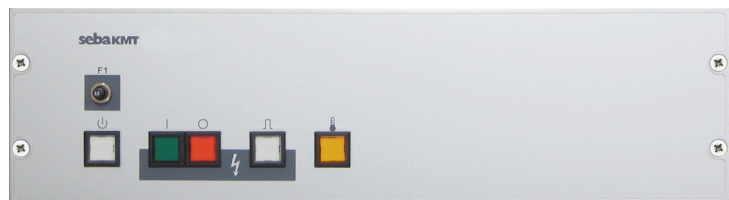


Operating Manual

Arc Stabilizing Unit ARM 3E 19"



Mess- und Ortungstechnik Measuring and Locating Technologies

Elektrizitätsnetze
Power Networks



Kommunikationsnetze
Communication Networks



Rohrleitungsnetze
Water Networks



Abwassernetze
Sewer Systems



Leitungsortung
Line Locating



Consultation with SebaKMT

The present system manual has been designed as an operating guide and for reference. It is meant to answer your questions and solve your problems in as fast and easy a way as possible. Please start with referring to this manual should any trouble occur.

In doing so, make use of the table of contents and read the relevant paragraph with great attention. Furthermore, check all terminals and connections of the instruments involved.

Should any question remain unanswered, please contact:

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SebaKMT warrant that at the time of delivery SebaKMT products are free from manufacturing or material defects which might considerably reduce their value or usability. This warranty does not apply to faults in the software supplied. During the period of warranty, SebaKMT agree to repair faulty parts or replace them with new parts or parts as new (with the same usability and life as new parts) according to their choice.

This warranty does not cover wear parts, lamps, fuses, batteries and accumulators.

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All warranty claims versus SebaKMT are hereby limited to a period of 12 months from the date of delivery. Each component supplied by SebaKMT within the context of warranty will also be covered by this warranty for the remaining period of time but for 90 days at least.

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This warranty does not apply to any fault or damage caused by exposing a product to conditions not in accordance with this specification, by storing, transporting, or using it improperly, or having it serviced or installed by a workshop not authorized by SebaKMT. All responsibility is disclaimed for damage due to wear, will of God, or connection to foreign components.

For damage resulting from a violation of their duty to repair or re-supply items, SebaKMT can be made liable only in case of severe negligence or intention. Any liability for slight negligence is disclaimed.

Since some states do not allow the exclusion or limitation of an implied warranty or of consequential damage, the limitations of liability described above perhaps may not apply to you.

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1 Safety Advices

1.1 General Notes

Safety precautions This manual contains basic instructions on commissioning and operating the ARM 3E system. For this reason, it is important to ensure that the manual is available at all times to authorised and trained personnel. Any personnel who will be using the devices should read the manual thoroughly. The manufacturer will not be held liable for any injury or damage to personnel or property through failure to observe the safety precautions contained in this handbook.

Locally applying regulations have to be observed.

Labelling of safety instructions Important instructions concerning personal, operational and technical safety are marked in the text as follows:

Symbol	Description
	Indicates a potential danger that may lead to fatal or serious injury.
	The notes contain important information and useful tips for using the system. Failure to observe them can render the measuring results useless.

Working with products from SebaKMT It is important to observe the general electrical regulations of the country in which the device will be installed and operated, as well as the current national accident prevention regulations and internal company rules (work, operating and safety regulations).

After working with the equipment, make sure to de-energise, protect against re-energising, discharge, earth and short-circuit the instrument and installations that have been worked on.

Use genuine accessories to ensure system safety and reliable operation. The use of other parts is not permitted and invalidates the warranty.

Operating staff This system and its peripheral equipment may only be operated by trained or instructed personnel. Anyone else must be kept away.

The system may only be installed by an authorised electrician. DIN VDE 0104 (EN 50191), DIN VDE 0105 (EN 50110) and the German accident prevention regulations (UVV) define an electrician as someone whose knowledge, experience and familiarity with the applicable regulations enables him to recognise potential hazards.

Repair and maintenance Repairs and service must only be done by SebaKMT or authorised service departments of SebaKMT. SebaKMT recommends having the equipment serviced and checked once per year at a SebaKMT service location.

SebaKMT also offers direct on-site support. Please contact our service office for more information.

1.2 General Cautions and Warnings


Intended application Safe operation is only realised when using the equipment for its intended purpose. Using the equipment for other purposes may lead to human danger and damage of equipment of involved installations.

The limits described under technical data may not be exceeded. Operating products of SebaKMT in condensing environment may lead to flash-over, danger and damage. The instruments should only be operated under tempered conditions. It is not allowed to operate SebaKMT products at direct contact with humidity, water or near aggressive chemicals nor explosive gases and fumes.

Behaviour at malfunction of normal operation The equipment may only be used when working properly. When irregularities or malfunctions appear that cannot be solved consulting this manual, the equipment must immediately be put out of operation and marked as not functional. In this case inform the person in charge who should inform the SebaKMT service to resolve the problem. The instrument may only be operated when the malfunction is resolved.


Five safety rules
 The five safety rules must always be followed when working with HV (High Voltage):

1. De-energise
2. Protect against re-energising
3. Confirm absence of voltage
4. Earth and short-circuit
5. Cover up or bar-off neighbouring energised parts



Using cardiac pacemaker

Physical processes during operation of high voltage may endanger persons wearing a cardiac pacemaker when near these high voltage facilities.



Fire fighting in electrical installations

- According to regulations, carbon dioxide (CO₂) **is required to be used** as extinguishing agent for fighting fire in electrical installations.
- Carbon dioxide is electrically non conductive and does not leave residues. It is safe to be used in energized facilities as long as the minimum distances are maintained. A CO₂ fire extinguisher must be always available within electrical installations.
- If, contrary to the regulations, any other extinguishing agent is used for fire fighting, this may lead to damage at the electrical installation. SebaKMT disclaims any liability for consequential damage. Furthermore, when using a powder extinguisher near high-voltage installations, there is a danger that the operator of the fire extinguisher will get an electrical shock from a voltage arc-over (due to the powder dust created).
- It is essential to observe the safety instruction on the extinguishing agent.
- Applicable is DIN VDE 0132.

**WARNING****Dangers when working with HV**

Special attention and safety-conscious behaviour is needed when operating HV facilities and especially non-stationary equipment. The regulations VDE 0104 about setting up and operation of electric test equipment, i.e. the corresponding EN 50191 as well as country-specific regulations and standards must be observed.

- The system generates a dangerous voltage of up to 4/12 kV during operation. This is supplied via a HV cable to the test object.
- The system may not be operated without supervision.
- Safety installations may not be by-passed nor deactivated.
- All metallic parts in close proximity of the test equipment must be earthed in order to avoid the build-up of hazardous electric surface charges.

2 Technical Description

2.1 Application

The arc stabilizing unit ARM 3E is designed for maintaining and stabilizing of an arc produced in at a high resistance fault, making a prelocation of such faults in power cables possible using conventional pulse reflection techniques in a standing arc. The arc can be ignited by means of a shock discharge generator. Here, surge voltages of up to 32 kV are permissible.

Since the usual high series impedance in the surge path is dispensed with, the excellent ignition characteristics of the shock discharge generator are not affected. This is of special advantage in the case of long, lossy or wet cables.

Even extremely long ignition delay times (up to 500 ms) do not pose a problem to the ARM 3E. The connected Time Domain Reflectometer (TDR) is always triggered at the right point in time through a trigger pulse from the ARM 3E.

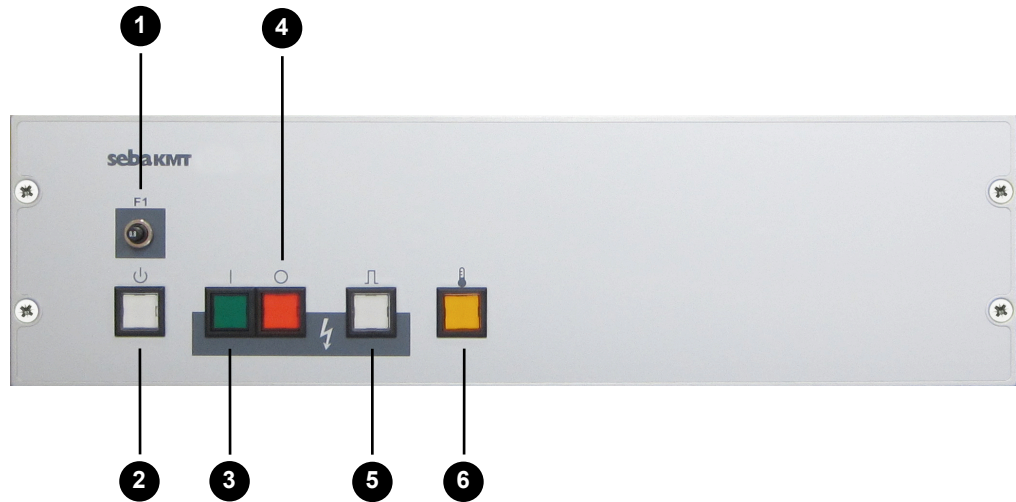
Ignition voltages up to 2 kV can be generated in the ARM 3E itself. Hence, when applying the arc reflection method in low voltage networks, the need for a separate shock discharge generator is dispensed with. This also precludes that a voltage of more than 2 kV is applied to the cable.

2.2 Technical Data

Parameter	Value
Max. voltage of the external surge battery	32 kV
Voltage of the internal surge battery	2 kV
Energy of the internal surge battery	640 Ws / 2 kV
Duration of stabilization	approx. 20 ms
Interval	20 s
Mains connection	110 V / 220 V / 230 V / 240 V 50 Hz / 60 Hz
Input	350 VA / 2 sec. 100 VA in the operational state "Ready for switching on"
Dimensions (L x W x H)	520 x 430 x 625 mm (+/- 1 mm)
Weight	47 kg

2.3 Indicators and Control Elements

The control panel of the ARM 3E is equipped with the following indicators and control elements:



Element	Description
①	Fuse
②	“ON/OFF” pushbutton
③	„HV ON“ pushbutton
④	„HV OFF“ pushbutton
⑤	“ARM SURGE” pushbutton (LSG button)
⑥	“OVERTEMPERATURE” pilot lamp

3 Test configuration / Instrument Requirement

For the application of the arc reflection method, apart from the ARM 3E one normally requires a shock discharge generator (SWG) whose output voltage can be controlled and a TDR.

As the ARM 3E is almost exclusively used as fixed installation in a test van configuration, the cabling to the surge discharge generator and the TDR is permanently installed. The connection to the object under test is done according to the instructions supplied with the test van.

4 Putting into Operation and Test Procedure

After completion of the setting up procedures of the test van and the selection of the phase to be tested, the operation mode is to be selected at the mains operation panel.

The ARM 3E is to be switched on by means of the "ON/OFF" pushbutton **2**. In this state, no surge can be triggered by the shock discharge generator or the ARM 3E.

The TDR has to be switched on and the "ARM" operation mode has to be started.

After the settings (e.g. V/2 and pulse width) have been adjusted, the measurement can be started. In a first step, the TDR records a reference trace (without arc) of the selected phase.

Afterwards, the TDR has to be switched to fault trace recording. The TDR is now armed for external triggering through the ARM 3E. The operator is asked to trigger a shot with the SWG.

For detailed information on how to operate the TDR, please refer to the respective operation manual.

Now, the ARM 3E is activated by pressing the key "HV ON" pushbutton **3**. After approximately 20 seconds, the interlock between the shock discharge generator and the ARM 3E is released which is then indicated by the "ARM SURGE" pushbutton **5**. In this operational state, no voltage is present at the cable.

Having set the appropriate surge voltage at the shock discharge generator, the surge discharge can now be triggered. In this case, the surge discharge has to be triggered by pressing the "ARM SURGE" pushbutton **5** of the ARM 3E.

When measuring at low voltage cables, the surge voltage can alternatively be provided by the ARM 3E itself.

If the ignition is successful, the arc current is taken over by the ARM 3E and maintained stable for approx. 20 ms.

On the screen of the TDR, the fault trace appears which can now be compared to the previously recorded and still visible reference trace. In this way, suspicious impedance changes which may indicate a fault position can be easily identified.

If the TDR was not triggered or if no clear conclusion can be drawn from the recorded fault trace, the measurement should be repeated with adjusted settings (e.g. trigger threshold, pulse width, surge voltage).

If very frequent surge discharges lead to overtemperature in the ARM 3E, the "OVERTEMPERATURE" pilot lamp **6** lights up. Further surge discharges can then not be triggered until the components have cooled down and the pilot lamp goes out.

After the fault trace has been successfully recorded, high voltage has to be switched off by pressing the "HV OFF" pushbutton **4**.



After completion of the prelocation and prior to the commencement of the acoustic pinpoint location, the ARM 3E has to be switched off!
