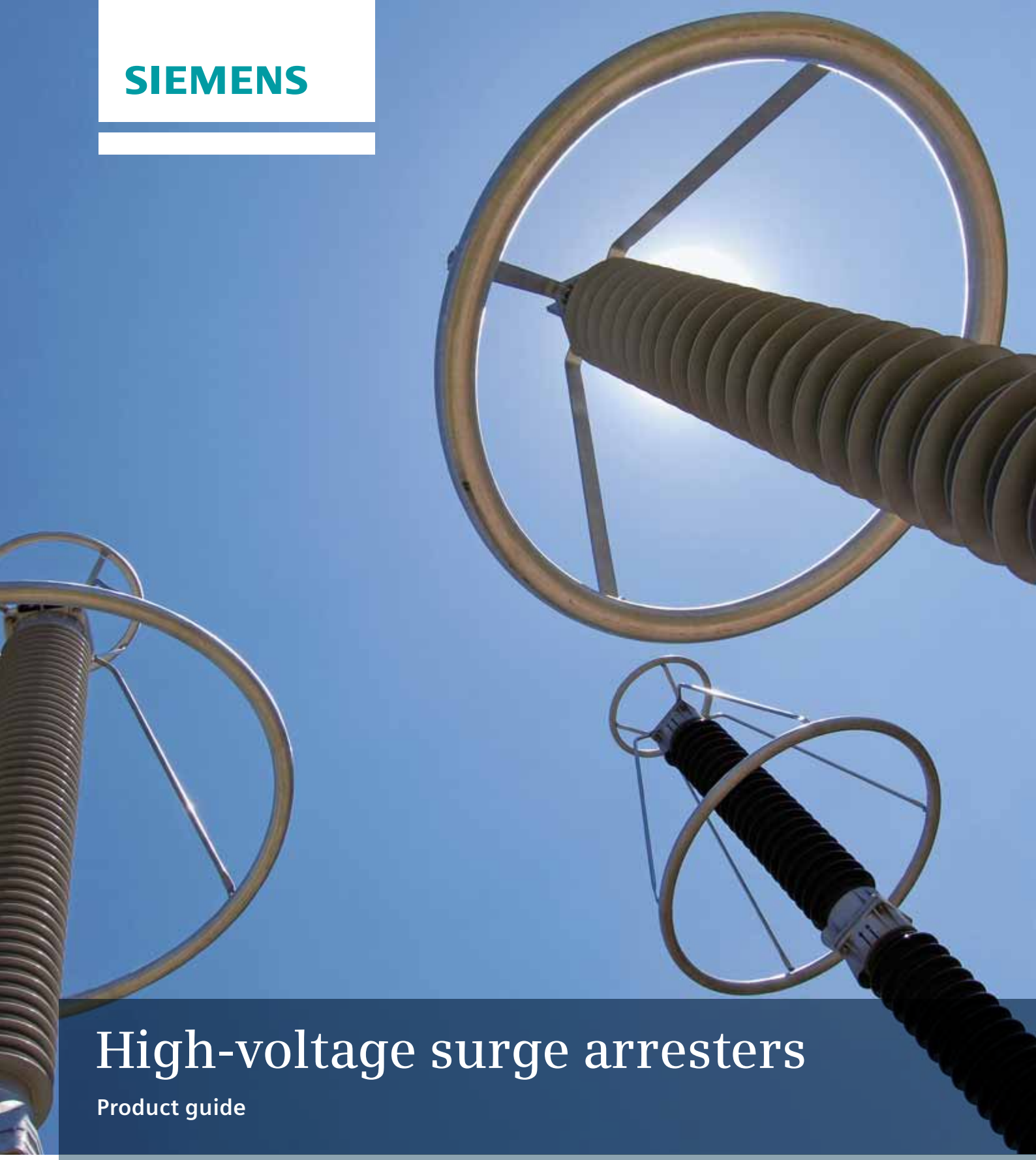
SIEMENS

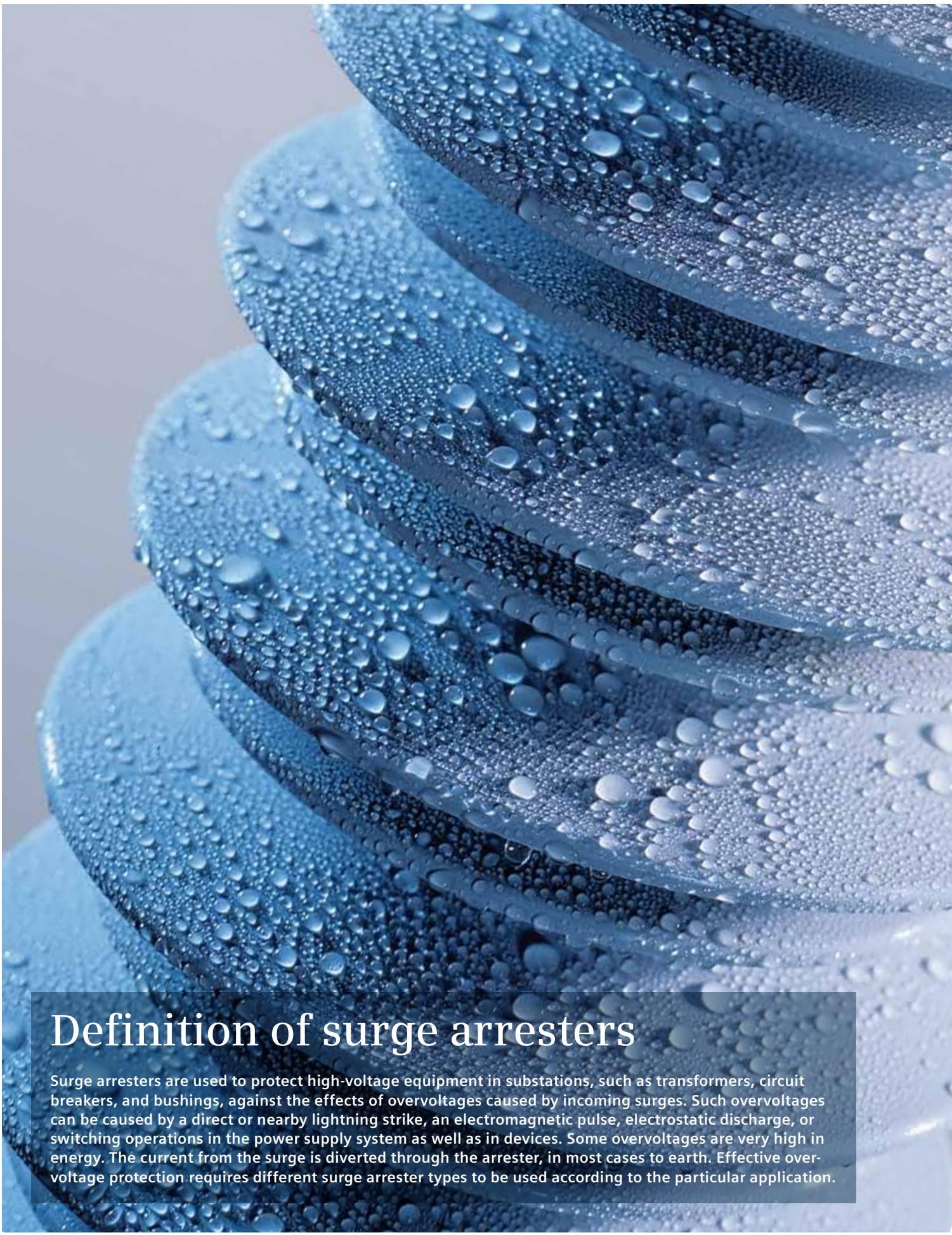


# High-voltage surge arresters

## Product guide

siemens.com/energy/arrester

Answers for energy.



# Definition of surge arresters

**Surge arresters are used to protect high-voltage equipment in substations, such as transformers, circuit breakers, and bushings, against the effects of overvoltages caused by incoming surges. Such overvoltages can be caused by a direct or nearby lightning strike, an electromagnetic pulse, electrostatic discharge, or switching operations in the power supply system as well as in devices. Some overvoltages are very high in energy. The current from the surge is diverted through the arrester, in most cases to earth. Effective overvoltage protection requires different surge arrester types to be used according to the particular application.**

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# Siemens surge arresters for any requirement

Experience is most essential when it comes to reliability in medium- and high-voltage applications. Siemens has been designing and manufacturing medium- and high-voltage surge arresters for standard and special applications since 1925. Continuous research and development, the wealth of Siemens know-how, and comprehensive worldwide experience give Siemens surge arresters a leading edge in overvoltage protection. Their uncompromising quality ensures a long service life and reliability in any application.

Siemens surge arresters are an indispensable aid to insulation coordination in electrical power supply systems. Valuable equipment such as transformers, circuit breakers, generators, motors, capacitors, traction vehicles, and bushings, as well as complete switchgear, is optimally protected against lightning and switching overvoltages.

Siemens surge arresters have been designed to meet the requirements of a wide range of common installation environments, from arctic cold to the heat of the desert and the dampness of tropical climates. They are available for any application from 3 kV up to 1,200 kV including special applications such as high-voltage direct current (HVDC) and FACTS systems as well as all kinds of compensation systems for electric power networks.

**Substation Bidingen 400 kV**

Protection of transformer
Solution with 3EQ4

# Always the best solution

Developments in technology and practical experience have led to three different surge arrester designs:

- Surge arresters with porcelain housings
- Surge arresters with silicone housings
- Surge arresters with metal enclosures

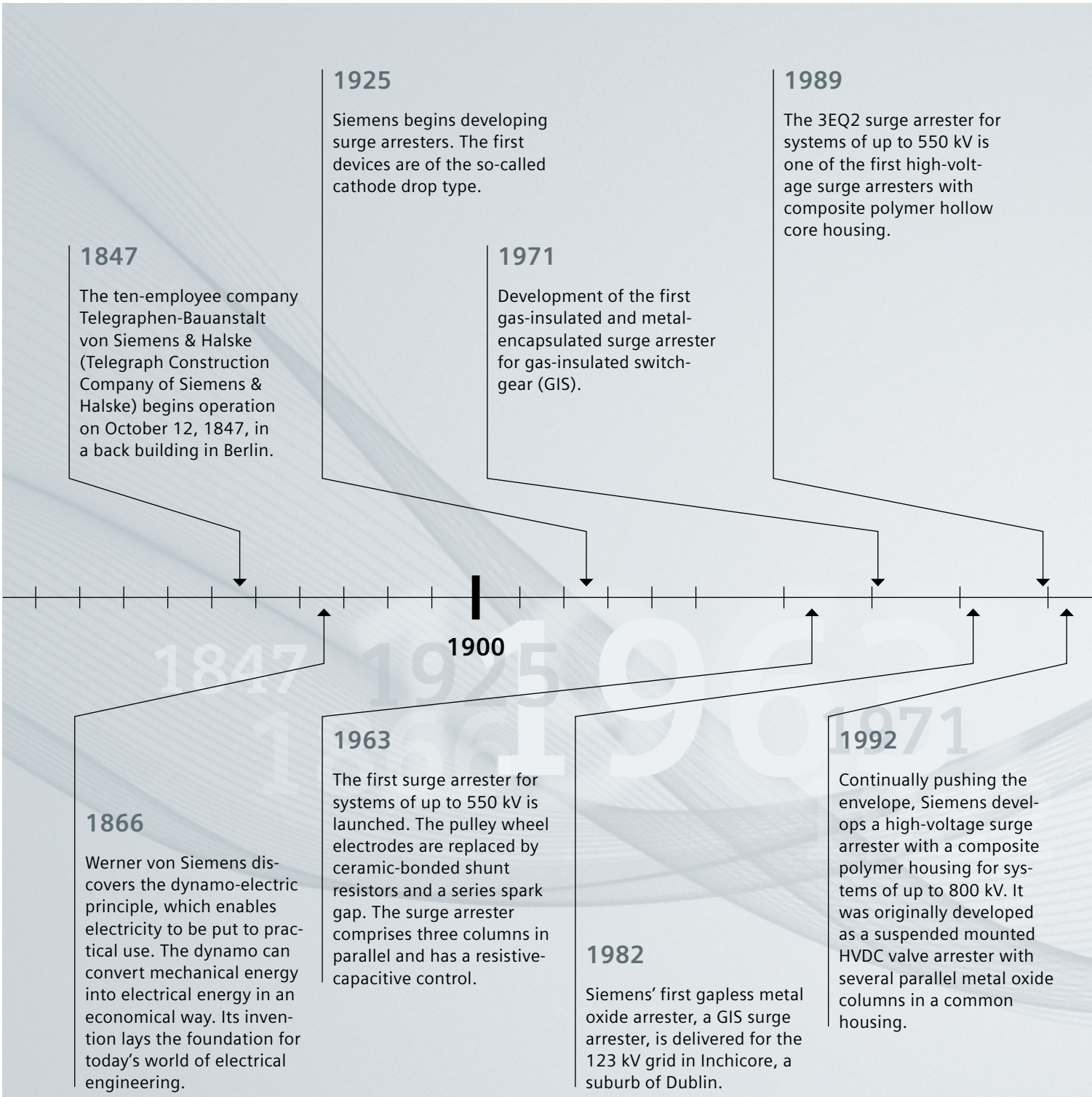
Siemens provides each of these types in several versions, making it possible to find the optimal surge arrester for every conceivable application and meet even specific demands, such as

- High mechanical stability for outstanding seismic safety
- Extremely reliable pressure relief behavior for use in areas requiring special protection
- Excellent pollution layer characteristics for use in coastal and desert regions or in areas with extreme air pollution.

All Siemens surge arresters feature a superior sealing system that reliably prevents moisture ingress to ensure the highest possible degree of overvoltage protection and decades of trouble-free service. Moreover, the choice of materials used in the making of Siemens surge arresters contributes to the protection of the environment.

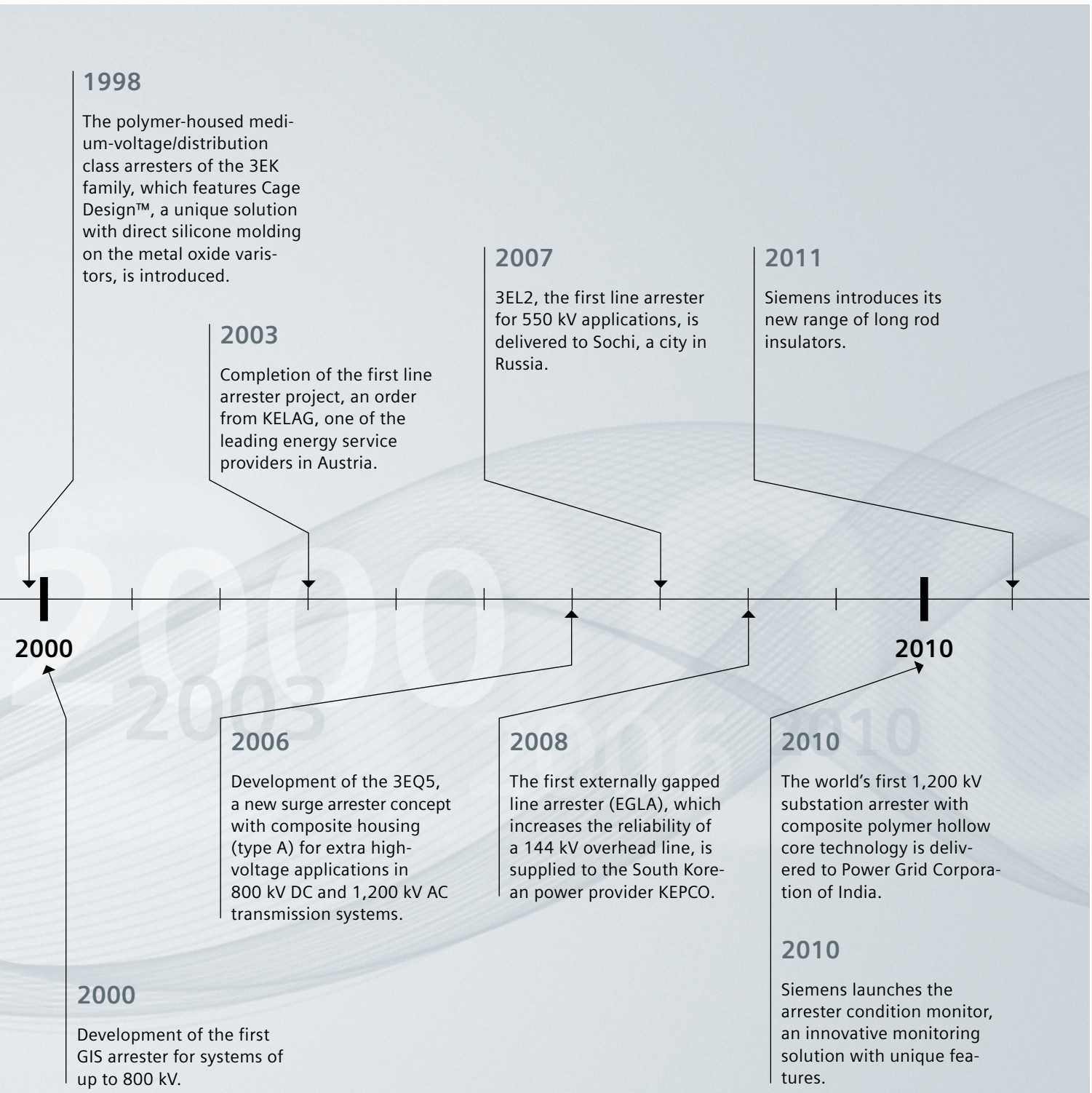
**Substation Bidingen 400 kV**

Protection of switchgear
Solution with 3EQ4




# History timeline

**Siemens is a pioneer in many fields of the electricity and digitization markets. Experience is most essential when it comes to reliability in medium- and high-voltage applications. Since 1925 Siemens has been manufacturing high-voltage surge arresters up to rated voltages of 1,200 kV – for standard and specialized applications. Our permanent research and development and the concerted know-how in our factories give our surge arresters a leading edge in overvoltage protection. Our uncompromising quality ensures the long service life and reliability of each application.**




**As a pioneer in the field of silicone rubber insulation and one of the few suppliers with comprehensive in-house research and development capabilities in this technology, Siemens has been providing surge arresters with silicone rubber housing for more than 30 years and has gathered excellent service experience from even the most severe climatic and environmental conditions. Today, silicone rubber is among the most widely used materials for high-voltage outdoor equipment.**

# MOVs: the core of Siemens surge arresters

The main task of an arrester is to protect equipment from the effects of overvoltages. During normal operation, an arrester should have no negative effect on the power system. Moreover, the arrester must be able to withstand typical surges without incurring any damage. Nonlinear resistors fulfill these requirements thanks to the following properties:

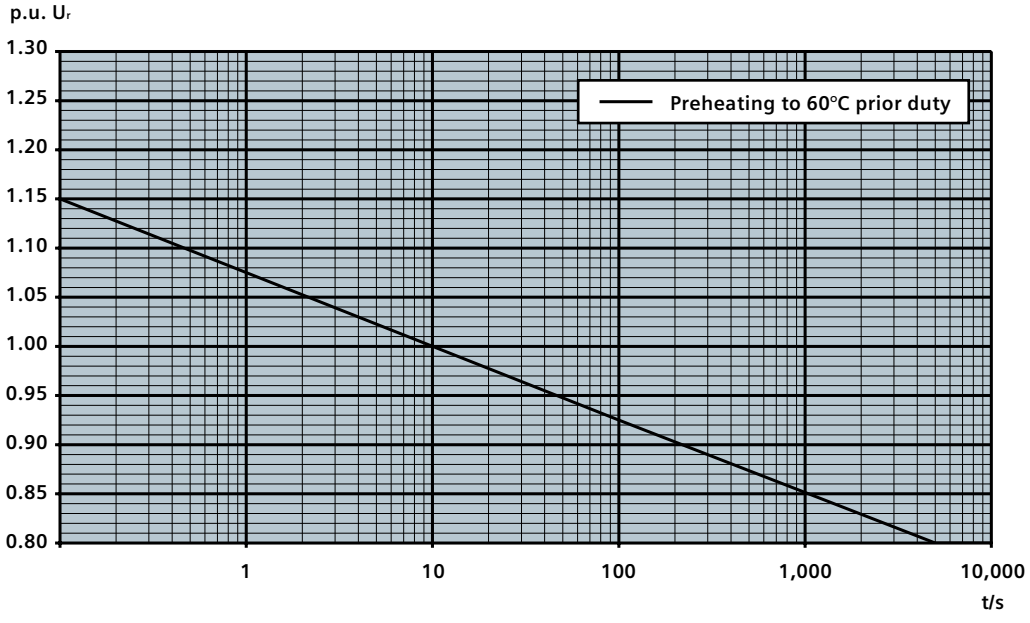
- Low resistance during surges, so that overvoltages are limited
- High resistance during normal operation to avoid negative effects on the power system
- Sufficient energy absorption capability for stable operation

With this kind of nonlinear resistor, there is only a small flow of current when continuous operating voltage is being applied. When there are surges, however, excess energy can quickly be removed from the power system by a high discharge current.

Nonlinear resistors made of metal oxide (MO) have proven especially suitable for this use. The nonlinearity of MO resistors is considerably high, which is why MO arresters do not need series gaps. Siemens has many years of experience with gapless MO arresters in low-voltage systems, distribution systems, and transmission systems.

Siemens metal oxide varistors (MOVs) provide a high energy absorption capability and a very low protection level. This means they absorb a high amount of energy while avoiding thermal runaways. The MOVs are characterized by their high long-duration current impulse withstand capability – an indirect measure of their single impulse energy absorption capability. Siemens surge arresters are less prone to self-heating and consequent self-destruction, and they maintain their characteristics throughout their lifetime.

IEC power-frequency voltage vs. time (U-t) characteristic (TOV)



# Silicone rubber

As a pioneer in the field of silicone rubber insulation and one of the few suppliers with comprehensive in-house research and development capabilities in this technology, Siemens has been providing surge arresters with silicone rubber housing for more than 25 years and has gathered excellent service experience from even the most severe climatic and environmental conditions. Today, silicone rubber is among the most widely used materials for high-voltage outdoor equipment.

Siemens silicone rubber-housed surge arresters are polymer-housed arresters that use silicone rubber as the only insulating material. The exclusive use of silicone has proven to be the best solution in several studies: Silicone rubber is highly hydrophobic. While there are many polymeric materials with similar initial hydrophobic properties, most of them, such as EPDM alloy rubber, lose their hydrophobicity after a relatively short period. Only genuine silicone rubber as used by Siemens is capable of maintaining its hydrophobicity throughout its entire lifetime. This ensures the long service life of Siemens surge arresters with silicone rubber housing. Even the most severe ambient conditions, such as salt fog in coastal regions or dust-laden air causing serious contamination in an industrial area, cannot impair the hydrophobicity of silicone rubber. This material property reliably prevents conductive moisture from forming on the arrester surface, thus averting surface currents and discharges. Moreover, genuine silicone is highly fire-retardant and self-extinguishing, and it is neither subject to erosion nor sensitive to UV radiation. This ensures the long-term stability of the housing material.

There are several characteristics that set the silicone elastomers used by Siemens apart from other organic insulating materials.

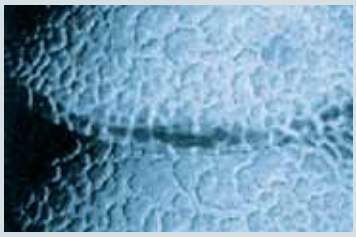
As a matter of principle, Siemens only uses HTV (high-temperature vulcanized) or LSR (liquid silicone rubber) silicone elastomers. These types of silicone help maintain the properties mentioned above.

The –Si–O– backbone of silicone rubber has a higher bonding energy than the –C–C– backbone of EPDM. Silicone rubber has a lower carbon proportion than EPDM. Consequently, silicone rubber boasts inherently better chemical and physical resistance, better UV resistance, and lower flammability than EPDM. Consider these facts:

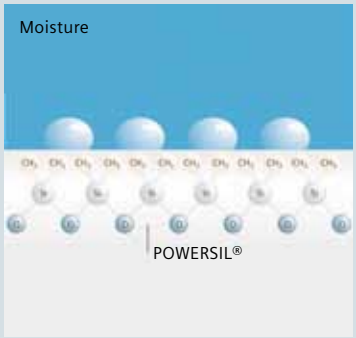
- Silicone rubber is highly stable under the influence of ultraviolet radiation (sunlight), ozone, and nitrogen oxide. Its stability beats that of EPDM-based alloy rubbers.
- The hydrophobic performance of a silicone rubber surface remains excellent throughout the entire arrester service life, whereas EPDM-based alloy rubbers lack this critical requirement.
- The hydrophobicity of silicone rubber returns after a corona discharge, which assures reliable long-term performance.
- The arcing resistance of silicone rubber is higher as compared to EPDM-based alloy rubbers.
- The flame-retardant properties of silicone rubber comply with IEC 60707 and UL94 V-0 (i.e. self-extinguishing, no burning drips, probe does not burn).
- Silicone rubber is resistant to all common organic and nonorganic cleaning agents and solvents.
- Silicone rubber performs well in an ambient temperature range of –60 °C to +200 °C. No other polymeric material can beat silicone rubber.

**Characteristic damage on EPDM insulators due to natural UV radiation**

Chalking



Cracking




Hydrophobic effect on Siemens 3EL surge arrester due to alignment of methyl groups in silicone polymers.

# Porcelain

Siemens porcelain surge arresters feature a directional pressure relief device that ensures maximum protection in the case of an overload. Thanks to the excellent sealing of its surge arresters, Siemens has recorded decades of trouble-free service life without failures or moisture ingress.

Both ends of a porcelain surge arrester housing are equipped with aluminum flanges that are cemented to the housing. Sulfur cement is the first choice for this purpose. It has favorable mechanical properties and also proves advantageous over Portland cement, which is quite common in the insulator industry. The main advantage of sulfur cement is that it can be brought into contact with aluminum during manufacturing without causing any corrosion, and it can be quickly processed, since it almost reaches its full mechanical strength directly after application.

The design of the flanges and the end sections of the porcelain housings is key to the strength of the entire housing. This is why these parts of Siemens arresters are designed in a way that ensures that the cement joint is mechanically stronger than the porcelain itself. This enables making full use of the porcelain's strength when specifying the permissible mechanical head loads of the arrester housing.

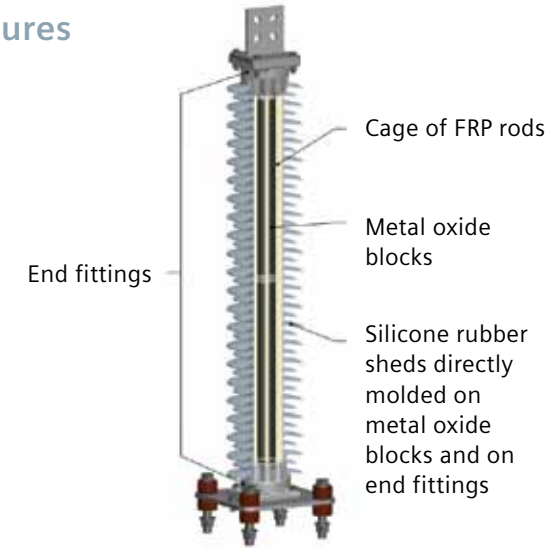
# High-voltage station class surge arresters

**Siemens provides three surge arrester product families for standard and special AC applications from 3 kV up to 800 kV, which are described in this brochure:**

- **3EL surge arresters with silicone housing, Cage Design™**
- **3EQ surge arresters with silicone housing, composite hollow core design**
- **3EP surge arresters with porcelain housing**

# 3EL silicone rubber surge arresters with Cage Design

## Design features




Siemens' Cage Design ensures high mechanical strength and safe overload performance. It is characterized by the use of silicone and fiberglass-reinforced plastic (FRP) rods as housing materials. Reliability is guaranteed by the direct molding of the silicone rubber onto the MO blocks and the FRP rods. This ensures the total embedding of all components free of bubbles and gaps, thus preventing any partial discharge or moisture ingress.

The MO blocks of 3EL surge arresters are enclosed by a cage made of prestressed FRP rods, which leads to a rigid, reinforced structure ensuring high mechanical strength. The high tensile strength of the FRP rods is used to hold the arrester's MO blocks in place tightly. This is why Cage Design arresters are among the mechanically strongest polymer arresters available on the market and at the same time ensure minimal use of material and very low weight. As the MO blocks are neither enclosed in a sealed mechanical shell nor wrapped in hard material, no excess pressure will develop in the case of an overload or the extremely rare event of an arrester short circuit. The arc can escape directly through the soft silicone housing, and the ejection of internal parts that could damage other equipment nearby is prevented almost completely.

## Long service life

Silicone is the only polymeric material that maintains its hydrophobicity throughout its lifetime: Water and pollution do not form a continuous conductive film on its surface. This reduces surface currents and the risk of a flashover, especially in polluted and coastal environments.

Other polymeric materials may be hydrophobic, too, but they lose this property after a short period of time. Unlike other polymeric materials such as EPDM, for example, the silicone used for our 3EL arresters is also fire-retardant and self-extinguishing, and it is neither subject to erosion nor sensitive to UV radiation. This ensures the long-term stability of the housing material.

## Low weight: flexible and easy installation

The use of FRP and silicone as housing materials also makes Siemens 3EL arresters extremely lightweight, allowing easy transport and flexible installation. The use of 3EL surge arresters helps reduce the required strength and weight of arrester supports and the need for heavy installation equipment.

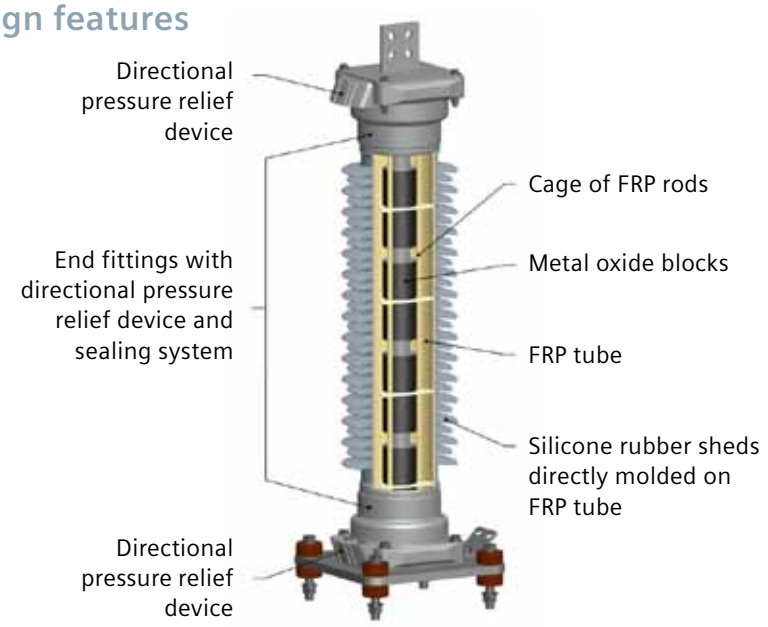
## Applications

The 3EL series of surge arresters covers a wide range of common installation requirements including station and line surge arresters for the protection of switchgear, transformers, and other equipment in high-voltage systems of up to 550 kV. 3EL surge arresters can be installed at all mounting angles (e.g. horizontally, vertically, or suspended from the transmission line as line surge arrester). Mechanically strong enough to meet common mechanical requirements and with sheds that are resistant to damage resulting from transport, installation, storms, earthquakes, and vandalism, 3EL surge arresters are perfectly suited for installations that demand low weight and indestructibility of the arrester.

Horizontal cut of a cage design arrester

# 3EQ silicone rubber surge arresters with composite hollow core design

## Design features




Siemens' innovative composite hollow core design uses silicone and a FRP hollow core as housing materials. The advantages of this design are more than compelling, as it offers the perfect combination of cost savings and safety for substations. The direct molding of the silicone rubber onto the FRP hollow core ensures reliability, while an excellent special sealing of the flanges at both ends of the surge arrester effectively prevents partial discharges and moisture ingress. The combination of silicone rubber and fiberglass-reinforced hollow core also allows an enormous load carrying capacity for the structure. Hence, 3EQ surge arresters are the perfect choice for the replacement of existing post insulators in substations of up to 800 kV.

The composite hollow core design provides a very high degree of safety: In the case of an overload or the extremely rare case of an arrester short circuit, the arc escapes directly through directional pressure relief devices, internal parts are not ejected, and the housing does not break.

## A reliable, sturdy, and economic choice

Siemens 3EQ composite hollow core design surge arresters are virtually indestructible. While the composite hollow core design provides the highest possible mechanical strength and enables the support of high bending moments, the silicone rubber insulation is ideal for outdoor applications in severe environmental conditions. No matter how tough environmental and operating conditions may be, 3EQ arresters assure 100% reliable pressure relief performance and provide the ultimate in protection. They are shatterproof and retain at least 75 percent of their mechanical strength even after pressure relief, and they provide the greatest stability, even during earthquakes.

## Reduced space requirements

Whenever space is at a premium, 3EQ surge arresters can even be mounted directly over a transformer to support connectors without any danger to neighboring equipment. Their unique composite hollow core design ensures maximum stability, even if an arrester should »blow out« after overloading. Pressure relief is absolutely reliable – there is no danger to equipment in the direct vicinity, no parts will be ejected, and the emerging arc will safely burn between the ends of the pressure relief device.

## Longevity and reliability

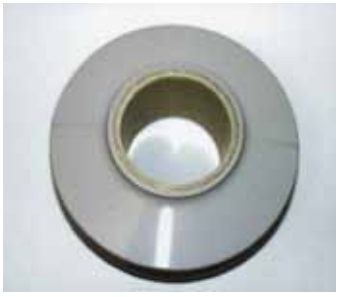
The silicone rubber housings of 3EQ surge arresters provide the best possible long life performance for high-voltage surge arresters. They make use of all the advantages of vulcanizing silicone rubber sheds onto an FRP hollow core, providing enhanced safety and meeting every requirement.

With their silicone rubber housings, the arresters enjoy all-around protection. The silicone rubber shed provides a reliable defense against snow, sandstorms, ozone, high-level UV radiation, sea salt, soot, and acid rain in industrial regions. Only genuine silicone rubber is capable of maintaining its hydrophobic properties throughout its entire service life – and is resistant to UV radiation. The silicone rubber of the 3EQ surge arresters reliably prevents the formation of films of water or dirt. Surface currents resulting from conductive layers of accumulated dirt are eliminated.

## Applications

Siemens 3EQ composite hollow core design surge arresters will go the extra mile. They meet highest mechanical demands and are ideally suited for challenging environments, such as areas with heavy seismic activity or extremely high wind loads.

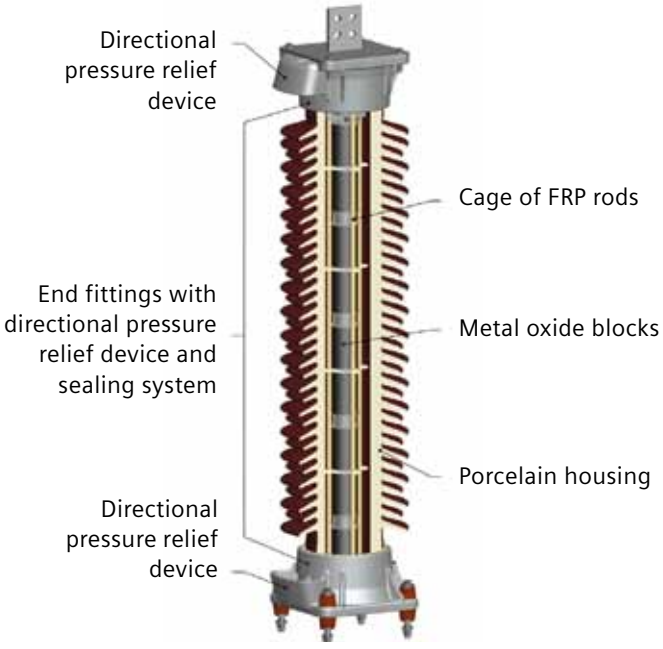
3EQ surge arresters boast a prolonged service life, because they are absolutely shatterproof and feature reliable overload performance with no hazardous splinters being ejected even under maximum pressure. These arresters can be installed close to costly system components. 3EQ composite hollow core design arresters are virtually indestructible during transportation, installation, storms, and earthquakes, and they are immune to vandalism.



Horizontal cut of a composite hollow core design arrester

# 3EP porcelain surge arresters

## Design features




Siemens' 3EP porcelain-housed surge arresters are the ideal choice for high mechanical performance requirements at voltage levels of up to 800 kV. With a seismic qualification of 0.5 g that is guaranteed up to 800 kV, they suit environments with even the most challenging mechanical requirements, such as heavy seismic activity and extremely high wind loads.

3EP surge arresters ensure maximum protection in an overload situation thanks to a specially designed directional pressure relief device. In the case of an overload or the extremely rare case of an arrester short circuit, the arc escapes easily through the pressure relief devices. No pressure is built up inside the arrester and no internal parts are ejected, which prevents damage to surrounding equipment.

The excellent sealing system of 3EP surge arresters prevents failures or moisture ingress and guarantees decades of trouble-free service. The use of nonporous sulfur cement instead of corrosive Portland cement for bonding protects the MO blocks and prevents aging effects. The MO blocks of 3EP surge arresters are enclosed by a rigid, reinforced cage made of FRP rods. The high tensile strength of the FRP rods is used to hold the arrester's MO blocks in place tightly.

## Applications

Thanks to their high degree of safety and reliability, Siemens 3EP porcelain-housed surge arresters can be installed in close proximity to costly system components. 3EP composite hollow core design arresters are virtually indestructible during transportation, installation, storms, and earthquakes, and they are immune to vandalism.

# Standards and testing – reliability you can count on

## Tests

Siemens surge arresters have been designed and tested in compliance with the latest IEC 60099-4, IEEE C62.11, and GB 11032 standards. All type tests are performed by independent, PEHLA-certified laboratories; reports are available on request. Please contact your Siemens representative for details.

Moreover, every single surge arrester that leaves the Siemens factory undergoes a routine test and is delivered with a routine test certificate.

## Quality Assurance

Siemens meets all requirements of ISO 9001:2008, ISO 14002:2004, and BS OHSAS 18001:2007. All Siemens suppliers need to be certified according to ISO standards or will be audited by Siemens.

To maintain sustainable quality improvement, Siemens introduced corporate quality guidelines that contribute to each step of the quality process.

## Standardization

The aim of the IEC's Technical Committee 37 (TC 37) as well as the IEEE's Surge Protective Device Committee (SPDC) is the standardization of surge arrester testing and application. The TC 37 develops the standards IEC 60099-4, IEC 60099-8 (EGLA), IEC 60099-9 (HVDC), and the application guide IEC 60099-5, while the SPDC develops the standard IEEE C62.11 and the application guide IEEE C62.22. Both committees include representatives of manufacturers, utilities, test field labs, and universities.

Siemens R&D experts are members of both bodies, thus playing an important role in the definition of the standards. They also share their expert knowledge in electrical power systems in CIGRE, the international council on large electric systems, which participates in the development of international standards.

DAkkS
Deutsche
Akkreditierungsstelle
D-PL-12072-04-01

The test field is certified by the »Deutsche Akkreditierungsstelle« (Germany's national accreditation body) according to DIN EN ISO/IEC 17025

Test generator supplying both impulse voltages (1.2/50 µs and 250/250 µs) and impulse currents (8/20 µs and 30/60 µs)

UHV arrester prepared for testing in the HV test laboratory

# Selection table

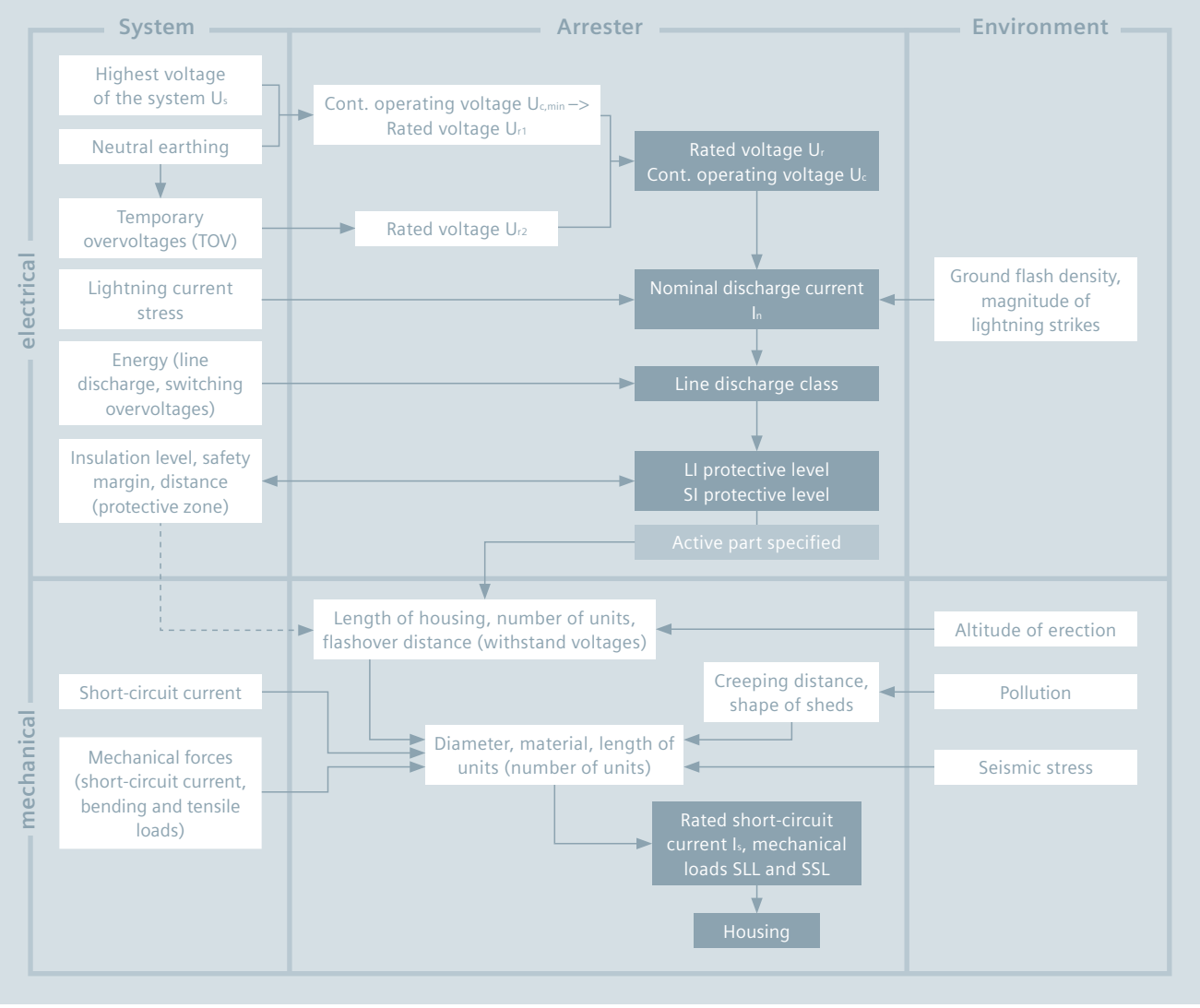



Fig. 1: Configuration procedure for an MO surge arrester

# How to select a suitable surge arrester

This section describes the general approach to selecting typical arresters for overvoltage protection in high-voltage systems. For a detailed description of how to configure a surge arrester, please refer to the handbook *Metal-Oxide Surge Arresters in High-Voltage Power Systems – Fundamentals.*[1]

The requirements for a surge arrester emerge from two basic requirements: It should provide adequate protection with a sufficient safety margin, which means that overvoltages at the device to be protected must always remain below its withstand voltage. Furthermore, the surge arrester should be dimensioned for stable continuous operation, which means that the arrester must remain electrically and thermally stable under all conditions while handling all long-term, temporary, and transient stress resulting from network operation.

These two requirements cannot be fulfilled independently. A reduction of the protective level automatically means a higher degree of specific electrical stress during continuous operation, and conversely, the continuous operating voltage of an arrester cannot be increased arbitrarily without raising its protective level as well. Both operating points are for a given type of MOV strictly associated with each other through the voltage-current (U-I-) characteristic curve.

## Step 1: Selection of the continuous operating voltage and the rated voltage.

The first step is to define the minimally required continuous operating voltage $U_{c,min}$. This must be as high as the continuous phase-to-earth voltage of the system. Here, »continuously« applied voltage means every voltage that occurs within an uninterrupted period of more than 30 minutes. The type of neutral earthing of the system is decisive in determining the continuous operating voltage. In isolated or resonant earthed neutral systems, the voltage of a healthy phase against ground takes on the value of the phase-to-phase voltage in the case of a one-phase earth fault (earth fault factor k = 1.73). Since resonant earthed neutral systems are operated quite commonly for time periods of more than 30 minutes in this condition, the continuous operating voltage of the arrester must, in this case, have the value of the highest voltage of the system, $U_s$.

**Solidly earthed neutral system:**
$U_{c,min} \geq U_s/\sqrt{3}$

**Isolated or resonant earthed neutral system:**
$U_{c,min} \geq U_s$

The definition of the minimally required continuous operating voltage, a factor which usually has a value of 1.25, helps achieve a rated voltage $U_r = 1.25 \cdot U_{c,min}$. This is the lowest necessary rated voltage of the arrester.
Table »Typical rated voltages $U_r$ for highest voltages of the system $U_s$« on page 27 lists typically applied rated voltages.

[1] Volker Hinrichsen: »Metal-Oxide Surge Arresters in High-Voltage Power Systems«, 3rd edition, September 2012, Order No. E50001-G630-H197-X-4A00

## Step 2: Selection of the nominal discharge current $I_n$

The nominal discharge current $I_n$ serves to classify a surge arrester. From a technical point of view, it is calculated from a typical maximum lightning current amplitude that can be expected in the substation, for which the insulation coordination is performed via the arrester's lightning protection level. This amplitude is calculated from the flashover voltage $U_{fo}$ of the line insulators, the lightning protection level $U_{pl}$ of the arresters, and the surge impedance Z of the line for $I_{max}$:

$$I_{max} = (2 \cdot U_{fo} - U_{pl})/Z$$

**Example for a 420 kV system:**

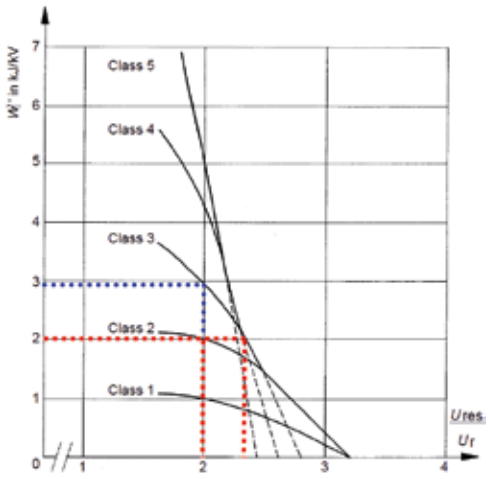
$U_{fo}$ = 2.1 MV
$U_{pl}$ = 806 kV
Z = 350 Ω
$I_{max}$ = 9.7 kA

A 10 kA arrester, for instance, can readily withstand lightning current impulses of higher amplitudes without severe damage.

## Step 3: Selection of the line discharge class

The line discharge class is the actual determining characteristic of a high-voltage arrester. Presently, it is the only way of specifying the energy-handling capability of an arrester in accordance with IEC 60099-4. It is, however, only indirectly found within the value of the line discharge class.

The definition of the line discharge class is based on the assumption that a long transmission line, charged to a certain overvoltage during a switching operation, will discharge into a connected arrester in the form of a traveling wave process.




Specific energy in kJ/kV of rated voltage dependent on the ratio of switching impulse residual voltage $U_{res}$ to the r.m.s. value of the rated voltage $U_r$ of the arrester (from IEC 60099-4)

The IEC standard 60099-4 provides a diagram that represents the converted energy during a single line discharge in a test object with reference to its rated voltage. This energy is not a fixed value, but instead depends on the arrester's protective level. The higher the residual voltage, the less energy the arrester absorbs during the line discharge, since the line will discharge less intensely when the residual voltage is higher. The diagram referred to is shown in the figure above. It is now possible to easily identify the issue when the energy-handling capability is specified with the help of the line discharge class.

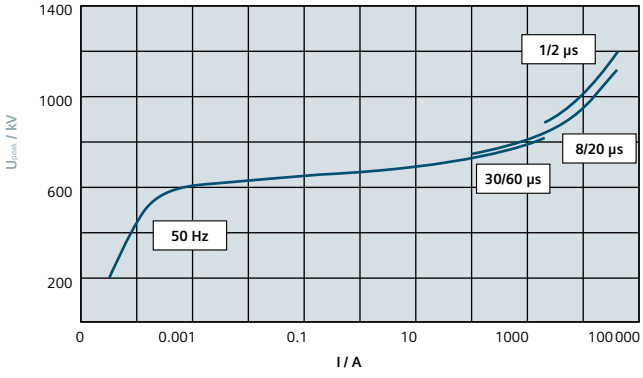
## Step 4: Selection of protective levels

The protective characteristics of an arrester are most frequently assessed by means of its lightning impulse protective level: It is assessed according to its residual voltage while the nominal discharge current is flowing. This usually means that a protective level equaling the standard lightning impulse withstand voltage of the device to be protected and divided by a factor of 1.4 is adequate for protection against lightning overvoltages.

$U_{pl}$, 10kA, 8/20µs < BIL / 1.4

The selection of the electrical characteristics of the arrester is finished when the requirements regarding the protective levels of all mentioned current impulse stresses are fulfilled.

Example U-I-curve 550 kV network




## Step 5: Selection of the housing

Dielectric and mechanical requirements are generally taken into account when selecting the housing. The length, the creepage distance, and the material must be determined. The arrester characteristics determined by the housing are the rated short-circuit current $I_s$, the specified long-term load, SLL, and the specified short-term load, SSL.

The minimal housing length first of all results from the demand that the MOV column (the active part) must fit. The length of this column is determined by the electrical data that were gathered during the selection steps taken up to that point. Generally speaking, further demands cause the housing lengths to be much greater than those of the active parts.

First of all, the clearance, which results from the withstand voltage requirements, must be determined. Siemens takes care of the parameters »demand by MOV column« and »clearance« by stating the minimum required housing length.

Creepage distance requirements are, however, a much more frequent reason for longer housings. The shortest possible housing as a result of the length of the active part can normally be achieved only by designing for specific creepage distances of up to 20 mm/kV. However, specific creepage distances of 25 mm/kV and 31 mm/kV play an important role. In addition, there are environmental conditions, such as maritime and desert climates as well as heavy industrial pollution, that require the use of even longer creepage distance.

After the housing parameters have been determined in order to fulfill the electrical requirements, the next and last steps focus on mechanical criteria. They indirectly lead to the selection of housing material and housing diameter. There often is only a vague idea as to the mechanical stress of an arrester in service, and accordingly no requirements are made or – maybe even worse – values are estimated too high. If there is no information available about the actual requirements, the following values can serve as a guideline for the necessary static head loads in high-voltage systems:

| Highest system voltage $U_s$ (kV) | SLL (N) |
|---|---|
| < 123 | 350 |
| 123 ... 420 | 400 |
| 550 | 600 |
| 800 | 800 |

## Glossary

**Continuous operating voltage (symbol $U_c$)**

indicates the designated permissible root mean square value of the power frequency voltage that is allowed to be applied continuously between the arrester terminals.

**Creepage (distance)**

defines the distance between the metal end fittings, measured along the housing surface. It is an important factor in the behavior of an insulator – or a device containing an insulator – in polluted conditions.

**Highest voltage of a system (symbol $U_s$)**

indicates the root mean square value of the highest phase-to-phase operating voltage that occurs under normal operating conditions at any time and at any point in the system.

**Nominal discharge current (symbol $I_n$)**

indicates the peak value of a lightning current impulse used to classify an arrester.

**Protective level**

is the maximum value of an arrester's residual voltage at a standard current impulse. In this case, there is a difference between the lightning impulse protective level (8/20 µs), the switching impulse protective level (30/60 µs), and the steep current impulse (1/2µs) protective level.

**Rated short-circuit current (symbol $I_s$)**

indicates the root mean square value of the symmetrical highest short-circuit current that can flow after an arrester has been overloaded without causing violent shattering of the housing.

**Rated voltage (symbol $U_r$)**

is the maximum permissible root mean square value of the power frequency voltage between the arrester terminals at which the arrester is designed to operate correctly under temporary overvoltage conditions as established in the operating duty tests. Normally, the manufacturer specifies whether it can be applied to the arrester for a duration of 10 seconds (which corresponds to the value in the operating duty test) or 100 seconds. The rated voltage is the reference parameter for determining the operating characteristics.

**Residual voltage**

quantifies the voltage drop between the arrester's terminals when a current impulse is injected. For current impulses in the shape and value of a standard test current impulse (lightning current impulse, switching current impulse, steep current impulse), the simultaneously occurring residual voltages define the protective levels that are assigned to this current shape and value.

**Specific creepage distance (SCD)**

is the creepage distance of an insulator in relation to the highest voltage for the equipment, $U_s$ (phase-to-phase voltage), given in mm/kV.

**Specified long-term load (SLL)**

is a force perpendicular to the longitudinal axis of an arrester and allowed to be applied during service for long periods without causing any mechanical damage to the arrester.

**Specified short-term load (SSL)**

is a force perpendicular to the longitudinal axis of an arrester and allowed to be applied during service for short periods and for relatively rare events (for example, short-circuit current loads, very high wind loads, and seismic loads) without causing any mechanical damage to the arrester.

**Temporary overvoltage (TOV)**

denominates the power frequency overvoltage that can occur for a duration of several tenths of a second to up to a few seconds, as a result of a switching operation or system failure. Its value depends on the type of neutral earthing in the system.

# Applications as line surge arresters

The use of surge arresters on hazardous stretches of a power line helps improve network protection and increases the reliability of the entire transmission system.

Offering a highly efficient combination of low weight, outstanding strength, and safety features, Siemens 3EL surge arresters are ideally suited for this purpose.

400 kV line in Bulgaria
NGLA solution realized with 3EL2

550 kV line in Colombia
NGLA solution realized with 3EL2

## Siemens provides two solutions for line surge arresters:

### Non-gapped line arresters (NGLA)

Non-gapped line surge arresters offer a high degree of mounting flexibility and operational reliability. Depending on the tower design and the arrangement of insulators and lines, these arresters can either be installed directly on the insulators or on the tower. Thanks to their high energy absorption capacity, non-gapped line arresters ensure a very high level of protection against overvoltages caused by lightning and network-generated switching impulse currents.

Siemens 3EL1, 3EL2, 3EL3, 3EL5 surge arresters are available as NGLA types.

### Externally gapped line arresters (EGLA)

Siemens EGLA line surge arresters of the 3EV1, 3EV2, and 3EV5 series have an external spark gap placed in series that galvanically isolates the active part of the line surge arrester from the line voltage under normal conditions. In case of lightning, the spark gap is ignited and the dangerous overvoltage is safely discharged through the resulting arc. The active component limits the subsequent current to ensure that the arc is extinguished within the first half-cycle of the operating current frequency.

The series varistor units (SVU) of the EGLA 3EV1, 3EV2, and 3EV5 product lines are based on the respective 3EL1, 3EL2, and 3EL5 product lines.

Refer to the brochure »Line surge arresters for increased system reliability« for a detailed overview of Siemens' solutions for line surge arresters.

# Early detection of relevant changes through efficient equipment monitoring

Due to continuously growing worldwide power demand, more and more power networks are required to transmit higher loads – sometimes up to the limits of their capacity. This makes reliable, responsible network operation an increasingly difficult challenge. In many of today's markets, transmission and distribution system operators are also liable for compensation in the case of power failures. And natural events like lightning can cripple entire networks. As a result, many network operators are seeking solutions to increase the reliability of their transmission systems. Equipment monitoring is a proven method for the recording of operating states and remaining service life, providing the operator with important asset management data and enabling the immediate assessment of a network's overall state.

Surge arresters are highly reliable components in power transmission and distribution systems. When operated in accordance with their specifications, their service life can reach up to 30 years without any maintenance. Nevertheless, overloads that can cause arrester failure and even endanger the safety of the network may sometimes occur. Equipment monitoring helps detect changes and faults at the earliest possible stage and supports security of supply on a whole new level. Siemens provides a complete line of monitoring devices with a variety of innovative functionalities that can be perfectly matched to customer requirements, ensuring that impending faults will be detected as early as possible and before security of supply is compromised.

## Order code system

| Data position | 1 | 2 | 3 | 4 | 5 | 6 | 7 | – | 8 | 9 | 10 | 11 | 12 | | 13 | 14 | 15 | 16 | – | Z |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Order code | n | a | a | n | n | n | n | – | n | a | a | n | n | – | n | a | a | n | – | Z |
| Product line | 3 | E | L | 2 | | | | | | | | | | | | | | | | |
| Rated voltage (kV) | | | | | 0 | 9 | 6 | | | | | | | | | | | | | |
| Long duration current impulse, energy absorption capability | | | | | | | | | 2 | | | | | | | | | | | |
| Application | | | | | | | | | | P | | | | | | | | | | |
| Housing size | | | | | | | | | | | J | | | | | | | | | |
| Line discharge class | | | | | | | | | | | | 3 | | | | | | | | |
| Number of units | | | | | | | | | | | | | 1 | | | | | | | |
| Form of sheds and color of housing | | | | | | | | | | | | | | | 4 | | | | | |
| High-voltage terminal | | | | | | | | | | | | | | | | X | | | | |
| Nameplate | | | | | | | | | | | | | | | | | A | | | |
| Mounting | | | | | | | | | | | | | | | | | | 1 | | |
| Accessories | | | | | | | | | | | | | | | | | | | | |

a: alphabetical
n: numerical

## Ordering example

The order code can be obtained through the following steps:

1. Select the product line from table »Main technical data« on page 26.
   Example: product line 3EL2
2. Select the rated voltage and required energy rating of the arrester using the »Ratings and specifications – Electrical Characteristics« in the technical datasheet of the selected product line.
   Example: 3EL2 096-2P.3.-...
3. Select the required housing using the »Ratings and specifications – mechanical characteristics« in the technical datasheet of the selected product line.
   Example: for 3EL2 096-2P.3.-.... the minimum housing is »J«: + 3EL2 ...-..J..., resulting in: 3EL2 096-2PJ31-...
4. Select the required terminal, nameplate, and mounting from the table »Order numbers«
   Example: 3EL2 096-2PJ31-4XA1.
   (4 = upright mounting, X = DIN/NEMA flat terminal, A = English nameplate, 1 = insulated mounting, D = 200mm)
5. Select optional accessories from table »Optional accessories« on page 110
   Example: D91 line clamp, resulting in 3EL2 096-2PJ31-4XA1-Z D91
6. Select optional monitoring device from table »Monitoring devices« on page 111.
   Example: 3EX5 080-0 ACM basic

# Product range

Siemens offers multiple models of each surge arrester product family. The models mainly differ in diameter, length of the housings, and sizes of the MOV blocks to meet different customer requirements.

The following selection table shows the main technical data of the different product lines. Detailed technical data is listed in the sections for each dedicated product line.

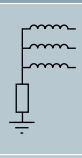
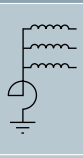
For additional specifications, please contact your local Siemens representative.

| Maximum values | | | | 3EL5 | 3EL1 | 3EL2 | 3EL3 | 3EP5 | 3EP4 | 3EP6 | 3EP3 | 3EQ1 | 3EQ4 | 3EQ3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Highest voltage of the system | | | kV | 72.5 | 252 | 420 | 550 | 123 | 362 | 800 | 800 | 362 | 800 | 800 |
| Maximum rated voltage | | | kV | 60 | 198 | 360 | 444 | 96 | 288 | 588 | 624 | 288 | 588 | 624 |
| Nominal discharge current kA | Line discharge class | Energy absorption capability $kJ/kV_r$ | Long duration current impulse A | | | | | | | | | | | |
| 10 | 2 | 4.4 | 550 | ■ | | | | | | | | | | |
| 10 | 2 | 5.0 | 750 | | ■ | | | ■ | ■ | | | ■ | | |
| 10 | 3 | 6.0 | 800 | | ■ | | | | | | | | | |
| 10 | 2 | 5.0 | 1100 | | | ■ | | ■ | ■ | | | ■ | | |
| 10 | 3 | 8.0 | 1100 | | | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | |
| 10 | 3 | 8.0 | 1200 | | | ■ | | | | | | | | |
| 20 | 4 | 10.0 | 1200 | | | ■ | | | | | | | | |
| 20 | 4 | 10.0 | 1600 | | | | ■ | | | ■ | ■ | | ■ | ■ |
| 20 | 5 | 14.0 | 2000 | | | | ■ | | | ■ | ■ | | ■ | ■ |
| 20 | 5 | 16.0 | 3200 | | | | | | | | ■ | | ■ | ■ |
| Rated short-circuit current | | | kA | 20 | 65 | 65 | 65 | 40 | 65 | 65 | 65 | 40 | 65[1] | 80 |
| High current impulse | | | kA | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Bending moment dynamic | | | kNm | 0.5 | 1.2 | 4.0 | 10.0 | 2.0 | 4.5 | 18/30[2] | 34/90[2] | 6.0 | 21/38[2] | 42/72[2] |

Main technical data

[1] Increased rated short-circuit current of 80 kA available on request. [2] Increased bending moment

The table below shows an overview of the typical minimum rated voltage for the surge arrester, depending on the highest voltage and grounding of the system.

| Highest voltage of system $U_s$ kV | Solidly earthed neutral system $U_r$ kV | Isolated neutral system $U_r$ kV | Impedance earthed neutral system $U_r$ kV | Resonant earthed neutral system $U_r$ kV | Neutral protection $U_r$ kV |
|---|---|---|---|---|---|
| | | |  |  | |
| 3.6 | 3 | 6 | 3 | 6 | 3 |
| 7.2 | 6 | 9 | 9 | 9 | 3 |
| 12 | 9 | 15 | 12 | 15 | 6 |
| 17.5 | 15 | 24 | 15 | 24 | 9 |
| 24 | 18 | 30 | 21 | 30 | 12 |
| 36 | 27 | 45 | 33 | 45 | 15 |
| 52 | 39 | 66 | 45 | 66 | 21 |
| 72.5 | 54 | 96 | 66 | 96 | 30 |
| 123 | 90 | 154 | 108 | 154 | 51 |
| 145 | 108 | 183 | 126 | 183 | 60 |
| 170 | 123 | 216 | 147 | 216 | 69 |
| 245 | 180 | | | | 102 |
| 300 | 222 | | | | 120 |
| 362 | 261 | | | | 147 |
| 420 | 336 | | | | 168 |
| 550 | 396 | | | | 222 |
| 800 | 580 | | | | 321 |

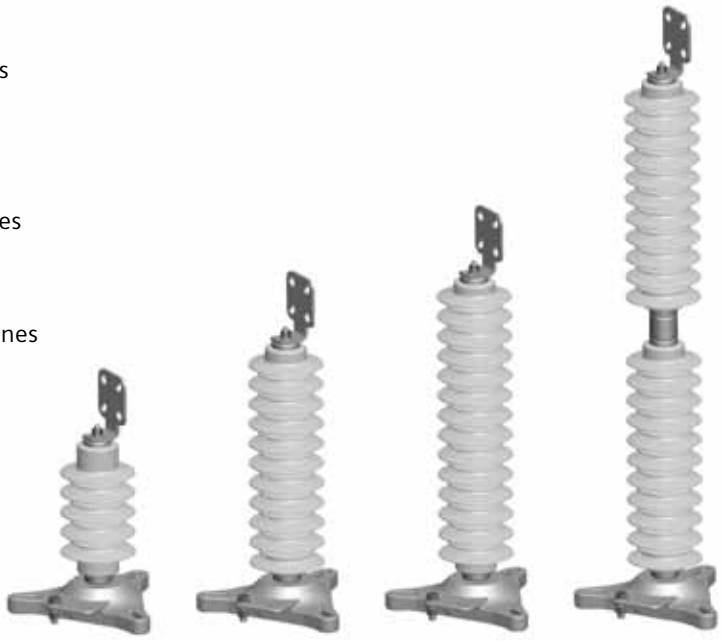
Typical rated voltages $U_r$ for highest voltages of the system $U_s$ according to IEC 60099-4.

# 3EL5 Surge arrester with silicone rubber housing and Cage Design™

## Technical datasheet

### Protection of:

- Transformers
- Circuit breakers
- Generators
- Motors
- Capacitors
- Traction vehicles
- Bushings
- Switchgear
- Transmission lines



| Maximum values | | 3EL5 |
|---|---|---|
| Highest voltage of the system | kV | 72.5 |
| Maximum rated voltage | kV | 60 |
| Nominal discharge current | kA | 10 |
| Line discharge class | | 2 |
| Energy absorption capability | $kJ/kV_r$ | 4.4 |
| Long duration current impulse | A | 550 |
| Rated short-circuit current | kA | 20 |
| High current impulse | kA | 100 |
| Bending moment dynamic | kNm | 0.5 |

## 3EL5 – order numbers

| Data position | 1 | 2 | 3 | 4 | – | 5 | 6 | 7 | – | 8 | 9 | 10 | 11 | 12 | – | 13 | 14 | 15 | 16 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Order number** | **3** | **E** | **L** | **5** | | **x** | **x** | **x** | | **0** | **P** | **H** | **2** | **1** | | **4** | **X** | **A** | **1** | **–** | **Z** |
| **Product line** | | | | | | | | | | | | | | | | | | | | | |
| Silicone rubber-housed surge arrester, cage design | 3 | E | L | 5 | | | | | | | | | | | | | | | | | |
| **Rated voltage in kV** | | | | | | x | x | x | | | | | | | | | | | | | |
| **Long duration current impulse, energy absorption capability** | | | | | | | | | | | | | | | | | | | | | |
| $I_{2ms}$ = 550 A, $E_{th}$ = 4.4 kJ/$kV_r$, line discharge class 2 | | | | | | | | | | 0 | | | 2 | | | | | | | | |
| **Application** | | | | | | | | | | | | | | | | | | | | | |
| Line surge arrester (For more details refer to catalog Line Surge Arresters) | | | | | | | | | | | L | | | | | | | | | | |
| Phase surge arrester | | | | | | | | | | | P | | | | | | | | | | |
| Neutral point surge arrester | | | | | | | | | | | S | | | | | | | | | | |
| **Housing size, number of units. Refer to »Mechanical characteristics« on page 31** | | | | | | | | | | | | | | | | | | | | | |
| Housing »B«, 1 unit | | | | | | | | | | | | B | | 1 | | | | | | | |
| Housing »C«, 1 unit | | | | | | | | | | | | C | | 1 | | | | | | | |
| Housing »D«, 1 unit | | | | | | | | | | | | D | | 1 | | | | | | | |
| Housing »E«, 1 unit | | | | | | | | | | | | E | | 1 | | | | | | | |
| Housing »F«, 1 unit | | | | | | | | | | | | F | | 1 | | | | | | | |
| Housing »H«, 1 unit | | | | | | | | | | | | H | | 1 | | | | | | | |
| Housing »J«, 1 unit | | | | | | | | | | | | J | | 1 | | | | | | | |
| Housing »K«, 1 unit | | | | | | | | | | | | K | | 1 | | | | | | | |
| Housing »2xH«, 2 units | | | | | | | | | | | | H | | 2 | | | | | | | |
| **Form of sheds and color of silicone rubber** | | | | | | | | | | | | | | | | | | | | | |
| Alternating sheds, gray silicone rubber, upright mounting | | | | | | | | | | | | | | | | 4 | | | | | |
| Alternating sheds, gray silicone rubber, suspended mounting | | | | | | | | | | | | | | | | 8 | | | | | |
| **High-voltage terminal** | | | | | | | | | | | | | | | | | | | | | |
| Flat DIN/NEMA, 40x40 ... 50x50, hot dip galvanized steel | | | | | | | | | | | | | | | | | X | | | | |
| Flat DIN/NEMA, 40x40 ... 50x50, stainless steel | | | | | | | | | | | | | | | | | Y | | | | |
| **Nameplate** | | | | | | | | | | | | | | | | | | | | | |
| German/English (standard) | | | | | | | | | | | | | | | | | | A | | | |
| French | | | | | | | | | | | | | | | | | | B | | | |
| Czech | | | | | | | | | | | | | | | | | | C | | | |
| Slovene | | | | | | | | | | | | | | | | | | D | | | |
| Russian | | | | | | | | | | | | | | | | | | E | | | |
| Spanish | | | | | | | | | | | | | | | | | | F | | | |
| Portuguese | | | | | | | | | | | | | | | | | | G | | | |
| Arabic | | | | | | | | | | | | | | | | | | R | | | |
| Brazil | | | | | | | | | | | | | | | | | | T | | | |
| CFE (Mexico) | | | | | | | | | | | | | | | | | | U | | | |
| Customized version | | | | | | | | | | | | | | | | | | Z | | | |
| **Mounting** | | | | | | | | | | | | | | | | | | | | | |
| D=200 mm–254 mm, insulated, stainless steel | | | | | | | | | | | | | | | | | | | 1 | | |
| D=200 mm–254 mm, grounded, stainless steel | | | | | | | | | | | | | | | | | | | 5 | | |
| **Accessories** | | | | | | | | | | | | | | | | | | | | | |
| Refer to table »Optional accessories« on page 110 | | | | | | | | | | | | | | | | | | | | – | Z |

# Ratings and specifications

## Electrical characteristics – phase arresters

| Highest voltage of the system | Rated voltage | Continuous operating voltage | Line discharge class | Long duration current 2ms | Maximum values of the residual voltages at discharge currents of the following impulses | | | | | | | Arrester type | Minimum housing size |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $U_s$ kV | $U_r$ kV | $U_c$ kV | LD Class | A | 30/60 µs 0.5 kA kV | 30/60 µs 1 kA kV | 30/60 µs 2 kA kV | 8/20 µs 5 kA kV | 8/20 µs 10 kA kV | 8/20 µs 20 kA kV | 8/20 µs 40 kA kV | | |
| 3.6 | 3 | 2.4 | 2 | 550 | 6.6 | 6.8 | 7.2 | 8.0 | 8.6 | 9.8 | 11.4 | 3EL5 003 - 0 P . 2 . - .... | B |
| | 6 | 4.8 | 2 | 550 | 13.2 | 13.7 | 14.4 | 15.9 | 17.1 | 19.7 | 22.7 | 3EL5 006 - 0 P . 2 . - .... | B |
| 7.2 | 6 | 4.8 | 2 | 550 | 13.2 | 13.7 | 14.4 | 15.9 | 17.1 | 19.7 | 22.7 | 3EL5 006 - 0 P . 2 . - .... | B |
| | 9 | 7.2 | 2 | 550 | 19.8 | 20.5 | 21.5 | 23.9 | 25.7 | 29.5 | 34.1 | 3EL5 009 - 0 P . 2 . - .... | C |
| 12 | 9 | 7.2 | 2 | 550 | 19.8 | 20.5 | 21.5 | 23.9 | 25.7 | 29.5 | 34.1 | 3EL5 009 - 0 P . 2 . - .... | C |
| | 12 | 9.6 | 2 | 550 | 26.3 | 27.4 | 28.7 | 31.8 | 34.2 | 39.3 | 45.5 | 3EL5 012 - 0 P . 2 . - .... | D |
| 17.5 | 15 | 12.0 | 2 | 550 | 32.9 | 34.2 | 35.9 | 39.8 | 42.8 | 49.2 | 56.9 | 3EL5 015 - 0 P . 2 . - .... | D |
| | 18 | 14.4 | 2 | 550 | 39.5 | 41.0 | 43.1 | 47.7 | 51.3 | 59.0 | 68.2 | 3EL5 018 - 0 P . 2 . - .... | E |
| 24 | 18 | 14.4 | 2 | 550 | 39.5 | 41.0 | 43.1 | 47.7 | 51.3 | 59.0 | 68.2 | 3EL5 018 - 0 P . 2 . - .... | E |
| | 21 | 16.8 | 2 | 550 | 46.1 | 47.9 | 50.3 | 55.7 | 59.9 | 68.8 | 79.6 | 3EL5 021 - 0 P . 2 . - .... | F |
| | 24 | 19.2 | 2 | 550 | 52.7 | 54.7 | 57.5 | 63.6 | 68.4 | 78.7 | 91.0 | 3EL5 024 - 0 P . 2 . - .... | H |
| | 30 | 24 | 2 | 550 | 65.8 | 68.4 | 71.8 | 79.5 | 85.5 | 98.3 | 114 | 3EL5 030 - 0 P . 2 . - .... | H |
| 36 | 27 | 21.6 | 2 | 550 | 59.3 | 61.6 | 64.6 | 71.6 | 77.0 | 88.5 | 102 | 3EL5 027 - 0 P . 2 . - .... | H |
| | 30 | 24.0 | 2 | 550 | 65.8 | 68.4 | 71.8 | 79.5 | 85.5 | 98.3 | 114 | 3EL5 030 - 0 P . 2 . - .... | H |
| | 33 | 26.4 | 2 | 550 | 72.4 | 75.2 | 79.0 | 87.5 | 94.1 | 108 | 125 | 3EL5 033 - 0 P . 2 . - .... | H |
| | 45 | 36 | 2 | 550 | 98.8 | 103 | 108 | 119 | 128 | 147 | 171 | 3EL5 045 - 0 P . 2 . - .... | K |
| 48 | 36 | 28.8 | 2 | 550 | 79.0 | 82.1 | 86.2 | 95.4 | 103 | 118 | 136 | 3EL5 036 - 0 P . 2 . - .... | J |
| | 39 | 31.2 | 2 | 550 | 85.6 | 88.9 | 93.4 | 103 | 111 | 128 | 148 | 3EL5 039 - 0 P . 2 . - .... | J |
| 52 | 42 | 34 | 2 | 550 | 92.2 | 95.8 | 101 | 111 | 120 | 138 | 159 | 3EL5 042 - 0 P . 2 . - .... | J |
| | 45 | 36 | 2 | 550 | 98.8 | 103 | 108 | 119 | 128 | 147 | 171 | 3EL5 045 - 0 P . 2 . - .... | K |
| | 48 | 38 | 2 | 550 | 105 | 109 | 115 | 127 | 137 | 157 | 182 | 3EL5 048 - 0 P . 2 . - .... | 2xH |
| | 51 | 41 | 2 | 550 | 112 | 116 | 122 | 135 | 145 | 167 | 193 | 3EL5 051 - 0 P . 2 . - .... | 2xH |
| 72.5 | 54 | 43 | 2 | 550 | 119 | 123 | 129 | 143 | 154 | 177 | 205 | 3EL5 054 - 0 P . 2 . - .... | 2xH |
| | 57 | 46 | 2 | 550 | 125 | 130 | 136 | 151 | 162 | 187 | 216 | 3EL5 057 - 0 P . 2 . - .... | 2xH |
| | 60 | 48 | 2 | 550 | 132 | 137 | 144 | 159 | 171 | 197 | 227 | 3EL5 060 - 0 P . 2 . - .... | 2xH |

## Mechanical characteristics

| Housing size | Height [H] | Creepage distance | Housing insulation | | Specified short-term load SSL | Specified long-term load SLL | Grading ring diameter [D] | Maximum weight of arrester | Flashover distance | Arrester type | Figure |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Lightning impulse withstand voltage 1.2/50µs kV | Power frequency withstand voltage 1 min., wet kV | | | | | | | |
| | mm | mm | | | N | N | mm | kg | mm | | |
| B | 170 | 372 | 104 | 49 | 2940 | 2050 | - | 3.6 | 180 | 3EL5 ... - .. B . 1 - .... | A |
| C | 200 | 485 | 122 | 57 | 2500 | 1750 | - | 3.9 | 210 | 3EL5 ... - .. C . 1 - .... | A |
| D | 240 | 605 | 144 | 67 | 2080 | 1450 | - | 4.5 | 248 | 3EL5 ... - .. D . 1 - .... | A |
| E | 270 | 775 | 166 | 77 | 1850 | 1290 | - | 4.9 | 286 | 3EL5 ... - .. E . 1 - .... | A |
| F | 300 | 900 | 184 | 86 | 1660 | 1160 | - | 5.2 | 318 | 3EL5 ... - .. F . 1 - .... | A |
| H | 400 | 1230 | 242 | 113 | 1250 | 870 | - | 6.2 | 418 | 3EL5 ... - .. H . 1 - .... | A |
| J | 470 | 1420 | 281 | 131 | 1060 | 740 | - | 7.0 | 484 | 3EL5 ... - .. J . 1 - .... | A |
| K | 510 | 1595 | 302 | 140 | 980 | 680 | - | 7.4 | 520 | 3EL5 ... - .. K . 1 - .... | A |
| 2xH | 840 | 2460 | 484 | 226 | 590 | 410 | - | 10.2 | 836 | 3EL5 ... - .. H . 2 - .... | B |

The maximum arrester weight can vary depending on rated voltage and line discharge class.

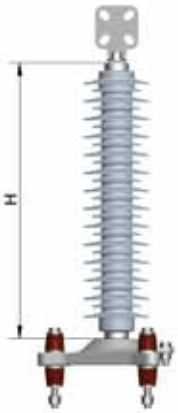



Figure A

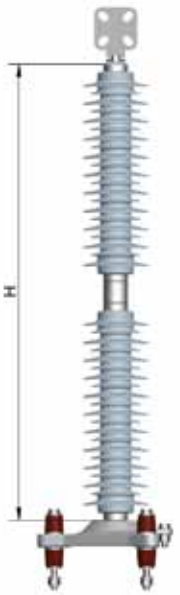
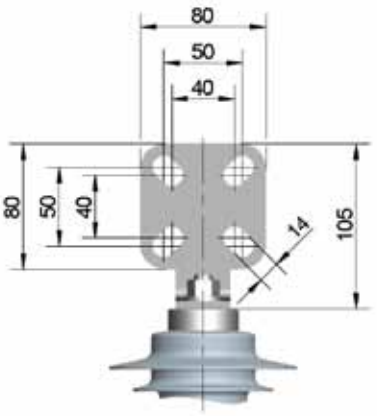



Figure B

## Line terminals

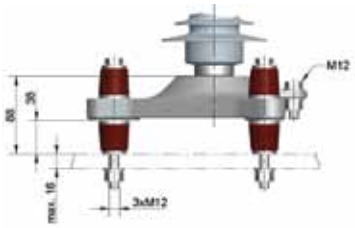


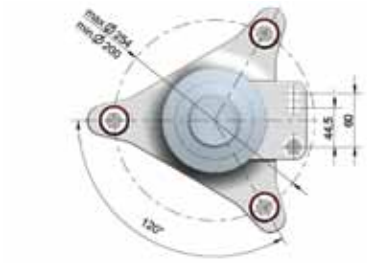

**DIN/NEMA flat terminal**

3EL5 ...-.....-.X.. (hot dip galvanized)

3EL5 ...-.....-.Y.. (stainless steel)

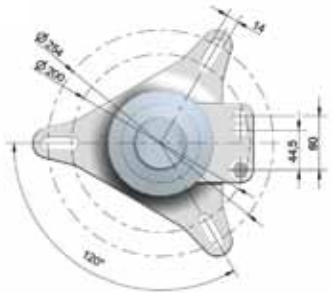
## Mounting






**Insulated**

3EL5 ...-.....-...1




**Grounded**

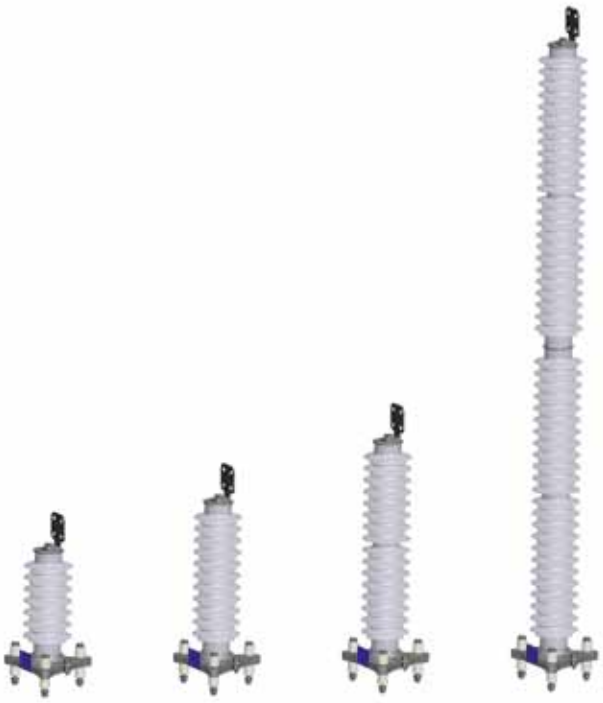
3EL5 ...-.....-...5

# 3EL1 Surge arrester with silicone rubber housing and Cage Design™

## Technical datasheet

### Protection of:

- Transformers
- Circuit breakers
- Generators
- Motors
- Capacitors
- Traction vehicles
- Bushings
- Switchgear
- Transmission lines



| Maximum values | | 3EL1 | 3EL1 |
|---|---|---|---|
| Highest voltage of the system | kV | 252 | 170 |
| Maximum rated voltage | kV | 198 | 156 |
| Nominal discharge current | kA | 10 | 10 |
| Line discharge class | | 2 | 3 |
| Energy absorption capability | $kJ/kV_r$ | 5.0 | 6.0 |
| Long duration current impulse | A | 750 | 800 |
| Rated short-circuit current | kA | 65 | 65 |
| High current impulse | kA | 100 | 100 |
| Bending moment dynamic | kNm | 1.2 | 1.2 |

# 3EL1 – order numbers

| Data position | 1 | 2 | 3 | 4 | – | 5 | 6 | 7 | – | 8 | 9 | 10 | 11 | 12 | – | 13 | 14 | 15 | 16 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Order number** | **3** | **E** | **L** | **1** | | **x** | **x** | **x** | | **1** | **P** | **H** | **2** | **1** | | **4** | **D** | **A** | **1** | **–** | **Z** | |
| **Product line** | | | | | | | | | | | | | | | | | | | | | | |
| Silicone rubber-housed surge arrester, cage design | 3 | E | L | 1 | | | | | | | | | | | | | | | | | | |
| **Rated voltage in kV** | | | | | | x | x | x | | | | | | | | | | | | | | |
| **Long duration current impulse, energy absorption capability** | | | | | | | | | | | | | | | | | | | | | | |
| $I_{2ms}$ = 750 A, $E_{th}$ = 5 kJ/$kV_r$, line discharge class 2 | | | | | | | | | | 1 | | | 2 | | | | | | | | | |
| $I_{2ms}$ = 800 A, $E_{th}$ = 6 kJ/$kV_r$, line discharge class 3 | | | | | | | | | | 1 | | | 3 | | | | | | | | | |
| **Application** | | | | | | | | | | | | | | | | | | | | | | |
| Line surge arrester (For more details refer to catalog Line Surge Arresters) | | | | | | | | | | | L | | | | | | | | | | | |
| Phase surge arrester | | | | | | | | | | | P | | | | | | | | | | | |
| Neutral point surge arrester | | | | | | | | | | | S | | | | | | | | | | | |
| **Housing size, number of units. Refer to »Mechanical characteristics« on page 37** | | | | | | | | | | | | | | | | | | | | | | |
| Housing »C«, 1 unit | | | | | | | | | | | | C | | 1 | | | | | | | | |
| Housing »E«, 1 unit | | | | | | | | | | | | E | | 1 | | | | | | | | |
| Housing »H«, 1 unit | | | | | | | | | | | | H | | 1 | | | | | | | | |
| Housing »K«, 1 unit | | | | | | | | | | | | K | | 1 | | | | | | | | |
| Housing »E+H«, 2 units | | | | | | | | | | | | N | | 2 | | | | | | | | |
| Housing »2xH«, 2 units | | | | | | | | | | | | H | | 2 | | | | | | | | |
| Housing »E+K«, 2 units | | | | | | | | | | | | P | | 2 | | | | | | | | |
| Housing »H+K«, 2 units | | | | | | | | | | | | Q | | 2 | | | | | | | | |
| Housing »2xK«, 2 units | | | | | | | | | | | | K | | 2 | | | | | | | | |
| **Form of sheds and color of silicone rubber** | | | | | | | | | | | | | | | | | | | | | | |
| Alternating sheds, gray silicone rubber, upright mounting | | | | | | | | | | | | | | | | 4 | | | | | | |
| Alternating sheds, gray silicone rubber, suspended mounting | | | | | | | | | | | | | | | | 8 | | | | | | |
| **High-voltage terminal** | | | | | | | | | | | | | | | | | | | | | | |
| Metal plate with M10 thread insert | | | | | | | | | | | | | | | | | A | | | | | |
| Bolt, 30 mm diameter, 80 mm length, stainless steel | | | | | | | | | | | | | | | | | D | | | | | |
| Bolt, 40 mm diameter, 80 mm length, stainless steel | | | | | | | | | | | | | | | | | G | | | | | |
| Bolt, 40 mm diameter, 120 mm length, stainless steel | | | | | | | | | | | | | | | | | J | | | | | |
| Flat DIN/NEMA, 40x40 ... 50x50, aluminum | | | | | | | | | | | | | | | | | T | | | | | |
| Flat DIN/NEMA, 40x40 ... 50x50, hot dip galvanized steel | | | | | | | | | | | | | | | | | X | | | | | |
| Flat DIN/NEMA, 40x40 ... 50x50, stainless steel | | | | | | | | | | | | | | | | | Y | | | | | |
| Bolt, 26 mm diameter, 100 mm length, stainless steel | | | | | | | | | | | | | | | | | Z | | | | | P1A |
| Bolt, 35 mm diameter, 120 mm length, stainless steel | | | | | | | | | | | | | | | | | Z | | | | | P1F |
| Flat, 4xD=16, aluminum | | | | | | | | | | | | | | | | | Z | | | | | P5A |
| Flat, 2xD=18/60, Palm 7, aluminum | | | | | | | | | | | | | | | | | Z | | | | | P5J |
| **Nameplate** | | | | | | | | | | | | | | | | | | | | | | |
| German/English (standard) | | | | | | | | | | | | | | | | | | A | | | | |
| French | | | | | | | | | | | | | | | | | | B | | | | |
| Czech | | | | | | | | | | | | | | | | | | C | | | | |
| Slovene | | | | | | | | | | | | | | | | | | D | | | | |
| Russian | | | | | | | | | | | | | | | | | | E | | | | |
| Spanish | | | | | | | | | | | | | | | | | | F | | | | |
| Portuguese | | | | | | | | | | | | | | | | | | G | | | | |
| Arabic | | | | | | | | | | | | | | | | | | R | | | | |
| Brazil | | | | | | | | | | | | | | | | | | T | | | | |
| CFE (Mexico) | | | | | | | | | | | | | | | | | | U | | | | |
| Customized version | | | | | | | | | | | | | | | | | | Z | | | | |
| **Mounting** | | | | | | | | | | | | | | | | | | | | | | |
| Metal plate with M10 thread insert | | | | | | | | | | | | | | | | | | | 0 | | | |
| D=200 mm–254 mm, insulated, stainless steel | | | | | | | | | | | | | | | | | | | 1 | | | |
| D=200 mm–254 mm, grounded, stainless steel | | | | | | | | | | | | | | | | | | | 5 | | | |
| **Accessories** | | | | | | | | | | | | | | | | | | | | | | |
| Refer to table »Optional accessories« on page 110 | | | | | | | | | | | | | | | | | | | | – | Z | |

# Ratings and specifications

**Electrical characteristics – phase arresters**

| Highest voltage of the system | Rated voltage | Continu-ous operating voltage | Line discharge class | Long duration current 2ms | Maximum values of the residual voltages at discharge currents of the following impulses | | | | | | | Arrester type | Mini-mum housing size |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $U_s$ kV | $U_r$ kV | $U_c$ kV | LD Class | A | 30/60 µs 0.5 kA kV | 30/60 µs 1 kA kV | 30/60 µs 2 kA kV | 8/20 µs 5 kA kV | 8/20 µs 10 kA kV | 8/20 µs 20 kA kV | 8/20 µs 40 kA kV | | |
| 3.6 | 3 | 2.4 | 2 | 750 | 5.9 | 6.1 | 6.4 | 7.1 | 7.7 | 8.6 | 9.8 | 3EL1 003 - 1 P . 2 . - .... | C |
| | 3 | 2.4 | 3 | 800 | 5.9 | 6.1 | 6.4 | 7.1 | 7.7 | 8.6 | 9.8 | 3EL1 003 - 1 P . 3 . - .... | C |
| | 6 | 4.8 | 2 | 750 | 11.8 | 12.2 | 12.9 | 14.2 | 15.3 | 17.1 | 19.6 | 3EL1 006 - 1 P . 2 . - .... | C |
| | 6 | 4.8 | 3 | 800 | 11.8 | 12.2 | 12.9 | 14.2 | 15.3 | 17.1 | 19.6 | 3EL1 006 - 1 P . 3 . - .... | C |
| 7.2 | 6 | 4.8 | 2 | 750 | 11.8 | 12.2 | 12.9 | 14.2 | 15.3 | 17.1 | 19.6 | 3EL1 006 - 1 P . 2 . - .... | C |
| | 6 | 4.8 | 3 | 800 | 11.8 | 12.2 | 12.9 | 14.2 | 15.3 | 17.1 | 19.6 | 3EL1 006 - 1 P . 3 . - .... | C |
| | 9 | 7.2 | 2 | 750 | 17.7 | 18.4 | 19.3 | 21.3 | 23.0 | 25.7 | 29.4 | 3EL1 009 - 1 P . 2 . - .... | C |
| | 9 | 7.2 | 3 | 800 | 17.7 | 18.4 | 19.3 | 21.3 | 23.0 | 25.7 | 29.4 | 3EL1 009 - 1 P . 3 . - .... | C |
| 12 | 9 | 7.2 | 2 | 750 | 17.7 | 18.4 | 19.3 | 21.3 | 23.0 | 25.7 | 29.4 | 3EL1 009 - 1 P . 2 . - .... | C |
| | 9 | 7.2 | 3 | 800 | 17.7 | 18.4 | 19.3 | 21.3 | 23.0 | 25.7 | 29.4 | 3EL1 009 - 1 P . 3 . - .... | C |
| | 12 | 9.6 | 2 | 750 | 23.6 | 24.5 | 25.7 | 28.5 | 30.6 | 34.3 | 39.2 | 3EL1 012 - 1 P . 2 . - .... | C |
| | 12 | 9.6 | 3 | 800 | 23.6 | 24.5 | 25.7 | 28.5 | 30.6 | 34.3 | 39.2 | 3EL1 012 - 1 P . 3 . - .... | C |
| 17.5 | 15 | 12.0 | 2 | 750 | 29.5 | 30.6 | 32.1 | 35.6 | 38.3 | 42.8 | 49.0 | 3EL1 015 - 1 P . 2 . - .... | C |
| | 15 | 12.0 | 3 | 800 | 29.5 | 30.6 | 32.1 | 35.6 | 38.3 | 42.8 | 49.0 | 3EL1 015 - 1 P . 3 . - .... | C |
| | 18 | 14.4 | 2 | 750 | 35.3 | 36.7 | 38.6 | 42.7 | 45.9 | 51.4 | 58.8 | 3EL1 018 - 1 P . 2 . - .... | C |
| | 18 | 14.4 | 3 | 800 | 35.3 | 36.7 | 38.6 | 42.7 | 45.9 | 51.4 | 58.8 | 3EL1 018 - 1 P . 3 . - .... | C |
| | 24 | 19.2 | 2 | 750 | 47.1 | 49.0 | 51.4 | 56.9 | 61.2 | 68.5 | 78.3 | 3EL1 024 - 1 P . 2 . - .... | C |
| | 24 | 19.2 | 3 | 800 | 47.1 | 49.0 | 51.4 | 56.9 | 61.2 | 68.5 | 78.3 | 3EL1 024 - 1 P . 3 . - .... | E |
| 24 | 21 | 16.8 | 2 | 750 | 41.2 | 42.8 | 45.0 | 49.8 | 53.6 | 60.0 | 68.5 | 3EL1 021 - 1 P . 2 . - .... | C |
| | 21 | 16.8 | 3 | 800 | 41.2 | 42.8 | 45.0 | 49.8 | 53.6 | 60.0 | 68.5 | 3EL1 021 - 1 P . 3 . - .... | C |
| | 24 | 19.2 | 2 | 750 | 47.1 | 49.0 | 51.4 | 56.9 | 61.2 | 68.5 | 78.3 | 3EL1 024 - 1 P . 2 . - .... | C |
| | 24 | 19.2 | 3 | 800 | 47.1 | 49.0 | 51.4 | 56.9 | 61.2 | 68.5 | 78.3 | 3EL1 024 - 1 P . 3 . - .... | E |
| | 30 | 24.0 | 2 | 750 | 58.9 | 61.2 | 64.3 | 71.1 | 76.5 | 85.7 | 97.9 | 3EL1 030 - 1 P . 2 . - .... | E |
| | 30 | 24.0 | 3 | 800 | 58.9 | 61.2 | 64.3 | 71.1 | 76.5 | 85.7 | 97.9 | 3EL1 030 - 1 P . 3 . - .... | E |
| 36 | 30 | 24.0 | 2 | 750 | 58.9 | 61.2 | 64.3 | 71.1 | 76.5 | 85.7 | 97.9 | 3EL1 030 - 1 P . 2 . - .... | E |
| | 30 | 24.0 | 3 | 800 | 58.9 | 61.2 | 64.3 | 71.1 | 76.5 | 85.7 | 97.9 | 3EL1 030 - 1 P . 3 . - .... | E |
| | 45 | 36 | 2 | 750 | 88.4 | 91.8 | 96.4 | 107 | 115 | 129 | 147 | 3EL1 045 - 1 P . 2 . - .... | E |
| | 45 | 36 | 3 | 800 | 88.4 | 91.8 | 96.4 | 107 | 115 | 129 | 147 | 3EL1 045 - 1 P . 3 . - .... | H |
| 52 | 42 | 34 | 2 | 750 | 82.5 | 85.7 | 90.0 | 99.6 | 107 | 120 | 137 | 3EL1 042 - 1 P . 2 . - .... | E |
| | 42 | 34 | 3 | 800 | 82.5 | 85.7 | 90.0 | 99.6 | 107 | 120 | 137 | 3EL1 042 - 1 P . 3 . - .... | E |
| | 45 | 36 | 2 | 750 | 88.4 | 91.8 | 96.4 | 107 | 115 | 129 | 147 | 3EL1 045 - 1 P . 2 . - .... | E |
| | 45 | 36 | 3 | 800 | 88.4 | 91.8 | 96.4 | 107 | 115 | 129 | 147 | 3EL1 045 - 1 P . 3 . - .... | H |
| 72.5 | 54 | 43 | 2 | 750 | 106 | 110 | 116 | 128 | 138 | 154 | 176 | 3EL1 054 - 1 P . 2 . - .... | H |
| | 54 | 43 | 3 | 800 | 106 | 110 | 116 | 128 | 138 | 154 | 176 | 3EL1 054 - 1 P . 3 . - .... | H |
| | 60 | 48 | 2 | 750 | 118 | 122 | 129 | 142 | 153 | 171 | 196 | 3EL1 060 - 1 P . 2 . - .... | H |
| | 60 | 48 | 3 | 800 | 118 | 122 | 129 | 142 | 153 | 171 | 196 | 3EL1 060 - 1 P . 3 . - .... | K |
| | 66 | 53 | 2 | 750 | 130 | 135 | 141 | 157 | 168 | 188 | 215 | 3EL1 066 - 1 P . 2 . - .... | H |
| | 66 | 53 | 3 | 800 | 130 | 135 | 141 | 157 | 168 | 188 | 215 | 3EL1 066 - 1 P . 3 . - .... | K |
| | 72 | 58 | 2 | 750 | 141 | 147 | 154 | 171 | 184 | 206 | 235 | 3EL1 072 - 1 P . 2 . - .... | H |
| | 72 | 58 | 3 | 800 | 141 | 147 | 154 | 171 | 184 | 206 | 235 | 3EL1 072 - 1 P . 3 . - .... | K |

# Ratings and specifications

| Electrical characteristics – phase arresters | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Highest voltage of the system | Rated voltage | Continuous operating voltage | Line discharge class | Long duration current 2ms | Maximum values of the residual voltages at discharge currents of the following impulses | | | | | | | Arrester type | Minimum housing size |
| $U_s$ kV | $U_r$ kV | $U_c$ kV | LD Class | A | 30/60 µs 0.5 kA kV | 30/60 µs 1 kA kV | 30/60 µs 2 kA kV | 8/20 µs 5 kA kV | 8/20 µs 10 kA kV | 8/20 µs 20 kA kV | 8/20 µs 40 kA kV | | |
| 123 | 96 | 77 | 2 | 750 | 188 | 196 | 206 | 228 | 245 | 274 | 313 | 3EL1 096 - 1 P . 2 . - .... | K |
| | 96 | 77 | 3 | 800 | 188 | 196 | 206 | 228 | 245 | 274 | 313 | 3EL1 096 - 1 P . 3 . - .... | N |
| | 102 | 82 | 2 | 750 | 200 | 208 | 218 | 242 | 260 | 291 | 333 | 3EL1 102 - 1 P . 2 . - .... | K |
| | 102 | 82 | 3 | 800 | 200 | 208 | 218 | 242 | 260 | 291 | 333 | 3EL1 102 - 1 P . 3 . - .... | 2xH |
| | 108 | 86 | 2 | 750 | 212 | 220 | 231 | 256 | 275 | 308 | 353 | 3EL1 108 - 1 P . 2 . - .... | K |
| | 108 | 86 | 3 | 800 | 212 | 220 | 231 | 256 | 275 | 308 | 353 | 3EL1 108 - 1 P . 3 . - .... | 2xH |
| | 154 | 123 | 2 | 750 | 302 | 314 | 330 | 365 | 393 | 440 | 503 | 3EL1 154 - 1 P . 2 . - .... | P |
| 145 | 120 | 96 | 2 | 750 | 236 | 245 | 257 | 285 | 306 | 343 | 392 | 3EL1 120 - 1 P . 2 . - .... | 2xH |
| | 120 | 96 | 3 | 800 | 236 | 245 | 257 | 285 | 306 | 343 | 392 | 3EL1 120 - 1 P . 3 . - .... | P |
| | 132 | 106 | 2 | 750 | 259 | 269 | 283 | 313 | 337 | 377 | 431 | 3EL1 132 - 1 P . 2 . - .... | 2xH |
| | 132 | 106 | 3 | 800 | 259 | 269 | 283 | 313 | 337 | 377 | 431 | 3EL1 132 - 1 P . 3 . - .... | P |
| | 144 | 115 | 2 | 750 | 283 | 294 | 308 | 341 | 367 | 411 | 470 | 3EL1 144 - 1 P . 2 . - .... | P |
| | 144 | 115 | 3 | 800 | 283 | 294 | 308 | 341 | 367 | 411 | 470 | 3EL1 144 - 1 P . 3 . - .... | Q |
| 170 | 138 | 110 | 2 | 750 | 271 | 282 | 296 | 327 | 352 | 394 | 450 | 3EL1 138 - 1 P . 2 . - .... | 2xH |
| | 138 | 110 | 3 | 800 | 271 | 282 | 296 | 327 | 352 | 394 | 450 | 3EL1 138 - 1 P . 3 . - .... | Q |
| | 144 | 115 | 2 | 750 | 283 | 294 | 308 | 341 | 367 | 411 | 470 | 3EL1 144 - 1 P . 2 . - .... | P |
| | 144 | 115 | 3 | 800 | 283 | 294 | 308 | 341 | 367 | 411 | 470 | 3EL1 144 - 1 P . 3 . - .... | Q |
| | 150 | 120 | 2 | 750 | 295 | 306 | 321 | 356 | 383 | 428 | 490 | 3EL1 150 - 1 P . 2 . - .... | P |
| | 150 | 120 | 3 | 800 | 295 | 306 | 321 | 356 | 383 | 428 | 490 | 3EL1 150 - 1 P . 3 . - .... | Q |
| 245 | 192 | 154 | 2 | 750 | 377 | 392 | 411 | 455 | 490 | 548 | 627 | 3EL1 192 - 1 P . 2 . - .... | 2xK |
| | 198 | 158 | 2 | 750 | 389 | 404 | 424 | 470 | 505 | 565 | 646 | 3EL1 198 - 1 P . 2 . - .... | 2xK |
| **Electrical characteristics – neutral ground arresters** | | | | | | | | | | | | | |
| 12 | 9 | 7.2 | 2 | 750 | 17.7 | 18.4 | 19.3 | 21.3 | 23.0 | 25.7 | 29.4 | 3EL1 009 - 1 S . 2 . - .... | C |
| | 9 | 7.2 | 3 | 800 | 17.7 | 18.4 | 19.3 | 21.3 | 23.0 | 25.7 | 29.4 | 3EL1 009 - 1 S . 3 . - .... | C |
| 24 | 12 | 9.6 | 2 | 750 | 23.6 | 24.5 | 25.7 | 28.5 | 30.6 | 34.3 | 39.2 | 3EL1 012 - 1 S . 2 . - .... | C |
| | 12 | 9.6 | 3 | 800 | 23.6 | 24.5 | 25.7 | 28.5 | 30.6 | 34.3 | 39.2 | 3EL1 012 - 1 S . 3 . - .... | C |
| 36 | 15 | 12.0 | 2 | 750 | 29.5 | 30.6 | 32.1 | 35.6 | 38.3 | 42.8 | 49.0 | 3EL1 015 - 1 S . 2 . - .... | C |
| | 15 | 12.0 | 3 | 800 | 29.5 | 30.6 | 32.1 | 35.6 | 38.3 | 42.8 | 49.0 | 3EL1 015 - 1 S . 3 . - .... | C |
| | 45 | 36 | 2 | 750 | 88.4 | 91.8 | 96.4 | 107 | 115 | 129 | 147 | 3EL1 045 - 1 S . 2 . - .... | E |
| | 45 | 36 | 3 | 800 | 88.4 | 91.8 | 96.4 | 107 | 115 | 129 | 147 | 3EL1 045 - 1 S . 3 . - .... | H |
| 72.5 | 30 | 24.0 | 2 | 750 | 58.9 | 61.2 | 64.3 | 71.1 | 76.5 | 85.7 | 97.9 | 3EL1 030 - 1 S . 2 . - .... | E |
| | 30 | 24.0 | 3 | 800 | 58.9 | 61.2 | 64.3 | 71.1 | 76.5 | 85.7 | 97.9 | 3EL1 030 - 1 S . 3 . - .... | E |
| | 45 | 36 | 2 | 750 | 88.4 | 91.8 | 96.4 | 107 | 115 | 129 | 147 | 3EL1 045 - 1 S . 2 . - .... | E |
| | 45 | 36 | 3 | 800 | 88.4 | 91.8 | 96.4 | 107 | 115 | 129 | 147 | 3EL1 045 - 1 S . 3 . - .... | H |
| 123 | 51 | 41 | 2 | 750 | 100 | 104 | 109 | 121 | 130 | 146 | 166 | 3EL1 051 - 1 S . 2 . - .... | H |
| | 51 | 41 | 3 | 800 | 100 | 104 | 109 | 121 | 130 | 146 | 166 | 3EL1 051 - 1 S . 3 . - .... | H |
| | 60 | 48 | 2 | 750 | 118 | 122 | 129 | 142 | 153 | 171 | 196 | 3EL1 060 - 1 S . 2 . - .... | H |
| | 60 | 48 | 3 | 800 | 118 | 122 | 129 | 142 | 153 | 171 | 196 | 3EL1 060 - 1 S . 3 . - .... | K |
| | 72 | 58 | 2 | 750 | 141 | 147 | 154 | 171 | 184 | 206 | 235 | 3EL1 072 - 1 S . 2 . - .... | H |
| | 72 | 58 | 3 | 800 | 141 | 147 | 154 | 171 | 184 | 206 | 235 | 3EL1 072 - 1 S . 3 . - .... | K |
| 245 | 102 | 82 | 2 | 750 | 200 | 208 | 218 | 242 | 260 | 291 | 333 | 3EL1 102 - 1 S . 2 . - .... | K |
| | 102 | 82 | 3 | 800 | 200 | 208 | 218 | 242 | 260 | 291 | 333 | 3EL1 102 - 1 S . 3 . - .... | 2xH |
| | 108 | 86 | 2 | 750 | 212 | 220 | 231 | 256 | 275 | 308 | 353 | 3EL1 108 - 1 S . 2 . - .... | K |
| | 108 | 86 | 3 | 800 | 212 | 220 | 231 | 256 | 275 | 308 | 353 | 3EL1 108 - 1 S . 3 . - .... | 2xH |

## Ratings and specifications

| Mechanical characteristics | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Housing size | Height [H] | Creepage distance | Housing insulation | | Specified short-term load SSL | Specified long-term load SLL | Grading ring diameter [D] | Maximum weight of arrester | Flashover distance | Arrester type | Figure |
| | | | Lightning impulse withstand voltage 1.2/50µs | Power frequency withstand voltage 1 min., wet | | | | | | | |
| | mm | mm | kV | kV | N | N | mm | kg | mm | | |
| C | 305 | 900 | 183 | 85 | 3930 | 2750 | - | 7.9 | 315 | 3EL1 ... - .. C . 1 - .... | A |
| E | 445 | 1400 | 264 | 123 | 2690 | 1880 | - | 10.0 | 455 | 3EL1 ... - .. E . 1 - .... | A |
| H | 620 | 2050 | 365 | 170 | 1930 | 1350 | - | 12.5 | 630 | 3EL1 ... - .. H . 1 - .... | A |
| K | 900 | 3075 | 528 | 246 | 1330 | 930 | - | 16.5 | 910 | 3EL1 ... - .. K . 1 - .... | A |
| N | 1070 | 3450 | 629 | 293 | 1120 | 780 | - | 19.7 | 1085 | 3EL1 ... - .. N . 2 - .... | B |
| 2xH | 1245 | 4100 | 731 | 340 | 960 | 670 | - | 22.1 | 1260 | 3EL1 ... - .. H . 2 - .... | B |
| P | 1350 | 4475 | 792 | 369 | 880 | 620 | - | 23.6 | 1365 | 3EL1 ... - .. P . 2 - .... | B |
| Q | 1525 | 5125 | 893 | 416 | 780 | 550 | - | 25.7 | 1540 | 3EL1 ... - .. Q . 2 - .... | B |
| 2xK | 1805 | 6150 | 1056 | 492 | 660 | 460 | - | 29.3 | 1820 | 3EL1 ... - .. K . 2 - .... | B |

The maximum arrester weight can vary depending on rated voltage and line discharge class.

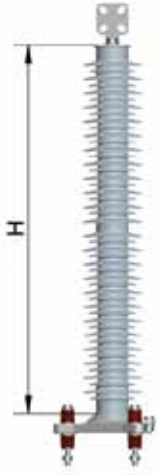



Figure A

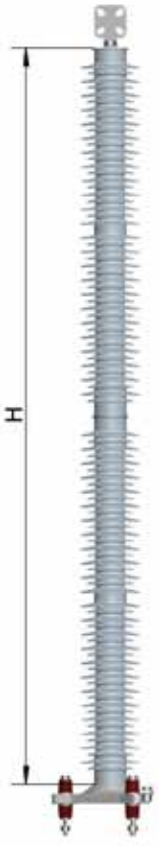
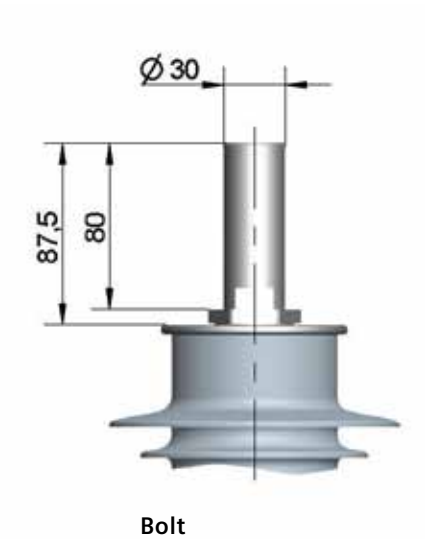


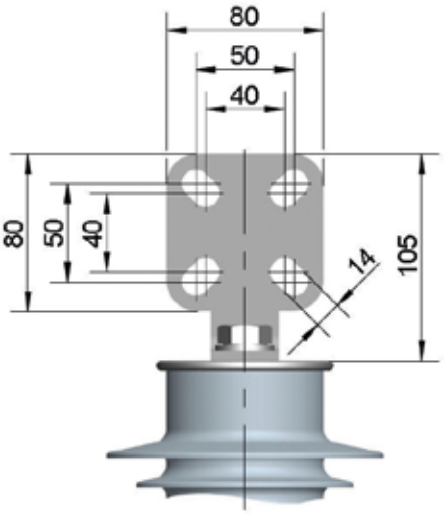

Figure B

## Line terminals




**Bolt**

3EL1 ...-.....-.D..



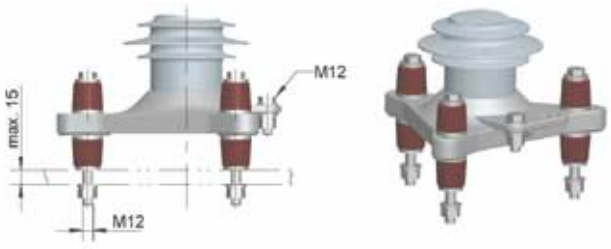

**DIN/NEMA flat terminal**

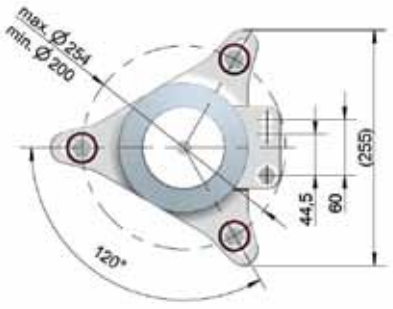
3EL1 ...-.....-.T.. (aluminum)

3EL1 ...-.....-.X.. (hot dip galvanized)

3EL1 ...-.....-.Y.. (stainless steel)

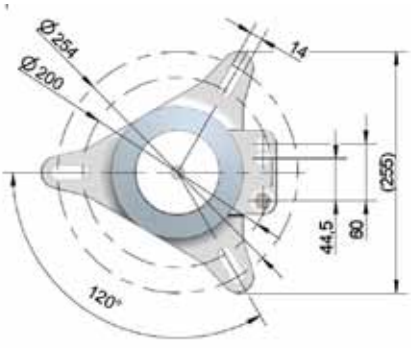
## Mounting




**Insulated**

3EL1 ...-.....-...1




**Grounded**

3EL1 ...-.....-...5

# 3EL2 Surge arrester with silicone rubber housing and Cage Design™

## Technical datasheet

### Protection of:

- Transformers
- Circuit breakers
- Generators
- Motors
- Capacitors
- Traction vehicles
- Bushings
- Switchgear
- Transmission lines

| Maximum values | | 3EL2 | 3EL2 | 3EL2 | 3EL2 |
|---|---|---|---|---|---|
| Highest voltage of the system | kV | 362 | 420 | 420 | 420 |
| Maximum rated voltage | kV | 288 | 360 | 360 | 360 |
| Nominal discharge current | kA | 10 | 10 | 20 | 20 |
| Line discharge class | | 2 | 3 | 3 | 4 |
| Energy absorption capability | $kJ/kV_r$ | 5.0 | 8.0 | 8.0 | 10.0 |
| Long duration current impulse | A | 1100 | 1100 | 1200 | 1200 |
| Rated short-circuit current | kA | 65 | 65 | 65 | 65 |
| High current impulse | kA | 100 | 100 | 100 | 100 |
| Bending moment dynamic | kNm | 4.0 | 4.0 | 4.0 | 4.0 |

# 3EL2 – order numbers

| Data position | 1 | 2 | 3 | 4 | – | 5 | 6 | 7 | – | 8 | 9 | 10 | 11 | 12 | – | 13 | 14 | 15 | 16 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Order number** | **3** | **E** | **L** | **2** | | **x** | **x** | **x** | | **2** | **P** | **J** | **3** | **1** | | **4** | **D** | **A** | **1** | **–** | **Z** | | |
| **Product line** | | | | | | | | | | | | | | | | | | | | | | | |
| Silicone rubber-housed surge arrester, cage design | 3 | E | L | 2 | | | | | | | | | | | | | | | | | | | |
| **Rated voltage in kV** | | | | | | x | x | x | | | | | | | | | | | | | | | |
| **Long duration current impulse, energy absorption capability** | | | | | | | | | | | | | | | | | | | | | | | |
| $I_{2ms}$ = 1100 A, $E_{th}$ = 5 kJ/$kV_r$, line discharge class 2 | | | | | | | | | | 2 | | | 2 | | | | | | | | | | |
| $I_{2ms}$ = 1100 A, $E_{th}$ = 8 kJ/$kV_r$, line discharge class 3 | | | | | | | | | | 2 | | | 3 | | | | | | | | | | |
| $I_{2ms}$ = 1200 A, $E_{th}$ = 8 kJ/$kV_r$, line discharge class 3 | | | | | | | | | | 6 | | | 3 | | | | | | | | | | |
| $I_{2ms}$ = 1200 A, $E_{th}$ = 10 kJ/$kV_r$, line discharge class 4 | | | | | | | | | | 6 | | | 4 | | | | | | | | | | |
| **Application** | | | | | | | | | | | | | | | | | | | | | | | |
| Line surge arrester (For more details refer to catalog Line Surge Arresters) | | | | | | | | | | | L | | | | | | | | | | | | |
| Phase surge arrester | | | | | | | | | | | P | | | | | | | | | | | | |
| Neutral point surge arrester | | | | | | | | | | | S | | | | | | | | | | | | |
| **Housing size, number of units. Refer to »Mechanical characteristics« on page 45** | | | | | | | | | | | | | | | | | | | | | | | |
| Housing »C«, 1 unit | | | | | | | | | | | | C | | 1 | | | | | | | | | |
| Housing »F«, 1 unit | | | | | | | | | | | | F | | 1 | | | | | | | | | |
| Housing »J«, 1 unit | | | | | | | | | | | | J | | 1 | | | | | | | | | |
| Housing »M«, 1 unit | | | | | | | | | | | | M | | 1 | | | | | | | | | |
| Housing »C+J«, 2 units | | | | | | | | | | | | P | | 2 | | | | | | | | | |
| Housing »F+J«, 2 units | | | | | | | | | | | | Q | | 2 | | | | | | | | | |
| Housing »F+M«, 2 units | | | | | | | | | | | | R | | 2 | | | | | | | | | |
| Housing »2xJ«, 2 units | | | | | | | | | | | | J | | 2 | | | | | | | | | |
| Housing »J+M«, 2 units | | | | | | | | | | | | W | | 2 | | | | | | | | | |
| Housing »2xM«, 2 units | | | | | | | | | | | | M | | 2 | | | | | | | | | |
| Housing »F+J+J«, 3 units | | | | | | | | | | | | X | | 3 | | | | | | | | | |
| Housing »3xJ«, 3 units | | | | | | | | | | | | J | | 3 | | | | | | | | | |
| **Form of sheds and color of silicone rubber** | | | | | | | | | | | | | | | | | | | | | | | |
| Alternating sheds, gray silicone rubber, upright mounting | | | | | | | | | | | | | | | | 4 | | | | | | | |
| Alternating sheds, gray silicone rubber, suspended mounting | | | | | | | | | | | | | | | | 8 | | | | | | | |
| **High-voltage terminal** | | | | | | | | | | | | | | | | | | | | | | | |
| Metal plate | | | | | | | | | | | | | | | | | A | | | | | | |
| Bolt, 30 mm diameter, 80 mm length, stainless steel | | | | | | | | | | | | | | | | | D | | | | | | |
| Bolt, 30 mm diameter, 100 mm length, stainless steel | | | | | | | | | | | | | | | | | E | | | | | | |
| Bolt, 40 mm diameter, 80 mm length, stainless steel | | | | | | | | | | | | | | | | | G | | | | | | |
| Bolt, 40 mm diameter, 120 mm length, stainless steel | | | | | | | | | | | | | | | | | J | | | | | | |
| Flat DIN/NEMA, 40x40 ... 50x50, 20 mm, hot dip galvanized steel | | | | | | | | | | | | | | | | | L | | | | | | |
| Flat DIN/NEMA, 40x40 ... 50x50, aluminum | | | | | | | | | | | | | | | | | T | | | | | | |
| Flat DIN/NEMA, 40x40 ... 50x50, hot dip galvanized steel | | | | | | | | | | | | | | | | | X | | | | | | |
| Flat DIN/NEMA, 40x40 ... 50x50, stainless steel | | | | | | | | | | | | | | | | | Y | | | | | | |
| Bolt, 26 mm diameter, 100 mm length, stainless steel | | | | | | | | | | | | | | | | | Z | | | | | | P1A |
| Bolt, 30 mm diameter, 80 mm length, aluminum | | | | | | | | | | | | | | | | | Z | | | | | | P1C |
| Bolt, 35 mm diameter, 120 mm length, stainless steel | | | | | | | | | | | | | | | | | Z | | | | | | P1F |
| Bolt, 38 mm diameter, 125 mm length, stainless steel | | | | | | | | | | | | | | | | | Z | | | | | | P1G |
| Bolt, 40 mm diameter, 80 mm length, aluminum | | | | | | | | | | | | | | | | | Z | | | | | | P1H |
| Bolt, 40 mm diameter, 125 mm length, aluminum | | | | | | | | | | | | | | | | | Z | | | | | | P1L |
| Bolt, 40 mm diameter, 150 mm length, aluminum | | | | | | | | | | | | | | | | | Z | | | | | | P1N |
| Bolt, 40 mm diameter, 80 mm length, copper | | | | | | | | | | | | | | | | | Z | | | | | | P1Q |
| Flat, 4xD=16, aluminum | | | | | | | | | | | | | | | | | Z | | | | | | P5A |
| Flat, 4xD=14/50, Palm 5, aluminum | | | | | | | | | | | | | | | | | Z | | | | | | P5G |
| Flat, 2xD=18/60, Palm 7, aluminum | | | | | | | | | | | | | | | | | Z | | | | | | P5J |
| Flat, 4xD=18/60, Palm 8, aluminum | | | | | | | | | | | | | | | | | Z | | | | | | P5K |
| Flat, 6xD=18/70, Palm 13, aluminum | | | | | | | | | | | | | | | | | Z | | | | | | P5P |
| Flat, 6xD=18 60/60, hot dip galvanized steel | | | | | | | | | | | | | | | | | Z | | | | | | P5S |

## 3EL2 – order numbers

| Data position | 1 | 2 | 3 | 4 | – | 5 | 6 | 7 | – | 8 | 9 | 10 | 11 | 12 | – | 13 | 14 | 15 | 16 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Order number** | **3** | **E** | **L** | **2** | | **x** | **x** | **x** | | **2** | **P** | **J** | **3** | **1** | | **4** | **D** | **A** | **1** | **–** | **Z** | | |
| **Nameplate** | | | | | | | | | | | | | | | | | | | | | | | |
| German/English (standard) | | | | | | | | | | | | | | | | | | A | | | | | |
| French | | | | | | | | | | | | | | | | | | B | | | | | |
| Czech | | | | | | | | | | | | | | | | | | C | | | | | |
| Slovene | | | | | | | | | | | | | | | | | | D | | | | | |
| Russian | | | | | | | | | | | | | | | | | | E | | | | | |
| Spanish | | | | | | | | | | | | | | | | | | F | | | | | |
| Portuguese | | | | | | | | | | | | | | | | | | G | | | | | |
| Arabic | | | | | | | | | | | | | | | | | | R | | | | | |
| Brazil | | | | | | | | | | | | | | | | | | T | | | | | |
| CFE (Mexico) | | | | | | | | | | | | | | | | | | U | | | | | |
| Customized version | | | | | | | | | | | | | | | | | | Z | | | | | |
| **Mounting** | | | | | | | | | | | | | | | | | | | | | | | |
| D=140 mm, grounded, stainless steel | | | | | | | | | | | | | | | | | | | 0 | | | | |
| D=200 mm–276 mm, insulated, stainless steel | | | | | | | | | | | | | | | | | | | 1 | | | | |
| 200 mm x 200 mm, insulated | | | | | | | | | | | | | | | | | | | 2 | | | | |
| 310 mm x 310 mm, insulated | | | | | | | | | | | | | | | | | | | 3 | | | | |
| D=200 mm–276 mm, grounded, stainless steel | | | | | | | | | | | | | | | | | | | 5 | | | | |
| 170 mm x 170 mm, insulated | | | | | | | | | | | | | | | | | | | 9 | | | | R1B |
| **Accessories** | | | | | | | | | | | | | | | | | | | | | | | |
| Refer to table »Optional accessories« on page 110 | | | | | | | | | | | | | | | | | | | | – | Z | | |

# Ratings and specifications

**Electrical characteristics – phase arresters**

| Highest voltage of the system | Rated voltage | Continuous operating voltage | Line discharge class | Long duration current 2ms | Maximum values of the residual voltages at discharge currents of the following impulses | | | | | | | Arrester type | Minimum housing size |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $U_s$ kV | $U_r$ kV | $U_c$ kV | LD Class | A | 30/60 µs 0.5 kA kV | 30/60 µs 1 kA kV | 30/60 µs 2 kA kV | 8/20 µs 5 kA kV | 8/20 µs 10 kA kV | 8/20 µs 20 kA kV | 8/20 µs 40 kA kV | | |
| 12 | 9 | 7.2 | 2 | 1100 | 16.2 | 16.6 | 17.4 | 19.0 | 20.3 | 22.5 | 25.5 | 3EL2 009 - 2 P . 2 . - .... | C |
| | 9 | 7.2 | 3 | 1100 | 16.9 | 17.3 | 18.2 | 19.9 | 21.2 | 23.5 | 26.6 | 3EL2 009 - 2 P . 3 . - .... | C |
| | 9 | 7.2 | 4 | 1200 | 17.5 | 17.9 | 18.8 | 20.3 | 21.6 | 23.8 | 25.9 | 3EL2 009 - 6 P . 4 . - .... | C |
| | 12 | 9.6 | 2 | 1100 | 21.6 | 22.1 | 23.2 | 25.4 | 27.0 | 30.0 | 34.0 | 3EL2 012 - 2 P . 2 . - .... | C |
| | 12 | 9.6 | 3 | 1100 | 22.6 | 23.1 | 24.3 | 26.5 | 28.2 | 31.3 | 35.5 | 3EL2 012 - 2 P . 3 . - .... | C |
| | 12 | 9.6 | 4 | 1200 | 23.3 | 23.9 | 25.1 | 27.1 | 28.8 | 31.7 | 34.6 | 3EL2 012 - 6 P . 4 . - .... | C |
| 17.5 | 15 | 12.0 | 2 | 1100 | 27.0 | 27.7 | 29.0 | 31.7 | 33.8 | 37.5 | 42.5 | 3EL2 015 - 2 P . 2 . - .... | C |
| | 15 | 12.0 | 3 | 1100 | 28.2 | 28.9 | 30.3 | 33.1 | 35.3 | 39.1 | 44.4 | 3EL2 015 - 2 P . 3 . - .... | C |
| | 15 | 12.0 | 4 | 1200 | 29.2 | 29.9 | 31.3 | 33.8 | 36.0 | 39.6 | 43.2 | 3EL2 015 - 6 P . 4 . - .... | C |
| | 18 | 14.4 | 2 | 1100 | 32.4 | 33.2 | 34.8 | 38.1 | 40.5 | 45.0 | 51.0 | 3EL2 018 - 2 P . 2 . - .... | C |
| | 18 | 14.4 | 3 | 1100 | 33.8 | 34.7 | 36.4 | 39.8 | 42.3 | 47.0 | 53.3 | 3EL2 018 - 2 P . 3 . - .... | C |
| | 18 | 14.4 | 4 | 1200 | 35.0 | 35.9 | 37.6 | 40.6 | 43.2 | 47.5 | 51.8 | 3EL2 018 - 6 P . 4 . - .... | C |
| | 24 | 19.2 | 2 | 1100 | 43.2 | 44.3 | 46.4 | 50.8 | 54.0 | 59.9 | 68.0 | 3EL2 024 - 2 P . 2 . - .... | C |
| | 24 | 19.2 | 3 | 1100 | 45.1 | 46.2 | 48.5 | 53.0 | 56.4 | 62.6 | 71.1 | 3EL2 024 - 2 P . 3 . - .... | C |
| | 24 | 19.2 | 4 | 1200 | 46.7 | 47.8 | 50.1 | 54.1 | 57.6 | 63.4 | 69.1 | 3EL2 024 - 6 P . 4 . - .... | C |
| 24 | 21 | 16.8 | 2 | 1100 | 37.8 | 38.7 | 40.6 | 44.4 | 47.3 | 52.4 | 59.5 | 3EL2 021 - 2 P . 2 . - .... | C |
| | 21 | 16.8 | 3 | 1100 | 39.5 | 40.5 | 42.4 | 46.4 | 49.4 | 54.8 | 62.2 | 3EL2 021 - 2 P . 3 . - .... | C |
| | 21 | 16.8 | 4 | 1200 | 40.8 | 41.8 | 43.8 | 47.4 | 50.4 | 55.4 | 60.5 | 3EL2 021 - 6 P . 4 . - .... | C |
| | 30 | 24.0 | 2 | 1100 | 54.0 | 55.4 | 58.1 | 63.5 | 67.5 | 74.9 | 85.1 | 3EL2 030 - 2 P . 2 . - .... | C |
| | 30 | 24.0 | 3 | 1100 | 56.4 | 57.8 | 60.6 | 66.3 | 70.5 | 78.3 | 88.8 | 3EL2 030 - 2 P . 3 . - .... | C |
| | 30 | 24.0 | 4 | 1200 | 58.3 | 59.8 | 62.6 | 67.7 | 72.0 | 79.2 | 86.4 | 3EL2 030 - 6 P . 4 . - .... | C |
| 36 | 30 | 24.0 | 2 | 1100 | 54.0 | 55.4 | 58.1 | 63.5 | 67.5 | 74.9 | 85.1 | 3EL2 030 - 2 P . 2 . - .... | C |
| | 30 | 24.0 | 3 | 1100 | 56.4 | 57.8 | 60.6 | 66.3 | 70.5 | 78.3 | 88.8 | 3EL2 030 - 2 P . 3 . - .... | C |
| | 30 | 24.0 | 4 | 1200 | 58.3 | 59.8 | 62.6 | 67.7 | 72.0 | 79.2 | 86.4 | 3EL2 030 - 6 P . 4 . - .... | C |
| | 45 | 36 | 2 | 1100 | 81.0 | 83.0 | 87.1 | 95.2 | 101 | 112 | 128 | 3EL2 045 - 2 P . 2 . - .... | C |
| | 45 | 36 | 3 | 1100 | 84.6 | 86.7 | 90.9 | 99.4 | 106 | 117 | 133 | 3EL2 045 - 2 P . 3 . - .... | F |
| | 45 | 36 | 4 | 1200 | 87.5 | 89.6 | 94.0 | 102 | 108 | 119 | 130 | 3EL2 045 - 6 P . 4 . - .... | F |
| 52 | 42 | 34 | 3 | 1100 | 79.0 | 80.9 | 84.9 | 92.8 | 98.7 | 110 | 124 | 3EL2 042 - 2 P . 3 . - .... | C |
| | 42 | 34 | 4 | 1200 | 81.6 | 83.7 | 87.7 | 94.8 | 101 | 111 | 121 | 3EL2 042 - 6 P . 4 . - .... | F |
| | 45 | 36 | 3 | 1100 | 84.6 | 86.7 | 90.9 | 99.4 | 106 | 117 | 133 | 3EL2 045 - 2 P . 3 . - .... | F |
| | 45 | 36 | 4 | 1200 | 87.5 | 89.6 | 94.0 | 102 | 108 | 119 | 130 | 3EL2 045 - 6 P . 4 . - .... | F |
| 72.5 | 54 | 43 | 3 | 1100 | 102 | 104 | 109 | 119 | 127 | 141 | 160 | 3EL2 054 - 2 P . 3 . - .... | F |
| | 54 | 43 | 4 | 1200 | 105 | 108 | 113 | 122 | 130 | 143 | 156 | 3EL2 054 - 6 P . 4 . - .... | F |
| | 60 | 48 | 3 | 1100 | 113 | 116 | 121 | 133 | 141 | 157 | 178 | 3EL2 060 - 2 P . 3 . - .... | F |
| | 60 | 48 | 4 | 1200 | 117 | 120 | 125 | 135 | 144 | 158 | 173 | 3EL2 060 - 6 P . 4 . - .... | F |
| | 66 | 53 | 3 | 1100 | 124 | 127 | 133 | 146 | 155 | 172 | 195 | 3EL2 066 - 2 P . 3 . - .... | F |
| | 66 | 53 | 4 | 1200 | 128 | 131 | 138 | 149 | 158 | 174 | 190 | 3EL2 066 - 6 P . 4 . - .... | F |
| | 72 | 58 | 3 | 1100 | 135 | 139 | 146 | 159 | 169 | 188 | 213 | 3EL2 072 - 2 P . 3 . - .... | F |
| | 72 | 58 | 4 | 1200 | 140 | 143 | 150 | 162 | 173 | 190 | 207 | 3EL2 072 - 6 P . 4 . - .... | F |

# Ratings and specifications

**Electrical characteristics – phase arresters**

| Highest voltage of the system | Rated voltage | Continuous operating voltage | Line discharge class | Long duration current 2ms | Maximum values of the residual voltages at discharge currents of the following impulses | | | | | | | Arrester type | Minimum housing size |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $U_s$ kV | $U_r$ kV | $U_c$ kV | LD Class | A | 30/60 µs 0.5 kA kV | 30/60 µs 1 kA kV | 30/60 µs 2 kA kV | 8/20 µs 5 kA kV | 8/20 µs 10 kA kV | 8/20 µs 20 kA kV | 8/20 µs 40 kA kV | | |
| 123 | 96 | 77 | 3 | 1100 | 180 | 185 | 194 | 212 | 226 | 250 | 284 | 3EL2 096 - 2 P . 3 . - .... | J |
| | 96 | 77 | 4 | 1200 | 187 | 191 | 200 | 217 | 230 | 253 | 276 | 3EL2 096 - 6 P . 4 . - .... | J |
| | 102 | 82 | 3 | 1100 | 192 | 197 | 206 | 225 | 240 | 266 | 302 | 3EL2 102 - 2 P . 3 . - .... | J |
| | 102 | 82 | 4 | 1200 | 198 | 203 | 213 | 230 | 245 | 269 | 294 | 3EL2 102 - 6 P . 4 . - .... | J |
| | 108 | 86 | 3 | 1100 | 203 | 208 | 218 | 239 | 254 | 282 | 320 | 3EL2 108 - 2 P . 3 . - .... | J |
| | 108 | 86 | 4 | 1200 | 210 | 215 | 226 | 244 | 259 | 285 | 311 | 3EL2 108 - 6 P . 4 . - .... | J |
| | 154 | 123 | 3 | 1100 | 290 | 297 | 311 | 340 | 362 | 402 | 456 | 3EL2 154 - 2 P . 3 . - .... | M |
| 145 | 120 | 96 | 3 | 1100 | 226 | 231 | 243 | 265 | 282 | 313 | 355 | 3EL2 120 - 2 P . 3 . - .... | J |
| | 120 | 96 | 4 | 1200 | 233 | 239 | 251 | 271 | 288 | 317 | 346 | 3EL2 120 - 6 P . 4 . - .... | J |
| | 132 | 106 | 3 | 1100 | 248 | 254 | 267 | 292 | 310 | 344 | 391 | 3EL2 132 - 2 P . 3 . - .... | M |
| | 132 | 106 | 4 | 1200 | 257 | 263 | 276 | 298 | 317 | 348 | 380 | 3EL2 132 - 6 P . 4 . - .... | M |
| | 144 | 115 | 3 | 1100 | 271 | 277 | 291 | 318 | 338 | 376 | 426 | 3EL2 144 - 2 P . 3 . - .... | M |
| | 144 | 115 | 4 | 1200 | 280 | 287 | 301 | 325 | 346 | 380 | 415 | 3EL2 144 - 6 P . 4 . - .... | M |
| 170 | 138 | 110 | 3 | 1100 | 259 | 266 | 279 | 305 | 324 | 360 | 409 | 3EL2 138 - 2 P . 3 . - .... | M |
| | 138 | 110 | 4 | 1200 | 268 | 275 | 288 | 311 | 331 | 364 | 397 | 3EL2 138 - 6 P . 4 . - .... | M |
| | 144 | 115 | 3 | 1100 | 271 | 277 | 291 | 318 | 338 | 376 | 426 | 3EL2 144 - 2 P . 3 . - .... | M |
| | 144 | 115 | 4 | 1200 | 280 | 287 | 301 | 325 | 346 | 380 | 415 | 3EL2 144 - 6 P . 4 . - .... | M |
| | 150 | 120 | 3 | 1100 | 282 | 289 | 303 | 331 | 353 | 391 | 444 | 3EL2 150 - 2 P . 3 . - .... | M |
| | 150 | 120 | 4 | 1200 | 292 | 299 | 313 | 338 | 360 | 396 | 432 | 3EL2 150 - 6 P . 4 . - .... | M |
| 245 | 192 | 154 | 3 | 1100 | 361 | 370 | 388 | 424 | 451 | 501 | 569 | 3EL2 192 - 2 P . 3 . - .... | Q |
| | 192 | 154 | 4 | 1200 | 373 | 382 | 401 | 433 | 461 | 507 | 553 | 3EL2 192 - 6 P . 4 . - .... | Q |
| | 198 | 158 | 3 | 1100 | 372 | 382 | 400 | 437 | 465 | 516 | 586 | 3EL2 198 - 2 P . 3 . - .... | Q |
| | 198 | 158 | 4 | 1200 | 385 | 394 | 413 | 447 | 475 | 523 | 570 | 3EL2 198 - 6 P . 4 . - .... | Q |
| | 228 | 182 | 3 | 1100 | 429 | 439 | 461 | 504 | 536 | 595 | 675 | 3EL2 228 - 2 P . 3 . - .... | R |
| | 228 | 182 | 4 | 1200 | 443 | 454 | 476 | 514 | 547 | 602 | 657 | 3EL2 228 - 6 P . 4 . - .... | 2xJ |
| 300 | 228 | 182 | 3 | 1100 | 429 | 439 | 461 | 504 | 536 | 595 | 675 | 3EL2 228 - 2 P . 3 . - .... | R |
| | 228 | 182 | 4 | 1200 | 443 | 454 | 476 | 514 | 547 | 602 | 657 | 3EL2 228 - 6 P . 4 . - .... | 2xJ |
| | 240 | 192 | 3 | 1100 | 451 | 462 | 485 | 530 | 564 | 626 | 711 | 3EL2 240 - 2 P . 3 . - .... | 2xJ |
| | 240 | 192 | 4 | 1200 | 467 | 478 | 501 | 541 | 576 | 634 | 691 | 3EL2 240 - 6 P . 4 . - .... | 2xJ |
| 362 | 276 | 221 | 3 | 1100 | 519 | 532 | 558 | 610 | 649 | 720 | 817 | 3EL2 276 - 2 P . 3 . - .... | W |
| | 276 | 221 | 4 | 1200 | 537 | 550 | 576 | 623 | 662 | 729 | 795 | 3EL2 276 - 6 P . 4 . - .... | W |
| | 288 | 230 | 3 | 1100 | 541 | 555 | 582 | 636 | 677 | 751 | 853 | 3EL2 288 - 2 P . 3 . - .... | 2xM |
| | 288 | 230 | 4 | 1200 | 560 | 574 | 601 | 650 | 691 | 760 | 829 | 3EL2 288 - 6 P . 4 . - .... | 2xM |
| 420 | 336 | 269 | 3 | 1100 | 632 | 647 | 679 | 742 | 790 | 876 | 995 | 3EL2 336 - 2 P . 3 . - .... | 3xJ |
| | 336 | 269 | 4 | 1200 | 653 | 669 | 702 | 758 | 806 | 887 | 968 | 3EL2 336 - 6 P . 4 . - .... | 3xJ |
| | 360 | 288 | 3 | 1100 | 677 | 694 | 728 | 795 | 846 | 939 | 1066 | 3EL2 360 - 2 P . 3 . - .... | 3xJ |
| | 360 | 288 | 4 | 1200 | 700 | 717 | 752 | 812 | 864 | 950 | 1037 | 3EL2 360 - 6 P . 4 . - .... | 3xJ |

# Ratings and specifications

**Electrical characteristics – neutral ground arresters**

| Highest voltage of the system | Rated voltage | Continu-ous operating voltage | Line discharge class | Long duration current 2ms | Maximum values of the residual voltages at discharge currents of the following impulses | | | | | | | Arrester type | Mini-mum housing size |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $U_s$ kV | $U_r$ kV | $U_c$ kV | LD Class | A | 30/60 µs 0.5 kA kV | 30/60 µs 1 kA kV | 30/60 µs 2 kA kV | 8/20 µs 5 kA kV | 8/20 µs 10 kA kV | 8/20 µs 20 kA kV | 8/20 µs 40 kA kV | | |
| 72.5 | 30 | 24.0 | 3 | 1100 | 56.4 | 57.8 | 60.6 | 66.3 | 70.5 | 78.3 | 88.8 | 3EL2 030 - 2 S . 3 . - .... | C |
| | 30 | 24.0 | 4 | 1200 | 58.3 | 59.8 | 62.6 | 67.7 | 72.0 | 79.2 | 86.4 | 3EL2 030 - 6 S . 4 . - .... | C |
| | 45 | 36 | 3 | 1100 | 84.6 | 86.7 | 90.9 | 99.4 | 106 | 117 | 133 | 3EL2 045 - 2 S . 3 . - .... | F |
| | 45 | 36 | 4 | 1200 | 87.5 | 89.6 | 94.0 | 102 | 108 | 119 | 130 | 3EL2 045 - 6 S . 4 . - .... | F |
| 123 | 51 | 41 | 3 | 1100 | 95.9 | 98.3 | 103 | 113 | 120 | 133 | 151 | 3EL2 051 - 2 S . 3 . - .... | F |
| | 51 | 41 | 4 | 1200 | 99.1 | 102 | 106 | 115 | 122 | 135 | 147 | 3EL2 051 - 6 S . 4 . - .... | F |
| | 60 | 48 | 3 | 1100 | 113 | 116 | 121 | 133 | 141 | 157 | 178 | 3EL2 060 - 2 S . 3 . - .... | F |
| | 60 | 48 | 4 | 1200 | 117 | 120 | 125 | 135 | 144 | 158 | 173 | 3EL2 060 - 6 S . 4 . - .... | F |
| | 66 | 53 | 3 | 1100 | 124 | 127 | 133 | 146 | 155 | 172 | 195 | 3EL2 066 - 2 S . 3 . - .... | F |
| | 66 | 53 | 4 | 1200 | 128 | 131 | 138 | 149 | 158 | 174 | 190 | 3EL2 066 - 6 S . 4 . - .... | F |
| | 72 | 58 | 3 | 1100 | 135 | 139 | 146 | 159 | 169 | 188 | 213 | 3EL2 072 - 2 S . 3 . - .... | F |
| | 72 | 58 | 4 | 1200 | 140 | 143 | 150 | 162 | 173 | 190 | 207 | 3EL2 072 - 6 S . 4 . - .... | F |
| | 90 | 72 | 3 | 1100 | 169 | 173 | 182 | 199 | 212 | 235 | 266 | 3EL2 090 - 2 S . 3 . - .... | J |
| | 90 | 72 | 4 | 1200 | 175 | 179 | 188 | 203 | 216 | 238 | 259 | 3EL2 090 - 6 S . 4 . - .... | J |
| 145 | 80 | 64 | 3 | 1100 | 150 | 154 | 162 | 177 | 188 | 209 | 237 | 3EL2 080 - 2 S . 3 . - .... | J |
| | 80 | 64 | 4 | 1200 | 156 | 159 | 167 | 180 | 192 | 211 | 230 | 3EL2 080 - 6 S . 4 . - .... | J |
| 245 | 102 | 82 | 3 | 1100 | 192 | 197 | 206 | 225 | 240 | 266 | 302 | 3EL2 102 - 2 S . 3 . - .... | J |
| | 102 | 82 | 4 | 1200 | 198 | 203 | 213 | 230 | 245 | 269 | 294 | 3EL2 102 - 6 S . 4 . - .... | J |
| | 108 | 86 | 3 | 1100 | 203 | 208 | 218 | 239 | 254 | 282 | 320 | 3EL2 108 - 2 S . 3 . - .... | J |
| | 108 | 86 | 4 | 1200 | 210 | 215 | 226 | 244 | 259 | 285 | 311 | 3EL2 108 - 6 S . 4 . - .... | J |
| 420 | 168 | 134 | 3 | 1100 | 316 | 324 | 340 | 371 | 395 | 438 | 497 | 3EL2 168 - 2 S . 3 . - .... | P |
| | 168 | 134 | 4 | 1200 | 327 | 335 | 351 | 379 | 403 | 444 | 484 | 3EL2 168 - 6 S . 4 . - .... | Q |

## Ratings and specifications

| Mechanical characteristics | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Housing size | Height [H] | Creepage distance | Housing insulation | | | Specified short-term load SSL | Specified long-term load SLL | Grading ring diameter [D] | Maximum weight of arrester | Flash-over distance | Arrester type | Figure |
| | mm | mm | Lightning impulse withstand voltage 1.2/50µs kV | Switching impulse withstand voltage 250µs/ 2500µs, wet kV | Power frequency withstand voltage 1 min., wet kV | N | N | mm | kg | mm | | |
| C | 482 | 1470 | 235 | 170 | 109 | 8290 | 5800 | - | 17.7 | 405 | 3EL2 ... - .. C . 1 - .... | A |
| F | 705 | 2340 | 365 | 265 | 170 | 5670 | 3970 | - | 23.5 | 630 | 3EL2 ... - .. F . 1 - .... | A |
| J | 1062 | 3820 | 571 | 414 | 266 | 3760 | 2630 | - | 32.3 | 985 | 3EL2 ... - .. J . 1 - .... | A |
| M | 1240 | 4495 | 676 | 489 | 315 | 3220 | 2250 | - | 37.6 | 1165 | 3EL2 ... - .. M . 1 - .... | A |
| P | 1544 | 5290 | 806 | 584 | 375 | 2590 | 1810 | - | 46.2 | 1390 | 3EL2 ... - .. P . 2 - .... | B |
| Q | 1767 | 6160 | 936 | 678 | 436 | 2260 | 1580 | - | 51.3 | 1615 | 3EL2 ... - .. Q . 2 - .... | B |
| R | 1945 | 6835 | 1041 | 754 | 485 | 2050 | 1430 | - | 56.9 | 1795 | 3EL2 ... - .. R . 2 - .... | B |
| 2xJ | 2124 | 7640 | 1142 | 827 | 532 | 1880 | 1310 | - | 57.2 | 1970 | 3EL2 ... - .. J . 2 - .... | B |
| W | 2302 | 8315 | 1247 | 903 | 581 | 1730 | 1210 | 600 | 63.6 | 1905 | 3EL2 ... - .. W . 2 - .... | C |
| 2xM | 2480 | 8990 | 1352 | 979 | 629 | 1610 | 1120 | 800 | 69.6 | 1925 | 3EL2 ... - .. M . 2 - .... | C |
| X | 2829 | 9980 | 1507 | 1093 | 702 | 1410 | 980 | 800 | 79.8 | 2250 | 3EL2 ... - .. X . 3 - .... | D |
| 3xJ | 3186 | 11460 | 1713 | 1242 | 798 | 1250 | 870 | 1000 | 86.7 | 2470 | 3EL2 ... - .. J . 3 - .... | D |
| 3xM | 3720 | 13485 | 2028 | 1467 | 945 | 1070 | 750 | 1000 | 93.2 | 2950 | 3EL2 ... - .. M . 3 - .... | D |

The maximum arrester weight can vary depending on rated voltage and line discharge class.

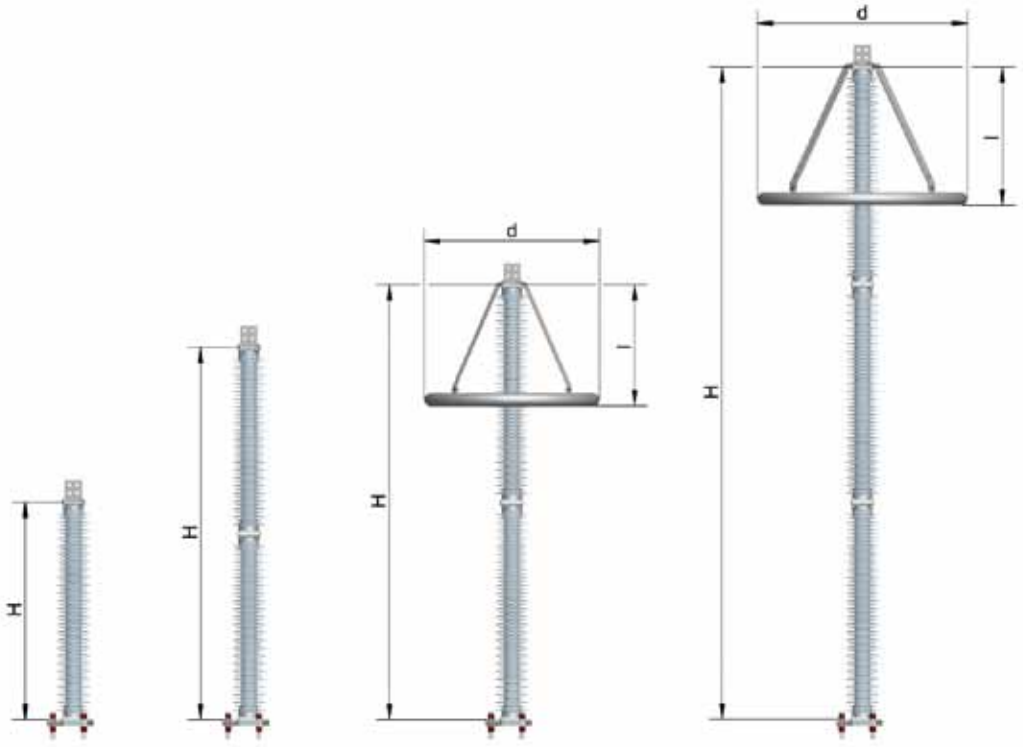



Figure A Figure B Figure C Figure D

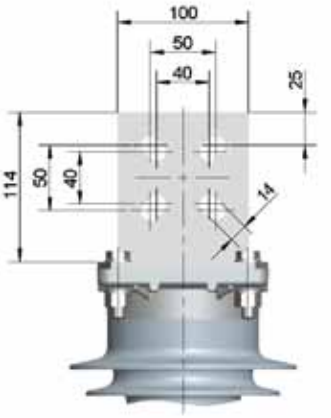
## Line terminals

**Plate**

3EL2 ...-.....-.A..

**Bolt**

3EL2 ...-.....-.D..



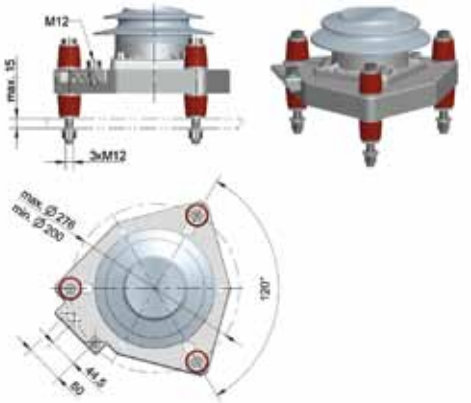

**DIN/NEMA flat terminal**

3EL2 ...-.....-.T.. (aluminum)

3EL2 ...-.....-.X.. (hot dip galvanized)

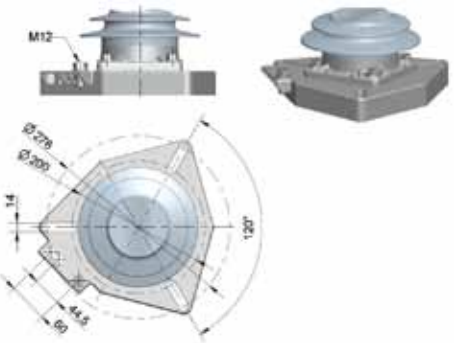
3EL2 ...-.....-.Y.. (stainless steel)

## Mounting



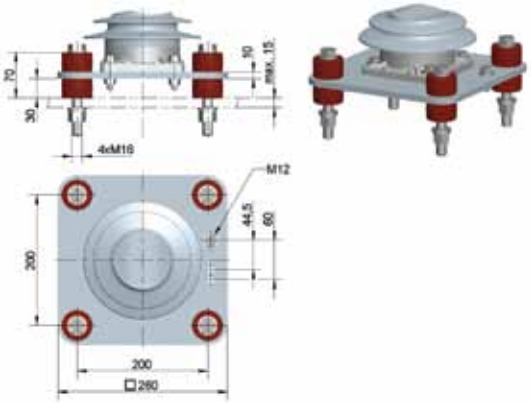

**Insulated**

3EL2 ...-.....-...1



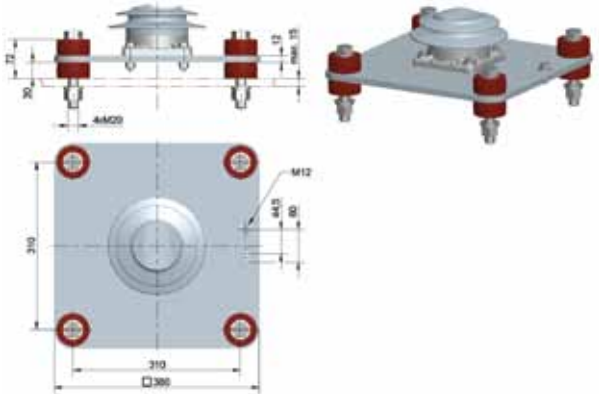

**Grounded**

3EL2 ...-.....-...5




**Insulated**

3EL2 ...-.....-...2




**Insulated**

3EL2 ...-.....-...3

# 3EL3 Surge arrester with silicone rubber housing and Cage Design™

## Technical datasheet

### Protection of:

- Transformers
- Circuit breakers
- Generators
- Motors
- Capacitors
- Bushings
- Switchgear
- Transmission lines

| Maximum values | | 3EL3 | 3EL3 |
|---|---|---|---|
| Highest voltage of the system | kV | 550 | 550 |
| Maximum rated voltage | kV | 444 | 468 |
| Nominal discharge current | kA | 20 | 20 |
| Line discharge class | | 4 | 5 |
| Energy absorption capability | $kJ/kV_r$ | 10.0 | 14.0 |
| Long duration current impulse | A | 1600 | 2000 |
| Rated short-circuit current | kA | 65 | 65 |
| High current impulse | kA | 100 | 100 |
| Bending moment dynamic | kNm | 10.0 | 10.0 |

# 3EL3 – order numbers

| Data position | 1 | 2 | 3 | 4 | – | 5 | 6 | 7 | – | 8 | 9 | 10 | 11 | 12 | – | 13 | 14 | 15 | 16 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Order number** | **3** | **E** | **L** | **3** | | **x** | **x** | **x** | | **4** | **P** | **J** | **4** | **1** | | **4** | **D** | **A** | **1** | **–** | **Z** |
| **Product line** | | | | | | | | | | | | | | | | | | | | | |
| Silicone rubber-housed surge arrester, cage design | 3 | E | L | 3 | | | | | | | | | | | | | | | | | |
| **Rated voltage in kV** | | | | | | x | x | x | | | | | | | | | | | | | |
| **Long duration current impulse, energy absorption capability** | | | | | | | | | | | | | | | | | | | | | |
| $I_{2ms}$ = 1600 A, $E_{th}$ = 10 kJ/$kV_r$, line discharge class 4 | | | | | | | | | | 4 | | | 4 | | | | | | | | |
| $I_{2ms}$ = 2000 A, $E_{th}$ = 14 kJ/$kV_r$, line discharge class 5 | | | | | | | | | | 4 | | | 5 | | | | | | | | |
| **Application** | | | | | | | | | | | | | | | | | | | | | |
| Line surge arrester (For more details refer to catalog Line Surge Arresters) | | | | | | | | | | | L | | | | | | | | | | |
| Phase surge arrester | | | | | | | | | | | P | | | | | | | | | | |
| Neutral point surge arrester | | | | | | | | | | | S | | | | | | | | | | |
| **Housing size, number of units. Refer to »Mechanical characteristics« on page 51** | | | | | | | | | | | | | | | | | | | | | |
| Housing »F«, 1 unit | | | | | | | | | | | | F | | 1 | | | | | | | |
| Housing »G«, 1 unit | | | | | | | | | | | | G | | 1 | | | | | | | |
| Housing »H«, 1 unit | | | | | | | | | | | | H | | 1 | | | | | | | |
| Housing »J«, 1 unit | | | | | | | | | | | | J | | 1 | | | | | | | |
| Housing »K«, 1 unit | | | | | | | | | | | | K | | 1 | | | | | | | |
| Housing »L«, 1 unit | | | | | | | | | | | | L | | 1 | | | | | | | |
| Housing »M«, 1 unit | | | | | | | | | | | | M | | 1 | | | | | | | |
| Housing »2xG«, 2 units | | | | | | | | | | | | G | | 2 | | | | | | | |
| Housing »2xH«, 2 units | | | | | | | | | | | | H | | 2 | | | | | | | |
| Housing »2xJ«, 2 units | | | | | | | | | | | | J | | 2 | | | | | | | |
| Housing »2xK«, 2 units | | | | | | | | | | | | K | | 2 | | | | | | | |
| Housing »2xL«, 2 units | | | | | | | | | | | | L | | 2 | | | | | | | |
| Housing »2xM«, 2 units | | | | | | | | | | | | M | | 2 | | | | | | | |
| Housing »3xJ«, 3 units | | | | | | | | | | | | J | | 3 | | | | | | | |
| Housing »3xK«, 3 units | | | | | | | | | | | | K | | 3 | | | | | | | |
| Housing »3xL«, 3 units | | | | | | | | | | | | L | | 3 | | | | | | | |
| Housing »3xM«, 3 units | | | | | | | | | | | | M | | 3 | | | | | | | |
| **Form of sheds and color of silicone rubber** | | | | | | | | | | | | | | | | | | | | | |
| Alternating sheds, gray silicone rubber, upright mounting | | | | | | | | | | | | | | | | 4 | | | | | |
| Alternating sheds, gray silicone rubber, suspended mounting | | | | | | | | | | | | | | | | 8 | | | | | |
| **High-voltage terminal** | | | | | | | | | | | | | | | | | | | | | |
| Metal plate | | | | | | | | | | | | | | | | | A | | | | |
| Bolt, 30 mm diameter, 80 mm length, hot dip galvanized steel | | | | | | | | | | | | | | | | | C | | | | |
| Bolt, 30 mm diameter, 80 mm length, stainless steel | | | | | | | | | | | | | | | | | D | | | | |
| Bolt, 40 mm diameter, 80 mm length, stainless steel | | | | | | | | | | | | | | | | | G | | | | |
| Bolt, 40 mm diameter, 120 mm length, stainless steel | | | | | | | | | | | | | | | | | J | | | | |
| Flat DIN/NEMA, 40x40 ... 50x50, 20 mm, hot dip galvanized steel | | | | | | | | | | | | | | | | | L | | | | |
| Flat DIN/NEMA, 40x40 ... 50x50, aluminum | | | | | | | | | | | | | | | | | T | | | | |
| Flat DIN/NEMA, 40x40 ... 50x50, hot dip galvanized steel | | | | | | | | | | | | | | | | | X | | | | |
| Flat DIN/NEMA, 40x40 ... 50x50, stainless steel | | | | | | | | | | | | | | | | | Y | | | | |

## 3EL3 – order numbers

| Data position | 1 | 2 | 3 | 4 | – | 5 | 6 | 7 | – | 8 | 9 | 10 | 11 | 12 | – | 13 | 14 | 15 | 16 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Order number** | **3** | **E** | **L** | **3** | | **x** | **x** | **x** | | **4** | **P** | **J** | **4** | **1** | | **4** | **D** | **A** | **1** | **–** | **Z** |
| **Nameplate** | | | | | | | | | | | | | | | | | | | | | |
| German/English (standard) | | | | | | | | | | | | | | | | | | A | | | |
| French | | | | | | | | | | | | | | | | | | B | | | |
| Czech | | | | | | | | | | | | | | | | | | C | | | |
| Slovene | | | | | | | | | | | | | | | | | | D | | | |
| Russian | | | | | | | | | | | | | | | | | | E | | | |
| Spanish | | | | | | | | | | | | | | | | | | F | | | |
| Portuguese | | | | | | | | | | | | | | | | | | G | | | |
| Arabic | | | | | | | | | | | | | | | | | | R | | | |
| Brazil | | | | | | | | | | | | | | | | | | T | | | |
| CFE (Mexico) | | | | | | | | | | | | | | | | | | U | | | |
| Customized version | | | | | | | | | | | | | | | | | | Z | | | |
| **Mounting** | | | | | | | | | | | | | | | | | | | | | |
| 200 mm x 200 mm, grounded | | | | | | | | | | | | | | | | | | | 0 | | |
| 200 mm x 200 mm, insulated | | | | | | | | | | | | | | | | | | | 1 | | |
| D=10", insulated with DIN/NEMA earth terminal | | | | | | | | | | | | | | | | | | | 2 | | |
| 310 mm x 310 mm, insulated | | | | | | | | | | | | | | | | | | | 3 | | |
| D=10", grounded | | | | | | | | | | | | | | | | | | | 5 | | |
| D=10", insulated | | | | | | | | | | | | | | | | | | | 7 | | |
| **Accessories** | | | | | | | | | | | | | | | | | | | | | |
| Refer to table »Optional accessories« on page 110 | | | | | | | | | | | | | | | | | | | | – | Z |

# Ratings and specifications

**Electrical characteristics – phase arresters**

| Highest voltage of the system | Rated voltage | Continuous operating voltage | Line discharge class | Long duration current 2ms | Maximum values of the residual voltages at discharge currents of the following impulses | | | | | | | Arrester type | Minimum housing size |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $U_s$ kV | $U_r$ kV | $U_c$ kV | LD Class | A | 30/60 µs 0.5 kA kV | 30/60 µs 1 kA kV | 30/60 µs 2 kA kV | 8/20 µs 5 kA kV | 8/20 µs 10 kA kV | 8/20 µs 20 kA kV | 8/20 µs 40 kA kV | | |
| 123 | 96 | 77 | 4 | 1600 | 179 | 185 | 190 | 204 | 216 | 235 | 257 | 3EL3 096 - 4 P . 4 . - .... | H |
| | 102 | 82 | 4 | 1600 | 190 | 196 | 202 | 217 | 230 | 250 | 273 | 3EL3 102 - 4 P . 4 . - .... | H |
| | 108 | 86 | 4 | 1600 | 202 | 208 | 214 | 230 | 243 | 265 | 289 | 3EL3 108 - 4 P . 4 . - .... | H |
| | 154 | 123 | 4 | 1600 | 288 | 296 | 305 | 327 | 347 | 378 | 412 | 3EL3 154 - 4 P . 4 . - .... | L |
| 145 | 120 | 96 | 4 | 1600 | 224 | 231 | 238 | 255 | 270 | 294 | 321 | 3EL3 120 - 4 P . 4 . - .... | J |
| | 132 | 106 | 4 | 1600 | 247 | 254 | 261 | 281 | 297 | 324 | 353 | 3EL3 132 - 4 P . 4 . - .... | K |
| | 144 | 115 | 4 | 1600 | 269 | 277 | 285 | 306 | 324 | 353 | 386 | 3EL3 144 - 4 P . 4 . - .... | L |
| 170 | 138 | 110 | 4 | 1600 | 258 | 265 | 273 | 293 | 311 | 338 | 369 | 3EL3 138 - 4 P . 4 . - .... | K |
| | 144 | 115 | 4 | 1600 | 269 | 277 | 285 | 306 | 324 | 353 | 386 | 3EL3 144 - 4 P . 4 . - .... | L |
| | 150 | 120 | 4 | 1600 | 280 | 289 | 297 | 319 | 338 | 368 | 402 | 3EL3 150 - 4 P . 4 . - .... | L |
| 245 | 192 | 154 | 4 | 1600 | 359 | 369 | 380 | 408 | 432 | 471 | 514 | 3EL3 192 - 4 P . 4 . - .... | 2xH |
| | 198 | 158 | 4 | 1600 | 370 | 381 | 392 | 421 | 446 | 486 | 530 | 3EL3 198 - 4 P . 4 . - .... | 2xH |
| | 228 | 182 | 4 | 1600 | 426 | 439 | 451 | 485 | 513 | 559 | 610 | 3EL3 228 - 4 P . 4 . - .... | 2xJ |
| 300 | 228 | 182 | 4 | 1600 | 426 | 439 | 451 | 485 | 513 | 559 | 610 | 3EL3 228 - 4 P . 4 . - .... | 2xJ |
| | 240 | 192 | 4 | 1600 | 448 | 462 | 475 | 510 | 540 | 589 | 643 | 3EL3 240 - 4 P . 4 . - .... | 2xJ |
| 362 | 276 | 221 | 4 | 1600 | 515 | 531 | 546 | 587 | 621 | 677 | 739 | 3EL3 276 - 4 P . 4 . - .... | 2xL |
| | 276 | 221 | 5 | 2000 | 515 | 531 | 546 | 587 | 621 | 677 | 739 | 3EL3 276 - 4 P . 5 . - .... | 2xL |
| | 288 | 230 | 4 | 1600 | 538 | 554 | 570 | 612 | 648 | 706 | 771 | 3EL3 288 - 4 P . 4 . - .... | 2xL |
| | 288 | 230 | 5 | 2000 | 538 | 554 | 570 | 612 | 648 | 706 | 771 | 3EL3 288 - 4 P . 5 . - .... | 2xL |
| 420 | 336 | 269 | 4 | 1600 | 627 | 646 | 665 | 714 | 756 | 824 | 900 | 3EL3 336 - 4 P . 4 . - .... | 3xJ |
| | 336 | 269 | 5 | 2000 | 627 | 646 | 665 | 714 | 756 | 824 | 900 | 3EL3 336 - 4 P . 5 . - .... | 3xJ |
| | 360 | 288 | 4 | 1600 | 672 | 693 | 713 | 765 | 810 | 883 | 964 | 3EL3 360 - 4 P . 4 . - .... | 3xK |
| | 360 | 288 | 5 | 2000 | 672 | 693 | 713 | 765 | 810 | 883 | 964 | 3EL3 360 - 4 P . 5 . - .... | 3xK |
| 550 | 396 | 317 | 4 | 1600 | 740 | 762 | 784 | 842 | 891 | 971 | 1060 | 3EL3 396 - 4 P . 4 . - .... | 3xM |
| | 396 | 317 | 5 | 2000 | 740 | 762 | 784 | 842 | 891 | 971 | 1060 | 3EL3 396 - 4 P . 5 . - .... | 3xM |
| | 420 | 336 | 4 | 1600 | 784 | 808 | 832 | 893 | 945 | 1030 | 1125 | 3EL3 420 - 4 P . 4 . - .... | 4xK |
| | 420 | 336 | 5 | 2000 | 784 | 808 | 832 | 893 | 945 | 1030 | 1125 | 3EL3 420 - 4 P . 5 . - .... | 4xK |
| | 444 | 355 | 4 | 1600 | 829 | 854 | 879 | 944 | 999 | 1089 | 1189 | 3EL3 444 - 4 P . 4 . - .... | 4xK |
| | 444 | 355 | 5 | 2000 | 829 | 854 | 879 | 944 | 999 | 1089 | 1189 | 3EL3 444 - 4 P . 5 . - .... | 4xK |
| | 468 | 374 | 4 | 1600 | 874 | 900 | 927 | 995 | 1053 | 1148 | 1253 | 3EL3 468 - 4 P . 4 . - .... | 4xK |
| | 468 | 374 | 5 | 2000 | 874 | 900 | 927 | 995 | 1053 | 1148 | 1253 | 3EL3 468 - 4 P . 5 . - .... | 4xK |

**Electrical characteristics – neutral ground arresters**

| Highest voltage of the system | Rated voltage | Continuous operating voltage | Line discharge class | Long duration current 2ms | Maximum values of the residual voltages at discharge currents of the following impulses | | | | | | | Arrester type | Minimum housing size |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $U_s$ kV | $U_r$ kV | $U_c$ kV | LD Class | A | 30/60 µs 0.5 kA kV | 30/60 µs 1 kA kV | 30/60 µs 2 kA kV | 8/20 µs 5 kA kV | 8/20 µs 10 kA kV | 8/20 µs 20 kA kV | 8/20 µs 40 kA kV | | |
| 245 | 102 | 82 | 4 | 1600 | 190 | 196 | 202 | 217 | 230 | 250 | 273 | 3EL3 102 - 4 S . 4 . - .... | H |
| | 108 | 86 | 4 | 1600 | 201 | 206 | 216 | 233 | 248 | 273 | 298 | 3EL3 108 - 4 S . 4 . - .... | H |
| 420 | 168 | 134 | 4 | 1600 | 314 | 323 | 333 | 357 | 378 | 412 | 450 | 3EL3 168 - 4 S . 4 . - .... | M |

# Ratings and specifications

**Mechanical characteristics**

| Housing size | Height [H] | Creepage distance | Housing insulation | | | Specified short-term load SSL | Specified long-term load SLL | Grading ring diameter [D] | Maximum weight of arrester | Flashover distance | Arrester type | Figure |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | mm | mm | Lightning impulse withstand voltage 1.2/50µs kV | Switching impulse withstand voltage 250µs/ 2500µs, wet kV | Power frequency withstand voltage 1 min., wet kV | N | N | mm | kg | mm | | |
| F | 747 | 2476 | 370 | 240 | 160 | 13380 | 9370 | - | 36.0 | 648 | 3EL3 ... - .. F . 1 - .... | A |
| G | 836 | 2864 | 420 | 280 | 180 | 11960 | 8370 | - | 39.1 | 737 | 3EL3 ... - .. G . 1 - .... | A |
| H | 925 | 3252 | 470 | 320 | 200 | 10810 | 7560 | - | 43.1 | 826 | 3EL3 ... - .. H . 1 - .... | A |
| J | 1014 | 3640 | 520 | 350 | 220 | 9860 | 6900 | - | 46.1 | 915 | 3EL3 ... - .. J . 1 - .... | A |
| K | 1104 | 4029 | 580 | 380 | 240 | 9050 | 6340 | - | 50.2 | 1005 | 3EL3 ... - .. K . 1 - .... | A |
| L | 1193 | 4417 | 630 | 420 | 260 | 8380 | 5860 | - | 53.3 | 1094 | 3EL3 ... - .. J . 1 - .... | A |
| M | 1282 | 4805 | 680 | 450 | 290 | 7800 | 5460 | - | 57.2 | 1183 | 3EL3 ... - .. M . 1 - .... | A |
| 2xG | 1672 | 5728 | 850 | 560 | 360 | 5980 | 4180 | - | 75.5 | 1474 | 3EL3 ... - .. G . 2 - .... | B |
| 2xH | 1850 | 6504 | 950 | 640 | 410 | 5400 | 3780 | - | 82.6 | 1652 | 3EL3 ... - .. H . 2 - .... | B |
| 2xJ | 2028 | 7280 | 1050 | 700 | 450 | 4930 | 3450 | - | 88.6 | 1830 | 3EL3 ... - .. J . 2 - .... | B |
| 2xK | 2208 | 8058 | 1160 | 760 | 480 | 4520 | 3170 | 600 | 96.3 | 1768 | 3EL3 ... - .. K . 2 - .... | C |
| 2xL | 2386 | 8834 | 1260 | 840 | 520 | 4190 | 2930 | 600 | 103 | 1940 | 3EL3 ... - .. L . 2 - .... | C |
| 2xM | 2564 | 9610 | 1360 | 900 | 580 | 3900 | 2730 | 800 | 107 | 1956 | 3EL3 ... - .. M . 2 - .... | C |
| 3xJ | 3042 | 10920 | 1560 | 1050 | 660 | 3280 | 2300 | 800 | 134 | 2367 | 3EL3 ... - .. J . 2 - .... | D |
| 3xK | 3312 | 12087 | 1740 | 1140 | 720 | 3010 | 2110 | 1000 | 145 | 2523 | 3EL3 ... - .. K . 2 - .... | D |
| 3xL | 3579 | 13251 | 1890 | 1260 | 780 | 2790 | 1950 | 1000 | 153 | 2763 | 3EL3 ... - .. L . 2 - .... | D |
| 3xM | 3846 | 14415 | 2040 | 1350 | 870 | 2600 | 1820 | 1200 | 163 | 3006 | 3EL3 ... - .. M . 3 - .... | D |
| 4xK | 4416 | 16116 | 2320 | 1520 | 960 | 2260 | 1580 | 1500 | 197 | 3656 | 3EL3 ... - .. K . 4 - .... | E |

The maximum arrester weight can vary depending on rated voltage and line discharge class.

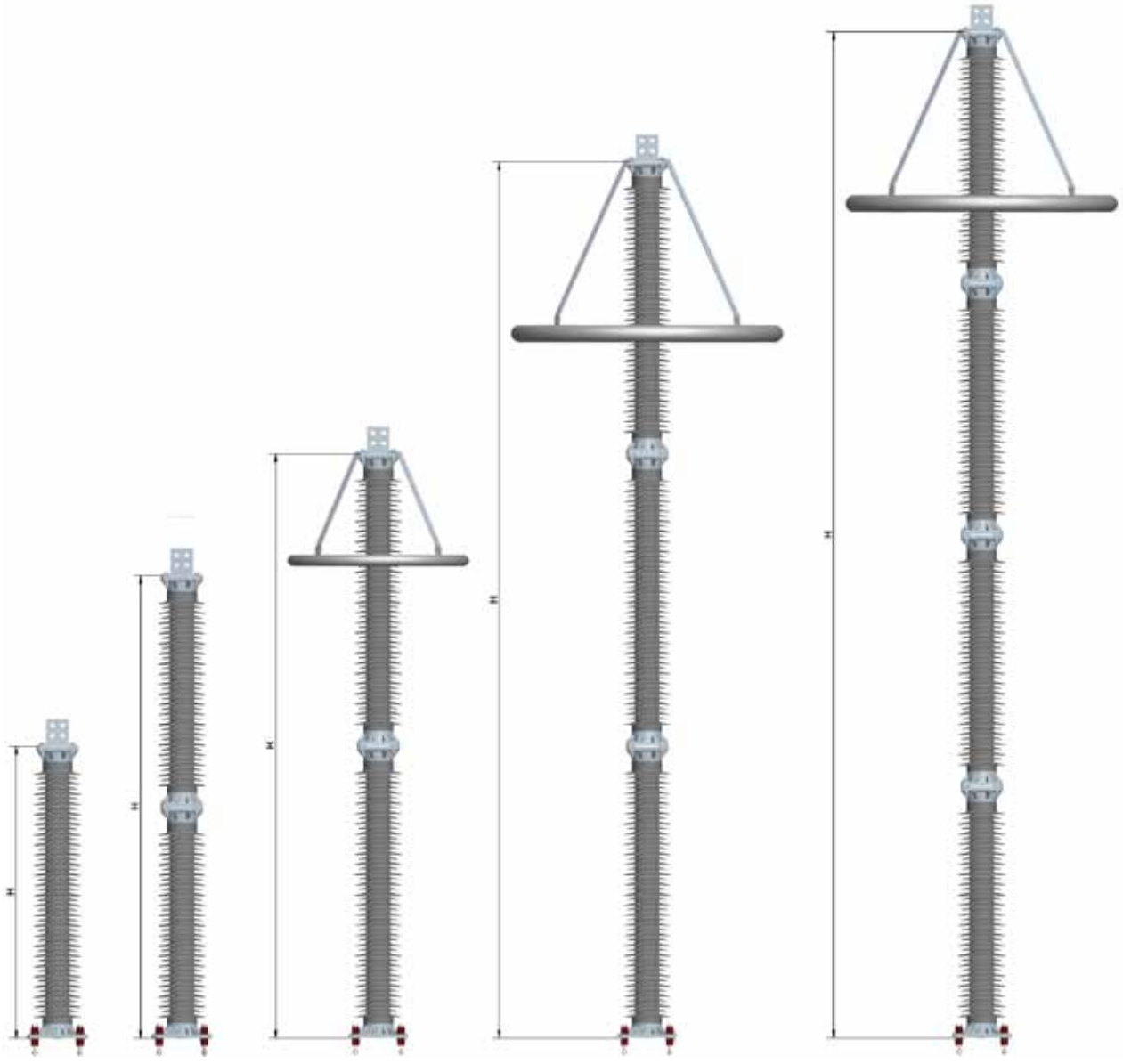
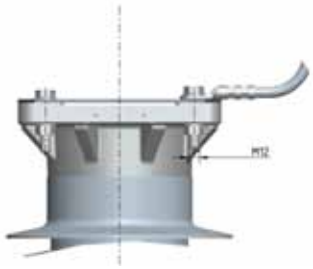


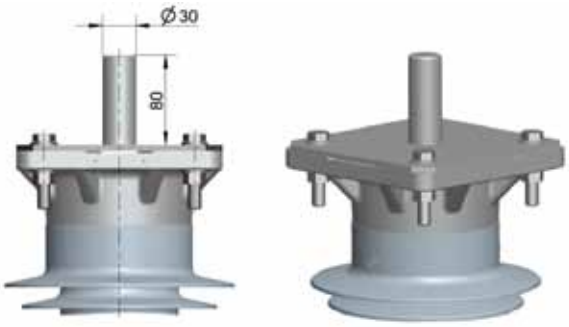
Figure A Figure B Figure C Figure D Figure E

## Line terminals



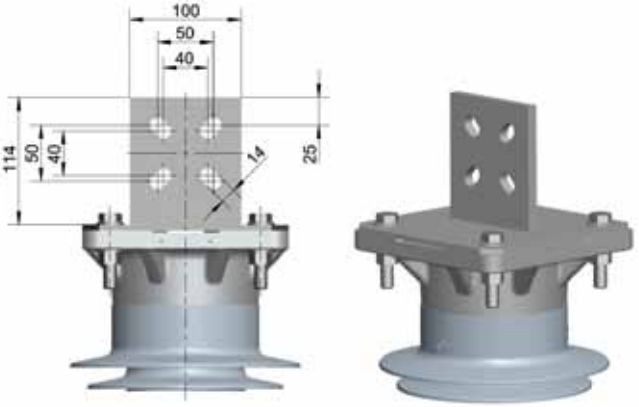

**Plate**

3EL3 ...-.....-.A..




**Bolt**

3EL3 ...-.....-.D..



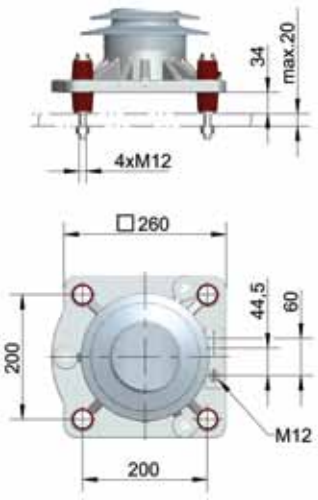

**DIN/NEMA flat terminal**

3EL3 ...-.....-.T.. (aluminum)

3EL3 ...-.....-.X.. (hot dip galvanized)

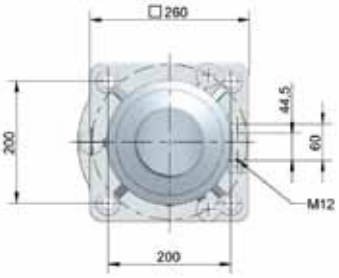
3EL3 ...-.....-.Y.. (stainless steel)

## Mounting



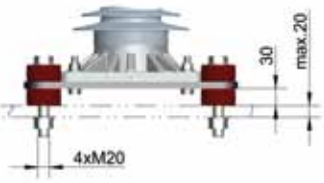
**Insulated**

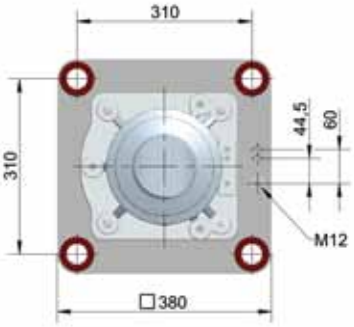
3EL3 ...-.....-...1



**Grounded**

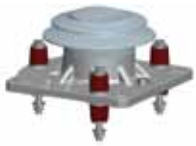
3EL3 ...-.....-...0

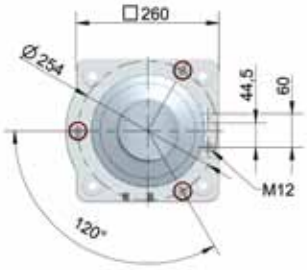





**Insulated**

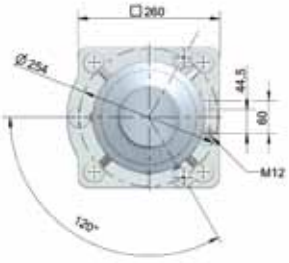
3EL3 ...-.....-...3






**Insulated**

3EL3 ...-.....-...7




**Grounded**

3EL3 ...-.....-...5

# 3EP5 Surge arrester with porcelain housing

## Technical datasheet

### Protection of:

- Transformers
- Circuit breakers
- Generators
- Motors
- Capacitors
- Bushings
- Switchgear

| Maximum values | | 3EP5 | 3EP5 | 3EP5 |
|---|---|---|---|---|
| Highest voltage of the system | kV | 123 | 123 | 123 |
| Maximum rated voltage | kV | 96 | 96 | 96 |
| Nominal discharge current | kA | 10 | 10 | 10 |
| Line discharge class | | 2 | 2 | 3 |
| Energy absorption capability | kJ/kV$_r$ | 5.0 | 5.0 | 8.0 |
| Long duration current impulse | A | 750 | 1100 | 1100 |
| Rated short-circuit current | kA | 40 | 40 | 40 |
| High current impulse | kA | 100 | 100 | 100 |
| Bending moment dynamic | kNm | 2.0 | 2.0 | 2.0 |

# 3EP5 – order numbers

| Data position | 1 | 2 | 3 | 4 | – | 5 | 6 | 7 | – | 8 | 9 | 10 | 11 | 12 | – | 13 | 14 | 15 | 16 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Order number** | **3** | **E** | **P** | **5** | | **x** | **x** | **x** | | **2** | **P** | **E** | **3** | **1** | | **1** | **D** | **A** | **1** | **–** | **Z** | |
| **Product line** | | | | | | | | | | | | | | | | | | | | | | |
| Porcelain-housed surge arrester | 3 | E | P | 5 | | | | | | | | | | | | | | | | | | |
| **Rated voltage in kV** | | | | | | x | x | x | | | | | | | | | | | | | | |
| **Long duration current impulse, energy absorption capability** | | | | | | | | | | | | | | | | | | | | | | |
| $I_{2ms}$ = 750 A, $E_{th}$ = 5 kJ/kV$_r$, line discharge class 2 | | | | | | | | | | 1 | | | 2 | | | | | | | | | |
| $I_{2ms}$ = 1100 A, $E_{th}$ = 5 kJ/kV$_r$, line discharge class 2 | | | | | | | | | | 2 | | | 2 | | | | | | | | | |
| $I_{2ms}$ = 1100 A, $E_{th}$ = 8 kJ/kV$_r$, line discharge class 3 | | | | | | | | | | 2 | | | 3 | | | | | | | | | |
| **Application** | | | | | | | | | | | | | | | | | | | | | | |
| Phase surge arrester | | | | | | | | | | | P | | | | | | | | | | | |
| Neutral point surge arrester | | | | | | | | | | | S | | | | | | | | | | | |
| **Housing size, number of units. Refer to »Mechanical characteristics« on page 59** | | | | | | | | | | | | | | | | | | | | | | |
| Housing »C«, 1 unit | | | | | | | | | | | | C | | 1 | | | | | | | | |
| Housing »E«, 1 unit | | | | | | | | | | | | E | | 1 | | | | | | | | |
| Housing »H«, 1 unit | | | | | | | | | | | | H | | 1 | | | | | | | | |
| Housing »J«, 1 unit | | | | | | | | | | | | J | | 1 | | | | | | | | |
| **Form of sheds and color of porcelain** | | | | | | | | | | | | | | | | | | | | | | |
| Normal sheds, brown porcelain, upright mounting | | | | | | | | | | | | | | | | 1 | | | | | | |
| Normal sheds, gray porcelain, upright mounting | | | | | | | | | | | | | | | | 3 | | | | | | |
| Normal sheds, brown porcelain, suspended mounting | | | | | | | | | | | | | | | | 5 | | | | | | |
| Normal sheds, gray porcelain, suspended mounting | | | | | | | | | | | | | | | | 7 | | | | | | |
| **High-voltage terminal** | | | | | | | | | | | | | | | | | | | | | | |
| Bolt, 30 mm diameter, 80 mm length, stainless steel | | | | | | | | | | | | | | | | | D | | | | | |
| Bolt, 40 mm diameter, 80 mm length, stainless steel | | | | | | | | | | | | | | | | | G | | | | | |
| Bolt, 40 mm diameter, 120 mm length, stainless steel | | | | | | | | | | | | | | | | | J | | | | | |
| Flat DIN/NEMA, 40x40 ... 50x50, copper | | | | | | | | | | | | | | | | | R | | | | | |
| Flat DIN/NEMA, 40x40 ... 50x50, aluminum | | | | | | | | | | | | | | | | | U | | | | | |
| Flat DIN/NEMA, 40x40 ... 50x50, hot dip galvanized steel | | | | | | | | | | | | | | | | | X | | | | | |
| Flat DIN/NEMA, 40x40 ... 50x50, stainless steel | | | | | | | | | | | | | | | | | Y | | | | | |
| Bolt, 26 mm diameter, 100 mm length, stainless steel | | | | | | | | | | | | | | | | | Z | | | | | P1A |
| Bolt, 30 mm diameter, 80 mm length, aluminum | | | | | | | | | | | | | | | | | Z | | | | | P1C |
| Bolt, 35 mm diameter, 120 mm length, stainless steel | | | | | | | | | | | | | | | | | Z | | | | | P1F |
| Bolt, 40 mm diameter, 80 mm length, aluminum | | | | | | | | | | | | | | | | | Z | | | | | P1H |
| Flat DIN/NEMA, 40x40 ... 50x50, hot dip galvanized steel, horizontal | | | | | | | | | | | | | | | | | Z | | | | | P2Q |
| Flat, 4xD=16, aluminum | | | | | | | | | | | | | | | | | Z | | | | | P5A |
| Flat, 4xD=14/50, Palm 5, aluminum | | | | | | | | | | | | | | | | | Z | | | | | P5G |
| **Nameplate** | | | | | | | | | | | | | | | | | | | | | | |
| German/English (standard) | | | | | | | | | | | | | | | | | | A | | | | |
| French | | | | | | | | | | | | | | | | | | B | | | | |
| Czech | | | | | | | | | | | | | | | | | | C | | | | |
| Slovene | | | | | | | | | | | | | | | | | | D | | | | |
| Russian | | | | | | | | | | | | | | | | | | E | | | | |
| Spanish | | | | | | | | | | | | | | | | | | F | | | | |
| Portuguese | | | | | | | | | | | | | | | | | | G | | | | |
| Arabic | | | | | | | | | | | | | | | | | | R | | | | |
| Brazil | | | | | | | | | | | | | | | | | | T | | | | |
| CFE (Mexico) | | | | | | | | | | | | | | | | | | U | | | | |
| Customized version | | | | | | | | | | | | | | | | | | Z | | | | |
| **Mounting** | | | | | | | | | | | | | | | | | | | | | | |
| D=200 mm–254 mm, insulated, stainless steel | | | | | | | | | | | | | | | | | | | 1 | | | |
| D=200 mm–254 mm, grounded, stainless steel | | | | | | | | | | | | | | | | | | | 5 | | | |
| **Accessories** | | | | | | | | | | | | | | | | | | | | | | |
| Refer to table »Optional accessories« on page 110 | | | | | | | | | | | | | | | | | | | | – | Z | |

# Ratings and specifications

**Electrical characteristics – phase arresters**

| Highest voltage of the system | Rated voltage | Continu-ous operating voltage | Line discharge class | Long duration current 2ms | Maximum values of the residual voltages at discharge currents of the following impulses | | | | | | | Arrester type | Mini-mum housing size |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $U_s$ kV | $U_r$ kV | $U_c$ kV | LD Class | A | 30/60 µs 0.5 kA kV | 30/60 µs 1 kA kV | 30/60 µs 2 kA kV | 8/20 µs 5 kA kV | 8/20 µs 10 kA kV | 8/20 µs 20 kA kV | 8/20 µs 40 kA kV | | |
| 12 | 9 | 7.2 | 2 | 750 | 17.7 | 18.4 | 19.3 | 21.3 | 23.0 | 25.7 | 29.4 | 3EP5 009 - 1 P . 2 . - .... | C |
| | 9 | 7.2 | 3 | 1100 | 17.3 | 17.7 | 18.6 | 20.3 | 21.6 | 24.0 | 27.2 | 3EP5 009 - 2 P . 3 . - .... | C |
| | 12 | 9.6 | 2 | 750 | 23.6 | 24.5 | 25.7 | 28.5 | 30.6 | 34.3 | 39.2 | 3EP5 012 - 1 P . 2 . - .... | C |
| | 12 | 9.6 | 3 | 1100 | 23.0 | 23.6 | 24.8 | 27.1 | 28.8 | 32.0 | 36.3 | 3EP5 012 - 2 P . 3 . - .... | C |
| 17.5 | 15 | 12.0 | 2 | 750 | 29.5 | 30.6 | 32.1 | 35.6 | 38.3 | 42.8 | 49.0 | 3EP5 015 - 1 P . 2 . - .... | C |
| | 15 | 12.0 | 3 | 1100 | 28.8 | 29.5 | 31.0 | 33.8 | 36.0 | 40.0 | 45.4 | 3EP5 015 - 2 P . 3 . - .... | C |
| | 18 | 14.4 | 2 | 750 | 35.3 | 36.7 | 38.6 | 42.7 | 45.9 | 51.4 | 58.8 | 3EP5 018 - 1 P . 2 . - .... | C |
| | 18 | 14.4 | 3 | 1100 | 34.6 | 35.4 | 37.2 | 40.6 | 43.2 | 48.0 | 54.4 | 3EP5 018 - 2 P . 3 . - .... | C |
| 24 | 21 | 16.8 | 2 | 750 | 41.2 | 42.8 | 45.0 | 49.8 | 53.6 | 60.0 | 68.5 | 3EP5 021 - 1 P . 2 . - .... | C |
| | 21 | 16.8 | 3 | 1100 | 40.3 | 41.3 | 43.3 | 47.4 | 50.4 | 55.9 | 63.5 | 3EP5 021 - 2 P . 3 . - .... | C |
| | 24 | 19.2 | 2 | 750 | 47.1 | 49.0 | 51.4 | 56.9 | 61.2 | 68.5 | 78.3 | 3EP5 024 - 1 P . 2 . - .... | C |
| | 24 | 19.2 | 3 | 1100 | 46.1 | 47.2 | 49.5 | 54.1 | 57.6 | 63.9 | 72.6 | 3EP5 024 - 2 P . 3 . - .... | C |
| | 30 | 24.0 | 2 | 750 | 58.9 | 61.2 | 64.3 | 71.1 | 76.5 | 85.7 | 97.9 | 3EP5 030 - 1 P . 2 . - .... | C |
| | 30 | 24.0 | 3 | 1100 | 57.6 | 59.0 | 61.9 | 67.7 | 72.0 | 79.9 | 90.7 | 3EP5 030 - 2 P . 3 . - .... | C |
| 36 | 30 | 24.0 | 2 | 750 | 58.9 | 61.2 | 64.3 | 71.1 | 76.5 | 85.7 | 97.9 | 3EP5 030 - 1 P . 2 . - .... | C |
| | 30 | 24.0 | 3 | 1100 | 57.6 | 59.0 | 61.9 | 67.7 | 72.0 | 79.9 | 90.7 | 3EP5 030 - 2 P . 3 . - .... | C |
| | 36 | 28.8 | 2 | 750 | 70.7 | 73.4 | 77.1 | 85.4 | 91.8 | 103 | 118 | 3EP5 036 - 1 P . 2 . - .... | E |
| | 36 | 28.8 | 3 | 1100 | 69.1 | 70.8 | 74.3 | 81.2 | 86.4 | 95.9 | 109 | 3EP5 036 - 2 P . 3 . - .... | C |
| | 45 | 36 | 2 | 750 | 88.4 | 91.8 | 96.4 | 107 | 115 | 129 | 147 | 3EP5 045 - 1 P . 2 . - .... | E |
| | 45 | 36 | 3 | 1100 | 86.4 | 88.6 | 92.9 | 102 | 108 | 120 | 136 | 3EP5 045 - 2 P . 3 . - .... | E |
| 52 | 42 | 34 | 2 | 750 | 82.5 | 85.7 | 90.0 | 99.6 | 107 | 120 | 137 | 3EP5 042 - 1 P . 2 . - .... | E |
| | 42 | 34 | 3 | 1100 | 80.6 | 82.7 | 86.7 | 94.8 | 101 | 112 | 127 | 3EP5 042 - 2 P . 3 . - .... | E |
| | 54 | 43 | 2 | 750 | 106 | 110 | 116 | 128 | 138 | 154 | 176 | 3EP5 054 - 1 P . 2 . - .... | E |
| | 54 | 43 | 3 | 1100 | 104 | 106 | 111 | 122 | 130 | 144 | 163 | 3EP5 054 - 2 P . 3 . - .... | E |
| 72.5 | 54 | 43 | 2 | 750 | 106 | 110 | 116 | 128 | 138 | 154 | 176 | 3EP5 054 - 1 P . 2 . - .... | E |
| | 54 | 43 | 3 | 1100 | 104 | 106 | 111 | 122 | 130 | 144 | 163 | 3EP5 054 - 2 P . 3 . - .... | E |
| | 60 | 48 | 2 | 750 | 118 | 122 | 129 | 142 | 153 | 171 | 196 | 3EP5 060 - 1 P . 2 . - .... | E |
| | 60 | 48 | 3 | 1100 | 115 | 118 | 124 | 135 | 144 | 160 | 181 | 3EP5 060 - 2 P . 3 . - .... | E |
| | 66 | 53 | 2 | 750 | 130 | 135 | 141 | 157 | 168 | 188 | 215 | 3EP5 066 - 1 P . 2 . - .... | H |
| | 66 | 53 | 3 | 1100 | 127 | 130 | 136 | 149 | 158 | 176 | 200 | 3EP5 066 - 2 P . 3 . - .... | H |
| | 72 | 58 | 2 | 750 | 141 | 147 | 154 | 171 | 184 | 206 | 235 | 3EP5 072 - 1 P . 2 . - .... | H |
| | 72 | 58 | 3 | 1100 | 138 | 142 | 149 | 162 | 173 | 192 | 218 | 3EP5 072 - 2 P . 3 . - .... | H |
| 123 | 96 | 77 | 2 | 750 | 188 | 196 | 206 | 228 | 245 | 274 | 313 | 3EP5 096 - 1 P . 2 . - .... | J |
| | 96 | 77 | 3 | 1100 | 184 | 189 | 198 | 217 | 230 | 256 | 290 | 3EP5 096 - 2 P . 3 . - .... | J |

# Ratings and specifications

**Electrical characteristics – neutral ground arresters**

| Highest voltage of the system | Rated voltage | Continu-ous operating voltage | Line discharge class | Long duration current 2ms | Maximum values of the residual voltages at discharge currents of the following impulses | | | | | | | Arrester type | Mini-mum housing size |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $U_s$ kV | $U_r$ kV | $U_c$ kV | LD Class | A | 30/60 µs 0.5 kA kV | 30/60 µs 1 kA kV | 30/60 µs 2 kA kV | 8/20 µs 5 kA kV | 8/20 µs 10 kA kV | 8/20 µs 20 kA kV | 8/20 µs 40 kA kV | | |
| 12 | 9 | 7.2 | 2 | 750 | 17.7 | 18.4 | 19.3 | 21.3 | 23.0 | 25.7 | 29.4 | 3EP5 009 - 1 S . 2 . - .... | C |
| | 9 | 7.2 | 3 | 1100 | 17.3 | 17.7 | 18.6 | 20.3 | 21.6 | 24.0 | 27.2 | 3EP5 009 - 2 S . 3 . - .... | C |
| 24 | 12 | 9.6 | 2 | 750 | 23.6 | 24.5 | 25.7 | 28.5 | 30.6 | 34.3 | 39.2 | 3EP5 012 - 1 S . 2 . - .... | C |
| | 12 | 9.6 | 3 | 1100 | 23.0 | 23.6 | 24.8 | 27.1 | 28.8 | 32.0 | 36.3 | 3EP5 012 - 2 S . 3 . - .... | C |
| 36 | 15 | 12.0 | 2 | 750 | 29.5 | 30.6 | 32.1 | 35.6 | 38.3 | 42.8 | 49.0 | 3EP5 015 - 1 S . 2 . - .... | C |
| | 15 | 12.0 | 3 | 1100 | 28.8 | 29.5 | 31.0 | 33.8 | 36.0 | 40.0 | 45.4 | 3EP5 015 - 2 S . 3 . - .... | C |
| | 45 | 36 | 2 | 750 | 88.4 | 91.8 | 96.4 | 107 | 115 | 129 | 147 | 3EP5 045 - 1 S . 2 . - .... | E |
| | 45 | 36 | 3 | 1100 | 86.4 | 88.6 | 92.9 | 102 | 108 | 120 | 136 | 3EP5 045 - 2 S . 3 . - .... | E |
| 72.5 | 30 | 24.0 | 2 | 750 | 58.9 | 61.2 | 64.3 | 71.1 | 76.5 | 85.7 | 97.9 | 3EP5 030 - 1 S . 2 . - .... | C |
| | 30 | 24.0 | 3 | 1100 | 57.6 | 59.0 | 61.9 | 67.7 | 72.0 | 79.9 | 90.7 | 3EP5 030 - 2 S . 3 . - ... | C |
| 123 | 51 | 41 | 2 | 750 | 100 | 104 | 109 | 121 | 130 | 146 | 166 | 3EP5 051 - 1 S . 2 . - .... | E |
| | 51 | 41 | 3 | 1100 | 97.9 | 100 | 105 | 115 | 122 | 136 | 154 | 3EP5 051 - 2 S . 3 . - .... | E |
| | 60 | 48 | 2 | 750 | 118 | 122 | 129 | 142 | 153 | 171 | 196 | 3EP5 060 - 1 S . 2 . - .... | E |
| | 60 | 48 | 3 | 1100 | 115 | 118 | 124 | 135 | 144 | 160 | 181 | 3EP5 060 - 2 S . 3 . - .... | E |
| | 72 | 58 | 2 | 750 | 141 | 147 | 154 | 171 | 184 | 206 | 235 | 3EP5 072 - 1 S . 2 . - .... | H |
| | 72 | 58 | 3 | 1100 | 138 | 142 | 149 | 162 | 173 | 192 | 218 | 3EP5 072 - 2 S . 3 . - .... | H |

# Ratings and specifications

| Mechanical characteristics | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Housing size | Height [H] | Creepage distance | Housing insulation | | Specified short-term load SSL | Specified long-term load SLL | Grading ring diameter [D] | Maximum weight of arrester | Flashover distance | Arrester type | Figure |
| | mm | mm | Lightning impulse withstand voltage 1.2/50µs kV | Power frequency withstand voltage 1 min., wet kV | N | N | mm | kg | mm | | |
| C | 368 | 648 | 157 | 67 | 5430 | 2170 | - | 24.1 | 242 | 3EP5 ... - .. C . 1 - .... | A |
| E | 566 | 1260 | 266 | 114 | 3530 | 1410 | - | 32.9 | 440 | 3EP5 ... - .. E . 1 - .... | A |
| H | 764 | 1871 | 375 | 160 | 2610 | 1040 | - | 41.6 | 638 | 3EP5 ... - .. H . 1 - .... | A |
| J | 896 | 2279 | 448 | 191 | 2230 | 890 | - | 46.2 | 770 | 3EP5 ... - .. J . 1 - .... | A |

The maximum arrester weight can vary depending on rated voltage and line discharge class.

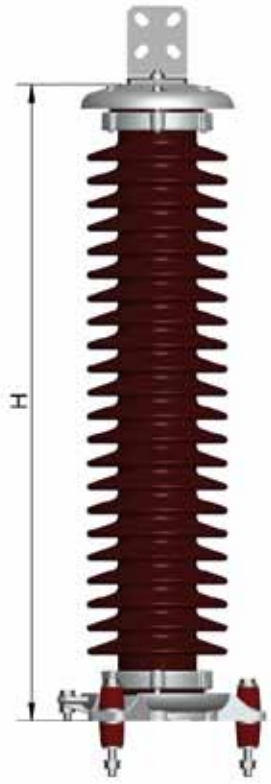
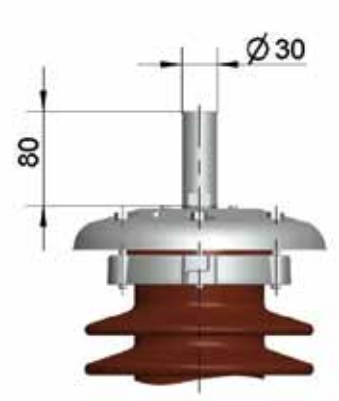


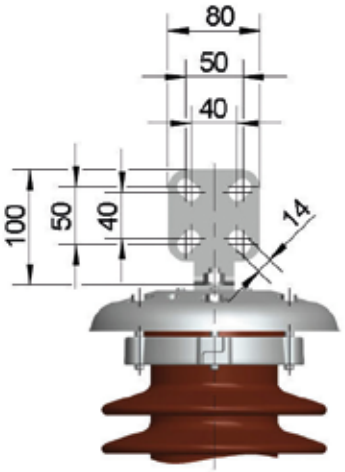

Figure A

## Line terminals




**Bolt**

3EP5 ...-.....-.D..




**DIN/NEMA flat terminal**

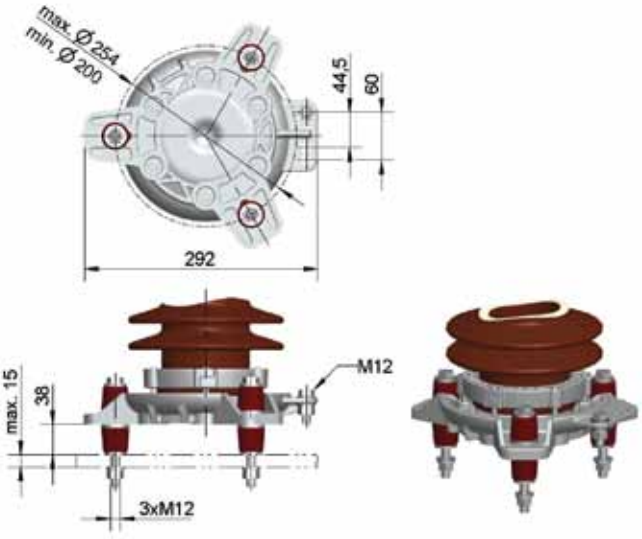
3EP5 ...-.....-.R.. (copper)

3EP5 ...-.....-.U.. (aluminum)

3EP5 ...-.....-.X.. (hot dip galvanized)

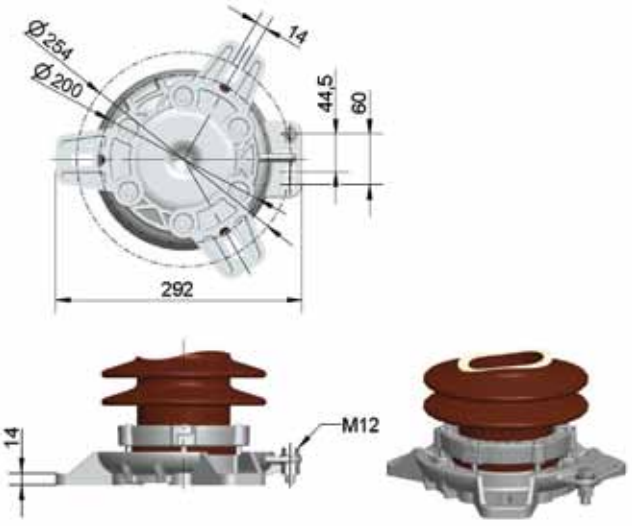
3EP5 ...-.....-.Y.. (stainless steel)

## Mounting




**Insulated**

3EP5 ...-.....-...1




**Grounded**

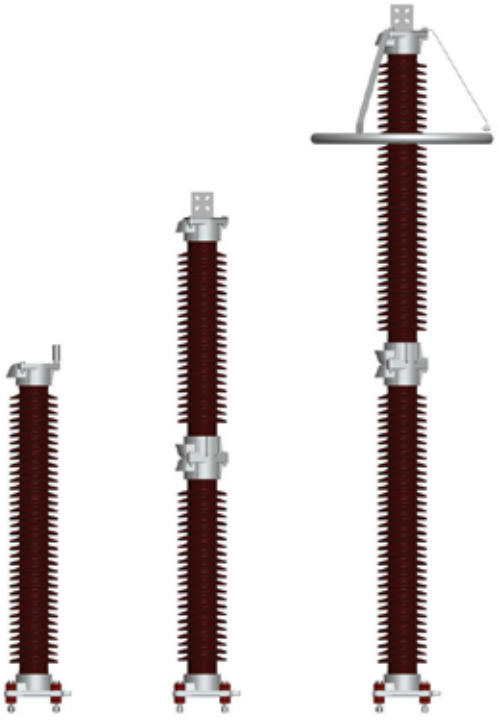
3EP5 ...-.....-...5

# 3EP4 Surge arrester with porcelain housing

## Technical datasheet

### Protection of:

- Transformers
- Circuit breakers
- Generators
- Motors
- Capacitors
- Bushings
- Switchgear



| Maximum values | | 3EP4 | 3EP4 | 3EP4 |
|---|---|---|---|---|
| Highest voltage of the system | kV | 300 | 300 | 362 |
| Maximum rated voltage | kV | 240 | 240 | 288 |
| Nominal discharge current | kA | 10 | 10 | 10 |
| Line discharge class | | 2 | 2 | 3 |
| Energy absorption capability | $kJ/kV_r$ | 5.0 | 5.0 | 8.0 |
| Long duration current impulse | A | 750 | 1100 | 1100 |
| Rated short-circuit current | kA | 65 | 65 | 65 |
| High current impulse | kA | 100 | 100 | 100 |
| Bending moment dynamic | kNm | 4.5 | 4.5 | 4.5 |

# 3EP4 – order numbers

| Data position | 1 | 2 | 3 | 4 | – | 5 | 6 | 7 | – | 8 | 9 | 10 | 11 | 12 | – | 13 | 14 | 15 | 16 | – | Z | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Order number** | **3** | **E** | **P** | **4** | | **x** | **x** | **x** | | **2** | **P** | **E** | **3** | **1** | | **1** | **D** | **A** | **1** | **–** | **Z** | |
| **Product line** | | | | | | | | | | | | | | | | | | | | | | |
| Porcelain-housed surge arrester | 3 | E | P | 4 | | | | | | | | | | | | | | | | | | |
| **Rated voltage in kV** | | | | | | x | x | x | | | | | | | | | | | | | | |
| **Long duration current impulse, energy absorption capability** | | | | | | | | | | | | | | | | | | | | | | |
| $I_{2ms}$ = 750 A, $E_{th}$ = 5 kJ/kV$_r$, line discharge class 2 | | | | | | | | | | 1 | | | 2 | | | | | | | | | |
| $I_{2ms}$ = 1100 A, $E_{th}$ = 5 kJ/kV$_r$, line discharge class 2 | | | | | | | | | | 2 | | | 2 | | | | | | | | | |
| $I_{2ms}$ = 1100 A, $E_{th}$ = 8 kJ/kV$_r$, line discharge class 3 | | | | | | | | | | 2 | | | 3 | | | | | | | | | |
| **Application** | | | | | | | | | | | | | | | | | | | | | | |
| Phase surge arrester | | | | | | | | | | | P | | | | | | | | | | | |
| Neutral point surge arrester | | | | | | | | | | | S | | | | | | | | | | | |
| **Housing size, number of units. Refer to »Mechanical characteristics« on page 65** | | | | | | | | | | | | | | | | | | | | | | |
| Housing »B«, 1 unit | | | | | | | | | | | | B | | 1 | | | | | | | | |
| Housing »C«, 1 unit | | | | | | | | | | | | C | | 1 | | | | | | | | |
| Housing »D«, 1 unit | | | | | | | | | | | | D | | 1 | | | | | | | | |
| Housing »E«, 1 unit | | | | | | | | | | | | E | | 1 | | | | | | | | |
| Housing »F«, 1 unit | | | | | | | | | | | | F | | 1 | | | | | | | | |
| Housing »2xD«, 2 units | | | | | | | | | | | | D | | 2 | | | | | | | | |
| Housing »2xE«, 2 units | | | | | | | | | | | | E | | 2 | | | | | | | | |
| Housing »2xF«, 2 units | | | | | | | | | | | | F | | 2 | | | | | | | | |
| **Form of sheds and color of porcelain** | | | | | | | | | | | | | | | | | | | | | | |
| Normal sheds, brown porcelain, upright mounting | | | | | | | | | | | | | | | | 1 | | | | | | |
| Normal sheds, gray porcelain, upright mounting | | | | | | | | | | | | | | | | 3 | | | | | | |
| Normal sheds, brown porcelain, suspended mounting | | | | | | | | | | | | | | | | 5 | | | | | | |
| Normal sheds, gray porcelain, suspended mounting | | | | | | | | | | | | | | | | 7 | | | | | | |
| **High-voltage terminal** | | | | | | | | | | | | | | | | | | | | | | |
| Metal plate | | | | | | | | | | | | | | | | | A | | | | | |
| Bolt, 30 mm diameter, 80 mm length, stainless steel | | | | | | | | | | | | | | | | | D | | | | | |
| Bolt, 30 mm diameter, 100 mm length, stainless steel | | | | | | | | | | | | | | | | | E | | | | | |
| Bolt, 40 mm diameter, 80 mm length, stainless steel | | | | | | | | | | | | | | | | | G | | | | | |
| Bolt, 40 mm diameter, 120 mm length, stainless steel | | | | | | | | | | | | | | | | | J | | | | | |
| Flat DIN/NEMA, 40x40 ... 50x50, copper | | | | | | | | | | | | | | | | | R | | | | | |
| Flat DIN/NEMA, 40x40 ... 50x50, aluminum | | | | | | | | | | | | | | | | | T | | | | | |
| Flat DIN/NEMAl, 40x40 ... 50x50, hot dip galvanized steel | | | | | | | | | | | | | | | | | X | | | | | |
| Flat DIN/NEMA, 40x40 ... 50x50, stainless steel | | | | | | | | | | | | | | | | | Y | | | | | |
| Bolt, 26 mm diameter, 100 mm length, stainless steel | | | | | | | | | | | | | | | | | Z | | | | | P1A |
| Bolt, 30 mm diameter, 80 mm length, aluminum | | | | | | | | | | | | | | | | | Z | | | | | P1C |
| Bolt, 35 mm diameter, 120 mm length, stainless steel | | | | | | | | | | | | | | | | | Z | | | | | P1F |
| Bolt, 40 mm diameter, 125 mm length, aluminum | | | | | | | | | | | | | | | | | Z | | | | | P1L |
| Flat DIN/NEMA, 40x40 ... 50x50, hot dip galvanized steel, horizontal | | | | | | | | | | | | | | | | | Z | | | | | P2Q |
| Flat, 4xD=16, aluminum | | | | | | | | | | | | | | | | | Z | | | | | P5A |
| Flat, 4xD=17.5 50/50, hot dip galvanized steel | | | | | | | | | | | | | | | | | Z | | | | | P5D |
| Flat, 4xD=17.5 50/50, aluminum | | | | | | | | | | | | | | | | | Z | | | | | P5E |
| Flat, 4xD=14/50, Palm 5, aluminum | | | | | | | | | | | | | | | | | Z | | | | | P5G |
| Flat, 4xD=18/60, Palm 8, aluminum | | | | | | | | | | | | | | | | | Z | | | | | P5K |

# 3EP4 – order numbers

| Data position | 1 | 2 | 3 | 4 | – | 5 | 6 | 7 | – | 8 | 9 | 10 | 11 | 12 | – | 13 | 14 | 15 | 16 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Order number** | **3** | **E** | **P** | **4** | | **x** | **x** | **x** | | **2** | **P** | **E** | **3** | **1** | | **1** | **D** | **A** | **1** | **–** | **Z** |
| **Nameplate** | | | | | | | | | | | | | | | | | | | | | |
| German/English (standard) | | | | | | | | | | | | | | | | | | A | | | |
| French | | | | | | | | | | | | | | | | | | B | | | |
| Czech | | | | | | | | | | | | | | | | | | C | | | |
| Slovene | | | | | | | | | | | | | | | | | | D | | | |
| Russian | | | | | | | | | | | | | | | | | | E | | | |
| Spanish | | | | | | | | | | | | | | | | | | F | | | |
| Portuguese | | | | | | | | | | | | | | | | | | G | | | |
| Arabic | | | | | | | | | | | | | | | | | | R | | | |
| Brazil | | | | | | | | | | | | | | | | | | T | | | |
| CFE (Mexico) | | | | | | | | | | | | | | | | | | U | | | |
| Customized version | | | | | | | | | | | | | | | | | | Z | | | |
| **Mounting** | | | | | | | | | | | | | | | | | | | | | |
| 200 mm x 200 mm, grounded | | | | | | | | | | | | | | | | | | | 0 | | |
| 200 mm x 200 mm, insulated | | | | | | | | | | | | | | | | | | | 1 | | |
| 310 mm x 310 mm, insulated | | | | | | | | | | | | | | | | | | | 3 | | |
| D=10", grounded | | | | | | | | | | | | | | | | | | | 5 | | |
| D=10", insulated | | | | | | | | | | | | | | | | | | | 7 | | |
| **Accessories** | | | | | | | | | | | | | | | | | | | | | |
| Refer to table »Optional accessories« on page 110 | | | | | | | | | | | | | | | | | | | | – | Z |

# Ratings and specifications

**Electrical characteristics – phase arresters**

| Highest voltage of the system | Rated voltage | Continu-ous operating voltage | Line discharge class | Long duration current 2ms | Maximum values of the residual voltages at discharge currents of the following impulses | | | | | | | Arrester type | Mini-mum housing size |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $U_s$ kV | $U_r$ kV | $U_c$ kV | LD Class | A | 30/60 µs 0.5 kA kV | 30/60 µs 1 kA kV | 30/60 µs 2 kA kV | 8/20 µs 5 kA kV | 8/20 µs 10 kA kV | 8/20 µs 20 kA kV | 8/20 µs 40 kA kV | | |
| 72.5 | 54 | 43 | 2 | 750 | 106 | 110 | 116 | 128 | 138 | 154 | 176 | 3EP4 054 - 1 P . 2 . - .... | C |
| | 54 | 43 | 3 | 1100 | 104 | 106 | 111 | 122 | 130 | 144 | 163 | 3EP4 054 - 2 P . 3 . - .... | C |
| | 60 | 48 | 2 | 750 | 118 | 122 | 129 | 142 | 153 | 171 | 196 | 3EP4 060 - 1 P . 2 . - .... | D |
| | 60 | 48 | 3 | 1100 | 115 | 118 | 124 | 135 | 144 | 160 | 181 | 3EP4 060 - 2 P . 3 . - .... | D |
| | 66 | 53 | 2 | 750 | 130 | 135 | 141 | 157 | 168 | 188 | 215 | 3EP4 066 - 1 P . 2 . - .... | D |
| | 66 | 53 | 3 | 1100 | 127 | 130 | 136 | 149 | 158 | 176 | 200 | 3EP4 066 - 2 P . 3 . - .... | D |
| | 72 | 58 | 2 | 750 | 141 | 147 | 154 | 171 | 184 | 206 | 235 | 3EP4 072 - 1 P . 2 . - .... | D |
| | 72 | 58 | 3 | 1100 | 138 | 142 | 149 | 162 | 173 | 192 | 218 | 3EP4 072 - 2 P . 3 . - .... | D |
| 123 | 96 | 77 | 2 | 750 | 188 | 196 | 206 | 228 | 245 | 274 | 313 | 3EP4 096 - 1 P . 2 . - .... | D |
| | 96 | 77 | 2 | 1100 | 173 | 177 | 186 | 203 | 216 | 240 | 272 | 3EP4 096 - 2 P . 2 . - .... | D |
| | 96 | 77 | 3 | 1100 | 184 | 189 | 198 | 217 | 230 | 256 | 290 | 3EP4 096 - 2 P . 3 . - .... | D |
| | 102 | 82 | 2 | 750 | 200 | 208 | 218 | 242 | 260 | 291 | 333 | 3EP4 102 - 1 P . 2 . - .... | D |
| | 102 | 82 | 3 | 1100 | 196 | 201 | 211 | 230 | 245 | 272 | 308 | 3EP4 102 - 2 P . 3 . - .... | D |
| | 108 | 86 | 2 | 750 | 212 | 220 | 231 | 256 | 275 | 308 | 353 | 3EP4 108 - 1 P . 2 . - .... | D |
| | 108 | 86 | 3 | 1100 | 207 | 213 | 223 | 244 | 259 | 288 | 327 | 3EP4 108 - 2 P . 3 . - .... | D |
| | 154 | 123 | 3 | 1100 | 296 | 303 | 318 | 347 | 370 | 410 | 466 | 3EP4 154 - 2 P . 3 . - .... | E |
| 145 | 120 | 96 | 2 | 750 | 236 | 245 | 257 | 285 | 306 | 343 | 392 | 3EP4 120 - 1 P . 2 . - .... | D |
| | 120 | 96 | 3 | 1100 | 230 | 236 | 248 | 271 | 288 | 320 | 363 | 3EP4 120 - 2 P . 3 . - .... | D |
| | 132 | 106 | 3 | 1100 | 253 | 260 | 272 | 298 | 317 | 352 | 399 | 3EP4 132 - 2 P . 3 . - .... | E |
| | 144 | 115 | 3 | 1100 | 276 | 283 | 297 | 325 | 346 | 384 | 435 | 3EP4 144 - 2 P . 3 . - .... | E |
| 170 | 138 | 110 | 3 | 1100 | 265 | 272 | 285 | 311 | 331 | 368 | 417 | 3EP4 138 - 2 P . 3 . - .... | E |
| | 144 | 115 | 3 | 1100 | 276 | 283 | 297 | 325 | 346 | 384 | 435 | 3EP4 144 - 2 P . 3 . - .... | E |
| | 150 | 120 | 3 | 1100 | 288 | 295 | 310 | 338 | 360 | 400 | 454 | 3EP4 150 - 2 P . 3 . - .... | E |
| 245 | 192 | 154 | 3 | 1100 | 369 | 378 | 396 | 433 | 461 | 511 | 581 | 3EP4 192 - 2 P . 3 . - .... | 2xD |
| | 198 | 158 | 3 | 1100 | 380 | 390 | 409 | 447 | 475 | 527 | 599 | 3EP4 198 - 2 P . 3 . - .... | 2xD |
| | 228 | 182 | 3 | 1100 | 438 | 449 | 471 | 514 | 547 | 607 | 689 | 3EP4 228 - 2 P . 3 . - .... | 2xD |
| 300 | 228 | 182 | 3 | 1100 | 438 | 449 | 471 | 514 | 547 | 607 | 689 | 3EP4 228 - 2 P . 3 . - .... | 2xD |
| | 240 | 192 | 3 | 1100 | 461 | 472 | 495 | 541 | 576 | 639 | 726 | 3EP4 240 - 2 P . 3 . - .... | 2xD |
| 362 | 276 | 221 | 3 | 1100 | 530 | 543 | 570 | 623 | 662 | 735 | 835 | 3EP4 276 - 2 P . 3 . - .... | 2xF |
| | 288 | 230 | 3 | 1100 | 553 | 567 | 594 | 650 | 691 | 767 | 871 | 3EP4 288 - 2 P . 3 . - .... | 2xF |

# Ratings and specifications

## Electrical characteristics – neutral ground arresters

| Highest voltage of the system | Rated voltage | Continuous operating voltage | Line discharge class | Long duration current 2ms | Maximum values of the residual voltages at discharge currents of the following impulses | | | | | | | Arrester type | Minimum housing size |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $U_s$ kV | $U_r$ kV | $U_c$ kV | LD Class | A | 30/60 µs 0.5 kA kV | 30/60 µs 1 kA kV | 30/60 µs 2 kA kV | 8/20 µs 5 kA kV | 8/20 µs 10 kA kV | 8/20 µs 20 kA kV | 8/20 µs 40 kA kV | | |
| 72.5 | 30 | 24.0 | 2 | 750 | 58.9 | 61.2 | 64.3 | 71.1 | 76.5 | 85.7 | 97.9 | 3EP4 030 - 1 S . 2 . - .... | B |
| | 30 | 24.0 | 3 | 1100 | 57.6 | 59.0 | 61.9 | 67.7 | 72.0 | 79.9 | 90.7 | 3EP4 030 - 2 S . 3 . - .... | B |
| 123 | 51 | 41 | 2 | 750 | 100 | 104 | 109 | 121 | 130 | 146 | 166 | 3EP4 051 - 1 S . 2 . - .... | C |
| | 51 | 41 | 3 | 1100 | 97,9 | 100 | 105 | 115 | 122 | 136 | 154 | 3EP4 051 - 2 S . 3 . - .... | C |
| | 60 | 48 | 2 | 750 | 118 | 122 | 129 | 142 | 153 | 171 | 196 | 3EP4 060 - 1 S . 2 . - .... | D |
| | 60 | 48 | 3 | 1100 | 115 | 118 | 124 | 135 | 144 | 160 | 181 | 3EP4 060 - 2 S . 3 . - .... | D |
| | 72 | 58 | 2 | 750 | 141 | 147 | 154 | 171 | 184 | 206 | 235 | 3EP4 072 - 1 S . 2 . - .... | D |
| | 72 | 58 | 3 | 1100 | 138 | 142 | 149 | 162 | 173 | 192 | 218 | 3EP4 072 - 2 S . 3 . - .... | D |
| 145 | 80 | 64 | 2 | 750 | 157 | 163 | 171 | 190 | 204 | 228 | 261 | 3EP4 080 - 1 S . 2 . - .... | D |
| | 80 | 64 | 3 | 1100 | 154 | 157 | 165 | 180 | 192 | 213 | 242 | 3EP4 080 - 2 S . 3 . - .... | D |
| | 84 | 67 | 2 | 750 | 165 | 171 | 180 | 199 | 214 | 240 | 274 | 3EP4 084 - 1 S . 2 . - .... | D |
| | 84 | 67 | 3 | 1100 | 161 | 165 | 173 | 190 | 202 | 224 | 254 | 3EP4 084 - 2 S . 3 . - .... | D |
| 245 | 102 | 82 | 2 | 750 | 200 | 208 | 218 | 242 | 260 | 291 | 333 | 3EP4 102 - 1 S . 2 . - .... | D |
| | 102 | 82 | 3 | 1100 | 196 | 201 | 211 | 230 | 245 | 272 | 308 | 3EP4 102 - 2 S . 3 . - .... | D |
| | 108 | 86 | 2 | 750 | 212 | 220 | 231 | 256 | 275 | 308 | 353 | 3EP4 108 - 1 S . 2 . - .... | D |
| | 108 | 86 | 3 | 1100 | 207 | 213 | 223 | 244 | 259 | 288 | 327 | 3EP4 108 - 2 S . 3 . - .... | D |

## Mechanical characteristics

| Housing size | Height [H] | Creepage distance | Housing insulation | | | Specified short-term load SSL | Specified long-term load SLL | Grading ring diameter [D] | Maximum weight of arrester | Flashover distance | Arrester type | Figure |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | mm | mm | Lightning impulse withstand voltage 1.2/50µs kV | Switching impulse withstand voltage 250µs/ 2500µs, wet kV | Power frequency withstand voltage 1 min., wet kV | N | N | mm | kg | mm | | |
| B | 390 | 470 | 113 | 78 | 46 | 11530 | 4610 | – | 21.1 | 195 | 3EP4 ... - .. B . 1 - .... | A |
| C | 555 | 980 | 206 | 142 | 83 | 8100 | 3240 | – | 27.3 | 355 | 3EP4 ... - .. C . 1 - .... | A |
| D | 1050 | 2490 | 484 | 334 | 196 | 4280 | 1710 | – | 50.2 | 835 | 3EP4 ... - .. D . 1 - .... | A |
| E | 1315 | 3405 | 658 | 454 | 267 | 3420 | 1360 | – | 65.5 | 1135 | 3EP4 ... - .. E . 1 - .... | A |
| F | 1460 | 3835 | 722 | 498 | 293 | 3080 | 1230 | – | 73.3 | 1245 | 3EP4 ... - .. F . 1 - .... | A |
| 2xD | 2100 | 4980 | 900 | 620 | 360 | 2140 | 850 | – | 105 | 1670 | 3EP4 ... - .. D . 2 - .... | B |
| 2xE | 2630 | 6810 | 1316 | 908 | 534 | 1710 | 680 | 800 | 134 | 1885 | 3EP4 ... - .. E . 2 - .... | C |
| 2xF | 2920 | 7670 | 1444 | 996 | 586 | 1540 | 610 | 800 | 148 | 2150 | 3EP4 ... - .. F . 2 - .... | C |

The maximum arrester weight can vary depending on rated voltage and line discharge class.

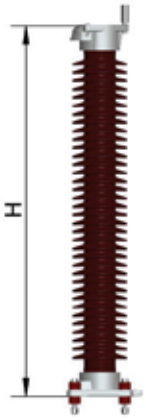



Figure A

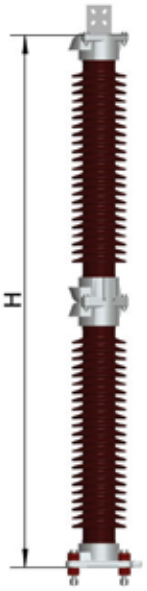
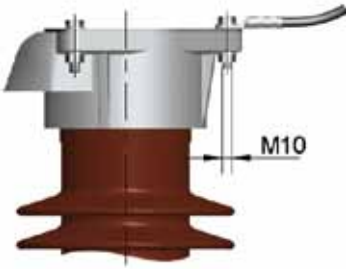



Figure B

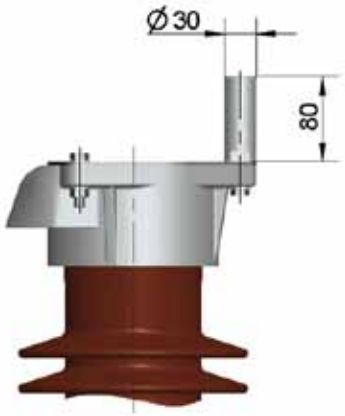
Figure C

## Line terminals



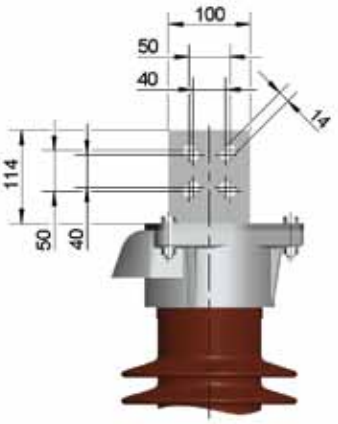

**Plate**

3EP4 ...-.....-.A..




**Bolt**

3EP4 ...-.....-.D..




**DIN/NEMA flat terminal**

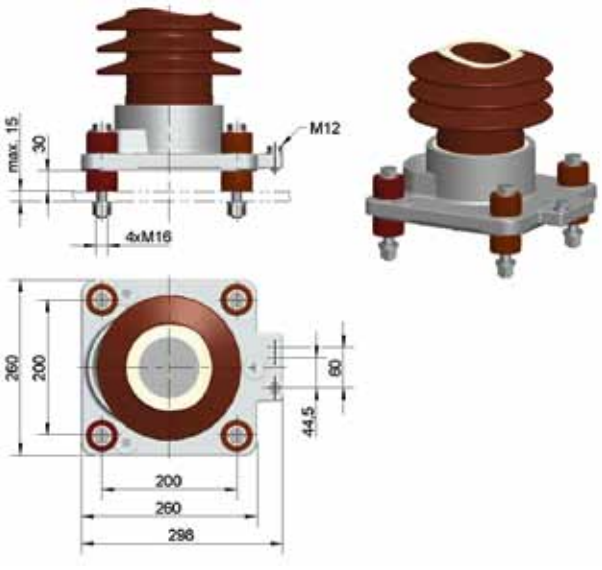
3EP4 ...-.....-.R.. (copper)

3EP4 ...-.....-.T.. (aluminum)

3EP4 ...-.....-.X.. (hot dip galvanized)

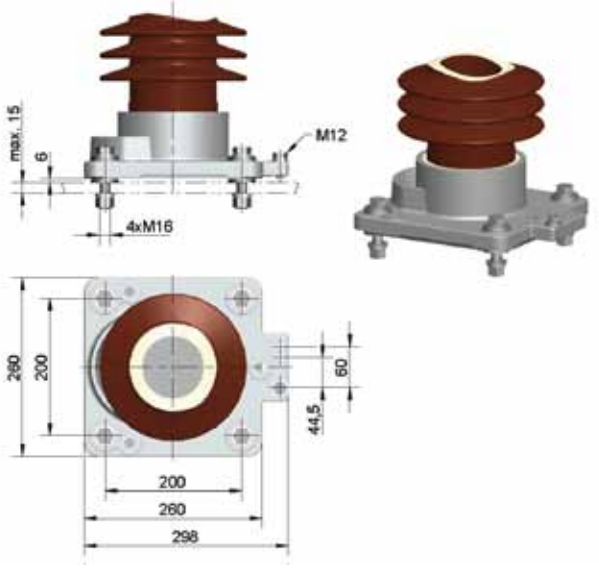
3EP4 ...-.....-.Y.. (stainless steel)

## Mounting




**Insulated**

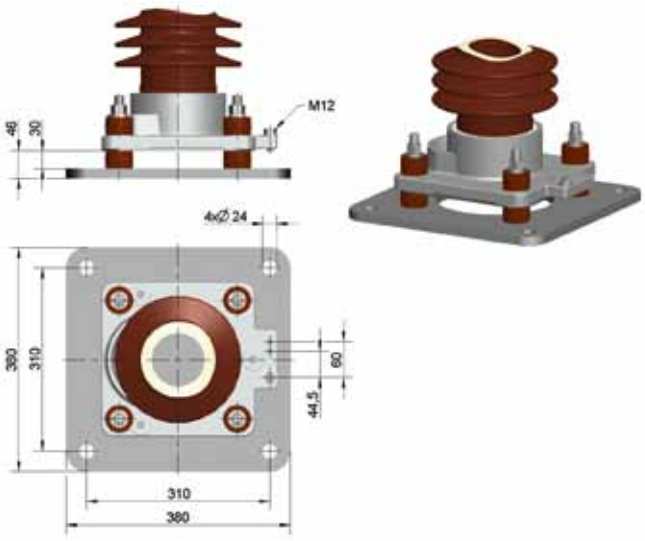
3EP4 ...-.....-...1




**Grounded**

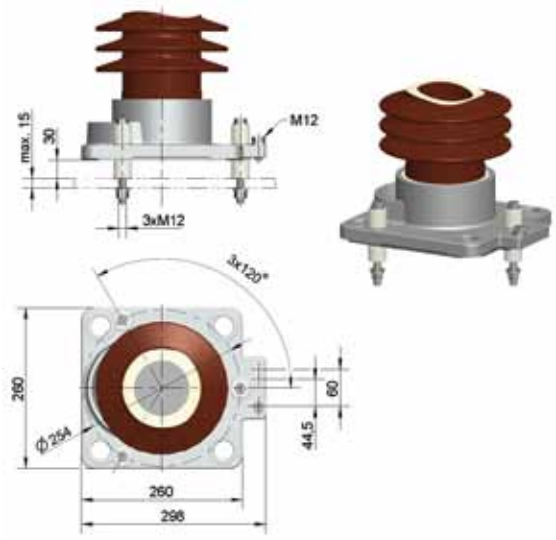
3EP4 ...-.....-...0

## Mounting



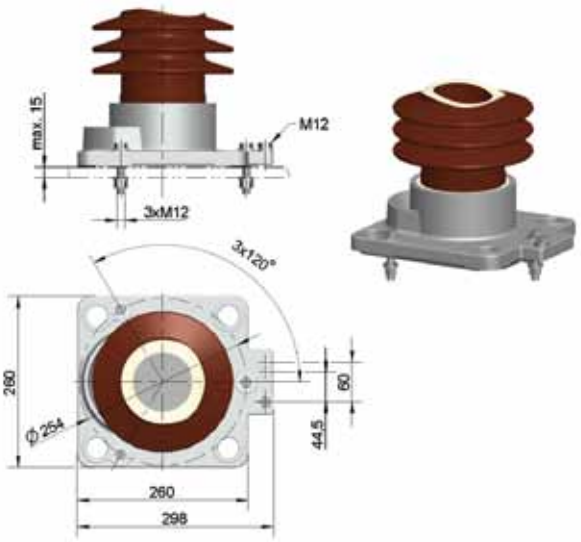

**Insulated**

3EP4 ...-.....-...3




**Insulated**

3EP4 ...-.....-...7




**Grounded**

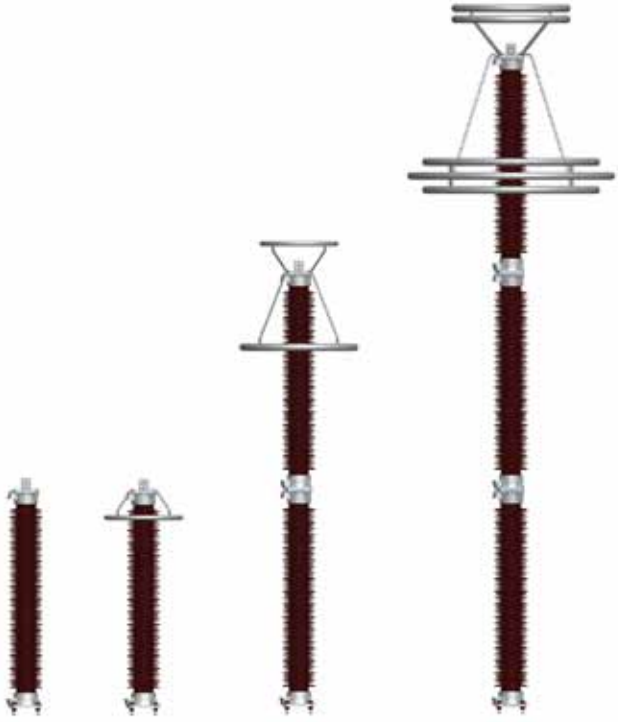
3EP4 ...-.....-...5

# 3EP6 Surge arrester with porcelain housing

## Technical datasheet

### Protection of:

- Transformers
- Circuit breakers
- Generators
- Motors
- Capacitors
- Bushings
- Switchgear



| Maximum values | | 3EP6 | 3EP6 | 3EP6 |
|---|---|---|---|---|
| Highest voltage of the system | kV | 420 | 550 | 800 |
| Maximum rated voltage | kV | 360 | 468 | 588 |
| Nominal discharge current | kA | 10 | 20 | 20 |
| Line discharge class | | 3 | 4 | 5 |
| Energy absorption capability | kJ/kV$_r$ | 8.0 | 10.0 | 14.0 |
| Long duration current impulse | A | 1100 | 1600 | 2000 |
| Rated short-circuit current | kA | 65 | 65 | 65 |
| High current impulse | kA | 100 | 100 | 100 |
| Bending moment dynamic | kNm | 18/30 | 18/30 | 18/30 |

# 3EP6 – order numbers

| Data position | 1 | 2 | 3 | 4 | – | 5 | 6 | 7 | – | 8 | 9 | 10 | 11 | 12 | – | 13 | 14 | 15 | 16 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Order number** | **3** | **E** | **P** | **6** | | **x** | **x** | **x** | | **2** | **P** | **F** | **3** | **1** | | **2** | **D** | **A** | **1** | **-** | **Z** | | |
| **Product line** | | | | | | | | | | | | | | | | | | | | | | | |
| Porcelain-housed surge arrester | 3 | E | P | 6 | | | | | | | | | | | | | | | | | | | |
| **Rated voltage in kV** | | | | | | x | x | x | | | | | | | | | | | | | | | |
| **Long duration current impulse, energy absorption capability** | | | | | | | | | | | | | | | | | | | | | | | |
| $I_{2ms}$ = 1100 A, $E_{th}$ = 8 kJ/$kV_r$, line discharge class 3 | | | | | | | | | | 2 | | | 3 | | | | | | | | | | |
| $I_{2ms}$ = 1600 A, $E_{th}$ = 10 kJ/$kV_r$, line discharge class 4 | | | | | | | | | | 3 | | | 4 | | | | | | | | | | |
| $I_{2ms}$ = 2000 A, $E_{th}$ = 14 kJ/$kV_r$, line discharge class 5 | | | | | | | | | | 4 | | | 5 | | | | | | | | | | |
| **Application** | | | | | | | | | | | | | | | | | | | | | | | |
| Phase surge arrester | | | | | | | | | | | P | | | | | | | | | | | | |
| Neutral point surge arrester | | | | | | | | | | | S | | | | | | | | | | | | |
| **Housing size, number of units. Refer to »Mechanical characteristics« on page 74** | | | | | | | | | | | | | | | | | | | | | | | |
| Housing »C«, 1 unit | | | | | | | | | | | | C | | 1 | | | | | | | | | |
| Housing »D«, 1 unit | | | | | | | | | | | | D | | 1 | | | | | | | | | |
| Housing »F«, 1 unit | | | | | | | | | | | | F | | 1 | | | | | | | | | |
| Housing »G«, 1 unit | | | | | | | | | | | | G | | 1 | | | | | | | | | |
| Housing »J«, 1 unit | | | | | | | | | | | | J | | 1 | | | | | | | | | |
| Housing »2xD«, 2 units | | | | | | | | | | | | D | | 2 | | | | | | | | | |
| Housing »D+F«, 2 units | | | | | | | | | | | | N | | 2 | | | | | | | | | |
| Housing »D+G«, 2 units | | | | | | | | | | | | P | | 2 | | | | | | | | | |
| Housing »2xF«, 2 units | | | | | | | | | | | | F | | 2 | | | | | | | | | |
| Housing »2xF«, 2 units, increased SSL | | | | | | | | | | | | F | | 6 | | | | | | | | | |
| Housing »2xG«, 2 units | | | | | | | | | | | | G | | 2 | | | | | | | | | |
| Housing »2xG«, 2 units, increased SSL | | | | | | | | | | | | G | | 6 | | | | | | | | | |
| Housing »F+J«, 2 units | | | | | | | | | | | | R | | 2 | | | | | | | | | |
| Housing »F+J«, 2 units, increased SSL | | | | | | | | | | | | R | | 6 | | | | | | | | | |
| Housing »G+J«, 2 units | | | | | | | | | | | | S | | 2 | | | | | | | | | |
| Housing »2xJ«, 2 units | | | | | | | | | | | | J | | 2 | | | | | | | | | |
| Housing »2xJ«, 2 units, increased SSL | | | | | | | | | | | | J | | 6 | | | | | | | | | |
| Housing »3xF«, 3 units | | | | | | | | | | | | F | | 3 | | | | | | | | | |
| Housing »3xF«, 3 units, increased SSL | | | | | | | | | | | | F | | 7 | | | | | | | | | |
| Housing »3xG«, 3 units | | | | | | | | | | | | G | | 3 | | | | | | | | | |
| Housing »3xG«, 3 units, increased SSL | | | | | | | | | | | | G | | 7 | | | | | | | | | |
| Housing »3xJ«, 3 units | | | | | | | | | | | | J | | 3 | | | | | | | | | |
| Housing »3xJ«, 3 units, increased SSL | | | | | | | | | | | | J | | 7 | | | | | | | | | |
| **Form of sheds and color of porcelain** | | | | | | | | | | | | | | | | | | | | | | | |
| Alternating sheds, brown porcelain, upright mounting | | | | | | | | | | | | | | | | 2 | | | | | | | |
| Alternating sheds, gray porcelain, upright mounting | | | | | | | | | | | | | | | | 4 | | | | | | | |
| Alternating sheds, brown porcelain, suspended mounting | | | | | | | | | | | | | | | | 6 | | | | | | | |
| Alternating sheds, gray porcelain, suspended mounting | | | | | | | | | | | | | | | | 8 | | | | | | | |

# 3EP6 – order numbers

| Data position | 1 | 2 | 3 | 4 | – | 5 | 6 | 7 | – | 8 | 9 | 10 | 11 | 12 | – | 13 | 14 | 15 | 16 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Order number** | **3** | **E** | **P** | **6** | | **x** | **x** | **x** | | **2** | **P** | **F** | **3** | **1** | | **2** | **D** | **A** | **1** | **-** | **Z** | | |
| **High-voltage terminal** | | | | | | | | | | | | | | | | | | | | | | | |
| Metal plate | | | | | | | | | | | | | | | | | A | | | | | | |
| Bolt, 30 mm diameter, 80 mm length, hot dip galvanized steel | | | | | | | | | | | | | | | | | C | | | | | | |
| Bolt, 30 mm diameter, 80 mm length, stainless steel | | | | | | | | | | | | | | | | | D | | | | | | |
| Bolt, 40 mm diameter, 80 mm length, stainless steel | | | | | | | | | | | | | | | | | G | | | | | | |
| Bolt, 40 mm diameter, 120 mm length, stainless steel | | | | | | | | | | | | | | | | | J | | | | | | |
| Flat double DIN, 200x100, hot dip galvanized steel | | | | | | | | | | | | | | | | | M | | | | | | |
| Flat DIN/NEMA, 40x40 ... 50x50, copper | | | | | | | | | | | | | | | | | R | | | | | | |
| Flat DIN/NEMA, 40x40 ... 50x50, aluminum | | | | | | | | | | | | | | | | | T | | | | | | |
| Flat DIN/NEMA, 40x40 ... 50x50, hot dip galvanized steel | | | | | | | | | | | | | | | | | X | | | | | | |
| Flat DIN/NEMA, 40x40 ... 50x50, stainless steel | | | | | | | | | | | | | | | | | Y | | | | | | |
| Bolt, 30 mm diameter, 125 mm length, stainless steel | | | | | | | | | | | | | | | | | Z | | | | | P1E | |
| Flat DIN/NEMA, 40x40 ... 50x50, hot dip galvanized steel, horizontal | | | | | | | | | | | | | | | | | Z | | | | | P2R | |
| Flat, 4xD=16, aluminum | | | | | | | | | | | | | | | | | Z | | | | | P5A | |
| Flat, 4xD=14/50, Palm 5, aluminum | | | | | | | | | | | | | | | | | Z | | | | | P5G | |
| **Nameplate** | | | | | | | | | | | | | | | | | | | | | | | |
| German/English (standard) | | | | | | | | | | | | | | | | | | A | | | | | |
| French | | | | | | | | | | | | | | | | | | B | | | | | |
| Czech | | | | | | | | | | | | | | | | | | C | | | | | |
| Slovene | | | | | | | | | | | | | | | | | | D | | | | | |
| Russian | | | | | | | | | | | | | | | | | | E | | | | | |
| Spanish | | | | | | | | | | | | | | | | | | F | | | | | |
| Portuguese | | | | | | | | | | | | | | | | | | G | | | | | |
| Arabic | | | | | | | | | | | | | | | | | | R | | | | | |
| Brazil | | | | | | | | | | | | | | | | | | T | | | | | |
| CFE (Mexico) | | | | | | | | | | | | | | | | | | U | | | | | |
| Customized version | | | | | | | | | | | | | | | | | | Z | | | | | |
| **Mounting** | | | | | | | | | | | | | | | | | | | | | | | |
| 240 mm x 240 mm, grounded | | | | | | | | | | | | | | | | | | | 0 | | | | |
| 240 mm x 240 mm, insulated | | | | | | | | | | | | | | | | | | | 1 | | | | |
| 310 mm x 310 mm, insulated | | | | | | | | | | | | | | | | | | | 3 | | | | |
| D=10", grounded | | | | | | | | | | | | | | | | | | | 5 | | | | |
| D=16,5", grounded | | | | | | | | | | | | | | | | | | | 6 | | | | |
| D=10", insulated | | | | | | | | | | | | | | | | | | | 7 | | | | |
| D=16,5", insulated | | | | | | | | | | | | | | | | | | | 8 | | | | |
| 240 mm x 240 mm, insulated, increased SSL | | | | | | | | | | | | | | | | | | | 9 | | | | R4A |
| **Accessories** | | | | | | | | | | | | | | | | | | | | | | | |
| Refer to table »Optional accessories« on page 110 | | | | | | | | | | | | | | | | | | | | – | Z | | |

# Ratings and specifications

**Electrical characteristics – phase arresters**

| Highest voltage of the system | Rated voltage | Continu-ous operating voltage | Line discharge class | Long duration current 2ms | Maximum values of the residual voltages at discharge currents of the following impulses | | | | | | | Arrester type | Mini-mum housing size |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $U_s$ kV | $U_r$ kV | $U_c$ kV | LD Class | A | 30/60 µs 0.5 kA kV | 30/60 µs 1 kA kV | 30/60 µs 2 kA kV | 8/20 µs 5 kA kV | 8/20 µs 10 kA kV | 8/20 µs 20 kA kV | 8/20 µs 40 kA kV | | |
| 123 | 96 | 77 | 3 | 1100 | 184 | 189 | 198 | 217 | 230 | 256 | 290 | 3EP6 096 - 2 P . 3 . - .... | C |
| | 96 | 77 | 4 | 1600 | 179 | 183 | 192 | 208 | 221 | 243 | 265 | 3EP6 096 - 3 P . 4 . - .... | C |
| | 102 | 82 | 3 | 1100 | 196 | 201 | 211 | 230 | 245 | 272 | 308 | 3EP6 102 - 2 P . 3 . - .... | C |
| | 102 | 82 | 4 | 1600 | 190 | 195 | 204 | 221 | 235 | 258 | 282 | 3EP6 102 - 3 P . 4 . - .... | C |
| | 108 | 86 | 3 | 1100 | 207 | 213 | 223 | 244 | 259 | 288 | 327 | 3EP6 108 - 2 P . 3 . - .... | C |
| | 108 | 86 | 4 | 1600 | 201 | 206 | 216 | 233 | 248 | 273 | 298 | 3EP6 108 - 3 P . 4 . - .... | C |
| | 154 | 123 | 3 | 1100 | 296 | 303 | 318 | 347 | 370 | 410 | 466 | 3EP6 154 - 2 P . 3 . - .... | C |
| | 154 | 123 | 4 | 1600 | 287 | 294 | 308 | 333 | 354 | 390 | 425 | 3EP6 154 - 3 P . 4 . - .... | C |
| 145 | 120 | 96 | 3 | 1100 | 230 | 236 | 248 | 271 | 288 | 320 | 363 | 3EP6 120 - 2 P . 3 . - .... | C |
| | 120 | 96 | 4 | 1600 | 224 | 229 | 240 | 259 | 276 | 304 | 331 | 3EP6 120 - 3 P . 4 . - .... | C |
| | 132 | 106 | 3 | 1100 | 253 | 260 | 272 | 298 | 317 | 352 | 399 | 3EP6 132 - 2 P . 3 . - .... | C |
| | 132 | 106 | 4 | 1600 | 246 | 252 | 264 | 285 | 304 | 334 | 364 | 3EP6 132 - 3 P . 4 . - .... | C |
| | 144 | 115 | 3 | 1100 | 276 | 283 | 297 | 325 | 346 | 384 | 435 | 3EP6 144 - 2 P . 3 . - .... | C |
| | 144 | 115 | 4 | 1600 | 268 | 275 | 288 | 311 | 331 | 364 | 397 | 3EP6 144 - 3 P . 4 . - .... | C |
| 170 | 138 | 110 | 3 | 1100 | 265 | 272 | 285 | 311 | 331 | 368 | 417 | 3EP6 138 - 2 P . 3 . - .... | C |
| | 138 | 110 | 4 | 1600 | 257 | 263 | 276 | 298 | 317 | 349 | 381 | 3EP6 138 - 3 P . 4 . - .... | C |
| | 144 | 115 | 3 | 1100 | 276 | 283 | 297 | 325 | 346 | 384 | 435 | 3EP6 144 - 2 P . 3 . - .... | C |
| | 144 | 115 | 4 | 1600 | 268 | 275 | 288 | 311 | 331 | 364 | 397 | 3EP6 144 - 3 P . 4 . - .... | C |
| | 150 | 120 | 3 | 1100 | 288 | 295 | 310 | 338 | 360 | 400 | 454 | 3EP6 150 - 2 P . 3 . - .... | C |
| | 150 | 120 | 4 | 1600 | 279 | 286 | 300 | 324 | 345 | 380 | 414 | 3EP6 150 - 3 P . 4 . - .... | C |
| 245 | 192 | 154 | 3 | 1100 | 369 | 378 | 396 | 433 | 461 | 511 | 581 | 3EP6 192 - 2 P . 3 . - .... | F |
| | 192 | 154 | 4 | 1600 | 358 | 367 | 384 | 415 | 442 | 486 | 530 | 3EP6 192 - 3 P . 4 . - .... | F |
| | 198 | 158 | 3 | 1100 | 380 | 390 | 409 | 447 | 475 | 527 | 599 | 3EP6 198 - 2 P . 3 . - .... | F |
| | 198 | 158 | 4 | 1600 | 369 | 378 | 396 | 428 | 455 | 501 | 546 | 3EP6 198 - 3 P . 4 . - .... | F |
| | 214 | 171 | 3 | 1100 | 411 | 421 | 442 | 483 | 514 | 570 | 647 | 3EP6 214 - 2 P . 3 . - .... | F |
| | 214 | 171 | 4 | 1600 | 399 | 409 | 428 | 463 | 492 | 541 | 591 | 3EP6 214 - 3 P . 4 . - .... | F |
| | 216 | 173 | 3 | 1100 | 415 | 425 | 446 | 487 | 518 | 575 | 653 | 3EP6 216 - 2 P . 3 . - .... | F |
| | 216 | 173 | 4 | 1600 | 402 | 412 | 432 | 467 | 497 | 546 | 596 | 3EP6 216 - 3 P . 4 . - .... | F |
| | 228 | 182 | 3 | 1100 | 438 | 449 | 471 | 514 | 547 | 607 | 689 | 3EP6 228 - 2 P . 3 . - .... | G |
| | 228 | 182 | 4 | 1600 | 425 | 435 | 456 | 493 | 524 | 577 | 629 | 3EP6 228 - 3 P . 4 . - .... | G |
| 300 | 228 | 182 | 3 | 1100 | 438 | 449 | 471 | 514 | 547 | 607 | 689 | 3EP6 228 - 2 P . 3 . - .... | G |
| | 228 | 182 | 4 | 1600 | 425 | 435 | 456 | 493 | 524 | 577 | 629 | 3EP6 228 - 3 P . 4 . - .... | G |
| | 240 | 192 | 3 | 1100 | 461 | 472 | 495 | 541 | 576 | 639 | 726 | 3EP6 240 - 2 P . 3 . - .... | J |
| | 240 | 192 | 4 | 1600 | 447 | 458 | 480 | 519 | 552 | 607 | 662 | 3EP6 240 - 3 P . 4 . - .... | J |
| 362 | 276 | 221 | 3 | 1100 | 530 | 543 | 570 | 623 | 662 | 735 | 835 | 3EP6 276 - 2 P . 3 . - .... | J-g |
| | 276 | 221 | 4 | 1600 | 514 | 527 | 552 | 597 | 635 | 698 | 762 | 3EP6 276 - 3 P . 4 . - .... | J-g |
| | 276 | 221 | 5 | 2000 | 515 | 531 | 546 | 587 | 621 | 677 | 739 | 3EP6 276 - 4 P . 5 . - .... | J-g |
| | 288 | 230 | 3 | 1100 | 553 | 567 | 594 | 650 | 691 | 767 | 871 | 3EP6 288 - 2 P . 3 . - .... | 2xD |
| | 288 | 230 | 4 | 1600 | 537 | 550 | 576 | 623 | 662 | 729 | 795 | 3EP6 288 - 3 P . 4 . - .... | 2xD |
| | 288 | 230 | 5 | 2000 | 538 | 554 | 570 | 612 | 648 | 706 | 771 | 3EP6 288 - 4 P . 5 . - .... | 2xD |

# Ratings and specifications

| Electrical characteristics – phase arresters | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Highest voltage of the system | Rated voltage | Continu-ous operating voltage | Line discharge class | Long duration current 2ms | Maximum values of the residual voltages at discharge currents of the following impulses | | | | | | | Arrester type | Mini-mum housing size |
| $U_s$ kV | $U_r$ kV | $U_c$ kV | LD Class | A | 30/60 µs 0.5 kA kV | 30/60 µs 1 kA kV | 30/60 µs 2 kA kV | 8/20 µs 5 kA kV | 8/20 µs 10 kA kV | 8/20 µs 20 kA kV | 8/20 µs 40 kA kV | | |
| 420 | 336 | 269 | 3 | 1100 | 645 | 661 | 694 | 758 | 806 | 895 | 1016 | 3EP6 336 - 2 P . 3 . - .... | P |
| | 336 | 269 | 4 | 1600 | 626 | 641 | 672 | 726 | 773 | 850 | 927 | 3EP6 336 - 3 P . 4 . - .... | 2xG |
| | 336 | 269 | 5 | 2000 | 627 | 646 | 665 | 714 | 756 | 824 | 900 | 3EP6 336 - 4 P . 5 . - .... | P |
| | 360 | 288 | 3 | 1100 | 691 | 708 | 743 | 812 | 864 | 959 | 1089 | 3EP6 360 - 2 P . 3 . - .... | 2xG |
| | 360 | 288 | 4 | 1600 | 671 | 687 | 720 | 778 | 828 | 911 | 994 | 3EP6 360 - 3 P . 4 . - .... | 2xG |
| | 360 | 288 | 5 | 2000 | 672 | 693 | 713 | 765 | 810 | 883 | 964 | 3EP6 360 - 4 P . 5 . - .... | 2xG |
| 550 | 396 | 317 | 4 | 1600 | 738 | 756 | 792 | 856 | 911 | 1002 | 1093 | 3EP6 396 - 3 P . 4 . - .... | R |
| | 396 | 317 | 5 | 2000 | 740 | 762 | 784 | 842 | 891 | 971 | 1060 | 3EP6 396 - 4 P . 5 . - .... | R |
| | 420 | 336 | 4 | 1600 | 782 | 802 | 840 | 908 | 966 | 1063 | 1159 | 3EP6 420 - 3 P . 4 . - .... | 2xJ |
| | 420 | 336 | 5 | 2000 | 784 | 808 | 832 | 893 | 945 | 1030 | 1125 | 3EP6 420 - 4 P . 5 . - .... | 2xJ |
| | 444 | 355 | 4 | 1600 | 827 | 848 | 888 | 960 | 1021 | 1123 | 1225 | 3EP6 444 - 3 P . 4 . - .... | 3xF |
| | 444 | 355 | 5 | 2000 | 829 | 854 | 879 | 944 | 999 | 1089 | 1189 | 3EP6 444 - 4 P . 5 . - .... | 2xJ |
| | 468 | 374 | 4 | 1600 | 872 | 893 | 936 | 1012 | 1076 | 1184 | 1292 | 3EP6 468 - 3 P . 4 . - .... | 3xF |
| | 468 | 374 | 5 | 2000 | 874 | 900 | 927 | 995 | 1053 | 1148 | 1253 | 3EP6 468 - 4 P . 5 . - .... | 3xF |
| 800 | 580 | 464 | 5 | 2000 | 1083 | 1116 | 1148 | 1233 | 1305 | 1422 | 1553 | 3EP6 580 - 4 P . 5 . - .... | 3xJ |
| | 588 | 470 | 5 | 2000 | 1098 | 1131 | 1164 | 1250 | 1323 | 1442 | 1574 | 3EP6 588 - 4 P . 5 . - .... | 3xJ |
| **Electrical characteristics – neutral ground arresters** | | | | | | | | | | | | | |
| 245 | 102 | 82 | 3 | 1100 | 196 | 201 | 211 | 230 | 245 | 272 | 308 | 3EP6 102 - 2 S . 3 . - .... | C |
| | 102 | 82 | 4 | 1600 | 190 | 195 | 204 | 221 | 235 | 258 | 282 | 3EP6 102 - 3 S . 4 . - .... | C |
| | 108 | 86 | 3 | 1100 | 207 | 213 | 223 | 244 | 259 | 288 | 327 | 3EP6 108 - 2 S . 3 . - .... | C |
| | 108 | 86 | 4 | 1600 | 201 | 206 | 216 | 233 | 248 | 273 | 298 | 3EP6 108 - 3 S . 4 . - .... | C |
| 420 | 168 | 134 | 3 | 1100 | 323 | 331 | 347 | 379 | 403 | 448 | 508 | 3EP6 168 - 2 S . 3 . - .... | D |
| | 168 | 134 | 4 | 1600 | 313 | 321 | 336 | 363 | 386 | 425 | 464 | 3EP6 168 - 3 S . 4 . - .... | D |

# Ratings and specifications

**Mechanical characteristics**

| Housing size | Height [H] | Creepage distance | Housing insulation | | | Specified short-term load SSL | Specified long-term load SLL | Grading ring diameter [D] | Maximum weight of arrester | Flashover distance | Arrester type | Figure |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | mm | mm | Lightning impulse withstand voltage 1.2/50µs kV | Switching impulse withstand voltage 250µs/ 2500µs, wet kV | Power frequency withstand voltage 1 min., wet kV | N | N | mm | kg | mm | | |
| C | 1299 | 3941 | 600 | 392 | 243 | 13850 | 5540 | – | 137 | 1034 | 3EP6 ... - .. C . 1 - .... | A |
| D | 1459 | 4505 | 690 | 451 | 280 | 12330 | 4930 | – | 164 | 1190 | 3EP6 ... - .. D . 1 - .... | A |
| F | 1749 | 5809 | 860 | 563 | 349 | 10290 | 4110 | – | 197 | 1483 | 3EP6 ... - .. F . 1 - .... | A |
| G | 1869 | 6335 | 931 | 609 | 377 | 9630 | 3850 | – | 212 | 1605 | 3EP6 ... - .. G . 1 - .... | A |
| J | 2189 | 7668 | 1116 | 730 | 452 | 8220 | 3280 | – | 251 | 1924 | 3EP6 ... - .. J . 1 - .... | A |
| J-g | 2189 | 7668 | 1116 | 730 | 452 | 8220 | 3280 | 800 | 251 | 1770 | 3EP6 ... - .. J . 1 - .... | B |
| 2xD | 2924 | 9010 | 1380 | 903 | 486 | 6150 | 2460 | 800 | 333 | 2033 | 3EP6 ... - .. D . 2 - .... | C |
| N | 3214 | 10314 | 1550 | 1014 | 592 | 5600 | 2240 | 1000 | 351 | 2170 | 3EP6 ... - .. N . 2 - .... | C |
| P | 3334 | 10840 | 1621 | 1060 | 620 | 5390 | 2150 | 1000 | 379 | 2305 | 3EP6 ... - .. P . 2 - .... | C |
| 2xF | 3504 | 11618 | 1720 | 1125 | 697 | 5130 | 2050 | 1000 | 398 | 2470 | 3EP6 ... - .. F . 2 - .... | C |
| | 3504 | 11406 | 1720 | 1125 | 697 | 8560 | 3420 | 1000 | 413 | 2470 | 3EP6 ... - .. F . 6 - .... | C |
| 2xG | 3744 | 12670 | 1862 | 1218 | 754 | 4800 | 1920 | 1000 | 423 | 2669 | 3EP6 ... - .. G . 2 - .... | C |
| | 3744 | 12457 | 1862 | 1218 | 754 | 8010 | 3200 | 1000 | 441 | 2669 | 3EP6 ... - .. G . 6 - .... | C |
| R | 3944 | 13477 | 1976 | 1293 | 801 | 4560 | 1820 | 1000 | 435 | 2915 | 3EP6 ... - .. R . 2 - .... | C |
| | 3944 | 13265 | 1976 | 1293 | 801 | 7600 | 3040 | 1000 | 450 | 2915 | 3EP6 ... - .. R . 6 - .... | C |
| S | 4064 | 14003 | 2047 | 1339 | 829 | 4420 | 1770 | 1200 | 463 | 2984 | 3EP6 ... - .. S . 2 - .... | C |
| 2xJ | 4384 | 15336 | 2232 | 1460 | 904 | 4100 | 1640 | 1200 | 498 | 3235 | 3EP6 ... - .. J . 2 - .... | C |
| | 4384 | 15124 | 2232 | 1460 | 904 | 6840 | 2730 | 1200 | 520 | 3235 | 3EP6 ... - .. J . 6 - .... | C |
| 3xF | 5259 | 17427 | 2580 | 1688 | 1046 | 3420 | 1360 | 1500 | 445 | 3761 | 3EP6 ... - .. F . 3 - .... | D |
| | 5259 | 17003 | 2580 | 1688 | 1046 | 5700 | 2280 | 1500 | 635 | 3761 | 3EP6 ... - .. F . 7 - .... | D |
| 3xG | 5619 | 19005 | 2793 | 1827 | 1131 | 3200 | 1280 | 1500 | 464 | 4097 | 3EP6 ... - .. G . 3 - .... | D |
| | 5619 | 18579 | 2793 | 1827 | 1131 | 5330 | 2130 | 1500 | 668 | 4097 | 3EP6 ... - .. G . 7 - .... | D |
| 3xJ | 6573 | 23004 | 3348 | 2190 | 1356 | 2730 | 1090 | 2100 | 571 | 4776 | 3EP6 ... - .. J . 3 - .... | D |
| | 6573 | 22520 | 3348 | 2190 | 1356 | 4560 | 1820 | 2100 | 802 | 4776 | 3EP6 ... - .. J . 7 - .... | D |

The maximum arrester weight can vary depending on rated voltage and line discharge class.

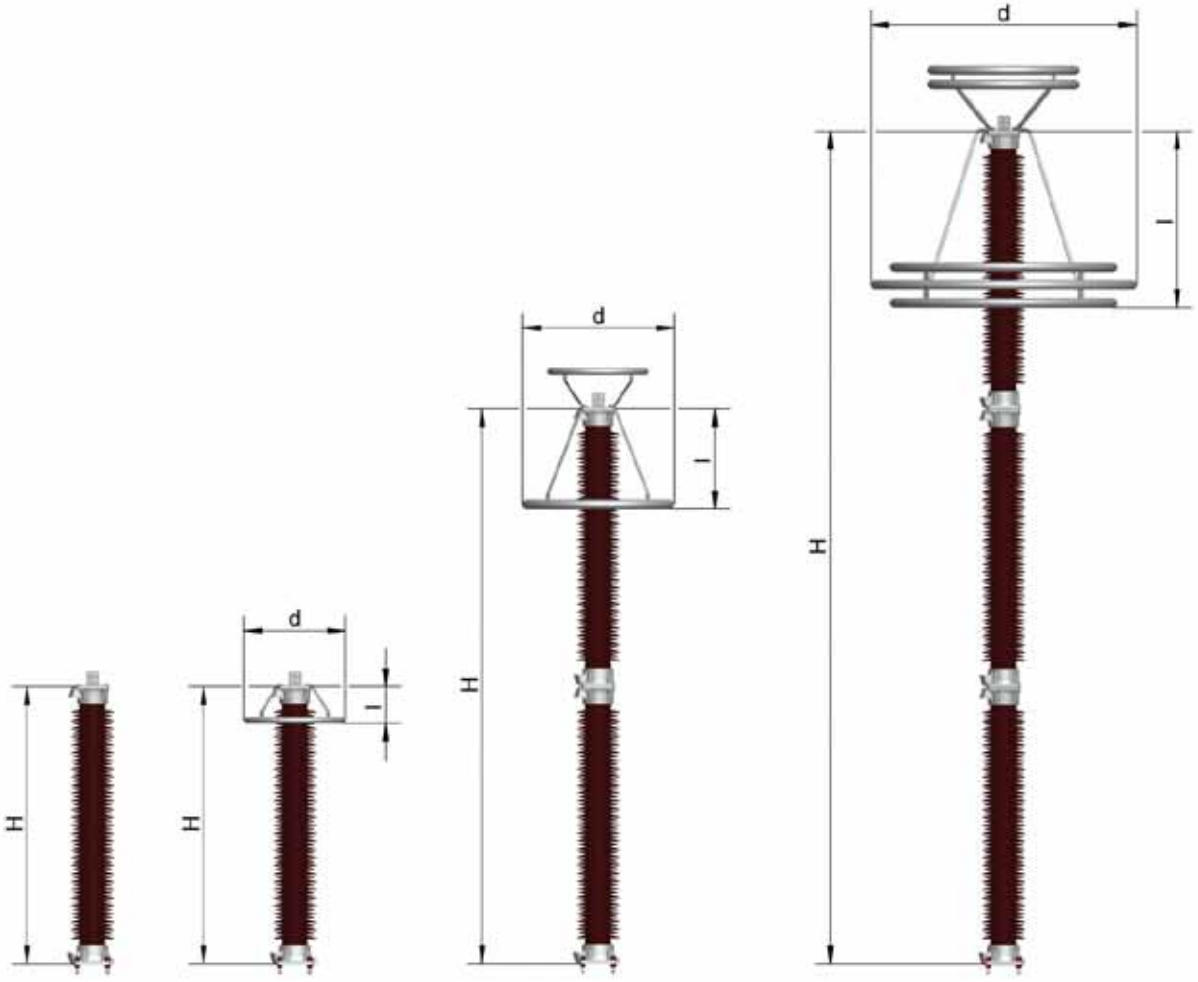



Figure A Figure B Figure C Figure D

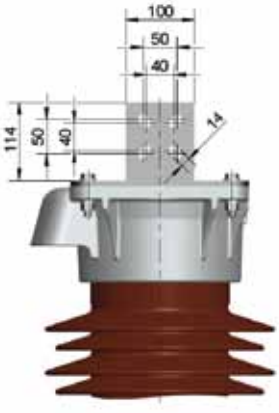
## Line terminals

**Plate**

3EP6 ...-.....-.A..

**Bolt**

3EP6 ...-.....-.D..




**DIN/NEMA flat terminal**

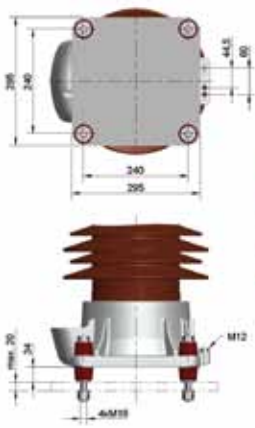
3EP6 ...-.....-.R.. (copper)

3EP6 ...-.....-.T.. (aluminum)

3EP6 ...-.....-.X.. (hot dip galvanized)

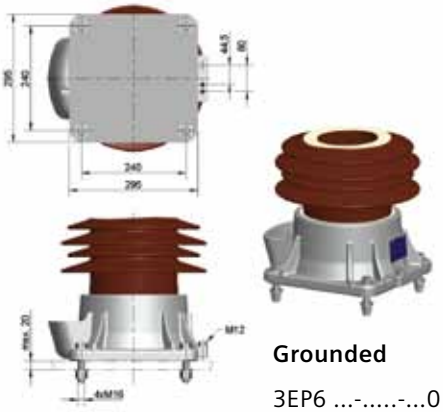
3EP6 ...-.....-.Y.. (stainless steel)

## Mounting



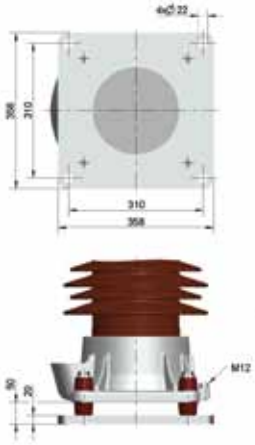
**Insulated**

3EP6 ...-.....-...1



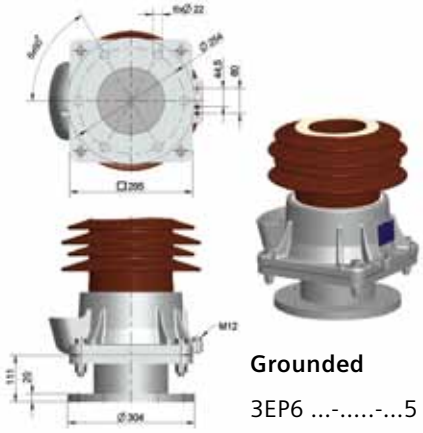
**Grounded**

3EP6 ...-.....-...0



**Insulated**

3EP6 ...-.....-...3



**Grounded**

3EP6 ...-.....-...5

**Insulated**

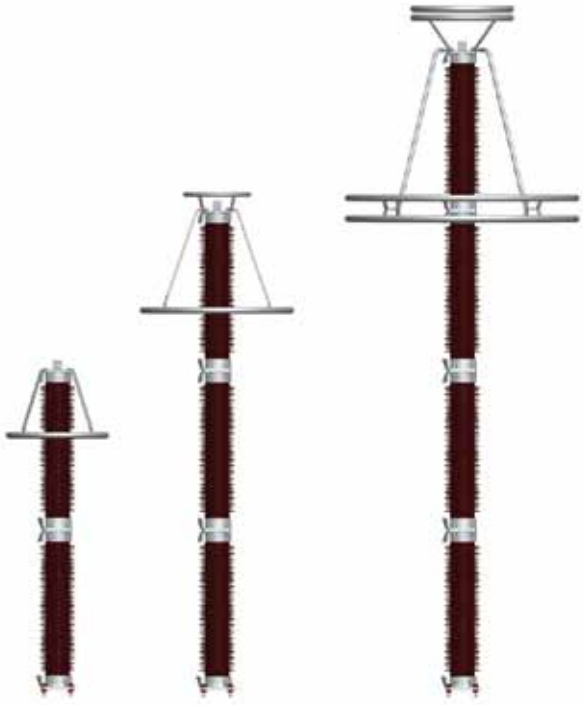
3EP6 ...-.....-...7

# 3EP3 Surge arrester with porcelain housing

## Technical datasheet

### Protection of:

- Transformers
- Circuit breakers
- Generators
- Motors
- Capacitors
- Bushings
- Switchgear



| Maximum values | | 3EP3 | 3EP3 | 3EP3 |
|---|---|---|---|---|
| Highest voltage of the system | kV | 550 | 800 | 800 |
| Maximum rated voltage | kV | 468 | 624 | 624 |
| Nominal discharge current | kA | 20 | 20 | 20 |
| Line discharge class | | 4 | 5 | 5 |
| Energy absorption capability | kJ/kV$_r$ | 10.0 | 14.0 | 16.0 |
| Long duration current impulse | A | 1600 | 2000 | 3200 |
| Rated short-circuit current | kA | 65 | 65 | 65 |
| High current impulse | kA | 100 | 100 | 100 |
| Bending moment dynamic | kNm | 34/90 | 34/90 | 34/90 |

# 3EP3 – order numbers

| Data position | 1 | 2 | 3 | 4 | – | 5 | 6 | 7 | – | 8 | 9 | 10 | 11 | 12 | – | 13 | 14 | 15 | 16 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Order number** | **3** | **E** | **P** | **3** | | **x** | **x** | **x** | | **3** | **P** | **K** | **4** | **3** | | **2** | **D** | **A** | **1** | **–** | **Z** | | |
| **Product line** | | | | | | | | | | | | | | | | | | | | | | | |
| Porcelain-housed surge arrester | 3 | E | P | 3 | | | | | | | | | | | | | | | | | | | |
| **Rated voltage in kV** | | | | | | x | x | x | | | | | | | | | | | | | | | |
| **Long duration current impulse, energy absorption capability** | | | | | | | | | | | | | | | | | | | | | | | |
| $I_{2ms}$ = 1100 A, $E_{th}$ = 8 kJ/$kV_r$, line discharge class 3 | | | | | | | | | | 2 | | | 3 | | | | | | | | | | |
| $I_{2ms}$ = 1600 A, $E_{th}$ = 10 kJ/$kV_r$, line discharge class 4 | | | | | | | | | | 3 | | | 4 | | | | | | | | | | |
| $I_{2ms}$ = 2000 A, $E_{th}$ = 14 kJ/$kV_r$, line discharge class 5 | | | | | | | | | | 4 | | | 5 | | | | | | | | | | |
| $I_{2ms}$ = 3200 A, $E_{th}$ = 16 kJ/$kV_r$, line discharge class 5 | | | | | | | | | | 5 | | | 5 | | | | | | | | | | |
| **Application** | | | | | | | | | | | | | | | | | | | | | | | |
| Phase surge arrester | | | | | | | | | | | P | | | | | | | | | | | | |
| Neutral point surge arrester | | | | | | | | | | | S | | | | | | | | | | | | |
| **Housing size, number of units. Refer to »Mechanical characteristics« on page 81** | | | | | | | | | | | | | | | | | | | | | | | |
| Housing »2xF«, 2 units | | | | | | | | | | | | F | | 2 | | | | | | | | | |
| Housing »2xK«, 2 units | | | | | | | | | | | | K | | 2 | | | | | | | | | |
| Housing »3xH«, 3 units | | | | | | | | | | | | H | | 3 | | | | | | | | | |
| Housing »3xK«, 3 units | | | | | | | | | | | | K | | 3 | | | | | | | | | |
| Housing »4xH«, 4 units | | | | | | | | | | | | H | | 4 | | | | | | | | | |
| Housing »4xK«, 4 units | | | | | | | | | | | | K | | 4 | | | | | | | | | |
| **Form of sheds and color of porcelain** | | | | | | | | | | | | | | | | | | | | | | | |
| Alternating sheds, brown porcelain | | | | | | | | | | | | | | | | 2 | | | | | | | |
| Alternating sheds, gray porcelain | | | | | | | | | | | | | | | | 4 | | | | | | | |
| **High-voltage terminal** | | | | | | | | | | | | | | | | | | | | | | | |
| Metal plate | | | | | | | | | | | | | | | | | A | | | | | | |
| Bolt, 30 mm diameter, 80 mm length, hot dip galvanized steel | | | | | | | | | | | | | | | | | C | | | | | | |
| Bolt, 30 mm diameter, 80 mm length, stainless steel | | | | | | | | | | | | | | | | | D | | | | | | |
| Bolt, 30 mm diameter, 100 mm length, stainless steel | | | | | | | | | | | | | | | | | E | | | | | | |
| Bolt, 40 mm diameter, 80 mm length, stainless steel | | | | | | | | | | | | | | | | | G | | | | | | |
| Bolt, 40 mm diameter, 120 mm length, stainless steel | | | | | | | | | | | | | | | | | J | | | | | | |
| Flat double DIN, 200x100, hot dip galvanized steel | | | | | | | | | | | | | | | | | M | | | | | | |
| Flat DIN/NEMA, 40x40 ... 50x50, copper | | | | | | | | | | | | | | | | | R | | | | | | |
| Flat DIN/NEMA, 40x40 ... 50x50, aluminum | | | | | | | | | | | | | | | | | T | | | | | | |
| Flat DIN/NEMA, 40x40 ... 50x50, hot dip galvanized steel | | | | | | | | | | | | | | | | | X | | | | | | |
| Flat DIN/NEMA, 40x40 ... 50x50, stainless steel | | | | | | | | | | | | | | | | | Y | | | | | | |
| Bolt, 30 mm diameter, 125 mm length, stainless steel | | | | | | | | | | | | | | | | | Z | | | | | | P1E |
| Bolt, 40 mm diameter, 80 mm length, aluminum | | | | | | | | | | | | | | | | | Z | | | | | | P1H |
| Bolt, 40 mm diameter, 80 mm length, copper | | | | | | | | | | | | | | | | | Z | | | | | | P1Q |
| Flat, 4xD=16, aluminum | | | | | | | | | | | | | | | | | Z | | | | | | P5A |
| Flat, 4xD=17.5 50/50, hot dip galvanized steel | | | | | | | | | | | | | | | | | Z | | | | | | P5D |
| Flat, 4xD=17.5 50/50, aluminum | | | | | | | | | | | | | | | | | Z | | | | | | P5E |
| Flat, 4xD=14/50, Palm 5, aluminum | | | | | | | | | | | | | | | | | Z | | | | | | P5G |
| Flat, 4xD=18/60, Palm 8, copper | | | | | | | | | | | | | | | | | Z | | | | | | P5L |
| Flat, 4x, 70x60, Palm 12, copper | | | | | | | | | | | | | | | | | Z | | | | | | P5N |
| Flat, 6x, 60x60, copper | | | | | | | | | | | | | | | | | Z | | | | | | P5R |
| Flat, 6xD=18 60/60, hot dip galvanized steel | | | | | | | | | | | | | | | | | Z | | | | | | P5S |

# 3EP3 – order numbers

| Data position | 1 | 2 | 3 | 4 | – | 5 | 6 | 7 | – | 8 | 9 | 10 | 11 | 12 | – | 13 | 14 | 15 | 16 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Order number** | **3** | **E** | **P** | **3** | | **x** | **x** | **x** | | **3** | **P** | **K** | **4** | **3** | | **2** | **D** | **A** | **1** | **–** | **Z** | |
| **Nameplate** | | | | | | | | | | | | | | | | | | | | | | |
| German/English (standard) | | | | | | | | | | | | | | | | | | A | | | | |
| French | | | | | | | | | | | | | | | | | | B | | | | |
| Czech | | | | | | | | | | | | | | | | | | C | | | | |
| Slovene | | | | | | | | | | | | | | | | | | D | | | | |
| Russian | | | | | | | | | | | | | | | | | | E | | | | |
| Spanish | | | | | | | | | | | | | | | | | | F | | | | |
| Portuguese | | | | | | | | | | | | | | | | | | G | | | | |
| Arabic | | | | | | | | | | | | | | | | | | R | | | | |
| Brazil | | | | | | | | | | | | | | | | | | T | | | | |
| CFE (Mexico) | | | | | | | | | | | | | | | | | | U | | | | |
| Customized version | | | | | | | | | | | | | | | | | | Z | | | | |
| **Mounting** | | | | | | | | | | | | | | | | | | | | | | |
| 310 mm x 310 mm, grounded | | | | | | | | | | | | | | | | | | | 0 | | | |
| 310 mm x 310 mm, insulated | | | | | | | | | | | | | | | | | | | 1 | | | |
| D=10", grounded | | | | | | | | | | | | | | | | | | | 5 | | | |
| D=16.5", grounded | | | | | | | | | | | | | | | | | | | 6 | | | |
| D=10", insulated | | | | | | | | | | | | | | | | | | | 7 | | | |
| D=16.5", insulated | | | | | | | | | | | | | | | | | | | 8 | | | |
| 540 mm x 350 mm, insulated | | | | | | | | | | | | | | | | | | | 9 | | | R1Q |
| **Accessories** | | | | | | | | | | | | | | | | | | | | | | |
| Refer to table »Optional accessories« on page 110 | | | | | | | | | | | | | | | | | | | | – | Z | |

# Ratings and specifications

**Electrical characteristics – phase arresters**

| Highest voltage of the system | Rated voltage | Continu-ous operating voltage | Line discharge class | Long duration current 2ms | Maximum values of the residual voltages at discharge currents of the following impulses | | | | | | | Arrester type | Mini-mum housing size |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $U_s$ kV | $U_r$ kV | $U_c$ kV | LD Class | A | 30/60 µs 0.5 kA kV | 30/60 µs 1 kA kV | 30/60 µs 2 kA kV | 8/20 µs 5 kA kV | 8/20 µs 10 kA kV | 8/20 µs 20 kA kV | 8/20 µs 40 kA kV | | |
| 245 | 192 | 154 | 5 | 3200 | 347 | 355 | 367 | 392 | 413 | 446 | 487 | 3EP3 192 - 5 P . 5 . - .... | 2xF |
| 420 | 336 | 269 | 4 | 1600 | 626 | 641 | 672 | 726 | 773 | 850 | 927 | 3EP3 336 - 3 P . 4 . - .... | 2xK |
| | 360 | 288 | 4 | 1600 | 671 | 687 | 720 | 778 | 828 | 911 | 994 | 3EP3 360 - 3 P . 4 . - .... | 2xK |
| | 360 | 288 | 5 | 2000 | 672 | 693 | 713 | 765 | 810 | 883 | 964 | 3EP3 360 - 4 P . 5 . - .... | 2xK |
| | 360 | 288 | 5 | 3200 | 650 | 666 | 689 | 735 | 774 | 836 | 913 | 3EP3 360 - 5 P . 5 . - .... | 2xK |
| 550 | 396 | 317 | 4 | 1600 | 738 | 756 | 792 | 856 | 911 | 1002 | 1093 | 3EP3 396 - 3 P . 4 . - .... | 3xH |
| | 396 | 317 | 5 | 2000 | 740 | 762 | 784 | 842 | 891 | 971 | 1060 | 3EP3 396 - 4 P . 5 . - .... | 3xH |
| | 396 | 317 | 5 | 3200 | 715 | 732 | 758 | 809 | 851 | 920 | 1005 | 3EP3 396 - 5 P . 5 . - .... | 3xH |
| | 399 | 319 | 4 | 1600 | 743 | 762 | 798 | 863 | 918 | 1009 | 1101 | 3EP3 399 - 3 P . 4 . - .... | 3xH |
| | 399 | 319 | 5 | 2000 | 745 | 768 | 790 | 848 | 898 | 979 | 1068 | 3EP3 399 - 4 P . 5 . - .... | 3xH |
| | 399 | 319 | 5 | 3200 | 721 | 738 | 763 | 815 | 858 | 926 | 1012 | 3EP3 399 - 5 P . 5 . - .... | 3xH |
| | 420 | 336 | 4 | 1600 | 782 | 802 | 840 | 908 | 966 | 1063 | 1159 | 3EP3 420 - 3 P . 4 . - .... | 3xH |
| | 420 | 336 | 5 | 2000 | 784 | 808 | 832 | 893 | 945 | 1030 | 1125 | 3EP3 420 - 4 P . 5 . - .... | 3xH |
| | 420 | 336 | 5 | 3200 | 759 | 777 | 804 | 858 | 903 | 975 | 1066 | 3EP3 420 - 5 P . 5 . - .... | 3xH |
| | 444 | 355 | 5 | 2000 | 829 | 854 | 879 | 944 | 999 | 1089 | 1189 | 3EP3 444 - 4 P . 5 . - .... | 3xH |
| | 444 | 355 | 5 | 3200 | 802 | 821 | 850 | 907 | 955 | 1031 | 1126 | 3EP3 444 - 5 P . 5 . - .... | 3xH |
| | 468 | 374 | 5 | 2000 | 874 | 900 | 927 | 995 | 1053 | 1148 | 1253 | 3EP3 468 - 4 P . 5 . - .... | 3xH |
| | 468 | 374 | 5 | 3200 | 845 | 865 | 896 | 956 | 1006 | 1087 | 1187 | 3EP3 468 - 5 P . 5 . - .... | 3xH |
| 800 | 580 | 464 | 5 | 2000 | 1083 | 1116 | 1148 | 1233 | 1305 | 1422 | 1553 | 3EP3 580 - 4 P . 5 . - .... | 4xK |
| | 580 | 464 | 5 | 3200 | 1047 | 1072 | 1110 | 1185 | 1247 | 1347 | 1471 | 3EP3 580 - 5 P . 5 . - .... | 4xK |
| | 588 | 470 | 5 | 2000 | 1098 | 1131 | 1164 | 1250 | 1323 | 1442 | 1574 | 3EP3 588 - 4 P . 5 . - .... | 4xK |
| | 588 | 470 | 5 | 3200 | 1062 | 1087 | 1125 | 1201 | 1264 | 1365 | 1492 | 3EP3 588 - 5 P . 5 . - .... | 4xK |
| | 597 | 478 | 5 | 2000 | 1115 | 1148 | 1182 | 1269 | 1343 | 1464 | 1598 | 3EP3 597 - 4 P . 5 . - .... | 4xK |
| | 597 | 478 | 5 | 3200 | 1078 | 1104 | 1142 | 1219 | 1284 | 1386 | 1515 | 3EP3 597 - 5 P . 5 . - .... | 4xK |
| | 612 | 490 | 5 | 2000 | 1143 | 1177 | 1212 | 1301 | 1377 | 1501 | 1639 | 3EP3 612 - 4 P . 5 . - .... | 4xK |
| | 612 | 490 | 5 | 3200 | 1105 | 1132 | 1171 | 1250 | 1316 | 1421 | 1553 | 3EP3 612 - 5 P . 5 . - .... | 4xK |
| | 624 | 499 | 5 | 2000 | 1165 | 1200 | 1236 | 1327 | 1404 | 1530 | 1671 | 3EP3 624 - 4 P . 5 . - .... | 4xK |
| | 624 | 499 | 5 | 3200 | 1127 | 1154 | 1194 | 1275 | 1342 | 1449 | 1583 | 3EP3 624 - 5 P . 5 . - .... | 4xK |

# Ratings and specifications

**Mechanical characteristics**

| Housing size | Height [H] | Creepage distance | Housing insulation | | | Specified short-term load SSL | Specified long-term load SLL | Grading ring diameter [D] | Maximum weight of arrester | Flashover distance | Arrester type | Figure |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | mm | mm | Lightning impulse withstand voltage 1.2/50µs kV | Switching impulse withstand voltage 250µs/ 2500µs, wet kV | Power frequency withstand voltage 1 min., wet kV | N | N | mm | kg | mm | | |
| 2xF | 2820 | 7680 | 1276 | 880 | 484 | 12050 | 4820 | 1000 | 433 | 1640 | 3EP3 ... - .. F . 2 - .... | A |
| 2xK | 3740 | 11030 | 1810 | 1248 | 686 | 9090 | 3630 | 1200 | 598 | 2520 | 3EP3 ... - .. K . 2 - .... | A |
| 3xH | 4920 | 14025 | 2313 | 1596 | 878 | 6910 | 2760 | 1800 | 778 | 3340 | 3EP3 ... - .. H . 3 - .... | B |
| 3xK | 5610 | 16545 | 2715 | 1872 | 1030 | 6060 | 2420 | 1800 | 866 | 3810 | 3EP3 ... - .. K . 3 - .... | B |
| 4xH | 6560 | 18700 | 2313 | 1596 | 878 | 5180 | 2070 | 1800 | 1001 | 4610 | 3EP3 ... - .. H . 4 - .... | C |
| 4xK | 7480 | 22060 | 3620 | 2496 | 1373 | 4540 | 1810 | 2650 | 1169 | 5380 | 3EP3 ... - .. K . 4 - .... | C |

The maximum arrester weight can vary depending on rated voltage and line discharge class.

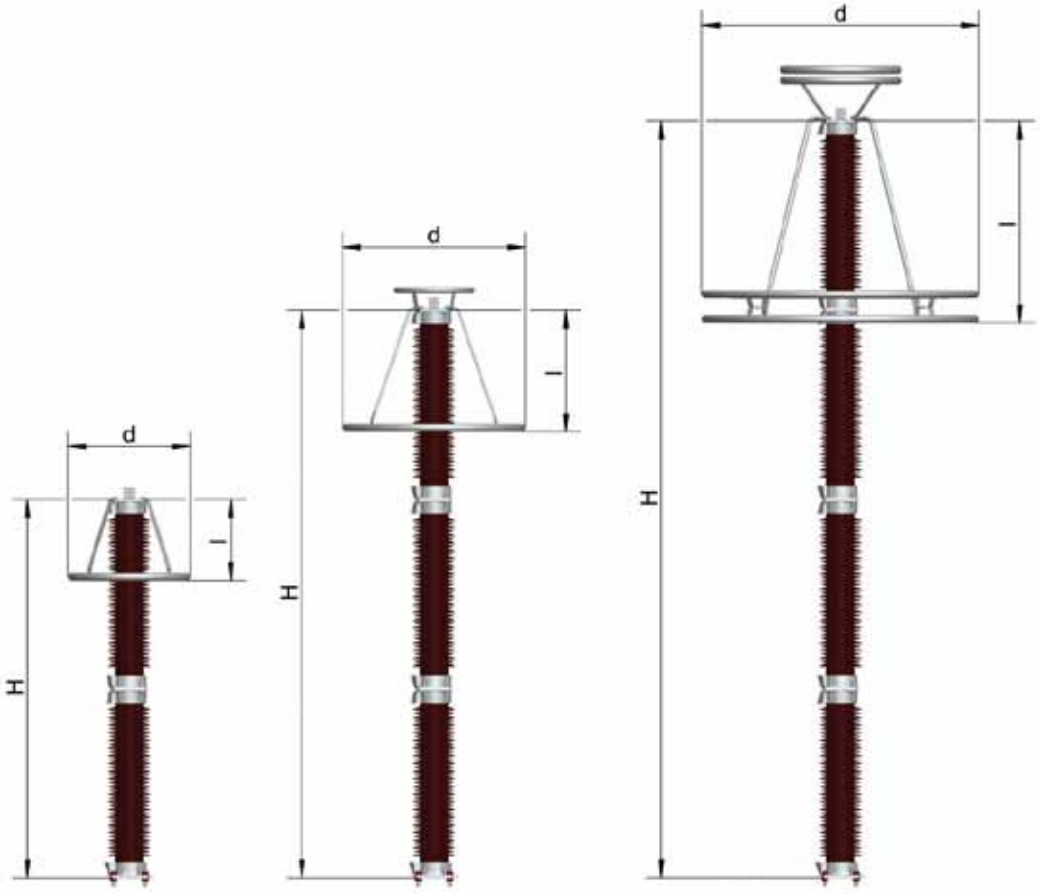
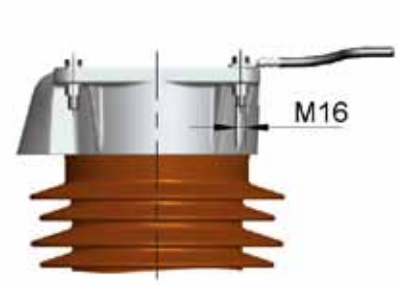


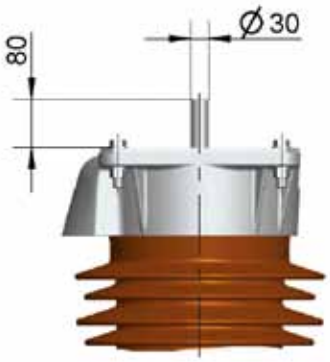

Figure A Figure B Figure C

## Line terminals



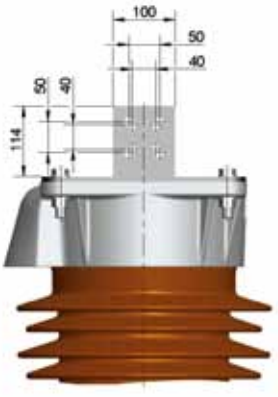

**Plate**

3EP3 ...-.....-.A..




**Bolt**

3EP3 ...-.....-.D..




**DIN/NEMA flat terminal**

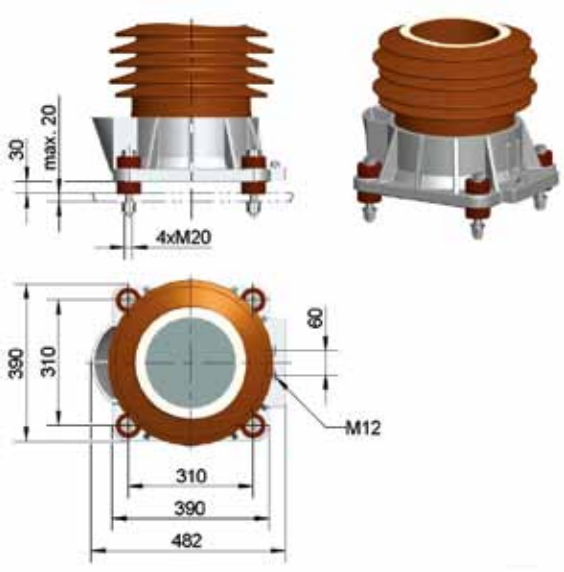
3EP3 ...-.....-.R.. (copper)

3EP3 ...-.....-.T.. (aluminum)

3EP3 ...-.....-.X.. (hot dip galvanized)

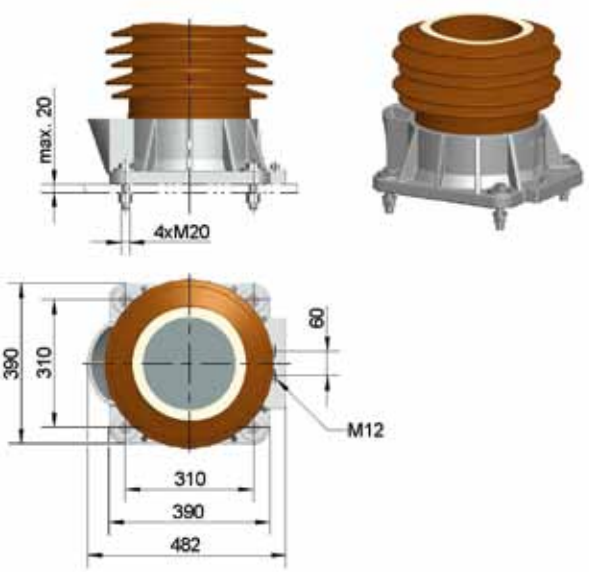
3EP3 ...-.....-.Y.. (stainless steel)

## Mounting




**Insulated**

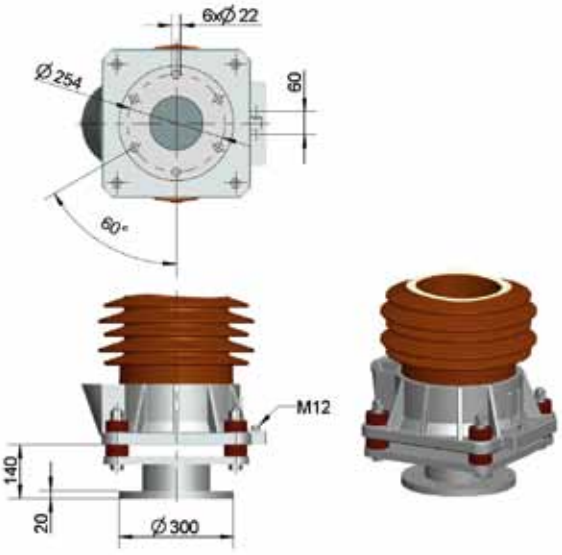
3EP3 ...-.....-...1




**Grounded**

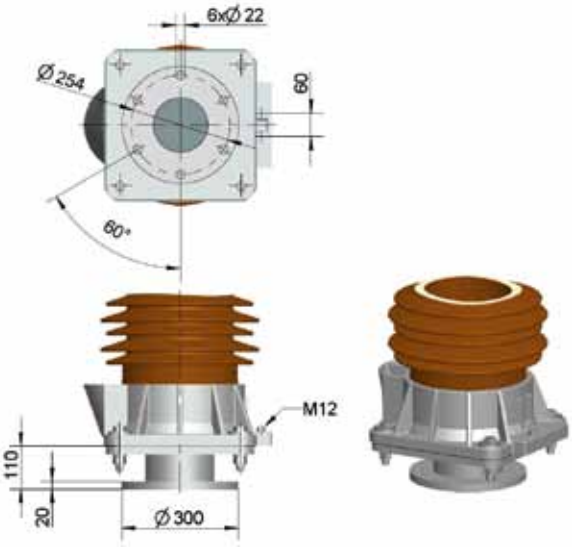
3EP3 ...-.....-...0

## Mounting



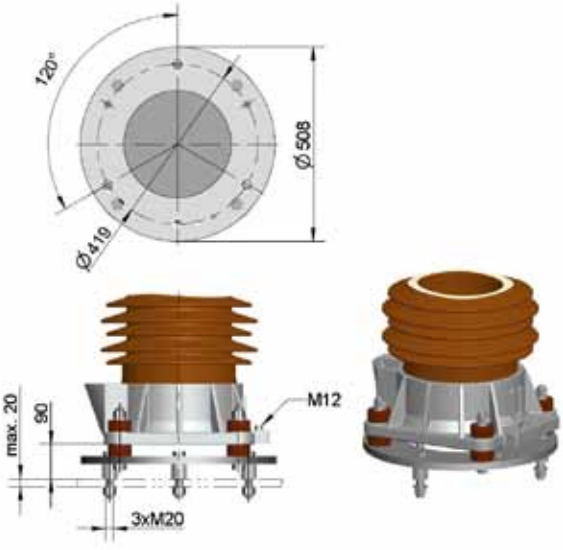

**Insulated**

3EP3 ...-.....-...7



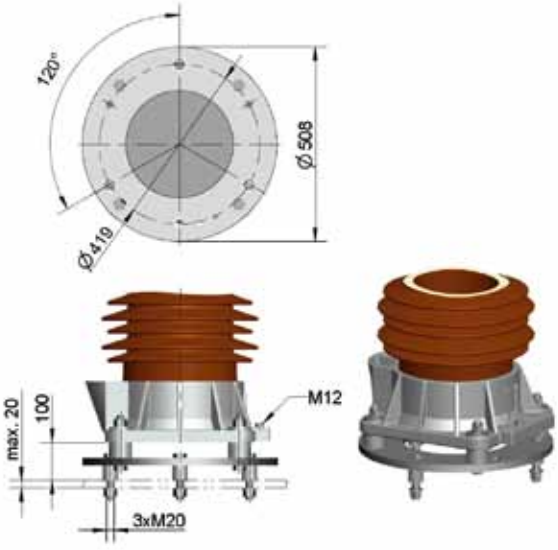

**Grounded**

3EP3 ...-.....-...5




**Insulated**

3EP3 ...-.....-...8




**Grounded**

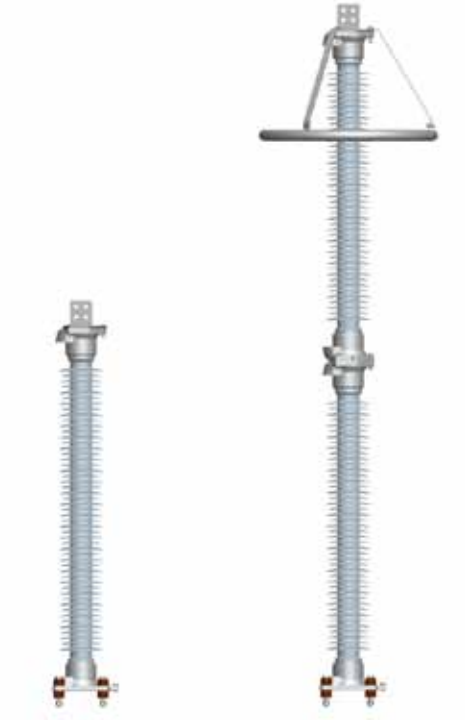
3EP3 ...-.....-...6

# 3EQ1 Surge arrester with composite hollow core design

## Technical datasheet

### Protection of:

- Transformers
- Circuit breakers
- Generators
- Motors
- Capacitors
- Bushings
- Switchgear



| Maximum values | | 3EQ1 | 3EQ1 | 3EQ1 |
|---|---|---|---|---|
| Highest voltage of the system | kV | 300 | 300 | 362 |
| Maximum rated voltage | kV | 240 | 240 | 288 |
| Nominal discharge current | kA | 10 | 10 | 10 |
| Line discharge class | | 2 | 2 | 3 |
| Energy absorption capability | kJ/kV$_r$ | 5.0 | 5.0 | 8.0 |
| Long duration current impulse | A | 750 | 1100 | 1100 |
| Rated short-circuit current | kA | 40 | 40 | 40 |
| High current impulse | kA | 100 | 100 | 100 |
| Bending moment dynamic | kNm | 6.0 | 6.0 | 6.0 |

# 3EQ1 – order numbers

| Data position | 1 | 2 | 3 | 4 | – | 5 | 6 | 7 | – | 8 | 9 | 10 | 11 | 12 | – | 13 | 14 | 15 | 16 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Order number** | **3** | **E** | **Q** | **1** | | **x** | **x** | **x** | | **2** | **P** | **J** | **3** | **1** | | **4** | **D** | **A** | **1** | **–** | **Z** | |
| **Product line** | | | | | | | | | | | | | | | | | | | | | | |
| Silicone rubber-housed surge arrester, hollow core design | 3 | E | Q | 1 | | | | | | | | | | | | | | | | | | |
| **Rated voltage in kV** | | | | | | x | x | x | | | | | | | | | | | | | | |
| **Long duration current impulse, energy absorption capability** | | | | | | | | | | | | | | | | | | | | | | |
| $I_{2ms}$ = 750 A, $E_{th}$ = 5 kJ/kV$_r$, line discharge class 2 | | | | | | | | | | 1 | | | 2 | | | | | | | | | |
| $I_{2ms}$ = 1100 A, $E_{th}$ = 5 kJ/kV$_r$, line discharge class 2 | | | | | | | | | | 2 | | | 2 | | | | | | | | | |
| $I_{2ms}$ = 1100 A, $E_{th}$ = 8 kJ/kV$_r$, line discharge class 3 | | | | | | | | | | 2 | | | 3 | | | | | | | | | |
| **Application** | | | | | | | | | | | | | | | | | | | | | | |
| Phase surge arrester | | | | | | | | | | | P | | | | | | | | | | | |
| Neutral point surge arrester | | | | | | | | | | | S | | | | | | | | | | | |
| **Housing size, number of units. Refer to »Mechanical characteristics« on page 89** | | | | | | | | | | | | | | | | | | | | | | |
| Housing »B«, 1 unit | | | | | | | | | | | | B | | 1 | | | | | | | | |
| Housing »E«, 1 unit | | | | | | | | | | | | E | | 1 | | | | | | | | |
| Housing »J«, 1 unit | | | | | | | | | | | | J | | 1 | | | | | | | | |
| Housing »P«, 1 unit | | | | | | | | | | | | P | | 1 | | | | | | | | |
| Housing »S«, 1 unit | | | | | | | | | | | | S | | 1 | | | | | | | | |
| Housing »2xJ«, 2 units | | | | | | | | | | | | J | | 2 | | | | | | | | |
| Housing »2xP«, 2 units | | | | | | | | | | | | P | | 2 | | | | | | | | |
| **Form of sheds and color of silicone rubber** | | | | | | | | | | | | | | | | | | | | | | |
| Alternating sheds, gray silicone rubber, upright mounting | | | | | | | | | | | | | | | | 4 | | | | | | |
| Alternating sheds, gray silicone rubber, suspended mounting | | | | | | | | | | | | | | | | 8 | | | | | | |
| **High-voltage terminal** | | | | | | | | | | | | | | | | | | | | | | |
| Metal plate | | | | | | | | | | | | | | | | | A | | | | | |
| Bolt, 30 mm diameter, 80 mm length, stainless steel | | | | | | | | | | | | | | | | | D | | | | | |
| Bolt, 30 mm diameter, 100 mm length, stainless steel | | | | | | | | | | | | | | | | | E | | | | | |
| Bolt, 40 mm diameter, 80 mm length, stainless steel | | | | | | | | | | | | | | | | | G | | | | | |
| Bolt, 40 mm diameter, 120 mm length, stainless steel | | | | | | | | | | | | | | | | | J | | | | | |
| Flat DIN/NEMA, 40x40 ... 50x50, 90°, 20 mm, hot dip galvanized steel | | | | | | | | | | | | | | | | | L | | | | | |
| Flat DIN/NEMA, 40x40 ... 50x50, copper | | | | | | | | | | | | | | | | | R | | | | | |
| Flat DIN/NEMA, 40x40 ... 50x50, aluminum | | | | | | | | | | | | | | | | | T | | | | | |
| Flat DIN/NEMA, 40x40 ... 50x50, hot dip galvanized steel | | | | | | | | | | | | | | | | | X | | | | | |
| Flat DIN/NEMA, 40x40 ... 50x50, stainless steel | | | | | | | | | | | | | | | | | Y | | | | | |
| Bolt, 26 mm diameter, 100 mm length, stainless steel | | | | | | | | | | | | | | | | | Z | | | | | P1A |
| Bolt, 30 mm diameter, 80 mm length, aluminum | | | | | | | | | | | | | | | | | Z | | | | | P1C |
| Bolt, 35 mm diameter, 120 mm length, stainless steel | | | | | | | | | | | | | | | | | Z | | | | | P1F |
| Bolt, 40 mm diameter, 125 mm length, aluminum | | | | | | | | | | | | | | | | | Z | | | | | P1L |
| Flat DIN/NEMA, 40x40 ... 50x50, hot dip galvanized steel, horizontal | | | | | | | | | | | | | | | | | Z | | | | | P2Q |
| Flat, 4xD=16, aluminum | | | | | | | | | | | | | | | | | Z | | | | | P5A |
| Flat, 4xD=17.5 50/50, hot dip galvanized steel | | | | | | | | | | | | | | | | | Z | | | | | P5D |
| Flat, 4xD=17.5 50/50, aluminum | | | | | | | | | | | | | | | | | Z | | | | | P5E |
| Flat, 4xD=14/50, Palm 5, aluminum | | | | | | | | | | | | | | | | | Z | | | | | P5G |
| Flat, 4xD=18/60, Palm 8, aluminum | | | | | | | | | | | | | | | | | Z | | | | | P5K |

## 3EQ1 – order numbers

| Data position | 1 | 2 | 3 | 4 | – | 5 | 6 | 7 | – | 8 | 9 | 10 | 11 | 12 | – | 13 | 14 | 15 | 16 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Order number** | **3** | **E** | **Q** | **1** | | **x** | **x** | **x** | | **2** | **P** | **J** | **3** | **1** | | **4** | **D** | **A** | **1** | **–** | **Z** |
| **Nameplate** | | | | | | | | | | | | | | | | | | | | | |
| German/English (standard) | | | | | | | | | | | | | | | | | | A | | | |
| French | | | | | | | | | | | | | | | | | | B | | | |
| Czech | | | | | | | | | | | | | | | | | | C | | | |
| Slovene | | | | | | | | | | | | | | | | | | D | | | |
| Russian | | | | | | | | | | | | | | | | | | E | | | |
| Spanish | | | | | | | | | | | | | | | | | | F | | | |
| Portuguese | | | | | | | | | | | | | | | | | | G | | | |
| Arabic | | | | | | | | | | | | | | | | | | R | | | |
| Brazil | | | | | | | | | | | | | | | | | | T | | | |
| CFE (Mexico) | | | | | | | | | | | | | | | | | | U | | | |
| Customized version | | | | | | | | | | | | | | | | | | Z | | | |
| **Mounting** | | | | | | | | | | | | | | | | | | | | | |
| 200 mm x 200 mm, grounded | | | | | | | | | | | | | | | | | | | 0 | | |
| 200 mm x 200 mm, insulated | | | | | | | | | | | | | | | | | | | 1 | | |
| 310 mm x 310 mm, insulated | | | | | | | | | | | | | | | | | | | 3 | | |
| D=10", grounded | | | | | | | | | | | | | | | | | | | 5 | | |
| D=10", insulated | | | | | | | | | | | | | | | | | | | 7 | | |
| **Accessories** | | | | | | | | | | | | | | | | | | | | | |
| Refer to table »Optional accessories« on page 110 | | | | | | | | | | | | | | | | | | | | – | Z |

# Ratings and specifications

| Electrical characteristics – phase arresters | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Highest voltage of the system | Rated voltage | Continu-ous operating voltage | Line discharge class | Long duration current 2ms | Maximum values of the residual voltages at discharge currents of the following impulses | | | | | | | Arrester type | Mini-mum housing size |
| $U_s$ kV | $U_r$ kV | $U_c$ kV | LD Class | A | 30/60 µs 0.5 kA kV | 30/60 µs 1 kA kV | 30/60 µs 2 kA kV | 8/20 µs 5 kA kV | 8/20 µs 10 kA kV | 8/20 µs 20 kA kV | 8/20 µs 40 kA kV | | |
| 72.5 | 54 | 43 | 2 | 750 | 106 | 110 | 116 | 128 | 138 | 154 | 176 | 3EQ1 054 - 1 P . 2 . - .... | B |
| | 54 | 43 | 3 | 1100 | 104 | 106 | 111 | 122 | 130 | 144 | 163 | 3EQ1 054 - 2 P . 3 . - .... | B |
| | 60 | 48 | 2 | 750 | 118 | 122 | 129 | 142 | 153 | 171 | 196 | 3EQ1 060 - 1 P . 2 . - .... | B |
| | 60 | 48 | 2 | 1100 | 108 | 111 | 116 | 127 | 135 | 150 | 170 | 3EQ1 060 - 2 P . 2 . - .... | B |
| | 60 | 48 | 3 | 1100 | 115 | 118 | 124 | 135 | 144 | 160 | 181 | 3EQ1 060 - 2 P . 3 . - .... | B |
| | 66 | 53 | 2 | 750 | 130 | 135 | 141 | 157 | 168 | 188 | 215 | 3EQ1 066 - 1 P . 2 . - .... | B |
| | 66 | 53 | 3 | 1100 | 127 | 130 | 136 | 149 | 158 | 176 | 200 | 3EQ1 066 - 2 P . 3 . - .... | B |
| | 72 | 58 | 2 | 750 | 141 | 147 | 154 | 171 | 184 | 206 | 235 | 3EQ1 072 - 1 P . 2 . - .... | B |
| | 72 | 58 | 3 | 1100 | 138 | 142 | 149 | 162 | 173 | 192 | 218 | 3EQ1 072 - 2 P . 3 . - ... | B |
| 123 | 96 | 77 | 2 | 750 | 188 | 196 | 206 | 228 | 245 | 274 | 313 | 3EQ1 096 - 1 P . 2 . - .... | B |
| | 96 | 77 | 2 | 1100 | 173 | 177 | 186 | 203 | 216 | 240 | 272 | 3EQ1 096 - 2 P . 2 . - .... | B |
| | 96 | 77 | 3 | 1100 | 184 | 189 | 198 | 217 | 230 | 256 | 290 | 3EQ1 096 - 2 P . 3 . - .... | B |
| | 102 | 82 | 2 | 750 | 200 | 208 | 218 | 242 | 260 | 291 | 333 | 3EQ1 102 - 1 P . 2 . - .... | B |
| | 102 | 82 | 3 | 1100 | 196 | 201 | 211 | 230 | 245 | 272 | 308 | 3EQ1 102 - 2 P . 3 . - .... | B |
| | 108 | 86 | 2 | 750 | 212 | 220 | 231 | 256 | 275 | 308 | 353 | 3EQ1 108 - 1 P . 2 . - .... | E |
| | 108 | 86 | 3 | 1100 | 207 | 213 | 223 | 244 | 259 | 288 | 327 | 3EQ1 108 - 2 P . 3 . - .... | E |
| | 154 | 123 | 3 | 1100 | 296 | 303 | 318 | 347 | 370 | 410 | 466 | 3EQ1 154 - 2 P . 3 . - .... | J |
| 145 | 120 | 96 | 2 | 750 | 236 | 245 | 257 | 285 | 306 | 343 | 392 | 3EQ1 120 - 1 P . 2 . - .... | J |
| | 120 | 96 | 3 | 1100 | 230 | 236 | 248 | 271 | 288 | 320 | 363 | 3EQ1 120 - 2 P . 3 . - .... | J |
| | 132 | 106 | 3 | 1100 | 253 | 260 | 272 | 298 | 317 | 352 | 399 | 3EQ1 132 - 2 P . 3 . - .... | J |
| | 144 | 115 | 3 | 1100 | 276 | 283 | 297 | 325 | 346 | 384 | 435 | 3EQ1 144 - 2 P . 3 . - .... | J |
| 170 | 138 | 110 | 3 | 1100 | 265 | 272 | 285 | 311 | 331 | 368 | 417 | 3EQ1 138 - 2 P . 3 . - .... | J |
| | 144 | 115 | 3 | 1100 | 276 | 283 | 297 | 325 | 346 | 384 | 435 | 3EQ1 144 - 2 P . 3 . - .... | J |
| | 150 | 120 | 3 | 1100 | 288 | 295 | 310 | 338 | 360 | 400 | 454 | 3EQ1 150 - 2 P . 3 . - .... | J |
| 245 | 192 | 154 | 3 | 1100 | 369 | 378 | 396 | 433 | 461 | 511 | 581 | 3EQ1 192 - 2 P . 3 . - .... | P |
| | 198 | 158 | 3 | 1100 | 380 | 390 | 409 | 447 | 475 | 527 | 599 | 3EQ1 198 - 2 P . 3 . - .... | S |
| | 228 | 182 | 3 | 1100 | 438 | 449 | 471 | 514 | 547 | 607 | 689 | 3EQ1 228 - 2 P . 3 . - .... | 2xJ |
| 300 | 228 | 182 | 3 | 1100 | 438 | 449 | 471 | 514 | 547 | 607 | 689 | 3EQ1 228 - 2 P . 3 . - .... | 2xJ |
| | 240 | 192 | 3 | 1100 | 461 | 472 | 495 | 541 | 576 | 639 | 726 | 3EQ1 240 - 2 P . 3 . - .... | 2xJ |
| 362 | 276 | 221 | 3 | 1100 | 530 | 543 | 570 | 623 | 662 | 735 | 835 | 3EQ1 276 - 2 P . 3 . - .... | 2xP |
| | 288 | 230 | 3 | 1100 | 553 | 567 | 594 | 650 | 691 | 767 | 871 | 3EQ1 288 - 2 P . 3 . - .... | 2xP |
| **Electrical characteristics – neutral ground arresters** | | | | | | | | | | | | | |
| 123 | 72 | 58 | 2 | 750 | 141 | 147 | 154 | 171 | 184 | 206 | 235 | 3EQ1 072 - 1 S . 2 . - .... | B |
| | 72 | 58 | 3 | 1100 | 138 | 142 | 149 | 162 | 173 | 192 | 218 | 3EQ1 072 - 2 S . 3 . - .... | B |
| | 90 | 72 | 2 | 750 | 177 | 184 | 193 | 213 | 230 | 257 | 294 | 3EQ1 090 - 1 S . 2 . - .... | B |
| | 90 | 72 | 3 | 1100 | 173 | 177 | 186 | 203 | 216 | 240 | 272 | 3EQ1 090 - 2 S . 3 . - .... | B |
| 245 | 102 | 82 | 2 | 750 | 200 | 208 | 218 | 242 | 260 | 291 | 333 | 3EQ1 102 - 1 S . 2 . - .... | B |
| | 102 | 82 | 3 | 1100 | 196 | 201 | 211 | 230 | 245 | 272 | 308 | 3EQ1 102 - 2 S . 3 . - .... | B |
| | 108 | 86 | 2 | 750 | 212 | 220 | 231 | 256 | 275 | 308 | 353 | 3EQ1 108 - 1 S . 2 . - .... | E |
| | 108 | 86 | 3 | 1100 | 207 | 213 | 223 | 244 | 259 | 288 | 327 | 3EQ1 108 - 2 S . 3 . - .... | E |

## Ratings and specifications

| Mechanical characteristics | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Housing size | Height [H] | Creepage distance | Housing insulation | | | Specified short-term load SSL | Specified long-term load SLL | Grading ring diameter [D] | Maximum weight of arrester | Flashover distance | Arrester type | Figure |
| | mm | mm | Lightning impulse withstand voltage 1.2/50µs kV | Switching impulse withstand voltage 250µs/ 2500µs, wet kV | Power frequency withstand voltage 1 min., wet kV | N | N | mm | kg | mm | | |
| B | 885 | 2075 | 348 | 252 | 162 | 6780 | 4750 | - | 29.5 | 600 | 3EQ1 ... - .. B . 1 - .... | A |
| E | 1035 | 2635 | 435 | 315 | 203 | 5800 | 4060 | - | 32.8 | 750 | 3EQ1 ... - .. E . 1 - .... | A |
| J | 1235 | 3390 | 551 | 399 | 257 | 4860 | 3400 | - | 37.6 | 950 | 3EQ1 ... - .. J . 1 - .... | A |
| P | 1485 | 4330 | 696 | 504 | 324 | 4040 | 2830 | - | 43.1 | 1200 | 3EQ1 ... - .. P . 1 - .... | A |
| S | 1635 | 4895 | 783 | 567 | 365 | 3670 | 2570 | - | 45.6 | 1350 | 3EQ1 ... - .. S . 1 - .... | A |
| 2xJ | 2470 | 6780 | 1102 | 798 | 513 | 2430 | 1700 | 800 | 69.1 | 1615 | 3EQ1 ... - .. J . 2 - .... | B |
| 2xP | 2970 | 8660 | 1392 | 1008 | 648 | 2020 | 1410 | 800 | 77.3 | 2090 | 3EQ1 ... - .. P . 2 - .... | B |

The maximum arrester weight can vary depending on rated voltage and line discharge class.

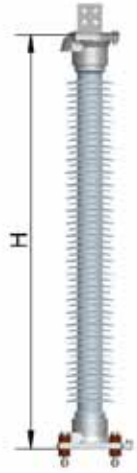



Figure A

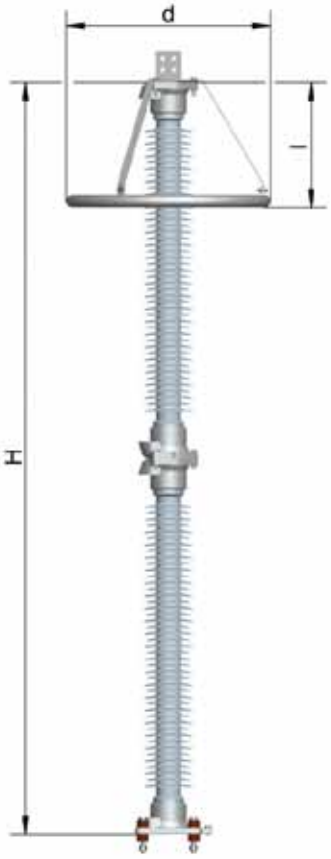
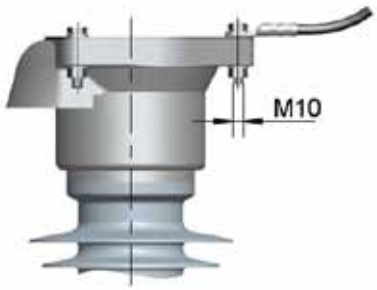


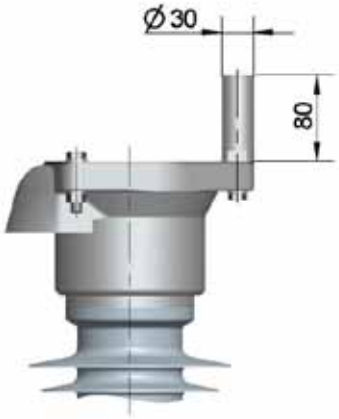

Figure B

## Line terminals



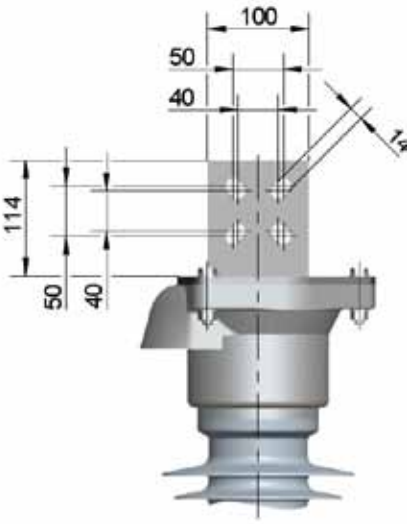

**Plate**

3EQ1 ...-.....-.A..




**Bolt**

3EQ1 ...-.....-.D..




**DIN/NEMA flat terminal**

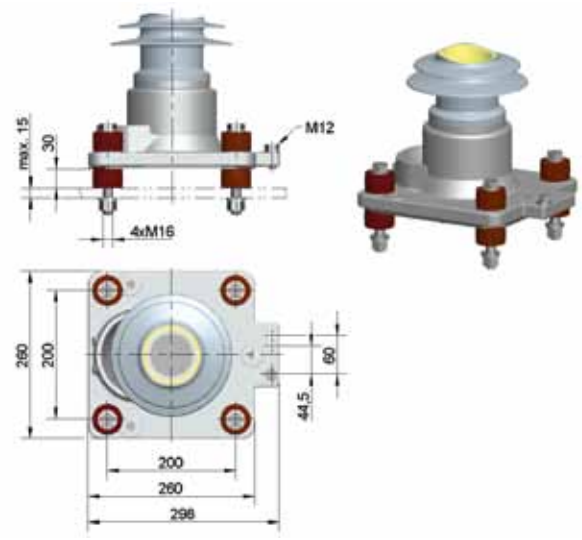
3EQ1 ...-.....-.R.. (copper)

3EQ1 ...-.....-.T.. (aluminum)

3EQ1 ...-.....-.X.. (hot dip galvanized)

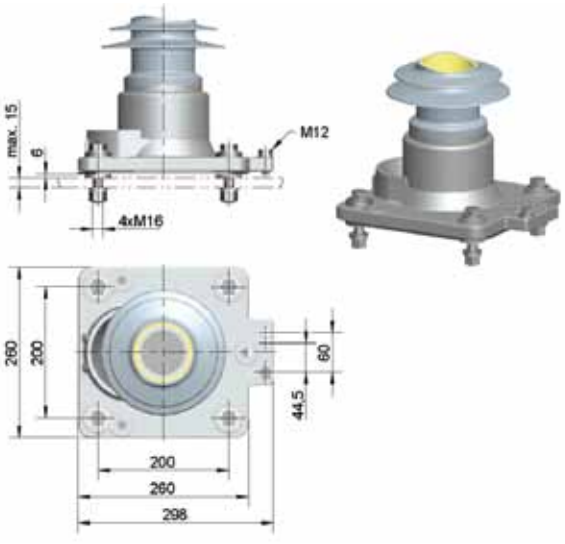
3EQ1 ...-.....-.Y.. (stainless steel)

## Mounting




**Insulated**

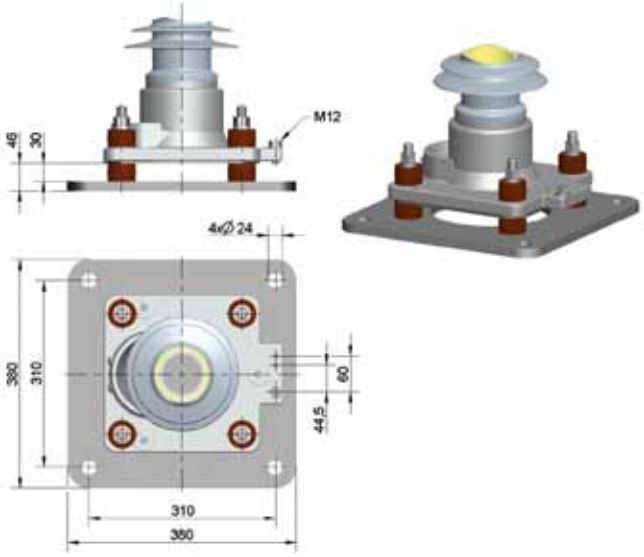
3EQ1 ...-.....-...1




**Grounded**

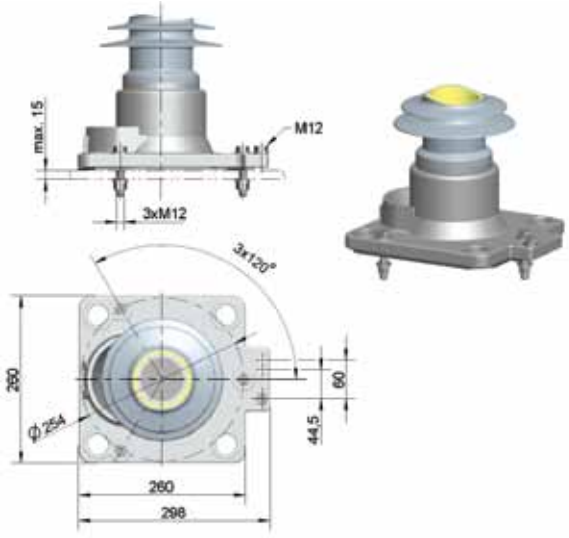
3EQ1 ...-.....-...0

## Mounting



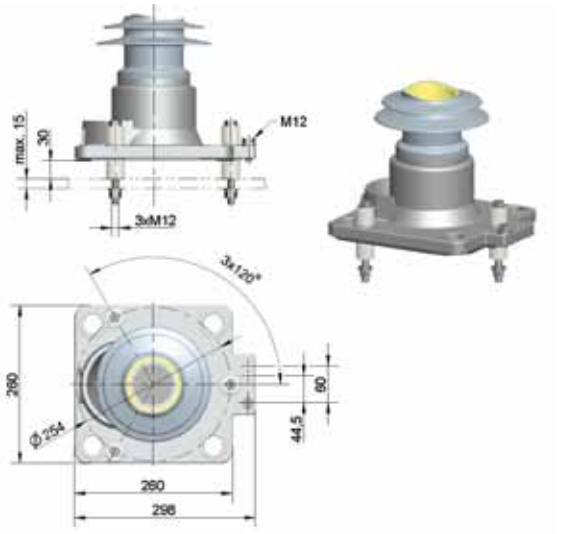

**Insulated**

3EQ1 ...-.....-...3




**Grounded**

3EQ1 ...-.....-...5




**Insulated**

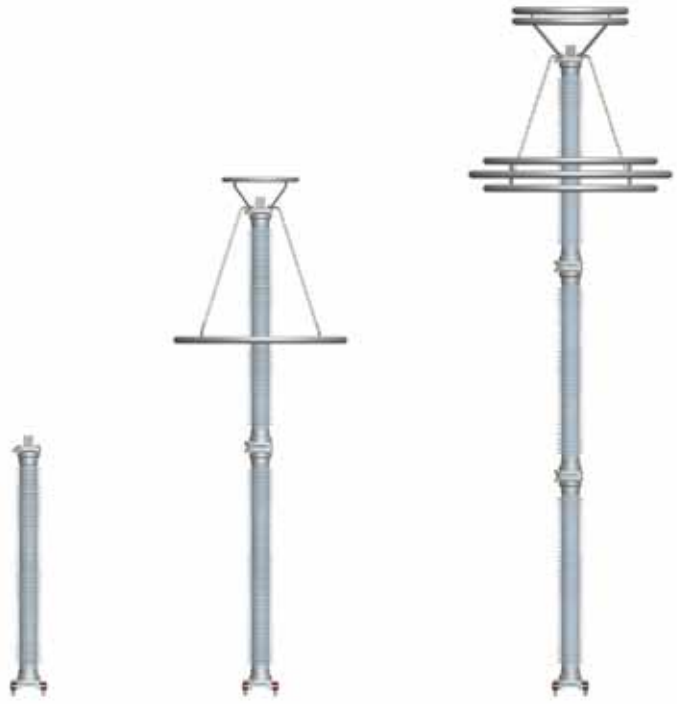
3EQ1 ...-.....-...7

# 3EQ4 Surge arrester with composite hollow core design

## Technical datasheet

### Protection of:

- Transformers
- Circuit breakers
- Generators
- Motors
- Capacitors
- Bushings
- Switchgear



| Maximum values | | 3EQ4 | 3EQ4 | 3EQ4 | 3EQ4 |
|---|---|---|---|---|---|
| Highest voltage of the system | kV | 420 | 550 | 800 | 800 |
| Maximum rated voltage | kV | 360 | 444 | 588 | 588 |
| Nominal discharge current | kA | 10 | 20 | 20 | 20 |
| Line discharge class | | 3 | 4 | 5 | 5 |
| Energy absorption capability | kJ/kV$_r$ | 8.0 | 10.0 | 14.0 | 16.0 |
| Long duration current impulse | A | 1100 | 1600 | 2000 | 3200 |
| Rated short-circuit current | kA | 65[1] | 65[1] | 65[1] | 65 |
| High current impulse | kA | 100 | 100 | 100 | 100 |
| Bending moment dynamic | kNm | 21/38 | 21/38 | 21/38 | 21/38 |

[1] Increased rated short-circuit current of 80 kA available on request

# 3EQ4 – order numbers

| Data position | 1 | 2 | 3 | 4 | – | 5 | 6 | 7 | – | 8 | 9 | 10 | 11 | 12 | – | 13 | 14 | 15 | 16 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Order number** | **3** | **E** | **Q** | **4** | | **x** | **x** | **x** | | **2** | **P** | **V** | **3** | **1** | | **4** | **D** | **A** | **1** | **–** | **Z** | | |
| **Product line** | | | | | | | | | | | | | | | | | | | | | | | |
| Silicone rubber-housed surge arrester, hollow core design | 3 | E | Q | 4 | | | | | | | | | | | | | | | | | | | |
| **Rated voltage in kV** | | | | | | x | x | x | | | | | | | | | | | | | | | |
| **Long duration current impulse, energy absorption capability** | | | | | | | | | | | | | | | | | | | | | | | |
| $I_{2ms}$ = 1100 A, $E_{th}$ = 8 kJ/$kV_r$, line discharge class 3 | | | | | | | | | | 2 | | | 3 | | | | | | | | | | |
| $I_{2ms}$ = 1600 A, $E_{th}$ = 10 kJ/$kV_r$, line discharge class 4 | | | | | | | | | | 3 | | | 4 | | | | | | | | | | |
| $I_{2ms}$ = 2000 A, $E_{th}$ = 14 kJ/$kV_r$, line discharge class 5 | | | | | | | | | | 4 | | | 5 | | | | | | | | | | |
| $I_{2ms}$ = 3200 A, $E_{th}$ = 16 kJ/$kV_r$, line discharge class 5 | | | | | | | | | | 5 | | | 5 | | | | | | | | | | |
| **Application** | | | | | | | | | | | | | | | | | | | | | | | |
| Phase surge arrester | | | | | | | | | | | P | | | | | | | | | | | | |
| Neutral point surge arrester | | | | | | | | | | | S | | | | | | | | | | | | |
| **Housing size, number of units. Refer to »Mechanical characteristics« on page 97** | | | | | | | | | | | | | | | | | | | | | | | |
| Housing »N«, 1 unit | | | | | | | | | | | | N | | 1 | | | | | | | | | |
| Housing »N«, 1 unit, increased SSL | | | | | | | | | | | | N | | 5 | | | | | | | | | |
| Housing »P«, 1 unit | | | | | | | | | | | | P | | 1 | | | | | | | | | |
| Housing »P«, 1 unit, increased SSL | | | | | | | | | | | | P | | 5 | | | | | | | | | |
| Housing »R«, 1 unit | | | | | | | | | | | | R | | 1 | | | | | | | | | |
| Housing »R«, 1 unit, increased SSL | | | | | | | | | | | | R | | 5 | | | | | | | | | |
| Housing »S«, 1 unit | | | | | | | | | | | | S | | 1 | | | | | | | | | |
| Housing »S«, 1 unit, increased SSL | | | | | | | | | | | | S | | 5 | | | | | | | | | |
| Housing »V«, 1 unit | | | | | | | | | | | | V | | 1 | | | | | | | | | |
| Housing »V«, 1 unit, increased SSL | | | | | | | | | | | | V | | 5 | | | | | | | | | |
| Housing »2xN«, 2 units | | | | | | | | | | | | N | | 2 | | | | | | | | | |
| Housing »2xN«, 2 units, increased SSL | | | | | | | | | | | | N | | 6 | | | | | | | | | |
| Housing »2xP«, 2 units | | | | | | | | | | | | P | | 2 | | | | | | | | | |
| Housing »2xP«, 2 units, increased SSL | | | | | | | | | | | | P | | 6 | | | | | | | | | |
| Housing »2xR«, 2 units | | | | | | | | | | | | R | | 2 | | | | | | | | | |
| Housing »2xS«, 2 units | | | | | | | | | | | | S | | 2 | | | | | | | | | |
| Housing »2xS«, 2 units, increased SSL | | | | | | | | | | | | S | | 6 | | | | | | | | | |
| Housing »2xV«, 2 units | | | | | | | | | | | | V | | 2 | | | | | | | | | |
| Housing »2xV«, 2 units, increased SSL | | | | | | | | | | | | V | | 6 | | | | | | | | | |
| Housing »3xP«, 3 units, increased SSL | | | | | | | | | | | | P | | 7 | | | | | | | | | |
| Housing »3xS«, 3 units, increased SSL | | | | | | | | | | | | S | | 7 | | | | | | | | | |
| **Form of sheds and color of silicone rubber** | | | | | | | | | | | | | | | | | | | | | | | |
| Alternating sheds, gray silicone rubber, upright mounting | | | | | | | | | | | | | | | | 4 | | | | | | | |
| Alternating sheds, gray silicone rubber, suspended mounting | | | | | | | | | | | | | | | | 8 | | | | | | | |

# 3EQ4 – order numbers

| Data position | 1 | 2 | 3 | 4 | – | 5 | 6 | 7 | – | 8 | 9 | 10 | 11 | 12 | – | 13 | 14 | 15 | 16 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Order number** | **3** | **E** | **Q** | **4** | | **x** | **x** | **x** | | **2** | **P** | **V** | **3** | **1** | | **4** | **D** | **A** | **1** | **–** | **Z** | | |
| **High-voltage terminal** | | | | | | | | | | | | | | | | | | | | | | | |
| Metal plate | | | | | | | | | | | | | | | | | A | | | | | | |
| Bolt, 30 mm diameter, 80 mm length, hot dip galvanized steel | | | | | | | | | | | | | | | | | C | | | | | | |
| Bolt, 30 mm diameter, 80 mm length, stainless steel | | | | | | | | | | | | | | | | | D | | | | | | |
| Bolt, 30 mm diameter, 100 mm length, stainless steel | | | | | | | | | | | | | | | | | E | | | | | | |
| Bolt, 40 mm diameter, 80 mm length, stainless steel | | | | | | | | | | | | | | | | | G | | | | | | |
| Bolt, 40 mm diameter, 120 mm length, stainless steel | | | | | | | | | | | | | | | | | J | | | | | | |
| Flat DIN/NEMA, 40x40 ... 50x50, 20 mm, hot dip galvanized steel | | | | | | | | | | | | | | | | | L | | | | | | |
| Flat double DIN, 200x100, hot dip galvanized steel | | | | | | | | | | | | | | | | | M | | | | | | |
| Flat DIN/NEMA, 40x40 ... 50x50, copper | | | | | | | | | | | | | | | | | R | | | | | | |
| Flat DIN/NEMA, 40x40 ... 50x50, aluminum | | | | | | | | | | | | | | | | | T | | | | | | |
| Flat DIN/NEMA, 40x40 ... 50x50, hot dip galvanized steel | | | | | | | | | | | | | | | | | X | | | | | | |
| Flat DIN/NEMA, 40x40 ... 50x50, stainless steel | | | | | | | | | | | | | | | | | Y | | | | | | |
| Bolt, 30 mm diameter, 125 mm length, stainless steel | | | | | | | | | | | | | | | | | Z | | | | | P1E | |
| Bolt, 40 mm diameter, 80 mm length, aluminum | | | | | | | | | | | | | | | | | Z | | | | | P1H | |
| Bolt, 40 mm diameter, 130 mm length, stainless steel | | | | | | | | | | | | | | | | | Z | | | | | P1K | |
| Bolt, 50 mm diameter, 125 mm length, stainless steel | | | | | | | | | | | | | | | | | Z | | | | | P1M | |
| Bolt, 40 mm diameter, 80 mm length, copper | | | | | | | | | | | | | | | | | Z | | | | | P1Q | |
| Bolt, 30 mm diameter, 125 mm length, aluminum | | | | | | | | | | | | | | | | | Z | | | | | P1R | |
| Flat, 4xD=16, aluminum | | | | | | | | | | | | | | | | | Z | | | | | P5A | |
| Flat, 4xD=17.5 50/50, hot dip galvanized steel | | | | | | | | | | | | | | | | | Z | | | | | P5D | |
| Flat, 4xD=17.5 50/50, aluminum | | | | | | | | | | | | | | | | | Z | | | | | P5E | |
| Flat, 4xD=14/50, Palm 5, aluminum | | | | | | | | | | | | | | | | | Z | | | | | P5G | |
| Flat, 2xD=18/60, Palm 7, aluminum | | | | | | | | | | | | | | | | | Z | | | | | P5J | |
| Flat, 4xD=18/60, Palm 8, copper | | | | | | | | | | | | | | | | | Z | | | | | P5L | |
| Flat, 4x, 70x60, Palm 12, copper | | | | | | | | | | | | | | | | | Z | | | | | P5N | |
| Flat, 6x, 60x60, copper | | | | | | | | | | | | | | | | | Z | | | | | P5R | |
| Flat, 6xD=18 60/60, hot dip galvanized steel | | | | | | | | | | | | | | | | | Z | | | | | P5S | |
| **Nameplate** | | | | | | | | | | | | | | | | | | | | | | | |
| German/English (standard) | | | | | | | | | | | | | | | | | | A | | | | | |
| French | | | | | | | | | | | | | | | | | | B | | | | | |
| Czech | | | | | | | | | | | | | | | | | | C | | | | | |
| Slovene | | | | | | | | | | | | | | | | | | D | | | | | |
| Russian | | | | | | | | | | | | | | | | | | E | | | | | |
| Spanish | | | | | | | | | | | | | | | | | | F | | | | | |
| Portuguese | | | | | | | | | | | | | | | | | | G | | | | | |
| Arabic | | | | | | | | | | | | | | | | | | R | | | | | |
| Brasil | | | | | | | | | | | | | | | | | | T | | | | | |
| CFE (Mexico) | | | | | | | | | | | | | | | | | | U | | | | | |
| Customized version | | | | | | | | | | | | | | | | | | Z | | | | | |
| **Mounting** | | | | | | | | | | | | | | | | | | | | | | | |
| 310 mm x 310 mm, insulated | | | | | | | | | | | | | | | | | | | 1 | | | | |
| D=10", grounded | | | | | | | | | | | | | | | | | | | 5 | | | | |
| D=16.5", grounded | | | | | | | | | | | | | | | | | | | 6 | | | | |
| D=10", insulated | | | | | | | | | | | | | | | | | | | 7 | | | | |
| D=16.5", insulated | | | | | | | | | | | | | | | | | | | 8 | | | | |
| 310 mm x 310 mm, insulated, increased SSL | | | | | | | | | | | | | | | | | | | 9 | | | | R4C |
| D=10", grounded, increased SSL | | | | | | | | | | | | | | | | | | | 9 | | | | R4D |
| D=16.5", grounded, increased SSL | | | | | | | | | | | | | | | | | | | 9 | | | | R4E |
| D=10", insulated, increased SSL | | | | | | | | | | | | | | | | | | | 9 | | | | R4F |
| 191 mm x 191 mm, grounded | | | | | | | | | | | | | | | | | | | 9 | | | | R5D |
| **Accessories** | | | | | | | | | | | | | | | | | | | | | | | |
| Refer to table »Optional accessories« on page 110 | | | | | | | | | | | | | | | | | | | | – | Z | | |

# Ratings and specifications

| Electrical characteristics – phase arresters | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Highest voltage of the system | Rated voltage | Continuous operating voltage | Line discharge class | Long duration current 2ms | Maximum values of the residual voltages at discharge currents of the following impulses | | | | | | | Arrester type | Minimum housing size |
| $U_s$ kV | $U_r$ kV | $U_c$ kV | LD Class | A | 30/60 µs 0.5 kA kV | 30/60 µs 1 kA kV | 30/60 µs 2 kA kV | 8/20 µs 5 kA kV | 8/20 µs 10 kA kV | 8/20 µs 20 kA kV | 8/20 µs 40 kA kV | | |
| 245 | 192 | 154 | 3 | 1100 | 369 | 378 | 396 | 433 | 461 | 511 | 581 | 3EQ4 192 - 2 P . 3 . - .... | N |
| | 192 | 154 | 4 | 1600 | 358 | 367 | 384 | 415 | 442 | 486 | 530 | 3EQ4 192 - 3 P . 4 . - .... | N |
| | 198 | 158 | 3 | 1100 | 380 | 390 | 409 | 447 | 475 | 527 | 599 | 3EQ4 198 - 2 P . 3 . - .... | N |
| | 198 | 158 | 4 | 1600 | 369 | 378 | 396 | 428 | 455 | 501 | 546 | 3EQ4 198 - 3 P . 4 . - .... | N |
| | 228 | 182 | 3 | 1100 | 438 | 449 | 471 | 514 | 547 | 607 | 689 | 3EQ4 228 - 2 P . 3 . - .... | P |
| | 228 | 182 | 4 | 1600 | 425 | 435 | 456 | 493 | 524 | 577 | 629 | 3EQ4 228 - 3 P . 4 . - .... | P |
| 300 | 228 | 182 | 3 | 1100 | 438 | 449 | 471 | 514 | 547 | 607 | 689 | 3EQ4 228 - 2 P . 3 . - .... | P |
| | 228 | 182 | 4 | 1600 | 425 | 435 | 456 | 493 | 524 | 577 | 629 | 3EQ4 228 - 3 P . 4 . - .... | P |
| | 240 | 192 | 3 | 1100 | 461 | 472 | 495 | 541 | 576 | 639 | 726 | 3EQ4 240 - 2 P . 3 . - .... | R |
| | 240 | 192 | 4 | 1600 | 447 | 458 | 480 | 519 | 552 | 607 | 662 | 3EQ4 240 - 3 P . 4 . - .... | R |
| 362 | 258 | 206 | 3 | 1100 | 495 | 508 | 533 | 582 | 619 | 687 | 780 | 3EQ4 258 - 2 P . 3 . - .... | R |
| | 258 | 206 | 4 | 1600 | 481 | 493 | 516 | 558 | 593 | 653 | 712 | 3EQ4 258 - 3 P . 4 . - .... | R |
| | 276 | 221 | 3 | 1100 | 530 | 543 | 570 | 623 | 662 | 735 | 835 | 3EQ4 276 - 2 P . 3 . - .... | V |
| | 276 | 221 | 4 | 1600 | 514 | 527 | 552 | 597 | 635 | 698 | 762 | 3EQ4 276 - 3 P . 4 . - .... | V |
| | 288 | 230 | 3 | 1100 | 553 | 567 | 594 | 650 | 691 | 767 | 871 | 3EQ4 288 - 2 P . 3 . - .... | V |
| | 288 | 230 | 4 | 1600 | 537 | 550 | 576 | 623 | 662 | 729 | 795 | 3EQ4 288 - 3 P . 4 . - .... | V |
| 420 | 336 | 269 | 3 | 1100 | 645 | 661 | 694 | 758 | 806 | 895 | 1016 | 3EQ4 336 - 2 P . 3 . - .... | 2xN |
| | 336 | 269 | 4 | 1600 | 626 | 641 | 672 | 726 | 773 | 850 | 927 | 3EQ4 336 - 3 P . 4 . - .... | 2xN |
| | 336 | 269 | 5 | 2000 | 627 | 646 | 665 | 714 | 756 | 824 | 900 | 3EQ4 336 - 4 P . 5 . - .... | 2xN |
| | 360 | 288 | 3 | 1100 | 691 | 708 | 743 | 812 | 864 | 959 | 1089 | 3EQ4 360 - 2 P . 3 . - .... | 2xP |
| | 360 | 288 | 4 | 1600 | 671 | 687 | 720 | 778 | 828 | 911 | 994 | 3EQ4 360 - 3 P . 4 . - .... | 2xP |
| | 360 | 288 | 5 | 2000 | 672 | 693 | 713 | 765 | 810 | 883 | 964 | 3EQ4 360 - 4 P . 5 . - .... | 2xP |
| 550 | 396 | 317 | 4 | 1600 | 738 | 756 | 792 | 856 | 911 | 1002 | 1093 | 3EQ4 396 - 3 P . 4 . - .... | 2xR |
| | 396 | 317 | 5 | 2000 | 740 | 762 | 784 | 842 | 891 | 971 | 1060 | 3EQ4 396 - 4 P . 5 . - .... | 2xR |
| | 396 | 317 | 5 | 3200 | 715 | 732 | 758 | 809 | 851 | 920 | 1005 | 3EQ4 396 - 5 P . 5 . - .... | 2xR |
| | 420 | 336 | 4 | 1600 | 782 | 802 | 840 | 908 | 966 | 1063 | 1159 | 3EQ4 420 - 3 P . 4 . - .... | 2xR |
| | 420 | 336 | 5 | 2000 | 784 | 808 | 832 | 893 | 945 | 1030 | 1125 | 3EQ4 420 - 4 P . 5 . - .... | 2xR |
| | 420 | 336 | 5 | 3200 | 759 | 777 | 804 | 858 | 903 | 975 | 1066 | 3EQ4 420 - 5 P . 5 . - .... | 2xR |
| | 444 | 355 | 4 | 1600 | 827 | 848 | 888 | 960 | 1021 | 1123 | 1225 | 3EQ4 444 - 3 P . 4 . - .... | 2xV |
| | 444 | 355 | 5 | 2000 | 829 | 854 | 879 | 944 | 999 | 1089 | 1189 | 3EQ4 444 - 4 P . 5 . - .... | 2xS |
| | 444 | 355 | 5 | 3200 | 802 | 821 | 850 | 907 | 955 | 1031 | 1126 | 3EQ4 444 - 5 P . 5 . - .... | 2xS |
| 800 | 580 | 464 | 5 | 2000 | 1083 | 1116 | 1148 | 1233 | 1305 | 1422 | 1553 | 3EQ4 580 - 4 P . 5 . - .... | 7xS |
| | 588 | 470 | 5 | 2000 | 1098 | 1131 | 1164 | 1250 | 1323 | 1442 | 1574 | 3EQ4 588 - 4 P . 5 . - .... | 7xS |
| **Electrical characteristics – neutral ground arresters** | | | | | | | | | | | | | |
| 245 | 102 | 82 | 3 | 1100 | 196 | 201 | 211 | 230 | 245 | 272 | 308 | 3EQ4 102 - 2 S . 3 . - .... | N |
| | 102 | 82 | 4 | 1600 | 190 | 195 | 204 | 221 | 235 | 258 | 282 | 3EQ4 102 - 3 S . 4 . - .... | N |
| | 108 | 86 | 3 | 1100 | 207 | 213 | 223 | 244 | 259 | 288 | 327 | 3EQ4 108 - 2 S . 3 . - .... | N |
| | 108 | 86 | 4 | 1600 | 201 | 206 | 216 | 233 | 248 | 273 | 298 | 3EQ4 108 - 3 S . 4 . - .... | N |
| 420 | 168 | 134 | 3 | 1100 | 323 | 331 | 347 | 379 | 403 | 448 | 508 | 3EQ4 168 - 2 S . 3 . - .... | N |
| | 168 | 134 | 4 | 1600 | 313 | 321 | 336 | 363 | 386 | 425 | 464 | 3EQ4 168 - 3 S . 4 . - .... | N |

## Ratings and specifications

| Mechanical characteristics | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Housing size | Height [H] | Creepage distance | Housing insulation | | | Specified short-term load SSL | Specified long-term load SLL | Grading ring diameter [D] | Maximum weight of arrester | Flashover distance | Arrester type | Figure |
| | mm | mm | Lightning impulse withstand voltage 1.2/50µs kV | Switching impulse withstand voltage 250µs/ 2500µs, wet kV | Power frequency withstand voltage 1 min., wet kV | N | N | mm | kg | mm | | |
| N | 1760 | 5085 | 812 | 588 | 378 | 11930 | 8350 | – | 131 | 1400 | 3EQ4... - .. N . 1 - .... | A |
| P | 1860 | 5460 | 870 | 630 | 405 | 11290 | 7900 | – | 136 | 1500 | 3EQ4... - .. P . 1 - .... | A |
| R | 2060 | 6210 | 950 | 680 | 490 | 10190 | 7130 | – | 144 | 1700 | 3EQ4... - .. R . 1 - .... | A |
| S | 2160 | 6590 | 1000 | 700 | 510 | 9720 | 6800 | – | 147 | 1800 | 3EQ4... - .. S . 1 - .... | A |
| V | 2460 | 7715 | 1175 | 800 | 570 | 8530 | 5970 | – | 167 | 2100 | 3EQ4... - .. V . 1 - .... | A |
| 2xN | 3520 | 10170 | 1624 | 1176 | 756 | 5960 | 4170 | 1000 | 227 | 2320 | 3EQ4... - .. N . 2 - .... | B |
| 2xP | 3720 | 10920 | 1740 | 1260 | 810 | 5640 | 3950 | 1000 | 263 | 2520 | 3EQ4... - .. P . 2 - .... | B |
| | 3720 | 10920 | 1740 | 1260 | 810 | 10210 | 7150 | 1000 | 263 | 2520 | 3EQ4... - .. P . 6 - .... | B |
| 2xR | 4120 | 12420 | 1612 | 1168 | 751 | 5090 | 3560 | 1200 | 279 | 2840 | 3EQ4... - .. R . 2 - .... | B |
| | 4120 | 12420 | 1612 | 1168 | 751 | 9220 | 6450 | 1200 | 279 | 2840 | 3EQ4... - .. R . 6 - .... | B |
| 2xS | 4320 | 13180 | 1728 | 1252 | 805 | 4860 | 3400 | 1200 | 290 | 3040 | 3EQ4... - .. S . 2 - .... | B |
| | 4320 | 13180 | 1728 | 1252 | 805 | 8790 | 6150 | 1200 | 290 | 3040 | 3EQ4... - .. S . 6 - .... | B |
| 2xV | 4920 | 15430 | 2071 | 1499 | 964 | 4260 | 2980 | 1500 | 304 | 3480 | 3EQ4... - .. V . 2 - .... | B |
| | 4920 | 15430 | 2071 | 1499 | 964 | 7720 | 5400 | 1500 | 304 | 3480 | 3EQ4... - .. V . 6 - .... | B |
| 7xS | 6480 | 19770 | 2593 | 1877 | 1207 | 4940 | 3450 | 2240 | 348 | 4500 | 3EQ4... - .. S . 7 - .... | C |

The maximum arrester weight can vary depending on rated voltage and line discharge class.

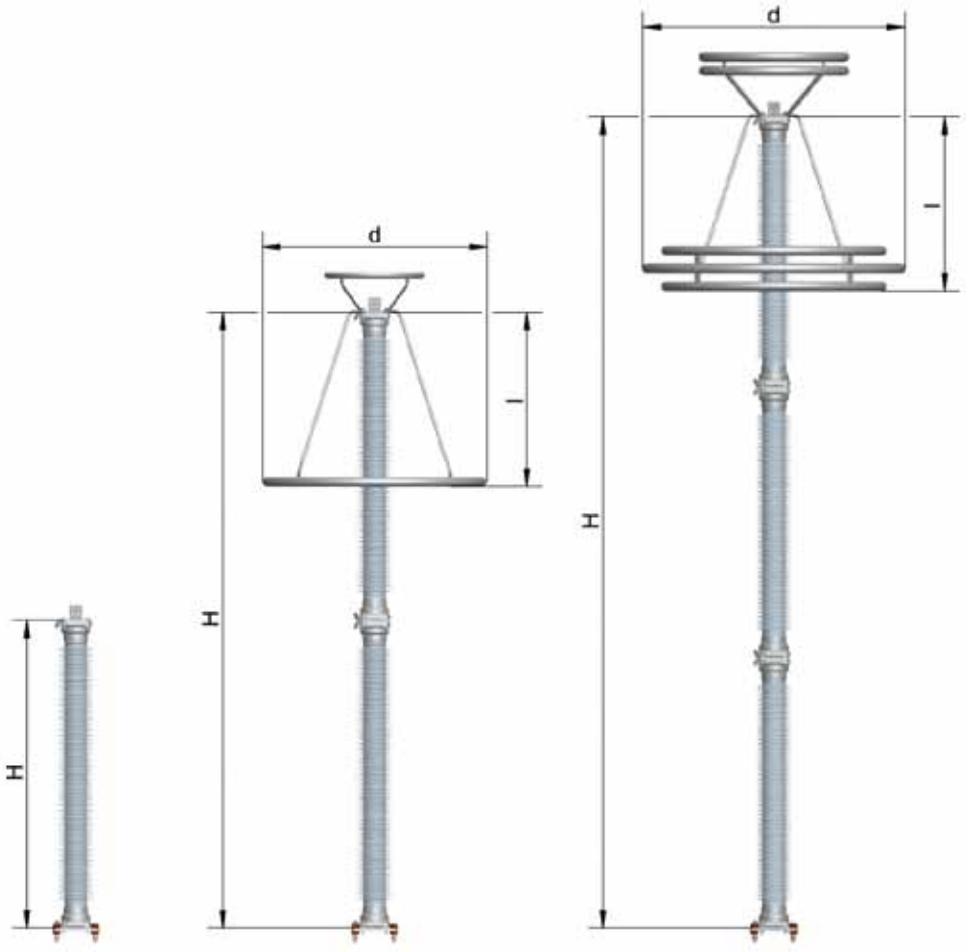



Figure A Figure B Figure C

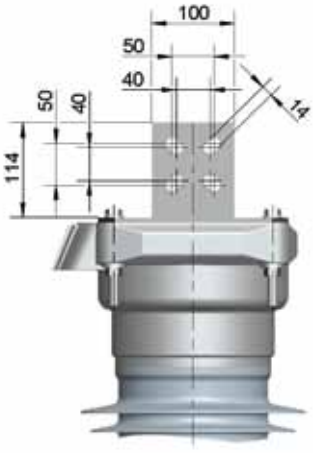
## Line terminals

**Plate**

3EQ4 ...-.....-.A..

**Bolt**

3EQ4 ...-.....-.D..




**DIN/NEMA flat terminal**

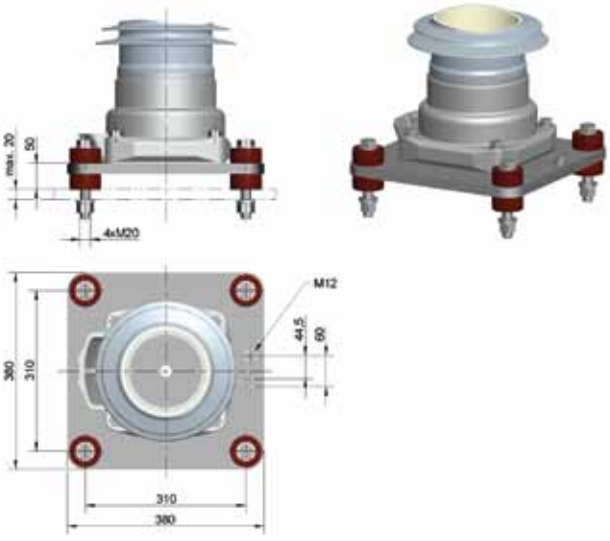
3EQ4 ...-.....-.R.. (copper)

3EQ4 ...-.....-.T.. (aluminum)

3EQ4 ...-.....-.X.. (hot dip galvanized)

3EQ4 ...-.....-.Y.. (stainless steel)

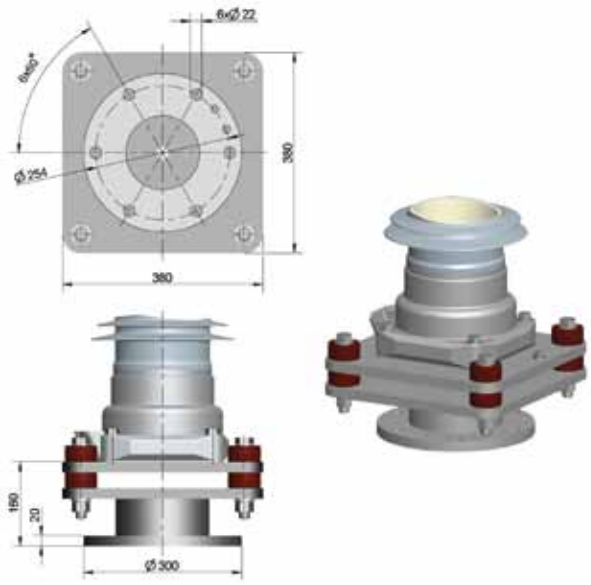
## Mounting




**Insulated**

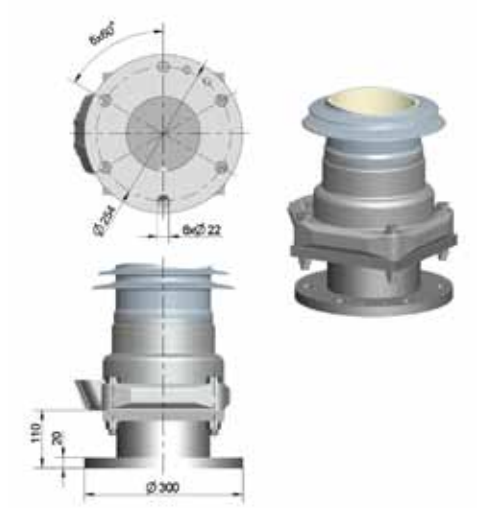
3EQ4 ...-.....-...1

## Mounting



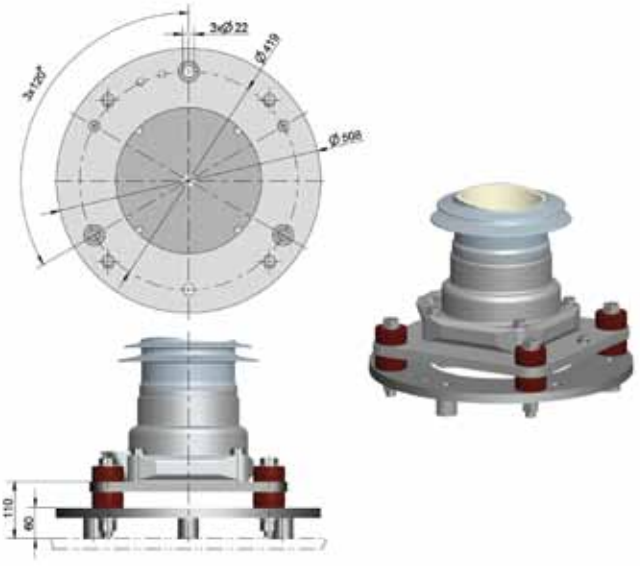

**Insulated**

3EQ4 ...-.....-...7



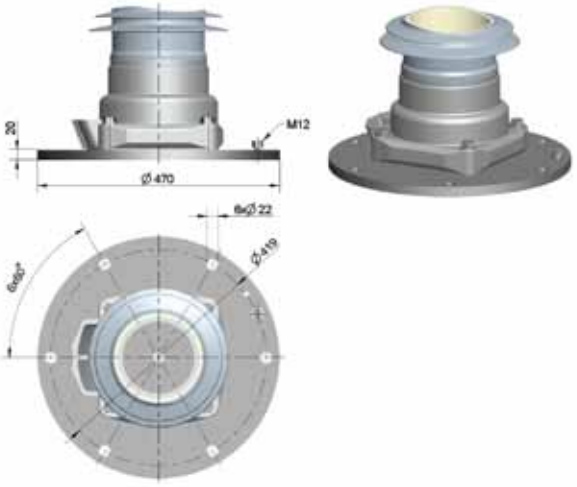

**Grounded**

3EQ4 ...-.....-...5




**Insulated**

3EQ4 ...-.....-...8




**Grounded**

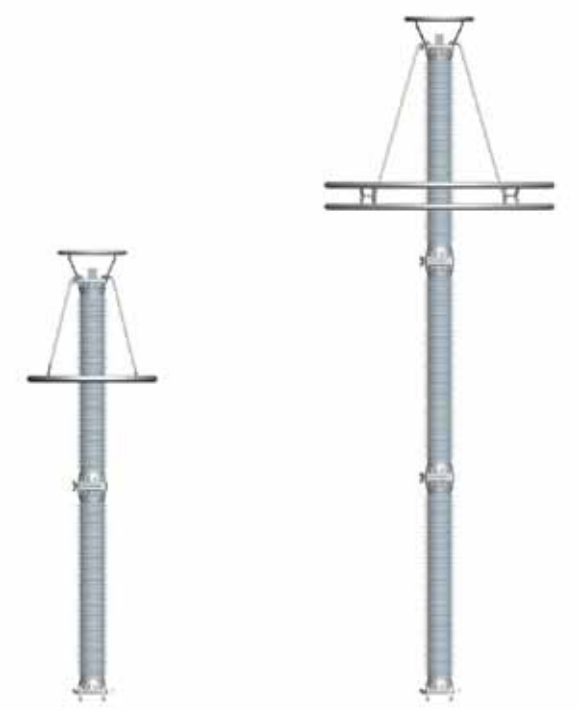
3EQ4 ...-.....-...6

# 3EQ3 Surge arrester with composite hollow core design

## Technical datasheet

### Protection of:

- Transformers
- Circuit breakers
- Generators
- Motors
- Capacitors
- Bushings
- Switchgear



| Maximum values | | 3EQ3 | 3EQ3 | 3EQ3 |
|---|---|---|---|---|
| Highest voltage of the system | kV | 550 | 800 | 800 |
| Maximum rated voltage | kV | 468 | 624 | 624 |
| Nominal discharge current | kA | 20 | 20 | 20 |
| Line discharge class | | 4 | 5 | 5 |
| Energy absorption capability | kJ/kV$_r$ | 10.0 | 14.0 | 16.0 |
| Long duration current impulse | A | 1600 | 2000 | 3200 |
| Rated short-circuit current | kA | 80 | 80 | 80 |
| High current impulse | kA | 100 | 100 | 100 |
| Bending moment dynamic | kNm | 42/72 | 42/72 | 42/72 |

## 3EQ3 – order numbers

| Data position | 1 | 2 | 3 | 4 | – | 5 | 6 | 7 | – | 8 | 9 | 10 | 11 | 12 | – | 13 | 14 | 15 | 16 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Order number** | **3** | **E** | **Q** | **3** | | **x** | **x** | **x** | | **5** | **P** | **T** | **5** | **3** | | **4** | **D** | **A** | **1** | **–** | **Z** | | |
| **Product line** | | | | | | | | | | | | | | | | | | | | | | | |
| Silicone rubber-housed surge arrester, hollow core design | 3 | E | Q | 3 | | | | | | | | | | | | | | | | | | | |
| **Rated voltage in kV** | | | | | | x | x | x | | | | | | | | | | | | | | | |
| **Long duration current impulse, energy absorption capability** | | | | | | | | | | | | | | | | | | | | | | | |
| $I_{2ms}$ = 1600 A, $E_{th}$ = 10 kJ/$kV_r$, line discharge class 4 | | | | | | | | | | 3 | | | 4 | | | | | | | | | | |
| $I_{2ms}$ = 2000 A, $E_{th}$ = 14 kJ/$kV_r$, line discharge class 5 | | | | | | | | | | 4 | | | 5 | | | | | | | | | | |
| $I_{2ms}$ = 3200 A, $E_{th}$ = 16 kJ/$kV_r$, line discharge class 5 | | | | | | | | | | 5 | | | 5 | | | | | | | | | | |
| **Application** | | | | | | | | | | | | | | | | | | | | | | | |
| Phase surge arrester | | | | | | | | | | | P | | | | | | | | | | | | |
| Neutral point surge arrester | | | | | | | | | | | S | | | | | | | | | | | | |
| **Housing size, number of units. Refer to »Mechanical characteristics« on page 104** | | | | | | | | | | | | | | | | | | | | | | | |
| Housing »2xL«, 2 units | | | | | | | | | | | | L | | 2 | | | | | | | | | |
| Housing »2xM«, 2 units | | | | | | | | | | | | M | | 2 | | | | | | | | | |
| Housing »2xN«, 2 units | | | | | | | | | | | | N | | 2 | | | | | | | | | |
| Housing »2xS«, 2 units | | | | | | | | | | | | S | | 2 | | | | | | | | | |
| Housing »2xT«, 2 units | | | | | | | | | | | | T | | 2 | | | | | | | | | |
| Housing »3xS«, 3 units | | | | | | | | | | | | S | | 3 | | | | | | | | | |
| Housing »3xT«, 3 units | | | | | | | | | | | | T | | 3 | | | | | | | | | |
| Housing »3xU«, 3 units | | | | | | | | | | | | U | | 3 | | | | | | | | | |
| **Form of sheds and color of silicone rubber** | | | | | | | | | | | | | | | | | | | | | | | |
| Alternating sheds, gray silicone rubber | | | | | | | | | | | | | | | | 4 | | | | | | | |
| **High-voltage terminal** | | | | | | | | | | | | | | | | | | | | | | | |
| Metal plate | | | | | | | | | | | | | | | | | A | | | | | | |
| Bolt, 30 mm diameter, 80 mm length, hot dip galvanized steel | | | | | | | | | | | | | | | | | C | | | | | | |
| Bolt, 30 mm diameter, 80 mm length, stainless steel | | | | | | | | | | | | | | | | | D | | | | | | |
| Bolt, 30 mm diameter, 100 mm length, stainless steel | | | | | | | | | | | | | | | | | E | | | | | | |
| Bolt, 40 mm diameter, 80 mm length, stainless steel | | | | | | | | | | | | | | | | | G | | | | | | |
| Bolt, 40 mm diameter, 120 mm length, stainless steel | | | | | | | | | | | | | | | | | J | | | | | | |
| Flat double DIN, 200x100, hot dip galvanized steel | | | | | | | | | | | | | | | | | M | | | | | | |
| Flat DIN/NEMA, 40x40 ... 50x50, copper | | | | | | | | | | | | | | | | | R | | | | | | |
| Flat DIN/NEMA, 40x40 ... 50x50, aluminum | | | | | | | | | | | | | | | | | T | | | | | | |
| Flat DIN/NEMA, 40x40 ... 50x50, hot dip galvanized steel | | | | | | | | | | | | | | | | | X | | | | | | |
| Flat DIN/NEMA, 40x40 ... 50x50, stainless steel | | | | | | | | | | | | | | | | | Y | | | | | | |
| Bolt, 30 mm diameter, 125 mm length, stainless steel | | | | | | | | | | | | | | | | | Z | | | | | | P1E |
| Bolt, 40 mm diameter, 80 mm length, aluminum | | | | | | | | | | | | | | | | | Z | | | | | | P1H |
| Bolt, 40 mm diameter, 80 mm length, copper | | | | | | | | | | | | | | | | | Z | | | | | | P1Q |
| Valve-tower cover plate t=8,0 M20x150 | | | | | | | | | | | | | | | | | Z | | | | | | P2V |
| Flat, 4xD=16, aluminum | | | | | | | | | | | | | | | | | Z | | | | | | P5A |
| Flat, 4xD=17.5 50/50, hot dip galvanized steel | | | | | | | | | | | | | | | | | Z | | | | | | P5D |
| Flat, 4xD=17.5 50/50, aluminum | | | | | | | | | | | | | | | | | Z | | | | | | P5E |
| Flat, 4xD=14/50, Palm 5, aluminum | | | | | | | | | | | | | | | | | Z | | | | | | P5G |
| Flat, 4xD=18/60, Palm 8, copper | | | | | | | | | | | | | | | | | Z | | | | | | P5L |
| Flat, 4x, 70x60, Palm 12, copper | | | | | | | | | | | | | | | | | Z | | | | | | P5N |
| Flat, 6x, 60x60, copper | | | | | | | | | | | | | | | | | Z | | | | | | P5R |
| Flat, 6xD=18 60/60, hot dip galvanized steel | | | | | | | | | | | | | | | | | Z | | | | | | P5S |

## 3EQ3 – order numbers

| Data position | 1 | 2 | 3 | 4 | – | 5 | 6 | 7 | – | 8 | 9 | 10 | 11 | 12 | – | 13 | 14 | 15 | 16 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Order number** | **3** | **E** | **Q** | **3** | | **x** | **x** | **x** | | **5** | **P** | **T** | **5** | **3** | | **4** | **D** | **A** | **1** | **–** | **Z** | | |
| **Nameplate** | | | | | | | | | | | | | | | | | | | | | | | |
| German/English (standard) | | | | | | | | | | | | | | | | | | A | | | | | |
| French | | | | | | | | | | | | | | | | | | B | | | | | |
| Czech | | | | | | | | | | | | | | | | | | C | | | | | |
| Slovene | | | | | | | | | | | | | | | | | | D | | | | | |
| Russian | | | | | | | | | | | | | | | | | | E | | | | | |
| Spanish | | | | | | | | | | | | | | | | | | F | | | | | |
| Portuguese | | | | | | | | | | | | | | | | | | G | | | | | |
| Arabic | | | | | | | | | | | | | | | | | | R | | | | | |
| Brazil | | | | | | | | | | | | | | | | | | T | | | | | |
| CFE (Mexico) | | | | | | | | | | | | | | | | | | U | | | | | |
| Customized version | | | | | | | | | | | | | | | | | | Z | | | | | |
| **Mounting** | | | | | | | | | | | | | | | | | | | | | | | |
| 270 mm x 270 mm, grounded | | | | | | | | | | | | | | | | | | | 0 | | | | |
| 270 mm x 270 mm, insulated | | | | | | | | | | | | | | | | | | | 1 | | | | |
| D=16.5", grounded | | | | | | | | | | | | | | | | | | | 6 | | | | |
| D=16.5", insulated | | | | | | | | | | | | | | | | | | | 8 | | | | |
| D=20", insulated | | | | | | | | | | | | | | | | | | | 9 | | | | R2U |
| D=20", grounded | | | | | | | | | | | | | | | | | | | 9 | | | | R2V |
| D=20", NEMA, insulated, copper tin-plated | | | | | | | | | | | | | | | | | | | 9 | | | | R2W |
| D=20", NEMA, insulated, with connection plate, copper tin-plated | | | | | | | | | | | | | | | | | | | 9 | | | | R2X |
| 270 mm x 270 mm, insulated, increased SSL | | | | | | | | | | | | | | | | | | | 9 | | | | R4B |
| 270 mm x 270 mm, NEMA, grounded | | | | | | | | | | | | | | | | | | | 9 | | | | R5C |
| **Accessories** | | | | | | | | | | | | | | | | | | | | | | | |
| Refer to table »Optional accessories« on page 110 | | | | | | | | | | | | | | | | | | | | – | Z | | |

# Ratings and specifications

**Electrical characteristics – phase arresters**

| Highest voltage of the system | Rated voltage | Continuous operating voltage | Line discharge class | Long duration current 2ms | Maximum values of the residual voltages at discharge currents of the following impulses | | | | | | | Arrester type | Minimum housing size |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $U_s$ kV | $U_r$ kV | $U_c$ kV | LD Class | A | 30/60 µs 0.5 kA kV | 30/60 µs 1 kA kV | 30/60 µs 2 kA kV | 8/20 µs 5 kA kV | 8/20 µs 10 kA kV | 8/20 µs 20 kA kV | 8/20 µs 40 kA kV | | |
| 420 | 336 | 269 | 4 | 1600 | 626 | 641 | 672 | 726 | 773 | 850 | 927 | 3EQ3 336 - 3 P . 4 . - .... | 2xL |
| | 336 | 269 | 5 | 2000 | 627 | 646 | 665 | 714 | 756 | 824 | 900 | 3EQ3 336 - 4 P . 5 . - .... | 2xL |
| | 360 | 288 | 4 | 1600 | 671 | 687 | 720 | 778 | 828 | 911 | 994 | 3EQ3 360 - 3 P . 4 . - .... | 2xM |
| | 360 | 288 | 5 | 2000 | 672 | 693 | 713 | 765 | 810 | 883 | 964 | 3EQ3 360 - 4 P . 5 . - .... | 2xM |
| 550 | 420 | 336 | 4 | 1600 | 782 | 802 | 840 | 908 | 966 | 1063 | 1159 | 3EQ3 420 - 3 P . 4 . - .... | 2xS |
| | 420 | 336 | 5 | 2000 | 784 | 808 | 832 | 893 | 945 | 1030 | 1125 | 3EQ3 420 - 4 P . 5 . - .... | 2xS |
| | 420 | 336 | 5 | 3200 | 759 | 777 | 804 | 858 | 903 | 975 | 1066 | 3EQ3 420 - 5 P . 5 . - .... | 2xS |
| | 444 | 355 | 4 | 1600 | 827 | 848 | 888 | 960 | 1021 | 1123 | 1225 | 3EQ3 444 - 3 P . 4 . - .... | 2xT |
| | 444 | 355 | 5 | 2000 | 829 | 854 | 879 | 944 | 999 | 1089 | 1189 | 3EQ3 444 - 4 P . 5 . - .... | 2xT |
| | 444 | 355 | 5 | 3200 | 802 | 821 | 850 | 907 | 955 | 1031 | 1126 | 3EQ3 444 - 5 P . 5 . - .... | 2xS |
| 800 | 580 | 464 | 5 | 2000 | 1083 | 1116 | 1148 | 1233 | 1305 | 1422 | 1553 | 3EQ3 580 - 4 P . 5 . - .... | 3xT |
| | 580 | 464 | 5 | 3200 | 1047 | 1072 | 1110 | 1185 | 1247 | 1347 | 1471 | 3EQ3 580 - 5 P . 5 . - .... | 3xS |
| | 588 | 470 | 5 | 2000 | 1098 | 1131 | 1164 | 1250 | 1323 | 1442 | 1574 | 3EQ3 588 - 4 P . 5 . - .... | 3xT |
| | 588 | 470 | 5 | 3200 | 1062 | 1087 | 1125 | 1201 | 1264 | 1365 | 1492 | 3EQ3 588 - 5 P . 5 . - .... | 3xS |
| | 597 | 478 | 5 | 2000 | 1115 | 1148 | 1182 | 1269 | 1343 | 1464 | 1598 | 3EQ3 597 - 4 P . 5 . - .... | 3xT |
| | 597 | 478 | 5 | 3200 | 1078 | 1104 | 1142 | 1219 | 1284 | 1386 | 1515 | 3EQ3 597 - 5 P . 5 . - .... | 3xS |
| | 612 | 490 | 5 | 2000 | 1143 | 1177 | 1212 | 1301 | 1377 | 1501 | 1639 | 3EQ3 612 - 4 P . 5 . - .... | 3xU |
| | 612 | 490 | 5 | 3200 | 1105 | 1132 | 1171 | 1250 | 1316 | 1421 | 1553 | 3EQ3 612 - 5 P . 5 . - .... | 3xT |
| | 624 | 499 | 5 | 2000 | 1165 | 1200 | 1236 | 1327 | 1404 | 1530 | 1671 | 3EQ3 624 - 4 P . 5 . - .... | 3xU |
| | 624 | 499 | 5 | 3200 | 1127 | 1154 | 1194 | 1275 | 1342 | 1449 | 1583 | 3EQ3 624 - 5 P . 5 . - .... | 3xU |

**Mechanical characteristics**

| Housing size | Height [H] | Creepage distance | Housing insulation | | | Specified short-term load SSL | Specified long-term load SLL | Grading ring diameter [D] | Maximum weight of arrester | Flashover distance | Arrester type | Figure |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | mm | mm | Lightning impulse withstand voltage 1.2/50µs kV | Switching impulse withstand voltage 250µs/ 2500µs, wet kV | Power frequency withstand voltage 1 min., wet kV | N | N | mm | kg | mm | | |
| 2xL | 3400 | 9790 | 1566 | 1134 | 729 | 12350 | 8640 | 1200 | 261 | 2100 | 3EQ3... - .. L . 2 - .... | A |
| 2xM | 3600 | 10540 | 1682 | 1218 | 783 | 11660 | 8160 | 1200 | 272 | 2295 | 3EQ3... - .. M . 2 - .... | A |
| 2xN | 3800 | 11300 | 1798 | 1302 | 837 | 11050 | 7730 | 1200 | 277 | 2495 | 3EQ3... - .. N . 2 - .... | A |
| 2xS | 4600 | 14300 | 1891 | 1369 | 880 | 9130 | 6390 | 1800 | 350 | 2940 | 3EQ3... - .. S . 2 - .... | A |
| 2xT | 4800 | 15060 | 2007 | 1453 | 934 | 8750 | 6120 | 1800 | 358 | 3135 | 3EQ3... - .. T . 2 - .... | A |
| 3xS | 6900 | 21450 | 2836 | 2054 | 1320 | 6080 | 4260 | 2200 | 513 | 4780 | 3EQ3... - .. S . 3 - .... | B |
| 3xT | 7200 | 22590 | 3010 | 2180 | 1401 | 5830 | 4080 | 2200 | 526 | 5000 | 3EQ3... - .. T . 3 - .... | B |
| 3xU | 7500 | 23700 | 3184 | 2306 | 1482 | 5600 | 3920 | 2650 | 538 | 5230 | 3EQ3... - .. U . 3 - .... | B |

The maximum arrester weight can vary depending on rated voltage and line discharge class.

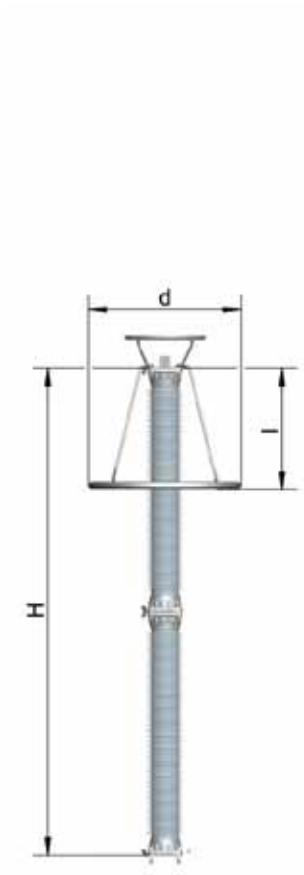



Figure A

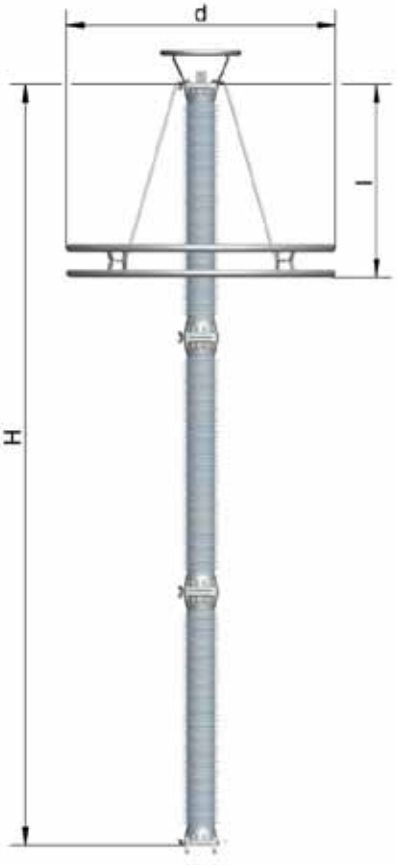
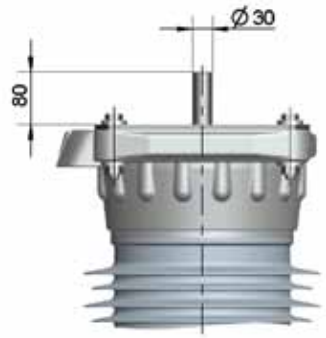



Figure B

## Line terminals

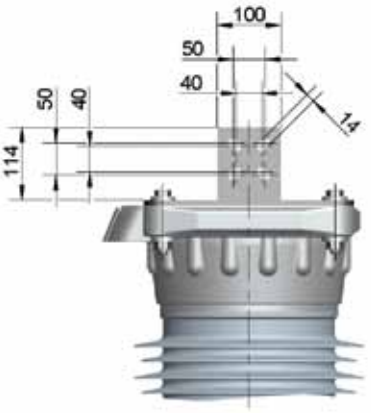
**Plate**

3EQ3 ...-.....-.A...




**Bolt**

3EQ3 ...-.....-.D..




**DIN/NEMA flat terminal**

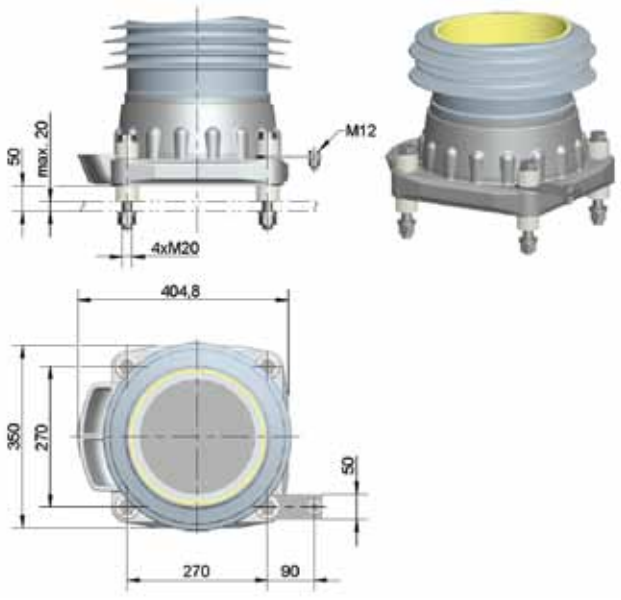
3EQ3 ...-.....-.R.. (copper)

3EQ3 ...-.....-.T.. (aluminum)

3EQ3 ...-.....-.X.. (hot dip galvanized)

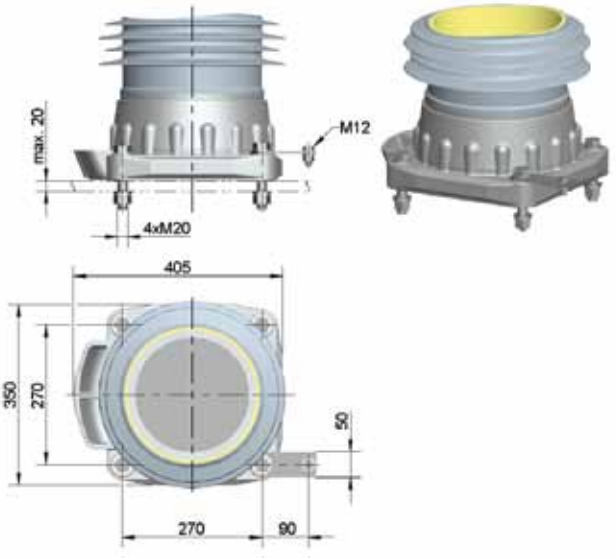
3EQ3 ...-.....-.Y.. (stainless steel)

## Mounting




**Insulated**

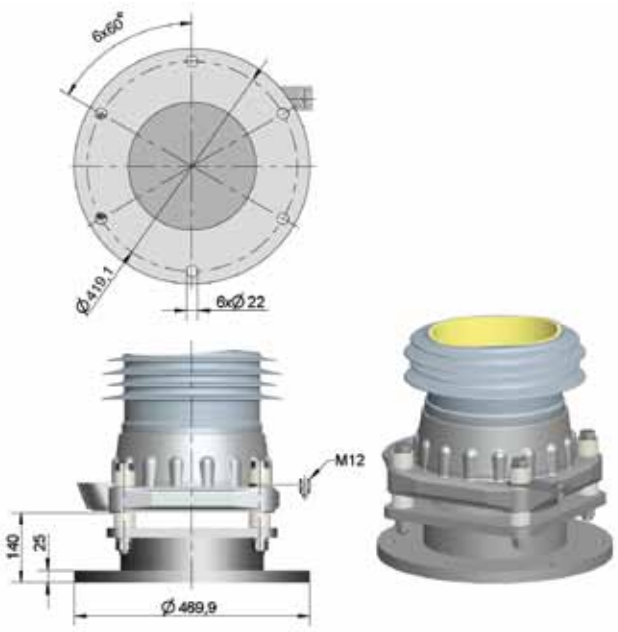
3EQ3 ...-.....-...1




**Grounded**

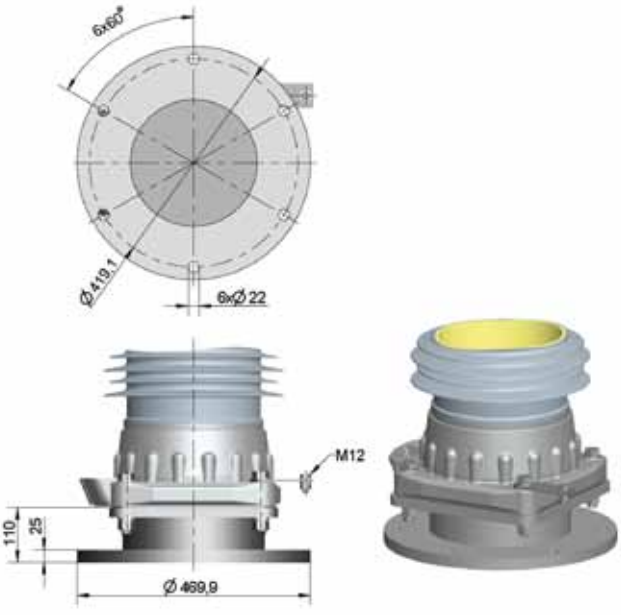
3EQ3 ...-.....-...0

## Mounting




**Insulated**

3EQ3 ...-.....-...8




**Grounded**

3EQ3...-.....-...6

# Accessories and monitoring

- Accessories for surge arresters
- Monitoring devices for surge arresters

# Accessories for surge arresters

Siemens' surge arresters can optionally be equipped with one or more accessories, which are listed in the table below. The selected code for the accessory should be added to the order number of the surge arrester. Example: 3EL2 096-2PJ31-4XA1-Z D91.

| Accessories | Code | 3EL5 | 3EL1 | 3EL2 | 3EL3 | 3EP5 | 3EP4 | 3EP6 | 3EP3 | 3EQ1 | 3EQ4 | 3EQ3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Earth terminal, copper tin-plated | D51 | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| DIN/NEMA earth terminal | D71 | | | ■ | | | ■ | | | ■ | ■ | |
| Adapter DIN/NEMA to double DIN flat terminal, including 2 line clamps | D81 | | ■ | ■ | | | ■ | | | ■ | ■ | |
| Adapter DIN/NEMA to double NEMA flat terminal, including 2 line clamps | D82 | | ■ | ■ | | | ■ | | | ■ | ■ | |
| Line clamp | D91 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Eyebolt earth terminal | D92 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| NEMA earth terminal, stainless steel | D93 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| NEMA earth terminal, copper | D94 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| Palm earth terminal, aluminum | D95 | | ■ | ■ | | ■ | ■ | | ■ | ■ | ■ | |
| Earth terminal, 2x D14, stainless steel | D96 | | | | | | | | ■ | | ■ | ■ |
| $N_2$ filling | K02 | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Yellow cover panels for gas diverter | K14 | | | | | | ■ | ■ | ■ | ■ | ■ | ■ |
| Increased rated short-circuit current of 80 kA | K80 | | | | | | | | | | ■ | |

Optional accessories

# Monitoring devices for surge arresters

Surge arresters are highly reliable components in power transmission and distribution systems. When operated in accordance with their specifications, their service life can span as much as 30 years without any maintenance. Nevertheless, overloads may sometimes occur that can cause arrester failure and even endanger the safety of the network.

Monitors assist in the early detection of relevant changes and support security of supply on a whole new level.

Siemens offers a complete line of monitoring devices with a variety of innovative functionalities that can be perfectly matched to the customer's requirements, ensuring that impending faults will be detected as early as possible and before the security of supply is compromised.

### Based on solid experience

Siemens has over 85 years of experience with surge arresters – a solid foundation on which to build a comprehensive range of monitors that are precisely tailored to today's surge arrester technology. Siemens' line of surge arrester monitors ranges from simple counters and condition indicators to periodic analytic condition monitoring and a future live condition monitoring system. All monitors provide the requisite information on surge arrester responses and the arrester's condition – perfectly matched to the respective voltage level, network situation, and customer requirements.

Surge counter

Surge counter with leakage current meter

**Surge counter**
Order number: 3EX5 030-0

**Surge counter with auxiliary contact**
Order number: 3EX5 030-1

**Surge counter with leakage current meter (0–30 mA)**
Order number: 3EX5 050-0

**Surge counter with leakage current meter (0–30 mA) with auxiliary contact**
Order number: 3EX5 050-1

**Surge counter with leakage current meter (0–50 mA)**
Order number: 3EX5 050-2

ACM Basic

ACM Advanced

**Arrester Condition Monitor (ACM) basic**
Order number: 3EX5 080-0

**Arrester Condition Monitor (ACM) advanced**
Order number: 3EX5 080-1
Order number: 3EX5 086 (USB wireless module)

**Upgrade from ACM basic to ACM advanced**
Order number: 3EX5 081

Sensor

Display

**Sensor**
Order number: 3EX5 060-1

**Display**
Order number: 3EX5 062-1

**Connecting lead (required for operation)**
Length 3 m. Order number: 3EX5 963-0D
Length 6 m. Order number: 3EX5 963-0G
Length 10 m. Order number: 3EX5 963-1A
Length 12 m. Order number: 3EX5 963-1C
Length 14 m. Order number: 3EX5 963-1E
Length 16 m. Order number: 3EX5 963-1G
Length 18 m. Order number: 3EX5 963-1J
Length 20 m. Order number: 3EX5 963-2A
Length 22 m. Order number: 3EX5 963-2C
Length 24 m. Order number: 3EX5 963-2E
Length 26 m. Order number: 3EX5 963-2G
Length 28 m. Order number: 3EX5 963-2J
Length 30 m. Order number: 3EX5 963-3A

**Mounting bracket for surge counter**
Order number: 3EX5 930

**Connection cable for monitors**
Order number: 3EX5 952

**Earth lead**
Order number: 3EX5 955



Please refer to our monitoring brochure for more information.

Published by and copyright © 2014:
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Order No. E50001-G630-A249-X-4A00
Printed in Germany
Dispo 30002, SIMC-0000-43759
fb 5870 WÜ WS 05141.0

Printed on elementary chlorine-free bleached paper

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The information in this document contains general descriptions of the technical options available, which may not apply in all cases. The required technical options should therefore be specified in the contract.

**siemens.com/energy/arrester**