

Efficient work with
maximum safety for
your staff and equipment



Safety optimized tools for the
efficient maintenance and
service of electrical networks

sebaKMT

Knowing how it works - and what happens next.

Safety first!

Working safely on the grid



The service and maintenance of electrical grids must often be carried out on-site, in the immediate vicinity of cables and distributors. Unfortunately, the condition of the object is not always reliably recognised.

Despite complying with regulations, there is no absolute safety whether a cable or other system component is live or has a residual charge. Certain types of work can only be performed under voltage. The risk that this poses for persons and equipment is well known.

SebaKMT's safety-optimised tools constitute a responsible precaution – at the highest technical level.

Comprehensive, simple, reliable: Tools optimised for safety by SebaKMT.

► Comprehensive

The tasks involved in servicing and maintaining your network are diverse and require specialised solutions. As the world's leading designer and manufacturer of measuring equipment for power and communication networks, we develop small, easy-to-use equipment and systems that are optimised for safety.

Applications:

- Cable identification
- Troubleshooting
- Phase identification
- Phase selection
- Sheath testing and sheath fault location
- Reflection measurement

► Easy

SebaKMT solutions are characterised by simple and intuitive user guidance. This not only contributes to the increased efficiency of personnel, but actively improves the personal as well as the technical safety in the execution of tasks.

► Safe

Equipment that is worked on whilst under voltage, whether this is intentional or not, requires a corresponding CAT classification in terms of VDE 0411/IEC 61010. All SebaKMT devices, as well as their connection technology, meet these safety requirements and CAT classifications.

► Reliable

SebaKMT devices stand for high quality workmanship and maximum service life. Should you nevertheless require assistance fast; the more than 130 SebaKMT service centres worldwide ensure that our support is close at hand.

Maximum safety: cable and phase identification



Easy to use - maximum safety!

Cable identification assists in precisely determining the correct cable, before carrying out the work, for example, before cutting a cable. In the past, incorrectly cutting of live cables has repeatedly resulted in accidents, sometimes with fatal consequences. Power failures as well as damage to the infrastructure were the result. In response, strict safety regulations have now been introduced in many countries. Even before these regulations, we were developing reliable and easy-to-use cable identification systems, which meet the highest safety requirements.

Cable identification using the current pulse method

When the current pulse method is used for identification, a strong pulse with a defined polarity is sent through the cable. Based on the knowledge of the pulse parameters, the identification signal is detected by means of a sensor. Kirchoff's law states that the same current is present throughout a conductor. Adjacent cables or wires show a reduced current with an opposite polarity, due to the branching of the individual currents. This is the basis on which SebaKMT cable identification

devices, such as the CI Cable Identifier, evaluate the measurements. Only the correct wire has the correct polarity and amplitude.



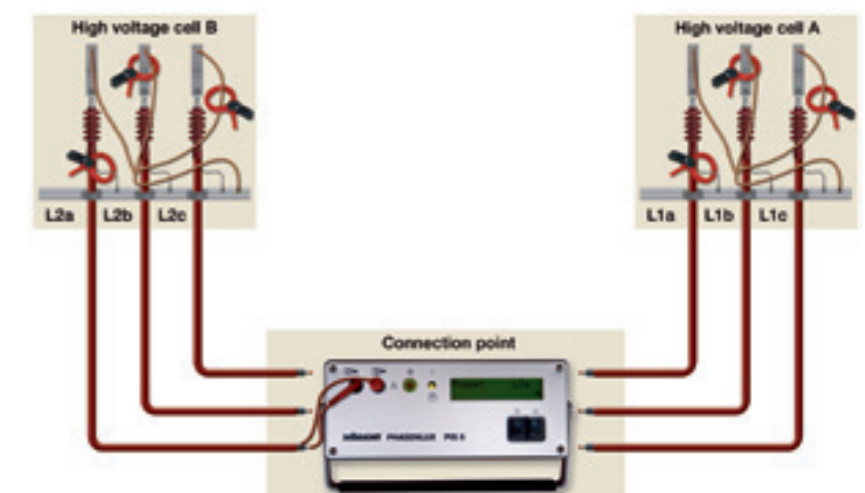
Safety without ambiguity

Our philosophy on the safety of phase identification is quite simple: Maximum safety! The regulation VDE 0105 Part 100/10/1997 states: "... Appropriate additional safety precautions must be taken, if the earthing or short circuit needs to be disabled for the duration of the measurement or test." The advantage of the SebaKMT method is that the earthing and short circuit, at the end of the cable, do not need to be removed for testing, as this technology functions only with the earthing or short circuit stalled. Accordingly, the personnel's maximum safety is always ensured.

Phase identification on the cable

A portable, battery-operated generator sends a frequency into the cable. This frequency inductively charges the identification clamps at the grounded cable end. As soon as there is

sufficient power, the clamps send a coded and correspondingly assigned phase signal through the wire. This is analysed by the receiver and displayed. Enabling the relevant wire and its phase to be uniquely identified.



Connection of the Phasenlux PIL 8 at the interface

Perfection in all aspects, large and small:

Phase identification on the cable and in the grid



Phase identification in the whole grid

Precise knowledge of the phase assignment within the network is an essential condition for its safe and reliable operation. This applies universally across all voltage levels. Phase identification on live systems is necessary, when restructuring or repairing the network, updating the documentation as well as for planning and setup of new network systems. The new PVS 100 system allows safe and easy verification of the phases on live systems, so that the phases can be reliably assigned and labelled. This prevents operating errors resulting in severe accidents.

The requirements for using the PVS 100 are a GPS signal for obtaining the precise timebase, a GSM connection for the communication between the base and mobile unit, and a base unit connected to a defined reference phase. Based on the GPS time, the phase tested is compared with the reference phase. The result is displayed immediately. Depending on the voltage level, the vector group is automatically integrated in the calibration procedure. One of the main advantages of SebaKMT technology is that it does not rely on the reception or quality of a signal.



The brief reception of a GPS or GSM signal is sufficient for a reliable identification of the phases. This ensures proper functioning, even within stations or when used underground.



Using the PVS 100

Locating earth faults in unearthed networks

Important industrial electrical systems, such as railways, hospitals, power stations and petrochemical plants, require fail-safe operation. This is achieved with unearthed wiring and systems for the power supply, as well as for control cables, signal and data lines. These systems are designed to be potential-free (as in an IT network) and monitored by earth fault indicators. In this case, a single-pole earth fault will not cause a service interruption or failure. Only if an additional earth fault occurs will the danger of a failure arise. Accordingly, earth faults must immediately be located and repaired.

The following is important in fault correction:

- No influence on active processes
- No disturbance in data or communication lines
- Direct, secure connection without switching off power
- Reliable function even with high fault resistances
- Ease of use

The Geolux GL 660 offers the simplest and quickest solution. The location method is devised so that an earth contact point

can be located, without causing an interruption. A low frequency signal is coupled directly to the wire affected by the earth fault. The integrated separation filter allows a direct galvanic coupling of up to 660 V. The electromagnetic field of this signal current is traced to the fault position with an inductive sensor.



GL 660

Maximum safety through cable fault prevention: Sheath testing and sheath fault location



Sheath testing and sheath fault location

Sheath faults generally precede a cable fault. Damaged sheaths allow water to penetrate into the cable, lead to a impaired insulation and to a cable failure. Accordingly, the location of sheath faults is one of the primary steps in preventative network maintenance. Wires in contact with earth also pose a potential danger to people and animals.

► Finding sheath faults Simple, precise, efficient

SebaKMT's product range

SebaKMT offers a wide range of products for sheath testing and sheath fault location.



MFM 10

Earth fault location device

► The method: Sheath testing

Sheath testing serves to ensure that the cable sheath is undamaged. The shield is tested with a defined voltage. If the leakage current exceeds a limit, a sheath fault is probable. To repair this, the fault must be prelocated or directly located in the next step.

► Sheath fault location using direct current

Prelocation

The MFM 10 prelocation employs a bipolar voltage drop method to determine the distance to the fault point. Prelocation considerably reduces the time required, as it eliminates the need to walk off the entire line distance.

Sheath fault pinpointing

In pinpointing, the exact position of the sheath fault is determined. A pulsed DC voltage is applied to the cable, which is then measured by step voltage sensors.

The direction of the fault location can be determined by the polarity. As the fault is approached, the voltage increases. The polarity of the voltage changes directly above the fault point.

Sheath fault location using audio frequency



The advantage of using audio frequency for sheath fault location, is that for a capacitive probe, no direct contact to the ground is required. Consequently, the user can move relatively quickly and freely. Prelocation and determining

the direction of the fault are not possible, but because of the high degree of mobility they are not necessary.

Fault pinpointing, without switching off the power and without contact with the cable

A cable fault burns insulating material, generating typical gases that quickly dissipate into the ground after the occurrence of the fault. The FaultSniffer is designed specifically for these combustion gases. A simple measurement with the press of a button, in the area of the fault, shows the concentration of the gas. The highest concentration indicates the location of the fault.



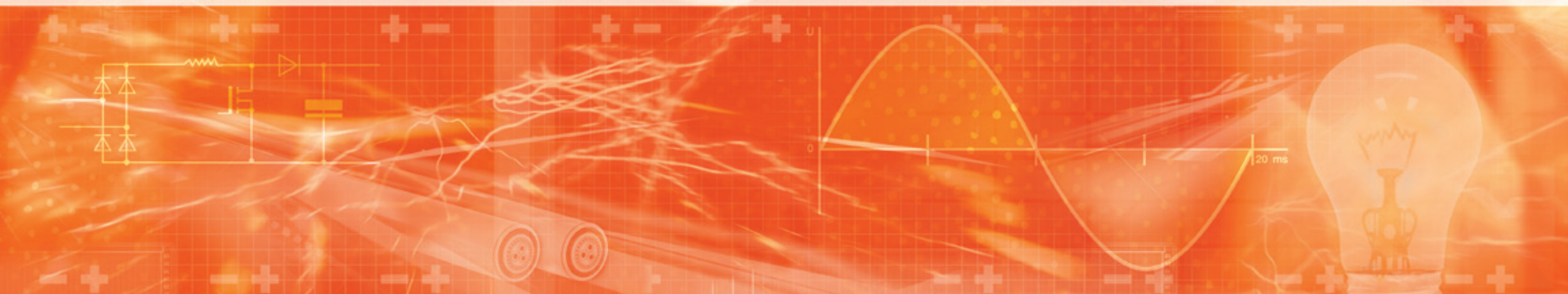
FaultSniffer



Using the FaultSniffer

This can be in the soil or under a sealed surface. There is no need to disconnect consumers or to perform a reflection measurement. Even inexperienced users can use this location method, as no electrical expertise is required. The accuracy is within the width of a spade.

Learn all there is to know about your cables: The reflection measurement



Reflectometer, the "all-rounder"

Basic uses

Reflectometers, aside from their use in troubleshooting, also provide information on the condition of cables. For example, the remaining length on a cable drum can easily be determined.

For simple applications, like length measurement, SebaKMT offers suitable devices such as the Miniflex or the Microflex.

Complex requirements

In cables used for the transmission of signals or data, assessments in respect of quality are often also required. This involves the measurement of cross talk and other values. Faults, due to improper installation for example, become visible immediately. For these applica-

tions, SebaKMT similarly offers extremely easy-to-use reflectometers, such as the Digiflex or the Easyflex.

The LV monitor also offers continuous monitoring, whilst measuring the voltage quality.



Digiflex COM



LV monitor

Its applications are:

- Distance and length measurement
- Fault location
- Qualitative assessments
- Comparative measurements
- Detection of illegally connected consumers

Safety

To protect them from external voltages, SebaKMT devices have an integrated or optional power filter that allows the operation on live cables.

Reflection measurement at higher voltages

For high voltage networks, there are special Teleflex devices. The information on these is contained in our cable fault location brochure.



ETF 3

Simply order it from your local SebaKMT sales representative, or go to: www.sebakmt.com



SebaKMT brochure on cable fault location



Countries with SebaKMT representatives

Expertise:

We are the world's leading developer and manufacturer of measurement equipment for diagnosing the condition of networks and locating faults. Our market sectors include power supply networks as well as communication and pipe networks.

Performance:

We concentrate on five areas: network condition analysis, cable fault location, leak location, sewer TV inspection and line location. We are therefore in a position to offer extraordinary expertise in each of these areas.

Availability:

SebaKMT has representatives in 130 countries worldwide with excellently trained staff and the most modern technology. This means we have the best service and support network in the industry. Wherever your international activities may lead you, we are there to serve you.

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