

## Type 3EF Surge Limiters

Rated voltage 3.6 to 15 kV, nominal discharge current 1 kA

- Lower protection level than in the case of common arresters
- The protection characteristic is relatively insensitive to steep-edge impulse waves
- Especially suitable for limiting switching impulse overvoltages
- All-purpose solution for effective protection of high-voltage motors, independent of the system configuration



HG21025b eps

Medium-Voltage  
Equipment  
Catalog Data Sheet  
HG 21.2.3 · 1999

Supersedes:  
Catalog Data Sheet  
HG 21.2.3 · 1991

# Type 3EF Surge Limiters



Type 3EF1 surge limiter

HG21025 eps



Type 3EF3 surge limiter

HG21010 eps

## Application

The task of type 3EF surge limiters is to restrict excessive overvoltages that might damage the windings of high-voltage motors. Such overvoltages can occur through the use of switchgear that has extremely fast dielectric recovery of the contact gap after the current zero crossing.

These types of surge limiters have been designed for use in cable systems and are normally installed indoors.

Type 3EF1 surge limiters are normally used in cable systems up to 15 kV. For station service systems of power stations and extensive cable systems type 3EF3 surge limiters are used having a higher absorption capacity and improved protection level.

If the cable system is connected to overhead lines, a set of surge arresters must be fitted at each transition point, e.g. type 3EG/3EK.

## Construction and mode of operation

The housing is made of plastic. Inside the housing there are gaps and non-linear resistors connected in series. The interior is hermetically sealed and there are screwed studs at each end for making the electrical connections.

The series gap has a low sparkover voltage and, under normal circumstances, isolates the resistors from the supply system.

The resistors are Siemens SIOV metal-oxide varistors which have a very sharply curved current/voltage characteristic. The resistance decreases in considerable overproportion to an increase in voltage and increases again similarly when the voltage decreases.

As a result of these characteristics, the surge limiters respond very quickly to switching surges and restrict them to low values.

## Protection for motors

Surge limiters selected from the following table are recommended for the protection of motors with a starting current < 600 A. When unit-connected transformers are employed, the current on the switch side is the governing factor.

Rated motor voltage to	Surge limiters
3.6 kV	3EF1 036-0A 3EF3 036-0
4.8 kV	3EF1 048-0A 3EF3 048-0
7.2 kV	3EF1 072-0A 3EF3 072-0
12 kV	3EF3 120-1

## Installation

The surge limiters can be mounted in any position, connected phase-to-earth. The value of rated voltage  $U_r$  marked on a surge limiter must not be exceeded in service at the place of installation. This also applies to all kinds of tests.

When installing surge limiters ensure that the clearances between live parts or between live parts and earthed parts are not less than the minimum values specified (DIN VDE 0101). The earthing connection of the surge limiters is identified with the symbol  $\perp$ .

### Note:

Surge limiters must be disconnected from the system before any voltage tests are carried out on the switchgear.

## Dimension drawings

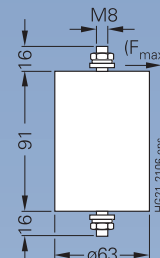


Fig. 1  
Types 3EF1 036-0A to 3EF1 072-0A

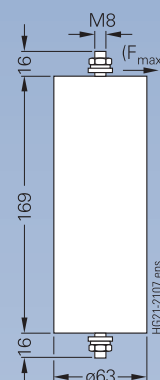
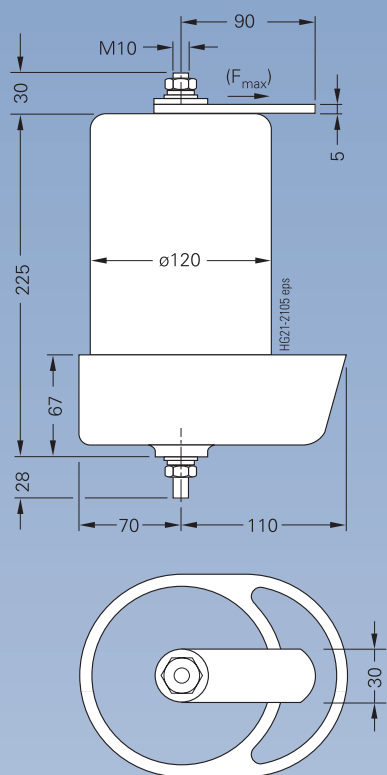


Fig. 2  
Types 3EF1 120-0A to 3EF1 150-0A

$F_{max} = 10 \text{ N}$



**Fig. 3**  
Types 3EF3 036-0 to 3EF3 120-1

$F_{\max} = 10 \text{ N}$

### Selection and ordering data

Rated voltage <sup>1)</sup> $U_r$ (rms value)	Continuous operating voltage <sup>2)</sup> $U_c$	Switching impulse sparkover voltage $U_{si}$ (5/200 wave)	Residual voltage $U_{res}$ with 0.5 kA impulse current (30/60 wave)	Energy absorption capacity	Order No.	Weight approx.	Dimension drawing
kV	kV	kV	kV	kJ/kV rated voltage		kg	Fig.

#### 3EF1: indoor version

3.6	2.9	8	8	0.8	<b>3EF1 036-0A</b>	0.73	1
4.8	3.6	10	10	0.8	<b>3EF1 048-0A</b>	0.73	1
7.2	5.4	15	15	0.8	<b>3EF1 072-0A</b>	0.73	1
12	9	25	25	0.8	<b>3EF1 120-0A</b>	1.2	2
15	11	31	31	0.8	<b>3EF1 150-0A</b>	1.2	2

#### 3EF3: indoor version

3.6	3.2	8	8	4	<b>3EF3 036-0</b>	3	3
4.8	4.1	10	10	4	<b>3EF3 048-0</b>	3.5	
7.2	6.1	15	15	4	<b>3EF3 072-0</b>	4	
7.2	4.9	12	12	4	<b>3EF3 072-1</b>	4	
12	10.2	25	25	4	<b>3EF3 120-0</b>	5	3
12	8.2	20	20	4	<b>3EF3 120-1</b>	5	

1) The rated voltage is the max. permissible power-frequency voltage which may occur at the mounting position of the limiter in case of an earth fault.

2) The continuous operating voltage is the max. continuous permissible power-frequency voltage to earth which may occur at the mounting position of the limiter during service.

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Subject to the

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## Dimensions

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Siemens Aktiengesellschaft

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Order No.: **E50001-K1521-A231-A2-7600**  
Printed in Germany  
KGK 0299 3.0 4 En 100639 6101/U620