

Technical specifications LYRA501

1. Input (mains)

Input voltage (single phase)	230Vac nominal
Input voltage range	165 to 275 Vac
Frequency range	45 to 55Hz*(1)
Input power	600W max.
Input current	10A max.
Inrush current	30A (peak)
Energy reserve	10 ms
Power factor (50 – 110% of nominal load)	0.99
Input current THD	<5%
Efficiency (20 – 110% of nominal load)	>90%*(2)

2. Output

Max. power – repetitive mode	500W
Max. single flash energy	300J*(see table 2)
Output current – (adjustable /150values)	0-150 A *(3)
Max. flash period – (100ms)	100ms
Max. total period – (turn on + turn off)	1000ms
Min. flash period	1ms*(4)
Min. total period – (Ton + Toff)	3ms
Max. flash frequency – (depending of adjusted periods and energy)	100Hz*(5)
Flash lamp voltage range	0 to 400Vdc
Simmer source voltage (open circuit)	400V
Simmer source voltage (during operation)	0-80V
Simmer source current (adjustable)	0-500mA
Igniter voltage (HF) – direct on lamp contacts	15kV*(6)
Switching frequency	200 kHz

3. Environmental conditions

Operating temperature range	0 to +55° C
Storage and transport temperature range	-45 to +85° C
Operating humidity (no condensation)	30 to 95%
Storage and transport humidity (no condensation)	10 to 95%

4. Mechanical characteristics

Weight	12 kg
Height	320mm
Width	165mm
Depth	390 mm

5. Dielectric strength (during 1 minute)

Between input and earth	2.1 kVdc
Between output and earth	2.1 kVdc
Between input and output	4 kVdc

6. Other specification

Simmer source current regulation (analog)	0 - 500mA
Simmer source voltage regulation (internal)	200V - 400V
Current regulation I (8b DA)	0-150A
Frequency regulation (depending of sequence period duration)	0.5-100Hz
LCD display	2x16 char

***(1)** – Input voltage frequency is limited by galvanic insulation transformer. Safe frequency range is 45-55Hz. Wide-range input frequency capabilities are possible without this transformer.

***(2)** - During automatic repetition modes of operation.

***(3),*(4),*(5)** - Flashlamp current is constant during turn-on period. Duration of light emission may be adjusted between 0 and 100ms. Discharge current may be within 1 –150A range, adjusted with 1A step.

After the whole sequence comes Toff period. This value is crucial for calculating the frequency of automatic mode of operation. Toff range is 1 – 1000ms, adjustable with 10ms step.

	Min. value	Max. value	Step	Default
Flash current	0	150A	1A	0
Flash period	0	100ms	1ms	0
Turn-off time	10ms	1000ms	10ms	1000ms
Simmer current	0	500ma	analog	500mA
Simmer voltage	200V	400V	analog	400V

table 1.

***(6) - Important note.** Flashlamp ignition voltage is about 15kV. This voltage occurs on the lamp contacts. Measuring of the lamp voltage is enabled from a connector on the back side of device. Those measuring points are connected before high voltage generator and are safe for standard measuring equipment. High voltage does not occur on this point.

For triggering and stable flow of simmer current as well as the main plasma channel it is necessary to place small conduction wire along the lamp tube. Ignition voltage occurs directly on the lamp ends, but this wire is important for plasma trajectory definition.

Also, this wire produces higher density of plasma tube.

Another way to make similar effect is to put lamp tube into one focus point of mirror made of conducting material. This mirror also has the light focusing function.

This wire can be placed along just one side of the lamp tube and may be very thin.

Anyway, to eliminate this conductor it is necessary to inject 50kV HF pulse directly on the lamp contacts, with 100Hz repetition. This will make possible just the start of simmer current but not the stable current flow and high density of plasma during other periods of operation. Also, the simmer plasma tube will be stable with more than 1500mA simmer current. In this case the voltage on lamp ends is about 55V.

It produces 80W dissipation on the lamp just for keeping simmer plasma tube.
 LYRA501 is equipped with 15kV single pulse HF voltage source. On your request it can be modified for 50kV repetition mode.
 My suggestion is to keep existing solution at this level of development.

***(7) Maximum operation ratings – single trigger mode**

Flash current	Flash voltage	Duration	Energy	Power
150A	250V	5ms	190J	300W
100A	200V	30ms	300J	500W
80A	166V	40ms	400J	500W
70A	130V	50ms	450J	500W
50A	100V	100ms	500J	500W

table 2.

Maximum operation ratings – repetitive mode

Flash current	Flash voltage	Duration	Energy	Power
120A	250V	5ms	150J	300W
100A	200V	15ms	300J	500W
80A	166V	25ms	385J	500W
70A	130V	50ms	450J	500W
50A	100V	100ms	500J	500W

table 3.

Maximal values of flash duration are defined by manufacturer.
Anode voltage during discharge depends on the type of lamp. If this value exceeds values in table 2. user must choose lower duration time. Higher values will not cause damage of the device but output current waveform will not be rectangular.

Appendixes:

Examples of current waveforms.

Sequences with duration under 1ms are not allowed in LYRA501.

This possibility of the device is not important for long term radiation operations.

On your request the software can be modified to adjusting flash periods with 10 microsecond step.

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