

PLD-CW-2000H-ZIF

PRECISION CONSTANT CURRENT LASER DIODE DRIVER



Key Features

- Special Design for 10/14 pin Butterfly Laser Diode
- High Precision Constant Current Mode
- Output Current up to 2000 mA
- High Current Stability: 0.01 mA
- Control interfaces USB, RS-232, CAN
- LabView compatible
- Python libraries
- Analog and Digital full current amplitude Modulation
- Optical power stabilization mode
- On-Board TEC Controller
- Regulated Maximum TEC Current
- Hi precision temperature stability: 0.01 deg
- 5Vdc Input Power
- Completed by Heatsink
- Compact Size 100 mm × 85 mm × 31 mm

Description

The PLD-CW-2000H-ZIF is a constant current laser diode driver for powering 10/14-pin butterfly laser diode modules for applications, which require high precision low ripple constant current regulation.

The driver circuitry operates from a single 5Vdc power source. The driver supplies a bidirectional proportional-integral-derivative (PID) thermoelectric cooler controller (TEC) with current capability of 4A and voltage capability of 4V. Maximum TEC current is regulated by user.

The main parameters of PLD-CW-2000H-ZIF (output current, temperature set, maximum TEC current, monitor photodiode signal)

are controlled by computer interface. The GUI can control multiple drivers connected by CAN/USB hub.

The driver supports full amplitude modulation of drive current by an external analog 0...5 V and TTL signals.

Driver has special push-in connector for easy connecting butterfly laser diode directly into driver board and large heat sink for stable heat dissipation.

Specifications

Parameter	Min.	Typ.	Max.	Units
INPUT				
Voltage	4.8	5.0	5.2	Vdc
Current	-	-	3	A
OUTPUT				
Current	-	-	2000	mA
Current Regulation Step	-	0.01	-	mA
Current Ripple amplitude	-	-	0.1	%
Current Stability	-	-	0.1	%
Current Set Accuracy	-	-	1	%
Compliance Voltage	1	-	3	V
TEC current setting range	-4	-	+4	A
TEC Voltage	1	-	4	V
TEC Temperature Set	5	25	50	°C
TEC Temperature Step	-	0.01	-	°C
TEC Temperature Accuracy	-	-	0.1	%
MODULATION				
Trigger input voltage	3.3	-	5	V
Trigger input impedance	-	500	-	Ω
Trigger pulse frequency	-	-	3	kHz
Trigger pulse width	150	-	-	μS
Current rise time	100	-	140	μS
Current fall time	80	-	160	μS
Analog input voltage	0	-	5	V
Analog input impedance	-	400	-	Ω
Current setpoint	-	400	-	mA/V
Analog input frequency	-	-	3	kHz

Parameter	Min.	Typ.	Max.	Units
TEMPERATURE				
Operating	+10	-	+50	°C
Storage	-20	-	+70	°C
Humidity, Non-Condensing	-	-	95	%
CONNECTIONS				
Power	2 mm / 5.5 mm Jack (PJ-05AH Cui Devices)			
USB	Mini-USB, Type B (1734035-1 TE connectivity)			
Interface connector	Terminal block (1-282834-0 TE connectivity)			
MECHANICAL				
Size	100×85×31 mm			
Weight, not more	200 g			

Interface connector pinout

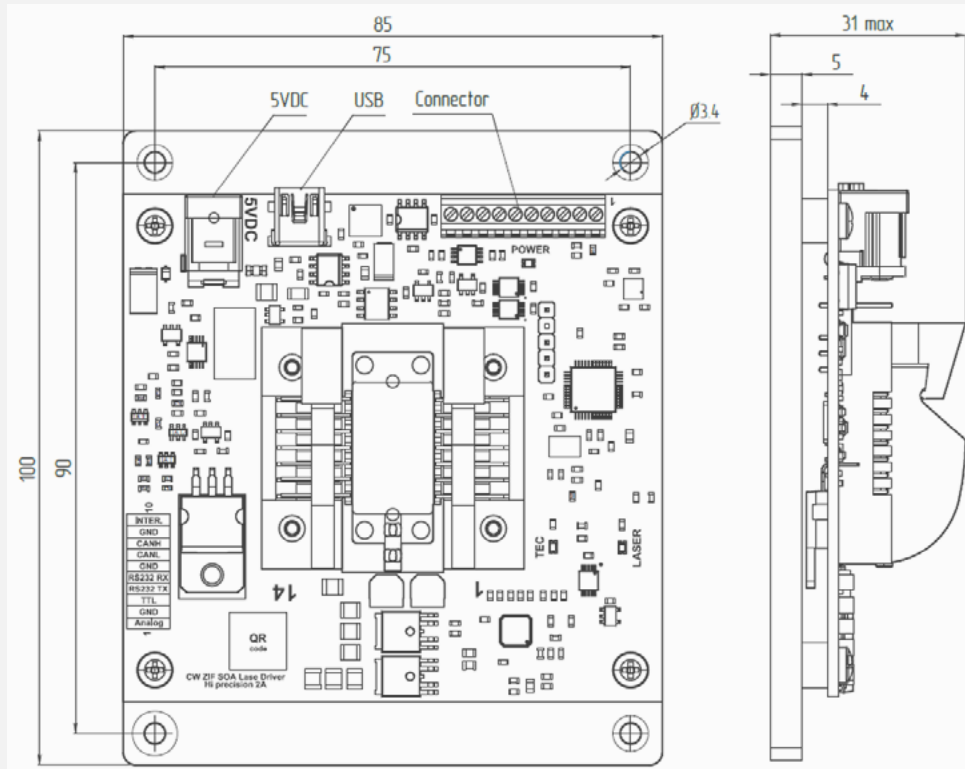
PIN	Function	Description
1	ANALOG	<p>Analog modulation input.</p> <p>Connect to the external analog voltage or external sinusoidal signal generator for control output current. 0÷5V analog input correspond to 0÷2A output current. Current setpoint is 400mA/V. Input impedance is 400 Ω.</p> <p>Choose “ANALOG” mode by PC software and press “ON/OFF” button to activate output current and control it by analog input. Maximum frequency of external sinusoidal signal is 3 kHz, that supports 2A modulation amplitude. The modulation amplitude gets smaller at higher frequency.</p>
2	GND	Device ground
3	TTL	<p>Trigger input.</p> <p>Connect to the external TTL signal generator for triggering output current. The amplitude of external trigger must be 3.3V to 5V range. Input impedance is 500 Ω.</p> <p>Choose “External” mode by PC software and press “ON/OFF” button to activate triggering output current by external input. Current amplitude sets by PC software. Maximum frequency of external triggering signal is 3 kHz.</p>
4	RS232 TX	RS232 port transmit
5	RS232 RX	RS232 port reception
6	GND	Device ground
7	CANL	CAN bus high
8	CANH	CAN bus low
9	GND	Device ground

INTERLOCK

Connect to the external interlock circuit. Open: device is locked. Closed: device is operational. Internally pulled up to 3.3V by 1 kΩ resistor. Use open collector or dry contact.

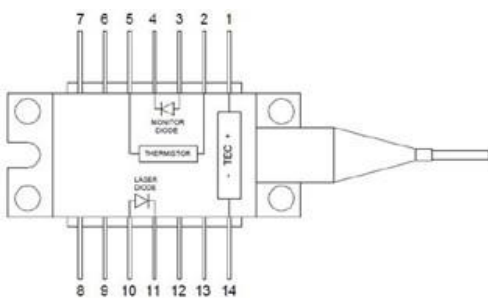
Note: The laser emission can only be started when the interlock circuit is closed

Dimensions and Connections



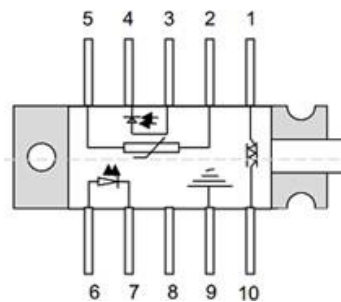
Compatible Laser Pinout

14-pin Butterfly package



Nº	Description	Nº	Description
1	TEC Anode	8	n/c
2	Thermistor	9	n/c
3	Monitor PD Anode	10	LD Anode
4	Monitor PD Cathode	11	LD Cathode
5	Thermistor	12	n/c
6	n/c	13	n/c
7	n/c	14	TEC Cathode

10-pin Butterfly package



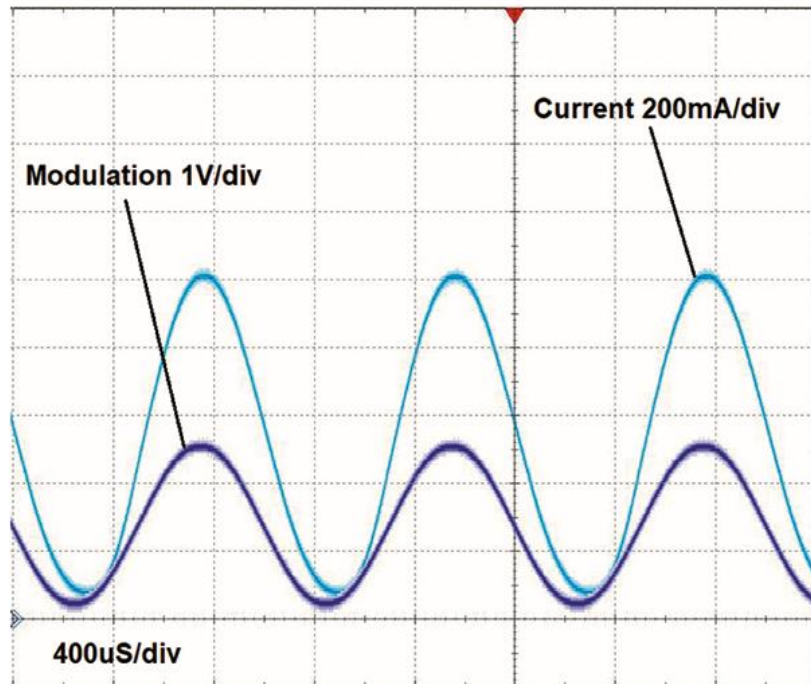
Nº	Description	Nº	Description
1	TEC (+)	6	Laser anode (+)
2	Thermistor	7	Laser cathode (-)
3	Monitor anode (-)	8	NC
4	Monitor cathode (+)	9	Package ground
5	Thermistor	10	TEC (-)

Power supply

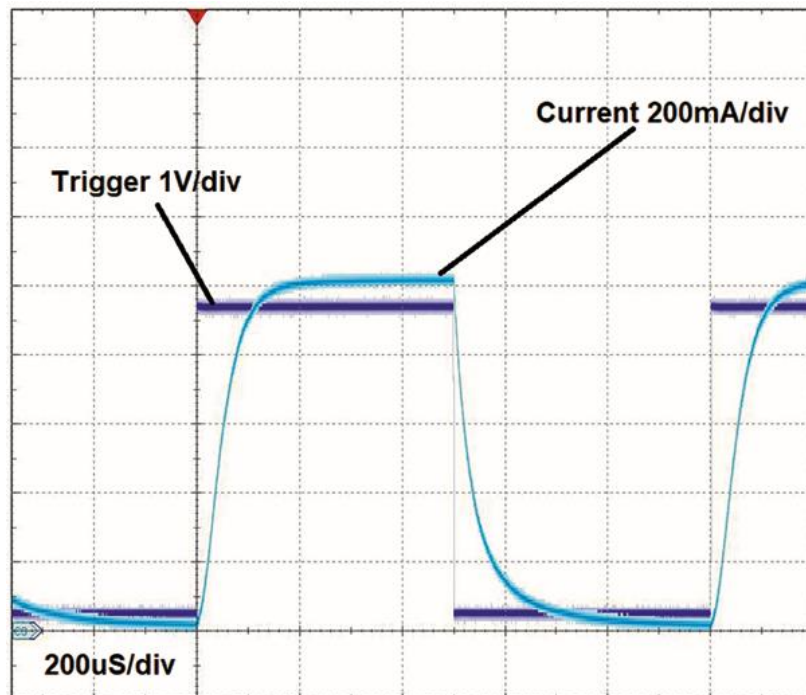
Recommended type of power supply unit MEAN WELL RS-25-5.

It is possible to use other power sources with an output voltage of 5 V and a current of up to 5 A.

Typical Performance Characteristics

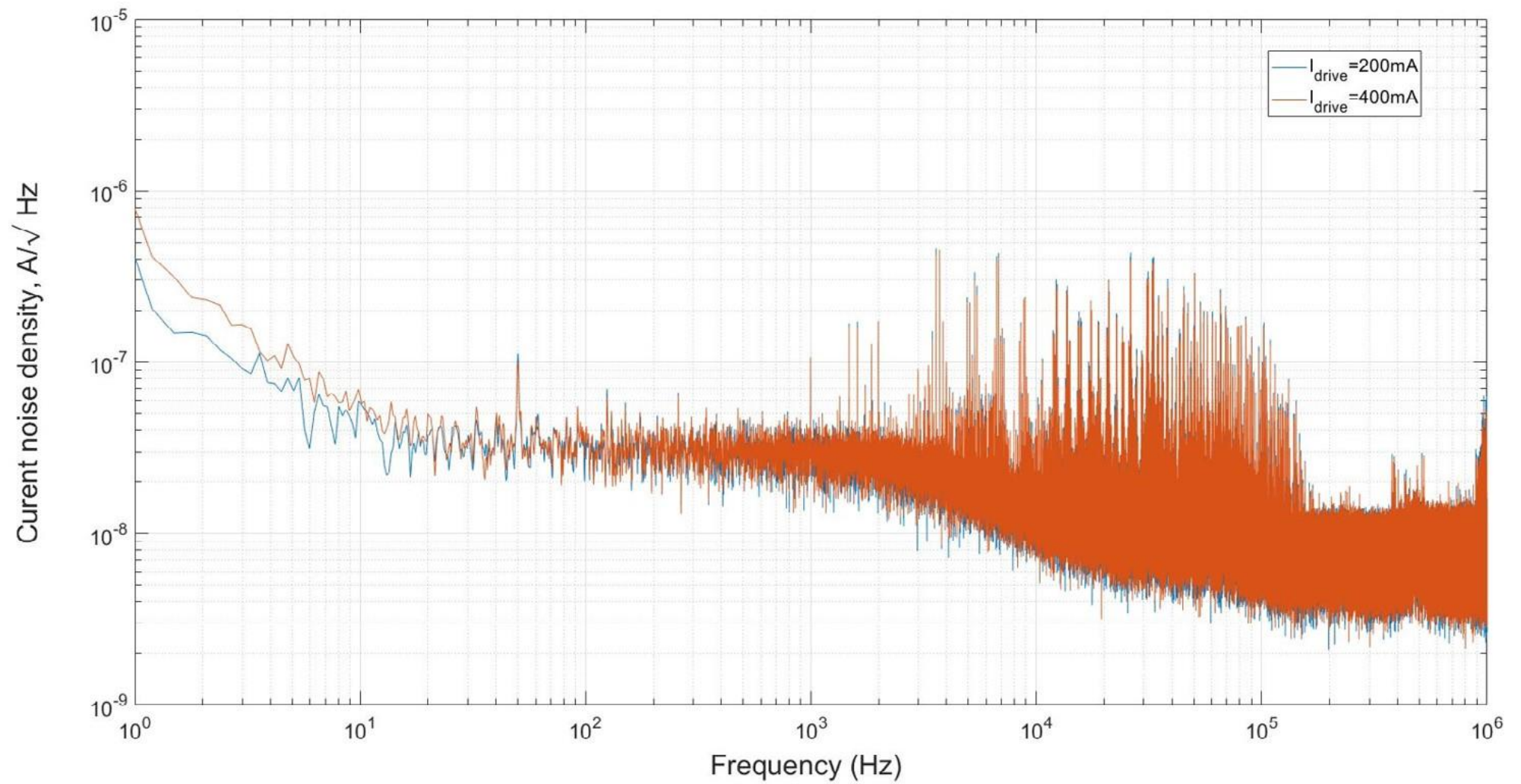


1. Output current waveform, modulated by external sinusoidal signal generator with frequency 1 kHz



2. Output current waveform, modulated by external trigger signal generator with frequency 1 kHz.
Current amplitude is set at 1A by PC software

Typical Performance Characteristics



Control Center Driver Software

Quick start (mini USB mode, only one driver)

1. Install the laser diode into the ZIF socket: Open the ZIF socket clams. Insert the laser into the mount in such way, that the pins fit easily into the slots of the ZIF socket. **Note:** Make sure, the laser pin numbering matches with the imprint on the laser socket. Close the clamps of the ZIF socket.
2. Power the driver board according to its datasheet. After the power is applied, the Power LED will light up.
3. Connect the mini USB cable.
4. Run Id_control_center_vXXX.exe.
5. Click “Settings” to enter the program configuration menu (fig. 1).

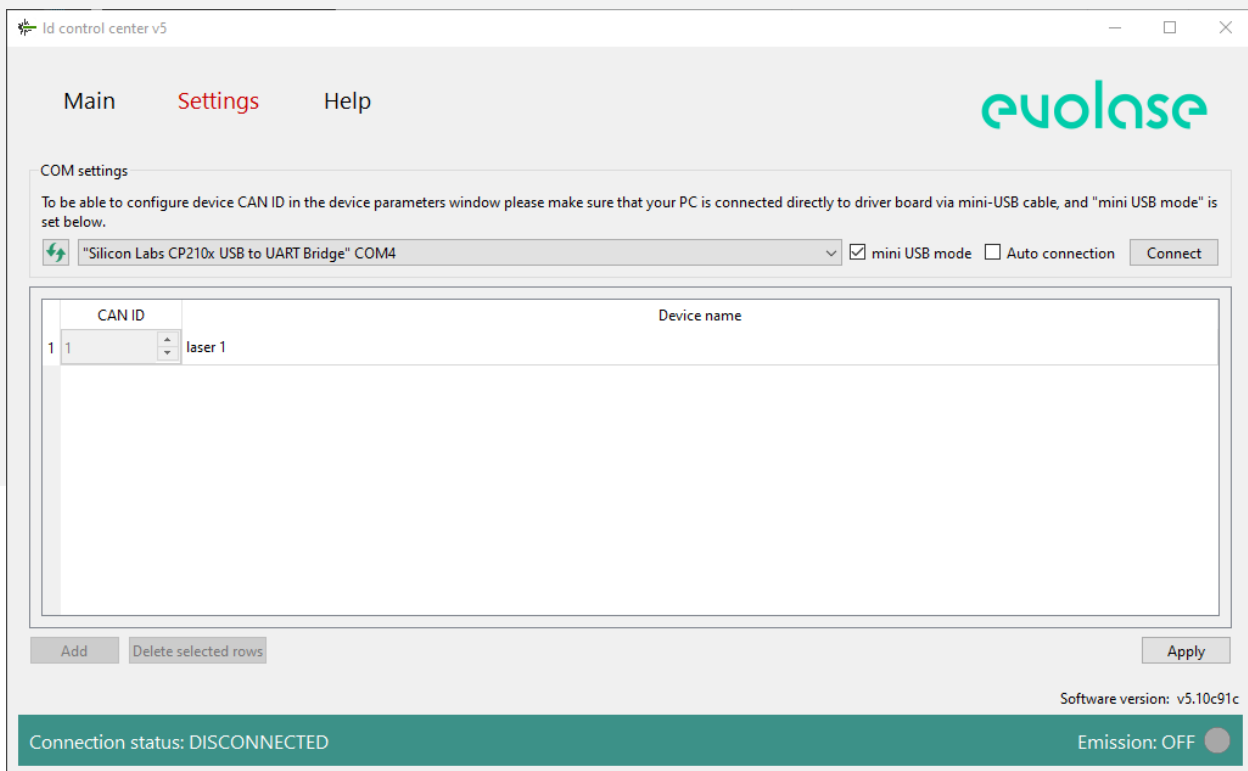


Figure 1: The system configuration menu

6. Press icon to refresh the list of COM ports and select the COM port the driver is connected to from the drop down menu.
7. Tick the “mini USB mode” box.
8. Tick the “Auto connection” box to select the “Auto connection” mode; otherwise click “Connect”.
9. Click “Main” menu panel. The control panel corresponding to the type of USB connected
10. The driver should appear in the first channel. Click the “Main” menu panel. The shown control panel matches the connected driver type.
11. Click icon located in the control panel’s upper right corner to enter the driver setting mode.
The driver setting mode allows entering the permitted range of laser parameters and laser operating conditions.
12. The middle column shows the current value of the parameters. To change the parameter value, enter each parameter in the settings window and click “Write” to apply the value.
13. CAN ID for the driver could also be set here for operation as part of the CAN network. The new CAN ID value will be applied only after resetting the driver power supply. See more about the CAN network in the relevant section.
14. After setting all the parameters, click "Close". The driver is now configured and ready for operation.

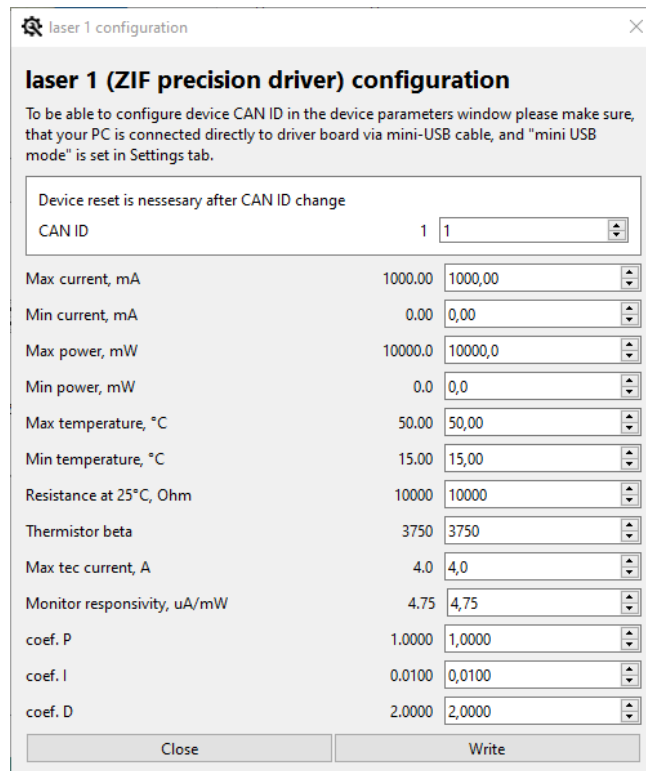


Figure 2: The laser diode setting menu

Laser diode setting and system configuration

The system configuration window (fig. 2) is accessed by pressing “Settings” in the navigation bar. In this window the user can set the number of channels, CAN network ID and the names for the connected drivers.

The user can access the laser diode settings menu by pressing the wrench icon in the expanded main control view. The wrench icon will open a new individual menu for each of the connected diodes, and the software applies the new settings only to that single diode. The user can set CAN ID of the driver, the allowed ranges for the operation temperature, current and optical power, the values of thermistor resistance at 25 °C and beta parameter, the maximum current of the TEC, the monitor PD responsivity and the coefficients of the PID controller of the TEC. The available settings for CW drivers are shown in Figure 2. The middle column shows the current value of the parameters. To change the parameter value, enter each parameter in the settings window or change by up and down arrows and click “Write” to apply the value.

Basic controls and operation

The main software window implements controls (fig. 3), control panel can be collapsed. The software supports up to 200 devices connected to a PC through a USB/CAN adapter. Each laser diode’s drive current, temperature, drive voltage, repetition rate, and pulse duration can be entered into parameter window or changed by up and down arrows. The user needs to confirm the value by pressing Enter for changes to take effect.

Note: All settings are not available for all driver types. The software will show only the available controls based on the recognized driver type.

The CW driver can operate in four modes:

CW – conventional CW operation mode. Temperature can be set with 0.01 deg C precision and current can be set with 0.01 mA precision. Suitable regulation step can be defined in the corresponding “Stepsize” control window.

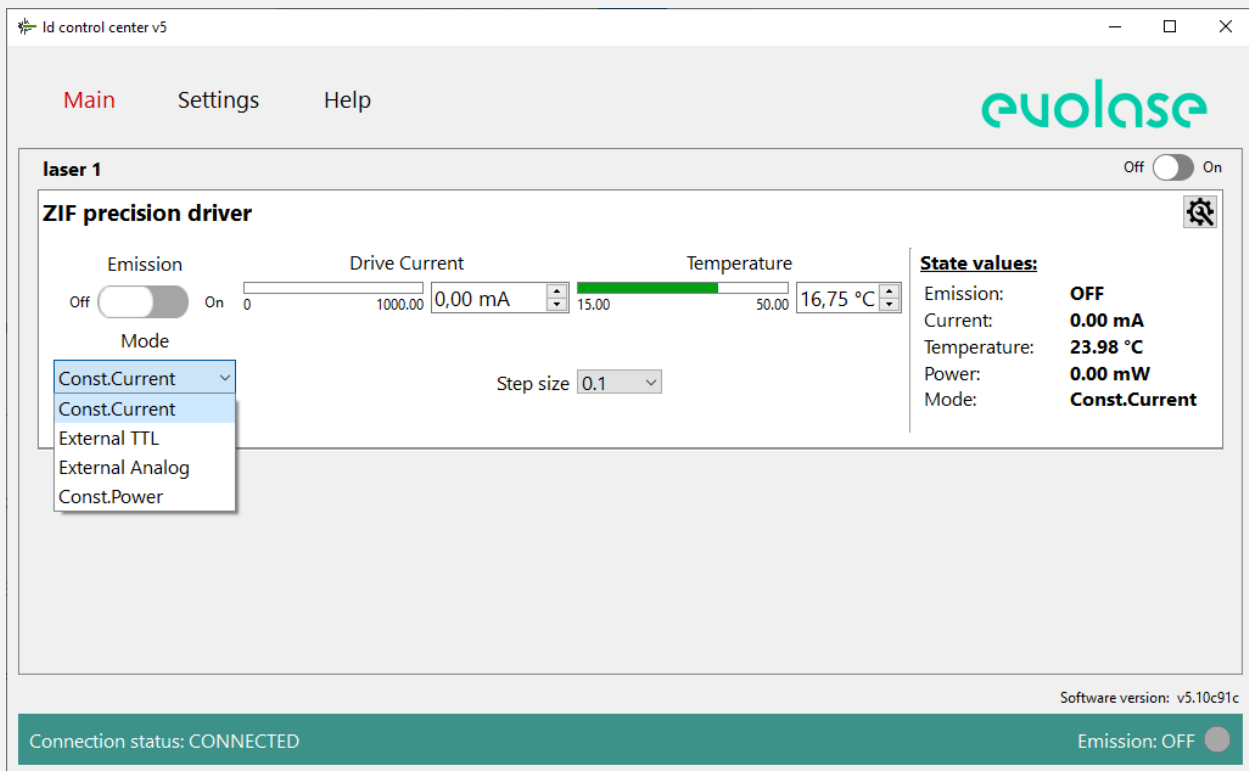


Figure 3: The main control menu

ANALOG – analog modulation mode. The output current is controlled within 0..2A range by an externally applied analog modulation voltage within 0..5 V range (refer driver manual for analog modulation pin of the interface connector). The window “Drive current” shows average over time value of the output current.

TTL – TTL modulation mode. The output current is switch on from zero to the value set in “Drive current” window by an externally applied TTL signal (refer driver manual for TTL modulation pin of the interface connector).

Constant Power – Stabilized optical power CW operation mode. Power can be set with 0.01 mW precision.

Note. Only for lasers equipped with monitor PD.

To set the operating mode of the laser diode, select the required operating mode from the drop-down menu.

In the CW driver, the user can only set the temperature and current or optical power (in Constant Power mode) of the laser diode. To set the laser diode temperature, enter the required temperature value in the temperature setting window and press “Enter” on PC keyboard. After that, the thermoelectric cooler (TEC) will turn on, bringing the temperature of the laser diode to the set temperature, and the indicator TEC LED will light up. To set the laser diode current, enter the required current value in the current setting window and press “Enter” on PC keyboard. To set the laser diode optical power, enter the required value in the power setting window and press “Enter” on PC keyboard.

Note. Since, in this mode, a constant current is maintained on the monitor PD, and the responsivity of the PD changes over the entire range of optical powers, we recommend starting the laser in CW mode first. Then changing the current to achieve the required power value measured by an external power meter, and memorize the Power value in the table “Read values” on the right side of the main panel. After that Start the laser in Constant Power mode by setting the stored power value.

The “Stepsize” window sets the step of adjusting these parameters when using the up and down arrows. Green indicator bars show the actual set value relative to the minimum and maximum allowed. The user can change the allowed range in the driver settings menu (⚙️).


To turn on the laser diode emission, click the “Power Status” switch. The switch will move to the “On” position and change the color to green, the indicator LASER LED will light up. To turn off the laser diode emission, click the “Power Status” switch. The switch will move to the “Off” position and change the color to grey, the indicator LASER LED will go off. The laser diode emission can be turned on and off even when the main control panel is collapsed.

The table “Read values” on the right side of the main panel displays the current state of the laser diode.

The driver can be disconnected from the USB port during operation and the device will preserve the last known status.

The driver stores the settings in the onboard memory, and after reconnection, the software reads driver settings and displays them in the control panel. When trying to close the software with at least one laser running, a dialog window opens prompting the user to select whether to switch off the laser or to keep it running.

Operating in CAN network

1. Before connecting several drivers into a CAN network, the user needs to set a CAN ID for each driver by connecting the driver through the mini USB port and following the procedure described in the Quick Start section. The set CAN ID for each driver should be recorded.
2. Connect up to 200 drivers into the CAN network (fig. 5) by using the CAN hub (fig. 5).
3. Click “Settings” to enter the program configuration menu (Fig 4.).
4. Press  icon to refresh the list of the COM ports and select from the drop down menu the COM port the driver board is connected to.
5. Untick the “mini USB mode” box.
6. Tick “Auto Connection” box to select the “Auto Connection” mode. Otherwise, click “Connect”.
7. The software has a lot of channels for connecting and controlling devices. To connect a new driver, click "Add", enter the CAN ID of the driver in the appeared row. You can rename the drivers to better keep track of them. Click “Apply” to apply system configuration.
8. To remove drivers, select the rows with these devices and click “Delete selected rows”, then click “Apply” to apply system configuration.

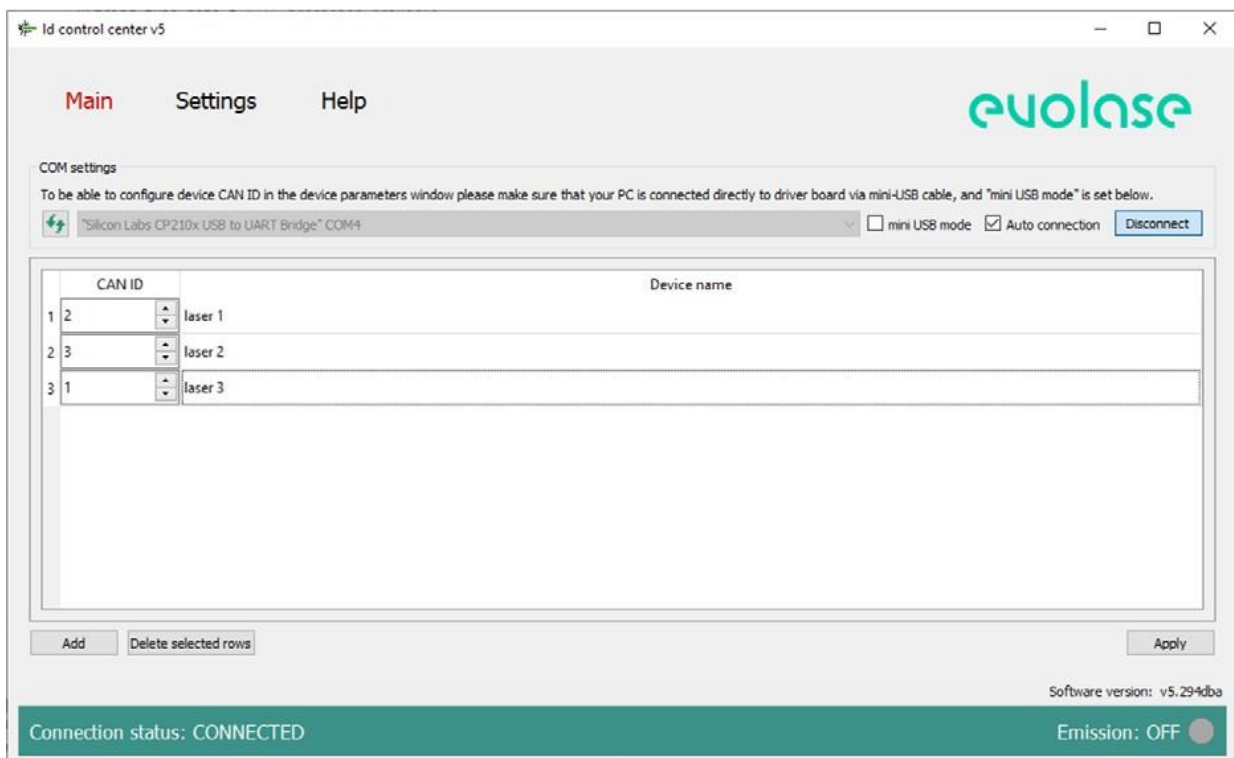


Figure 4: The system configuration menu

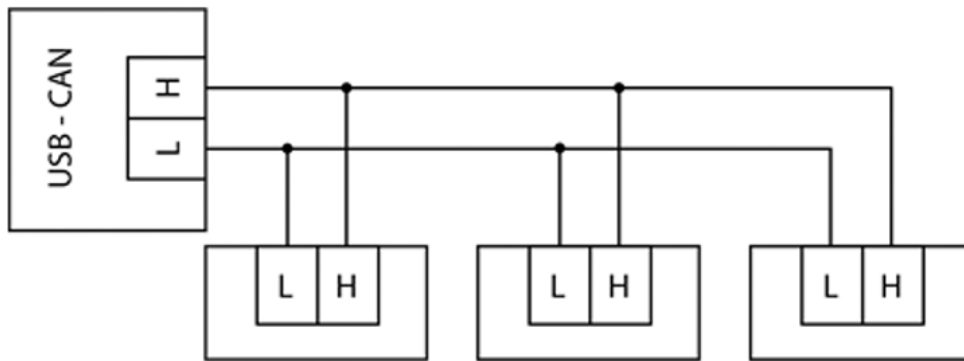


Figure 5: CAN interface connection scheme

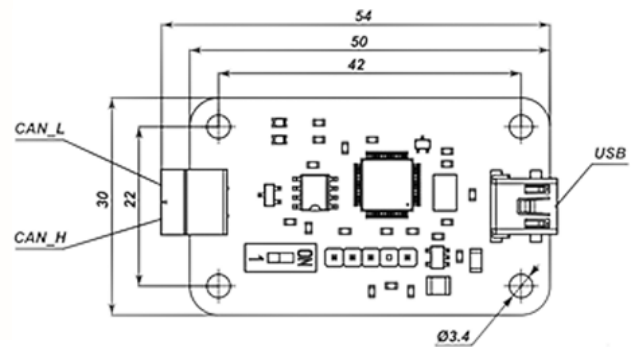


Figure 6: USB-CAN hub