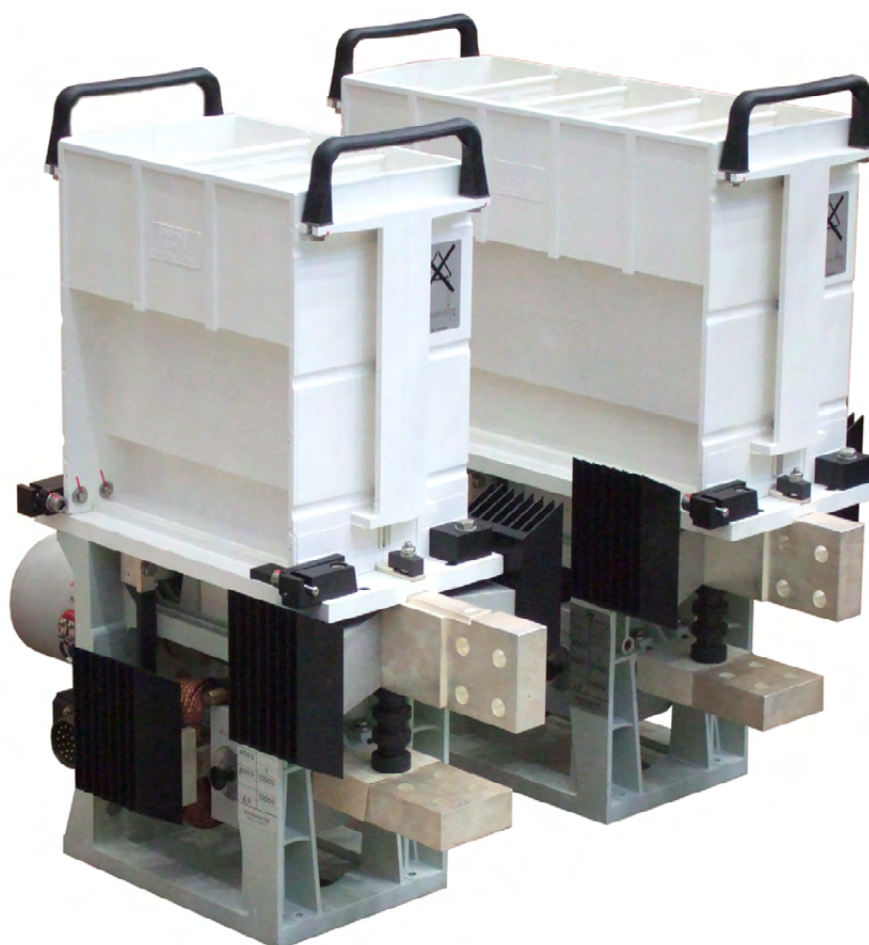


# Instructions manual

## DC High speed circuit-breaker UR46-81/82S



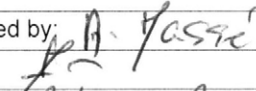


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## **Document information**

In case of dispute between a non-English version of this publication and its corresponding English version, the English one is the only legal version.

It is important to keep this manual for the lifetime of the equipment and to pass it on to any subsequent owner or user.

## **Structure of this instruction manual**

- Chapters A to F: all the information needed to understand, install, use, perform the maintenance and order a spare part for the standard version of this device.
- Chapter G. Options: all the information needed to understand, install, use, perform the maintenance and order an option or a spare part for these options.
- Chapter H. Customization: all the information needed to install, use, perform the maintenance and order a part for these customized assemblies (chapter not included without customization).

**Note!** When the "Customization" chapter is present, always refer to it at first before referring to the other chapters which are intended to the standard device.

Throughout this manual:

- the numbers between brackets (x) refer to the corresponding positions in the figure shown in the same sub-chapter.

the **blue texts** are hyperlinks, to be clicked on to navigate in electronic files; they are black in printed manuals.

# Revision changes

Version: SG104148TEN

Revision	Date	Established by:	Description
A00	18.4.08	Desbaillet	New manual
B00	19.12.08	Desbaillet	<p>B.1.2: added (<math>T_{amb}=40\text{ °C}</math>); modified <math>I_{Nss}</math> text.            Exchanged B.2 and B.3.            C.3: modified.            C.8.2: added text.            C.9.2: modified.            D.1: changed greases.            D.7.6: changed text.            D.8.2 + D.9 + D.11: removed Molycote.            G.1.2: added "and the lever (9) "; changed drawing.            G.1.3: added.            G.3: added kit number.            G.3.1 + G.3.2: added stroke.            G.3.1 + G.4.1 + G.6: added important.            And many small updates throughout the manual.</p>
B01	20.8.12	Desbaillet	<p>A.2: added safety rules.            B.3: modified.            C.1: modified all.            C.8: added.            C.12.1: added.            C.13.2: changed drawings; modified values.            C.15, C.16: added.            D.1: changed all.            D.2: added important.            D.4: modified all.            E.1.1.A: changed for procedure "2".            F.4.1: added pos. 1192; modified pos 25, 26.            F.4.2: added pos 325; changed drawing.            F.4.3: changed.            F.4.4: put 1200 instead of 1250.            G.2.4: modified pos 1280 + 1290.            G.3.1, G.3.2: added note.            G.4: changed all; removed BI24.            G.5, G.6: added.            G.10: added.            And many small updates throughout the manual.</p>

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# A. Introduction



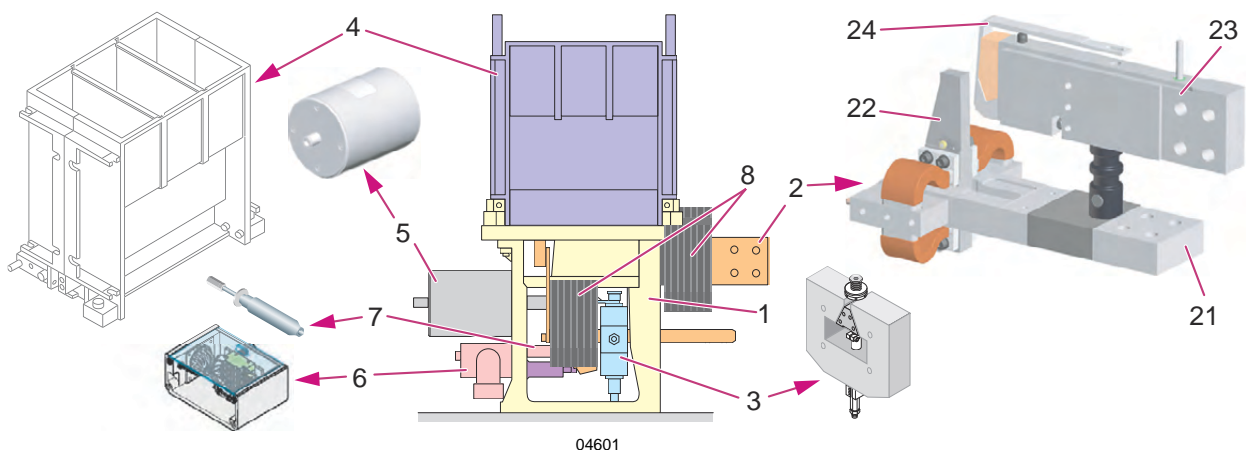
## **DANGER!**

To ensure maximum safety, servicemen and operators must read the **A.2 "Safety precautions"** section before starting installation, maintenance and adjustment of the device or before starting to operate it.

## A.1 General description

### A.1.1 Description

The UR46 is a DC high-speed current-limiting circuit-breaker, with natural cooling. It has been designed to ensure, on detection of a short-circuit, a trip free and rapid opening of its main contact; and to quickly extinguish the arc by generating a constant over-voltage during the whole interruption process.



1. Fixed insulating frame made of glass-fibre reinforced insulating material.
2. Main circuit, consisting of a lower connection terminal (21), a moving contact (22), an upper connection terminal (23) and a fixed contact (24).
3. Over-current release.
4. Arc chute.
5. Closing device and fork.
6. Auxiliary contacts housing with pusher (7).
8. Coolers

### A.1.2 Uses of the high speed circuit-breaker

Because of its short response time following the detection of an excess current (short-circuit, overload detection...), it is particularly suitable for the protection of the DC equipment in traction substations or industrial installations.

### A.1.3 Main features

- High insulation level to earth and between main contact
- High breaking and making capacity
- Long service life
- Simple maintenance
- Small dimensions

### A.1.4 Functions

#### Closing

When a closing pulse is received, the closing device (1) moves the fork (2), which closes the moving contact (3) and applies the contact pressure to the main contacts (3 & 9). The pusher (4), pushed by the moving contact (3), actuates the auxiliary contacts (5). The closing force is absorbed by the shock absorber (6).

#### Holding

Once the main contact is closed, the contact pressure is maintained by the closing device (1), either with a reduced holding current (E type) or with a permanent magnet (M type).

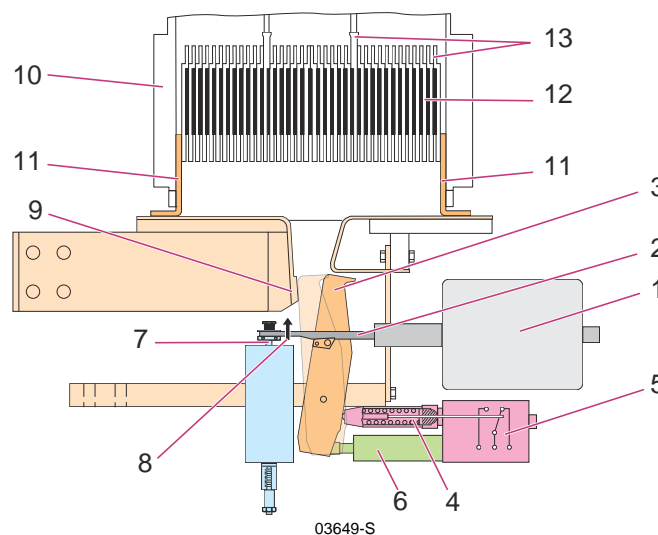
#### Opening

The circuit-breaker opens either through an over-current release or through an appropriate opening order:

- An over-current that exceeds the maximum current setting value, causes the direct release rod (7) to move up, which lifts (8) the fork (2), thus releasing the moving contact (3).
- Opening the breaker on remote order cuts off the holding current of the closing device (E type) or applies a reverse current pulse (M type), which causes the fork (2) to retract.

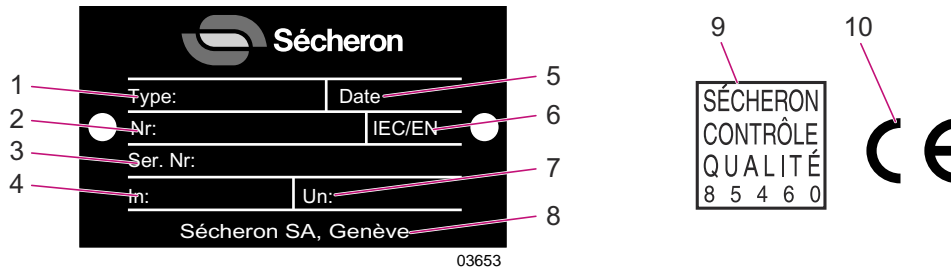
The pusher (4) then opens the moving contact (3) and actuates the auxiliary contacts (5).

The arc generated between the main contacts (3 & 9) moves upwards between the horns (11) into the arc chute (10) and is split by the baffles (12). The ionized gases are mostly neutralised between the de-ionizing plates (13).



## A.1.5 Device identification

The plate that is riveted to the device carries the data should you need to contact Sécheron. The CE mark indicates that this device complies with the basic health and safety regulations of the European Economic Area (EEA).



- |                              |                                      |
|------------------------------|--------------------------------------|
| 1. Device type               | 6. International standards number    |
| 2. Identification number     | 7. Rated voltage                     |
| 3. Serial number             | 8. Manufacturer, site of manufacture |
| 4. Rated operational current | 9. Routine test certificate          |
| 5. Manufacture date          | 10. CE mark                          |

## A.1.6 Routine tests

These tests define the particular characteristics that each device has to fulfil at the end of the production. These values are recorded in a routine test sheet, which is attached to the device at delivery.

## A.2 Safety precautions

### A.2.1 General precautions

**DANGER!**

High voltage electricity can kill or cause serious injury.

Never touch the circuit-breaker before the high voltage circuit is neutralized and the installation is properly earthed.

All inspection, maintenance and installation operations carried out on the circuit-breaker must be performed with the power off and the circuit-breaker earthed.

Some controls require the use of low voltage (DC) electrical supply. Follow the safety requirements in force to carry out these operations.

When performing installation, inspections and maintenance, keep your hands away from moving parts during the opening and closing operations of the circuit-breaker.

Do not attempt to service the internal parts without the presence of another person who is trained in first aid.

Modifying, removing, deactivating or otherwise changing components in any way may affect the safety of the device. Not using parts from the original manufacturer can affect the performance and safety of the device and automatically waives Sécheron's warranty

A circuit-breaker that appears to be damaged or defective should be disconnected or made inoperative and secured against unintended operation until they can be repaired by qualified personnel.

When isolating electrical equipment, the following five safety rules have to be observed: disconnect from the power supply / take the necessary means to prevent reclosing of the isolating switches / test absence of voltage by approved means / ensure earthing and short-circuiting by approved means / protect adjacent live parts by covers and barriers and fit a suitable warning notice.

### A.2.2 Safety requirements for the installation

of electric equipment connected to a Sécheron's circuit-breaker mounted on a vehicle.

When mounting electrical equipment inside a vehicle, the consequences of an eventual fault in the circuit breaking of the Sécheron's circuit-breaker must absolutely be taken into account.

All the necessary precautions must be taken in order to ensure the safety of the people inside (and/or outside) the vehicle if such a fault happens. Sécheron declines any responsibility in the case of non respect of the directive EN 45545.

### A.2.3 Hazard information

Hazard information in this document has the following meanings:

**DANGER!****Immediate danger to life!****Failure to observe this information will result in death or serious personal injury!****WARNING!****Risk of serious personal injury!****Failure to observe this information could result in death or serious personal injury!****CAUTION!****Risk of minor personal injury!****Failure to observe this information may result in minor personal injury!****Important!****Risk of damage to equipment!****Failure to observe this information could result in damage to equipment**

### A.2.4 Personnel use requirements

**WARNING!****If safety precautions are not followed, there is risk of personal injury.**

The **instruction manual** describes the authorized ways to install, operate and service the device, and it may only be installed, operated and serviced in accordance with these instructions. Sécheron will take no responsibility for injury or damage if the device is installed, operated and serviced in any other way.

During installation, maintenance and operation of the device, technicians and operators are responsible for:

- the device and the working area around the device;
- the personnel in the device area;
- ensuring that the safety test is fully completed before the high voltage circuit is connected.

Electricians should be certified according to local regulations with experience of similar types of installations. They must have proven skills in reading and working with drawings and cable lists, as well as knowledge of local safety regulations for power and automation. Work with the electrical equipment must be performed by **skilled or instructed technicians only**.

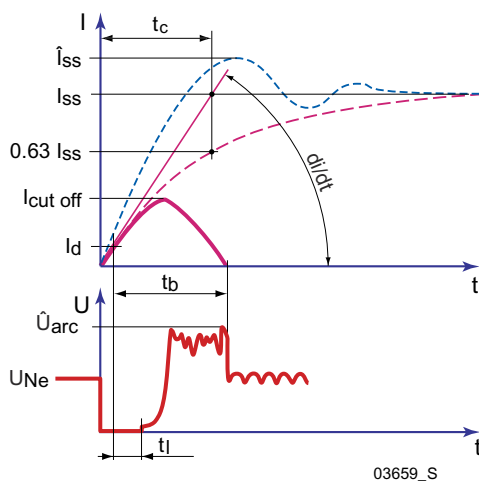
- A skilled person is an individual with technical knowledge or sufficient experience enabling him to avoid the hazards that electricity/mechanical devices/chemicals etc. can create.
- An instructed person is an individual adequately advised or supervised by a skilled person, in order to avoid the hazards that electricity/mechanical devices/chemicals etc. can create.

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# B. Technical specifications

## B.1 Characteristics

### B.1.1 Breaking current parameters



$I_{SS}$  = Prospective sustained short circuit current

$\hat{I}_{SS}$  = Peak of  $I_{SS}$

$I_{cut\ off}$  = Cut off current

$I_d$  = Setting of maximum current release

$di/dt$  = Initial current rate of rise

$U_{Ne}$  = Rated voltage

$\hat{U}_{arc}$  = Maximum arc voltage

$t_b$  = Total break time

$t_c$  = Time-constant of the circuit

$t_l$  = Opening time

### B.1.2 Main circuit

	Unit	UR46-81S	UR46-82S
Rated voltage	$U_{Ne}$	900 V	1800 V
Maximum operational voltage		1000 V	2000 V
Rated insulation voltage	$U_{Nm}$	3000 V	3000 V
Rated service current	$I_{Ne}$	4600 A	4600 A
Conventional free air thermal current ( $T_{amb}=40\text{ °C}$ )	$I_{th}$	4600 A	4600 A
Rated short-circuit making and breaking capacity according to EN-50123-1-2	$\hat{I}_{Nss}$	180 kA	115 kA
	$I_{Nss}$	125 kA	80 kA
	$T_{Nc}$	100 ms	31.5 ms
Maximum arc voltage	$\hat{U}_{arc}$	$\leq 2500\text{ V}$	$\leq 4000\text{ V}$

Refer to the corresponding data sheet for complementary information.

### B.1.3 Control circuit

Nominal voltage	$U_n$	24, 36, 48, 72, 96, 110, 220 Vdc
Supply voltage limits ( $-25\text{ °C} < T_{amb} < +40\text{ °C}$ )		$0.7U_n$ to $1.25U_n$

### B.1.4 Operating conditions

Ambient outdoors temperature	$T_{amb}$	$-25\text{ °C}$ to $+40\text{ °C}$
Altitude	$h$	$\leq 1400\text{ m}$
Flammability		To standards NF F 16-101 - NF F 16-102 – NF ISO 1928

## B.2 Breaker control

The circuit-breaker can be maintained in the closed position using either a reduced holding current (E type) or without current (M type).

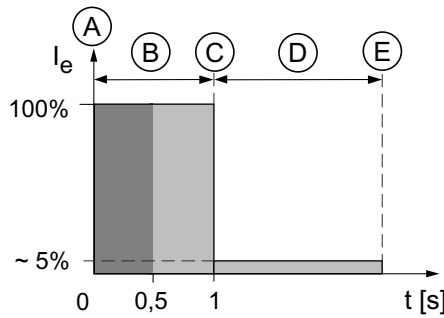
**Note!** Sécheron recommends the protection of the closing device coil using an automatic circuit-breaker with thermal protection, having the following characteristics: a closing pulse duration of 0.5-1 sec, the ability to trigger the circuit-breaker several times consecutively and a holding current that is limited to 5% of the closing current.



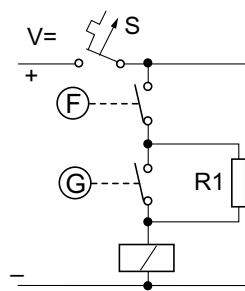
**Important!**  
A longer closing pulse may burn the coil.

### Electric holding: E type

- A. Start of the closing pulse: the contacts F + G close.
- B. Closing pulse: 0.5 to 1 s.
- C. Start of the holding current: the contact G opens.
- D. Holding: a R1 resistance limits the holding current to 5% of the closing current.
- E. Opening: the contact F opens to provoke the interruption of the holding current.



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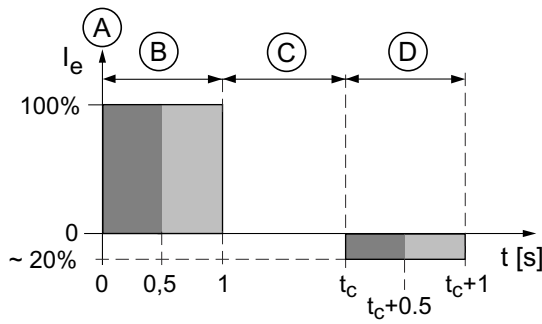


R1: holding resistor

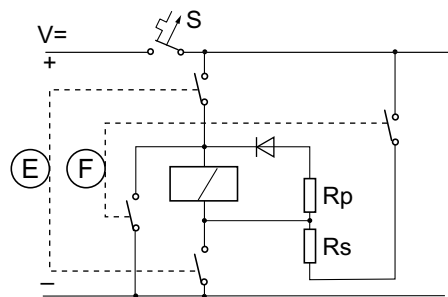
S: automatic circuit-breaker

### Magnetic holding: M type

- A. Start of the closing pulse: the contacts E close.
- B. Closing pulse: 0.5 to 1 s, then the contacts E open.
- C. Holding: achieved by the permanent magnet.
- D. Opening: the contacts F close to provoke a current pulse of the opposite polarity to the closing current. The duration of this pulse is 0.5-1 s, then the contacts F opens. The opening current is 20 % of the closing current.



03604



Rp: parallel resistor

Rs: serial resistor

S: automatic circuit-breaker



## B.2.1 Typical values for the closing coils

Coil characteristics				Closing Pulse 0,5 to 1 [s]				E type holding				M type opening Pulse 0,5 to 1 [s]				
$U_{nom}$	$U_{min}$	$U_{max}$	$R_{nom}$	$I_{nom}$	$I_{min}^E$	$I_{min}^M$	$I_{max}$	R1	$I_{nom}$	$I_{min}$	$I_{max}$	$R_s$	$R_p$	$I_{nom}$	$I_{min}$	$I_{max}$
[V]	[V]	[V]	[Ω]	[A]	[A]	[A]	[A]	[Ω]	[A]	[A]	[A]	[Ω]	[Ω]	[A]	[A]	[A]
24	16.8	30.0	0.575	41.7	22.5	25.0	70.9	11.4	2.00	1.38	2.54	2.36	1.33	6.07	3.81	8.49
36	25.2	45.0	1.10	32.7	17.7	19.6	55.6	25.0	1.38	0.95	1.74	5.30	2.99	4.31	2.73	5.96
48	33.6	60.0	2.30	20.9	11.3	12.5	35.4	45.7	1.00	0.69	1.27	9.40	5.35	3.05	1.90	4.27
64*	44.8	80.0	3.64	17.6	9.5	10.6	29.9	79.4	0.77	0.53	0.97	17.20	9.00	2.30	1.45	3.20
72	50.4	90.0	4.40	16.4	8.8	9.8	27.8	100.0	0.69	0.48	0.87	21.20	11.97	2.16	1.36	2.98
110	77.0	137.5	9.40	11.7	6.3	7.0	19.9	210.0	0.50	0.35	0.63	40.00	20.00	1.61	1.01	2.26
125*	87.5	156.3	11.95	10.5	5.6	6.3	17.8	272.0	0.44	0.30	0.56	52.00	26.00	1.42	0.89	1.99
220	154.0	275.0	37.60	5.9	3.2	3.5	9.9	840.0	0.25	0.17	0.32	160.0	80.00	0.81	0.50	1.13
Power consumption [W]				1300	400	400	2200	55	2.3	1.2	3.6	200	15	25	12	38

\* Optional voltage

R1: resistor to be inserted in the holding circuit of the E type; the power to be considered for the resistor choice is 220 W (4x55 W).

Rs: resistor to be inserted in serial with the coil in the opening circuit of the M type; the power to be considered for the resistor choice is 50 W (200 W / 4).

Rp: resistor to be inserted in parallel with the closing coil in the opening circuit of the M type.

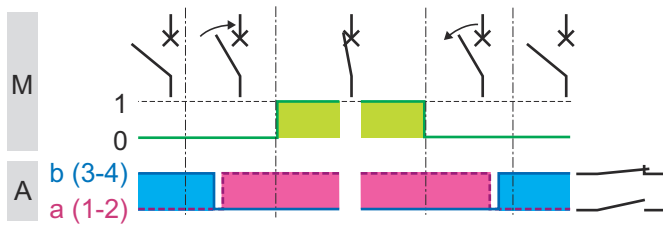
### Notes

- Values given for ambient temperature range between -30°C and 70°C. The  $I_{max}$  and  $I_{min}$  values are given for the most unfavourable values of voltage and temperature.
- $R_{min} = 0.92 \times R_{nom}$ ;  $R_{max} = 1.08 \times R_{nom}$ .
- These values refer to DC voltage or rectified full-wave voltage.
- The total opening time with a recovery diode is 2.5 s (not recommended as the opening time is too long).
- Sécheron recommends to protect the control circuit (while opening) with a varistor.

## B.3 Auxiliary contacts

Number of auxiliary contacts		5a (NO) + 5b (NC) in standard configuration
Rated voltage (potential free contacts)		24 to 220 Vdc
Maximum breaking current		1 A
– Ohmic load at 110 Vdc		0.3 A
– Inductive load $\tau = 15$ ms at 110 Vdc		
Conventional thermal current	$I_{th}$	10 A
Minimum let-through current at 24 Vdc (For a dry and clean environment)		10 mA for silver contact; 4 mA for gold contacts.
Connections		M3 screws

### B.3.1 Commutation diagram



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M. Main contact

A. Switching of auxiliary contacts (a+b)

# C. Installation



## DANGER!

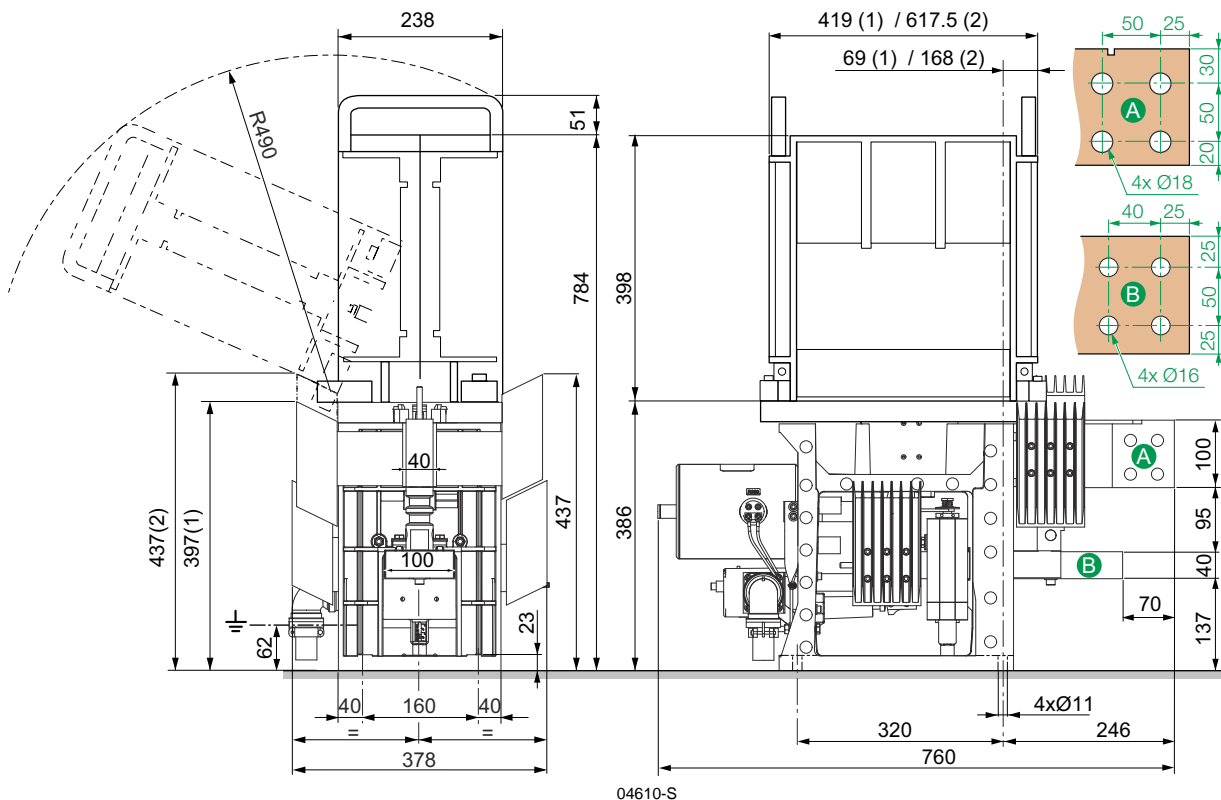
To ensure maximum safety, servicemen and operators must read the A.2 "Safety precautions" section before starting installation, maintenance and adjustment of the device or before starting to operate it.

## C.1 Weight and dimensions

Weight ( $\pm 5$ kg)	UR46-81S	UR46-82S
Circuit-breaker (standard, without options):	85kg	86 kg
Arc chute:	25 kg	34 kg
Total:	110 kg	120 kg

### Dimensions

The DIN-ISO 2768-1 coarse tolerances are applied to these dimensions.



(1) Type 81 arc chute

(2) Type 82 arc chute

## C.2 General requirements

---

Special arrangements must be agreed between the user and Sécheron SA to cover extreme service conditions such as:

- altitude above 1400 m;
- ambient temperature exceeding + 40°C;
- minimum temperature below - 25°C;
- high average temperature combined with high relative air humidity (> 95%);
- heavy rain, sand storms, etc.

## C.3 Delivery check and acceptance

---

### C.3.1 Check

The customer must open the package and visually check:

- the conformity of the delivered devices with the order: correct identification numbers on the identification plates and correct number of devices;
- for any damage on devices.

### C.3.2 Transport damage procedure

If the equipment is damaged, the customer must imperatively report the damage by an official letter to Sécheron SA **within 7 days after receiving the goods**. Once this delay has expired, all transport damages can no longer be covered by Sécheron SA. Sécheron SA will have to charge the customer for any repair. For the repair procedure, please refer to our website “[www.secheron.com](http://www.secheron.com)” and click on “Services / RMA”.

## C.4 Handling

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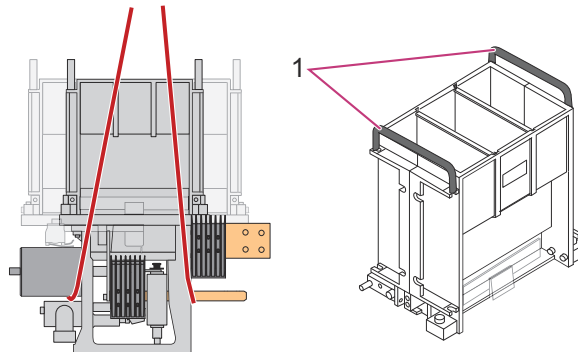
Circuit-breaker with its arc chute attached: lift it using ropes/slings as shown below.

Arc chute only: manipulate it by hand, or ropes, or straps and a hook. Lift the arc chute using both lifting handles (1).



**CAUTION! Risk of crushing.**

**The high speed circuit-breaker can weight up to 120 kg.**



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## C.5 Packing

Always pack the circuit-breaker assembled with the arc chute and protected against impacts and moisture.

## C.6 Storage

Store the circuit-breaker in a dry (maximum 50% of relative humidity at 40°C), clean and covered place, with a temperature range between -25°C and +55°C.

## C.7 Disposal

If the device is to be permanently disposed of, disassemble it as far as possible and separate the following materials:

- stainless steel
- copper and copper alloys
- aluminium
- rubber (seals, etc.)
- plastics
- electrical cables
- permanent magnets

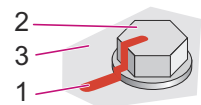
Recycle or dispose of all materials and components in compliance with local regulations.

## C.8 Tightening torques

### C.8.1 General procedure

Each screw/nut needs to be tightened to a specific torque. Torques that are different from the table below are indicated throughout this manual in their corresponding sections. Put a new elastic washer each time one has been loosened.

For the purpose of checking the tightening of all screws and nuts, paint a red line (1) from the screw/nut (2) onto the parts (3) after having tightened any screw/nut to the requested torque.



### C.8.2 Standard tightening torques

Unless specially indicated, use these values for greased stainless steel bolts.

Thread diameter	M3	M4	M5	M6	M8	M10	M12
Torque [Nm] $\pm$ 10% for A2/A4-70	1	1.7	3.4	5.9	14.5	30	50
Torque [Nm] $\pm$ 10% for A2/A4-80	1.3	2.3	4.6	8.0	19.3	39.4	67

## C.9 Mounting



**Important!**

**The circuit-breaker must be installed in an indoor ventilated enclosure that is free from dust and moisture (minimum IP54).**

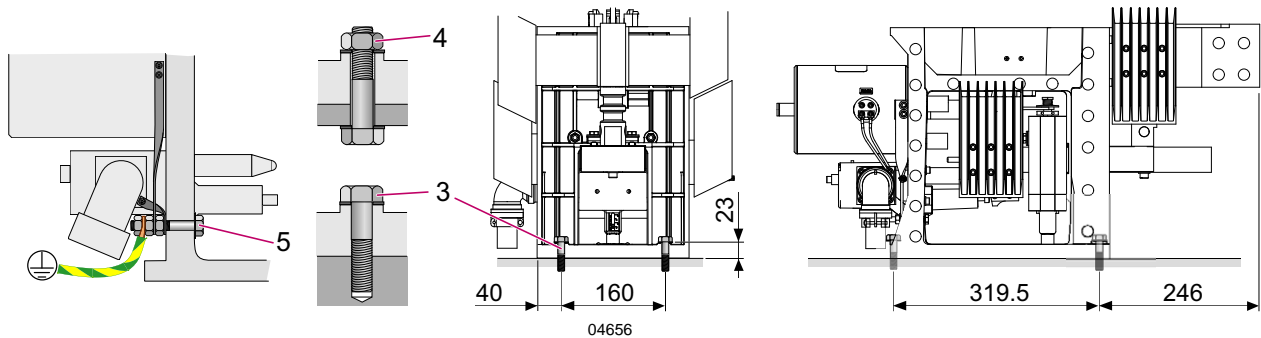
### C.9.1 Mounting position

The circuit-breaker must be installed with the arc chute upside (except when installed in some optional enclosures).

The arc chute must be screwed on the circuit-breaker.

Fix the circuit-breaker by means of M10 screws (3) or bolts (4), with washers, tightened to a torque of 44 Nm.

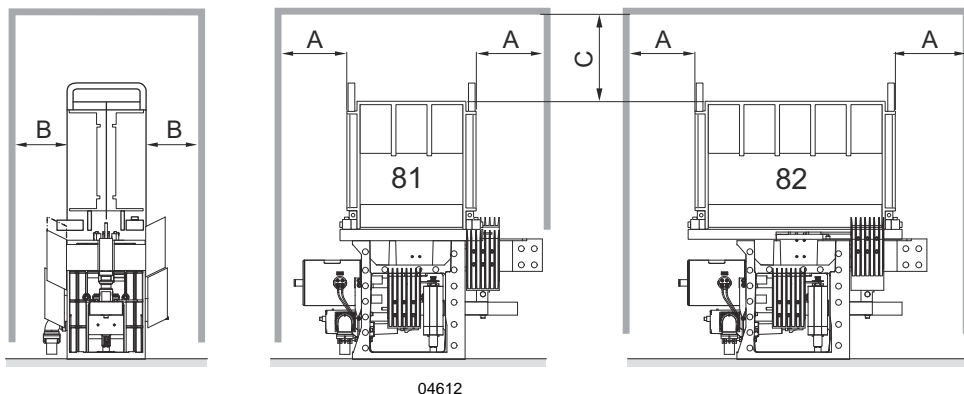
To be able to insert one of the screw (3), the earth bolt (5) needs to be removed and reassembled after (see § C.11).



### C.9.2 Clearances to be observed in operating position

Minimum distances to:	A	B	C (1)
Insulating wall	25	145	350 *
Metal wall	Contact Sécheron		

\* Grid with 50% of surface opening.



## C.10 Low voltage connector

The connector: Harting 32 poles HAN 32EE.

Sécheron's number for the mobile connector: SG104063R10100, including 30 pins of 1.5 mm<sup>2</sup> (SC202344) and 2 pins of 2.5 mm<sup>2</sup> (SC201259).

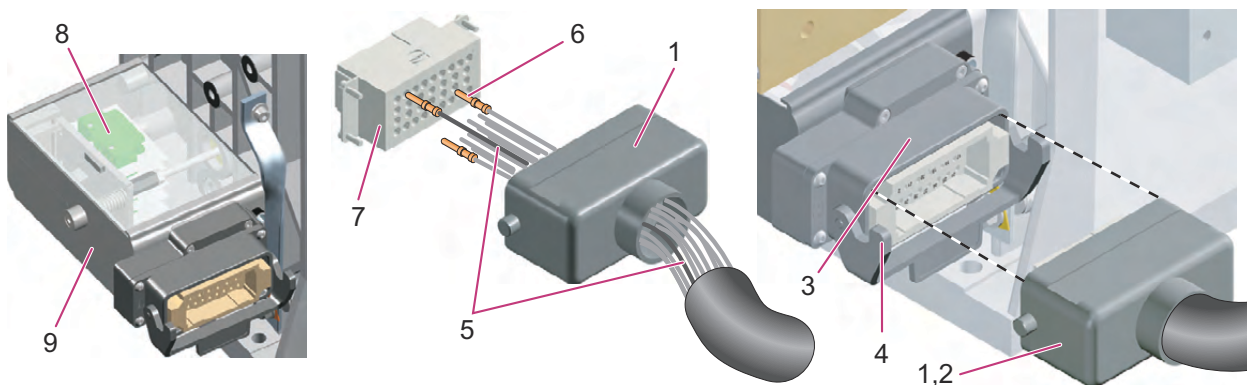
**Note!** The mobile connector needs to be ordered separately.

### Procedure

- Insert the cables (5) into the pins (6) according to the following 08007 diagram, using the 09 99 000 0110 crimping tool (with locator) from Harting for HAN E<sup>®</sup> with wire gauges 0.5 - 4 mm<sup>2</sup>.

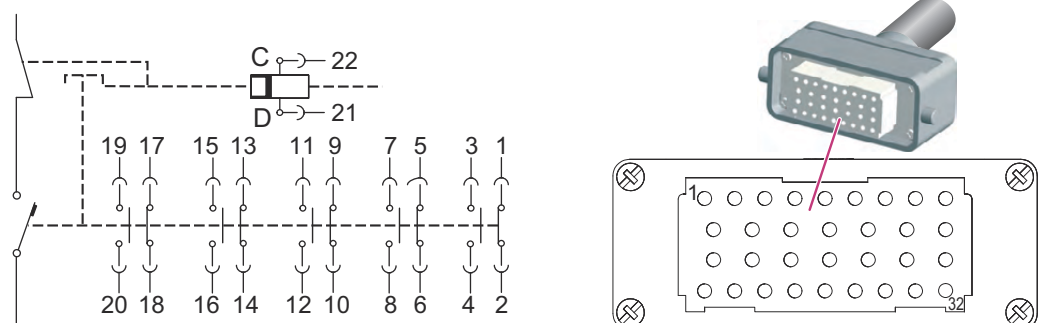
**Note!** The number of the Harting's pins removal tool is 09 99 000 0319.

- Manually insert the pins (6) into the holder (7) and fix the holder (7) into the connector (1).
- Check that the fixed (3) and mobile (1) connectors are not damaged.
- Connect the mobile connector (1) into the fixed connector (3), ensuring the correct orientation (pin 1 must go into hole 1 according to the wiring diagram) and that the lock (4) is correctly locked.



08006

### Pins correspondence



08007

The closing coil is connected to pins 21 and 22 (or 31 and 32 for devices manufactured before spring 2012), regardless of the polarity.

**Note!** Up to five double-contact switches (5) can be inserted in the auxiliary housing (6).

## C.11 Earth connection

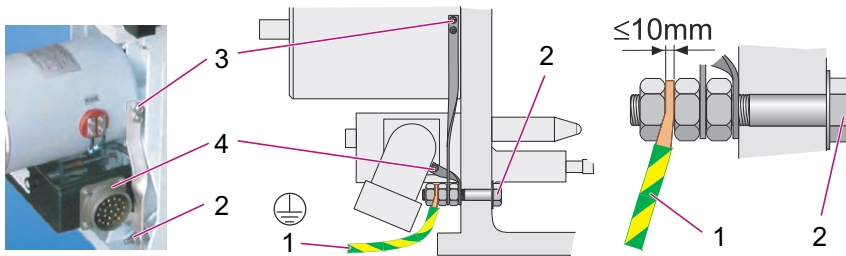
Connect the earthing conductor (1) onto the M8 connecting bolt (2). Tighten it to a torque of 22 Nm.

This bolt also connects the closing device (3) and the multi-pole connector (4) to the earth.



### CAUTION!

The minimal cross-section of the earthing conductor (1) must be of 50 mm<sup>2</sup>.



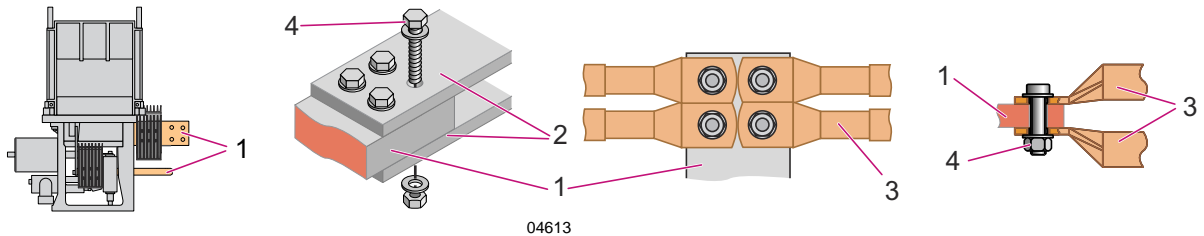
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## C.12 High voltage connections

The power connections may be made by cables or bars.

- Clean the surface of the main connections (1).
- Connect the bars (2) or the cables (3) using four M12 bolts (4) onto each main terminal (1). Tighten the bolts (4) to a torque of 50-67 Nm.



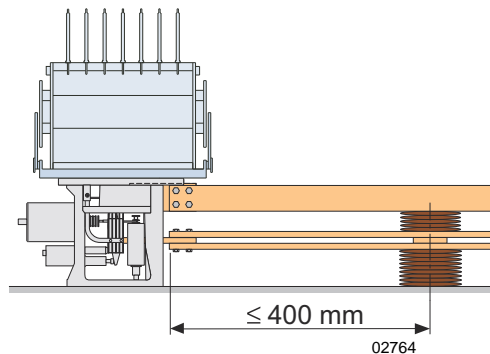
**Note!** According to EN-50123 for this range of current, the recommended current density is 1 A/mm<sup>2</sup> for copper bars and 1.3 A/mm<sup>2</sup> for copper cables.

### C.12.1 Recommended dimensions of the bars/cables



#### Important!

When connecting with bars, avoid creating mechanical stresses in the connections (1) by installing the first bar support (2) not farther than 400 mm from the connections (1).

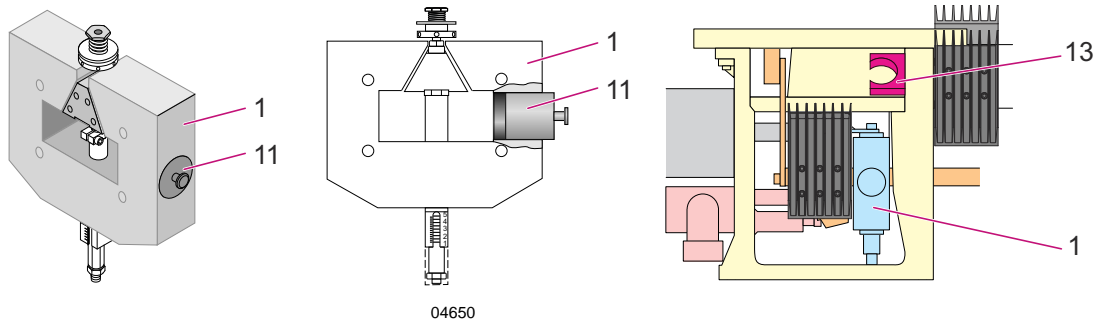


According to EN-50123 for this range of current, the recommended current density is 1 A/mm<sup>2</sup> for copper bars and 1.3 A/mm<sup>2</sup> for copper cables.

## C.13 Maximum current release (I<sub>d</sub>) setting

### C.13.1 Direct release

The direct release may or may not be equipped with a removable core (11) according to your specification of the release range. When the core is removed, store it in the special clip (13).



### C.13.2 Setting procedure

- Remove the caps (6 & 7).
- Loosen the lock nut (3).
- Loosen or tighten the special nut (4) to move the indicating mark (5) to the required value.
- Tighten the lock nut (3) and re-insert both caps (7 & 6).

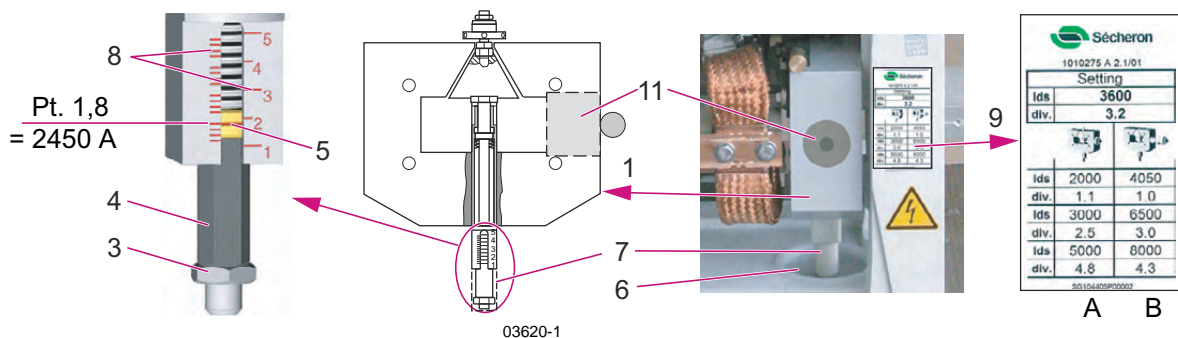
The direct release (1) is calibrated at the factory and adjusted either to the lowest value on the adjustment scale or to the value requested by the customer when ordering. A label (2 & 9) shows the correspondence between the current values and the scale (8).

#### Version with core

Two ranges of setting are available:

- With the core (11) inserted in the direct release (1): the setting range is, according to label (9A), between 2000 and 5000 A, with corresponding scale (5) from 1.1 to 4.8.
- With the core (11) removed from the direct release (1): the setting range is, according to label (9B), between 4050 and 8000 A, with corresponding scale (5) from 1.0 to 4.3.

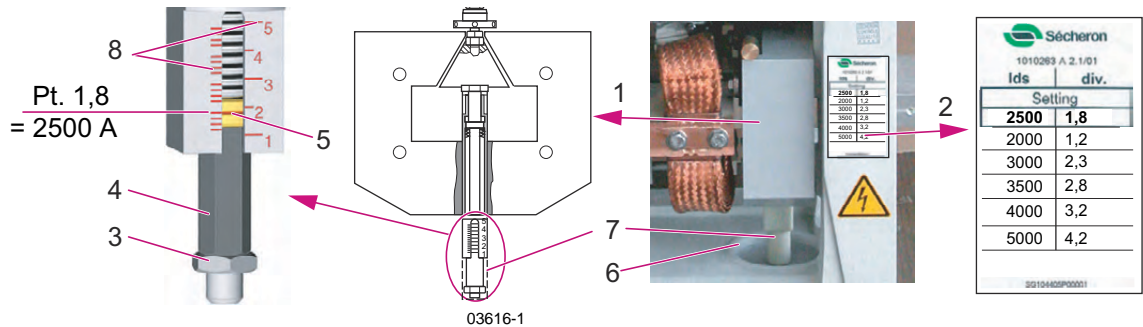
Example: to set the maximum current release value I<sub>d</sub> at 6000 A, an extrapolation from the label (9) requires the indicating mark (5) to be set at 2.4 on the scale with the core (11) removed.



- Values with the core inserted (in amperes corresponding to the beginning, middle and end of the scale).
- Values with the core removed (in amperes corresponding to the beginning, middle and end of the scale).

### Version without core (optional)

Example: to set the maximum current release value  $I_d$  at 2500 A, an extrapolation from the label (2) requires the indicating mark (5) to be set at graduation 1.8.

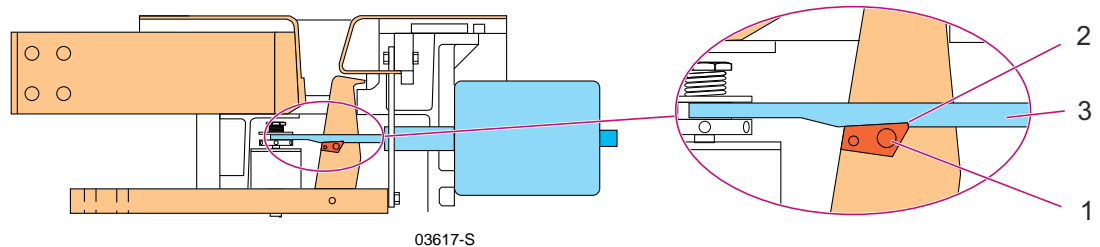


- A. Current in amperes.  
B. Corresponding line on the direct release scale (8).

## C.14 Final visual inspection and tests

Perform the following operations before putting the circuit-breaker into service.

- Check the following points:
  - Closing pulse duration set between 0.5 and 1 s, followed by the holding current.
  - Holding current value (in the case of an E type circuit-breaker) set at 5% of the closing current value.
- Ensure that both catches (1) of the moving contact are properly inserted in both grooves (2) of the fork unit (3).



- Check that all fixing and connection bolts are correctly tightened.
- Check that the circuit-breaker can close and open several time consecutively.



### Important!

**Operate the circuit-breaker to test it WITHOUT connecting it to the high voltage circuit.**

**Never operate the circuit-breaker under electric load without the arc chute and the sparks arresters fitted.**

## C.15 Security check advised during operation

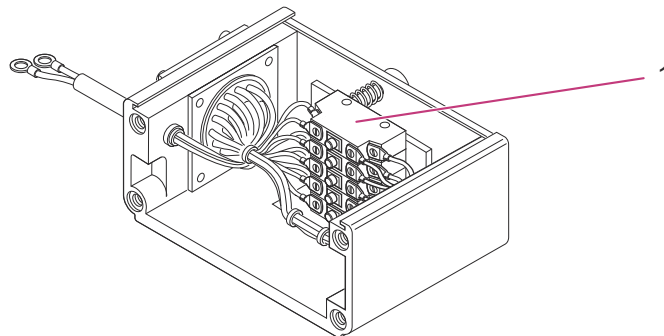
The customer should permanently verify that the voltage/current information coming from a voltage/current detector corresponds to the information about the state of the circuit-breaker given by its auxiliary contacts (1), according to the complete electrical circuit.

For example, if the information coming from the auxiliary contacts of the circuit-breaker shows that the circuit-breaker is open and the voltage transformer detect a voltage, this indicates a serious problem which must be immediately solved.



### **WARNING!**

**Never run a vehicle if the information coming from the auxiliary contacts (1) and a voltage/current detector is contradictory!**



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## D. Maintenance

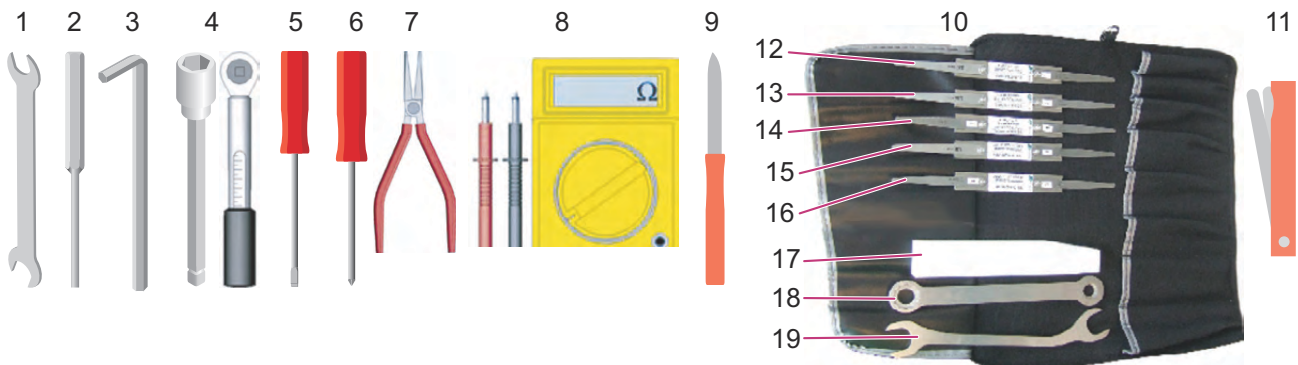


### DANGER!

To ensure maximum safety, servicemen and operators must read the A.2 "Safety precautions" section before starting installation, maintenance and adjustment of the device or before starting to operate it.

### D.1 Required tools and consumable

- |                                      |   |
|--------------------------------------|---|
| 1. Open end wrenches                 | 8, 10, 13 and 17 mm / 2x24 +2x27mm (4 mm thick) |
| 2. Pin removers                      | 4 and 6 mm                                      |
| 3. Allen wrenches                    | 2.5, 3, 4, 5, 6 and 8 mm                        |
| 4. Ratchet wrench with sockets       | 8, 9, 10 and 13 mm                              |
| 5. Flat head screwdrivers            | Nº 4 and 6 mm                                   |
| 6. Pozidriv screwdriver              | Nº 1  |
| 7. Flat long nose pliers             | 60 mm   |
| 8. Electric test multi-meter         |   |
| 9. Knife or scraper                  |   |
| 10. SG104782R10001 tools kit UR2/3/4 |   |
| 11. Or set of feeler gauges          | 0.05 to 2 mm                                    |
| Dry cloth                            |   |



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The standard SG104782R10001 tools kit UR2/3/4 contains (Sécheron quotes and delivers this kit on request):

- |   |  |
|---|--|
| 12. Control gauge UR2/3/4 gap X.          | 16. Control gauge UR2/3/4 gap J "IND". |
| 13. Control gauge UR2/3/4 gap Y.          | 17. Sécheron spacer.                   |
| 14. Control gauge UR2/3/4 gap Z standard. | 18. Ring spanner                       |
| 15. Control gauge UR2/3/4 gap J "M3".     | 19. Spanner                            |

12-16: gauges of type min-max:

- if both ends pass: clearance too wide;
- if both ends do not pass: clearance too narrow;
- if one end passes and not the other: the clearance is within tolerances.

### Grease for general purpose

Shell Rhodina LT2; Sécheron number SG104245P00001.

### Cleaning agents

Denatured alcohol.



**Important!**  
**No other solvents allowed!**

A solution of liquid soap in water may be used on polyester or polyamide parts on the condition that these parts are stripped down to the polyester or polyamide parts only for this work and then rinsed with fresh water and well dried before reassembly.

## D.2 Periodicity of the inspections



**Important!**  
**These frequencies are given for normal (abnormal conditions are listed in § C.2). The user should adapt these frequencies when using this device in other conditions.**

Operation	Frequency
Visual inspection	At least once a year
Detailed inspection	Whenever one of the following event occurs first: <ul style="list-style-type: none"> <li>– Every 18-24 months</li> <li>– Or after every 250 overload current interruptions (current value &gt; maximum current release setting Id).</li> <li>– Or after every 500 manual or remote openings (current value &lt; maximum current release setting Id).</li> </ul>

## D.3 Procedure

Perform the following operations:

### Visual inspection

- |                                  | See § |
|----------------------------------|-------|
| 1. Remove the arc chute          | D.5.1 |
| 2. Perform the visual inspection | D.5.2 |
| 3. Refit the arc chute           | D.5.3 |

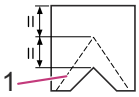
### Detailed inspection

- |   |               |
|---|---------------|
| 1. Clean the contact area                 | D.6.1         |
| 2. Measure the “W” contact wear dimension | D.6.2         |
| 3. Check and adjust the “X” clearance     | D.6.3         |
| 4. Check and adjust the “Y” clearance     | D.6.4         |
| 5. Check and adjust the “Z” clearance     | D.6.5         |
| 6. Check and grease                       | D.6.6         |
| 7. Check and adjust the “J” clearance     | G.3.2 / G.4.3 |

## D.4 Part replacement criteria

Refer to the “parts catalogue” chapter for the location of the parts.

For parts that are subject to wear due to current interruptions:

Item position	Name of the component	Replacement criteria	See §
130 - F.4.1 2 - F.4.1 1192 - F.4.1	Moving contact* Fixed contact* Pole*	When dimension $W_1 \leq 22 \pm 0.5$ mm or $W_2 \leq 3 \pm 0.5$ mm.	D.6.2 D.7
1196,1197 - F.4.1	Spark arresters	When the marks left by local burns reach a depth that is half the part's original thickness or when cracks appear.	D.7
5806 - F.4.6	Horns (81) Horns (82)	When their cross-section reaches half the part's original cross-section ( $20 \times 4 \text{ mm}^2$ ).	D.9
5802 - F.4.6 5803 - F.4.6 5804 - F.4.6	De-ionization plates	When the marks left by local burns reach a depth that is half the part's original thickness (2.5 mm). When vertical cracks appear.	D.9
5805 - F.4.6	Baffles	When they are touching each other. When the wear (1) reaches a height that is half the part's original height. 	D.9

\* These parts should be changed simultaneously

Replace the following parts, subject to wear due to mechanical operations, according to the number of cycles (counted or estimated).



### Important!

**These frequencies are given for normal (abnormal conditions are listed in § C.2). The user should adapt these frequencies when using this device in other conditions.**

One cycle is one opening and one closing of the circuit-breaker (with or without load).

Refer to the “spare parts catalogue” chapter for the location of the parts

Item position	Name of the component	Number of cycles	See §
1330 - F.4.2 131 - F.4.1	Fork assembly Catch	25'000	D.7 D.8
334 - F.4.2 370 - F.4.2 710 - F.4.5 720 - F.4.5	Compression spring Closing core Pusher assembly Shock absorber	50'000	D.10 D.10 D.13 D.13
300 - F.4.2	Closing device	150'000	D.10
1200 - F.4.4 1250, 1280, 1290 - G.4.6	Direct over-current instantaneous release* Optional indirect release*	Criterion: Every 10'000 trips (every 10 years at a rate of 3 trips per day).	D.12 G.4

\* To be replaced completely, or returned to Sécheron SA for repair.

## D.5 Visual inspection

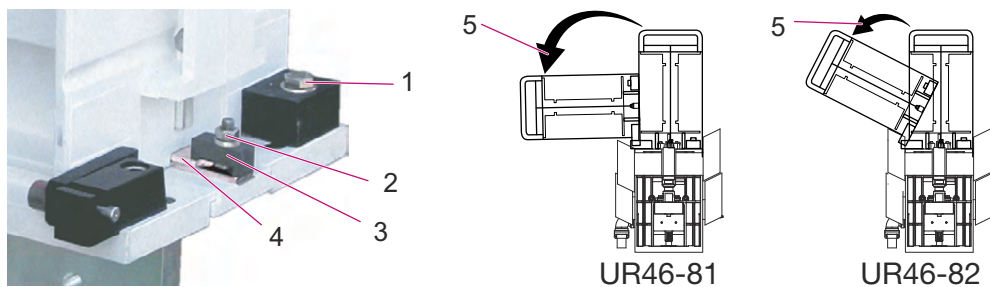
The circuit-breaker contacts must be checked and maintained with special care. Any soot deposit should be wiped away with a dry rag. If large beads form, scrape them off using a wire brush.



**Important!**  
**Never use a file on the contacts.**  
**Never apply grease onto the contacts.**

### D.5.1 Arc chute removal

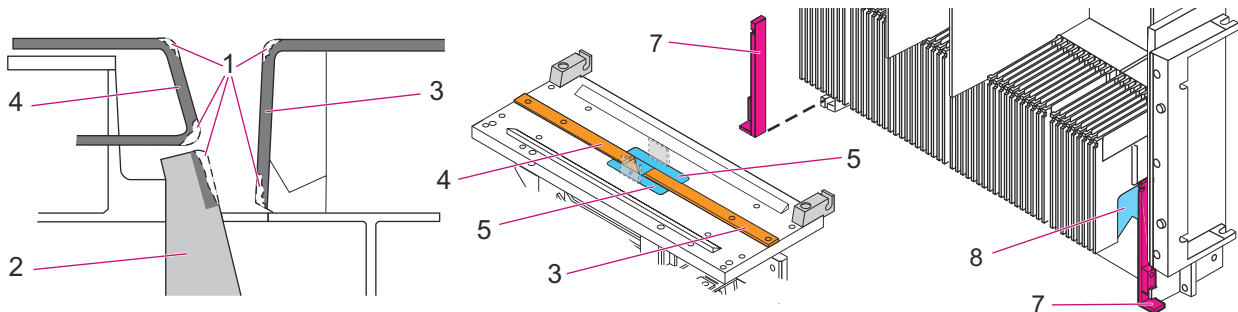
- Remove the screws (1).
- Loosen both nuts (2) and turn the flanges (3) of 90° to free the horns (4).
- Carefully swivel (5) the arc chute to the side of the circuit-breaker.



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### D.5.2 Inspection

- Visually check that all components such as bolts, nuts, clips, etc. are present. If needed, replace them, and tighten them according to the table of the § D.2, except for specifically specified torques in corresponding paragraphs throughout this manual.
- Check the following parts for wear (1) according to the § D.4 "Part replacement criteria" and their referenced sections:
  - the moving contact (2);
  - the fixed contact (3);
  - the pole (4);
  - the sparks arresters (5): remove them from the circuit-breaker and clean them using a dry rag and a dust collector;
  - the outer horns (7) and the baffles (8).
- Change them when necessary.



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### D.5.3 Arc chute refitting

Reassemble the arc chute in reverse order to § D.5.1 "Arc chute removal".

Tighten both nuts (2) with washer to a torque of 10 Nm.

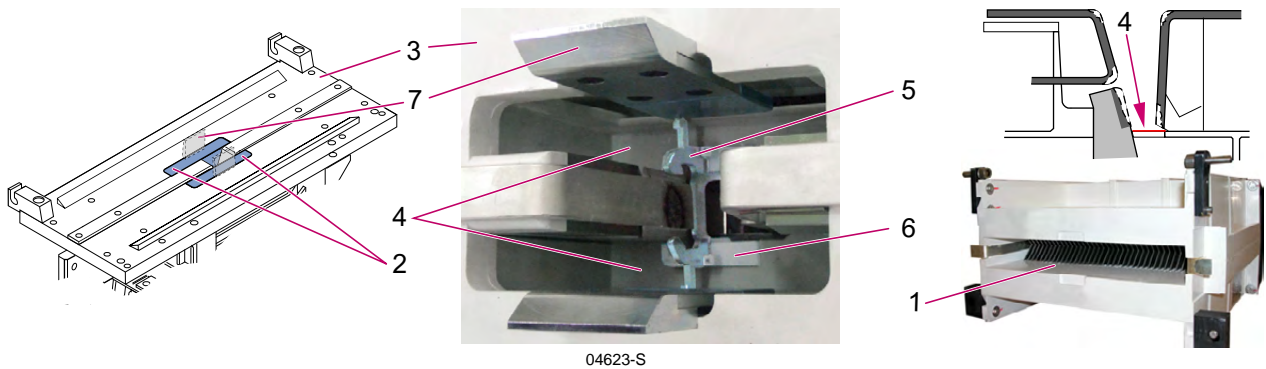


## D.6 Detailed inspection

First perform a visual inspection, see § D.5.

### D.6.1 Cleaning the contact area

- Remove the spark arresters (2).
- If the blowing device (7) is present, remove the electrode (5) without disconnecting its cable and the electrode support (6). Clean them using a dry cloth. If the electrode (5) or the electrode support (6) have burns, change them.
- Using a dry cloth and a dust collector, clean the upper plate (3), the frame at the bottom (4) of the cut-out chamber and the arc chute inlet (1).
- Refit all components.



### D.6.2 Measuring the “W” contact wear dimension

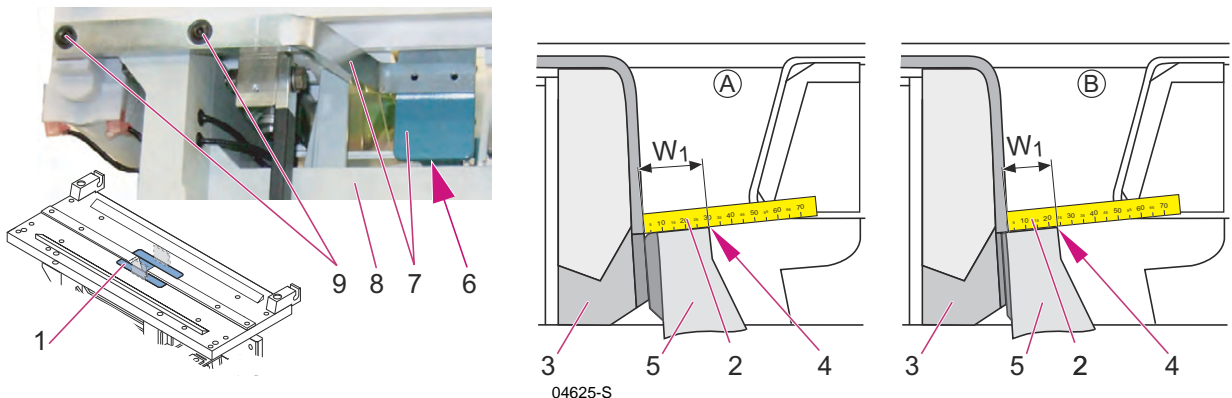
Two different methods can be used. Use the method 1 when the lateral access to the main contacts is possible.

The circuit-breaker must be closed.

#### Method 1

- Remove a spark arrester (1).
- Using a flexible graduated ruler (2), measure the  $W_1$  distance between the base of the fixed contact plate (3) and the horn (4) of the moving contact (5).  
If  $W_1 \leq 22 \pm 0.5$  mm, replace the main contacts (see § D.7).

**Note!** If the blowing device is present, read the ruler by looking between (6) the magnetic cheek (7) and the main frame (8). If reading is not possible, remove both screws (9) and one magnetic cheek (7).



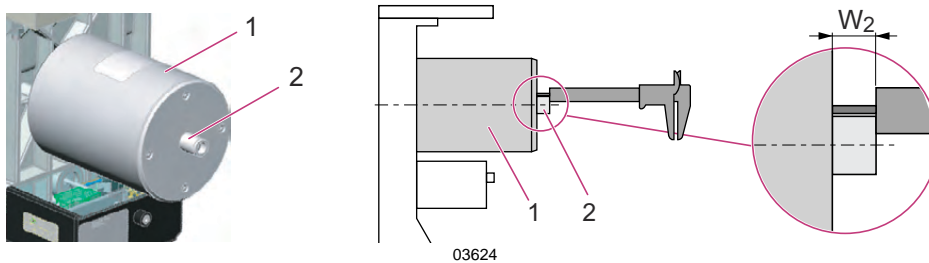
**Note!** “ $W_1$ ” dimension for new contacts is  $29 \pm 1$  mm.

## Method 2

The circuit-breaker must be closed.

Measure as shown below.

- “W<sub>2</sub>” dimension for new contacts is 8±1mm.
- If  $W_2 \leq 3^{\pm 0.5}$  mm, replace the main contacts (see § D.7).



**Note!** Where the optional manual closing device is present, please see § G.1 "Manual closing device".

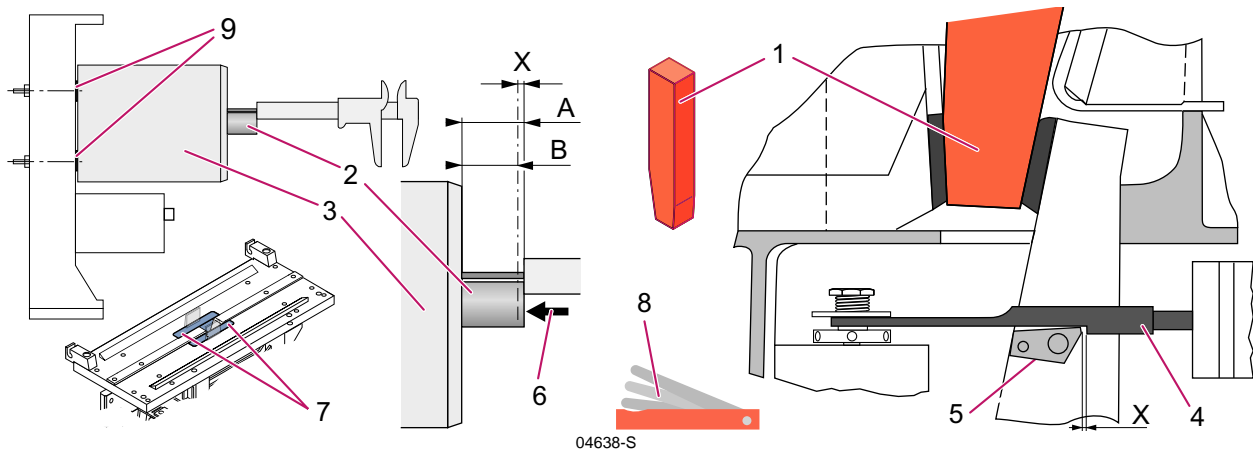
## D.6.3 Check and adjustment of the X clearance

Requirement:  $X = 2.0 \pm 0.5$  mm.

**Note!** This measurement is performed with the circuit-breaker opened and secured in this position.

### Measurement

- a) The SG101777P00001 spacer (1) must be inserted between the mobile and the fixed contacts to block the contacts in the open position.



- b) Checking the X clearance: two possible ways:

- Measure the extension of the rod (2) out of the closing device (3) with a depth gauge or a comparator.
    - First, without pressure on the rod (2), measure the length A.
    - Second, with pressure (6) applied axially onto the rod (2), press the fork (4) against both catches (5), measure the length B.
    - The A-B difference corresponds to the X clearance.
  - Remove the arc chute (see § D.5.1 "Arc chute removal") and the spark arresters (7). Insert the Sécheron's "X" gauge (8) (or a feeler gauge) between the fork (4) and one of the two catches (5).
- c) Adjust the X clearance if the measurement is out of tolerances.

### Adjustment

Add or remove the bolt shims (9) of the closing device according to § D.10, until the correct X clearance is obtained (adding shims (9) increases the X clearance).

## D.6.4 Check and adjustment of the Y clearance

Requirement:  $Y = 2.0^{+0.2/-0.5}$  mm

**Note!** This measurement is performed with the circuit-breaker closed.

### Measurement

Measure the Y clearance on both arms (6) of the fork with the recommended Sécheron's "Y" gauge (or a feeler gauge). Where there is a difference between the sides, take the average value  $Y = (Y1+Y2)/2$ .

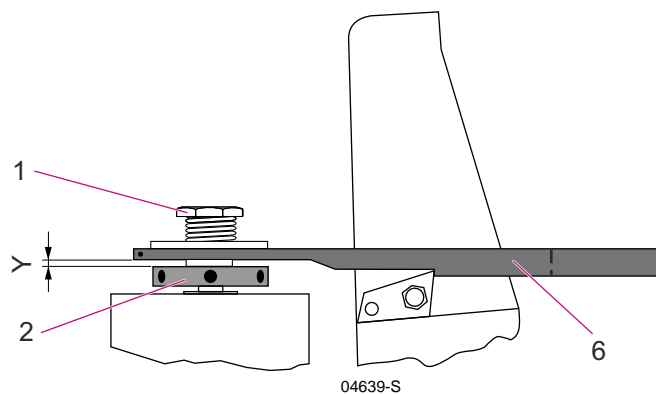
### Adjustment

Loosen the lock nut (1) and the nut (2), turn the nut (2) to adjust the Y clearance and retighten the nut (1).

After adjustment, at least two open/closing operations must be performed prior to re-check the clearance.

**Note!** Control and adjust the Y clearance after each setting of the "Id" value (see § C.13 "Maximum current release (Id) setting").

If no specific Id value is determined when adjusting the Y value, set the Id to the mark "2" on the direct release scale.



## D.6.5 Check and adjustment of the Z clearance

Requirement:  $Z = 1.6 \pm 0.2$  mm

This measurement is performed with the circuit-breaker opened. A correct Z clearance setting is important to correctly operate the auxiliary contacts (2), which signal the circuit-breaker status (opened or closed). The auxiliary contacts may not operate when there is an incorrect Z clearance.

### Measurement

- The SG101777P00001 spacer (1) must be inserted between the mobile (3) and the fixed (4) contacts to block them in the completely opened position.

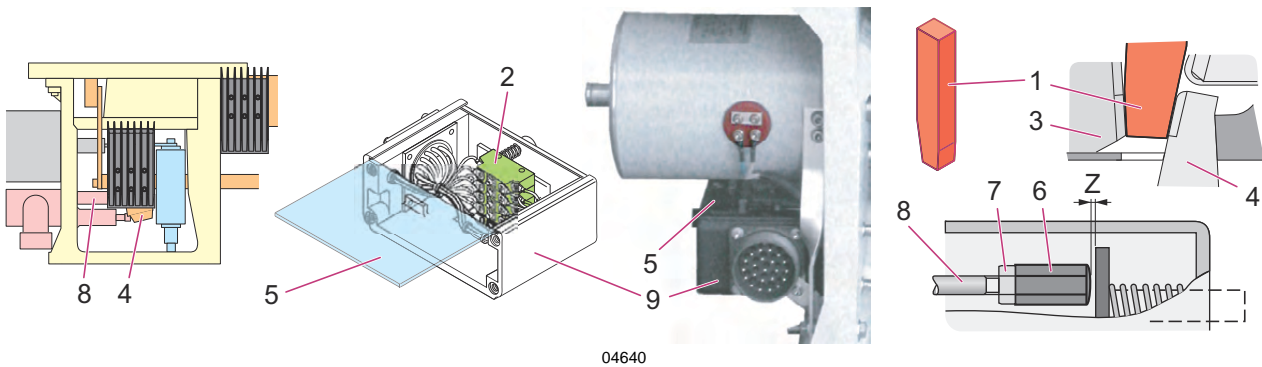
**Note!** If the optional "Position Indicator" is mounted on the housing (9), see § G.9.

- Remove the transparent cover (5).
- Measure the Z clearance at the tip of the pusher (8) using the recommended Sécheron's "Z" gauge (or an universal feeler gauge).

### Adjustment

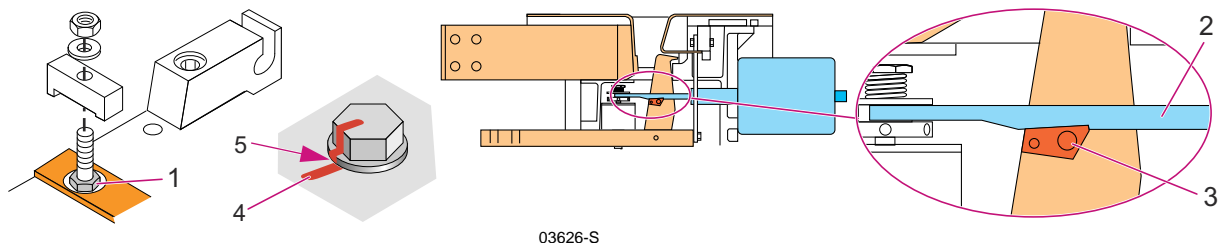
Loosen the lock nut (7) and nut (6), turn the nut (6) to adjust the Z clearance and retighten both.

After the adjustment, at least two open/closing operations must be performed before rechecking the clearance.



## D.6.6 Check and grease

- In order to check the tightening torque of all screws and nuts, look at the red mark (4) which must be aligned; if this mark is desaligned (5) retighten the screw according to the § D.2 table or specifically specified torques in corresponding paragraphs throughout this manual (i.e the nuts (1) at 17 Nm).
- Grease the fork assembly (2) and the ratchet catch (3), applying the grease with a brush.



## D.7 Replacement of the main contacts and the pole

- a) Remove the arc chute (see § D.5.1 "Arc chute removal").
- b) Remove the spark arresters (1 below).

### D.7.1 Removal of the fixed contact, the pole and the metal strips

- a) If the blowing device (36,37,38,39,40,41) is present, remove the screws (36) and both magnetic cheeks (37), then disconnect the cable (38) and remove the electrode (39) with its support (40).
- b) Remove the flanges (2), the thin M8 nuts (3) and the spring washers (4).

#### Fixed contact

- c) Lift up the end (6) of the fixed contact (5) to free it from the threaded rod (7).
- d) Simultaneously loosen both nuts (27) to release the fixed contact (5) and remove it (31) from above.

#### Pole

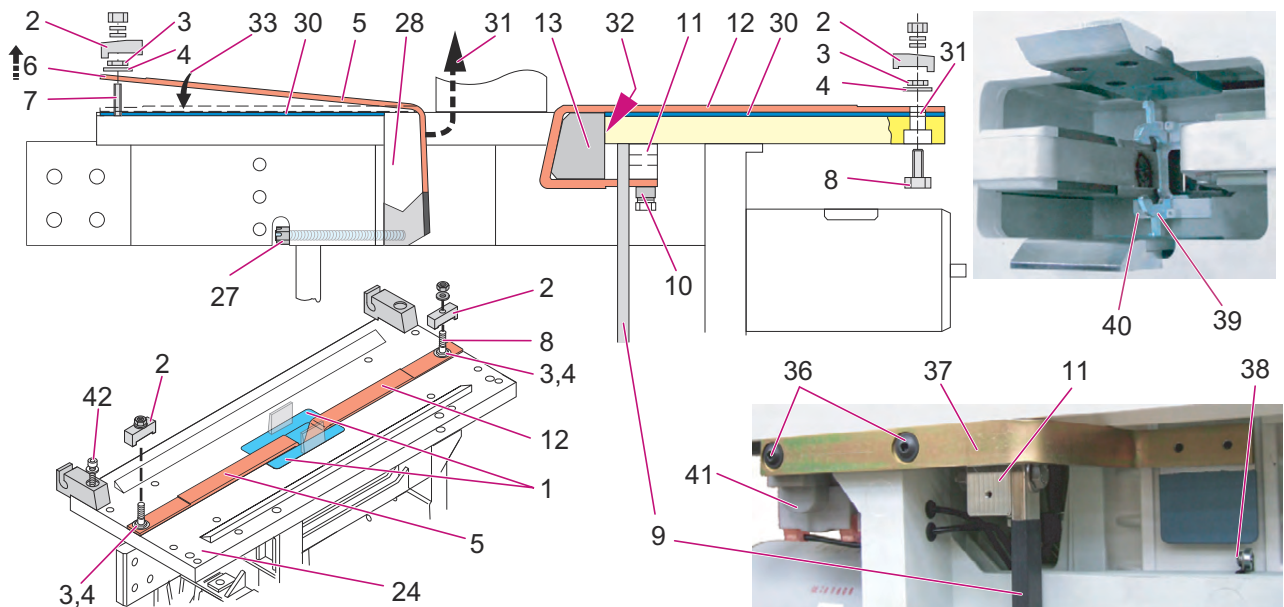
- e) Remove the screw (8).

**Note!** For the UR46-81 version only and if the blowing device is present, loosen the screws (42) and remove the coil (41) to be able to remove this screw (8).

- f) Entirely remove both straight connections (9).
- g) Loosen the flange (10).
- h) Push the pole (12) with blow-out core (13) first inward then upward.
- i) Separate the pole (12) from the blow-out core (13) by sliding them apart.

#### Metal strips

- j) Remove both metal strips (30).

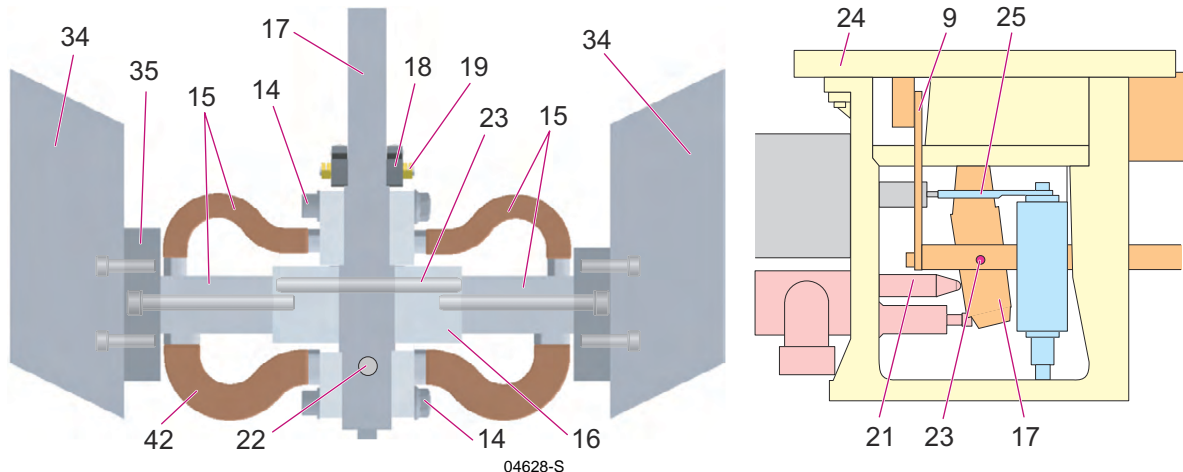


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## D.7.2 Replacement of the moving contact

### Disassemble

- Remove the coolers (34) and the plates (35).
- Remove both flexible connections (15).
- Remove the catches (18) with the pins and threaded nut rod by unscrewing one of the nuts (19).
- Remove the end of the pusher (21) from its seat (22) on the moving contact.
- Push the pin (23) out of the moving contact (17).
- Remove the moving contact (17) through the top plate (24).



### Reassemble

- Insert the new moving contact (17) through the top plate (24) between both pawls of the fork (25). Lightly grease the fork and the moving contact catches.
- Insert the pin (23).
- Insert the end of the pusher (21) into its seat (22) on the moving contact.
- Reassemble new catches (18) with the pins, threaded nut rod and both nuts (19).
- Connect the flexible connections (15) with the thicker flexible connections (42) underneath: first onto the top part, then onto the lower part and finally onto the lower connecting bar (16).
- Refit the plates (35) and the coolers (34).

## D.7.3 Reassemble the metal strips, the pole and the fixed contact

Refer to both figures above.

### Assemble the metal strips

- Insert new metal strips (30): align the metal strips holes (31) with the top plate (24) holes.

### Assemble the pole

- Insert the blow-out core (13) into the new pole (12).
- Insert this assembly correctly into the circuit-breaker, hold it against the rib of the frame (24) to place and tighten the flange (10).
- Assemble both straight connections (9) onto the connecting plate (11) and the flexible connections (15).
- Insert the M8 screw (8) into the frame plate (24) and fasten the pole (12) with the thin M8 nut (3; tightening torque of 17 Nm) and spring washer (4).
- Fit the flange (2) and hand tighten the M8 nut and washers.

### Assemble the fixed contact

- g) Check the condition of the surfaces at the point of contact (32). These should be flat, smooth and clean.
- h) Place the contact fixe (5) on the fixed part (28).
- i) Raise the end (6) of the fixed contact (5) by three centimetres to be able to tighten both nuts (27) simultaneously to a tightening torque of 10 Nm.
- j) Bend (33) the fixed contact (5) towards the top plate (24).
- k) Attach the fixed contact (5) with the thin M8 nut (3) and the spring washer (4). Tighten the thin nut (3) to a torque of 17 Nm.
- l) Place the flange (2), and hand-tighten it with the washer and the nut.
- m) If the blowing device is present:
  - For UR46-81 version only: reassemble the coil (41).
  - Insert the electrode support (40) into its seat into the main frame and insert the electrode (39).
  - Connect the cable (38)
  - Assemble both magnetic cheeks (37).
- n) Insert the spark arresters (1) into their seats.

### D.7.4 Refit the arc chute

See § D.5.3 "Arc chute refitting".

## D.8 Replacement of the fork unit

- a) Remove the closing device; see § D.10 "Replacement of the closing device".



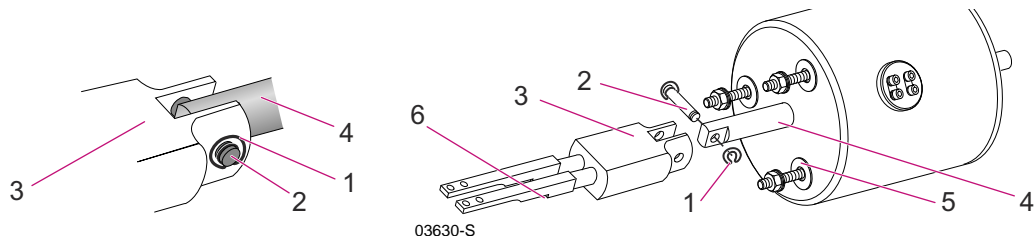
#### Important!

**When reassembling the closing device, the spacers (5) must be reinserted exactly at the same place from where they were removed.**

- b) Remove the circlip (1) and the pin (2).

The new fork unit is supplied with its own pin, therefore to reassemble the fork unit:

- c) Remove the circlips (1) and then the pin (2) from the new assembly.
- d) Place the fork (3) onto the end of the closing rod (4); the notches (6) must be downside.
- e) Connect them by inserting the pin (2), then the circlips (1).
- f) Lightly grease the fork.
- g) Reassemble the closing device; see § D.10 "Replacement of the closing device".



## D.9 Replacement of the arc chute parts

### D.9.1 Replacement of de-ionizing plates and baffles

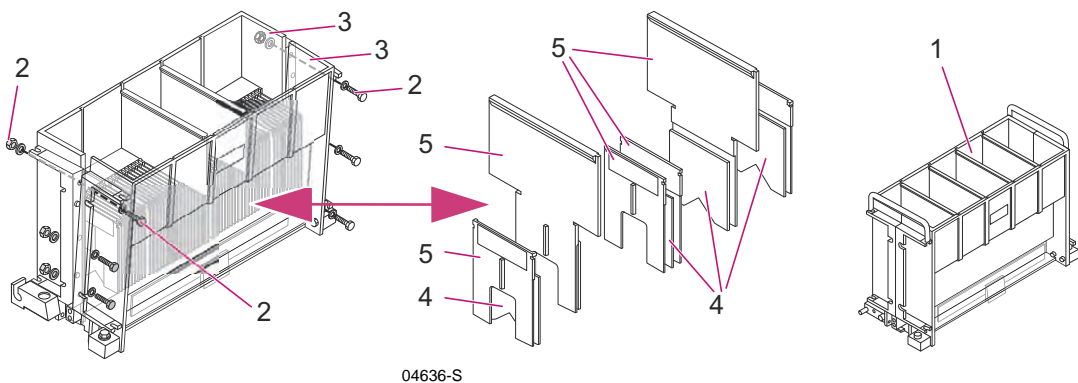
- Remove the arc chute (1, see § D.5.1 "Arc chute removal") and place it upright on a bench.
- Loosen the six bolts (2) by several turns, starting from the bolts at the top.
- Separate the tops of the arc chute walls (3) by about 8 mm to form a "V".
- Remove the baffles (4) and de-ionizing plates (5) one by one.



#### Important!

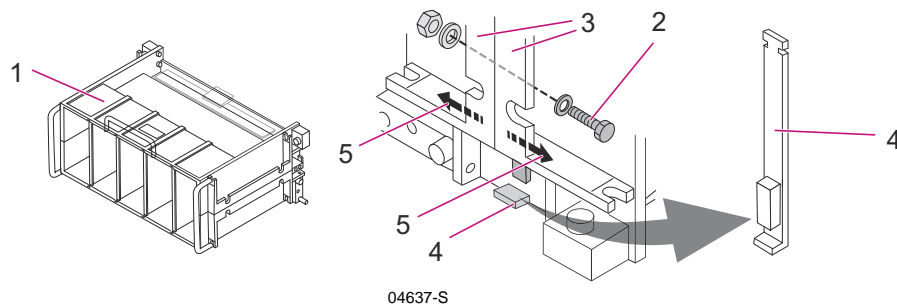
**These elements must be reassembled in the same order.**

- Re-insert the baffles (4) and the de-ionizing plates (5) one by one, replacing the worn parts according to § D.4 "Part replacement criteria".
- Press the arc chute walls (3) together and tighten the six bolts (2); do not forget the washers!



### D.9.2 Replacement of the horns

- Lay the arc chute (1) on a bench.
- Loosen the bolts (2) and spread (5) the lower part of the arc chute walls (3).
- Remove the horns (4) and replace the worn horns according to § D.4 "Part replacement criteria".
- Fit the new horns (4) and press the lower parts of the arc chute walls (3) together.
- Tighten the bolts (2) by hand.
- Place the arc chute (1) upright and tighten the bolts (2) firmly using a wrench.



- Reassemble the arc chute according to the § D.5.3.



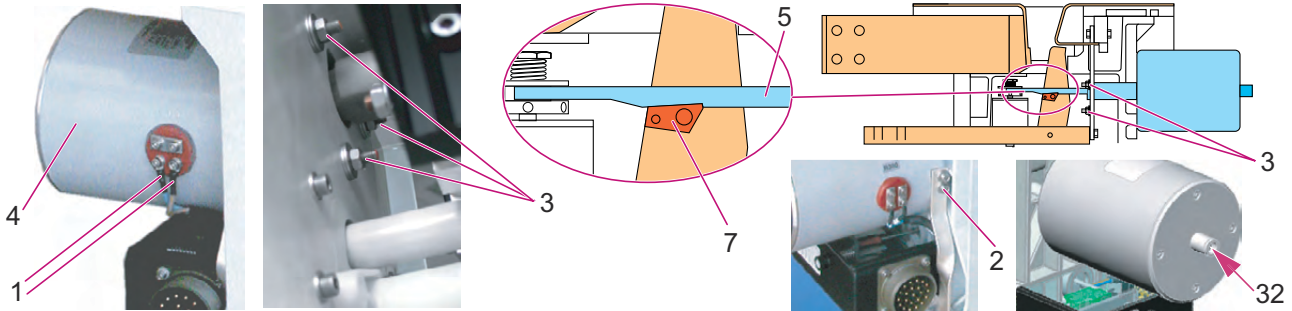
## D.10 Replacement of the closing device



**Important!**  
Never touch the screw (32).

### Removal

- Disconnect the wires (1).
- Remove both M6 earth connection screws (2).
- Unscrew the three M8 nuts (3) and remove the entire device (4).



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### Reassembling

- Insert the entire device (4).
- Ensure that the fork unit (5) is properly turned, with its notches for the catches (7) underneath, and properly placed on the moving contact catches (7).
- Holding the device (4), tighten the three M8 nuts (3) with their washers.
- Lift the fork (5) by hand and check that it remains properly in place when released.
- Check the X and Y clearances and adjust them if necessary (see § D.6.3 and D.6.4).
- Connect both (or the four for 24 V coil) wires (1), with the blue one on the left.
- Connect the earth connection (2) using both M6 screws.
- Slightly grease the fork (5) and the catches (7).

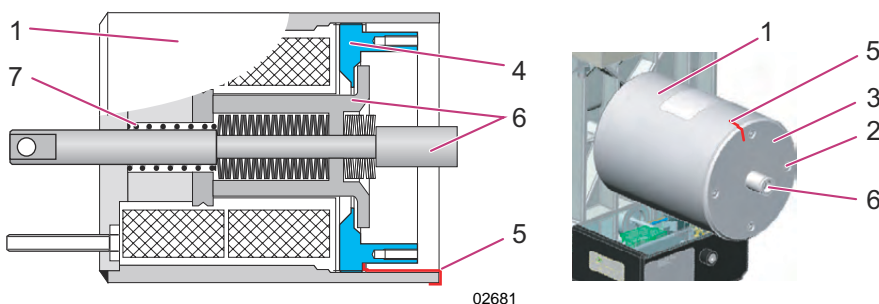
## D.11 Replacement of the closing core and the spring

- Remove the closing device (1) (see § D.10 "Replacement of the closing device") and the fork unit (see § D.8 "Replacement of the fork unit").
- Stand it on a bench in vertical position and remove the four screws (2) and the cover (3).



**Important!**  
Do not change the position of the flange (4) while working.  
Mark its position (5) with a felt-tip pen before removing the closing core.

- Remove the closing core (6) and the spring (7).
- Reassemble in reverse order with new closing core and spring.



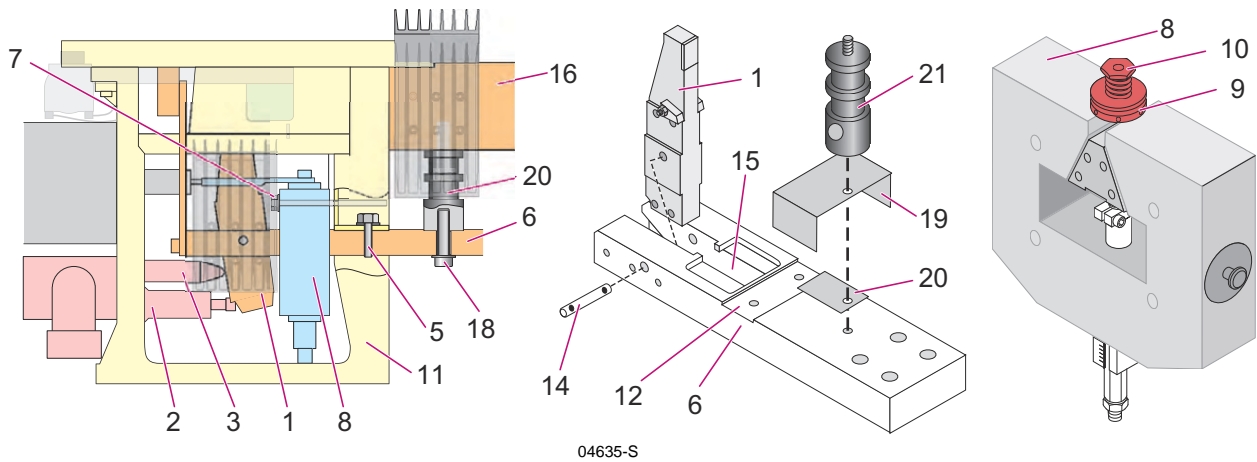
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## D.12 Replacement of the direct release

### Removal

- Remove the moving contact (1) with the catches: see § D.7.2 "Replacement of the moving contact".
- Remove the shock absorber unit (2) and the pusher assembly (3): see § D.13 "Replacement of the pusher and the shock absorber".
- Remove the screw (18) and the isolations (19,20).
- Remove both screws (5) to lower the connecting bar (6).
- Remove both M8 x 90 screws (7) to lower the direct release (8).

**Note!** These screws (7) can also attach an optional indirect release (see § G.4).



### Reassembling

- On the new direct release, hand-tighten the nut (9) and lock nut (10) firmly.
- Attach the direct release (8) onto the frame (11), using both screws (7, attach also the optional indirect release if present).
- Insert the lower connecting bar (6) through the frame (11) and the direct release (8). To have this bar in the correct position, the groove (12) must be upside. Screw in the screws (5) and hand-tighten them.
- Insert the isolations (19,20) between the bar (6) and the support (21), screw in the screw (18) and hand-tighten it.
- Insert the moving contact (1, see § D.7.2 "Replacement of the moving contact") and insert its pin (14). The moving contact (1) must be located in the centre of the slot (15) and in front of the fixed contact (16); so adjust it by adjusting the position of the lower connecting bar (6) before tightening the screws (5,18).
- Insert the pusher (3) and the shock absorber unit (2) into the frame (11); see § D.13 "Replacement of the pusher and the shock absorber".
- Close the breaker and adjust clearance Y: see D.6.4 "Check and adjustment of the Y clearance".
- In case of an optional indirect release or manual release is present, adjust the J clearance according to § G.4 "Indirect releases".

**Note!** With a new direct release, calibrate the circuit-breaker to determine the new equivalencies between the maximum current release  $I_d$  and the adjustment scale. A direct current supply is needed.

## D.13 Replacement of the pusher and the shock absorber

These parts must be removed when changing the direct release.

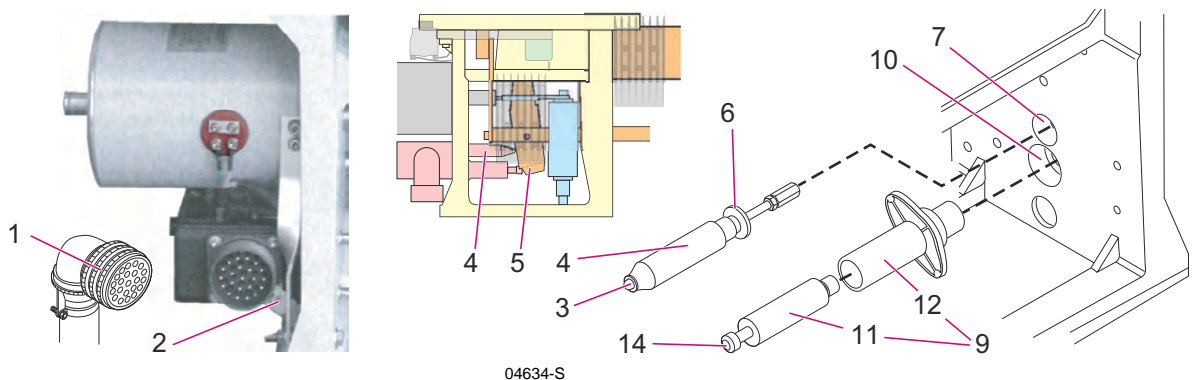
Criteria to change the shock absorber (11): 50'000 operations, or visible traces of oil on it or on the bottom of the frame (13).

### Pusher

- Remove the connector (1) and the earth connection (2).
- Remove the end (3) of the pusher (4) from its seat on the moving contact (5).
- Push the swivel joint support (6) off its seat (7) to remove the pusher.
- Insert the new pusher (4) into its seat (7).
- Insert the end (3) of the pusher into its seat on the moving contact (5).
- Check that the swivel joint support (6) is at the bottom of its seat (7).
- Adjust clearance Z: see § D.6.5 "Check and adjustment of the Z clearance".
- Reconnect the connector (1) and the earth connection (2).

### Shock absorber

- Remove the connector (1) and the earth connection (2).
- Remove the unit (9) from its frame seat (10).
- Remove the shock absorber (11) from its sleeve (12).
- Insert the new shock absorber (11) into its sleeve (12).
- Hold the unit (9) by hand and insert it into its frame seat (10), compressing the piston (14) with your thumb.
- Push the unit (9) to the bottom of its seat (10); closing the circuit-breaker if necessary.
- Reconnect the connector (1) and the earth connection (2).



## D.14 After sales services

For any return of merchandise to Sécheron, please refer to our website "www.secheron.com" and click on "Services / RMA".

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# E. Trouble shooting



## **DANGER!**

To ensure maximum safety, servicemen and operators must read the [A.2 "Safety precautions"](#) section before starting installation, maintenance and adjustment of the device or before starting to operate it.

## E.1 Procedure

After all adjustment, perform a check according to § [E.3](#).

### E.1.1 Main circuit malfunctions

Defect	Possible causes	Remedies
Over-heating	Dirty or damaged (worn or burnt) contacts.	Clean or change the main contacts, see § <a href="#">D.7</a> .
	Loose main conductor connections.	Tighten the connections bolts, see § <a href="#">C.12</a> .
	Load current exceeds the circuit-breaker admissible value.	<ol style="list-style-type: none"> <li>1. Increase the power cables or busbars cross-sections: see § <a href="#">C.12</a>.</li> <li>2. Reduce the current.</li> <li>3. Change the category of circuit-breaker.</li> </ol>

Both of the following tables refer to the closing device type mounted on the circuit-breaker:

**Type M closing device**

Defect	Possible causes	Remedies
<b>A</b> The circuit-breaker does not maintain its closed position.	Closing current too low: $I < I_{min}$	1. Check the power of the alternating current source. 2. Charge the batteries.
	Closing pulse too short: $t < 0,5$ s.	Modify the delay of the pulse (at drop-out).
	Closing device gap too wide.	Reduce the gap: see § E.2 procedure 2.
<b>B</b> The closing device does not return to rest after an opening by $I_{max}$ (direct or indirect release) followed by an "off" order.	Pulse too short: $t < 0,5$ s.	Modify the delay of the pulse (at drop-out).
	Correct agreement between the gap of the device and the tripping current out of range ( $I < I_{min}$ . or $I > I_{max}$ .).	1. Check the values of the tripping $R_s$ resistor: see § B.2.1. 2. Check the presence and the values of the parallel $R_p$ resistor: see § B.2.1. Insert $R_p$ if needed: see § B.2. 3. Check if the closing coil has been dismantled. In that case, it may have been improperly set when reassembled: adjust the gap according to § E.2 procedure 3. Do not change settings made by Sécheron.

**Type E closing device**

DEFECT	CAUSE	REMEDY
<b>C</b> The device does not maintain its closed position.	Closing current too low: $< I_{min}$	1. Check the power of the alternating current source. 2. Charge the batteries.
	Closing pulse too short: $< 0,5$ s.	Modify the delay of the pulse (at drop-out).
	Series connection of the holding resistor: 1. without overlapping. 2. not available.	Verify and modify: 1. Delay. 2. Relaying.
	Holding current too low: $< I_{hold min}$	Verify and adjust holding resistor.
	Gap too wide	Reduce the closing device gap: see § E.2 procedure 1.
<b>D</b> The device does not return to rest after an opening by $I_{max}$ (direct or indirect release) and an "off" order.	Residual current in the closing coil: $I \neq 0$ .	Modify the control circuit to have $I = 0$ .
	Gap too small.	Increase the gap: see § E.2 procedure 2. If the device has been dismantled and then improperly set: adjust the rated gap according to § E.2 procedure 3.

**E.1.2 Auxiliary switches malfunctions**

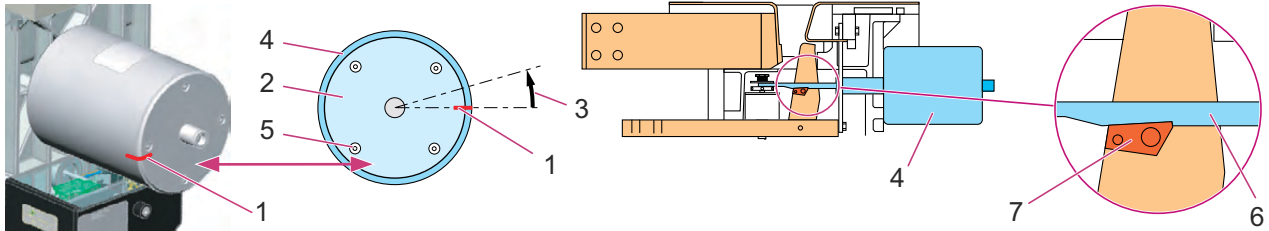
Defect	Possible causes	Remedies	See §
Switch does not operate	Defective switch	Replace the switch	E.4
One or more switches do not operate	Z clearance outside of setting tolerances	Adjust the Z clearance	D.6.5

## E.2 Adjustments of the closing coil

### Procedure 1

This procedure:

- reduces the gap on the E type closing device.
- increases the gap on the M type closing device.



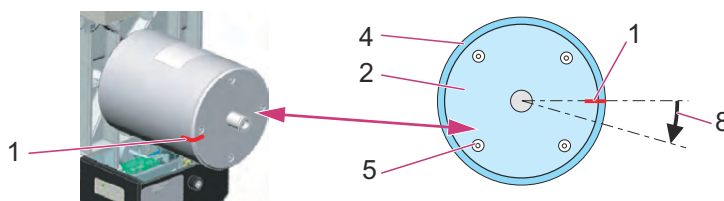
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- Mark (1) the position of the cover (2) in relation to the body (4) with a pen.
- Loosen the four screws (5).
- Turn the cover (2) counter clockwise (3) by 50 mm (taken on the body (4) at the circumference).
- Tighten the four screws (5) to a torque of 9 Nm.
- If the adjustment described above is not sufficient, repeat operations a) to d) until the correct result is achieved.
- If the adjustment is satisfactory, carry out the following test:
  - close the circuit-breaker;
  - disengage the fork (6) from the catches (7);
  - transmit an “off” order to the closing device; if it does not return to rest, see defect: B for M type or D for E type (in the above tables).

### Procedure 2

This procedure:

- increases the gap on the E type closing device.
  - reduces the gap on the M type closing device.
- Mark (1) the position of the cover (2) in relation to the body (4) with a pen.
  - Loosen the four screws (5).
  - Turn the cover (2) clockwise (8) by 50 mm (taken on the body (4) at the circumference).
  - Tighten the four screws (5) to a torque of 9 Nm.
  - If the adjustment described above is not sufficient, repeat operations a) to d) until the correct result is achieved.
  - If the adjustment is satisfactory, carry out the following test:
    - close the circuit-breaker.
    - If the closing device dose not remain in the closed position, see defect: A for M type, or C for E type in the above tables.



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**Procedure 3: adjusting the rated gap**

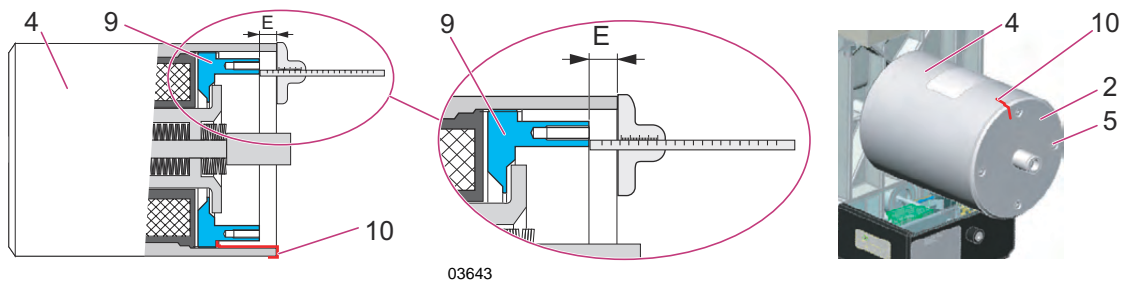
- a) Remove the four screws (5) and remove the cover (2).
- b) Rotate the flange (9) until the following E dimensions are obtained:
  - E = 10 ±0.1 mm for type E (electric hold)
  - E = 8.5 ±0.1 mm for type M (magnetic hold)
- c) Mark the new point (10) corresponding to the rated gap on the body (4).



**Important!**

**Do not turn the flange (9) after this adjustment.**

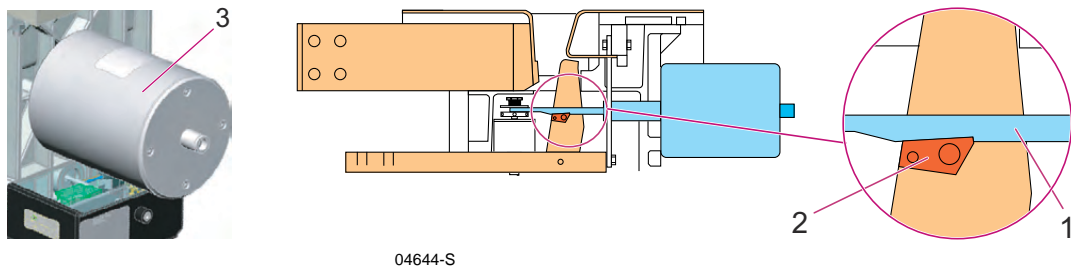
- d) Insert the cover (2) and tighten the four screws (5) to a torque of 9 Nm.
- e) Mark the cover (2), with a extension of the marking (10) on the body (4) to indicate the position of the flange (9).



**E.3 Performance check**

See the trouble shooting sheets for M or E type if one of the functions is not carried out during the test.

- a) Close the circuit-breaker and check:
  - the closing current;
  - the holding current (E type).
- b) Trip the circuit-breaker by giving it an “Off” order and check:
  - the tripping current (M type).
- c) Close the circuit-breaker, disengage the fork (1) from the catches (2), give an “Off” order to the closing device (3) and check:
  - the return of the fork (1) to the rest position.





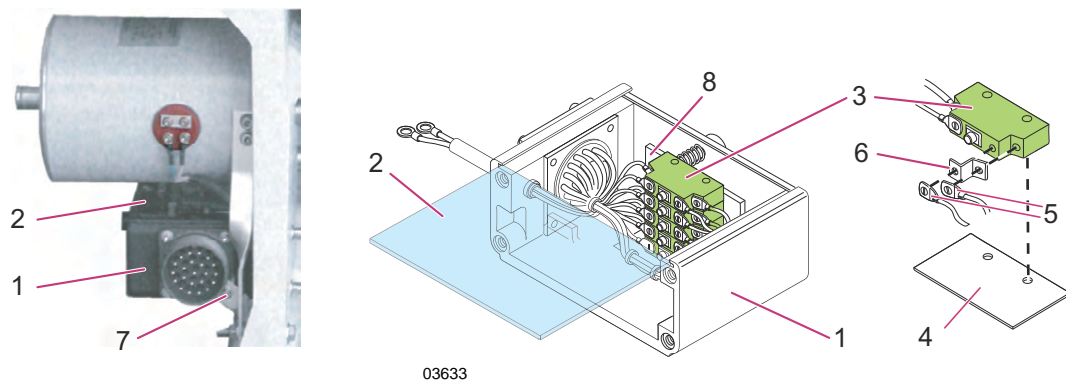
## E.4 Replacement of the auxiliary contacts

To be performed in case of a damaged auxiliary contact (for example, by a short-circuit).

- a) Disconnect the earth connection nut (7).
- b) Remove the auxiliary contacts housing (1) and the transparent cover (2).
- c) Remove the first switch (3), then the first insulation sheet (4) and continue until you find the defective switch (by testing them with an electric multi-meter).
- d) Mark and disconnect the 3 or 4 wires and replace the defective switch.
- e) Connect the wires.

**Note!** To wire the 5U type (3 wires - reversing contacts), remove the connection (6) from the old switch (3) and refit it on the new switch.

- f) Replace the switches (3) and insulation sheets (4) in the reverse order to which they were removed.
- g) Slowly push the plate (8) by hand to check the function of the five switches (3) by the sound of the switching noise.
- h) Slide the cover (2) back on.
- i) Attach the auxiliary contacts housing (1) with screws tighten to a torque of 2 Nm.
- j) Tighten the earth connection nut (7) to a torque of 2 Nm.



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# F. Wear & spare parts catalogue

## F.1 List description:

---

- Pos: reference number between list and drawing.
- Part number: number to quote when ordering a part.
- WP: wear parts
- SP: recommended spare part (see the “Recommended spare parts” section below).
- Description: name of the article.
- Qty: number of items needed in the complete assembly.

**Note!** Some parts may not be the correct ones if your device have optional parts that override these parts: in that case, the correct part numbers can be found in the “Options” or “Customization” chapters.



### **Important!**

**Check first if the part is (or isn't) in the “Options” and “Customization” chapters before to quote a part number.**

## F.2 Recommended spare parts

---

In addition to the wearing parts, we recommend to keep in stock some parts that could be damaged by inadequate operations.

Depending on the quantity of devices in operation, we recommend the following number of spare parts for each SP part quoted in the catalogue:

Quantity of devices in operation	Quantity of spare parts
1 to 10	1
11 to 100	2
101 to 500	2%
> 500	1%

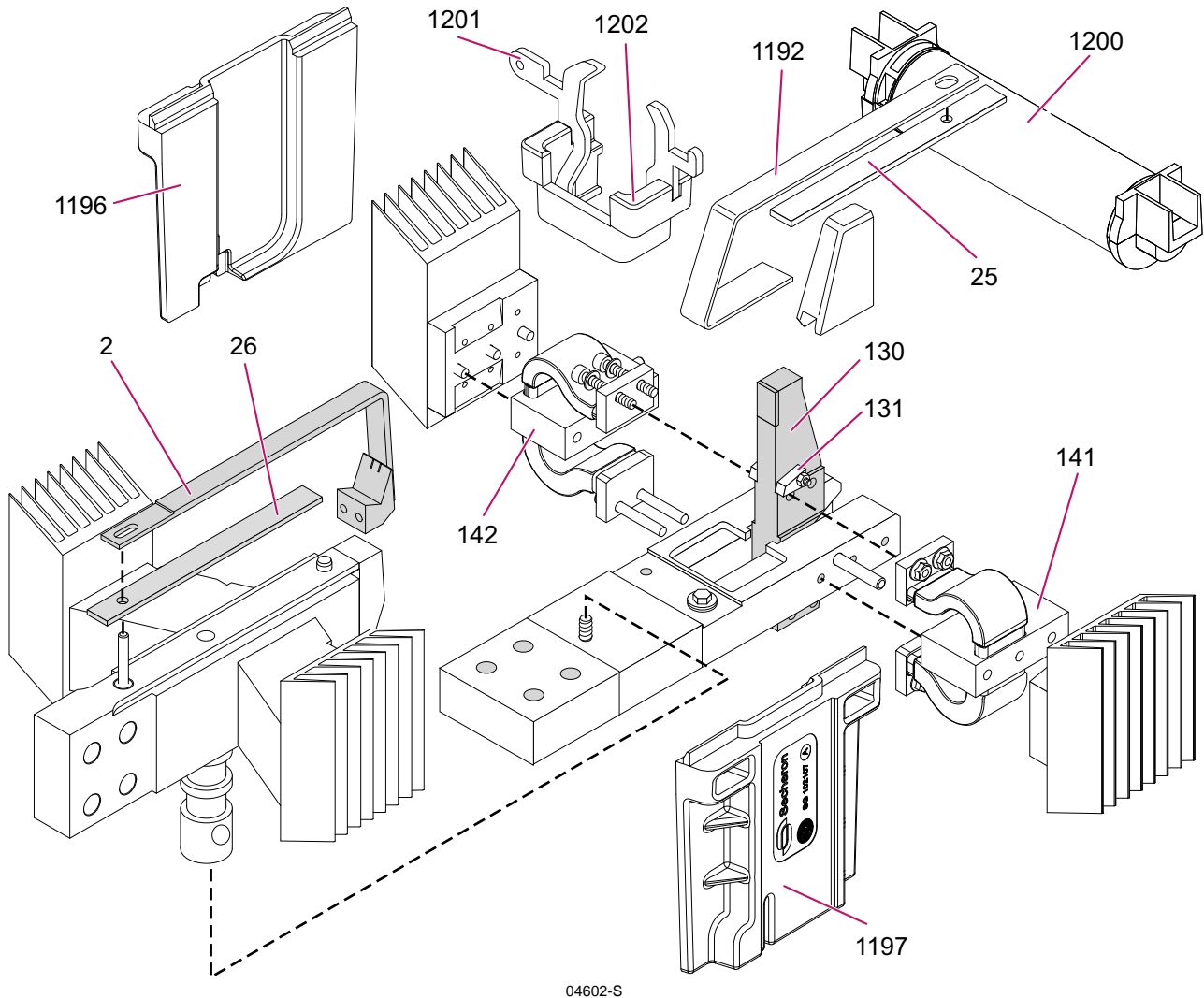
## F.3 After sales services

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For any return of merchandise to Sécheron, please refer to our website “[www.secheron.com](http://www.secheron.com)” and click on “Services/RMA”.

## F.4 Catalogue

### F.4.1 Main circuit



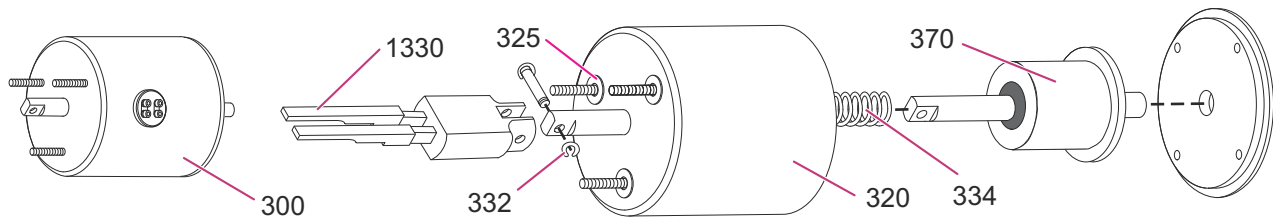
Pos.	Part number	WP SP	Description	Qty
<b>UR46-81S</b>				
25	SG100017P1		SHEET 157x18x1 RIGHT 1KV-MU METAL	1
26	SG100017P2		SHEET G 1KV 18x1x193-MU METAL	1
1192	HSBA300168P46001	x	CONNECT 20x6x341.5 UR46 POLE 1KV-CU	1
<b>UR46-82S</b>				
25	SG100017P3	x	SHEET 249x18x1 RIGHT 2KV-MU METAL	1
26	SG100017P4	x	SHEET G 2KV 18x1x285-MU METAL	1
1192	HSBA300168P46002	x	CONNECT 20x6x435 UR46 POLE 2KV-CU	1
<b>Common parts</b>				
2	HSR330085R46001	x	CONTACT FIXED UR46 1KV	1
	HSR330085R46002	x	CONTACT FIXED UR46 2KV	1
130	HSBA300158R46001	x	BLADE WITH CATCH UR46	1
131	SG101906R00001	x	Catches kit UR46	1
141*	HSBA300172R46001*	x	CONNECT FLEX UR46 LEFT ASM*	1

Pos.	Part number	WP SP	Description	Qty
142*	HSBA300172R46002*	x	CONNECT FLEX UR46 RIGHT ASM*	1
1196**	HSBA331202P0001**	x	ANTI-SPARK PL 138x119x21.3-BMC**	2
<b>In case of presence of the blowing device</b>				
1196	SG102106P00001	x	ANTI-SPARK RIGHT 137.5x122x21.3 UR346-EBOD-BMC	1
1197	SG102107P00001	x	ANTI-SPARK LEFT 137.5x122x21.3 UR346-EBOD-BMC	1
1200	SG101868R00002	x	BLOW OUT COIL E-BOD STD	1
1201	SG102093P00001	x	ELECTRODE 88x55x3 UR36-40 E-BOD-ST 37	1
1202	SG102109P00001	x	ELECTRODE REST 52x28.5x27 UR346-EBOD-BMC	1

\* The thicker flexible connections go underneath.

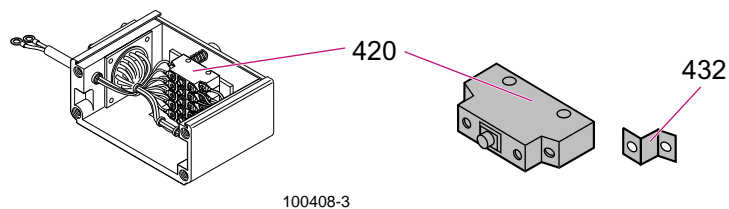
\*\* This number is valid only for HSCB without blowing device.

## F.4.2 Closing device



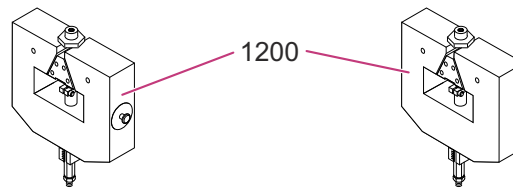
Pos.	Part number	WP SP	Description	Qty
300			CLOSING DEVICE	
	HSBA100027R0700	x	24 / 48 V type E	1
	HSBA100027R0600	x	24 / 48 V type M	
	HSBA100027R0900	x	32 / 64 V type E	
	HSBA100027R0800	x	32 / 64 V type M	
	HSBA100027R0500	x	36 / 72 V type E	
	HSBA100027R0400	x	36 / 72 V type M	
	HSBA100027R0300	x	110 / 220 V type E	
	HSBA100027R0200	x	110 / 220 V type M	
	HSBA100027R1300	x	125 / 250 V type E (option)	
	HSBA100027R1400	x	125 / 250 V type M (option)	
320			Body with coil	
	HSBA200010R0700		24 / 48 V type E	
	HSBA200010R0600		24 / 48 V type M	
	HSBA200010R0900		32 / 64 V type E	
	HSBA200010R0800		32 / 64 V type M	
	HSBA200010R0500		36 / 72 V type E	
	HSBA200010R0400		36 / 72 V type M	
	HSBA200010R0300		110 / 220 V type E	
	HSBA200010R0200		110 / 220 V type M	
325	HZN451264P0008		WASHER SHIM 8/20x0.1-SP ST-DIN988	
	HZN451264P1208		WASHER SHIM 8/20x0.3-SP ST-DIN988	
332	NB435160P0006	x	CIRCLIPS WIRE 6-SP ST NICK	2
334	HSBA400158P0001	x	SPRING COMPR 24.5x3x83-SP ST	1
370	SG100892R1	x	MOVING CORE ASM	1
1330	HSBA300169R0300	x	FORK UR36-40-46 ASSEMBLY	1

## F.4.3 Auxiliaries



Pos.	Part number	WP SP	Description	Qty
420	HSHR430302R00501	x	AUXILIARY SILVER CONTACT KIT	1
420	HSHR430302R00502	x	AUXILIARY GOLD CONTACT KIT	1
432	HSBA400096P0002	x	CON S41202/AUX SWITCH S800B	1

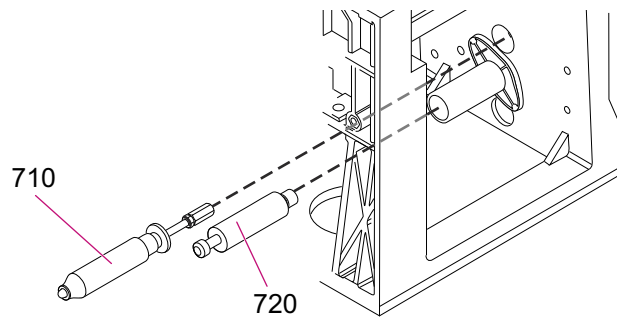
#### F.4.4 Direct tripping device



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Pos.	Part number	WP SP	Description	Qty
1200			DIRECT TRIPPING DEVICE	1
	HSR230035R0200	x	2 to 8 kA	
	HSR230035R0100	x	4 to 15 kA	
	HSBA200070R0300	x	2 to 5 kA (option)	
	HSBA200070R0400	x	4 to 10 kA (option)	

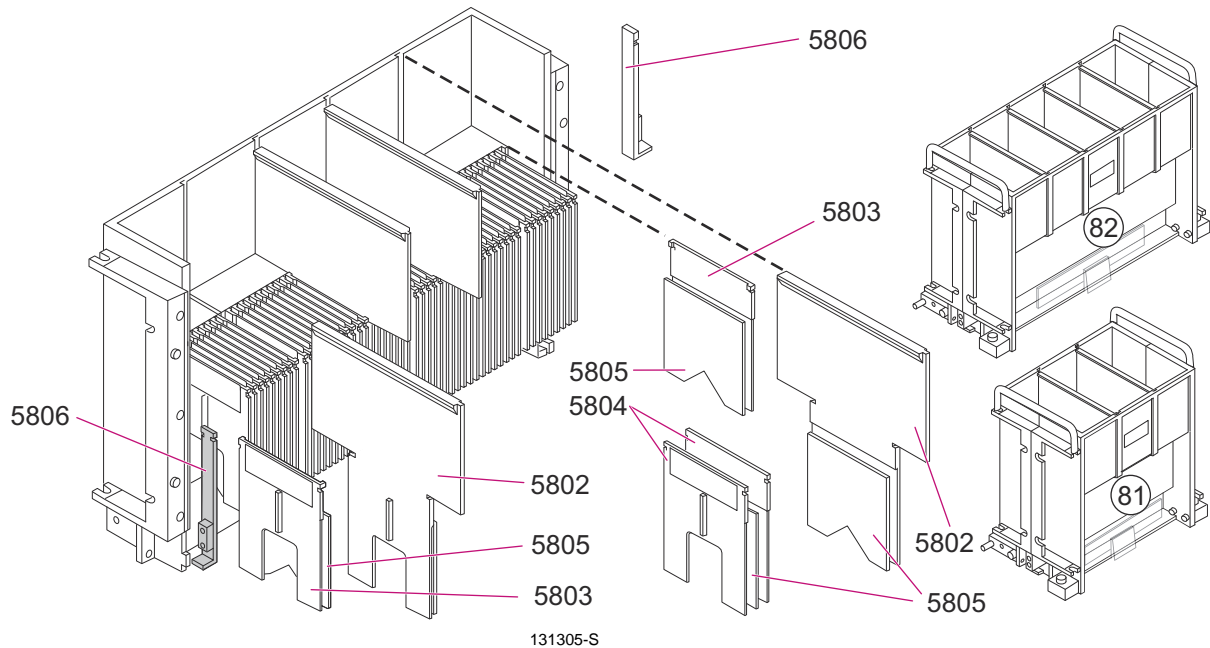
#### F.4.5 Frame and accessories



110408-2

Pos.	Part number	WP SP	Description	Qty
710	HSBA300028R0100	x	PUSHER ASSEMBLY	1
720	HSBA400213P0001	x	SHOCK ABSORBER 25.4/16x130.2	1

## F.4.6 Arc chute



131305-S

Pos.	Part number	WP SP	Description	Qty
<b>Arc chute without blowing device</b>				
	HSBA131305R0002	x	ARC CHUTE 81S	1
	HSBA131306R0002	x	ARC CHUTE 82S	
<b>Arc chute with blowing device</b>				
	HSBA131305R00006	x	ARC CHUTE 81S EBOD-ASS	
	HSBA131306R00006		ARC CHUTE 82S EBOD-ASM	
<b>Arc chute type 81 parts</b>				
5802	HSBA231223P0001	x	PLATE 301x229x12.3 UPPER DEIONIZER-BMC	2
5803	HSBA231222P0001	x	PLATE 164.5x119.5x5.8 LOWER DEIONIZ-BMC	34
5804	HSBA231254P0001	x	PLATE 164.5x119.5x7.6 DEIONIZ INF-BMC	2
5805	HSBA432089P0001	x	BAFFLE 119.5x2.5x119.5-ST U1203	37
5806	HSBA432105P0001	x	HORN L 166x34x20.5 END CH 81-CU ETP	2
<b>Arc chute type 82 parts</b>				
5802	HSBA231223P0001	x	PLATE 301x229x12.3 UPPER DEIONIZER-BMC	4
5803	HSBA231222P0001	x	PLATE 164.5x119.5x5.8 LOWER DEIONIZ-BMC	54
5804	HSBA231254P0001	x	PLATE 164.5x119.5x7.6 DEIONIZ INF-BMC	2
5805	HSBA432089P0001	x	BAFFLE 119.5x2.5x119.5-ST U1203	59
5806	HSBA432119P0001	x	HORN L 166x27x20.5 CH 82-CU ETP	2



# G. Options



## DANGER!

To ensure maximum safety, servicemen and operators must read the A.2 "Safety precautions" section before starting installation, maintenance and adjustment of the device or before starting to operate it.

## G.1 Manual closing device

### G.1.1 Description

Mounted at the rear of the closing device (1), the manual closing device (2) enables the customer to close the circuit-breaker manually.

### G.1.2 Maintenance

#### Removal

- Remove the four screws (1) holding the flange (2) and the cover (3).



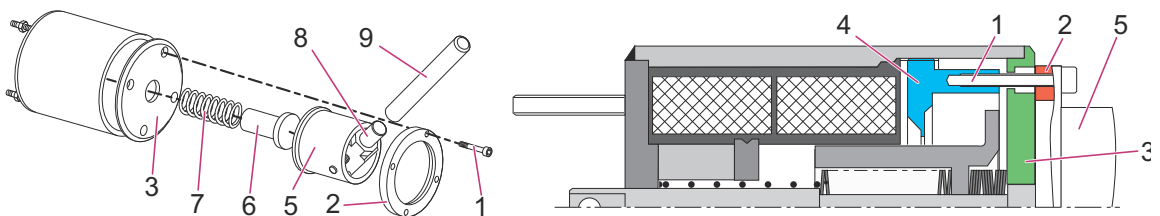
#### Important!

Do not change the position of the flange (4) while working.  
Mark its position with a felt-tip pen before removing the moving core assembly.

- Remove the complete manual closing device (5).
- Remove the cylinder (6) and cover (3).

#### Reassembling

- Insert the cover (3), taking care that the flange (4) does not move.
- Hold the cover (3) and insert the cylinder (6) with its spring (7) and insert the manual closing device (5).
- Screw the unit together with the four M6 screws (1), taking care that the flange (4) does not move: hold the cover (3) firmly in this position and turn the manual closing device (5) until the pivot (8) and the lever (9) can be operated vertically from top to bottom.
- Tighten the four M6 screws (1) to a torque of 9 Nm.



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### G.1.3 Spare part catalogue

Refer to the figure above.

Pos.	Part number	SP	Description	Qty
9	HSBR430708P0001	x	Lever	1

## G.2 Over current release indicator & contact wear indicator

These options can be connected to the low voltage connector only if the auxiliary switches are in "type U changeover" configuration (see § C.11 "Earth connection").

### G.2.1 Description

#### Over current release indicator

Attached to the rear of the closing coil (1), the over current release indicator (2) counts the number of times the circuit-breaker is tripped by an overcurrent release.

The coil shaft moves a plate (3) and actuates the switch (4) each time the direct or indirect release is activated.

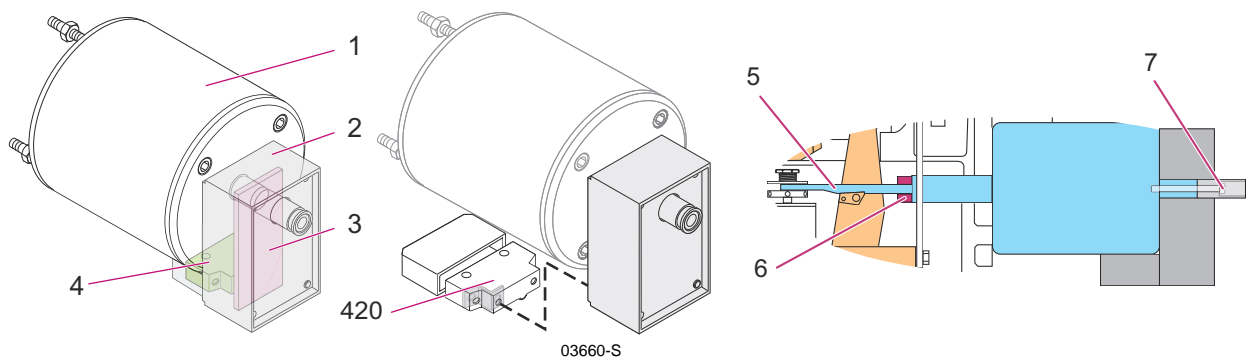
#### Contact wear indicator

Attached to the rear of the closing coil (1), the contact wear indicator (2) indicates that the main contacts are reaching their maximum acceptable value for wear and must therefore be changed.

The coil shaft moves a plate (3) each time the direct or indirect release is activated and actuates the switch (4) when the maximum wear has been reached.

### G.2.2 Maintenance

When changing the option, hold the fork (5) with pliers (6) to loose or tighten the screw (7).



### G.2.3 Spare and wear parts catalogue

Refer to the figure above.

Pos.	Part number	SP	Description	Qty
420	HSBA400096P0001		Switch	1

## G.3 Manual tripping device: M3 type

Sécheron's reference of the complete kit : SG104226R00500.

### G.3.1 Description

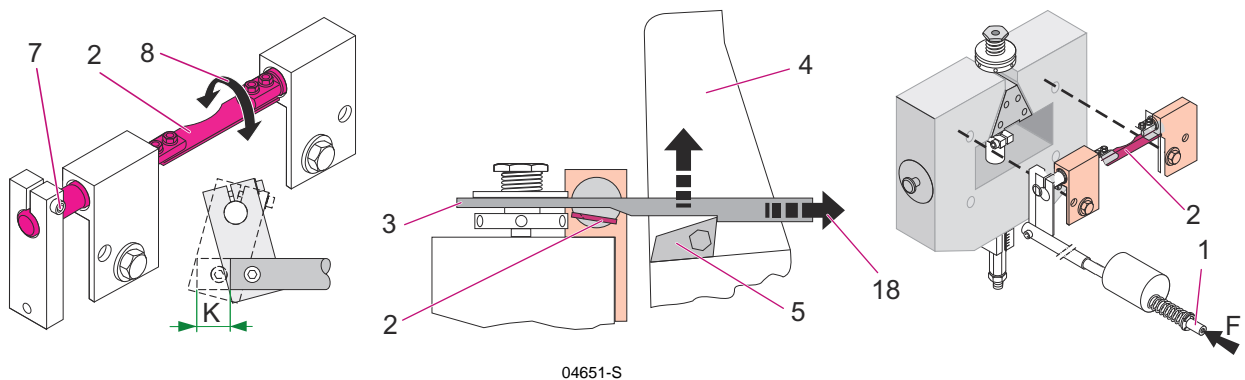
The circuit-breaker can be manually tripped by pushing the rod (1).

Pressure on the rod (1) causes the plate (2) to rotate, which lifts the fork (3), and releases the moving contact (4).



#### Important!

When the circuit-breaker trips following a manual release, the fork (3) remains in closed position and need to be reset (18) to its open position by giving an "OFF" order to the closing coil.



**Note!** The force F needed to perform a manual release is 70 N. The stroke of the rod (1) until the release point is 13 mm, on a total possible stroke of 20 mm.

### G.3.2 Maintenance - J clearance

$$J = 1,0 \pm 0.25 \text{ mm}$$

**Note!** This measurement is taken with the circuit-breaker closed.

Measure the J clearance between the fork (3) and the plate (2), using a feeler gauge. If needed adjust the J clearance.

#### Adjustment

- Loosen the screw (7).
- Rotate (8) the shaft (2) until the proper J clearance is obtained.

**Note!** The stroke (K) must be of  $17 \pm 2$  mm.

- Tighten the screw (7).



#### Important!

After adjustment, at least two open/closing operations must be performed prior to rechecking the clearance to check that nothing interferes with the movement of the fork (3) as well as with its hooking on the catch (5).

### G.3.3 Troubleshooting

Fault	Possible causes	Remedies	See §
Circuit-breaker does not trip following an order.	1. Lever (4) does not rotate or plate (3) does not lift. 2. J clearance too wide.	Adjust the J clearance and tighten the screw (8) or both screws (9).	G.3.2
Circuit-breaker does not close.	The lever (4) or plate (3) always lift the fork.		

## G.4 Indirect releases

### G.4.1 Description

The indirect releases reduce the mechanical opening time of the circuit-breaker when required by specific applications. Depending on the application, one of the two following indirect releases has been selected according to Sécheron recommendations:

- The BIM5 is controlled by a CID-3 control unit and the colour of its axle end (10) is black.
- The BIM6 is directly connected to the battery and the colour of its axle end (10) is brass-yellow.

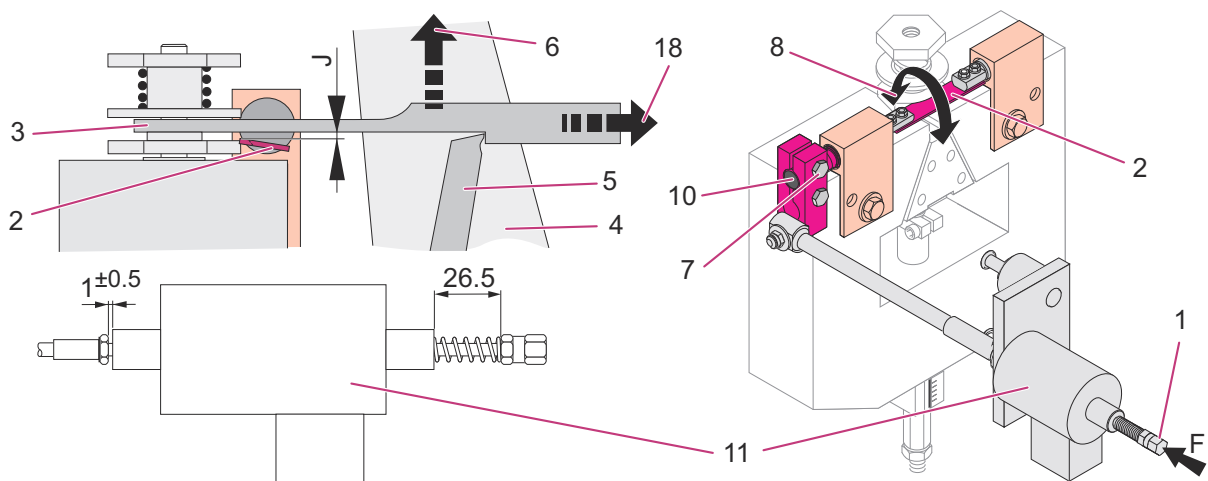
The circuit-breaker can be remotely opened by a pulse sent to the coil (11), which rotates (8) the plate (2), thereby lifting (6) the fork (3) and opening the moving contact (4).



#### Important!

The duration of the pulse coming from a battery must not exceed 1 second to avoid burning the coil!

When the circuit-breaker trips following an indirect release, the fork (3) remains in closed position and need to be reset (18) to its open position by giving an "OFF" order to the closing coil.



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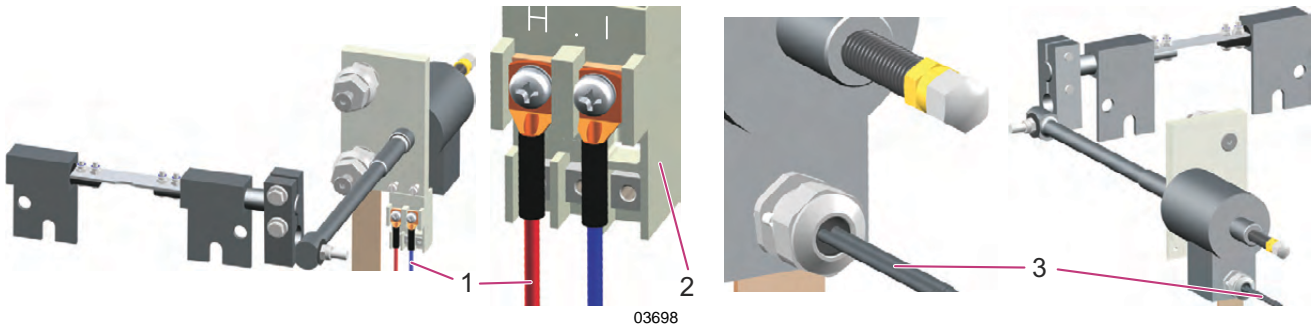
**Note!** The BIM5 and BIM6 indirect releases can be used as manual releases by pushing on the axle (1) end.

The force  $F$  needed to perform a manual release is 80 N. The stroke of the axle (1) until the release point is 8 mm, on a total possible stroke of 10 mm.

## G.4.2 Installation - Electrical connection

BIM5: connect the 6 mm<sup>2</sup> cables (1) coming from the CID-3 into the terminal (2); there is no recommended polarity.

BIM6: connect both 2.5 mm<sup>2</sup> cables (3) on your device.



## G.4.3 Maintenance - J clearance

Refer to the § G.5 for the procedure.

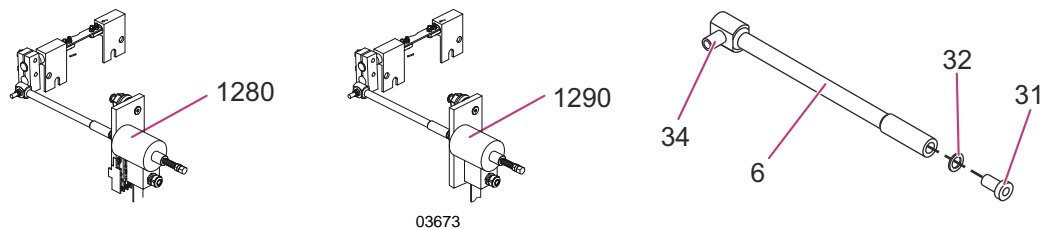
## G.4.4 Maintenance - In case of replacement of the direct release

When removing the direct release in the § D.12: remove either the complete BIM5 and BIM6 indirect releases, either only the axle (2) by losing the screws (7).

## G.4.5 Troubleshooting

See the § G.3.3.

## G.4.6 Spare and wear parts catalogue



Pos.	Part number	WP SP	Description	Qty
1280	HSBA131233R00006		INDIRECT TRIPPING DEVICE BIM5 FOR UR36-46	1
1290	HSBA131233R0004		INDIRECT TRIPPING DEVICE BIM6 FOR UR36-46	1
6	HSBA431837P0001		ROD ROUND 12x195-PA6.6 GF30	1
31	HSBA432291P0001		SPACER CY IE M6/13x19 BIM-SS4305	1
32	GON336152P0422		WASHER ELA S 8-ST PHOS B	1
34	SG101204P2		PIPE 9/1.5x15-NBR 65Sh A	1

## G.5 Checking and adjusting the J clearance

The J clearance is the operating clearance for the indirect and manual releases.

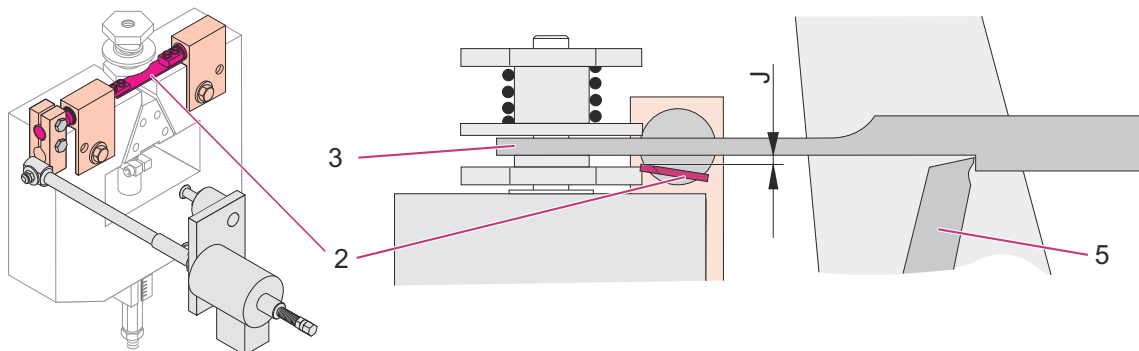
$J = 0.4^{+0.3/-0}$  mm for BIM5 and BIM6 indirect releases

$J = 1.0^{\pm 0.25}$  mm for the M3 manual release.

**Note!** This measurement is taken with the circuit-breaker closed.

### G.5.1 Measurement

Measure the J clearance between the fork (3) and the plate (2) (using the recommended Sécheron's "J-IND" or "J-M3" gauges). If needed adjust the J clearance.



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### G.5.2 Adjustment



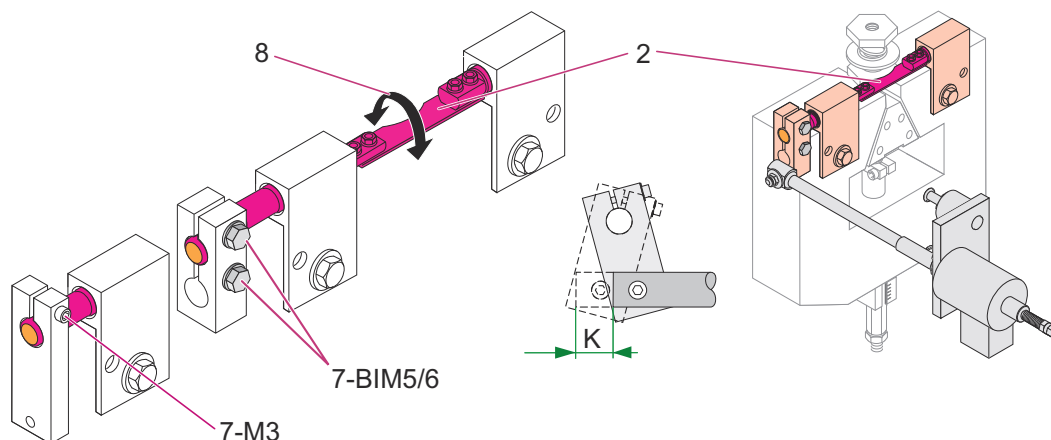
#### Important!

After the adjustment, at least two open/closing operations must be performed prior to rechecking the clearance to check that nothing interferes with the movement of the fork (3) as well as with its hooking on the catch (5).

- Loosen the screw(s) (7).
- Rotate (8) the shaft (2) until the proper J clearance is obtained.

**Note!** The stroke (K) must be of  $17 \pm 2$  mm.

- Tighten the screw(s) (7).



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## G.6 Vertical mechanical release

### G.6.1 Description of the vertical mechanical release

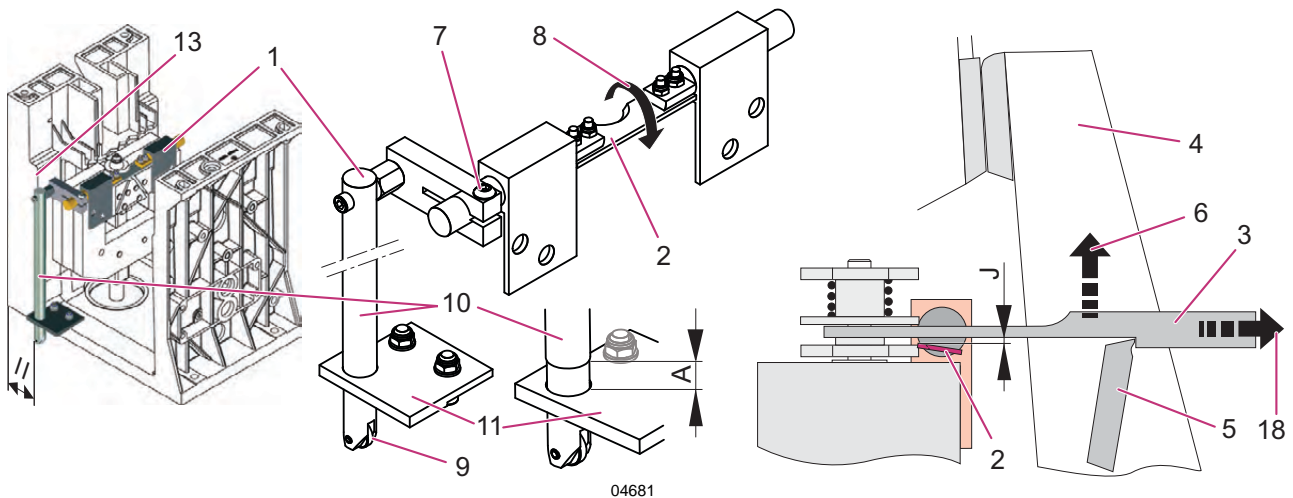
Used for circuit-breaker mounted on a trolley, the vertical release (1) allows to mechanically open the circuit-breaker when the trolley is moved out of its working position.

When the roller (1) rolls over an incline, it rises the rod (2), which rotates (8) the plate (2), thereby lifting (6) the fork (3) and opening the moving contact (4).



#### Important!

**When the circuit-breaker trips following a release, the fork (4) remains in closed position and need to be reset (18) to its open position by giving an "OFF" order to the closing coil.**



### G.6.2 Installation - Prerequisites

The wheel (9) must not touch anything when the circuit-breaker is in working position.

The maximum vertical stroke (A) of the rod (10) is 20 mm, and the tripping is occurring around a stroke (A) of 14 mm. Be sure that your ramp rising the wheel (9) is high enough to let the plate (2) release the fork (3).

### G.6.3 Installation - Adjust the J clearance

The J clearance is the operating clearance between the fork (3) and the plate (2):  $J=1.0 \pm 0.25$  mm. This procedure is performed with the circuit-breaker closed.

- Loosen the screw (7) and move laterally the lever (12) in order to bring the rod (1) parallel to the frame (13).
- Let the rod (10) go down until it lies onto the plate (11).
- Rotate clockwise (8) the shaft (2) until the plate 3 touches the fork (3).
- Lift the rod (10) of  $4.5 \pm 0.5$  mm (A) without rotating the plate (3).
- Tighten the screw (7).



#### Important!

**After the adjustment, at least two open/closing operations must be performed prior to checking the clearance, to check that nothing interferes with the movement of the fork (3) as well as with its hooking on the catch (5).**

- Check the J clearance with the Sécheron's "J-M3" gauge; then if needed, re-adjust the J clearance by loosening the screw (7), slightly rotating the axle (2) and tightening the screw (7).

## G.7 Varistor

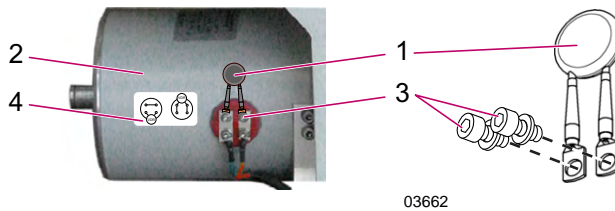
### G.7.1 Description

This varistor (1) protects the closing device relays from the overvoltage that occurs when the closing device (2) opens.

### G.7.2 Trouble shouting

Remove both screws (3) to replace the varistor (1) as shown by the position label (4).

Screws: M4x6 + flat washer; 1 Nm tightening.



### G.7.3 Spare parts catalogue

The varistor type is determined according to the closing device voltage, in the following table:

Coil voltage U [VDC]	Battery	Rectified with 2 half-waves
24	SG101375R1	SG101375R1
36	SG101375R1	SG101375R00004
48	SG101375R1	SG101375R00002
64	SG101375R00004	-
72	SG101375R00002	SG101375R14
96	SG101375R00003	SG101375R00005
110-125	SG101375R14	SG101375R00008
220	SG101375R00012	SG101375R00009



## G.8 Direct release type DE



### Important!

When the circuit-breaker trips following a direct release, the fork remains in closed position and need to be reset to its open position by giving an "OFF" order to the closing coil.

### G.8.1 Description

- Easy access to the trip setting
- Easy reading of the trip setting value on an amperes graduated scale.
- Easy change of the trip setting value by the customer.
- Same mechanical performance ( $T_{mec}$ ) as the standard direct release.

#### Main setting ranges

Variant	DE 1	DE 2	DE-3	DE 4
Setting ranges	2 – 5 kA	4 – 8 kA	6 – 10 kA	9 – 15 kA

### G.8.2 Maximum current release ( $I_d$ ) settings

Two different settings are performed:

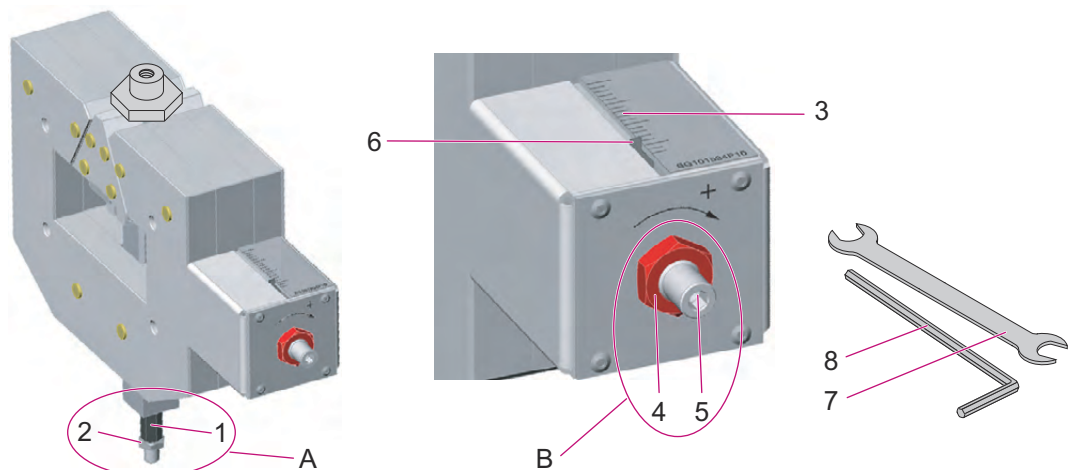
- A. The setting of the main range is done by Sécheron by means of the nut (1) and counter nut (2), which are tightened at the factory.



### Important!

The customer is not allowed to change this setting.

- B. The thin regulation, by step of 200 A, is performed by the customer on the side of the circuit-breaker:
- Loosen the nut (4) with a 19 mm flat key (7).
  - Turn the screw (5) with a 5 mm Allen key (8) until the marker (6) reaches the desired value on the scale (3); turn clockwise to rise the  $I_{ds}$  value and counter clockwise to lower it.
  - Hold the screw (5) to tighten the nut (4) with a tightening torque of 30 Nm.

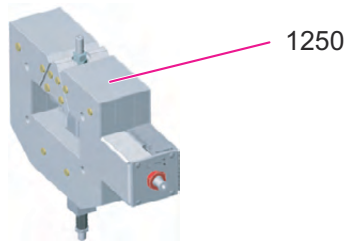


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### G.8.3 Maintenance

See § D.12 "Replacement of the direct release".

## G.8.4 Spare and wear parts catalogue



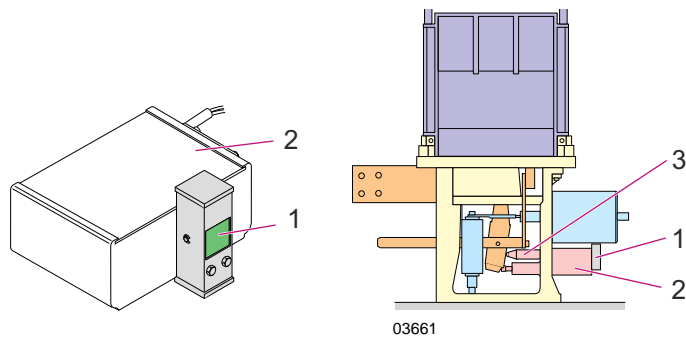
Pos.	Part number	WP SP	Description	Qty
1250	SG101522R0300	x	SPRING TRIPPING DEVICE 2 - 5 kA	1
	SG101522R0400	x	SPRING TRIPPING DEVICE 4 - 8 KA	1
	SG101522R00500	x	SPRING TRIPPING DEVICE 6 - 10 KA	1
	SG101522R00600	x	SPRING TRIPPING DEVICE 9 - 15 KA	1

## G.9 Position indicator

### G.9.1 Description

Attached to the rear of the auxiliary contacts (1), the position indicator (2) shows whether the circuit-breaker is open or closed. It is actuated by the pusher (3).

When the indicator is red the circuit-breaker is closed, and when the indicator is green the circuit-breaker is open.



## G.10 VEAM low voltage connections

The mobile connector needs to be ordered separately.

### Connector specifications

- VEAM swivel type, with 22 contact pins for conductors from 1.5 to 2.5 mm<sup>2</sup>, using a multi-core cable.
- The 20x1.5 mm<sup>2</sup> and the 2x2.5 mm<sup>2</sup> (positions 21 and 22) male pins are made of gold plated copper.
- The 22 x 2.5 mm<sup>2</sup> female pins are made of gold plated brass.
- Contact:  $I_{max} = 41A$ ;  $\Delta U = 20$  mV.

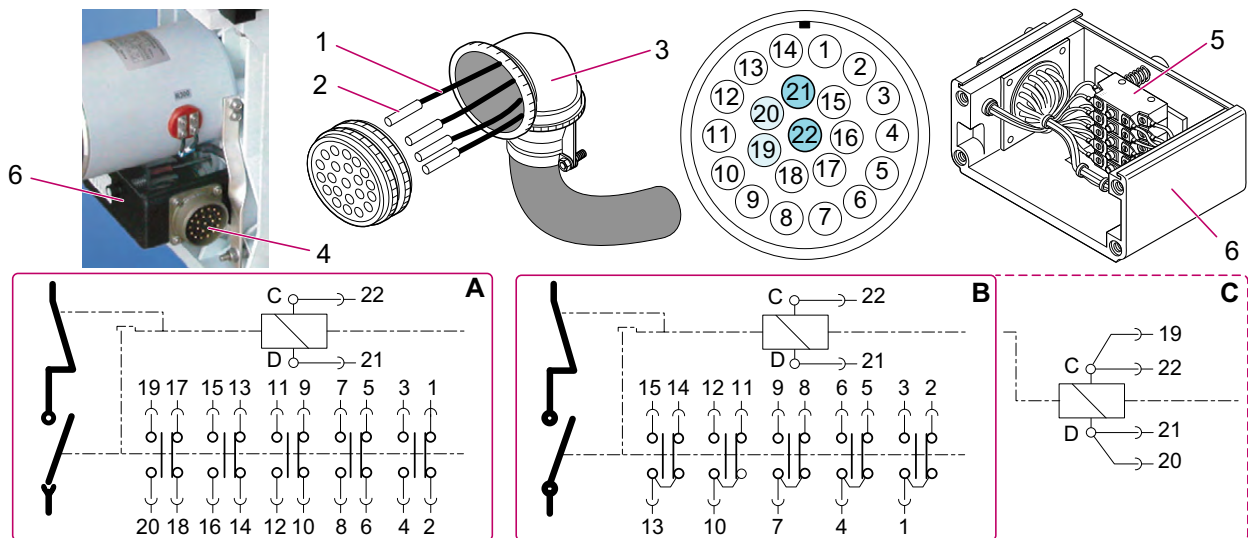
### Installation

a) Insert the cables (1) into the female pins (2) according to the diagrams shown below, using the following crimp contact tools from Cannon ITT Industries:

- Crimping tool VM8.
- Crimping die VH435.
- Insertion tool 46736.
- Removal tool 43240.
- Guide pin for female contacts 27977-12T8.

The closing coil is connected to pins 21 and 22 of the connector, regardless of the polarity

b) Connect the moving connector (3) into the fixed connector (4).



Wiring between the auxiliary contacts and the connector:

- Type ab (NO-NC) auxiliary switches.
- Type U changeover auxiliary switches.
- Double connection only for closing device at 24 Vdc.

**Note!** Up to five double-contact switches (5) can be inserted in the auxiliary housing (6).

