



ENSTO

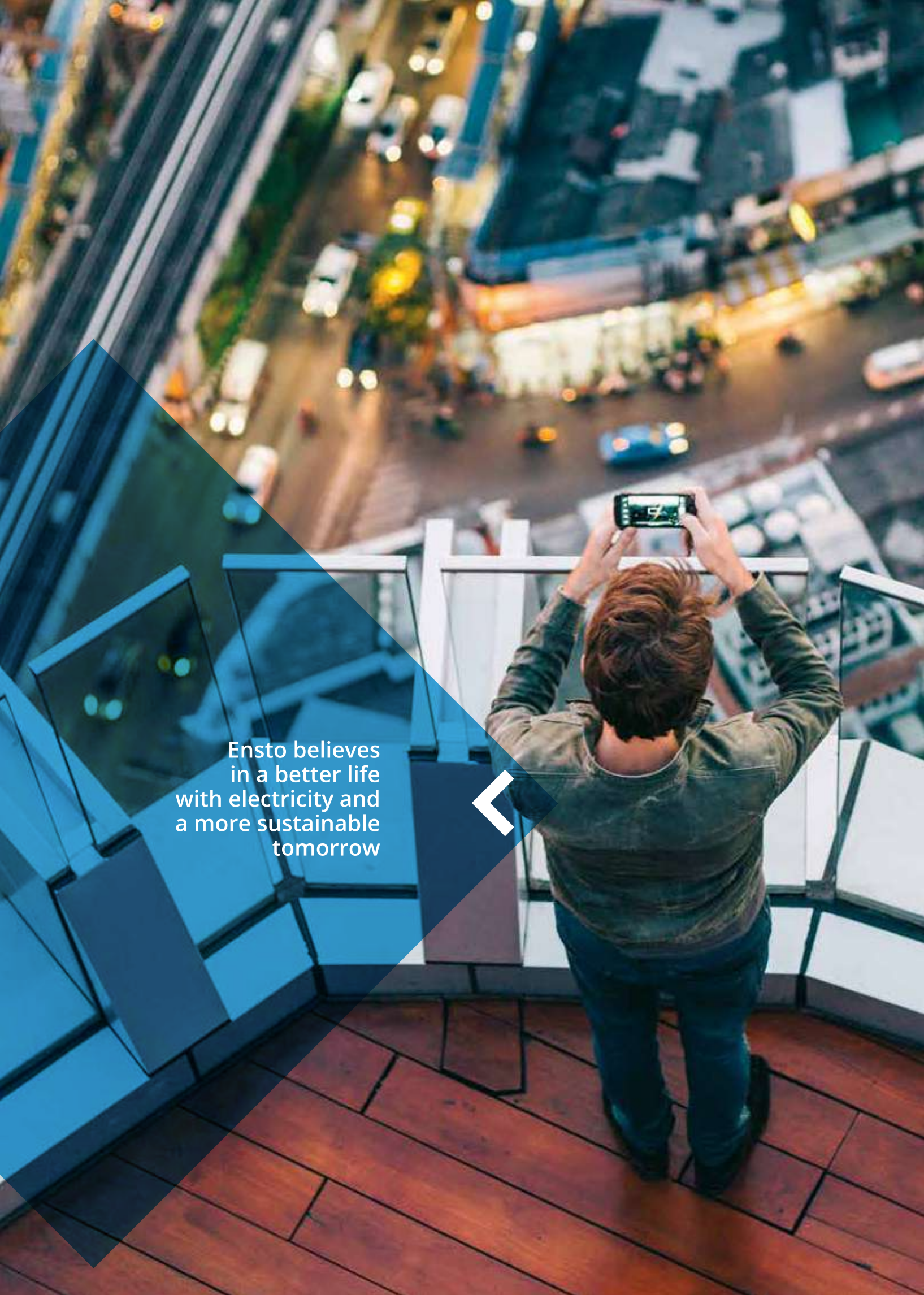
Ensto accessories for electricity distribution

Reliability & efficiency

Better life.
With electricity.

Ensto provides smart and reliable solutions with long life-cycle to ensure the electricity distribution in all circumstances.

ensto.com



Ensto believes
in a better life
with electricity and
a more sustainable
tomorrow



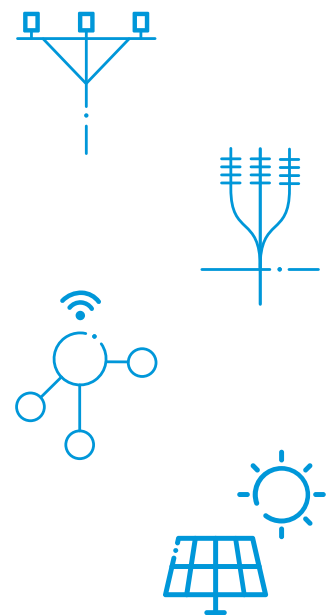


Electrical solutions for better tomorrow

Ensto designs and provides innovative and reliable electrical solutions and expertise for electricity distribution system operators

Ensto is an international, growth-oriented family business and technology company, which has dedicated to electricity with a long-term and human-centric approach for over 60 years. Our aim is to become a leading expert for distribution system operators and help them to succeed and create a more sustainable tomorrow. We offer innovative and reliable, long life-cycle overhead lines, underground networks, network automation and new

smart technology products and solutions for electricity distribution networks. Our own R&D, manufacturing and laboratories give us the expertise to continually innovate and serve our customers on an individual level. We are bound by our common purpose: making life better with electricity Sustainably.





Well Functioning Solutions

Ensto's solutions play a key role in building reliable, low-loss electricity distribution networks with disturbance-free service. High-quality products guarantee lower total costs for creating robust distribution networks.

We have thorough experience and knowledge of distribution networks in even the most demanding conditions: cold, hot, and stormy surroundings all over the world. Our products are developed in close cooperation with our customers. They are designed for a long service life, minimal need for maintenance, and a low life-cycle impact on the environment.

Tested to Meet Your Expectations

Ensto has fully equipped and calibrated testing laboratories in-house; even an accredited one in our headquarters in

Finland. We test our products to ensure meeting the toughest national and international standards – in fact, beyond standard requirements. We work with many international test laboratories and use well-known external laboratories for certification testing.

Answers Close to You

Ensto has local sales personnel in 17 countries, allowing us to serve and support our customers flexibly in their own language, thanks to a strong local presence. In addition, we sell throughout the world.

Unique Training

Ensto's extensive training program Ensto Pro provides continuing support and comprehensive training for our customers. The benefits of this training include time, cost, and energy savings and

fewer installation errors. Moreover, we receive reliable input on the solutions the customer truly needs and all training sessions are customized.

Focus on Energy-Efficiency

Ensto is committed to building sustainable energy infrastructure with energy-efficient solutions.

Higher-quality power and lower distribution losses are key to energy efficiency. Sustainability and efficiency are also achieved via recyclable materials, local expertise, and in-house manufacturing. Ensto's solutions for network power quality improve efficiency in electricity distribution and the quality of electricity. They save your time, money, and energy.


Low voltage overhead lines

Properties and Typical Values of LV ABC (Aerial Bundle Cable) Overhead Line Systems Realized with Ensto Fittings



Character/Criteria	Four core system	Insulated neutral messenger wire	Uninsulated neutral messenger wire
Description	Four equal aluminium alloy conductors including phase - and neutral conductors. The cable can also have separate conductors for street lighting.	Insulated aluminium phase conductors. Insulated aluminium alloy messenger wire, which is also the neutral conductor. The cable can also have separate conductors for street lighting.	Insulated aluminium phase conductors. Bare aluminium alloy messenger wire, which is also the neutral conductor. The cable can also have separate conductors for street lighting.
Minimum breaking loads for the conductor	4x35 mm ² = 22.4 kN 4x50 mm ² = 33.2 kN 4x70 mm ² = 45.3 kN 4x95 mm ² = 60.8 kN 4x120 mm ² = 75.2 kN	3x35 mm ² + 54.6 mm ² = 16.0 kN 3x70 mm ² + 54.6 mm ² = 16.0 kN 3x120 mm ² + 70.0 mm ² = 17.7 kN	3x35 mm ² + 50 mm ² = 14.7 kN 3x70 mm ² + 95 mm ² = 27.9 kN 3x120 mm ² + 95 mm ² = 27.9 kN
Sharing of mechanical load	Mechanical load applied in all conductors.	Messenger wire carries all mechanical load.	Messenger wire carries all mechanical load.
Tensile strength of wires of conductor (N/mm ²)	All conductors 160 N/mm ²	Neutral 300 N/mm ² Phases 120 N/mm ²	Neutral 300 N/mm ² Phases 120 N/mm ²
Risk of neutral breaking under unexpected loads like falling trees etc.	The neutral is unlikely to break alone, if the installation is made properly. High mechanical strength.	The neutral may break alone, if not provided with weak links. Risk to personnel and apparatus due to risen phase voltage and high potential in neutral, if the earthing is not made properly.	The neutral is reinforced, but it may break alone. Risk to personnel and apparatus due to risen phase voltage and high potential in neutral, if the earthing is not made properly.
Live line work	No special requirements.	No special requirements.	No special requirements. Uninsulated neutral may have touch voltage in poor earthing conditions. Proper earthing is essential.
Connectors	Same connector can be used for all cores.	Sometimes different connectors for phases and neutral.	Sometimes different connectors for phases and neutral.
Risk of corrosion in the neutral	Reduced risk.	Reduced risk.	Potential risk in extreme climatic conditions.
Installation methods	No special tools or methods. Suspension clamps with incorporated pulleys available.	No special tools or methods. Pulleys are needed.	No special tools or methods. Pulleys are needed. Economical fittings.



An aerial night photograph of a city. In the foreground, there are several modern residential buildings with lit-up balconies and roofs, situated along a waterfront. In the middle ground, a large, illuminated cable-stayed bridge spans across a body of water. The background shows a city skyline with numerous lights reflecting on the water under a dark blue sky. A large, semi-transparent blue triangle is overlaid on the left side of the image, containing the text.

Ensto offers
comprehensive
solutions for overhead
and underground
distribution
of electricity.



Product information

Accessories for low voltage distribution networks

Insulation piercing connectors

Waterproof insulation piercing connector SLIW 11 series

SLIW11.1 is used with insulated aluminium or copper conductors. Fully insulated bolt provides safe live line working. Both main and branch conductor insulations are pierced by single bolt action. Test voltage 6 kV/50 Hz/1 min in water. Connector's design enables hot line installation without peeling insulation from conductor.

Product code	Main conductor mm ²	Branch conductor mm ²	Pack. (pcs)
SLIW11.1	Al/Cu 16-95	Al/Cu 1.5-10	120
SLIW11.2	Al/Cu 16-95	Al/Cu 2.5-16	120



Waterproof insulation piercing connector SLIW 15 series

SLIW15.1 is used with insulated Al or Cu conductors. Fully insulated bolt provides safe live line working. Both main and branch conductor insulations are pierced by single bolt action. Shear head bolt and end cap are insulated. Test voltage 6 kV/50 Hz/1 min in water.

Product code	Main conductor mm ²	Branch conductor mm ²	Pack. (pcs)
SLIW15.1	Al/Cu 16-95	Al/Cu 6-50	50
SLIW15.16	Al/Cu 16-95	Al/Cu 4-50	50
SLIW15.17	Al/Cu 16-150	Al/Cu 4-35(50)	50
SLIW15.18	Al/Cu 16-95	Al/Cu 16-50(95)	50



Waterproof insulation piercing connectors SLIW 17 series

The connector is used in all connections with insulated aluminium or copper conductors. The design enables live line installation without peeling the insulation of the conductors. Test voltage 6 kV/50 Hz/1 min in water.

Product code	Main conductor mm ²	Branch conductor mm ²	Pack. (pcs)
SLIW17.151	Al 25-150	Al 25-150	50



Waterproof insulation piercing connector SLIW 60 series

Multitap connectors is specially designed for use with universal piercing connectors to facilitate several out-going conductors. Each branch conductor can be connected with a separate screw.

Product code	Branch conductor mm ²	Pack. (pcs)
SLIW66	Al/Cu 2 x 6-35	40
SLIW67	Al/Cu 4 x 6-35	20



Product information

Accessories for low voltage distribution networks

End caps PK99

Grease filled end caps are used for preventing water entry from the end of the branch cable.

Product code	For conductors mm ²	Pack. (pcs)
PK99.1695	16-95	300
PK99.70150	70-150	300



Waterproof insulation piercing connectors

SLIW59 is for use with insulated aluminium or copper conductors. Fully insulated bolt provides safe live line working. Test voltage 6 kV/50 Hz/1 min in water. Connector's design enables live line installation without peeling insulation from conductor.

Product code	Main conductor mm ²	Branch conductor mm ²	Pack. (pcs)
SLIW59	70-150	70-240	24
SLIW59.1	70-120	70-240	24



Waterproof insulation piercing connectors

SLIW63 is for all connections of uninsulated aluminium and copper main and insulated branch conductors up to 1000 V AC. Equipped with shear head screw.

Product code	Main conductor mm ²	Branch conductor mm ²	Pack. (pcs)
SLIW63	16-95	2,5-25	60
SLIW64	16-95	16-95	60



Product information

Accessories for low and medium voltage distribution networks

Aluminium to Aluminium Parallel Groove Connectors

Aluminium to aluminium connectors SL37.1 and SL37.2

Non tension aluminium to aluminium connector SL37.1 is equipped with one M8 bolt. Non tension aluminium to aluminium connector SL 37.2 is equipped with two M8 bolts.

Product code	Main conductor mm ²	Branch conductor mm ²	Pack. (pcs)
SL37.1	Al 6-95	Al 6-95	200
SL37.2	Al 6-95	Al 6-95	50



Aluminium to aluminium connector SL39.2

Non tension aluminium to aluminium LV and MV connections. The SL39.2 connector is suitable for AAC, AAAC and ACSR conductors. Equipped with two M8 bolts.

Product code	Main conductor mm ²	Branch conductor mm ²	Pack. (pcs)
SL39.2	Al 16-150	Al 16-150	50
SL39.21	16-150 (shear head)	16-150 (shear head)	50



Aluminium to aluminium connectors

Aluminium to aluminium LV and MV connections.

Product code	Main conductor mm ²	Branch conductor mm ²	Pack. (pcs)
SL2.1	Al 16-50	Al 16-50	200
SL4.2	Al 16-120	Al 16-120	50
SL8.2	Al 50-240	Al 50-240	25



Aluminium to copper connector SL39.271

Non tension aluminium to aluminium LV and MV connections.

Product code	Main conductor mm ²	Branch conductor mm ²	Pack. (pcs)
SL39.271	Al/Cu 16-150	Al 16-150, Cu 10-120	50





Ensto's overhead
line products
are proven to last
decades



Product information

Accessories for low and medium voltage distribution networks

Suspension Clamps

Suspension clamp SO260

For suspending of LV ABC cables in an insulated messenger wire system (IMWS). Suitable for every climatic conditions.

Product code	Bracket	Messenger mm ²	Pack. (pcs)
SO260	with bracket	25-95	20
SO260-PS2000	with bracket	16-95	20



Suspension clamp SO265

For suspending of LV ABC cables in an insulated messenger wire system (IMWS) with standard hook installation. Easy to install without tools. The messenger is placed to the groove and locked with the locking part. SO265.1 is equipped with wear protection plate.

Product code	Messenger mm ²	Weight (kg)	Pack. (pcs)
SO265	16-95	0.1	20



Suspension clamp SO214

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

Product code	Messenger mm ²	Tightening torque Nm	Pack. /pcs
SO214.2	16-155	48	50



Suspension clamp SO270

For the installation and suspension of 4-core ABC cables from poles with standard hook attachment. For straight lines and depending on cross section, angles up to 15/30 degrees. Structure itself provide installation without any tools. Clamp including composite parts is protected from wearing in hook attachment point.

Product code	Depth mm	Height mm	Length mm	Pack. (pcs)
SO270	40	51	80	40



Suspension clamp SO130 & SO136

For the installation and suspension of 4-core LV ABC cables to poles with standard hook attachment. For straight lines and angles up to 90°. No extra parts are needed for the installation.

Product code	For conductor mm ²	Conductor diameter mm	Pack. (pcs)
SO130	2-4x(16-120)	12-42	25
SO130.02	2-4x(16-120), with wing nut	12-42	25
SO136	2-4x(25-120)	12-42	10
SO136.02	2-4x(25-120), with wing nut	12-42	10



Product information

Accessories for low voltage distribution networks

Tension Clamps

Tension clamp SO250

So250 series consists of clamps for different messenger cross sections suitable for various climatic conditions. The clamps are easy to install without tools and are available for both bracket and hook installation to wooden, concrete or steel poles. Clamps are supplied with or without the bracket.

Product code	Bracket	Messenger mm ²	Pack. (pcs)
SO250	with bracket	50-70	10
SO250.01	without bracket	50-70	15
SO251	with bracket	95	10
SO251.01	without bracket	95	15
SO252.10	with bracket	25-50	20
SO252.101	without bracket	25-50	20
SO253	anchor bracket	-	40



Tension clamp SO95

Used for the tensioning cables. Light weight, no loose parts. The clamp is easy to install, without cutting the cable. The body is made of weather and UV-radiation resistant thermoplastic and the bail of hot-dip galvanized steel.

Product code	Cable diA mm	Pack. (pcs)
SO95	11-19	50
SO95.1	16-25	30



Tension clamp SO141

For anchoring of LV ABC with uninsulated messenger. The messenger is fitted, the clamp opened, directly into the groove without cutting. Clamp is equipped with eye for cable hoist. SMFL for various messenger cross-sections are as follows:

Product code	Messenger mm ²	Tightening torque Nm	Pack. (pcs)
SO141.3	16-155	44	25



Product information

Accessories for low voltage distribution network

4-core tension clamps

For the installation of 4-core LV ABC cables to poles with standard hook attachment. For straight lines and angles up to 90°. No extra parts are needed for the installation.

Product code	For conductor mm ²	Conductor diameter	Pack. (pcs)
SO274	4x25-50	7-10.2	10
SO276S	4x70-120	12.7-17.6	4
SO234S	4x50-120	10.8-16.7	10



Tension clamp SO243

The SO243 is a tension clamp for four core service connections - made from weather durable and mechanically reliable polymeric plastic. The light weight design of SO243 provides extremely easy and quick anchoring of LV overhead cables - either to poles or walls by means of standard hooks. No tools are required during the installation.

Product code	For conductor mm ²	Conductor diameter mm	Pack. (pcs)
SO243	2-4x6-25	5.3 - 9.1	50



Product information

Accessories for low voltage distribution networks

Automatic tension joints

Automatic tension joints and joint kits

The automatic joint is reliable and quick to make. No tools are needed for the installation and the with the colour code, you can find the correct size easily. The wedges ensure a safe joint.

Product code	For conductor mm ²	Conductor diameter mm	Color code	Pack. (pcs)
CIL63	35 - 50	5.81-8.64	orange/red	25
CIL64	70 - 95	9.27-12.06	yellow/grey	25
CIL65	120 - 150	12.75-14.86	pink/black	25
CIL71	159	14.73-18.40	green/brown	10
CIL72	241	18.8-21.7	blue/green	10
Joint kits				
CIL66	insulated messenger 35-50	5.81-8.6	orange/red	1
CIL67	insulated messenger 70-95	9.27-12.06	yellow/black	1
CIL68	insulated messenger 120-150	12.75-14.86	pink/black	1



Mid Span joints

Pre-insulated joints for ABC-cables. SJ9 Series Joints are pre-insulated joining sleeves used to connect LV insulated overhead phase conductors and messengers.

Product code	For conductors mm ²	Hex Die	Pack. (pcs)
SJ9.16	16	E173	100
SJ9.25	25	E173	100
SJ9.35	35	E173	100
SJ9.50	50	E173	100
SJ9.70	70	E173	100
SJ9.700	70	E215	50
SJ9.95	95	E173	100
SJ9.950	95	E215	50
SJ9.1200	120	E215	50
SJ9.1500	150	E215	50
SJ9.251	25	E173	70
SJ9.351	35	E173	70
SJ9.501	50	E173	70
SJ9.701	70	E173	70



Product information

Accessories for low voltage distribution networks

SJL9 Pre-insulated lugs

These are pre-insulated lugs used to terminate LV insulated overhead lines.

Product code	For conductors mm ²	Hex Die	Pack. (pcs)
SJL9.16	16	E173	100
SJL9.25	25	E173	100
SJL9.35	35	E173	100
SJL9.50	50	E173	100
SJL9.70	70	E173	100
SJL9.95	95	E173	100
SJL9.120	120	E215	50
SJL9.150	150	E215	50



Pole accessories

Suspension hooks through the pole SOT15

The suspension hook is used with insulated overhead cables or service cables. The hook is made of hot dip galvanized steel.

Product code	Description	Pack. (pcs)
SOT15.11	flat type eye hook	40
SOT15.12	bolted eye hook Ø 16	25



Band COT37 and buckle COT36 for band hooks

Installation with tightening tool CT42.

Product code	Description	Pack. (pcs)
COT37.2	stainless steel band/20 mm x 0.7 mm x 50 m	50 m
COT36	stainless buckle/for band	100



Product information

Accessories for low voltage distribution networks

Clamp SH168 and hooks SOT29 & SOT39

SH168, SOT29 and SOT39 are used with insulated overhead cables or service cables

Product code	Description
SH168	for rectangular PCC pole
SH168.1	pole clamp for H-Beam
SH168.2	pole clamp for R S joist
SOT29	universal pole clamp
SOT39	universal pole clamp



Street lighting

Branching connector KE10

The connectors can be used for aluminum and copper conductors. Tightening torque is 10 Nm. The connectors are used either inside metal poles or in separate boxes.

Product code	For conductor mm ²	Conductor diameter mm	Colour code	Pack. (pcs)
KE10.504	4 x (Al 10-50/Cu 2.5-35)	2.0-10.2	transparent	50
KE10.506	6 x (Al 10-50/Cu 2.5-35)	2.0-10.2	transparent	50



Distribution boxes SK190.1 and SK190.3

Product code	Description	Pack. (pcs)
SK190.1	single phase distribution box 1 in 9 out	1
SK190.3	three phase distribution box 1 in 5 out	1



Pole fuse switch disconnectors 160 A 415 V

Pole fuse switch disconnecter SZ160.3 and SZ160.32

Pole fuse switches include separate terminal covers for in-coming and out-going conductors, thus making installation safer

Product code	GTIN	Number of poles	Conductor size mm ²	Connectors included	Weight (kg)	Pack. /pcs
SZ160.3	6438100318314	3	Al 2x(16-120)/ Cu 2x(16-120)	6xKG45.5	3.17	1
SZ160.32	6438100318321	3+PEN	Al 2x(16-120)/ Cu 2x(16-120)	7xKG45.5	3.9	1



Pole fuse switch disconnecter SZ160.4

Pole fuse switches include separate terminal covers for incoming and out-going conductors, thus making installation safer

Product code	GTIN	Number of poles	Conductor size mm ²	Connectors included	Weight (kg)	Pack. /pcs
SZ160.4	6438100318338	4	Al 2x(16-120)/ Cu 2x(16-120)	8xKG41	4.8	1
SZ160.41	6438100318345	3+PEN	Al 2x(16-120)/ Cu 2x(16-120)	8xKG45.5	4.8	1



Pole fuse switch disconnectors 400 A 500 V

Pole fuse switch disconnecter SZ400.3

For protecting stranded overhead cables and underground cables in LV-networks Fuse-switch can be operated from the ground level by using operating rods

Product code	GTIN	Number of poles	Conductor size mm ²	Connectors included	Weight (kg)	Pack. /pcs
SZ400.3	6438100328689	3	Al 2x(50-240)/ Cu2x(50-240)	6xKG43	9.9	1
SZ400.322	6438100328726	3	Al 2x(50-240)/ Cu2x(50-240)	3xKG43	9.1	
SZ400.33	6438100328719	3	Al 2x(50-240)/ Cu2x(50-240)	3xKG43	9.1	1



Pole fuse switch disconnecter SZ400.4

For protecting stranded overhead cables and underground cables in LV-networks Fuse-switch can be operated from the ground level by using operating rods The fourth pole is there for extra phase conductor It is opened and closed together with the other phase-poles Connectors included 8 x KG43, poles 4

Product code	GTIN	Number of poles	Conductor size mm ²	Connectors included	Weight (kg)	Pack. /pcs
SZ400.4	6438100328696	4	Al 2x(50-240)/ Cu2x(50-240)	8xKG43	12.5	1
SZ400.41	6438100328702	3+PEN	Al 2x(50-240)/ Cu2x(50-240)	8xKG43	12.8	1



Disconnecter - Medium voltage distribution networks

SZ24 disconnector is used to simplify operation in fault situations and to reduce recovery and maintenance time. SZ24 disconnector can be operated from the ground level or pole by using operating rods such as our CT60.50 and CT48.64. KG43 bus-bar connector can also be used instead of KG41. - Rated voltage (Ur): 24 kV.

Product code	Conductor size mm ²	Rating	Weight (kg)	Pack. (pcs)
SZ24	16-120	24 kV	9,6	3



Full covered conductor solution



Covered conductors were developed to improve reliability of the distribution of electricity. Time has assured the Covered Conductor solution to be extremely functional and reliable. Faults caused by snow, ice or storms have decreased remarkably. Full Covered Conductor Solution provides even more complete protection for the line.

Covered Conductor Solution (CC) allows space savings e.g. 40% narrower clearances for line corridors through forested areas, compared to a standard bare line. With parallel line structure, the space saving is even bigger. Ensto accessories for medium voltage Covered Conductor Solutions are tested according to the EN 50397-2 standard which, compared to earlier national standards, is substantially more demanding and covers the accessories designed for such solutions more extensively. This brings a whole lot of reliability for the Covered Conductor Solution.

Benefits of FCCS

Full Covered Conductor Solution (FCC) provides even more complete protection for the line compared to traditional Covered Conductor Solution. In addition for the covering of the conductors, other live parts of the line have been covered also such as insulators, support- and tension clamps, connectors, etc. This has been done to acquire even more protection from wildlife, such as birds and squirrels, and to prevent interruptions in the distribution of electricity.

Choosing a Full Covered Conductor solution with Ensto accessories is guaranteed to pay for itself in the form of fewer faults, lower maintenance costs, and higher-quality electricity.

Ensto's accessories to Full Covered Conductor lines are electrically and mechanically designed for the best performance and safety. Accessories for medium voltage Full Covered Conductor lines include insulators, tension and suspension clamps, arc protection devices, current limiters and connectors.

Product information

Accessories for medium voltage distribution networks

Composite insulators

Composite tension insulator

Insulator for terminal and intermediate poles of 24-36 kV lines. Ideal for 24 kV lines in areas of pollution class II & class III (IEC 60815).

Product code	End fittings	Creepage distance mm	SMFL kN	Weight (kg)	Pack. (pcs)
SDI90.280	Eye-eye	613	70	1.08	3



Composite suspension insulator

Composite line post Insulator 24kV with pin M20x140. SDI82.2M20 has integrated top clamp so it does not need separate helical ties to tie down the conductor.

Product code	GTIN	Neck dia. mm	Creepage distance mm	SMFL kN	Weight kg	Pack. pcs
SDI82.1M20	6438100316013	73	561	12,5	2,56	1
SDI82.2M20	6438100340414	N/A	561	12,5	2.56	1



Tension & suspension clamps

Tension clamps

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	Conductor range mm ²	Conductor dia. mm	SMFL kN	Weight (kg)	Pack. (pcs)
SO255S	50 - 70	12,7 - 16,7	20	1.133	9
SO256S	95 - 157	16,1 - 22,3	25	2.53	3
SO257S	150 - 241	18,0 - 30,0	60	2.45	3



Suspension clamps

Suspension clamp with pulley for covered conductors PAS/BLL AlMgSi. The clamp also functions as an installation pulley thereby completely eliminating the need for separate pulleys.

Product code	Conductor range mm ²	Conductor dia. mm	SMFL kN	Weight (kg)	Pack. (pcs)
SO181.6S	50 - 157	12,7 - 22,3	30	1.224	3
SO183S	150 - 241	18,0 - 30,0	60	2	3



Product information

Accessories for medium voltage distribution networks

Connectors

Insulation piercing connector

The watertight shear head bolt connector is for Medium Voltage Covered Conductors (MV CC) non-tension aluminium to aluminium connections without peeling the insulation. The nominal insulation thickness of the conductor can be between 2.3-4.0 mm.

Product code	Conductor range mm ²	Conductor dia. mm	Tightening torque Nm	Weight (kg)	Pack. (pcs)
SLW26	50 - 157	11.5 - 22.5	35 ± 2	0.286	24
SLW27	95 - 241	16.0 - 26.5	35 ± 2	0.286	24
SLW34		14.2 - 26.1	35 ± 2	0.286	
SLW34.1					



Earth parking devices

The SEW's are used for temporary earthing for Medium Voltage Covered Conductors (MV CC). The connector is watertight by silicone greased teeth. The nominal insulation thickness of the conductor can be between 2.3-4.0 mm.

Product code	Conductor range mm ²	Conductor dia. mm	Tightening torque Nm	Weight (kg)	Pack. (pcs)
SEW30	50 - 157	11.5 - 22.5	35 ± 2	1.093	6
SEW31	150 - 241	18.0 - 26.5	35 ± 2	1.093	6



IP / Bare connectors

The connector can be used for medium voltage covered conductor to bare conductor connections. Nominal insulation thickness of the conductor can be between 2.3-4.0 mm.

Product code	Branch conductor mm ²	Conductor dia. mm	Main conductor mm ²	Weight (kg)	Pack. (pcs)
SLW34	50-241	6.8 - 16	35-157	0.28	24
SLW34.1	35-157	-	50-241	0.43	12



Helical Ties

For covered conductors, one bag contains six ties

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.

Product code	Conductor range mm ²	Colour code	Insulator neck mm	Weight (kg)	Pack. (pcs)
SO216.62	50 - 62	White	73 - 85	0,63	25
SO216.99	70 - 120	Red	73 - 85	0,687	25
SO216.157	157	Blue	73 - 85	0,801	25
SO216.24173	241	Yellow-green	73	0,92	25



Product information

Accessories for medium voltage distribution networks

Power arc devices

For line post insulators

Arc protection device for covered conductors with line post insulators. The spark gap is adjustable. Short circuit current: Arc test 10kA/1 s.

Product code	Conductor range mm ²	Arc gap length at 24 kV	Weight (kg)	Pack. pcs
SDI24	50-157	130 - 150	1.96	3
SDI29	150-241	130 - 150	1.96	3



For tension insulators

Power arc device SDI27.1 is used with composite tension insulators.

Product code	Conductor range mm ²	Arc gap length at 24 kV	Weight (kg)	Pack. (pcs)
SDI27.1	50-241	130-150	0.83	9



Current limiting devices

For line post insulators

Used on straight line crossarms with post line insulators for arc protection. The set includes a surge arrester, a fixing bracket, a connector, a spark horn/an arc protection horn. Three sets are needed for one crossarm.

Product code	Conductor range mm ²	Arc gap length at 24 kV	Weight (kg)	Pack. (pcs)
SDI48.5	50-157	70-80	5.18	3
SDI48.6	150-241	70-80	5.18	3



For tension insulators

Used on crossarms with tension insulators for arc protection. The product includes a surge arrester, an tension insulator and spark horn. Three sets are needed for one crossarm.

Product code	Conductor range mm ²	Arc gap length at 24 kV	Weight (kg)	Pack. (pcs)
SDI46.824	50-241	70-80	7.905	1
SDP5	-	-	0.28	30



Dedicated Smart Grid solutions



Energy distribution reliability is a prerequisite for so-called Smart Grids. Ensto's automation solutions provide global optimisation regardless of grid configurations.

Our response to today's major challenges

Population growth, along with permanent industrial development, have led to an increase in energy demand in general, and for electricity in particular. Energy suppliers are therefore required to constantly produce more, by optimizing their grids to satisfy their customers, whose demands for quality and continuity of service are increasingly stringent. Global solutions are thus required to reduce service interruption duration and frequency.

Distribution reliability indicators

In a constant effort to improve their performance, energy suppliers regularly monitor specific indicators, the two most frequently used are

- SAIDI (System Average Interruption Duration Index) which measures the average duration of power cuts affecting an end consumer in a recorded period.
- SAIFI (System Average Interruption Frequency Index) which measures the average frequency of power cuts affecting an end consumer in a recorded period.

Adapted Smart Grid solutions

Ensto Novexia offers network automation solutions which include equipment dedicated to rapid fault location combined with remote controlled medium voltage operating components for automatic isolation of a faulty grid section or remote grid configuration.

Product information

Accessories for low voltage distribution networks

Power Quality

Voltage Controller

The voltage controller is a single phase unit that can increase and decrease the line voltage level at the problem points of a low voltage distribution network. If a customer is experiencing problems with lowered or high voltages (caused by solar panels for example), the voltage controller is an ideal solution to solve the problem.

Product code	Nominal power kVA	Nominal current	Max input current A	Weight (kg)	Pack. (pcs)
VC6K-1P-000	6	25	28	35	1



Phase Balancer

The phase balancer is a device that will fix unbalance problems in low voltage distribution grids. The unit shall be installed parallel with the distribution grid where the unbalance problem occurs. The phase balancer will correct asymmetric load problems, increase short circuit current and decrease harmonic content in low voltage networks.

Product code	Max continuous balancing current 40 °C	Max short term balancing current 40 °C	Grounding system	Weight (kg)	Pack. (pcs)
PB50A-3P-200STD	50A (3 x 17A)	100 A (3 x 33 A) 10 min.	TT/TN	125	1
PB50A-3P-200ADV*	50A (3 x 17A)	100 A (3 x 33 A) 10 min.	TT/TN	125	1



*ADV-version including:

- Grid state monitoring
- Overload protection (hardware/software)
- Operation indicators
- RS232 for remote control application (MODBUS RTU)



Product information

Accessories for medium voltage distribution networks

Medium voltage overhead load break switches

Manual or electric remotely controllable for 24 kV and 36 kV three-phase grids

- 24 kV switch, 31.5 A to 100 A breaking capacity
- 36 kV switch, 25 A to 80 A breaking capacity
- Ceramic, synthetic or glass insulator



Medium Voltage overhead SF6 load break switches

Manual or electric remotely controllable. IP68 sealed metal housing, enclosing the MV/LV power transformer or with external transformer.

Can automatically isolate the defective part of the grid following a pre-programmed number of openings of the automatic circuit recloser placed upstream (ADA function).

- Rated voltage: 12/24/36 kV
- Rated current: 630 A
- Breaking capacity: 12,500 A



Vacuum Medium Voltage automatic circuit reclosers

Detect current surges, interrupt the fault currents and re-power the line by automatic reclosing. If a fault is permanent, they isolate the defective section from the rest of the grid.

- Rated voltage: 38 kV
- Rated current: 630 A
- Breaking capacity: 12.5 kA



Monitoring control units

- ITI Controller for Medium Voltage overhead switches

- Measurement: current, voltage, energy and unit power supply
- Detection: current, directional
- Protocols: IEC 60870-5-101, IEC 60870-5-104, Modbus RTU, DNP3 and HNZ
- Communication: Digital or analogue radio, Dedicated lines, GSM, GPRS, Public switched telephone networks (PSTNs), Ethernet, external RTU



Smartcloser controller for Medium Voltage reclosers

- Measurement: current, voltage, energy and unit power supply
- Detection: Power surge ANSI 50, 51, 67, CPL ...
- Protocols: IEC 60870-5-101, IEC 60870-5-104, Modbus RTU, DNP3 and HNZ
- Communication: Digital or analogue radio, Dedicated lines, GSM, GPRS, Public switched telephone networks (PSTNs), Ethernet, external RTU



Product information

Accessories for low voltage distribution networks

Pole circuit breaker

To protect 50 kVA, 100 kVA and 160 kVA transformers from load unbalance and power surges. Includes a digital or analog tripping unit modeling the thermal image of the transformer.

PAS fuse protection

To protect 50 kVA, 100 kVA and 160 kVA transformers from load unbalance and power surges. IP34D rated weather resistant. Is also available in plate form for integration in the new medium voltage and low voltage stations.



Customer benefits

- › Adaptable to all grids
- › Durable
- › Reliable operation under extreme weather conditions

Product information

Accessories for low voltage distribution networks

Low Voltage panelboards

TIPI (Power Interface and Information Panelboard)

TIPI, second generation of boards with IP2X protection. It has the main additional features over the TUR board:

- Operating safety (IP2X).
- Connectors to connect replenishment outlets by a back-up unit.
- Inclusion of voltage measuring outlets.
- Presence of a short-circuiter.

Configurations:

- 4 outputs + 1 temporary, fitted with a 500 A switch.
- 8 outputs + 1 temporary, fitted with a 1200 or 1800 A switch.

TUR (small urban panelboard)

The TUR board, first generation of boards, has the main functions below:

- Easy distribution of electric energy through reduced, modular configuration (up to 4.5 or 8 LV outputs).
- Ensure general cut using a switch of powers up to 1000 kVA.
- Protect LV outputs via HRC (high rupturing capacity) fuses.

Configurations:

- 4 outputs + 1 temporary, fitted with a 800 A switch.
- 5 outputs + 1 temporary, fitted with a 1200 A switch.
- 8 outputs + 1 temporary, fitted with a 1200 or 1800 A switch.



Monitoring - Control

ITI - Underground controller

For remote operation of 1 to 8 switches within MV/LV stations.

- Measurement: current, voltage and unit power supply.
- Detection: current, directional.
- Protocols: IEC 60870-5-101, IEC 60870-5-104, Modbus RTU, DNP3 and HNZ.
- Communication: Digital or analogue radio, Dedicated lines, GSM, GPRS, Public switched telephone networks (PSTNs), Ethernet, external RTU



Product information

Accessories for low voltage distribution networks

LYNX - Fault passage indicator

- › Types: Overcurrent or directional
- › Neutral point treatment: Direct to earth or impedance-earthed (Overcurrent)
Compensated or isolated (Directional)
- › Rated grid voltage: 6 to 36 kV - 50/60Hz
- › Power supply: Can be autonomous (supercapacitor or battery) or fitted with a low voltage power supply with battery backup.



DEIE - Distributed generation controller

Manages the remote control and monitoring of decentralized production facilities (wind generators, thermal power plants, etc.). It is used to exchange data and commands between the MV grid manager and the independent producer.

- › Protocols: HNZ (Enedis-specific), IEC 60870-5-104.
- › Communication: Digital or analog radio, Dedicated lines, GSM, GPRS, Public switched telephone networks (PSTNs), Ethernet, external RTU



Overvoltage protection



In order to deliver high-quality power, electricity companies must constantly improve the quality of their grids. Overvoltage protection is a key element.

Appropriate overvoltage protection is key to optimizing grid continuity of service. Furthermore, it ensures personal safety and reduces immobilization costs.

Surge arresters for every application

Designed and manufactured to the highest quality standards, Ensto Novexia's broad range of surge arresters ensure years of maintenance-free service in the following fields:

- Overvoltage protection for high voltage and medium voltage hardware.
- Overvoltage protection for direct or alternating current rail networks.

- Overvoltage protection for cable sheaths.
- Voltage limiter for non-earthed metal structures.

Based on cutting edge metal oxide and silicone coating technologies, our surge arresters provide total control of residual voltage based on insulation coordination rules, thus considerably improving the level of protection.

Surge arresters for rail applications

The availability of a secure railway power supply is critical for operators. This search for reliability requires e.g. the

use of specific surge arresters and voltage limiters adapted to these networks. The protection afforded by these devices ensures the safety of persons and equipment, thus reducing operating costs.

Customer benefits

- Guaranteed continuity of service.
- Improved current quality.
- Guaranteed personal and equipment safety.
- Maintenance-free equipment.

Product information

Accessories for medium and high voltage distribution networks

HV source station surge arresters with polymer coating

VARISIL™ HI (for grids up to 170 kV)

- 10 kA/Class 2 to 5 at 144 kV
- Creepage distance: 25 mm/kV
- SLL/SSL mechanical strength: 800/1000 N.m

VARISIL™ HTS (for grids up to 245 kV)

- 10 kA/Class 3 to 5 at 198 kV
- Creepage distance: 25 mm/kV
- SLL/SSL mechanical strength: 800/1000 N.m



Medium voltage source station surge arresters with polymer coating

Compliant with the IEC 60099-4 standard

VARISIL™ H24 / H36

(for 24 kV or 36 kV grids)

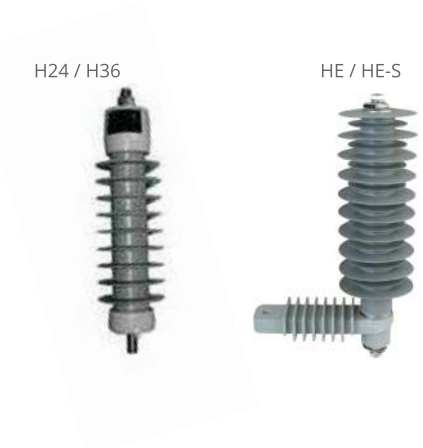
- 10 kA / Class 1
- Creepage distance: 25 mm/kV
- Mechanical strength: 250/300 N.m
- Compliant with the EDF HN 65-S-40 standard

VARISIL™ HE-S (for grids up to 54 kV)

- 10 kA/Class 1 to 3 at 54 kV
- Creepage distance: 31 mm/kV
- SLL/SSL mechanical strength: 200/250 N.m

H24 / H36

HE / HE-S



VARISIL™ HE (for grids up to 36 kV)

- 10 kA/Class 1 to 3 at 36 kV
- Creepage distance: 31 mm/kV
- SLL/SSL mechanical strength: 100/125 N.m

Cable sheath surge arresters

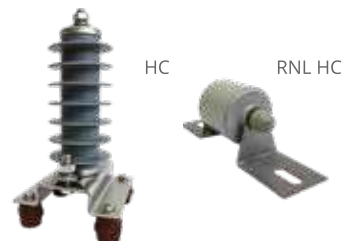
Compliant with the IEC 60099-4 standard

VARISIL™ HC (for grids up to 18 kV)

- 10 kA / Class 1
- For connection to links earthed at one point

RNL HC (for grids up to 6 kV)

- 10 kA / Class 1
- Designed to be fitted into screen permutation units



Surge arresters for rail applications

Compliant with the IEC 60099-4 standard

VARISIL™ HDC

- 10 kA / Class 2
- For direct current subways, trains and tramways (1 kV to 4.8 kV)

8506

- 10 kA / Class 3
- For direct current rolling stock (1.5 kV and 3kV)

VARISIL™ HD/T

- 10 kA
- For alternating current subways, trains and tramways (36 kV to 42 kV)

CLS - Low-voltage limiter

- For alternating and direct current subways, trains and tramways

VARISIL™ HDP

- For direct current rolling stock



Product information

Accessories for low voltage distribution networks

Tools

Wire brush ST18

In aluminium connections it is important to remove the Al-oxide from the aluminium surfaces by using a wire brush. Use of joint compound SR 1 prevents further re-oxidation. ST18.2 is the case for ST18.

Product code	Weight (kg)	Pack. (pcs)
ST18	0.07	1
ST18.2	0.02	1



Joint compound SR1

Used for the prevention of oxidation on aluminium surfaces. The use of the wire brush and joint compound SR1 reduces the contact resistance. It also protects the connection from corrosion. There are no skin irritating ingredients in the grease.

Product code	Weight (kg)	Pack. (pcs)
SR1	0.22	25



Ratchet wrench CT164

For installation of connectors and suspension fittings. The wrench body is made of steel and the grip of oil resistant rubber. The wrench is double-sided 13 and 17 mm.

Product code	Weight (kg)	Pack. (pcs)
CT164	0.25	20



Fork wrench ST34

The ST34 is for holding the connector while tightening the bolts. Approved also for insulation piercing connectors with live conductors.

Product code	Weight (kg)	Pack. (pcs)
ST34	0.34	25



Product information

Accessories for low voltage distribution networks

Wedges ST31 and ST192

During the installation of connectors the phase conductors of an insulated overhead cable can be separated by using wedges. The wedge can also be used when installing suspension clamps.

Product code	Description	Weight (kg)	Pack. /pcs
ST31	two plastic wedges	0.11	10
ST192	plastic wedge for LV ABC	0.14	10



Wire stringing wheels ST26.1, ST26.11, ST26.22 and ST26.33

Used for pulling in overhead cables. ST26.1, ST26.33 and ST26.11 are used for straight lines and small angles up to 30 degrees. Double pulley ST26.22 is used for larger angles up to 90 degrees.

Product code	Description	Weight (kg)	Pack. (pcs)
ST26.1	stringing wheel/cable groove 50 mm, nylon	1.46	10
ST26.11	stringing wheel/cable groove 50 mm, nylon, with chain attachment	3.9	3
ST26.22	stringing wheel/ Cable groove diameter 50 mm, nylon with chain attachment, double pulley	6.25	3
ST26.33	stringing wheel Cable groove 77 mm, aluminium	2.17	5



Tightening tool CT42

Tightening tool CT42 CT42 is a special tool which is used for tightening the steel band COT37.

Product code	Weight (kg)	Pack. (pcs)
CT42	1.95	20



Pole climbing irons CT2

Made of Al-alloy. The irons can be adjusted with different sizes of wooden poles.

Product code	Pole diam. mm	Weight (kg)	Pack. (pcs)
CT2	140-300	4.84	1



Product information

Accessories for low voltage distribution networks

Pole climbing irons ST155

Made of alloyed and heat-refined steel. The welded and forged areas of the irons, are tested for cracks. Irons ST155 are supplied with straps.

Product code	Pole diameter mm	Weight (kg)	Pack. /pcs
ST155.8	Max. 200	2.6	1
ST155.11	Max. 280	2.7	5
ST155.14	Max. 350	2.8	1



Come along clamps ST102 for four core cables

For tensioning overhead line spans of four core cables. The grips cover a wide range of diameters and can apply high-tension force. ST102 uses an articulated construction. It is easy to mount and change on the line.

Product code	Description	Weight (kg)	Pack. (pcs)
ST102.50	come along clamp/4x25-50 mm ²	2.3	1
ST102.95	come along clamp/4x70-95 mm ²	4.31	1
ST102.120	come along clamp/4x120 mm ²	4.3	1



Come along clamps CT102 and CT105

For tensioning both bare and covered conductors overhead line spans. The grips cover a wide range of diameters and make a good fixing and high tension force.

Product code	Conductor diameter mm	Weight (kg)	Pack. (pcs)
CT102.501	7.87-13.46	1.7	1
CT102.1201	13.46-18.80	3.77	1
ST102.120	4-20	2.75	10
CT105.35	3-8	0.83	1
CT105.70	5-10	1.16	1



Pulling grip CT103

Pulling grips are made of high-grade galvanised steel wire, in a double weave construction for safe and secure cable pulling. Grip length 600 mm.

Product code	Diameter mm	Weight (kg)	Pack. (pcs)
CT103.35	20-30	0.23	1
CT103.50	30-40	0.30	1
CT103.95	40-50	0.59	1



Product information

Accessories for low voltage distribution networks

Cable hoist ST116 and CT116

Ratchet puller for line tensioning.

Product code	Lift height m, single/ double wire	Capacity kg, single/ double wire	Weight (kg)	Pack. (pcs)
ST116	3/1.5	500/1000	4.1	1
ST116.1	4/2	750/1500	5.000	1
CT116.3	4.57 (15 Ft) / 2.29 (7.5 Ft)	454 (1000 lbs) / 908 (2000 lbs)	6.39	1
CT116.7	9.15 (30 Ft) / 4.58 (15 Ft)	680 (1500 Lbs) / 1360 (3000 Lbs)	7.02	1



Swivel for conductor linking CT104

Swivels are essential for effective pulling operation of underground cables and overhead conductors. The swivels are fitted with bearings to prevent build up of twist and loops in the cable or pulling rope. Rope dia.10 mm, working tension 10 kN.

Product code	Description	Pack. (pcs)
CT104	0.45	20
ST102.95	come along clamp/4x70-95 mm ²	1
ST102.120	come along clamp/4x120 mm ²	1

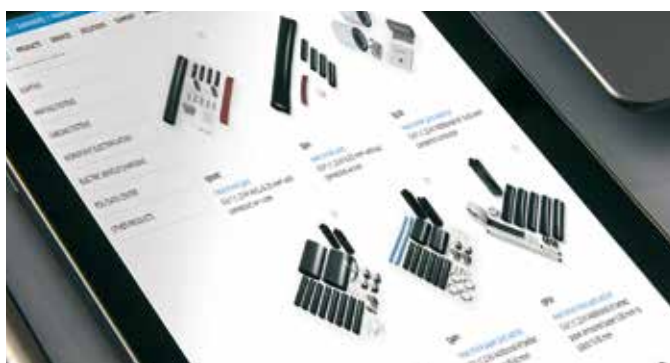


Ensto underground cable solutions

Comprehensive products and training



A well designed underground cable network guarantees uninterrupted electricity distribution. The Ensto Pro training academy provides professionals a comprehensive range of both theory based information and practical installation work.



Product information with you everywhere and on any device

Ensto web site includes thorough information about our solutions and detailed data on our products. The product data includes product cards and specifications for individual products.



Installation videos

Installation videos and animations help in installing our products as smooth and easy as possible – where ever, when ever.

- ▶ The videos can be found on our YouTube channel "EnstoGroup". Scan the QR code above to access them directly.

Cable lugs and connectors

for a wide range of cross-sections

Our solutions for underground distribution networks offer functional and reliable medium voltage packages with both heat and cold shrink technologies. Moreover, our hybrid joints are an effective and durable combination of both technologies. Our screened separable connectors are safe to use and easy to install.

Our cable lugs and connectors have been designed to make installation as easy and effortless as possible. All our connectors and cable lugs have been equipped with shear-head bolts, which guarantee a reliable and uniform end result without the need for special tools.



Low voltage cable lugs and Connectors 6-300mm²

Wide range:

- › Suitable for solid, stranded, sector and round conductors.
- › Suitable for aluminum and copper conductors.

Fast and easy installation:

- › Shear head technology - no compression tools.

Medium voltage cable lugs and Connectors 10-1000mm²

Wide range:

- › Suitable for solid, stranded, sector and round conductors.
- › Suitable for aluminum and copper conductors.

Fast and easy installation:

- › Screw design with step less shearing.
- › Always correct cut-off point.
- › No need for hammering or grinding the screw after break.



Screened separable connectors

Our screened connectors are used for installing plastic cables for transformers, motors and especially SF6 switchgears both indoors and outdoors. Installation is quick and easy. In order to make it easier for you to choose the right product to suit your needs, the connectors have a wide cross-section which means fewer products from which to choose from.

Benefits:

- › Wide range with only one product.
- › The screened separable connectors are safe to use and easy to install.
- › The connectors do not require a lot of space, and there is no need for minimum installation clearances.
- › Disconnecting and connecting is quick and easy.
- › There is no need for any special tools.
- › The cable can be connected to the network immediately after installation.
- › The connectors are manufactured from flexible silicone rubber.



Heat and cold shrink accessories

Heat shrink accessories

Ensto heat shrink products cover 12–36kV indoor and outdoor terminations and joints. The selection includes separate accessories for both plastic and pa-

per insulated cables and for transition joints. The packages contain all components required in a cable termination or joint. The stress control tube and the insulating sleeve are combined in the

joints. This reduces the number of components and makes installation work quicker.



Cable joints

- Dual layer stress control technology in 24kV solutions.
- Packages available both with and without connectors.

Terminations

- Easily shrinkable stress control tube.
- Reliable, conventional structure.
- Stress control using a separate tube for good and uniform shrinkage – especially in tight spaces.

Cold shrink and hybrid accessories

Cold shrink accessories enable working in places where hot work permits are difficult to obtain or where hot work is otherwise not possible. E.g. oil refineries, many chemical plants and other industrial facilities tend to favour work methods that do not require hot work.

The hybrid joints, on the other hand, are a carefully selected combination of cold and heat shrink components that together ensure a durable joint. Ensto's hybrid joints, cold shrink terminations and separable connectors have multiple uses and a wide range of applications can be covered fully with only

a small number of products. The installation work is fast because there are only a few work steps. The packages contain all components required in terminating or jointing cables.



Cable joints

- Spiral technology: quick and easy to install.
- Cold shrink and hybrid joints.
- All-in-one joints.

Cable terminations

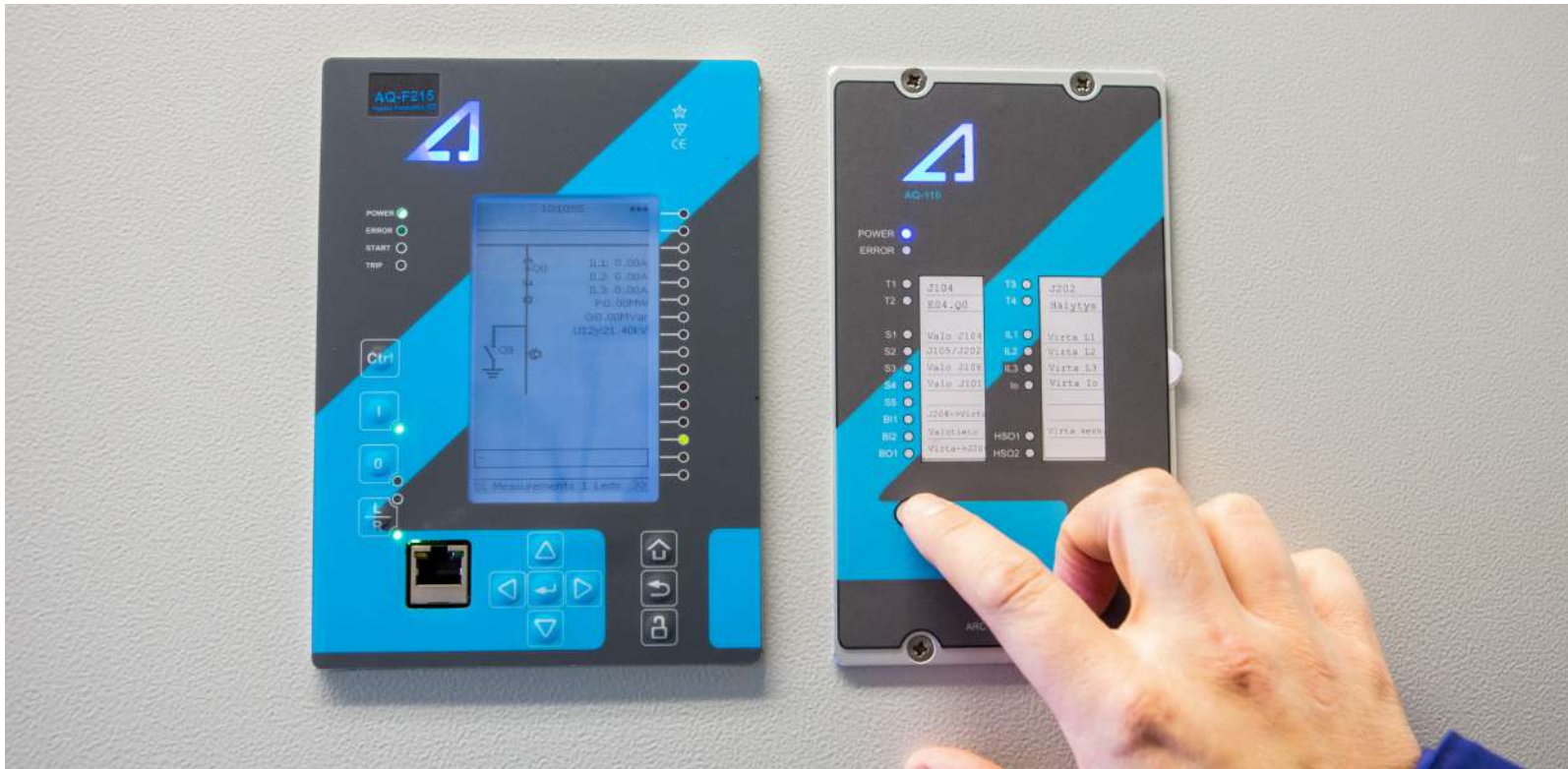
- One termination tube combining stress control, rainsheds and antitracking tube.
- Spiral technology.
- Ready for use right after the installation.
- Indoor and outdoor terminations.

Screened Separable Connectors

- For installing plastic cables (12 and 24kV) for transformers, motors, and especially SF6 switch-gears both indoors and outdoors.
- Installation is quick and easy.

Arc protection solutions

Designed using top-of-the-line technology



Arcteq is the pioneer in arc flash protection and known for making the best protection relays in the world.

Arcteq is a part of Ensto Group and designs, markets, sells and supports protection relays, arc flash protection systems and measuring and monitoring equipment for electrical utility, traditional and renewable power generation, industrial, off-shore, marine, institutional and commercial users.

Our services can include everything from the selection of the suitable protection device to the setting and commissioning the system. We are using the latest software commercially available like PsCad, ETAP and MatLab additionally to the calculation programs build by us which are specifically tailored to Arcteq relays. For commissioning we are using Omicron with added capability for Line differential testing with GPS synchronized tests sets.



Distribution Utilities (DSO)

With the use of transformers distribution substations connect to the transmission system and lower the transmission voltage to medium voltage (2 kV – 35 kV).

Transmission Utilities (TSO)

Transmission line operations require reliable, accurate and fast operation of the protection IED.



Protection Relay

Arcteq's AQ-200 and AQ-300 series of protection IEDs are developed to cover any application in transmission or distribution network protection and control.



Arc Flash Protection

The AQ-100 product line is designed using top-of-the-line technology, with a focus on simplicity while maintaining both flexibility and function.

Fault detection solutions

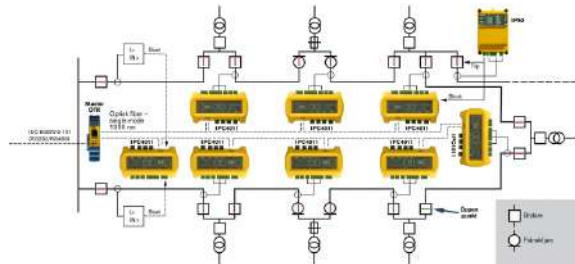
With relay performance



All detector products are based on Protrol's well proven and patented method for detection of earth faults.

Protrol's products are designed for performance monitoring, control and fault detection in secondary substations. The products are based on patented technology. Expert services are also available within several fields, with a special focus on protection and control for primary substations, high voltage direct current and connection of new power sources.

Our society's dependence on reliable power supply is steadily increasing, thereby also the demands on power distribution companies. Power outages are expensive - both directly and indirectly. The governing authorities underline their demands on distributors by measuring SAIFI or SAIDI. These demands will hardly decrease. Investment in fast fault detection and disconnection will therefore give return, regardless of how you calculate.



Distribution Grid Automation

Protrol offers many levels of automation, with and without communication to the control centre. From local indication to pass-through faults to fully automatic fault disconnection and power restoration.



Fault Detector/ RTU's

Protrol's products have been developed for cost-efficient and reliable fault detection and grid supervision.

SASensor

Totally integrated protection and control.



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