



# VA, VAA, VXC

## Vacuum Circuit-Breakers up to 38 kV



Operating Manual  
Nr. AGS 531 171-01  
Edition 06/05

**only for  
information**  
- see page 2 -

Operating Manual

## **IMPORTANT NOTE**

The Operating Instructions, which are exclusively valid are always supplied by AREVA Sachsenwerk GmbH together with the product in question. Our products may only be commissioned, operated, serviced, repaired or decommissioned together with Operating Instructions which have been directly enclosed to the product in question by the factory.

On the other hand, this electronic version of the operating instructions is provided to the customer at his/her request for information only. None of our products may be commissioned, operated, serviced, repaired or decommissioned on the basis of this electronic version.

Non-compliance with this instruction may entail serious damage to the product, the objects pertaining to it, as well as health hazard or mortal danger. AREVA Sachsenwerk GmbH shall not be held liable for any such damage.

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# 1 Regulations, provisions, operating conditions

## 1.1 Remarks on this manual

This manual describes transport, assembly, operation, handling and maintenance of vacuum service breakers VA, VAA and VXC.

It must be stored so that it is at any time readily accessible for and can be used by persons who are to work on the switchgear.

When re-selling the circuit-breaker or the switchgear with circuit-breaker, make sure that this manual is transmitted as well.

For assembly and operation of the circuit-breaker, the operating manual of the switchgear in which it is operated must be complied with.

All dimensions specified in this manual are metric.

## 1.2 Terms and symbols used

This manual uses certain terms and symbols. They warn about dangers or provide important information which must be complied with at all costs so as to avoid danger and damage:

### „WARNING“



This symbol warns of dangerous electrical voltage. Contact with voltage may result in fatal injury!

### „WARNING“



This symbol is used for instructions non-compliance with which may result in serious injury, death or serious material damage.

### „NOTICE“



This symbol is used for information which is important to avoid damage.

## 1.3 Use in the line with the intended purpose

Vacuum circuit-breakers VA, VAA and VXC are exclusively intended as switching units in air-insulated medium-voltage switchgear. They must only be used in the scope of the specified standards and the switchgear-specific technical data. Any other use constitutes improper use and may result in dangers and damage.

### Disclaimer of liability

The manufacturer shall not be held responsible for damage which occurs if

- instructions in this manual are not complied with,
- the circuit-breaker is not operated according to its intended use (see above),
- the circuit-breaker is assembled, connected or operated improperly,
- accessories or spare parts are used which have not been approved by the manufacturer,
- the circuit-breaker is converted without the manufacturer's approval, or if inadmissible parts are attached.

In case of queries and orders for spare parts, the following data on the rating plate must be specified:

- Type designation
- Factory number
- Year of construction

### NOTICE:



**Operating reliability and service life depend on correct operation.**

## 1.4 Applied standards

The three-pole vacuum circuit-breaker VA, VAA, VXC

- corresponds to the requirements for AC switchgear for voltages above 1 kV acc. to IEC 62271-100;
- complies, regarding its switching capacity and insulating level, ANSI C37.... (please enquire at the manufacturer's)

### Type approval of vacuum interrupter chambers acc. to RöV

The vacuum interrupter chambers have been approved by the X-Ray Ordinance (RöV) of the Federal Republic of Germany up to a maximum voltage amounting to the rated short-time power-frequency voltage (rated power frequency withstand voltage) defined by DIN VDE/IEC. Thus, they satisfy the conditions for operation exempt of approval up to the voltage in question according to the X-Ray Ordinance (RöV).

### Environmental and operating conditions

Circuit-breakers VA, VAA and VXC may only be operated under normal operating conditions according to IEC 60694. Operation under conditions different from these is only admissible upon consultation with the manufacturer and obtention of his approval.

Ambient conditions	
Temperature class: "Minus 5 indoors" (optional "Minus 25 indoors")	
Ambient temperature min./max.	-5 / 40°C
Average value over 24 hours (max.)	35°C
Maximum installation altitude above sea level (higher installation altitudes possible on request)	1000m

## 1.5 Safety instructions

The work described in this manual may only be performed by specialist electricians who have proved their experience with the circuit-breaker VA, VAA, VXC and EN 50110-1.

Applicable standards and regulations:

- Adhere to the locally applicable accident prevention, operating and work instructions.
- Installation: HD 637 S1
- Operation of electrical equipment: EN 50110-1

Read these instructions carefully before you work on the circuit-breaker, and perform the work detailed in it according to the descriptions. Only perform such work if you have understood the instructions. Do not perform any work on the circuit-breaker which is not described in this manual.



**Before starting work on the circuit-breaker, de-energize the system, verify it for zero voltage and earth the system according to the applicable safety rules pursuant to EN50110-1.**



**Before performing work on the circuit-breaker, switch off the supply voltage and prevent it from reclosing.**



**Risk of injury due to the energy storing device. Before starting work, release the energy storing device via the operating sequence OFF-ON-OFF.**

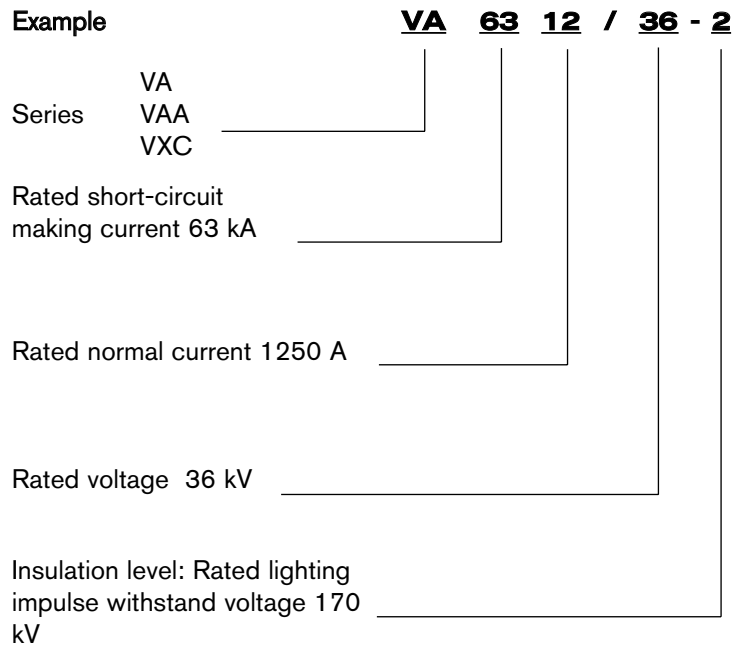
## 1.6 Disposal after the end of service life

A manual on disposal after the end of the service life is available for disposal of the circuit-breaker VA, VAA, VXC. Disposal at the end of service life is performed on request by the service center at the manufacturer's.

# 2 Technical data

## 2.1 Type designation

The type designation of the vacuum circuit-breakers - refer to rating plate - specifies the essential technical data. The following example shows the composition of the type designation:



## 2.2 Operating times

Rated voltage	[kV]	12	17,5	24	36	38
Opening time at rated voltage of the release						
for release 160 W	[ms]	30 - 50				
for release 25 W	[ms]	45 - 65				
Arc duration (max. value)	[ms]	6 - 12	6 - 14			
Closing time at rated voltage of the release	[ms]	35 - 75				
Minimum command time "OFF"Electrical tripping						
for release 160 W	[ms]	20				
for release 25 W	[ms]	50				
Minimum command time "ON"	[ms]	20				
Motor charging time	[s]	≤ 12				

### 2.3 Control and operating devices

The drive mechanism is designed on principle for manual charging of the energy storing device (closing spring).

The drive can be equipped with additional operating and control devices.

Possible components fitted:

#### Motor

- for charging the energy-storing device (closing spring)

#### Shunt opening release

- 2 ea.

#### Secondary coil

- 2 ea.
- (Maximum equipment - shunt opening release and secondary coil, 3 in total)

#### Under-voltage coil

- 1 ea.
- An additional device prevents releasing "OFF" of the circuit-breaker on closing, if voltage is only applied to the undervoltage release after switching ON.

#### Shunt closing release

- 1 ea.

#### Blocking coil

- The blocking coil prevents the circuit breaker from being switched on via the "ON" push-button when the rated supply voltage has dropped out or has been switched off.

### Power consumption of solenoids and motor, motor charging time

Solenoids	Power consumption [W]
Shunt closing release	160
Shunt opening release without auxiliary spring energy store	
Shunt opening release with auxiliary spring energy store	25
Undervoltage release without/with delay	15
Secondary coil	12
Blocking coil	
Motor	200 - 250

Information about the power consumption of coils and the motor is available from the manufacturer. To this effect, auxiliary voltage data is required.

#### Locking mechanism with lock

- The locking mechanism with lock blocks the "ON" or "OFF" buttons or only the "ON" button (depending on design).

#### Operating counter

- The operating counter indicates the number of switching operations.

#### Push switches

- installed depending on components fitted and operating sequence

#### Extension of the switch shaft

- The switch shaft can be equipped subsequently with "shaft extension", at choice on the right, left side or on both sides. To this effect, refer to section 5.4 "Locking of additional devices".

#### Anti-pumping relay

If an ON and OFF command is simultaneously and permanently present at the circuit-breaker, the latter returns to its initial position after closing. It remains in this initial position until the ON command is issued anew. This prevents continuous closing and opening ("pumping").

## 2.4 Auxiliary switches

Switching functions on delivery, refer to circuit diagram.

Other switching functions of the auxiliary switch can be set by adjustable cams.

The setting may only be performed by specialists who dispose of experience regarding the installed auxiliary switches.

### **WARNING!**



**Refer to the safety instructions in section 1.5.**

The auxiliary switches are accessible from the front end of the switchgear after removal of the front cover.

### Setting procedure:

1. Remove cover plate (release five screws).
2. Set desired switching function.
3. Click cam back into catch.
4. Check whether the cam has locked in the changed position.
5. After adjustment, mount cover plate.

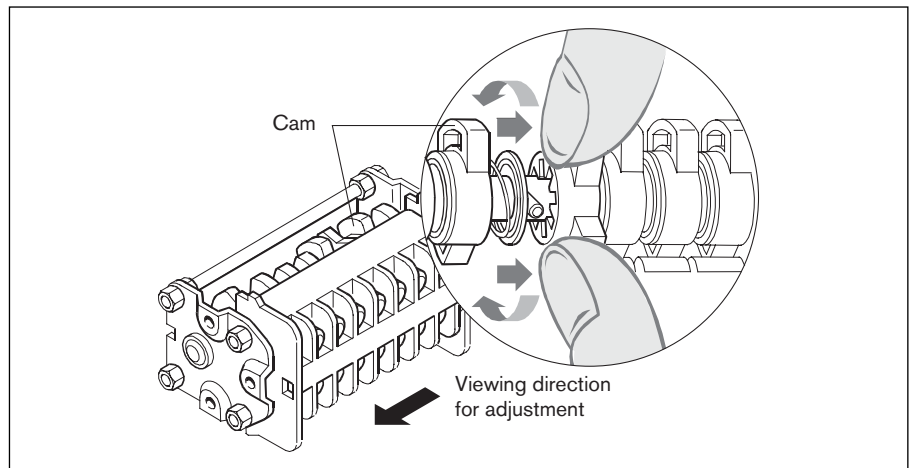


Fig. 1

Setting the cams of the auxiliary switch

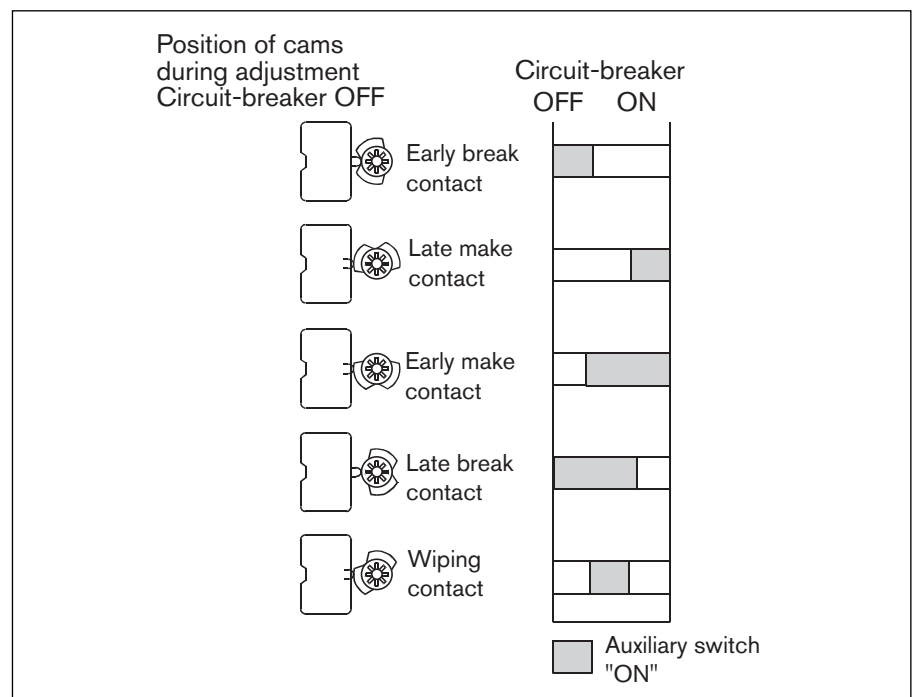


Fig. 2

Possible switching functions of the auxiliary switch (switching program)

### Auxiliary switch

Rated supply voltage	[V]	VDC					VAC	
		24	48	60	110	220	120	230
Switching capacity	[A]	8	4	3	2	1	10	
Rated short-time current		100 A for a duration of 30 ms						
Time factor T=L/R	[ms]	≤ 20					-	
Rated continuous current	[A]	10						



# 3 Variant overview

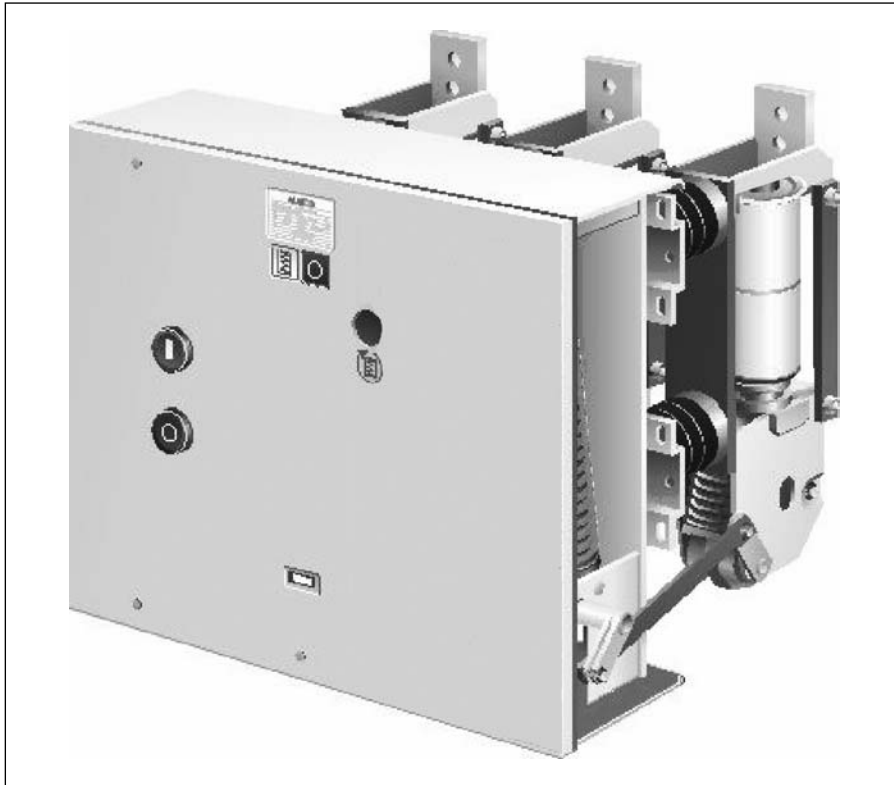


Fig. 3  
Vacuum circuit-breaker, series VA, VXC

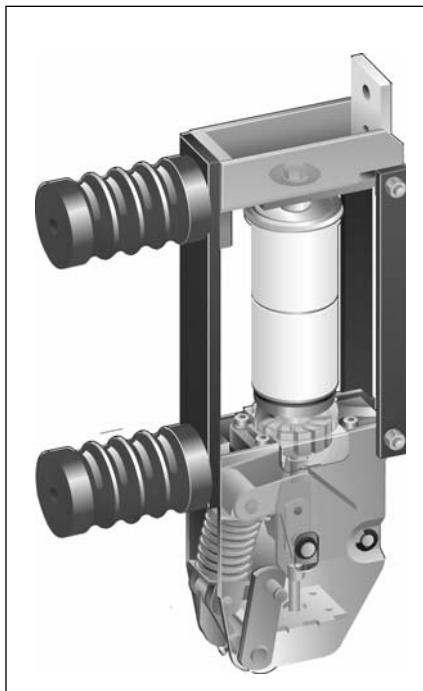


Fig. 4  
Vacuum circuit-breaker, series VA,  
VXC, switch pole

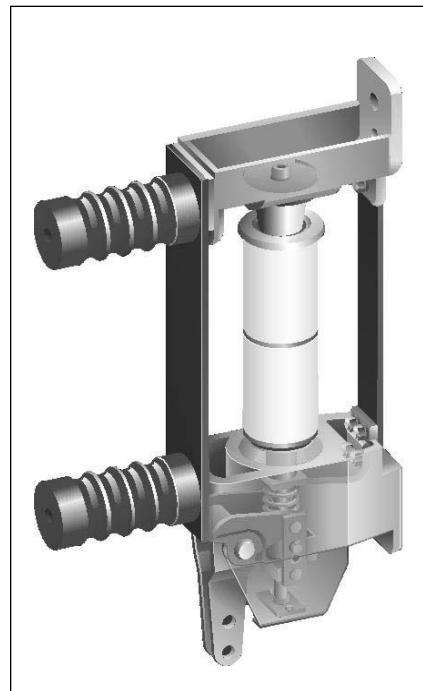


Fig. 5  
Vacuum circuit-breaker, series VAA,  
switch pole



## 4 Delivery, storage and transport

### 4.1 Delivery

- Handle shipping units carefully when unloading and unpacking them.
- Shipping units must be unpacked immediately after receipt. Any damage occurred in transit must be recorded and reported immediately to the manufacturer.
- On delivery, the consignment must be checked for completeness.
- The supplier must be notified in writing about any differences.

### 4.2 Storage

The transport packaging is not intended for storage. The risk of storing the parts in packed condition shall be the consignee's responsibility!

### 4.3 Transport

#### Transport using a forklift truck:

Only transport the circuit-breaker on a pallet.

#### Transport without pallet:

Lift circuit-breaker acc. to Fig 6. To this effect, a crane mounting harness is required.



**WARNING:**  
**Make sure the crane mounting harness is strong enough to bear the weight of the circuit-breaker!**

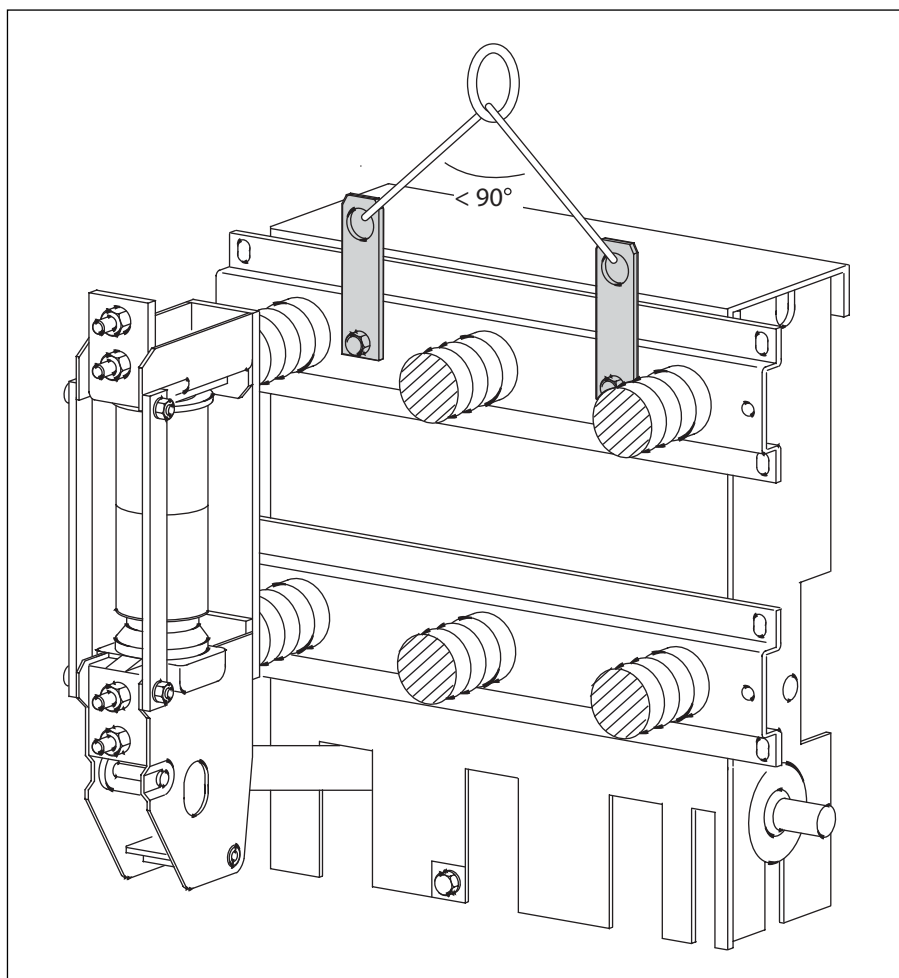


Fig. 6

Transport without pallet

#### Weights

Series	Rated voltage [kV]	Weight [kg]
VA	12 / 17,5 / 24	140
	36	160
VAA	12 / 17,5 / 24	105
VXC	24	130
	36 / 38	160

Approximate values without packaging in case of maximum rated (normal) current

# 5 Assembly

## 5.1 Instructions for assembly

- Check data on rating plate.
- Check rated supply voltage of the control and operating devices installed.

The circuit-breakers are supplied in position "OFF" and with the energy storing device "released".

### WARNING!



Refer to the safety instructions in section 1.5.

## 5.2 Fastening the circuit-breaker

- The securing points are the ends of the post insulators with specified hole pattern. In special models, the securing holes are provided with threaded inserts. For examples for the securing design, see below.
- Any other than standard installation positions must be agreed upon with the manufacturer.
- Screws and attachments are not included in the scope of supplies.

- Parts for fastening
  - must be suitable for the weight of the circuit-breaker.
  - may not protrude by more than 10 mm over the post insulators to the circuit-breaker poles.
- The circuit-breaker must not be deformed by the fastening.

### NOTICE:



Comply with the specified tightening torques (refer to Annex).

The dimension drawing is provided on request.

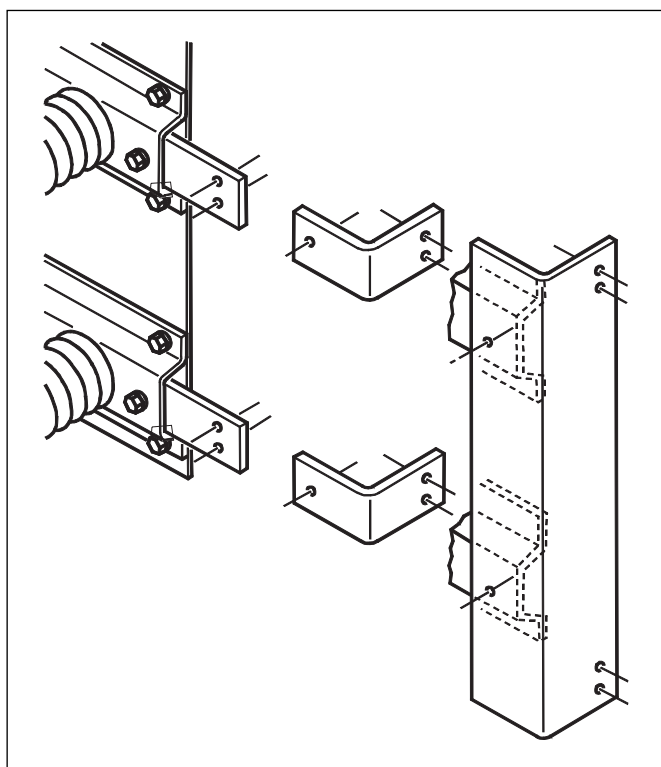


Fig. 7  
Fastening example for up to 24 kV

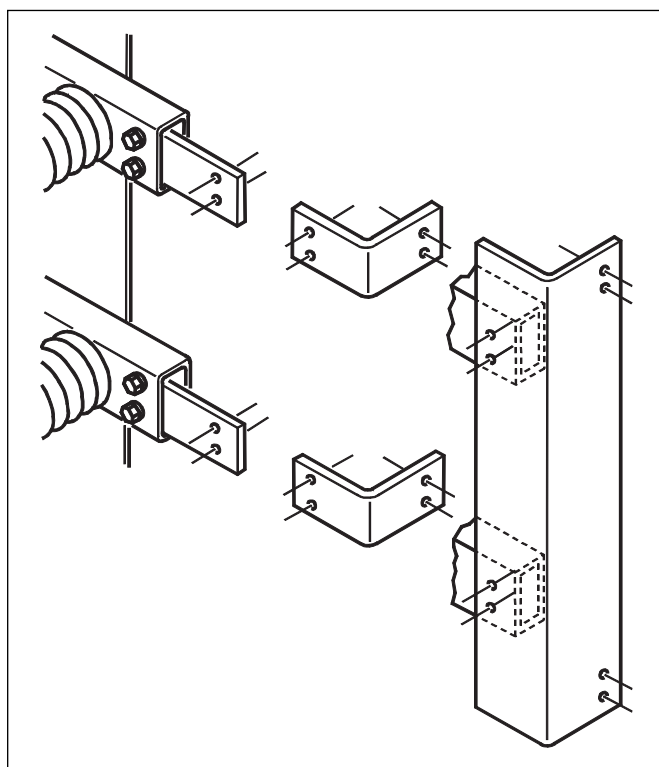


Fig. 8  
Fastening example for 24 kV to 38 kV

### 5.3 Locking of additional devices

If locking of other devices is to be actuated or controlled depending on the circuit-breaker position, it must be ensured that the masses and forces acting on the units do not interfere with the switching characteristics of the circuit-breaker.

The torque load attacking on the switch shaft must not exceed 2 Nm.

If circuit-breakers are equipped with switch shaft extension and the latter is exposed to transverse forces, an additional bracket bearing is required near the shaft end.

### 5.4 Pole partitions

If circuit-breakers are equipped with pole partitions (depending on the technical data), the latter are enclosed. The pole partitions must be mounted according to the enclosed attachment drawing.

### 5.5 Connecting the conductor bars

#### WARNING:



**Aluminium conductor bars must not be connected to silver-plated connection areas of the circuit-breaker. Inadmissible matching of materials.**

#### NOTICE:



**Coat contact surfaces (refer to Annex).**

#### NOTICE:



**Comply with the specified tightening torques (refer to Annex).**

- Remove transport aid and jack rings.
- Take account of DIN 43 670 and DIN 43 671 regarding the dimensioning for continuous current.
- Maximum distance of the next support point from the circuit-breaker's terminals in the direction of the switch pole axis: 3x pole center spacing of the circuit-breaker (unless the next supporting point is located in the direction of the switch pole axis, make sure that the circuit-breaker pole is not exposed to higher electrodynamic forces).
- Screw-fasten conductor bar according to DIN 43 673.
- The circuit-breaker must not be deformed by screw-fastening the conductor bars.

#### Material of current conductors or cable lugs for connection of the circuit-breaker

Connection areas on circuit-breaker	Connection area on conductor bar or cable lug
Series VAA: Connection for 630A Material: Aluminium bright	- Copper - Aluminium
Series VAA: Connection for 1250A Material: Aluminium, silver-plated  Series VA/VXC: Material: Copper, silver-plated	- Copper - Copper, silver-plated - Aluminium, silver-plated  In case of aluminium, metallicly bright, use an intermediate layer of copper (thickness 0.1 mm) corresponding to the fullsize of the connecting area. To this effect, a 13% reduction of the rated (normal) current must be taken into consideration on principle, or an enquiry must be submitted to the manufacturer.
Earth connection Material: Steel	Selection acc. to HD 637 S1 or appropriate national interpretation clause
(Connection areas are current conduction areas)	

## 5.6 Earth terminal

- Design and dimensioning of the circuit-breaker's earth terminal acc. to IEC 62271-100.
- Select the cross section of and the material used for the earth conductor according to HD 637 S1 or the appropriate national work instruction.

### NOTICE:



**Coat contact surfaces (refer to Annex).**

### NOTICE:



**Comply with the specified tightening torques (refer to Annex).**

Connect earth conductor of station to earth terminal of circuit-breaker (Fig. 9).

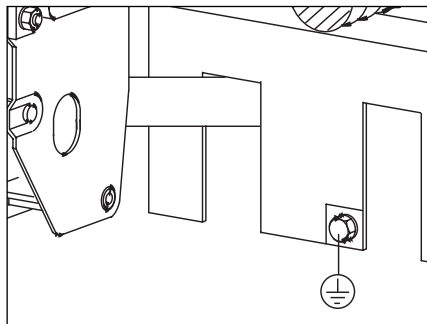


Fig. 9

Earth terminal

Protective earthing is also admissible through the securing bolts on the post insulators, if galvanizing self-locking bolts whose tothing penetrates the paint, are used as securing bolts.

Admissible thermally effective short-time current per self-locking bolt M12:

- 4 kA (1 s)
- 2,7 kA (3 s)

## 5.7 Connecting the control lines

The control lines are connected, depending on design, via control connectors or control lines to the terminal strips in the drive casing. The control lines are wired in the circuit-breaker up to the control connector or up to the terminal strip.

Single-wire conductors or strands can be connected

- to terminal strip up to 2,5 mm<sup>2</sup>
- in control connector up to 1,5 mm<sup>2</sup>

### Terminal with control connector

Push the control connector onto the 64-pin right-angle plug-and socket connector of the circuit-breaker, and lock it.

### If connection to a terminal strip is possible:

1. Remove the cover plate.
2. Connect external control lines via the terminal strip and route them to the outside through the cutouts in the drive casing (Fig. 10).

The circuit diagram which is binding for the system in question is glue-fastened on the inside of the cover plate.

If additional control lines are placed in the drive casing, leave a sufficient distance from the movable parts of the drive.

3. After connecting the external control line, mount the cover plate.

### NOTICE:



**Comply with the tightening torques specified for screw-fastening (refer to Annex).**

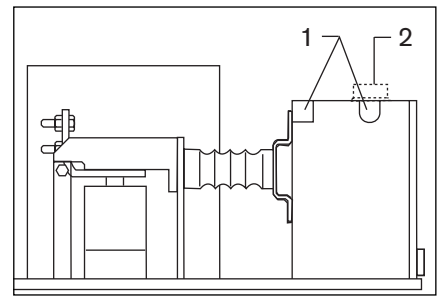


Fig. 10

Cutout in drive casing

- 1 Cutout for control and auxiliary lines in drive casing
- 2 Connector (alternatively)

# 6 Commissioning

- Check circuit-breaker for external damage.
- Make sure that there are no external parts in the circuit-breaker compartment.
- Check surface of insulating components for impurities. If necessary, clean, as described in Chapter 8.
- Check assembly work
  - Check securing bolts.
  - Check the conductor bars' screw couplings using a torque wrench.
  - Check the screw coupling of the earth terminal.

## Perform functional tests

### **NOTICE:**



**Observe the operating and locking conditions acc. to Chapter 7.**

1.  
Charge energy-storing device using the crank.

Check the spring position indicator.

2.  
Switch circuit-breaker on and off several times by hand. Check position indicator.

3.  
Check electrical functions of control and operating devices.

### **NOTICE:**



**The energy storing device of motorized circuit-breakers is charged automatically as soon as the motor's auxiliary supply is applied.**

Apply auxiliary voltage

Perform switching operations and check for proper working order by actuating the shunt release and the blocking coil.

Watch position indicator.

4.  
Check interlocks between circuit-breaker and other devices.

# 7 Operation

## 7.1 Operator interface and operating elements

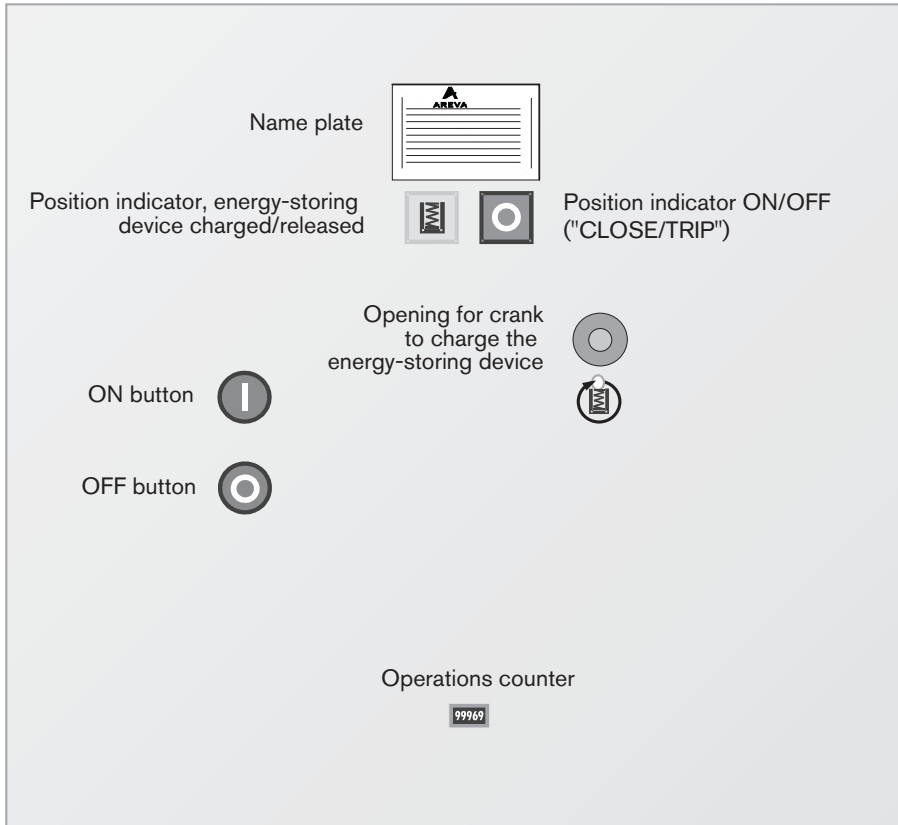










Fig. 11  
Control panel

### Position indicators on circuit-breaker and possible operating sequences

Pos.	Position indicator Energy-storing device (closing spring)	Position indicator ON/OFF ("CLOSE/TRIP") Switch position	Opening spring	possible operating sequence
1	 released	 OFF (TRIP)	released	none
2	 charged	 OFF (TRIP)	released, is charged via C	C - O
3	 released	 ON (CLOSE)	charged	O
4	 charged	 ON (CLOSE)	charged, is re-charged via C	O - C - O

C = Closing (ON)  
O = Opening (OFF)

## 7.2 Charging the energy storing device

### Manually

Initial position:

- Circuit-breaker in "OFF" position.
- Energy storing device "released" (Table, section 7.1, item 1)

Move circuit-breaker in "ready-for-closing" position

1. Insert crank into opening for tensioning the energy storing device
2. Perform approx. 35 turns (clockwise) until position indicator "charged" appears (starting the motor during this procedure does not involve a danger).
3. After charging, remove the crank. The circuit-breaker is ready for closing (Table, section 7.1, item 2).

### Via motor

The energy storing device of motorized circuit-breakers is charged automatically as soon as the motor's rated supply voltage is applied.

## 7.3 Switching operations

### NOTICE:



***The specific interlocks between the circuit breaker and the panel must be taken into account.***

### Closing (ON)

- Push button "ON" - or
- apply voltage to shunt closing release.

The position indicator shows the switch position "ON" (Table, section 7.1, item 3).

The position of the auxiliary switch has changed.

The energy storing device can be charged immediately after switching ON (by hand or by motor). If voltage is applied to the motor, charging is performed automatically.

- The position indicator shows the energy storing device position "charged" (Table, section 7.1, item 4).

### Opening (OFF)

- Push button "OFF" - or
- switch off via shunt opening release, undervoltage release or secondary coil.

The position indicator shows the switch position "OFF" (Table, section 7.1, item 1 or 2).

The position of the auxiliary switch has changed.



# 8 Servicing

## 8.1 General

The series VA, VAA and VXC vacuum circuit-breakers do not require maintenance for a service life of over 20 years.

In case of doubt or if deviations from the circuit-breaker's proper working order are detected, the manufacturer should be contacted.

A visual inspection of the circuit-breaker and switching tests are recommended, depending on the stress imposed during operation and on the operating conditions, every 4 years (VA, VAA) or yearly (VXC). In case of dust deposits, the circuit-breaker must be cleaned by expert staff.

### WARNING:



**Comply with the safety provisions in section 1.5!**

For maintenance work, the circuit-breaker must not be disassembled, except in case of replacement as described.

Once maintenance is complete, proceed as described in Chapter 6 "Commissioning".

## 8.2 Cleaning insulating components

Cleaning of plastic and ceramic parts:

- Partitions
- Post insulators
- Operation rods
- Pull straps
- Ceramics of vacuum interrupter chambers

Clean by means of a dry, lint-free cloth. Depending on dirt collected, replace cloth as often as necessary.

## 8.3 Servicing schedule

Maintenance interval	Maintenance work	
	Series VA, VAA	Series VXC
Every 10,000 operating cycles (max. 30,000 operating cycles)	Handle circuit-breaker drive and circuit-breaker pole acc. to the lubrication instructions, sect. 8.5.	-
Every 25,000 operating cycles (max. 75,000 operating cycles)	-	<ul style="list-style-type: none"> <li>• Handle circuit-breaker drive and circuit-breaker pole acc. to the lubrication instructions, sect. 8.5.</li> <li>• Replacement of control and operating devices subject to consultation of the manufacturer (refer also to section 8.6)</li> <li>• ECO Exchange Program subject to consultation with the manufacturer</li> </ul>
Once the summation current limit has been reached (refer to section 8.4)	Replace circuit-breaker poles subject to consultation with the manufacturer (replacement instructions are available on request).	

## 8.4 Numbers of breaking operations up to summation current limit

The diagrams define exclusively the admissible summation current limit. They indicate whether the vacuum interrupter chambers need to be replaced.

Depending on the rated normal voltage, not all the combinations shown may be possible.

The data for the rated normal current and short-circuit opening current are indicated on the rating plate.

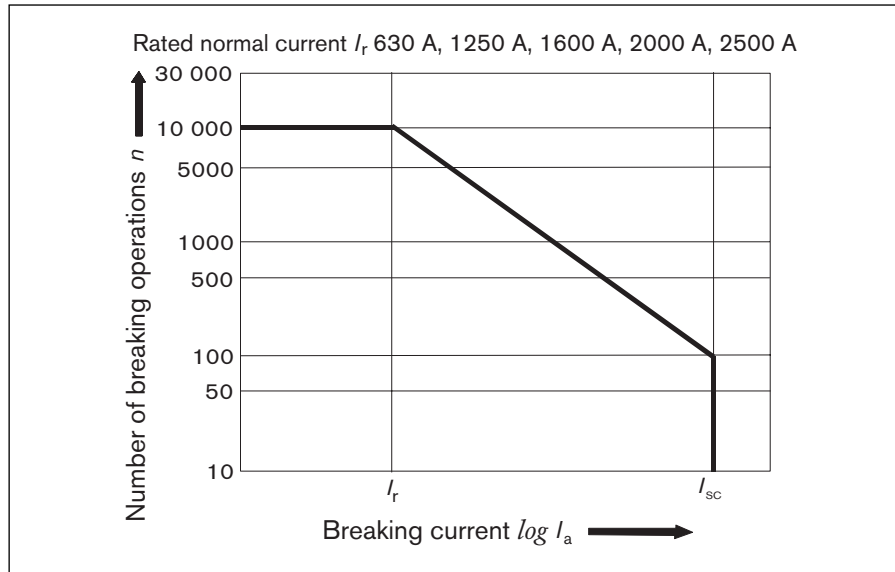
### NOTICE:

**Due to the further development and operating experience regarding vacuum interrupter chambers, contact erosion inspection is no longer considered.**

$I_r$  = Rated (normal) current [A]

$I_{sc}$  = Short-circuit breaking current [kA]

### Vacuum circuit-breaker VA, VAA



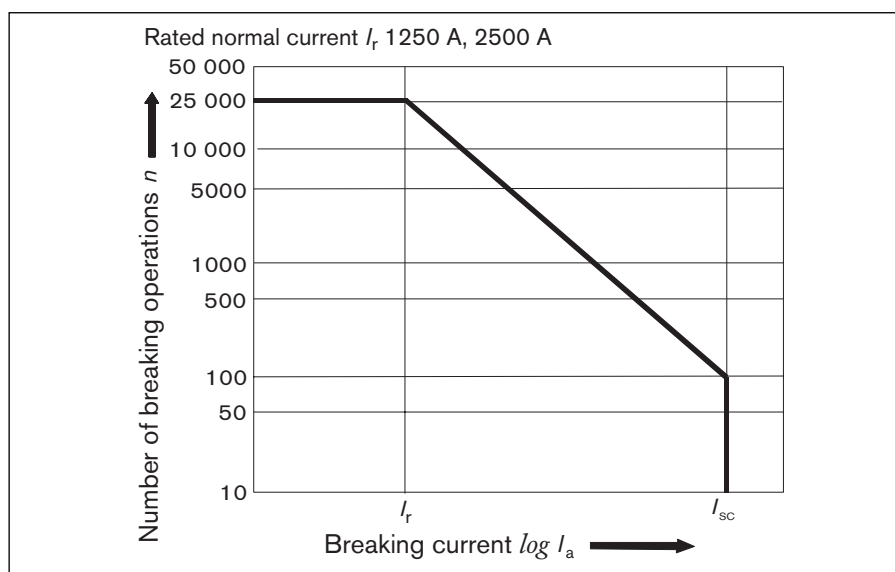
### Vacuum circuit-breaker Type VA

$I_r$ [A]	$I_{sc}$ [kA]			
	25	31,5	40	50
630		x		
1250		x	x	x
1600	x	x	x	x
2000	x	x	x	x
2500	x	x	x	x

### Vacuum circuit-breaker Type VAA

$I_r$ [A]	$I_{sc}$ [kA]		
	16	20	25
630	x	x	
1250	x	x	x

### Vacuum circuit-breaker VXC



### Vacuum circuit-breaker Type VXC

$I_r$ [A]	$I_{sc}$ [kA]	
	25	31,5
1250	x	x
2500	x	x

## 8.5 Lubrication instructions



**WARNING:**  
Comply with safety provisions (section 1.5).

Coat circuit-breaker poles with oil:



Liquid lubricant FL for bearings, joints and guide systems.

Pour drops of liquid lubricant (oil can, drip feed lubricator) into the bearing gap. Liquid lubricant gets between the bearing surfaces due to the capillary effect. In case of inaccessible lubrication points, use an extension tube or spray.

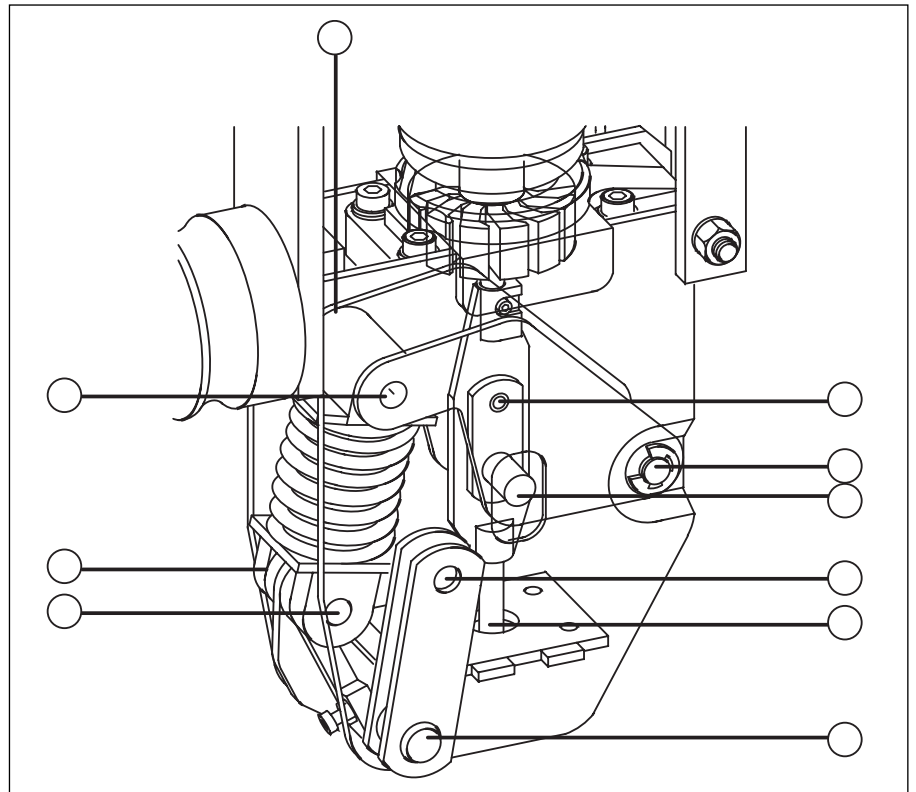


Fig. 12

Circuit-breaker pole VA, VXC, bottom, points of lubrication

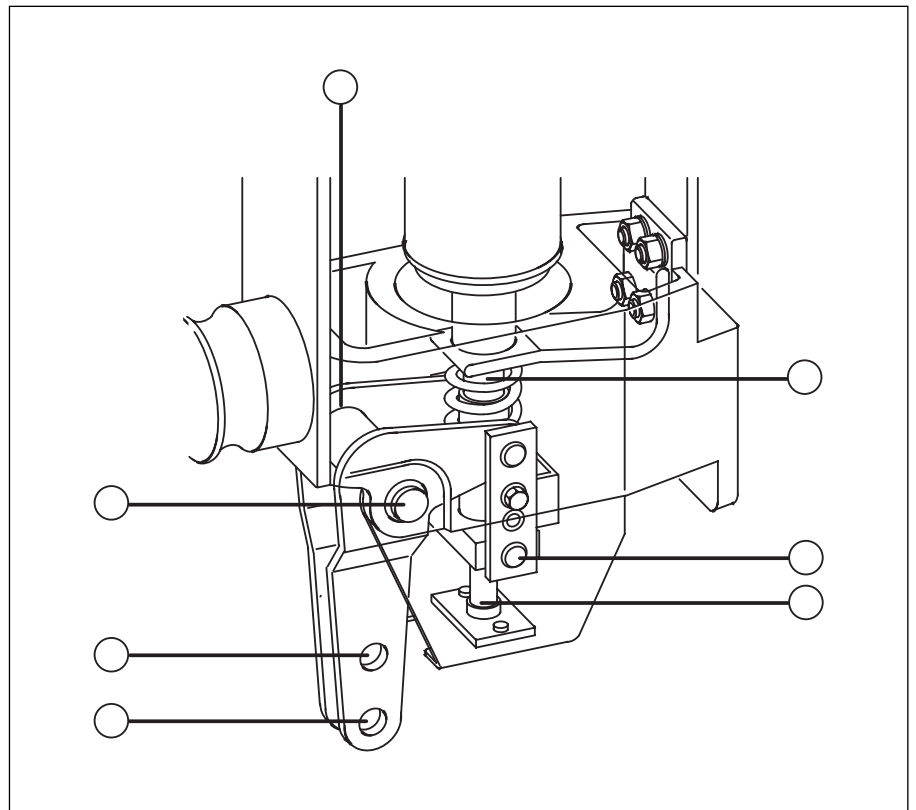


Fig. 13

Circuit-breaker pole VAA, bottom, points of lubrication

### Greasing the drive:

Release front cover via 5 bolts.

### WARNING:



**Comply with safety provisions (section 1.5).**

The following elements must not be lubricated:

- Spring charging mechanism
- Motor
- Ball bearings and sliding bearings
- Shunt closing release
- Shunt opening release
- Push switch ON - OFF
- Initiator "energy storing device"
- Auxiliary switch
- Plungers of tripping coils

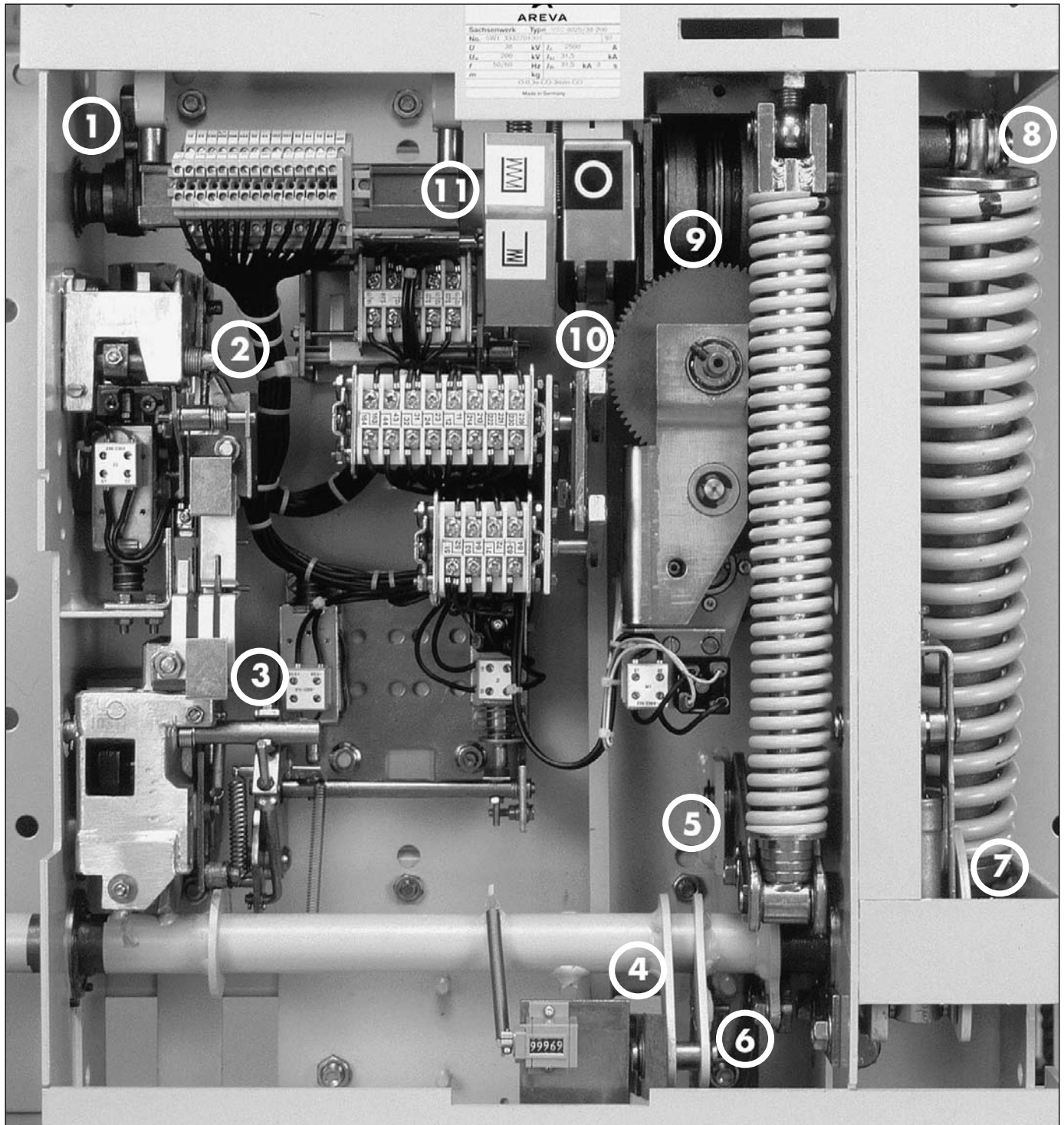


Fig. 14

Overview of points of lubrication in drive (for a schematic view, refer to the following page)

### Lubrication procedure

□ Lubricant KL for surfaces sliding upon one another.

Clean lubricating points, e.g. using a lint-free cloth or a soft paint-brush and detergent (use sparingly, just wet points of lubrication).

Apply a thin coat of lubricant KL, using e.g. a paintbrush.

○ Liquid lubricant FL for bearings, joints and guide systems.

Pour drops of liquid lubricant (oil can, drip feed lubricator) into the bearing gap. Liquid lubricant gets between the bearing surfaces due to the capillary effect. In case of inaccessible lubrication points, use an extension tube or spray.

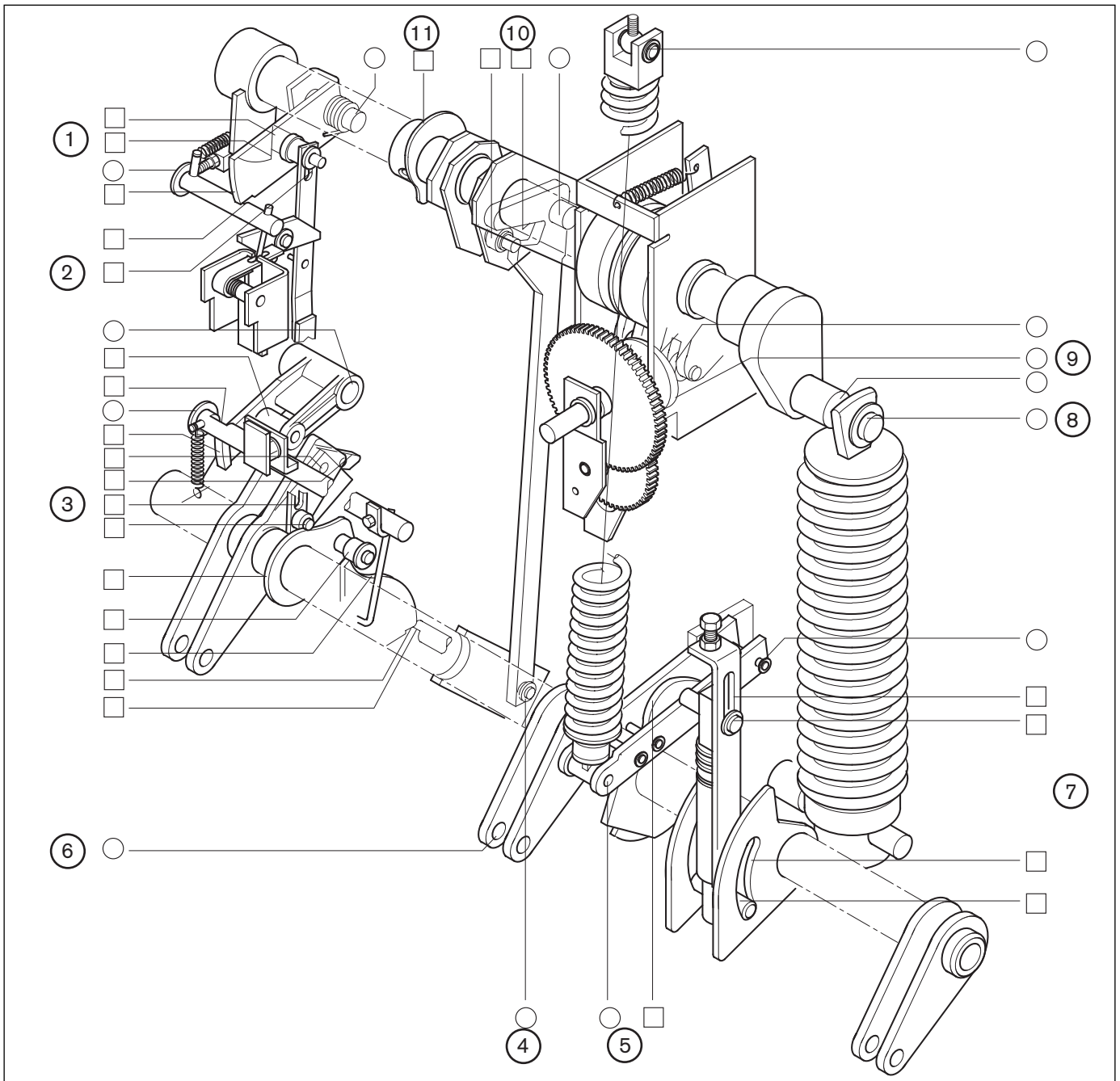


Fig. 15  
Points of lubrication and lubricant in the drive

## 8.6 Replacement of control and operating devices

The following electro-mechanical components may be replaced in the circuit-breaker's drive as required and subject to consultation with the manufacturer:

- Motor
- Anti-pumping relay
- Blocking coil
- Shunt closing release
- Shunt opening release
- Secondary coil
- Undervoltage coil

For replacement of the components, you must release (5 screws) and remove the front cover.

The appropriate subcomponents can be released to facilitate access to the above-mentioned components.

### WARNING:



**Refer to the safety provisions in section 1.5!**

### NOTICE:



**Compare the label on the terminal strip to the auxiliary voltage data.**

### Motor

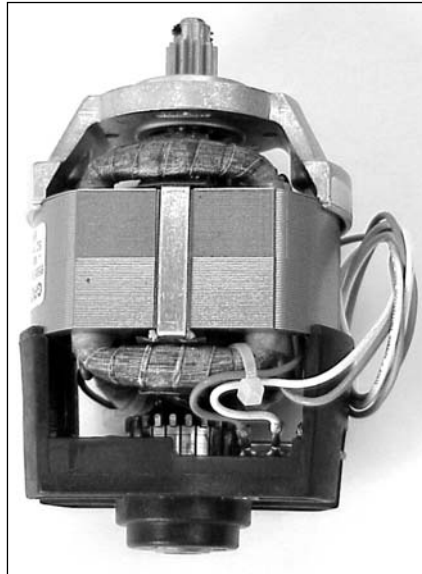


Fig. 16

Motor

### NOTICE:



**Check the technical data on the motor's rating plate.**

### Replacement:

1. Disconnect and mark the feeder wires.
2. Release the three motor securing bolts and pull motor out of its centering in axial direction.
3. Insert the brand-new motor into the centering and screw it down using the securing bolts.
4. Connect the feeder wires. Comply with the marking!

### Anti-pumping relay

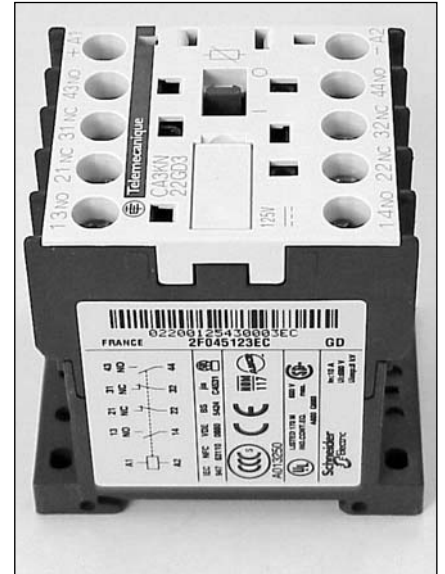


Fig. 17

Anti-pumping relay

### Replacement:

1. Disconnect and mark the feeder wires.
2. Release the two securing bolts and remove the relay.
3. Insert and secure brand-new relay.
4. Connect the feeder wires. Comply with the marking!

## Blocking coil



Fig. 18  
Blocking coil

### Replacement:

1. Disconnect and mark the feeder wires.
2. Release the two securing bolts and remove the blocking coil.
3. Insert a brand-new blocking coil and adjust it as described below:

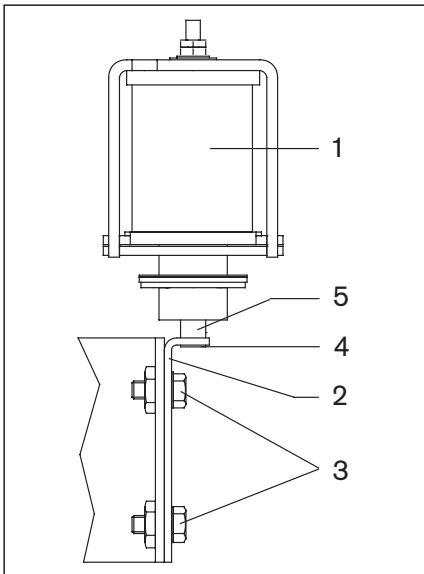


Fig. 19

- 1 Blocking coil
- 2 Angular bracket
- 3 Securing bolts
- 4 Adjust angular bracket (2) using the securing bolts (3) so that the magnet armature (5) protrudes over the angular bracket by 0 to 1 mm.

4. Secure the blocking coil.
5. Connect the feeder wires. Comply with the marking!

## Shunt closing release

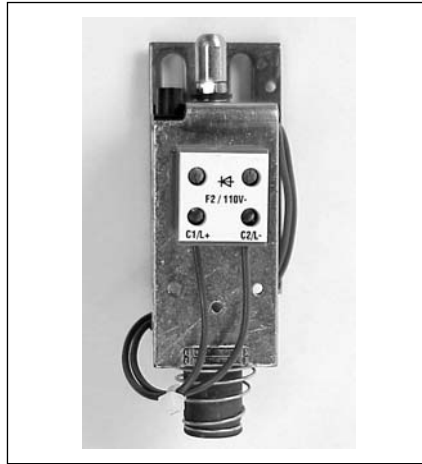


Fig. 20  
Shunt closing release

### Replacement:

1. Disconnect and mark the feeder wires.
2. Expel the lock pin, release the two securing bolts and remove the auxiliary switch.
3. Bore the hole in the magnet mounting plate of the brand-new shunt closing release to  $\text{Ø}3 \text{ H}11$  for the lock pin.
4. Insert and screw-fasten shunt closing release, but do not yet tighten it.

5. Adjust the shunt closing release:

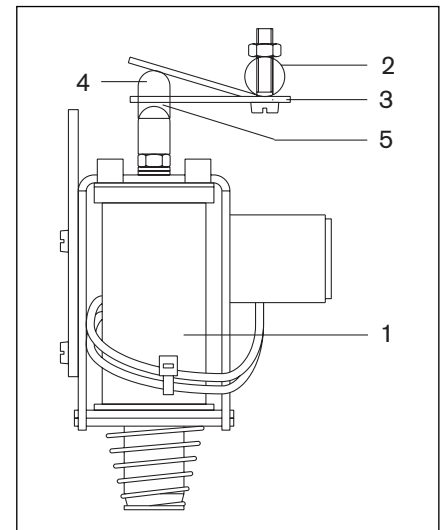


Fig. 21

- 1 Shunt closing release
- 2 Semi-shaft
- 3 Clamping lever
- 4 The appropriate semi-shaft has just been "unlatched". The plunger of the tripping coil is 2 - 3 mm away from its final position.
- 5 The clamping lever rests loosely on the plunger (air gap, approx. 1 mm).
6. In this position, tighten the securing bolts and secure the magnet mounting plate by means of pins.
7. Connect the feeder wires. Comply with the marking!

**Shunt opening release,  
secondary release,  
lowvoltage release**

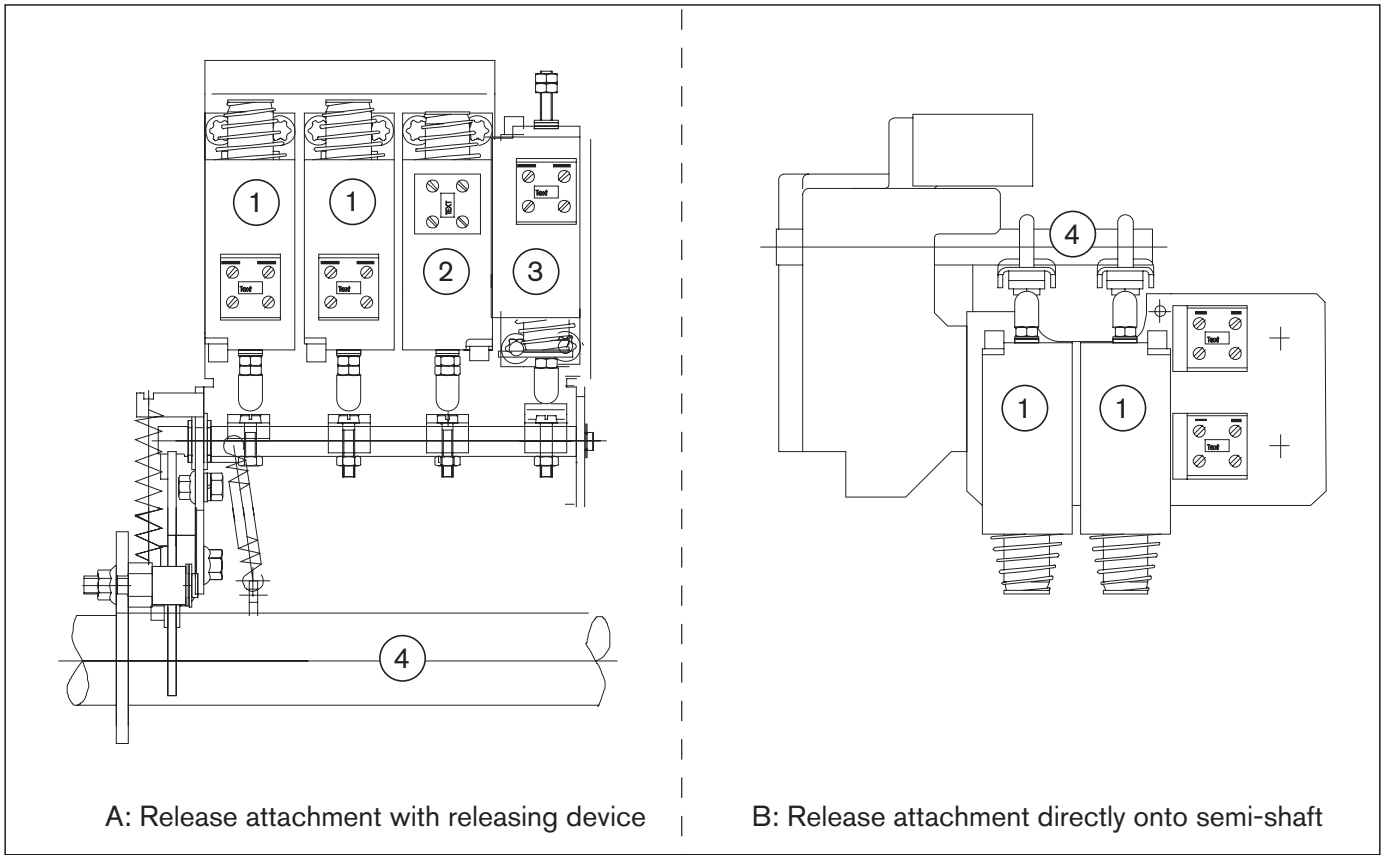


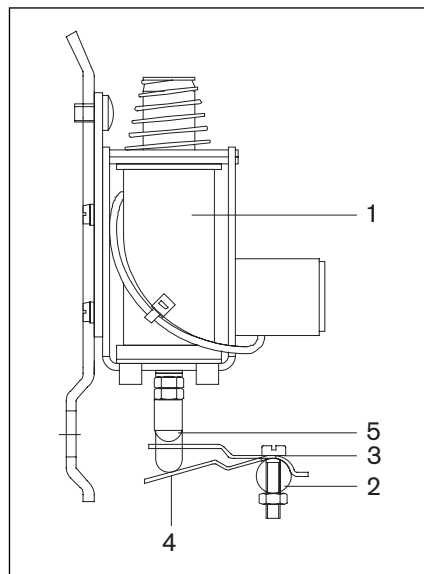
Fig. 22

- 1 Shunt opening release
- 2 Secondary release
- 3 Lowvoltage release
- 4 Semi-shaft

**Replacement:**

1. Disconnect and mark the feeder wires.
2. Release the two securing bolts and remove the auxiliary release.
3. Insert and screw-fasten brand-new shunt opening release, secondary coil or undervoltage release.

**4. Adjust release:**



5. In this position, tighten nut of clamping lever.
6. Connect the feeder wires. Comply with the marking!

Fig. 23

- 1 Shunt opening release
- 2 Semi-shaft
- 3 Clamping lever
- 4 The appropriate semi-shaft has just been "unlatched". The plunger of the tripping coil is 2 - 3 mm away from its final position.
- 5 The clamping lever rests loosely on the plunger (air gap approx. 1 mm).



# 9 Annex

## 9.1 Accessories

Designation	Order no.
Manual crank	AGS 617 810-01

## 9.2 Auxiliary products

The auxiliary products are available from AREVA Sachsenwerk GmbH.

Designation	Order no.
Lubricant KL 0.5-kg can	S 008157
Liquid lubricant FL 0.5-kg can	S 008153
Cleaning agent 1l can	S 008152

The use of other auxiliary products is not admissible.

## 9.3 Screw couplings

The following elements must be used for all metal screw couplings:

- Screws and bolts:  
Grade  $\geq$  8.8
- Nuts:  
Grade 8

Thread size	Tightening torque [Nm]	
	min.	max.
M6	7	9
M8	16	24
M10	36	44
M12	63	77
M16	153	187

Table 1:

Hex. bolts and socket-head capscrews (except slotted screws) and nuts (except self-locking nuts)

Thread size	Tightening torque [Nm]	
	min.	max.
M6	12,5	15,5
M8	32	40
M10	65	79
M12	90	110
M16	243	297

Table 2:

Self-locking bolts and nuts

Thread size	Tightening torque [Nm]	
	min.	max.
M6	0,7	0,9
M8	1,5	2
M10	3	3,9
M12	5,1	6,7
M14	7,6	9,9
M16	10,2	13,2

Table 3:

Plastic screws and nuts (Partition attachment). No preliminary treatment of the thread

Thread size	Tightening torque [Nm]	
	min.	max.
M6	4,5	6,5
M8	10	14
M10	20	27
M12	40	56
M16	80	108

Table 4:

Screw coupling between switching device and conductor bar with conductor material aluminium

Thread size	Tightening torque [Nm]	
	min.	max.
M6	5,5	7,5
M8	15	19
M10	30	40
M12	60	76

Table 5:

Screw coupling between switching device and conductor bar with conductor material copper

## 9.4 Treatment of firmly screw-connected contact surfaces

Contact surfaces must be subjected to preliminary treatment before screw-fastening.

### 1. Clean

- use a lint-free cloth,
- in case of severe contamination: use detergent.

### 2. Polish to achieve a bright surface

Material of contact surfaces	Pre-treatment
Copper, silver-plated	-
Copper	A
Aluminium, silver-plated	-
Aluminium	B
Steel or steel, galvanized	C

- (A) – use emery cloth (grain size 100 or finer)
- or use a steel brush which is only used for copper

- (B) – use emery cloth (grain size 100 or finer)
- or use a steel brush which is only used for aluminium

- (C) remove any existing passivation using a steel brush which is only used for steel.

### 3. Immediately after cleaning the material metallically bright, coat it with lubricant KL so that the space between the contact surfaces is completely filled once the screws have been fastened.



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