

RUP8-3x30kV

High voltage pulse generator for up to 90 kV

- True square wave pulses with active switching off
- Pulse width up to 1s almost completely freely adjustable
- Rise time 2.5kV/ μ s
- Pulse-frequency up to 100Hz
- Voltage up to 90 kV
- Peak pulse current up to 1A, short circuit proof
- Very compact and economical design

Gefördert durch:



Bundesministerium
für Wirtschaft
und Energie

aufgrund eines Beschlusses
des Deutschen Bundestages

The RUP8 universal pulse generator has been designed for very high output voltages up to 90kV while maintaining an economical and compact design. The RUP8 generates positive square-waves which are preferably for operation on high-impedance loads with low capacitances, so for example at electrostatic coating processes.

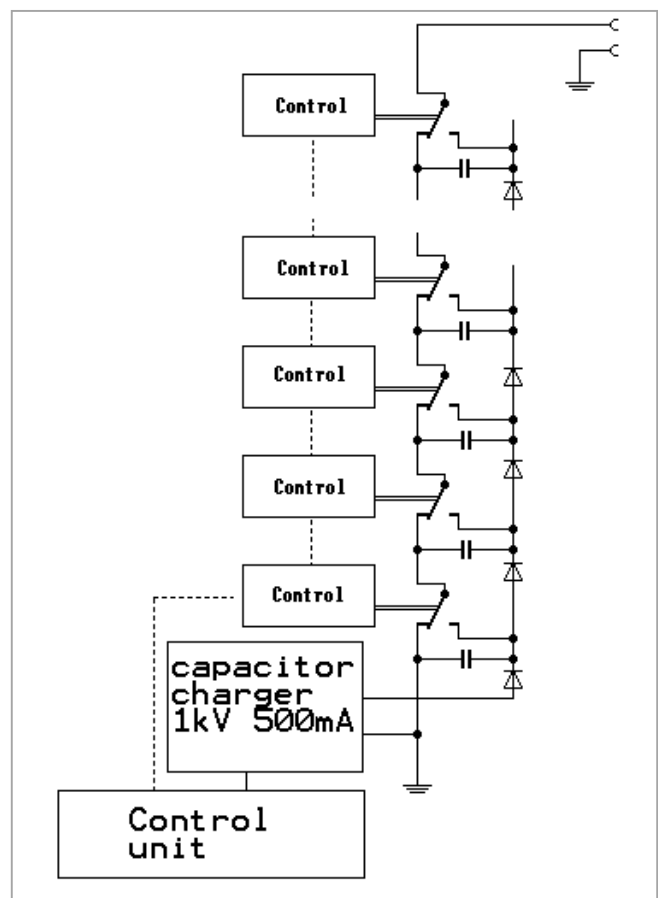
The device is divided into two parts. A control unit which provides the adjustment of all necessary parameter and up to three semi-open cascades, generating the high voltage.

The semi-open cascade was designed to be used in high-voltage protection areas.

Comparable to a Marx generator, many capacitors are charged in parallel up to 1000V to connect them in series for the duration of a pulse. This is realized with MOSFET-half-bridges.

The individual stages do not switch simultaneously but transmit the control signal from stage to stage with a time offset of approx. 400ns. The output currents are electronically limited, overcurrent shutdown is staggered over the time.

The components of a cascade are complete realized in SMD-Technology. The necessary energy for switching the stages is supplied by an auxiliary converter during the pulse pauses. This limits the maximum pulse duration and the duty cycle. The control unit is optionally equipped with a remote-control interface. It is possible to switch the high-voltage on or off, to adjust the frequency and duty cycle from a distance up to 30m. The set values are shown on a display.



Technical Data RUP8-3x30kV

Current and voltage

- Maximum output voltage up to 90kV
- Output impedance approx. 850Ω.
- Internal pulse capacity approx. 34nF.
- Peak current up to 1.2A.
Note: A higher current for more than 2μs activates the short circuit shutdown. The peak short-circuit current at maximum voltages is 5A. In case of arcing, it can be up to 9A.
- Average output current → up to 5.3mA
- Maximum output power 500W, decreasing with increasing duty cycle.
$$P_{out} = P_{max} \cdot (1 - v + f \cdot 150 \mu s)$$

(v = duty cycle)
- Maximum load capacity: ~400 pF

Waveform and frequency

- Square wave pulses with variable frequency and pulse width.
- Rise time without load approx. 31μs, fall time without load approx. 24μs
- Pulse width: 31μs - 1000μs (without load, the pulse voltage can drop by approx. 4.5% within 1s.)
- The duty cycle may be in the range of 0 ÷ 75%
Note: The output power decreases linearly with increasing the duty cycle.
- Maximum Pulse-Frequency 100Hz

Technical Data RUP8 general

Current and voltage

- Output peak voltage up to 90kV can be realized in 3 kV steps. 3 stages of 1kV each are realized in one module, a maximal of N=94 steps are possible to compensate voltage drops.
- Output impedance about 9Ω per stage, total impedance is N x 9Ω.
- Internal pulse capacitance 3.25μF per stage, i.e. 3.25μF /N.
- Rise and fall time about N x 0.4μs
- Maximum frequency is fixed at 100Hz.

Higher frequencies depending on maximum number of modules and application possible on request.

- Maximum average output current 500mA / N.
- Maximum output power 500W, decreasing with increasing duty cycle.

Approximate formula:

$$P_{out} = P_{max} \cdot (1 - v + f \cdot 150 \mu s)$$

- Maximum load capacity ~400pF; max. peak current at short circuit 4A, independent of the number of stages.
- Control of voltage and internal pulse generator (frequency and duty cycle) optionally via 10-turn front panel potentiometer or (0 ÷ 10) V control inputs, optionally an external pulse generator can be used (BNC input, TTL/CMOS level up to 15V).

Mechanical Items

- Control unit 19" Rack, 5HE (483 x 503 x 222) mm
- Cascade (H x W x D in mm)
660 x 254 x 330 for 30kV
970 x 254 x 330 for 60kV
1280 x 254 x 330 for 90kV
- Connection cable control unit . cascade 3m
- Remote control (optional)
- Supply voltage 230 V_{AC}.
- Monitor output for voltage and current.
- Displays for module voltage and output peak voltage and average power supply current.

Safety

- External interlock
- Fast overcurrent detection protects the switching stages as far as possible against short circuits and flashovers.
- As short-time transients, flashover currents are limited to a maximum of 9A.
- Limitation of pulse frequency, pulse duration and duty cycle.