

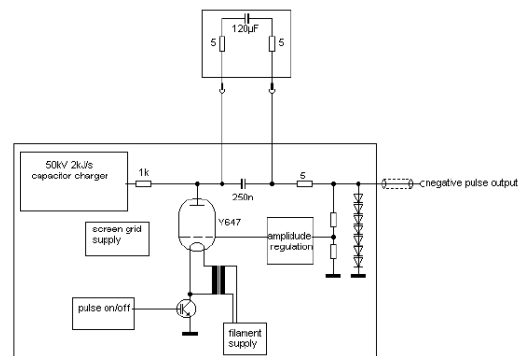
RUP5L

Rossendorfer Universal Pulse Generator

The high voltage pulse generator RUP5L is a modification of the RUP5, which uses a high power elektron tube not only as switch but also as shunt regulator for achieving a constant output voltage. As switch serves a Y647 watercooled tetrode.

The circuit with the switch parallel to the load resistance is designed primary for small duty cycles and has the advantage of filament and tube control near ground level. As a power supply special low output capacity capacitor charging unit is used. When the tetrode is nonconductive, the charging switch is closed and the capacitor will be charged by means of decoupling resistor (1 kOhm) and diode.

When the tetrode is switched, (charging unit is disabled for this time), the positive pole of the capacitor will go down. On the negative pole of the capacitor a negative voltage is now present, which can be taken from the high voltage output. The pulse amplitude is controlled by regulating the voltage drop on the tube (may be in the range 2-10 kV). This is done by regulating the control grid voltage on the output amplitude. The regulation circuit is of proportional-integral type, the regulation parameters (regulation amplification, integration time constant) can be adjusted by the customer for optimum speed near the stability limit. Optimum setting may depend on load and pulse parameters.



Voltages and Currents

peak current 50 A max. average current 40 mA.
maximum voltage 50 kV
maximum average output power up to 2kW
internal storage capacitor 250nF, external storage capacitor 120µF
20 ms max. pulse length are possible with 40kV, 40A output pulse.

Waveform and Frequency

square wave pulse, output voltage regulated
Regulation is done by steering the control grid voltage with a PI regulation circuit. Settling time and accuracy depends largely on adjustment, but settling within 10µs and a stability of better 1% should be possible.
Regulation can also be switched off, then settling time is <1µs.

rise time: a few µs, depending on voltage and load, the lower limit is given by the stability of the voltage regulation loop. Fall time depending on load.

pulse duration 2 µs - about 20 ms (useful maximum pulse duration is given by the discharging of the internal pulse capacitor of 120 µF and the energy absorbing capability of the tube).

duty cycle <10%, but mostly limited by average current and power capability, max. frequency 1 kHz

Sizes, included items

tube rack 800*800*2000 mm
external capacitor rack 800*800*2000mm

with 120µF external capacity
control rack (25HE 19", 600*780*1200mm)
power input 3 * 230 V 50 Hz~ and adjustable to 3*127V, 60Hz~ (transformer included in control rack)
high voltage supply 50 kV, 2 kW included in control rack. monitor outputs for pulse voltage and current.
control input 3-10V Signal (TTL) at 200 W, signal source has to be provided by customer

Safety

external interlock

If the high voltage is switched off or the external interlock is opened the pulse output is shorted to ground.

short circuit detection: If the output pulse voltage does not reach at least 2/3rd of its nominal value after a few microseconds or drops below this value, the pulse is switched off.

The use of rugged tube technology and minimising of semiconductors in the power stage leads to a robust pulse generator which is tolerant to short circuits and arcs to a far extend even without operating short circuit detection. short circuit currents are limited to 100 A. The pulse generator is conformal to the laws of electromagnetic compatibility (EMC). the tube cabinet is shielded by 1mm lead foil; the provisions of the german x-ray law Anlage III Abs. 5 are fulfilled. Please consider that due to local laws a license for operation of this unit may be necessary, as this unit is a potential x-ray hazard.

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