

## When the EMV- test concerned IEC 60601-1-2 and EN 61000-4-11 is failed??

Some Electrical and Electronically Equipment and the most of medical-Equipments must be tested with a voltage dip of 10 msec. duration, correspond EN 61000-4-11. (EN 61000-4-11 is included into the IEC 60601-1-2.) Medical Equipment with transformers must withstand this test, without any failure.

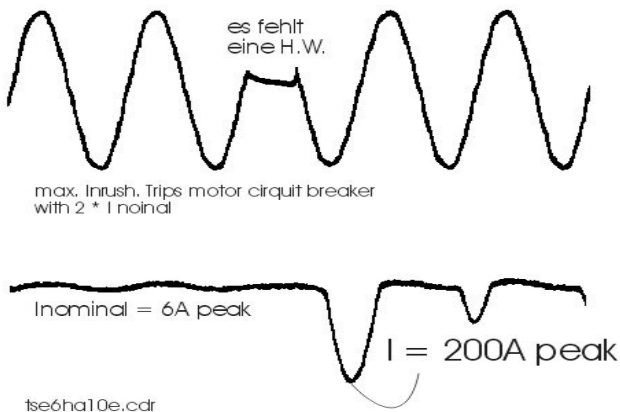


Also a fuse with a value of 3 times the nominal current trips after this test, when a transformer is inside the equipment. Ordinary Inrush current limiters can not react as fast enough of this short voltage dip, and the limiting element stay bridged or hot when a NTC-resistor is used.

Graph 1 is measured without any current limiting element in front of the transformer.

Half cycle missing test  
on a welded 1kVA EI Transfo  
with 1 kW ohmic loaded

(Soft characteristic Transformer)



Graph 1 shows a typical tested „Voltage Dip“.

This behaviour of a transformer is relatively unknown.

The Graph 1 was measured without a “Transformer Switching relay”, see Picture 2, in front of the transformer. The curve ahead shows the interrupted line voltage at the transformers primary side. The curve above shows the current peak that follows to the voltage dip and is drawn from the transformers primary side.

The duration of the voltage dips is only 10 msec.

This can also happens by a failure in the ordinary voltage grid. The transformer gets here two times the same polarized voltage-time area. That leads to the core saturation and to a big current impulse, higher than by normally switch on. Tested with an Toroidal core 1kva Transformer, the current peak will rise to 400 Amp peak. No fuse can withstand that.

## But the voltage dip test will be passed and the transformer fuse not trips,

if a transformer switching relay,- TSRL-, see above Picture 2, is connected in front of the transformer.

With a patented switch on procedure, are inrush current peaks avoided in all circumstances, also after voltage dips.

Picture 2 shows a “Transformer switching relay” –TSRL-, from the producer FSM-Elektronik.



Attention:

In the past, elderly Voltage dip simulators, can not deliver the high inrush currents, drawing from a toroidal transformer, after a voltage dip, who can lead to the trip of the fuses.

The tested equipment therefore appears to withstand this test, because the fuse does not trip.

Novel Simulators can deliver such high current peaks and can trip the transformer fuses.

Further informations see:

[www.emeko.de](http://www.emeko.de) Or

[www.transformerinrush.com](http://www.transformerinrush.com)