

# Medium Voltage Fuses

European Standard

For Installation Inside  
Transformers Under Oil



## General purpose fuses installed in transformers

The installation of high-voltage fuse-links inside oil filled transformers provides space and cost savings in the total concept of distribution transformer substations. Furthermore they provide superior protection inside the so called “Intrinsically Safe Transformers”.

For this purpose, the high voltage fuses are designed as general purpose fuse-links. The fuse-links will provide detection and cut-off of a widest possible range of fault currents.

As well as the desired protection of transformer tanks against bursting, they also interrupt.

The fuse-links fulfill all requirements regarding oiltightness during the manufacturing phase of the transformer itself and also during service operation. The fuse-links are safe up to continuous temperatures of 105°C and can withstand very high temperatures arising during vacuum impregnation of transformers.

The fuse-links are provided with threaded holes size M10 at their contact caps for easy installation inside the transformer.

The fuse is age resistant, owing to the specific design of the fuse element and the use of high grade ceramic as well as appropriate sealing methods. These fuse-links can be used inside oil filled transformers free of any ageing for many decades.

Because these fuses are fitted inside transformers under oil, they are subjected to severe stresses, like partial discharges, high temperatures and vacuum during filling and drying process of transformer during manufacture. Superior design and construction of our fuses and long positive field experience eliminate problems, which may be caused due to such stresses.

## Summary of Advantages

- ▶ Space and cost saving in distribution transformer substation design
- ▶ Protection against short-circuit and internal transformer faults
- ▶ Protection against bursting of the transformer through specific characteristic of the fuse-link
- ▶ Resistance against ageing



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**Selection Guide**

| Rated Voltage<br>AC<br>[kV] | Class           | Part No.  | Selector<br>Guide<br>[Page] | Techn.<br>Data<br>[Page] |
|-----------------------------|-----------------|-----------|-----------------------------|--------------------------|
| 12                          | General-purpose | 30 310 91 | HHO 3                       | HHO 5                    |
| 12                          | Back-up         | 30 310 11 | HHO 3                       | HHO 5                    |
| 17.5                        | General-purpose | 30 311 91 | HHO 3                       | HHO 5                    |
| 24                          | General-purpose | 30 312 91 | HHO 4                       | HHO 6                    |
| 24                          | Back-up         | 30 312 11 | HHO 4                       | HHO 6                    |
| 36                          | Back-up         | 30 323 11 | HHO 4                       | HHO 6                    |



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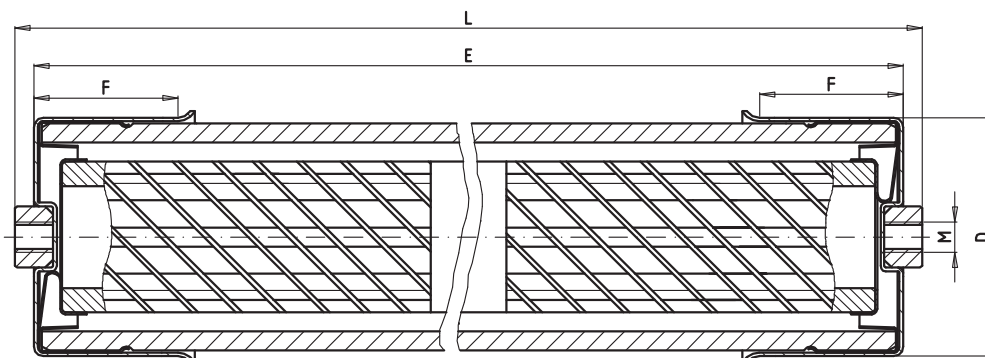
For Installation Inside  
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Rated Voltage  
**AC 12 kV** **Oiltight**

| Rated Current [A] | Part No.      | Rated Breaking Current [kA] | Class           | Weight [kg/1] | Pack |
|-------------------|---------------|-----------------------------|-----------------|---------------|------|
| 8                 | 30 310 91.8   | 63                          | General-purpose | 2.4           | 1    |
| 12                | 30 310 91.12  | 63                          | General-purpose | 2.4           | 1    |
| 16                | 30 310 91.16  | 63                          | General-purpose | 2.4           | 1    |
| 20                | 30 310 91.20  | 63                          | General-purpose | 2.4           | 1    |
| 22                | 30 310 91.22  | 63                          | General-purpose | 2.4           | 1    |
| 40                | 30 310 91.40  | 63                          | General-purpose | 2.4           | 1    |
| 50                | 30 310 91.50  | 63                          | General-purpose | 2.4           | 1    |
| 63                | 30 310 91.63  | 63                          | General-purpose | 2.4           | 1    |
| 80                | 30 310 11.80  | 63                          | Back-up         | 2.4           | 1    |
| 100               | 30 310 11.100 | 63                          | Back-up         | 2.4           | 1    |
| 125               | 30 310 11.125 | 63                          | Back-up         | 2.4           | 1    |

Rated Voltage  
**AC 17.5 kV** **Oiltight**

| Rated Current [A] | Part No.     | Rated Breaking Current [kA] | Class           | Weight [kg/1] | Pack |
|-------------------|--------------|-----------------------------|-----------------|---------------|------|
| 8                 | 30 311 91.8  | 63                          | General-purpose | 2.4           | 1    |
| 10                | 30 311 91.10 | 63                          | General-purpose | 2.4           | 1    |
| 12                | 30 311 91.12 | 63                          | General-purpose | 2.4           | 1    |
| 16                | 30 311 91.16 | 63                          | General-purpose | 2.4           | 1    |
| 20                | 30 311 91.20 | 63                          | General-purpose | 2.4           | 1    |



|   |                 |
|---|-----------------|
| D | 2.48" (63.5 mm) |
| E | 14.17" (360 mm) |
| F | 1.57" (40 mm)   |
| L | 14.60" (371 mm) |
| M | M8              |



**Medium Voltage Fuses**  
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Rated Voltage  
**AC 24 kV**

**Oiltight**

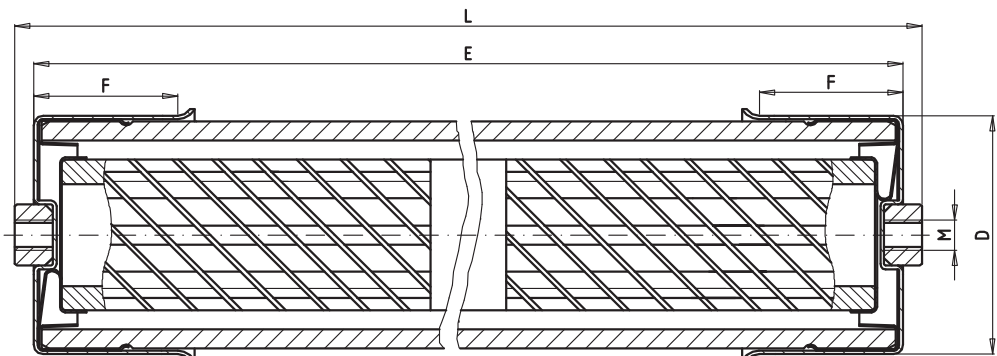
| Rated Current [A] | Part No.       | Rated Breaking Current [kA] | Class           | Weight [kg/1] | Pack |
|-------------------|----------------|-----------------------------|-----------------|---------------|------|
| 8                 | 30 312 91.8    | 63                          | General-purpose | 2.4           | 1    |
| 12                | 30 312 91.12   | 63                          | General-purpose | 2.4           | 1    |
| 16                | 30 312 91.16   | 63                          | General-purpose | 2.4           | 1    |
| 20                | 30 312 91.20   | 63                          | General-purpose | 2.4           | 1    |
| 31.5              | 30 312 11.31.5 | 63                          | Back-up         | 2.4           | 1    |
| 40                | 30 312 11.40   | 63                          | Back-up         | 2.4           | 1    |
| 50                | 30 312 11.50   | 63                          | Back-up         | 2.4           | 1    |
| 63                | 30 312 11.63   | 63                          | Back-up         | 2.4           | 1    |
| 80                | 30 312 11.80   | 63                          | Back-up         | 2.4           | 1    |

Rated Voltage  
**AC 36 kV**

**Oiltight**

| Rated Current [A] | Part No.       | Rated Breaking Current [kA] | Class   | Weight [kg/1] | Pack |
|-------------------|----------------|-----------------------------|---------|---------------|------|
| 10                | 30 323 11.10   | 40                          | Back-up | 2.4           | 1    |
| 16                | 30 223 11.16   | 40                          | Back-up | 2.4           | 1    |
| 20                | 30 323 11.20   | 40                          | Back-up | 2.4           | 1    |
| 25                | 30 323 11.25   | 40                          | Back-up | 2.4           | 1    |
| 31.5*             | 30 324 11.31.5 | 40                          | Back-up | 2.4           | 1    |
| 40*               | 30 324 11.40   | 40                          | Back-up | 2.4           | 1    |

\* E= 17.32 " (440 mm)



|   |                 |
|---|-----------------|
| D | 2.48" (63.5 mm) |
| E | 14.17" (360 mm) |
| F | 1.57" (40 mm)   |
| L | 14.60" (371 mm) |
| M | M8              |

|                         |                                  |   |
|-------------------------|----------------------------------|---|
| Length<br><b>360 mm</b> | Rated Voltage<br><b>AC 12 kV</b> | Class<br><b>General-Purpose / Back-up</b> |
|-------------------------|----------------------------------|---|

| Rated Current [A] | Part No.      | Rated Breaking Current [kA] | Power Loss [W] | Class           | Pre-arcing I <sup>2</sup> t-value [A <sup>2</sup> s] | Total I <sup>2</sup> t-value [A <sup>2</sup> s] |
|-------------------|---------------|-----------------------------|----------------|-----------------|--|---|
| 8                 | 30 310 91.8   | 63                          | 8              | General-purpose | 172  | 1 800   |
| 12                | 30 310 91.12  | 63                          | 13             | General-purpose | 340  | 3 800   |
| 16                | 30 310 91.16  | 63                          | 16.5           | General-purpose | 830  | 9 200   |
| 20                | 30 310 91.20  | 63                          | 20             | General-purpose | 1 730  | 17 300  |
| 22                | 30 310 91.22  | 63                          | 12             | General-purpose | 2 260  | 22 600  |
| 40                | 30 310 91.40  | 63                          | 35             | General-purpose | 3 530  | 35 500  |
| 50                | 30 310 91.50  | 63                          | 46             | General-purpose | 5 490  | 55 000  |
| 63                | 30 310 91.63  | 63                          | 62             | General-purpose | 9 030  | 90 000  |
| 80                | 30 310 11.80  | 63                          | 91             | Back-up         | 17 500   | 175 000   |
| 100               | 30 310 11.100 | 63                          | 115            | Back-up         | 41 500   | 415 000   |
| 125               | 30 310 11.125 | 63                          | 176            | Back-up         | 56 500   | 565 000   |

|                         |                                    |                                 |
|-------------------------|------------------------------------|---------------------------------|
| Length<br><b>360 mm</b> | Rated Voltage<br><b>AC 17.5 kV</b> | Class<br><b>General-Purpose</b> |
|-------------------------|------------------------------------|---------------------------------|

| Rated Current [A] | Part No.     | Rated Breaking Current [kA] | Power Loss [W] | Class           | Pre-arcing I <sup>2</sup> t-value [A <sup>2</sup> s] | Total I <sup>2</sup> t-value [A <sup>2</sup> s] |
|-------------------|--------------|-----------------------------|----------------|-----------------|--|---|
| 8                 | 30 311 91.8  | 63                          | 10             | General-purpose | 172  | 1 800   |
| 10                | 30 311 91.10 | 63                          | 15             | General-purpose | 250  | 2 800   |
| 12                | 30 311 91.12 | 63                          | 17             | General-purpose | 460  | 5 100   |
| 16                | 30 311 91.16 | 63                          | 22             | General-purpose | 1 100  | 12 000  |
| 20                | 30 311 91.20 | 63                          | 27             | General-purpose | 1 700  | 18 500  |

**Time-current characteristics and cut-off current diagram please refer to pages HHO 7 and HHO 8**

Length  
**360 mm**

Rated Voltage  
**AC 24 kV**

Class  
**General-Purpose / Back-up**

| Rated Current [A] | Part No.       | Rated Breaking Current [kA] | Power Loss [W] | Class           | Pre-arcing I <sup>2</sup> t-value [A <sup>2</sup> s] | Total I <sup>2</sup> t-value [A <sup>2</sup> s] |
|-------------------|----------------|-----------------------------|----------------|-----------------|--|---|
| 8                 | 30 312 91.8    | 63                          | 17             | General-purpose | 172  | 1 900   |
| 10                | 30 312 91.10   | 63                          | 21             | General-purpose | 250  | 2 800   |
| 12                | 30 312 91.12   | 63                          | 24             | General-purpose | 460  | 5 100   |
| 16                | 30 312 91.16   | 63                          | 31             | General-purpose | 830  | 8 300   |
| 20                | 30 312 91.20   | 63                          | 21             | General-purpose | 1 730  | 17 300  |
| 31.5              | 30 312 11.31.5 | 63                          | 76             | Back-up         | 1 400  | 14 000  |
| 40                | 30 312 11.40   | 63                          | 94             | Back-up         | 2 200  | 22 000  |
| 50                | 30 312 11.50   | 63                          | 108            | Back-up         | 4 700  | 47 000  |
| 63                | 30 312 11.63   | 63                          | 114            | Back-up         | 8 700  | 87 000  |
| 80                | 30 312 11.80   | 63                          | 176            | Back-up         | 13 500   | 135 000   |

Length  
**360 mm**

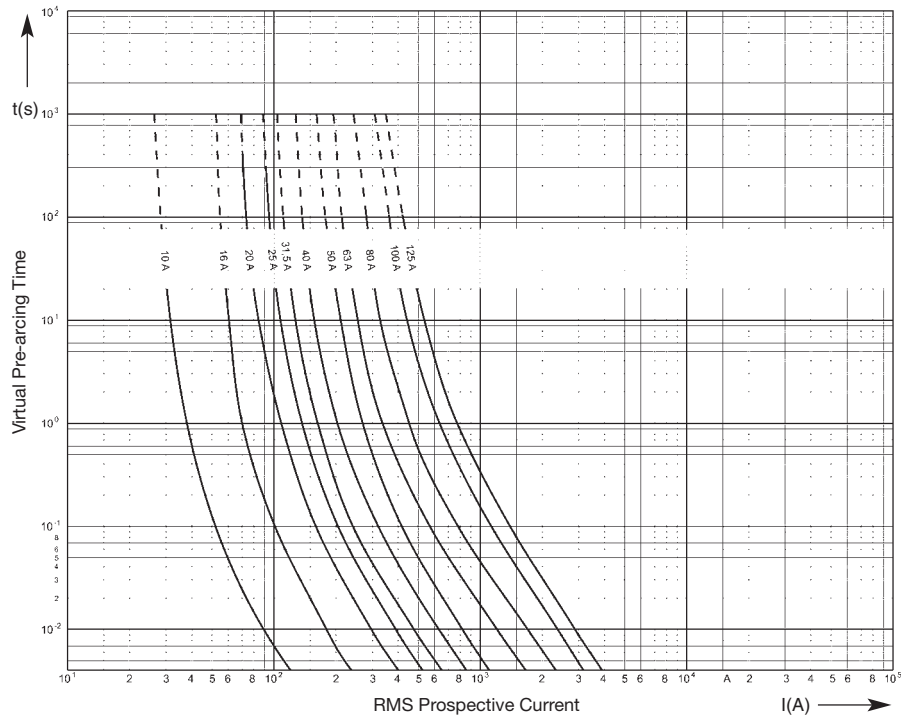
Rated Voltage  
**AC 36 kV**

Class  
**Back-up**

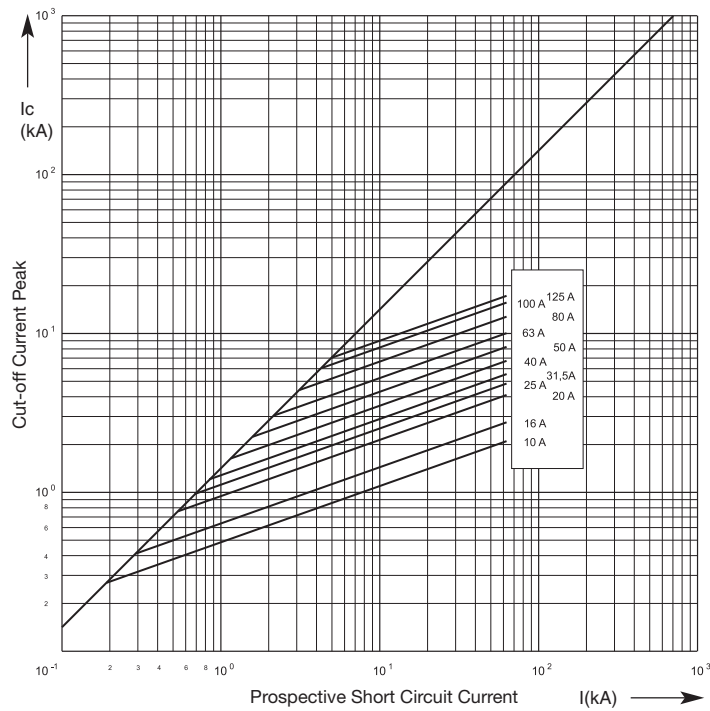
| Rated Current [A] | Part No.       | Rated Breaking Current [kA] | Power Loss [W] | Class   | Pre-arcing I <sup>2</sup> t-value [A <sup>2</sup> s] | Total I <sup>2</sup> t-value [A <sup>2</sup> s] |
|-------------------|----------------|-----------------------------|----------------|---------|--|---|
| 10                | 30 323 11.10   | 40                          | 85             | Back-up | 70   | 1 100   |
| 16                | 30 323 11.16   | 40                          | 50             | Back-up | 160  | 1 900   |
| 20                | 30 323 11.20   | 40                          | 73             | Back-up | 550  | 6 600   |
| 25                | 30 323 11.25   | 40                          | 88             | Back-up | 920  | 11 000  |
| 31.5              | 30 324 11.31.5 | 40                          | 132            | Back-up | 1 400  | 16 800  |
| 40                | 30 324 11.40   | 40                          | 152            | Back-up | 2 640  | 31 700  |

**TIME/CURRENT CHARACTERISTICS AND CUT-OFF CURRENT DIAGRAM  
PLEASE REFER TO PAGES HHO 7 AND HHO 8**

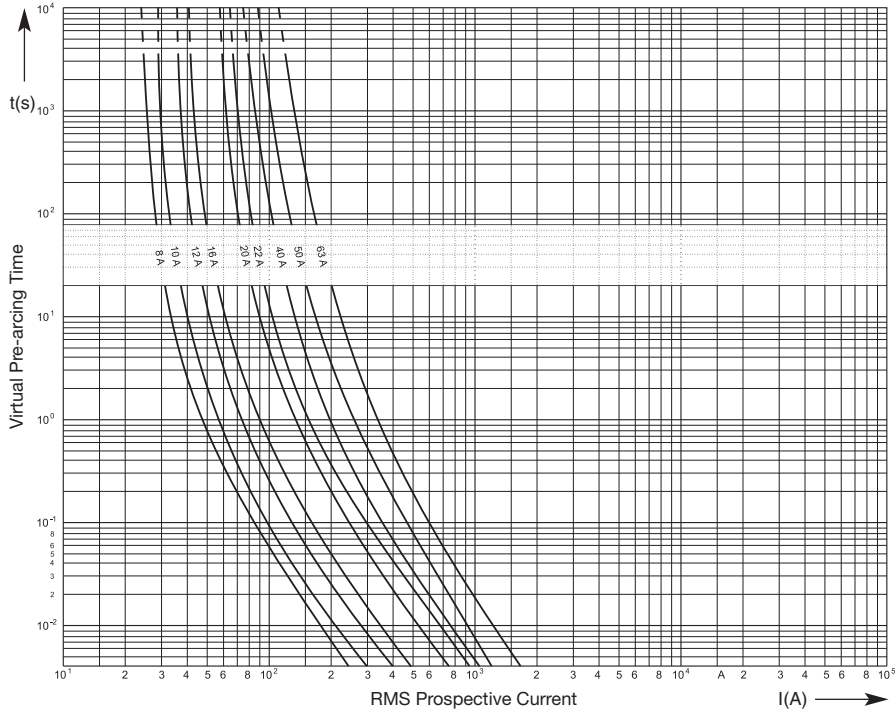
**Time-Current Characteristics** **Back-up**



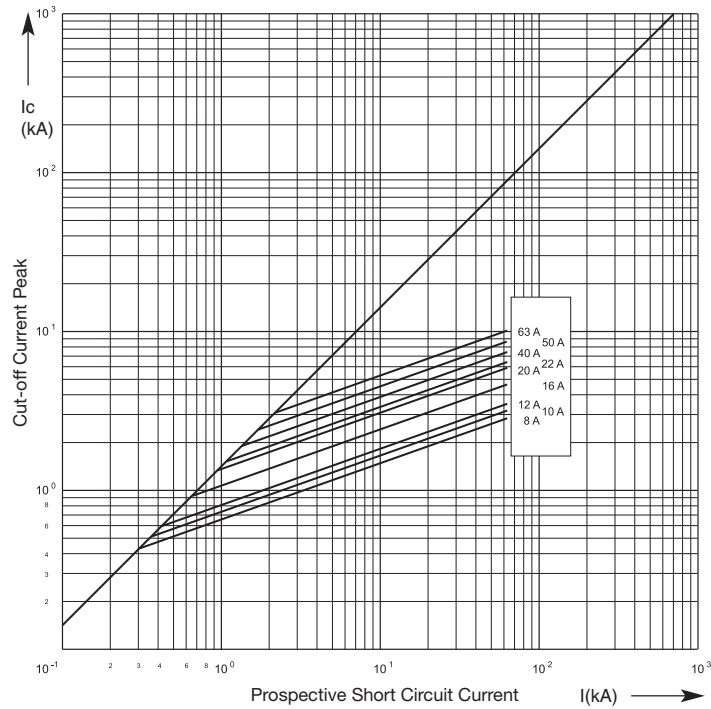
**Cut-Off Current Diagram** **Back-up**



**Time-Current Characteristics** **General-Purpose**



**Cut-Off Current Diagram** **General-Purpose**





**Recommendation for Protection of Main Transformer**

| Rated Voltage<br>[kV] | Transformer Rated Capacity<br>[kVA] |     |     |     |     |     |     |      |     |     |      |
|-----------------------|-------------------------------------|-----|-----|-----|-----|-----|-----|------|-----|-----|------|
|                       | 50                                  | 100 | 160 | 200 | 250 | 315 | 400 | 500  | 630 | 800 | 1000 |
| 12                    | 8                                   | 12  | 16  | 20  | 22  | 40  | 50  | 63   | 80  | 100 | -    |
| 24                    | 8                                   | 8   | 10  | 12  | 16  | 20  | 20  | 31.5 | 40  | 63  | 80   |
| 36                    | -                                   | -   | 10  | 16  | 16  | 20  | 20  | -    | -   | -   | -    |



