Thorlabs GmbH
Hans-Boeckler-Str. 6
85221 Dachau
Germany
Phone: +49 (0) 8131-5956-0
Fax: +49 (0) 8131-5956-99
www.thorlabs.com

Certificate of Calibration

x **Report of new unit**
Report of returned unit before calibration
Report of returned unit after calibration

Manufacturer . . . . . Thorlabs GmbH

Model Number CLD1010LP

Serial Number M00549740

Date of Calibration 16-Sep-2019

Environment . . . . . Temp. 23 °C +/-5 °C; Hum. 35% +/-15%

Result . . . . . PASSED

Measurement Equipment

TYPE	MANUFACTURER	MODEL	SERIAL NO	CALIBRATION
Multimeter	Agilent	AG34410A	MY45002442	26-Feb-2019
Source	Keithley	MODEL 2400	1271946	26-Feb-2019
Switcher/Shunt	Thorlabs	ACA4000BOX	1	21-May-2019

Calibration Standards

Thorlabs GmbH does hereby certify that the above mentioned equipment has been calibrated in accordance with our quality management system. Our Quality Management System is certified according to DIN EN ISO 9001.
The measurement equipment used for calibration is traceable to national standards of the 'EUROMET' members (NPL, PTB, BNM etc.), the US 'NIST' or other national metrological institutions. Measurements which cannot be traced to national standards can be traced to natural constants, other accepted standards or relational measurements. Additional documentation concerning traceability of the measurement equipment is available and can be examined upon request. The certificate of calibration may only be forwarded in complete form without any changes. The recommended calibration interval is 24 months. The calibration period of this instrument/system begins on the date of receipt by the customer.

Calibrated by _____ **Qendrim Qunaku, Thorlabs GmbH**

Date Received _____

Calibrated Due _____

1. Calibration Laser Current Setpoint..... PASSED

Polarity	Nominal	Actual	Tolerance	Deviation
AG	0.100000 A	0.099929 A	0.000600 A	-0.000071 A
AG	0.500000 A	0.499893 A	0.001000 A	-0.000107 A
AG	1.000000 A	1.000028 A	0.001500 A	+0.000028 A

2. Calibration Laser Current Limit ..... PASSED

Polarity	Nominal	Actual	Tolerance	Deviation
AG	0.100000 A	0.099953 A	0.000920 A	-0.000047 A
AG	0.500000 A	0.499904 A	0.001400 A	-0.000096 A
AG	1.000000 A	1.000027 A	0.002000 A	+0.000027 A

3. Calibration Laser Current Measurement..... PASSED

Polarity	Nominal	Actual	Tolerance	Deviation
AG	0.099929 A	0.099915 A	0.000600 A	-0.000014 A
AG	0.499891 A	0.499919 A	0.001000 A	+0.000028 A
AG	1.000025 A	1.000007 A	0.001500 A	-0.000018 A

4. Calibration Laser Voltage Measurement..... PASSED

Polarity	Nominal	Actual	Tolerance	Deviation
AG	0.999535 V	1.000090 V	0.090000 V	+0.000554 V
AG	3.996617 V	3.996474 V	0.120000 V	-0.000143 V
AG	7.977752 V	7.974435 V	0.160000 V	-0.003317 V

5. Calibration Laser Compliance Voltage..... PASSED

Polarity	Nominal	Actual	Tolerance	Deviation
AG	8.200000 V	8.117705 V	0.200000 V	-0.082295 V

6. Calibration Photodiode Current Measurement ..... PASSED

Pol./Range	Nominal	Actual	Tolerance	Deviation
CG 2mA	0.200082mA	0.199894mA	0.000660mA	-0.000188mA
CG 2mA	1.000036mA	0.999819mA	0.001300mA	-0.000217mA
CG 2mA	2.000819mA	2.000532mA	0.002100mA	-0.000287mA
CG 20mA	2.000815mA	1.998524mA	0.006600mA	-0.002291mA
CG 20mA	10.000214mA	9.997668mA	0.013000mA	-0.002545mA
CG 20mA	20.006902mA	20.003390mA	0.021000mA	-0.003513mA

7. Calibration Photodiode Current Setpoint ..... PASSED

Pol./Range	Nominal	Actual	Tolerance	Deviation
CG 2mA	0.200000mA	0.199949mA	0.000660mA	-0.000051mA
CG 2mA	1.000000mA	1.000056mA	0.001300mA	+0.000056mA
CG 2mA	2.000000mA	2.000111mA	0.002100mA	+0.000111mA
CG 20mA	2.000000mA	1.999416mA	0.006600mA	-0.000584mA
CG 20mA	10.000000mA	10.000606mA	0.013000mA	+0.000605mA
CG 20mA	20.000000mA	20.001270mA	0.021000mA	+0.001270mA

8. Calibration Photodiode BIAS Voltage ..... PASSED

Polarity	Nominal	Actual	Tolerance	Deviation
CG	1.000000 V	0.996415 V	0.050000 V	-0.003585 V
CG	3.000000 V	2.976726 V	0.070000 V	-0.023274 V
CG	5.500000 V	5.439882 V	0.095000 V	-0.060118 V

9. Calibration External Modulation [1] ..... PASSED

Polarity	Nominal	Actual	Tolerance	Deviation
AG	0.100007 A	0.098245 A	0.005000 A	-0.001762 A
AG	0.500025 A	0.492318 A	0.025000 A	-0.007706 A
AG	1.000070 A	0.984711 A	0.050000 A	-0.015359 A

10. Calibration TEC Current [2] ..... PASSED

Setup	Nominal	Actual	Tolerance	Deviation
n/a	3.000000 A	2.999745 A	0.026000 A	-0.000255 A
n/a	1.500000 A	1.499680 A	0.023000 A	-0.000320 A

n/a	0.000000 A	-0.000297 A	0.020000 A	-0.000297 A
n/a	-1.500000 A	-1.501466 A	0.023000 A	-0.001466 A
n/a	-3.000000 A	-3.001656 A	0.026000 A	-0.001656 A

11. Calibration Thermistor Measurement..... PASSED

Setup	Nominal	Actual	Tolerance	Deviation
n/a	110.132512kOhm	110.153232kOhm	0.110500kOhm	+0.020719kOhm
n/a	52.706680kOhm	52.716536kOhm	0.053500kOhm	+0.009855kOhm
n/a	7.501156kOhm	7.501572kOhm	0.008500kOhm	+0.000417kOhm
n/a	3.810053kOhm	3.810117kOhm	0.004810kOhm	+0.000063kOhm
n/a	0.449920kOhm	0.449898kOhm	0.001450kOhm	-0.000022kOhm

12. Check Interlock Circuit ..... PASSED

13. Check TEC Output Voltage Protection..... PASSED

14. Check Keylock Protection Circuit..... PASSED

15. Device Selftest Routine..... PASSED

Notes:

[1] Tested in constant current operating mode. The specified current setpoint is achieved by applying a DC voltage to the external modulation input. The instrument's current setpoint is set to 0.0A

[2] Tested in constant current operating mode with current limit set to maximum. When used with a TEC element a positive current value indicates cooling, a negative current value indicates heating.