

HANDLING AND INSTALLATION GUIDE FOR WATER-COOLED LASER DIODES

WATER-COOLED LASER DIODES

The following guide is provided to assist you with the proper handling and installation of your laser diode product. Please note that Leonardo does not warranty its product for damage due to mishandling or misuse. If, after reviewing this guide, you have additional questions about the safe handling and use of your laser diode components, please contact your Leonardo representative for assistance prior to use.

UNPACKING & HANDLING

Electrostatic Discharge

All items that come in contact with the laser diode must be continuously grounded to avoid electrostatic discharge (ESD). Leonardo is not responsible for ESD-damaged products.

Protecting your laser product can be as easy as wearing a grounding wrist strap at all times when handling the laser diode, including during the unpacking and inspection process. Properly grounded anti-static mats are also useful.

Unpacking & Inspection

Your Leonardo product was packaged with the utmost care, and the container was inspected before shipping.

Leonardo products leave the factory in vacuum-sealed packaging and with shorted leads to protect the product from contamination and damage due to ESD. If possible, leave the product in its original, sealed packaging until you are ready for installation. It is also recommended that the leads remain electrically shorted until you are ready to connect the wiring to the system.

Handling

Powder-free latex or nitrile gloves should always be worn while handling the products. The laser diode front facet is extremely sensitive and must be kept free of dust, water and any other kind of contamination. Any contact to the laser front facet will lead to irreversible damage and failure of the laser diode, even if there is no sudden failure. **DO NOT** attempt to clean the front facets. Avoid soldering near the laser diode.

Laser diode components should not be used outside of a cleanroom environment until integrated into a system capable of maintaining a similar level of cleanliness.

Read these instructions carefully before unpacking to avoid damaging the laser diodes. Laser diodes should be handled and operated by qualified personnel only. Any violation of these instructions may result in loss of warranty.



MOUNTING & OPERATING

It is important to select the right mount for your laser diode. **DO NOT** operate the laser diode without mounting it appropriately for its intended use.

Contact Leonardo for recommended mounting and gasket designs.

Cooling

Laser diodes can generate large amounts of heat. Proper cooling is a key element to extending the life of the laser. The following equations are provided to assist with selecting the capacity of the cooling system required to accommodate waste heat.

For continuous operation:

Typical waste heat = I_{op} (A) x V_{op} (V) – Optical Power (W)

End of life waste heat = I_{op} (A_{EOL}) x V_{op} (V_{EOL}) – Optical Power (W_{EOL})

For pulsed operation:

Typical waste heat = Pulse width (Sec) x Frequency (Hz) x I_{op} (A) x V_{op} (V) – Average Optical Power (W)

End of life waste heat = Pulse width (Sec) x Frequency (Hz) x I_{op} (A_{EOL}) x V_{op} (V_{EOL}) – Average Optical Power (W_{EOL})

ELECTRICAL

Laser diodes require precise control of operating current and voltage to avoid overdriving the laser. The right driver will provide protection against power surges, transients and fluctuations. It is **NOT** recommended that you use a voltage supply with a current-limiting resistor, as this will not provide sufficient regulation to protect the laser diode.

Following local country electrical standards, size the electrical cables in accordance with the end of life max current. Be careful not to exceed the maximum voltage and currents. Reverse currents as low as a few microamps can damage a laser diode.

Be sure to review your specific product drawing in order to match the diode to the correct polarity.

Each laser is clearly marked with a + (indicating the anode) and a – (indicating the cathode).

Ensure that the power supply does not produce any leakage current when set to 0 A. Verify the impedance of the drive circuitry such that there are no current spikes during **TURN-ON** and no reverse bias spikes during **TURN-OFF**. It is recommended that the drive circuitry be tuned to provide critically damped response without any ringing or oscillations.

OPERATING TEMPERATURE

Laser diode operating characteristics vary with temperature. Reliability of the laser diode falls exponentially with increasing temperature.

Never allow the case to exceed the minimum and maximum operating temperatures (generally 70°C down to the freezing point of the fluid used, unless specified otherwise).

Recommended Water System Specifications

Parameter	MIN	TYP	MAX	Units
Filter Element (absolute)			5	µm
Filter Material	Stainless Steel			
Coolant Type	Filtered Water ¹			
pH	5.5		8.5	
Resistivity	0.01	0.1	0.5	MOhm-cm
Total Dissolved Solids			50	mg/l
Safe Operation Temp. Range	15		30	
Static Water Pressure			75	psi

¹ Distilled water or similar recommended. The addition of any additives will change the thermal conductivity of water.

Stainless steel is recommended for use in the cooling system. If the system contains copper, replace the water frequently, or use a corrosive inhibitor such as OptiShield®. **DO NOT USE** aluminum or brass in the system.

Algae inhibitors should **NOT** be used in the system. At the first signs of algae, use ultraviolet (UV) light to treat the coolant, or drain and clean the coolant system and replace coolant lines. New coolant

STORAGE & SHIPPING

Always replace the shorting clips when storing and/or shipping laser diodes. Laser diodes should be stored in a clean, dry environment in the original packaging. **DO NOT** store near glues, paints, pastes, solvent, etc., as those products could volatilize and deposit on the facets.

Devices should be drained and purged with clean, dry air or dry nitrogen before storing for extended periods of time or shipping. Always use caution when storing devices with liquid in coolant lines.

Storage temperatures should not exceed -40°C to 85°C for drained and purged devices. Devices stored with coolant inside should not drop below the freezing point of the coolant.

RETURNS

Save the original package. If your product arrives damaged and you choose to file a damage claim against your shipper, you will need the packaging as evidence. After filing the claim, return the product to Leonardo in the original package, and be sure to include a damage report.

Contact Leonardo
Customer Service
for more
information about
warranties and
our return policy.

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