

finesse pure with fpu60

User Manual



Table of Contents

Table of Contents.....	2
Warranty Information	4
Introduction	6
Laser Safety	7
System Specifications.....	8
PSU Configuration Drawings.....	10
Laser Operation	11
Cooling Requirements and Power Consumption	21
Laser Maintenance.....	23
Liability	23

CUSTOMER SUPPORT

Before contacting us for assistance, review appropriate sections in the manual that may answer your questions.

After consulting this manual, please contact one of our worldwide offices between 9 AM and 5 PM local time.

Should the laser fall below acceptable specification performance, please contact our service and support team on +44 161 975 5306 or submit a service request through our website [here](#). We will provide initial assistance to rectify the problem remotely. If this is not possible, we will provide you with a Return Material Authorisation (RMA) Form and instruction on how to package and return the laser safely to us for assessment.

For our commitment to the 'Waste Electrical' compliance requirements we recommend you to return your systems back to the manufacturing site at end of life.

This take-back service will enable us to put the systems beyond use and disseminate the parts into recycling waste streams.

PLEASE DO NOT RETURN THE LASER WITHOUT PRIOR CONTACT WITH AND AGREEMENT FROM OUR SUPPORT TEAM.

Novanta UK

Unit 1.

Orion Business Park,

Bird Hall Lane,

Stockport,

SK4 0XG

UK

Tel: +44 (0) 161 975 5300

Novanta Corporation

Sales and Service Support

47673 Lakeview Blvd.

Fremont

Ca 94538, Usa

USA

Tel: +1 510 210 3034

Warranty Information

The company provides a return to base warranty across all our product ranges. See contact details in the Support section.

Warranty cover for the laser is subject to proper use, care and protection from mistreatment. Examples of mistreatment include but are not limited to any of the following:

- Any deviation from the instructions laid out in the Operating Manual
- Opening the product or breaking the warranty seals
- Operation in any hostile environment as outlined in the Operating Manual
- Any damage due to operation in unclean environments
- Any substantial mechanical shock
- Any damage through static discharge (this will not occur under normal operation)

The definition of mistreatment and its applicability to the warranty is at the reasonable discretion of Novanta.

Our obligation under this warranty is limited to the replacement or repair of the product which having been returned to the factory is found to be defective, and where the defect was not caused by factors external to the product. Any replacement part/product is under warranty for the remainder of the initial product warranty period.



Caution: Possible Equipment Damage

Failure to read this manual carefully before operating the laser may result in catastrophic damage to the system which may void the warranty.

Summary of EU Compliance (SUMEU-FIN-FPU-v1)

<i>1. Product</i>	
Product	Finesse Pure
Controller	FPU
Wavelength	532nm
Reference	DOCEU-FIN-FPU-v1
<i>2. Manufacturer</i>	
Novanta PHOTONICS, Stockport, UK	
<i>3. This declaration is issued under the sole responsibility of the manufacturer</i>	
<i>4. The product described above is in conformity with the relevant Union harmonisation legislation:</i>	
2014/35/EU	Low Voltage Directive (LVD)
2014/30/EU	Electromagnetic Compatibility (EMC) Directive
2011/65/EU	Restriction of the use of certain hazardous substances (RoHS)
<i>5. References to the relevant harmonised standards used or references to the other technical specifications in relation to which conformity is declared:</i>	
EN 60825-1:2014	Safety of Laser Products
EN 61010-1:2010+A1:2019	Safety requirements for electrical equipment for measurement and laboratory use
EN 61326-1:2021	Electrical equipment for measurement, control and laboratory use - EMC requirements. General requirements for immunity and emissions
<i>6. Further information on the technical file or official declaration of conformity is available from the manufacturer at the address above</i>	
Technical File	FIN-TF-v1
	

Introduction

The **finesse pure** is a Diode-Pumped Solid-State (DPSS) laser system emitting light in the visible region of the spectrum at 532 nm. It is a Class 4 laser product. This manual describes the set up requirements and operational procedures to ensure the systems safe operation.



Warning: Serious Personal Injury

Use of controls or procedures or performance of procedures other than those specified herein may result in hazardous radiation exposure. **Use laser ONLY for the originally intended requirement such as for scientific research, industrial application or for oem integration.**

Operational Requirement: Electrical Specification

The **fpu60** Power Supply Unit (PSU) requires

Mains input: 90 to 264 V AC, 47-63 Hz, 300 W max

Fuse Rating: 4 A (anti-surge type)



Important Note: The Earth pin of the mains IEC lead (supplied) must be connected to ground at all times. If the system experiences significant power interruption (surges or dips) it will restart and revert to a safe standby safe mode.

Operational Requirement: Environment

Optimal Operating Temperature Range – Laser Head 20°C to 38°C

Optimal Operating Temperature Range – Environment 15°C to 32°C

Maximum Operating Temperature – Laser Head 40°C

Maximum Operating Temperature – PSU 40°C

For optimal performance, the laser head should be mounted onto an appropriate heatsink in a stable environmental temperature. The heatsink requirements will depend on the ambient temperature of the operating environment and the operating power of the laser (section 6).

In the event of the laser head or PSU over-heating, a controlled shut down of the system will occur (Section 6). The system can only be restarted once it has been cooled to a safe temperature.

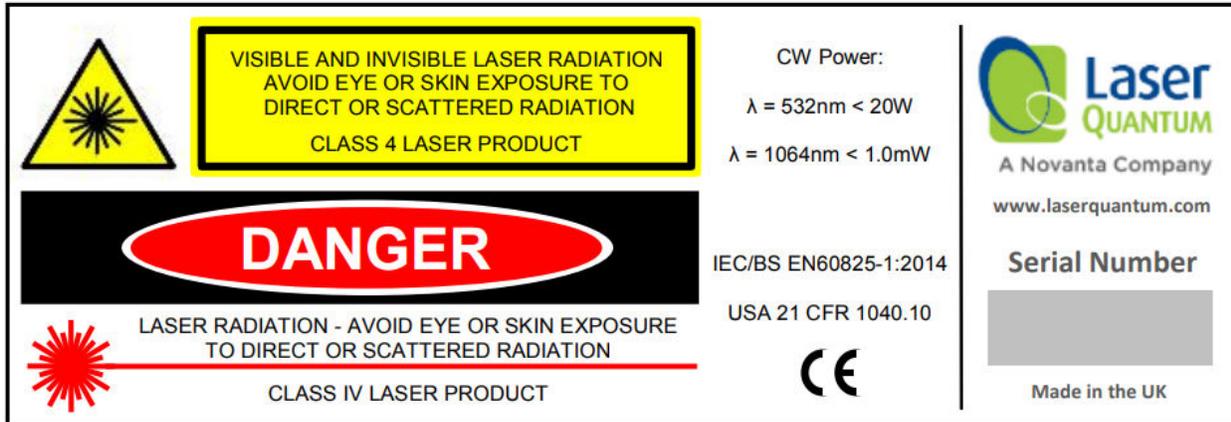
Storage Requirements

Temperature Range: **5°C to 45°C**

Humidity: **Non-Condensing**

Laser Safety

The **finesse pure** is a Class 4 laser product, this is denoted by the laser warning label affixed to the laser head. A further label also appears adjacent to the laser aperture.

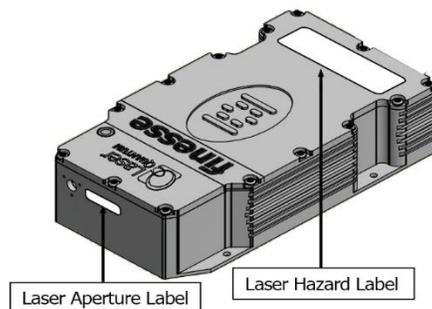


A further label also appears adjacent to the laser aperture:



When operating the laser, those in the environment must adhere to the following instructions to avoid eye damage and prevent the risk of fire:

- Laser safety goggles must be worn at all times when the laser is in operation
- Always ensure the beam is safely collected in a suitable beam stop or that the laser is disabled when not in use.



For a full description of laser safety procedures, the user is referred to Declaration of Conformity standards plus:

- FDA Code of Federal Regulations (CFR) Title 21 Subchapter J section 1040.10 Laser products
- American National Standards for Safe Use of Lasers – ANSI Z136
- IEC/BS EN60825-1:2014 “Safety of Laser Products – Part 14: A user’s guide”

System Specifications

A full list of parts supplied with the laser systems appears in the Parts List Section below.

The dimensions (mm) and weights (kg) are shown in the Weights and Dimensions Section below. These measurements should be referred to whilst integrating the system.

Parts List

The **finesse pure** laser system comes complete with:

- **finesse pure** laser head.
- **fpu60** Microprocessor Controlled Power Supply Unit (PSU)
- Umbilical Cable – to connect the laser head and PSU.

Depending on the purchase specification, some or all of the following items may also be included:

- IEC Mains Lead
- PSU Key Set – to operate the interlock key on the PSU control panel.
- Interlock dongle – to enable the laser system (red spot on casing and red LED)

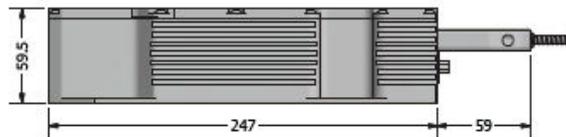
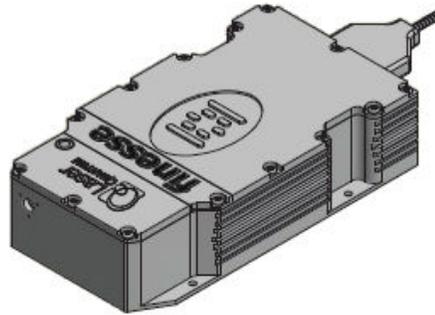
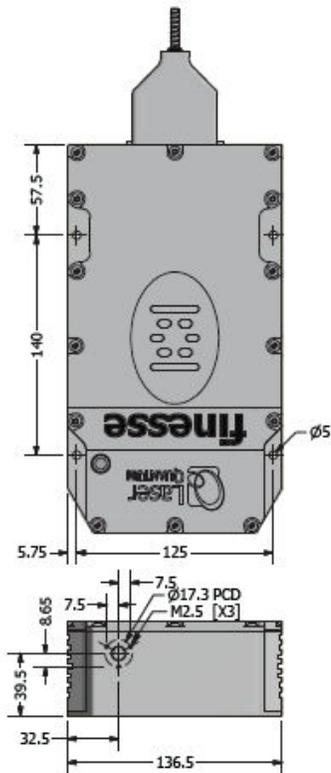


Important Note: System parts and accessories that meet the manufacturer's specification **MUST** only be used. **DO NOT** replace the IEC Mains Lead with alternative inadequately rated leads.

Weights and Dimensions

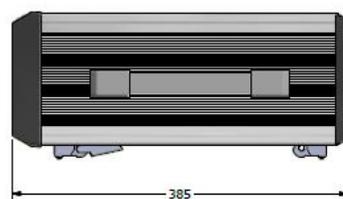
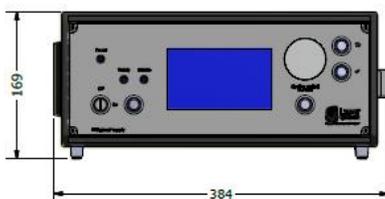
finesse pure laser head

Weight: 3.6 kg



fpu60 PSU

Weight: 11 kg



PSU Configuration Drawings

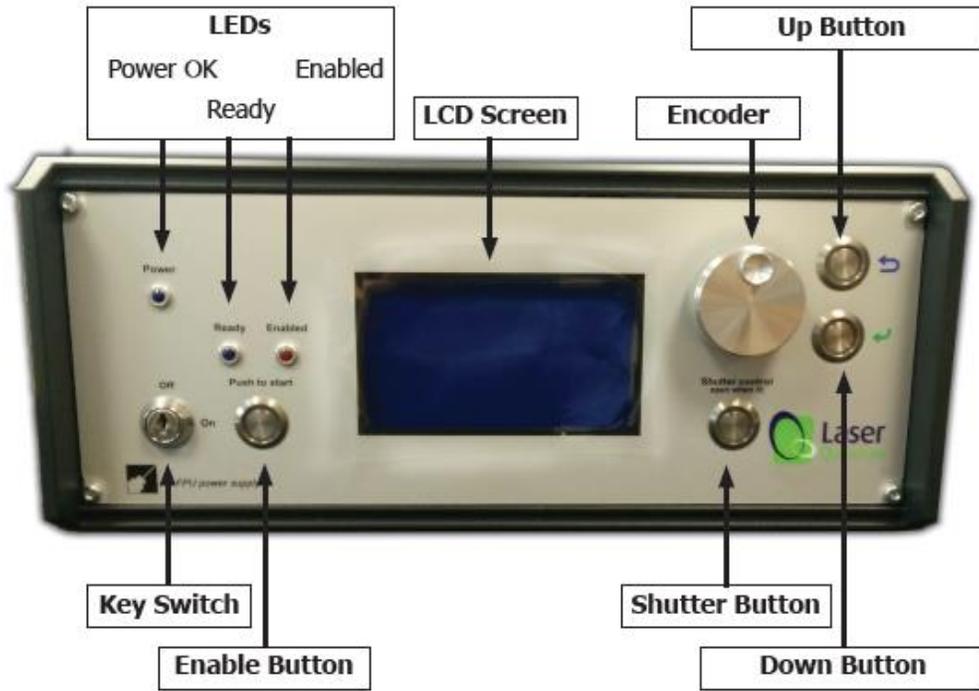


Figure 4-1

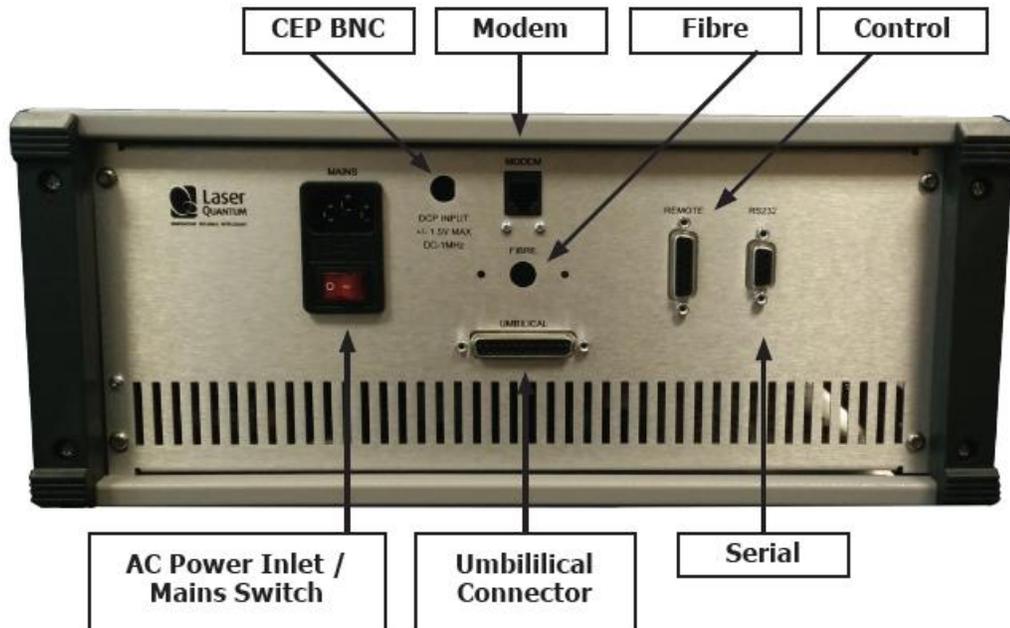


Figure 4-2

Laser Operation

The manner in which the optical fiber is handled can have a significant impact on the functionality and reliability of the **finesse pure** system. Ensure there are no sharp bends in the fiber and that it is not forced or trapped under any heavy equipment. The cost of a rework or replacement due to improper handling can be significant.

Do NOT disconnect to the fiber at any time. The finesse pure system MUST NOT be positioned so that it is difficult to operate the disconnecting devices.

Switching the laser “on”

- 1 Ensure the FPU60 is not powered (i.e. mains source is switched off).
- 2 Connect the Umbilical Cable to the port marked ‘Umbilical’ on the **fpu60** before connecting the other end to the laser head. Tighten the locking posts on the screws at both ends so they are finger tight.
- 3 Switch on the mains switch at the rear of the PSU (the ‘I’ position), this should illuminate the front panel ‘POWER’ LED. At this stage the thermal control circuitry is activated but no laser emission should occur. During this process the LCD will initially display a screen containing information describing the type of laser system followed by the model and serial number details.
- 4 The Interlock must be closed to allow the laser to operate and this can be achieved using the supplied red spot interlock dongle.



Caution: Possible Equipment Damage

Safety features within the PSU will ensure the system does not operate if the connections at both ends of the umbilical are not good and well secured.

- 5 With the Key Switch turned to the ‘on’ position, a momentary press of the Enable button will start the laser, the system will sound an audible warning at this point.
- 6 Opening the Shutter in the laser head is achieved by pressing the ‘SHUTTER’ button, the status LED will glow red to indicate the shutter is open.
- 7 Using the Encoder and Menu Up/Down buttons the operation current or power can be adjusted (see Section 5: Front Panel Controls).

Switching the laser “off”

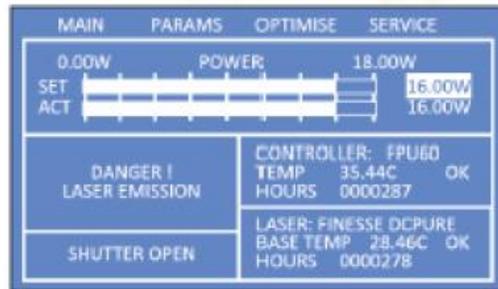
The laser is switched off by turning the Key Switch to the ‘off’ position or disabling the interlock connection.

Front Panel LCD MAIN Menu

The operator can interact with the 'MAIN' and 'OPTIMISE' menus (the other menus can be viewed but are locked). Within the 'MAIN' menu the screen is split into two sections:

The top half of the LCD screen displays the system settings that control the laser. It is from this window that the operator can set the output power needed. Note due to the implementation of Pure technology to reduce the noise of the system the power will be stable close to the requested power but may not be at exactly the requested power. Following the description in the Power Calibration section may bring the power closer together if this is repeated a few times.

The bottom half of the LCD screen displays information regarding the system temperatures, PSU controller type, timers and the status of the shutter and laser emission.



Front Panel controls- Functions

On the front panel of the **fpu60**:

'Up' button is marked



'Down' button is marked



To adjust the laser configuration the operator must select a parameter in the 'MAIN' menu.

- 1 The function to be changed must be selected using the selection cursor (a bar of inverted text). Under normal operation the selector cursor is not displayed. To make it appear rotate the jog wheel to 'MAIN' and press the 'down' button.
- 2 Once the cursor has appeared rotate the jog wheel to select the parameter to be adjusted. When the parameter is highlighted press the 'down' button to select it, this will change the select cursor in to the modify cursor.
- 3 The value of the chosen parameter can now be changed by rotating the jog wheel. Depressing the jog wheel increases the rate at which the value changes.
- 4 Once the value has been adjusted the modify cursor should be changed back to the select cursor by pressing the 'up' button.
- 5 Finally pressing the 'up' button once more will store the chosen value in the PSU memory and remove the select cursor from the LCD.

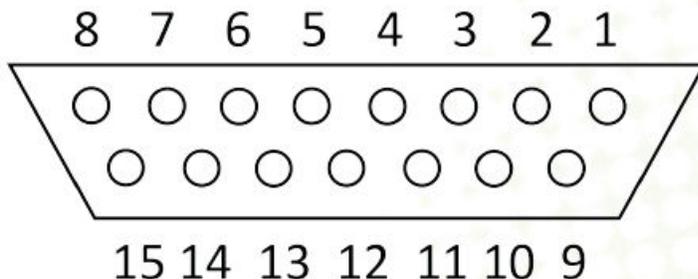
Front Panel Controls- Power Feedback

With the 'SET' power highlighted by the modify cursor, adjusting the jog wheel will change the set output power (0 to maximum in 0.01 W steps). The top bar displays the SET power value and the bottom bar the actual (ACT) power output. To store the new 'SET' power value press the up button twice.

Modifications to the SET output power can be made with the laser either enabled or disabled. If the laser is enabled the power will immediately change as the chosen output power changes. With the laser disabled the SET output power will be achieved upon enabling the system.

Control Port - Functionality

An external interlock system is fitted to the **fpu60**. The connector for it is the 15-pin D type on the rear panel. The pins are numbered as shown below when viewed from the panel side:

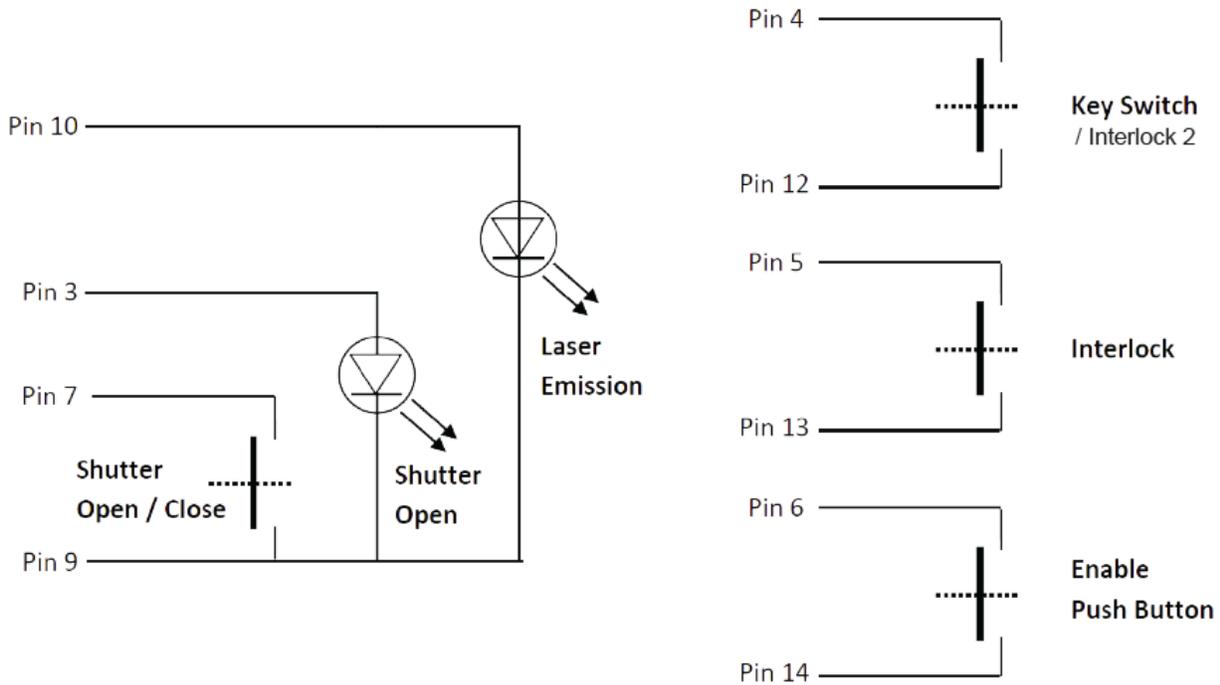


The external Interlock will disable the system (laser emission will cease) whenever the circuit is open. The status window on the LCD screen will read 'DISABLED: KEYSWITCH/INTLK'. To re-enable the laser the Interlock circuit must be closed and then the "Switching On" instructions followed (Section 5.).

If the laser is to be used:

- Within an enclosed cabinet: It is suggested that the Interlock connector be wired to an Interlock switch that changes from closed to open circuit with the removal of an access lid or panel.
- In an open environment: It is suggested that the Interlock connector be wired to an Interlock switch that changes from closed to open circuit if the laboratory door is opened.

If the Interlock connection is broken or if the laser head or fpu60 overheats, the laser will shut down. The Enable button must be pressed again to operate the laser once the Interlock connection is restored or the temperature has cooled.



It is recommended that an LED is always connected between pin 10 and 9, to show when the laser is active and a second LED between pin 3 and 9 to show when the shutter is open. The minimum connections that need to be made for the system to operate are:

- Pin 5 to Pin 13
- Pin 4 to Pin 12
- Pin 6 to Pin 14
- Pin 7 to Pin 9 (to open shutter).

RS232 Port – Functionality

Control of the laser can be achieved via the RS232 port using a terminal emulator such as HyperTerminal or PUTTY. This allows the operator to:

- Turn the laser on/off.
- Control the laser power.
- Query information such as laser head/PSU temperature.
- Check the laser status.

It is necessary to have the Interlock, external keyswitch/interlock2 and Enable switches closed via the Control port in order to enable the laser, prior to controlling the laser through the RS232 port.

The RS232 port uses the standard 9-way connector pin configuration:

Pin 2 TXD: RS232 – Transmit

Pin 3 RXD: RS232 – Receive

Pin 5 GND – Ground

Port settings are:

Baud Rate: 19,200

Parity: None

Stop Bit: 1

Hand Shaking: None

The operator must wait for a response from the PSU before sending the next command. A response is any text string (including null) followed by a carriage return, new line.

Note that most PCs do not have an RS232/Serial port as standard so a USB to Serial (RS232) adapter (sold separately) is needed that is able to go to the full RS232 voltage levels for the connection to function correctly. For recommendations on adapters or more information please contact your sales representative.

RS232 Port – Serial Commands

Serial Command	Function
OFF	Disables the laser, and “Push to Start” button regardless of the interlock status
ON	Enables the “Push to Start” button subject to Interlocks and Enable Switch status
POWER=###	This sets the output power of the laser in Watts. For example, to set a power of 5W, send the string POWER=5
POWER?	Returns the power of the laser (read from the internal photodiode)
SHUTTER OPEN	Opens laser shutter
SHUTTER CLOSE	Closes laser shutter
BACKLIGHT=###	LCD Backlight brightness (%)
INTERLOCK	Returns the status of the Interlock
SERIAL?	Returns the laser serial number
SHUTTER?	Returns the status of the Shutter
STATUS?	Returns whether the laser is enabled or disabled
HTEMP?	Returns the temperature of the laser head base in degrees centigrade
PSUTEMP?	Returns the temperature of the PSU in degrees centigrade
TIMERS?	Returns the timers of the laser and PSU: PSU Time = ##### Mins Total time the system has been powered. Laser Enabled Time = ##### Mins Total time the laser has been enabled. Laser Threshold Time = ##### Mins Total time the laser has been enabled and running above threshold.
CALDATE?	Reports the calibration date of the system
DATE?	Reports the date stored in the FPU60 controller
SOFTVER?	Reports the firmware version
TIME?	Reports the time stored in the FPU60 controller

The system has been tested for compliance using a 3 m serial cable. If a serial cable >3 m is used, compliance of the system may be compromised unless optical isolation is used.

RemoteApp

Using our unique RemoteApp software suite the laser can be controlled via the RS232 port. It can be downloaded from www.novantaphotonics.com. Follow the on-screen prompts to install the software onto the computer. RemoteApp includes a comprehensive instruction manual which can be accessed via the 'Help' and 'Contents' tabs.

The RemoteApp can also be used if a remote connection is required by our Service & Support Centre and is a powerful tool if performance optimization is required.

Performance Optimization

The performance of the finesse system can be optimized using the 'OPTIMISE' menu on the LCD screen. This will ensure the system is operating at peak performance.

Set-up Conditions

On the front panel of the **fpu60**:

'Up' button is marked



'Down' button is marked



To adjust the laser configuration the operator must select a parameter in the 'OPTIMISE' menu. The screen shown below will be displayed.

MAIN	PARAMS	OPTIMISE	SERVICE
POWER = 16.00W		CURRENT = 27.80A	
	SET	ACTUAL	
LBO OPT :	00.00	-00.000	
DIODE OPT :	00.00	00.002	
CAVITY OPT :	00.0	-00.005	
EFFICIENCY =>	0575mW/A		
PURE GAIN :	033.0		
RMS ->	0.0110%		
RE-CALIB :	-00.0%		

Power Optimization

On the front panel of the **fpu60**:

'Up' button is marked



'Down' button is marked



The laser power in Watts and the diode current needed to deliver the laser power are both displayed on the screen. The 3 parameters that can be optimized by the operator are listed as:

LBO OPT; DIODE OPT; CAVITY OPT; **Note – Some Finesse Heads do not have a controlled CAVITY**

In each case the objective is to maximize the EFFICIENCY => value displayed in mW/A

MAIN	PARAMS	OPTIMISE	SERVICE
POWER = 16.00W		CURRENT = 27.80A	
	SET	ACTUAL	
LBO OPT :	00.00	-00.000	
DIODE OPT :	00.00	00.002	
CAVITY OPT :	00.0	-00.005	
EFFICIENCY =>	0575mW/A		
PURE GAIN :	033.0		
RMS =>	0.0110%		
RE-CALIB :	-00.0%		

By rotating the jog wheel, position the cursor over the LBO OPT and press the 'down' button. This will select the SET value for LBO OPT, as indicated by the modify cursor (shown above)

By using the jog wheel again slowly change the SET value in a positive or negative direction. The ACTUAL value will automatically begin to change as the system tries to achieve the new SET value. Simultaneously the EFFICIENCY value will change too. Continue to move the SET value across the range permitted until the maximum value of EFFICIENCY is reached.

Press the 'up' button when the maximum EFFICIENCY value is reached.

Repeat the above process for both the DIODE OPT and CAVITY OPT. It should be noted that these parameters respond slowly so patience is needed to allow time for the ACTUAL value to reach the SET as it is changed.

It is normal to see the ACTUAL values fluctuate in keeping with the operation of the control loops. On completion of the Power Optimization procedure press the 'up' button twice and check the cursor returns to the OPTIMISE menu tab. This will ensure the new values are stored.



Important Note: Take extra care to remove back-reflections to the laser. Any magnitude of back reflection may disturb the resonant cavity and will affect the APC feedback control loop.

Power Calibration

On the front panel of the **fpu60**:

'Up' button is marked



'Down' button is marked



The output power of the **finesse** as shown on the LCD can be calibrated to match that of the operator's own Power Meter. This is a simple procedure requiring a pre-calibrated Power Meter suitable for measuring a laser source at 532nm at least the maximum wattage of the system.

With the laser set up in accordance with Section 5.8.1, place the Power Meter at the laser aperture of the finesse head and open the Shutter. (Note: There must be no other optics between the laser head and the Power Meter.)

Using the jog wheel select the RE-CALIB value and press the 'down' button. The modify cursor will appear either side of the % value displayed. Rotate the jog wheel steadily until the POWER reading on the LCD matches the external Power Meter reading. Then press the 'up' button twice to store the new value in the memory.

MAIN	PARAMS	OPTIMISE	SERVICE
POWER - 16.00W		CURRENT - 27.80A	
	SET	ACTUAL	
LBO OPT :	00.00	00.002	
DIODE OPT :	00.00	00.004	
CAVITY OPT :	00.0	00.008	
EFFICIENCY =>	0575mW/A		
PURE GAIN :	033.0		
RMS =>	0.0120%		
RE-CALIB :	■-00.0%■		

All the factory settings are not affected when the new off-sets are stored in the memory. To return to the factory settings simply return each of the parameters to zero SET value.

Pure Gain Calibration

The RMS noise is shown as a % on the LCD, below the PURE GAIN value. The RMS noise is measured at 1 Hz – 10 MHz.

MAIN	PARAMS	OPTIMISE	SERVICE
POWER - 16.00W		CURRENT - 27.80A	
	SET	ACTUAL	
LBO OPT :	00.00	00.002	
DIODE OPT :	00.00	00.004	
CAVITY OPT :	00.0	00.008	
EFFICIENCY =>	0575mW/A		
PURE GAIN :	033.0		
RMS =>	0.0120%		
RE-CALIB :	■-00.0%■		

Using the jog wheel select the PURE GAIN and press the 'down' button. The modify cursor appears each side of the value displayed. Rotate the jog wheel steadily to increase or decrease the value until the noise reading reaches a lower value (if this is possible). Then press the 'up' button twice to store the new value in the memory.

Alternatively the PURE GAIN value can be adjusted against the optical noise output of the Ti:Sa oscillator instead of the **finesse pure** laser. Follow the same procedure to reach optimal performance of the Ti:Sa oscillator.

The PURE GAIN is optimized before shipment therefore it should require none or very little adjustment when the system is started for the first time. Ensure you make a note of the original PURE GAIN value before making any adjustment.



Important Note: Setting the PURE GAIN value to 0 will disable the finesse pure active electronics feedback which will result in a higher RMS noise output.

Direct Modulation Input Guidelines

This section outlines the critical points for the operation of the 'DC PURE' direct modulation input via the BNC socket located at the rear of the **fpu60**.

Linear control range (approx)	+/- 0.5 V
Full input voltage range (approx)	+/- 1.0 V ** <i>(Clipping will occur if the voltage exceeds +1.0V)</i>
Maximum input voltage	+/- 5.0 V
Centre point of modulation	0 V

Power modulation of the system is fully DC-coupled and will typically vary by +/- 1.5% to

+/- 3.0% of its specified power for full scale input modulation. This percentage may vary at different power levels but should remain similar when operated close to its specified power.

If the Modulation bandwidth is > 1 MHz the laser will exhibit <90 degree phase shift (measured from input voltage to actual power output) up to about 750 kHz and approximate phase shifts are shown on the following page for lower frequencies:

Modulation Frequency	Phase Shift
100 kHz	~ 20 degrees
400 kHz	~ 35 degrees
750 kHz	< 90 degrees

When the modulation voltage is applied this will cause an offset between the actual and target powers of the system. If the required powers are outside the +/- 1.5% to +/- 3.0% range then the target power can be changed via the serial link (or encoder wheel on the fpu front panel) to adjust the range up or down in power level.

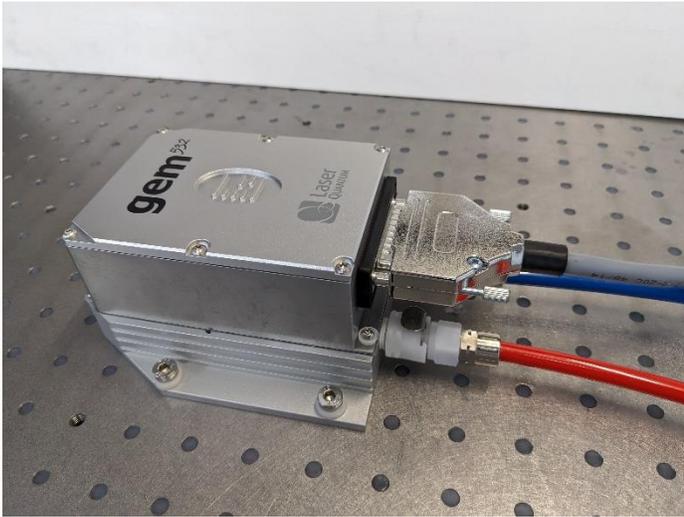
Cooling Requirements and Power Consumption

Cooling Requirements

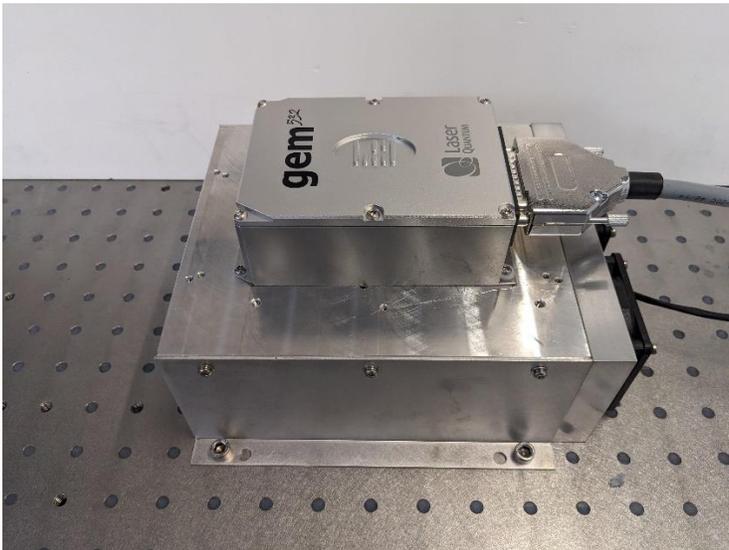
The laser has a characteristic warm-up period before it reaches specification; this time depends partly on the heatsink to which it is attached. However, the typical warm-up time is 10 minutes from switch on.

In order for the laser to perform to specification, it must be adequately heatsinked to the base of the laser. Operating the laser on an inadequate heatsink will adversely affect its stability and may lead overheating and the laser shutting down. Operating the laser on a water-cooled plate will produce optimum performance. Examples of heat sinking solutions are shown below. For further information on heatsinking your **finesse pure**, please consult your sales representative who may be able to provide a heatsink solution.

Water cooled heat sink.

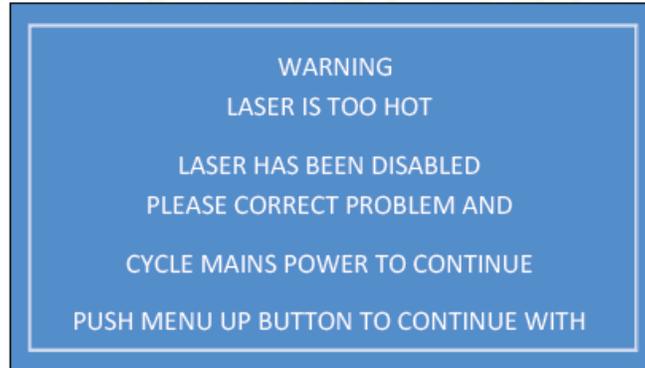


Air cooled heat sink

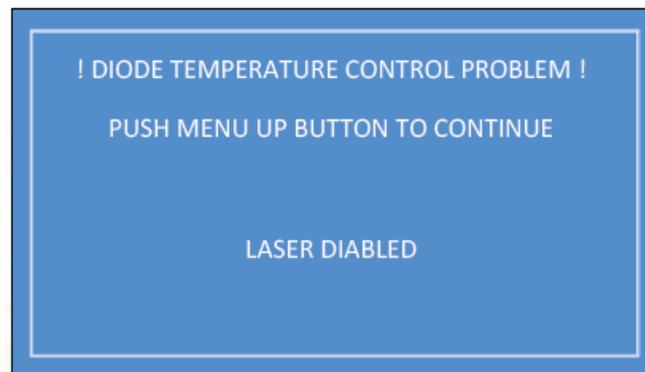


If the **finesse pure** is not attached to an adequate heatsink or cooling solution or the **fpu60** cooling intakes are blocked, then these components will gradually increase in temperature.

If the temperature of the laser head reaches 42.5°C the following warning screen will appear:



If the temperature of the diode reaches 50°C the following warning screen will appear:



Power Consumption

The power consumption shown is that which is drawn at the plug from the mains supply in both the maximum and typical states. The maximum power will usually be drawn at start up and the typical power is when all temperatures are stabilised and the system is operating at the specified power. Peak values are shown in all cases.

Maximum at 240 V supply:

300 W

Laser System: Maximum (laser system power shown in blue)

- 16 W: 300 W

Laser System: Typical Power Draw (laser system power shown in blue):

- 16 W: 240 W

The power dissipation of the laser head is no more than 40% of the total power consumption. The values shown are system power consumption.

Laser Maintenance

If the **finesse pure** is operated in a smoky or dirty environment, occasional cleaning of the laser window may be necessary. To perform this procedure, the laser must be turned off and, using optical cloth dampened with research grade methanol, the laser window must be gently wiped.

- Always follow the instructions given in this Operating Manual
- Ensure laser is firmly fixed to an appropriate heatsink to allow efficient heat dissipation from the laser head and ensure a thermal equilibrium is achieved. The laser should be held in an environment with temperature stability to $\pm 0.1^{\circ}\text{C}$ to achieve marketed specifications. Use the laser head power consumption figures to help determine what heatsink dissipation is needed or speak with your sales representative.
- Never touch the connector on the laser head with anything other than the Umbilical cable provided and always follow the connection instructions in this Operating Manual
- Do not open the laser head or PSU; this will immediately invalidate the warranty
- Do not subject the laser head to mechanical shock; if severe this can cause misalignment of the laser cavity
- Do not allow the output window of the laser to be touched as this may damage the precision optical coatings used. Avoid very dirty atmospheres where dirt may settle on the window
- Do not operate or store this laser system in very humid or damp environments

Liability

Novanta accepts no liability for damage to persons or property caused by incorrect or unsafe use of any of its products; this is the sole responsibility of the user. Proper safety regulations for the use of these products must be observed at all times.

This page is intentionally left blank



Novanta

PHOTONICS

Novanta

Manchester, United Kingdom

Unit 1, Orion Business Park, Bird Hall Lane.
Stockport, SK4 0XG, UK

Email: photonics@novanta.com

Website: www.novantaphotonics.com

R-0150 Revision 3.0

May 2024

©2024 Novanta Corporation.