Using the surge wave generators

SWG

Benefits:

- **Surge generators for most voltages and output up to 3500 J**
- **Optimized surge energy for switchable capacitors**

sebaKMT

Using the surge wave generators

Together with reflectometers, surge generators are the central component for cable fault location. They are used for both prelocation and also pinpoint location.

Prelocation

Prelocation can be divided into transient methods and Arc reflection prelocation, which differentiates between passive, semi-active and active methods.

ICE – Impulse Current Method (ICE-Method = Impulse Current Equipment)

This method is ideal particularly for fault location in long ground cables and wet splices.

The surge wave generator ignites an arc at the fault. This results in a transient, i.e. a spreading and repeatedly reflected travelling wave between the fault and the surge wave generator. An inductive coupler records this transient wave with a reflectometer, the **Teleflex**. The length of one full oscillation wave corresponds to the direct distance to the fault.

A coupler for recording the transient current wave is fitted as a standard feature in all surge wave generators with a surge energy of 1000 J or more.

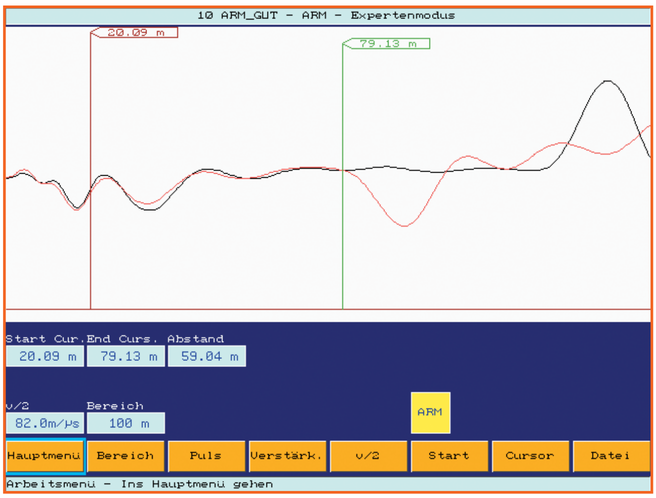
ARM – Arc Reflection Method (HV-supported reflection method)

All reflection prelocation methods offer the advantage of a very detailed measurement result corresponding in principle to the picture of a normal reflection measurement. So these are the preferred fault location methods. Differences arise with the different technologies, which can have a relatively simple structure resulting in weight advantages. More complex technologies are more efficient, but also have to be integrated in a measuring system.

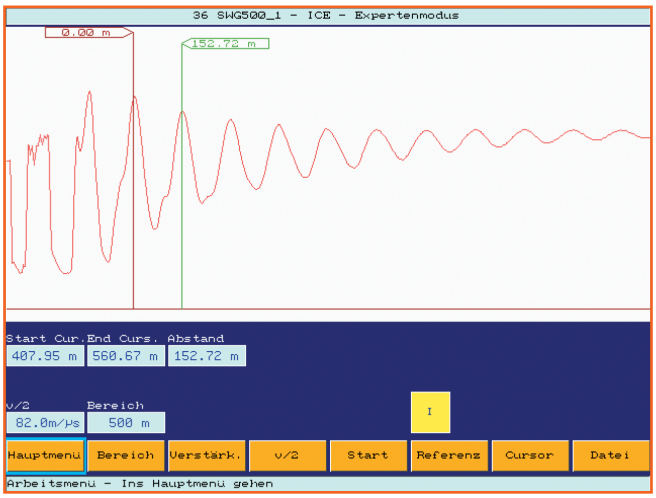
The simplest method is the **passive** ARM method (used to be called arc stabilization or short-term arc method). This extends the discharge of the surge generator and with it the burning duration of the arc by means of a series resistor in the discharge path.

In the **semi-active** ARM method, the discharge is extended by an inductivity. Use of inductivity means that the level of voltage is not affected, making it much easier to locate faults also with a high ignition voltage.

With the LSG 3-E, SebaKMT offers an **active** ARM method with an integrated 2 kV surge unit for excellent extension and stabilization of the arc. At the same time, this device permits an independent use as a 2 kV prelocation and surge unit.



Teleflex picture of the ARM method



Teleflex picture of the ICE method (current decoupling)

SWG

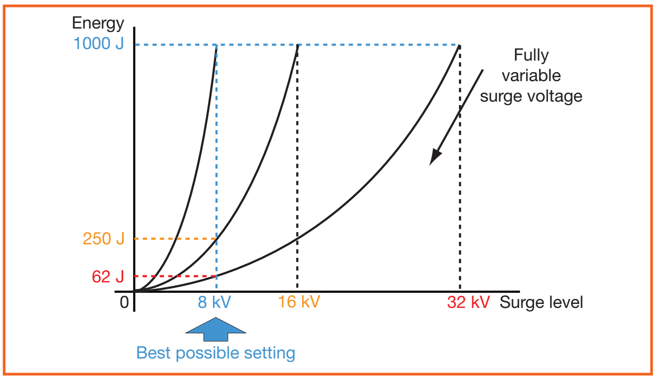
Pinpoint location

For a precise location of the fault it is essential to confirm its position along the cable, because pre-location with the Teleflex only visualizes the absolute distance. But the position and path of the cable in the ground, and thus the actual position of the fault, is only relatively inaccurately known. An absolutely precise pinpointing is necessary to limit expensive excavation work and resulting surface damage to an absolute minimum.

Here, a direct discharge of the surge generator produces an arc at the fault position. The direct connection means that this discharge takes place very quickly, generating a loud flashover sound which can be located without any problems using a corresponding acoustic receiver at the surface, such as the **Digiphone**.

It is important to always use the maximum available surge energy, given the proportional behaviour of volume and discharge energy. All **SebaKMT SWG** surge wave generators have switchable surge stages.

The basic equation of the surge energy is: $W = 0.5 \times C \times U^2$



Example with a required surge voltage of 8 kV: The full 1000 Joule surge energy is obtained with 100% surge voltage in the 8kV surge range. A setting of 25% surge voltage in the 32 kV surge range (kV) would be useless, producing only 62 Joule surge energy.

Therefore it is always recommended as follows: First select the optimum range, i.e. the lowest necessary voltage level, and then adjust the SWG to the maximum possible voltage. This is the only way to guarantee the maximum energy and sound at the arc. If only half the voltage range is used, then only one quarter of the surge energy is available.

Modell	Range n	Voltage kV	Energy Joule	Cap. µF	Voltage adjustable	Cycle Single imp	I_{max} mA	Dimension W x D x H	Weight kg
SWG 505	I II III	3 4 5	180 320 500	40	no	1.5 … 6 yes	129 172 213	520 x 255 x 530	43
SWG 500	I II	0 … 2.5/5/10 0 … 4/8/16	195 500	62.5 15.6 3.9	yes	1.5 … 6 yes	185 300	520 x 280 x 530	47
SWG 8-1000	I II III	0 … 2 0 … 4 0 … 8	1000 1000 1000	500 125 31.5	yes	2 … 6 yes	1400 700 500	520 x 270 x 670	70
SWG 1000 C-1	I II III	0 … 8 0 … 16 0 … 32	1000 1000 1000	31.2 7.8 2	yes	2.5 … 10 yes	210 105 53	520 x 430 x 630	106
SWG 1750 C **SWG 1750 CI ***	I II III	0 … 8 0 … 16 0 … 32	1750 1750 1750	54.4 13.6 3.4	yes	2.5 … 10 yes	210 105 53	520 x 430 x 630	97
SWG 1750 C-4 **two-part**	I II I II III	0 … 2 0 … 4 0 … 8 0 … 16 0 … 32	1150 1150 1750 1750 1750	566 142 54.4 13.6 3.4	yes	2.5 … 10 yes	3650 1850 210 105 53	520 x 430 x 630 520 x 430 x 460	104 + 69
SWG 1750 CD **two-part** **3500 Joule**	I II III	0 … 8 0 … 16 0 … 32	3500 3500 3500	109 27.2 6.8	yes	2.5 … 10 yes	210 105 53	520 x 430 x 630 520 x 270 x 410	99 + 30

* including leakage current measurement

We are happy to provide you with information!

Digiphone – receiver for combined acoustic and electromagnetic pinpoint location

The Digiphone works according to the principle of the coincidence or difference method. It automatically measures the time differencebetween the electromagnetic signal of the surge voltage and the acoustic bang of the arc flashover.

The Digiphone operates like a stopwatch. The electromagnetic pulse starts a counter and the much slower propagating sound stops the counter afterward. The displayed time, or the time difference between the sound and the magnetic pulse, corresponds to the distance to the fault. The shorter the time, the closer you are to the fault. The display shows the difference in time as a numerical value, while a bar graph shows the electromagnetic field strength. The field strength display also acts as a locating facility of the cable position. The bar graph display is broken down into individual segments to permit a very accurate definition of where the cable is running. As long as you keep your bearings on this maximum, your longitudinal axis is already exactly on top of the cable. As a result, the position over the cable is so precise that you almost cannot miss the fault, even when faults are very difficult to hear.

This location principle also works for secondary noises and is particularly useful in situations where cables are installed in protective ducts or under solid road surfaces (concrete, asphalt, etc.).

SWG and Digiphone

Fault location with SWG and Digiphone

Our range of products: Equipment and systems to locate faults in power and communications networks, as well as for leak location on pipe networks · line location equipment · seminars · service · contracting.

We reserve the right to make technical changes.

ISO 9001:2000

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