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LDD-1137

Hardware Version v1.32

The LDD-1137 is a current driver designed to precision-drive laser diodes or other loads in CW or modulation operations up to 1 ms. Featuring fully digital current and optional light power control, various safety features and comprehensive communication interfaces, it offers a complete solution for continuous or modulated applications. The device communicates through various interfaces, provides an API for system integration and comes with a comprehensive GUI software for seamless operation.

HIGHLIGHTS

- **Input Voltage:** 18 – 75 VDC
- **Laser Diode Driver:**
  - Compliance Voltage: 0 – 70 V
  - Output Current: 0 – 75 A
  - Efficiency: > 96 % (@ > 50 % Load)
  - Ultra-Fast Switch-off for optimal LD protection
  - 1 ms – CW operation
  - High output current resolution (1.5 mA) and low ripple (~ 0.2 %)
  - Temperature Coefficient: 20 ppm/K
- Dimensions: 171 × 118 × 48 mm
- Digital PID-controlled current source with internal signal generator and LUT
- Safety features: Interlock input and overvoltage/ -current/ -temperature protection
- Easy configuration via provided GUI software
- Stand-alone or remote-controlled operation via USB (isolated), RS485 or Ethernet
- GPIO features for monitoring and control (Enable, Trigger, Error Indication, etc.)
- Optional LPC option (-PD4) allows for precise controlling of Light Power through Photodiode feedback

Trial Device & Technical Support

Trial devices and technical support are available for evaluation projects.
Please contact support@meerstetter.ch or visit our support center.

RELATED PRODUCTS

Model	Output Range	Modes	Description
LDD-1125	0–30 A / 0–27 V	1 µs – CW, modulated, QCW and pulsed modes	lower power
LDD-1301	0–20 A / 0.5–45 V	1 ms – CW	lower power
LDD-1303	0–20 A / 1–120 V	1 ms – CW	lower current, higher voltage
LDD-1321	0–1.5 A / 0–14 V	CW, Add-on TEC Controller available	lower power, more compact

See the full product overview in the Meerstetter Engineering's Product Compatibility section.

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TABLE OF CONTENTS

1 SPECIFICATIONS

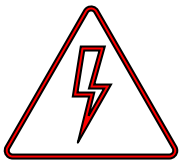
1.1 Absolute Maximum Ratings [1]

		Min	Max	Unit
Voltage	$U_{IN, DC}$		80	V
Current	I_{IN} (On Board Fuse)		70	A
	I_{OUT}		80	A

1 Operation at or beyond the absolute maximum ratings may result in permanent device damage. These limits are stress ratings only and functional operation of the device at these conditions is not guaranteed. Prolonged exposure to absolute maximum conditions can adversely affect long-term reliability and should be avoided during normal operation.

1.2 Operating Characteristics

		Min	Max	Unit
Temperature	Operation Temperature	0	70	°C
Humidity	RH_{OP}, non-condensing	5	95	%



Warning

This is a high-power device.
Only operate this device in an enclosure.
Take necessary precautions to protect the operator.

1.3 Electrical Characteristics

Unless otherwise noted: T_A = 25 °C, U_{IN} = 24 V, R_{load} = 3.3 Ω

Symbol	Parameter	Test Conditions / Hints	Min	Typ	Max	Unit
DC Power Supply Input:						
U_{IN}	Supply voltage		18		75	V
U_{IN} Ripple	Ripple tolerance	U_{IN} never below U_{IN} min or above U_{IN} max			300	mV_{PP}
Output:						
I_{OUT}	Current range		2 [1]		75	A
U_{OUT}	Voltage range	U_{IN} = 75 V	0	70		V
I_{OUT_RIPPLE}	Current ripple	I_{out} > 2 A		TBD		mA
I_{OUT_RES}	Current resolution	Driver		1.5		mA
U_{OUT_LIMIT}	Output voltage			TBD		V
P_{OUT}	Output power	U_{LD} = 70 V, additional cooling			5000	W
f_{CW}	Current change	For L_{Load} < 100 nH, higher f_{CW} are possible		TBD		kHz
I_{OUT_SLOPE}	Current slope limit	I_{out} > 10 A		TBD		A/ns
System Characteristics:						
$\eta_{50\%}$	Power efficiency	@ 50 % Load		96		%
$\eta_{100\%}$	Power efficiency	@ 100 % Load		98		%

1 Operation below this value is possible but the output current and measurement may show offsets outside of the specifications.

1.4 Light Measurement Characteristics [Devices with -PD4 Option only]

Unless otherwise noted: T_A = 25 °C

Symbol	Parameter	Test Conditions / Hints	Min	Typ	Max	Unit
Photodiode Input Characteristics:						
I_{PD}	Photodiode current				4	mA
f_{ADC_PD}	Sampling frequency	@ 16bit Note: bandwidth-limited.		1		MSPS

2 FUNCTIONAL DESCRIPTION

2.1 Current-Controlled Operation Modes and Communication Options

The LDD-1137 is an OEM high performance current source that is primarily designed to operate in CW and modulation mode up to 1 ms. It is configured over an industry-standard RS485, Ethernet or a USB connection, either GUI-driven using the included Configuration Software, or by direct parameter control using the predefined communication protocol. Basic system status is visually indicated by on-board LEDs, more detailed status information can be polled at any time. The LDD-1137 can operate in a stand-alone configuration as well as in a remotely controlled manner, with parameters adjusted on the fly. The laser diode driver is current-PID-controlled.

Configuration parameters further include: Control source selection, maximum current limits, nominal current ramping, PID controller settings, NTC temperature sensor modeling coefficients, measurement circuitry calibration, error thresholds, etc. Please refer to the user manual for further information.

2.2 Light-Power-Controlled Operation Mode [Devices with -PD4 Option only]

The LDD-1137-PD4 has additional light measurement circuitry (photodiode input). A user-defined “Light System Scale“ factor links the generated photocurrent to the absolute light power. The light PID controller’s output is fed to the current controller’s input. The nominal light power value may be CW, modulated CW (using internal generation) or remotely controlled.

2.3 Configuration Software

The included Configuration Software is a powerful tool that allows monitoring and full configuration of the LDD-1137 via a standard USB, RS485 or Ethernet connection from a PC running Windows.

This tool is ideal for laboratory setups, product evaluation diagnosis, debugging and commissioning:

- internal generators set up (see Figure below)
- configuration import and export
- data charting with trigger functionality
- error codes and built-in descriptions
- hardware configuration (e.g. calibration)
- maintenance (e.g. firmware upgrades)

Please refer to the laser diode driver user manual for more information on features and system requirements.

3 INTERFACE AND CONNECTORS

3.1 Electrical Characteristics for Interface Connectors

3.1.1 Platform Bus Connector (PBC) X7

Unless otherwise noted: T_A = 25 °C

Symbol	Parameter	Test Conditions / Hints	Min	Typ	Max	Unit
GPIO 1-8 Characteristics:						
U_{IH}	Logic high input threshold		2.35			V
U_{IL}	Logic low input threshold				0.9	V
U_{IMAX}	Absolute limit input voltage		-0.5		3.6	V
Output Characteristics:						
U_{OH}	Logic high output voltage		2.9	3.3		V
U_{OL}	Logic low output voltage				0.4	V
R_S	Series Resistor			100		Ω
Output Characteristics GND:						
I_{max}	Absolute limit output current	Total GND Output (Fused)			±375	mA
ESD Protection:						
U_{PP}	ESD	IEC61000-4-2 Level 4, Contact Discharge		18		kV

3.1.2 Mini USB Connector X15

Unless otherwise noted: T_A = 25 °C

Symbol	Parameter	Test Conditions / Hints	Min	Typ	Max	Unit
Input Characteristics:						
U_{IORM}	Maximum Working Insulation Voltage				560	V

3.1.3 Interlock Connector X16

Unless otherwise noted: T_A = 25 °C

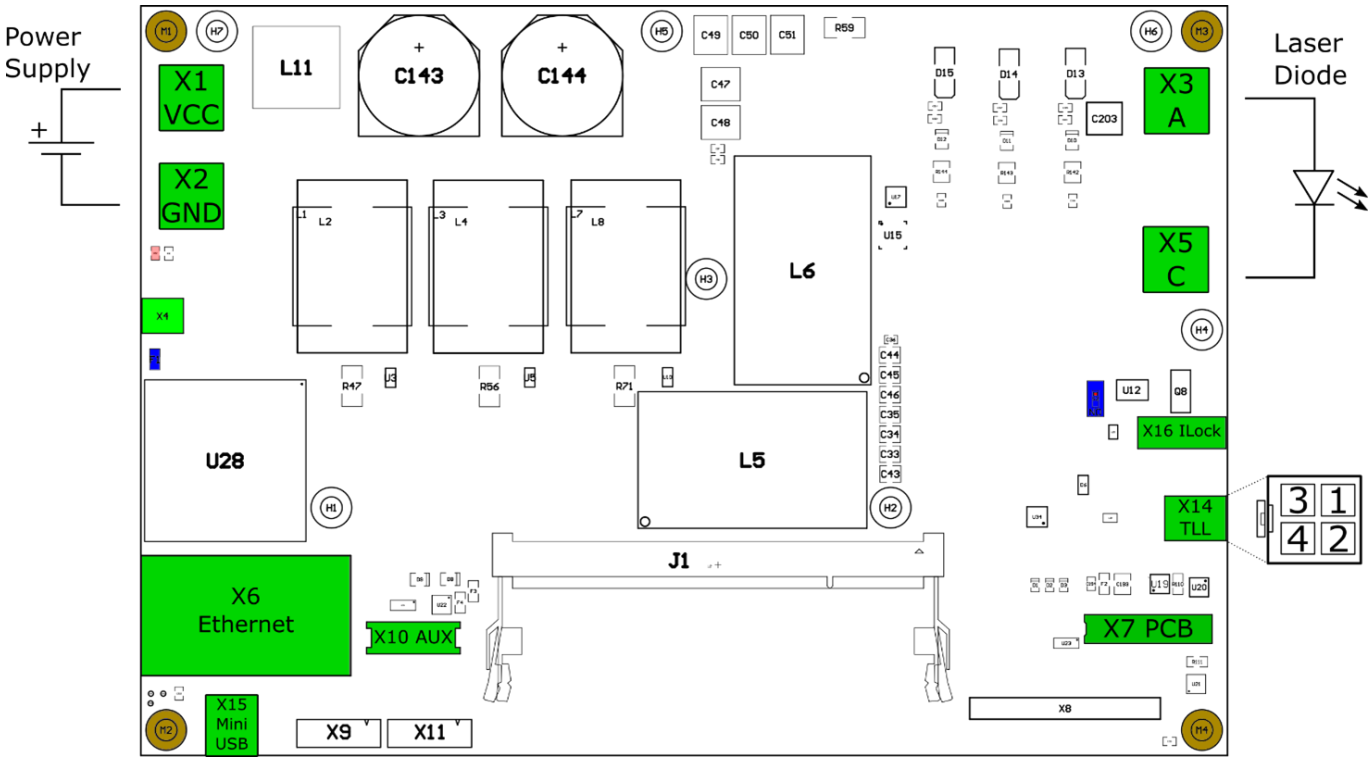
Symbol	Parameter	Test Conditions / Hints	Min	Typ	Max	Unit
Input Characteristics Interlock:						
U_{IAct}	Interlock active input voltage range	Voltage range which is detected as active input	3		30	V
U_{IORM}	Maximum Working Insulation Voltage				630	V

3.1.4 Auxiliary Communication and GPIOs (AUX) X10

Unless otherwise noted: T_A = 25 °C

Symbol	Parameter	Test Conditions / Hints	Min	Typ	Max	Unit
Input Characteristics GPI TTL 1 and 2 (HW v1.20):						
U_{IH}	Logic high input threshold		4.7			V
U_{IL}	Logic low input threshold				1.8	V
U_{IMAX}	Maximum input voltage		-0.5		7	V
Input Characteristics GPI TTL 1 and 2: (HW v1.30 and later):						
U_{IH}	Logic high input threshold		3.9			V
U_{IL}	Logic low input threshold				1.5	V
U_{IMAX}	Maximum input voltage		-0.8		6	V
Input Characteristics Analog In 1V:						
U_{AN}	Input voltage range	Analog input	0		1	V
BW	Bandwidth	Analog input		10		kHz
R_{IN}	Input Resistance			10		kΩ
Input Characteristics Analog In 5V:						
U_{AN}	Input voltage range	Analog input	0		5.3	V
BW	Bandwidth	Analog input		10		kHz
R_{IN}	Input Resistance			23		kΩ
Input Characteristics Analog In 10V:						
U_{AN}	Input voltage range	Analog input	0		10	V
BW	Bandwidth	Analog input		10		kHz
R_{IN}	Input Resistance			37		kΩ
Output Characteristics GND:						
I_{max}	Maximum output current	Total GND Output (Fused)	0		±375	mA
Output Characteristics 5V:						
I_{max}	Maximum output current	5V Output (Fused)	0		±375	mA
ESD Protection:						
U_{PP}	ESD	IEC61000-4-2 Level 4, Contact Discharge		18		kV

3.2 Device Connectors Overview



3.3 Screw Terminals X1, X2, X3 and X5

M4 Screw terminals
Usable with M4 Ring Connectors or M4 Spade Connectors.

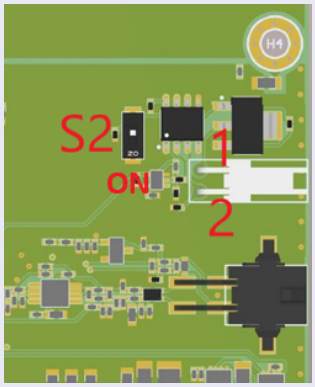
Examples:
TE Connectivity AMP Connectors 171551-1 CONN SPADE TERM 18-22AWG M4 RED
Molex 0193230210 AA1-321-M4T METRIC VERSAK RING T
Phoenix Contact 3240023 CONN RING CIRC 14-16AWG M4 CRIMP

3.4 Interlock Connector X16

To enable the LDD, apply a voltage between the Interlock + and Interlock – Pins. The Interlock Pins are galvanically isolated from the LDD.

The DIP-Switch S2 can be switched ON to disable the Interlock functionality.

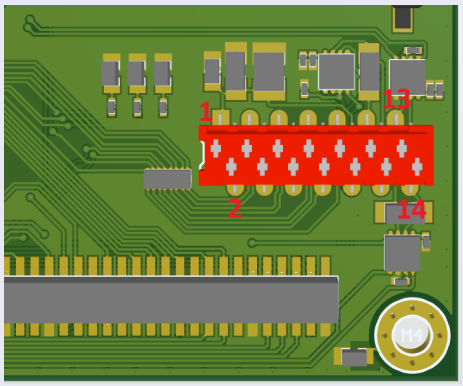
Mating connector: Molex 0022013027



PIN 1	Interlock +	PIN 2	Interlock –

3.5 Pin Configuration Platform Bus Connector (PBC) X7

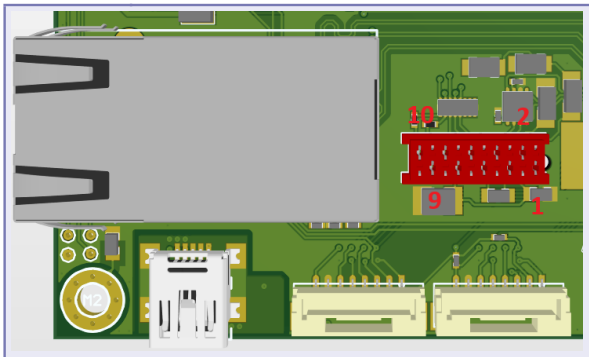
Connector:
MICRO-MATCH SMD FTE
Part Number: 8-188275-4
Number of Positions: 14
Centerline (Pitch): 1.27 mm [.05 in]



PIN 1	GND EXT	PIN 8	GPIO7
PIN 2	GPIO1	PIN 9	GPIO8
PIN 3	GPIO2	PIN 10	GND EXT
PIN 4	GPIO3	PIN 11	RS485 1 A/D+
PIN 5	GPIO4	PIN 12	RS485 1 B/D–
PIN 6	GPIO5	PIN 13	RS485 2 A/D+
PIN 7	GPIO6	PIN 14	RS485 2 B/D–

3.6 Pin Configuration Auxiliary Communication and GPIOs (AUX) X10

Connector:
Würth Elektronik MiniModule Connector WR-MM
Part Number: 690367181072
Number of Positions: 10

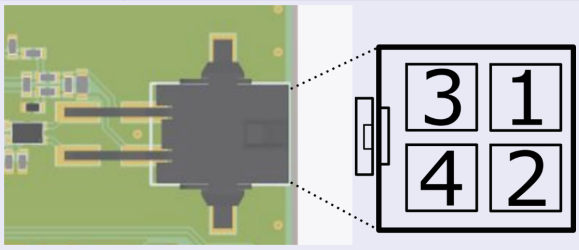


PIN 1	5V	PIN 6	GPI TTL 2
PIN 2	GND	PIN 7	GND
PIN 3	CANH (not available)	PIN 8	Analog Input 0 – 1 V range
PIN 4	CANL (not available)	PIN 9	Analog Input 0 – 5 V range
PIN 5	GPI TTL 1	PIN 10	Analog Input 0 – 10 V range

3.7 Temperature and Laser Light (TLL) X14

Connector:
TE Connectivity 4-POL
Plug Housing 794617-4
With AWG 20-24

Crimp Contacts: 794610-1
Matching Cable: CAB-6156



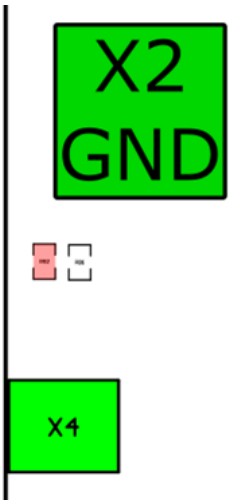
PIN 1	NTC Temperature Sensor A	PIN 3	Photo Diode Cathode
PIN 2	NTC Temperature Sensor B	PIN 4	Photo Diode Anode

3.8 Mini USB Connector X15

The Mini USB Connector X15 can be used to communicate with the LDD using the MeCom communications protocol or the Configuration Software. It is galvanically isolated.

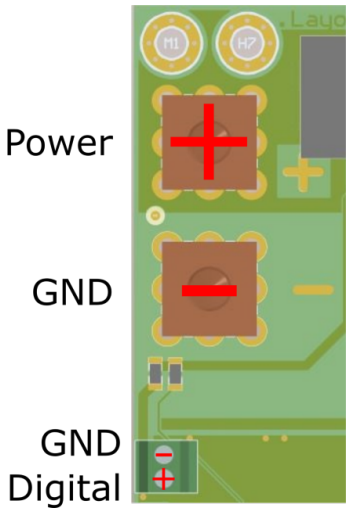
3.9 Separate supply for Power and Digital parts

The device supports supplying the power and digital sections separately.



R92 (marked red) must be removed. X4 can then be used to provide power only to the digital part of the LDD.

X4 can either be used to directly attach the supply via soldering or to solder a pin header or screw connector.



Power requires a Voltage between 18 – 75 V. This supplies the Power electronics of the LDD.

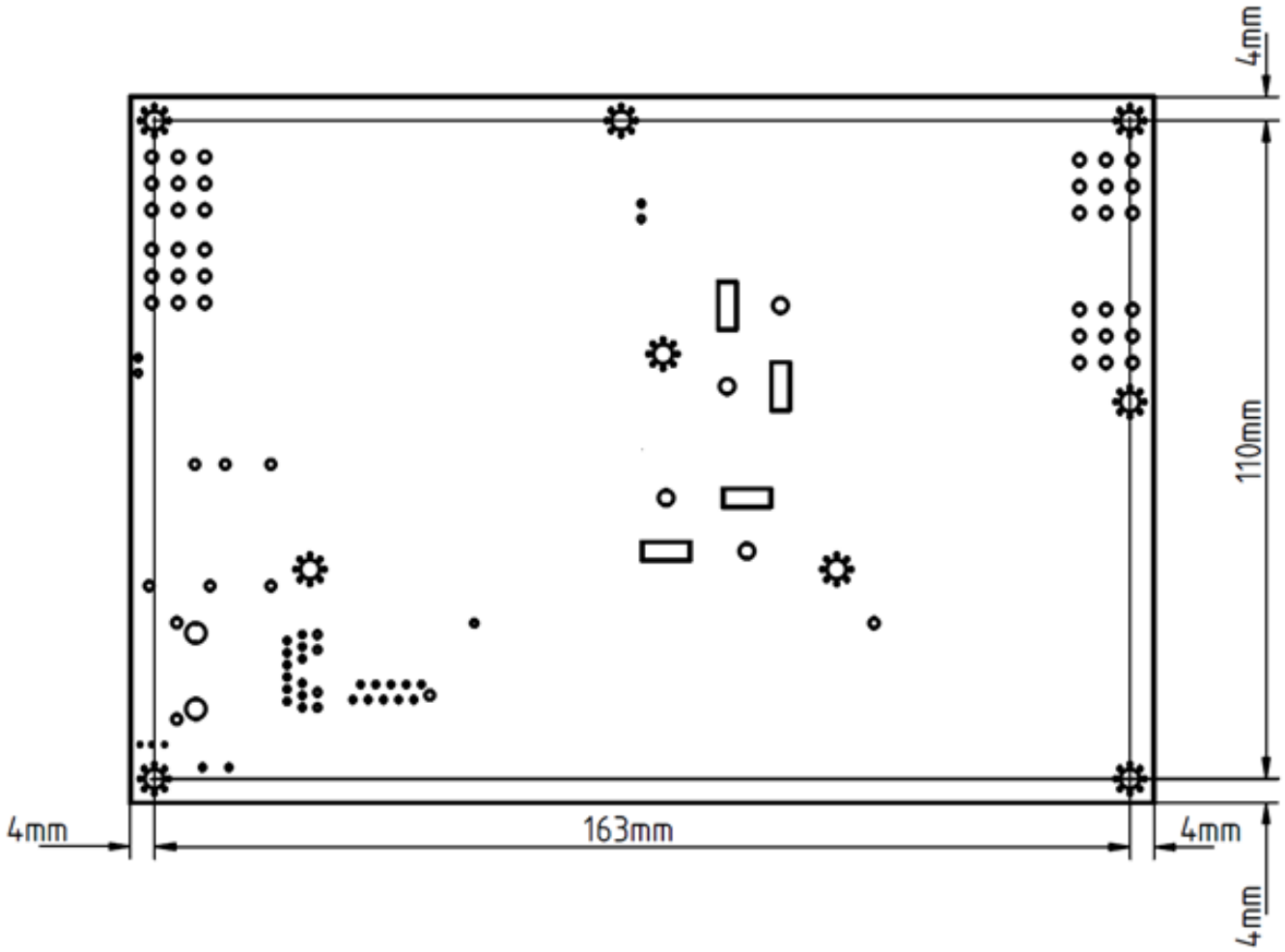
Digital supplies the logic part of the LDD and requires 18 – 75 V. The digital part requires < 5 W of power.

GND is shared between both supplies.

4 MECHANICAL DATA

4.1 Dimensions

Top View



Mounting holes in the corner are 3.2 mm holes for M3 screws.

5 ORDERING AND CONFIGURATION

5.1 LDD-1137 Ordering Information & Configuration

Example Configuration:
LDD-1137 (NA) FW1.50

Variant Name	Requirement	Description	Options / Single choice
Photodiode Input Type	**Required**	**Select the presence of the photodiode input and the associated laser power control function.**	**NA, PD4**
Firmware Version	Optional	Select a compatible firmware if you do not want the latest version (default). Check the relevant Software Release Notes for details.	Example: FW1.50
Customer Specific Modifications	Advanced	Usually hardware modifications, available only on demand and quote.	Empty, or example: CS3
Customer Specific Profile	Advanced	Preset parameters/configuration, available only on demand and quote.	Empty, or example: 15
Hardware Version	-	For reference, specifies the hardware version (latest by default, subject to future change).	Example: HW1.32

5.2 Ordering Confirmation Example

LDD-1137 (NA, HW1.32)
Firmware Version: FW1.50

String can additionally contain:
Profile: Default

6 ALL MEERSTETTER ENGINEERING PRODUCTS

6.1 Meerstetter Engineering's Product Compatibility

The Laser Diode Drivers and TEC Controllers from Meerstetter have been developed to work along with each other. They share the same platform bus, communication protocol and hardware architecture. See the following table for an overview of the Laser Diode Drivers and TEC Controllers from Meerstetter Engineering:

Model		Output	Description
Laser Diode Drivers			
LDD-1321		0–1.5 A / 0–14 V	CW, Add-on TEC Controller available
LDD-1301		0–20 A / 0.5–45 V	1 ms – CW
LDD-1303		0–20 A / 1–120 V	1 ms – CW
LDD-1137		0–75 A / 0–70 V	1 ms – CW
LDD-1124		0–1.5 A / 0–15 V	CW, modulated modes
LDD-1121		0–15 A / 0–15 V	1 µs – CW, modulated, QCW and pulsed modes
LDD-1125		0–30 A / 0–27 V	1 µs – CW, modulated, QCW and pulsed modes
TEC Controllers			
Single-Channel Models	TEC-1092	±1.2 A / ±9.6 V	Micro
	TEC-1091	±4 A / ±21 V	Small
	TEC-1089	±10 A / ±21 V	Medium
	TEC-1162	±5 A / ±56 V	Medium-high
	TEC-1090	±16 A / ±30 V	Large
	TEC-1163	±25 A / ±56 V	Extra-large
Dual-Channel Models	TEC-1161-4A	2 x (±4 A / ±21 V)	Small
	TEC-1161-10A	2 x (±10 A / ±21 V)	Medium
	TEC-1122	2 x (±10 A / ±21 V)	Medium
	TEC-1166	2 x (±5 A / ±56 V)	Medium-high
	TEC-1123	2 x (±16 A / ±30 V)	Large
	TEC-1167	2 x (±25 A / ±56 V)	Extra-large

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7 CHANGE HISTORY

Date of change	Version	Changed / Approved	HW Version
March 4, 2021	B	PV / MR	
Change / Reason • Add Change History • First prototype measurement data inserted • New layout template used			
December 2, 2021	C	PV / RS	
Change / Reason • New HW v1.20 changes • High power warning • Measurement plots			
September 7, 2022	D	PV / RS	
Change / Reason • Fixed RS485 polarity • Added X14 pinout • Adjusted TTL levels for HW v1.30			
January 31, 2024	E	RS	
Change / Reason • Update HW version to v1.31 • Remove unsupported features			
February 26, 2025	F	PV/SC / RS	
Change / Reason • Added PD order information • Added 1st page introduction • Refer to HW v1.31 in header • Remove unsupported features			
September 8, 2025	G	SC / RS	v1.32
Change / Reason • Update HW version to v1.32			

Date of change	Version	Changed / Approved	HW Version
April 20, 2026	H	NJ / RS	v1.32
Change / Reason • Mod: Datasheet design • Del: Old Ordering codes • Add: Standardized product designations and ordering codes tables • Add: Functional Description			

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