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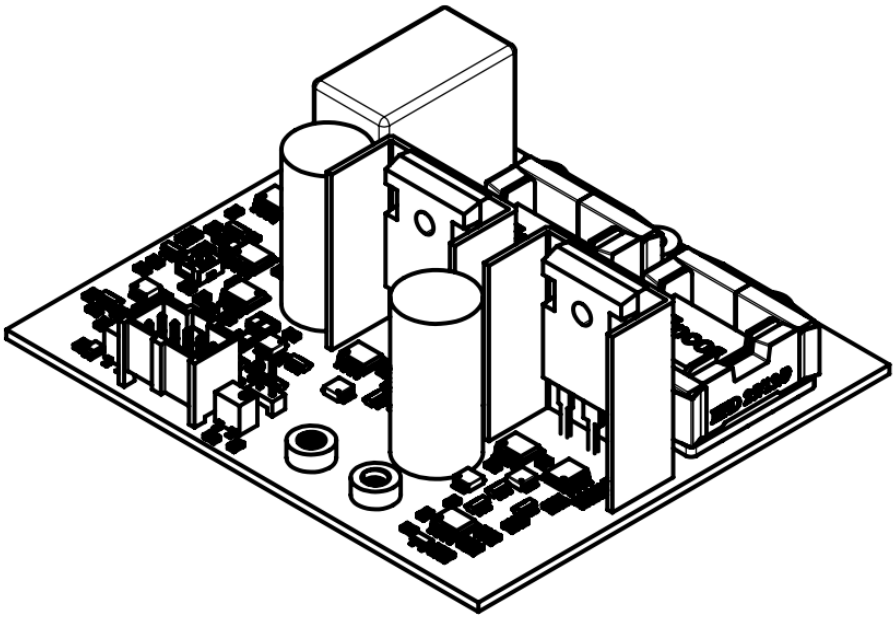
FLD-nano flashlamp driver

User manual



Warning! This equipment produces high voltages that can be very dangerous.
Please read the entire user manual carefully before using the product.

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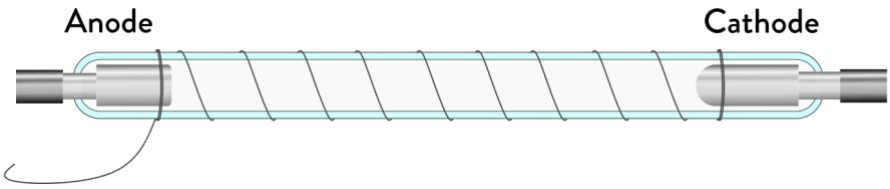
Overview / Appearance

The FLD-nano is a compact but powerful flashlamp driver designed for air-cooled flashlamps similar to the one depicted below.



The driver charges an external capacitor bank up to the required voltage and then, following an external TTL signal, initiates discharge by applying a trigger pulse (400V by default) to the flashlamp.

The FLD-nano requires a +24 V DC power supply and a pulse generator to set the operating frequency.

The output voltage level can be programmed within the working range by the user, either manually (via the onboard configuration trimpot) or remotely (by applying a DC voltage to the respective pin). The driver's maximum output power can be reduced, if needed, using the onboard trimpot.

Main parameters:

- 24V DC input
- 100W average output power
- Up to 2000V output voltage (to the capacitor bank)
- External triggering, no simmer

Applications:

- UV polymerization
- UV sterilization
- Sintering
- Annealing
- Stroboscopy

Cooling

Active cooling is not required for operation at a low repetition rate. However, forced air cooling with an external fan may be necessary for full performance.

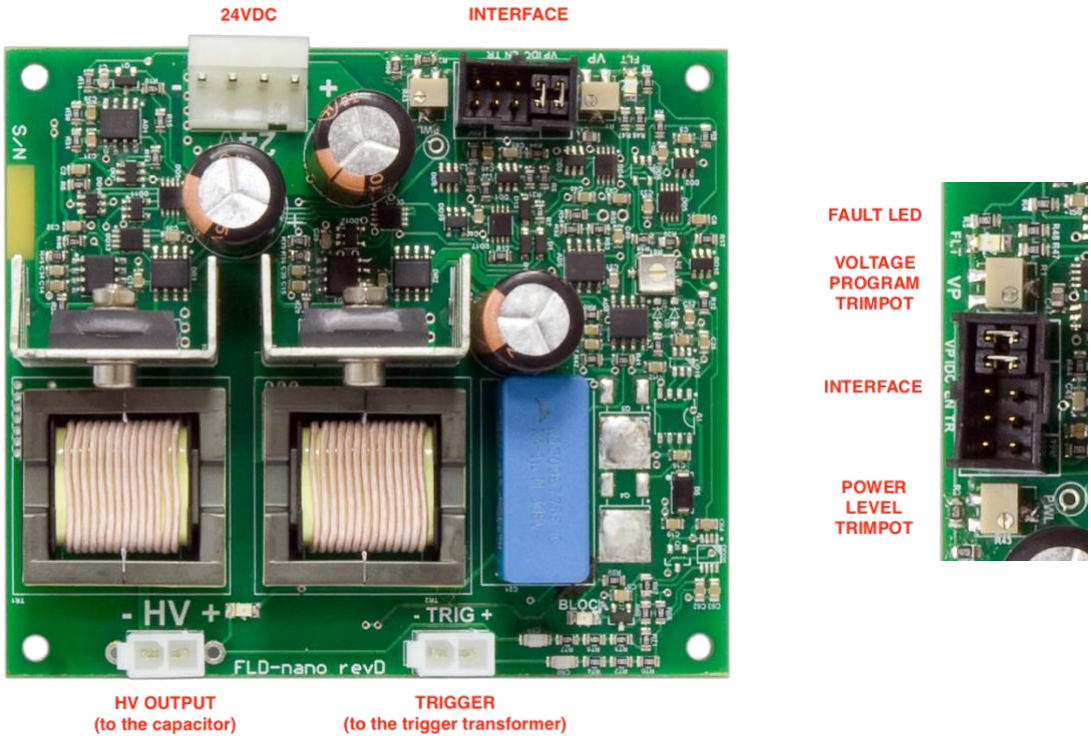
Contents of delivery

By default, the delivery package for standard versions (not FL) contains the following parts:

- FLD-nano flashlamp driver – 1pc
- 24VDC cable (50cm length) – 1pc
- INTERFACE cable (50cm length) – 1pc
- HV OUTPUT cable (50cm length) – 1pc
- TRIGGER cable (50cm length) – 1pc

The trigger transformer is not included with the standard delivery and must be purchased separately. Customized delivery content is available upon request.

Connections, signals, signal descriptions



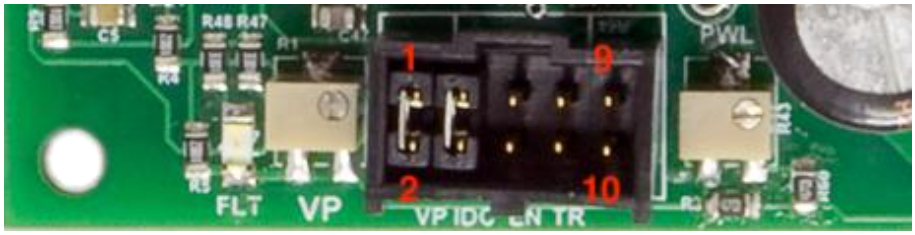
The FLD-nano can be controlled in manual mode. In this case, a jumper is set between PINS 1 and 2 of the INTERFACE connector to enable the use of the VOLTAGE PROGRAM trimpot. To generate a trigger pulse immediately after the storage capacitor is charged to the set output voltage (manual autorun mode), install a jumper between PINS 8 and 7. ENABLE jumper between PINS 5 and 6 allows the driver to run. For added convenience, PINS 5 and 6 can be interconnected using a button instead of a jumper.

Alternatively, the FLD-nano can be controlled via an external device, which sets the storage capacitor voltage level (0-5V to PIN 1) and sends TTL pulses to PIN 8 to initiate pulses to trigger transformer.

24V DC INPUT: Molex SPOX (0965-2048)

PIN (color)	DESIGNATION	DESCRIPTION
1, 2 (black)	**GND**	24V DC negative
3, 4 (red)	**24VDC**	24V DC positive

INTERFACE: Molex C-Grid III (90130-1210)



PIN (color)	DESIGNATION	DESCRIPTION
1 (blue)	**Voltage Program**	0-5V signal applied to PIN 1 sets the output voltage level of FLD-nano. 5V corresponds to V_{MAX} at the output (1000V or 2000V in standard versions). In manual mode PINs 1 and 2 should be interconnected with a jumper (the output voltage is regulated by VOLTAGE PROGRAM trimpot).
2 (violet)	**VP+**	Should be used in manual mode only. In manual mode PINs 1 and 2 should be interconnected with a jumper (the output voltage is regulated by VOLTAGE PROGRAM trimpot).
3 (brown)	**IDC**	Interlock door connector pin. PIN 3 inhibits the operations until it is short-circuited to one of the GND pins. To allow the operations a real Door-interlock connection should be organized or, alternatively, a jumper should be placed between PINs 3 and 4.
4 (black)	**GND**	Common ground of FLD-nano circuits.
5 (green)	**Enable**	When pulled to the ground, PIN 5 enables the driver's outputs. One can enable the driver by placing a jumper between PINs 5 and 6.
6 (black)	**GND**	Common ground of FLD-nano circuits.
7 (yellow)	**Ready**	When a storage capacitor is charged up to the required value, the driver sets the state PIN 7 to 5V (TTL). In manual mode PINs 7 and 8 can be interconnected with a jumper for autorun mode.
8 (white)	**Pulse**	When 5V (TTL) has been applied to PIN 8, FLD-nano sends one pulse (400V by default) to trigger transformer. If flashlamp is triggered successfully, a flash occurs. In manual mode PINs 7 and 8 can be inter-connected with a jumper for autorun mode.
9 (-)	**N/C**	-

10 (orange)	**Fault**	When an internal fault of FLD-nano occurs, the driver stops the operations and sets PIN 10 to 5V (TTL) to indicate the failure. To start the operations again, the cause of the failure should be eliminated and after then, FLD-nano should be disabled and enabled again using PIN 5. FLD-nano sets Fault state in the next cases: • Overheating

HV OUTPUT (1000V version): Molex Mini-Fit (3928-1023) or flying leads

PIN (color)	DESIGNATION	DESCRIPTION
1 (red)	**HV OUTPUT**	HV OUTPUT positive
2 (black)	**GND**	HV OUTPUT negative

HV OUTPUT (2000V version): Molex SPOX (0965-2048)

PIN (color)	DESIGNATION	DESCRIPTION
1 (red)	**HV OUTPUT**	HV OUTPUT positive
2, 3	**-**	N/C
4 (black)	**GND**	HV OUTPUT negative

TRIGGER: Molex Mini-Fit (3928-1023) or flying leads

PIN (color)	DESIGNATION	DESCRIPTION
1 (red)	**TR+**	To the trigger transformer primary winding positive
2 (black)	**TR-**	To the trigger transformer primary winding negative

Other elements

VOLTAGE PROGRAM trimpot – sets the output voltage in Stand-alone mode.
POWER LEVEL trimpot – adjusts the driver's maximum output power (for example, to reduce input current in low-power applications).

FAULT LED – indicates the driver's failure (overheating).

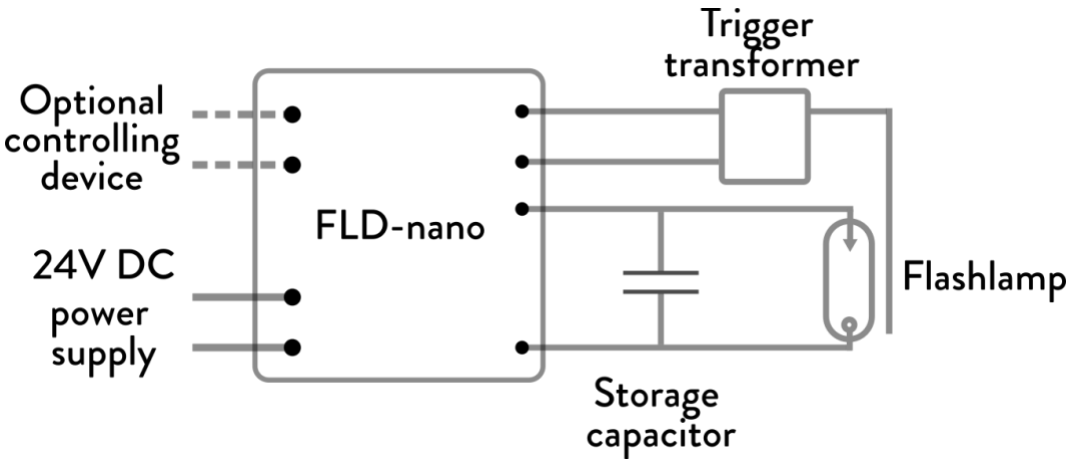
Grounding and mounting

Grounding policy
By default, INTERFACE return, 24VDC INPUT negative, HV OUTPUT negative are interconnected to each other.

The driver should be mounted using four M3 screws.

System layout

Recommended system layout is shown below:



Safety

- Assemble the entire setup before powering the device.
- Avoid casual contacts of personnel with output cables and with the load.
- Do not connect or disconnect cables while the driver is powered on.
- Do not operate with load disconnected.
- Be very careful when setting jumpers and using the trimpots; accidental contact with the board can be fatal; in the same sense, it's recommended not to control the driver manually, but remotely via the interface connector.
- Do not turn on the driver if it has been damaged by water, chemicals, mechanical or electrical shock.
- Do not repair the driver yourself, there are no user serviceable parts inside.

Operations (in manual regime)

- Ensure that the FLD-nano is disconnected from the power source.
- Connect a storage capacitor (e.g. 33uF) with the appropriate voltage rating to the FLD-nano.
- Connect your flashlamp to the storage capacitor.
- Connect a trigger transformer to the FLD-nano and to the flashlamp.
- Ensure that all jumpers of the FLD-nano are removed.
- Connect a 24V DC power supply to the FLD-nano and apply 24V DC power to the FLD-nano.
- Set the VOLTAGE PROGRAM jumper (i.e. place jumper between PINS 1 and 2 of the INTERFACE), now the output voltage to the storage capacitor is regulated by the VOLTAGE PROGRAM trimpot.
- Set a jumper between PINS 3 and 4 of the INTERFACE to short-circuit the IDC signal and allow the operations.
- Set a jumper between PINS 7 and 8 of the INTERFACE to switch the FLD-nano in autorun mode, where the flash is initiated immediately after the capacitor bank is charger to the required voltage.
- Interconnect PINS 5 and 6 of the INTERFACE by any means (a jumper, a button) to enable the outputs of FLD-nano and start flashes.

Important note

The Power/Enable start-up sequence is important. The FLD-nano must be powered first and enabled after then only. If the FLD-nano is already enabled at the moment of power-up, this will be considered a fault, and the driver will not start operations.

Specifications

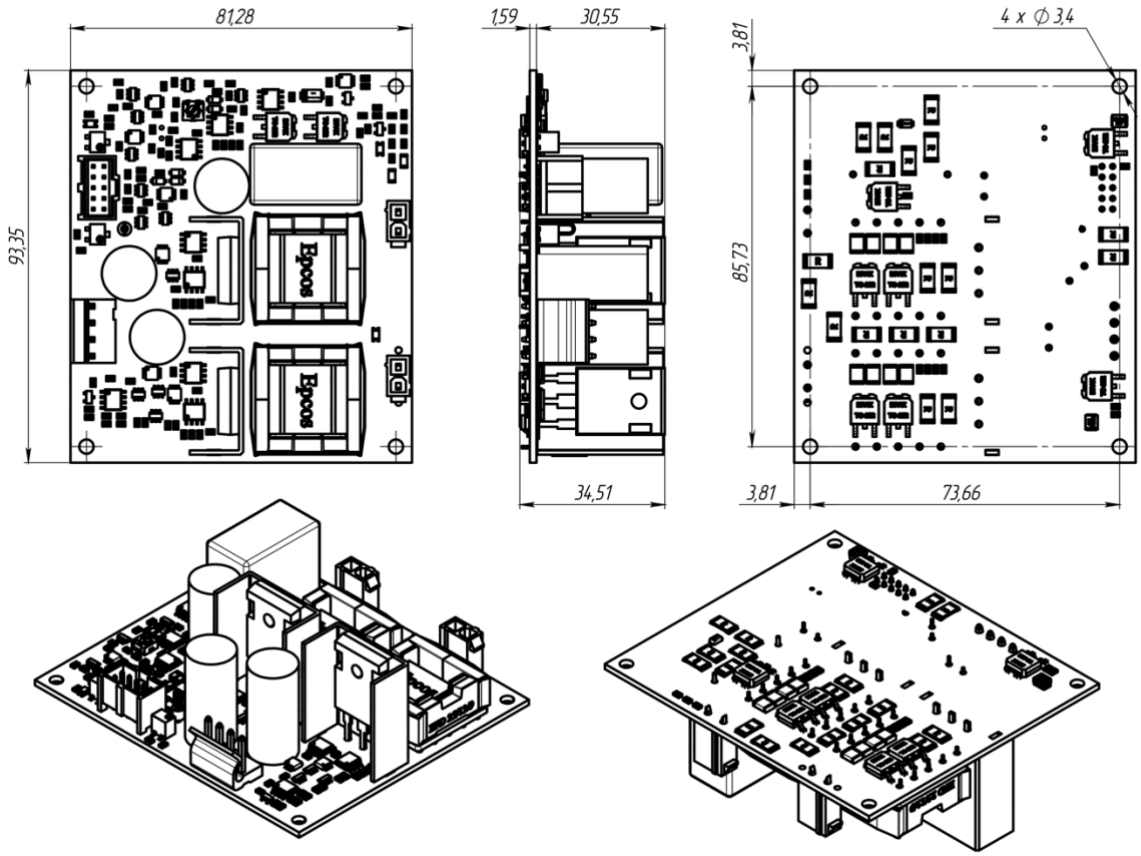
ELECTRICAL SPECIFICATION

Input	
Input voltage	24V DC, 10A max.
HV Output	
Output voltage (V_{MAX})	Model dependent 1000V or 2000V in standard models, other on request
Load capacitor	External (not included) For example, 33uF or other on customer's choice
Output power	>100J/s
Flashlamp	
Flashlamp	External (not included) For example, FG 1901 MTC3D(H) by Excelitas or similar
Triggering	
Triggering method	External only
Trigger capacitor	400V/470nF by default, other on request
Trigger transformer	External (not included) For example, ZS1031-11(H) by Excelitas or similar
Pulse	
Pulse width	Not regulated, defined by flashlamp and wiring inductance only
Pulse repetition rate	From single shot and up to 20Hz
Protections	From overheating Door-interlock protection
Cooling	Passive at small output power Forced air cooling with external fan might be needed at full output power
Environmental	
Operation temperature	+10…+40 °C
Storage temperature	-20…+60 °C
Humidity	0…90%, non-condensing

MECHANICAL SPECIFICATION

Size (LxWxH)	94x82x40mm (see also the dimensional drawing below)
Weight	Approx. 0.2 kg

Dimensional drawing



How to order?

There are several standard modifications of the driver.

Part number	Description
FLD-nano-1000V	Maximum output voltage (V_{MAX}) – 1000V Voltage program calibration – 5V : 1000V Trigger capacitor – 400V/470nF HV Output – Molex Mini-Fit Trigger – Molex Mini-Fit
FLD-nano-1000V-FL	Maximum output voltage (V_{MAX}) – 1000V Voltage program calibration – 5V : 1000V Trigger capacitor – 400V/470nF HV Output – flying leads Trigger – flying leads
FLD-nano-2000V	Maximum output voltage (V_{MAX}) – 2000V Voltage program calibration – 5V : 2000V Trigger capacitor – 400V/470nF HV Output – Molex SPOX Trigger – Molex Mini-Fit

Custom modifications are available on request.