

Operating Instructions No. 2173 (EN)

Device: Motor-Operated Mechanism
for Disconnectors and Earthing Switches
Type: CMM 01
with Non-Adjustable Auxiliary Switch

Manufacturer: ALSTOM Energietechnik GmbH
High Voltage Products
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34123 Kassel
Germany

Note: Please read the operating instructions carefully before beginning installation and commissioning.

Preliminary Remarks

1. The CMM 01 motor-operated mechanism has been specifically developed to be low-maintenance and to allow for long maintenance intervals. Experience has shown that the operational reliability of the equipment is guaranteed by proper servicing and by following the instructions given in this manual.
2. It is not possible to include in the operating instructions every possible eventuality that might occur when using technical equipment. Please contact your authorized ALSTOM representative if a situation arises that is not covered in detail by this manual.
3. This document and the equipment described herein are subject to change without notice in the interest of further development.
4. No claims may be derived from the specifications, figures, or descriptions.
5. No part of this document may be duplicated in any way or passed on to a third party without the written consent of ALSTOM Energietechnik GmbH.

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1 Safety Instructions

1.1 Special Safety Instructions

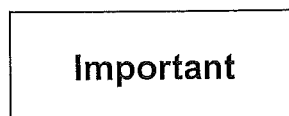
The text of these operating instructions includes special safety instructions that are identified as follows:



Immediate danger that could potentially lead to death or serious injury.



Dangerous situation that could potentially lead to minor injuries or damage to the product or to objects nearby.



Application tips and useful information

1.2 General Safety Instructions



The operator must ensure

- that the equipment described in these instructions is installed, commissioned and maintained only by or under the direction and supervision of trained electrical technicians, in compliance with electrical codes and regulations, and
- that all installation, maintenance and operating personnel are familiar with these operating instructions, including all safety instructions and warnings, all safety regulations applicable locally, and instructions regarding action to be taken in the event of accidents, and that they can consult these documents at any time.

2 Technical Data

| Type | CMM 01 | | | | |
|--------------------------------------|---------|--------------------|-----|-----|------|
| Rated torque | Nm | 300 | 500 | 800 | 1800 |
| Angle of rotation | Degree | 90/135/180/192/200 | | | |
| Motor voltage | V ac/dc | 110 – 254 | | | |
| - Frequency with alternating current | Hz | 50/60 | | | |
| Control voltage | V ac/dc | 110 – 254 | | | |
| - Frequency with alternating current | Hz | 50/60 | | | |
| Heater rating | W | 18 | | | |
| - Heater voltage | V ac | 120 – 254 | | | |
| - Frequency with alternating current | Hz | 50/60 | | | |
| Auxilliary switch | | Non-adjustable | | | |
| - Rated contact current | A | 10 | | | |
| - Contact rating per IEC 694 | A | 2 | | | |
| Degree of protection (optional) | | IP 3XDW, (IP 55) | | | |
| Weight | kg | approx. 50 | | | |

Other data available on request.

Designation

Important

Motor-operated mechanisms for disconnectors are identified by the additional letter "T."

Motor-operated mechanisms for earthing (grounding) switches are identified by the additional letter "E."

3 Description

3.1 General

The motor-operated mechanisms described below are used to operate disconnectors and earthing switches (grounding switches).

The motor-operated mechanisms conform to the current editions of IEC 129 and IEC 694.

3.2 Design (Figures 1 and 2)

The motor-operated mechanism consists of the following main subassemblies:

- Enclosure with door
- Mechanism unit
- Electrical components and wiring

Enclosure

The enclosure cover (door) is hinged and opens from right to left; it has a seal around its edge. On the underside of the enclosure is a removable aluminum plate (3) for cable entry. As a special option, the cable entry plate can also be supplied with the necessary cable glands installed.

Buildup of condensation is prevented by ventilation holes (4) in the bottom and rear wall of the enclosure and also by a heating resistor (21).

The motor-operated mechanism is mounted on the base frame or support structure of the disconnector by means of the mounting brackets located on the rear of the mechanism enclosure.

The mechanism nameplate is affixed to the enclosure door. As a special option, the disconnector or earthing switch nameplate can also be affixed to the enclosure door.

Mechanism Assembly

The principal components of the mechanism assembly are a gear unit (5) and a motor (4) that is flange-mounted on the gear unit.

The gear unit consists of hermetically sealed, greased-for-life gearing and a back gear unit. The last stage of the gear unit is self-locking. An output shaft (8) protrudes from both sides of the gearbox. On one side it runs through the wall of the mechanism enclosure, where it serves as the drive shaft. The other end of the drive shaft actuates an auxiliary switch (9).

The auxiliary switch is used to control the motor, the electrical interlock and the electrical position indicating device. Its unassigned contacts are connected, when necessary, to the terminals of a terminal strip (34) located on the mounting plate on the right (11).

Electrical Components and Wiring

The control contactors for closing and opening (18, 19), overcurrent relays (20) and terminal strips (17), to which unassigned auxiliary switch contacts or the control and motor voltages are connected, are located on the mounting plate on the left (10) and are easily accessible.

A heating resistor (21) designed for continuous operation is hidden behind a mounting plate.

Wiring and terminal connection diagrams are part of the documentation supplied with the equipment.

3.3 Operation

Operation is described as follows based on the example of a closing operation:

- The disconnecter is in open position.
- As soon as the closing contactor is actuated, the motor starts up.
- After the motor has started up, the auxiliary switch switches from the open position to its middle position. Not until the disconnecter has reached the closed position does the auxiliary switch leave its middle position and indicate the closed position.
- The closing contactor then drops out and the motor stops.
- The control contactors for the close and open commands are governed by an electrical interlock.
- The mechanical position indicating device moves continuously from the open position to the closed position.

Actuation of the opening contactor in the closed position triggers the reverse sequence, which continues until the open position is reached.

3.4 Manual Operation



Safety instructions and warnings regarding rotating parts must be followed.

3.4.1 Side Opening (Figures 1 and 5a)

In the normal operating state, the sliding plate (35) is held by the switch (37) and the electromagnetic switch (38) (optional) in a position that makes it impossible to insert the crank handle. For operation using the hand crank, proceed as follows:

- Get approval from the plant operator so that a release is issued.
- Remove the padlock (optional) from either the sliding plate (35) or the lock on the crank handle hole (14).

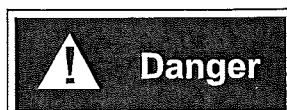
The electromagnetic switch (38) (optional) is opened when the release is issued.

- Slide the sliding plate (35) to the side and hold it while inserting the crank handle (13) through the hole. Move the crank handle until it clicks into place.

A mechanical stop on the gear unit limits manual operation.

- After manual operation is completed, pull the crank handle (13) all the way out of the enclosure. The sliding plate (35) will then snap back automatically into its original position.
- Attach the padlock again (optional).

The electromagnetic switch can be operated manually for commissioning purposes, provided there is no control voltage.



Always obtain approval from the plant operator before carrying out this operation.

- Release the electromagnetic switch (38) (optional) through opening (36) by using a suitable object such as a small screwdriver and slide the sliding plate (35) to the side.

3.4.2 Bottom Opening (Figures 2 and 5b)

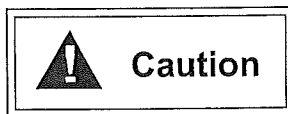
In the normal operating state, the sliding plate (35) is held by the switch (37) and the electromagnetic switch (38) (optional) in a position that makes it impossible to insert the crank handle. For operation using the hand crank, proceed as follows:

- Get approval from the plant operator so that a release is issued.
- Remove any padlock (optional) from either the sliding plate (35) or the lock on the crank handle hole (14).

The electromagnetic switch (38) (optional) is opened when the release is issued.

- Slide the link plate (35) to the side and hold it while inserting the crank handle (13) through the hole. Move the crank handle until it clicks into place.

A battery-powered screwdriver with a suitable head can also be used instead of the hand crank for manual operation of the mechanism.



When the closed and open indications appear in the indicator windows of the auxiliary switch (Figure 6), then use the hand crank again until the movement is completed.

A mechanical stop on the gear unit limits manual operation.

- After manual operation is completed, pull the crank handle (13) all the way out of the enclosure. The sliding plate (35) will then snap back automatically into its original position.
- Attach the padlock again (optional).

The electromagnetic switch can be operated manually for commissioning purposes, provided there is no control voltage.



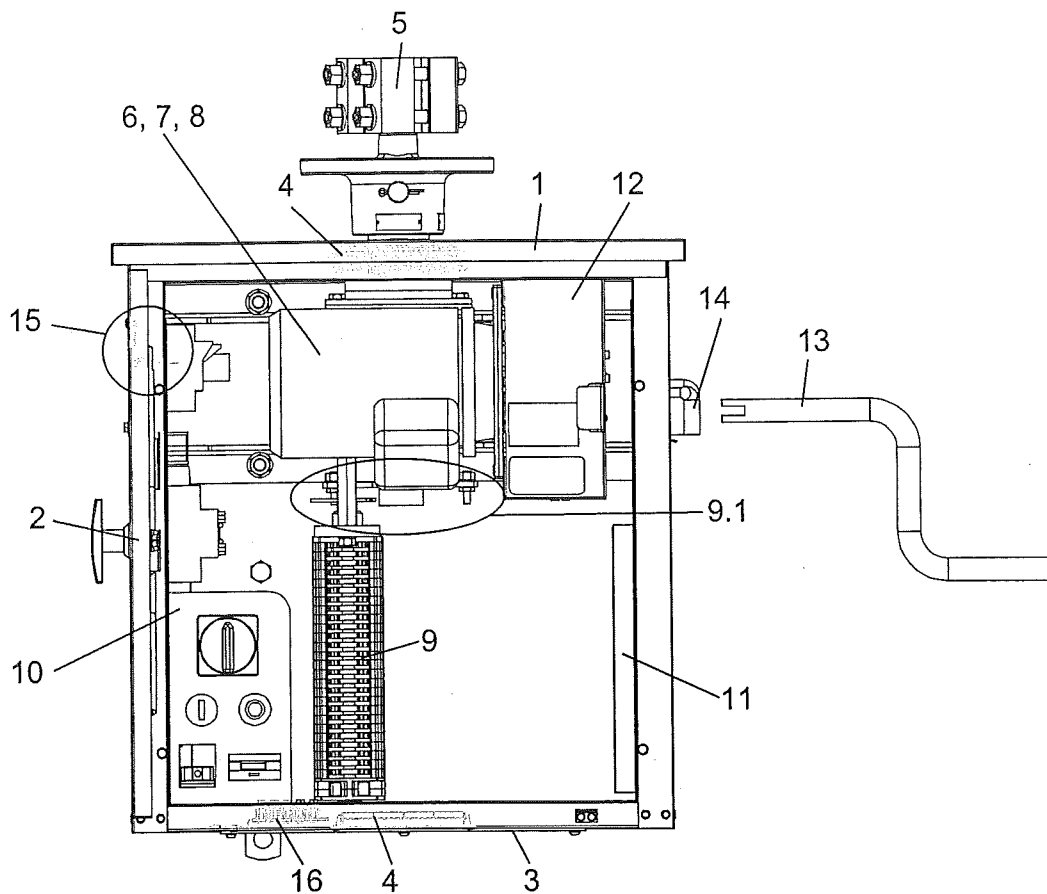
Always obtain approval from the plant operator before carrying out this operation.

- Release the electromagnetic switch (38) (optional) through opening (36) by using a suitable object such as a small screwdriver, and slide the sliding plate (35) to the side.

3.5 Special Options

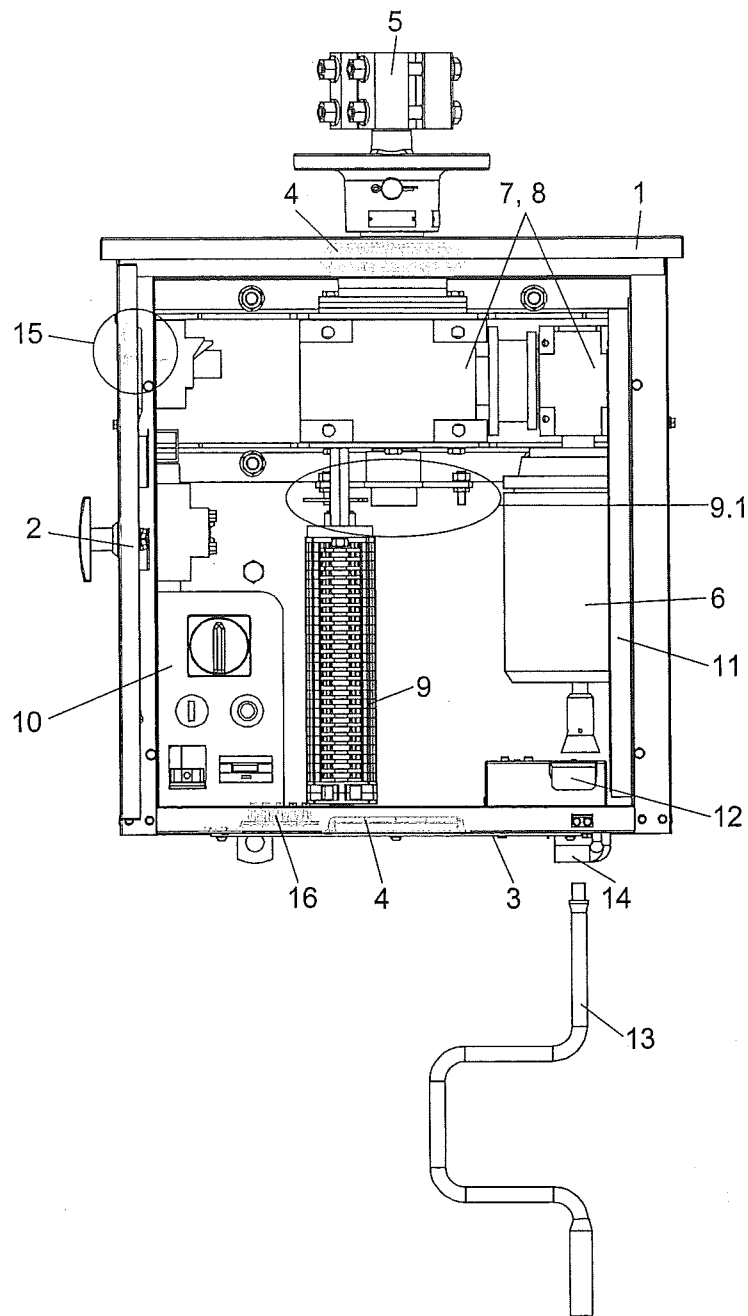
The mechanism can be equipped with the following optional equipment:

- Thermostat (22)
- Rectifier (23)
- Electric local/off/remote selector and close/open buttons (24)
- Undervoltage relay (25)
- Miniature circuit breaker for heater (26)
- Interior lighting (27)
- Door switch (28)
- Counter (29)
- Close/open relay (30)
- Jumpers and fuses (31)
- Miniature circuit breaker (32)
- Socket-outlet (33)
- Electromagnetic switch (38)
- Motor protection switch
- Cable entry plate with cable glands made of heavy-gauge conduit thread
- Auxiliary switch with 15 make and 15 break contacts



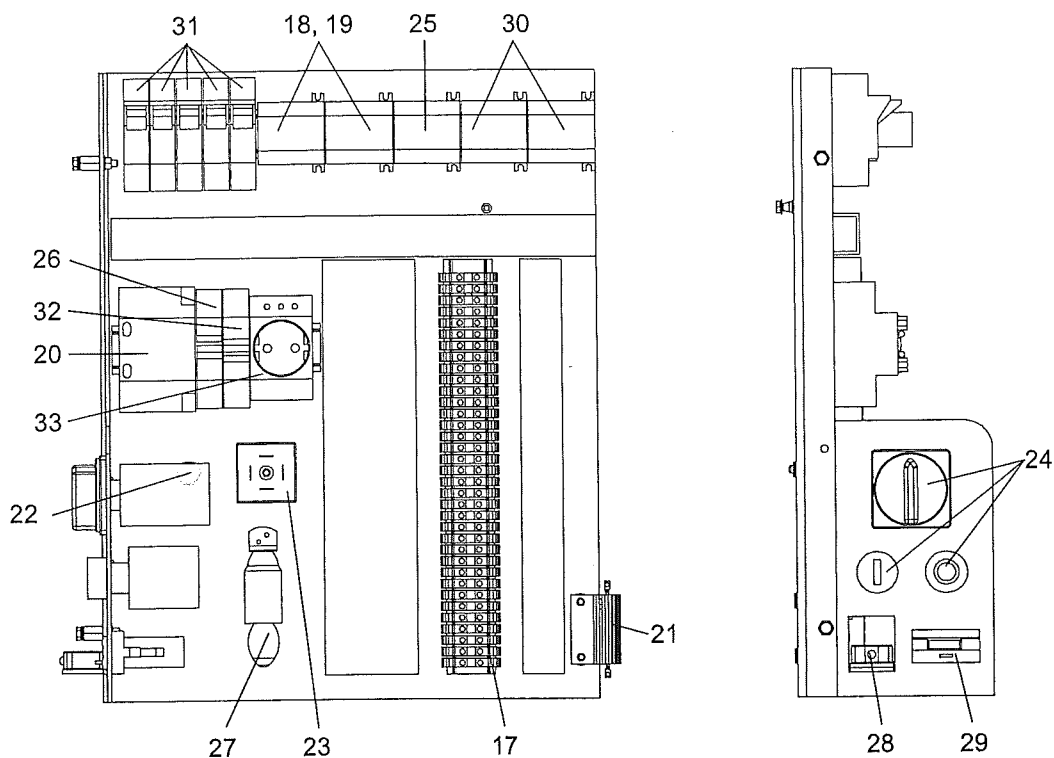
| | | | |
|---|----------------------|-----|--|
| 1 | Enclosure | 9.1 | Auxiliary switch control assembly |
| 2 | Enclosure door | 10 | Left mounting plate |
| 3 | Cable entry plate | 11 | Right mounting plate |
| 4 | Ventilation openings | 12 | Interlock box |
| 5 | Coupling | 13 | Crank handle |
| 6 | Motor | 14 | Crank handle hole |
| 7 | Gear unit | 15 | Position of flexible earthing cable (grounding cable) |
| 8 | Output shaft | 16 | Earth terminal (ground terminal) |
| 9 | Auxiliary switch | | |

Figure 1: CMM 01 motor-operated mechanism with hand crank on the side



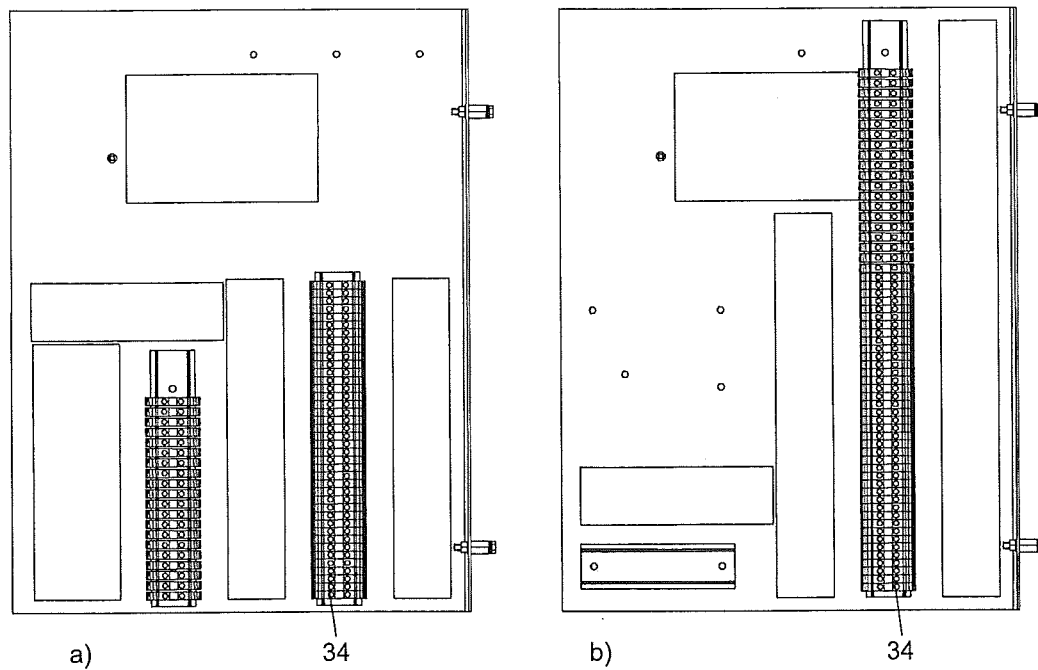
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| 5 | Coupling | 13 | Crank handle |
| 6 | Motor | 14 | Crank handle hole |
| 7 | Gear unit | 15 | Position of flexible earthing cable (grounding cable) |
| 8 | Output shaft | 16 | Earth terminal (ground terminal) |
| 9 | Auxiliary switch | | |

Figure 2: CMM 01 motor-operated mechanism with hand crank on the bottom



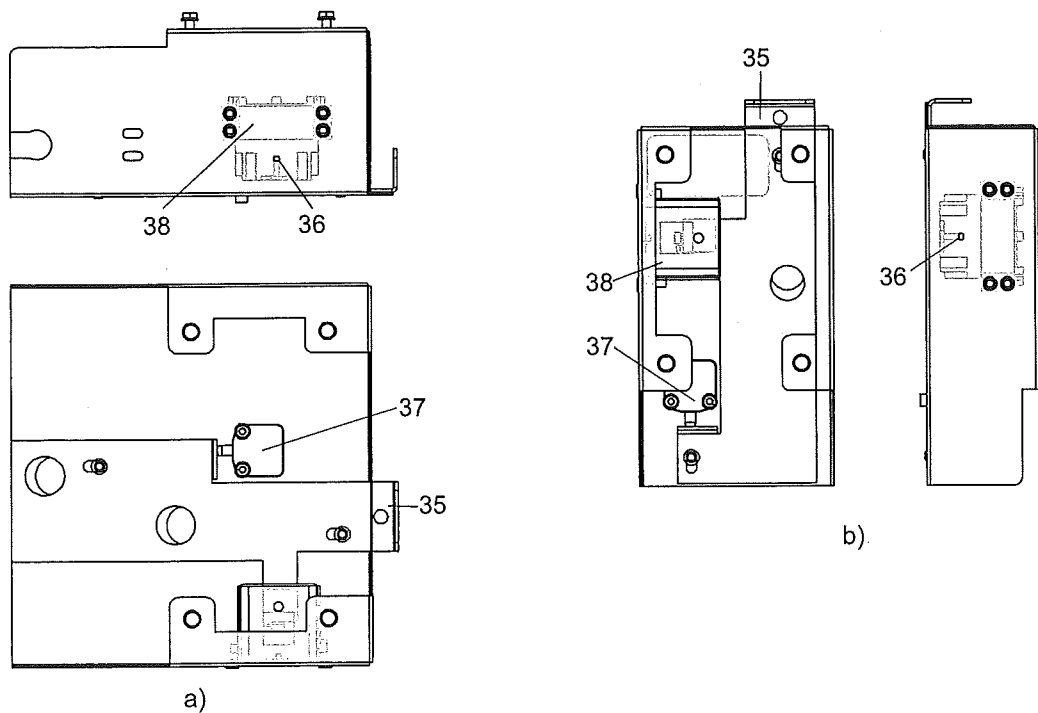
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|----|---|----|--------------------------------------|
| 17 | Terminal strip | 26 | Miniature circuit breaker for heater |
| 18 | Control contactor | 27 | Interior lighting |
| 19 | Control contactor | 28 | Door contact |
| 20 | Overcurrent relay | 29 | Counter |
| 21 | Heating resistor (behind mounting plate) | 30 | Close/open relay |
| 22 | Thermostat | 31 | Jumpers and fuses |
| 23 | Rectifier | 32 | Miniature circuit breaker |
| 24 | Local/off/remote selector (optional) | 33 | Socket-outlet |
| 25 | Undervoltage relay | | |

Figure 3: Left mounting plate



34 Terminal strip (auxiliary switch)

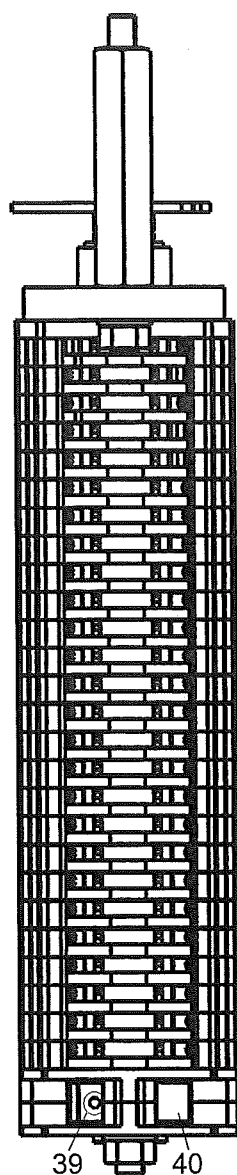
Figure 4: Right mounting plate: a) side-mounted hand crank, b) bottom-mounted hand crank



35 Sliding plate
36 Hole

37 Switch
38 Electromagnetic switch

Figure 5: Interlock box: a) side-mounted hand crank, b) bottom-mounted hand crank



39 Indicator window for open position 40 Indicator window for closed position

Figure 6: Non-adjustable auxiliary switch

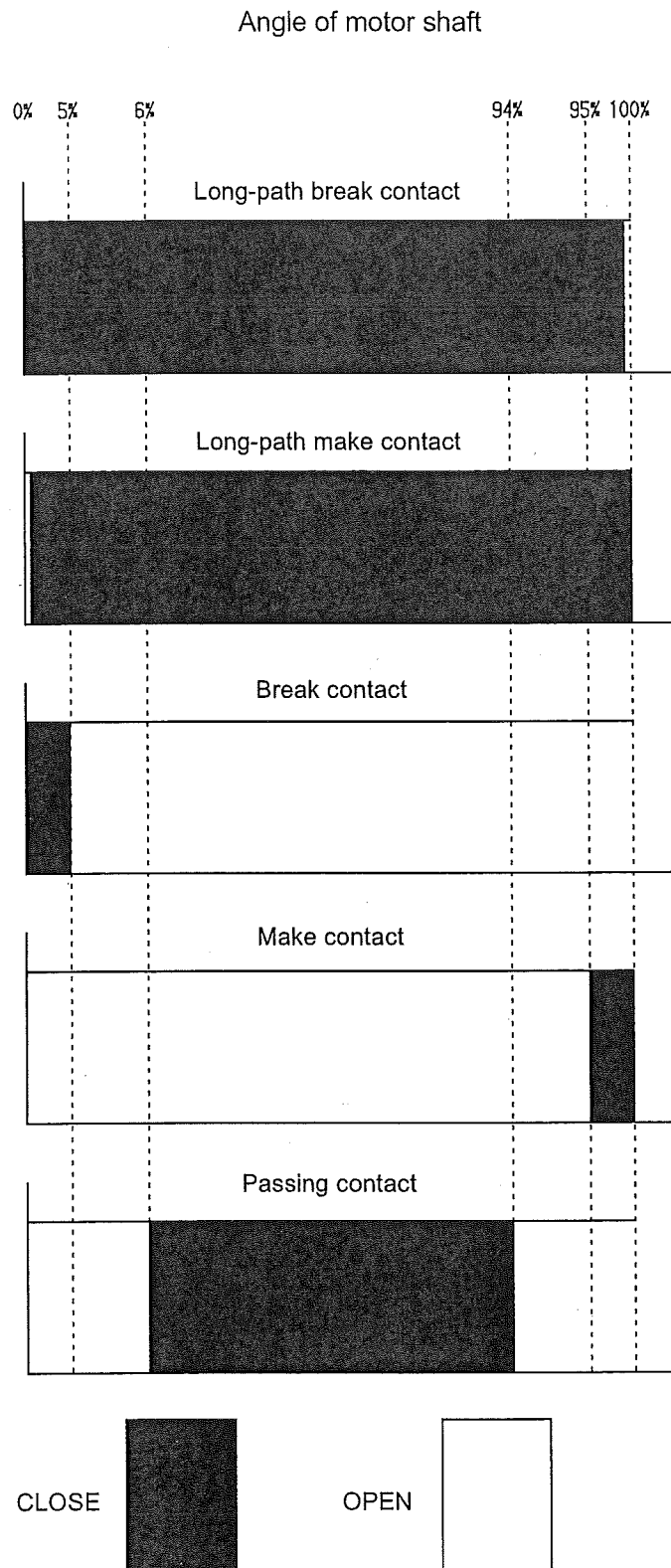


Figure 7: Operating diagram for the auxiliary switch contacts

4 Transport and Storage

4.1 Packaging

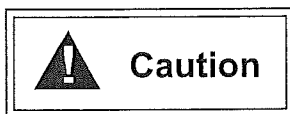
A bag containing silica gel is placed in the motor-operated mechanisms after the ventilation holes and cable glands (if present) have been sealed off.

The motor-operated mechanisms are packaged on pallets and covered with plastic sheeting.

The manufacturer may select special types of packaging depending on the shipping route and the climatic conditions of the specific regions through or to which the equipment will be shipped.

The number, dimensions, and weights of the packing units are given in the shipping documents.

4.2 Transport



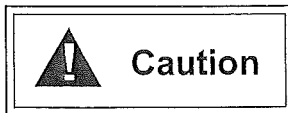
- Transport the packing units to the installation site as intact packages.
- Do not use steel cable since it may cause damage to packaging materials.
- Check shipments against the shipping documents (packing list) for completeness and possible shipping damage. Notify both the shipping company and the manufacturer if there is any visible damage.
- Comply with the instruction and warning labels on the packaging.

4.3 Storage



- When stored, motor-operated mechanisms must be protected against damage and weather.
- If climatic conditions are such that condensate buildup appears likely, remove the shipping packaging, the seals over the ventilation openings and the moisture adsorbent bag located in the mechanism. Connect the anti-condensation heating unit immediately.

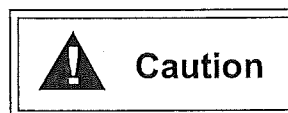
5 Installation



When delivered, motor-operated mechanisms will always be in the following positions:

| Motor-Operated Mechanism for | Position |
|------------------------------|----------|
| Center-break disconnect | Closed |
| Vertical-break disconnect | Closed |
| Pantograph disconnect: | Open |
| Earthing switch | Open |

Install and commission the motor-operated mechanisms in accordance with the instructions given in the disconnect and earthing switch operating instructions.



All necessary adjustments to the motor-operated mechanisms have already been made at the factory and must not be changed.

Connect the wiring for control and supply voltages as shown in the terminal connection diagram.

6 Maintenance



Safety instructions and warnings regarding rotating parts must be followed.

Under normal conditions, the mechanisms should be serviced about every 5 years along with the switchgear.

Servicing shall include the following steps:

- Inspect the unit visually for damage caused by unacceptable external influences.
- Check to make sure the ventilation holes are not stopped up
- Check the terminal connections
- Carry out test operations

Determine the motor running time and the power consumption of the motor resulting from one close-open operation.

For this purpose, the electrical interlock and connected devices such as circuit breakers must be jumpered.

The values are given in the acceptance reports.

- Check the heating unit for proper operation.

When the supply voltage is connected, the temperature of the heating unit must be higher than the ambient temperature.

7 Replacement Parts

- Contactors
- Overcurrent release
- Heating resistor
- Motor

In the event of questions, orders for replacement parts, or equipment malfunction, please contact the nearest ALSTOM representative, citing the information given on the nameplate.

