High Voltage Surge Arresters
Buyer´s Guide

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Safe, secure and economic supply of electricity — with ABB surge arresters

ABB surge arresters are the primary protection against atmospheric and switching overvoltages. They are generally connected in parallel with the equipment to be protected to divert the surge current. The active elements (MO resistors) of ABB surge arresters are manufactured using a highly non-linear ceramic resistor material, composed primarily of zinc oxide mixed with other metal oxides and sintered together.

Strong focus on quality at all stages, from raw material through to finished product, ensures that ABB surge arresters survive the designed stresses with ease and with good margins. Different dimensions permit a large variety of standard arresters as well as client-specific solutions with regards protection levels, energy capability and mechanical performance.

This Buyer's Guide deals with high voltage surge arresters for standard AC applications. For other applications, such as series capacitors protection, shunt capacitor protection or DC applications, contact your ABB sales representative.

Product range

Arrester classification	Type	Max. system voltage [2] kV_{rms}	Rated voltage [2] kV_{rms}	Energy requirement/ Lightning intensity	Mechanical strength [3] Nm
PEXLIM — Silicone polymer-housed arrester					
Superior where low weight, reduced clearances, flexible mounting, non-fragility and additional personnel safety is required. Major component for PEXLINK™ concept for transmission line protection.					
10 kA, IEC station class designation SL	PEXLIM R-Z	72 - 145	75 - 120	Moderate	1 300
10 kA, IEC station class designation SL	PEXLIM R-Y	24 - 170	18 - 144	Moderate	1 600
10 kA, IEC station class designation SM	PEXLIM Q	52 - 420	42 - 396	High	4 000
20 kA, IEC station class designation SH	PEXLIM P-X	52 - 420	42 - 360	Very high	4 000
20 kA, IEC station class designation SH	PEXLIM P-Y	300 - 550	228 - 444	Very high	9 000
TEXLIM — High strength silicone polymer-housed arrester					
Specially suited to extreme seismic zones.					
10 kA, IEC station class designation SM	TEXLIM Q-C	123 - 420	90 - 420	High	40 000
20 kA, IEC station class designation SH	TEXLIM P-C	245 - 550	180 - 444	Very high	40 000
20 kA, IEC station class designation SH	TEXLIM T-C	245 - 800	180 - 624	Very high	40 000
EXLIM — Porcelain-housed arrester					
10 kA, IEC station class designation SL	EXLIM R	52 - 170	42 - 168	Moderate	7 500
10 kA, IEC station class designation SM	EXLIM Q-E	52 - 245	42 - 228	High	7 500
10 kA, IEC station class designation SM	EXLIM Q-D	170 - 420	132 - 420	High	20 000
20 kA, IEC station class designation SH	EXLIM P	52 - 550	42 - 444	Very high	20 000
20 kA, IEC station class designation SH	EXLIM T	245 - 800	180 - 624	Very high	20 000

[1] Arrester classification according to IEC 60099-4.
[2] Arresters with lower or higher voltages may be available on request for special applications.
[3] Specified short-term service load (SSL).

Definitions

NOTE! The standards referred to hereunder are the latest editions of IEC 60099-4 and IEEE C62.11

Maximum system voltage (Us)
The maximum voltage between phases during normal service.

Nominal discharge current (IEC)
The peak value of the lightning current impulse which is used to classify the arrester.

Lightning classifying current (ANSI/IEEE)
The designated lightning current used to perform the classification tests.

Rated voltage (U_r)
An arrester fulfilling the IEC standard must withstand its rated voltage (U_r) for 10 s after being preheated to 60 °C and subjected to energy injection as defined in the standard. Thus, U_r shall equal at least the 10-second TOV capability of an arrester. Additionally, rated voltage is used as a reference parameter.

NOTE! TOV capability of ABB arresters exceeds the IEC requirements.

Duty-cycle voltage rating (IEEE)
The designated maximum permissible voltage between its terminals at which an arrester is designed to perform its duty cycle.

Continuous operating voltage
The maximum permissible r.m.s. power frequency voltage that may be applied continuously between the arrester terminals. This voltage is defined in different ways (verified by different test procedures) in IEC and IEEE.

- IEC (U_C)
  IEC gives the manufacturer the freedom to decide U_C. The value is verified in the operating duty test.
- IEEE (MCOV)
  IEEE lists the maximum continuous operating voltage (MCOV) for all arrester ratings used in a table. The value is used in all tests specified by IEEE.

Temporary overvoltages (TOV)
Temporary overvoltages, as differentiated from surge overvoltages, are oscillatory power frequency overvoltages of relatively long duration (from a few cycles to hours).
The most common form of TOV occurs on the healthy phases of a system during an earth-fault involving one or more phases. Other sources of TOV are load-rejection, energization of unloaded lines, ferroresonance, etc. The TOV capability of the arresters is indicated with prior energy stress in the relevant catalogues.

Residual voltage/Discharge voltage
The peak value of the voltage that appears between the terminals of an arrester during the passage of discharge current through it. Residual voltage depends on both the magnitude and the waveform of the discharge current. The voltage/current characteristics of the arresters are given in the relevant catalogues.

Arrester class
- Distribution class arrester (IEC designations: DL, DM, DH)
  An arrester intended for use on distribution systems, typically of Us ≤ 52 kV, to protect components primarily from the effects of lightning.

- Station class arrester (IEC designations: SL, SM, SH)
  An arrester intended for use in stations to protect the equipment from transient overvoltages, typically but not only intended for use on systems of Us ≥ 72,5 kV.

Energy capability
The energy that a surge arrester can absorb, in one or more impulses, without damage and without loss of thermal stability. The energy capability of a surge arrester is different depending on the type, duration and grouping of applied impulses as well as what occurs afterwards. Arrester standards have historically not explicitly defined the energy capability of an arrester, and the current editions have specifically focused on attempting to resolve this deficiency in the following forms (IEC 60099-4 definitions):

- Repetitive charge transfer rating, Q_{rs}
  The maximum specified charge transfer capability of an arrester, in the form of a single event or group of surges that may be transferred through an arrester without causing mechanical failure or unacceptable electrical degradation to the MO resistors. This applies to both station and distribution class arresters.

- Thermal charge transfer rating, Q_{th}
  The maximum specified charge that may be transferred through an arrester or arrester section within 3 minutes in a thermal recovery test without causing a thermal runaway. This applies only to distribution class arresters.

– Thermal energy rating, W_{th}
  The maximum specified energy, given in kJ/kV of U_r, that may be injected into an arrester or arrester section within 3 minutes in a thermal recovery test without causing a thermal runaway. This applies only to station class arresters.

Short-circuit capability

The ability of an arrester, in the event of an overload due to any reason, to conduct the resulting system short-circuit current without violent shattering which may damage nearby equipment or injure personnel. After such an operation, the arrester must be replaced. The system short-circuit current may be high or low depending on the system impedance and earthing conditions and hence short-circuit capability is verified at different current levels.

External insulation withstand strength

The maximum value of the applied voltage of a specified wave shape which does not cause the flashover of an arrester. Unlike other equipment, arresters are designed to discharge internally and the voltage across the housing can never exceed the protective levels. Thus, the external insulation of arrester housings is self-protected and need not fulfill a certain standardized insulation class provided its insulation withstand strength is higher than the protective levels by a designated safety factor and appropriately corrected for installation altitude.

NOTE! The insulation withstand of ABB surge arresters has been thoroughly considered in the design, and spacings between metal flanges as well as spacings between flanges and grading rings are sufficiently large to withstand overvoltages appearing during current discharges. All ABB arresters are suitable for installations up to at least 1000 m above sea level, often with a large margin.

Pollution performance

IEC 60815 defines five levels of pollution (from very light to very heavy), with the traditional correspondingly required creepage for porcelain housings as indicated in the table below.

Site pollution severity class	Pollution level	Specific creepage in mm/kV (U_s)	Unified specific creepage distance mm/kV (Us/ √3)
a	Very light	12.7	22.0
b	Light (L)	16	27.8
c	Medium (M)	20	34.7
d	Heavy (H)	25	43.3
e	Very heavy (V)	31	53.7

Polymeric insulators of hydrophobicity transfer material (HTM), e.g. silicone, present advantages including a generally improved pollution withstand behaviour when compared to similar ceramic insulators of equal creepage distance. From a pollution withstand or flashover point of view, a reduced creepage distance may be used on PEXLIM and TEXLIM arresters with such HTM insulators.

The creepage distance is the length measured along the housing's external profile and serves as a measure of the arrester performance in polluted environments with respect to the risk of external flashover. Since the mean diameter for all the standard arresters is less than 300 mm, the specific creepage distance is the same as the nominal creepage distance.

SSL

Specified short-term load allowed to be applied during service for short periods and for relatively rare events without causing any mechanical damage to the arrester.

SLL

Specified long-term load allowed to be continuously applied during service without causing any mechanical damage to the arrester.

MBL

Mean breaking load is the average breaking load for porcelain-housed arresters.

Definitions
Line Surge Arresters (LSA)

Backflashover
Occurs when lightning strikes the tower structure or overhead shield wire. The lightning discharge current, flowing through the tower and tower footing impedance, produces potential differences across the line insulation. If the line insulation strength is exceeded, flashover occurs i.e. a backflashover. Backflashover is most prevalent when tower footing impedance is high.

Compact insulation lines
Transmission lines with reduced clearances between phases and between phase and earth and with lower insulation level withstand than for normal lines for the same system voltage.

Coupling factor
The ratio of included surge voltage on a parallel conductor to that on a struck conductor. This factor is determined from the geometric relationships between phase and ground (or protected phase conductors). A value often used for estimation purposes is 0.25.

Keraunic level
Number of annual thunderstorm days for a given region.

LSA
Line Surge Arresters are intended for installation in overhead lines in parallel to the line insulators in order to prevent flashovers, which may be either:

– non-gapped line arrester (NGLA)
  arrester without internal or external series gap

– externally gapped line arrester (EGLA)
  arrester with series gap used to protect an insulator assembly from lightning-caused fast-front overvoltages only

NOTE! PEXLINK is a NGLA

Shielding
Protection of phase conductors from direct lightning strokes; generally, by means of additional conductor(s) running on the top of the towers and grounded through the tower structures.

Shielding angle
The included angle, usually between 20 to 30 degrees, between shield wire and phase conductor.

Shielding failure
Occurs when lightning strikes a phase conductor of a line protected by overhead shield wires.

Tower footing impedance
The impedance seen by a lightning surge flowing from the tower base to true ground. The risk for backflashover increases with increasing footing impedance.

Travelling waves
Occur when lightning strikes a transmission line span and a high current surge is injected on to the struck conductor. The impulse voltage and current waves divide and propagate in both directions from the stroke terminal at a velocity of approximately 300 meters per microsecond with magnitudes determined by the stroke current and line surge impedance.

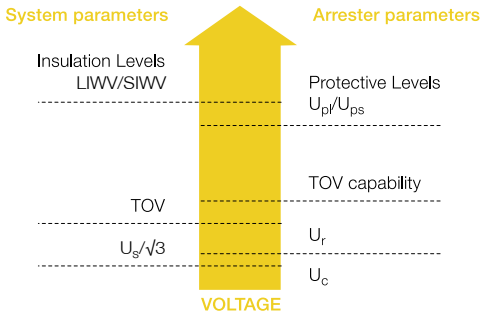
Simplified selection procedure

The selection is carried out in two major steps:

- Matching the electrical characteristics of the arresters to the system's electrical demands
- Matching the mechanical characteristics of the arresters to the system's mechanical and environmental requirements.

The final selection is reflected in the arrester type designation.

System/arrester parameters

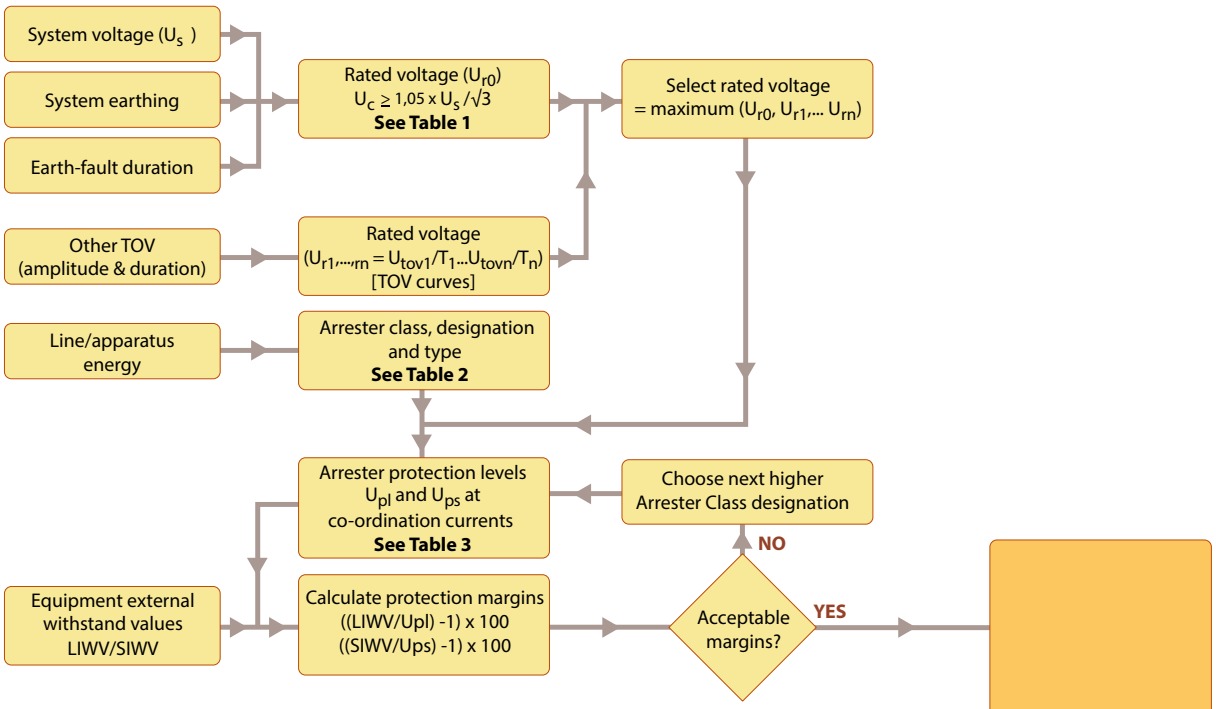


Vocabulary

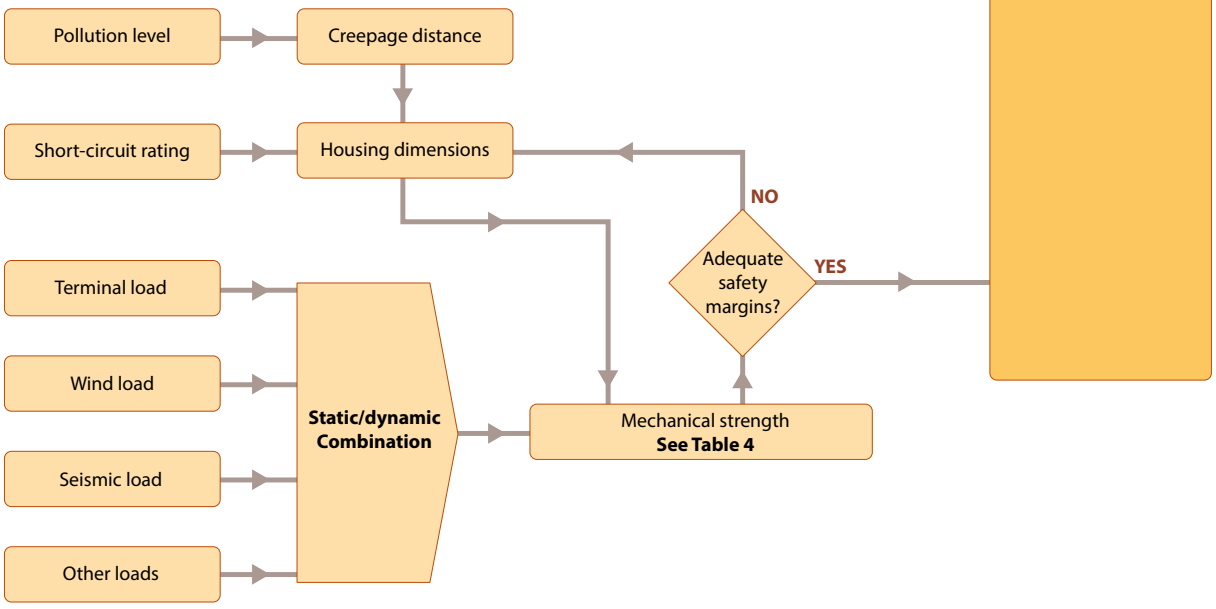
U_s	Maximum system voltage
U_c	Continuous operating voltage
U_r	Rated voltage
TOV	Temporary overvoltage
T	TOV strength factor
k	Earth fault factor
U_{ps}	Switching impulse protective level
U_{pl}	Lightning impulse protective level
U_{ws}	Switching impulse withstand level
U_{wl}	Lightning impulse withstand level
SIWV	Switching impulse withstand voltage
LIWV	Lightning impulse withstand voltage

Flowchart for simplified selection of surge arresters

Electrical selection



Mechanical selection



Matching the system characteristics

Arrester rated voltage (U_r)

For each system voltage, the tables "Guaranteed protective data" show a range of U_r and maximum continuous operating voltages U_c, all of which are capable of withstanding the actual continuous operating voltage (U_{ca}) with sufficient margin. Hence, the selection of U_r is only a function of the applied temporary overvoltages, TOV, (U_{tov}), taking into account their amplitudes and duration.

TOV, as differentiated from surge overvoltages, are oscillatory power frequency overvoltages, with or without harmonics, of relatively long duration (from a few cycles to hours or longer) which are generated by system events. The arresters must withstand the heat energy generated by them.

Most commonly, a single or two-phase earth fault leads to a TOV in the healthy phase(s) and also in the neutral of Y-connected transformers. Its amplitude is determined by the system earthing conditions and its duration by the fault-clearance time.

If the earth-fault factor, (k) = U_{tov}/U_{ca}, is 1.4 or less, the system is considered to be effectively earthed. Generally, this implies a solid connection of the neutral to the earth grid. All other forms of earthing via an impedance or a non-earthing of the neutral is considered as non-effective with, typically, k = 1.73

For effectively earthed systems, the fault-clearance time is generally under 1 s but it can vary widely among different systems. The catalogues list the values of TOV capability for 1 and 10 s duration after a prior energy stress (as a conservative approach). For other durations or for specific TOV conditions, follow the procedure hereunder:

- Consider each TOV separately.
- From the TOV curves, read off the TOV strength factor (T_r) for the time corresponding to the fault-clearance time.
- U_{tov}/T_r gives the minimum value of U_r for withstanding this TOV. Choose the next higher standard rating.
- The final choice of U_r will be the highest of the U_r values obtained from the above calculations for each TOV.

System earthing	Fault duration	System voltage U_s (kV)	Min. U_r (kV)
Effective	≤ 10 s	≤ 100	≥ 0.79 x U_s
Effective	≤ 1 s	≥ 123	≥ 0.74 x U_s
Non-effective	≤ 10 s	≤ 170	≥ 0.97 x U_s
Non-effective	≤ 1 h	≤ 170	≥ 1.24 x U_s

Table 1.

The table gives a suggested minimum value of the arrester rated voltage (U_r). based on common parameters. In each case, choose the next higher standard rating as given in the catalogue. This is only intended as a general guide, and actual U_r necessary may depend on the specific parameters of the system and the chosen arrester.

Note: Do not select a lower value of U_r than obtained as above unless the parameters are known more exactly; otherwise the arrester may be over-stressed by TOV.

Energy capability and Arrester Class designation

IEC classifies arresters by their application and nominal discharge current. Station class 10 and 20 kA arresters are further classified by energy capability expressed as a repetitive charge transfer rating and thermal energy rating. These arresters are thereafter designated as either SL, SM, or SH where the letters "L", "M" and "H" in the designation stand for "low", "medium" and "high" duty, respectively.

Matching the system characteristics

Arrester Class designation	Arrester type	Energy capability		Normal application range (U_s)
		Wth kJ/kV (U_r)	Qrs(C)	
SL	EXLIM R	5	1.2	≤ 170 kV
	PEXLIM R-Z	5	1.2	≤ 145 kV
	PEXLIM R-Y	5	1.2	≤ 170 kV
SM	EXLIM Q-E	8	2.0	≤ 245 kV
	EXLIM Q-D	8	2.0	170-420 kV
	PEXLIM Q	8	2.0	≤ 420 kV
	TEXLIM Q-C	8	2.0	123-420 kV
SH	EXLIM P	11	3.2	≤ 550 kV
	PEXLIM P-X	11	3.2	≤ 420 kV
	PEXLIM P-Y	11	3.2	300-550 kV
	TEXLIM P-C	11	3.2	245-550 kV
	EXLIM T	15	5.2	245-800 kV
	TEXLIM T-C	15	5.2	245-800 kV

Table 2.

Energy capability of ABB arresters: The normal application range is only a guide, and depends on the specific parameters.

Though the energy capability is mentioned in a different manner in IEEE, the normal range of application as above applies even for IEEE systems. For specific and special cases, e.g. capacitor banks, it may be necessary to calculate the energy capability differently; for example as shown in the IEC 60099-5 and other guides.

Protection levels (U_{pl} and U_{ps})

For insulation coordination purposes, consider the lightning impulse protection level (U_{pl}) at 10 kA for $U_m \leq 362$ kV and at 20 kA for higher voltages. Similarly, the switching impulse protection levels (U_{ps}) for coordination purposes range from 0.5 kA (for $U_m \leq 170$ kV) to 2 kA (for $U_m \geq 362$ kV). The values can be read-off from the catalogue tables or easily computed from Table 3. In the latter case, they must be rounded upwards.

Arrester type	Nom. Discharge current (I_n)	U_{pl}/U_r at 10 kA_p	U_{pl}/U_r at 20 kA_p	U_{ps}/U_r
EXLIM R	10	2.590		2.060 at 0.5 kA_p
PEXLIM R-Z	10	2.590		2.060 at 0.5 kA_p
PEXLIM R-Y	10	2.590		2.060 at 0.5 kA_p
EXLIM Q	10	2.350		1.981 at 1.0 kA_p
PEXLIM Q	10	2.350		1.981 at 1.0 kA_p
TEXLIM Q-C	10	2.350		1.981 at 1.0 kA_p
EXLIM P	20	2.275	2.5	2.020 at 2.0 kA_p
PEXLIM P-X	20	2.275	2.5	2.020 at 2.0 kA_p
PEXLIM P-Y	20	2.275	2.5	2.020 at 2.0 kA_p
TEXLIM P-C	20	2.275	2.5	2.020 at 2.0 kA_p
EXLIM T	20	2.200	2.4	1.976 at 2.0 kA_p
TEXLIM T-C	20	2.200	2.4	1.976 at 2.0 kA_p

Table 3.

U_{pl} and U_{ps} ratios for ABB arresters

Matching the system characteristics

Protection margins

Protection margins (in %), calculated at coordinating impulse currents as per Table 3, are defined as follows:

- Margin for lightning impulses = ((LIWV/U_{pl})-1) x 100, where LIWV is the external insulation withstand of the equipment against lightning impulses.
- Margin for switching impulses = ((SIWV/U_{ps})-1) x 100 where SIWV is the external insulation withstand of the equipment for switching impulses.

Note: IEEE standards refer to LIWV as BIL and SIWV as BSL.

Margins are normally excellent due to the low U_{pl}, U_{ps} and also that most equipment at present have high external insulation withstand. However, depending on the electrical distance between the arrester and the protected equipment, the Upl margin is reduced and thus arresters fail to protect equipment that is not in the close vicinity of the arresters, i.e. within their protection zone. The flexible erection alternatives for PEXLIM arresters may be of benefit in reducing the distance effects. Additional line-entrance arresters may help too. For more detailed information, please refer to separate ABB technical publication regarding application guidelines for station protection.

Note! The ”distance effect” reduction does not apply to U_{ps} margin since the front-time of a switching surge impulse is longer.

It is recommended that the protection margins (after taking into account the ”distance effect”) should be of the order of 20% or more to account for uncertainties and possible reduction in the withstand values of the protected equipment with age.

Should the selected arrester type not give the desired protection margins, the selection should be changed to an arrester of a higher designated energy class, which automatically leads to lower U_{pl}.

Note! Do NOT use a lower-than selected U_r to attempt improvement of the margins, as this may lead to unacceptably low TOV capability.

As an additional assistance in selection, please refer to the simplified flow chart at the beginning of this chapter. The MO resistor column must be suitably housed to withstand long-term effects of the system loading and the environmental stresses.

External creepage distance

IEC 60815 defines the minimum creepage distances for different environmental conditions. Select the housing to give the desired creepage — the same as for the other equipment in the same location. If the specific creepage demand exceeds 31 mm/kV, please refer to ABB for a special design.

PEXLIM and TEXLIM arresters, having a highly hydrophobic housing, are better suited for extremely polluted areas than EXLIM arresters and a lower creepage may be justified in many cases.

Matching the system characteristics

Mechanical strength

Surge arresters are an active protective device, which means they are not inherently intended to be permanently mechanically loaded in service. Naturally their design includes consideration to withstanding rarely-occurring and short-term mechanical loads (e.g. external short-circuit, gust winds, earthquake, etc) as well as more likely and long-term mechanical loads (e.g. conductor weight, static wind, etc). However, such loads should always be limited as much as possible though proper installation.

All ABB arrester designs exhibit very high strength under tensile or compression loading; hence it is the cantilever loading that is of interest in defining mechanical strength. To be applicable to different arrester lengths, the loading is given in terms of bending moment in this guide. The line terminal and the insulating base (when supplied) match or exceed the strength of the arrester housing.

Standard arresters are intended for vertical, upright erection on a structure and require no bracing. Pedestal-mounted arresters with mechanical strength higher than listed can be quoted on request. Special arresters for suspension, inverted mounting or other angular erection are also available.

Due to their otherwise advantageous flexible construction, PEXLIM arresters may exhibit a visible deflection at the line-end under maximum terminal loading. Such deflection is nevertheless limited by our specified value for long-term load (SLL) given in Table 4. This maximum recommended continuous loading ensures that the electrical and mechanical functions of the arrester are not impaired in any way, even during long-term cyclic loading. Importantly, the value for specified short-term load (SSL) can be upheld even after such cyclic loading.

If the permissible bending moment for a certain arrester appears insufficient for a given loading, consider one of the following methods to reduce the loading demand.

- Use lighter terminal clamps and/or optimized tee-offs for arresters. In contrast to the current capability (and thus the size of clamps and conductors) required for other substation equipment, the continuous current through an arrester is of the order of only a few mA. Hence, using a lighter terminal clamp and/or connecting the arresters by lighter and more vertical tee-offs can considerably reduce the demand for mechanical strength.

- Use another erection alternative (suspension, under-hung, etc). Since PEXLIM arresters are very light compared to equivalent porcelain-housed arresters, they permit innovative erection alternatives, which could reduce the bending moment demands. This in turn can lead to the additional benefit of lighter structures with subsequent reduced costs, or even the complete elimination of the need for a separate structure at all.

EXLIM
Porcelain-housed insulator

Arrester type	Cantilever strength (Nm)	
	SSL	SLL
EXLIM R-C	7 500	3 000
EXLIM Q-D	20 000	8 000
EXLIM Q-E	7 500	3 000
EXLIM T-B	20 000	8 000
EXLIM P-G	20 000	8 000

PEXLIM
Silicone polymer-housed insulator

Arrester type	Cantilever strength (Nm)	
	SSL	SLL
PEXLIM R-Z	1 300	800
PEXLIM R-Y	1 600	1 000
PEXLIM Q-Y	4 000	2 500
PEXLIM P-Y	9 000	6 000

TEXLIM
High stregth silicone polymer-housed insulator

Arrester type	Cantilever strength (Nm)	
	SSL	SLL
TEXLIM Q-C	40 000 Nm	21 000
TEXLIM P-C	40 000 Nm	21 000
TEXLIM T-C	40 000 Nm	21 000

SSL Specified short-term load. | **SLL** Specified long-term load. (For PEXLIM and TEXLIM arresters this is a declared value based on cyclic loading.)

Table 4. Permissible mechanical loading for ABB arresters

Matching the system characteristics

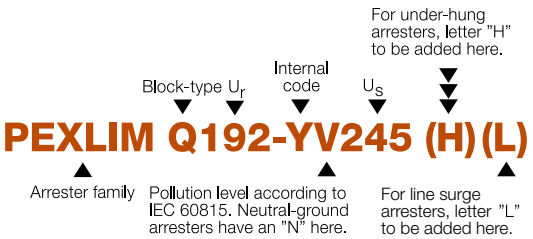
Neutral-ground arresters

For neutral-ground arresters the recommended rated voltage is approximately the maximum system voltage divided by √3. The recommended neutral-ground arresters in the relevant sections are calculated for unearthed systems with relatively long fault duration. The electrical characteristics are identical to standard catalogue arresters with the corresponding rated voltage. For such arresters, U_c is zero since they are not subject to any continuous voltage stress during normal service conditions. The neutral-ground arresters should preferably be of the same type as the phase-ground arresters. For resonant-earthed systems with long radial lines special considerations must be taken and a higher rated voltage (20% to 40%) than listed may be necessary.

Type designation

The type designation itself gives detailed information of the arrester and its application. See the figure below. As standard, the arresters are meant for upright vertical erection. For under-hung erection, when desired, the type designation has the suffix letter ”H”. For other angular erection, please inform us at order. For non-standard arresters the type designation will have additional suffix letters, for example:

E	Non-standard electrical data
M	Non-standard mechanical data
P	Non-standard metal-oxide columns



Special applications

Please consult your nearest ABB representative for help in selection of arresters for special applications such as protection of shunt or series capacitor banks, cables and cable-aerial junctions, rotating machines, traction systems, overhead lines, HVDC or for non-standard arrester ratings or extreme mechanical demands.

Ordering data for arresters

The following information, at a minimum, is required with your order:

- Quantity and type designation
- Rated voltage
- Type of line terminal
- Type of earth terminal
- Type of surge counter, if any
- Type of insulating base, if any.

(Insulating base is required if surge counter and/or leakage current measurements are desired. One base is required for each arrester.)

Ordering example

Below is a typical example of an order with three PEXLIM arresters and its accessories.

Number	Item
3	PEXLIM Q192-YH245, rated voltage 192 kV
3	Line terminal type 1HSA 410 000-L
3	Earth terminal type 1HSA 420 000-A
3	Insulating base type 1HSA 430 000-A
3	Surge counter type EXCOUNT-C

Note! We recommend that the order form, on page 137, be filled-in and attached to your order to ensure inclusion of all the important parameters and commercial conditions.

Simple selection example

Substation data	
Maximum system voltage	145 kV
Arrester location	Phase-ground
System earthing	Effective
System fault clearance time	1 s
Creepage distance	3625 mm

1. U_{r0} = 0.74xU_s (according to table 1) = 0.74x145 = 107.3 kV_{rms}. Select the next higher standard U_r (see "Guaranteed protective data"), i.e. 108 kV_{rms}.

2. According to table 2, a common choice selection for 145 kV_{rms} would be a Arrester Class designation SL arrester, i.e. PEXLIM R. This arrester has a U_{pl}/U_r of 2.59, i.e. U_{pl} of 280 kV_{peak} at 10 kA (according to table 3). With a LIWV of 650 kV_{peak} this would give a protective margin of (650/280-1)x100 = 132%.

3. This margin appears to be excellent but it must be noted that, after considering distance effect and possible insulation ageing, the margin could be reduced to below 20% depending on the impinging impulse steepness and amplitude. Thus, it is very important that the arrester is installed as close as possible to the protected object.

4. If the margin is considered insufficient, choose a higher class designation arrester, e.g. PEXLIM Q, with the same rated voltage 108 kV.

5. With a required creepage distance of 3625 mm, i.e. 25 mm/kV SCD, a H145 housing is suitable from the range.

6. The type designation of the selected arrester will then be:

   PEXLIM R108-YH145 (or PEXLIM Q108-YH145)

Design features
Porcelain-housed arresters EXLIM

The design is based on successful experience of over 75 years, first as gapped SiC arresters, in all climates and conditions all over the world. EXLIM arresters live up to their name: EXcellent voltage LIMiters. The design is robust and well-matched with the other apparatus in substations.

Each arrester is built up of one or more units. Each unit is a porcelain housing containing a single column of MO resistors (blocks), all individually extensively routine-tested during manufacture, dispersed with the necessary spacers as determined by the electrical design for the arrester. It is necessary, therefore, that the units are series-connected at site in the pre-determined order as marked on the units. Consult the installation instructions supplied with each arrester.

Longer arresters often require (and are supplied with) external grading rings to maintain a uniform and acceptable voltage stress along their length. Operation of such arresters without the grading rings, therefore, may lead to failure and invalidates our guarantees/warranties.

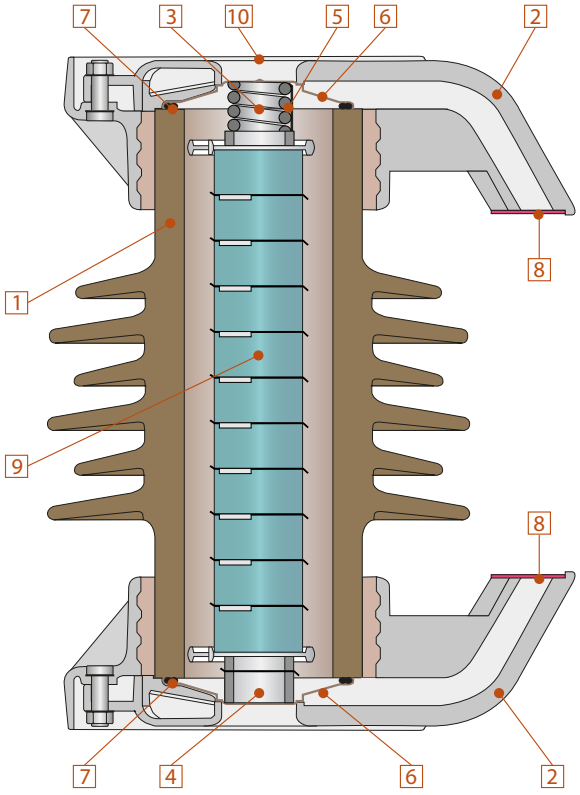
The standard porcelain color is brown but grey porcelain is supplied on request.

Seaworthy packing of the arresters is standard.

Sealing and pressure-relief function

The flanges are cemented to the porcelain and enclose also the sealing arrangement. Please see the figures herein. For satisfactory performance, it is important that the units are hermetically sealed for the lifetime of the arresters. The sealing arrangement at each end of each unit consists of a pre-stressed stainless steel plate with a rubber gasket. This plate exerts a continuous pressure on the gasket against the surface of the insulator and ensures effective sealing even if the gasket ”sets” due to ageing. It also serves to fix the column of the blocks in the longitudinal direction by means of springs. The sealing is verified for each unit after manufacture in routine tests.

The sealing plate is designed to act also as an over-pressure relief system. Should the arrester be stressed in excess of its design capability, an internal arc is established. The ionized gases cause rapid increase in the internal pressure, which in turn causes the sealing plate to flap open and the ionized gases to flow out through the venting ducts. Since the ducts at the two ends are directed towards each other, this results in an external arc; thus relieving the internal pressure and preventing a violent shattering of the insulator.



1	Porcelain insulator	6	Sealing cover
2	Venting duct	7	Sealing ring
3	Spring	8	Indication plates
4	Desiccant bag	9	MO resistors
5	Copper sheet	10	Flange cover

Design features
Porcelain-housed arresters EXLIM

Mechanical Strength
The mechanical strength of the housing is defined in accordance with IEC 60099-4. Thus the guaranteed mean breaking load (MBL) is at least 20% above the specified figure for short-term service load (SSL). The insulating base (when supplied) matches the strength of the housing.

The specified long-term load (SLL) should be limited to 40% of the SSL in accordance with IEC 60099-4.

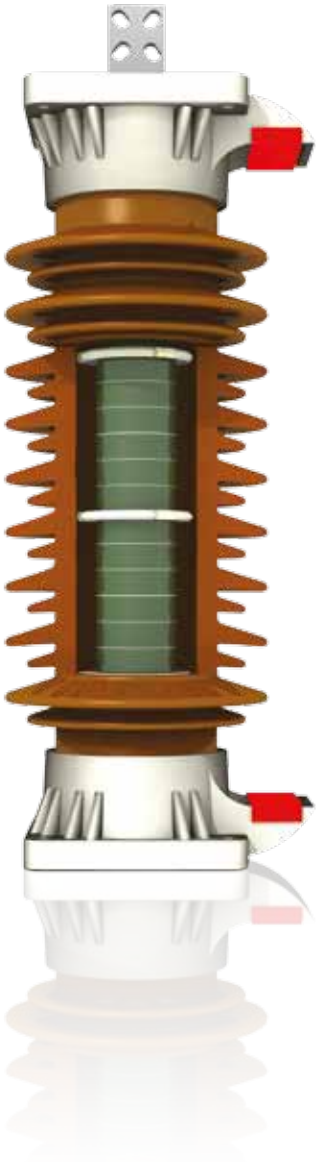
Arresters with mechanical strength higher than listed are quoted on request.

Mechanical loading — Horizontal (cantilever) load
The maximum permissible continuous horizontal load is calculated as the maximum continuous (static) moment divided by the distance between the base of the arrester and the centre of the terminal load.

The continuous current through an arrester is of the order of a few mA. Hence, using a lighter terminal clamp and/or connecting the arrester by a lighter tee-off considerably reduces the demand for mechanical strength.

Installation, maintenance and monitoring
Standard EXLIM arresters are intended for vertical, upright erection on a structure and require no bracing. Special EXLIM arresters for suspension, inverted mounting or other angular erection are available on request.

EXLIM arresters are easy to install following the instructions packed with each arrester. Installation does not need any special tools or instruments. Properly chosen and installed arresters are practically maintenance-free for their lifetime and do not need any monitoring. However, if such monitoring is demanded, it is easily performed online by using the EXCOUNT-II with it's built-in features for correctly measuring the resistive leakage current.

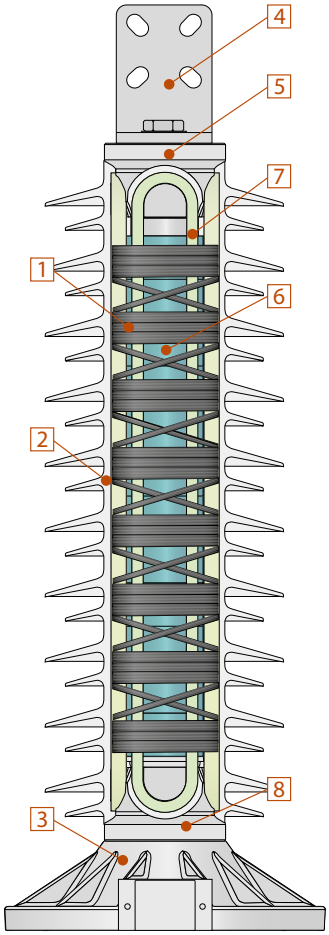


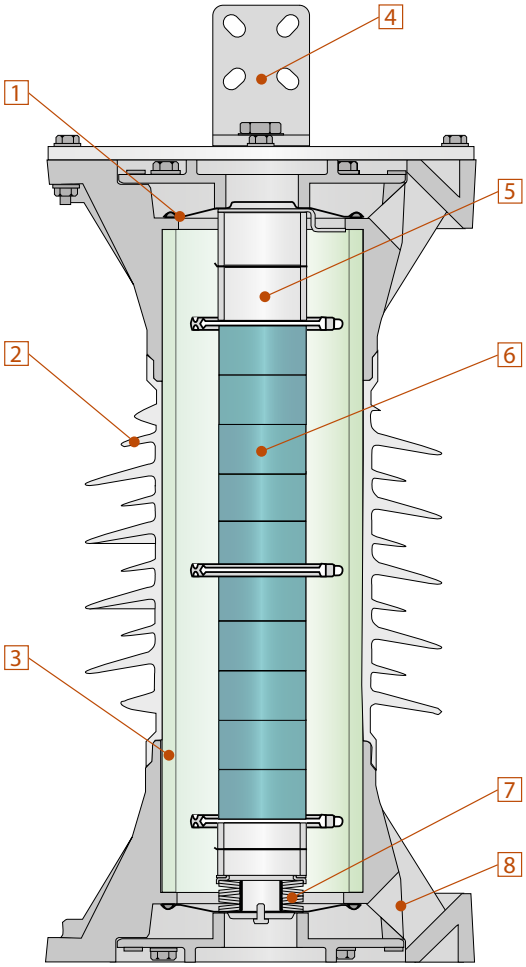
Design features
Polymer-housed arresters PEXLIM and TEXLIM

PEXLIM and TEXLIM arresters use the same MO resistors as the EXLIM arresters and match their electrical performance. Silicone as outer insulation material has been used for over 30 years with good results and has been chosen by ABB for arresters as well. It confers the additional benefits of low weight, improved pollution performance, increased personnel safety and flexibility in erection.

Two basic designs

The ABB polymer-housed arresters comes in two different designs:





Moulded PEXLIM design	
1 Protective winding	2 Silicone rubber insulator
3 Base	4 Line terminal
5 Top yoke	6 MO resistors
7 Fibre glass loop	8 Bottom yoke

TEXLIM tube design	
1 Sealing cover	2 Silicone rubber insulator
3 Fibre glass tube	4 Line terminal
5 Spacers	6 MO resistors
7 Spring	8 Venting duct

Design features
Moulded PEXLIM design

Design Highlights

Each arrester is built-up of one or more units, which in turn may be made up of one or more modules. Each module contains a single column of MO resistors (blocks), which are extensively individually routine-tested during manufacture, dispersed with the necessary spacers as determined by the electrical design for the arrester. The modules are standardized into different sizes based on electrical, mechanical and process considerations.

ABB employs a unique patented design to enclose the blocks in each module under axial pre-compression in a cage formed of fibreglass reinforced loops fixed between two yokes which also serve as electrodes. A protective fibre-winding is then wound over the loops resulting in an open cage design for the module. This results in high mechanical strength and excellent short-circuit performance. See the figures hereunder.

Each module is then passed through a computer-controlled cleaning and priming process. The module is then loaded in a highly automated vulcanizing press and silicone injected at a high pressure and temperature (HTV process) to completely bond to the active parts, leaving no internal voids or air spaces. Individual modules are thereafter assembled into units and routine tested before packing and dispatch.

For satisfactory performance, it is important that the units are hermetically sealed for the lifetime of the arresters. The HTV moulding process under vacuum ensures this by bonding along the entire length from electrode to electrode. There is no air or any gas entrapped between the active parts and the housing. Hence, gaskets or sealing rings are not required.

Should the arrester be electrically stressed in excess of its design capability, an internal arc will be established. Due to the open cage design, it will easily burn through the soft silicone material, permitting the resultant gases to escape quickly and directly. At the same time, the fibre-windings prevent the explosive expulsion of the internal components. Hence, special pressure-relief vents are not required for this design; with the fail-safe short-circuit capability well verified by short-circuit tests in accordance with IEC/IEEE.

Cutaway view of a typical PEXLIM module showing the internal arrangements and the open-cage construction designed to improve both mechanical strength and personnel safety.

Design features
High strength TEXLIM tube design

In special cases with very high demands for mechanical strength, the moulded design may not provide the optimal solution — particularly at system voltages above 420 kV. Instead, what is required is a mix between the features of the standard EXLIM and the moulded PEXLIM designs. The TEXLIM tube design provides this by offering comparable mechanical strength to EXLIM arresters, but with much less mass. The seismic and pollution performance is in line with the moulded PEXLIM arresters and thus superior to conventional porcelain designs.

Design highlights

The basic concept is the replacement of the porcelain housing used with EXLIM arresters by a fibreglass tube housing onto which the silicone sheds are vulcanized and metal flanges are integrated. The internal arrangement and the pressure-relief devices are similar to those for EXLIM arresters.

For satisfactory performance, it is important that the units are hermetically sealed for the lifetime of the arresters. The sealing arrangement at each end of each unit is shown in the figure hereunder and consists of a pre-stressed stainless steel plate with a rubber gasket. This plate exerts a continuous pressure on the gasket against the inner surface of the flanges and ensures effective sealing even if the gasket “sets” due to ageing. It also serves to fix the column of the blocks in the longitudinal direction by means of heavy spring washers.

To maintain the interior free of any humidity, the unit is evacuated after the sealing plate and gaskets are fitted and then filled with dry air at low dew point. Additionally, a small bag of a desiccant is placed in each unit during assembly. Sealing is verified for each unit after manufacture during routine tests.

The sealing plate is designed to also act as an over-pressure relief system. Should the arrester be electrically stressed in excess of its design capability, an internal arc is established. The ionized gases cause a rapid increase in the internal pressure, which in turn causes the sealing plate to flap open and the ionized gases to flow out through openings in the flanges. Since the openings at the two ends are directed towards each other this results in an external arc; thus relieving the internal pressure and preventing a violent breaking of the insulator.

Cutaway view of a typical TEXLIM unit showing the internal arrangements.

Silicone as an insulator

All PEXLIM and TEXLIM arresters utilize silicone for the external insulation. Silicone rubber is highly hydrophobic and resistant to UV radiation and has been shown to be the best insulation (compared to both porcelain and other polymers) based on world wide independent laboratory and field tests. ABB uses special fillers to enhance these properties as well as giving it high pollution resistance, tracking resistance and fire-extinguishing features. The silicone housing is available only in grey color. For additional information, please refer to publication 1HSM 9543 01-06en.

In a form-fit-function comparison, PEXLIM is the most optimized and cost-effective of the available polymer designs. A separately defining criteria often becomes the mechanical strength demands. TEXLIM would seemly have the advantage in this regard, and it could be that specific applications do require a very strong composite tube solution. However, mechanical loads should always be limited as much as possible though proper installation using good engineering practices, and by so doing, the PEXLIM design remains the first choice for the vast majority of applications.

Installation, maintenance and monitoring

All ABB arresters are easy to install following the instructions packed with each arrester. Installation does not need any special tools or instruments.

The units of multiple-unit arresters must be series-connected at site in a pre-determined order as marked on the units and explained in the instructions that are packed in each case. An incorrect assembly may lead to failure and invalidates our warranty.

The design of tall arresters often requires external grading rings to maintain a uniform and acceptable voltage stress along their length. Such rings are included in the delivery of arresters. Installation or operation of such arresters without these grading rings may lead to failure and invalidates our warranty.

Properly chosen and installed arresters are practically maintenance-free for their lifetime and do not need any monitoring. However, if such monitoring is desired, it is easily performed online by using EXCOUNT-II with its built-in features for diagnostic analysis of resistive leakage current. More information is available in the chapter dealing with accessories.

Line surge arresters PEXLINK
The concept

Both large and small public/private utility owners of transmission systems face a sharpened competitive situation which demands increased availability and reliability of the systems. Consumers have become more demanding as their processes are dependent on constant and reliable energy supply of good quality.

In many countries, it has also been increasingly difficult to obtain permission to build new lines of normal dimensions. Hence, new lines under construction may mostly be ”compact-insulation” lines. This, in turn, requires optimal control of overvoltages caused by lightning or switching events. Surge arresters installed along the line or at a few selected critical towers, in this case, may be an attractive solution or a complement to other means.

Improvement in the reliability and availability of a transmission system can be obtained in one or more of the following ways:

1. Duplication of the system (more than one line)
This is a very expensive method and often impractical.

2. Increased insulation withstand.
It can both be expensive and create other problems such as the need for increased insulation of station equipment.

3. Improved footing impedance
Often difficult and expensive, especially in hilly terrain.

4. Shield wires
If the provision was not in the original tower design, it can be expensive to retrofit such shielding. It helps eliminate a large number of interruptions, but it may not be enough to obtain the now-demanded degree of reliability.

5. Protection of line insulation by surge arresters
Surge arresters connected in parallel with them at selected towers. In this application usually the term line surge arresters (LSA) is used. Protection using polymer-housed arresters (ABB type PEXLIM) along with additional accessories for fixing the arresters across the insulators and providing automatic disconnection of the arresters in the event of their being overstressed is called the PEXLINK concept. This method is simple, cost-effective and, in many cases, an attractive alternative to the methods mentioned above.

More information on internet
Visit www.abb.com/arrestersonline for viewing the PEXLINK video.

PEXLINK
ABB's protection philosophy

ABB's philosophy is to provide protection for line insulation at selected locations by using standard available components. The main item is the gapless silicone polymer-housed arrester, PEXLIM, with metal-oxide (MO) active elements. Such arresters have been used for many years for protection of equipment in substations and hence their protective performance and reliability is well-known.

Line surge arresters, incorporating PEXLIM Q arresters and disconnecting devices on earth leads, erected on ESKOM 300 kV system in South Africa.

The low weight permits installation on existing structures and the polymer housing gives increased safety of the line equipment as well as people and animals which may be in the vicinity of the lines during overstress conditions.

With regard to lightning energy, line arresters are exposed to more severe conditions than arresters placed in substations. The latter are benefited by the reduction of surge steepness due to line corona effect and reduction in surge amplitude as the lightning current finds parallel paths through shielding wires, flashover and parallel lines. Thus, it is necessary to ensure that the MO resistors of the LSA are not under-dimensioned from an energy and current point-of-view. A computer program is used to determine the optimum number of locations (generally where the footing impedance is high) and to calculate the arrester stresses at each of the chosen locations.

The design permits installation using standard transmission-line hardware normally available locally. The design also permits mounting at different positions based on tower geometry and conductor spacing.

If very high availability is desired, a very large number of locations may have to be protected, mainly due to the unpredictable nature of lightning. In such a case it may not be economically justified to select arresters with "sufficient energy capability" and instead a higher failure rate may be acceptable.

To ensure quick, safe, automatic and controlled disconnection of a failed arrester, ABB uses a special disconnecting device with a suitable link, often in the earthing circuit of the arresters.

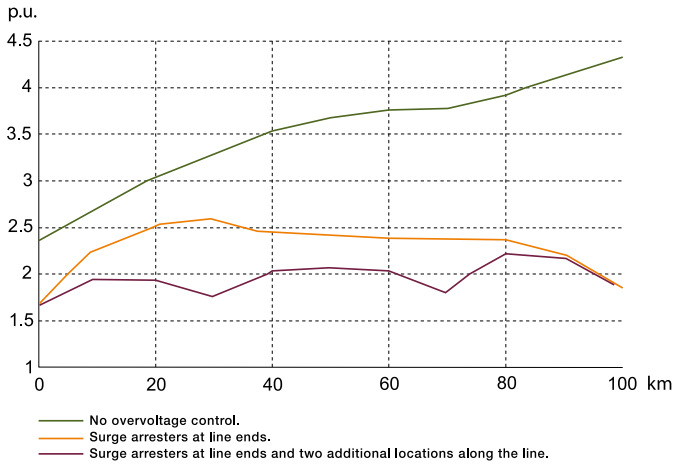
The recommended earth lead is designed to withstand the short-circuit currents and the disconnecting device is tested to ensure no false operations. Thus, at a failure, the tripped line does not have to be locked-out and attended to immediately.

PEXLINK
Application

Increased line availability
By locating the PEXLINK on sections of lines with high footing impedance towers and one additional low footing-impedance tower at each end of the section, PEXLINK protects existing shielded and non-shielded lines from abnormal lightning surges (frequent or high amplitudes) and reduces the outages.

The reduced outages are beneficial also indirectly in that sensitive equipment is not damaged and the circuit breakers overhaul interval can be increased. Thus, total maintenance costs are also reduced.

This protection may be used for all system voltages where the stated abnormal conditions exist. Arresters with moderate energy capability are often sufficient. However, the high-current capability must be large and distribution-type arresters may not be suitable.



The diagram shows overvoltages phase-ground generated by three-phase reclosing of 550 kV, 200 km transmission line with a previous ground fault. For long EHV lines pre-insertion resistors traditionally are used to limit switching overvoltages. Surge arresters, as a robust and efficient alternative, could be located at line ends and along the line at selected points.

Switching overvoltage control
For long EHV lines, surge arresters usually are located at line-ends. In addition, by locating arresters at one or more points along the line e.g. at midpoint or 1/3 and 2/3 line length switching surge overvoltages and thus line insulation requirements could be limited without using preinsertion resistors. Arresters used for this type of application should be designed for high energy capability, especially at the receiving end of the line.

Compact-insulation lines
Arresters placed in parallel with line insulators permit a large degree of compacting of a transmission line with lower right-of-way costs as a result.

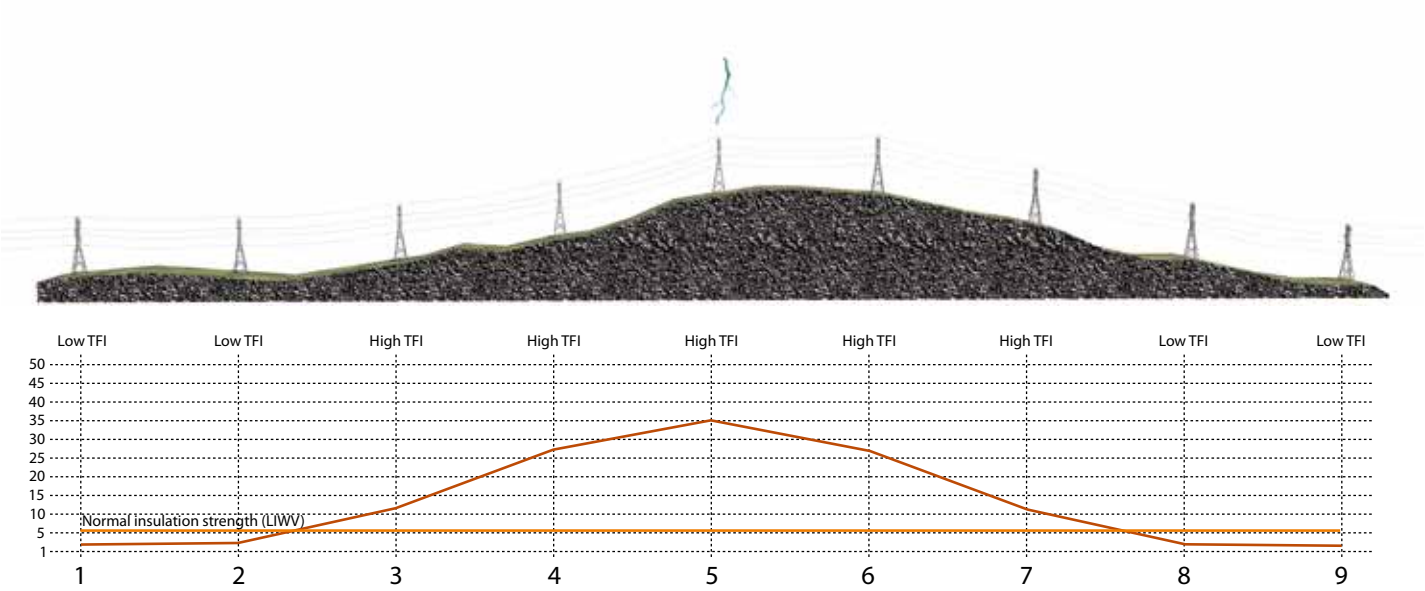
Line upgrading
The existing insulation level of a line, when suitably protected by arresters, may be upgraded for service at a higher system voltage leading to greater power transfer without much additional capital cost.

Extended station protection
By locating arresters on towers near a substation, the risk of backflashovers near the station is eliminated. This results in reduction of steepness and amplitude of incoming travelling waves, thus improving the protection performance of station arresters and eliminating the need for additional expensive metal-enclosed arresters even for large GIS.

Substitute for shield wires
In cases where provision of shield wires is not practical physically or is very expensive, e.g. very long spans, very high towers etc, arresters are a good and economical substitute.

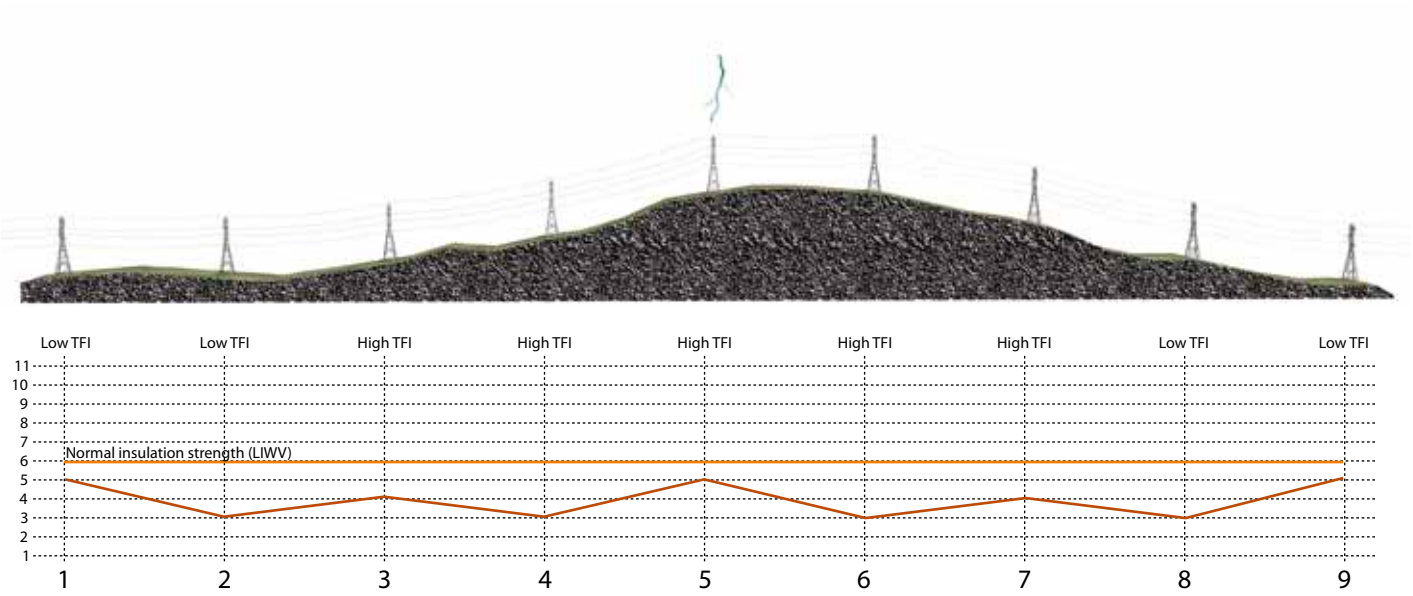
Arresters located in all phases on each tower eliminate the need for both shield wires and good footing impedance and may be economically justified in cases where the cost of reduction in footing impedance and the cost of overhead shield wire are very high.

PEXLINK
Application



No arresters at all. Lightning stroke to tower number 5

Very high risk for flashover due to high TFI (Tower Footing Impedance) with an earth fault followed by a circuit breaker operation as a consequence.



Arresters in all 9 towers. Lightning stroke to tower number 5

The overvoltage profile is well below the LIWV of the system all along the section. An ideal protection is obtained.

PEXLINK
Features

Lightning discharge capability

In general, arresters on lines are subjected to higher energy and current stresses caused by lightning than arresters installed in stations. Furthermore, the associated waveform and durations differ considerably from those specified for station arrester applications. Thus, line arresters are defined in terms of their lightning discharge capability, and PEXLIM arresters perform well in this regard.

Arrester type	Lightning discharge capability as per IEC 60099-4 Annex H	
	Energy	Charge
PEXLIM R	2.5 kJ/kV (U_r)*	1.0 As **
PEXLIM Q	4.0 kJ/kV (U_r)*	1.8 As **
PEXLIM P	7.0 kJ/kV (U_r)*	2.8 As **

* U_r = Rated voltage
** As = Ampere second

Standard components

The suspension of the arresters is simplified and standard clamps and similar hardware normally available may be used for this purpose. This leads to overall economy for the user.

A few examples can be seen in the figures for "Some erection alternatives" on next page.

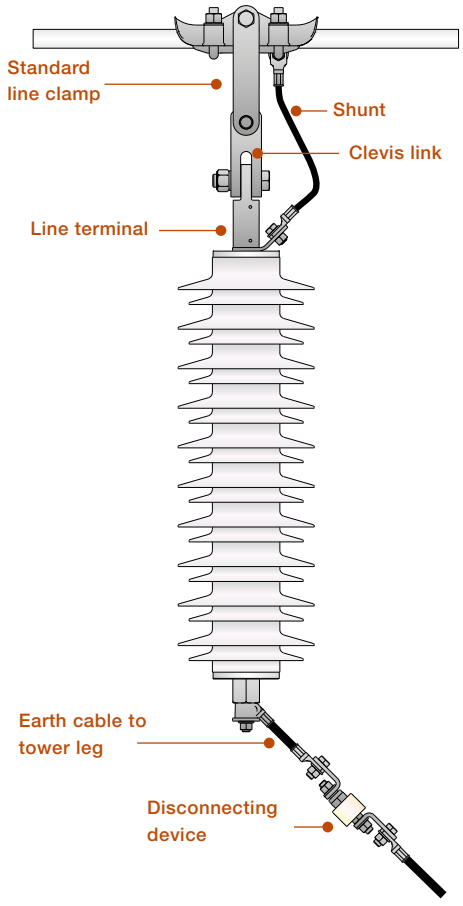
The disconnecting device is carefully chosen to perform its function only at the overload of the arrester.

The separation of the disconnector is quick and effective and the method of connection advised by ABB in each particular case ensures that neither the disconnected conductor nor the damaged arrester cause any interference with other live parts. Thus, after a failure, the line can be re-charged without attending to it immediately.

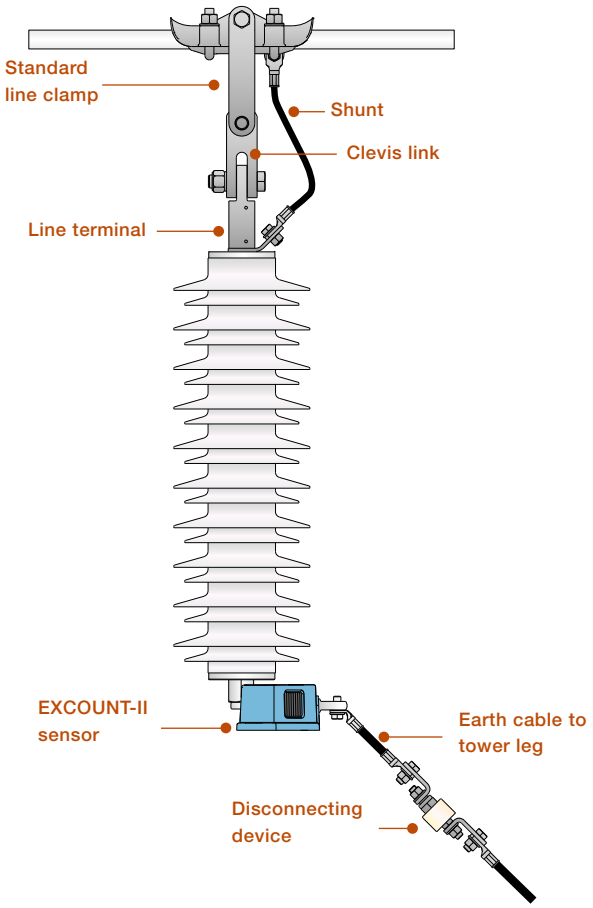
The disconnection is easily visible from the ground and thus locating it is simple for the maintenance crew.

Easy to install

The PEXLIM arresters are built-up of optimum-length modules and hence can be easily designed for use on various voltages. They are light and easily transported up the towers.



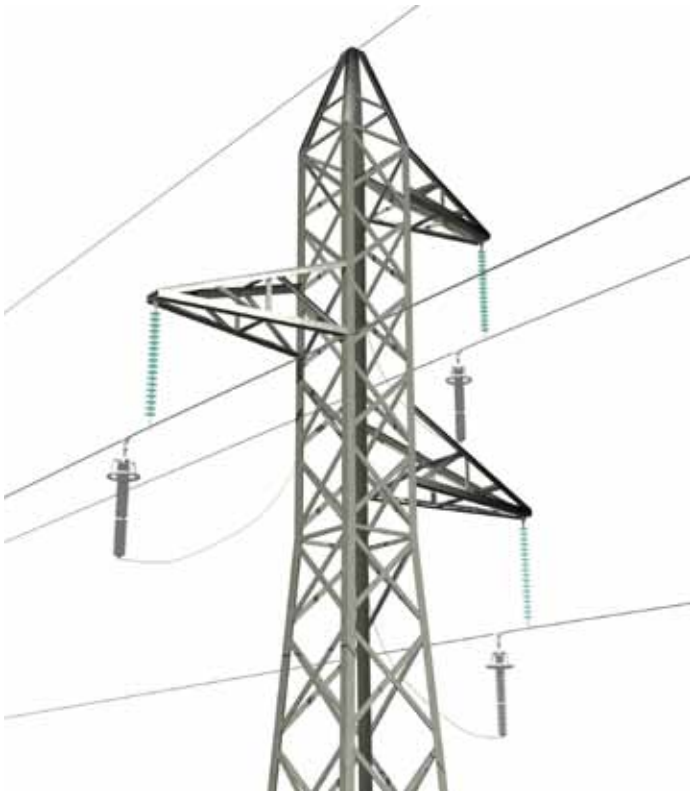
PEXLINK line surge arrester

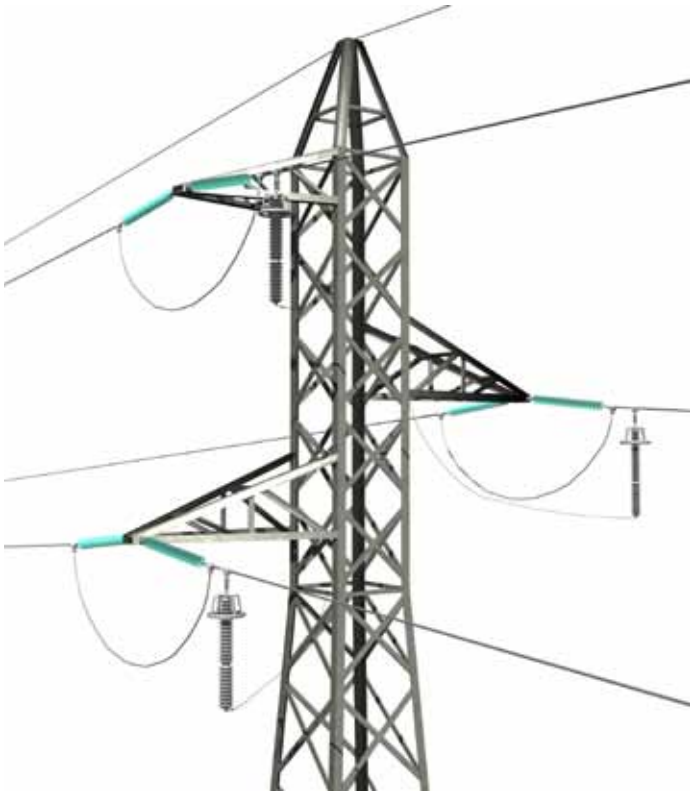


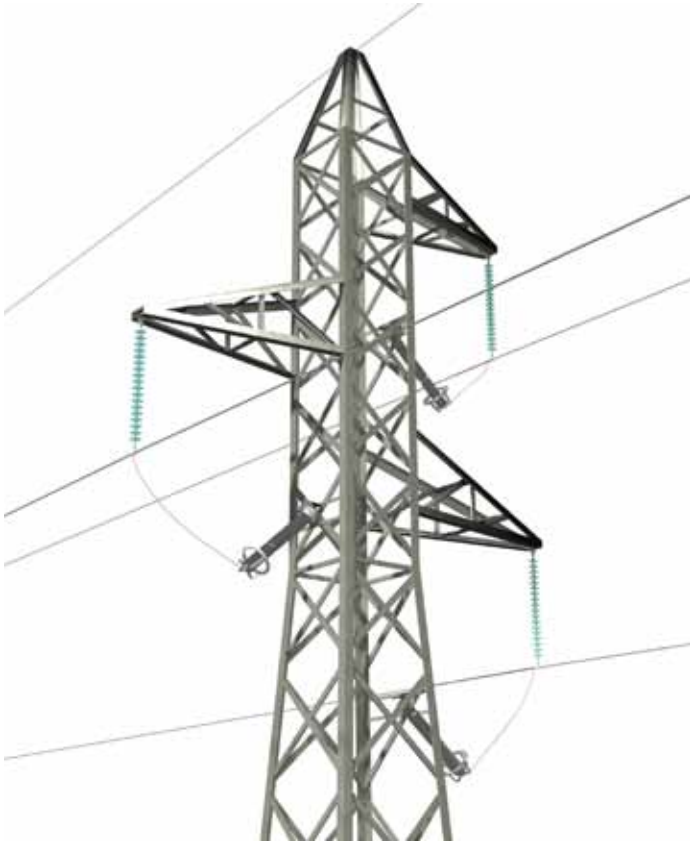
PEXLINK line surge arrester with ABB surge arrester monitor EXCOUNT-II

PEXLINK
Some erection alternatives

Different arrangements showing how easy it is to install the PEXLINK concept in towers of different design.







Quality control and testing

ABB is certified to fulfil the requirements of ISO 9001

Type tests
Type (design) tests have been performed in accordance with IEC 60099-4. Test reports are available on request.

Routine tests
Routine tests are performed on MO resistors as well as on assembled arrester units and accessories. The most important type tests data is verified on all batches of MO resistors, thus verifying catalogue data.

Tests on MO resistors

Energy withstand test on all blocks
Each individual MO resistor passes three energy test cycles with cooling in-between. In each cycle, the injected energy is in excess of the rated energy capability. Blocks with insufficient energy capability are automatically rejected.

Classification and inspection
Each individual MO resistor is classified at 1 mA (d.c.) and 10 kA (8/20 µs) and the voltages are printed on each block together with a batch identification. Finally all blocks are visually inspected.

Accelerated life test on samples
Power losses after 1000 hours calculated from a test with shorter duration (approximately 300 hours) at an elevated temperature of 115 °C at 1.05 times U_C shall not exceed the losses at start of the test. Batches in which unapproved blocks appear are rejected.

Energy capability test on samples
Validation of repetitive charge transfer rating (Qrs), based on the same sampling and test procedure and criteria as the IEC 60099-4 type test for station class. The samples are representative of the highest residual voltage of MO resistors from the individual batch in order to verify the statistical quality of each produced batch of all sizes of MO resistors. Batches which do not fulfill the criteria are rejected.

Impulse current test on samples
Selected blocks are subjected to two 100kA current impulses (4/10 µs) at spaced intervals.

Other sample tests
In addition to the above, low current characteristics, protection characteristics, power losses and capacitance are checked to verify the inherent MO resistor parameters.

Tests on assembled mechanical units

Routine tests on units fulfil the demands of both IEC 60099-4 and ANSI/IEEE C62.11. Each arrester has a unique serial number.

Guaranteed residual voltage
The residual voltage at 10 kA, 8/20 µs impulse current of each unit is calculated as the sum of the residual voltages for all blocks connected in series in the unit.

The residual voltage of the complete arrester is the sum of the residual voltages for its units.

Tightness check (only for EXLIM and TEXLIM arresters)
During manufacture, a vacuum is drawn on the internal volume and then dry air is pumped in, together with a small amount of helium tracer gas, before sealing off the unit. A leakage test is performed by placing each unit in a vacuum chamber connected to a He-spectrometer. Maximum permissible leakage rate of Helium is 0.0001 mbarl/s at a pressure difference of 0.1 MPa as a pass/ no pass test.

Power frequency reference voltage
Reference voltage is measured on each arrester unit.

Internal corona
The satisfactory absence of partial discharge is checked on each unit at 0.9 times U_r. A steady internal corona level of not greater than 10 pC is required in a pass/no-pass test.

Grading current
The total leakage current passing through the arrester unit is measured at U_C for information only.

Power losses
Power loss is measured at U_C on each unit verifying that the thermal performance is in compliance with performed type tests.

Test reports
Routine test reports are filed and are available on request.

Tests on accessories

Surge counters and monitors
All such devices are routinely function-tested before leaving the factory.

Zinc Oxide Surge Arrester PEXLIM R-Z

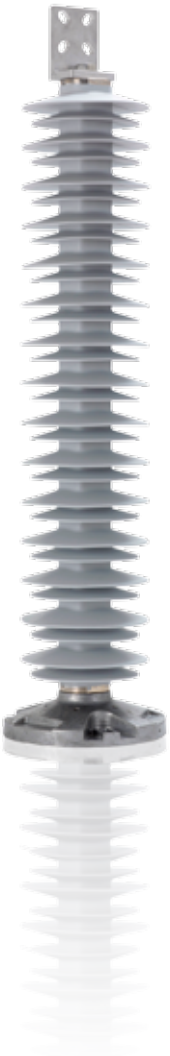
Protection of switchgear, transformers and other equipment in high voltage systems against atmospheric and switching overvoltages. For use when requirements of lightning intensity, energy capability and pollution are moderate.

Superior where low weight, reduced clearances, flexible mounting, non-fragility and additional personnel safety is required.
Major component in PEXLINK™ concept for transmission line protection.

Other data can be ordered on request. Please contact your local sales representative.

Brief performance data

Arrester classification as per IEC 60099-4 Ed 3.0	Station; SL
Arrester classification as per IEEE Std C62.11-2012	Station
System voltages (U_s)	72 - 145 kV
Rated voltages (U_r)	75 - 120 kV
Nominal discharge current (IEC)	10 kA_{peak}
Lightning impulse classifying current (ANSI/IEEE)	10 kA_{peak}
Charge, energy and current withstand:	
Repetitive charge transfer rating, Q_{rs} (IEC)	1.2 C
Thermal energy rating, W_{th} (IEC)	5 kJ/kV (U_r)
Single impulse energy capability (2 ms to 4 ms impulse)	2.5 kJ/kV (U_r)
Discharge current withstand strength:	
High current 4/10 µs	100 kA_{peak}
Low current 2000 µs, (based on Q_{rs})	600 A_{peak}
Energy class as per IEEE standard (switching surge energy rating)	-
Single-impulse withstand rating as per IEEE standard	1.2 C
Repetitive charge transfer test value - sample tests on all manufactured block batches	1.5 C
Short-circuit/Pressure relief capability	40 $kA_{rms(sym)}$
Mechanical strength:	
Specified long-term load (SLL)	800 Nm
Specified short-term load (SSL)	1300 Nm
Service conditions:	
Ambient temperature	-50 °C to +45 °C
Design altitude	max. 1000 m
Frequency	15 - 62 Hz
Line discharge class (as per IEC60099-4, Ed. 2.2)	Class 2



Further data according to the IEEE standard can be supplied on request

PEXLIM R-Z
Guaranteed protective data

Max. system voltage	Rated voltage	Max. continuous operating voltage [1]		TOV capability [2]		Max. residual voltage with current wave						
		as per IEC	as per ANSI/IEEE			30/60 µs			8/20 µs			
U_s	U_r	U_c	MCOV	1 s	10 s	0.5 kA	1 kA	2 kA	5 kA	10 kA	20 kA	40 kA
kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}
72	75	60	60.7	82.4	77.4	157	164	171	187	198	222	253
	78	62	63.0	85.7	80.5	161	167	175	191	203	227	259
	84	67	68.0	92.3	86.7	173	180	188	206	218	244	279
	90	72	72.0	98.9	92.9	186	193	202	220	234	262	299
	96	77	77.0	105	99.1	198	206	215	235	249	279	319
100	75	60	60.7	82.4	77.4	155	161	168	184	195	218	249
	84	67	68.0	92.3	86.7	173	180	188	206	218	244	279
	90	72	72.0	98.9	92.9	186	193	202	220	234	262	299
	96	77	77.0	105	99.1	198	206	215	235	249	279	319
123	90	72	72.0	98.9	92.9	186	193	202	220	234	262	299
	96	77	77.0	105	99.1	198	206	215	235	249	279	319
	102	78	82.6	112	105	210	218	229	250	265	296	339
	108	78	84.0	118	111	223	231	242	264	280	314	359
	120	78	98.0	131	123	247	257	269	294	311	349	398
145	108	86	86.0	118	111	223	231	242	264	280	314	359
	120	92	98.0	131	123	247	257	269	294	311	349	398

1) The continuous operating voltages U_C (as per IEC) and MCOV (as per IEEE) differ only due to deviations in type test procedures.
U_c has to be considered only when the actual system voltage is higher than the tabulated.
Any arrester with U_C higher than or equal to the actual system voltage divided by √3 can be selected.

2) With prior duty equal to the thermal energy rating of 5 kJ/kV (U_r).

Arresters with lower or higher rated voltages may be available on request for special applications.

PEXLIM R-Z
Technical data for housings

Max. system voltage	Rated voltage	Housing	Creepage distance	External insulation *)				Dimensions				
U_s	U_r			1.2/50 µs dry	50 Hz wet (60s)	60 Hz wet (10s)	250/2500 µs wet	Mass	A_{max}	B	C	Fig.
kV_{rms}	kV_{rms}		mm	kV_{peak}	kV_{rms}	kV_{rms}	kV_{peak}	kg	mm	mm	mm	
72	75-96	ZV072	3628	553	278	278	422	24	995	-	-	1
100	75-96	ZV100	3628	553	278	278	422	24	995	-	-	1
123	90-120	ZH123	3628	553	278	278	422	23	995	-	-	1
145	108-120	ZH145	3628	553	278	278	422	23	995	-	-	1

*) Withstand voltages for empty unit of arrester.

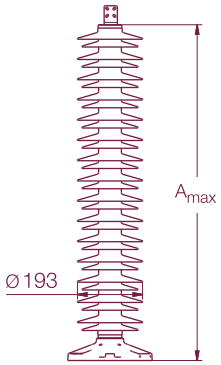
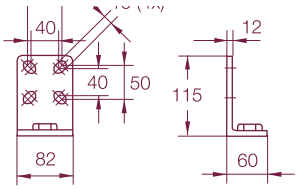


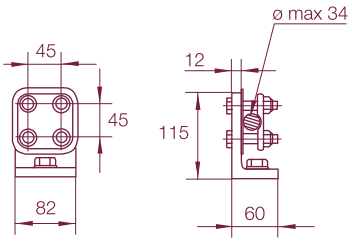
Figure 1

PEXLIM R-Z
Accessories

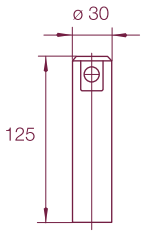
Line terminals



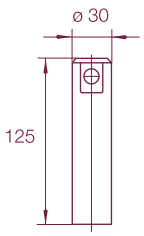
1HSA410 000-L
Aluminium



1HSA410 000-M
Aluminium flag with other items in stainless steel

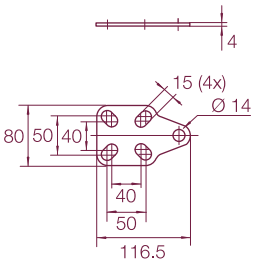


1HSA410 000-N
Aluminium

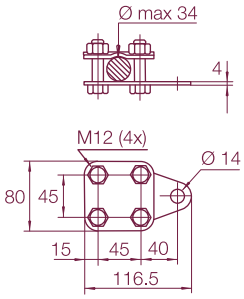


1HSA410 000-P
Stainless steel

Earth terminals

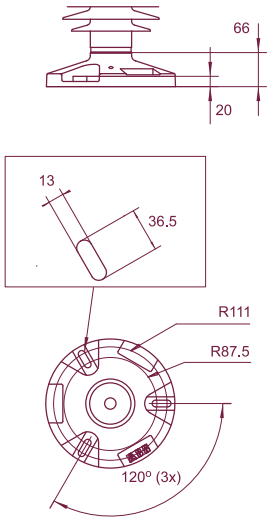


1HSA420 000-A
Stainless steel

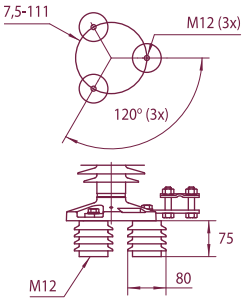


1HSA420 000-B
Stainless steel

Drilling plans



Without insulating base
Aluminium



Insulating base
1HSA430 000-H
Epoxy resin

M12 bolts for connection to structure are not supplied by ABB. Required threaded grip length is 15-20 mm.

PEXLIM R-Z
Shipping data

Rated voltage	Housing	Number of arresters per crate					
		One		Three		Six	
U_r		Volume	Gross	Volume	Gross	Volume	Gross
kV_{rms}		m^3	kg	m^3	kg	m^3	kg
072-096	ZV072	0,2	39	0,69	96	1,22	167
075-096	ZV100	0,2	39	0,69	96	1,22	167
090-120	ZH123	0,2	38	0,69	95	1,22	136
108-120	Z H145	0,2	38	0,69	95	1,22	136

Each crate contains a certain number of arrester units and accessories for assembly and erection. A packing list is attached externally on each crate.

Each separate crate is numbered and the numbers of all crates and their contents are listed in the shipping specification. ABB reserves the right to pack arresters in the most effective/economic combination. Alternate or non-standard crates may involve additional charges.

The table above is to be seen as an approximation and specific data for deliveries may differ from the values given.

Zinc Oxide Surge Arrester PEXLIM R-Y

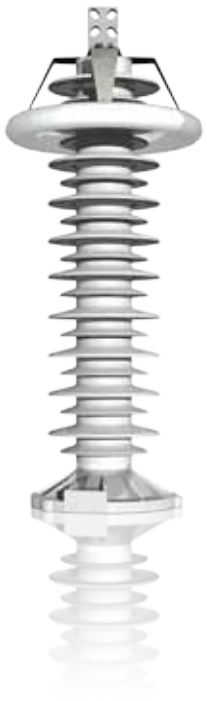
Protection of switchgear, transformers and other equipment in high voltage systems against atmospheric and switching overvoltages. For use when requirements of lightning intensity, energy capability and pollution are moderate.

Superior where low weight, reduced clearances, flexible mounting, non-fragility and additional personnel safety is required.
Major component in PEXLINK™ concept for transmission line protection.

Other data can be ordered on request. Please contact your local sales representative.

Brief performance data

Arrester classification as per IEC 60099-4 Ed 3.0	Station; SL
Arrester classification as per IEEE Std C62.11-2012	Station
System voltages (U_s)	24 - 170 kV
Rated voltages (U_r)	18 - 144 kV
Nominal discharge current (IEC)	10 kA_{peak}
Lightning impulse classifying current (ANSI/IEEE)	10 kA_{peak}
Charge, energy and current withstand:	
Repetitive charge transfer rating, Q_{rs} (IEC)	1.2 C
Thermal energy rating, Wth (IEC)	5 kJ/kV (U_r)
Single impulse energy capability (2 ms to 4 ms impulse)	2.5 kJ/kV (U_r)
Discharge current withstand strength:	
High current 4/10 µs	100 kA_{peak}
Low current 2000 µs, (based on Q_{rs})	600 A_{peak}
Energy class as per IEEE standard (switching surge energy rating)	-
Single-impulse withstand rating as per IEEE standard	1.2 C
Repetitive charge transfer test value - sample tests on all manufactured block batches	1.5 C
Short-circuit/Pressure relief capability	50 $kA_{rms(sym)}$
Mechanical strength:	
Specified long-term load (SLL)	1000 Nm
Specified short-term load (SSL)	1600 Nm
Service conditions:	
Ambient temperature	-50 °C to +45 °C
Design altitude	max. 1000 m
Frequency	15 - 62 Hz
Line discharge class (as per IEC60099-4, Ed. 2.2	Class 2



Further data according to the IEEE standard can be supplied on request

PEXLIM R-Y
Guaranteed protective data 24 - 100 kV

Max. system voltage	Rated voltage	Max. continuous operating voltage [1]		TOV capability [2]		Max. residual voltage with current wave						
		as per IEC	as per ANSI/IEEE			30/60 µs			8/20 µs			
U_s	U_r	U_c	MCOV	1 s	10 s	0.5 kA	1 kA	2 kA	5 kA	10 kA	20 kA	40 kA
kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}
24[3]	18	14,4	15.3	19.7	18.5	37.1	38.5	40.3	44.0	46.7	52.3	59.7
	21	16,8	17.0	23.0	21.6	43.2	44.9	47.0	51.3	54.4	61.0	69.7
	24	19,2	19.5	26.3	24.7	49.4	51.3	53.8	58.7	62.2	69.7	79.6
	27	21,6	22.0	29.6	27.8	55.6	57.7	60.5	66.0	70.0	78.4	89.6
36[3]	30	24,0	24.4	32.9	30.9	61.7	64.2	67.2	73.3	77.7	87.1	100
	33	26,4	26.7	36.2	34.0	67.9	70.6	73.9	80.6	85.5	95.8	110
	36	28,8	29.0	39.5	37.1	74.1	77.0	80.6	88.0	93.3	105	120
	39	31,2	31.5	42.8	40.2	80.3	83.4	87.3	95.3	102	114	130
	42	34	34.0	46.1	43.3	86.4	89.8	94.0	103	109	122	140
	48	38	39.0	52.7	49.5	98.8	103	108	118	125	140	160
52	42	34	34.0	46.1	43.3	86.4	89,8	94,0	103	109	122	140
	48	38	39.0	52.7	49.5	98.8	103	108	118	125	140	160
	51	41	41.3	56.0	52.6	105	109	115	125	133	148	170
	54	43	43.0	59.3	55.7	112	116	121	132	140	157	180
	60	48	48.0	65.9	61.9	124	129	135	147	156	175	199
	66	53	53.4	72.5	68.1	136	142	148	162	171	192	219
72	54	43	43.0	59.3	55.7	112	116	121	132	140	157	180
	60	48	48.0	65.9	61.9	124	129	135	147	156	175	199
	66	53	53.4	72.5	68.1	136	142	148	162	171	192	219
	72	58	58.0	79.1	74.3	149	154	162	176	187	209	239
	75	60	60.7	82.4	77.4	155	161	168	184	195	218	249
	84	67	68.0	92.3	86.7	173	180	188	206	218	244	279
	90	72	72.0	98.9	92.9	186	193	202	220	234	262	299
	96	77	77.0	105	99.1	198	206	215	235	249	279	319
100	75	60	60.7	82.4	77.4	155	161	168	184	195	218	249
	84	67	68.0	92.3	86.7	173	180	188	206	218	244	279
	90	72	72.0	98.9	92.9	186	193	202	220	234	262	299
	96	77	77.0	105	99.1	198	206	215	235	249	279	319

1) The continuous operating voltages U_C (as per IEC) and MCOV (as per IEEE) differ only due to deviations in type test procedures.
U_c has to be considered only when the actual system voltage is higher than the tabulated.
Any arrester with U_C higher than or equal to the actual system voltage divided by √3 can be selected.

2) With prior duty equal to the thermal energy rating of 5 kJ/kV (U_r)

3) Arresters for system voltages 36 kV or below can be supplied, on request, when the order also includes arresters for higher system voltages.

Arresters with lower or higher rated voltages may be available on request for special applications.

PEXLIM R-Y
Guaranteed protective data 123 - 170 kV

Max. system voltage	Rated voltage	Max. continuous operating voltage [1]		TOV capability [2]		Max. residual voltage with current wave						
		as per IEC	as per ANSI/IEEE			30/60 µs			8/20 µs			
U_s	U_r	U_c	MCOV	1 s	10 s	0.5 kA	1 kA	2 kA	5 kA	10 kA	20 kA	40 kA
kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}
123	90	72	72.0	98.9	92.9	186	193	202	220	234	262	299
	96	77	77.0	105	99.1	198	206	215	235	249	279	319
	102	78	82.6	112	105	210	218	229	250	265	296	339
	108	78	84.0	118	111	223	231	242	264	280	314	359
	120	78	98.0	131	123	247	257	269	294	311	349	398
	132	78	106	145	136	272	283	296	323	342	383	438
	138	78	111	151	142	284	295	309	338	358	401	458
	144	78	115	158	148	297	308	323	352	373	418	478
145	108	86	86.0	118	111	223	231	242	264	280	314	359
	120	92	98.0	131	123	247	257	269	294	311	349	398
	132	92	106	145	136	272	283	296	323	342	383	438
	138	92	111	151	142	284	295	309	338	358	401	458
	144	92	115	158	148	297	308	323	352	373	418	478
170	132	106	106	145	136	272	283	296	323	342	383	438
	138	108	111	151	142	284	295	309	338	358	401	458
	144	108	115	158	148	297	308	323	352	373	418	478

1) The continuous operating voltages U_C (as per IEC) and MCOV (as per IEEE) differ only due to deviations in type test procedures.
Uc has to be considered only when the actual system voltage is higher than the tabulated.
Any arrester with U_C higher than or equal to the actual system voltage divided by √3 can be selected.

2) With prior duty equal to the thermal energy rating of 5 kJ/kV (U_r)

Arresters with lower or higher rated voltages may be available on request for special applications.

PEXLIM R-Y
Technical data for housings

Max. system voltage	Rated voltage	Housing	Creepage distance	External insulation *)				Dimensions				
U_s	U_r			1.2/50 µs dry	50 Hz wet (60s)	60 Hz wet (10s)	250/2500 µs wet	Mass	A_{max}	B	C	Fig.
kV_{rms}	kV_{rms}		mm	kV_{peak}	kV_{rms}	kV_{rms}	kV_{peak}	kg	mm	mm	mm	
24	18-27	YV024	1863	310	150	150	250	16	641	-	-	1
36	30-48	YV036	1863	310	150	150	250	15	641	-	-	1
52	42-60	YV052	1863	310	150	150	250	15	641	-	-	1
	66	YV052	2270	370	180	180	300	17	727	-	-	1
72	54-60	YH072	1863	310	150	150	250	15	641	-	-	1
	54-72	YV072	2270	370	180	180	300	17	727	-	-	1
	75-96	YV072	3726	620	300	300	500	27	1216	-	-	2
100	75-96	YV100	3726	620	300	300	500	27	1216	-	-	2
123	90	YH123	3726	620	300	300	500	29	1219	400	160	3
	96-120	YH123	3726	620	300	300	500	27	1216	-	-	2
	90-96	YV123	4133	680	330	330	550	31	1305	400	160	3
	102-132	YV123	4133	680	330	330	550	29	1302	-	-	2
	138-144	YV123	4540	740	360	360	600	30	1388	-	-	2
145	108	YH145	3726	620	300	300	500	29	1219	400	160	3
	120	YH145	3726	620	300	300	500	26	1216	-	-	2
	108	YV145	4540	740	360	360	600	33	1391	400	160	3
	120-144	YV145	4540	740	360	360	600	30	1388	-	-	2
170	132-144	YH170	4540	740	360	360	600	32	1391	400	160	3
Neutral-ground arresters												
52	30-36	YN052	1863	310	150	150	250	14	641	-	-	1
72	42-54	YN072	1863	310	150	150	250	14	641	-	-	1
100	60	YN100	1863	310	150	150	250	14	641	-	-	1
123	72	YN123	2270	370	180	180	300	16	727	-	-	1
	84-120	YN123	3726	620	300	300	500	25	1216	-	-	2
145	75-120	YN145	3726	620	300	300	500	25	1216	-	-	2
170	75-120	YN170	3726	620	300	300	500	25	1216	-	-	2

*) Sum of withstand voltages for empty units of arrester.

PEXLIM R-Y
Technical data for housings

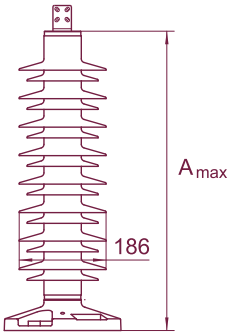


Figure 1

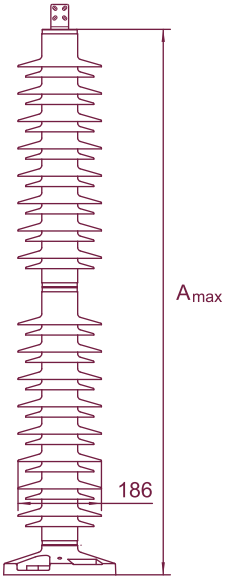


Figure 2

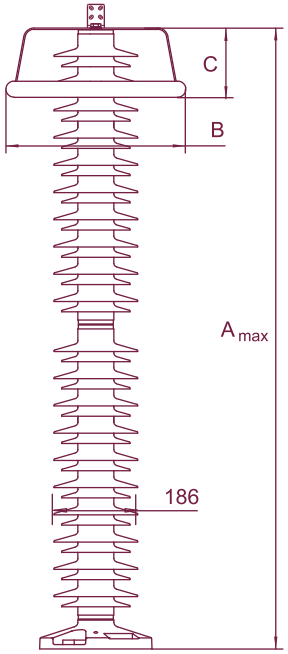
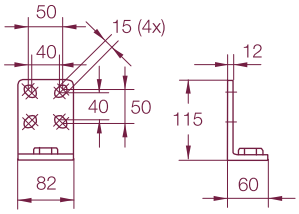


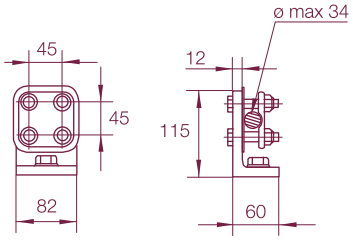
Figure 3

PEXLIM R-Y
Accessories

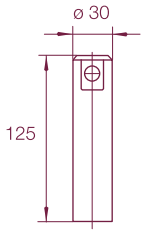
Line terminals



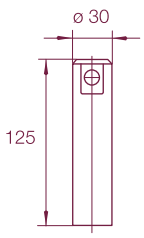
1HSA410 000-L
Aluminium



1HSA410 000-M
Aluminium flag with other items in stainless steel

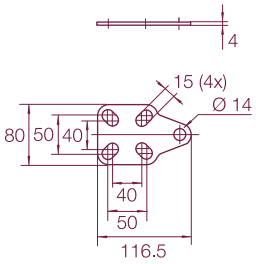


1HSA410 000-N
Aluminium

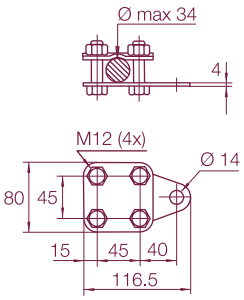


1HSA410 000-P
Stainless steel

Earth terminals

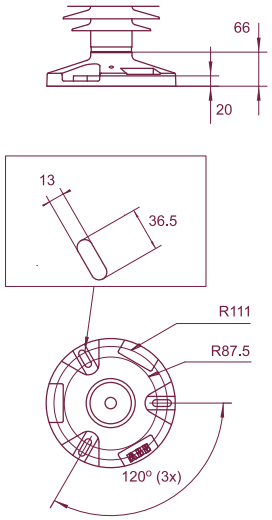


1HSA420 000-A
Stainless steel

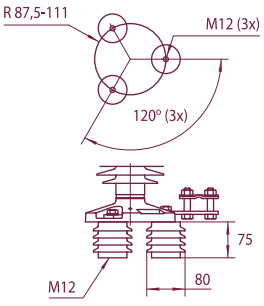


1HSA420 000-B
Stainless steel

Drilling plans



Without insulating base
Aluminium



Insulating base
1HSA430 000-H
Epoxy resin

M12 bolts for connection to structure are not supplied by ABB. Required threaded grip length is 15-20 mm.

PEXLIM R-Y
Shipping data

Rated voltage	Housing	Number of arresters per crate					
		One		Three		Six	
U_r		Volume	Gross	Volume	Gross	Volume	Gross
kV_{rms}		m^3	kg	m^3	kg	m^3	kg
18-27	YV024	0.5	35	0.5	65	0.9	110
30-48	YV036	0.5	36	0.5	68	0.9	116
42-60	YV052	0.5	36	0.5	68	0.9	116
66	YV052	0.5	38	0.5	74	0.9	128
54-60	YH072	0.5	36	0.5	68	0.9	116
54-72	YV072	0.5	38	0.5	74	0.9	128
75-96	YV072	0.7	51	0.7	103	1.2	181
75-96	YV100	0.7	51	0.7	103	1.2	181
90	YH123	0.7	53	0.7	109	1.2	193
96-120	YH123	0.7	52	0.7	106	1.2	187
90-96	YV123	0.7	55	0.7	115	1.2	205
102-132	YV123	0.7	54	0.7	112	1.2	199
138-144	YV123	0.9	61	0.9	123	1.5	216
108-120	YH145	0.7	54	0.7	112	1.2	199
108	YV145	0.9	62	0.9	126	1.5	222
120-144	YV145	0.9	61	0.9	123	1.5	216
132-144	YH170	0.9	63	0.9	129	1.5	228
Neutral-ground arresters							
30-36	YN052	0.5	36	0.5	68	0.9	116
42-54	YN072	0.5	36	0.5	68	0.9	116
60	YN100	0.5	36	0.5	68	0.9	116
72	YN123	0.5	38	0.5	74	0.9	128
84-120	YN123	0.7	52	0.7	106	1.2	187
75-120	YN145	0.7	52	0.7	106	1.2	187
75-120	YN170	0.7	52	0.7	106	1.2	187

Each crate contains a certain number of arrester units and accessories for assembly and erection. A packing list is attached externally on each crate.

Each separate crate is numbered and the numbers of all crates and their contents are listed in the shipping specification. ABB reserves the right to pack arresters in the most effective/economic combination. Alternate or non-standard crates may involve additional charges.

The table above is to be seen as an approximation and specific data for deliveries may differ from the values given.

Zinc Oxide Surge Arrester PEXLIM Q-Y

Protection of switchgear, transformers and other equipment in high voltage systems against atmospheric and switching overvoltages.
- **in areas with high lightning intensity and high energy requirements.**
- **where grounding or shielding conditions are poor or incomplete.**

Superior where low weight, reduced clearances, flexible mounting, non-fragility and additional personnel safety is required.
Major component in PEXLINK™ concept for transmission line protection.

Other data can be ordered on request. Please contact your local sales representative.

Brief performance data

Arrester classification as per IEC 60099-4 Ed 3.0	Station; SM
Arrester classification as per IEEE Std C62.11-2012	Station
System voltages (U_s)	52 - 420 kV
Rated voltages (U_r)	42 - 396 kV
Nominal discharge current (IEC)	10 kA_{peak}
Lightning impulse classifying current (ANSI/IEEE)	10 kA_{peak}
Charge, energy and current withstand:	
Repetitive charge transfer rating, Q_{rs} (IEC)	2.0 C
Thermal energy rating, W_{th} (IEC)	8 kJ/kV (U_r)
Single impulse energy capability (2 ms to 4 ms impulse)	4.5 kJ/kV (U_r)
Discharge current withstand strength:	
High current 4/10 µs	100 kA_{peak}
Low current 2000 µs, (based on Q_{rs})	1000 A_{peak}
Energy class as per IEEE standard (switching surge energy rating)	E
Single-impulse withstand rating as per IEEE standard	2.2 C
Repetitive charge transfer test value - sample tests on all manufactured block batches	2.7 C
Short-circuit/Pressure relief capability	65 $kA_{rms(sym)}$
Mechanical strength:	
Specified long-term load (SLL)	2500 Nm
Specified short-term load (SSL)	4000 Nm
Service conditions:	
Ambient temperature	-50 °C to +45 °C
Design altitude	max. 1000 m
Frequency	15 - 62 Hz
Line discharge class (as per IEC60099-4, Ed. 2.2)	Class 3

Further data according to the IEEE standard can be supplied on request

PEXLIM Q-Y

Guaranteed protective data 24 - 145 kV

Max. system voltage	Rated voltage	Max. continuous operating voltage [1]		TOV capability [2]		Max. residual voltage with current wave						
		as per IEC	as per ANSI/IEEE			30/60 µs			8/20 µs			
U_s	U_r	U_c	MCOV	1 s	10 s	0.5 kA	1 kA	2 kA	5 kA	10 kA	20 kA	40 kA
kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}
24[3]	24	19.2	19.5	26.4	24.9	46.1	47.6	49.5	53.6	56.4	62.1	69.4
36[3]	30	24.0	24.4	33.0	31.2	57.6	59.5	61.8	67.0	70.5	77.6	86.8
	33	26.4	26.7	36.3	34.3	63.4	65.4	68.0	73.7	77.6	85.4	95.4
	36	28.8	29.0	39.6	37.4	69.2	71.4	74.2	80.4	84.6	93.1	105
52	42	34	34.0	46.2	43.7	80.7	83.3	86.5	93.8	98.7	109	122
	48	38	39.0	52.8	49.9	92.2	95.1	98.9	108	113	125	139
	51	41	41.3	56.1	53.0	98.0	102	105	114	120	132	148
	54	43	43.0	59.4	56.2	104	107	112	121	127	140	157
	60	48	48.0	66.0	62.4	116	119	124	134	141	156	174
	66	53	53.4	72.6	68.7	127	131	136	148	156	171	191
	72	58	58.0	79.2	74.9	139	143	149	161	170	187	209
72	54	43	43.0	59.4	56.2	104	107	112	121	127	140	157
	60	48	48.0	66.0	62.4	116	119	124	134	141	156	174
	66	53	53.4	72.6	68.7	127	131	136	148	156	171	191
	72	58	58.0	79.2	74.9	139	143	149	161	170	187	209
	75	60	60.7	82.5	78.0	144	149	155	168	177	194	217
	78	62	63.1	85.8	81.1	150	155	161	175	184	202	226
	81	65	65.6	89.1	84.3	156	161	167	181	191	210	235
	84	67	68.0	92.4	87.4	162	167	173	188	198	218	243
100	75	60	60.7	82.5	78.0	144	149	155	168	177	194	217
	78	62	63.1	85.8	81.1	150	155	161	175	184	202	226
	81	65	65.6	89.1	84.3	156	161	167	181	191	210	235
	84	67	68.0	92.4	87.4	162	167	173	188	198	218	243
	90	72	72.0	99.0	93.6	173	179	186	201	212	233	261
	96	77	77.0	105	99.9	185	191	198	215	226	249	278
123	90	72	72.0	99.0	93.6	173	179	186	201	212	233	261
	96	77	77.0	105	99.9	185	191	198	215	226	249	278
	102	78	82.6	112	106	196	203	210	228	240	264	295
	108	78	84.0	118	112	208	214	223	242	254	280	313
	120	78	98.0	132	124	231	238	248	268	282	311	347
	129	78	104	141	134	248	256	266	288	304	334	373
	132	78	106	145	137	254	262	272	295	311	342	382
	138	78	111	151	143	265	274	285	309	325	357	399
	144	78	115	158	149	277	286	297	322	339	373	417
	150	78	121	165	156	288	298	309	335	353	388	434
145	108	86	86.0	118	112	208	214	223	242	254	280	313
	114	91	92.3	125	118	219	226	235	255	268	295	330
	120	92	98.0	132	124	231	238	248	268	282	311	347
	132	92	106	145	137	254	262	272	295	311	342	382

1) The continuous operating voltages Uc (as per IEC) and MCOV (as per IEEE) differ only due to deviations in type test procedures.
U_c has to be considered only when the actual system voltage is higher than the tabulated.
Any arrester with U_c higher than or equal to the actual system voltage divided by √3 can be selected.

2) With prior duty equal to the thermal energy rating of 8 kJ/kV (U_r).

3) Arresters for system voltages 36 kV or below can be supplied, on request, when the order also includes arresters for higher system voltages.

Arresters with lower or higher rated voltages may be available on request for special applications.

PEXLIM Q-Y

Guaranteed protective data 145 - 420 kV

Max. system voltage	Rated voltage	Max. continuous operating voltage [1]		TOV capability [2]		Max. residual voltage with current wave						
		as per IEC	as per ANSI/IEEE			30/60 µs			8/20 µs			
U_m	U_r	U_c	MCOV	1 s	10 s	0.5 kA	1 kA	2 kA	5 kA	10 kA	20 kA	40 kA
kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}
145	138	92	111	151	143	265	274	285	309	325	357	399
	144	92	115	158	149	277	286	297	322	339	373	417
	150	92	121	165	156	288	298	309	335	353	388	434
	162	92	131	178	168	312	321	334	362	381	419	469
	168	92	131	184	174	323	333	346	376	395	435	486
	180	92	144	198	187	346	357	371	402	423	466	521
170	132	106	106	145	137	254	262	272	295	311	342	382
	144	108	115	158	149	277	286	297	322	339	373	417
	150	108	121	165	156	288	298	309	335	353	388	434
	162	108	131	178	168	312	321	334	362	381	419	469
	168	108	131	184	174	323	333	346	376	395	435	486
	180	108	144	198	187	346	357	371	402	423	466	521
	192	108	152	211	199	369	381	396	429	452	497	555
245	180	144	144	198	187	346	357	371	402	423	466	521
	192	154	154	211	199	369	381	396	429	452	497	555
	198	156	160	217	206	381	393	408	443	466	512	573
	210	156	170	231	218	404	417	433	469	494	543	608
	216	156	175	237	224	415	428	445	483	508	559	625
	219	156	177	240	227	421	434	451	489	515	567	634
	222	156	179	244	231	427	440	458	496	522	574	642
	228	156	180	250	237	438	452	470	510	536	590	660
300	216	173	175	237	224	415	428	445	483	508	559	625
	240	191	191	264	249	461	476	495	536	564	621	694
	258	191	209	283	268	496	512	532	576	607	667	746
	264	191	212	290	274	507	523	544	590	621	683	764
	276	191	220	303	287	530	547	569	617	649	714	798
362	258	206	209	283	268	496	512	532	576	607	667	746
	264	211	212	290	274	507	523	544	590	621	683	764
	276	221	221	303	287	530	547	569	617	649	714	798
	288	230	230	316	299	553	571	593	643	677	745	833
420	330	264	267	363	343	634	654	680	737	776	854	954
	336	267	272	369	349	646	666	692	751	790	869	972
	342	267	277	376	356	657	678	705	764	804	885	989
	360	267	291	396	374	692	714	742	804	846	931	1046
	372	267	301	409	387	715	737	766	831	875	962	1080
	378	267	306	415	393	726	749	779	844	889	978	1098
	381	267	308	419	396	732	755	785	851	896	985	1106
	390	267	315	429	405	749	773	803	871	917	1013	1132
	396	267	318	435	412	761	785	816	885	931	1029	1150

1) The continuous operating voltages Uc (as per IEC) and MCOV (as per IEEE) differ only due to deviations in type test procedures.
U_c has to be considered only when the actual system voltage is higher than the tabulated.
Any arrester with U_c higher than or equal to the actual system voltage divided by √3 can be selected.

2) With prior duty equal to the thermal energy rating of 8 kJ/kV (U_r).

Arresters with lower or higher rated voltages may be available on request for special applications.

PEXLIM Q-Y

Technical data for housings

Max. system voltage	Rated voltage	Housing	Creepage distance	External insulation *)				Dimensions					
U_m	U_r			1.2/50 µs dry	50 Hz wet (60s)	60 Hz wet (10s)	250/2500 µs wet	Mass	A_{max}	B	C	D	Fig.
kV_{rms}	kV_{rms}		mm	kV_{peak}	kV_{rms}	kV_{rms}	kV_{peak}	kg	mm	mm	mm	mm	
24	24	YV024	1363	269	120	120	223	18	483	-	-	-	1
36	30-36	YV036	1363	269	120	120	223	18	483	-	-	-	1
52	42-72	YV052	2889	390	200	200	333	28	743	-	-	-	2
72	54-84	YV072	2889	390	200	200	333	28	743	-	-	-	2
100	75-84	YH100	2889	390	200	200	333	28	743	-	-	-	2
	75-96	YV100	3740	499	238	238	409	35	956	-	-	-	2
123	90-120	YH123	3740	499	238	238	409	35	956	-	-	-	2
	90-150	YV123	4549	580	295	295	461	42	1127	-	-	-	2
145	108-120	YH145	3740	499	238	238	409	34	956	-	-	-	2
	108-150	YV145	4549	580	295	295	461	42	1147	-	-	-	3
	162-168	YV145	5778	780	400	400	666	49	1431	-	-	-	4
	180	YV145	6629	889	438	438	742	57	1644	-	-	-	4
170	132-150	YH170	4549	580	295	295	461	40	1147	-	-	-	3
	132-168	YV170	5778	780	400	400	666	50	1431	-	-	-	4
	180-192	YV170	6629	889	438	438	742	57	1644	-	-	-	4
245	180-198	YH245	6629	889	438	438	742	57	1627	400	-	160	5
	210-228	YH245	7438	970	495	495	794	63	1798	400	-	160	5
	180-198	YV245	8289	1079	533	533	870	76	2028	800	-	400	6
	210-228	YV245	8289	1079	533	533	870	76	2028	600	-	300	5
300	216	YH300	8289	1079	533	533	870	74	2028	800	-	400	6
	240	YH300	8289	1079	533	533	870	73	2028	800	-	200	6
	258-264	YH300	8289	1079	533	533	870	74	2028	800	-	200	7
	276	YH300	9098	1160	590	590	922	81	2306	800	-	200	7
	216-240	YV300	9518	1279	638	638	1075	90	2419	900	800	400	10
	258-276	YV300	9518	1279	638	638	1075	90	2419	900	-	300	9
362	258-276	YH362	9098	1160	590	590	922	91	2306	1400	1000	600	8
	288	YH362	9098	1160	590	590	922	83	2306	900	-	300	7
	258-288	YV362	11220	1497	714	714	1227	111	2845	1400	1000	600	10
420	330-360	YH420	11178	1469	733	733	1203	104	2803	1400		500	9
	330-396	YV420	13647	1740	885	885	1383	109	3358	1400	1000	600	10
Neutral-ground arresters													
52	30-36	YN052	1363	269	120	120	223	18	483	-	-	-	1
72	42-54	YN072	2889	390	200	200	333	28	743	-	-	-	2
100	60	YN100	2889	390	200	200	333	28	743	-	-	-	2
123	72-84	YN123	2889	390	200	200	333	27	743	-	-	-	2
	90-120	YN123	3740	499	238	238	409	35	956	-	-	-	2
145	84	YN145	2889	390	200	200	333	27	743	-	-	-	2
	90-120	YN145	3740	499	238	238	409	35	956	-	-	-	2
170	96-120	YN170	3740	499	238	238	409	34	956	-	-	-	2
	132	YN170	4549	580	295	295	461	40	1127	-	-	-	2
245	108-120	YN245	3740	499	238	238	409	34	956	-	-	-	2
	132-144	YN245	4549	580	295	295	461	40	1127	-	-	-	2

*) Sum of withstand voltages for empty units of arrester.

PEXLIM Q-Y

Technical data for housings

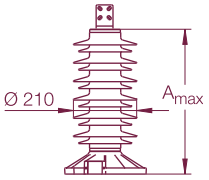


Figure 1

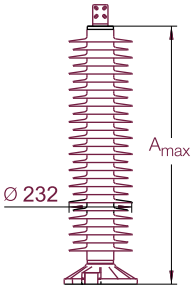


Figure 2

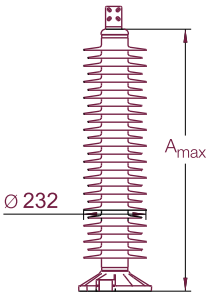


Figure 3

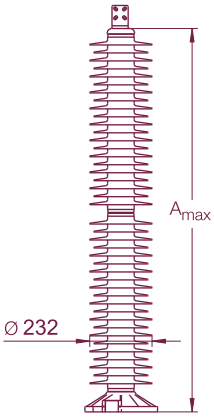


Figure 4

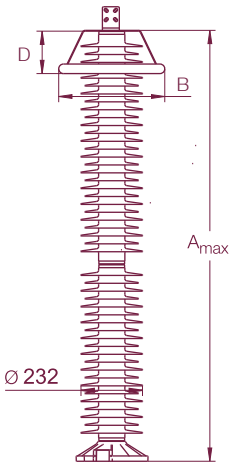


Figure 5

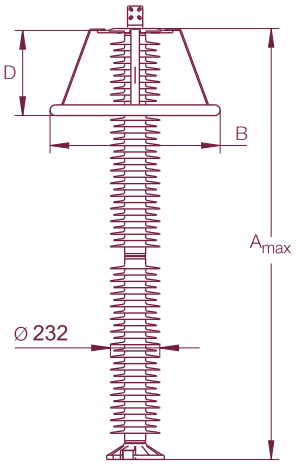


Figure 6

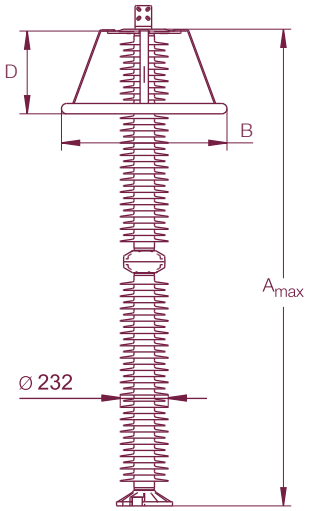


Figure 7

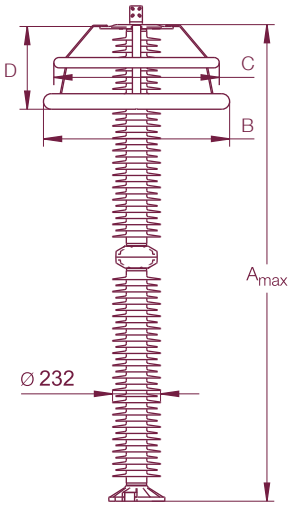


Figure 8

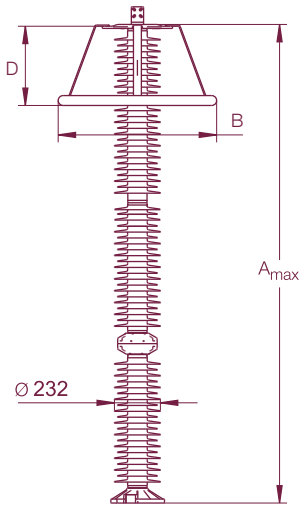


Figure 9

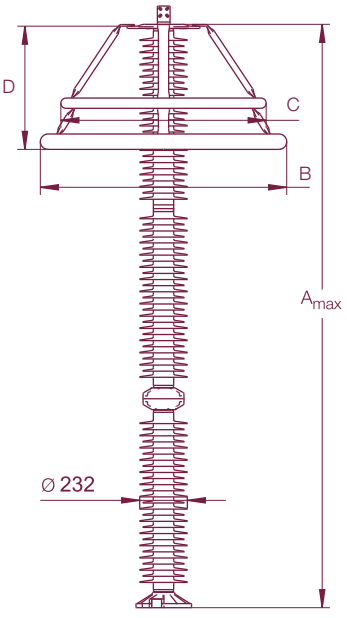
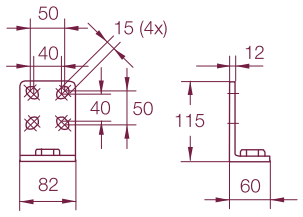


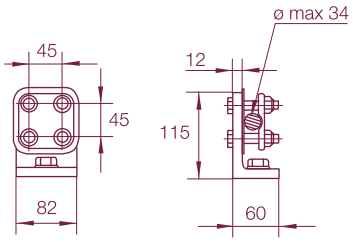
Figure 10

PEXLIM Q-Y
Accessories

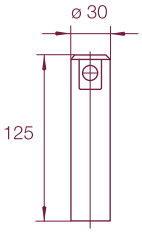
Line terminals



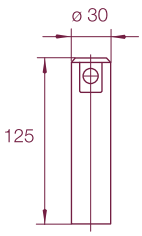
1HSA410 000-L
Aluminium



1HSA410 000-M
Aluminium flag with other items in stainless steel

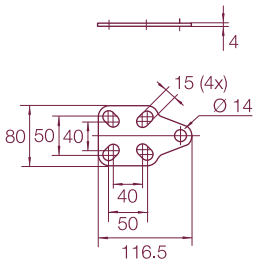


1HSA410 000-N
Aluminium

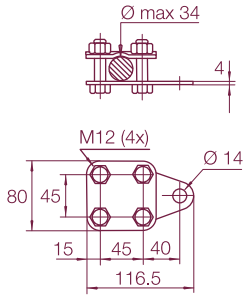


1HSA410 000-P
Stainless steel

Earth terminals

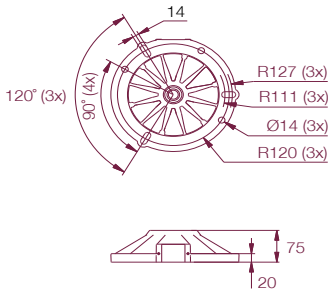


1HSA420 000-A
Stainless steel



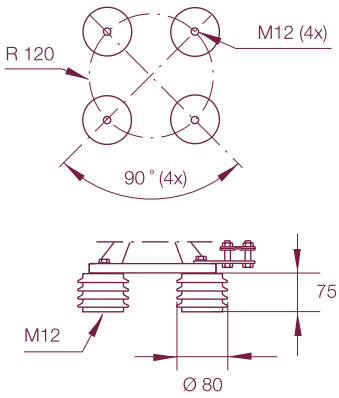
1HSA420 000-B
Stainless steel

Drilling plans



NOTE! Alternative drilling plan
3 slotted holes (120 °), n14 at R111-127

Without insulating base
Aluminium



Insulating base
1HSA430 000-A
Epoxy resin

M12 bolts for connection to structure are not supplied by ABB. Required threaded grip length is 15-20 mm.

PEXLIM Q-Y
Shipping data

Rated voltage	Housing	Number of arresters per crate					
		One		Three		Six	
U_r		Volume	Gross	Volume	Gross	Volume	Gross
kV_{rms}		m^3	kg	m^3	kg	m^3	kg
24	YV024	0.14	28	0.51	74	0.90	128
30-36	YV036	0.14	28	0.51	74	0.90	128
42-72	YV052	0.14	38	0.51	104	0.90	188
54-84	YV072	0.14	37	0.51	104	0.90	188
75-84	YH100	0.14	37	0.51	101	0.90	182
75-96	YV100	0.20	48	0.69	130	1.22	235
90-120	YH123	0.20	48	0.69	130	1.22	235
90-150	YV123	0.20	55	0.69	151	1.22	277
108-120	YH145	0.20	55	0.69	127	1.22	229
108-150	YV145	0.20	55	0.69	151	1.22	277
162-168	YV145	0.27	64	0.87	177	1.51	324
180	YV145	0.27	72	0.87	201	1.51	372
132-150	YH170	0.20	53	0.69	145	1.22	265
132-168	YV170	0.27	65	0.87	180	1.51	330
180-192	YV170	0.27	70	0.87	225	1.51	420
180-198	YH245	0.87	92	0.87	206	1.51	372
210-228	YH245	1.06	95	1.06	224	1.87	413
180-198	YV245	1.06	111	1.06	263	1.87	491
210-228	YV245	1.06	108	1.06	254	1.87	473
216-240	YH300	1.06	109	1.06	257	1.87	479
258-264	YH300	0.70	100	1.22	250	-	-
276	YH300	0.70	106	1.22	268	-	-
216-240	YV300	1.31	165	1.97	348	-	-
258-276	YV300	1.31	163	1.97	336	-	-
258-276	YH362	1.48	191	2.22	383	-	-
288	YH362	1.14	155	1.66	340	-	-
258-288	YV362	1.84	225	2.87	453	-	-
330-360	YH420	1.65	210	2.53	424	-	-
330-396	YV420	2.0	252	3.16	552	-	-
Neutral-ground arresters							
30-36	YN052	0.14	28	0.51	74	0.90	128
42-54	YN072	0.14	38	0.51	104	0.90	188
60	YN100	0.14	38	0.51	104	0.90	188
72-84	YN123	0.14	37	0.51	101	0.90	182
90-120	YN123	0.20	48	0.69	130	1.22	245
84	YN145	0.14	37	0.51	101	0.90	182
90-120	YN145	0.20	48	0.69	130	1.22	245
96-120	YN170	0.20	47	0.69	127	1.22	229
132	YN170	0.20	53	0.69	145	1.22	265
108-120	YN245	0.20	47	0.69	127	1.22	229
132-144	YN245	0.20	53	0.69	145	1.22	265

Each crate contains a certain number of arrester units and accessories for assembly and erection. A packing list is attached externally on each crate.
Each separate crate is numbered and the numbers of all crates and their contents are listed in the shipping specification. ABB reserves the right to pack arresters in the most effective/economic combination. Alternate or non-standard crates may involve additional charges.

The table above is to be seen as an approximation and specific data for deliveries may differ from the values given.

Zinc Oxide Surge Arrester PEXLIM P-X

Protection of switchgear, transformers and other equipment in high voltage systems against atmospheric and switching overvoltages.
- **in areas with very high lightning intensity**
- **where grounding or shielding conditions are poor or incomplete**
- **for important installations**
- **where energy requirements are very high (e.g. very long lines, capacitor protection).**

Superior where low weight, reduced clearances, flexible mounting, non-fragility and additional personnel safety is required.

Major component in PEXLINK™ concept for transmission line protection.

Other data can be ordered on request. Please contact your local sales representative.

Brief performance data

Arrester classification as per IEC 60099-4 Ed 3.0	Station; SH
Arrester classification as per IEEE Std C62.11-2012	Station
System voltages (U_s)	52 - 420 kV
Rated voltages (U_r)	42 - 360 kV
Nominal discharge current (IEC)	20 kA_{peak}
Lightning impulse classifying current (ANSI/IEEE)	10/15 kA_{peak}
Charge, energy and current withstand:	
Repetitive charge transfer rating, Q_{rs} (IEC)	3.2 C
Thermal energy rating, W_{th} (IEC)	11 kJ/kV (U_r)
Single impulse energy capability (2 ms to 4 ms impulse)	7.0 kJ/kV (U_r)
Discharge current withstand strength:	
High current 4/10 µs	100 kA_{peak}
Low current 2000 µs, (based on Q_{rs})	1 600 A_{peak}
Energy class as per IEEE standard (switching surge energy rating)	G
Single-impulse withstand rating as per IEEE standard	3.2 C
Repetitive charge transfer test value - sample tests on all manufactured block batches	4.0 C
Short-circuit/Pressure relief capability	65 $kA_{rms(sym)}$
Mechanical strength:	
Specified long-term load (SLL)	2500 Nm
Specified short-term load (SSL)	4000 Nm
Service conditions:	
Ambient temperature	-50 °C to +45 °C
Design altitude	max. 1000 m
Frequency	15 - 62 Hz
Line discharge class (as per IEC60099-4, Ed. 2.2)	Class 4

Further data according to the IEEE standard can be supplied on request

PEXLIM P-X

Guaranteed protective data 24 - 145 kV

Max. system voltage	Rated voltage	Max. continuous operating voltage [1]		TOV capability [2]		Max. residual voltage with current wave						
		as per IEC	as per ANSI/IEEE			30/60 µs			8/20 µs			
U_s	U_r	U_c	MCOV	1 s	10 s	1 kA	2 kA	3 kA	5 kA	10 kA	20 kA	40 kA
kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}
24[3]	24	19.2	19.5	27.8	26.4	46.8	48.5	49.7	51.9	54.6	59.8	65.6
36[3]	30	24.0	24.4	34.8	33.0	58.5	60.7	62.2	64.9	68.3	74.8	81.9
	33	26.4	26.7	38.2	36.3	64.4	66.7	68.4	71.4	75.1	82.3	90.1
	36	28.8	29.0	41.7	39.6	70.2	72.8	74.6	77.9	81.9	89.7	98.3
	39	31.2	31.5	45.2	42.9	76.1	78.8	80.8	84.3	88.8	97.2	107
52	42	34	34.0	46.4	44.1	81.9	84.9	87.0	90.8	95.6	105	115
	48	38	39.0	53.0	50.4	93.6	97.0	99.4	104	110	120	132
	51	41	41.3	56.3	53.5	99.5	104	106	111	117	128	140
	54	43	43.0	59.6	56.7	106	110	112	117	123	135	148
	60	48	48.0	66.3	63.0	117	122	125	130	137	150	164
	72	58	58.0	79.5	75.6	141	146	150	156	164	180	197
72	54	43	43.0	59.6	56.7	106	110	112	117	123	135	148
	60	48	48.0	66.3	63.0	117	122	125	130	137	150	164
	63	50	51.0	69.6	66.1	123	128	131	137	144	157	172
	66	53	53.4	72.9	69.3	129	134	137	143	151	165	181
	72	58	58.0	79.5	75.6	141	146	150	156	164	180	197
	75	60	60.7	82.8	78.7	147	152	156	163	171	187	205
	78	62	63.1	86.1	81.9	153	158	162	169	178	195	213
	81	65	65.6	89.5	85.0	158	164	168	176	185	202	222
	84	67	68.0	92.8	88.2	164	170	174	182	192	210	230
100	72	58	58.0	83.5	79.2	141	146	150	156	164	180	197
	75	60	60.7	87.0	82.5	147	152	156	163	171	187	205
	78	62	63.1	90.4	85.8	153	158	162	169	178	195	213
	81	65	65.6	93.9	89.1	158	164	168	176	185	202	222
	84	67	68.0	97.4	92.4	164	170	174	182	192	210	230
123	90	72	72.0	104	99.0	176	182	187	195	205	225	246
	96	77	77.0	111	105	188	194	199	208	219	240	263
	102	78	82.6	118	112	199	207	212	221	233	255	279
	108	78	84.0	125	118	211	219	224	234	246	270	295
	114	78	92.3	132	125	223	231	237	247	260	284	312
	120	78	98.0	139	132	234	243	249	260	273	299	328
	129	78	104	149	141	252	261	268	279	294	322	353
	132	78	106	153	145	258	267	274	286	301	329	361
	138	78	111	160	151	270	279	286	299	314	344	377
	144	78	115	167	158	281	291	299	312	328	359	394
	150	78	121	174	165	293	304	311	325	342	374	410

1) The continuous operating voltages U_c (as per IEC) and MCOV (as per IEEE) differ only due to deviations in type test procedures.
U_c has to be considered only when the actual system voltage is higher than the tabulated.
Any arrester with U_c higher than or equal to the actual system voltage divided by √3 can be selected.

2) With prior duty equal to the thermal energy rating of 11 kJ/kV (U_r)

3) Arresters for system voltages 36 kV or below can be supplied, on request, when the order also includes arresters for higher system voltages.

Arresters with lower or higher rated voltages may be available on request for special applications.

PEXLIM P-X

Guaranteed protective data 145 - 420 kV

Max. system voltage	Rated voltage	Max. continuous operating voltage [1]		TOV capability [2]		Max. residual voltage with current wave						
		as per IEC	as per ANSI/IEEE			30/60 µs			8/20 µs			
U_s	U_r	U_c	MCOV	1 s	10 s	1 kA	2 kA	3 kA	5 kA	10 kA	20 kA	40 kA
kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}
145	108	86	86.0	125	118	211	219	224	234	246	270	295
	120	92	98.0	139	132	234	243	249	260	273	299	328
	132	92	106	153	145	258	267	274	286	301	329	361
	138	92	111	160	151	270	279	286	299	314	344	377
	144	92	115	167	158	281	291	299	312	328	359	394
	150	92	121	174	165	293	304	311	325	342	374	410
	162	92	131	187	178	316	328	336	351	369	404	443
	168	92	131	194	184	328	340	348	364	383	419	459
170	132	106	106	153	145	258	267	274	286	301	329	361
	144	108	115	167	158	281	291	299	312	328	359	394
	150	108	121	174	165	293	304	311	325	342	374	410
	162	108	131	187	178	316	328	336	351	369	404	443
	168	108	131	194	184	328	340	348	364	383	419	459
	180	108	144	208	198	351	364	373	390	410	449	492
	192	108	152	222	211	375	388	398	415	437	479	525
245	180	144	144	208	198	351	364	373	390	410	449	492
	192	154	154	222	211	375	388	398	415	437	479	525
	198	156	160	229	217	387	400	410	428	451	494	541
	210	156	170	243	231	410	425	435	454	478	524	574
	214	156	173	248	235	419	434	445	464	488	535	586
	216	156	175	250	237	422	437	448	467	492	539	590
	219	156	177	254	240	427	443	454	474	499	546	598
	222	156	179	257	244	433	449	460	480	506	554	607
	228	156	180	264	250	445	461	473	493	519	568	623
300	216	173	175	250	237	422	437	448	467	492	539	590
	228	182	182	264	250	445	461	473	493	519	568	623
	240	191	191	278	264	468	485	497	519	546	598	656
	258	191	209	299	283	504	522	535	558	587	643	705
	264	191	212	306	290	515	534	547	571	601	658	721
	276	191	220	320	303	539	558	572	597	628	688	754
362	258	206	209	299	283	504	522	535	558	587	643	705
	264	211	212	306	290	515	534	547	571	601	658	721
	276	221	221	320	303	539	558	572	597	628	688	754
	288	230	230	334	316	562	582	597	623	656	718	787
420	330	264	267	382	363	644	667	684	714	751	823	901
	336	267	272	389	369	656	679	696	727	765	838	918
	342	267	277	396	376	667	691	709	740	779	852	934
	360	267	291	417	396	702	728	746	779	819	897	983

1) The continuous operating voltages U_c (as per IEC) and MCOV (as per IEEE) differ only due to deviations in type test procedures.
U_c has to be considered only when the actual system voltage is higher than the tabulated.
Any arrester with U_c higher than or equal to the actual system voltage divided by √3 can be selected.

2) With prior duty equal to the thermal energy rating of 11 kJ/kV (U_r)

Arresters with lower or higher rated voltages may be available on request for special applications.

PEXLIM P-X

Technical data for housings

Max. system voltage	Rated voltage	Housing	Creepage distance	External insulation *)				Dimensions					
U_s	U_r			1.2/50 µs dry	50 Hz wet (60s)	60 Hz wet (10s)	250/2500 µs wet	Mass	A_{max}	B	C	D	Fig.
kV_{rms}	kV_{rms}		mm	kV_{peak}	kV_{rms}	kV_{rms}	kV_{peak}	kg	mm	mm	mm	mm	
24	24	XV024	1363	283	126	126	235	19	481	-	-	-	1
36	30-36	XV036	1363	283	126	126	235	19	481	-	-	-	1
	39	XV036	2270	400	187	187	330	30	736	-	-	-	1
52	42-72	XV052	2270	400	187	187	330	30	736	-	-	-	1
72	54-72	XV072	2270	400	187	187	330	29	736	-	-	-	1
	75-84	XV072	3625	578	293	293	462	44	1080	-	-	-	1
100	75-96	XV100	3625	578	293	293	462	44	1080	-	-	-	1
123	90-120	XH123	3625	578	293	293	462	43	1080	-	-	-	1
	90-144	XV123	4540	800	374	374	660	54	1397	-	-	-	2
	150	XV123	4988	861	419	419	697	55	1486	-	-	-	2
145	108-120	XH145	3625	578	293	293	462	42	1080	-	-	-	1
	108-144	XV145	4540	800	374	374	660	53	1397	-	-	-	2
	150	XV145	4988	861	419	419	697	55	1486	-	-	-	2
	162-168	XV145	5895	978	480	480	792	66	1741	-	-	-	2
170	132-144	XH170	4540	800	374	374	660	53	1400	400	-	160	3
	150	XV170	4988	861	419	419	697	57	1489	400	-	160	3
	132-192	XV170	5895	978	480	480	792	70	1744	400	-	160	3
245	180-192	XM245	5895	978	480	480	792	66	1744	400	-	160	3
	180-228	XH245	7250	1156	586	586	924	83	2088	400	-	160	3
	180-198	XV245	8613	1439	712	712	1159	101	2647	800	-	500	4
	210-228	XV245	8613	1439	712	712	1159	98	2617	600	-	300	4
300	216-240	XH300	8613	1439	712	712	1159	101	2617	800	-	400	4
	258-276	XH300	8613	1439	712	712	1159	101	2617	800	-	500	4
	216-276	XV300	9520	1556	773	773	1254	110	2872	800	-	400	4
362	258-276	XH362	9520	1556	773	773	1254	118	2872	1200	1000	600	5
	288	XH362	9520	1556	773	773	1254	116	2872	900	800	400	5
	258-288	XV362	11790	1956	960	960	1584	148	3533	1400	1000	700	6
420	330-360	XH420	10875	1734	879	879	1386	131	3216	1400	-	500	4
Neutral-ground arresters													
52	30-36	XN052	1363	283	126	126	235	19	481	-	-	-	1
72	42-54	XN072	2270	400	187	187	330	29	736	-	-	-	1
100	60	XN100	2270	400	187	187	330	30	736	-	-	-	1
123	72	XN123	2270	400	187	187	330	28	736	-	-	-	1
	75-120	XN123	3625	578	293	293	462	43	1080	-	-	-	1
145	84-120	XN145	3625	578	293	293	462	42	1080	-	-	-	1
170	96-120	XN170	3625	578	293	293	462	42	1080	-	-	-	1
245	108	XN245	3625	578	293	293	462	41	1080	-	-	-	1
	132-144	XN245	4540	800	374	374	660	50	1397	-	-	-	2

*) Sum of withstand voltages for empty units of arrester.

PEXLIM P-X
Technical data for housings

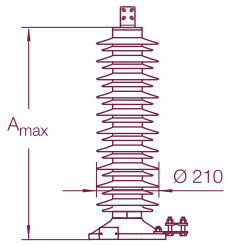


Figure 1

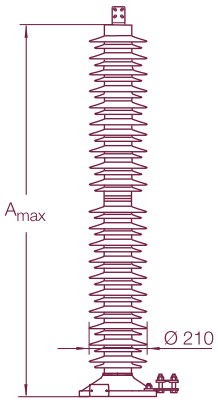


Figure 2

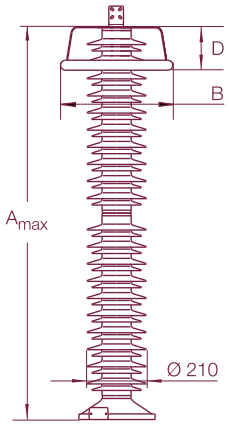


Figure 3

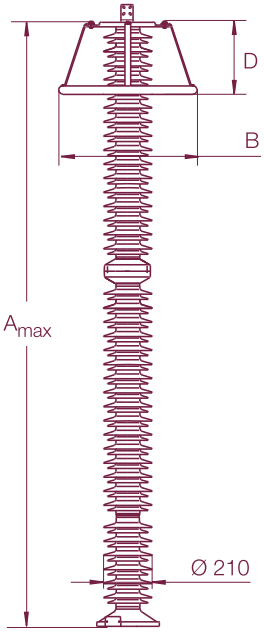


Figure 4

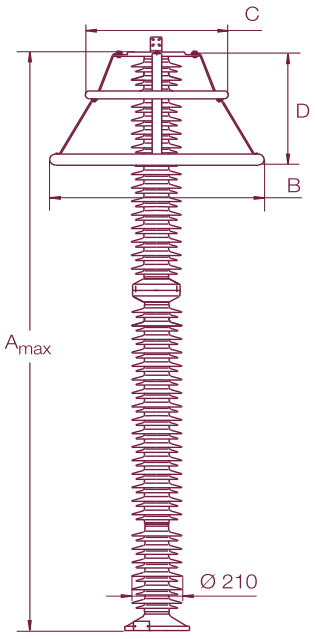


Figure 5

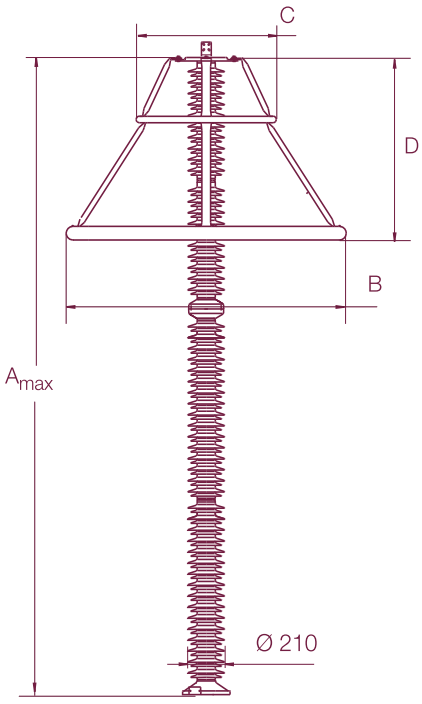
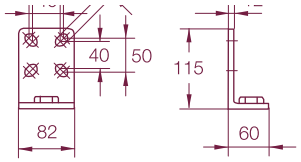


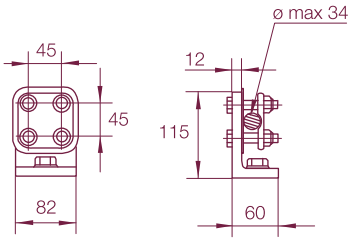
Figure 6

PEXLIM P-X
Accessories

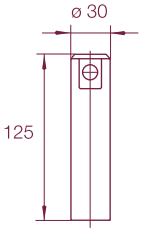
Line terminals



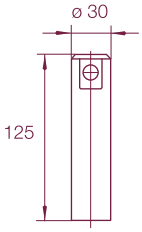
1HSA410 000-L
Aluminium



1HSA410 000-M
Aluminium flag with other items in stainless steel

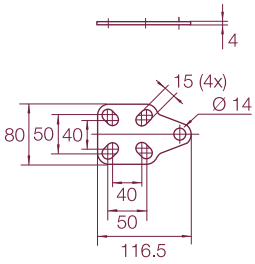


1HSA410 000-N
Aluminium

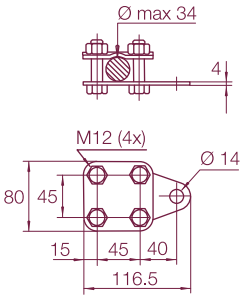


1HSA410 000-P
Stainless steel

Earth terminals

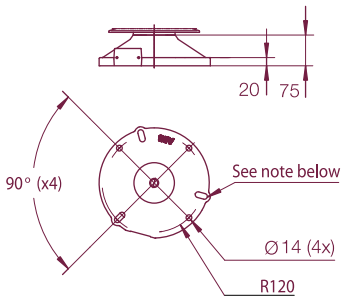


1HSA420 000-A
Stainless steel



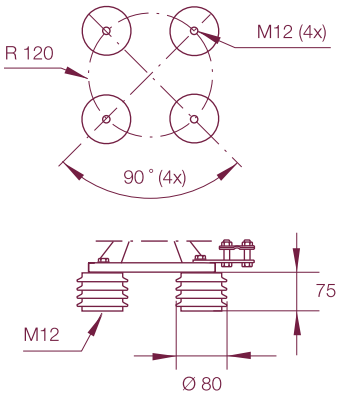
1HSA420 000-B
Stainless steel

Drilling plans



NOTE! Alternative drilling plan
3 slotted holes (120 °), n14 at R111-127

Without insulating base
Aluminium



Insulating base
1HSA430 000-A
Epoxy resin

M12 bolts for connection to structure are not supplied by ABB. Required threaded grip length is 15-20 mm.

PEXLIM P-X
Shipping data

Rated voltage	Housing	Number of arresters per crate					
		One		Three		Six	
U_r		Volume	Gross	Volume	Gross	Volume	Gross
kV_{rms}		m^3	kg	m^3	kg	m^3	kg
24	XV024	0.1	42	0.5	86	0.9	152
30-36	XV036	0.1	42	0.5	86	0.9	152
39	XV036	0.5	52	0.5	116	0.9	212
42-72	XV052	0.5	52	0.5	116	0.9	212
54-72	XV072	0.5	52	0.5	116	0.9	212
75-84	XV072	0.7	71	0.7	163	1.2	301
75-96	XV100	0.7	71	0.7	163	1.2	301
90-120	XH123	0.7	71	0.7	163	1.2	301
90-144	XV123	0.9	87	0.9	201	1.5	372
150	XV123	0.9	87	0.9	201	1.5	372
108-120	XH145	0.7	68	0.7	154	1.2	283
108-144	XV145	0.9	87	0.9	201	1.5	372
150	XV145	0.9	87	0.9	201	1.5	372
162-168	XV145	1.1	98	1.1	239	1.9	443
132-144	XH170	0.9	89	0.9	207	1.5	384
150	XH170	0.9	89	0.9	207	1.5	384
132-192	XV170	1.1	102	1.1	251	1.9	443
192	XM245	1.1	98	1.1	239	1.9	443
180-228	XH245	1.1	115	1.1	290	1.9	545
180-198	XV245	0.9	133	1.5	339	-	-
210-228	XV245	0.9	133	1.5	339	-	-
216-264	XH300	1.0	155	1.7	358	-	-
276	XH300	1.0	155	1.7	358	-	-
216-276	XV300	1.0	163	1.7	382	-	-
258-288	XH362	1.6	207	2.3	435	-	-
258	XV362	2.1	242	2.9	497	-	-
264-288	XV362	2.1	258	2.3	545	-	-
330-360	XH420	2.1	242	2.3	497	-	-
30-36	XN052	0.1	42	0.5	86	0.9	152
42-54	XN072	0.5	52	0.5	116	0.9	212
60	XN100	0.5	52	0.5	116	0.9	212
72	XN123	0.5	52	0.5	116	0.9	212
75-120	XN123	0.7	71	0.7	163	1.2	301
84-120	XN145	0.7	71	0.7	163	1.2	301
96-120	XN170	0.7	71	0.7	163	1.2	301
108-120	XN245	0.7	71	0.7	163	1.2	301
132-144	XN245	0.9	87	0.9	201	1.5	372

Each crate contains a certain number of arrester units and accessories for assembly and erection. A packing list is attached externally on each crate.

Each separate crate is numbered and the numbers of all crates and their contents are listed in the shipping specification. ABB reserves the right to pack arresters in the most effective/economic combination. Alternate or non-standard crates may involve additional charges.

The table above is to be seen as an approximation and specific data for deliveries may differ from the values given.

Zinc Oxide Surge Arrester PEXLIM P-Y

Protection of switchgear, transformers and other equipment in high voltage systems against atmospheric and switching overvoltages.

- **in areas with very high lightning intensity**
- **where grounding or shielding conditions are poor or incomplete**
- **for important installations**
- **where energy requirements are very high (e.g. very long lines, capacitor protection).**

Superior where low weight, reduced clearances, flexible mounting, non-fragility and additional personnel safety is required.

Other data can be ordered on request. Please contact your local sales representative.

Brief performance data

Arrester classification as per IEC 60099-4 Ed 3.0	Station; SH
Arrester classification as per IEEE Std C62.11-2012	Station
System voltages (U_s)	300 - 550 kV
Rated voltages (U_r)	228 - 444 kV
Nominal discharge current (IEC)	20 kA_{peak}
Lightning impulse classifying current (ANSI/IEEE)	10/15 kA_{peak}
Charge, energy and current withstand:	
Repetitive charge transfer rating, Q_{rs} (IEC)	3.2 C
Thermal energy rating, W_{th} (IEC)	11 kJ/kV (U_r)
Single impulse energy capability (2 ms to 4 ms impulse)	7.0 kJ/kV (U_r)
Discharge current withstand strength:	
High current 4/10 µs	100 kA_{peak}
Low current 2000 µs, (based on Q_{rs})	1 600 A_{peak}
Energy class as per IEEE standard (switching surge energy rating)	G
Single-impulse withstand rating as per IEEE standard	3.2 C
Repetitive charge transfer test value - sample tests on all manufactured block batches	4.0 C
Short-circuit/Pressure relief capability	65 $kA_{rms(sym)}$
Mechanical strength:	
Specified long-term load (SLL)	6000 Nm
Specified short-term load (SSL)	9000 Nm
Service conditions:	
Ambient temperature	-50 °C to +45 °C
Design altitude	max. 1000 m
Frequency	15 - 62 Hz
Line discharge class (as per IEC60099-4, Ed. 2.2)	Class 4

Further data according to the IEEE standard can be supplied on request

PEXLIM P-Y
Guranteed protective data

Max. system voltage	Rated voltage	Max. continuous operating voltage [1]		TOV capability [2]		Max. residual voltage with current wave						
		as per IEC	as per ANSI/IEEE			30/60 µs			8/20 µs			
U_s	U_r	U_c	MCOV	1 s	10 s	1 kA	2 kA	3 kA	5 kA	10 kA	20 kA	40 kA
kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}
300	228	182	182	251	239	445	461	473	493	519	568	623
	240	191	191	265	252	468	485	497	519	546	598	656
	258	191	209	285	270	504	522	535	558	587	643	705
	264	191	212	291	277	515	534	547	571	601	658	721
	276	191	220	304	289	539	558	572	597	628	688	754
362	258	206	209	285	270	504	522	535	558	587	643	705
	264	211	212	291	277	515	534	547	571	601	658	721
	276	221	221	304	289	539	558	572	597	628	688	754
	288	230	230	318	302	562	582	597	623	656	718	787
420	330	264	267	364	346	644	667	684	714	751	823	901
	336	267	272	371	352	656	679	696	727	765	838	918
	342	267	277	377	359	667	691	709	740	779	852	934
	360	267	291	397	378	702	728	746	779	819	897	983
	378	267	306	417	396	737	764	783	817	860	942	1037
	390	267	315	430	409	761	788	808	843	888	972	1070
	396	267	318	437	415	773	800	820	856	901	987	1086
550	396	317	318	437	415	773	800	820	856	901	987	1086
	420	336	336	464	441	819	849	870	908	956	1051	1152
	444	349	353	490	466	866	897	920	960	1015	1111	1217

1) The continuous operating voltages U_c (as per IEC) and MCOV (as per IEEE) differ only due to deviations in type test procedures.
U_c has to be considered only when the actual system voltage is higher than the tabulated.
Any arrester with U_c higher than or equal to the actual system voltage divided by √3 can be selected.

2) With prior duty equal to the thermal energy rating of 11 kJ/kV (U_r)

Arresters with lower or higher rated voltages may be available on request for special applications.

PEXLIM P-Y
Technical data for housings

Max. system voltage	Rated voltage	Housing	Creepage distance	External insulation *)				Dimensions					
U_s	U_r			1.2/50 µs dry	50 Hz wet (60s)	60 Hz wet (10s)	250/2500 µs wet	Mass	A_{max}	B	C	D	Fig.
kV_{rms}	kV_{rms}		mm	kV_{peak}	kV_{rms}	kV_{rms}	kV_{peak}	kg	mm	mm	mm	mm	
300	228-240	YH300	7500	1156	586	586	924	112	2220	800	-	400	1
	258-276	YH300	8863	1439	712	712	1159	126	2625	800	-	500	2
	228-276	YV300	9770	1556	773	773	1254	139	2880	800	-	400	2
362	258-276	YM362	8863	1439	712	712	1159	134	2625	1200	1000	600	3
	258-288	YH362	9770	1556	773	773	1254	145	2880	1200	1000	600	3
	258-288	YV362	11250	1734	879	879	1386	180	3330	1400	1000	700	4
420	330-360	YH420	11125	1734	879	879	1386	170	3225	1400	-	500	2
	378-396	YH420	12613	2017	1005	1005	1621	188	3740	1400	1000	700	5
	330-396	YV420	13520	2134	1066	1066	1716	202	3995	1400	1000	700	5
550	396-444	YH550	14875	2312	1172	1172	1848	226	4335	2000	1000	1000	6

*) Sum of withstand voltages for empty units of arrester.

PEXLIM P-Y
Technical data for housings

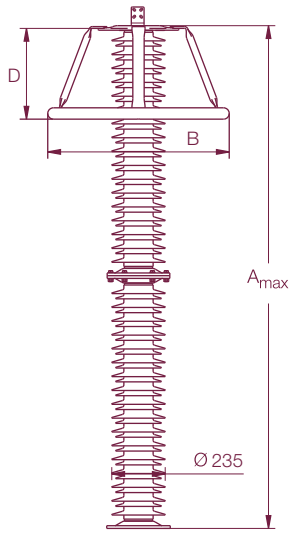


Figure 1

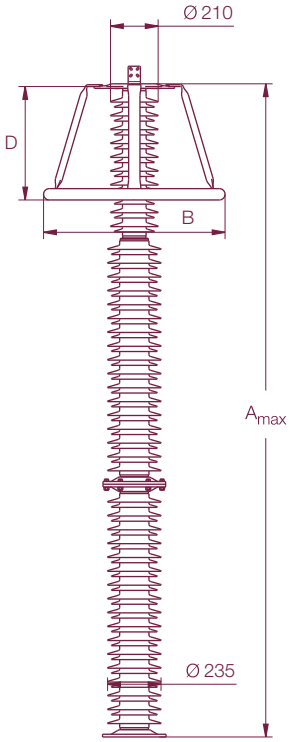


Figure 2

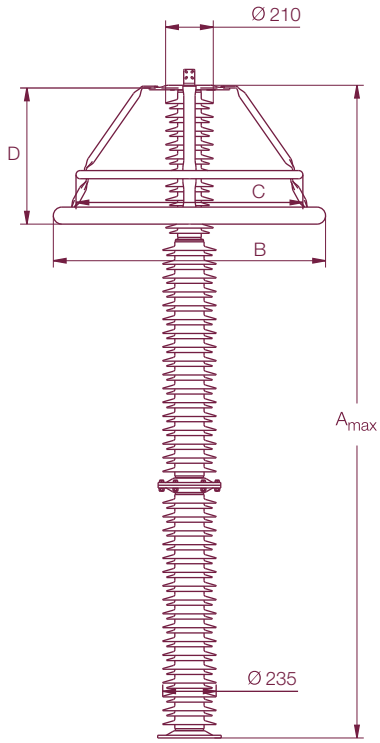


Figure 3

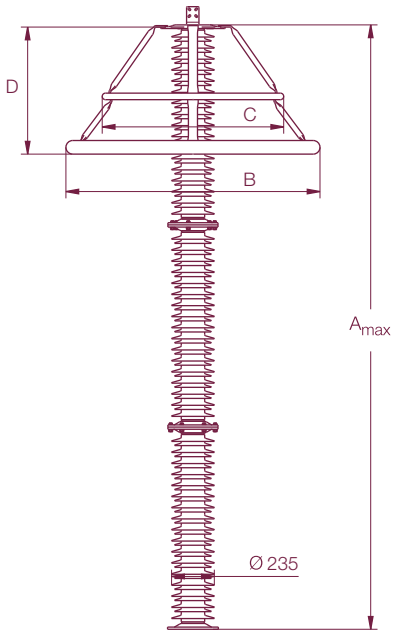


Figure 4

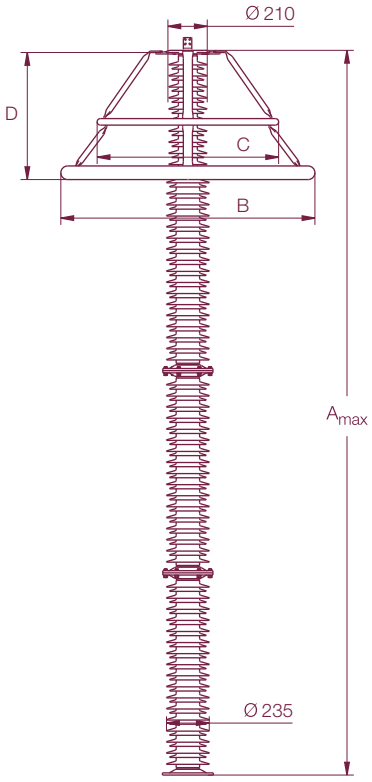


Figure 5

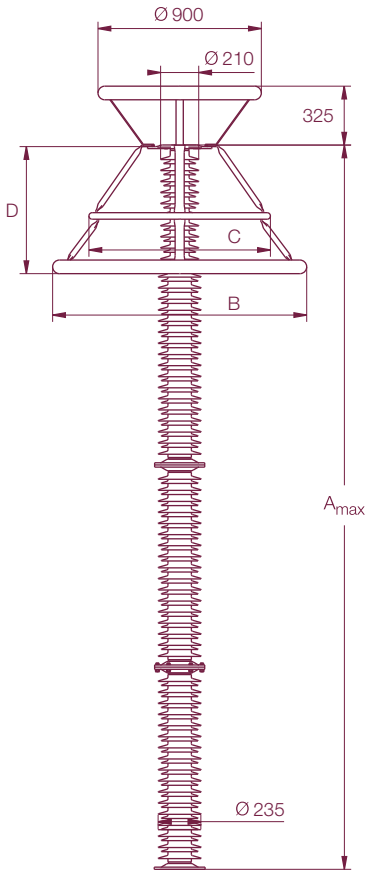
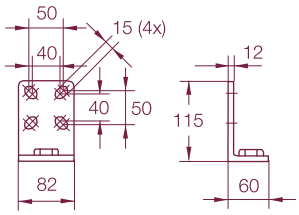


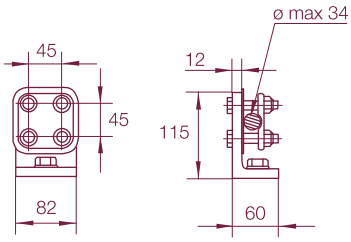
Figure 6

PEXLIM P-Y
Accessories

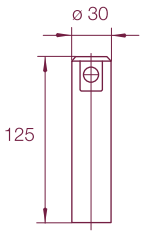
Line terminals



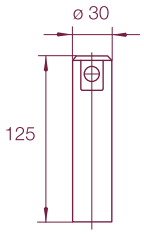
1HSA410 000-L
Aluminium



1HSA410 000-M
Aluminium flag with other items in stainless steel

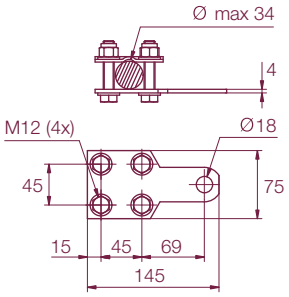


1HSA410 000-N
Aluminium

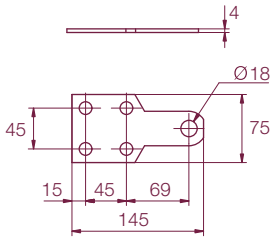


1HSA410 000-P
Stainless steel

Earth terminals

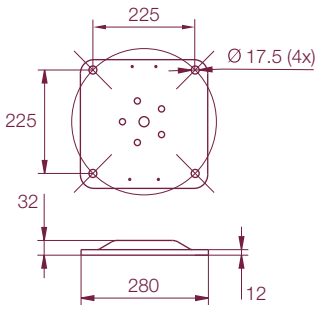


1HSA420 000-U
Stainless steel

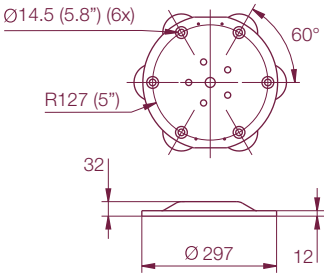


1HSA420 000-V
Stainless steel

Drilling plans without insulating base

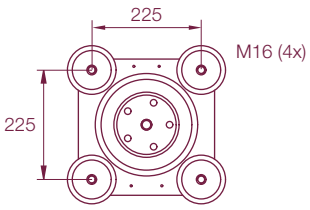


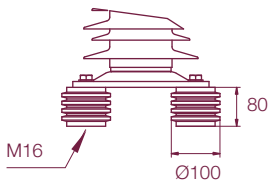
Standard



Optional

Drilling plan with insulating base





Insulating base
1HSA430 000-C
Epoxy resin

M16 bolts for connection to structure are not supplied by ABB. Required threaded grip length is 15-20 mm.

PEXLIM P-Y
Shipping data

Rated voltage	Housing	Number of arresters per crate			
		One		Three	
U_r		Volume	Gross	Volume	Gross
kV_{rms}		m^3	kg	m^3	kg
288-240	YH300	1.18	162	1.18	386
258-276	YH300	1.18	176	1.18	429
228-276	YV300	1.18	189	1.18	467
258-276	YM362	1.69	230	1.94	499
258-288	YH362	1.69	240	1.94	531
330-360	YH420	1.85	280	2.19	621
258-288	YV362	1.85	290	2.19	652
378-396	YH420	1.85	298	2.19	675
330-396	YV420	1.85	312	2.19	716
396-444	YH550	3.38	426	3.38	879

Each crate contains a certain number of arrester units and accessories for assembly and erection. A packing list is attached externally on each crate.

Each separate crate is numbered and the numbers of all crates and their contents are listed in the shipping specification. ABB reserves the right to pack arresters in the most effective/economic combination. Alternate or non-standard crates may involve additional charges.

The table above is to be seen as an approximation and specific data for deliveries may differ from the values given.

Zinc-Oxide Surge Arrester TEXLIM Q-C

Protection of switchgear, transformers and other equipment in high voltage systems against atmospheric and switching overvoltages.
- **in areas with very high lightning intensity**
- **where grounding or shielding conditions are poor or incomplete**
- **for important installations**
- **where energy requirements are very high (e.g. very long lines, capacitor protection).**
- **Specially suited to extreme seismic zones.**

Superior where low weight, non-fragility and additional personnel safety is required.

Other data can be ordered on request. Please contact your local sales representative.

Brief performance data

Arrester classification as per IEC 60099-4 Ed 3.0	Station; SM
Arrester classification as per IEEE Std C62.11-2012	Station
System voltages (U_s)	123 - 420 kV
Rated voltages (U_r)	90 - 420 kV
Nominal discharge current (IEC)	10 kA_{peak}
Lightning impulse classifying current (ANSI/IEEE)	10 kA_{peak}
Charge, energy and current withstand:	
Repetitive charge transfer rating, Q_{rs} (IEC)	2.0 C
Thermal energy rating, W_{th} (IEC)	8 kJ/kV (U_r)
Single impulse energy capability (2 ms to 4 ms impulse)	4.5 kJ/kV (U_r)
Discharge current withstand strength:	
High current 4/10 µs	100 kA_{peak}
Low current 2000 µs, (based on Q_{rs})	1 600 A_{peak}
Energy class as per IEEE standard (switching surge energy rating)	J
Single-impulse withstand rating as per IEEE standard	2.2 C
Repetitive charge transfer test value - sample tests on all manufactured block batches	2.7 C
Short-circuit/Pressure relief capability	80 $kA_{rms(sym)}$
Mechanical strength:	
Specified long-term load (SLL)	21000 Nm
Specified short-term load (SSL)	40000 Nm
Service conditions:	
Ambient temperature	-50 °C to +45 °C
Design altitude	max. 1000 m
Frequency	15 - 62 Hz
Line discharge class (as per IEC60099-4, Ed. 2.2)	Class 3

Further data according to the IEEE standard can be supplied on request

TEXLIM Q-C
Guaranteed protective data

Max. system voltage	Rated voltage	Max. continuous operating voltage [1]		TOV capability [2]		Max. residual voltage with current wave						
		as per IEC	as per ANSI/IEEE			30/60 µs			8/20 µs			
U_s	Ur	U_c	MCOV	1 s	10 s	0.5 kA	1 kA	2 kA	5 kA	10 kA	20 kA	40 kA
kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}
123	090	72	72.0	98.5	92.7	173	178	185	201	212	233	261
	096	77	77.0	105	98.9	185	190	197	215	226	249	278
	102	78	82.0	111	105	196	202	210	228	240	264	295
	108	78	84.0	118	111	208	214	222	242	254	280	313
	120	78	98.0	131	123	231	237	247	268	282	311	347
	129	78	104	141	132	248	255	265	288	304	334	373
	132	78	106	144	136	254	261	271	295	311	342	382
	138	78	111	151	142	265	273	284	309	325	357	399
	144	78	115	157	148	277	285	296	322	339	373	417
	150	78	121	164	154	288	297	308	335	353	388	434
145	108	86	86.0	118	111	208	214	222	242	254	280	313
	120	92	98.0	131	123	231	237	247	268	282	311	347
	132	92	106	144	136	254	261	271	295	311	342	382
	138	92	111	151	142	265	273	284	309	325	357	399
	144	92	115	157	148	277	285	296	322	339	373	417
	150	92	121	164	154	288	297	308	335	353	388	434
	162	92	131	177	167	312	320	333	362	381	419	469
	168	92	131	183	173	323	332	345	376	395	435	486
170	132	106	106	144	136	254	261	271	295	311	342	382
	144	108	115	157	148	277	285	296	322	339	373	417
	150	108	121	164	154	288	297	308	335	353	388	434
	162	108	131	177	167	312	320	333	362	381	419	469
	168	108	131	183	173	323	332	345	376	395	435	486
	180	108	144	197	185	346	356	370	402	423	466	521
	192	108	152	210	197	369	380	394	429	452	497	555
245	180	144	144	197	185	346	356	370	402	423	466	521
	192	154	154	210	197	369	380	394	429	452	497	555
	198	156	160	216	204	381	391	407	443	466	512	573
	210	156	170	229	216	404	415	431	469	494	543	608
	216	156	174	236	222	415	427	444	483	508	559	625
	219	156	177	239	225	421	433	450	489	515	567	634
	222	156	179	243	228	427	439	456	496	522	574	642
	228	156	180	249	235	438	451	468	510	536	590	660

1) The continuous operating voltages Uc (as per IEC) and MCOV (as per IEEE) differ only due to deviations in type test procedures.
Uc has to be considered only when the actual system voltage is higher than the tabulated.
Any arrester with U_c higher than or equal to the actual system voltage divided by √3 can be selected.

2) With prior duty equal to the thermal energy rating of 11 kJ/kV (U_r).

Arresters with lower or higher rated voltages may be available on request for special applications.

TEXLIM Q-C
Guaranteed protective data

Max. system voltage	Rated voltage	Max. continuous operating voltage [1]		TOV capability [2]		Max. residual voltage with current wave						
		as per IEC	as per ANSI/IEEE			30/60 µs			8/20 µs			
U_s	Ur	U_c	MCOV	1 s	10 s	0.5 kA	1 kA	2 kA	5 kA	10 kA	20 kA	40 kA
kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}
300	216	173	174	236	222	415	427	444	483	508	559	625
	228	182	182	249	235	438	451	468	510	536	590	660
	240	191	191	262	247	461	474	493	536	564	621	694
	258	191	209	282	265	496	510	530	576	607	667	746
	264	191	212	289	272	507	522	542	590	621	683	764
	276	191	220	302	284	530	545	567	617	649	714	798
362	258	206	209	282	265	496	510	530	576	607	667	746
	264	211	212	289	272	507	522	542	590	621	683	764
	276	221	221	302	284	530	545	567	617	649	714	798
	288	230	230	315	296	553	569	591	643	677	745	833
420	330	264	267	361	340	634	652	678	737	776	854	954
	336	267	272	367	346	646	664	690	751	790	869	972
	342	267	277	374	352	657	676	702	764	804	885	989
	360	267	291	394	371	692	711	739	804	846	931	1046
	372	267	301	407	383	715	735	764	831	875	962	1080
	378	267	306	413	389	726	747	776	844	889	978	1098
	381	267	308	417	392	732	753	782	851	896	985	1106
	390	267	315	427	402	749	770	801	871	917	1013	1132
	396	267	318	433	408	761	782	813	885	931	1029	1150
	420	267	335	459	433	807	830	862	938	987	1091	1219

1) The continuous operating voltages Uc (as per IEC) and MCOV (as per IEEE) differ only due to deviations in type test procedures.
Uc has to be considered only when the actual system voltage is higher than the tabulated.
Any arrester with U_c higher than or equal to the actual system voltage divided by √3 can be selected.

2) With prior duty equal to the thermal energy rating of 11 kJ/kV (U_r).

Arresters with lower or higher rated voltages may be available on request for special applications.

TEXLIM Q-C
Technical data for housings

Max. system voltage	Rated voltage	Housing	Creepage distance	External insulation *)				Dimensions					
U_s	U_r			1.2/50 µs dry	50 Hz wet (60s)	60 Hz wet (10s)	250/2500 µs wet	Mass	A_{max}	B	C	D	Fig.
kV_{rms}	kV_{rms}		mm	kV_{peak}	kV_{rms}	kV_{rms}	kV_{peak}	kg	mm	mm	mm	mm	
123	90-150	CV123	4800	620	270	270	440	95	1562	-	-	-	1
145	108-168	CV145	4800	620	270	270	440	97	1562	-	-	-	1
170	132-180	CH170	4800	620	270	270	440	98	1562	-	-	-	1
	132-150	CV170	7700	980	430	430	690	125	2282	600	-	300	2
	162-192	CV170	7700	980	430	430	690	128	2282	-	-	-	1
245	180-198	CV245	7700	980	430	430	690	132	2282	800	-	400	2
	210-228	CV245	7700	980	430	430	690	133	2282	600	-	300	2
300	216-240	CH300	7700	980	430	430	690	136	2282	900	-	400	2
	258	CH300	7700	980	430	430	690	137	2282	800	-	200	2
	216-228	CV300	9600	1240	540	540	880	190	3109	1200	1000	800	3
	240-258	CV300	12500	1600	700	700	1130	195	3109	1200	1000	600	3
	264-276	CV300	12500	1600	700	700	1130	190	3109	900	800	400	3
362	258-264	CH362	9600	1240	540	540	880	194	3109	1400	1000	600	3
	276-288	CH362	9600	1240	540	540	880	195	3109	1200	1000	600	3
	258-264	CV362	12500	1600	700	700	1130	226	3829	1600	1000	1200	3
	276-288	CV362	12500	1600	700	700	1130	225	3829	1400	1000	700	3
420	330-360	CH420	12500	1600	700	700	1130	232	3829	1200	1000	800	3
	372-420	CH420	12500	1600	700	700	1130	237	3829	1200	1000	600	3
	330-420	CV420	15400	1960	860	860	1380	267	4549	1200	1000	800	3

Neutral-ground arresters

123	72-120	CN123	4800	620	270	270	440	92	1562	-	-	-	1
145	84-120	CN145	4800	620	270	270	440	92	1562	-	-	-	1
170	96-132	CN170	4800	620	270	270	440	93	1562	-	-	-	1
245	108-144	CN245	4800	620	270	270	440	94	1562	-	-	-	1

*) Sum of withstand voltages for empty units of arrester.

TEXLIM Q-C
Technical data for housings

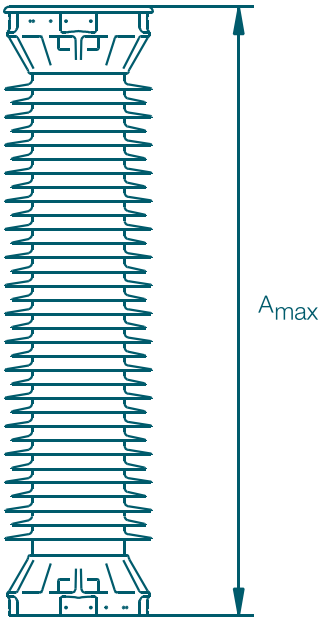


Figure 1

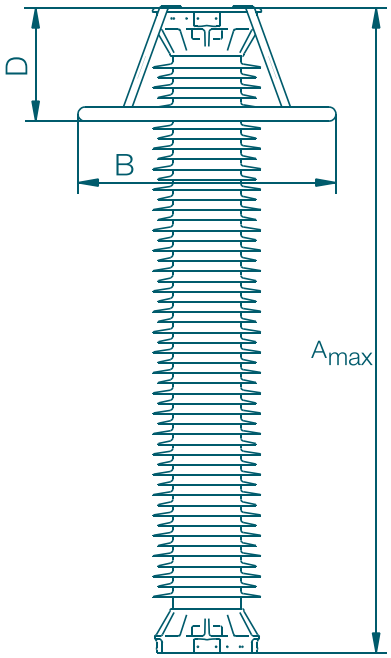


Figure 2

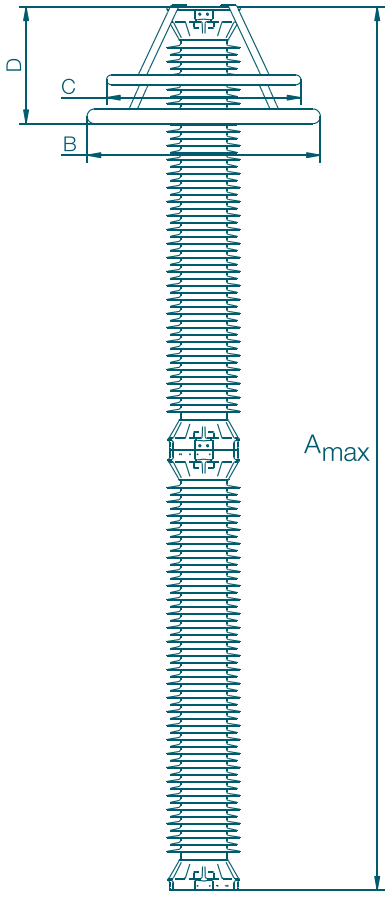
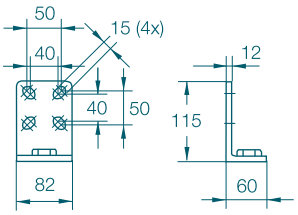


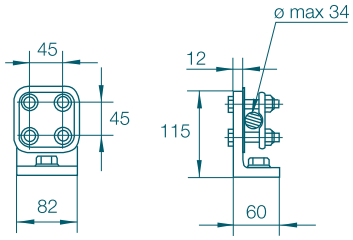
Figure 3

TEXLIM Q-C
Accessories

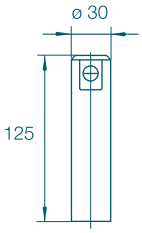
Line terminals



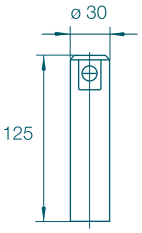
1HSA410 000-A
Aluminium



1HSA410 000-B
Aluminium flag with other items in stainless steel

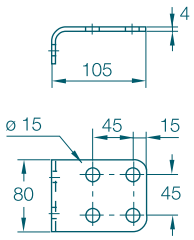


1HSA410 000-C
Aluminium

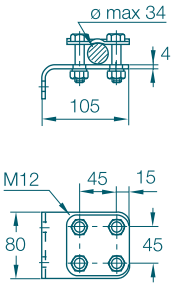


1HSA410 000-D
Stainless steel

Earth terminals

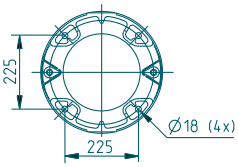


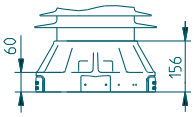
1HSA420 000-C
Stainless steel



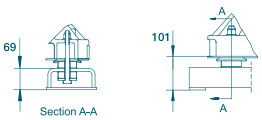
1HSA420 000-D
Stainless steel

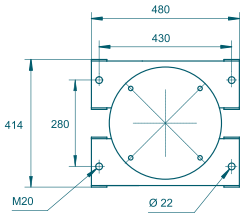
Drilling plans





Without insulating base
Aluminium





Insulating base
1HSA430000-V

M20 bolts for connection to structure are not supplied by ABB.

TEXLIM Q-C
Shipping data

Rated voltage	Housing	Without insulating base						With insulating base					
		Number of arresters per crate						Number of arresters per crate					
		One		Two		Three		One		Two		Three	
U_r		Volume	Gross	Volume	Gross	Volume	Gross	Volume	Gross	Volume	Gross	Volume	Gross
kV_{rms}		m^3	kg	m^3	kg	m^3	kg	m^3	kg	m^3	kg	m^3	kg
90-150	CV123	2.96	170	2.96	265	2.96	360	2.96	197	2.96	319	2.96	441
108-168	CV145	2.96	172	2.96	269	2.96	366	2.96	199	2.96	323	2.96	447
132-180	CH170	2.96	173	2.96	271	2.96	369	2.96	200	2.96	325	2.96	450
132-150	CV170	4.16	200	4.16	325	4.16	450	4.16	227	4.16	379	4.16	531
162-192	CV170	4.16	203	4.16	331	4.16	459	4.16	230	4.16	385	4.16	540
180-198	CV245	4.16	207	4.16	339	4.16	471	4.16	234	4.16	393	4.16	552
210-228	CV245	4.16	208	4.16	341	4.16	474	4.16	235	4.16	395	4.16	555
216-240	CH300	4.16	211	4.16	347	4.16	483	4.16	238	4.16	401	4.16	564
258	CH300	4.16	212	4.16	349	4,16	486	4.16	239	4.16	403	4,16	567
216-228	CV300	2.96	265	5.54	500	5.54	690	2.96	292	5.54	554	5.54	726
240-258	CV300	2.96	270	5.54	510	5.54	705	2.96	297	5.54	564	5.54	741
264-276	CV300	2.96	265	5.54	500	5.54	690	2.96	292	5.54	554	5.54	726
258-264	CH362	3.74	344	5.54	508	5.54	702	3.74	371	5.54	562	5.54	738
276-288	CH362	2.96	270	5.54	510	5.54	705	2.96	297	5.54	564	5.54	741
258-264	CV362	5.76	426	5.54	572	5.54	798	5.76	453	5.54	626	5.54	834
276-288	CV362	4.94	380	5.54	570	5.54	795	4.94	402	5.54	624	5.54	831
330-360	CH420	4.16	307	5.54	584	5.54	816	4.16	334	5.54	638	5.54	852
372-420	CH420	4.16	312	5.54	594	5.54	831	4.16	339	5.54	648	5.54	867
330-360	CV420	4.16	337	5.54	644	5.54	906	4.16	364	5.54	698	5.54	942
372-420	CV420	4.16	342	5.54	654	5.54	921	4.16	369	5.54	708	5.54	957

Neutral-ground arresters

Rated voltage	Housing	Without insulating base						With insulating base					
		Number of arresters per crate						Number of arresters per crate					
		One		Two		Three		One		Two		Three	
U_r		Volume	Gross	Volume	Gross	Volume	Gross	Volume	Gross	Volume	Gross	Volume	Gross
kV_{rms}		m^3	kg	m^3	kg	m^3	kg	m^3	kg	m^3	kg	m^3	kg
72-120	CN123	2.96	167	2.96	259	2.96	351	2.96	194	2.96	313	2.96	432
84-120	CN145	2.96	167	2.96	259	2.96	351	2.96	194	2.96	313	2.96	432
96-132	CN170	2.96	168	2.96	261	2.96	354	2.96	195	2.96	315	2.96	435
108-144	CN245	2.96	169	2.96	263	2.96	357	2.96	196	2.96	317	2.96	438

Each crate contains a certain number of arrester units and accessories for assembly and erection. A packing list is attached externally on each crate.

Each separate crate is numbered and the numbers of all crates and their contents are listed in the shipping specification. ABB reserves the right to pack arresters in the most effective/economic combination. Alternate or non-standard crates may involve additional charges.

The table above is to be seen as an approximation and specific data for deliveries may differ from the values given.

Zinc-Oxide Surge Arrester TEXLIM P-C

Protection of switchgear, transformers and other equipment in high voltage systems against atmospheric and switching overvoltages.
- **in areas with very high lightning intensity**
- **where grounding or shielding conditions are poor or incomplete**
- **for important installations**
- **where energy requirements are very high (e.g. very long lines, capacitor protection).**
- **Specially suited to extreme seismic zones.**

Superior where low weight, non-fragility and additional personnel safety is required.

Other data can be ordered on request. Please contact your local sales representative.

Brief performance data

Arrester classification as per IEC 60099-4 Ed 3.0	Station; SH
Arrester classification as per IEEE Std C62.11-2012	Station
System voltages (Us)	245 - 550 kV
Rated voltages (U_r)	180 - 444 kV
Nominal discharge current (IEC)	20 kA_{peak}
Lightning impulse classifying current (ANSI/IEEE)	10/15 kA_{peak}
Charge, energy and current withstand:	
Repetitive charge transfer rating, Q_{rs} (IEC)	3.2 C
Thermal energy rating, W_{th} (IEC)	11 kJ/kV (U_r)
Single impulse energy capability (2 ms to 4 ms impulse)	7 kJ/kV (U_r)
Discharge current withstand strength:	
High current 4/10 µs	100 kA_{peak}
Low current 2000 µs, (based on Q_{rs})	1 600 A_{peak}
Energy class as per IEEE standard (switching surge energy rating)	G
Single-impulse withstand rating as per IEEE standard	3.2 C
Repetitive charge transfer test value - sample tests on all manufactured block batches	4.0 C
Short-circuit/Pressure relief capability	80 $kA_{rms(sym)}$
Mechanical strength:	
Specified long-term load (SLL)	21000 Nm
Specified short-term load (SSL)	40000 Nm
Service conditions:	
Ambient temperature	-50 °C to +45 °C
Design altitude	max. 1000 m
Frequency	15 - 62 Hz
Line discharge class (as per IEC60099-4, Ed. 2.2)	Class 4

Further data according to the IEEE standard can be supplied on request

TEXLIM P-C
Guaranteed protective data

Max. system voltage	Rated voltage	Max. continuous operating voltage [1]		TOV capability [2]		Max. residual voltage with current wave						
		as per IEC	as per ANSI/IEEE			30/60 µs			8/20 µs			
U_s	Ur	U_c	MCOV	1 s	10 s	1 kA	2 kA	3 kA	5 kA	10 kA	20 kA	40 kA
kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}
245	180	144	144	196	186	350	362	372	390	410	449	492
	192	154	154	209	199	373	386	397	415	437	479	525
	198	156	160	216	205	385	398	410	428	451	494	541
	210	156	170	229	217	408	422	434	454	478	524	574
	216	156	174	236	223	420	434	447	467	492	539	590
	219	156	177	239	227	425	440	453	474	499	546	598
	222	156	179	242	230	431	446	459	480	506	554	607
	228	156	180	249	236	443	459	471	493	519	568	623
300	216	173	174	236	223	420	434	447	467	492	539	590
	228	182	182	249	236	443	459	471	493	519	568	623
	240	191	191	262	248	466	483	496	519	546	598	656
	258	191	209	281	267	501	519	533	558	587	643	705
	264	191	212	288	273	513	531	546	571	601	658	721
	276	191	221	301	286	536	555	571	597	628	688	754
362	258	206	209	281	267	501	519	533	558	587	643	705
	264	211	212	288	273	513	531	546	571	601	658	721
	276	221	221	301	286	536	555	571	597	628	688	754
	288	230	230	314	298	559	579	595	623	656	718	787
420	330	264	267	360	342	641	663	682	714	751	823	901
	336	267	272	367	348	653	675	695	727	765	838	918
	342	267	277	373	354	664	688	707	740	779	852	934
	360	267	291	393	373	699	724	744	779	819	897	983
	372	267	301	406	385	722	748	769	804	847	927	1021
	378	267	306	413	391	734	760	781	817	860	942	1037
	381	267	308	416	395	740	766	788	824	867	950	1045
	390	267	315	426	404	757	784	806	843	888	972	1070
	396	267	318	432	410	769	796	819	856	901	987	1086
	420	267	336	459	435	816	844	868	908	956	1051	1152
550	396	317	318	432	410	769	796	819	856	901	987	1086
	420	336	336	459	435	816	844	868	908	956	1051	1152
	444	349	353	485	460	862	892	918	960	1015	1111	1217

1) The continuous operating voltages Uc (as per IEC) and MCOV (as per IEEE) differ only due to deviations in type test procedures.
Uc has to be considered only when the actual system voltage is higher than the tabulated.
Any arrester with U_c higher than or equal to the actual system voltage divided by √3 can be selected.

2) With prior duty equal to the thermal energy rating of 8 kJ/kV (U_r).

Arresters with lower or higher rated voltages may be available on request for special applications.

TEXLIM P-C
Technical data for housings

Max. system voltage	Rated voltage	Housing	Creepage distance	External insulation *)				Dimensions					
U_s	U_r			1.2/50 µs dry	50 Hz wet (60s)	60 Hz wet (60s)	250/2500 µs wet	Mass	A_{max}	B	C	D	Fig.
kV_{rms}	kV_{rms}		mm	kV_{peak}	kV_{rms}	kV_{rms}	kV_{peak}	kg	mm	mm	mm	mm	
245	180-228	CV245	7700	980	430	430	690	145	2282	600	-	-	2
300	216-240	CH300	7700	980	430	430	690	148	2282	900	-	-	2
	258	CH300	7700	980	430	430	690	150	2282	800			2
	216-240	CV300	9600	1240	540	540	880	202	3109	1200	1000	600	3
	258-276	CV300	9600	1240	540	540	880	203	3109	900	800	400	3
362	258-264	CH362	9600	1240	540	540	880	207	3109	1400	1000	700	3
	276-288	CH362	9600	1240	540	540	880	209	3109	1200	1000	600	3
	258-264	CV362	12500	1600	700	700	1130	236	3829	1400	1000	700	3
	276-288	CV362	12500	1600	700	700	1130	239	3829	1200	1000	800	3
420	330-360	CH420	12500	1600	700	700	1130	249	3829	1200	1000	600	3
	372-420	CH420	12500	1600	700	700	1130	254	3829	900	800	400	3
	330-360	CV420	15400	1960	860	860	1380	278	4549	1200	1000	800	3
	372-420	CV420	15400	1960	860	860	1380	287	4549	1200	1000	600	3
550	396-420	CM550	12500	1600	700	700	1130	267	4162	1800	1000	800	4
	396-444	CH550	15400	1960	860	860	1380	302	4882	2000	1000	1000	4
	396-444	CV550	17300	2220	970	970	1570	348	5709	2000	1000	1000	5
Neutral - ground arresters													
245	108-144	CN245	4800	620	270	270	440	102	1562	-	-	-	1

*) Sum of withstand voltages for empty units of arrester.

TEXLIM P-C
Technical data for housings

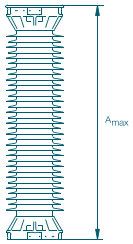


Figure 1

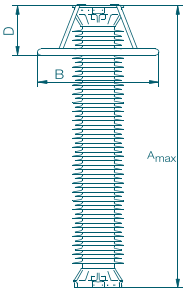


Figure 2

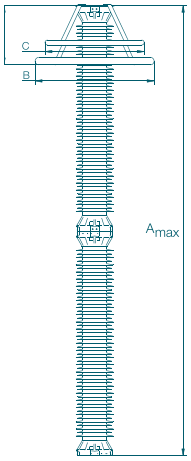


Figure 3

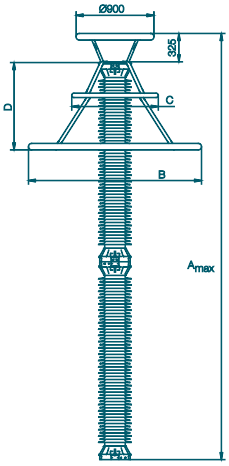


Figure 4

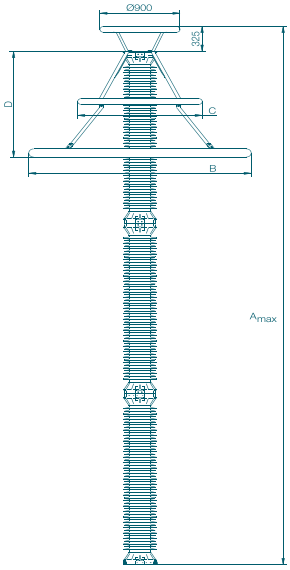
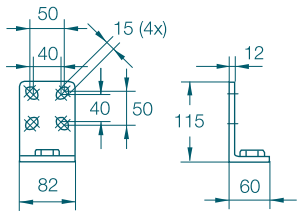


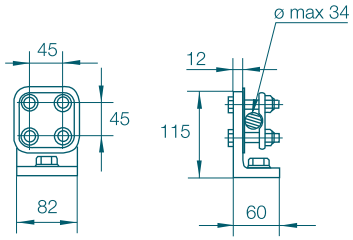
Figure 5

TEXLIM P-C
Accessories

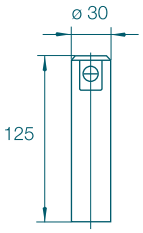
Line terminals



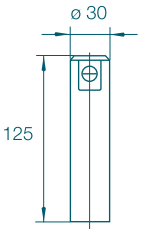
1HSA410 000-A
Aluminium



1HSA410 000-B
Aluminium flag with other items in stainless steel

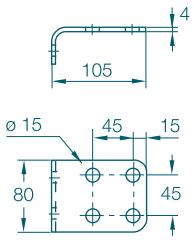


1HSA410 000-C
Aluminium

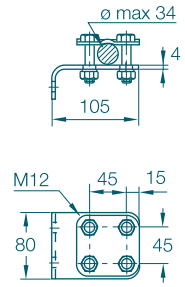


1HSA410 000-D
Stainless steel

Earth terminals

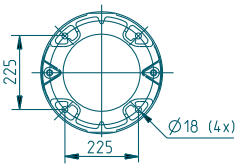


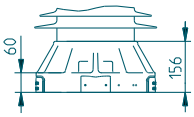
1HSA420 000-C
Stainless steel



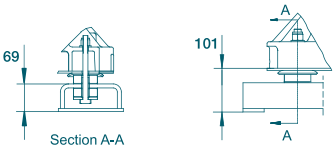
1HSA420 000-D
Stainless steel

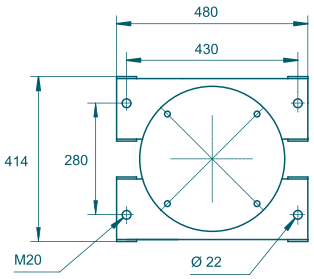
Drilling plans





Without insulating base
Aluminium





Insulating base
1HSA430000-V

M20 bolts for connection to structure are not supplied by ABB.

TEXLIM P-C
Shipping data

Rated voltage	Housing	Without insulating base						With insulating base					
		Number of arresters per crate						Number of arresters per crate					
		One		Two		Three		One		Two		Three	
U_r		Volume	Gross	Volume	Gross	Volume	Gross	Volume	Gross	Volume	Gross	Volume	Gross
kV_{rms}		m^3	kg	m^3	kg	m^3	kg	m^3	kg	m^3	kg	m^3	kg
180-228	CV245	4.16	220	4.16	365	4.16	510	4.16	247	4.16	419	4.16	591
216-240	CH300	4.16	223	4.16	371	4.16	519	4.16	250	4.16	425	4.16	600
258	CH300	4.16	225	4.16	375	4.16	525	4.16	252	4.16	429	4.16	606
216-240	CV300	2.96	277	5.54	524	5.54	726	2.96	304	5.54	578	5.54	807
258-276	CV300	2.96	278	5.54	526	5.54	729	2.96	305	5.54	580	5.54	810
258-264	CH362	3.74	357	5.54	534	5.54	741	3.74	384	5.54	588	5.54	822
276-288	CH362	2.96	284	5.54	538	5.54	747	2.96	311	5.54	592	5.54	828
258-264	CV362	5.76	386	5.54	592	5.54	828	5.76	413	5.54	646	5.54	909
276-288	CV362	4.16	314	5.54	598	5.54	837	4.16	341	5.54	652	5.54	918
330-360	CH420	4.16	324	5.54	618	5.54	867	4.16	351	5.54	672	5.54	948
372-420	CH420	4.16	329	5.54	628	5.54	882	4.16	356	5.54	682	5.54	963
330-360	CV420	4.16	353	5.54	676	5.54	954	4.16	380	5.54	730	5.54	1035
372-420	CV420	4.16	362	5.54	694	5.54	981	4.16	389	5.54	748	5.54	1062
396-420	CM550	5.76	467	7.14	779	7.14	1046	5.76	494	7.14	833	7.14	1127
396-444	CH550	6.13	527	7.51	874	7.51	1176	6.13	554	7.51	928	7.51	1257
396-444	CV550	6.13	573	7.51	966	7.51	1389	6.13	600	7.51	1020	7.51	1470
Neutral-ground arresters													
108-144	CN245	2,96	177	2,96	279	2,96	381	2,96	204	2,96	333	2,96	462

Each crate contains a certain number of arrester units and accessories for assembly and erection. A packing list is attached externally on each crate.

Each separate crate is numbered and the numbers of all crates and their contents are listed in the shipping specification. ABB reserves the right to pack arresters in the most effective/economic combination. Alternate or non-standard crates may involve additional charges.

The table above is to be seen as an approximation and specific data for deliveries may differ from the values given.

Zinc-Oxide Surge Arrester TEXLIM T-C

Protection of switchgear, transformers and other equipment in high voltage systems against atmospheric and switching overvoltages.
- **in areas with very high lightning intensity**
- **where grounding or shielding conditions are poor or incomplete**
- **for important installations**
- **where energy requirements are very high (e.g. very long lines, capacitor protection).**
- **Specially suited to extreme seismic zones.**

Superior where low weight, non-fragility and additional personnel safety is required.

Other data can be ordered on request. Please contact your local sales representative.

Brief performance data

Arrester classification as per IEC 60099-4 Ed 3.0	Station; SH
Arrester classification as per IEEE Std C62.11-2012	Station
System voltages (U_s)	245 - 800 kV
Rated voltages (U_r)	180 - 624 kV
Nominal discharge current (IEC)	20 kA_{peak}
Lightning impulse classifying current (ANSI/IEEE)	10/15/20kA_{peak}
Charge, energy and current withstand:	
Repetitive charge transfer rating, Q_{rs} (IEC)	5.2 C
Thermal energy rating, W_{th} (IEC)	15 kJ/kV (U_r)
Single impulse energy capability (2 ms to 4 ms impulse)	11 kJ/kV (U_r)
Discharge current withstand strength:	
High current 4/10 µs	150 kA_{peak}
Low current 2000 µs, (based on Q_{rs})	2 600 A_{peak}
Energy class as per IEEE standard (switching surge energy rating)	J
Single-impulse withstand rating as per IEEE standard	5.2 C
Repetitive charge transfer test value - sample tests on all manufactured block batches	6.2 C
Short-circuit/Pressure relief capability	80 $kA_{rms(sym)}$
Mechanical strength:	
Specified long-term load (SLL)	21000 Nm
Specified short-term load (SSL)	40000 Nm
Service conditions:	
Ambient temperature	-50 °C to +45 °C
Design altitude	max. 1000 m
Frequency	15 - 62 Hz
Line discharge class (as per IEC60099-4, Ed. 2.2)	Class 5

Further data according to the IEEE standard can be supplied on request

TEXLIM T-C
Guaranteed protective data

Max. system voltage	Rated voltage	Max. continuous operating voltage [1]		TOV capability [2]		Max. residual voltage with current wave						
		as per IEC	as per ANSI/IEEE			30/60 µs			8/20 µs			
U_s	Ur	U_c	MCOV	1 s	10 s	1 kA	2 kA	3 kA	5 kA	10 kA	20 kA	40 kA
kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}
245	180	144	144	199	189	346	356	363	381	396	428	466
	192	154	154	212	201	369	380	387	406	423	457	497
	198	156	160	218	208	381	392	399	419	436	471	512
	210	156	170	232	220	404	415	423	444	462	499	543
	216	156	174	238	227	415	427	435	457	476	514	559
	219	156	177	242	230	421	433	441	463	482	521	567
	222	156	179	245	233	427	439	447	469	489	528	574
	228	156	180	252	239	438	451	459	482	502	542	590
300	216	173	174	238	227	415	427	435	457	476	514	559
	228	182	182	252	239	438	451	459	482	502	542	590
	240	191	191	265	252	461	475	484	507	528	571	621
	258	191	209	285	271	496	510	520	545	568	614	667
	264	191	212	291	277	508	522	532	558	581	628	683
	276	191	220	305	290	531	546	556	583	608	656	714
362	258	206	209	285	271	496	510	520	545	568	614	667
	264	211	212	291	277	508	522	532	558	581	628	683
	276	221	221	305	290	531	546	556	583	608	656	714
	288	230	230	318	302	554	569	580	609	634	685	745
420	330	264	267	364	347	634	652	665	697	726	785	854
	336	267	272	371	353	646	664	677	710	740	799	869
	342	267	277	378	359	657	676	689	723	753	813	885
	360	267	291	398	378	692	712	725	761	792	856	931
	372	267	301	411	391	715	735	749	786	819	884	962
	378	267	306	418	397	726	747	761	799	832	899	978
	381	267	308	421	400	732	753	767	805	839	906	985
	390	267	315	431	410	750	771	786	824	858	927	1013
	396	267	318	437	416	761	783	798	837	872	941	1029
	420	267	336	464	441	807	830	846	888	924	998	1091
550	396	317	318	437	416	761	783	798	837	872	941	1029
	420	336	336	464	441	807	830	846	888	924	998	1091
	444	349	353	491	467	853	878	894	938	977	1060	1153
800	588	470	470	650	618	1134	1167	1189	1247	1299	1402	1525
	612	490	490	676	643	1180	1214	1237	1298	1351	1459	1587
	624	499	499	690	656	1203	1238	1261	1323	1378	1488	1618

1) The continuous operating voltages Uc (as per IEC) and MCOV (as per IEEE) differ only due to deviations in type test procedures.
Uc has to be considered only when the actual system voltage is higher than the tabulated.
Any arrester with U_c higher than or equal to the actual system voltage divided by √3 can be selected.

2) With prior duty equal to the thermal energy rating of 11 kJ/kV (U_r).

Arresters with lower or higher rated voltages may be available on request for special applications.

TEXLIM T-C
Technical data for housings

Max. system voltage	Rated voltage	Housing	Creepage distance	External insulation *)				Dimensions					
U_s	U_r			1.2/50 µs dry	50 Hz wet (60s)	60 Hz wet (10s)	250/2500 µs wet	Mass	A_{max}	B	C	D	Fig.
kV_{rms}	kV_{rms}		mm	kV_{peak}	kV_{rms}	kV_{rms}	kV_{peak}	kg	mm	mm	mm	mm	
245	180-228	CV245	7700	980	430	430	690	180	2282	600	-	300	2
300	216-240	CH300	7700	980	430	430	690	185	2282	900	-	400	2
	216-228	CV300	9600	1240	540	540	880	240	3109	1200	1000	600	3
	240-276	CV300	9600	1240	540	540	880	251	3109	900	800	400	3
362	258-264	CH362	9600	1240	540	540	880	256	3109	1400	1000	700	3
	276-288	CH362	9600	1240	540	540	880	257	3109	1200	1000	600	3
	258-264	CV362	12500	1600	700	700	1130	295	3829	1400	1000	700	3
	276-288	CV362	12500	1600	700	700	1130	298	3829	1200	1000	800	3
420	330-360	CH420	12500	1600	700	700	1130	309	3829	1200	1000	600	3
	372-420	CH420	12500	1600	700	700	1130	314	3829	900	800	400	3
	330-360	CV420	15400	1960	860	860	1380	338	4549	1200	1000	800	3
	372-381	CV420	15400	1960	860	860	1380	343	4549	1200	1000	600	3
	390-420	CV420	15400	1960	860	860	1380	350	4549	900	800	400	3
550	396-420	CM550	12500	1600	700	700	1130	329	4162	1800	1000	800	4
	396	CH550	15400	1960	860	860	1380	366	4882	2000	1000	1000	4
	420-444	CH550	15400	1960	860	860	1380	371	4882	1800	1000	800	4
	396-444	CV550	17300	2220	970	970	1570	432	5709	2000	1000	1000	5
800	588	CH800	23100	2940	1290	1290	2070	555	7149	2500	1400	1000	5
	612	CH800	23100	2940	1290	1290	2070	555	7149	2500	1200	1000	5
	624	CH800	23100	2940	1290	1290	2070	555	7149	2500	1000	1000	5

Neutral-ground arresters

245	108-144	CN245	4800	620	270	270	440	102	1562	-	-	-	1

*) Sum of withstand voltages for empty units of arrester.

TEXLIM T-C
Technical data for housings

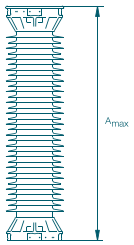


Figure 1

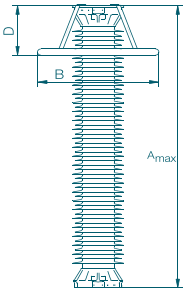


Figure 2

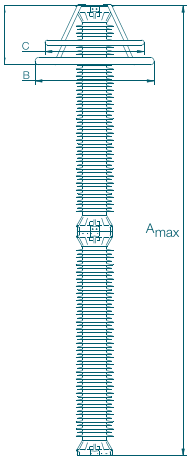


Figure 3

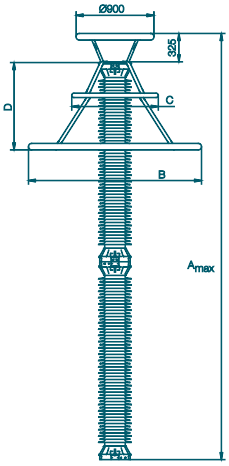


Figure 4

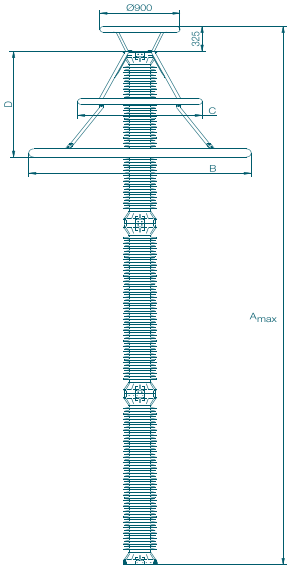
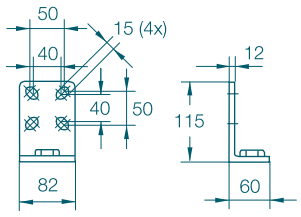


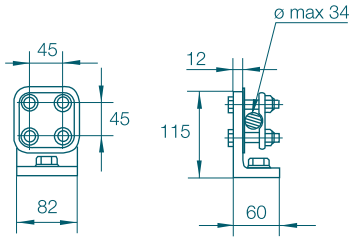
Figure 5

TEXLIM T-C
Accessories

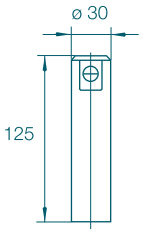
Line terminals



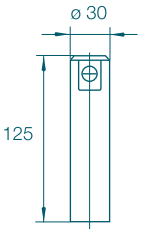
1HSA410 000-A
Aluminium



1HSA410 000-B
Aluminium flag with other items in stainless steel

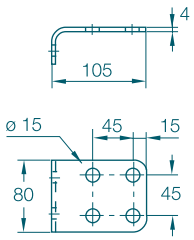


1HSA410 000-C
Aluminium

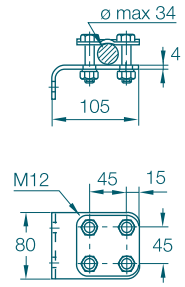


1HSA410 000-D
Stainless steel

Earth terminals

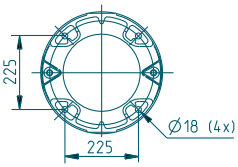


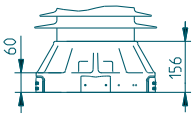
1HSA420 000-C
Stainless steel



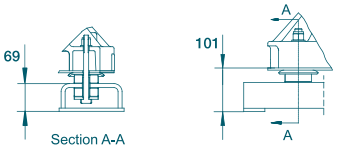
1HSA420 000-D
Stainless steel

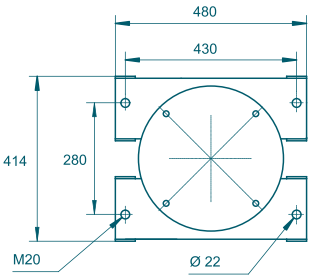
Drilling plans





Without insulating base
Aluminium





Insulating base
1HSA430000-V

M20 bolts for connection to structure are not supplied by ABB.

TEXLIM T-C
Shipping data

Rated voltage	Housing	Without insulating base						With insulating base					
		Number of arresters per crate						Number of arresters per crate					
		One		Two		Three		One		Two		Three	
U_r		Volume	Gross	Volume	Gross	Volume	Gross	Volume	Gross	Volume	Gross	Volume	Gross
kV_{rms}		m^3	kg	m^3	kg	m^3	kg	m^3	kg	m^3	kg	m^3	kg
180-228	CV245	4.16	255	4.16	435	4.16	615	4.16	282	4.16	489	4.16	696
216-240	CH300	4.16	260	4.16	445	4.16	630	4.16	287	4.16	499	4.16	711
216-228	CV300	2.96	315	5.54	600	5.54	840	2.96	342	5.54	654	5.54	921
240-276	CV300	2.96	326	5.54	622	5.54	873	2.96	353	5.54	676	5.54	954
258-264	CH362	3.74	406	5.54	632	5.54	888	3.74	433	5.54	686	5.54	969
276-288	CH362	2.96	332	5.54	634	5.54	891	2.96	359	5.54	688	5.54	972
258-264	CV362	5.76	445	5.54	710	5.54	1005	5.76	472	5.54	764	5.54	1086
276-288	CV362	4.16	373	5.54	716	5.54	1014	4.16	400	5.54	770	5.54	1095
330-360	CH420	4.16	384	5.54	738	5.54	1047	4.16	411	5.54	792	5.54	1128
372-420	CH420	4.16	389	5.54	748	5.54	1062	4.16	416	5.54	802	5.54	1143
330-360	CV420	4.16	413	5.54	796	5.54	1134	4.16	440	5.54	850	5.54	1215
372-381	CV420	4.16	418	5.54	806	5.54	1149	4.16	445	5.54	860	5.54	1230
390-420	CV420	4.16	425	5.54	820	5.54	1170	4.16	452	5.54	874	5.54	1251
396-420	CM550	5.76	529	5.76	903	7.14	1232	5.76	556	5.76	957	7.14	1313
396	CH550	6.13	591	6.13	1002	7.51	1368	6.13	618	6.13	1056	7.51	1449
420-444	CH550	5.76	571	5.76	987	7.51	1358	5.76	598	5.76	1041	7.51	1439
396-444	CV550	6.13	657	6.13	1134	11.67	1641	6.13	684	6.13	1188	11.67	1722
588	CH800	9.0	1005	9.0	1605	14.55	2205	9.0	1032	9.0	1659	14.55	2286
612	CH800	9.0	1005	9.0	1605	14.55	2223	9.0	1032	9.0	1659	14.55	2304
624	CH800	9.0	1005	9.0	1605	14.55	2232	9.0	1032	9.0	1659	14.55	2313
Neutral-ground arresters													
108-144	CN245	2,96	200	2,96	325	2,96	450	2,96	227	2,96	379	2,96	531

Each crate contains a certain number of arrester units and accessories for assembly and erection. A packing list is attached externally on each crate.

Each separate crate is numbered and the numbers of all crates and their contents are listed in the shipping specification. ABB reserves the right to pack arresters in the most effective/economic combination. Alternate or non-standard crates may involve additional charges.

The table above is to be seen as an approximation and specific data for deliveries may differ from the values given.

Zinc Oxide Surge Arrester EXLIM R

Protection of switchgear, transformers and other equipment in high voltage systems against atmospheric and switching overvoltages. For use when requirements of lightning intensity, energy capability and pollution are moderate.

Other data can be ordered on request. Please contact your local sales representative.

Brief performance data

Arrester classification as per IEC 60099-4 Ed 3.0	Station; SL
Arrester classification as per IEEE Std C62.11-2012	Station
System voltages (U_s)	52 - 170 kV
Rated voltages (U_r)	42 - 168 kV
Nominal discharge current (IEC)	10 kA_{peak}
Lightning impulse classifying current (ANSI/IEEE)	10 kA_{peak}
Charge, energy and current withstand:	
Repetitive charge transfer rating, Q_{rs} (IEC)	1.2 C
Thermal energy rating, W_{th} (IEC)	5 kJ/kV (U_r)
Single impulse energy capability (2 ms to 4 ms impulse)	2.5 kJ/kV (U_r)
Discharge current withstand strength:	
High current 4/10 µs	100 kA_{peak}
Low current 2000 µs, (based on Q_{rs})	600 A_{peak}
Energy class as per IEEE standard (switching surge energy rating)	-
Single-impulse withstand rating as per IEEE standard	1.2 C
Repetitive charge transfer test value - sample tests on all manufactured block batches	1.5 C
Short-circuit/Pressure relief capability	50 $kA_{rms(sym)}$
Mechanical strength:	
Specified long-term load (SLL)	3000 Nm
Specified short-term load (SSL)	7500 Nm
Service conditions:	
Ambient temperature	-50 °C to +45 °C
Design altitude	max. 1000 m
Frequency	15 - 62 Hz
Line discharge class (as per IEC60099-4, Ed. 2.2)	Class 2

Further data according to the IEEE standard can be supplied on request

EXLIM R
Guaranteed protective data

Max. system voltage	Rated voltage	Max. continuous operating voltage [1]		TOV capability [2]		Max. residual voltage with current wave						
		as per IEC	as per ANSI/IEEE			30/60 µs			8/20 µs			
U_s	U_r	U_c	MCOV	1 s	10 s	0.5 kA	1 kA	2 kA	5 kA	10 kA	20 kA	40 kA
kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}
36[3]	24	19.2	19.5	26.3	24.7	49.4	51.3	53.8	58.7	62.2	69.7	79.6
	30	24.0	24.4	32.9	30.9	61.7	64.2	67.2	73.3	77.7	87.1	99.5
	33	26.4	26.7	36.2	34.0	67.9	70.6	73.9	80.6	85.5	95.8	110
	36	28.8	29.0	39.5	37.1	74.1	77.0	80.6	88.0	93.3	105	120
	39	31.2	31.5	42.8	40.2	80.3	83.4	87.3	95.3	102	114	130
52	42	34	34.0	46.1	43.3	86.4	89.8	94.0	103	109	122	140
	45	36	36.5	49.4	46.4	92.6	96.2	101	110	117	131	150
	48	38	39.0	52.7	49.5	98.8	103	108	118	125	140	160
	51	41	41.3	56.0	52.6	105	109	115	125	133	148	170
	54	43	43.0	59.3	55.7	112	116	121	132	140	157	180
	60	48	48.0	65.9	61.9	124	129	135	147	156	175	199
72	54	43	43,0	59.3	55.7	112	116	121	132	140	157	180
	60	48	48,0	65.9	61.9	124	129	135	147	156	175	199
	66	53	53,4	72.5	68.1	136	142	148	162	171	192	219
	72	58	58,0	79.1	74.3	149	154	162	176	187	209	239
	75	60	60,7	82.4	77.4	155	161	168	184	195	218	249
	84	67	68,0	92.3	86.7	173	180	188	206	218	244	279
100	75	60	60,7	82.4	77.4	155	161	168	184	195	218	249
	84	67	68,0	92.3	86.7	173	180	188	206	218	244	279
	90	72	72,0	98.9	92.9	186	193	202	220	234	262	299
	96	77	77,0	105	99.1	198	206	215	235	249	279	319
123	90	72	72,0	98.9	92.9	186	193	202	220	234	262	299
	96	77	77,0	105	99.1	198	206	215	235	249	279	319
	108	78	84,0	118	111	223	231	242	264	280	314	359
	120	78	98,0	131	123	247	257	269	294	311	349	398
	132	78	106	145	136	272	283	296	323	342	383	438
	138	78	111	151	142	284	295	309	338	358	401	458
145	108	86	86,0	118	111	223	231	242	264	280	314	359
	120	92	98,0	131	123	247	257	269	294	311	349	398
	132	92	106	145	136	272	283	296	323	342	383	438
	138	92	111	151	142	284	295	309	338	358	401	458
	144	92	115	158	148	297	308	323	352	373	418	478
170	106	106	145	136	272	283	296	323	342	383	438	438
	108	115	158	148	297	308	323	352	373	418	478	478
	108	131	178	167	334	347	363	396	420	470	538	538
	108	131	184	173	346	359	376	411	436	488	557	557

1) The continuous operating voltages U_c (as per IEC) and MCOV (as per IEEE) differ only due to deviations in type test procedures.
U_c has to be considered only when the actual system voltage is higher than the tabulated.
Any arrester with Uc higher than or equal to the actual system voltage divided by √3 can be selected.

2) With prior duty equal to the thermal energy rating of 5 kJ/kV (U_r).

3) Arresters for system voltages 36 kV or below can be supplied, on request, when the order also includes arresters for higher system voltages.

Arresters with lower or higher rated voltages may be available on request for special applications.

EXLIM R
Technical data for housings

Max. system voltage	Rated voltage	Housing	Creepage distance	External insulation *)			Dimensions				
U_s	U_r			1.2/50 µs dry	50 Hz wet (60s)	250/2500 µs wet	Mass	A_{max}	B	C	Fig.
kV_{rms}	kV_{rms}		mm	kV_{peak}	kV_{rms}	kV_{peak}	kg	mm	mm	mm	
52	42-60	CV052	1615	275	129	212	45	725	-	-	1
72	54-75	CM072	1615	275	129	212	46	725	-	-	1
	54-84	CV072	2651	394	221	320	62	997	-	-	1
100	75-96	CH100	2651	394	221	320	63	997	-	-	1
	84-96	CV100	3685	537	287	433	78	1268	-	-	1
123	90-108	CM123	2651	394	221	320	64	997	-	-	1
	90-138	CH123	3685	537	287	433	81	1268	-	-	1
	90-96	CV123	4266	669	350	532	103	1697	600	300	3
	108-138	CV123	4266	669	350	532	103	1697	-	-	2
145	108-144	CH145	3685	537	287	433	82	1268	-	-	1
	108-144	CV145	5302	788	442	640	119	1969	600	300	3
170	132-144	CM170	3685	537	287	433	82	1268	-	-	1
	132-144	CH170	4266	669	350	532	105	1697	600	300	3
	162-168	CH170	4266	669	350	532	105	1697	-	-	2
	132-168	CV170	5302	788	442	640	120	1969	600	300	3
Neutral-ground arresters											
52	30-36	CN052	1615	275	129	212	43	725	-	-	1
72	42-54	CN072	1615	275	129	212	45	725	-	-	1
100	60	CN100	1615	275	129	212	45	725	-	-	1
123	72	CN123	1615	275	129	212	62	725	-	-	1
	84-108	CN123	2651	394	221	320	64	997	-	-	1
	120	CN123	3685	537	287	433	79	1268	-	-	1
145	84	CN145	2651	394	221	320	62	997	-	-	1
	90-108	CN145	2651	394	221	320	64	997	-	-	1
	120	CN145	3685	537	287	433	79	1268	-	-	1
170	96-108	CN170	2651	394	221	320	64	997	-	-	1
	120	CN170	3685	537	287	433	79	1268	-	-	1

*) Sum of withstand voltages for empty units of arrester.

EXLIM R
Technical data for housings

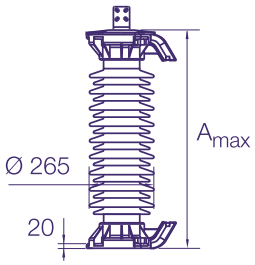


Figure 1

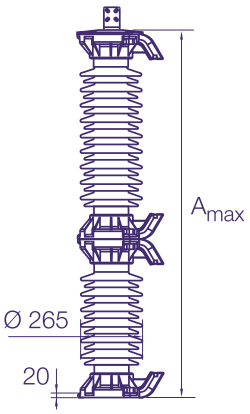


Figure 2

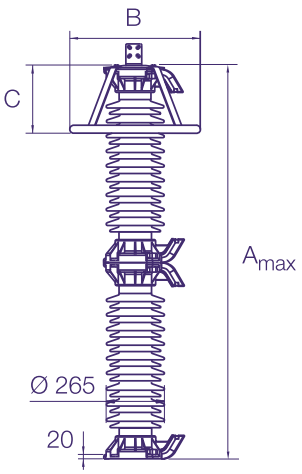
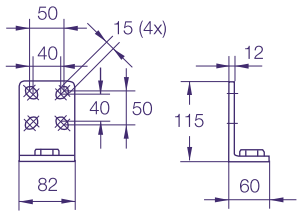


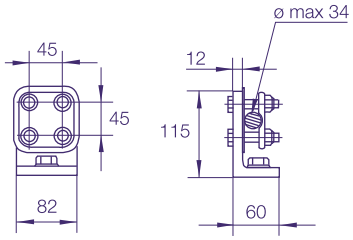
Figure 3

EXLIM R
Accessories

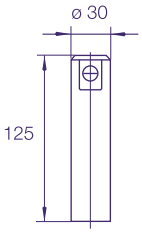
Line terminals



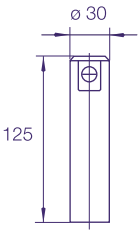
1HSA410 000-A
Aluminium



1HSA410 000-B
Aluminium flag with other items in stainless steel

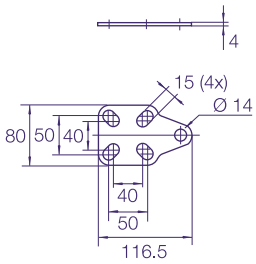


1HSA410 000-C
Aluminium

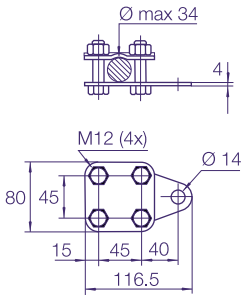


1HSA410 000-D
Stainless steel

Earth terminals

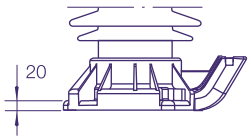


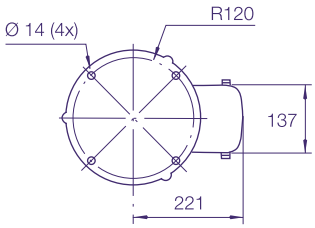
1HSA420 000-A
Stainless steel



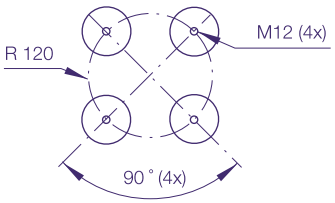
1HSA420 000-B
Stainless steel

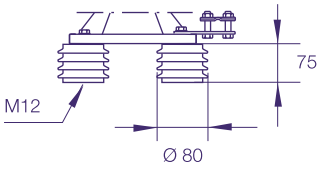
Drilling plans





Without insulating base
Aluminium





Insulating base
1HSA430 000-A
Epoxy resin

M12 bolts for connection to structure are not supplied by ABB. Required threaded grip length is 15-20 mm.

EXLIM R
Shipping data

Rated voltage	Housing	Number of arresters per crate					
		One		Three		Six	
U_r		Volume	Gross	Volume	Gross	Volume	Gross
kV_{rms}		m^3	kg	m^3	kg	m^3	kg
24-39	CV036	0.3	74	0.5	171	1.0	337
42-60	CV052	0.3	76	0.5	177	1.0	349
54-75	CM072	0.3	77	0.5	180	1.0	355
54-84	CV072	0.3	93	0.7	228	1.4	451
75-96	CH100	0.3	94	0.7	231	1.4	457
84-96	CV100	0.4	115	0.8	276	1.7	547
90-108	CM123	0.3	92	0.7	234	1.4	463
90-138	CH123	0.4	116	0.8	279	1.7	553
90-138	CV123	0.7	131	1.4	367	-	-
108-144	CH145	0.4	119	0.9	288	1.7	571
108-144	CV145	0.7	147	1.4	415	-	-
132-144	CM170	0.4	119	0.9	288	1.7	571
132-168	CH170	0.7	133	1.4	373	-	-
132-168	CV170	0.7	148	1.4	418	-	-
Neutral-ground arresters							
30-36	CN052	0.3	75	0.5	175	1.0	340
42-54	CN072	0.3	80	0.5	180	1.0	350
60	CN100	0.3	80	0.5	180	1.0	350
72	CN123	0.3	80	0.5	180	1.0	355
84-108	CN123	0.3	95	0.7	235	1.4	465
120	CN123	0.4	115	0.8	280	1.7	555
84	CN145	0.3	95	0.7	230	1.4	455
90-108	CN145	0.3	95	0.7	235	1.4	465
120	CN145	0.4	115	0.8	280	1.7	555
96-108	CN170	0.3	95	0.7	235	1.4	465
120	CN170	0.4	115	0.8	280	1.7	555

Each crate contains a certain number of arrester units and accessories for assembly and erection. A packing list is attached externally on each crate.

Each separate crate is numbered and the numbers of all crates and their contents are listed in the shipping specification. ABB reserves the right to pack arresters in the most effective/economic combination. Alternate or non-standard crates may involve additional charges.

The table above is to be seen as an approximation and specific data for deliveries may differ from the values given.

Zinc Oxide Surge Arrester EXLIM Q-E

Protection of switchgear, transformers and other equipment in high voltage systems against atmospheric and switching overvoltages.

- **in areas with high lightning intensity and high energy requirements.**
- **where grounding or shielding conditions are poor or incomplete.**

Other data can be ordered on request. Please contact your local sales representative.

Brief performance data

Arrester classification as per IEC 60099-4 Ed 3.0	Station; SM
Arrester classification as per IEEE Std C62.11-2012	Station
System voltages (U_s)	52 - 245 kV
Rated voltages (U_r)	43 - 228 kV
Nominal discharge current (IEC)	10 kA_{peak}
Lightning impulse classifying current (ANSI/IEEE)	10 kA_{peak}
Charge, energy and current withstand:	
Repetitive charge transfer rating, Q_{rs} (IEC)	2.0 C
Thermal energy rating, W_{th} (IEC)	8 kJ/kV (U_r)
Single impulse energy capability (2 ms to 4 ms impulse)	4.5 kJ/kV (U_r)
Discharge current withstand strength:	
High current 4/10 µs	100 kA_{peak}
Low current 2000 µs, (based on Q_{rs})	1000 A_{peak}
Energy class as per IEEE standard (switching surge energy rating)	E
Single-impulse withstand rating as per IEEE standard	2.2 C
Repetitive charge transfer test value - sample tests on all manufactured block batches	2.7 C
Short-circuit/Pressure relief capability	65 $kA_{rms(sym)}$
Mechanical strength:	
Specified long-term load (SLL)	3000 Nm
Specified short-term load (SSL)	7500 Nm
Service conditions:	
Ambient temperature	-50 °C to +45 °C
Design altitude	max. 1000 m
Frequency	15 - 62 Hz
Line discharge class (as per IEC60099-4, Ed. 2.2)	Class 3

Further data according to the IEEE standard can be supplied on request

EXLIM Q-E

Guaranteed protective data 36 - 145 kV

Max. system voltage	Rated voltage	Max. continuous operating voltage [1]		TOV capability [2]		Max. residual voltage with current wave						
		as per IEC	as per ANSI/IEEE			30/60 µs			8/20 µs			
U_s	U_r	U_c	MCOV	1 s	10 s	0.5 kA	1 kA	2 kA	5 kA	10 kA	20 kA	40 kA
kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}
36[3]	24	19.2	19.5	26.2	24.7	46.1	47.6	49.5	53.6	56.4	62.1	69.4
	30	24.0	24.4	32.8	30.9	57.6	59.5	61.8	67.0	70.5	77.6	86.8
	33	26.4	26.7	36.1	34.0	63.4	65.4	68.0	73.7	77.6	85.4	95.4
	36	28.8	29.0	39.4	37.1	69.2	71.4	74.2	80.4	84.6	93.1	105
	39	31.2	31.5	42.7	40.2	74.9	77.3	80.3	87.1	91.7	101	113
52	42	34	34.0	45.9	43.3	80.7	83.3	86.5	93.8	98.7	109	122
	48	38	39.0	52.5	49.4	92.2	95.1	98.9	108	113	125	139
	51	41	41.3	55.8	52.5	98.0	102	105	114	120	132	148
	54	43	43.0	59.1	55.6	104	107	112	121	127	140	157
	60	48	48.0	65.7	61.8	116	119	124	134	141	156	174
72	54	43	43.0	59.1	55.6	104	107	112	121	127	140	157
	60	48	48.0	65.7	61.8	116	119	124	134	141	156	174
	66	53	53.4	72.2	68.0	127	131	136	148	156	171	191
	72	58	58.0	78.8	74.2	139	143	149	161	170	187	209
	75	60	60.7	82.1	77.3	144	149	155	168	177	194	217
	78	62	63.1	85.4	80.4	150	155	161	175	184	202	226
	81	65	65.6	88.6	83.5	156	161	167	181	191	210	235
	84	67	68.0	91.9	86.6	162	167	173	188	198	218	243
100	84	67	68.0	91.9	86.6	162	167	173	188	198	218	243
	90	72	72.0	98.5	92.7	173	179	186	201	212	233	261
	96	77	77.0	105	98.9	185	191	198	215	226	249	278
123	90	72	72.0	98.5	92.7	173	179	186	201	212	233	261
	96	77	77.0	105	98.9	185	191	198	215	226	249	278
	108	78	84.0	118	111	208	214	223	242	254	280	313
	120	78	98.0	131	123	231	238	248	268	282	311	347
	132	78	106	144	136	254	262	272	295	311	342	382
	138	78	111	151	142	265	274	285	309	325	357	399
145	108	86	86.0	118	111	208	214	223	242	254	280	313
	120	92	98.0	131	123	231	238	248	268	282	311	347
	132	92	106	144	136	254	262	272	295	311	342	382
	138	92	111	151	142	265	274	285	309	325	357	399
	144	92	115	157	148	277	286	297	322	339	373	417

1) The continuous operating voltages Uc (as per IEC) and MCOV (as per IEEE) differ only due to deviations in type test procedures.
U_c has to be considered only when the actual system voltage is higher than the tabulated.
Any arrester with U_c higher than or equal to the actual system voltage divided by √3 can be selected.

2) With prior duty equal to the thermal energy rating of 8 kJ/kV (U_r).

3) Arresters for system voltages 36 kV or below can be supplied, on request, when the order also includes arresters for higher system voltages.

Arresters with lower or higher rated voltages may be available on request for special applications.

EXLIM Q-E

Guaranteed protective data 170 - 245 kV

Max. system voltage	Rated voltage	Max. continuous operating voltage [1]		TOV capability [2]		Max. residual voltage with current wave						
		as per IEC	as per ANSI/IEEE			30/60 µs			8/20 µs			
U_s	U_r	U_c	MCOV	1 s	10 s	0.5 kA	1 kA	2 kA	5 kA	10 kA	20 kA	40 kA
kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}
170	132	106	106	144	136	254	262	272	295	311	342	382
	144	108	115	157	148	277	286	297	322	339	373	417
	162	108	131	177	167	312	321	334	362	381	419	469
	168	108	131	183	173	323	333	346	376	395	435	486
245	180	144	144	197	185	346	357	371	402	423	466	521
	192	154	154	210	197	369	381	396	429	452	497	555
	198	156	160	216	204	381	393	408	443	466	512	573
	210	156	170	229	216	404	417	433	469	494	543	608
	216	156	175	236	222	415	428	445	483	508	559	625
	219	156	177	239	225	421	434	451	489	515	567	634
	222	156	179	243	228	427	440	458	496	522	574	642
	228	156	180	249	235	438	452	470	510	536	590	660

1) The continuous operating voltages Uc (as per IEC) and MCOV (as per IEEE) differ only due to deviations in type test procedures.
U_c has to be considered only when the actual system voltage is higher than the tabulated.
Any arrester with U_c higher than or equal to the actual system voltage divided by $\sqrt{3}$ can be selected.

2) With prior duty equal to the thermal energy rating of 8 kJ/kV (U_r).

Arresters with lower or higher rated voltages may be available on request for special applications.

EXLIM Q-E
Technical data for housings

Max. system voltage	Rated voltage	Housing	Creepage distance	External insulation *)				Dimensions					
U_m	U_r			1.2/50 µs dry	50 Hz wet (60s)	60 Hz wet (10s)	250/2500 µs wet	Mass	A_{max}	B	C	D	Fig.
kV_{rms}	kV_{rms}		mm	kV_{peak}	kV_{rms}	kV_{rms}	kV_{peak}	kg	mm	mm	mm	mm	
36	24-39	EV036	1615	275	129	133	n.a.	45	725	-	-	-	1
52	42-60	EV052	1615	275	129	133	n.a.	48	725	-	-	-	1
72	54-84	EV072	2651	394	221	203	n.a.	66	997	-	-	-	1
100	84-96	EH100	2651	394	221	203	n.a.	67	997	-	-	-	1
	84-96	EV100	3685	537	287	261	n.a.	82	1268	-	-	-	1
123	90-108	EM123	2651	394	221	203	n.a.	69	997	-	-	-	1
	90-138	EH123	3685	537	287	261	n.a.	88	1268	-	-	-	1
	90-96	EV123	4266	669	350	336	n.a.	106	1697	600	-	300	3
	108-138	EV123	4266	669	350	336	n.a.	110	1697	-	-	-	2
145	108-144	EH145	3685	537	287	261	n.a.	88	1268	-	-	-	1
	108-120	EV145	5302	788	442	406	n.a.	124	1969	600	-	300	3
	132-144	EV145	5302	788	442	406	n.a.	125	1969	-	-	-	2
170	132-144	EM170	3685	568	287	261	n.a.	88	1268	-	-	-	1
	132	EH170	4266	669	350	336	n.a.	111	1697	600	-	300	3
	144-168	EH170	4266	669	350	336	n.a.	113	1697	-	-	-	2
	132-144	EV170	5302	788	442	406	n.a.	127	1969	600	-	300	3
	150-168	EV170	5302	788	442	406	n.a.	128	1969	-	-	-	2
245	180-198	EH245	6336	931	508	464	753	151	2240	800	-	500	3
	210-228	EH245	6336	931	508	464	753	153	2240	600	-	300	3
	180-228	EV245	7953	1182	663	609	960	201	2941	1000	1400	700	4
Neutral-ground arresters													
52	30-36	EN052	1615	275	129	133	n.a.	45	725	-	-	-	1
72	42-54	EN072	1615	275	129	133	n.a.	48	725	-	-	-	1
100	60	EN100	1615	275	129	133	n.a.	48	725	-	-	-	1
123	72-108	EN123	2651	394	221	203	n.a.	69	997	-	-	-	1
	120	EN123	3685	537	287	261	n.a.	88	1268	-	-	-	1
145	84-108	EN145	2651	394	221	203	n.a.	69	997	-	-	-	1
	120	EN145	3685	537	287	261	n.a.	88	1268	-	-	-	1
170	96-108	EN170	2651	394	221	203	n.a.	69	997	-	-	-	1
	120	EN170	3685	537	287	261	n.a.	88	1268	-	-	-	1
245	108	EN245	2651	394	221	203	n.a.	69	997	-	-	-	1
	120-144	EN245	3685	537	287	261	n.a.	88	1268	-	-	-	1

*) Sum of withstand voltages for empty units of arrester.

EXLIM Q-E
Technical data for housings

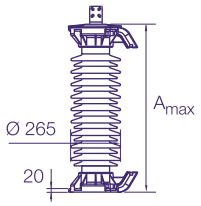


Figure 1

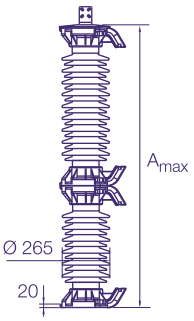


Figure 2

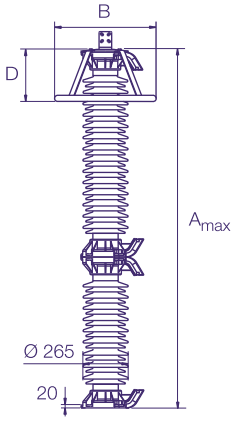


Figure 3

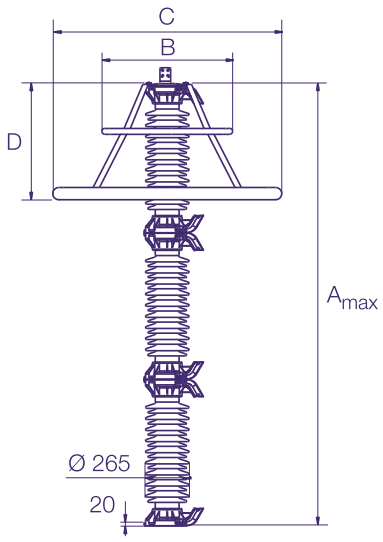
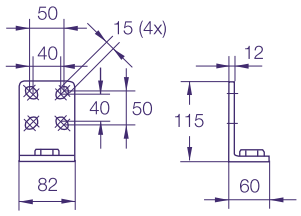


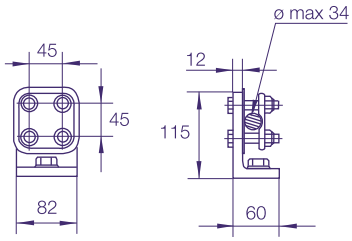
Figure 4

EXLIM Q-E
Accessories

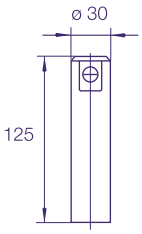
Line terminals



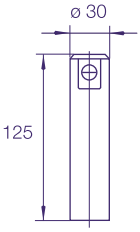
1HSA410 000-A
Aluminium



1HSA410 000-B
Aluminium flag with other items in stainless steel

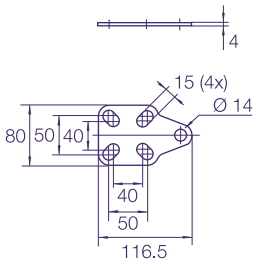


1HSA410 000-C
Aluminium

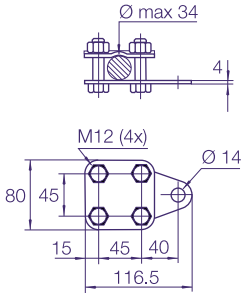


1HSA410 000-D
Stainless steel

Earth terminals

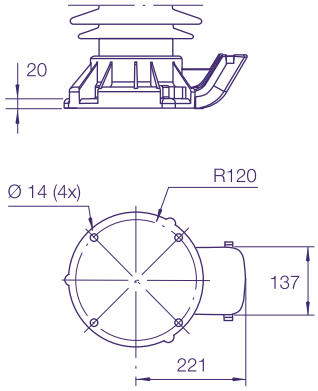


1HSA420 000-A
Stainless steel

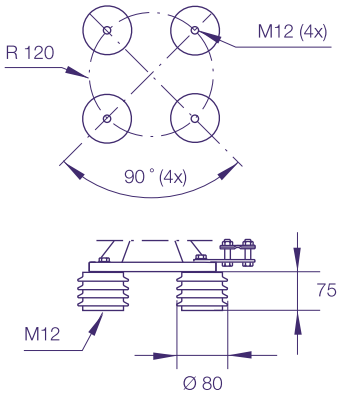


1HSA420 000-B
Stainless steel

Drilling plans



Without insulating base
Aluminium



Insulating base
1HSA430 000-A
Epoxy resin

M12 bolts for connection to structure are not supplied by ABB. Required threaded grip length is 15-20 mm.

EXLIM Q-E
Shipping data

Rated voltage	Housing	Number of arresters per crate					
		One		Three		Six	
U_r		Volume	Gross	Volume	Gross	Volume	Gross
kV_{rms}		m^3	kg	m^3	kg	m^3	kg
24-39	EV036	0.3	76	0.5	177	1.0	349
42-60	EV052	0.3	79	0.5	186	1.0	367
54-84	EV072	0.3	97	0.7	240	1.4	475
84-96	EH100	0.3	98	0.7	243	1.4	481
84-96	EV100	0.4	119	0.8	288	1.7	571
90-108	EM123	0.3	100	0.7	249	1.4	493
90-138	EH123	0.4	125	0.8	306	1.7	607
90-138	EV123	0.7	138	1.4	389	-	-
108-144	EH145	0.4	125	0.9	306	1.7	607
108-144	EV145	0.7	152	1.4	431	-	-
132-144	EM170	0.4	125	0.9	306	1.7	607
132-168	EH170	0.7	141	1.4	398	-	-
132-168	EV170	0.7	156	1.4	662	-	-
180-228	EH245	0.8	181	1.7	518	-	-
180-228	EV245	1.7	320	3.1	743	-	-
Neutral-ground arresters							
30-36	EN052	0.3	80	0.5	180	1.0	350
42-54	EN072	0.3	80	0.5	190	1.0	370
60	EN100	0.3	80	0.5	190	1.0	370
72-108	EN123	0.3	100	0.7	250	1.4	495
120	EN123	0.4	125	0.8	310	1.7	610
84-108	EN145	0.3	100	0.7	250	1.4	495
120	EN145	0.4	125	0.8	310	1.7	610
96-108	EN170	0.3	100	0.7	250	1.4	495
120	EN170	0.4	125	0.8	310	1.7	610
108	EN245	0.3	100	0.7	250	1.4	495
120-144	EN245	0.4	125	0.8	310	1.7	610

Each crate contains a certain number of arrester units and accessories for assembly and erection. A packing list is attached externally on each crate.

Each separate crate is numbered and the numbers of all crates and their contents are listed in the shipping specification. ABB reserves the right to pack arresters in the most effective/economic combination. Alternate or non-standard crates may involve additional charges.

The table above is to be seen as an approximation and specific data for deliveries may differ from the values given.

Zinc Oxide Surge Arrester EXLIM Q-D

Protection of switchgear, transformers and other equipment in high voltage systems against atmospheric and switching overvoltages.

- **in areas with high lightning intensity and high energy requirements.**
- **where grounding or shielding conditions are poor or incomplete.**

Other data can be ordered on request. Please contact your local sales representative.

Brief performance data

Arrester classification as per IEC 60099-4 Ed 3.0	Station; SM
Arrester classification as per IEEE Std C62.11-2012	Station
System voltages (U_s)	170 - 420 kV
Rated voltages (U_r)	132 - 420 kV
Nominal discharge current (IEC)	10 kA_{peak}
Lightning impulse classifying current (ANSI/IEEE)	10 kA_{peak}
Charge, energy and current withstand:	
Repetitive charge transfer rating, Q_{rs} (IEC)	2.0 C
Thermal energy rating, W_{th} (IEC)	8 kJ/kV (U_r)
Single impulse energy capability (2 ms to 4 ms impulse)	4.5 kJ/kV (U_r)
Discharge current withstand strength:	
High current 4/10 µs	100 kA_{peak}
Low current 2000 µs, (based on Q_{rs})	1000 A_{peak}
Energy class as per IEEE standard (switching surge energy rating)	E
Single-impulse withstand rating as per IEEE standard	2.2 C
Repetitive charge transfer test value - sample tests on all manufactured block batches	2.7 C
Short-circuit/Pressure relief capability	65 $kA_{rms(sym)}$
Mechanical strength:	
Specified long-term load (SLL)	8000 Nm
Specified short-term load (SSL)	20000 Nm
Service conditions:	
Ambient temperature	-50 °C to +45 °C
Design altitude	max. 1000 m
Frequency	15 - 62 Hz
Line discharge class (as per IEC60099-4, Ed. 2.2)	Class 3

Further data according to the IEEE standard can be supplied on request

EXLIM Q-D
Guaranteed protective data

Max. system voltage	Rated voltage	Max. continuous operating voltage [1]		TOV capability [2]		Max. residual voltage with current wave						
		as per IEC	as per ANSI/IEEE			30/60 µs			8/20 µs			
U_s	U_r	U_c	MCOV	1 s	10 s	0.5 kA	1 kA	2 kA	5 kA	10 kA	20 kA	40 kA
kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}
170	132	106	106	144	136	254	262	272	295	311	342	382
	144	108	115	157	148	277	286	297	322	339	373	417
	162	108	131	177	167	312	321	334	362	381	419	469
	168	108	131	183	173	323	333	346	376	395	435	486
245	180	144	144	197	185	346	357	371	402	423	466	521
	192	154	154	210	197	369	381	396	429	452	497	555
	198	156	160	216	204	381	393	408	443	466	512	573
	210	156	170	229	216	404	417	433	469	494	543	608
	216	156	175	236	222	415	428	445	483	508	559	625
	219	156	177	239	225	421	434	451	489	515	567	634
	228	156	180	249	235	438	452	470	510	536	590	660
300	216	173	175	236	222	415	428	445	483	508	559	625
	228	182	182	249	235	438	452	470	510	536	590	660
	240	191	191	262	247	461	476	495	536	564	621	694
	258	191	209	282	265	496	512	532	576	607	667	746
	264	191	212	289	272	507	523	544	590	621	683	764
362	258	206	209	282	265	496	512	532	576	607	667	746
	264	211	212	289	272	507	523	544	590	621	683	764
	276	211	221	302	284	530	547	569	617	649	714	798
	288	230	230	315	296	553	571	593	643	677	745	833
420	330	264	267	361	340	634	654	680	737	776	854	954
	336	267	272	367	346	646	666	692	751	790	869	972
	360	267	291	394	371	692	714	742	804	846	931	1046
	372	267	301	407	383	715	737	766	831	875	962	1080
	378	267	306	413	389	726	749	779	844	889	978	1098
	381	267	308	417	392	732	755	785	851	896	985	1106
	390	267	315	427	402	749	773	803	871	917	1013	1132
	396	267	318	433	408	761	785	816	885	931	1029	1150
	420	267	335	459	433	807	833	865	938	987	1091	1219

1) The continuous operating voltages U_c (as per IEC) and MCOV (as per IEEE) differ only due to deviations in type test procedures.
Uc has to be considered only when the actual system voltage is higher than the tabulated.
Any arrester with U_c higher than or equal to the actual system voltage divided by √3 can be selected.

2) With prior duty equal to the thermal energy rating of 8 kJ/kV (U_r).

Arresters with lower or higher rated voltages may be available on request for special applications.

EXLIM Q-D
Technical data for housings

Max. system voltage	Rated voltage	Housing	Creepage distance	External insulation *)				Dimensions					
U_s	U_r			1.2/50 µs dry	50 Hz wet (60s)	60 Hz wet (10s)	250/2500 µs wet	Mass	A_{max}	B	C	D	Fig.
kV_{rms}	kV_{rms}		mm	kV_{peak}	kV_{rms}	kV_{rms}	kV_{peak}	kg	mm	mm	mm	mm	
170	132	DH170	4432	765	378	359	n.a.	155	1645	600	-	300	2
	144-168	DH170	4432	765	378	359	n.a.	155	1645	-	-	-	1
	132-144	DV170	6570	1160	556	546	924	230	2585	800	-	500	3
	162-168	DV170	6570	1160	556	546	924	230	2585	600	-	300	3
245	180-219	DH245	6570	1160	556	546	924	230	2585	800	-	500	3
	228	DH245	6570	1160	556	546	924	235	2585	600	-	300	3
	180	DV245	7717	1345	656	632	1078	270	2915	1400	1000	700	4
	192-198	DV245	7717	1345	656	632	1078	270	2915	1200	1000	600	4
	210-228	DV245	7717	1345	656	632	1078	270	2915	800	-	500	3
300	228-264	DM300	6570	1160	556	546	924	240	2585	800	-	500	3
	216	DH300	7717	1345	656	632	1078	275	2915	1400	1000	700	4
	228-240	DH300	7717	1345	656	632	1078	280	2915	1200	1000	600	4
	258-264	DH300	7717	1345	656	632	1078	275	2915	800	-	500	3
	216	DV300	9855	1740	834	819	1386	350	3859	1600	1000	1200	6
	228-240	DV300	9855	1740	834	819	1386	355	3859	1600	1000	1000	6
	258-264	DV300	9855	1740	834	819	1386	355	3859	1200	1000	800	6
362	258-264	DM362	7717	1345	656	632	1078	280	2915	1400	1000	700	5
	276-288	DM362	7717	1345	656	632	1078	285	2915	1200	1000	600	5
	258-288	DH362	9855	1740	834	819	1386	360	3859	1600	1000	1000	6
	258-288	DV362	12149	2110	1034	991	1694	415	4520	1800	1000	1000	6
420	330-360	DM420	8864	1530	756	718	1232	325	3245	1400	1000	700	5
	330-360	DH420	11002	1925	934	905	1540	400	4190	1800	1000	1000	6
	372-396	DH420	11002	1925	934	905	1540	400	4190	1400	1000	700	6
	420	DH420	11002	1925	934	905	1540	400	4190	1200	1000	600	6
	330-420	DV420	13296	2295	1134	1077	1848	465	4850	1800	1000	1000	6

*) Sum of withstand voltages for empty units of arrester.

EXLIM Q-D
Technical data for housings

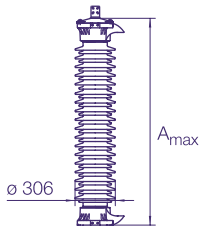


Figure 1

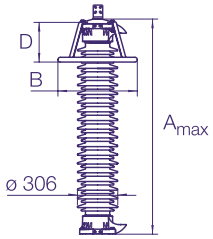


Figure 2

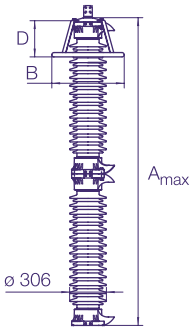


Figure 3

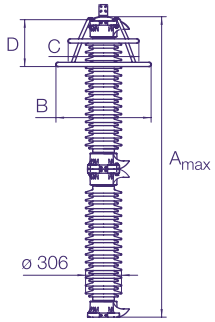


Figure 4

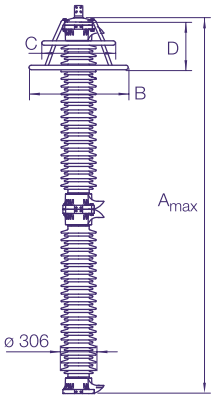


Figure 5

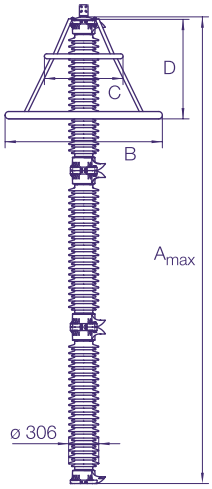
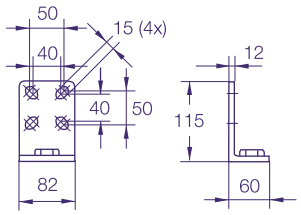


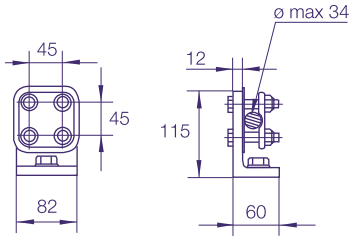
Figure 6

EXLIM Q-D
Accessories

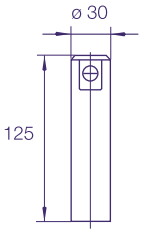
Line terminals



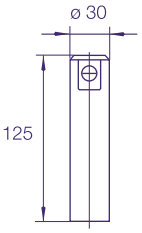
1HSA410 000-A
Aluminium



1HSA410 000-B
Aluminium flag with other items in stainless steel

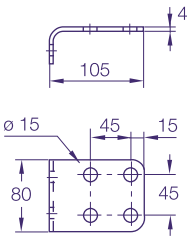


1HSA410 000-C
Aluminium

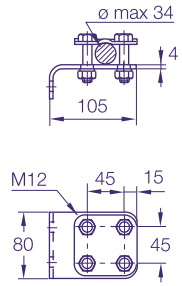


1HSA410 000-D
Stainless steel

Earth terminals

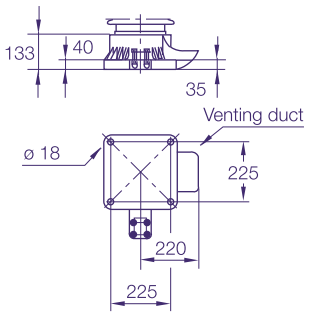


1HSA420 000-C
Stainless steel

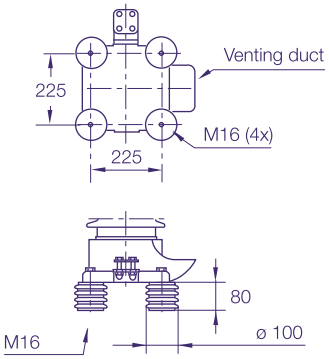


1HSA420 000-D
Stainless steel

Drilling plans



Without insulating base
Aluminium



Insulating base
1HSA430 000-C
Epoxy resin

M16 bolts for connection to structure are not supplied by ABB. Required threaded grip length is 15-20 mm.

EXLIM Q-D
Shipping data

Rated voltage	Housing	Number of arresters per crate					
		One		Three		Six	
U_r		Volume	Gross	Volume	Gross	Volume	Gross
kV_{rms}		m^3	kg	m^3	kg	m^3	kg
132-168	DH170	0.5	195	1.7	365	1.7	530
132-168	DV170	1.4	275	2.8	545	2.8	790
180-228	DH245	1.4	280	2.8	555	2.8	805
180	DV245	2.4	375	4.2	685	4.1	960
192-198	DV245	2.2	360	3.8	670	3.9	950
210-228	DV245	1.7	315	3.1	615	3.1	890
228-264	DM300	1.4	290	2.8	575	2.8	835
216	DH300	2.4	380	4.2	695	4.1	975
228-240	DH300	2.2	365	3.8	680	3.9	965
258-264	DH300	1.7	320	3.1	630	3.1	910
216-240	DV300	2.9	500	5.7	930	6.1	1315
258-264	DV300	1.9	445	3.6	875	5.0	1240
258-264	DM362	2.4	385	4.2	705	4.1	995
276-288	DM362	2.2	375	3.8	690	3.9	985
258-288	DH362	2.9	505	5.7	940	6.1	1330
258-264	DV362	3.2	575	6.3	1075	6.7	1535
276-288	DV362	3.2	575	6.0	1060	6.7	1525
330-360	DM420	4.2	475	4.9	835	5.3	1175
330-360	DH420	3.2	545	6.0	1015	6.7	1430
372-396	DH420	2.4	505	5.6	970	5.5	1380
420	DH420	2.2	485	5.2	945	5.3	1370
330-360	DV420	3.2	615	6.6	1150	7.0	1450

Each crate contains a certain number of arrester units and accessories for assembly and erection. A packing list is attached externally on each crate.

Each separate crate is numbered and the numbers of all crates and their contents are listed in the shipping specification. ABB reserves the right to pack arresters in the most effective/economic combination. Alternate or non-standard crates may involve additional charges.

The table above is to be seen as an approximation and specific data for deliveries may differ from the values given.

Zinc Oxide Surge Arrester EXLIM P

Protection of switchgear, transformers and other equipment in high voltage systems against atmospheric and switching overvoltages.
- **in areas with very high lightning intensity.**
- **where grounding or shielding conditions are poor or incomplete.**
- **for important installations.**
- **where energy requirements are very high (e.g. very long lines, capacitor protection).**

Other data can be ordered on request. Please contact your local sales representative.

Brief performance data

Arrester classification as per IEC 60099-4 Ed 3.0	Station; SH
Arrester classification as per IEEE Std C62.11-2012	Station
System voltages (U_s)	52 - 550 kV
Rated voltages (U_r)	42 - 444 kV
Nominal discharge current (IEC)	20 kA_{peak}
Lightning impulse classifying current (ANSI/IEEE)	10/15 kA_{peak}
Charge, energy and current withstand:	
Repetitive charge transfer rating, Q_{rs} (IEC)	3.2 C
Thermal energy rating, W_{th} (IEC)	11 kJ/kV (U_r)
Single impulse energy capability (2 ms to 4 ms impulse)	7 kJ/kV (U_r)
Discharge current withstand strength:	
High current 4/10 µs	100 kA_{peak}
Low current 2000 µs, (based on Q_{rs})	1600 A_{peak}
Energy class as per IEEE standard (switching surge energy rating)	G
Single-impulse withstand rating as per IEEE standard	3.2 C
Repetitive charge transfer test value - sample tests on all manufactured block batches	4.0 C
Short-circuit/Pressure relief capability	80 $kA_{rms(sym)}$
Mechanical strength:	
Specified long-term load (SLL)	8000 Nm
Specified short-term load (SSL)	20000 Nm
Service conditions:	
Ambient temperature	-50 °C to +45 °C
Design altitude	max. 1000 m
Frequency	15 - 62 Hz
Line discharge class (as per IEC60099-4, Ed. 2.2)	Class 4

Further data according to the IEEE standard can be supplied on request

EXLIM P
Guaranteed protective data 36 - 170 kV

Max. system voltage	Rated voltage	Max. continuous operating voltage [1]		TOV capability [2]		Max. residual voltage with current wave						
		as per IEC	as per ANSI/IEEE			30/60 µs			8/20 µs			
U_s	U_r	U_c	MCOV	1 s	10 s	1 kA	2 kA	3 kA	5 kA	10 kA	20 kA	40 kA
kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}
36[3]	30	24.0	24.4	32.7	31.1	58.5	60.7	62.2	64.9	68.3	74.8	81.9
	33	26.4	26.7	36.0	34.2	64.4	66.7	68.4	71.4	75.1	82.3	90.1
	36	28.8	29.0	39.3	37.3	70.2	72.8	74.6	77.9	81.9	89.7	98.3
	39	31.2	31.5	42.6	40.4	76.1	78.8	80.8	84.3	88.8	97.2	107
52	42	34	34.0	45.9	43.5	81.9	84.9	87.0	90.8	95.6	105	115
	48	38	39.0	52.4	49.7	93.6	97.0	99.4	104	110	120	132
	54	43	43.0	59.0	55.9	106	110	112	117	123	135	148
	60	48	48.0	65.5	62.2	117	122	125	130	137	150	164
72	54	43	43.0	59.0	55.9	106	110	112	117	123	135	148
	60	48	48.0	65.5	62.2	117	122	125	130	137	150	164
	66	53	53.4	72.1	68.4	129	134	137	143	151	165	181
	72	58	58.0	78.6	74.6	141	146	150	156	164	180	197
	75	60	60.7	81.9	77.7	147	152	156	163	171	187	205
	78	62	63.1	85.2	80.8	153	158	162	169	178	195	213
	84	67	68.0	91.8	87.1	164	170	174	182	192	210	230
100	84	67	68.0	91.8	87.1	164	170	174	182	192	210	230
	90	72	72.0	98.3	93.3	176	182	187	195	205	225	246
	96	77	77.0	104	100	188	194	199	208	219	240	263
123	90	72	72.0	98,3	93,3	176	182	187	195	205	225	246
	96	77	77.0	104	100	188	194	199	208	219	240	263
	108	78	84.0	118	111	211	219	224	234	246	270	295
	120	78	98.0	131	124	234	243	249	260	273	299	328
	132	78	106	144	136	258	267	274	286	301	329	361
	138	78	111	150	143	270	279	286	299	314	344	377
145	108	86	86.0	118	111	211	219	224	234	246	270	295
	120	92	98.0	131	124	234	243	249	260	273	299	328
	132	92	106	144	136	258	267	274	286	301	329	361
	138	92	111	150	143	270	279	286	299	314	344	377
	144	92	115	157	149	281	291	299	312	328	359	394
170	132	106	106	144	136	258	267	274	286	301	329	361
	144	108	115	157	149	281	291	299	312	328	359	394
	150	108	121	163	155	293	304	311	325	342	374	410
	162	108	131	177	167	316	328	336	351	369	404	443
	168	108	131	183	174	328	340	348	364	383	419	459

1) The continuous operating voltages U_c (as per IEC) and MCOV (as per IEEE) differ only due to deviations in type test procedures.
U_c has to be considered only when the actual system voltage is higher than the tabulated.
Any arrester with Uc higher than or equal to the actual system voltage divided by √3 can be selected.

2) With prior duty equal to the thermal energy rating of 11 kJ/kV (U_r).

3) Arresters for system voltages 36 kV or below can be supplied, on request, when the order also includes arresters for higher system voltages.

Arresters with lower or higher rated voltages may be available on request for special applications.

EXLIM P

Guaranteed protective data 245 - 550 kV

Max. system voltage	Rated voltage	Max. continuous operating voltage [1]		TOV capability [2]		Max. residual voltage with current wave						
		as per IEC	as per ANSI/IEEE			30/60 µs			8/20 µs			
U_s	U_r	U_c	MCOV	1 s	10 s	1 kA	2 kA	3 kA	5 kA	10 kA	20 kA	40 kA
kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}
245	180	144	144	196	186	351	364	373	390	410	449	492
	192	154	154	209	199	375	388	398	415	437	479	525
	198	156	160	216	205	387	400	410	428	451	494	541
	210	156	170	229	217	410	425	435	454	478	524	574
	216	156	174	236	223	422	437	448	467	492	539	590
	219	156	177	239	227	427	443	454	474	499	546	598
	228	156	180	249	236	445	461	473	493	519	568	623
300	216	173	174	236	223	422	437	448	467	492	539	590
	228	182	182	249	236	445	461	473	493	519	568	623
	240	191	191	262	248	468	485	497	519	546	598	656
	258	191	209	281	267	504	522	535	558	587	643	705
	264	191	212	288	273	515	534	547	571	601	658	721
362	258	206	209	281	267	504	522	535	558	587	643	705
	264	211	212	288	273	515	534	547	571	601	658	721
	276	221	221	301	286	539	558	572	597	628	688	754
	288	230	230	314	298	562	582	597	623	656	718	787
420	330	264	267	360	342	644	667	684	714	751	823	901
	336	267	272	367	348	656	679	696	727	765	838	918
	360	267	291	393	373	702	728	746	779	819	897	983
	372	267	301	406	385	726	752	771	804	847	927	1021
	378	267	306	413	391	737	764	783	817	860	942	1037
	381	267	308	416	395	743	770	789	824	867	950	1045
	390	267	315	426	404	761	788	808	843	888	972	1070
	396	267	318	432	410	773	800	820	856	901	987	1086
	420	267	336	459	435	819	849	870	908	956	1051	1152
550	396	317	318	432	410	773	800	820	856	901	987	1086
	420	336	336	459	435	819	849	870	908	956	1051	1152
	444	349	353	485	460	866	897	920	960	1015	1111	1217

1) The continuous operating voltages U_c (as per IEC) and MCOV (as per IEEE) differ only due to deviations in type test procedures.
U_c has to be considered only when the actual system voltage is higher than the tabulated.
Any arrester with Uc higher than or equal to the actual system voltage divided by √3 can be selected.

2) With prior duty equal to the thermal energy rating of 11 kJ/kV (U_r).

Arresters with lower or higher rated voltages may be available on request for special applications.

EXLIM P

Technical data for housings 36 - 362 kV

Max. system voltage	Rated voltage	Housing	Creepage distance	External insulation				Dimensions					
U_s	U_r			1.2/50 µs dry	50 Hz wet (60s)	60 Hz wet (10s)	250/2500 µs wet	Mass	A_{max}	B	C	D	Fig.
kV_{rms}	kV_{rms}		mm	kV_{peak}	kV_{rms}	kV_{rms}	kV_{peak}	kg	mm	mm	mm	mm	
36	30-39	GV036	1444	300	151	135	228	85	785	-	-	-	1
52	42-60	GH052	1444	300	151	135	228	90	785	-	-	-	1
	42-60	GV052	3285	580	278	273	462	115	1315	-	-	-	1
72	54-84	GV072	3285	580	278	273	462	115	1315	-	-	-	1
100	84-96	GV100	3285	580	278	273	462	120	1315	-	-	-	1
123	90-138	GH123	3285	580	278	273	462	120	1315	-	-	-	1
	90-138	GV123	4432	765	378	359	616	150	1645	-	-	-	1
145	108-138	GM145	3285	580	278	273	462	120	1315	-	-	-	1
	108-120	GH145	4432	765	378	359	616	150	1645	-	-	-	1
	132-144	GH145	4432	765	378	359	616	155	1645	-	-	-	1
	108-144	GV145	4729	880	429	408	690	200	2060	-	-	-	2
170	132-168	GH170	4432	765	378	359	616	155	1645	-	-	-	1
	132	GV170	6570	1160	556	546	924	230	2585	800	-	500	3
	144-150	GV170	6570	1160	556	546	924	230	2585	600	-	300	3
	162-168	GV170	6570	1160	556	546	924	230	2585	-	-	-	2
245	180-198	GH245	6570	1160	556	546	924	240	2585	800	-	500	4
	210-228	GH245	6570	1160	556	546	924	240	2585	600	-	300	4
	180	GV245	7717	1345	656	632	1078	275	2915	1200	1000	600	5
	192-210	GV245	7717	1345	656	632	1078	270	2915	800	-	500	3
	216-228	GV245	7717	1345	656	632	1078	270	2915	600	-	300	4
300	228-264	GM300	6570	1160	556	546	924	245	2585	800	-	500	4
	216	GH300	7717	1345	656	632	1078	280	2915	1400	1000	700	5
	228-264	GH300	7717	1345	656	632	1078	275	2915	800	-	500	4
	216	GV300	9855	1740	834	819	1386	355	3860	1600	1000	1000	6
	228	GV300	9855	1740	834	819	1386	355	3860	1400	1000	700	6
	240	GV300	9855	1740	834	819	1386	355	3860	1200	1000	800	6
	258-264	GV300	9855	1740	834	819	1386	355	3860	1200	1000	600	6
362	258	GM362	7717	1345	656	632	1078	285	2915	1400	1000	700	5
	264-288	GM362	7717	1345	656	632	1078	285	2915	1200	1000	600	5
	258-264	GH362	9855	1740	834	819	1386	360	3860	1600	1000	1000	6
	276-288	GH362	9855	1740	834	819	1386	360	3860	1400	1000	700	6
	258-288	GV362	12149	2110	1034	991	1694	420	4850	1600	1000	1200	6

*) Sum of withstand voltages for empty units of arrester.

EXLIM P

Technical data for housings 420 - 550 kV

Max. system voltage	Rated voltage	Housing	Creepage distance	External insulation *)				Dimensions					
U_m	U_r			1.2/50 µs dry	50 Hz wet (60s)	60 Hz wet (10s)	250/2500 µs wet	Mass	A_{max}	B	C	D	Fig.
kV_{rms}	kV_{rms}		mm	kV_{peak}	kV_{rms}	kV_{rms}	kV_{peak}	kg	mm	mm	mm	mm	
420	330-360	GM420	8864	1530	756	718	1232	325	3245	1200	1000	600	5
	330-336	GH420	11002	1925	934	905	1540	405	4190	1800	1000	1000	6
	360-372	GH420	11002	1925	934	905	1540	405	4190	1400	1000	700	6
	378-420	GH420	11002	1925	934	905	1540	405	4190	1200	1000	600	6
	330-396	GV420	13296	2295	1134	1077	1848	460	4850	1600	1000	1000	6
	420	GV420	13296	2295	1134	1077	1848	460	4850	1400	1000	700	6
550	396	GM550	11002	1925	934	905	1540	425	4500	2000	1000	1200	7
	420	GM550	11002	1925	934	905	1540	420	4500	1800	1000	1000	7
	444	GM550	11002	1925	934	905	1540	420	4500	1800	1000	800	7
	396-444	GH550	14287	2505	1212	1178	2002	530	5763	2000	1000	1200	8
Neutral-ground arresters													
123	72-84	GN123	3285	580	278	273	462	115	1315	-	-	-	1
	90-120	GN123	3285	580	278	273	462	120	1315	-	-	-	1
145	84	GN145	3285	580	278	273	462	115	1315	-	-	-	1
	90-120	GN145	3285	580	278	273	462	120	1315	-	-	-	1
170	96-120	GN170	3285	580	278	273	462	120	1315	-	-	-	1
245	108-120	GN245	3285	580	278	273	462	120	1315	-	-	-	1
	132	GN245	3285	580	278	273	462	125	1315	-	-	-	1
	144	GN245	4432	765	378	359	616	155	1645	-	-	-	1

*) Sum of withstand voltages for empty units of arrester.

EXLIM P

Technical data for housings

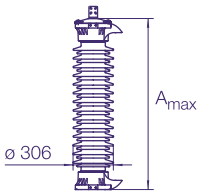


Figure 1

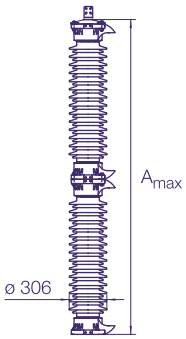


Figure 2

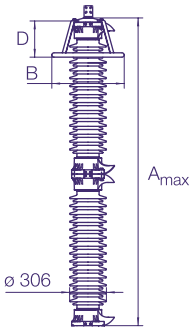


Figure 3

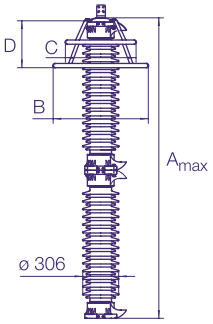


Figure 4

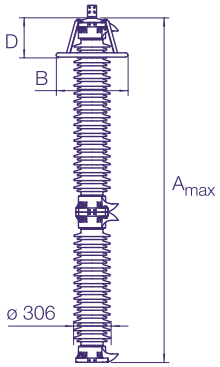


Figure 5

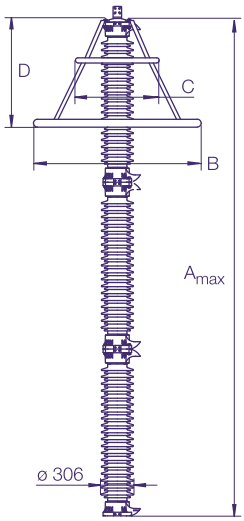


Figure 6

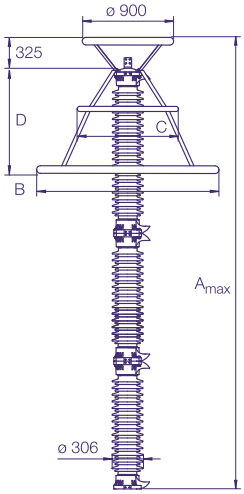


Figure 7

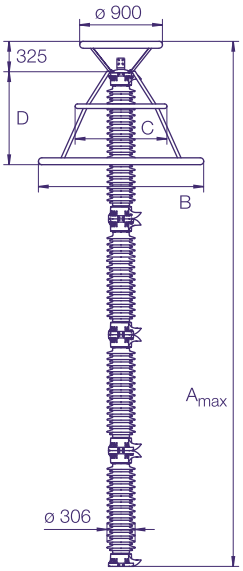
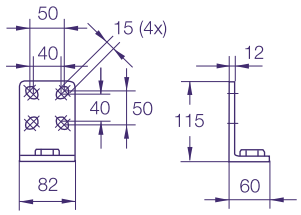


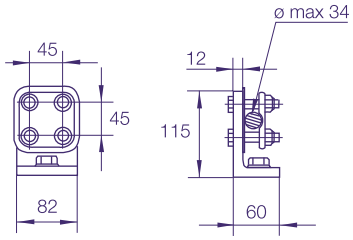
Figure 8

EXLIM P
Accessories

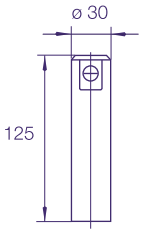
Line terminals



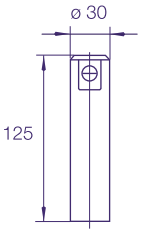
1HSA410 000-A
Aluminium



1HSA410 000-B
Aluminium flag with other items in stainless steel

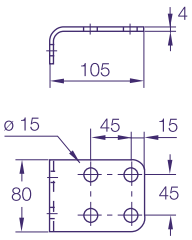


1HSA410 000-C
Aluminium

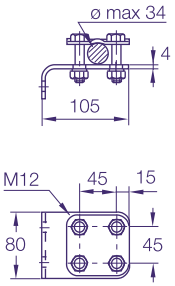


1HSA410 000-D
Stainless steel

Earth terminals

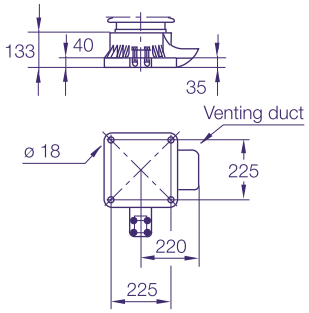


1HSA420 000-C
Stainless steel

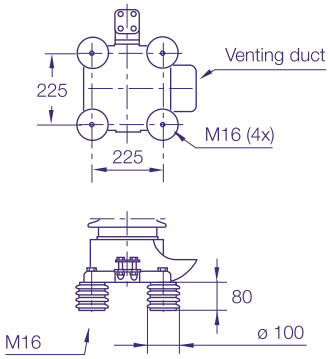


1HSA420 000-D
Stainless steel

Drilling plans



Without insulating base
Aluminium



Insulating base
1HSA430 000-C
Epoxy resin

M16 bolts for connection to structure are not supplied by ABB. Required threaded grip length is 15-20 mm.

EXLIM P
Shipping data

Rated voltage	Housing	Number of arresters per crate					
		One		Two		Three	
U_r		Volume	Gross	Volume	Gross	Volume	Gross
kV_{rms}		m^3	kg	m^3	kg	m^3	kg
30-39	GV036	0.4	115	0.9	225	0.90	320
42-60	GH052	0.4	120	0.9	235	0.9	335
42-60	GV052	0.5	150	1.4	285	1.4	410
54-84	GV072	0.5	150	1.4	285	1.4	410
84-96	GV100	0.5	155	1.4	295	1.4	425
90-138	GH123	0.5	155	1.4	295	1.4	425
90-138	GV123	0.5	190	1.7	355	1.7	515
108-138	GM145	0.5	155	1.4	295	1.4	425
108-144	GH145	0.5	190	1.7	355	1.7	515
108-144	GV145	1.4	245	2.3	470	2.3	690
132-168	GH170	0.5	195	1.7	365	1.7	530
132-168	GV170	1.4	275	2.8	545	2.8	780
180-228	GH245	1.4	285	2.8	565	2.8	810
180	GV245	2.2	365	3.8	665	3.9	945
192-228	GV245	1.7	315	3.1	615	3.1	895
228-264	GM300	1.4	290	2.8	575	2.8	825
216	GH300	2.4	385	4.2	690	4.1	975
228-264	GH300	1.7	320	3.1	630	3.1	905
216	GV300	2.5	500	5.2	930	6.1	1315
228	GV300	2.1	460	5.2	890	5.2	1255
240-264	GV300	1.9	445	4.9	875	5.0	1240
258	GM362	2.4	390	4.2	705	4.1	995
264-288	GM362	2.2	375	3.8	690	3.9	985
258-264	GH362	2.5	505	5.2	940	6.1	1330
276-288	GH362	2.1	465	5.2	900	5.2	1270
258-288	GV362	3.2	565	6.3	1050	6.7	1500
330-360	GM420	2.2	410	4.1	770	4.2	1105
330-336	GH420	3.2	545	6.0	1010	6.0	1440
360-372	GH420	2.4	505	5.5	970	5.5	1375
378-420	GH420	2.2	490	3.8	960	5.3	1370
330-420	GV420	3.2	610	6.6	1150	7.0	1645
396	GM550	5.1	615	6.5	1100	6.5	1520
420-444	GM550	3.2	565	6.0	1045	6.0	1485
396-444	GH550	5.1	805	7.9	1330	7.9	1860
Neutral-ground arresters							
72-78	GN123	0.4	150	1.4	285	1.4	410
84	GNxxx	0.4	150	1.4	285	1.4	410
90-132	GNxxx	0.4	155	1.4	295	1.4	425
144	GNxxx	0.5	190	1.7	355	1.7	515

Each crate contains a certain number of arrester units and accessories for assembly and erection. A packing list is attached externally on each crate.

Each separate crate is numbered and the numbers of all crates and their contents are listed in the shipping specification. ABB reserves the right to pack arresters in the most effective/economic combination. Alternate or non-standard crates may involve additional charges.

The table above is to be seen as an approximation and specific data for deliveries may differ from the values given.

Zinc Oxide Surge Arrester EXLIM T

Protection of switchgear, transformers and other equipment in high voltage systems against atmospheric and switching overvoltages.

- **in areas with very high lightning intensity**
- **where grounding or shielding conditions are poor or incomplete**
- **for important installations**
- **where energy requirements are very high (e.g. very long lines, capacitor protection).**

Other data can be ordered on request. Please contact your local sales representative.

Brief performance data

Arrester classification as per IEC 60099-4 Ed 3.0	Station; SH
Arrester classification as per IEEE Std C62.11-2012	Station
System voltages (U_s)	245 - 800 kV
Rated voltages (U_r)	180 - 624 kV
Nominal discharge current (IEC)	20 kA_{peak}
Lightning impulse classifying current (ANSI/IEEE)	10/15/20 kA_{peak}
Charge, energy and current withstand:	
Repetitive charge transfer rating, Q_{rs} (IEC)	5.2 C
Thermal energy rating, W_{th} (IEC)	15 kJ/kV (U_r)
Single impulse energy capability (2 ms to 4 ms impulse)	11 kJ/kV (U_r)
Discharge current withstand strength:	
High current 4/10 µs	150 kA_{peak}
Low current 2000 µs, (based on Q_{rs})	2600 A_{peak}
Energy class as per IEEE standard (switching surge energy rating)	J
Single-impulse withstand rating as per IEEE standard	5.2 C
Repetitive charge transfer test value - sample tests on all manufactured block batches	6.2 C
Short-circuit/Pressure relief capability	80 $kA_{rms(sym)}$
Mechanical strength:	
Specified long-term load (SLL)	8000 Nm
Specified short-term load (SSL)	20000 Nm
Service conditions:	
Ambient temperature	-50 °C to +45 °C
Design altitude	max. 1000 m
Frequency	15 - 62 Hz
Line discharge class (as per IEC60099-4, Ed. 2.2)	Class 5

Further data according to the IEEE standard can be supplied on request

EXLIM T
Guaranteed protective data

Max. system voltage	Rated voltage	Max. continuous operating voltage [1]		TOV capability [2]		Max. residual voltage with current wave						
		as per IEC	as per ANSI/IEEE			30/60 µs			8/20 µs			
U_s	U_r	U_c	MCOV	1 s	10 s	1 kA	2 kA	3 kA	5 kA	10 kA	20 kA	40 kA
kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{rms}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}	kV_{peak}
245	180	144	144	199	189	346	356	363	381	396	428	466
	192	154	154	212	201	369	380	387	406	423	457	497
	198	156	160	218	208	381	392	399	419	436	471	512
	210	156	170	232	220	404	415	423	444	462	499	543
	216	156	174	238	227	415	427	435	457	476	514	559
	219	156	177	242	230	421	433	441	463	482	521	567
	228	156	180	252	239	438	451	459	482	502	542	590
300	216	173	174	238	227	415	427	435	457	476	514	559
	228	182	182	252	239	438	451	459	482	502	542	590
	240	191	191	265	252	461	475	484	507	528	571	621
	258	191	209	285	271	496	510	520	545	568	614	667
	264	191	212	291	277	508	522	532	558	581	628	683
362	258	206	209	285	271	496	510	520	545	568	614	667
	264	211	212	291	277	508	522	532	558	581	628	683
	276	221	221	305	290	531	546	556	583	608	656	714
	288	230	230	318	302	554	569	580	609	634	685	745
420	330	264	267	364	347	634	652	665	697	726	785	854
	336	267	272	371	353	646	664	677	710	740	799	869
	360	267	291	398	378	692	712	725	761	792	856	931
	372	267	301	411	391	715	735	749	786	819	884	962
	378	267	306	418	397	726	747	761	799	832	899	978
	381	267	308	421	400	732	753	767	805	839	906	985
	390	267	315	431	410	750	771	786	824	858	927	1013
	396	267	318	437	416	761	783	798	837	872	941	1029
	420	267	336	464	441	807	830	846	888	924	998	1091
550	396	317	318	437	416	761	783	798	837	872	941	1029
	420	336	336	464	441	807	830	846	888	924	998	1091
	444	349	353	491	467	853	878	894	938	977	1060	1153
800	588	470	470	650	618	1134	1167	1189	1247	1299	1402	1525
	612	490	490	676	643	1180	1214	1237	1298	1351	1459	1587
	624	499	499	690	656	1203	1238	1261	1323	1378	1488	1618

1) The continuous operating voltages U_c (as per IEC) and MCOV (as per IEEE) differ only due to deviations in type test procedures.
U_c has to be considered only when the actual system voltage is higher than the tabulated.
Any arrester with Uc higher than or equal to the actual system voltage divided by √3 can be selected.

2) With prior duty equal to the thermal energy rating of 15 kJ/kV (U_r).

Arresters with lower or higher rated voltages may be available on request for special applications.

EXLIM T
Technical data for housings

Max. system voltage	Rated voltage	Housing	Creepage distance	External insulation *)				Dimensions					
U_s	U_r			1.2/50 µs dry	50 Hz wet (60s)	60 Hz wet (10s)	250/2500 µs wet	Mass	A_{max}	B	C	D	Fig.
kV_{rms}	kV_{rms}		mm	kV_{peak}	kV_{rms}	kV_{rms}	kV_{peak}	kg	mm	mm	mm	mm	
245	180-192	BH245	6570	1160	556	546	924	270	2585	800	-	500	2
	198-228	BH245	6570	1160	556	546	924	275	2585	600	-	300	2
	180-198	BV245	7717	1345	656	632	1078	300	2915	800	-	500	2
	210-228	BV245	7717	1345	656	632	1078	305	2915	600	-	300	2
300	228-264	BM300	6570	1160	556	546	924	295	2585	800	-	500	2
	216-264	BH300	7717	1345	656	632	1078	315	2915	800	-	500	2
	216-240	BV300	9855	1740	834	819	1386	395	3860	1600	1000	1000	4
	258-264	BV300	9855	1740	834	819	1386	400	3860	1200	1000	800	4
362	258	BM362	7717	1345	656	632	1078	330	2915	1400	1000	700	3
	264-288	BM362	7717	1345	656	632	1078	335	2915	1200	1000	600	3
	258-288	BH362	9855	1740	834	819	1386	410	3859	1600	1000	1000	4
	258-288	BV362	12149	2110	1034	991	1694	470	4520	1600	1000	1200	4
420	330-360	BM420	8864	1530	756	718	1232	385	3245	1200	1000	600	3
	330-336	BH420	11002	1925	934	905	1540	460	4190	1600	1000	1000	4
	360	BH420	11002	1925	934	905	1540	465	4190	1400	1000	700	4
	372-420	BH420	11002	1925	934	905	1540	475	4190	1200	1000	600	4
	330-372	BV420	13296	2295	1134	1077	1848	515	4850	1600	1000	1000	4
	378-396	BV420	13296	2295	1134	1077	1848	530	4850	1400	1000	700	4
	420	BV420	13296	2295	1134	1077	1848	540	4850	1200	1000	600	4
550	396-444	BM550	11002	1925	934	905	1540	490	4500	1800	1000	800	5
	396-444	BH550	14287	2505	1212	1178	2002	595	5763	2000	1000	1200	6
800	On request												
Neutral-ground arresters													
245	108	BN245	3285	580	278	273	462	140	1315	-	-	-	1
	120-132	BN245	3285	580	278	273	462	145	1315	-	-	-	1
	144	BN245	4432	765	378	359	616	180	1645	-	-	-	1

*) Sum of withstand voltages for empty units of arrester.

EXLIM T
Technical data for housings

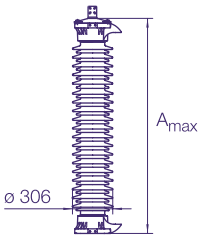


Figure 1

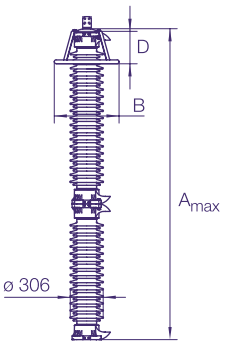


Figure 2

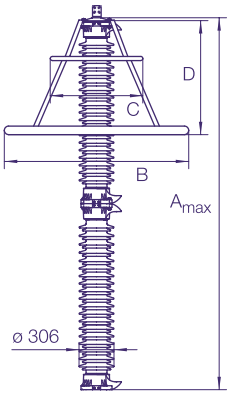


Figure 3

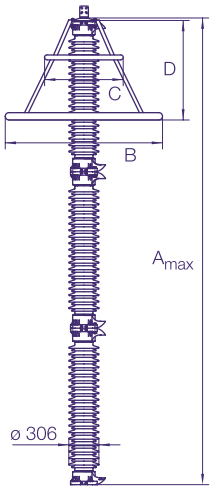


Figure 4

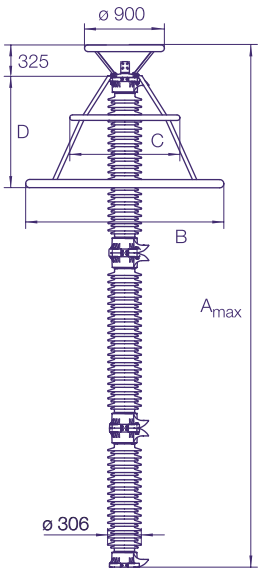


Figure 5

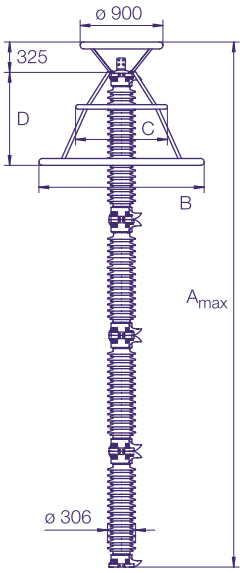
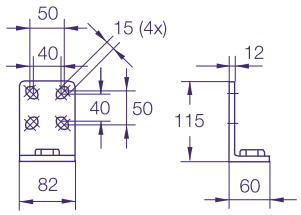


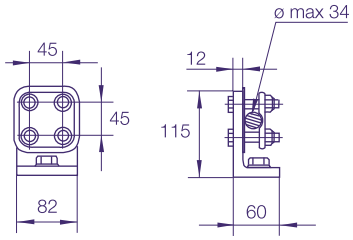
Figure 6

EXLIM T
Accessories

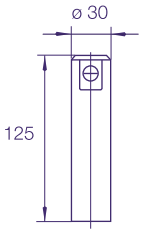
Line terminals



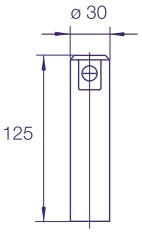
1HSA410 000-A
Aluminium



1HSA410 000-B
Aluminium flag with other items in stainless steel

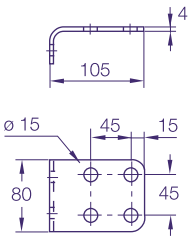


1HSA410 000-C
Aluminium

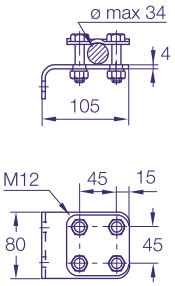


1HSA410 000-D
Stainless steel

Earth terminals

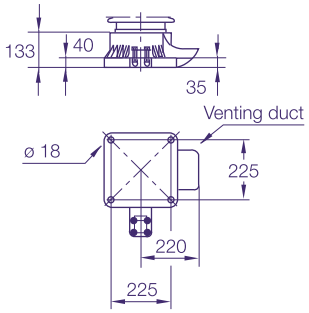


1HSA420 000-C
Stainless steel

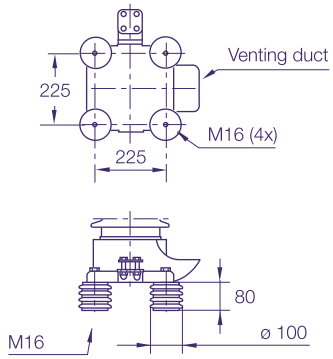


1HSA420 000-D
Stainless steel

Drilling plans



Without insulating base
Aluminium



Insulating base
1HSA430 000-C
Epoxy resin

M16 bolts for connection to structure are not supplied by ABB. Required threaded grip length is 15-20 mm.

EXLIM T
Shipping data

Rated voltage	Housing	Number of arresters per crate					
		One		Two		Three	
U_r		Volume	Gross	Volume	Gross	Volume	Gross
kV_{rms}		m^3	kg	m^3	kg	m^3	kg
180-228	BH245	1.4	320	2.8	635	2.8	925
180-228	BV245	1.7	360	3.1	705	3.1	1025
228-264	BM300	1.4	340	2.8	675	2.8	985
216	BH300	2.2	410	3.8	755	3.8	1080
228-264	BH300	1.7	375	3.1	730	3.1	1060
216-240	BV300	2.9	540	5.7	1010	6.1	1435
258-264	BV300	1.9	490	3.5	965	5.0	1375
258	BM362	2.4	435	4.2	800	4.2	1140
264-288	BM362	2.2	430	3.8	800	3.8	1145
258-288	BH362	2.9	555	5.7	1040	6.1	1480
258-288	BV362	3.2	620	6.3	1150	6.3	1500
330-360	BM420	2.2	485	4.1	900	3.4	1300
330-336	BH420	3.2	605	6.3	1130	6.3	1620
360	BH420	2.4	570	4.2	1100	4.2	1570
372-420	BH420	2.2	575	3.8	1120	3.8	1610
330-336	BV420	3.2	665	6.6	1255	7.0	1805
360-378	BV420	3.2	680	6.6	1280	7.0	1840
381-396	BV420	2.4	640	6.1	1240	6.1	1780
420	BV420	2.2	635	5.8	1225	5.9	1795
396-420	BM550	5.1	710	6.5	1270	6.5	1795
444	BM550	3.2	665	6.0	1215	6.0	1745
396-444	BH550	5.1	805	7.9	1500	7.9	2105
Neutral-ground arresters							
108-132	BN245	0.5	180	1.4	345	1.4	500
144	BN245	0.5	220	1.7	415	1.7	605

Each crate contains a certain number of arrester units and accessories for assembly and erection. A packing list is attached externally on each crate.

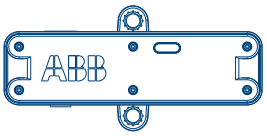
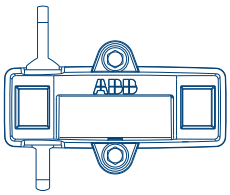
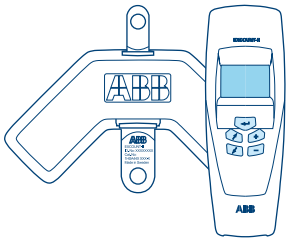
Each separate crate is numbered and the numbers of all crates and their contents are listed in the shipping specification. ABB reserves the right to pack arresters in the most effective/economic combination. Alternate or non-standard crates may involve additional charges.

The table above is to be seen as an approximation and specific data for deliveries may differ from the values given.

EXCOUNT

Surge arrester monitors matched with the surge arresters

With our state-of-the-art product family EXCOUNT, ABB has the full range of counters and monitors to cater for all customer needs – from simple discharge operation count (EXCOUNT-C) through leakage current measurement (EXCOUNT-I) to on-line monitoring and diagnostics (EXCOUNT-II).

	EXCOUNT-C	EXCOUNT-I	EXCOUNT-II
			
Surge registration			
Number of impulses	Yes	Yes	Yes
Impulse amplitude	-	-	Yes
Leakage current measurement			
Total current	-	Yes (also available without)	Yes
Resistive leakage current	-	-	Yes (also available without)
Display	6-digit, electromechanical counter	6 digit, Ch-LCD	Remote reading, PC connectivity
Power supply	Not applicable	Solar panel	Solar panel and field probe

EXCOUNT
Monitoring the health of surge arresters

Well-designed and tested, ABB surge arresters are maintenance-free and can reasonably be expected to have a long service life. Nevertheless, considering the type of expensive equipment which an arrester is protecting, together with how costly and devastating an unplanned power outage can be, there are good reasons for "monitoring" the condition of arresters.

Surge arresters present a high impedance at normal service voltage such that they behave as an insulator for the majority of their life. This is necessary to assure a long life for the arrester itself as well as stability of the electrical network as a whole. A deterioration of an arrester's insulating properties is therefore important to detect early before the situation becomes acute.

In order to truly evaluate the health of an arrester, testing of the kind made as routine during manufacture would need to be performed. However, such testing is not practical to make in the field and removal of the arrester to a HV lab is deemed uneconomic. Instead some kind of in-service diagnostic is required.

Surge registration

The primary reason for the use of surge counters on modern gapless ZnO arresters is to check if a particular transmission line or phase suffers from an exceptionally high number of overvoltages leading to arrester operation — lightning faults on a line, for example. If this is the case, whilst it validates the need for the arresters, use of some preventative countermeasures may be warranted to limit the number of surges. A sudden increase in the counting rate may also indicate an internal arrester fault, in which case the arrester should be investigated further.

However, simple surge counters tell only part of the story, as they only register the number of surges according to their operating characteristic. The user therefore has no way of telling the magnitude of the surge and if it was significant, nor when it occurred and if it was coincident with a system event.

Leakage current measurement

Surge counters can be complimented with the facility to measure leakage currents (total and/or resistive), with the intention of monitoring and diagnosing the condition of the arrester and its state of fitness for continued service. However it is important to understand the validity of the information provided.

At continuous operating voltage (U_C), a metal-oxide varistor acts as a capacitor, leading to a predominantly capacitive component of current and a significantly smaller resistive part. For a complete surge arrester, the capacitive current is further dependent on stray capacitances, pollution currents on the insulator surface, number of varistor columns in parallel and the actual operating voltage. Meanwhile the small resistive component of the leakage current is temperature and voltage dependant.

Since the capacitive component of the current dominates so greatly, the total leakage current measured on a basic mA-meter will be very sensitive to the installation; making interpretation of the readings difficult. Furthermore, the capacitive current does not change significantly due to deterioration of the voltage-current characteristic of the surge arrester. Consequently, measurement of capacitive current cannot reliably indicate the condition of metal-oxide arresters. Nevertheless, increasing values may be of some use in indicating that cleaning of the insulators is necessary.

EXCOUNT
Monitoring the health of surge arresters

Instead, it is generally recognized (IEC 60099-5) that the only reliable indicator for the condition of a gapless arrester that can be assessed during normal service is to measure the resistive component of the leakage current (or estimate it from the 3rd harmonic). The obtained value may then be compared with the maximum allowable resistive current as given by the manufacturer under prevailing service conditions i.e. temperature and applied voltage.

Remote reading with EXCOUNT-II

If a metal-oxide varistor ages or is damaged by impulses etc, the arrester resistive leakage current, and hence power losses, increase permanently. This may result in an increase in temperature, which in turn, increases the leakage current and so on until a so-called thermal runway occurs. Early detection of a possible harmful increase may prevent a failure and subsequent unplanned shutdown. Hence, to provide true diagnostics, a good monitor must be able to detect the arrester leakage current and isolate and measure the resistive component flowing internally.

Diagnostic plan

A surge arrester does not contain any moving parts or items that can break. Consequently there is nothing to maintain, adjust, correct or repair, which is why there is normally no need to perform any form of periodical checking or monitoring. In general, a correctly chosen and installed arrester is maintenance free during its entire lifetime. A correctly chosen arrester in this context means that its electrical and mechanical characteristics are matched to actual service conditions.

Nonetheless, since external factors can place stresses on the arrester, potentially leading to its deterioration and ultimate overload, it may be prudent to draw up a schedule for regular checks. Such consideration is all the more important if an unplanned outage is unacceptable for reasons of system stability or economics. The older the arrester, the more regular these checks may need to be, since the statistical risk for overload increases with age.

As a guide, the following strategy is proposed to be made at regular intervals as required and determined by site availability and importance:

- Visual inspection and possible cleaning
- Diagnostics in advance of the designated lighting season and thereafter following periods with bad weather conditions.
- Diagnostics after special fault conditions causing flashover in the network or TOV's of high amplitude and/or long duration.

Because of their nature, old-style gapped arresters should be removed as soon as possible as part of a scheduled replacement program. Their age and inherent design does not warrant detailed evaluation. Early models of gapless arresters may require additional visual checks to look for signs of mechanical or physical deterioration as well as monitoring of the internals. Newly purchased arresters can also benefit from diagnostic monitoring right from first installation since this permits easy trend analysis to detect potential deterioration later on in its service life.

EXCOUNT
When safety comes first

EXCOUNT draws upon over 75 years of experience by ABB in the development of arresters and associated accessories. Safety, functionality and longevity are key elements which are given priority in selection and design of components. In stark contrast to many other competing products, EXCOUNT has not neglected short-circuit safety which lies inherent in the design concept.

The EXCOUNT family is characterized by:

Highest personnel safety
- Explosion-proof for short-circuit currents up to 65 kA.
- Same safe performance as ABB arresters.

Negligible residual voltage
- Does not reduce protection margins.
- Minimized risk for injury in case of accidental contact during surges.

Maintenance free
- Sealed components.
- Requires no external power supply.

Long life
- Moulded components, non-sensitive to humidity or temperature variations.

Universal application
- All makes and types of gapless surge arresters.
- All weather and temperature conditions.

Design
The use of an impulse current transformer with a single-turn primary ensures that the voltage drop across the counter is negligible, even at the highest impulse currents encountered in service. This leads to added personnel safety and no increase in the protection level of the arrester. Since no gaps or series impedance are used, there is no risk of internal arcing and consequent explosive failure in the event of a short-circuit following an arrester failure.

One further common feature with the entire EXCOUNT family is that all internal components are fully encapsulated in polymer. This provides sealing to IP67, which ensures no harmful ingress of dust or moisture as well as providing personal safety through complete protection against contact with the internals.

EXCOUNT is available in different variants, depending on the user's needs: simple, basic or extensive.

Surge counter EXCOUNT-C

EXCOUNT-C is a simple surge counter with all the essentials for easy installation and highest personnel safety. The counter is maintenance free; powered by the surge current and suitable for all weather and temperature conditions.

Design features

EXCOUNT-C is to be fitted in the earth circuit between the arrester and ground. For simplicity, the EXCOUNT-C does not have a termination point for the earth cable. Instead an opening is provided to draw the entire earth conductor from the arrester completely through and down to ground. In case the conductor is too large to fit through the hole, an optional conductor kit may be ordered separately.

The secondary circuit is connected to a mechanical counting relay and all components are totally sealed in polymer.
A viewing window permits easy reading of the six-digit cyclometer-type counter.

Surge registration

The counting threshold for EXCOUNT-C is adapted for gapless surge arresters. Only pulses that are considered significant to the arrester capability and life are therefore registered.

Maintenance free

A robust plastic casing is fitted over the encapsulated internals, which makes EXCOUNT-C non-sensitive to humidity or temperature variations. It can be exposed to all environments regardless of weather and temperature conditions. The current transformer secondary output is sufficient for driving the counter and an external supply source is hence not needed.

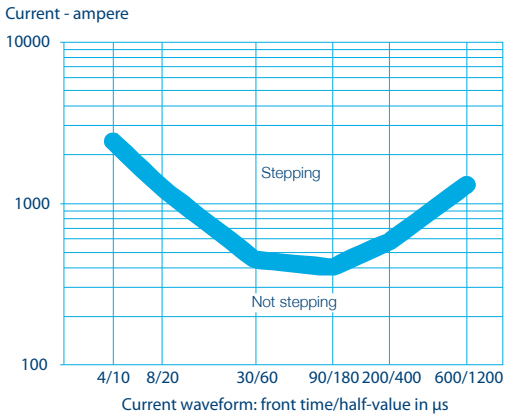
EXCOUNT-C
Technical data

General

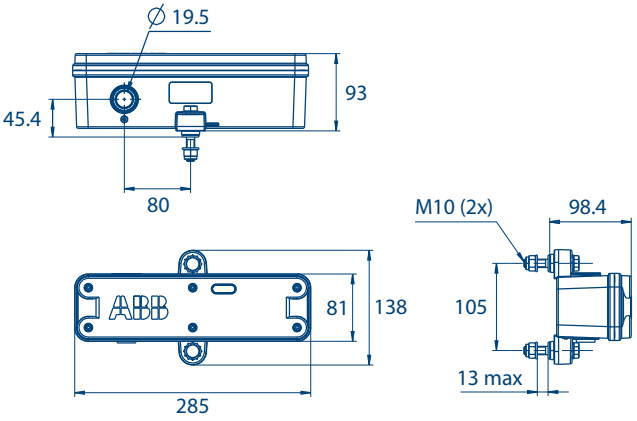
Item number	1HSA448000-A
Climatic conditions	Sealed water-tight design, IP67
Short-circuit capability	65 kA according to IEC 60099-4
Power supply	Impulse current

Surge registration

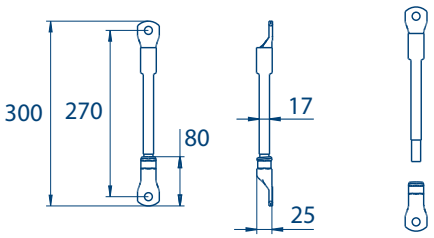
Minimum counting threshold (8/20 µs)	1.5 kA



Stepping criteria



Dimensions



Optional accessory EXCOUNT-C current conductor
Item number: 1HSA448427-A

Surge counter EXCOUNT-I
with mA-meter

EXCOUNT-I is a surge counter with basic leakage current measurement function. The counter provides a number of unique features such as short-circuit safety and a well proven electronic display which is easy to read, even in direct sunlight. EXCOUNT-I is specially designed for use with all makes and types of gapless arresters and in diverse environments.

Design features.
As with all surge counters from ABB, EXCOUNT-I does not negatively affect the residual voltage of the arrester. EXCOUNT-I is housed in a sealed, weather-proof case, suitable for outdoor use and proven to match the short circuit capability of the arresters. EXCOUNT-I has been designed for highest personal safety and has been successfully short circuit tested at 65 kA.

EXCOUNT-I requires no external power supply as it incorporates its own internal power source in the form of a high-efficiency capacitor charged by solar cells.

The electronic display is of Cholesteric Liquid Crystal Display type. This ensures highest readability, even in direct sunlight. The display is Bi-stable, which means that power is only required during refresh of the display.

Surge registration
EXCOUNT-I registers the surge each time the arrester has discharged a current over 10 A. The accumulated number of surges is continuously shown on the electronic display.

Leakage current measurement
ABB's unique design ensures that total leakage current through the arrester can be measured without risking personnel safety.

The measurement is initiated by triggering a light sensitive diode using a standard laser pointer. This will initiate EXCOUNT-I to start measuring the total leakage current for several cycles and shortly thereafter display the average value (in mA). The counter will then automatically return to its normal state and display number of impulses. Thus, the measurement can be made at a discreet distance without coming into direct contact with the equipment.

Maintenance free
EXCOUNT-I is a maintenance free product in outdoor applications. The display and solar panels might however need to be wiped off before measurement in extremely polluted conditions.

EXCOUNT-I
Technical data

General

Climatic conditions	Sealed water-tight design, IP67
Short-circuit capability	65 kA according to IEC 60099-4
Power supply	Built-in solar cells (battery alternative for indoor use)

Surge registration

Minimum counting threshold (8/20 µs)	10 A
Surge counting memory capacity	999999 registrations (wrap-around)
Time resolution	< 0.5 s

Leakage current measurement

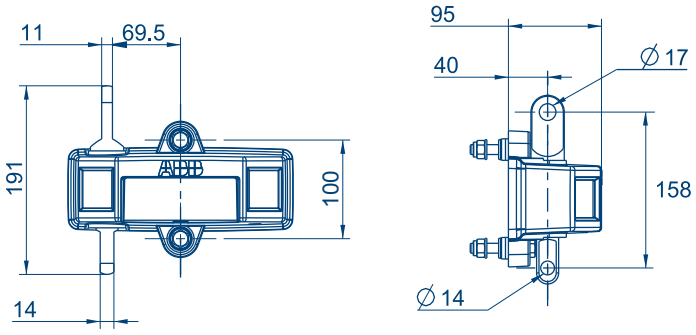
Measuring range of total leakage current	0.1 - 50 mA_{peak}
Measuring frequency range	48 - 62 Hz
Laser pointer wavelength	630 nm

EXCOUNT-I versions

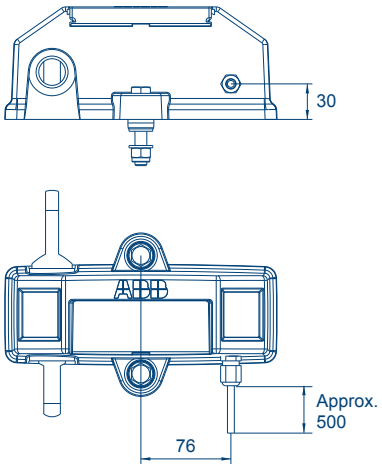
EXCOUNT-I can be supplied with an output connection (auxiliary contact) for interfacing to external signalling equipment. Versions with only surge counting function are also available.

Model	Surge counting	Leakage current measurement	Auxiliary contact	Laser pointer included
1HSA440000-C	Yes	-	-	-
1HSA440000-E	Yes	-	Yes	-
1HSA440000-J	Yes	Yes	-	Yes
1HSA440000-L	Yes	Yes	Yes	Yes

The auxiliary pulse contact is suitable for use with AC or DC voltage (max. 250V, 1A). An auxiliary relay of suitable type must be connected separately to the EXCOUNT-I auxiliary contact (not included as standard).



Dimensions



Auxiliary contact brought out via dual-core (2 x 1 mm) cable 1HSA440000-E and 1HSA440000-L

Surge arrester monitor EXCOUNT-II

EXCOUNT-II is our top-of-the line product combining outstanding looks with the most extensive and powerful features. Included are a variety of surge counting features together with all the essential leakage current measurement functions. EXCOUNT-II enables users to keep track of overvoltages in the network as well as providing state-of-the art on-line condition monitoring of arresters.

Design features

EXCOUNT-II is a unique monitoring system, which can be used as an aid to assess the health of the entire substation by monitoring surges transmitted in and out of the network. Each surge arrester is fitted with a sensor, which detects the total number of discharges, the surge amplitude, date and time of occurrence, as well as the leakage current through the arrester. The measurements can be remotely read when convenient with the aid of a hand-held transceiver (and optional external antenna).

Remote reading provides increased personnel safety compared with conventional counters. With a communication distance of up to 60 m (120 m with external antenna), the person does not necessarily have to even be inside the substation perimeter, so saving the need to arrange entry permits or have electrically trained personnel perform the work.

The measured data can then be transferred to a computer for statistical analysis. Included with EXCOUNT-II is specially designed software which facilitates download of the measured data from the transceiver and permits analysis and reporting of the collected information.

Surge registration

EXCOUNT-II does more than just count surges. It also registers the date and time as well as amplitude of the surge each time the arrester has discharged a current over 10 A. Time and amplitude measurement gives the user better information about overvoltages in the network and the operation of the arrester.

Leakage current measurement and condition monitoring

EXCOUNT-II gives the user the possibility to measure both the total leakage current as well as the resistive component of the current through the arrester. Measurement of the resistive current gives a good indication of the arrester's condition and fitness for continued service. The measurement method employed is based on third-harmonic analysis which is considered the most reliable measuring method for condition monitoring according to IEC 60099-5.

Safe and secure

The sensor is housed in a sealed, weather-proof case, suitable for outdoor use and proven to match the short-circuit capability of the arrester to which it is connected. The sensor requires no external power supply as it incorporates its own internal power source in the form of a high-efficiency capacitor automatically charged by solar cells and electric field probe.

EXCOUNT-II
Technical data

General

Climatic conditions	Sealed water-tight design, IP67
Short-circuit capability	65 kA according to IEC 60099-4
Power supply	Built-in solar cells and field probe (battery alternative for indoor use)

Surge registration

Minimum counting threshold (8/20 µs)	10 A
Amplitude classification (8/20 µs)	10 - 99 A 100 - 999 A 1000 - 4999 A 5000 - 9999 A > 10000 A
Time stamp	Yes
Time resolution	< 0.5 s
Memory capacity	1000 registrations (wrap-around)

Leakage current measurement

Measuring range of total leakage current	0.2 - 12 mA_{peak}
Measuring range of resistive leakage current (peak level)	10 - 2000 µA
Measuring frequency range	48 - 62 Hz

EXCOUNT-II versions

EXCOUNT-II are available for two different frequencies depending on national regulations. Contact ABB for guidance.

Sensor

Model	Frequency
1HSA441 000-A	for 868.35 MHz
1HSA441 000-C	for 916.50 MHz

Sensors for inverted mounting

Model	Frequency
1HSA441 000-D	for 868.35 MHz
1HSA441 000-E	for 916.50 MHz

Transceiver model 1

Application: Measuring total leakage current and surge data

Model	Frequency
1HSA442 000-C	for 868.35 MHz
1HSA442 000-E	for 916.50 MHz

Transceiver model 2

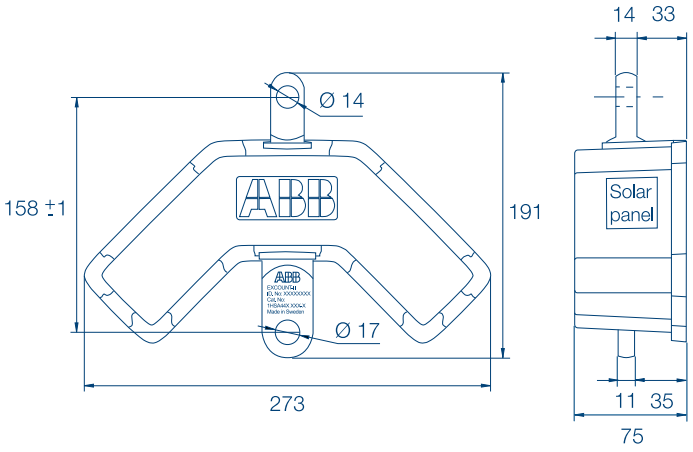
Application: Measuring total leakage current, resistive leakage current and surge data.

Model	Frequency
1HSA442 000-A	for 868.35 MHz
1HSA442 000-D	for 916.50 MHz

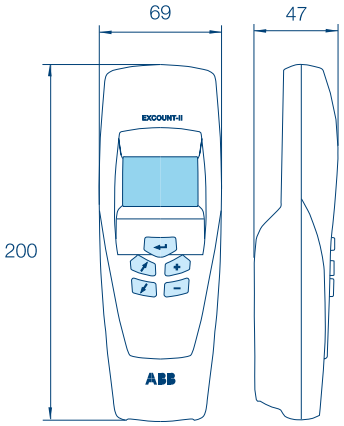
External antenna

Model	Frequency
1HSA446 000-A	for 868.35 MHz
1HSA446 000-B	for 916.50 MHz

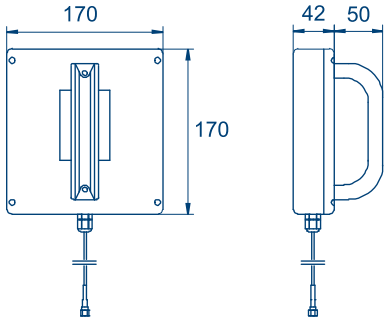
EXCOUNT-II
Dimensions



Sensor



Transceiver



External antenna