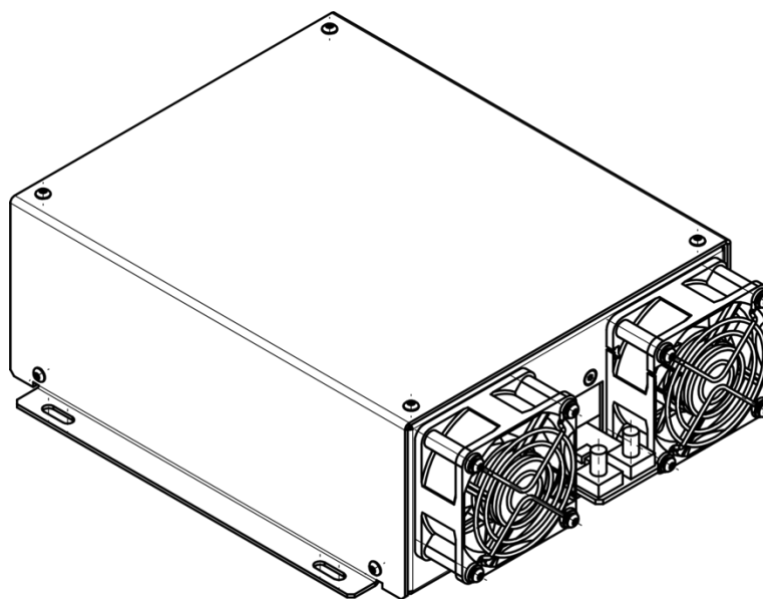


PDD-1000 pulsed diode driver PDD-500 pulsed diode driver

User manual



Warning! This equipment can be dangerous.
Please read this entire user manual carefully before operating the product.

Important note. Please measure the output with an adequate load only (diodes). A resistive load connected to the output will not destroy the driver but will severely distort its behavior.



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Overview / Appearance

PDD-1000/PDD-500 is a high-power pulsed laser diode driver series. The modules are fast-switching, low-noise, accurate and efficient current sources for laser diodes. They were developed, first of all, for medical and medical aesthetic treatments, namely, for hair removal applications.

PDD-1000 has average output power up to 1000W and maximum peak output power up to 10kW (depending on user defined I_{MAX} and V_{MAX}), PDD-500 has average output power up to 500W and maximum peak output power up to 10kW (depending on user defined I_{MAX} and V_{MAX}).



The input voltage is 300VDC, and it's supposed that the driver is powered from a buffer capacitor bank included in the system. Such a configuration, see also [Applications](#) section below, is very appropriate and cost effective for dual IPL/laser and diode systems.

The modules also require a +24V DC power supply for the interface circuits.

Since the driver isn't directly connected to the AC power grid and only operates in the secondary circuits of hair-removal systems, it doesn't require individual certification of compliance to medical standards. Therefore, the PDD-1000/PDD-500 can be used in medical systems without any modifications, additional filtering, or extra protective measures.

Applications

DIODE AND FLASHLAMP (IPL, LASER)

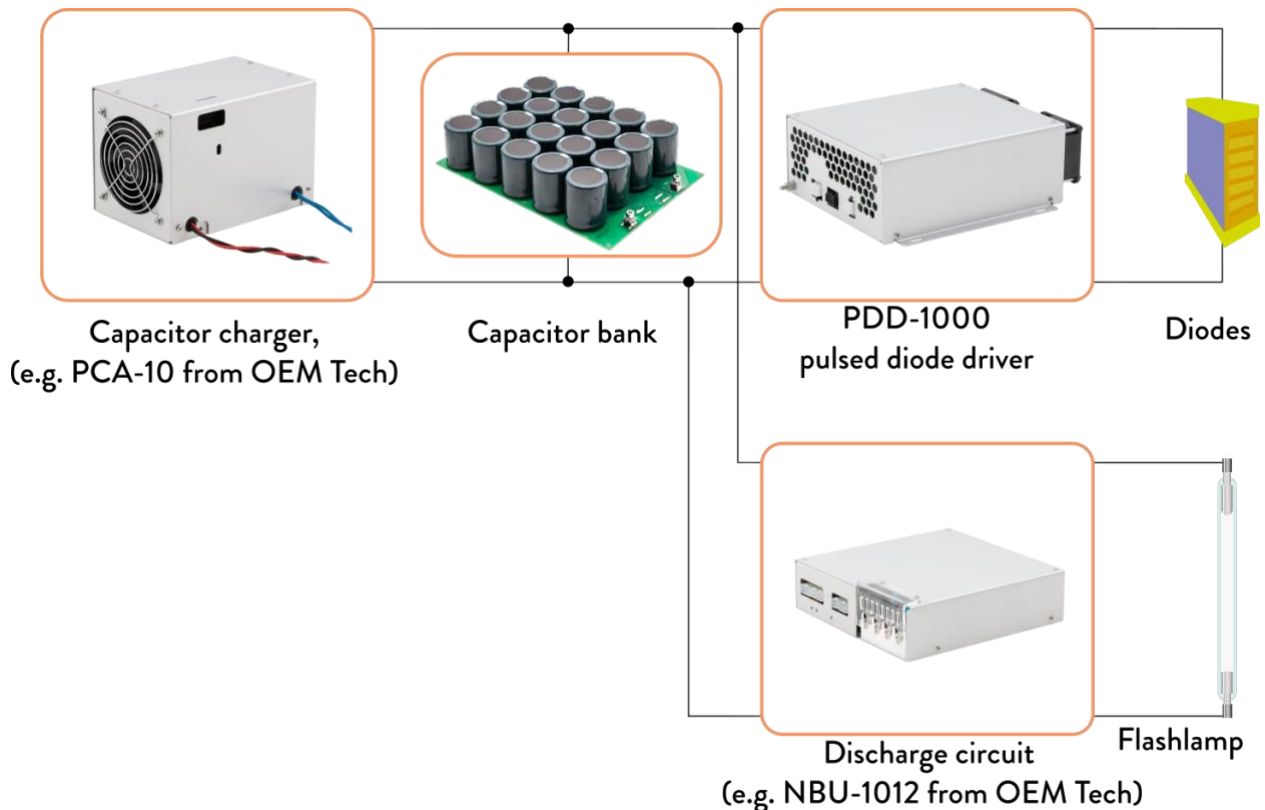


Figure 1. Recommended configuration of the system

DIODE ONLY

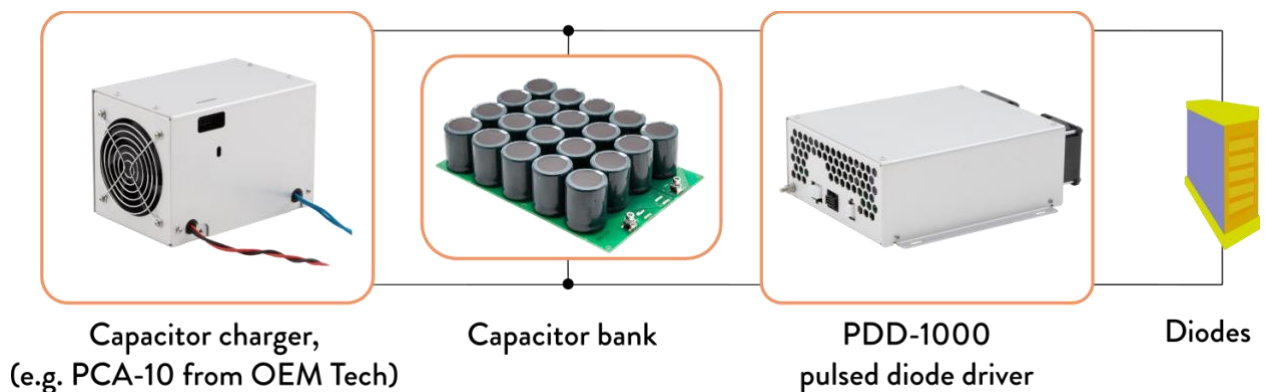


Figure 2. Possible configuration of the system

Cooling

The module contains fans for active cooling. No additional cooling is required.

Contents of delivery

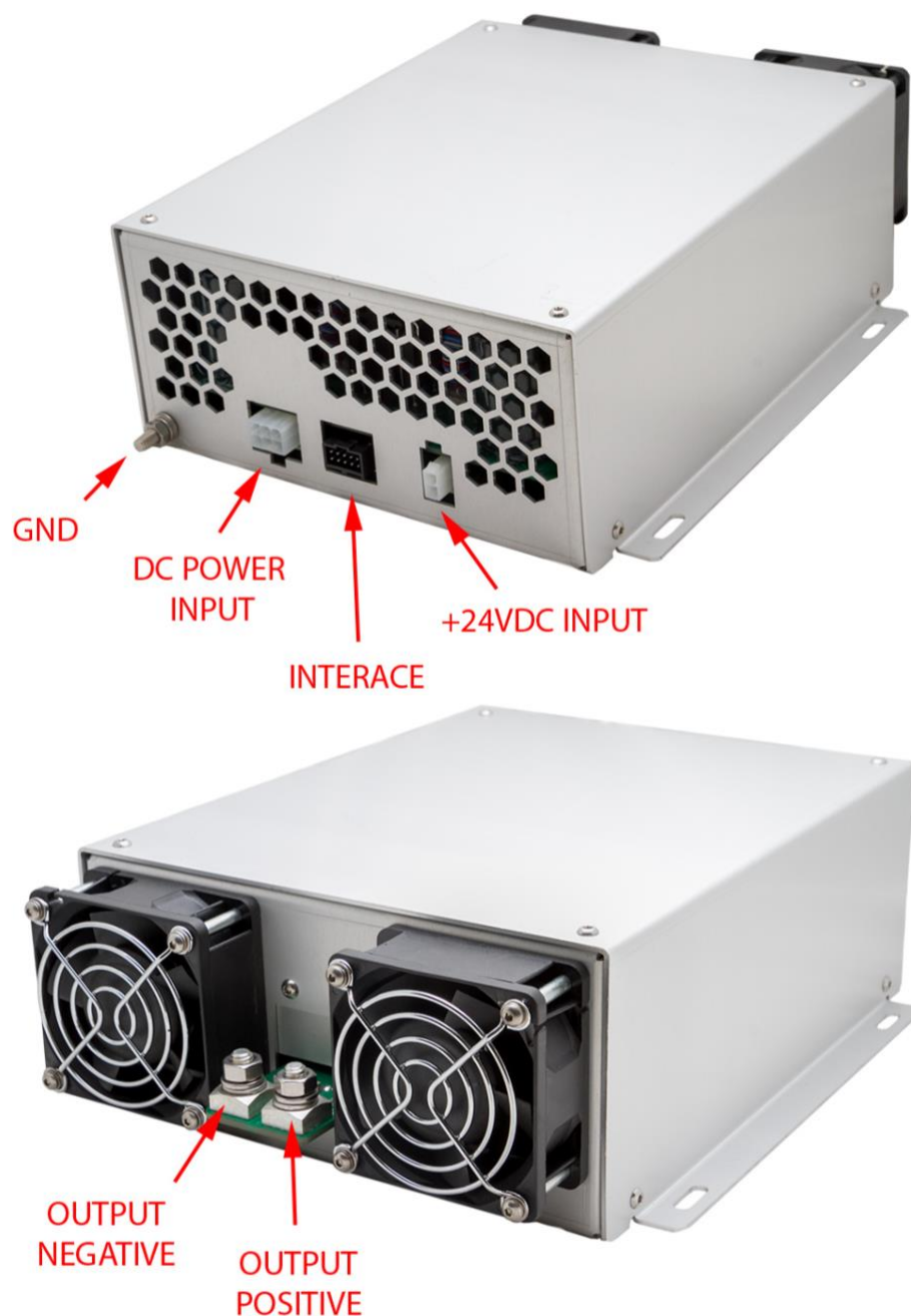
By default, the delivery package contains:

- PDD-1000 (PDD-500) diode driver – 1pc
- DC POWER INPUT cable – 1pc (50cm length)
- 24VDC INPUT cable – 1pc (50cm length)
- INTERFACE cable – 1pc (50cm length)

Output cables are not usually supplied.

Customized delivery content is available on request.

Connections, signals, signal description



+24V DC INPUT: Molex Mini-Fit MF-2F type

2
1

Connection for the +24V DC power supply used to feed the PDD-1000 interface circuits. The maximum current consumption is 1A.

PIN (color)	DESIGNATION	DESCRIPTION
1 (red)	+24V DC	+24V DC positive

2 (black)	RETURN	+24V DC negative
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INTERFACE: Molex C-Grid type

1	3	5	7	9
2	4	6	8	10

PIN (color)	DESIGNATION	DESCRIPTION
1 (black)	PULSE 1 RETURN	Pulse 1 signal return
2 (yellow)	PULSE 2	+5V TTL pulses must be applied simultaneously to pin 2 and pin 3 in order to obtain pulsed current from the PDD-1000. If 0V is applied to one of these pins, or if at least one of these pins is unconnected, no current will be generated by the PDD-1000.
3 (yellow)	PULSE 1	+5V TTL pulses must be applied simultaneously to pin 2 and pin 3 in order to obtain pulsed current from the PDD-1000. If 0V is applied to one of these pins, or if at least one of these pins is unconnected, no current will be generated by the PDD-1000.
4 (black)	PULSE 2 RETURN	Pulse 2 signal return
5 (white)	ENABLE RETURN	Enable signal return
6 (violet)	INTERFACE RETURN	Other Interface signals return (namely Fault, Current program and +15V DC)
7 (red)	ENABLE	+5V DC applied to this pin enables PDD. When 0V is applied to this pin, or if the pin is unconnected, the module is disabled. Once <i>Fault</i> has occurred, the module remains blocked until the fault cause is eliminated. After that, <i>disable</i> the module and <i>enable</i> it again.
8 (orange)	+15V DC AUXILIARY OUTPUT	Auxiliary +15V DC output. Maximum output current 50mA.

9 (blue-white)	FAULT	If the module is enabled and a fault occurs, the module automatically stops operation and sets the <i>Fault</i> status (<i>Fault</i> loop is “closed”). Currently, the <i>Fault</i> can be caused only by overheating. To clear the Fault state, <i>disable</i> the driver, wait until it cools down and then <i>enable</i> it again. During normal operation, the <i>Fault</i> loop is “open”. Maximum allowed current in the <i>Fault</i> loop is 50 mA.
10 (green)	CURRENT PROGRAM	Voltage applied to this pin sets the output current. 0-10V DC are linear with 0-I_{MAX}.

DC POWER INPUT: Molex Mini-Fit MF-6F type

6	5	4
3	2	1

This connector supplies the PDD-1000 diode driver with power from the buffer capacitor bank. All six pins must be used when the driver operates at maximum power.

PIN (color)	DESIGNATION	DESCRIPTION
1, 2, 3 (red)	DC POWER	To the capacitor bank positive
4, 5, 6 (black)	RETURN	To the capacitor bank negative

OUTPUT POSITIVE AND OUTPUT NEGATIVE: M6 studs

PIN (color)	DESCRIPTION
DIODE “+” (red)	To the laser diode stack anode
DIODE “-” (blue)	To the laser diode stack cathode

GROUND: M5 stud

Module should be grounded using this stud.
Grounding should be done before powering the system.

Grounding policy

By default, OUTPUT POSITIVE, OUTPUT NEGATIVE, and INTERFACE RETURN are isolated from the chassis ground (i.e. the output and interface are floating).

Modifications with grounded anode or grounded cathode
are available upon request.

Installation

- Only qualified personnel are allowed to install and connect the PDD-1000 into the customer's system.
- Use four M4 oval mounting slots at the bottom on the sides of the PDD-300 to fix the module in your system. Refer to the [Dimensional drawing](#) section for their location.
- There is no preferred driver orientation; it can be mounted in the normal position, upside-down, or in other orientations as well.
- Connect the module to your system's protective ground using the provided M5 grounding stud.
- Connect DC POWER INPUT, +24VDC INPUT, OUTPUT and INTERFACE cables according to their functions.
- Since the module is air-cooled, at least 50mm of free space should be provided at both the suction and pressure sides of the PDD-1000.

Operations

A typical operation sequence is given below:

1. Disable the driver using the Enable signal (pins 7 and 5 of the INTERFACE connector).
2. Set the desired output current using the Current program signal (pins 10 and 6 of the INTERFACE connector).
3. Apply both 24VDC and 300VDC power to the PDD-1000 (+24V DC INPUT and DC POWER INPUT connectors).
4. Enable the driver using the Enable signal (pins 7 and 5 of the INTERFACE connector).
5. Apply TTL pulses of the desired width to the Pulse 1 and Pulse 2 inputs (pins 3, 1 and 2, 4 of the INTERFACE connector).
6. Disable the output after operation, then disconnect the driver from the power source.

Operation notes:

1. The proper sequence of the driver's start-up procedure is "power → enable → pulse". Any other sequence is considered incorrect.
2. When the driver is powered but disabled, fans rotate at lower speed. Once the driver is enabled, fans accelerate to a higher speed.
3. A Fault state is entered when a fault condition occurs, and the driver is enabled.
4. To clear the Fault state, disable the driver, wait until it cools down and then enable it again.

Specifications

ELECTRICAL

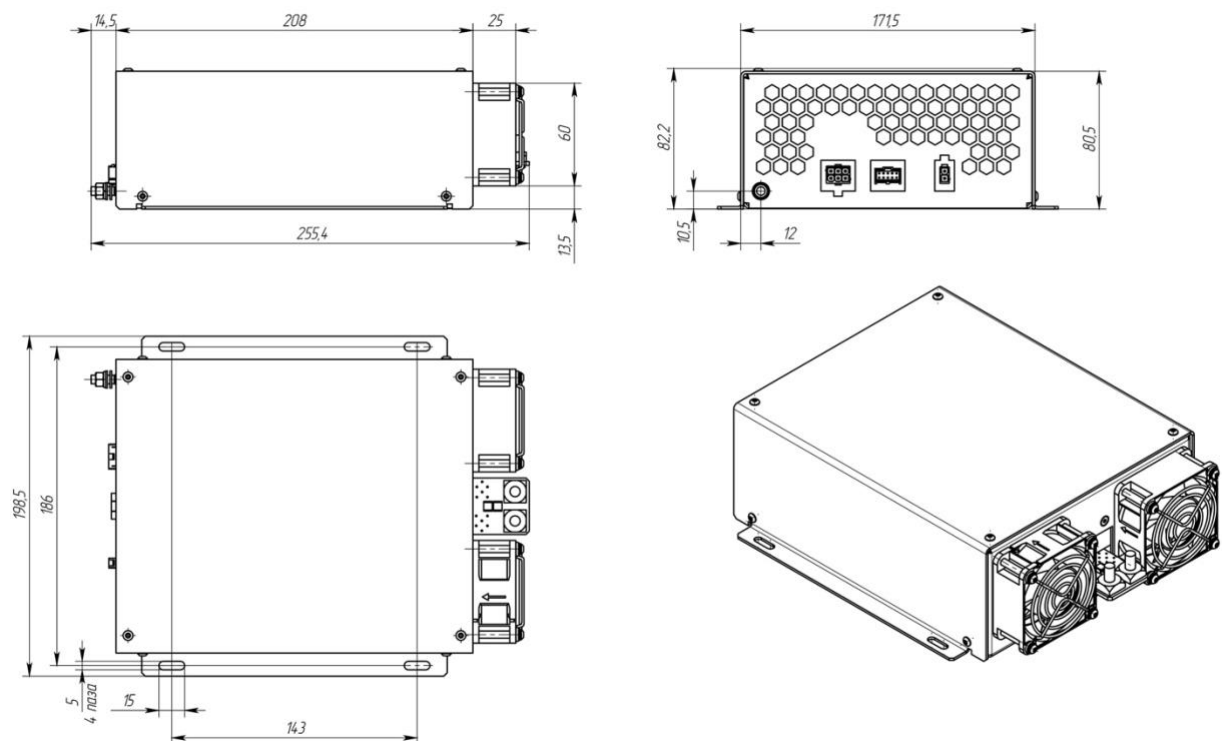
INPUTS	
Power input voltage	300V by default (other on request)
Power input current	<5A typically
+24V DC input	+24V DC, 1A max
OUTPUT	
Maximum output voltage (V_{MAX})*	50V by default (up to 200V on request)
Maximum output current (I_{MAX})*	200A by default (other on request)
Maximum peak power (P_{PEAK})*	Up to 10kW (other on request)
Output voltage (V)*	Recommended diode voltage: 70–100% of V_{MAX} Allowed diode voltage: 20–100% of V_{MAX}
Output current (I)*	Adjustable in 0–100% of I_{MAX} range with recommended diode voltage (70–100% of V_{MAX}) Adjustable in 10–100% of I_{MAX} range with allowed diode voltage (20–100% of V_{MAX})
Pulse width (t)*	From 1ms (limited with rise and fall times) to tens and hundreds of milliseconds (depends on the driver's modification, operating current and voltage), see also the formulas below
Maximum pulse energy (E_{MAX})*	1000J for PDD-1000 500J for PDD-500
Rise and fall times	<1ms (10-90% level)
Maximum average output power (P_{AV})*	1000W for PDD-1000 500W for PDD-500
Pulse repetition rate (f)*	Limited with pulse energy and maximum average output power only
(*) The parameters aren't independent from each other. There are certain limitations: 1. $0.7 * V_{MAX} < V < V_{MAX}$ (recommended) 2. $I < I_{MAX}$ 3. $V * I < V_{MAX} * I_{MAX} = P_{PEAK} < 10kW$ 4. $V * I * t < E_{MAX}$ 5. $V * I * t * f < P_{AV}$ For further details, please contact the manufacturer or use the online calculator on our website to calculate the average output power and pulse energy.	
Current accuracy	<1% of I_{MAX}
Current overshoot	<1% of I_{MAX}
REGULATIONS	Safety as per IEC 60601-1

	EMC as per IEC 60601-1-2 RoHS compliant
COOLING	No external cooling is required
ENVIRONMENT	
Operation temperature	+10 ... +40 °C
Storage temperature	-20 ... +60 °C
Humidity	90%, non-condensing

MECHANICAL

Dimensions	See also the dimensional drawing below
Weight	Approx. 2.2 kg

Dimensional drawing



How to order?

PDD-1000/500-XXXX-YYYY, where:

- 1000 denotes the high-power version of the driver, providing an average output power of 1000W. 500 denotes the low-power and low-cost version of the driver, providing an average output power of 500W.
- XXXX denotes the maximum output current I_{MAX} (user-selectable up to 200A; even higher current is available on special request).
- YYYY denotes the maximum output voltage V_{MAX} (user-selectable up to 50V, up to 200V is available on special request).

Examples (some popular modifications):

P/N	Description
PDD-1000-200A-50V	300VDC input 200A/50V output High-power version (1000W average output power)
PDD-500-200A-50V	300VDC input 200A/50V output Low-power version (500W average output power)
PDD-500-150A-45V	300VDC input 150A/45V output Low-power version (500W average output power) Popular version, has the best price and lead time

Other modifications are available upon request.

Appendix 1 – Accessories, Remote control assembly

Remote control assembly (ordering code – LDD-RC) allows to use [LDY-series](#), [LDD-series](#), [PDD-series](#) diode drivers in the laboratory, both in CW and pulsed regimes.



More details can be found on the product page ([link](#)).