

AHA
Metal-clad
Medium-Voltage Switchgear

Operating Instructions
No. 531 681, Edition 04/00

Important notes on operating instructions

- **The operating instructions contain a brief operating overview with drawing (Chapters 1 and 2).**
- **The operating sequences are described in detail in Chapter 3. These are referred to directly in the operating overview.**

Rules and Safety Regulations

These operating instructions are for AHA metal-clad medium-voltage switchgear up to 24 kV.
The switchgear may only be operated by qualified electrical staff.
Proper operator control is a precondition for correct, safe operation of the switchgear.

The legally recognised provisions (DIN EN, VDE, DIN VDE, IEC) and the connection conditions of the local power supply companies as well as the accident prevention regulations of the Industrial Injuries Insurance Institutions or comparable organisations must be adhered to in their entirety.

The switchgear is:

- air-insulated, metal-enclosed and metal-clad;
- resistant to accidental arcs;
- designed in accordance with the provisions of DIN EN 60298 (VDE 0670 Part 6) and/or IEC publication 60298;
- suitable for normal operating conditions in accordance with the provisions of DIN EN 60694 (VDE 0670 Part 1000) and/or IEC publication 60694;
- and comply with switching and insulating capacity in accordance with ANSI C37.

Temperature class: "Minus 5 indoors"

- Temperature max. +55 °C, at ambient temperatures >40 °C reduction of rated normal current.
- Temperature min. -5 °C.

In the Federal Republic of Germany, the following regulations apply for operator control:

- DIN EN 60298 (VDE 0670 Part 6) including Appendix AA and/or IEC publication 60298.
- DIN EN 60129 (VDE 0670 Part 2) and/or IEC publication 60129.
- VDE 0660 Part 103 and/or IEC publication 60470.
- E DIN VDE 0682 Part 415 and/or IEC publication 61243-5.
- DIN EN 50110-1 (VDE 0105 Part 1).
- Accident prevention regulations BGV A 2 of the Industrial Injuries Insurance Institution "Light engineering and electrical engineering".

Operating companies outside the Federal Republic of Germany should:

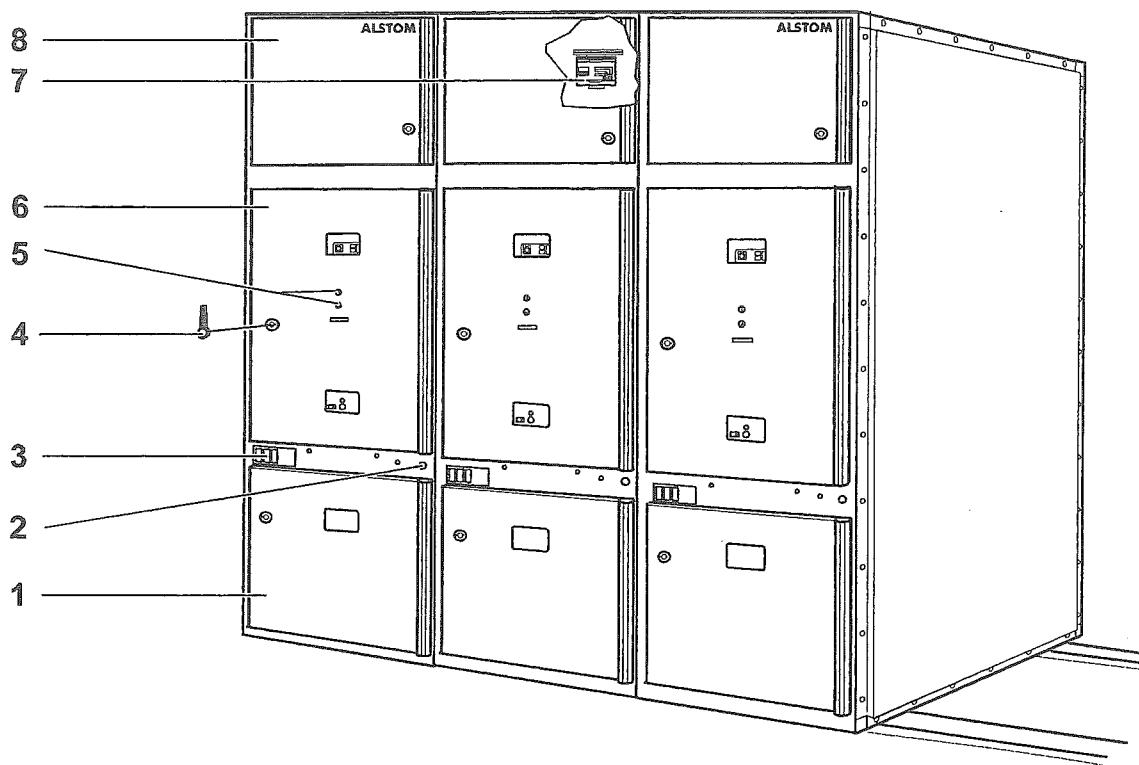
- regard the above-mentioned regulations as a basis;
- apply the relevant local regulations;
- carry out any necessary measures on site.

Operational reliability and service life depend on operation and maintenance in accordance with regulations. The notes in these operating instructions must be followed. Non-compliance may endanger warranty claims.

Table of Contents

1	Overview drawing	6
2	Operating overview	7
3	Detailed Description of Operating Sequences	8
3.1	Opening the door	8
3.2	Racking out the cassette	8
3.3	Racking in the cassette	10
3.4	Interchangeability of cassettes	11
3.5	Switching and operating sequences	12
3.6	Failure of rated motor supply voltage	12
3.7	Switching the earthing switch (circuit-breaker panel)	13
3.8	Opening shutters with device	13
4	Technical Data	15
4.1	Mechanical interlocks	16
5	Maintenance	17
5.1	Maintenance plan	17
5.2	Test for proper working order	17
5.3	Lubrication instructions	18
6	Annex	23
6.1	Accessories and spare parts	23
6.2	Disposal at the end of the switchgear's service life	23



1 Overview drawing



Key:

- 1) Door for cable connection compartment
- 2) Drive opening for earthing switch and position status display
- 3) IVIS, optional
- 4) Actuating lever for lifting door
- 5) Mechanical On / Off actuation of circuit breaker
- 6) Door for circuit breaker compartment
- 7) ILIS, optional
- 8) Door for low-voltage compartment

2 Operating overview

Operating sequences	For detailed description of operating sequences see Chapter
Opening the door (6).	3.1
Racking out the cassette.  Only move the cassette with the transport trolley in interlock state. Risk of accidents!	3.2
Racking in the cassette.	3.3
Interchangeability of circuit breaker cassettes.	3.4
Switching and control operations: - moving cassette to service position. - switching the circuit breaker (5). - failure of rated motor supply voltage.	3.5
 In the event of failure of rated motor supply voltage, the closing spring can be charged using the crank handle.	3.6
- Switching the earthing switch (2).	3.7
Opening shutters with device.	3.8
For IVIS (3) see Operating Instructions for Intelligent Voltage Information System, stored in tool board (end panel).	
For ILIS (7) see Operating Instructions for Intelligent Light Information, System, stored in tool board (end panel).	

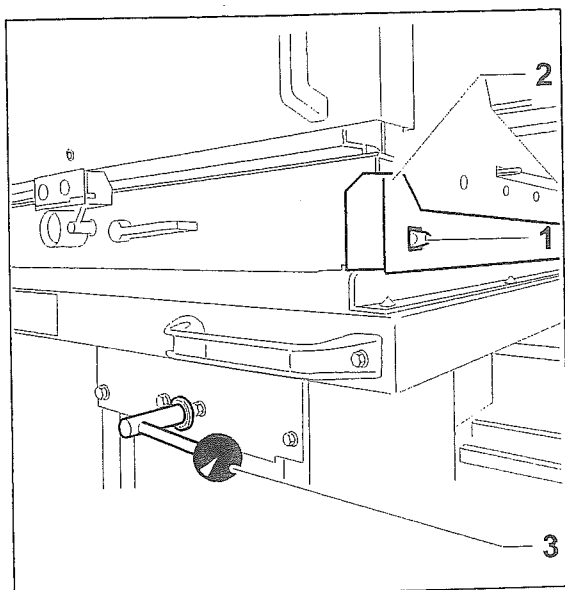


Fig. 3-5 1 Interlocking studs
2 Guide rails
3 lever

Check that cassette is interlocked with the transport trolley.

- The interlocking studs (1) of the cassette must be interlocked on the right and on the left with the guide rails (2) of the transport trolley.



Only move the cassette with the transport trolley in interlocked state.
Risk of accidents!

- Lift table of transport trolley (lever (3) to the right) and move away with cassette.

3.3 Racking in the cassette

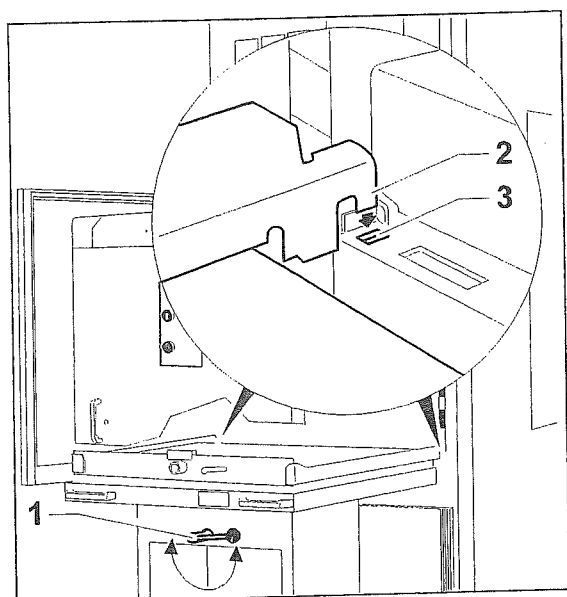


Fig. 3-6 1 Lever
2 Studs
3 Recesses

- Lift the table of the transport trolley by moving lever (1) to the left.
- Move transport trolley up so that the studs (2) lock into the rectangular recesses (3) when the transport trolley is lowered.
- Lower the table of the transport trolley by turning the lever (1) to the right.

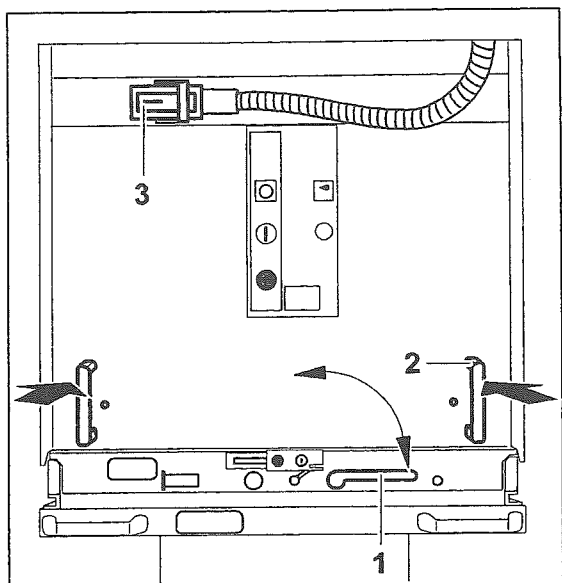


Fig. 3-7 1 Interlocking lever
2 Handles
3 Low-voltage plug

- Release cassette from transport trolley until the interlocking lever (1) is vertical.
- Push cassette into the switchgear panel by the handles (2).
- Interlock cassette with the switchgear panel until the interlocking lever (1) is horizontal.
- Lift table of transport trolley (lever right) and move it away.
- Push on low-voltage plug (3) and interlock it (clip right).

3.4 Interchangeability of cassettes

Interlock against unauthorised racking into service position

The cassette can only be racked into the switchgear panel it is intended for, [coding on the low-voltage connection allows only the interchange of identically equipped cassettes (rated normal current of circuit breaker)]. Interlocking is effected via the low-voltage plug system.

Condition:

- Circuit breaker in OFF position
- Earthing switch in OFF position.
- Low-voltage plug pushed on and interlocked.

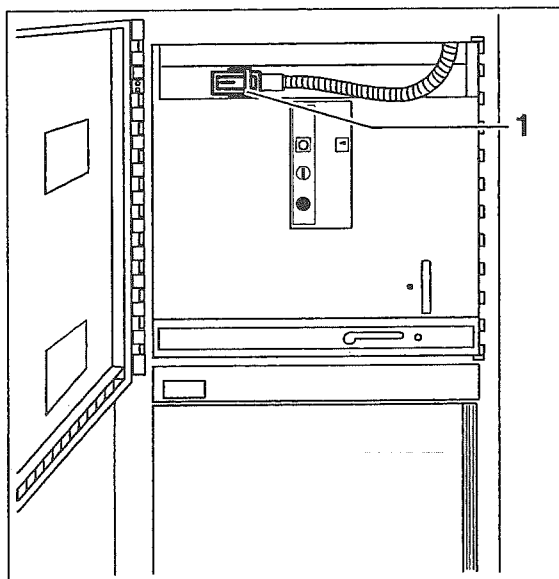


Fig. 3-8 1 Low-voltage plug

3.5 Switching and operating sequences

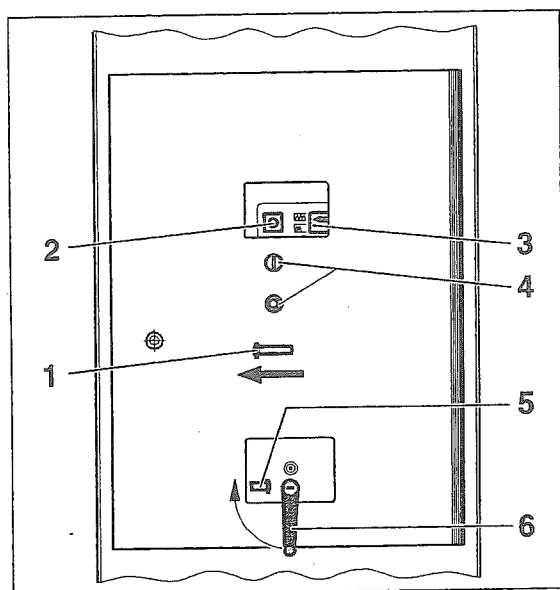


Fig. 3-9 Circuit breaker switchgear panel
 1 Lever
 2 Circuit breaker switching state I/O
 3 Display "Energy storing device charged / released"
 4 ON / OFF pushbutton
 5 Slider for insertion opening
 6 Crank for circuit breaker cassette

Racking cassette to service position:

- Lifting door is properly closed.
- Unlock the insertion opening with the slider (5), insert crank (6) and turn it to the right as far as it will go.

Switching the circuit breaker (door closed)

- To switch on and off, turn the lever (1) to the left, hold in this position and press ON / OFF pushbutton (4) (identical to manual auxiliary actuation).

3.6 Failure of rated motor supply voltage

In the event of a failure of the rated motor supply voltage, the closing spring can be charged with the crank handle (1).

- Release door of the circuit breaker compartment with the actuating lever and open it.
- Insert the crank handle (1) and turn clockwise until the energy storing device display (2) switches to "charged".

The ON / OFF pushbutton (4) can be operated directly (manual auxiliary actuation).

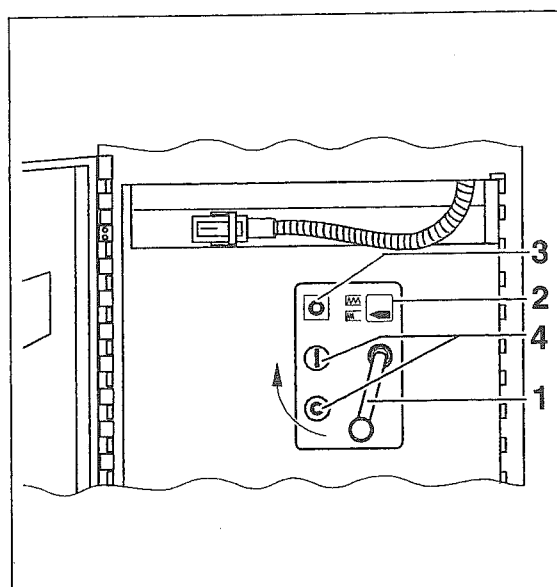


Fig. 3-10 1 Crank handle
 2 Display "Energy storing device (spring mechanism) charged / released"
 3 Position indicator I/O
 4 Mechanical manual auxiliary actuation (ON / OFF- pushbutton)

3.7 Switching the earthing switch (circuit breaker panel)

- Switch circuit breaker from service to disconnected position.
- Unblock the insertion opening with the slider (1), insert detachable lever (2) and move it in the OFF or ON direction to its stop.

i Switching movement approx. 110°.

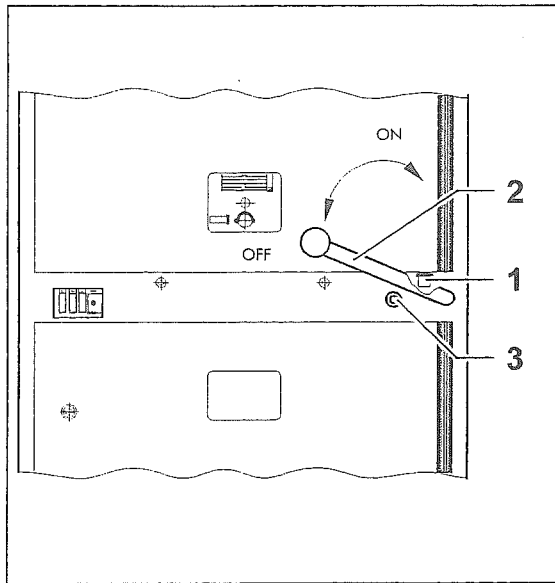


Fig. 3-11 1 Slider for insertion opening
2 Detachable lever
3 Position indicator

3.8 Opening shutters with device



DIN EN 50110-1 (VDE 105 Part 1) safety rules must be complied with.

Condition:

- Open door of circuit breaker compartment.
- Cassette in outside position.
- Insert device (locks automatically).



The device can only be unlocked and removed with both shutters closed.

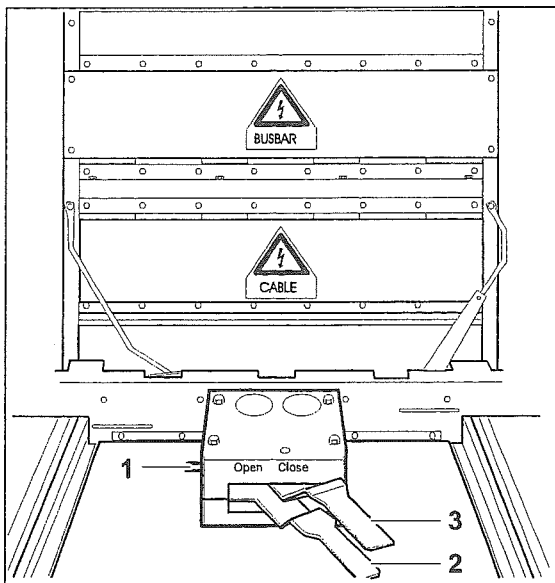


Fig. 3-12 Both shutters closed
1 Release lever for device (for removing device)
2 Actuation lever for shutter of outgoing feeder compartment
3 Actuation lever for shutter of busbar compartment

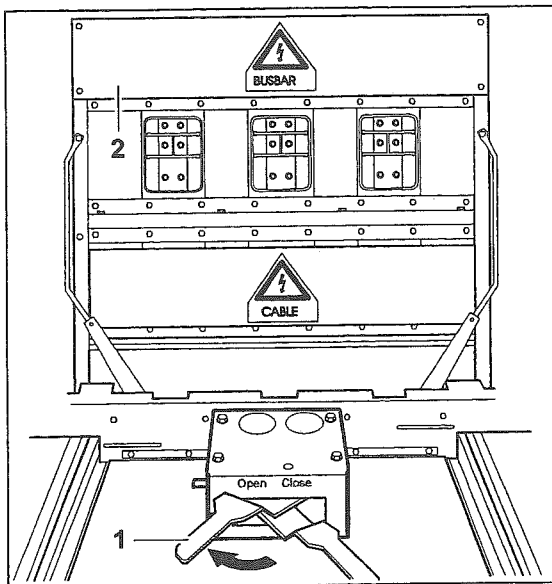


Fig. 3-13 1 Actuation lever
2 Shutter for busbar compartment

Opening shutter for busbar compartment

- Move actuation lever (1) for busbar compartment shutter (2) to the left.

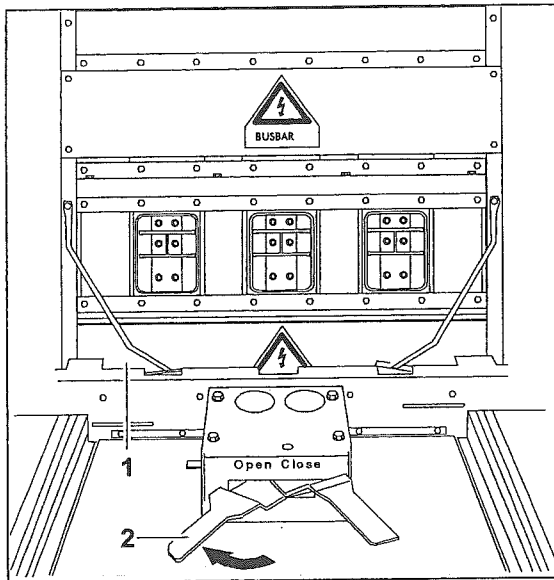


Fig. 3-14 1 Shutter for outgoing feeder compartment
2 Actuation lever

Opening shutter for outgoing feeder compartment

- Move actuation lever (2) for outgoing feeder compartment shutter (1) to the left.

4 Technical Data

Operating times for circuit breakers

Rated voltage	[kV]	12	17.5	24
Opening time at release rated voltage for release 160 W for release 25 W	[ms] [ms]	30-50 45-65 ^{*)}		
Arcing time (max. value)	[ms]	12	14	
Closing time at release rated voltage	[ms]	30-50		
Minimum command time "OFF" electrical tripping for release 160 W for release 25 W	[ms] [ms]	20 50		
Minimum command time "ON"	[ms]	20		
Motor charging time	[s]	≤5		
Motor (power consumption)	[W]	200-250		

^{*)} for releases with extended opening time for 40/44 kA-circuit breaker (12/10 kV) = 80-110 ms

5.3 Lubrication instructions

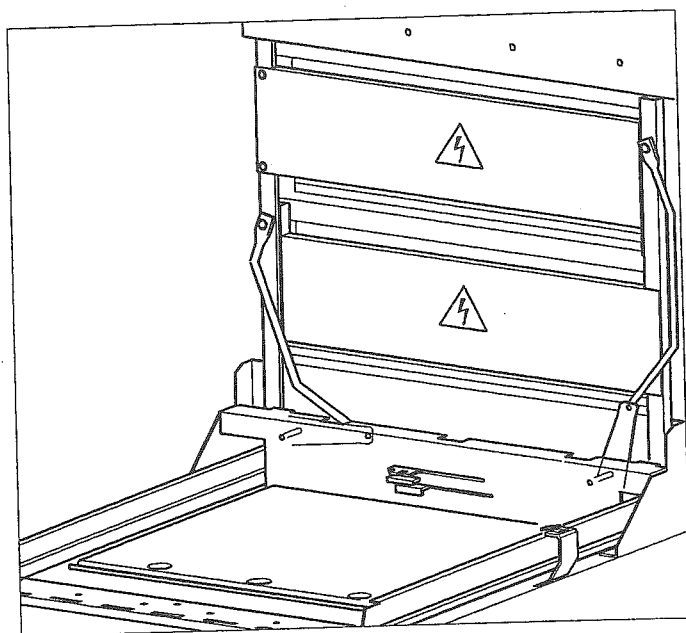


Fig. 5-1
Shutters and
moving rails in
switchgear panel

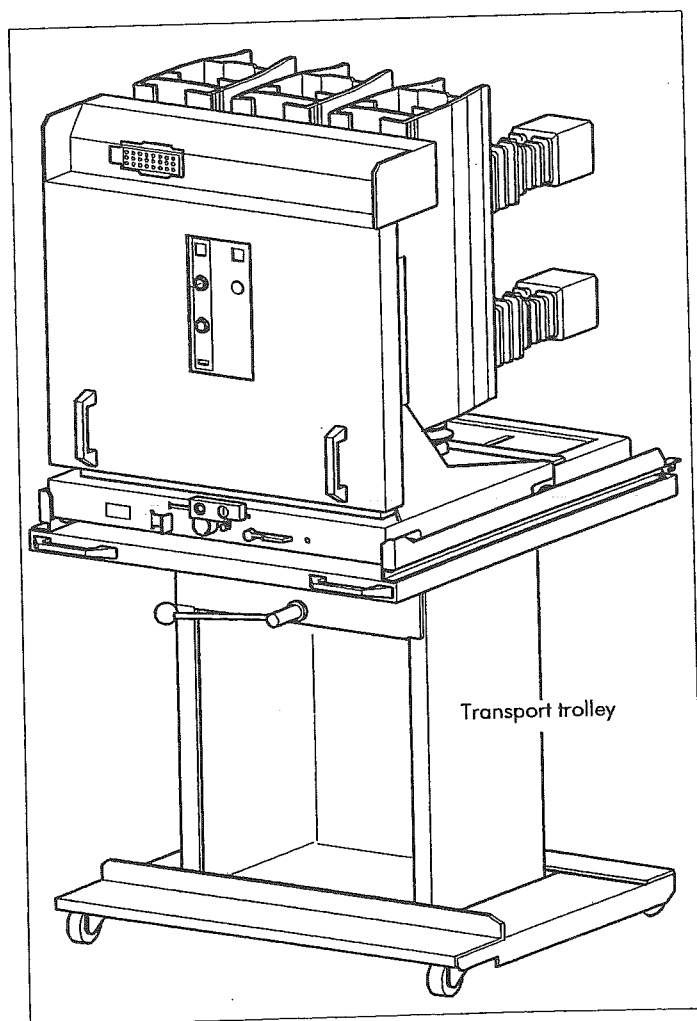


Fig. 5-2
Circuit-breaker
cassette on
transport trolley

Measures to be taken before maintenance work

Maintenance work should only be performed by experts who are experienced in the operation of switchgear.

The DIN EN 50110-1 (VDE 105 Part 1) safety rules must be observed.

Lubricating procedure

- △ Contact lubricant KL to be used for live contact surfaces and sliding contact surfaces.

Clean lubricating points using a lint-free cotton cloth.

Apply a thin film of contact lubricant (e.g. using a paint brush).

- Multi-purpose lubricant ML for sliding and bearing surfaces.

Clean lubricating points, e.g. using a lint-free cotton cloth or a soft paint brush and cleaning agent (use sparingly, only wet lubricating points). Apply a thin film of multi-purpose lubricant.

- Liquid lubricant FL to be used for bearings, articulations and guide mechanisms which are not readily accessible.

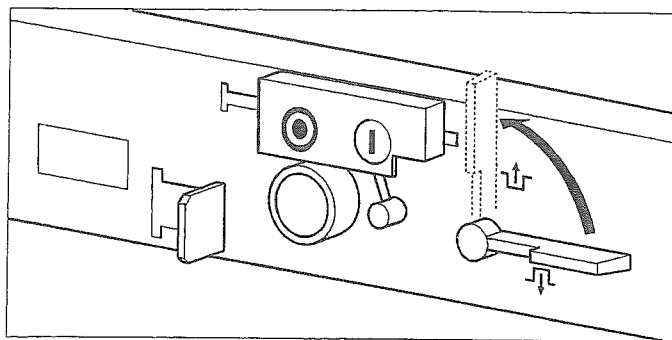
Liquid lubricant to be applied drop by drop into the bearing gap (oil can, drip feed lubricator). Thanks to the capillary effect, liquid lubricant gets between the bearing surfaces. In case of inaccessible lubrication points, use extension tube or spray.

Consumables

	Item no.
Contact lubricant KL 0.5 kg can	008 157
Multi-purpose lubricant ML 0.5 kg can	008 154
Liquid lubricant FL 0.5 l can	008 153
Cleaning agent 1 l can	008 152

The use of other consumables is not admissible.

Fig. 5-3
Unlocking the
cassette

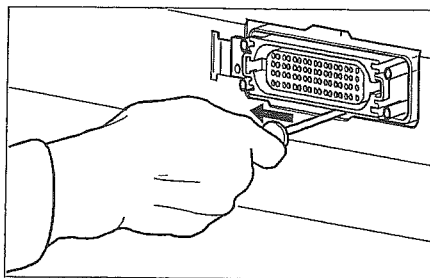


Removal of the circuit-breaker cassette

1. Switch off circuit-breaker and move it into disconnected position.
2. Remove low-voltage plug.
3. Unlock circuit-breaker cassette (position cassette interlock lever vertically).
4. Rack cassette to the suspended transport trolley.
5. Lock cassette on transport trolley (lever horizontal).

⚠ Only move circuit-breaker cassette on transport trolley in interlock state (risk of accidents).

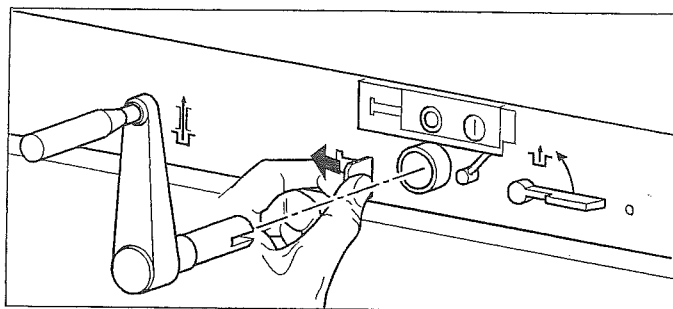
⚠ Fig. 5-4 Plug locking condition may only be cancelled on transport trolley (handling mechanism for low-voltage plug inserted)



Lubricating points on cassette's drive end

1. Use a screw-driver to push lock pin in the lower part of the low-voltage plug approx. 20 mm to the left (Fig. 5-4) (Handling for "Low-voltage plug inserted").
2. Simultaneously, move the slider for access to the insertion opening to the left.
3. Keep in position and introduce crank (Fig. 5-5).
4. Turn crank clockwise to its stop (Cassette in "service position" outside of the switchgear panel).
5. Remove front cover plate (release 2 screws).

Fig. 5-5
Moving the circuit-
breaker on the
cassette



Cassette on drive end (in "service position")

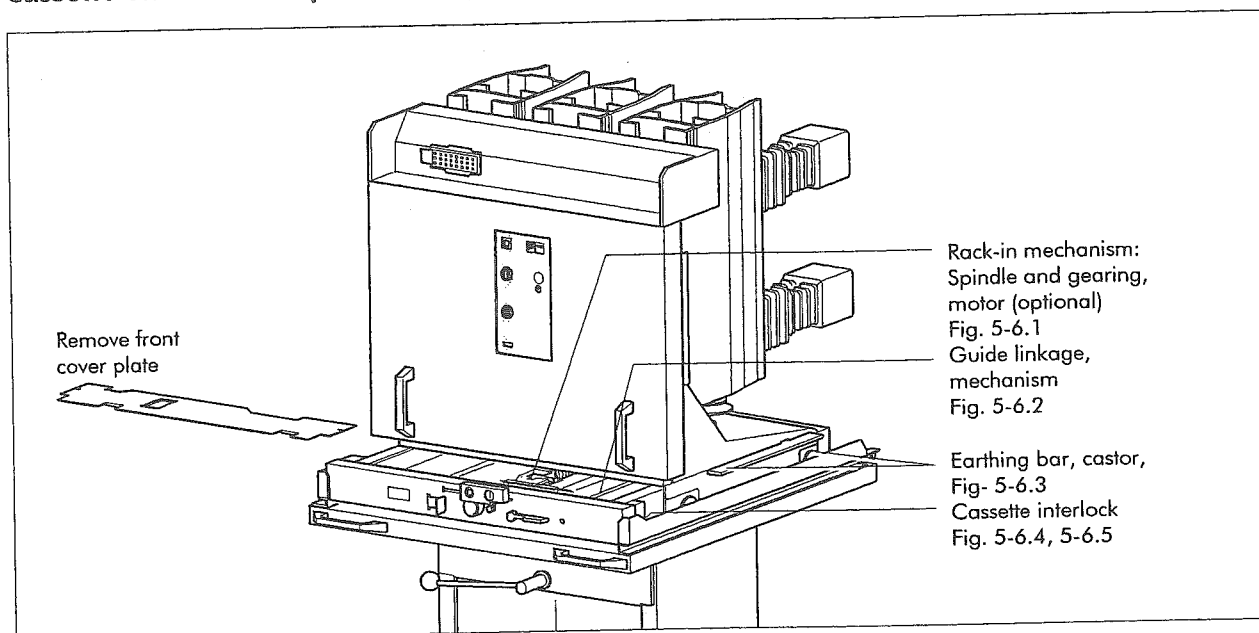
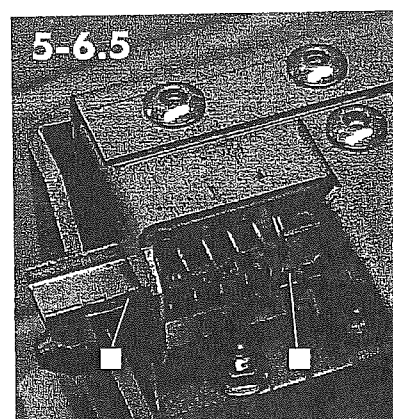
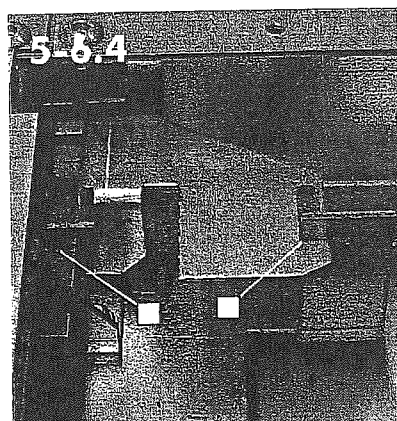
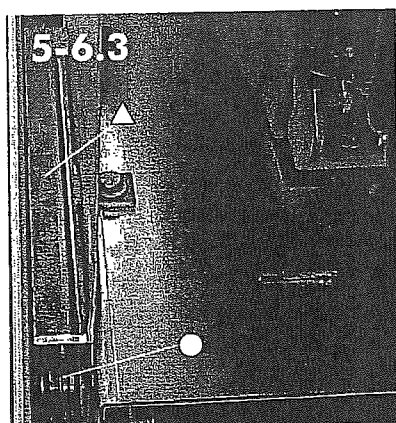
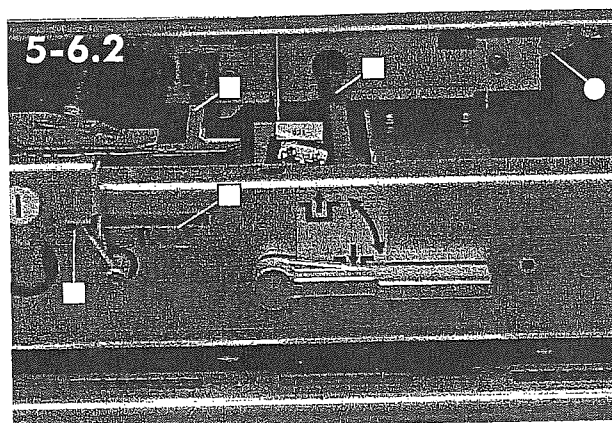
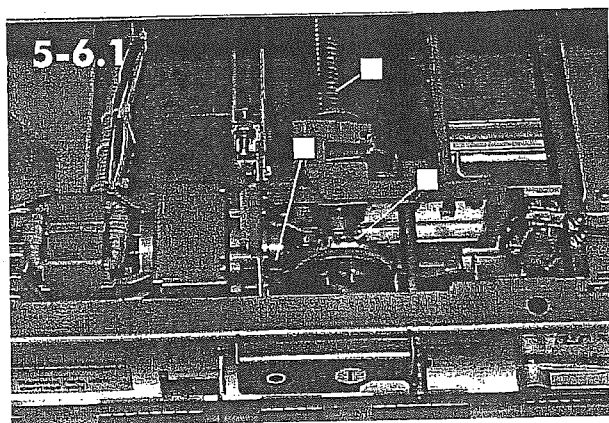


Fig. 5-6
Cassette on front side



Cassette on contact end (in "disconnected position")

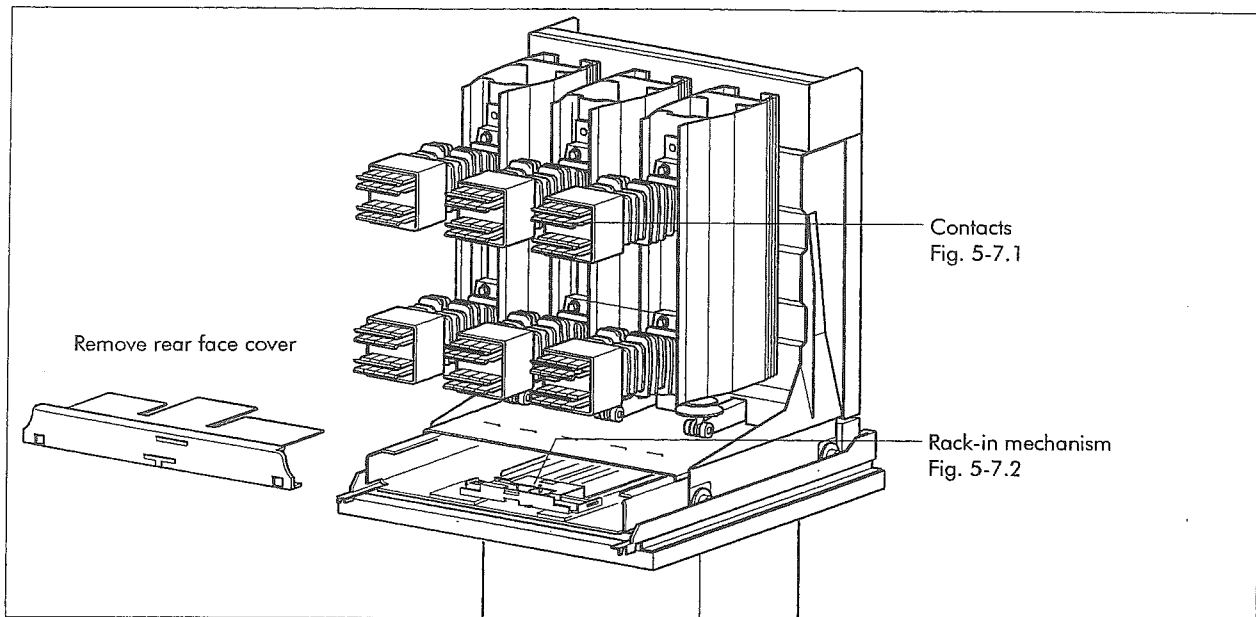
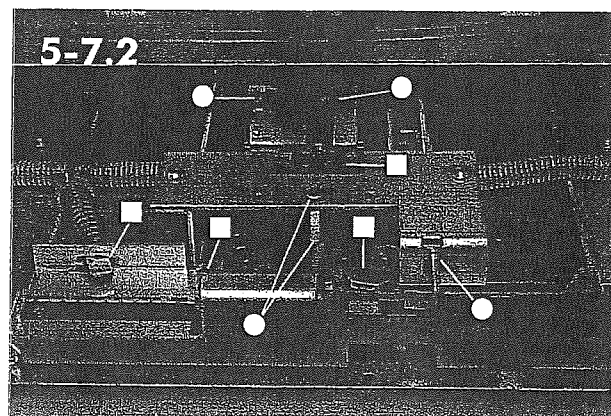
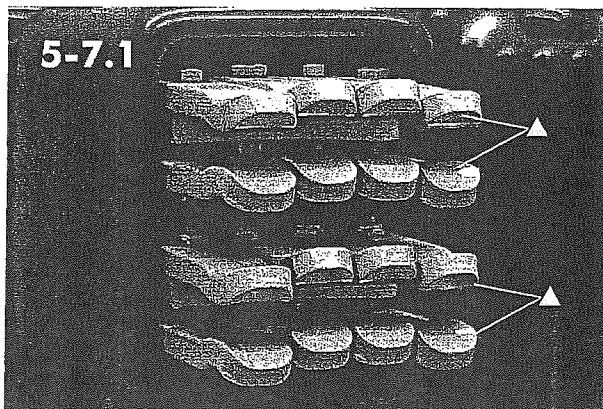
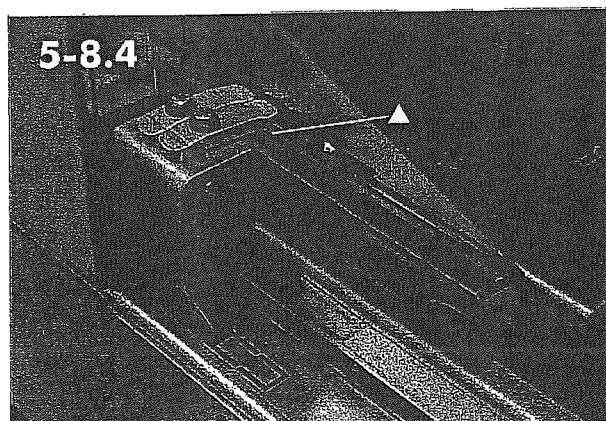
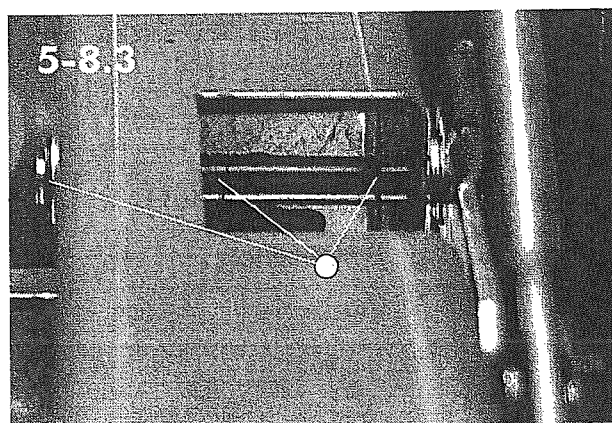
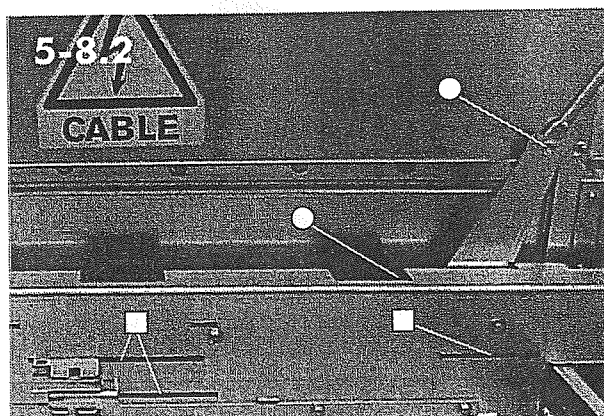
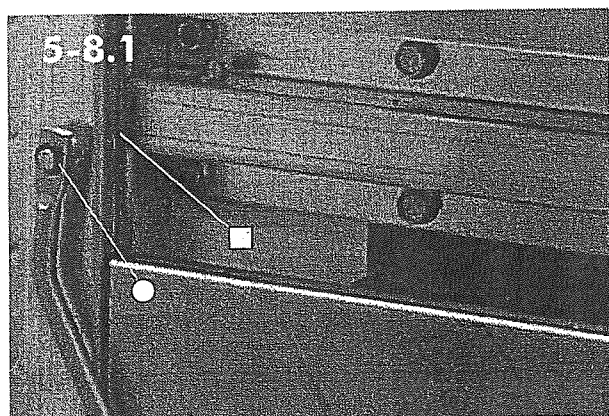
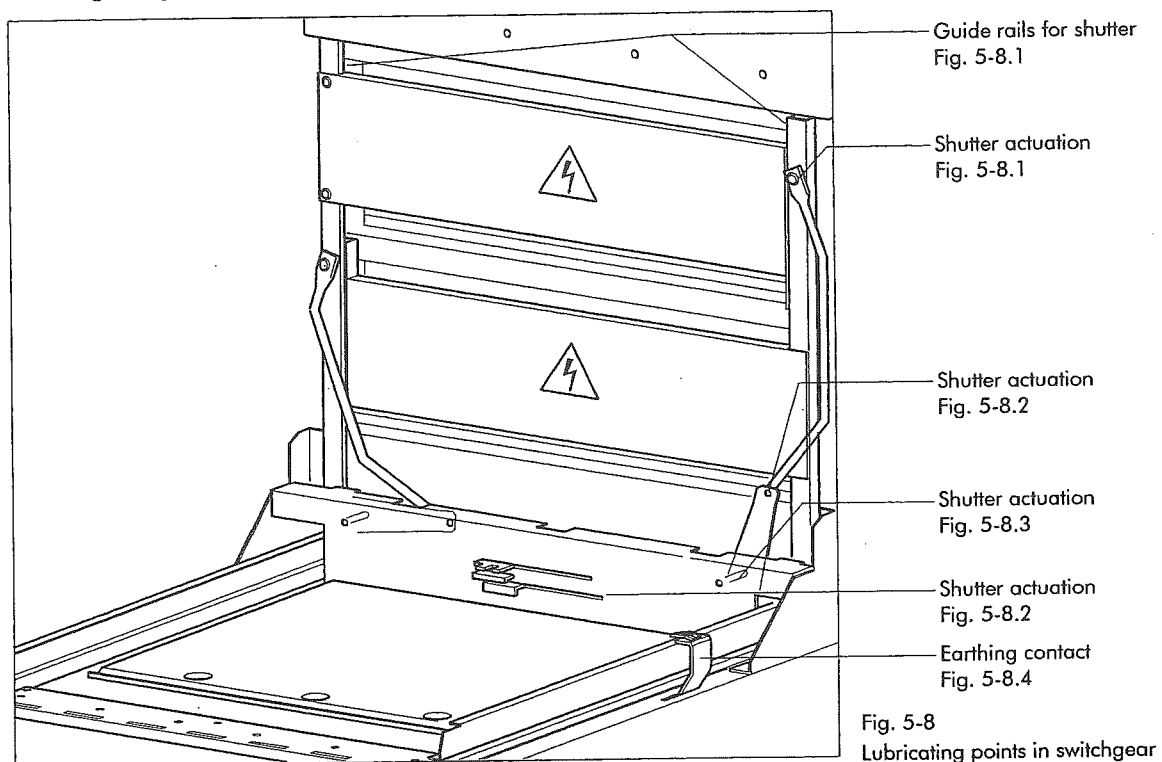


Fig. 5-7
Cassette from contact end



1.
After lubrication, reposition and screw-fasten the front cover plate.
2.
Move cassette on transport trolley back into "disconnected position" (crank actuation counter-clockwise).
3.
Remove rear face cover (release 5 screws).
4.
After lubricating, reposition and screw-fasten the face cover.

Lubricating points in switchgear panel



6 Annex

6.1 Accessories and spare parts

Accessories, spare parts	Item no.
Actuation lever for lifting door	C64 020
Screwdriver size 4.5 x 100 for magnetic interlock	080 291
Detachable lever for earthing switch	447 489
Double-bit key	434 101
Crank handle for actuating cassette	C66 911
Crank handle for charging the closing spring	617 810

6.2 Disposal at the end of the switchgear's service life

There is a manual with instructions on disposal of the switchgear at the end of its service life.
On request, disposal may be effected by the Service Center at the factory.

Address and delivery address

ALSTOM Sachsenwerk GmbH
Service-Center V71
Rathenaustrasse 2
D-93055 Regensburg

Tel.: +49 (0) 941/4620-771
Fax: +49 (0) 941/4620-776