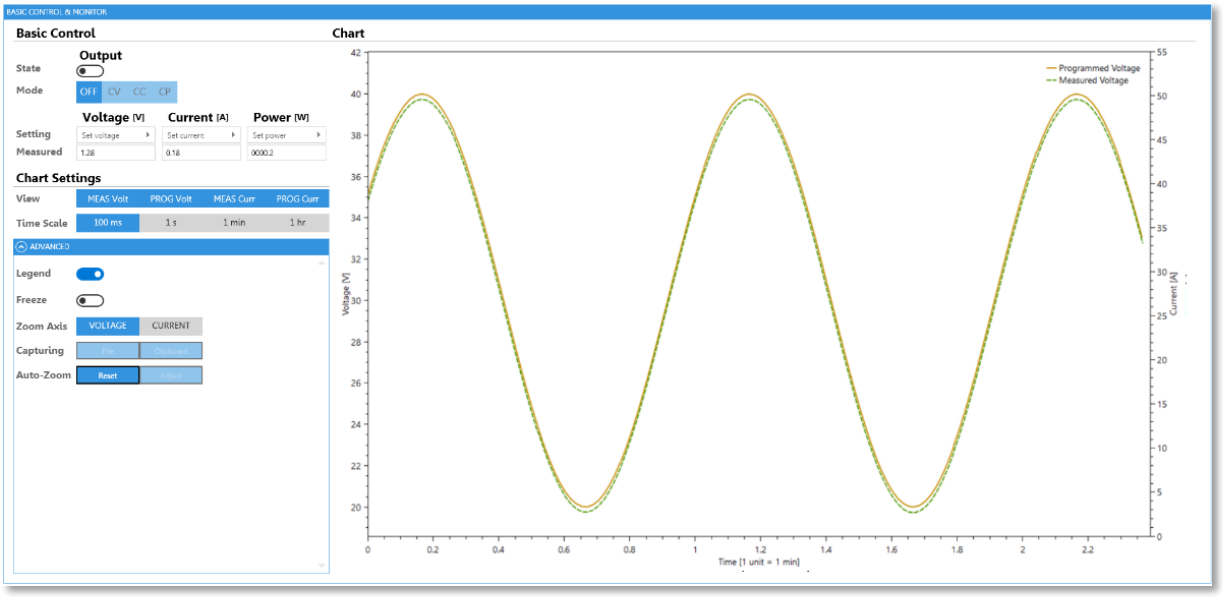
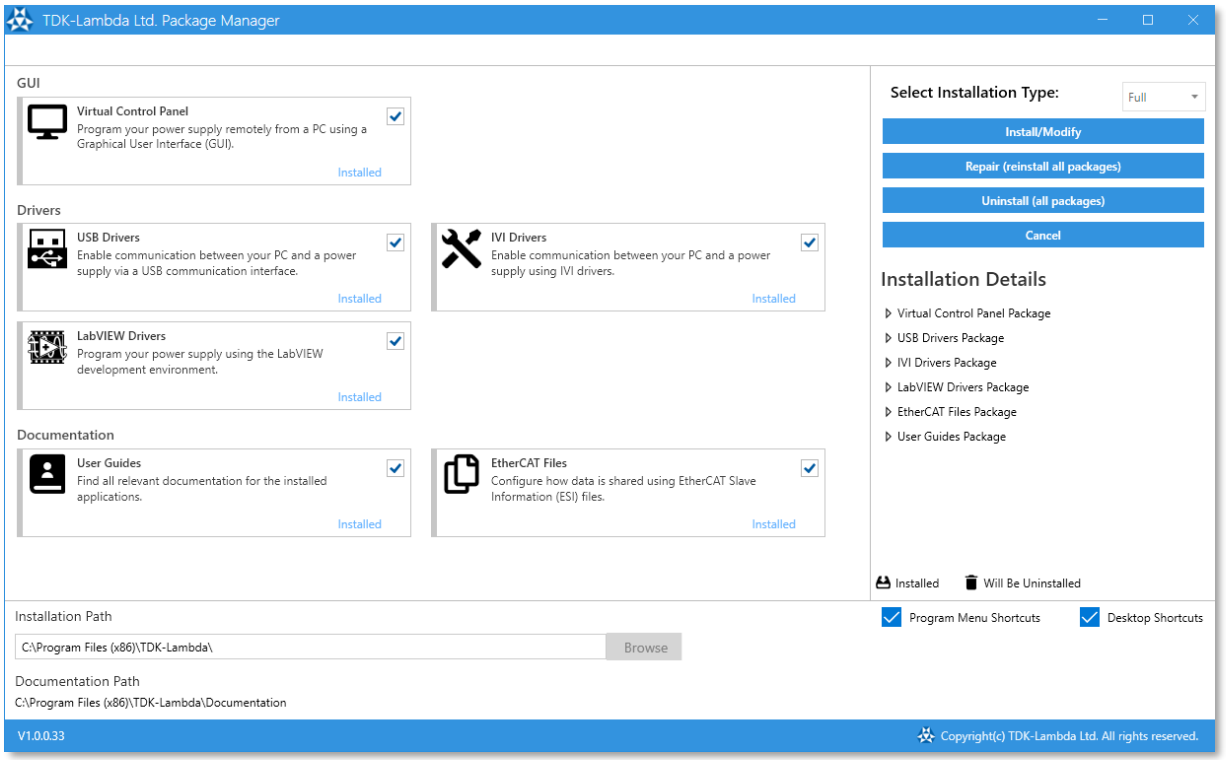
Virtual Control Panel
Installation and Applications Guide





REVISION HISTORY

Date	Revision	Issue
March 2022	H - Initial Revision	

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1. Introduction

General Information

Documentation (including this User Guide) is subject to change without notice. Refer to TDK-Lambda's Technical Data web page for up-to-date documentation:
http://www.emea.lambda.tdk.com/software

Introduction

The Virtual Control Panel (VCP) is a graphical user interface that allows the user to remotely and comfortably control all TDK-Lambda Ltd. programmable power sources using a single PC application. The application is installed using a software installer tool called the Package Manager. It is responsible for installing and updating TDK-Lambda Ltd. drivers and tools used with programmable power sources. It incorporates several software packages and streamlines the process of installing them on a PC.

Communication Interfaces

The Virtual Control Panel can communicate with a power source over multiple interfaces:

- RS-232/RS-485
- USB
- Ethernet (LAN)
- IEEE-488 (GPIB)
- MODBUS-TCP
- EtherCAT

Software Requirements

- Microsoft Windows 10 (64-bit)
- .NET Framework 4.8 (64-bit)

NOTES

1. VCP is officially compatible with Windows 10 (64-bit). Some software packages included in the Package Manager are 32-bit. Since VCP is not dependent on these packages, the user can freely install them without affecting VCP's functionality.
2. In order to install and run the Installer and the VCP, latest version of .NET Framework should be installed (version 4.8). In case it is not installed, a warning message will pop-up. To download .NET Framework 4.8, use the link below. If the link is no longer available, please search for "Download .NET Framework 4.8" in any popular search engine.

https://dotnet.microsoft.com/en-us/download/dotnet-framework/net48

Minimum Hardware Requirements

- Intel i3 processor or above
- At least 20GB of hard disk space
- At least 4GB of memory
- Display resolution: 1280 x 768 (scale and layout set to 100%)

Compatible Devices

The Virtual Control Panel is compatible with the following TDK-Lambda Ltd. DC power source series: ***GENESYS+***, ***Z+*** and ***GENESYS***.

2. First-Time Installation

This section presents the steps of a *first-time* installation of the Virtual Control Panel software and of all relevant software packages. The installation process depends on the packages selected for installation, so different selections may result in different installation processes. To provide a complete understanding of the setup process, the longest installation type, *Full*, is presented below.

NOTE

For information on updating/re-installing software, please refer to section 3. For details on uninstalling software, refer to section 4.

1. Launch the Package Manager by double-clicking on its executable file (*.exe). Home screen will be displayed:

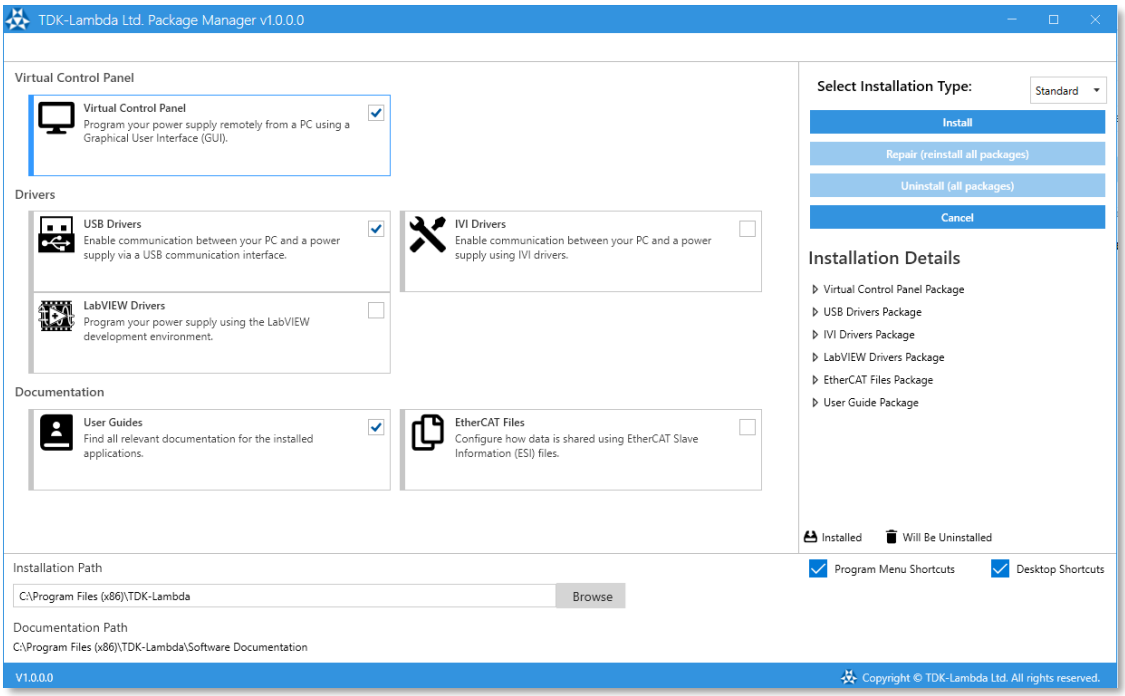

Figure 1

2. To add/remove packages, select/deselect them. Packages contain one or more components. To install all packages and components, select *Full* under the *Select Installation Type* dropdown menu. The *Standard* installation type is selected by default.
3. Under *Installation Details*, for each package, select the components you would like to install. All selected components will be installed. Some components are recommended by default.
4. Whenever the Package Manager is launched, it searches for packages and components that are already installed on your PC. An installed component is represented by the 💾 symbol. If a package and all of its components are already installed on your PC, the package will be marked as *Installed* and will be check-marked, as shown below. If only some of a package's components are installed, it will be marked as *Partially Installed*. On the other hand, if the user chooses to uninstall a previously installed component, a 🗑 symbol will appear next to it. To indicate that this is a first-time installation, the *Repair* and *Uninstall* buttons are also greyed-out. Once the first installation is done and a few packages are installed, these buttons will turn blue.

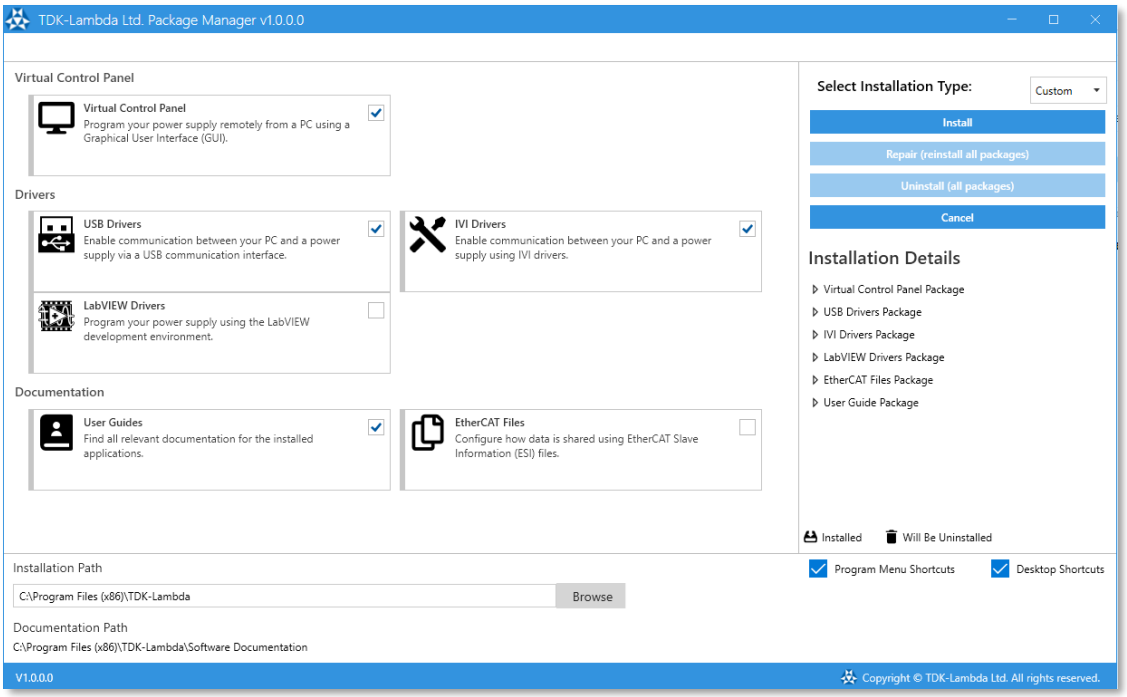

Figure 2

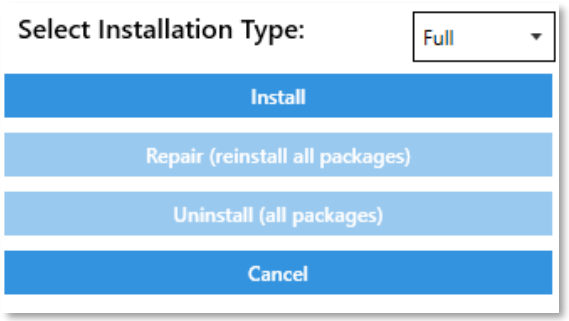

Figure 3

After the installation process, the *Installation Type* shown depends on the packages and components installed. If all *Standard* packages are installed, the installation is shown as Standard, while if absolutely all packages and components are installed, the *Installation Type* is Full. In all other cases, the Type is Custom.

5. To change the installation path, click *Browse* and then choose the new installation folder. You can also create a new folder for the installation. All documentation will be saved in the selected location.

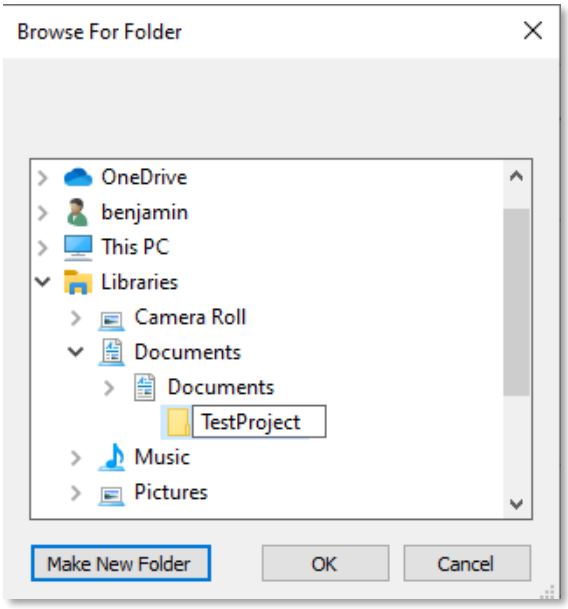

Figure 4

NOTE

If the new location is not the default path, it is possible that Windows 10's antivirus may request to scan the installed application. This behavior is normal. Agree and complete the quick scan.

6. Deselect *Program Menu Shortcuts* and *Desktop Shortcuts* (enabled by default) if you do not want to create any shortcuts. All Program Menu shortcuts are saved in a folder named *TDK-Lambda*.

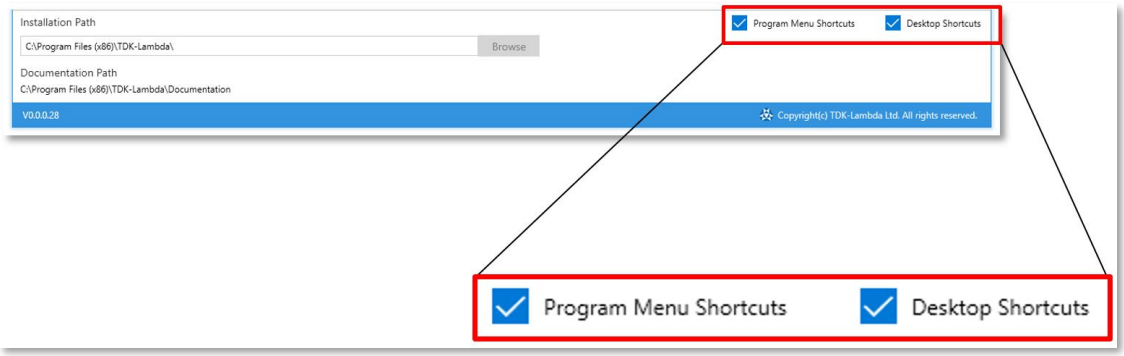

Figure 5

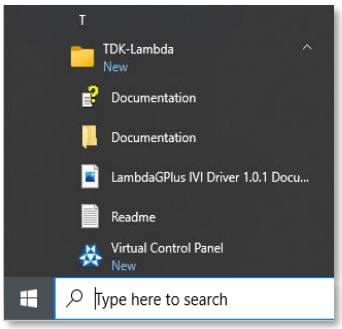

Figure 6

7. Click *Install* once you have selected your packages and components. There are three types of installation processes: *Standard*, *Custom* or *Full*. They only differ by the packages they install. The complete installation type, *Full*, is presented below to provide a complete understanding of the setup process.

Figure 7

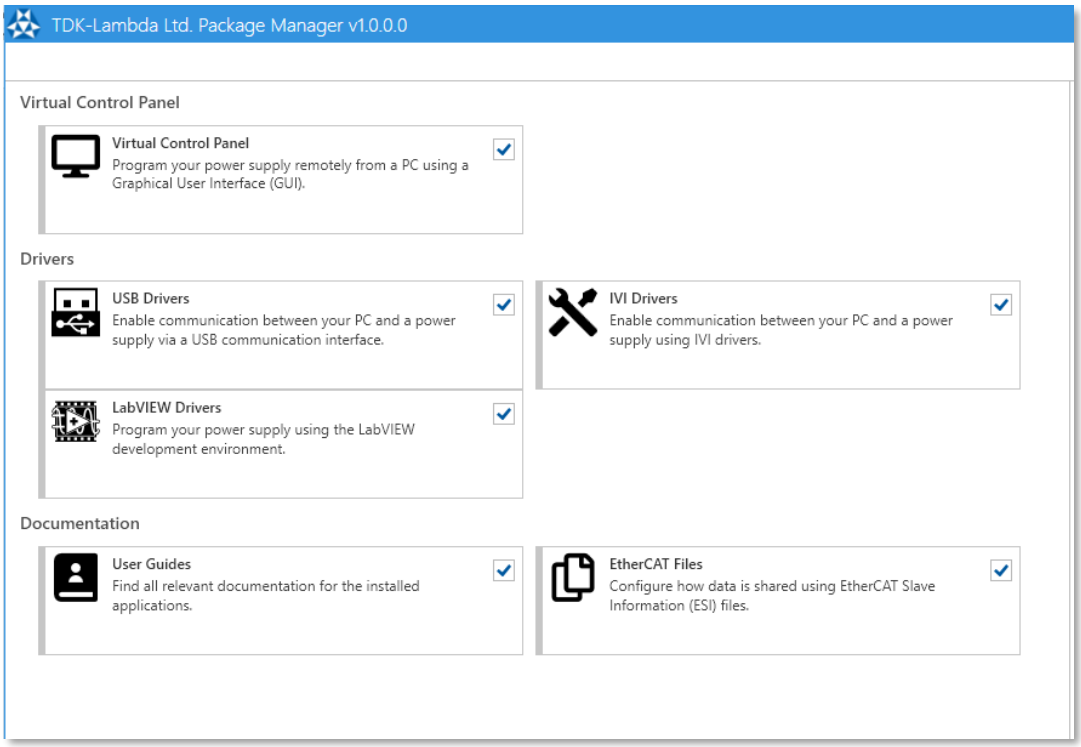

Figure 8

A *Full* Installation includes the following packages and components:

Virtual Control Panel

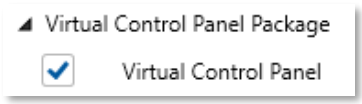

Figure 9

- Virtual Control Panel: Graphical User Interface (GUI) used to remotely control a power source.

USB Drivers

Figure 10

- Enables communication between a host PC and a power source via a USB communication interface.

IVI Drivers

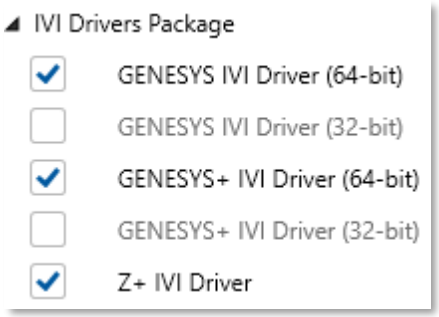

Figure 11

- Enables communication between a host PC and a power source using IVI drivers, one for each source series. IVI drivers abstract away the use of programming languages such as SCPI and GEN by providing a simple, high-level API to remotely control Test & Measurement equipment.

LabVIEW Drivers

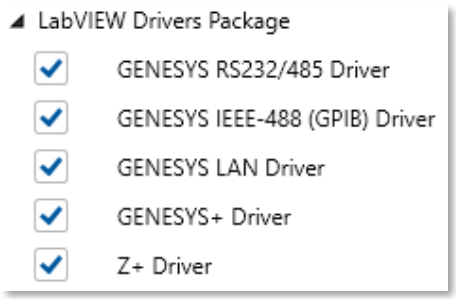

Figure 12

- Plug-in to program various power source series using the LabVIEW development environment. LabVIEW drivers developed in LabVIEW. Copyright © [2018] National Instruments Corporation. All Rights Reserved.

EtherCAT Files

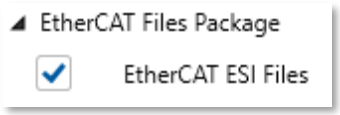

Figure 13

- An EtherCAT Slave Information file (ESI) is an XML file that contains device information on a power source series. The file provides an EtherCAT Master with the configuration information of Slave devices.

User Guides

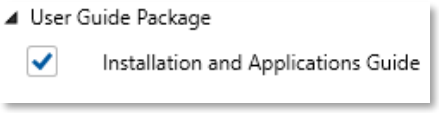

Figure 14

- A user guide that explains how to use and install the Virtual Control Panel software.

8. If other programs on your PC are open and are using files that will need to be modified during the installation process (for example, a previously installed version of VCP), a pop-up warns you to close the other programs in order to continue or click *Cancel* to stop the installation process. The installation automatically continues once you have closed the conflicting programs.

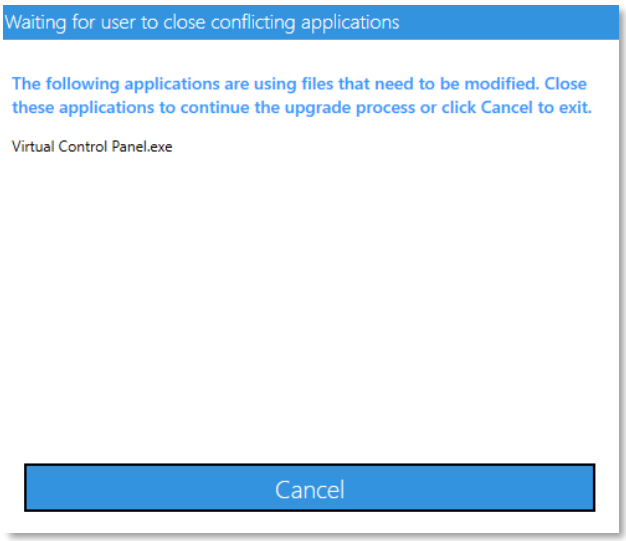

Figure 15

9. A list of the packages and components that will be installed is presented. Click on any package to view its new components. Then click *Accept*. To cancel the installation, click *Cancel*.

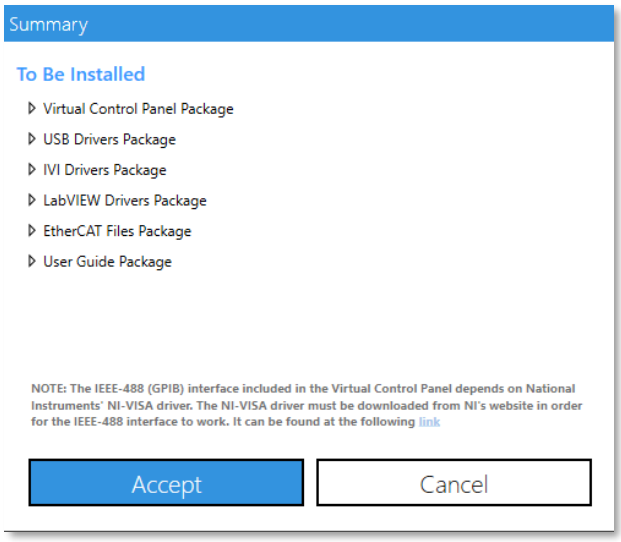

Figure 16

10. WARNING: the IEEE-488 (GPIB) interface included in the Virtual Control Panel depends on National Instruments' NI-VISA driver. The NI-VISA driver must be downloaded from NI's website in order for the IEEE-488 interface to work in the Virtual Control Panel. Download NI-VISA from the following link and make sure to download version 20.0 or later (downloading the latest version is recommended): https://www.ni.com/en-il/support/downloads/drivers/download.ni-visa.html

NOTES

1. The link above is for informational purposes only (since NI manages its own links). If the link above is no longer valid, please search for "NI-VISA driver download" in any popular search engine.
2. The Virtual Control Panel's GPIB interface has only been tested with National Instruments' GPIB-USB-HS adapter. Adapters from other manufacturers are not guaranteed to be compatible.

11. On National Instruments' NI-VISA download page, select the following fields:
    Supported OS: Windows
    Version: *20.0 (or later)*
    Included Editions: Full

12. Click the *Download* button. Note that a National Instruments' user account is required to complete the installation. Click *Create Account* if you do not have one already and follow the on-screen instructions to finish the installation process.

13. The Package Manager's EULA (End-User License Agreement) is presented. Third-party software EULAs are included as well. Read the agreements and click *Accept* to continue the installation process. If you do not agree with the agreement, click *Cancel*. The installation process will stop; no packages will be installed on your PC. The installation process will start if the EULA is accepted.

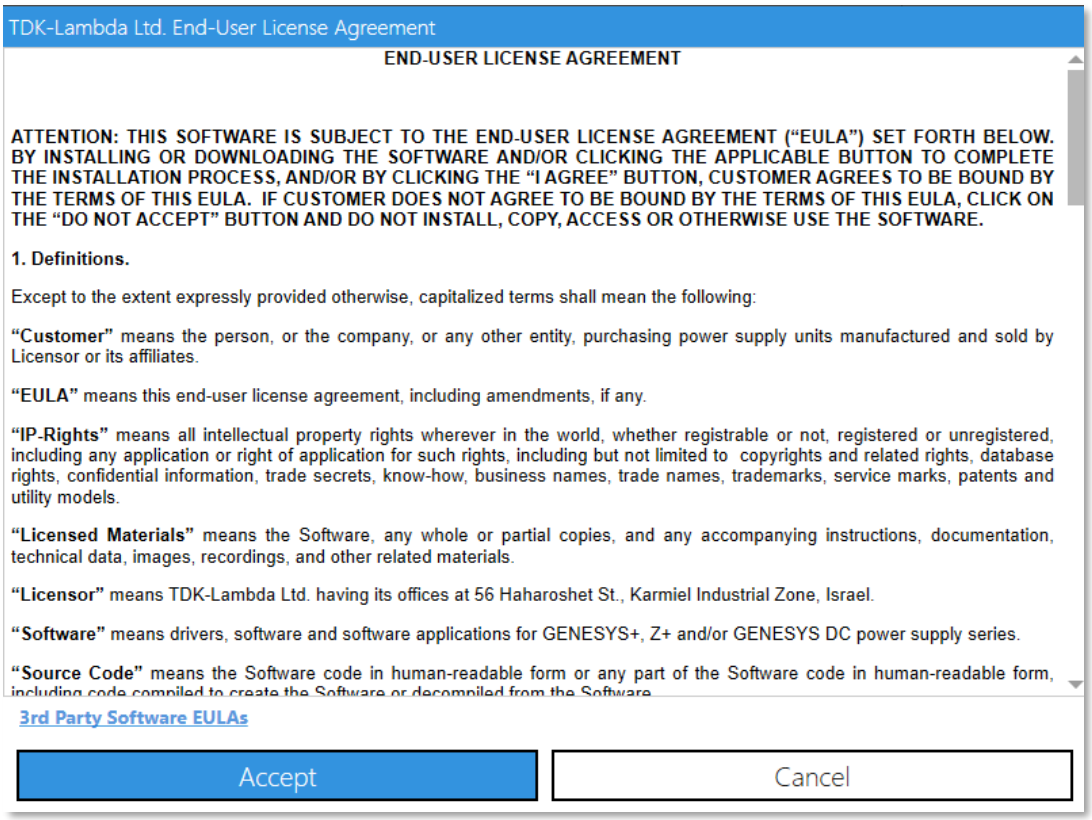

Figure 17

14. If the newest version of the TDK-Lambda USB Driver software isn't already installed on your PC, its Installation Wizard will pop-up as shown below. Press *Next* to start the driver installation. If you decline to install the USB driver, the installation process will continue and skip to step 17.

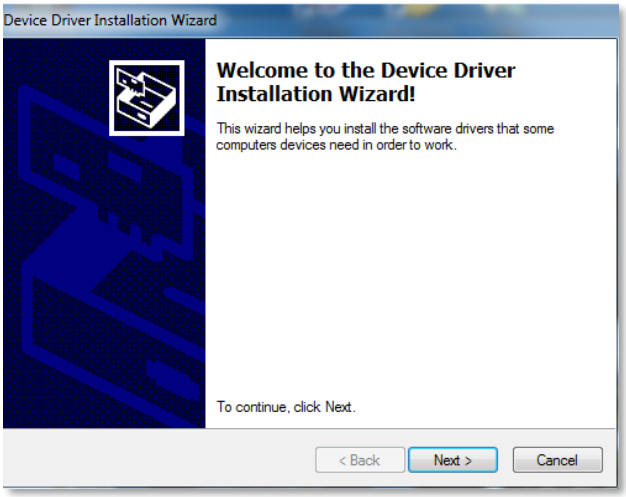

Figure 18

15. Click *Install*.

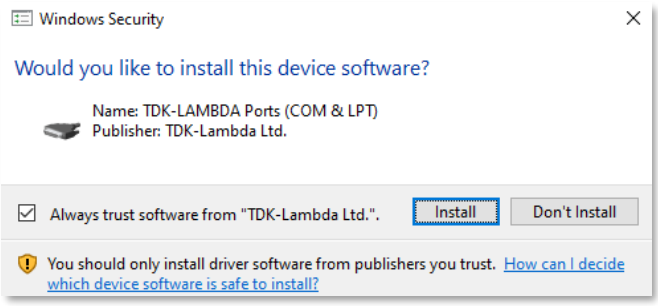

Figure 19

16. The USB driver is installed as an additional serial port (e.g. serial port COM5).

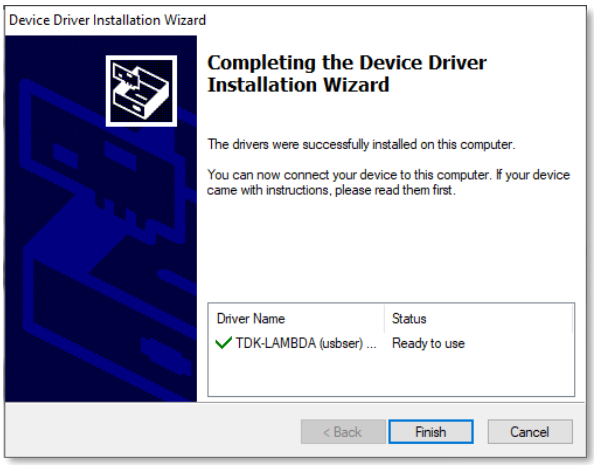

Figure 20

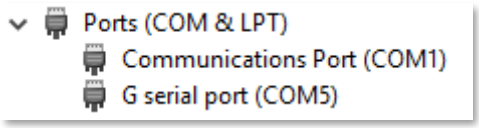

Figure 21

17. The EtherCAT interface used by the Virtual Control Panel requires the WinPcap driver. If WinPcap (or Npcap, which is an update of the WinPcap library) isn't already installed on your PC, its Installation Wizard will pop-up as shown below. Click *Next*. Driver installation will start.

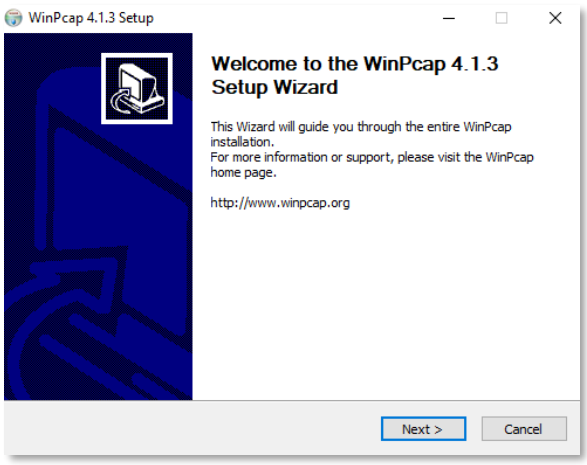

Figure 22

18. Read the WinPcap license agreement. Click *I Agree* to continue the installation. If you do not agree with the agreement, click *Cancel*. The installation process will continue and skip to step 22. Note, however that the Virtual Control Panel package will be marked as *Partially Installed*.

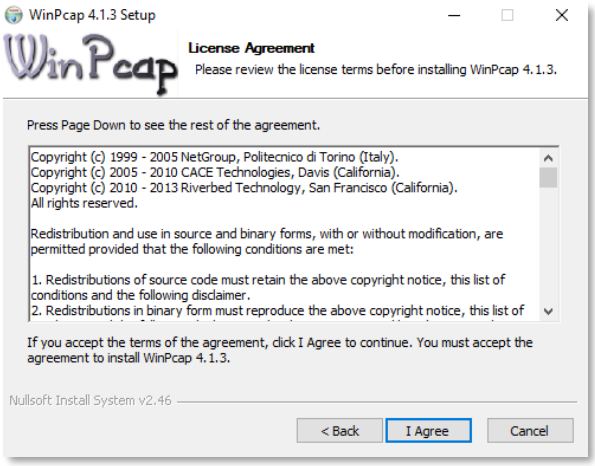

Figure 23

19. Click *Install* and keep the *Automatic Start* option checked. Driver installation will start.

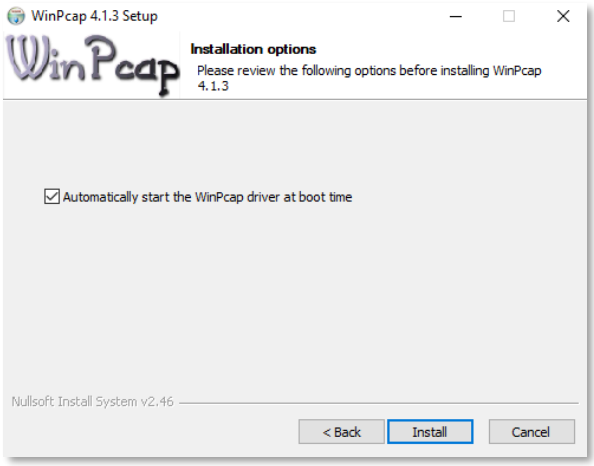

Figure 24

20. Click *Finish*. Driver installation is complete.

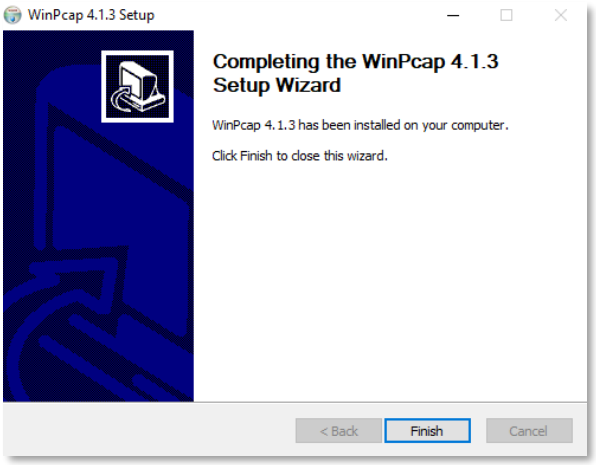

Figure 25

21. *Notice*: In case WinPcap is already installed on your PC, two error messages may pop-up on your screen during the installation process:
    a. Click *Ok* in order to continue the installation process.

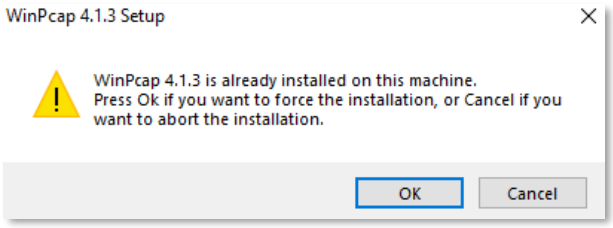

Figure 26

    b. Click *Ignore* in order to complete the installation process.

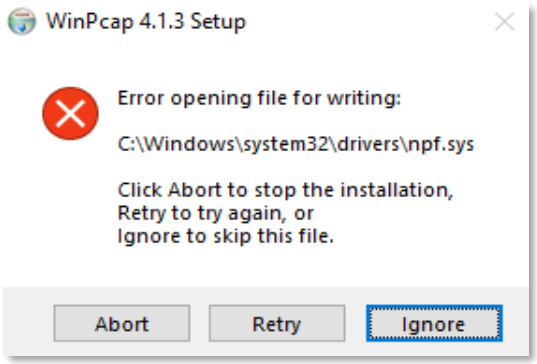

Figure 27

The latest version of WinPcap is installed as a part of the Package Manager installation. Therefore, it is highly recommended to install WinPcap as a part of the Package Manager installation in order to make sure that the latest version is installed.

22. The setup procedure will silently install the IVI and LabVIEW drivers, EtherCAT files and Documentation.

23. Once complete, the installation window will show that the installation was successful. To start the Virtual Control Panel application and/or open the documentation folder, click on the corresponding checkboxes, then click *Finish*. The installation is complete.

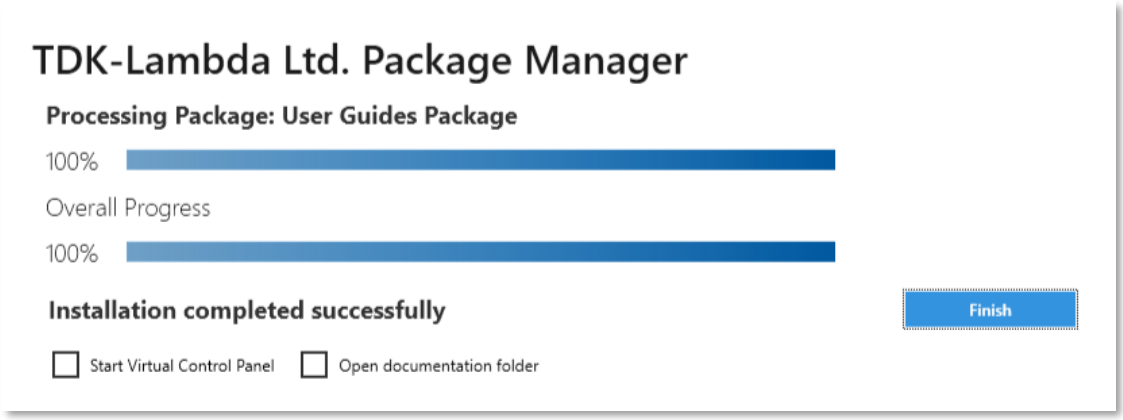

Figure 28

3. Modifying Packages

Adding & Removing Packages

NOTE

Please refer to step 4 of the *First-Time Installation* section for information on previously installed packages.

1. To add a new package or component, tick its checkmark box.
2. To remove a previously-installed package, deselect its checkmark. It will now be marked as "*Will be Uninstalled*" and all of its installed components with a 🗑 symbol.

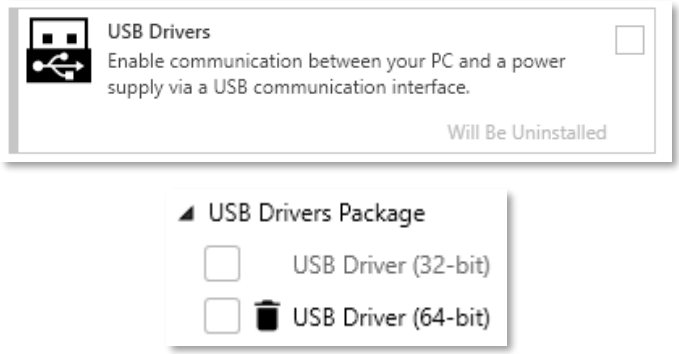

Figure 29

3. Click *Install / Modify*.

Figure 30

4. A window listing the components that will be installed/uninstalled will pop-up. Click *Accept*.
   In the example below, the GENESYS LabVIEW component and EtherCAT package were added, while the USB Driver was removed.

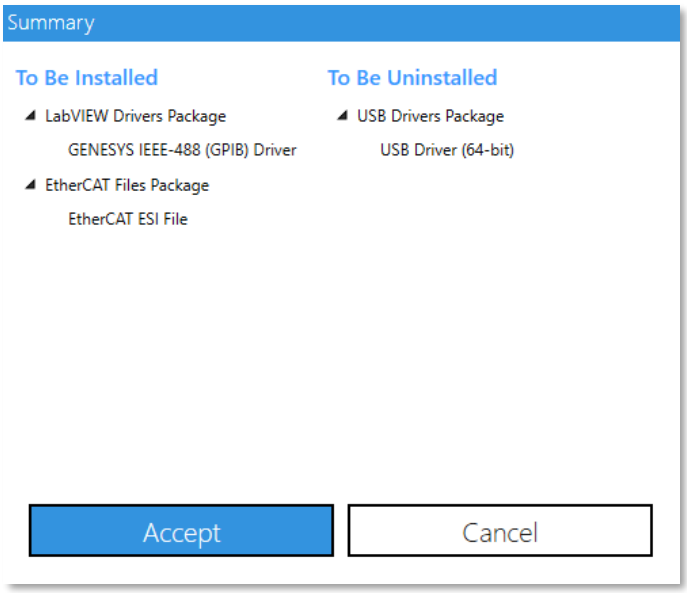

Figure 31

5. The Package Manager's EULA (End-User License Agreement) is presented. Third-party software EULAs are included as well. Read the agreements and click *Accept* to continue the installation process. If you do not agree with the agreement, click *Cancel*. The installation process will stop; no packages will be modified.

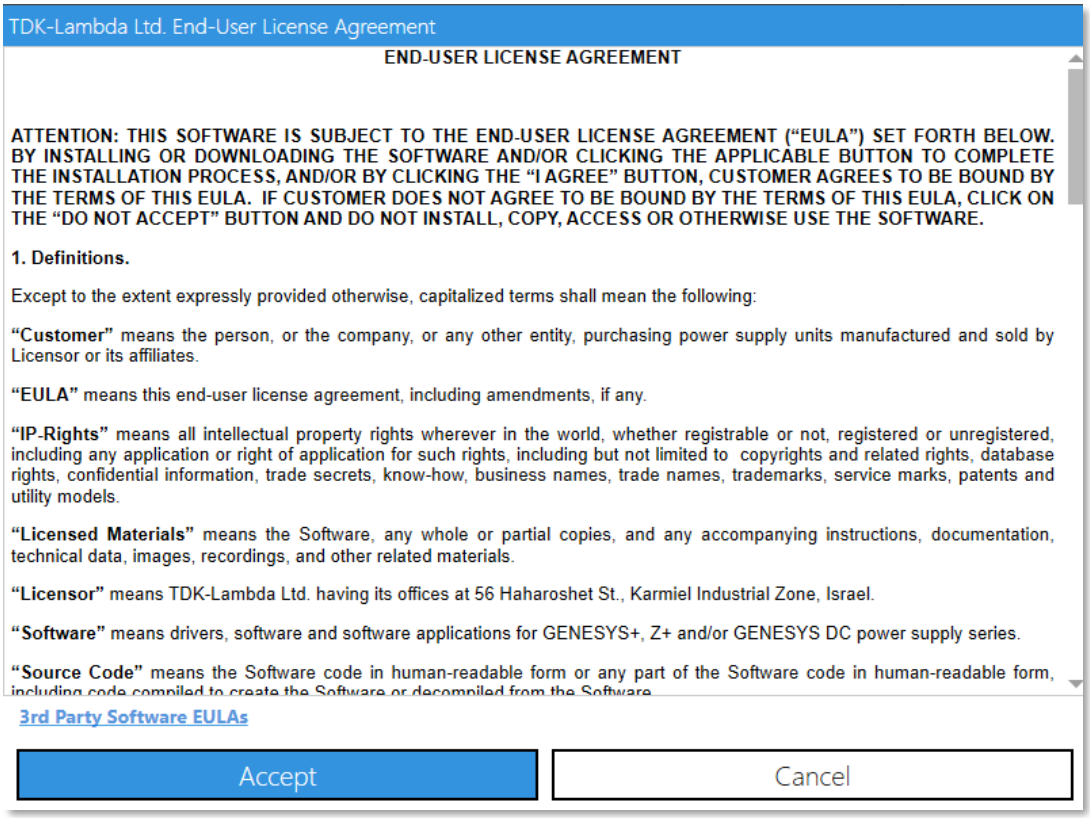

Figure 32

6. The components and packages are (un)installed successfully. Click *Finish*.

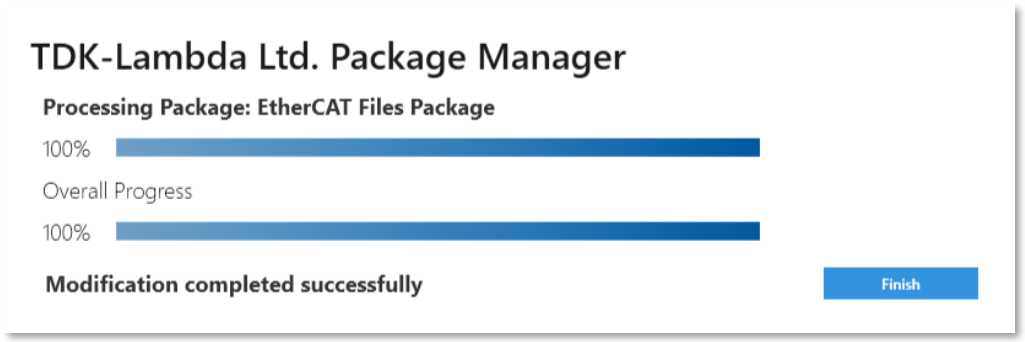

Figure 33

Repairing (Reinstalling) All Packages

NOTE

The Repair function reinstalls ALL installed packages regardless of the packages selected or deselected. Even if a package is deselected, it will not be uninstalled during the Repair process.

1. To reinstall all packages, click on the **Repair (reinstall all packages)** button. A pop-up reminds the user that the Package Manager will reinstall all previously installed packages. Click *Accept* to proceed with the Repair or *Cancel* to exit.

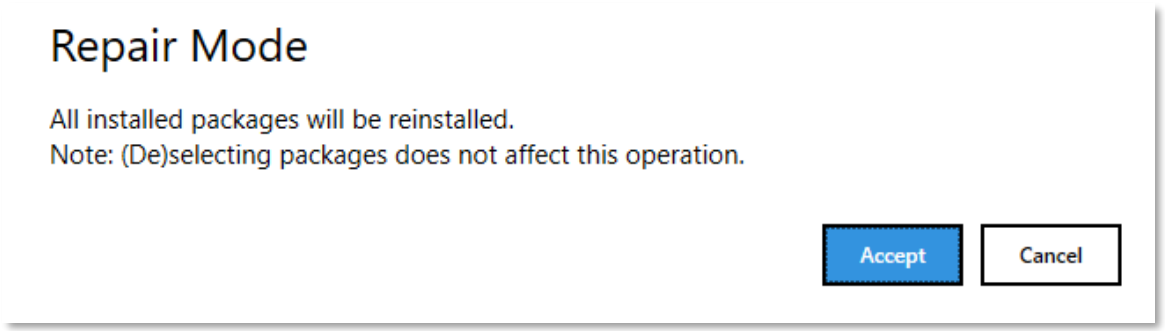

Figure 34

2. Click *Finish*.

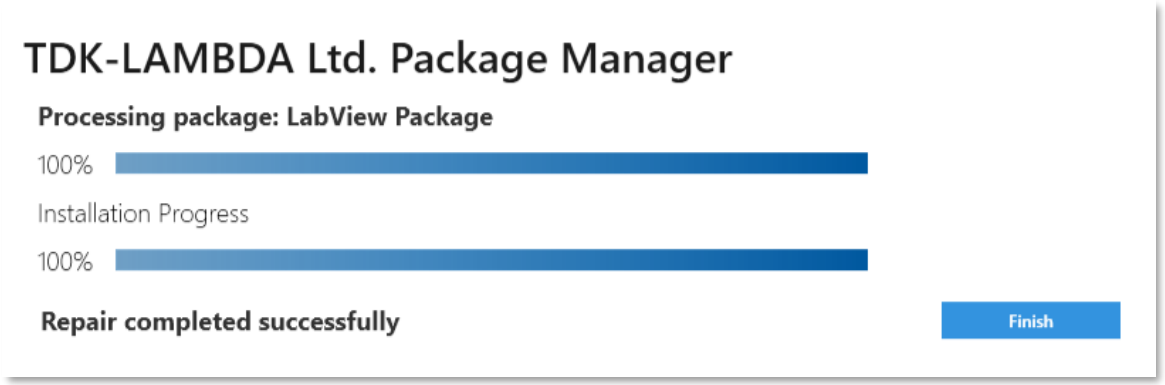

Figure 35

Upgrading Packages

If a package bundled inside the Package Manager, such as the Virtual Control Panel, is updated by TDK-Lambda Ltd., a new version of the Package Manager will be available for download on the company website.

1. Click on the link below to download the newest version of the Package Manager:
   http://www.emea.lambda.tdk.com/software

2. Launch the Package Manager by double-clicking on its executable file (*.exe). A pop-up announcing the upgrade is presented. Click *Accept* to start the upgrade process or *Decline* to exit.

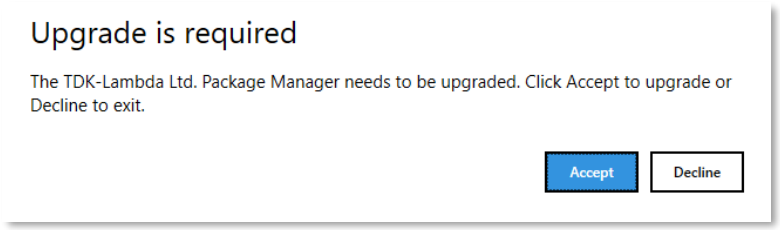

Figure 36

3. If the upgrade is accepted, a list of the affected packages is shown. Click *Accept* to confirm or *Cancel* to decline. In the example below, a handful of packages have available updates. No updates will be modified if the upgrade is refused.

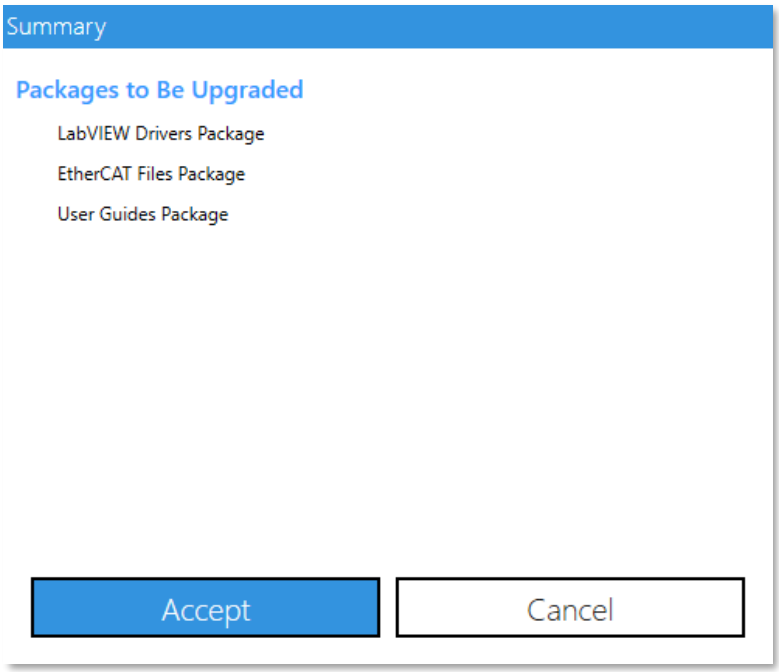

Figure 37

4. The Package Manager's EULA (End-User License Agreement) is presented. Third-party software EULAs are included as well. Read the agreements and click *Accept* to continue the installation process. If you do not agree with the agreement, click *Cancel*. The installation process will stop; no packages will be installed on your PC.

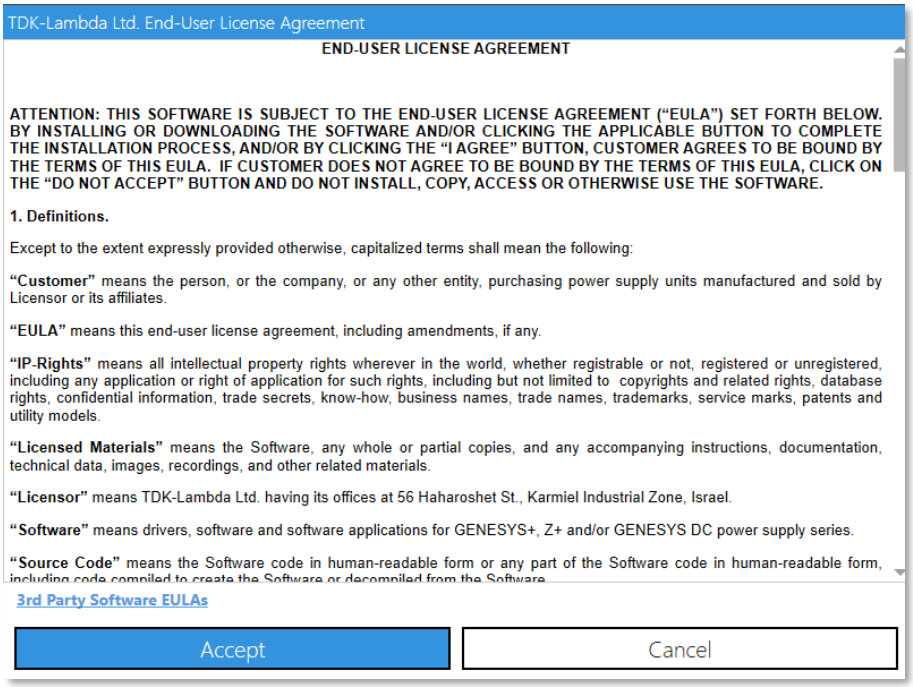

Figure 38

5. Once complete, the installation window will show that the upgrade was successful. Click *Finish*. The upgrade is complete.

Figure 39

6. If an older version of the Package Manager is launched by mistake after a newer version has already been installed, the Package Manager warns the user that a newer version is already installed and offers to launch it instead of the older version. Click *Yes* to open the newest version or Click *No* to exit. The version IDs in the example below are for illustrative purposes only:

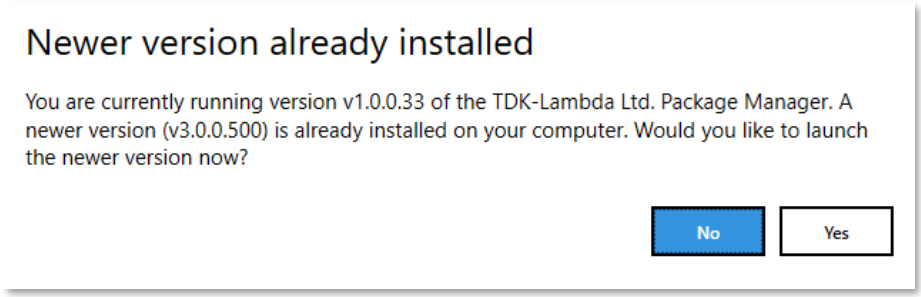

Figure 40

4. Uninstallation

Uninstalling All Packages

1. To uninstall ALL packages, click the **Uninstall (All packages)** button.
2. An uninstallation window pops-up.

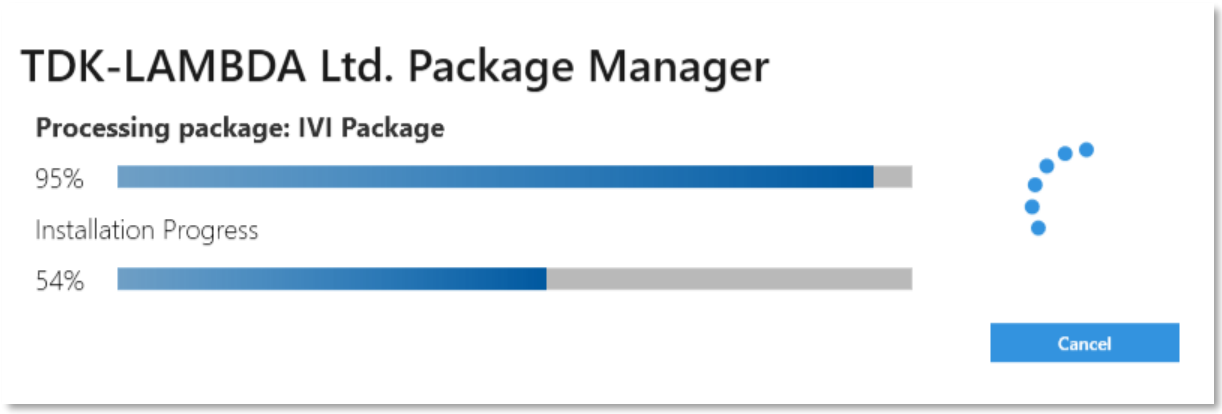

Figure 41

3. Next, a special uninstallation window for 3rd party software will pop-up. Select the 3rd party applications you wish to uninstall, if any. You are not obliged to uninstall them. Then, click *Finish*.

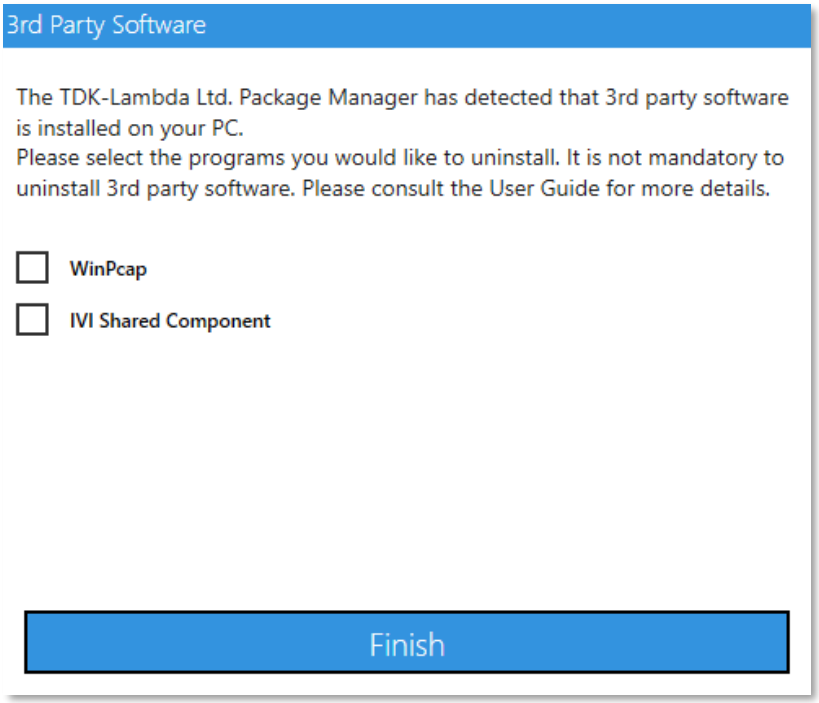

Figure 42

4. If you choose to uninstall WinPcap, an uninstallation window will pop-up. Click *Uninstall* to remove the software. Otherwise, click *Cancel*.

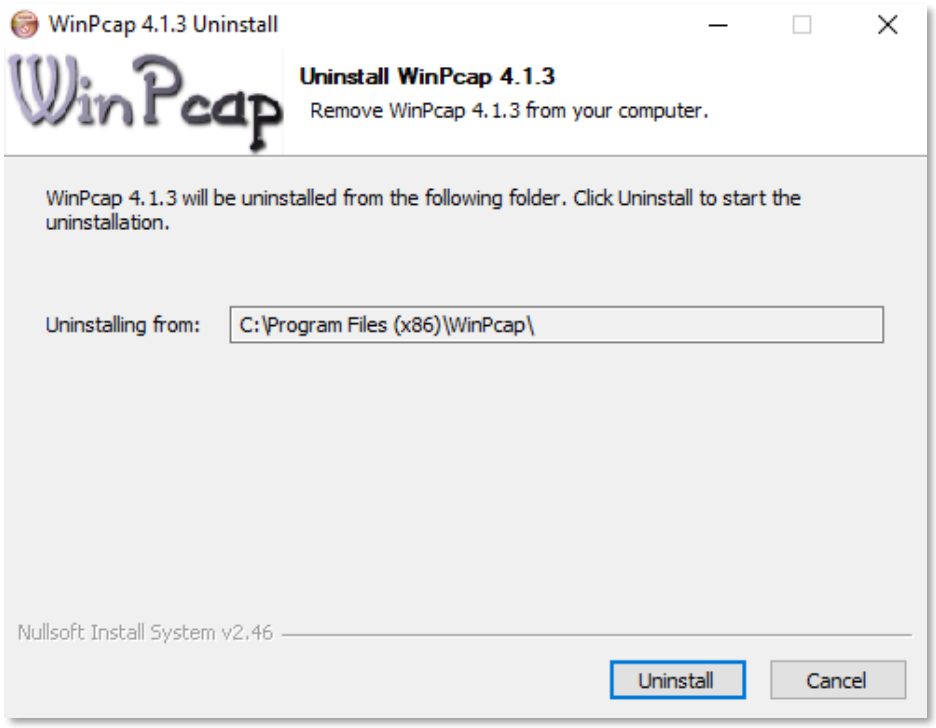

Figure 43

5. Click *Finish*. WinPcap is successfully uninstalled.

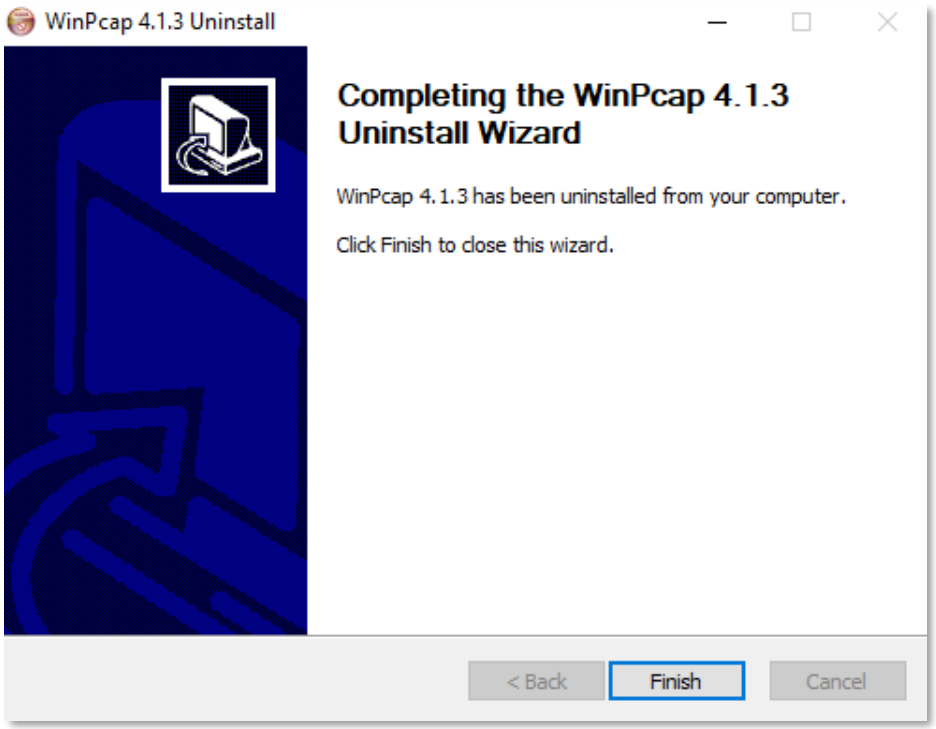

Figure 44

NOTE

WARNING: DO NOT manually uninstall WinPcap using the *Programs and Features* Windows 10 Control Panel. The VCP EtherCAT interface depends on WinPcap, and it cannot function without it. If WinPcap is uninstalled manually by mistake, the VCP Package will be misleadingly marked as *Partially Installed*. To solve this issue, download WinPcap (version 4.1.3) from the link below and reinstall it. If the link is no longer available, please search for "Download WinPcap" in any popular search engine.

https://www.winpcap.org/install/default.htm

6. The IVI Shared Component Cleanup tool pops-up. Select *Uninstall*.

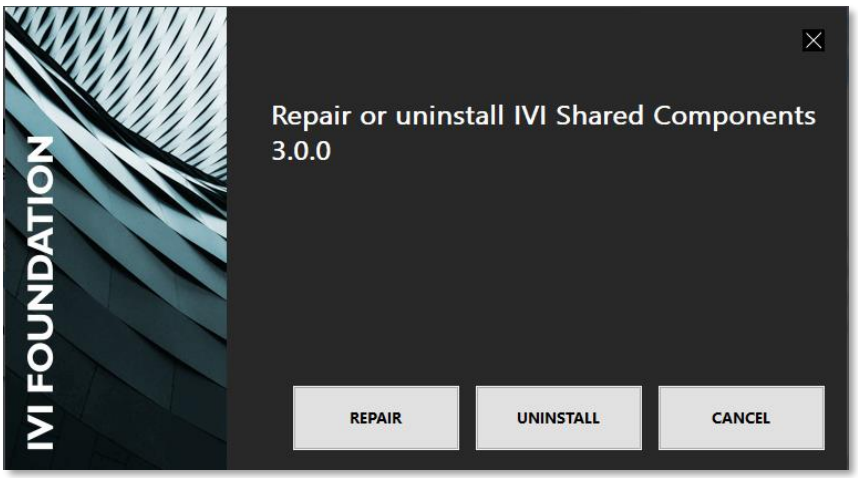

Figure 45

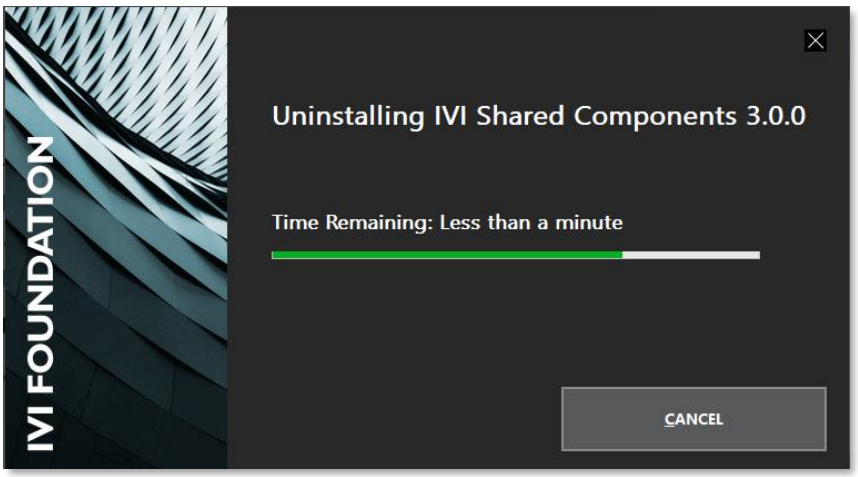

Figure 46

7. The uninstallation is complete.

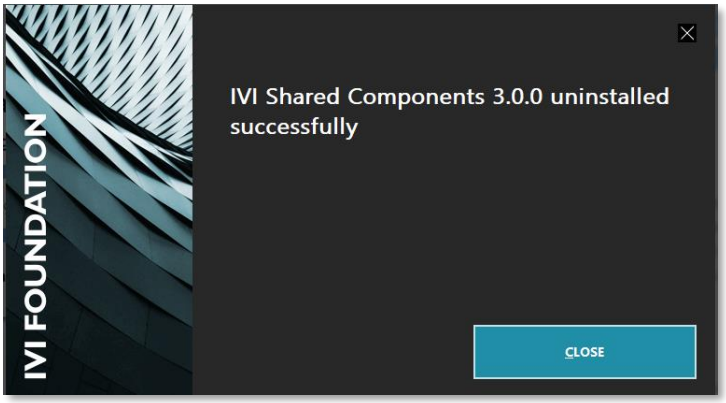

Figure 47

NOTE

WARNING: DO NOT manually uninstall the IVI Shared Component using the *Programs and Features* located in Windows 10 Control Panel, if other IVI software is still installed on your computer. It significantly complicates uninstalling other IVI software. The IVI Package will also be misleadingly marked as *Partially Installed*. If you uninstalled the IVI Shared Component by mistake and are having difficulty using your other software, try to reinstall it using the *Repair* function. If that fails, download the IVI Shared Component from the IVI Foundation's website and reinstall it. If the link is no longer available, please search for "Download IVI Shared Components" in any popular search engine.

https://ivifoundation.org/shared_components/default.aspx

8. The uninstallation process has successfully deleted all packages from your PC, including the Package Manager itself. Click *Finish*.

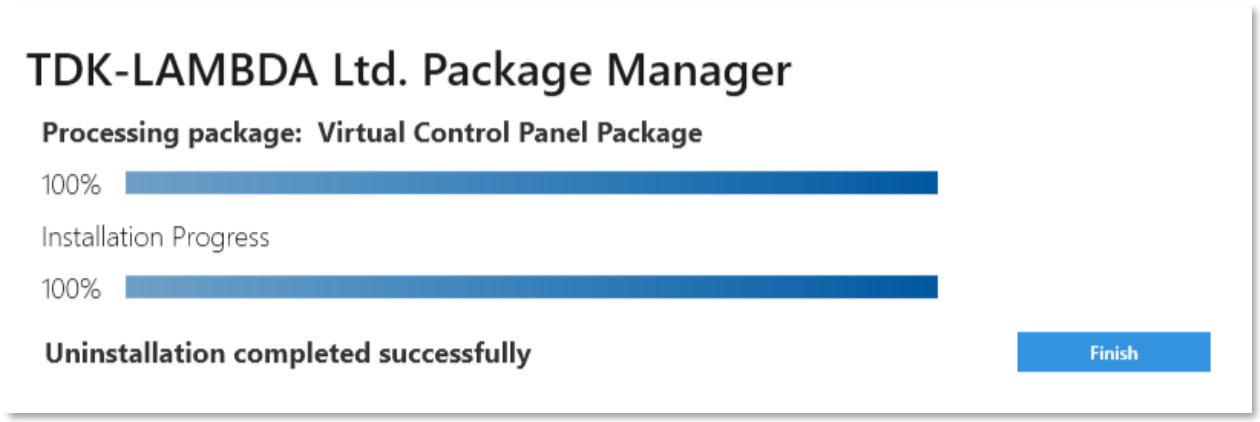

Figure 48

Cancelling an Installation

1. To cancel an installation once it has already started, click *Cancel*. No new packages will be installed on your PC.

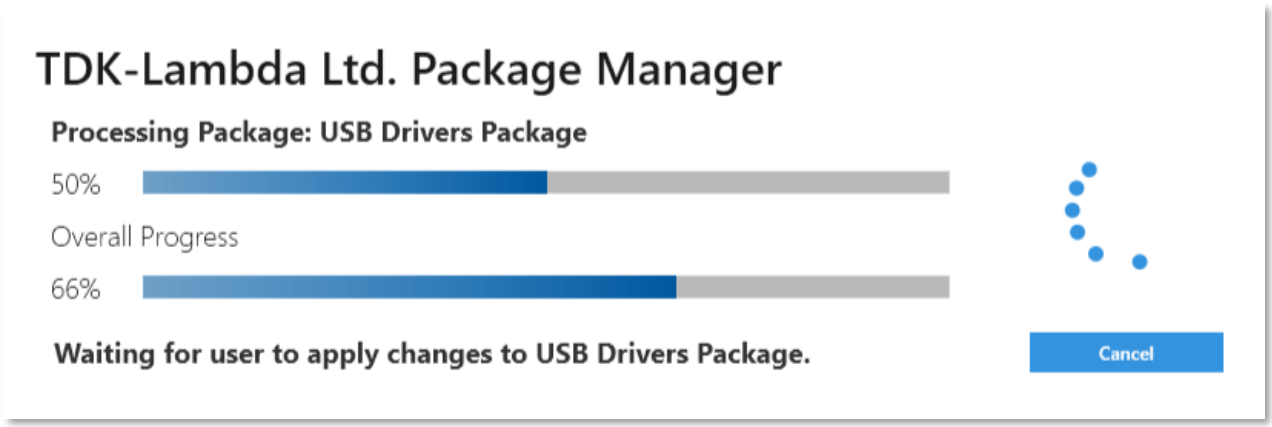

Figure 49

5. Virtual Control Panel Features

Each TDK-Lambda Ltd. programmable power source series has a unique set of supported features. This guide presents all of the available features (some of the features may not be available, these depend on the controlled power source).

Initial Settings

- Automatically identify all power sources connected to a host PC, regardless of the power source's series, interface and language (supported DC programmable series are GENESYS, Z+ and GENESYS+).
- Manually connect a PC to a power source by specifying its interface, address and language.

Basic Control & Monitor

- Modify basic power source settings such as output ON/OFF, programmed/measured voltage, current and power.
- View real-time charts of the above parameters. Save a snapshot of the chart (or copy it to your clipboard).

Terminal

- Send/receive commands to/from a power source.
- Save command history to disk.

Waveform Creator

- Generate a waveform using a waveform creator and preview its graphical profile.
- Save/load a wave to/from a file.

Protection

- Activate and define Over Voltage Protection (OVP), Under Voltage Protection/Limit (UVP/UVL), as well as Foldback (FB).

Analog Programming & Digital Signals

- Setup remote voltage/resistor programming.
- Activate programmable pins, Over Current Limit (OCL), Interlock (ILC) and Enable (ENA).

Global Commands

- Send global commands to power supplies connected together in a multi-drop chain topology.
- Save/recall a power source's state and copy it to all supplies.

Solar Array Simulator

- Solar Array Simulator (SAS) is an internal algorithm used to approximate a SAS *I-V* curve.
- It requires four input parameters:
  - V_{OC} - Open Circuit Voltage.
  - V_{MP} - Maximum Power Voltage.
  - I_{SC} - Short Circuit Current.
  - I_{MP} - Maximum Power Current.

Miscellaneous

- Choose the Front Panel access mode (Local, Remote or Local Lockout).
- Factory-reset.
- Setup the watchdog timer.
- Save/recall basic source settings.
- Test and define display settings.

Multi-Model

- Monitor multiple power supplies simultaneously.
- For each power supply, the following parameters will be monitored:
  - Output State (including output on/off control).
  - Output Operation Mode.
  - System Faults.
  - Measured Output Values.

NOTE

The following advanced features are only available in certain power-source series and in the SCPI language.

Sequencer

- Generate list and wave sequences using a built-in, Excel-like table and preview a sequence's graphical profile.
- Save/recall sequences to/from the power source.
- Setup a sequence trigger: define its source, delay, step mode and continuousness.

Slew Rate

- Setup the Slew Rate's mode, voltage and current references.

Internal Resistance

- Set the Internal Resistance.

Constant Power

- Set the Constant Power limit.

6. Series Specific Features

The following table presents each series' features:

Feature	GENESY+	Z+	GENESYS
Device Interface	V	V	V
Basic Control & Monitor	V	V	V
Terminal	V	V	V
Waveform Creator	V	V	V
Protection	V	V	V
Analog Programming & Digital Signals	V	V	V
Global Commands	V	V	V
Solar Array Simulator	V	V	V
Miscellaneous	V	V	V
Sequencer	V	V	X
Slew Rate	V	X	X
Internal Resistance	V	X	X
Constant Power	V	X	X
Multi-Model	V	V	V

Table 1

7. Basic Features

Initial Settings

Auto detection:

The Auto-Detection tool allows the user to automatically identify all TDK-Lambda Ltd. programmable power sources connected to a host PC, regardless of the power source's series, interface and language. The tool is particularly powerful because it also detects all supplies connected in a multi-drop configuration.

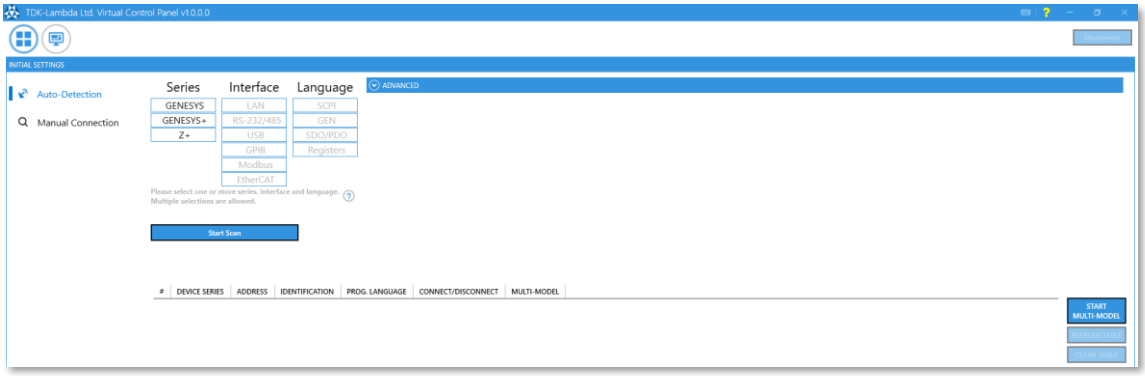

Figure 50

Follow the steps below to setup Auto-Detection:

1.
   (a) If you don't know your power source's series, interface or language, select all options in the *Series*, *Interface* and *Language* columns. Then, click the *Start Scan* button. Otherwise, skip to step 2.
   (b) The Auto-Detection software will start a broad search of all selected series types, interfaces and languages. Devices will be progressively added to the Device List as they are discovered.

WARNING

This type of Auto-Detection is powerful but time-consuming. It can take several minutes to complete since the Auto-Detection tool searches over all your PC's interfaces and for all possible power sources' addresses.

2.
   (a) If you know the series of your power source, select it in the *Series* column.

NOTES

1. If you are unsure of a certain parameter value such as the series, interface or language being used, it is preferable to select all values in that column.
2. Multiple selections are allowed in each column, in case power supplies of different series and configurations are connected to your PC.

(b) The interfaces available with the selected series will appear in the Interface column. If you know which interface your device is using to communicate with your PC, select it in the *Interface* column.

(c) The languages supported by the selected interface will appear in the Language column. If you know which language your device is using to communicate with your PC, select it in the *Language* column.

(d) OPTIONAL: if you approximately know your power source's device address or Baud Rate, but do not remember the exact value, you can input this information (and more) in the *Advanced* dropdown menu. The Auto-Detection software will scan devices in the selected range. An example is shown below:

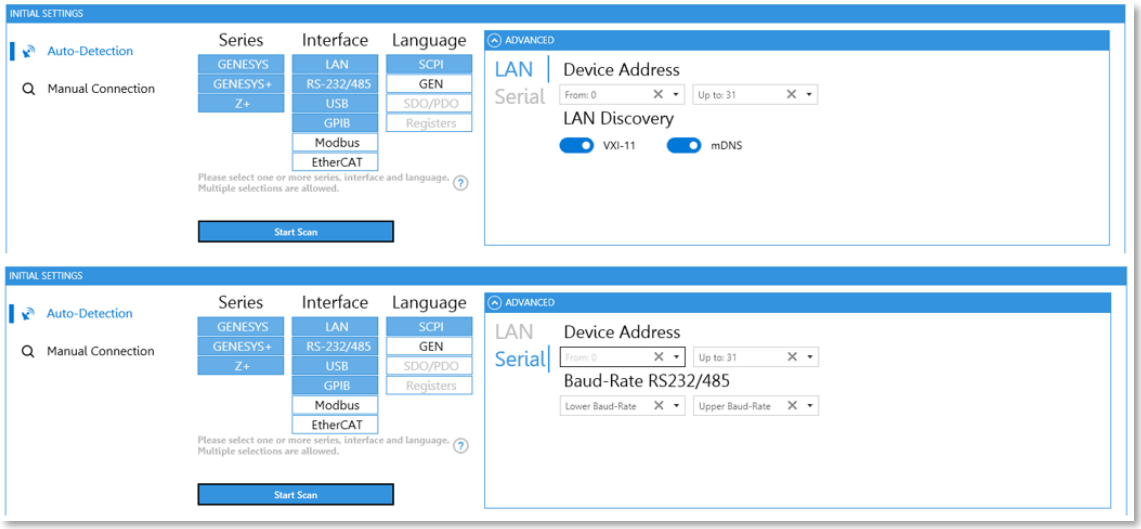

Figure 51

(e) Click *Start Scan*.

3. Click on the device you would like to communicate with (you can click anywhere in the device's row). Only one power source can be selected.

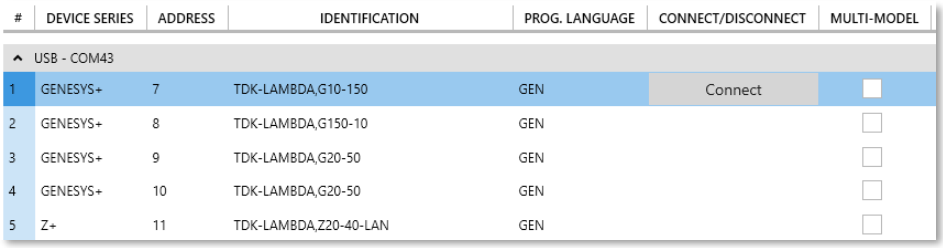

Figure 52

4. Click on the device you would like to communicate with (you can click anywhere in the device's row). Only one power source can be selected.

Figure 53

Figure 54

Manual Connection

If you know which interface your power source is connected to, as well as other details such as its address or language, it can be faster to connect using the *Manual Connection* mode.

NOTE

This mode only allows connecting to the Master device of a multi-drop configuration, and not the slaves.

Below is a screenshot of the interfaces supported by the *Manual Connection* mode, as well as an example of a USB connection.

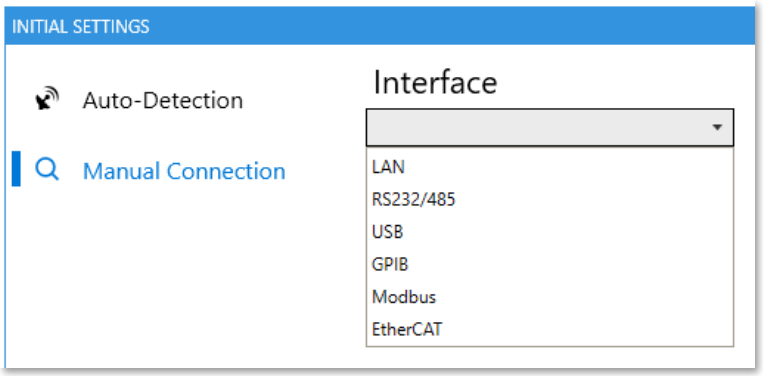

Figure 55

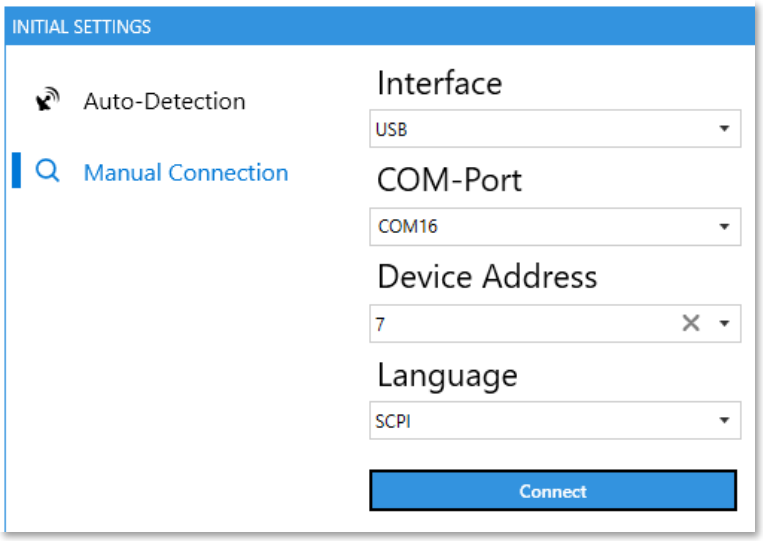

Figure 56

Application Settings

To change the appearance of the Virtual Control Panel software, click on the *Application Settings* tab found on the bottom-left corner of the window. The selected settings will be applied every time VCP is opened.

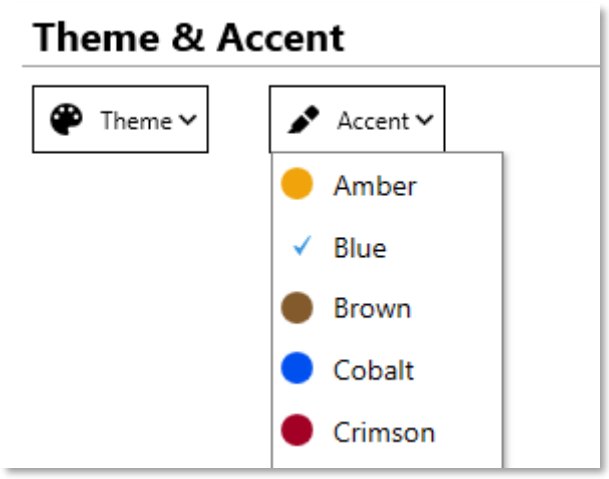

Figure 57

Basic Control & Monitor

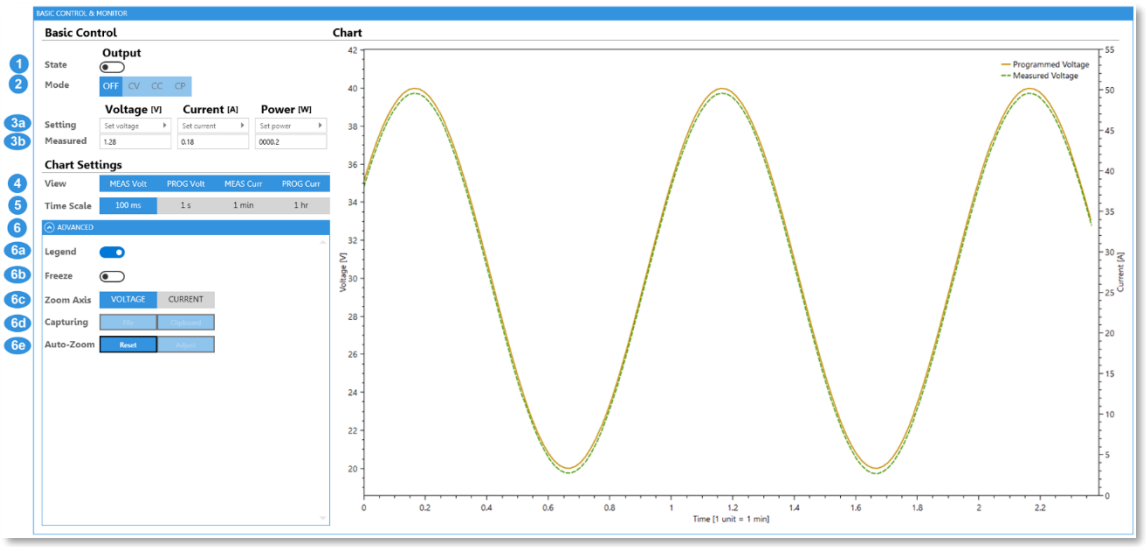

Figure 58

1. Enable or disable the power source's output.
2. View the output mode: OFF, CV, CC or CP (available in some series only).
3.
   (a) Set the output voltage and/or current. The software automatically verifies that the input values respect the power source's range.
   (b) View the actual (Measured) value output by the power source (the value is read from the power source).
4. Select which values should be shown in the chart: measured/programmed current and voltage. Multiple values can be viewed simultaneously.
5. Choose the time scale with which to view the power source's data. Each major tick on the horizontal chart axis represents one unit of the time scale, while each minor tick represents one-tenth of a unit. Regardless of the chosen time scale, 10 full units are always shown.
6. OPTIONAL: if you want to manage the axis zoom, freeze the chart or copy the chart to your clipboard, you can set these parameters (and more) in the *Advanced* dropdown menu.
   (a) Make Legend visible / invisible by clicking on the *Legend* switch.
   (b) Select to zoom on the voltage or current axis. Then, place your cursor anywhere on the chart and start zooming in/out using your mouse wheel.
   (c) Save a screen capture of the chart as an image file or to your clipboard.
   (d) Freeze the chart's appearance (stops chart refresh).
   (e) Increase zoom on displayed curves that so that they fill the entire chart area. You can also reset the zoom to full-range view.

NOTES

1. Even when chart is frozen, the power source is still queries for its values in real-time. Therefore, when the chart is unfrozen, it will still include all data queried when the chart was frozen.
2. Left-clicking on any point of a curve causes the point's timestamp and value to momentarily appear, as long as the user clicks on the curve. To anchor an information box to the chart, so that it still appears after releasing the mouse-click (for example, to capture the chart with a point's information displayed), click Freeze and then right-click on the point. To make the information box disappear, left-click anywhere on the chart.

Terminal

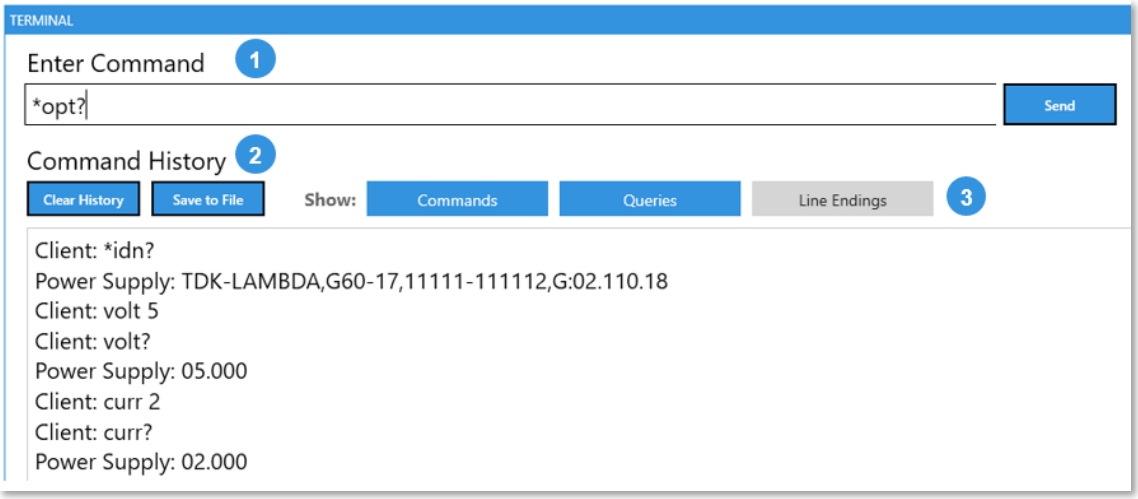

Figure 59

1. Enter a command in the input field and press ENTER (keyboard key) or click *SEND* to submit the command. The command will appear in the Command History box. If it is a valid query or if the language being used is GEN, the power source's response will be shown.

NOTES

1. Pressing the UP/DOWN arrows on your keyboard shows previously-sent commands in the input field.
2. The Virtual Control Panel regularly sends in the background a "keep-alive" query to the power source to check that the connection is still alive. To provide more control to the user, the keep-alive query is NOT sent when the user is using the Terminal. The exception to this rule is the Modbus interface, because its protocol inherently requires a keep-alive message to maintain a connection.

2.
   (a) Click *Clear History* to clear the command history.
   (b) Click *Save to File* to save the command history to your PC.
3.
   (a) To filter the command history and only show certain types of commands, click:
      (i) *Commands* to show commands only.
      (ii) *Queries* to show queries only.
   (b) Click *Line Endings* to view/hide line feed characters (e.g. \r, \n, \r\n and \n\r).

Waveform Creator

This feature is controlled directly from the PC, the waveform is not stored in the power supply. In order to store it, please skip to the *Sequencer* section.

Basic Waveform Creator Settings

The Waveform Creator allows advanced waveform programming of a power source's output.
It includes two chart modes: STATIC and REAL-TIME and two programming modes: VOLTAGE and CURRENT.
It also includes five different waveforms functions: Line, Sine, Triangle, Saw tooth and Square, each one has its own parameters to define.

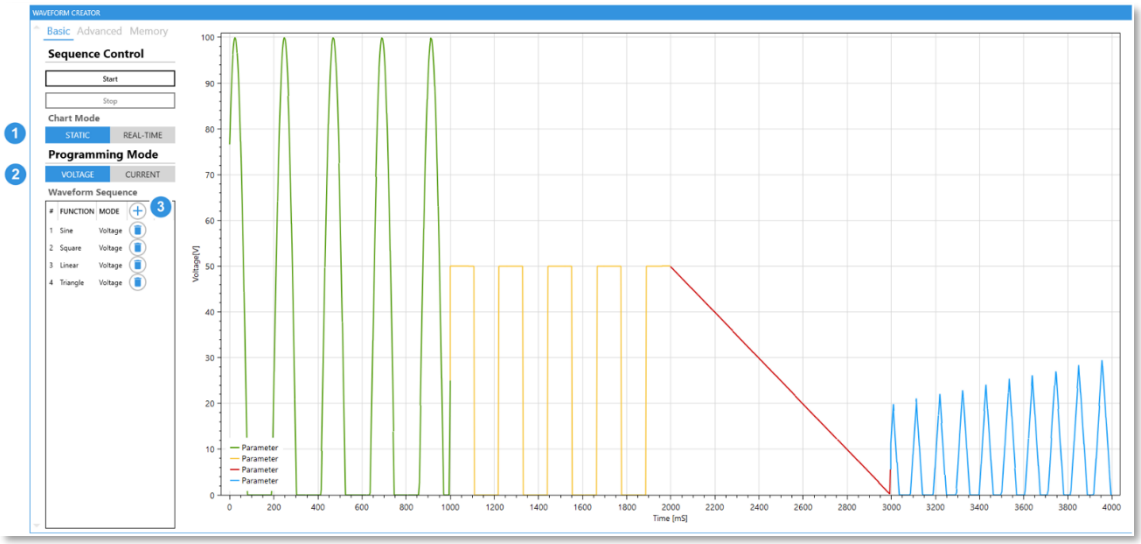

Figure 60

There is an option to replicate the wave periodically, save it to your PC memory or upload it from there.

In order to generate a waveform simulation, please follow the next steps:

1. Select wave chart mode: STATIC or REAL-TIME.
2. Select wave programming mode: VOLTAGE or CURRENT.
3. Create a new waveform by clicking the ⊕ button. Preview window will pop-up:

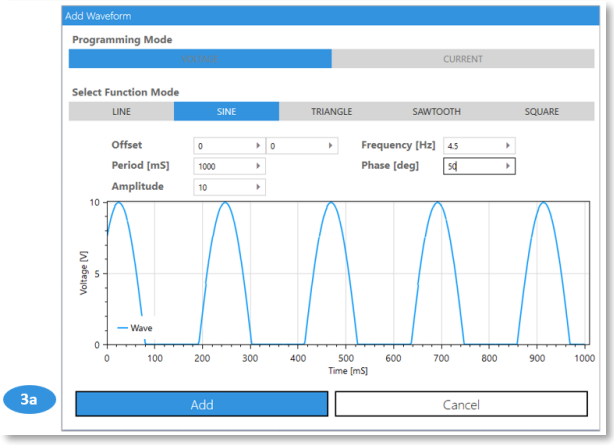

Figure 61

(a) Choose one of the given functions, set parameters, and watch as the wave's graph is automatically generated as you type, then click the *add* button.

- If you do not want to set *Advanced Settings*, please skip to step 5.

NOTE

Due to the waveform drawing algorithm, the limited number of points and the timing required to update power supply waveform values, there may be a slight deviation in the waveform graph shown, and the actual power supply output.

Advanced Waveform Creator Settings

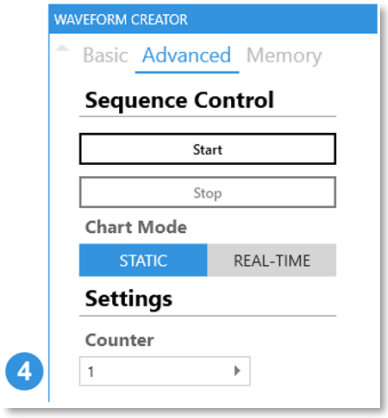

Figure 62

4. Define the number of times the waveform should be repeated.

Waveform Creator Control

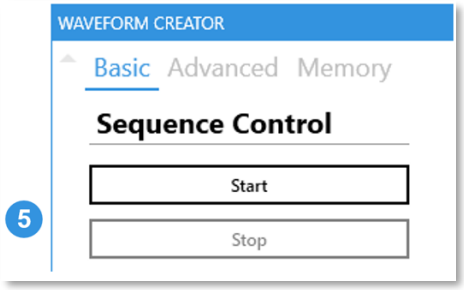

Figure 63

5. Once the waveform is ready to be executed, click the *Start* button to initiate the execution. To stop the waveform execution, click *Stop* at any time.

Waveform Creator Memory

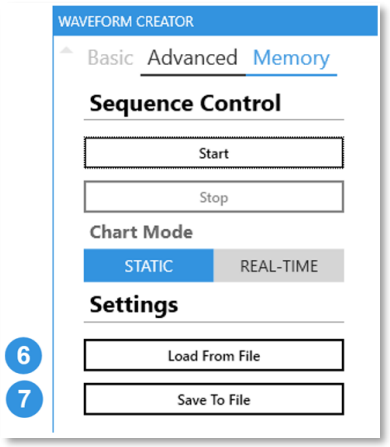

Figure 64

6. Click *Load From File* to load a waveform stored on your PC. The settings will be shown on the graph and in the tabs. To execute the waveform, go back to step 5.
7. Click *Save To File* to save a waveform to your PC for future use.

Protection

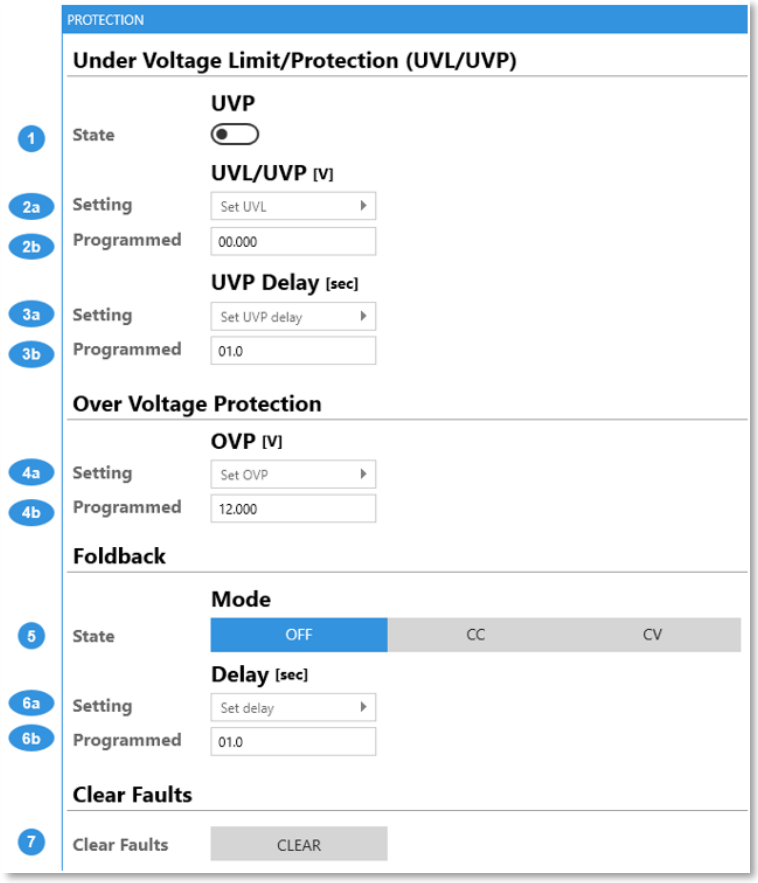

Figure 65

1. Click on the UVP (Under Voltage Protection) switch to enable or disable UVP protection. If enabled, the power source's output will be automatically disabled if the measured output voltage reaches the UVL (Under Voltage Limit) voltage.
2. 3. 4. 6.
   (a) Set the value of UVP/UVL (2), UVP delay (3), OVP (4) or Foldback (6). The Setting value is the field that needs to be set by the user. VCP automatically verifies that the respective input value is valid based on the power source's range.
   (b) View the actual (Programmed) value accepted by the power source (the value is read from the power source).
5. Select the Foldback protection Mode. If CV (Constant Voltage) is selected, the protection will disable the power source's output if it crosses from CC (Constant Current) or CP (Constant Power, for power sources which include the Constant Power function) to CV mode. If CC is selected, the protection will disable the power source's output if it crosses over from CV or CP to CC. If OFF is selected, Foldback protection is disabled.
7. Clear latching faults (for OVP, UVP and Foldback). The actual fault condition must be removed before the latch is cleared.

Analog Programming & Digital Signals

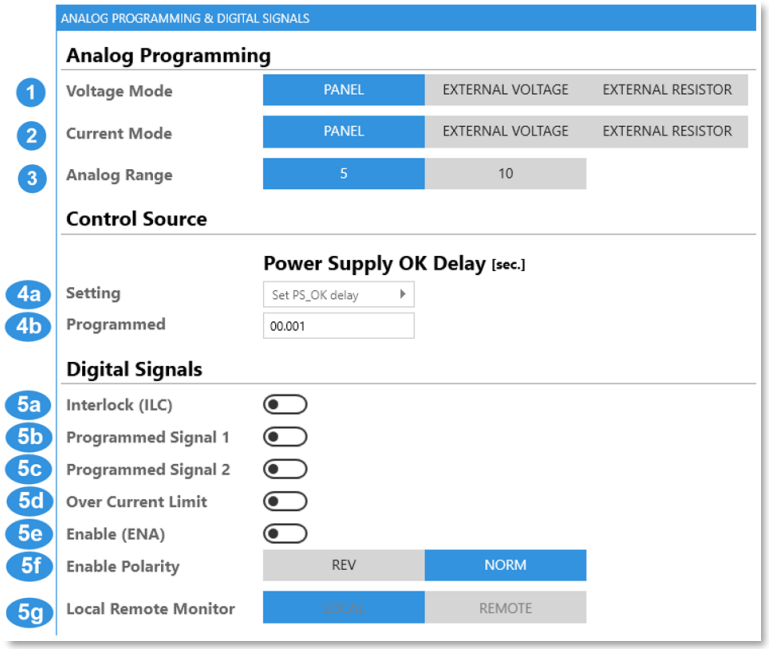

Figure 66

Analog Programming

Select the:

1. Voltage programming source type:
    - Panel: programmed using the Front Panel or a digital communication interface.
    - External voltage source.
    - External variable resistor.
2. Current Programming source type: the options are the same as in step 1.
3. Analog Programming range: relevant only if one of the modes above isn't PANEL.

NOTES

1. If analog Programming is enabled, the Sequencer, Constant Power Limit, Slew Rate and Internal Resistance functions are disabled.
2. If the Sequencer, Constant Power Limit, Slew Rate and Internal Resistance functions are enabled, Analog Programming is disabled.

Control Source

4.

(a) Set the delay of the PS_OK signal. The *Setting* value is the field that needs to be set by the user. The PS_OK signal indicates whether the power source output is ON or OFF. The delay is added to the signal after the output turns on.

(b) View the actual (*Programmed*) value accepted by the power source (the value is read from the power source).

Digital Signals

5. Click on the following switches / buttons to enable or disable their functions:
   (a) Interlock (ILC).
   (b) Programmed Signal 1.
   (c) Programmed Signal 2.
   (d) Over Current Limit (OCL).
   (e) Enable (ENA).
   (f) Set the polarity of the ENAble signal: REV means that the device's output will be ON if the ENA pin signal is high. On the other hand, NORM means that the output will be ON if the ENA pin signal is low (which is the same behavior as Interlock).
   (g) View if Analog Programming is enabled (by rear panel connector).

Global Commands

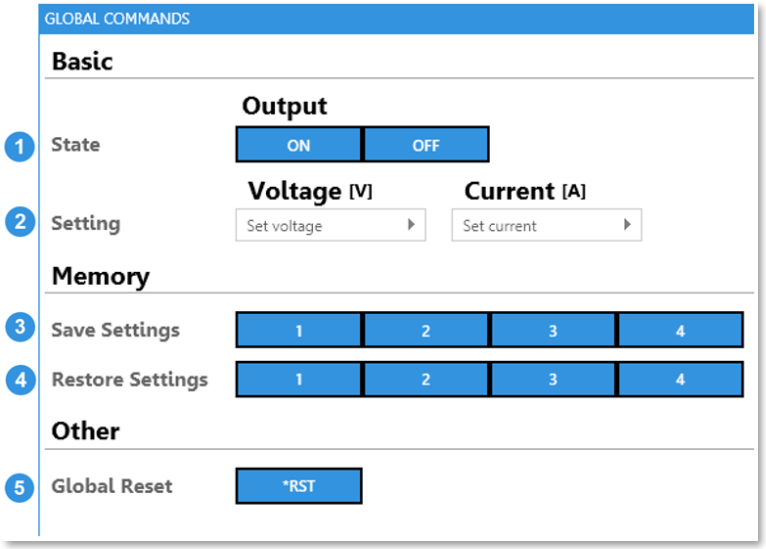

Figure 67

Basic

6. Turn ON/OFF the output of all power supplies.
7. Set the voltage/current of all daisy-chained power sources to the same value. It is the user's responsibility to verify that the input value is in the range of all chained power sources. Only supplies with a sufficient voltage/current range will accept the programmed value.

Memory

8. Save each power source's settings to its respective memory cell.
9. Restore each power source's settings from its respective memory cell.

Settings

10. Reset all power sources to default settings.

Solar Array Simulator

Solar Array Simulator (SAS) is an internal algorithm used to approximate a SAS I-V curve.
Four input parameters are required in order to build the curve:

Figure 68

1. V_{OC} - Open Circuit Voltage.
2. V_{MP} - Maximum Power Voltage. The voltage at the peak power point of the curve. Its range is limited by the V_{OC} value.
3. I_{SC} - Short Circuit Current.
4. I_{MP} - Maximum Power Current. The Current at the peak power point of the curve. Its range is limited by the I_{SC} value.

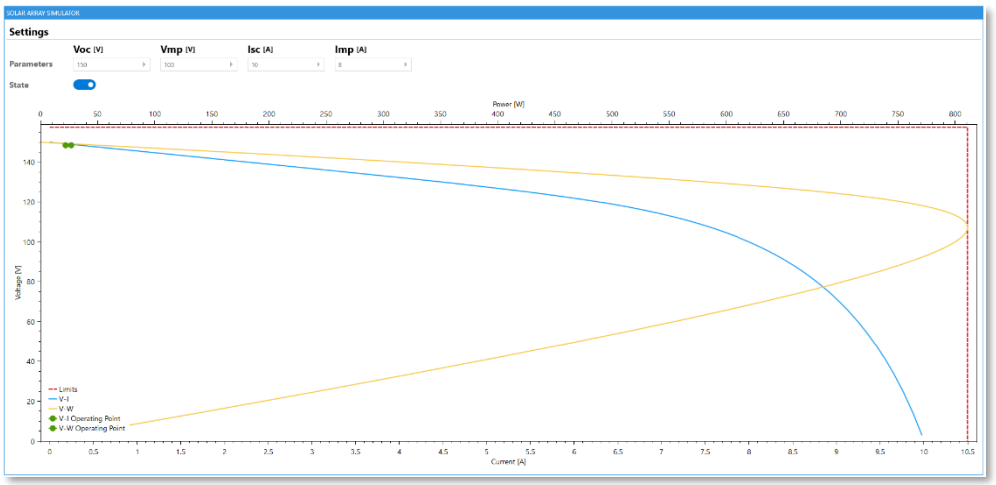

Figure 69

- After setting all parameters, click the *State* switch to enable or disable the SAS.
- Click on the operating point on the graph to view the values of the power source's measured voltage (V_{OUT}) and measured current (I_{OUT}).

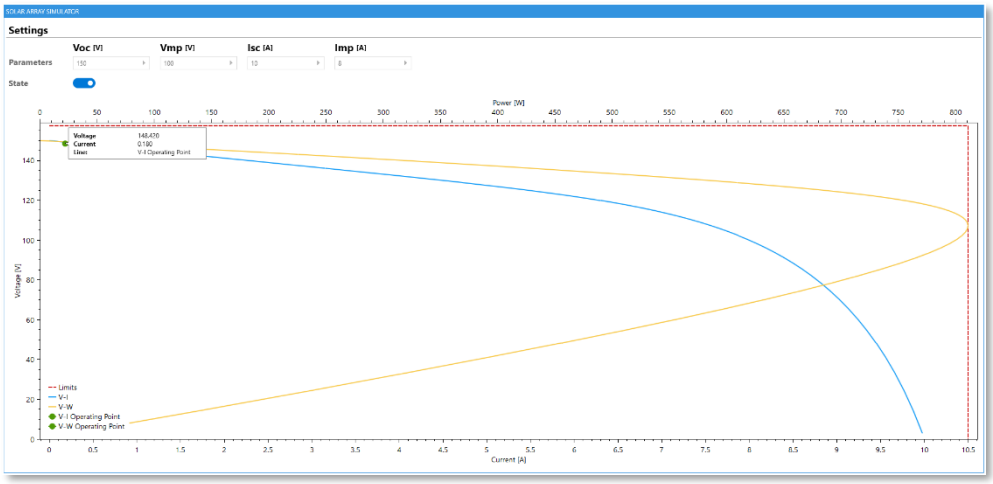

Figure 70

- Solar Mode Simulator can be enabled only if all four input parameters were set.

Miscellaneous

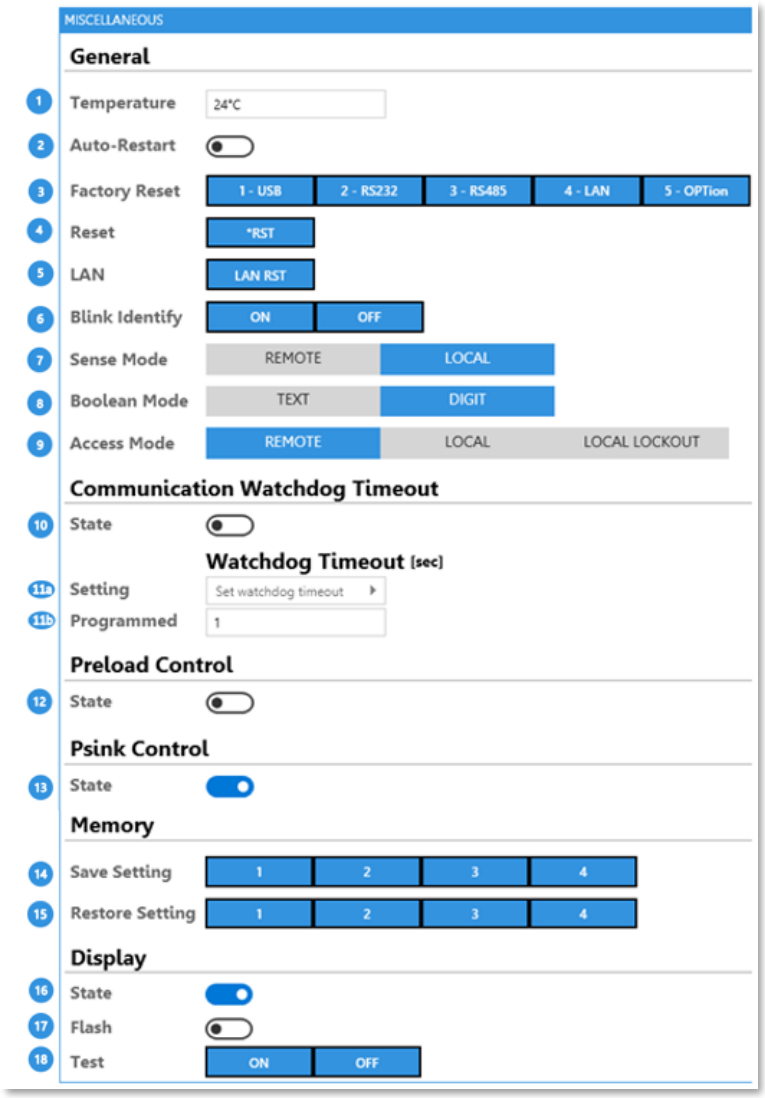

Figure 71

General

1. View the power source's ambient temperature (in degrees Celsius).
2. Press the *Auto-Restart* switch to restore the power source, at start-up, to its last operational settings.
3. Reset all power source parameters to factory settings and select a communication interface.
4. Reset basic power source parameters to factory settings. The communication interface will remain the same.
5. Reset LAN parameters to their default values (only available using the LAN interface).
6. Locate the Master source in a rack by forcing its Front Panel and green LAN LED to continuously blink (available using the LAN interface).
7. Select the output voltage sensing source: Remote or Local.
8. Select the format of responses to Boolean queries: ON/OFF vs 0/1.
9. Select the Front Panel's access mode. The default Front Panel mode is *Remote*.

Communication Watchdog Timeout

10. Press the *State* switch to enable/disable the Communication Watchdog Timeout function.
11.

    (a) Set the Watchdog's timeout value. If there is no activity on any of the available communication interfaces, the source's output will be disabled. The Setting value is the field that needs to be set by the user. VCP automatically verifies that the input value is valid.
    (b) View the actual (*Programmed*) value accepted by the power source (the value is read from the power source).

NOTES

1. The Communication Watchdog is available in the SCPI language only (not available in GEN).
2. Switching communication interfaces (i.e. USB to RS232) stops the communication interface's timeout period. It is automatically re-initiated following the first command or query (including invalid commands) received on the selected interface.
3. Pressing Front Panel buttons does not affect the Watchdog timeout period.

Preload Control

12. Press the *State* switch to enable/disable Preload Control.

NOTES

1. The Preload Control function enables/disables internal preload circuitry. This function is mainly used to prevent batteries (connected to a power source's output terminals) from discharging.
2. Setting the preload to ON (the default configuration) keeps the preload active as long as the power source's output is ON. Setting the preload to OFF deactivate the internal preload five seconds after a transition to the output OFF state.

Psink Control

13. Click on the *State* switch to enable/disable the Psink.

NOTES

1. The Psink Control function enables the power supply to absorb bursts of power fed back to it.
2. Available only for power supplies equipped with a Power Sink option.

Memory

14. Save the power source's settings to a selected memory cell.
15. Restore the power source's settings from a selected memory cell.

Display

16. Enable/disable the *State* switch to turn the Front Panel ON or OFF (display and buttons).
17. Turn on the *Flash* switch to force the Front Panel to blink.
18. Turn on the *Test* switch to display all characters on the Front Panel. Turn off the switch to return to the normal display.

8. Multi-Model

Functionality

The Multi-Model Monitor allows you to monitor multiple supplies simultaneously, and control its output state.

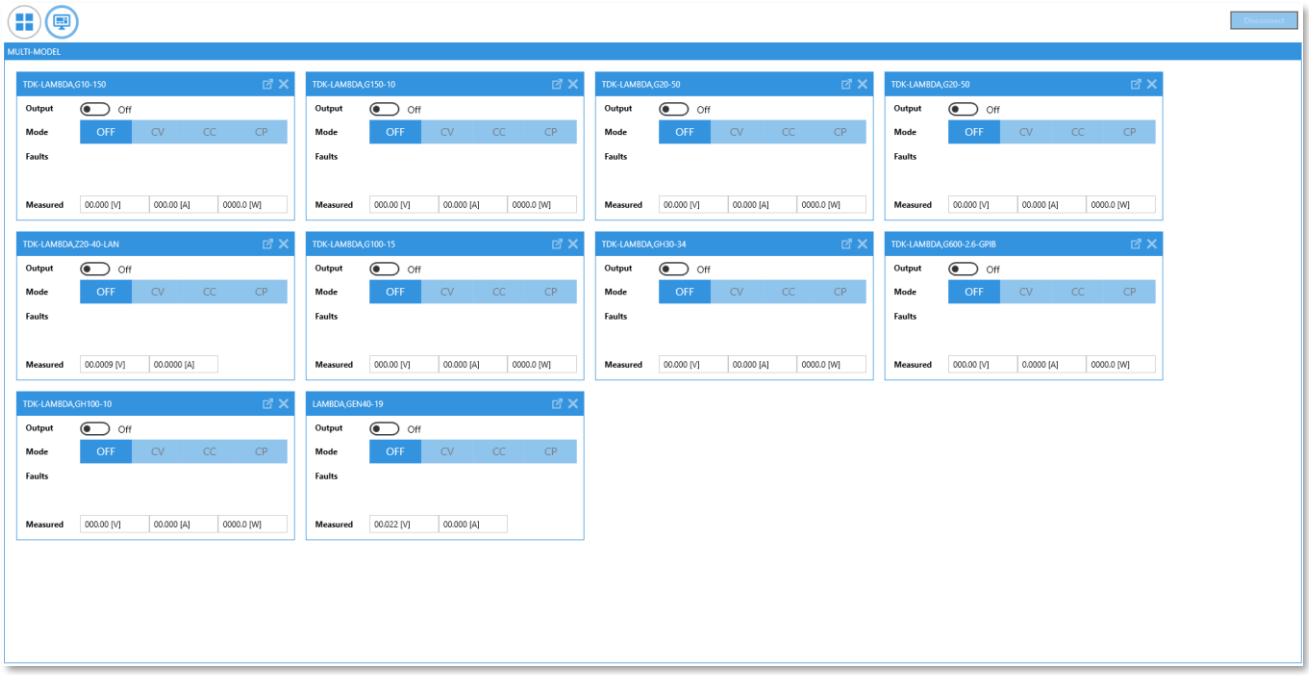

Figure 72

For each power supply the following parameters will be monitored:

- Output State (including output on/off control).
- Output Operation Mode.
- System Faults.
- Measured Output Values.

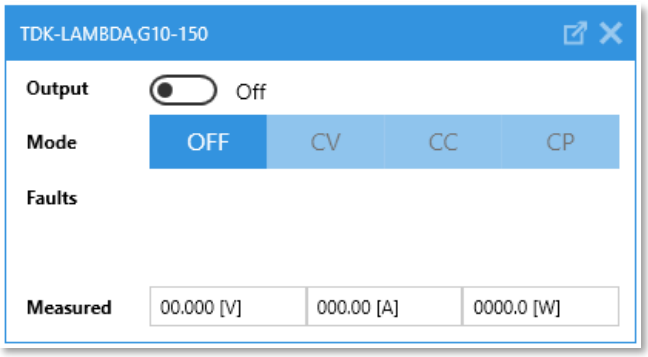

Figure 73

The Multi-Model can:

- Control the output state.
- Generate a connection to a specific power supply and operate it using all available features.
- Monitor all supplies connected in a Multi-Drop configuration in one tab.

NOTES

Multiple series, languages, baud-rates can be displayed in the Multi-Model.

Connection Instructions

1. In the *Initial Settings* Tab, set all required parameters and detect the relevant power supplies. In order to include (display) any device in the Multi-Model tab, tick the Multi-Model column by clicking on ☐ which will turn into ☑ .

   Once the supplies were detected, it will be displayed as follows:

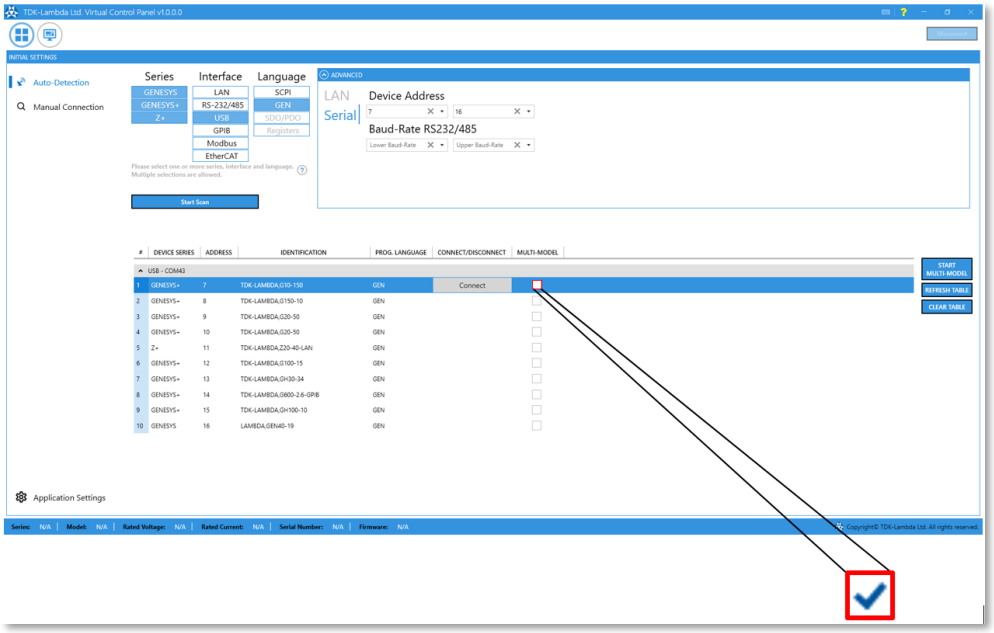

Figure 74

#	DEVICE SERIES	ADDRESS	IDENTIFICATION	PROG. LANGUAGE	CONNECT/DISCONNECT	MULTI-MODEL
USB - COM43						
1	GENESYS+	7	TDK-LAMBDA,G10-150	GEN	Connect	☑
2	GENESYS+	8	TDK-LAMBDA,G150-10	GEN		☑
3	GENESYS+	9	TDK-LAMBDA,G20-50	GEN		☑
4	GENESYS+	10	TDK-LAMBDA,G20-50	GEN		☑
5	Z+	11	TDK-LAMBDA,Z20-40-LAN	GEN		☑
6	GENESYS+	12	TDK-LAMBDA,G100-15	GEN		☑
7	GENESYS+	13	TDK-LAMBDA,GH30-34	GEN		☑
8	GENESYS+	14	TDK-LAMBDA,G600-2.6-GPIB	GEN		☑
9	GENESYS+	15	TDK-LAMBDA,GH100-10	GEN		☑
10	GENESYS	16	LAMBDA,GEN40-19	GEN		☑

Figure 75

2. Click the *START MULTI-MODEL* button, GUI will switch to the Multi-Model tab. All ticked supplies will be displayed (refer to Figure 72). The number of ticked devices will be shown next to the *START MULTI-MODEL button.*

   Switching to the Multi-Model tab is also possible, by clicking the  icon in the functions banner at the top of the screen.

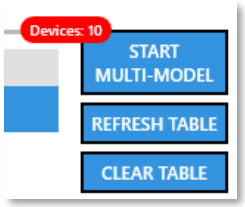

Figure 76

3. Once you are in the Multi-Model tab, you can turn each connected supply Output ON / OFF, monitor its Output Measured Values, Output State and Output Operation Mode.

4. You can also choose a specific power supply and connect to its Virtual Control Panel by clicking the  icon on the right top corner of the device's frame. You will be immediately transferred to the *Basic Control & Monitor* tab.

5. In order to remove a power supply from the Multi-Model tab, simply click on the  icon on the right top corner of the device's frame. It will also remove it mark from the table.

NOTE

While working in Multi-Drop configuration, all chained supplies should be marked in the table in order to display these in the Multi-Model tab.

6. If faults occur in one or more of the power supplies, it will be detailed in the Multi-Model monitor as follows:

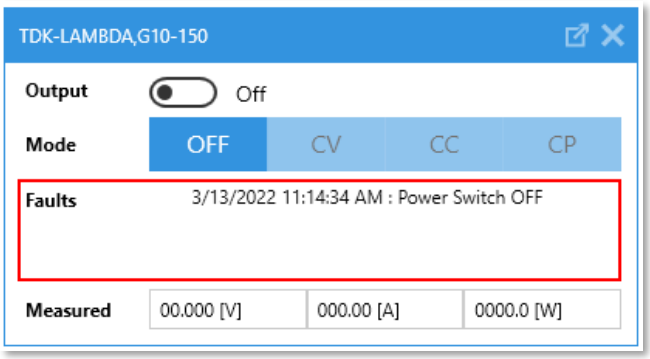

Figure 77

NOTE

The monitor will display up to three faults. These faults are the first three active faults occurred in the power supply based on the Questionable Condition Register state.

7. If one or more of the power supplies disconnects, it will be shown in the Multi-Model tab as follows:

Figure 78

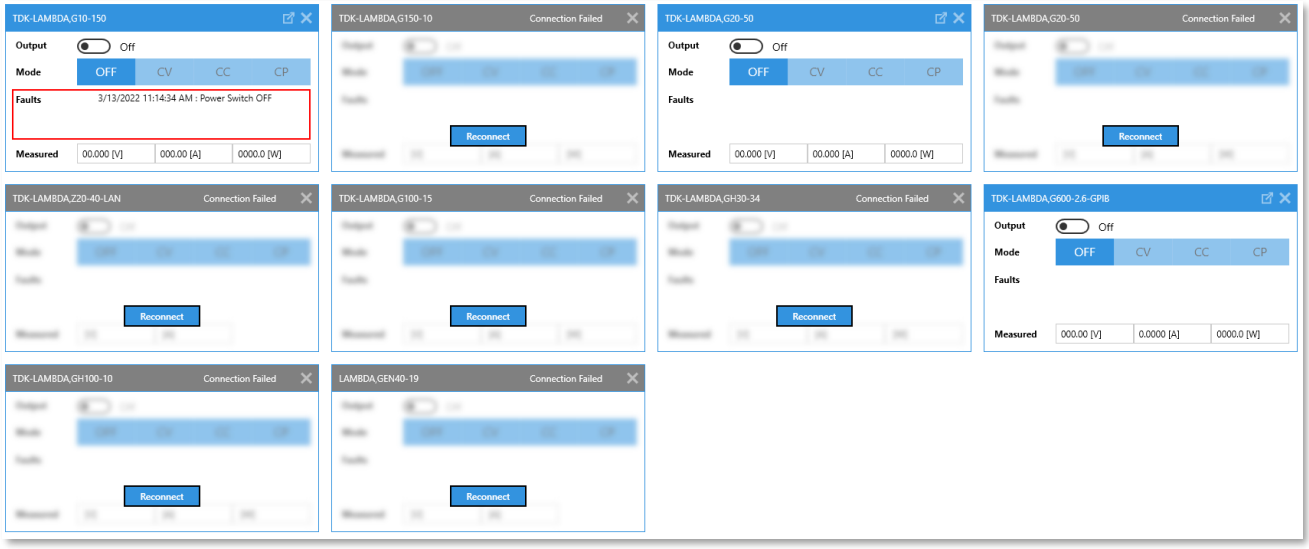

Figure 79

8. In order to reconnect to the power supply, click on the Reconnect button. When there is an attempt to reconnect, it will be noted on the screen as follows:

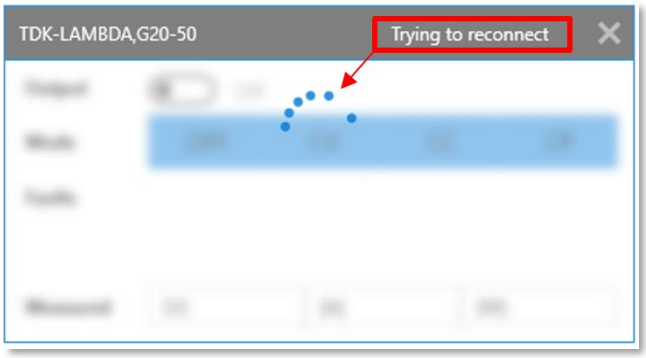

Figure 80

9. Advanced Features

Sequencer

Basic Sequencer Settings

The Sequencer allows advanced waveform programming of a power source's output. There are three programmable modes: LIST, WAVE and FIX (available in some series only). The modes are synchronized by an input trigger. The power source can also activate an output trigger according to the selected mode. Please refer to your power source's User Manual for more information about its specific Sequencer functionalities.

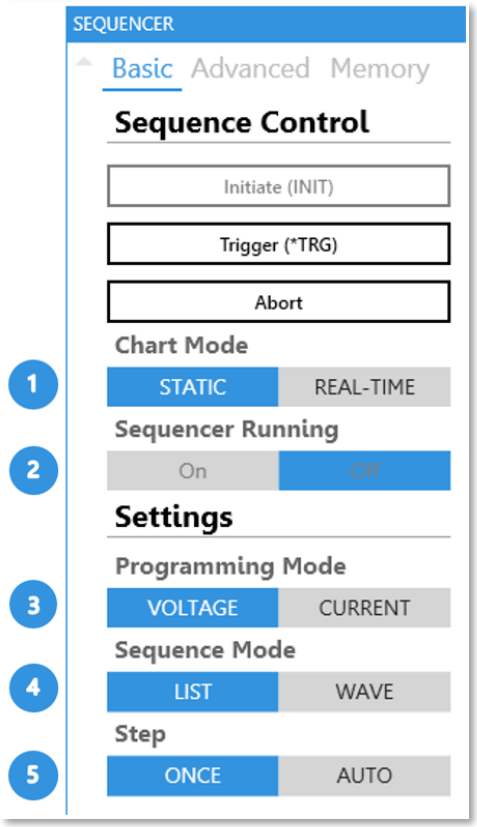

Figure 81

1. Select the chart mode: STATIC or REAL-TIME.
2. Monitor the sequence running.
3. Select the sequence data type: VOLTAGE or CURRENT.
4. Select the sequence mode: LIST, WAVE or FIX (if compatible).
5. Select the step type: ONCE or AUTO. If ONCE is chosen, each step of the sequence needs to be triggered before it is executed, one step at a time. If AUTO is selected, all steps are executed by a single trigger. ONCE is selected by default.
6. Fill-in the sequence's table on the right-hand side of the window. Watch as the sequence's graph is automatically generated as you type. If you do not want to set Advanced Settings, please skip to step 13.

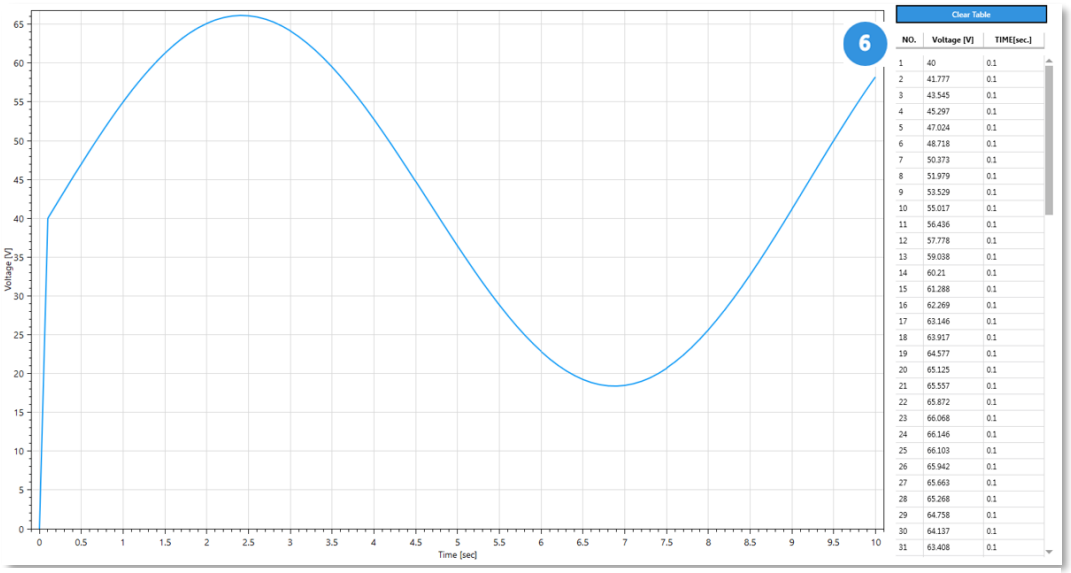

Figure 82

NOTES

1. A GENESYS+ power source can be programmed with up to 100 points per sequence, while the Z+ series accepts up to 12 points. Sequencing is not available in the GENESYS series.
2. Due to the sequence-drawing algorithm and the limited number of points, there may be a slight deviation in the waveform graph compared to the power supply output.

Advanced Sequencer Settings

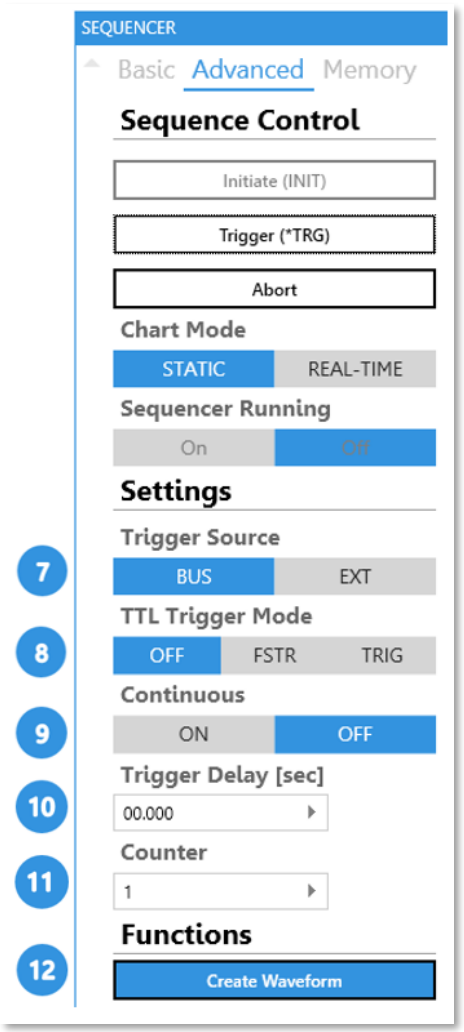

Figure 83

7. Set the sequencer's trigger source: this can be through a BUS (the TRG command or Front Panel) or using an EXTernal source (an input pin on the device's rear panel).
8. Set the trigger mode.

NOTES

1. In FSTR mode, for a NONE sequence, an output pulse is generated automatically any time an output parameter (such as the output state, voltage or current) is programmed. For other types of sequences, an output pulse is generated automatically any time a step has completed.
2. In TRIG mode, for a NONE sequence, a trigger is generated if the output state changes. For other types of sequences, a trigger is generated once the sequence has completed.

9. Enable or disable the Continuous flag. If the flag is off, the sequencer must be manually reinitialized after every trigger using the INITate command. Otherwise, it is reset automatically.
10. Set the trigger delay. Following a trigger input, a delay (in seconds) will be added before executing the sequence.
11. Define the number of times the sequence should be repeated.
12. Create a sequence using the waveform creator.

Sequencer Control

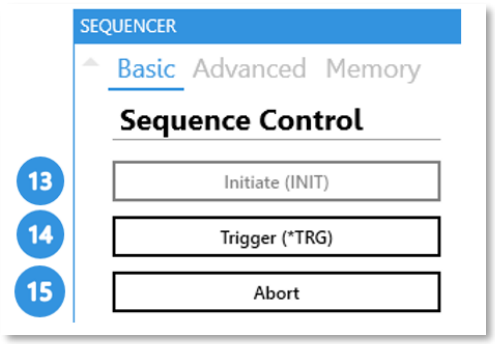

Figure 84

Once a sequence is ready to be executed by the power source, we need to send a few commands to the source to initiate the execution.

13. Click on *INIT*. This will write the sequence to the source and initiate the sequencer.
14. If *BUS* was selected in step 7, click on *Trigger* to cause the Sequencer to run.
15. To stop the sequence execution, click *Abort* at any time.

NOTES

1. If the Sequencer is enabled (in the INIT state), the Internal Resistance, Constant Power Limit, Slew-Rate and Analog Programming functions are disabled.
2. If the Internal Resistance, Constant Power Limit, Slew-Rate or Analog Programming functions are enabled, the Sequencer is disabled.

Sequencer Memory

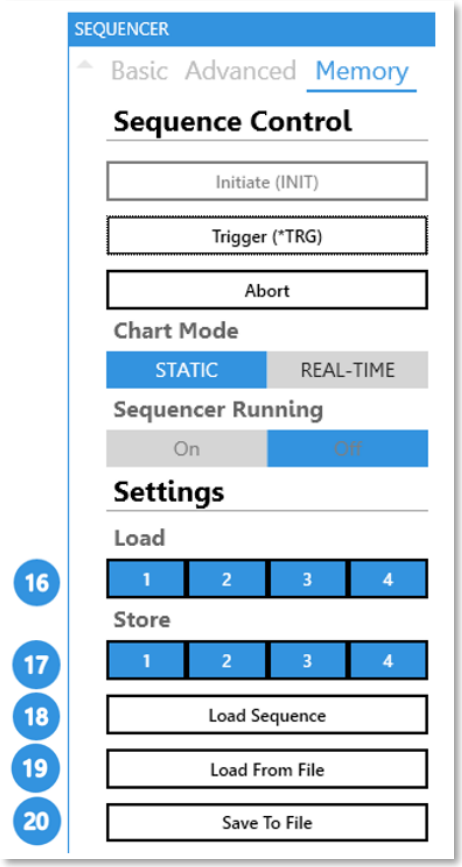

Figure 85

16. Click *Load* to retrieve a sequence from a persistent power source memory cell. The sequence's setting will show on the graph and in the tabs. To execute the sequence, go back to step 13.
17. Store a generated sequence into one of the power source's persistent memory cells.

NOTE

The STORe command does not save all of a sequence's settings to memory.

Only the following settings are saved: voltage/current, sequence mode, dwell/time, step and counter.

18. Load the last, most recent sequence executed by the power source.
19. Load a sequence stored on your PC. The sequence's setting will show on the graph and in the tabs. To execute the sequence, go back to step 13.
20. Save a sequence to your PC for future use.

Slew Rate

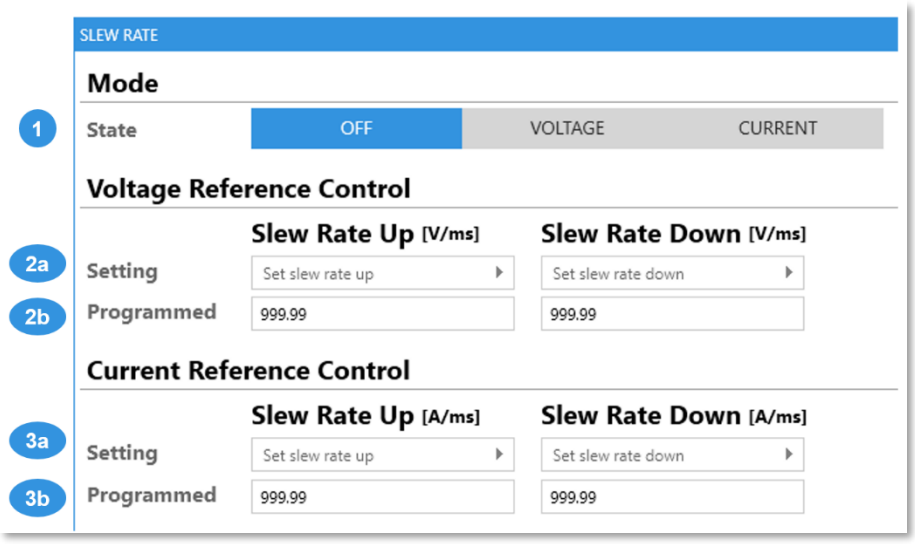

Figure 86

Mode

1. Select the Slew Rate mode: OFF, Voltage or Current.

Voltage/Current Reference Control

2. and 3.
   (a) Set the up/down values of the Voltage Slew Rate (2) and Current Slew Rate (3). The Setting value is the field that needs to be set by the user. VCP automatically verifies that the respective input value is valid.
   (b) View the actual (Programmed) values of the up/down Slew Rate accepted by the power source (the values are read from the power source).

NOTES

1. The Slew Rate range is 0.0001 to 999.99 Volts/Amperes per millisecond.
2. The maximum Slew Rate is limited by hardware (unique for each power source model).
3. If the Slew Rate is enabled, the Sequencer, Constant Power Limit, Internal Resistance and Analog Programming functions are disabled.
4. If the Sequencer, Constant Power Limit, Internal Resistance or Analog Programming functions are enabled, the Slew Rate is disabled.

Internal Resistance

If a power source's Internal Resistance is taken into account to calculate its measured voltage (V_{OUT}), we have that:

$$V_{OUT} = V_{PROG} - I_{MON} \times R_S$$

Equation 1

Where V_{OUT} is the actual output voltage of the power source, V_{PROG} is the programmed voltage, I_{MON} is the actual measured output current, and R_S is the source's Internal Resistance.

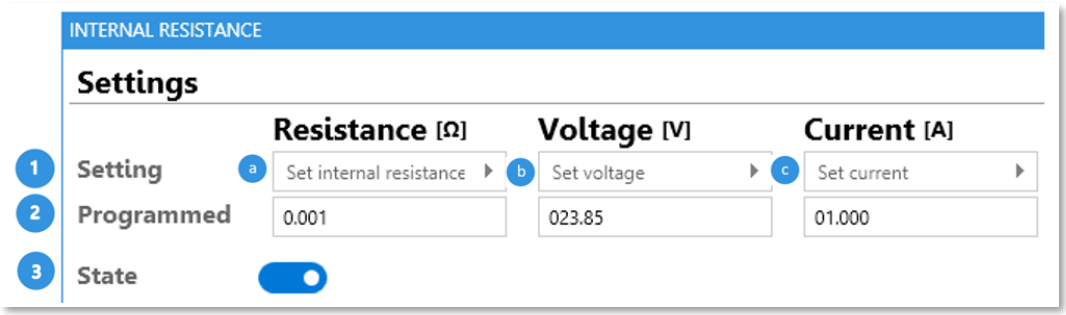

Figure 87

1. Set the values of the Internal Resistance (a), Programmed Voltage (b) and Programmed Current (c). The *Setting* value is the field that needs to be set by the user. VCP automatically verifies that the respective input value is valid based on the power source's range.
2. View the actual (*Programmed*) values accepted by the power source (the values are read from the power source).
3. Click the State switch to enable or disable the Internal Resistance. If it is disabled, $R_S = 0$.
4. Click on the operating point on the graph to view the values of the power source's measured voltage (V_{OUT}) and measured current (I_{OUT}).

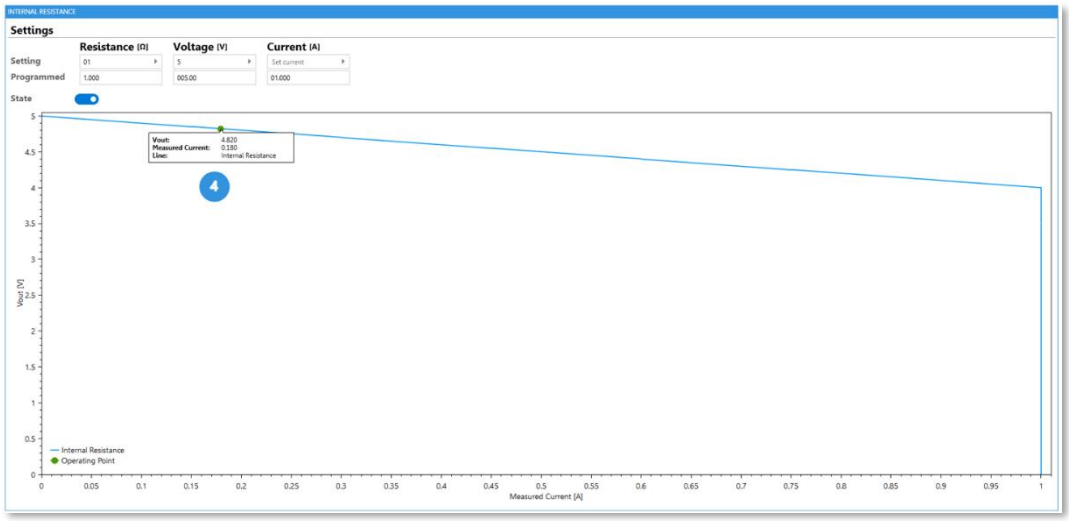

Figure 88

NOTES

1. If the Internal Resistance is enabled, the Sequencer, Constant Power Limit, Slew-Rate and Analog Programming functions are disabled.
2. If the Sequencer, Constant Power Limit, Slew-Rate or Analog Programming functions are enabled, the Internal Resistance is disabled.

Constant Power

The Constant Power function limits the output power provided by a power source. The source uses a control system to ensure that the output voltage multiplied by the output current is smaller or equal to the Constant Power limit:

$$V_{MON} \times I_{MON} \leq P_{CST}$$

Equation 2

Where V_{MON} is the actual measured output voltage of the power source, I_{MON} is the actual measured output current, and P_{CST} is the constant power limit.

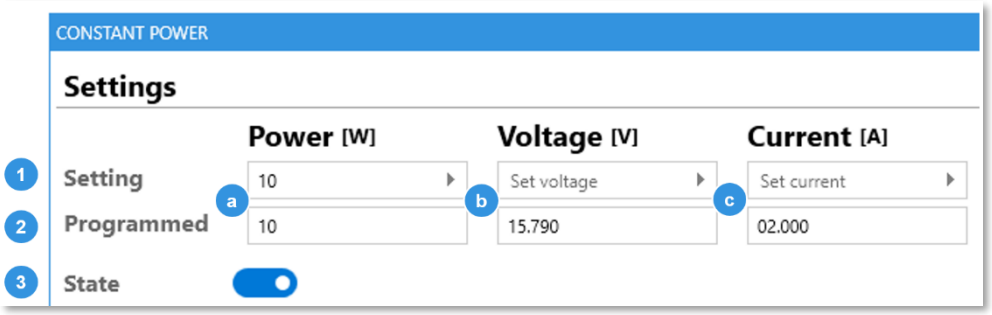

Figure 89

1. Set the values of the Constant Power limit (a), Programmed Voltage (b) and Programmed Current (c). The *Setting* value is the field that needs to be set by the user. VCP automatically verifies that the respective input value is valid, based on the power source's range.
2. View the actual *(Programmed)* values accepted by the power source (the values are read from the power source).
3. Click the *State* switch to enable or disable the Constant Power function.
4. Click on the operating point on the graph to view the values of the power source's voltage and current.

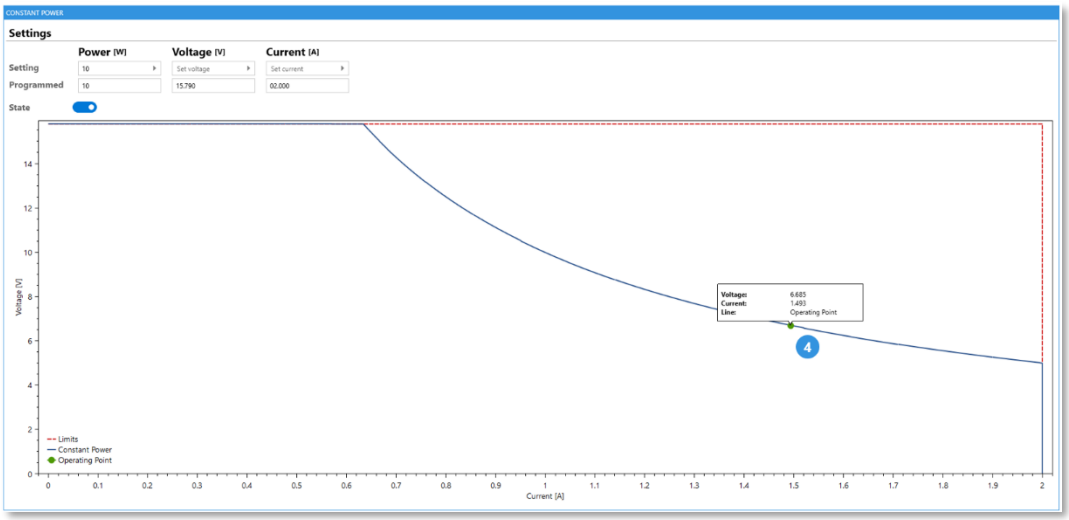

Figure 90

NOTES

1. If the Constant Power Limit is enabled, the Sequencer, Internal Resistance, Slew-Rate and Analog Programming functions are disabled.
2. If the Sequencer, Internal Resistance, Slew-Rate or Analog Programming functions are enabled, the Constant Power Limit is disabled.

10. Troubleshooting

EtherCAT Device Does Not Appear

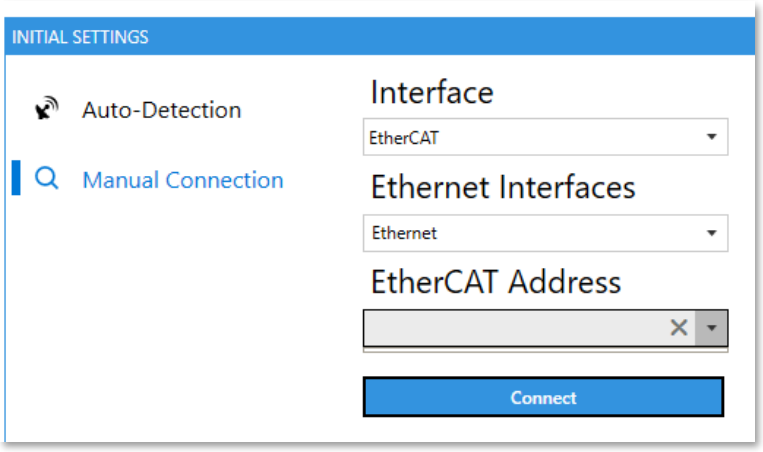

Figure 91

If your PC is connected to a power source equipped with an EtherCAT card, but VCP does not show an address for the device, make sure to check the following points:

1. In the Manual Connection Mode, verify you are connected to the correct Ethernet network adapter.
2. If Npcap is installed on your computer, verify that it was installed with the WinPcap API enabled. If you are unsure, it is a good idea to reinstall Npcap and enable the WinPcap API as shown below. Another option is to install WinPcap instead of Npcap.

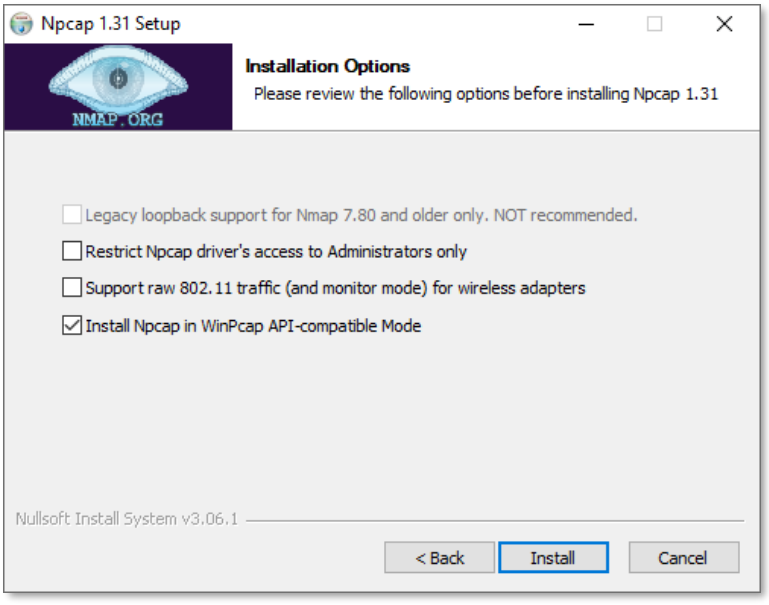

Figure 92

.NET Framework Update Error Message

In order to install and run the Installer and the VCP, latest version of .NET Framework should be installed (version 4.8). In case it didn't, a warning message will pop-up.

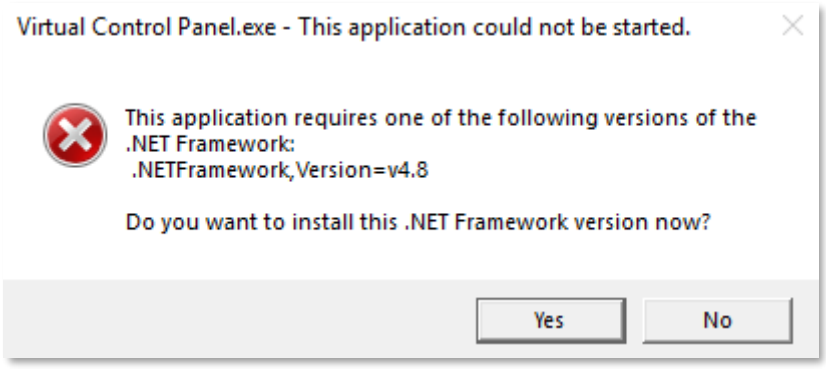

Figure 93

Please refer to *Software Requirements* section in order to download the latest version of .NET Framework.