NFC LED DRIVER CONFIGURER TOOL
V0.7240.3

NFC SOFTWARE
TECHNICAL APPLICATION GUIDE
VOSSLOH-SCHWABE

CONTENT

1 INSTALLATION OF THE NFC LED DRIVER CONFIGURER TOOL

1. Click on the .exe installation file inside the downloaded .zip folder, as shown in Image 1.

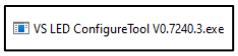

Image 1 – Installation file

2. After opening the installation file, you will be asked which language you would like to use for the installation of the software and confirm with the "OK" button.

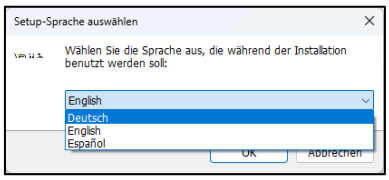

Image 2 – Installation language

3. Before you can start with further installation settings you will be asked to which file storage location you would like to save the software installation files.

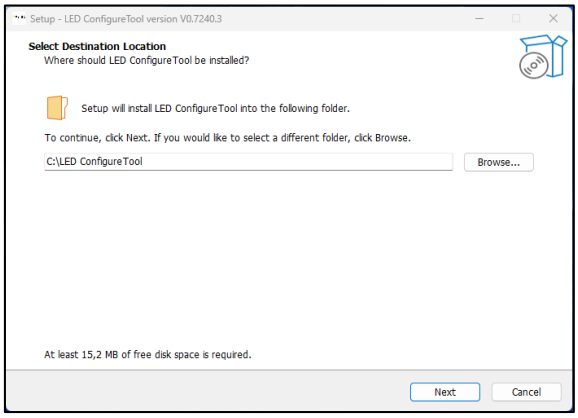

Image 3 – File storage location

4. In the next step you can select which components of the installation file should be installed. It is recommended to install all components to ensure the functionality of the NFC configuration software. Click on the "Next" button to continue the installation.

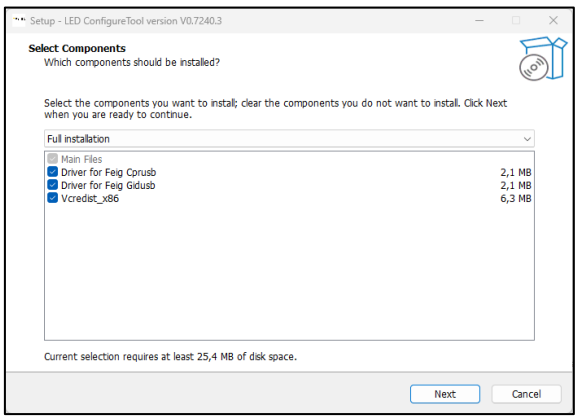

Image 4 – Installation components

5. If you would like to create a desktop shortcut, please make sure that the checkbox is activated

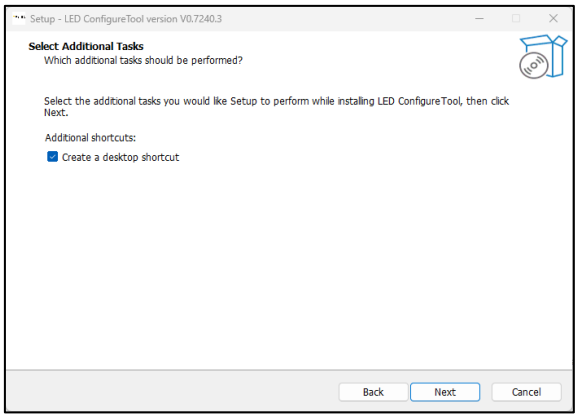

Image 5 – Desktop shortcut

6. In the next step you will get an overview about the selected installation setup. Please double check your settings and start the installation with the "Install" button.

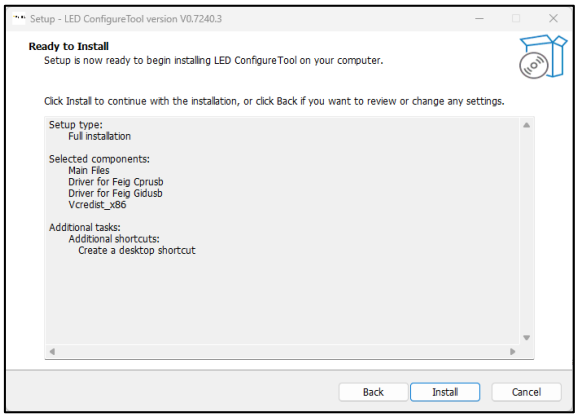

Image 6 – Setup overview

7. During the installation you will be asked to confirm the installation of the needed drivers of the compatible NFC configuration devices.

Image 7 – Driver installation

8. When you have installed all the needed drivers for the NFC configuration software, you will reach the next step, where you need to agree to the license terms and conditions. To agree to the license terms and conditions please activate the checkbox and click on the "Install" button to continue the installation.

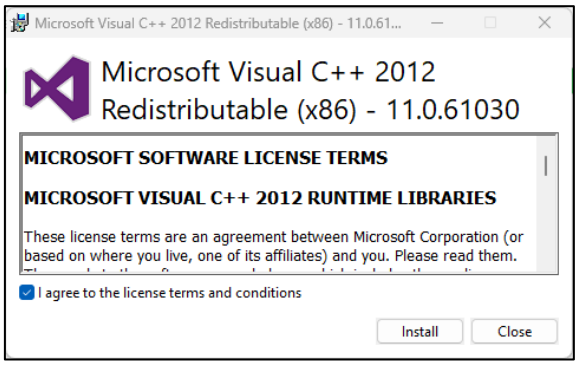

Image 8 – License terms and conditions

9. If the setup can be completed successful you will receive the message "Setup successful". This window can be closed by clicking the "Close" button.

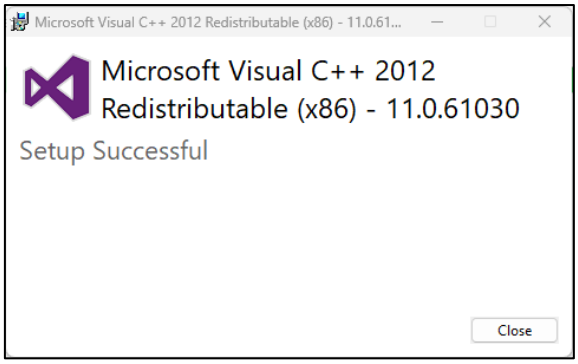

Image 9 – Setup successful

10. In the last step of the installation of the NFC LED Driver Configurer Tool you will receive the information that the installation on the computer has been finished. Furthermore, by activating the checkbox "Launch NFC LED Driver Configurer Tool" the software will be started directly after clicking on the "Finish" button.

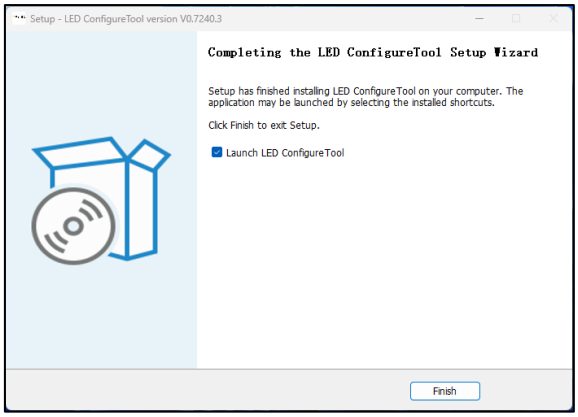

Image 10 – Finish the installation

11. When you have activated the checkbox in the previous step, a window will be opened for the login to the software. Please click the "Login" button to enter the software. The login name and login password are already filled in, please don't change the name or the password otherwise you will not be able to access the NFC LED Driver Configurer Tool.

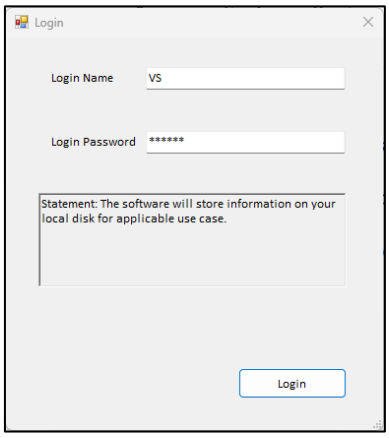

Image 11 – Login to the software

12. Finally, you have successfully entered the NFC LED Driver Configurer Tool software interface.

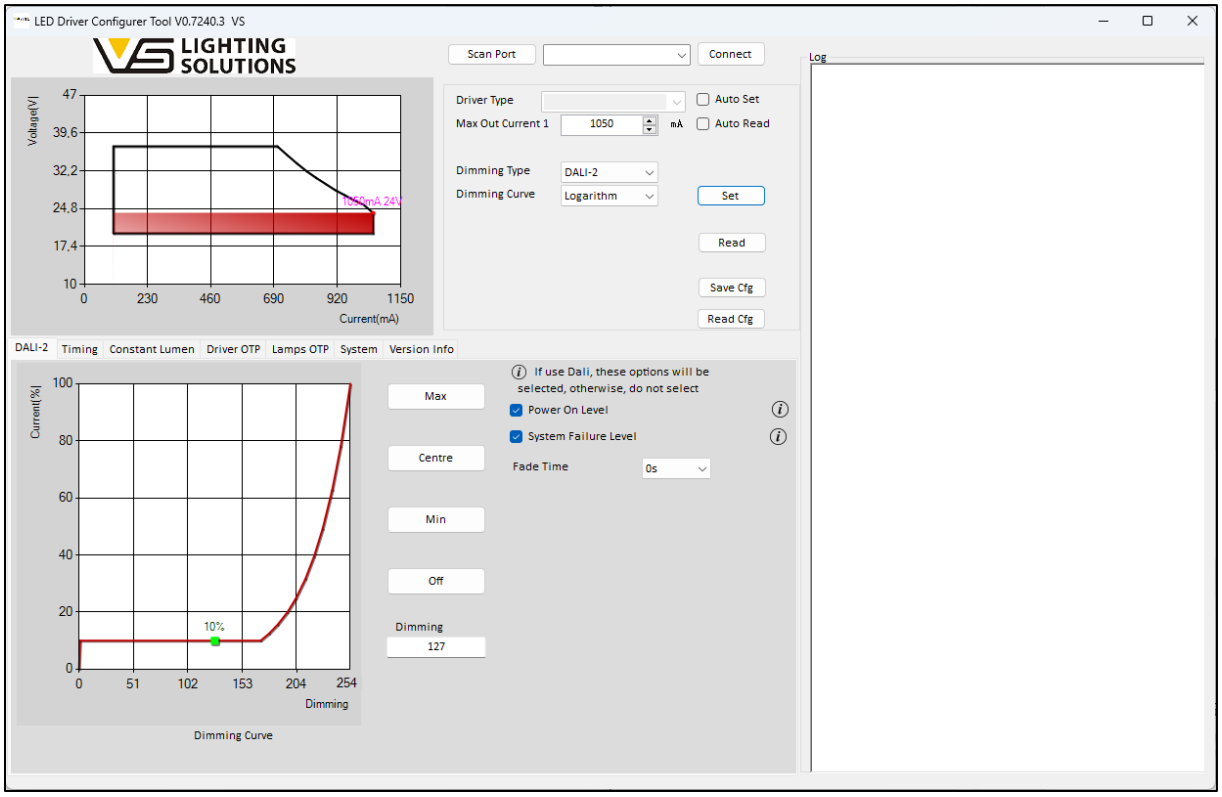

Image 12 – User interface NFC LED Driver Configurer Tool

2 TECHNICAL DATA – PROGRAMMING DEVICES

This chapter provides you with a comprehensive overview of the compatible programming devices. We will introduce you to the various models and give you an overview of the technical data. Please mention that there are two NFC LED driver families that can be configured with the NFC LED Driver Configurer Tool. We have the PrimeLine NFC S-MD DALI2 Dx and on the other hand we have the ComfortLine NFC S Midnight LED driver family.

If you have ordered the first generation of the PrimeLine NFC S-MD DALI2 Dx driver family (with order suffix "187XYZ-**1802**" and "187XYZ-**1803**"), you will need the iProgrammer Streetlight DALI (Ref.No.: 187412) to read out and configure all parameters via wire connected to the DALI terminal. On this first generation there are certain functions that can be read out and configured via NFC, such as DALI-2, Midnight function, CLO, LED driver/Luminaire OTP. If you have ordered the second generation of the PrimeLine NFC S-MD DALI2 Dx (order suffix "187XYZ-**1804**" you will be able to read out and configure all parameters and functions via NFC.

When you have ordered ComfortLine NFC S Midnight drivers, you will be able to read out and configure all parameters only via NFC, such as Control Phase function, Midnight function, CLO, LED driver OTP. As these drivers have no DALI interface the iProgrammer Streetlight DALI must not be used for the configuration.

2.1 NFC PROGRAMMING DEVICE – FEIG NFC PROGRAMMER

Feig Programmer	**HF Handheld Reader ID ISC.PRH101-USB**
Casing	ABS plastic
Dimensions (L x W x H)	230 x 100 x 80 mm
Colour	RAL 9002 / RAL 7044
Function	Programming of host applications
Weight	320 g (without batteries)
Temperature range	0 °C up to +50 °C (operation)
Voltage supply	5 V, USB-Bus powered
Optical displays	1 LED (multi-coloured)
Accoustic display	buzzer
Antenna	integrated
Operating frequency	13.56 MHz
RF interface	ISO-15693
Standards	EN 300 330, FCC 47 CFR Part 15 (USA), IC RSS-GEN, RSS-210 (Kanada), EN 301 489 (EMV), EN 60950 (elektr. Sicherheit), EN 50364 (Human Exposure), EN 60068-2-6 (Vibration), EN 60068-2-27 (Schock)

2.2 NFC PROGRAMMING DEVICE – FEIG NFC DESKTOP READER

Feig NFC Desktop reader	ISO14443/ISO15693 Desktop reader
Dimensions (L x W x H)	144 x 84 x 18 mm
Antenna	Integrated Antenna
Voltage supply	5 V, USB-Bus powered
Interfaces	USB 2.0

2.3 NFC PROGRAMMING DEVICE – SYSTEM SETUP

Note: For the configuration of LED drivers via NFC, the LED driver must not be powered on. Please make sure that the NFC programming device is close to the NFC interface of the LED driver (check exact antenna position on the driver label) - the distance must be **≤ 30 mm**.

When you start the software and you have already connected an NFC reader to the USB interface of your computer, usually the programming device will already be connected. If this is not the case, press the "Scan Port" button. The port, to which the NFC reader is connected, should be successfully recognized, "NFC0" appears in the field next to the button, and accordingly "NFC connected" should be written in the log window.

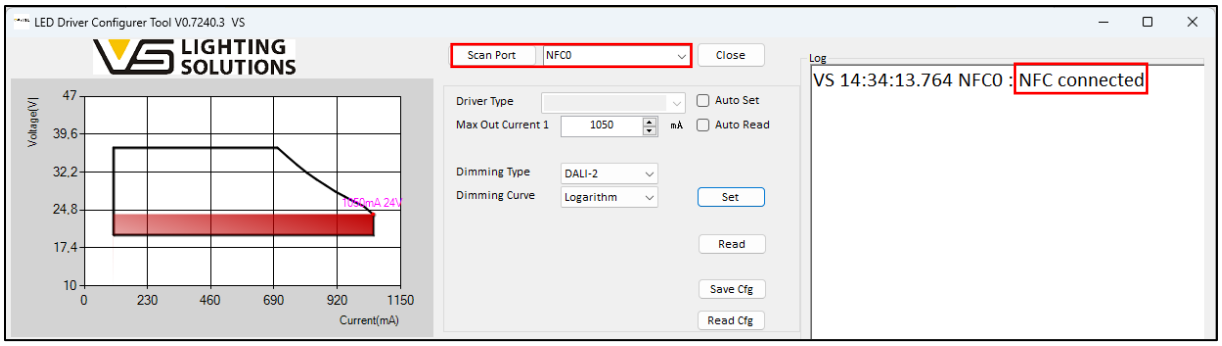

Image 13 – Connect NFC programming device

Once this information is displayed, the NFC reader is ready for use and hence can be placed near by the LED driver, which needs to be programmed / read out. The optimum position, where to put the NFC reader, is designated on the top side of the LED driver by the following icon:

Place the NFC reader at a distance not more than 30 mm to the icon and the driver should be detected and read out successfully, indicated by the indicator light on the different NFC reader types. Furthermore, there will be a notification in the log window that reading or configuration of the LED driver was successful.

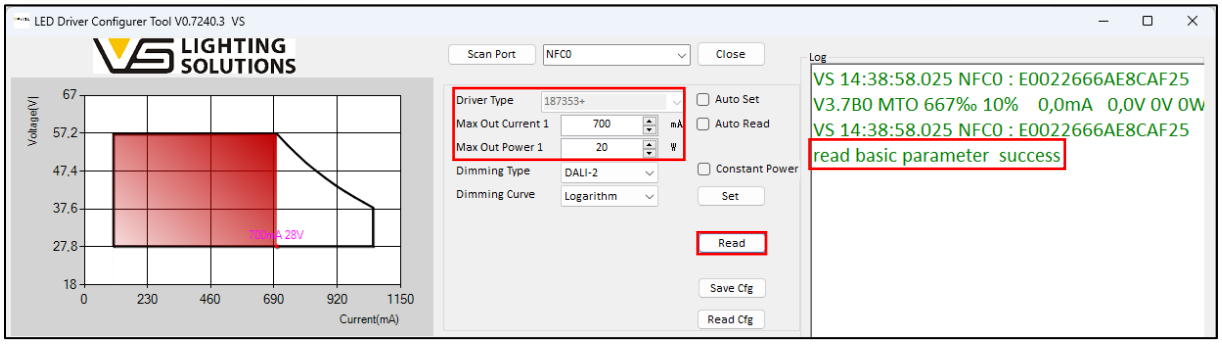

Image 14 – Read out LED driver via NFC

2.4 DALI PROGRAMMING DEVICE – IPROGRAMMER STREETLIGHT DALI

DALI Programming device	iProgrammer Streetlight DALI
Reference number	187412
Dimensions (L x W x H)	72 x 28 x 11 mm
Voltage supply	5 V, USB-Bus powered
Connection terminals	0.2 – 1.5 mm²

2.5 DALI PROGRAMMING DEVICE – SYSTEM SETUP

iProgrammer Streetlight 2
Ref. No.: 187412

PrimeLine NFC S-MD DALI2 Dx

Note: For the configuration of LED drivers via the iProgrammer Streetlight DALI, the programming device must be connected through the USB interface to the computer and the other side must be connected to the dimming interface of the LED driver, please take care of the right polarity (purple terminal "DIM +", the grey terminal is "DIM–"). It is mandatory that the LED driver is **powered on to the mains voltage**, otherwise in the de-energized state it is not possible to communicate with the DALI processor.

When you have connected everything like mentioned above and powered the driver on, the iProgrammer Streetlight DALI will be usually recognized by the software after starting. If this is not the case, press the "Scan Port" button. The port, to which the iProgrammer Streetlight DALI is connected, should be successfully recognized, "HID0" appears in the field next to the button, and accordingly "DALI connected" should be written in the log window.

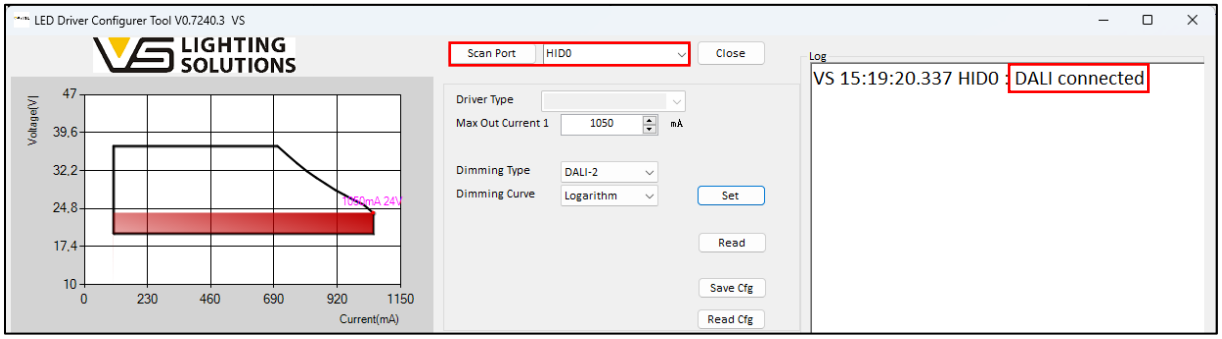

Image 15 – Connect iProgrammer Streetlight DALI

Once this information is displayed, the iProgrammer Streetlight DALI is ready for use and hence can be used for configuring or reading out LED drivers. If you start with the reading process, there will be a notification in the log window that reading or configuration of the LED driver was successful.

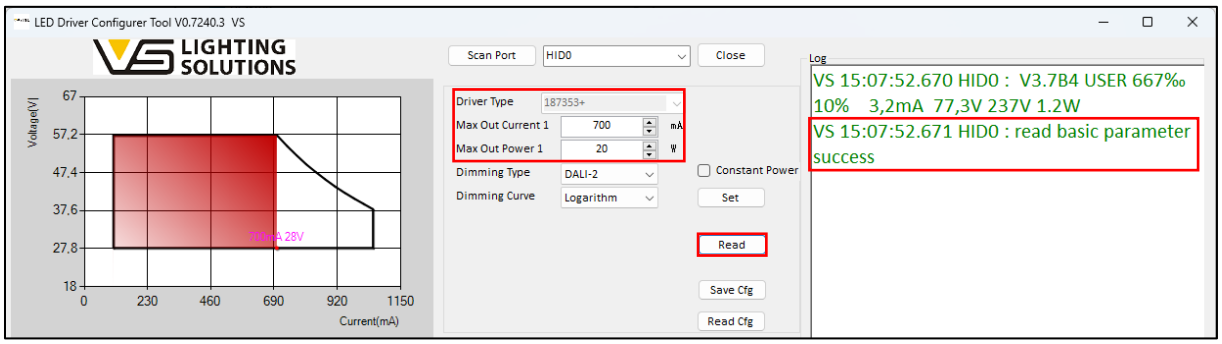

Image 16 – Read out LED driver via DALI

3 INTRODUCTION

This chapter provides you with an overview of the various configurable and readable parameters and functions, as well as an introduction to the general user interface.

3.1 NFC CONFIGURATION SOFTWARE – PROGRAMMABLE FUNCTIONS

3.1.1 OUTPUT CURRENT

Individual configuration of the output current in mA.

3.1.2 DALI CONFIGURATION

This function allows changing and reading out DALI parameters.

3.1.3 ACTIVE DALI BUS POWER SUPPLY

The integrated active DALI bus power supply, e.g. for sensors, can be switched on and off during configuration.

3.1.4 TIMING DIMMING (TRADITIONAL / SELF-ADAPTING / MIDNIGHT FUNCTION):

This function enables the setting of a time-based dimming schedule for the night to increase energy savings.

3.1.5 AC DIMMING

This function offers the dimming via the mains voltage, though the definition of the start input and cut-off input voltage it is possible to define a linear dimming curve. Furthermore, it is possible to define the input under- and overvoltage protection.

3.1.6 CLO – CONSTANT LUMEN OUTPUT

The luminous flux of LED modules decreases in a stepwise manner up to the end of the modules' service life. To guarantee constant luminous flux, the output of the LED driver must be gradually increased over its service life.

3.1.7 LED DRIVER OTP

This function ensures thermal protection of the LED driver by reducing the output current upon attaining critical temperatures. The reduction of temperature can be configured without connection of an external NTC resistor.

3.1.8 LUMINAIRE OTP – NTC RESISTOR

The NTC interface ensures thermal protection of LED modules by reducing current upon attaining critical temperatures. The reduction of temperature can be configured via an external NTC resistor that is connected to the driver.

3.1.9 CONTROL PHASE

When a voltage (mains voltage 230 V) is applied to or removed from the control phase terminal LST, the driver can either dim up (power increase) or dim down (power reduction).

3.2 NFC CONFIGURATION SOFTWARE – DIAGNOSTIC AND MAINTENANCE DATA

3.2.1 LUMINAIRE INFO

The luminaire info offers luminaire manufacturers to enter information about the luminaire, in which the configured LED driver will be mounted. The luminaire info can be written on the LED driver, can be read out and saved in a text file.

3.2.2 LED DRIVER DATA & LUMINAIRE DATA

The LED driver and luminaire data enable the luminaire manufacturer or the luminaire owner to read out diagnostic and maintenance data out of the LED drivers' memory.

3.3 NFC CONFIGURATION SOFTWARE – USER INTERFACE

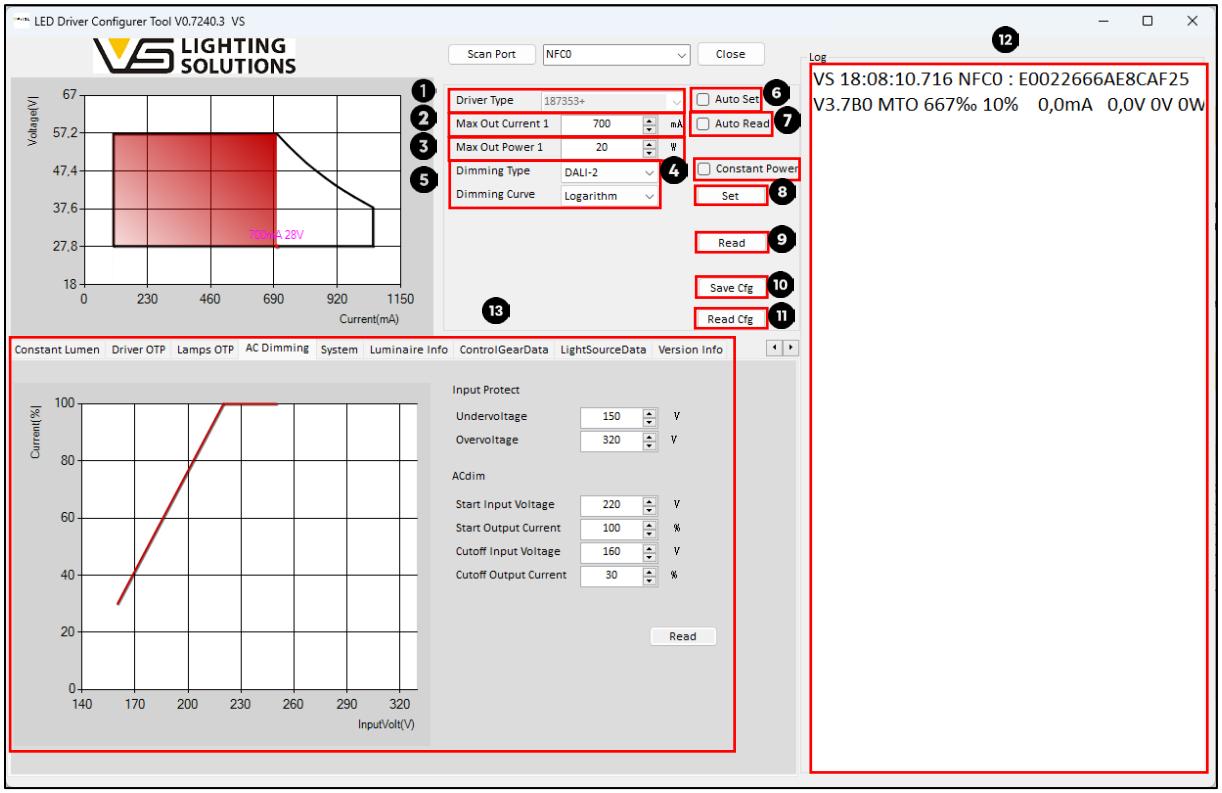

Image 17 – User interface overview

1. **"Driver Type"** field shows the LED driver model (belonging VS Ref. No.). The read-out driver model can't be changed – it will be displayed automatically after reading out the LED driver model via NFC or iProgrammer Streetlight DALI.

2. **"Max Out Current"** - The maximum output current can be set according to actual needs.

3. **"Max Out Power"** - Set the maximum output power, ensure that the driver does not exceed this set Max value. If the output voltage is too high and the output power exceeds the set value, the output current is automatically reduced so that the set maximum power is not exceeded (automatic adjustment to the working window).

4. **"Constant Power"** ensures that the output power of the LED driver is constant during the dimming process. (For example, when the user changes an 80W-driver into 60W maximum output by the "Max Out Power" function, and sets the dimming ratio to 50%, the output power of the driver will be 30W instead of 40W).

5. **"Dimming Type"** includes different dimming options, which can be selected depending on the LED driver type. Below the dimming type the "**Dimming Curve"** can be selected between linear and logarithmic.

6. When a configuration was created or an existing configuration file was opened, with the intention to configure for example several LED drivers in a row, it is recommended to activate the "**Auto Set**" checkbox to start the configuration of several drivers with the same configuration settings.

7. To read the configuration of several LED drivers in a row, it is recommended to activate the "**Auto Read**" checkbox to realize the function of automatically reading configured data of drivers within 6s (Programmer read data once every six seconds).

8. To configure a single LED driver with a set configuration the **"Set"** button must be clicked and the configuration process will be started.

9. To read out the configuration out of a single LED driver the **"Read"** button must be clicked and the reading process will be started.

10. Configurations that are intended to be used again in mass production can be stored in the file storage by clicking on the **"Save Cfg"** button.

11. Configurations that have been stored in the file storage can be opened by clicking on the **"Read Cfg"** button.

12. The **log window** shows the last events in the software such as connection of the programming device, reading out LED driver configuration and setting LED driver configuration. Furthermore, in the log window are messages displayed if reading or writing processes have been successful or not.

13. Depending on the selected tab or function the **configuration area** enables the setting of various parameters.

3.4 WORKING WINDOW – OUTPUT CURRENT VS. LOAD VOLTAGE CURVE

This chart represents the working window (voltage vs. current range) of the LED driver. The constant power range of the driver is represented by the declining curve on the right side of the working window. Along this line, the driver is always operated at full capacity. The magenta-colored dot represents the current and voltage currently set. Setting is possible within the current range as defined in the driver specification (in this example: 105 ... 1050 mA).

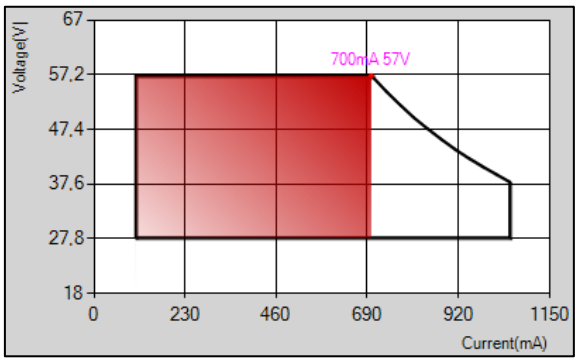

Image 18 – Output window (current vs. Load)

4 NFC CONFIGURATION IN DETAIL

4.1 OUTPUT CURRENT AND OUTPUT POWER

The output current can be set in the field "max out current" can be individually adjusted depending on the application. Please mention that the output current range depends on the LED driver design. Additionally, it is possible to set the maximum output power in the field "max out power". When you set the maximum output power, this should be to ensure that the driver does not exceed this set max value. If the output voltage is high and the output power exceeds the set value, the output current is automatically reduced so that the set maximum power is not exceeded in order to protect the connected LED modules (automatic adjustment to the working window). The output power and output current can either be entered in the field or can be adjusted with the arrow keys.

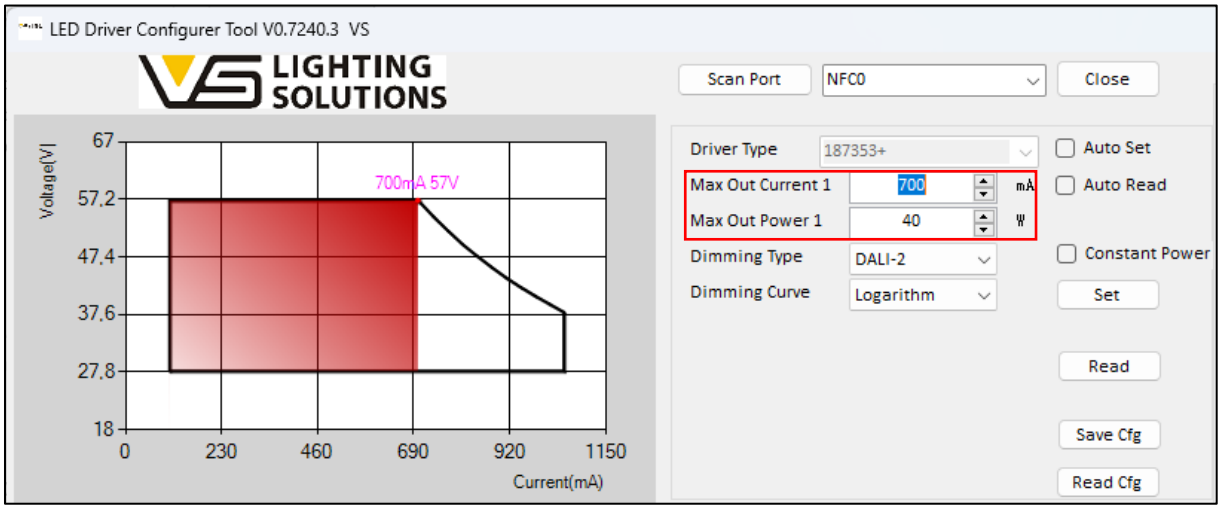

Image 19 – Output current setting

4.2 DIMMING TYPE AND DIMMING CURVE

There are different dimming modes that can be selected. These would be **DALI-2 dimming**, **AC dimming**, **Timing dimming**, **Timing-DALI2 dimming**, and **Control Phase** as shown in the image below. The available dimming types in the configuration depend on the LED drivers, which need to be configured. Please note that it is not possible to combine several dimming types at the same configuration.

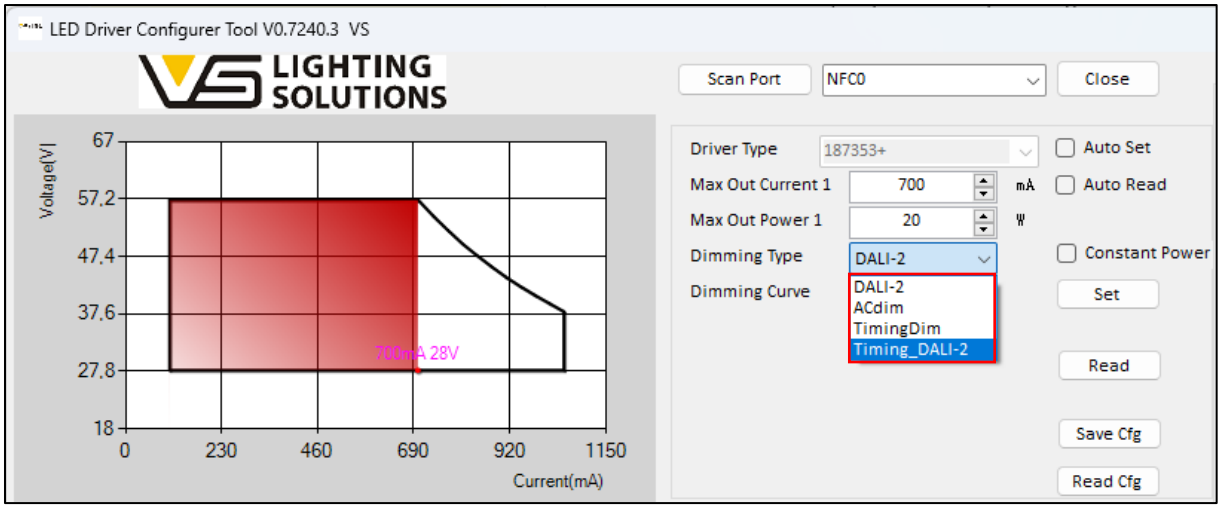

Image 20 – Dimming type selection (PrimeLine NFC S-MD DALI2 Dx)

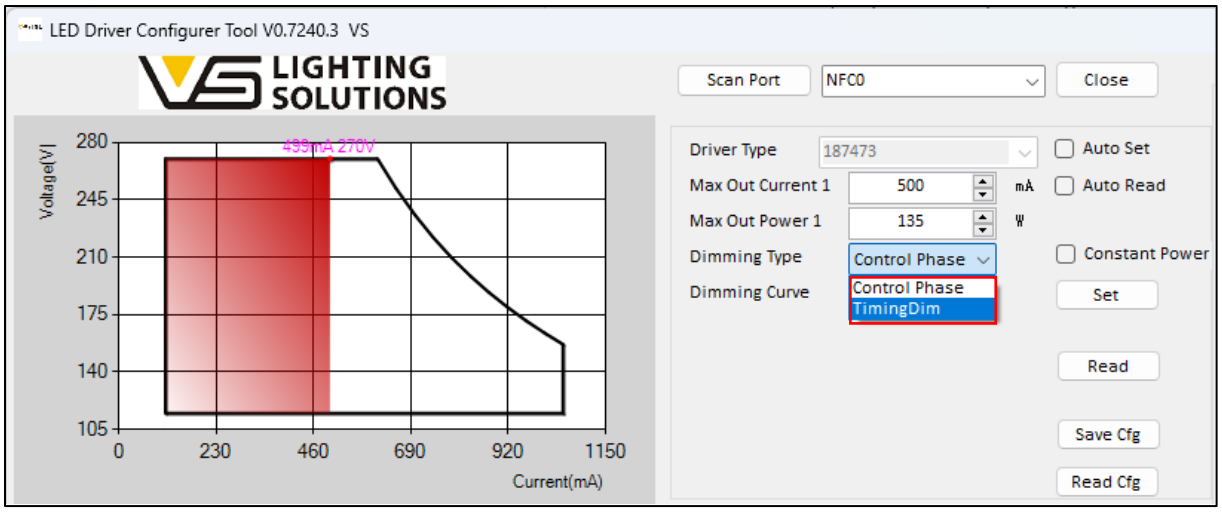

Image 21 – Dimming type selection (ComfortLine NFC S MidNight)

When you have selected the dimming type, you can select in the dropdown field below the dimming curve between logarithmic curve and linear curve. When DALI-2 dimming is selected, the logarithmic dimming curve will be selected as default settings, while the linear dimming curve will be selected for the other dimming types. Regardless of the default settings it is possible to change the dimming curve manually. Please note the exception that when the AC-dim function is selected, it is not possible to change the linear dimming curve. When the LED driver will be set to the dimming type DALI2, the logarithmic dimming behavior will be selected by default. If required, this can also be changed manually to linear behavior.

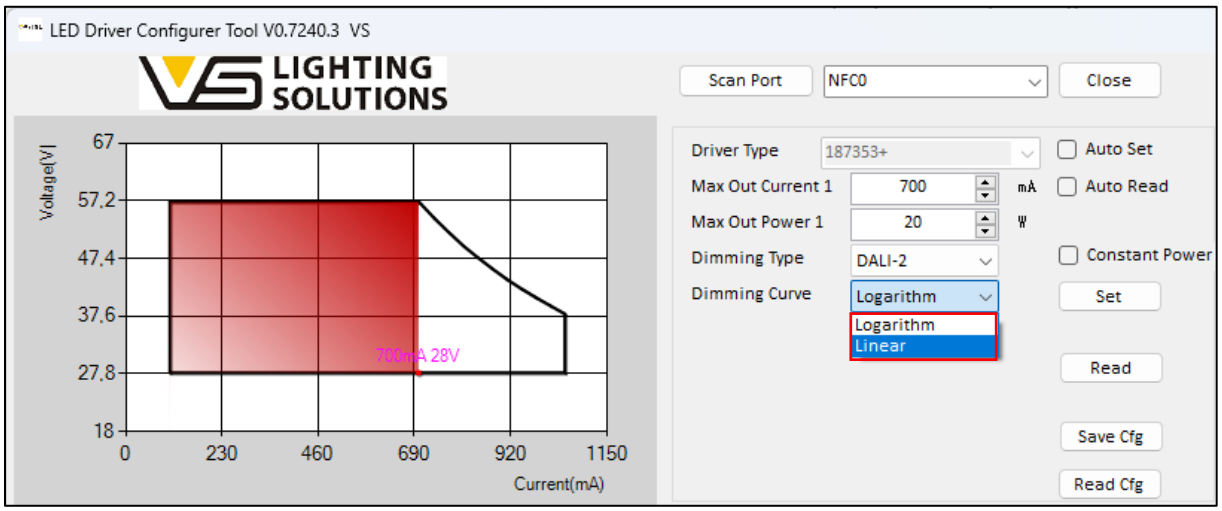

Image 22 – Dimming curve selection

4.3 DALI-2 DIMMING

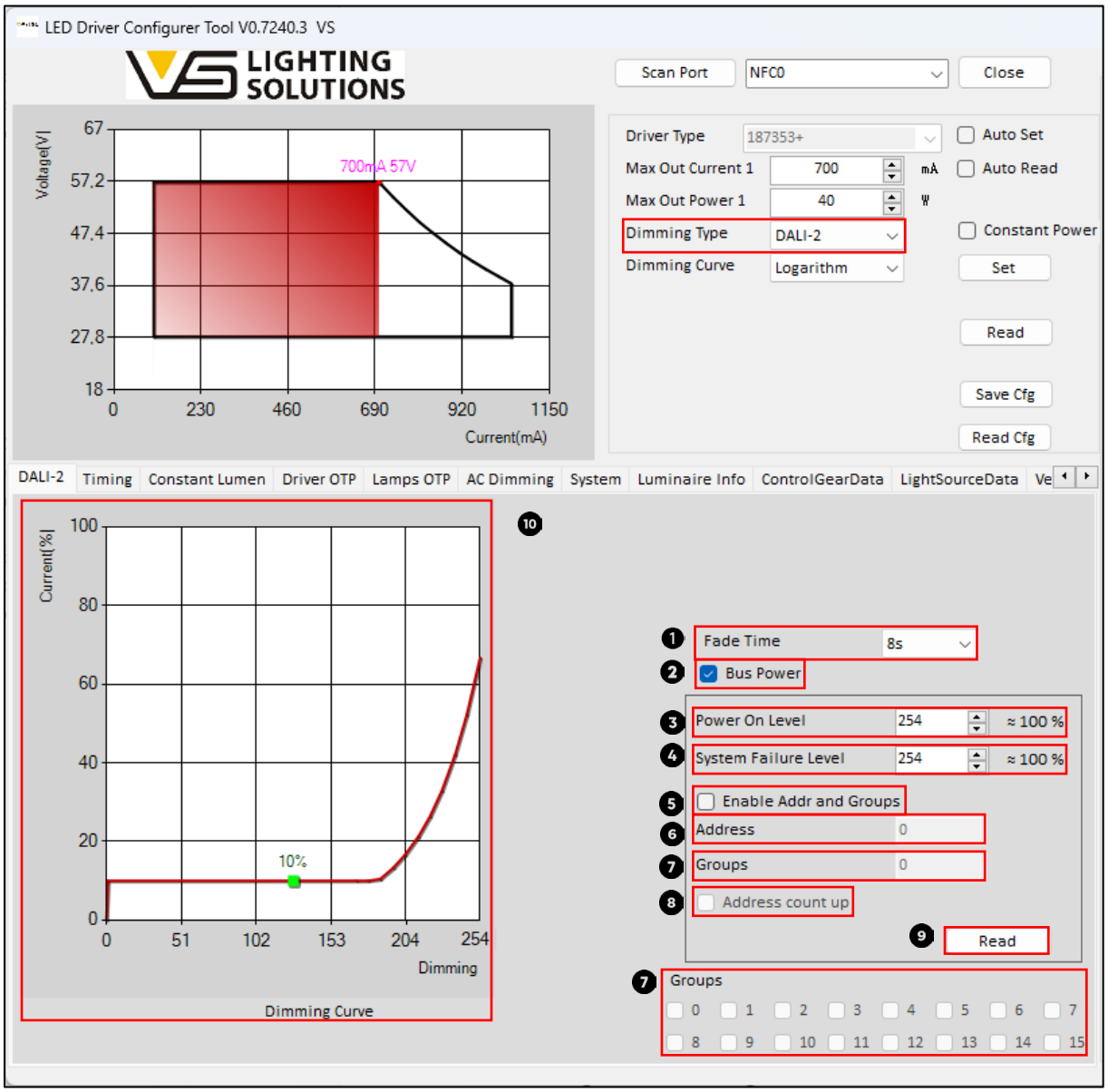

Image 23 – DALI2 dimming configuration

1. **Fade Time**

   This function is defined by DALI standard, but it can be also used with the NFC programmer. The fade time can be set from the minimum value of 0s to the maximum value of 90s. When the selected Fade Time is determined, each subsequent dimming operation will be completed within the specified Fade Time. For example, when the fade time is set to 8s, it will take 8s to complete the dimming operations (Including adjustment to the maximum dimming value, adjustment to the minimum dimming value, and adjustment to the middle dimming value, as long as it is an action of changing the dimming value.

2. **Bus Power**

   The driver has a built-in 16V DALI bus power supply, the checkbox for the DALI bus power supply is enabled by default. This checkbox can change the enabled state of the DALI bus power supply. When the checkbox is activated the power supply provides a current of min. 50 mA (max. 60 mA).

3. **Power On Level**

   This function is defined by the DALI standard. If you use a DALI controller or a DALI programmer to control the dimming level, this function must be activated. When the checkbox is not activated, the driver remembers the last DAPC level (**D**irect **A**rc **P**ower **C**ontrol) and starts with the last DAPC level on the next reboot. When this checkbox is selected, the driver always starts at the set dimming level. The power on level can be defined in a range between 0 – 254 (10 – 100%) or can be set to 255 (MASK). Depending on the selected dimming curve the selected dimming level will be calculated and displayed on the right side of the field.

4. **System Failure Level**

   This function is defined by DALI standard and is also only available when using the DALI programmer or DALI controller. A system failure occurs, for example, if there is a permanent interruption or a short circuit in the DALI line. In this case, the driver dims to the set system failure level. The system failure level can be defined in a range between 0 – 254 (10 – 100%) or can be set to 255 (MASK). Depending on the selected dimming curve the selected dimming level will be calculated and displayed on the right side of the field.

   NOTE: Normally, when "timing dimming" or "AC dimming" mode is selected, the Power on level check box and System Failure Level checkbox will be automatically deselected. But please re-confirm it again that the "System Failure Level" checkbox is not checked when using one of this two modes. Because when the "System Failure Level" is turned on, the driver would detect that there is an open circuit at the dimming terminal and will expect that the LED driver is in a failure state. When the dimming wire is connected to the DALI controller and the fault is removed, the driver will run the preset timing function.

5. **Enable Address and Groups**

   When the checkbox is activated, it is possible for the user to set the DALI address and groups manually. The checkbox is deactivated by default settings and the field for groups and addresses will be greyed out.

6. **DALI Address**

   If the checkbox is activated the DALI address can be entered, in a range between 0 – 63.

7. **DALI Group**

   If the checkbox is activated the DALI group can be entered, in a range between 0 – 65535. For example: the DALI group 0 has the value $2^0 = 1$, the DALI group 1 has the value $2^1 = 2$ and the DALI group 15 has the value $2^{15} = 32768$, everything between follows the same logic. If you have the intention to select more than one DALI group at the same time the values will be added to each other, this means when all groups are selected you reach the max value of 65535. You can either enter the value in the field or you can select the checkboxes below to assign a DALI address to several groups. When you enter the value in the field, the boxes below will be selected automatically and vice versa when you select the boxes for the groups the calculated value will be entered in the field.

   Note: The DALI standard allows a maximum of 16 groups to be assigned to a LED driver.

8. **DALI Address count up**

   When this checkbox is activated, the software will. start to count up the value in the field of the DALI address after each set configuration, this enables the user to set the DALI addresses faster while keeping the same DALI groups.

9. **Read DALI configuration**

   The DALI2 configuration is not part of the "basic reading process" to shorten the reading time of the LED driver configuration. When you read out the basic parameters, there will not be shown directly all values in the user interface for the DALI2 configuration. This means when users want to see all the DALI2 configurations it is mandatory to press the "Read" button at the right bottom of the user interface as well.

10. DALI-2 dimming curve

On the left bottom side of the user interface the dimming curve will be shown, depending on the selected dimming curve you will see either a logarithmic or a linear dimming curve. The vertical axis represents the current percentage, and the horizontal axis represents the dimming value corresponding to the current percentage.

4.4 TIMING DIMMING

If the dimming type "Timing Dim" or "Timing_DALI2" is selected, the software will automatically open the timing dimming settings in the lower part of the user interface. This tab enables you to set all relevant parameters to set up dimming schedules. When "Timing Dimming" is selected you have the choice between 3 different modes: Traditional timing, Self-adapting timing and Midnight timing function.

4.4.1 TIMING DIMMING - TRADITIONAL TIMING

When the LED driver is powered on, it works according to the defined steps of the dimming schedule (duration and output level). In this mode, the number of steps, time and output power are always the same. In the setup of the timing schedule, the duration and the output level can be defined individually in 7 steps. The defined dimming level is set in % of the set output current and the dimming curve is set by default on linear.

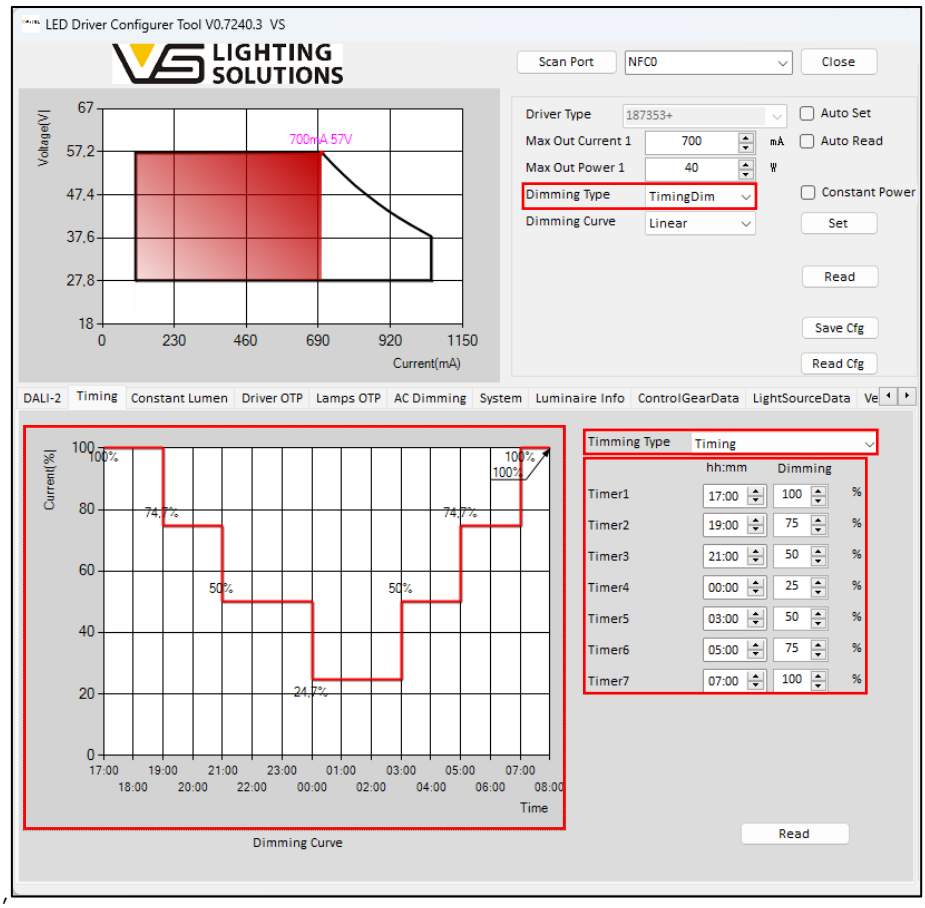

Image 24 – Timing dimming - Traditional timing

4.4.2 TIMING DIMMING – MIDNIGHT FUNCTION

If you select in the dropdown "Virtual Midnight" the Midnight function will be selected. This function is to adapt the timing schedule to the case that the nighttime changes with the seasons, and the duration of the configured timing schedule changes accordingly to the change of the length of the night. Therefore, it is mandatory to define a reference period (between 1–7 days) where the LED driver will calculate the average nighttime. The setup of the timing schedule is the same as for the traditional timing dimming. The duration and the output level of each step can be defined individually in 7 steps, and the defined dimming level is set in % of the set output current and the dimming curve is set by default on linear.

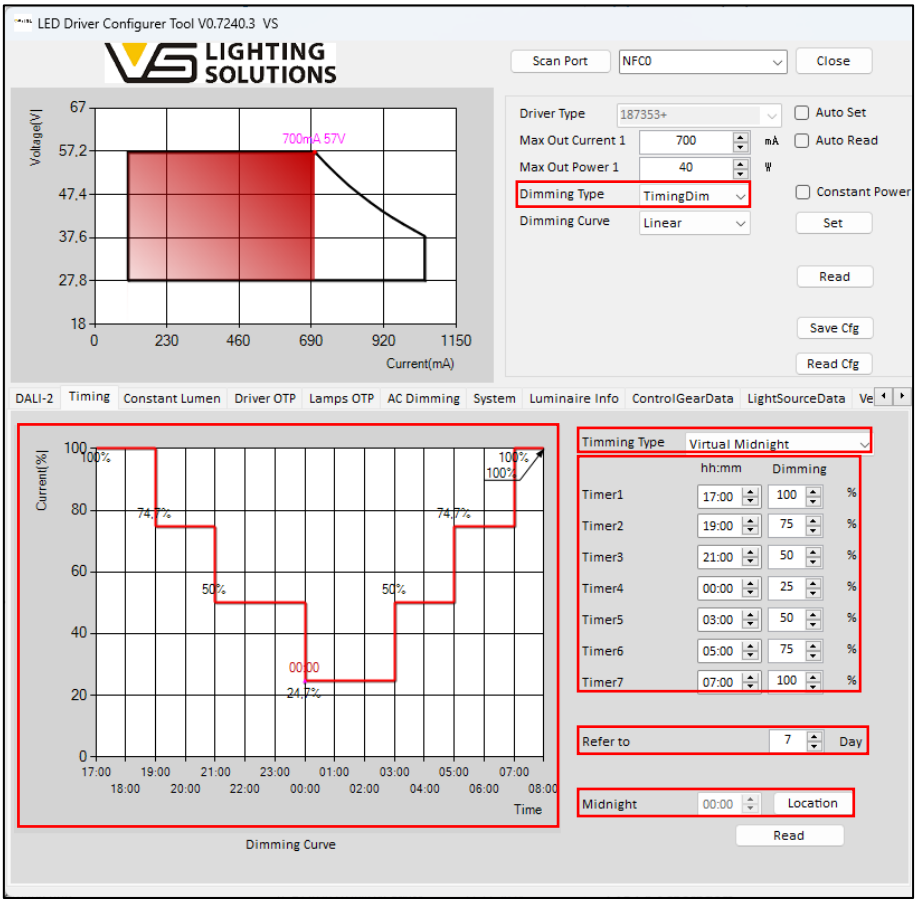

Image 25 – Timing dimming - Midnight function

After setting the reference period, the actual midnight point, and initial duration of the nighttime the LED drivers are ready to operate in the Midnight timing mode. This dimming profile is referenced to the average middle of the night, calculated based on the average operation time over the defined reference period. According to the new average night length, the timing schedule will be adjusted.

The longer/shorter the night becomes the timing dimming schedule will be adapted by the change of the night. In the Midnight timing function the duration of each step in the dimming schedule remains the same, except for the first and last step. According to the change of the nighttime the time is added or cut off from the first and last step.

Example:
Assuming that the reference period is set to 7 days and the night length in the beginning 12:00 hours. When the LED driver calculates after the reference period the average night length of 11:30 hours then the first and last step will be 15 minutes shorter because the night has become shorter by 30 minutes.

When the "Virtual Midnight" function is activated, there is no relation to the location where the LED drivers will be installed, this can lead to a gap between the virtual calculated midnight and the real midnight of the location. If you would like to consider the location in the configuration, please press the "Location" button, and a window will open in the software.

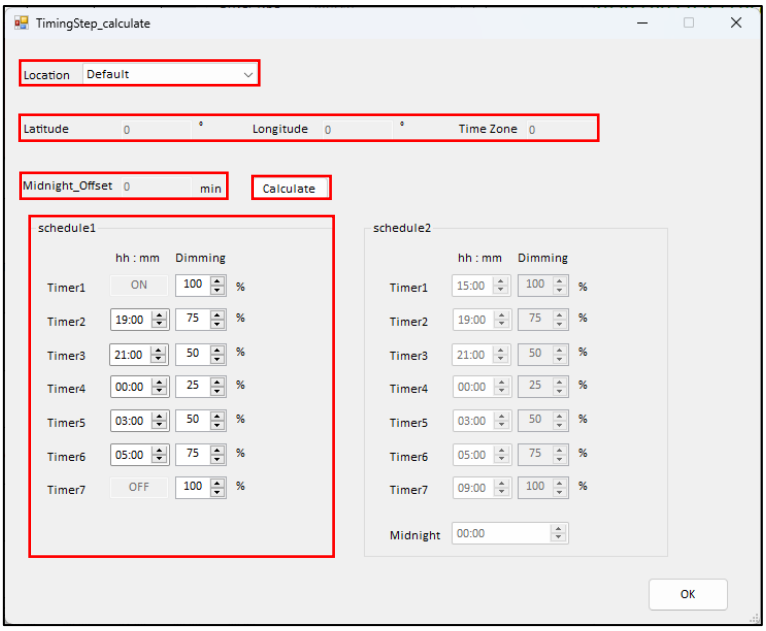

Image 26 – Midnight function - default settings

By default settings the location-based settings are deactivated, to activate this function open the dropdown for the location. In this dropdown it is possible to select one of the locations out of the existing database, otherwise if the desired location is not included in the list, you can select customize to enter the latitude, longitude and time zone manually. When you select one of the locations which is included in the list, the latitude and longitude will be selected automatically and the midnight Offset will be displayed, when you press the button "Calculate" there will be displayed an adjusted timing schedule (schedule 2) which respects the midnight offset of the selected location.

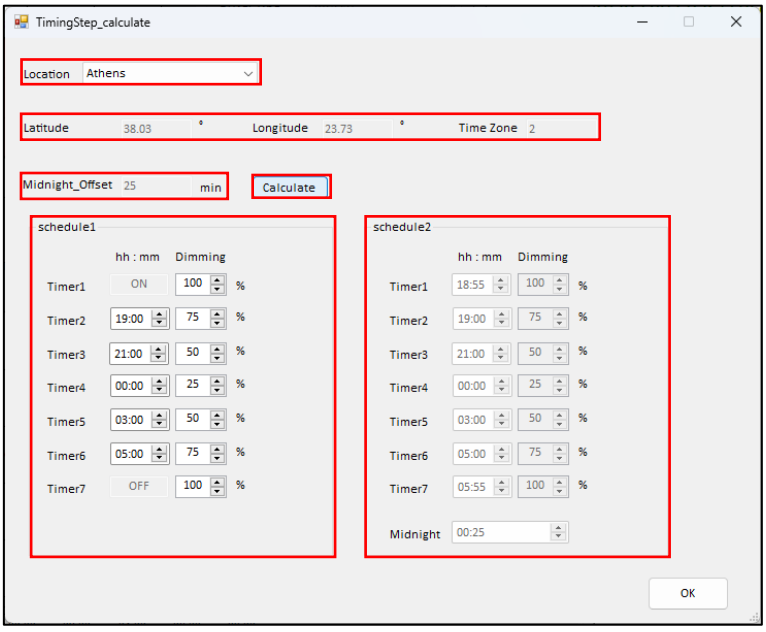

Image 27 – Midnight function - location-based settings

If the desired location is not included in the list, please select in the dropdown list "Customize". You will be asked to insert the latitude, the longitude and the time zone of the customized location. When the customized information is entered in the fields, press the button "Calculate", then the customized midnight offset will be calculated and the customized location-based timing schedule will be calculated.

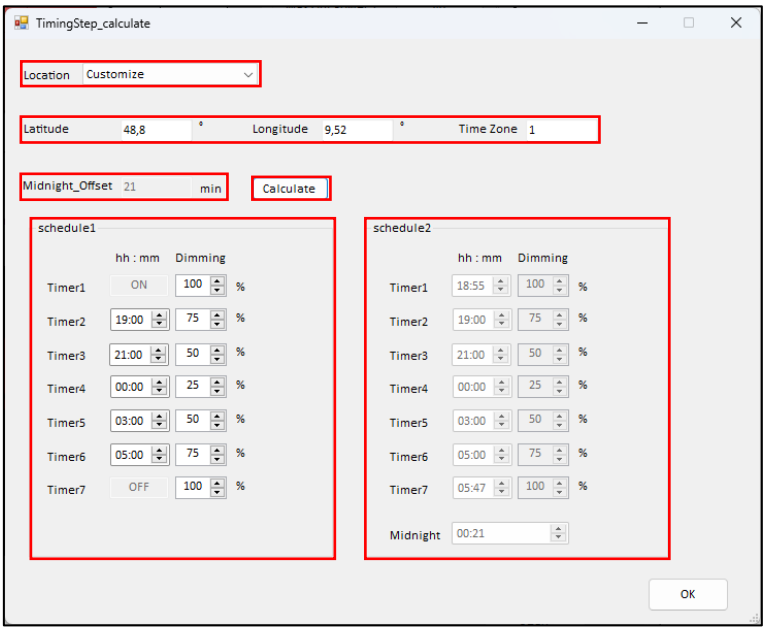

Image 28 – Midnight function - customized location-based settings

When the location-based midnight function has been configured and calculated, please press the "OK" button, then you will be asked to confirm the new timing schedule, please press again "OK" to confirm the new timing schedule.

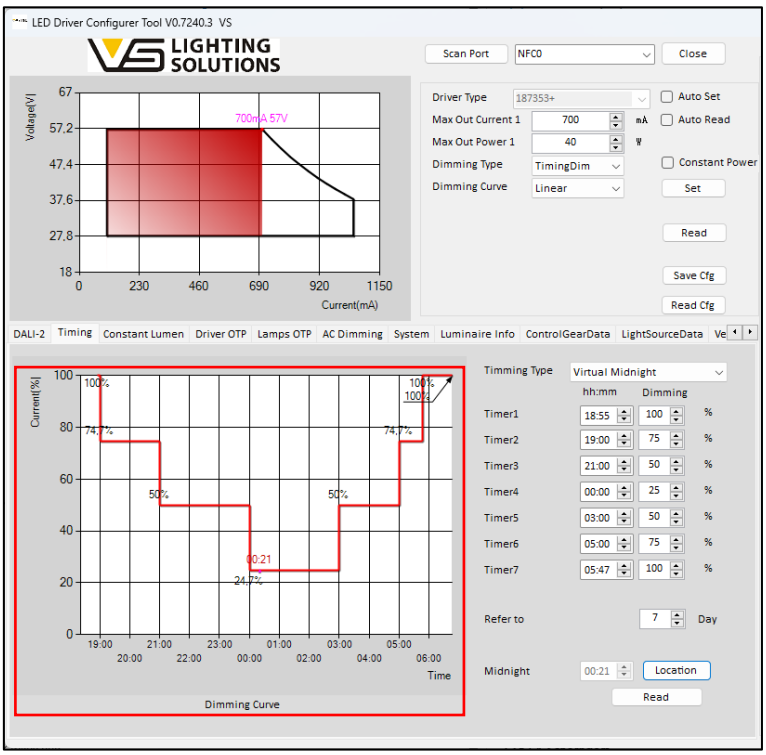

Image 29 – Midnight function - location based

NOTE: The time settings in the software given here are for an easier understanding and for the visualization of the settings. In general, LED drivers are not able to capture real time, the start of the timing schedule depends on the time the LED drivers will be switched on (power on time).

NOTE: When the operating time in a switching cycle of the driver is greater than 4 hours and less than 24 hours, it is considered as a valid working day from the driver's side. When the actual power-on time of the driver is more than 24 hours, the driver will return to Timer1, which is equivalent to a cycle of 24 hours. The 24 hours are not included in the calculation of sampling time and are invalid.

4.4.3 TIMING DIMMING – SELF-ADAPTING MIDNIGHT

If you select in the dropdown "Self-Adaption" the Self-adapting Midnight function is activated. This function is to adapt the timing schedule to the case that the nighttime changes with the seasons, and the duration of each configured step of the timing schedule changes accordingly to the change of the length of the night. Therefore, it is mandatory to define a reference period (between 1–7 days) where the LED driver will calculate the average nighttime. The setup of the timing schedule is the same as for the Midnight function and the traditional timing dimming. The duration and the output level of each step can be defined individually in 7 steps, and the defined dimming level is set in % of the set output current and the dimming curve is set by default on linear.

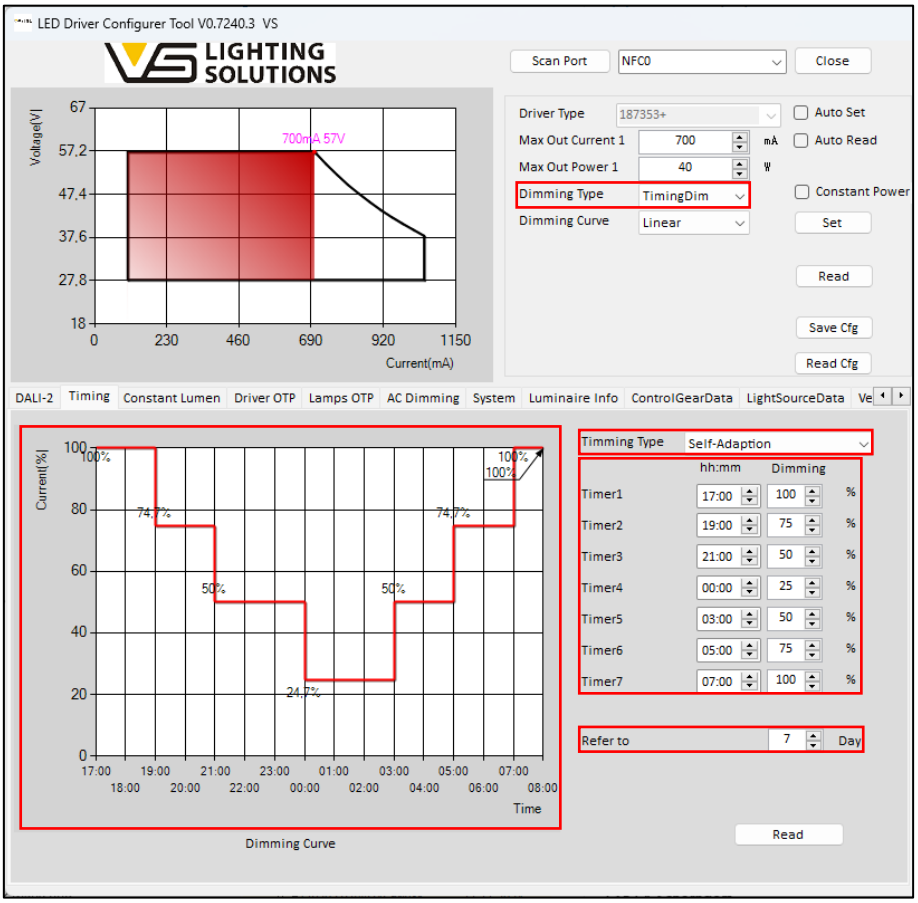

Image 30 – Timing dimming - Self-adapting Midnight

After setting the reference period the LED driver will count the operating time of each day and calculate the average night length. According to the new average night length, the timing schedule will be adjusted. The longer/shorter the night becomes the timing dimming schedule will be adapted (stretched/ compressed) by the percentual change of the night.

Example:

Assuming that the reference period is set to 7 days and the night length at the beginning 12:00 hours in total. When the LED driver calculates after the reference period the average night length of 11:30 hours then each step will become shorter by 95,83 % (see calculation below) because the night has become shorter. The timing dimming schedule will automatically adjust (according to the proportion of steps) the working time of each step (except step 0) according to the new average nighttime.

Initial nighttime:	12:00 hrs
Reference period nighttime:	11:30 hrs
Percentual change per step:	690 min/720 min = **95,93%**
Step X at initial nighttime:	3:00 hrs
Step X after reference period:	3:00 hrs x 95,93% = 2:53 hrs

NOTE: The time settings in the software given here are for an easier understanding and for the visualization of the settings. In general, LED drivers are not able to capture real time, the start of the timing schedule depends on the time the LED drivers will be switched on (power on time).

NOTE: When the operating time in a switching cycle of the driver is greater than 4 hours and less than 24 hours, it is considered as a valid working day from the driver's side. When the actual power-on time of the driver is more than 24 hours, the driver will return to Timer1, which is equivalent to a cycle of 24 hours. The 24 hours are not included in the calculation of sampling time and are invalid.

4.5 TIMING DALI2 DIMMING

There is in the software the opportunity to select the dimming type "Timing_DALI2", this enables a combination of the timing dimming function with the DALI2 configuration.

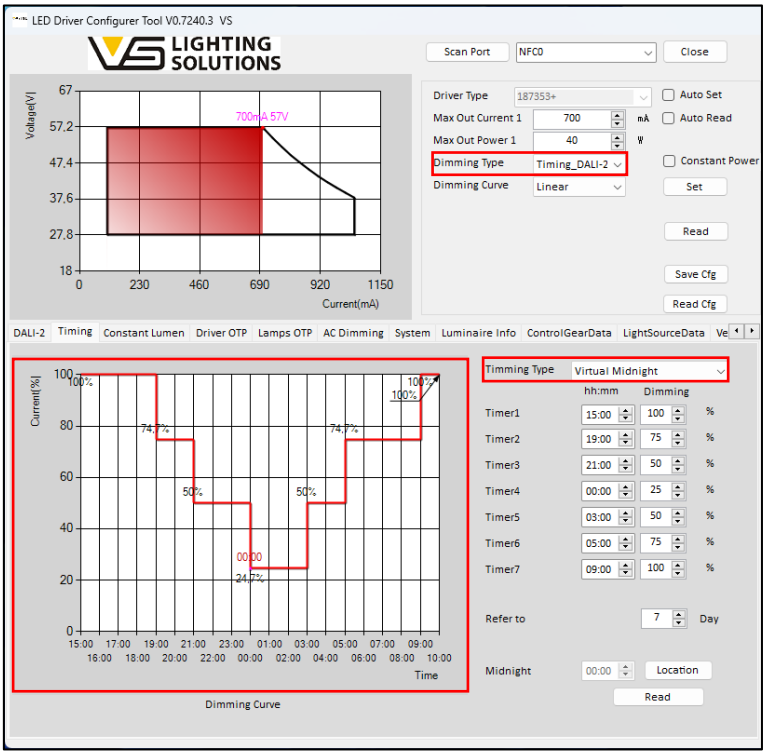

Image 31 – Timing dimming DALI2 - Midnight function

The Midnight function and the DALI2 configurations can be individually made like described in the previous chapters. Please double-check which dimming curve is selected in order to prevent misconfigurations for the dimming behavior of the LED drivers.

NOTE: If 'Timing_DALI2' mode is selected, the driver follows the dimming schedule unless a DALI command is received. This means that as long as no DALI command is received, the preset timing dimming function is executed, but if a DALI2 command is received, the driver will prioritise the DALI 2 dimming function while the dimming schedule remains active in the background. As long as the DALI command exists, the DALI2 dimming function is executed. If no further DALI command is received until the next step of the dimming schedule, the LED driver returns to the dimming schedule and dims to the set dimming level of the dimming schedule.

4.6 AC-DIMMING (DIMMING VIA MAINS VOLTAGE)

If the dimming type "ACdim" is selected, the software will automatically open the AC dimming settings in the lower part of the user interface. This tab enables you to set all relevant parameters to set up the dimming via the mains voltage amplitude. When the AC dimming function is selected it will be the default settings of a linear dimming curve and there is no possibility to change the dimming curve.

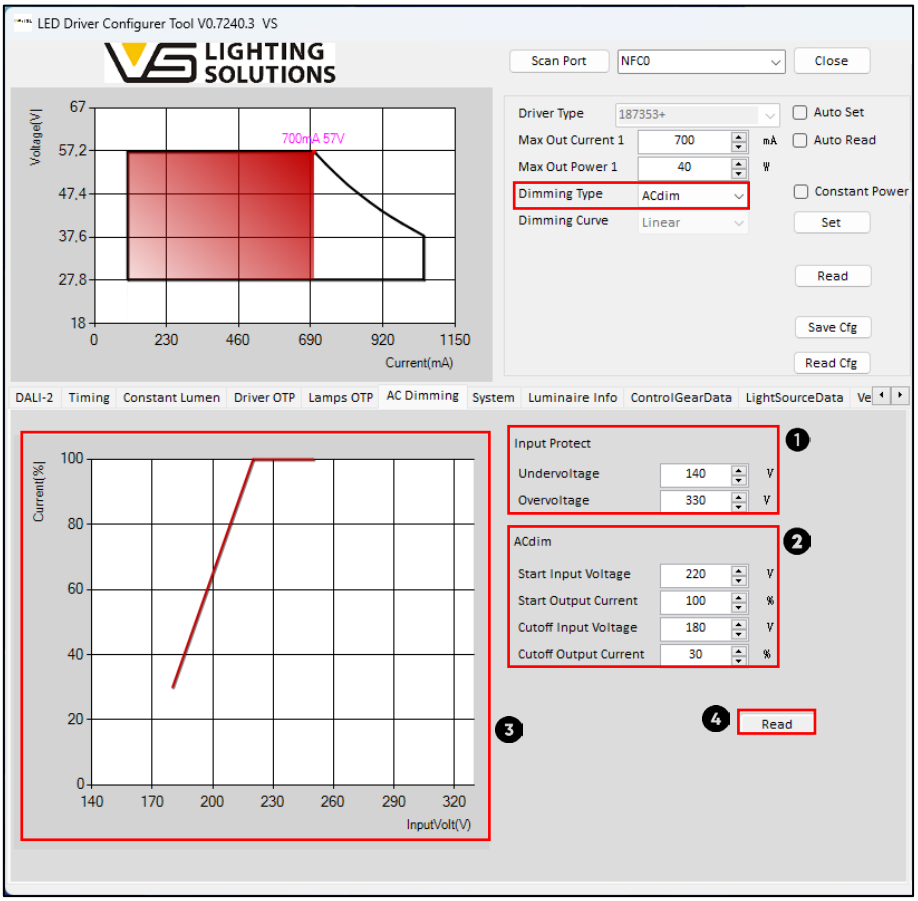

Image 32 – AC dimming configuration

1. **Input protection**
   These two fields below the input protection allow the setting of the under- and overvoltage protection for protection of the LED driver in case of over- or undervoltage on the mains input terminals.
   The "undervoltage protection" can be set in a range between 140 – 160 V, while the "overvoltage protection" can be set in a range between 310 – 330 V.

2. AC dimming parameters

The parameters in this part of the user interface allow to set the dimming curve for the mains amplitude dimming. It is possible to set the start and cutoff input voltage as well as the start and cutoff output current level.
The "start input voltage" can be set between 200 – 250 V and defines the voltage level where the LED driver will start the derating. The "start output current" can be set between 10 – 100% and defines the percentage of the set max. output current which should be set at the start input voltage.
The "cutoff input voltage" defines the input voltage level, at which the driver will reach the lower limit of the input voltage for the AC dimming, this value can be set between 160 – 180 V. The "cutoff output current" defines the lowest dimming level which can be reached at the lowest input voltage and defines the lower limit of the dimming curve.

NOTE: When the input voltage is above the start input voltage the output current will remain to upper limit AC dimming curve. When the input voltage is below the set start input voltage the LED driver will start the dimming according to the defined dimming curve.

3. AC dimming curve

On the left bottom side of the user interface the dimming curve of the AC dimming setting will be visualized, depending on the parameter settings the dimming curve will be adjusted. The vertical axis represents the current percentage, and the horizontal axis represents the input voltage.

4. Read the AC dimming configuration

The AC dimming configuration is not part of the "basic reading process" to shorten the reading time of the LED driver configuration. When you read out the basic parameters, there will not be shown directly all values in the user interface for the set AC dimming configuration. This means when users want to see all the AC dimming configurations it is mandatory to press the "Read" button at the right bottom of the user interface as well.

NOTE: The start input voltage should be set at least 20 Vac higher than the set lower cut-off input voltage.

		Minimum value	Default Value	Maximum Value
AC DIMMING	**Start input Voltage**	180Vac	220Vac	250Vac
	Start output Current	10%	100%	100%
	Cut off input Voltage	160Vac	170Vac	230Vac
	Cutoff output Current	10%	30%	100%
	The difference between the starting voltage and the cut-off voltage	/	20Vac	/
	Starting and cut-off voltage increments	/	1V	/
	Starting and cut-off current increments	/	1%	/

NOTE: The tolerance range of both above functions is ≤ 5V.

4.7 CONSTANT LUMEN OUTPUT (CLO)

To compensate the degradation of the luminous flux of LED modules during the lifetime over its entire lifetime it is possible to configure the CLO function (**C**onstant **L**umen **O**utput). This configuration defines an output current curve over the entire lifetime. This not only ensures stable light output but also saves energy and increases the lifetime of LEDs.

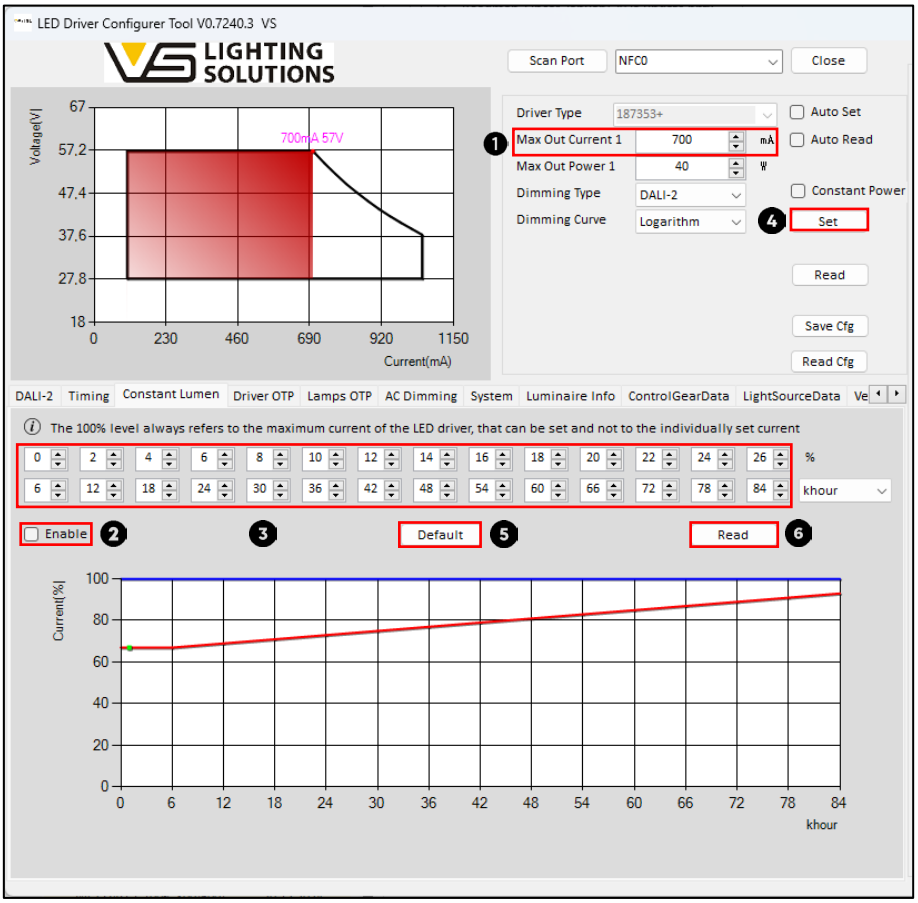

Image 33 – Constant lumen output configuration

1. **Set output current**
   First, the output current must be set in the "Max Out Current" field. Please take care that the selected output current must be lower than the maximum output current (< 1050 mA) otherwise the CLO function can't be used.

2. **Enable CLO function**
   Please activate now the checkbox to "Enable" the CLO function.

3. **CLO output level and CLO lifetime**
   If you want to configure the CLO function, you need to enter the CLO lifetime and the CLO output level in 14 steps. The CLO lifetime and CLO output level should be configured according to the LED module lifetime performance out of the LED module datasheets. This enables the most efficient utilization of the CLO function. The CLO curve shows an increase of the output current of the LED driver during the lifetime of the LED module. The CLO curve level starts at the set output current in % of the max. current 1050 mA. For example, when you set the output current on 700 mA, the CLO curve will start at 66,67% (700 mA / 1050 mA *100 = 66,67%). When the output level is set in 14 steps from 0 to 26% the LED driver output current will increase linearly from 66,67% to 92,67% (1050 mA * 92,67% = 973 mA) over the set CLO lifetime.

4. **Save CLO configuration on LED driver**
   If you want to save the CLO configuration on the LED driver you need to hold the NFC programming device near to the NFC Antenna of the LED driver and click on the "Set" button. When the LED driver configuration has been set successfully there will be a message in the software user interface on the right side.

5. **Default settings**
   By clicking on the "Default" button, the CLO settings will be reset to the default settings.

6. **Read CLO configuration**
   If you want to read out the CLO configuration from a LED driver you need to hold the NFC programming device near to the NFC Antenna of the LED driver and click on the "Read" button. When the LED driver CLO configuration has been read out successfully, the settings will be filled in automatically in the configuration fields for the Output level and LED Module lifetime. Afterwards the CLO curve below will visualize the settings in the GUI below.

NOTE: The dropdown selection from "khour" to "minute" is only for test verification purposes. When you select "minute" you can test the set CLO curve settings. If you have verified the constant lumen settings, you can power off the driver and read again the configuration of the LED driver and change the dropdown selection from "minute" to "khour".

4.8 OVER TEMPERATURE PROTECTION – OTP FUNCTION

The OTP functions of VS LED drivers protect the LED driver and the luminaire from damage caused by overtemperatures in the application. This chapter provides an overview of the "Driver OTP" and the "Luminaire OTP" function.

4.8.1 LED DRIVER OTP

This function is an overtemperature protection designed in the LED driver for applications where it is undesirable to install and wire an NTC resistor in the luminaire.

Image 34 – LED Driver OTP configuration

1. **Set output current**
   First, the output current must be set in the "Max Out Current" field. Please make sure that the heat development of the luminaire hat been measured with the set output current of the driver. For the configuration of this function in the next steps, it is important to be aware of the thermal behavior of the LED driver in the luminaire.

2. Enable Driver OTP function

Please make sure the checkbox "Driver OTP" is activated to use the Driver OTP function.

3. Set start and end of the OTP derating

If you want to use the Driver OTP function, you need to define the "Start derating" and "End derating" temperature. The "Start derating" value is the temperature at which the LED driver will start to reduce the output level. The "End derating" value is the temperature at which the LED driver will stop with the derating of the output level. The "OTP out ratio" value is pre-defined on 0% and this value can't be changed in the user interface. The output level derating of the OTP function between the "Start derating" and "End derating" temperature will always be linearly from 100% (set output current level) to the 0% ("OTP out ratio").
Let' look on an example, the "Start derating" temperature is set to 90°C and the "End derating" temperature is set to 100°C. In case of an overtemperature, which exceeds the temperature of 90°C, the LED driver will start with the decreasing of the output level. If the casing temperature of the LED driver now increases further until 100°C, the driver derating will reach the output level of 0% and will switch-off. When the driver has cooled down after the decreasing of the output level, the output level will increase again to the output level according to the actual detected LED driver temperature.

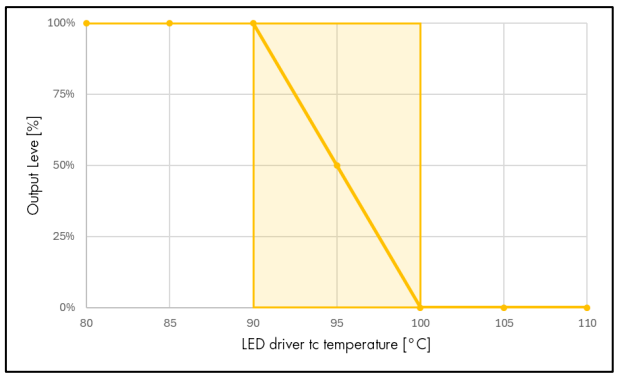

Image 35 – LED Driver OTP behavior

4. Save OTP configuration on LED driver

If you want to save the OTP configuration on the LED driver you need to hold the NFC programming device near to the NFC Antenna of the LED driver and click on the "Set" button. When the LED driver configuration has been set successfully there will be a message in the software user interface on the right side.

5. Read OTP configuration

If you want to read out the OTP configuration from a LED driver you need to hold the NFC programming device near to the NFC Antenna of the LED driver and click on the "Read" button at the bottom of the user interface. When the LED driver OTP configuration has been read out successfully, the settings will be filled in automatically in the configuration fields.

The output level dimming value can be calculated by using the following formula:

$$\mathbf{Vd} = (\mathbf{254} - \mathbf{Vo}) \cdot \frac{\boldsymbol{T} - \boldsymbol{Ts}}{\boldsymbol{Te} - \boldsymbol{Ts}} + \boldsymbol{Vo}$$

- Vd = Actual dimming value
- Vo = Corresponding dimming value of the OTP out ratio
- Te = "End Derating" temperature
- Ts = "Start Derating" temperature
- T = Actual measured temperature

NOTE: The temperature detection of this OTP function designed inside of the LED driver has a measurement tolerance of +/- 5% of the measured temperature in view of "Start derating" and "End derating" temperatures.

4.8.2 LUMINAIRE OTP

This function is an overtemperature protection designed for applications where it is desired to install and wire an NTC resistor in the luminaire for the thermal monitoring and as protection mechanism.

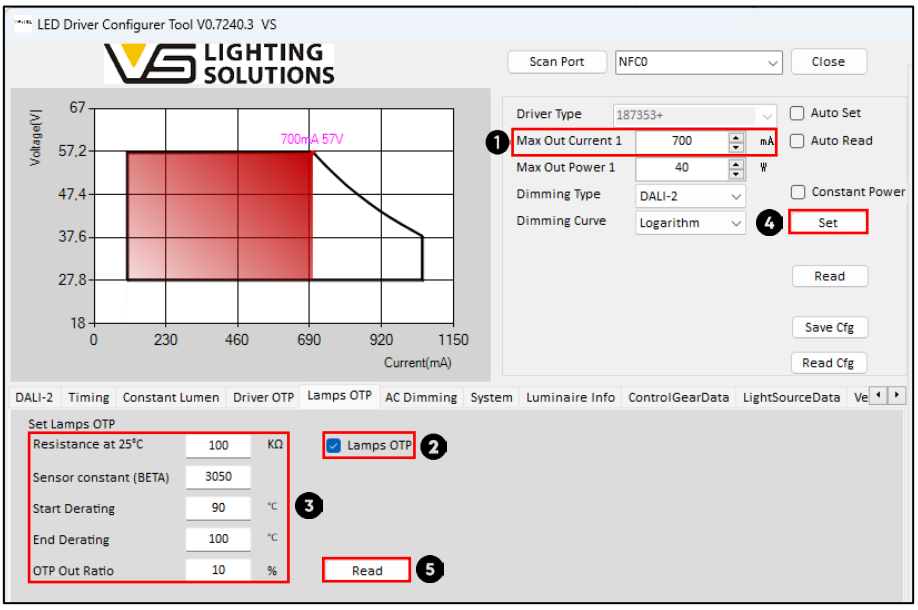

Image 36 – Luminaire OTP configuration

1. **Set output current**
   First, the output current must be set in the "Max Out Current" field. Please make sure that the heat development of the luminaire has been measured with the set output current of the driver. For the configuration of this function in the next steps, it is important to be aware of the thermal behavior of the luminaires and the LED modules.

2. **Enable Lamps OTP function**
   Please make sure the checkbox "Lamps OTP" is activated to use the Luminaire OTP function.

3. **Set NTC resistance and NTC constant**
   In the next step it is mandatory to enter the NTC resistance (at 25 °C) and the NTC thermistor value (Beta value). Therefore, please look at the datasheet of the NTC resistor. It is recommended to use an 100kΩ, because here the tolerances between measured and actual temperature will be the lowest.

4. **Set start and end of the OTP derating**
   If you want to use the Lamps OTP function, you need to define as well the "Start derating" and "End derating" temperature. The "Start derating" value is the temperature at which the LED driver will start to reduce the output level. The "End derating" value is the temperature at which the LED driver will stop with the derating of the output level. Furthermore, you can set the "OTP out ratio" value to define the lower limit of the OTP derating. The output level derating of the OTP function between the "Start derating" and "End derating" temperature will decrease the output level from 100% (set output current level) to the set "OTP out ratio" level (e.g. 10%). When the driver has cooled down after the decreasing of the output level, the output level will increase again to the output level according to the actual detected LED driver temperature.

5. **Save OTP configuration on LED driver**
   If you want to save the OTP configuration on the LED driver you need to hold the NFC programming device near to the NFC Antenna of the LED driver and click on the "Set" button. When the LED driver configuration has been set successfully there will be a message in the software user interface on the right side.

6. Read OTP configuration

If you want to read out the OTP configuration from a LED driver you need to hold the NFC programming device near to the NFC Antenna of the LED driver and click on the "Read" button at the bottom of the user interface. When the LED driver OTP configuration has been read out successfully, the settings will be filled in automatically in the configuration fields.

4.9 CONTROL PHASE FUNCTION

The control phase function makes it possible to increase or reduce the output level by applying or removing a voltage (mains voltage 230 V) to the control phase terminal LST. One possible application in street lighting is to apply or remove voltage to the additional phase LST via a timer-controlled switch in the control cabinet. This signal can be used to reduce the output current and the light level and enable energy savings at night. In general, there are three selection options for the control phase function (Deactivated, Mode 1 and Mode 2).

4.9.1 CONTROL PHASE – DEACTIVATED

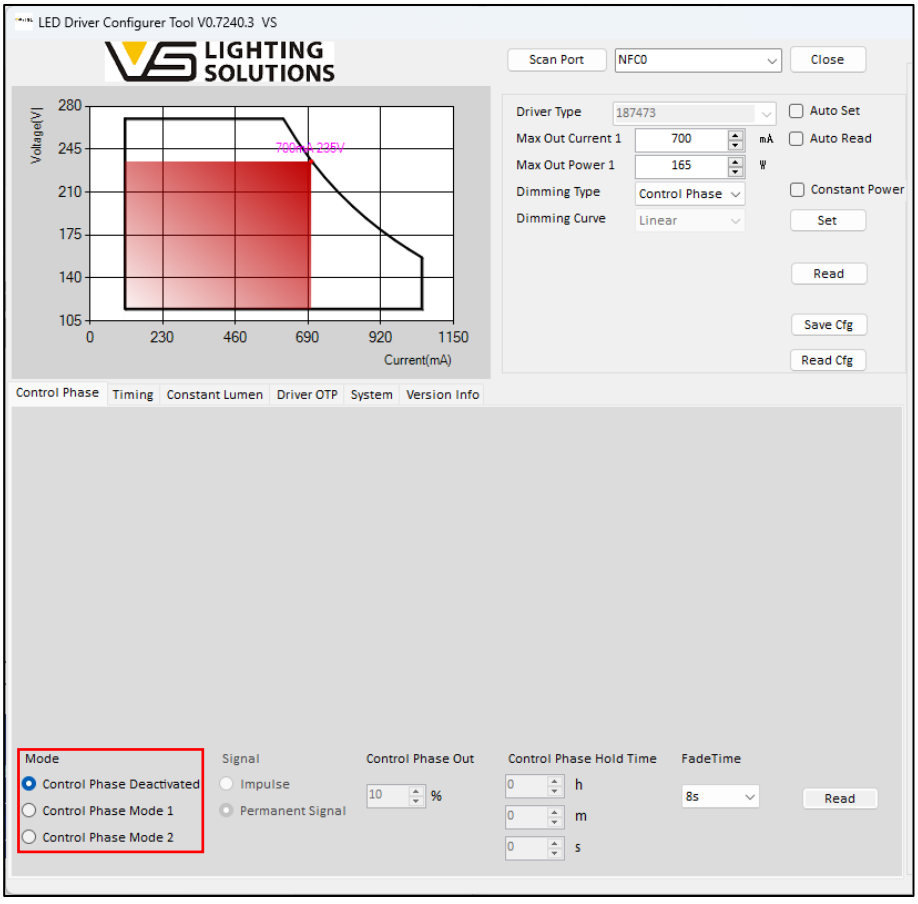

Image 37 – Control phase function deactivated

If the control phase function is deactivated, all adjustable parameters are deactivated and grayed out.

4.9.2 CONTROL PHASE MODE 1 – IMPULSE

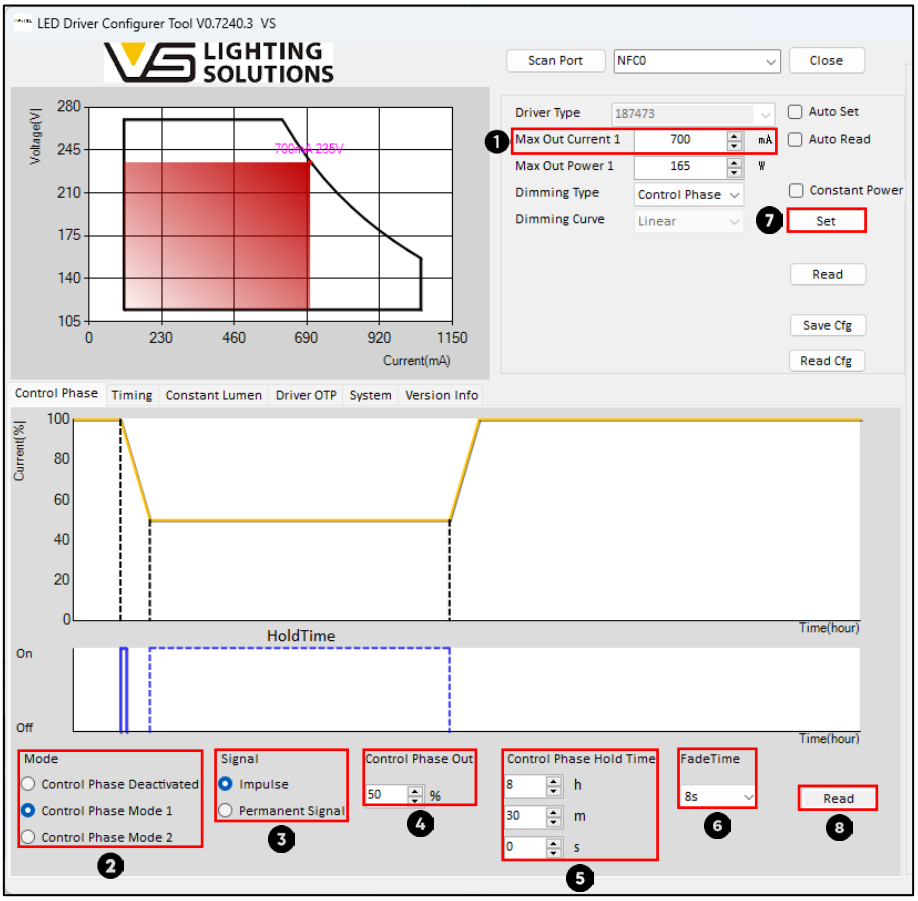

Image 38 – Control phase Mode 1 - Impulse

1. **Set output current**
   First, the output current must be set in the "Max Out Current" field.

2. **Select Control Phase Mode**
   To set control phase mode 1, activate the "Control Phase Mode 1" checkbox.

3. **Select Signal**
   If you want the control phase function to be triggered by a pulse in the application, please ensure that the "Pulses" checkbox is activated.

4. **Control Phase Output Level**
   Next, you can set the output level up to which the control phase power reduction should be executed in the event of a control phase pulse being applied to the LST interface. The control phase output level can be set between 10 - 100% and relates to the set output current.

5. **Set Control Phase Hold Time**
   Next, the control phase duration must be set. After entering the values, the control phase duration is visualized in the user interface. The control phase duration can be set between 0 - 18 hours (hh:mm:ss).

6. **Set Fade Time**
   In the last step, the fade time is set in which the LED driver should reach the desired power level after the signal. The fade time can be set between 0 - 90 seconds.

7. Save Control Phase configuration on LED driver

If you want to save the LED driver configuration on the LED driver, you must hold the NFC programming device near the NFC antenna of the LED driver and click on the "Set" button. When the LED driver configuration has been successfully transferred, a message is displayed on the right-hand side of the software user interface.

8. Read Control Phase configuration

If you want to read out the LED driver configuration from an LED driver, you must hold the NFC programming device near the NFC antenna of the LED driver and click on the "Read" button at the bottom of the user interface.If the control phase configuration of the LED driver has been successfully read, the settings are automatically entered in the configuration fields.

4.9.3 CONTROL PHASE MODE 1 – PERMANENT SIGNAL

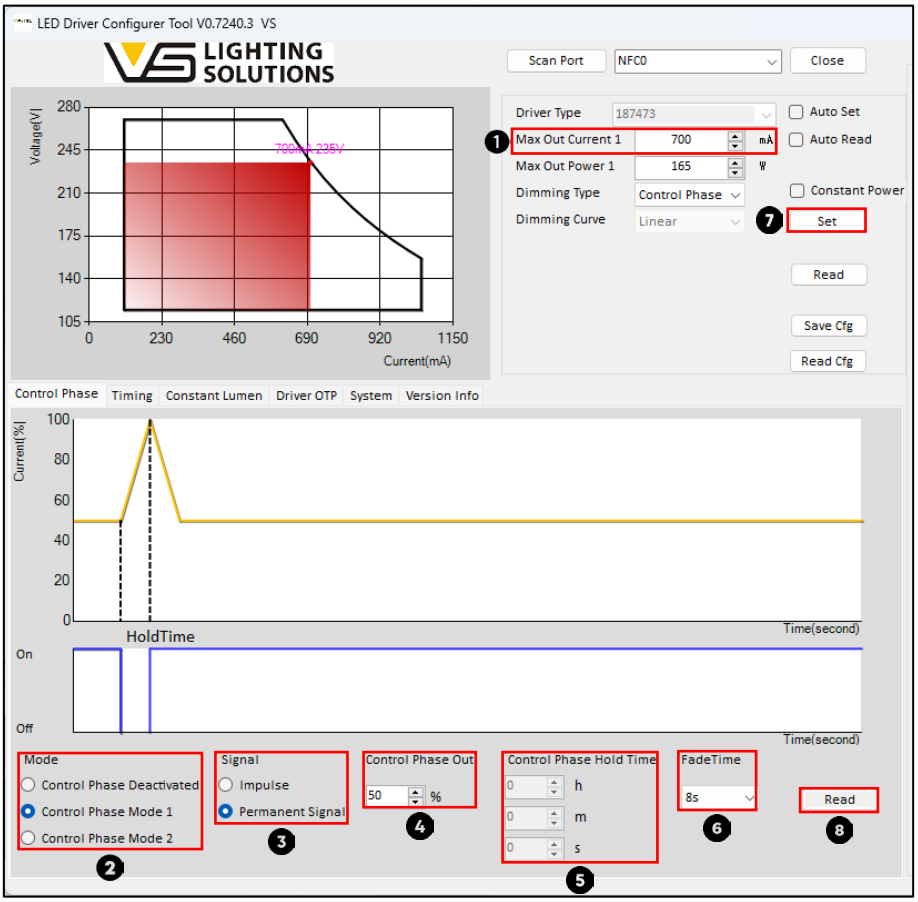

Image 39 – Control Phase Mode 1 - Permanent signal

1. Set output current

First, the output current must be set in the "Max Out Current" field.

2. Select Control Phase Mode

To set control phase mode 1, activate the "Control phase mode 1" checkbox.

3. Select Signal

If you want the control phase function to be triggered by a permanent signal in the application, please ensure that the "Permanent signal" checkbox is activated.

4. **Set Control Phase Output Level**
   Next, you can set the output level at which the LED driver should be operated until the control phase power increase is executed in the event of a removed control phase signal at the LST interface. The control phase output level can be set between 10 - 100% and refers to the set output current.

5. **Set Control Phase Hold Time**
   If the "Permanent signal" signal is selected in the previous step, the fields for setting the control phase duration are grayed out. In this operating mode, the power increase is maintained until the permanent signal is applied again.

6. **Set Fade Time**
   In the last step, the fade time is set in which the LED driver should reach the desired power level after the signal. The fade time can be set between 0 - 90 seconds.

7. **Save Control Phase configuration on LED driver**
   If you want to save the LED driver configuration on the LED driver, you must hold the NFC programming device near the NFC antenna of the LED driver and click on the "Set" button. When the LED driver configuration has been successfully transferred, a message is displayed on the right-hand side of the software user interface.

8. **Read Control Phase configuration**
   If you want to read out the LED driver configuration from an LED driver, you must hold the NFC programming device near the NFC antenna of the LED driver and click on the "Read" button at the bottom of the user interface. If the control phase configuration of the LED driver has been successfully read, the settings are automatically entered in the configuration fields.

4.9.4 CONTROL PHASE MODE 2 – IMPULSE

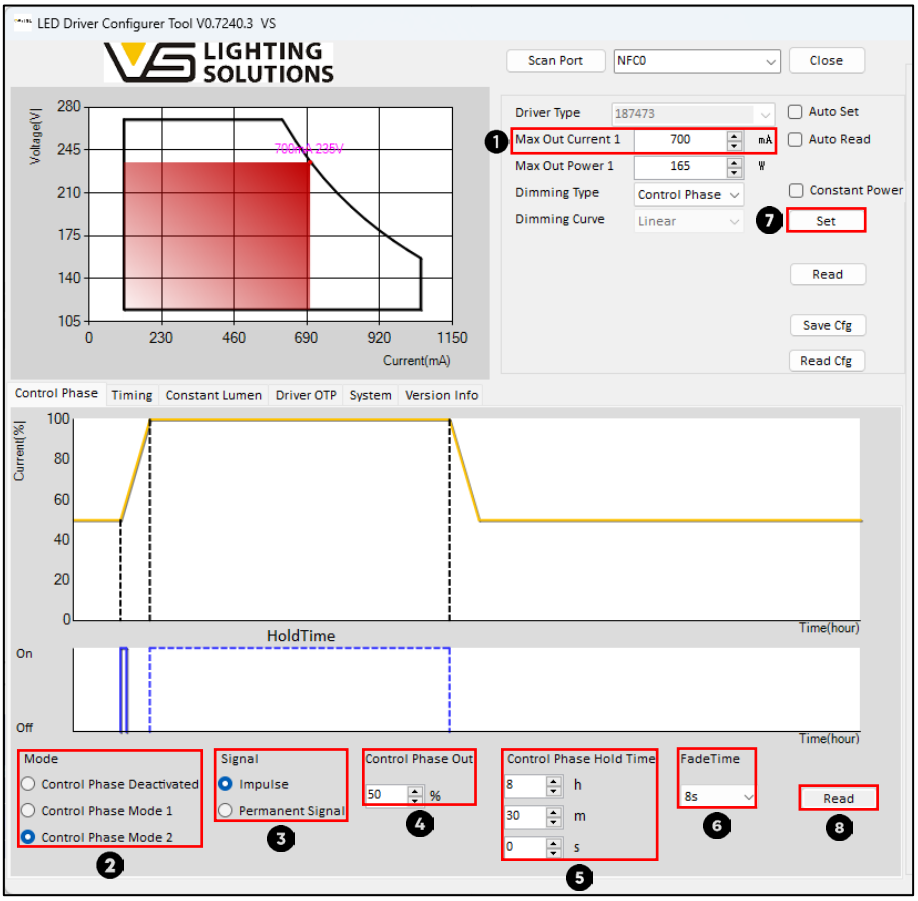

Image 40 – Control Phase Mode 2 - Impulse

Control Phase Mode 2 is generally the same as mode 1, but with inverted (reversed) dimming logic.

1. **Set output current**
   First, the output current must be set in the "Max Out Current" field.

2. **Select Control Phase Mode**
   To set control phase mode 2, activate the "Control phase mode 2" checkbox.

3. **Select Signal**
   If you want the control phase function to be triggered by a pulse in the application, please ensure that the "Pulses" checkbox is activated.

4. **Set Control Phase Output Level**
   Next, you can set the output level at which the LED driver should be operated until the control phase power increase is executed when a control phase pulse is applied to the LST interface. The control phase output level can be set between 10 - 100% and refers to the set output current.

5. **Set control Phase Hold Time**
   Next, the control phase duration must be set. After entering the values, the control phase duration is visualized in the user interface. The control phase duration can be set between 0 - 18 hours (hh:mm:ss).

6. Set Fade Time

In the last step, the fade time is set in which the LED driver should reach the desired power level after the signal. The fade time can be set between 0 - 90 seconds.

9. Save Control Phase configuration on LED driver

If you want to save the LED driver configuration on the LED driver, you must hold the NFC programming device near the NFC antenna of the LED driver and click on the "Set" button. When the LED driver configuration has been successfully transferred, a message is displayed on the right-hand side of the software user interface.

10. Read Control Phase configuration

If you want to read out the LED driver configuration from an LED driver, you must hold the NFC programming device near the NFC antenna of the LED driver and click on the "Read" button at the bottom of the user interface. If the control phase configuration of the LED driver has been successfully read, the settings are automatically entered in the configuration fields.

4.9.5 CONTROL PHASE MODE 2 – PERMANENT SIGNAL

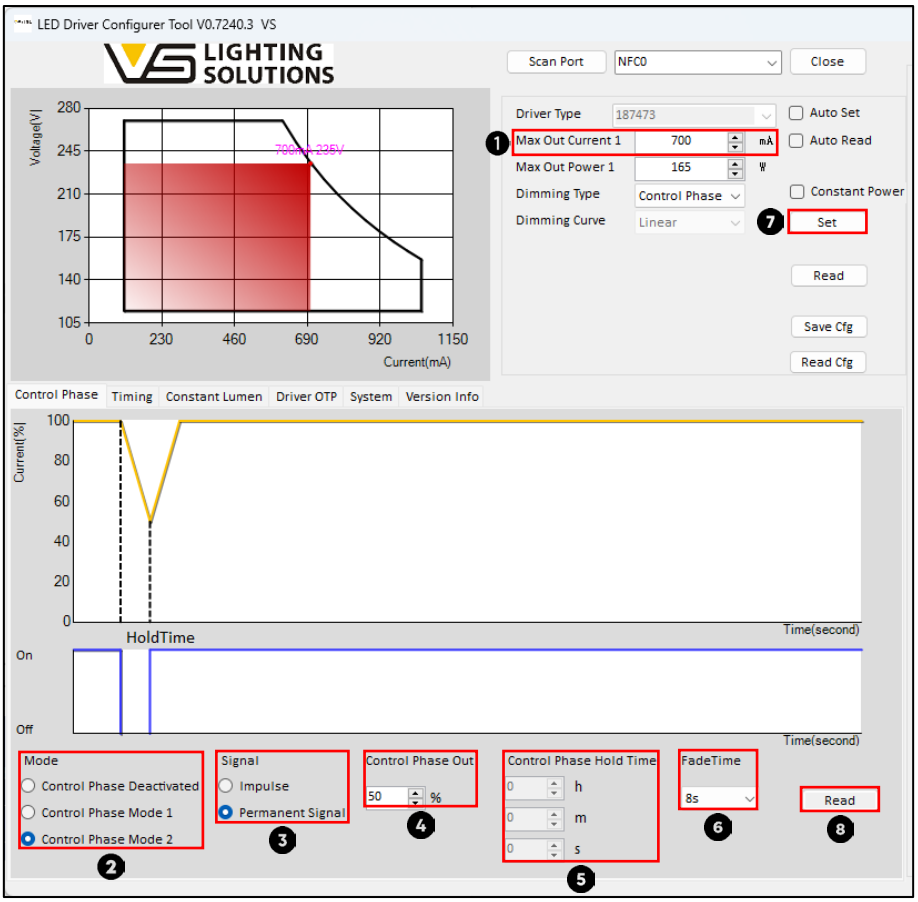

Image 41 – Control Phase Mode 2 – Permanent signal

1. Set output current

First, the output current must be set in the "Max Out Current" field.

2. Select Control Phase Mode

To set control phase mode 2, activate the "Control phase mode 2" checkbox.

3. **Select Signal**
   If you want the control phase function to be triggered by a permanent signal in the application, please ensure that the "Permanent signal" checkbox is activated.

4. **Set Control Phase Output Level**
   Next, you can set the output level at which the LED driver should be operated until the control phase power increase is executed when a control phase pulse is applied to the LST interface. The control phase output level can be set between 10 - 100% and refers to the set output current.

5. **Set Control Phase Hold Time**
   If the "Permanent signal" signal is selected in the previous step, the fields for setting the control phase duration are grayed out. In this operating mode, the power reduction is maintained until the permanent signal is applied again.

6. **Set Fade Time**
   In the last step, the fade time is set in which the LED driver should reach the desired power level after the signal. The fade time can be set between 0 - 90 seconds.

7. **Save Control Phase configuration on LED driver**
   If you want to save the LED driver configuration on the LED driver, you must hold the NFC programming device near the NFC antenna of the LED driver and click on the "Set" button. When the LED driver configuration has been successfully transferred, a message is displayed on the right-hand side of the software user interface.

8. **Read Control Phase configuration**
   If you want to read out the LED driver configuration from an LED driver, you must hold the NFC programming device near the NFC antenna of the LED driver and click on the "Read" button at the bottom of the user interface. If the control phase configuration of the LED driver has been successfully read, the settings are automatically entered in the configuration fields.

4.10 DIAGNOSICS AND MAINTENANCE DATA (DALI PARTS 251, 252, 253)

This chapter provides an explanation how the luminaire info (DALI part 251) can be set and read out of VS LED drivers. Furthermore, it will be explained how the diagnostic and maintenance data (DALI parts 252, 253) can be read out via NFC or the iProgrammer Streetlight DALI.

4.10.1 LUMINAIRE INFO (DALI PART 251)

If you have ordered the first generation of the PrimeLine NFC S-MD DALI2 Dx driver family (with order suffix "187XYZ-**1802**" and "187XYZ-**1803**"), you will need the iProgrammer Streetlight DALI (Ref.No.: 187412) to read out the luminaire data (DALI part 251). If you have ordered the new generation of the PrimeLine NFC S-MD DALI2 Dx (order suffix "187XYZ-**1804**") you will be able to read out the luminaire data (DALI part 251) via NFC.

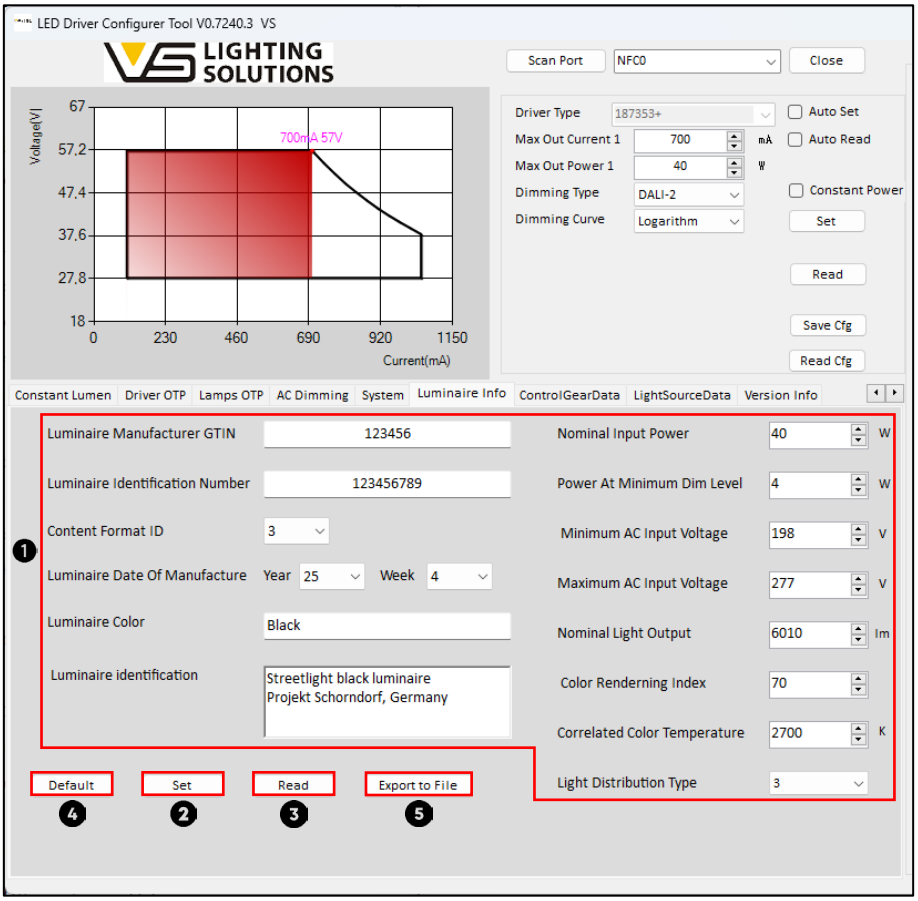

Image 42 – Luminaire Info (DALI part 251)

1. **Set Luminaire info**
   The luminaire information is there to define in the NFC configuration in which kind of luminaire LED driver will be used. Furthermore, the luminaire information enables conclusions in the case of quality claims in which kind of luminaire the drivers were installed and under which operating conditions the LED driver should be used. In the default settings of the luminaire info most of the fields are empty, for the configuration the fields must be filled in by the luminaire manufacturer.

2. **Save Luminaire info on LED driver**
   If you want to save the luminaire info configuration on the LED driver you need to connect the iProgrammer Streetlight DALI to the DALI interface of the LED driver or hold the NFC programming device near to the NFC Antenna of the LED driver and click on the "Set" button at the bottom of the user interface. When the LED driver configuration has been set successfully there will be a message in the software user interface on the right side.

3. **Read Luminaire info**
   If you want to read out the luminaire info configuration from a LED driver you need to connect the iProgrammer Streetlight DALI to the DALI interface of the LED driver or to hold the NFC programming device near to the NFC Antenna of the LED driver and click on the "Read" button at the bottom of the user interface. When the LED driver Luminaire info configuration has been read out successfully, the settings will be filled in automatically in the configuration fields.

4. **Default settings**
   By clicking on the "Default" button at the bottom of the user interface, the Luminaire info settings will be reset to the default settings.

5. **Export diagnostic and maintenance data to file**
   By clicking on the "Export to file" button at the bottom of the user interface, all diagnostic and maintenance data (Luminaire info, LED driver Data, Luminaire Data) will be exported in a .txt file.

4.10.2 LED DRIVER DATA (DALI PART 252, 253)

If you have ordered the first generation of the PrimeLine NFC S-MD DALI2 Dx driver family (with order suffix "187XYZ-**1802**" and "187XYZ-**1803**"), you will need the iProgrammer Streetlight DALI (Ref.No.: 187412) to read out the LED driver Data and the Luminaire Data (DALI part 252, 253). If you have ordered the new generation of the PrimeLine NFC S-MD DALI2 Dx (order suffix "187XYZ-**1804**") you will be able to read out the LED driver Data and the Luminaire Data (DALI part 252, 253)via NFC.

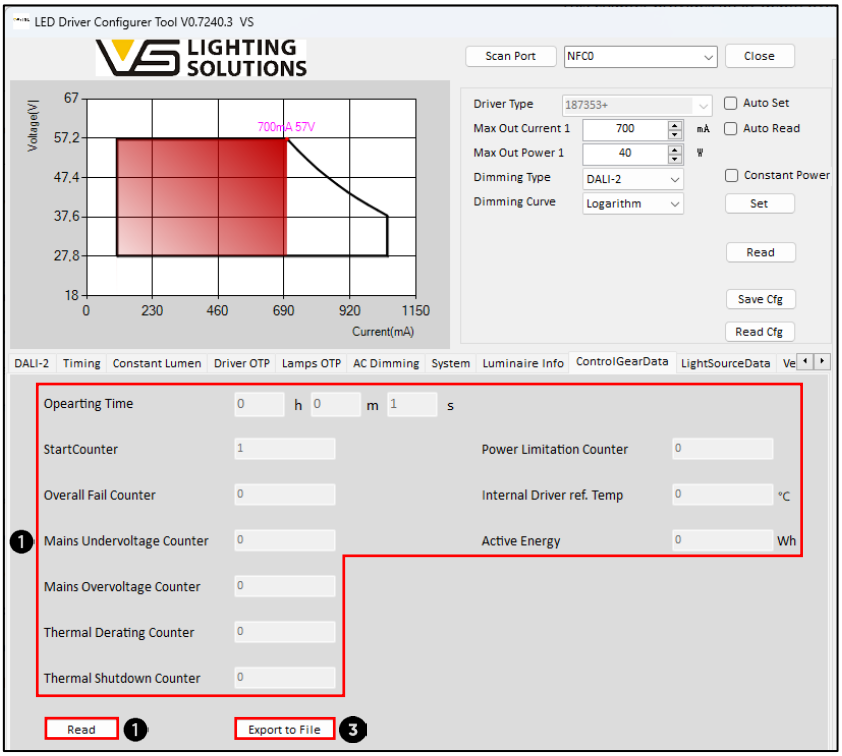

Image 43 – LED driver data (DALI Part 252, 253)

1. **Read LED driver data**
   If you want to read out the LED driver Data from a LED driver you need to connect the iProgrammer Streetlight DALI to the DALI interface of the LED driver or to hold the NFC programming device near to the NFC Antenna of the LED driver and click on the "Read" button at the bottom of the user interface. When the LED driver data has been read out successfully, the data will be displayed in the user interface.

2. Export diagnostic and maintenance data to file

By clicking on the "Export to file" button at the bottom of the user interface, all diagnostic and maintenance data (Luminaire info, LED driver Data, Luminaire Data) will be exported in a .txt file.

4.10.3 LUMINAIRE DATA (DALI PART 252, 253)

If you have ordered the first generation of the PrimeLine NFC S-MD DALI2 Dx driver family (with order suffix "187XYZ-**1802**" and "187XYZ-**1803**"), you will need the iProgrammer Streetlight DALI (Ref.No.: 187412) to read out the LED driver and the Luminaire Data (DALI part 252, 253). If you have ordered the new generation of the PrimeLine NFC S-MD DALI2 Dx (order suffix "187XYZ-**1804**") you will be able to read out the LED driver Data and the Luminaire Data (DALI part 252, 253)via NFC.

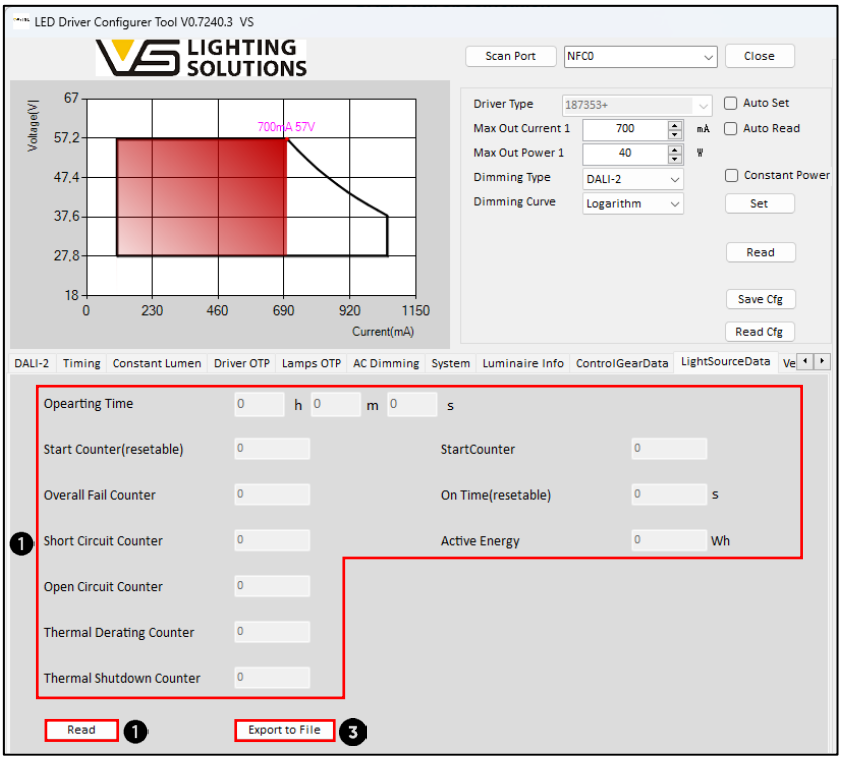

Image 44 – Luminaire data (DALI Part 252, 253)

1. Read LED driver data

If you want to read out the Light Source Data from a LED driver you need to connect the iProgrammer Streetlight DALI to the DALI interface of the LED driver or to hold the NFC programming device near to the NFC Antenna of the LED driver and click on the "Read" button at the bottom of the user interface. When the LED driver Luminaire info configuration has been read out successfully, the data will be displayed in the user interface.

2. Export diagnostic and maintenance data to file

By clicking on the "Export to file" button at the bottom of the user interface, all diagnostic and maintenance data (Luminaire info, LED driver Data, Luminaire Data) will be exported in a .txt file.

4.11 SOFTWARE VERSION INFO

When the tab "Version Info" is selected in the user interface of the NFC LED Driver Configurer Tool there will be displayed in the user interface the last software versions and the change log. This enables a conclusion about the changes between the different software versions and the added software features can be an indication if you are using the latest software version.

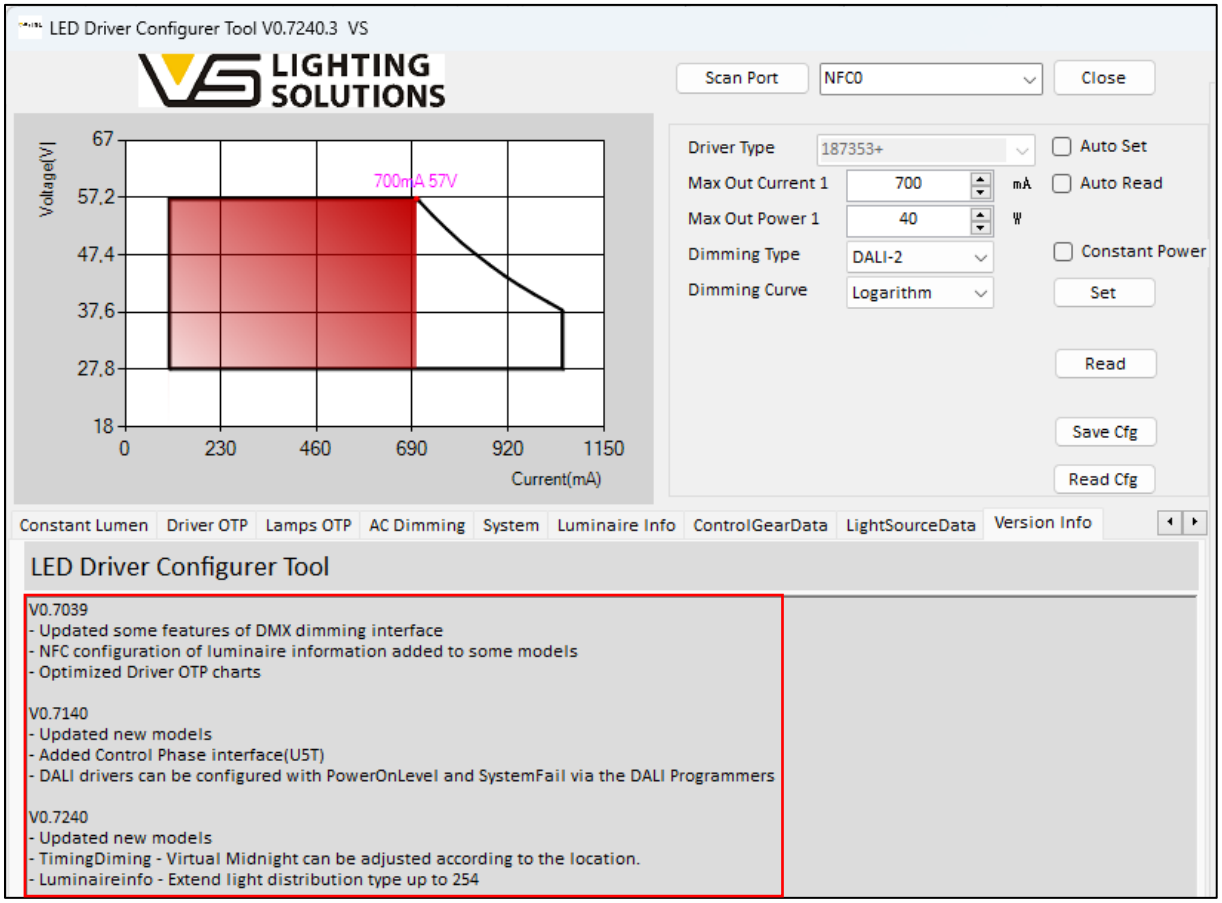

Image 45 – Software version and change log