DRIESCHER -
Outdoor

## Switch-Disconnector FLa 15/60

- Three-pole
- Rated voltage
$12 \mathrm{kV}, 24 \mathrm{kV}, 36 \mathrm{kV}$ and 38.5 kV
- Rated current 400 A


ELEKTROTECHNISCHE WERKE FRITZ DRIESCHER \& SÖHNE GMBH


# DRIESCHER - Outdoor Switch-Disconnector FLa 15/60 

in compliance with DIN VDE 0670, Part 301 and IEC 60265-1


## DRIESCHER - Outdoor Switch-Disconnector FLa 15/60

## General

For decades DRIESCHER - Outdoor switch-disconnector have been used as line sectionalizers in medium voltage overhead line networks and have proven to be extremely satisfactory based on their reliability and operating safety. The switch is in compliance with the regulations as per DIN VDE 0670 Part 301.

The arc extinguishing device in its weatherproof housing, operates in accordance with the oil flow principle of the well-established DRIESCHER circuit-breakers and is shunted in the On condition. Each arcing chamber is filled at the factory with approximately 0.5 litres of Shell Diala D switchgear oil.

The switch frame and the operating shafts mounted in bronze bearings are hot-galvanized. All insulators (catalogue 712) used in the construction are made of cycloaliphatic cast resin (Color RAL 8017 brown).

The contacts with flat terminations in accordance with DIN 46206 are made of electrolyte copper and are silver plated.

The switch has a current path with contacts that are designed with an adequate cross section. Even after many years of operation, a spring guarantees a constant contact pressure as well as easy and satisfactory switching.

The nuts, washers and spring washers of stainless steel ensure corrosion-free connections even under extreme climate conditions.
The switchgears are fastened to supports for mounting on wooden or concrete poles.

For the wide span system the switches are delivered in three single poles (for mounting on concrete crossarms) with coupling shafts. The latter are adjusted to the required pole centre gauge.

Shaft support bearings for wide span system (see page 8) prevent a unilateral pressure load of the operating shafts at the centre pole through the linkage operating mechanism.

When using larger concrete cross-arms, due to the greater tension (as from approx. 30 kN ), underframes (see page 8) are assembled in the factory under the breaker pole as the normal pole frame length is no longer sufficient.

Outdoor operating mechanisms in accordance with our catalogue 776 are available for operating the disconnectors and earthing switches.

The short-circuit strength specified in the following table applies to switch-disconnectors as well as to the earthing switches mounted on the switches.

| Technical data |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Rated voltage | $U_{r}$ | kV | 12 | 24 | 36 | 38,5 |
| Rated current | $I_{\text {r }}$ | A | 400 | 400 | 400 | 400 |
| Frequency rating | $\mathrm{f}_{\mathrm{r}}$ | Hz | 50 | 50 | 50 | 50 |
| Rated short time current | $I_{\text {k }}$ | kA | 16 | 16 | 16 | 16 |
| Rated peak withstand current | $\mathrm{I}_{\mathrm{p}}$ | kA | 40 | 40 | 40 | 40 |
| Rated short-circuit making current | $I_{\text {ma }}$ | kA ${ }^{1}$ | 10 | 10 | 10 | 10 |
| Rated mainly active load breaking current | $\mathrm{I}_{1}$ | A | 400 | 400 | 400 | 400 |
| Rated distribution line closed-loop breaking current | $\mathrm{I}_{2 \mathrm{a}}$ | A | 400 | 400 | 400 | 400 |
| Rated no-load transformer breaking current | $\mathrm{I}_{3}$ | A | 50 | 50 | 10 | 10 |
| Rated cable-charging breaking current | $\mathrm{I}_{4}$ | A | 11 | 11 | 11 | 11 |
| Rated earth fault breaking current | $\mathrm{I}_{6 \mathrm{a}}$ | A | 56 | 56 | 30 | 30 |
| Nominal cable-charging breaking current under earth fault | $\mathrm{I}_{6 \mathrm{~b}}$ | A | - | - | 32 | 32 |



Current flow, closed position, switching position and opening operation are shown in the above illustrations.

The contact arm mounted on the hinged insulator has two concave hemispheres(2)at the end.

A stainless steel forked piece (3)extends as coun-ter-contact out of the arcing chamber (1). When the switch is actuated this fork piece is forcibly driven by the contact arm during both making and breaking operations.

A high-speed control mechanism connected in the center of the arcing chamber closes and disconnects the contacts.



During the switching on, first the main contact closes and then the contact in the arcing chamber.

During the switching off procedure no external arc occurs because during the opening of the main contacts, the arcing chamber in the parallel connection remains closed until the main contacts are sufficiently opened.
The hinged insulator continues to move until the isolated position is attained.

The switching off takes place in the arcing chamber. The arcing chamber is shunted.

## Arcing chamber sectional model


(1) Filling screw with dipstick and vent
(2) Lower section of arcing chamber (sectional view)
(3) Fork piece (of stainless steel)
(4) Main contact with external spring mounting
(5) Cast resin insulator GSA
(6) Connecting rail with screw
(7) Switching pin
(8) Secondary contact
(9) Toggle mechanism (rapid make and break)
(10) Upper section of arcing chamber (sectional view)

## FLa 15/60 • three pole • for mounting on wooden or concrete pole



1) Hexagonal screw with nut, washer and spring washer

| Part-no. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Rated voltage kV | Rated current A | without earthing switch | with earthing switch | p | b | d | e | $\approx$ h | k | 1 | $\mathrm{v}_{1}$ | $\alpha$ | $\beta$ | $\gamma$ | Weight approx. kg | Drawing-No. |
| 12 | 400 | 76222011 |  | 700 | 600 | 1465 | 405 | 612 | 215 | 1530 | - | $29^{\circ}$ | $60^{\circ}$ | - | 99,0 | LH3-044679 |
| 12 | 400 |  | 76222111 | 700 | 600 | 1465 | 405 | 612 | 215 | 1530 | 175 | $29^{\circ}$ | $60^{\circ}$ | $52^{\circ}$ | 115,0 | LH3-044679 |
| 24 | 400 | 76252011 |  | 700 | 600 | 1465 | 405 | 682 | 215 | 1530 | - | $25^{\circ}$ | $60^{\circ}$ | - | 109,0 | LH3-044679 |
| 24 | 400 |  | 76252111 | 700 | 600 | 1465 | 405 | 682 | 215 | 1530 | 175 | $25^{\circ}$ | $60^{\circ}$ | $60^{\circ}$ | 125,0 | LH3-044679 |
| 24 | 400 | 76252013 |  | 1000 | 600 | 2065 | 405 | 682 | 215 | 2130 | - | $25^{\circ}$ | $60^{\circ}$ | - | 126,0 | LH3-044679 |
| 24 | 400 |  | 76252113 | 1000 | 600 | 2065 | 405 | 682 | 215 | 2130 | 175 | $25^{\circ}$ | $60^{\circ}$ | $60^{\circ}$ | 145,0 | LH3-044679 |
| 24 | 400 | 76252014 |  | 1200 | 600 | 2465 | 405 | 682 | 215 | 2530 | - | $25^{\circ}$ | $60^{\circ}$ | - | 136,0 | LH3-044679 |
| 24 | 400 |  | 76252114 | 1200 | 600 | 2465 | 405 | 682 | 215 | 2530 | 175 | $25^{\circ}$ | $60^{\circ}$ | $60^{\circ}$ | 157,0 | LH3-044679 |
| 36 | 400 | 76282013 |  | 1000 | 650 | 2065 | 455 | 762 | 265 | 2130 | - | $25^{\circ}$ | $60^{\circ}$ | - | 138,0 | LH3-044679 |
| 36 | 400 |  | 76282113 | 1000 | 650 | 2065 | 455 | 762 | 265 | 2130 | 250 | $25^{\circ}$ | $60^{\circ}$ | $67^{\circ}$ | 157,0 | LH3-044679 |
| 36 | 400 | 76282014 |  | 1200 | 650 | 2465 | 455 | 762 | 265 | 2530 | - | $25^{\circ}$ | $60^{\circ}$ | - | 148,0 | LH3-044679 |
| 36 | 400 |  | 76282114 | 1200 | 650 | 2465 | 455 | 762 | 265 | 2530 | 250 | $25^{\circ}$ | $60^{\circ}$ | $67^{\circ}$ | 169,0 | LH3-044679 |
| 38,5 | 400 | 76282023 |  | 1000 | 650 | 2065 | 455 | 762 | 265 | 2130 | - | $25^{\circ}$ | $60^{\circ}$ | - | 145,0 | LH3-107662 |
| 38,5 | 400 |  | 76282123 | 1000 | 650 | 2065 | 455 | 762 | 265 | 2130 | 250 | $25^{\circ}$ | $60^{\circ}$ | $67^{\circ}$ | 164,0 | LH3-107662 |

2) The weights include Cu tension straps (for dimension of Cu tension straps see table on page 6)

For tension units please refer to page 9 • Outdoor operating mechanisms in accordance with catalogue 776

## Mounting supports

for switch-disconnectors as per drawing LH 3-44679, as given on page 5

on single pole

Drawing no. FT 4-44328 • Part no. 76010124
Weight (with accessories) approx. 14.4 kg

on double pole
Drawing no. FT 4-44328 • Part no. 76010130
Weight (with accessories) approx. 15.4 kg

1) Hexagonal screw with nut and spring washer
2) Gewindebolt with nut and washers
3) Hexagonal screw and washer

## Cu tension straps ( $3 \times 30 \times 1$, tin-plated) • Standard lengths

| Part-no. 53171004 | 53171006 |  | 53171009 | 53171011 |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Lengths 1100 mm | 1340 mm |  | 1540 mm | 1740 mm |  |
|  | Anchoring | For rated voltage | Straps lengths |  | quantity of straps each side and each pole $\cdot 400 \mathrm{~A}$ |
| Switch mounting |  | kV | Fixed insulator side | Hinged insulator side |  |
| On wooden or concrete pole | Single staying | 12 | 1100 | 1340 | 1 |
| On wooden or concrete pole | Single staying | 24 | 1100 | 1340 | 1 |
| On wooden or concrete pole | Single staying | 36 | 1340 | 1540 | 1 |
| On wooden or concrete pole | Double staying | 12 | 1340 | 1540 | 1 |
| On wooden or concrete pole | Double staying | 24 | 1340 | 1540 | 1 |
| On wooden or concrete pole | Double staying | 36 | 1540 | 1740 | 1 |
| On concrete cross-arms (wide span system) | Single staying | 24 | 1340 | 1540 | 1 |
| On concrete cross-arms (wide span system) | Single staying | 36 | 1340 | 1540 | 1 |
| On concrete cross-arms (wide span system) | Double staying | 24 | 1540 | 1540 | 1 |
| On concrete cross-arms (wide span system) | Double staying | 36 | 1540 | 1540 | 1 |

Note: The tension straps with 3 layers $30 \times 1 \mathrm{~mm}$ each are riveted together in the centre (page 9 ).

## FLa 15/60 • three-pole • for assembly on concrete cross-arms

For wide span system - comprising 3 single poles interconnected using coupling shafts


2) The weights include the CU tension straps, but not the coupling shafts (for dimensions of Cu tension straps please refer to table on page 6) 3) For dimensions and weights and part numbers of the coupling shafts please refer to following table

## Coupling shafts for switch-disconnectors (wide span system)

| Pole distance $p$ | Shaft diameter | Part-no. | 2 coupling shafts for switch <br> without earthing switch <br> Weight approx. kg | 4 coupling shafts for switch <br> with earthing switch <br> Weight approx. kg | 6 coupling shafts for switch <br> with 2 earthing switches <br> Weight approx. kg |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 1000 | 30 | 64114460 | 4,5 | 9,0 | 13,5 |
| 1200 | 30 | 64114360 | 6,7 | 13,4 | 20,1 |
| 1400 | 30 | 64114370 | 8,9 | 17,8 | 26,7 |
| 1600 | 30 | 64114390 | 11,1 | 22,2 | 33,3 |
| 1800 | 30 | 64114400 | 13,3 | 26,6 | 39,9 |
| 2000 | 40 | 64114420 | 28,0 | 56,0 | 84,0 |
| 2200 | 40 | 64114430 | 32,0 | 64,0 | 96,0 |
| 2400 | 40 | 64114440 | 36,0 | 72,0 | 108,0 |

## Underframe

for wide span system (drawing no. LH 3-43667) • Underframe fully assembled for three-pole switch-disconnector • rated voltage 24 kV Part no. 76020120 (drawing no. LH 4-44069), weight approx. 32 kg, for oversized concrete cross-arms


## Support bearing

For switch-disconnectors without earthing switch for mounting on concrete cross arms (page 10)with appropriately cast threaded bushes


| Underframe | Part-no. | h | Weight <br> approx. kg | Drawing-no. |
| :---: | :---: | :---: | :---: | :---: |
| without | 76020105 | 85 | 1,9 | LH 4-44099 |
| with | 76020106 | 159 | 3,1 | LH 4-44099 |

## Support bearing

For switch-disconnectors with earthing switch for mounting on concrete cross-arms with appropriately cast threaded bushes


Support bearing for switch-disconnectors with earthing switches, rated voltage 36 kV , on request

Designation


Spacer

Forked strap s=100 mm for switch on wooden pole

Forked strap s=250 mm for horn-break
switch in wide span system version

Adjustable strap for switch
on auf concrete pole with T-head cross arm in wide span system version (adjustable by 50 mm )

Turned double ring for spacer

Tensioning stiffener up to $70 \mathrm{~mm}^{2}$

Clamping cable lug 35 to $70 \mathrm{~mm}^{2}$ (required in addition)

Cu tension straps $3 \times 30 \times 1 \mathrm{~mm}$
$\mathrm{L}=1100 \mathrm{~mm}$
$\mathrm{L}=1340 \mathrm{~mm}$
$\mathrm{L}=1540 \mathrm{~mm}$
$\mathrm{L}=1740 \mathrm{~mm}$

2-531 71004
2-531 71006
2-531 71009
2-531 71011

WN 4-37028
0.9
1.1
1.3

## Design of tension units

Single staying
Double staying


## Permissible tension angle



## Concrete cross arm

For mounting an outdoor switch-disconnector FLa 15/60 with tension units


1) cast threaded bushes for shaft support bearings

Remark: For peak tensions (>30 kN) underframes are usually required for breaker pole mounting (see page 8).
Arrangement of operating mechanisms for outdoor switch-disconnectors FLa 15/60 (wide span system)

Fig. $1 \begin{aligned} & \text { Switch-disconnector with single operating mechanism (item } 1 \text { to } 8 \text { ), } \\ & \text { with support bearing item ga and underframe (item 10) }\end{aligned}$ $2 \begin{aligned} & \text { as in Fig. } 1 \text {, but with support bearing (item } 9 \text { ), however without } \\ & \text { underframe }\end{aligned}$ 3 Switch--lisconnector with one earthing switch (on the fixed insulator 4 Switch-disconnector with two earthing switches (on both the fixed and
5 as in Fig. 4, but with support bearing item ga and underframe (item 10) Item. $\begin{aligned} & 1 \text { Single box-type actuator } \\ & \text { aa Double box-type actuator }\end{aligned}$







 Item. 1 Single box-type actuator

## Fig. 4

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$\operatorname{li} \quad \underset{\sim}{\infty}$
 $=4$ 4 $\qquad$ $\sqrt{8}$




## Field of application

## Outdoor switch-disconnector FLa 15/60

Arranged in three levels as shown in to system diagram.
The three single poles are actuated by an upright linkage rod.


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