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# Power Supply For Pulse Lasers

## **PS 5062** Series

Operation manual  
Registration certificate

2018  
Lithuania

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### 1.1. Components

The **power supply unit for pulse lasers PS5062 series** is designed for flash lamp-pumped lasers.

It consists of modules - capacitor charging, simmer/trigger and pulse forming, and control circuitry.

#	Component	Quantity
1	Power supply PS5062 series	1
2	Powering cable*	1
3	Operation manual	1

\* Customer's specification

### 1.2. Warranty

The manufacturer guarantees to the direct customer that the power supply unit will operate reliably during 1 year period from the date of purchase. In case the power supply unit will fail during the warranty period, the Buyer is entitled to its repair or replacement by the similar power supply unit free of charge. The manufacturer shall waive his warranty obligations, if the power supply unit's case is damaged; it was used not according to its application or it was repaired by the persons having no authorization from the manufacturer. After general warranty period expires, all servicing expenses are the subject to cover by customer.

Manufacturer takes the responsibility over safe transportation of the device to customer's location. In case shipment is arranged by customer himself, the manufacturer does not assume any responsibility.

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### 2.1. Technical Parameters

<i>Parameter</i>		<i>Standard</i>
Max. average charge rate at max. output voltage, J/s		700
Smooth adjustment range of capacitor bank charging voltage $U_c$ , V		300...1000
Error of capacitor bank charging voltage (at $U_c = U_{max}$ ), less than, %		$\pm 0.15$
Capacitance of capacitor bank, $\mu F$		120
Discharge inductance, $\mu H$		50
Simmer current, A		$0.6 \pm 0.1$
Power consumption at maximum output power, kVA	average	$\leq 0.9$
	peak	$\leq 1.6$

Range applicable for whole product line, not this particular device. Depends on ordered specification.

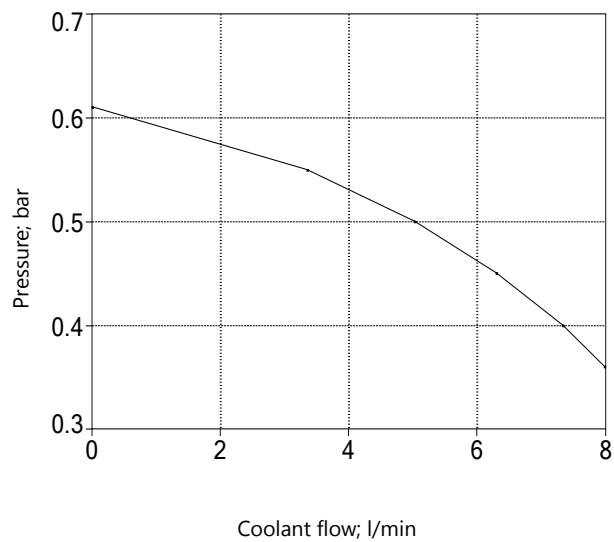
### 2.2. Operation Requirements

<i>Parameter</i>		<i>Specifications</i>
Mains voltage, V		200...240
Mains phases		1
Mains frequency, Hz		50/60
Ambient temperature; °C	storage	+5...+50
	operation	+15...+40
Humidity; below, %		80
Forced air cooling		

### 2.3. Cooling Parameters

<i>Parameter</i>	<i>Specifications</i>
Recommended cooling capacity, W	700
Coolant temperature regulation (to laser), °C	0.5
Temperature range, °C	17...35
Coolant reservoir capacity, $dm^3$	4
Coolant	Distilled/deionized water (1...20 $\mu S/cm$ conductivity)

The cooling unit is supplied with a deionizer cartridge (pre-fitted inside the unit).

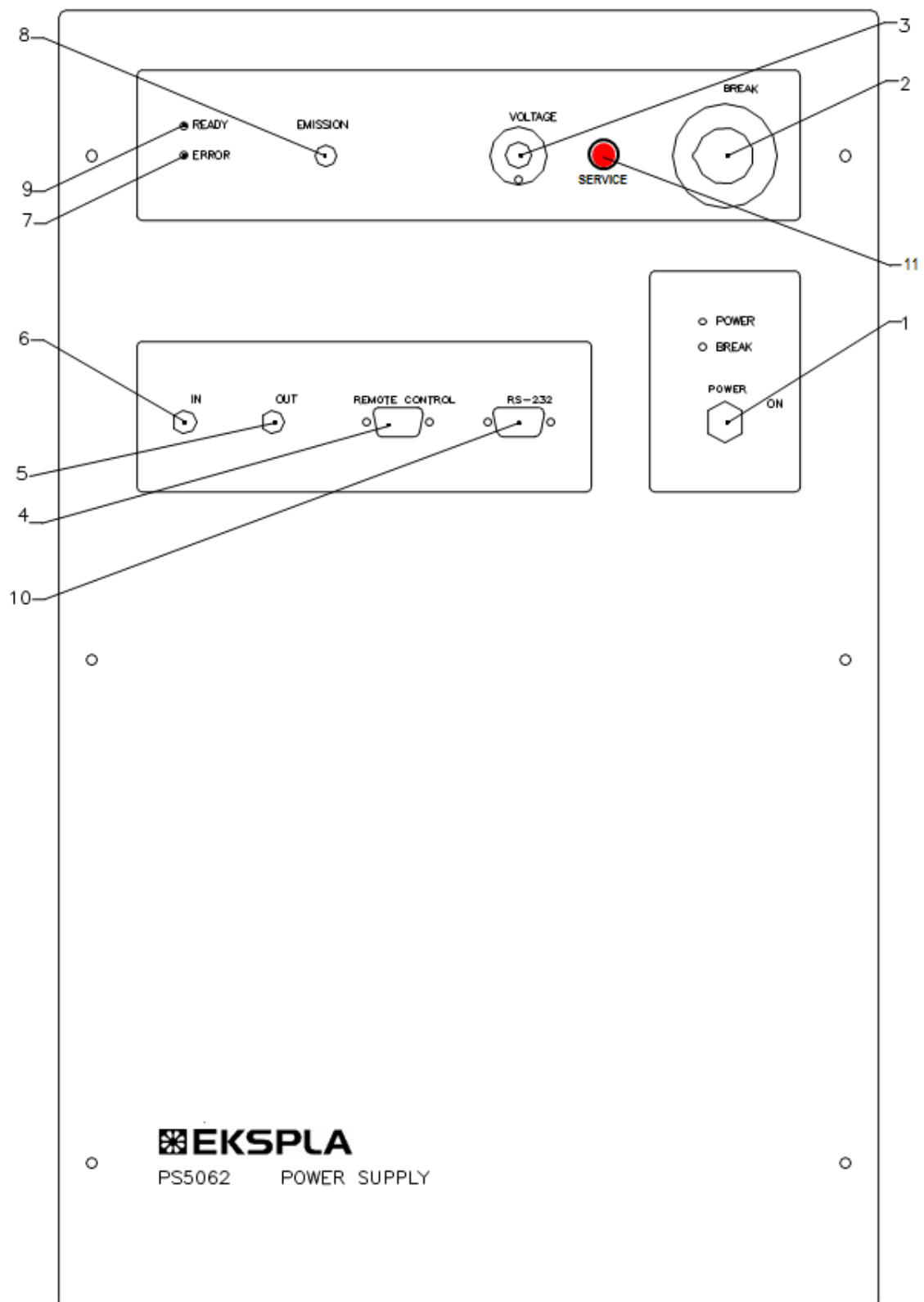


**Figure 1** Pumpic capacity with pump UPS 25-60

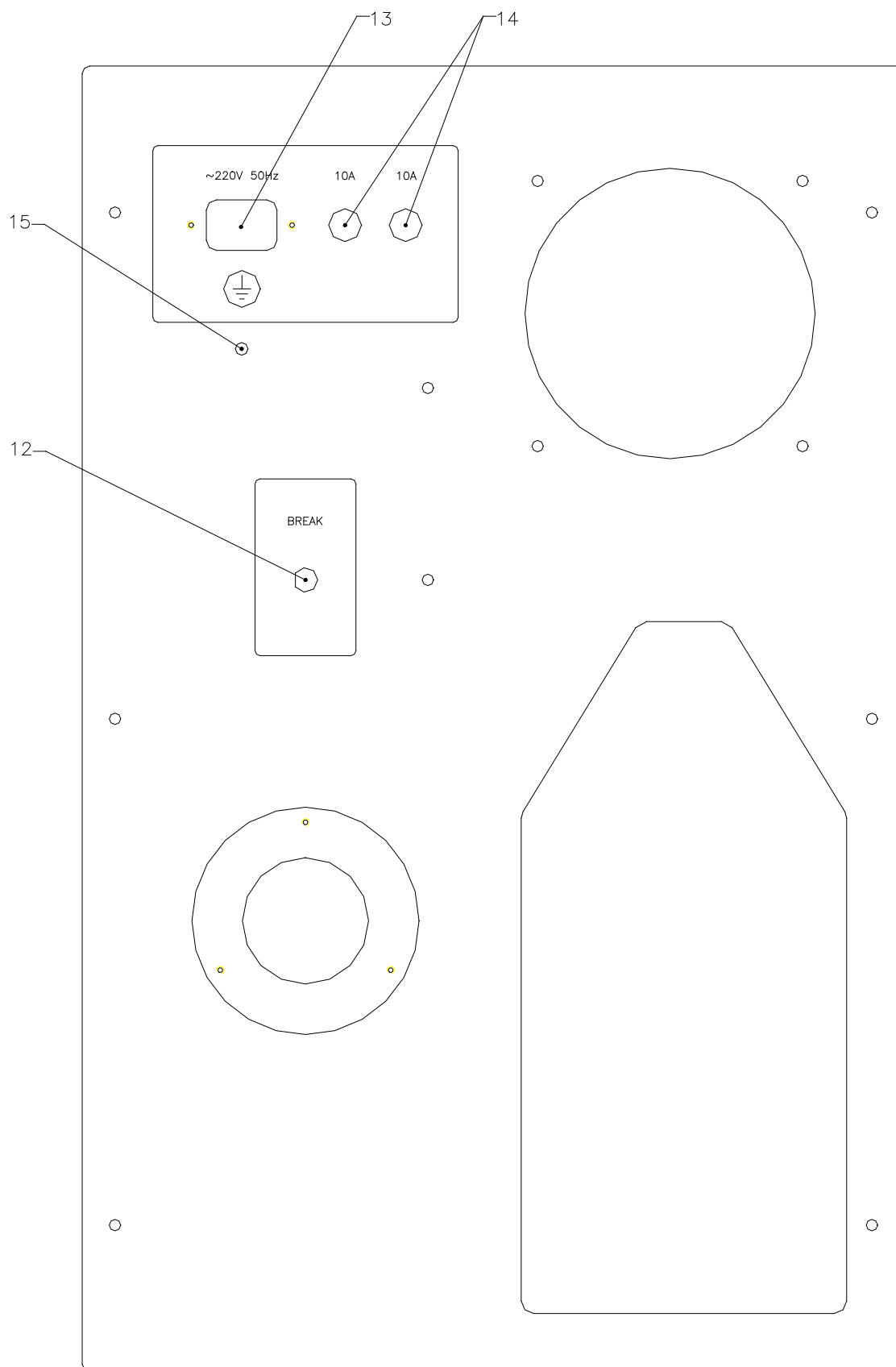
## 2.4. Other Data

<i><b>Parameter</b></i>	<i><b>Specifications</b></i>
Average lifetime, <i>hours</i> (when operated in compliance with technical parameters)	5000
Dimensions, <i>mm</i>	517(H) × 431(D) × 326(W) case
Maximal dimensions, <i>mm</i>	572(H) × 513(D) × 326(W) case
Weight, not exceeding, <i>kg</i>	25

1. Working with power supply is allowed to persons acquainted with operation manual and having permission to deal with voltages over 1000 V.
2. Do not remove unit covers while power cable is connected to the mains.
3. Do not operate the unit when it is not **grounded** and the load is not connected, as well as when flash lamp housing is not grounded.
4. Do not use the unit if any defects have been detected.
5. Power supply PS5062 series is provided with safety circuits & blockings set. See 5.1 Activation of safety circuits.



**Figure 2** Front panel view



**Figure 3 Rear panel view**



<b>Pos. in Fig.2/3</b>	<b>Control</b>	<b>Functions</b>
1	POWER	AC mains ON/OFF key
2	BREAK	Breakdown (emergency stop) mushroom switch
3	VOLTAGE SET	Control knobs for setting the capacitor bank charging voltage $U_c$
4	REMOTE CONTROL	REMOTE CONTROL connector
5	OUT	OUT connector
6	IN	IN connector
7	LED ERROR	Indicator of cooling liquid overheating above set value Indicator of cooling liquid flow Indicator of power supplies errors
8	LED EMISSION	Laser emission LED
9	LED READY	Capacitor bank charging (lights up when capacitor voltage attains a pre-defined value)
10	RS232	RS232 connector
11	SERVICE	Button for disconnecting high voltage from flash-lamp(s) without disconnecting the whole system from the mains
12	BREAK	External breakdown connector; must be shorted if not used.
13	~220 V	Socket for mains cable connection
14	16A	Fuse sockets. Fuses 16A Slow, $\varnothing 5\text{mm} \times 20\text{mm}$
15	GND	Protective ground clamp

Power supply features forced air cooling of heated nodes. Operation of power supply with the covers lifted is prohibited.

Synchronization pulse is ignored if the pulse frequency is too high for the capacitor bank to reach a set voltage. Charging is then initiated by the next pulse after completion.

The power supply can be switched off at any time.

After switching off, it takes 10 seconds for the capacitor bank to discharge through an internal shunt (relay-triggered process).

### 5.1. Activation of safety circuits

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Power supply PS5062 series is provided with safety circuits & blockings set, ensuring safe and consistent performance of the device. Emergency events are displayed on the front panel according to description in the table below. At safety activation, both simmer glow and capacitor bank charging is canceled, and a relay initiates the discharge. If the temperature rises above safe limits, the power supply terminate. It restarts automatically after the conditions have normalized. In all the other cases, the device must necessarily be re-switched on manually.

<b>Error status</b>	<b>Event</b>	<b>Recommendations</b>
Overheating of cooling liquid, "ERROR" LED lights	Cooling liquid overheating above 2...5 °C in respect to set value	1. Switch the unit off, check the presence of water in the reservoir. 2. Set higher temperature of cooling liquid. 3. Set lower voltage or repetition rate of pulses into flash lamp.
"ERROR" LED lights. Pump is stopped.	Absence of cooling liquid flow	1. Make sure the cooling loop is not blocked. 2. Make sure the reservoir is full.

Change the coolant and filters at least every 24 months.

Remove all and any liquids from the system before long-term storage or transportation (see below for instructions).

**Caution!**

**Avoid freezing the cooling unit while the coolant is not fully removed.**

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### **6.1. Filling with Coolant**

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1. Turn the POWER key to OFF.
2. Connect the unit with laser head by hoses.
3. Fill reservoir with 4...4.5 l of coolant through the inlet at the top.
4. Connect the unit to mains power (must be grounded).
5. Turn the POWER key to ON position. The pump will be started. If it stops about 5 seconds of operation, turn the unit off and add coolant. Then turn the POWER key to ON again.
6. Let the unit run for up to 5 minutes – trapped air must be purged from the cooling contour.

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### **6.2. Removing the Coolant**

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Remove coolant before replacing it, or before transportation (residual liquid may freeze at high altitudes when airlifting).

1. Turn the POWER key to OFF.
2. Disconnect the water hoses. Let the coolant run out of the laser freely.
3. Use a manual pump to remove the coolant from the reservoir alternatively, tip the whole unit to the side to pour the coolant out.
4. Use pressurized air to remove any residual liquid inside the contour.

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### **6.3. Coolant Replacement**

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To replace the coolant, remove it from the unit and fill the unit with fresh coolant according to instructions above.

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### **6.4. Changing the Deionizer Filter**

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The deionizer filter must be periodically replaced. Contact EKSPLA for the deionizer filter: part number PS1223DEJ (#C115).

Before proceeding, prepare some paper tissues or similar – some coolant leakage is possible. When replacing the filter, prevent any coolant spilling inside the unit, on wires and other components.

1. Turn the POWER key to OFF.
2. Disconnect the unit from mains.
3. Wait at least 2 minutes.
4. On the side of the unit, undo the 6 screws holding the side panel (see figure below). Remove the side panel.



**Figure 4 Undo screws on side panel**

5. The deionizer filter group is seen near the rear panel of the unit (see figure below).
6. Having some tissue paper on hand, undo the hose quick disconnect #1. Some leakage may occur. Clean any spilled coolant.
7. Undo the hose quick disconnect #2, also cleaning the leaked coolant.
8. Undo the two screws on plate #3 – they hold the filter attached to the cooling unit.
9. The filter is now free to move. Gently pull the filter body towards yourself. Twist and unscrew the plate from the filter body.



**Figure 4** Deionizer filter group

10. Unscrew the cap #4.
11. Remove the deionizer filter (#5). Replace the filter with a new one, following the directions in reverse order.
12. When tightening screws, filter gaskets and other elements, ensure proper fit to prevent any leakage.
13. After filter replacement, when operating the cooling unit, check for any leakage. If a leak is detected, immediately stop operation, turn the unit off and check for proper fit of the replaced parts.

## 7.1. Test Data

Parameter		Standard	Test Data
Max. average charge rate at max. output voltage, J/s		576	890
Smooth adjustment range of capacitor bank charging voltage $U_c$ , V		300...1200	277...1200
Error of capacitor bank charging voltage (at $U_c = U_{max}$ ), less than, %		$\pm 0.15$	$\pm 0.08$
Capacitance of capacitor bank, $\mu F$		80	80
Discharge inductance, $\mu H$		60	60
Simmer current, A		$0.6 \pm 0.1$	0.7
Power consumption at maximum output power, kVA	average	$\leq 0.9$	1.5
	peak	$\leq 1.6$	1.6

## 7.2. Certificate

Power Supply unit **PS5062AM** s/n **37201** is designed to fit norms EN 61010 and EN 55011, is free from defects in material and workmanship fits technical requirements and is voted valid for operation.

Test officer

Mindaugas Pupienis

(Name, signature)

Date of approval

2018-09-19