



Saves Your Energy

Accessories for Medium Voltage Distribution Networks

Certified quality



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Safe, energy efficient and environmentally friendly solutions

Ensto is a family business and international cleantech company specializing in the development, manufacture and marketing of electrical systems and supplies for the distribution of electrical power as well as electrical applications.

We are committed to lasting sustainable development and our goal is to be the world's leading company in green energy efficiency and distribution. Our products are environmentally friendly, energy efficient and leave a minimum carbon footprint. Ensto has three key business units: Ensto Utility Networks, Ensto Building Technology and Ensto Industrial Solutions.

Ensto Solutions for Electricity Networks

Ensto Utility Networks offers accessories and solutions for:

- Low voltage overhead lines focused on Aerial Bundled Cable Systems
- Medium voltage overhead lines (for bare and covered conductor lines)

- Low and medium voltage underground cable networks
- Power quality
- Network automation

This catalogue covers Ensto solutions for medium voltage overhead lines:

- Covered Conductors (p. 7)
- Bare Conductors (p. 22)
- Universal Cables (p. 23).



Functional Solutions

Ensto's solutions are reliable, installation-friendly and a good example of well-known Finnish engineering. Our products are designed for a long service life and a low lifecycle impact on environment. Ensto's solutions are developed in close cooperation with our customers. We have thorough knowledge of distribution networks even in the most demanding circumstances in cold, hot and stormy surroundings all over the world.

Focus on Energy Efficiency

Ensto is committed to building sustainable energy infrastructure. Our low and medium voltage solutions are used to support sustainable energy production and distribution. Better power quality and decreased distribution losses are the key issues for energy efficiency. Sustainability and efficiency are also achieved

by recyclable materials, local expertise and own manufacturing.

Ensto Power Quality Solutions improve efficiency in electricity distribution and the quality of electricity. The assortment includes e.g. voltage boosters and a DC link.

The French Ensto Novexia manufactures low and medium voltage power grid devices, as well as automation and remote control equipment. Its product offering complements Ensto's product selection especially in the area of network automation for smart grids.

Tested to Meet Your Expectations

Our products are tested according to the toughest national and international standards – actually, we test beyond standard requirements. Ensto has fully equipped and calibrated testing laboratories in-house, where both

components and products are continuously tested. We work with many international test laboratories and use well known external laboratories for certification testing.

Ensto accessories for medium voltage covered conductors are tested according to the EN 50397-2 standard. This international overhead line standard defines test requirements for the accessories used with covered conductors (e.g. PAS/BLL).

Close to You

Ensto has local sales offices in 17 countries and export throughout the world. Therefore we have experience and knowledge of solutions and products for most varying climate conditions. Ensto arranges Ensto Pro training for its customers including both theory based information and practical installation work.

Environmental Protection Adds Reliability

Animals cause many electricity breakages by wandering near transformers and electricity lines. By preventing animal accidents, we can also improve the function of electricity distribution: it will become more effective and the maintenance costs will decrease. Ensto's animal protectors reduce accidents remarkably.

Knowledge that Counts

We also arrange Ensto Pro training for our customers covering both theory and practical installation process. The training modules can be tailored according to the customer's needs. Moreover, our web pages include important information of electricity network building in local languages.



Ensto Solutions for Various Medium Voltage Systems

Ensto has developed integrated product packages and solutions for various medium voltage overhead lines from Covered Conductors (CC) and Universal Cables to Bare Conductors. Ensto accessories for medium voltage include e.g. insulators, tension and suspension clamps, arc protection devices, current limiting devices, connectors, bird protectors, crossarms and tools.



Covered Conductor System

Plastic covered conductors without metal sheaths were developed to improve reliability of the distribution and transfer of electricity. Several years in use have proven the covered conductor system to be extremely functional and reliable. Interruptions and faults caused by snow, ice or storms have diminished remarkably.

Using the Covered Conductor system offers also considerable space savings as the space required is approximately 40 % less than that of a standard bare line. This means e.g. narrow line corridors and space savings in substations. Parallel line structure enables more space savings.

Ensto accessories for medium voltage covered conductors are tested according to the EN 50397-2 standard. Compared to earlier national standards, EN 50397-2 is substantially more demanding and covers the accessories designed for covered conductors more extensively. This adds

reliability for the covered conductor system.

The Ensto covered conductor accessories cover 6-24 kV and 36 kV lines and can be found on pages 27-41.



Covered Conductor Systems

Costs and general requirements

Costs

Covered Conductor (CC) line construction costs are moderate, considering their advantages over traditional bare line structures. When constructing parallel lines, the costs of bare and CC lines are the same.

Design

Compared to traditional bare conductor construction, some additional requirements have been set for covered conductors.

The most important requirements include:

- Conductors must be handled with care

- Only accessories designed and approved for the conductor may be used
- Arc protection devices must be used on lines vulnerable to overvoltages
- Substations must have tripping earth-fault protection devices and alarming secondary devices.

Arc Protection

Overvoltage is induced on the line when lightning strikes an overhead line or its vicinity. The magnitude of the overvoltage is approximately the same in all phases and may rise to several hundred kilovolts between the phase and earth.

Overvoltage travels along the line to the nearest pole where it discharges by igniting an arc between the crossarm and conductors. After the overvoltage has discharged a power frequency short-circuit current – the magnitude of which depends on the short-circuit power of the network and distance to the substation – starts to flow through ionized air resulting a power arc between the phases. Power arc magnitude is normally several kilo amperes.

Power arc can move freely along an ordinary bare conductor line towards the load, but in the covered conductor line the covering forms an obstacle. When an arc ignites, it burns a small hole in the covering and keeps burning until the conductor is damaged or burned through.

Circuit breakers cannot respond quickly enough. In order to prevent damage a covered conductor must be protected by installing arc protection devices at the appropriate locations. These offer the power arc a safe discharge route without damaging the conductor.

An arc protection device is used to protect the conductors as well as other network components. In this way, it is possible to achieve disruption-free distribution of electricity, a major benefit to the consumer. Arc protection devices must be installed in places in which overvoltage is likely to occur, e.g. fields and hills. Furthermore, protection is required in frequently used areas; for example, buildings, yards, their immediate vicinity, traffic routes and sports fields.

Relative costs		
Structure	Conductor	Cost of complete line
Bare conductor	54/9 AlFe RAVEN	1.0
Covered conductor	PAS 3x70	1.3
Aerial cable	SAXKA 3x70	2.5
Underground cable	AHXMKW 3x70	3.0

The cost of a pole transformer with the PAS structure is approximately one third cheaper than a park transformer required for an underground cable network.



Arc protection can be accomplished using the following methods:

- Arc protection device (APD)
- Power arc device (PAD)
- Surge arrester
- Current limiting device.

The protection chosen also depends on the network’s short-circuit values. The adjoining table displays the selected phase spacing of the covered conductors, the value of the short-circuit current with a protected object, and the recommended arc protection devices.

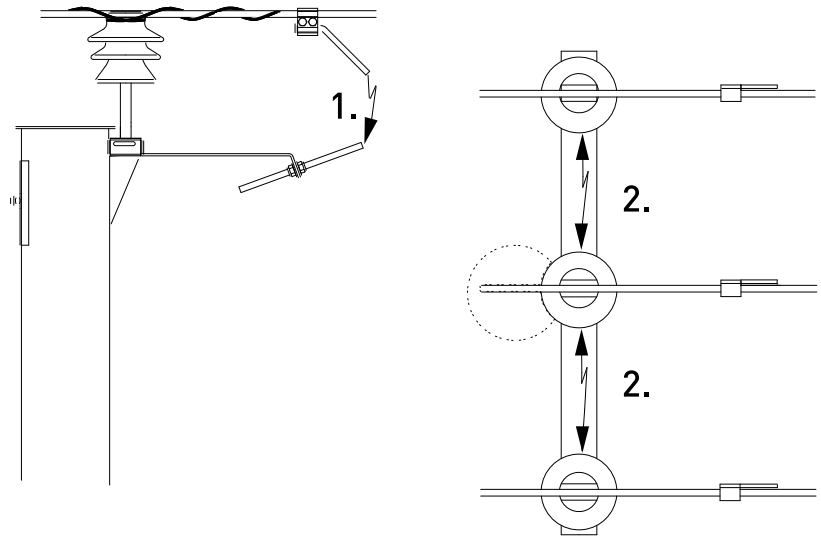
Crossarm type	Short-circuit current (kA)	Protection methods
Phase spacing 40-60 cm	approx. 1.0	Power arc device, surge arrester, current limiting device
Phase spacing 40-60 cm	2.0 - 3.0	Arc protection device with double wire, power arc device, surge arrester, current limiting device
Phase spacing 40-60 cm	> 3.0	Arc protection device, power arc device, surge arrester, current limiting device
Phase spacing over 60 cm		Power arc device, surge arrester, current limiting device

Covered conductor arc protection methods				
	Arc protection device (APD)	Power arc device (PAD)	Surge arrester	Current limiting device
Protection of the conductor	Efficient	Efficient	Efficient	Efficient
Protection of other line components	No protection	Small spark gap protects small transformers	Protects transformers and cables	Protects small transformers
Quality of power supply	High-speed autoreclosure	High-speed autoreclosure	No interruption	No interruption
Uncovered components of the line	Bird protection needed	Bird protection needed	Bird protection needed	Bird protection needed
Radio interference	No RIV	No RIV	No RIV	No RIV
Device endurance	Withstands 2-3 operations at 10 kA/1 sec.	Withstands 2-3 operations at 10 kA/1 sec.	May be damaged by high lightning current/energy	May be damaged by high lightning current/energy
Price	Economical	Economical	Reasonable	Reasonable

Power Arc Devices

Power Arc Devices

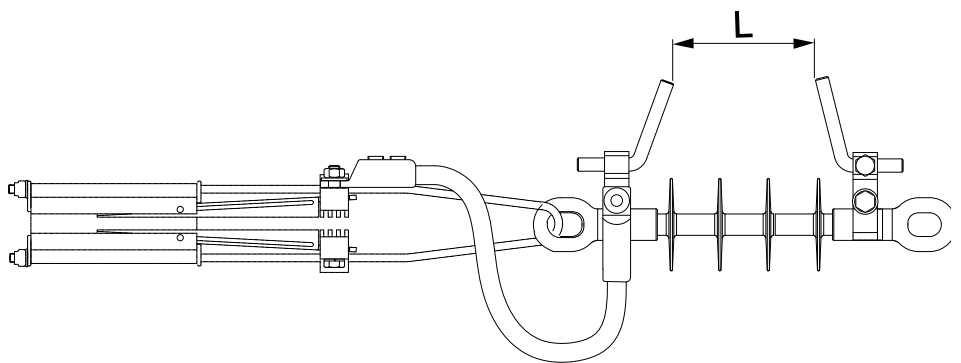
With small short-circuit currents, an arc will move slowly and stress the insulator for a prolonged period. To avoid damage to the insulator, the arc must be ignited directly in the spark gap (1), so that the short circuit occurs through the crossarm (2) and trips the circuit breakers. The spark gap can also withstand the stresses of high short-circuit currents ($I_k = 10 \text{ kA/1 sec}$). Power arc devices are not dependent on the direction of power feed and therefore can be installed on either side of the insulator. Power arc devices can also be installed on different sides of the pole. Power arc devices can be used with tension and suspension insulators.



Installing Power Arc Devices

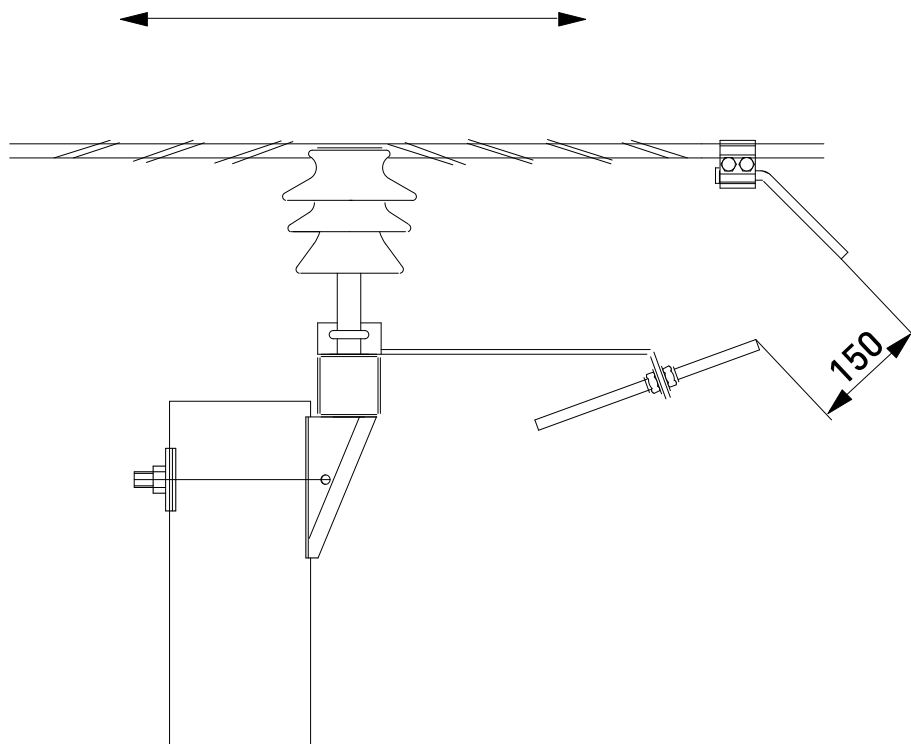
Tension Insulators

The best method of implementing power arc protection with tension insulators is to use the SDI90.X equipped with the set SDI27.1 or SDI10.2 power arc device. Power arc devices are not dependent on the direction of power feed, and can be installed on either side of the crossarm. Power arc devices for different phases can be installed on different sides of the crossarm. The spark gap L should be adjusted to 100...150 mm.



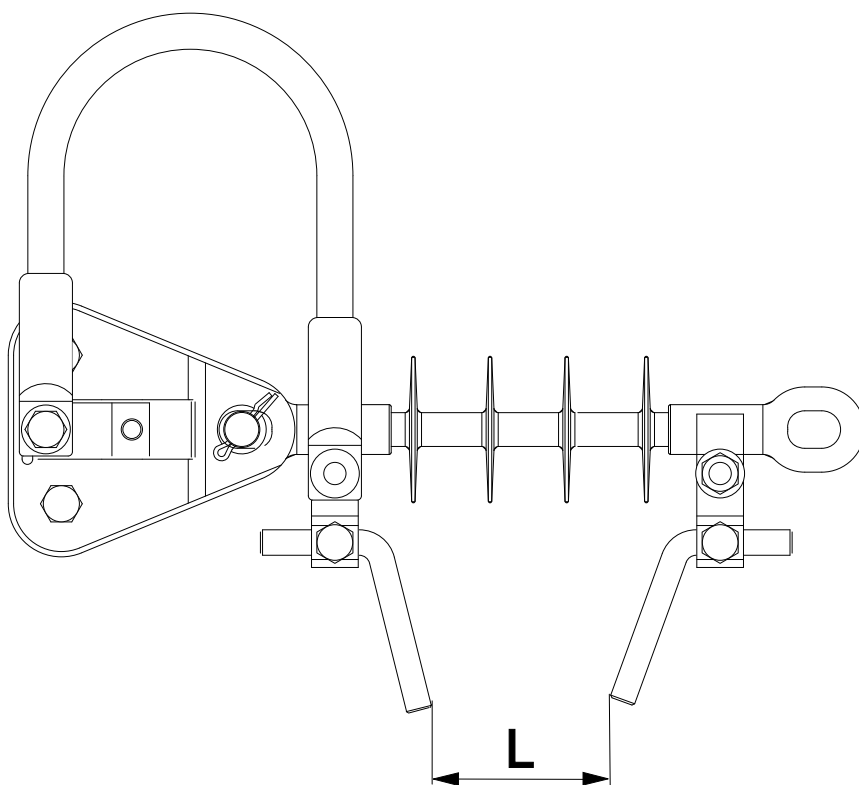
Horizontal Crossarms

A spark gap is formed using the complete set SDI20.3 or SDI21.3, containing an arc protection connector and a mounting iron for the crossarm pin, equipped with an arcing horn. Three SDI20.3 or SDI21.3 series are required per crossarm. The spark gap may be located on either side of the insulator; the effectiveness of the protection not being dependent on the direction of the power feed. The spark gap should be set to 100-150 mm.



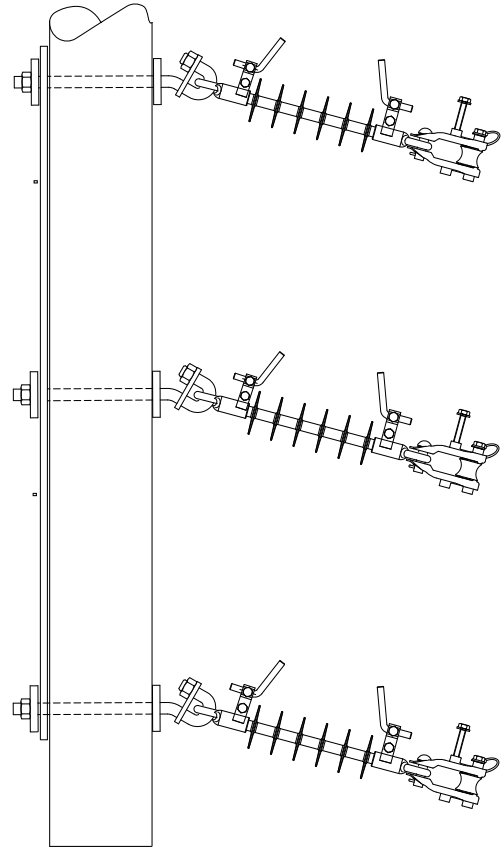
Crossarm for Line Angle

The best method on crossarms is to use the suspension clamp with pulling wheel SO181.6, accessory kit SDI27.1 (see p. 28) and tension insulator SDI90.X. These accessories provide the best conductor protection and eliminate radio interference. The covered conductor need not be stripped. The normal suspension clamp (SO181) is not recommended for CC installations.



Angle with Tension Insulators

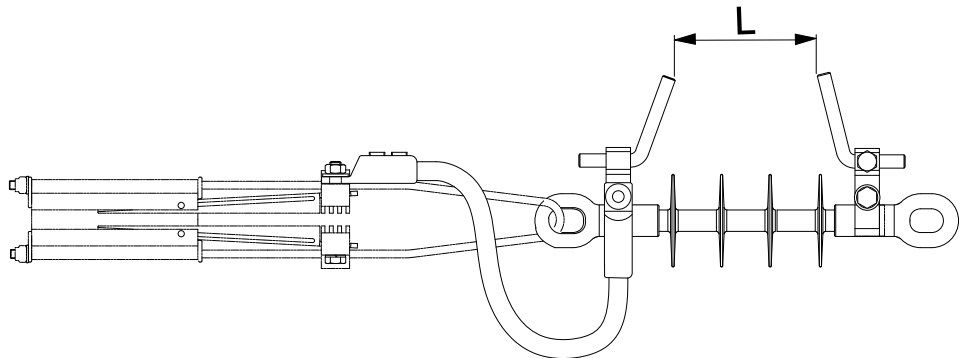
When constructing an angle with tension insulators installed in vertical line formation, arcing horns SDI27.1 must be used for tension insulator SDI90.X. The bolts must always be connected behind the pole with a vertical iron, e.g. PEK68, or a conductor (min. Cu 50 mm²). This prevents short-circuiting through the pole. Otherwise, the structures as for crossarms for line angle should be used.



Terminal Crossarm with Spark Gap

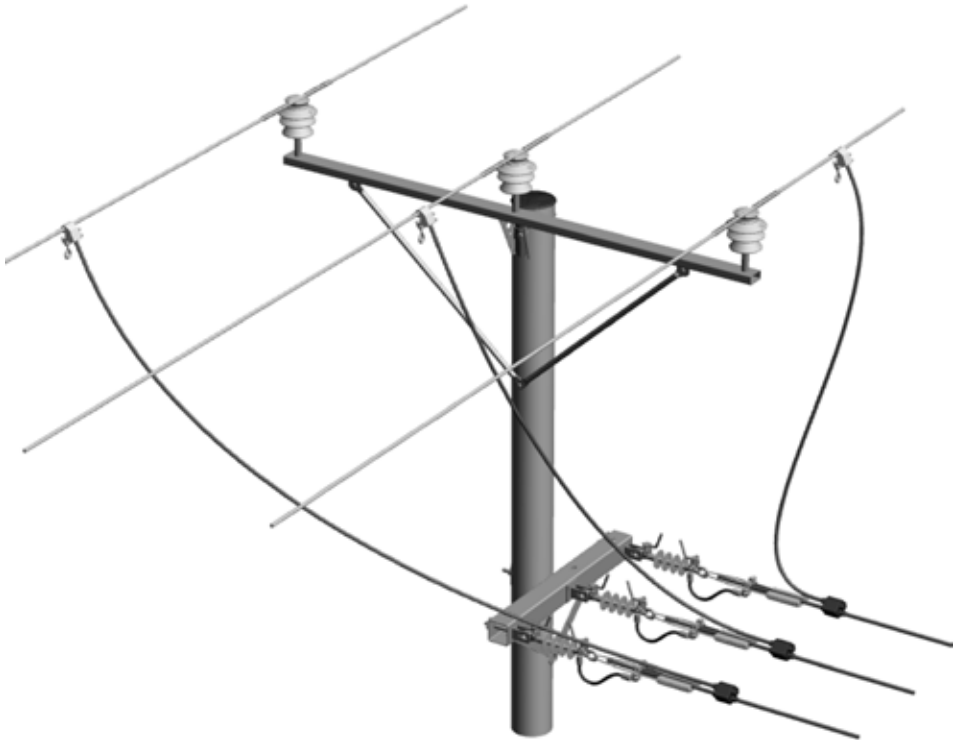
For the termination or tension of a covered conductor the best method is to use tension clamp SO255 or SO256 and tension insulator SDI90.X equipped with arcing horns SDI27.1. You may also use the SDI10.2 and SO85.

Branch lines should be connected using the insulation piercing connector SLW25.2 and SP16 without other protection. The covered conductor needs not be stripped.



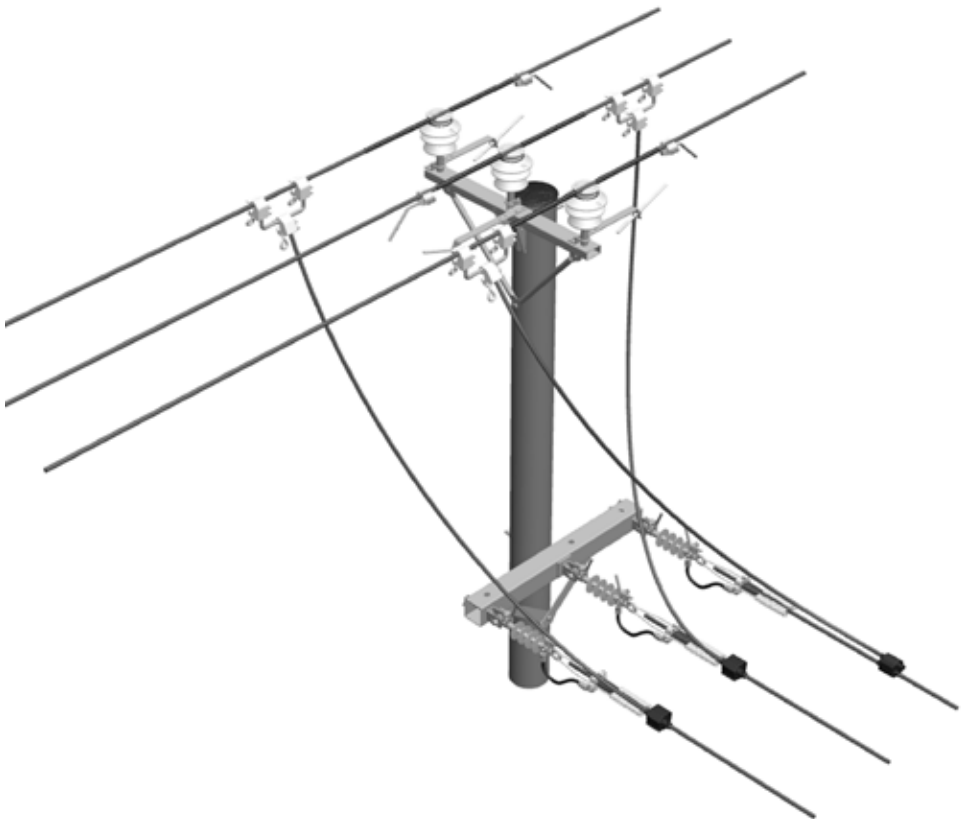
Main Line Bare Conductor / Branch Line CC

The best and easiest way to implement arc protection at a branch pole is to install the SDI27.1 spark gap set with tension clamp SO255 or SO256, so that the conductor does not need to be stripped. It is also possible to use the SDI10.2 and SO85. When using a spark gap on the tension insulators of the branch conductor, the connecting conductors can be bare or covered.



Main Line CC / Branch Line CC or Bare Conductor

The main line shall be equipped with spark gaps. The connectors may be positioned freely, and the connecting conductors may be either covered or bare.



Current Limiting Devices

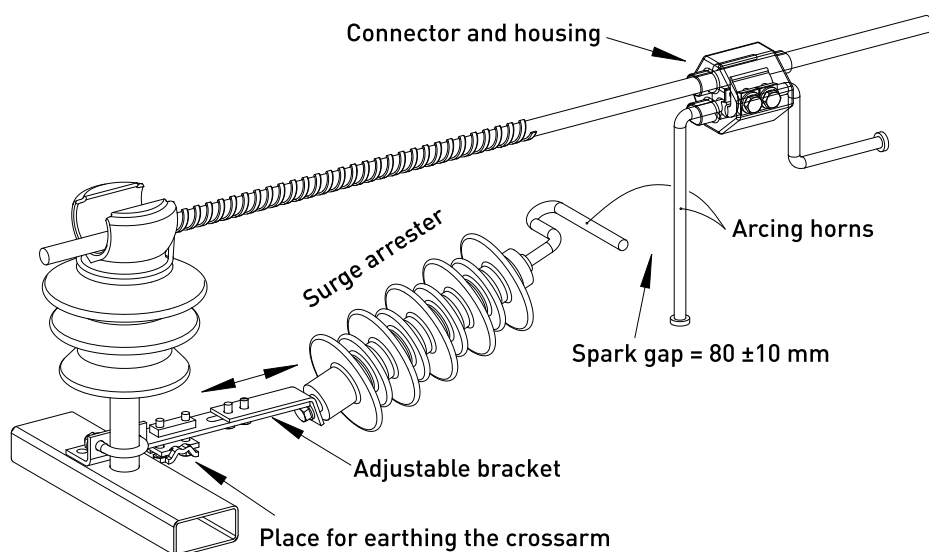
The economical way to protect a conductor is to use a current limiting device rather than only a surge arrester. The advantage is based on selecting a smaller surge arrester. Under normal operating conditions the smaller surge arrester is not stressed at line voltage, as its other end is in the air. This protection method also provides consumers with an uninterrupted electricity supply, because the arc protection does not cause high-speed auto-recloser operations.

A surge arrester should be installed in the crossarm in the same way as an arcing horn.

Installation can be performed on either side of the crossarm regardless of the direction of power supply. The crossarm must always be earthed. The protection device installation density depends on the span length, the height of conductors from the ground, the position of any trees and the relief of the terrain.

Installing Current Limiting Devices

One advantage of current limiting protection is uninterrupted distribution of electricity to consumers. Activation of this protection does not cause any high-speed automatic reclosing in substation protection devices. A lightning discharge to a covered conductor is directed via a metal oxide protection device and spark gap past the insulator, but supply voltage can no longer pass through the protection device. The device ignites at a lower level than the flashover level of the insulator, and the discharge passes through the protection. Birds, other animals or branches straying onto the device do not activate the protection. The crossarm must be earthed. For installation, the SDI46.7 series is used, in which the protection device is installed in the crossarm pin and the arcing horn in the conductor. The surge arrester is installed onto the crossarm with an adjustable mounting bracket. The spark gap is adjusted to the required value: 80 mm. The arcing horn is equipped with an insulation piercing connector. Three sets per crossarm are required.



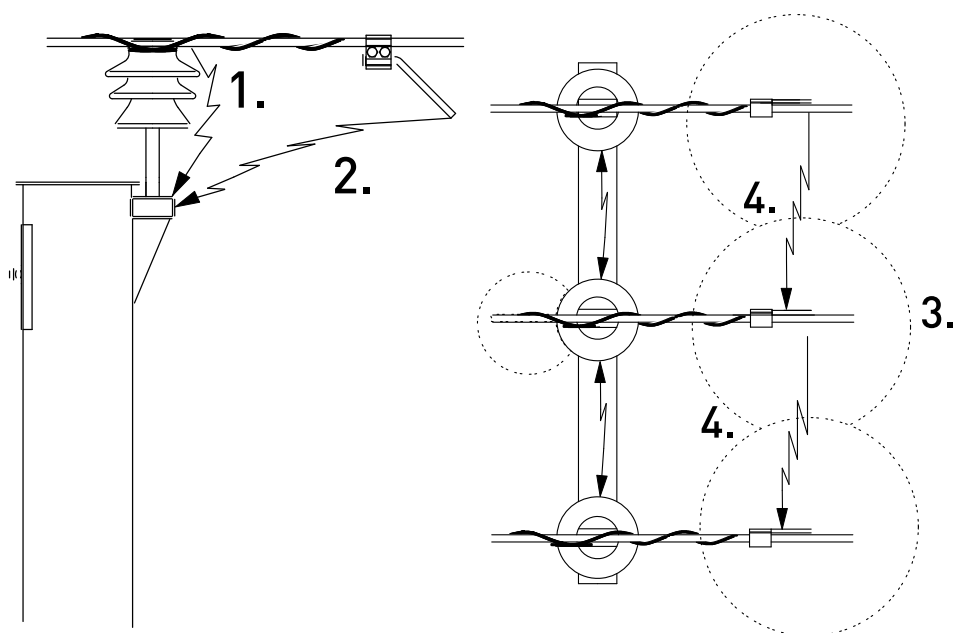
Arc Protection Devices

Arc Protection Device (APD)

Arc protection devices are designed to direct the arc generated to a sufficient distance from the conductor and insulator. An arc protection device implemented with an arcing horn is recommended for pin and line post insulators. We also recommend power arc devices (PAD) for branching and tension insulators (see p. 28).

While it is burning, the arc will not damage the conductor itself, but ignite over the insulator (1). After this, the arc will move along the Al wire twisted onto the insulator's neck to the arcing horn (2). While burning at the end of the horn, the arc ionises the air, making it conductive (3) and creates a short circuit between the phases (4), at which point the circuit breakers are tripped.

The distance between the horns must be no greater than the CC phase spacing for covered conductor. Installation is performed through the insulation, avoiding the need to strip the conductor. The installation of a connector will not damage the mechanical strength of the conductor; this has been proven in several tension and vibration tests.



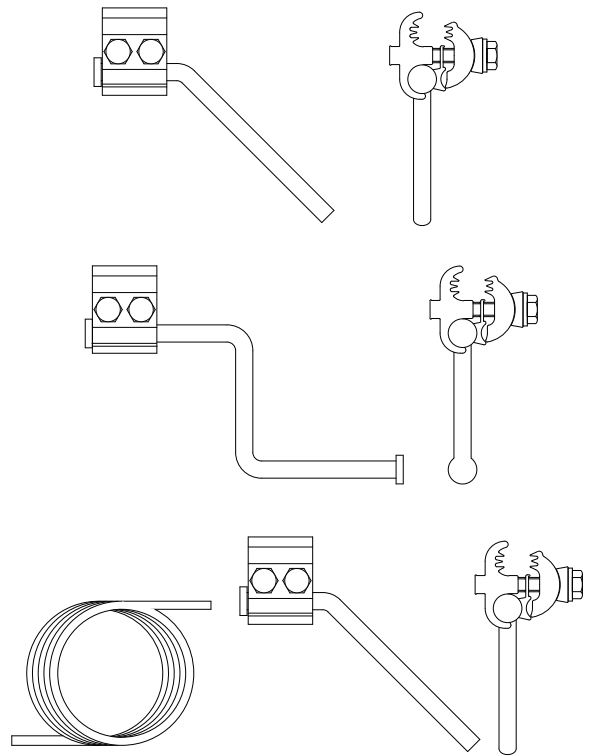
Arc protection devices can also easily be installed afterwards if fault statistics so require. In network, an arc protection device should be installed on the side of the load, and in a ring network on both sides of the insulator. Arc protection devices have also been approved as mounting points for screw-on temporary earth tools and can be used with pin, tension, and suspension insulators. For small short circuit currents, arc protection connectors with double wire must be used. In such cases, two 25 mm² Al binding wires are installed in the same way as a single wire.

Installing Connectors

Before beginning installation, you should carefully read the installation instructions, which explain the installation methods in detail.

When installing the arc protection connectors SEW20.1, SEW20.2 or SEW20.3, connectors SEW21.1, SEW21.2 or SEW21.3, there is no need to remove the conductor covering (see figure). The connector is equipped with an insulation piercing feature. The grease in the connectors must not be removed, since this will contribute towards ease of installation and protect the installation section from dirt, dust and corrosion.

Install the connector carefully and according to the installation instructions, tightening it to nominal torque of 40 Nm with a torque wrench. Extreme care must be taken when installing in subzero conditions. Arc protection connectors must not be reused. For phase spacing over 60 cm and with low short-circuit currents, arc protection devices do not adequately protect the conductor and you must therefore choose another method of protection, e.g. a power arc device.



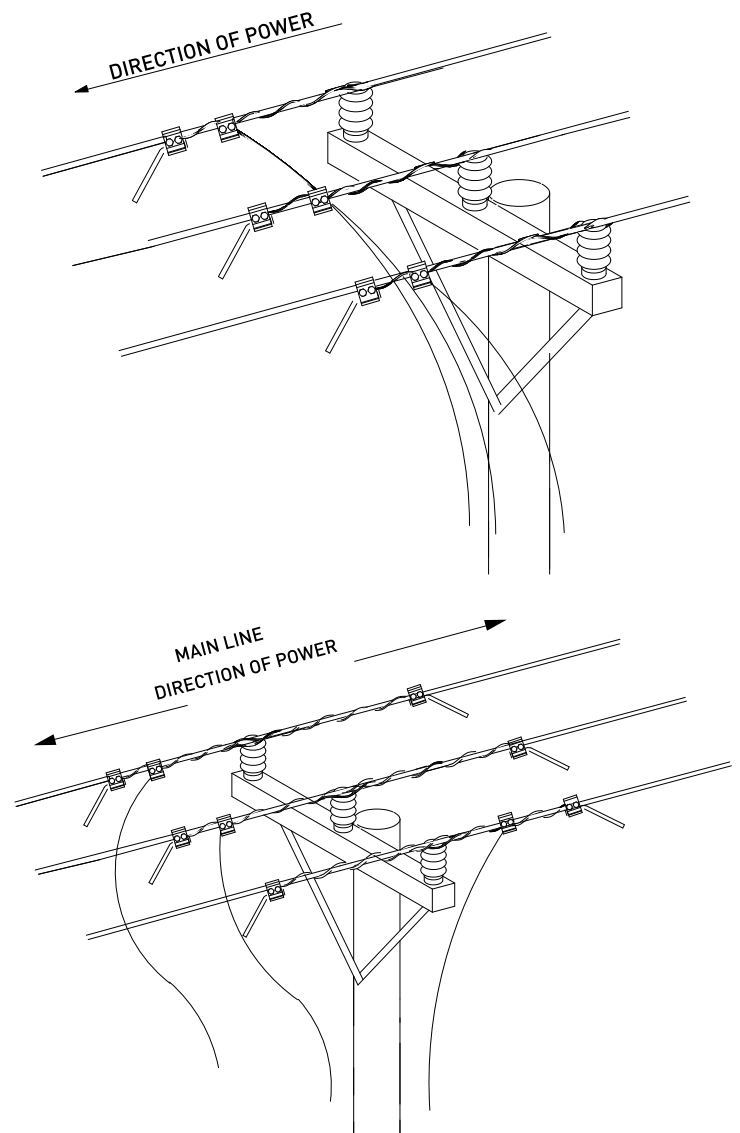
Arc Protection Device for a Branch Pole

On a branching pole we recommend the use of power arc devices with tension insulators (see p. 28). However, in exceptional cases, arc protection devices can be used.

Radially operated covered main line should be branched by installing branching connectors on the load side of the crossarm between the arc protection devices and the crossarm (see figure).

Ring operated covered or bare main lines should be branched by installing branching connectors on the load side of the crossarm between the arc protection devices and the crossarm (see figure).

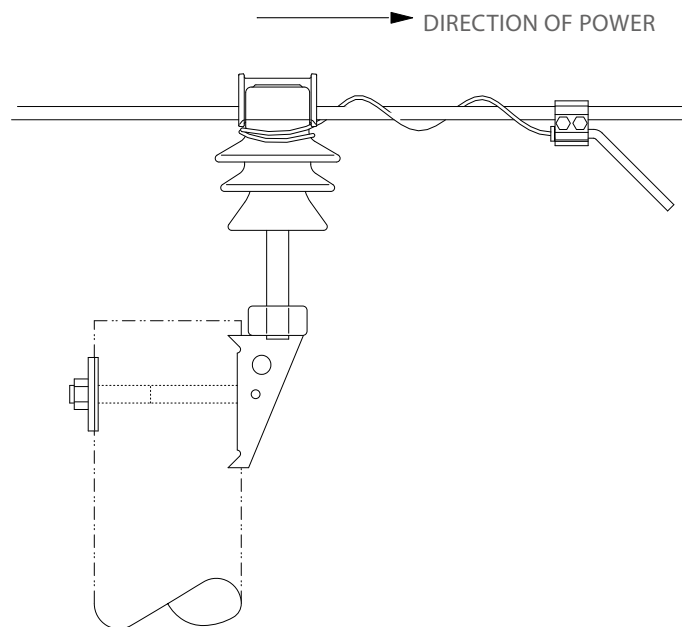
If covered main line may be fed also from branch line, the connecting wires (down leads) must be bare. Exceptions to this are pole structures, in which SDI90-series tension insulators equipped with arching horns SDI10.2 or surge arresters or current limiting devices are used. In such cases connecting wires may be covered conductors.



Installing Arc Protection Devices

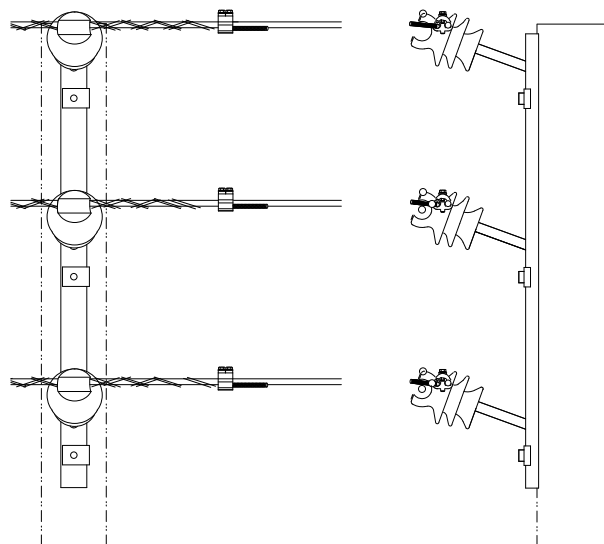
Horizontal Crossarm, Radial Network, One Line on Pole

In a radial network, the arc protection connectors must be installed on the side of the load with the horn facing down. The Al wire used to bind the conductor must have a cross-section of 25 mm², and the end of the wire closest to the connector must be installed in the connector. If pre-formed helical ties are used, the arc protection devices must be connected with a separate 25 mm² Al wire to the insulator neck so that it is wound twice around the conductor and twice around the insulator neck.



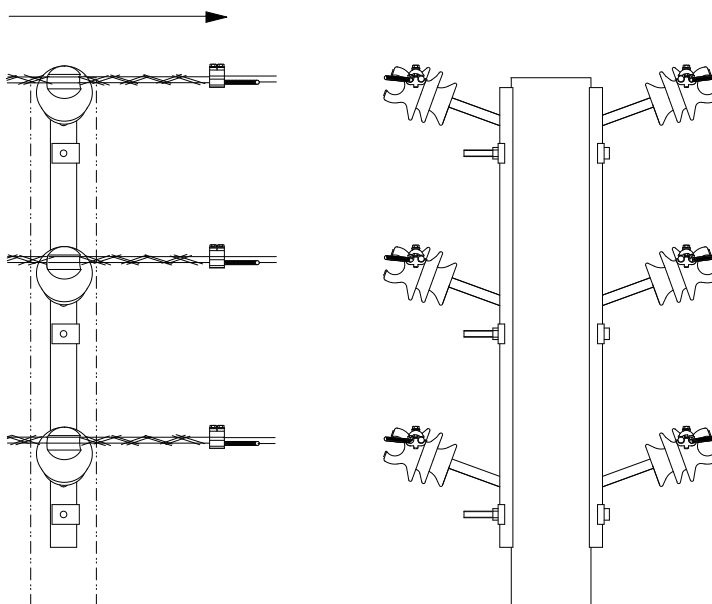
Vertical Crossarm, Radial Network, on Line

In a radial network, the arc protection connectors must be installed on the side of the load with the horn facing out. The Al wire used to bind the conductor must have a cross-section of 25 mm², and the end of the wire closest to the connector must be installed in the connector. If pre-formed helical ties are used, the arc protection devices must be connected with a separate 25 mm² Al wire to the insulator neck so that it is wound twice around the conductor and twice around the insulator neck.



Vertical Crossarm, Radial Network, Double Line

In a radial network, the arc protection connectors must be installed on the side of the load with the horn facing out. The Al wire used to bind the conductor must have a cross-section of 25 mm², and the end of the wire closest to the connector must be installed in the connector. If pre-formed helical ties are used, the arc protection devices must be connected to the insulator neck with a separate 25 mm² Al wire so that it is wound twice around the conductor and twice around the insulator neck.

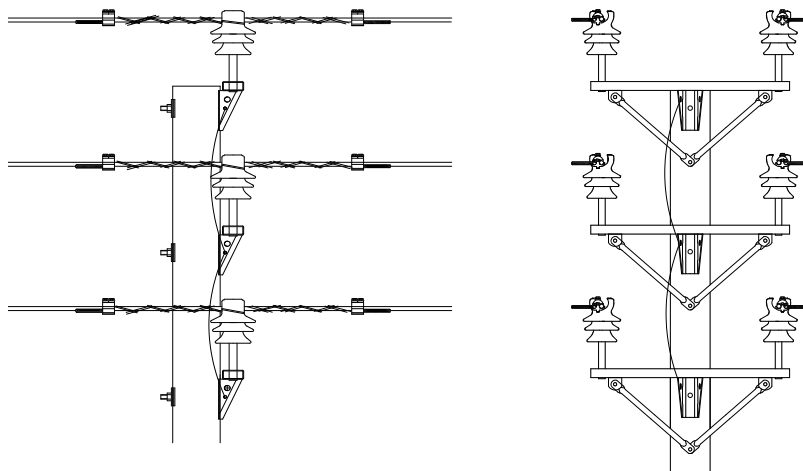


Horizontal Crossarm, Ring Network, Double Line

In a ring network, the arc protection connectors must be installed on both sides of the insulator with the horn facing out. The Al wire used to bind the conductor must have a cross-section of 25 mm², and the ends of the wire closest to the connectors must be installed in the connectors. If pre-formed helical ties are used, the arc protection devices must be connected to the insulator neck with a separate 25 mm² Al wire.

The wire is wound twice around the insulator neck and at least twice around the conductor, after which the ends of the Al wire are installed in the connectors.

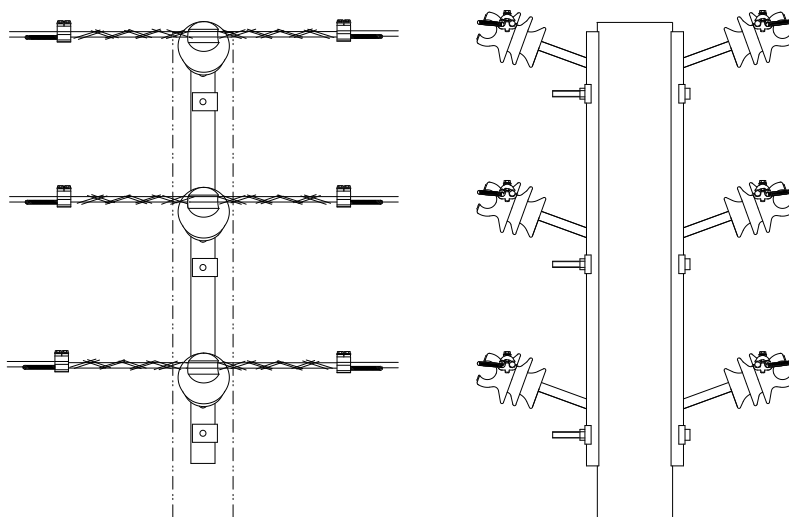
The crossarms must be connected to each other with a 50 mm² minimum Cu conductor.



Vertical Crossarm, Ring Network, Double Line

In a ring network, the arc protection connectors must be installed on both sides of the insulator with the horn facing out. The Al wire used to bind the conductor must have a cross-section of 25 mm², and the ends of the wire closest to the connectors must be installed in the connectors. If pre-formed helical ties are used, the arc protection devices must be connected to the insulator neck with a separate 25 mm² Al wire.

The wire is wound twice around the insulator neck and at least twice around the conductor, after which the ends of the Al wire are installed in the connectors.

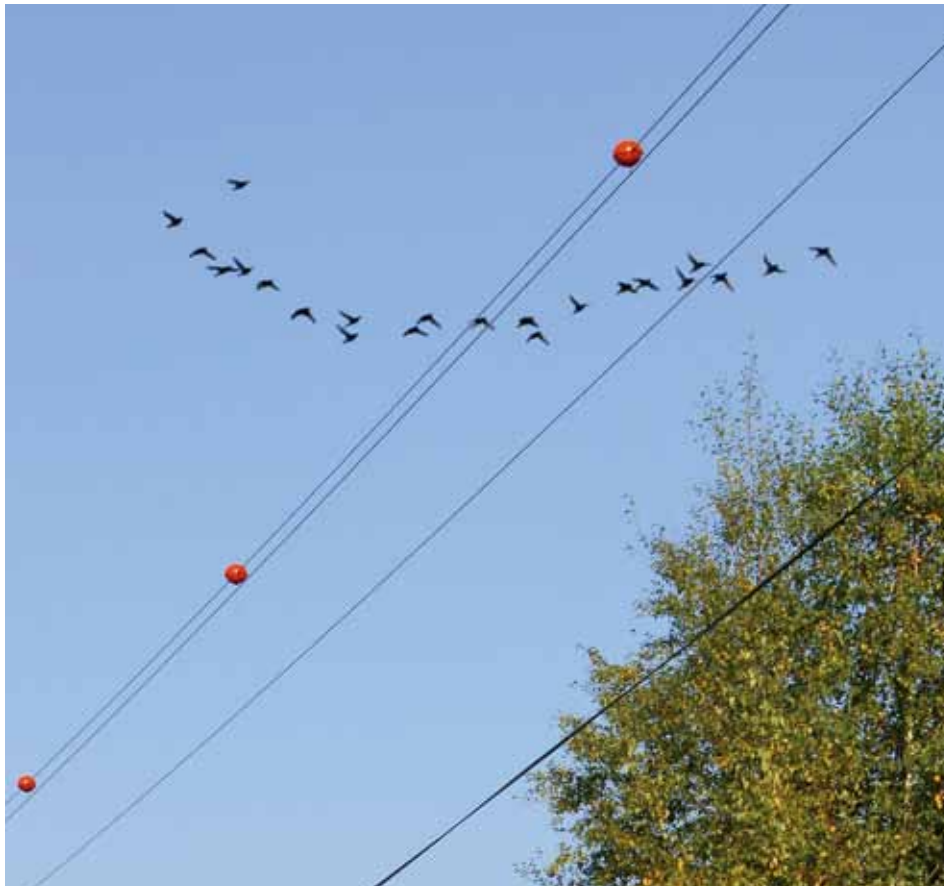


Additional Protection

Surge Arrester

Surge arresters protect the conductor as well as other network components in case of atmospheric, switching or power frequency overvoltages. They are mostly used with pole transformers and terminal poles of underground cables. Ensto's SGA surge

arresters complete our solutions designed for fault free distribution of electricity. The surge arresters have been developed to endure the vast temperature variations that are common in the Nordic countries and they are designed and type tested according to IEC60099-4:2004 standard.



Protection from Birds

Covered conductors are not as vulnerable to damage and disruption caused by birds or branches as traditional, bare conductors. However, smaller phase distance of covered conductors increases the risk of such short circuits on cross arms. This risk can be diminished with e.g. twig protector, preventing branches from sliding along the covering, and bird protection that - when installed onto live parts - prevents birds and branches from touching live parts. Insulators can also be protected with SP45.3 bird protection sets.

Radio Interference

Radio interference refers to partial discharges that may cause interference in electronic devices. With covered conductors, the main sources of radio interference are the following:

1. Crossarms for line angle, when an ordinary overhead line suspension clamp is used. No interference occurs when using the radio interference-tested suspension clamp SO181.6 with pulling wheel.
2. Crossarms for line angle, when an ordinary pulling wheel suspension clamp (SO181) is used. No interference occurs when using the radio interference-tested SO181.6 suspension clamp with pulling wheel.
3. Radio interference may also be generated in the oxidized cups and pins of glass insulators. This problem can be avoided by using composite insulator SDI90.

Installation

Installing Connectors

For covered conductors, the insulation piercing connectors SLW25.2 and arc protection connectors SEW20, SEW20.1, SEW20.2 or SEW20.3 as well as corresponding SEW21 series are recommended. If the conductor is stripped, it is possible to use SL4.25 or SL8.21 connectors, which can be protected by using plastic insulation covers SP15 or SP16.

When installing connectors, the main rule is that the branch connector should always be located between the arc protection connector and crossarm. For this reason, the arc protection connectors must be installed at an adequate distance from the crossarm so that the connection can be made properly. Bare or covered conductors can be used as branch and down leads.

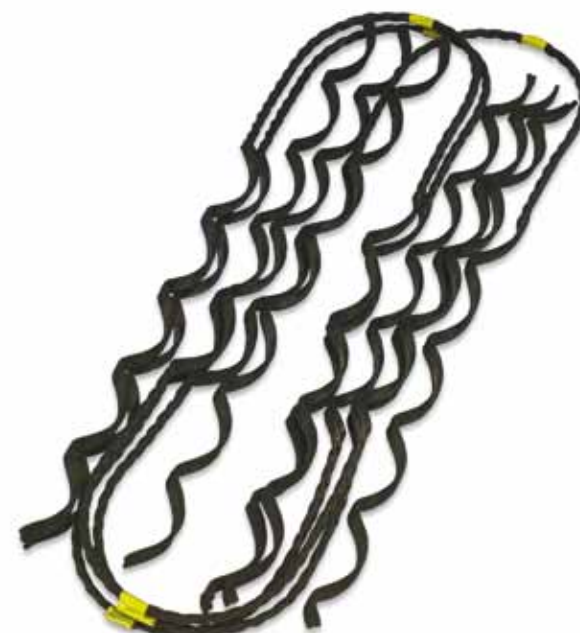


Tensioning of the Conductors

Conductors are tensioned by evenly tensioning each conductor. The sag and tension tables and recommendations of conductor manufacturer should be utilized.

Tying Conductors

Conductors can be tied to the top or neck of an insulator with helical ties or with aluminum wire. When using pre-tensioned helical ties, e.g. CO35, CO70, CO120, SO115 series or SO216 series, two ties are installed for each conductor. Only 25 mm² wire may be used for connecting arc protection connectors to insulator neck. 16 mm² is not suitable for arc protection.



Temporary Earthing

Temporary earthing must be performed in the same way as for bare overhead lines, i.e. a covered conductor has to have points of attachment for temporary earth equipment at adequate intervals. These temporary earth points must be located so close to a pole that temporary earthing can easily be made from the pole. Temporary earthing can be made with the arc protection connector SEW20.1 alternatively SEW21.1 or temporary earth connector SEW20.3 alternatively SEW21.3, which also acts as an arc protection device. Live-line connector SL36 can also be used with bail PSS923. Approved screw-on temporary earth equipment, e.g. CT86.5 (5 kA) or CT86.8 (8 kA) must be used for temporary earthing.





Bare Conductor System

Ensto's assortment for the conventional Bare Conductor Line Networks covers most common conductors. The comprehensive range of the accessories provides a simple and economic system for line erection. The products comply with the most commonly

used European standards. Our accessories are designed in co-operation with power supply companies. They are easy to install and have a long service life in extremely hard climatic conditions.

Ensto accessories for Bare Conductor System are presented on pages 42-47.



Universal Cable System 12-36 kV

Universal cables can be installed in demanding conditions underground, in water or in air. Ensto has designed a range of special accessories for universal cable systems. Our long experience of demanding circumstances has helped us

to develop reliable and safe accessories. However, because there are so many different manufacturers of universal cables the suitability of the accessories should always be confirmed by the cable manufacturer. Ensto accessories for Universal Cable System can be found on pages 48-49.

Also Ensto Underground Solutions offer a wide range of strong and reliable joints and terminations. There is a separate Ensto Underground brochure, which can be found in our web pages www.ensto.com - Brochures.





Network Automation

The French Ensto Novexia is a designer and manufacturer of equipment for distribution grids: medium voltage switches with remote controls for overhead lines, pole mounted circuit breakers to protect low voltage overhead lines, distribution panels and fault detectors for underground cable networks.

Ensto Novexia's product offering with comprehensive services (training, maintenance and repair) complements Ensto's overall offering for distribution grids, especially in the area of network automation for the Smart Grid. The clientele includes e.g. electrical and railways utilities, distribution companies and industry. The offering covers load break switches with

- air break technologies with glass, synthetic or porcelain insulators
- SF6 break technology
- vacuum break technology with solid insulation.

Auguste is a SF6 insulated overhead switch family designed for full-load breaking up to 630A of overhead electricity lines up to 36kV. Auguste suits all networks types, especially those requiring frequent operations in severe weather conditions.

IA and ISAR are air break disconnecter switch families with rated currents up to 400A.

Ensto Crossarms and Pole Accessories for Medium Voltage Systems

Ensto has a wide range of crossarms and pole accessories for medium voltage lines. Our crossarms have been in use in Nordic countries for decades.

Ensto's crossarms cover most typical products for

- PAS system with pin insulators
- BLL/BLX system with line post insulators
- Bare MV systems.

They are designed for installation on wooden, steel or concrete poles. Ensto's crossarms are made of corrosion resistant, hot-dip galvanized steel. The construction suits for straight lines, angles up to 90 degrees and terminal poles.

In addition to standard models Ensto also supplies 24 and 36 kV special crossarms. We also offer tailor made crossarms according to

special requirements of our customers.

Ensto also provides a very vast pole accessory portfolio.

Ensto offers

- Finished stay wire sets
- Eye-bolts and stay anchors
- Stay anchors for rock installations
- Pole braces for wooden poles
- Hooks
- Pole reinforcers for wooden poles
- Pole foundations for marsh poles.



Tools

Ensto has a wide range of tools for network building to facilitate the installation work. The range includes e. g. ratchet, torque and fork wrenches, wedges, wire stringing wheels, pole climbing irons, dynamometers and swivel for wire linking. All our tools can be found in our Ensto Tools catalogue, www.ensto.com - Brochures.



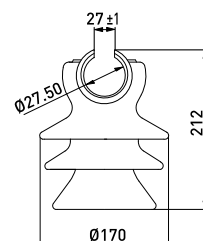
Product information

24 kV Covered Conductor Solution

Pin insulator SDI37

SDI37 is used with bare wires or covered conductors. Suitable for installation on pin SOT24 (SFS 4385). The plastic sleeve in the top-groove of the insulator enables pulling of conductor without using pulleys. The conductor can be tied to the top-groove or to the neck. In angles, always tie to the neck. Creepage distance 325 mm. Neck diameter 85 mm.

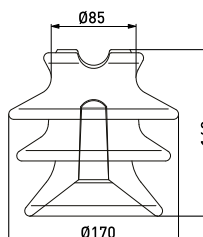
Product code	EAN	Highest system voltage kV	Breaking load kN	Insulator pin	Weight (kg)	Pack./pcs
SDI37	6418677408731	24	12.5	SOT24	3.8	3



Pin insulator SDI30

SDI30 is used with bare wires or covered conductors. Suitable for installation on pin SOT24 (SFS 4385). The conductor can be tied to the top-groove or to the neck. In angles, always tie to the neck. Creepage distance 325 mm. Neck diameter 85 mm.

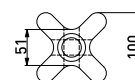
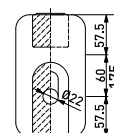
Product code	EAN	Highest system voltage kV	Breaking load kN	Insulator pin	Weight (kg)	Pack./pcs
SDI30	6418677408748	24	12.5	SOT24	3.37	3



Stay insulator SDI4.5

Porcelain stay insulator is suitable for installation in stay wires up to 52 mm². Conforms with standard SFS 3741. Creepage distance is 110 mm.

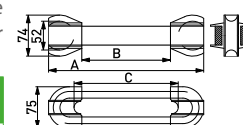
Product code	EAN	Highest system voltage kV	Max continuous load kN	SMFL kN	Weight (kg)	Pack./pcs
SDI4.5	6418677418556	24	35	120	2.15	6



Composite stay insulators SDI70.24

SDI70.24 insulator has high mechanical and electrical capacity combined with light weight. The insulating section is made of glass fibre impregnated with UV stabilized resin and twice covered silicon rubber. The end thimble is made of aluminium and dimensioned for minimum 52 mm eyelet. SDI70.24 is suitable for installation on stay wires up to Fe52 and is tested according to IEC 60383. Creepage distance 160 mm.

Product code	EAN	Highest system voltage kV	Max continuous load kN	SMFL kN	Weight (kg)	Pack./pcs
SDI70.24	6418677401787	24	35	>180	0.8	15



24 kV Covered Conductor Solution

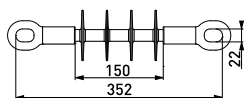
Composite insulators SDI90 series

SDI90.x composite insulators are the next step on Ensto's composite insulator series. SDI90.x insulators fulfill the requirements of IEC 61109 The sheds of the insulators are made of highly hydrophobic silicon rubber. The core is made of corrosion resistant fiber glass rod and the end fittings are made of hot-dip galvanized steel. Tension insulators SDI90.15x are meant to be used on 10 kV up to 24 kV depending on pollution class requirements. SDI90.28x are meant to be used on 24 kV up to 36 kV. Creepage distance of SDI90.15x is 391 mm and creepage distance of SDI90.28x is 613 mm.

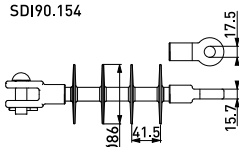


Product code	EAN	End fittings	Highest system voltage kV	Weight (kg)	Pack./pcs
SDI90.150	6418677422669	eye / eye	24	0.995	3
SDI90.154	6418677422706	tongue/clevis	24	1.2	3
SDI90.280	6418677422768	eye / eye	36	1.08	10
SDI90.282	6418677422782	socket / eye	36	1.3	3
SDI90.283	6418677422799	ball / socket	36	1.1	3
SDI90.284	6418677422805	clevis / tongue	36	1.3	3
SDI90.285	6418677422812	clevis / ball	36	1.2	3
SDI90.288	6418677422843	socket / tongue	36	1.3	3
SDI90.350	6438100304904	eye / eye	36	1.43	10

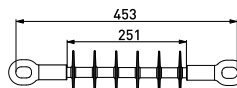
SDI90.150



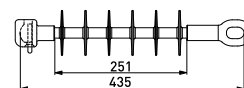
SDI90.154



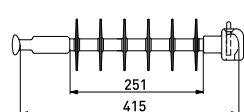
SDI90.280



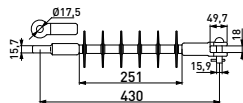
SDI90.282



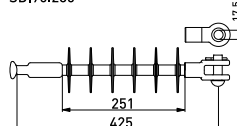
SDI90.283



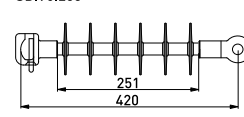
SDI90.284



SDI90.285



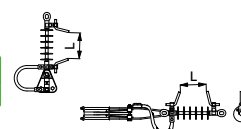
SDI90.288



Power arc device SDI27.1

Power arc device SDI27.1 is used with SDI90.x composite insulators on angle poles with suspension clamp SO181.6 and on tension poles with tension clamps SO255 or SO256. The package includes arching horns and 95 mm² conductor with cable lugs. Spark gap is adjusted to 100-150 mm on 24-36 kV.

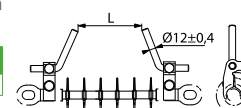
Product code	EAN	Weight (kg)	Pack./pcs
SDI27.1	6418677419133	0.83	9



Power arc device SDI10.2

Used as arc protection with tension insulator type SDI90.x on covered conductor lines. SDI10.2 includes two horns, which are fixed to the metal parts of the tension insulator so that the peaks are towards each other and the distance between the peaks is adjustable.

Product code	EAN	Weight (kg)	Pack./pcs
SDI10.2	6418677410673	0.58	15



24 kV Covered Conductor Solution

Power arc devices SDI20.3, SDI20.31 and SDI20.2

Used on straight line cross arms for making spark gap protection. The set includes one arc protection device SEW20.1 and one arc horn. The spark gap is adjustable. SDI20.3 is for horizontal pin insulator crossarm and SDI20.31 is for vertical pin insulator crossarm. SDI20.2 is for linepost insulator crossarm.

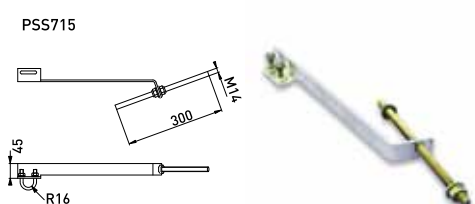
Product code	EAN	Crossarm	Weight (kg)	Pack./pcs
SDI20.3	6418677401534	Horizontal	1.6	9
SDI20.31	6418677418563	Vertical	1.6	9
SDI20.2	6418677418600	Horizontal	1.25	12



Spark gap horn PSS715

Used on straight line cross arm for making spark gap protection on covered conductor line. The spark gap is adjustable. On a wooden crossarm, the pins must be connected with min. 50 mm² Cu-wire. PSS715 is for horizontal crossarm, PSS715.1 is for vertical crossarm.

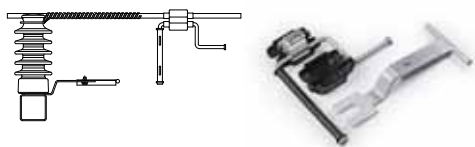
Product code	EAN	Weight (kg)	Pack./pcs
PSS715	6418677401312	1.135	12
PSS715.1	6418677418570	1.135	12



Power arc device SDI25

Arc protection device for covered conductors with line post insulators. The spark gap is adjustable. The distance between the spark gap is 100 - 150 mm at 24 kV.

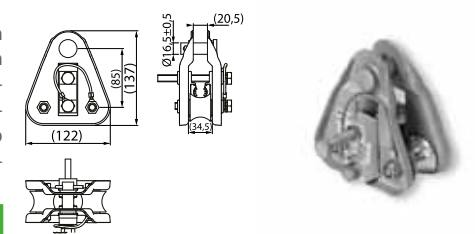
Product code	EAN	Weight (kg)	Pack./pcs
SDI25	6418677401541	1.6	3



Suspension clamp SO181.6

Suspension clamp with pulley for covered conductors PAS/BLL AIMgSi. The clamp also functions as an installation pulley thereby completely eliminating the need for separate pulleys. Conductor joints with diameter under 30 mm can be pulled through the suspension clamp. The suspension clamp has no loose parts, so it is easy to handle even in difficult conditions. The insulation piercing contact part has a silicone seal which prevents the moisture getting into the conductor. The insulation piercing clamp piece is connected to the body with a wire for balancing the potential. The product is tested for radio interference. SMFL 30 kN. Suspension bolt 16 mm.

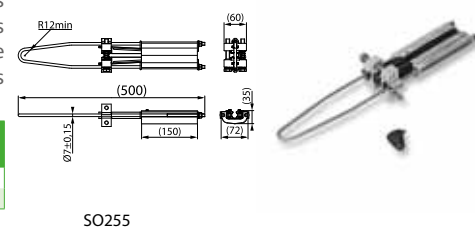
Product code	EAN	For conductor mm ²	Conductor diameter mm	Tightening torque Nm	Weight (kg)	Pack./pcs
SO181.6	6418677459849	PAS/BLL 50-157 AIMgSi	12.7-22.3	40	1.224	3



Waterproof tension clamps SO255 and SO255.2

For dead-ending covered conductors. The clamp is very easy to install compared with the other clamps on the market as there is no need to peel the conductor. The insulation piercing part of the clamp keeps the parts of the clamp at the same potential and prevents partial discharges and radio disturbances. The insulation piercing part also makes it possible to add an arc protection device to the clamp. SO255.2 comes with an adapter for hoist hook.

Product code	EAN	For conductor mm ²	Conductor diameter mm	Tightening torque Nm	Weight (kg)	Pack./pcs
SO255	6438100303846	PAS/BLL 50-70 AIMgSi	12.7-16.7	40	1.133	9
SO255.2	6438100303860	PAS/BLL-T 50-70 AIMgSi	12.7-16.7	40	1.25	9

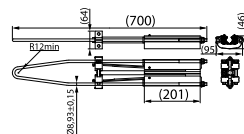


24 kV Covered Conductor Solution

Waterproof tension clamp SO256 and SO256.2

For dead-ending covered conductors. The clamp is very easy to install compared with the other clamps on the market as there is no need to peel the conductor. The insulation piercing part of the clamp keeps the parts of the clamp at the same potential and prevents partial discharges and radio disturbances. The insulation piercing part also makes it possible to add an arc protection device to the clamp.

Product code	EAN	For conductor mm ²	Conductor dia. mm	SMFL kN	Weight (kg)	Pack./ pcs
SO256	6438100303822	PAS/BLL 95-157 AlMgSi	16.1-22.3	30	2.53	3
SO256.2	6438100303839	PAS/BLL 95-157 AlMgSi	16.1-22.3	30	2.79	3



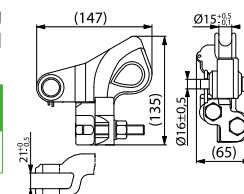
SO256



Tension clamp SO85

For dead-ending bare and covered conductors. The covered conductor has to be peeled before installing the clamp. The body is made of corrosion resistant aluminium alloy and the bolts are hot dip galvanized steel. Breaking strength 35 kN. Bolts 16 mm

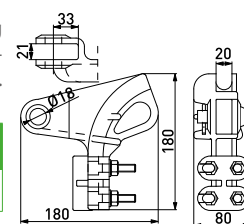
Product code	EAN	For conductor mm ²	Conductor diameter mm	Tightening torque Nm	Weight (kg)	Pack./pcs
SO85	6418677405112	AAAC 25 - 150, PAS 35-150, ACSR 25 - 99	6-14.9	55	0.743	25



Tension clamp SO105

For dead-ending bare and covered conductors. The covered conductor has to be peeled before installing the tension clamp. The body is made of corrosion resistant aluminium alloy and the bolts are hot-dip galvanized steel. The conductor is inserted on one side and clamped by four bolts. Breaking strength 50 kN. Suspension bolt 16 mm.

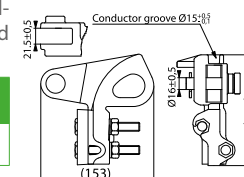
Product code	EAN	For conductor mm ²	Conductor diameter mm	Tightening torque Nm	Weight (kg)	Pack./pcs
SO105	6418677404030	AAAC 95 - 241, ACSR 63 - 98, AACSR 131, PAS/BLL 95 - 157	10-20	44	1.208	10



Tension clamp SO146

Used for dead-ending bare and covered conductors. The covered conductor has to be peeled before installing the clamp. The body is made of corrosion resistant aluminium alloy and the bolts are hot-dip galvanized steel. The conductor is inserted on one side and clamped by two bolts. Breaking strength 35 kN.

Product code	EAN	For conductor mm ²	Conductor diameter mm	Tightening torque Nm	Weight (kg)	Pack./pcs
SO146	6418677404436	AAAC 25 - 150, Al/Fe 25 - 99, PAS/BLL 35 - 150	6-15	55	0.9	10



Helical tie sets CO and SO

Used with covered conductors for tying the conductors to the insulators. Can be used as both top and side ties. Easy to install without tools. The tie is installed on the insulation of the covered conductor. The sets include 6 pcs ties (one set/cross arm). The right size is easy to recognise by the colour code.

Product code	EAN	Covered conductors mm ²	Color code	Insulator neck mm	Weight (kg)	Pack./pcs
CO35	6418677409165	35-50	Yellow	85	0.527	25
CO70	6418677409172	70-95	Green	85	0.65	25
CO120	6418677409134	120-150	Black	85	0.71	25
SO115.5073	6418677404085	35-50-62	Yellow	73	0.633	25
SO115.9573	6418677404108	70-95-99	Green	73	0.615	25
SO115.5085	6418677404092	35-50-62	Red	85	0.55	25
SO115.9585	6418677404115	70-95-99	Blue	85	0.617	25
SO115.150	6418677414329	120-150-157	White	73-85	0.665	25
SO216.62	6418677404566	62	White	73-85	0.63	25
SO216.99	6418677404573	99	Red	73-85	0.687	25
SO216.157	6418677404542	157	Blue	73-85	0.801	25
SO216.241	6418677404559	241	Yellow	73-85	1.6	300

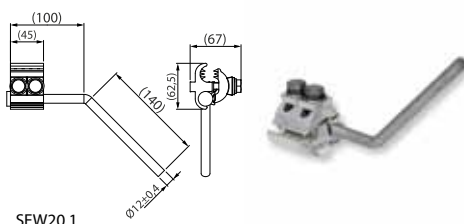


24 kV Covered Conductor Solution

Arc protection device SEW20.1 and SEW21.1

Used with covered conductors for arc protection. There is no need to peel the covered conductor. The connector includes an arc protection horn suitable also for use with temporary earthing devices with a screw fixing. The connector has a place for installing the Al-thread, which must be connected to the neck of the insulator.

Product code	EAN	For conductor mm ²	Tightening torque Nm	Weight (kg)	Pack./pcs
SEW20.1	6438100305529	PAS/BLL AI 50-157	40	0.492	24
SEW21.1	6438100305505	PAS/BLL 150-241	40	0.481	24

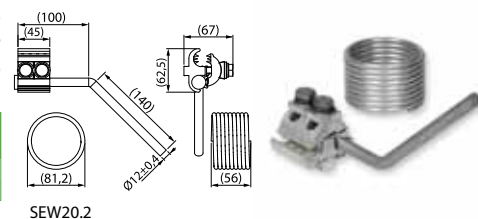


SEW20.1

Arc protection device SEW20.2 and SEW21.2

Used with covered conductors for arc protection. There is no need to peel the covered conductor. The connector includes an arc protection horn suitable also for use with temporary earthing devices with a screw fixing. The connector has a place for installing the Al-thread, which must be connected to the neck of the insulator. The products includes a 25 mm² Al thread 2.1 m.

Product code	EAN	For conductor mm ²	Tightening torque Nm	Weight (kg)	Pack./pcs
SEW20.2	6438100305543	PAS/BLL AI 50-157	40	0.627	24
SEW21.2	6438100305512	PAS/BLL 150-241	40	0.566	24

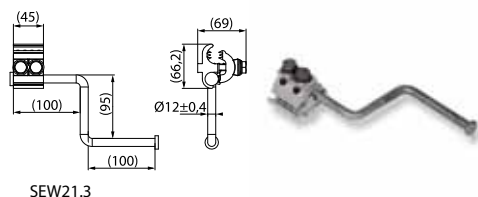


SEW20.2

Temporary earthing connector SEW20.3 and SEW21.3

Used as a temporary earthing connector where the arc protection devices SEW20.1 or SEW20.2 are not present. There is no need to peel the covered conductor. The connector includes an arc protection horn suitable for use with temporary earthing device with a screw fixing. The connector has a place for an Al-thread, so it also works as an arc protection device.

Product code	EAN	For conductor mm ²	Tightening torque Nm	Weight (kg)	Pack./pcs
SEW20.3	6438100305581	PAS/BLL 50-157	40	0.56	24
SEW21.3	6438100306281	PAS/BLL-T 150-241 AlMgSi	40	0.56	24

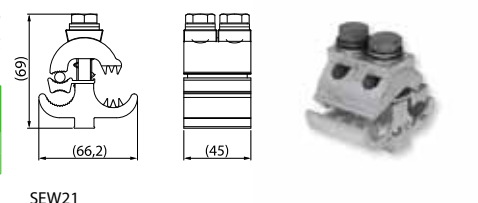


SEW21.3

SEW20 and SEW21

Used as a branching connector from covered to bare conductors, for aluminium to aluminium connections where no mechanical tension is involved. The body is made of corrosion resistant aluminium alloy, and the bolts are hot-dip galvanized. The parallel conductor groove with teeth is brushed and prepared with a joint compound.

Product code	EAN	For conductor mm ²	Tightening torque Nm	Weight (kg)	Pack./pcs
SEW20	6438100304553	PAS/BLL-T 50-157 AlMgSi	40	0.266	25
SEW21	6438100304560	PAS/BLL 150-241	40	0.284	25

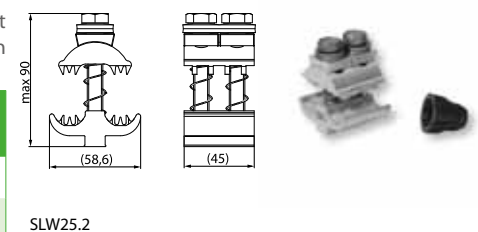


SEW21

Insulation piercing connectors SLW25.2 and SLW25.22

Used as a branch connector for covered conductors. There is no need to peel the covered conductor because the connector is equipped with insulation piercing teeth. The connector is made of corrosion resistant aluminium and the bolts are hot-dip galvanized steel. The connector is prepared with joint compound. Can be used with insulation cover SP16. SLW25.22 is equipped with shear head bolt.

Product code	EAN	Main conductor mm ²	Branch conductor mm ²	Conductor diameter mm	Tightening torque Nm	Plastic cover included	Weight (kg)	Pack./pcs
SLW25.2	6438100304201	AI 50-157 AlMgSi	AI 50-157 AlMgSi	12.7-22.3	40		0.246	25
SLW25.22	6438100304218	AI 50-157 AlMgSi	AI 50-157 AlMgSi	12.7-22.3	40	SP16	0.246	20

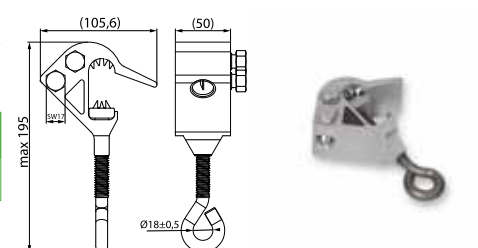


SLW25.2

Live-line connector SLW36

The connector SLW36 is made of corrosion resistant aluminium and the bolts of stainless steel. The installation can be made with a live-line stick (e.g. CT48). Branching and temporary earthing can be made with SLW36 and SL30 by using stirrups PSS923 and PSS924.

Product code	EAN	Main conductor mm ²	Branch conductor mm ²	Tightening torque Nm	Weight (kg)	Pack./pcs
SLW36	6438100304577	PAS/BLL-T 50-157 AlMgSi	PAS/BLL-T 50-157 AlMgSi	40	0.494	24



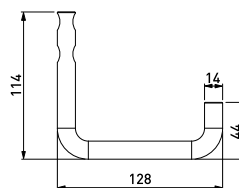
24 kV Covered Conductor Solution

Stirrup PSS923

Branching and temporary earthing can be made with SLW36 and SL30 by using stirrups PSS923 and PSS924. The stirrup is made of corrosion resistant aluminium. PSS923 is a stirrup of L-shape.

Product code	EAN	Weight (kg)	Pack./pcs
PSS923	6418677414299	0.109	100

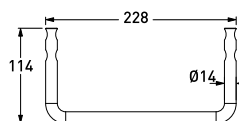
PSS923



Stirrup PSS924

Branching and temporary earthing can be made with SLW36 and SL30 by using stirrups PSS923 and PSS924. The stirrup is made of corrosion resistant aluminium. PSS924 is a stirrup of U-shape.

Product code	EAN	Weight (kg)	Pack./pcs
PSS924	6418677414305	0.181	50

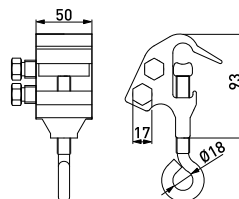


Live-line connectors SL30 and SL30.1

SL30 is used as a live-line branching connector for bare conductors. The connector is made of corrosion resistant aluminium and the bolts of stainless steel. The installation can be made with a live-line stick (e.g. CT48). Branching and temporary earthing can be made with SL30 and SLW36 by using stirrups PSS923 and PSS924. The stirrups are made of corrosion resistant aluminium. PSS923 is a stirrup of L shape and PSS924 is a stirrup of U shape. In SL30 branching point is downwards. In SL30.1 the branching point is on the side of the connector.

Product code	EAN	Main conductor mm ²	Branch conductor mm ²	Tightening torque Nm	Weight (kg)	Pack./pcs
SL30	6418677403705	Al 25-150	Al 25-150	40/44	0.476	24
SL30.1	6418677411533	Al 25 - 150	Al 25-150	40/44	0.45	24

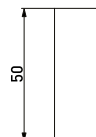
SL30



Sleeve PSS830

PSS830 is used with live-line connectors SL30, SL30.1 and SLW36, when branch conductor is copper. The sleeve is tin coated aluminium and it is installed into live-line clamp. The inner diameter of the sleeve is 16 mm.

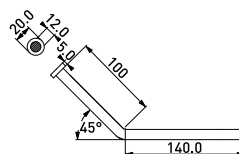
Product code	EAN	Cu mm ²	Weight (kg)	Pack./pcs
PSS830	6418677406737	25-95	0.008	30



PSS464-P

Used with covered conductors as an arc protection horn. The horn withstands 2-3 arcs 10 kA/1 s and after that, it has to be changed. The horn has been approved for fixing temporary earthing device with screw fixing.

Product code	EAN	Weight (kg)	Pack./pcs
PSS464-P	6418677452130	0.2	25

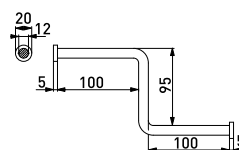


24 kV Covered Conductor Solution

Earthing horn PSS469-P

Used with covered conductors as a temporary earthing point. The temporary earthing device with screw fixing can be installed to the horn.

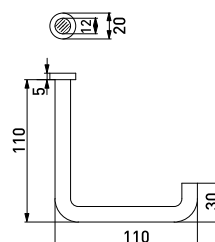
Product code	EAN	Weight (kg)	Pack./pcs
PSS469-P	6418677452147	0.3	25



Earthing horn PSS597

Used on pole transformers when temporary earthing is made on jumpers. The horn has been approved for screw type temporary earthing devices. The horn is installed on the conductor with SL4.25, SEW20 or SLW25.2 connectors and insulating covers. The earthing horns can be installed on different heights in the conductors.

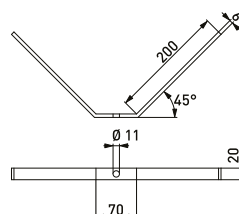
Product code	EAN	Weight (kg)	Pack./pcs
PSS597	6418677406584	0.2	25



Arc protection horn PSS463 for crossarm

Used with covered conductors on angle cross arms (SH153.10). The arc protection horn is hot-dip galvanized steel and is supplied with a bolt and a nut.

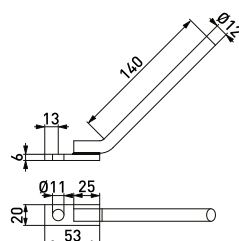
Product code	EAN	Weight (kg)	Pack./pcs
PSS463	6418677401268	0.53	25



Arc protection horn PSS465 for tension clamp

Used with dead-end clamps SO85, SO105 and SO146 on covered lines. The arc protection horn is made of hot-dip galvanized steel and supplied with a bolt and a nut.

Product code	EAN	Weight (kg)	Pack./pcs
PSS465	6418677401282	0.215	25



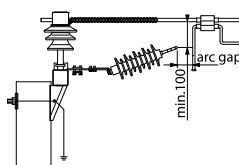
Current limiting arc horn SDI46 series

The sets include a surge arrester, a fixing bracket, an insulation piercing connector, an arc protection horn and a connector cover:

SDI46.7 and SDI46.710 are suitable for pin insulators.

SDI46.5 and SDI46.510 are suitable for line-post insulators.

Product code	EAN	Highest system voltage kV	Insulator attachment type	Weight (kg)	Pack./pcs
SDI46.7	6418677401626	24	PIN	3.0	1
SDI46.710	6418677419102	12	PIN	2.3	1
SDI46.5	6418677418631	24	Line-post	3.86	1
SDI46.510	6418677418655	12	Line-post	3.16	1



SDI46.7



24 kV Covered Conductor Solution

Current limiting device SDI3143.2

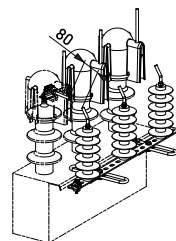
The use of current limiting devices on transformer covers is as beneficial as when used in the protection of covered conductors. The number of high-speed automatic reclosures can be reduced significantly compared to the widely used power arc devices – thus, a resistant and maintenance-free protection method is achieved. Ensto has renewed the product range of its current limiting devices for small transformers (< 200 kVA). A special attention has been given to easy usability:

- All necessary parts with one product code
- Easy to adjust surge arrester support
- Use of the familiar KG connector in connecting the bushing insulator of the transformer
- Easy to install protective covers

The set includes:

- 3 surge arresters
- 3 electrodes attached to the bushing insulator of the transformer
- 3 protective covers with fasteners
- A surge arrester support with fasteners

Product code	EAN	Weight (kg)	Pack./pcs
SDI3143.2	6418677453618	12.5	1



Surge arrester set SDI2024.10

Protection of pole mount transformers against atmospheric and switching overvoltages. Surge arrester have been designed and tested according to IEC 60099-4/2004.

A special attention has been given to easy usability:

- All necessary parts with one product code- Surge arrester rack is easy to adjust
- Use of the familiar KG connector in connecting the transformer bushing insulator to surge arrester
- Protective covers are easy to install

The set includes:

- 3 surge arresters $U_c = 20$ kV, $I_n = 10$ kA
- A surge arrester rack with fasteners
- 6 protective covers with fasteners
- 6 busbar connectors for connecting the transformer bushing insulators to surge arresters
- A busbar connector for grounding the surge arrester rack

Product code	EAN	Weight (kg)	Pack./pcs
SDI2024.10	6438100300586	23.95	1



Surge arrester set SDI2327.10

Protection of pole mount transformers against atmospheric and switching overvoltages. Surge arrester have been designed and tested according to IEC 60099-4/2004.

A special attention has been given to easy usability:

- All necessary parts with one product code
- Surge arrester rack is easy to adjust
- Use of the familiar KG connector in connecting the transformer bushing insulator to surge arrester
- Protective covers are easy to install

The set includes:

- 3 surge arrester $U_c = 23$ kV, $I_n = 10$ kA
- A surge arrester rack with fasteners
- 6 protective covers with fasteners
- 6 busbar connectors for connecting the transformer bushing insulators to surge arresters
- A busbar connector for grounding the surge arrester rack

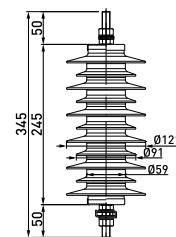
Product code	EAN	Weight (kg)	Pack./pcs
SDI2327.10	6438100300593	24.55	1



Surge arresters SGA

Protection of transformers, switchgears and transmission lines against atmospheric and switching overvoltages. Selection of arrester has to be carried out according to IEC 60099-4/2004.

Product code	EAN	Description	Weight (kg)	Pack./pcs
SGA1012.10	6418677457579	$U_c = 10$ kV, $I_n = 10$ kA, Class 1	2.0	1
SGA1518.10	6418677459122	$U_c = 15$ kV, $I_n = 10$ kA, Class 1	2.7	1
SGA2024.10	6418677453472	$U_c = 20$ kV, $I_n = 10$ kA, Class 1	3.86	1
SGA2327.10	6418677453489	$U_c = 23$ kV, $I_n = 10$ kA, Class 1	3.65	1
SGA2833.10	6438100303051	$U_c = 28$ kV, $I_n = 10$ kA, Class 1	6.5	1



SGA1518.10



24 kV Covered Conductor Solution

Automatic tension joint kits CIL

Suitable for covered conductors, which have to be peeled. The automatic joints are reliable and fast to make. The color codes make it easy to identify the right type. The wedges ensure a secure joint. The joint kits include a joint, an insulation sleeve and an abrasive band.

Product code	EAN	Conductor dia. mm	Color code	Weight (kg)	Pack./pcs
CIL66	6418677414251	5.81 – 8.6	orange/red	0.26	25
CIL67	6418677414268	9.27 – 12.06	yellow/grey	0.47	25
CIL68	6418677414275	12.75 – 14.86	pink/black	0.79	25
CIL69	6418677438899	14.73 – 18.40	green/brown	0.850	25



Spiral vibration dampers CO27 and CO28

Spiral Vibration Dampers are designed to control high frequency aeolian vibration and are particularly effective on small sized earth wires and cables. They do not impose a concentrated mass or clamping stress on the conductor or cable at the point of attachment and are therefore ideally suited for use on PAS/BLL, OPGW, OPCON and ADSS applications.

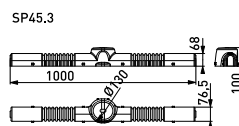
Product code	EAN	Covered conductors mm ²	Weight (kg)	Pack./pcs
CO27	6418677409141	35-50	0.46	1
CO28	6418677409158	70-157	1.0	1



Bird protector set SP45.3

SP45.3 bird protectors prevent failures created by birds or other animals in bare or covered lines. These protectors are suitable for different pin and line post insulators. They are also easy to install even in line angles or when the conductor is attached to the neck of the insulator. SP45.3 covers arc protecting devices (i.e. SEW20.2) in covered conductor lines and it is weather resistant. The SP45.3 bird protector is 1000 mm long. Extra length can be achieved in combination with SP31.3. One set consists of 3 units.

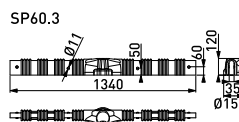
Product code	EAN	Weight (kg)	Pack./pcs
SP45.3	6418677405327	0.875	1



Bird protector set SP60.3

SP60.3 bird protectors prevent failures created by birds or other animals in bare or covered lines. This protector is suitable for different pin and line post insulators. It is also easy to install even in line angles or when the conductor is attached to the neck of the insulator. SP60.3 covers arc protecting devices (i.e. SEW20.2) in covered conductor lines and it is weather resistant. SP60.3 can be installed in a live line with the aid of special tools. Delivered in complete sets of 3 pcs.

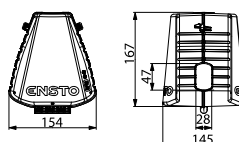
Product code	EAN	Weight (kg)	Pack./pcs
SP60.3	6418677441714	1.83	1



Bird protector set SP62.3

SP62.3 is a bird protection set for pulley suspension clamp SO181.6. The products are manufactured of weather and UV-resistance thermoplastic material. The bird protectors prevent failures created by birds or other animals or flying branches in bare or covered lines. The bird protectors are easy to install due to snap-on fixings.

Product code	EAN	Weight (kg)	Pack./pcs
SP62.3	6438100301163	0.390	3



Bird protector set SP63.3

SP63.3 is a bird protection set for dead-end clamp SO255. The products are manufactured of weather and UV-resistance thermoplastic material. The bird protectors prevent failures created by birds or other animals.

Product code	EAN	Weight (kg)	Pack./pcs
SP63.3	6438100305826	0.891	3

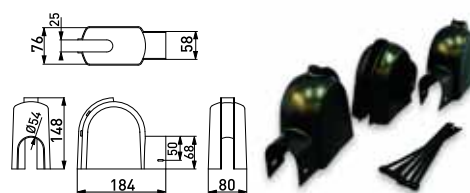


24 kV Covered Conductor Solution

Bird protector set SP46.3 for underground cable terminals

Prevents short-circuiting by large birds or airborne debris at surge arresters or cable terminals in medium voltage networks. Bare jumpers can be protected with flexible protectors SP31.3. Made of weather and UV resistant plastic. One set consists of 3 units.

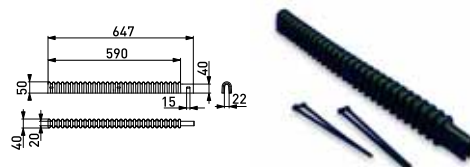
Product code	EAN	Weight (kg)	Pack./pcs
SP46.3	6418677405334	0.226	8



Cable protector set SP31.3

Flexible cover for jumpers or conductors close to insulators. Can be used together with SP36.3 for pin insulators or transformer bushings. Easy tie fixing. Made of weather and UV resistant plastic. One set consists of 3 units.

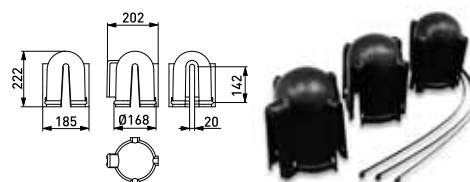
Product code	EAN	Weight (kg)	Pack./pcs
SP31.3	6418677405266	0.3	1



Bird protection set SP36.3

Used for bushings, insulators and surge arresters in dia. 100-180 mm. Can be used together with flexible protector SP31.3. Easy tie fixing. Made of weather and UV resistant plastic. One set consists of 3 units.

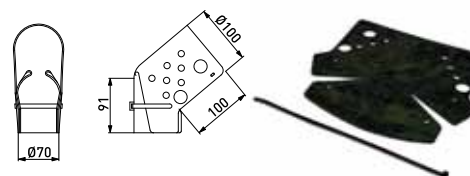
Product code	EAN	Weight (kg)	Pack./pcs
SP36.3	6418677405280	0.445	8



Bird protection set SP38.3

Flexible cover for low voltage bushings, transformers and motors. Easy tie fixing. Made of weather and UV resistant rubber. One set consists of 3 units.

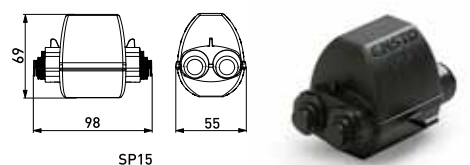
Product code	EAN	Weight (kg)	Pack./pcs
SP38.3	6418677405297	0.4	10



Insulating cover SP15

SP15 is used as a connector cover. The cover has to be installed so that the drain hole for ambient water is downwards. The cover is made of UV-radiation and weather resistant thermoplastic. Suitable for SM2.1, SM2.11, SM2.2, SM2.21, SM2.25, SL4.2, SL4.21, SL4.25, SL4.26, SL37.1, SL37.2, SL39.2

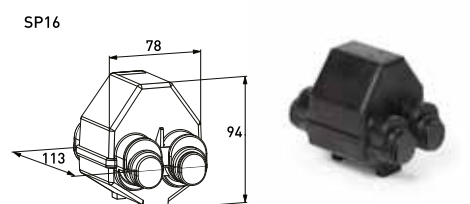
Product code	EAN	Weight (kg)	Pack./pcs
SP15	6418677405211	0.031	100



Insulating cover SP16

SP16 is used as a connector cover. The cover has to be installed so that the drain hole for ambient water is downwards. The cover is made of UV-radiation and weather resistant thermoplastic. Suitable for SM4.2, SM4.21, SL8.2, SL8.21, SL14.2, SLW25.2, series SEW20 and SEW21.

Product code	EAN	Weight (kg)	Pack./pcs
SP16	6418677410208	0.037	50



24 kV Covered Conductor Solution

Number plates PEM241

Used with conductors to mark the phases. Made of UV radiation resistant plastic. The plates are installed by nylon ties.

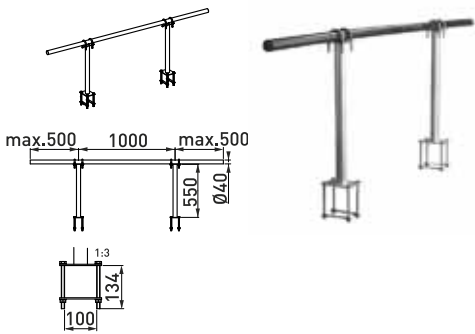
Product code	EAN	Plate no.	Weight (kg)	Pack./pcs
PEM241.1	6418677400445	1	0.007	100
PEM241.2	6418677400476	2	0.007	100
PEM241.3	6418677400490	3	0.007	100



Eagle protection fixture SH693

Eagle protection fixture for cross arms. This product is developed together with Ensto customers to prevent electrical shocks to large birds.

Product code	EAN	Weight (kg)	Pack./pcs
SH693	6418677459016	8.55	1

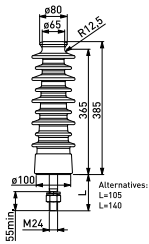


36 kV Covered Conductor Solution

Porcelain line post insulators SDI81 and SDI81.1

Porcelain line post insulator for bare or covered 36 kV lines. Creepage distance 600 mm.

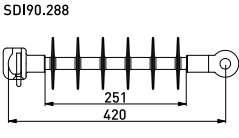
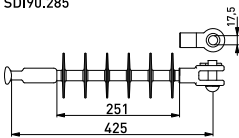
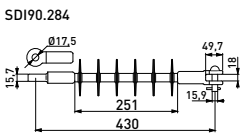
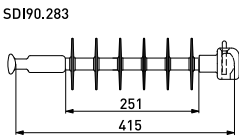
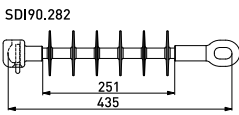
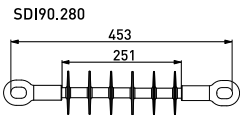
Product code	EAN	Highest system voltage kV	Breaking load kN	Insulator pin	Weight (kg)	Pack./pcs
SDI81	6418677422874	36	6	M24x105	6.5	3
SDI81.1	6418677422881	36	6	M24x140	6.6	3



Composite insulators SDI90 series

Composite tension insulator SDI90 series are used for terminal and intermediate poles of 36 kV lines. Creepage distance 613 mm.

Product code	EAN	End fittings	Highest system voltage kV	Weight (kg)	Pack./pcs
SDI90.280	6418677422768	eye / eye	36	1.08	10
SDI90.282	6418677422782	socket / eye	36	1.3	3
SDI90.283	6418677422799	ball / socket	36	1.1	3
SDI90.284	6418677422805	clevis / tongue	36	1.3	3
SDI90.285	6418677422812	clevis / ball	36	1.2	3
SDI90.288	6418677422843	socket / tongue	36	1.3	3

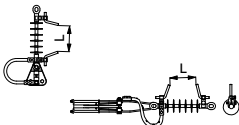


Power arc device SDI27.1

Power arc device SDI27.1 is used with SDI90.x composite insulators on angle poles with suspension clamp SO181.6 and on tension poles with tension clamps SO255 or SO256.

The package includes arching horns and 95 mm² conductor with cable lugs. Spark gap is adjustable.

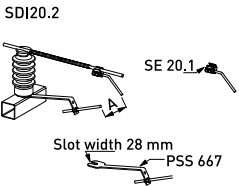
Product code	EAN	Weight (kg)	Pack./pcs
SDI27.1	6418677419133	0.83	9



Power arc device SDI20.2

Power arc device SDI20.2 is used as a arcing protection device for covered conductors. The device is suitable for horizontal suspension crossarms that are equipped with line post insulators e.g. SDI81. Nominal thickness of covering may vary from 2.0 mm up to 3.6 mm. Spark gap is adjustable.

Product code	EAN	Weight (kg)	Pack./pcs
SDI20.2	6418677418600	1.25	12

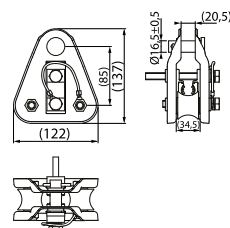


36 kV Covered Conductor Solution

Suspension clamp SO181.6

Suspension clamp with pulley for covered conductors PAS/BLL AlMgSi and for insulated messengers of aerial MV cables like AHXAMK-WM3 (Multi-wiki). The clamp also functions as an installation pulley thereby completely eliminating the need for separate pulleys. Conductor joints with diameter under 30 mm can be pulled through the suspension clamp. The suspension clamp has no loose parts, so it is easy to handle even in difficult conditions. The insulation piercing contact part has a silicone seal which prevents the moisture getting into the conductor. The insulation piercing clamp piece is connected to the body with a wire for balancing the potential. The product is tested for radio interference. SMFL 30 kN. Suspension bolt 16 mm.

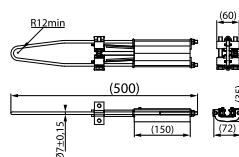
Product code	EAN	For conductor mm ²	Conductor diameter mm	Tightening torque Nm	Weight (kg)	Pack./pcs
SO181.6	6418677459849	PAS/BLL 50-157 AlMgSi	12.7-22.3	40	1.224	3



Waterproof tension clamp SO255

Tension clamp for covered conductors (PAS/BLL AlMgSi and for insulated messengers of aerial MV cables like AHXAMK-WM3 (Multi-wiki). The insulation piercing contact part has silicone seal which prevents the moisture getting into the conductor.

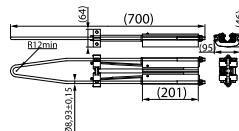
Product code	EAN	For conductor mm ²	Conductor dia. mm	SMFL kN	Weight (kg)	Pack./pcs
SO255	6438100303846	PAS/BLL 50-70 AlMgSi	12.7-16.7	18	1.133	9



Waterproof tension clamp SO256

Tension clamp for covered conductors PAS/BLL AlMgSi and for insulated messengers of aerial MV cables like AHXAMK-WM3 (Multi-wiki). The insulation piercing contact part has silicone seal which prevents the moisture getting into the conductor.

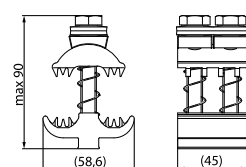
Product code	EAN	For conductor mm ²	Conductor dia. mm	SMFL kN	Weight (kg)	Pack./pcs
SO256	6438100303822	PAS/BLL 95-157 AlMgSi	16.1-22.3	30	2.53	3



Insulation piercing connector SLW25.2

The connector SLW25.2 is for non-tension aluminium to aluminium connections in MV up to 36 kV covered conductors without peeling the insulation. The connector is watertight by silicone greased teeth. The nominal insulation thickness of the conductor varies between 2.3-3.3 mm. Especially used with CC conductors. The connectors can be used with insulation cover SP16.

Product code	EAN	Main conductor mm ²	Branch conductor mm ²	Conductor diameter mm	Tightening torque Nm	Plastic cover	Weight (kg)	Pack./pcs
SLW25.2	6438100304201	Al 50-157 AlMgSi	Al 50-157 AlMgSi	12.7-22.3	40		0.246	25
SLW25.22	6438100304218	Al 50-157 AlMgSi	Al 50-157 AlMgSi	12.7-22.3	40		0.246	20



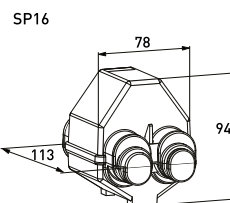
SLW25.2



Insulating cover SP16

SP16 is used as a connector cover. The cover has to be installed so that the drain hole for ambient water is downwards. The cover is made of UV-radiation and weather resistant thermoplastic. Suitable for SM4.2, SM4.21, SL8.2, SL8.21, SL14.2, SLW25.2, series SEW20, SEW21.

Product code	EAN	Weight (kg)	Pack./pcs
SP16	6418677410208	0.037	50



SP16

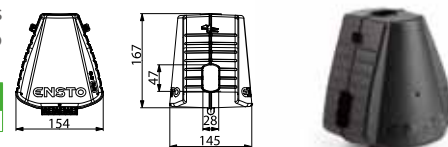


36 kV Covered Conductor Solution

Bird protector set SP62.3

SP62.3 is a bird protection set for pulley suspension clamp SO181.6. The products are manufactured of weather and UV-resistance thermoplastic material. The bird protectors prevent failures created by birds or other animals or flying branches in bare or covered lines. The bird protectors are easy to install due to snap-on fixings.

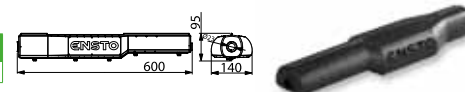
Product code	EAN	Weight (kg)	Pack./pcs
SP62.3	6438100301163	0.390	3



Bird protector set SP63.3

SP63.3 is a bird protection set for dead-end clamp SO255. The products are manufactured of weather and UV-resistance thermoplastic material. The bird protectors prevent failures created by birds or other animals.

Product code	EAN	Weight (kg)	Pack./pcs
SP63.3	6438100305826	0.891	3



Automatic tension joint kits CIL

Automatic tension joints are suitable for covered conductors which have to be peeled. The automatic joints are reliable and fast to make. The colour codes make it easy to identify right size. The wedges ensure a safe joint. Insulation sleeves and an abrasive band included in kits.

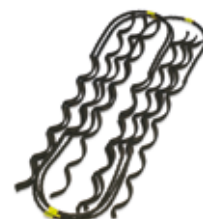
Product code	EAN	Conductor dia. mm	Color code	Weight (kg)	Pack./pcs
CIL66	6418677414251	5.81 – 8.6	orange/red	0.26	25
CIL67	6418677414268	9.27 – 12.06	yellow/grey	0.47	25
CIL68	6418677414275	12.75 – 14.86	pink/black	0.79	25



Helical tie SO115 series

Used with covered conductors for tying the conductors to the insulators. Can be used as both top and side ties. Easy to install without tools. The tie is installed on the insulation of the covered conductor. The sets include 6 pcs ties (one set/cross arm). The right size is easy to recognise by the colour code.

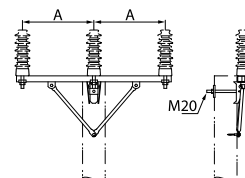
Product code	EAN	Covered conductors mm ²	Color code	Insulator neck mm	Weight (kg)	Pack./pcs
SO115.5073	6418677404085	35-50-62	Yellow	73	0.633	25
SO115.9573	6418677404108	70-95-99	Green	73	0.615	25
SO115.5085	6418677404092	35-50-62	Red	85	0.55	25
SO115.9585	6418677404115	70-95-99	Blue	85	0.617	25
SO115.150	6418677414329	120-150-157	White	73-85	0.665	25



Horizontal suspension crossarm SH248

Suspension crossarm for single three phase covered conductor lines. Phase spacing 600 mm. Line post insulators SDI81 are used with the crossarm. Insulators must be ordered separately.

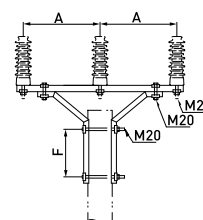
Product code	EAN	A mm	Weight (kg)	Pack./pcs
SH248	6418677422898	600	12.9	1



Horizontal suspension crossarm SH249

Suspension crossarm for single three phase covered conductor lines. Phase spacing 600 mm. Line post insulators SDI81 are used with the crossarm. Insulators must be ordered separately.

Product code	EAN	A mm	F mm	Weight (kg)	Pack./pcs
SH249	6418677422904	600	375	12.6	1

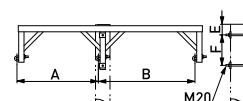


36 kV Covered Conductor Solution

Horizontal angle crossarm SH250

Angle crossarm for single three phase covered conductor lines. Phase spacing A=1070 mm / B=1270 mm. Insulators and clamps must be ordered separately.

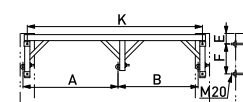
Product code	EAN	A mm	B mm	E mm	F mm	Weight (kg)	Pack./pcs
SH250	6418677422911	1070	1270	140	400	35.0	1



Horizontal angle crossarm SH251

Angle crossarm for single three phase covered conductor lines. Phase spacing A=1270 mm/B=1070 mm. Insulators and clamps must be ordered separately.

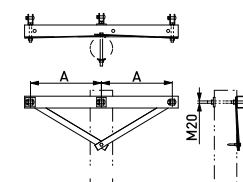
Product code	EAN	A mm	B mm	E mm	F mm	K mm	Weight (kg)	Pack./pcs
SH251	6418677422928	1270	1070	140	400	2340	38.0	1



Terminal crossarm SH252

Terminal crossarm for single three phase covered conductor lines. Phase spacing A=600 mm. Tension insulators SDI90.280 equipped with SO255 or SO256 tension clamps with SDI27.1 are used with the crossarm and have to be ordered separately.

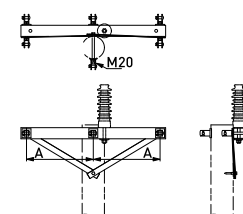
Product code	EAN	A mm	Weight (kg)	Pack./pcs
SH252	6418677422935	600	22.0	1



Intermediate tension crossarm SH253

Intermediate tension crossarm for single three phase covered conductor lines. Phase spacing A=600 mm. Tension insulators SDI90.280 equipped with SO255 or SO256 tension clamps with SDI27.1 are used with the crossarm. Additional SDI81 insulator is also needed. Insulators and clamps must be ordered separately.

Product code	EAN	A mm	Weight (kg)	Pack./pcs
SH253	6418677422942	600	25.0	1

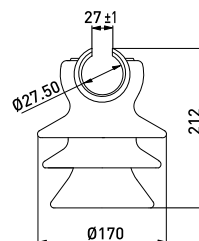


6-36 kV Bare Conductor Solution

Pin insulator SDI37

SDI37 is used with bare wires or covered conductors. Suitable for installation on pin SOT24 (SFS 4385). The plastic sleeve in the top-groove of the insulator enables pulling of conductor without using pulleys. The conductor can be tied to the top-groove or to the neck. In angles, always tie to the neck. Creepage distance 325 mm. Neck diameter 85 mm.

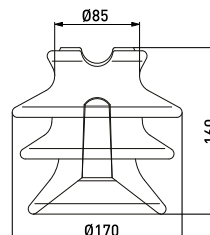
Product code	EAN	Highest system voltage kV	Breaking load kN	Insulator pin	Weight (kg)	Pack./pcs
SDI37	6418677408731	24	12.5	SOT24	3.8	3



Pin insulator SDI30

SDI30 is used with bare wires or covered conductors. Suitable for installation on pin SOT24 (SFS 4385). The conductor can be tied to the top-groove or to the neck. In angles, always tie to the neck. Creepage distance 325 mm. Neck diameter 85 mm.

Product code	EAN	Highest system voltage kV	Breaking load kN	Insulator pin	Weight (kg)	Pack./pcs
SDI30	6418677408748	24	12.5	SOT24	3.37	3



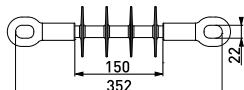
Composite insulators SDI90 series

SDI90.x composite insulators are the next step on Ensto's composite insulator series. SDI90.x insulators fulfill the requirements of IEC 61109. The sheds of the insulators are made of highly hydrophobic silicon rubber. The core is made of corrosion resistant fiber glass rod and the end fittings are made of hot-dip galvanized steel. Tension insulators SDI90.15x are meant to be used on 10 kV up to 24 kV depending on pollution class requirements. SDI90.28x are meant to be used on 24 kV up to 36 kV. Creepage distance of SDI90.15x is 391 mm and creepage distance of SDI90.28x is 613 mm.

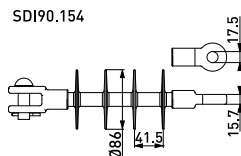
Product code	EAN	End fittings	Highest system voltage kV	Weight (kg)	Pack./pcs
SDI90.150	6418677422669	eye / eye	24	0.995	3
SDI90.280	6418677422768	eye / eye	36	1.08	10
SDI90.282	6418677422782	socket / eye	36	1.3	3
SDI90.283	6418677422799	ball / socket	36	1.1	3
SDI90.284	6418677422805	clevis / tongue	36	1.3	3
SDI90.285	6418677422812	clevis / ball	36	1.2	3
SDI90.288	6418677422843	socket / tongue	36	1.3	3
SDI90.350	6438100304904	eye / eye	36	1.43	10



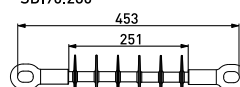
SDI90.150



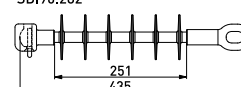
SDI90.154



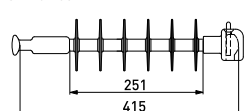
SDI90.280



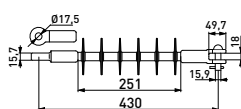
SDI90.282



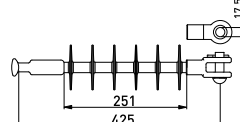
SDI90.283



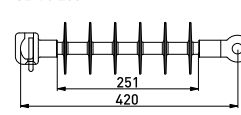
SDI90.284



SDI90.285



SDI90.288

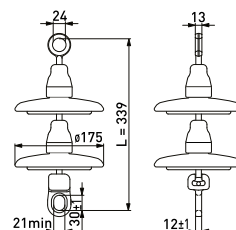


6-36 kV Bare Conductor Solution

Glass tension insulator strings SH193

Suitable for installation on angle and terminal crossarms as well as hooks. The insulators are 24 - 52 kV glass insulators U40BL according to IEC 60305. They are tested according to IEC 60383/1983. Breaking load is 40 kN.

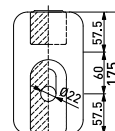
Product code	EAN	End fittings	Creepage distance	No of discs	Highest system voltage kV	Weight (kg)	Pack./pcs
SH193	6418677407062	ball-socket	380	2	24	4.40	1
SH193.453	6418677441424	ball-socket	570	3	36	6.16	1
SH193.454	6418677414114	ball-socket	760	4	52	7.92	1
SH193.455	6418677414121	ball-socket	950	5	52	9.68	1



Stay insulator SDI4.5

Porcelain stay insulator is suitable for installation in stay wires up to 52 mm². Conforms with standard SFS 3741. Creepage distance is 95 mm.

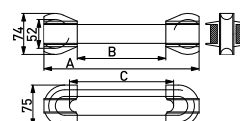
Product code	EAN	Highest system voltage kV	Max continuous load kN	SMFL kN	Weight (kg)	Pack./pcs
SDI4.5	6418677418556	24	35	120	2.15	6



Composite stay insulators SDI70.24

SDI70.24 insulator has high mechanical and electrical capacity combined with light weight. The insulating section is made of glass fibre impregnated with UV stabilized resin and twice covered silicon rubber. The end thimble is made of aluminium and dimensioned for minimum 52 mm eyelet. SDI70.24 is suitable for installation on stay wires up to Fe52 and is tested according to IEC 60383. Ordinary mechanical load 48 kN, max. mechanical load 144 kN, specified mechanical load 180 kN. Creepage distance 160 mm.

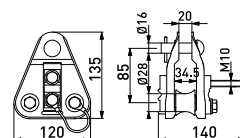
Product code	EAN	Highest system voltage kV	Max continuous load kN	SMFL kN	Weight (kg)	Pack./pcs
SDI70.24	6418677401787	24	35	>180	0.8	15



Suspension clamp SO181

Suitable for bare conductors. The clamp also functions as an installation pulley thereby completely eliminating the need for separate pulleys. Conductor joints with diameter under 30 mm can be pulled through the suspension clamp. Has no loose parts, so it is easy to handle even in difficult conditions. The serrated clamping piece is connected to the body with a wire for balancing the potential. Tested for radio interference. Breaking strength >36 kN. Suspension bolt 16 mm.

Product code	EAN	For conductor mm ²	Conductor diameter mm	Tightening torque Nm	Weight (kg)	Pack./pcs
SO181	6418677404474	Al/Fe 25-131 AAAC 35-201	6.3-20.2	20	1.192	3



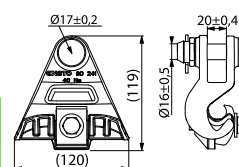
SO241



Suspension clamps SO241

The suspension clamp SO241 is suitable for bare conductors at medium and low voltages. The body is made of corrosion resistant aluminium alloy and the bolt is of hot-dip galvanised steel. SO241 suspension bolt diameter is 16 mm and breaking load is >50 kN. SO241.2 suspension bolt diameter is 19 mm and breaking load is >50 kN.

Product code	EAN	For conductor mm ²	Conductor diameter mm	Tightening torque Nm	Weight (kg)	Pack./pcs
SO241	6418677416309	AAAC 25-201, ACSR 25-110	6-18.5	40	0.55	25
SO241.2	6418677416316	AAAC 25-201, ACSR 25-110	6.0-18.5	40	0.617	25



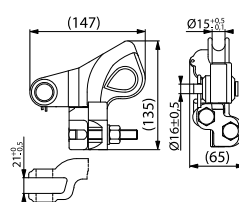
SL4.25



Tension clamp SO85

For dead-ending bare and covered conductors. The body is made of corrosion resistant aluminium alloy and the bolts are hot dip galvanized steel. Breaking load is 35 kN. SO85 suspension bolt diameter is 16 mm. SO85.2 suspension bolt diameter is 19 mm.

Product code	EAN	For conductor mm ²	Conductor diameter mm	Tightening torque Nm	Weight (kg)	Pack./pcs
SO85	6418677405112	AAAC 25 - 150, PAS 35-150, ACSR 25 - 99	6-14.9	55	0.743	25
SO85.2	6418677405136	AAAC 25 - 132, PAS 35-120, ACSR 25 - 99	6-14.9	55	0.781	25

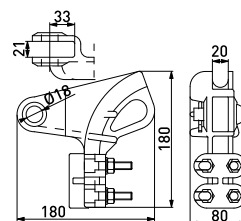


6-36 kV Bare Conductor Solution

Tension clamp SO105

For dead-ending bare and covered conductors. The body is made of corrosion resistant aluminium alloy and the bolts are hot dip galvanized steel. Breaking load >50 kN. Suspension bolt diameter is 16 mm.

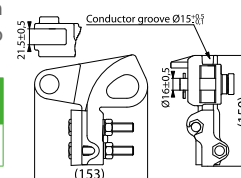
Product code	EAN	For conductor mm ²	Conductor diameter mm	Tightening torque Nm	Weight (kg)	Pack./pcs
SO105	6418677404030	AAAC 95 - 241, ACSR 63 - 98, AACSR 131, PAS/BLL 95 - 157	10-20	44	1.208	10



Tension clamp SO146

Used for dead-ending bare and covered conductors. The body is made of corrosion resistant aluminium alloy and the bolts are hot-dip galvanised steel. The conductor is inserted on one side and clamped by two bolts. Breaking load >35 kN. Suspension bolt diameter is 16 mm.

Product code	EAN	For conductor mm ²	Conductor diameter mm	Tightening torque Nm	Weight (kg)	Pack./pcs
SO146	6418677404436	AAAC 25 - 150, Al/Fe 25 - 99, PAS/BLL 35 - 150	6-15	55	0.9	10

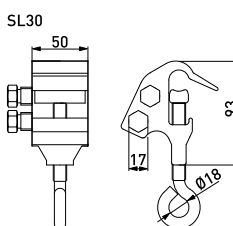


SL30

Live-line connector SL30

Used with bare conductors as a live-line branching connector. The connector is made of corrosion resistant aluminium and the bolts of stainless steel. For copper branch conductors sleeve PSS830 is needed. The installation can be made with a live-line stick (e.g. CT48). In SL30 branching point is downwards. In SL30.1 the branching point is on the side of the connector.

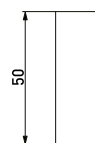
Product code	EAN	Main conductor mm ²	Branch conductor mm ²	Tightening torque Nm	Weight (kg)	Pack./pcs
SL30	6418677403705	Al 25-150	Al 25-150	40/44	0.476	24
SL30.1	6418677411533	Al 25 - 150	Al 25-150	40/44	0.45	24



Sleeve PSS830

PSS830 is used with live-line connectors SL30, and SL30.1 when the branch conductor is copper. The sleeve is tin coated aluminium and it is installed into the live-line clamp. The inner diameter of the sleeve is 16 mm.

Product code	EAN	Cu mm ²	Weight (kg)	Pack./pcs
PSS830	6418677406737	25-95	0.008	30

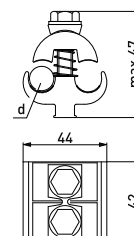


SL4.25

Parallel groove connectors SL4.25 and SL8.21

For aluminium or steel to aluminium connections where no mechanical tension is involved. The lower section of the body protects the bolts from corrosion and makes tightening of the bolts easy, using fork wrench ST34. The correct tightening torque is essential to the connection. The body is made of corrosion resistant aluminium alloy, and the bolts are hot-dip galvanised steel. All connectors are pre-brushed and prepared with joint compound. SL4.25 is equipped with springs to make the installation even easier.

Product code	EAN	Main conductor mm ²	Branch conductor mm ²	Conductor diameter mm	Tightening torque Nm	Plastic cover	Weight (kg)	Pack./pcs
SL4.25	6418677403750	Al 16-120	Al 16-120	4.6-13.5	20	SP15	0.128	50
SL8.21	6418677403781	Al 50-240	Al 50-240	7.7-20.0	44	SP16	0.29	25

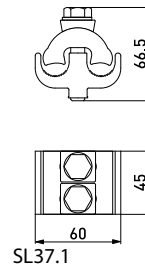


6-36 kV Bare Conductor Solution

Parallel groove connector SL14.2

SL14.2 is for Al or Cu connections where no mechanical tension is involved. The body is made of tin plated aluminium alloy, and the bolts are hot-dip galvanized steel.

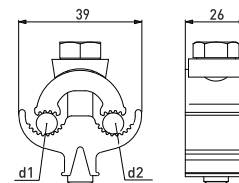
Product code	EAN	Main conductor mm ²	Branch conductor mm ²	Conductor diameter mm	Tightening torque Nm	Plastic cover	Weight (kg)	Pack./ pcs
SL14.2	6418677403552	Al/Cu 50-240	Al 50-185 / Cu 50-150	7.7-20	44	SP16	0.28	25



Parallel groove connectors SL37.1 and SL37.2

SL37.1 and SL37.2 are used for aluminium or steel to aluminium connections where no mechanical tension is involved. The correct tightening torque is essential to the connection. SL37.271 is suitable for copper and aluminium connections. SL37.271 is equipped with shear head bolts.

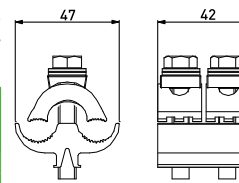
Product code	EAN	Main conductor mm ²	Branch conductor mm ²	Conductor diameter mm	Tightening torque Nm	Plastic cover	Weight (kg)	Pack./ pcs
SL37.1	6418677414404	Al 6-95	Al 6-95	3.0-13.0 / 3.0-13.0	22	SP15	0.055	200
SL37.2	6418677414411	Al 6-95	Al 6-95	3.0-13.0 / 3.5-13.0	22	SP15	0.1	50
SL37.271	6418677450273	Al/Cu 6-95	Al 6-95 / Cu 6-70	3.0-13.0	22	SP15	0.11	50



Parallel groove connector SL39.2, SL39.27 and SL39.271

SL39.2 is used for aluminium or steel to aluminium and SL39.27 is suitable for copper and aluminium connections. The correct tightening torque is essential to the connection. SL39.271 is equipped with shear head bolts. The connectors are used when no mechanical tension is involved.

Product code	EAN	Main conductor mm ²	Branch conductor mm ²	Conductor diameter mm	Tightening torque Nm	Plastic cover	Weight (kg)	Pack./ pcs
SL39.2	6418677419607	Al 16-150	Al 16-150	4.5-17.5	22	SP15	0.12	50
SL39.27	6418677438905	Al/Cu 16-150	Al 16-150 / Cu 10-120	4.5-17.5	22	SP15	0.120	50
SL39.271	6418677450280	Al/Cu 16-150	Al 16-150, Cu 10-120	4.5-17.5	22	SP15	0.13	50



SL39.2



Automatic tension joints CIL

The automatic joints are reliable and fast to make. The installation can be made without tools. The colour codes make it easy to identify the right type. The wedges ensure a safe joint.

Product code	EAN	Conductor dia. mm	Color code	Weight (kg)	Pack./pcs
CIL63	6418677414220	5.81-8.64	orange / red	0.155	25
CIL64	6418677414237	9.27-12.06	yellow / grey	0.278	25
CIL65	6418677414244	12.75-14.86	pink / black	0.478	25
CIL71	6418677417726	14.73-18.40	green / brown	0.840	10
CIL72	6418677418440	18.8-21.7	blue / green	1.08	10



Automatic joints CIL9

CIL9 automatic tension joints are used for universal cables with steel messenger and also for stay wire applications.

Product code	EAN	For conductor mm ²	Conductor dia. mm	Weight (kg)	Pack./pcs
CIL9.25	6418677418549	Fe 25	5.46-6.86	0.381	50
CIL9.33	6418677419072	Fe 33	6.86-8.00	0.381	5
CIL9.52	6418677419089	Fe 52	8.25-9.96	0.599	25
CIL9.68	6418677418532	Fe 68	9.96-11.56	0.726	25
CIL9.89	6418677419096	Fe 89	11.56-13.21	0.871	10



6-36 kV Bare Conductor Solution

Dead ends COL25, COL33 and COL52

Automatic stay wire clamps are used for steel stay wire or steel messenger wire.

Product code	EAN	For conductor mm ²	Conductor dia. mm	Weight (kg)	Pack./pcs
COL25	6418677418495	Fe 25	5.46-6.86	0.236	25
COL33	6418677418501	Fe 33	6.86-8.00	0.380	25
COL52	6418677418518	Fe 52	8.25-9.96	0.563	25



Insulated stay wire sets SHS

An insulated set for medium voltage lines. The wire gauge is 25 mm² steel wire and the permitted load is up to 17.5 kN. All steel parts are hot-dip galvanized and plastic marking tubes are of weather and UV-resistant material.

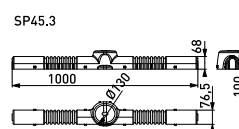
Product code	EAN	Description	Weight (kg)	Pack./pcs
SHS25K.165L	6418677407697	Upper end clamp, ceramic, L=16.5 m	9.6	1
SHS25K.165R	6418677407703	Upper end iron, ceramic, L=16.5 m	10.7	1
SHS12.0611232	6418677402531	Upper end clamp, composite, L=18 m	11.2	1
SHS5.0610052	6418677414350	Upper end clamp, composite, L=18 m	14.5	1



Bird protector sets SP45.3

SP45.3 bird protectors prevent failures created by birds or other animals in bare or covered lines. These protectors are suitable for different pin and line post insulators. They are also easy to install even in line angles or when the conductor is attached to the neck of the insulator. SP45.3 covers arc protecting devices (i.e. SEW20.2) in covered conductor lines and it is weather resistant. The SP45.3 bird protector length is 1000 mm. Extra length can be achieved in combination with SP31.3. One set consists of 3 units.

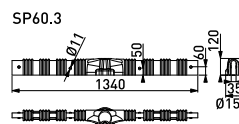
Product code	EAN	Weight (kg)	Pack./pcs
SP45.3	6418677405327	0.875	1



Bird protector set SP60.3

SP60.3 bird protectors prevent failures created by birds or other animals in bare or covered lines. This protector is suitable for different pin and line post insulators. It is also easy to install even in line angles or when the conductor is attached to the neck of the insulator. SP60.3 covers arc protecting devices (i.e. SEW20.2) in covered conductor lines and it is weather resistant. SP60.3 can be installed in a live line with the aid of special tools. Delivered in complete sets of 3 pcs.

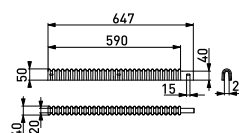
Product code	EAN	Weight (kg)	Pack./pcs
SP60.3	6418677441714	1.83	1



Cable protector set SP31.3

Flexible cover for jumpers or conductors close to insulators. Can be used together with SP36.3 for pin insulators or transformer bushings. Easy tie fixing. Made of weather and UV resistant plastic. One set consists of 3 units.

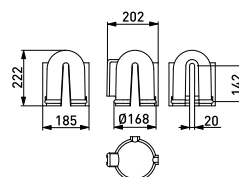
Product code	EAN	Weight (kg)	Pack./pcs
SP31.3	6418677405266	0.3	1



Bird protection set SP36.3

Used for bushings, insulators and surge arresters in dia. 100-180 mm. Can be used together with flexible protector SP31.3. Easy tie fixing. Made of weather and UV resistant plastic. One set consists of 3 units.

Product code	EAN	Weight (kg)	Pack./pcs
SP36.3	6418677405280	0.445	8

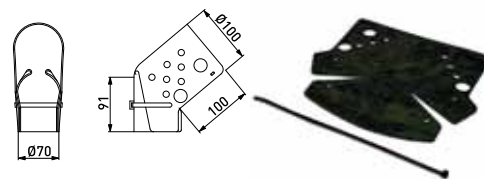


6-36 kV Bare Conductor Solution

Bird protection set SP38.3

Flexible cover for low voltage bushings, transformers and motors. Easy tie fixing. Made of weather and UV resistant rubber. One set consists of 3 units.

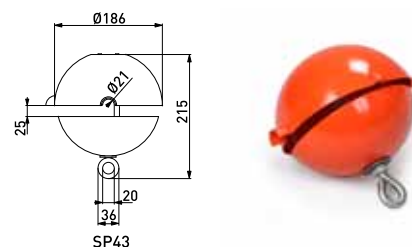
Product code	EAN	Weight (kg)	Pack./pcs
SP38.3	6418677405297	0.4	10



Wire markers SP43

Wire markers are used for marking overhead lines and wires. They can be used at crossing of water courses and roadways, bird migration routes and near airports. It also prevents conductors from clashing together. The installation is easy with any standard operating rod, like CT48.64. Wire markers SP43 have a diameter of 200 mm.

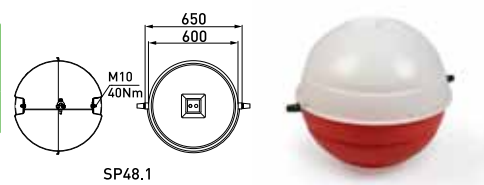
Product code	EAN	Cable diameter mm	Color	Diameter mm	Weight (kg)	Pack./pcs
SP43	6418677405303	Al/Fe 7-21	orange	200	0.4	10
SP43.1	6418677408205	Al/Fe 7-21	orange + reflectors	200	0.45	10
SP43.2	6418677408212	Cu 7-21	orange	200	0.45	10
SP43.3	6418677408229	Al/Fe 7-21	orange-white	200	0.45	10



Warning balls SP48

The aviation warning ball SP48 is a visual eye catcher in the overhead line span.

Product code	EAN	Cable diameter mm	Color	Diameter mm	Weight (kg)	Pack./pcs
SP48.1	6418677405341	Al/Fe 9-20	red/white	600	6.1	1
SP48.2	6418677413667	Al/Fe 9-20	white	600	6.1	1
SP48.3	6418677413674	Al/Fe 9-20	red	600	6.1	1

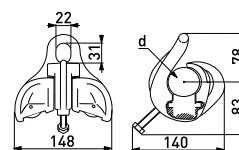


12-36 kV Universal Cable Solution

Suspension clamp SO86 with PK rubber inserts

Used for universal cables at straight line and angle poles. The rubber inserts PK143.12 or PK143.24 must be ordered separately for various cables. The suspension clamp is used in angles, one up to 30° and two up to 60°. With a construction of two suspension clamps a yoke SOT73 is needed.

Product code	EAN	Highest system voltage kV	Tightening torque Nm	Weight (kg)	Pack./pcs
SO86	6418677405143	12-24	15	0.908	10
PK143.12	6418677400803			0.14	100
PK143.24	6418677400810			0.074	100



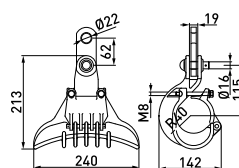
SO86



Suspension clamp SD21 with rubber inserts

Used for universal cables at straight line and angle poles. The rubber insert PK88 must be ordered separately. The suspension clamp is used in angles, one up to 30° and two up to 60°. With a construction of two suspension clamps a yoke SOT73 is needed.

Product code	EAN	Highest system voltage kV	Tightening torque Nm	Weight (kg)	Pack./pcs
SD21	6418677401527	12-24	10	2.24	1
PK88	6418677400988			1.1	10



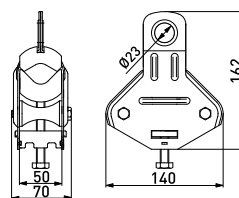
SD21



Suspension clamp SO99

Used for the installation and suspension of cables from poles in straight lines and at angles of up to 90° with 4x25 mm² and 4x50 mm² cables or up to 60° with 4x95 mm² cables. The body is made of hot-dip galvanized steel, and there is a stainless steel reinforced ring in the hook attachment. The integral rollers are made of corrosion resistant aluminium and inserts of weather resistant plastic. At angles exceeding 30°, the use of an additional roller ST26.99 is recommended.

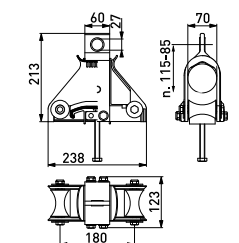
Product code	EAN	Highest system voltage kV	Tightening torque Nm	Weight (kg)	Pack./pcs
SO99	6418677405181	12	12	0.825	10



Suspension clamp SO150

Used in angle and suspension poles. Can also be used as a pulley when installing the cable. When the cable has been tightened to its final length, it is locked to the clamp. The clamp is used at angles max. 30 degrees depending on the bending radius and tightening strength of the cable.

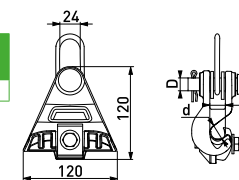
Product code	EAN	Highest system voltage kV	Tightening torque Nm	Weight (kg)	Pack./pcs
SO150	6418677404443	12-24	25	2.2	4



Suspension clamp SO241.1

For MV aerial bundled cables with bare messenger. Suitable for hook attachment. Breaking load is 22 kN.

Product code	EAN	Messenger mm	Tightening torque Nm	Weight (kg)	Pack./pcs
SO241.1	6418677419485	5.9-18.5	40	0.65	1



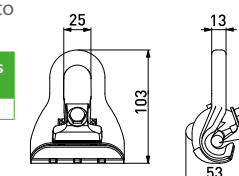
SO241.1



Suspension clamp SO214

Used for the suspension of overhead cables with uninsulated messenger in straight lines and angles up to 90°. Breaking load is 25 kN.

Product code	EAN	Messenger mm	Tightening torque Nm	Weight (kg)	Pack./pcs
SO214	6418677410666	5.8-13	48	0.248	50

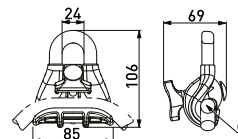


12-36 kV Universal Cable Solution

Suspension clamp SO69.95

The suspension clamp is used for the suspension of the insulated messenger in straight lines and at angles up to 90°. Breaking load is 22 kN.

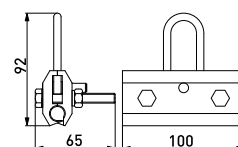
Product code	EAN	Messenger mm	Tightening torque Nm	Weight (kg)	Pack./pcs
SO69.95	6418677414572	7.0-16.5	By hand	0.244	50



Suspension clamp SO220

Use for the suspension of the Axclight-H, Exclight-H cable with messenger in straight lines and at angles of up to 30° and as a double construction together with yoke SOT73 up to 60°. Breaking load is 22 kN.

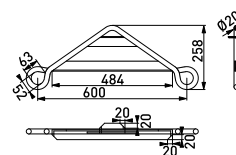
Product code	EAN	Messenger mm	Tightening torque Nm	Weight (kg)	Pack./pcs
SO220	6418677414343	10.5-11.5	20	0.29	25



Yoke SOT73

Suspension console is used for universal cable suspension construction with two suspension clamps at line angles up to 60°. Suspension console is made of hot dip galvanized steel.

Product code	EAN	Hook length mm	Weight (kg)	Pack./pcs
SOT73	6418677408922		7.2	1



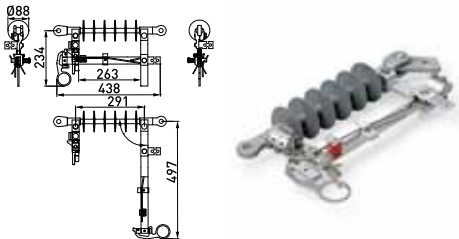
SZ 24 Disconnecter is an ideal solution for MV overhead lines

Disconnecter

Disconnecter SZ24

SZ24 is easy and quick to install even on existing lines as no additional construction is needed. SZ24 disconnecters is 1-pole operated by standard live-line tools e.g. Ensto's CT48.64. SZ24 is tested and aproved according to the newest international standards. Its breaking capacity is 12.5 A, sufficient for rural areas on branch lines.

Rated values	
Voltage U _n	24 kV
*Power frequency withstand voltage, 1 min, 50 Hz	50 kV, 60 kV
*Lightning withstand voltage	125 kV, 145 kV
Frequency	50 Hz
Normal current I _n	400 A
Short time withstand current I _k	10 kA
Peak withstand current I _p	25 kA
Duration of short circuit t _k	1 s
Mechanical endurance class M0	1000 operating cycles
Mainly active load-breaking current I _a	12.5 A (30 co)
Cable charging breaking current 14a	10 A (30 closing and opening operations)
Line-charging breaking current 14b	10 A (30 closing and opening operations)
Leakage distance, minimum	628 mm
Ice breaking capacity	10 mm



Pole-mounted transformer substation



Disconnection point on the network



With cable termination



Branch lines

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Saves Your Energy

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