

Data Sheet no. 3.11/5

Impulse Voltage Generators

100 kV up to 1200 kV – Series L

Brief Description

The impulse voltage generators / series L are the main component of impulse voltage test systems, series L (s. Data Sheet 3.10), ranging from 100 kV to 1200 kV cumulative charging voltage.

They are designed for testing high voltage equipment of power systems with lightning (LI: 1.2/50 μ s) and switching (SI 250/2500 μ s) impulses according to the IEC standard 60060-1 (IEEE St.4). The maximum charging voltage is 100 kV per stage with a maximum energy of 5 kJ / per stage. This corresponds for 12 stages to maximum output voltages of 1150 kV (LI) and 900 kV (SI) in the no-load case.

The generators can be modified for carrying out a variety of special tests, e.g. on transformers, impulse current testing of surge arresters as well as EMP tests of electrical equipment. The chosen modular system enables a very variable application in industries as well in laboratories for research and education.

The circuit of the impulse generators is the Marx multiplier circuit. The impulse capacitors, arranged in the stages of the generator are charged in parallel with DC voltages up to 100 kV against earth potential and, in order to generate impulses, connected in series by spark gaps. For the adjustment of the front time and time to half value of the test impulse, the generator stages comprise front resistors and tail resistors. A short discharge loop guarantees low internal inductances and smooth voltage shape.

The impulse generator is constructed in five-column design. All of these columns are made of glass-fiber reinforced plastic support; three of them serve as supports for the impulse capacitors in the generator stages. All necessary front and tail resistors are arranged between one of the three columns and a fourth column. At the fifth column the fixed sphere gaps and the charging resistors of each stage are arranged. The movable sphere gaps are fixed together at a vertically arranged insulating bar which can be horizontally moved for adjustment of the gap distance with the help of a motor drive on earth potential.

The five insulating columns are placed on a common sectional steel base which is designed either as stationary or as a mobile type, the latter having rollers or receptacles for air cushions.

Electrical main parameters

Stage energy ¹⁾		2.5 kJ		5 kJ	
Total charging voltage	Number of stages	Total charging energy	Impulse capacitance	Total charging energy	Impulse capacitance
kV		kJ	nF	kJ	nF
100	1	2.5	500	5	1000
200	2	5.0	250	10	500
300	3	7.5	167	15	333
400	4	10.0	125	20	250
500	5	12.5	100	25	200
600	6	15.0	83	30	167
700	7	17.5	71	35	143
800	8	20.0	63	40	125
900	9	22.5	56	45	111
1000	10	25.0	50	50	100
1100*	11	27.5	45	55	91
1200*	12	30.0	42	60	83
Min. time difference between impulses		20 s		40 s	
Capacitors per generator stage		1 x 0.50 µF/100 kV		1 x 1 µF/100 kV	

*) Only stationary

¹⁾ Other stage energies resp. other min. time difference between impulses on request.

Type designation

IG a/b L

a = total charging energy in kJ
= stage energy in kJ x number of stages

b = total charging voltage in kV

Example: IG 40/800 L

Impulse generator

40 kJ, 800 kV, series L

Main parameters

total charging voltage: 100 to 1200 kV

total charging energy: 2.5 to 60 kJ

stage charging voltage: 100 kV

stage energy: 2.5, 5.0 kJ

Number of stages: 1 to 12

Dimensions, Weights

Total charging voltage	Number of stages	Height H installation	Base frame Length x Width L x B mm		Weight ²⁾ kg	
			2.5	5	2.5	5
kV		mm	Stage energy kJ		Stage energy kJ	
100	1	1050	1060 x 835	1425 x 835	252	327
200	2	1390			313	423
300	3	1730			375	520
400	4	2070			436	616
500	5	2410			498	713
600	6	2750			560	810
700	7	3090			621	906
800	8	3430			683	1003
900	9	3770			744	1099
1000	10	4110			806	1196
1100*	11	4450			868	1293
1200*	12	4790			929	1389

* only stationary

²⁾ with resistor set for LI 1.2/50 µs

Safety clearance D (see dimensional drawing):

D is approximately height H / 2.

Please note:

D depends on wave shape (LI, SI,..), dimension of top electrode and dimension of test hall.

Mobility:

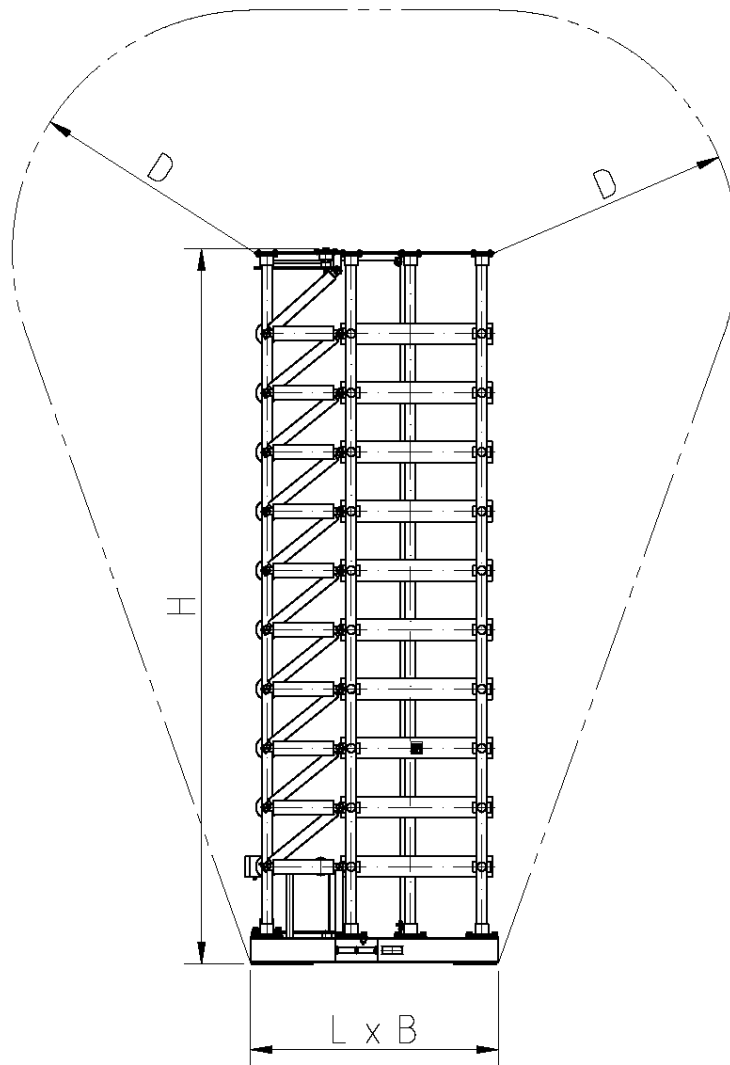
Impulse generators with voltages from 100 to 1000 kV are moveable as option.

Impulse generators with voltages for 1100 and 1200 kV are only stationary systems.



Fig. 1:
Impulse voltage test generator IG 10/500 L

Dimensional drawing



Accessories on special request:

- set of resistors for switching impulse test of transformers;
- air cushions for the impulse generator to move it on smooth horizontal floor (up to 1000 kV);
- rollers for the test generator, in order to move it by hand with a dirigible shaft (up to 1000 kV);
- additional resistors and inductances (Glaniger coils, Data Sheet 3.32) for the lightning impulse voltage test of transformers;
- reactors for the generation of oscillating lightning and switching impulses and switching impulses, e.g. for the on-site testing of SF₆-switchgear (Data Sheet 8.50);
- reactors for the generation of impulse currents, e.g. for the testing of surge arresters and components of lightning protection or for the generation of impulse magnetic fields;
- weather-protecting hood for a limited out-door installation of the generator outdoors;
- the generator can be equipped with a motor driven earthing rope, which additionally short-circuited all impulse capacitors after the generator is switched off;

For further information please contact:

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