



SR AOM series

Sealed CO₂ laser source with integrated AOM

User manual

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SR AOM series

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Warranty shipments, returns and adjustments

Warranty claims must be made promptly and must be received by Luxinar Ltd during the applicable warranty period. Always identify the product, by both model number and serial number, when contacting Luxinar Aftersales.

If it becomes necessary to return a product for repair and/or adjustment, the instructions as to how and where these products should be shipped must be obtained from Luxinar Aftersales.

Service and repair

Servicing or calibration of the system can only be carried out by trained Luxinar service engineers or customers who have undertaken and passed a Luxinar approved service training course. Details of training courses and servicing can be obtained from the local Luxinar Aftersales address.

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Preface

Audience

This manual should be read by all personnel who install or operate SR AOM series lasers.

Important!

Read this manual carefully before operating the laser for the first time. Pay special attention to the Safety chapter.

The SR AOM series is designed and sold for use in Original Equipment Manufacturer (OEM) systems and is not to be used as a stand-alone laser. The OEM is responsible for compliance with all applicable safety regulations.

Other publications

- Luxinar part number 906-0251-xx; Safety manual
- Luxinar part number 906-0109-00; Serial interface specification
- Luxinar part number 906-0202-99; Chiller water temperature tables

How to use this manual

The following conventions are used in this manual.

Admonitions

The use of controls, replacement parts, adjustments, or procedures other than those specified within this manual may result in exposure to any of these hazards.

- Laser hazards
- Electrical hazards
- Environmental hazards
- Mechanical hazards.

The degree of seriousness of the hazard is indicated by the use of the following signal words:

DANGER

Indicates an imminent hazard which, if not avoided, is extremely likely to result in death or serious injury.

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It is also used to alert the user against unsafe working practices and potential damage to the equipment.

Connector labels and signal names

Connector labels and signal names are shown in bold serif font to aid identification. For example;

RF Enable, external interlock

Section 1

Safety

General Safety information

It is strongly recommended that any personnel who are involved with the installation, operation or maintenance of this laser equipment should first read and fully understand the contents of this manual and Safety manual 906-0251-xx.

If there are any questions or doubts on any of the safety aspects of the equipment, then do not hesitate to contact your nearest Luxinar Aftersales office or distributor for advice before proceeding.

The installation, operation, maintenance and repair of this laser equipment must only be carried out by Luxinar service personnel or trained staff who have received correct instruction concerning the hazards associated with this particular equipment.

Important!

All safety critical instructions contained within this document are framed with a border and identified by CAUTION, WARNING or DANGER depending on the severity of the risk involved. In addition, the safety symbol  indicates that care should be taken when working with or on the laser equipment.

Luxinar does not accept liability for any damage or injury howsoever caused or arising.

The symbol given below is also used on the equipment and indicates that the user should refer to the OEM equipment operator's manual for more information on the safe operation or installation of the equipment.



Label locations

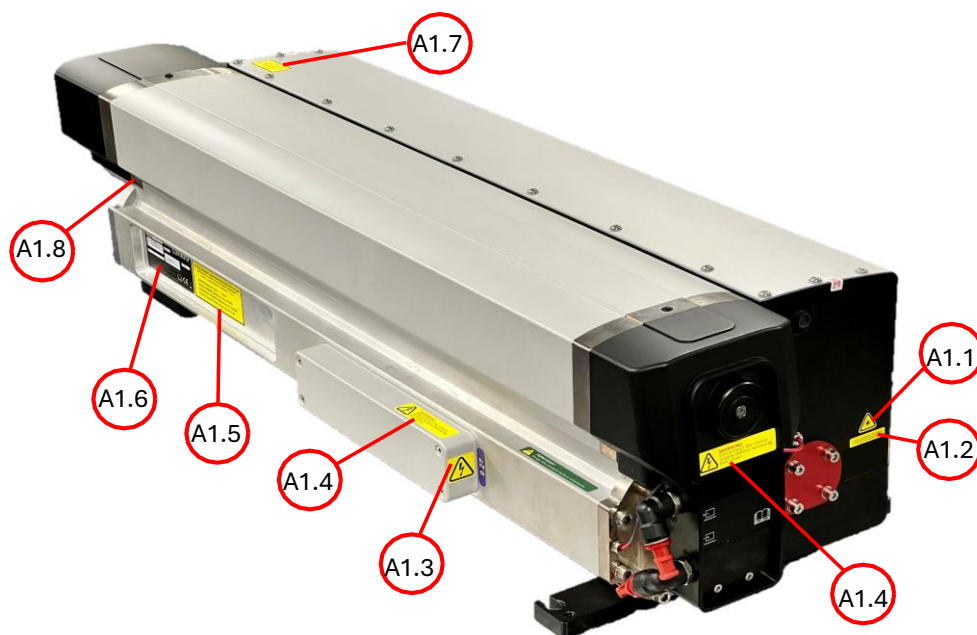


Figure 1 - Location of safety labels - front view

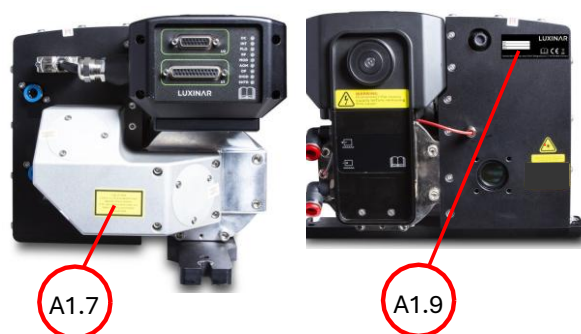


Figure 2 - Location of safety labels - rear view

Labels

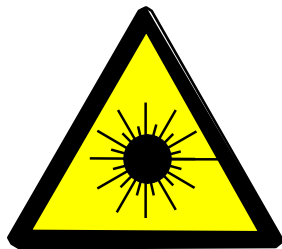


Figure 3 - Label A1.1 — Laser hazard

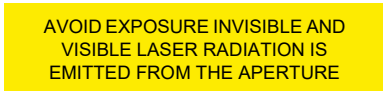


Figure 4 - Label A1.2 —Laser aperture



Figure 5 - Label A1.3 — Electrical hazard

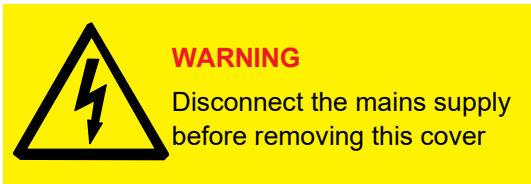


Figure 6 - Label A1.4 — DC voltage warning

Table 1 - Label A1.5 — Class 4 laser

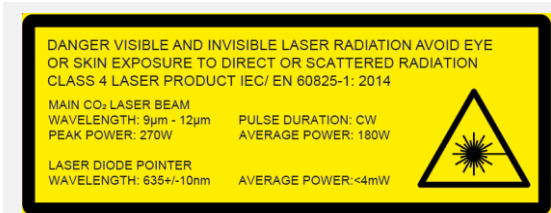


Figure 7 - SR 10 AOM

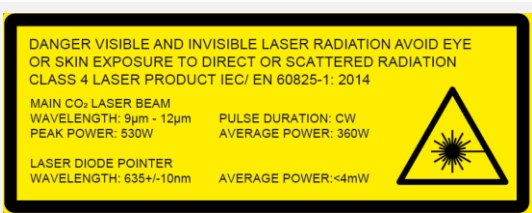


Figure 8 - SR 25 AOM

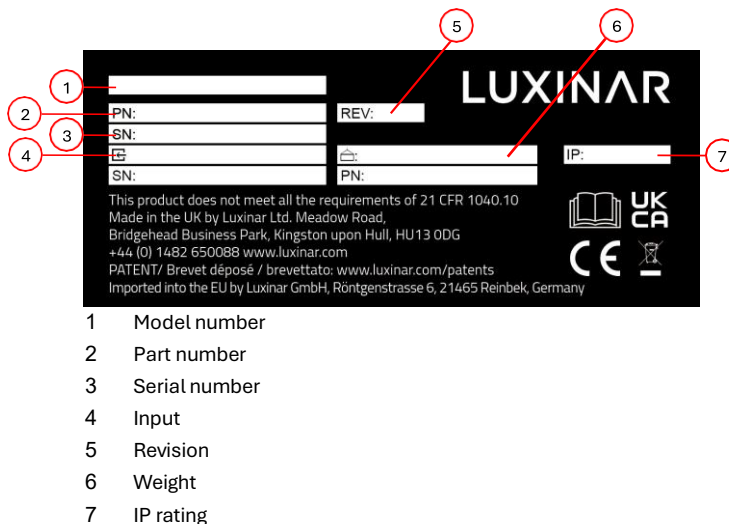


Figure 9 - Label A1.6 — Product identification and certification

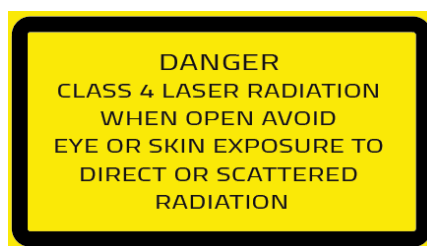


Figure 10 - Label A1.7 — Non-interlocked panel



Figure 11 - Label A1.8 — RF power supply product identification

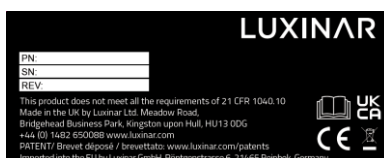


Figure 12 - Label A1.9 — AOM module product identification

Maximum Permissible Exposure and Nominal Ocular Hazard Distance

The Maximum Permissible Exposure (MPE) is the level of radiation to which, under normal circumstances, persons may be exposed without adverse effects. The MPEs represent the maximum level to which the eye or skin can be exposed without consequential injury and are related to the wavelength of the laser radiation, the pulse duration or exposure duration, and the tissue at risk.

The MPEs given in the following tables are informative and provided so that the integrator can calculate the Nominal Ocular Hazard Distance (NOHD), perform a risk analysis and inform the user about the safe usage of the product. However, exposure limits for the eye and the skin of employees in the work place and the general public are in many countries specified in national laws. These legally-binding national exposure limits might differ from the MPEs given in the tables below.

The NOHD is the distance from the output aperture beyond which the beam irradiance or radiant exposure remains below the appropriate MPE. Importantly, the NOHD is dependent upon the beam waist size and the divergence of the beam. Therefore, the NOHD is dependent upon the optical components acting on the beam. The NOHDs given in the tables below are relevant only when the laser is operated without external beam delivery attached. When beam delivery is attached it is the responsibility of the integrator or end-user to recalculate the NOHDs. Further details of the safe use of lasers are given with IEC/ TR 60825-14 "Safety of laser products – Part 14: A user's guide."

SR 10 AOM

Wavelength (µm)	9.3
MPE (W/m ²)	1000
NOHD (m)	325

SR 25 AOM

Wavelength (µm)	9.3
MPE (W/m ²)	1000
NOHD (m)	625

AOM module cover interlock

The AOM module has an interlock switch that opens to disable laser output when the cover is removed. For maintenance purposes, the switch can be overridden by pulling out the switch plunger.

Important!

There are no user serviceable parts within the AOM module. The cover should only be removed by trained Luxinar service personnel.

With the cover removed and the interlock overridden, full power laser emission is present within the AOM module even if there is no laser emission at the output window and no demand signal is active.



DANGER



Laser radiation hazard

Hazardous laser radiation is present within the AOM module at all times when modulation is active. Do not operate the laser with the AOM module cover removed.

Decommissioning and disposal

Dispose of the system according to appropriate local regulations.



Section 2

General description

Laser head

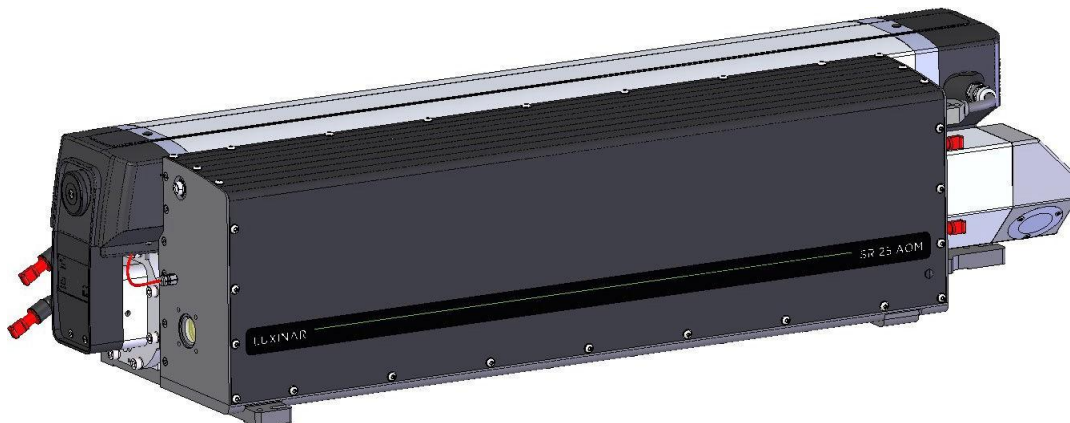


Figure 13 - SR AOM laser head

SR AOM lasers comprise a laser tube, integrated RF power supply unit and an Acousto-Optic Modulator (AOM) module packaged within a robust aluminium casing. The laser tube is RF-excited and has a diffusion cooled sealed cavity. All have an excitation frequency of 81MHz and an expected tube lifetime greater than 20000 hours. The AOM module provides laser output pulses with faster rise and fall times ($<1\mu\text{s}$) than are available from standard SR series lasers. There are two models offering different output powers.

- **SR 10 AOM**
75W peak power
- **SR 25 AOM**
150W peak power

DC power supply (optional)

Refer to [Appendix 4](#) for details of Luxinar DC power supplies

Specifications

Note: This equipment is designed for overvoltage category II as defined within EN 61010-1:2010+A1:2019.

RF power supply

Table 2 - RF power supply characteristics

Model	SR 10 AOM	SR 25 AOM
DC input ⁽¹⁾	50VDC $\pm$ 1% @ $I_{\text{peak}} = 80\text{A}$ $I_{\text{avg}} = 54\text{A}$	50VDC $\pm$ 1% @ $I_{\text{peak}} = 160\text{A}$ $I_{\text{avg}} = 106\text{A}$
Maximum average power requirement ⁽²⁾	2.7kW	5.3kW

1. Luxinar recommends using a DC power supply with a maximum current output at least 20% higher than these values.
2. Luxinar recommends using a DC power supply with a maximum average power rating at least 20% higher than these values.

Dimensions

Table 3 - External dimensions (including RF power supply)

Model	SR 10 AOM	SR 25 AOM
Standard laser (LxWxH) (mm)	885x290x226	947x290x226

Weights

Note: All weights are approximate.

Table 4 - Weight (including RF power supply)

Model	SR 10 AOM	SR 25 AOM
Standard laser	47.1kg	50kg

Cooling system

SR AOM lasers require a temperature stabilised recirculating coolant circuit in order to operate correctly.

The preferred coolant is deionised water or deionised water with anti-bacterial additive. See [Appendix 2](#).

Important!

To prevent condensation on optical surfaces, the coolant temperature must be maintained above the dew point.

The following look-up table defines minimum coolant temperatures (above the dew point) that avoid condensation with respect to ambient temperature and relative humidity.

Table 5 - Minimum laser resonator coolant temperatures

		Ambient temperature (°C)					
		20	25	30	35	40	45
Relative humidity	45%	19	19	19	24	29	
	50%	19	19	20	25	30	
	55%	19	19	21	26		
	60%	19	19	22	27		
	65%	19	19	23	28		
	70%	19	19	24	29		
	75%	19	20	25	30		
	80%	19	21	26			
	85%	19	22	27			
	90%	19	23	28			
	95%	19	24	29			

Table 6 - Coolant specification — laser

Model	SR 10 AOM	SR 25 AOM
Minimum flow rate (L/min)	4	5
Recommended flow rate (L/min)	≥ 6	≥ 6
Maximum pressure	6bar	
Dissipation	3kW	5kW
Required refrigeration capacity	> 3kW	> 5kW
Coolant temperature (laser)	18–25°C ± 1°C (above dew point) Refer to document 906-0202-99 for more details.	

Table 7 - Coolant specification — AOM module

Model	SR 10 AOM	SR 25 AOM
Minimum flow rate (L/min)	2	2
Recommended flow rate (L/min)	≥ 3	≥ 3
Maximum pressure	3bar	
Dissipation	0.45kW	0.5kW
Required refrigeration capacity	> 0.45kW	0.5kW
Coolant temperature (AOM)	18–20°C ± 1°C (above dew point)	

Optics purge gas

Table 8 - Optics purge gas specification

Purge gas pressure	0.07–0.21bar (1–3psi)
Flow rate	1–2L/min
<i>Nitrogen purity</i>	
Nitrogen purity grade	≥ 4.6 (O ₂ ≤ 3vppm, H ₂ O ≤ 2vppm)
<i>Compressed air contamination limits</i>	
Oil	≤ 0.005mg/m ³
Water	≤ 0.05g/m ³
Particles	≤ 0.05µm

Environmental specifications

Note: This equipment is designed for indoor use only and Pollution Degree 2 as defined within EN 61010-1:2010+A1:2019

Table 9 - Environmental specifications

Ambient working temperature	5–30°C
Storage temperature (with drained cooling circuit)	-10 to +30°C
Relative humidity (non-condensing)	10–85%
Maximum altitude	< 2000m

Performance

Table 10 - SR AOM output characteristics

Model	SR 10 AOM	SR 25 AOM
Output wavelength ⁽³⁾	9.3µm	
Rated average power range ⁽⁴⁾	0–75W	0–150W
Typical long term stability ⁽⁵⁾	± 2%	
Peak power	75W	150W
Minimum shipment power ⁽⁶⁾	> 75W	> 150W
Pulse frequency	0–240kHz	
Pulse energy	> 0.15mJ	> 0.3mJ
Pulse width	> 1µs	
Maximum duty cycle	100%	
Optical pulse rise time	< 1µs	
Optical pulse fall time	< 1µs	
Excitation frequency	81MHz	
Expected tube lifetime	20000 hours	
Beam diameter (1/e ²) at the laser output optic	5.6 ± 0.5mm	7.7 ± 0.5mm
Beam quality factor	M ² <1.2 (K >0.83)	
Beam divergence (full angle far field)	≤ 3.1mrad	≤ 2mrad
Beam ellipticity ⁽⁷⁾	< 1.2:1	
Pointing stability (half angle)	≤ 0.3mrad	
Polarisation	Linear perpendicular to the laser base	

3. 9.27µm is the predominant wavelength but can typically vary in the range 9.2–9.4µm.

4. Mean average power at 100% AOM duty cycle. The mean average power is proportional to the AOM duty cycle.

5. Guaranteed long term stability is ± 3%.

6. Mean average power at 100% AOM duty cycle. The mean average power is proportional to the AOM duty cycle.

7. At a demand duty cycle of 50%.

Section 3

Operation

Overview of operating modes

Table 11 - SR AOM control feature overview

Standard version	
<i>Control modes</i>	
Internal closed loop power control with AOM demand.	✓
<i>Signals</i>	
RF Enable	✓
Interlock	✓
Shutter enable	✓
Laser diode pointer enable	✓
RS232 control commands	✓

AOM operation overview

SR AOM lasers contain an internal Acousto-Optic Modulator (AOM) fitted between the laser resonator and the output window. The laser resonator runs continuously under closed-loop control and the output passes into the AOM which diverts the beam into a beam dump. When an AOM demand pulse is applied, the AOM rapidly switches the beam from the dump to the output aperture. This results in a significantly shortened rise and fall time for each laser pulse.

General considerations before starting the laser

- Ensure that the beam path is free from obstructions.
- If the machine is in a maintenance or installation situation with machine guards removed, check that there are no personnel within the area and that safety warning notices are prominently displayed.
- Ensure all interlocks are operating correctly.
- Verify that the material to be processed is suitable for CO2 laser processing.
- Verify that the material to be processed is correctly positioned and ready for processing.

Start-up

1. Ensure that all machine safety features are present and activated.

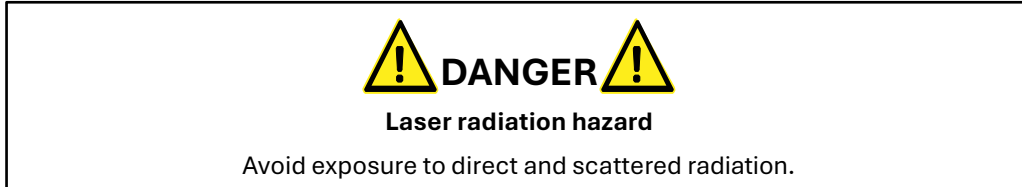
If the machine is in maintenance mode with enclosure panels removed, ensure that the area surrounding the machine complies with local laser safety regulations and that laser safety warning notices are displayed prominently. All persons in the area must wear laser protection eyewear.



Risk of injury to eyes and exposed skin

This is a Class 4 (Class IV) laser product. All precautions relevant to this class of laser product should be strictly observed. Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure. Strict compliance with the safety precautions set out and referred to in this manual and extreme care in use are essential to minimise the chance of accidental damage to the equipment or personal injury. Luxinar does not accept liability for any damage or injury howsoever caused or arising.

2. Turn on the coolant circulating system and check for correct flow and temperature.
3. Turn on the optics purge gas.
4. Verify that all interlocks are closed.
5. Switch on mains power to the laser and controller.
6. Set the operating parameters on the machine controller.
7. Enable the RF power supply.



8. Enable the shutter.
9. Apply a **Laser enable** signal.
10. Apply an energy demand signal.

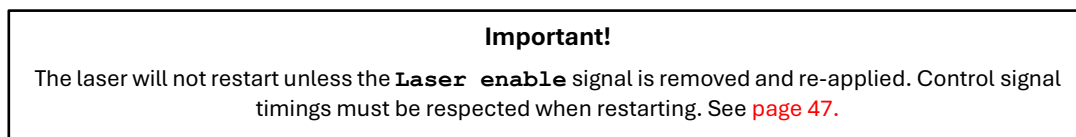
Shut-down

1. Remove the energy demand signal.
2. Remove the **Laser enable** signal.
3. Close the shutter.
4. Disable the RF power supply.
5. Switch off mains power to the laser and controller.
6. Turn off the coolant recirculating system (AOM and laser).
7. Turn off the optics purge gas.

Emergency stop

An emergency stop is initiated by the OEM machine. The machine should automatically:

- Remove the **Laser enable** signal.
- Close the shutter.
- Remove the RF enable signal.
- Break the laser interlock circuit.

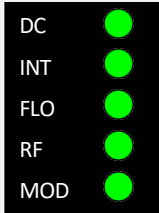
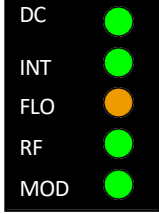
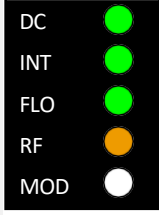
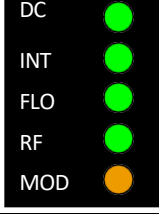
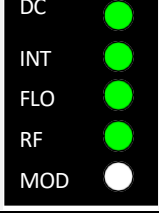
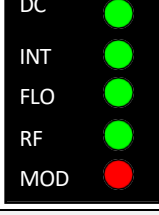
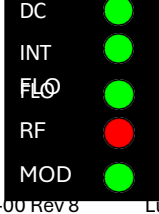


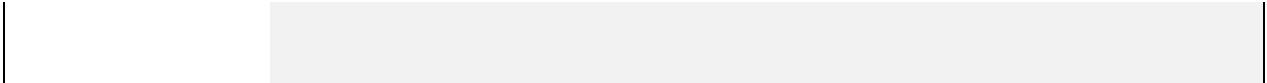
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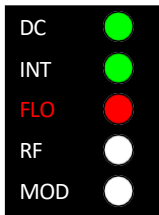
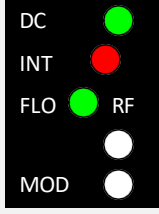
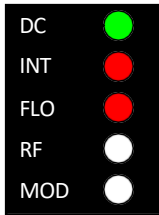
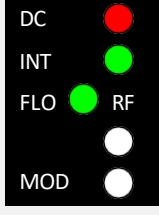
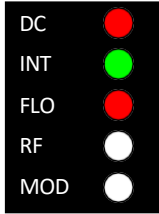
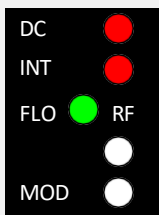
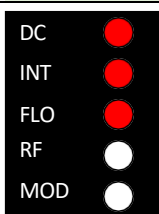
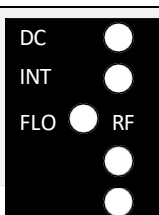
Diagnostics and troubleshooting

Status indicator diagnostics – PSU, interlocks & cooling

Table 12 - Status indicator diagnostics

Indicator display	Status	Action
	Normal operation. Laser enabled.	No action required.
	Coolant flow rate is close to the minimum flow rate. See page 15	- Check the coolant flow rate. - Check for blockages or restrictions in the cooling system pipes.
	No RF Enable signal.	Check the RF Enable signal.
	The modulation input is not within the specified limits.	Check the modulation signal. See Section 8 .
	No modulation input.	Check the modulation signal. See Section 8 .
	VSWR fault.	- If the indicator is intermittently red, check the pre-ioniser fuse. See page 26 - If the problem persists, contact Luxinar Aftersales.
	RF power supply error.	Contact Luxinar Aftersales.



Indicator display	Status	Action
	Coolant flow is below the required minimum.	Provide the required minimum coolant flow rate to the system. See page 15
	No interlock signal.	Check for open machine interlocks.
	- No interlock signal. - No coolant flow.	- Check for open machine interlocks. - Provide the required minimum coolant flow rate to the system. See page 15
	The DC supply voltage is not within the specified limits.	Provide the required DC input voltage. See page 14
	- The DC supply voltage is not within the specified limits. - The coolant flow rate is below the required minimum.	- Provide the required DC input the voltage. See page 14 - Provide the required minimum coolant flow rate to the system. See page 15
	- The DC supply voltage is not within the specified limits. - No interlock signal.	- Provide the required DC input voltage. See page 14. - Check for open machine interlocks.
	- The DC supply voltage is not within the specified limits. - No interlock signal. - The coolant flow rate is below the required minimum.	- Provide the required DC input voltage. See page 14 - Provide the required minimum coolant flow rate to the system. See page 15 - Check for open machine interlocks.
	The DC supply is not present.	- Check the DC power supply connection to the RF power supply. - Check the DC power supply.

Status indicator diagnostics – AOM module

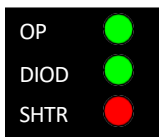
Table 13 - Status indicator diagnostics — AOM module

Indicator display	Status	Action
AOM 	Normal operation	No action required.
AOM 	AOM demand signal out of specification	- Ensure the AOM demand signal pulse width is $>1\mu\text{s}$. - Ensure the AOM demand signal repetition frequency is $\leq 240\text{kHz}$
AOM 	AOM fault or AOM thermal trip activated	- Switch off the system and allow it to cool down. - Check the AOM fuse. See page 26 - If the problem persists, contact Luxinar Aftersales.

Status indicator diagnostics – Control modes

Table 14 - Status indicator diagnostics — AOM lasers

Indicator display	Status	Action
OP  DIOD  SHTR 	- Diode pointing laser disabled. - Shutter closed.	- Apply a high (5–24V) signal to U1, pin 21 to enable the diode pointing laser. - Apply a high (5–24V) signal to U1, pin 1 to enable the shutter.
OP  DIOD  SHTR 	- Diode pointing laser enabled. - Shutter closed.	Apply a high (5–24V) signal to U1, pin 1 to enable the shutter.
OP  DIOD  SHTR 	- Diode pointing laser disabled. ⁽¹⁾ - Shutter open.	Normal system operation for External Modulation mode.
OP  DIOD  SHTR 	- Diode pointing laser enabled. - Shutter fault.	Contact Luxinar Aftersales.
OP  DIOD  SHTR 	Internal Modulation mode selected. - Diode pointing laser disabled. - Shutter closed.	- Apply a high (5–24V) signal to U1, pin 21 to enable the diode pointing laser. - Apply a high (5–24V) signal to U1, pin 1 to enable the shutter.
OP  DIOD  SHTR 	Internal Modulation mode selected. - Diode pointing laser enabled. - Shutter closed.	Apply a high (5–24V) signal to U1, pin 1 to enable the shutter.
OP  DIOD  SHTR 	Internal Modulation mode selected. - Diode pointing laser disabled. ⁽²⁾ - Shutter open.	Normal system operation for Internal Modulation mode.

Indicator display	Status	Action
OP DIOD SHTR 	• Internal Modulation mode selected. • Diode pointing laser enabled. • Shutter fault.	Contact Luxinar Aftersales.
OP 	Internal mode selected.	Normal operating status for AOM lasers.
OP 	Service or external PWM mode selected.	Service use only.

Section 5

Routine Maintenance

The SRAOM has been designed to be low maintenance. Internal routine maintenance procedures are not required. The system's sealed construction and limited number of moving parts ensures trouble free and reliable operation.

General cleaning



WARNING

Laser radiation and electrical hazards

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous laser radiation exposure. This is a Class 4 (Class IV) laser and the beam is invisible to the eye.

Please review all safety instructions and precautions given in the Safety chapter before attempting to operate or service this system.

Always ensure that the laser system is switched off and isolated from the mains supply before attempting any cleaning or maintenance procedures.

- The external surfaces of the system can be cleaned with a mild detergent. It is advisable to use a damp cloth to facilitate the cleaning of the external cabinets, etc.
- Take care not to allow entry of water into any of the electrical cabinets or onto the output window or final beam delivery optic.

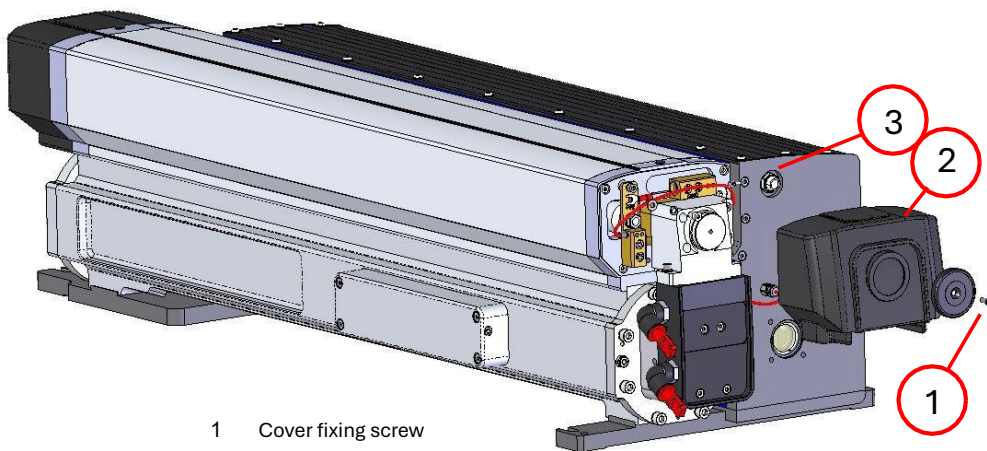
Pre-ioniser and AOM fuse replacement



DANGER

Risk of electric shock

Ensure that the equipment is disconnected from the mains supply before replacing the fuse.

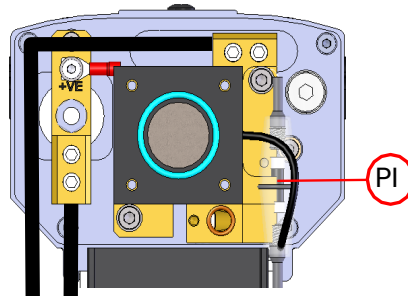


- 1 Cover fixing screw
- 2 Cover
- 3 AOM fuse holder

Figure 14 - Pre-ioniser and AOM fuse locations

Pre-ioniser fuse

1. Disconnect the equipment from the mains electrical supply.
2. Remove the cover (2) from the rear end of the laser by unscrewing the fixing screw (1).
3. Remove the faulty fuse (PI).



4. Fit a replacement fuse of the same size and type.
Fuse specification: 20mm, T1A250V (Luxinar part number 552-0007-00)
5. Replace the cover and secure it with the fixing screw. Care should be taken when fitting the cover. Ensure the pre-ioniser cable is not trapped or crushed when fastening.

AOM fuse

1. Disconnect the equipment from the mains electrical supply.
2. Unscrew the fuse cap (3) and withdraw the faulty fuse.
3. Fit a replacement fuse of the same size and type.
Fuse specification: 20mm, T8A250V (Luxinar part number 552-0067-00)
4. Replace the fuse cap.

Note: If a fuse fails again after replacement, this may indicate a more serious fault. For more information and advice, contact Luxinar Aftersales.

Cooling system contamination

If the cooling water is contaminated with bacteria or has been treated with other chemicals it will be necessary to clean the cooling circuit:

The pH value, conductivity and dissolved solids levels can be measured using a portable meter. The bacterial contamination level can be checked using a test kit. For more information and advice, contact Luxinar Aftersales. Pay particular attention to the instructions provided by the manufacturer of the NALCO water treatment kit.

1. Drain off the contaminated cooling water.
Ensure that disposal of all the materials used in this product is conducted according to all local and national regulations.
2. Flush the cooling water circuit with tap water by filling and draining once only.
3. Mix tap water with deionised water in a 1:1 ratio and fill the cooling water circuit.
4. Add a NALCO biocide water treatment kit and mix well with the cooling water.
5. Operate the system for two to four days, then drain off the cooling water.
6. Flush the cooling water circuit twice.
7. Fill the cooling system with fresh deionised water and add the contents of a fresh NALCO water treatment kit.

Frost protection

If the cooling system or chiller which supplies the cooling for the laser system is located in an area where the temperature may drop below 0°C, then the cooling circuit must be equipped with a winter-proof heating tank to prevent the cooling water temperature dropping below 15°C.

Section 6

Installation

Installation procedure

Before unpacking the laser, prepare for the installation by making sure that the required equipment, resources and materials are available. Carefully inspect the package contents for shipment damage and notify Luxinar immediately if any damage is found.

- The means to transport and lift the laser into position. See [page 16](#) for equipment weights.
- A flat surface with prepared fixing locations to match the laser mounting feet. See [this section](#).
- A DC power supply supplied by Luxinar or sourced locally.
- A beam delivery system and supports with a prepared connection for the laser output window mounting point.
- A source of cooling water or a chiller for laser cooling. See [page 31](#).
- A source of high purity nitrogen or compressed air to provide a positive purge pressure for the laser optics. See [page 34](#).
- Emergency stop interlock circuit.
- Laser control interface circuitry.

Perform the following steps to install the laser:

1. Carefully unpack the laser and place it on the prepared mounting surface, then fasten it in place using M8 bolts. Do not remove the protection cap from the laser output window at this stage.
See section [this section](#).



Heavy equipment — risk of severe lumbar injury

The weight of the laser head supply exceeds the single person lift limit of 18kg, as specified in EN 61010-1:2010+A1:2019. Ensure a minimum of two people lift the laser head or that suitable lifting equipment is employed.

Suitable lifting points are the base of the laser resonator and AOM module.

2. Connect the laser to the cooling water source or chiller using 10mm OD tubing (see [page 31](#)). To connect the cooling tubing:
 - a. Push the tube into the connector until it reaches the stop. Pull back on the tube to ensure that the connector has gripped the tube firmly.
 - b. To remove the tube, press the release ring on the end of the connector end and pull out the tube.
3. Connect the optics purge gas supply using 6mm OD tubing (see [page 34](#)). To connect the gas purge tubing:
 - a. Push the tube into the connector until it reaches the stop. Pull back on the tube to ensure that the connector has gripped the tube firmly.
 - b. To remove the tube, press the release ring on the end of the connector end and pull out the tube.
4. Connect the laser to the DC power supply.



Exposed terminals — risk of electrocution

Switch off and disconnect the equipment from the mains electrical supply before exposing electrical terminals. Only trained and authorised personnel should make electrical connections.

5. Connect the DC power supply to the mains. See [page 34](#).
6. Connect the emergency stop interlock circuit.
7. Connect the control interface circuitry.
8. Test the laser output before fitting the beam delivery.
Place a suitable beam block or power monitoring device in the beam path. Do not place it close to optical surfaces to avoid risk of contamination by evaporated material.



Hazardous laser radiation

Always wear protective eyewear matched to the emission wavelength and output power of the laser. Instruct all personnel in the vicinity to wear identical protective

Mount the beam delivery and connect it to the laser output window using the prepared connector. See [page 35](#).

Unpacking, mounting and connections

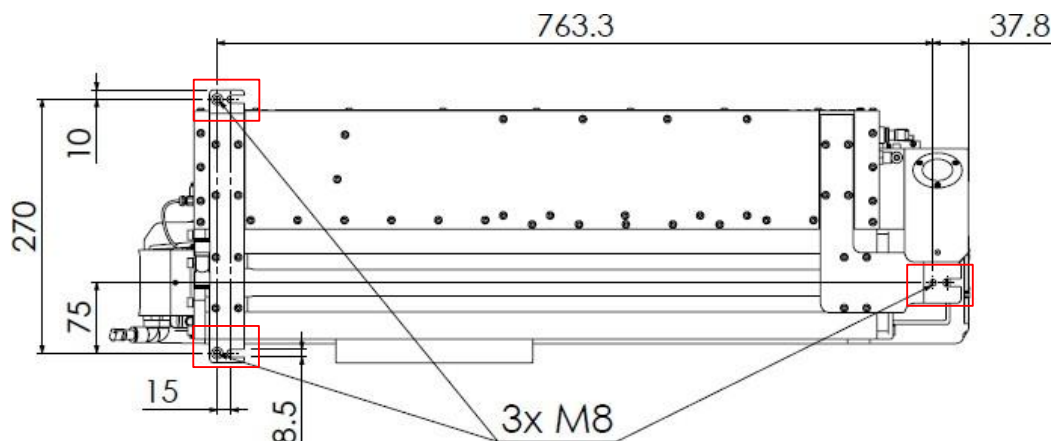
Refer to [page 16](#) for details of weights and dimensions.

Mechanical fixing

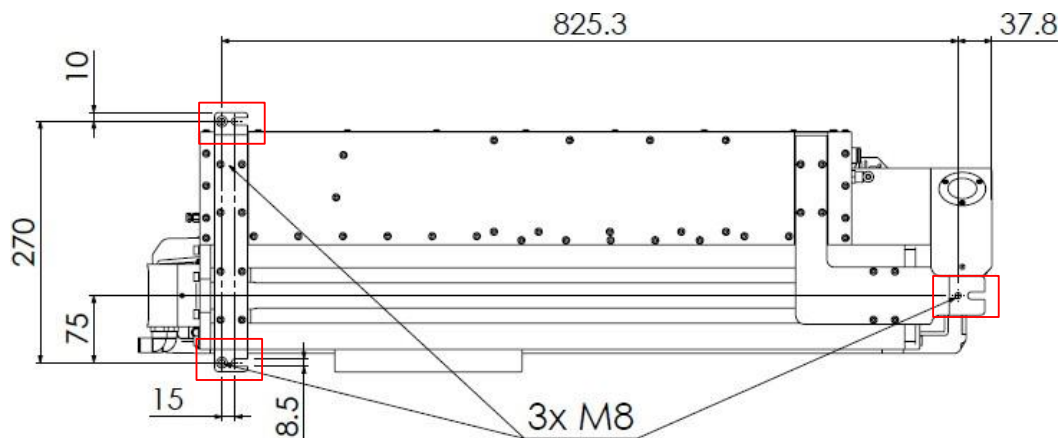
Secure the laser to the host machine using the three mounting feet on the base. Each mounting foot has an M8 threaded hole and an open-ended slot suitable for an M8 bolt.

Mounting position dimensions are shown in the following drawings

SR 10 AOM



SR 25 AOM



WARNING

Risk of optical damage and shutter failure

To ensure correct operation of the laser and shutter, the laser must be mounted in one of the approved orientations identified by check marks in the following figure. All other orientations are prohibited.

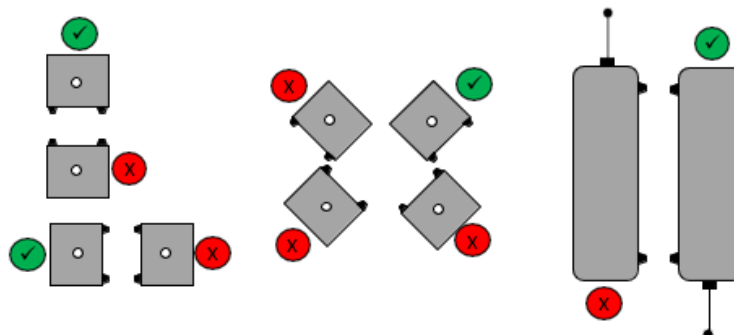
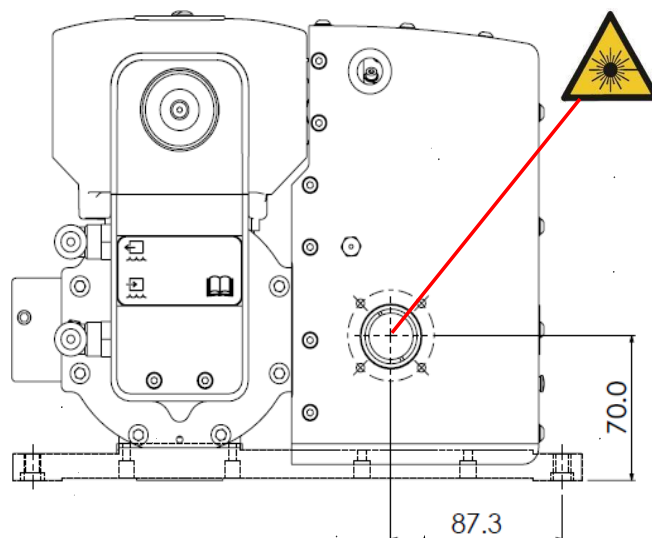


Figure 15 - Correct and incorrect mounting orientations

Laser output aperture location



Coolant connections and pipework

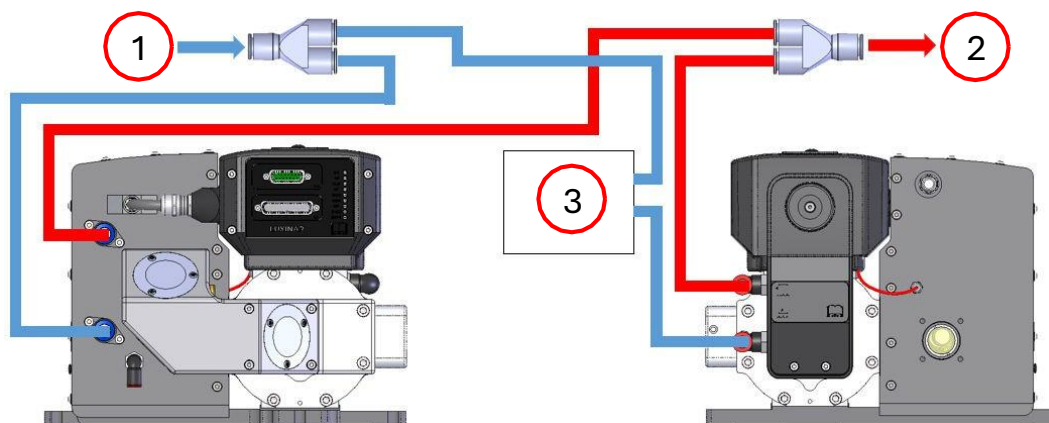
The laser tube/DC power supply and the AOM module are served by independent cooling water circuits which are each protected by separate flow sensors. This provides two scenarios for cooling the system:

Important!

If the optional Luxinar DC power supply is fitted, the coolant must flow through the power supply before the laser resonator.

Scenario 1 — Single chiller

All modules are connected to a single chiller. The AOM module is cooled using a branch circuit fitted with a pressure regulator.



- 1 Coolant in
- 2 Coolant out
- 3 DC power supply

Figure 16 - Single chiller coolant connections

Table 15 - Chiller flow requirements

Flow (L/min)	SR 10 AOM	SR 25 AOM
Minimum overall flow	≥ 6	≥ 7
Recommended overall flow	≥ 8	≥ 9
Minimum flow for AOM module branch circuit	≥ 2	≥ 2

Scenario 2 — Dual chillers

Separate chillers are provided for the laser resonator/DC power supply and for the AOM module.

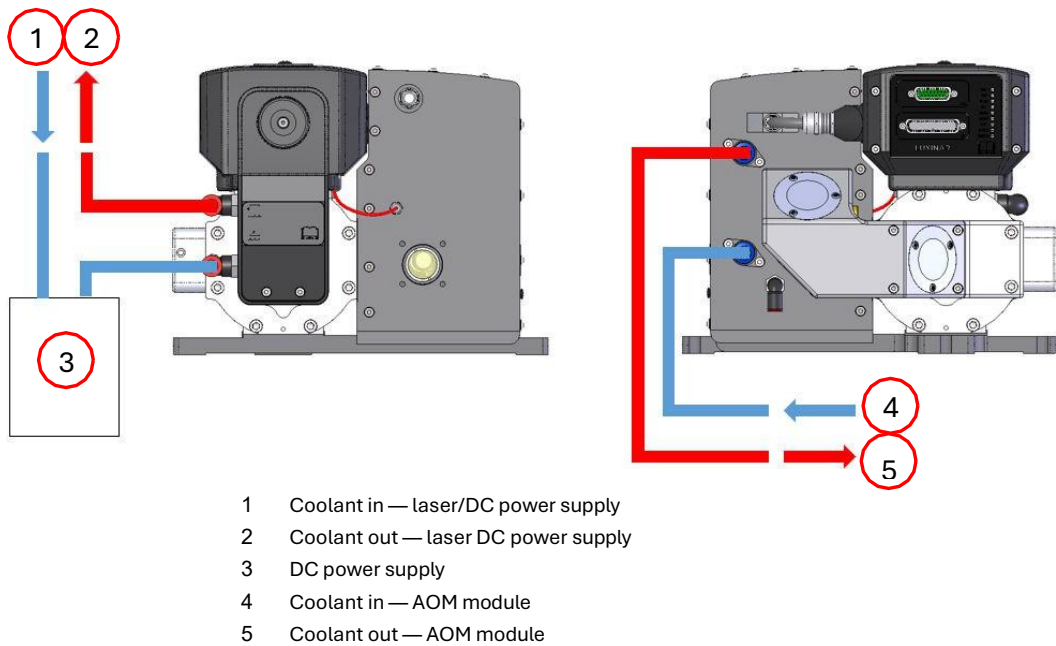


Figure 17 - Dual chiller coolant connections

Table 16 - Coolant flow requirements

Flow (L/min)	SR 10 AOM	SR 25 AOM
Laser/DC power supply minimum flow	≥ 4	≥ 5
Laser/DC power supply recommended flow	≥ 5	≥ 6
AOM module minimum flow	≥ 2	≥ 2
AOM module recommended flow	≥ 3	≥ 3



Risk of damage to optical components within the AOM module

The coolant pressure within the AOM module must not exceed 3bar. Higher pressures may cause leakage within the module resulting in irreversible damage to optical components.

An inline pressure regulator, set to 3bar, is supplied with the system and must be fitted to the coolant inlet pipe as shown in the following figure. The pressure regulator is directional and must be fitted with the arrow in the same sense as the coolant flow (pointing toward the inlet connector).

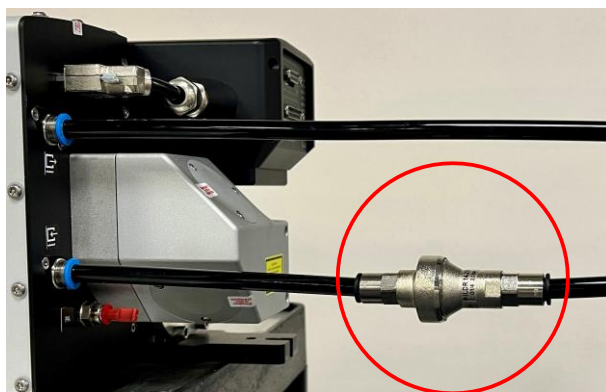
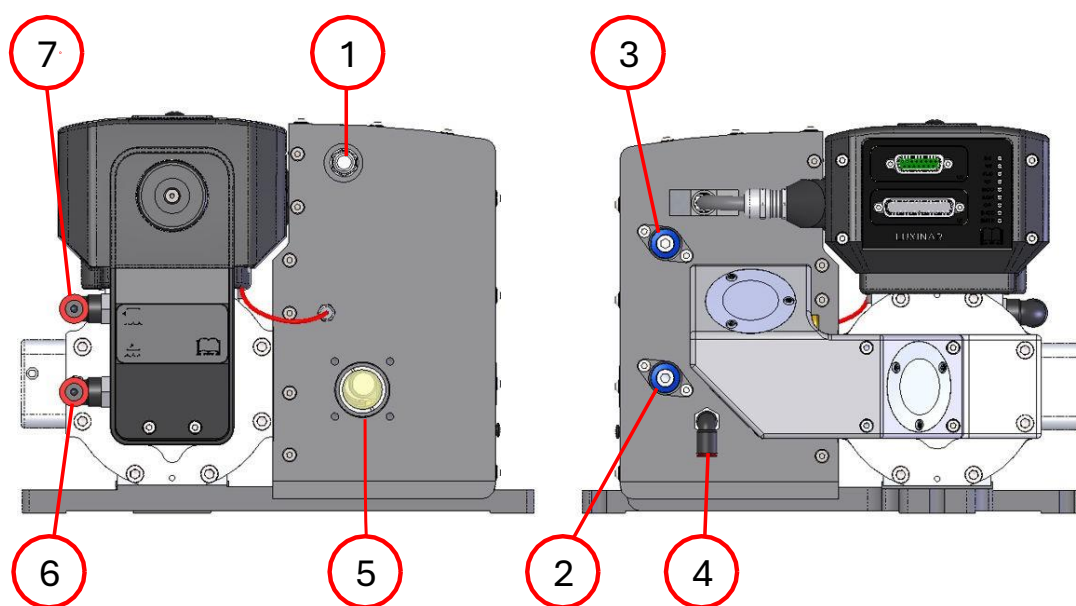


Figure 18 - AOM module pressure regulator

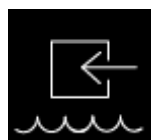


- 1 AOM module fuse
- 2 AOM module coolant inlet
- 3 AOM module coolant outlet
- 4 Optics purge gas inlet
- 5 Beam delivery mounting position
- 6 Laser resonator/DC power supply coolant inlet
- 7 Laser resonator/DC power supply coolant outlet

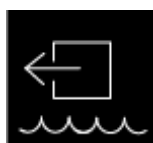
Figure 19 - Coolant and gas purge connections

Coolant inlet and outlet connectors are marked with the following symbols (direction depends on the label location):

- Coolant in



- Coolant out



Important!

- Materials used in the external cooling circuit must be chosen to avoid corrosion. Never use aluminium, zinc, mild steel or cast iron components. Suitable materials are stainless steel, copper, copper alloys and opaque plastics. Only use pipework that is impervious to light in order to reduce the possibility of bacterial contamination of the cooling system.
- The coolant temperature must be kept above the dew point in order to prevent formation of condensation on internal laser components.
- Completely drain the cooling system before shipment or storage.

Beam delivery optics purge gas

If the internal or external beam delivery is contaminated with fume, water vapour or debris then these contaminants can absorb the laser energy and cause laser power fluctuations and steering of the laser beam. In severe cases, laser optics can be contaminated and damaged.

The laser internal beam delivery is fitted with an optics purge system using contaminant-free compressed air or nitrogen.

A non-return check valve is fitted to the internal beam delivery. The check valve opens and allows the excess purge pressure to escape.

Once the purge pressure has dropped to the correct pressure, the valve will close automatically, preventing dust, moisture and contaminants from entering the optical system.

Electrical power connections

The laser requires a 50V DC power supply, either supplied locally or available from Luxinar. For specifications refer to [page 16](#).

The connecting cable cross-section depends on the laser model and cable length. Refer to the following table for cable selection.

Table 17 - DC power supply cable specification

Model	Cable length	Cross-section
SR 10 AOM	Up to 10m	16mm ²
SR 10 AOM	10m up to 16m maximum	25mm ²
SR 25 AOM	Up to 4m	16mm ²
SR 25 AOM	4m up to 6m maximum	25mm ²



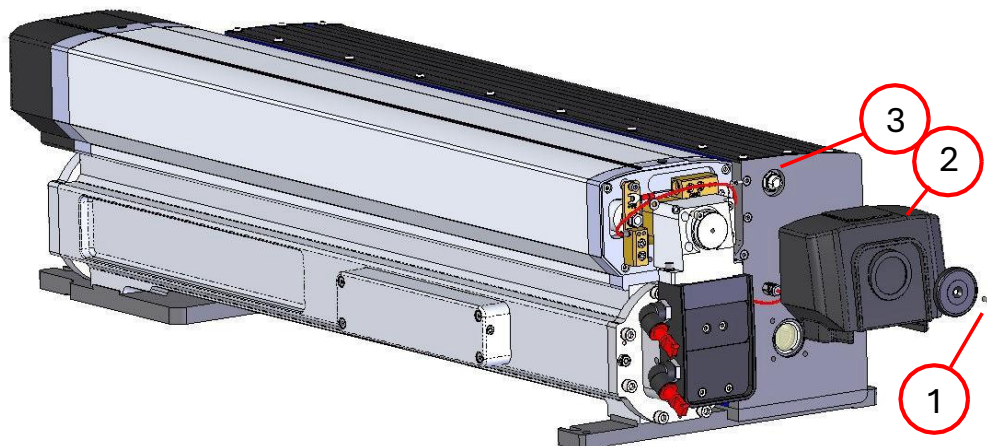
Risk of electric shock or severe damage to the equipment

Ensure that the equipment is disconnected from the mains supply before making this connection.

Respect the polarity of the terminals on the power supply and the laser.

To connect the cables to the laser:

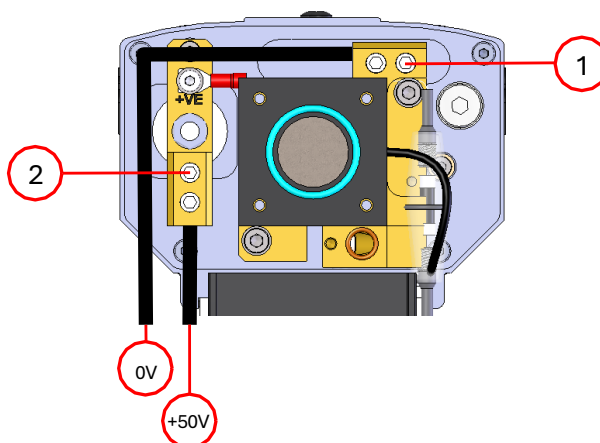
1. Remove the cover (2) from the rear end of the laser by unscrewing the securing screw (1).



- 1 Cover fixing screw
- 2 Cover
- 3 AOM fuse holder

Figure 20 - Pre-ioniser and AOM fuse locations

The terminals are marked as **+VE** (2) and **Ground** (1).



2. Clamp the cables securely in the terminals using the two clamp screws on each terminal
3. Replace the cover and secure it with the securing screw. Care should be taken when fitting the cover. Ensure the pre-ioniser cable is not trapped or crushed when fastening.

Beam delivery



Risk of damage to the laser output window mount

The laser output window mount is not capable of supporting a beam delivery. Always provide strong and stable mechanical support for the beam delivery and other external optics.

Important!

Remove the blanking cap from the output window before attempting to attach the beam delivery.

Attach the beam delivery to the four M5 x 8Dp mounting holes around the output window mount. The holes are equispaced on a 44.0mm pitch circle diameter.

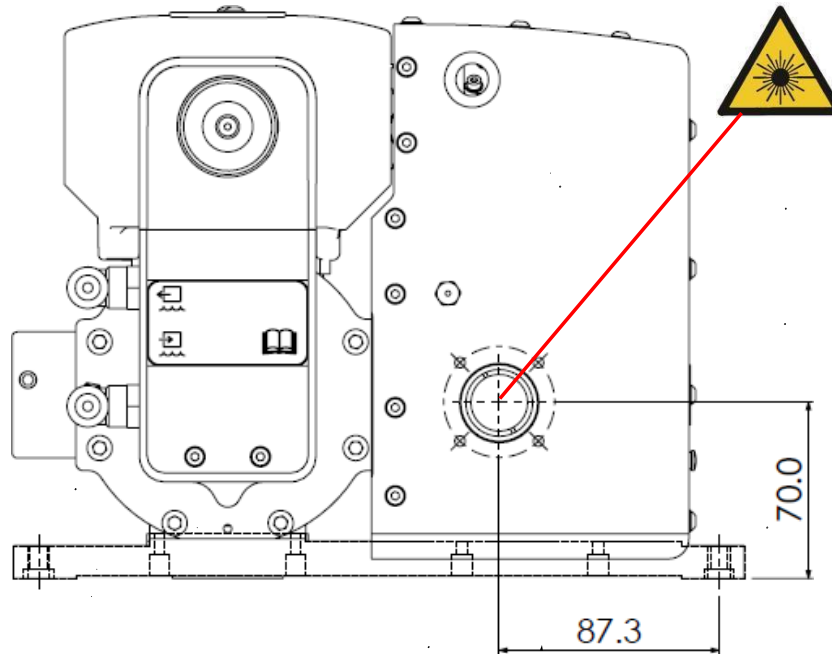


Figure 21

Note: SR AOM lasers have a visible light laser diode pointer to assist with beam delivery alignment. The rated power of the laser diode pointer is 4mW.



WARNING



Class 3R visible laser radiation

Avoid eye exposure to direct and scattered radiation.

Section 7

Transport and recommissioning

Before transporting the laser, observe the following precautions:

- Completely drain the laser cooling system to prevent damage during shipping. Use clean compressed air, at a maximum pressure of 2bar, to blow out all traces of coolant in the cooling system pipework.
Failure to remove coolant from the system prior to transport can cause damage to the laser. Damage caused in this way will invalidate the warranty.
- If the external beam delivery has been removed, replace the output window protection cap to prevent damage or contamination during shipping.

Section 8

Interfacing

User interface connections for SR AOM lasers are made through the 25-pin and 15-pin connectors on the rear panel. Pin connections depend on the laser version.

Important!

Under certain conditions, it may be possible for power cables carrying high voltages and currents to emit electrical noise levels that may interfere with control cable signals.
To eliminate the possibility of interference, control signal cables must be screened and routed along a different path to power cables.
Ensure that high quality screened cables and connectors are used, and that the cable screen is connected to ground.



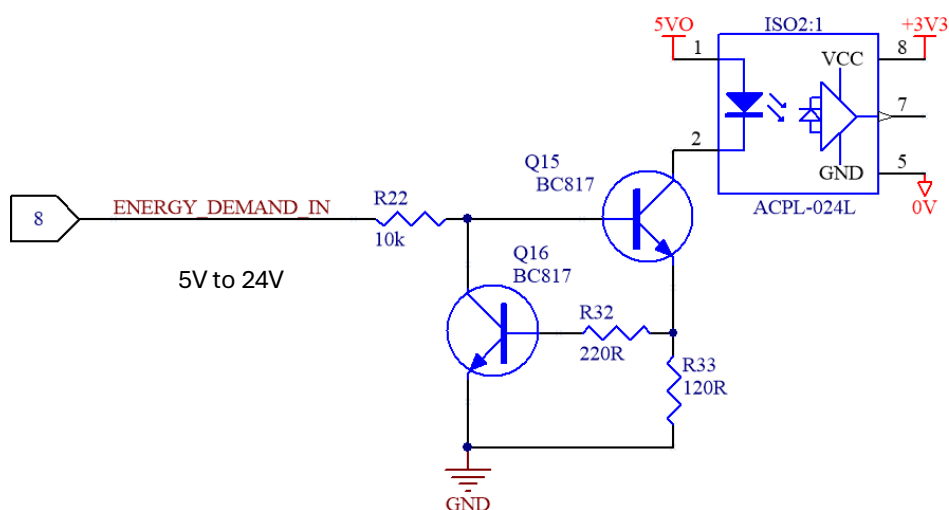
Figure 22 - U1 and U2 connector locations

Table 18 - U1 pin designations

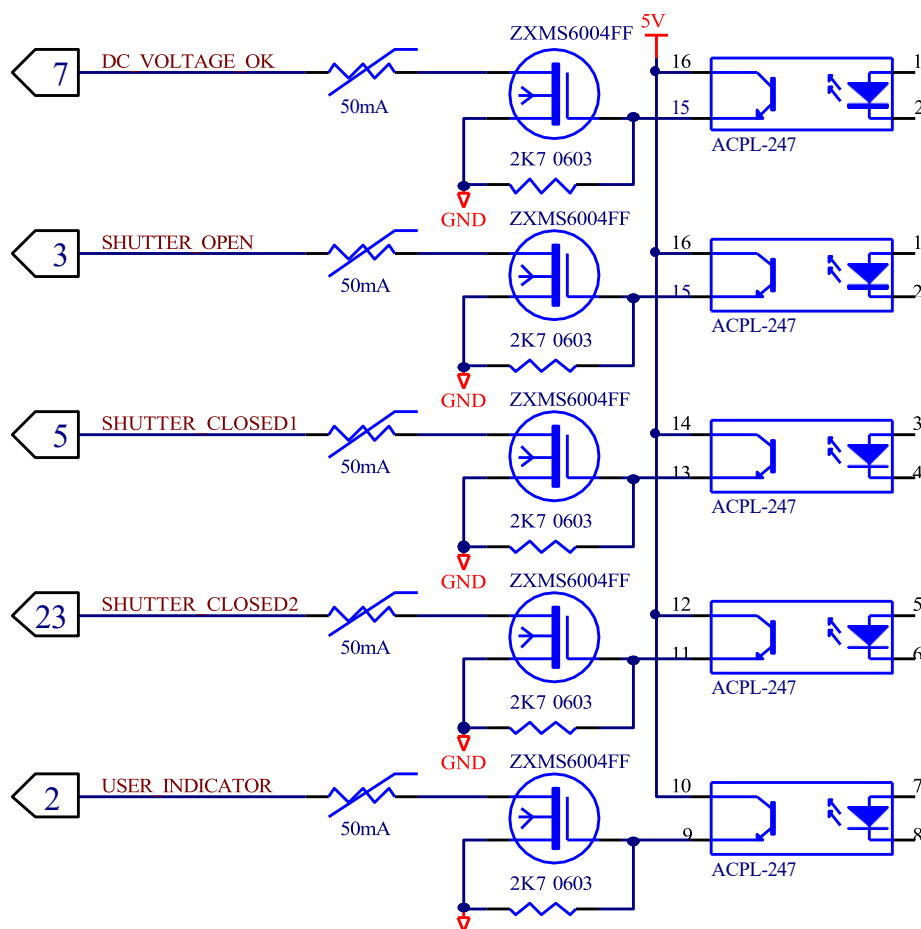
Pin N°	Function	I/O type	Signal
1	Shutter enable	Input	5–24V
2	User indicator	Output, open drain	5–24V @ 50mA
3	Shutter open	Output, open drain	5–24V @ 50mA
4	Ground	Ground	—
5	Shutter closed 1	Output, open drain	5–24V @ 50mA
6	Ground	Ground	—
7	DC voltage OK	Output, open drain	5–24V @ 50mA
8	Energy demand	Input	5–24V
9	Not used	—	—
10	Reflected RF signal	Output, open drain	0–3V analogue
11	Forward RF signal	Output, open drain	0–3V analogue
12	RF enable	Input	0V/5–24V

13	Not used	—	—
14	Not used	—	—
15	Overmodulation	Output, open drain	0–5V
16	+ VSWR status	RS422 output (+)	0.5–3.5V
17	- VSWR status	RS422 output (-)	3.5–0.5V
18	TX	RS232 output	-6 to +6V
19	External interlock return	Input	5–24V
20	External interlock	Output	5V @ 50mA
21	Diode enable	Opto-isolated input	5–24V
22	RX	RS232 input	-6 to +6V
23	Shutter closed 2	Output, open drain	5–24V @ 50mA
24	Laser enable	Input	0V
25	Ground	Ground	—

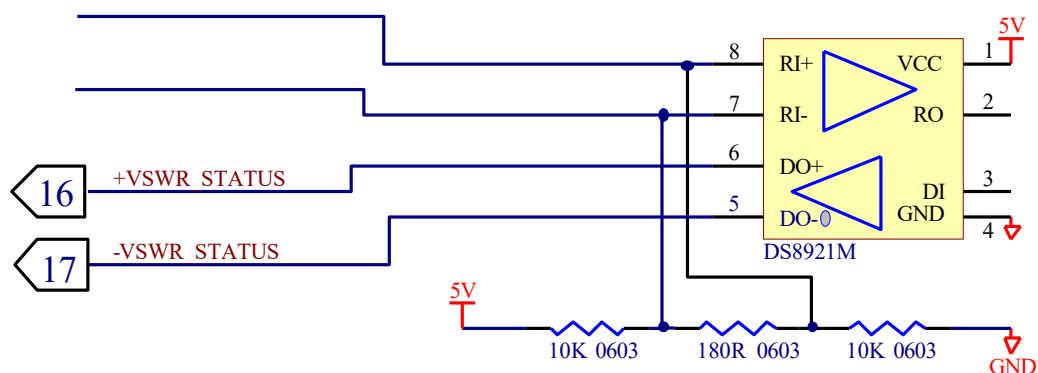
Energy demand signal



Status monitoring signals

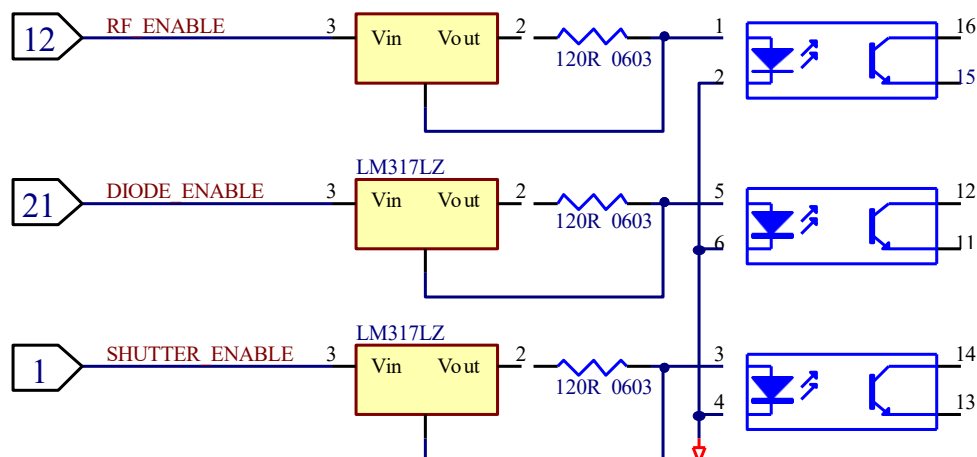


Monitoring input and VSWR status



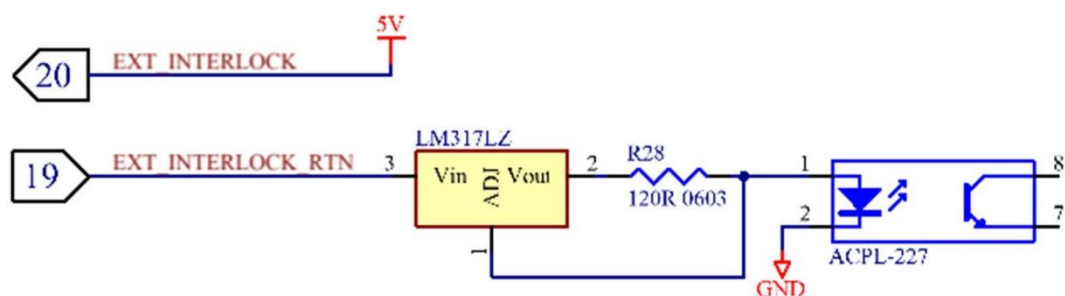
VSWR status output (pins 16 and 17, RS422) — RF power supply or laser tube problem. Laser output is reduced.

Enable signals

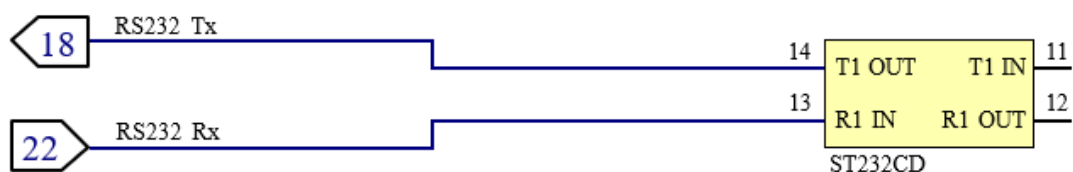


- **RF enable (pin 12)**
Pull the input high (5–24V) to enable the laser.
- **Diode enable (pin 21)**
Pull the input high (5–24V) to switch on the pointing laser.
- **Shutter enable (pin 1)**
Pull the input high (5–24V) to enable the shutter.

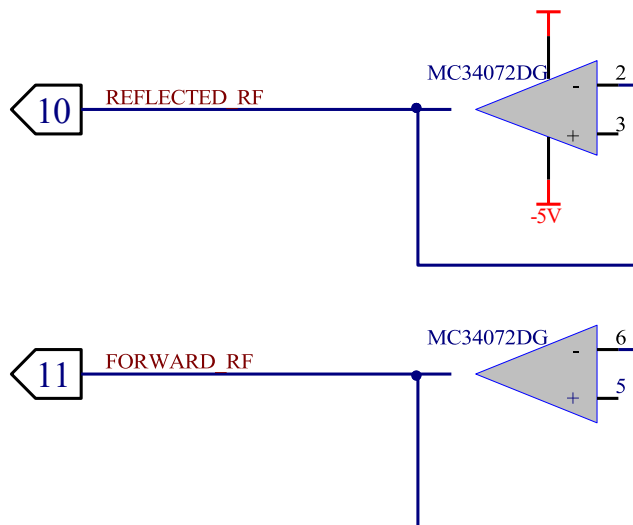
External interlock



RS232 signals

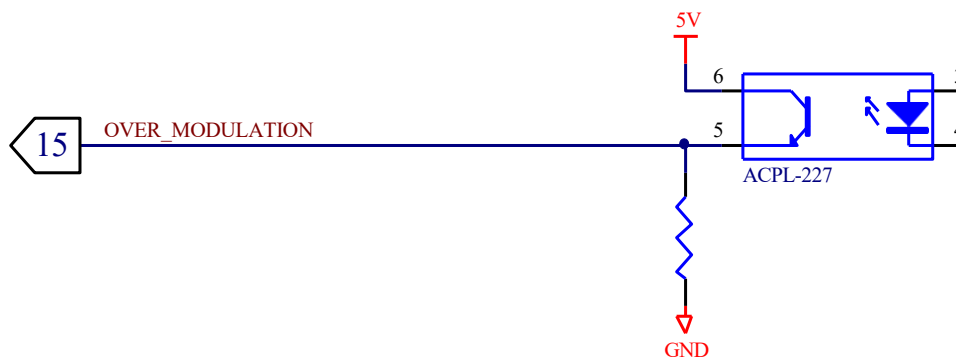


RF forward and reflection signal monitoring



- **RF forward output (pin 11, analogue)**
Signal proportional to the forward RF voltage.
- **RF reflected output (pin 10, analogue)**
Signal proportional to the reflected RF voltage.

Overmodulation



Active low output indicating overmodulation

Ground connection

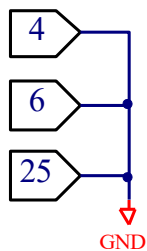
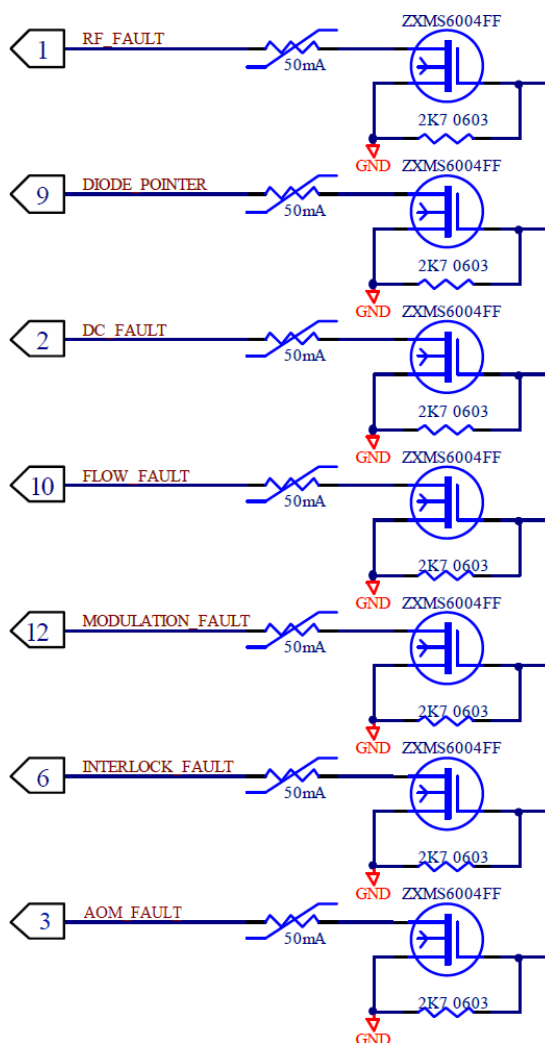


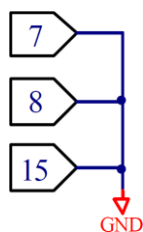
Table 19 - U2 pin designations

Pin N°	Function	I/O type	Signal
1	RF Fault	Output	5-24V @ 50mA
2	DC Fault	Output	5-24V @ 50mA
3	AOM Fault	Output	5-24V @ 50mA
4	Not used	—	—
5	Not used	—	—
6	Interlock Fault	Output	5-24V @ 50mA
7	Ground (0V)	Ground	—
8	Ground (0V)	Ground	—
9	Diode Enabled	Output	5-24V @ 50mA
10	Flow Fault	Output	5-24V @ 50mA
11	Not used	—	—
12	Modulation Fault	Output	5-24V @ 50mA
13	Not used	—	—
14	Not used	—	—
15	Ground (0V)	Ground	—

Diagnostic signals



Ground connection



Minimum interface connections for laser output

- Connect the DC power supply.
- Enable the external **Interlock** by connecting an interlock switch between U1, pins 19 and 20.
- Enable **RF enable** by connecting 5–24V to U1, pin12.
- Enable **Shutter enable** by applying a 5–24V signal to U1, pin1.
- Enable **Diode enable** by applying a 5–24V signal to U1, pin 21 (for lasers fitted with the optional diode pointing laser).
- Enable the **Laser enable** by connecting U1, pin 24 to ground (0V).

Important!

The **Laser enable** signal must be switched to ground to enable laser operation but must *not* be permanently connected to ground. If laser operation is interrupted, a transition in the **Laser enable** signal must be received for in order to restart the laser.

- Connect the RS232 Tx and Rx on U1, pins 18 & 22 to the remote terminal (optional).
- Connect the required 5–24V **Energy demand** signal to U1, pin 8.
- Connect U1, pin 25 to ground.

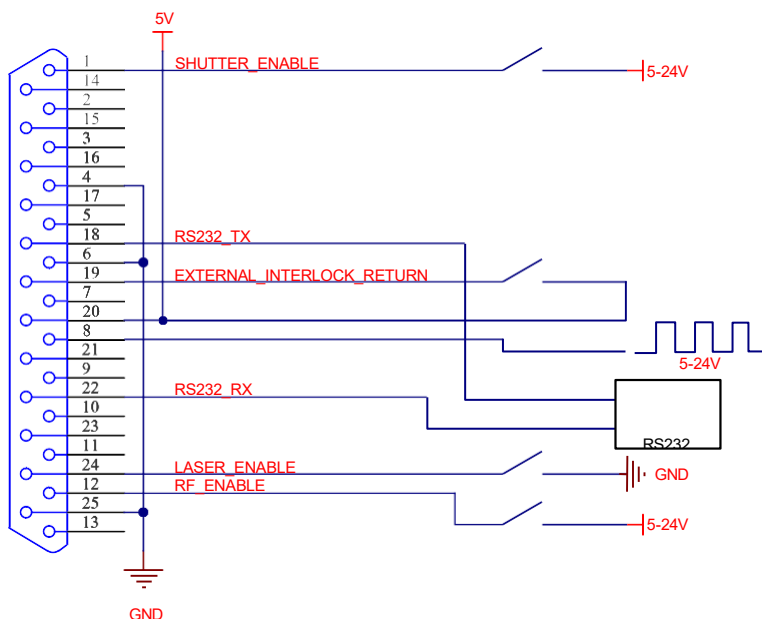


Figure 23 - SR AOM — minimum interface connections

RS232 serial interface

Refer to the Serial Interface Specification (part number 906-0109-00) for details of RS232 commands. In addition, the following RS232 commands are used to monitor coolant status for SR AOM lasers:

ID	Description	Parameters	Reply	Comment
59	Water inlet temperature	N/A	\$59 <Temperature[3]>	Returns the water inlet temperature in hundreds of °C.
5A	AOM temperature and humidity	N/A	\$5A <Temperature[3]> <Humidity[3]>	Returns the AOM temperature in hundreds of °C.
5B	AOM water flow	N/A	\$5B <Flow [3]>	Returns the water flow inside the AOM enclosure.

Diffraction Efficiency Control

The acousto-optic modulator (AOM) in the SR 10 AOM and SR 25 AOM systems is factory-calibrated to operate at its optimal diffraction efficiency. This setting ensures the maximum available peak laser output power when the AOM energy demand signal is applied.

In some applications, it may be necessary to reduce the peak laser output power. This can be achieved by lowering the diffraction efficiency of the AOM using a digital potentiometer, which is controlled via the system's RS232 interface.

The digital potentiometer supports values from 0 to 255 in 1-bit increments. During factory testing, the potentiometer is adjusted to determine the value that yields the maximum peak laser output power. This value is stored as the upper limit and cannot be exceeded by the user. Users can adjust the potentiometer within the range of 0 to this upper limit, allowing control of the laser's peak output power from minimum to maximum.

Refer to the Serial Interface Specification (Part No. 906-0106-00) for the required RS232 command set.

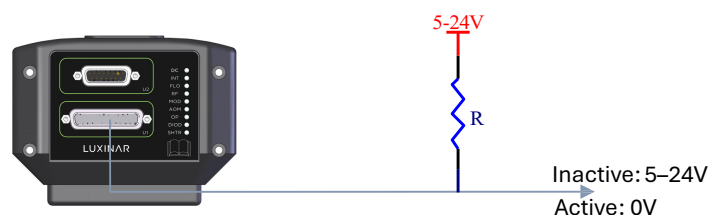
The typical response time between issuing an RS232 command and observing a change in laser output power is approximately 20 ms.

Note: The relationship between potentiometer value and peak laser output power may vary slightly between systems due to differences in characteristics of the installed AOM and driver components. Likewise, the factory-defined upper value for the potentiometer may differ from unit to unit.

Open drain output usage

Open drain status outputs require a pull-up resistor and voltage source (5 – 24V) to be connected to the monitored output. When the signal becomes active, the output falls to 0V.

The following diagram shows a typical connection.



Control signal timings

The following control signal timings must be respected when starting up and operating SR AOM lasers.

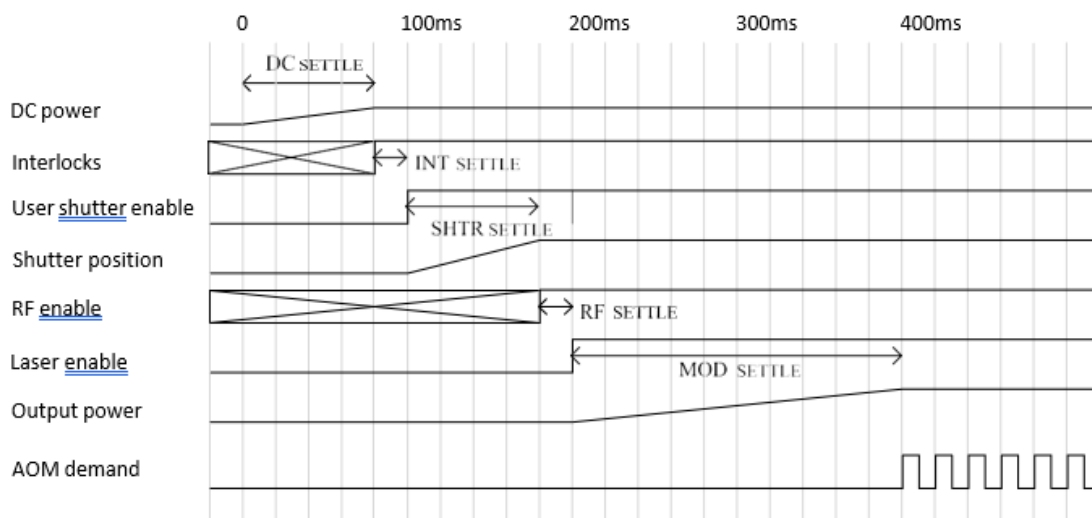


Figure 25 - Control signal startup timing — Initial startup with all signals disabled

1. Enable **DC power** before any other function.
2. The **User shutter enable** signal will take the system from standby mode into execute mode and should be applied at least 80ms after **DC power** is enabled and DC power has stabilised. The shutter will start to open immediately after the **User shutter enable** signal is applied and requires 80ms to fully open.
3. The **Laser enable** signal can be applied once the shutter is fully open. The laser output power into the AOM module then requires 200ms to stabilise before applying the **AOM demand** signal.
4. If required, **Interlocks** and **RF enable** signals can be applied before enabling **DC power**, as shown in the following timing diagram.

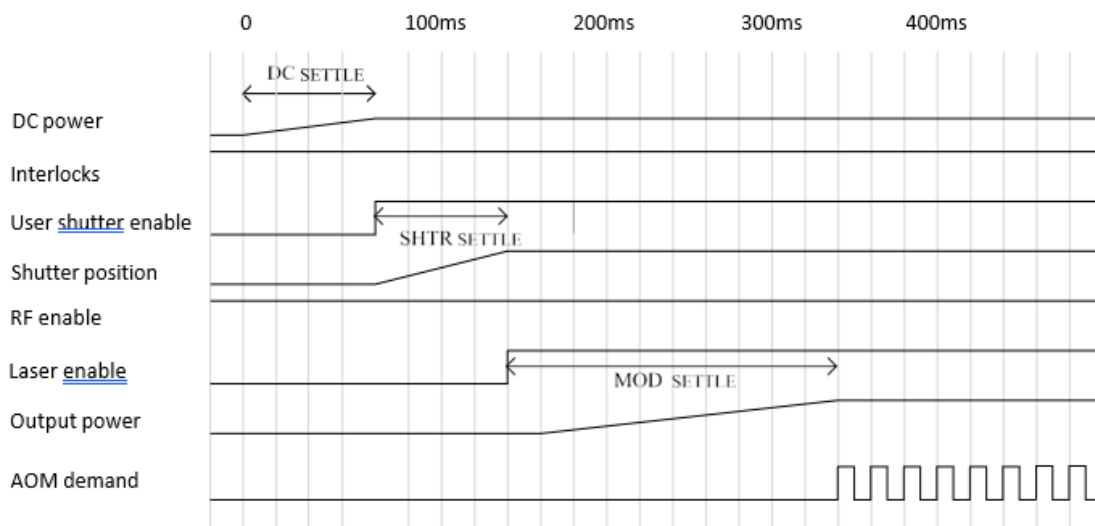


Figure 26 - Startup timing — Interlocks and RF pre-enabled

Table 20 - Parameter settling times

Parameter	Description	Previous required input	Minimum settling time
DC _{SETTLE}	Minimum time for soft-start of the DC power supply.	None	80ms
INT _{SETTLE}	Minimum time for the Interlock signal to propagate through the system.	None	20ms
SHTR _{SETTLE}	Minimum time for the shutter to open after applying the User shutter enable signal.	• DC power • Interlocks	80ms
RF _{SETTLE}	Minimum time for the RF enable signal to propagate through the system.	None	20ms
MOD _{SETTLE}	Minimum time between applying the Laser enable signal and achieving stable laser output into the AOM module.	• DC power • Interlocks • User shutter enable • RF enable	200ms

The dual channel safety critical approach [EN:13849 Performance Level D] requires the system to react to system conditions as follows:

- When the external **Interlock** is disabled, **User shutter enable** and **RF enable** must also be disabled by the machine controller.
- When restarting the system with the external **Interlock** enabled, the control signal startup timing sequence must be followed.

Status indicators

The operational status of the laser is displayed by status indicator lamps on the laser rear panel.



Figure 27 - Laser with power feedback and shutter status indicators

Indicator name	Status monitored
DC	DC PSU
INT	Interlock
FLO	Coolant flow
RF	RF
MOD	Modulation
OP	Operation mode
AOM	AOM
DIOD	Diode laser
SHTR	Shutter

Shutter reset

If an SR AOM laser experiences DC, Interlock, Coolant Flow, Shutter Fault or AOM Fault errors, laser output will terminate and the shutter will close. Once any faults or errors have been rectified, a **Shutter Enable** signal must be re-applied in order to restart the laser.

APPENDIX 2

Coolant requirements and additives

The following requirements concerning water quality and permitted additives must be complied with.

Coolant quality

Table 21 - Coolant quality

Description	Value
Coolant type	De-mineralised, deionised or distilled water with corrosion inhibitor & anti-bacterial treatment
Conductivity	<1000µS/cm
Total hardness	<10ppm
pH value	7–8.5
Bacteria level	<1000cfu/ml

The pH value, conductivity and dissolved solids levels can be measured with a portable meter and the bacteria level can be checked with a test kit. For more information contact your local Luxinar Aftersales office.

Suspended particle removal

To remove particulate contamination, an in-line filter with a pore size of 50µm must be fitted as close as possible to the laser coolant inlet. The filter should be regularly checked for blockages and cleaned or replaced where necessary. This is particularly important after bacterial growth has been detected and anti-bacterial treatment applied. Luxinar can supply a 50µm water filter kit (part number 004-0498-00) and replacement filter cartridges (part number 402-0011-00).

Water filter kit 004-0498-00 consists of a water filter housing, 50µm water filter cartridge and two ¾" BSPT to ½" hose tail connectors. The water filter housing accepts 10" long filter cartridges with 1" inside diameter and 2 ½" outside diameter. Remove the lower section of the filter housing and insert the filter cartridge, making sure that the bottom of the cartridge is seated correctly in the housing. Reattach the upper and lower sections of the housing, using the included spanner to tighten. Attach the provided hose tails (or other suitable water fittings) using thread sealing tape. Insert the filter assembly into the coolant supply before the laser. Connect the water supply from the chiller to the "IN" port of the filter housing and connect the "OUT" port of the filter housing to the laser, ensuring that the hoses are securely fastened to the hose tails using hose clips or equivalent. The water filter housing includes a mounting bracket which can be used to mount the filter to a suitable surface.

To change the filter cartridge, turn off and drain the coolant supply. Press the red button on the top of the filter housing to release the internal water pressure. Remove the lower section of the housing using the spanner if necessary. Remove the old filter cartridge and replace with a new 50 µm cartridge following the instructions above.



- 1 Water filter housing
- 2 Spanner
- 3 50µm water filter cartridge
- 4 ¾" BSPT to ½" hose tail connectors

Figure 28 - Water filter kit components



Figure 29 - Assembled water filter



- 1 IN from chiller
- 2 OUT to laser

Figure 30 - Water filter connections

Corrosion and anti-bacterial inhibitor

To prevent bacterial formation and corrosion of the cooling water circuit, Luxinar has tested and approved a specialist water treatment kit which is manufactured by NALCO.

Three water treatment kits are available, dependant on the total volume of the cooling water circuit to be used:

Circuit volume	Reference
50–199L	Order No.: 480-WTK-YM20.88
200–350L	Order No.: 480-WTK-YM60.88
351–500L	Order No.: 480-WTK-YM100.88

Order water treatment kits directly from NALCO at:

Nalco Deutschland GmbH,
Solmstraße 41
60486 Frankfurt am Main
Germany
Tel.: +49 69 7934-0
Customer service tel.: +49 7141 703 216
E-mail: custserv.germany@nalco.com

NALCO are equipped to ship kits worldwide.

- **Expiration period**
Two years
- **Storage temperature**
0–25°C
- **Disposal of used material**
Ensure that the disposal of all the materials used in this product is conducted according to all local and national regulations.
- **Instructions for use**
Completely empty both inhibitor bottles which are included with the NALCO kit into the cooling water reservoir tank. After mixing the NALCO chemicals with the cooling water, the pH value should be between 6.5 and 9.0.



WARNING

Risk of injury to eyes

Use appropriate eye protection when handling chemicals used in the NALCO water treatment kit.

- NALCO 73199 is a multi-metal corrosion inhibitor to ensure effective protection against corrosion of stainless steel, copper and copper alloys and it also works as a bacteriostatic and hardness stabiliser.
- NALCO 7330 is a biocide which removes bacteria and organic contamination (algae and slime) from the water circuit.

NALCO 73199 and 7330 are completely compatible with glycol. The glycol should be without any inhibitor (concentration 30–35% glycol in demineralised water).

The use of inhibitors, biocides, other substances or hardness stabilisers other than the specialist NALCO kit may cause premature failure of the laser. It is the user's responsibility to ensure that the specification of any alternative additive is equivalent to that of the NALCO additive.

- **Cooling system maintenance**

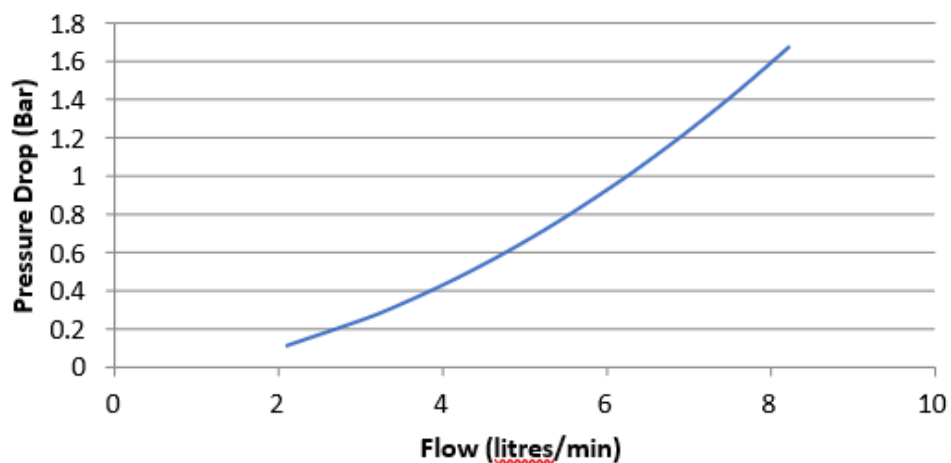
After six months of operation, drain off the coolant and refill with fresh water treated with the appropriate NALCO kit or equivalent anti-bacterial product, as specified in [Table 21](#).

Ensure that the disposal of all the materials used in this product is conducted according to all local and national regulations.

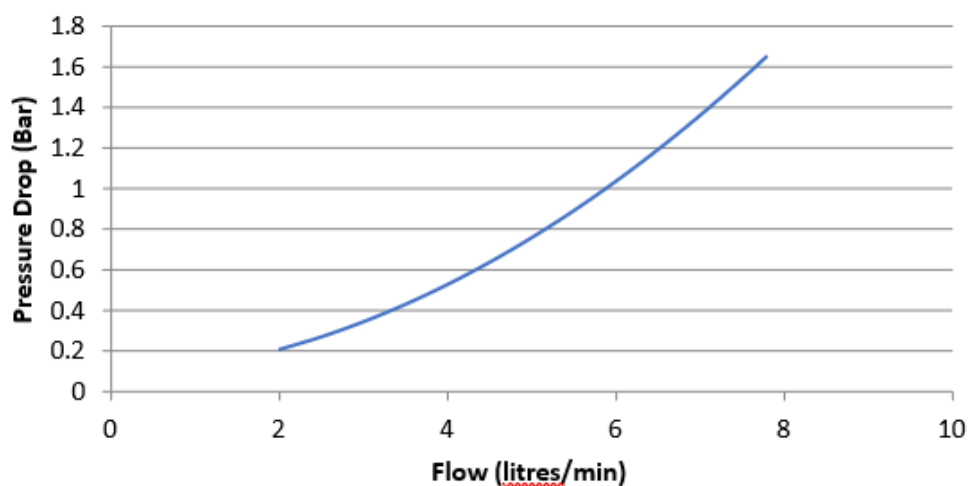
APPENDIX 3

Cooling system pressure drop curves

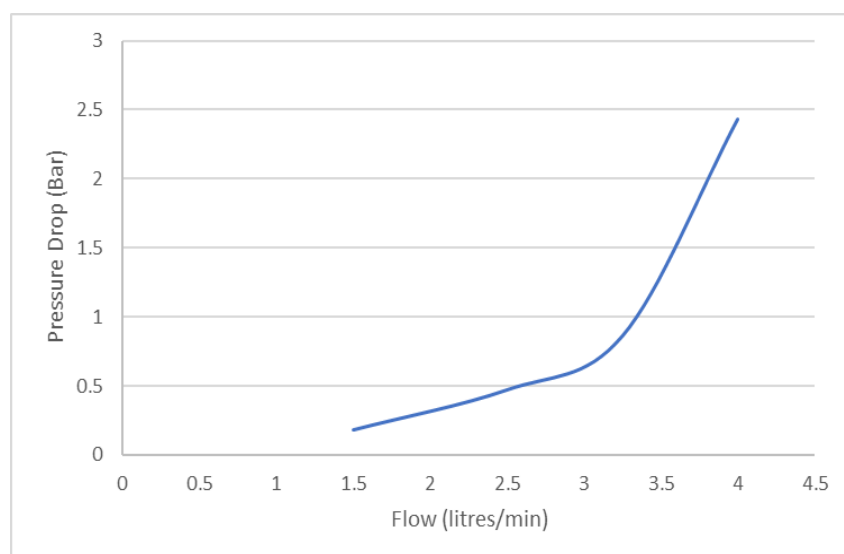
SR 10 AOM resonator and power supplies



SR 25 AOM resonator and power supplies

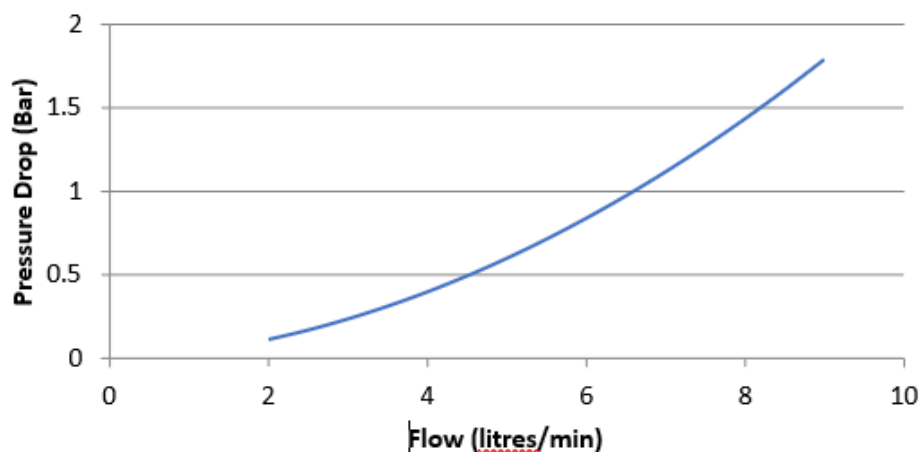


AOM module

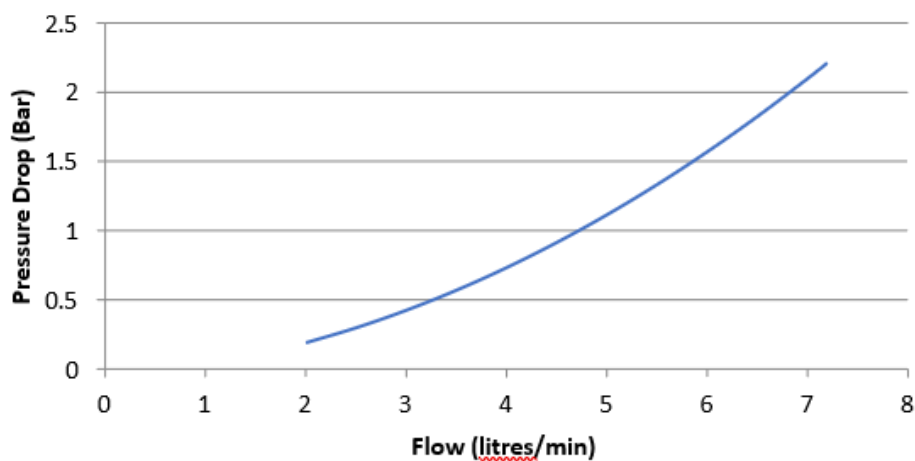


Note: This pressure drop graph shows the drop through the AOM module with a 3bar pressure limiting regulator fitted to the inlet of the AOM coolant circuit.

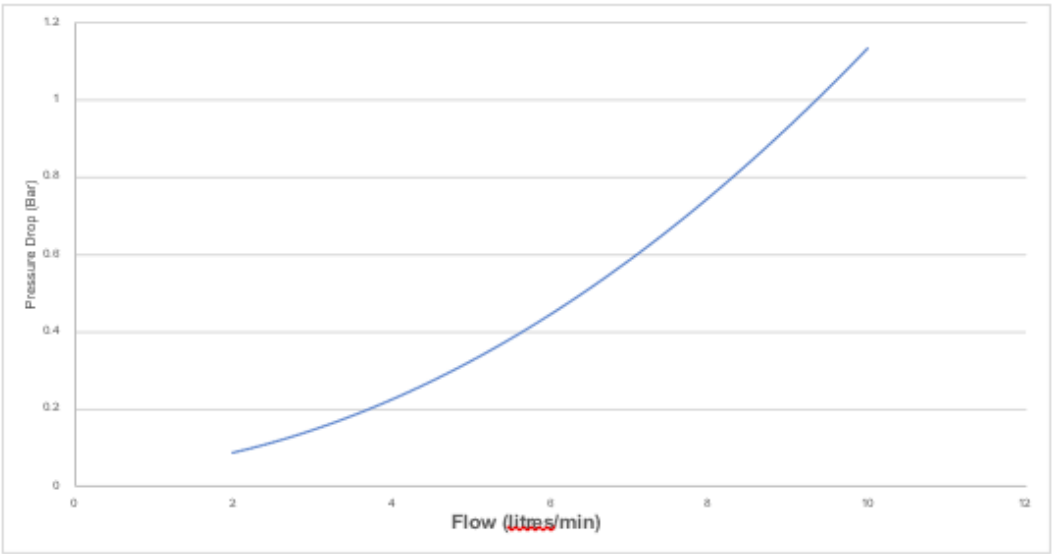
SR 10 DC power supply



SR 25 single-phase DC power supply



SR three-phase DC power supply



APPENDIX 4

DC power supply options

Note: This equipment is designed for overvoltage category II as defined within EN 61010-1:2010+A1:2019.

DC 3kW single-phase DC power supply

General description

The DC 3kW is a 3U, 19" rack mountable, DC 3kW power supply. (PSU)

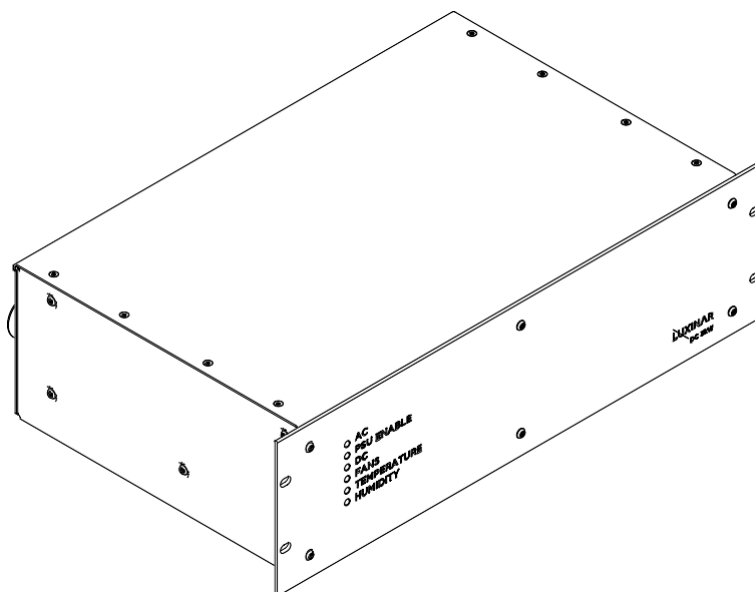


Figure 31 - DC 3kW single-phase DC power supply

Specification

Table 22 - Dimensions, weight and cooling

Dimensions (mm) LxWxH	483x286x132 (3U rack height)
Weight	11kg
Coolant type	Deionised water with anti-bacterial additive
Coolant pipe	10mm OD
Coolant flow rate	Refer to page 16 .

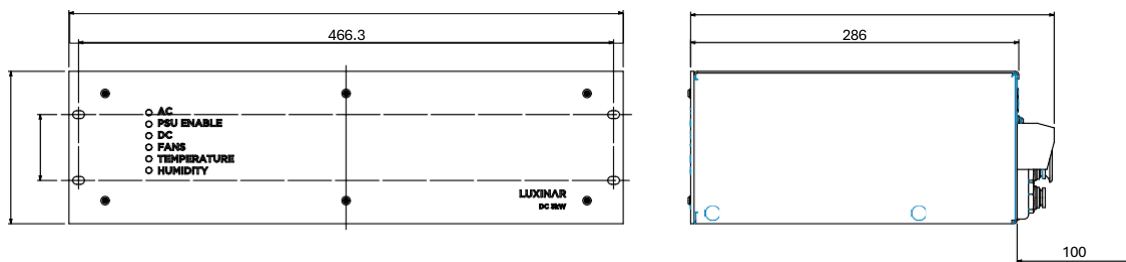


Figure 32 - Overall dimensions

1 Clearance for cabling and

1

Table 23 - Electrical specifications

DC 3kW	
Input voltage range	230VAC $\pm$ 10% (single/bi-phase)
Mains input frequency range	50–60Hz
Mains input fuse rating	20A
AC inrush current (max.)	60A
Output voltage (DC)	50V
Output current (max.)	62.5A
Power factor	> 0.90 at full power
Power consumption (max.)	3kW at pulsed full power
Earth leakage current	< 4mA

Important!

An external disconnect device must be fitted at the time of installation, and must be accessible without needing to use a tool. This must be suitably located and easily reached and must be marked as the disconnecting device for the power supply.

Installation

Mechanical installation

Using suitable fixings, mount the power supply within the OEM machine racking using the four mounting holes shown in the following figure.

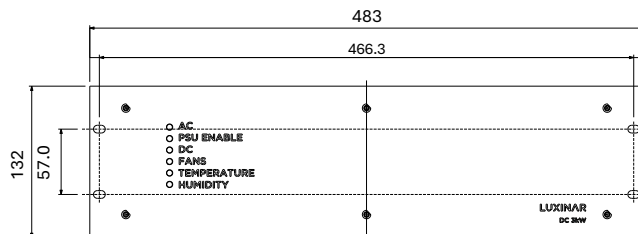


Figure 33 - Fixing locations

Mains AC power connections

Important!

Under certain conditions, it may be possible for high voltage and current cables to emit noise energy levels that may interfere with control signal cables. To eliminate the possibility of interference, cables carrying control signals should be routed along a different path to power cables.

The power supply is provided with a mains supply cable. If this cable needs to be replaced with a longer cable, ensure the replacement cable is of the correct rating for the power supply.

Note: The **L1** and **L2** terminals are internally fused by 16A μ R fuses.



DANGER



Risk of electric shock or severe damage to the equipment

Ensure that the equipment is disconnected from the mains supply before making this connection.

To replace the cable:

1. Remove the access panel on the rear of the power supply by unfastening the four fixing screws.

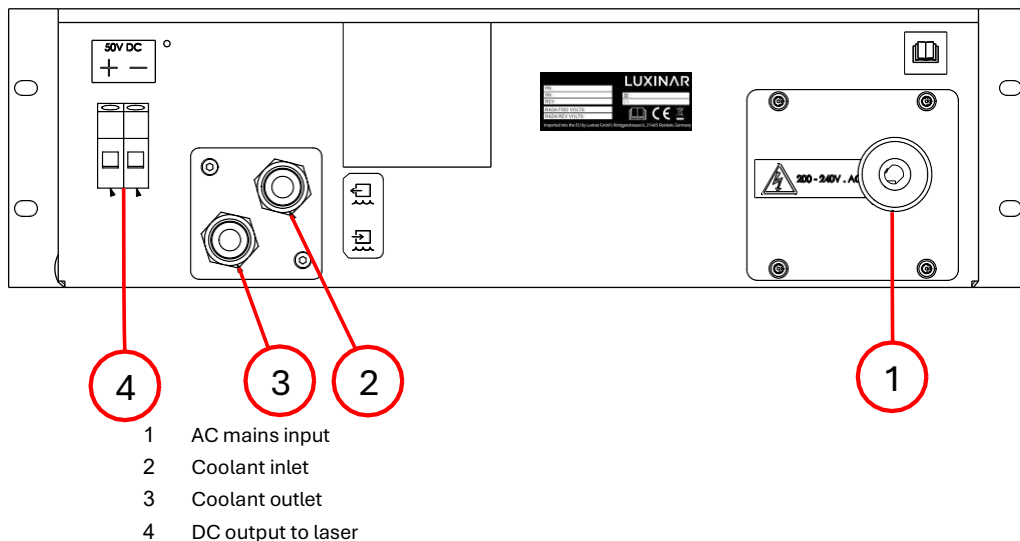
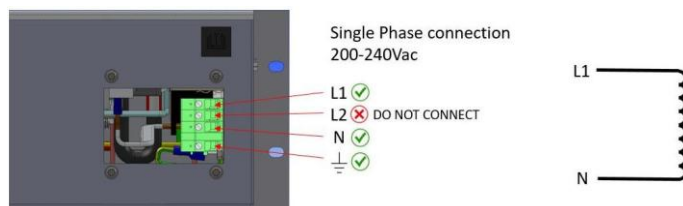
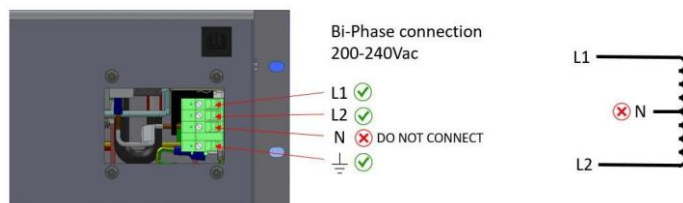


Figure 34 - AC mains connection point

2. Remove the supplied cable from the connector. and replace it with the alternative cable in either single or bi-phase configuration.
- **Single phase configuration**
Connect the phase to the **L1** terminal and neutral to the **N** terminal. Do not use the **L2** terminal.



- **Bi-phase connection**
Connect phase 1 to the **L1** terminal and phase 2 to the **L2** terminal. Do not use the **N** terminal.



Important!

Ensure that the earth connection is well-made in both cases.

DC laser supply cables

DC power cables must be securely fitted to the connectors provided on the rear of the power supply and on the laser system.

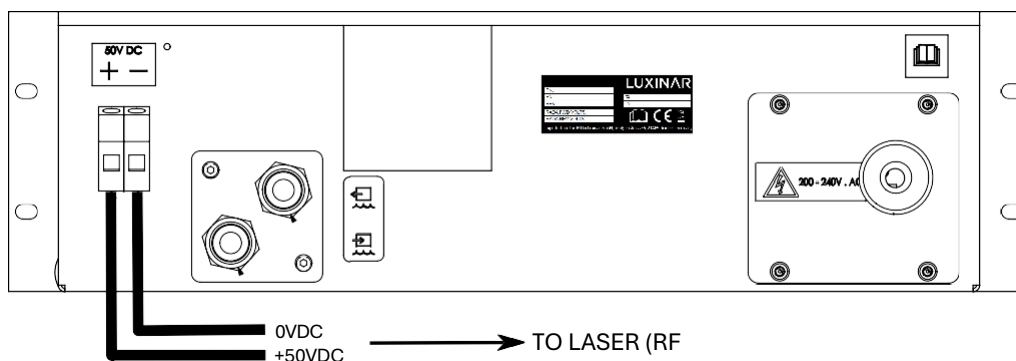


Figure 35 - DC cable connections

DC power cables of the correct specification can be supplied by Luxinar.

Cooling system connections

The power supply requires a liquid cooling source. It is recommended that it is connected in series with the laser system cooling circuit. The coolant connections are located on the rear of the power supply. See [page 31](#).

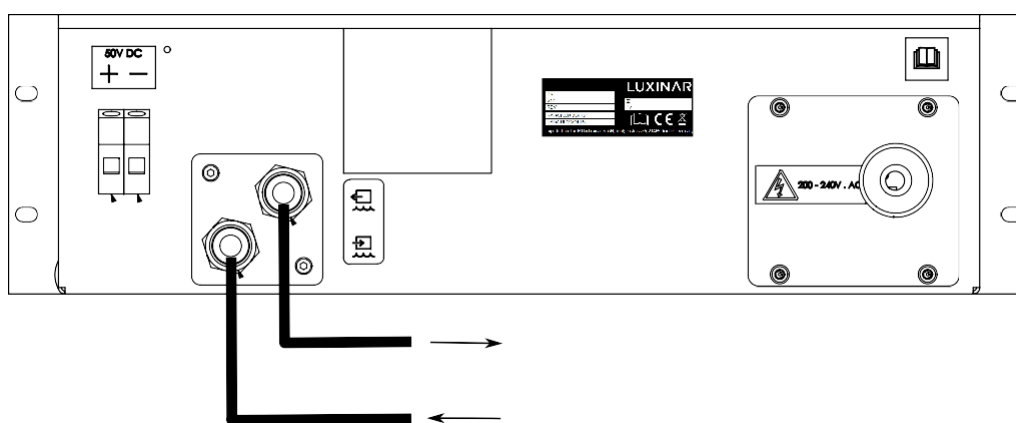
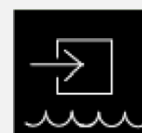


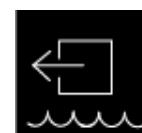
Figure 36 - Coolant connectors

The coolant inlet and outlet connectors are labelled as shown below.

Coolant IN



Coolant OUT



Operation

The power supply has no user controls. When powered up, it will automatically carry out diagnostic checks. If no faults are detected, the status indicators on the front panel all display green and the DC output is enabled. *50VDC will be present.*

If faults are detected, one or more status indicators will be off or displaying red/amber. For a status indicator explanation, refer to the following table.

Indicator	Status definition
AC	 No AC voltage  AC input OK  AC voltage out of range
PSU ENABLED	 PSU disabled  PSU enabled
DC	 DC module off  DC module OK  DC module fault
FANS	 Internal fans off  Internal fans OK  Internal fans fault
TEMPERATURE	 Temperature OK  Temperature too high
HUMIDITY	 Humidity sensor not fitted  Humidity OK  Humidity too high

SR 25i single-phase DC power supply (005-0595-00)

General description

The SR 25i single-phase power supply is a free-standing AC to DC liquid cooled power supply. (PSU)

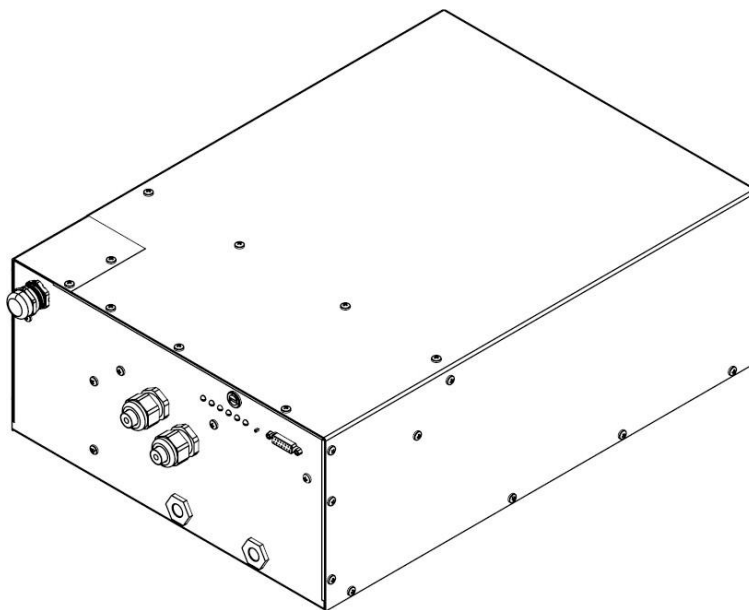


Figure 37 - SR 25i single-phase DC power supply

Specification


WARNING


Heavy equipment — risk of severe lumbar injury

The weight of the DC power supply exceeds the single person lift limit of 18kg, as specified in EN 61010-1:2010+A1:2019. Ensure a minimum of two people lift the power supply or that suitable lifting equipment is employed.

Table 24 - Dimensions, weight and cooling

Dimensions (mm) LxWxH	511x371x176
Weight	23kg
Coolant type	Deionised water with anti-bacterial additive
Coolant pipe	10mm OD
Coolant flow rate	Refer to page 16 .

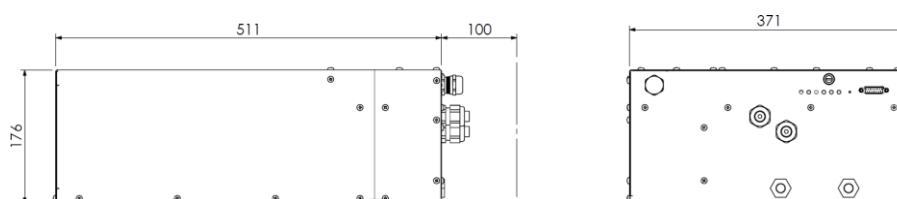


Figure 38 - Overall dimensions

Table 25 - Electrical specifications

SR 25i	
Input voltage range	230VAC $\pm$ 10% (single/bi-phase)
Mains input frequency range	50–60Hz
Mains input fuse rating	40A
AC inrush current (max.)	120A
Output voltage (DC)	50 $\pm$ 1V
Output current	120A
Power factor	>0.95 at full power
Power consumption (max.)	6kW at pulsed full power
Earth leakage current	<4mA

Important!

An external disconnect device must be fitted at the time of installation, and must be accessible without needing to use a tool. This must be suitably located and easily reached and must be marked as the disconnecting device for the power supply.

Installation

Mechanical installation

Using M8 screws, mount the power supply within the OEM machine racking by means of the four mounting holes shown in the following figure.

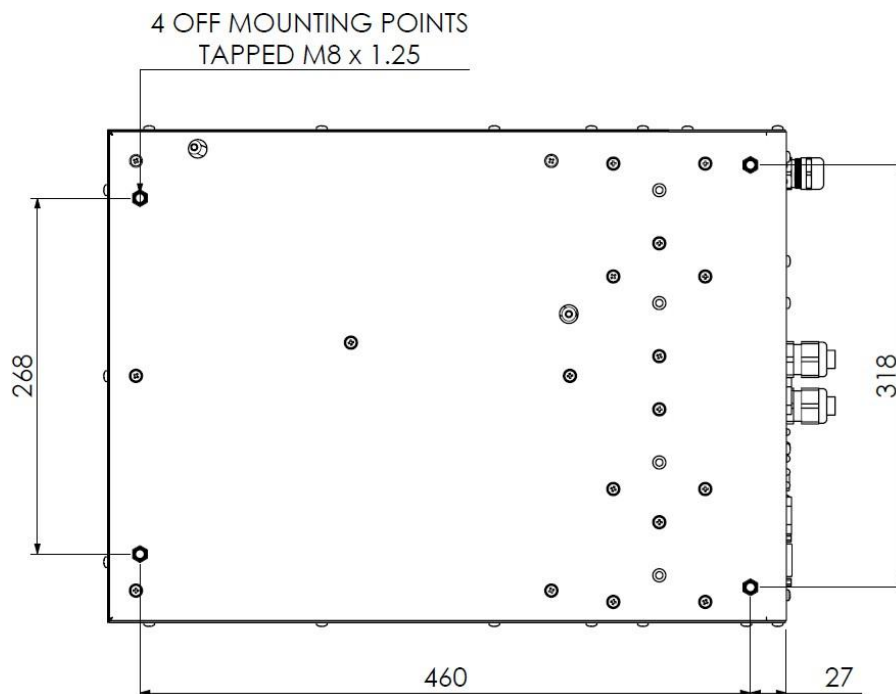


Figure 39 - Fixing locations

Main AC power connections

Important!

Under certain conditions, it may be possible for high voltage and current cables to emit noise energy levels that may interfere with control signal cables. To eliminate the possibility of interference, cables carrying control signals should be routed along a different path to power cables.

The power supply is provided with a 6mm² mains supply cable. If this cable needs to be replaced with a longer cable, ensure the replacement cable is of the correct rating for the power supply.



DANGER

Risk of electric shock or severe damage to the equipment

Ensure that the equipment is disconnected from the mains supply before making this connection.

To replace the cable:

1. Remove the access panel on the rear of the power supply by removing the seven screws.

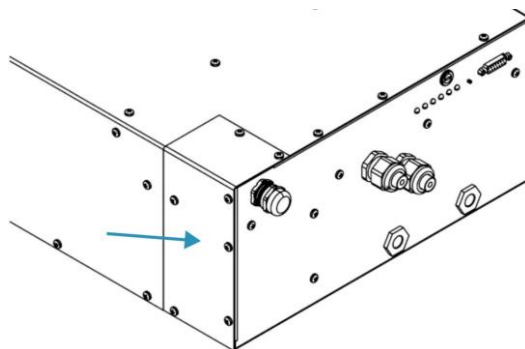


Figure 40 - AC mains power connection point

2. Remove the supplied cable from the connector and replace it with the alternative cable in either single-phase or bi-phase configuration.

Important!

An earth connection is essential. Ensure that the earth wire is connected before connecting the mains supply. For improved EMC performance, Luxinar recommends using a screened cable and terminating the cable screen to the gland.

- **Single-phase configuration**

Connect the phase to the **L1** terminal and the neutral to the **N** terminal. Do not use the **L2** terminal.



- **Bi-phase configuration**

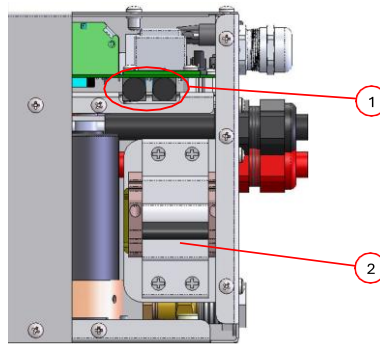
Connect the phase to the **L1** terminal and phase 2 to the **L2** terminal. Do not use the **N** terminal.



Main AC protection device locations

Remove the access panel on the side of the power supply to reveal the AC mains protection devices.

The Miniature Circuit Breaker (MCB) is a 40A type-B device. For correct operation, the reset lever should be in the *up* position with red visible in the MCB window.



- 1 Mains fuses for internal electronics circuits: 1A
- 2 AC mains input MCB: 40A type-B

Figure 41 - AC mains protection devices

DC laser supply cables

DC power cables must be securely fitted to the connectors provided on the rear of the power supply and on the laser system.

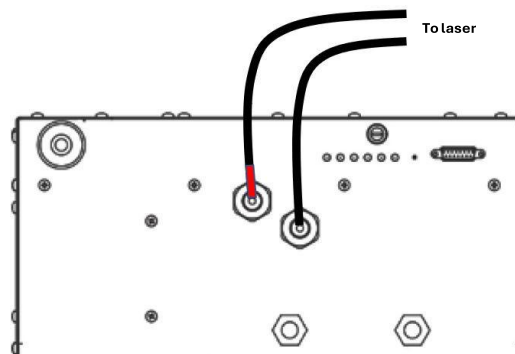


Figure 42 - DC cable connection

DC power cables of the correct specification can be supplied by Luxinar.

DC fuse location

The internal control circuits are powered from the 50VDC output and are protected by a 20mm, 2A fuse located in a fuse holder on the front panel.

Cooling system connections

The power supply requires a liquid cooling source. It is recommended that it is connected in series with the laser system cooling circuit. The coolant connections are located on the front panel. See [page 31](#).

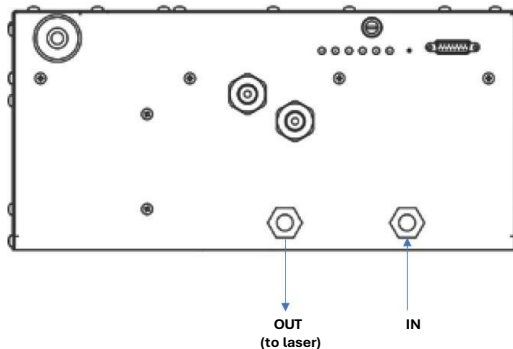


Figure 43 - Coolant connections

The coolant inlet and outlet connectors are labelled as shown in the following table.

Coolant IN		
Coolant OUT		

Operation

The power supply requires a user input to enable it. When powered up, it will automatically carry out diagnostic checks. If no faults are detected, then the DC power supply is ready for use. *50VDC will be present.*

User controls and features are located at the top right corner of the front panel as shown below:

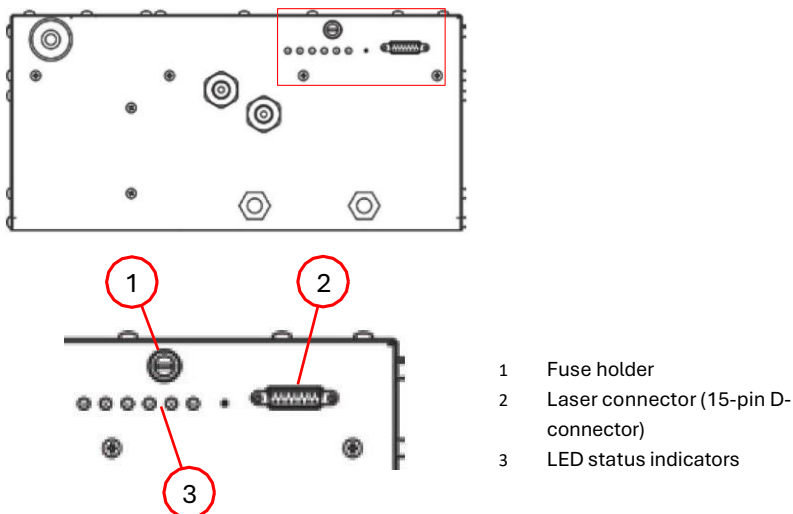


Figure 44 - Interface connector and controls

Fuse holder [1]

This contains a 20mm, 2A fuse connected to the 50VDC output. Its function is to protect the internal control electronics in the event of a fault.

Control connector (15-pin D-connector) [2]

The DC enable circuit is present on this connector. Link pins 13 and 14 using volt-free contacts, such as a relay, to enable the power supply using a remote controller. To permanently enable the power supply, fit the link provided (Luxinar part number 011-0172.00).

- **Pin 13**
DC enable return signal. Link to pin 14 to enable the power supply.
- **Pin 14**
12VDC @ 10mA supply. Link to pin 13 to enable the power supply.

Important!

Disconnecting the permanent or external link will disable the power supply and turn off the 50VDC output.

Table 26 - Control connector

Pin N°	Function	I/O type	Signal
1	DC_OK	Open-drain	5–24V @ 50mA
2	Reserved	—	—
3	Reserved	—	—
4	WARN_Humidity	Open-drain	5–24V @ 50mA
5	Reserved	—	—
6	Reserved	—	—
7	Reserved	—	—
8	Reserved	—	—
9	FAULT_AC	Open-drain	5–24V @ 50mA
10	FAULT_DC	Open-drain	5–24V @ 50mA
11	FAULT_TEMP	Open-drain	5–24V @ 50mA
12	FAULT_FAN	Open-drain	5–24V @ 50mA
13	DC Enable 1	Volt-free contact	Return to pin 14
14	DC Enable 2	Volt-free contact	12V @ 10mA
15	Signal ground	Ground	—

Note: Open-drain status outputs require a pull-up resistor and a voltage source (5–24V) connected to the monitored output. When the signal becomes active, the output is pulled to 0V.

LED status indicators [3]

There are six status indicators to aid troubleshooting. Refer to section below for details.

Troubleshooting

In normal operation, status indicators display green. If faults are detected, at least one indicator will be off or displaying amber or red.



Indicator number	Indicator function	Status definition
1	AC mains voltage status	● AC supply voltage is within specified limits. ● AC supply fault.
2	50V DC enable status	● PSU output is enabled. ○ PSU output is disabled.
3	50V DC output status	● 50V output OK. ○ 50V output is disabled.
4	Power supply temperature status	● Temperature is within specified limits. ● Over-temperature fault on one or more sensors.
5	Power supply internal cooling fan status	● Cooling fan is running at normal speed. ○ 50V output is disabled. ● Cooling fan is stopped or running slowly.
6 (1)	Power supply humidity status	● < 90% relative humidity. ● ≥ 90% relative humidity. ● ≥ 95% relative humidity.

1. If fitted

Note: LED indicators may flash during power up or power down.

SR 25i three-phase DC power supply (016-0035-00)

General description

The SR 25i three-phase DC PSU is a free-standing/rack mountable AC to DC water cooled power supply. (PSU)

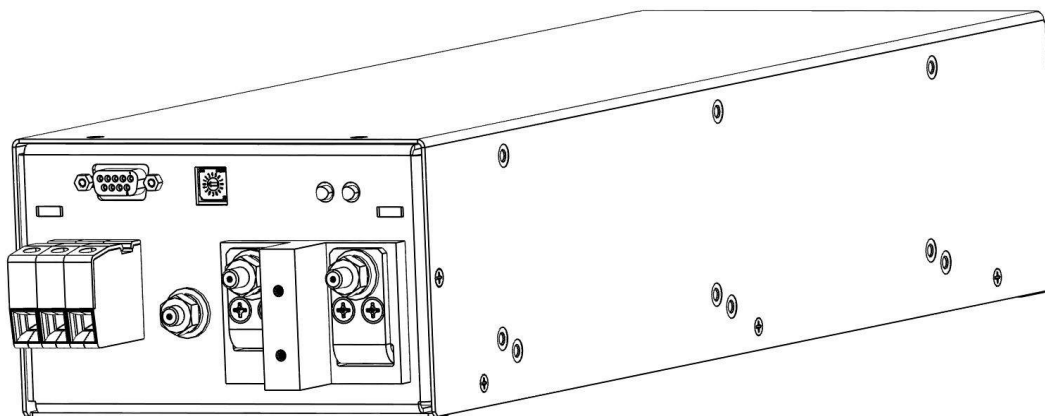


Figure 45 - SR 25i three-phase DC power supply

Specification

Table 27 - Dimensions, weight and cooling

Dimensions (mm) LxWxH	512x149.2x88 (2U rack height)
Weight	7kg
Coolant type	Demineralised, deionised or distilled water with corrosion inhibitor and anti-bacterial additive
Coolant pipe	10mm OD
Coolant flow rate	Min 5.5 l/m Refer to page 16 .
Pressure	Maximum 6 bar
Protection class	IP21

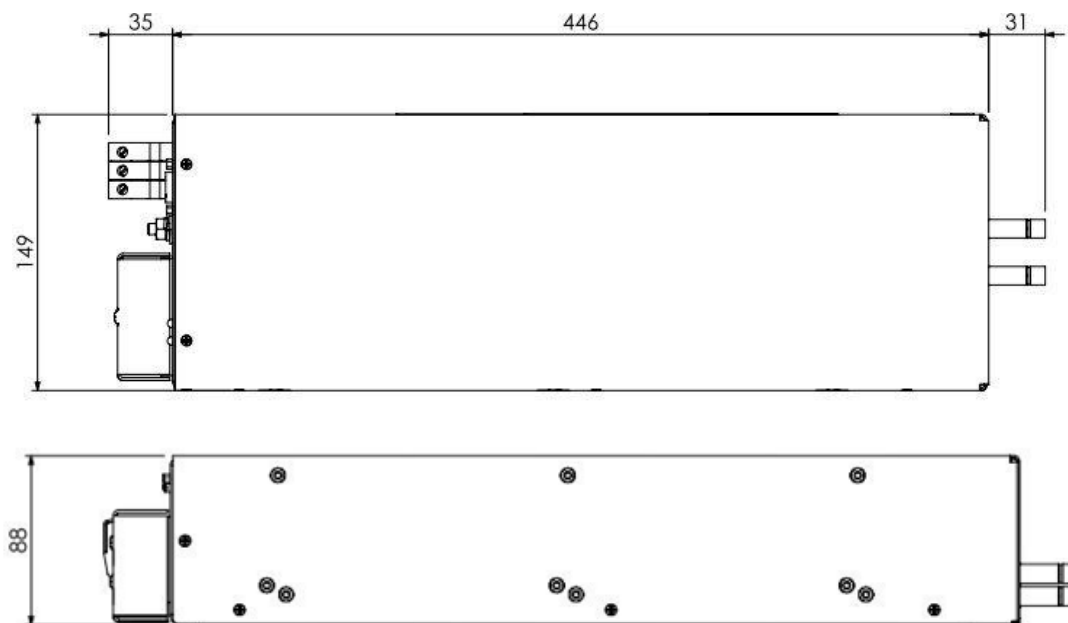


Figure 46 - Overall dimensions

Table 28 - Electrical specifications

SR 25i	
Input voltage range	380-480VAC (47/63Hz) three-phase ⁽²⁾
Mains input fuse rating	15A
AC inrush current (max)	50A
Output voltage (DC)	50 ± 1V
Output current	110A
Power factor	>0.90 at full power
Power consumption (max.)	5.5kW at full power
Earth leakage current	<5mA

2. No neutral connection is required. Connection to neutral will cause irreparable damage to the power supply.

Important!

An external disconnect device must be fitted at the time of installation, and must be accessible without needing to use a tool. This must be suitably located and easily reached and must be marked as the disconnecting device for the power supply.

Installation

Mechanical installation

Using suitable fasteners, mount the power supply within the OEM machine racking using the six mounting holes shown in the following figure.

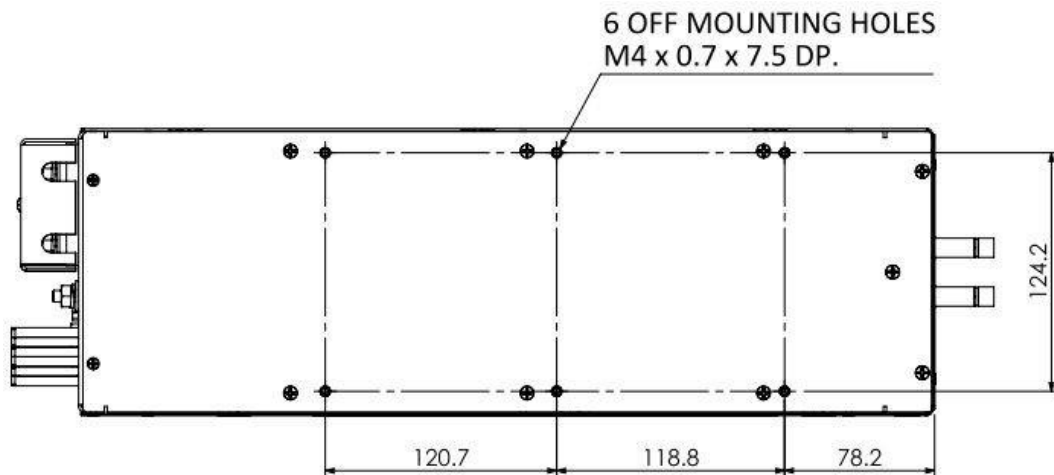


Figure 47 - Fixing locations

Mains AC power connections

Important!

Under certain conditions, it may be possible for high voltage and current cables to emit noise energy levels that may interfere with control signal cables. To eliminate the possibility of interference, cables carrying control signals should be routed along a different path to power cables.

The power supply is provided with a mains supply cable. If this cable needs to be replaced with a longer cable, ensure the replacement cable is of the correct rating for the power supply.



Risk of electric shock or severe damage to the equipment

Ensure that the equipment is disconnected from the mains supply before making this connection.

Connect the three-phase cable to the L1, L2 and L3 terminals on the rear panel of the power supply. Connect the earth cable to the M6 earth stud.

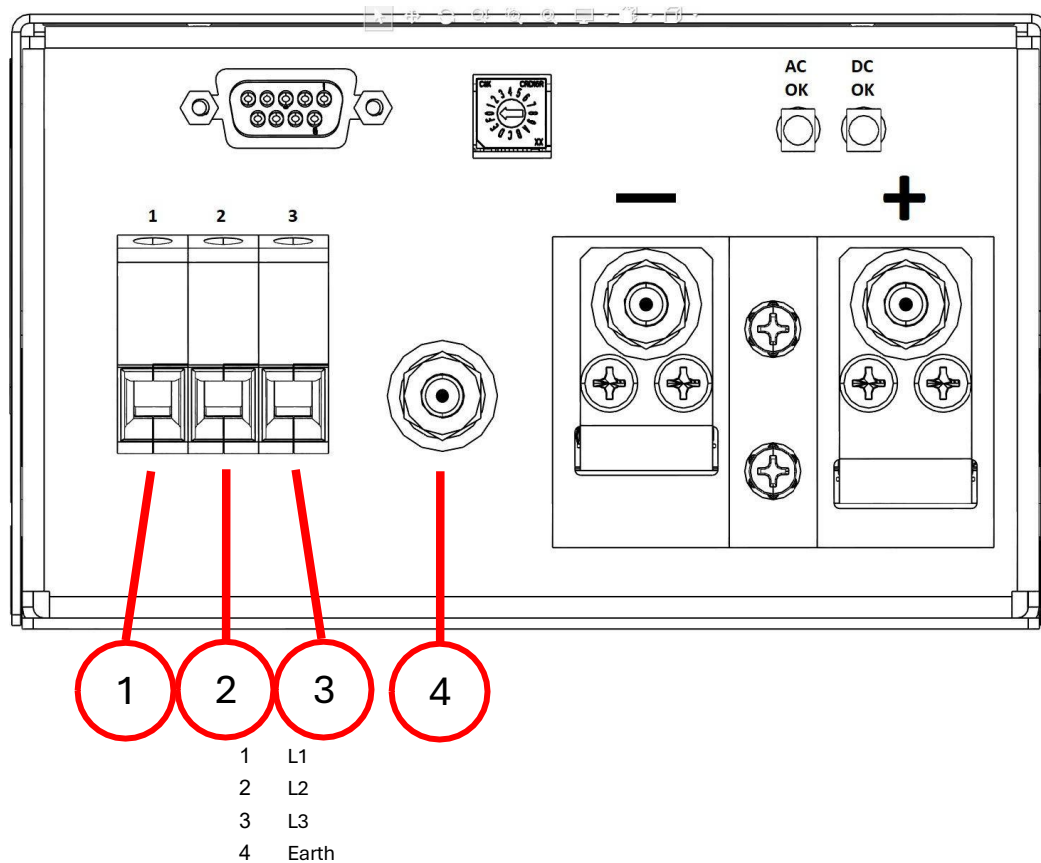


Figure 48 - Three-phase mains supply connections

Important!

An earth connection is essential. Ensure that the earth wire is connected before connecting the mains supply.



Risk of irreparable damage to the power supply

Do not connect the power supply to neutral.

For improved EMC performance, the power supply earth stud will need a permanent bond strap connection to earth.

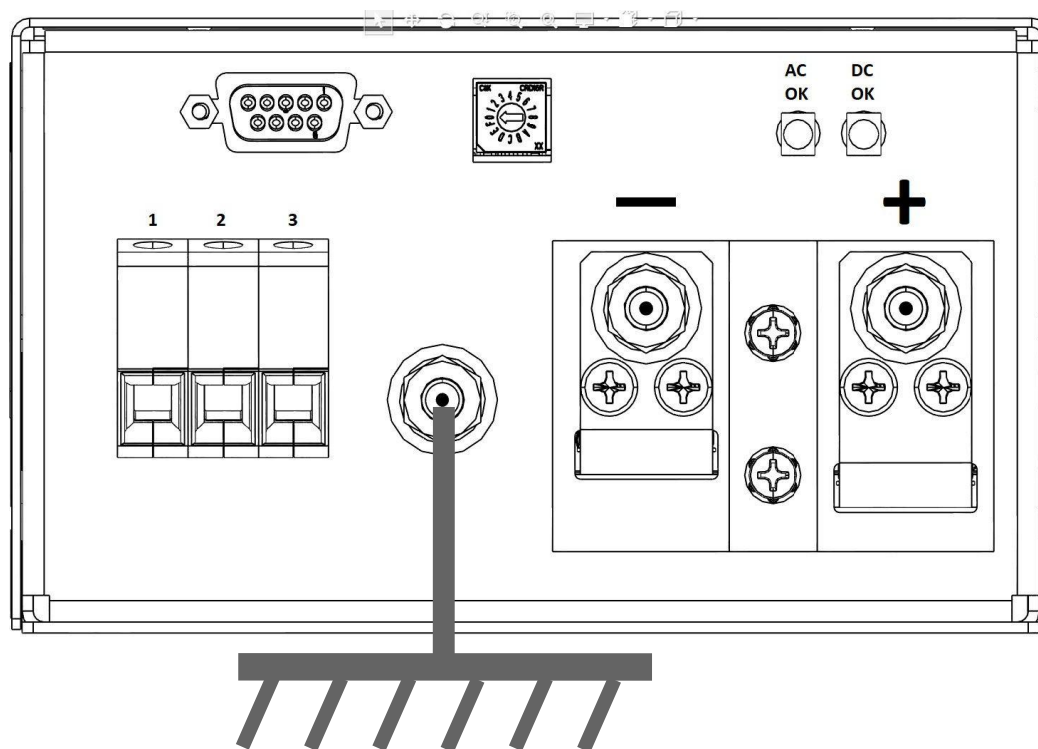
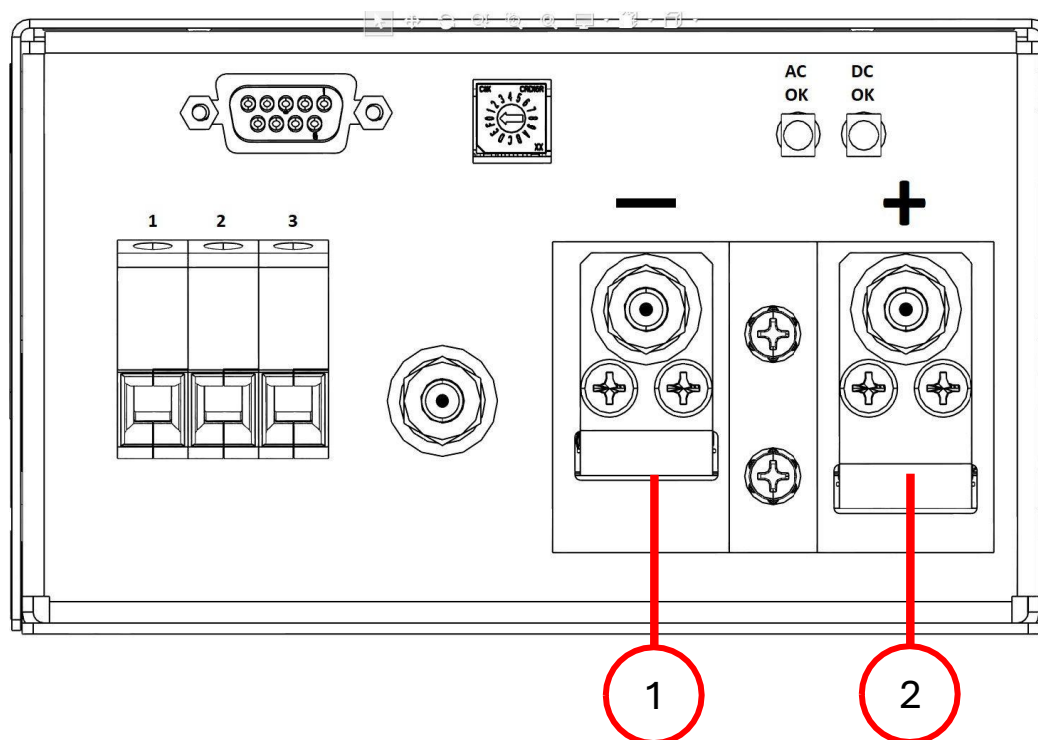


Figure 49 - Three-phase earth connections

DC laser supply cables

DC power cables must be secure

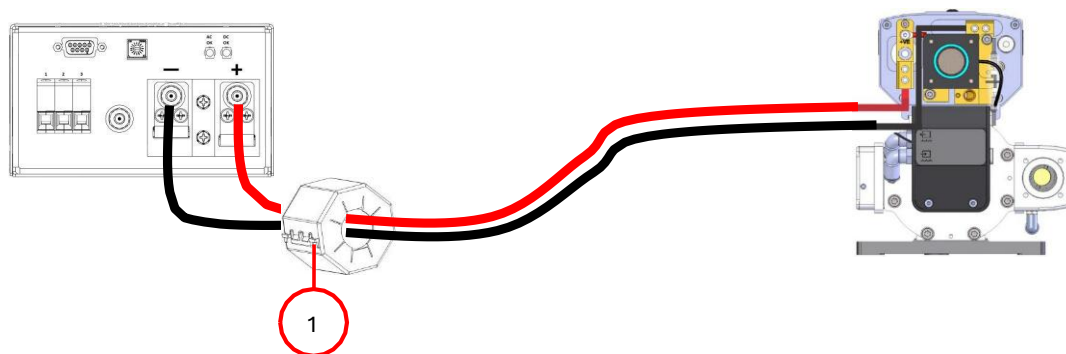


- 1 0V
- 2 50V DC

Figure 50 - DC cable connections

Power supply terminal	Terminal
+	50VDC
-	0VDC

Ensure the correct polarity of cable when connecting to the power supply terminals. DC power cables of the correct specifications can be supplied by Luxinar.



1 Ferrite core

Figure 51 - System wiring

Important!

Ensure correct polarity when connecting the DC PSU to the SR laser system.

For improved EMC performance, a ferrite core (Luxinar 543-0043-00) will need connecting to the DC cables, close to the DC Power supply terminals

Cooling system connections

The power supply requires a liquid cooling source. It is recommended that it is connected in series with the laser system cooling circuit.

The coolant connections are located on the rear of the power supply.

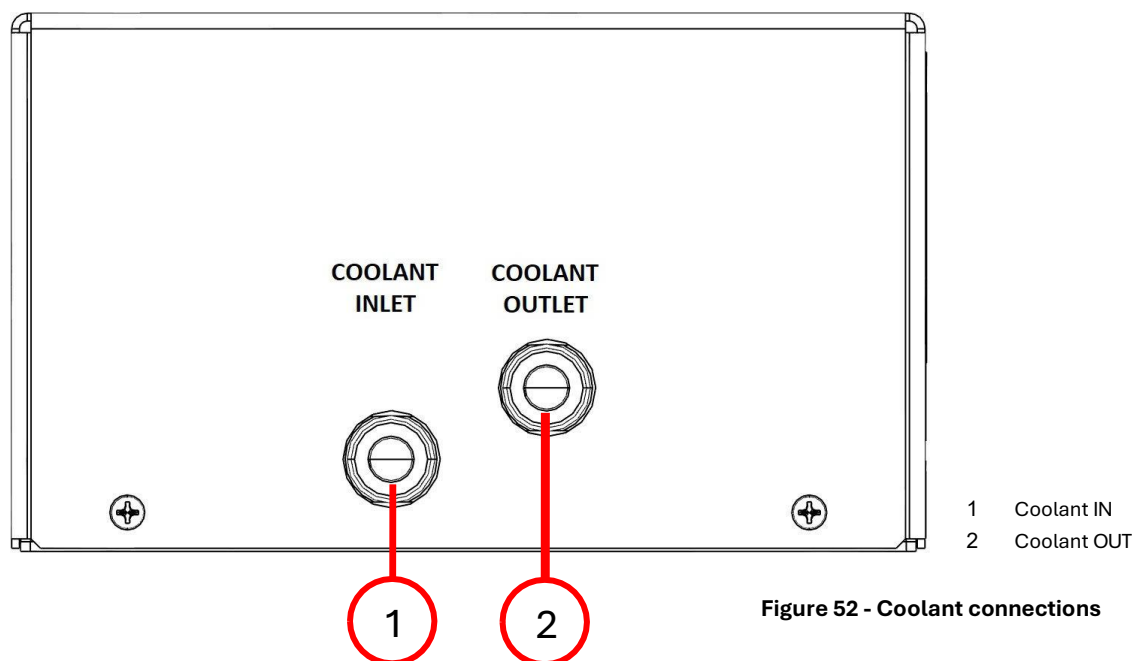


Figure 52 - Coolant connections

Operation

The power supply requires user input to operate. When powered up, the power supply will automatically carry out diagnostic checks. This will take a maximum of 7 seconds to complete. If no faults are detected, then the DC power supply is ready for use.

On the rear of the power supply, there is 1 D-type connector.

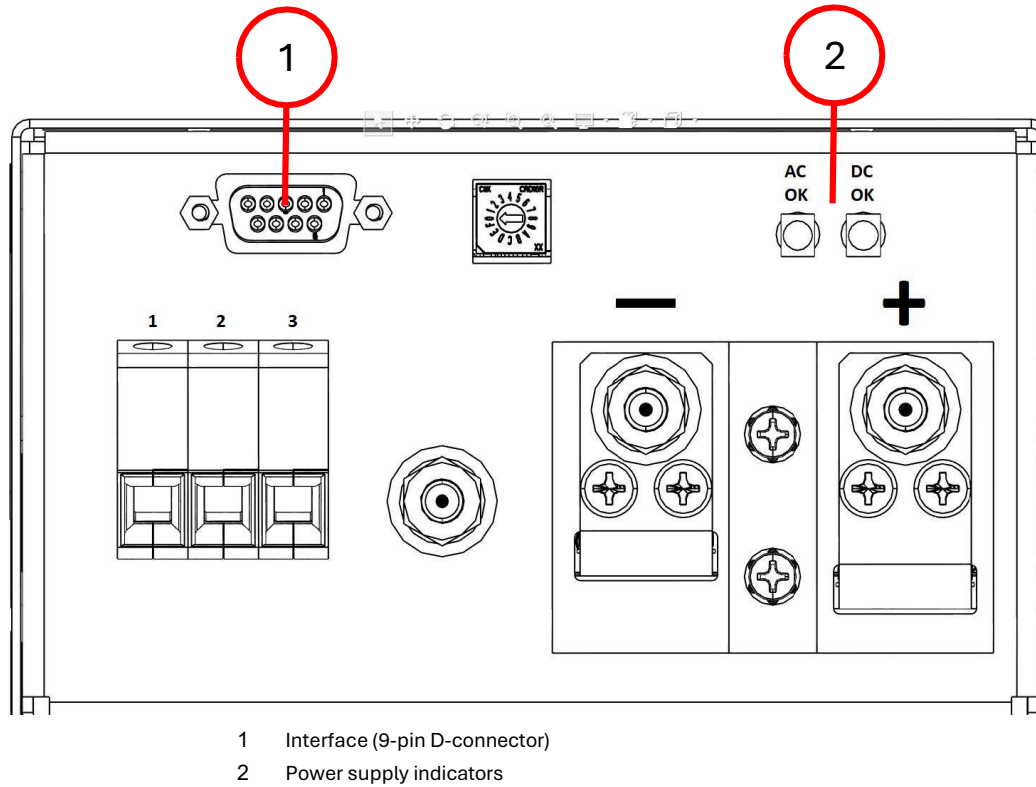


Figure 53 - Rear panel connections

Table 29 - Interface (9 pin D-type)

Pin N°	Function	I/O type	Signal
1	DC_Fault	Output	Open collector
2	EXT_CAN-	Not used	—
3	PSU_Enable	Input	Active Low (return to pin 9)
4	INT_CAN-	Not used	—
5	INT_CAN+	Not used	—
6	Temperature_Fault*	Output	Open collector
7	EXT_CAN+	Not used	—
8	AC_Fault	Output	Open collector
9	RTN		

Power supply indicators

The LED indicators on the front panel provide information about the power supply operating status.

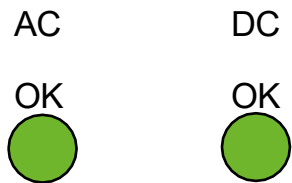


Figure 54 - PSU LED indicators

Table 30 - PSU LED indicators

LED	Colour	Meaning
AC OK	Red	AC input voltage out of range
	Green	AC input voltage within range (correct operation)
	Off	No AC input voltage detected
DC OK	Red	DC output voltage out of range
	Green	DC output voltage present (correct operation)
	Off	DC output voltage disabled

History of Changes

Revision	Date	Changes
1	10/03/2021	Update to XML format. Includes changes relating to CR 651325 and CR 651481.
2	18/01/2022	Addition of maximum single person lifting weight warning and EN61010 statements, update of EN60825 specification title, update of DC power supplies and minor technical corrections and adjustments. Addition of detail for EN55011 compliance statement. Updates to DC PSU and safety sections.
3	31/10/2022	UKCA marking and safety section updates.
4	17/10/2023	EMC details added to DC PSU section. System water fitting updates.
5	08/02/2024	Safety label updates.
6	23/05/2024	U1 pin designations updated.
7	24/10/2025	Diffraction Efficiency Control section added.
8	29/06/2026	Updated to various documents to reflect closure of office in Hamburg and transfer of responsibility to Krailling. Changes from 652906 and 653952 included

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