

Outdoor load disconnectors Fla 15/60, DRIBO Fib and DRIBO Fic

single- and three-pole design
rated voltage 25 and 38.5 kV
rated current 400 and 630 A



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ISO 9001
ISO 14001
BUREAU VERITAS
Certification



Outdoor load disconnectors

Outdoor load disconnectors, produced by DRIBO, used for many years on high-voltage long-distance lines, have proven their high reliability and safety of operation. Load disconnectors are intended particularly for terminal branchings in radial arrangement.

Load disconnectors satisfy standards EN 62271-1, EN 62271-102, EN 62271-103. Used insulators satisfy the fourth grade of contamination area.

Fla 15/60 switching takes place in a tightly closed extinguishing chamber, filled with SHELL transformer oil.

With regard to this fact, Fla 15/60 load disconnectors meet the extreme environmental requirements.

The Fla 15/60 load disconnectors can be provided with earthing switches located on the side either of the fixed or of the pendulum bearing, possibly on both sides. The use of earthing switches requires a double or triple drive with a sturdy blocking mechanism preventing incorrect handling. The number of pull rods and pendulum bearings is correspondingly increased.

In order to ensure a safe and reliable disconnection of electric path the **DRIBO Flb** load disconnectors are equipped with arc quenching horns.

The **DRIBO Flc** load disconnectors are equipped with spring-based arc quenching mechanism.

Simple load disconnectors of a sturdy structure proved themselves in an excellent way under very different climatic conditions.

The construction of the load disconnectors, the quality level of material used and care exercised in the production process, which is governed by the principles of the ISO 9001:2000 standard, is a guarantee for low operation and maintenance costs in the future.

Under normal operating conditions it is not necessary for the load disconnectors to undergo a preventive maintenance during the period of twenty years for hand operated devices and ten years for motor operated devices (remote control).

The basic welded frame is made of open steel profiles that guarantee perfect surface protection from corrosion caused by heat zinc coating that can be controlled on all places. Heat zinc coating protects the shafts of the load disconnectors mounted in bronze bearings as well as all other steel components.

All current conduction components are made of silver plated electrolytical copper and constitute a loopless current conduction path.

The cross-section of the conductors on the current conduction path is sufficiently dimensioned. Appropriate contact pressures of the stainless steel springs ensure optimum prerequisites for faultless switching even after many years of the load disconnector operation under extreme operating conditions as well as under load.

The load disconnectors are delivered with insulators made of a cyclo-aliphatic resin or porcelain.

Control of the load disconnectors and earthing switches is ensured by means of hand or motor outdoor drives.

The load disconnectors can be provided with encased auxiliary switches (IP 44 protection) installed directly on the frame of the device ensuring thus reliable switching-on and switching-off signalling.

The values of the short-circuit resistance are kept so as to ensure an adequately large reserve. These values apply both for the disconnectors and built-in earthing switches.

Withstand voltages

| | | | |
|---|----|-----|------|
| rated voltage | kV | 25 | 38,5 |
| rated short-time withstand power frequency voltage / 1min. in both dry and wet environment. conditions | | | |
| against the earth, across the poles and between disconnected contacts | kV | 50 | 80 |
| across the isolating distance | kV | 60 | 90 |
| rated lightning pulse withstand voltage | | | |
| against the earth, across the poles and between disconnected contacts | kV | 125 | 180 |
| across the isolating distance | kV | 145 | 210 |

Climatic conditions

| | | |
|---------------------------|----------|--------------|
| highest temperature | °C | + 40 |
| lowest temperature | °C | - 30 |
| highest relative humidity | % | 100 |
| highest wind pressure | Pa (m/s) | 700 (34) |
| admissible hoar frost | mm | 20 |
| typical altitude | m a. s. | up to 1000 * |

* Usage in higher altitudes please consult with producer.

Technical data of load disconnectors

Fla 15/60

| | | | | |
|--|------------|------------------|-----------|-----------|
| rated voltage | U_r | kV | 25 | 38,5 |
| rated current | I_r | A | 400 / 630 | 400 / 630 |
| rated short-time current | I_k | kA | 20 | 20 |
| rated peak withstand current | I_p | kA | 50 | 50 |
| rated making current | I_{ma} | kA ¹⁾ | 18 | 11 |
| rated breaking current – $\cos \phi$ 0,7 | I_{load} | A | 630 | 400 |
| rated breaking current of closed loop | I_{loop} | A | 400 | 400 |
| rated breaking current of unloaded transformer | I_{nltr} | A | 53 | 10 |
| rated breaking current of no-load cable and power line | I_{cc} | A | 20 | 20 |
| rated breaking current of the earth fault | I_{ef1} | A | 56 | 40 |

DRIBO Fib

| | | | | |
|--|------------|------------------|-----------|-----------|
| rated voltage | U_r | kV | 25 | 38,5 |
| rated current | I_r | A | 400 / 630 | 400 / 630 |
| rated short-time current | I_k | kA | 20 | 20 |
| rated peak withstand current | I_p | kA | 50 | 50 |
| rated making current | I_{ma} | kA ¹⁾ | 16 | 3,15 |
| rated breaking current – $\cos \phi$ 0,7 | I_{load} | A | 31,5 | 18 |
| rated breaking current of closed loop | I_{loop} | A | 31,5 | 16 |
| rated breaking current of unloaded transformer | I_{nltr} | A | 4 | 4 |
| rated breaking current of no-load cable and power line | I_{cc} | A | 16 | 10 |
| rated breaking current of the earth fault | I_{ef1} | A | 40 | 15 |

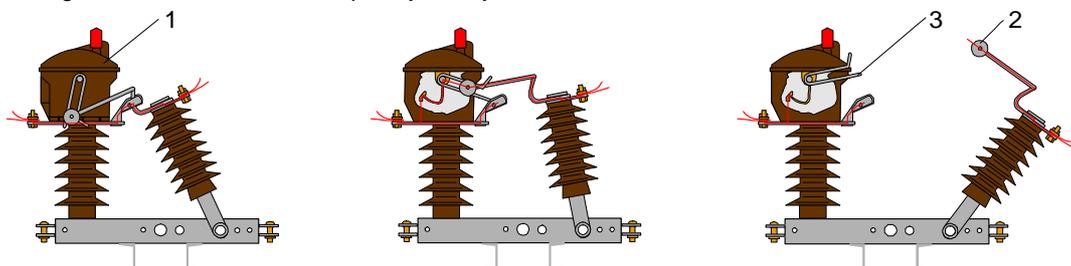
DRIBO Fic

| | | | | |
|--|------------|------------------|-----------|-----------|
| rated voltage | U_r | kV | 25 | 38,5 |
| rated current | I_r | A | 400 / 630 | 400 / 630 |
| rated short-time current | I_k | kA | 20 | 20 |
| rated peak withstand current | I_p | kA | 50 | 50 |
| rated making current | I_{ma} | kA ¹⁾ | 10 | 10 |
| rated breaking current – $\cos \phi$ 0,7 | I_{load} | A | 35 | 18 |
| rated breaking current of closed loop | I_{loop} | A | 20 | 18 |
| rated breaking current of unloaded transformer | I_{nltr} | A | 8 | 4 |
| rated breaking current of no-load cable | I_{cc} | A | 16 | 15 |
| rated breaking current of no-load power line | I_{lc} | A | 16 | 15 |
| rated breaking current of the earth fault | I_{ef1} | A | 50 | 36 |
| rated cable charging breaking current below earth fault conditions | I_{ef2} | A | 21 | 18 |

¹⁾ At a sufficiently quick hand control.

Function description

Tried and tested oil extinguishing chambers, parallelly connected to the main circuit, are provided with a quick-action switching mechanism. The extinguishing chambers are of an adequately sturdy

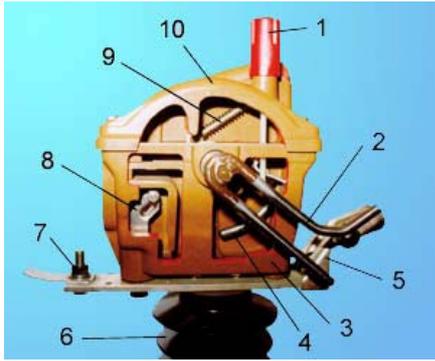


The above drawings show the current flow during switching in switched-on position, intermediate position and switched-off position of the disconnector. The contact arm mounted on the pendulum bearing is provided, on its end, with two rollers (2) their concave sides being inwards oriented. The extinguishing chamber (1) is controlled by the stainless-steel forked contact (3). When controlling the switch, the roller both during switching-on and switching-off positively entrains

structure ensuring that their tightness remains undamaged even under extreme service conditions. Each extinguishing chamber is filled with a quantity of about 0,5 l of Shell Diala D or Shell Fluid 4600 oil.

the fork. The snap-action mechanism connected with the said fork acts on the contact system inside the chamber and closes or opens immediately the contacts of the extinguishing chamber independently on the speed of the hand control. When switching-off, first of all the main contacts are opened and only after having achieved the safety switching-off distance the contact system inside the extinguishing chamber is opened by the snap-action mechanism.

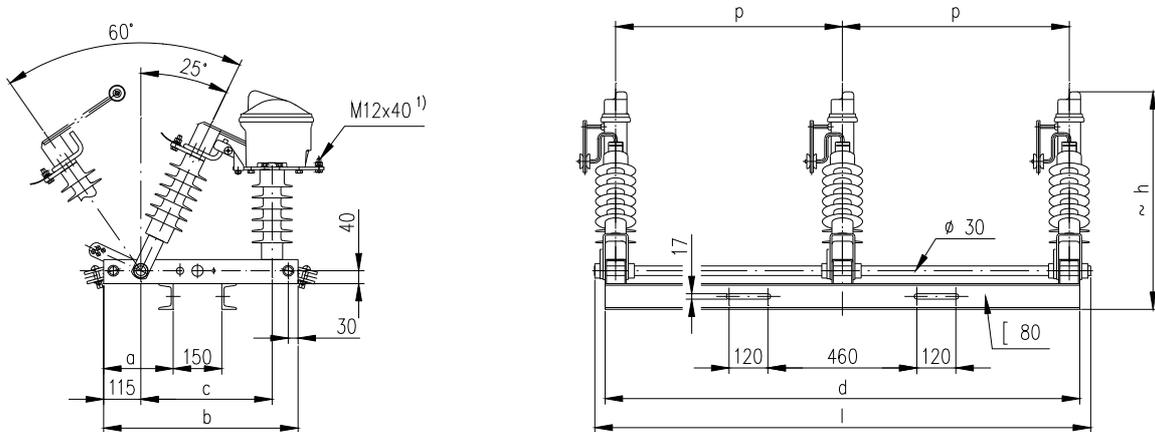
Sectional view of the extinguishing chamber



1. closure of the filling opening with the gauge and the air release valve
2. control lever (made of stainless steel)
3. bottom part of the extinguishing chamber (sectional view)
4. contact rod
5. main contact
6. supporting insulator
7. connecting clamp with a screw
8. auxiliary contact
9. snap-action mechanism
10. upper part of the extinguishing chamber (sectional view)

Three-pole outdoor load disconnecter Fla 15/60

for assembly on concrete and wooden pole



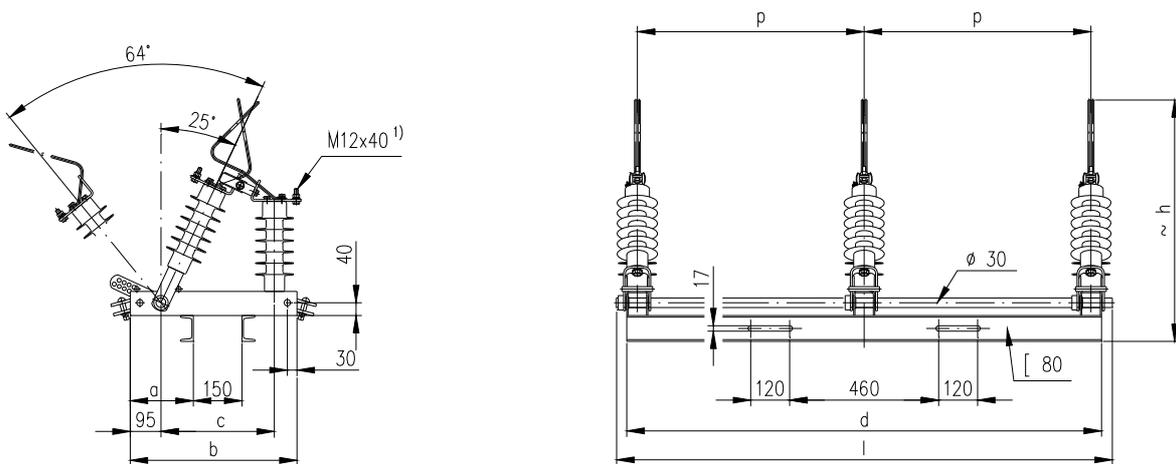
¹⁾ hexagon head screw with nut, washer and spring washer

| U_r [kV] | I_r [A] | earthing switch | p | a | b | c | d | l | $\approx h$ | α | β | weight approx. [kg]* |
|------------|-----------|-----------------|------|-----|-----|-----|------|------|-------------|----------|---------|----------------------|
| 25 | 400 | no | 700 | 215 | 600 | 405 | 1465 | 1530 | 678 | 25° | 60° | 128/91 |
| 25 | 400 | yes | 700 | 215 | 600 | 405 | 1465 | 1530 | 678 | 25° | 60° | 142/105 |
| 25 | 400 | no | 1000 | 215 | 600 | 405 | 2065 | 2130 | 678 | 25° | 60° | 144/107 |
| 25 | 400 | yes | 1000 | 215 | 600 | 405 | 2065 | 2130 | 678 | 25° | 60° | 162/125 |
| 38,5 | 400 | no | 1000 | 265 | 650 | 455 | 2065 | 2130 | 762 | 25° | 60° | 180/129 |
| 38,5 | 400 | yes | 1000 | 265 | 650 | 455 | 2065 | 2130 | 762 | 25° | 60° | 198/147 |

* Weight with porcelain / epoxy insulators.

Three-pole outdoor load disconnecter DRIBO Fib

for assembly on concrete and wooden pole



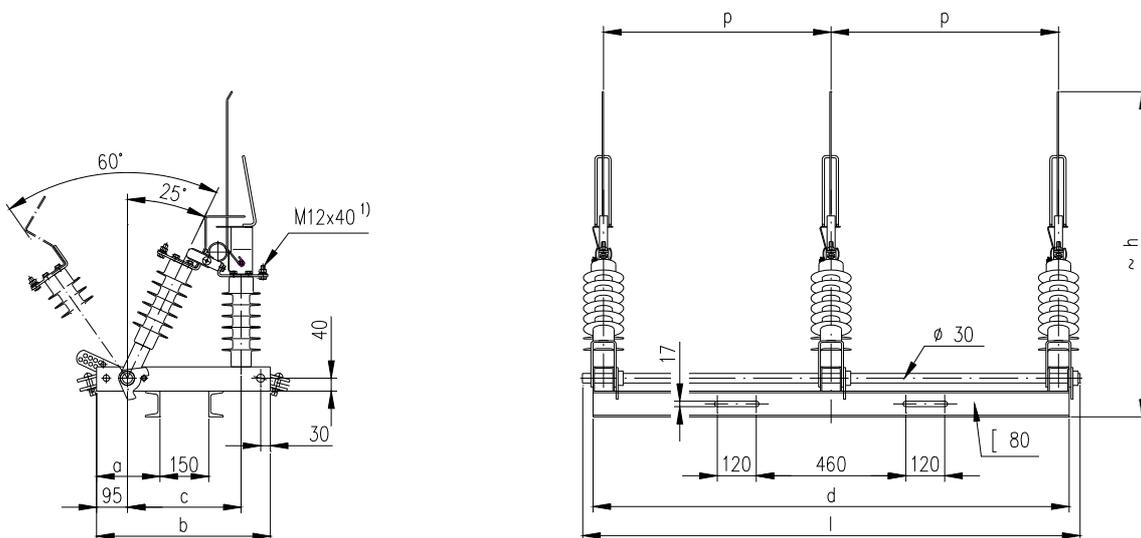
¹⁾ hexagon head screw with nut, washer and spring washer

| U _r [kV] | I _r [A] | earthing switch | p | a | b | c | d | l | ≈ h | α | β | weight approx. [kg]* |
|---------------------|--------------------|-----------------|------|-----|-----|-----|-------|-------|-----|-----|-----|----------------------|
| 25 | 400 | no | 1000 | 195 | 515 | 330 | 2 065 | 2 130 | 765 | 25° | 64° | 129/92 |
| 38,5 | 400 | no | 1200 | 200 | 550 | 385 | 2 465 | 2 530 | 840 | 25° | 64° | 172/135 |

* Weight with porcelain / epoxy insulators.

Three-pole outdoor load disconnecter DRIBO Fic

for assembly on concrete and wooden pole



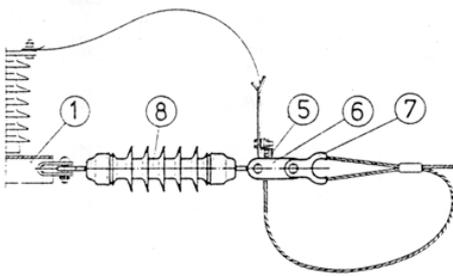
¹⁾ hexagon head screw with nut, washer and spring washer

| U _r [kV] | I _r [A] | earthing switch | p | a | b | c | d | l | ≈ h | α | β | weight approx. [kg]* |
|---------------------|--------------------|-----------------|------|-----|-----|-----|-------|-------|------|-----|-----|----------------------|
| 25 | 400 | no | 1000 | 195 | 535 | 350 | 2 065 | 2 130 | 1011 | 25° | 60° | 130/93 |
| 38,5 | 400 | no | 1200 | 200 | 550 | 387 | 2 465 | 2 530 | 1190 | 25° | 60° | 173/136 |

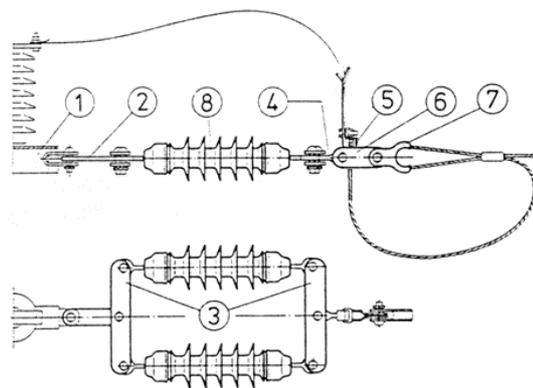
* Weight with porcelain / epoxy insulators.

Assembly of the suspension

single suspension



double suspension

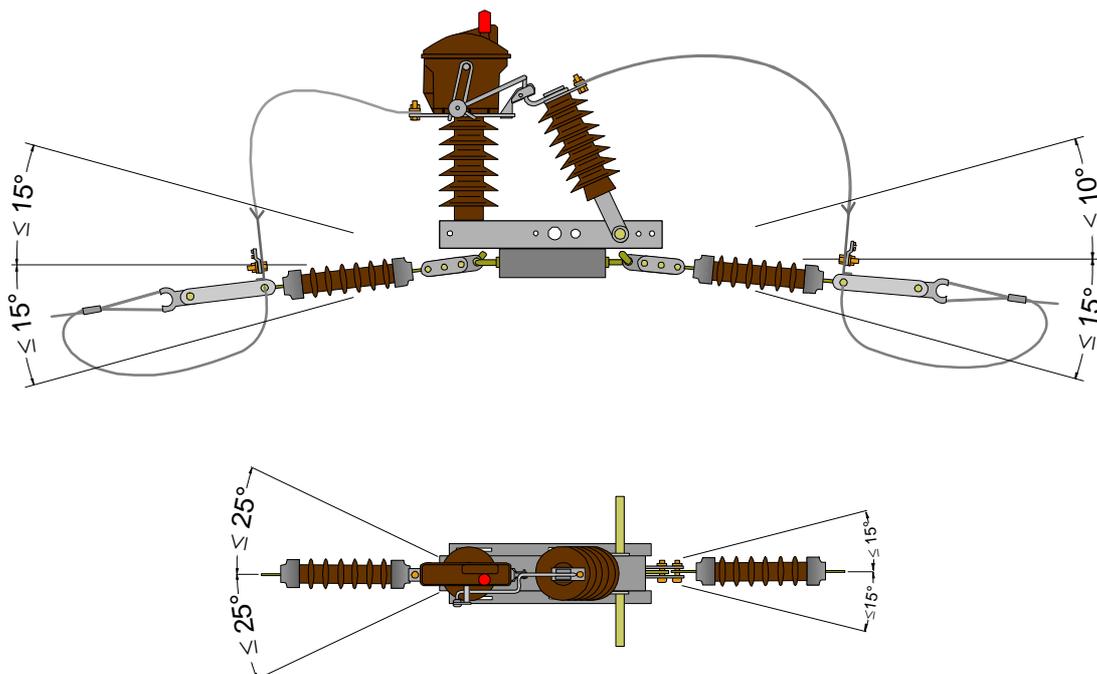


1. load disconnecter with a carrying yoke and bonding strips
2. armature
3. expanding armature
4. eye
5. clamp
6. forked pull rod
7. suspension
8. tensile insulator

Assignment of the bonding strips

| U _r [kV] | assembly method | strip length [mm] | |
|---------------------|-------------------|---------------------------|------------------------------|
| | | side of the fixed bearing | side of the pendulum bearing |
| 25 | single suspension | 1100 | 1340 |
| 25 | double suspension | 1340 | 1540 |
| 38,5 | single suspension | 1340 | 1540 |
| 38,5 | double suspension | 1540 | 1740 |

Permissible deviations of the suspensions from the straight direction



Arrangement of actuators for outdoor load disconnectors Fla 15/60, DRIBO Fib and DRIBO Flc

Figure 1

load disconnector with a single drive (pos. 1 to 8)

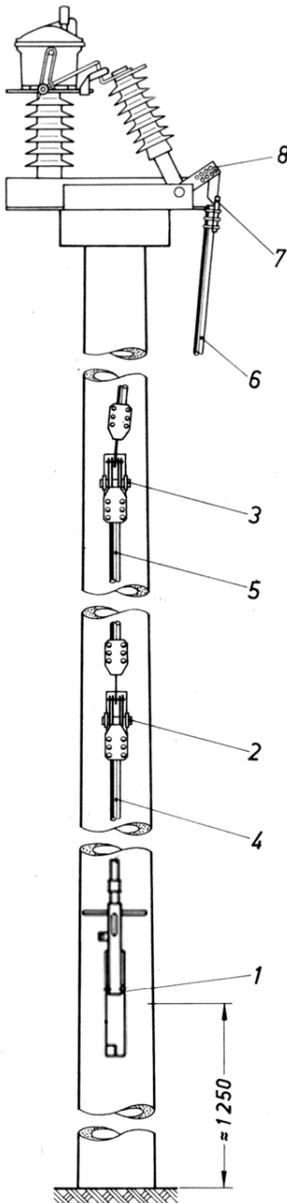


Figure 2

load disconnector with one earthing switch (on the side of the fixed bearing) with a double drive (pos. 1a to 8)

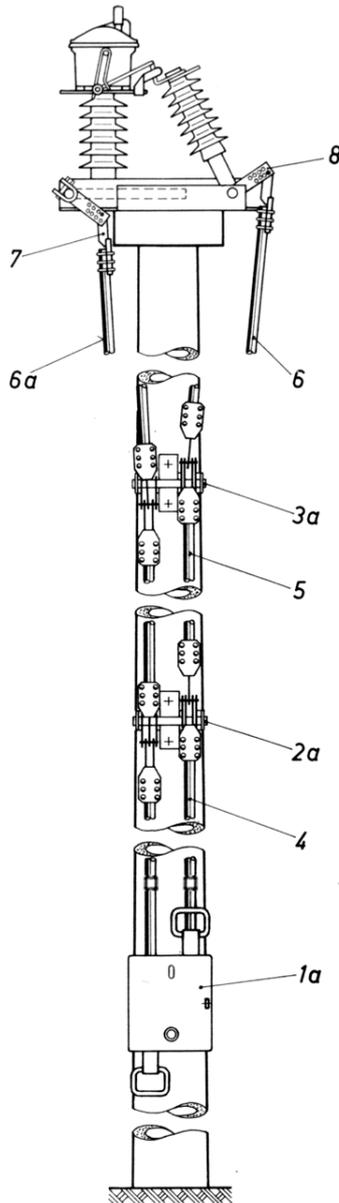
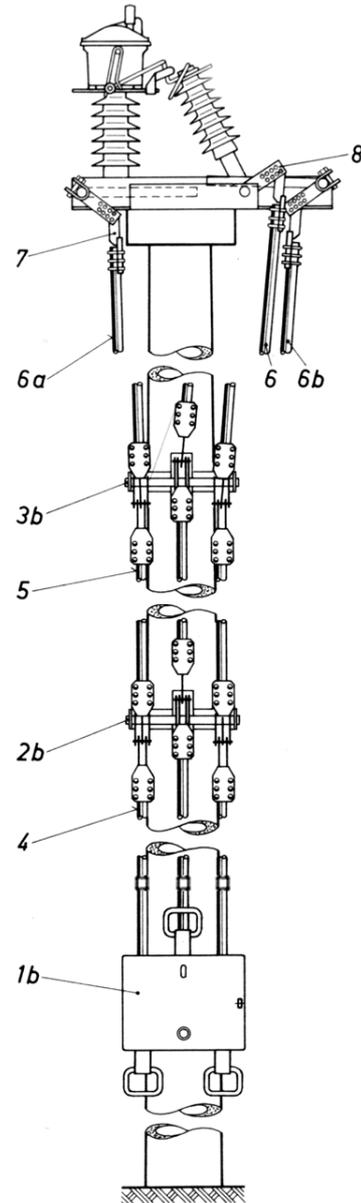


Figure 3

load disconnector with two earthing switches (on the side of the pendulum bearing) with a triple drive (pos. 1b to 8)



- 1 - single drive or L-type drive
- 1a - double drive
- 1b - triple drive

- 2 - single intermediate bearing
- 2a - double intermediate bearing
- 2b - triple intermediate bearing

- 3 - single bearing ¹⁾
- 3a - double bearing ¹⁾
- 3b - triple bearing ¹⁾

¹⁾ upper clamping terminal with an articulated bushing

- 4 - bottom pull rod of the drive

- 5 - middle pull rod of the drive

- 6 - upper pull rod of the drive (disconnector)

- 6a - upper pull rod of the drive (earthing switch on the side of the fixed bearing)

- 6b - upper tube of the pull rods (earthing switch on the side of the pendulum bearing)

- 7 - clamping terminal with an articulated bushing

- 8 - control lever (pitch 73 to 132,5 mm, openings up to 8,5 mm)

The control lever of the earthing switch is mechanically locked in relation to the load disconnector lever.