

Pulse Generator RUP6-10

Rossendorf Universal Pulse Generator

- True square wave pulse with active switching off
- Arbitrary pulse width
- rise time ~100 ns
- frequency up to 3 kHz
- voltage up to -10 kV
- peak current up to 40 A
- short circuit proof

The RUP6 is a new universal solid state pulse generator which may be constructed for voltages up to 60 kV.

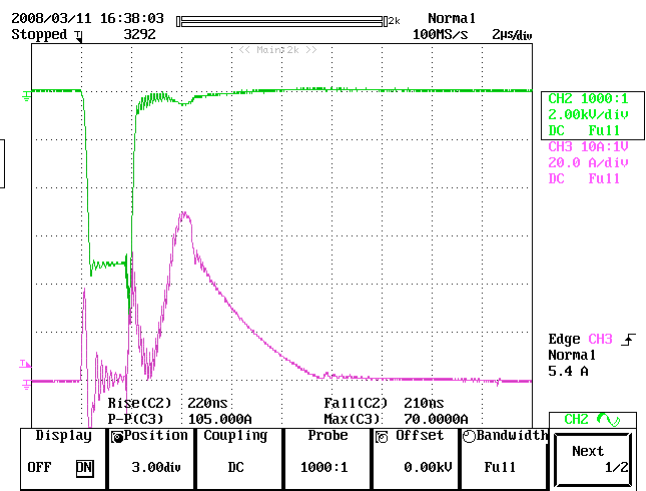
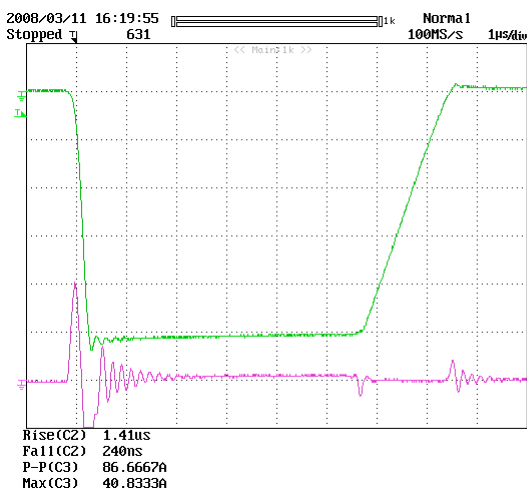
Prominent features are high pulse current, very high efficiency, scalability of the voltage and an ultra fast switching off in case of arcs.

The RUP6 consists of numbers of 1 kV pulse modules which are charged in parallel and are switched in series during pulse. Power supply and modulator are integrated within this principle.

An advantage compared to tubes is the much easier scalability for higher or lower voltages.

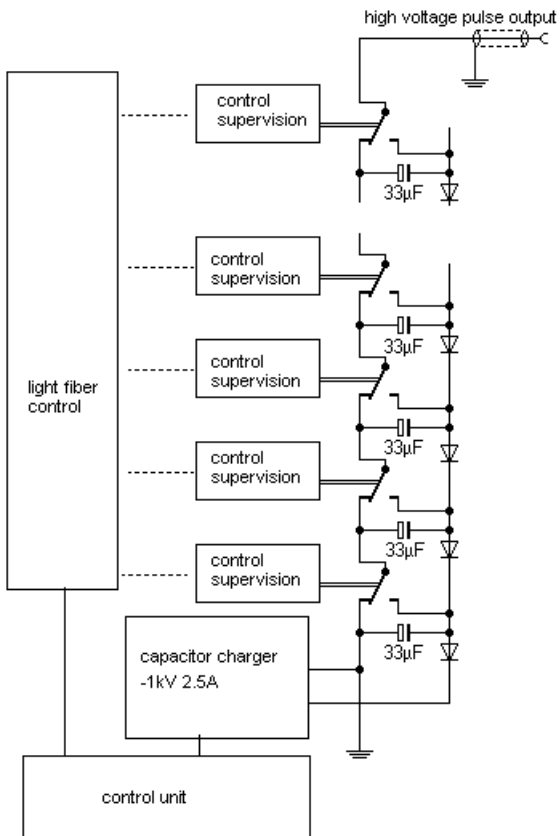
Absolute synchronous switching of all modules is not necessary with this principle, even failure of complete modules will only lead to decreased output voltage but not to total destruction.

The realization was done entirely with standard electronic components, therefore fascinating economic manufacturing.



On the left pulse waveform with load 3.3 kOhm and 10 kV amplitude, on the right with amplitude adjusted to 7kV and arc after 2µs.

Technical Data



principal scheme of RUP6

Current and Voltage

- output impedance about 15 Ohm, corresponding to 1.5 Ohm per module.
- internal pulse capacity about 3.3 µF, corresponding to 33 µF per module.
- peak current 44 A. Overcurrent for more than 2 µs will activate short circuit switch off. The inherent short circuit current limit is about 100 A. An Arc (sudden short circuit within a pulse) will initiate switch off within 100 ns
- average current 250 mA max.
- maximum output pulse voltage -10 kV
- maximum output power 2.5 kW, decreasing with duty cycle. $P_{out} = P_{max} * (1 - \text{frequency} * (\text{pulse width} + 150\mu\text{s}))$

Wave Form and Frequency

- square wave with variable pulse width and variable frequency
- rise time about 200-300 ns
- fall time 3 µs maximum, eventually faster depending on load.
- pulse width 0.5 µs - 100 µs, using external control or computer control also longer. Principally the internal pulse capacitor should

not discharge more than 10 % of the maximum rated voltage.

- Duty cycle can be chosen nearly arbitrarily, it has only to be noted that maximum possible output power will decrease to zero when the duty cycle is approaching 100%, as the internal power supply is off during pulse and starts again after end of pulse with a 150µs delay.
- maximum frequency 3 kHz (in burst mode, 10 kHz may be possible)
- control of voltage, pulse width and frequency by potentiometers on the front or alternatively by computer control via RS 232 interface. Pulse control may also be done by external TTL signal at the control input at the front.

Mechanical, included items

- rack, 600 * 550 * 860 mm
- grid supply 220-240V.
- output cable 3m RG11
- Internal controller, addressable by RS232, with the following functionalities:
 - programmable pulse generator
 - control of output voltage
 - wave form control (peak current, peak voltage)
 - generator state (OK/error)
 - Arc counter, pulse counter
- RS232 light fiber cable
- software for PC
- documentation

Safety

- external interlock
- a fast short circuit detection protects the pulse modules from damage by short circuit or arcing in the load.
- short circuit currents are inherently limited to about 100 A.
- The pulse generator is compatible to regulations about electromagnetic compatibility (EMV).

All given data and parameters are by best knowledge. Changes may be reserved.

30.05.11 Dr. Jörg Brutscher