

Surge arrester 3EB5

with polymeric composite housing
for operating aboard traction units

Operating instructions

Order No.: 928 00186 176 a



Inhalt

Description	4
Technical data	4
Design	5
Mode of operation	5
Transport and storage	7
Montage	7
Screwed joints	7
Place of installation	8
Installing of the arrester	8
Earthing	8
Terminal	9
Maintenance	10
Disposal of arrester and arrester accessories	11

The manufacturer of this surge arrester

Siemens AG
Energy Sector - Power Transmission
High Voltage

has introduced and applies a quality system in accordance with

DIN ISO 9001 / EN 29 001

Quality systems: Model for quality assurance This system was first demonstrated in 1989 to the DQS (German Association for the Certification of Quality Systems).

The **electrical testing laboratories** and the **materials technology laboratories** of the manufacturer have been certified since 1992 by the German Accreditation Body in accordance with **DIN EN 45 001**.

If you require further copies of the operating instructions, please order them from the appropriate Siemens office, indicating the title and order number shown on the title page.

Published by:

Siemens AG
E T H P A R
D-13623 Berlin

In case of request:

Telephone exchange +49 / 30 / 386 1
Sales department: +49 / 30 / 386 33222
Fax: +49 / 30 / 386 26721
e-mail: <mailto:Arrester@Siemens.de>

Subject to change.



Note

The equipment covered by these instructions should be installed and serviced only by competent personnel familiar with good safety practices. This instruction is written for such personnel and is not intended as a substitute for adequate training and experience in safe procedures.

This information is intended for the correct installation of this product. Siemens has no control over the condition of the network, which can be greatly affected by the installation of a product. It is the responsibility of the user to choose the appropriate method of installation. Under no circumstance is Siemens liable for any direct or indirect damage caused by the use or misuse of this product.

Description

The 3EB5 surge arrester serves to protect the insulation of a system (or of one of its components) from undue stresses resulting from overvoltages. It is designed for special operating conditions encountered aboard traction units.

Technical data

The standard model is suitable for the operation of up to 1800 m above sea-level and for a rated frequency between 16 2/3 Hz and 62 Hz AC (3EB5 ...-**A**...-..) and DC (3EB5 ...-**D**...-..) respectively.

The surge arrester meets the following standards when applicable:

3EB5 ...-6...-..

Standard	Classification
VDE 0675-4	10 kA, Designation SM
IEC 60099-4	10 kA, Designation SM

3EB5 ...-7...-.. / 3EB5 ...-8...-..

Standard	Classification
VDE 0675-4	20 kA, Designation SH
IEC 60099-4	20 kA, Designation SH

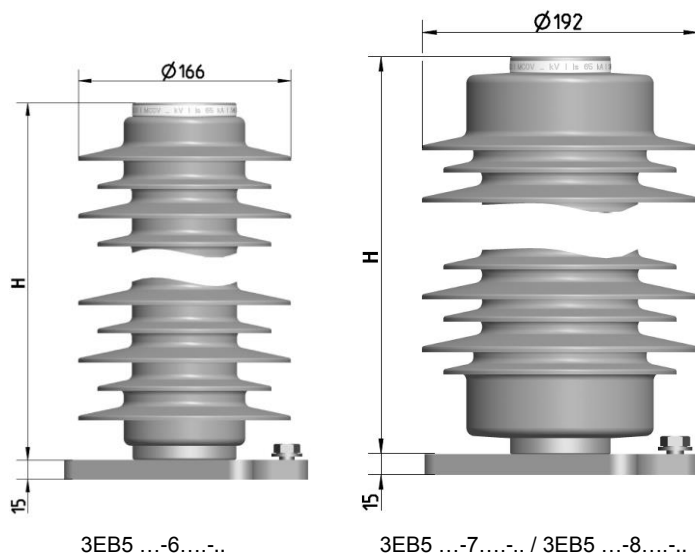


Fig. 1 Surge arrester type 3EB5

The rating plate [Fig. 2] is attached to the top flange.

3EB5 ...-6...0-0D Designation SM Ur ... kV In 10 kA Qrs 2,0 C Uc ... kV Is 50 kA S/N 2016
3EB5 ...-7...0-0D Designation SH Ur ... kV In 20 kA Qrs 2,8 C Uc ... kV Is 65 kA S/N 2016
3EB5 ...-8...0-0D Designation SH Ur ... kV In 20 kA Qrs 3,4 C Uc ... kV Is 65 kA S/N 2016

Arrester type | Designation | Rated voltage | Nominal discharge current | Repetitive charge transfer rating | Continuous operating voltage | Rated short-circuit current | Serial number | Year of manufacture

Fig. 2 Rating plate

Design

The active components of the arrester are metal oxide resistors. They are arranged in a stack and hermetically protected against environmental influences by means of a directly mounted silicon enclosure. The mechanical strength is attained by glass-fibre-reinforced polymer rods which tightly enclose and compress the resistor stack. Thanks to its hydrophobic properties, the silicon enclosure minimises electrical discharges on the enclosure surface and thus ensures particularly good operating characteristics, even under conditions of heavy pollution.

The flanges are made of a lightweight metal alloy suitable for use outdoors and directly connected with the silicon enclosure.

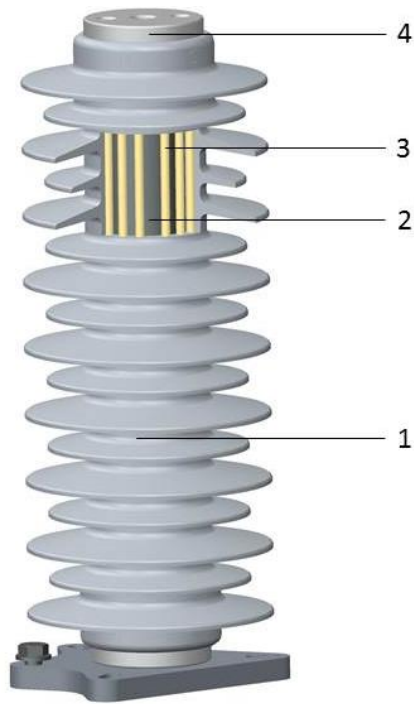
The metal-oxide (MO) resistors are tightly enclosed by the fibre-reinforced plastic (FRP) rods (as if in a cage). In the event of resistor overload – an extremely unlikely case, but which cannot entirely be ruled out – the resultant arc produces no overpressure, since the resistors are not enclosed by a sealed, mechanically rigid casing. The arc escapes immediately through the silicon enclosure, without any abrupt rupturing of the mechanical load bearing enclosing structure. At the same time the MO resistors are held largely in place by a considerable number of FRP rods. The risk of parts flying off is therefore minimised.

The arresters are, where necessary, equipped with control fittings and / or shields.

Mode of operation

Metal oxide resistors are markedly non-linear - in other words, they have a strongly curved current-voltage characteristic, which means that with the continuous voltage under normal circumstances only the so-called leakage current of just a few milliamps will flow.

In the case of overvoltages due to lightning or to switching operations, the resistors become conductive (ohm range) thereby allowing a discharge current to flow to ground and the overvoltage to be reduced to the value of the voltage drop at the arrester ("discharge voltage"). Here the discharge currents may range up to 2 kA in the case of switching surges and 1 - 10 - 20 kA in the case of lightning surges.



- 1 Polymeric composite housing
- 2 Non-linear metal-oxide resistor
- 3 Insulating rods
- 4 Flange

Fig. 3 Sectional view of a modular unit

Transport and storage

The arresters are packed according to the stresses and climatic conditions during transportation and to the customer's specifications.

The packing is provided with signs for transport and storage as well as directives for appropriate handling. As soon as the shipment arrives examine it for signs of damage. If such damage be found immediately notify the forwarding agent. Any parts packed separately should be checked against the dispatch notes. All the boxes should be opened for this purpose.

With long storage it is recommended to leave the units and the accessories in the transport packing.

As protection against mechanical, chemical and thermal influences (e.g. direct solar radiation, etc.) the surge arresters must be stored in a normally cool, dry and "dust-free" environment.


Storage temperatures: -50°C to +60°C

Relative air humidity below 80% at 15°C as annual mean value, 100% at 25°C as maximum value.

Surge arresters which are removed from the vehicle must be thoroughly cleaned before storage.

Montage

Note the following before installing:

	<p>Warning</p> <p>Before any work starts:</p> <ul style="list-style-type: none">➤ switch off and isolate➤ secure against reclosing➤ verify that equipment is dead➤ earth and short circuit the equipment➤ cover or fence off nearby live parts <p>Death, severe injury and considerable damage to property and environmental damage may result if the safety instructions are not followed.</p> <ul style="list-style-type: none">➤ Confirm that these safety measures have been carried out.
---	---

Accessories


With the standard model, the following accessories are included in the scope of supply:

- Connecting lug for earth connection

Screwed joints

For mounting the arrester use only the bolts supplied.

Grease the bolt threads with Molykote Longterm 2 plus.

	<p>Attention</p> <p>Unchecked tightening can result in damage or loosening of bolt joints</p> <p>Use torque wrench for assembly.</p>
---	--

Necessary torque for screwed joints:

M 8:	18 ± 2 Nm
M 10:	35 ± 5 Nm
M 12:	60 ± 5 Nm
M 16:	90 ± 10 Nm
M 20:	105 ± 10 Nm

Place of installation

The protective range of the surge arresters is limited. The place of installation must therefore be as close as possible to the equipment to be protected. The distance to earthed or live parts must be in accordance with relevant standards.

The arresters must be fitted vertically. If non-vertical installation is desired, confer with the manufacturer.

Installing of the arrester

The contact faces of the flanges of the arresters must be bright. The arresters can be mounted with 3 head screws or stud bolts M12 [Fig. 4].

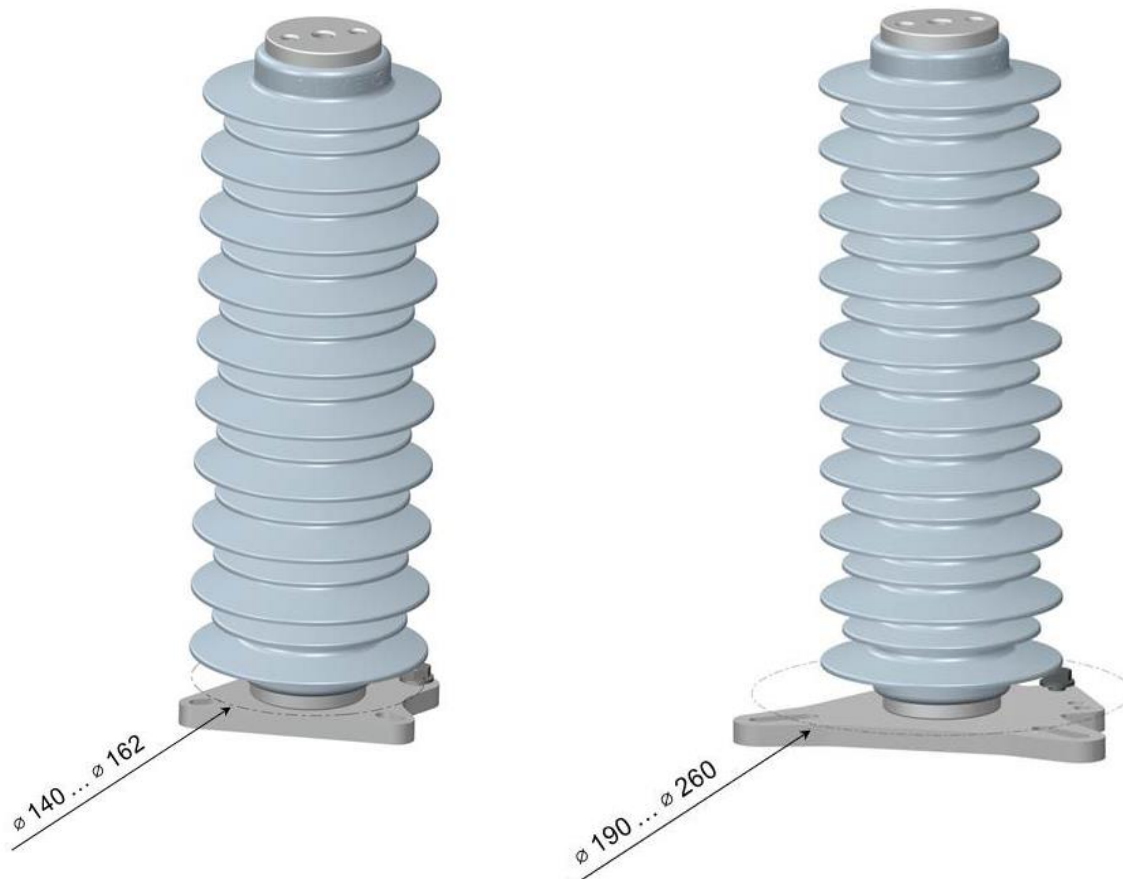


Fig. 4 Mounting: 488-04062-002 (left) and 488-04062-006 (right)

In other respects, the arrester must be installed at site in accordance with local conditions.

Earthing

To ensure safe, reliable function of the arrester and optimal protection, earthing must be effective (low earthing resistance, short earthing connection).

For earthing purposes the bottom flange of the surge arrester is equipped with one M12 bolt. So as not to reduce the protection level of the arresters the earthing connections should be as short and straight as possible. (Take account of the minimum cross-section of the conductor).

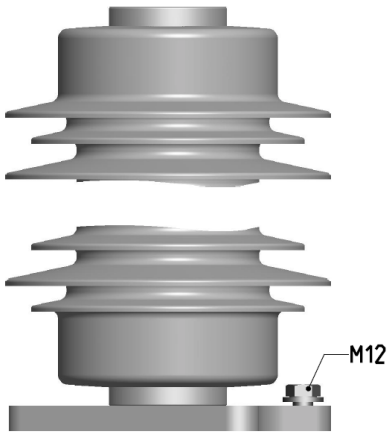


Fig. 5 Earthing

Terminal

For the connection between phase and surge arrester there are the following possibilities:

- 1xM16 threaded hole and 2xM12 threaded holes [Fig. 6]
- Flat terminal (stainless steel) [Fig. 7]

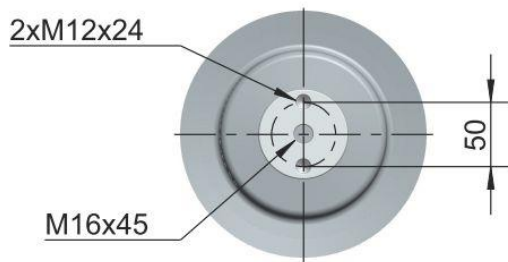


Fig. 6 Possible connections: central M16 threaded hole and 2xM12 threaded holes

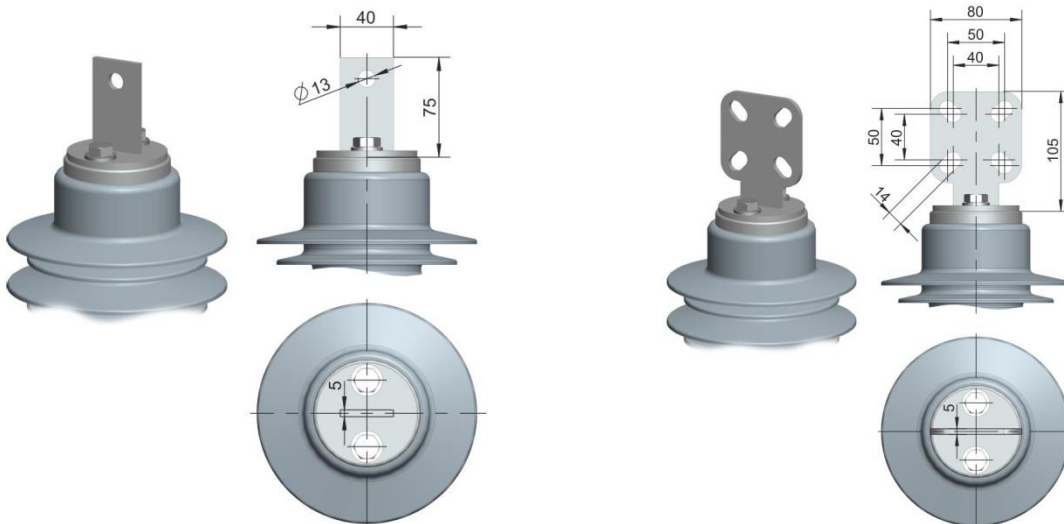




Fig. 7 Flat terminals: 488-04061-001 (left) und 488-04061-002 (right)

Pay attention to the electrochemical compatibility of the materials utilised.

Maintenance

	<p>Warning</p> <p>Before any work starts:</p> <ul style="list-style-type: none">➤ switch off and isolate➤ secure against reclosing➤ verify that equipment is dead➤ earth and short circuit the equipment➤ cover or fence off nearby live parts <p>Death, severe injury and considerable damage to property and environmental damage may result if the safety instructions are not followed.</p> <ul style="list-style-type: none">➤ Confirm that these safety measures have been carried out.
---	---

For technical reasons the silicone sheds do not need cleaning. Should they nonetheless be cleaned, only use clear or soapy water and a soft cloth or sponge.

	<p>Important</p> <p>Do not use solvents or abrasive or scratching materials.</p>
---	---

Regular maintenance of the arresters is not necessary.

The only monitoring required is to:

- Read the operations counter, if installed.
- Check the tell-tale spark gap, if installed.
- The arc effects due to overloading cause a controlled cracking or tearing open of the silicone housing (blackening traces). In such a case you will need to replace the arrester. You may also need to replace any monitoring accessories.

Disposal of arrester and arrester accessories

Surge arresters and the accessories are an environmentally compatible product. In disposal, priority must be given to reuse of the materials. Environmentally acceptable disposal of the surge arresters and the accessories is possible in line with current legislation.

The following materials have been used to make up the device: Steel, copper, aluminium, PTFE, cast resin or cast-resin-impregnated fabric, glass-fibre-reinforced plastics, polyurethane, rubbers for sealing, ceramics, electronic components and silicone rubber (VMQ), ceramics (porcelain, metal oxide).

The device can be recycled as mixed scrap, or, if it is dismantled as far as possible, in a more environmentally acceptable way as sorted scrap with a mixed-scrap residual portion. The arrester resistors of metal oxide (MO) should be disposed of as industrial waste similar to domestic garbage (not as building rubble).

In as-supplied-by-Siemens state, the device incorporates no hazardous substances in the sense of the pertinent regulations in Germany. If the device is to be operated outside Germany, the locally applicable laws and regulations must be followed.

Local customer support offices will be able to answer any questions concerning disposal.