

# RUP6-17CL

Improved pulse generator for high power resistive loads

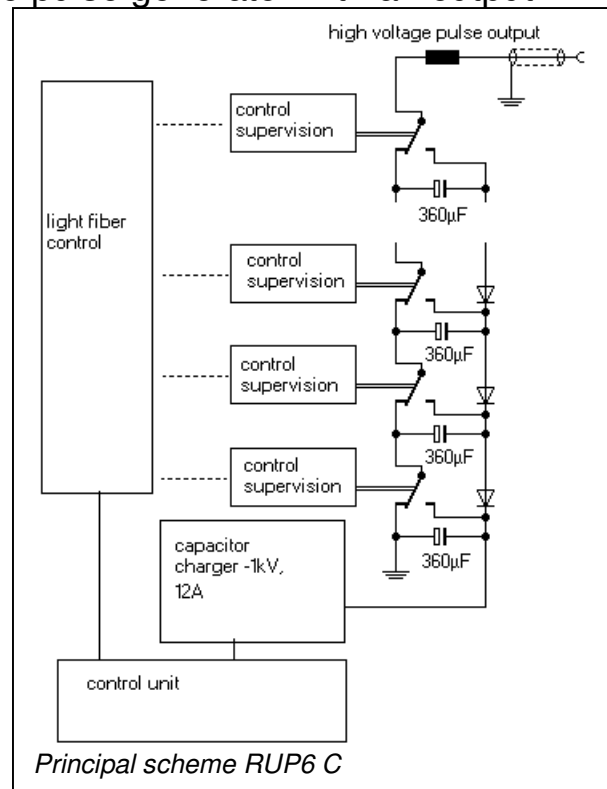
- True square wave pulse with active switching off
- Arbitrary pulse width
- rise time adjustable in the range 0.3...3 $\mu$ s
- frequency up to 2 kHz
- voltage up to -17 kV
- pulse current up to 200 A
- average power up to 12 kW
- short circuit proof

The RUP6-17CL is an universal solid state pulse generator with an output voltage up to -17kV, which also may be constructed for other maximum voltages in the range 1 - 40 kV.

The version „C“ stands for very high average power and pulse current, „L“ is developed from the standard version for decreased switching losses due to a small output inductor and adjustable rise time.

Prominent features of the RUP6 in general are high pulse current, very high efficiency, scalability of the voltage and 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 the modules is not necessary nor desired with this principle, stepwise switching for fine adjustment of rise time even a feature.



## Technical data

### Current and Voltage

- maximum output pulse voltage -17 kV
- maximum output power 12 kW, decreasing with duty cycle.  $P_{out} = P_{max} * (1 - \text{frequency} * (\text{pulse width} + 150\mu\text{s}))$
- Output impedance around 7 Ohm, corresponding to 0.4 Ohm per module. In series to this is an inductor of 15μH.
- Internal pulse capacity around 21μF, corresponding to 360μF per module.
- Maximum peak current 200 A, overcurrent for more than 1μs activates short circuit switch off. The inherent peak short circuit current (at maximum voltage) is around 270A. An Arc (sudden short circuit within a pulse) will initiate current limiting within 80 ns and switch off after 700ns.
- RMS current up to 12A allowed.
- Maximum average current around 700 mA.

### Wave Form and Frequency

- Trapezoidal pulse with variable pulse width, frequency and rise time.
- Rise time adjustable in the range 0.3 ... 3μs.
- Fall time is just the double of the rise time. Internally the ratio of rise to fall time can be adjusted in the range 1:1 to 1:3.
- Adjustable pulse width 0.5 μs - 100 μs, using external control also longer. Principally the internal pulse capacitor should not discharge more than 10% of the maximum rated voltage (1.7kV in this case). Without load, pulse width up to 2 seconds is possible.

- Duty cycle can be chosen nearly arbitrarily, it has only to be noted that the maximum possible output power will linearly decrease with increasing duty cycle. The reason for that is that the internal power supply is off during pulse and up to 150μs after pulse.
- Maximum frequency 2 kHz at full voltage and with a maximum capacitive load (including cable capacity) of 0.5nF. With larger capacitive load and maximum voltage the frequency may have to be reduced.
- Control of voltage, pulse width, rise time and frequency by potentiometers on the front. Pulse control may also be done by external TTL signal at the control input at the front.

### Mechanical, included items

- 19" rack, 800 \* 553 \* 1850 mm (38HE)
- grid supply 3\*400 V.
- monitor outputs for voltage and current.
- Meters for module voltage and average output current.
- 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 270 A.
- The pulse generator is compatible to regulations about electromagnetic compatibility (EMC).

14.06.13 Dr. Jörg Brutscher