

# Outdoor load disconnectors Fla 15/6400 Fla 15/6410

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 Fla 15/6400 and Fla 15/6410

Outdoor load disconnectors, produced in accordance with the Driescher company's documentation, 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 branching in radial arrangement.

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

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

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.

Switching takes place in a tightly closed extinguishing chamber, filled with SHELL transformer oil.

**With regard to this fact, Fla type load disconnectors meet the extreme environmental requirements.**

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

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 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 rime.

The load disconnectors are delivered with insulators made of a cycloaliphatic resin or porcelain.

The load disconnectors can be provided with earthing switches located on the under side. 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.

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.

The load disconnectors can be optionally equipped with overvoltage limiters.

## Technical data

| Rated voltage   | U <sub>r</sub> kV                | 12          |             | 25          |             | 38,5        |             |
|---|----------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
|   |                                  | Fla 15/6400 | Fla 15/6410 | Fla 15/6400 | Fla 15/6410 | Fla 15/6400 | Fla 15/6410 |
| Type load disconnector                                      |                                  |             |             |             |             |             |             |
| rated current   | I <sub>r</sub> A                 | 630         | 400         | 630         | 400         | 400         | 400         |
| rated short-time current                                    | I <sub>k</sub> kA <sup>1)</sup>  | 20          | 16          | 25          | 16          | 20          | 16          |
| rated peak withstand current                                | I <sub>p</sub> kA                | 50          | 40          | 63          | 40          | 50          | 40          |
| rated making current  | I <sub>ma</sub> kA <sup>2)</sup> | 10          |             | 10          |             | 10          |             |
| rated breaking current – cos φ 0,7                          | I <sub>load</sub> A              | 630         |             | 630         |             | 400         |             |
| rated breaking current of closed loop                       | I <sub>loop</sub> A              | 400         |             | 400         |             | 400         |             |
| rated breaking current off unloaded transformer             | I <sub>nltr</sub> A              | 50          |             | 53          |             | 10          |             |
| rated breaking current when switching - off unloaded cables | I <sub>cc</sub> A                | 11          |             | 20          |             | 20          |             |
| rated breaking current of the earth fault                   | I <sub>ef1</sub> A               | 56          |             | 56          |             | 50          |             |

<sup>1)</sup> In short circuit time „t“ in range from 1 to 5 seconds, it is necessary to multiply one second short-time current by factor  $\frac{1}{\sqrt{t}}$ .

<sup>2)</sup> At a sufficiently quick hand control.

## Withstand voltages of Fla 15/6400 and Fla 15/6410 load disconnectors

|  |    |    |     |      |
|--|----|----|-----|------|
| <b>rated voltage</b>   | kV | 12 | 25  | 38,5 |
| <b>rated short-time withstand power frequency voltage / 1min. to be applied in both dry and wet environmental conditions</b> |    |    |     |      |
| against the earth, across the poles and between disconnected contacts  | kV | 28 | 50  | 80   |
| across the isolating distance  | kV | 32 | 60  | 90   |
| <b>rated lightning pulse withstand voltage</b>   |    |    |     |      |
| against the earth, across the poles and between disconnected contacts  | kV | 75 | 125 | 180  |
| across the isolating distance  | kV | 85 | 145 | 210  |

## Climatic conditions

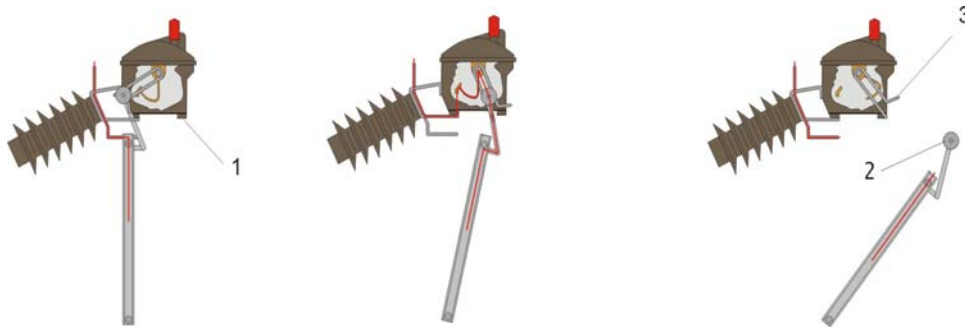
|                           |          |            |
|---------------------------|----------|------------|
| highest temperature       | °C       | + 40       |
| lowest temperature        | °C       | - 30       |
| highest relative humidity | %        | 100        |
| highest wind pressure     | Pa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

Usages in higher altitudes please consult with producer.

## 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

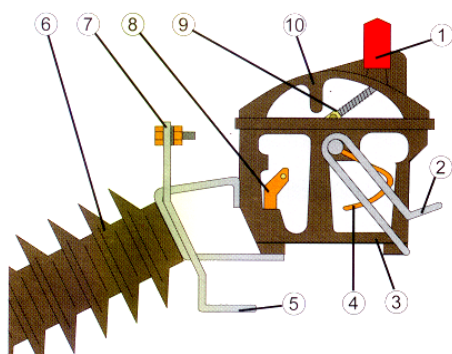
structure ensuring that their tightness remains undamaged even under extreme service conditions. Each extinguishing chamber is filled with a quantity of about 0,5 l of Shell Diala D or Shell Fluid 4600 oil.



The 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

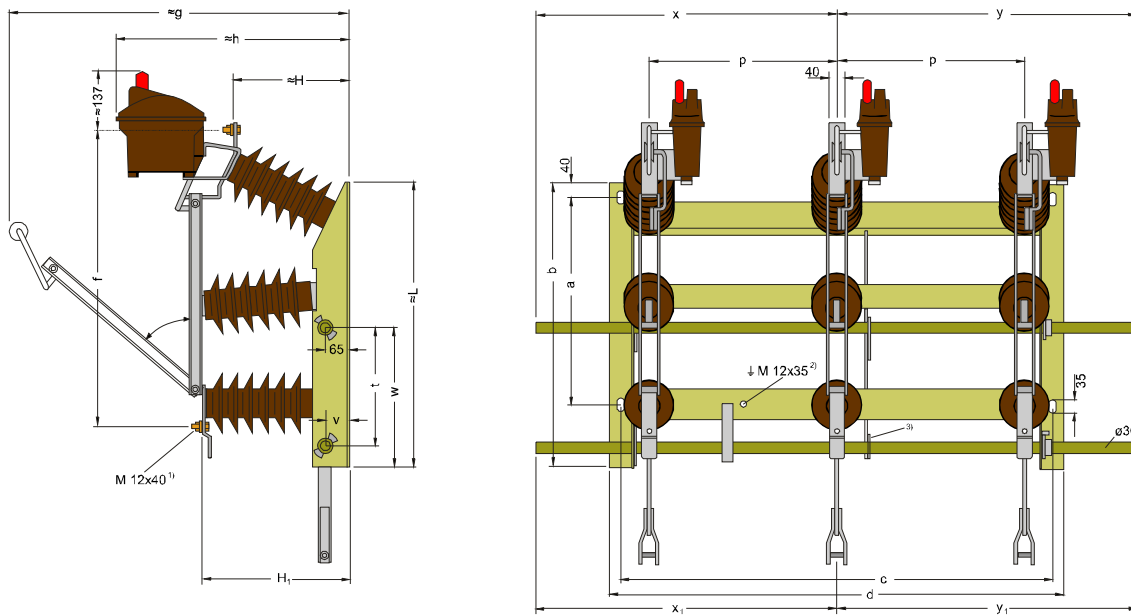
the fork. The snap-action mechanism connected with the said fork acts on the contact system inside the chamber and closes or opens immediately the contacts of the extinguishing chamber independently on the speed of the hand control. When switching-off, first of all the main contacts are opened and only 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 disconnectors Fla 15/6400



- 1) Hexagon head screw with nut, washer and spring washer
- 2) Head screw with nut, washer and spring washer
- 3) Supporting bearing for earthing switch shaft only for rated voltage 38,5 kV

### without earthing switch

| Rated voltage<br>kV | Rated current<br>A | Part no.  | a   | b   | c    | d    | f    | ≈ g  | ≈ h | ≈ H | H <sub>1</sub> | p   | v   | x   | y   | Weight approx.<br>[kg] |
|---------------------|--------------------|-----------|-----|-----|------|------|------|------|-----|-----|----------------|-----|-----|-----|-----|------------------------|
| 25                  | 630                | 763 64003 | 550 | 760 | 1150 | 1210 | 793  | 905  | 620 | 311 | 392            | 500 | 375 | 800 | 800 | 104                    |
| 38,5                | 630                | 763 94004 | 750 | 960 | 1550 | 1610 | 1044 | 1068 | 699 | 390 | 472            | 700 | 450 | 950 | 950 | 147                    |

### with earthing switch with mechanical locking

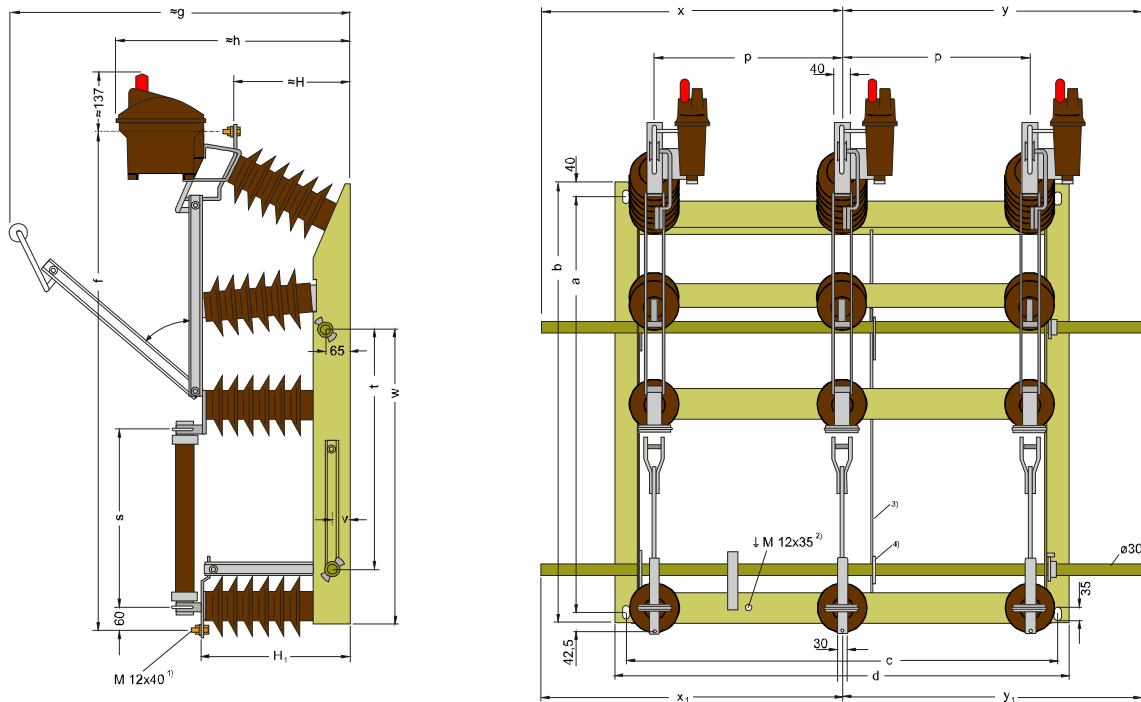
| Rated voltage<br>kV | Rated current<br>A | Part no.  | ≈ L  | t   | v  | x <sub>1</sub>       | y <sub>1</sub> | Weight approx.<br>[kg] |     |
|---------------------|--------------------|-----------|------|-----|----|----------------------|----------------|------------------------|-----|
| 25                  | 630                | 763 64103 | 1017 | 315 | 65 | for missing measures | 800            | 800                    | 119 |
| 38,5                | 630                | 763 94104 | 1297 | 390 | 65 | see table above      | 950            | 950                    | 165 |

The switching devices can further be complemented with the following auxiliary equipment:

- motor operated drives,
- auxiliary switches.

## Three-pole outdoor load disconnectors Fla 15/6410

with fuse holders mounted upright below  
for HV HBC fuses to 200 A rated current



- 1) Hexagon head screw with nut, washer and spring washer
- 2) Head screw with nut, washer and spring washer
- 3) Strut only for rated voltage 38,5 kV
- 4) Supporting bearing for earthing switch shaft only for rated voltage 38,5 kV

### without earthing switch

| Rated voltage<br>kV | Rated current<br>A | Part no.  | a    | b    | c    | d    | f      | ≈g   | ≈h  | ≈H  | H <sub>1</sub> | p   | s   | w   | x   | y   | Weight approx.<br>[kg] |
|---------------------|--------------------|-----------|------|------|------|------|--------|------|-----|-----|----------------|-----|-----|-----|-----|-----|------------------------|
| 25                  | 400                | 763 56003 | 1105 | 1167 | 1150 | 1210 | 1330,5 | 905  | 620 | 311 | 392            | 500 | 475 | 782 | 800 | 800 | 133                    |
| 38,5                | 400                | 763 86004 | 1400 | 1462 | 1550 | 1610 | 1676,5 | 1068 | 699 | 390 | 472            | 700 | 570 | 952 | 950 | 950 | 182                    |

### with earthing switch with mechanical locking

| Rated voltage<br>kV | Rated current<br>A | Part no.  | t     | v  | x <sub>1</sub>       | y <sub>1</sub> | Weight approx.<br>[kg] |
|---------------------|--------------------|-----------|-------|----|----------------------|----------------|------------------------|
| 24                  |                    | 763 56103 | 632,5 | 65 | for missing measures |                | 148                    |
| 38,5                |                    | 763 86104 | 802,5 | 65 | see table above      |                | 200                    |

The switching devices can further be complemented with the following auxiliary equipment:

- motor operated drives,
- auxiliary switches.

## Arrangement of single and double actuators

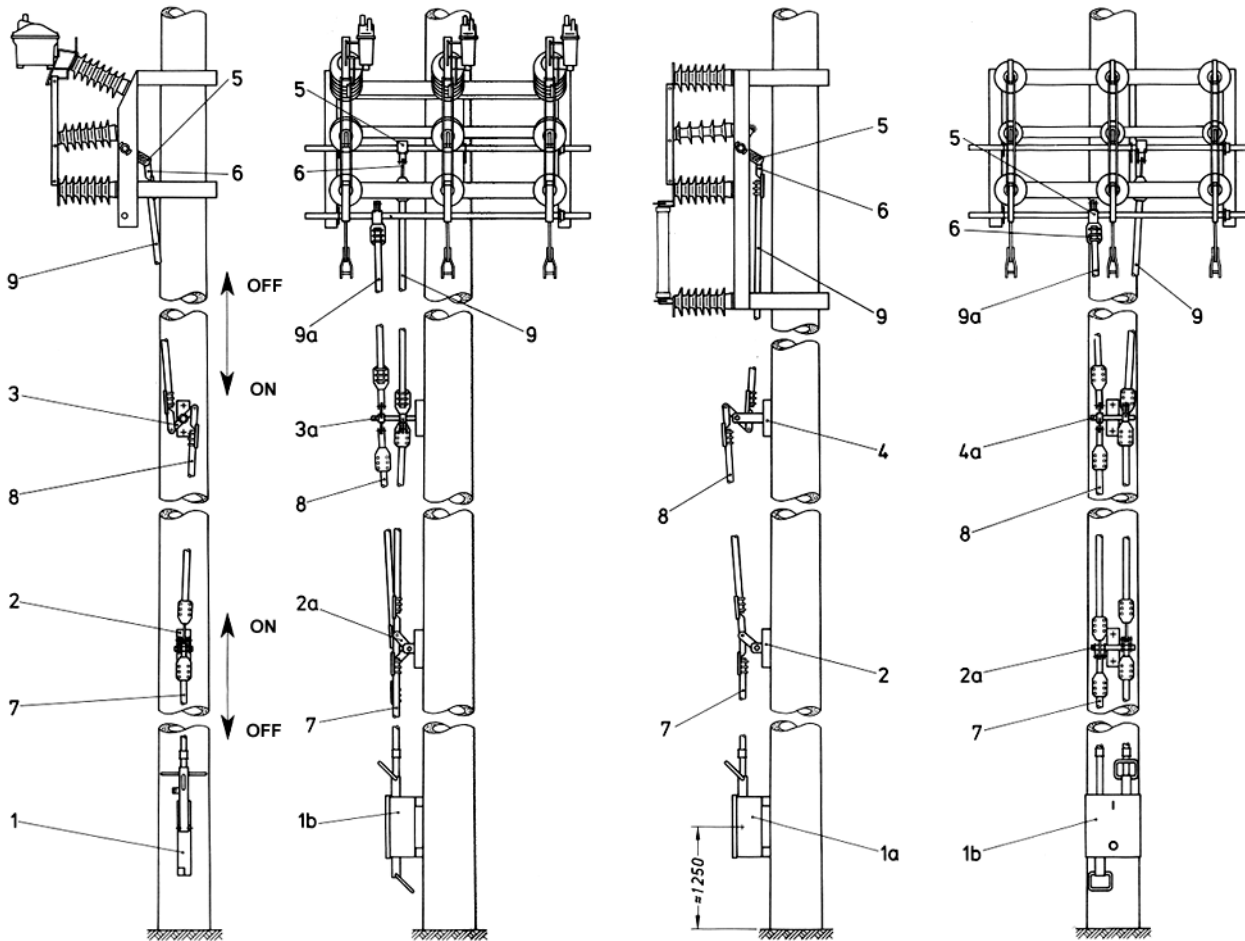
for outdoor load disconnectors Fla 15/6400 and Fla 15/6410

Figure 1

Figure 2

Figure 3

Figure 4



**Figure**

1. Load disconnector Fla 15/6400
2. Load disconnector Fla 15/6400 with earthing switch mounted below
3. 6410 with fuse holders mounted below
4. Disconnector 6400 with earthing switch mounted below

**Item**

- 1 Single-actuator L, stroke 140 mm
- 1a Single box-type actuator, stroke 110 or 140 mm
- 1b Double box-type actuator
- 2 Single intermediate bearing
- 2a Double intermediate bearing
- 3 Single reversible bearing
- 3a Double reversible bearing
- 4 Single reversible bearing
- 4a Double reversible bearing
- 5 Forked clamping crank (gauge from 73 to 132.5 mm; hole matrix 8.5 mm)
- 6 Single stub head (with link bush)
- 7 Lower linkage rod, with thread
- 8 Linkage rod
- 9 Upper linkage rod for isolator or load-break switch
- 9a Upper linkage rod for earthing switch

**Earthing switch operating lever (left-hand lever) mechanically locked to the disconnector operating lever.**