

# Laser Diode Power Supply 1000W

## LDPS1000

### *Operating Instructions*





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# 1 General

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Please read the whole operating instructions before using this instrument together with a laser diode.

## 1.1 Warranty and Assistance

This instrument manufactured by LASER ELECTRONICS LE GMBH is warranted against defects in material and workmanship for a period of 12 months from date of shipment to the customer. During the warranty period, LASER ELECTRONICS LE GMBH will, at its option, either repair or replace products which prove to be defective.

The warranty does not apply to defects resulting from improper use or maintenance by the buyer, from unauthorized modifications or operation outside the environmental specifications and from electrostatic discharge (ESD).

For warranty service or repair, the instrument should be sent to LASER ELECTRONICS LE GMBH in appropriate packing. Please enclose a detailed fault report including instrument type and serial number(s).

## 1.2 Maintenance

The instrument does not require special maintenance if it is used correctly. For precisely operation it is recommended to send back the instrument for calibration every two years.

Servicing should only be performed by trained service personnel.

## 1.3 General Safety Considerations

Before switching on the instrument, make sure it has been properly grounded through the supplied AC power cable to a socket outlet with a protective earth contact. Any interruption of the grounding can result in personal injury.

This instrument must be used under normal conditions and as specified, otherwise the protection provided by the instrument could be impaired.

ESD: Electrostatic discharge (ESD) on or near the connectors can damage electronic devices inside the instrument. Personnel should touch the metal frame of the instrument for a second before touching any connector.

## 1.4 Laser Safety

### 1.4.1 Laser Radiation

This instrument is designed to control laser diodes. Please read also very carefully the operating instructions given by the manufacturer of the laser diode.

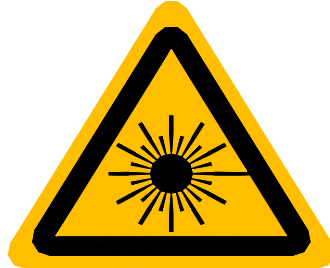
The radiation of the used laser diode may be visible or invisible. These products emit radiation in the 630 to 1560nm spectral region.

**Use caution to avoid hazardous exposure to the beam. Take precautions to eliminate exposure to a direct or reflected beam. Do not look directly into the beam of the laser diode under conditions which exceeds the specified limits. Never observe the laser beam through optical instruments.**

## 1.4.2 Laser Class

The laser safety classification and the relevant parameters of the laser diode for normal operation are indicated on the top of the laser diode. The laser radiation is emitted through the optics at the side of the laser diode where the warning label is placed or at the fibre connector. The laser diodes are classified according to EN 60825-1:94.

General warning label for laser radiation:



Label for laser radiation:



Label for relevant parameters (example) of the laser diode for normal operation and its statements:

Average radiant power at max. rep. frequ.:  $P_o$   
Peak radiant power:  $P_p$   
Pulse width:  $t$   
Max. pulse repetition frequency:  $F$   
Wavelength laser radiation:  $\lambda$



## 1.5 System contents

Laser Diode Power Supply

Manual

## 2 Introduction

The instrument is a compact power supply unit for driving medium-power and high-power laser diodes.

The instrument delivers a total power of 1000W. Depending on the version, a maximal current up to 200A or a maximal voltage up to 60V is possible.

Please be aware of the fact that the equation "current x voltage = power" must be respected in all cases.

The instrument features an external input for analogue modulation of the laser diode via a D-SUB interface.

### 3 Connectors

The instrument must be turned off before making the connection.

**Attention -1-:**

**Double-check if the wiring was done the right way. A mismatch destroys the laser diode within microseconds in an unrecoverable way!**

**Laser diodes are extremely sensitive to electrostatic discharge. Follow the instructions supplied with the laser diode very carefully.**

**The instrument must be turned off before making the connection to the output for the laser diode.**

LASER ELECTRONICS LE GMBH is not responsible for any damage arising from a mismatch in wiring.

**Attention -2-:**

The output pin „laser diode anode, plus, „+“ „, which is connected to the anode (A) of the laser diode is internally connected to any internal power supply voltage of the instrument.

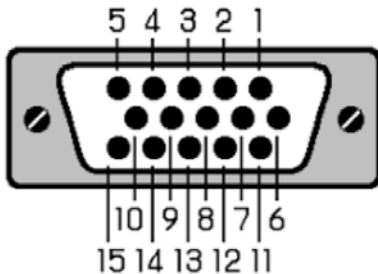
Please be aware that most of all medium and high power laser diodes have their housing electrically connected to the anode of the laser diode.

Therefore in order to avoid any grounding loops when applying external modules to the instrument it is recommended to isolate the housing of the laser diode from the chassis (earth).

Remark: If the laser diode is mounted to the heat spreader of the heat sink provided by LASER ELECTRONICS LE GMBH it is already isolated from chassis ground (earth).

#### 3.1 Analogue Interface D-SUB

This connector at the rear panel is a D-Sub 15 (5x3), female type.



The pin-out is shown when facing the connector mounted to the rear panel directly.

Pin number	Pin Name	Function	Description
1	Enable (IN)	ON = 5V OFF = 0V	The device can be switched on or off by supplying 5V (ON) or 0V (OFF).
3	Interlock (IN)	ON = Connected to GND OFF = Open	The interlock can be connected to external switches (e.g. doors, windows).
4,9,15	GND		
5	Vout Monitor (OUT)	See chapter 5	The output voltage supplied by the device can be monitored via Vout.
6	Iout Monitor (OUT)	0V – 10V = 0 - Ioutmax	The output current supplied by the device can be monitored via Iout.
7	Iprogram (IN)	0V – 10V = 0 - Ioutmax	The output current of the device can be set via Iprogram.
2, 8, 10-14	n.c.		

## **3.2 Laser Diode**

The instrument must be turned off before making the connection.

This connector is a terminal block with 2 M6 screws.

The left screw (+) must be connected to the laser diode anode.

The right screw (-) must be connected to the laser diode cathode.

## **3.3 Connector for AC line**

The instrument must be turned off before making the connection.

This connector is a terminal block with 3 M4 screws.

The left screw (L) must be connected with phase.

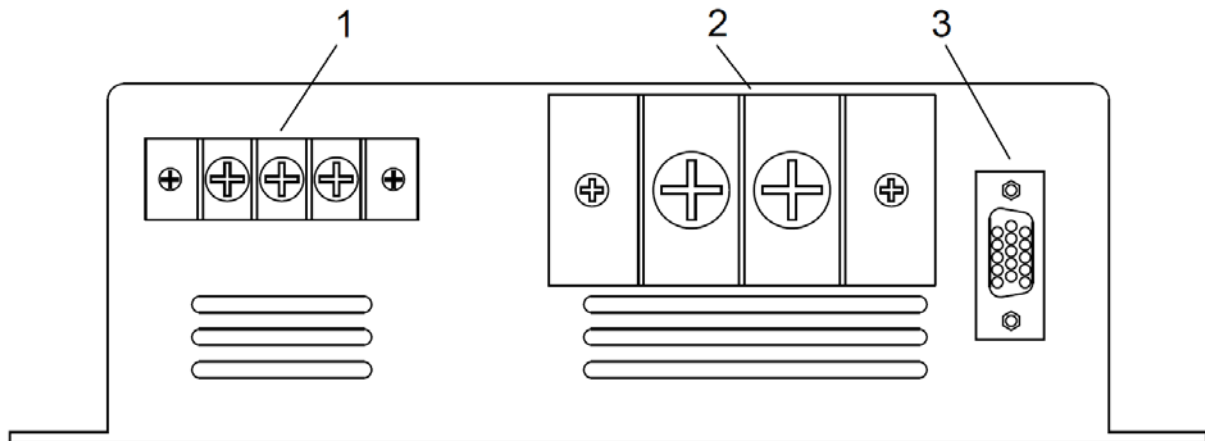
The middle screw (N) must be connected with the neutral conductor.

The right screw (Earth) must be connected with earth.



## 4 Installation

### Elements of the instrument at the front panel



1. Connector for AC line
2. Laser Diode
3. Analogue Interface D-SUB

### Installation of the instrument

Before installation check the local mains voltage. The instrument is equipped with auto-ranging power supplies for a continuous input voltage from 85 to 264 V AC @ 50 - 60 Hz.

Connect the instrument to the mains. Do not switch on the instrument yet.

Plug in the D-SUB cable to the appropriate connector. Please note the interlock connector needs a closed loop for the interlock feature.

### Installation of the laser diode

Connect the laser diode to the Laser Diode cables.

ESD: Electrostatic discharge (ESD) on or near the connectors can damage electronic devices inside the instrument. Personnel should touch the metal frame of the instrument for a second before touching any connector.

**Laser diodes are extremely sensitive to electrostatic discharge. Follow the instructions supplied with the laser diode very carefully.**

## 5 Available Voltage and Current Combinations

The LDPS1000 will provide the laser diode with up to 1000W.

Many different combinations of voltage and current are possible.

Please see the table below.

<b>Name</b>	<b>Max. Current</b>	<b>Max. Voltage</b>	<b>Transfer function: 0...10V refers to:</b>
LDPS1000-200-5	200A	5V	0...10V
LDPS1000-88-12	88A	12V	0...20V
LDPS1000-70-15	70A	15V	0...20V
LDPS1000-44-24	44A	24V	0...30V
LDPS1000-29-36	29A	36V	0...50V
LDPS1000-22-48	22A	48V	0...60V
LDPS1000-17-60	17A	60V	0...70V

# 6 Operation

## 6.1.1 External Analogue Input

The instrument provides an external analogue modulation input.

The analogue modulation signal is applied to the Iprogram Pin on the D-SUB connector (pin 7). The valid range for the signal is 0 V to +10 V. The transfer function for the applied signal voltage to the laser diode current is 10 A / V. The modulation bandwidth is DC to 100 Hz. E.g.: A signal voltage of 2.5 V refers to a laser diode current of 25A.

## 6.1.2 Current and Voltage Monitor Output

The instrument provides a current monitor output and a voltage monitor output. They are set to the D-SUB connector. These signals indicate the actual laser diode current and voltage.

The pin 5 (Vout monitor) is the output voltage. The range for the signal is 0 V to +10 V. For the transfer function, see chapter 5.

E.g. for the LDPS1000-200-5, a signal voltage of 5 V refers to a output voltage of 5 V.

E.g. for the LDPS1000-17-60, a signal voltage of 5 V refers to a output voltage of 35 V.

The pin 6 (Iout monitor) is the output current. The range for the signal is 0 V to +10 V. The signal 0 V to +10 V refers to a laser diode current from 0 A to max. current.

E.g. for the LDPS1000-200-5, a signal voltage of 5 V refers to a laser diode current of 100 A.

## 6.1.3 Interlock

The instrument is equipped with an interlock feature. The interlock is realized with a loop which has to be provided via the interlock connector, see section *Analogue Interface D-SUB*.

The interlock loop must be realized with a peripheral device. It is prior to the laser on command. The laser diode can only be turned on if the interlock loop is closed. If the interlock loop is opened while the laser diode is on, the laser diode is immediately turned off. The laser diode can only be turned on again by closing the interlock loop.

Instead of realizing a (passive) closed loop it is also possible to apply a TTL-level signal to Pin1 referred to Pin2.

Pin1 = High ( $U > 2.4 \text{ V}$ ) → Interlock loop open set an interlock error

Pin1 = Low ( $U < 0.8 \text{ V}$ ) → Interlock loop closed no interlock error

Pin2 = Reference (Signal Ground)

## 7 Specifications

<b>Laser Diode Power Supply 1000W</b>	<b>LDPS1000</b>
Max. Power Laser Diode	1000 W
Max. Laser Diode Current	200 A
Max. Laser Diode Voltage	60 V
Ripple / Noise (rms) [mA]	200
Current Limit Range	0 ... Max. Laser Diode Current
Current Adjustment Accuracy	100 mA
Temperature Coefficient	< 100 ppm/°C
Short Term Stability (1hr)	< 30 ppm
Long Term Stability (24hr)	< 75 ppm
Repetition Rate	0 ... 100 Hz
Pulse Width (*)	> 5 ms
Rise- / Fall- Time (*)	< 2ms (10 % – 90 % of max. current)
<b>Analogue Modulation</b>	
Input Voltage	0 ... 10 V, 1 kΩ
Transfer Function	10 A / V
Bandwidth	0 ... 100 Hz
<b>Power Monitor</b>	
Output Voltage	0 ... 10 V
<b>Power Supply</b>	
Line Voltage	85 - 264 V AC, auto ranging
Frequency	50 - 60 Hz
Power Consumption	1350 W
<b>General Characteristics</b>	
Ambient Temperature, operating	0 ... 30 °C
Relative Humidity, operating	30 ... 70 %
Weight	5 kg
Dimensions	220 x 66 x 348 (W x H x D, mm <sup>3</sup> )

### Notes:

(\*) The rise time, the fall time and the pulse width may be prolonged by long cables between the power supply and the laser diode.

### Attention:

The output pin „laser diode anode, plus, „+“ „, which is connected to the anode (A) of the laser diode is internally connected to any internal power supply voltage of the instrument.

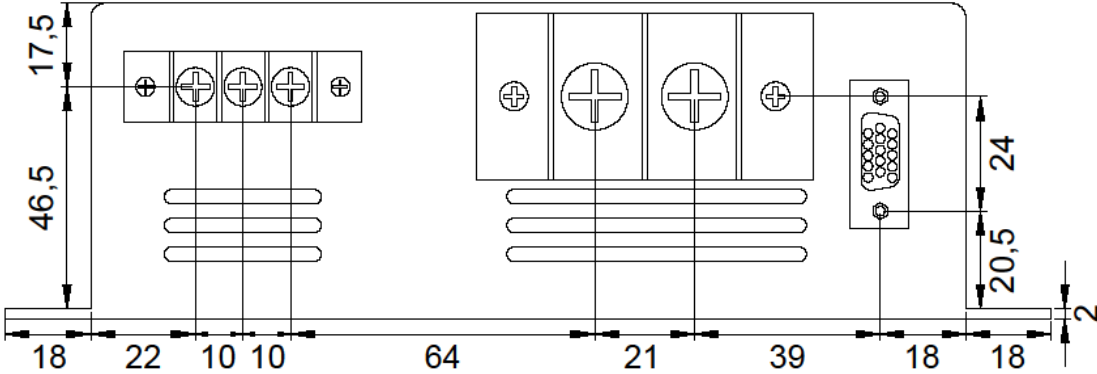
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Therefore in order to avoid any grounding loops when applying external modules to the instrument it is recommended to isolate the housing of the laser diode from the chassis (earth).

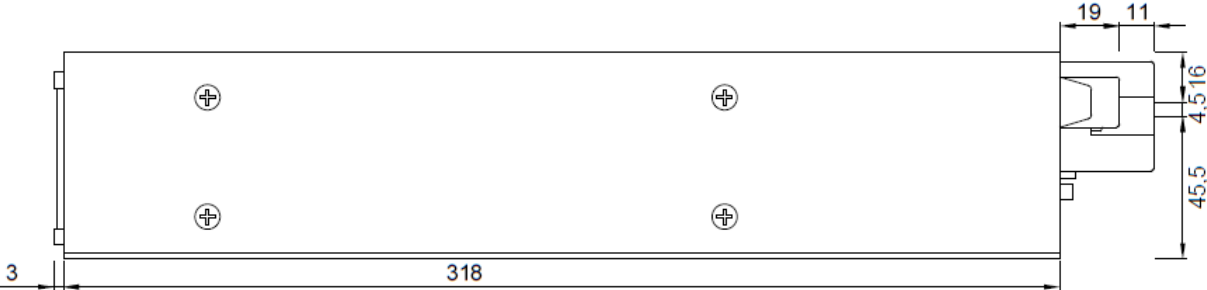
Remark: If the laser diode is mounted to the heat spreader of the heat sink provided by LASER ELECTRONICS LE GMBH it is already isolated from chassis ground (earth).

# 8 Technical Drawings

Front:



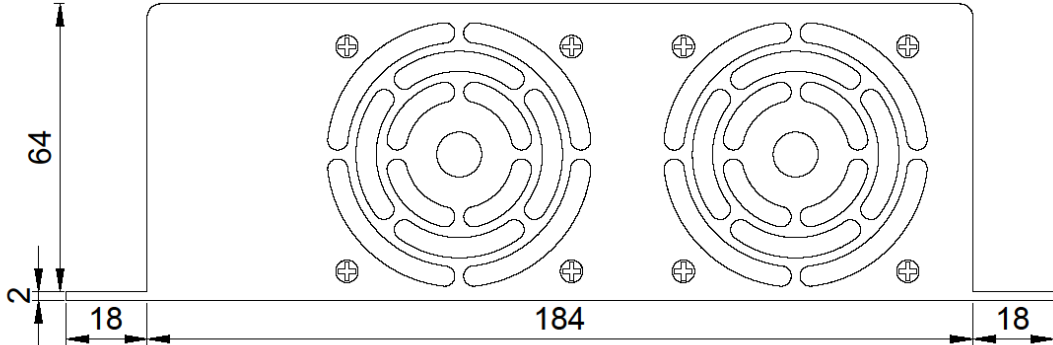
Left side:



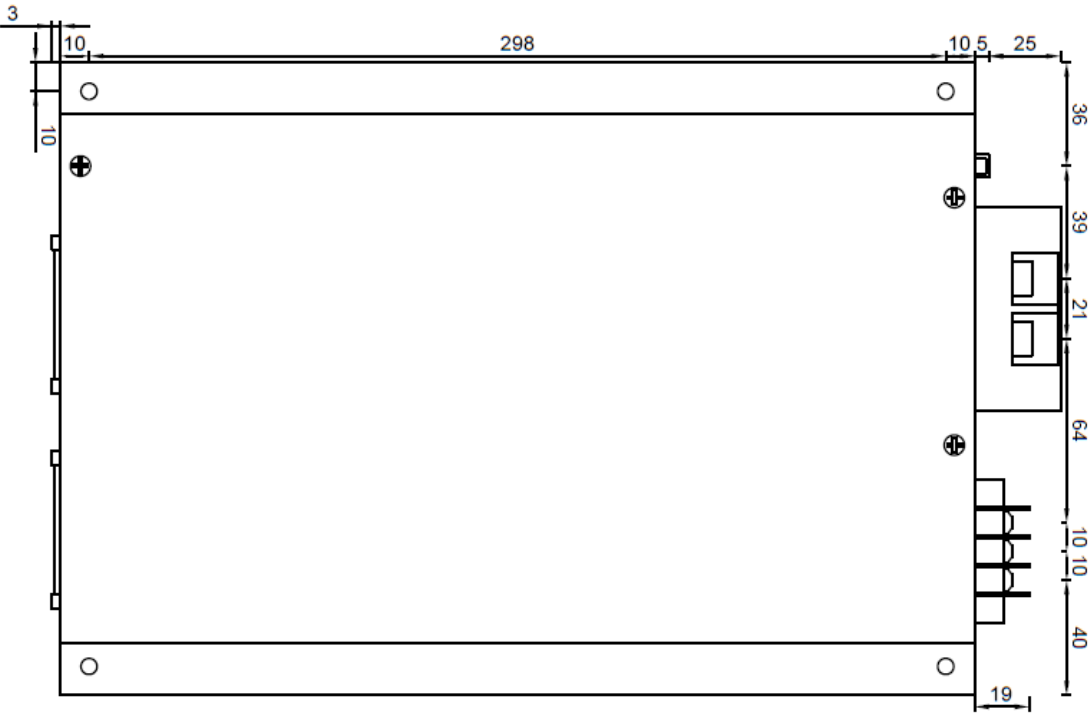
Right side:



Back side:



Top view:



Bottom view:

