

# USER MANUAL ARC-KILLER SV-25 ON VA-2



## SV250001 ARC-KILLER FOR DF-D



READ THIS DOCUMENT CAREFULLY BEFORE OPERATION



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## 1. PREFACE

This document is intended as a reference for qualified and trained operators to transport, operate and maintain the arc-killer in a safe and economical way. In the documentation the words “left”, “right”, “front” and “behind” are used to indicate a specific part of the arc-killer. The starting point is always the position of the operator, standing in front of the arc-killer, facing the arc-killer.

### 1.1. Related Documentation

The following technical documentation is available about the DF-2 medium-voltage switchgear:

- User Manual
- Spare Parts List
- Technical Brochure

### 1.2. General Safety Guidelines

The general applicable safety guidelines are included in full in the user manual.

### 1.3. Intended Use

The arc-killer is designed exclusively to offer protection against the negative consequences of an internal arc in DF-2 medium-voltage switchgear. Both in the cable and bus bar compartment.

## 2. TECHNICAL SPECIFICATION

KEMA type tested according to IEC 60298 appendix AA all 6 criteria: arc extinguishing in less than 50ms.

## 3. TRANSPORT AND STORAGE

The general applicable safety guidelines are included in full in the user manual.

We reiterate that:



Cubicles that fell over or have otherwise been damaged always **HAVE TO BE RETURNED** to SGC - SwitchGear Company for a checkup.

#### 4. OPERATIONAL PROCEDURE SV-25

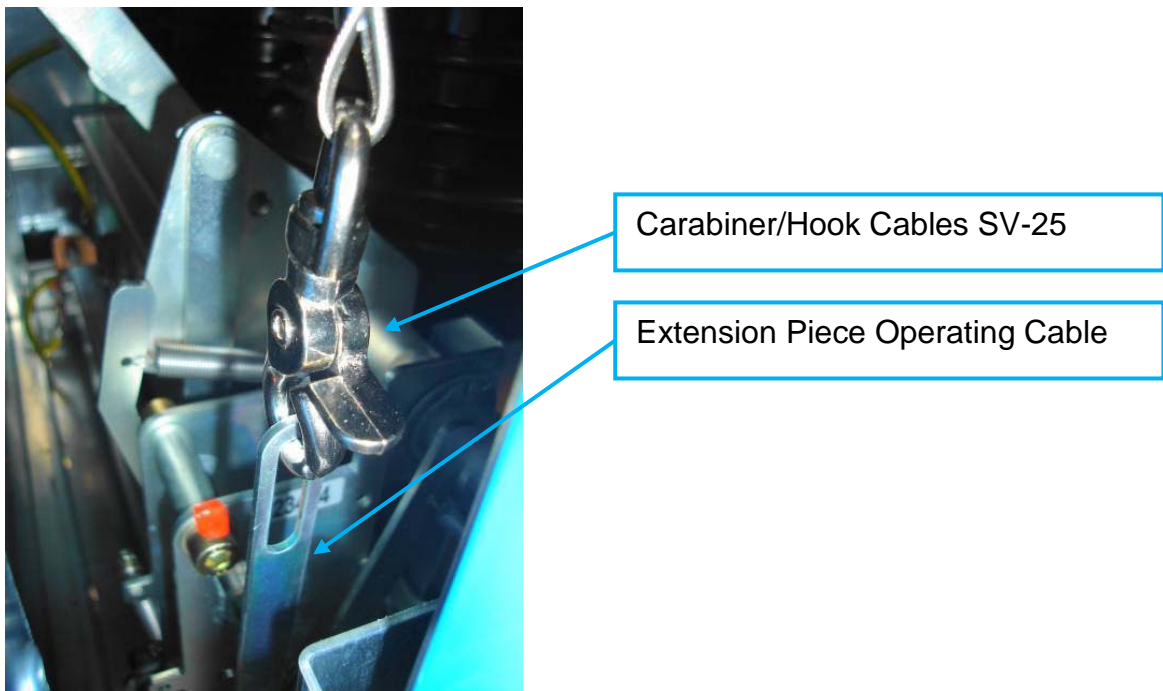
After the installation and before the actual commissioning of the medium-voltage field, check whether the overpressure flaps at the rear of the cubicle are absolutely free of damage or distortion.

DF-D type cubicles are by default delivered as follows:

1. Load break switch OPEN: no connection between cables and bus bars.
2. Earthing switch CLOSED: cubicle is connected to earth. The door is always removable in this position.
3. Arc-killer CLOSED: Connection between earth and arc-killer (SV-25) on the circuit breaker (VA-2).
4. Coupling between cubicle and arc-killer ACTIVE.

##### 4.1. Coupling arc-killer with cubicle equipment

Coupling the Arc-Killer SV-25, installed on the circuit breaker VA-2, with equipment inside the cubicle, is achieved by the use of “Carabiner/Hook Cables SV-25” and “Extension Piece Operating Cable”. See Photo 1.



**Photo 1**

#### 4.1.1 Procedure withdrawing circuit breaker (disconnecting)



Check whether the arc-killer is engaged (unarmed, photo 2). If it is not engaged, it needs to be done. See §4.3.1 Disarming the arc-killer SV-25 (moving to a closed position).

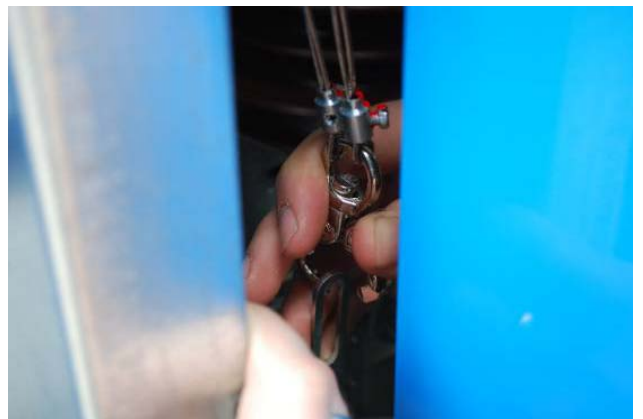


**Photo 2**

- The operator is ideally positioned to the right of the circuit breaker (Photo 3). Use the right hand to disconnect “Carabiner/Hook Cables SV-25” from “Extension Piece Operating Cable” (Photo 4).



**Photo 3**

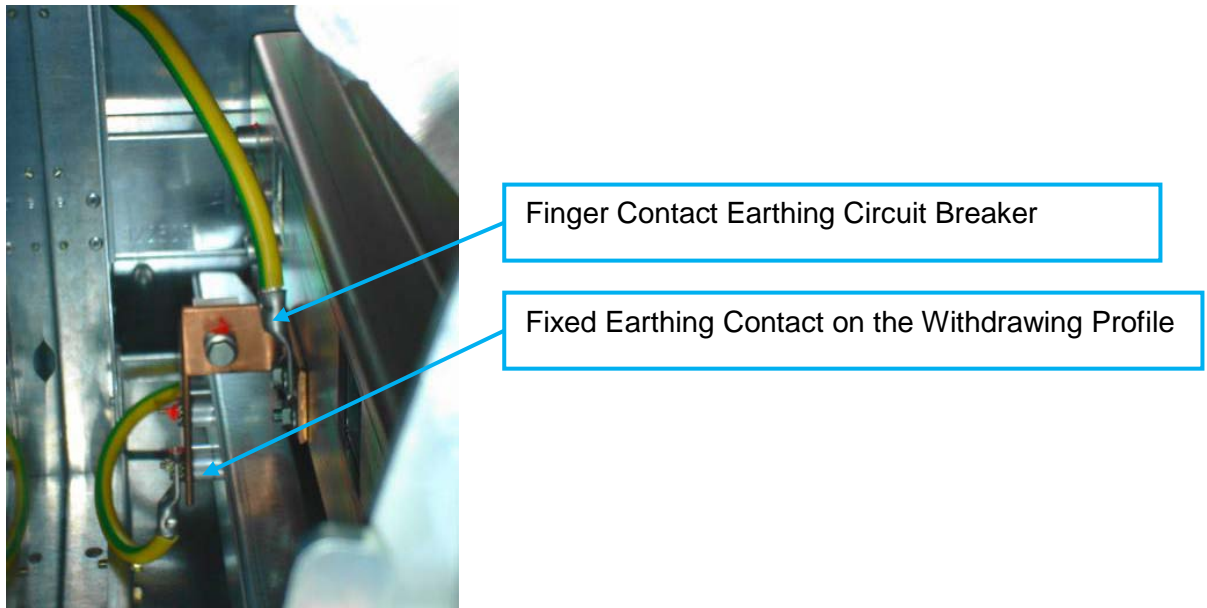


**Photo 4**

- Put the “Extension Piece Operating Cable SV-25” against the main axis of the arc-killer mechanism.
- The circuit breaker can now be withdrawn from the cubicle. Pay extra attention to the circuit breaker being withdrawn straight and level, in order to prevent any damage to the arc-killer and the “Extension Piece Operating Cable”.

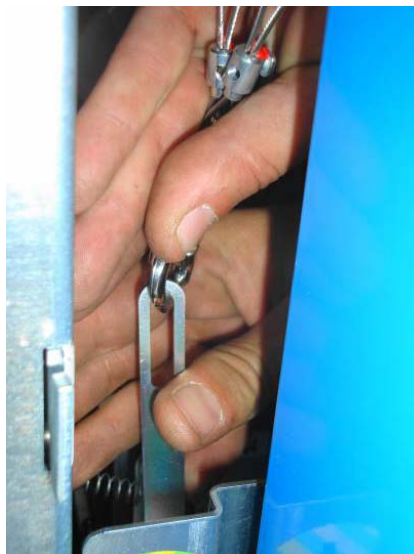
**4.1.2 Procedure withdrawing into place circuit breaker (connecting)**

- Before withdrawing the circuit breaker into place in the cubicle, the arc-killer needs to be connected, and be unarmed (Photo 2). If it is not connected, it needs to be. See §4.3.1 Disarming arc-killer SV-25 (moving to a closed position).
- Withdraw the circuit breaker back into the cubicle. Pay extra attention to the circuit breaker being withdrawn straight and level, in order to prevent any damage to the arc-killer and the “Extension Piece Operating Cable”. Additionally, ensure that the “Fixed Earthing Contact on the Withdrawing Profile”, assembled inside the cubicle, moves neatly and straight into the “Finger Contact Earthing Circuit Breaker” (see Photo 5).



**Photo 5**

- Connect the “Carabiner/Hook SV-25” to the “Extension Piece Operating Cable”, see Photo 6. After connection, check whether “Carabiner/hook SV-25” can move freely in the slot of the extension piece of the operating cable.



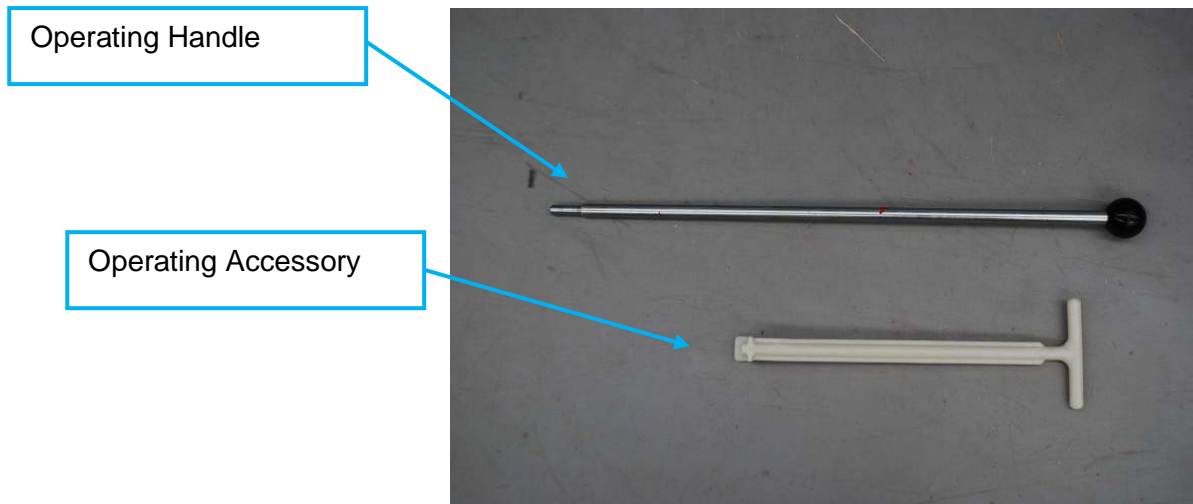
**Photo 6**

## 4.2. User Procedure for First Commissioning

After withdrawing the circuit breaker VA-2, the following is required:

- Connection between arc-killer SV-25 and cubicle, using “Carabiner/hook SV-25”
- Arming the arc-killer SV-25. Arming here implies moving the arc-killer to the OPEN position.

### Requirements:

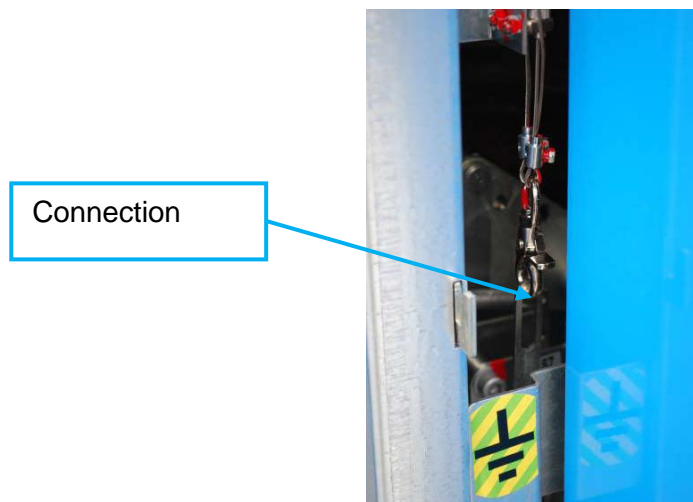


### 4.2.1 Arming the arc-killer SV-25 (moving to open position)

**STEP 1:** Always check whether the connection was made correctly before arming the arc-killer SV-25, §4.1.2 Procedure withdrawing into place circuit breaker (connecting). See Photo 7.



Without connection the arc-killer will not function in case of an internal arc.



**Photo 7**



Ensure that the arc-killer is in a disarmed state before attempting to arm it.



**STEP 2:** Place the “Operating Accessory” on the switching wheel. Turn counter-clockwise (left) until the wheel clicks into a vertical position (Photo 9).



**Photo 8**



**Photo 9**

**STEP 3:** Place the supplied arc-killer “Operating Handle” in the drilling space of the arc-killer. The space is just behind the panel of the circuit breaker. See Photo 10, Photo 11.



**Photo 10: drilling in main axis of arc-killer**



**Photo 11: Operating handle in drilling space**

**STEP 4:** Using the supplied “Operating Accessory”, move the “Handle to block the arc-killer” to the left, in the direction of the side panel. The handle is operated using the left hand. See Photo 12 - Photo 14.



**Photo 12**



**Photo 13**



**Photo 14**

**STEP 5:** While the “Handle to block the arc-killer” is pressed to the side-panel, the right hand is used to move the “Operating Handle” left until the earthing knife is released from the earthing blocks, see Photo 15. Now remove the “Handle Accessory” (left) and keep the “Operating Handle” under tension (right).



**Photo 15: Earthing knife arc-killer is moved out of the earthing block**

**STEP 6:** The operator is ideally positioned to the right of the circuit breaker to apply the required force. The “Operating Handle” is now able to move fluidly in the direction of the left side panel. After reaching the end position, the activation of the interlocking can be heard. The indicator with the earthing symbol is partially hidden between the LV part of the circuit breaker, Photo 17.

The “Operating Handle” is no longer under tension. The arc-killer is armed and in the OPEN position.



**Photo 16**



**Photo 17**



Never move your head inside the cubicle during operation. If the arc-killer is incorrectly put under tension, the “Operating Handle” could snap back and cause serious injury.




Only if the arc-killer is in the OPEN position, can the cubicle be commissioned, according to safety guidelines 5.1 on page 5.1 and the operating procedure 5.2.1.2 “Opening the earthing switch and closing the load break switch” on page 5.3 of the user manual.


**STEP 7:** Remove the “Operating Handle” from the drilling space of the arc-killer main axis.

**4.3. Withdrawing a circuit breaker with an armed arc-killer**


For maintenance reasons, or because of changes on the grid, the medium-voltage field might be taken out of commission and the circuit breaker needs to be withdrawn from the medium-voltage field.

A circuit breaker with an armed arc-killer cannot be withdrawn. Because the earthing knife cannot move past the plating of the frame. Additionally, the connection between the arc-killer SV-25 and the VA-2 inside the cubicle, must be broken. Instructions can be found under §4.1 Coupling arc-killer with cubicle provisions.

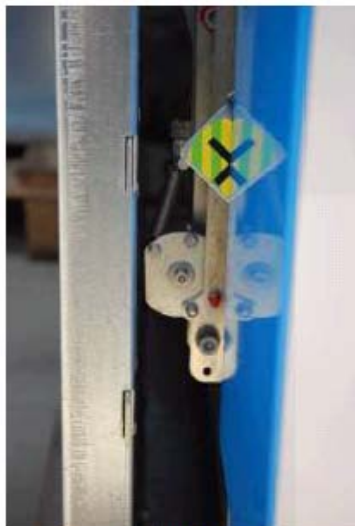
 To withdraw the circuit breaker from a cubicle that is decommissioned, the arc-killer **NEEDS** to be in a closed position. Activating the arc-killer needs to happen with the utmost care.

 Never move your head inside the cubicle during operation. If the arc-killer is incorrectly put under tension, the “Operating Handle” could snap back and cause serious injury.

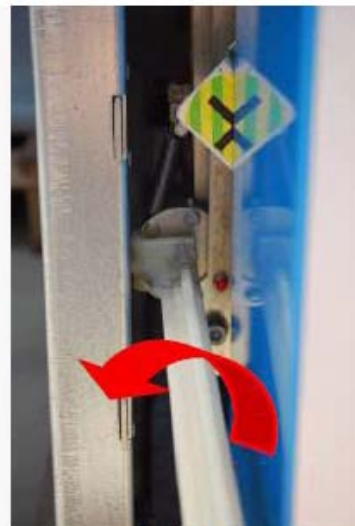
**4.3.1 Disarming the arc-killer SV-25 (moving to closed position)**

 Check whether all handles in and around the circuit breaker are removed.

**STEP 1:** Use the left hand to bring the “Handle Accessory” in a vertical position on the switching wheel, Photo 18 & Photo 19.




**Photo 18**



**Photo 19**

**STEP 2:** Turn the “Operating Accessory” counter clockwise (left) until the arc killer engages.

 A significant amount of energy is released during this operation.

#### 4.4. User procedure after an internal arc is interrupted by the arc-killer

The voltageless cubicle is now taken out of service according to procedure “Opening the load break switch and closing the earthing switch” described in the user manual. The door can now be opened.

The arc-killer rests on earthing blocks (earthed) (see photo 20).

The arc-killer is resting on top of earthing knife blocks.



Photo 20



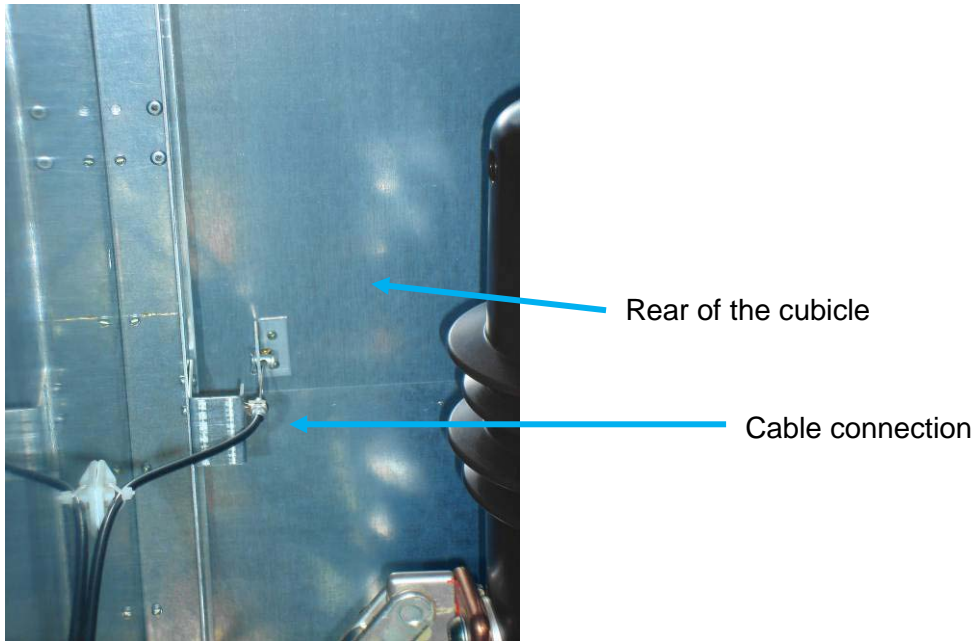
If the cause of the internal arc cannot be established unambiguously, SGC - SwitchGear Company will need to be contacted. If this is the case, the circuit breaker must not be withdrawn!

As soon as the circuit breaker is withdrawn from the cubicle or as soon as any cleaning operations are performed, SGC – SwitchGear Company’s & Mevoco’s liability is void.

If after taking into consideration the above, the cause of the internal arc is known, the following steps are required before the installation can be put into service again:

- If possible, remedy the cause of the internal arc.
- If the circuit breaker is withdrawn, follow the entire procedure described in §4.1.1. If not, follow the entire procedure starting from arming the arc-killer VA-2 before taking the cubicle into service.
- Check the condition of the arc-killer contacts and earthing knife blocks. They cannot be burned in severely. The copper needs to show a silver layer at all times.
- If necessary, remove the carbon black on the isolators and the poles.
- Clean the arc killer’s earthing knife spoons and earthing blocks, and regrease these components with grease.
- It is recommended to perform a 1 min. 38 kV «power frequency withstand test» to evaluate the status of the entire medium-voltage switchgear.

After solving the cause, **after checking the cable connections**, and after testing, the medium-voltage switchgear is ready for service again, provided that the overpressure flaps at the rear are back to their original position and the cable connections are still intact (see photo 21).



**Photo 21**

## 5. MAINTENANCE

The general maintenance guidelines and maintenance procedures that apply here are fully included in user manual.

The procedure “Greasing the earthing knife spoons and earthing blocks” applies to the arc-killer as well as the standard earthing knife.



During the maintenance work, and when the doors are open, or when the arc-killer is armed, never touch the plate levers, nor the rear flaps or the operation cables.