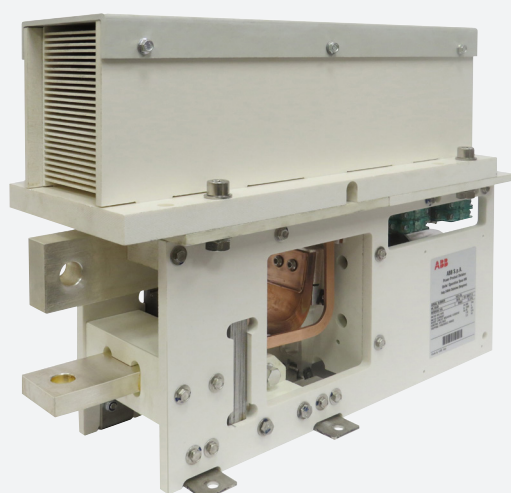


DISTRIBUTION SOLUTIONS

# DCBreak

## Rolling Stock High Speed Direct Current circuit breaker

### Spare parts kits – instructions for replacement



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# 1 For your safety!

## 1.1 Foreword

Make sure that the installation area (spaces, divisions and ambient) is suitable for the electrical apparatus.

To ensure that the installations are built in accordance with the rules of good working practice and occupational safety, make sure that the regulatory and legal requirements are complied with during installation, putting into service and maintenance.

Check that the rated performances of the apparatus are not exceeded during service.

## 1.2 Qualified personnel

All installation, putting into service, operation and maintenance work must be carried out by suitably qualified personnel with in-depth knowledge of the apparatus.

The tasks described in this document must only be performed by qualified personnel who possess authorizations enabling them to work on electromechanical equipment and who are aware of the electrical hazards (dangerous voltage) and mechanical hazards (moving parts) relating to work on electric circuit breakers. The workers must also be familiar with the use of personal protective equipment.

For the purposes of this document and the data plates affixed to the product, a qualified person is a person who:

- carefully reads the entire instruction manual (see par. 2.1 of this document)
- possesses detailed knowledge about the installation, the construction and operation of the apparatus and who is aware of the risks associated with the interventions
- is qualified and authorized to energize and deenergize, earth and identify the circuits in accordance with the safety procedures and local laws in force
- is qualified and authorized to put this apparatus into service and to service and repair it
- is trained on how to correctly use protective equipment, such as rubber gloves, hard hats, protective goggles, face masks, fire-resistant clothing, etc., according to the safety procedures and local laws
- is trained provide first-aid (act as first responder)

## 1.3 Field work

Strictly follow the information given in the instruction manual (see par. 2.1 of this document). Check that the personnel operating the apparatus have the instruction manual to hand as well as the necessary information for correct intervention. Pay special attention to the danger notes indicated in the manual by the following symbol:



Doubts concerning the interpretation of the contents of this document or the need for further information should be submitted to your ABB representative in order to obtain the necessary explanations before proceeding.

Only use original spare parts for maintenance operations. Use of not original spare parts could lead to dangerous faults, in which case the warranty would become void.

This document does not relieve the user from his responsibility for implementing the rules of good workmanship when applying, installing, operating and servicing the purchased apparatus. Please contact ABB if further information is required. ABB can supply competent, well-trained personnel for field assistance and to provide technical guidance when the apparatus is installed, overhauled, repaired and serviced.

## 2 References

### 2.1 Product manual

This document must be read in conjunction with DCBreak instructions for installation, service and maintenance 1VCD601427.

### 2.2 Certification levels

ABB, according to the "Training and certification policy for ELDS" defines the following certification levels for each spare parts kit:

#### 2.2.1 Level 1-2

Parts that can be replaced directly by customers, as per the "Training and certification policy for ELDS Service", according to the relevant instructions.

#### 2.2.2 Level 3

Parts that can be replaced by sending the equipment/unit to repair at our factory or delivered only when ordered with intervention of appropriately qualified personnel ABB Service with a certificate of participation in the training of Level 3 in our "Training Center" according to the "Training and certification policy for ELDS Service".

Qualified personnel ABB Service that is defined as:

- Service Technician of ABB SPA ELDS Service in Dalmine (BG), Italy or
- Technician duly trained at level 3 and registered in dedicated ELDS Service Database (i.e. PCS2)

These parts require special tools and specialized knowledge for their replacement. Due to the specific topics explained during the training, written instructions might not be available for all the topics of a L3 training.

If the activities of replacement are performed by NOT Authorized Personnel as described above, ABB S.p.A. shall not grant any warranty on the goods and on the spare parts and ABB S.p.A. shall not be liable, except as provided for by the law, for any direct, special, indirect or consequential damages or losses to people or goods or spare parts such as but not limited to loss of revenue, loss of use, loss of power, costs of capital or costs of replacement power and any kind of damages that the Purchaser should pay to third parties for any reason.

#### 2.2.3 Level 4

Parts, that compared to L3, need additional special tools and specific training is required.

These parts MUST be replaced by sending the equipment/unit to repair at our factory or delivered to an authorized ABB Service unit.

Those ABB Service unit shall have personnel with a certificate of participation in Level 4 the training provided by our "Training Center" according to the "Training and certification policy for ELDS Service".

## 3 Maintenance

Refer to the proper section of DCBreak manual 1VCD601427.

### 3.1 General information

Maintenance includes the following operations:

- Routine inspection: checks are performed to assess the effective conditions of the apparatus and whether dedicated maintenance work is required
- Preventive routine maintenance: tasks performed to preserve the required conditions.
- Corrective maintenance: tasks performed to restore correct operation after faults.

All maintenance work must be performed in accordance with the regulations in force in the country where the apparatus is installed.

The maintenance operations must be performed by specialized personnel, who have been duly trained and informed about the characteristics of the apparatus in question.

Please refer to chap. 1 of the current document.

Inspection and maintenance frequency for components subject to wear are established on the basis of the effective conditions in which the apparatus is used, i.e. operation frequency, length of time in service and number of short-circuit interruptions, environmental pollution conditions and presence of semi-conductive dust.

Since the real conditions of use vary to a great extent between one installation and the other, they cannot be known to ABB.

The frequencies given are purely indicative since they are based on an average degree of use in subway and tramline installations.

Users should acquire familiarity with the typical conditions of use in their installations and keep track of the observations reported in successive inspections so as to establish the best frequency with which inspections and preventive maintenance should be performed.

### 3.2 Routine inspections

Type of inspection	Frequency in normal conditions	Operation
Basic inspections	The event that occurs first among:	
	• 18 months	Visual inspection
	• 25000 operations without load	Check safety rings
	• 400 operations up to rated load	Tighten screws
	• 6 current interruptions due to overload	Clean insulating parts
Main inspection	The event that occurs first among:	
	• 18 months	Basic inspection (see above)
	• 50000 operations without load	Check pressure of contacts
	• 800 operations up to rated load	Carefully inspect the arc-quenching chute
	• 12 current interruptions due to overload	Check electric contact between circuit breaker and arc-quenching chute
Inspections of contacts after short-circuit interruption	NA (the event occurs in random way)	Revamp the surface of fixed and mobile contacts with 150-grit emery cloth
		Check the pressure of contacts measuring the resistance of main circuit that must not exceed 150 $\mu\Omega$
		Inspect accurately the arc-quenching chute
		Verify the electrical contact between the circuit breaker the arc quenching chute

### 3.3 When parts need to be replaced

Kit	Certification level required	When parts need to be replaced
Main contacts kit	L2	When wear on the contacts reaches 2 mm
		When contact resistance exceeds 150 $\mu\Omega$ after trimming and cleaning
		If guides have been perforated
		If arc quenching path has been perforated
Arc chute kit	L2	Every 800 operations under rated load
		Every 12 current interruptions due to overload
		If more than 6 plates touch each other
		Presence of evident melting between plates
Ceramic guides kit	L2	Every 800 operations under rated load
		Every 12 current interruptions due to overload
Auxiliary contacts kit	L2	If a fault occurs
Flexible connection kit	L2	After 100000 mechanical operations

## 4 Spare parts kits for DCBreak

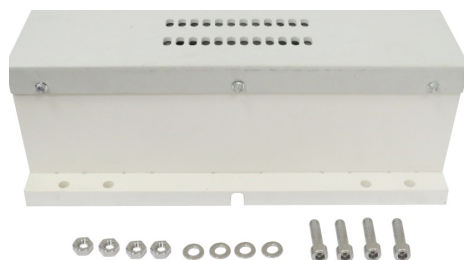
### 4.1 Arc chute

#### 4.1.1 Certification level required

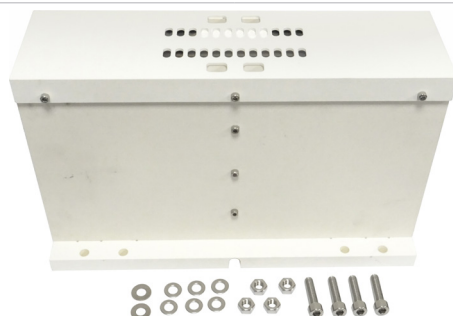
L2

#### 4.1.2 Ordering codes (Service)

Ordering code	Description
1VCF439100S0041	Complete arc-chute, set of 1, for DCBreak 915-915B



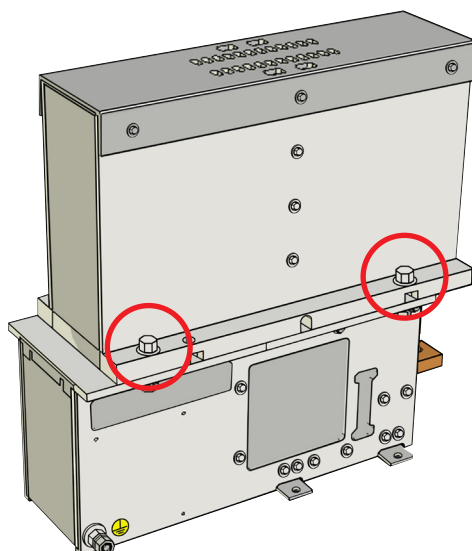
1VCF439100S0042	Complete arc-chute, set of 1, for DCBreak 1815-1815B
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#### 4.1.3 Instructions for replacement

Please always refer to sec. 1 of this document.

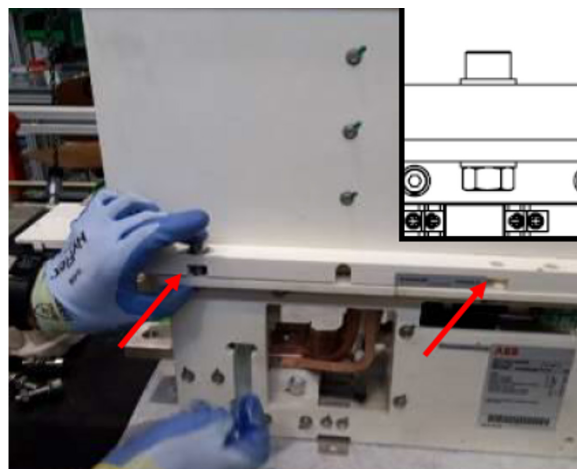
1. Unscrew the 4 bolts (red circle in the image below) and remove the Arc Chute from the breaker housing.



2. Place the arc chute on top of the circuit breaker, pay attention to the correct alignment and to do not damage the ceramic guides.



3. Close with: n.8 washers, n.4 screws, n.4 nuts present in the kit. Apply firstly a tightening torque of 10 Nm and tighten the screws with 45-48 Nm torque with a cross sequence. Mark the screws.

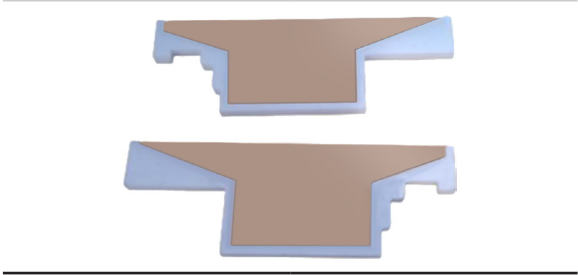


4.2 Ceramic plates

4.2.1 Certification level required  
L2

4.2.2 Ordering codes (Service)

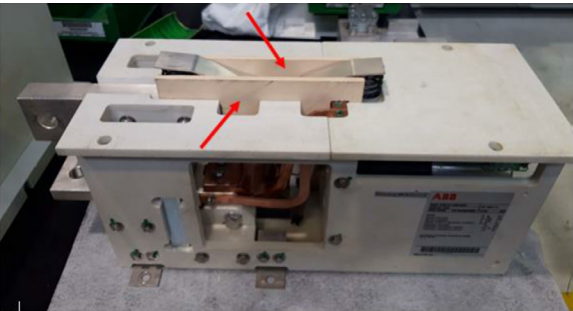
Ordering code	Description
1VCF439199S0031	Ceramic plate for side of main contact, set of 2, for DCBreak



4.2.3 Instructions for replacement

Please always refer to sec. 1 of this document.

1. Remove the arcing chute (see arcing chute instructions for replacement).
2. Mount n.2 ceramic guide. Pay attention: the new ceramic guide shall not present damages.



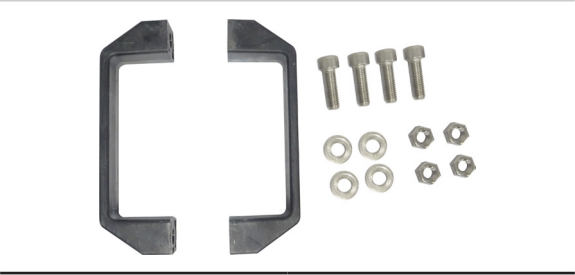
3. Re-install the arcing chute (see arcing chute instructions for replacement).

4.3 Handles for upper box

4.3.1 Certification level required  
L2

4.3.2 Ordering codes (Service)

Ordering code	Description
1VCF439199S0151	Handles for upper box, set of 2, for DCBreak 915B-1815B



4.3.3 Instructions for replacement

Please always refer to sec. 1 of this document.  
Mount the handle with Safety Washer, nut, tightening torque 25 Nm. Mark the screws.





## 4 Spare parts kits for DCBreak

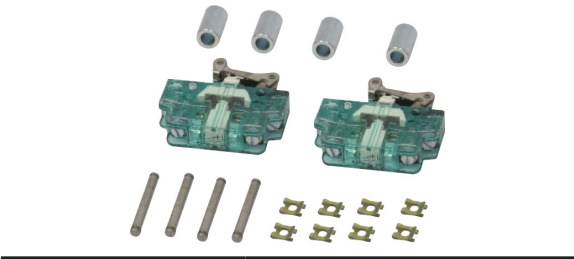
### 4.4 Position switches

#### 4.4.1 Certification level required

L2

#### 4.4.2 Ordering codes (Service)

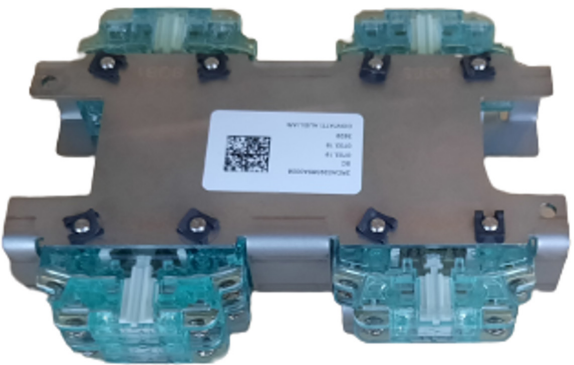
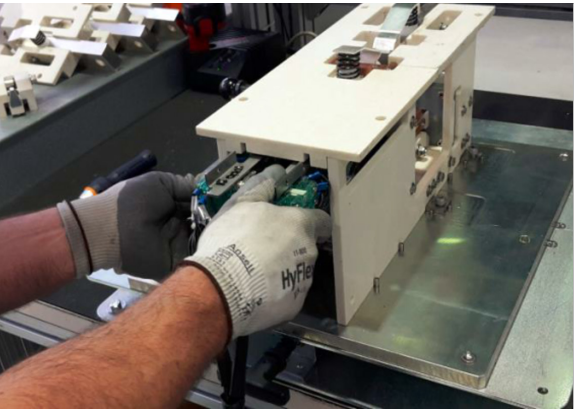
Ordering code	Description
1VCF439199S0051	Position switches BGB_ of circuit breaker operating mechanism, set of 2, for DCBreak



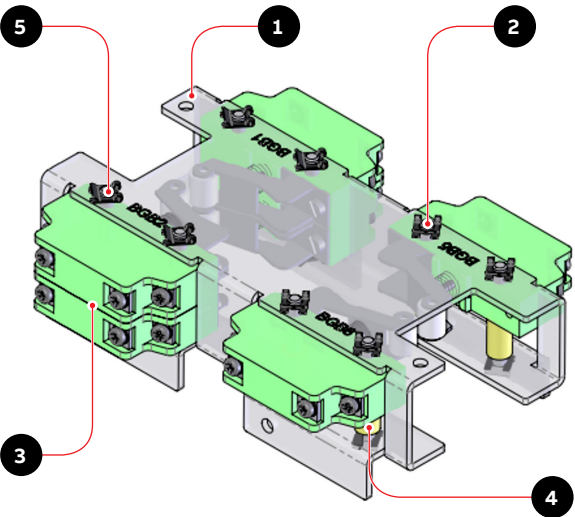
#### 4.4.3 Instructions for replacement

Please always refer to sec. 1 of this document.

1. Extract the aux contact support from the DCBreak.



2. Remove the clips (5), the pin (2) and the spacer (if present) (5).
3. Replace the Microswitch (3).
4. Re-assemble the clips (5), the pin (2) and the spacer (if present) (5) with the ones present in the kit.



5. Re-assemble the auxiliary contacts support on DCBreak and re-connect the auxiliary wiring (refer to the proper section of manual 1VCD601427 for the connection of the main circuit).



## 4.5 Socket for auxiliary circuit

### 4.5.1 Certification level required

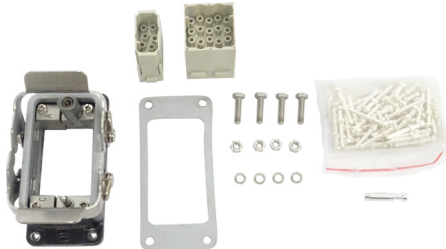
L2

### 4.5.2 Ordering codes (Service)

Ordering code	Description
1VCF439199S0131	Socket with 24 pin without wiring for DCBreak 915B-1815B



1VCF439199S0132	Socket with 28 pin without wiring for DCBreak 915B-1815B
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1VCF439199S0133	Socket with 36 pin without wiring for DCBreak 915B-1815B
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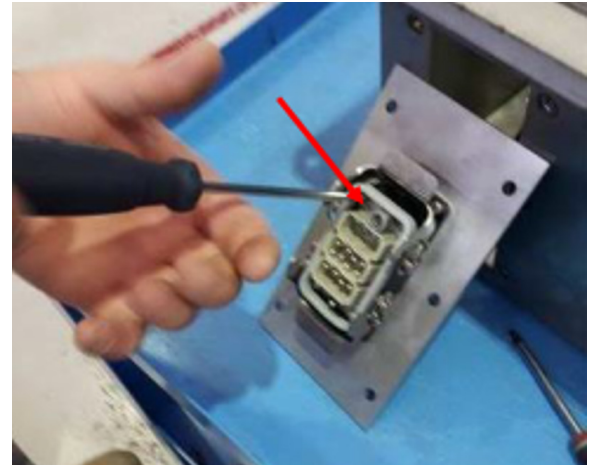


### 4.5.3 Instructions for replacement

Please always refer to sec. 1 of this document.

1. Unscrew the socket support frame from the box and remove the plug.

2. Replace the socket terminal. Pay attention to connect the wirings according to the wiring diagram.
3. Mount the wiring connection in the socket support frame and connect the earthing cable at the plug frame.



4. Fix the assembly to the box with the 6 screws with a tightening torque of 10 Nm. Mark the screws. Pay attention that the wirings do not touch the metallic frame.



## 4 Spare parts kits for DCBreak

### 4.6 Plug for auxiliary circuit (DCBreak 915B and 1815B)

**4.6.1 Certification level required**  
L2

**4.6.2 Ordering codes (Service)**

Ordering code	Description
1VCF439100S0201	Plug with 24 pin without wiring for DCBreak 915B-1815B



1VCF439100S0202	Plug with 28 pin without wiring for DCBreak 915B-1815B
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1VCF439100S0203	Plug with 36 pin without wiring for DCBreak 915B-1815B
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**4.6.3 Instructions for replacement**  
Please always refer to sec. 1 of this document.  
Plug to be mounted on secondary socket by Customer on secondary circuit (external secondary circuit not part of DCBreak scope of supply).

### 4.7 Cable glands (DCBreak 915B and 1815B)

**4.7.1 Certification level required**  
L2

**4.7.2 Ordering codes (Service)**

Ordering code	Description
1VCF439100S0271	Cable glands, set of 2, Ø 11-21 M32 for DCBreak 915B-1815B
1VCF439100S0272	Cable glands, set of 2, Ø 19-28 M40 for DCBreak 915B-1815B
1VCF439100S0273	Cable glands, set of 2, Ø 27-35 M50 for DCBreak 915B-1815B
1VCF439100S0274	Cable glands, set of 2, Ø 35-40 M50 for DCBreak 915B-1815B



**4.7.3 Instructions for replacement**

Please always refer to sec. 1 of this document.

1. Remove the upper part of the box.
2. Disconnect the power cables from the main terminals.
3. Remove the cable glands and replace with new ones as reported in the picture below.
4. Tighten the cable glands with tightening torque 10 Nm.



5. Reconnect the power cables to the main terminals (refer to the proper section of manual 1VCD601427 for the connection of the main circuit).
6. Mount the upper part of the box (refer to the proper section of manual 1VCD601427).

## 4.8 Stopper for cable plate (DCBreak 915B and 1815B)

### 4.8.1 Certification level required

L2

### 4.8.2 Ordering codes (Service)

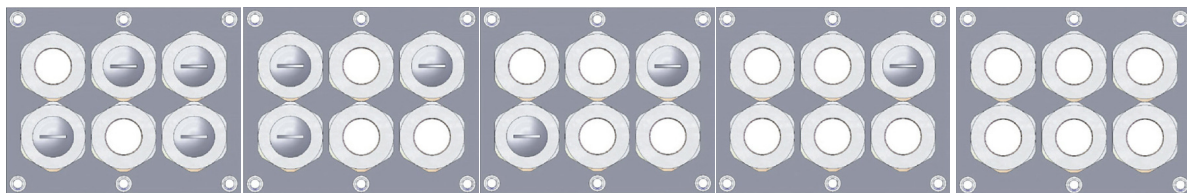
Ordering code	Description
1VCF439199S0111	Stopper for cable plate, set of 2, for DCBreak 915B-1815B



### 4.8.3 Instructions for replacement

Please always refer to sec. 1 of this document.

1. Place the stoppers on the DCBreaks box main connections where no cable gland is present (see configurations below).



## 4.9 Insulating internal parts for upper box (DCBreak 915B and 1815B)

### 4.9.1 Certification level required

L2

### 4.9.2 Ordering codes (Service)

Ordering code	Description
1VCF439199S0141	Insulating internal parts of upper box for DCBreak 915B
1VCF439199S0142	Insulating internal parts of upper box for DCBreak 1815B



### 4.9.3 Instructions for replacement

Please always refer to sec. 1 of this document.

1. Remove the upper part of the box
2. Untight side screws with tightening torque 25 Nm. Mark the screws.





## 4 Spare parts kits for DCBreak

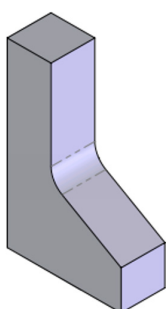
3. Unscrew the arc chute in the box and remove it.



4. Disassemble the 2 insulating shields from the sides of the box (one per side).



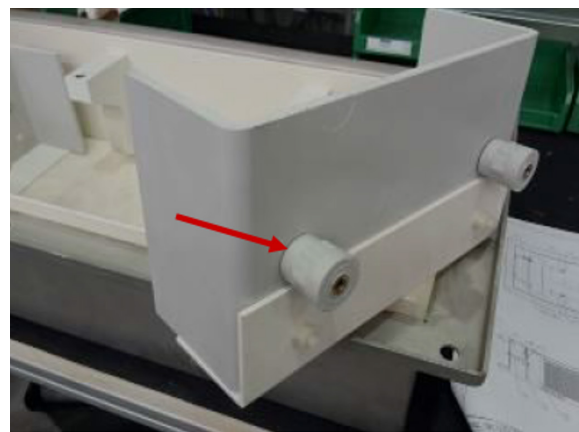
5. Unscrew and remove the supports on the long sides (2 per side).



6. Remove the 2 side on each of the long sides of the box.

7. Remove the upper insulating part of the box.

8. Mount all the replacement insulating part, reinstall the arc chute and reinstall the arching chute as per points 1-7 in reverse order. Apply a tightening torque of 10 Nm for mounting the insulating parts shown below.



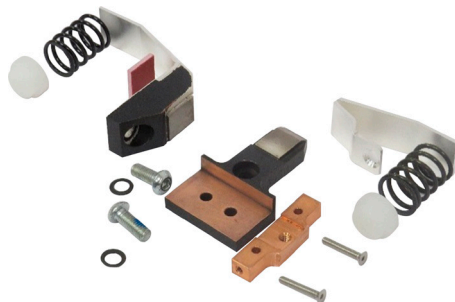
## 4.10 Fixed and moving main contact

### 4.10.1 Certification level required

L2

### 4.10.2 Ordering codes (Service)

Ordering code	Description
1VCF439199S0071	Fixed and moving main contact for DCBreak



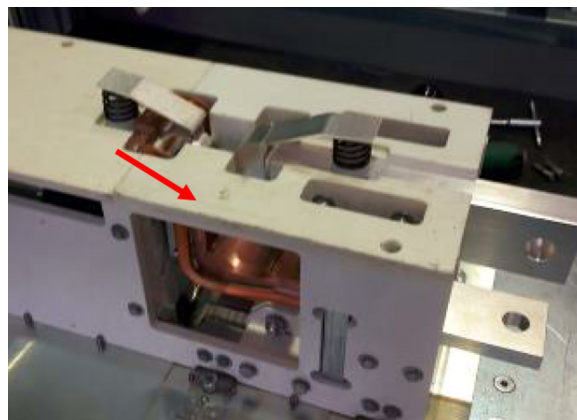
### 4.10.3 Instructions for replacement

Please always refer to sec. 1 of this document.

1. Remove the arching chute (see 4.1.3).
2. Remove the 4 screws that fix the upper (connected to the upper main busbar) cover to the breaker structure and remove this assembly from the breaker.



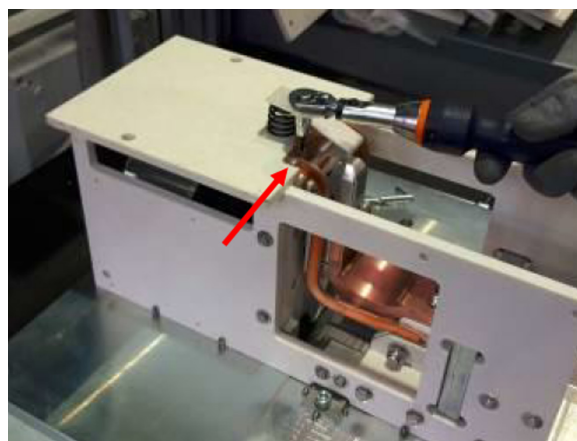
3. Remove the upper cover and the connected upper main busbar.



4. Unscrew the 2 screws that fix the equipotential connections.



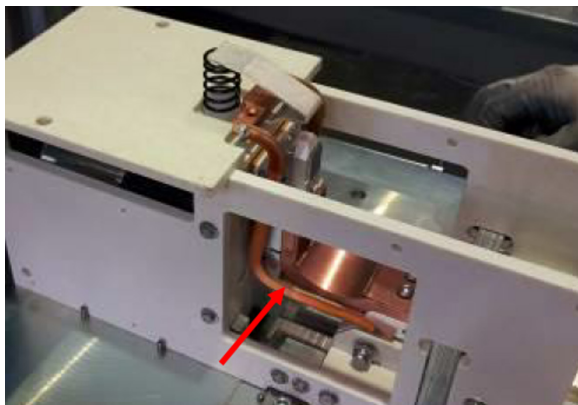
5. Remove the upper copper plate (fixed with 2 screws).



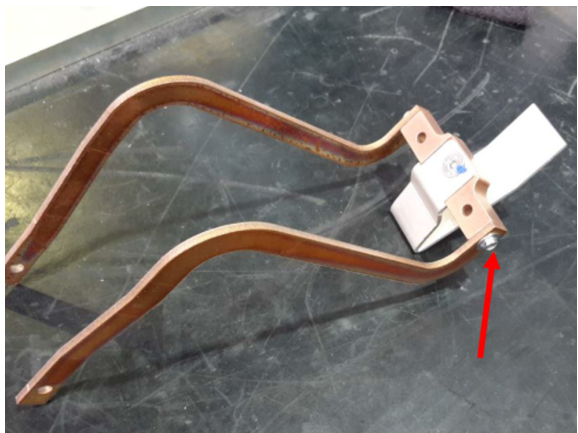


## 4 Spare parts kits for DCBreak

6. Remove the equipotential connection assembly from the breaker.



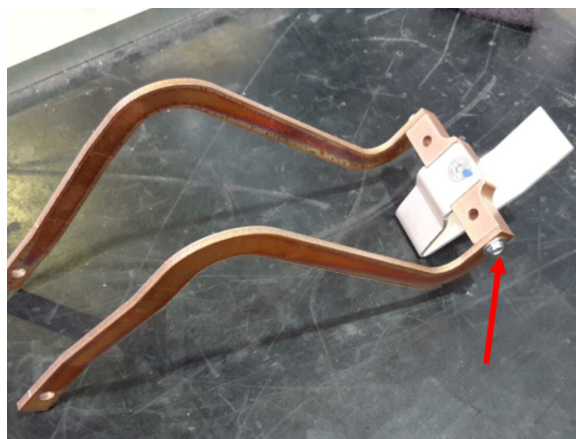
7. Remove the left and right equipotential connections (2 screws).



8. Take the new mobile rail and the new equipotential beam from the replacing kit and mount together the mobile rail and the equipotential beam with the provided M5x10 screw, tightening torque of 6 Nm. Mark the screw.



9. Reassemble the equipotential connection to the new assembly, tightening torque 3 Nm. Mark the screws.



10. Remove the flexible connection (2 screws) and the main contact (1 screw) from the movable lever connected to the actuator.

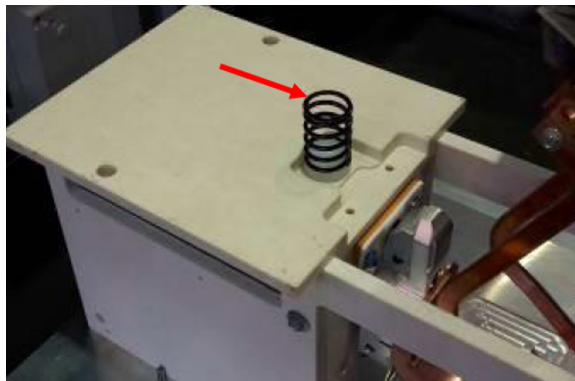


11. Replace the main movable contact, tightening torque 10 Nm. Mark the screw.

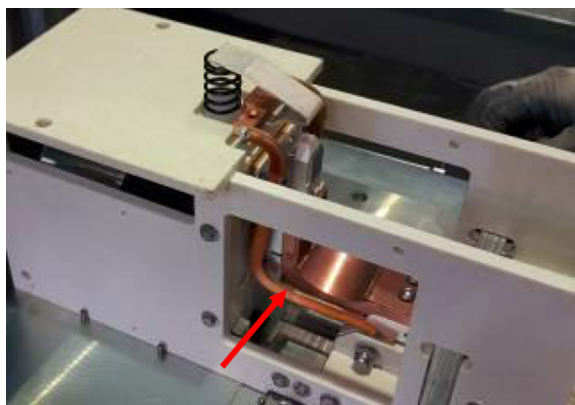


12. Fix again the flexible connection to the new movable contact (see point 10) Clean carefully the contact surface the flexible contact before mounting. Tightening torque 10 Nm. Mark the screws.

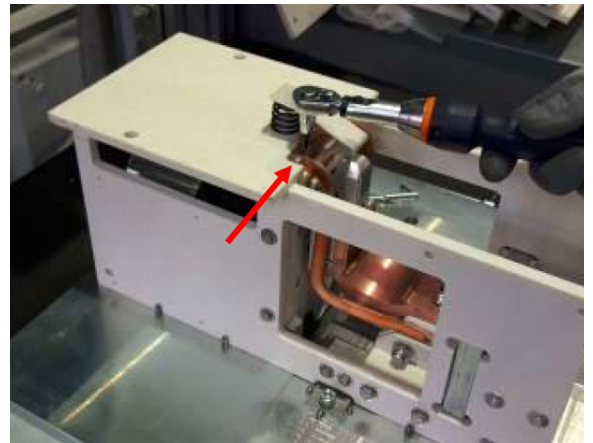
13. Replace the contact spring and the spring support from the upper cover.



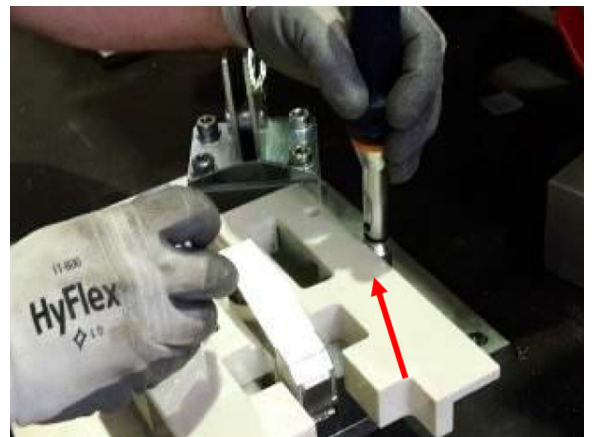
14. Position the new equipotential assembly (point 9) on the breaker.



15. Fix the assembly with two M4x25 screws. Tightening torque 3 Nm. Mark the screws.



16. Take the upper cover assembly (removed at point 3) and remove the upper from the upper main busbar.



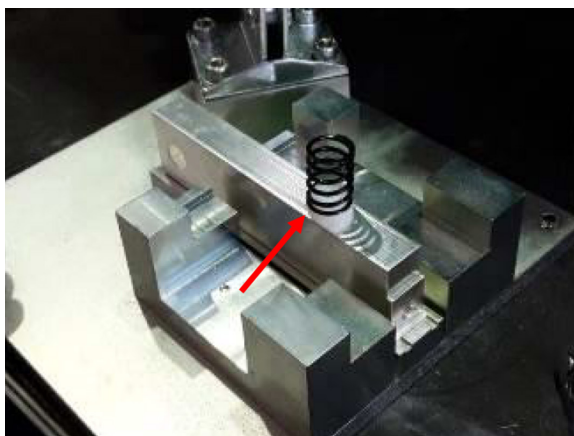
17. Remove fixed the main contact from the upper main busbar.



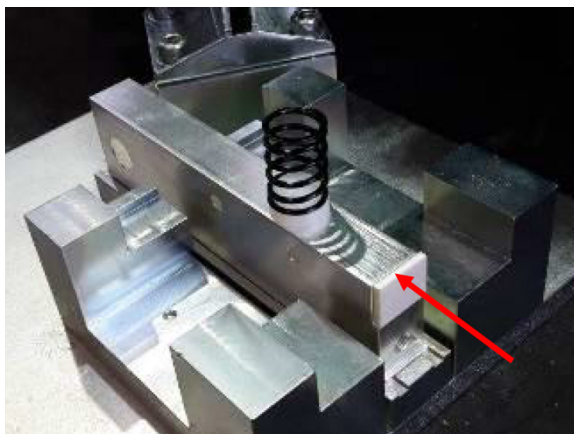


## 4 Spare parts kits for DCBreak

18. Replace the contact spring and the spring support from the upper cover.



19. Replace the new insulating part on the bushing.



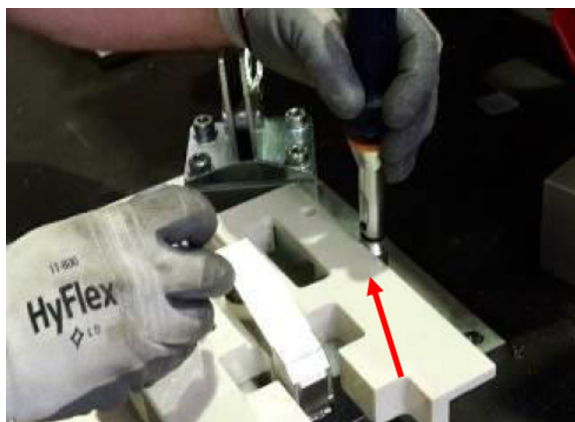
20. Mount the new arc guide with the new main fixed contact.



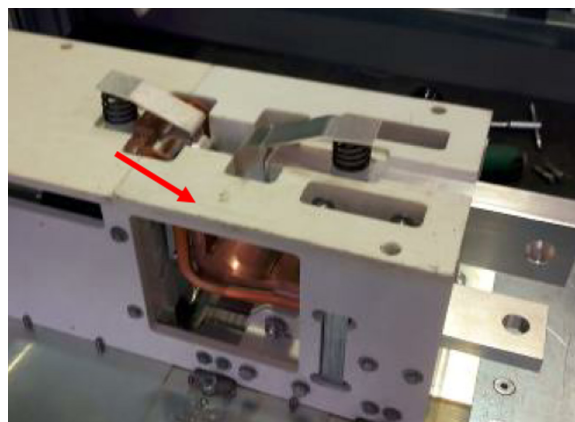
21. Mount the fixed main contact assembly with the busbar. Pay attention to the alignment between the copper bar and the contact, the parts must be perfectly aligned. Tightening torque 25 Nm. Mark the screw.



22. Mount the upper main busbar assembly to the upper cover (see point 16). Tightening torque 10 Nm. Mark the screws.



23. Mount the upper cover assembly on the breaker structure and fix it with the 4 screws (see point 2-3). Tightening torque 10 Nm. Mark the screws.



24. Close the breaker and check the resistance of the main circuit. The main circuit resistance of the breaker between busbars has to be  $< 150 \mu\Omega$ . This measure can be done with a current of 200 Adc (so the voltage drop across the main circuit must be  $< 30 \text{ mV}$ ). If this verification is passed proceed with the next step, otherwise repeat the replacing procedure.
25. Reinstall the arcing chute using the 4 screws previously removed (point 1). Apply firstly a tightening torque of 10 Nm and tighten the screws with 45-48 Nm torque with a cross sequence (see 4.1.3).



## 4 Spare parts kits for DCBreak

### 4.11 Flexible connection

#### 4.11.1 Certification level required

L2

#### 4.11.2 Ordering codes (Service)

Ordering code	Description
1VCF439199S0081	Flexible connection without main contact for DCBreak



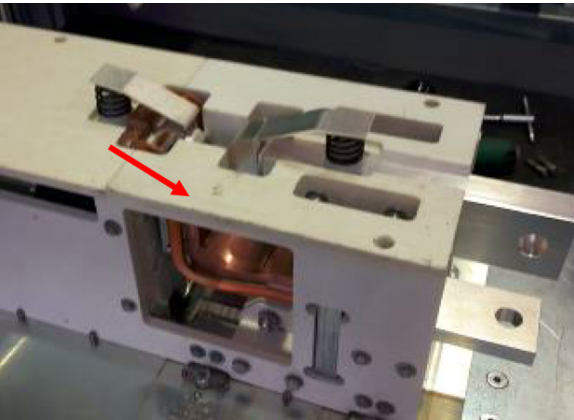
#### 4.11.3 Instructions for replacement

Please always refer to sec. 1 of this document.

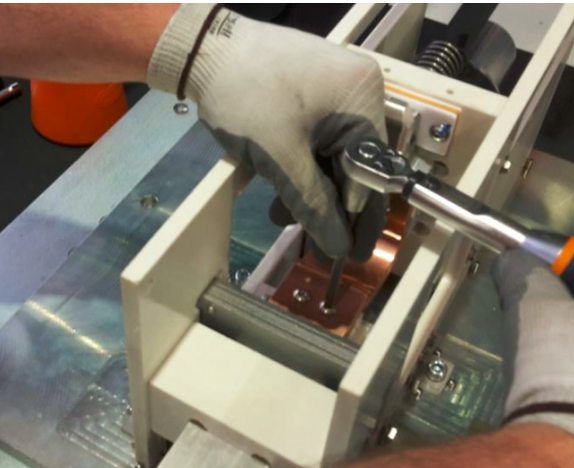
1. Remove the arching chute (see 4.1.3).
2. Remove the 4 screws that fix the upper cover.



3. Remove the upper cover and the connected upper main busbar.



4. Remove the 2 screws which fix the flexible copper connection and the stirrup to the lower main busbar



5. Remove the 2 screws which fix the flexible copper connection and the stirrup to the movable main contact and to the lever.



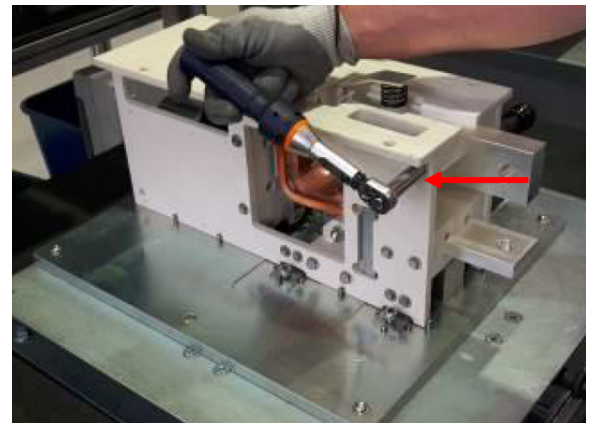
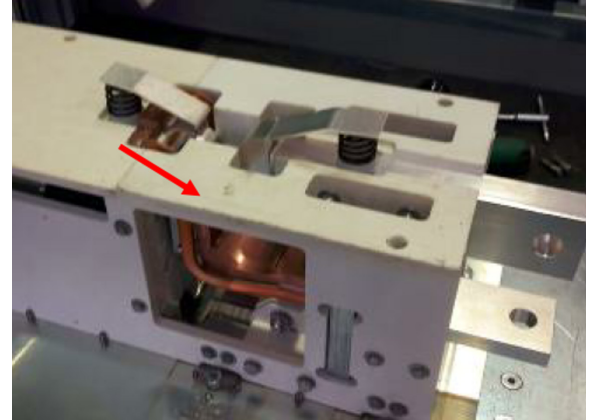
6. Clean carefully the new flexible contacts, the new stirrups and the parts that allows the electrical flow before mounting.



7. Fix the new flexible connection and the copper stirrups as per points 4-5 in reverse order. Tightening torque of 10Nm to the screws for fixing the flexible connection to the main busbar and to the movable contact. Mark the screws.

8. Reinstall the upper cover and fix it with the 4 screws previously removed (point 2). Apply a tightening torque of 10 Nm. Mark the screws.

9. Mount the upper cover assembly on the breaker structure and fix it with the 4 screws (see point 2-3). Tightening torque 10 Nm. Mark the screws.



10. Close the breaker and check the resistance of the main circuit. The main circuit resistance of the breaker between busbars has to be  $< 150 \mu\Omega$ . This measure can be done with a current of 200 A dc (so the voltage drop across the main circuit must be  $< 30 \text{ mV}$ ). If this verification is passed proceed with the next step, otherwise repeat the replacing procedure.

11. Reinstall the arcing chute using the 4 screws previously removed (point 1). Apply firstly a tightening torque of 10 Nm and tighten the screws with 45-48 Nm torque with a cross sequence (see 4.1.3).

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