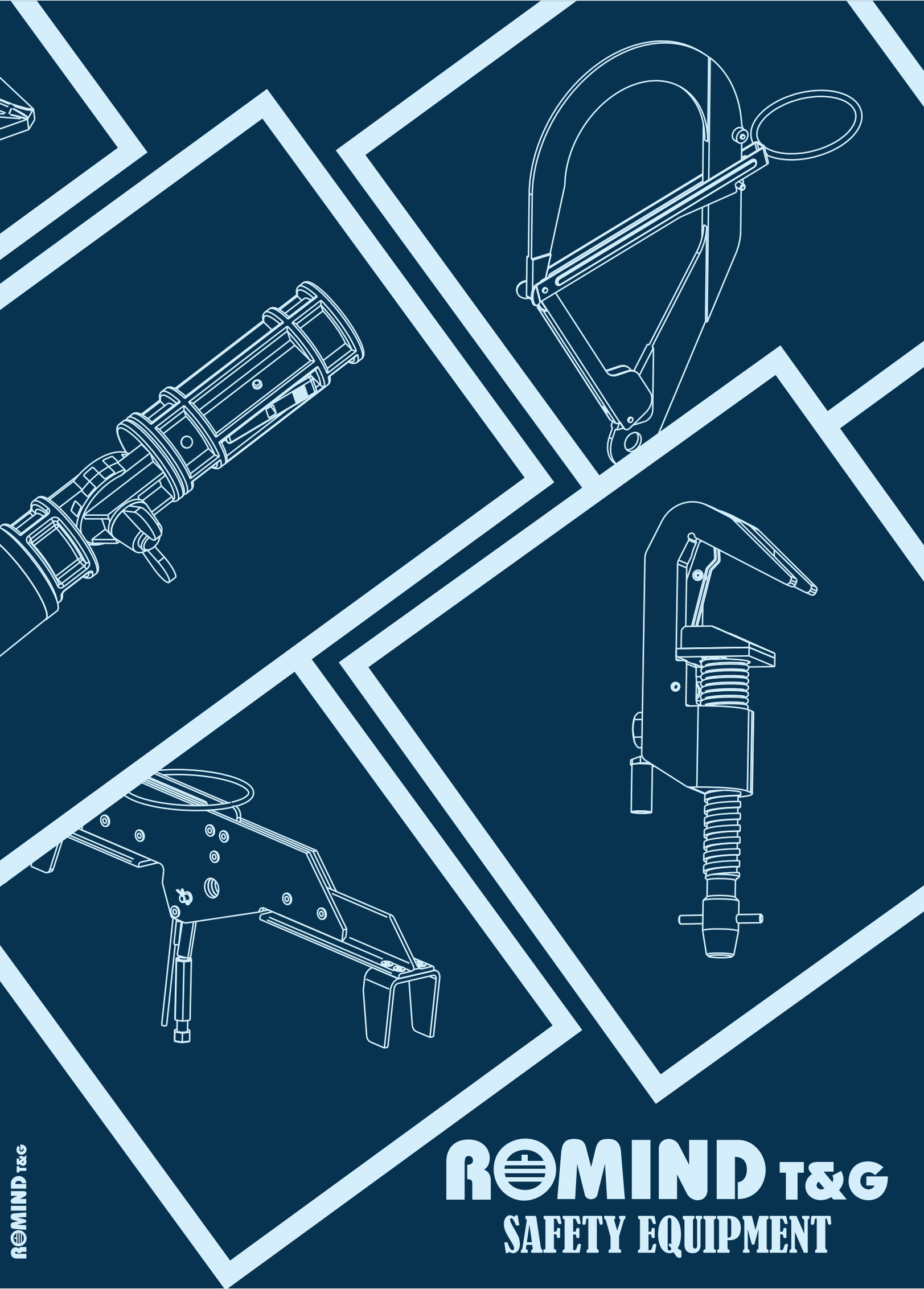


ROMIND T&G

SAFETY EQUIPMENT

ROMIND T&G

ROMIND T&G

Who are we?

Romind is a Romanian company with private capital, founded in Bucharest, in 1993.

What we do?

With over more than 20 years of experience, the company is nationally known as the leading manufacturer and supplier of electrical safety equipment and fall protection systems. At the same time, the functional components for cooling towers and water treatment manufactured by Romind are valued for their technical performance and quality.

Main domains:

- Electrical safety equipment
- Fall protection systems
- Electrical testing services
- Functional components for cooling towers
- Engineering services for cooling circuits
- Components for water treatment installations
- Meter seals with stainless steel wire
- Lightning protection systems
- Fault indicators for power networks

How we do it?

Most of our products are designed in our R&D department. After testing, they are made within our own production departments, where we perform machining operations, plastic injection molding, welding, manual and automated mechanical assembling, laser marking or stamping.
In our own Testing Lab, certified according to European standard, high voltage electrical tests can be performed.
We collaborate with leading European suppliers of equipment and components.

Our main customers are:

- Power producers, suppliers and distributors
- Companies from oil and gas industry, chemical industry, metallurgical industry, concrete industry, goods and passengers transport companies

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The **Personal Protective Equipment (PPE)** is a specialized clothing or equipment worn by workers for protection against safety hazards. PPE is designed to protect different parts of the body: eyes (e.g. goggles), head (e.g. helmets), face (e.g. face shields), hands (e.g. gloves) and feet (e.g. boots).

The wearing of the PPE can offer protection against:
- **Electrical risks** by preventing direct or indirect contact with live conductors;
- **Mechanical risks** acting as a protection shield of the body against elements that can cause injuries;
- **Explosions** caused by electrical arc.

Protective helmet with hinged visor - EDL-01 type

EN 50365 Enel CE

EN 166 EN 170 EN 397

Code: EDL-01

The protective helmet with hinged visor provides complex protection of the head against mechanical risks, electrical risks and against electrical arc flash.

Through its design, the visor offers total protection of the face against electrical arc flash.
In order to protect it against scratches, the visor can be folded up under the frontal part of the shell.

The protective helmet is provided with an adjustable fixing system with 6-points texture harness, absorbent sweat band and chin strap.
Optionally, the helmet might be delivered with a protective bag or/and with a flashlight adapted for fixing on the helmet.

Optionally, the helmet can be delivered in a protective transport bag and can be provided with flashlight with hooks for attachment on the helmet.



EDL-01

Helmet

Technical characteristics	
Material	Polypropylene
Head fixing system	Adjustable, with rack
Number of attachment points	6
Absorbent sweat band	Textile material
Maximum operating voltage (V AC)	440
Test voltage (V AC)	1200/15 sec.
Sizes	52 ÷ 66
Total weight visor + helmet (gr)	710



TIKKA XP 2 FLASHLIGHT

Visor

Technical characteristics	
Visor material	Transparent polycarbonate
Visor dimensions (mm)	450 x 180
Visor thickness (mm)	2
Optical class (EN 166)	2
UV transmission factor (EN 170)	2-1, 2
Protection against high speed particles impact	Resistance at medium energy impact - B class
Protection against droplets and splashes of liquid	YES
Protection against electrical arc flash	YES
Protection against melted metal and hot solids	YES
Protection against fine dust particles	YES
Steaming resistance	YES



7 LEDS FLASHLIGHT



TRANSPORT BAG

Protective helmet

EN 50365 EN 397 CE

Code: INAP Electro / INAP Master

The protective helmets **INAP Electro** and **INAP Master** ensure protection of the head against mechanical risk factors. INAP Electro helmet does not have holes for ventilation and provides electrical insulation for working in LV electrical installations.
The protective helmet is provided with an adjustable fixing system with 6-points synthetic harness, absorbent sweat band and, optionally, with a chin strap.

Type	Inap Electro	Inap Master
Maximum operational voltage (V AC)	1000	-
Withstand voltage (V AC)	5000 / 3 min.	-
Accessories slots width (mm)	30	30
Sizes	51 ÷ 64	51 ÷ 64
Color	Blue, yellow, etc.	Blue, yellow, etc.
Weight (gr)	340	340



INAP ELECTRO

EN 397 CE



INAP MASTER

Face shield against electrical arc flash

EN 166 EN 170 CE

Code: A3

The face shield against electrical arc flash ensures protection of eyes, face and neck, against the injuries caused by the electrical arc flash:
- Impact at high speed and medium-energy of particles or dusts;
- Thermal effects and non-ionizing radiations.

The face shield contains two components delivered dismantled - a fixing support for helmet and a protective visor.

Technical characteristics	
Visor flat dimensions (mm)	390 x 220
Visor thickness (mm)	1,5
Optical class	1
UV transmission factor	Nr. echelon 2-1,2
Mechanical protection	Medium energy - class B
Weight (gr)	200



FACE SHIELD A3



Fuse handle with protective sleeve

CST

Code: MMPS/1-MPR or MMPS/1-MPR-L

The fuse handle with protective sleeve is a protective equipment designed for insertion and extraction of HRC (high rupture capacity) fuses for LV electrical installations. This device can be also used to handle insulating knives for fuse sockets or phase knives of the short-circuiting devices for LV panel boards and cabinets. The handle with protective sleeve is made of insulated and fireproof materials (bakelite and polycarbonate) and it can be used for handling of all sizes HRC fuses (00...3).

The protective sleeve protects the worker's arm toward the thermal effect of the electric arc flash that might accidentally appears during the fuse insertion or extraction.
The sleeve is made of suede leather or smooth leather.

Code	Sleeve material	Color	Leather thickness	Withstand voltage
MMPS/1-MPR	Suede leather	Grey	2-2,5 mm	5000 V/1min.
MMPS/1-MPR-L	Smooth leather	Dark red	1,5-2 mm	5000 V/1min



MMPS / 1 - MPR



MMPS / 1 - MPR - L



The limiters of the working area and the warning signs assure a special zone for workers and prevents unauthorized access of other persons in this zone.

Extensible metallic barrier

Code: BM - 01

The extensible barrier is designed for temporarily delimitation of the working area, in order to limit the access of unauthorized personnel in this area.
Two metallic poles are joined through a red-white articulated bars system. Depending on needs, by extending the bars system, the length of the barrier can be adjusted.

The articulated bars system is alternatively painted in red and white.



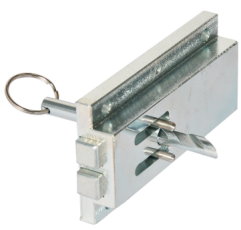
Technical characteristics	
Height (m)	1,2
Maximum extended length (m)	2
Weight (kg)	5,5

Mechanical locks - light / heavy type

Code: see table

The mechanical locks (two types: heavy duty / light duty) are special designed to avoid the unauthorized access of civil persons into the transformer substations or cabinets. Through their shape, the locks assure a secure mechanical lock of the access doors or the lids of cabinets from electrical installations.
All types of locks can be operated only by a special key. Heavy duty mechanical locks can be used in areas where electrical installations are subject to vandalism.
The materials used in their construction have very good mechanical properties.

The actuation of locks can be performed:
From inside - by simultaneously pulling of two buttons;
From outside - by pushing forward the special key in the hole of the mechanical lock.



Mechanical locks - heavy type
BIT 90/ BIF 65



Mechanical locks - light type
BIT 85T / BIF 60T

Code	BIT 90 / BIT 85T	BIF 65 / BIF 60T
Recomanded use	Substations	Cabinets
Ensuring a high protection standard	By using a special key	
Locking elements dimensions (mm)	28 x 12	
Locking elements stroke (mm)	24	18
Dimensions (mm)	60 x 90 x 28 / 55 x 85 x 28	60 x 65 x 28 / 55 x 60 x 28

Temporary fencing system



The temporary fencing system assures the demarcation of the working area and prevents unauthorized access of other persons in this zone.

This system includes:
- a set of 8-10 pillars with stand,
- a rewinder with red warning tape,
- a transport cart or a transport bag.

Each pillar (weight – 0.6kg / height – 0.9m) is made from white-red pipes and is provided with a stand for ensure its stability.

The tape rewinder (weight – 2kg) is made from two stainless steel plates jointed by a cylindrical pipe, the warning tape (length – 50m / width – 40 or 50 mm) being wrapped on it.

The transport cart or the transport bag could be used for transport and storage of the system.



Technical characteristics of transport cart	
Material	Steel
Dimensions (H x L x l) (mm)	1360 x 725 x 796
Front compartment inner dimensions (H x L x l) (mm)	520 x 660 x 300
Back compartment inner dimensions (H x L x l) (mm)	500 x 400 x 200
Lateral support with two compartments inner dimensions (H x L x l) (mm)	830 x 200 x 125
Maximum weight of stored equipment (kg)	70
Cart weight (kg)	26



Meter seal with stainless steel wire



Model: RO.C-02

The unique identifiable seal prevents unauthorized access to the meters and offers visible proofs of its violation (tampering). The seal is used to secure the electricity meters, water meters, gas meters oil pumps or other counters and containers. The RO.C 02 seals can be easily installed, without any tools.

Each seal contains:
- A transparent (clear) body made of polycarbonate, with holes for wire and a small plate for marking.
- A locking spindle with a rotating handle. Different colours of spindle are available.
- A resistant multicore stainless steel wire. Strong and flexible, the wire is pre-installed into the seal.

The seal can be supplied with custom wire length.

All the plastic parts might be treated with UV markers, becoming fluorescent under UV lamp.
The sealing loop is achieved through the passing of the wire through the holes of the body and of the spindle, followed by wire's winding onto the spindle by rotating of the locking spindle inside the seal's body.

Available markings: customer's name or logo / serial number / barcode.

The marking of the serial number (8 digits) can be made in three areas:
- on the marking zone of the body (standard marking)
- on the upper part of the spindle (standard marking)
- rotating handle of the spindle (only at request)

The marking of the name (logo) of the customer can be made in two areas:
- on the marking zone of the body (standard marking)
- rotating handle of the spindle (only at request)







The **insulated or insulating equipment** is designed to prevent direct or indirect contact between live elements or conductors from electrical installations and the parts of human body. The contact between a part of the human body and a live part or conductor might occur by direct touching or indirectly, through a conductive object (e.g. a non-insulated tool). In order to prevent such a situation - which might cause injuries by electrical shock - the workers must use insulated / insulating equipment, specially designed to avoid the electrical contact between worker's body and live elements. In order to break the path of current, the insulated equipment should be temporarily used for covering the live conductors or another live metallic parts.
Different types of insulated / insulating tools are specially designed for live workings. In this situation, the conductive part of the equipment can get in contact with live elements, but the worker is protected because his hand get in contact only with the tool's handle, usually made of or covered with insulated materials.

Insulating sleeve

SR EN 61479 CST

Code: P 2297-0-00

The insulating sleeves ensure temporarily the covering of HRC fuses from the LV panels, in order to avoid an accidental electric contact during the working period. The sleeves are made of polycarbonate, a material with good mechanical strength, with flexibility and good insulation properties. Their shape allows their attachment to HRC fuses, sizes 0...3.

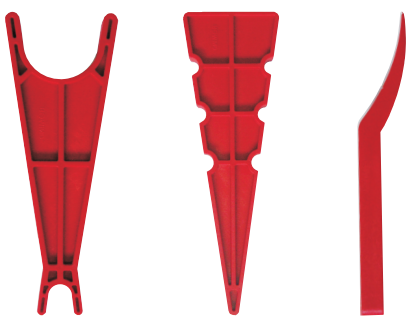


Technical characteristics	
Maximum operating voltage (V AC)	1000
Test voltage (V/3min AC)	5000
Withstand voltage (V)	10000
Thickness (mm)	1,5 ± 0,5
Temperature range (^{0}C)	-25...+55
Weight (gr)	120

Insulating separation pieces

The insulating separation pieces are designed for live works on LV overhead lines with insulated conductors (twisted in bunch). These pieces are designed to allow and to facilitate the separation of the conductors from the bunch without damaging the insulation of conductors.

There are three types of separation pieces:
- The **"Lever"** allows the separation of a single conductor from the bunch;
- The **"Wedge"** allows the separate positioning of each insulated conductor of the bunch;
- The **"X spacer"** allows the separate positioning of a single insulated conductor from the bunch.



X spacer **Wedge** **Lever**

Code	PD 090-0-00	PD 091-0-00	PD 092-0-00
Type	X spacer	Wedge	Lever
Dimensions (mm)	75 x 200 x 15	80 x 250 x 15	30 x 190 x 15
Weight (gr)	95	146	33

Insulating foil

Code: FE - JT

The insulating foil should be used in order to avoid the accidental contact of the worker with live parts of the LV electrical installations.

The foil is made from PVC and can be fixed onto live parts using plastic pliers.

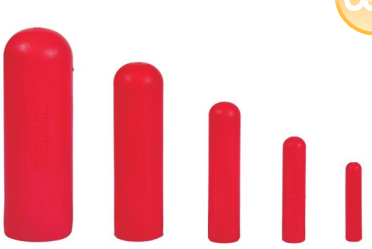




Dimensions of roll	Color	Thickness(mm)	Masa (kg)
1,3 x 12,5	Transparent	0,3	6
1,3 x 12,5	Red	0,3	7
1,3 x 25	Transparent	0,3	12

Insulating end caps

The insulating end-caps are designed to be used for covering the bare ends of conductors in live working LV electrical installations. Their usage prevents an accidental contact between a live conductor with parts of worker's body or a short-circuit between two phase conductors or between a phase conductor and the grounding conductor. 5 sizes of insulating end caps are available. The end-caps are made of flexible and insulating material. Their internal profile enables the secure mounting of each end-cap on different sizes of conductors.



Technical characteristics	
Maximum operating voltage (V AC)	1.000
Test voltage (V/1min AC)	5.250
Temperature range (^{0}C)	-25 ... +55

Size	Length (mm)	Conductor section min (mm^2)	Conductor section max (mm^2)
Size 0	45	1,5	6
Size 1	60	8	10
Size 2	80	16	50
Size 3	100	70	120
Size 4	120	150	240



Insulating shutter

Code: PEAD - 20

The insulating shutter can be used on MV cabinets in order to avoid the accidental closing of the disconnecting switches. The shutter is positioned between the fixed part and the mobile part of an open switch. Depending on the positioning of the switch, this working procedure can be done using a connectable insulating stick PMU 20-1-B/ba or PMU 110-2-B/ba.
The shutter is made of PVC plate and has a removable element, made of insulating fiberglass tube (length = 0,6 m). At the end of this element, a hinged bayonet coupling system that allows the shutter`s positioning at different angles towards the stick`s axis.



Technical characteristics	
Maximum operating voltage (kV AC)	20
Test voltage U (kV/3min AC)	50
Dimensions without / with removable element (mm)	710 x 505 x 150 / 710 x 1235 x 150
Temperature range (^{0}C)	- 25...+55
Weight (kg)	3,5

Insulating platform

Code: PE-500-P

The insulating platform is an auxiliary protective device used for different operations, in dry conditions, in indoor / outdoor electrical installations. The platform is made of lightweight material (polypropylene) and can be easily carried to the working zone. In order to avoid the sliding of the workers, the upper surface and the legs are profiled with striations.



Technical characteristics	
Test voltage (kV/1min.)	81
Leak current (mA)	max. 2
Dimensions (mm)	570 x 570 x 260
Active surface (mm)	500 x 500
Maximum load (kg)	150
Weight (kg)	4,1

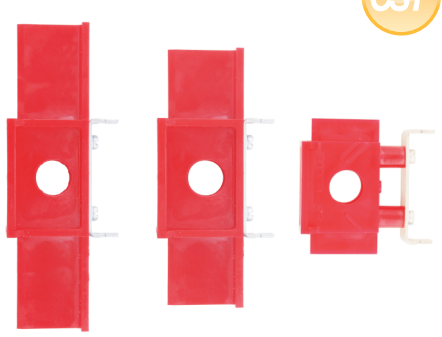
Insulating plugs and knives

The **insulating plugs** can be mounted on E27 / E33 fuse sockets of the LV panel boards in order to perform a visible electrical separation of the installation.

The **insulating knives** should be mounted on the HRC fuse sockets of the LV panel boards and cabinets.

By a temporary replacement of fuses, the insulating plugs / knives allow the locking in OPEN position of the electrical circuits and avoid the accidental occurrence of voltage.
The insulating plugs and knives are made of red polycarbonate, in different sizes, according to the dimensions of the fuses sockets.

The insulating knives have a metallic piece allows the connection with the fuse handle.



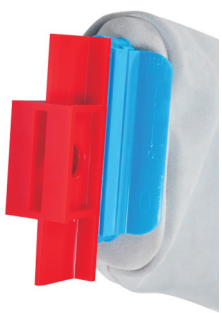
INSULATING KNIVES

Technical characteristics	
Maximum operating voltage (V AC)	1000
Test voltage (V/1min AC)	5250
Temperature range (^{0}C)	-25...+55



INSULATING PLUGS

Code	Type	Type fuse sockets
P 2344-0-00	Insulating knives	NH 00
P 240-0-00	Insulating knives	NH 0, 1, 2, 3
P 240-1-00	Insulating knives	PK 1 XL
P 279-0-00	Insulating plugs	25 A / E 27
P 280-0-00	Insulating plugs	63 A / E 33



Insulating flexible cover

SR EN 61479

The insulating flexible cover can be used in dry conditions, during live works, for temporary insulation of the LV non-insulated overhead conductors.

The insulating covers could also cover the insulators or the bus bars of LV cabinets. They are made of yellow plasticized PVC, with a high resistance to UV radiation.

The covers can be delivered in various lengths, with plastic pliers.



Code	Length (cm)	Weight (kg)	Number plastic pliers	Thickness (mm)
TE - 150 - 0	150	1,4	4	2,5 ± 0,5
TE - 200 - 0	200	1,9	6	2,5 ± 0,5
TE - 250 - 0	250	2,4	6	2,5 ± 0,5
TE - 300 - 0	300	2,8	8	2,5 ± 0,5



Technical characteristics	
Maximum operating voltage (V)	1000
Dielectric rigidity - Test voltage (V/3min)	5000
Dielectric rigidity - Withstand voltage (V)	10000
Oil resistance	Category H
Very low temperature resistance (-40 ^{0}C)	Category C
Very high temperature resistance (+70 ^{0}C)	Category W



The **insulating sticks** are protective devices designed to avoid the contact with live conductive parts and to assure the **minimum approach distance** towards live parts during manoeuvers in indoor or outdoor electrical installations.

If for works in low voltage installations there isn't a minimum approach distance (only the direct contact with live parts is forbidden), in medium and high voltage installations the minimum approach distance (provided by national regulations) varies from 0,8 m to 3,7 m, depending on the nominal voltage and the type of the installation.
The operating voltage of the insulating sticks should be equal or higher than the nominal voltage of installation (Un).

There are two types of insulating sticks **(connectable** or **telescopic**), manufactured from fiberglass tubes. Each stick has an operating head that allows the connection with a part of the installation (e.g. special hook for switches) or a coupling system that allows the fixing of a protective device (e.g. voltage detector, anchoring hook, phase clamp of earthing device).

There are different types of coupling systems, but most common are **hexagonal system** (manufactured from plastic elements, in two shapes: fixed or foldable (hinged)) and **bayonet system** (manufactured from metallic parts).
All the insulating sticks are provided with a limiter (usually a ring) that separates the stick's handle to the useful (operational) part of the stick. While working, the operator must keep his hands only on this handle.

The sticks are characterized by the following dimensional elements:
- Total length - measured between the two extremities (ends);
- Useful length - measured from the extremity that contains the coupling system or operating head until the handle ring. This length must be greater than the minimum approach distance;
- Handle length - measured from the handle ring to the other end of the stick (protection cork).

Depending on the domain of use, the insulating sticks are manufactured according the EN 61230; EN 61235; EN 60855 standards.
The insulating sticks can be used in indoor or outdoor installations, during dry weather. For wet conditions, the insulating sticks will be adjusted with special characteristics.

The insulating sticks can be used for:
- mounting and removing phase clamps of earthing devices;
- mounting and removing insulating shutters;
- mounting and removing anchoring hooks / devices;
- operating of switches;
- operating live conductors;
- checking the presence/absence of voltage using voltage detectors;
- mounting the fault indicators on medium voltage overhead lines;
- rescuing an injured person or removing various objects fallen on live conductors.

In order to be used in various situations, the insulating sticks might be provided with different adaptors and accessories.



The connectable insulating sticks are made of one or more modules, mechanically assembled by the user. There are various models designed for specific applications or multi-purpose insulating sticks.

The most known and used connectable insulating sticks are provided with bayonet coupling system - PMU type (used in dry conditions) or PMP (used both in dry and wet conditions), known also as multi-purpose insulating sticks.
Other types of connectable insulating sticks can be used for:
- operating of switches (PSU type),
- operating live conductors (PCU type),
- operating electrical equipment (PAE type),
- rescuing injured persons (rescue sticks with large metallic hook).



The **telescopic insulating sticks** are made of two or more undetachable tubes (of various diameters) that can be extended or gathered up.
The telescopic insulating sticks – PTU type - are provided with a hexagonal coupling systems that allow the connection of other kinds of protective devices, adaptors or accessories. In the coupling system can be directly connected a voltage detector (MV / HV), any phase clamp of the earthing device provided with hexagonal rod of 12 mm.
The PTU sticks can be used in order to obtain anchoring points for works at height.
The stick is fixed in working position by enlargement of their tubes (from the smallest to the biggest one) and blocking them through pushing buttons.

The voltage detector or any other equipment provided with connecting hexagonal rod of 12 mm can be fixed by ratcheting in the hexagonal coupling system of the stick. Their dismantling can be performed only by operating the lever-button of the coupling system.

The adaptors usually allow the connection between the coupling system of the stick and other equipment with different connection system.
The AF E-C, AR E-C and AB/DTTU-Tv can be used with connectable insulating sticks (PMU and PMP type), provided with bayonet coupling system.
The AC/DTTU-Tv, AR C-C, ACMIT/C and ACAI/C adaptors can be used with telescopic insulating sticks (PTU type), provided with hexagonal coupling system.

Connectable insulating sticks-PMU type-dry conditions

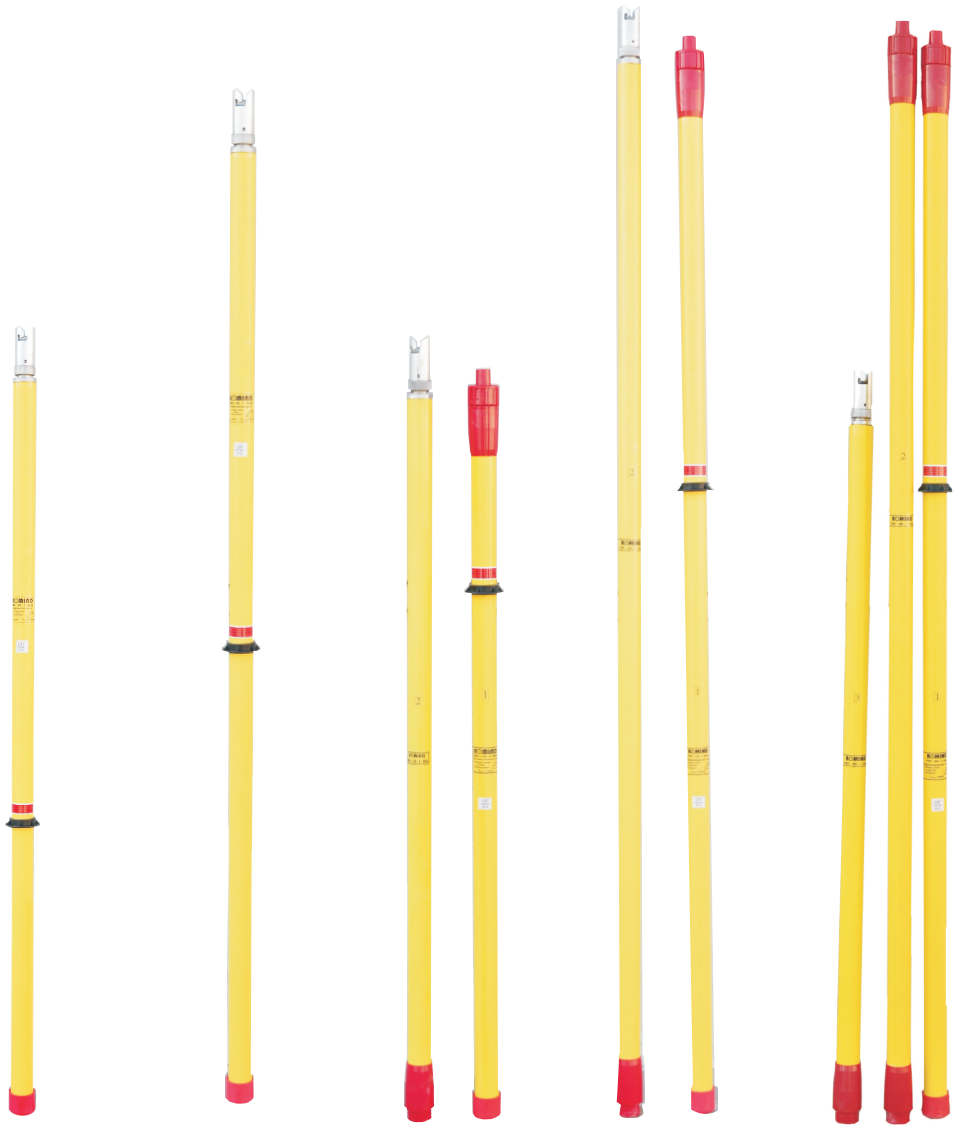
SR EN 61230 SR EN 61235 CST

Code: PMU-U_n-n-B/ba

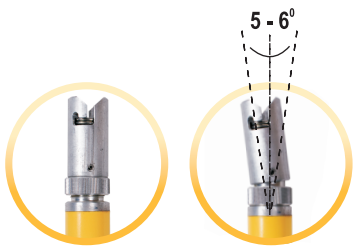
The PMU insulating sticks contain from 1 up to 3 connectable modules. These sticks are designed to be used for almost all types of works in indoor and outdoor MV/HV installations, in dry conditions.

The insulating sticks are recommended for operating the phase clamps of the earthing device on bus bars or round conductors in substations or MV/HV overhead lines.

The PMU insulating sticks are provided with an **adjustable bayonet coupling system**. This system can be blocked in fixed position (when the fixing nut is screwed and it presses upon the coupling piece) or in articulated position (when the fixing nut is completely unscrewed), which allows a maximal circular deviation of 6° of the coupling system towards the stick's direction.



PMU-20-1-B/ba PMU-20-1-B/baS PMU-110-2-B/ba PMU-220-2-B/ba PMU-400-3-B/ba



ADJUSTABLE BAYONET COUPLING SYSTEM





Code	Operational voltage U_n (kV)	Test voltage U_{inc} (kV)	Nr. of modules	Diameter of modules (mm)	Total length L_t (m)	Handle length L_m (m)	Utile length L_u (m)	Weight (kg)
PMU-20-1-B/ba	20	60	1	Module 1 - Ø 42	1,31	0,41	0,90	0,90
PMU-20-1-B/baS	20	60	1	Module 1 - Ø 42	1,71	0,81	0,90	1,10
PMU-110-2-B/ba	110	190	2	Module 1; 2 - Ø 42	2,55	0,90	1,65	1,83
PMU-220-2-B/ba	120	380	2	Module 1; 2 - Ø 42	3,79	1,10	2,69	2,40
PMU-400-3-B/ba	400	695	3	Module 1; 2; 3 - Ø 42	5,03	1,10	3,93	3,36

Connectable insulating sticks-PMP type - wet and dry conditions

SR EN 61230 SR EN 60855

Code: PMP-U_n-n-B/ba

The PMP connectable insulating sticks contain from 2 up to 4 connectable modules. These sticks are designed to be used for almost all types of works in indoor and outdoor MV/HV installations, in wet and dry conditions.
The PMP insulating sticks are recommended for operating the phase clamps of the earthing device on bus bars or round conductors in substations, or on MV/HV overhead lines.

The PMP insulating sticks are provided with an adjustable bayonet coupling system which allows a maximal deviation of 6° of the coupling system towards the stick's direction.

Code	Operating voltage U_n (kV)	Test voltage U_{test} (kV)	Nr. of modules	Diameter of modules (mm)	Total length L_t (m)	Handle lenght L_m (m)	Useful lenght L_u (m)	Weight (kg)
PMP-110-2-B/ba	110	190	2	Module 1; 2 - Ø 38	2,57	0,91	1,66	3,1
PMP-220-3-B/ba	220	380	3	Module 1; 2 - Ø 46 Module 3 - Ø 38	3,81	1,11	0,92	4,6
PMP-400-4-B/ba	400	695	4	Module 1; 2 - Ø 46 Module 3; 4 - Ø 38	5,05	1,11	2,70	6,1







PMP-110-2-B/ba

Bayonet-hexagon adaptors

SR EN 61230 CST

Code: AF E-C
AR E-C

The bayonet-hexagonal fixed or foldable (hinged) adaptors (AF E-C / AR E-C) allow the connection of any device provided with connecting hexagonal rod of 12 mm (e.g.: voltage detector) with connectable multi-purpose insulating sticks (PMU and PMP type) provided with bayonet coupling system.



AF E-C



AR E-C

Operating insulating sticks - PSU / PAE type

SR EN 61230 SR EN 61235 CST

Code: PSU-U_n
PAE-U_n

The operating insulating sticks are provided with a small hook, made of galvanised steel, special designed to allow the actuation (opening or closing) of the disconnecting switches or other electric equipment.



Code	Operating voltage U_n (kV)	Test voltage U_{test} (kV)	Nr. of modules	Diameter of modules (mm)	Total length L_t (m)	Handle lenght L_m (m)	Useful lenght L_u (m)	Weight (kg)
PSU - 20	20	60	1	Ø 38	1,23	0,41	0,82	1,2
PSU - 35	35	105	1	Ø 38	1,66	0,61	1,05	1,4
PAE - 35	35	105	2	Ø 38	3,02	0,92	2,10	2,7



PSU-20



PAE-35

Operating insulating stick-PCU type

SR EN 61230 SR EN 61235

Code: PCU-U_n

The PCU operating insulating sticks are provided with a large hook, made of galvanised steel, special designed to allow handling live conductors.

Code	Operating voltage U_n (kV)	Test voltage U_{test} (kV)	Diameter of modules (mm)	Total length L_t (m)	Handle lenght L_m (m)	Useful lenght L_u (m)	Weight (kg)
PCU - 20	20	60	Ø 38	1,36	0,41	0,95	1,3
PCU - 35	35	105	Ø 38	1,80	0,61	1,19	1,5





PCU-20

Rescue insulating stick

SR EN 61230 SR EN 61235

Code: PSU - 35 - C

The rescue insulating sticks are provided with a special hook, made of galvanized steel, special designed to:
- rescue by grabbing of an injured person (electrocution, dizziness...) and bringing him back to a protected area;
- handle live conductors;
- remove fallen objects upon live conductors.

This kind of stick is also provided with a coupling piece in order to allow the connection with a voltage detector.

Code	Operating voltage U_n (kV)	Test voltage U_{test} (kV)	Diameter of modules (mm)	Total length L_t (m)	Handle lenght L_m (m)	Useful lenght L_u (m)	Weight (kg)
PSU - 35 - C	35	105	Ø 38	1,91	0,61	1,30	2





Tightening handle for phase clamps

Code: P249-0-00

The tightening handle can be used for operating the phase clamps of earthing devices in MV installations, in special conditions, in compliance with user's safety rules.
The tightening handle is provided with a bayonet coupling system.

Even if it has an insulating part, the tightening handle does not respect the minimum approach distance from the conductors, therefore the tightening handle cannot be assimilated as an insulating stick.

The length of the tightening handle is 440 mm.





Telescopic insulating sticks - PTU type

SR EN 61230 SR EN 61235 CST

Code: PTU-U_n-F
PTU-U_n-R
PTU-AS-U_n-n-C

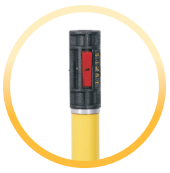
The PTU telescopic insulating sticks are made of two, four or six undetachable fiberglass tubes, of various diameters, that can be extended to achieve the useful length, in compliance with the safety norms.

The telescopic insulating sticks – PTU type - are provided with hexagonal coupling systems that allow the connection of other kinds of protective devices (e.g. MV/HV voltage detectors, phase clamps of the earthing devices), adaptors or accessories provided with hexagonal rod of 12 mm.

The stick is fixed in working position by enlargement of their tubes (from the smallest to the biggest one) and blocking them through pushing buttons.

These sticks can be used to perform different operations during the workings in substations or on the overhead lines.





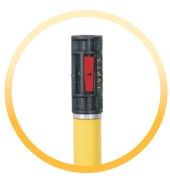
FIXED HEXAGONAL COUPLING SYSTEM



FOLDABLE (HINGED) HEXAGONAL COUPLING SYSTEM

Code	Operating voltage U_n (kV)	Test voltage U_{test} (kV)	Diameter of modules (mm)	Total length L_t (m)	Handle lenght L_m (m)	Useful lenght L_u (m)	Closed length (m)	Weight (kg)
PTU-20-35-F	20 35	60 105	Ø 42 / Ø 37	1,26 1,46	0,41	0,85 1,05	0,86	0,9
PTU-20-35-R	20 35	60 105	Ø 42 / Ø 37	1,32 1,52	0,41	0,91 1,11	0,92	0,96
PTU-20-110-F	20 110	60 190	Ø 42 / Ø 37	1,41 2,13	0,56	0,85 1,57	1,27	1,25
PTU-20-110-R	20 110	60 190	Ø 42 / Ø 37	1,47 2,19	0,56	0,91 1,63	1,33	1,31

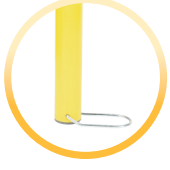




FIXED HEXAGONAL COUPLING SYSTEM



PUSHING BUTTONS



FOLDABLE METALLIC FOOT

Code	Operating voltage U_n (kV)	Test voltage U_{test} (kV)	Telescoped modules	Total length L_t (m)	Extended length L_{ext} (m)	Transport length (m)	Weight (kg)
PTU-AS-400-4-C	35-110 220 400	190 380 695	4 (base)+1 4 (base)+1+2 4 (base)+1+2+3	6	3,35 4,66 6	2,05	3,2
PTU-AS-400-6-C	35-110 220 400	190 380 695	6 (base)+1 6 (base)+1+2 6 (base)+1+2+3 6 (base)+1+2+3+4 6 (base)+1+2+3+4+5	9,03	3,49 4,80 6,15 7,55 9,03	2,19	5,6

Hexagon-bayonet articulated adaptor - ACMIT-C

SR EN 61230 CST

Code: ACMIT/C

The hexagon-bayonet adjustable adaptor ACMIT/C allow the connection of any device provided with bayonet terminal (e.g.: phase clamp of earthing device) with the telescopic insulating sticks (PTU type) provided with hexagonal coupling system.
The adjustable bayonet system is similar with the one used at PMU or PMP stick.



Hexagon foldable adaptor - AR C-C

SR EN 61230 CST

Code: AR C-C

The hexagon foldable adaptor AR C-C can be used with the telescopic insulating sticks (PTU type) and allows the positioning of another safety equipment (e.g. a voltage detector) at a different direction (0°, 30°, 60°, 90°) towards the stick's axis.



Adaptor for Crochevit hook - ACAI/C

SR EN 61230 CST

Code: ACAI/C

The ACAI/C adaptor can be used with the telescopic insulating sticks (PTU type) and allows the connection of Crochevit anchoring hook to the stick.



Hook - CASC/C

SR EN 61230 CST

Code: CASC/C

The CASC/C hook can be used with the telescopic insulating sticks (PTU type) for removing fallen objects from live conductors or in their proximity.



Special pliers for handling MV fuses

Code: P2324-0-00

The special pliers can be used with a connectable insulating stick (PMU) for operating (extracting / inserting) the MV fuses (with a diameter between 35 mm and 90 mm).
By twisting the stick, the MV fuse will be grabbed or released by the jaws of the pliers.





The **voltage detectors and indication/warning devices for voltage presence** are electronic devices used as protective equipment against electrical risks.
The voltage detectors must be used for checking the presence/absence of voltage in all types of electrical installations. The presence of voltage is doubly signaled, both optical and acoustical. The voltage detectors are manufactured according EN 61243 standard. The detectors should be always on "stand by" mode, ready to perform the checking of voltage presence.
The voltage indicators and indication/warning devices for voltage presence are protective devices which can be permanently fixed in indoor MV installations. These devices assure the voltage detection together with the warning of the workers or the blocking of their access in hazardous area (with live circuits).

LV Testers

EN 61243-3

Code: see table

The **LV testers** are used in LV installations for multiple purposes: optical and acoustical signaling of voltage presence (including the indication of the voltage level), checking the phase rotation in three-phased circuits, checking the continuity of the circuits, measurement of the resistances.

In order to perform the remote checking of the presence/absence of voltage, the LV testers can be attached to the **contact probes PA 01** (length: 1,1 m / weight: 0,3 kg / IP20).

Code	EazyVolt	EazyVolt Plus	Testboy Profi III LED +	Testboy Profi III LCD +
Operating voltage	12...750 V AC/DC	12...750 V AC (± 1,3% + 5d) 12...750 V DC (± 1,0% + 2d)	6...1000 V AC 6...1400 V DC	3...1000 V AC 4...1400 V DC
Resolution	LEDs: 12,24,50,120, 230,400,750 V	LCD; 1V	LEDs: 12, 24, 48, 120, 230, 400, 690 and 1000 V	LCD with liquid crystals and backlighting
Frequency	45 - 65 Hz	45 - 65 Hz	45 - 65 Hz	45 - 65 Hz
Single pole phase test	> 100 V AC	> 100 V AC	> 100 V AC	> 100 V AC
Rotary field indication	YES	YES	YES	YES
Autotest	YES	YES	YES	YES
Resistance	NO	0...2 kΩ	NO	0...2 kΩ
Continuity	< 200 kΩ	< 200 Ω	< 50 kΩ	< 50 Ω
Frequency testing	NO	30~999 Hz	NO	10~1000 Hz
Operating temperature (°C)	-15...+45	-15...+45	-10...+55	-10...+55
IP Protection	IP 65	IP 65	IP 65	IP 65
Dimensions (mm)	239 x 68 x 29	239 x 68 x 29	300 x 75 x 20	300 x 75 x 20
Weight including batteries (kg)	0,230	0,240	0,270	0,270
Power supply	2 x 1,5 V, LR03, AAA size			



EazyVolt



EazyVolt Plus



Testboy Profi III LED +



Testboy Profi III LCD +



Contact probes PA 01

Voltage detector for MV and HV installations - DTCIER type

SR EN 61243-1

Code: MV installations: DTCIER 6-20 kV DTCIER/P 6-35 kV
HV installations: DTCIER 110 kV DTCIER/P 110 kV DTCIER/P 220-400 kV

The voltage detectors for indoor and outdoor MV and HV electrical installations can be used for a safe checking of the presence/absence of voltage.

The voltage detectors are permanently ready to perform the testing being in stand by stage. Before each use the detectors must be self-tested by pressing the test button. If the battery is charged and the electronic circuits are functioning normally, once pressing the test button, the detector will optically (red colour) and acoustically signalize. After releasing the test button, the acoustical signal stops, but the green LED of the detector will stay on, continuously, for around 2 minutes, confirming that the detector is ready to perform the checking the presence of voltage.

For performing the checking of the presence/absence of voltage, the detector should be attached to an appropriate insulating stick and should be brought in contact with the tested conductor. If the voltage is present, the red LEDs of detector will light up and acoustical warning signals will be released.

For usage in wet conditions, it is mandatory the use of an appropriate stick and spraying on the outer surface of the detector and the stick with a pellicle of silicone oil (delivered upon request).



OPTICAL SIGNALING



DTCIER 6-20 kV



DTCIER/P 6-35 kV

Type	DTCIER 6-20 kV	DTCIER/P 6-35 kV
Operational voltage (kV)	6 - 20	6 - 35
Temperature range - operation and storage (°C)	-25 ...+55	-25 ...+55
Temperature range - long-term storage (°C)	-10...+45	-10...+45
Power supply	Alkaline battery 9V, 6LR61 type	Alkaline battery 9V, 6LR61 type
Dimensions - without contact electrode (mm)	Ø 78 x 150	Ø 78 x 150
Dimensions - with contact electrode (mm)	Ø 78 x 225	Ø 78 x 225
Weight including battery (kg)	0,370	0,370
Operational in wet conditions	NO	YES



OPTICAL SIGNALING



DTCIER 110 kV



DTCIER/P 110 kV



DTCIER/P 220-400 kV

Type	DTCIER 110 kV	DTCIER/P 110 kV	DTCIER/P 220-400 kV
Operational voltage (kV)	110	110	220 - 400
Temperature range - operation and storage (°C)	-25 ...+55	-25 ...+55	-25 ...+55
Temperature range - long-term storage (°C)	-10...+45	-10...+45	-10...+45
Power supply	Alkaline battery 9V, 6LR61 type	Alkaline battery 9V, 6LR61 type	Alkaline battery 9V, 6LR61 type
Dimensions - without contact electrode (mm)	Ø 78 x 165	Ø 78 x 165	Ø 78 x 165
Dimensions - with contact electrode (mm)	Ø 78 x 380	Ø 78 x 380	Ø 78 x 380
Weight including battery (kg)	0,530	0,530	0,530
Operational in wet conditions	NO	YES	YES

Warning device for voltage presence

SR EN 61243-1

Code: DAPT 6-35 kV
DAPT/BA 6-35 kV

DAPT 6-35 kV and DAPT/BA 6-35 kV are warning electronic devices designed to detect and signalize the presence of voltage in MV indoor cabinets, in order to prevent / to block the accidental or unauthorized access beyond the fences of the electrical installation. This device should be mounted on the outside frame of the cabinet's door. The permanent magnet (which assures the control of the device functioning) should be fixed on the door. While the door is closed, its position should be in front of the marked zone of the detecting device. Depending to the configuration of the cabinets, the detecting antenna can be fixed to the device's terminal or can be replaced by a special long antenna (up to 2,5 meters).



DAPT 6-35 kV

DAPT 6-35kV - As long as the conductors (bus bars) from inside are energized and the door is open, the device will warn (through acoustical and optical signals) the workers about the presence of a hazardous area. Closing of the door will stop the warnings.

DAPT BA 6-35kV – The functioning of this device is similar with the previous one, but through its electromagnetic locking system (ELS), this device also blocks the opening of the cabinet's door as long as the conductors (bus bars) from inside are energized. Opening of the door can be done by pushing the "UNBLOCKING" button from ELS only while the bars are not energized. The locking mechanism will be deactivate and the door can be deliberately opened through a special key not later than 15 seconds after the pushing of button. If the door is still closed, the locking mechanism will be automatically reactivated and the access will be denied. Thus the risk to allow an accidentally access due to a mistake of usage is avoided. Also, the closing of the door will generate the blocking of the locking mechanism.



DAPT/BA 6-35 kV

Technical characteristics	
Nominal operating voltage (kV)	6 - 35
Acoustical signal (dB)	min. 67
Optical red intermittent signal for voltage presence (mCd)	min. 1000
Optical signal for external power source	Green LED, continuous
Optical signal for internal battery	Yellow LED, continuous
Optical signal from ELS	Red LED = locked Green LED = unlocked
Temperature range operation / storage (^{0}C)	-15 ...+45 / -20...+50
Selftesting button	YES
Internal power supply - alkaline battery	9 V Type 6LR61
IP protection	IP 20
Dimensions DAPT/BA (mm) / dimensions ELS (mm) / total weight (kg)	195 x 72 x 28 / 238 x 85 x 51 / 1,2

Signaling device for voltage presence

Code: DIPT 6-35 kV

DIPT 6-35 kV is a warning electronic device designed to detect and signalize the presence of voltage in MV indoor cabinets, in order to prevent / to block the accidental or unauthorized access beyond the fences of the electrical installation.
This device has no power source and it can be easily fixed on the bus bars using an appropriate insulating stick.
As long as the bars are energized, the device will issue flashing red optical signals.



Technical characteristics	
Nominal operating voltage (kV)	6 ÷ 35
Signaling frequency (s)	≤ 12
Nominal voltage frequency of the installation (kV)	50 Hz
Temperature range - operation / storage (^{0}C)	-10 ... + 45 / -20 ... + 50
Optical signaling	7 red LEDs
Thickness of the bus bar on which the device can be mounted (mm)	max. 28
Dimensions (mm) / weight (kg)	80 x 110 x 50 / 0,26

Voltage detectors for electrical installations of public transport (trolley/tramway)

Code: DTTU-Tb - for trolley
DTTU-Tv - for tramway

The voltage detectors DTTU-Tb / DTTU-TV are designed to check and signalize the presence of voltage through direct contact with the conductors of power networks for urban transport (trolley/tramway) (825 V DC).

Before each use, the detectors must be self-tested by pressing the test button. If the battery is charged and the electronic circuits are functioning normally, once pressing the test button, the detector will optically and acoustically signalize. After validation of self-test, the voltage detector is brought in direct contact with the conductor.

In the presence of DC voltage, the detector lights up a red LED - for reverse polarity - or green LED - for normal polarity - (visible in high ambient lighting conditions) and releases acoustic signals (higher than 69 dB (A)). In the presence of AC voltage, the detector lights up both red and green LEDs.

The **DTTU-Tb detector** contains two insulating sticks (including the electronic circuits) in order to get in contact with the trolley's contact lines. Also this detector can be used in cabinets (injection points).

The **DTTU-Tv detector** contains a single insulating stick (including the electronic circuits) in order to get in contact with the tram's contact line connected through an insulated conductor (8 m length) with pliers for the contact with the tram's rail.
The checking of voltage can be performed by remote, using an appropriate insulating stick + an appropriate adaptor (e.g. telescopic stick PTU-AS-400-4c + adaptor **AC-DTTU** or modulated stick PMU 400-3 B/ba + adaptor **AB-DTTU**).



DTTU-Tb



DTTU-Tv



AC/DTTU-Tv



AB/DTTU-Tv

Technical characteristics	
Maximum operating voltage (V DC)	1000
Intermittent optical and acoustic signaling, in bipolar connection, for voltages higher than (V DC)	130 ± 20
Test voltage for dielectric rigidity check (V/1min)	6000
Power supply	9 V battery 6LR61 type
Temperature range - operation / long term storage (^{0}C)	-25 ...+55 / -10...+45
IP protection	IP 20
Weight DTTU Tb / DTTU Tv (kg)	1,35 / 1,19

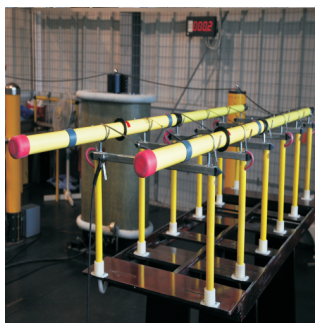
ELECTRICAL TESTING SERVICES

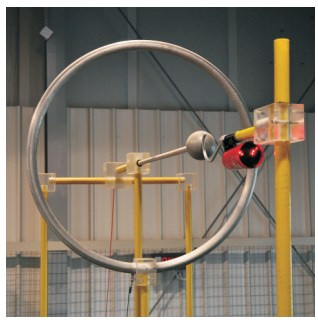
Romind T&G provides electrical tests carried out in its High Voltage Testing Laboratory.

Our laboratory has RENAR accreditation for the following areas:
a) Measurement of the threshold voltage at capacitive voltage detectors (1-400 kV);
b) Dielectric test with AC voltage at industrial frequency (0-100 kV, 50 Hz) for electrical equipment designed for electrical hazard protection (gloves, boots, plates, platforms, covers, ropes, end caps, sleeves, false fuses, etc) insulating sticks and capacitive voltage detectors.











A short-circuiting device or an earthing device defines a mechanical assembly used to achieve an electric circuit which perform an temporary connection of the conductors of the power networks with the ground.
The mounting of the short-circuiting devices represents the main preventive measure to protect personnel against electric risk, in case of accidental occurrence of voltage at the working place.
This working procedure must be carried out by two workers, in the following sequence of operations:
a) Earthing the short-circuiting device, which is achieved by firm fixing of its earthing clamp to the artificial / natural earth grounding of the electrical installation or to the earthing rod, previously buried.
b) Checking the absence of voltage on the conductors, using a voltage detector (eventually fixed on the coupling system of an appropriate insulating stick)
c) Applying the phase clamps to the phase conductors, which assure a temporary electrical connection between the conductor and the earth.

Depending on the type of the earthing device and the voltage of the installation, this operation must be performed using appropriate insulating sticks or handles.
The dismantling of the short-circuiting device should be performed in the reverse order.
The earthing devices are manufactured in compliance with SR EN 61230 standard and can be applied in indoor and outdoor electrical installations.
The earthing devices can be single phase or poly phase (usually three phase) types.
The earthing and short-circuiting cables are stranded type, made of copper, very flexible, class VI, in compliance with EN 60228:2005 standard and are protected with an insulating cover of transparent plastic material, directly extruded on the copper core strands, in compliance with SR EN 61138 standard.
The phase clamps and earthing clamps are specially designed and manufactured in a wide variety of structural forms in order to be easy and firm applied on various types of conductors of LV, MV or HV power networks.

Earthing device for LV bare overhead lines

SR EN 61230 Enel CST

Code: Msp - 1 - nxS_f /l_f - S_p /l_p - O/p

The short-circuiting and earthing device for LV bare overhead lines is provided with self-tightening phase clamps (casting from aluminum alloy) provided with an insulating rod with handle.
The insulating extension rod can be added to clamp's handle.

This equipment contains the following subassemblies and components:
- Short-circuiting subassembly (1):
  - Self-tightening phase clamps - "n" = 4 ... 7 pieces
  - Short-circuiting cables - 3 ... 6 pieces
  - Connecting cable with coupling socket - 1 piece
- Earthing subassembly (2):
  - Coupling plug - 1 piece
  - Earthing cable - 1 piece
  - Earthing clamp - 1 piece
- Insulating extension rod (3) - 1 piece
- Earthing rod (4) - 1 piece (only at request)

This equipment is delivered in a carrying bag.



Technical characteristics		
Nominal operational voltage U_n (kV)	max. 1	
Short-circuiting S_f and earthing S_p cable cross-section (mm^2)	16	25
Nominal current of short-circuiting for t = 1 s I_{sc} (kA)	4	6
Peak current for t = 0,02 s I_{sd} (kA)	8	12
Testing short-circuiting current for t = 1 s I_{test} (kA)	4,6	6,9
Testing peak current for t = 0,02 s I_{peak} (kA)	9,2	13,8
Peak factor (SR EN 61230)	2	
Short-circuiting cables length l_f (m)	max. 1	
Earthing cable length l_p (m)	max. 15	
Number of phase clamps (n)	max. 7	
Protection length of insulating rod (m)	0,35	
Total protection length of insulating rod, using the extension (m)	0,84	
Conductor diameter on which the phase clamp can be applied (mm)	5 - 16	
Section of the conductor on which it can be applied the phase clamp (mm^2)	25 - 120	



SELF-TIGHTENING PHASE CLAMP

Poly phase earthing device for LV bare overhead lines -application from the ground

SR EN 61230 CST

Code: Msp - CAA - U - nxS_f/I_f - S_p/I_p - O/p

The poly phase earthing device provided with automatic self-locking phase clamps (CAA) can be applied from the ground on the LV overhead lines.
This device contains three or four subassemblies: one for earthing, the others for short-circuiting of the conductors.
The main parts of the phase clamp are made by casting from aluminum alloy.
This clamp (CAA) is provided with a special coupling system for setting up on conductor and a steel ring for removal from conductor. The new coupling system allows easy and safe mounting of the clamp on the applicator. This system avoids an accidental detachment of the clamp and assures a simultaneously detachment of the clamp from the applicator along with its fastening on conductor.
The operation is performed from the ground using a long telescopic insulating stick (maximum length 9 meters, code: PTU-AS-400kV-6-C).

This procedure should be done respecting following operations:
1. The earthing subassembly should be applied in order to get the connection of a phase conductor to the ground.
2. After that, the short-circuiting subassemblies should be applied, starting by the conductor connected to the ground.

The fastening of the phase clamp is performed by hooking and pulling downward of the clamp, on conductor. At the setting up operation, an appropriate insulating stick with applicator should be used.
The removal of the phase clamp could be performed by hooking and pulling downward the steel ring of the phase clamp. At the removal operation, an insulating stick with removal fork should be used.

This equipment contains the following subassemblies and components:
● Short-circuiting subassembly for 3 LV conductors (1...3 pieces):
- Automatic self-locking phase clamp (CAA) - 3 pieces
- Short-circuiting cables - 2 pieces

● Short-circuiting subassembly for 2 LV conductors (0...1 pieces):
- Automatic self-locking phase clamp (CAA) - 2 pieces
- Short-circuiting cables - 1 pieces

● Earthing subassembly:
- Automatic self-locking phase clamp (CAA) - 1 piece
- Earthing cable - 1 piece
- Earthing clamp - 1 piece

● Clamp applicator - 1 piece
● Removal fork - 1 piece
● Earthing rod - 1 piece



SHORT-CIRCUITING SUBASSEMBLY FOR 3 CONDUCTORS



SHORT-CIRCUITING SUBASSEMBLY FOR 2 CONDUCTORS



EARTHING SUBASSEMBLY

Number of overhead conductors	Short-circuiting subassembly for 3 LV conductors	Short-circuiting subassembly for 2 LV conductors	Earthing subassembly
4	1	1	1
5	2	0	1
6	2	1	1
7	3	0	1



CLAMP APPLICATOR

Technical characteristics			
Short-circuiting S_f and earthing S_p cable cross-section (mm^2)	16	25	35
Nominal short-circuiting current for t = 1 s I_{sc} (kA)	4	6	8
Nominal peak currrent for t = 0,02 s I_{sd} (kA)	10	15	20
Testing short-circuiting current for t = 1 s I_{test} (kA)	4,6	6,9	9,2
Testing peak current for t = 0,02 s I_{peak} (kA)	11,5	17,25	23
Peak factor (SR EN 61230)		2,5	
Short-circuiting cables length l_f (m)		max. 4	
Earthing cable lenght l_p (m)		max. 17,5	
Diameter of conductor on which can be applied the phase clamp øD (mm)		5 ÷ 32	



REMOVAL FORK

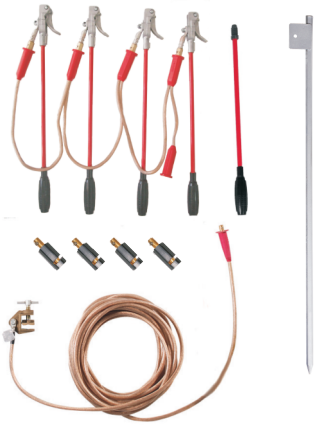
Universal earthing device for LV overhead lines (insulated and bare conductors)

SR EN 61230 Enel CST

Code: Msp - 1 - nxS$_t$ /l$_f$ - S$_p$ /l$_p$ - O/F/p

The universal earthing device for LV overhead lines can be used for all types of LV overhead lines from Romania.

The equipment contains the following subassemblies and components:
- Short-circuiting subassembly (1):
  - Coupling plugs for COT 10-95 A voltage connectors - "n" = 4...7 pieces
  - Short-circuiting cables - 3...6 pieces
  - Connecting cable with coupling socket - 1 piece
- Earthing subassembly (2):
  - Coupling plug - 1 piece
  - Earthing cable - 1 piece
  - Earthing clamp - 1 piece
- Set of phase clamps for LV bare overhead lines (3) - "n" = 4...7 pieces
- Set of coupling adaptors at DPS voltage connectors (4) - "n" = 4...7 pieces
- Insulating extension rod (5) - 1 piece
- Earthing rod (6) - 1 piece



For works on LV insulated overhead lines with COT 10-95 voltage connectors should be used following components:
- short-circuiting subassembly (1)
- earthing subassembly (2)
- earthing rod (6)



SHORT-CIRCUITING SUBASSEMBLY FOR INSULATED OVERHEAD LINES

For works on LV insulated overhead lines with DPS voltage connectors should be used following components:
- short-circuiting subassembly (1)
- earthing subassembly (2)
- set of coupling adaptors (4)
- earthing rod (6)



EARTHING SUBASSEMBLY

For works on LV bare overhead lines should be used following components:
- short-circuiting subassembly (1)
- earthing subassembly (2)
- set of phase clamps (3)
- insulating extension rod (5)
- earthing rod (6)



SET OF 4...7 PHASE CLAMPS FOR LV BARE OVERHEAD LINES

This equipment is delivered in a carrying bag.



SET OF 4...7 COUPLING ADAPTORS AT DPS CONNECTORS

Technical characteristics			
Nominal operational voltage U$_n$ (kV)		max. 1	
Short-circuiting S$_t$ and earthing S$_p$ cable cross-section (mm^2)	16	25	35
Nominal short-circuiting current for t = 1 s I$_{sc}$ (kA)	4	6	8
Nominal peak currrent for t = 0,02 s I$_{sd}$ (kA)	8	12	16
Testing short-circuiting current for t = 1 s I$_{test}$ (kA)	4,6	6,9	9,2
Testing peak current for t = 0,02 s I$_{peak}$ (kA)	9,2	13,8	18,4
Peak factor (SR EN 61230)		2	
Short-circuiting cables length l$_f$ (m)		max. 1	
Earthing cable length l$_p$ (m)		max. 15	
Number of phase clamps for overhead lines / adaptors for DPS connectors		max. 7	
Protection length of the insulating rod (m)		0,35	
Total protection length of the insulating stick, using the extesion rod (m)		0,84	
Diameter of the conductor on which the phase clamp can be applied (mm)		5 ... 16	
Section of the conductor on which it can be applied the phase clamp (mm^2)		25 ... 120	
Type of connectors		COT 10-95 A DPS	

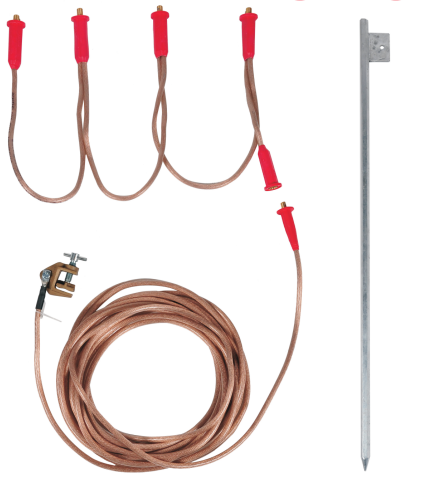


INSULATING EXTENSION ROD

EARTHING ROD

Earthing device for LV insulated overhead lines

SR EN 61230 Enel CST



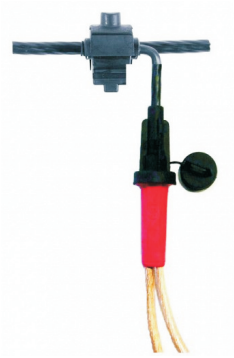
Code: Msp - T - 1 - nxS_f/0,7 - S_p/l_p - F/p

The earthing device for LV insulated overhead lines is provided with coupling plugs (machined from brass) with insulating sleeves.

This equipment contains the following subassemblies and components:
- Short-circuiting subassembly (1):
  - Coupling plugs - "n" - 4 ... 7 pieces
  - Short-circuiting cables - 3 ... 6 pieces
  - Connecting cable with coupling socket - 1 piece
- Earthing subassembly (2):
  - Coupling plug - 1 piece
  - Earthing cable - 1 piece
  - Earthing clamp - 1 piece
- Set of coupling adaptors at DPS voltage connectors (3) - "n" = 4...7 pieces (only at request)
- Earthing rod (4) - 1 piece (only at request).

This equipment is delivered in a carrying bag.

Technical characteristics		
Nominal operating voltage U_n (kV)	max. 1	
Short-circuiting S_f and earthing cable S_p cross-section (mm^2)	16	25
Nominal short-circuiting current for t = 1 s I_{sc} (kA)	4	6
Peak current for t = 0,02 s I_{sd} (kA)	10	15
Testing short-circuiting current for t = 1 s I_{test} (kA)	4,6	6,9
Testing peak current for t = 0,02 s I_{peak} (kA)	11,5	17,25
Peak factor (SR EN 61230)	2,5	
Short-circuiting cables length l_f (m)	0,7	
Earthing cable length l_p (m)	max. 15	



Voltage connector COT 10-95 A for LV insulated conductors

SR EN 61230

Code: COT 10-95 A

The voltage connectors are permanently mounted on LV insulated overhead lines.
They can be applied directly to the live insulated conductors using appropriate insulating tools without damaging of the insulation and the anticorrosive protection of the insulated conductor.

The voltage connector contains:
- an insulated piercing clamp SL 11.118 (Ensto)
- an insulated subassembly which allows a quick connection with the coupling plug of the short-circuiting device.

Technical characteristics	
Nominal operating voltage U_n (kV)	max. 1
Section of the insulated conductors S_c (mm^2)	10; 16; 25; 35; 50 Ol+Al; 70; 95
Nominal short-circuiting current for t = 1 s I_{sc} (kA)	8
Peak current for t = 0,02 s I_{sd} (kA)	16
Testing short-circuiting current for t = 1 s I_{test} (kA)	9,2
Testing peak current for t = 0,02 s I_{peak} (kA)	18,4
Peak factor (SR EN 61230)	2
Dielectric rigidity of the case (kV/1 min)	9
Case type / Case material	Waterproof and ventilated / HD polyethylene (PEHD)
Contact elements material / Tightening elements material	Aluminium alloy / Stainless steel
Protection against corrosion and oxides (Al/Cu contact)	Contact element: tinning and neutral vaseline with dropping point at 120 °C. Tightening elements: stainless steel
Compensation measures for the leaking at cold of the aluminium conductor	Two elastic elements from stainless steel that assure a tightening torque constant in time
Temperature - minimum instalation / operational (°C)	-20 / -25...+55



Earthing device for LV panel boards

SR EN 61230

Code: Msp - 1 - Sp/Ip - B00/p (single phase)
Msp - 1 - Sp/Ip - B/p (single phase)
Msp - 1 - Sp/Ip - B1/p (single phase)
Msp - 1 - 3xSf/If - Sp/Ip - B/p (three phase)
Msp - 1 - 3xSf/If - Sp/Ip - B00/p (three phase)
Msp - 1 - 3xSf/If - Sp/Ip - B1/p (three phase)

The earthing device for LV panel boards and cabinets can be delivered in two constructive shapes: a set of three single phase devices or a three phase device.
The earthing device for LV panel boards and cabinets is provided with phase knives adapted to the size of HRC fuses sockets. The smallest phase knife (code B00) can be fitted on fuse sockets size 00 (code B00), the regular one (code B) can be fitted on sockets size 0 up to 3, the largest one (code B1) can be fitted on PK1 XL – 1000V fuse sockets.

- The single phase earthing device contains:
  - Phase knife - 1 piece
  - Earthing cable - 1 piece
  - Earthing clamp - 1 piece

- The three phase earthing device contains:
  - Phase knives - 3 pieces
  - Phase (short-circuiting) cables - 3 pieces
  - Earthing cable - 1 piece
  - Earthing clamp - 1 piece

This equipment is delivered in a carrying bag.



SINGLE PHASE EARTHING DEVICE



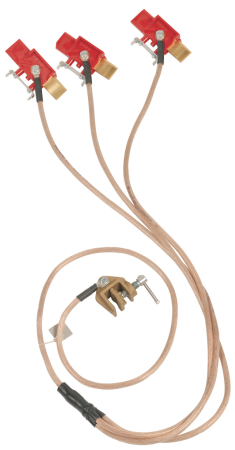
PHASE CLAMP - B00



PHASE CLAMP - B



PHASE CLAMP - B1



THREE PHASE EARTHING DEVICE

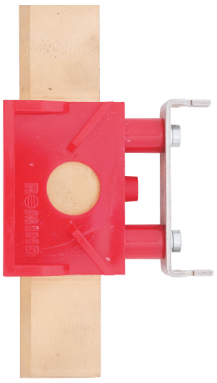
Technical characteristics	
Nominal operating voltage U_n (kV)	max. 1
Peak factor (SR EN 61230)	2,5
Short-circuiting cables length l_f (m) - three phased earthing device	max. 1,2
Earthing cable length l_p (m) - three phased earthing device	max. 5,5
Earthing cable length l_p (m) - single phased earthing device	max. 6,7

Technical characteristics	Earthing device for fuses size NH 00 (code B00)	Earthing device for fuses sizes NH 0...3 (code B)			Earthing device for fuse PK1 XL - 1kV (code B1)		
Short-circuiting S_f and earthing cable S_p cross-section(mm^2)	16	16	25	35	16	25	35
Nominal short-circuiting current for t = 1 s I_{sc} (kA)	4	3,5	6	8	4	6,25	8,75
Nominal peak currrent for t = 0,02 s I_{sd} (kA)	10	8,75	15	20	10	15,63	21,9
Testing short-circuiting current for t = 1 s I_{test} (kA)	4,6	4	6,9	9,2	4,6	7,2	10,06
Testing peak current for t = 0,02 s I_{peak} (kA)	11,5	10	17,25	23	11,5	17,97	25,16

Connecting knife for fuse sockets

Code: P 2282-0-00

The connecting knife (shunt) can be used on LV installations, in order to complete the circuits in the separation points.
The connecting knife can be fitted in HRC fuses sockets - size NH 0, 1, 2 and 3 and should be handle using a fuse handle with protective sleeve or an appropriate insulating stick.



Technical characteristics	
Nominal current (A)	250
Weight (kg)	0,32

Single phase earthing device for bus bars

SR EN 61230

Code: Msp - C - S_p/l_p - P/p
Msp - CCU - S_p/l_p - S/O/P/p
Msp - CA - S_p/l_p - P/p
Msp - CAE - S_p/l_p - P/p
Msp - CAU - S_p/l_p - S/O/P/p



The single phase earthing device for bus bars (rectangular conductors, flat bars) can be provided with one of the following phase clamps:
- **Classic phase clamp, C type** – casting from aluminum alloy;
- **Universal classic phase clamp, CCU type** – extrusion of aluminum alloy;
- **Automatic phase clamp, CA type** – casting from aluminum alloy;
- **Automatic extruded phase clamp, CAE type** – extrusion of aluminum alloy;
- **Universal automatic phase clamp, CAU type** – extrusion of aluminum alloy.

All types of phase clamps have a fixing system on the bar, consisting of a mobile die operated by a tightening screw. This screw is provided - to its extremity - with a bayonet coupling system which allows a quick and safe connection at the insulating stick. The automatic phase clamps are additionally provided with a special system which allows a preliminary fastening of the clamp on bar (by acting the mobile die). This preliminary fastening is triggered by a lightly knocking of the clamp by bar and must be followed by a firm fastening obtained by screwing.

The earthing clamp can be classic (standard models) or with scrapping die (optional models), adapted to the short-circuiting current of the earthing device. The length of the earthing cable should be chosen depending on the positions of application points for phase clamp and earthing clamp. The cross-section of the earthing cable should by chosen depending on the required short-circuiting current.

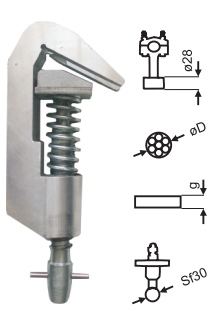
This equipment is delivered in sets of three pieces, in a carrying bag or a transport case.

General characteristics for the earthing devices for bus bars								
Earthing cable section S_p (mm^2)		16	25	35	50	70	95	120
Nominal short-circuiting current for t = 1 s I_{sc} (kA)	C / CA / CAE	3,5	6	8	12	16	20	30
	CCU / CAU	4	6,25	8,75	12,5	17,5	23,75	30
Nominal peak currrent for t = 0,02 s I_{sd} (kA)		$I_{sd} = 2,5 \times I_{sc}$						
Testing short-circuiting current for t = 1 s I_{test} (kA)		$I_{test} = 1,15 \times I_{sc}$						
Testing peak current for t = 0,02 s I_{peak} (kA)		$I_{peak} = 1,15 \times I_{sd}$						
Peak factor (SR EN 61230)		2,5						

Phase clamp type	Classic clamp (C)	Universal classic clamp (CCU)	Automatic clamp (CA)	Automatic extruded clamp (CAE)	Universal automatic clamp (CAU)
Earthing cable length l_p (m)	max. 8,5	max. 10	max. 8,5	max. 8,5	max. 10
Thickness of rectangular conductor on which can be mounted the phase clamp g (mm)	max. 40	max. 40	max. 37	max. 36	max. 37
Diameter of coupling piece spherical type (mm)	-	30	-	-	30



CLASSIC
PHASE CLAMP (C)



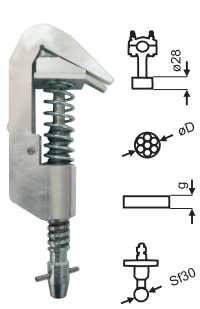
UNIVERSAL CLASSIC
PHASE CLAMP (CCU)



AUTOMATIC
PHASE CLAMP (CA)



AUTOMATIC EXTRUDED
PHASE CLAMP (CAE)

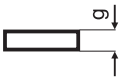


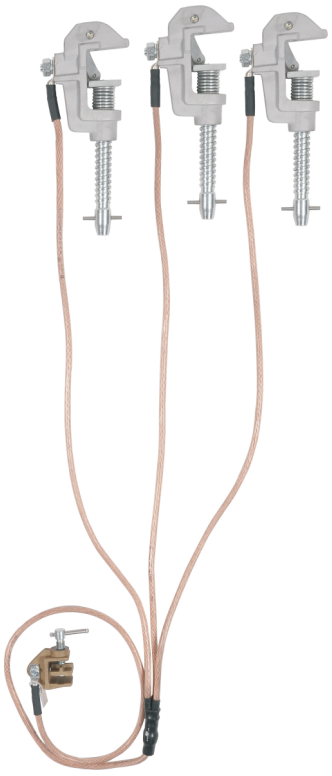
UNIVERSAL AUTOMATIC
PHASE CLAMP (CAU)

Three phase earthing device for bus bars

SR EN 61230

Code: Msp - C - 3xS_f/l_f - S_p/l_p - P/p
Msp - CCU - 3xS_f/l_f - S_p/l_p - S/P/p
Msp - CA - 3xS_f/l_f - S_p/l_p - P/p
Msp - CAE - 3xS_f/l_f - S_p/l_p - P/p
Msp - CAU - 3xS_f/l_f - S_p/l_p - S/P/p





The three phase earthing device for bus bars (rectangular conductors, flat bars) can be provided with one of the following phase clamps:
- **Classic phase clamp, C type** – casting from aluminum alloy;
- **Universal classic phase clamp, CCU type** – extrusion of aluminum alloy;
- **Automatic phase clamp, CA type** – casting from aluminum alloy;
- **Automatic extruded phase clamp, CAE type** – extrusion of aluminum alloy;
- **Universal automatic phase clamp, CAU type** – extrusion of aluminum alloy.

All types of phase clamps have a fixing system on the bar, consisting of a mobile die operated by a tightening screw. This screw is provided - to its extremity - with a bayonet coupling system which allows a quick and safe connection at the insulating stick. The automatic phase clamps are additionally provided with a special system which allows a preliminary fastening of the clamp on bar (by acting the mobile die). This preliminary fastening is triggered by a lightly knocking of the clamp by bar and must be followed by a firm fastening obtained by screwing.

The earthing clamp can be classic (standard models) or with scrapping die (optional models), adapted to the short-circuiting current of the earthing device. The length of the earthing cables should be chosen depending on the positions of application points for phase clamps and earthing clamp. The cross-section of the earthing cable should by chosen depending on the required short-circuiting current.

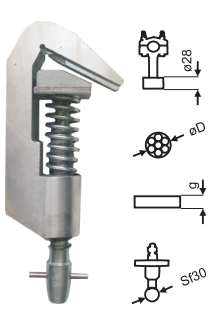
This equipment is delivered in a carrying bag or a transport case.

General characteristics for the earthing devices for bus bars								
Earthing cable section S_p (mm^2)		16	25	35	50	70	95	120
Nominal short-circuiting current for t = 1 s I_{sc} (kA)	C / CA / CAE	3,5	6	8	12	16	20	30
	CCU / CAU	4	6,25	8,75	12,5	17,5	23,75	30
Nominal peak currrent for t = 0,02 s I_{sd} (kA)		$I_{sd} = 2,5 \times I_{sc}$						
Testing short-circuiting current for t = 1 s I_{test} (kA)		$I_{test} = 1,15 \times I_{sc}$						
Testing peak current for t = 0,02 s I_{peak} (kA)		$I_{peak} = 1,15 \times I_{sd}$						
Peak factor (SR EN 61230)		2,5						

Phase clamp type	Classic clamp (C)	Universal classic clamp (CCU)	Automatic clamp (CA)	Automatic extruded clamp (CAE)	Universal automatic clamp (CAU)
Short-circuiting cable length l_f (m)	max. 1,5	max. 1,5	max. 1,5	max. 1,5	max. 1,5
Earthing cable length l_p (m)	max. 7	max. 8,5	max. 7	max. 7	max. 8,5
Thickness of rectangular conductor on which can be mounted the phase clamp g (mm)	max. 40	max. 40	max. 37	max. 36	max. 37
Diameter of coupling piece spherical type (mm)	-	30	-	-	30



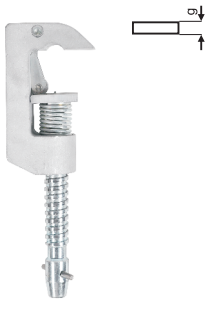
CLASSIC PHASE CLAMP (C)



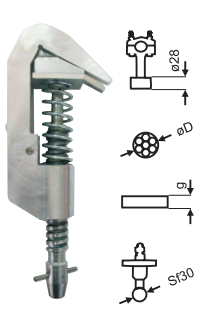
UNIVERSAL CLASSIC PHASE CLAMP (CCU)



AUTOMATIC PHASE CLAMP (CA)



AUTOMATIC EXTRUDED PHASE CLAMP (CAE)

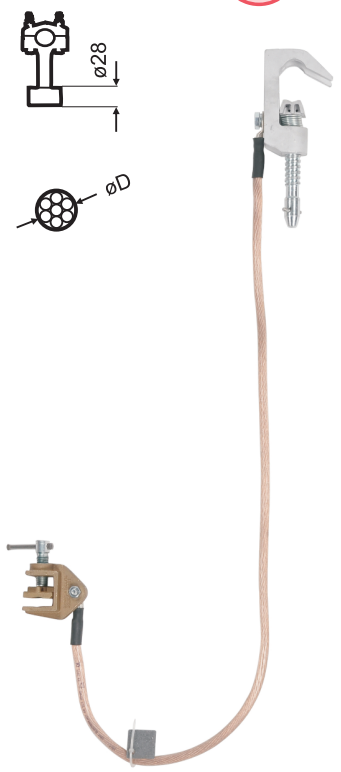


UNIVERSAL AUTOMATIC PHASE CLAMP (CAU)

Single phase earthing device for round conductors

SR EN 61230

Code: Msp - Cr - Sp/Ip - O/p
Msp - CCU - S_p/I_p -S/O/P/p
Msp - CA - S_p/I_p - O/p
Msp - CAEr - Sp/Ip - O/p
Msp - CAU - S_p/I_p - S/O/P/p



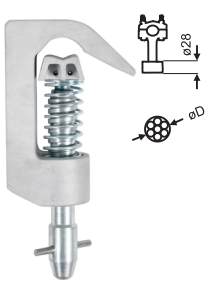
The single phase earthing device for round conductors can be provided with one of the following phase clamps:
- **Classic reduced phase clamp, Cr type** - extrusion of aluminium alloy;
- **Universal classic phase clamp, CCU type** - extrusion of aluminium alloy;
- **Automatic phase clamp, CA type** - casting from aluminium alloy;
- **Automatic extruded phase clamp, CAEr type** - extrusion of aluminium alloy;
- **Universal automatic phase clamp, CAU type** - extrusion of aluminium alloy.

All types of phase clamps have a fixing system on the bar, consisting of a mobile die operated by a tightening screw. This screw is provided - to its extremity - with a bayonet coupling system which allows a quick and safe connection at the insulating stick. The automatic phase clamps are additionally provided with a special system which allows a preliminary fastening of the clamp on conductor (by acting the mobile die). This preliminary fastening is triggered by a hooking of the clamp on conductor and must be followed by a firm fastening obtained by screwing.
The earthing clamp can be classic (standard models) or with scrapping die (optional models), adapted to the short-circuiting current of the earthing device. The length of the earthing cable should be chosen depending on the positions of application points for phase clamp and earthing clamp. The cross-section of the earthing cable should by chosen depending on the required short-circuiting current.

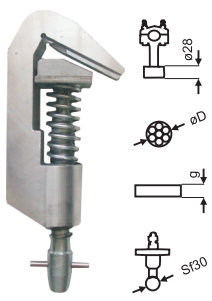
This equipment is delivered in sets of three pieces, in a carrying bag or a transport case.

General characteristics for the earthing devices for round conductors								
Earthing cable section S_p (mm^2)		16	25	35	50	70	95	120
Nominal short-circuiting current for t = 1 s I_{sc} (kA)	Cr / CAEr	4	6,25	8,75	12,5	16	23,75	30
	CA	4	6	8	12	16	20	30
	CCU/ CAU	4	6,25	8,75	12,5	17,5	23,75	30
Nominal peak currrent for t = 0,02 s I_{sd} (kA)		$I_{sd} = 2,5 \times I_{sc}$						
Testing short-circuiting current for t = 1 s I_{test} (kA)		$I_{test} = 1,15 \times I_{sc}$						
Testing peak current for t = 0,02 s I_{peak} (kA)		$I_{peak} = 1,15 \times I_{sd}$						
Peak factor (SR EN 61230)		2,5						

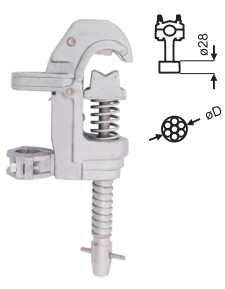
Phase clamp type	Classic reduced clamp (Cr)	Universal classic clamp (CCU)	Automatic clamp (CA)	Automatic extruded clamp (CAEr)	Universal automatic clamp (CAU)
Diameter of conductor on which can be applied the phase clamp øD (mm)	17 ÷ 32	9 ÷ 32	17 ÷ 32	17 ÷ 32	9 ÷ 32
Maximum length of earthing cable I_p (m) - section cable between 16 and 70 mm^2 - section cable of 95 or 120 mm^2	 17,5 10	 10 10	 8 8	 17,5 10	 10 10



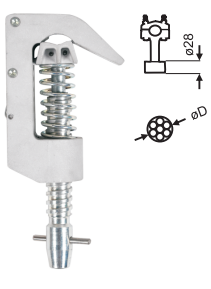
CLASSIC REDUCED PHASE CLAMP (Cr)



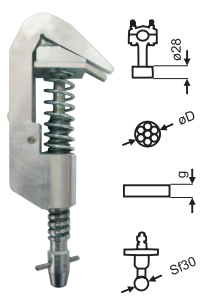
UNIVERSAL CLASSIC PHASE CLAMP (CCU)



AUTOMATIC PHASE CLAMP (CA)



AUTOMATIC EXTRUDED PHASE CLAMP (CAEr)



UNIVERSAL AUTOMATIC PHASE CLAMP (CAU)

Fixed points “Tr” and “T” type

SR EN 61230

The fixed points “Tr” and “T” type are provided with a round section piece and can be permanently mounted on a large range of flexible round conductors, in order to improve the montage conditions of the phase clamps and to indicate the application point for earthing devices.

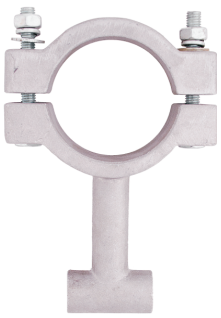
The fixed points "Tr" type are universal, having the same shape, regardless of the cable`s section on which they are mounted.

The fixed points “Tr” and “T” type are made of aluminum alloy.



“Tr” FIXED POINT

Fix point type	“Tr”	“T”
Nominal short-circuiting current for t = 1 s I_{sc} (kA)	30	30
Nominal peak currrent for t = 0,02 s I_{sd} (kA)	75	75
Testing short-circuiting current for t = 1 s I_{test} (kA)	34,5	-
Testing peak current for t = 0,02 s I_{peak} (kA)	86,25	-
Peak factor (SR EN 61230)	2,5	-
Diameter of multicore flexible conductors øD (mm)	19 - 36	-
Section of multicore flexible conductors (mm^2)	185 - 680	-
Diameter of round rigid bars øD (mm)	-	55; 80



“T” FIXED POINT

Rods for earthing devices

The earthing rods are components of earthing devices for LV / MV overhead lines.
They are made of steel profiles, protected by hot dip galvanizing against corrosion.

The standard earthing rod has a hexagonal profile (code P2312-0-00).

The "T" profile earthing rod (code P2163-0-00) is a component of MV earthing device with self-locking phase clamps.

The drilling earthing rod (code P2379-0-00) can be operated without any other tool (hammer or something similar). It can be buried by twisting the rod.



EARTHING ROD
P 2312-0-00



EARTHING ROD
P 2163-0-00



EARTHING ROD
P 2358-0-00



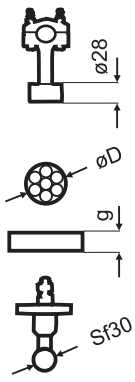
EARTHING ROD
P 2379-0-00

Code	P 2312-0-00	P 2163-0-00	P 2358-0-00	P 2379-0-00
Length (mm)	1150	1200	1200	1200
Section	Hexagon 18	“T” profile	“T” profile	Drill type
Weight (kg)	3,0	4,6	3,8	7,2

Universal single phase / three phase earthing device

SR EN 61230

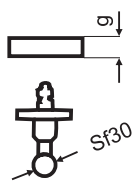
Code: **Msp - CCNU - S_p/I_p – S/O/P/p** **Msp - CCNU - $3xS_f/I_f$ - S_p/I_p – S/O/P/p**
Msp - CCRU - S_p/I_p – S/O/P/p **Msp - CCRU - $3xS_f/I_f$ - S_p/I_p – S/O/P/p**
Msp - CAU - S_p/I_p - S/O/P/p **Msp - CAU - $3xS_f/I_f$ - S_p/I_p - S/P/p**
Msp - CCU - S_p/I_p - S/O/P/p **Msp - CCU - $3xS_f/I_f$ - S_p/I_p - S/P/p**





The universal single phase or three phase earthing device can be provided with one of the following phase clamps:
- **Universal classic reduced phase clamp, CCRU type -** casting from aluminium alloy;
- **Universal classic normal phase clamp, CCNU type -** casting from aluminium alloy;
- **Universal classic phase clamp, CCU type -** extrusion of aluminium alloy;
- **Universal automatic phase clamp, CAU type -** extrusion of aluminium alloy.

All types of phase clamps have a fixing system on the conductor (bars, round conductors, spherical pieces, "T" fixed points), consisting of a mobile die operated by a tightening screw. This screw is provided - to its extremity - with different types of coupling system which allows a quick and safe connection at the insulating stick. The automatic phase clamps are additionally provided with a special system which allows a preliminary fastening of the clamp on conductor (by acting the mobile die). This preliminary fastening is triggered by a hooking and by a lightly knocking of the clamp on conductor and must be followed by a firm fastening obtained by screwing.



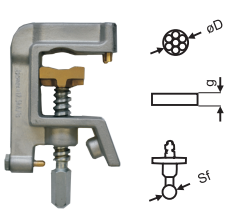


The earthing clamp can be classic (standard models) or with scrapping die (optional models), adapted to the short-circuiting current of the earthing device. The length of the earthing cable should be chosen depending on the positions of application points for phase clamp and earthing clamp. The cross-section of the earthing cable should by chosen depending on the required short-circuiting current.

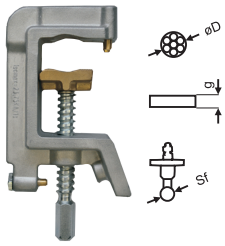
This equipment is delivered in a carrying bag or a transport case.

General characteristics for the earthing devices equipped with universal phase clamps							
Earthing cable section S_p (mm^2)	16	25	35	50	70	95	120
Nominal short-circuiting current for t = 1 s I_{sc} (kA)	4	6,25	8,75	12,5	17,5	23,75	30
Nominal peak currrent for t = 0,02 s I_{sd} (kA)	10	15,63	21,9	31,25	43,75	59,38	75
Testing short-circuiting current for t = 1 s I_{test} (kA)	4,6	7,2	10,06	14,38	20,13	27,31	34,5
Testing peak current for t = 0,02 s I_{peak} (kA)	11,5	17,97	25,16	35,94	50,31	68,3	86,25
Peak factor (SR EN 61230)				2,5			

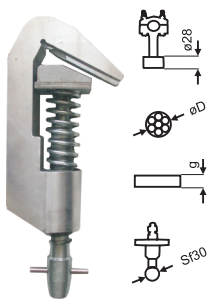
Phase clamp type	Universal classic reduced phase clamp (CCRU)	Universal classic normal phase clamp (CCNU)	Universal classic phase clamp (CCU)	Universal automatic phase clamp (CAU)
Short-circuiting cables length - three phased earthing device l_f (m)	max. 2,5	max. 2,5	max. 1,5	max. 1,5
Earthing cable length - single phased earthing device / three phased earthing device l_p (m)	max. 10 / max. 7,5	max. 10 / max. 7,5	max. 10 / max. 8,5	max. 10 / max. 8,5
Thickness of rectangular conductor on which can be mounted the phase clamp g (mm)	max. 30	max. 45	max. 40	max. 37
Diameter of coupling piece spherical type (mm)	20 / 25	20 / 25	30	30
Diameter of conductor on which can be applied the phase clamp øD (mm)	4 ÷ 30	4 ÷ 36	9 ÷ 32	9 ÷ 32



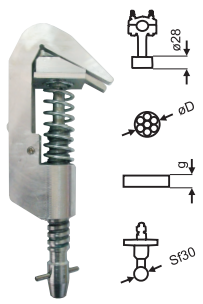
UNIVERSAL CLASSIC REDUCED PHASE CLAMP (CCRU)



UNIVERSAL CLASSIC NORMAL PHASE CLAMP (CCNU)



UNIVERSAL CLASSIC PHASE CLAMP (CCU)



UNIVERSAL AUTOMATIC PHASE CLAMP (CAU)

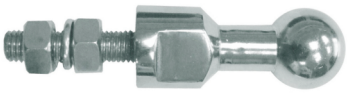
Spherical pieces for bus bars

SR EN 61230 CST

Code: P 2180-0-00 M x L

The spherical pieces could be permanently mounted on the bus bars, on MV indoor installations.
This system allows ergonomically mounting conditions of the phase clamps (CCU / CAU) of the short-circuiting devices. Usually, the spherical pieces are mounted by replacing an existing bolt or screw used in assembling of bars.
The fasteners choice is made by the customer according the characteristics of the conductors (bus bars).

The spherical piece is made of copper in order to assure a proper electrical conductivity between the bus bar and the phase clamp of the short-circuiting device.
Each spherical piece is provided with a bolt, a flat washer, a split-lock (Grower) washer and two hexagonal nuts.





Technical characteristics	
Nominal short-circuiting current for t = 1 s I_{sc} (kA)	30
Nominal peak currrent for t = 0,02 s I_{sd} (kA)	75
Dimension of the bolt / screw	M12; M14; M16
Free length of the bolt / screw - upon request (mm)	30; 40; 50; 60; 70; 80
Type of phase clamp that can be applied to the spherical piece	Phase clamps (CCU / CAU)
Sphere diameter (mm)	30

Three-phased short-circuiting device for electrical motors

SR EN 61230 CST

Code: Msp - M - 3xS_f/l_f - S_p/l_p - S/p

The three phase short-circuiting device can be fixed to the terminals of electrical motors.
The ends of phase cables are provided with copper terminals (lugs) which can be easily tightened to the terminals of the motors. A set of fasteners (screw, nut, split-lock washer) is attached to each copper terminal.

This equipment contains the following components:
- Copper terminals (lugs) with fasteners (hexagonal screw, split-lock washer, screw nut) - 3 pieces
- Phase cable - 3 pieces
- Earthing cable - 1 piece
- Earthing clamp - 1 piece

This equipment is delivered in a carrying bag or a transport case.



Technical characteristics							
Short-circuiting S_f and earthing S_p cable section (mm^2)	16	25	35	50	70	95	120
Nominal short-circuiting current for t = 1 s I_{sc} (kA)	3,5	6	8	12	16	20	30
Nominal peak currrent for t = 0,02 s I_{sd} (kA)	8,75	15	20	30	40	50	75
Testing short-circuiting current for t = 1 s I_{test} (kA)	4,6	6,9	9,2	13,8	18,4	23	34,5
Testing peak current for t = 0,02 s I_{peak} (kA)	11,5	17,25	23	34,5	46	57,5	86,25
Peak factor (SR EN 61230)				2,5			
Short-circuiting cable length l_f (m)				max. 2,5			
Earthing cable length l_p (m)				max. 7			
Preferential dimension of the assembly elements	M8	M8	M10	M10	M10	M12	M12
Optional dimensions of the assembly elements (mm)	M10	M10	M8 M12	M8 M12	M8 M12	M10 M16	M10 M16

Three phase earthing device for MV overhead lines - application from the ground - self-fastening phase clamp

SR EN 61230 SR EN 61235

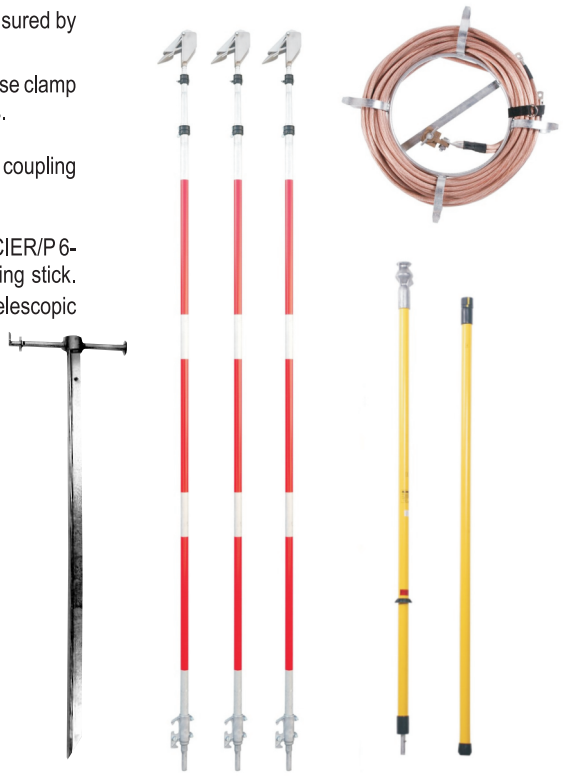
Code: Msp - AS - 3x35/10 - O/p

The three phase earthing device provided with self- fastening phase clamps can be applied from the ground on the MV overhead lines, up to 10 m height.

The phase clamp has a simple and efficient self-fastening system, its fastening on conductor being insured by the weight of assembly "copper earthing cable – metallic telescopic stick".
The phase clamp is permanently fixed on top of the metallic telescopic stick. The main parts of the phase clamp are made by casting from aluminum alloy. The telescopic stick is made from three (four) aluminum pipes.

The earthing device contains also a special connectable insulating stick (2 modules) provided with a coupling system which allows the connection with the end piece of the metallic telescopic stick.

The checking of voltage presence on the overhead lines can be performed using a voltage detector DTCIER/P 6-35 kV (without contact electrode) mounted to the special coupling piece from the top of the insulating stick. During this operation, the electrode of the detector is been replaced by the "phase clamp – metallic telescopic stick" assembly.



This equipment contains the following subassemblies and components:
- Metallic telescopic stick with self-fastening clamp from 3 pipes - 3 pieces
- Connectable insulating stick from 2 modules - 1 piece
- Metallic drum for cables - 1 piece
- Earthing cables 10 m x 35 mm^2 - 3 pieces
- Earthing clamp - 1 piece
- Earthing rod - 1 piece

There can be manufactured a model that has a smaller transport length, that contains:
- Metallic telescopic stick with self-fastening clamp from 4 pipes - 3 pieces
- Connectable insulating stick from 3 modules - 1 piece
- Metallic drum for cables - 1 piece
- Earthing cables 10 m x 35 mm^2 - 3 pieces
- Earthing clamp - 1 piece
- Earthing rod - 1 piece

This equipment is delivered in a carrying bag.







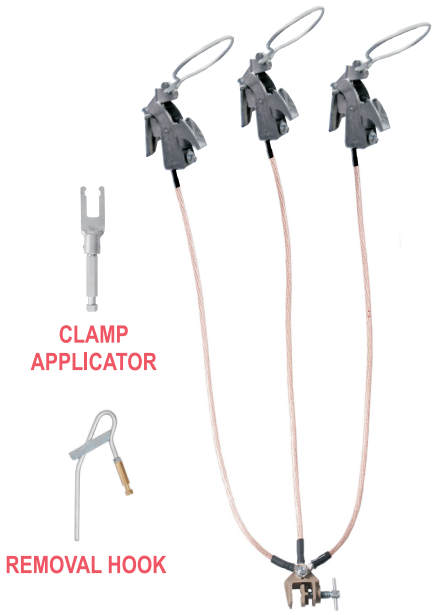
Technical characteristics	
Section/length of the earthing cable (mm^2/m)	35/10
Nominal short-circuiting current for t = 1 s I_{sc} (kA)	8
Nominal peak currrent for t = 0,02 s I_{sd} (kA)	20
Testing short-circuiting current for t = 1 s (kA)	9,2
Testing peak current for t = 0,02 s (kA)	23
Peak factor (SR EN 61230)	2,5
Length of the telescopic stick: folded/extended (m)	2,45/6,35
Total length of the insulating stick from two sections (m)	3,42
Conductor diameter on which the phase clamp can be applied (mm)	4÷22

Three phase earthing device for MV overhead lines - application from the ground

SR EN 61230 Enel CST

Code: Msp - CAA - AS - 3xS_p /I_p - O/p

The three phase earthing device provided with automatic self-locking phase clamps (CAA) can be applied from the ground on MV overhead lines, up to 9 m height.
The main parts of the phase clamp are made by casting from aluminium alloy. This clamp (CAA) is provided with a special coupling system for setting up on conductor and a steel ring for removal from conductor. The new coupling system allows easy and safe mounting of the clamp on the applicator. This system avoids an accidental detachment of the clamp and assures a simultaneously detachment of the clamp from the applicator along with its fastening on conductor.
The operation should be performed from the ground using a long telescopic insulating stick (maximum length 9 meters, code: PTU-AS-400kV-6-C). Before the setting up of the CAA clamp, a special applicator must be fixed on the bayonet coupling system of the stick, then the phase clamp must be attached to this applicator. The fastening of the phase clamp on conductor is performed by hooking and pulling downward of the clamp. The removal of the phase clamp could be performed by hooking and pulling downward the steel ring of the phase clamp. At the removal operation, an insulating stick with removal hook should be used.
ATTENTION! It is recommended that the cross-sections of the cables do not exceed 50 mm² (due to the heavy weight of the cables, the setting up procedure will be difficult to be performed).



This equipment contains the following components:
- Automatic self-locking phase clamps (CAA) - 3 pieces;
- Earthing cables - 3 pieces
- Earthing clamp - 1 piece;
- Earthing rod - 1 piece
- Clamp applicator - 1 piece
- Removal hook - 1 piece

This equipment is delivered in a carrying bag or a transport case.

Technical characteristics					
Earthing cable section S_p (mm²)	16	25	35	50	70
Nominal short-circuiting current for t = 1 s I_{sc} (kA)	4	6	8	12	16
Nominal peak currrent for t = 0,02 s I_{sd} (kA)	10	15	20	30	40
Testing short-circuiting current for t = 1 s I_{test} (kA)	4,6	6,9	9,2	13,8	18,4
Testing peak current for t = 0,02 s I_{peak} (kA)	11,5	17,25	23	34,5	46
Peak factor (SR EN 61230)			2,5		
Earthing cable length I_p (m)			max. 15		
Conductor diameter on which the phase clamp can be applied (mm)		5÷32		6÷32	

Three phase earthing device for plug-in connectors

SR EN 61230 CST

Code: Msp - KA - 3x50/I_f - 50/I_p - K/p

The three phase earthing device for plug-in connectors (male) is provided with special phase clamps, KA type.
The **KA phase clamp** contains a plug-in connector (female) and can be handled using a fuse handle with protective sleeve.



This equipment contains the following components:
- Phase clamp KA type - 3 pieces
- Short-circuiting cable - 3 pieces
- Earthing cable - 1 piece
- Earthing clamp - 1 piece

This equipment is delivered in a carrying bag or a transport case.

Technical characteristics	
Type of connection interface according SR EN 50181	A
Short-circuiting S_f and earthing S_p cable sections (mm²)	50
Nominal short-circuiting current for t = 1 s I_{sc} (kA)	10
Nominal peak currrent for t = 0,02 s I_{sd} (kA)	25
Short-circuiting cable length I_f (m)	max. 1,5
Earthing cable length I_p (m)	max. 7

Three phase earthing device for MV overhead lines - application from the ground or from height - CAA clamp

SR EN 61230 CST

Code: Msp - CAA - U - 2xS_f /l_f - S_p /l_p - O/p

The three phase earthing device provided with automatic self-locking phase clamps (CAA) can be applied from the ground or from height on the MV overhead lines.
This device contains two subassemblies: one for earthing, other for short-circuiting of the conductors.

The main parts of the phase clamp are made by casting from aluminum alloy.
This clamp (CAA) is provided with a special coupling system for setting up on conductor and a steel ring for removal from conductor. The new coupling system allows easy and safe mounting of the clamp on the applicator. This system avoids an accidental detachment of the clamp and assures a simultaneously detachment of the clamp from the applicator along with its fastening on conductor.

If the operation should be performed from the ground, a long telescopic insulating stick (maximum length 9 meters, code: PTU-AS-400kV-6-C) could be used.

If the operation should be performed from height, a short telescopic insulating stick (PTU type) could be used. Different other options are available.

This procedure should be done respecting following operations:
1. The earthing subassembly should be applied in order to get the connection of a phase conductor to the ground.
2. After that, the short-circuiting subassembly should be applied starting by the conductor connected to the ground.

The fastening of the phase clamp is performed by hooking and pulling downward of the clamp, on conductor. At the setting up operation, an appropriate insulating stick with applicator should be used.
The removal of the phase clamp could be performed by hooking and pulling downward the steel ring of the phase clamp. At the removal operation, an insulating stick with removal fork should be used.

This equipment contains the following subassemblies and components:
- Short-circuiting subassembly:
  - Automatic self-locking phase clamp (CAA) - 3 pieces
  - Short-circuiting cables - 2 pieces

- Earthing subassembly:
  - Automatic self-locking phase clamp (CAA) - 1 piece
  - Earthing cable - 1 piece
  - Earthing clamp - 1 piece

- Clamp applicator - 1 piece
- Removal fork - 1 piece
- Earthing rod - 1 piece

This equipment is delivered in a carrying bag or a transport case.



SHORT-CIRCUITING SUBASSEMBLY



EARTHING SUBASSEMBLY



CLAMP APPLICATOR



REMOVAL FORK

Technical characteristics			
Short-circuiting S_f and earthing S_p cable section (mm^2)	16	25	35
Nominal short-circuiting current for t = 1 s I_{sc} (kA)	4	6	8
Nominal peak currrent for t = 0,02 s I_{sd} (kA)	10	15	20
Testing short-circuiting current for t = 1 s I_{test} (kA)	4,6	6,9	9,2
Testing peak current for t = 0,02 s I_{peak} (kA)	11,5	17,25	23
Peak factor (SR EN 61230)		2,5	
Short-circuiting cable length l_f (m)		max. 4	
Earthing cable length l_p (m)		max. 15	
Conductor diameter on which the phase clamp can be applied (mm)		5 ÷ 32	

Three phase earthing device for MV overhead lines -application from height

SR EN 61230

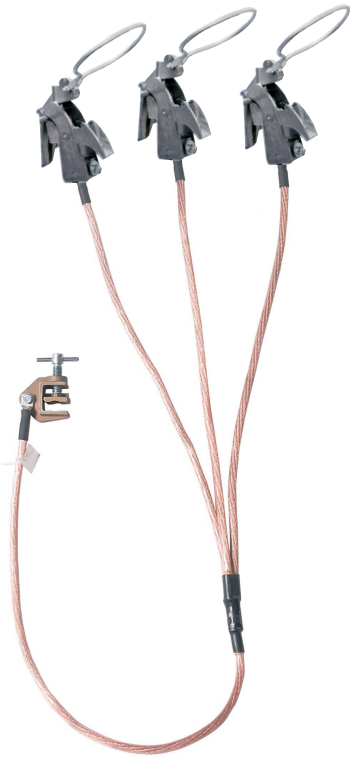
Code: Msp - CAA - AST - 3xS_f/l_f - S_p/l_p - O/p

The three phase earthing device provided with automatic self-locking phase clamps (CAA) can be applied from height on MV overhead lines.
The main parts of the phase clamp are made by casting from aluminum alloy.
This clamp (CAA) is provided with a special coupling system for setting up on conductor and a steel ring for removal from conductor. The new coupling system allows easy and safe mounting of the clamp on the applicator. This system avoid an accidental detachment of the clamp and assures a simultaneously detachment of the clamp from the applicator along with its fastening on conductor.

The operation should be performed from height using a short telescopic / connectable insulating stick. Before the setting up of the CAA clamps, an appropriate applicator must be fixed on the hexagonal / bayonet coupling system of the stick, then the phase clamps must be attached to this applicator. The fastening of the phase clamp on conductor is performed by hooking and pulling downward of the clamp. The removal of the phase clamp could be performed by hooking and pulling downward the steel ring of the phase clamp. At the removal operation, an insulating stick with removal hook should be used.

This equipment contains the following components:
- Automatic self-locking phase clamps (CAA) - 3 pieces
- Phase (short-circuiting) cables - 3 pieces
- Earthing cable – 1 piece
- Earthing clamp - 1 piece
- Earthing rod - 1 piece
- Applicator - 1 piece
- Removal hook - 1 piece

This equipment is delivered in a carrying bag or a transport case.





CLAMP APPLICATOR
(BAYONET COUPLING)



CLAMP APPLICATOR
(HEXAGONAL COUPLING)





REMOVAL HOOK
(BAYONET COUPLING)



REMOVAL HOOK
(HEXAGONAL COUPLING)

General technical characteristics for three phase earthing device for MV overhead lines - application from height						
Short-circuiting S_f and earthing S_p cable section (mm^2)	16	25	35	50	70	95
Nominal short-circuiting current for t = 1 s I_{sc} (kA)	4	6	8	12	16	18
Nominal peak currrent for t = 0,02 s I_{sd} (kA)	10	15	20	30	40	50
Testing short-circuiting current for t = 1 s (kA)	4,6	6,9	9,2	13,8	18,4	20,7
Testing peak current for t = 0,02 s (kA)	11,5	17,25	23	34,5	46	51,75
Peak factor (according SR EN 61230)	2,5					
Short-circuiting cable length l_f (m)	max. 2,5					
Earthing cable length l_p (m)	max. 15					
Conductor diameter on which the clamp can be applied (mm)	5 ÷ 32			6÷32		

Three phase earthing device for MV overhead lines-application from height - CAA phase clamp fixed on insulating stick

SR EN 61230 SR EN 61235 Enel CST

Code: Msp - CAA - AST - 3xS_f/l_f - S_p/l_p - O/p - E (ENEL model)
Msp - CAA - AST - 3xS_f/l_f - S_p/l_p - O/p - T

The three phase earthing device provided with automatic self-locking phase clamps (CAA) fixed on insulating sticks from one module or telescopic insulating sticks can be applied from height on MV overhead lines.

The main parts of the phase clamp are made by casting from aluminum alloy.
The phase clamp is fixed on the end of insulating stick (made of fiberglass).

The fastening of the phase clamp on conductor is performed by hooking and pulling downward of the clamp.
The removal of the phase clamp is performed by pushing and vertical twisting of the insulating stick.

This equipment contains the following components:
- Automatic self-locking phase clamp (CAA) with insulating stick from one module (E) or with telescopic insulating stick (T) - 3 pieces
- Short-circuiting cables - 3 pieces
- Earthing cable – 1 piece
- Earthing clamp - 1 piece
- Earthing rod - 1 piece

This equipment device is delivered in a metallic box:
- 1830 x 300 x 160 mm - equipped with insulating sticks from one module - model E
- 1030 x 300 x 160 mm - equipped with telescopic insulating sticks - model T



THREE PHASE EARTHING DEVICE
CAA PHASE CLAMP WITH STICK (ENEL MODEL)





THREE PHASE EARTHING DEVICE
CAA PHASE CLAMP WITH TELESCOPIC STICK

Technical characteristics	Stick of one section	Telescopic stick
Total length L_t (m)	1,6	1,55
Useful length L_u (m)	0,8	1,14
Transport length L_s (m)	-	0,95

General technical characteristics for three phase earthing device for MV overhead lines - application from height - CAA clamp fixed in the stick						
Short-circuiting S_f and earthing S_p cable section (mm^2)	16	25	35	50	70	95
Nominal short-circuiting current for t = 1 s I_{sc} (kA)	4	6	8	12	16	18
Nominal peak currrent for t = 0,02 s I_{sd} (kA)	10	15	20	30	40	50
Testing short-circuiting current for t = 1 s I_{test} (kA)	4,6	6,9	9,2	13,8	18,4	20,7
Testing peak current for t = 0,02 s I_{peak} (kA)	11,5	17,25	23	34,5	46	51,75
Peak factor (SR EN 61230)	2,5					
Short-circuiting cable length l_f (m)	max. 2,5					
Earthing cable lengtht l_p (m)	max. 15					
Conductor diameter on which the phase clamp can be applied (mm)	5÷32			6÷32		

Single phase earthing device for HV overhead lines - CAA phase clamp

SR EN 61230

Code: Msp CAA - S_p /l_p - O/p (classic earthing clamp)
Msp CAA - S_p /l_p - O/pr (earthing clamp with scrapping die)

The single phase earthing device provided with automatic self-locking phase clamp (CAA) can be applied from the pillar, on the HV overhead lines. The main parts of the phase clamp are made by casting from aluminium alloy. This clamp (CAA) is provided with a special coupling system for setting up on conductor and a steel ring for removal from conductor.
Before the setting up of the CAA clamp, a special applicator must be fixed on the bayonet coupling system of the stick, then the phase clamp must be attached to this applicator (please see the picture).
The fastening of the phase clamp is performed by its pushing downward, on conductor. The removal of the phase clamp could be performed using same equipment (insulating stick with special applicator) by hooking and pulling upward the steel ring of the phase clamp.
For this procedure, it is recommended to use an appropriate connectable insulating stick PMU-Un-n-B/ba.

Usually, this kind of earthing device is provided with special earthing clamp with scraping system (clamp with scraping die) for painted metallic pillars (in order to remove the paint and oxides layers).

This equipment contains the following components:
- Automatic self-locking phase clamp (CAA) - 1 piece
- Earthing cable - 1 piece
- Earthing clamp (scraping or normal) - 1 piece
- Special applicator with removal hook - 1 piece/set of three earthing devices

This equipment is delivered in sets of three pieces, in a carrying bag or a transport case.





AUTOMATIC SELF-LOCKING PHASE CLAMP (CAA)

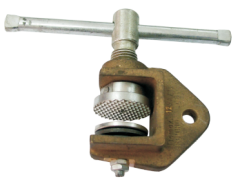


SPECIAL APPLICATOR
WITH REMOVAL HOOK





EARTHING CLAMP
WITH SCRAPPING DIE - Isc = 16 kA/1 s



EARTHING CLAMP
WITH SCRAPPING DIE - Isc = 12 kA/1 s

Technical characteristics						
Earthing cable section S_p (mm^2)	16	25	35	50	70	95
Nominal short-circuiting current for t = 1 s I_{sc} (kA)	4	6	8	12	16	18
Nominal peak currrent for t = 0,02 s I_{sd} (kA)	10	15	20	30	40	45
Testing short-circuiting current for t = 1 s I_{test} (kA)	4,6	6,9	9,2	13,8	18,4	20,7
Testing peak current for t = 0,02 s I_{peak} (kA)	11,5	17,25	23	34,5	46	51,75
Peak factor (SR EN 61230)	2,5					
Earthing cable lengtht l_p (m)	max. 17,5					
Conductor diameter on which the phase clamp can be applied (mm)	5÷32			6÷32		

Single phase earthing device for railways contact line

SR EN 61230 CST

Code: Msp - CrTf - S_p/l_p - Fc/ps

The single phase earthing device for railways contact line is provided with a classic clamp for the railways installations (CrTf type) and a manual earthing clamp for the rail (used on the tramrails or railways).

The **classic clamp for the railway installations - CrTf type** has an extruded body (made of aluminum alloy) and a tightening screw with a bayonet terminal. An electrode for discharging the contact power line from induced residual electric charges from the neighbouring installations is placed on the top of the clamp.
The manual earthing clamp (casting from copper-aluminium alloy) is special designed to allow its fastening under the rail, leaving the track free.

This equipment contains the following components:
- CrTf classic phase clamp - 1 piece
- earthing cable - 1 piece
- earthing clamp (special type for railways) - 1 piece

This equipment is delivered in a carrying bag or a transport case.



Technical characteristics					
Earthing cable section S_p (mm^2)	16	25	35	50	70
Nominal short-circuiting current for t = 1 s I_{sc} (kA)	3,5	6	8	12	16
Nominal peak currrent for t = 0,02 s I_{sd} (kA)	8,75	15	20	30	40
Testing short-circuiting current for t = 1 s I_{test} (kA)	4,6	6,9	9,2	13,8	18,4
Testing peak current for t = 0,02 s I_{peak} (kA)	11,5	17,25	23	34,5	46
Peak factor (SR EN 61230)			2,5		
Maximum earthing cable length l_p (m)			max. 16		
Diameter of conductor on which can be applied the phase clamp(mm)			5÷32		
Railway type			40, 49, 60, R65		

Single phase earthing device for subway

SR EN 61230 CST

Code: Msp - CM - 120/1,5 - S3/ps

The single phase earthing device for subway is provided with a special phase clamp for the 3rd rail (power supply rail) from the subways and manual earthing clamp for rails.
The **special phase clamp for connection at the 3rd rail** has a body (casting from cooper-aluminium alloy) and a tightening screw. At the end of the screw, there is an actuating ring. The fastening of this clamp could be performed using an insulating stick PMU-20-1-B/ba and a hook-bayonet adaptor mounted in the coupling system of the stick.
The manual earthing clamp (casting from copper-aluminium alloy) is special designed to allow its fastening under the rail, leaving the track free.
The single phase earthing device contains:
- special phase clamp for 3rd rail- 1 piece
- earthing cable - 1 piece
- earthing clamp (special type for railways) - 1 piece
- hook-bayonet adaptor – 1 piece

This equipment is delivered in a carrying bag or a transport case.



Technical characteristics	
Earthing cable section S_p (mm^2)	120
Nominal short-circuiting current for t = 1 s I_{sc} (kA)	30
Nominal peak currrent for t = 0,02 s I_{sd} (kA)	60
Testing short-circuiting current for t = 1 s I_{test} (kA)	34,5
Testing peak current for t = 0,02 s I_{peak} (kA)	69
Peak factor (SR EN 61230)	2
Maximum earthing cable length l_p (m)	1,5
Railway type	40, 49, 60, R65
Type of the phase clamp for the 3rd rail	40

Phase clamps - for bus bars (rectangular conductors)

SR EN 61230

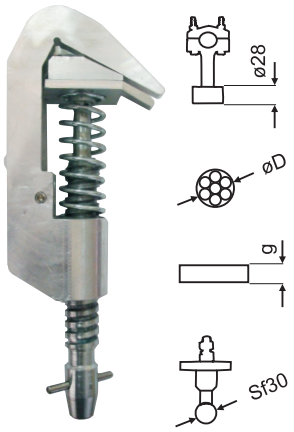
General characteristics for phase clamps	
Nominal short-circuiting current for t = 1 s I_{sc} (kA)	30
Nominal peak currrent for t = 0,02 s I_{sd} (kA)	75
Testing short-circuiting current for t = 1 s I_{test} (kA)	34,5
Testing peak current for t = 0,02 s I_{peak} (kA)	86,25
Peak factor (SR EN 61230)	2,5



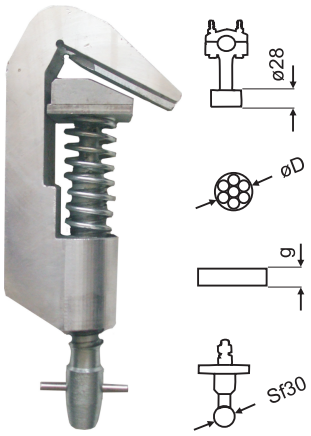
CLASSIC
PHASE CLAMP (C)



AUTOMATIC
PHASE CLAMP (CA)



UNIVERSAL AUTOMATIC
PHASE CLAMP (CAU)



UNIVERSAL CLASSIC
PHASE CLAMP (CCU)



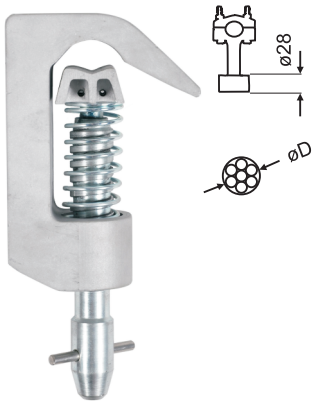
AUTOMATIC EXTRUDED
PHASE CLAMP (CAE)

Phase clamp type	Classic clamp (C)	Universal classic clamp (CCU)	Automatic clamp (CA)	Automatic extruded clamp (CAE)	Universal automatic clamp (CAU)
Code	P 231-0-00C	P 2393-0-00	P 235-0-00	P 235-0-00	P 2380-0-00
Dimensions (mm)	97 x 170 x 52	95 x 220 x 55	94 x 188 x 52	75 x 180 x 50	95 x 220 x 55
Thickness of rectangular conductor on which can be mounted the phase clamp g (mm)	max. 40	max. 40	max. 37	max. 36	max 37
Short-circuiting and earthing cable length l_p (m)	8,5	10	8,5	8,5	10
Body type	Casting	Extrusion	Casting	Extrusion	Extrusion
Weight (kg)	0,58	1,28	0,90	1,04	1,26

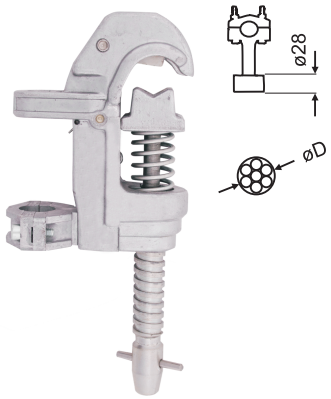
Phase clamps - for round conductors

SR EN 61230 CST

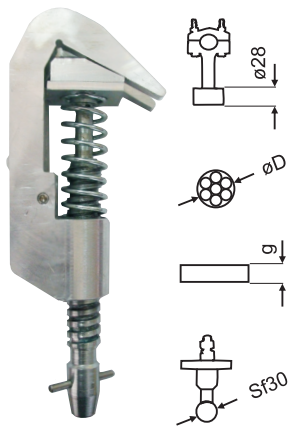
General characteristics for phase clamps	
Nominal short-circuiting current for t = 1 s I_{sc} (kA)	30
Nominal peak currrent for t = 0,02 s I_{sd} (kA)	75
Testing short-circuiting current for t = 1 s I_{test} (kA)	34,5
Testing peak current for t = 0,02 s I_{peak} (kA)	86,25
Peak factor (SR EN 61230)	2,5



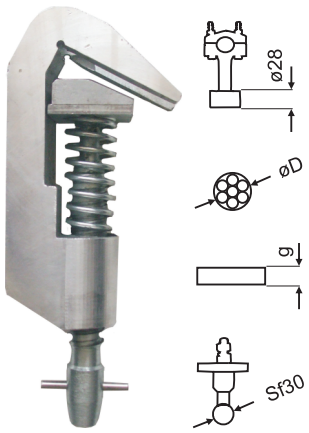
CLASSIC REDUCED PHASE CLAMP (Cr)



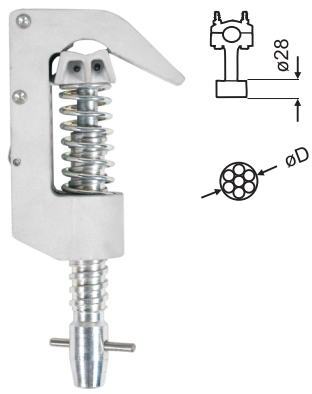
AUTOMATIC PHASE CLAMP (CA)



UNIVERSAL AUTOMATIC PHASE CLAMP (CAU)



UNIVERSAL CLASSIC PHASE CLAMP (CCU)



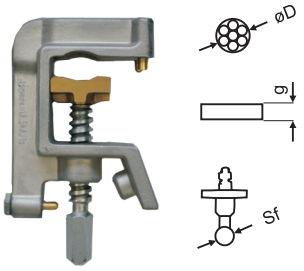
AUTOMATIC EXTRUDED PHASE CLAMP (CAEr)

Phase clamp type	Classic reduced clamp (Cr)	Universal classic clamp (CCU)	Automatic clamp (CA)	Automatic extruded clamp (CAEr)	Universal automatic clamp (CAU)
Code	P 2179-0-00	P 2393-0-00	P 236-0-00	P 2256-0-00	P 2380-0-00
Dimensions (mm)	90 x 160 x 50	95 x 220 x 55	120 x 200 x 62	90 x 180 x 56	95 x 220 x 55
Diameter of conductor on which can be applied the phase clamp øD (mm)	17 ÷ 32	9 ÷ 32	18 ÷ 32	17 ÷ 32	9 ÷ 32
Earthing cable length l_p (m)	8,5	10	8,5	8,5	10
Body type	Extrusion	Extrusion	Casting	Extrusion	Extrusion
Weight (kg)	0,96	1,28	1,10	0,94	1,26

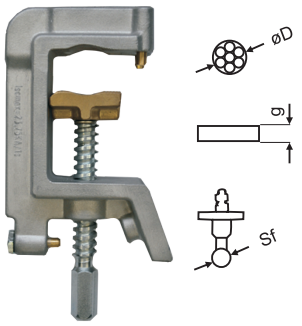
Universal phase clamps

SR EN 61230

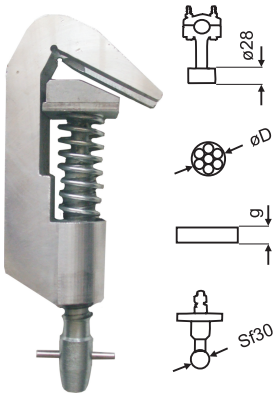
General characteristics	CCRU	CCNU	CCU / CAU
Earthing cable section S_p (mm^2)	50	95	120
Nominal short-circuiting current for t = 1 s I_{sc} (kA)	12,5	23,75	30
Nominal peak currrent for t = 0,02 s I_{sd} (kA)	31,25	59,38	75
Testing short-circuiting current for t = 1 s I_{test} (kA)	14,38	27,31	34,5
Testing peak current for t = 0,02 s I_{peak} (kA)	35,94	68,3	86,25
Peak factor (SR EN 61230)		2,5	



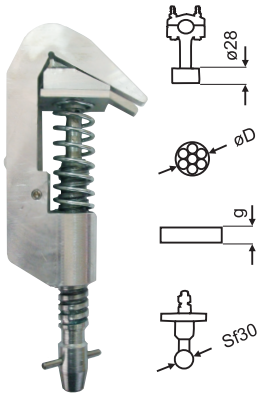
UNIVERSAL CLASSIC
REDUCED PHASE CLAMP (CCRU)



UNIVERSAL CLASSIC
NORMAL PHASE CLAMP (CCNU)



UNIVERSAL CLASSIC
PHASE CLAMP (CCU)



UNIVERSAL AUTOMATIC
PHASE CLAMP (CAU)

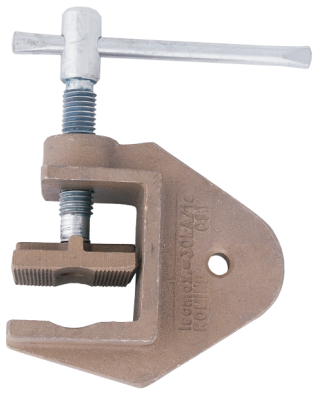
Phase clamp type	Universal classic reduced phase clamp (CCRU)	Universal classic normal phase clamp (CCNU)	Universal classic phase clamp (CCU)	Universal automatic phase clamp (CAU)
Code	P 2402-0-00	P 2403-0-00	P 2393-0-00	P 2380-0-00
Dimensions (mm)	77 x 34 x 148	82 x 40 x 187	95 x 220 x 55	95 x 220 x 55
Short-circuiting cables length - three phased earthing device l_f (m)	max. 2,5	max. 2,5	max. 1,5	max. 1,5
Earthing cable lenght - single phased earthing device / three phased earthing device l_p (m)	max. 10 / max. 7,5	max. 10 / max. 7,5	max. 10 / max. 8,5	max. 10 / max. 8,5
Thickness of rectangular conductor on which can be mounted the phase clamp g (mm)	max. 30	max. 45	max. 40	max. 37
Diameter of coupling piece spherical type ø (mm)	20 / 25	20 / 25	30	30
Diameter of conductor on which can be applied the phase clamp øD (mm)	4 ÷ 30	4 ÷ 36	9 ÷ 32	9 ÷ 32
Body type	Casting	Casting	Extrusion	Extrusion
Weight (kg)	0,29	0,42	1,28	1,26

Earthing clamps

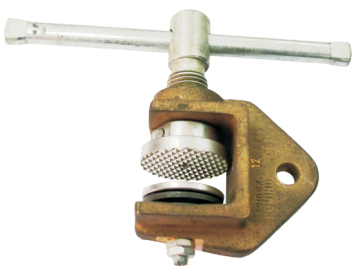
SR EN 61230



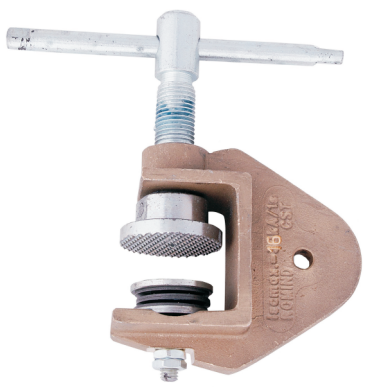
CLASSIC EARTHING CLAMP
CLPR-16



CLASSIC EARTHING CLAMP
CLPN-30



EARTHING CLAMP
WITH SCRAPPING DIE - 12 kA/s



EARTHING CLAMP
WITH SCRAPPING DIE - 16 kA/s

Earthing clamp type	Classic type		Clamp with scrapping die	
	Reduced type CLPR-16	Normal type CLPN-30	Reduced type P 2366-0-00	Normal type P 2277-0-00
Nominal short-circuiting current for t = 1 s I_{sc} (kA)	16	30	12	16
Nominal peak currrent for t = 0,02 s I_{sd} (kA)	40	75	30	40
Testing short-circuiting current for t = 1 s I_{test} (kA)	18,4	34,5	13,8	18,4
Testing peak current for t = 0,02 s I_{peak} (kA)	46	86,25	34,5	46
Peak factor (SR EN 61230)	2,5			
Dimensions (mm)	70 x 83 x 40	105 x 127 x 50	70 x 95 x 40	105 x 145 x 50
Maximum thickness of bus bar on which it can be applied (mm)	20	30	11	17
Short-circuiting and earthing cable length l_p (m)	max. 17,5	max. 17,5	max. 17,5	max. 17,5
Body material	Cooper-aluminum alloy			
Body type	Casting			
Weight (kg)	0,48	1,09	0,6	1,25

Pole anchoring device, with pliers, for Irmut and Krause ladders

Code: P 2414-0-00 for Irmut ladders
P 2416-0-00 for Krause ladders

The pole anchoring device, with pliers, for Irmut and Krause ladders is a component of the equipment against falling from height, designed for anchoring and fixing the ladders Krause and Irmut types, on poles with various shapes and sections.
This device prevents the overturning or sliding of the ladder. The device can be used also for protecting against falling from height of the worker that climbs / descends or works on the ladder.

The pole anchoring device, with pliers, for Irmut and Krause ladders can be used on round poles with diameters between 150 ÷ 450 mm and on rectangular poles with sides of maximum 450x335 mm.

By operating from the ground the pliers of the anchoring device, the ladder can be also mounted on the electrical networks poles, provided with over crossed cables belonging to other utilities (TV cable, optic fibers, telephone etc).

The pole anchoring device, with pliers, for Irmut and Krause ladders, with fall arrest system, is composed of:
1. Anchoring system of the ladder on pole
2. Flexible anchoring support with fall arrester and energy absorber
3. Tensioning and blocking system of the flexible anchoring support

The pole anchoring device, with pliers, is **detachable -** can be easily mounted / dismounted at the top extremity of the ladder and secured through its own tensioning and blocking system from the first step of the ladder.

The flexible anchoring support with fall arrester and energy absorber is coupled through a snap hook at the operating rope of the pliers.

The tensioning and blocking system of the flexible anchoring support is composed of an adjustable strap, a snap hook and a blocking device. The system is designed to maintain tensioned the flexible anchoring support in order to be avoided the accidental opening of the system`s pliers.

ATENTTION!
The pole anchoring device, with pliers, for Irmut and Krause ladders, with fall arrest system, can be used by a single person.

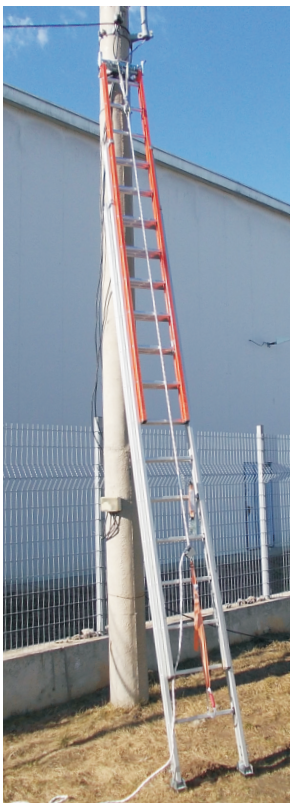
The user must be equipped with a personal protective equipment according the regulations in force.
The maximum load of the device (user weight + accessories): 150 kg.

The entire equipment is delivered in an impermeable textile bag.

P2414-0-00



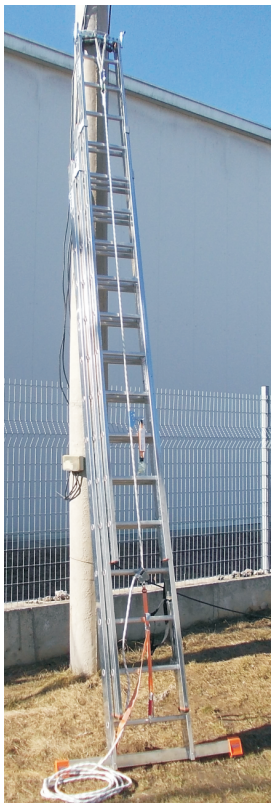




P2416-0-00







Anchoring hooks

EN 795

Code: CA 150
CA 152 A
CA 152 B

The anchoring hooks are components of protective systems against falling from height.
These hooks can be applied on consoles of the overhead lines poles. A flexible anchoring support with fall arrester should be connected at the eyelet of the anchoring hook. The hanging of this assembly to the console of the pole creates an adequate protective system for workers climbed on the pole.

The anchoring hooks are made of galvanized steel. The anchoring hooks are provided at the inferior part with a hole that allows the mounting of a snap hook attached at the flexible anchoring support. The hooks can be applied to the console of the pole using a telescopic insulating stick.

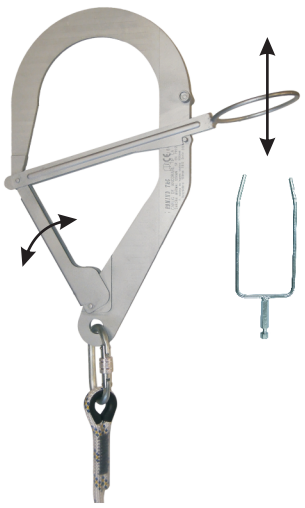
The anchoring hooks CA 150 and CA 152 B hooks have a lever in order to prevent an involuntary detachment of the system from the pole.

The hook CA 150 is delivered with a hexagonal piece for fixing it in the coupling system of the insulating telescopic stick. The lever is provided with a ring that allows the maneuvering of the lever at both applying and detaching the hook from the metallic console of the pole.

The hooks CA 152 A and CA 152 B have a hexagonal piece for fixing in the coupling system of the insulating telescopic stick.
The CA 152 A and CA 152 B remain fixed as anchoring points along with the insulating telescopic stick, until their detachment from the pole.
On these types of hooks it is painted a red safety area for anchoring.

When using the CA 152 A hook, in order to assure the insulating stick against accidental lifting of the hook from the working position, the hook is provided with a strap for tying the stick on the pole.

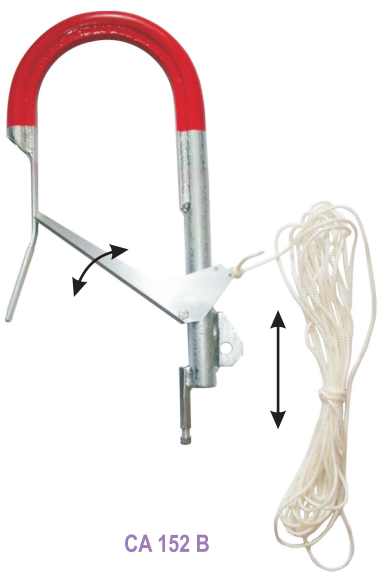
When using the CA 152 B hook, in order to allow the detachment of the hook from the console, the opening of the lever is made by pulling its cord from the ground.



CA 150



CA 152 A



CA 152 B

Code	CA 150	CA 152 A	CA 152 B
Maximum load (daN)	120	120	120
Mimimum static breaking force (daN)	1000	1000	1000
Hook opening (mm)	150 ± 3	152 ± 3	152 ± 3
Dimensions (mm)	400 x 460	263 x 473	263 x 473
Weight (kg)	2	2	2,1

Anchoring stick

SR EN 61230 SR EN 795 CE



The anchoring stick is a component of the protective equipment against falls from height, used in the fall arrest system, in order to create an anchoring point of the flexible anchoring support on the metallic consoles of the poles and on the lattices of the metallic poles of HV overhead lines.
The anchoring stick can be used only by one person, whose PPE must contain a fall arrest system with a guided type fall arrester, specified in SR EN 353-2:2003
In order to properly anchor the user, the anchoring point created with this anchoring stick must always be above the operator`s working position.

The equipment is composed of an insulating stick from 2 detachable modules, the upper module having in the end permanently fixed a metallic anchoring hook, CA 152A.

The snap hook that connects the stick with the anchoring support, the flexible anchoring support and the guided type fall arrest system (with energy absorber and connector) are nor included in the device but can be ordered separately.

Technical characteristics	
Maximum operating load (operator weight + accessories) (daN)	120
Minimum static breaking force of the hook (daN)	1000
Hook opening (mm)	152
Hook dimensions (mm)	263 x 473
Insulating stick dimensions	Length 3500 mm / Diameter Ø42mm
Assembly dimensions (stick + hook) (mm)	263 x 3917
Weight (stick + hook) (kg)	4,4



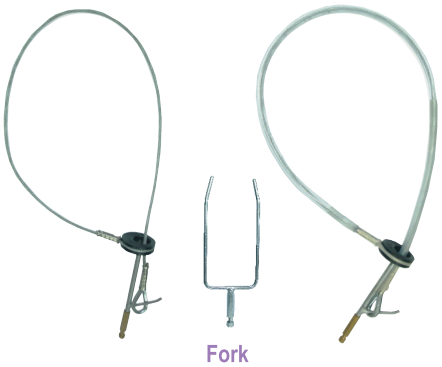
Anchoring device with cable loop

SR EN 795

Code: P 2269-0-00

The anchoring device with cable loop is a component of the protective systems against falling from height. The device can be used on poles without consoles of electrical overhead lines.
A safety rope with fall arrester should be fixed to the eyelet of the cable loop. By hanging this assembly on the top of the pole, it is created an adequate protective system for workers climbed on the pole.
One of the cable loop ends is fixed to the circumference of the ring; the other end has an eyelet for attaching the flexible anchoring support (using a snap hook).
The anchoring device with cable loop can be applied on the top of the pole using a telescopic insulating stick, telescopic type, with length of 9 m, code PTU-AS-400-6c (that is not included in the device).
The anchoring device with cable loop can remain fixed in the pole during the operation or can be detached, using a fork for hooks and anchoring devices (delivered at request).

The anchoring device with cable loop contains following components:
- Cable loop made of steel, simple, or protected by a plastic sleeve;
- Hexagonal adaptor for fixing the device in the telescopic insulating stick.



Code	P 2269-0-00	P 2269-0-00L	P 2269-0-00P	P 2269-0-00PL
Loop type	steel cable	steel cable	insulated cable	insulated cable
Loop length (mm)	1400	1800	1400	1800
Maximum diameter of the pole in the anchoring area (mm)	360	500	360	500
Maximum load (daN)	120	120	120	120
Minimum static breaking force of the loop (daN)	1000	1000	1000	1000
Weight (kg)	0,535	0,600	0,675	0,825

Anchoring device for poles with concrete console

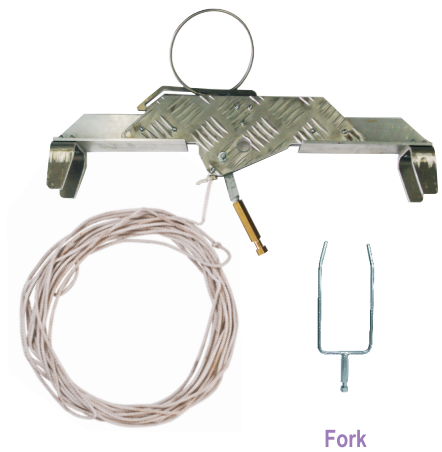
SR EN 795

Model: DA 400

The DA 400 anchoring device for poles with concrete console is a component of the protective systems against falling from height. This device is recommended be applied on the poles with concrete console of the electrical overhead lines. By attaching at the anchoring device a flexible anchoring support and by mounting the device on the console of the pole, it is created an anchoring point in order to protect the operators working at height.

The anchoring device is applied on the concrete console using a telescopic insulating stick, with length of 9 meters, code PTU-AS-400-6c (which it is not included in the device). The anchoring device - having the anchoring beam positioned vertically - is lifted and introduced through the alveole of the concrete console. Then, by pulling the cord and setting the anchoring beam in horizontal position, it is positioned the assembly on the superior part of the console. Thus it is created an anchoring point from which it is fixed the flexible anchoring device. In order to remove the anchoring device from the console, the insulating stick is lifted so that the beam reaches the vertically position, allowing the descent of the entire anchoring system through the alveole.

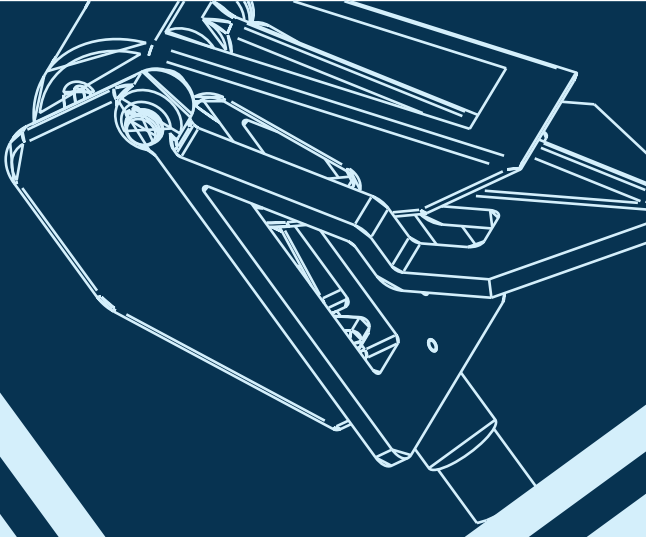
The anchoring device DA400 can remain fixed in the pole during the operation or can be detached, using a fork for hooks and anchoring devices (delivered at request).
The DA 400 anchoring device contains the following components:
- Anchoring beam with stabilizer sole, with limiters at ends, a dismantling ring on top and a central hole that allows the mounting of the snap hook on the flexible anchoring support (not included in the system);
- Foldable hexagonal piece, for fixing the device on top of the telescopic insulating stick;
- Operating cord, for positioning the anchoring beam (horizontally / vertically).

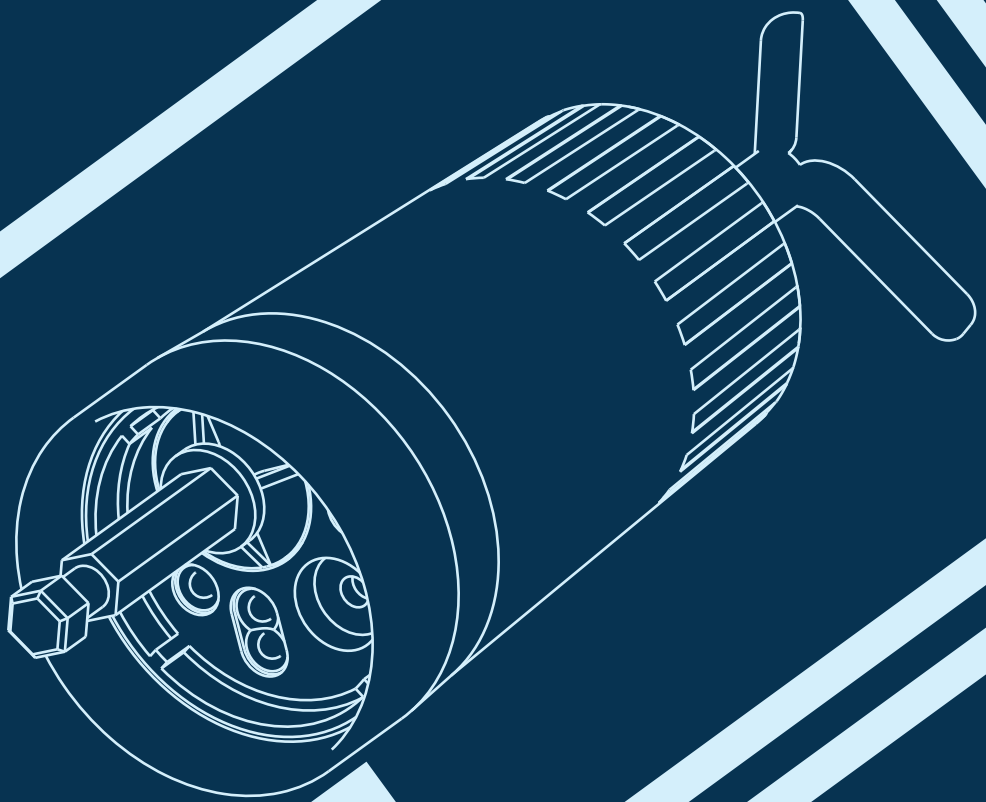


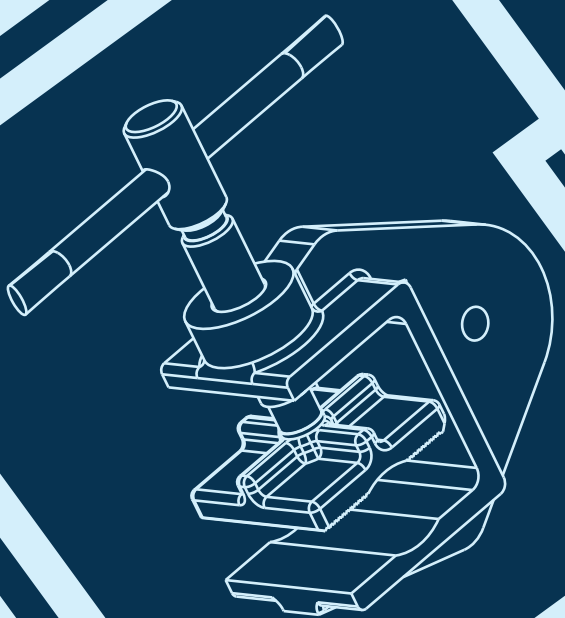


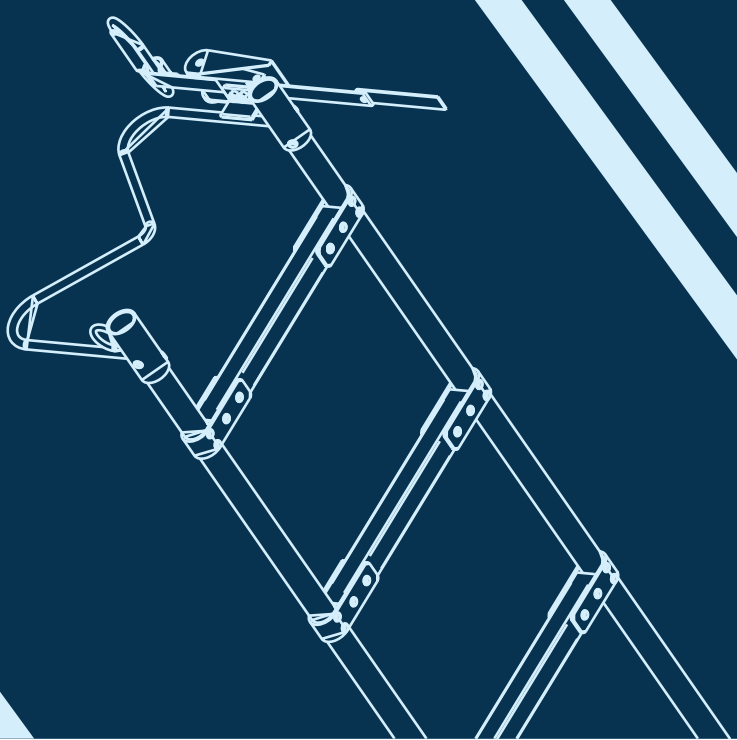
Technical characteristics	
Maximum load (daN)	120
Mimimum static breaking force (daN)	1000
Distance between the lateral limiters (mm)	400
Dimensions (mm)	460 x 218 x 56
Weight (kg)	0,990

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