

Product list cw 2012



- Dye-Laser, cw-Ring
- Titan Sapphire Laser, cw
- Standing Wave Laser
- Overhaul of *Coherent* lasers
- Accessories for cw lasers
- Dye-Circulators, -Cells, - Filters
- Power measuring devices
- Laser dyes

Radiant Dyes Laser Acc. GmbH, Friedrichstr. 58, D-42929 Wermelskirchen

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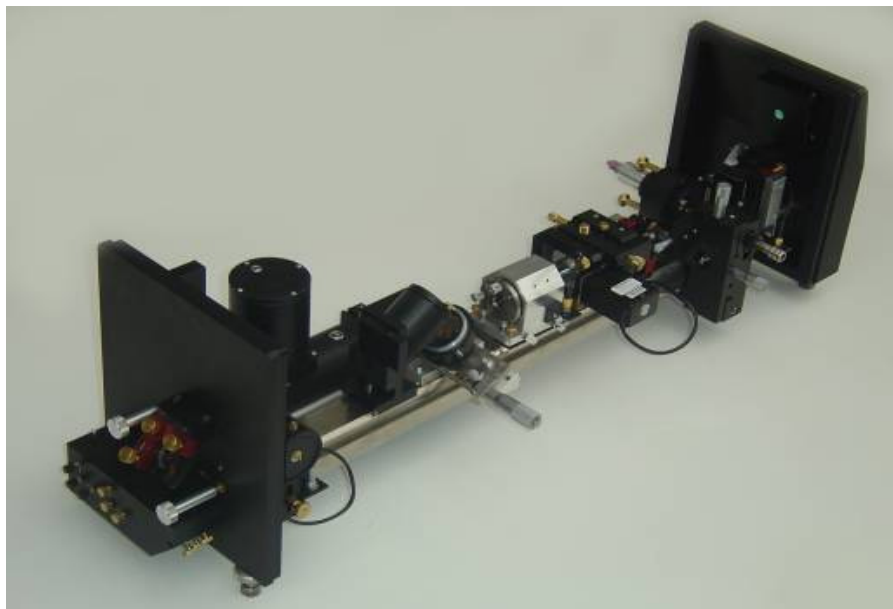
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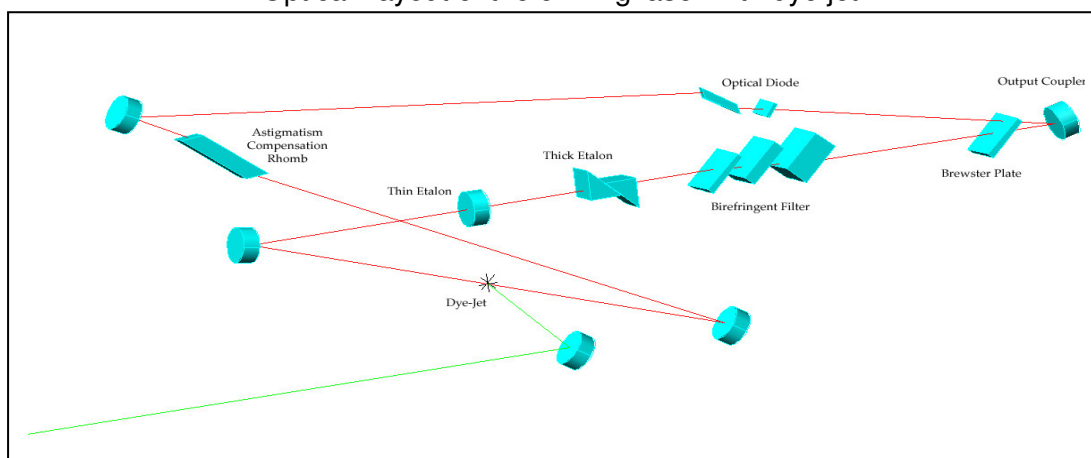
Actively and passively stabilized Dye Ring Laser



Our new carefully designed and optimized single mode ring resonator guarantees – in any configuration - high performance, stability and easy operation. All optical elements, including the dye jet and titanium:sapphire are mounted on an extremely rigid 58 mm diameter Invar rod. This extremely rigid, high thermal mass structure reduces system sensitivity to vibration and temperature changes.

In our laser system we adopted the concept of *Coherent* and improved some important features like handling, adjustability and customer-friendliness. Our laser is characterized by very high stable, precise opto mechanical components and stable reproducibility of the adjustment. Due to the fact that we use a **hysteresis free Galvo drive** instead of piezo drives, the laser is able to perform reproducible, narrowband wavelength scans. The laser is equipped with our **RD 1000 CW dye circulator that is absolutely vibration-free** and our **special dye nozzle RDSN02** which is interferometrically tested and provides a vibration-free dye jet.

Optical Layout of the cw ring laser with dye jet



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Passively stabilized cw dye ring laser (incl. thin etalon)

- Tuning range 540 – 800 nm
- Linewidth approx. 20 – 50 MHz
- Frequency drift: 100 MHz/h
- Scan Range 30 GHz
- Incl. dye circulator and dye nozzle
- Manually tunable birefringe filter scan, not mode-hopping free
- Not single-mode

Passively stabilized cw dye ring laser (incl. thick and thin etalon) with analog scan generator

- Tuning range 540 – 800 nm
- Linewidth approx. < 20 MHz
- Incl. dye circulator and dye nozzle
- Analog scan generator

Actively stabilized cw dye ring laser (incl. thick and thin etalon), single-mode

- Tuning range 540 – 800 nm
- Linewidth approx. < 1 MHz,
- Frequency drift: 100 MHz/h
- Scan Range 30 GHz
- Scan linearity: approx. 1%
- Incl. dye circulator and dye nozzle
- Reference cavity
- Electronical stabilisation, analog scan generator

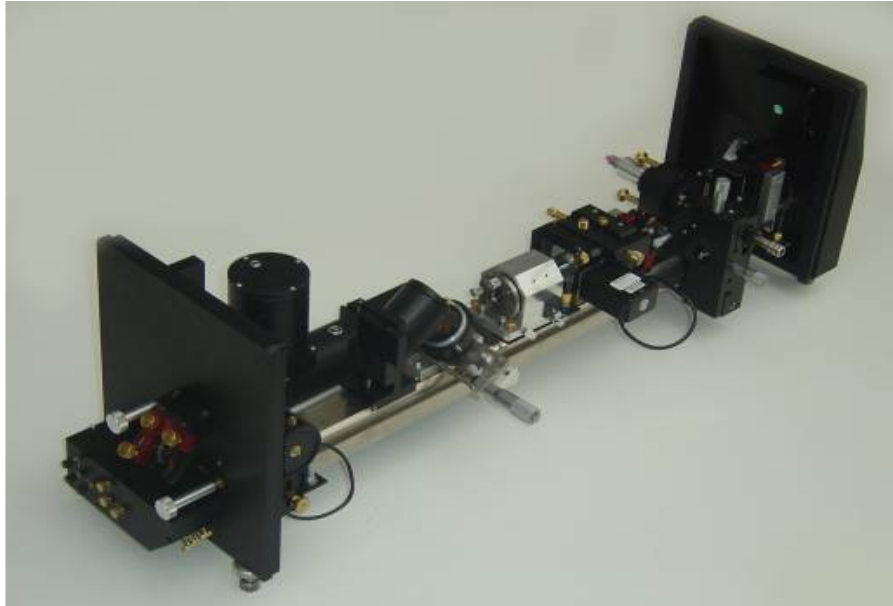
Actively stabilized cw dye ring laser (incl. thick and thin etalon), single-mode, digital scan generator

- Tuning range 540 – 800 nm
- Linewidth: approx. < 1 MHz (measured over many seconds under spectroscopic conditions)
< 250 kHz rms/ 100 msec
- With opto-acoustic modulator linewidth of some Hz possible
- Frequency drift: 100 MHz/h
- Scan Range 60 GHz
- Scan linearity: approx. 1%
- Incl. dye circulator and dye nozzle
- Reference cavity
- Electronical stabilisation, digital scan generator

Options

- Automatic birefringe filter scan by stepper motor, without wavelength calibration, not mode-hopping free, controlling by RS232
- Autoscan without mode-hopping, tunability by overlapping scan, (wavemeter is required)

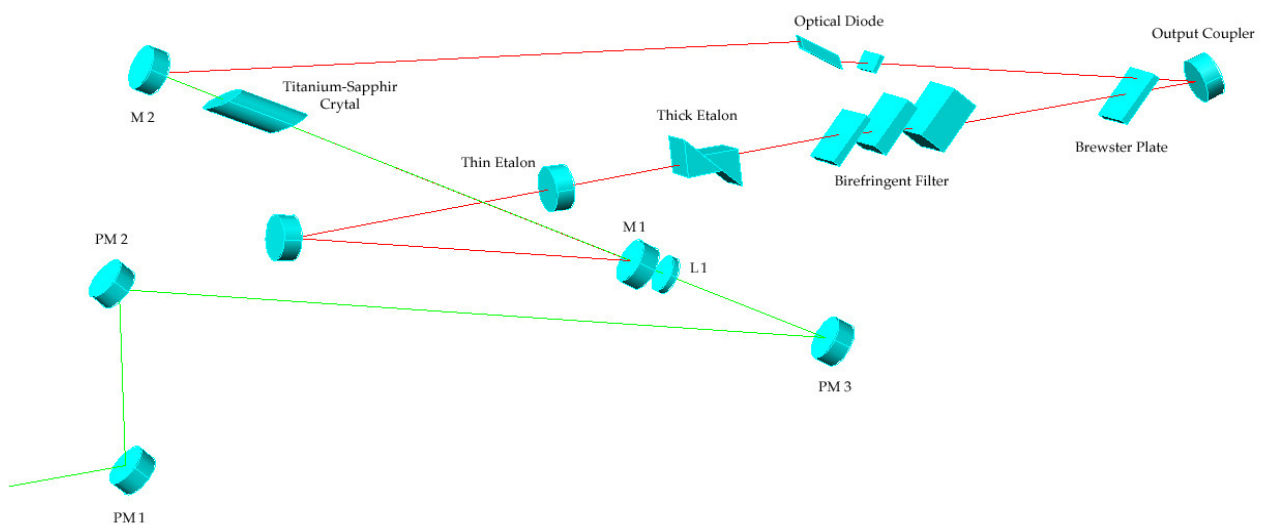
Actively and passively stabilized Ti:Sa Ring Laser



Our new carefully designed and optimized single mode ring resonator guarantees – in any configuration - high performance, stability and easy operation. All optical elements, including the dye jet and titanium:sapphire are mounted on an extremely rigid 58 mm diameter Invar rod. This extremely rigid, high thermal mass structure reduces system sensitivity to vibration and temperature changes.

In our laser system we adopted the concept of *Coherent* and improved some important features like handling, adjustability and customer-friendliness. Our laser is characterized by very high stable, precise opto mechanical components and stable reproducibility of the adjustment. Due to the fact that we use a **hysteresis free Galvo drive** instead of piezo drives, the laser is able to perform reproducible, narrowband wavelength scans.

Optical Layout of the cw ring laser with Ti:Sa crystal



Passively stabilized cw Ti:Sa ring laser (incl. thin etalon)

- Tuning range 700 – 1000 nm
- Linewidth approx. 20 – 50 MHz
- Frequency drift: 100 MHz/h
- Scan Range 30 GHz
- Manually tunable birefringe filter scan, not mode-hopping free
- Not single-mode

Passively stabilized cw Ti:Sa ring laser (incl. thick and thin etalon) with analog scan generator

- Tuning range 700 – 1000 nm
- Linewidth approx. < 20 MHz
- Analog scan generator

Actively stabilized cw Ti:Sa ring laser (incl. thick and thin etalon), single-mode

- Tuning range 700 – 1000 nm
- Linewidth approx. < 1 MHz,
- Frequency drift: 100 MHz/h
- Scan Range 30 GHz
- Scan linearity: approx. 1%
- Reference cavity
- Electronical stabilisation, analog scan generator

Actively stabilized cw dye ring laser (incl. thick and thin etalon), single-mode, digital scan generator

- Tuning range 700 – 1000 nm
- Linewidth: approx. < 1 MHz (measured over many seconds under spectroscopic conditions)
< 250 kHz rms/ 100 msec
- With opto-acoustic modulator linewidth of some Hz possible
- Frequency drift: 100 MHz/h
- Scan Range 60 GHz
- Scan linearity: approx. 1%
- Reference cavity
- Electronical stabilisation, digital scan generator

Options

- Automatic birefringe filter scan by stepper motor, without wavelength calibration, not mode-hopping free, controlling by RS232
- Autoscan without mode-hopping, tunability by overlapping scan, (wavemeter is required)

External Frequency Doubling Unit

Featuring: High efficiency and indexmatching by electronically controlled temperature of the crystal. No back reflections in the pump laser and UV emission only in one direction.

Doubling Crystal:	BBO, LiJO ₃ , LiNbO ₃ , ADA (range: 290 - 305 nm), etc.
Conversion Efficiency:	> 20% (at 415 nm)
Linewidth:	given by the fundamental laser
Optical Resonator Length:	approx. 480 mm

External Doubling Ring

Advantage of our doubling system against conventional products of our competition:

We use an extra cavity doubling unit with loop electronic to find the best doubling efficiency. The principle of this method is given by Hänsch and Coulliaud. The signal which would be detected by two photodiodes can be used to get an electronic signal for finding the correct cavity length. With the different photodiodes we get a dispersive signal, which zero point we use to get the maximum signal in resonance. An amplifier and a des-integration build the servo-electronic which tunes the piezo-actuator element. This is used to hold the resonator on the frequency of the fundamental light.

Frequency Doubling Unit for RD cw RDFD

The unit RDFD is an inexpensive external frequency doubling unit for the laser dye Rhodamine 6G. The compact configuration of the unit allows a comfortable adjustment of the optical components with a closed cover. The completely covered separate unit allows a long operation period without having to clean the optical components.

The standard system is supplied with an electronic control unit which guarantees an automatic temperature adaption of the doubling crystal and the resonator length to the frequency of the pump laser.

Advantages of the frequency doubling system:

Resonant enhancement of the fundamental wave is carried out in the ring resonator, therefore

- high efficiency
- no back reflections in the pump laser
- UV emission only in one direction

Electronic stabilization to the pump beam according to Couillard and Hänsch, therefore

- automatic following of the changes of the fundamental frequency
- certain elimination of interferences such as frequency jitter of the fundamental laser or mechanical disturbances

Index matching by electronically controlled temperature of the crystal, no complicated angle adjustment of the crystal

Easy adjustment without opening the laser housing

Technical data (Rhodamine 6G):

Optical resonator length: approx. 1500 mm

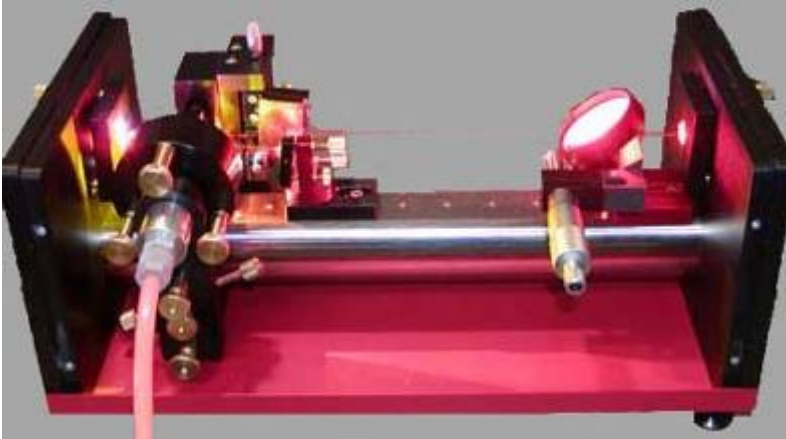
Doubling crystal : BBO, LiJO₃, LiNbO₃, ADA (range: 290 - 305 nm), etc.

Output power : 10 mW with 500 mW pump power

Linewidth : given by the fundamental laser

Dimensions (W x H x L) : approx. 180 x 220 x 600 mm

Standing wave Dye-Laser and Ti:Sa Laser



This dye laser is based on our exchange unit for the Coherent 699 ring laser RDU 10 (nozzle holder and pump mirror adjustment).

We paid attention to it that the laser is easy to handle. By an adjustment with micrometer screws a very high reproducibility is guaranteed. The laser is mounted on a 50 mm invar rod and the dimensions allow a later installation of the etalon for single

mode operation. It consists of a 3-mirror-resonator, wavelength tuning is done by rotation of the Lyot-filter.

The standard laser is equipped with a 0.2 mm low pressure nozzle in connection with our dye circulator RDN 2000 CW.

An advantage is the simple laser dye change by a reproducible exchange of the complete nozzle holder with nozzle and dye circulator.

The further advantages of the RD-cw-linear dye laser are:

- Compact and stable resonator configuration
- Simple, fast and reproducible adjustment
- Good efficiency

Tuning range Dye: (Other ranges are possible by exchanging the mirrors.)	540 - 800 nm (optional 400 – 540 nm)
Specifications for Rhodamine 6G	
Conversion efficiency (Peak Rhodamin 6G):	> 15%

Tuning range Ti:Sa: (Other ranges are possible by exchanging the mirrors.)	700-1000 nm
Conversion efficiency (Peak Ti:Sa)	~ 20%

Linewidth: with single stage Lyot-Filter:	< 200 GHz
with multiple stage Lyot-Filter:	< 40 GHz
Divergence:	< 1.5 mrad
Beam diameter:	< 1.3 mm
Stability of the output power (at constant pump power):	< 0.02/h

Accessories for cw laser

Modification of *Coherent* Ti:Sa 899-21 and 699-21 lasers

including:

- Exchange of the mount for the Brewster plate
Advantage: now it can easily be removed and put it in the beam path again reproducibly (important for the basic adjustment). Besides this, the Brewster angle can be optimized
- Installation of a new mounting for the thick and thin etalon (split etalon) The thin etalon can be removed and installed reproducibly (allows easier optimization of the output power) Vertical position of the thin etalon can be adjusted for power optimization
- adjustment of the tweeter mount by direct fine thread adjustment screws
- adjustment of the upper folding mirror mount by direct fine thread adjustment screws
- adjustment of the mount for the outside pump beam turning mirror by direct fine thread adjustment screws
- modification of the output coupling unit

Modification of *Coherent* dye laser 899-21 and 699-21 lasers

including:

- Exchange of the mount for the Brewster plate
Advantage: now it can easily be removed and put it in the beam path again reproducibly (important for the basic adjustment). Besides this, the Brewster angle can be optimized
- Installation of a new mounting for the thick and thin etalon (split etalon) The thin etalon can be removed and installed reproducibly (allows easier optimization of the output power) Vertical position of the thin etalon can be adjusted for power optimization
- adjustment of the tweeter mount by direct fine thread adjustment screws
- adjustment of the upper folding mirror mount by direct fine thread adjustment screws
- modification of the output coupling unit
- dye circulator unit (optimized cw dye circulator and low pressure special nozzle)

7.2 Optics for cw ring laser

Optic-Set for Radiant Dyes dye ring laser and Coherent 699

- Optic-Set VIS (without Tweeter), P1, M1, M4, M5
- Tweeter with Mechanics and Piezo-element, M3

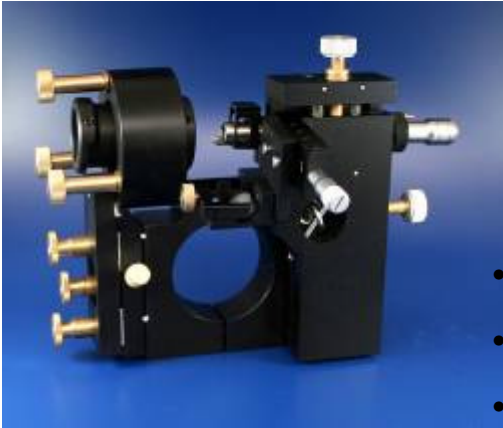
Optic-Set for Radiant Dyes dye ring laser and Coherent 699

- Optic-Set BLUE (without Tweeter), P1, M1, M4, M5
- Tweeter with Mechanics and Piezo-element, M3

Optic-Set for Radiant Dyes TiSa laser and Coherent 899

- Optic-Set TiSa (without Tweeter), P1, P2, P3, M1, M4, M5
- Tweeter with Mechanics and Piezo-element, M3

Accessories for Coherent cw Dye laser



RDU 10

Exchange Unit for the Coherent 699

Consisting of the nozzle holder and pump mirror adjustment. Exchangeable against the original unit; suitable for the original nozzle and the Radiant Dyes special nozzle

Advantages:

- Exact, reproducible and straight adjustment with micrometer screws.
- Fast dye change by exchanging the whole nozzle holder unit.
- Adjustment without any tools.

RDE 15

Separate Etalon Mounting for cw ring laser "**Coherent 699**".

Dual-axis translation for the thin etalon; allows simple adjustment of the lasers and guarantees optimum output power

RDJ 99 Alignment Aid

For the Coherent ring dye laser 699/21-29 for optimum adjustment of the optical axes of the different components.

Geared Pump

For older *Coherent* systems. For higher flow rates and pressures up to 75 PSI.

RDMA 100

Stronger magnet; up to 100 PSI pressure.

Modification and Overhaul of old Laser Systems and Laser Accessories:

- Coherent and Spectra Physics dye lasers
- Coherent Dye circulators
- Coherent Geared pump
- Spectra Physics pump
- Dye flow cell units
- Dye nozzles for Coherent lasers
- Laser optics sets
- Exchange of all optomechanical components
- Upgrade of cw free-running (not stabilized) systems with reference cavity and stabilizing electronics

Accessories for cw Dye laser

The following cw laser accessories should be used in order to achieve an absolutely steady and precise dye jet for **Radiant Dyes**, *Coherent*, *Spectra Physics* and for custom-made laser systems. We carry two different types of dye circulators and air cushions which were designed in such a way that vibrations due to the geared pumps can be avoided completely. This is achieved by a high efficient especially spooled cooling coil and also by the air buffer inside the stainless steel filter housing.

As in all our other dye circulators we paid attention to the exclusive use of stainless steel and synthetic materials which are not harmful to the laser dyes and withstand high pressures. Our low pressure dye circulator is the most appropriate pump for all usual applications with standing wave and ring dye lasers. For all high stabilised applications we recommend the low pressure air cushion and the 0.2 mm special dye nozzle RDSN 02 (interferometrically tested).

For all special applications where high pressure and flow rates are required we recommend the high power dye circulators and dye nozzles with different thicknesses.



RD 1000 CW

High performance gear pump consisting of: 380 Volt motor with max. 2800 rpm, up to a maximum pressure of 7 bar, max. flow rate approx. 6 l/min., integrated aircushion in the filter housing, non-ferrous metal, only stainless steel and plastics that are resistant to all known solvents

RD 1000 CW - high pressure

High Pressure-Dye Circulator, same as RD 1000 CW, but up to approx. 13 bar

Filter for Spectra Physics and Coherent dye circulators retention rate 0,2 µm

RDSN 02

Low Pressure Special Nozzle. Dye jet thickness 0.2 mm for original Coherent or Spectra Physics pumped dye systems. The nozzle can be used for pressures of approx. 12 bar, depending on high pump energies (20-25 W). So the nozzle covers almost all applications.

On request, we also deliver dye nozzles with the thickness 0,05; 0,1; 0,3; 0,4; 0,5 and 1 mm.

RDF 11

Filter for RD 2000 CW

RDF 50

Filter for Spectra Physics and Coherent dye lasers

RDAC 10

Low Pressure Air Cushion

RDAC 20

High Pressure Air Cushion



Power Measuring Heads



The listed power heads are based on thermoelectric principles, which means that the heat generated by the incident radiation is transformed directly into a voltage.

The head of BB-series has a black, broadband absorbing coating. The HP-series are equipped with a ceramic coating which allows high energy and power densities.

The head HP 25 S is specially made for service. The compact dimensions enable easier transport. Due to the smaller heat sink, high powers are only possible for a short time.

The heads need some seconds to reach a thermal equilibrium. To avoid this delay time, we recommend the use of one of our power meters, such as LEM 2420. These devices determine the voltage and its increase and evaluate the laser power from this data. The time constant from the whole system is reduced to 1 second.

	BB 25	HP 25 S	HP 25/50	HP 50	HP 25/150
Active diameter	25 mm	25 mm	25 mm	50 mm	25 mm
Max. power	10 W	10 W	50 W	30 W	150 W
Max. power density	20 W/cm ²	20 W/cm ²	40 W/cm ²	20 W/cm ²	200W/cm ²
Dimensions [mm]	Ø 120 x 80	Ø 90 x 32	Ø 120 x 80	Ø 150 x 80	Ø 120 x 60
Sensitivity	70 mV/W .. 150 mV/W				
Connector	BNC				

More power heads for other applications on request. Please contact us!

Pulse Energy and Power Measuring Instrument LEM 2420



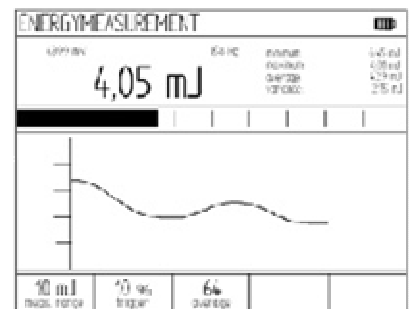
A touch panel and function keys make this device comfortable and easy to handle.

The preamplifiers integrated into the device and the choice of sensor sensitivity, allow to use a wide range of sensor heads .

The large graphic display offers space for a variety of display and analysis choices. The digital display can be used for determining the energy, frequency and average power. The analogue part with its bar graph display is useful e.g. for laser adjustments. Laser stability can be monitored using the data logger and statistics window.

The LEM2420 is equipped with a RS232 interface and with a TCP/IP network connector. These ports allows remote control and transferring of all measuring data to a PC. Additionally, a MMC/SD-Card slot to save the data is integrated.

- For pyroelectric energy sensor heads and thermoelectric power sensor heads
- Digital display, analogue display, graphic data logger, statistics
- Wide dynamic range, especially for energy measuring
- input of correction factors e.g. for mirrors or beam splitters
- Power plug or rechargeable battery with integrated charging unit
- Adjustable trigger level
- External trigger input
- HiRes Graphic display with background illumination
- Touch panel
- RS 232 interface
- TCP/IP-Network-Connector
- MMC/SD-Card slot
- Software update possible
- compatible to all heads of PEM, HP and BB series



power parameter		Channel 1
sensitivity		120 mW/W
connection factor		100%
wavelength		600nm
absorber		BLACK
JCD refresh time		200ms
time constant		25

Laser Dyes

Art. No.	Dye name	EUR/g	Art.No.	Dye name	EUR/g
001	BM-Terphenyl (BMT)	81,-	048	Coumarin 102 (C 480)	41,-
002	PTP (P-Terphenyl)	12,-	049	Coumarin 106	69,-
003	TMQ	79,-	050	Coumarin 120 (C 440)	28,-
004	Butyl-PBD (BPBD)	20,-	051	Coumarin 151 (C 490)	69,-
005	PBD	20,-	052	Coumarin 152 (C 485)	39,-
006	PPO	15,-	053	Coumarin 152A (C 481)	45,-
007	PPF	24,-	054	Coumarin 153 (C 540A)	45,-
008	Exalite 351	208,-	055	Coumarin 307 (C 503)	33,-
009	Exalite 376	208,-	056	Coumarin 311	27,-
010	Exalite 377E	208,-	057	Coumarin 314 (C 504)	67,-
011	Exalite 384	208,-	058	Coumarin 334 (C 521)	80,-
012	Exalite 389	208,-	059	Coumarin 337 (C 523)	67,-
013	Exalite 392A	208,-	060	Coumarin 343	93,-
014	Exalite 392E	208,-	061	Coumarin 445	51,-
015	Exalite 398	208,-	062	Coumarin 466 (LD 466)	69,-
016	Exalite 400E	208,-	063	LD 473	67,-
017	Exalite 404	208,-	064	Coumarin 487	155,-
018	Exalite 411	208,-	065	LD 489	261,-
019	Exalite 416	208,-	066	Coumarin 498	80,-
020	Exalite 417	208,-	067	Coumarin 500	61,-
021	Exalite 428	208,-	068	Coumarin 510	93,-
022	RDC 360 Neu	112,-	069	Coumarin 545	85,-
023	Polyphenyl 2	150,-	070	Pyromethene 546	208,-
024	BMQ	117,-	071	Pyromethene 556	208,-
025	DMQ	104,-	072	Pyromethene 567	208,-
026	TMI	128,-	073	Pyromethene 580	208,-
027	QUI	122,-	074	Pyromethene 597	208,-
028	BiBuQ (BBQ)	33,-	075	Pyromethene 650	208,-
029	Quinolon 390 (LD 390)	85,-	076	DOCI	91,-
030	a-NPO	15,-	077	Uranin	16,-
031	PBBO	25,-	078	Fluorescein 27 (Fluor. 548)	39,-
032	DPS	47,-	079	Rhodamin 6G (Rh. 590)	10,-
033	BBO	33,-	080	Rhodamin 6G Tetrafluorab.	21,-
034	Stilben 1	110,-	081	Rhodamin 6G Perchlorat	21,-
035	Stilben 3 (Stilben 420)	23,-	082	Fluorol 7GA (Fluor. 555)	40,-
036	LD 423	67,-	083	Rhodamin 19 (Rh. 575)	32,-
037	Carbostyryl 3 (LD 425)	61,-	084	Rhodamin 101 (Rh. 640)	51,-
038	POPOP	25,-	085	Sulforhodamin 101	59,-
039	Umbelliferon 7	11,-	086	Rhodamin 110 (Rh. 560)	40,-
040	Umbelliferon 47 (C 4)	24,-	087	Rhodamin B (Rh. 610)	7,-
041	Bis-MSB	16,-	088	Rhodamin B Perchlorat	10,-
042	Coumarin 2 (C 450)	23,-	089	Sulforhodamin B (Kiton Red)	23,-
043	Coumarin 6 (C 540)	53,-	090	Malachitgrün	21,-
044	Coumarin 6H (LD 490)	64,-	091	DCM	48,-
045	Coumarin 7 (C 535)	59,-	092	DCM-Spezial	43,-
046	Coumarin 30 (C 515)	72,-	093	DODC-Jodid (DODCI)	48,-
047	Coumarin 47	16,-	094	LD 688	131,-

Art.No.	Dye name	EUR/g	Art.No.	Dye name	EUR/g
095	Kresylviolett	35,-	125	DQOCI	315,-
096	Pyridin 1 (LDS 698)	44,-	126	DDC-Jodid 4	201,-
097	Pyridin 2 (LDS 722)	44,-	127	Phenoxazon 9 (Phenox.660)	75,-
098	Nilblau Perchlorat	69,-	128	Sättigbarer Absorber 580	69,-
099	Oxazin 4 (LD 690 Perchl)	67,-	129	DTTC Jodid	40,-
100	DCI-2	101,-	130	IR 26	427,-
101	DTCI	111,-	131	IR 125	125,-
102	DQTCI	128,-	132	IR 140	149,-
103	Rhodamin 700 (LD 700)	99,-	133	IR 143	315,-
104	Oxazin 1 Perch. (Ox 725)	25,-	134	IR 144	259,-
105	Oxazin 170 (Ox 720)	69,-	135	9-Methylantracen	16,-
106	Oxazin 750	51,-	136	DASPI	126,-
107	Styryl 6 (LDS 730)	81,-	137	PICI	101,-
108	Styryl 7 (LDS 750)	97,-	138	DMETCI	171,-
109	Styryl 8 (LDS 751)	91,-	139	DASBTI	171,-
110	LDS 765	333,-	140	HICI	85,-
111	Styryl 11 (LDS 798)	384,-	141	Pinacyanol	80,-
112	Styryl 9 (LDS 821)	89,-	142	DDBCI	160,-
113	Styryl 9M	89,-	143	Kryptocyanin	67,-
114	LDS 867	1090,-	144	DTDC Jodid	59,-
115	Styryl 13 (LDS 925)	910,-	145	NCI	229,-
116	Rhodamin 800 (LD 800)	131,-	146	DDI	284,-
117	Hexacyanin 2 (HIDC Jodid)	104,-	147	DTP	133,-
118	DOTC Jodid	104,-	148	HDITCP	96,-
119	DOTC Perchlorat	104,-	149	DNTTCI	261,-
120	HITC Perchlorat	67,-	150	DQTrCI	133,-
121	Hexacyanin 3 (HITC Jodid)	64,-	151	Q-Switch I	907,-
122	Methyl-DOTCI (DMOTCI)	193,-	152	Q-Switch 5	475,-
123	Hexadibenzocyanin 3	101,-	153	BBOT	16,-
124	Dibenzocyanin 45 (DDTTC)	256,-			

Discounts:

Purchase of 5 grams per dye: 15% purchase of 10 grams per dye: 25%

Higher discounts for larger quantities and special customer discounts on request!

Solvents in laser quality

- | | | | |
|-----------------------|----------------|---------------|----------------|
| • Ethylene glykol | EUR 140,-/5l | EUR 250,-/10l | EUR 500,-/30l |
| • Propylene carbonate | EUR 64,-/5l | EUR 110,-/10l | EUR 300,-/30l |
| • COT | EUR 500,-/10ml | | |
| • Ammonyx LO | EUR 43,-/1l | EUR 161,-/5l | EUR 269,-/10l |
| • Benzyl alcohol | EUR 48,-/1l | EUR 213,-/5l | EUR 400,-/10l |
| • DABCO | EUR 85,-/10g | EUR 376,-/50g | EUR 693,-/100g |