

L A S E R

model LCS-DTL-312

I N S T R U C T I O N M A N U A L



L *aser* C *ompact*

APPLICATIONS

Spectroscopy

Research & Development

Optical Testing Communication Applications

FEATURES

Air cooler state

Automatic control output power

Adjustable power

BENEFITS

No liquid cooling problems

Stability

Ease of operation

Simple to use

Reliable

Cost effective

1. General information.

1.1. The model LCS-DTL-312 Laser is a diode pumped solid state laser with CW mode of operation and intracavity frequency doubling.

1.2. Laser consists of the following parts:

- laser head,
- power supply,
- power cord.

1.3. Laser head includes:

- two laser diodes,
- Nd doped active element,
- focusing lens,
- nonlinear crystal,
- telescope.

2. Specifications

Wavelength, nm.....	532
CW output power, mW	50
TEM ₀₀ beam diameter, mm	
(typical, 1/e ²)	1.5
TEM ₀₀ beam divergence, mrad	
(half angle, 1/e ²).....	0.4
Stability of output power,	
%/hour	< 2
Polarization	linear, > 100:1
Warm-up-time, min	≤ 10

Electrical requirements

voltage, V	230±15% (115±20%)
frequency, Hz.....	50 - 60
power consumption (total), W.....	< 100

Environment

Range for operation, °C.....	15 ~ 35
Humidity (non condensing).....	< 80%
Storage range, °C.....	-10 ~ +50

Size (mm)

Laser head	46×90×225
Power supply	85×260×197

Weight (kg)

Laser head	< 1.0
Power supply	< 2.5

3. LASER SAFETY.

3.1. Optical safety.

The LCS-DTL-312 laser is classified in accordance with the United States National Center for Device and Radiological Health (CDRH) as a Class III B laser product. It emits VISIBLE LASER RADIATION of 532 nm wavelength from the aperture in the front of the laser head. Collateral INVISIBLE LASER RADIATION of 1064 and 810 nm may also be present.

WARNING! Direct eye contact with the output beam from the laser will cause serious damage and possible blindness. Laser beams can ignite volatile substances such as alcohol, gasoline, ether and other solvents, and can damage light-sensitive elements in video cameras, photomultipliers and photodiodes. Reflected beams may also cause damage. For these reasons, observe all safety precautions in this instruction manual.

3.1.1. Limit access to the laser to qualified users who are familiar with laser safety practices and who are aware of the dangers involved. It is good practice to operate the laser in the room with controlled and restricted access.

3.1.2. Avoid direct or mirror reflected exposure to eyes. Never look directly into the laser light source or at scattered laser light from any reflective surface. Never sight down the beam into the source.

3.1.3. A laser radiation emission indicator consisting of a yellow light is provided on the top of the laser head. Never look into output window of laser head when a yellow LED lights.

3.1.4. Maintain experimental setups at low heights to prevent inadvertent beam-eye encounter at eye level.

3.1.5. Extreme caution should be exercised when using solvents in the area of the laser.

3.1.6 As a precaution against accidental exposure to the output beam or its reflection, the users of the laser system should wear laser safety glasses as required by the wavelength being generated.

3.1.7. Use the laser in an enclosed room. Laser light will remain collimated over long distances and therefore presents a potential hazard if not confined.

3.1.8. Post warning signs in the area of the laser beam to alert those present. Advise all those present of these precautions.

3.2. Electrical Safety.

3.2.1. The LCS-DTL-312 laser uses AC and DC voltages inside the power supply unit. Do not disconnect the laser head and power supply when the laser is turned on.

Do not disassemble the power supply. There are no user serviceable components inside. All units are designed to be operated as assembled. Warranty will be voided if the laser components are disassembled.

The power supply is complied with DHHS performance radiation standard in accordance with 21 CFR Chapter I, Subchapter J.

3.2.2. A normally closed remote interlock switch is installed on the rear panel of the power supply. Refer to item 4.7. and the corresponding table.

3.3. Location of Safety Labels.

Refer to Figure 1.1., Figure 1.2. and Figure 1.3. on following pages for the location and description of safety labels.

4. Installation & Operation.

4.1. This Model is complete and needs no additional components or special equipment for operation. A few precautions relating to the cooling of the laser head and the mating of the head and supply will ensure that you can put the laser to immediate use.

4.2. Cooling the laser head.

This model is adequately cooled by heat conduction through the metal base. Mount the laser head in such a way that the heat dissipation becomes possible. There are six oblong holes for suitable fastening on the sides of the laser head.

Warning!

If not enough heat sink is provided, laser head base may be heated up above 50°C. Be attentive not to burn your skin.

In case of overheating protective circuit turns off pumping diodes. After temperature of base is reduced pumping diodes are turned on again automatically.

4.3. Matching the laser head and the power supply.

The power supply is factory tuned to optimize the performance of the laser head delivered with the supply. Do not operate a Model LCS-DTL-312 laser head with any supply but its own. The Model LCS-DTL-312 has features that protect the laser diodes pump from destructive current surges. A few precautions will give the additional margin of safety.

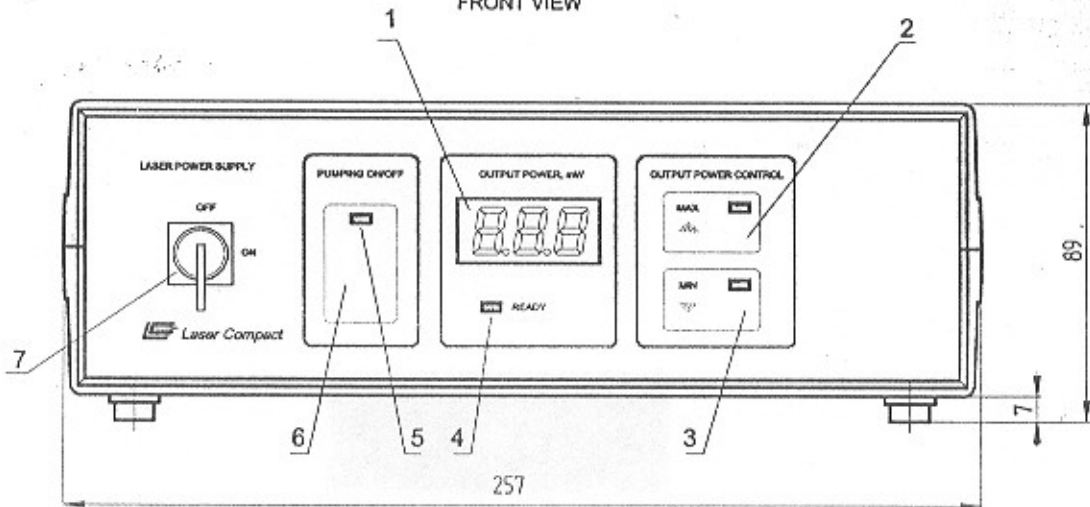
a) To connect the laser head and power supply use special cord. Push plug of the cord in the proper receptacle of the laser head and screw up the screws on the plug.

b) Before disconnecting the laser head from the power supply, turn the power supply off.

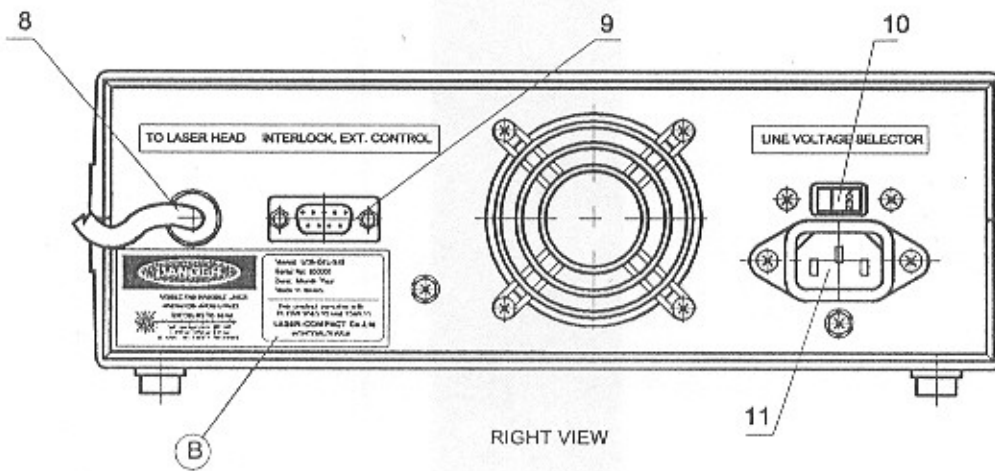
c) When the Model LCS-DTL-312 is in storage, leave the laser head and the power supply connected

POWER SUPPLY

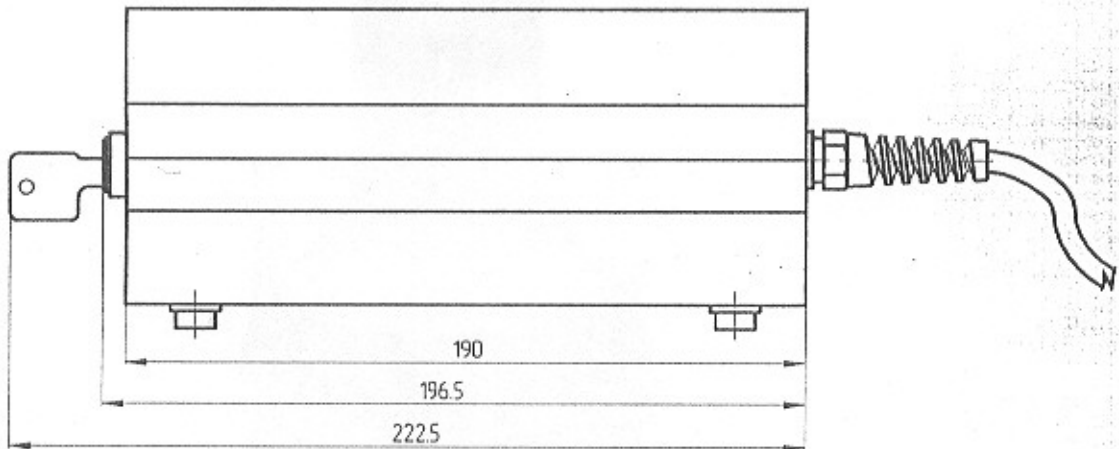
FRONT VIEW



BACK VIEW



RIGHT VIEW



- | | |
|------------------------------|----------------------------|
| B - SAFETY LABEL | 6. PUMPING ON/OFF SWITCH. |
| 1. POWER METER | 7. KEY SWITCH |
| 2. INCREASE POWER REGULATOR | 8. POWER TO LASER HEAD |
| 3. DECREASE POWER REGULATOR | 9. INTERLOCK CONNECTOR |
| 4. SYSTEM STATUS INDICATOR. | 10. LINE VOLTAGE SELECTOR |
| 5. PUMPING ON/OFF INDICATOR. | 11. LINE VOLTAGE CONNECTOR |

Figure 1.2. Power Supply Safety label.

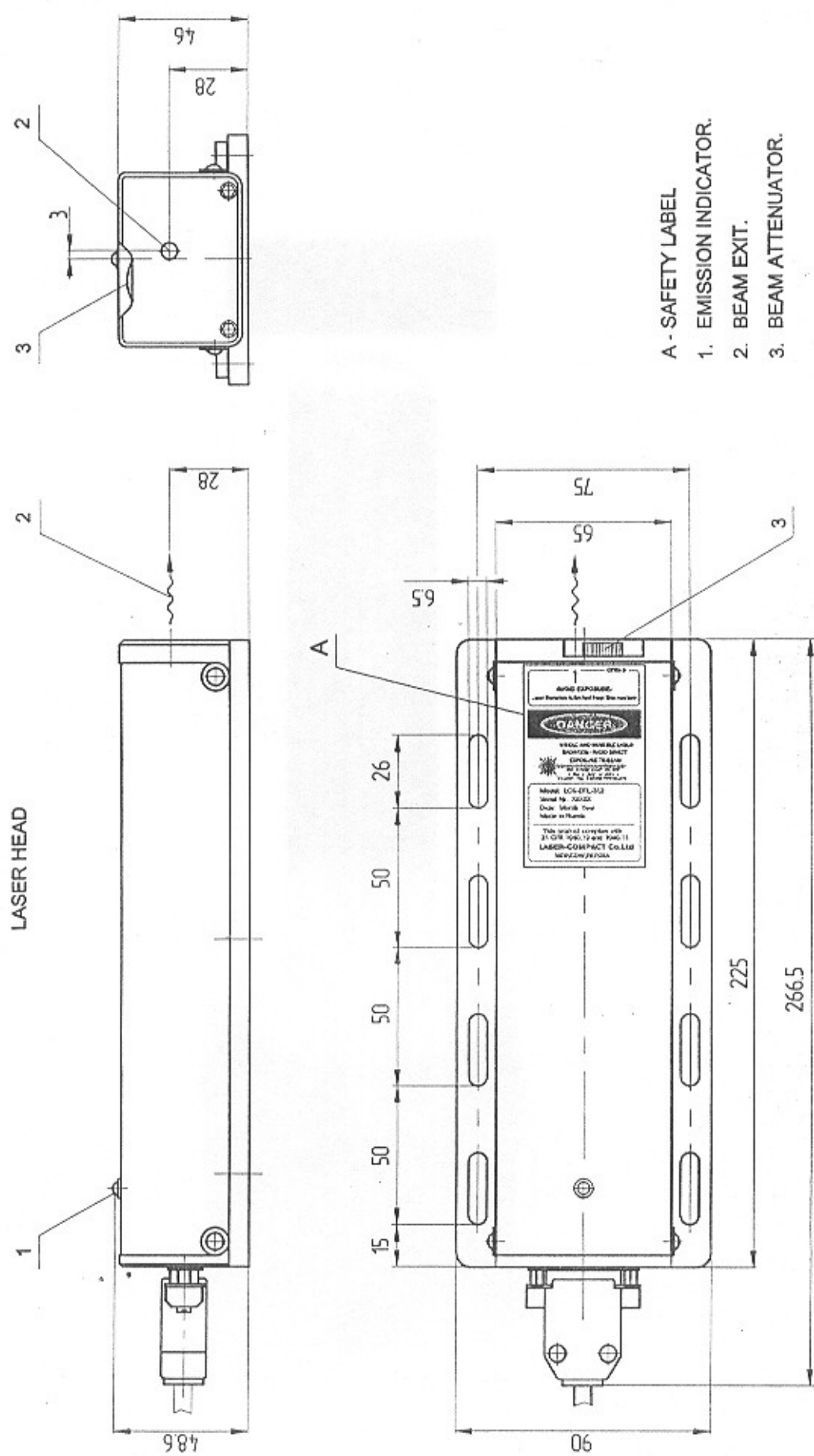


Figure 1.1 Laser Head Safety label.


A

↑ OPEN ▶

AVOID EXPOSURE-
Laser Radiation Is Emitted From This Aperture

DANGER

VISIBLE AND INVISIBLE LASER
RADIATION- AVOID DIRECT
EXPOSURE TO BEAM

 max. average power 280 mW
λ 532 nm, 1064 nm, 810 nm
CLASS IIIb LASER PRODUCT


Model: LCS-DTL-312
Serial No: 2000
Date: April 1999
Made in Russia

This product complies with
21 CFR 1040.10 and 1040.11
LASER-COMPACT Co.Ltd
MOSCOW, RUSSIA

B

DANGER

VISIBLE AND INVISIBLE LASER RADIATION- AVOID
DIRECT EXPOSURE TO BEAM

 max. average power 280 mW
λ 532 nm, 1064 nm, 810 nm
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Model: LCS-DTL-312
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Figure 1.3. Key to Figure 1.1. and 1.2. Safety Labels.

4.4. Preparing to operation.

WARNING! Check that voltage select switch on the rear panel of PSU is in a position corresponding your voltage supply. Factory set voltage - in accordance with contract specification.

Set key switch "ON/OFF" on the front panel of the power supply to "OFF" position, then connect power cord to the power source. Insert Interlock Plug into "INTERLOCK" socket on the rear panel of power supply. Fix the plug with wire lock of receptacle.

WARNING! Power supply should be grounded via ground wire of its power cord. It should be connected to the ground of the user system.

4.5. Turning it on.

To turn the laser on set the key switch "ON/OFF" on the front panel of the power supply to the "LASER ON" position. The LED powermeter indicator "mW" switch should light immediately, and "Ready" indicator will be blinking during 15-20 second and then after temperature of the pumping laser diodes gets stabilized it will light up continuously. After the temperature of the pumping laser diodes gets stabilized "READY" indicator should go on. For the first installation or after long intermission, we recommend to wait for stable operation of power supply ~10 minutes after "READY" indicator went on.

Then press the button of pumping "ON/OFF" switch. The LED indicator "PUMPING ON/OFF" over the button starts blinking. After 5 ~ 10 seconds the indicator should light continually that points out the diodes pumping current comes on.

The laser is ready to use now and its output power is shown on the digital indicator "mW" on the front panel. Using Buttons of "OUTPUT POWER CONTROL" regulator you can set the output power between 0 ~ 100 % of maximum power.

ATTENTION! Laser output power may be set within 10 minutes (warm-up-time of the laser) after the red button being pressed. Environment temperature being changed rapidly, output stability deviation from the value listed in specifications is possible.

4.6. Control panel.

a) Power Switch.

In the position "OFF" of the key switch "ON/OFF" the power supply is turned off.

In the position "ON" of the key switch "ON/OFF" the power supply is on. The powermeter indicator above the switch should light up.

b) System Status.

If the temperature of the pumping laser diodes is above or below the setpoint temperature, the "READY" light is off. The Pumping "ON/OFF" switch turns the laser on and off without affecting the function of the temperature stabilization electronics. Using the button to turn the laser on and off, rather than using the power switch, will minimize warm-up time.

c) Output Power control.

To set the output power you should use buttons of "OUTPUT POWER CONTROL" regulator. Using Increase Power Regulator button (Fig.1.2) you will increase output power, using Decrease Power Regulator button (Fig.1.2), you will decrease the output power. Output power control regulator is 8 bit (256 steps) digital controller. By short time pressing on regulator's buttons you can change output power within one step (1/256 of max. output power), by holding control buttons more than one second you will change output power continually. When output power achieves its maximum or minimum value, appropriate LED indicator (MAX or MIN) will go.

If the power of the laser is unstable it is recommended to change installed power using Increase and Decrease Power Regulator buttons.

Pay attention that the numerical indicator shows power value properly only when the beam aperture on the laser head is opened.

4.7. Rear panel.

There is "INTERLOCK, EXT.CONTROL" connector on the rear panel of the power supply.

The laser can be active only if the remote interlock loop is closed. If the loop is being interrupted while the laser is active the power supply will automatically deactivate the laser, the pumping current and the LED indicator placed on the laser head will go off. The "PUMPING ON/OFF" LED indicator and Power Meter will become blinking. The laser will be reactivated only if the remote interlock has been closed again.

By means of applying analog signals to "INTERLOCK, EXT. CONTROL" connector you can remotely control output power of the laser and do the following:

- #1- Enable or disable laser output.
- #2- Control and set output power continually from zero to maximum.
- #3- Modulate output power with sine or square waveform at 50-1000Hz frequencies.

ATTENTION: Modulated output signal waveform can differ from control signal waveform.

To do item #1 you should short or open interlock loops – pin 2 and pin 3 (short – enable, open – disable).

To control output power (item #2) – you should set output power to minimum (zero), using Decrease Power Regulator (Fig.1.2) and then apply DC voltage from 0 to +5V to pin 3(ground) and 7(signal). 0V-corresponds to minimum (zero) output, +5V – to maximum (pins 2 and 3. are shorted).

To modulate output power with some sine or rectangular waveform frequencies (item #3) you should set output power to half of the maximum value, then apply AC signal to pins 3(ground) and 6(signal) (pins 2 and 3. are shorted). The more AC signal, the more output power modulation.

Description of "INTERLOCK, EXT.CONTROL" connector.

No	Description	Note
1.	N.C.	_____
2.	Interlock loop.	+12V (if open) <0.2 V (if closed)
	(loop resistance must be <10 kOhms, to be identified as closed and > 1 MOhms, to be identified as open)	
3.	Signal ground.	
4.	N.C.	_____
5.	N.C.	_____
6.	Laser Power modulation	0-5VAC(sine or rectangular)
7.	Laser power control signal.	Input 0 V to 5 V.
8.	N.C.	_____
9.	N.C.	_____

Pin 2 is the part of the interlock loop.

Pin 6 accepts AC signal to modulate output power

Pin 7 accepts a signal between 0 V and +5.0 V to control power.

4.8. Trouble Shooting Guide.

Below you find a troubleshooting guide that covers several possible problem situations you may encounter. These problems may be removed by yourself and should not be addressed to Laser-Compact Co.

Event	Indicators					Possible cause and recommendation
	Ready	Pumping On/Off	Power Meter	Min/Max	Beep	
#1	-	-	-	-	-	Key switch doesn't activate the laser. The power cord is unplugged.
#2	-	-	Er.1	-	-	Low input voltage - Line voltage is below 195 V (90V). Rec.: Check input voltage and input voltage selector
#3	+	+	888	+	+	System reset
#4	-	-	Er.2	Blinking	+	Laser head is disconnected to power supply, or connection is not proper. Rec.: Check connection
#5	Blinking	-	Er.3	-	+	The laser head is overheated. Rec.: Provide sufficient heat dissipation to laser head.
#6	Blinking	-	000	Current	-	The system temperature is out of range. Rec.: Wait until "READY" indicator goes on.
#7	+	-	000 - Blinking	Current	-	- remote interlock insertion is removed. Rec.: Check remote interlock and close it.

5. Caution!

- Do not place laser in dusty or humid places.
- Do not shock or shake laser.

6. Warranty.

Manufactory warrants laser Model LCS-DTL-312 to be free from defects for twelve months from the date of shipment. If found to be defective during the warranty period, the product will either be repaired or replaced.

This warranty does not apply to defects resulting from modification or misuse of product.

To return Model LCS-DTL-312 for repair, Laser Compact packing box should be used. Otherwise the laser can have been damaged during shipment.

LCS-DTL-312

Identification Sheet

Serial Numbers:

a) power supply: No

b) laser head: No

Line Voltage

CW output power

Date

Name

		_____	_____
		_____	V
		_____	mW
		_____	_____
		_____	_____
		_____	_____
		_____	_____