

FEDAL

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SF530

Power supply

User Manual

Before working with power supply, read this manual thoroughly.
If you have any doubt or suggestion, please do not hesitate to contact us!

FEDAL
phone /fax +7 (812) 326-07-48
e-mail: office@fedalel.com
web site: www.fedalel.com

Introduction

Power supply SF530 is designed for supplying laser diode stacks. Power supply ensures wide range of smooth variation of frequency, current and pulse duration.

SF530 is controlled from the front panel or with PC via RS-232 interface.

Safety requirements

1. Engineering personnel with necessary knowledge on laser safety, familiar with design and operation principles of solid-state lasers with diode pumping and with this manual, is allowed to operate the power source.

2. All operations with the source shall be carried out with power cable disconnected from the electric mains and capacitor bank discharge only.

3. Special chains are to be used for block casing grounding. It is strongly prohibited to use water, heating and gas piping for grounding.

4. When connecting the source to mains the earth wire is to be connected the first, and disconnected the last one during shutdown.

5. The power source is to be dismantled and repaired by manufacturer only.

6. In case any abnormal noise arises during source operation, like, for instance, crack noise, buzz, squeaking or other manifestations of damage, the source is to be immediately disconnected from mains. Contact manufacturer to rectify the problem.

Specification

Technical parameters

Mode	QCW		CW	
	Min.	Max.	Min.	Max.
Output voltage, V*	1	120	1	120
Output current, A*	1	40	1	20
Frequency, Hz*	1	500	-	-
Pulse width, μ s*	50	1000	-	-
Rise/Fall time, μ s	-	60	-	60
Average output power, kW	-	2.4	-	2.4
Output current tolerance, %	0.3		0.3	
Trigger (In; Out)	5V, 10 μ s		5V	
Communication interface	RS232			
Interlock	NC contact			
Power input	single phase 220 VAC, 50Hz			
Power input frequency, Hz	50			
Weight, kg	23			
Dimensions	440*132*440 mm; 3U			
Cooling	Air cooled			

* Values are limited by average power: $F \cdot V \cdot I \cdot \tau \leq P$ (pulse mode); $V \cdot I \leq P$ (CW mode)

Delivery set

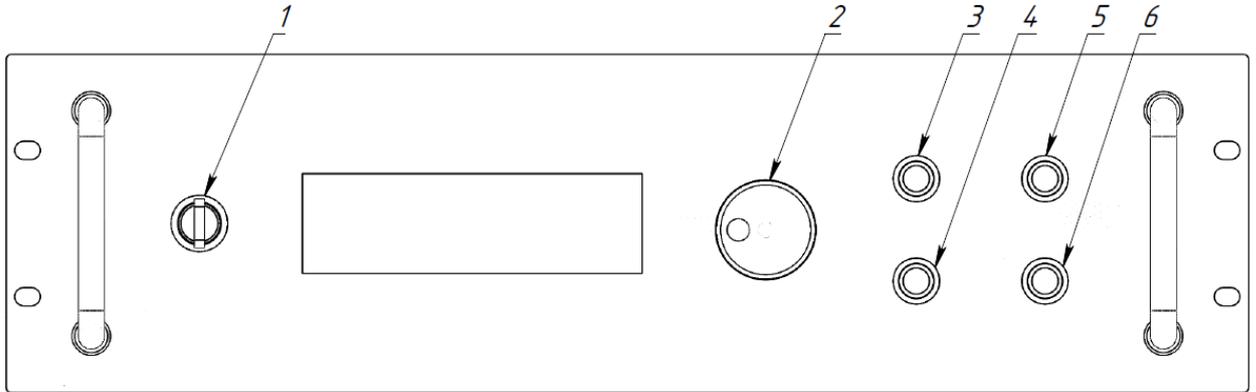
- Power supply unit..... 1 pc.
- User manual 1 pc.
- Test report..... 1 pc.

Operating conditions

- Ambient temperature from +5°C to +40°C;
- Humidity 80% (at +25°C);
- Atmospheric pressure from 84 kPa to 106 kPa;
- Air free from corrosive vapours.

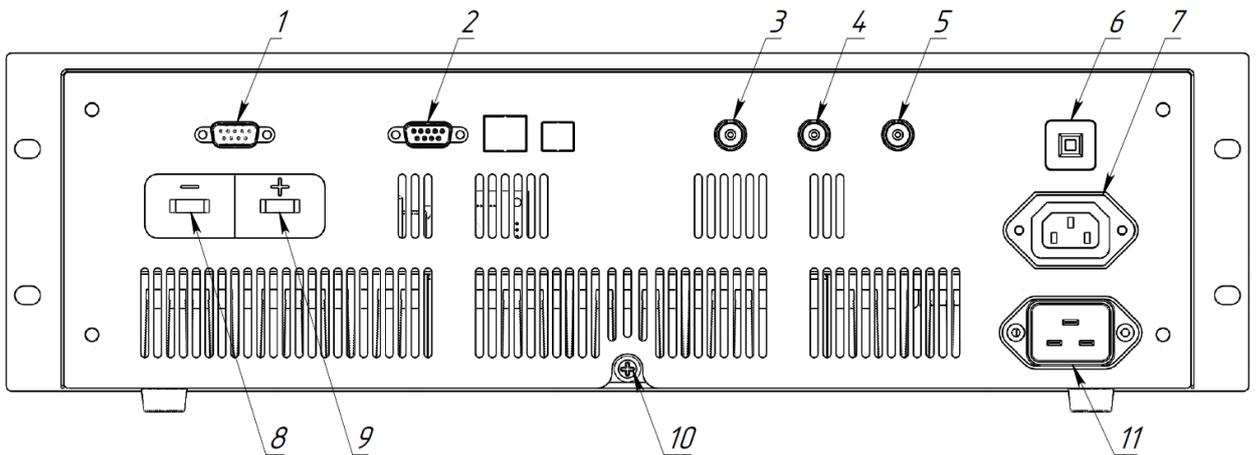
Views

SF-530 power supply is made in a standard 19" 3U case. The front and back panel of the unit are shown.



Front panel SF530

1. ON/OFF key switch;
2. Encoder;
3. "EXT. TRIG." button;
4. "START" button;
5. "MODE" button;
6. "STOP" button.



Back panel SF530

1. Interlock connector (DB-9-M);
2. Communication connector (RS232, DB-9-F);
3. Current monitor connector;
4. Trigger output connector;
5. Trigger input connector;

6. Circuit breaker;
7. Output power connector for additional equipment;
8. LD negative terminal;
9. LD positive terminal;
10. Screw for protective earth conductor (M5);
11. Input power connector.

Table of indication elements is below.

Table 1.

Indication element	Description
Hz	Frequency adjustment mode
ms	Pulse width adjustment mode
I	Pump current amplitude adjustment mode
V	Voltage adjustment mode
T_o	Output sync delay adjustment mode
GO	Front panel lock
RS₂₃₂	Link with PC using 232 interface
⊕ 30°C	Triggering of internal thermal protection
ILK	Triggering of external protection
24V	Error of internal power supply
Er00	Shut down due to external protection error
Er01	Shut down due to internal thermal protection error
Er02	Shut down due to internal power supply error
Er03	Shut down due to triggering protection of pulse width is more than setted, overcurrent or overvoltage on output switch

How to get started

ATTENTION!

*All operations related to SF530 installation and connection are carried out with power supply off and power plug removed from the socket. Any operations associated with connection and disconnection of source from mains may be carried out **three** minutes after SF530 complete blackout only.*

1. Unpack your power supply; Connect a laser diode stack or a dummy load (e.g. a Schottky diode which is electrical equivalent of your LD) to the laser diode power cable. Connect the laser diode power cable to the power supply LD+ LD- terminals. Please note polarity;
2. Connect a main cable to the input power connection. Plug in main cable to the socket;
3. Turn on circuit breaker. After that LCD display is to be activated with information displayed;

ATTENTION!

To ensure reliable and stable operation it is recommended to supply SF530 from individual socket ~ three phase 220/380 VAC, 50Hz with feeder cable of minimum 1.5 mm² in cross-section. The unit is to be earthed with individual wire to general earthing network, at that ground wire cross section shall be 2.5mm² at least. It is strongly recommended to use the original mains cable only being part of power source set.

4. Switch the ON/OFF key switch to position I. After that «STOP» button lights on. Select the operating mode. Hold the «MODE» «STOP» button to change CW/QCW mode. Set required values of frequency, pulse duration, current, voltage in QCW mode (required values of current, voltage in CW mode). This can be done by turn encoder. Turn the encoder clockwise increases the value, counterclockwise - reduces. Selection of the control parameter is performed using the button «MODE» (of frequency, pulse duration, current, voltage).

ATTENTION!

During the first start-up avoid large values of parameters, for instance, do not set maximum current, pulse duration and frequency at once. Ensure test run of the unit by gradually increasing pulse energy. Start with testing single pulses at LD threshold current. This enables early identification of latent defects in a new unit, if any, to avoid major failures in the future.

5. Setting the operating voltage. Tuning of the operating voltage should be done once for each particular laser diode stack. It is easy to calculate the preferable voltage. Use the nominal voltage from the manual given with the laser diode stack and increase it by 1-1.5V. Example: for a single diode with nominal voltage about 10V you have to set operation voltage of the supply unit equal to 11-11.5V. It is preferably to start with such voltage and check the current shape with the

oscilloscope. The extra 1-1.5V will be dissipated on the output transistor, connectors and power wires. If the pulse shape doesn't satisfy you, please increase voltage a little. But never set too high voltage (greater than 3-5V over nominal voltage of the load) to avoid power supply overheat.

6. When voltage setting is done, switch the ON/OFF key to position II. After that the charging module will start and power supply will be ready to work. Generation of pumping current pulses in internal synchronization mode will be start by press the «START» button.

7. Selection of the synchronization setting. The power supply can be powered by external synchronization or manually mode (by the internal synchronization). Select the synchronization by press the button «EXT. TRIG.». In manual mode, the frequency of the power supply is carried out from the front panel of the unit. The selected external synchronization mode (button «EXT. TRIG.» lit), by press the button «START» SF530 run from an external synchronization. When the power supply is in external synchronization mode all the parameters (except frequency) are changed from the front panel, or from a PC.

8. After the required parameters are set press the button «START»;

9. To switch off the power supply is necessary to press the button «STOP». Switch the ON/OFF key switch to position I, and after 10-15 seconds, to position 0. Being switched off the power source automatically stores all settings and recalls them during next start-up.

10. Parameter variation blocking. To avoid accidental change of settings parameters the power source features blocking function for control panel. To activate or deactivate blocking keep «STOP» button pressed for about 5 seconds until blocking icon appears/disappears in the left corner of LCD display. When this function is active the power source does not respond to encoder rotation and pressing of «EXT. TRIG.» and «MODE» buttons. This function does not work for key switch, «STAT» and «STOP» buttons.

11. The power supply has the ability to control via software. SF530 is connected to PC via RS-232 interface. Communication protocols and software description given in a separate document and are not considered here.

12. The power supply has an interlock contact (switch contact closure). Interlock signal cable is in laser diode connector.

13. The power supply has a pulses counter for QCW mode, operating time measuring for CW mode.

14. To change the display mode for the pulse counter keep "MODE" button in QCW mode for 3 seconds. The top line of the counter is resettable, the down line is not resettable (the number of pulses during the all operation time of the power supply). To reset the pulse counter keep "STOP" button pressed for about 3 seconds (only for the pulse counter display mode).

15. To change the display mode for the operating time measuring keep "MODE" button in CW mode for 3 seconds. The top line of the operating time measuring is resettable, the down line is not resettable (all operation time of the power supply). To reset the operating time measuring keep "STOP" button for 3 seconds.

Connector Interfaces

On back panel of power supply located connectors: input power, additional equipment power output, diode power terminal, interlock and RS-232..

Interlock connector (DB-9-M)

Contact	Description
1	Interlock (Normally closed)
2	Interlock (Normally closed)
3-9	Not used

RS-232 connector (DB-9-F)

Contact	Description
1	Not used
2	RxD
3	TxD
4	Not used
5	Gnd
6-9	Not used

Transportation and storage

SF530 is to be transported fixed in standard package only by any transport means.

Transportation conditions:

- air temperature between +5 and +40°C;
- relative humidity maximum 80% at +25°C without moisture condensation;
- atmospheric pressure between 84 and 106 kPa.

SF530 shall be stored in standard package or without it in closed storehouses on shelves at temperature between +5 and +40°C and relative humidity maximum 80% at +25°C without moisture condensation. In case SF530 is stored without packing it is necessary to cover the unit with polyethylene film to protect it against dust.

Maintenance

SF530 does not require periodic maintenance. It is mainly recommended to keep it clean. Use lightly wetted cloth to remove dust from SF530. Use soft brush and vacuum cleaner to clean air holes.

After completion of guaranteed life expert diagnostics may be required to identify any parts to be replaced. In case of long-term outages it is recommended to cover the unit with polyethylene film to protect it against dust.

Manufacturer warranty

Manufacturer guarantees that this power supply meets specified technical characteristics provided operation modes and conditions, storage and transportation rules are observed by the user.

Guarantee period is 12 months as of shipment with warranty time between failure of 2000 hours. During warranty period the manufacturer shall be entitled to rectify revealed defects free of charge or replace device parts being out of service, if manufacturer is responsible for these defects.

Certificate of acceptance

Power supply SF530 corresponds to the set of design documentation.

Product: Power Supply	Model: SF530
Serial number _____	Manufacture date _____