ISO 9001:2008
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monocrom
LASER DIODE DEVICES

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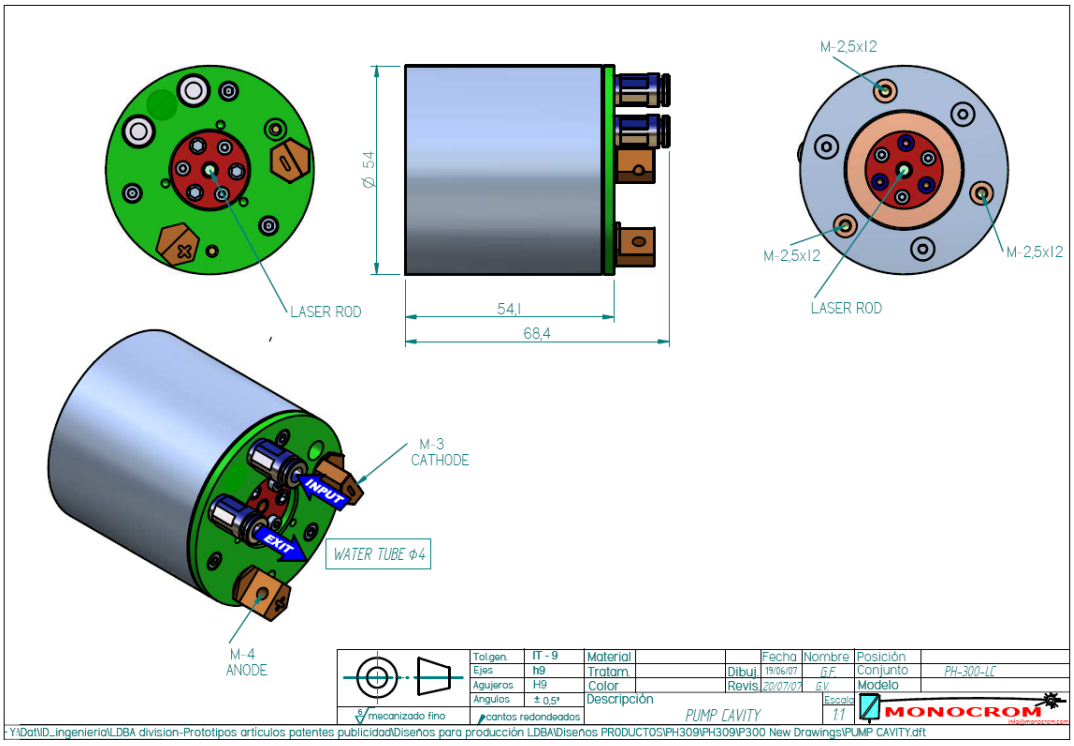
Product Division	LDBA **Laser Diode Bar Assemblies**
Product	**PH-PPP-MMM-LC Series**
Description	High power diode laser PUMPING HEADS for solid-state laser. **PPP**: pumping power | **MMM**: operation mode | **CW** or **QCW** | **LC**: laser crystal included optional. Water cooled mount - No micro-channels are used.
Main Features	This compact laser pumping head consists of six water-cooled diode laser bars arranged radially around a central cavity suitable for accommodating a crystal laser rod as Nd:YAG. It shows excellent gain uniformity and lensing performance. We have more than 10 years of experience with this product. We have combined the best high power laser diodes with a smart design optimizing efficiency, beam quality and lifetime, as well as reducing the cost. Our customers are very satisfied with its superior features and reliability, which help them gain competitive advantages. The laser module is an OEM CYLINDRICAL block. This allows rotation of the pumping chamber, thus giving flexibility during the production and optimization of a laser system. With a pumped length of 23mm the laser rod is shorter than other similar products in the market. This is advantageous for regenerative amplifiers, since higher energy is available before self-focusing appears. The pumping laser diode bars are mounted using our clamping technology. The main features of the solder-free concept of the clamping technology, exclusively used by monocrom, are: ● **Long lifetime**, due to the lack of the mechanical stress caused by the soldering process at high temperature. ● **Minimum "smile"**, less than 0.5 μm ● **High reliability** in pulsed conditions, since the clamped bars do not suffer the same fatigue effect than the soldered ones due to the thermal cycle. ● **Small thermal resistance**, owing the reduction of the contact resistance between electrodes and laser bar. No micro channels are needed to reach low thermal resistances. ● **Large storage temperature** interval tested from –60ºC to + 85ºC. Monocrom active cooled mounts use millimetre-water channels instead of micro-channels. TAP WATER CAN BE USED FOR COOLING, without any obstruction or channel degradation.
Some Applications	It is designed for scientific and industrial applications. For example: ● Laser marking ● Micro-machining ● Manufacturing ● Regenerative amplifiers ● Medical and aesthetical (ophtalmology, oncology, cosmetic medicine, dentistry laser) ● Scientific (fluid dynamics, laser spectroscopy)

Picture(s)

Outline



PH-PPP-MMM-LC | GENERAL TECH SPECFICATION						
Product number		**PH-300-CW**	**PH-350-CW**	**PH-450-QCW**	**PH-900-QCW**	**PH-1200-QCW**
Number of pumping LD bars		6	6	3	6	6
Emission Wavelength from Nd:YAG rod [(2)]		1064nm				
Pumping wavelength @ Max.Op.Current		808nm				
Pumping wavelength Temperature shift		0,27-0,3 nm/ºC				
Maximum difference of wavelength in LD bars		1nm				
Pumping peak power @ Max.Current[2]	**CW**	240W	340W	340W	–	–
	QCW[1]	300W	420W	450W	900W	1200W
Output peak power@1064nm[2, 3]	**CW**	85W	120W	-	–	–
	QCW[1]	100W	140W	150W	300W	400W
Pulse energy @ 1064nm [2,3]	**CW**	-	-	-	-	-
	QCW[1]	30mJ	42mJ	45mJ	90mJ	180mJ
Recommended Op. current[4]	**CW**	40A	50A	–	–	–
	QCW	50A	60A	125A	125A	180A
Maximum Operation current	**CW**	45A	60A	30A	30A	30A
	QCW	55A	75A	150A	150A	200A
Pumping threshold current, typical		8 A	10 A	20 A	20 A	20A
Voltage before cables		< 11V	< 11V	< 6,5V	< 13V	< 13V
Pulse length -QCW		Without limits	Without limits	Without limits	Up to tens of milliseconds, QCW	Up to tens of milliseconds
Duty cycle, DC -QCW		50%	50 %	10 %	10%	10%
Thermal lens @Max. Ratings, DIOPTERS		<10 m^{-1}	<10 m^{-1}	<1 m^{-1}	<1 m^{-1}	<3 m^{-1}
Birrefringence @ Max. Ratings,DEPOLARIZATION		N.A.	N.A.	<5%	<5%	<20%
Laser crystal (optional) [5]		0.4 – 1,1% Nd:YAG rod, Ø3x50 mm (Ø2 or Ø 4mm rod under request)				
Rod pumped length		23 mm				
Output Beam Diameter without Aperture		ϕ3mm (Ø2 or Ø 4mm rod under request)				
Dimensions (see outline above)		Ø54 x 69 mm				
Weight (aprox.)		400 g				
Cooling		TAP water (distilled water with 5% ethylenglycol is recomm.), >0,7 l/min @ 2-3 bars				
Operation temperature[6]		<45 ºC, out of condensation conditions				
Electrical connections		Thread M3 for cathode, M4 for anode.				
Water connection		Water flow outlet for Ø4mm tube				
Laser class product (EN-60825)		4				
Expected lifetime		10^4 hours CW; 10^9 shots QCW tp<1ms; 10^8 shots QCW tp>1ms				

NEW: Laser head with 3600W of pumping power. See www.monocrom.com/pdf/PH-3600-QCW-LC.pdf

1) QCW: 300μs, 100Hz

2) Typical value in the beginning of life performance at 25ºC

3) Assuming 33,3% of optical efficiency, at maximum operation current. Typical values between 30 and 40% of optical efficiency are obtained. These depend on the type of laser rods chosen by customer. Typical specifications are based on standard rods of Nd:YAG

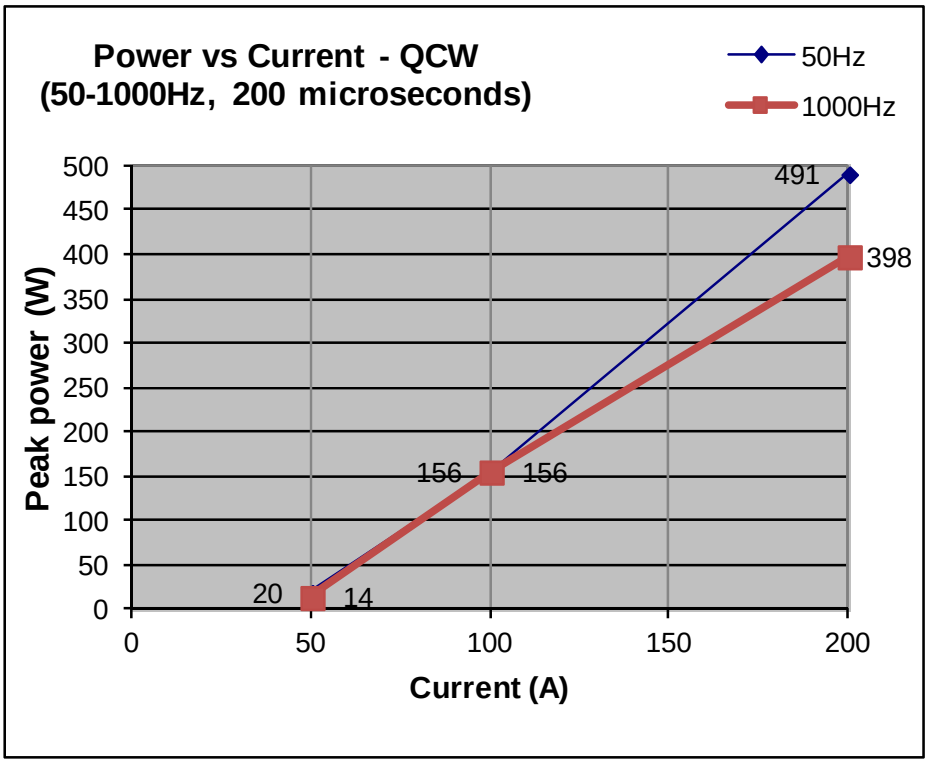
4) Burn-In Current

5) Other active media on request.
LASER CRYSTAL COULD SUPPLIED BY CUSTOMER TO BE MOUNTED IN MONOCROM

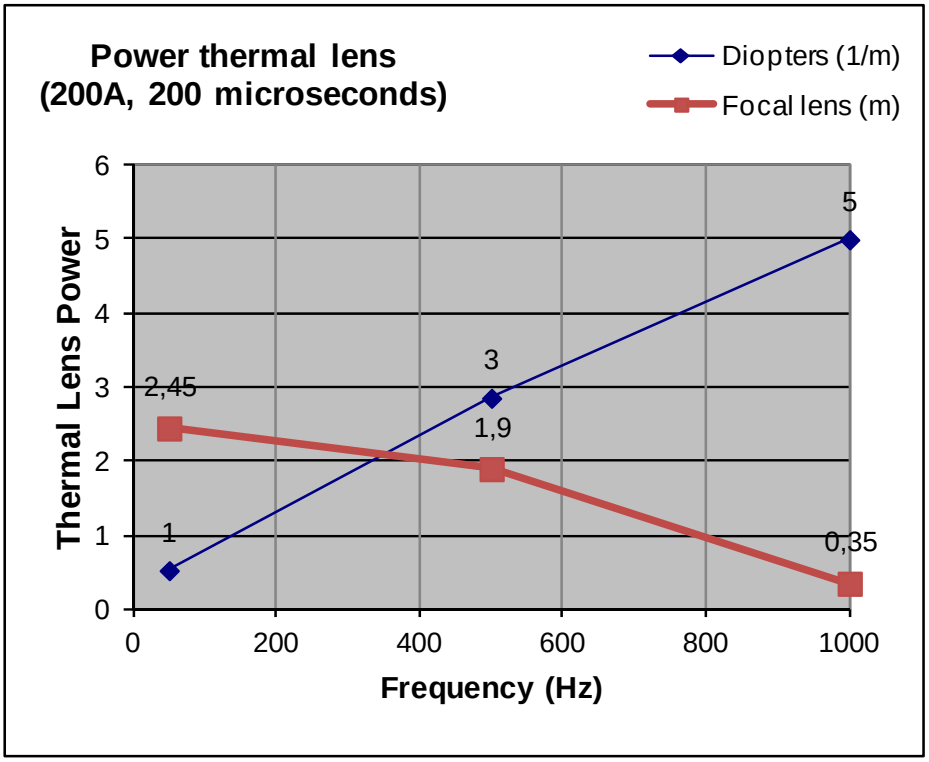
6) Water temperature of 45ºC for 1%DC. For CW operation the maximum temperature should be 30ºC. The optimum water temperature depends on the operation current and water flow. It is recommended to measure the wavelength of the diode by using a spectrometer, so that water temperature is adjusted to achieve 808nm for optimum pumping.

Example of pumping chamber PH-1200-QCW

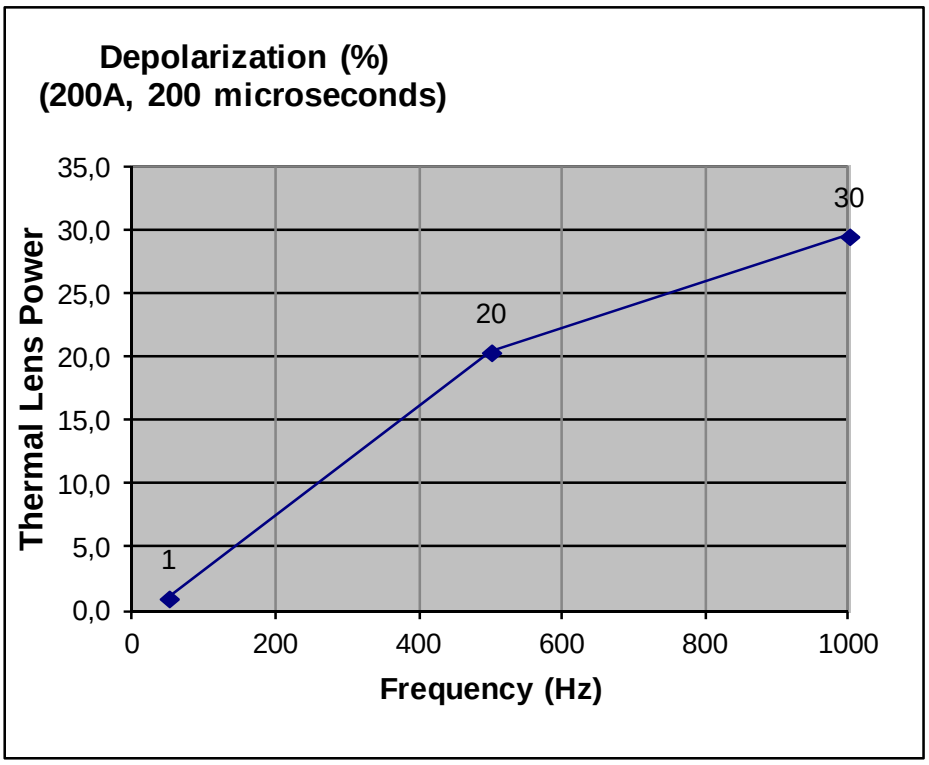
QCW POWER
23mm pumping cavity, 3mm rod



Thermal lensing



DEPOLARIZATION



Typical QCW characteristics@ 1064 nm; output mirror pl: 85% reflection; back mirror pl; resonator length 140 mm.

Installation Instructions

1. Scope of delivery:

PH-PPP-MMM-LW (for specification, please see the data sheet)

2. Connections

The electrical contacts are indicated at the housing. The short-circuit should be remove before connecting the power supply to the electric contacts of the head

For the water-in and –outlet, quick connectors are used. Please use polyamide tubes with Ø4 mm, type JRE2602927, or equivalent. Deionised water +10% ethylene glycol is recommended for the cooling liquid, but not continuous maintenance of the liquid is required

3. Installation Instructions

- Please insure that the water tubes are cut right-angled, please avoid that the tubes suffer stress at the in and outlets
- It is recommended to mount the cavity horizontal, in the case of vertical mounting the water in and outlet has to be located at the bottom side
- Cooling Water Requirements: around 1 L/min @ 2-3 bar, recommended water temperature: 15 to 30 °C
- Please use power supplies which avoid tension peaks.
- Please use interlocks for the water flow, over-current, under-temperature, and over-temperature.
- It is recommended to measure the pumping wavelength during the laser head operation, in order to set the optimum water temperature for maximum pumping absorption. The optimum absorption wavelength for Nd:YAG is 808 nm.