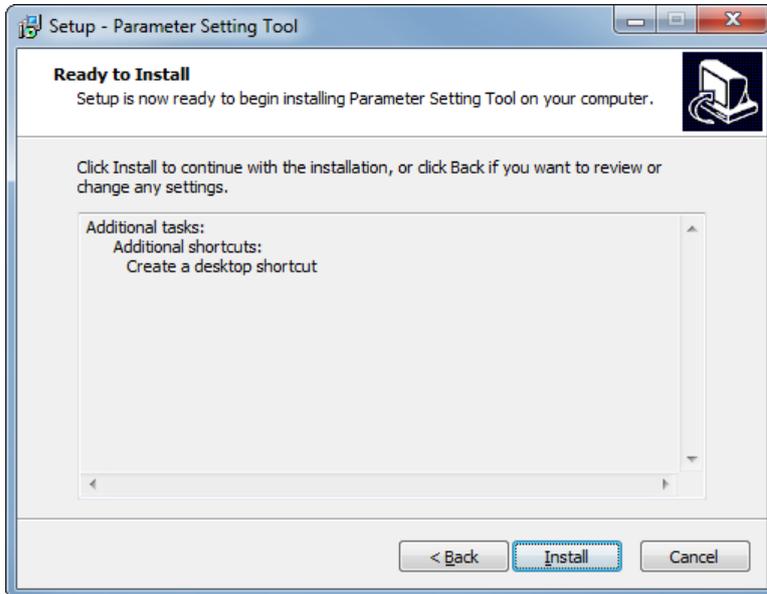
Picture: Installation – End-User License Agreement

5. Next you can create a desktop shortcut or not.
Then click **Next >**.



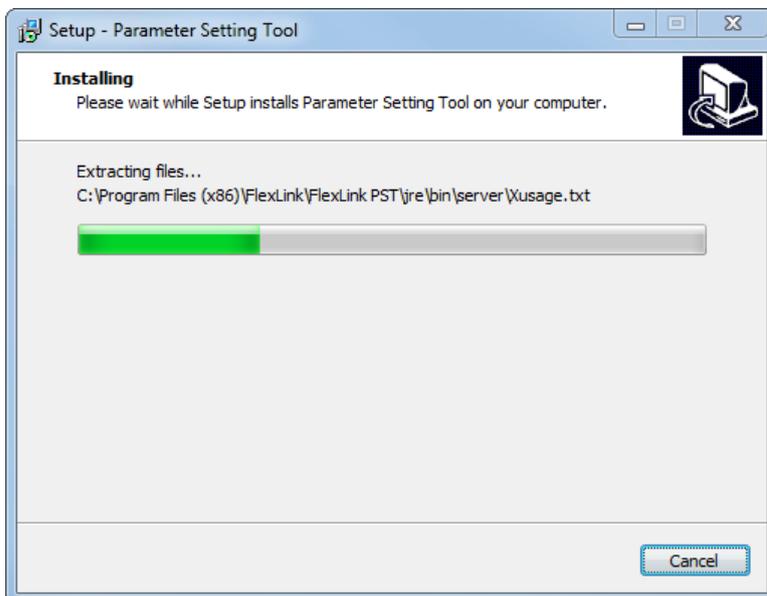
Picture: Installation – Create a desktop shortcut

6. Then the software is ready to install.
Click **Install**.



Picture: Installation – Ready to Install

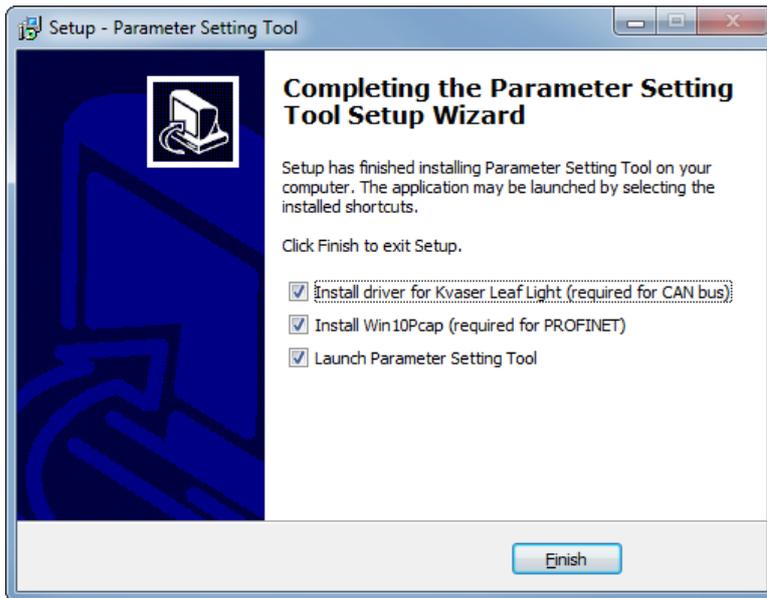
7. In the next step the actual installation is started.



Picture: Installation – Installing Parameter Setting Tool

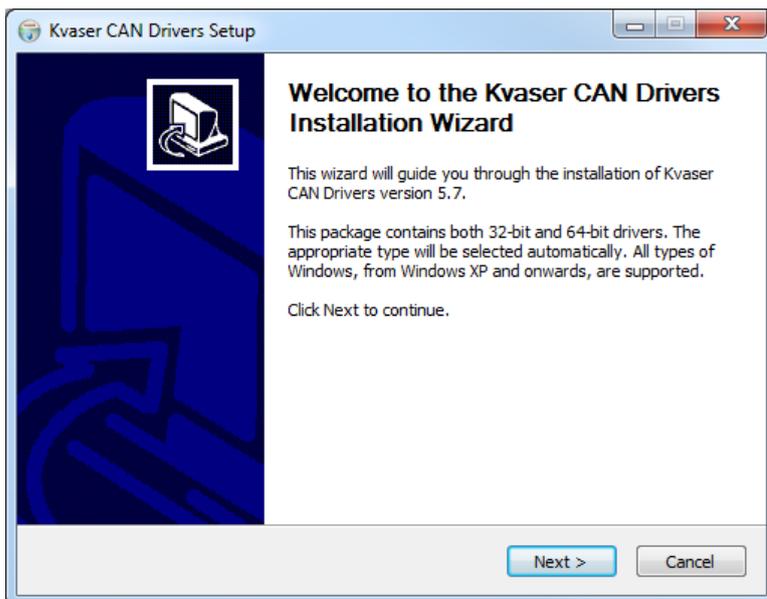
- The next step is to choose additional installations if required. Kvaser CAN driver is only required if you want to use X45e units with CANbus. Win10Pcap is only required if you want to open connection via Profinet. Click **Next >** to continue.

Note: The Kvaser driver installation could also be done from the CD included together with the communication cable or from the website www.kvaser.com



Picture: Installation – additional installations

- Start of Kvaser CAN driver installation. Click **Next >** to continue.

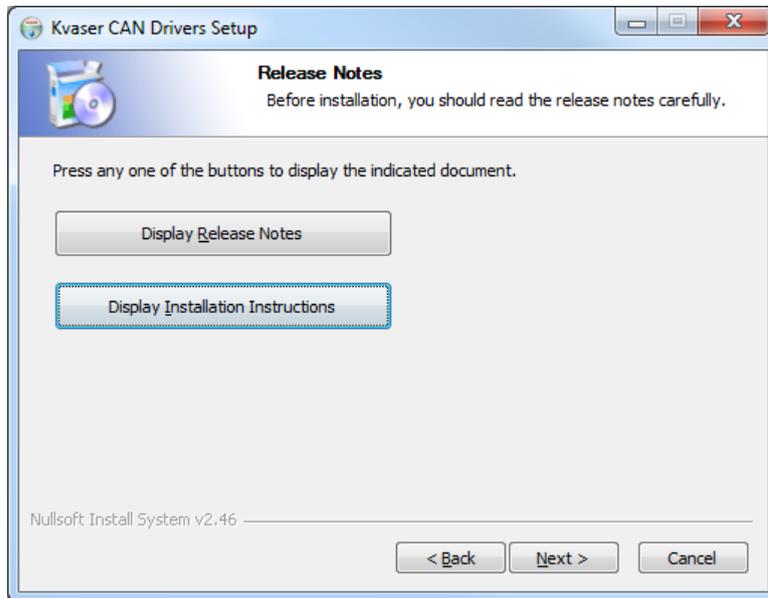


Picture: Installation – Kvaser CAN Driver Setup

10. Kvaser CAN Drivers Setup – Release notes.

Next step gives the possibility to read about the release notes and the installation instructions of the Kvaser software.

Click **Next >** to continue.

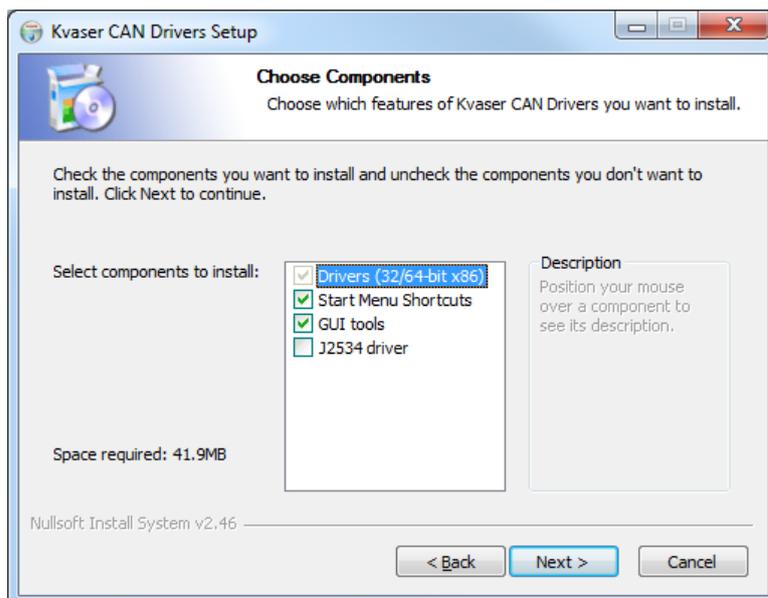


Picture: Installation – Kvaser, Release Notes

11. Kvaser CAN Drivers Setup – Choose Components.

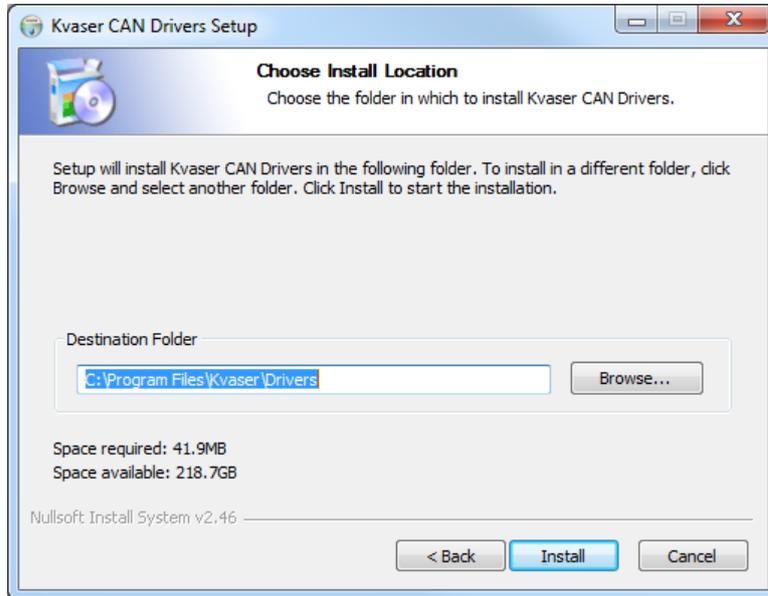
Next window is for choosing the components to be installed. The default setting is ok to use. The start menu short cut can be unselected if wanted.

Click **Next >** to continue.



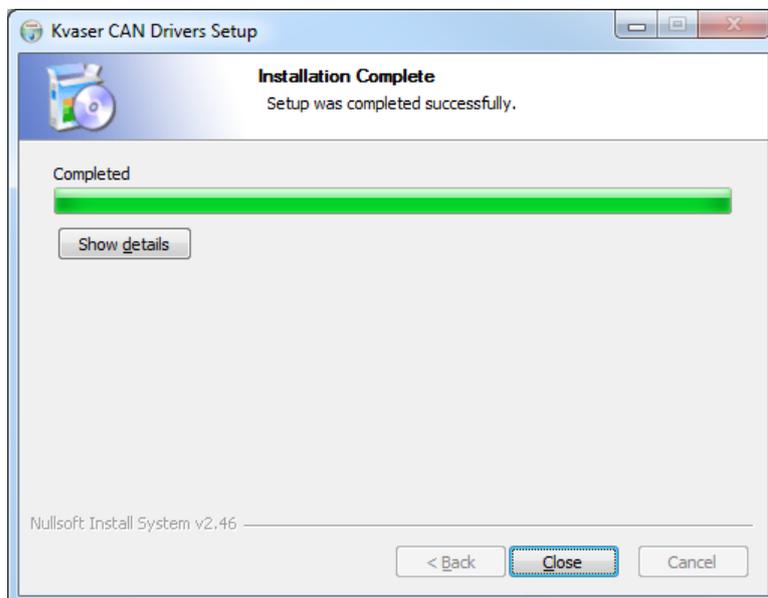
Picture: Installation – Kvaser, Choose Components

12. Kvaser CAN Drivers Setup – Choose Install Location. Next pop up window is for setting the destination folder for the Kvaser software. Change the default setting if required.
Click on **Install** to continue.



Picture: Installation – Kvaser, Choose Install Location

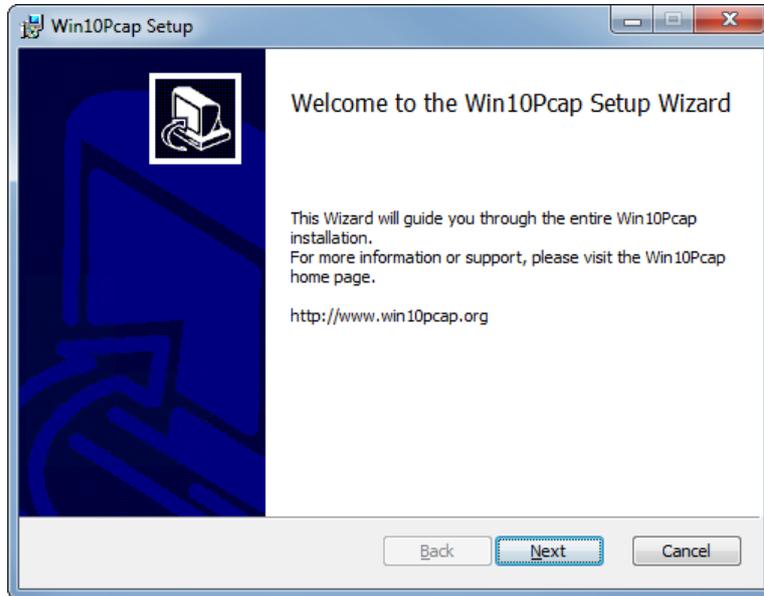
13. When the installing is complete click **Close** to finish the Kvaser installation.



Picture: Installation – Kvaser, Installation Complete

When the Kvaser CAN cable is connected to a USB port the PC tries to recognise the hardware and install it automatically. Ever unique USB port is installed separately.

14. Start of Win10Pcap setup.
Click **Next** to continue.



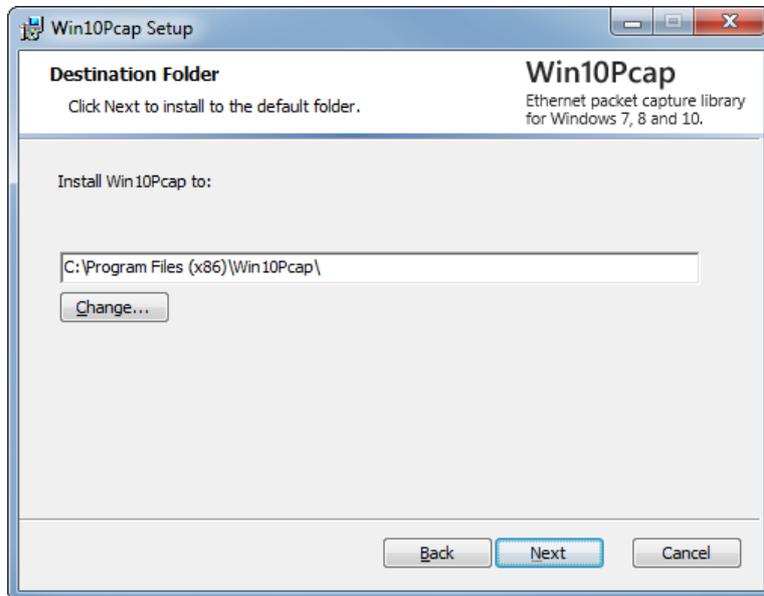
Picture: Installation – Win10Pcap setup

15. The End-User License Agreement window has to be accepted.
Then click **Next**.



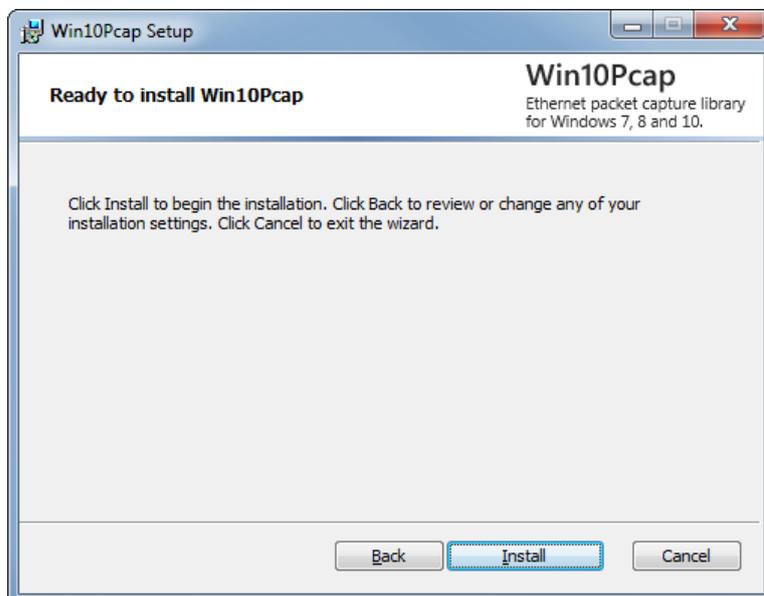
Picture: Installation – Win10Pcap End-User license Agreement

16. The destination folder can be changed.
Click **Next** to continue.



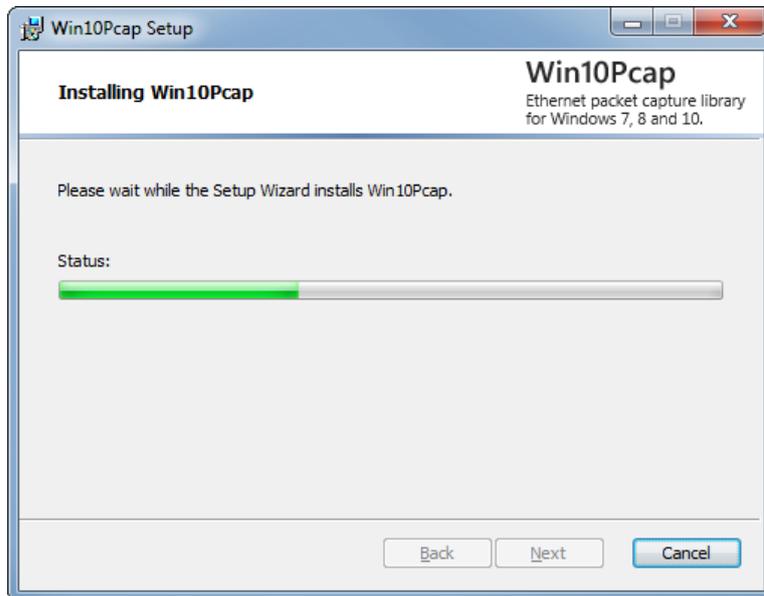
Picture: Installation – Win10Pcap Destination Folder

17. Then the software is ready to install.
Click **Install**.



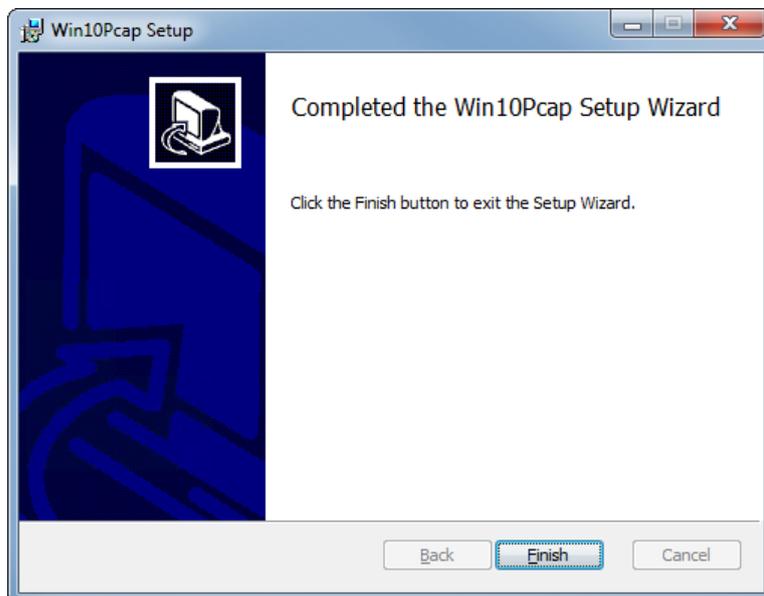
Picture: Installation – Win10Pcap Ready to install

18. In the next step the actual installation is started.



Picture: Installation – Installing Win10Pcap

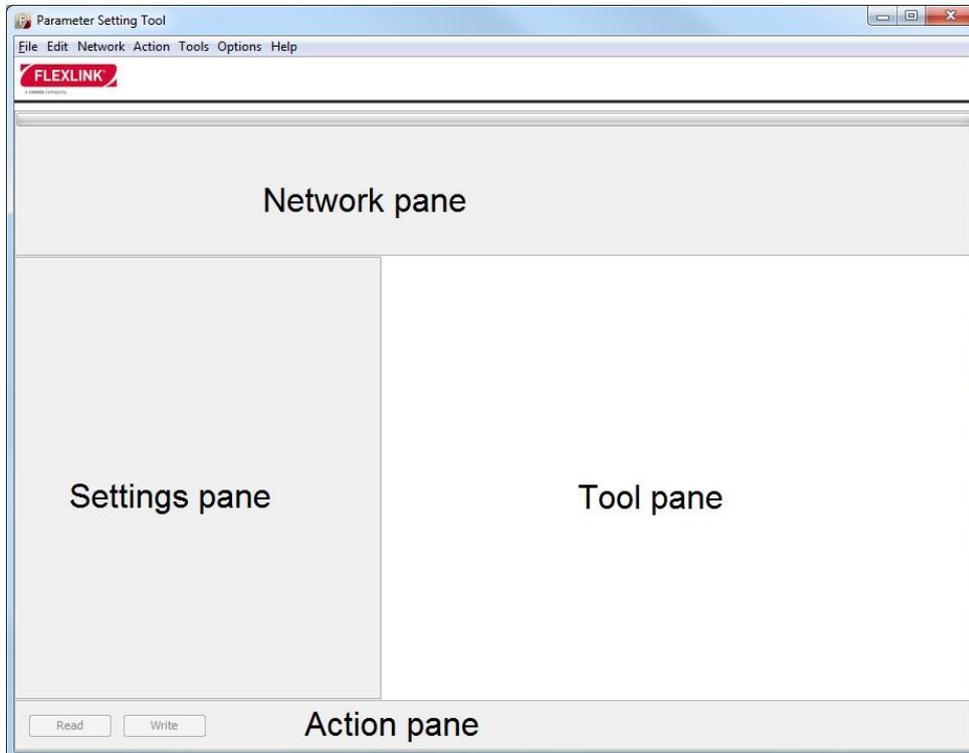
19. With next window the installation of Win10Pcap is completed.
Click **Finish** to close the wizard.



Picture: Installation – Installation completed

Graphic interface

This is the graphical screen layout of the software. The four areas, panes, are described below. The menu structure is described in a separate chapter.



Picture: Parameter Setting Tool Screen

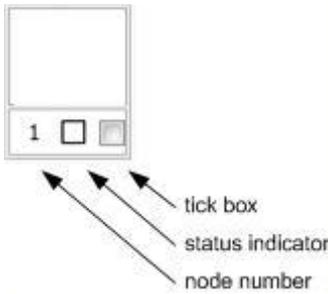
Network pane

This area contains a progress bar used when scanning or verifying a network at the top. The rest of the pane is for showing all nodes on the network, the node list. This could be both nodes from a real network or an offline configuration. If all nodes are not fitted in the node list a horizontal scroll bar appears. There are two types of motors icons that can be in this list, the drive motor and the function motor.



Picture: Drive motor & Function motor

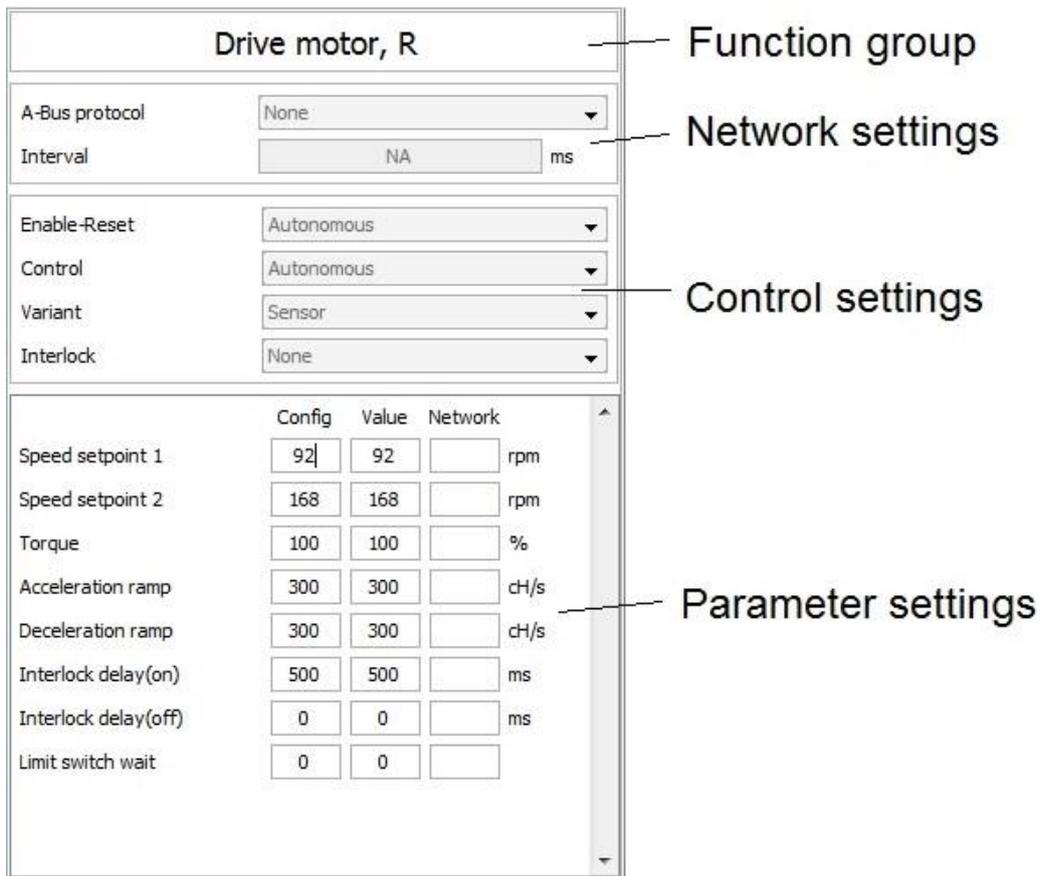
Every node show the node number at the far left of the node box. The node has a node number even if no field bus is activated. The middle small icon is the status indicator. This is explained in detail later in this document where the **Verify network** command is covered (**Network menu**). The last small icon is the selection tick box. This is only for selecting the node before other commands are triggered.



Picture: Graphical node, node list

Setting pane

This pane is divided into several smaller setting windows. All information in this pane is correlated to the selected node in the network pane. The interaction with the node are described in the chapter regarding the **Action menu**.



Picture: Settings pane

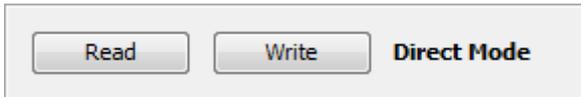
Tool pane

Next to the **Setting** pane is the **Tool** pane. This area is changing depending on which tool that is currently activated. It is also correlated to the selected node in the network pane. If no node is selected it could show a system picture if a configuration is open and a system picture is activated.

Action pane

The bottom pane is the **Action** pane. This shows some command buttons from the **Action** menu. If a configuration is open it is also printing out the configuration name along with its folder structure. If the user is connected to a unit without working with a configuration the text **Direct mode** is visible (as the example below).

The software can also show some addition user information below the button row.



Picture: Action pane - example

Operating modes

The Parameter setting Tool software has two different operating modes.

Configuration mode

If the parameter settings are supposed to be stored in a file for later use a configuration must be used. This gives the possibility to set up a complete system of certain number of nodes offline. The **Config** column in the setting pane shows the configuration data. When the real equipment is installed these settings can be downloaded to the system node by node.

See the **Appendix** for a description of two installation procedures

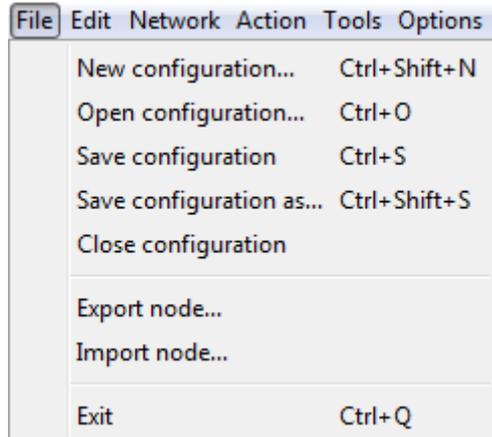
Direct mode

The direct mode is interacting with the connected motor or motors without a configuration. This mode is started with a **Scan network** command to detect all connected nodes. Then it is possible to read and write parameters, download new software, calibrate or monitor the motor. If wanted, it is also possible to switch to configuration mode by using the **Save as** command.

Menu structure

File menu

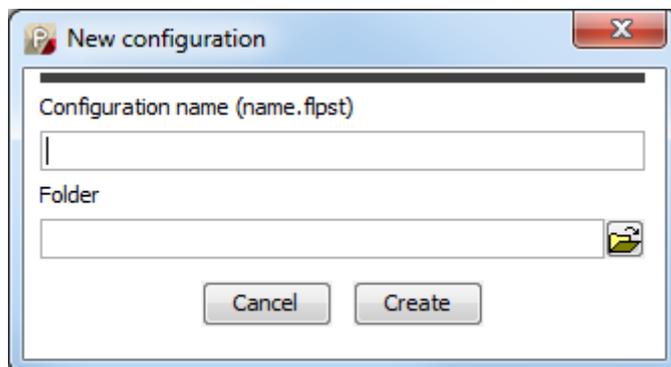
The **File** menu is used when operating with configuration files. These files are always in xml format.



Picture: File menu

New configuration... (Ctrl+shift+N)

The **New configuration...** command creates an empty xml file. A pop up window appears demanding the user to type in the required configuration name (including the extension .xml) together with the target folder.



Picture: New configuration...

Open configuration... (Ctrl + O)

This command opens an existing configuration file. After the command is triggered a pop up window "**Choose configuration file**" appears and the user has to browse and choose an xml file. The nodes in the configuration are visualized in the node list in the network pane. If the screen is too small for all motors fit a horizontal scroll bar appears. The folder path and the configuration name are printed in the **Action** pane. This command also activates the configuration mode.

Save configuration (Ctrl + S)

The **Save configuration** command stores the values in the configuration into a configuration file, (.xml). The command is writing to the existing file name and path. If no configuration is open this command is greyed out.

When working on the A-bus only nodes that has been explicitly read parameters from will be saved to the configuration file.

Save configuration as... (Ctrl + shift + S)

The **Save configuration as** command works similar as the **Save configuration** command. The only difference is that the user must specify the file name and the path. And the command is activating the configuration mode.

Close configuration

The Close configuration command closes the current configuration. The user has to either open a new configuration or scan the network.

Export node

This command saves the marked node to a separate configuration containing only this node. The user must specify the file name and the path.

Import node

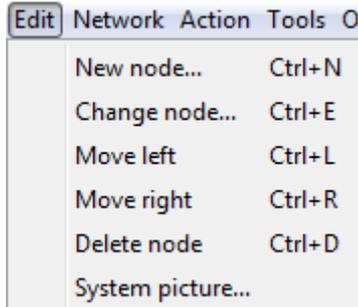
The import command adds a node to the configuration. The user has to specify the address of the new node and the file name and the path of the motor configuration to be imported.

Exit (Ctrl + Q)

The software session ends with the command **Exit**.

Edit menu

All commands under the edit menu are used for changing the currently open configuration.

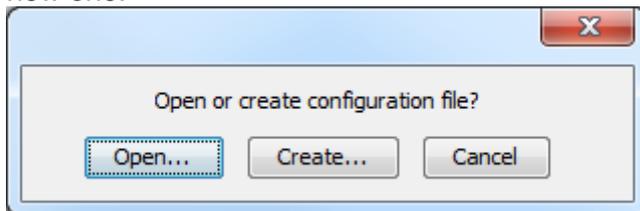


Picture: Edit menu

New node (Ctrl + N)

The new node command adds a node to the current configuration by opening a wizard pop up window. The user must choose which type of unit the added node should be set as. See separate chapter for a more detailed description of the wizard.

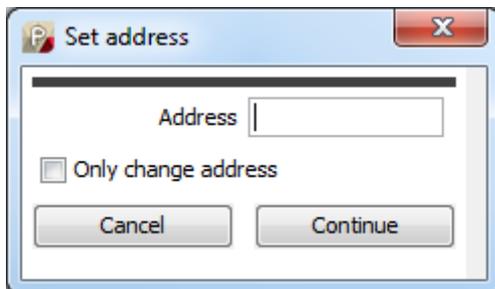
If no configuration is open the user is required to open an existing configuration or create a new one.



Picture: New node (if no configuration is open)

Change node (Ctrl + E)

The **Change node** command can be used for changing both the node address and the variant on the selected node. The first window is used for changing the node address of the selected node. The user can quit the command by clicking **Only change address**.



Picture: Change node – Set address

Otherwise the command continues by opening the wizard sequence giving the possibility to choose another variant setting for the selected node. See separate chapter for a more detailed description of the wizard.

Online /Offline change

When the change node command is completed the new settings are always written into the **Value** column. If the selected unit is connected on the network (either via A-Bus or B-Bus) these new settings are also written down to the actual node (into the **Network** column). It is not automatically written into the configuration file (**Config** column). This has to be done explicitly with a **Save** command. If the new settings only was a temporary test the configuration settings could be used again with the **Restore** command. In this case the node address will not be changed back if it differs from the configuration.

Move left (Ctrl + L)

The nodes appear in the node list in the order they were created. The move left command takes the marked node and switches position with the node at left. The command is greyed out if no node exists to the left of the selected node.

Move right (Ctrl + R)

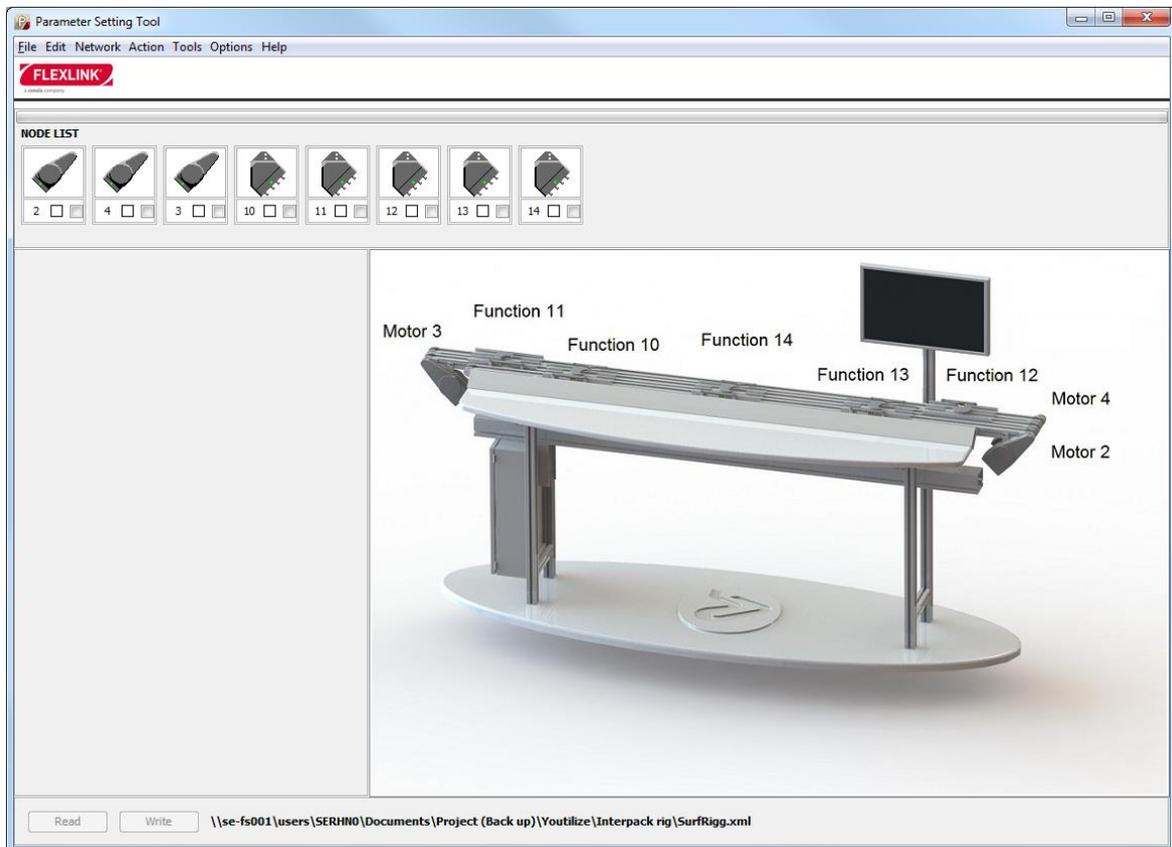
This command switches the marked node with the node at the right. The command is greyed out if no node exists to the right of the selected node.

Delete node (Ctrl + D)

The delete node command removes the marked node from the currently open configuration.

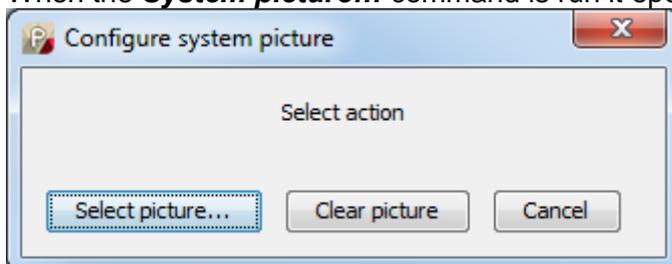
System picture

The system picture is an option for the user to add a picture representing the complete configuration. This picture will be shown in the tool pane when graphics is chosen but node specific node is marked.



Picture: System picture - example

When the **System picture...** command is run it opens up a configure system picture window.



Picture: Configure system picture

Select picture...

This command requires the user to select the system picture. The file must be located in the same folder as the configuration file.

Allowed file formats:

- .png
- .gif
- .jpg
- .bmp

Clear picture

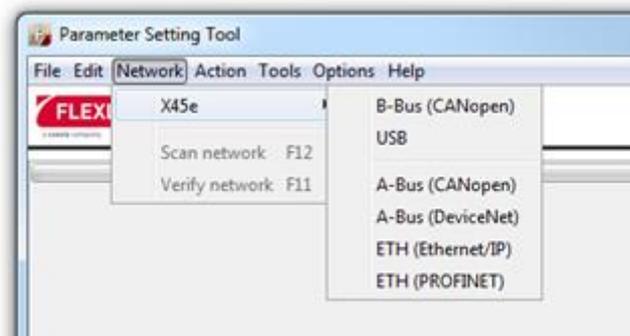
The **Clear picture** command can be used to remove the connection between the configuration and the system picture.

Cancel

The configure system picture pop up window can be closed by selecting cancel. It is also possible to close this window with the close icon in the top right corner.

Network menu

The **Network** menu is containing commands and settings useful when operating with the nodes.



Picture: Network menu

The PST software is compatible with both the old CAN-based X45e units as well as the 2nd generation of X45e units which supports Ethernet.

When connecting with nodes the PST software needs to know how they are connected to the PC which PST are running on. These options are found under the X45e option and can be grouped into two sub categories. The first category is when the unit is connected directly to one unit. This is done with the B-Bus on the old X45e units and USB on the newer version. Then there is also the option to connect to the units through the line network. This is done with either **CANopen** or **DeviceNet** on the old version of X45e and **Ethernet/IP** or **PROFINET** on the newer version.

See the **User documentation, Electrical system description, 5113269** for more details around the A-Bus and B-Bus concept on the first generation of X45e units (CAN version).

See the **User documentation, Electrical system description, FLX1000558** for more details around the ETH and USB concept on the second generation of X45e units (Ethernet version).

B-Bus (CANopen)

The B-Bus connects directly to the motor via the internal bus. The parameter cable must be connected between the PC and the motor node (connection BUS B). The tool can only reach the connected motor. The internal bus in every motor node should always contain two nodes, FEG and ECO. In order to download the ECO software you have to use this alternative (for the CAN version of X45e). This communication option requires the Kvaser com cable.

USB

The USB connects directly to the motor using a standard mini-USB cable. The tool can only reach the connected motor. The internal bus in every motor node should always contain two nodes, FEG and ECO. In order to download the ECO software you have to use this alternative. This option is only possible with the Ethernet version of the X45e unit and requires a standard mini-USB cable.

A-Bus (CANopen)

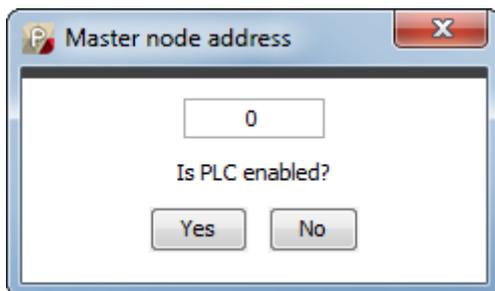
This alternative connects to the external bus (A-bus) with **CANopen** protocol. The external network links all motors units together. This option gives the possibility to communicate with all motors on the network. On a network there is a limit of one master or scanner module simultaneously. In normal running mode the line controller is the master on the network. When adding a PC running PST with the A-Bus setting activated it can be interfering the communication from and to the line controller. Because of this it is recommended to disconnect the line control (network master) on the network while working with the PST in A-Bus mode. If the line controller is disconnected during the communication via the PST software it is important to keep the network supplied with power.

Pin 2 = + 24 VDC Pin 3 = -

Table: Pin configuration, A-Bus power

A-Bus (DeviceNet)

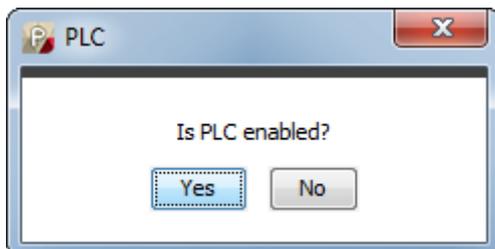
The A-Bus setting also exists in a **DeviceNet** version. There is no difference with this choice (compared to **CANopen**, above) except the field bus protocol. Additionally master node address and the state of PLC (enabled or not) has to be set in a dialog. If PLC is not enabled PST has to behave slightly different. X45e unit can be controlled by PST in this case.



Picture: Master node address

ETH (Ethernet/IP)

The Ethernet version of X45e units has the possibility to connect via the ETH connectors. If this options is used several nodes can be connected to the same network. PST is then scanning the complete Ethernet network for X45e nodes. The connected nodes has to be set to Ethernet/IP in order to appear in the node list. When this option is selected the follow up question below shows in a pop up window.

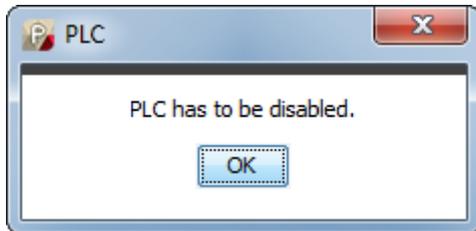


Picture: PLC enabled

Without enabled PLC PST is able to control the X45e unit.

ETH (PROFINET)

The ETH setting also exists in a PROFINET version. There is no difference with this choice and the Ethernet/IP except the communication protocol. PLC must always be disabled.



Picture: PLC disabled

Scan network (F12)

The command **Scan network** searches the connected network for active nodes and replies by updating the node list in the network pane. This command is only executed in **Direct mode**. If a configuration is opened the user must answer the question: **Leave configuration?** When executing the command the progress bar at the top indicates the scanning process together with the info text **scan network** in the action pane. After the command is completed the PST is always in **Direct mode**. If a scan network command has been performed without finding any nodes this is also stated in the info text: **No nodes found**.

A-Bus / ETH

If the network is set to A-Bus every motor node has one function controller showing its identity in the node list (in the network pane).

B-Bus / USB

If the network is set to B-Bus two nodes should appear. The function controller is called the FEG. The FEG controller is represented with the icon of either a function motor or a drive motor. This node address is by default 1 but could be changed by the user. The drive controller is called ECO and has always the node address 127. This B-Bus is the internal CANopen network that these two controllers are continuously communicating over. This internal communication has priority over the PST communication. Because of this the **Scan network** command could possible miss one or both nodes. In that case, repeat the command once again.



Picture: Node list example, USB & function motor

The status of the **Scan network** process is shown in the node list until the next time a **Scan network** is performed. This means a node can drop of the network and still be visible on the screen. When a scan is done a firmware check is also done. If the firmware on either the FEG or the ECO processor differs from the list of compatible version an error message window pops up. The list can be reached from the **Help** menu, **About** command.

Verify network (F11)

The verify command is used for checking the network. It gives information about node numbers and motor types compared to the current setup in the node list. If a configuration is open and B-Bus / USB mode is used the found node is automatically selected.

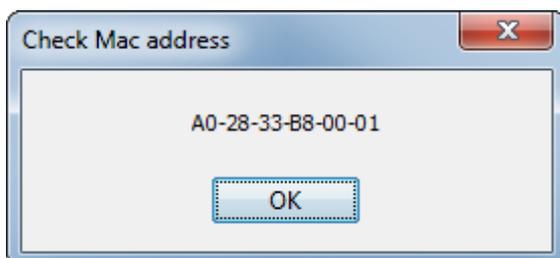
Colour:				
ETH / A-Bus, Configuration mode	Not applicable	Node is found Correct software version	Node is found Motor type is incorrect or FEG or ECO version is old	Node is not found or FEG version not supported
ETH / A-Bus, Direct mode	Not applicable	Node is found Correct software version	Node is found FEG or ECO version is old	Node is found FEG version not supported
USB / B-Bus, Configuration mode	Node is not connected	Node is found Correct software version	Node is found Motor type is incorrect or FEG or ECO version is old	Node is found FEG version not supported
USB /B-Bus, Direct mode	Not applicable	Node is found Correct software version	Node is found FEG or ECO version is old	Node is found FEG version not supported

- Old FEG version: more than 10 versions before latest version.
- Not supported FEG version: version before oldest supported version.
- Old ECO version: version before supported version.

(see **About** dialog in **Help** menu for information regarding supported versions).

Check Mac address

If a 2nd generation X45e unit is connected then **Check Mac address** will also be available in **Network** menu. This will show you a small dialog with Mac address of connected X54e unit.



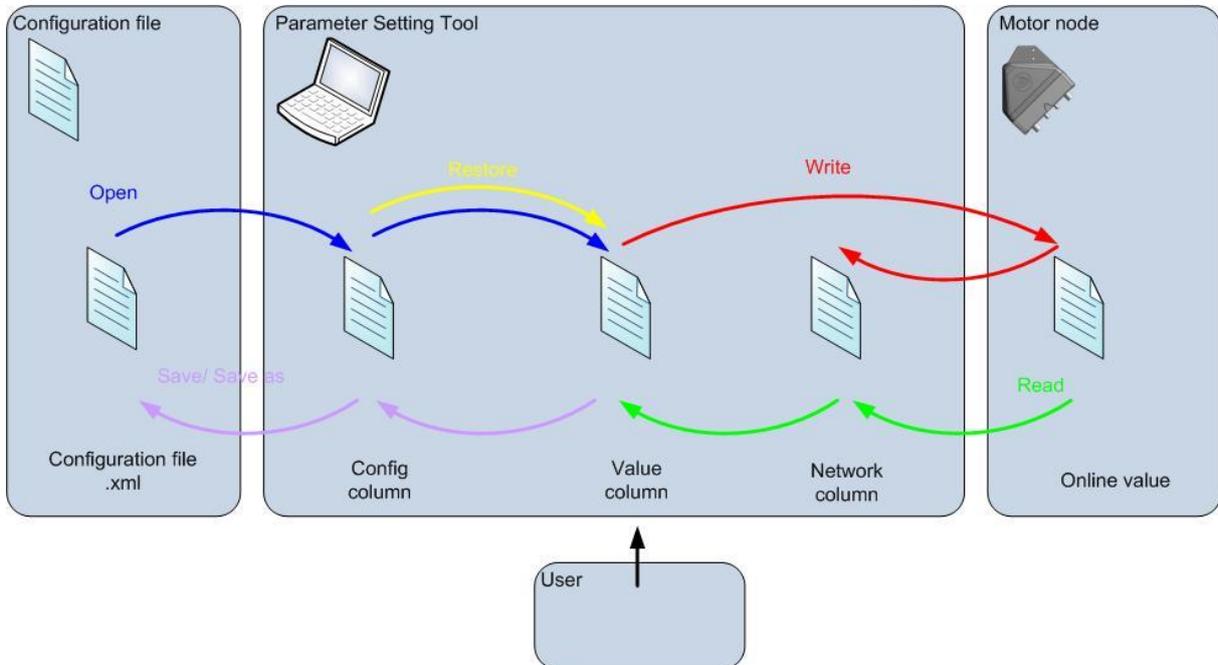
Picture: Check Mac address

Action menu

Action	Tools	Options	Help
Read (from network)			F9
Write (to network)			F8
Restore (configuration to value)			F7
Factory reset			

Picture: Action menu

This menu contains commands interacting with a specific motor node. The picture below describes the data flow for the parameters. Note that the commands in this menu (action menu) are interacting between the PC level and the Motor node. The other commands (Save/Save as and Open) are interacting with the configuration file.



Picture: Data flow, parameters

See the **User documentation, Electrical system description, 5113269 or FLX1000558** in order to find information about individual parameters.

Read (from network) (F9)

The **Read (from network)** command reads data from a specific motor node. The command can also be accessed via the **Read** button in the action pane (at the bottom of the screen). When the command is triggered all data in the **Network** column is deleted. The new data from the node are filled in in the Network settings. All these parameters are then copied to the **Value** column. All other data in the settings pane (Function group, Network settings and Control settings) are also updated together with the picture in the tools pane. Only data from the marked node is uploaded.

Write (to network)

The **Write (to network)** command writes the data from the **Value** column to the selected node. After a write command is executed a **Read** command is automatically done (the downloaded parameter value should appear in the **Network** column after download). The command can also be accessed via a dedicated **Write** button in the action pane (at the bottom of the screen).

Restore (configuration to value)

When working in configuration mode it is always possible to change the **Value** column and write to the motor unit without updating the configuration file (with **Save** or **Save as...**). Then it might be useful to go back to the saved configuration setup of the unit. This is done with the **Restore** command. This command takes the currently open configuration and updates both the **Config** and the **Value** columns with its data. It is very similar to the **Open configuration...** command. The difference is that **Restore** keeps the **Network** column intact from the last **Read** command. Then it is easy to compare what has been changed since the last backup. Also the **Restore** command doesn't restore the node addresses if these has been changed.

Factory reset

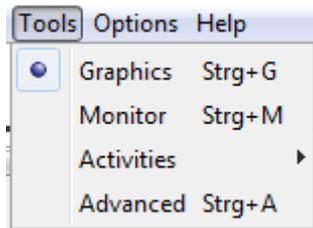
The factory reset command restores all values to default settings. This is different depending on the hardware. The main advantage with this command if the unit has been set to an invalid combination of parameters in the advanced mode and should be restored. After this command the user can continue to set the correct parameters either using the wizard or fine tune.

Stop in boot loader

If a 2nd generation X45e unit is connected via USB then **Stop in boot loader** will also be available in **Action** menu. This will guide you with a number of dialogs to stop the motor in boot loader instead of starting the firmware. Then you can make a firmware. That might be helpful if firmware is somehow defect and firmware update is not possible the normal way (via USB, Ethernet/IP or Profinet or web server of X45e).

Tools menu

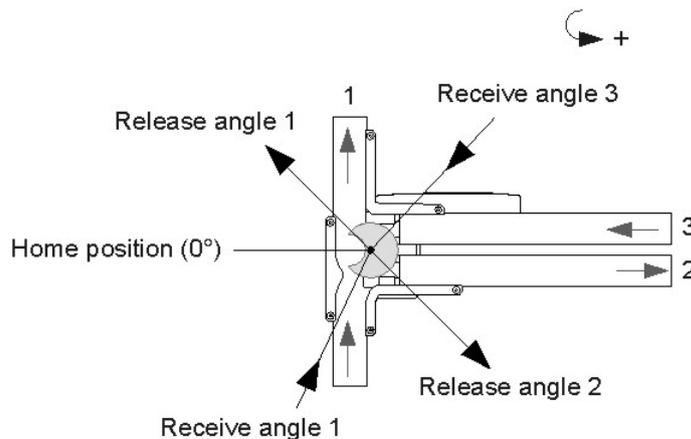
The tools menu is controlling what Tools to show in the tool pane. Activities is a sub menu which content depends on version and type of device and how it is connected. The Tools pane is always showing one of the options. The default setting is to show Graphics.



Picture: Tools menu

Graphics (Ctrl + G)

If a node is marked in the node list a picture of this node is shown in the tool pane. There are mainly two categories of nodes, drive units and function units. The drive unit will only show a right or a left version. The function unit will be showing a more explanatory picture representing the behaviour of the unit. This picture is explaining the home position angle (to be used in calibration) and also all of the release and receive angles.

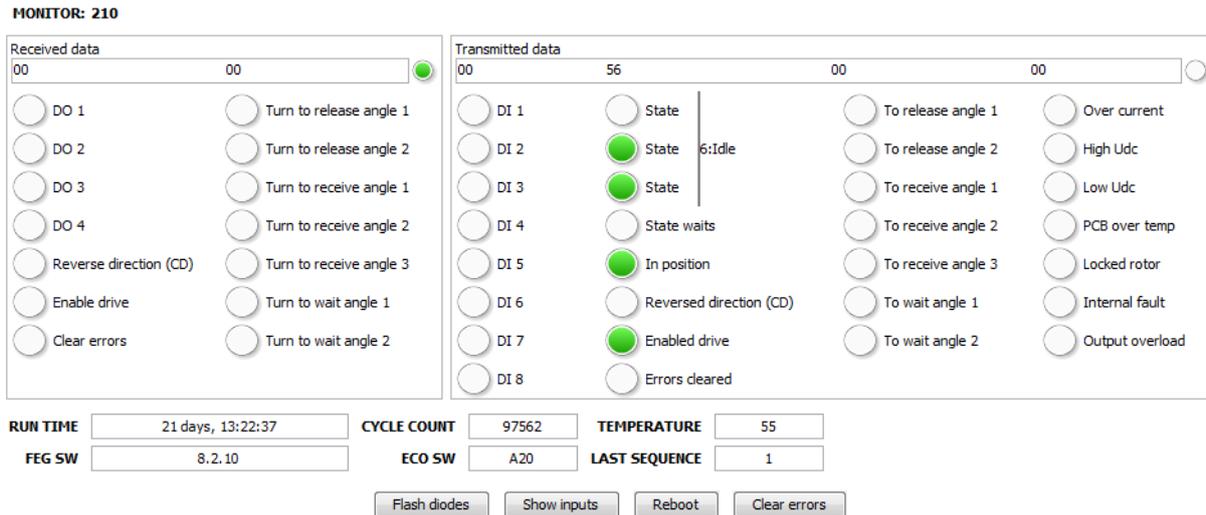


Picture: Graphics – example (Combined divert/merge 90 right)

When no node is selected and a configuration is open the system picture (if chosen) will be shown.

Monitor (Ctrl + M)

The monitor screen is updated constantly until another tool option is activated. These view will be slightly different depending on which generation of X45e unit that is connected.



Picture: Monitor (Function unit, 2nd generation)

Received data

The left part of the monitor screen is presenting data sent from the line controller to the X45e unit. It consists of two bytes of data (2x8 binary signals). The round indicator at the top of the received data window is flashing green when communication is detected. Examples of signals is digital outputs, enable and clear errors.

Transmitted data

The right part is presenting data sent out from the X45e unit to the line controller (or PST). It consists of four byte data (4*8 binary signals). The circle indicator at the top is flashing green when communication is detected (message available). Examples of signals are digital inputs, In position of the and alarms.

All motors have an internal state handling in the software. These differ depending on the motor type. It is build up by three binary signals. The actual state is written next to the state bits.

See the **User documentation, Electrical system description, 5113269 or FLX1000558** in order to find more information about the available data.

RUN TIME

Accumulated time enable has been on, printed in format "Y years, D days, HH:MM:SS". This value is stored in a permanent memory space inside the integrated motor node every hour. At power loss the run time since last write event is lost. The reason behind this solution is that the permanent memory area has a limit number of write events.

POWER

Momentary power drawn by the motor, stated in W. This value is only shown for a conveyor motor.

CYCLE COUNT

Accumulated number of cycles completed by the unit. This value is stored in a permanent memory space every hour. At power loss the cycle count since last write event is lost. This is because the permanent memory area has a limit number of write events.

This value is only presented for a function motor.

LAST SEQUENCE

This is a time value (in ms) for the last executed sequence. The sequence is timed from start of one cycle to the start of the next cycle, meaning it also includes any idle time between the cycles.

FEG SW

Software version in the FEG controller (processor).

ECO SW

Software version in the ECO controller (processor).

TEMPERATURE

Every motor has an analog sensor for measuring the temperature on the PCB board.

Flash diodes (button)

This button trigger the node to flash with green colour with both LED's.

This can be useful to quickly check which of the nodes that has the selected address in an A-bus network. The button has a toggle function.

Show inputs (button)

The show inputs function visualizes the status of the digital inputs on the two LED's.

This can be useful at a start-up or at trouble shooting on the node (including the sensors).

- DI1 – LED 1 green (same side as DI1&DI3)
- DI2 – LED 2 green (same side as DI2&DI4)
- DI3 – LED 1 red (same side as DI1&DI3)
- DI4 – LED 2 red (same side as DI2&DI4)

The button has a toggle function.

Reboot (button)

This command shuts down the node and start it up again immediately after.

The LED's are flashing green during the start-up. The text "Rebooting, wait 5 s..." is also printed in the action pane. When the unit is up and running the text disappears and the LED's is lit green with fixed light.

Clear errors (button)

The command clear errors resets any existing faults. The node is then trying to start up once more.

Activities – Firmware update

The Parameter Setting Tool software can be used for downloading firmware to both the drive controller ECO and the function controller FEG. For the FEG processor it is also possible to download new boot software. The **Firmware update** page can be reached from the **Tools / Activities** menu, via the **Firmware update** command.

FEG SW

ECO SW Function

Start update Stop update after current device Multiple nodes

Node progress Node in progress 0

Programming progress

Picture: Firmware update

FEG SW

The user can specify the appropriate file to be downloaded. This firmware file is to be downloaded to the FEG processor. This processor contains the application software of the unit. This field should also be use when downloading new boot to the FEG processor. The name of this firmware has the following format:

- feg_vXXX.mot (first generation unit)
- feg_Vx.y.z.ihex (2nd generation unit)

ECO SW

The ECO SW can also be specified if the user wants to download this file. This firmware exists in two versions, one for the drive motor and one for the function motor
These are the names of the ECO files:

- A_STEP_A_XXmot – Function motor (stepper motor)
- A_PM_A_XX.mot – Drive motor (Permanent magnetic motor)

To reduce the risk of downloading the wrong ECO SW-file to the unit there is a name filter when the user should select the firmware to download. The ECO SW can only be downloaded if the user is connected via the B-Bus or USB.

During the downloading of the software there is a feedback from the LEDs on the (first generation) motor.

	Function motor	LED colour	Interval
1	Downloading FEG SW	<i>green/red</i>	<i>fast flashing</i>
2	Downloading ECO SW	<i>green</i>	<i>fast flashing</i>
3	Rebooting	<i>green</i>	<i>slow flashing</i>
4	Running (no A-Bus)	<i>green</i>	<i>fixed</i>

Table: Feedback from the LED

Start update (button)

The firmware update process is started with the **Start update** button.

Node progress

This progress bar is presenting the complete download process. The node in progress number presents the actual node ID updated. This feature is only important when updating several units on the A-Bus or network.

Programming progress

This progress bar is showing the download process for the current node.

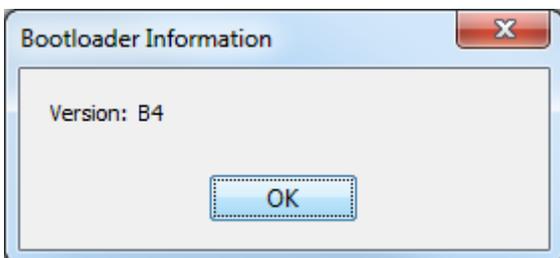
When the downloading process is completed a feedback text describing if the downloading succeeded or not is shown on the download screen.



Picture: Firmware update completed

Bootloader Information

In the firmware update page there is a command for reading the boot software version from the (first generation) unit. When the button **Bootloader Information** is pressed.



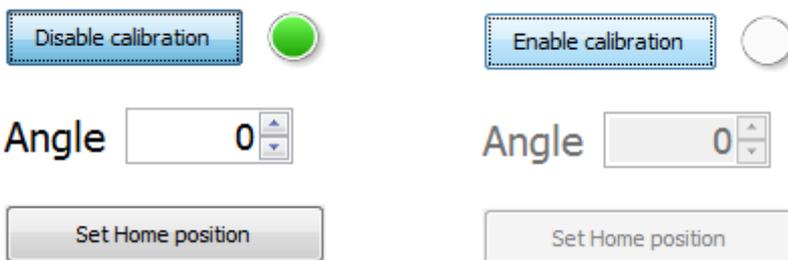
Picture: Boot software version

Activities – Bootloader update

First generation units have the possibility to update bootloader. This panel looks almost the same as **Firmware update** and it is same procedure. When the bootloader is downloaded the units has to be powered off and on again to activate it. This should be done at least five seconds after the bootloader is downloaded.

Activities – Calibration

All stepper motors have to be calibrated in order to determine a zero position. The Calibration screen can be reached from the menu Tools.



Picture: Calibration process active / inactive

Enable calibration / Disable calibration (button)

When the text on the button is **Enable calibration** the calibration process is not started. As soon as the user starts the calibration presses the button the text changes to **Disable calibration**. The indicator next to the button turns to green when the calibration process is activated.

Angle

The text and the angle value are greyed out if the calibration process is inactive. To change the calibration angle the user could either right a new value in the Angle input field or increasing/decreasing the value with the arrow buttons.

To get the info how the calibration reference (homing angle) it is showed either in the picture in the graphics screen or in the **User documentation, 5113196**

Set Home position

When the guide disc is correctly orientated it is possible to store this setting with the button **Set home position**.

If the unit has been set with proper parameters and has been calibrated it should work according to the specification. It is still possible to adjust the angles to fine tune the function. The recommendation is to adjust the angles values in this case.

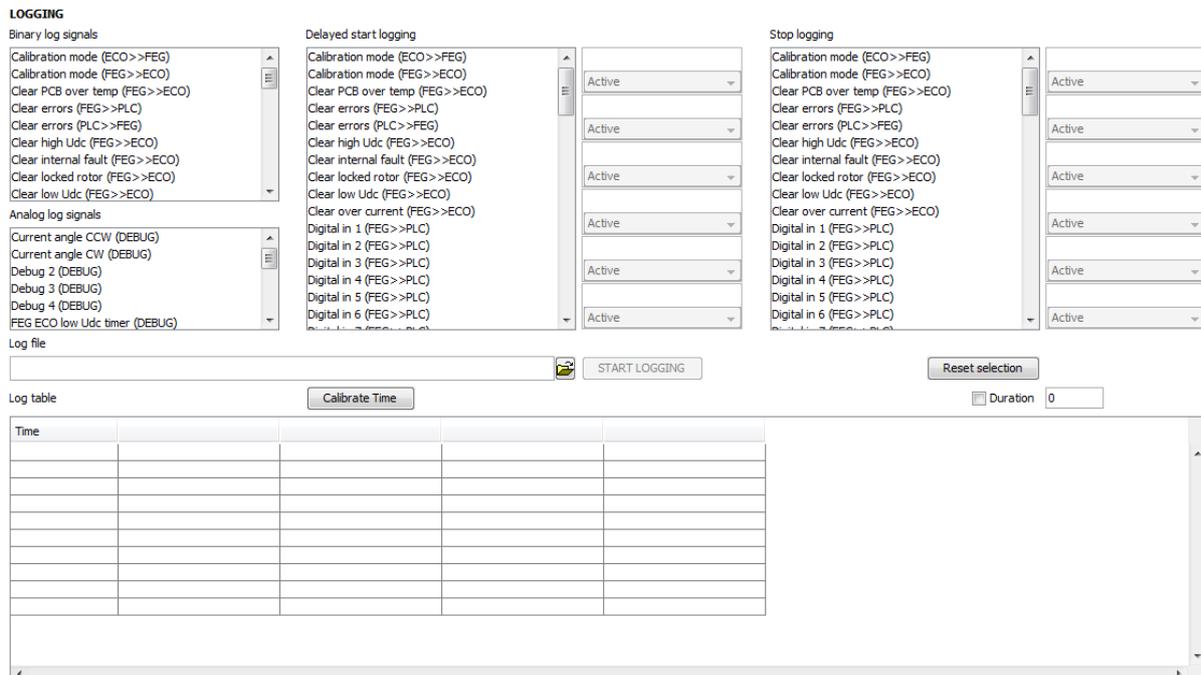
Activities – Logging

The X45e units have a built in logging function that can be useful when wanting to trouble shoot and understand details about the behaviour of the unit. The logging function is sending out messages from the motor node on the internal bus. This means the B-Bus for first generation of X45e and USB for the 2nd. This requires the parameter cable (Kvaser cable) alternatively a standard mini-USB to be attached.

See **User documentation, Electrical system description, 5113269 or FLX1000558** for available logging signals

Logging procedure (example)

- Connect the B-Bus connector on the X45e unit to a PC via the parameter cable (Kvaser cable and the adapter cable).
- Supply the X45e unit with 24VDC power on the PWR connector
- Launch the Parameter Setting Tool software
- Set the Network to X45e > B-Bus (CANopen)
- Search for the X45e unit with Network / Scan network (F12)
- Select the FEG node by clicking in the select tick box on the node with the motor icon.
- Go to the Logging page from the Tools menu
- Set all logging signals and log file (details are described below)
- Start the logging with the start button.
- Let the logging continue until a stop condition is triggered or stop it with the Stop button.
- As an output the Log table are filled with log data. Also the file could be imported into excel for further analysis.



The screenshot shows the 'LOGGING' configuration screen. It is divided into four main sections for selecting logging signals:

- Binary log signals:** Includes 'Calibration mode (ECO>>FEG)', 'Calibration mode (FEG>>ECO)', 'Clear PCB over temp (FEG>>ECO)', 'Clear errors (FEG>>PLC)', 'Clear errors (PLC>>FEG)', 'Clear high Udc (FEG>>ECO)', 'Clear internal fault (FEG>>ECO)', 'Clear locked rotor (FEG>>ECO)', and 'Clear low Udc (FEG>>ECO)'.
- Analog log signals:** Includes 'Current angle CCW (DEBUG)', 'Current angle CW (DEBUG)', 'Debug 2 (DEBUG)', 'Debug 3 (DEBUG)', 'Debug 4 (DEBUG)', and 'FEG ECO low Udc timer (DEBUG)'.
- Delayed start logging:** Includes 'Calibration mode (ECO>>FEG)', 'Calibration mode (FEG>>ECO)', 'Clear PCB over temp (FEG>>ECO)', 'Clear errors (FEG>>PLC)', 'Clear errors (PLC>>FEG)', 'Clear high Udc (FEG>>ECO)', 'Clear internal fault (FEG>>ECO)', 'Clear locked rotor (FEG>>ECO)', 'Clear low Udc (FEG>>ECO)', and 'Clear over current (FEG>>ECO)'.
- Stop logging:** Includes 'Calibration mode (ECO>>FEG)', 'Calibration mode (FEG>>ECO)', 'Clear PCB over temp (FEG>>ECO)', 'Clear errors (FEG>>PLC)', 'Clear errors (PLC>>FEG)', 'Clear high Udc (FEG>>ECO)', 'Clear internal fault (FEG>>ECO)', 'Clear locked rotor (FEG>>ECO)', 'Clear low Udc (FEG>>ECO)', and 'Clear over current (FEG>>ECO)'.

Each signal has a corresponding 'Active' dropdown menu. Below these sections are fields for 'Log file' and a 'START LOGGING' button. A 'Calibrate Time' button is also present. A 'Duration' field is set to 0. At the bottom, there is a 'Log table' with a header row containing 'Time' and several empty columns for data.

Picture: Logging screen

Binary log signals

All selected binary log signal will be logged. They will be logged at all transitions. To select more than one signal keep the CTRL key pressed while selecting all signals. The binary signals are only logged if some of them change status.

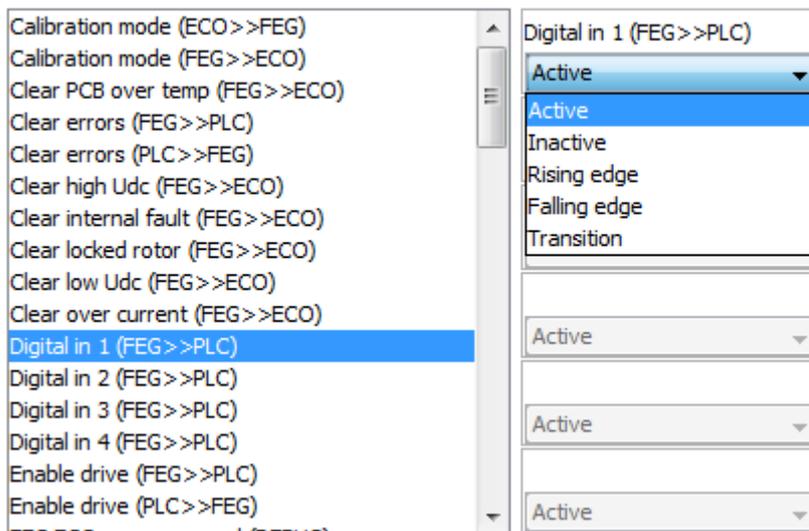
Delayed start logging

These signals defines when the actual logging to the txt file (and to the log table) should start. If more than one signal is selected it is enough that only one of the conditions are fulfilled. When a delay start signal is selected it appears in the window next to the signal list. Here it is possible to select more details about how the delay should be triggered. The option for every signal is:

- Active – If the signal is true
- Inactive – If the signal is false
- Raising edge – If the signal goes from true to false
- Falling edge – If the signal goes from false to true
- Transition – If the signal changes

If no signal is selected the logging starts immediately after the user pushes the start button.

Delayed start logging



Picture: Delayed start logging

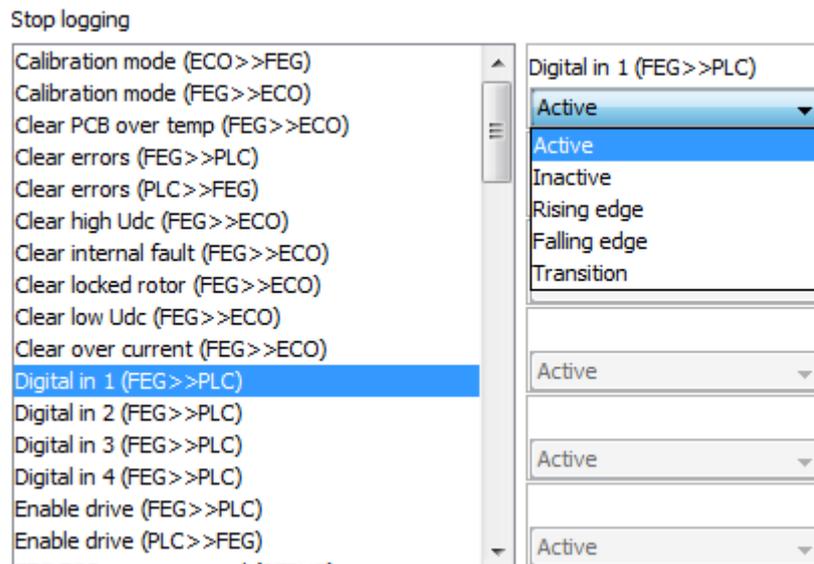
Analog log signals

This list contains all analog signal possible to log. The logging of the analog signals is event triggered on change.

Stop logging

If some special signal/signals should be used for ending the logging this is specified here. In the same manner as for the delayed start the stopping of the logging could be specified more in details. The option for every signal is:

- Active – If the signal is true
- Inactive – If the signal is false
- Rising edge – If the signal goes from false to true
- Falling edge – If the signal goes from true to false
- Transition – If the signal changes



Picture: Stop logging

Log file

All log data are written to a txt file (tab separated data). File path and name are specified here. If an old file is used the browse button can be used to select it. File size is limited to 100MB. A rollover algorithm limits the number of files to 5.

START LOGGING / STOP LOGGING

When the log screen is first launched the text on the button is **START LOGGING**. Then when this button is pressed it is possible to capture the other events. This doesn't mean that the actual logging start only that the software starts to listen for events (triggers for delay start). When the logging events is started the text on the button changes to **STOP LOGGING**. The user can the stop the logging before the other stop condition is fulfilled.

Reset selection

The **Reset selection** button is removing all signal selections in the logging page.

Duration

If the check box next to **Duration** is selected the logging will only continue for a limited amount of seconds. This limit is specified in the **Duration** input field.

Calibrate Time

It is recommended to run a calibration procedure every time a logging should be performed (first generation unit). Every individual Kvaser cable is a bit unique and has to be synchronized with the PST tool. These settings are not remembered by the software so it is needed to perform this calibration every time the logging page is opened. When the button is pressed the window below appears for some seconds. When this window disappears the calibration process is completed.



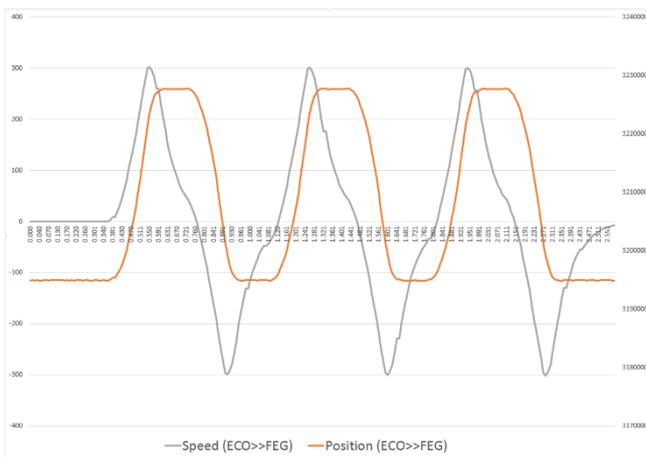
Picture: Calibrate Time window

Log table

In this table window all the data from the logging are shown. This is also written to the txt file. The logging events are triggered on any change of either a binary or an analog log signal. Then all selected log signals will be stored.

Import to Microsoft Excel

The output file from the logging can be imported into Microsoft Excel using the command “Get Data From Text” and further used for creating charts.



Picture: Logging graph – example

Activities – Control

If PST is connected to X45e unit via **DeviceNet**, **Profinet** or **Ethernet/IP** then it is possible to control X45e unit like from a PLC. No active PLC must be connected to X45e unit at this time.

CONTROL: 126

Received data		Transmitted data			
20	00	C0	41	00	00
<input type="radio"/> DO 1	<input type="radio"/> Turn to release angle 1	<input type="radio"/> DI 1	<input checked="" type="radio"/> State	<input type="radio"/> To release angle 1	<input type="radio"/> Over current
<input type="radio"/> DO 2	<input type="radio"/> Turn to release angle 2	<input type="radio"/> DI 2	<input type="radio"/> State	<input type="radio"/> To release angle 2	<input type="radio"/> High Udc
<input type="radio"/> DO 3	<input type="radio"/> Turn to receive angle 1	<input type="radio"/> DI 3	<input type="radio"/> State	<input type="radio"/> To receive angle 1	<input type="radio"/> Low Udc
<input type="radio"/> DO 4	<input type="radio"/> Turn to receive angle 2	<input type="radio"/> DI 4	<input type="radio"/> State waits	<input type="radio"/> To receive angle 2	<input type="radio"/> PCB over temp
<input type="radio"/> Reverse direction (CD)	<input type="radio"/> Turn to receive angle 3	<input type="radio"/> DI 5	<input type="radio"/> In position	<input type="radio"/> To receive angle 3	<input type="radio"/> Locked rotor
<input checked="" type="radio"/> Enable drive	<input type="radio"/> Turn to wait angle 1	<input type="radio"/> DI 6	<input type="radio"/> Reversed direction (CD)	<input type="radio"/> To wait angle 1	<input type="radio"/> Internal fault
<input type="radio"/> Clear errors	<input type="radio"/> Turn to wait angle 2	<input checked="" type="radio"/> DI 7	<input checked="" type="radio"/> Enabled drive	<input type="radio"/> To wait angle 2	<input type="radio"/> Output overload
		<input checked="" type="radio"/> DI 8	<input type="radio"/> Errors cleared		

RUN TIME 21 days, 05:00:07 **POWER** 0.95 W **TEMPERATURE** 47
FEG SW 8.2.9 **ECO SW** A19

Picture: Activities – Control

This panel is quite similar to **Monitor**. Main difference is that the lights for **Received data** are buttons. State of these buttons is send to X45e unit frequently as if it came from a PLC.

Activities – Health check

2nd generation X45e unit supports a health check to see if everything is working. This check consist of 5 steps.

FEG is running

ECO is running

Read from EEPROM

Write to EEPROM

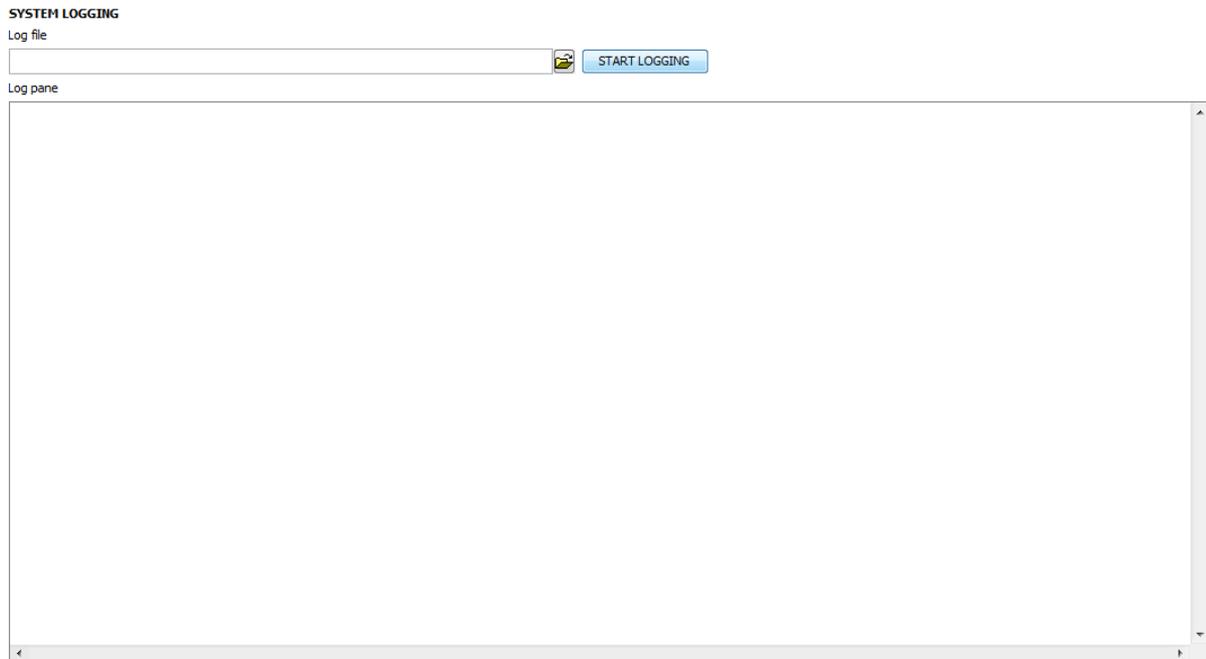
Parameter plausibility

Picture: Activities - Health check

After clicking Run health check lights should get green one after the other. If a light get read then this step of health check has failed. Light keeps white as long as this step is not performed.

Activities – System logging

If PST is connected to X45e unit via USB then it is possible to log system messages. Several interesting events causing log messages e.g. connecting/disconnecting Ethernet cable or requests to web server.

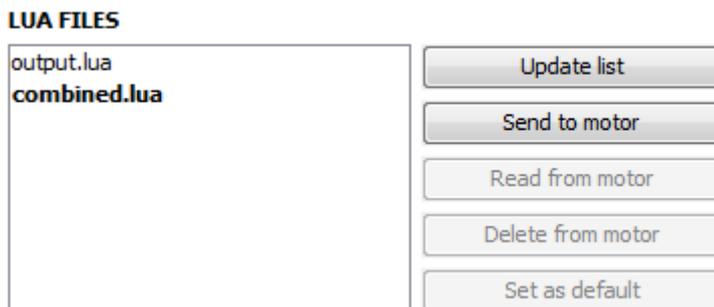


Picture: Activities – System logging

Log file can be set but is not required. After clicking **START LOGGING** every log message will appear in **Log pane**.

Activities – Lua file handling

If PST is connected to X45e unit via USB then it is possible to handle Lua files on X45e unit.

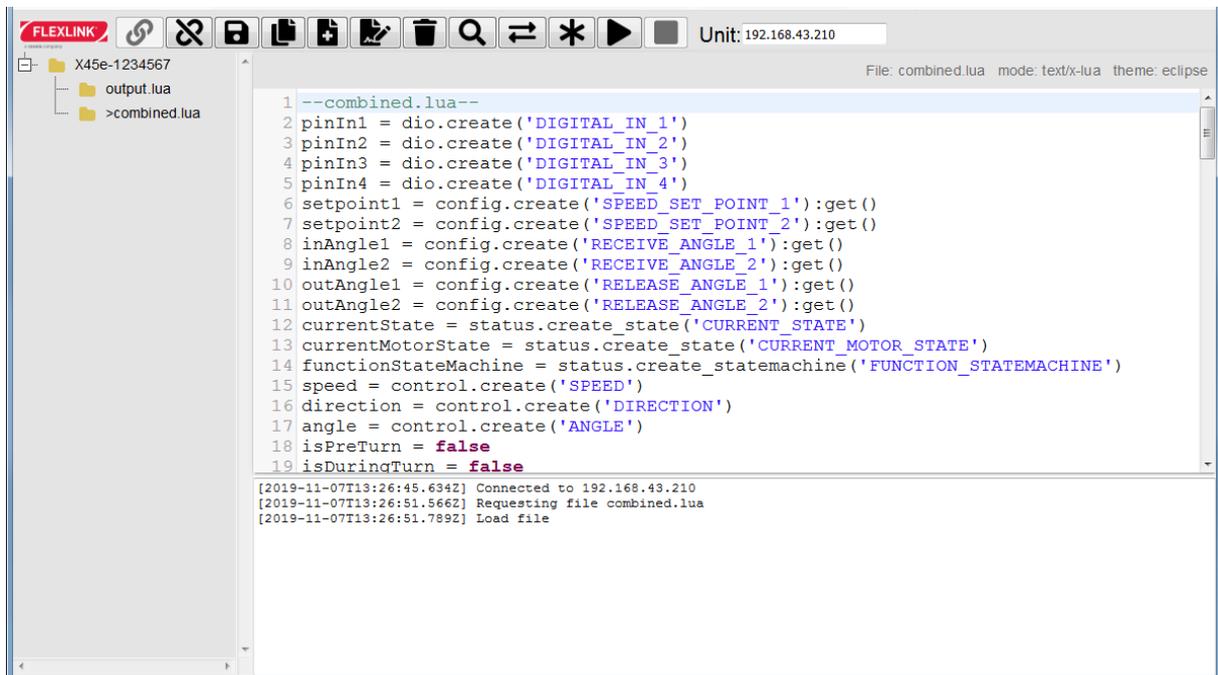


Picture: Activities – Lua file handling

Additional to a list of available files at X45e unit there are buttons for typical file handling operations. Current default file (which will be executed if unit is in Lua mode) is printed in bold.

Activities – Lua editor

2nd generation X45e units can run Lua scripts for non-standard usage. For easy editing and testing of these scripts PST is hosting a single page application that will start in default browser when clicking **Lua editor** in **Tools / Activities** menu.



Picture: Activities – Lua editor

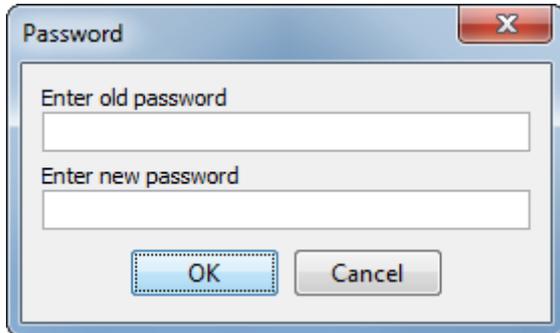
In the upper part of editor you find a tool bar with all functions and the IP address of currently connected X45e unit. First two buttons are to connect and disconnect from unit defined by IP address on right hand side. Next 5 buttons are for file handling (e.g. save, copy ...). Then came search and replace. Last 3 Buttons are for setting default script and run and stop current script.

Left hand side is a list of available files at X45e unit. Current default script (which will be executed if unit is in Lua mode) is marked with '>'.

Editing area is main part of page. Below this is a logging area with events regarding connection to X45e unit. Command con.print() will result in messages here.

Activities – Change Lua password

Access to Lua scripts at 2nd generation X45e units can have password protection. To set, change or remove the password at an X45e unit just click **Change Lua Password** in **Tools / Activities** menu.



Picture: Activities Change Lua password

If currently no password is set then the field for the old password is disabled. To remove the password just let field for new password blank.

Advanced (Ctrl + A)

The advanced option is not for normal use.

The only reason for the user to use this option is if a control variant is wanted but there is no support of this in the wizard. In this case the user can adjust the following parameters:

- Function mode
- Function parameters 1-4
- A-Bus enable drive and reset
- A-Bus network protocol
- Function group

A detailed description of these settings can be found in appendix F.

When Function variant is set the other parameters above are automatically set to the corresponding values (same as in the wizard).

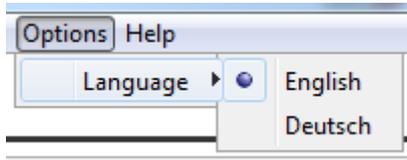
- Function Variant

If this parameter is set to zero the other parameters are not changed. This could be used if a user defined parameter setting is to be used. This User defined set up is also possible to set via the wizard.

The new setting is written into column Value and then transferred to the node with the **Write** button.

Options menu

The **Options** menu is containing settings for the **Parameter Setting Tool** software. The only feature in the current version is the **Language** setting.



Picture: Options menu

Language

The Language option has two alternatives:

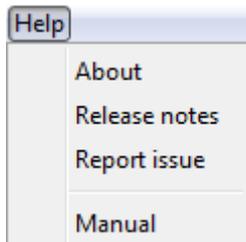
- English
- Deutsch

This affects all text fields in the software.

When a new setting has been set the **Parameter Setting Tool** must be restarted.

Help menu

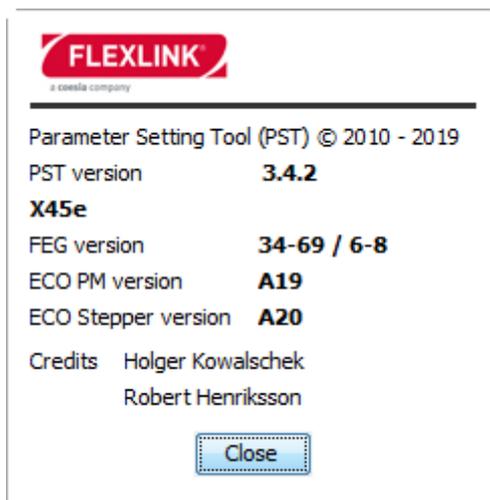
The **Help** menu contains features that could be useful assisting the user when trouble shooting or learning more about the software.



Picture: Help menu

About

With the **About** command in the **Help** menu it is possible to read out useful information regarding the version handling.



Picture: About window

PST version

The PST version shows the actual version of the **Parameter Setting Tool** software and contains of three numbers.

- The first is the major release version.
- The second number is the sub version of the release. This is increased if a change is done in the definition of the PST software. This could be caused by a change in any of the motor software (FEG, ECO PM or ECO stepper). This could also be caused by a change or addition of some motor parameter.
- The third number is the minor version. This is only concerning a small change in the PST software. No new motor software is released and no parameter setting is changed.

FEG version

The FEG version describes the corresponding version of the FEG software. This is the valid range of versions that are compatible with the current version of the PST software.

ECO PM version

The ECO PM version describes the corresponding version of the ECO PM software. This is the valid range of version that is compatible with the existing version of the PST software.

ECO Stepper version

The ECO Stepper version describes the corresponding version of the ECO Stepper software. This is the valid range of version that is compatible with the existing version of the PST software.

Release notes

When new releases are developed it could be useful to read about the implemented changes. This can be read in the document opened by the command ***Release notes***.

Report issue

The ***Report issue*** command launches an email client with the FlexLink software support email address as default.

FlexLink software support email address: ***softwaresupport@flexlink.com***

Manual

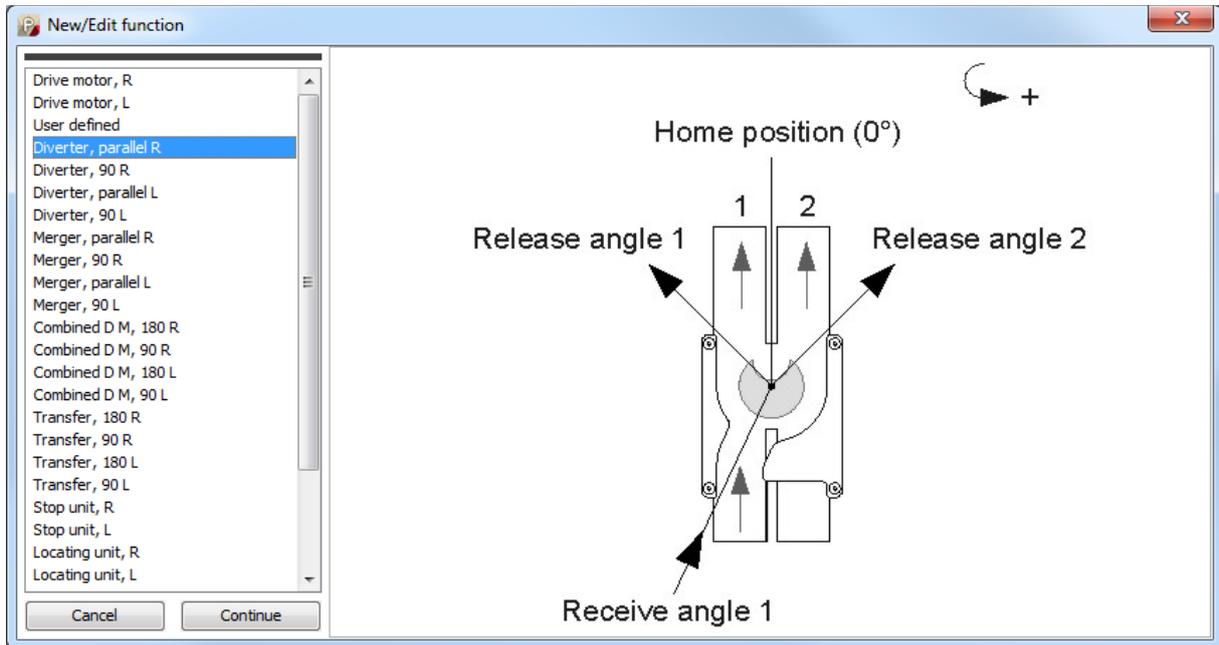
This command opens up a copy of this document. It is built in in the PST software and makes sure the user always has this help available when using the PST tool.

Wizard

The wizard helps the user to set the motor node parameters step by step. It is initiated by the commands **New node...** or **Change node...**

New node.../Change node...

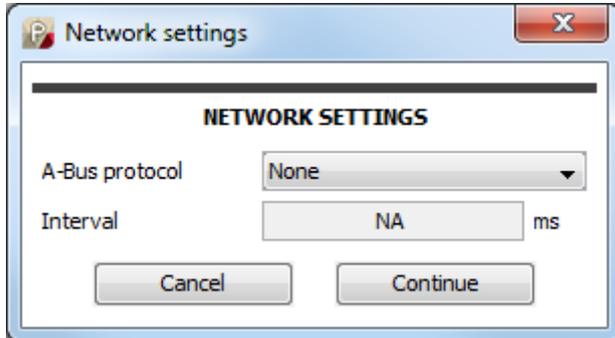
The first pop up window is describing which mechanical product (function/module) the particular motor node belongs to. If the software can detect what type the current motor is all other alternatives are greyed out. Throughout the complete wizard only valid combinations are possible to select, the other ones are greyed out.



Picture: *New node... or Change node...*

Network settings

The next step in the wizard is to set the network settings.



Picture: Network settings (Wizard)

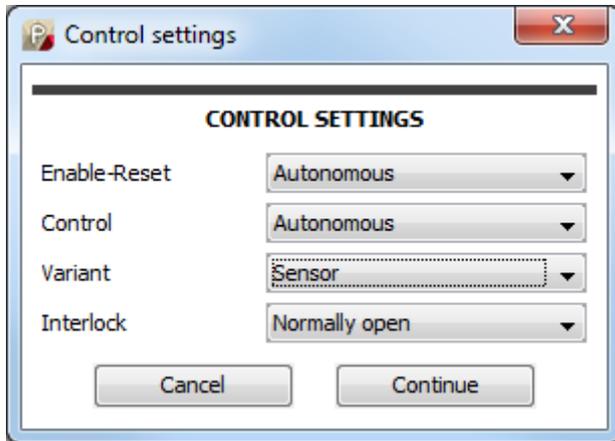
There are five alternatives for the **A-Bus protocol**. For the two last options this bus is called Network protocol instead.

- **None**
This inactivates all A-bus features. The unit will not be able to communicate with a line controller at all.
- **CANopen – 250 kbit/s**
The node is prepared to communicate via **CANopen** protocol on the A-bus. With this option an interval (in ms) must be specified. This sets how often the cyclic information should be sent over the bus.
- **DeviceNet – 250 kbit/s**
The node is prepared to communicate with **DeviceNet** protocol on the A-bus.
- **Ethernet/IP**
The node is prepared to communicate with **Ethernet/IP** protocol on the ETH network.
- **PROFINET**
The node is prepared to communicate with **PROFINET** protocol on the ETH network.

For 2nd generation X45e units **Interval** is replaced by IP address.

Control settings

The last pop up window in the wizard is the control settings window.



Picture: Control settings

Enable-Reset

Every motor has an enable and a reset signal. These could be set either from a line controller or internally.

Autonomous

If the **Autonomous** mode is chosen those two signals are set via this software. The enable bit is by default set to true (one) and the reset bit is set to false (zero). This means the motor is always trying to run when powered up. If a fault occurs the power has to be dropped in order to reset the error.

Line control

In the **Line control** mode those two signals has to be sent from a line controller via the A-Bus network. This setting requires the **Network setting** to be set to either **CANopen** or **DeviceNet**.

Control

The control alternative decides the main control approach for the unit.

Autonomous

In autonomous mode all inputs to the unit comes from sensors connected directly to the unit. No interaction is done with a line controller.

Line control

In the **Line control** mode the unit interacts with the line controller to perform its task. This control mode is still depending on the local sensors but the main commands are coming from the line controller. This setting requires the **Network setting** to be set to either **CANopen** or **DeviceNet**.

Variant

In some cases the Control mode can be divided into more sub categories. The variant is a more detailed option of the control selection.

No choice

If the Control doesn't have any sub categories the option **No choice** is the only possible option to choose.

1/1

This choice is only implemented for the diverters. It means one product is diverted to the left and the next one is diverted to the right and so on.

Sensor

This choice is indicating that the unit triggers its behaviour by a sensor. It is not the ordinary sensor functions detecting the puck in the gap of the guide disc that is referred to. Typically this is used for locating units when the pucks should be released. Also there is a diverter variant that controls where to divert the pucks, depending on the sensor input.

Inverted sensor

The **Inverted sensor** selection is also triggered by sensors, but the function is inverted compared to the selection above.

Normally closed

The **Normally closed** mode is referring to the position of the guide disc of the function unit. This means when the function unit is in position to start a new cycle it waits in a position where it is not receiving any new pucks.

Normally open

On the contrary (compared to the selection above) the guide disc waits in a position where it is able to receive products.

Timer

If the **Timer** is set as the variant the trigger for the release movement is controlled by an internal timer. It is only applicable for locating units.

Interlock

Interlock is a function for temporary stopping the unit (pausing) depending on specified conditions. The setting window has two delays related to this interlock function. Not all function has the possibility to interlock. The reason for this is that digital input 4 is already used for other purposes.

None

No interlock functionality is activated.

Normally closed

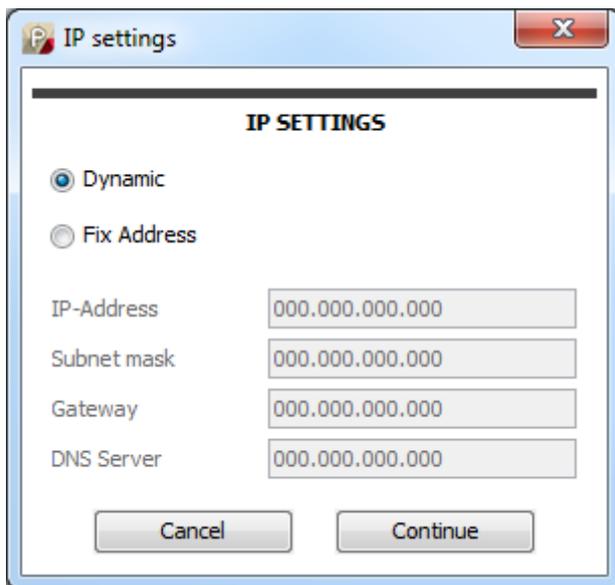
Digital input 4 (DI4) is controlling the interlock function. The default condition of the input status is closed, i.e. the input is logical high. When it falls the unit is stopped temporary.

Normally open

Digital input 4 (DI4) is controlling the interlock function. The default condition of the input status is open, i.e. the input is logical low. When it rises the unit is stopped temporary.

IP settings

If Ethernet/IP or PROFINET is chosen in an earlier step the IP setting pop up window appears. There are two main options, **Dynamic** or **Fix Address**. Dynamic addressing requires the network to have a DHCP server.



Picture: IP settings

Result

When the wizard is completed the node list is updated to match the new setup. If the wizard has been triggered by the **New node...** command the node list is added with one more node. If the **Change node...** has been used the existing node is adjusted to the new settings. The symbol of the node is either a drive motor or a function motor depending on the actual motor type.

See separate document describing all the variants and the behaviour:

User documentation, Electrical system description, 5113269 or FLX1000558

Settings

The setting values can be change and fine-tuned whenever wanted later on. It is only the parameters in the settings window that can be changed. When changing these parameters the user can key in the required value in the middle column (**Value**) and then use the **Write** button to download it to the unit. The function group, network settings or control settings are read-only. If these should be changed this has to be done with using the wizard (**Change node...**) or from the **Advanced** page.

	Config	Value	Network	
Speed setpoint 1	<input type="text" value="27"/>	<input type="text" value="27"/>	<input type="text" value="27"/>	rpm
Speed setpoint 2	<input type="text" value="360"/>	<input type="text" value="360"/>	<input type="text" value="360"/>	rpm
Acceleration ramp	<input type="text" value="300"/>	<input type="text" value="300"/>	<input type="text" value="300"/>	ch/s
Deceleration ramp	<input type="text" value="300"/>	<input type="text" value="300"/>	<input type="text" value="300"/>	ch/s
Receive angle 1	<input type="text" value="110"/>	<input type="text" value="110"/>	<input type="text" value="110"/>	°
Release angle 1	<input type="text" value="70"/>	<input type="text" value="70"/>	<input type="text" value="70"/>	°
Pre turn delay	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	ms
During turn delay	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	ms
Post turn delay	<input type="text" value="350"/>	<input type="text" value="350"/>	<input type="text" value="350"/>	ms
Interlock delay(on)	<input type="text" value="500"/>	<input type="text" value="500"/>	<input type="text" value="500"/>	ms
Interlock delay(off)	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	ms

Picture: Settings - example

See the **User documentation, Electrical system description, 5113269 or FLX1000558** in order to find information about individual parameters.

Appendix

A: Configuration example of start up, A-bus (X45e first generation)

Offline preparation

- Create an empty configuration
- Use the wizard to add with appropriate number of nodes with correct settings and addresses.
- Chose a system picture if wanted
- Save the configuration to an xml-file

Online, B-Bus

All motors are set to address 1 at delivery. This has to be changed via the B-bus before continuing with other settings.

- Connect Parameter Setting Tool cable to the first node via the B-bus
- Chose **Network** -> **X45e** -> **B-Bus (CANopen)**
- Chose **Network** -> **Scan network (F12)** to connect to the node. Two nodes should appear in the node list. If the configuration was open a question pops up asking if this configuration could be closed.
- Chose **Action** -> **Change address (Direct mode)** and set the motor node to correct address
- Repeat this procedure for all motor nodes

Online, A-Bus

- Make sure the A-Bus is connected properly, with bus terminations and that the bus is supplied by power.
- Set the PLC in paus/stop mode or disconnect it from the network. This is a recommended action because it can cause problems if there are more than one master on the network and PST act like one.
- Connect Parameter Setting Tool cable to the A-Bus
- Open the configuration file

- Chose **Network** -> **Verify network (F11)** to detect status of the nodes.
- Select the first node and download the parameters with the **Write** button.
- Repeat the previous task for all nodes

B: Configuration example of start up, B-bus (X45e first generation)

Offline preparation

- Create an empty configuration
- Use the wizard to add with appropriate number of nodes with correct settings and addresses.
- Chose a system picture if wanted
- Save the configuration to an xml-file

Online, B-Bus

All motors are set to address 1 at delivery. This has to be changed via the B-bus before continuing with other settings.

- Connect Parameter Setting Tool cable to the first node via the B-bus
- Chose **Network -> X45e -> B-Bus (CANopen)**
- Chose **Network -> Scan network (F12)** to connect to the node. Two nodes should appear in the node list. If the configuration was open a question pops up asking if this configuration could be closed.
- Chose **Action -> Change address (Direct mode)** and set the motor node to correct address
- Chose **File -> Open configuration...** to reopen the created configuration
- Chose **Network -> Verify network** to select the currently connected node
- Press the **Write** button the transfer all settings to the node.
- Fine tune any settings in the **Settings** window if needed
- Repeat this procedure for all motor nodes

C: Upgrade of a function or drive motor in Direct mode (X45e first generation)

- Use the old Parameter Setting Tool to connect to the motor and backup the parameters. This is not necessary but in case the unit has been fine-tuned is it recommended to store this values for further use.
- Connect the parameter setting cable to the USB port at the PC and the B-Bus at the motor unit.
- Launch the new Parameter Setting Tool software
- Chose **Network** -> X45e -> **B-bus (CANopen)**
- Chose **Network** -> **Scan network (F12)** to connect to the node. Two nodes should appear in the node list.
- Mark the first node, represented by a symbol of the motor. This node is called FEG.
- Chose **Tools** -> Activities to open the Firmware download page. Browse and select the latest FEG SW and ECO SW files. It is very important to update both software.
- Start the firmware update procedure by pressing the **Start update** button.
- Wait for the update to be finalized.
- Chose **Edit** -> **Change node... (CTRL + E)** to start the wizard and set all setting to wanted values. When the wizard is completed all parameters are automatically downloaded to the motor node. One downside with this procedure (wizard function) is that any old change in the parameters is overwritten. The alternative is to use the advanced mode and set every individual parameter manually. But this requires a lot deeper knowledge about the parameters settings.
- If necessary the **Value** column should be filled with any setting that needs to be adjusted. Download these settings by pressing the **Write** button in the action pane. Note that these setting appear under the **Network** column after the write procedure.