

Data Sheet no. 3.31/4

Overshoot Compensation for Tests with Lightning Impulse Voltage

General remark

HIGHVOLT impulse generators have a very low internal inductance. Therefore, the overshoot compensation is only necessary if the external conditions cause an unacceptable overshoot.

A maximum overshoot of 5 % is admissible for the test voltage for high-voltage testing with lightning impulses, according to IEC Standard 60060-1:1989. For certain test conditions it is difficult to fulfil this limitation. These conditions are mainly:

1. The testing with ultrahigh voltages requires longer distances between the items of the test system which leads to a comparably high circuit inductance.
2. A test object with high capacitance requires low values of front resistors (to keep the rising time T_1) which increase the tendency of oscillations in the circuit.

Certain additional measures are possible to reduce the overshoot of the output lightning impulse voltage. These circuitries are summarized under the term of "overshoot compensation". When all possible measures to limit the self inductance of the test circuit are carried out as according to the HIGHVOLT design, an additional extension of the capacitive load range can be reached by the so-called overshoot compensation.

Principle

The overshoot compensation consists of an additional RLC arrangement in the test circuit. Basically, two arrangements are possible, either a parallel connection forming parallel overshoot compensation or a series connection forming a series filter.

A) Parallel Overshoot Compensation

The principle of the parallel overshoot compensation is shown in Fig. 1.

This solution, preferred by HIGHVOLT, is easier to handle. The overshoot compensation has a similar mechanical arrangement like an impulse voltage divider. It can easily be moved to the test object and has to be connected in parallel. No additional rearrangement of the impulse generator is necessary. No heavy weight elements have to be implemented between the impulse generator and the test object.

Remark

The parallel overshoot compensation must be well adapted to the test generator, the inductance of the test object and the test arrangement. Based on these data, HIGHVOLT is able to optimise the parallel overshoot compensation up to the highest test voltages (see Fig. 2).

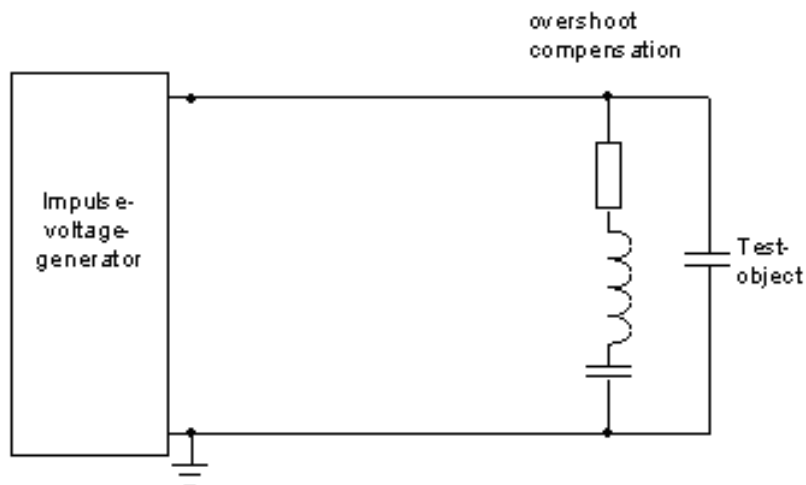


Fig. 1: Parallel overshoot compensation



Fig. 2: Parallel overshoot compensation in front of impulse voltage generator

B) Overshoot Compensation with external Resistors

Overshoot can also effectively be compensated by using adapted external front resistors, which will be arranged between the impulse generator and the test object. Additionally, the internal front resistors within the impulse generator have to be adapted for the test object. This solution is especially suited, if the distance between test object and impulse generator is quite large. Furthermore, the adaptation to different load cases is also possible with less effort in comparison to the parallel compensation.

For further information please contact:

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