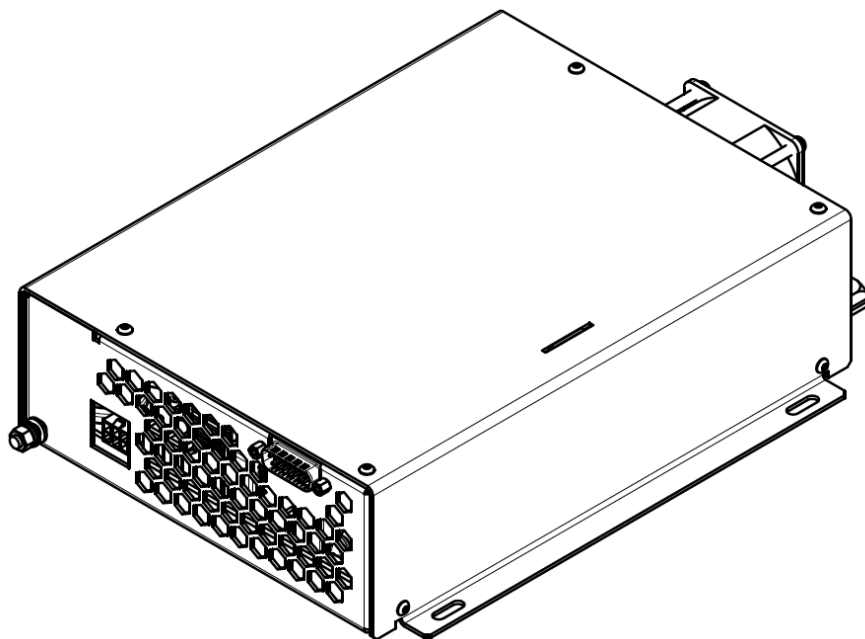


PDD-300 pulsed diode driver

User manual



Warning! This equipment may be dangerous.
Please read user manual before starting operations.

Important note. Please measure output with adequate load only (diodes). Resistive load connected to the output won't destroy the driver, but will severe distort its behavior.

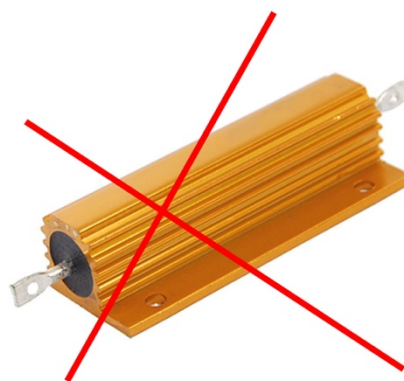











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Warnings

	Warning! The equipment is CLASS I ME EQUIPMENT. To avoid risk of electrical shock, the equipment must be protectively grounded.
	Warning! There is no user-serviceable parts inside the device. Do not self-repair the driver. Do not even open the enclosure, because of risk of electrical shock with residual high voltage.
	Warning! Equipment is not suitable for use in presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide.

Explanation of symbols

Symbol	Description
	Refer to instruction manual before handling
IPX0	Particles: No data available to specify a protection rating Water: Non-protected
	Dangerous voltage
	Protective earth terminal
	The product shall not be disposed of with household waste
	The year and the month of the manufacturing
	The name and the address of the manufacturer
MAINS	AC power input of the device
LED + LED -	Output positive and output negative of the device
INTERFACE	Interface (control) connector of the device

Overview / Applications

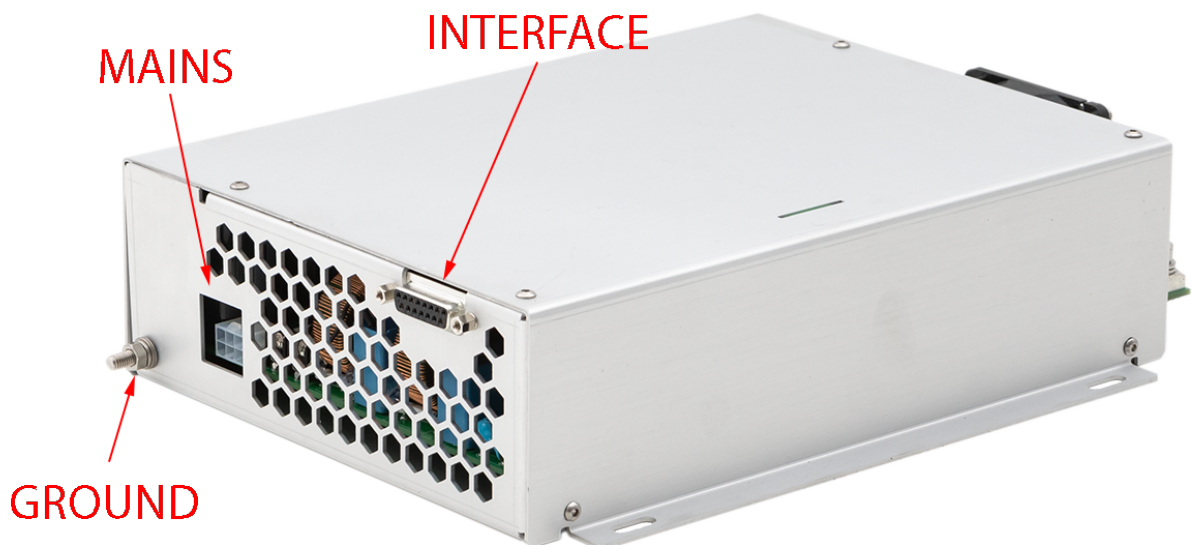
PDD-300 is a series of high power pulsed diode drivers. Peak output power is up to 5kW (with user selectable I_{MAX} and V_{MAX}), averaged output power is up to 300W.

Driver was especially designed for direct diode hair removal application. Driver's input is 100-240VAC.

Cooling

Module is cooled with embedded fans. No additional cooling is required.

Appearance / Layout



Connectors / Pins / Interface signals

INTERFACE: 15-pin D-SUB Female

PIN (color)	DESIGNATION	DESCRIPTION
1 (green)	ENABLE	+5V DC applied to this pin enable PDD. While 0V are applied to this pin or pin is unconnected module is disabled. Once <i>Fault</i> has occurred module is blocked till you eliminate fault cause, then <i>disable</i> module and <i>enable</i> it again.
2 (orange)	FAULT	If module is <i>enabled</i> and some trouble has occurred, module automatically stops operations and sets <i>Fault</i> status (<i>Fault</i> loop is “closed”). Module rises Fault in the next cases: - overheating - mains voltage interruption - maximal pulse energy exceeded To remove Fault state one should <i>disable</i> driver and <i>enable</i> it again In case of normal operations <i>Fault</i> loop is “opened”. Maximal allowed current in <i>Fault</i> loop is 50mA.
3 (transparent)	PULSE 1	+5V TTL pulse should be applied to pin 3 and to pin 8 to apply pulsed current to the output of PDD-300. While 0V are applied to one of these pins or one of these pins is unconnected there is no current at the output of PDD-300.
4 (black)	PULSE 2 RETURN	Return of Pulse 2 signal
5 (yellow)	PULSE 1 RETURN	Return of Pulse 1 signal
6	N/C	
7 (blue)	CURRENT PROGRAM	Voltage applied to this pin sets output current. 0-10V DC are linear with 0- I_{MAX} .
8 (white)	PULSE 2	+5V TTL pulse should be applied to pin 3 and to pin 8 to apply pulsed current to the output of PDD-300. While 0V are applied to one of these pins or one of these pins is unconnected there is no current at the output of PDD-300.
9 (purple)	ENABLE RETURN	Return of Enable signal
10, 11, 12, 13	N/C	
14 (red)	+15VDC AUXILIARY OUTPUT	Auxiliary +15VDC output. Maximal output current 50mA.

15 (white/blue)	INTERFACE RETURN	Return of other Interface signals (namely Fault, Current program and +15VDC)
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AC POWER INPUT: Molex Minifit MF-6F type

6	5	4
3	2	1

PIN (color)	DESCRIPTION
1, 4	Pins 1 and 4 are connected
2, 5	Not used
3, 6	Pins 3 and 6 are connected

**OUTPUT POSITIVE AND OUTPUT NEGATIVE:
M6 thread (8mm thread depth)**

PIN (color)	DESCRIPTION
DIODE “+” (red)	To laser diode anode
DIODE “-” (black)	To laser diode 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 and OUTPUT NEGATIVE are isolated from the chassis' ground (i.e. output is floating).

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

Operations notes

1. The proper sequence of driver's start up procedure is 'power -> enable -> pulse'. Other sequences are considered as improper
2. When driver is powered but disabled fans operate at lower speed; once driver is enabled fans accelerate to higher speed
3. Fault state is set when fault condition is met AND driver is enabled
4. To remove Fault state one should disable driver and enable it again

Pulse width limitations

Maximal pulse width the driver is able to provide at its output isn't fixed, but depends on driver's modification, load voltage and operating current.

Approximate formulae to estimate the maximal pulse width in a certain regime is $E_{MAX}=I*V*T_{MAX}$, where T_{MAX} is a maximal pulse width PDD-300 is able to provide with current I and voltage V at its output. E_{MAX} is a maximal extractable energy, which varies from 180J to 200J in dependence on driver's modification.

Examples of pulse width curves for different drivers and different loads are given below. More detailed information can be requested from the manufacturer.

PDD-300-100A-30V	PDD-300-150A-25V
<p><i>Maximal pulse width - around 65ms at maximal current and voltage. Even longer at smaller currents and/or voltages</i></p>	<p><i>Maximal pulse width - around 45ms at maximal current and voltage. Even longer at smaller currents and/or voltages</i></p>
PDD-300-100A-50V	PDD-300-100A-20V
<p><i>Maximal pulse width - around 35ms at maximal current and voltage. Even longer at smaller currents and/or voltages.</i></p>	<p><i>Maximal pulse width - around 100ms at maximal current and voltage. Even longer at smaller currents and/or voltages.</i></p>

Specifications

ELECTRICAL

INPUTS	
Input voltage	100-240VAC 50/60Hz
Input current	<5A, inrush current <10A
OUTPUT	
Maximal output voltage (V_{MAX}) *	Up to 50V (user selectable)
Maximal output current (I_{MAX}) *	Up to 200A (user selectable)
Peak power *	Up to 5kW
(*) $I_{MAX} * V_{MAX}$ shouldn't exceed maximal peak power (5kW)	
Pulse width **	From 1ms to tens of milliseconds at I_{MAX} and V_{MAX} and to hundreds of milliseconds at smaller operating parameters (see also <i>Pulse width limitations</i> section).
(**) Minimal pulse width is 1ms by default, maximal pulse width depends on driver's modification, operating current and voltage. In given regime, i.e. with given operating current (I) and voltage (V), maximal pulse width can be estimated as approx. 180-200J divided by $I * V$. Please contact the factory for further details.	
Risetime/falltime	<1ms (10-90% level)
Averaged power	300W
Pulse repetition rate	Limited with pulse energy and maximal averaged power only
Current accuracy	<1% of I_{MAX}
Current overshoot	<1% of I_{MAX}
SAFETY	Safety as per IEC 60601-1 EMC as per IEC 60601-1-2
COOLING	No external cooling is required
ENVIRONMENT	
Operation temperature	0 ... +40 °C
Storage temperature	-20 ... +60 °C
Humidity	90%, non-condensing

MECHANICAL

Dimensions	See dimensional drawing below
Weight	Approx. 2.8 kg

How to order?

PDD-300-XX-YY, where

XX means maximal output current I_{MAX} (user selectable up to 200A, even higher current is available on special request)

YY means maximal output voltage V_{MAX} (user selectable up to 50V, other on request)

See also *Pulse width limitations* section to better understand the driver's performance.

Examples (some popular modifications):

P/N	Description	Certificates
PDD-300-100A-30V	100-240VAC input, 100A/30V output	In process
PDD-300-150A-25V	100-240VAC input, 150A/25V output	In process
PDD-300-100A-50V	100-240VAC input, 100A/50V output	On demand
PDD-300-100A-20V	100-240VAC input, 100A/20V output	On demand

Other modifications are available on request.

Cables are ordered and purchased separately.

PDD-300-CABLES	A set of cables for PDD-300. Includes: - AC input cable – 1pc - Interface cable – 1pc - Output leads – 2pc	-
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Environmental protection

PDD-300 should not be disposed of with household waste.

Please dispose PDD-300 in accordance with the legislation on the management of electronic waste in your country.

Troubleshooting

- In case of a mains voltage interruption, the output voltage drops down. Once the mains voltage is restored, the unit doesn't restart automatically and needs to be enabled again to resume the operations.

Name and address of the manufacturer

OEM Tech O.O.O.
Odoevskogo 129
220018 Minsk, Belarus

EMC Compliance

IEC 60601-1-2 Edition 4.0 (2014).

Environment of intended uses: Professional Healthcare Facility Environment

Declared EMC compliance (to be confirmed with test reports for every particular part number):

Test	Standard	Class/ Severity level	Test result
Emission (IEC 60601-1-2 section 7.1-7.2)			
Radiated emission Freq. range: 30 - 1000 MHz	CISPR 11	Group 1 Class A	Complies
Conducted emission Freq. range: 150 kHz - 30 MHz		Group 1 Class A 120VAC / 230 VAC	Complies
Harmonic current emission	IEC 61000-3-2	230 VAC	Complies
Voltage changes, Voltage fluctuations and Flicker test	IEC 61000-3-3	230 VAC	Complies
Immunity (IEC 60601-1-2 section 8.9 & 8.10)			
Immunity from Electrostatic discharge (ESD)	IEC 61000-4-2	8 kV contact discharges & 15 kV air discharges	Complies
Immunity from radiated electromagnetic fields	IEC 61000-4-3	3.0 V/m 80 MHz ÷ 2.7 GHz, 80% AM, 1kHz	Complies
Immunity from Proximity field from wireless communications equipment	IEC 61000-4-3	List of frequencies (Table 9), from 9 V/m up to 28 V/m, PM (18 Hz or 217 Hz), FM 1 kHz	Complies
Immunity from Electrical Fast transient (EFT)	IEC 61000-4-4	± 2 kV on 230 VAC Tr/Th – 5/50 ns, 100 kHz	Complies
Immunity from Surge	IEC 61000-4-5	±1.0 kV DM/ 2.0kV CM on 230 VAC Tr/Th – 1.2/50 (8/20) µs	Complies
Immunity from conducted disturbances induced by RF fields	IEC 61000-4-6	3.0 & 6.0 VRMS on 230 VAC 0.15÷ 80 MHz, 80% AM, 1 kHz	Complies
Immunity from Voltage dips, short interruptions and voltage variations	IEC 61000-4-11	230 & 120 VAC mains; 0 % - 10 ms; 70% - 500 ms; 0% - 20 ms; 0% - 5sec	Complies

Means of protection (MOPs)

Path	MOPs	Path	MOPs
Between parts of the opposite polarity	1x MOOP	Input-to-chassis	1x MOPP
Mains part-to-chassis	1x MOPP	Input-to-output	1x MOPP
Mains part-to-secondary circuits	1x MOPP	Output-to-chassis	1x MOPP @ 240VAC