User Manual

LDP-CW 250-40
LDP-CW 250-40 F

PicoLAS

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Rev. 2103

Table of Contents

PicoLAS
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Rev. 2103

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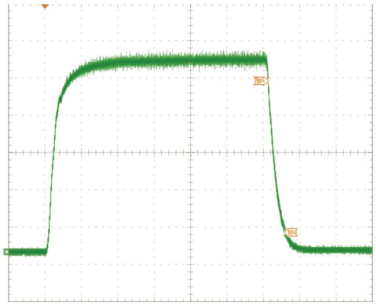
Driver for Laser Diode Stacks (10 kW)

- Fast analog modulation
- High efficiency
- Compact design: 5 W / cm³
- Isolated control interface



Technical Data*

Output current	10 A .. 250 A (300 A peak)
Compliance voltage	10 V .. 40 V
Efficiency	> 91 % @ 12 V, > 40 A
Current ripple	< 2.8 % (measured at 250 A)
Current overshoot	< 3.0 % (measured at 250 A)
Analog modulation	0 .. 50 kHz
Modulation voltage	0 .. 3 V (10 mV/A)
Current monitor	0 .. 3 V (10 mV/A)
Current rise time	< 20 µs
Current fall time	< 20 µs
Supply voltage power stage	20 .. 56 V, typ. 48 V
Supply voltage control stage	18 .. 25 V, typ. 48 V
Losses	280 W @ 12 V/250 A
Cooling	Water max. 45 °C
Power connection	Bus bars 5 x 10 mm
Control (18 V .. 60 V / 6 W)	Phoenix RM5.08
Modulation, current Monitor	SMC
Dimensions in mm	310 x 110 x 60
Weight	2.5 kg

* Specifications measured with a fast recovery diode instead of a laser diode and measured at a supply voltage of 24 V. Technical data is preliminary and subject to change without further notice.

Product Description

The LDP-CW 250-40 is a very efficient and compact driver for high power laser diodes and is available in two different versions: Standard and fast modulated (F). Both versions deliver a max. output voltage of 40 V with a current of up to 250 A. This 10 kW driver has an exceptional compact design leading to excellent power density of 5 W/cm³ and a high efficiency of up to 94 %.
The standard version features a very low current ripple of <0.8 %, minimal overshoot of <3 % with a maximum modulation frequency of 1 kHz. The F version increases the maximum modulation frequency to 50 kHz (-3 dB) with a pulse rise time of <20 µs, while keeping the maximum overshoot below 3 %.

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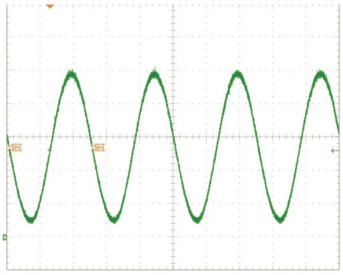

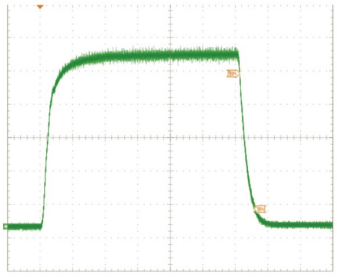

- Fast analog modulation
- High efficiency
- Compact design: 5 W / cm³
- Isolated control interface

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Compliance voltage	10 V .. 40 V
Efficiency	> 96 % @ 12 V, > 40 A**
Current ripple	< 0.8 % (measured at 250 A)
Current overshoot	< 3.0 % (measured at 250 A)
Analog modulation	0 .. 50 kHz
Modulation voltage	0 .. 3 V (10 mV/A)
Current monitor	0 .. 3 V (10 mV/A)
Current rise time	< 50 µs**
Current fall time	< 50 µs**
Supply voltage power stage	20 .. 56 V, typ. 48 V
Supply voltage control stage	18 .. 25 V, typ. 48 V
Losses	280 W @ 12 V / 250 A
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Dimensions in mm	310 x 110 x 60
Weight	2.5 kg

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** Can be lower depending on set up.

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How to get started

Step	What to do	Check
1	Unpack your device	
2	Connect a load (for example a dummy load or your laser diode) to the output.	 Check for correct polarity
3	Connect the water cooling	See details for temperature and flow rate
4	Connect the power supply for the control stage (18 .. 50 V DC)	 Check for correct polarity
5	Connect the power supply for the power stage (48 V DC)	 Check for correct polarity
6	Connect the input signal for the current setpoint	Signal generator should be off or set to 0 V
7	Turn on the water cooling	Check for leaks and sufficient water flow
8	Turn on the supply for the control stage	Check if all five LEDs turn on (green). If not stop and check the previous steps.
9	Turn on the supply for the power stage	
10	Apply current setpoint (0 .. 2.5 V)	Current can be checked with the current monitor and an oscilloscope
11	**Shutdown sequence:** Set current setpoint to 0 V	
11	Turn off supply of the power stage	Wait for 3 secs
11	Turn off supply of the control stage	
11	Turn off water cooling	

Laser Module

It is highly recommended to use galvanic isolated I/Os for „I_soll“, the current monitor „I_ist“ and a 24 V power supply, when operating several laser modules in parallel. Otherwise, unwanted ground loops will occur and lead to a shift of the reference ground for the control signals. In the worst case, the laser module and/or the laser diode can be damaged.

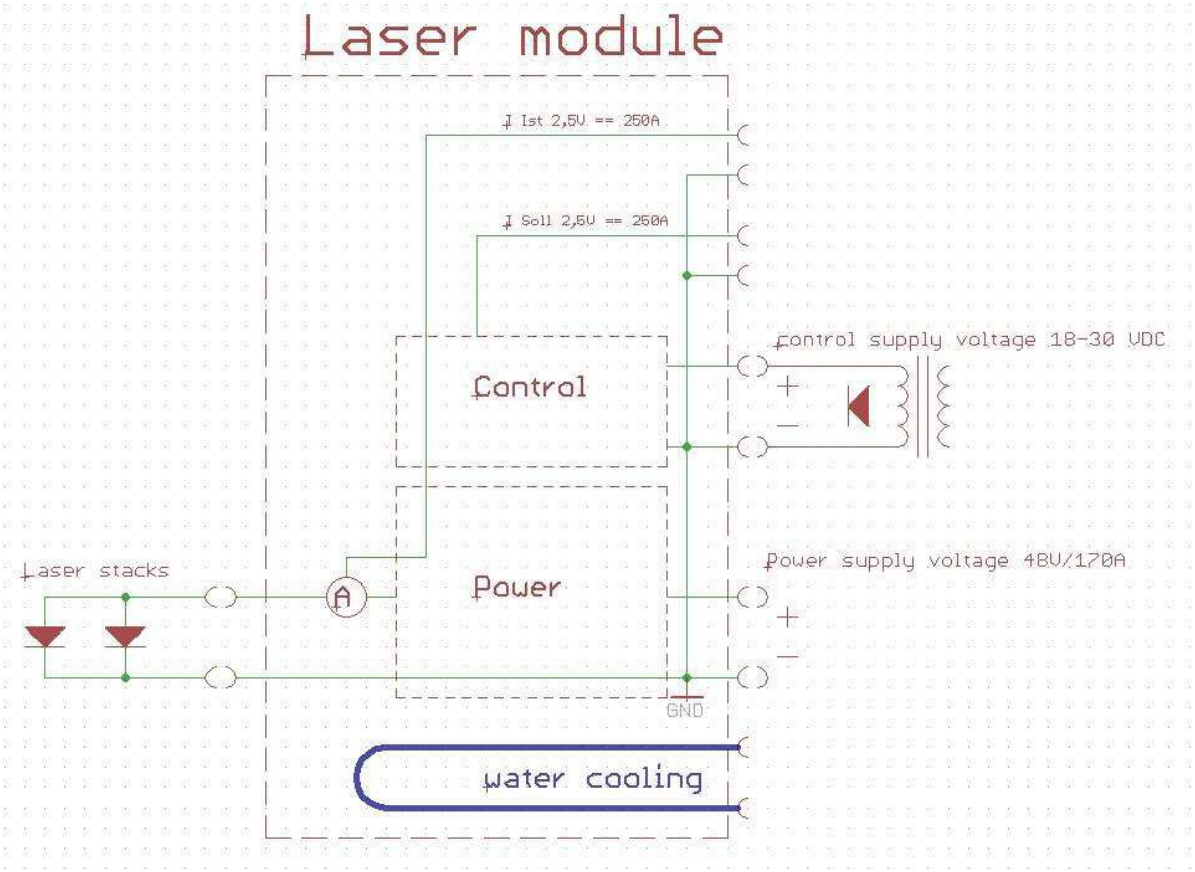
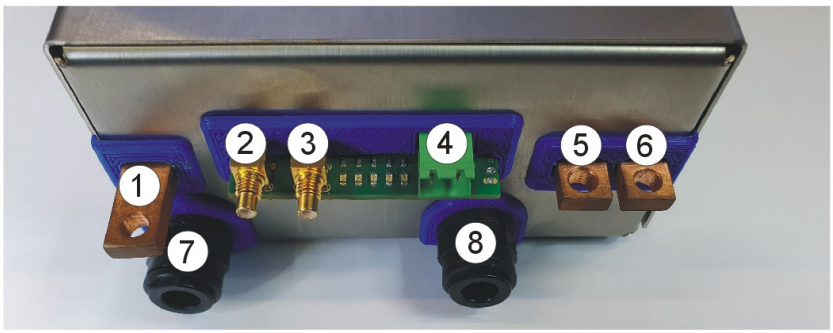


Figure 1: Laser module with all interfaces

Description of the Connectors

Table 1: Description of the connectors

Name	Connector Type	Electrical Specification	Description
I_Soll	SMC	0 .. 2,5 V (0 .. 250 A) R_I = 5kΩ standard R_I = 10 kΩ F-Version 0 .. 50 kHz (-3 dB)	Input of the current setpoint for the laser (relation of the GND of the control voltage)
I_Ist	SMC	0 .. 2,5 V (0 .. 250 A) R_I = 1 kΩ 0 .. 50 kHz (-3 dB)	Output of the actual current of the laser (relation of the GND of the control voltage)
Power supply for the control stage	Connector: Würth 69131251000 Possible counterpart: Würth 691351500002	18 .. 50 V / 6 W typ.	Supply voltage of the controller (must be galvanic isolated)
Power voltage +	Power rail: Copper 5x10 mm Screw connector M5		Supply voltage for power stage
Power voltage -	Power rail: Copper 5x10 mm Screw connector M5		Supply voltage for power stage
Laser +	Power rail: Copper 5x10 mm Screw connector M5		Supply voltage for power stage
Laser -	Power rail: Copper 5x10 mm Screw connector M5		Supply voltage for power stage
Cooling water input / output	Plastic tube with 8 mm (outer diameter)	Throughput: 2 - 6 l/min	Cooling of the module
Cooling channel	Aluminium, coolant needs to contain appropriate corrosion protection		
Max. temp. of the power rail	50 °C		
Max. water temp	40 °C		



1 Anode
2 I_ist (Monitor Signal)
3 I_soll (Setpoint Signal)
4 Supply voltage
Left Pin: + 24 V
Right Pin: GND
5 GND
6 Supply +48 V
7 Cooling water intake
8 Cooling water outake

Figure 1: LDP-CW 250-40 (F) with all connectors with housing. Alternative layouts with backward facing LD connectors are also available.

Status LEDs

The driver features five status LEDs. These are located between the I_Soll and the voltage supply for the controller connector as shown in figure 3. As soon as the 24 V supply voltage for the controller is turned on, all LEDs should be illuminated.
If not:

- All LEDs are off: Please check the supply voltage
- One or more LEDs are off: Please contact PicoLAS GmbH or your distributor

Absolute Maximum Ratings

Do not exceed the ratings in the datasheet.
There is no overcurrent protection!
There is no overtemperature protection!
Setting the current value outside of the specification will damage the module.
(For instance: 3V @ „I_soll“ input, sets module output current value to 300 A. The overcurrent leads to overheating and destruction of the module.