

TruPulse nano GUI

Instruction Manual



Preface

Definition of Symbols and Terms



This symbol is to alert the user to the danger to exposure of hazardous invisible Laser radiation



This symbol is to emphasize important information regarding installation points or operating procedures

DANGER:

Describes hazards that could directly or indirectly lead to serious personal injury or death.

WARNING:

Describes hazards or practices that could directly or indirectly lead to serious personal injury or death.

CAUTION:

Describes hazards or practices that could lead to minor personal injury or product damage.

**LASER
INTEGRATOR**

Any person that integrates the Laser into their equipment, or any person who uses the Laser in the form as supplied by TRUMPF Laser UK Limited.

PRODUCT

The definition of “Product” as used herein means the item that was procured from TRUMPF Laser UK Limited. The Product is sold ready for use for its intended purpose as a Laser component for incorporation.

Warnings



WARNING: If the Fibre Laser described in this Product Manual is used in a manner not specified by TRUMPF Laser UK Limited, the protection provided by the equipment may be impaired.



WARNING: Attempts to modify or alter the product, or the use of controls, adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.



CAUTION: Modifications to the product or the use of controls or adjustments or performance of procedures other than those specified herein:

- will invalidate the warranty
- may result in patent infringement

Laser Integrators are not authorized to modify the specification of the Product.

Virtual patent marking

TruPulse nano lasers are protected by patents and patent applications including those listed in the virtual patent marking notice, which can be found at www.trumpf.com/s/patents. This website address can also be found on the following label, which is applied to all TruPulse nano laser products.



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1 Scope of Instructions for Use

These Instructions for Use describe the graphical user interface that is designed specifically for the TruPulse nano laser family.

This document will provide all the information that is required to locate, install and run TruPulse nano GUI (Graphical User Interface).

The TruPulse nano GUI is intended to run on a Windows PC or laptop and provides the facility to configure, monitor and report the status of a TruPulse nano laser.

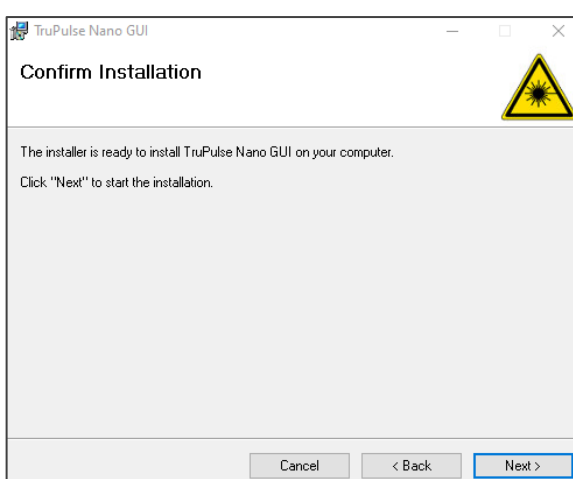
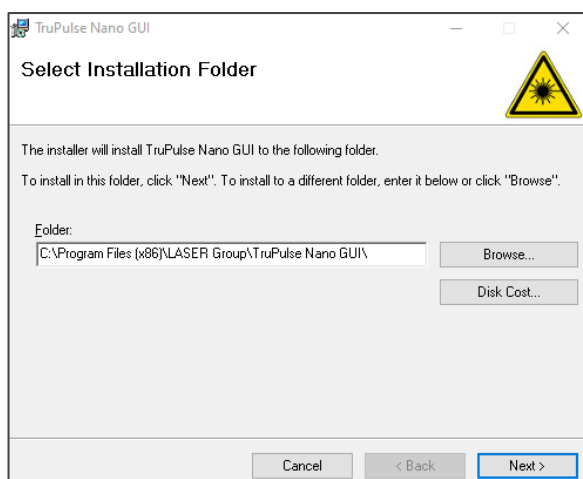
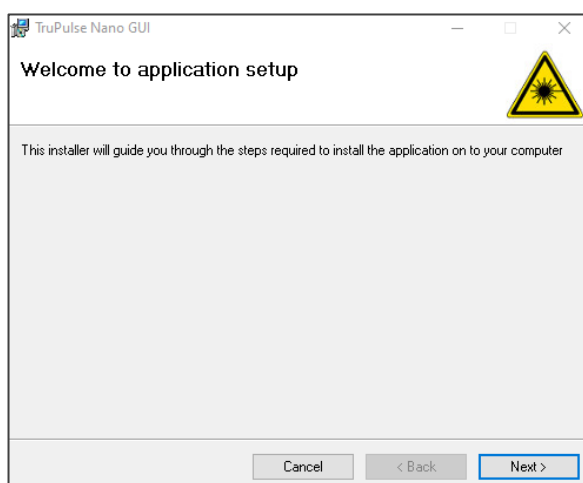
2 Document References

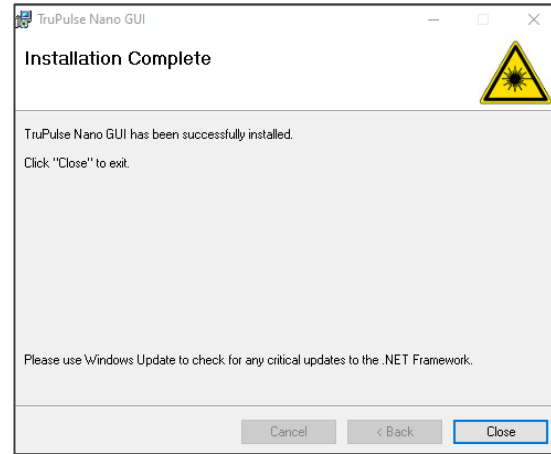
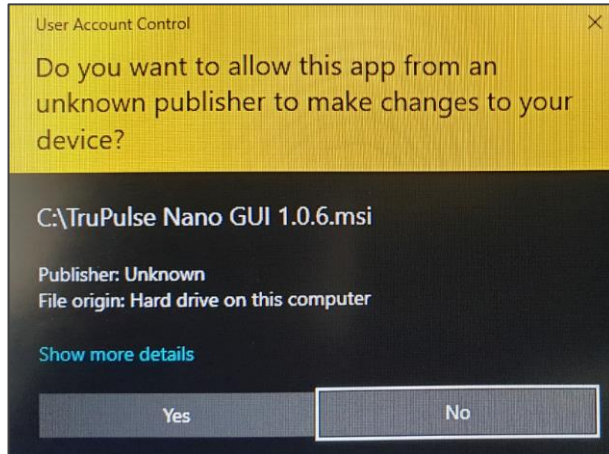
Document number	Description
SM-S00360	V8 control interface manual
SM-S00227	OEM Safety and System Integration Manual: Module types A1 and A

3 Getting started

The TruPulse nano GUI needs to be installed onto a Windows PC using the latest TruPulse nano GUI installer (MSI file).

To install the TruPulse nano GUI simply double click the TruPulse nano GUI.msi file and follow the instructions during the installation process.





4 Connecting to a laser

Physically connect the laser to the PC. This can be done in several ways.

RS232

A RS232 cable can be used to connect directly from the laser IO connector to the PC.

DHCP

A laser can be connected to an Ethernet network

STATIC

An Ethernet cable can be used to connect directly from the laser to the PC

The preferred connection method is Ethernet as there is a far larger command set available. For example the digital I/O and waveform editing is only available using an Ethernet connection.

4.1 Ethernet Control Safety Warning



It is possible for multiple users to connect to and control a TruPulse Laser simultaneously via the Ethernet port. The Laser will respond to each command in the order in which it is received and does not differentiate between commands sent from different Ethernet controllers.

Care should be taken especially when controlling the Laser remotely across a network as another user could be working with the Laser.

It is the Integrators responsibility to ensure that any remote connectivity to the Laser cannot inadvertently allow the Laser IR to be enabled during the Integration process when, IR, Pilot Laser and interlock systems are being installed.

We recommend that any user intending to control the Laser via Ethernet, remotely across a network should first check that the Laser is installed in an interlocked, Class 1 enclosure.

4.2 Starting the TruPulse nano GUI

The TruPulse nano GUI is installed by default into the C:\Program Files (x86)\LASER Group\TruPulse nano GUI directory. To start the GUI from here double click the TruPulse nano GUI.exe.

During installation there are two shortcuts created. One is on the desktop and the other is in the programs menu. Clicking either of these shortcuts will open the GUI.

4.3 Basics - Search and connect

The first screen to be displayed is the search screen.

The search screen allows the user to search for lasers physically connected using Ethernet or RS232.

The screenshot shows the 'Ethernet Settings' window of the TruPulse nano application. It features a 'Search for lasers' button and an 'Auto Search On Start' checkbox. The 'Search Results' section for Ethernet shows a table with one result for Serial Number 375081. Below this, there are input fields for 'Enter IP Address manually' (192, 168, 0, 1) and a 'Manual Connect' button. The bottom section is for 'Search COM Ports', with a 'Search COM Ports' checkbox and a 'Search Parameters' list containing 9600, 19200, 38400, 57600, and 115200. The 'COM8' port is selected in the 'Search Results' table.

Serial Number	IP Address	MAC Address	Laser Type	LAN Adapter
375081	169.254.39.16	90-EA-60-00-10-26	15-020P-A-EP-S-A-Y(03)	169.254.39.17

Serial Number	COM Port	Baud Rate	Laser Type
375081	COM8	115200	15-020P-A-EP-S-A-Y(03)

The screen is split in to two main parts. The top section is for Ethernet searching and results, the bottom section is for RS 232 searching and results.

The search can be configured to speed up the search process. Select either '**Search Ethernet**' check box or '**Search COM ports**' check box or both. The less there is to search, the quicker the search will be.

If the '**Auto search on start**' check box is ticked, the search for lasers will start immediately when the GUI application is first opened based on the last successful search criteria.

If some search parameters have changed and a new search is required, then click the '**Search for lasers**' button.

To connect to the laser simply click the required laser in the search results.

4.4 Connecting the laser for the first time

4.4.1 Default IP Address allocation

When the laser first starts up and detects that it has an Ethernet cable connected, or if the Ethernet cable has just been re-connected, the laser will try to determine what its IP configuration should be.

By default, when the laser leaves the factory the laser will be set to DHCP mode. This means that when it reaches the customer site it will try to wait for a DHCP address to be allocated to it by the network. It will wait for approximately 30 seconds. If after this time the laser has not been allocated a DHCP address, it will allocate its own.

Default DHCP address 169.254.x.x

This address is to make use of the APIPA (Automatic private IP addressing) that the PC network adapter will use when it does not get an IP address allocated by a network.

4.4.2 Connect and find laser for the first time

To start to communicate with the laser when it has just arrived from the factory, switch the laser power on and connect the Ethernet cable.

1. To connect to a network just attach the other end of the Ethernet cable directly into a network port.
2. To connect directly to a PC, connect the other end of the Ethernet cable directly to the PC or laptop. The PC network adapter IPv4 settings should be left to auto detect and not set to fixed.

The laser search on the TruPulse nano GUI application will detect the laser and show it in its search results.

If the laser is on the network and has had an address allocated to it by the network, then the search will be fairly quick.

If, however, the laser is directly connected to the PC then the search may take significantly longer (> 30 seconds) if it has just been started or the connection has just been re-established.

NOTE: If the laser is to be connected to directly for the long term it may be better to set the IP config to fixed. See 4.6.2

4.5 RS232

4.5.1 Baud rates

The laser can be configured with 5 different baud rates. Each baud rate is listed as a search parameter. The laser is set to **115200** by default before leaving the factory but it may have been change subsequently. The baud rate highlighted in blue is the baud rate that is used during the search. To change the search baud rate simply click to select a different rate from the list.

Default baud rate = 115200

4.5.2 COM ports

The available COM ports will automatically show up in the COM port list. If a new physical connection has been made, then click the refresh button to add this to the available COM ports list.

Refresh COM port button =



4.6 Ethernet

When the laser leaves the factory, the IP mode will be set to DHCP by default. (See section 4.4 Connecting the laser for the first time)

Default IP mode = DHCP

4.6.1 DHCP

For lasers connected on an Ethernet network, the laser needs to be configured as DHCP. The Ethernet adapter on the PC that is connected to the same network also needs to be configured as DHCP.

4.6.1.1 Adapter settings for DHCP

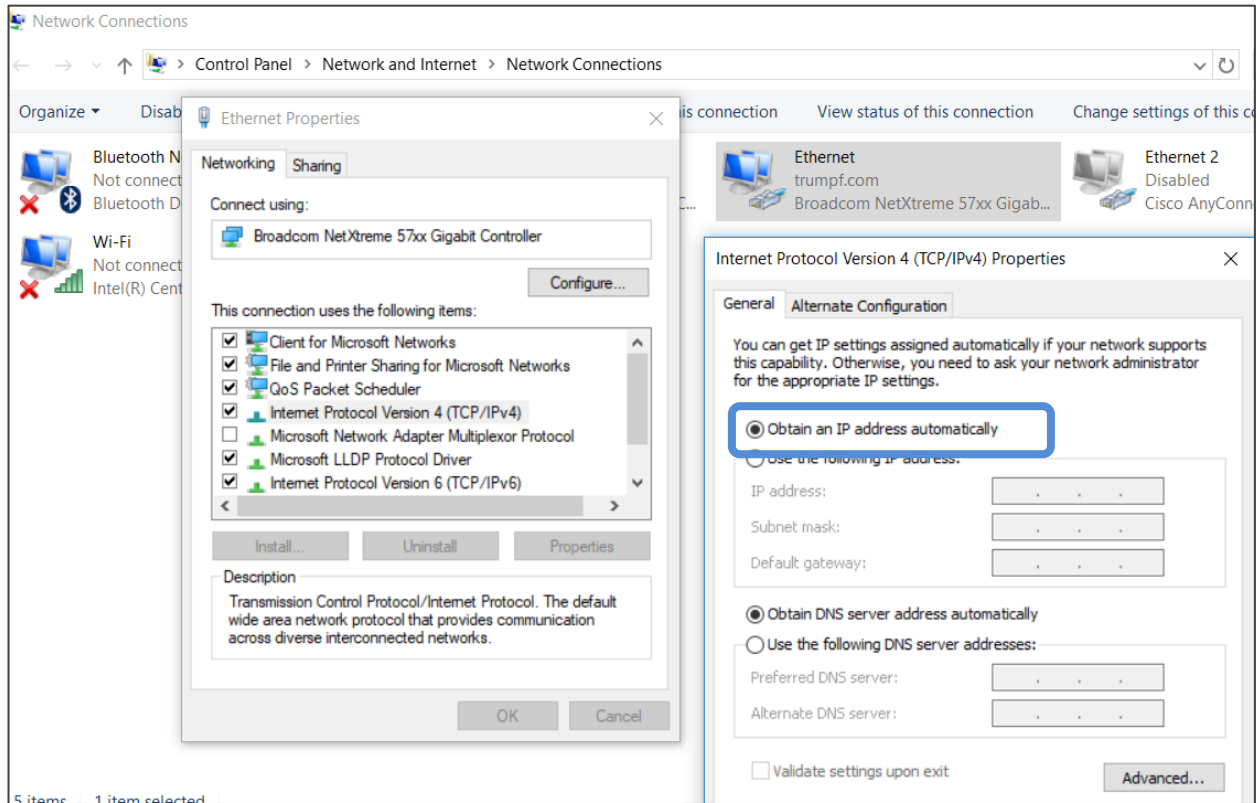
To set the Ethernet adapter for DHCP go to the control panel of the PC and navigate to Network connections.

Find the adapter that is connected to the network that the laser is also connected to.

Right click on the adapter to get a menu and select **Properties**.

A new window will open with the Ethernet properties. Select **Internet Protocol Version 4 (TCP/IPv4)** and click the **Properties** button.

In the **Internet Protocol Version 4 (TCP/IPv4) Properties** window, make sure the **Obtain IP address automatically** is selected.



4.6.2 STATIC

For lasers connected by Ethernet cable directly to the PC a static IP configuration can be used. The Ethernet adapter on the PC needs to be configured with a fixed IP address and matching subnet mask.

4.6.2.1 Adapter settings for a fixed / static address

To set the Ethernet adapter for STATIC go to the control panel of the PC and navigate to Network connections.

Find the adapter that is connected to the network that the laser is also connected to.

Right click on the adapter to get a menu and select **Properties**.

A new window will open with the Ethernet properties. Select **Internet Protocol Version 4 (TCP/IPv4)** and click the **Properties** button.

In the **Internet Protocol Version 4 (TCP/IPv4) Properties** window, make sure the **Use the following IP address** is selected.

In the next sections there are some suggested IP address, subnet mask and gateway settings.

4.6.2.2 Choosing an IP address.

For faster search results and easy configuration, the first 3 numbers of the adapters IP address should match those of the laser.

For example, if the

Laser IP address = 192.168.0.1

then the PC ethernet

Adapter IP address = 192.168.0.2 or

Adapter IP address = 192.168.0.30.

Only the last number needs to be different. It can be anywhere within the 255 range but make sure it is not the same as that of the laser.

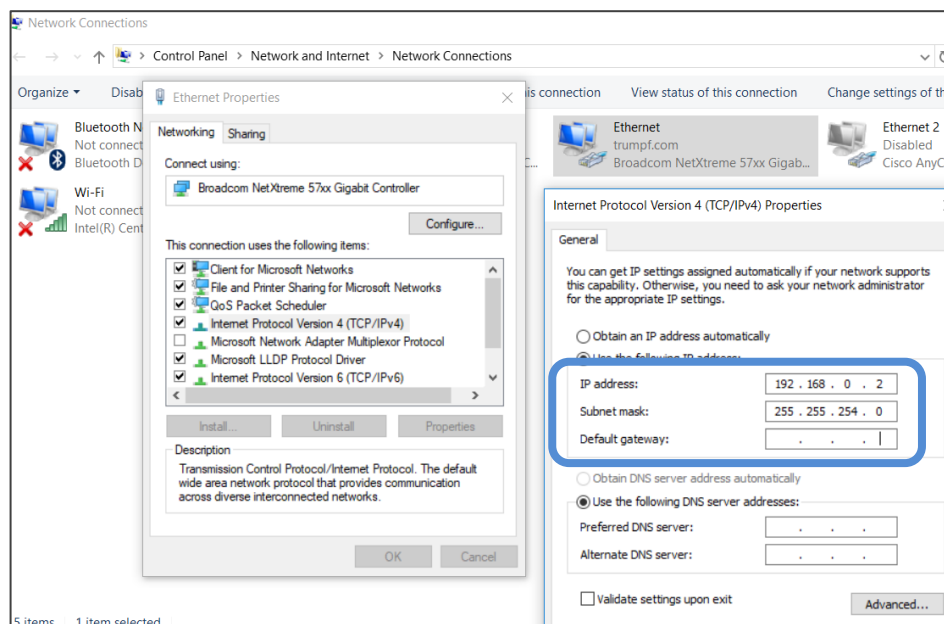
4.6.2.3 Choosing a subnet mask

To follow on from choosing an IP address examples above a simple subnet mask to use is 255.255.254.0

This should however match the subnet mask of the laser.

4.6.2.4 Choosing a gateway

The gateway can be left blank or it should be set to that of the lasers gateway.



4.6.3 UNKNOWN IP Configuration

If the Ethernet settings of the laser have been forgotten, then they can be reset using the IP configuration form of the GUI.

First make sure the PC adapter IPv4 properties are set correctly depending how the laser is connected to the PC. Network (DHCP) or Direct connection (STATIC).

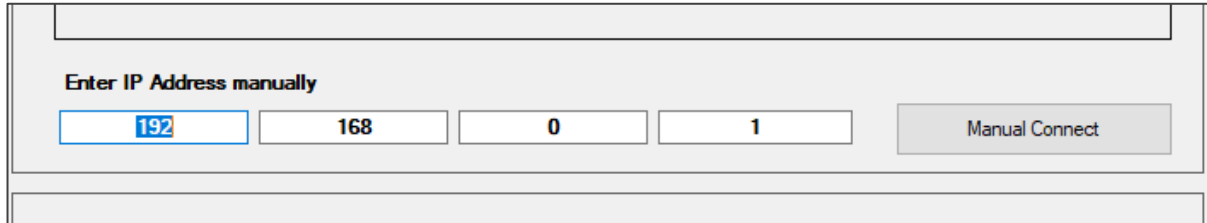
From the search screen click the [Ethernet settings](#) menu item. A new window will open, IP Configuration, which allows the user to set new IP parameters on the laser.

1. **Enter the serial number of the laser.** This can be found on the top of the laser. Make sure the number is correct as this is used to find the correct laser.
2. **Select an IP mode. DHCP or STATIC.** The PC Ethernet adapter will have to be set appropriately. See section DHCP or STATIC above.
3. **Select a new static IP config.** If the IP mode has been set to STATIC, then a new static IP config can be set if the current one is unknown. By default, the IP configuration form will provide some default static parameters. **Note:** These have not been read from the laser and are provided as a means of a fast setup. See section DHCP or STATIC above on choosing an IP address and subnet mask.
4. **Send configuration to the laser.** When all the parameters have been updated on the form, click the [Set Laser IP Config](#) button.

Important: The laser will now have the new configuration **BUT** will not set it until the next power cycle. To set the new IP configuration on the laser turn the laser off and then back on again.

4.6.4 Manual IP address

The laser can be connected to using the Enter IP Address manually option on the search screen.



Enter IP Address manually

192	168	0	1	Manual Connect
-----	-----	---	---	----------------

Enter a valid IP address and click **Manual Connect** button.

5 GUI structure and navigation

The main form of the GUI can be seen in the image below.

The main menu is at the top of the main form and provides the means to navigate the GUI.

Beneath the menu is the laser control panel. This has all the buttons to control the laser state.

The laser status shows the current state of the laser.

The parameter editor allows the user to edit the control mode, waveforms and associated parameters.

The bottom panel displays information about the control mode, any active alarms and the temperatures and power readings.

TruPulse Nano GUI : 1.0.6.0 Laser Serial Number : 123456 Laser Type : SP-SIM-A-HS-S-A-Y(01)

Close/Search View Edit Export Communications **MENU**

STANDBY **ENABLE** **LASER CONTROL** Pilot laser is OFF Comms OK

Laser State

STANDBY Laser Is On Laser Enabled Laser Disabled Laser Emission Gate CW Mode Alarm System Fault Task Active Laser Body Temp Beam Delivery Temp

Active Parameter Set Edit

Control Mode	CW / Pulse	Waveform	PRF (Hz)	PRF0 (Hz)	Active	Simmer	Duty Factor (%)	Burst Length
2	PULSE	0	PARAMETER EDITOR					0

Control Mode Parameters

Laser Control	Serial cmd
Pulse Generation	Internal pulse gen
Current Control	Serial cmd
FPE Method	JIT Pumping
FPE Equalisation Control	FPE
Waveform Selection	Serial cmd

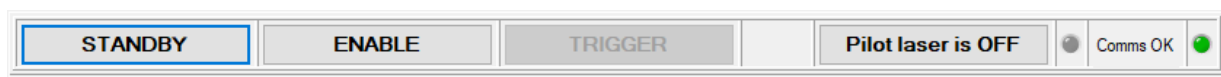
Alarms

CONTROL MODE
ALARMS
STATUS

Status

Laser Temperature	24.6 °C
BDO Temperature	24.6 °C
Pre Amp Current	0.09 A
Main Amp Current	0.07 A
Logic Supply Voltages	23.30 V
Amp Supply Voltages	23.84 V

6 Laser Control



The main control panel has four buttons.

- **STANDBY**
- **ENABLE**
- **TRIGGER**
- **Pilot Laser**

6.1 STANDBY

When the “STANDBY” button is clicked, the laser will be returned to the [standby](#) state.

Behind the scenes the standby button sends the ...

RS232 command Clear status word = SC 0 or

Ethernet command Set laser control signals = 0x0A bit 0 = 0

6.2 ENABLE

When the “ENABLE” button is clicked, the laser will be taken to the [enable](#) state.

The enable button can be used to clear alarms and put the laser into the simmer state.

Behind the scenes the enable button sends the ...

RS232 command Clear status word = SC 0 or

RS232 command Set status word = SS 0

Ethernet command Set laser control signals = 0x0A bit 0 = 1

6.3 TRIGGER

Note: The laser must first be enabled, and all alarms cleared.

When the trigger button is clicked, the laser will [start the task](#). If all the conditions are correct, then the laser will go into the active state when triggered.

Behind the scenes the start button sends the ...

RS232 command Clear status word = SS 1 or

Ethernet command Restart Pulse Generator = 0x2F and the current waveform

Note: If there is no laser output check that the laser emissions gate is high. The RS232 interface can't read the emission gate signal so has no way of knowing if it is high. The RS232 GUI will assume it is high when the start button is pressed.

6.4 Pilot Laser

To turn on the pilot laser use the Pilot Laser button at the top right of the main form.

When the pilot laser is turned on it will interrupt any active task and prevent any new task from being started while the pilot laser is on.

When the pilot laser is on a yellow LED will be lit next to the pilot laser button.

To turn off the pilot laser use the Pilot Laser button.

When the pilot laser is off the pilot laser LED next to the Pilot Laser button will be grey.

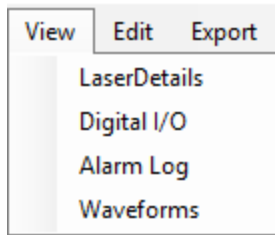
When the pilot laser has been turned off the laser will return to the previous state prior to the pilot laser being turned on.

6.5 Menus

The menu items are grouped into functional areas.

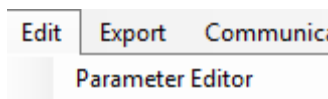
1. View

View lists all the features that are for read only purposes.



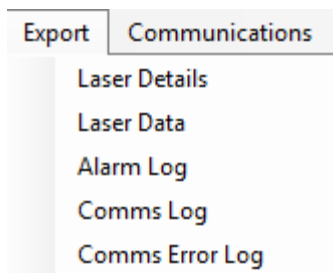
2. Edit

Edit lists all the items that the user can edit.



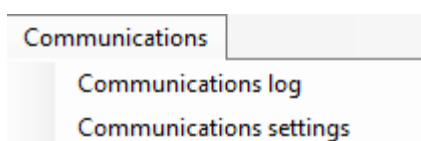
3. Export

Export lists all the items that can be exported to a file and saved to a user defined location.



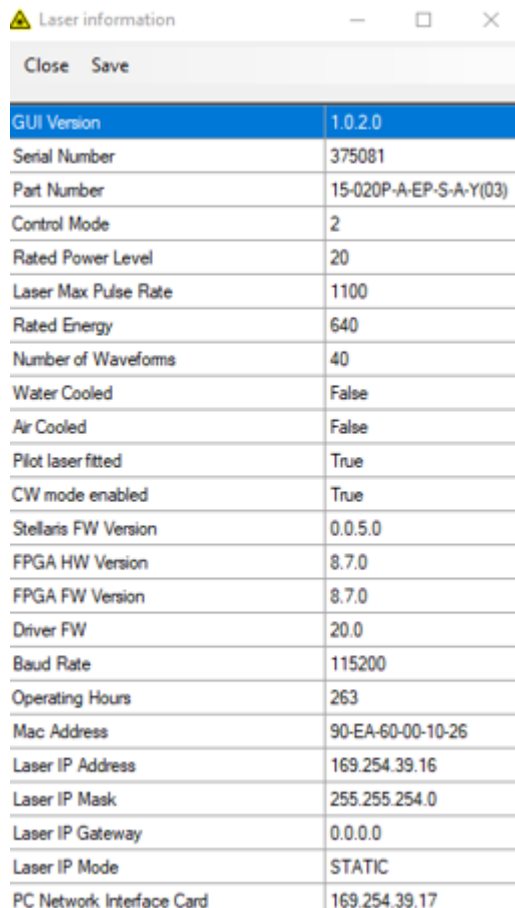
4. Communications

Communications lists the items that are for connecting or communicating with the laser.



7 Laser Details

The laser details window displays all the laser specific information.



The screenshot shows a window titled 'Laser information' with a yellow warning icon. It has 'Close' and 'Save' buttons at the top. Below is a table with 20 rows of laser parameters and their values.

Close Save	
GUI Version	1.0.2.0
Serial Number	375081
Part Number	15-020P-A-EP-S-A-Y(03)
Control Mode	2
Rated Power Level	20
Laser Max Pulse Rate	1100
Rated Energy	640
Number of Waveforms	40
Water Cooled	False
Air Cooled	False
Pilot laser fitted	True
CW mode enabled	True
Stellaris FW Version	0.0.5.0
FPGA HW Version	8.7.0
FPGA FW Version	8.7.0
Driver FW	20.0
Baud Rate	115200
Operating Hours	263
Mac Address	90-EA-60-00-10-26
Laser IP Address	169.254.39.16
Laser IP Mask	255.255.254.0
Laser IP Gateway	0.0.0.0
Laser IP Mode	STATIC
PC Network Interface Card	169.254.39.17

7.1.1 Save laser details

To save the details to a CSV file select “Save” and then “Details”

7.1.2 Save laser data

To save the lasers data to a CSV file select “Save” and then “Data”

The laser data is all the information that has been polled or requested so far from the laser. It is a snap shot in time at the point where the laser was last requested to send the information. The laser data save to file feature is used for debugging purposes. There may be instances where the data shows as default or blank. These cases will be where the GUI or the user has not yet requested to read the data from the laser.

8 IO Signals

The digital inputs and outputs are displayed in the Digital I/O window.

CloseLaser ConnectorBreakout Board

Active analogue19mVSimmer analogue9mV

Filter signals

AllAllAllAll

Signal group	Signal Name	State	Direction	Active	IO Pin	BB Connector	BB Pin
Real Time	Task Active		Digital Out	High	1	J3	12
Real Time	Laser Has Pulsed	i	Digital Out	High	2	J3	13
Monitoring	Monitor		Digital Out	Low	3	J1	2
Real Time	First Pulse Equalisat	i	Digital In	High	4	J3	4
Real Time	Laser Emission Gat		Digital In	High	5	J3	2
Laser Control	Pilot Laser Enable H		Digital In	High	6	J2	5
Laser Control	Laser Enable H		Digital In	High	7	J2	1
Monitoring	Laser Temperature		Digital Out	Low	8	J1	4
Monitoring	Alarm		Digital Out	Low	9	J1	3
Monitoring	System Fault		Digital Out	Low	10	J1	6
Monitoring	Beam Delivery		Digital Out	Low	11	J1	5
Monitoring	Laser Deactivated		Digital Out	Low	12	J1	7
Real Time	Pulse Trigger H	i	Digital In	High	13	J3	3
Monitoring	Laser Is On		Digital Out	High	14	J1	9
Laser Control	Laser Disable H		Digital In	High	15	J2	3
Monitoring	Laser Emissions Wa...		Digital Out	High	16	J1	8
Parallel	DI_0		Digital In		17	J6	2
Parallel	DI_1		Digital In		18	J6	3
Parallel	DI_2		Digital In		19	J6	4
Parallel	DI_3		Digital In		20	J6	5
Laser Control	Laser Pulse CW H		Digital In	High	21	J2	7
Real Time	PRF Sync Out	i	Digital Out	High	22	J3	10
RS232	Tx	i	Out		25	J5	2
RS232	Rx	i	In		26	J5	3
Real Time	GND A	i			30	J3	6
Real Time	GND A	i			31	J3	6
Real Time	Laser Ready To Pul	i	Digital Out	High	35	J3	11
Real Time	GND D	i			26	J2	6

i = This signal is not read from the laser and is for information purposes only.

8.1 Filtering and sorting

The signals can be filtered on Signal group, State, Direction and Breakout board connector.

By default, all signals are displayed. Use the drop-down boxes to add filters to the table so that only the relevant information is displayed.

The columns can be sorted into alphabetical order by clicking on the column header.

Not all the signals can be read from the laser.

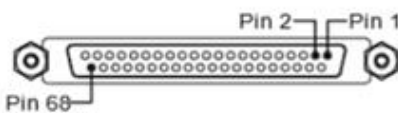
The signals that are polled/read from the laser can be filtered by selecting the “Read” item in the drop-down filter box above the State column.

All other connectors and pin positions are shown in the table for information purposes. These are displayed with an “i” in the State column and are greyed out.



8.2 Laser connector

There is a picture of the pin positions. This can be viewed by clicking the Laser connector button on the I/O Signals window.

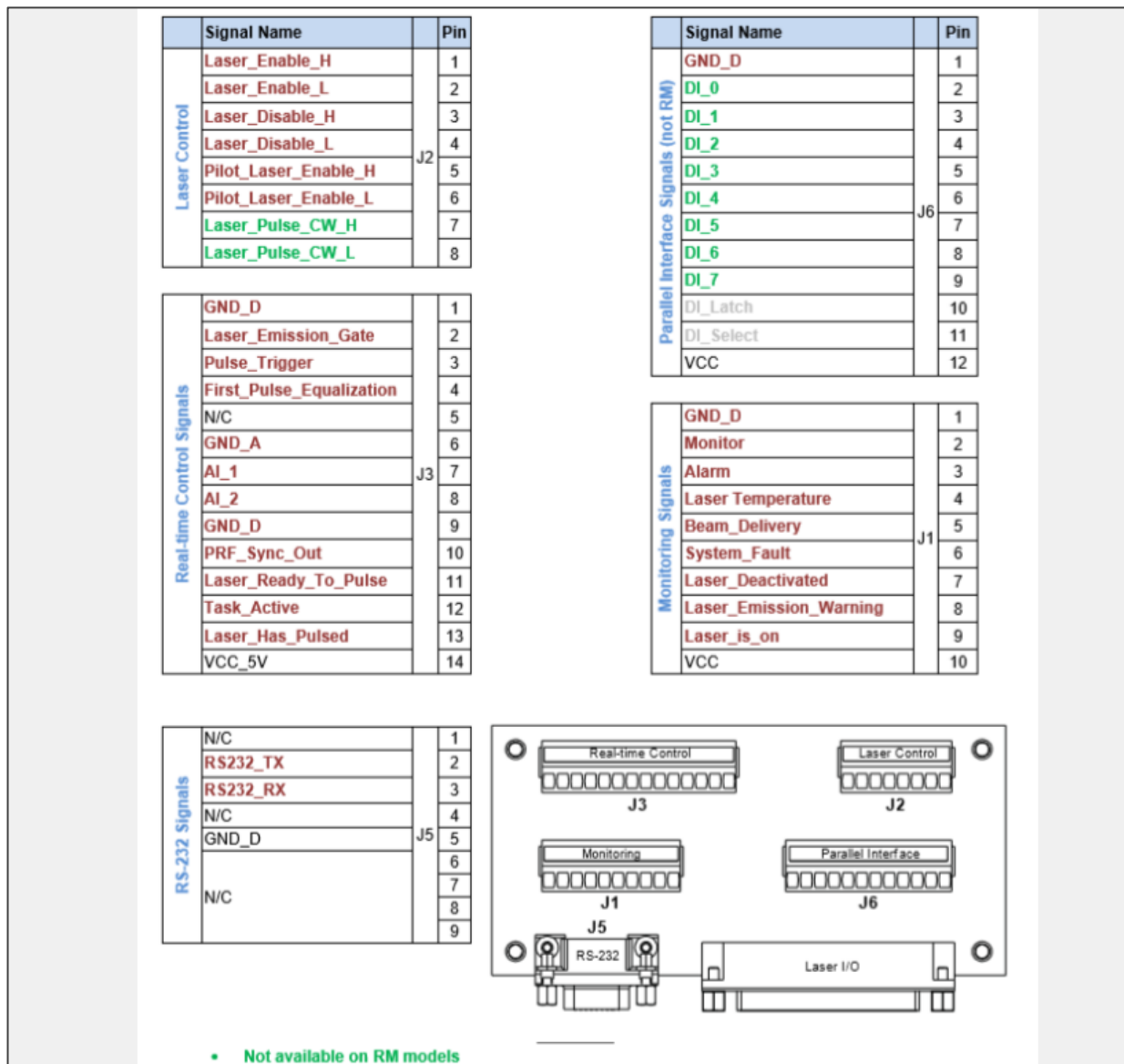


signal group	signal name		pin	signal name	signal group
real-time	Laser_Ready_To_Pulse	DO	35 1	DO Task_Active	real-time
real-time	GND_D	↓	36 2	DO Laser_Has_Pulsed	real-time
monitoring	GND_D	↓	37 3	DO Monitor	Monitoring
	N/C		38 4	DI First_Pulse_Equalisation	real-time
real-time	Laser_Emission_Gate_I	↓	39 5	DI Laser_Emission_Gate_h	real-time
Laser control	Pilot_Laser_Enable_I	↓	40 6	DI Pilot_Laser_Enable_h	Laser control
Laser control	Laser_Enable_I	↓	41 7	DI Laser_Enable_h	Laser control
monitoring	GND_D	↓	42 8	DO Laser_Temperature	Monitoring
monitoring	GND_D	↓	43 9	DO Alarm	Monitoring
monitoring	GND_D	↓	44 10	DO System_Fault	Monitoring
monitoring	GND_D	↓	45 11	DO Beam_Delivery	Monitoring
monitoring	GND_D	↓	46 12	DO Laser_Deactivated	Monitoring
real-time	Pulse_Trigger_I	↓	47 13	DI Pulse_Trigger_h	real-time
monitoring	GND_D	↓	48 14	DO Laser_Is_On	Monitoring
Laser control	Laser_Disable_I	↓	49 15	DI Laser_Disable_h	Laser control
monitoring	GND_D	↓	50 16	DO Laser_Emission_Warning	Monitoring
parallel	DI_4	DI	51 17	DI DI_0	Parallel
parallel	DI_5	DI	52 18	DI DI_1	Parallel
parallel	DI_6	DI	53 19	DI DI_2	Parallel
parallel	DI_7	DI	54 20	DI DI_3	Parallel
Laser control	Laser_Pulse_CW_I	↓	55 21	DI Laser_Pulse_CW_h	Laser control
real-time	GND_D	↓	56 22	DO PRF_Sync_Out	real-time
parallel	DI_Select	DI	57 23	DI DI_Latch	Parallel
parallel	GND_D	↓	58 24	N/C	
RS-232	GND_D	↓	59 25	→ RS232_Tx	RS-232
RS-232	GND_D	↓	60 26	← RS232_Rx	RS-232
	N/C		61 27	↓ GND_A	
	N/C		62 28	↓ GND_A	
	N/C		63 29	↓ GND_A	
real-time	AI_2	AI	64 30	↓ GND_A	real-time
real-time	AI_1	AI	65 31	↓ GND_A	real-time
	N/C		66 32	↓ GND_A	
	N/C		67 33	↓ GND_A	
	N/C		68 34	↓ GND_A	

* Not available on RM models

8.3 Breakout board

There is a picture of the various connectors. This can be viewed by clicking the Breakout board button on the I/O Signals window.




9 Alarm Log

The alarm log displays any alarms that have been reported to the GUI. The GUI will time and date stamp the alarms when it receives them.

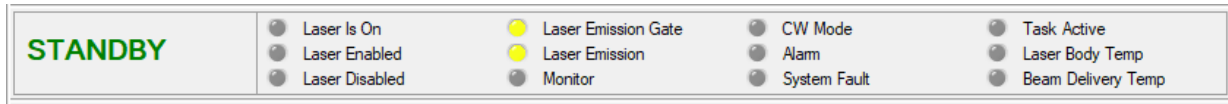
If the GUI receives a clear state for any alarm it has logged and then the alarm is reported as raised again by the laser it will be logged again with a new time and date stamp.

The laser does not store alarms in a log. The GUI will only be able to report those alarms that it has received since it has connected to the laser.

Close Save 	
Name	Date
OtherPowerSupplyFault	29/08/2018 14:37:31
EmergencyStopFault	29/08/2018 14:37:31
FanFault	29/08/2018 14:37:32

The alarm log can be saved to a CSV file but clicking on the save button on the alarm log window.

10 Laser state



On the left side of the laser state panel is the main state the laser is in.

The laser can be in one of the following states...

Ethernet interface

DISABLED, STANDBY, SIMMER, ACTIVE, PILOT IRQ, LASER OFF

RS232 interface

DISABLED, STANDBY, ON, PILOT IRQ

10.1 Disabled

The laser is **DISABLED**.

Ethernet connection

The disabled signal is read from the Query status lines and alarms command. Get Status 0x50 for Ethernet or QD Query status lines and alarms Serial.

RS232 connection

The disabled state will be displayed when the laser is in the deactivated hardware state or if there are class 1, 2, 3 or latched alarms present.

To clear the disabled state the laser must be powered on, no class 1, 2, 3 or latched alarms and no disabled digital input.

To clear alarms click the “ENABLE” button. If the alarms clear, the laser should go to the standby state.

The “ENABLE” button may need to be clicked a second time to clear any remaining alarms.

10.2 Standby

The laser is in **STANDBY**.

The laser is powered on and has no class 1, 2, 3 or latched alarms.

To return to the standby state if the laser is in the simmer or Active state, click “OFF” to get back to the standby state.

When is the standby state the laser emissions warning LED will be lit.

10.3 ON (RS232 only)

The status panel will show the ON state when the laser is

The “laser is on” LED will be lit.

The “laser enabled” LED will be lit.

The “laser emission” will be lit.

Note: The RS232 interface has no status information about the simmer or active state. If the “Enable” button is clicked, then the laser will be in Simmer state and if the “Start” button is clicked the laser will be in Active state. These states are not shown on the TruPulse nano GUI for the RS232 because if a user uses a different GUI to change the state of the laser, there is no reporting state that the RS232 TruPulse nano GUI can read that would differentiate between the Simmer and Active states.

10.4 Simmer (Ethernet only)

The laser is in the **SIMMER** state.

The “laser is on” LED will be lit.

The “laser enabled” LED will be lit.

The “laser emission” will be lit.

To go to the **ACTIVE** state, click “Start”.

To go to the **STANDBY** state, click “OFF”.

10.5 Active (Ethernet only)

The laser is in the **ACTIVE** state.

The “laser is on” LED will be lit.

The “laser enabled” LED will be lit.

The “laser emission” LED will be lit.

The “task active” LED will be lit.

The “laser emissions gate LED will be lit.

To go to the **SIMMER** state, click “Enable”.

To go to the **STANDBY** state, click “OFF”.

10.6 Pilot IRQ

The laser is in the **PILOT IRQ** state.

The pilot laser is on.

The “Pilot Laser” LED (next to the “Pilot Laser” button) will be lit.

The “monitor” LED will be lit.

To exit and return to the previous state, click the “Pilot Laser” button.

10.7 Laser Off

The laser is in the **LASER OFF** state

There is no 24V Diode power supply connected

11 Laser LED states

Ethernet LED display

STANDBY	<input type="radio"/> Laser Is On	<input checked="" type="radio"/> Laser Emission Gate	<input type="radio"/> CW Mode	<input type="radio"/> Task Active
	<input type="radio"/> Laser Enabled	<input type="radio"/> Laser Emission	<input type="radio"/> Alarm	<input type="radio"/> Laser Body Temp
	<input type="radio"/> Laser Disabled	<input type="radio"/> Monitor	<input type="radio"/> System Fault	<input type="radio"/> Beam Delivery Temp

RS232 LED display

STANDBY	<input type="radio"/> Laser Is On	<input checked="" type="radio"/> Laser Emission	<input type="radio"/> CW Mode	<input type="radio"/> Laser Body Temp
	<input type="radio"/> Laser Enabled	<input type="radio"/> Monitor	<input type="radio"/> Alarm	<input type="radio"/> Beam Delivery Temp
	<input type="radio"/> Laser Disabled		<input type="radio"/> System Fault	

On the right side of the laser state panel is the LED display showing the various laser states. The RS232 has a subset of the LEDs the Ethernet display has due to the limitation of the RS232 command set.

11.1 Laser is on

The laser is in the “SIMMER” or “ACTIVE” state.

The laser emission warning LED will be lit.

11.2 Laser enabled

The laser is in the “SIMMER” or “ACTIVE” state.

The laser emission warning LED will be lit.

11.3 Laser disabled

The laser will be in the DISABLED state.

The laser disabled input is high.

The “Laser disabled” LED will be lit.

11.4 Laser emissions gate

The laser emission gate digital input is high

11.5 Laser emission

The laser is in the STANDBY, SIMMER, ACTIVE or PILOT IRQ state

11.6 Monitor

The “monitor” LED is lit when the pilot laser is on.

11.7 CW mode

The laser is in CW mode

11.8 Alarm

The laser has an alarm

11.9 System fault

The laser has a system fault

11.10 Task active

The laser is in the “ACTIVE” state.

11.11 Laser body temp

The laser temperature is above the threshold.

11.12 Beam delivery temp

The beam delivery temperature is above the threshold.

12 Laser configuration

12.1 Parameter set

Active Parameter Set								Edit
Control Mode	CW / Pulse	Waveform	PRF (Hz)	PRFO (Hz)	Active	Simmer	Duty Factor (%)	Burst Length
2	PULSE	0	33000	33000	0	FPE		0

TruPulse nano GUI displays the current active parameter set on the main form.

A parameter set is made up of the following configurable parameters

- **Control mode**
- **CW/pulse**
- **Waveform**
- **PRF (pulse rate factor)**
- **Active**
- **simmer**
- **Duty factor**
- **Burst length**

12.1.1 Editing the active parameter set

Active Parameter Set								
Control Mode	CW / Pulse	Waveform	PRF (Hz)	PRFO (Hz)	Active	Simmer	Duty Factor (%)	Burst Length
2	PULSE	0	33000	33000	0	FPE		0
Editing Parameter Set						Set	Save	Close
2	PULSE	0	33000		0			0

To edit the active parameter set click the “Edit” button which expands the panel to display the parameters that can be edited.

When the editing is complete click the “Set” button to send the information to the laser. No data is sent to the laser until the “Set” button is clicked. The laser will use the data for the current parameter set. The active parameter set details will be updated in the current parameter set on TruPulse nano GUI.

Note: When the “Set” button is clicked, ALL the data in the editing controls is sent to the laser and not just the parameter that has changed. Make sure ALL the values are correct as these will be used for the current active parameters.

12.1.1.1 Control mode

When selecting a new control mode, the editor may change the number of displayed edit boxes in accordance with which parameters will be valid for the chosen control mode.

12.1.1.2 CW/Pulse mode

When CW or Pulse mode the editor may change the number of displayed edit boxes in accordance with which parameters will be valid for the chosen mode.

12.1.1.3 Waveform

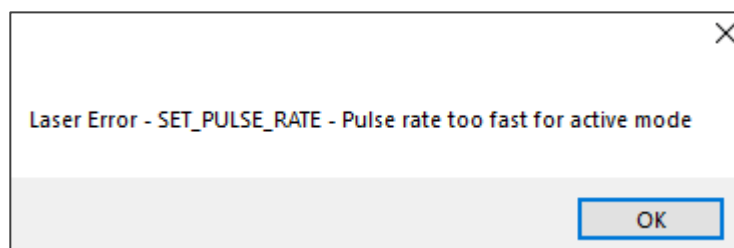
When selecting a new waveform, the editor may change the data in the other editor boxes to match those that exist currently against that waveform on the laser.

To see what all the waveforms are set to on the laser go to the Waveform editor which lists the complete set.

Note: The RS232 interface only has knowledge of the current waveform and will only show the active parameters.

12.1.2 Laser error message

If the laser receives any invalid data, it will return an error message which will be displayed as a pop-up message box to the user of TruPulse nano GUI. The message will contain enough information to determine what the problem was so the user can take appropriate action.



12.1.3 Saving the edited parameter set

To save the chosen parameter set click the “save” button. This will allow the user to save the parameter set as a CSV file.

Note: The “Save” will not send the data to the laser. To send the data to the laser the “Set” button must be clicked.

12.1.4 Closing the parameter editor

Click the “Close” button to hide the parameter set edit controls.

Note: The “Close” will not send the data to the laser. To send the data to the laser the “Set” button must be clicked.

12.2 Parameter editor

The parameter editor is a tool that allows up to 50 different parameter sets to be pre-configured by the user and stored in a CSV file ready for quick access and easy use.

From the parameter set editor the user can select one of the fifty sets to become the current active parameter set.

The 50 parameter sets are not stored on the laser. The laser has only one parameter set and that is the current parameter set.

The parameter set editor can be used to save the 50 sets to a CSV file and then shared between lasers. A saved parameter set file can be opened each time the editor is opened to retrieve a specific saved set. This allows for multiple parameter CSV files to be saved and reused across multiple lasers.

By default, the parameter editor will open with an empty list of 50 parameters ready and waiting to be populated with data.

File										Active Waveform = 39	
Parameter Set Name	Control mode	CW / Pulse	Waveform	PRF	Active setpoint	Simmer setpoint	Duty Factor	Burst Length	Set Active		
Parameter Set 1	0	▼ CW	▼ 0	▼					Set		
Parameter Set 2	0	▼ CW	▼ 0	▼					Set		
Parameter Set 3	0	▼ CW	▼ 0	▼					Set		
Parameter Set 4	0	▼ CW	▼ 0	▼					Set		
Parameter Set 5	0	▼ CW	▼ 0	▼					Set		
Parameter Set 47	0	▼ CW	▼ 0	▼					Set		
Parameter Set 48	0	▼ CW	▼ 0	▼					Set		
Parameter Set 49	0	▼ CW	▼ 0	▼					Set		
Parameter Set 50	0	▼ CW	▼ 0	▼					Set		

The Lasers current active waveform is displayed in the top right of the form.

12.2.1 Editing parameter sets

The parameter sets can be edited in any order.

The parameter sets are a complete set of 50 and will be saved to a file and opened from a file as a set of 50 in number order as they are displayed on the form.

The parameter set name can be changed to be more helpful to use a process name or product name for example.

12.2.1.1 Control mode

When selecting a new control mode, the editor may change the number of displayed edit boxes in accordance with which parameters will be valid for the chosen control mode.

12.2.1.2 CW/Pulse mode

When CW or Pulse mode the editor may change the number of displayed edit boxes in accordance with which parameters will be valid for the chosen mode.

12.2.1.3 Waveform

When selecting a new waveform, the editor may change the data in the other relevant editor boxes to match those that exist currently against that waveform on the laser.

The waveform parameters can be edited on the parameter editor form. Any waveform parameters that are changed from the active values during the editing process will be set on the laser when the “Set” button is clicked.

To see what all the waveforms are set to on the laser go to the Waveform editor which lists the complete set. Alternatively use the drop-down box in the parameter sets form to see what each of the waveforms are set to on an individual basis.

12.2.2 Saving parameter sets

Configure one or more parameter sets and then save them to a CSV file

To save the set of 50 parameter sets to a CSV file, select the “Save” menu item under the “File” menu.

12.2.3 Opening parameter sets

To open a previously saved set of 50 parameter sets from a CSV file, select the “Open” menu item under the “File” menu.

12.3 Waveforms

The laser can store one or more waveforms. The number of stored waveforms will be dependent on the type of laser. The waveforms are stored in volatile memory and will be set to default when the laser is reset.

Each waveform has a ...

- **Pulse rate**
- **Pulse burst length**
- **Pulse duty factor**

Each waveform can be updated on an individual basis by using the parameter editor on the main form.

Active Parameter Set							Edit
Control Mode	CW / Pulse	Waveform	PRF (Hz)	Active	Simmer	Duty Factor	Burst Length
0	CW	0	80000	0	0	250	800000

Click the “Edit” button to see the configurable values. Enter the required new values and then click “Set”. The new values will be stored, and the current active parameter set will be updated with the new values.

Editing Parameter Set


Set
Save
Close

0
CW
1
75000
0
0
200
75000

Note: When “Set” button is clicked, all the values in the editor panel will be sent to the laser and made the active current parameter set.

Active Parameter Set							Edit
Control Mode	CW / Pulse	Waveform	PRF (Hz)	Active	Simmer	Duty Factor	Burst Length
0	CW	1	75000	0	0	200	75000

12.4 Waveforms

Close					Refresh List 	
Waveform	PRF	PRF0	Duty Factor (%)	Burst Length		
0	33000	33000	100	0		
1	35000	35000	100	0		
2	38000	38000	100	0		
3	40000	40000	100	0		
4	42000	42000	100	0		
5	44000	44000	100	0		
6	47000	47000	100	0		
7	50000	50000	100	0		
8	52000	52000	100	0		
9	54000	54000	100	0		
10	57000	57000	100	0		
11	60000	60000	100	0		
12	63000	63000	100	0		
13	67000	67000	100	0		
14	71000	71000	100	0		
15	75000	75000	100	0		
16	80000	80000	100	0		
17	85000	85000	100	0		
18	90000	90000	100	0		
19	98000	98000	100	0		
20	110000	110000	100	0		
21	115000	115000	100	0		
22	125000	125000	100	0		
23	140000	140000	100	0		
24	162000	162000	100	0		
25	200000	200000	100	0		

Note: The waveform display is only available for Ethernet connections. RS232 only has knowledge of the current waveform and associated parameters.

The waveform editor is primarily for viewing all the currently configured waveforms.

On opening the form, all the waveforms stored on the laser are requested from the laser and displayed in the waveform editor along with all the associated values.

13 Logs and exporting data

All the data that can be exported from TruPulse nano GUI is accessible from the main form under the “Export” menu item.

All data is exported to a CSV file and can be saved anywhere the user can access and has write permission to.

13.1 CSV file format

GUI Version,1.0.2.0
 Serial Number,375081
 Part Number,15-020P-A-EP-S-A-Y(03)
 Control Mode,2
 Rated Power Level,20
 Laser Max Pulse Rate,1100
 Rated Energy,640
 Number of Waveforms,40
 Water Cooled,False
 Air Cooled,False
 Pilot laser fitted,True
 CW mode enabled,True
 Stellaris FW Version,0.0.5.0
 FPGA HW Version,8.7.0
 FPGA FW Version,8.7.0
 Driver FW,20.0
 Baud Rate,115200
 Operating Hours,263
 Mac Address,90-EA-60-00-10-26
 Laser IP Address,169.254.39.16
 Laser IP Mask,255.255.254.0
 Laser IP Gateway,0.0.0.0
 Laser IP Mode,STATIC
 PC Network Interface Card,169.254.39.17

13.2 CSV file in Excel

Data example when imported or opened as CSV file in Excel

	A	B	
1	GUI Version	1.0.2.0	
2	Serial Number	375081	
3	Part Number	15-020P-A-EP-S-A-Y(03)	
4	Control Mode	2	
5	Rated Power Level	20	
6	Laser Max Pulse Rate	1100	
7	Rated Energy	640	
8	Number of Waveforms	40	
9	Water Cooled	FALSE	
10	Air Cooled	FALSE	
11	Pilot laser fitted	TRUE	
12	CW mode enabled	TRUE	
13	Stellaris FW Version	0.0.5.0	
14	FPGA HW Version	8.7.0	
15	FPGA FW Version	8.7.0	
16	Driver FW	20	
17	Baud Rate	115200	
18	Operating Hours	263	
19	Mac Address	90-EA-60-00-10-26	
20	Laser IP Address	169.254.39.16	
21	Laser IP Mask	255.255.254.0	
22	Laser IP Gateway	0.0.0.0	
23	Laser IP Mode	STATIC	
24	PC Network Interface Card	169.254.39.17	
25			

14 Technical Support & Customer Service

14.1 Warranty Information

TRUMPF Laser UK Limited reserves the right to change the information and specification contained in this manual without prior notice.

TRUMPF Laser UK Limited expressly warrants the equipment it manufactures as set forth in the standard Terms and Conditions of sale. **TRUMPF Laser UK Limited makes no other warranties, expressed or implied, including and without limitation, warranties as to merchantability of fitness for use.**

14.2 Product Support

In the unlikely event that a TruPulse nano laser does not function normally and that it requires attention, contact TRUMPF Laser UK Limited for advice on further on-site fault diagnosis and/or module return.

If the laser is to be returned to TRUMPF Laser UK Limited, ensure that all relevant return documentation is in place before shipment. Details of documentation requirements and copies can be obtained where required from TRUMPF Laser UK Limited.

Pack the laser in the original packaging and include all original accessories and documentation as detailed in the original inventory. It is advised that the correct and original packaging is used to prevent transit damage to the module. Please contact TRUMPF Laser UK Limited for replacement packaging items if some, or all, or the original packaging is missing. Please take time to complete all return documentation. This can be obtained from TRUMPF Laser UK Limited and accurate details, diagnosis and comments in the documentation can help reduce turnaround time for repair at TRUMPF Laser UK Limited.

On request, TRUMPF Laser UK Limited will supply a report detailing faults found and repairs carried out necessary to return the module to full operational specification.

14.2.1 TRUMPF Laser UK Product Support Contacts

Product Support

service.tgbl@trumpf.com

Tel: +44 (0)1489 779696 - Option 2

Order management

orders_laser@trumpf.com

Tel: +44 (0)1489 779696 - Option 5

Product documentation

www.trumpf.com/s/productdocs

Company Web Site

www.trumpf.com

Or contact your local distributor.