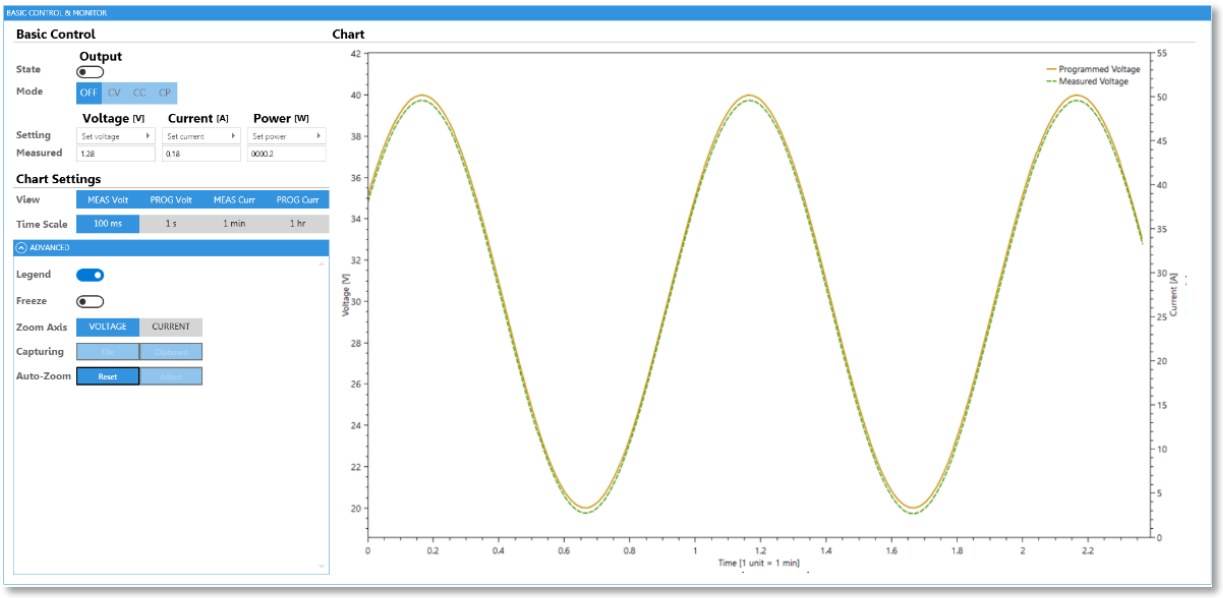
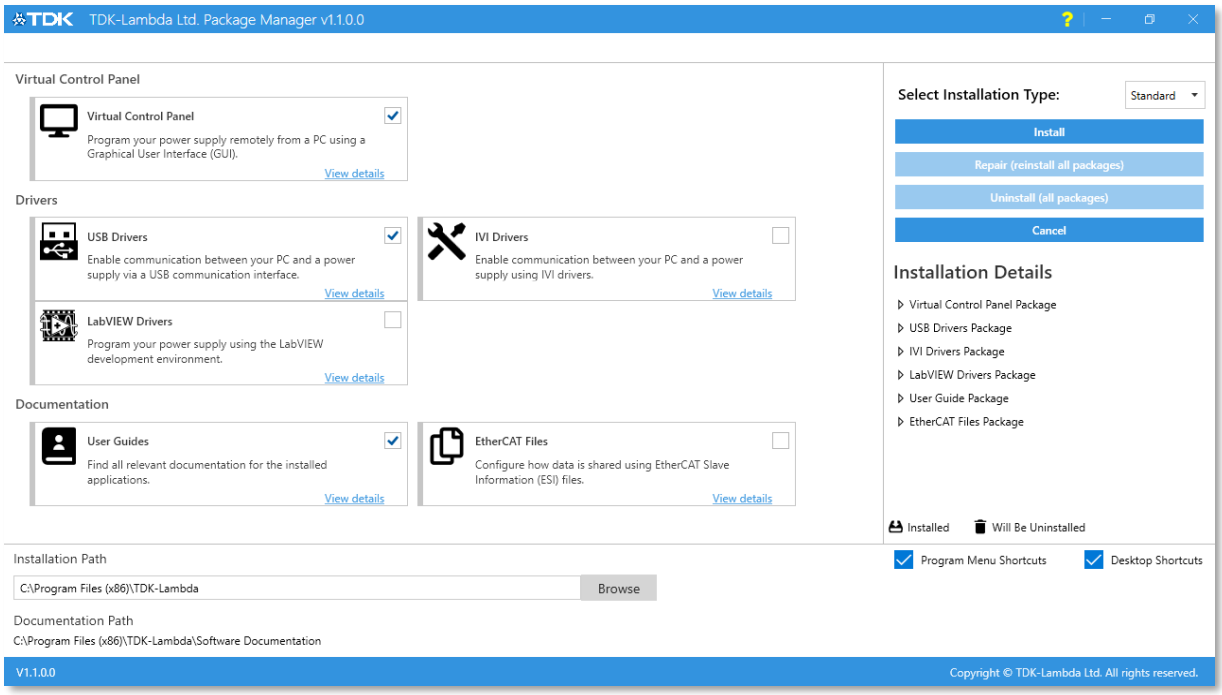
Virtual Control Panel
Installation and Applications Guide





REVISION HISTORY

Date	Revision	Issue
March 2022	H - Initial Revision	
August 2023	I	1. Update Series Features Mapping Table (Table 1) 2. Edit “Terminal” section – add “Scripting” (new feature) 3. Edit “Initial Settings” section – add “DC Power Supply Simulator” (new feature) 4. Add Logger section (new feature) 5. Add Register Tree section (new feature) 6. Add Keyword Navigation section (new feature) 7. Add Multi-Model section (new feature) 8. Add note regarding NI’s GPIB-USB-HS adapter 9. Add notes regarding Waveform Creator

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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:
https://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 supplies 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 supplies. 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 supply 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, .NET Framework version 4.8 should be installed. 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

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EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

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Minimum Hardware Requirements

- Intel i5 processor or above
- At least 20GB of hard disk space
- At least 8GB 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 supply 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:

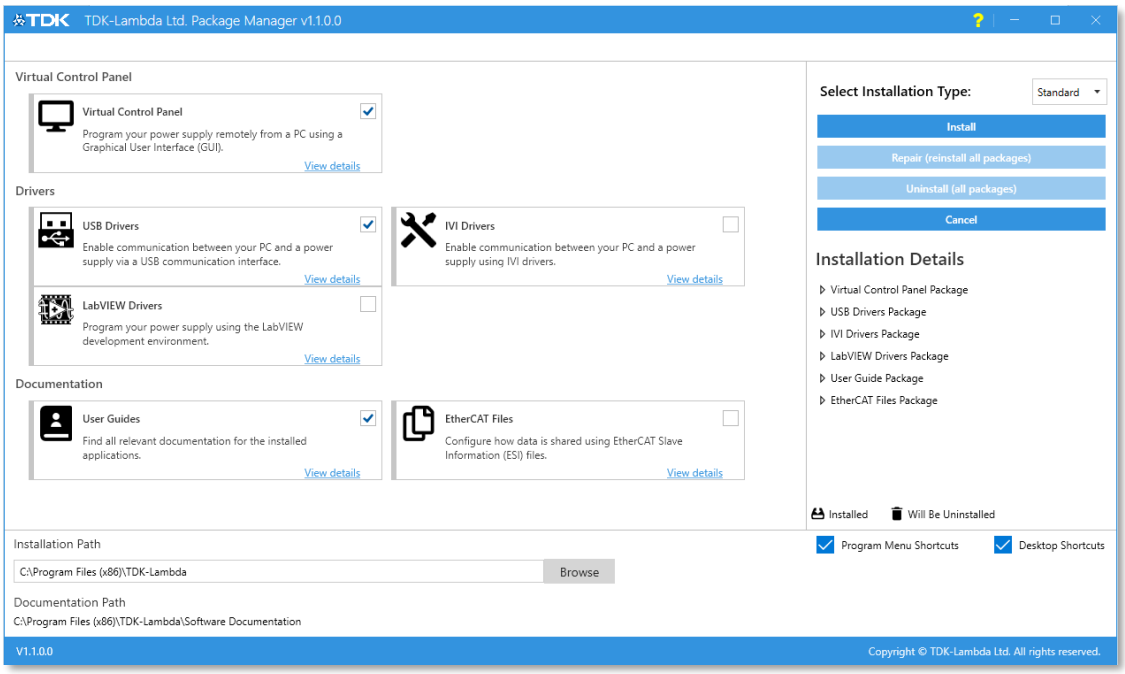


Figure 1

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 in Figure 3. 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.

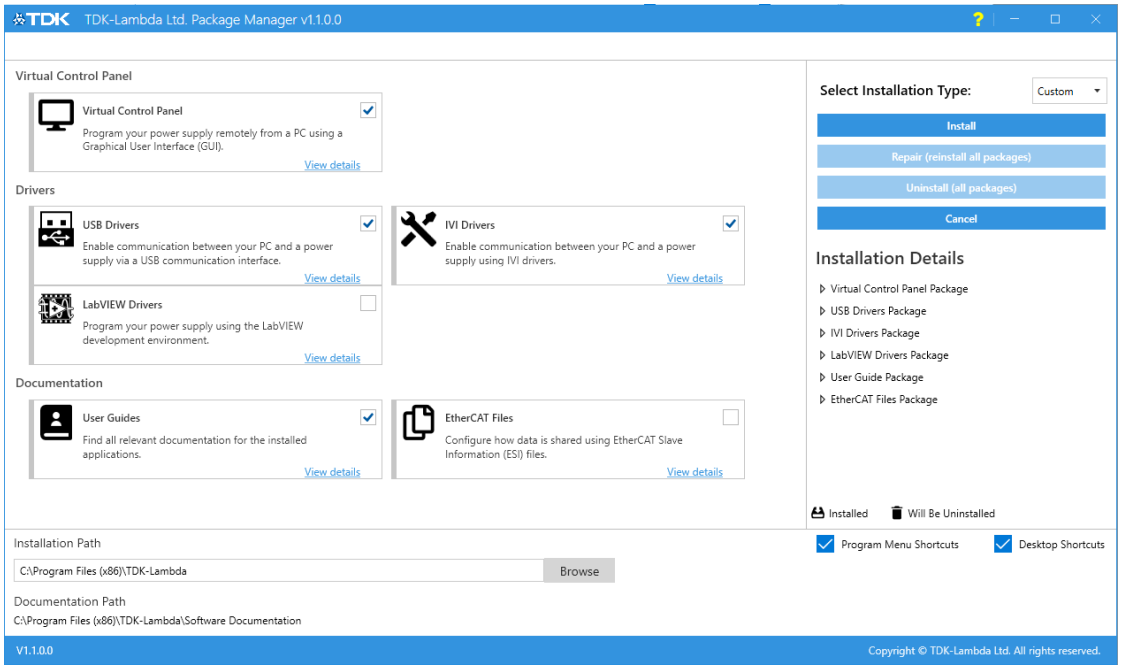


Figure 2

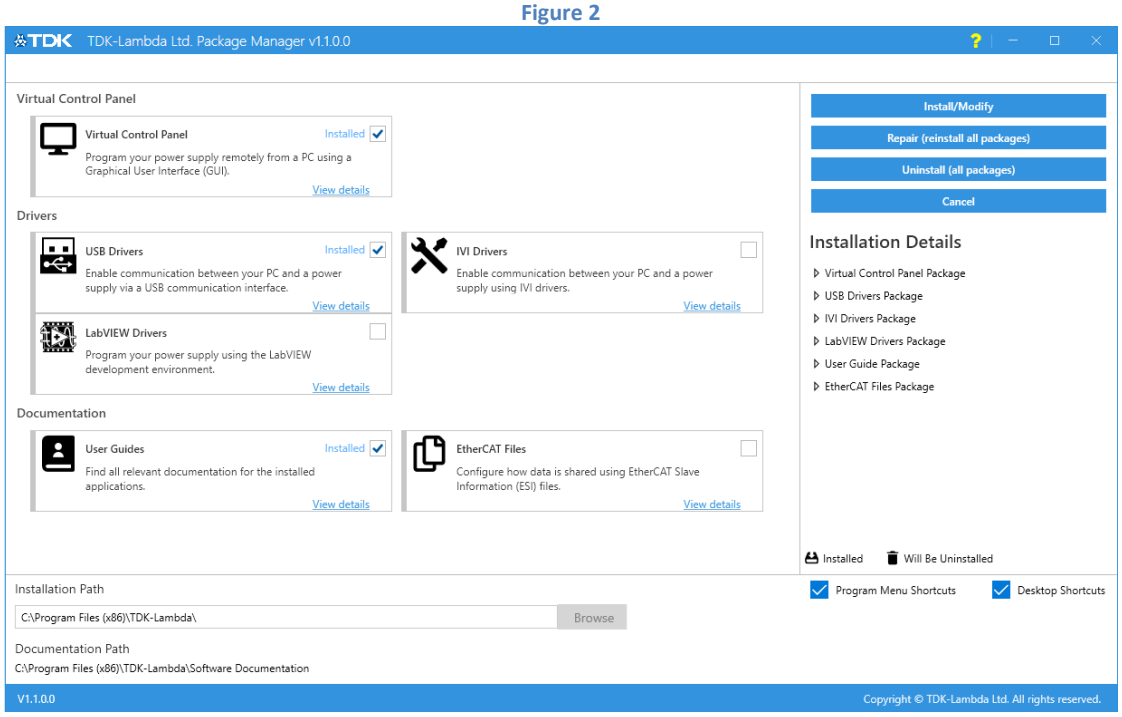


Figure 3

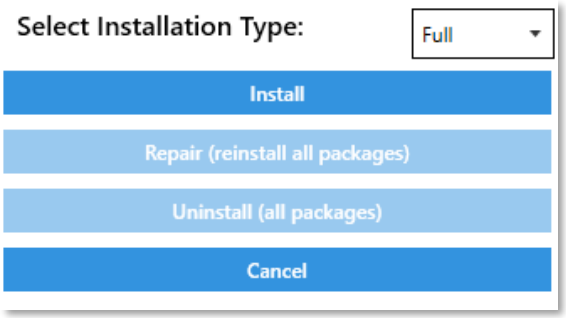


Figure 4

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.

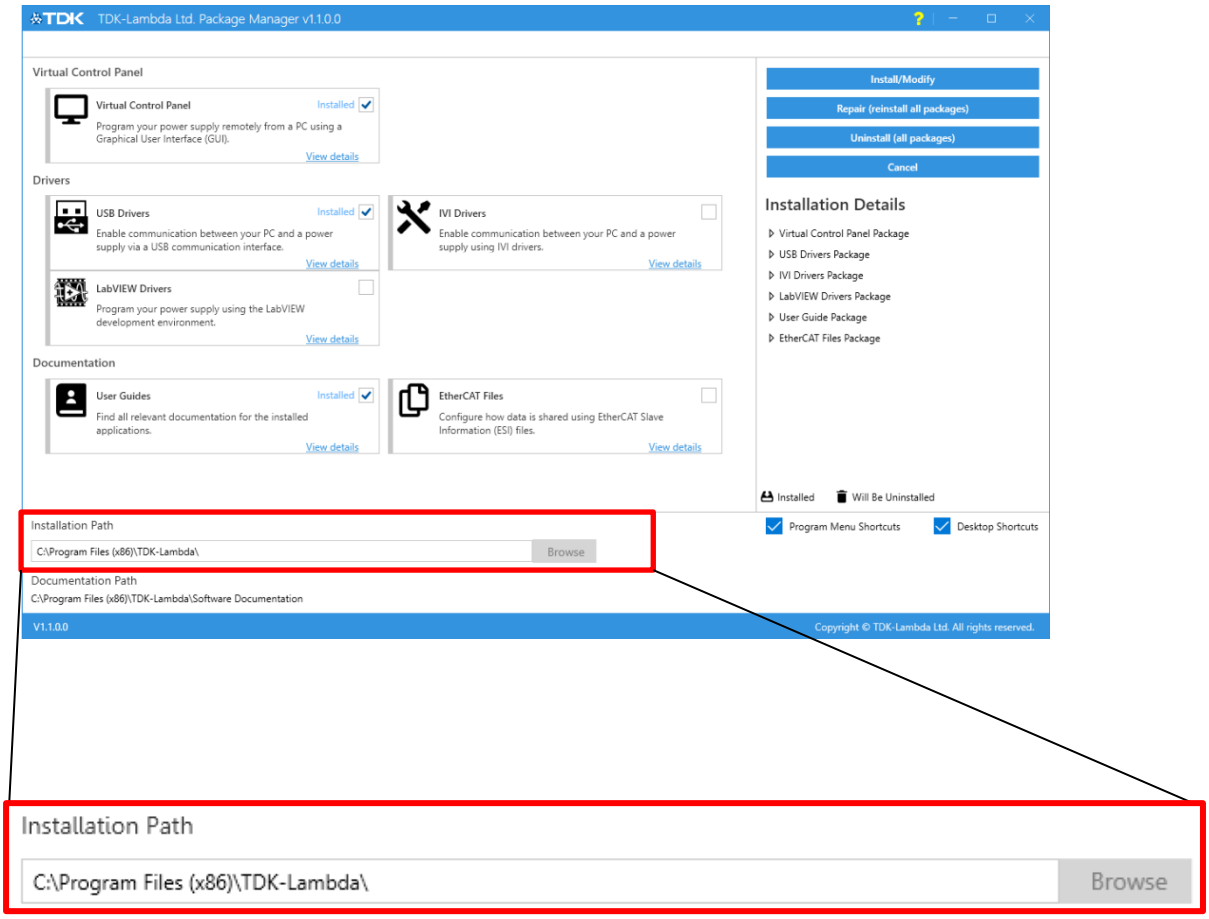


Figure 5

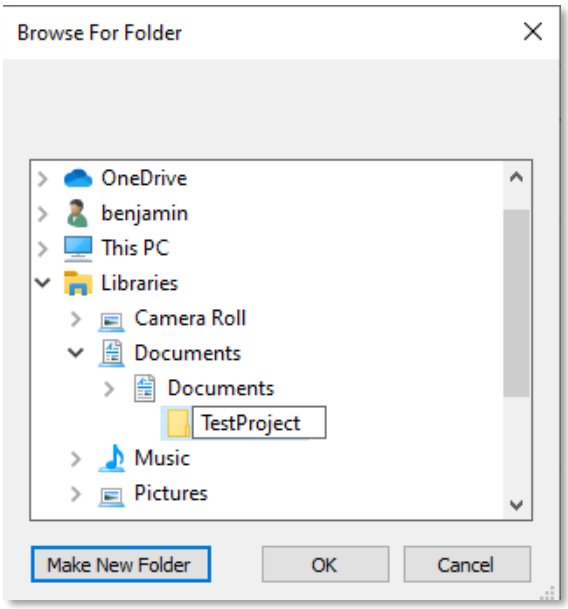


Figure 6

NOTE

If the new location is not the default path, it is possible that an 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*.

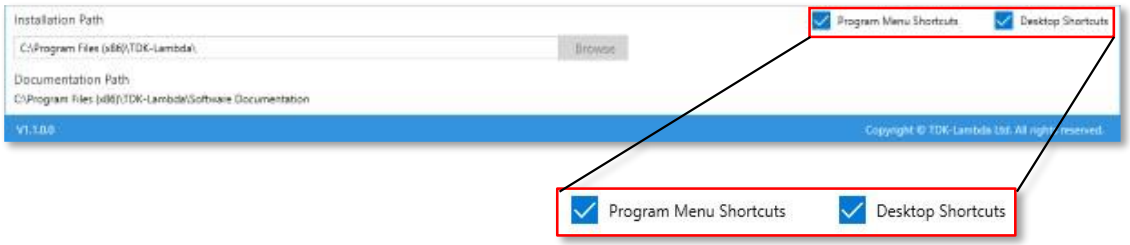


Figure 7

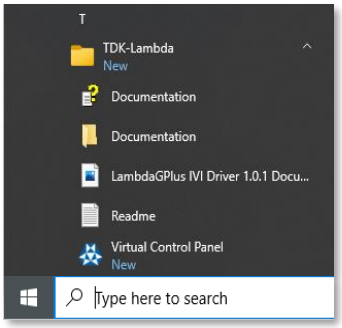


Figure 8

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 9

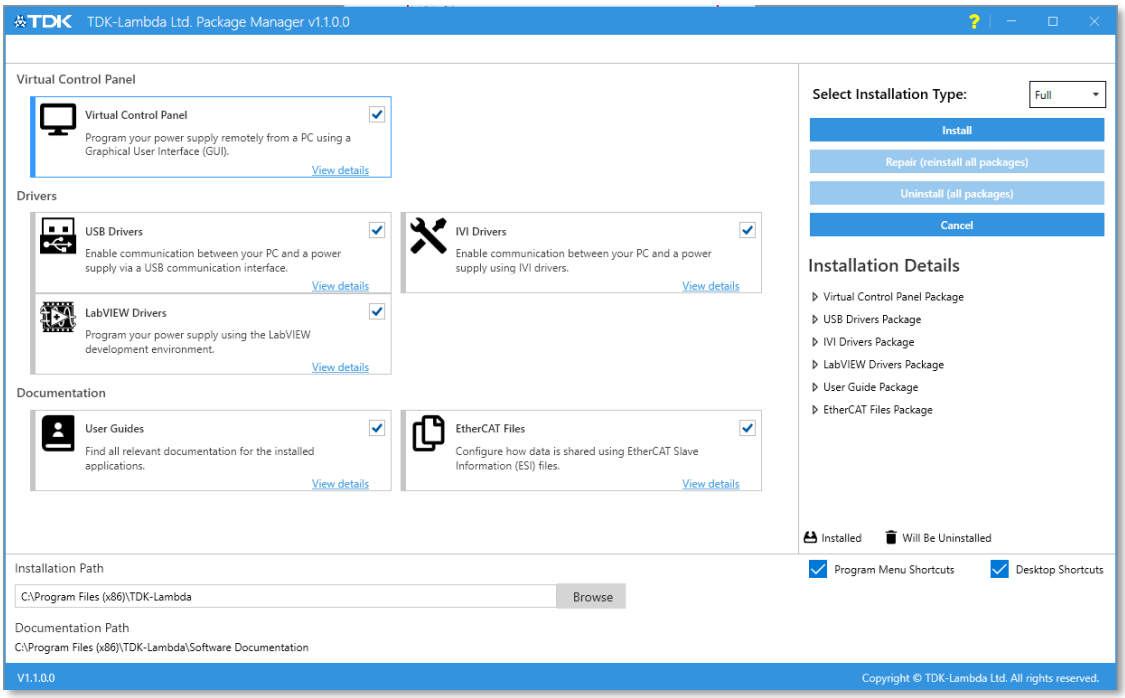
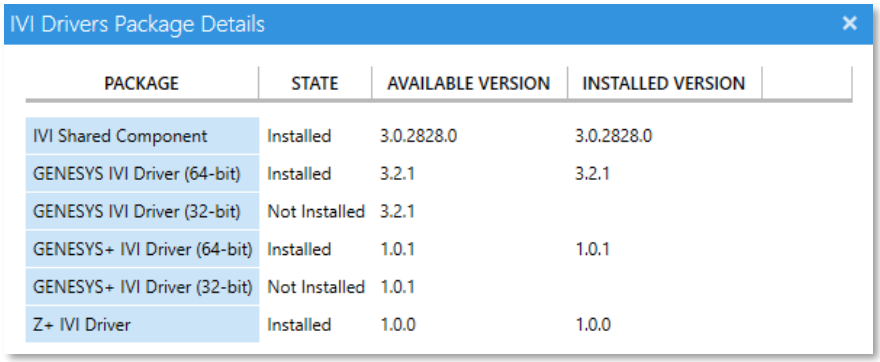


Figure 10

8. Click on View details to open the details tab of each package. In this tab you will find the information regarding each component of the package (is the component installed / uninstalled, installed version, available version).



PACKAGE	STATE	AVAILABLE VERSION	INSTALLED VERSION
IVI Shared Component	Installed	3.0.2828.0	3.0.2828.0
GENESYS IVI Driver (64-bit)	Installed	3.2.1	3.2.1
GENESYS IVI Driver (32-bit)	Not Installed	3.2.1	
GENESYS+ IVI Driver (64-bit)	Installed	1.0.1	1.0.1
GENESYS+ IVI Driver (32-bit)	Not Installed	1.0.1	
Z+ IVI Driver	Installed	1.0.0	1.0.0

Figure 11

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

Virtual Control Panel

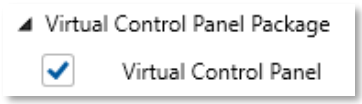


Figure 12

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

USB Drivers



Figure 13

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

IVI Drivers

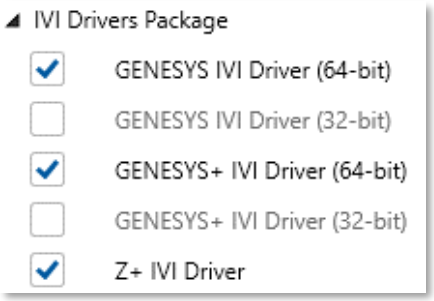


Figure 14

- Enables communication between a host PC and a power supply using IVI drivers, one for each supply 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

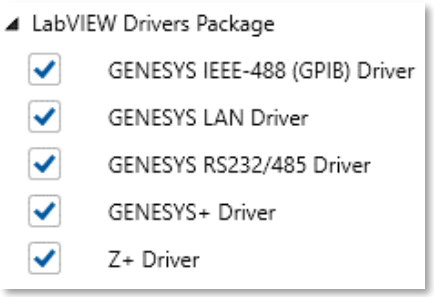


Figure 15

- Plug-in to program various power supply series using the LabVIEW development environment. LabVIEW drivers developed in LabVIEW.

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EtherCAT Files

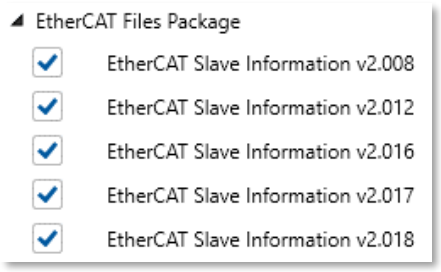


Figure 16

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

User Guides

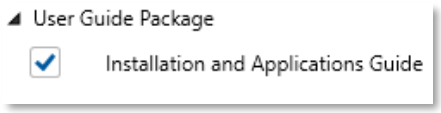


Figure 17

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

9. 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.

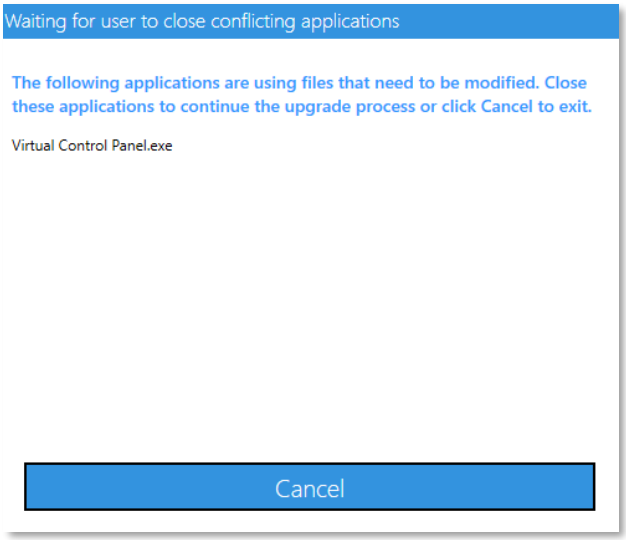


Figure 18

10. 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*.

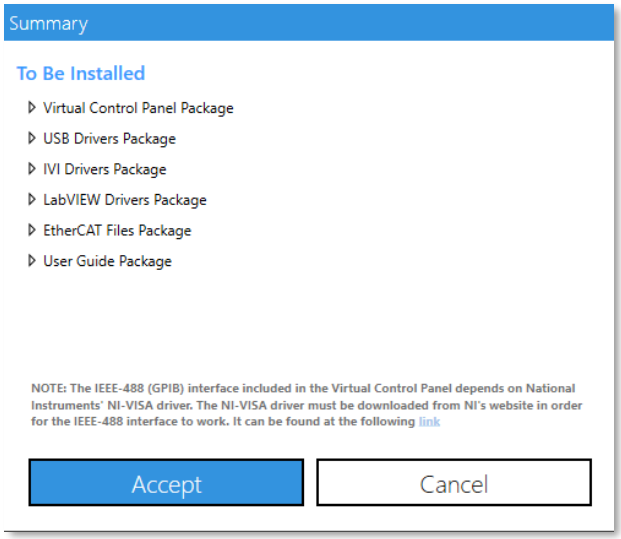


Figure 19

11. 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.
3. Any adapters used requires a dedicated driver. For example, NI's GPIB-USB-HS adapter requires the NI-488.2 driver that can be downloaded from NI's website.

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

13. 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.

14. 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.

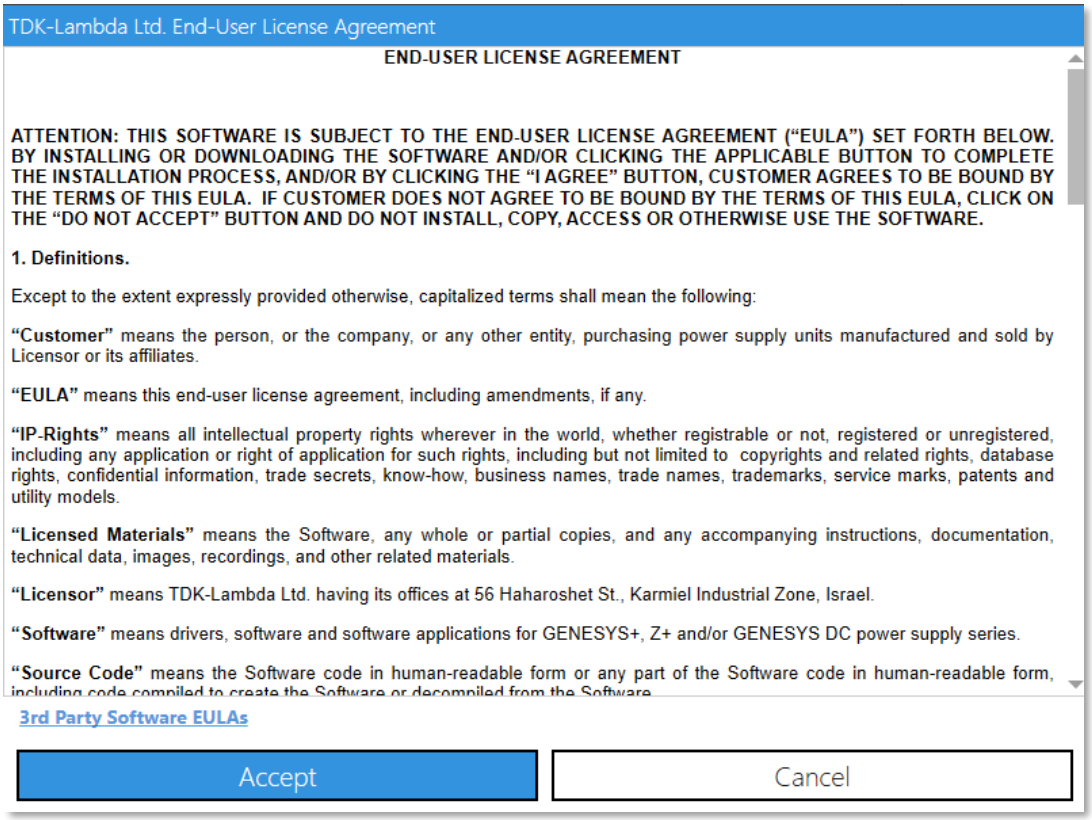


Figure 20

15. 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.

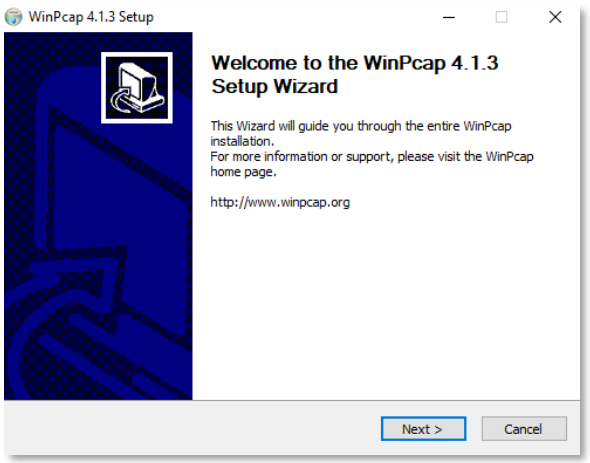


Figure 21

16. 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 20. Note, however that the Virtual Control Panel package will be marked as *Partially Installed*.

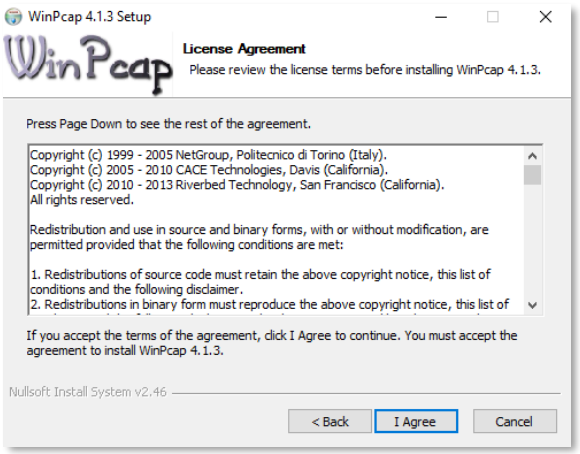


Figure 22

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

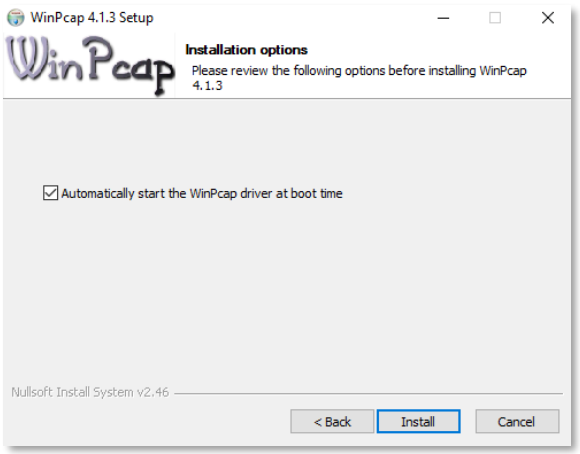


Figure 23

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

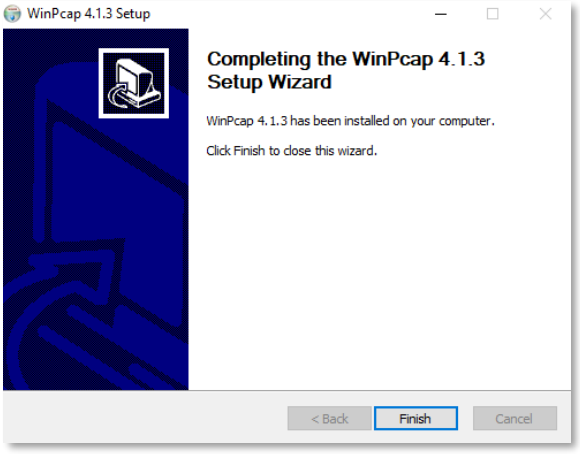


Figure 24

19. *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.

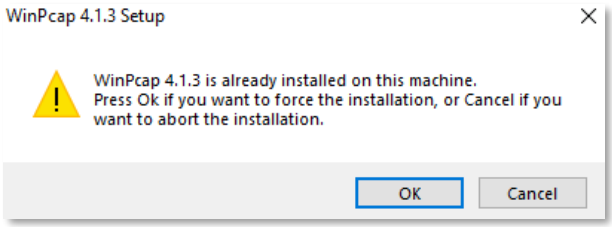


Figure 25

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

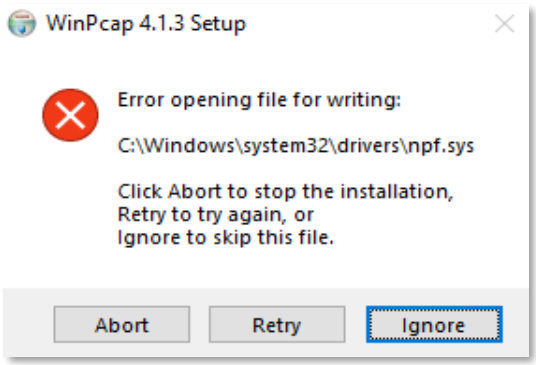


Figure 26

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.

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

21. 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.

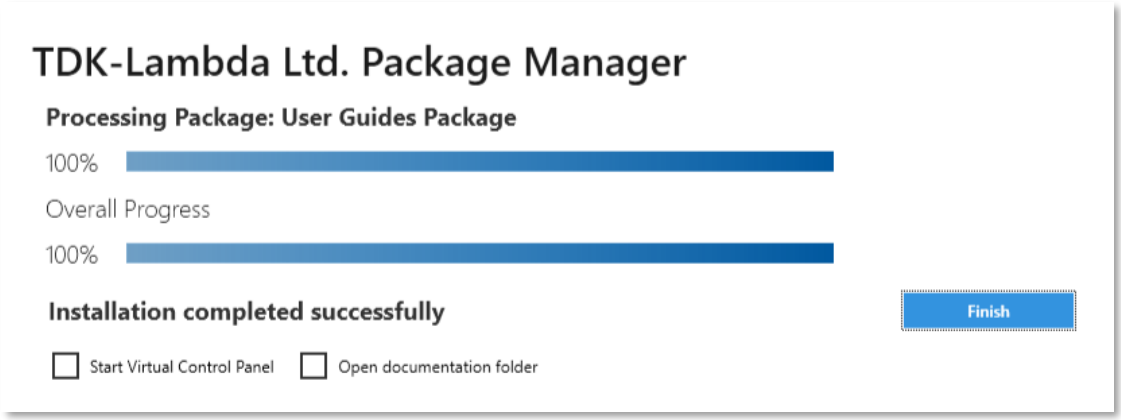


Figure 27

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.

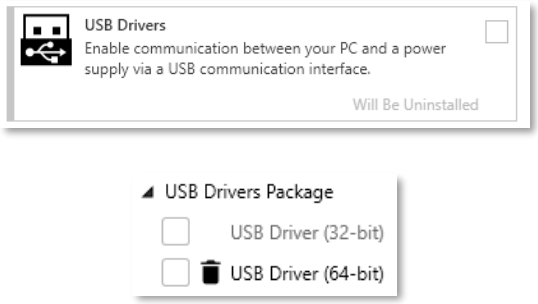


Figure 28

3. Click *Install / Modify*.



Figure 29

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.

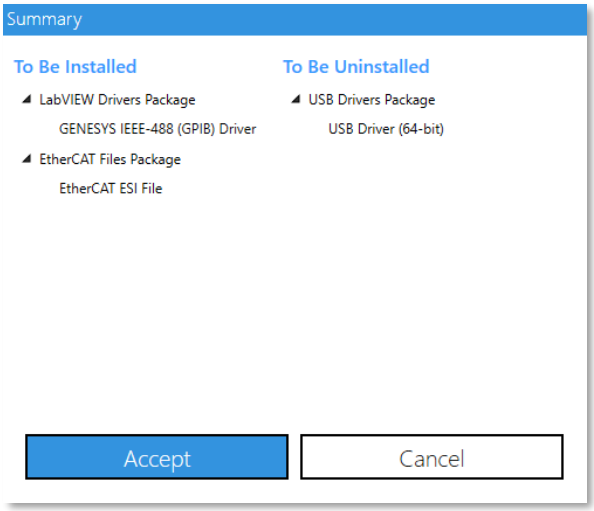


Figure 30

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.

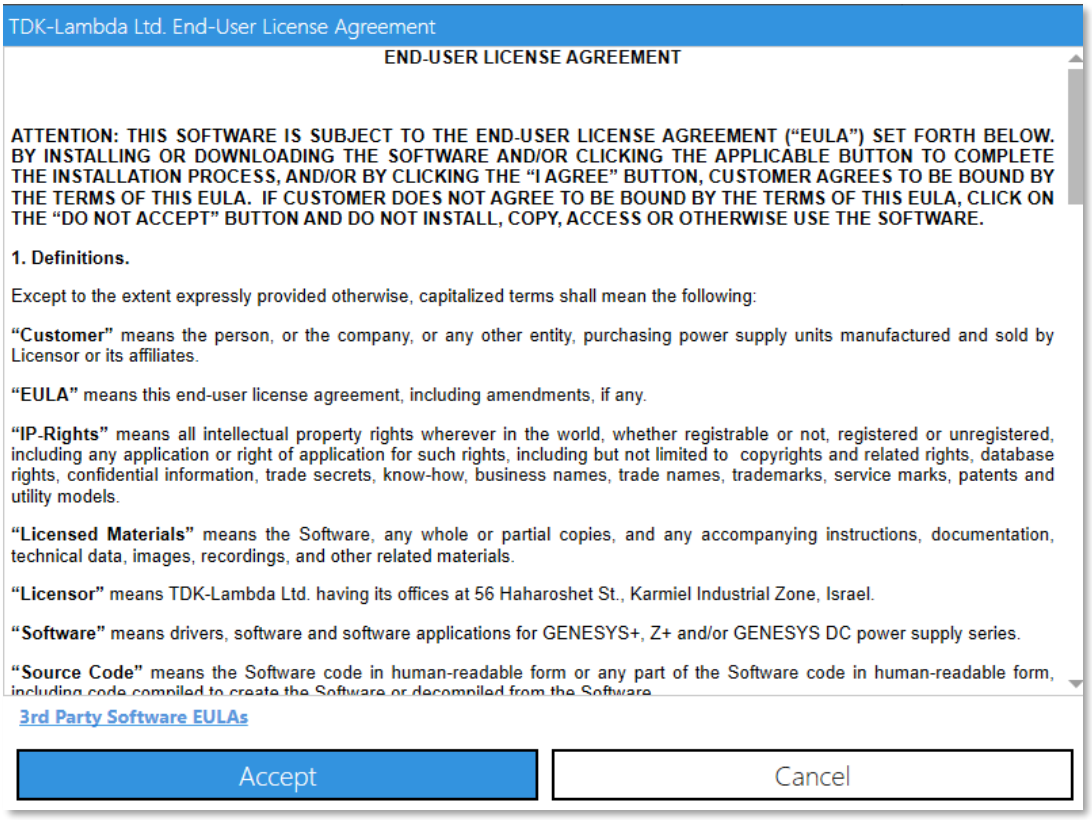


Figure 31

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

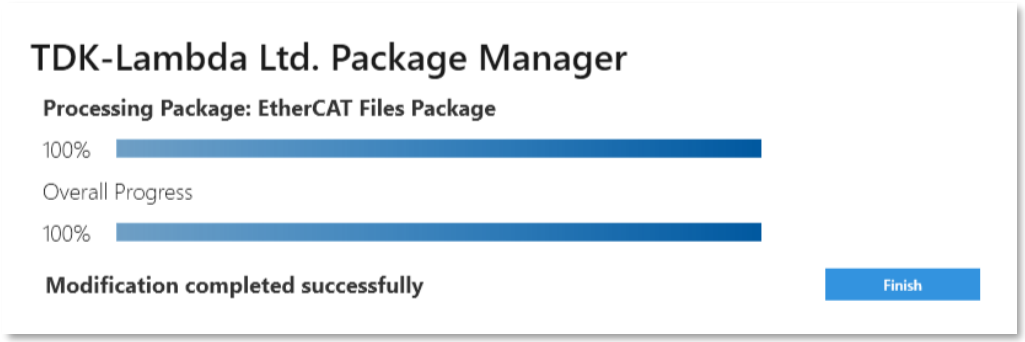


Figure 32

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.

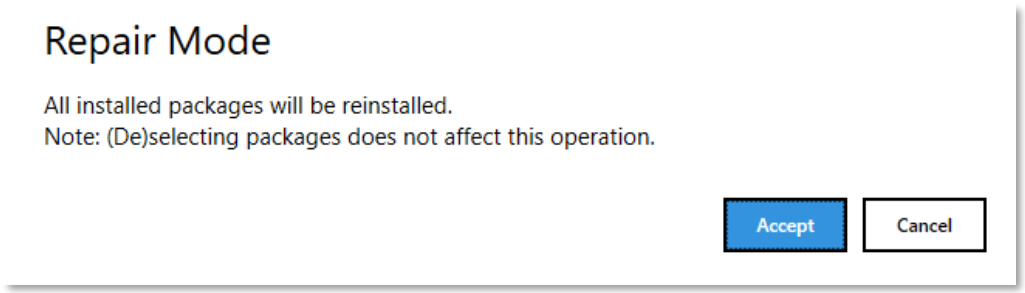


Figure 33

2. Click *Finish*.

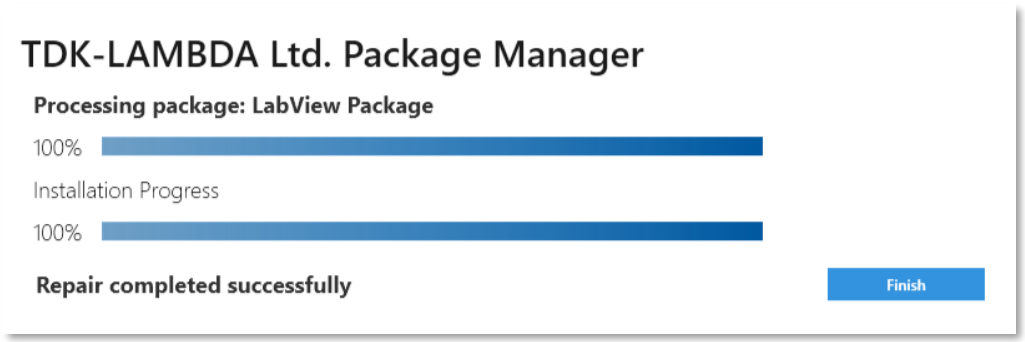


Figure 34

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:
   https://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.

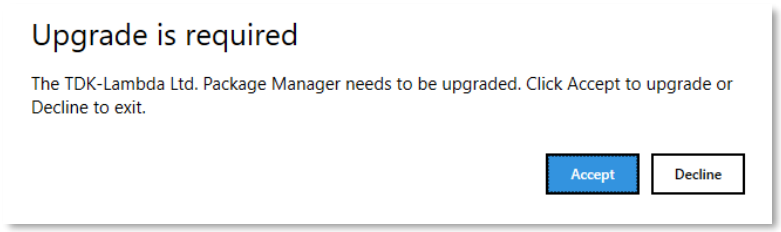


Figure 35

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.

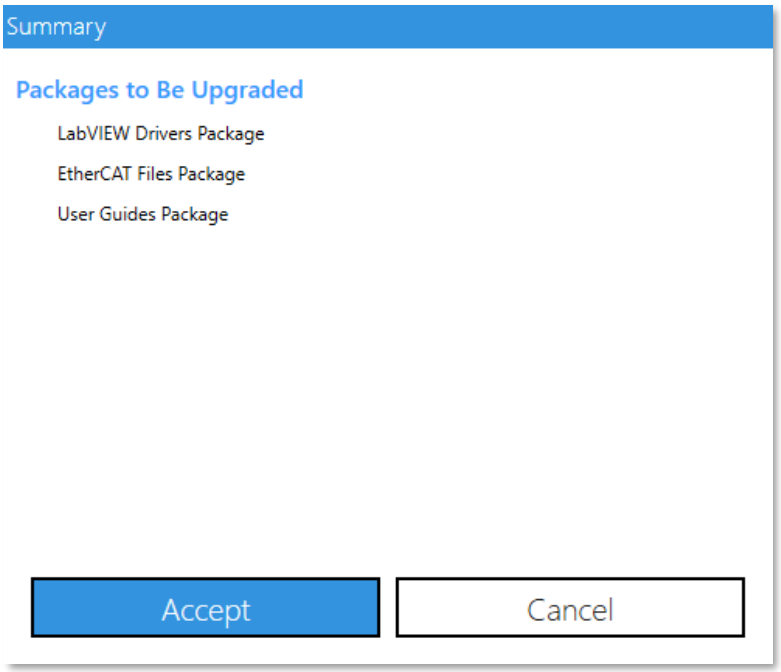


Figure 36

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.

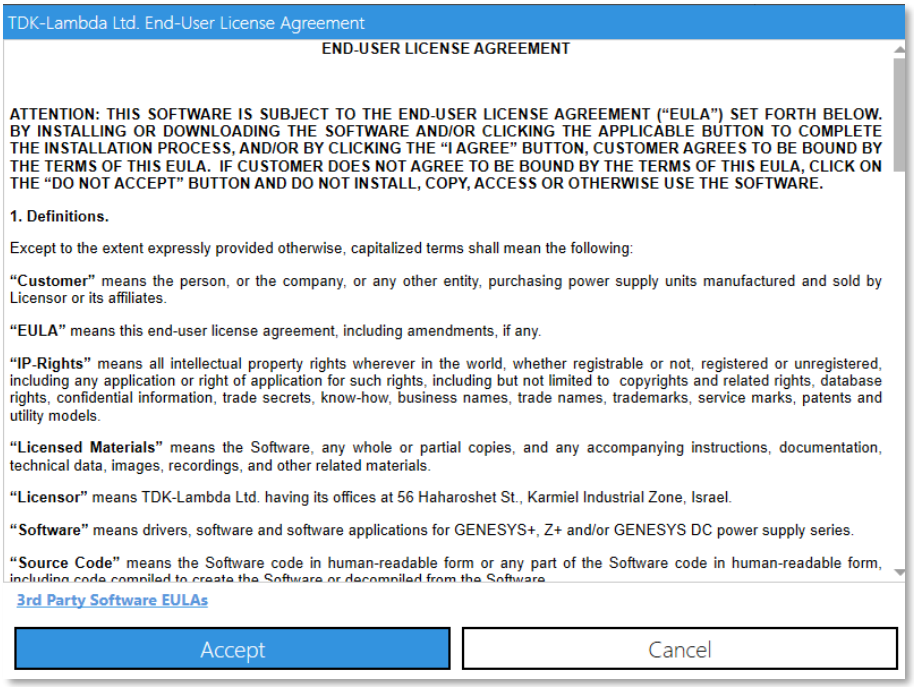


Figure 37

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



Figure 38

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:

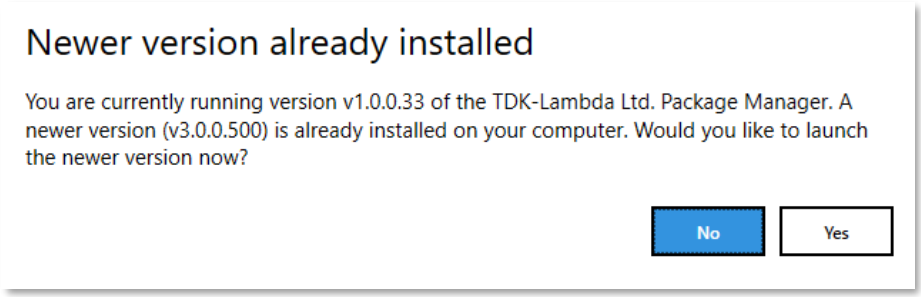


Figure 39

4. Uninstallation

Uninstalling All Packages

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

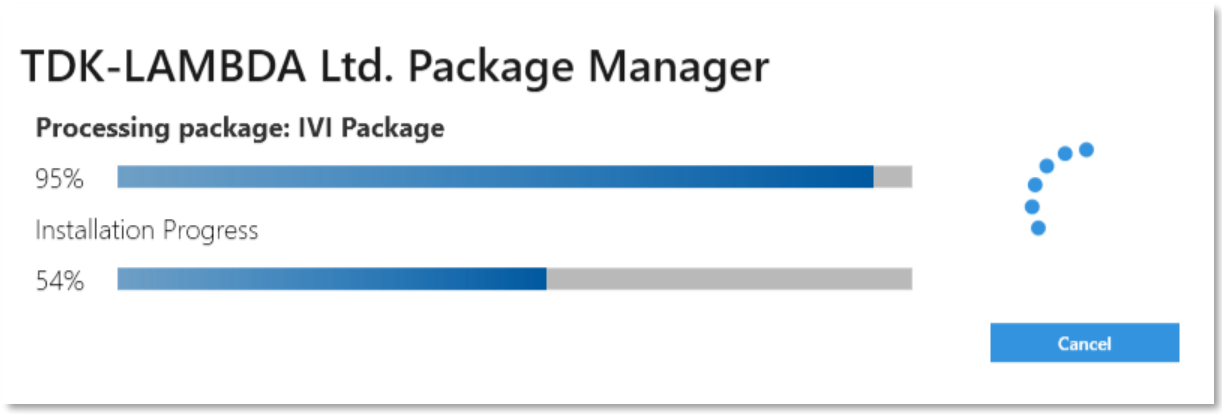


Figure 40

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*.

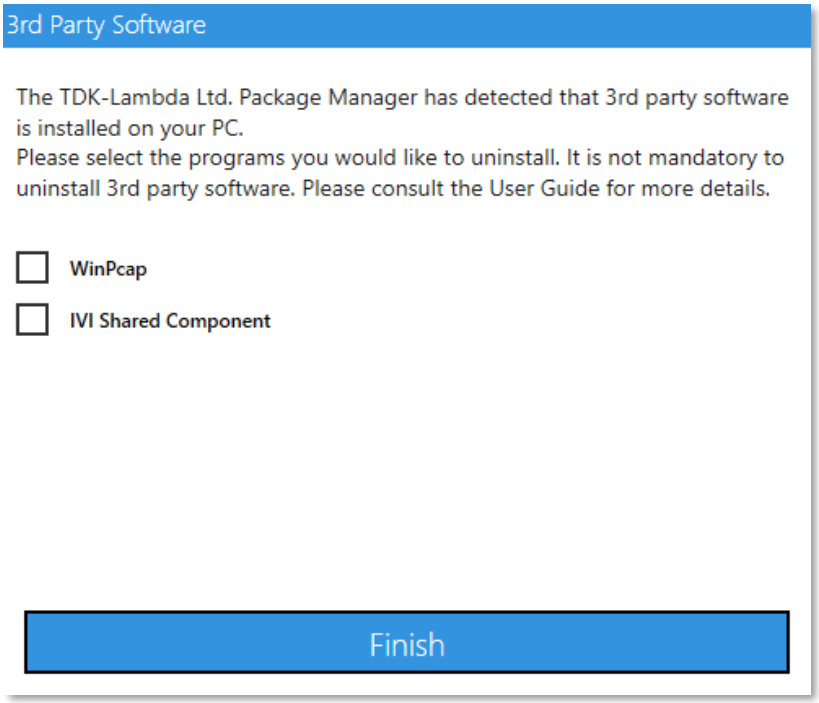


Figure 41

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

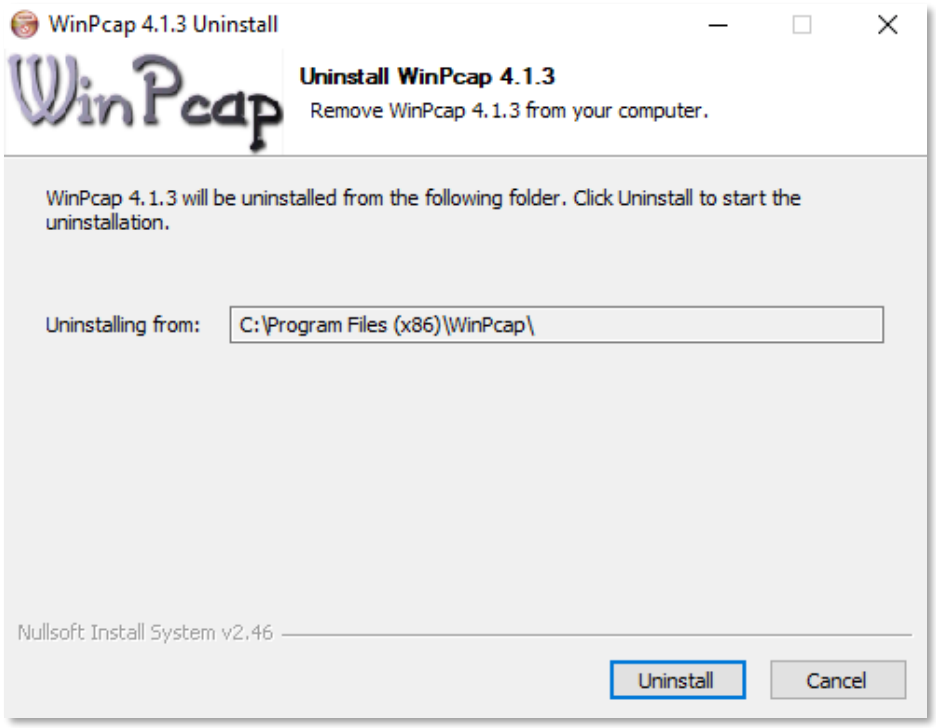


Figure 42

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

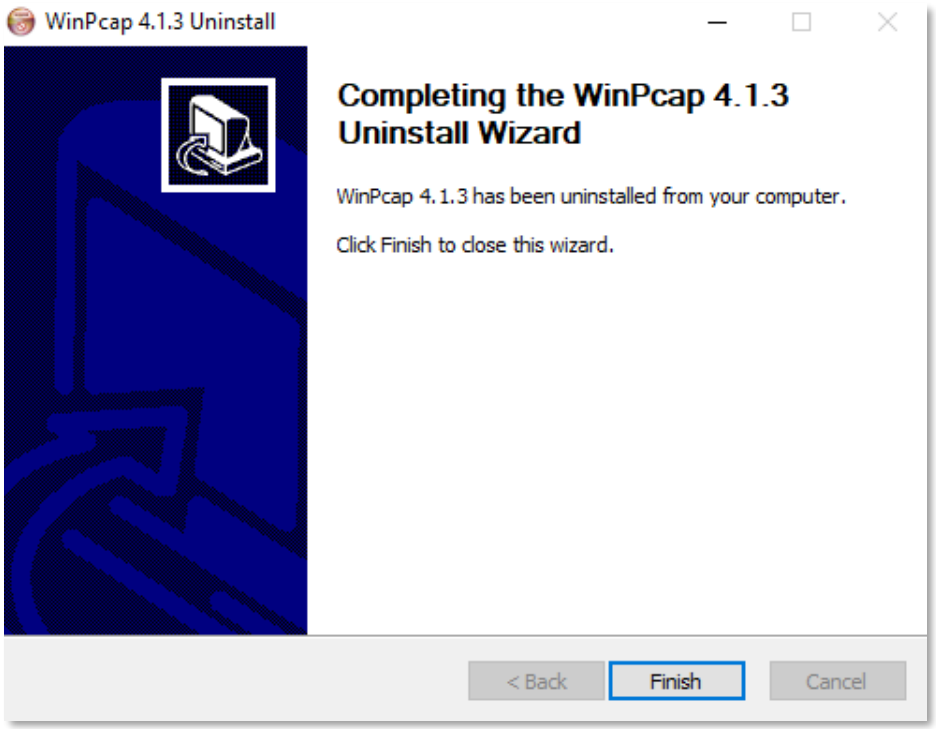


Figure 43

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*.

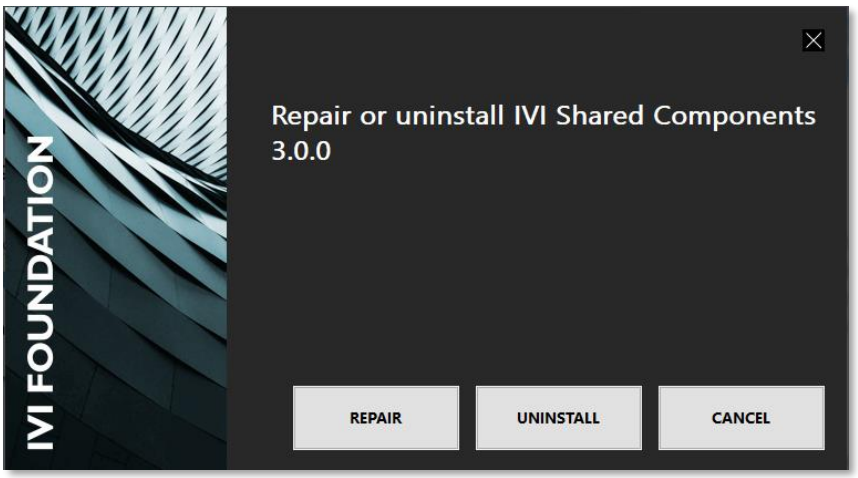


Figure 44

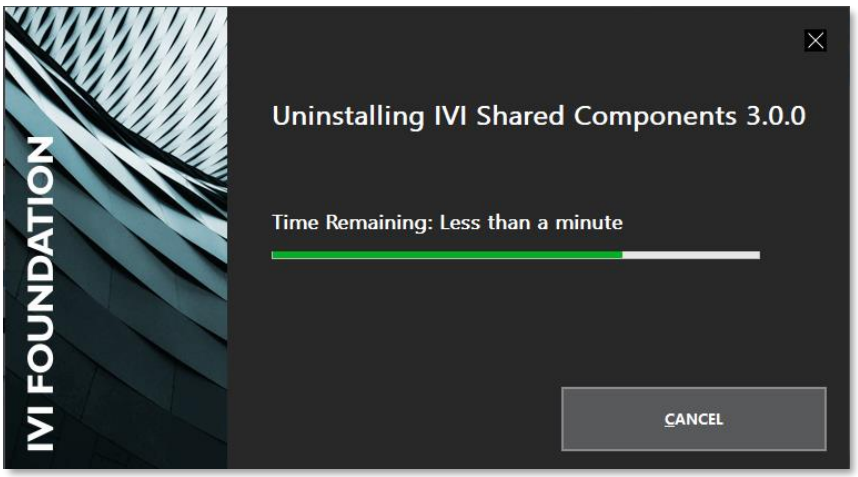


Figure 45

7. The uninstallation is complete.

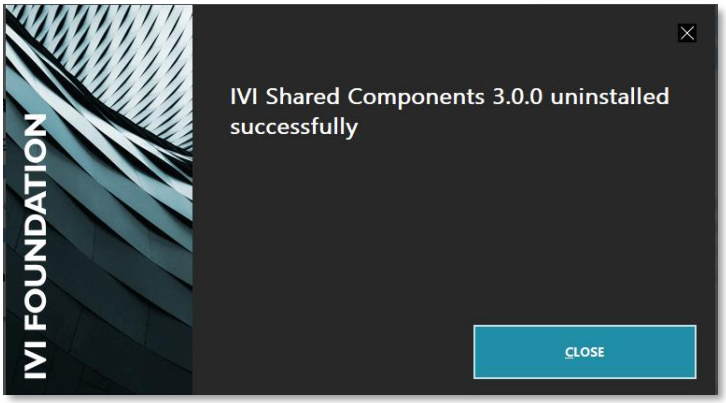


Figure 46

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*.

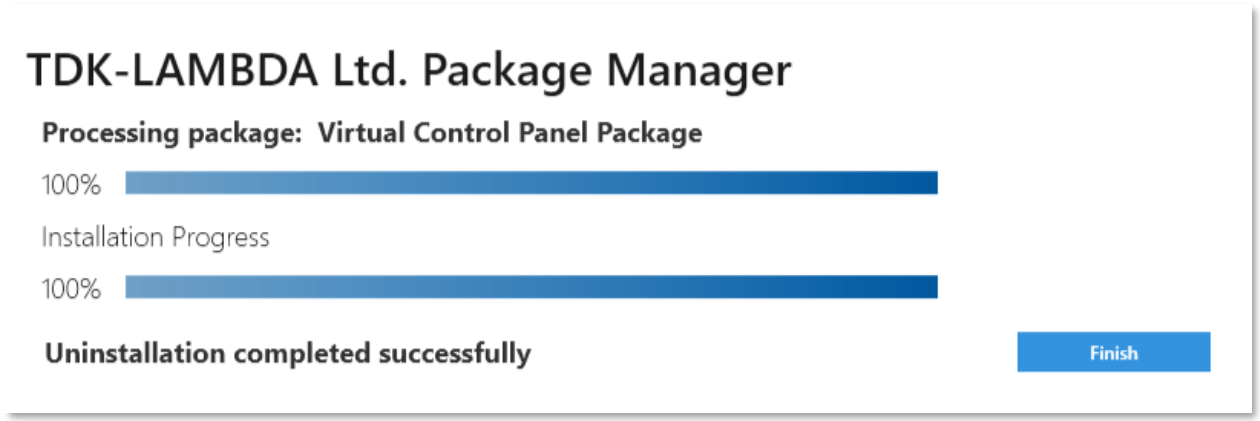


Figure 47

Cancelling an Installation

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

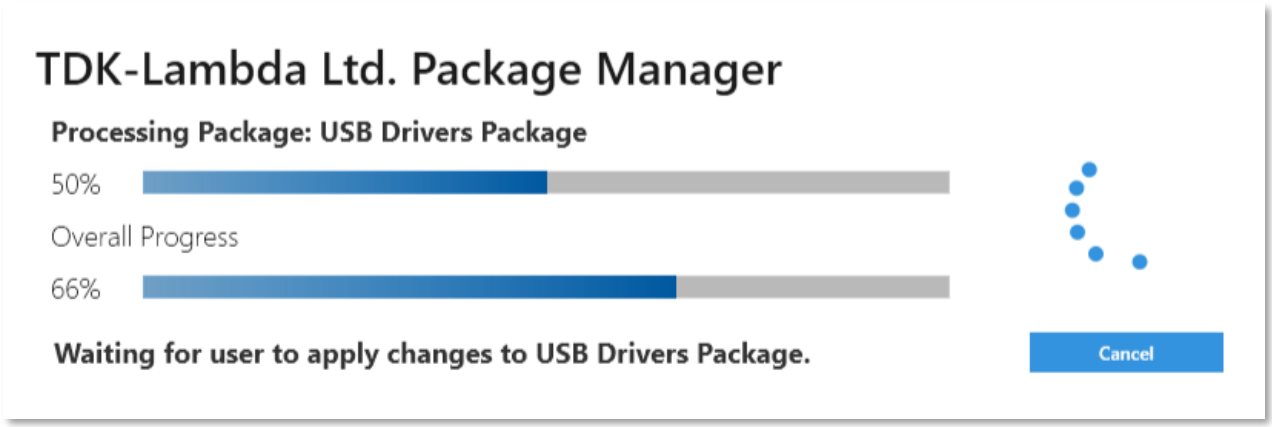


Figure 48

5. Virtual Control Panel Features Summary

Each TDK-Lambda Ltd. programmable power supply 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 supply).

Initial Settings

- Auto-Detection: automatically identify all power supplies connected to a host PC, regardless of the power supply's series, interface and language (supported DC programmable series are GENESYS, Z+ and GENESYS+).
- Manual Connection: manually connect a PC to a power supply by specifying its interface, address and language.
- Simulator: allows the user to simulate a connection to a power supply and program it using the GUI, without the need to connect a power supply.
- Set application theme and accent.

Basic Control & Monitor

- Modify basic power supply 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 / Scripting

- Terminal:
  - Send/receive commands to/from a power supply.
  - Save command history to disk.
- Scripting:
  - Create scripts based on SCPI/GEN languages.
  - Save/load scripts to/from your disk.
  - Additional features: step by step execution, delay, repeat, label.

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 supply'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 supply 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.

Logger

- Real-time display of pre-selected commands and measurements that are sent to and received from the power supply.

Registers Tree

- Monitor the content of the power supply's registers in real-time.

Keyword Navigation

- Use acronyms or part of a word or a feature's name in order to quickly navigate to the tab it is located in.

NOTE

The following advanced features are only available in certain power supply 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 supply.
- 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 Dependent Features Mapping

The following table presents each series' features:

Feature	GENESYS+	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
Logger	V	V	V
Keyword Navigation	V	V	V
Registers Tree	V	V	V
Simulator	V	X	X

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 supplies connected to a host PC, regardless of the power supply's series, interface and language. The tool is particularly powerful because it also detects all supplies connected in a multi-drop configuration.

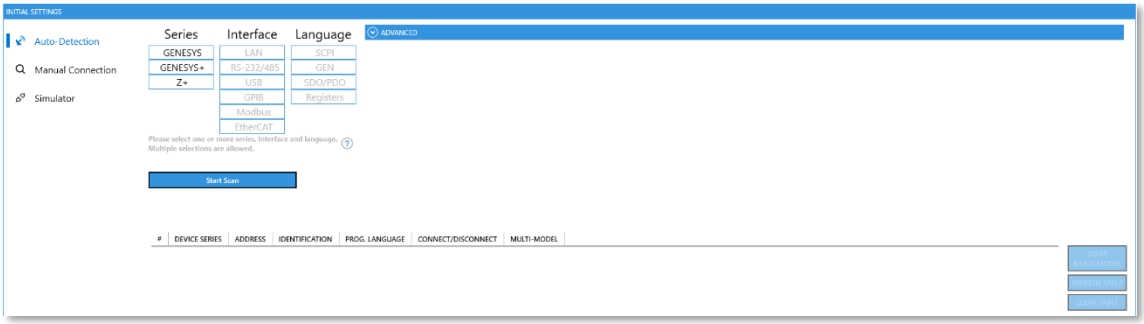


Figure 49

Follow the steps below to setup Auto-Detection:

1.

(a) If you don't know your power supply'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 supplys' addresses.

2.

(a) If you know the series of your power supply, 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 supply'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:

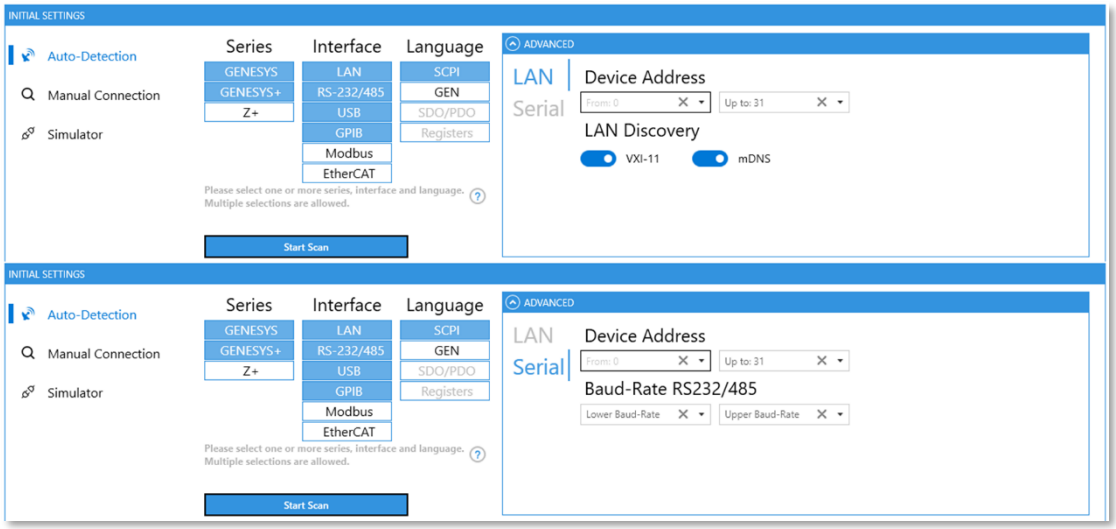


Figure 50

(e) Click *Start Scan*.

3. Double-click (or press *Connect*) on the device you would like to communicate with (you can click anywhere in the device's row). Only one power supply can be selected.

#	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		☐

Figure 51

4. Once you are connected to the device, you will see its details at the bottom of the screen (Figure 53). Choose any of the features on the top banner (Figure 52) in order to be transferred to the feature's tab.



Figure 52



Figure 53

NOTE

If one package of NI-VISA or more is not installed, there will be no option to scan for GPIB devices in the VCP Auto-Detection.

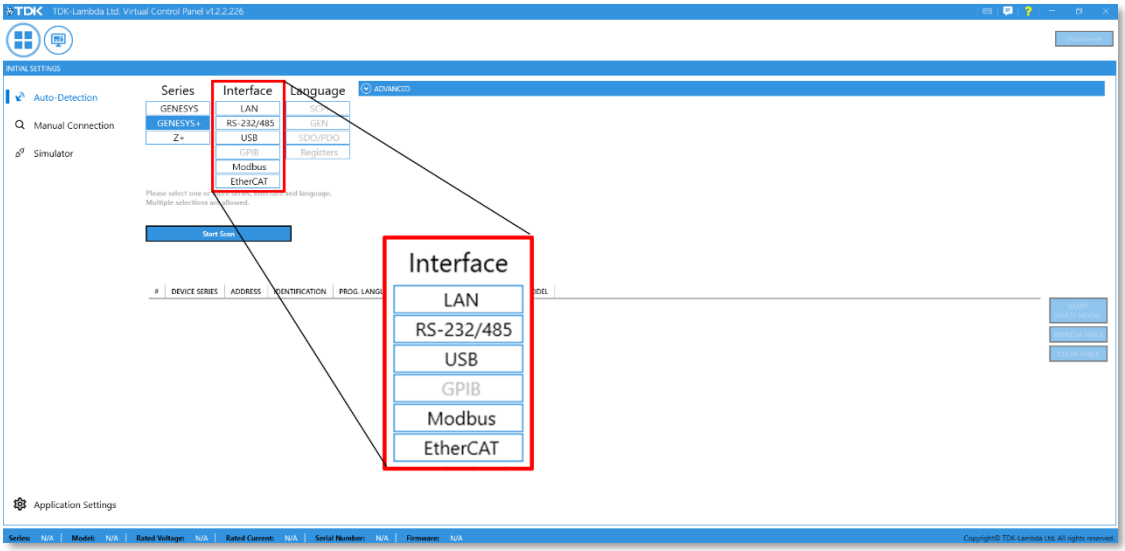


Figure 54

Manual Connection

If you know which interface your power supply 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.

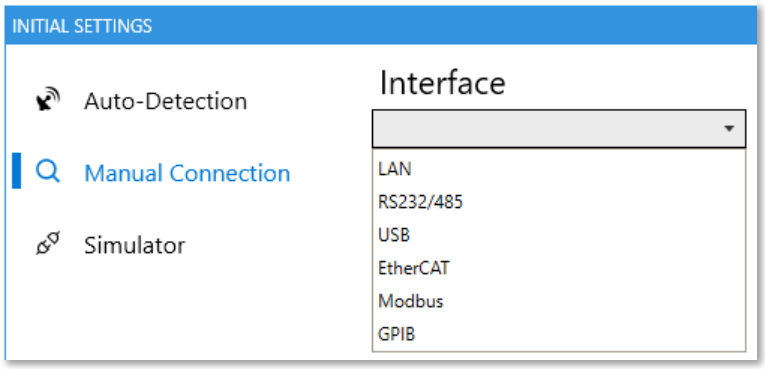


Figure 55

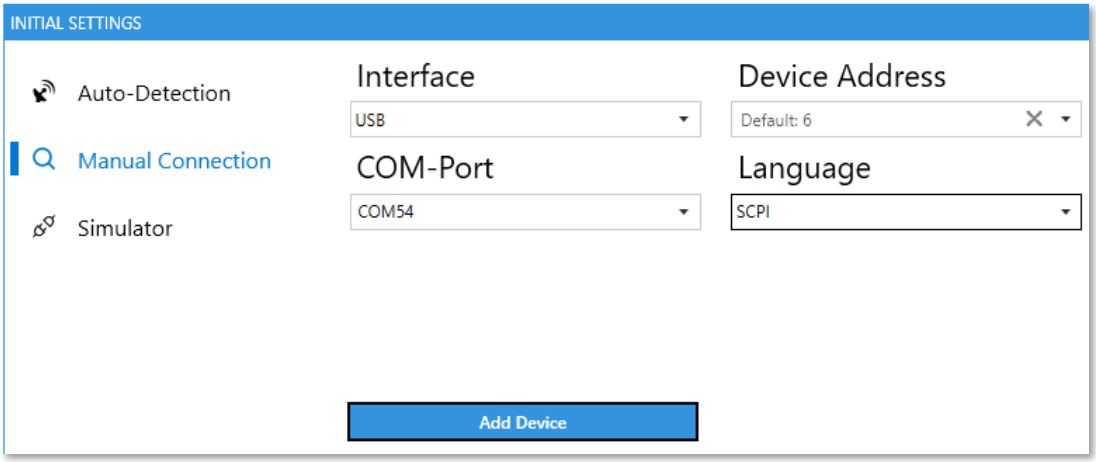


Figure 56

If one package of NI-VISA or more is not installed, there will be no option to add a GPIB device using the Manual Connection tab. Three alert messages can appear on the screen, according to the missing packages:

1. "NI-VISA.NET Development Support" package is missing

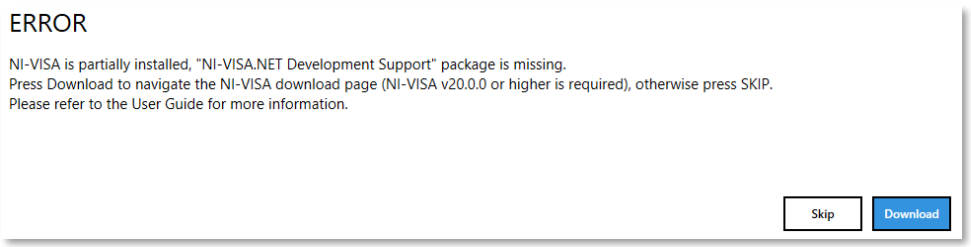


Figure 57

2. “NI-VISA.NET Runtime” package is missing

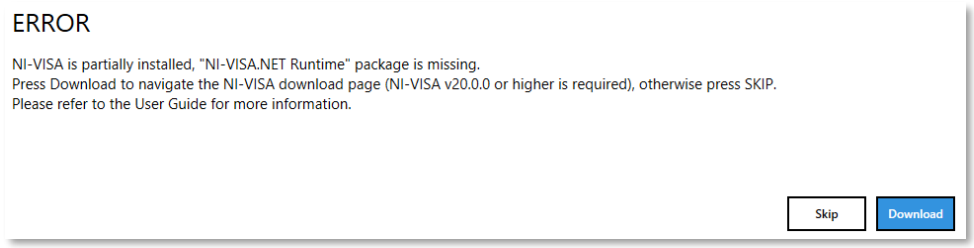


Figure 58

3. “NI-VISA.NET Development Support” and “NI-VISA.NET Runtime” packages are missing

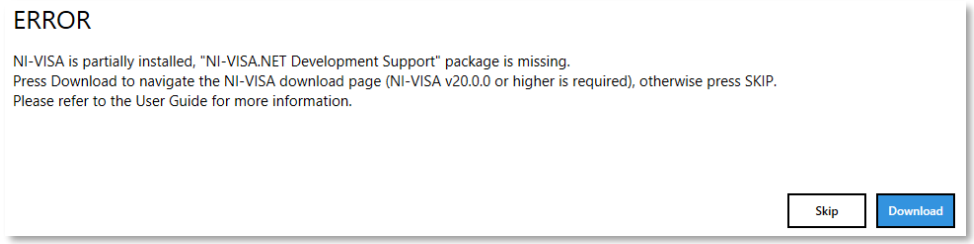


Figure 59

In any of the cases specified above, please click *Download* to install the missing package or *Skip* if GPIB option won’t be used.

DC Power Supply Simulator

The DC Power Supply Simulator allows the user to simulate a connection to a GENESYS+ power supply and program it, using the GUI, without the need to connect a power supply.
You can choose the rated voltage and current for your simulation, within the range limitation, then press *Add Device* to add the device to the table.

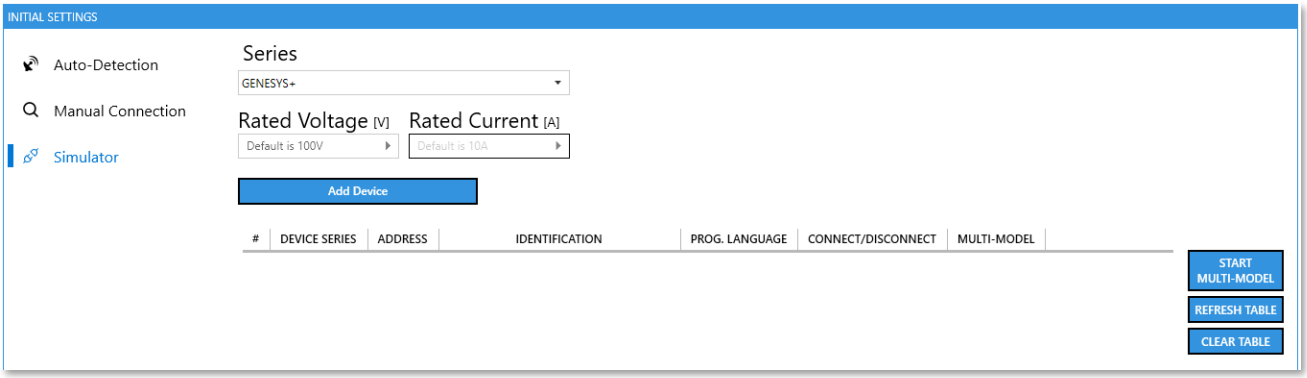


Figure 60

To connect, double-click on the device or press *Connect*.

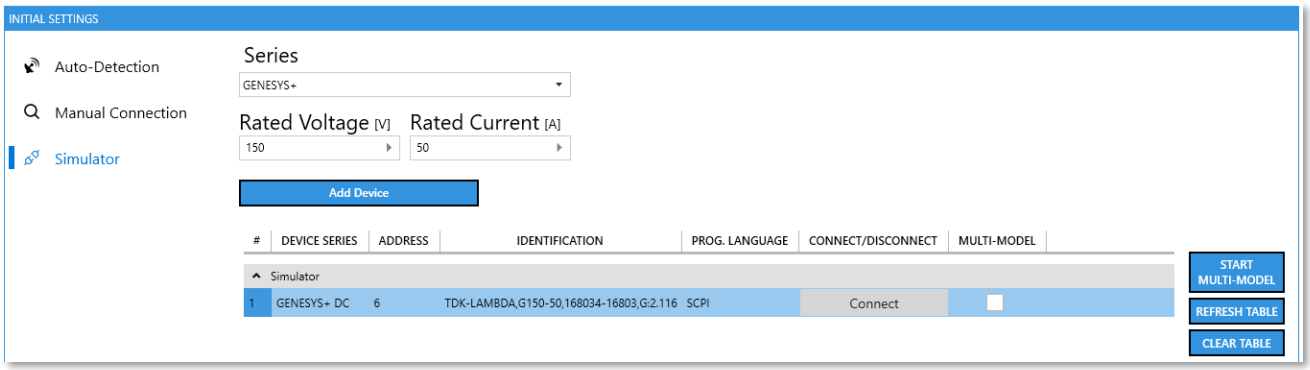


Figure 61

NOTE

1. The Simulator feature is available for GENESYS+ series only.
2. Simulation is available with address 6, SCPI language only.
3. Maximum two simulation mode power supplies can be added to the table.

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.

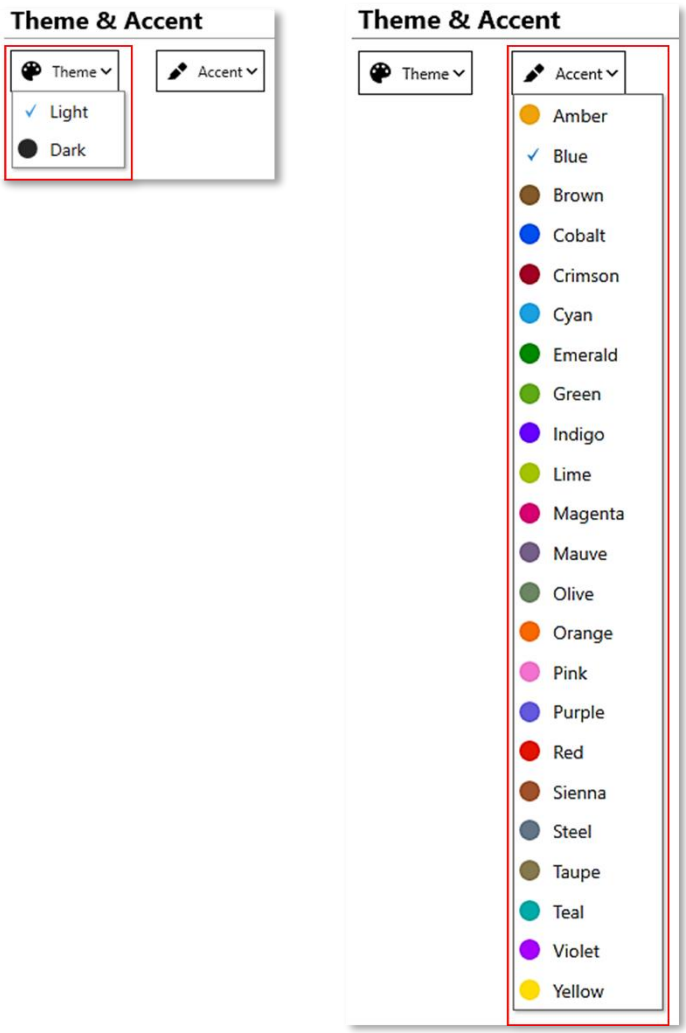


Figure 62

Basic Control & Monitor

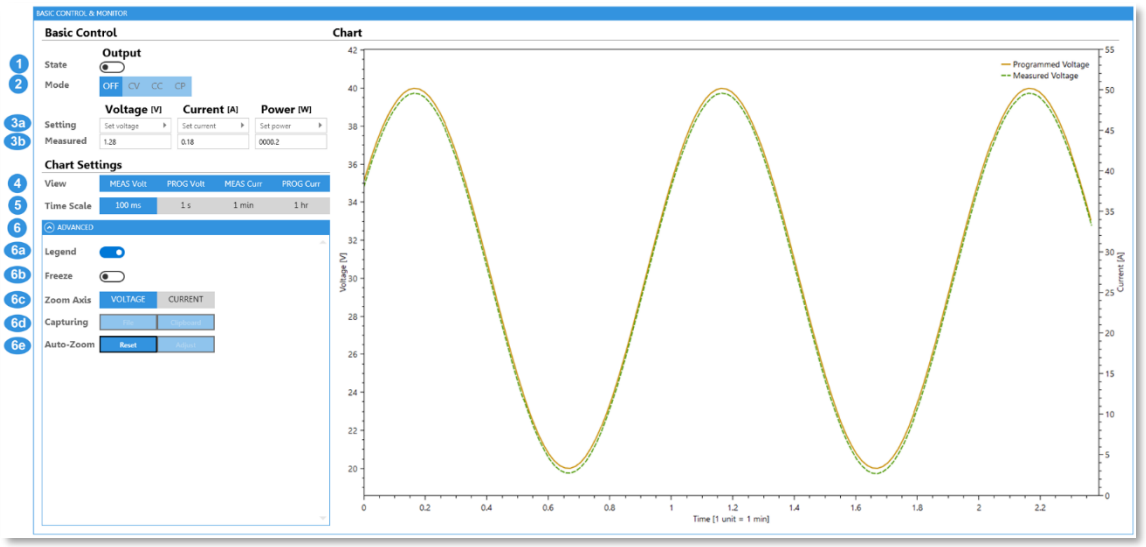


Figure 63

1. Enable or disable the power supply'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 supply's range.
   (b) View the actual (Measured) value output by the power supply (the value is read from the power supply).
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 supply'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 supply 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 / Scripting

Terminal

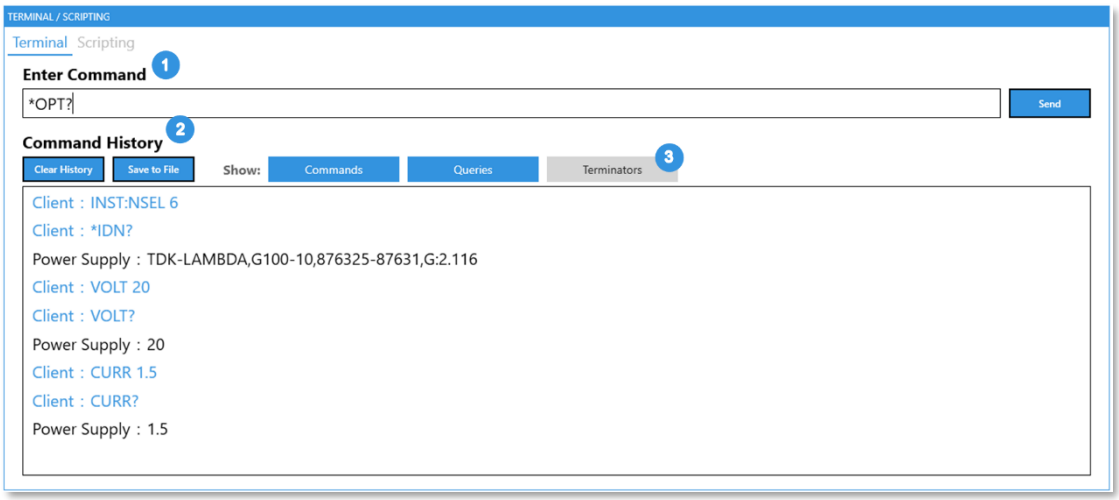


Figure 64

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 supply'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 supply 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 *Terminators* to view/hide line feed characters (e.g. \r, \n, \r\n and \n\r).

For EtherCAT and Modbus, when sending a query, the answer sent back from the power supply can be converted to a human-readable format. Right click on the answer, click **Decode As** then choose **Char**.

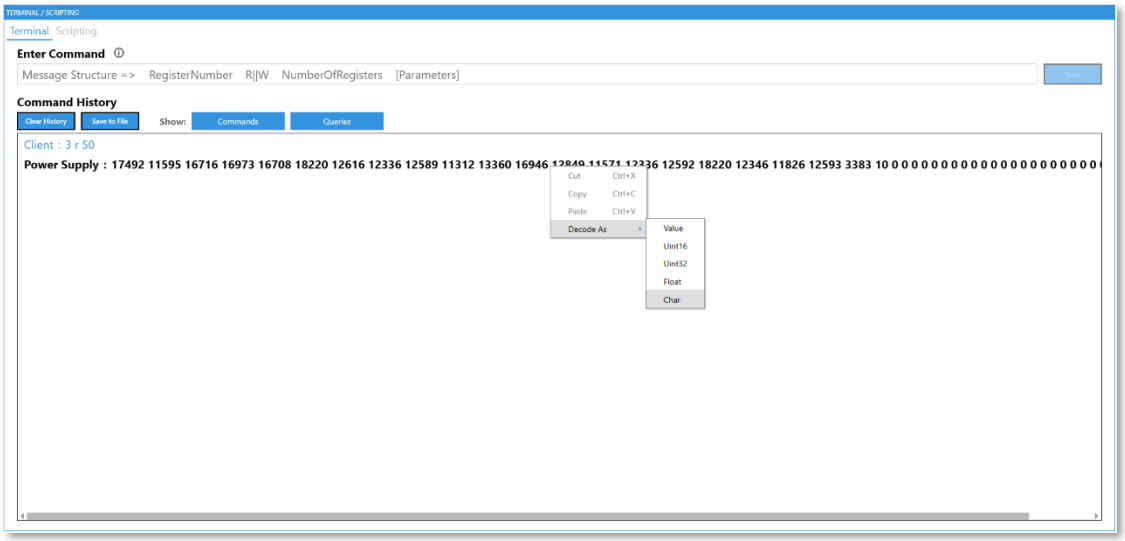


Figure 65

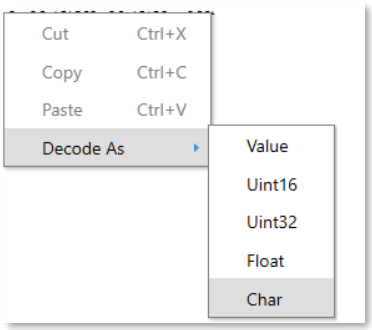


Figure 66

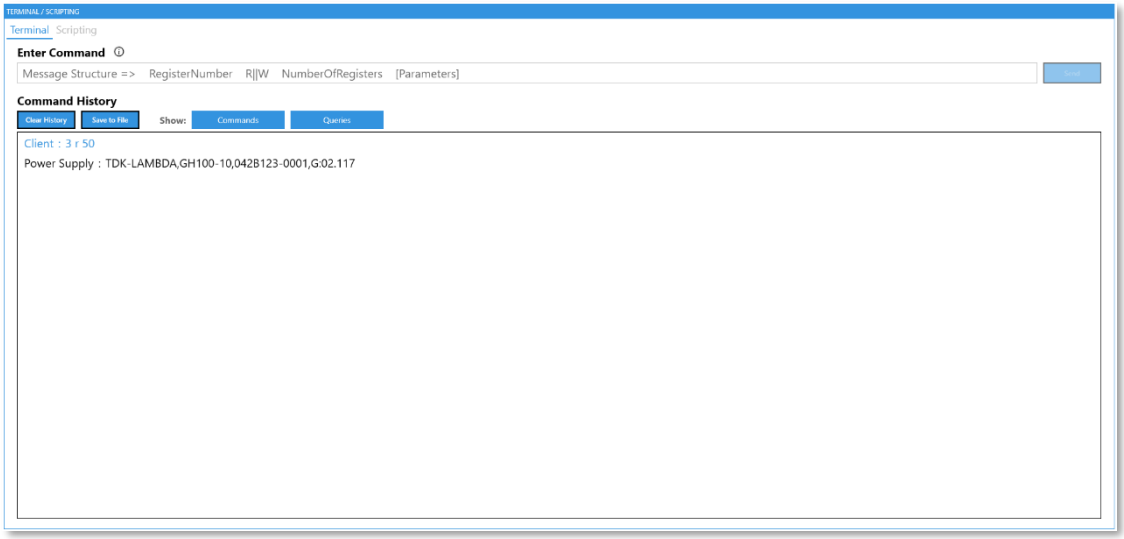


Figure 67

When trying to send a command that is not supported by the terminal or that is illegal due to the affect it has on the connection between the VCP and the power supply, a “special command” alert will appear on the screen:

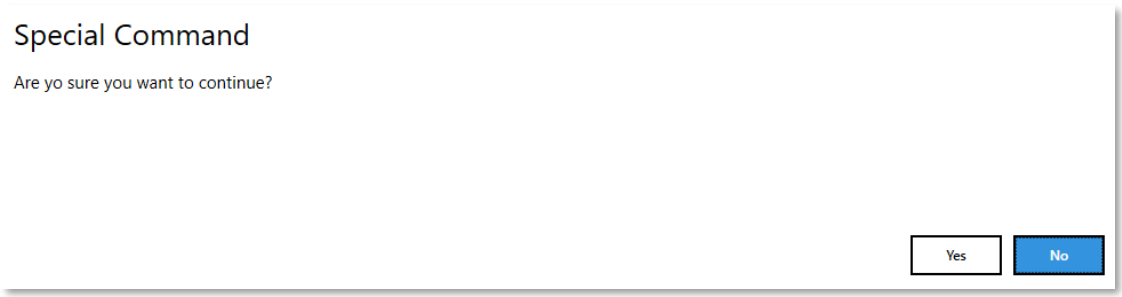


Figure 68

Scripting

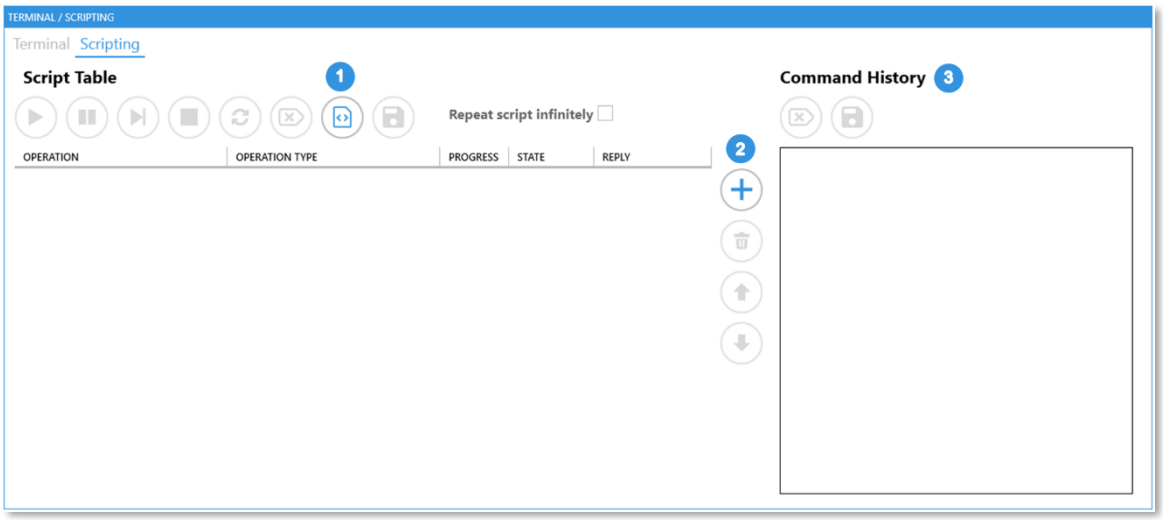


Figure 69

1. Load a script from your PC.
2. Add an instruction, command or query using the ⊕ button. Options are as follows:
   (a) Add Query

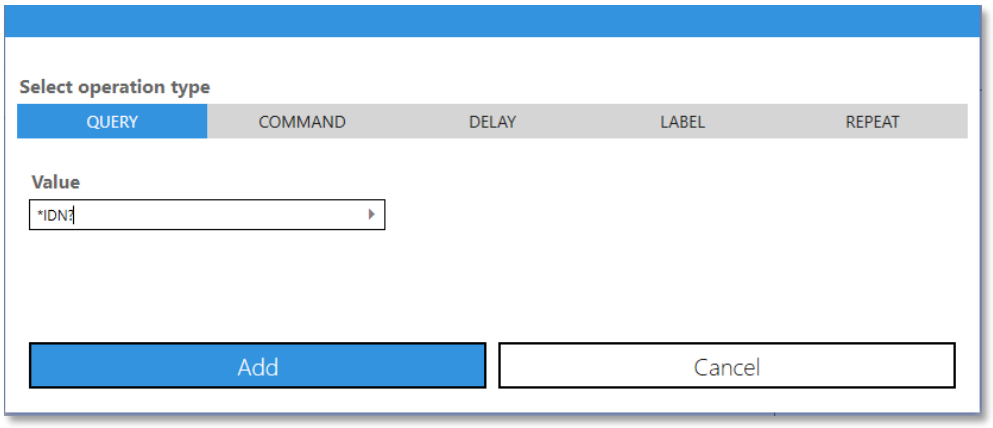


Figure 70

(b) Add Command

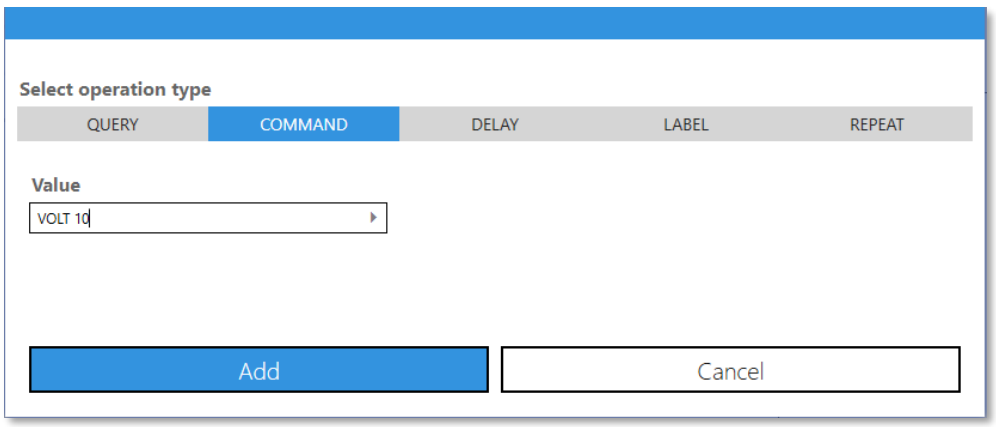


Figure 71

(c) Add Delay

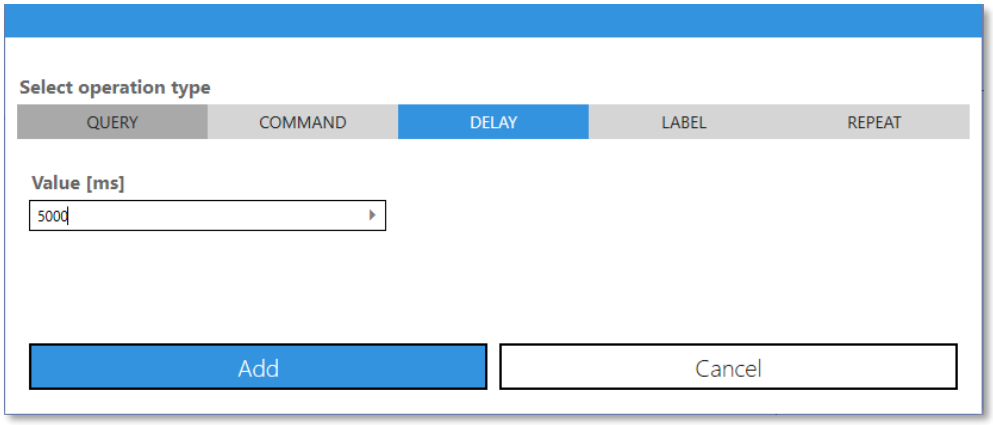


Figure 72

(d) Add Label which describes the next line or block of lines in your script

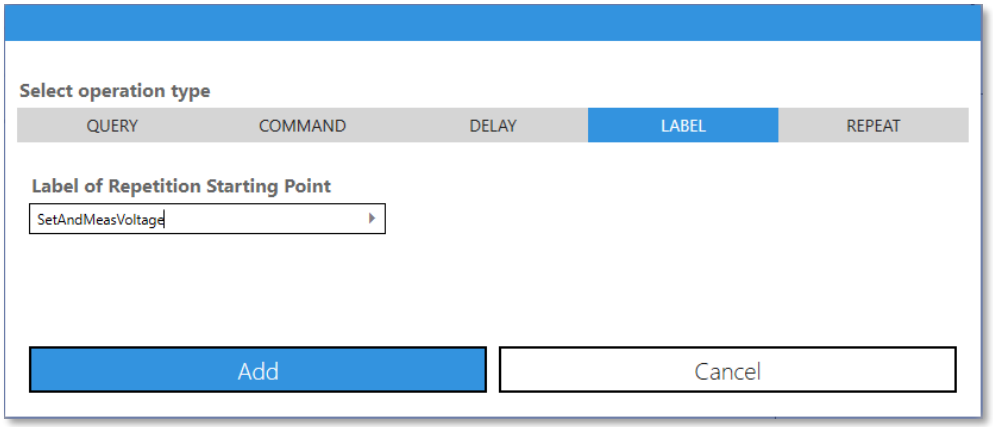


Figure 73

(e) Add *Repeat* instruction based on the labels in the script, to repeat a line or a block of lines in your script and choose the number of iterations

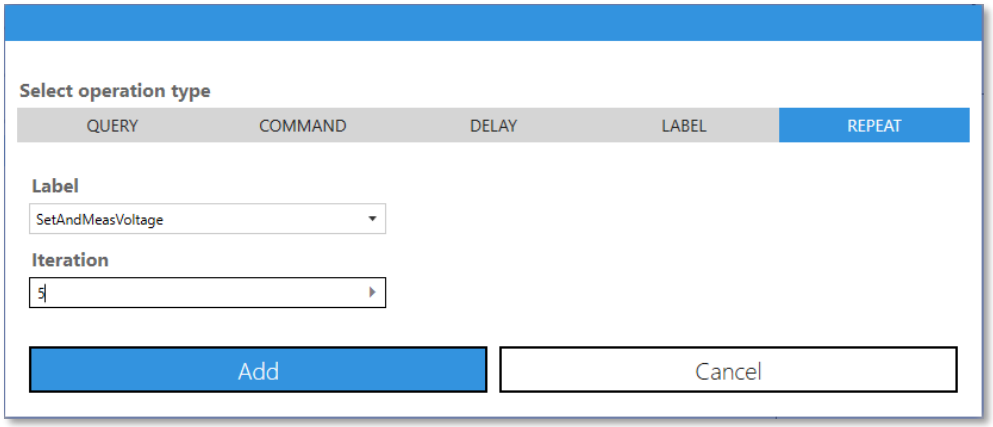


Figure 74

3. All the instructions, commands, queries, and replies are displayed in the Command History window. The command history can be saved to your PC each time the execution is finished, and the window can be cleared each time the script is paused / execution finished.

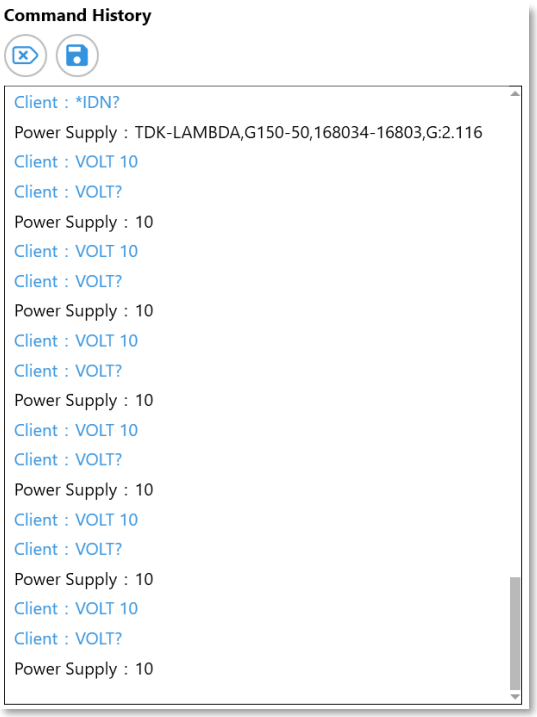


Figure 75

A script can be executed automatically using the button or step by step using the button.

To refresh / initialize a script, use the button.

To clear a script, use the button, and to save it, use the button.

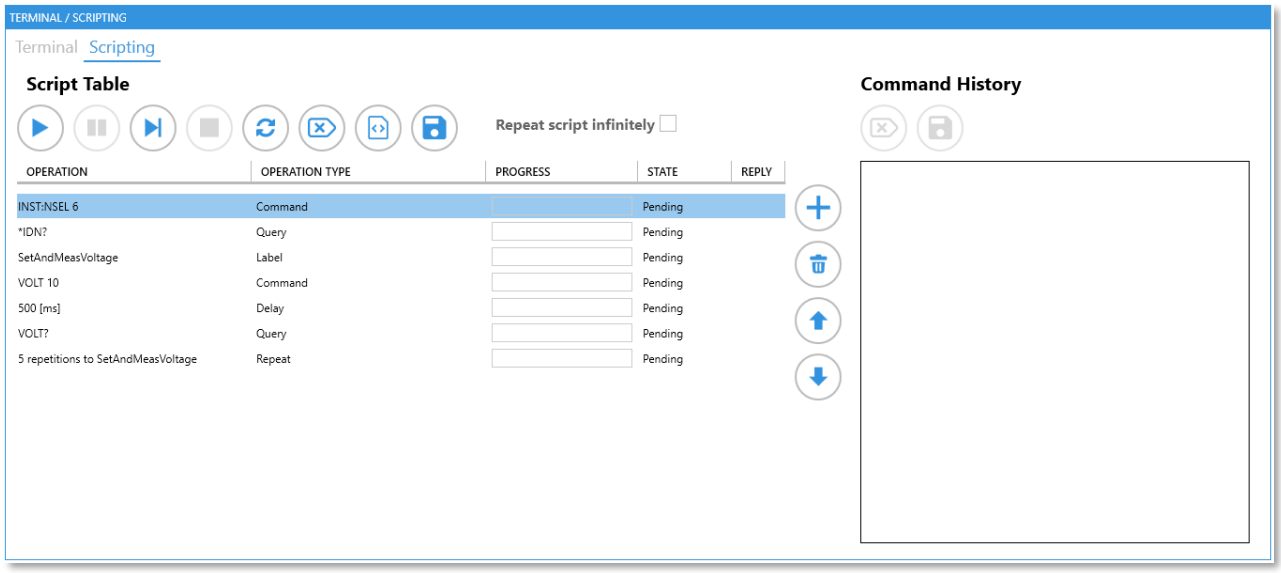


Figure 76

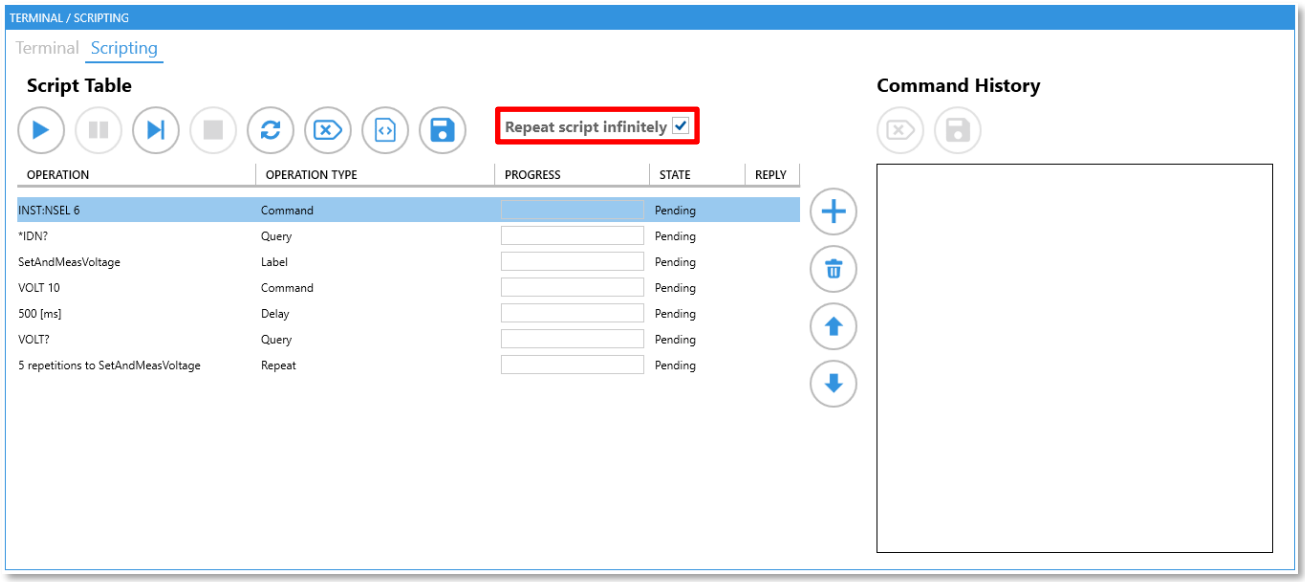


Figure 77

To run the script infinitely, mark the *Repeat script infinitely* check box.

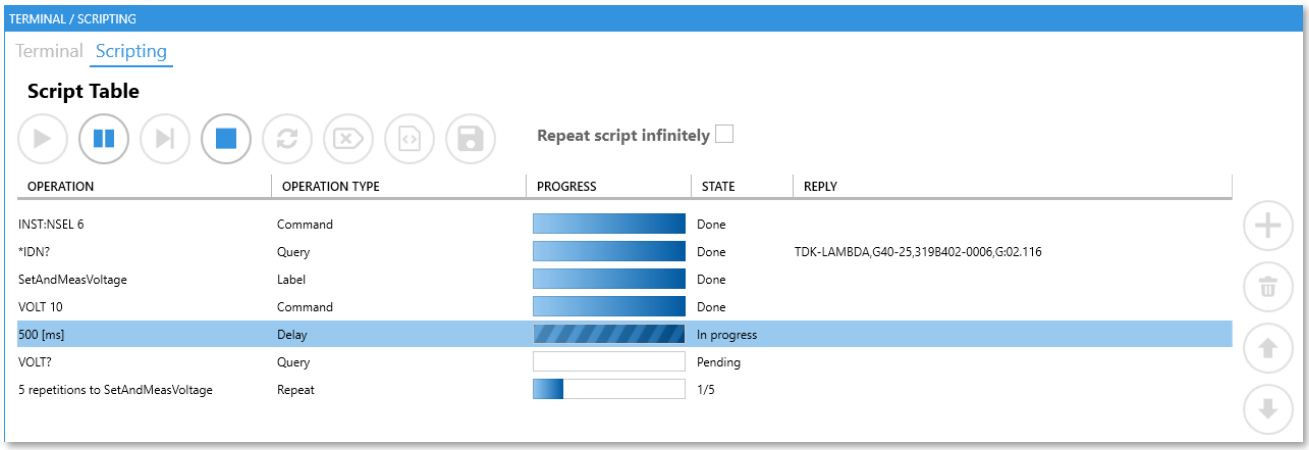


Figure 78

While the script is running, each step's progress is shown in *PROGRESS* column.

NOTES

Command History window can hold up to 100 lines. Saving it to a file will allow you to see all the data saved during the entire run.

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 supply'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, Sawtooth and Square, each one has its own parameters to define.
There is an option to replicate the wave periodically, save it to your PC memory or upload it from there.

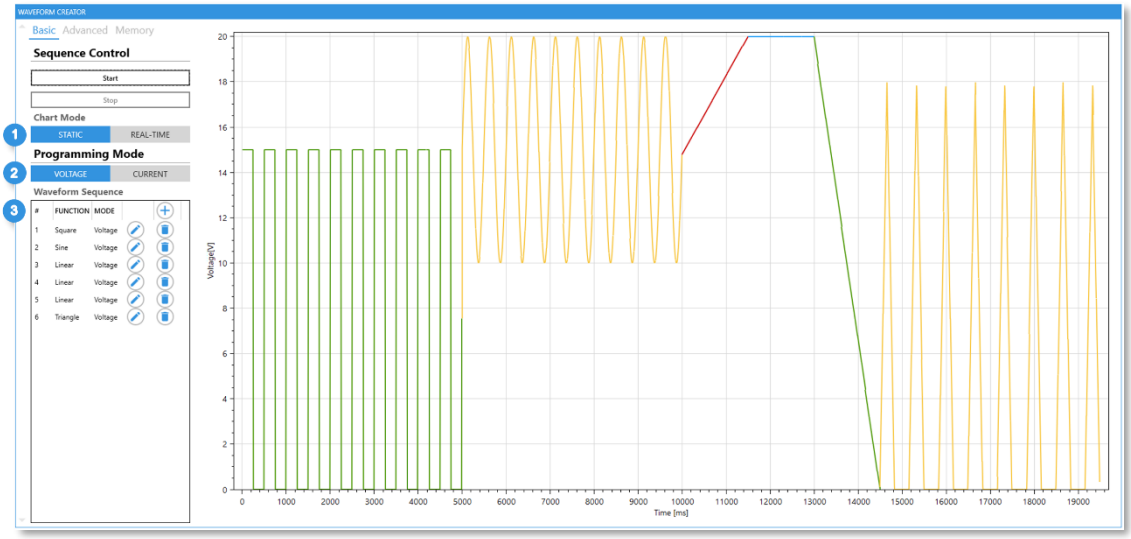


Figure 79

In order to generate a waveform simulation, please follow the next steps:
1. Select wave chart mode: STATIC or REAL-TIME.

STATIC chart mode:

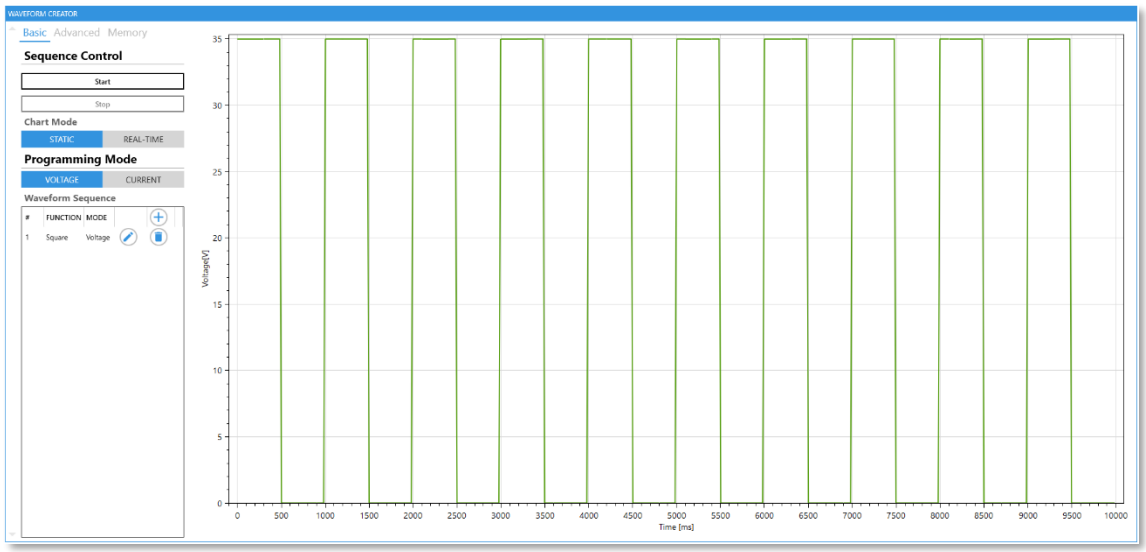


Figure 80

REAL-TIME chart mode:

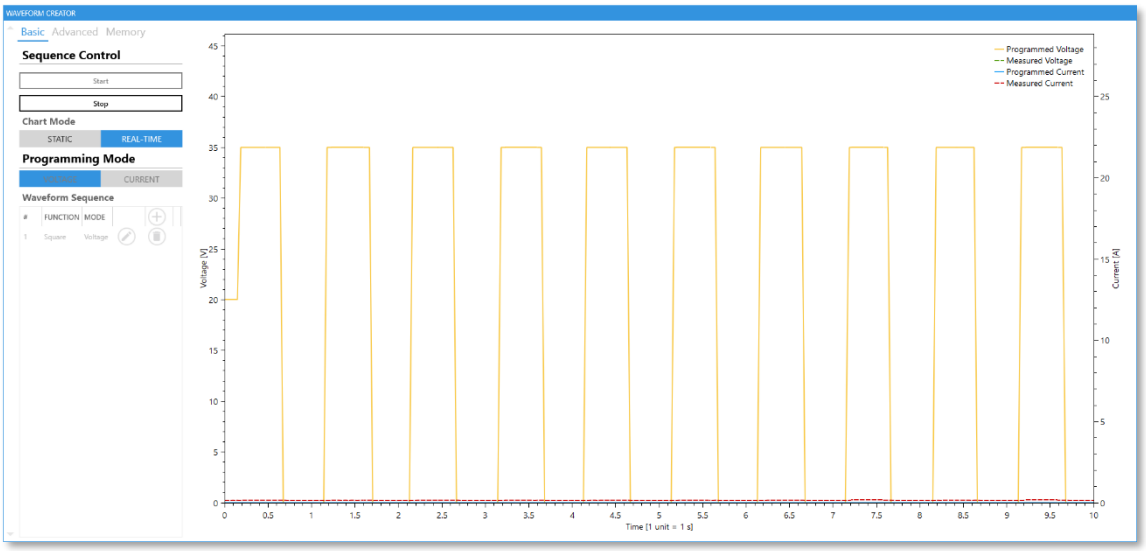


Figure 81

- By double-clicking the Legend in the top-right corner, curves selection window will pop-up on the screen:

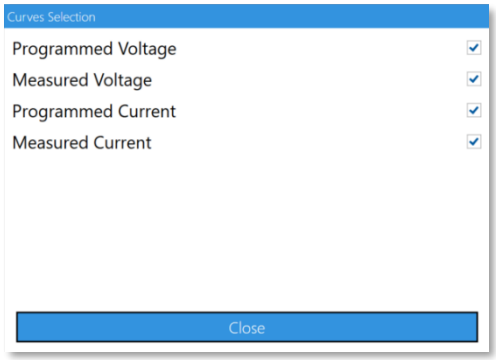


Figure 82

Choose which curves will be displayed on the chart.

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

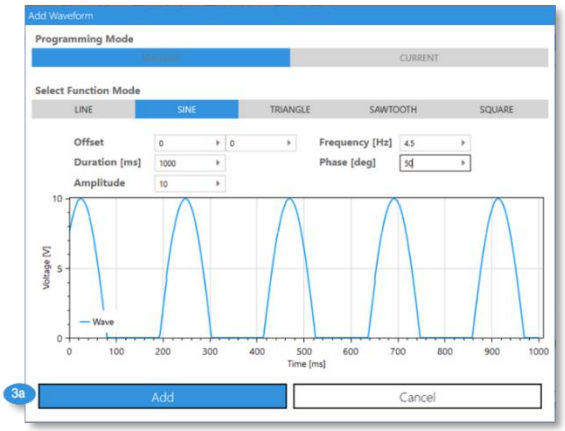


Figure 83

(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.

A waveform can be modified by clicking the button and can be deleted from the sequence by clicking the button.

- If you do not want to set *Advanced Settings*, please skip to step 9.

NOTE

1. The accuracy of the waveform graph depends on the drawing algorithm, the operating system performance, the limited number of points and the timing required to update the power supply's waveform values, which can result in a slight deviation in the waveform graph shown compared to the actual power supply's output.
2. It is recommended to limit the number of waves to 50 due to the load it creates in the application.

Advanced Waveform Creator Settings

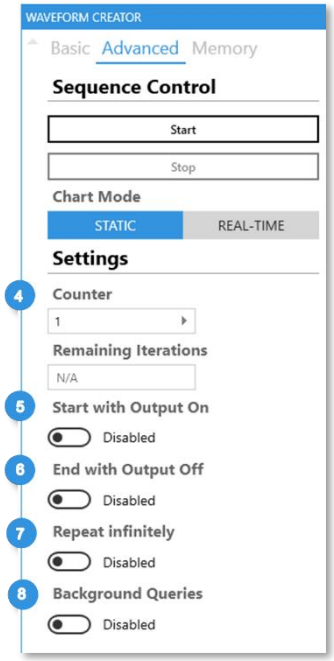


Figure 84

4. Define the number of times the waveform should be repeated and monitor how many iterations have left.
5. Output Control – set the output state ON when the sequence starts running.
6. Output Control – set the output state OFF when the sequence stops running.
7. Repeat the sequence infinitely.
8. Indicates whether background queries will be ON during sequence run-time.

Waveform Creator Control

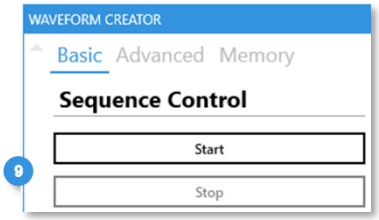


Figure 85

9. 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

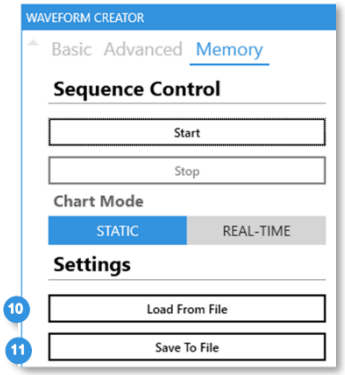


Figure 86

10. 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 0.
11. Click *Save To File* to save a waveform to your PC for future use.

Protection

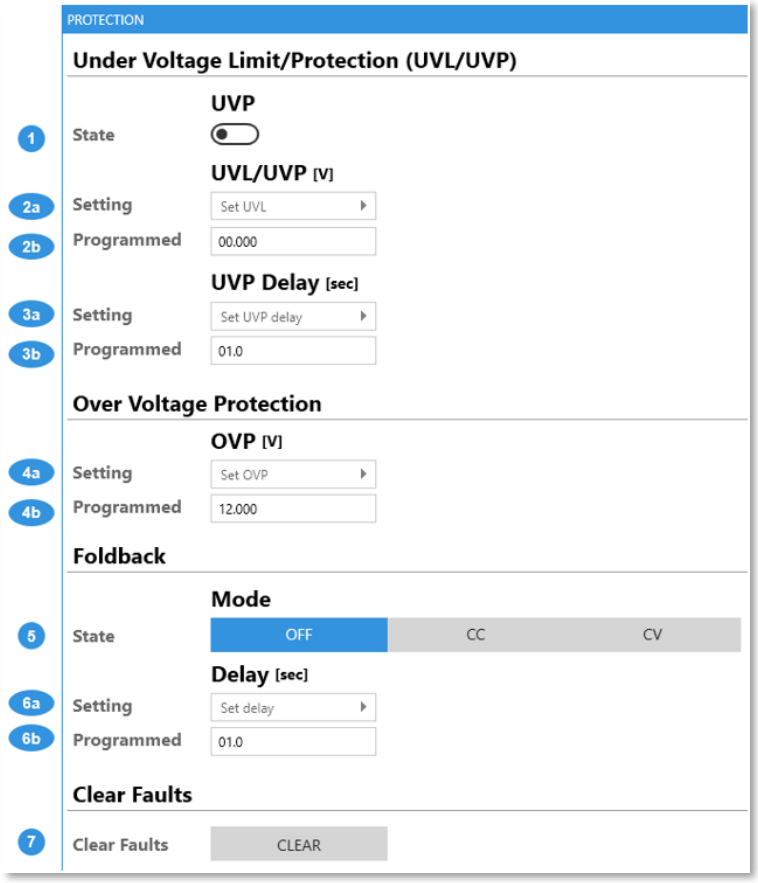


Figure 87

1. Click on the *UVP* (Under Voltage Protection) state button switch to enable or disable UVP protection. If enabled, the power supply'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 supply's range.

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

5. Select the *Foldback protection Mode*. If *CV* (Constant Voltage) is selected, the protection will disable the power supply's output if it crosses from *CC* (Constant Current) or *CP* (Constant Power, for power supplies which include the Constant Power function) to *CV* mode. If *CC* is selected, the protection will disable the power supply'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

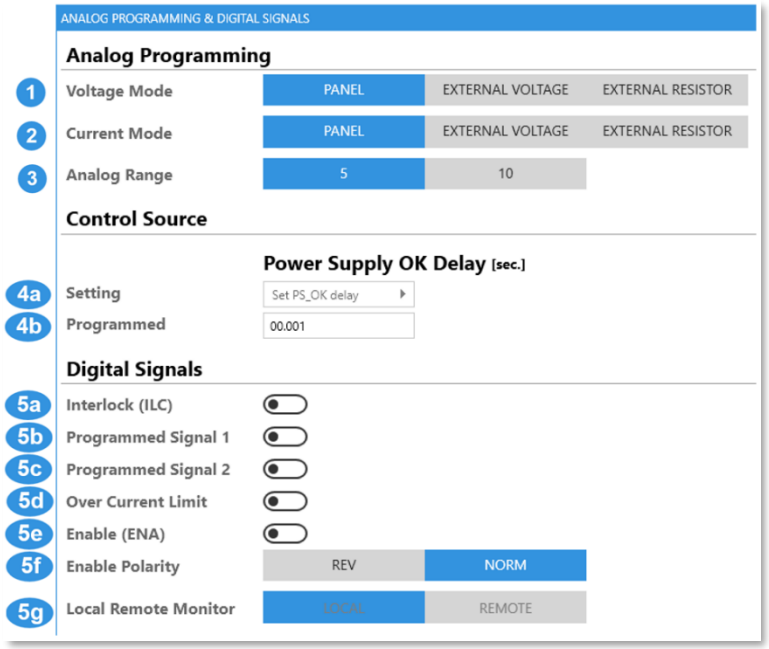


Figure 88

Analog Programming

User must select:

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 0.
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 supply 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 supply (the value is read from the power supply).

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

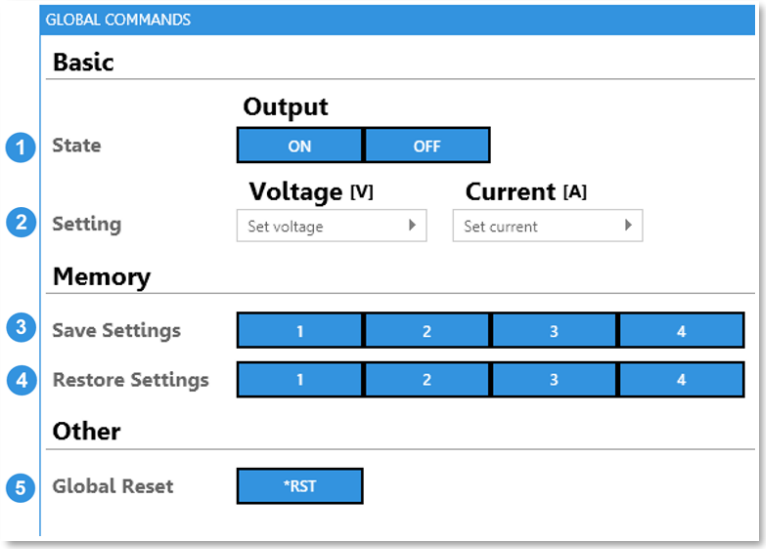


Figure 89

Basic

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

Memory

3. Save each power supply's settings to its respective memory cell.
4. Restore each power supply's settings from its respective memory cell.

Settings

5. Reset all power supplies 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:

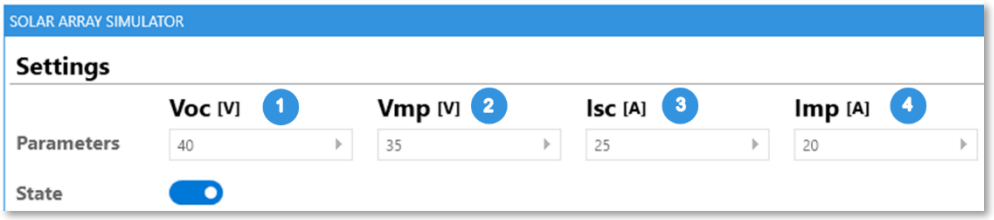


Figure 90

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.

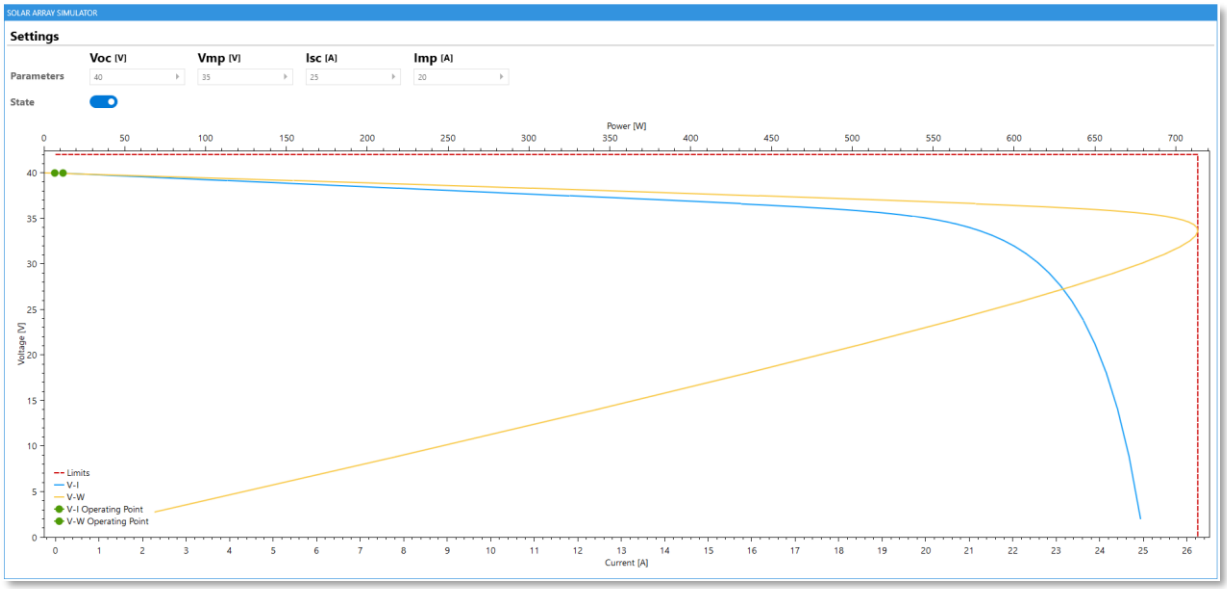


Figure 91

- 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 supply's measured voltage (V_{OUT}) and measured current (I_{OUT}).

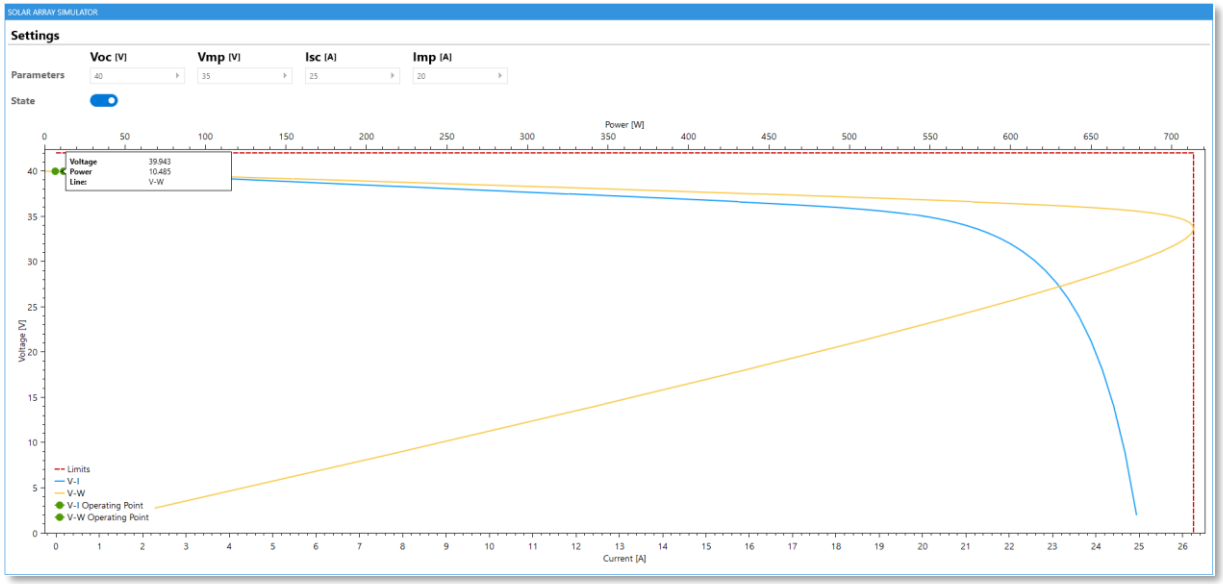


Figure 92

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

Miscellaneous



Figure 93

General

1. View the power supply's ambient temperature (in degrees Celsius).
2. Press the *Auto-Restart* switch to restore the power supply, at start-up, to its last operational settings.
3. Reset all power supply parameters to factory settings and select a communication interface.
4. Reset basic power supply 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 supply 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 supply'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 supply (the value is read from the power supply).

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 supply's output terminals) from discharging.
2. Setting the preload to ON (the default configuration) keeps the preload active as long as the power supply'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 supply's settings to a selected memory cell.
15. Restore the power supply'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.

Logger

Real-time display of pre-selected commands, queries and measurements that are sent to and received from the power supply (Log).
The Logger window can be opened and closed, anytime, by clicking the button.
Closing the window is possible using the button as well.

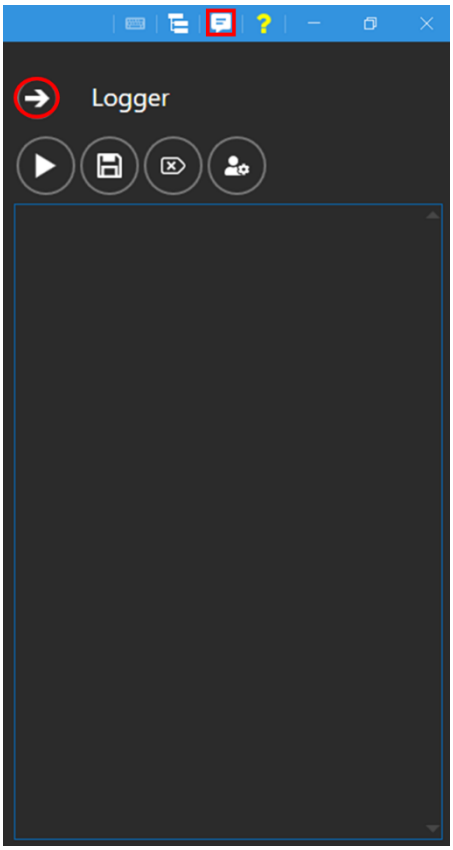


Figure 94

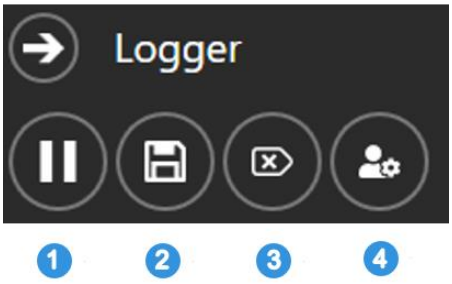


Figure 95

1. Pause / Play notifications streaming.
2. Save Log history to a file on your PC.
3. Clear Log history.

4. Set Log configurations:

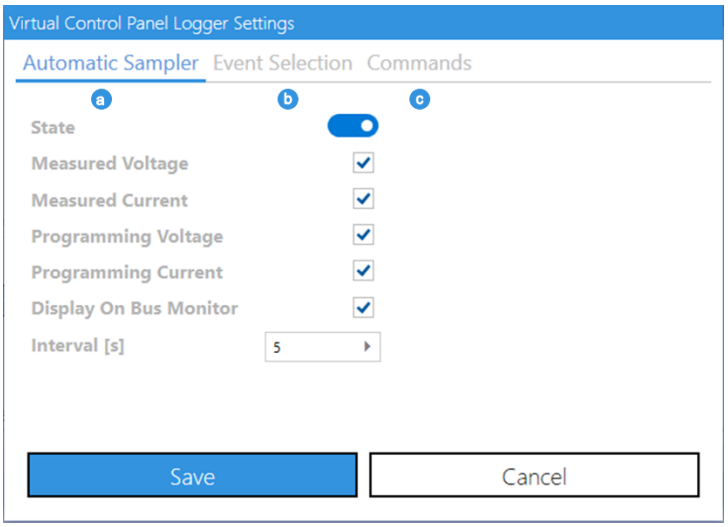


Figure 96

(a) Automatic Sampler configuration menu:

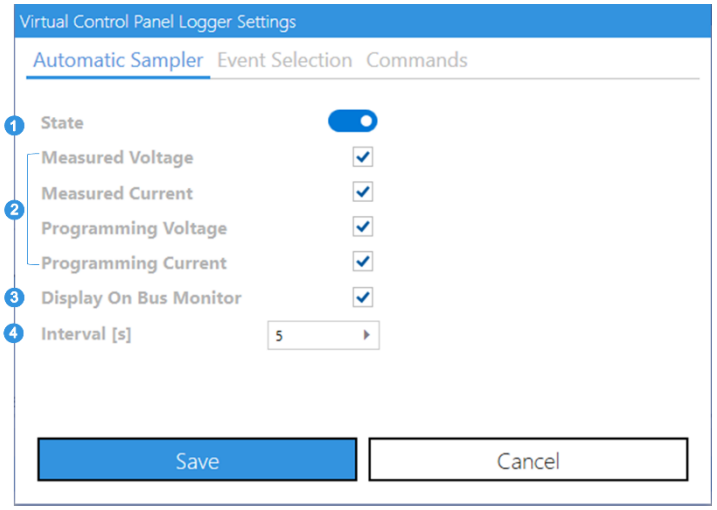


Figure 97

(1) Enable or disable the sampler. When enabled, settings and measurements samples will be taken from the power supply every X second, according to the interval (see section 4).
(2) Select the measurements and settings for which notifications will be displayed in the log.
(3) Choose whether to display the samples on the log or sample without displaying.
(4) Select sampling interval (time between samples).

(b) Event Selection configuration menu:

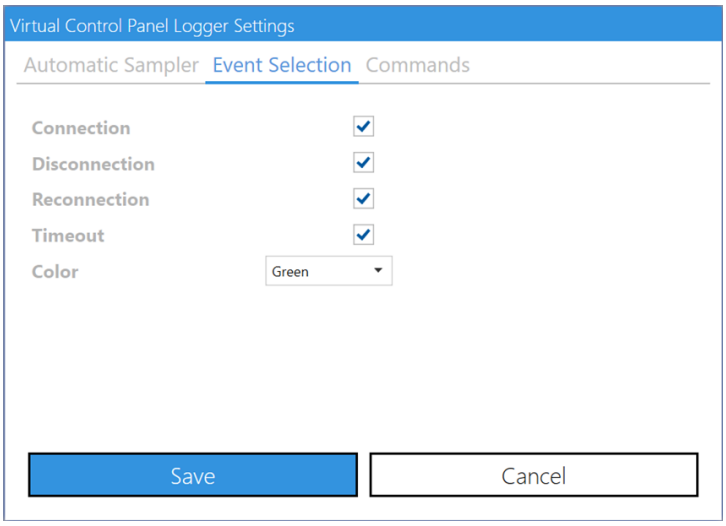


Figure 98

(1) Select the events for which notifications will be displayed in the log.
(2) Select the color of these notifications.

(c) Commands configuration menu

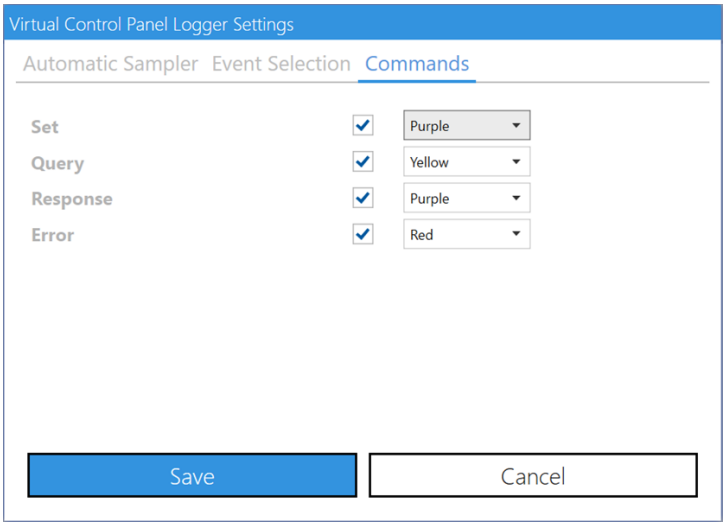


Figure 99

(1) Select the events for which notifications will be displayed in the log.
(2) Select the color of each event's notifications.

New notification alert will be marked as follows:



Figure 100

NOTES

Logger window can hold up to 100 lines. Saving it to a file will allow you to see all the data saved during the entire run.

Registers Tree

Registers Tree provides information regarding the different registers in the power supply.
The information depends on the power supply's series and the communication language (SCPI or GEN).
For more information, refer to GENESYS+, Z+ or GENESYS user manuals under *Status, Fault and SRQ Registers* section.
The Registers Tree window can be opened and closed, anytime, by clicking the button.
Closing the window is possible using the button as well.

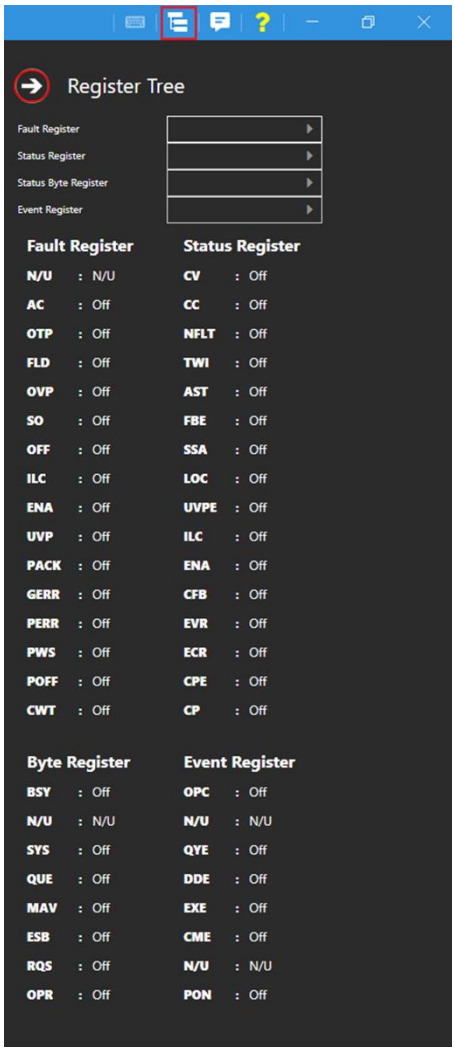


Figure 101

NOTE

N/U – Stands for Not Used.

An example of GENESYS+ Registers Tree:

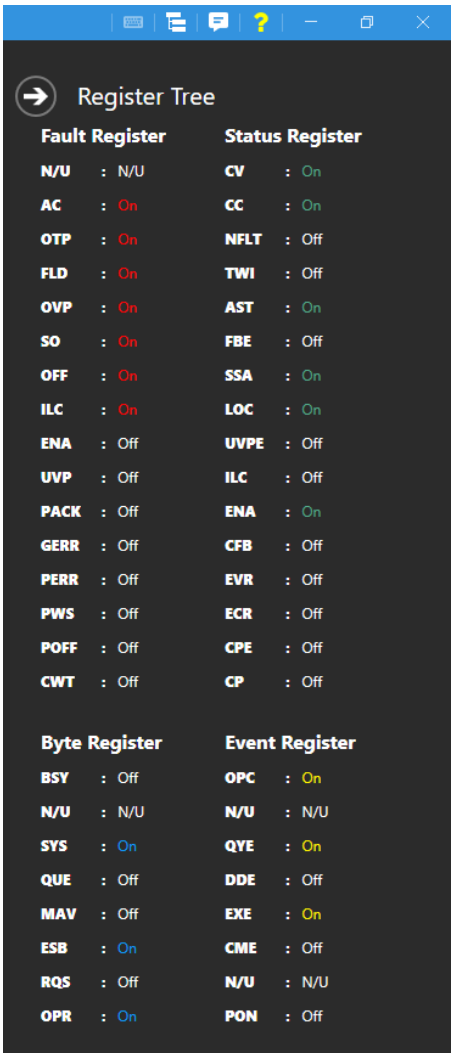


Figure 102

For the first register, the *Fault Register*, the first seven bits are set: AC, OTP, FLD, OVP, SO, OFF and ILC. For the bit configuration, refer to GENESYS+ user manual, under *Questionable Condition (Fault Register) Group Structure* section.

In general, a register holds a snapshot of the actual status state of the power supply at a present time. If a fault occurs, the corresponding bit is set. If a fault is removed, the corresponding bit is cleared.

Keyword Navigation

The feature is located at the right top side of the screen.

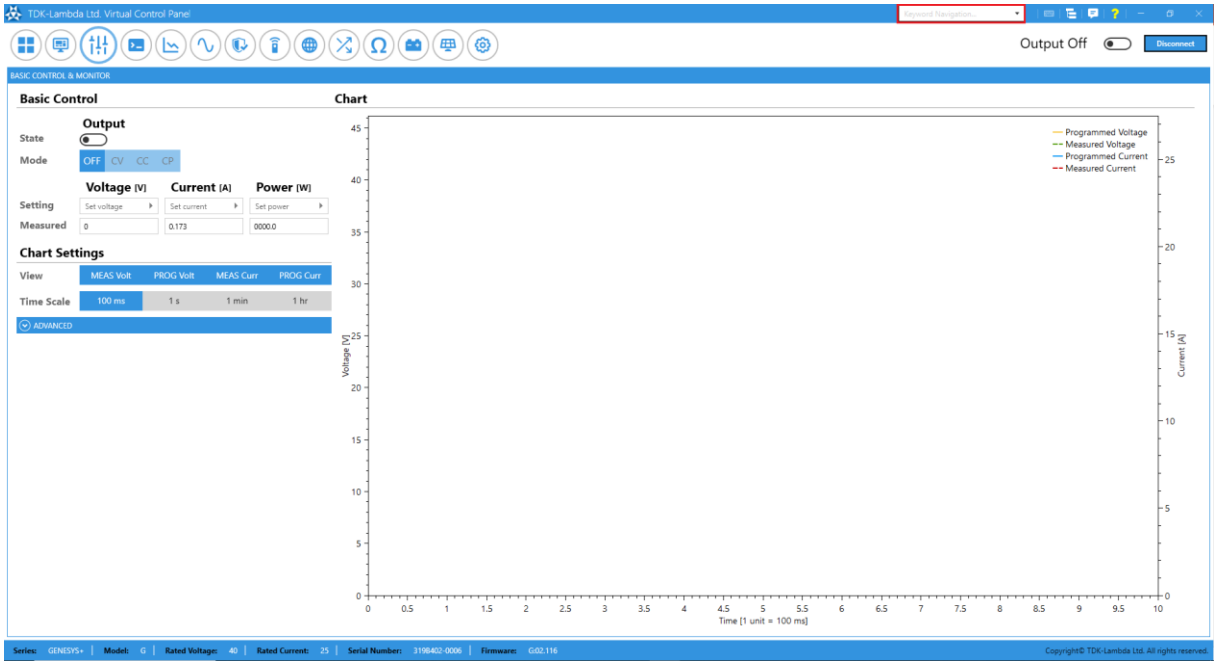


Figure 103

Use acronyms or part of a word or a feature's name in order to quickly navigate to the tab it is located in

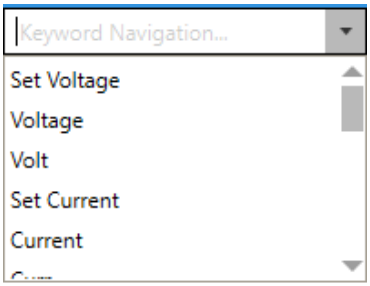


Figure 104



Figure 105

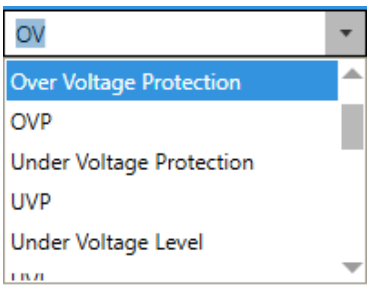


Figure 106

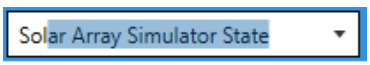


Figure 107

8. Multi-Model

Functionality

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

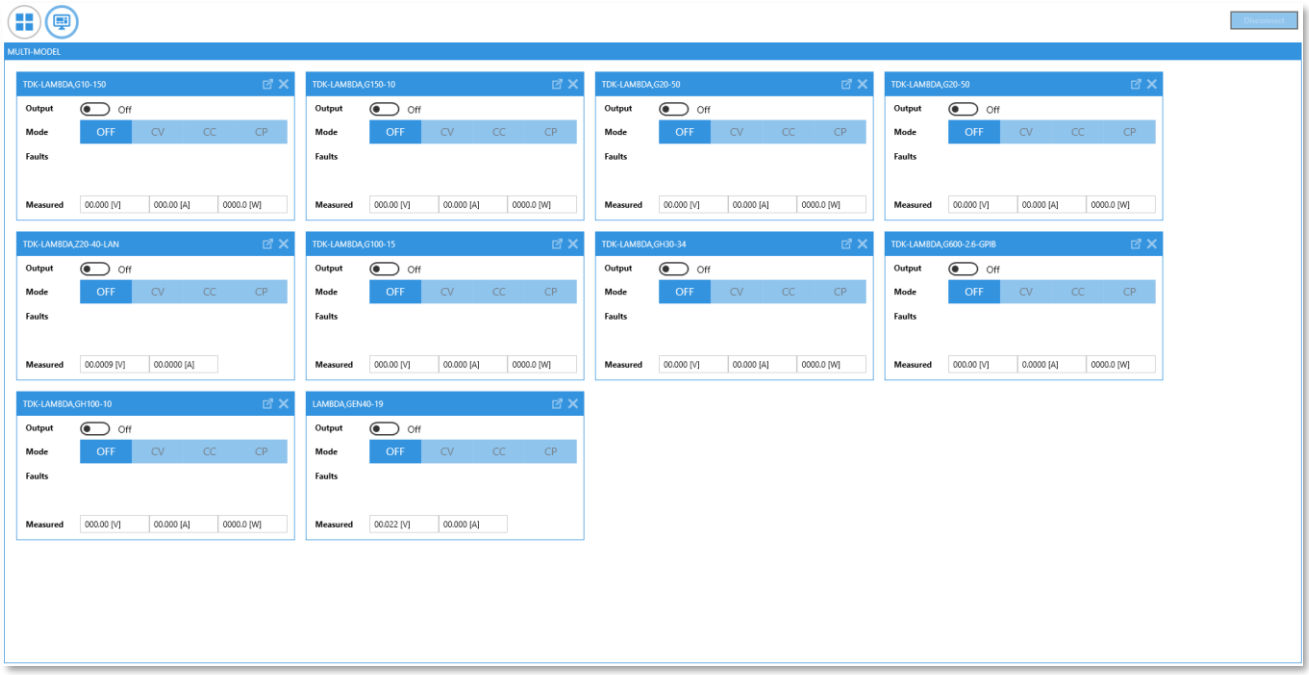


Figure 108

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.

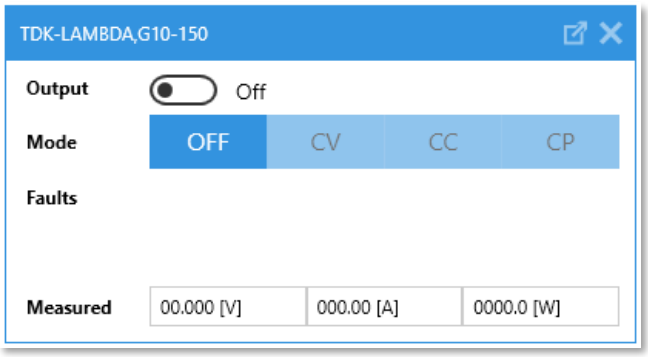


Figure 109

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 ☑ .

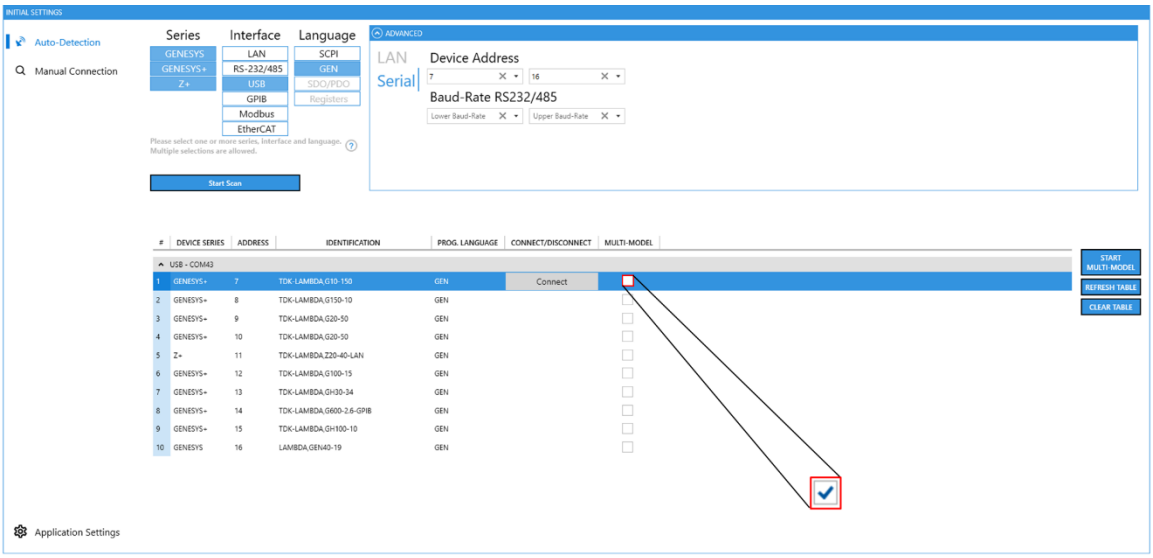


Figure 110

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

#	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 111

2. Click the *START MULTI-MODEL* button, GUI will switch to the Multi-Model tab. All ticked supplies will be displayed (refer to Figure 108). 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.

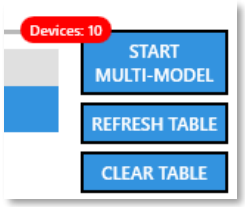


Figure 112

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:

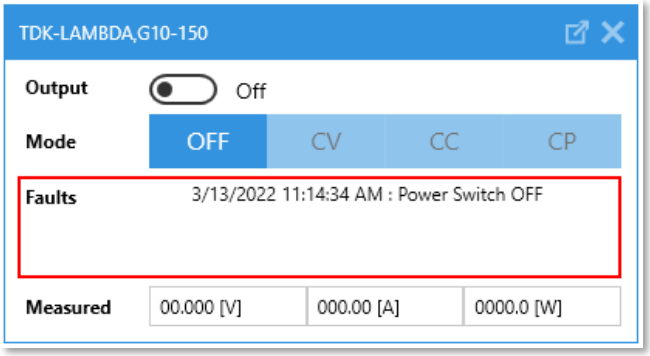


Figure 113

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 114

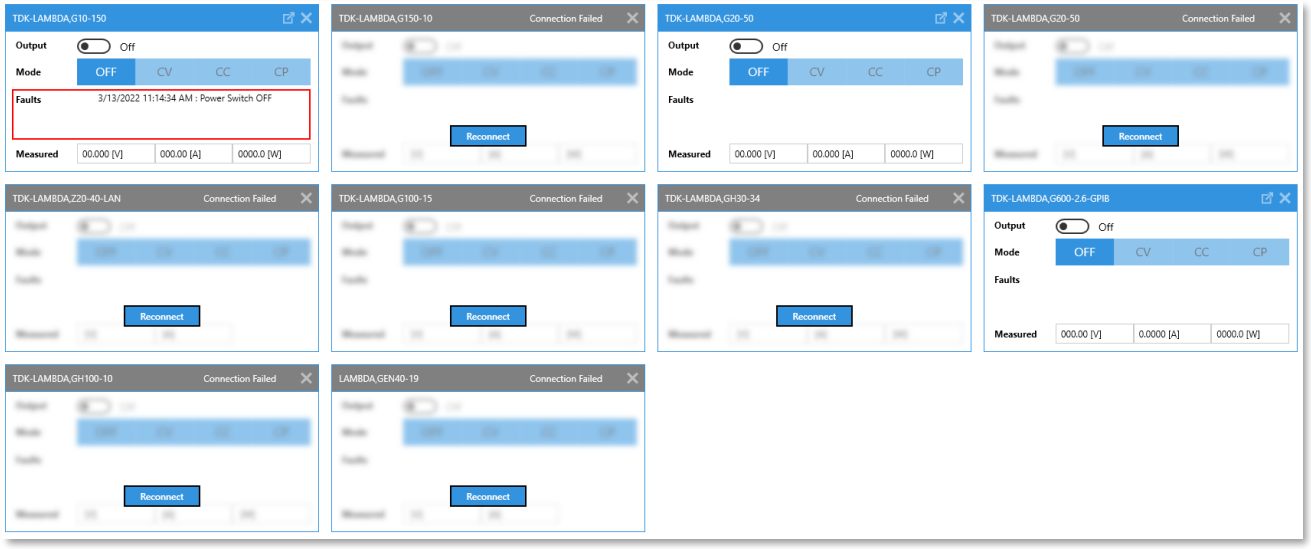


Figure 115

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 116

9. Advanced Features

Sequencer

Basic Sequencer Settings

The Sequencer allows advanced waveform programming of a power supply'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 supply can also activate an output trigger according to the selected mode. Please refer to your power supply's User Manual for more information about its specific Sequencer functionalities.

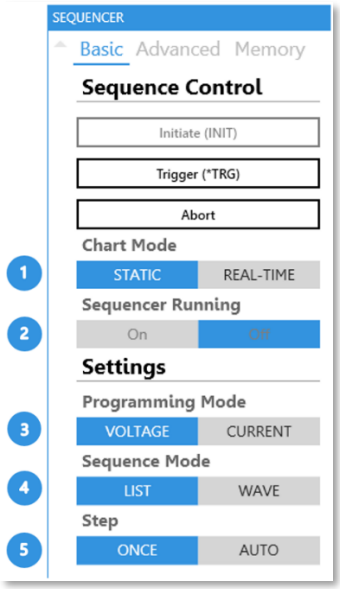


Figure 117

1. Select the chart mode: STATIC or REAL-TIME.
   STATIC chart mode:

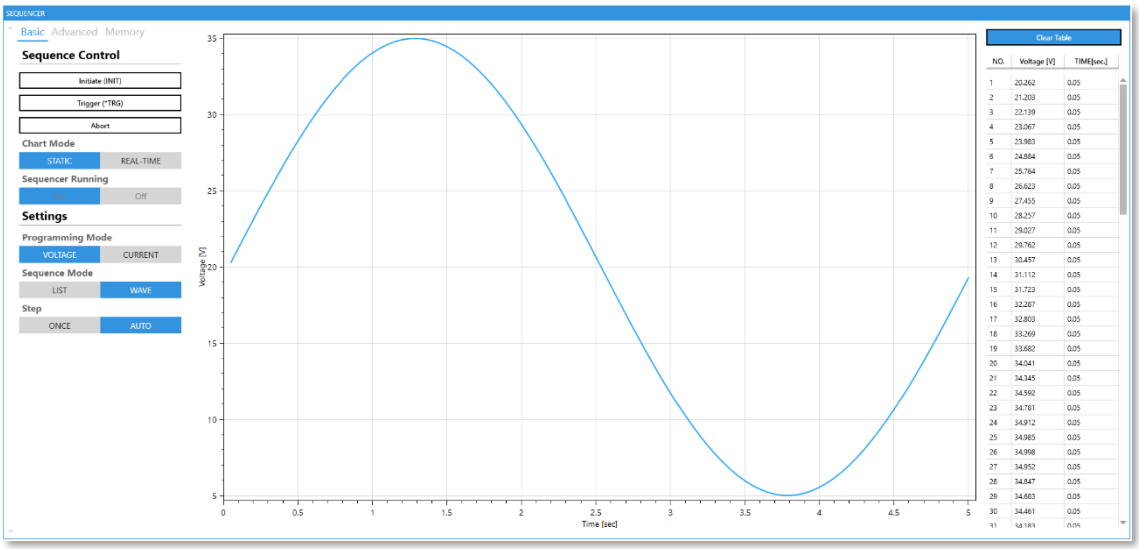


Figure 118

REAL-TIME chart mode:

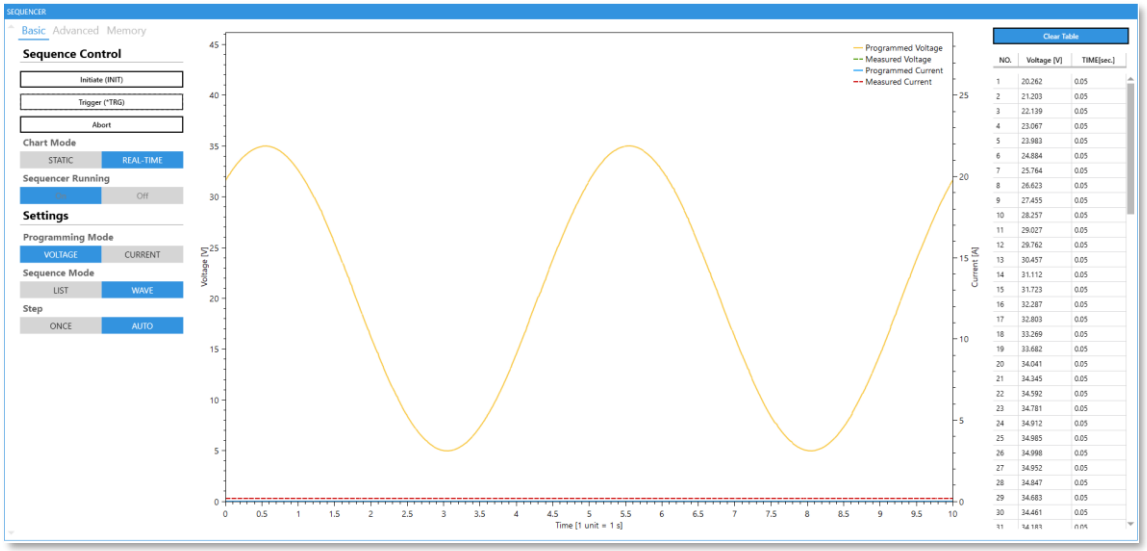


Figure 119

- By double-clicking the Legend in the top-right corner, curves selection window will pop-up on the screen:

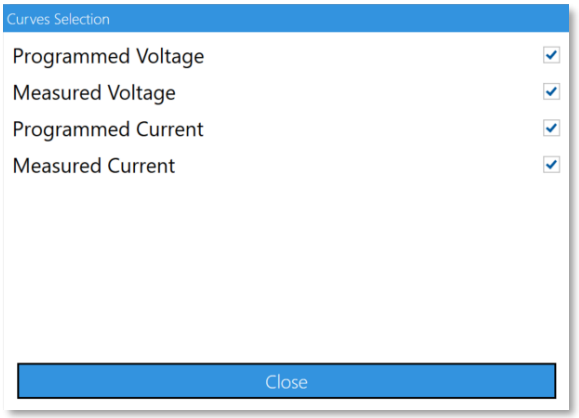


Figure 120

Choose which curves will be displayed on the chart.

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.

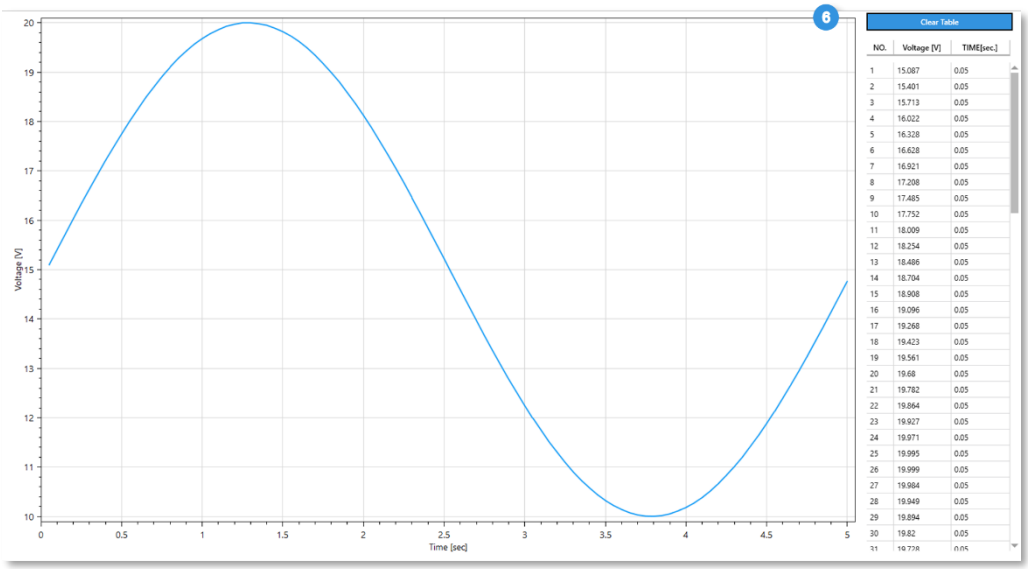


Figure 121

NOTES

1. A GENESYS+ power supply 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. The accuracy of the sequencer graph depends on the sequence-drawing algorithm, the operating system performance and the limited number of points, which can result in a slight deviation in the waveform graph compared to the power supply's output.
3. The Sequencer's functionality is not the same as the Waveform Creator and their goal, implementation, algorithm and data handling are different.

Advanced Sequencer Settings

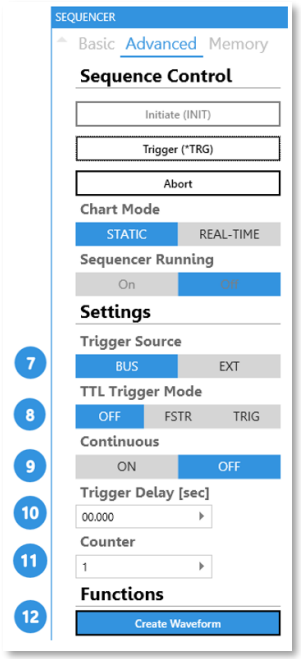


Figure 122

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

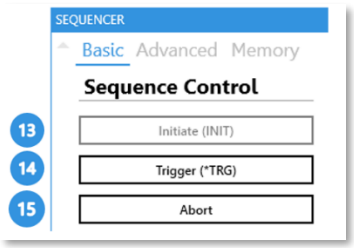


Figure 123

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

13. Click on *INIT*. This will write the sequence to the supply and initiate the sequencer.
14. If *BUS* was selected in step 0, 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

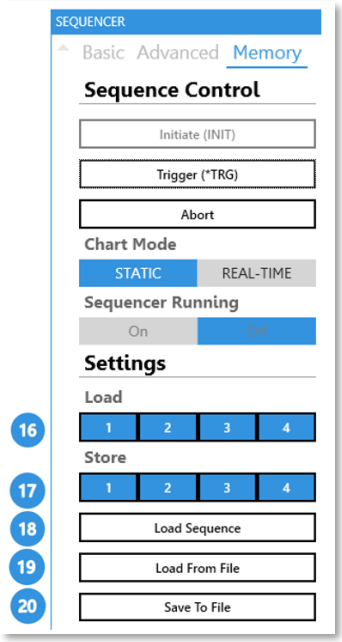


Figure 124

16. Click *Load* to retrieve a sequence from a persistent power supply memory cell. The sequence's setting will show on the graph and in the tabs. To execute the sequence, go back to step 0.
17. Store a generated sequence into one of the power supply's persistent memory cells.

NOTE

1. The STORe command does not save all of a sequence's settings to memory.
2. Only the following settings are saved: voltage/current, sequence mode, dwell/time, step and counter.
3. The STORe command stops an active sequence running.

18. Load the last, most recent sequence executed by the power supply.
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 0.
20. Save a sequence to your PC for future use.

Slew Rate

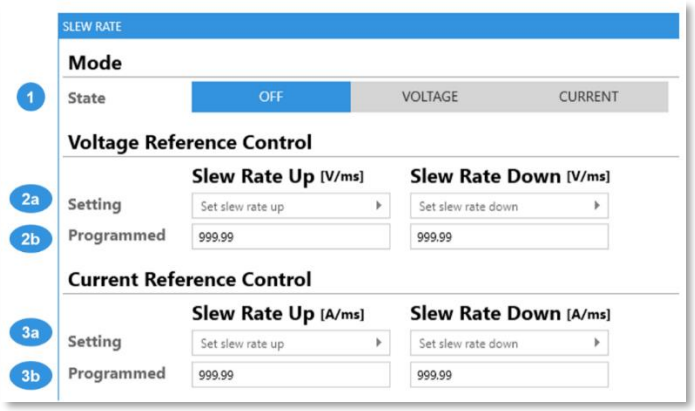


Figure 125

Mode

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

Voltage/Current Reference Control

2, 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 supply (the values are read from the power supply).

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 supply 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 supply'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 supply, V_{PROG} is the programmed voltage, I_{MON} is the actual measured output current, and R_S is the supply's Internal Resistance.

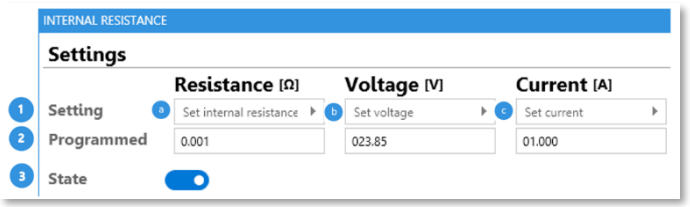


Figure 126

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 supply's range.
2. View the actual (*Programmed*) values accepted by the power supply (the values are read from the power supply).
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 supply's measured voltage (V_{OUT}) and measured current (I_{OUT}).

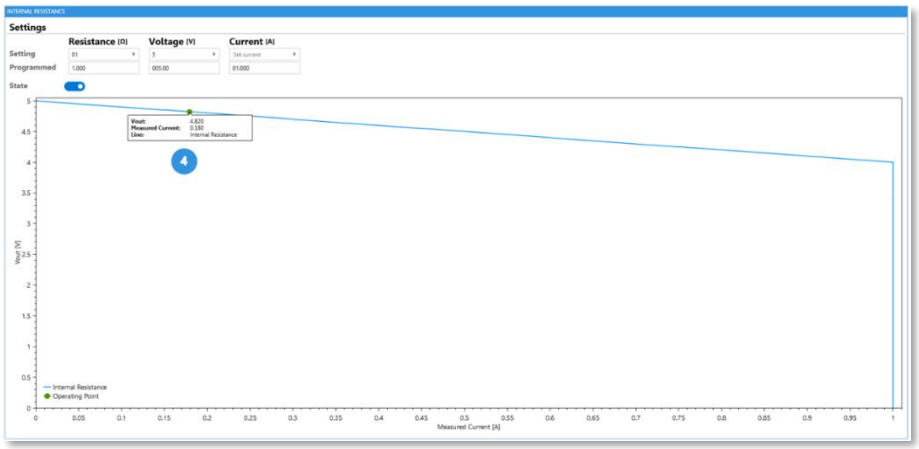


Figure 127

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 supply. The supply 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 supply, I_{MON} is the actual measured output current, and P_{CST} is the constant power limit.

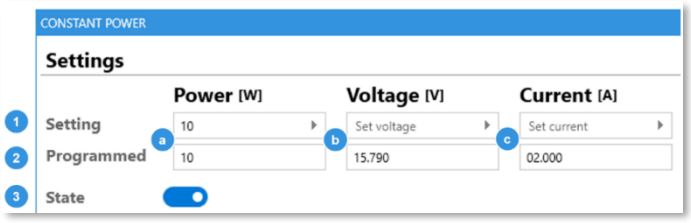


Figure 128

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 supply's range.
2. View the actual *(Programmed)* values accepted by the power supply (the values are read from the power supply).
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 supply's voltage and current.

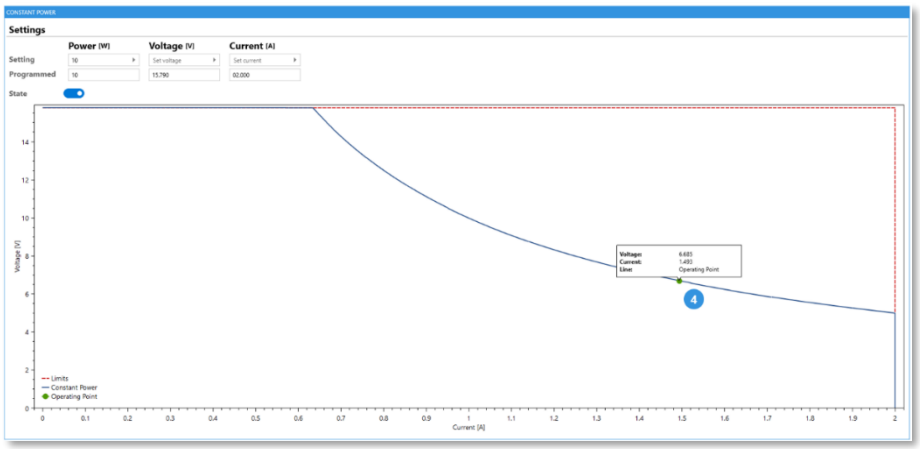


Figure 129

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

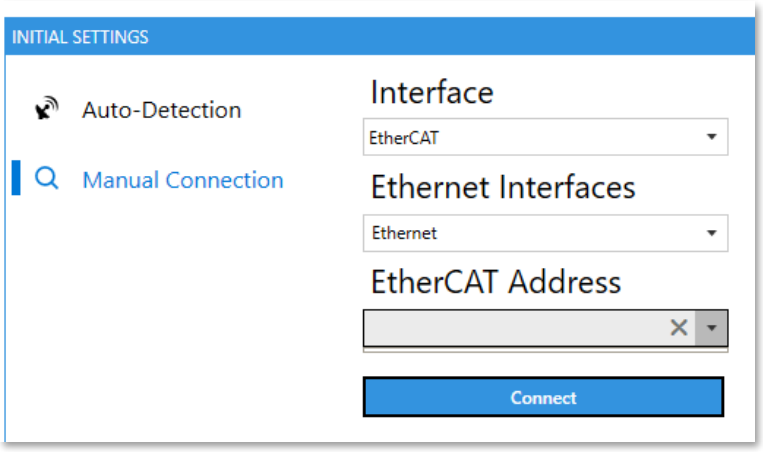


Figure 130

If your PC is connected to a power supply 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.

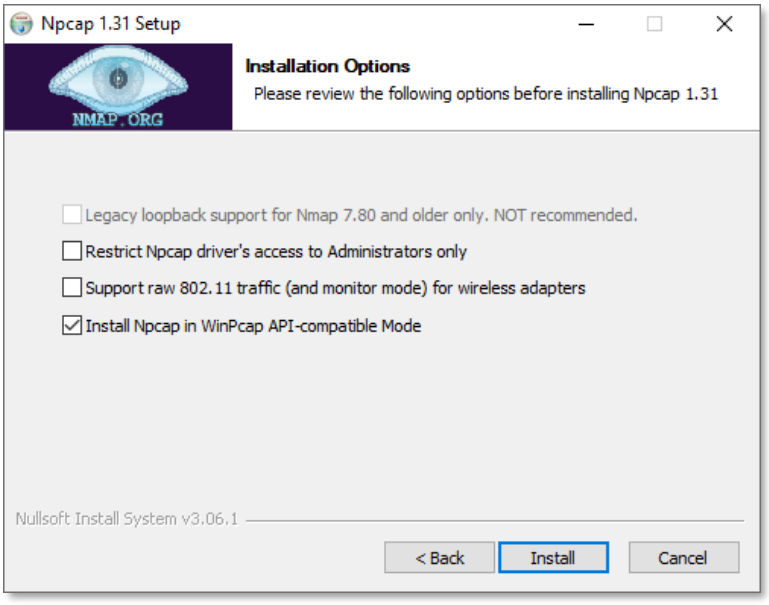


Figure 131

.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.

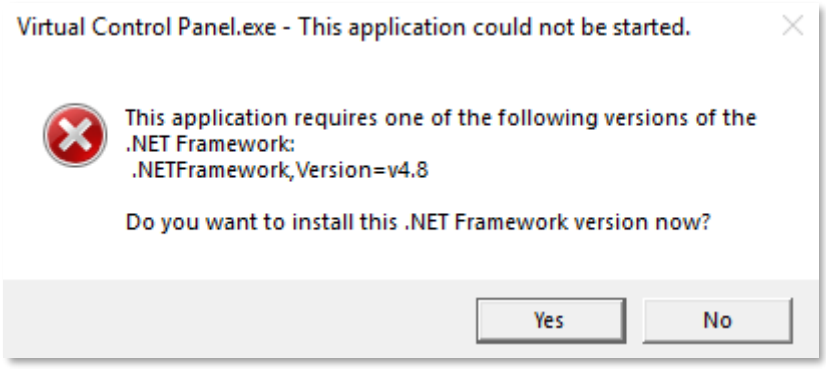


Figure 132

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

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