



GENERAL CATALOG

June/09





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INTRODUCTION

Safety Procedures with Hot Line Tools

The Hot Line Tools described in this Catalog must be handled, installed and stored only by trained personnel, who shall also be acquainted with the operation procedures as well as follow all the applicable safety standards.

The information available herein and any other information found in instruction manuals, shall under no circumstances, replace the recommended training and all necessary experience related to the applicable safety procedures. Also, they do not describe all details and situations, nor do they describe all possible existing tools installation, operation and maintenance situations.

For additional information or any special request, not contained in this Catalog, RITZ shall be contacted to assist in the development of the most viable solution.

RITZ is continuously improving its products and services. Therefore, the information presented in this Catalog can be modified without previous notice, always having in mind the total safety of the linemen involved in the electrical system maintenance activities.

Hot Line Work Methods

In order to avoid or minimize the need to shutdown electrical networks for maintenance services, it was mandatory to develop safety and practical techniques that would allow the continuous electrical power supply, reducing the risks and minimizing the costs for the electrical generation, transmission and distribution companies.

The most diversified works to be performed on the several voltage levels and on the several electrical systems, such as transmission lines, substations and distribution networks have demanded the development of appropriate tools, as well as different work methods, according to each application, based on each specific situation for the works to be performed taking into consideration the specific criteria adopted by each company.

There are three different hot line working methods when working on electrical systems, which can be applied on the main voltage levels, as long as the team is properly trained and has all the necessary tools and personal and collective protection equipment.

First Method - HOT STICK METHOD

This was the first method to be developed. The lineman performs the works using auxiliary tools attached to the tip of insulating hot sticks. This method allows the work to be performed at any voltage level.

For voltages up to 69 kV, as the distance between phases is smaller, the conductors are moved from their original position using insulating poles, snatch blocks etc.

All Hot Line Tools were developed and designed to ease the work of the linemen when working on the structures, with absolute safety.

When working using the Hot Stick Method, the lineman must rigorously observe and respect the minimum phase-to-ground and phase-to-phase safety distances, according to the table below.

Rated Voltage (kV)	Phase-to-Ground Distance (m)	Phase-to-Phase Distance (m)
0.05 to 1.0	*	*
1.1 to 15.0	0.64	0.66
15.1 to 36.0	0.72	0.77
36.1 to 46.0	0.77	0.85
46.1 to 72.5	0.90	1.05
72.6 to 121	0.95	1.29
138 to 145	1.09	1.50
161 to 169	1.22	1.71
230 to 242	1.59	2.27
345 to 362	2.59	3.80
500 to 550	3.42	5.50
765 to 800	4.53	7.91

** Contact is not allowed*

The safety distances listed above are according to the USA Standard, OSHA - Occupational Safety and Health Administration, published in 1994.

Second Method - RUBBER GLOVE METHOD

This method consists in protecting the lineman by using insulating gloves and sleeves, working with auxiliary equipment such as platforms, scaffolds, ladders or insulated aerial devices, allowing the work to be performed directly using protected hands.

The entire working zone is also protected with insulating blankets and, while performing the works, the minimum necessary area for the work remains uncovered. Thus, the possibility for the lineman or the components used for the work performance (conductors, tools etc) to touch two points with different potentials is eliminated, preventing a short-circuit.

This method shall be only used for distribution networks and substations of voltage class up to 35 kV.

Third Method - BAREHAND METHOD

This method aims at easing the maintenance process, specially when working on high voltage transmission lines, where the safety distances are larger and on 60 kV substations and above.

The barehand method is based on Faraday's Law, which consists in having the lineman in direct contact with the energized conductor.

In order to shield from the electromagnetic field effects, linemen use a conductive suit made of special material. Only the face of the lineman remains uncovered.

When close to the energized conductor, the lineman connects the suit to the conductor in order to be at the same potential of the system.

To ensure a complete protective insulation and to change the ground potential to the same potential as that of the energized network potential, RITZ offers several insulating equipment suitable for each type of installation, such as: Ladders, Chairs, Scaffolds, Crane Extensions, Aerial Devices and others.

Before using each of the mentioned equipment, it is necessary to perform the applied voltage test, deriving the power from the energized conductor and the current monitoring provided by a micro ammeter - Micro-Tester (RC402-0288/B) installed between the bottom of the equipment and the ground point, ensuring that the insulating characteristics are preserved, according to the leakage current values established by the applicable standard. It is also recommended to use the Hot Stick Tester (RITZ Tester), to field test equipment such as Ladders, Scaffolds, Sticks etc. This is an important test procedure to ensure the insulating conditions of the equipment before being used by the linemen.

Similar to the Hot Stick Method, the Bare-Hand Method requires minimum phase-to-phase and phase-to-ground safety distances to be strictly observed, specially in substation maintenance, where such safety distances are reduced.



RITZGLAS® Insulating Pole

What is the origin of the *RITZGLAS®* pole?

The hot line maintenance procedure was recognized to be used for the first time in 1913, when a wooden hot stick was used for opening a short-circuit protection switch that was energized.

In 1918, Tips Tools Company, located in Taylorville, IL - USA started the manufacturing of hot line clamps, grounding clamps and hot sticks.

The first tools were very rudimentary, normally hand- made and using treated wood as raw material.

In 1937, Tips Tools Company was acquired by the A.B. Chance Company and the plant was transferred to Centralia, MO - USA.

Since then, the hot line maintenance concept has been adopted step-by-step by the companies:

1937 - Works performed up to 34.5 kV

1948 - Insulator replacement at 287 kV

1954 - Insulator replacement at 330 kV

1957 - Insulator replacement at 500 kV

1964 - Works performed at 735 kV

All the works described above were performed with wooden hot sticks.

As the voltage levels were increasing with the elapse of time and with the need of continuous maintenance work to be performed, the wooden tools were getting heavier and harder to be handled. Then, in 1950, A.B. Chance company started to research an alternative material, lighter and with high mechanical and electrical reliability. In 1959, the company came up with a new product, the *EPOXIGLAS*® pole, which at the beginning, was used for maintenance works above 500 kV.

In 1973, the association that was established by the A.B. Chance company and Ritz Com. Ind. Ltda company, based in Belo Horizonte city, Minas Gerais state, Brasil, originated a new company named RITZ-CHANCE.

During the process of technology transfer, several tests were performed on RITZ poles, using A.B. Chance laboratories in the USA, as well as the High Voltage laboratory of the Federal University of Minas Gerais (UFMG). The product was successfully approved and complied with the characteristics and features found on the poles manufactured in the USA. At that time, they were marked with the *EPOXIGLAS*® brand.

In 1989, A.B. Chance sold its participation to RITZ when Ritz do Brasil S.A. became the successor of RITZ-CHANCE, ensuring the supply of equipment and tools with the same quality and reliability of A.B Chance products.

From that time on, the *EPOXIGLAS*® poles manufactured in Brasil became known as *RITZGLAS*®.

Ritz do Brasil S.A. company is proud of its Equipment and Tools and very proud for contributing with the continuous worldwide energy supply, being always aware of the importance of preserving and ensuring the safety conditions to each professional involved in such activity.

The *RITZGLAS*® insulating pole is an important part and it is used in the majority of Hot Line Tools manufactured by RITZ. The pole is provided with a polyurethane foam core that avoids humidity and dust absorption and condensation. Its external construction is made of highly treated fiberglass and disposed both at longitudinal and circumferential directions, also impregnated with an epoxy resin of special constitution, ensuring a high dielectric strength as well as high mechanical resistance, being both features essential for Hot Line Tools.

The orange color adopted for the *RITZGLAS*® poles is appropriate to ensure a high visibility in the working areas and also safety characteristics for the linemen.

The poles are submitted to several tests at RITZ laboratory according to the ASTM F-711 and IEC 60855 standards and are approved to be only used after the compliance with all the performed test. The Hot Sticks are finally assembled and then tested in accordance with IEC 60832 and NBR 11854 standards.

Glossary

For a better understanding of the definitions, measurement units, symbols and abbreviations adopted herein, a summarized description of the main terminology is presented below:

Definitions

- Extra-strength laminated aluminum:

Aluminum plates used to manufacture some yokes, in order to make them lighter and resistant. Such yokes are typical due to their plain plates construction.

- Jaws Opening Capacity:

They are the limit measurements (minimum and maximum) adopted for the grounding clamps and some hot sticks, compatible with the cables and conductors sizes.

- Rated Current Capacity:

Electrical conductor current capability during a determined period of time. In this Catalog, it refers to the capacity of cables used for temporary grounding purposes and hot line jumpers.

- Work Load Capacity:

Maximum work load value established for the Hot Line Tools (defined in daN).

The values for the referred loads are specified in this Catalog.

- Balanced Maximum Load:

Characterized by the traction forces or the load weights that are uniformly distributed over the sustaining equipment.

- Unbalanced Maximum Load:

Characterized by the non-uniform distribution of the forces over the sustaining equipment, thus reducing its working rated capacity.

- Shear:

Generated when a piece is subject to two forces in convergent opposite directions and perpendicularly to the axis, so that it tends to divide it in two parts.

- Catenary:

It is the curve shape that is generated by a long body (for example, a cable) when it is supported at two different points (a pole, a tower etc).

- Working Length:

Nominal distance between the tool coupling points (energized side and grounded side).

- Insulating Length:

Safety distance limit for each hot line tool. Normally this length is determined by the distance between the contact point with the energized area and the lineman's holding point (or the grounded part).

- Total Length:

Distance between the ends of the Hot Line Tools.

- Phase-to-phase distance:

Minimum distance between two phases with different potentials in a single circuit.

- Phase-to-ground distance:

Minimum distance between the energized part and the de-energized part on any electrical system.

- Tracking Effect:

Irreversible degradation effect caused by path formations that are initiated and developed on the surface of insulating materials, allowing the electrical current to be conducted through, even when it is dry.

- Structures:

These are constructions such as: towers, wooden, iron or concrete poles for supporting the electrical cables, in order to transport electricity to long distances.

- Bending:

Generated when external forces are applied to a body perpendicularly to its axis, which is supported at two points.

- Faraday's Principle:

Developed by Michael Faraday (1791-1867), the Faraday's Principle says that inside a conductive closed surface, the electrical field is null. With the objective to protective cover and protect the lineman against the effect of an electrical field when in contact with the potential, a special conductive suit (made of *NOMEX*® cloth and stainless steel filaments) and conductive boots must be used.

- Electrical Works:

All the maintenance work performed on electrical systems with the goal of assuring the continuous supply of electricity, using specific procedures and trained personnel.

- To handle:

Perform/use manually the Hot Line Tools and other instruments.

- Jaws:

Movable part of the grounding clamps and insulating hot sticks with the purpose of grabbing the conductor or other coupling systems. Normally these jaws are triggered by the tightening screws rotation (grounding clamps) or the hot stick itself.

- To operate:

Use the hot line equipment and other instruments for energized systems works, according to the procedures and characteristics of each product.

- Low Voltage Networks (LV):

Circuits with voltage greater than 50 V and equal or lower than 1 kV, between phases or between phase and ground.

- Medium Voltage Networks (MV):

Energized structures with voltages from 1 kV up to 60 kV, that normally distribute the energy received by the transmission systems to small, medium and big end users.

- High Voltage Networks (HV):

Energized structures with voltages from 60 kV up to 345 kV, responsible for the transportation of the electrical energy from the production centers to the end users.

- Extra High Voltage Networks (EHV):

Energized structures with voltages above 345 kV, also responsible for the electrical energy transportation from the production centers to the end users, normally to longer distances.

- Dielectric Strength:

Corresponds to the maximum electrical field value that can be supported by an insulating tool before conducting.

This dielectric strength varies from one tool to another, e.g.: concerning the air, its dielectric strength is around 3.0 kV/mm. Hence, when an electrical field surpasses this value, it becomes conductive and loses its insulating characteristics.

- Rated Voltage:

The maximum value of admissible electrical voltage to work with any insulated equipment.

- Traction:

Application of external forces acting perpendicularly to the transverse section, which have opposite directions, tending to stretch the element.

- Torsion:

Generated when a force is applied to a normally long body extremity which tends to deform it.

- Torque:

Vectorial parameter defined as a fraction of the force applied to an object, which is effectively used to make the object turn around an axis or a central point, known as pivot point. e.g. for grounding clamps the torque is applied to the tightening screws, which reference values are defined in this Catalog and shown in daN.m.

- Thermal treatment:

Process by which the parts and components made of cast aluminum are subject to treatment at high temperatures, in order to increase their mechanical resistance.

- Using Tools in line:

When two or more tools are used together, with the purpose of increasing the insulation when performing maintenance works. E.g. using a nylon strap hoist coupled to an insulating stick for hoists and rope blocks.

Measurement Units

- Ampere (A):

Electrical current measurement unit that, with an electromotive force of 1-Volt, flows through a circuit of

1-Ohm of resistance.

- AWG:

American Wire Gauge, North American designation used for wiring and electrical cables size.

In Brazil the metric system is adopted (mm^2).

- CA:

Brazilian Identification unit for aluminum bare cables sections without steel core (equivalent to ASC).

- CAA:

Brazilian identification unit adopted for bare cables sections with steel core (equivalent to ACSR).

- Kcmil ACSR (circular mil):

Unit adopted for the transverse section of wires or cables. It is the area of a circle with diameter of one-thousandth of an inch.

- daN (deca Newtons):

Unit adopted by ABNT (Brazilian Technical Standards Association) for the forces applied to Hot Line Tools. (according to ABNT, 1 daN is defined as 1 kgF or kilogram-force).

- Kilovolt (kV):

Electrical voltage unit equivalent to 1×10^3 V.

- Volt (V):

Electrical voltage unit, potential difference or electromotive force. Correspondent to the voltage that, applied to an 1-Ohm resistance, produces a current of 1 A.

Symbols / Abbreviations

- Ø (diameter):

Geometrical figure with the same average points as those of the parallel lines, used to designate the size of a round tool.

- ®:

company's trade-mark of a product or process.

- ATR:

Abbreviation used by RITZ when referring to temporary grounding equipment.

- FLV:

Abbreviation used by RITZ when referring to Hot Line Tools.

- BIL (Basic Insulation Level):

It is the value (in kV) that an equipment shall support during the application of a voltage impulse, during a determined time, however with no modification of its insulating characteristics.

- RITZGLAS®:

RITZ trademark for the insulating fiberglass poles, which are essential components for Hot Line Tools and equipment.



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Load Lifting Tools and Accessories

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QUALITY AND SAFETY
FOR ELECTRICAL SYSTEMS

Group A

Load Lifting Tools and Accessories

Manual Hoists

Manual Hoists are used in various construction and maintenance works of electrical systems. They have locking devices and gradual load control, allowing the use in two different positions, to the left or to the right of the load application axis.

Warning:

These hoists shall not be used as insulating tools to work on energized lines. For that purpose, the nylon straps shall be used with the insulating stick for hoists and rope blocks, according to the recommended safety distances.

Hoists with Nylon Straps

01 and 02-ton Hoists are offered with two different operating handle options: one with plastic terminal for manual work with the Rubber Glove Method, and the other one with a steel butt-swivel, for operation with the Hot Stick Method, using an insulating hot stick attached to the butt-swivel. The nylon straps can be acquired separately as replacement parts.



Handle with plastic cap for manual operation



Handle with butt-swivel for Hot Stick operation



RC309-0323



RC309-0467



RC312-0000

HOISTS WITH NYLON STRAP - ONE TON

Cat. No.	Description	Approx. Weight (kg)
RC309-0323	Hoist with nylon strap and regular handle, work load up to 1 ton	6.30
RC309-0467	Hoist with nylon strap and hot stick handle, work load up to 1 ton	7.20
RE309-0059	Nylon strap with hook and handle for hoists of 1 ton	1.30

HOISTS WITH NYLON STRAP - TWO TONS

Cat. No.	Description	Approx. Weight (kg)
RC312-0000	Hoist with nylon strap and regular handle, work load up to 2 tons	7.80
RC309-0468	Hoist with nylon strap and hot stick handle, work load up to 2 tons	8.80
RE309-0262	Nylon Strap (without the steel hook) for hoists of 2 tons	0.30

Chain Ratchet Hoists

Light weight and practical, providing features that allow a higher productivity when working in confined areas. The handle system allows operation in all load positions.

In order to ease the load coupling and alignment, the hoist is provided with forged steel hooks with safety lock system and 360° operation.

For safety purposes, the chains are released for freewheel operation only under no-load condition.

The hoists have two control levers: the first one to coordinate the movement direction and the second one to activate the safety lock system.

The control levers are easy to operate, even with the use of rubber gloves.



750E

CHAIN RATCHET HOISTS		
Cat. No.	Nominal Work Load (ton)	Approx. Weight (kg)
750E	0.75	7.30
1500E	1.5	11.50
3000E	3.0	17.00



3000E



RC309-0451



RC309-0452

Convertible Strap Hoists

Light-weight, resistant and versatile. These two hoist models were designed with special features for construction and maintenance works on de-energized or energized systems with the Hot Stick and Bare Hand Methods.

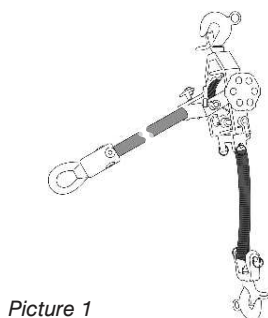
CONVERTIBLE STRAP HOISTS 0.75 to 1.5 ton		
Cat. No.	Description	Approx. Weight (kg)
RC309-0451	Convertible Strap Hoist, handle with plastic cap	5.30
RC309-0452	Convertible Strap Hoist, handle with butt-swivel	5.90
RE309-0473	Nylon Strap for replacement of above hoist models	0.25

Load Conversion Feature:

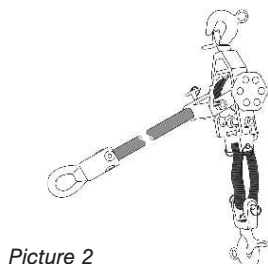
These models allow the work load conversion to 0.75 ton or 1.5 ton, simply by modifying the nylon straps arrangements, as follows:

To use a load capacity of 0.75 ton, attach the load hook sheave to the loop at the loose end of the strap (Pic. 1).

To use a load capacity of 1.5 ton, attach the load hook sheave to the middle of the strap when folded with the strap end fixed to the hoist body (Pic. 2).



Picture 1



Picture 2

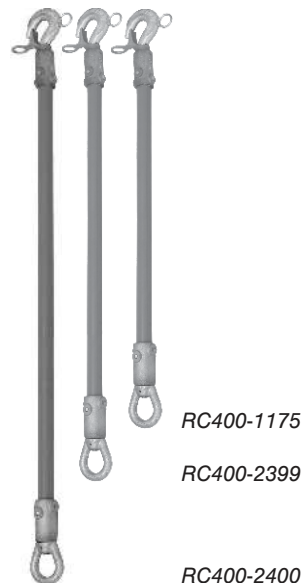
Distances between hooks:	Rated at 0.75 ton	Rated at 1.5 ton
Minimum	546 mm	546 mm
Maximum	2740 mm	1370 mm

Hoist Link Sticks

The *RITZGLAS*® Link Sticks for Hoists and Rope Blocks allow a safe conversion of a Strap Hoist or a Rope Block into an insulating equipment, hence allowing its use on energized systems.

The Hoist Link Stick has a forged steel safety hook on one end and a butt-swivel on the other. The butt-swivel can be coupled to the Hoist hook or Rope Block to ensure insulation from the structure grounded parts.

HOIST LINK STICKS				
Cat. No.	Ø (mm)	Insulating Length (m)	Rated Work Load (daN)	Approx. Weight (kg)
RC400-1175	32	0,38	2000	2.00
RC400-2399	32	0,46	2000	2.05
RC400-2400	32	0,61	2000	2.10



Gin Pole for Load Lifting

Light-weight, mechanically resistant and easy to install tools. The Gin Poles provide excellent gain in safety and productivity to lift equipment and material in general, in construction or maintenance works, for medium voltage overhead networks.

Composed of aluminum parts and insulating *RITZGLAS*® pole.

Important Notes:

- Gins are not designed for applications involving side pull of the hand rope or misaligned lifting load. The pulling force direction shall always be parallel to and aligned with the Gin Pole.



RC400-0090

- For work load calculation it is recommended to consider a 10% loss, due to the friction applied to the pulling ropes. E.g.: using a lifting system with a double rope block, the maximum load to be lifted will be 635 daN (a Snatch Block must be attached to the base of the structure for the hand rope of the Rope Block).

Using a simple lifting system, the maximum load will be 408 daN (the lifted load plus the pulling force and the friction is equal to the gin capacity).



RC400-0315

- RT400-0090 / RT400-0315

Model RC400-0090 can be mounted only on free areas of the pole, for it is not provided with a base extension.

Model RC400-0315 has a base extension, which allows installation close to crossarms. It is attached onto poles with chain tightener.

- RT400-1937 / RT400-1938

These gins are similar to RC400-0090 and RC400-0315, however their coupling to the pole is possible by using a strap type attachment system.



RT400-1937

The D-shape ring attached to the loose end of the strap offers fast and convenient attachment to the pole.

The strap fastening and removal operations are easy and fast, even with the use of insulating rubber gloves and protection gloves.

- RC400-0440

This gin has the same application as those mentioned before, however it is larger and equipped with two wheel tighteners and chain units. It is provided with a top eye casting which can be swiveled to by-pass secondary networks.



C400-0440

Warning:

This head was not designed to rotate under load.

- RC400-0648

This gin was designed to allow lifting equipment at obstructed areas around the pole.

The 100 x 100 mm *RITZGLAS*® square pole is rated at 907 daN of work load.

With the square pole removed, the mounting bracket itself can be used as a gin for hanging transformers and its work load is extended to 1130 daN.



RC400-0648

- RC400-0578

This gin has the advantage of being a multiple tool when used as a lifting system for a variety of equipment and materials, as well as a mast for the auxiliary cross arm.

The attachment to the double T concrete pole is done using two steel galvanized screws with wing-nuts and the existing holes of the pole.

For the round concrete pole the attachment is performed by conventional metallic straps. Due to its length, the mast provides an additional length in the pole top part, facilitating handling of the lifted equipment.

Considering that this tool has 4 different attachment positions, the following work load capacities shall be observed:

Position 1:100 daN (base side)

Position 2:.....150 daN

Position 3:.....200 daN

Position 4:.....250 daN (top side).



RC400-0578


- RT400-2007

Spare gin nylon strap tightener, for replacement on Support Masts (RT400-1937 and RT400-1938).



RT400-2007

GINS FOR LOAD LIFTING

Cat. No.	Description	Rated Work Load (daN)	Ø (mm)	Length (m)		Approx. Weight (kg)
				Insulation	Total	
RC400-0090	With saddle for attachment to the pole using 0.92 m chain	907	76	0.54	0.68	7.10
RC400-0315	With 0.13 m base extension for attachment to the pole using 0.92 m chain	907	76	0.52	0.68	9.80
RC400-0440	With two 0.13 m base extensions for attachment to the pole using 0.92 m chain	907	76	1.06	1.24	16.40
RC400-0578	Attachment to double T concrete pole using two screws with wing-nuts or round concrete pole using conventional metallic straps	100 to 250	64	1.05	1.83	12.20
RC400-0648	Movable with double function	907 / 1130	 100 x 100	-	-	38.00
RT400-1937	With saddle for attachment to the pole using 1.20 m strap	907	76	0.54	0.68	6.95
RT400-1938	With 0.13 m base extension for attachment to the pole using 1.20 m strap	907	76	0.52	0.68	9.30

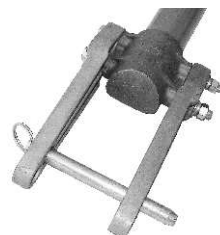
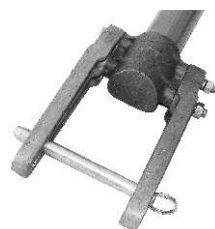
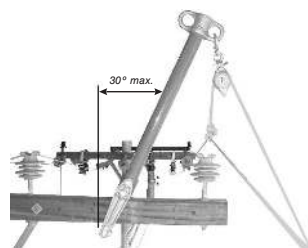
REPLACEMENT PART

Cat. No.	Description	Length (m)	Approx. Weight (kg)
RT400-2007	Gin nylon strap tightener for replacement on Support Masts (RT400-1937 and RT400-1938)	1.20	1.40

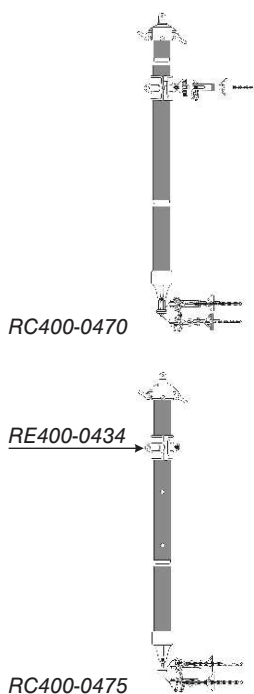
Crossarm Gin

Provided with clevis-type saddle to fit over distribution crossarms, allowing the use of blocks or ropes to lift the conductors from the insulators.

Saddles of RH20 and RT400-0870 can be inverted and have a removable galvanized steel pin for better adjustment on the crossarm.



CROSSARM GINS					
Cat. No.	Description	Crossarm Dimensions (mm)	Rated Work Load (daN) Max. angle 30°	Length (m)	Approx. Weight (kg)
FLV08257-3	Can not be inverted	75 x 75	340	0.71	7.70
RH20	Can be inverted	89 x 114 to 121 x 146	340	0.71	7.70
RT400-0870	Can be inverted	89 x 114 to 121 x 146	227	1.06	8.20



Insulated Gin Pole / Cargo Boom

The Gin Pole for heavy load lifting is built with a *RITZGLAS*® square pole and has three chain tighteners with the respective adapters for attachment to the structures.

The square head on the top of the mast has two eye-hooks to facilitate load fixing. When a pole clamp is used at the top of the pole, it is possible to use a Wire Tong for better stabilization.

The Cargo Boom has a square pole clamp (RE400-0434) installed next to the pole end. This clamp can be adjusted in three different positions for a better load lifting and retention to the structure.

The base saddle allows pivoting the Cargo Boom up to 90°, i.e. from horizontal to vertical position and vice-versa, as well as 180° rotation. The top head is similar to the one of the Gin Pole.

Note:

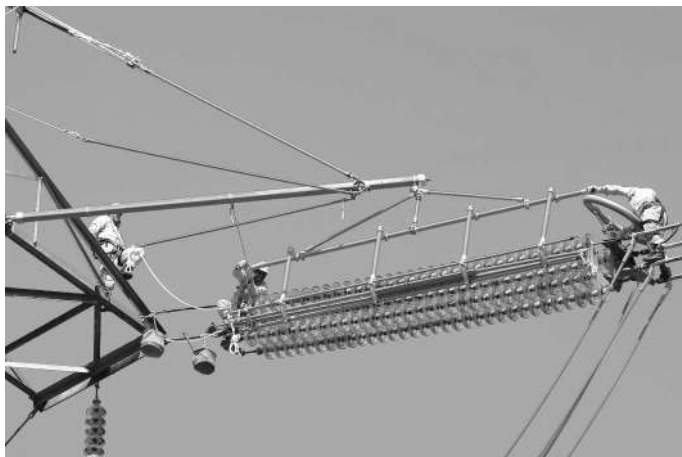
The rated work loads do not include the pulling force.

GIN POLE				
Cat. No.	Ø (mm) □	Insulating Length (m)	Rated Work Load (daN)	Approx. Weight (kg)
RC400-0470	100 x 100	2.28	2268	33.20
RC400-0472	100 x 100	3.50	2268	40.40

CARGO BOOM					
Cat. No.	Ø (mm) □	Insulating Length (m)	Rated Work Load (daN)	Attachment	Approx. Weight (kg)
RC400-0475	100 x 100	4.72	454	Poste	45.60
RC400-0483	100 x 100	4.72	454	Torre	45.00

REPLACEMENT PART		
Cat. No.	Description	Approx. Weight (kg)
RE400-0434	Square pole clamp for Cargo Boom	4.00

Swivel Boom with Mast



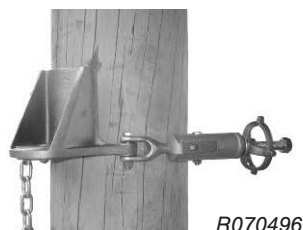
The Swivel Boom with Mast was designed for heavy duty live works on high voltage structures, particularly for removal of insulator strings in conjunction with the Insulator Cradle.

Swivel Booms with Mast RC400-0469 and RH1973/H-10 include two saddles (R070496), for attachment of the boom to poles; one at the top and the other one at the bottom. These saddles have chain tighteners with adapters.

Swivel Booms with Mast RC400-0464, RC400-0465, and RH1973-814 were designed for attachment to towers and use 02 models of hardware: one saddle (RC400-0602) mounted at the bottom which is attached to the tower with two sets of screws and jaws for tower bracket, and an included Triple Fork (FLV01644-1), installed at the top for coupling of the Trolley Poles.

When the mast is not required, the included adapter (FLV18133-1) shall be used for coupling of the boom to the saddle (RC400-0602).

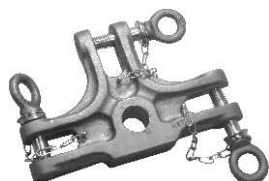
The coupling and the tripod configuration for stabilization of the mast to the metallic structure is done with the use of three Trolley Poles (RH4721-112) and saddles for metallic structure (RM4742-3). These items must be specified separately.



R070496



RC400-0602



FLV01644-1



FLV18133-1



RH4721-112



RC400-0464

For all models, the retention of the Boom to the Mast is made through a Strain Link Stick (RC400-0816) and a hoist (1500E), to be specified separately.

RC400-0464, RC400-0465, and RC400-0469, have a movable pole clamp on the square boom which can be adjusted in three different positions to facilitate the operation of the entire set at different angles of the insulator strings. The boom has an auxiliary hook with two handles on one end for retention or support of additional loads, tools, etc.

SWIVEL BOOM WITH MAST							
Cat. No.	Composition of the Set						
	Ø 76 mm Mast Insulating Length (m)	□ 100 x 100 mm Boom Insulating Length (m)	Rated Work Load (daN)	RC400-0602	FLV01644-1	R070496	Approx. Weight (kg)
RC400-0464*	2.30	4.72	454	01	01	-	58.50
RC400-0465*	2.91	5.33	454	01	01	-	63.90
RC400-0469**	2.91	5.33	454	-	-	02	63.90

* Coupling on metallic structures | ** Coupling on poles

Note:

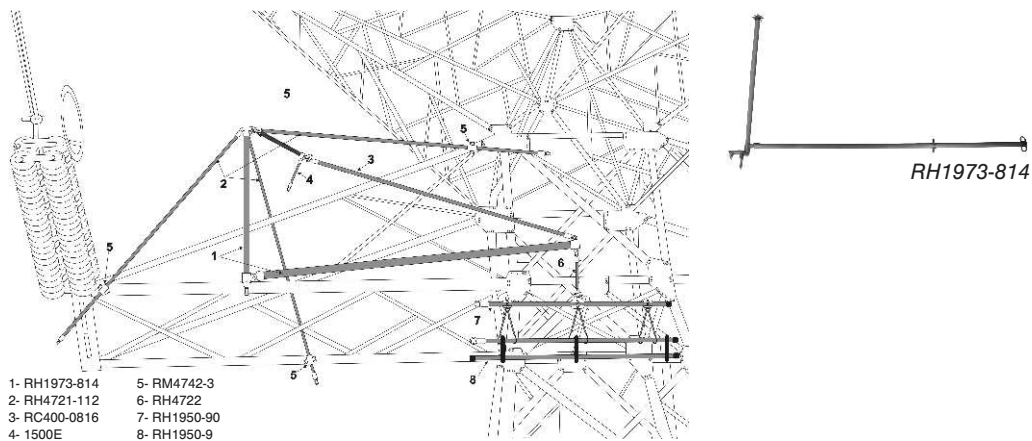
- Insulator Strain String - The Swivel Boom with Mast for displacement of insulator strings is composed of: Tripod, Ø 76 mm Mast, 100 x 100 mm Square Boom, 2-ton Hoist and Strain Link Stick and has a rated work load of 454 daN.

The additional use of Block is required only to support the extension of the square boom used to take the lineman to the potential.

SWIVEL BOOM WITH MAST

Cat. No.	Composition of the Set						
	Ø 76 mm Mast Insulating Length (m)	Ø 76 mm Boom Insulating Length (m)	Rated Work Load (daN)	RC400-0602	FLV01644-1	R070496	Approx. Weight (kg)
RH1973-814*	2.30	4.09	227	01	01	-	38.80
RH1973/H-10**	1.69	2.87	272	-	-	02	27.60

* Coupling on metallic structures | ** Coupling on poles



(items from 2 to 8 to be specified separately)

Note:

- For loads greater than 272 daN, the use of the saddle for metallic structure is suggested (RM4742), with a Ø 76 mm bronze pole clamp (FLV00196-5) plus an identical clamp for back-up, to avoid the slipping of the Trolley Pole, used in the Tripod for support of the Mast.

ACCESSORIES FOR SWIVEL BOOM WITH MAST

Cat. No.	Description	Approx. Weight (kg)
R070496	Saddle	7.00
RC400-0602	Saddle for Tower Bracket	10.30
FLV01644-1	Triple Fork	1.95
FLV00196-5	Ø 76 mm bronze pole clamp	2.62
FLV18133-1	Adapter of the Swivel Boom to the structure	1.00

Ropes



The polypropylene rope has as main features, high mechanical strength, reduced stretching and light weight.

These ropes, like any other rope for works on energized systems must be kept in clean and dry places.

Even considering that the ropes have a good dielectric strength when new, it is not considered insulated for works on energized system, therefore when in contact with energized parts, it is necessary to use an insulated pole in line with the rope.

The ropes are supplied in white color, with polypropylene strands, three-leg-braided, in rolls of 220 m.

ROPES

Cat. No.	Ø (pol.)	Rated Work Load (daN)	Tensile Strength (daN)	Approx. Weight (kg/m)
RM1895-1	1/4"	107	537	0.02
RM1895-2	3/8"	230	1153	0.04
RM1895-3	1/2"	402	2010	0.07
RM1895-4	5/8"	582	2910	0.12
RM1895-5	3/4"	734	3670	0.17

Rope Bag

This bag is used for transportation and storage of ropes used in live line works, to prevent contamination and ease handling.

Made of waterproof canvas, it is provided with metallic rings and tightening rope around the top border for proper closing.

ROPE BAG		
Cat. No.	Description	Approx. Weight (kg)
FLV16364-1	Bag for transportation and storage Ø 300 mm x 400 mm deep	1,90



FLV16364-1

Rope Insulating Stick

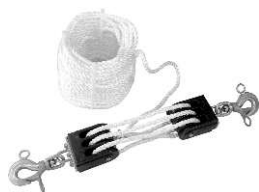
The rope insulating stick is used in line with the polypropylene rope to avoid a direct contact with energized parts of electrical systems.

The *RITZGLAS*® pole is provided with thermally treated aluminum heads and forged steel butt-swivel.

ROPE INSULATING STICK				
Cat. No.	Ø (mm)	Insulating Length (m)	Rated Work Load (daN)	Approx. Weight (kg)
FLV04803-1	25.4	0.42	800	0.63
FLV04803-2	25.4	1.04	800	0.95
FLV04803-3	25.4	1.54	800	1.15



FLV04803-1



RC400-0917



RC400-0915



RC400-0918



FLV10893-3



FLV07777-1

Rope Blocks

Housing and sheaves are made of thermoplastic material and assembled with the forged hooks with safety locks. The hooks feature continuous rotation enabling an easier coupling and alignment of the load.

When only blocks are acquired, a pair is formed by having one block with rope becket and another one without rope becket.

Common Rope Blocks

Equipped with eye-hooks for installation with the Hot Stick Method.

Although there are standard lengths already defined for the ropes, it is possible to supply different ones upon request.

Example of a customized length:

RC400-0914/50

Double block, complete, mounted with a special 50 m long, Ø 1/2" polypropylene rope (RM1895-3).

Note:

The number added at the end of the Catalog Number indicates the rope length.

Light Rope Blocks

Light-weight, compact and resistant, this tool was specially designed to be used on electrical and telecommunication systems for load lifting, cable pulling, mast staying etc.

It has a 15 m polypropylene white rope, Ø 3/8" (RM1895-2).

ROPE BLOCKS

Cat. No.	Description	Rated Work Load (daN)	Approx Weight (kg)
RC400-0914	Double Block, complete, mounted with 38 m of rope (RM1895-3)	1589	7.20
RC400-0915	Triple Block, complete, mounted with 45 m of rope (RM1895-3)	1589	7.90
RC400-0916	Block for Single Block (1 pulley) without becket	907	0.96
RC400-0917	Block for Single Block (1 pulley) with becket	907	1.05
RC400-0918	Block for Triple Block (3 pulleys) without becket	1589	2.00
FLV10893-3	Block for Triple Block (3 pulleys) with becket	1589	2.00
RC400-0919	Block for Double Block (2 pulleys) without becket	1589	2.00
FLV16813-1	Block for Double Block (2 pulleys) with becket	1589	2.00
FLV05716-1	Block for Light Double Block (2 pulleys) without becket	400	0.68
FLV05697-1	Block for Light Double Block (2 pulleys) with becket	400	0.74
FLV07777-1	Light Double Block, complete, mounted with 15 m of rope (RM1895-2)	400	2.10

Snatch Blocks

The snatch block is a very useful tool for lifting and handling loads when working on construction / maintenance of electrical and telecommunication systems.

The two versions of hook available (forged steel or steel meat hook) make it easy to connect the snatch block to the system.

The models RC417-6067 and R2230-1 have forged steel hooks and safety lock and model R2230-2 has a steel meat hook (without safety lock).

The housing and the sheave are made of thermally treated aluminum alloy, with hinged device, allowing the service rope introduction in a fast manner.

Models RC417-6067 and R2230-1 have hooks made of forged steel and safety lock, and model R2230-2 has steel meat hook without safety lock.



RC417-6067



R2230-1



R2230-2



RM1849

The Handline Hook is made of bronze and was designed to ease the lifting of loads or tools. It has two holes for the rope fixing and the sharp end is slightly curved to ease the introduction of tools.

Note:

- For safety reasons, the lifted equipment shall be always accommodated in the hook base for transportation purposes.



RM1979

The Snatch Block Support is built of a bracket, forged steel eye-link with continuous rotation for sustaining the Snatch Block, jaws made of bronze, two steel screws and wing-nuts for attachment to the metallic structure.

The five existing holes of the Snatch Block Support allow the adjustment to metallic structures of different sizes.

SNATCH BLOCKS

Cat. No.	Description	Rated Work Load (daN)	Approx Weight (kg)
RC417-6067	For rope up to Ø 5/8", with forged steel and safety lock	1134	2.60
R2230-1	For rope up to Ø 5/8", with forged steel and safety lock	567	1.10
R2230-2	For rope up to Ø 5/8", with steel meat hook	567	1.10

ACCESSORIES FOR SNATCH BLOCKS

Cat. No.	Description	Rated Work Load (daN)	Approx Weight (kg)
RM1849	Bronze handline hook with two holes for attachment of the rope	227	0.26
RM1979	Aluminum Snatch Block Support with attachment to metallic structures with 76 x 76 mm brackets and total length of 475 mm	567	6.00

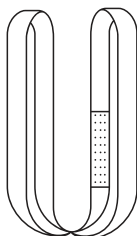
Webbing Slings

The webbing slings (non-insulating) have been designed for coupling loads to the corresponding tools or pulling equipment and such equipment/tools to the working structure. For that reason, they are largely applied for load transportation and electrical / telecommunication cable stringing. The models made without any metallic component are easy to handle and store, due to the flexibility.

Available in two basic types:

Endless Model

Available in 5 different sizes. This model is the most versatile as it can be used in vertical, choker or basket arrangement, and adapts well to any load shape. It also offers good gripping and holding power in the vertical position. Since there are no “eyes”, no wearing points are generated.



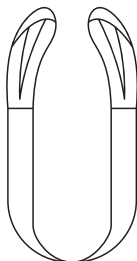
RC417-0133








RC417-0134

Return Eye Style:

One size only. This model has been designed primarily for use in choker hitch, although it can also be used with hooks in vertical and basket applications.



NYLON WEBBING SLINGS

Cat. No.	Width (mm)	Length (m)	MAXIMUM CAPACITIES Lifting Type (daN)					Types
			 Basket	 Choker	 Vertical	 Up to 45°	 From 45° to 60°	
RC417-0133	60	1.83	4000	1600	2000	2800	2000	Return eye
RC417-0134	30	0.92	2000	800	1000	1400	1000	Endless
RC417-0135	30	1.22	2000	800	1000	1400	1000	
RC417-0136	30	1.52	2000	800	1000	1400	1000	
RC417-0137	30	1.83	2000	800	1000	1400	1000	
RC417-0138	30	2.44	2000	800	1000	1400	1000	
RC417-0139	60	0.92	4000	1600	2000	2800	2000	
RC417-0140	60	1.22	4000	1600	2000	2800	2000	
RC417-0141	60	1.52	4000	1600	2000	2800	2000	
RC417-0142	60	1.83	4000	1600	2000	2800	2000	
RC417-0143	60	2.44	4000	1600	2000	2800	2000	



FLV03248-1

The slings with rings are made of 50 mm nylon straps, providing more adherence and being more malleable, causing no damages to the object to be transported.

They are supplied in three different lengths with the same maximum load in the three configurations: basket, choker and vertical.

At the end there are D-shape steel rings which provide for easy installation using insulating hot sticks.

NYLON SLINGS WITH RINGS

Cat. No.	Width (mm)	Length (m)	Rated Work Load (daN)	Approx. Weight (kg)
FLV06619-1	50	0.50	567	0.55
FLV06619-2	50	0.80	567	0.65
FLV06619-3	50	1.20	567	0.75

Wire Grips

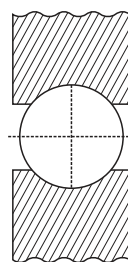
The wire grips are intended for conductors straining on live lines.

The movable grip on top provides its installation to the conductor by using an insulating hot stick and also, when loose, it can be used as a locking device, preventing it from falling off accidentally.

The double round shape gripper is suitable for aluminum and copper cables.



51.E07.D2-CE



DC Gripper

LIVE LINE WIRE GRIPS							
Cat. No.	Conductor Ø (mm)		Load Capacity (daN)		Gripper		Approx. Weight (kg)
	Minimum	Maximum	Working	Rupture	Type	Material	
51.E07.D2-CE	4.50	10.50	1250	2500	DC	Bronze	1.90
51.E07.D3-CE	6.50	13.50	1750	3500	DC	Bronze	3.40
51.E07.D4-CE	10.50	19.00	2500	5000	DC	Bronze	5.20
51.E07.D5-CE	13.50	23.00	3000	6000	DC	Bronze	7.50



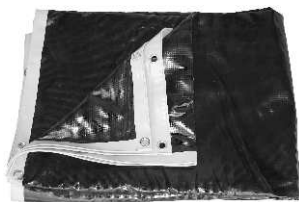
Tool Buckets

The molded plastic bucket is very useful for storing and lifting live line tools, providing protection and safety for the service to be performed.

Made of waterproof canvas, it is provided with reinforced bottom and rope lifting handle fixed to the bucket by metal eyeholes.

TOOL CANVAS BUCKET		
Cat. No.	Description	Approx. Weight (kg)
RC417-0144	Ø 305 mm x 380 mm deep	0.49
RC417-0146	Ø 180 mm x 255 mm deep	0.27

Tarpaulin for Live Line Tools



RT306-0014

The tarpaulin is used to prevent the live line tools from getting contaminated and to preserve the insulating properties of the live line tools. Besides protecting the tools against contamination, it is possible to handle and inspect the equipment that will be used.

This tarpaulin is made of twofold special vinyl, impregnated in orange/black colors.

TARPAULIN FOR LIVE LINE TOOLS		
Cat. No.	Dimensions (m)	Approx. Weight (kg)
RT306-0014	4 x 3	9.15

Safety Equipment for Work at Heights

Safety Harnesses

Equipment designed for safe displacement at heights, positioning, fall prevention and fall arrest, can be used with one or more accessories: Lanyards, Fall Arrester, and equipment for ascent and descent controlled by ropes.

RITZ safety harnesses are made of high strength polyester straps. Reinforced sewing is provided through vital straining parts of the harness, which are carefully inspected during and after confection.



SAFETY HARNESS - ALT 1000R MODEL			
Cat. No.	Description	Size	Approx. Weight (kg)
PCI099	For work at heights, quick lock	1 (S)	1.30
PCI113	For work at heights, quick lock	2 (M - L)	1.33
PCI117	For work at heights, quick lock	3 (XL)	1.36

CA: 19770 / 19781 / 19782

Applications:

For electrical maintenance works. Provided with three automatic buckle bands for easy dressing: two on legs and one on waistline.



PCI113



PCI013

SAFETY HARNESS - TELECOM MODEL			
Cat. No.	Description	Size	Approx. Weight (kg)
PCI013	With chest, abs, dorsal and side fixings points	1 (S - M)	2.45
PCI014	With chest, abs, dorsal and side fixings points	2 (L - XL)	2.50

CA: 11335 / 16748 / 17297 / 17403 / 17628

Applications:

Transportation, positioning, prevention and fall arrest.



PCI016

SAFETY HARNESS - ERGO MODEL			
Cat. No.	Description	Size	Approx. Weight (kg)
PCI015	For work at heights	2 (L - XL)	1.00
PCI016	For work at heights	1 (S - M)	0.95

CA: 11335 / 16748 / 17628

Application:

With breast and dorsal adjustments. To be used on civil constructions, towers, scaffolds and high points in general. It can also be used with the Elektra model belt.

SAFETY HARNESS - AMAZONAS MODEL

Cat. No.	Description	Size	Approx. Weight (kg)
PCI089	For work at heights and confined places	1 (S - M)	0.95
PCI092	For work at heights and confined places	2 (L - XL)	1.00

CA: 17298 / 17628

Application:

Breast and dorsal adjustments. Shoulders supports to assist linemen when climbing down hard-to-access locations. It can be used with the Elektra model belt.



PCI089

SAFETY HARNESS - AMAZONAS ELEKTRA MODEL (set)

Cat. No.	Description	Size	Approx. Weight (kg)
PCI093	For work at heights and confined places	1 (S - M)	1.,95
PCI094	For work at heights and confined places	2 (L - XL)	2.00

CA: 17298 / 17404

Application:

The Amazonas Elektra set is provided with breast, dorsal and side fixing system, allowing to perform a number of activities on high places.



PCI093



Lanyards

The lanyards are devices for attachment to the supporting points. They feature high straining and friction resistance and provide connection between the harness and the working structure.



PTA005

LANYARDS	
Cat. No.	Description
PTA001	Telecom Model. Movable unit made of polyester, with leather protection against abrasion
PTA002	Tree model. Made of polyester with leather coat, 4 adjustment hooks, according to the tree trunk diameter
PTA005	Adjustable Model. Made of 12 mm rope with protection against abrasion
PTI008	“Y” shape, 55 mm, 2 steel hooks, 55 mm opening, double lock, made in polyester. With ABS shock absorber system and quick connection to the harness
PTI010	“Y” Taurus, 2 aluminum hooks, 55 mm opening, double lock, made in polyester. Additional lanyards (leather protected) are supplied, for connection to bigger bars, preventing shocks on the hooks
PTI019	“Y” shape, 55 mm, 2 steel hooks, 55 mm opening, double lock, made in polyester
PTI023	“Y” shape, 110 mm, polyester, 2 aluminum hooks, 110 mm opening, double lock, ABS shock absorber system and quick connection to the harness
PTI024	“Y” shape, 55 mm, 2 steel hooks, 55 mm opening, double lock and quick connection. Made in polyester

LANYARDS

Cat. No.	Description
PTI031	"I" type lanyard, quick connection and ABS shock absorber, steel hook capacity of 55 mm, made in polyester
PTI037	"I" type rope lanyard with 55 mm steel hook and ABS shock absorber system at one end and a loop for a Lark's head knot at the other



PTI037

Fall arresters

These equipment are considered essential for vertical movements. Used to protect the lineman when falling off accidentally.

HARNESS

Cat. No.	Description
PTQ001	Steel cable model, made of stainless steel for safe vertical movements. Used over 8 mm steel cables. A steel karabiner with double locking system is included
PTQ002	Rope model, made of stainless steel for vertical movements, also used as a backup for 11 and 12 mm ropes. A steel karabiner with double locking system is included



Lanyard Adjuster

- ETA16176-1

Lanyard rope stainless steel adjuster.

Approx. Weight: 0.25 kg.



ETA16176-1



Group B

Manual Sticks and Universal Tools

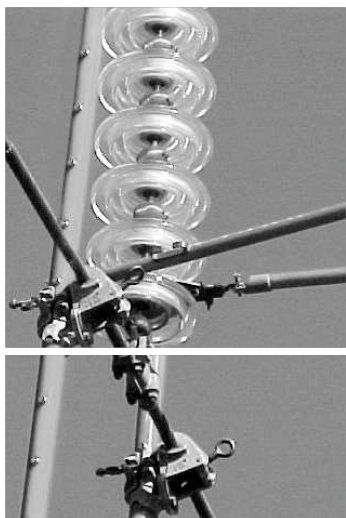
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QUALITY AND SAFETY
FOR ELECTRICAL SYSTEMS

Group B

Manual Sticks and Universal Tools



Pole Handling Tools

Pole handling sticks have a Ø 51 mm *RITZGLAS*® pole and were designed to rotate wooden, concrete or metallic round poles or other geometric cross sections (square, hexagonal etc), with the purpose of positioning the pole at the desired installation place.

Model RC305-0021 is provided with a 48 mm (width) x 1.83 m (length) nylon strap with a maximum tensile strength of 3402 daN and firmly fits poles of up to Ø 480 mm, also on smooth surfaces.



RC305-0021

Model RC305-0008 is provided with a galvanized steel hook, with articulated end and adjustable fixing system, allowing wood poles with different diameters to be gripped.



RC305-0008

Model RC200T has jaws that fit poles from Ø 180 through 406 mm.



RC200T

POLE HANDLING TOOLS

Cat. No.	Description	Approx. Weight (kg)
RC305-0021	Ø 51 mm x 1.22 m Pole Handling Stick, with nylon strap	2.90
RC305-0008	Ø 51 mm x 1.22 m Pole Handling Stick, with steel hook for wooden poles handling	3.40
RC200T	Ø 51 mm x 0.85 m Pole Handling Stick, for poles from Ø 180 through 406 mm	6.00

Grip-All Clampsticks

The grip-all clampstick is a very versatile tool and is provided with this mechanism that consists of a sliding hand grip that opens the hook to grasp a clamp and retract it into the tool head. A thumb latch must be pressed to release the locked hand grip so it can open the hook.

Intended for multiple applications, the equipment is primarily used for installing live line and grounding clamps, as well as live line protective covers and test instruments etc.

The use of the grip-all clampstick may be extended by fitting an adapter RM1867, or with a head attached to its bottom end (see pic. 1). Both solutions allow converting it into a universal stick.

The rated working capacity (traction) is: 133 daN (for all models).

Note:

Cleaning the plastic hook eye with solvent is not recommended.



Pic. 1

In order to purchase the universal head to be used with the stick, simply add the "A"-suffix to its catalog No., e.g.:

Standard model - RC403-0295

Model with universal head - RC403-0295A

The pole clamp (RE403-2543P) can be used with any hot stick, particularly those which are longer, requiring from the lineman additional efforts to support it, specially when used in the horizontal position.

The pole clamp fixing is possible by fastening the two halves of the ring and tightening them with screws (such ring is provided with a central bed for its pole and control rod, not interfering on its operational mechanism).

In order to keep the safe insulating distance when working on energized systems, it is necessary to use a strain link stick of suitable insulating length, in line with the polypropylene rope.

STORAGE

Canvas bags for storage and transportation are supplied separately.

OPEN

Position to grip the grounding clamp eye-ring or other tools to be handled.



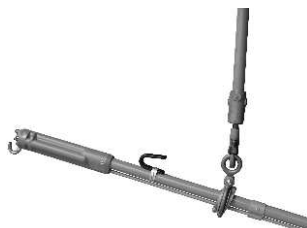
CLOSED

Hook grasps the grounding clamp eye ring, keeping it firm, but free to articulate, allowing torsion movements, inclusive in angle.

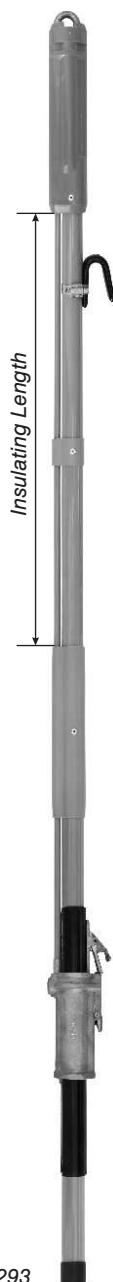


RETRACTED

The hook is retracted into the head, keeping the grounding clamp connected to the stick, in the suitable position for its installation and removal.



RE403-2543P



RC403-0293

REGULAR MODELS

Cat. No.	Dimensions		Insul. Length (m)	Max. Voltage (kV)	Approx weight. (kg)
	Ø (mm)	Total Length (m)			
RC403-0291	32	1.43	0.54	15	2.40
RC403-0292	32	2.04	0.74	35	2.60
RC403-0293	32	2.65	1.30	138	3.10
RC403-0294	32	3.26	1.86	230	3.50
RC403-0295	32	3.87	2.42	345	3.90

LIGHT MODELS

Cat. No.	Dimensions		Insul. Length (m)	Max. Voltage (kV)	Approx weight. (kg)
	Ø (mm)	Total Length (m)			
FLV08958-1	25	1.43	0.54	15	2.30
FLV08958-2	25	2.04	0.74	35	2.40
FLV08958-3	25	2.65	1.30	138	2.60
FLV08958-4	25	3.26	1.86	230	3.20
FLV08958-5	25	3.87	2.42	345	3.50

HINGED MODEL

Cat. No.	Dimensions				Maximum Voltage (kV)	Approx. Weight (kg)
	Ø (mm)	Folded (m)	Extended (m)	Insul. Length (m)		
RC403-0296	32	1.01	2.00	0.95	36	3.00
RC403-0297	32	1.32	2.59	1.37	138	3.60
RC403-0298	32	1.60	3.20	1.98	230	4.00
RC403-0299	32	1.93	3.81	2.59	345	4.40
RC403-0342	32	2.23	4.42	3.20	450	4.80
RC403-0343	32	2.54	5.03	3.81	500	5.10



Description		
Cat. No.	ACCESSORIES	Approx. Weight (kg)
RE403-2543/P	Auxiliary Pole Clamp with lifting eye-ring	0.42
RM1867	Universal adapter	0.14



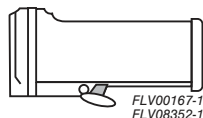
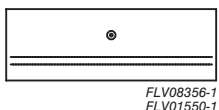
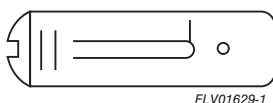
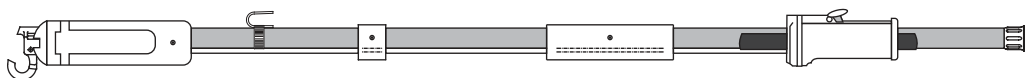
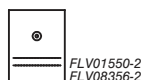
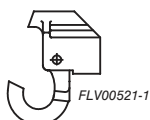
RE403-2543P



RM1867

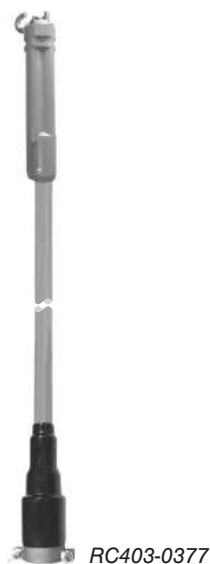
REPLACEMENT PARTS

Cat. No.	Description	Approx Weight. (kg)
FLV00521-1	Complete hook for Grip-all Clampstick (Ø 25 and 32 mm)	0.22
FLV02995-1	Complete lockbar for Grip-all Clampstick (Ø 25 and 32 mm)	0.17
FLV01629-1	Plastic head for Grip-all Clampstick (Ø 25 and 32 mm)	0.35
FLV00167-1	Aluminum handle for Grip-all Clampstick Ø 32 mm	0.30
FLV08352-1	Aluminum handle for Grip-all Clampstick Ø 25 mm	0.25
FLV01550-1	Guide (250 mm) for Grip-all Clampstick Ø 32 mm	0.07
FLV01550-2	Guide (40 mm) for Grip-all Clampstick Ø 32 mm	0.06
FLV08356-1	Guide (190 mm) for Grip-all Clampstick Ø 25 mm	0.05
FLV08356-2	Guide (40 mm) for Grip-all Clampstick Ø 25 mm	0.05
FLV03004-1	Fiberglass half sleeve for Grip-all Clampstick Ø 32 mm	0.10
FLV08353-1	Fiberglass half sleeve for Grip-all Clampstick Ø 25 mm	0.07
RH1760-5	Pole hanger	0.13
FLV17479-1	Rubber base for Ø 32 mm hot stick	0.03



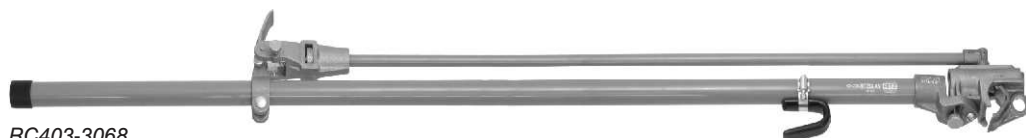
The extensions are easy to adapt to the head of any model of the **RITZGLAS®** Grip-all Clampstick and are intended to extend the length of the clampstick, without compromising its performance.

GRIP-ALL CLAMPSTICK EXTENSION		
Cat. No.	Description	Approx. Weight (kg)
RC403-0377	Ø 32 x 1.22 m extension with plastic head	2.00
RC403-0378	Ø 32 x 1.83 m extension with plastic head	2.60



RC403-0377

Wire-Holding Stick



RC403-3068

The wire-holding stick is used on energized systems, observing the hot stick method procedures, to hold and position conductors and jumper cables, specially during splicing operations. Also, this tool is used to disconnect/connect cables to bolt insulators.



The control lever on the stick is responsible for gripping the conductor into the holding jaws. By using the threaded nut, it is possible to pre-adjust the wire-holding jaws opening, according to the conductor size.

The two threaded screws have been designed to provide the control lever locking, after gripping the conductor.

The head of the tool locks in three different positions (left, middle and right) allowing the lineman to handle the conductor from any angle. The gripper suitable for from 6AWG (Ø4 mm) solid copper cables through

1590 MCM CAA (ACSR) (Ø 38 mm) aluminum cables.

WIRE-HOLDING STICK

Cat. No.	Dimensions			Conductor Ø (mm)		Approx. Weight (kg)
	Ø (mm)	Insul. Length (m)	Total Length (m)	Minimum	Maximum	
RC403-3068	32	1.37	1.95	4.00	38.00	3.30
RC403-3069	32	1.98	2.56	4.00	38.00	3.70

Insulated Oiler

The insulated oiler is used to oil high voltage mechanisms such as: breakers, switches, reclosers, etc.

This tool is composed of a Ø 32 mm *RITZGLAS*® pole and a fiberglass rod to operate the oil container attached to the top end.



RH1980-8

INSULATED OILER				
Cat. No.	Dimensions			Approx. Weight (kg)
	Ø (mm)	Insulating Length (m)	Total Length (m)	
RH1980-8	32	2.42	2.59	1.75

Tie Sticks

The tie sticks are made with a variety of heads to meet specific needs or the lineman's preference.

The hook sticks (rotary or not) are quick and easy to operate for handling of wire-formed loops. The rotary blade stick is used to handle wire-formed loops, which are not provided with eyes at its ends.

Rotary Prong



Rotary Blade



Two-prong



RH1855-26

TIE STICKS

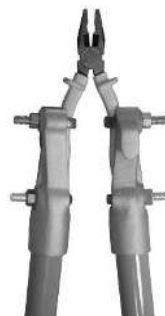
Cat. No.	Description	Dimensions			Approx. Weight. (kg)
		Ø (mm)	Insulating Length (m)	Total Length (m)	
RH1855-19	Tie Stick with rotary prong and universal head	32	2.36	2.51	2.00
RH1855-20	Tie stick with two-prong head and universal head	32	2.36	2.36	2.00
RH1855-25	Tie stick with rotary prong and rotary blade	32	2.36	2.48	1.90
RH1855-26	Tie stick with rotary blade and universal head	32	2.36	2.51	1.90

Insulated Handles

The insulated handles allow using different types of cutters, when carrying out maintenance by the hot stick method on energized systems.

They are available in two versions: with clamps or without clamps (handles only).

Insulated Handles are supplied with a head for attachment of pliers or other similar tools.



RH1861-1



RH1861-2

INSULATED HANDLES				
Cat. No.	Description	Dimensions		Approx. Weight (kg)
		Ø (mm)	Insul. Length (m)	
RH1861-1	Handles and pliers	32	1.18	2.00
RH1861-2	Handles only (pair)	32	1.18	1.80



RC403-0184



RC403-0186

Multi-Angle Socket Sticks

The articulated gears mechanism of the insulating stick allows linemen to adjust the tool socket to suitable angles, when working on high voltage systems, by the hot stick method.

The fiberglass rod in parallel with the pole is responsible for the gear head stabilization, keeping it aligned, even when the pole rotates.

The 1/2" square connection is attached to the gear and enables the fixing of sockets to operate the nuts.

The gears angle must be previously adjusted to a maximum variation of up to 140° regarding the pole, through the two wing-nuts at the head.

The gears head is made of bronze and the gears are made of a special thermally treated steel. This versatile set is attached to the *RITZGLAS*® pole in order to ensure the necessary insulation.

Warning:

This stick has been mechanically rated only for adjustment of the nut. The tightening of the nut, with proper torque must be done by using a flexible socket stick.

INSULATING STICK WITH MULTI-ANGLE SOCKET				
Cat. No.	Dimensions			Approx. Weight (kg)
	Ø (mm)	Insulating Length (m)	Total Length (m)	
RC403-0184	38	0.80	1.83	2.40
RC403-0185	38	1.41	2.44	2.90
RC403-0186	38	1.98	3.05	3.40
FLV01121-4	38	2.50	3.67	4.20

Flexible Socket Sticks

Insulating sticks with sockets have provisions to accommodate tools intended for tightening nuts on energized systems equipment.

The flexible socket offers the lineman more flexibility when struggling to work at tough acute angles.

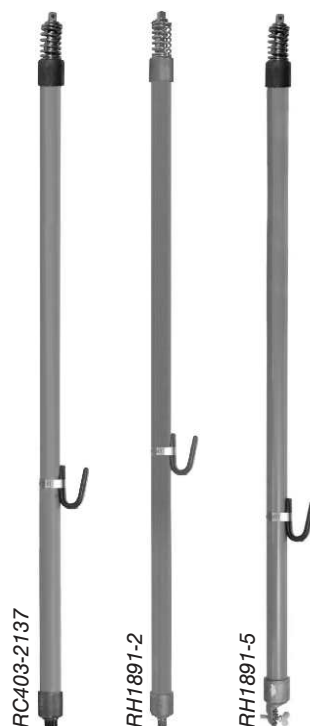
The male rigid socket at one of the ends of the sticks RH1891-2 and RH1891-3 allows the attachment of the Ratchet Wrench R066780 for a proper tightening torque.

The universal head attached at one of the stick ends (RH1891-5 and RH1891-6) allows attachment of all the universal tools.

Maximum Torque: 5.5 daN.m

The insulating sticks with sockets RC403-2136 and RC403-2137 are provided with a 1/2" male connection at one end and an end fitting which is suitable for the ratchet wrench (R066780) operation at the other end. For that reason, this tool is very versatile, for it can work with both coupling systems.

Maximum Torque: 10 daN.m



INSULATING STICKS WITH SOCKETS				
Cat. No.	Description	Dimensions		Approx Weight. (kg)
	Stick	Ø (mm)	Insulating Length (m)	
RC403-2136	Flexible socket and fixed socket female type	38	2.36	2.30
RC403-2137	Flexible socket and fixed socket female type	38	1.75	2.70
RH1891-2	Flexible socket and fixed socket male type	38	1.75	2.20
RH1891-3	Flexible socket and fixed socket male type	38	2.36	2.60
RH1891-5	Flexible socket and universal socket	38	1.75	2.30
RH1891-6	Flexible socket and universal socket	38	2.36	2.70



RC403-1085

ACCESSORIES

The hexagonal socket set can be supplied with 11 pieces in American standard sizes or 10 pieces in Metric standard sizes and is intended to fit to square-shank wrenches to work on energized systems.

The square female connectors allows attachment to a variety of wrenches and insulating socket sticks.

The hex sockets are supplied in a case, sorted out so to ease the selection work.

All sockets are made of steel.



R066780



By removing the 1/2" square socket, this tool is converted into a female model.

ACCESSORIES		
Cat. No.	Description	Approx. Weight (kg)
R066780	Manual ratchet wrench for 1/2" male and female sockets	0.50
RC403-1085	Set with 11 long steel sockets: 1/2", 9/16", 5/8", 11/16", 3/4", 13/16", 7/8", 15/16", 1", 1-1/16", 1-1/8" (includes storage case)	2.16
RC403-1085M	Set with 10 long steel sockets: 10 mm, 11mm, 12 mm, 13 mm, 14 mm, 15 mm, 16 mm, 17 mm, 18 mm, 19 mm (includes storage case)	2.40

Volt-Ammeter Stick



The insulating pole of the Volt-Ammeter Stick is provided with a head at the top end that can be adjusted to accept a variety of volt-ammeter clamps with triggering shot located at its left side.

The head plastic cover offers a better accommodation for the instrument and prevents possible damages to its surfaces. When attached to the pole, the volt-ammeter clamp is triggered using the stick lever at the gripping area of the stick, hence it can be used with total safety, ensured by the insulation of the *RITZGLAS*® pole and rod.

Volt-Ammeters are also offered in hinged style, which is much easier to transport, performing the same works with same efficiency.



RH1968-6



RH1978-6

INSULATING VOLT-AMMETER STICKS

Cat. No.	Dimensions			Approx. Weight (kg)
	Ø (mm)	Insulating Length (m)	Total Length (m)	
RH1968-6	32	1.80	1.90	2.20
RH1968-8	32	2.41	2.51	2.35
RH1978-6*	32	1.19	1.90	2.50
RH1978-8*	32	1.75	1.66	2.80

* hinged style

Universal Poles



RH1760-4

RITZGLAS® Universal Poles are intended for use with the universal tools introduced later herein. Composed of two universal heads, which provides easy, quick and safe connection of all tools through this unique fitting, allowing linemen to have tools attached to the poles, in angles of up to 90°.

Depending on the universal tool configuration, a universal adapter may be added (RM4455-84), to provide the necessary angle for the work to be performed.

The universal poles with rubber storm skirts are intended for use under wet, i.e. emergency situations. Rubber skirts offer additional leakage distance by modifying the water path, avoiding tracking through the pole surface.



Hinge

The hinge-type connection and rigid splice are used with some universal pole models, providing for easy transportation and keeping lengths suitable for the types of work to be performed.



Rigid Splice

Canvas bags for conditioning and transportation of all universal poles, can be provided separately.

UNIVERSAL POLES				
Cat. No.	Description	Dimensions		Approx. Weight (kg)
		Ø (mm)	Insulating Length. (m)	
RH1760	Universal pole with one spline tie wire assistant and rubber base	32	2.40	1.75
RH1760-1	Universal pole with one spline tie wire assistant and rubber base	32	1.79	1.30
RH1760-2	Rigid splice pole with two Ø 32 mm sections with head at one end and rubber cap at base end	32	2.29	2.10
RH1760-3	Universal pole with two heads	32	1.76	1.70
RH1760-4	Universal pole with two heads	32	2.37	2.00
RH1760-6	Rigid splice pole with two Ø 32 mm sections with head at top end and rubber cap at base end	32	2.25	2.40
RH1760-10	Pole with two splines and pole hanger	32	2.98	2.20
RH1760-12	Pole with two splines and pole hanger	32	3.59	2.50
RH1760-14	Pole with two splines and pole hanger	32	4.20	2.85

UNIVERSAL POLES

Cat. No.	Description	Dimensions		Approx. Weight (kg)
		Ø (mm)	Insulating Length. (m)	
RH1761	Universal stick with head at top end, rubber cap at base end and two rubber skirts	32	2.40	1.60
RH1761-1	Spline universal storm tool with three skirts, pole hanger and rubber cap	32	2.40	1.70
RH1770	Hinged pole with one spline, pole hanger and rubber base cap	32	2.30	2.00
RH1790-8	Pole with two splines and pole hanger	38	2.36	3.00
RH1790-10	Universal stick with 2 splines	38	2.97	3.30
RH1790-12	Universal stick with 2 splines	38	3.58	3.70
RH1790-14	Universal stick with 2 splines	38	4.19	4.10
RT403-0752	Sectional Universal Pole, two sections: Ø 32 mm x 3 m top section and Ø 38 mm x 3 m bottom section, with rigid splice, universal head on top and rubber base cap	32 / 38	5.93	4.75

Tool Rack and Crossarm Tool Hanger

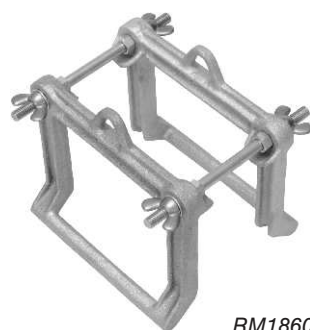
The Crossarm tool hanger for hot sticks is a very useful tool for the linemen, allowing the sticks under operation to be safely stored.

It adjusts to crossarms from 95 through 114 mm wide (height is not important). Made of aluminum alloy with heat-treated iron screws and wing bronze nuts.

The tool rack for poles should be used in pairs and it is an alternative/ complement to be used with our tarpaulin, preventing contamination out of possible contact with the soil.

All twelve supports and mast are covered with plastic material to protect the sticks against abrasion. Rack suitable for up to 12 hot sticks of Ø 76 mm max.

Tripod provides adjustment in two different positions to better fit the linemen's needs, besides being completely retractable, hence facilitating transportation and storage.



RM1860



RM4660

Tool rack and Crossarm Tool Hanger		
Cat. No.	Description	Approx. Weight (kg)
RM1860	Crossarm tool hanger	0.95
RM4660	Tool Rack	3.70

Universal Tools

The universal tools series presented in this section was rigorously selected to perform various works on energized systems, using universal insulating hot sticks.

Universal tools are provided with universal heads, providing perfect connection to universal hot sticks, when working by the Hot Stick Method, with absolute accuracy.

Each tool has its own characteristics and is intended to replace manual work, even when angles and working positions are not very satisfactory.



RC403-0005

- RC403-0005

Cotter Key Tool

Approx. weight: 0.38 kg

Tool used for pin type insulators disconnection.



RC403-0006

- RC403-0006

Cotter Key Tool

Approx. weight: 0.35 kg

Tool used for pin type insulator connection.



RC403-0011

- RC403-0011

Kicker.

Approx. weight: 0.27 kg

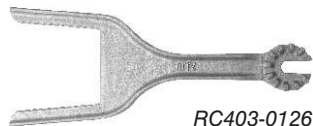
Due to the impact generated by the spring, this tool eases the pin extraction, when used with pin pullers, specially when the spaces are reduced and fitting is difficult.

- RC403-0126

Ball Socket Adjuster

Approx. weight: 0.32 kg

Similar to the RM4455-87 ball socket adjuster, this tool is designed to handle socket adapters up to 69 mm wide.



RC403-0126

- RC403-0175

Plastic Insulator tool

Approx. weight: 0.35kg

Plastic coating of this tool prevents damage to cold end insulators during handling.



RC403-0175

- RC403-0177

All-angle Pliers

Approx. weight: 0.88 kg

Designed to hold nuts or any other movable part during an intervention. Its wing-nut allows previously adjusting it to the desired angle.



RC403-0177

- RC403-0314

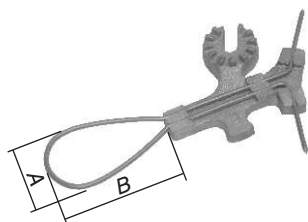
Conductor sander

Approx. weight: 0.29 kg

Developed to clean energized conductors surface before installing clamp, especially abraded copper conductors, where cleaning by other methods is difficult.



RC403-0314



RC403-0834

- RC403-0834

- RC403-1071

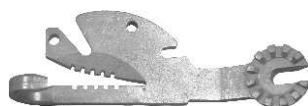
Hot Rodder Tool

Approx. weight: 0.10 kg

Ideal for applying line ties and other formed wire products on energized lines. The loop type work end allows rotational control, which is not possible with other tools. Due to its small size, the RC403-1071 model is recommended for top ties works.

HOT RODDER TOOL

Cat. No.	Ø A (mm)	Ø B (mm)
RC403-0834	27	44.5
RC403-1071	35	76



RC403-1416

- RC403-1416

Tie Wire Claw

Approx. weight: 0.22 kg

This claw applies tie wires, both factory formed and field-formed, controlling wires with grip equal to pliers.



RC403-1417

- RC403-1417

Utility-head

Approx. weight: 0.24 kg

This head is used in the most diversified interventions in live lines, such as: placing and removing blocks, slings, circuit-breakers, line hooks etc.

- RC403-2270

Aerosol can holder

Approx. weight: 0.21 kg

Intended for safe application of paint and lubricant to energized equipment in hard-to-reach places or insecticide to bee and wasp nests, on poles and crossarms.



RC403-2270

- RM4455-2

Pin holder

Approx. weight: 0.21 kg

This tool is used for replacing pins and bolts. The bolt head fits into a slot and is held tight by spring action. It can take bolts or pins up to Ø 15 mm.



RM4455-2

- RM4455-5

Cut-Out Tool

Approx. weight: 0.78 kg

This tool can be used for removing and replacing the doors of enclosed cut-outs, due to its finger-like grasp and plastic covered hooks.



RM4455-5

- RM4455-6

Ratchet wrench

Approx. weight: 0.69 kg

Used for tightening bolts and nuts on energized systems. Provided with a universal rotation screw at one end to be used with universal hot sticks.



RM4455-6



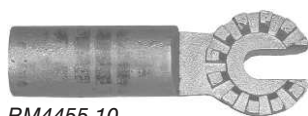
RM4455-9

- RM4455-9
- VMR01479-2

Disconnect

Approx. weight: 0.06 kg / 0.17 kg

Used for opening and closing switches, enclosed cut-outs etc. made of aluminum (RM4455-9) or bronze (VMR01479-2).



RM4455-10

- RM4455-10

Chuck Blank

Approx. weight: 0.12 kg

Screw drivers, hack saws and other tools may be inserted in this device and secured by soldering.



RM4455-12

- RM4455-12

Snapout cotter key remover

Approx. weight: 0.17 kg

Hammer-like action makes it extremely useful in pulling out stuck cotter keys on energized systems, when the head is directed to the structure.



RM4455-13

- RM4455-13

Snapout Disconnect

Approx. weight: 0.20 kg

Imparts a hammer blow to the pulling ring of a cut-out door or disconnect switch.



RM4455-15

- RM4455-15

Locating pin

Approx. weight: 0.32 kg

Used as a drift pin in aligning bolt holes as an aid in bolt and pin insertions.

- RM4455-16

Folding rule

Approx. weight: 0.26 kg

Suited for obtaining measurements near live conductors in congested areas. The universal head provides hot stick application.



RM4455-16

- RM4455-17

Fixed Prong Tie Stick Head

Approx. weight: 0.18 kg

Used for manipulating tie wires which have looped ends. It is very useful where loose ends of tie wire must be rolled up to prevent contact with crossarm or hardware while untying.



RM4455-17

- RM4455-18

Cotter Key Installing Tool

Approx. weight: 0.12 kg

Used for replacing cotter keys in insulator fittings or in fittings which are out of reach of linemen or near energized lines.



RM4455-18

- RM4455-19

Cotter Key pusher

Approx. weight: 0.33 kg

For ball and socket insulator coupling.

Straight end of the tool enters the socket opening to force cotter key out. Curved end forces cotter key rear into the position.



RM4455-19

- RM4455-22

Ball socket adjuster

Approx. weight: 0.34 kg

Useful in controlling the adapter between clevis clamps and ball and socket insulator pins.



RM4455-22



RM4455-23

- RM4455-23

Hack saw

Approx. weight: 0.42 kg

Excellent for use at various angles, it cuts components near energized conductors.



RM4455-25

- RM4455-25

Paint Brush

Approx. weight: 0.22 kg

Used for painting around live apparatus, it is useful for cleaning insulator heads and painting various equipment.



RM4455-26A

- RM4455-26A

Pruning saws

Approx. weight: 0.36 kg

Used for cutting trees that are near energized installations.



RM4455-28

- RM4455-28

Screw Driver

Approx. weight: 0.12 kg

For installation and removal of slotted flat head screws and bolts on energized systems.



RM4455-29B

- RM4455-29B

152 mm Clamp stick head.

Approx. weight: 0.30 kg

Universal clamp stick head for installation and removal of eye-screw grounding clamps on energized or de-energized systems.



RM4455-36

- RM4455-36

Link stick head

Approx. weight: 0.36 kg

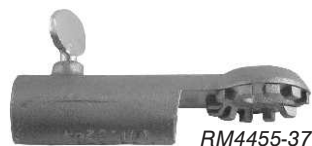
To be used with light conductors, when performing maintenance on energized systems. Opening range from 6 to 19 mm. Jaws have rounded edges to avoid conductor damage.

- RM4455-37

Chuck blank

Approx. weight: 0.14 kg

Used for a variety of applications, such as inserting screw drivers, saws etc. The wing nut tightens the insulated tool.



RM4455-37

- RM4455-38

Clear vision mirror

Approx. weight: 0.37 kg

Used for energized systems inspection, as the angle adjustment enables the operator to inspect hard-to-see areas. The angle can be pre-adjusted.



RM4455-38

- RM4455-39

Shepherd Hook

Approx. weight: 0.30 kg

The self-aligned shepherd hook is designed for pulling and lifting insulator strings. Swivel actions allows it to rotate and to keep a good alignment with the insulator.

Also used as a support when performing live line works, such as installation of strain poles and yokes.



RM4455-39

- RM4455-40

Fixed Blade Tie Stick Head

Approx. weight: 0.20 kg

Used for manipulating tie wires with or without looped ends. It has a V-notched blade that is set at 60° angle from the pole when attached.



RM4455-40



RM4455-46

- RM4455-46

Flexible Wrench Head

Approx. weight: 0.42 kg

Made to fit standard wrench sockets. The standard is 1/2".



RM4455-50

- RM4455-50

Skinning Knife

Approx. weight: 0.11 kg

For cutting and scraping insulation, cleaning conductors etc, near energized lines.



RM4455-63

- RM4455-63

- RM1889

Conductor Cleaning Brush

Approx. weight: 0.17 and 0.36 kg

Steel brushes in "V" position gives good 2-sided cleaning action. Available in different models: RM4455-63 with universal fitting for hot stick operation and RM1889 with hand grip, for rubber glove operation.

Replacement brushes are also available upon request RM1899 (10 pcs).



RH4455-64

- RH4455-64

Storm tool

Approx. weight: 1.10 kg

This tool was designed to help operators in emergency situations and shall be attached to hot sticks. Provided with rubber skirts.

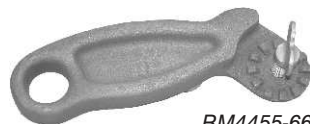
Insulating length: 0.5 m

- RM4455-66

Pistol grip saw handle

Approx. weight: 0.20 kg

Developed for use with a pruning saw RM4455-26A, using insulating gloves and sleeves.



RM4455-66

- RM4455-67

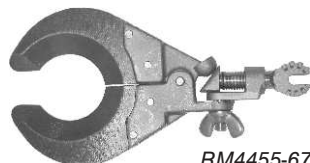
- RT403-1101

Insulator Forks

Approx. weight: 1.06 kg

Designed to grasp insulators during installation or removal.

With a pre-adjusted angle and by rotating screw, jaws adjust from 76 to 114 mm (3" to 4-1/2") (RM4455-67) or from 57 to 107 mm (2-1/4" to 4-1/4") (RT403-1101).



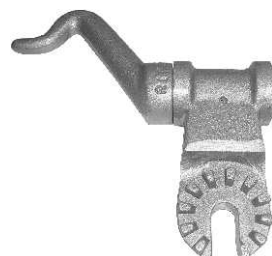
RM4455-67

- RM4455-69

Rotary Prong Tie Stick Head

Approx. weight: 0.30 kg

For placing insulator ties with looped ends on energized systems. Prong swivels freely, allowing a full turn on the tie wire without releasing contacts.



RM4455-69

- RM4455-70

Rotary Blade Tie Stick head

Approx. weight: 0.26 kg

"V" notched carbon steel blade grasps tie wire securely. Body design allows a swivel action. Used for manipulating tie wires with or without looped ends on energized systems.



RM4455-70



RM4455-71

- RM4455-71

Pointed Disconnect

Approx. weight: 0.09kg

Used for disconnect switches operation.



RM4455-72

- RM4455-72

Conductor gauge

Approx. weight: 0.08 kg

This aluminum gauge allows a quick and accurate check on the gauge of CAA (ACSR), solid or stranded copper conductors, from 4 Cu up to 4/0 CAA (ACSR).



RM4455-77

- RM4455-77

Fuse Puller

Approx. weight: 0.97 kg

Used to install, keep or pull out fuses from

Ø 13 to 38 mm on energized lines.



RM4455-78

- RM4455-78

Fuse Puller

Approx. weight: 1.0 kg

Similar to model RM4455-77.

Opening range: 25 to 64 mm.



RM4455-78

- RM4455-79

Spiral disconnect

Approx. weight: 0.18 kg

Very useful for opening switches and removing and installing cut-out doors. Also called 'pigtail' disconnect.



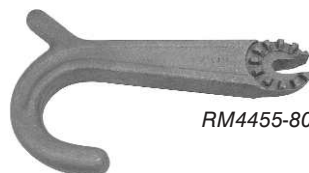
RM4455-79

- RM4455-80

Tree and Hope Hook

Approx. weight: 0.15 kg

Used to push tree limbs out of the way near energized lines or to clear rope if it becomes tangled.



RM4455-80

- RM4455-82

Cotter Key Tool

Approx. weight: 0.09 kg

Used for pulling and replacing clevis pins and ball socket insulators.

Provided with contoured slot and raised eye pin that guides the cotter key during its installation.



RM4455-82

- RM4455-84

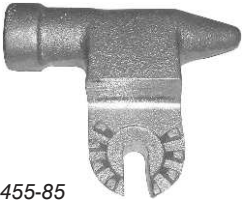
Universal adapter

Approx. weight: 0.11 kg

When mounted on a universal pole with any universal tool mounted on the adapter, it can be set at almost any angle relative to the stick.



RM4455-84



RM4455-85

- RM4455-85

Hammer

Approx. weight: 0.42 kg

Used for many operations requiring a forceful blow to move pieces of hardware.

- RM4455-86

Vise Grips Holder

Approx. weight: 0.13 kg

Used for many operations, this tool allows the operator to install bolts and other hardware and move or suspend cut conductors during maintenance operations.



RM4455-86

- RM4455-87

Ball socket adjuster

Approx. weight: 0.30 kg

Allows to position the insulator ball during its installation or removal. Used also as an auxiliary tool during the cradle installation in "V" strings.



RM4455-87

- RM4455-88

Bolt Head Wrench

Approx. weight: 0.42 kg

Used on heads of Ø 3/4" and 5/8" bolts to keep bolt from turning as nut is tightened. It can be used with the ratchet wrench RM4455-89 and multi-angle sockets RC403-1085 and RC403-1085M.



RM4455-88

- RM4455-89

Ratchet Wrench

Approx. weight: 1.19 kg

Used for tightening square nuts on 5/8" pole line hardware, regardless of the length of the bolt running beyond it.



RM4455-89

- RM4455-92

Conductor Cleaning brush

Approx. weight: 0.53 kg

Ø 64 mm semi-tubular shape and swivel head with universal fitting allow linemen to clean the entire circumference of the energized conductor.



RM4455-92

- RM4455-93

Pole only.

Approx. weight: 0.18 kg

Similar to model RM4455-92 (Ø 64 mm) for rubber glove operation.



RM4455-93

- RC403-0320

- RC403-0450

Pole with clip.

Approx. weight: 0.22 kg 0.45 kg

Similar to model RM4455-92 and provided with this plastic coated steel clip for better grip, still requiring the use of rubber gloves.



RC403-0320

(RC403-0320 external Ø: 64 mm and
RC403-0450 external Ø: 76 mm).



RM4455-96

- RM4455-96

Cotter key Puller

Approx. weight: 0.28 kg

Used to partially withdraw a ball-socket cotter key, so that the insulator can be removed from another insulator hanger.

- RM4455-97

Tool for "W" keys

Approx. weight: 0.22 kg

Used for handling "W" shaped keys used in suspension insulators, which are popular in western Europe and Japan.



RM4455-97

- RM4455-100

Flexible universal adapter

Approx. weight: 0.72 kg

Allows rotating another tool connected in line with it, even in angles, when attached to sectional hot sticks or grip-all clamp sticks.



RM4455-100

- RM4455-102

Pin Installer

Approx. weight: 0.40 kg

Positive grip, spring loaded three-finger device allows pins to be placed in semi-recessed areas of EHV hardware and insulators.



RM4455-102

- RM4455-103

Cotter Key Holder

Approx. weight: 0.26 kg

Used to install cotter keys at different angles in insulator strings, using its multi-socket device.



RM4455-103

- FLV16148-1

Universal Hook

Approx. Weight 0.34 kg

This tool is used for handling any items of up to Ø 64 mm.



FLV16148-1

- FLV16165-1

Universal Extension Device.

Approx. Weight 0.15 kg

This tool provides an extension, in certain situations, of other universal tools on hard to reach places.



FLV16165-1

- FLV16159-1

Rubber protection Hammer.

Approx. Weight 0.40 kg

For displacing equipment on electrical systems when necessary.

Lever Type Wire Cutters



FLV02818-1



RH1871-6

Used for cutting aluminum CAA (ACSR), CA (ASC) and copper wires, fully assembled with *RITZGLAS*® insulating poles.

Different models are available with lever-type system and hinged-type lever combined with adjustable ratchet.

Lever-type models are provided with a special reinforced fiberglass rod that drives the blades.

Levers are plastic-coated and their quick action offers linemen added cutting force to cut conductors sizes according to the below table.

FLV02818-1 is only used for light-duty applications and shall be used exclusively for works performed by rubber glove method.

CUTTERS

Cat. No.	Maximum Conductor Size	Stick Dimensions			Approx. Weight (kg)
		Ø (mm)	Insulating Length (m)	Working Length (m)	
FLV02818-1	1/0 CAA (ACSR) Ø 1.11 mm	32	0.31	0.70	2.50
RH1871-4	1/0 CAA (ACSR) Ø 10.11 mm	32	0.71	1.45	3.40
RH1871-6	1/0 CAA (ACSR) Ø 10.11 mm	32	1.16	2.00	4.00

CABLE CUTTERS

Cat. No.	Maximum Conductor Size	Stick Dimensions			Approx. Weight (kg)
		Ø (mm)	Insulating Length (m)	Working Length (m)	
RH1873-4/B	4/0 CAA (ACSR) Ø 14.31 mm	38	0.71	1.45	5.40
RH1873-6/B	4/0 CAA (ACSR) Ø 14.31 mm	38	1.16	2.00	6.00
RH1875-4	336.8 CAA (MCM ACSR) Ø 18.83 mm	38	0.71	1.45	6.20
RH1875-6	336.8 CAA (MCM ACSR) Ø 18.83 mm	38	1.16	2.00	6.80

RATCHET CABLE CUTTERS

Cat. No.	Maximum Conductor Size	Stick Dimensions			Approx. Weight (kg)
		Ø (mm)	Insulating Length (m)	Working Length (m)	
RC403-1382	556 MCM CAA (ACSR) (Ø 23.5 mm)	38	0.79	1.97	5.20
RC403-1384	556 MCM CAA (ACSR) (Ø 23.5 mm)	38	1.40	2.58	5.50



RC403-1382

These cutters construction with a plastic rotating system, allows the action mechanism to run smoothly over the *RITZGLAS*® pole and a soft hinging movement of the fiberglass rod.



RP403-1388P

REPLACEABLE/INTERCHANGEABLE CUTTER HEADS

Cat. No.	Description	Approx. Weight (kg)
RP403-1388P	Blade only maximum range: (556 MCM CAA) and (ACSR) Ø 23.5 mm	0.90

Tree Trimmers

Tree Trimmers are designed to cut tree branches, specially those near the electrical systems in hard-to-reach places.

The sharpened blades are stationary and movable, made of forged steel. The rope and pulley arrangement gives the operator a mechanical advantage of 3 to 1 ratio, e.g.: a 4.5 daN pull on the rope will exert a 13.5 daN force on the cutter head lever.

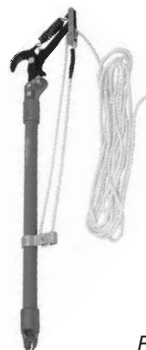
Ball bearing pulleys are used for easy operation.

Tree trimmers are provided with 7.60 m of rope.

RH2106-4 allows connection to complementary sticks by using universal heads.

Other models allow using complementary sticks (top and bottom sections) connected together by spring-action lock button.

A universal pruning saw can be added to the universal fitting at the side on the headmount.



RH2106-4



RH2106

TREE TRIMMERS				
Cat. No.		Description	Working Length (m)	Approx. weight (kg)
Ø 38 mm stick	Ø 32 mm stick			
RH2006	RH2106	RITZGLAS® tree trimmer, both with 7.60 m of Ø 1/4" Rope	2.00	2.00 / 2.40
-	RH2106-4	RITZGLAS® tree trimmer, Ø 32 mm x 3.72 m insulating length, universal head at one end for complementary sticks and 7.60 m of Ø 1/4" rope	0.65	1.70
RH2036	RH2136	2-Splice Extension	1.83	1.20 / 1.60
RH2038	RH2138	2-Splice Extension	2.44	1.50 / 2.00
RH2056	RH2156	1-Splice Extension	1.83	1.00 / 1.40
RH2058	RH2158	1-Splice Extension	2.44	1.30 / 1.80

ACCESSORIES AND REPLACEMENT PARTS

Cat. No.	Description	Approx. Weight (kg)
RH2020	Blades set for tree trimmers with Ø 38 mm, (including aluminum head, spring and lever with sheave)	1.00
RH2120	Blades set for tree trimmers with Ø 32 mm, (including aluminum head, spring and lever with sheave)	1.00
RP403-2283	Blade only for any head (for Ø 32 and 38 mm stick) Including only spring and lever with sheave	0.55
RM4455-26A	Universal Pruning Saw	0.36

Rescue Stick

The *RITZGLAS®* Rescue Stick is manufactured with the same pole used in the live line tools. Reduced weight, high mechanical strength and excellent dielectric strength, it ensures an easy-to-use tool with total safety.

Ideal for electrical accidents situations in energized systems up to 34.5 kV, this stick is provided with hooks that were anatomically designed, assuring the required safety distance and insulation, for ease on emergency interventions requiring quickness and safety.

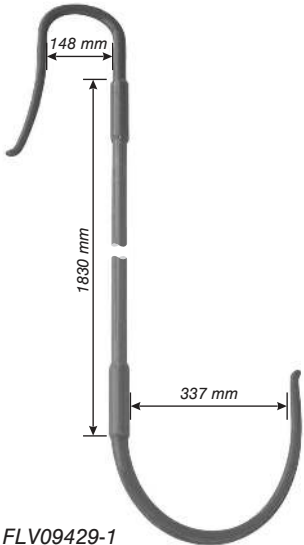
The *RITZGLAS®* Rescue Stick shall be only used to bring rear the victim from any spot that may be energized. The victim's removal shall be sufficient to perform the first aid procedures with safety.



Hook to pull by the rear



Hook to pull under the arm, legs or feet



FLV09429-1

RESCUE STICK			
Cat. No.	Description	Work Load (daN)	Approx. Weight (kg)
FLV09429-1	<i>RITZGLAS®</i> Ø 32 mm insulating Rescue Stick	300	2.30

Measuring Stick and Extension

RITZGLAS® insulating rods sport 10 cm black and orange striped marks alternately and are provided with hooks and universal connections, made of aluminum and cast bronze.

The measuring stick is ideal for measuring lengths and spans of up to 3 m on energized systems, where the recommended minimum safety distances are difficult to keep.

Its versatile design enables performing angular measurements.

Easy to handle, this tool can be used when working either by the Rubber Glove Method, or by the Hot Stick Method, using a hot stick connected to its universal head.

When measuring lengths over 3 m, extension FLV16146-1 should be attached to the set.



FLV16146-1

MEASURING STICK AND EXTENSION

Cat. No.	Description	Approx. Weight (kg)
FLV16140-1	Measuring Stick, Ø 9.5 mm x 3.0 m	0.80
FLV16146-1	Extension, Ø 16 mm x 2 m	1.00



FLV16140-1



Group C

Conductor Support Equipment

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Group C

Conductor Support Equipment

C

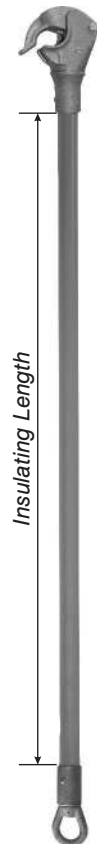
Wire Tongs

Wire Tongs are generally used to hold and keep conductors away from their original position. They allow linemen to perform maintenance on crossarms, insulators etc, removal and replacement of poles and hardware, as well as the installation of new components such as: lightning arresters on overhead lines.

Generally linemen work with a pair of wire tongs or together with other additional tools e.g.: saddles, pole bands, blocks, specially designed for a quick and safe work.

The wire tongs are manufactured with *RITZGLAS*® poles. Cast aluminum alloy fittings receive thermal treating, making them lighter and resistant. The forged-steel eye is fixed through steel pin and bearing, for a perfect and smooth rotation.

Wire tong jaw range allows for fixing onto conductors firmly and safely, by rotating the pole till the jaw is completely closed.



RH4645-8



WIRE-TONGS

Cat. No.	Ø (mm)	Insulating Length (m)	Conductor Ø (mm)		Approx. Weight (kg)
			Minimum	Maximum	
RH4645-6	38	1.74	4.10	57.00	3.30
RH4645-8	38	2.35	4.10	57.00	3.80
RH4645-10	38	2.96	4.10	57.00	4.20
RH4646-6	51	1.70	4.10	57.00	4.60
RH4646-8	51	2.33	4.10	57.00	5.30
RH4646-10	51	2.92	4.10	57.00	6.00
RH4646-12	51	3.53	4.10	57.00	7.50
RH4647-8	64	2.29	4.10	57.00	7.30
RH4647-10	64	2.90	4.10	57.00	8.40
RH4647-12	64	3.51	4.10	57.00	9.40
RH4647-14	64	4.12	4.10	57.00	10.40
RH4647-16*	64	4.73	4.10	57.00	13.90
RH4677-12	64	3.51	38.00	73.00	9.40
RH4677-14	64	4.12	38.00	73.00	10.40
RC400-0171	76	3.47	4.10	57.00	12.70
RC400-0172	76	4.08	4.10	57.00	14.90
RC400-0289*	76	4.71	4.10	57.00	18.40

* *Spliced wire tong*



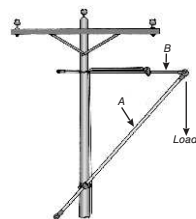
RC400-0289

RC400-0289 and RH4647-16 are spliced wire tongs, for easy transportation. The connection between the two sections is possible with a galvanized steel splice and they are fixed with a steel through pin and click-type counter pin, as shown on the picture aside.

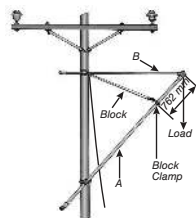
The sketches aside figure correct orientations on the use of the wire-tongs, through four of the most used configurations and their respective work loads.

Skt. 1 - Wire tong with saddles, wire tong band and blocks for conductors straining.

Skt. 2 - Wire tong with saddles, blocks band and blocks for conductor straining.



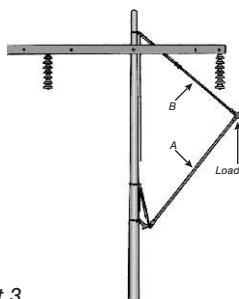
Skt. 1



Skt. 2

MAXIMUM WORK LOADS*								
Sketch No.	Dimensions of the RITZGLAS® Pole Ø (mm) / Length (m)		Type of Support	Work Load (daN / Conductor)	Max. Wire Size and Span (m)			
					ACSR		Copper	
	A	B			Size	Span	Size	Span
1	51 x 3.55	38 x 2.96	Saddles Lever lift	125	4/0	213	4/0	91
	64 x 3.51	38 x 2.96		215	4/0	366	4/0	152
2	51 x 3.55	38 x 2.96	Saddles Lever lift	125	4/0	213	4/0	91
	64 x 3.51	38 x 2.96		215	4/0	366	4/0	152

* Based on the fully horizontal wire-tong. The bottom the top saddle is placed below the conductor level, the greater the strain on Tong "A", therefore the lesser is the load it can support.

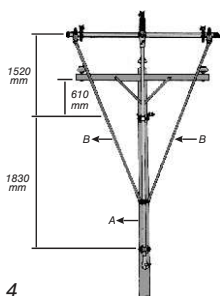


Skt. 3

The linemen must observe rigorously the safety distances during the use of the live line poles, according to the respective recommended voltages on the table at the beginning of this catalogue.

Skt. 3 - Wire-tongs, lever lifts, strain link sticks and rope blocks used on heavy conductors.

Skt. 4 - Three phases lift set where all three wires are lifted at once.



Skt. 4

MAXIMUM WORK LOAD

Sketch No.	Dimensions of the RITZGLAS® Pole Ø (mm) / Length (m)			Type of Support	Work Load (daN / Conductor)	Max. Wire Size and Span (m)			
						ACSR		Copper	
	A	B	C			Size	Span	Size	Span
3	51 x 3.55	38		Lever Lift saddles	159	4/0	259	4/0	114
	64 x 3.51	38			454	397.5	350	250	259
4	64 x 3.51	51 x 2.33	51 x 2.33	Pole saddles	102 + *	4/0	168	4/0	70

* With max. lift of 1.52 m above the saddle, max. unbalance of 102 kg on one side.

WARNING

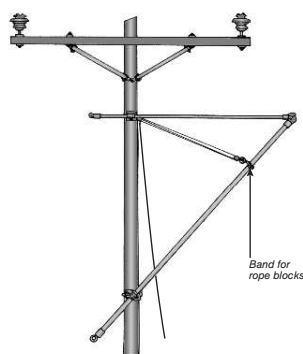
WORK LOAD - for the correct selection of the tools, refer to the loading information of the structure and if such details are not available, the entire working structure must be analyzed before applying the load.

Whenever such calculation is not possible, that is, when a pole becomes slightly higher than its adjacent pole, consider the weight of the adjacent spans as the maximum work load. This is not applicable to installed structures in high places, requiring special analysis for determination of the work load.

If the work load happens to be higher than indicated on the table for a specified tong, two wire tongs must be used with the dual saddle lift, or a wire tong of larger diameter.



RM1729



Wire Tong Band

The wire tong bands are attached to the wire tongs to be used as a straining point by the rope blocks, allowing therefore the articulation of the wire tongs when opening clear from their original position and returning them again to that position.

In order to ensure an effective insulation between the rope block and the energized conductors, the wire tong band must be attached to the pole at a minimum required distance, according to its voltage class or even bigger.

The wire tong bands are manufactured in 4 different diameters. The ring touching the pole is made of aluminum alloy, allowing free rotation of the pole when fixed to it by 2 bolts. The lifting eye is made of bronze alloy and has an articulation to follow the straining tool in relation to the wire tong.

WIRE TONG BAND			
Cat. No.	Ø (mm)	Work Load (daN)	Approx. Weight (kg)
RM1729	51	680	0.61
RM1729-1	64	680	0.65
RM1729-2	76	680	0.70
RM1729-3	38	680	0.33

Wire Tong Blocks Clamp

The wire tong blocks clamp is used as a fixing point for straining of the wire tong using a rope block, connected to the eye-ring of the blocks clamp. Such assembly aligns the straining loads with the wire tong, helping to lift heavy conductors rear to their original position.

The blocks clamp is manufactured in aluminum alloy. The eye-ring, tightening threaded bolt and wing-nut are manufactured in bronze alloy.

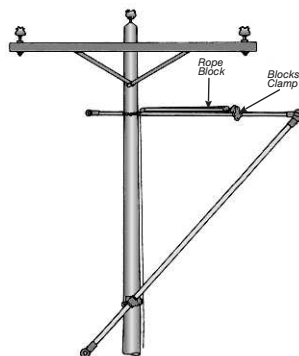
The inner walls of the clamp are covered with a stainless steel layer, in order to protect the surface of the pole from mechanical damages.

The clamp is composed of two parts which open up for fixing onto the pole, by tightening the wing nut, located at one of the sides of the clamp.

Spring action wing-nut and threaded bolt assembly to make the clamp operation easier, quicker and safer.



RM4743

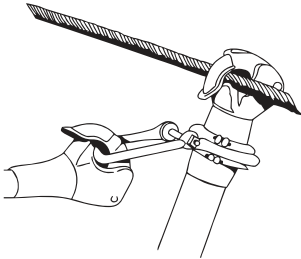


WIRE TONG BLOCKS CLAMP

Cat. No.	Ø (mm)	Work Load (daN)	Approx. Weight (kg)
RM4743	38	560	1.10
FLV11584-2	51	560	1.20
FLV11584-3	64	560	1.30



RM4745



Wire Tong Swivel

The wire tong swivel is an important tool for the assembly of two wire tongs when handling the conductor.

It is installed straight onto the wire tong head attached to the conductor. The other wire tong is attached to the grip of the wire tong swivel, providing thus an articulating set. The wire tong swivel is important to prevent two wire tongs attached to the same conductor, from twisting or even breaking.

It is provided in four diameters. The ring touching the pole is manufactured in aluminum alloy, allowing free rotation of the pole when fixed to it, by 04 bolts and nuts.

The round grip is manufactured in bronze alloy and the square grip is manufactured in aluminum and they are interconnected through a steel bolt to follow the articulations of the poles.

WIRE TONG SWIVEL			
Cat. No.	Ø (mm)	Work Load (daN)	Approx. Weight (kg)
RM4745	51	680	0.90
RM4745-1	64	680	0.98
RM4745-2	76	680	1.10
FLV16599-1	38	680	0.85

Wire Tong Saddles and Components

Pole saddles are intended for connection among poles, blocks or masts, to keep the wire tongs clear from the poles and, when necessary, they allow additional clearance by using the wire tong saddle extension. (RC400-0073).

Saddles are attached to poles using the chain tightener, final adjustment is possible by using the tightening wheel.

The wire tong saddles are made of special aluminum alloy, heat treated, meeting the load resistance and light-to-handle requirements. The following models are available: saddle and clamp, saddle and extension and clamp, saddle and hook and saddle and extension and hook.

The pole type saddle without extension is rated for work load of up to 454 daN and the saddle with extension is rated for working only up to 363 daN.

The crossarm type saddle (RM4744) is used when the working clearance is reduced or when one pole type saddle (or more) is also there attached.

The hook connected to the saddle allows for free movements, enabling the wire tong to move freely towards any direction.

It can be used in crossarms from 76 x 108 mm to 102 x 203 mm, with maximum work load of 227 daN.

The chain wheel tightener (RM1848-W) provides easy installation of the saddles, preventing it from sliding down or moving excessively, keeping it but firm to its location.



RC400-0073



RM4740-5W



RM4740-10W



RM4744



RM1848-W



RM1847

The length of this wheel tightener chain can be longer by using a chain extension (RM1847, RM1847-3, RM1847-4, RM1847-6) when attaching it to poles of bigger diameters.



RM4760-W

The single type lever lift (RM4760-W) is intended for “H” frameworks, or whenever the working clearance becomes too limited. This saddle is provided with handle and pin for connection of the rope block and wire tong respectively, allowing the free movement of both.

Whenever necessary, two saddles, one at each side, can be attached to the pole practically at the same location.

Also, one adapter is available (RM4760-2) to convert the single type lever lift into a double type lever lift, enabling two wire tongs to be used.



RM4760-2

These saddles are manufactured of special aluminum alloy, therefore they are very light and easy to handle. They allow up to 527 mm lift of the conductors and accept all models of wire tongs.



RC400-1016

The single type lever lift RC400-1016 (with insulating *RITZGLAS*® pole), is for the same application as that of the aluminum alloy saddle, but it is normally used on higher transmission voltages, where more space is required to lift the conductors.

It provides a total conductor lift of 915 mm.

The arbor adapter (RM4760-2) is also available for this saddle.

Such tool comprises a Ø 51 mm x 915 mm *RITZGLAS*® pole, of the same load capacity of the lever lifts in aluminum: 454 daN for the single type and 340 daN for the double type.



RM1846-W

The Bracket with wheel tightener and chain (RM1846-W) is a practical and easy-to-handle tool, to prevent undesired rope snarls. It is attached to the pole using the wheel tightener and chain assembly and is provided with six different rings, for the attachment of the ropes. It is manufactured with light aluminum alloy and is supplied with a 915 mm steel chain. It has a maximum total work load of 454 daN.

The Wire Tong Saddle Clevis (RM4740-14) is used to attach the Wire Tong butt-ring to a Wire Tong Saddle, when used as an arm for the Dual Auxiliary Arm, allowing the wire tong to rotate for attachment to the Stirrup of the Dual Auxiliary Arm.

The wire tong saddle bolt (RM4740) is intended for the same purpose as the wire tong saddle clevis (pole saddle), however it is used exclusively for mast connection to the double “T” concrete poles. Practical and simple, it bolts through one hole in the pole and is fixed with a wing nut. The body is manufactured in galvanized steel, the connector and wing nut are manufactured in bronze. Available in a total length of 295 mm.

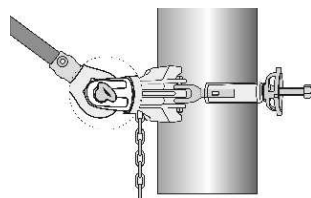
Pole clamps are versatile and very useful in distribution and transmission, allowing the fixing of the wire tongs with other tools previously fixed to the structure.

The two parts assembled together are made of aluminum alloy. Tightening bolt and wing nut are made of bronze alloy.

Pole clamp internal walls are covered with galvanized steel, to protect the pole's surface from getting damaged.



RM4740-14



RM4740



RM4741-3

SADDLES AND COMPONENTS

Cat. No.	Description	Work Load (daN)	Approx. Weight (kg)
R070358	Wheel tightener only	-	1.20
RC400-0073	Wire tong saddle extension	-	0.50
RM1846-W	Wheel tightener assembly	454	3.40
RM1848-W	0.915 m Wheel tightener assembly	1130	2.45

SADDLES AND COMPONENTS

Cat. No.	Description	Work Load (daN)	Approx. Weight (kg)
RM1847	0.457 m extension chain	1130	0.80
RM1847-3	0.915 m extension chain	1130	1.15
RM1847-4	1.22 m extension chain	1130	1.40
RM1847-6	1.83 m extension chain	1130	1.90
RM4740	Concrete pole wire tong saddle bolt, 0.290 m long	-	0.82
RM4740-3W	Saddle and tightener and 0.038 m clamp	454	4.90
RM4740-4W	Saddle and tightener and 0.051 m clamp	454	5.00
RM4740-5W	Saddle and tightener and 64 mm clamp	454	5.10
RM4740-9W	Saddle and tightener and 76 mm clamp	454	5.20
RM4740-10W	Saddle and tightener less clamp	454	4.10
RM4740-14	Wire tong saddle clevis	-	0.35
RM4740-15W	Saddle wheel tightener and clevis	454	3.40
RM4740-16W	Saddle, tightener, 38 mm clamp and extension	363	5.40
RM4740-17W	Saddle, tightener, 51 mm clamp and extension	363	5.50
RM4740-18W	Saddle, tightener, 64 mm clamp and extension	363	5.60
RM4740-19W	Saddle, tightener, 76 mm clamp and extension	363	5.70
RM4740-20W	Saddle, tightener, extension less clamp	363	4.60
RM4741-1	38 mm pole clamp only	-	0.80
RM4741-2	51 mm pole clamp only	-	0.90
RM4741-3	64 mm pole clamp only	-	1.00
RM4741-5	76 mm pole clamp only	-	1.08
RM4744	Crossarm type saddle 76 x 108 through 102 x 203 mm adjustment	227	2.50
RM4760-W	Single type lever lift	454*	5.83
RM4760-1W	Double type lever lift	340*	6.40
RC400-1016	RITZGLAS® lever lift	454*	8.50
RM4760-2	Arbor adapter	-	0.55

* For each wire tong

Tower Type Saddles

Tower Type Saddles are used to support wire tongs, boom poles, masts, rope blocks or hoists for insulator string displacement on towers. The saddle is securely fastened to the brackets of the metallic structure, by four hooks tightened by wing nuts.

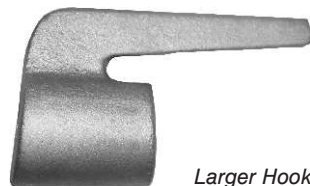
The RM4742 model is provided with a bronze clevis attached to its body, allowing rope blocks to be fastened, through a pivot connector.

Other models (RM4742-1 and RM4742-4) are provided with pole clamps of various diameters for firm and proper attachment to the poles, at any angle.

The RT400-1413 model is similar to the RM4742 model, with different length of the hooks, designed for larger angle-iron tower legs in heavier towers (see photo aside).



RM4742



Larger Hook

TOWER TYPE SADDLES

Cat. No.	Description	Work Load (daN)	Approx. Weight (kg)
RM4742	Tower saddle less clamp with regular hooks	454	5.50
RM4742-1	Saddle and 38 mm clamp	454	6.25
RM4742-2	Saddle and 51 mm clamp	454	6.30
RM4742-3	Saddle and 64 mm clamp	454	6.50
RM4742-4	Saddle and 76 mm clamp	454	6.70
RT400-1413	Tower saddle less clamp, with small and large hooks	454	5.80

Dual Auxiliary Arm



The Dual Auxiliary Arm is designed for use where a change of poles, crossarms or insulators is necessary.

The Dual Auxiliary Arm is lightweight and easily assembled. On regular construction, or alley arm construction, this tool can be used as a side arm.

Movable wire holders can be spaced for minimum conductor travel from the crossarm insulators to the temporary arm, yet the arm is long enough for use as a lifting arm with the use of three standard Wire Tongs.

Note:

When the Dual Auxiliary Arm is used on voltages above 15 kV and the arm is to support energized conductors during unstable weather conditions, it is recommended that insulators (RM4805-7) be added to the wire holders for increased creepage distance, in case of sudden rainfall.

It is also recommended that when the arm is to be left up overnight or during a period of possible rain, the arm should be wiped with a Silicone-Soaked Hot Stick Wiping Cloth (RM1904).

DUAL AUXILIARY ARM

Cat. No.	Description	Insulating Length (m)	Approx. Weight (kg)
RC400-0075	Dual Auxiliary Arm, with Wheel Binder & 1" Fork Wireholder	2.96	17.50

The Dual Auxiliary Arm is composed of the following tools:

- 01 pc Ø 64 mm *RITZGLAS*® pole and pole type saddle, with chain binder;
- 03 pcs RM4805-17 - Fork-type wireholder of 25.4 mm (1") opening, without insulator;
- 02 pcs RC400-0331 Wire tong stirrup;
- 01 pc RC400-0562 Dual Auxiliary Arm "T" with insulator.

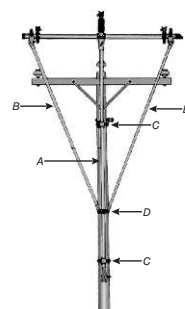
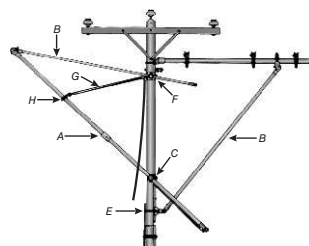
Accessory Tools required for these types of applications:

SIDE ARM

- 01 Wire tong RH4647-12 (A)
- 02 Wire tongs RH4646-8 (B)
- 01 Pole type saddles with extension and 64 mm RM4740-18W (C)
- 01 Pole type saddle with clevis RM4740-15W (E)
- 01 Saddle, tightener, clamp and extension for 51 mm pole RM4740-17W (F)
- 01 Double block RC400-0914 (G)
- 01 Wire tong band RM1729-1 (H)

LIFTING ARM

- 01 Wire tong RH4647-12 (A)
- 02 Wire tongs RH4646-8 (B)
- 02 Pole type saddles with extension and 64 mm RM4740-18W (C)
- 01 64 mm Wire tong pole clevis RM1728-5 (D)



PARTS AND COMPONENTS

Cat. No.	Description	Approx. Weight (kg)
RC400-0331	Wire tong stirrup	0.94
RC400-0562	Dual Auxiliary Arm "T" with insulator	2.40
FLV00714-2	Dual Auxiliary Arm "T" without insulator	1.95
RE400-0008	38 mm (1-1/2") Fork-type wireholder without insulator	1.30
RM1728-5	64 mm Wire tong pole clevis	1.50
RM4805-7	Supporting Insulator	0.45
RM4805-17	25 mm (1") Fork-type wireholder without insulator	0.90
RE400-0009	38 mm (1-1/2") Fork-type wireholder with insulator	1.75
RM4805-15	25 mm (1") Fork-type wireholder with insulator	1.35



RM4805-17



RE400-0008



RM4805-7



RC400-0331



RM1728-5



RC400-0562

TOOLS APPLICATION

- RE400-0008 (1-1/2" without insulator)
- RM4805-15 (1" with insulator)
- RE400-0009 (1-1/2" with insulator)
- RM4805-17 (1" without insulator).

The wireholders feature a 25 mm and 38 mm (1" or 1-1/2") opening. They have a counterbalanced latch which closes automatically behind the conductor to hold it as the conductor is lowered into the wireholder. The latch must be swiveled with an insulated hand tool to release the conductor.

The wireholders are available with or without insulator and are provided with a 64 mm pole clamp for attachment to the crossarm of the dual auxiliary arm.

- RM4805-7

Epoxy based insulators also available as separate items, to be attached to existing arm wireholders, for 34.5 kV.

- RC400-0331

The wire tong stirrup can be ordered separately either as a replacement part or to be used with the existing equipment. It is intended for connection of the wire-tong braces of the dual auxiliary arm, using its 64 mm pole band. Manufactured in light-weight aluminum alloy, easy to handle.

- RM1728-5

The wire tong pole clevis clamps around the vertical wire-tong supporting an auxiliary crossarm and engages butt rings of the two wire tongs used as side braces.

Manufactured in aluminum alloy, the two parts are assembled together with two eye-bolts, as one single piece.

- RC400-0562 / FLV00714-2

The dual Auxiliary Arm "T" is to be used specifically with the lifting arm application type.

Auxiliary Crossarms

These auxiliary arms are rated at 272 daN, with the three balanced conductors and 68 daN at each wireholder, for unbalanced conductors.

The auxiliary arms RH4862-6, RH4862-8 and RH4862-51 are used to change crossarms, insulators or poles on short spans up to and including 15 kV phase-to-phase. Two RM4740-5W saddles can be used to mount the mast to the pole, which must be ordered separately.

Two mast pole lengths are available:

- 1.52 m mast (RH4862-6 and RH4862-8 crossarms) provides a lift of 0.76 m above the top saddle when the saddles are mounted at a minimum recommended distance of 0.46 m apart.

- 3.05 m mast (RH4862-51 crossarm) provides a lift of 1.17 m.

The auxiliary crossarm RH4863-10 has a special mast and RITZGLAS® arm, for attachment to the insulating boom of aerial devices or similar equipment.

It is used on light construction or maintenance works, during the handling of the conductors.

The mast is built with two supporting poles and attached to an adjustable saddle for square or rectangular booms of 127 x 178 mm up to 254 x 254 mm.

It must be attached only onto equipment of minimum 900 daN load lifting rating.

The arm has a balanced load rating of 454 daN or the maximum load rating of the equipment, whichever is bottom.

The auxiliary crossarm is recommended to be only used with braces and is rated at 90 daN of max. unbalanced load (each wireholder).

Each roller wireholder (RC400-0268) used with this auxiliary crossarm is rated at 45 daN.



RC400-0268

AUXILIARY CROSSARMS

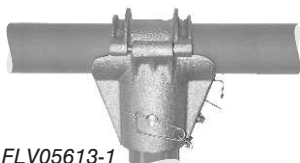
Cat. No.	Description	Approx. Weight (kg)
RH4862-6	Auxiliary arm assembly, composed of one Ø 64 mm x 1.52 m long mast and Ø 64 mm x 1.83 m long arm	12.80
RH4862-8	Auxiliary arm assembly, composed of one Ø 64 mm x 1.52 m long mast and Ø 64 mm x 2.64 m long arm	13.80
RH4862-51	Mast and braces for crossarm, Ø 64 mm x 3.05 m long arm	15.00
RH4863-10	Auxiliary arm for attachment to the aerial lift	54.00

PARTS AND COMPONENTS

Cat. No.	Description	Approx. Weight (kg)
RM4805-16	C-type wireholder, no insulator	1.08
FLV05613-1	Rubber-glove auxiliary arm "T"	1.30
RC400-0268	Roller wireholder, no insulator, for attachment to the auxiliary arm assembled on crane or other similar unit	1.90



RM4805-16



FLV05613-1

RH4862-6 auxiliary arm composition:

- 01 pc Ø 64 mm x 1.52 m long mast.
- 01 pc Ø 64 mm x 1.52 m long mast.
- 01 pc auxiliary arm "T" FLV05613-1.
- 04 pcs RM4805-16 wireholder.

RH4862-8 auxiliary arm composition:

- 01 pc Ø 64 mm x 1.52 m long mast.
- 01 pc Ø 64 mm x 2.44 m long arm.
- 01 pc auxiliary arm "T" FLV05613-1.
- 04 pcs RM4805-16 wireholder.

RH4862-51 mast composition:

- 01 pc Ø 64 mm x 3.05 m long mast.
- 02 pcs Ø 38 mm x 2.02 m long braces.
- 02 pcs Ø 64 mm pole bands RM4741-3
- 01 pc RM1728-5 Wire tong pole clevis.
- 01 pc auxiliary arm "T" FLV05613-1.

ACCESSORIES		
Cat. No.	Description	Approx. Weight (kg)
RC400-0269	Roller wireholder, with RM4805-7 insulator, for attachment to the auxiliary arm assembled on crane or other similar unit. 2" max. opening	2.50
FLV17382-1	Roller wireholder, for attachment to the auxiliary arm assembled on crane or other similar unit. 2-1/2" max. opening	2.10



RC400-0269



FLV17382-1

Extension Arm

The Extension Arm is designed for use on voltages up to and including 15 kV where reconductoring or insulator replacement is necessary.

The *RITZGLAS®* extension arm can be used on voltages up to 34.5 kV providing wireholders are fitted with RM4805-7 insulators.

The Extension Arm is suspended under the crossarm by brackets, in a way so that approximately 3/4 of its length exceeds the crossarm length, to enable the conductor to be removed from the original crossarm and placed in the wireholder mounted on the Extension Arm.



EXTENSION ARM						
Cat. No.	Ø (mm)	Insulating Length (m)	Quantity of Wireholders Per Set	Max. Crossarm Section (mm)	Max. Vertical Load Rating (each wireholder)	Approx. Weight (kg)
RH4800-60	64	1.43	1	95 x 120	68	5.80
RH4800-72	64	1.74	2	95 x 120	68	7.40
RC400-1310	76	1.74	2	95 x 120 and 152 x 152	136	10.90
RT403-2417	64	1.74	2	95 x 120 and 152 x 152	68	6.30

Temporary Conductor Support

- RC400-0517

This Support Tool clamps to the crossarm, adjusting to crossarms from 82 mm (3-1/4") x 102 mm (4") to 152 mm (6") x 152 mm (6"). The C-clamp and wireholder are made of heat treated aluminum and fixed onto the *RITZGLAS*® pole section. It can be installed with a Grip-All clamp stick. Work load: 68 daN (150 lbs).

- RC400-1509 / RH4809W

The *RITZGLAS*® temporary conductor supports are used to hold energized distribution conductors during replacement of poles or repair or replacement of pole tops and support insulators. It is furnished with wheel tightener for poles up to Ø 356 mm (14") and fork-type wireholders, accommodating conductor sizes up to Ø 25 mm (1") (2 pcs with the model RC400-1509 and 1 pc with the model RH4809W).

When using the temporary conductor support for voltages above 15 kV or when the tool is to support an energized conductor overnight or during periods of expected rain, RM48057 insulators should be added to the wireholders.

Work load: 68 daN (150lb) per wireholder. *

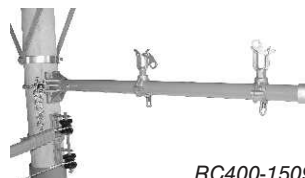
- RT400-1939 / RT400-1940

These two models of temporary conductor supports have the same application as the RC400-1509 and RH4809W, however they are supplied with a strap-type ratchet-action mount (RT400-2007), rather than a chain binder.

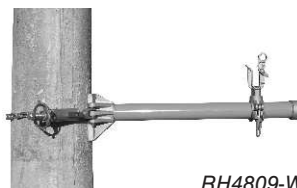
Same recommendations on the use of the RM4805-7 insulator and work load are valid for these two models.



RC400-0517



RC400-1509



RH4809-W



RT400-1940



RT400-2007



RT400-2272

- RT400-2272

The corner restraint bracket tool was specially designed for energized replacement of insulators on distribution running-corner poles.

Used in combination with a strap hoist, the Corner Restraint Bracket Tool helps control each phase conductor while insulators are replaced. Throughout maintenance procedures, the bracket helps restrain the conductor while repairs are made. It also acts as a load restraint for the hoist to pull the conductor rear in for reconnection to the insulator string.

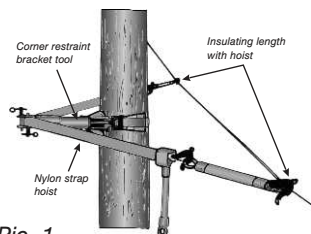
The Corner Restraint Bracket assists in isolating the strap hoist from the pole, a potential ground. It also avoids cutting a short section from a poleguard protective cover or using (and possibly damaging) a rubber blanket as a pad between the strap and the pole.

In order to insulate the strap hoist, two insulating link sticks (RC400-1175 or RC400-2399 or RC400-2400) are used, to connect the hoist hooks to live line grips on the conductor.

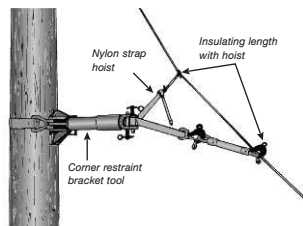
The corner restraint bracket tool comprises one Ø 64 mm RITZGLAS® pole with a 0.15 m insulating length, and a 0.40 m working length. Attachment to the pole is possible with a D-Buckle Strap Binder RT400-2007.

Work load: 907 daN.

TYPICAL APPLICATIONS



Pic. 1



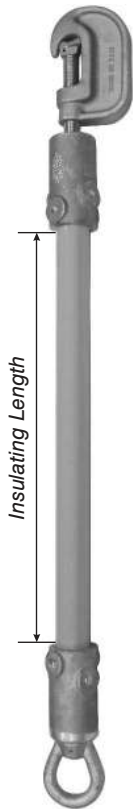
Pic. 2

Pic. 1 - In this arrangement, the Corner Restraint Bracket is rigged on the guy side of the pole. It is used where the conductor is pulled in only a short distance toward the pole.

Pic. 2 - In this arrangement, the Corner Restraint Bracket is rigged on the conductor side of the pole. It is used where the conductor must be pulled in a considerable distance toward the pole.

TEMPORARY CONDUCTOR SUPPORTS

Cat. No.	Description	Approx. Weight (kg)
RC400-0517	Crossarm Conductor Support, Ø 32 mm x 0.20 m of insulating length	2.20
RC400-1509	Two-conductor support, with wheel tightener for pole attachment, fixed onto a Ø 64 mm x 1.11 m <i>RITZGLAS</i> ® insulating pole. Supplied with two fork-type wireholders	7.70
RH4809-W	Single conductor support, with wheel tightener for pole attachment, fixed onto a Ø 64 mm <i>RITZGLAS</i> ® insulating pole. Supplied with one fork-type wireholder. Distance between the wireholder and the pole attachment: 0.76 m	6.30
RT400-1939	Two-conductor support, with strap-type ratchet-action pole mount (T400-2007), fixed onto a Ø 64 mm x 1.11 m <i>RITZGLAS</i> ® insulating pole. Supplied with two fork-type wireholders	8.10
RT400-1940	Single conductor support, with strap-type ratchet-action pole mount (T400-2007), fixed onto a Ø 64 mm <i>RITZGLAS</i> ® insulating pole. Supplied with one fork-type wireholder. Distance between the wireholder and the pole attachment: 0.76 m	6.40
RT400-2272	Corner restraint bracket tool, with strap-type ratchet-action pole mount. Insulating length: 0.15 m, working length: 0.40 m	5.90
RT400-2007	1.20 m strap ratchet-action pole mount for replacement in the corner restraint bracket tool RT400-2272	1.40



Strain Link Stick

On deadened structures and running corners, a strain link stick is used as insulation between rope blocks and a come-along clamp.

Conductor loads on long spans and H-frame structures are sometimes too high that they could effectively be handled with wire tongs only. To supplement the wire tongs, a strain link stick is attached to the conductor close to the wire tong.

Strain link sticks are also used to support the middle conductor on H-frame structures, during insulator or crossarm changes.

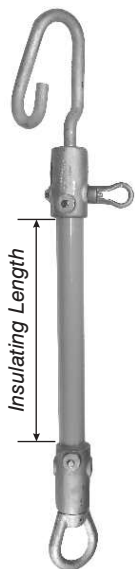
Hooks and ferrules are made of heat-treated aluminum alloy, for the best strength to weight ratio. Butt rings - for attaching rope blocks or hand lines - are forged of high quality steel and are mounted onto the pole through steel pin, enabling them to spin freely on ball thrust bearing.

The edges of the jaws of RITZ Link Sticks are rounded to prevent scarring of conductors.

In view of the growing range of works requiring numerous loads or diversity of conductor sizes, link sticks are available in four sizes of heads and several different lengths of poles.

STRAIN LINK STICK

Cat. No.	Dimensions		Jaw Opening (mm)		Work Load (daN)	Approx. Weight (kg)
	Ø (mm)	Insulating Length (m)	Min.	Max.		
RC400-0814	32	1.72	5.60	19.00	1588	2.30
RC400-0815	32	2.33	5.60	19.00	1588	2.60
RC400-0816	32	2.94	5.60	19.00	1588	2.90
RC400-0817	32	3.55	5.60	19.00	1588	3.20
RC400-0818	32	4.16	5.60	19.00	1588	3.60
RH4715-1	32	0.50	5.60	19.00	1588	1.70
RH4715-2	32	1.11	5.60	19.00	1588	2.00
RH4716-1	38	0.46	11.20	27.00	2948	2.90
RH4716-2	38	1.07	11.20	27.00	2948	3.30
RH4716-3	38	1.68	11.20	27.00	2948	3.70
RH4716-4	38	2.29	11.20	27.00	2948	4.15
RH4716-5	38	2.90	11.20	27.00	2948	4.60
RH4716-6	38	3.51	11.20	27.00	2948	5.00
RH4717	38	1.07	18.30	38.00	2948	3.40
RH4717-1	38	1.68	18.30	38.00	2948	3.80
RH4718	38	1.07	25.40	63.50	2948	4.30
RH4718-1	38	1.68	25.40	63.50	2948	4.70
RH4718-2	38	2.29	25.40	63.50	2948	5.10
RH4718-3	38	2.90	25.40	63.50	2948	5.60
RH4718-4	38	3.51	25.40	63.50	2948	6.00



Spiral Link Stick

The Spiral Link Stick is used in place of a strain link stick in close places where the lineman cannot safely install a strain link stick by hand. A lifting eye on the head ferrule enables the lineman to guide the Spiral Link Stick to the conductor with a hotstick. The Spiral Link Stick is composed of a 32 mm (1-1/4") RITZGLAS® pole, a spiral shape hook made of special hot galvanized steel. This provides a strong and suitable tool for work loads of conductors up to 1510.5 kcmil CAA (ACSR - approx. Ø 38 mm). Ferrule castings are of heat-treated aluminum alloy.

Butt rings - for attaching rope blocks or hand lines - are forged of high quality steel and are mounted onto the pole through steel pin, enabling them to spin freely on a ball thrust bearing.

SPIRAL LINK STICK				
Cat. No.	Dimensions		Work Load (daN)	Approx. Weight (kg)
	Ø (mm)	Insulating Length (m)		
RC400-0812	32	1.11	1588	2.40
RH4722	32	0.20	1588	1.90

Roller Link Stick

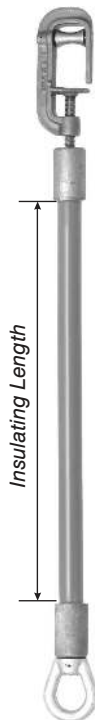
The Roller Link Stick is used to spread and hold conductors aside at midspan, for increased working space, when relocating poles.

Since it is attached to the conductor through the roller head, it may be pulled by the ground man into position by a hand line or rope block attached to the butt ring.

The roller head suitable for conductors of up to 605 kcmi CAA (ACSR - Ø 24 mm approx.).

The Roller Link Stick is composed of a 32 mm (1-1/4") RITZGLAS® pole and bronze alloy head and roller, assembled to a threaded pin, for jaw opening and closing operations, to secure conductors.

Ferrules are made of heat-treated aluminum alloy. Butt rings - for attaching rope blocks or hand lines - are forged of high quality steel and are mounted onto the pole, through steel pin, enabling them to spin freely on ball thrust bearing.



ROLLER LINK STICK				
Cat. No.	Dimensions		Work Load (daN)	Approx. Weight (kg)
	Ø (mm)	Insulating Length (m)		
RH4714-4	32	1.13	454	2.48
RH4714-6	32	1.74	454	2.80

Adjustable Strain Poles

The Ø 51 mm *RITZGLAS*® adjustable strain pole is provided with 6 stainless steel cross-pins (5 working cross-pins and 1 locking cross-pin), located at 152 mm intervals, to support the adjustable pole clamp on the hot-end.

The 5 crosspins arrangement enables the lineman to displace the yokes to a maximum length of 608 mm.

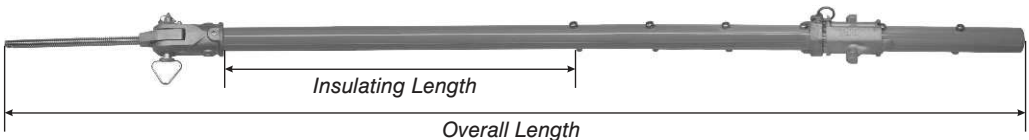
The hot end yokes for suspension and strain string insulators are attached to strain poles by adjustable pole clamps. The adjustable pole clamps can be adjusted manually, or with a hot stick and can be used directly on the strain pole to lift conductors, not requiring yokes.

On the cold end, a special 305 mm long high-strength steel strain-jack provides uniform traction of the set, using ratchet wrenches and trunnions.

Customized length strain jacks and adjustable pole clamps can be ordered as separate items or spare parts.

Ratchet wrenches and trunnions can also be ordered as separate items.

This tool is key to many high voltage (HV) and extra-high voltage (EHV) transmission maintenance works. Adjustable strain poles can be used with an adjustable pole clamp (RE401-0138) or an adjustable hook assembly (RM4724-1).

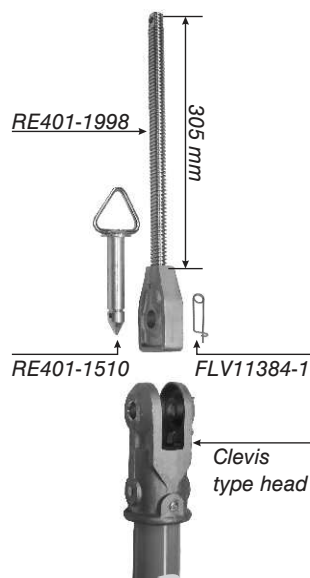


COMPOSITION OF THE SET:

Adjustable strain poles (RC401-2144 through RC401-2149 models) are supplied with the following components:

- 01 pc Ø 51 mm Strain pole, with clevis-type head
- 01 pc Adjustable pole clamp RE401-0138
- 01 pc 305 mm Strain jack RE401-1998
- 01 pc Steel through pin RE401-1510
- 01 pc Counterpin FLV11384-1

Maximum load rating: 3402 daN



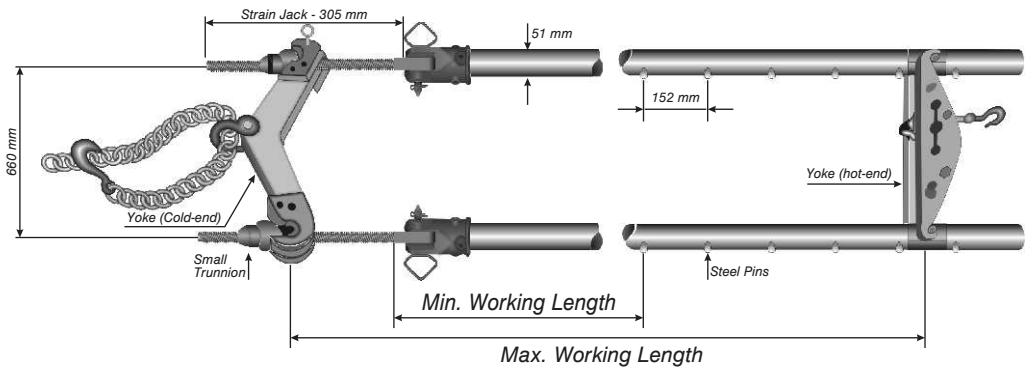
ADJUSTABLE STRAIN POLES

Cat. No.	Maximum Voltage Use (kV)	Insulated Length (m)	Overall Length (m)	Approx. Weight (kg)
RC401-2144	72.5	0.91	2.29	8.50
RC401-2145	169	1.22	2.60	8.90
RC401-2146	242	1.60	2.98	9.30
RC401-2147	302	2.13	3.51	10.00
RC401-2215	362	2.60	3.98	11.30
RC401-2148	552	3.43	4.81	11.50
RC401-2149	765	4.57	5.95	13.00

ACCESSORIES

Cat. No.	Description	Approx. Weight (kg)
RE401-0138	Ø 51 mm adjustable pole clamp	0.70
RE401-1998	305 mm long strain jack	1.30
RV401-0157	610 mm long strain jack	1.80
RV401-0158	915 mm long strain jack	2.30
RE401-1510	Steel through pin to hold the strain jack to the clevis-type head	0.30
FLV11384-1	Pin-type cotter pin	0.05

Two-pole Strain Carriers



Two-pole Strain Carriers series RC401-2174 through RC401-2179 relieve strain from an insulator string to enable energized replacement work of single or multiple insulator strings, depending on the hardware of the string arrangement.

The strain poles are used with pole clamps and yokes, with proper trunnions and strain jacks.

The Ø 51 mm *RITZGLAS*® strain pole with adjustable pole clamp is provided with 6 stainless steel cross-pins (5 working cross-pins and 1 locking cross-pin), located at 152 mm intervals to support the adjustable pole clamp on the hot-end.

The 5 crosspins arrangement enables the lineman to displace the yokes to a maximum length of 608 mm.

The hot end yokes for suspension and strain string insulators are attached to strain poles by adjustable pole clamps. The adjustable pole clamps can be adjusted manually or with a hot stick.

Hot-end Yoke includes steel hook.

A special 305 mm long steel strain jack at the energized end of each pole provides the uniform straining of the set.

Yokes are made of high-strength laminated aluminum plate and include a steel chain and hook assembly for anchoring the rear plate to the structure.

Nominal work load: 6084 daN.

Strain poles, adjustable pole clamps, trunnions or yokes can be ordered separately as replacement parts.

TWO-POLE STRAIN CARRIERS				
Cat. No.	Max. Working Voltage (kV)	Distance Between Yokes		Approx. Weight (kg)
		Min.	Max.	
RC401-2174	72.5	1.09	1.88	33.70
RC401-2175	169	1.40	2.19	34.00
RC401-2176	242	1.78	2.57	34.50
RC401-2177	302	2.31	3.10	35.20
RC401-2216	362	2.78	3.57	36.20
RC401-2178	552	3.61	4.40	36.70
RC401-2179	765	4.75	5.54	38.20

COMPOSITION OF THE SET:

The two-pole strain carriers of the previously mentioned group, are provided with the following components:

- 02 pc RITZGLAS® Ø 51 mm Strain poles, with clevis-type heads and proper crosspins and counter-pins.
- 01 pc Yoke RC401-1721 for anchoring to the structure (with chain RM1942).
- 01 pc Yoke RC401-1720 for attachment to the hot end.
- 02 pc Strain jacks RE401-1998 (305 mm).
- 02 pc Adjustable pole clamps RE401-0138.
- Two small trunnions RE401-2068.
- 01 yoke socket RC401-1720

Note:

Yoke socket RC401-1720 is specified according to the hardware to be informed by the customer.



RC401-1721

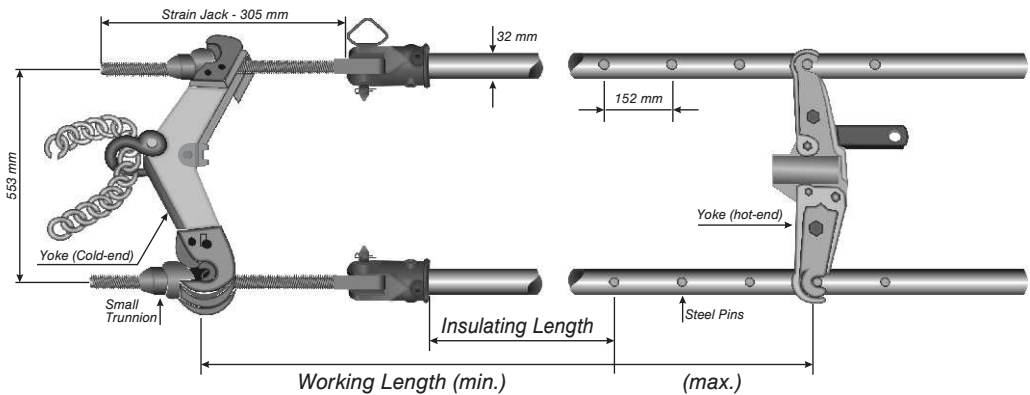


RM1942



RC401-1720

Distribution Strain Carriers



These Distribution Strain Carriers RC401-0411 and RC401-0410 relieve strain while removing a single cold end string of insulators, enabling its removal from the energized line. The distribution strain carrier has a yoke at the hot end, which is equipped with jaws having a compression lever-type action, gripping tighter onto the conductor as the load increases. The various jaws fit conductors from 7.40 through 20.50 mm (2 through 397.5 CAA or ACSR). The other end of the set is equipped with a yoke, a chain and hook for anchoring to the structure. Special Steel Strain jacks (305 mm long) and small trunnions allow for the uniform straining of the set.

Maximum load rating: 2948 daN, for each distribution strain-carrier assembly from 69 kV through 145 kV.

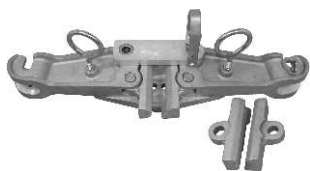
DISTRIBUTION STRAIN CARRIERS

Cat. No.	Pole Length (m)	Insulating Length (m)	Working Length (m)		Approx. Weight (kg)
			Min.	Max.	
RC401-0411	1.83	0.97	1.10	1.70	26.70
RC401-0410	2.44	1.59	1.70	2.32	27.30

Distribution strain carriers are supplied with the following components:

- 02 pc 32 mm Ø RITZGLAS® poles, for yoke adjustment through 05 existing steel pins, every 152 mm along the pole.
- 01 pc Yoke FLV12192-1 for hot-end installation.
- 01 pc Yoke FLV12239-1 for anchoring of the set to the structure, through the chain (RM1942) supplied along with the set.
- 02 pc Strain jacks RE401-1998 (305 mm).
- 02 pc Small trunnions RE401-2068.

Strain jacks, trunnions and yokes can be ordered separately as replacement parts.



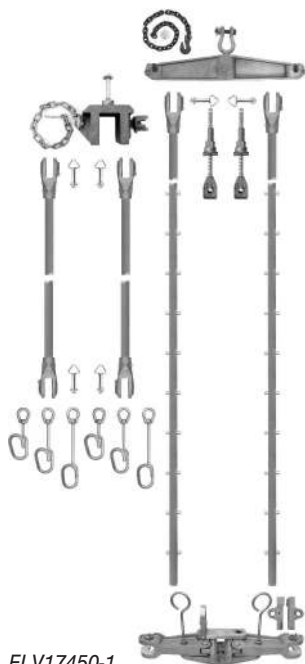
FLV12192-1



FLV12239-1



RM1942



FLV17450-1

Light-weight Strain Carrier

The Light-duty Strain Carrier for cold end and suspension insulator strings has been designed for conductors up to 636 MCM (Ø 25.15 mm) GROSBEAK, for replacement of single cold end insulator strings of 69 kV through 145 kV energized systems and suspension strings of 110 kV through 145 kV energized systems.

The excellent mechanical characteristics of the *RITZGLAS®* Insulating poles allows for the reduction of the Ø of the strain poles to only 32 mm (1-1/4"), offering thus a proportional reduction of the hardware dimensions, providing for a lighter and more practical equipment, making transportation and handling much easier.

The metallic tools used at the cold-end are used either on cold end or suspension works, offering versatility to the set and making the equipment more economical and attractive, from a cost-benefit perspective.

Max. work load: 2500 daN

LIGHT-WEIGHT STRAIN CARRIER	
Cat. No.	Description
FLV17450-1	Light-weight strain carrier, for 69 through 145 kV cold end strings and 110 through 145 kV suspension strings, on energized systems.

STRAIN POLES LENGTH			
Cat. No.	Insulating Length (m)	Working Length (m)	
		Min.	Max.
FLV13780-1	1.09	1.16	2.53
FLV13130-1	1.22	1.45	1.45

APPLICATION OF EACH TOOL

1) Cold-end yoke FLV13352-1

This tool is used on cold end and suspension strings.

On cold end strings, it is attached to the tower structure through clevis-pin and hook-chain assembly, coupled directly to the ball-link extension, with \varnothing of up to 22 mm and rabbet with \varnothing of up to 38 mm.

On suspension strings, it is attached to the tower structure using the attachment support. (FLV13356-1)



FLV13352-1

2) Small Trunnion RE401-2068

To be attached to strain jack (RE401-1998) using a ratchet wrench (RM1948-3), in order to strain the conductor, transferring load from the string to the strain carrier.

3) Strain jack RE401-1998

To be attached to strain pole (FLV13780-1), through eye-clevis assembly and to cold-end yoke (FLV13352-1), through small trunnions (RE401-2068).



RE401-2068

Note:

Strain jacks with different lengths are available upon request.



RE401-1998

4) Insulating Strain Pole FLV13780-1

Cold-end clevis for attachment to the strain jack and 10 (ten) pairs of hot-end stainless steel pins are used for support and attachment of the hot end yoke, without the need to use adjustable pole clamps when replacing insulators on cold end structures.



FLV12192-1

5) Hot-end Yoke FLV12192-1

Attached directly to the conductor, needing no wire grip for straining when replacing a cold end insulator string.

6) Attachment Support FLV13356-1

Attached to the end of the tower structure, it serves as a support and attachment of the cold-end yoke (FLV13352-1) when changing suspension insulator strings.



FLV13356-1



FLV13130-1



FLV13006-1



FLV13006-2



FLV13006-3



RE400-0044



RM1948-3

7) Insulating Strain Pole FLV13130-1

Used to support the conductor with the strain jack (RE401-1998) attached to one end and a spiral hook (FLV13006-1, FLV13006-2, FLV13006-3) to the other end, when changing suspension insulator strings.

Note:

Poles with different lengths can be provided upon request.

8) Spiral Hooks FLV13006-1 / FLV13006-2 / FLV13006-3

Attached to strain pole (FLV13130-1), it grips the conductor to support it when changing suspension insulator strings. Different lengths available depending on the length of the hot-end hardware of the insulator string.

9) Hook-type head RE400-0044

This tool is used as an option to the strain pole (FLV13130-1), instead of the spiral hooks (FLV13006-1, FLV13006-2, FLV13006-3).

10) Ratchet Wrench RM1948-3

Despite this tool not being included in the strain carrier set, it is recommended for application on the small trunnion (RE401-2068).

COMPOSITION OF THE COLD END SET

Cat. No.	Description	Qty.	Approx. Weight (kg)
FLV13352-1	Cold-end yoke, made of cast aluminum, with clevis, bolt and chain	01	8.10
RE401-1998	305 mm Strain jack	02	1.30
RE401-2068	Small trunnions	02	0.83
FLV13780-1	RITZGLAS® Insulating Strain poles, Ø 32 mm, overall length: 2.70 m, with cast aluminum clevis, for attachment of the strain pole and 10 stainless steel pins each, at 152 mm intervals, for attachment of the hot-end yoke	02	4.10
FLV12192-1	Cast aluminum Hot-end yoke, to accept CAA (ACSR) conductors, min. 2 AWG (Ø 8 mm), through max. 636 MCM (Ø 25.15 mm)	01	6.10
Approx. Overall weight (kg)			26.70

COMPOSITION OF THE SUSPENSION SET

Cat. No.	Description	Qty.	Approx. Weight (kg)
FLV13352-1	Cold-end yoke, made of cast aluminum, with clevis, bolt and chain	01	8.10
RE401-1998	305 mm Strain jack	02	1.30
RE401-2068	Small trunnions	02	0.83
FLV13130-1	RITZGLAS® Insulating Strain poles, Ø 32 mm, overall length: 1.46 m, with cast aluminum clevis at both ends	02	2.60
FLV13356-1	Cast aluminum alloy attachment support, for attachment to the tower structure, through chain with hook and safety lock	01	3.40
FLV13006-1*	695 mm long spiral hook made of heat-treated special steel, with eye-link for attachment of the clevis-clevis strain pole	02	2.30
FLV13006-2*	615 mm long spiral hook made of heat-treated special steel, with eye-link for attachment of the clevis-clevis strain pole	02	2.00
FLV13006-3*	555 mm long spiral hook made of heat-treated special steel, with eye-link for attachment of the clevis-clevis strain pole	02	1.80
Approx. Overall weight (kg)			22.33

* Note: These pairs of spiral hooks (FLV13006-1, FLV13006-2, FLV13006) can be alternatively replaced by two hooks RE400-0044.

Sectional Strain Pole (with splice)

The Sectional Strain Pole with splice, together with yokes, has been designed to withstand the mechanical straining of the conductors, when performing maintenance on the suspension or cold end insulator strings, where their lengths differ from the conventional standards.

The Sectional Strain Pole is composed of three parts:

Hot-end Strain pole (energized), Cold-end Strain pole (de-energized) and the fiberglass splice, which is the middle pole, intended for the joint of the hot-end and cold end poles.

These poles are manufactured with Ø 51 mm *RITZGLAS*® poles and each pole has a clevis-type bronze head for connection to the yokes. The fiberglass splice is manufactured with a special manufacturing process, with reinforced fiberglass, outside Ø of 76 mm. It is provided with holes every 6 mm enabling the assembly of the hot-end and cold-end poles, within pre-determined lengths.

The strain poles allow for different configurations with the strain jacks of following lengths: 305 mm, 610 mm and 915 mm, for extended overall length of the set.

Hot-end or cold-end strain poles, fiberglass splice, strain jacks or counter-pins can be ordered separately as replacement parts.

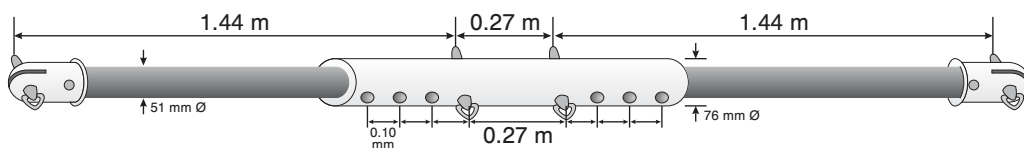
Note:

Although the fiberglass splice is manufactured to standard lengths of 1.12 m, the hot-end and cold-end strain poles can be ordered to special lengths, suitable to types and voltages of each company. For special lengths, which shall be according to the configuration of the strings, technical drawings must be provided to our RITZ engineering department, in order to analyze the technical viability of the product.



COMPOSITION OF THE SET:

- 01 pc *RITZGLAS*® hot-end strain pole, with clevis-type bronze head, with steel pin and counter-pin.
- 01 pc *RITZGLAS*® cold-end strain pole, with clevis-type bronze head, with steel pin and counter-pin.
- 01 pc 1.12 m long Fiberglass splice and two sets of steel pins and counter-pins.



SECTIONAL STRAIN POLE WITH FIBERGLASS SPLICE

Cat. No.	Description	Work Load (daN)	Approx. Weight (kg)
RC401-0758	Sectional Strain Pole with fiberglass splice, with 8 adjustment holes, minimum length of 3.15 m and maximum length of 3.75 m	4536	13.90

Accessories for Strain Carriers

APPLICATIONS

- FLV10460-1



FLV10460-1

It is highly recommended to provide the installation of the safety nut as soon as the trunnions are installed to the strain jacks. This ensures additional safety during the straining operation as a support to the trunnions.

- RE401-2066/ RE401-2068



RE401-2068 / RE401-2066

The small and large trunnions have been specially designed for the attachment of the yokes to the strain poles. They are made of bronze alloy and provided with ball-thrust bearings to make them easier to operate during the rotation on the strain jacks, using the ratchet wrench (RM1948-3).

- RE401-0138



RE401-0138

The adjustable pole clamp is made of thermal-treatment aluminum alloy and have been designed for attachment of the yokes to the hot-end strain poles. A movable device on this tool provides the adjustment and the manual or hot stick displacement of the splice, for better positioning over the steel pins of the strain pole.

- RE401-1998/ RV401-0157/ RV401-0158



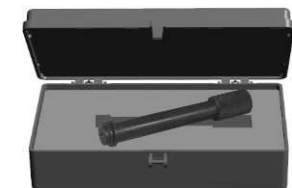
RE401-1998

The Tongue type Strain Jacks are used for attachment to the strain poles as an adjustment tool when straining insulator strings.

The Tongue type Strain Jack is attached to the eye of the strain poles through the existing head on one of its ends.

- FLV17755-1

Trunnion Gauge



FLV17755-1

Trunnion gauges, also known as "Go/No Go" (or Pass/Fail), are made of steel and are essential for periodical check of the trunnion threads to ensure that there is no thread wearing.

This gauge is provided with 0.5 mm wider threads. Thus, if the trunnion allows the introduction of the gauge, even only partially, the thread wearing of the trunnion is greater than 0.5 mm and, therefore, improper for use.

- RSPM2947-1

The eye link coupling is provided with the same thread as that of the strain jack. It enables and eases the lifting of the strain poles up to the structure, acting as a safe fixing point for the attachment of the hand line.



RSPM2947-1

- RH4785-1/ RH4785-2/ RH4785-3/ RT400-0025

The Clevis Type Strain Jacks are used for attachment to the clevis-eye strain poles (RH1949-113 / RC400-0612 and RC400-0613), as an adjustment tool when straining insulator strings.



RH4785-1

The Clevis type Strain Jack is attached to the eye of the strain poles, through the existing head on one of its ends.

- RM1948-3

The Reversible Ratchet Wrench was specially developed for use on hex-nuts and trunnions on single and double strain carriers.



RM1948-3

- FLV16054-1

The Reversible Ratchet Wrench was developed for use on hex-nuts and trunnions where more effort is required.



FLV16054-1

ACCESSORIES FOR STRAIN CARRIERS

Cat. No.	Description	Work Load (daN)	Approx. Weight (kg)
RE401-1998	305 mm Strain Jack Tongue type	4536	1.30
RV401-0157	610 mm Strain Jack Tongue type	4536	1.80
RV401-0158	915 mm Strain Jack Tongue type	4536	2.30
RH4785-1	305 mm Strain Jack Clevis type	4536	1.40
RH4785-2	457 mm Strain Jack Clevis type	4536	1.70
RH4785-3	610 mm Strain Jack Clevis type	4536	2.00

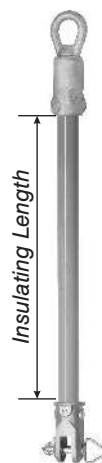
ACCESSORIES FOR STRAIN CARRIERS

Cat. No.	Description	Work Load (daN)	Approx. Weight (kg)
RT400-0025	915 mm Strain Jack Clevis type	4536	2.50
RSPM2947-1	Eye-link coupling made of galvanized steel, for attachment to the strain jack, in order to allow lifting and lowering of strain poles on the structure	-	0.36
RE401-0138	Ø 51 mm aluminum alloy adjustable pole clamp for strain pole	3402	0.70
RE401-1510	Steel through pin for the strain pole clevis	-	0.30
R059738	Click safety counter-pin for locking the yoke steel pin	-	0.05
RE401-2066	Large Trunnion	4536	1.40
RE401-2068	Small Trunnion	4536	0.83
FLV17755-1	Trunnion Gauge, conditioned in wooden case	-	0.37
RM1948-3	Ratchet Wrench for hex-nuts and trunnions of the strain carrier	-	1.05
FLV16054-1	Prolonged Ratchet Wrench for hex-nuts and trunnions of the strain carriers	-	1.20
FLV10460-1	Safety steel nut for trunnion support	-	0.11

Clevis-eye Strain Poles for Bundle Conductor Yoke Plates

Clevis-eye Strain Poles for Bundle Conductor Yoke Plates have been designed to be used with suspension or cold end strings, on single or multiple arrangements. Commonly used on “V” strings, attached directly to the hole of the spreader bar, for strain relief of both strings simultaneously.

Strain Poles for conductor yoke plates accommodate a wide range of extra-strong laminated aluminum yoke plate designs, using bronze alloy clevis heads, with clevis of 25.4 mm wide x 40 or 85 mm deep. Both Strain Poles are built of Ø 51 mm RITZGLAS® poles and offer 4536 daN maximum load capacity.



RC400-0612

STRAIN POLES FOR BUNDLE CONDUCTOR YOKE PLATES

Cat. No.	Description	Insulating Length (m)	Max. Working Length (m)	Approx. Weight (kg)
RH1949-113	Strain pole for bundle conductor yoke plates, with bronze alloy clevis head (fork type), inner spacing of 25.4 mm wide x 85.0 mm deep, and steel through pin for locking	2.53	2.87	7.50
RC400-0612	Strain pole for bundle conductor yoke plates, with bronze alloy clevis head (fork type), inner spacing of 25.4 mm wide x 40 mm deep, and steel through pin for locking	2.58	2.87	6.10
RC400-0613	Strain pole for bundle conductor yoke plates, with bronze alloy clevis head (fork type), inner spacing of 25.4 mm wide x 40.0 mm deep, and steel through pin for locking	3.11	3.40	6.70

Hot Stick Tension Puller

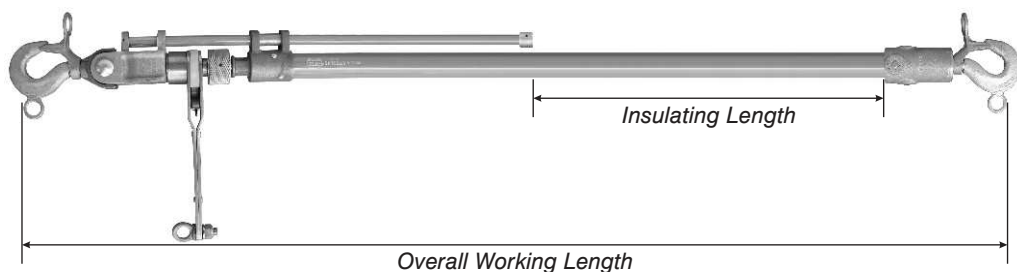
The Hot Stick Tension Puller is intended for straining and support of energized conductors and can be used during insulators replacement, conductor repair or several other works on energized systems. The Hot stick Tension Puller is complete and versatile, combining basically a **RITZGLAS®** Ø 38 mm pole and a straining device.

Both models feature non-swiveling forged steel hooks on each end, safety locks and eye-links, for easy and quick installation, manually or using an insulating hot stick.

The safety locks rotate 135 degrees to either left or right from closed position.

The actuation lever is equipped with an eye-link for introduction of the hot stick, enabling operation of the hot stick tension puller from a distance.

HOT STICK TENSION PULLER		
Cat. No.	Description	Approx. Weight (kg)
RC400-0574	34.5 kV Hot Stick Tension Puller	6.40
RC400-0575	69.0 kV Hot Stick Tension Puller	6.50



FOR PHASE-TO-PHASE VOLTAGES

Specification	Mechanical Load Capacity (daN)	Working Length (between hooks) (m)	Max. Tool Extension (m)	Insulating Length (m)
34.5 kV (RC400-0574)	1814	Minimum: 1.47 Maximum: 1.78	0.30	Minimum: 0.79 Maximum: 1.09
69 kV (RC400-0575)	1814	Minimum: 1.68 Maximum: 1.93	0.30	Minimum: 0.99 Maximum: 1.30

After the conductor has been cut close to the structure, when working with the hot stick tension puller, the Tension Puller Hook Adapter is used to keep the conductor tail out of the work area, to offer total safety during the work performance.

The installation on the conductor is possible with a Grip-all clamp stick.

Conductor range: 4 through 397.4 kcmil CAA (ACSR)
(6 through 20 mm).

REPLACEMENT PART

Cat. No.	Description	Approx. Weight (kg)
RC400-0573	Tension Puller Hook Adapter, for Tension Puller cold-end, for replacement on models RC400-0574 and RC400-0575	1.20



RC400-0573

ACCESSORIES

Cat. No.	Description	Approx. Weight (kg)
RC400-0600	Tie rear clamp	0.66

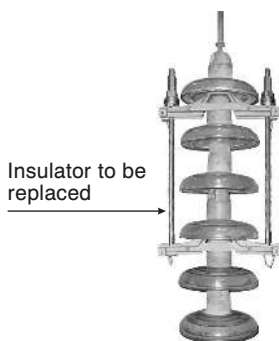


RC400-0600

Auxiliary Strain Carrier



FLV11537-1



Insulator to be replaced

The Auxiliary Strain Carrier is a lightweight and portable equipment, designed to ease the replacement of insulator on de-energized suspension strings, especially where the number of damaged insulators does not justify the removal and lowering of the whole string, for replacement of the insulators on ground.

However, the handling of the Auxiliary Strain Carrier requires special attention concerning its installation onto the system, in order to prevent accidents.

Safety procedures:

- 1) This tool is only used on de-energized systems;
- 2) Prior to the installation of the Auxiliary Strain Carrier, the lineman must install the complete strain carrier as stated in the previous pages, which is suitable for the insulator string to be maintained, in order to relieve the mechanical strain of the string and enable the release of the insulator.
- 3) After that, the Auxiliary Strain Carrier will be assembled over the insulator immediately above that to be replaced (the insulators must be replaced one at a time).

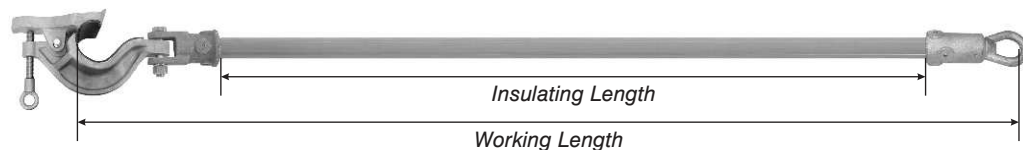
Warning

During the installation, make sure the insulator bell is supported only by the top part of the yoke.

AUXILIARY STRAIN CARRIER

Cat. No.	Description	Work Load (daN)	Approx. Weight (kg)
FLV11537-1	Auxiliary Strain Carrier for insulator replacement on suspension strings	600	8.15

Heavy-duty Suspension Link Stick



The Heavy-duty Suspension Link Stick has been designed for suspension of conductors from Ø 25 mm through 64 mm and can be used with several types of lifting devices, at the structure end.

The Heavy-duty Suspension Link Stick is manufactured with Ø 38 mm **RITZGLAS®** poles. The main head in cast aluminum alloy with internal rubber coating (to avoid damages to the conductor) is attached to one of the ends. At the other end, it is provided with an aluminum alloy head with forged steel butt-swivel, fixed to the pole with a steel pin.

POLES WITH HEADS FOR CONDUCTORS OF FROM Ø 3/4" THROUGH 1-3/4"

Cat. No.	Dimensions			Work Load (daN)	Approx. Weight (kg)
	Ø (mm)	Insulating Length (m)	Working Length (m)		
RH4719-84	38	2.00	2.42	2948	5.00
RH4719-96	38	2.31	2.73	2948	5.30
RH4719-114	38	2.61	3.03	2948	5.70

POLES WITH HEADS FOR CONDUCTORS OF FROM Ø 1" THROUGH 2-1/2"

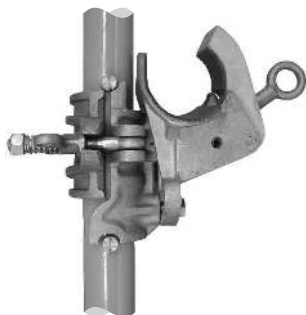
Cat. No.	Dimensions			Work Load (daN)	Approx. Weight (kg)
	Ø (mm)	Insulating Length (m)	Working Length (m)		
RH4720-84	38	2.00	2.42	2948	5.20
RH4720-96	38	2.31	2.73	2948	5.50
RH4720-114	38	2.61	3.03	2948	5.90



RE400-0044

REPLACEMENT HEAD		
Cat. No.	Description	Approx. Weight (kg)
RE400-0043	Head for Ø 3/4" through 1-3/4" conductors for replacement on the suspension pole	2.00
RE400-0044	Head for Ø 1" through 2-1/2" conductors for replacement on the suspension pole	2.50

Adjustable Hook Assembly



RM4724-1

The adjustable Hook Assembly can be used with the adjustable strain poles series RC401-2144 through RC401-2149, as a direct method of relieving the load on a suspension string. It has a round shape with a moveable gripper which is adjusted to the conductor with an eye-screw. It is suitable for Ø 28 through 64 mm (RM4724-1) and Ø 14 through 36 mm (FLV16193-1), approximately.

The moveable gripper is self-aligning within a range of 45° either to left or right, from vertical.

The hook has a maximum work load of 1688 daN and can be positioned every 152 mm on the strain pole.

ADJUSTABLE HOOK ASSEMBLY			
Cat. No.	Description	Work Load (daN)	Approx. Weight (kg)
RM4724-1	Adjustable Hook Assembly (Ø 28 a 64 mm)	1688	2.60
FLV16193-1	Adjustable Hook Assembly (Ø 14 a 36 mm)	1688	2.55

Suspension Pole with Adjustable Hook

The suspension pole with adjustable hook is made with a Ø 64 mm **RITZGLAS®** and is suitable for systems with suspension loads up to 1134 daN.

The position of the conductor hook can be adjusted to any position across the pole, according to the length of the insulator string. Tightening the nuts on each side of the clamp of the adjustable hook ensures firm connection to the pole.

The hook has wide jaws with round edges to avoid damages to the conductor.

The butt-swivel rotates freely and allows using hoists, ropes or strain jacks. The strain hook and base terminal are made of strong thermally treated aluminum alloy.

SUSPENSION POLE WITH ADJUSTABLE HOOK					
Cat. No.	Description	Total Length (m)	Max. Insulating Length (m)	Work Load (daN)	Approx. Weight (kg)
RH4710-4	Suspension Pole with adjustable hook	2.00	1.55	1134	6.50



RH4710-4



Yokes

Yokes are intended for attachment of the strain poles to yoke plates, extension links or any other types of supports on the structures, in order to relieve the mechanical load on single or multiple insulator strings, on cold end or suspension structures, for damaged insulator replacement.

These yokes and components have been developed to be attached to various structure configurations. Should the models available herein not meet a specific type of structure, technical drawings of the frames or tower supports have to be submitted for evaluation to RITZ engineering department to ensure the proper yoke and components will be designed.

The yokes are made of cast aluminum alloy, heat-treated or from high-strength laminated aluminum plate.

Note: The safety click counter-pin (R059738) can be ordered separately as a replacement part.



RC401-1720



RM2946-1



RC401-1721



RM2946-12

Two-pole strain carrier Yokes

The two former versions of the cast aluminum yokes and aluminum laminated plate yokes have been replaced as follows:

The model RC401-1720 replaces former RM2946-1

The Model RC401-1721 replaces former RM2946-12

RC401-1720 Yoke includes steel hook.

The yoke RC401-0095 is used with Two-pole strain carriers, requiring no shoulder or adapter to pull against, since it grips on the compression sleeve of the cold end string.

Shoes have movable device to enable the introduction and locking of the clamp before straining.

Prior to installation, a proper shoe must be defined according to the size of the conductor to be strained.

Note:

the shoe must be attached directly over the compression sleeve.

This yoke is supplied with 04 interchangeable shoes:

- 24 AH for conductors from 477 through 556.5 kcmil CAA (ACSR) Ø 21.7 through 23.4 mm
- 30 AH for conductors from 715 through 954 kcmil CAA (ACSR) Ø 27.4 through 29.6 mm
- 36 AH for conductors from 1192.5 through 1351.5 kcmil CAA (ACSR) Ø 34 through 36.2 mm
- 3/4" through 1" Ø (19 through 25.4 mm)
- RT401-0935

Hot-end suspension string yoke, for attachment to triple or quadruple bundle yoke plates, used together with clevis-clevis strain poles.

Made of high-strength laminated aluminum plates.

The hot-end and cold-end yokes can be ordered separately as replacement parts of strain carriers types RC401-2174 through RC401-2179.



RC401-0095

C



RT401-0935

TWO-POLE STRAIN CARRIERS

Cat. No.	Description	Work Load (daN)	Approx. Weight (kg)
RM1942	1.40 m chain and hook	-	3.55
RM2946-1 *	Hot-end two-pole strain carrier yoke	4000 (socket) 2500 (hook)	9.00
RM2946-12 *	Cold-end two-pole strain carrier yoke, with chain	4000	9.70
RT401-0935	Hot-end two-pole strain carrier yoke for "I" type suspension string (special box type)	6804	7.30
RC401-1720	Hot-end two-pole strain carrier yoke	6804	12.00
RC401-1721	Cold-end two-pole strain carrier yoke, with chain	6804	7.50
RC401-0095	Compression sleeve type yoke for two-pole strain carrier, made of high-strength laminated aluminum plates	4990	21.85

* The nominal working rating has been reduced to conform to the mechanical requirements of the IEC 61236 Standard.



RM2945-1



RM2945-3



RM2945-9



RC401-1894

YOKE ACCESSORIES (RC401-1720 AND RM2946-1)

Cat. No.	Description	Approx. Weight (kg)
RM2945-1	Socket (yoke model RM2946-1) for extension 7/8" x 2"	1.55
RM2945-3	Socket (yoke model RM2946-1) for extension 5/8" x 2"	1.55
RM2945-9	Socket (yoke model RM2946-1) for extension 7/8" x 1-1/2"	1.20
RC401-1894	Socket (yoke model RC401-1720) for extension 7/8" x 1-1/2"	0.55

Single pole strain carrier Yokes

These yokes can be used with adjustable strain poles (series RC401-2144 to RC401-2149) to relieve the mechanical straining from double and multiple insulator strings, both on cold end and suspension structures, during insulator replacement.

These yokes have been designed to fit various types of yoke plates and should be purchased in pairs, according to the structure hardware design. In some situations, they can be used on both the hot and cold end of the insulator string.

For certain applications, some yokes may be used alternatively (refer to table containing the rated work load):

- RC401-1717 yoke may replace RM1947-1 yoke.
- RC401-1718 yoke may replace RC401-0003 yoke.
- RC401-1719 yoke may replace RC401-0155 yoke.

SINGLE POLE STRAIN CARRIER YOKES			
Cat. No.	Application	Work Load (daN)	Approx. Weight (kg)
RC401-0003	Triangular-shape yoke plate	2000	5.20
RC401-0155*	Triangular-shape yoke plate	1350	3.80
RM1947-1*	Triangular-shape yoke plate	3250	14.00
RC401-1719	Triangular-shape yoke plate of 3/4" max. thickness	6804	9.40
RC401-1718	Triangular-shape yoke plate of 1" max. thickness	6804	8.90
RC401-1717	Rectangular-shape yoke plate of 3/4" max. thickness	6804	13.30
RT401-0573	Double triangular-shape yoke plate (SADE standard)	6804	4.80

* The nominal working rating has been reduced to conform to the mechanical requirements of the IEC 61236 Standard.



RC401-1717



RC401-1718



RC401-1719



RC401-0155



RC401-0003



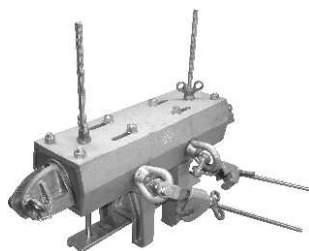
RT401-0573

Structure Yokes

- RH4783-22

The Metallic Structure Yokes are practical and quite versatile when replacing insulator strings. They easily fit over the tower arm, serving as a support for the Strain Poles to relieve straining on the suspension insulator string, together with the strain poles and hot-end yokes.

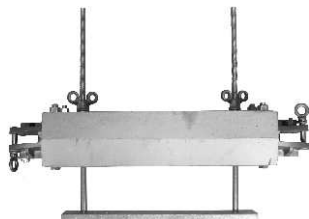
The supports of the yoke have been designed so that they can be adjusted to fit most tower structure configurations, however, it is recommended that the design drawings of the tower arms are submitted for evaluation by RITZ engineering department.



RH4783-22

It is composed of a main body part and movable parts made of aluminum alloy.

It can be adjusted from 74 through 181 mm between the supports and measures 554 mm center-to-center of the swiveling brackets for strain poles.



RC400-0219

- RC400-0219

This yoke is generally used on H-frame crossarms. Design and application is similar to the metallic structure yokes (RH4783-22). In order to fit various crossarm sizes, the two clamp bolts which secure the yoke may be adjusted to three center-to-center positions (230, 280 and 330 mm), and the height of the crossarm can vary from 230 to 305 mm.



RC400-0445

- RC400-0445

Designed for use on the end of the crossarm and, when necessary, attached through a RT400-0838 bracket. It is provided with swivel castings to ensure proper alignment of the Strain Poles and the hot-end yoke. The load rating is 6804 daN. When the angle of the end plate on the crossarm is 45°, the load rating is 4082 daN.

- RT400-0838

The metallic crossarm bracket is used with the steel arm yoke (RC400-0445), where the crossarm is not provided with an end plate for yoke attachment.

The bracket is made of heat-treated aluminum and attached to the metallic crossarm through a wheel binder.



RT400-0838

- RC401-1722

This yoke is made of high-strength aluminum plate and used together with strain poles (series RC401-2144 through RC401-2149). It can normally be attached to the hot end plate of "V" type suspension strings. In some applications, this yoke can be replaced by model RH4794, made of cast aluminum.



RC401-1722

- RC401-0168

This yoke is used on single "V" type suspension strings and can be attached to yoke plates with the adjustable strain poles or clevis-eye strain poles. It is made of laminated high-strength aluminum plate.



RC401-0168

- RT401-0689

Similar to the RC401-0168 model, but without adapter. Normally used at the hot end of "V" suspension strings and double cold end strings in confined areas.



RT401-0689

- RH4794

This yoke is mostly used on the hot end of the single "I" type insulator strings, on 220 through 345 kV transmission lines with double cables. Made of heat-treated cast aluminum alloy, it is provided with a saddle for duplicator (RH4794-1), attached to its base.



RH4794

Note:

The model of the support saddle for duplicator RH4794-2 (also used with the RH4794 yoke) can be ordered separately, if necessary.

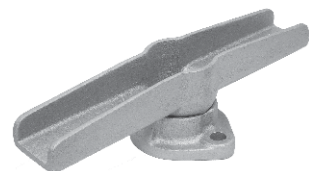
- RH4794-1 and RH4794-2

The support saddles are used together with the yoke RH4794, with attachment to the insulator string yoke plate. Its mechanism provides 360° continuous rotation.



RH4794-1

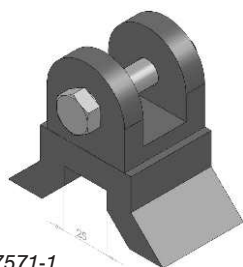
Available in two sizes: 89 and 305 mm, for better adjustment to the yoke plate. Both are made of aluminum alloy.



RH4794-2

STRUCTURE YOKES

Cat. No.	Description	Work Load (daN)	Approx. Weight (kg)
RC400-0219	H-frame yoke	5443	17.50
RC400-0445	Metallic crossarm yoke	6804	8.30
RT400-0838	Bracket for metallic crossarm	6804	5.30
RC401-0168	Two-pole strain carrier yoke, for the hot-end of single "V"- type suspension strings	6804	6.50
RC401-1722	Two-pole strain carrier yoke, for the hot-end of single "V"- type suspension strings	6804	10.30
RH4783-22	Yoke for metallic structure	5443	23.60
FLV02703-1	Yoke for metallic structure, middle phase	3402	10.50
FLV02698-1	Yoke for metallic structure, length: 0.82 m	5443	38.50
RH4794	Hot-end yoke for suspension, (3-1/2") saddle	6804	7.60
RH4794-1	Support saddle for 89 mm (3-1/2") duplicator (replacement)	6804	0.69
RH4794-2	Support saddle for 305 mm (12") duplicator	6804	1.00
RT401-0689	Hot-end two-pole strain carrier yoke for "V" suspension string and double cold end string	6804	3.50



FLV17571-1

YOKE ACCESSORIES (RC401-1722, RC401-0168)**- FLV17571-1**

This adapter is more often used when working with the yokes model RC401-1722 and RC401-0168. If necessary, RITZ engineering department can design a specific adapter. For this purpose, customer needs to inform the spreader bar model to which the yoke will adapt.

Approx. Weight: 1.15 kg

Static Ground

This tool has been designed to eliminate discomforts derived from the electro-static discharge during the connection and disconnection of insulator strings, when performing works on energized systems. It dissipates the static discharge with the use of a copper cable (size 16 mm² x 2.0 m long) and a clamp for connection to the structure framework or conductor cables.

In order to provide grounding of the insulator string at the cold end, the grounding clamp must be connected to the structure bracket and the jaws of the hot stick must be connected to the hardware of the insulator closest to the structure.

When working using barehand method, the clamp must be connected to the energized hardware and the jaws of the hot stick, to the second insulator, at the hot end.

The Static Ground is manufactured with Ø 32 mm x 0.76 m overall length *RITZGLAS*® pole.

The jaws ("pliers" type) are made of bronze alloy and were designed for insulator fittings of from Ø 64 to 152 mm.

The clamps for connection to the structure are available in two versions: with "T"-type screw and with eye-screw. Both are made of bronze alloy and the body of the clamp is made of aluminum alloy.



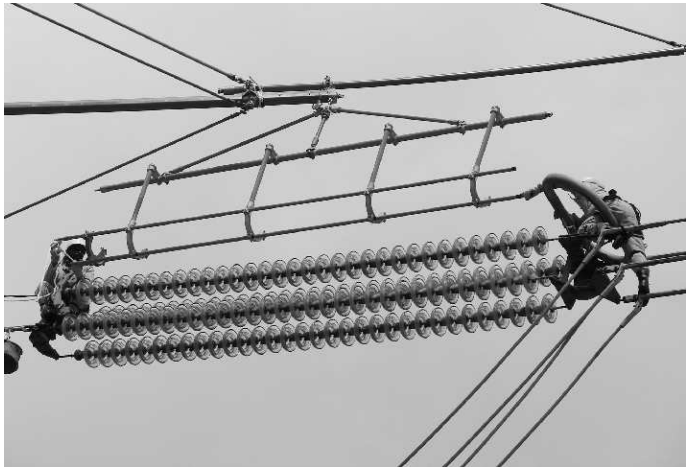
STATIC GROUND			
Cat. No.	Description	Insulating Length (m)	Approx. Weight (kg)
RC600-0000	Static Ground with "T"-type screw connection clamp	0.44	2.60
RHG4230-1	Static Ground with eye-screw connection clamp	0.44	2.80

Cradles

There are three basic solutions for cradles to meet the various insulator maintenance and replacement requirements.

All of them are manufactured with *RITZGLAS*® poles and enable works on cold end or suspension strings from 110 kV through 800 kV.

- Single insulator Cradles: Mostly used on insulator strings from 110 kV through 230 kV. They are supported by a pair of wire tongs or strain link sticks.
- EHV through design insulator Cradles: This cradle is designed to be used on 345 kV through 500 kV combined with cradles supports, providing the displacement of the insulators.
- EHV Side-opening insulator cradles: Used on cold end strings up to 800 kV to provide the removal of single or multiple insulator strings.

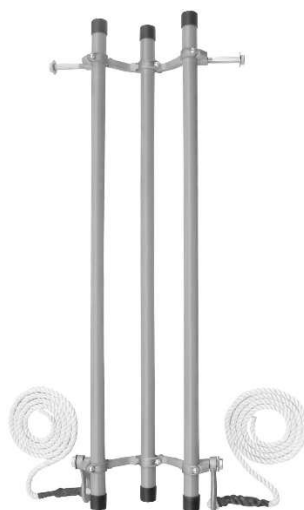


Single Insulator Cradles

This equipment is used either for the replacement of insulators on the string or to bottom it to ground. On cold end strings or angle strings, this cradle is used together with support sticks. On “I” suspensions, it is used with strain poles.

They are manufactured with Ø 38 mm *RITZGLAS*® poles. This type of single cradle is provided with two steel pins at the front end used to support the insulator string with one pair of wire tongs or strain link sticks.

The rear end of the cradle is provided with eyes and ropes to tie it up to the structure as hinging points. This way, the insulators may be raised or lowered to the most suitable position enabling the replacement of the damaged insulator(s). When lowering the insulator cradle is not necessary, the cradle is attached to the eyes located at the yokes fixed to the strain poles.



SINGLE CRADLES FOR INSULATOR STRINGS

Cat. No.	Description	Insulating Length (m)	Approx. Weight (kg)
RH1840-6	10 pcs of Ø 254 mm insulators	1.83	7.00
RH1840-8	14 pcs of Ø 254 mm insulators	2.44	8.30
RH1840-10	18 pcs of Ø 254 mm insulators	3.05	9.60

REPLACEMENT PARTS AND COMPONENTS

Cat. No.	Description	Approx. Weight (kg)
RH1840/SL	Metallic Bracket with side lugs for cradle	1.00
RH1940/OL	Metallic Bracket with side eye-links and 2.50 m of insulating rope tied up to the end for cradle	1.60
RH4540-1	Ø 38 mm x 1.83 m <i>RITZGLAS</i> ® poles with plastic caps at the ends	1.30
RH4540-2	Ø 38 mm x 2.44 m <i>RITZGLAS</i> ® poles with plastic caps at the ends	1.70
RH4540-3	Ø 38 mm x 3.05 m <i>RITZGLAS</i> ® poles with plastic caps at the ends	2.10



EHV through design insulator Cradles

This equipment is used for insulator replacement on strings up to 500 kV. It is required when lowering a “V”-type or cold end insulator string and for raising “I”-type suspension insulator strings.

The deep through design is a safe feature to prevent accidental dropping of the insulator strings with the assistance of the Slotted Insulator Retaining Plate to secure the top insulator, keeping it firm during displacement.

The cradle can be lowered or lifted easily for insulator replacement, using the steel bail (R070184), connected to a strain link stick. They are also provided with an auxiliary hook (R068922).

The steel bail and hook are supplied together with the cradle.

EHV THROUGH DESIGN INSULATOR CRADLES			
Cat. No.	Max. Capacity	Insulating Length (m)	Approx. Weight (kg)
RC401-0015	25 pcs of Ø 254 mm insulators	3.40	16.40
RH1950-9	19 pcs of Ø 254 mm insulators	2.69	14.90

REPLACEMENT PARTS AND COMPONENTS

Cat. No.	Description	Approx. Weight (kg)
FLV17453-1	Middle cradle metallic bracket	1.60
FLV17446-1	Aluminum Insulator Retaining Plate	2.60
FLV17447-1	Cradle metallic bracket with side lugs	1.60
R068922	Plastic coated Steel Hook	0.55
R070184	Galvanized Steel hook	1.10

Cradle Support

Manufactured with Ø 64 mm *RITZGLAS*® poles on its main structure, it is rated at 227 daN nominal work load. It is provided with three pairs of hooks attached to a spiral link stick used as a support element.

CRADLE SUPPORT

Cat. No.	Description	Insul. Length (m)	Approx. Weight (kg)
RH1950-90	Cradle support with three pairs of hooks	2.97	13.40



FLV17453-1



FLV17446-1



FLV17447-1



R068922



R070184



RH1950-90

EHV Side-opening insulator cradles

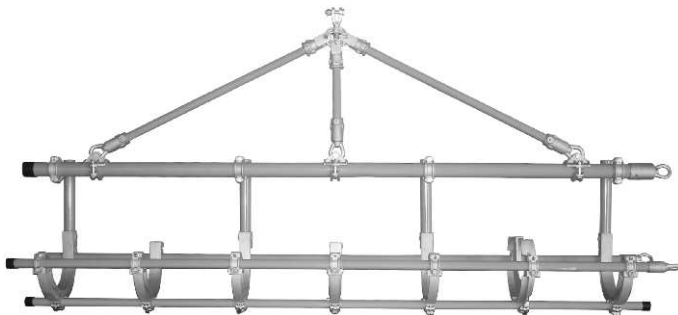
The side opening cradles have been designed for selective removal of an insulator string, particularly in double, triple or quadruple cold end bundles. Using this cradle, there is no need of removing top strings to get to the bottom string.

Manufactured with Ø 64 mm *RITZGLAS*® poles as its main element and three Ø 38 mm poles, it is rated at 226 daN maximum work load, for the 2.69 m model and 454 daN for the 3.91 m and 4.83 m cradles.

The 0.38 m hook assembly is used for single or double cold end bundles, whereas the 0.79 m assembly is used for the removal of bottom strings in quadruple cold end bundles.

The Insulator Retaining Plate has a dual purpose, one side is adaptable to Ø 279 mm insulator bells and the opposite side is adaptable to Ø 324 mm insulator bells.

Sticks for connection to the boom, 01 pc of top insulator retaining plate, hook assembly and metallic brackets are supplied together with the cradles.



EHV SIDE-OPENING INSULATOR CRADLES

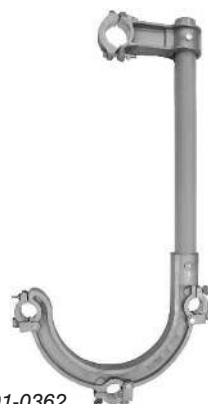
Cat. No.	Description	Work Load (daN)	Approx. Weight (kg)
RC401-0354	EHV Side-opening insulator cradles, 4.83 m insulating length, 4 pcs of 0.38 m support hooks, 2 pcs of metallic brackets and 01 pc of insulator retaining plate	454	62.00
RC401-0355	EHV Side-opening insulator cradles, 4.83 m insulating length, 4 pcs of 0.79 m support hooks, 2 pcs of metallic brackets and 01 pc of insulator retaining plate	454	64.00
RC401-0356	EHV Side-opening insulator cradles, 3.91 m insulating length, 4 pcs of 0.38 m support hooks, 2 pcs of metallic brackets and 01 pc of insulator retaining plate	454	58.50
RC401-0357	EHV Side-opening insulator cradles, 3.91 m insulating length, 4 pcs of 0.79 m support hooks, 2 pcs of metallic brackets and 01 pc of insulator retaining plate	454	60.50
RC401-0358	EHV Side-opening insulator cradles, 2.69 m insulating length, 3 pcs of 0.38 m support hooks and 01 pc of insulator retaining plate	226	42.60
RC401-0359	EHV Side-opening insulator cradles, 2.69 m insulating length, 3 pcs of 0.79 m support hooks and 01 pc of insulator retaining plate	226	44.00



FLV03460-1



RC401-0361



RC401-0362



RC401-0455

REPLACEMENT PARTS AND COMPONENTS

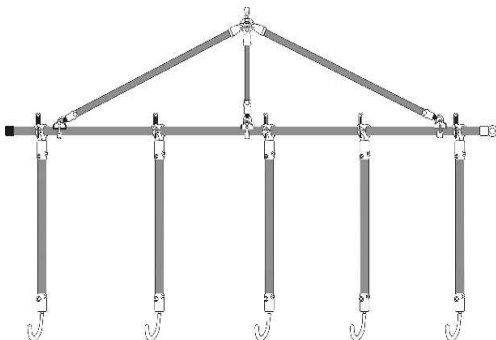
Cat. No.	Description	Approx. Weight (kg)
FLV03460-1	Metallic brackets	2.80
RC401-0361	0.38 m support hooks	5.00
RC401-0362	0.79 m support hooks	5.50
RC401-0455	Insulator retaining plate	3.00
RH4722	Spiral link stick	1.90
FLV03457-2	Small pole for cradles RC401-0356 and RC401-0357	2.07
FLV03457-3	Small pole for cradles RC401-0354 and RC401-0355	2.09
FLV03457-4	Pole for cradles RC401-0358 and RC401-0359	2.43
FLV03457-6	Big pole for cradles RC401-0356 and RC401-0357	2.70
FLV03457-7	Big pole for cradles RC401-0354 and RC401-0355	2.82

"J"-Hook Assembly

Manufactured with Ø 51 mm x 0.78 m *RITZGLAS*® pole, the "J"-Hook Assembly can be used as an efficient alternative solution for removal of the bottom insulators in a triple insulator string.

It is provided with a steel hook at one end of the pole, which swivels freely, for a quick and easy adjustment to the string. In order to ensure protection of the insulators, the hook is fully covered with plastic. For the complete configuration of the insulator cradle with the "J"-Hook Assembly, it is necessary to connect it to the main support set of the cradles series RC401-0354 to RC401-0359.

"J"-HOOK ASSEMBLY		
Cat. No.	Description	Approx. Weight (kg)
RC402-0790	"J"-Hook Assembly, Ø 51 mm x 0.91 m length	4.00



RC402-0790

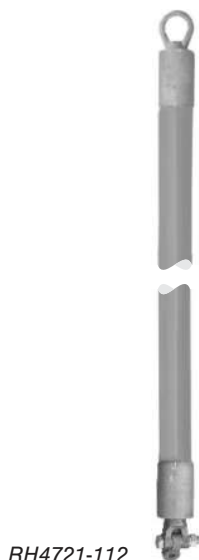
Trolley Pole Suspension Insulator Tool

The Trolley Pole Set is used for displacement of the string of suspension insulators to the structure.

Made of *RITZGLAS*® pole and metallic aluminum and steel parts, the trolley pole can be horizontally fastened under the tower arm using tower type wire tong saddles.

The fork suspension tool attachment (RH4723-2), slotted type, for insulators from Ø 267 mm through 273 mm properly bolts to the end of the Ø 64 mm Trolley Pole. Together with the single trolley wheel (RH4723-4) or the tandem trolley wheel (RC400-0152) used on extremely long or heavy insulator strings, these tools form the complete set of the Trolley Pole Suspension Insulator Tool.

The slotted suspension tool attachment fixed to the pole can be fitted under the top insulator of the string for removal and horizontal displacement for maintenance purposes and return to the original position.



RH4721-112



RH4723-2



RH4723-4



RC400-0152

TROLLEY POLE AND COMPONENTS

Cat. No.	Description	Approx. Weight (kg)
RH4721-112	Ø 64 mm Trolley pole, 3.51 m insulating length	9.50
RH4723-2	Ø 64 mm Slotted suspension insulator attachment	6.40
RH4723-4	Single trolley wheel with Ø 64 mm pole clamp	3.60
RC400-0152	Tandem trolley wheel with Ø 64 mm pole clamp	7.60

Note:

SUSPENSION STRING - The slotted tool attachment, tandem trolley wheel and trolley pole set has been designed for a maximum work load of 400 daN, but the following procedures must be observed during its application:

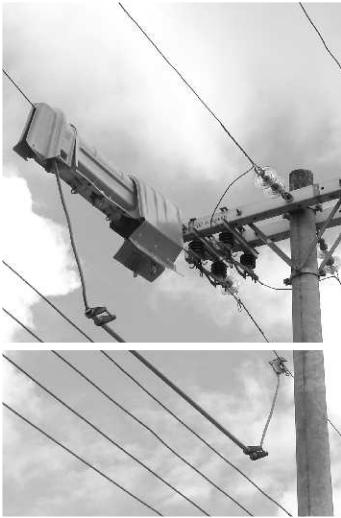
- a) always use the tandem trolley wheel with Ø 64 mm pole clamp (RC400-0152)
- b) the trolley pole recommended for such load is that of Ø 64 mm (RH4721-112)
- c) the maximum distance between the fixing points of the trolley pole and the structure is 2 m, in order to avoid excessive bending of the pole
- d) the attachment of the Ø 64 mm pole clamp of the tandem trolley wheel to the slotted tool attachment and pole assembly, must provide maximum clearance of 500 mm from the tool attachment center.



Group D

Temporary Jumpers

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Group D

Temporary Jumpers

D

15 kV Rated Protected Cables

The 15 kV Protected Cables are extremely flexible even in low temperatures and are provided with cover and insulation combinations resistant to abrasion, oil, heat, moisture and ozone effects.

Its orange color is natural of the EPR (Ethylene Propylene) based sheathing.

For easy identification and classification, the voltage and size (AWG) are marked all across the cable surface, regularly spaced.

The conductor is composed of extra-flexible copper filaments.



R3641

15 kV RATED PROTECTED CABLES					
Cat. No.	Cross Section (mm ²)	Cable Size (AWG)	Nominal Copper Conductor Ø (mm)	Max. Current Rating (A)	Approx. Weight (kg)
R3641	35	2	8	200	0.77
R3861	50	1/0	10	260	1.40
R3863	70	2/0	12	300	1.70
R3866	95	4/0	15	400	2.35

D



RG4765

Insulated Clamps

The clamp with insulating protection for By-Pass is suitable for maintenance works on energized systems up to 25 kV, when working with the Rubber Glove Method, wearing insulating gloves and sleeves.

The electric connection with the conductor is possible through manual twisting, for opening and closing of the jaw, which holds onto the conductor in a firm and safe manner.

The connection with the jumper cable is possible through a copper ferrule (series RC600-2598 to RC600-2601), which should be ordered separately. The body of the insulated clamp is built with thermoplastic insulating protection in orange color and the jaws are made of bronze alloy.

This tool is suitable for works with various cable sizes, from 2 AWG through 4/0 AWG.

The nominal current capacity is 400 A.

INSULATED CLAMPS

Cat. No.	Description	Clamp Connection Range		Current Rating (A)	Approx. Weight (kg)
		Min.	Max.		
RG4765	1 PAIR of insulated By-Pass clamps	# 6 Copper Ø 4 mm	477 MCM CAA (ACSR) Ø 22 mm	400	2.50
RT601-0039	1 PIECE of insulated By-Pass clamp	# 6 Copper Ø 4 mm	477 MCM CAA (ACSR) Ø 22 mm	400	1.25

Copper Cable Ferrules

The Copper Jumper Cable Ferrules are supplied in standard sizes, according to the chart below and are used to connect cables to the insulated clamps (RG4765) and By-Pass clamps (RC600-1743 / RG3622-1).

At one end, the ferrules are provided with 5/8" thread, with nut and washer and at the other end, they are fitted with an internal hole, where the jumper cable will be installed and then pressed.



RC600-2598

COPPER FERRULES FOR PROTECTED JUMPER CABLES				
Cat. No.	Application	Burndy Type Gauge No. Or Equivalent	Compression No.	Approx. Weight (kg)
RC600-2598	2 AWG Cable	U 165	2	0.12
RC600-2599	1/0 AWG Cable	U 165	2	0.12
RC600-2600	2/0 AWG Cable	U 165	2	0.14
RC600-2601	4/0 AWG Cable	U 166	3	0.15

Temporary Jumper Sets

The Temporary Jumpers are very common when performing maintenance on energized systems up to 15 kV and shall be done either with the Hot Stick or Rubber Glove Methods.

All Temporary Jumper Sets use two pieces of copper ferrules (series RC600-2598 to RC600-2601), one on each end of the cable for clamp connection.



RC601-0173

15 KV TEMPORARY JUMPERS RUBBER GLOVE INSTALLATION OF INSULATED CLAMPS RT601-0039						
Cat. No.	Cable Size (AWG)	Clamp Connection Range		Total Length (m)	Nominal Current Capacity (A)	Approx. Weight (kg)
		Min.	Max.			
RC601-0171	2	#6 Copper Ø 4 mm	477	3.70	200	5.20
RC601-0172	1/0		MCM CAA (ACSR)	3.70	260	6.70
RC601-0173	2/0		Ø 22 mm	3.70	300	7.80
RC601-0174	4/0			3.70	400	10.20

15 kV TEMPORARY JUMPERS - HOT STICK INSTALLATION OF INSULATED CLAMPS RC600-1743

Cat. No.	Cable Size (AWG)	Clamp Connection Range		Total Length (m)	Nominal Current Capacity (A)	Approx. Weight (kg)
		Min.	Max.			
RT601-0281	2	#6 Copper Ø 4 mm	1590 MCM CAA (ACSR) Ø 38 mm	3.70	200	4.50
RT601-0282				4.60	200	5.20
RT601-0283	1/0	#6 Copper Ø 4 mm	1590 MCM CAA (ACSR) Ø 38. mm	3.70	260	6.90
RT601-0284				4.60	260	8.10
RT601-0285	2/0	#6 Copper Ø 4 mm	1590 MCM CAA (ACSR) Ø 38 mm	3.70	300	8.00
RT601-0286				4.60	300	9.50
RT601-0287	4/0	#6 Copper Ø 4 mm	1590 MCM CAA (ACSR) Ø 38 mm	3.70	400	10.40
RT601-0288				4.60	400	12.60



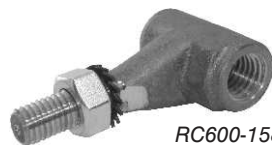
RT601-0281

15 kV TEMPORARY JUMPERS - HOT STICK INSTALLATION OF INSULATED CLAMPS RC600-1584

Cat. No.	Cable Size (AWG)	Clamp Connection Range		Total Length (m)	Nominal Current Capacity (A)	Approx. Weight (kg)
		Min.	Max.			
FLV17443-1*	2	#6 Copper Ø 4 mm	900 MCM CAA (ACSR) Ø 29 mm	3.70	200	4.80
FLV17443-5*				4.60	200	5.50
FLV17443-2*	1/0	#6 Copper Ø 4 mm	900 MCM CAA (ACSR) Ø 29 mm	3.70	260	7.10
FLV17443-6*				4.60	260	8.40
FLV17443-3*	2/0	#6 Copper Ø 4.0 mm	900 MCM CAA (ACSR) Ø 29 mm	3.70	300	8.30
FLV17443-7*				4.60	300	9.80
FLV17443-4*	4/0	#6 Copper Ø 4 mm	900 MCM CAA (ACSR) Ø 29 mm	3.70	400	10.70
FLV17443-8*				4.60	400	12.80



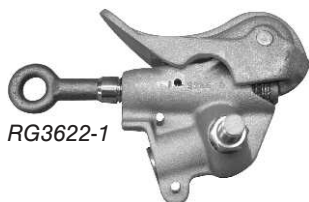
FLV17443-1



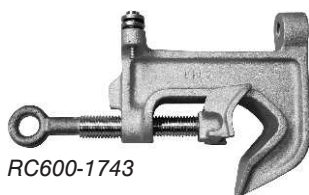
RC600-1584

* 02 pcs Threaded connectors (RC600-1584) for connection of the cable ferrules to the clamp, in special situations where the clamp has been designed for connection without thread.

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RG3622-1



RC600-1743

By-Pass Clamps

The By-Pass Clamps body is made of aluminum alloy. Connectors and eye-screws are made of bronze alloy. These clamps are suitable for works with the Hot Stick Method, using *RITZGLAS®* hot stick.

BY-PASS CLAMPS			
Cat. No.	Clamp Connection Range		Approx. Weight (kg)
	Min.	Max.	
RG3622-1	# 6 Copper Ø 4 mm	900 MCM CAA (ACSR) Ø 29 mm	0.70
RC600-1743	# 6 Copper Ø 4 mm	1590 MCM CAA (ACSR) Ø 38 mm	0.72

Rigid Jumpers

The insulated By-Pass rigid jumpers (series RC601-0260 through RC601-0263) are available with 4 different cable sizes.

The insulated By-Pass rigid jumpers are manufactured with reinforced fiberglass poles, orange color, Ø 38 mm and length 2.44 m - making it a proper tool for works with the Rubber Glove Method and the Hot Stick Method.

The nominal current capacity varies from 200 A through 400 A, depending on the size of the cable.

The grips installed at the ends of the rigid jumper are very useful when installing the jumper on the line or keeping the clamps clear during the installation.

Composition of the set:

- 4.88 m of 15 kV rated protected cable.
- 2.44 m of *RITZGLAS®* pole, Ø 38 mm, orange color.
- 02 pcs of By-Pass Twisting Clamps RC600-1743.
- 02 pcs Copper ferrules (series RC600-2598 through RC600-2601), one on each end.

BY-PASS INSULATED RIGID JUMPERS RATED FOR 15 kV PHASE-TO-PHASE SYSTEMS					
Cat. No.	Cable Size (AWG)	Clamp Connection Range		Nominal Current Capacity (A)	Approx. Weight (kg)
		Min.	Max.		
RC601-0260	2			200	7.20
RC601-0261	1/0	# 6 Copper Ø 4 mm	1590 MCM CAA (ACSR) Ø 38 mm	260	10.30
RC601-0262	2/0			300	11.70
RC601-0263	4/0			400	14.90

The By-Pass rigid jumpers (series RC601-0036 through RC601-0038) are composed of an internal round aluminum bar inside a fiberglass Ø 38 mm pole.

A 915 mm x 95 mm² section of flexible PVC crystal cable with threaded copper ferrules is fixed to each end of the bar.

Nominal current capacity: 400 A.



RC601-0036

BY-PASS INSULATED RIGID JUMPERS RATED FOR 34.5 kV PHASE-TO-PHASE / 20 kV PHASE-TO-GROUND SYSTEMS		
Cat. No.	Description	Approx. Weight (kg)
RC601-0036	Jumper with threaded ferrules, Ø 38 mm x 2.44 m poles, overall length: 4.30 m	8.10
RC601-0037	Jumper with threaded ferrules, Ø 38 mm x 3.05 m poles, overall length: 4.90 m	9.50
RC601-0038	Jumper with threaded ferrules, Ø 38 mm x 3.66 m poles, overall length: 5.50 m	10.80

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RC601-0013

Jumper Supports

The temporary jumper support to be installed on poles through wheel binder is manufactured with Ø 64 mm x 1.22 m RITZGLAS® pole and is used for lifting jumper cables.

It is composed of 4 wire holders, twisting type, provided with an internal device to prevent the jumper from sliding, avoiding thus its contact with ground.

Each wire holder suitable for cables of from Ø 19 mm through 38 mm.

The nominal load capacity of each wire holder is 34 daN.

TEMPORARY JUMPER SUPPORTS		
Cat. No.	Description	Approx. Weight (kg)
RC601-0013	Temporary Jumper Support to be installed on poles	11.30

Transformer Bushing Temporary Jumpers



The use of the Transformer Bushing Temporary Jumpers is a very common practice in maintenance works on medium voltage energized systems, for replacement and/or repair of components installed between the transformer bushings and the system, which can be carried out with the Hot Stick or Rubber Glove Methods.

This tool is available in two assembly models, according to the descriptions below (both are manufactured with 15 kV protected cable - 2 AWG).

JUMPERS COMPOSITION

- FLV17448-1

- 3.50 m 15 kV rated protected cable - size 2 AWG (R3641)
- 01 pc Clamp for Transformer bushing (FLV11179-2)*
- 01 pc Protection device for Jumper (FLV05784-1)
- 01 pc Twisting Clamp (RG3622-1)
- 01 pc Insulated support (RS1600-7)

- FLV17449-1

- 3.50 m 15 kV protected cable - size 2 AWG (R3641)
- 01 pc Clamp for Transformer bushing (FLV11179-2)*
- 01 pc Fuse switch (RC600-1895)
- 01 pc Twisting Clamp (RG3622-1)



Notes:

- 1) * On the above arrangements, clamp model FLV11179-2 has been considered (for installation with the Rubber Glove Method). The "T" - screw type clamp FLV11179-3 can also be ordered (also installed with the Rubber Glove Method) or FLV11179-1, with eye-screw, for installation with the Hot Stick Method.
- 2) The length of the cable can be modified according to the installation arrangement.

TEMPORARY JUMPER FOR TRANSFORMER BUSHING

Cat. No.	Description	Nominal Current Capacity (A)	Approx. Weight (kg)
FLV17448-1	Temporary jumper for transformer bushing, with 3.50 m of 2 AWG cable and protection device (FLV05784-1)	100	5.80
FLV17449-1	Temporary jumper for transformer bushing, with 3.50 m of 2 AWG cable and fuse switch (RC600-1895)	100	8.10

Transformer Bushing Clamps



FLV11179-1



FLV11179-2



FLV11179-3

The clamps have been designed to be installed directly to the transformer bushing when carrying out maintenance on energized systems.

They are available in three models and are discerned only by the types of tightening devices of the jaws:

- FLV11179-1: This model is provided with an eye-screw and clamp tightening is done with the Hot Stick Method, using hot sticks.
- FLV11179-2: This model is provided with Ø 25 mm x 215 mm insulating handle and rubber storm skirt and its installation is done with the Rubber Glove Method, using insulating rubber gloves and sleeves.
- FLV11179-3: The actuation of the jaws is done through the "T"-type screw and its installation is done with the Rubber Glove Method, using insulating rubber gloves and sleeves.

All clamp models are connected to the jumper cables through aluminum ferrules (FLV12486-1), supplied along with the clamp.

TRANSFORMER BUSHING CLAMPS

Cat. No.	Description	Approx. Weight (kg)
FLV11179-1	Clamp for transformer bushing provided with eye-screw	0.80
FLV11179-2	Clamp for transformer bushing provided with RITZGLAS® insulating handle	0.80
FLV11179-3	Clamp for transformer bushing provided with "T" type screw	0.80

Temporary Jumper Protection Devices

The Temporary Jumper Protection Devices are composed of a fuse-cartridge with aluminum coupling ferrules and are used as components of the temporary jumpers for transformer bushings.

Clamp RG3622-1 is connected to the head located on one end and the 2 AWG jumper cable is connected to the other end.

Note:

The fuse link is not included and must be specified and installed by the customer. It is recommended to use only fuse-links of proven performance.

TEMPORARY JUMPER PROTECTION DEVICES		
Cat. No.	Nominal Current Capacity (A)	Approx. Weight (kg)
FLV05784-1	100	0.80



FLV05784-1



RC600-1895



RC600-1944



Temporary Fuse Switch

The Temporary Fuse Switch up to 27 kV is used to maintain the protection when performing maintenance on conventional fuse switches of distribution systems. It is a component of the temporary jumper for transformer bushing.

The installation and removal of the Temporary Fuse Switch is done using a hot stick.

Bronze stud at the bottom end suitable for clamps on the temporary tap jumper. The Ø 32 mm *RITZGLAS*® pole fitted with two rubber storm skirts ensures insulation.

Notes:

Fuse links are not supplied with the fuse switches and must be obtained from specialized suppliers, with maximum current rating of 100 A.

It is necessary to use a load buster device to open the fuse switch, through the eye-link of the fuse-cartridge.

The Pivot-lever type Temporary Fuse Switch allows the closing of the switch from the opposite side of the fuse-cartridge, using a hot stick.

STANDARD TYPE

Cat. No.	Voltage Class	Approx. Weight (kg)
RC600-1895	up to 27 kV	4.10

PIVOT-LEVER TYPE

Cat. No.	Voltage Class	Approx. Weight (kg)
RC600-1944	up to 27 kV	4.40

Insulated Support

The Insulated Support is essential for installation of the temporary jumper in energized systems, when performed by only one lineman. It holds one of the ends of the jumper preventing it from being energized, enabling thus the safe handling and installation of the other end.

The Insulating Support is provided with two Ø 12 mm x 64 mm bronze-alloy side studs, isolated from the clamp through a Ø 25 mm *RITZGLAS*® pole, insulating length: 320 mm.

The attachment to the conductor is possible through a twisting clamp with eye-screw, to be operated with a hot stick.

INSULATED SUPPORT		
Cat. No.	Description	Approx. Weight (kg)
RS1600-7	Insulated support for temporary jumper up to 34.5 kV	1.00



RS1600-7

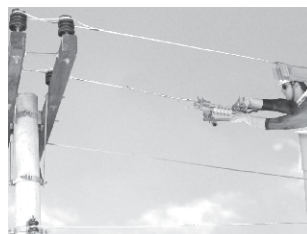
Temporary Cut-Out Equipment

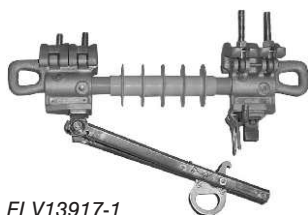
The Temporary Cut-Out Equipment is a safe and economic solution for the cut-out of distribution systems up to 24 kV, for it allows linemen to de-energize only specific parts of the line for maintenance purposes.

The operation consists in installing this tool on conductors from 1/0 through 336.4 MCM (Ø 10 through 18 mm), observing the live line work procedures, on previously determined locations, hence allowing to carry out maintenance on de-energized sections for a short period of time.

The installation of the equipment for temporary cut-out is always carried out close to the structures, observing all the live line work procedures.

Aiming at providing highest operational safety, one temporary cut-out must always be installed misaligned with regards to the adjacent one.





FLV13917-1

The Temporary Cut-Out Equipment has been designed with the same technical characteristics as those of a traditional knife-switch, nevertheless it is provided with insulating components that make it suitable for above applications.

This equipment has provisions for opening energized systems under load, using a load buster type device.

The insulating body is composed of a \varnothing 32 mm x 0.25 m rod, polymer insulators and aluminum alloy connectors.

Total length: 0.56 m



FLV17545-1

- FLV17545-1

Canvas bag for individual conditioning and transportation of the Temporary Cut-Out Equipment.

Approx. Weight: 1.30 kg

TEMPORARY CUT-OUT EQUIPMENT

Cat. No.	Voltage Class	Approx Weight (kg)
FLV13917-1	up to 24 kV	5.20

TECHNICAL CHARACTERISTICS

Maximum Nominal Voltage of the switch (Un)	24.2 kV (effective)
Nominal Frequency (f)	60 Hz
Nominal Withstand Voltage to industrial frequency (1 min.) (Uf)	55 kV (effective)
Nominal Withstand Voltage to environmental impulse (Ui)	140 kV (peak value)
Nominal current (In)	630 A
Nominal Withstand Current of short-duration and duration timing (It/t)	12.5 kA (effective - 1 sec.) 31.25 kA (peak value)
Recommend torque to the connector screw (T)	3.0 kg.m

Temporary Crossarm for Big Jumper

The Temporary Crossarm for Big Jumper has been designed to be used in emergency maintenance works or when energy supply to temporary users during a pre-determined period is required.

It is composed of a Ø 64 mm x 1.30 m *RITZGLAS*® pole and three fuse switches which have a maximum current rating of 100 A. It is assembled onto the pole using two steel screws and wing-nuts and is suitable for systems up to 27 kV.

Note:

The fuse link is not included and must be specified and installed by the customer. It is recommended to use only fuse-links of proven performance.



FLV13033-1

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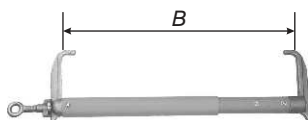
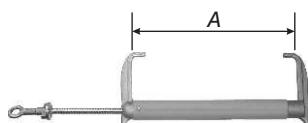
TEMPORARY CROSSARM FOR BIG JUMPER		
Cat. No.	Description	Approx. Weight (kg)
FLV13033-1	Temporary crossarm for big jumper provided with three temporary fuse switches	22.60

ACCESSORIES		
Cat. No.	Description	Approx. Weight (kg)
FLV13045-1	Temporary fuse switch for big jumper up to 27 kV	4.50
FLV13033-2	Temporary crossarm for big jumper without the fuse switches	5.90



FLV13045-1

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FLV12409-1

Temporary By-Pass for Fuse Switch

The By-Pass (FLV12409-1) has been designed for temporary release of the cartridge, enabling the replacement of the fuse link. The operation consists in installing the device with a Grip-all Clampstick or *RITZGLAS*® Hot Stick, preventing the interruption of the circuit.

It is provided with an internal metallic busbar rated at maximum 80 A, fixed to the aluminum supports, which establish contact with the metallic parts of the switch of several different manufacturers.

An exclusive casing-like insulating tubular protection system prevents exposure of the threaded metallic part during operation.

The opening and closing of the By-Pass is possible by twisting the threaded part with an eye-link, for installation using hot stick.

TEMPORARY BY-PASS FOR FUSE SWITCH

Cat. No.	Opening Range (mm)		Voltage Class (kV)	Approx. Weight (kg)
	A	B		
FLV12409-1	293	434	25	1.40



Group E

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Group E

Platforms, Ladders and Scaffolds

Hot Line Ladder

E

Hot Line Ladders are intended for several applications on high voltage hot line works, for they permit the lineman to work in a convenient position and perform line repairs on hard-to-reach places.

All hooks are made of Ø 25.4 mm (1") steel with surface treatment and are of swivel-type for adaptation to the several positions on the structure.

For increased operational safety, the hooks are provided with steel with surface treatment chain and locking system.

The rungs are made of Ø 32 mm RITZGLAS® poles, with sliding-proof coating.

In addition to the high mechanical strength of the connections between siderails and rungs, the Ladders for Hot Line Work are equipped with reinforcing steel rods close to the ends of the ladders.



Single Ladders with Hooks

The ladders (Single Ladders with Hooks / Ladders for Live Work) (model RH4904-8 through RH4904-16) are made of Ø 51 mm *RITZGLAS*® poles, which form the siderails. They are only used for vertical position works.

The ladders (Single Ladders with Hooks / Ladders for Live Work) (models RH4905-8 through RH4905-20) are made of Ø 64 mm *RITZGLAS*® poles, which form the siderails. These ladders are more appropriate for horizontal position works.

LADDERS WITH Ø 51 mm SIDERAILS			
Cat. No. (8" Hook)	Insulating Length (m)	Distance Between Rungs (m)	Approx. Weight (kg)
RH4904-8	2.39	0.30	20.80
RH4904-10	3.00		22.90
RH4904-12	3.61		24.40
RH4904-14	4.22		26.20
RH4904-16	4.83		28.60

LADDERS WITH Ø 64 mm SIDERAILS

Cat. No. (0.2 m - 8" Hook)	Insulating Length (m)	Distance Between Rungs (m)	Approx. Weight (kg)
RH4905-8	2.39	0.30	28.60
RH4905-10	3.00		31.00
RH4905-12	3.61		33.00
RH4905-14	4.22		37.20
RH4905-16	4.83		38.70
RH4905-18	5.44		42.00
RH4905-20	6.05		43.40

Add suffix "A" to the catalog No. for 0.36 m (14") hooks.

Add suffix "B" to the catalog No. for 0.40 m (18") hooks.

Nominal Working Load:

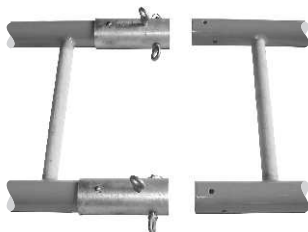
8" (0.20 m) Hooks: 567 daN

14" (0.36 m) Hooks: 454 daN

18" (0.46 m) Hooks: 340 daN



RH4905-16



Sectional Ladders with Hooks

The Sectional Ladders with Hooks are made of Ø 64 mm *RITZGLAS®* poles which form the siderails and provide for combinations up to 9.76 m long.

All sections are interchangeable allowing to reach several different heights with only a few sections, with dimensions suitable for transportation.

The top sections are provided with Ø 25.4 mm (1") and the connection between sections is made of steel splices with surface treatment and bronze counter-pins, for safe locking.

TOP SECTION (Ø 64 mm)

Cat. No. (0.2 m - 8" Hook)	Insulating Length (m)	Approx. Weight (kg)
RC402-0402	3.61	33.00
RC402-0404	4.22	35.40
RC402-0407	4.83	37.80
RC402-0411	6.05	42.60
RC402-0482	3.00	30.60

MIDDLE SECTION (Ø 64 mm)

Cat. No.	Insulating Length (m)	Approx. Weight (kg)
RT402-0423	2.96	22.00

BOTTOM SECTION (Ø 64 mm)

Cat. No.	Insulating Length (m)	Approx. Weight (kg)
RC402-0418	2.39	19.60
RC402-0421	3.00	22.00
RC402-0422	3.61	24.40

Sectional Ladders with Three Rails

The Sectional Ladder with Three Rails is provided with higher mechanical resistance and is subject to smaller deflection in order to enhance the efficiency when working with the ladder in the horizontal position.

It is provided with *RITZGLAS*® rails: Ø 51 mm siderails and Ø 64 mm middle rail.

The middle rail is also used as a fixing point for the fall protection device of the lineman's safety belt and divides the rungs anatomically, for a better feet support.

Each model below features its own characteristics, according to the description:

- RC402-0119

This ladder has only one section and, therefore, the only one that is not of the sectional type.

- RC402-0512 and RC402-0513

These two models are used as the bottom section, that is, they are provided with Ø 51 mm galvanized steel splices installed to the siderails, for attachment to the top section.

- RC402-0514

This ladder is used as the top section and can be attached to models RC402-0512 and RC402-0513.

Models RC402-0119 and RC402-0514 are provided with steel hooks.

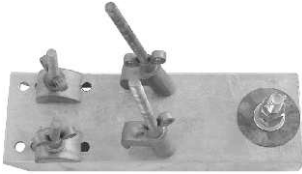


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SECTIONAL LADDERS WITH 3 RAILS

Cat. No.	Insulating Length (m)	Section	Approx. Weight (kg)
RC402-0119	6.00	One section only	51.00
RC402-0512	2.41	Bottom	21.60
RC402-0513	3.63	Bottom	26.00
RC402-0514	3.56	Top	29.50

Accessories for Ladder Support



RE402-0087



RE402-0092



RE402-0099



RE402-0138

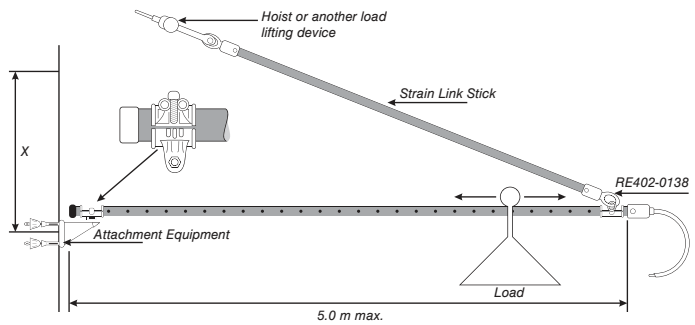


RE402-0568

The ladder supporting accessories provide quick, easy and safe installation of Hot Line Ladders on almost every type of structure.

These sets have been designed to be attached to metallic, wooden or concrete structures, vertically and horizontally, with Ø 64 mm (or larger) siderail ladders.

The diagram below shows a typical installation and the work loads with the different attachment points.



"X" = Distance between the attachment points (m)	Total maximum working load (kg)	Overall length of the ladder (m)
2.44	227	4.88
3.66	182	7.32
4.88	136	9.75

Note:

For assemblies requiring ladders longer than 5 m, an additional supporting equipment must be installed.



RE402-0526

**SPECIFICATION OF COMPONENTS AND/OR COMPLETE
LADDER SUPPORTING EQUIPMENT**

Cat. No.	Description	C402-0139 Vertical Tower Attachment Equipment	C402-0140 Horizontal Tower Attachment Equipment	C402-0155 Vertical Pole Attachment Equipment	Approx. Weight (kg)
RE402-0087	Base of the horizontal tower attachment saddle		1		11.50
RE402-0092	64 / 38 mm Double Clamp	1	1	1	1.30
RE402-0099	Spreader Bar	1	1	1	3.80
RE402-0138	64 mm ladder clamp	2	2	2	0.79
RE402-0141*	Ø 32 mm x 3.54 m Strain link stick	2	2	2	3.90
RE402-0525	Base of the vertical tower attachment saddle	1			11.25
RE402-0526	Base of the vertical pole attachment saddle			1	11.09
RE402-0568	64 mm clamp yoke	1	1	1	6.60
TOTAL WEIGHT (kg)					50.23

* Check for other strain link sticks.



RT402-0899

E

Ø 32 mm STRAIN LINK STICK		
Cat. No.	Insulating Length (m)	Approx. Weight (kg)
RE402-0141	3.54	3.90
RT402-0899	1.72	1.90
RT402-0900	2.33	2.50
RT402-0901	2.90	3.20

Adjustable Ladder Hooks



RH4905-1

Adjustable ladder hooks can be easily adapted to the side rails of the Hot Line Ladders and Platform Ladder platform.

This accessory converts a Ø 51 mm or Ø 64 mm side rail ladder into a hook ladder, or enables the attachment of the ladder to inclined structures.

Hooks are swiveling and installed using clamps, allowing installation at the most convenient position on the structure.

Hooks are made of Ø 25.4 mm (1") galvanized steel and installed on aluminum clamps. Complementary steel chains are provided with a safety locking system.

Maximum Load Capacity: 454 daN. (each pair)

COMPOSITION OF THE LADDER ADJUSTABLE HOOK

01 Steel Hook

01 Steel chain with safety locking system

01 Aluminum alloy clamp

LADDER ADJUSTABLE HOOK				
Cat. No.			For Side Rails of Ø (mm)	Approx. Weight (kg) *
203 mm (8") Hook	14" Hook (356 mm)	18" Hook (457 mm)		
RH4904-1	-	-	51	4.70
-	RH4924-1	-		5.60
RH4905-1	-	-	64	4.80
-	RH4925-1	-		5.70
-	-	RH4945-1		6.60

* Weight per piece.

Platforms

The Platforms have been designed with *RITZGLAS*® poles to offer the lineman a safe and convenient base, in order to perform hot line works with the Rubber Glove or Hot Stick Methods.

It can be quickly assembled to the structures, so the lineman can be well positioned vertically and horizontally.

These platforms are quickly attached to the structure, by means of two assembling options:

- 1) Adjustable type: for works which do not require frequent side changes on the platform position. The platform is attached to the pole using a chain tightener.
- 2) Pivot-type: it offers a 180° horizontal turn of the assembled platform, with the possibility to install it at intermediary angles, to the left or right.

Platforms may also be supplied with optional accessories, such as: tripods, hand-rails and saddles.

The board is made of fiberglass with sliding-proof surface, preventing the lineman from accidentally sliding.

The hand-rails and tripods are ideal as a supporting and fixing point of the fall protection device of the safety harness.

Insulating Platforms

A solution to add a 0.30 m insulating span between the board of the platform and the pole attachment saddle, using two Ø 51 mm *RITZGLAS*® poles. This prepares the insulating platforms for hot line work on systems up to 34.5 kV with the Rubber Glove or Hot Stick Methods.

The nominal work load is 227 daN.

Note:

The tripod or hand-rails of these platforms must be ordered separately, for they are not part of the set.



FLV17431-1



FLV17434-1



FLV17436-1

INSULATING PLATFORMS

Cat. No.	Description
FLV17431-1	Insulating platform, length 1.20 m, with adjustable saddle
FLV17432-1	Insulating platform, length 1.80 m, with adjustable saddle
FLV17433-1	Insulating platform, length 2.40 m, with adjustable saddle
FLV17434-1	Insulating platform, length 1.20 m, with pivot-type saddle
FLV17436-1	Insulating platform, length 1.80 m, with pivot-type saddle
FLV17438-1	Insulating platform, length 2.40 m, with pivot-type saddle

INSTRUCTIONS ON THE INTERCHANGEABILITY OF COMPONENTS

1.20 m INSULATING PLATFORM AND ACCESSORIES

Cat. No.	Description	Approx. Weight (kg)
FLV13132-1	1.20 m long insulating platform	11.80
RH4964	RITZGLAS® tripod for 1.20 m insulating platforms	2.00
RC402-1055	RITZGLAS® hand-rail for 1.20 m insulating platforms	2.00
RH4965-14W	Pivot-type saddle for 1.20 m platforms for pole attachment	12.00

1.80 m INSULATING PLATFORM AND ACCESSORIES

Cat. No.	Description	Approx. Weight (kg)
FLV17435-1	1.80 m long insulating platform	38.30
RC402-0023	<i>RITZGLAS</i> ® hand-rail for 1.80 m insulating platforms	4.50
RH4965-13W	Pivot-type saddle for 1.80 m platforms for pole attachment	13.40

2.40 m INSULATING PLATFORM AND ACCESSORIES

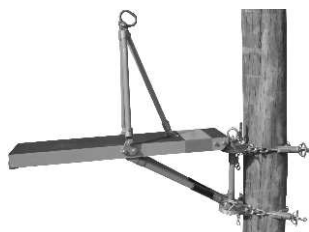
Cat. No.	Description	Approx. Weight (kg)
FLV17437-1	2.40 m long insulating platform	42.50
C402-0024	<i>RITZGLAS</i> ® hand-rail for 2.40 m insulating platforms	4.80
RH4965-13W	Pivot-type saddle for 2.40 m platforms for pole attachment	13.40

Note:

The above insulating platforms are intended for pole attachment. Should the attachment to metallic structures be required, specific saddles must be ordered, according to the Platform Accessories table.



RH4964-6W



RH4965-4W



RH4965-6W

Aerial Platforms

Aerial Platforms are intended for hot line work on systems up to 15 kV with the Rubber Glove or Hot Stick Methods.

The nominal working load for all models is 227 daN.

Note:

The tripod or hand-rails of these platforms must be ordered separately, for they are not part of the set.

STANDARD AERIAL PLATFORMS

Cat. No.	Description	Approx. Weight (kg)
RH4964-42W	Stand platform, length 1 m, with adjustable saddle	17.00
RH4964-4W	Stand platform, length 1.20 m, with adjustable saddle	19.00
RH4964-6W	Stand platform, length 1.80 m, with adjustable saddle	26.00
RH4964-8W	Stand platform, length 2.40 m, with adjustable saddle	31.00
RH4965-4W	Stand platform, length 1.20 m, with pivot-type saddle	25.50
RH4965-6W	Stand platform, length 1.80 m, with pivot-type saddle	39.40
RH4965-8W	Stand platform, length 2.40 m, with pivot-type saddle	45.60

INSTRUCTIONS ON THE INTERCHANGEABILITY OF THE COMPONENTS

Cat. No.	Description	Approx. Weight (kg)
RC402-0023	<i>RITZGLAS</i> ® hand-rail for 1.80 m insulating platforms	
RC402-0024	<i>RITZGLAS</i> ® hand-rail for 2.40 m insulating platforms	4.80
RT402-1195	<i>RITZGLAS</i> ® tripod for standard aerial platforms, length 1 m and 1.20 m	2.00

Note:

The above insulating platforms are intended for pole attachment. Should the attachment to metallic structures be required, specific saddles must be ordered, according to the Platform Accessories table.



RT402-0030

Suspension Platform

The suspension platform allows a rotation of 180° relative to the horizontal plane, providing a better positioning of the lineman, with no need to disassemble it for new adjustments.

It is normally used on structures with reduced clearance, where the assembly of a conventional Platform would not be possible.

The nominal load capacity is 181 daN in an aligned and perpendicular to the structure position. Such capacity is reduced to 136 daN when positioned at any different angle.

The working area is 1.20 m long and 0.25 m wide.

SUSPENSION PLATFORM

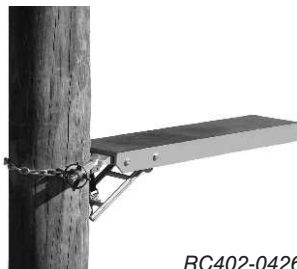
Cat. No.	Description	Approx. Weight (kg)
RT402-0030	1.20 m Suspension Platform	29.00

Utility Platform

The Utility Platform was designed to be used within limited clearances or in confined working areas, such as distribution poles, telecom poles, or substations, not equipped with hand-rails or tripod. Provided with chain binder for attachment to the pole, braces to be folded underneath the platform fiberglass board which make it compact, easy to transport and store.

Made of the same materials of all other platforms of larger sizes, the working area is 0.76 m long x 0.25 m wide.

Nominal working load: 100 daN.



RC402-0426

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UTILITY PLATFORM		
Cat. No.	Description	Approx. Weight (kg)
RC402-0426	0.76 m Utility Platform	13.10

Platform Saddle

The Platform Saddle was designed to meet specific requirements, when the lineman needs a foot supporting base on the pole, where the ladder is limited in height.

Made of aluminum alloy and is attached to the pole with a chain binder, for final tightening.

Note:

The utility platform and the platform saddle, due to their constructive characteristics, are not considered insulated.



FLV06423-1

PLATFORM SADDLE		
Cat. No.	Description	Approx. Weight (kg)
FLV06423-1	Platform saddle for the lineman feet support.	3.40



RC402-0277

Platform Ladder

The Platform Ladder allows the lineman to work either standing or sitting, offering a better positioning on the structure.

Composed of a 1.20 m *RITZGLAS*® ladder and a fiberglass platform with a 0.25 m x 0.51 m sliding proof surface. When supplied with adjustable hooks, they are used for the platform attachment to the structure.

This platform can be folded for easy transportation and storage.

Nominal working capacity of 227 daN.

PLATFORM LADDER

Cat. No.	Description	Work Load (daN)	Approx. Weight (kg)
RC402-0276	Platform Ladder without suspension hooks	227	18.50
RC402-0277	Platform Ladder with suspension hooks	227	28.50

Platform Accessories

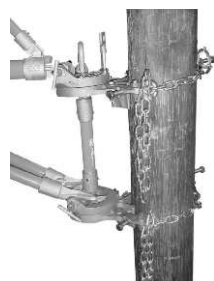
PLATFORM ACCESSORIES		
Cat. No.	Description	Approx. Weight (kg)
RC402-1055	Hand-rail for 1.20 m insulating platform (FLV17431-1; FLV17434-1; FLV13132-1)	2.00
RC402-0023	Hand-rail for all 1.80 m platforms	4.50
RC402-0024	Hand-rail for all 2.40 m platforms	4.80
RH4964	Only tripod for 1.20 m insulating platform (FLV17431-1; FLV17434-1; FLV13132-1)	2.00
RT402-1195	Standard-type tripod for 1 or 1.20 m platform (RH4964-42W, RH4964-4W and RH4965-4W)	2.00
RH4965-13W	Pivot-type saddle for 1.80 and 2.40 m platforms, with round and double-T concrete pole attachment provisions	13.20
H4965-14W	Pivot-type saddle for 1.20 m platforms, with round and double-T concrete pole attachment provisions	12.00



RC402-0023



RH4964



RH4965-14W



RH4965-15



RM4901-10W



RM4901-21

PLATFORMS ACCESSORIES

Cat. No.	Description	Approx. Weight (kg)
RH4965-15	Pivot-type saddle for 1.80 m and 2.40 m platforms, with 3-1/2" x 3-1/2" through 8" x 8" (89 x 89 mm through 203 x 203 mm) edges structures attachment provisions	11.75
RH4965-16	Pivot-type saddle for 1.20 m platforms, with 3-1/2" x 3-1/2" through 8" x 8" (89 x 89 mm through 203 x 203 mm) edges structures attachment provisions	11.00
RM4901-10W	Adjustable saddle for round pole attachment platform	4.10
RM4901-21	Adjustable saddle for platforms with 3-1/2" x 3-1/2" through 8" x 8" (89 x 89 mm through 203 x 203 mm) edges structures attachment provisions	3.10

Insulating Stool

The Insulating Stool is a very useful tool for insulation to ground potential, enhancing safety during maintenance works in substations, cubicles, electrical boards, etc. It also eases access to the work position.

- Made of fiberglass
- Removable feet for easy transportation and storage, with rubber caps at the ends
- Sliding-proof surface
- Nominal working capacity: 120 daN
- Nominal working voltage: 40 kV
- Orange color.

INSULATING STOOL				
Cat. No.	Description (m)		Max. Working Voltage (kV)	Approx. Weight (kg)
	Sliding-Proof Surface	Height		
FLV12564-1	0.50 x 0.50	0.33	40	6.00



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Insulating Modular Scaffold



The Insulating Modular Scaffold is essential for the performance of hot line works in high and extra-high voltage systems, mainly in substations.

The Insulating Modular Scaffold was conceived to enable linemen to reach the necessary work height in a safe and comfortable manner, specially in confined spaces such as substations. This equipment enabled the development of a large number of different hot line works extensively performed with the Hot Stick and the Bare-Hand Methods.

The development of additional components further increased the assembly options of the Insulating Modular Scaffold.

Made of light and interchangeable components, the Insulated Modular Scaffold is easily assembled by only two linemen, without any tools.

The structure is made of *RITZGLAS*® poles and the platform is made of fiberglass. Thus, it is possible to use the Insulated Modular Scaffold on energized systems up to 800 kV, with guarantee of electrical insulation.

The rated work load is 300 daN, applied at the center of the platform.

MAIN COMPONENTS

- FLV09091-1

1 x 2 m Module

Made of Ø 38 mm *RITZGLAS*® poles with sliding-proof rungs, cast aluminum connections and counter-pins for locking.

- FLV06052-1

1 x 1 m Module

Made of Ø 38 mm *RITZGLAS*® poles with sliding-proof rungs, cast aluminum connections and counter-pins for locking.

- FLV13916-1

1 x 2 m Module

With similar characteristics to those of module FLV09091-1, but provided with 5 top pins. Used for assembly of non-conventional arrangements.

- FLV16241-1

Side Crosspiece

Made of Ø 38 mm x 1 m *RITZGLAS*® poles and cast aluminum connection heads. Used for closing and locking the modules when assembling the base of the 1 x 1 m scaffold.

- FLV16241-2

Side Crosspiece

Made of Ø 38 mm x 2 m *RITZGLAS*® poles. Similar to FLV16241-1, but used when assembling the base of the 2 x 2 m scaffold.



FLV09091-1



FLV06052-1



FLV13916-1



FLV16241-1



FLV16241-2



FLV16241-3

- FLV16241-3

Diagonal Crosspiece

Made of Ø 38 mm x 1.41 m *RITZGLAS®* poles. This crosspiece is responsible for the diagonal locking between two modules when assembling the base of the 1 x 1 m scaffold.

- FLV16241-4

Diagonal Crosspiece

Made of Ø 38 mm x 2.24 m *RITZGLAS®* poles. Similar to FLV16241-3, but used when assembling the base of the 2 x 1 m scaffold.



FLV16241-4

- FLV16241-5

Diagonal Crosspiece

Made of Ø 38 mm x 2.83 m *RITZGLAS®* poles. Similar to FLV16241-3, but used when assembling the base of the 2 x 2 m scaffold.

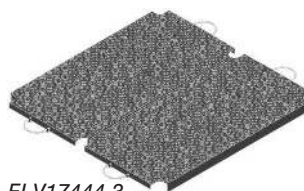


FLV16241-5

- FLV17444-3

Platform

Composed of two fiberglass boards with sliding-proof surface treatment. This model is only used when assembling the base of the 1 x 1 m scaffold.

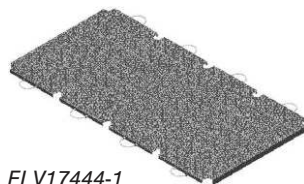


FLV17444-3

- FLV17444-1

Platform

Composed of four fiberglass boards with sliding-proof surface treatment. This model is only used when assembling the 2 x 1 m scaffold platform.

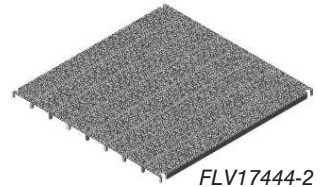


FLV17444-1

- FLV17444-2

Platform

Composed of eight fiberglass boards with sliding-proof surface treatment. This model is only used when assembling the 2 x 2 m scaffold platform.



- FLV11630-1

- FLV11630-3

- FLV11630-2

Set of four individual wheels for scaffold displacement. Provided with stabilizers and two steel rods for spacing and locking the base of the scaffold.

Although all three models are provided with common characteristics, the rods are different in length to meet different assembly requirements.

FLV11630-1 for the 1 x 1 m scaffold base,
FLV11630-2 for the 2 x 1 m scaffold base, and
FLV11630-2 for the 2 x 2 m scaffold base.



- FLV11658-1

- FLV11658-2

Set of hot dip galvanized rails (three pairs of 2 m long rails each). These rails are interconnected using locking pins and the correspondent spacing steel rods. This component has been designed to ease the horizontal displacement of the scaffold on uneven surfaces.

Each of the above models meets a specific assembly requirement:

FLV11658-1: for the 1 x 1 m and 2 x 1 m scaffold bases

FLV11658-2: for the 2 x 2 m scaffold base.





FLV15444-1

- FLV15444-1

The Removable Ladder Rungs can be attached to the side of the modules of the Insulating Modular Scaffold to provide additional rungs where originally there are no rungs.

- FLV16355-1

- FLV16355-2

The Tool Bracket is attached to the top module of the scaffold to ease the lifting of the scaffold components during assembly.

This accessory is available in two models: right (FLV16355-1) and left (FLV16355-2). Both models have an axial angle of approximately 40° regarding the module.

This angle enables the mounting of two brackets simultaneously for the lifting of materials with larger dimensions.

Max. load capacity: 40 daN

- RM1895-3

The polypropylene rope is used in conjunction with insulating separating poles (FLV04803-3) for staying the scaffold.

Ropes are supplied in white color and are provided with polypropylene multi-filaments, 3-legged braid, supplied in rolls of 220 m.



FLV16355-2



RM1895-3

Working Area Safety Components

A number of different components was developed to ensure safety in the working area, which are mounted on the Platform area.

- FLV14342-1 (for the 1 x 1 m scaffold base)
- FLV14342-2 (for the 2 x 1 m scaffold base)
- FLV14342-4 (for the 2 x 2 m scaffold base)

Safety baseboard for installation on the base of the scaffold platform to prevent tools or components from dropping accidentally.

Made of fiberglass plates and provided with couplings for attachment to the scaffold modules.

- FLV17496-1

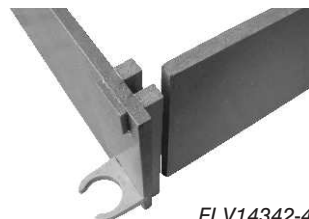
The 2 x 1.2 m Guard Module is made of the same material of the regular modules, but with a height of 1.2 m.

This module should only be used at working levels, that is, as an additional body protection at the level where the platform is assembled.

- FLV16238-1

The 1 x 1.2 m Guard Module is made of the same material of the regular modules, but with a height of 1.2 m.

Same application as that of FLV17496-1 module, but used with 1 m base scaffolds.



FLV14342-4

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FLV17496-1



FLV16238-1



FLV16241-6

- FLV16241-6

Side Crosspiece for Guard Module.

Composed of a *RITZGLAS*® Ø 0.38 mm x 1 m pole and fittings.

It is important to close and lock the 1 x 1 and 1 x 2 m Guard Modules of the scaffold.



FLV16241-7

- FLV16241-7

Side Crosspiece for Guard Module.

Similar to FLV16241-6, but used with the 2 x 2 m scaffold.



FLV16237-1

- FLV16237-1

Intermediary Crosspiece

Made of a *RITZGLAS*® Ø 0.38 mm x 1 m pole and clamps at the ends.

This crosspiece is used to close the Guard Modules of the 2 x 1 and 1 x 1 m scaffolds. It is assembled at 0.7 m from the platform, for increased safety.



FLV16237-2

- FLV16237-2

Intermediary Crosspiece

Similar to FLV16237-1, but used with the 2 x 2 m scaffold.

ACCESSORIES

- FLV09012-1

0.50 x 1 m module

With the same insulating and mechanical characteristics of all other modules. This module has a reduced height of 0.50 m, enabling the assembly of intermediary heights to offer, in certain cases, a more suitable working position.



FLV09012-1

- FLV04803-3

Insulating separating pole for staying rope

Made of Ø 25 mm x 1.70 m *RITZGLAS*® pole, fitted with aluminum heads and bronze butt-swivels. Nominal working load of 800 daN.

This tool is necessary for staying the scaffold.
(Recommended use: 4 pieces every 5 m height of scaffold).



FLV04803-3

- ESC15051-3 (1 m)

- ESC15051-2 (2 m)

- ESC15051-1 (3 m)

Staying Poles

Made with *RITZGLAS*® Ø 3/8" rods and provided with aluminum fork fitting at one end and aluminum eye-ring at the other end, making it possible to connect two poles, if necessary.

The fork fitting connects to the staying grip
(FLV17648-1), preventing the rope from breaking.

Nominal Working Load: 500 daN.



ESC15051-3

- FLV17648-1

Staying Pole

Made of cast bronze alloy and provided with grip for attachment of the staying pole. It must always be attached to the metallic connections of the scaffold.



FLV17648-1



FLV09422-1

- FLV09422-1

Fiberglass Tool Box

Provides safe, quick and practical storage of tools, during the maintenance works with the scaffold. Made of fiberglass, and fitted with two cast aluminum fasteners for attachment to the scaffold module.

Main dimensions: 0.62 x 0.22 x 0.20 m.

Approx. weight: 4.90 kg



RC402-0288

- RC402-0288

Micro Tester

The Micro Tester is a micro-ammeter intended to measure the leakage current when carrying out electrical insulation tests on the scaffold in the field. It features a 0 - 200 μ A scale. Supplied complete with fasteners, connection cable, and storage case.

INSULATING MODULAR SCAFFOLD

Cat. No.	Description	Approx. Weight (kg)
FLV06052-1	1 x 1 m Module	7.00
FLV09091-1	2 x 1 m Module	12.20
FLV13916-1	2 x 1 m Module, with 5 aluminum coupling pins	13.60
FLV09012-1	1 x 0.50 m Module	4.90
FLV16241-1	Ø 38 mm x 1 m Bottom Side Crosspiece	0.89
FLV16241-2	Ø 38 mm x 2 m Bottom Side Crosspiece	2.20
FLV16241-3	Ø 38 mm x 1.41 m Diagonal Crosspiece	1.50
FLV16241-4	Ø 38 mm x 2.24 m Diagonal Crosspiece	2.00

INSULATING MODULAR SCAFFOLD

Cat. No.	Description	Approx. Weight (kg)
FLV17496-1	2 x 1.2 m Guard Module	13,80
FLV16237-1	Middle Crosspiece for 2 x 1.2 m module	2.90
FLV16237-2	Middle Crosspiece for 1 x 1 m module	2.30
FLV16241-5	Ø 38 mm x 2.83 m Diagonal Crosspiece	2.40
FLV17444-1	Platform used with the 2 x 1 m and 1 x 1 m base scaffolds	26.40
FLV17444-2	Platform used on the 2 x 2 m scaffold base assemblies	110.60
FLV17444-3	Platform used on the 1 x 1 m scaffold base assemblies	13.20
FLV11630-1	Set of individual wheels and respective steel rods for the 1 x 1 m scaffold base	108.40
FLV11630-2	Set of individual wheels and respective steel rods for the 2 x 1 m scaffold base	108.40
FLV11630-3	Set of individual wheels and respective steel rods for the 2 x 2 m scaffold base	110.60
FLV11658-1	Set of steel rails, used for the 1 x 1 and 2 x 1 m scaffold base assemblies	103.10
FLV11658-2	Set of steel rails, used for the 2 x 2 scaffold base assemblies	104.30
FLV04803-3	Ø 25 mm x 1.70 m Insulating separating pole for staying rope	1.15
RM1895-3	Ø 1/2" Synthetic Fiber Rope, white color	0.075
FLV09422-1	Fiberglass Tool Box	5.00
FLV16355-2	Tool Bracket, for attachment to the left side of the scaffold	1.90
FLV16355-1	Tool Bracket, for attachment to the right side of the scaffold	1.90

INSULATING MODULAR SCAFFOLD

Cat. No.	Description	Approx. Weight (kg)
FLV15444-1	Removable Ladder Rungs structure for module attachment	3.70
FLV14342-1	Safety Baseboard, for arrangements with 1 x 1 m modules	16.00
FLV14342-2	Safety Baseboard, for arrangements with 1 x 2 m modules	25.50
FLV14342-4	Safety Baseboard, for arrangements with 2 x 2 m modules	32.00
FLV16238-1	1 x 1.2 m Guard Module	8.30
FLV16241-6	Side Crosspiece for Ø 38 mm x 1 m Guard Module	0.89
FLV16241-7	Side Crosspiece for Ø 38 mm x 2 m Guard Module	2.20
ESC15051-1	3 m Staying Poles	0.70
ESC15051-2	2 m Staying Poles	0.55
ESC15051-3	1 m Staying Poles	0.40
FLV17648-1	Staying Pole	0.40



Group F

Insulating Cover-Up Equipment

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QUALITY AND SAFETY
FOR ELECTRICAL SYSTEMS



Group F

Insulating Cover-Up Equipment



Hot Line Covers, Application, Handling and Maintenance

F

The Hot Line Covers are among the main protection equipment used when carrying out Hot Line Maintenance works on low and medium voltage systems.

Hot Line Covers are used to electrically protect the entire working area, in order to prevent possible accidental contacts between phases or from phase to ground, while performing the works.

Hot Line Covers are used with the Rubber Glove Method where they are installed manually or with the Hot Stick Method where they are operated using Hot Sticks attached to the existing metallic eye-rings.

Its installation and handling should be done only by linemen duly acquainted with Hot Line works, requiring the following basic rules to be observed:

- 01) Linemen should never, under any circumstances, touch the Covers on purpose, only if he is wearing rubber gloves, being always conscious about their position relative to the Covers, to avoid touching them accidentally.

This rule is valid for all Cover-Up equipment used to protect energized parts.

- 02) Pole, Crossarm, Horizontal Support, “C” Support and Round Cover-Up Equipment are intended to avoid the accidental contact of conductors or energized connections with the grounded parts of the structure.
- 03) The Cover-Up Equipment should be handled with care, to prevent fissures, cracks or scratches and should always be kept clean and dry.
- 04) Each Cover-Up equipment should be carefully inspected prior to use, making sure it is clean and dry, without cracks, deep scratches or any other damage.

If necessary, cleaning must be made with a cotton cloth. If this procedure does not completely remove the dirt, water and neutral soap should be used.
- 05) Differently from other covers for permanent use, mentioned by the last chapter of this group, the Cover-Up Equipment have been designed for temporary use, when performing various Hot Line maintenance works, and have to be removed after finishing the works.

PRECAUTIONS

The Hot Line Cover-Up Equipment have been designed to meet a wide range of maintenance situations on energized systems. Suitable covers are provided for each type of equipment, for increased efficiency and safety.

Before starting the work, the lineman must carefully select the most suitable covers, in the necessary quantities, thus avoiding dangerous improvisations.

The visual inspection of the covers to locate fissures, deep scratches, dirt and other damages, is mandatory for all Hot Line teams, for the safety of the users depends on the perfect maintenance of their equipment. In case of doubt, the covers must not be used and have to be submitted to electrical tests.

TECHNICAL CHARACTERISTICS

The Hot Line Cover-Up Equipment are made of thermoplastic with high dielectric strength, ozone-resistant, and UV-resistant.

The orange color offers excellent visibility of the area under maintenance.

The Cover-Up for hot stick installation are provided with metallic eye-rings where the hot stick can be attached.

The Cover-Up Equipment for Hot Lines are manufactured according to the ASTM-F 968 Standard and tested according to the ASTM-F 712 Standard.

Pole Covers

Used for insulating protection when installing or replacing poles.

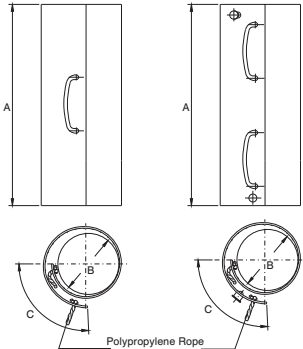
Provided with:

- Polypropylene rope grips for easy installation and removal;
- Internal ribs, which help to avoid abrasion on its surface during handling and highly contribute to an extended working life.

The 1200 mm and 1800 mm models are provided with one nylon button, which enables connecting two or more units to protect a longer section of the pole.



RC406-0000



COVER-UP FOR POLES UP TO Ø 300 mm NOMINAL VOLTAGE: 36.6 kV (PHASE-TO-PHASE)				
Cat. No.	Dimensions (mm)			Approx. Weight (kg)
	A	B	C	
RC406-0028	300	300	~ 115	1.15
RC406-0029	600	300	~ 115	2.35
RC406-0030	1200	300	~ 115	4.85
RC406-0000	1800	300	~ 115	7.20

**COVER-UP FOR POLES UP TO
Ø 230 mm NOMINAL VOLTAGE: 36.6 kV
(PHASE-TO-PHASE)**

Cat. No.	Dimensions (mm)			Approx. Weight (kg)
	A	B	C	
RM4937-1	300	230	~ 195	1.00
RM4937-2	600	230	~ 195	1.95
RM4937-4	1200	230	~ 195	3.95
RM4937-6	1800	230	~ 195	5.95



RM4937-1

Locking Device for Covers

This accessory is used to keep the pole covers firmly attached to the place of installation, including smooth surfaces.

It is very easy to install and remove and is provided with a locking device for the rope. In order to loosen it, simply pull the eye-ring with a hot stick.



RC406-0547

ACCESSORIES

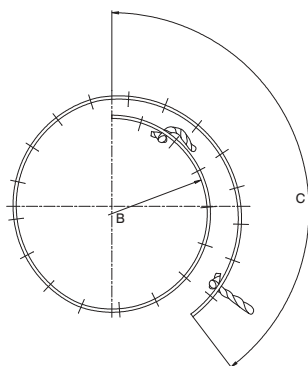
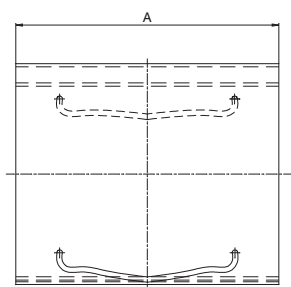
Cat. No.	Description	Approx. Weight (kg)
RC406-0547	Locking Rope for Pole Cover	0.75

Round Cover

Due to its versatility, these covers are used for protection of pole ends, braces, crossarms, lightning arresters, etc.

Since there is no specific application for these covers, special attention must be given in every situation, in order to verify the real protection offered.

Provided with polypropylene rope grips to ease installation and removal with insulating gloves.



**Ø 100 mm AND Ø 150 mm ROUND PROTECTIVE
COVERS NOMINAL VOLTAGE: 26.4 kV
(PHASE-TO-PHASE)**

Cat. No.	Dimensions (mm)			Approx. Weight (kg)
	A	B	C	
COB11176-1	300	100	~ 196	0.40
COB11176-2	600	100	~ 196	0.80
COB11176-3	900	100	~ 196	1.20
COB11176-4	1200	100	~ 196	1.60
COB04487-1	300	150	~ 135	0.50
COB04487-2	600	150	~ 135	0.90
COB04487-3	900	150	~ 135	1.30
COB04487-4	1200	150	~ 135	1.80

Crossarm Covers

These covers are mainly intended to avoid the contact between the wire formed loops and the crossarm when changing the pin insulator or post insulator.

Can also be used for support of temporary jumpers or conductors over the crossarm. When supporting conductors, the conductor must be protected with a suitable cover.

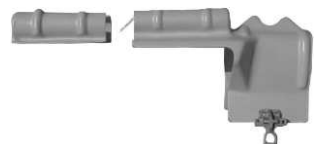
Available in three models, one for use on crossarms with pin insulators and the other two for use on crossarms with post insulators.



RM4933



COB11173-1



COB11173-2

CROSSARM COVER-UP NOMINAL VOLTAGE: 36.6 kV (PHASE-TO-PHASE)		
Cat. No.	Description	Approx. Weight (kg)
RM4933	Cover-Up for crossarms with pin insulators, length: 610 mm	1.45
COB11173-1	Cover-Up for crossarms with post insulator, length: 570 mm	1.50
COB11173-2	Short-type Cover-Up for crossarms with post insulator, length: 430 mm	1.10

Crossarm End Covers

The covers have been designed to protect the ends of the crossarms to avoid accidental contacts with the wire formed loop, during its installation or removal.

With the Rubber Glove Method, this cover also prevents the lineman in contact with the conductor from establishing contact with a grounded part.

The model RC406-0102 can be used on crossarms with pin insulators or post insulators, for they are provided with a slot to allow the insulator bolt to pass through, in assemblies with double crossarms.



RC406-0102



COB14780-1

CROSSARM END COVER-UP NOMINAL VOLTAGE: 36.6 kV (PHASE-TO-PHASE)		
Cat. No.	Description	Approx. Weight (kg)
RC406-0102	Cover-Up for crossarm ends	1.25
COB14780-1	Cover-Up for crossarm ends	0.71

Pole Top Cover-Up

This cover is intended for protection of the pole top when installing or removing the wire formed loop.

Fits poles up to Ø 254 mm and are provided with elastic band for easy installation.

POLE TOP COVER-UP NOMINAL VOLTAGE: 36.6 kV (PHASE-TO-PHASE)		
Cat. No.	Description	Approx. Weight (kg)
RC406-0097	Cover-Up for pole top	2.10



RC406-0097

F

Fuse-Switch Covers

Knife-Switch Covers - 26.4 kV

These covers are used for protection on structures where there are Fuse-Switches or Knife-Switches and can be installed with Rubber Glove or Hot Stick Methods.

The Fuse-Switch Cover RC406-0009 is held in place with a pin that slips behind the insulator and is supported by the metallic bracket of the switch.

The Knife-Switch Covers (COB08561-1) are installed by involving the two sheds of the insulator, onto which it is fixed by pressure.

The knife-switch housing cover (COB13345-1) is used for insulating protection between the housing of the knife-switch and the energized parts during the installation and removal of the jumper or other works performed on the switch. Designed for systems of 15 and 23 kV, they are built with 2 plain sheets, which after being partially open envelop the base of the insulators and are locked with insulating nuts.



RC406-0009

FUSE-SWITCH COVER-UP NOMINAL VOLTAGE: 26.4 kV (PHASE-TO-PHASE)		
Cat. No.	Description	Approx. Weight (kg)
RC406-0009	Cover-Up for fuse-switch	2.80



COB08561-1

KNIFE-SWITCH COVER-UP NOMINAL VOLTAGE: 26.4 kV (PHASE-TO-PHASE)		
Cat. No.	Description	Approx. Weight (kg)
COB08561-1	Cover-Up Equipment for knife-switch	2.90



COB13345-1

KNIFE-SWITCH HOUSING COVER-UP NOMINAL VOLTAGE: 26.4 kV (PHASE-TO-PHASE)		
Cat. No.	Description	Approx. Weight (kg)
COB13345-1	Cover-Up for knife-switch housing (365 x 880 mm)	2.00

Conductor Covers, Pin Insulator Covers and Disc Insulator Covers - 26.4 kV and 36.6 kV

Protective Conductor Covers

The Protective Conductor Covers are those offering a larger protection area on energized parts, therefore they are used more often when performing Hot Line works.

Available in several models to meet the requirements of different types of electrical systems with rated voltages up to 48.3 kV, according to the following models.

The ends are built with male and female designs enabling the firm connection of two or more units, or connection to other types of covers, such as pin insulator covers and disc insulator covers.

Specifically the models RC400-0181 / RP406-0184 RC406-0181GA / RC406-0514GA allow connection with rubber insulating conductor covers.

The metallic eye-rings are intended for installation of the covers with the Hot Stick Method, therefore some models are supplied with such connectors. Specifically the covers models COB03335-1 and RP406-0184 represent a solution for linemen installing the covers by the Rubber Glove Method.

The models RC406-0181 / RC406-0082 / RC406-0082-6 are provided with a Ø 25 mm *RITZGLAS*® hot stick of suitable length for the installation of the covers over the conductor.

By using the universal head attached to the end of the pole, it is possible to previously adjust the installation angle of the cover.



RC406-0181GA

F

CONDUCTOR COVER-UP
NOMINAL VOLTAGE: 26.4 kV (PHASE-TO-PHASE)

Cat. No.	Description	Approx. Weight (kg)
RC406-0181	Protective conductor cover for conductors up to Ø 25 mm, provided with a Ø 25 mm x 1.22 m <i>RITZGLAS</i> ® hot stick, for its installation over the conductor metallic bracket	2.40
RP406-0184	Protective conductor cover for conductors up to Ø 25 mm, provided with no metallic bracket and no installation hot stick	1.50
RC406-0181GA	Protective conductor cover for conductors up to Ø 25 mm, provided with metallic bracket	2.00

CONDUCTOR COVER-UP
NOMINAL VOLTAGE: 36.6 kV (PHASE-TO-PHASE)

Cat. No.	Description	Approx. Weight (kg)
RC406-0514GA	Protective conductor cover for conductors up to Ø 25 mm, provided with metallic bracket	2.15



RC406-0514GA

Pin Insulator Cover-Up

The pin insulator Cover-Up are intended to protect the energized conductor attached to the pin or post insulator, normally used together with the Conductor Covers to which they can be attached.

Available in several models, varying according to the application and working voltage class.

Some of them are provided with metallic brackets for installation with Hot Stick Method and some are provided without metallic brackets, for installation with Rubber Glove Method.



RC406-0182L

PIN INSULATOR COVER-UP NOMINAL VOLTAGE: 26.4 kV (PHASE-TO-PHASE)

Cat. No.	Description	Approx. Weight (kg)
RC406-0182	Pin Insulator Cover-Up, 153 mm high, with metallic bracket for hot stick installation	1.10
RP406-0185	Pin Insulator Cover-Up, 153 mm high, without metallic bracket for hot stick installation	0.98
RC406-0182L	Pin Insulator Cover-Up, 229 mm high, with metallic bracket for hot stick installation	1.20
RP406-0186	Pin Insulator Cover-Up, 229 mm high, without metallic bracket for hot stick installation	1.10

PIN INSULATOR COVER-UP NOMINAL VOLTAGE: 36.6 kV (PHASE-TO-PHASE)

Cat. No.	Description	Approx. Weight (kg)
RC406-0557	Pin Insulator Cover-Up, 305 mm high, with metallic connector for hot stick installation	1.10
RC406-0557L	Pin Insulator Cover-Up, 419 mm high, with metallic connector for hot stick installation	1.40



RC406-0557L

Disc Insulator Cover-Up

The disc insulator Cover-Up are for protection of the energized parts attached to the disc insulator on dead-end strings.

Provided with end connections, being one end for connection to the insulator and the other for connection to the Conductor Cover.

Available in different models, either for conventional (glass or porcelain) insulators or polymer insulators.

F



RC406-0164

DISC INSULATOR COVER-UP NOMINAL VOLTAGE: 26.4 kV (PHASE-TO-PHASE)		
Cat. No.	Description	Approx. Weight (kg)
RC406-0164	Disc Insulator Cover-Up, with max. Ø of 254 mm	4.30

Conductor Covers, Pin Insulator Covers and Disc Insulator Covers - 26.4 kV

CONDUCTOR COVER-UP NOMINAL VOLTAGE: 26.4 kV (PHASE-TO-PHASE)		
Cat. No.	Description	Approx. Weight (kg)
RM4946	MV Conductor Cover-Up - up to Ø 25 mm with metallic bracket	1.25
COB03335-1	MV Conductor Cover-Up - up to Ø 25 mm without metallic bracket	0.90



RM4946



RM4947

PIN INSULATOR COVER-UP NOMINAL VOLTAGE: 26.4 kV (PHASE-TO-PHASE)		
Cat. No.	Description	Approx. Weight (kg)
RM4947	Pin Insulator Cover-Up with metallic bracket	0.70



RM4948

DISC INSULATOR COVER-UP - NOMINAL VOLTAGE: 26.4 kV AND 36.6 kV (PHASE-TO-PHASE)		
Cat. No.	Description	Approx. Weight (kg)
RM4948	Disc Insulator Cover-Up with metallic bracket	2.60
COB11400-1	Dead end, Polymer, Porcelain Rigid and Disc Insulators Protective Cover-Up to Ø 160 mm	1.30



COB11400-1

Model RM4948 - 36.6 kV (Phase-to-Phase)

Model COB11400-1 - 26.4 kV (Phase-to-Phase)

Conductor Covers - 36.6 kV



COB08835-1

CONDUCTOR COVER-UP NOMINAL VOLTAGE: 36.6 kV (PHASE-TO-PHASE)		
Cat. No.	Description	Approx. Weight (kg)
COB08835-1	MV Conductor Cover-Up up to Ø 25 mm without metallic bracket	2.50

Conductor Covers, Pin Insulator Covers and Disc Insulator Covers - 48.3 kV

MV Conductor Cover-Up to Ø 25 mm, provided with metallic bracket for installation with Hot Stick Method, and internal conductor spacers.

Pin Insulator Cover-Up, provided with metallic bracket for installation with Hot Stick Method. There is an adjustment possibility on one side for improved installation to different sizes of crossarms.

Disc Insulator Cover-Up, provided with metallic bracket for installation with Hot Stick Method, and rubber strap for better fixing of the borders.

The Cover-Up for temporary jumper can be attached to the border of the Conductor Cover COB14097-1.



COB14097-1



COB14096-1



COB14098-1



COB14095-1

COVER FOR CONDUCTOR PIN AND DISC INSULATORS / JUMPER CLAMP NOMINAL VOLTAGE: 48.3 kV (PHASE-TO-PHASE)

Cat. No.	Description	Approx. Weight (kg)
COB14097-1	MV Conductor Cover-Up up to Ø 25 mm, provided with metallic bracket	4.20
COB14096-1	Pin Insulator Cover-Up	3.90
COB14098-1	Disc Insulator Cover-Up	4.20
COB14095-1	Temporary Jumper Cover-Up	1.25

Conductor Covers and Pin Insulator Covers - 48.3 kV



RM4931

CONDUCTOR COVER-UP NOMINAL VOLTAGE: 48.3 kV (PHASE-TO-PHASE)		
Cat. No.	Description	Approx. Weight (kg)
RM4931	MV Conductor Protective Cover-Up to Ø 45 mm	4.30



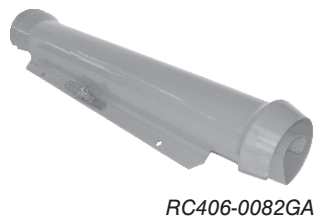
RC406-0046

PIN INSULATOR COVER-UP NOMINAL VOLTAGE: 48.3 kV (PHASE-TO-PHASE)		
Cat. No.	Description	Approx. Weight (kg)
RC406-0046	Pin Insulator Cover-Up, with metallic bracket	4.30

Spiral Covers for Conductors

NOMINAL VOLTAGE: 48.3 kV (PHASE-TO-PHASE)

Cat. No.	Description	Approx. Weight (kg)
RC406-0082	Spiral Conductor Cover-Up, length 1340 mm, with Ø 25 mm x 1.22 m long insulating stick for installation	4.15
RC406-0082-6	Spiral Conductor Cover-Up, length 1340 mm, with Ø 25 mm x 1.83 m long insulating stick for installation	4.40
RC406-0082GA	Spiral Conductor Cover-Up, length 1340 mm, with metallic connector	3.85



NOMINAL VOLTAGE: 14.6 kV / 36.6 kV (PHASE-TO-PHASE) FOR SINGLE CROSSARM

Cat. No.	Description	Approx. Weight (kg)
RC406-0083	Spiral Conductor Cover-Up, length 1340 mm, with Ø 25 mm x 1.22 m long insulating stick for installation	3.45
RC406-0083-6	Spiral Conductor Cover-Up, length 1340 mm, with Ø 25 mm x 1.83 m long insulating stick for installation	3.70
RC406-0083GA	Spiral Conductor Cover-Up, length 1340 mm, with metallic connector	3.15



NOMINAL VOLTAGE: 14.6 kV / 36.6 kV (PHASE-TO-PHASE) FOR DOUBLE CROSSARM

Cat. No.	Description	Approx. Weight (kg)
RC406-0084	Spiral Conductor Cover-Up, length 1340 mm, with Ø 25 mm x 1.22 m long insulating stick for installation	3.45
RC406-0084-6	Spiral Conductor Cover-Up, length 1340 mm, with Ø 25 mm x 1.83 m long insulating stick for installation	3.70
RC406-0084GA	Spiral Conductor Cover-Up, length 1340 mm, with metallic bracket	2.80

NOMINAL VOLTAGE: 14.6 kV / 36.6 kV (PHASE-TO-PHASE)

Cat. No.	Description	Approx. Weight (kg)
RC406-0510	Ø 229 mm Spiral Conductor Cover-Up, length 1340 mm, with metallic bracket	4.80

These covers are used together with the spiral Cover-Up for conductors, considering that they are provided with connection system at their ends, for perfect connection.

The bottom part covers the shed of the insulator and the top horizontal part covers the conductor and all other components.

The installation above 36.6 kV must not be performed with the Rubber Glove Method and must be installed only with Hot Stick Method.

PIN AND POST INSULATOR COVER-UP - NOMINAL VOLTAGE: 26.4 kV AND 48.3 kV (PHASE-TO-PHASE)		
Cat. No.	Description	Approx. Weight (kg)
RC406-0091	Pin Insulator Cover-Up, nominal voltage 48.3 kV (Phase-to-Phase)	1.50
RC406-0092	Post Insulator Cover-Up equipment, nominal voltage 26.4 kV (Phase-to-Phase)	1.40



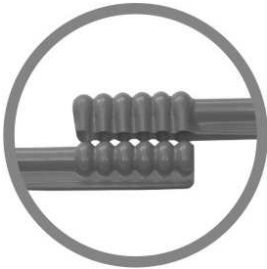
RC406-0091

F

Low Voltage Secondary Conductors Covers



COB03333-1



This cover has been specially designed for temporary installation on secondary systems, aiming at preventing people or tools from accidentally getting in contact with the low voltage conductors, when performing maintenance procedures close to the poles or working on medium voltage systems.

They are light-weight and allow attachment with other covers of the same type using the male-female system at the ends, allowing thus the insulation of a long section of the electrical system.

This cover is provided without connectors, therefore the installation on the line must be performed with the Rubber Glove Method.

SECONDARY SYSTEM COVER-UP NOMINAL VOLTAGE: 14.6 kV (PHASE-TO-PHASE)		
Cat. No.	Description	Approx. Weight (kg)
COB03333-1	Low Voltage Secondary System Conductors Covers, up to Ø 25 mm	0.45

Compact System Covers

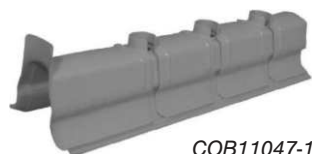
The Cover-Up for compact system support have been designed for protection of the CDS (Compact Distribution Systems) supports, when replacing pin insulators.

They are available in two models: one for horizontal support and the other for “C” type support.

Each model is composed of two pieces which are superposed, offering total protection of the supports.

The cover COB11050-1 is specifically used on CDS (Compact Distribution Systems) and is intended to protect the conductor attached to the lozenge spacer.

Used with the CDS Conductor Covers to which they are attached with the couplings at both their ends.

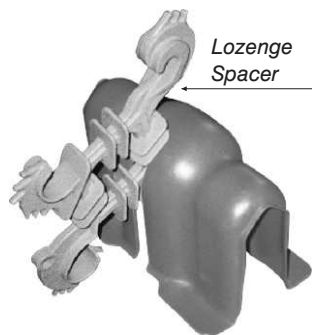


COB11047-1



COB11170-1

CDS SUPPORT AND LOZENGE SPACER COVER-UP NOMINAL VOLTAGE: 26.4 kV (PHASE-TO-PHASE)		
Cat. No.	Description	Approx. Weight (kg)
COB11047-1	Horizontal CDS Support Cover-Up	1.25
COB11170-1	CDS “C” type Support Cover-Up	1.10
COB11050-1	CDS Lozenge spacer Cover-Up	0.70



COB11050-1



COB11051-1

CDS PIN INSULATOR COVER-UP NOMINAL VOLTAGE: 26.4 kV (PHASE-TO-PHASE)		
Cat. No.	Description	Approx. Weight (kg)
COB11051-1	Pin Insulator Cover-Up with metallic bracket	0.80



COB11147-1

CDS CONDUCTOR COVER-UP NOMINAL VOLTAGE: 36.6 kV (PHASE-TO-PHASE)		
Cat. No.	Description	Approx. Weight (kg)
COB11147-1	CDS Conductor Protective Cover-Up to Ø 25 mm	0.90

Insulating Covers for Maintenance Works on Energized Substations, Class 14.6 kV

The insulating covers set composed of

- Side barrier
- Cut-out fixed contact cover
- Plain cover for busbar
- Adapter and head for cover installation protects adjacent circuits, fixed cut-out contacts and busbars, providing a safe working condition, preventing accidental contacts with the energized parts.

The versatility of this set allows protecting various types of cut-outs of: 630 A and 1250 A - single-pole and 1250 A - three-pole, among others.

The installation and removal can be done very quickly with a conventional hot stick.

- COB11612-1

Lateral barrier, installed on the adjacent bays, which are closer to the substation termination structure to be insulated, providing total protection to the operator and offering total protection to the working area. It is attached to the structure with removable fiberglass hooks, allowing various installation positions.

- COB11617-1

Fixed cut-out contact cover, made of thermoplastic, orange color, used for insulation of the fixed cut-out contact. It is provided with removable and adjustable fixing hooks, allowing its installation on different types of cut-outs, even with different dimensions of the lattices of the structure.

- COB11622-1

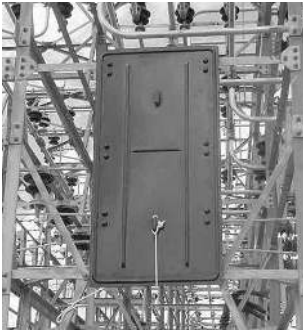
Plain Cover for busbars made of thermoplastic, orange color, similar to the conductor covers used on Hot Line maintenance works. It allows a wide range of protection when insulating energized busbars, up to Ø 58 mm, close to the working area.

- RM4455-84

When mounted on a universal pole with any universal tool mounted on the adapter, it can be set at almost any angle relative to the stick.

- FLV11623-1

Bronze installation head, with fiberglass sticks, used with a universal adapter, for installation and removal of the covers and insulating barriers.



COB11612-1



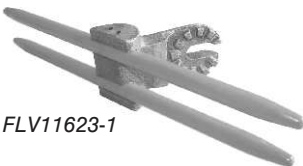
COB11617-1



COB11622-1



RM4455-84



FLV11623-1

LATERAL BARRIER

Cat. No.	Description	Approx. Weight (kg)
COB11612-1	1410 x 720 mm Lateral Barrier for substation	6.0

CUT-OUT FIXED CONTACT COVER

Cat. No.	Description	Approx. Weight (kg)
COB11617-1	Ø 250 mm cut-out fixed contact cover, 620 mm long x 500 mm high	2.65

PLAIN COVER FOR BUSBAR

Cat. No.	Description	Approx. Weight (kg)
COB11622-1	750 mm long Plain cover for busbar	0.70

ACCESSORIES

UNIVERSAL ADAPTER

Cat. No.	Description	Approx. Weight (kg)
RM4455-84	Universal Adapter	0.11

INSTALLATION HEAD

Cat. No.	Description	Approx. Weight (kg)
FLV11623-1	Installation Head	0.15

Insulated Rubber Blanket

Practical, versatile and easy handling, Insulated Rubber Blankets protect linemen from accidents of possible proximity or contact with energized parts of the structures during live line maintenance.

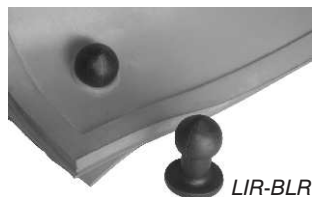
Due to their high flexibility, they allow linemen to cover several types of irregular shaped components, such as: load-break switches, secondary racks, pin insulators, cold end strings, crossarms, etc.

Made of special ozone and corona resistant rubber material offering excellent technical properties in accordance with ASTM D-1048/05 Standard.

These blankets are made of bright orange color rubber, type II (resistant to ozone effects) and measure 900 x 900 mm, and are available in two models, for a wider number of applications: Solid Type and Slotted Type. Both have 28 eyelets along their borders, enabling them to be firmly fixed to the energized parts by special plastic buttons (LIR-BLR).

Another fixing option is using the Cover Pegs (refer to specific page of this product).

The Slotted Type is provided with a 25 mm wide slot from center to border, allowing special applications in quite diverse situations which require smaller folds.



SOLID INSULATED RUBBER BLANKETS

Cat. No.	Dimensions (mm)	Nominal Working Voltage (kV)	Nominal Test Voltage (kV)	Approx. Thickness (mm)	Approx. Weight (kg)
LR-4/II	900 x 900	36	40	4.00	3.90

SLOTTED INSULATED RUBBER BLANKETS

Cat. No.	Dimensions (mm)	Nominal Working Voltage (kV)	Nominal Test Voltage (kV)	Approx. Thickness (mm)	Approx. Weight (kg)
LR-SP-4/II	900 x 900	36	40	4.00	3.80

PLASTIC BUTTON

Cat. No.	Description
LIR-BLR	Plastic button for fixing of insulated rubber blankets



Cover Pegs

The Cover Pegs without steel eyes (FLV04417-1 and FLV16886-1) can be installed on blankets and Cover-Up with the Rubber Glove Method.

The Cover Pegs with steel eyes (FLV04417-2 and FLV16886-2) can be installed on blankets and Cover-Up with the Hot Stick Method.

COVER PEGS		
Cat. No.	Description	Approx. Weight (kg)
FLV04417-1	Manual plastic peg for covers, length 210 mm	0.10
FLV04417-2	Manual plastic peg for covers, with steel eyes for installation with hot stick, length 210 mm	0.14
FLV16886-1	Manual plastic peg for covers, length 240 mm	0.12
FLV16886-2	Manual plastic peg for covers, with steel eyes for installation with hot stick, length 240 mm	0.16



FLV04417-1



FLV04417-2



FLV16886-1



FLV16886-2



COB14959-1

Permanent Covers

Permanent Covers are made of rigid black color thermoplastic, resistant to UV rays and electrical tracking. Suitable for Hot Line use and are installed with the Hot Stick or Rubber Glove Method.

Covers for Stirrup Connector

This cover is intended for permanently covering stirrups and protected distribution line clamps, class 14.6 kV.

STIRRUP CONNECTOR AND HOT LINE CLAMP COVER-UP NOMINAL VOLTAGE: 14.6 kV (PHASE-TO-PHASE)		
Cat. No.	Description	Approx. Weight (kg)
COB14959-1	Stirrup and Hot Line clamp Cover-Up, class 14.6 kV	0.95

Pin Insulator Cover-Up

This cover is intended to prevent Short-Circuits related to birds and kites resting on pin insulators, on MV systems, class 14.6 kV.

The elongated configuration provides insulation of a section of the conductors to both sides of the pin insulator.

Additional advantage is the flexible central part which enables the adaptation also on angular networks.

PIN INSULATOR COVER-UP		
Cat. No.	Description	Approx. Weight (kg)
COB12580-1	Pin insulator Cover-Up, black color, for permanent use	0.75

Shunt Connector Cover-Up

This cover is intended for permanently covering shunt connectors on protected distribution systems, class 14.6 kV. Only installed with the Rubber Glove Method.

SHUNT CONNECTOR COVER-UP NOMINAL VOLTAGE: 14.6 kV (PHASE-TO-PHASE)		
Cat. No.	Description	Approx. Weight (kg)
COB13559-1	Shunt connector protective cover, class 14.6 kV	0.10



COB13559-1

F

Jumper and Transformer Bushing Cover-Up

The Jumper Cover-Up are intended for the insulating protection of jumpers, preventing short-circuiting, related to birds and other small animals.

Made of black color thermoplastic with high dielectric strength and suitable for outdoor application.

The round shape with internal longitudinal ribs, provides proper spacing and conductor ventilation.

For a better identification, the RITZ trademark, type and size of the applicable conductors, month/year of manufacturing are stamped longitudinally.



JUMPER COVER-UP - 26.4 kV		
Cat. No.	For Conductors	Approx. Weight (kg) / 100 m
COB17541-1	6AWG / Cu through 2AWG / CA	10.00
COB17541-3	1/0AWG / CA through 4/0AWG / CA	17.00
COB17541-2	336.4 MCM / CA	22.00



COB11721-1



COB17542-1

Transformer Bushing COVER-UP

The bushing Cover-Up are used for protection of the transformer terminals on distribution systems, class 14.6 kV, preventing short-circuiting, mainly related to birds and other small animals.

The model COB11721-1 can be easily installed with specific plastic fasteners, available in one single model for several brands and models of transformers, class 14.6 kV, with output for surge arrester cable.

Model COB17542-1 can be installed on several sizes of cables.

TRANSFORMER BUSHING PROTECTIVE COVERS - 14.6 kV

Cat. No.	Basic Dimensions (mm)	Approx. Weight (kg)
COB11721-1	Ø: 114 mm Total Height: 157 mm	0.13
COB17542-1	Base Ø: 108 mm Body Ø: 87 mm Total Height: 211 mm	0.11

Coberstay

The Coberstay is a specific cover for warning of the steel cables used for staying of poles and metallic structures on electrical power transmission and distribution systems (towers and poles), and telecommunication systems (structures).

Made of special thermoplastic, suitable for outdoor use, with an exclusive helicoid section COB17543 (two colors) or longitudinal section COB17544 (one color), offers a quick and accurate installation on guy wire of various sizes.

It provides excellent visibility, avoiding accidents on urban or rural areas, especially in those areas with intensive use of tractors and other vehicles for agriculture.

Notes:

1) Helicoid COBERSTAY - COB17543

In order to cover the section involved by the wire formed grip, please identify the suitable diameter.

Ex.: Staying cable Ø 5/8" - one should use COB17543-7 on the section involved by the wire formed grip and COB17543-5 all over the guy wire length.

2) Longitudinal COBERSTAY - COB17544

In order to cover the section involved by the wire formed grip, please identify the suitable diameter.

Ex.: Staying cable Ø 5/8" - one should use COB17544-4 on the section involved by the wire formed grip and COB17544-2 all over the guy wire length.

3) Other diameters and lengths are available upon request.



COB17543



COB17544

HELICOID COBERSTAY - COB17543

Cat. No.	Steel Cable	Internal Ø (mm)	Standard Length (m)	Approx. Weight (g)
COB17543-1	1/4" through 5/16"	8.0	1.5	75
COB17543-2	3/8"	10.0	1.5	90
COB17543-3	7/16" through 1/2"	13.0	1.5	120
COB17543-4	9/16"	15.0	1.5	136
COB17543-5	5/8" through 3/4"	20.0	1.5	186
COB17543-6	7/8" through 1"	26.0	1.5	270
COB17543-7	1 1/4"	34.0	1.5	320

These Guy Wire Markers are manufactured with helical cuts, in yellow and black colors.

LONGITUDINAL COBERSTAY - COB17544

Cat. No.	Steel Cable	Internal Ø (mm)	Standard Length (m)	Approx. Weight (g)
COB17544-1	1/4" through 5/16"	7.5	3.0	260
COB17544-2	5/8" through 3/4"	20.0	3.0	665
COB17544-3	7/8" through 1"	22.0	3.0	700
COB17544-4	1-1/2"	41.0	3.0	1400

These Guy Wire Markers are manufactured with longitudinal cut, in orange color.

Overhead Distribution Systems COVER-UP

The overhead distribution systems Cover-Up are a practical and cost-effective solution for the protection of bare conductors on low voltage overhead systems.

Made of low density thermoplastic, specially developed for this purpose, with the following technical characteristics:

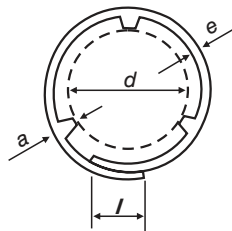
- Shape: spiral section, longitudinal opening with internal spacing and contraction ribs.
- Finishing: black color, smooth outer surface, with longitudinal internal ribs, for spacing and ventilation purposes, providing contraction of the cover to keep it closed.
- Dimensions: provided with suitable diameter for conductor sizes varying from 6 AWG / Cu through 336.4 MCM.
- Insulation Class: low voltage - 0.6 through 1.0 kV.
- Identification: RITZ trademark, type and section of the applicable conductor, working voltage class, month/ year of manufacture.
- Packing: Packed in rolls of 100 or 200 m.

The installation of the overhead distribution systems Cover-Up not only practically eliminates the low voltage systems outages, but also offers several environmental, safety and economical benefits, such as:

- a) End of the predatory tree pruning, considered aggressive to the environment.
- b) Protection against accidents caused by electrical shocks, on low voltage systems close to buildings or monuments.
- c) Reduction of low voltage systems damages caused by phase-to-phase and phase-to-ground Short-Circuits, with consequent reduction of the operational costs.



COB17540-7



OVERHEAD DISTRIBUTION SYSTEMS COVER-UP

Cat. No.	For conductors	Dimensions				Approx. Weight (kg / 100 m)
		A	D	E	I (mm)	
COB17540-7	6AWG/Cu	2.7 ± 0.2	4.3 ± 0.2	1.2 ± 0.2	6.0	5.5
COB17540-6	4AWG/CA	3.1 ± 0.2	7.5 ± 0.3	1.7 ± 0.2	7.0	8.5
COB17540-3	2AWG/CA	3.1 ± 0.2	8.5 ± 0.3	1.7 ± 0.2	8.0	9.5
COB17540-1	1/0AWG/CA	3.2 ± 0.2	11.0 ± 0.3	2.0 ± 0.2	9.0	11.0
COB17540-2	2/0AWG/CA	3.4 ± 0.2	12.2 ± 0.3	2.0 ± 0.2	10.0	13.0
COB17540-5	4/0AWG/CA	3.4 ± 0.2	16.0 ± 0.5	2.0 ± 0.2	11.0	17.0
COB17540-4	336.4 MCM/CA	3.4 ± 0.2	20.0 ± 0.5	2.0 ± 0.2	13.0	21.0

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Reusable Insulating Covers



Reusable insulating covers are intended for protection of energized circuits, preventing phase-to-phase or phase-to-ground contacts, which can be caused accidentally by small animals, generating possible outages.

Made of flexible plastic and specially customized for the various types and conditions of applications such as connectors, splices, busbars, MV structure bushings, etc. Can be quickly installed on these components and firmly fixed with nylon buttons, with the help of special pliers CPR14135-1, which can be ordered separately.

These covers are reusable and can be removed and re-installed whenever conducting inspection of the structure parts.



Reference technical characteristics for grey color reusable covers

Mechanical Characteristics

Tension Strength	1550 psi (min)	ASTM D 882
Elongation to rupture	310%	ASTM D 882
Hardness	70	A Shore Hardness-meter
Tearing Strength	185 psi (min)	ASTM D 882
Density (raw liquid)	10.2 0.2 pounds/ gallon	-
Abrasion Strength	85 - 106	Wearing level to 1000 cycles (NT = not traceable)

Reference technical characteristics for grey color reusable covers

Physical Characteristics

Water Absorption	0.3% to 38°C
Max. Working Temperature	105° C
Min. Working Temperature	-40° C
Thermal Conductivity	3 through 4 cal/s (cm / °C / cm x 10)

Reference technical characteristics for grey color reusable covers

Electrical Characteristics

Ohmic Resistance	10 ohms cm to 23°C
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Reference technical characteristics for grey color reusable covers

Flammability

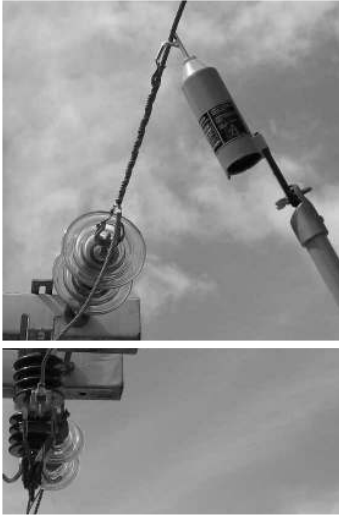
Flame Retardant	Self-extinguishing < 30s (UL 94V - 1)
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Group G

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Group G

Detection Devices and Test Instruments

Fase Tester

The Fase Tester is a portable device to easily and safely determine the phase rotation and compare the phases. Additionally, it provides AC voltage readings (phase-to-phase or phase-to-ground) on transmission and distribution systems, from 1 kV through 80 kV.

The basic unit is composed of one galvanometer for direct reading from 1 kV through 16 kV, one reel with 6.50 m 16 kV rated protected cable, and two *RITZGLAS*® poles, which are high-impedance units, necessary for the measurements.

For voltage classes higher than 16 kV, the use of extension resistors (RH1876-4 for 48 kV setting and RH1876-2 for 80 kV setting) is required. These extensions are attached to the end of the tester pole, using threaded connections. Thus, readings are no longer direct, that is, for 48 kV setting - scale reading must be multiplied by 3 and for 80 kV setting - scale reading must be multiplied by 5.

For 48 kV setting (RH1876-4), a pair of extensions is used and, for 80 kV setting (RH1876-2), two pairs of extensions are used. The length of each extension is 630 mm.



RH1876-1



RH1876



RH1876-4



H1876/B-AFT



RH1760-1

The Calibration Device (H1876/B-AFT) is intended to calibrate the Fase Tester prior to use, mainly after an extended period of no service. The calibration device sends a digital signal to the Fase Tester so the reading on the galvanometer can be compared with the value indicated on the display of the Calibration Device.

The Calibration Device must be ordered separately.

Power: 9 V Alkaline battery.

FASE TESTER		
Cat. No.	Description	Approx. Weight (kg)
RH1876	Complete set to test phases up to 16 kV, including tester, storage case, two universal sticks, canvas storage bag for the universal sticks and user guide	10.90
RH1876-1	Tester & case only to test phases up to 16 kV	8.35
RH1876-2	Extension resistor set, for voltages up to 80 kV	2.84
RH1876-4	Extension resistor set, for voltages up to 48 kV	1.42
H1876/B-AFT	Calibration Device	1.00

ACCESSORIES		
Cat. No.	Description	Approx. Weight (kg)
RH1760-1	Ø 32 mm Universal Sticks, insulating length: 1.75 m	1.30
RH1876-3	Fase Tester storage case	6.00
RP624/2	Canvas Bag for 48 kV extension resistors	0.24
RP624/4	Canvas Bag for 80 kV extension resistors	0.45
RP643/6	Canvas Bag for storage of the two universal sticks	0.46

Isolometro

Isolometro is a portable insulator tester enabling linemen to quickly detect a malfunctioning insulator of an insulator string on energized distribution and transmission systems.

The working principle is based on the measurement of the potential difference through the insulator disc under test. A high impedance galvanometer indicates this potential difference, enabling the comparison with other insulator discs of the same system. Therefore, the reading on the faulty insulator disc will be considerably bottom than on the others.

The Isolometro may be used to evaluate pin insulators, single insulators, multipart pin type insulators and disc insulators.

Composed of fiberglass poles and housing with contact probes that can be easily adjusted to various positions, enabling the test of insulators of any sizes, and also providing adjustments for a better view angle.

Isolometro features a 3-position switch to adjust its sensitivity so a more adequate probe deflection is obtained.

The Calibration Device is intended to check the Isolometro prior to use, mainly after an extended period of no service.

The calibration device sends a digital signal to the Isolometro so the reading on the galvanometer can be compared with the value indicated on the display of the Calibration Device.

The Calibration Device must be ordered separately.

The set is composed of the tester, case and user guide.





TILV-16/AFT

ISOLOMETRO		
Cat. No.	Description	Approx. Weight (kg)
TILV-16/DT	Insulator Tester on distribution and transmission systems up to 500 kV	1.13
TILV-16/AFT	Calibration Device for Isolometro	1.00



Ritz Tester

Ritz Tester is a portable tester for periodic electrical tests on insulating hot sticks, grip-all clamp sticks, sectional hot sticks, hot line ladders and insulating scaffolds, etc, to confirm the perfect insulation level of the insulating tools.

Ritz Tester is easy to handle and can be operated by a single lineman. The stick to be tested is placed in the horizontal position over two racks and its surface directly touched with the tester.



LS-80

Three models are available, each for either 110 V or 220 V voltage supply:

- Models LS-80 and LS-81 (standard size)
- Models LS-80/WD and LS-81/WD (wet/dry)
- Models RT-110 and RT-220 (reduced size)

Models LS-80 and LS-81, RT-110 and RT-220, reproduce electrical tests corresponding to an applied voltage of 100 kV every 300 mm, same as the tests carried out in authorized laboratories.

Models LS-80/WD and LS-81/WD provide electrical tests on dry and wet sticks (by simply positioning the selecting switch on the front panel of the tester to the desired function). When switched to the Wet position, an electrical test corresponding to 75 kV voltage every 300 mm is reproduced and when switched to the Dry position, an electrical test corresponding to 100 kV voltage every 300 mm is reproduced.

For better understanding, a DVD with operating instructions is supplied with the Ritz Tester Wet/Dry.

Prior to use, the Ritz Tester must be calibrated using the calibration knob installed on the front panel, placing the scale of the tester to the initial marking of the display. After that, the user must use the Test Stick (supplied with the tester) to certify that the Ritz Tester is functioning properly.



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RITZ TESTER				
Cat. No.	Description	Dimensions (mm)	Approx. Weight (kg)	
			Tester	Case
LS-80	For 110 V	200 x 365 x 310	5.30	5.20
LS-81	For 220 V			
RT-110	Reduced model for 110 V	155 x 250 x 250	3.40	2.80
RT-220	Reduced model for 220 V			
LS-80/WD	Wet/Dry model for 110 V	200 x 365 x 310	5.30	5.20
LS-81/WD	Wet/Dry model for 220 V			

Micro Tester Micro-Ammeter

The Micro Tester Micro-Ammeter is intended to measure the leakage current through any equipment in direct contact with the high voltage power on one end and grounded on the other end.

Therefore, it is a mandatory device for monitoring the leakage current (in micro amps), on hot line ladders, insulating scaffolds, insulating booms of aerial devices, etc. It is recommended to periodically take measurements while performing live works, to ensure continued safe working conditions which could be affected by weather changes.

The Micro Tester Micro-Ammeter is built as a shielded metallic box and is supplied complete with fasteners, connection cable, attachments to metallic structures (grounding points), and storage case.

The connection to the equipment to be monitored is possible with the adjustable fasteners through coaxial cables connected to the Micro Tester, with a plug on one end and a crocodile clip on the other end.

This tester is equipped with a galvanometer ranging from 0 through 200 micro amps. The lineman will monitor the possible variations of leakage current using this meter.

The Micro Tester is powered by two 1.5 V batteries, AA size.

The set is composed of: 01 Micro Tester

01 coaxial cable, 2.5 m long

03 adjustable fasteners

01 storage case

01 User Guide

Approximate weight of the tester: 1.92 kg.

Approximate weight of the case: 1.34 kg.



RC402-0288

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MICRO TESTER		
Cat. No.	Description	Approx. Weight (kg)
RC402-0288	Micro-Ammeter for leakage current monitoring	3.26

Hot Line Tester No Voltage Detector

Hot Line Tester has been designed to indicate the absence of voltage in distribution systems, substations and transmission systems during hot line maintenance. This is necessary due to the fact that when the system is re-energized, high voltage peaks are generated so the lineman needs to immediately initiate the required safety procedures while the system is de-energized.

TECHNICAL CHARACTERISTICS

- Works through direct contact with the conductor using the gripping clamp;
- Audible and visual warning red LEDs when the system is de-energized and green LEDs when the system is energized;
- Built-in functioning and battery load tests;
- Power: 9 V battery (6LR61 model);
- Frequency: 50 / 60 Hz;
- Sound pressure: 80 ± 5 db at 1m;
- Working temperature: -5° to 70°C ;
- Lightweight, strong polystyrene housing of excellent dielectric strength;
- To be installed on the conductor using a *RITZGLAS*® Hot Stick.



NHL 12-36



Gripping Clamp

HOT LINE TESTER		
Cat. No.	Description	Approx. Weight (kg)*
NHL 12-36	No voltage detector AC, on electrical systems from 12 kV through 36 kV	0.72
NHL 25-70	No voltage detector AC, on electrical systems from 25 kV through 70 kV	0.72
NHL 60-180	No voltage detector AC, on electrical systems from 60 kV through 180 kV	0.72
NHL 180-540	No voltage detector AC, on electrical systems from 180 kV through 540 kV	0.72

* Weight without case.

Contact Tester

Contact Tester is a contact AC voltage detector, which should only be used with a Hot Stick or Grip-All-Stick. The electronic circuit provides reliable and accurate indications through visual and sound warnings.

The Contact Tester is tested according to IEC-61243-1/08.

The Contact Tester provides quick and safe check of the voltage on AC networks of:

- Transmission lines;
- Distribution lines;
- Substations;
- Cubicles, etc.

NOTE:

According to the IEC-61243-1/08 standard:

- Scope: some restrictions on the use are applicable in the case of factory-assembled switchgear and on overhead systems of electrified railways.
- item 4.2.1 mentions that indication may not be reliable in the vicinity of large conductive parts that create equipotential zones.



CT 2-6



Model with
ON-OFF-TEST switch.



Stand-by model
NO switch

TECHNICAL CHARACTERISTICS:

- Power: 9 V battery (6LR61 model);
- Working Frequency: 50 / 60 Hz;
- Working Temperature: -5 to 70°C;
- Double Indication: extremely bright visual warning LEDs and alarm with sound pressure of 80 ± 5 dB (at 1 m);
- Built-in functioning and battery load tests;
- Light-weight and resistant, insulating housing offers impact resistance and easy handling;
- Round design provides better view of the place to be tested;
- Suitable for indoor and outdoor applications;
- Attachment to a Hot Stick or Grip-all Clamp Stick through a universal head (VMR00634-1);
- Color Coded Housing: orange, brown and black, depending on the voltage class.

IMPORTANT:

Stand by models - (automatic shutdown if the tester is not used for more than 2 minutes), **always ready for immediate use**, with low-consumption circuit (battery life is approximately 2 years, depending on the use).

Stand by models for high voltage applications (above 70 kV) are provided with an extended contact probe (220 mm long, made of aluminum), in order to allow a better view when touching the energized conductor (eg. CT 180-540/SB).



CT 180-540/SB

MODELS WITH ON-OFF-TEST SWITCH

Cat. No.	Voltage Range	Voltage Class	Applicable Standard / Revision	Class *	Color of Tester	Approx. Weight (kg) **
CT 0.07-1	70 V - 1 kV	Low	-	L	Brown	0.33
CT 2-6	2 kV - 6 kV	Medium	IEC 61243-1/03	L	Orange	0.33
CT 5-15	5 kV - 15 kV	Medium	IEC 61243-1/03	L	Orange	0.33
CT 10-30	10 kV - 30 kV	Medium	IEC 61243-1/03	L	Orange	0.33
CT 25-70	25 kV - 70 kV	Medium / High	IEC 61243-1/03	S	Orange	0.33

* Class "L": no contact probe extension. Class "S": with contact probe extension;

** Weight without case and extensions

STAND BY MODELS

Cat. No.	Voltage Range	Voltage Class	Applicable Standard / Revision	Class *	Color of Tester	Approx. Weight (kg) **
CT 2-6/SB	2 kV - 6 kV	Medium	IEC 61243-1/03	L	Orange	0.33
CT 5-15/SB	5 kV - 15 kV	Medium	IEC 61243-1/03	L	Orange	0.33
CT 10-30/SB	10 kV - 30 kV	Medium	IEC 61243-1/03	L	Orange	0.33
CT 12-36/SB#	12 kV - 36 kV	Medium	IEC 61243-1/03	L	Orange	0.33
CT 25-70/SB	25 kV - 70 kV	Medium / High	IEC 61243-1/03	S	Orange	0.33
CT 60-180/SB	60 kV - 180 kV	High	IEC 61243-1/03	L	Black	0.37
CT 180-540/SB	180 kV - 540 kV	High	IEC 61243-1/03	L	Black	0.37

* Class "L": no contact probe extension. Class "S": with contact probe extension;

** Weight without case and extensions

Outdoor Use

Contact Tester - CSU Type

Contact Testers model CT-CSU are intended to test energized systems for voltage presence. Indication through sound and visual signals. This tester indicates voltage presence only when touching the energized point to be tested with the tester electrode.

Since a universal head (VMR00634-1) is provided at its end, this tester can also be used in other applications such as opening de-energized switches without requiring special equipment to open energized switches. The pole attached to the tester is submitted to the same tensile test of the Sectional Hot Stick.

Usually, the voltage range is defined as maximum voltage 3 times the value of the minimum voltage (e.g. CT 12-36 ranges from 12 kV through 36 kV). However, such range can be modified by customer request and agreement with manufacturer.



CT-CSU-12-36

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CONTACT TESTER - CSU TYPE

Cat. No.	Voltage Range	Voltage Class	Applicable Standard / Revision	Color of Tester	Approx. Weight (kg)
CT-CSU-10-30	10 kV a 30 kV	Medium	IEC 61243-1/2003	Orange	0.65
CT-CSU-12-36	12 kV a 36 kV	Medium	IEC 61243-1/2003	Orange	0.65

Contact Tester - Underground System



The Contact Tester for underground systems is an AC voltage tester intended to detect voltage presence in underground systems elbow connectors and straight connectors. The contact electrode was developed to enable placing and removing the lid of such connectors in order to perform the tests.

The voltage range on the identification label is that of the system voltage, for both models, however, the model CT-RS/C (where the voltage output of the disconnecting terminals is only a reference voltage of usually 1/10 or 1/12 of the nominal voltage) is supplied with a label informing the actual voltage range of the tester.

TECHNICAL CHARACTERISTICS:

- Voltage Range: 2 kV through 6 kV - or according to customer specification;
- Stand by model;
- Sound and visual signals;
- Built-in functioning and battery load tests;
- Curved contact electrode;
- Universal adapter for Sectional Hot Stick and Grip-All Clamp Sticks.

CONTACT TESTER - UNDERGROUND SYSTEM

Cat. No.	Voltage Range	Description	Approx. Weight (kg)
CT-RS 2-6	2 kV to 6 kV	Voltage Tester for common disconnecting terminals	0.34
CT-RS/C 2-6	350 V to 1 kV	Voltage Tester for capacitive disconnecting terminals Output Ratio of 1/10 or 1/12 of the nominal voltage	0.34

DC Contact Tester

The DC Contact Tester is a direct current contact voltage tester intended for voltage detection by direct contact.

The DC Voltage Tester is a bipolar device, having one clamp connected to the ground point and the electrode used to detect voltage at the desired location.

TECHNICAL CHARACTERISTICS

- Voltage range: 500 V - 5 kV;
- Provided with ON-OFF-TEST switch;
- Visual signals and sound alarm to indicate voltage presence;
- Universal adapter for hot sticks;
- Built-in self-test circuit and cables test circuit.



CT-CC 0.5-5

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DC VOLTAGE TESTER		
Cat. No.	Description	Approx. Weight (kg)
CT-CC 0.5-5	DC Voltage Tester, 500 V through 5 kV	1.10

Super Tester

The Super Tester is a proximity voltage detector which should only be used with a Hot Stick or Grip-All Stick. The electronic circuit provides reliable and accurate indications through visual and sound warnings.

The Super Tester provides quick and safe check of the voltage, starting as low as 1 kV on AC networks, such as: transmission lines, distribution lines, substations, cubicles, etc, which have unshielded conductors.

Using the Super Tester is essential when carrying out maintenance on electrical networks, allowing the lineman to confirm there is no voltage on the system, in order to install the grounding equipment ensuring the required safety to perform the works.



H1990/ST-138

SUPER TESTER		
Cat. No.	Description	Approx. Weight (kg)
H1990/ST-138	Single-pole Non-Contact high voltage detector, for systems from 1 through 138 kV	1.00
H1990/ST-800	Single-pole Non-Contact high voltage detector, for systems from 1 through 800 kV	1.00

TECHNICAL CHARACTERISTICS

- Suitable for both indoor and outdoor applications;
- Built-in self working test;
- Double Indication: extremely bright visual warning LEDs and sound alarm, activated simultaneously;
- Encapsulated electronic circuit, immune to temperature variations from -10°C through 60°C;
- LED to indicate the perfect working conditions of the electronic circuit and battery load;
- Storage: Plastic Case.
- Universal adapter model VMR00634-1 for Hot Sticks;
- Dimensions: 180 x 180 x 90 mm;
- Working principle: Proximity to the electro-magnetic field;
- Warning signals: Visual - 04 (four) extremely bright front LEDs;
Sound - Electrical Transducer;
- Working Frequency: 50 / 60 Hz;
- Power: 9 Vdc battery - 15 h average working life;
- Approximate weight: Tester - 0.45 kg;
Case - 0.55 kg.

Multi-uso Tester and Detectavolt

The Multi-Use Tester and Detectavolt safely detect the presence of AC voltages without contact on distribution lines, substations, cubicles, etc, which have unshielded conductors.

The use of these testers is essential when carrying out maintenance on electrical networks, allowing the lineman to confirm there is no voltage on the system, in order to install the grounding equipment ensuring the required safety to perform the works.



DMU (with switch)



DMU (stand by)

NON-CONTACT VOLTAGE TESTERS (with Switch)		
Cat. No.	Description	Approx. Weight (kg)
DTV-15	Detectavolt - Monopolar Non-Contact voltage detector, for systems from 01 through 15 kV	0.30
DMU-15	Multi-uso Tester - Monopolar Non-Contact voltage detector, for systems from 110 V through 600 V (contact) and from 600 V through 15 kV (proximity)	0.30
DMU-25	Multi-uso Tester - Monopolar Non-Contact voltage detector, for systems from 110 V through 600 V (contact) and from 600 V through 25 kV (Non-Contact)	0.30

NON-CONTACT VOLTAGE TESTERS (Stand-By)		
Cat. No.	Description	Approx. Weight (kg)
DMU-35/SB	Multi-uso Tester - Stand by circuit, 1 kV through 35 kV	0.30
DMU-36/SB	Multi-uso Tester - Stand by circuit, 220 V through 36 kV	0.30

TECHNICAL CHARACTERISTICS

- Power: 9 V battery;
- battery load indication: Pilot LED to indicate battery load condition;
- Encapsulated electronic circuit;
- Built-in self working test;
- Warning signals: Visual - 01 (one) front LED;
Sound - Electrical Transducer;
- Sound intensity: 80 dB \pm 5dB (at 1 m distance);
- Attachment to a Hot Stick or Grip-all Clamp Stick through a Universal head (CS-U);
- Storage: Synthetic material.

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MDC - Helmet-Mounted Model Mini Voltage Detector

The MDC - Mini Voltage Detector is used for non-contact voltage detection on energized systems up to 36 kV, ensuring the safety of the lineman.

This tester is intended to warn the lineman when getting close to energized areas, preventing the risk of accidents. It can be used in substations, transmission and distribution lines, systems where the energized lines are very close, etc.

The housing is made of light-weight and high strength polyethylene and can be easily attached to any type of helmet. The anatomic shape of the tester and the sliding-proof rubber support on the back prevent it from falling off the helmet with sudden movements or minor trepidations. The reduced dimensions and light-weight provide easy handling and storage after use. The antenna installed on the inside of the rubber strap provides voltage detection 360° all around the lineman.



MDC - HELMET-MOUNTED MODEL MINI VOLTAGE DETECTOR		
Cat. No.	Description	Approx. Weight (kg)
MDC-36	For voltage systems from 220 V through 36 kV (proximity*)	0.15



MDC - 36

* For voltages below 1 kV, the operation is basically by direct contact.

TECHNICAL CHARACTERISTICS:

- Light-weight and resistant polyethylene housing, of high dielectric strength;
- Power: 9 V battery;
- Consumption: 10 mW;
- Double Indication: Intermittent and simultaneous Visual Warning LEDs and Sound Alarm;
- Working Frequency: 50 / 60 Hz;
- Working Temperature: -10 to 50°C;
- Sound pressure of 60 dB at 50 cm;
- Suitable for indoor and outdoor applications;
- Voltage ranges: 220 V through 36 kV (proximity).
- Approximate dimensions:
 - Length: 68 mm;
 - Width: 31 mm;
 - Height: 74 mm;
 - Weight: 0.15 kg;
 - Max. band diameter: 400 mm.



Power Shunt Stick

The Power Shunt Stick has been specially designed to safely and promptly derive power from three-phase, two-phase and single-phase low voltage secondary systems to allow sourcing power to exhausters, joint dryers, underground boxes illumination, compressors, welding machines, etc.

TECHNICAL CHARACTERISTICS:

- The assembly on *RITZGLAS*® pole ensures total safety when installing and removing the Power Shunt Stick.
- Quick and easy installation; no additional equipment or tool required.
- Molded-box circuit breaker, allowing on/off switching and providing protection during overloads or Short-Circuits.
- Sliding-proof grip, for firm handling of the stick.
- Equipped with a handle for simultaneous opening of all clamps, making contact with the bare conductors easy.
- Ø 25 mm *RITZGLAS*® pole, fully insulated;
- Fixing clamps for phases and neutral, made of aluminum, capable of connecting up to 477 CAA (ACSR).
- Protection circuit breaker in molded box;
- 4 pin industrial plug.
- Output voltage equal to the low voltage secondary system.

POWER SHUNT STICK			
Cat. No.	Circuit	Protection Device	Approx. Weight (kg)
BDR-1-25	1 Phase and 1 Neutral	25 A	2.50
BDR-2-25	2 Phases and 1 Neutral	25 A	2.70
BDR-3-25	3 Phases and 1 Neutral	25 A	2.80
BDR-3-30	3 Phases and 1 Neutral	30 A	2.80
BDR-3-SP	3 Phases and 1 Neutral	(without protection circuit breaker)	2.40

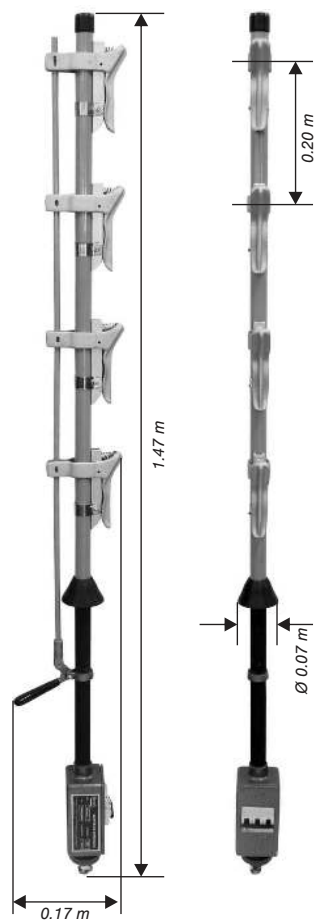
Note:

Electrical conductor cable for connection of electrical equipment is not included.

OPTIONAL

- S/BD

Canvas bag for storage and transportation of the Power Shunt Stick. (to be ordered separately).



G

Glove Tester



Glove Tester is a robust, easy-to-handle tester, which can be operated either manually, using a pneumatic pump, or connected to a compressed air source.

Its use is essential for visual inspection of insulating rubber gloves, by fully inflating them and, thus immediately detecting any damages which may adversely affect their insulating properties.

Since the insulating rubber gloves are constantly subject to fissures, perforations, scratches, cuts, etc, they require special care, including periodic visual test prior to every use, in addition to regular dielectric tests.

Glove Tester has been specially designed to allow a safe and complete visual inspection of the insulating rubber gloves, either at the work site or in the laboratory, uniformly inflating them to detect even the slightest damage on the surface.

Ideal for testing gloves of all voltage classes.

GLOVE TESTER		
Cat. No.	Description	Approx. Weight (kg)
FLV11404-1	Complete glove tester	7.75



Group H

Bare-hand Equipment

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Group H

Bare-hand Equipment



Conductive Suits

The Conductive Suit has been designed specially for works on EHV transmission systems and substations up to 800 kV.

It allows the lineman to equalize his potential with the electrical field of the energized system where the maintenance works will be performed.

The working principle of the Conductive Suit is based on the Faraday Cage principle, offering safe and comfortable working conditions on energized systems.

Made of high technology fabric based on aramid and stainless steel micro-fibers with reinforced sewing.

The Conductive Suits are available in three sizes: medium, large and extra-large.

The anatomic design allows the linemen to use the safety helmet underneath the hood of the Conductive Suit, without limitation of the movements and maintaining the Faraday Cage effect around the head.

The conductive suit meets all IEC 60895 standard requirements.



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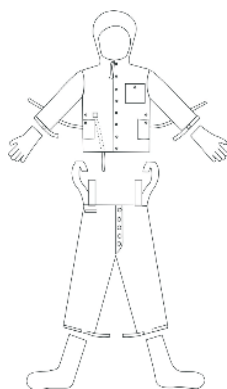


The routine tests report is provided together with the Conductive Suit. These test data are extremely important as reference for the continuous monitoring of the quality and performance of the Conductive Suit, even after years of use and many washings.

The Conductive Boots have been specially designed to provide efficient electrical connection of low ohmic resistance, therefore suitable for the linemen performing operations where the potential equalization with the working structure is required.

The conductive boots meet the ANSI Z-41 and IEC 60895 standards requirements.

They are available from size 37 through 46 (Brazilian size - please refer to your country size pattern).



CONDUCTIVE BOOTS

Cat. No.	Size		
	Brazil	USA	Europe
RC417-0623	37	6	39
RC417-0624	38	7	40
RC417-0624/5	39	7.5	41
RC417-00122/5	40	8.5	42
RC417-0123/5	41	9.5	43
RC417-0124	42	10	44
RC417-0125	43	11	45
RC417-0126	44	12	46
RC417-0126/5	45	12.5	47
RC417-0625/5	46	13.5	48

CONDUCTIVE SUITS

Cat. No	Description	Approx. Weight (kg)
RC402-0533/C	Complete Medium size Conductive Suit, composed of trousers, jacket, socks, gloves and storage bag	1.55
RC402-0534/C	Complete Large size Conductive Suit, composed of trousers, jacket, socks, gloves and storage bag	1.65
RC402-0535/C	Complete Extra-large size Conductive Suit, composed of trousers, jacket, socks, gloves and storage bag	1.75
RC402-0533	Medium size Conductive Trousers and Jacket, with storage bag	1.38
RC402-0534	Large size Conductive Trousers and Jacket, with storage bag	1.48
RC402-0535	Extra-large size Conductive Trousers and Jacket, with storage bag	1.58
RC402-0558U	Conductive gloves, one size only	0.12
RC402-0578U	Conductive socks, one size only	0.05
RP6252	Plastic storage bag for conductive suits	0.13
RT402-0694	Conductive strap	0.07

H



FLV07654-1

Bare-hand Working Chair

The Bare-hand Working Chair has been specially designed to make the transportation of the lineman from ground to the system where maintenance will be performed easier and quicker, and also to allow the lineman approaching the structure safely, quickly and comfortably.

The light-weight and resistant anatomic design, made of *RITZGLAS®* poles and aluminum fittings, allows horizontal and vertical displacement with absolute accuracy, when working with the Bare-hand Method. In order to ease transportation and storage, the Bare-hand Working Chair can be completely disassembled.

The Bare-hand Working Chair is equipped with a safety belt for the lineman.

The poles are tested according to ASTM F 711 and IEC 60855 standards.

BARE-HAND WORKING CHAIR		
Cat. No.	Maximum Work Load (daN)	Approx. Weight (kg)
FLV07654-1	Bare-hand working chair	19.80

Bare-hand Stick

The Bare-hand Stick is used for connecting the conductive strap of the Conductive Suit with the energized conductor, to equalize the potential between Conductive Suit and energized conductor. This prevents possible discomfort while performing live works.

Whenever performing maintenance with the Bare-hand Method, the first contact between the Conductive Suit and the energized conductor is made by the Bare-hand Stick. Similarly, at the end of the work, the Bare-hand Stick will be the last component to be disconnected, preventing thus the electrical arch from reaching the lineman.

When returning to ground potential, first the Bare-hand Stick must touch the structure to discharge of the static energy.

The models FLV06858-1 and FLV02544-1 are made of Ø 32 mm *RITZGLAS*® poles and the model FLV11493-1 is made of Ø 13 mm fiberglass rod and sliding-proof handle.

Types of Connection

Clamp attached to the pole: the clamp connects to the conductor by twisting the stick, and both the stick and the clamp remain attached to the conductor during the maintenance works.

Detachable clamp: the clamp also connects to the conductor by twisting the stick, however it allows the lineman to remove the stick, leaving only the clamp attached to the conductor (this clamp is provided with quick connection head, which connects to the clamp eye-ring firmly and safely).

Quick-action clamp: Differently from the above two clamps, there is no need to twist the stick to connect the clamp to the conductor, for it connects to the conductor only by quick spring action.

All models are equipped with pole hanger and provisions for connection of the conductive strap of the Conductive Suit.



FLV06858-1



FLV02544-1



FLV11493-1

BARE-HAND STICK

Cat. No.	Description	Approx. Weight (kg)
FLV06858-1	Bare-hand stick with clamp attached, insulating length 370 mm, clamp opening: min. 12 mm and max. 48 mm	1.45
FLV02544-1	Bare-hand stick with detachable clamp, insulating length 340 mm, clamp opening: min. 12 mm and max. 48 mm	1.60
FLV11493-1	Bare-hand stick with quick-action clamp, attached to fiberglass rod and sliding-proof handle, insulating length 415 mm, clamp opening: min. 10 mm and max. 40 mm	0.60



Group I

Repair, Replacement and Maintenance Components

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Hot Line Set for Maintenance and Cleaning of Substations up to 138 kV.....	290



Group I

Repair, Replacement and Maintenance Components

Repairers and Lubricants

Prior to the acquisition of these repair sets and lubricants, please contact RITZ Sales Department for basic information on the application.

These products can be easily applied by the user.

- RT400-0803

The Gloss Restorer is a colorless resin, specially designed for surface repairs on *RITZGLAS®* hot sticks, when featuring surface wearing and loss in gloss.

These types of damages on the insulating sticks compromise their dielectric strength, caused by moisture and impurity contamination.

- RM1909

Tool Lubricant, made of non-toxic and non-corrosive materials. This material is a highly efficient lubricant, for it offers a durable layer to the parts, preventing oxidation and avoiding friction and wearing of the metallic tools.

- RM1913

The Sliding-Proof Repairer for platforms has been specially developed for repairs of platform surfaces, which have lost their sliding-proof safety characteristic after a long period of use.

Made of black color rough sand resin (just as in the original platforms) and hardener.



RT400-0803



RM1909



RM1913

RH1917



- RH1917

RITZGLAS® Bond Patching set is a set of orange color resin and hardener, recommended for repairs of minor fissures, or other surface damages, such as scratches or cracks, either caused accidentally or due to improper use of the equipment. It is also used for replacement of metallic heads on sticks.

RH1921



- RH1921

The Sliding-Proof Repairer for ladders is intended for the repair of the **RITZGLAS®** ladder rungs, as they lose their original sliding-proof surface. Made of orange color fine sand resin and hardener.

RM1904



- RM1904

The Silicone-soaked Hot Stick Wiping Cloth for surface treatment of Insulating Hot Sticks is intended for surface applications of a preventive protection on sticks, offering a superficial protection layer.

REPAIR SETS AND LUBRICANTS

Cat. No.	Description	Approx. Weight (kg)
RT400-0803	Gloss Restorer set supplied with 12 bottles of 115 ml, being 6 bottles with component A and 6 bottles with component B, stored in plastic case	2.60
RM1909	Tool Lubricant, stored in a plastic bottle of 125 ml	0.14
RM1913	Sliding-Proof Repairer for platform surface, supplied in two components: sliding-proof sand stored in a 900 ml can and hardener stored in a 115 ml bottle	2.10
RH1917	RITZGLAS® Bond Patching set, supplied in two plastic bottles of 125 ml each, containing components A and B	0.32
RH1921	Sliding-Proof Repairer for ladder rungs, supplied in two components: sliding-proof sand stored in a 900 ml can and hardener stored in a 115 ml bottle	2.10
RM1904	Silicone-soaked Hot Stick Wiping Cloth for surface treatment of insulating hot sticks, 01 cloth measuring 0.50 x 0.50 m	0.08

Hot Stick Replacement parts

HOT STICK REPLACEMENT PARTS		
Cat. No.	Description	Approx. Weight (kg)
RH3365-1	Rigid splice for Ø 32 mm pole	0.39
RH3365-2	Rigid splice for Ø 38 mm pole	0.43
RH3365-3	Rigid splice for Ø 38 mm pole, converted into Ø 32 mm	0.39
RH4455	Universal had only, for Ø 32 mm hot stick	0.29
RH4455A	Universal had only, for Ø 38 mm hot stick	0.36
RP403-0467P	Replacement universal head wing-bolt	0.02
FLV05655-4	Plastic cap for Ø 25 mm hot stick	0.005
FLV05655-3	Plastic cap for Ø 32 mm hot stick	0.007
FLV05655-2	Plastic cap for Ø 38 mm hot stick	0.01
FLV05655-5	Plastic cap for Ø 51 mm hot stick	0.02
FLV05655-1	Plastic cap for Ø64mm hot stick	0.035
FLV05655-6	Plastic cap for Ø 76 mm hot stick	0.04
FLV10046-1	Storm tool, rubber skirt for Ø 25 mm hot stick	0.02
FLV10046-2	Storm tool, rubber skirt for Ø 32 mm hot stick	0.06
FLV10046-3	Storm tool, rubber skirt for Ø 38 mm hot stick	0.08
FLV17479-1	Rubber base for Ø 32 mm hot stick	0.03
FLV17479-2	Rubber base for Ø 25 mm hot stick	0.02





RC403-0799



RM3002



RH1760-5

HOT STICK REPLACEMENT PARTS		
Cat. No.	Description	Approx. Weight (kg)
RC403-0799	Distance marking plastic ring for Ø 32 mm hot stick*	0.04
RM3002	Distance marking rubber ring for Ø 32 mm hot stick*	0.05
RM3002-1	Distance marking rubber ring for Ø 38 mm hot stick*	0.06
RH1760-5	Pole hanger and clamp	0.13

* The distance marking ring is intended to delimit the allowed area for the lineman to grip the insulating pole, in order to maintain the required safety distances, as specified by the chart at the beginning of this catalogue.

Hot Line Set for Maintenance and Cleaning of Substations up to 138 kV

The Hot Line set has been designed to perform several works with the Hot Stick Method, on energized substations up to 138 kV, as follows:

- Retightening connections on hot spots;
- Cleaning of cut-out contacts;
- Cleaning of conductors, insulators and equipment;
- Cleaning and lubrication of movable parts or hinges etc;



RC403-0314



RC403-2270



RM4455-25

COMPOSITION OF THE SET			
Cat. No.	Qty.	Description	Approx. Weight (kg)
RC403-0314	1	Conductor cleaning sand	0.29
RC403-2270	1	Aerosol can holder (aerosol lubricant can not included)	0.21
RM4455-25	1	Paint brush	0.22

COMPOSITION OF THE SET			
Cat. No.	Qty.	Description	Approx. Weight (kg)
FLV12559	1	Insulator cleaning Paint Brush	0.23
RM4455-37	2	Chuck Blank Tool	0.14
RM4455-38	1	Clear vision mirror	0.37
RM4455-50	1	Skinning knife	0.11
RM4455-63	2	Insulator cleaning "V"-shaped brush	0.17
RM4455-6	2	Ratchet wrench	0.69



FLV12559



RM4455-37



RM4455-38



RM4455-50



RM4455-63



RM4455-6



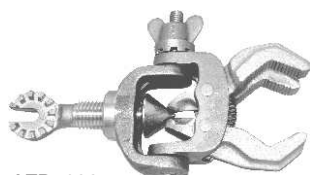
RM4455-94



FLV12552-1



FLV12560-1



ATR10994-1



ATR10455-3

COMPOSITION OF THE SET			
Cat. No.	Qty.	Description	Approx. Weight (kg)
RM4455-92	1	64 mm Ø Insulator cleaning round brush	0.53
RM4455-94	1	76 mm Ø Insulator cleaning round brush	0.61
FLV12552-1	1	Abrasive cloth for insulator cleaning, supplied with 5 spare pieces	0.29
FLV12560-1	1	Plain Steel brush	0.23

ADDITIONAL RECOMMENDED EQUIPMENT

Cat. No.	Qty.	Description	Approx. Weight (kg)
RH1980-8	1	Ø 32 mm x 2.60 m long Insulated Oiler	1.75
FLV12564-1	1	Insulated Stool	6.00
FLV02620-1	2	Head for installation and removal of the Temporary Jumper	0.19
EA/PR-27/PD	1	A-shaped ladder, length: 2.75 m	32.70
ATR17452-1	1	0.80 m long Temporary Jumper. Capacity: min. Ø 6.5 mm max. Ø 30 mm. Nominal current: 400 A	3.10
ATR17451-1	1	0.80 m long Temporary Jumper. Capacity: min. Ø 6.5 mm max. Ø 73 mm. Nominal current: 400 A	4.50



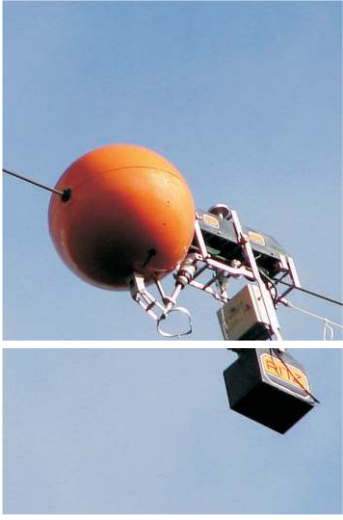
RH1980-8



FLV12564-1



FLV02620-1



Group J

Daylight Warning Spheres

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For Optical Cables.....	299
For Robotic / Rope Installation and Removal from Ground.....	299
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QUALITY AND SAFETY
FOR ELECTRICAL SYSTEMS



Group J

Daylight Warning Spheres



Daylight Warning Spheres

The Daylight Warning Spheres for electrical systems are intended for visual warning of aircrafts like helicopters, airplanes, balloons, gliders, etc. preventing thus the collision of these aircrafts with the electrical transmission and distribution systems.

Due to the various situations and places where the installation of the Daylight Warning Spheres is necessary, specific models have been designed, aiming at minimizing the inconveniences caused by hard-to-reach locations, irregular land surface and road crossings, among others.

In order to meet the requirements of the electrical utilities, Daylight Warning Spheres are manufactured according to Brazilian Standard NBR 15237 and in-house manufacturing process, ensuring excellent characteristics, such as:

- long service life
- UV resistance
- aeolic vibration resistance
- rotation movement resistance
- sliding resistance
- rain water draining system through radial holes, perpendicular to the cable

All models are made of polyester resin and fiberglass, with gel-coat surface finishing, as well as layers with orange color polyurethane painting.

Note:

Other color patterns can be supplied upon request.

The cable attachment system of the Warning Spheres for **conventional installation** (ESR-250/400/500/600 and ESRO-600) is composed of aluminum alloy brackets, specific rubber supports adapted for each cable diameter, bolts, nuts and washers. The rubber supports can be supplied for cable diameters ranging from 6.35 to 22.22 mm (1/4" to 7/8").



For Distribution Systems

- ESR-250 and ESR-400

These models have been specially designed for warning of overhead distribution systems, with the same characteristics of the conventional warning spheres, but with smaller Ø of 250 or 400 mm.

For Transmission Systems

- ESR-500 and ESR-600 (conventional installation)

These models have been designed for warning of overhead transmission systems, with steel messenger cable.

For Optical Cables

- ESRO-600

The Daylight Warning Spheres for Optical Cables have been designed aiming at preventing possible damages to the cables, either for the OPGW type or self-supporting cables (ADSS).

NOTE:

Preformed wire grips to mount Warning Spheres are not part of the supply.

RITZ developed Warning Spheres for **Hot Line Installation and Removal**, using different methods.

For Robotic / Rope Installation and Removal from Ground

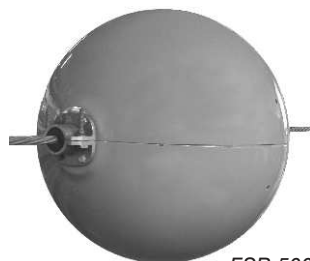
- ESRC-600

Developed to offer a practical and productive method for installation and removal from ground, using:

- a robot specially developed for this task, operated by remote control or
- a set for rope operation.



ESR-250



ESR-500



ESRC-600

Robot for Warning Spheres

The Robot for Daylight Warning Spheres is a high-technology equipment developed by RITZ intended for installation and removal of Daylight Warning Spheres on transmission lines.

Equipped with a remote control unit operated from ground, the robot drives the sphere toward the installation position on the line, and closes the bracket for attachment of the sphere on the cable. During the removal operation, for replacement or maintenance purposes, the robot drives the sphere back to the structure by opening the bracket.

TECHNICAL CHARACTERISTICS

- Maximum displacement speed: 2.5 km/h;
- Power: one 12 V - 45A battery (to be ordered separately);
- Battery Life: 1h;
- Radio transmitter / receiver power: 3 alkaline batteries (size AA);
- Radio transmitter: Frequency designated with FRS (Family Radio Service);
- Remote control maximum reach: 3 km (no obstacles);
- Tightening torque of the bracket: 21 N.m;
- Approx. weight of the robot with battery: 31 kg;
- Approx. weight of the battery: 18 kg.
- Maximum inclination angle of the robot: 15 degrees;



RPR-F/1



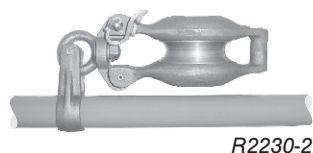
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ROBOT FOR WARNING SPHERES		
Cat. No.:	Description	Approx. Weight (kg)
RPR-F/1	Robot for Daylight Warning Sphere ESRC-600 installation and removal	31*

* with battery.

Set for Rope Operation

- R2230-2 - Snatch Block, made of aluminum;
- FLV12963-1 - Snatch Block and Strain link Stick;
- FLV11795-1 - Ø 6 x 1500 mm Rope Insulating Stick;
- FLV11796-1 - Hooks;
- RM1895-1 - Ø 1/4" Polypropylene Rope;



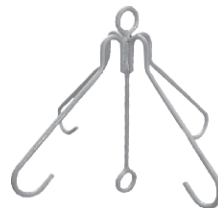
R2230-2



FLV12963-1



FLV11795-1



FLV11796-1

For Crane Extension Installation

- ESRG-600 (Required Patent)

Similar to ESRH-600 model (for helicopter installation), however equipped with the fixing eye-bolt at the bottom side of the sphere, without counterweight, for operation with a special Grip-All Clamp Stick from the Crane Extension (IE-500).

Notes:

- 1) For all inquiries/orders, the diameter of the cable on which the spheres will be installed must be informed.
- 2) Spheres with different outside diameters can be supplied upon request.

For Helicopter Installation

- ESRH-600

The Daylight Warning Spheres for installation using a helicopter is equipped with a special mechanism for opening and installation on the cable, activated by a single eye-bolt at the top of the sphere, for operation with a specially designed RITZGLAS® Grip-All Clamp-Stick (FLV16617-1). Equipped with a counterweight to maintain the eye-bolt in the top position of the sphere.

It enables a safe and quick installation of the sphere on the transmission line, directly from the helicopter.



ESRH-600

DAYLIGHT WARNING SPHERES - TECHNICAL CHARACTERISTICS

Cat. No.	Outside Ø (mm)	Axial Sliding Withstanding Load (daN)	Opening Capacity (mm)	Surface Finishing	Color	Approx. Weight (kg)
ESR-250	250	20	6.35 through 22.2	Polyurethane enamel painting	Orange Munsell 2.5 YR 6/14	1.8
ESR-400	400					3.0
ESR-500	500					4.0
ESR-600	600		6.35 through 19.00			6.0
ESRO-600						6.0
ESRH-600						6.6
ESRG-600						6.6
ESRC-600						7.0

ACCESSORY

RITZGLAS® Grip-all Clampstick for warning sphere installation

Cat. No.	Ø (mm)	Overall Length (m)	Approx. Weight (kg)
FLV16617-1	25	1.96	2.60



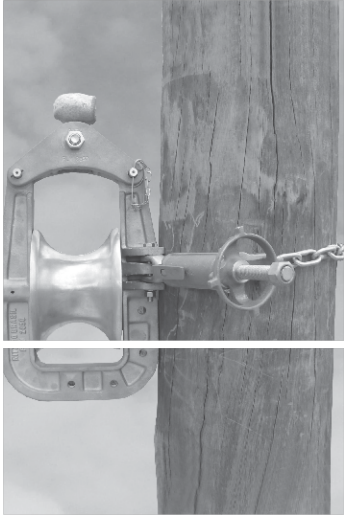
FLV16617-1



Group K

Cable Stringing Blocks

Blocks For Medium Voltage Overhead Systems.....	306
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Blocks for Multiplex / Messenger Cable.....	310
Accessories.....	311



Group K

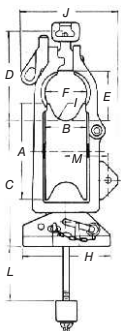
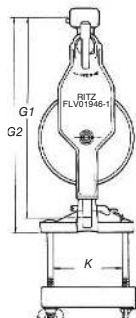
Cable Stringing Blocks

The Cable Stringing Blocks are used when launching single or multiple conductor cables on overhead medium or high voltage systems.

Made of heat treated cast aluminum alloy, assembled on bearings, for enhanced performance.



FLV01946-2



Blocks For Medium Voltage Overhead Systems

The distribution systems blocks are versatile due to the light-weight and resistant construction. Designed for suspension or dead end applications.

Attachment directly to the suspension insulator string socket can be made using the galvanized steel ball-socket type connector. Adjustable bolts with wing nuts enable attachment to crossarms of up to 115 x 140 mm, at five different angles.

The sheave of these blocks can be supplied with polished finishing (without rubber) or with rubber-coated finishing, for damping and protection of the conductor cable.

Blocks open by spring action; spring is normally closed.

Locking is made by an eye-ring which can be operated by Hot Stick.

BLOCKS FOR MEDIUM VOLTAGE OVERHEAD SYSTEMS		
Cat. No.	Description	Approx. Weight (kg)
FLV01946-2	Polished-sheave stringing	5.90
FLV01946-1	Rubber-coated sheave stringing	6.00

FLV01946-2 block is supplied only with the ball-socket component.

TECHNICAL SPECIFICATION			
Max. Conductor Ø (mm)	Work Load (daN)	Approx. Total Weight of the Block (kg)	Weight of the Block w/o Crossarm Bracket (kg)
45	1134	6.00	4.50

TECHNICAL SPECIFICATION					
Outside Sheave Ø (mm)	Sheave Width (mm)	Height from Crossarm (mm)	Height from Top to Neck Base (mm)	Neck	
				Height (mm)	Width (mm)
A	B	C	D	E	F
178	76	232*	170*	90*	78
		235**	165**	87**	

* dimensions with polished sheave | ** dimensions with rubber-coated sheave

TECHNICAL SPECIFICATION							
Total Length (mm)		Bracket Width (mm)	Groove Radius (mm)	Outside Width (mm)	Bracket Maximum Range (mm)		Side Assembly Height (mm)
G1	G2	H	I	J	K	L	M
373	400	153	25***	178	125****	145	76

*** identical dimensions for polished and smooth sheaves.

**** maximum dimensions adjustable to the crossarm.

Blocks for High Voltage Overhead Systems



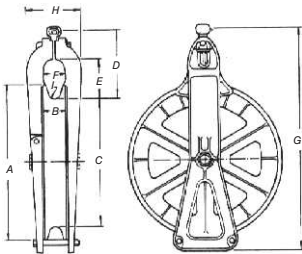
FLV02629-2

The blocks for high voltage systems (FLV02629-2 and FLV06694-2) offer excellent performance, when straining and launching conductor cables, due to the light weight and high mechanical strength.

The wide and high type neck of this tool enables relaunching of the cable, when the existing conductor is used as guide for the new one.

The sheave of these blocks can be supplied with rubber-coated finishing, for damping and protection of the conductor cable, or with polished sheave (without rubber).

In order to open these blocks, twist the top locking pin eye 90°.



BLOCKS FOR HIGH VOLTAGE OVERHEAD SYSTEMS

Cat. No.	Description	Approx. Weight (kg)
FLV02629-2	Polished-sheave stringing	8.75
FLV02629-1	Rubber-coated sheave stringing	8.90

FLV02629-2 blocks is supplied only with the ball-socket component.

K

TECHNICAL SPECIFICATION

Outside Ø (mm)	Width (mm)	Inner Ø (mm)	Height (mm)	Neck		Overall Height (mm)	Outside Width (mm)	Groove Radius (mm)
				Height (mm)	Width (mm)			
A	B	C	D	E	F	G	H	I
368	54	305*	241	140	92	605	160	17
		311**						

* dimensions without coating | ** dimensions with rubber coating

TECHNICAL SPECIFICATION		
Max. Conductor Ø		Work Load (daN)
Round Mils	mm	
1033.5	32	3402

BLOCKS FOR TRANSMISSION SYSTEMS (22")		
Cat. No.	Description	Approx. Weight (kg)
FLV06694-2	Polished-sheave stringing	20.70
FLV06694-1	Rubber-coated sheave stringing	20.90

FLV06694-2 block is supplied only with the ball-socket component.

TECHNICAL SPECIFICATION								
Outside Ø (mm)	Width (mm)	Inner Ø (mm)	Height (mm)	Neck		Overall Height (mm)	Outside Width (mm)	Groove Radius (mm)
				Height (mm)	Width (mm)			
A	B	C	D	E	F	G	H	I
559	79	457*	244*	145*	79	801	193	21
		461**	246**	143**				

* dimensions without coating | ** dimensions with rubber coating

TECHNICAL SPECIFICATION		
Max. Conductor Ø		Work Load (daN)
Round Mils	mm	
1590	39	5443

Blocks for Multiplex / Messenger Cable

These Blocks (FLV05584-1) are versatile when launching multiplex and messenger cables, given the two options for attachment to the structure: side pole attachment with wheel tightener or suspension attachment with ball-socket.

In order to open the block, simply remove the top locking pin.

Maximum conductor Ø 102 mm.



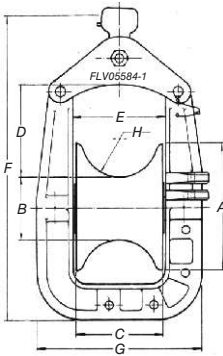
FLV05584-1

BLOCK FOR MULTIPLEX AND MESSENGER CABLE

Cat. No.	Description	Approx. Weight (kg)
FLV05584-1	Polished-sheave aluminum	9.90

TECHNICAL SPECIFICATION

Sheave Ø (mm)		Sheave Width (mm)	Neck		Outside Height (mm)	Outside Width (mm)	Groove Radius (mm)
			Height (mm)	Width (mm)			
A	B	C	D	E	F	G	H
178	98	120	127	127	430	228	52



WORK LOAD (daN)

Ball-Socket Suspension Attachment	Side Pole Attachment
1134	454

Accessories

All accessories are made of forged steel with surface treatment.

Accessories can be ordered separately when necessary for the block connector

ACCESSORIES			
Item	Cat. No.	Description	Approx. Weight (kg)
1	FLV16487-1	Ball-link	0.40
2	FLV16489-1	Ball-clevis	0.55
3	FLV16486-1	Ball-hook	0.48
4	FLV16488-1	Eye-ball	0.40



1



2



3



4



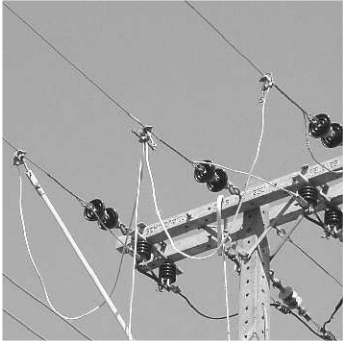
Group L

Grounding Equipment and Sectional Hot Stick

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QUALITY AND SAFETY
FOR ELECTRICAL SYSTEMS



Group L

Grounding Equipment and Sectional Hot Stick



Temporary Grounding Equipment

Temporary Grounding Equipment:

Equipment for effective electrical connection, with intentional low impedance to ground, designed to guarantee the equipotentiality and continuously maintain it during the intervention in the electrical installation, promoting protection of the workers against accidental energization.

The correct specification of the Temporary Grounding Equipment is the first principle which ensures efficiency and safety when performing dead line works, if the system is accidentally energized. The specification must be compatible with the characteristics of the electrical system where the Temporary Grounding Equipment will be installed.

Read carefully the following basic requirements for the correct specification of the Temporary Grounding Equipment, ensuring the use of equipment that will ensure the safety of the linemen.

L

In order to specify the Temporary Grounding Equipment, it is necessary to be acquainted with the following characteristics of the electrical systems where it will be installed:

- a) Type of system and voltage level:
 - Overhead line or network (kV);
 - Substation (kV);
 - Secondary Network (LV) either with bare or protected conductor;
 - Underground Network (kV).
- b) Maximum Short-Circuit Current;
- c) Response Time of the Protection System;
- d) Type of structure:
 - Metallic;
 - Concrete;
 - Wooden.
- e) Distances between phases / phase-ground;
- f) Phase and Ground conductors size where the Temporary Grounding Equipment will be installed.

The maintenance on de-energized overhead networks may seem to be, at first, an **apparently** safe work condition. However, the system can be accidentally energized, due to several common reasons, such as:

- Operational errors;
- Accidental contact with other energized networks;
- Induced voltage from adjacent lines;
- Atmospheric discharges, even if they happen far away from the working place;
- Third-party feeding power;

Unfortunately, the above reasons are not theoretical facts or impossible happenings, like many maintenance linemen may think. Evidences have been showing us the truth, given the number of accidents occurring every year at the electrical utility companies.

The Temporary Grounding and Short-Circuiting Equipment is the main protection for the lineman while performing maintenance on de-energized systems and must be therefore, considered the **main working tool**.

TYPICAL SEQUENCE OF INSTALLATION OF A TEMPORARY GROUNDING EQUIPMENT

- 1) Make sure the line is de-energized using the Voltage Detector attached to the *RITZGLAS®* Hot Stick.
- 2) Insert the Grounding Rod into ground and connect the grounding clamp to it. The Grounding Rod must be inserted as deep as possible into ground, only leaving above the surface the necessary section for connection of the clamp.
- 3) Using a *RITZGLAS®* Hot Stick proceeding exactly the same way as during hot line work, slowly lift the phase clamps and first connect the clamp to the middle phase.
- 4) Using the *RITZGLAS®* Hot Stick, connect the second and third phase clamps to the lateral phases, concluding the interconnection between phases and ground.
- 5) The lineman can only access the conductors after concluding the complete installation of the Temporary Grounding Equipment, that is, the system can only be considered de-energized once it is properly grounded.

Notes:

- 1) The Short-Circuit current capacity is limited to the specified grounding and Short-Circuiting cable size.
The specification of the cable can be changed regarding size (mm²) and/or lengths (longer or shorter pieces), according to the Short-Circuit capacity of the electrical system where the set will be used.
- 2) The *RITZGLAS®* Hot Sticks can be provided in different lengths, according to the operational requirements (refer to the specific Hot Stick section).
- 3) The storage canvas bag is reinforced on the bordering lines and both ends, and has suitable internal divisions for the storage of the sectional hot stick sections, transportation grip and one additional pocket for the operational heads.
This bag should be ordered separately, as it is an optional accessory.
Customized color patterns available upon request.

Grounding Equipment for Low Voltage Systems

Temporary Grounding and Short-Circuiting Stick for Secondary Systems (LV)

- ATR04514-2 / ATR04514-1

The Temporary Grounding and Short-Circuiting Stick for Secondary Systems is intended for maintenance on de-energized low voltage overhead systems.

It offers simultaneous connection of phase conductors to the neutral conductor, establishing the Short-Circuiting between them requiring only a single operation for the lineman.

This stick is manufactured with a Ø 25 mm *RITZGLAS*® pole, aluminum hooks, rubber storm skirt to delimit the handling area.

The fixing hooks are connected to the conductor by spring action, providing more quickness when installing, without damaging the conductors.

The aluminum bar for interconnection of the hooks is provided with a screw on its bottom end, to enable connection of a cable to ground.



ATR04514-2

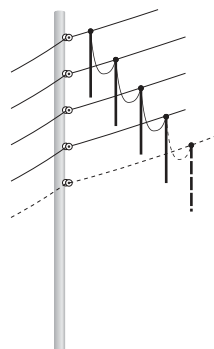
TECHNICAL CHARACTERISTICS

Characteristic	ATR04514-1	ATR04514-2
Overall length	1.40 m	1.20 m
Qty. of hooks	05	04
Max. Range	Ø 19.50 mm	Ø 19.50 mm
Min. Range	Ø 3.50 mm	Ø 3.50 mm
Approx. Weight	1.40 kg	1.10 kg

Temporary Short-Circuiting and Grounding Equipment for Conventional Low Voltage Networks (LV)

(According to IEC 61230 Standard)

Maximum Short-Circuit Current - 30 cycles: 8 kA
60 cycles: 5 kA



ATR17439-1

Item	Qty.	Unit.	Cat. No.	Description
01	04	pc	ATR17348-1	Pressure-type grounding clamp attached to a Ø 25 mm x 0.30 m RITZGLAS® pole, with rubber handle
02	1.20	m	CTC-25	25 mm ² extra-flexible copper cable, with PVC clear-vision insulation, being 3 lengths of 0.4 m
03	06	pc	ATR17423-2	Tin-plated copper ferrule for 25 mm ² cables
04	01	pc	ATR16843-7	Canvas Bag for conditioning of items 01 to 03

ATR17439-2

Item	Qty.	Unit.	Cat. No.	Description
01	05	pc	ATR17348-1	Pressure-type grounding clamp attached to a Ø 25 mm x 0.30 m RITZGLAS® pole, with rubber handle
02	1.60	m	CTC-25	25 mm ² extra-flexible copper cable, with PVC clear-vision insulation, being 4 lengths of 0.4 m
03	08	pc	ATR17423-2	Tin-plated copper ferrule for 25 mm ² cables
04	01	pc	ATR16843-7	Canvas Bag for storage of items 01 to 03

OPTIONAL ACCESSORIES

Item	Qty.	Unit.	Cat. No.	Description
05	10	m	CTC-25	25 mm ² extra-flexible copper ground cable, for connection to ground point, with connector to connect to phases conductor
06	01	pç	ATR17423-2	25 mm ² cable tin-plated copper ferrule
07	01	pç	ATR13036-2	25 mm ² cable shrouded and unshrouded aluminum ferrules
08	01	pc	RG3403T	Grounding Clamp for with "T"-screw for connection to the grounding rod
09	01	pc	ATR00137-2	Ø 17 mm x 1.0 m Grounding Rod
10	01	pc	ATR16819-1	Canvas bag for storage of the grounding rod
11	01	pc	ATR16843-4	Canvas bag for storage of the grounding equipment and accessories

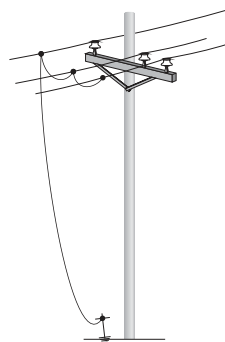
Note:

Should the customer chose to order items 01 to 11 (main set and optional accessories), item 04 shall be disconsidered.

Temporary Short-Circuiting and Grounding Equipment for Distribution Networks up to 22 kV

(According to Standard IEC 61230)

Maximum Short-Circuit Current: 30 cycles: 8 kA
60 cycles: 5 kA



ATR03654-1				
Item	Qty.	Unit.	Cat. No.	Description
01	01	pc	VMR-45/L	RITZGLAS® sectional hot stick, overall length of 3.95 m, composed of:
	01	pc	VMR/L-S	Ø 25 mm x 1.25 m Top section, with universal head VMR00634-1
	01	pc	VMR/L-I	Ø 32 mm x 1.25 m middle section
	01	pc	VMR/L-P	Ø 32 mm x 1.45 m handle section
02	01	pc	VMR00884-1	Head for switch operation
03	03	pc	ATR03653-1	Pressure-type grounding clamp, quick connection, by spring action
04	01	pc	ATR04694-1	Suspension cluster, for clamps installation and removal operations
05	01	pc	ATR03641-1	Metallic reel, with bronze clamps, for connection to the grounding rod and conditioning of the grounding cable
06	01	pc	ATR00137-2	Ø 17 mm x 1 m Copper-steel Grounding, with copper tip end
07	16	m	CTC-25	25 mm ² extra-flexible copper cable, with PVC clear-vision insulation, being 2 lengths of 2 m and 01 length of 12 m
08	06	pc	FLV17423-1	16 mm ² Extra-flexible copper cable ferrule
09	01	pc	ATR10455-1	Metallic case for storage and transportation of cables and fittings
10	06	pc	VMR10484-2	Canvas bag, with inside divisions for storage of the sectional hot stick and grounding rod



Temporary Grounding Equipment for Insulated Secondary Systems (LV) with Multiplex Cables and Conventional Systems with bare conductors

Maximum Short-Circuit current in 30 cycles: 10 kA
60 cycles: 7 kA

- ATR13043-1

This equipment enables quick, practical and safe installation and innovates the concept of grounding in LV multiplexed-cables insulated systems or conventional systems.

Provided with pressure grounding clamps made of aluminum alloy and handles with rubber coating.

Equipped with tail connectors that can be installed on the system at pre-determined locations, using jumper piercing connectors (refer to note 3 below), enabling the quick connection of the equipment to the system.

In order to increase safety of the installation, these tail connectors are provided with special terminals to protect the exposed connection points after the removal of the grounding set.



ATR13043-1

ATR13043-1

Item	Qty.	Unit.	Cat. No.	Description
01	04	pc	ATR13047-1 ATR13047-2	Pressure-type clamp, body in light cast aluminum-alloy, handle with black color plastic jacket ATR13047-2 (neutral) and red color plastic jacket ATR13047-1 (phases). Capacity: Min. 35 mm ² and Max. 120 mm ²
02	1.50	m	CTC-35	35 mm ² extra-flexible copper ground cable, being 3 lengths of 0.5 m
03	01	pc	ATR16818-1	Canvas bag for storage of the set
04	06	pc	ATR17423-3	Tin plated copper Ferrule for 35 mm ² cable

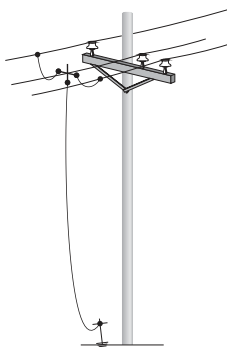
OPTIONAL ACCESSORIES

Item	Qty.	Unit.	Cat. No.	Description
05	--	pc	ATR13151-1	Tail connector, manufactured with XLPE insulated cable, black color, 600 V, 70 mm ² , for permanent installation to the LV system, with terminal protective device, for connection of the grounding set
06	01	pc	ATR00137-2	Ground rod, Cooperweld rod, Ø 17 and 1.0 m total length, brass thread
07	10	m	CTC-35	35 mm ² extra-flexible copper ground cable, for connection to ground point, with connector to connect to phases conductor
08	01	pc	ATR13747-1	Pressure-type clamp, for connection to the grounding rod
09	01	pc	ATR16819-1	Canvas bag for storage of the grounding rod
10	01	pc	ATR14484-1	Canvas bag for storage of the grounding equipment and accessories

Notes:

- 1) Should the customer choose to order items 01 to 10 (main set and optional accessories), item 03 shall be disconsidered.
- 2) The jumper piercing connectors are not produced by RITZ and should be ordered from another supplier. Quantities and sizes must be compatible with the conductors of the secondary system.
- 3) The necessary quantity of Tail connectors ATR13151-1 for installation at pre-determined locations of the system, should be ordered separately.





Medium Voltage Grounding Equipment

Temporary Grounding Equipment for Medium Voltage Systems up to 36 kV

(According to ASTM F 855)

Maximum Short-Circuit current in 30 cycles: 8 kA

60 cycles: 5 kA

ATR09734-1

Item	Qty.	Unit.	Cat. No.	Description
01	03	pc	RG3403	Twisting Grounding Clamp for overhead, with eye-screw
02	01	pc	ATR04116-1	Suspension cluster, for suspension of the clamps simultaneously
03	01	pc	RG3403T	Twisting Grounding Clamp for overhead, with "T"-screw, for connection of the phase-conductors to the ground
04	16	m	CTC-25	25 mm ² extra-flexible copper grounding cable, crystal-clear (PVC) insulation, 2 (two) pieces of 2 m and 1 (one) piece of 12.0 m
05	06	pc	ATR13036-2	Plain and shrouded Aluminum Ferrule, for 25 mm ² cables
06	01	pc	ATR00137-2	Ground rod, Cooperweld rod, Ø 17 x 1 m total length, brass thread
07	01	pc	VMR07205-1	Head for grounding clamp operation
08	01	pc	VMR00884-1	Hook made for cut-out-fuses and general purpose
09	01	set	VMR-45	RITZGLAS® Sectional Hot Stick, standard model, length: 3950 mm, composed of:
	01	pc	VMR-S	Ø 32 mm x 1.25 m RITZGLAS® Sectional Hot Stick end element with VMR00634-1 Universal head
	01	pc	VMR-I	Ø 38 mm x 1.25 m RITZGLAS® Sectional Hot Stick intermediary element
	01	pc	VMR-P	Ø 38 mm x 1.45 m RITZGLAS® Sectional Hot Stick base element
10	01	pc	VMR10484-2	Canvas bag with inside dividers, for conditioning of the hot stick and grounding rod
11	01	pc	ATR16843-2	Conditioning Canvas Case for the grounding set conditioning

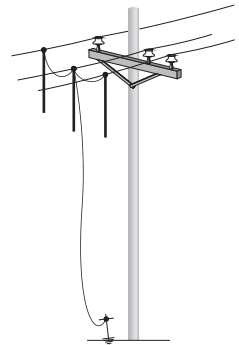
OPTIONAL ACCESSORIES - Hot Stick Option

Item	Qty.	Unit.	Cat. No.	Description
12	01	pc	VTT-3HD/5	RITZGLAS® Telescopic Hot Stick, 3 triangular shape design sections, extended length: 4 m, reduced length: 1.55 m
13	01	pc	SLT-4/5	Storage Canvas bag for VTT Telescopic Hot stick

Temporary Short-Circuiting and Grounding Equipment with Telescopic Hot Stick for Distribution Networks up to 13.8 kV

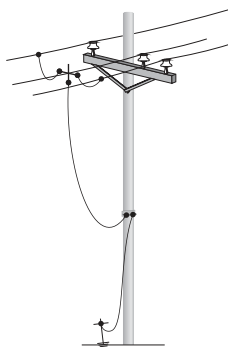
(According to IEC 61230)

Maximum Short-Circuit Current - 30 cycles: 8 kA
60 cycles: 5 kA



ATR04631-1

Item	Qty.	Unit.	Cat. No.	Description
01	03	pc	ATR17460-1	Twisting-type Grounding Clamp, attached to a 25 mm RITZGLAS® pole, with sliding-proof handle of 1.80 m of extended length
02	01	pc	RG3403T	Twisting-type Grounding Clamp, with "T" screw
03	01	pc	ATR04116-1	Suspension cluster, for simultaneously lifting clamps
04	01	pc	ATR00137-2	Ø 17 mm x 1 m long Copper-steel Grounding rod, with brass tip end
05	04	m	CTC-35	35 mm ² extra-flexible copper cable, with PVC clear-vision insulation, being 2 lengths of 2 m
06	10	m	CTC-25	25 mm ² extra-flexible copper cable, with PVC clear-vision insulation
07	01	pc	ATR16843-1	Canvas bag for conditioning of the grounding set components
08	04	pc	RC600-2626	Plain and shrouded aluminum ferrules for 35 mm ² cables
09	02	pc	ATR13036-2	Plain and shrouded aluminum ferrules for 25 mm ² cables



Temporary Grounding Equipment for Medium Voltage Systems up to 36 kV

(According to ASTM F 855)

Maximum Short-Circuit current in 30 cycles: 10 kA

60 cycles: 7 kA

ATR09729-1

Item	Qty.	Unit.	Cat. No.	Description
01	03	pc	RG3403	Twisting Grounding Clamp for overhead distribution systems, with eye-screw
02	01	pc	ATR04116-1	Suspension cluster, aluminum body, bronze pressure-type terminals, for cables up to 70 mm ² , for suspension of the G-3403/B clamps simultaneously
03	01	pc	ATR03318-1	Saddle cluster, aluminum body, with steel chain and quick locking system
04	03	pc	RG3403T	Twisting Grounding Clamp for overhead distribution systems, with "T"-screw, for connection of the phase-conductors to the ground
05	17	m	CTC-35	35mm ² extra-flexible copper grounding cable, crystal-clear (PVC) insulation, 600 V, 2 (two) pieces of 2 and 1 (one) piece of 12 m
06	08	pc	RC600-2626	Plain and shrouded aluminum Ferrule, for 35 mm ² cable
07	01	pc	ATR00137-2	Ground rod, Cooperweld rod, Ø 17 x 1 m total length, brass thread
08	01	pc	VMR07205-1	Head for grounding clamp operation
09	01	pc	VMR00884-1	Hook made of cast bronze/ silicium for cut-out-fuses and general purpose

OPTIONAL ACCESSORIES - First Hot Stick Option

Item	Qty.	Unit.	Cat. No.	Description
10	01	set	VMR-45	<i>RITZGLAS</i> ® Sectional Hot Stick, standard model, length: 3950 mm, composed of:
	01	pc	VMR-S	Ø 32 mm x 1.25 m <i>RITZGLAS</i> ® Sectional Hot Stick end element with Universal head (VMR00634-1)
	01	pc	VMR-I	Ø 38 mm x 1.25 m <i>RITZGLAS</i> ® Sectional Hot Stick intermediary element
	01	pc	VMR-P	Ø 33 mm x 1.45 m <i>RITZGLAS</i> ® Sectional Hot Stick base element
11	01	pc	VMR10484-2	Canvas bag with inside dividers, for conditioning of the hot stick and grounding rod

OPTIONAL ACCESSORIES - Second Hot Stick Option

Item	Qty.	Unit.	Cat. No.	Description
12	01	pc	VTT-3HD/5	<i>RITZGLAS</i> ® Telescopic Hot Stick, 3 triangular shape design sections, extended length: 4 m, reduced length: 1.55m - HEAVY-DUTY type
13	01	pc	SLT-4/5	Conditioning Canvas bag for VTT Telescopic Hot stick

CONDITIONING OF THE SET

Item	Qty.	Unit.	Cat. No.	Description
14	01	pc	ATR16843-2	Conditioning Canvas Case for the grounding set conditioning

Temporary Grounding Equipment for Medium Voltage Systems up to 36 kV

(According to ASTM F 855)

Maximum Short-Circuit current in 30 cycles: 10 kA

60 cycles: 7 kA

ATR17456-1				
Item	Qty.	Unit.	Cat. No.	Description
01	10	pc	RG3403	Twisting Grounding Clamp for overhead distribution systems, with eye-screw
02	03	pc	RG3626	Clamp resting support - HANGER STUDS, made of aluminum
03	01	pc	ATR03318-1	Saddle cluster, aluminum body, with steel chain and quick locking system
04	18	m	CTC-35	35 mm ² extra-flexible copper grounding cable, crystal-clear (PVC) insulation, 600V, 4 (four) pieces of 2 m and 1 (one) piece of 10 m
05	10	pc	RC600-2626	Plain and shrouded aluminum Ferrule, for 35 mm ² cable
06	01	pc	ATR00137-1	Ø 17 x 1.50 m Copper-steel Grounding rod with brass tip end
07	01	pc	VMR07205-1	Head for grounding clamp operation



OPTIONAL ACCESSORIES - First Hot Stick Option

Item	Qty.	Unit.	Cat. No.	Description
08	01	set	VMR-45	<i>RITZGLAS</i> ® Sectional Hot Stick, standard model, length: 3950 mm, composed of:
	01	pc	VMR-S	Ø 32 mm x 1.25 m <i>RITZGLAS</i> ® Sectional Hot Stick end element with VMR00634-1 Universal head
	01	pc	VMR-I	Ø 38 mm x 1.25 m <i>RITZGLAS</i> ® Sectional Hot Stick intermediary element
	01	pc	VMR-P	Ø 33 mm x 1.45 m <i>RITZGLAS</i> ® Sectional Hot Stick base element
09	01	pc	VMR10484-1	Canvas bag with inside dividers, for conditioning of the hot stick and grounding rod

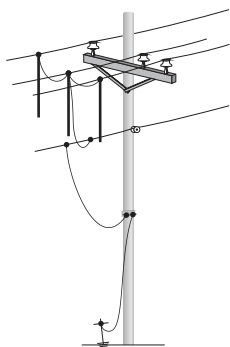
OPTIONAL ACCESSORIES - Second Hot Stick Option

Item	Qty.	Unit.	Cat. No.	Description
10	01	pc	VTT-3HD/5	<i>RITZGLAS</i> ® Telescopic Hot Stick, 3 triangular shape design sections, extended length: 4 m, reduced length: 1.55m - HEAVY-DUTY type
11	01	pc	SLT-4/5	Conditioning Canvas bag for VTT Telescopic Hot stick

CONDITIONING OF THE SET

Item	Qty.	Unit.	Cat. No.	Description
12	01	pc	ATR16843-2	Conditioning Canvas Case for the grounding set conditioning

This Temporary Grounding Equipment model is very versatile, for it provides installation on different system arrangements, such as: vertical and horizontal three-phase distribution and single-phase systems.



Temporary Grounding Equipment for Medium Voltage Systems up to 36 kV

(According to ASTM F 855)

Maximum Short-Circuit current in 30 cycles: 10 kA

60 cycles: 7 kA

ATR17457-1

Item	Qty.	Unit.	Cat. No.	Description
01	03	pc	ATR17462-1	Twisting Grounding Clamp for overhead distribution systems, fixed onto <i>RITZGLAS</i> ® telescopic hot stick VTT-1/2, extended length: 2.59 m
02	02	pc	RG3403	Twisting Grounding Clamp for overhead distribution systems, with eye-screw, one piece for the phase/neutral conductor and 01 piece for the neutral/saddle conductor
03	03	pc	RG3403T	Twisting Grounding Clamp for overhead distribution systems, with "T"-screw, for connection of conductors to the saddle or the grounding rod
04	01	pc	ATR04116-1	Suspension cluster, aluminum body, bronze pressure-type terminals, for cables up to 70 mm ² , for suspension of the G-3403/B clamps simultaneously
05	01	pc	ATR03318-1	Saddle cluster, aluminum body, with steel chain and quick locking system, for grounding intermediary point
06	18	m	CTC-35	35 mm ² extra-flexible copper grounding cable, crystal-clear (PVC) insulation, 600V, 4 (four) pieces of 2 m and 1 (one) piece of 10 m
07	10	pc	RC600-2626	Plain and shrouded aluminum ferrules for 35 mm ² cables
08	01	pc	ATR00137-1	Ø 17 x 1.50 m Copper-steel Grounding rod with brass tip end

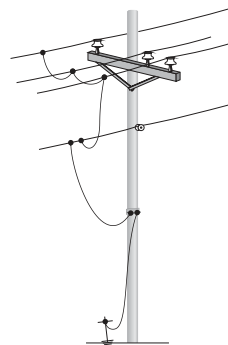
OPTIONAL ACCESSORIES

Item	Qty.	Unit.	Cat. No.	Description
09	01	pc	ATR16843-2	Conditioning Canvas Case for the grounding set conditioning

Temporary Short-Circuiting and Grounding Equipment for Overhead Distributions Systems - 7.2 / 69 kV

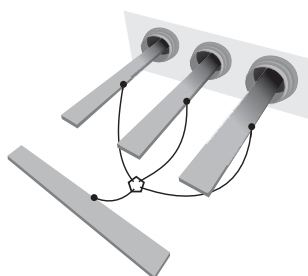
(According to ASTM F 855)

Maximum Short-Circuit Current - 30 cycles: 10 kA
60 cycles: 7 kA



RT600-0641				
Item	Qty.	Unit.	Cat. No.	Description
01	10	pc	RC600-0065	Clamp with serrated jaw and threaded terminal
02	01	pc	ATR03318-1	Clamp Suspension Cluster
03	18.2	m	CTC-35	35 mm ² extra-flexible copper cable, with PVC clear-vision insulation, being 3 lengths of 1.8 m, 1 length of 3.6 m and 1 length of 9.2 m
04	10	pc	RC600-2618	35 mm ² threaded and shrouded ferrule
05	03	pc	RC600-0080	Clamp resting support
06	01	pc	ATR00137-1	Ø 17 mm x 1.50 m Copper-steel Grounding rod with brass tip end

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Temporary Grounding Equipment for Medium Voltage Cubicles and Substations

Temporary Grounding Equipment for Cubicles and Substations up to 15 kV

(According to Standard IEC 61230)

Maximum Short-Circuit Current - 30 cycles: 8 kA
60 cycles: 5 kA

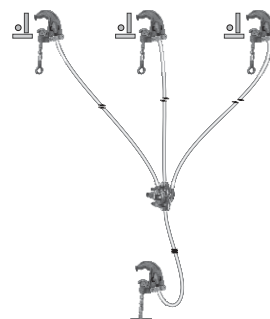
ATR17572-1

Item	Qty.	Unit.	Cat. No.	Description
01	03	pc	ATR08947-1	Twisting grounding clamp made of bronze alloy, attached to a fiberglass rod, with sliding-proof handle, total length: 600 mm
02	07	m	CTC-25	25 mm ² extra-flexible copper cable, with PVC clear-vision insulation, being 3 lengths of 2 m and 1 length of 1 m
03	01	pc	ATR17574-1	thermoplastic Terminal Block
04	01	pc	RG3363-1	Twisting type grounding clamp with "T" screw for connection to the grounding point
05	01	pc	ATR10455-2	Metallic case for conditioning of the grounding set

Grounding Equipment for Cubicles and Substations up to 36 kV

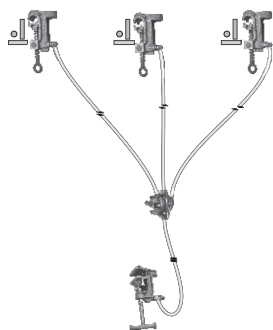
(According to ASTM F 855)

Maximum Short-Circuit current in 30 cycles: 8 kA
60 cycles: 5 kA



ATR12047-1				
Item	Qty.	Unit.	Cat. No.	Description
01	03	pc	ATR11627-1	Aluminum alloy Grounding clamp, for vertical 6 mm - 40 mm busbars, 16 mm - 40 mm horizontal busbars and Ø 6 mm - 35 mm round busbars
02	01	pc	RG4754-1	Aluminum Alloy Block, 04 connectors for grounding cables up to 95 mm ²
03	01	pc	ATR11627-2	Grounding clamp for connection to ground
04	06	pc	RC600-2627	Unshrouded plain aluminum ferrule (no thread), 1/0 AWG for 50 mm ² cables
05	02	pc	ATR13036-2	Unshrouded plain aluminum ferrule (no thread), # 2 AWG for 25 mm ² cables
06	6.0	m	CTC-50	50 mm ² Extra-flexible Copper cable, crystal clear (PVC) insulation, 3 (three) 2 m long cables
07	1.0	m	CTC-25	25 mm ² Extra-flexible Copper cable, crystal clear (PVC) insulation

COMPOSITION OF THE SET (ATR12047-1)				
Item	Qty.	Unit.	Cat. No.	Description
08	01	pc	VTT-5/1800	RITZGLAS® Telescopic Hot Stick, 5 triangular shape sections, extended length: 1800 mm, retracted length: 600 mm, with Universal head (VMR00634-1)
09	01	pc	VMR00874-1	Head for switch operation
10	01	pc	FLV02620-1	Grounding clamp head
11	01	pc	ATR10455-4	Metallic case, for grounding equipment and hot stick conditioning



Grounding Equipment for Cubicles up to 36 kV

(According to ASTM F 855)

Maximum Short-Circuit current 30 cycles: 20 kA

60 cycles: 15 kA

For specification of the Pin-Balls, essential for the installation of this temporary grounding and Short-Circuiting equipment, consider the most suitable shape and size refer to the specific section in this Catalog, for details.

ATR17455-1

Item	Qty.	Unit.	Cat. No.	Description
01	03	pc	RC600-2316	Grounding clamp for attachment to Pin-Ball or conductor, with eye-screw
02	01	pc	RG4754-1	Aluminum Alloy Block, 04 connectors for grounding cables up to 95 mm ²
03	01	pc	RC600-2231	Clamp for connection to ground
04	4.5	m	CTC-70	70 mm ² Extra-flexible Copper cable, crystal clear (PVC) insulation, 3 (three) 1.5 m long cables
05	2.5	m	CTC-35	35 mm ² Extra-flexible Copper cable, crystal clear (PVC) insulation
06	01	pc	RC600-2618	Shrouded threaded copper ferrule, # 2 AWG for 35 mm ² cables
07	03	pc	RC600-2620	Shrouded threaded copper ferrule, # 2/0 AWG for 70 mm ² cables
08	03	pc	RC600-2628	Plain and shrouded aluminum ferrules for 70 mm ² cables
09	01	pc	RC600-2626	Plain and shrouded aluminum ferrules for 35 mm ² cables
10	01	pc	FLV02620-1	Grounding clamp head

OPTIONAL ACCESSORIES

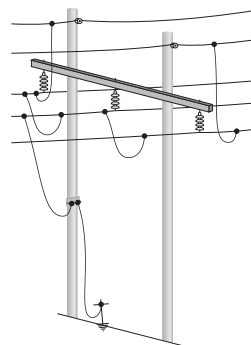
Item	Qty.	Unit.	Cat. No.	Description
11	01	pç	VTT-5/1800	RITZGLAS® Telescopic Hot Stick, 5 triangular shape sections, extended length: 1800 mm, retracted length: 600 mm, with Universal head (VMR00634-1)
12	01	pç	ATR10455-4	Metallic case, for grounding equipment and hot stick conditioning

Temporary Grounding Equipment for High Voltage Systems

Temporary Grounding Equipment for Transmission Lines up to 138 kV (Wooden, concrete and metallic structures)

(According to ASTM F 855 Standard)

Maximum Short-Circuit current in 30 cycles: 30 kA
60 cycles: 23 kA



ATR17441-1				
Item	Qty.	Unit.	Cat. No.	Description
01	12	pc	RC600-0965	Grounding clamp for transmission lines, serrated jaw and eye-screw
02	12	pc	RC600-2629	Plain and shrouded Aluminum Ferrule, for 95 mm ² cable
03	01	pc	ATR03318-1	Saddle cluster, aluminum body, with steel chain and quick locking system
04	01	pc	ATR00137-1	Screw ground rod, Copperweld rod, Ø 17 x 1 m and 1500 mm total length, brass-threaded end
05	27	m	CTC-95	95 mm ² extra-flexible copper grounding cable, crystal-clear (PVC) insulation, 600 V, 3 (three) pieces of 4 m and 1 (one) piece of 9 m
06	01	pc	VMR07205-1	Head for grounding clamp operation
07	04	pc	RG3626	Clamp resting support - HANGER STUDS, made of aluminum

OPTIONAL ACCESSORIES

Item	Qty.	Unit.	Cat. No.	Description
08	01	set	VMR-45	<i>RITZGLAS</i> ® Sectional Hot Stick, standard model, length: 3950 mm, composed of:
	01	pç	VMR-S	Ø 32 mm x 1.25 m <i>RITZGLAS</i> ® Sectional Hot Stick end element with VMR00634-1 Universal head
	01	pç	VMR-I	Ø 38 mm x 1.25 m <i>RITZGLAS</i> ® Sectional Hot Stick intermediary element
	01	pç	VMR-P	Ø 38 mm x 1.45 m <i>RITZGLAS</i> ® Sectional Hot Stick base element
09	01	pç	VMR10484-3	Canvas bag with extra-compartment for heads, 3 inside dividers, for conditioning of the hot stick.
10	02	pç	ATR16843-2	Conditioning Canvas Bag for the grounding set conditioning

Temporary Grounding Equipment for Substations up to 138 kV

(According to ASTM F 855 Standard)

Maximum Short-Circuit current in 30 cycles: 30 kA

60 cycles: 23 kA

ATR17454-1

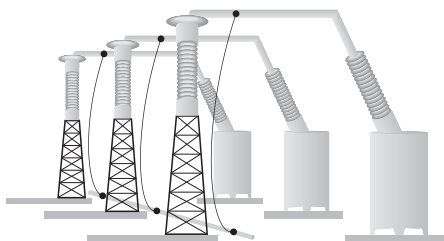
Item	Qty.	Unit.	Cat. No.	Description
01	03	pc	RC600-1732	All-angle Grounding clamp for bus-bars, with eye-screw
02	03	pc	RC600-2231	Twisting grounding clamp, with "T"-screw, for connection to ground (cable or angle plate)
03	06	pc	RC600-2621	Shrouded threaded copper ferrule, 4/0 AWG for 95 mm ² cables
04	30	m	CTC-95	95 mm ² extra-flexible copper grounding cable, crystal-clear (PVC) insulation, 600V, 3 (three) pieces of 10 m
05	01	pc	FLV02620-1	Grounding clamp head
06	01	pc	VMR00884-1	Hook made of cast bronze/ silicium for cut-out-fuses and general purpose

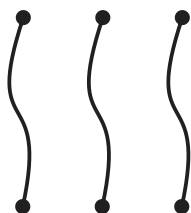
OPTIONAL ACCESSORIES - First Hot Stick Option				
Item	Qty.	Unit.	Cat. No.	Description
07	01	set	VMR-90	<i>RITZGLAS</i> ® Sectional Hot Stick, standard model, length: 6450 mm, composed of:
	01	pc	VMR-S	Ø 32 mm x 1.25 m <i>RITZGLAS</i> ® Sectional Hot Stick end element with Universal head (VMR00634-1)
	03	pc	VMR-I	Ø 38 mm x 1.25 m <i>RITZGLAS</i> ® Sectional Hot Stick intermediary element
	01	pc	VMR-P	Ø 33 mm x 1.45 m <i>RITZGLAS</i> ® Sectional Hot Stick base element
08	01	pc	VMR16826-1	Canvas bag with extra-compartment for heads, 3 inside dividers, for conditioning of the hot stick

OPTIONAL ACCESSORIES - Second Hot Stick Option				
Item	Qty.	Unit.	Cat. No.	Description
09	01	pc	VTT-3HD/7	<i>RITZGLAS</i> ® Telescopic Hot Stick, 5 triangular shape design sections, extended length: 6.76m, reduced length: 1.65m HEAVY-DUTY type
10	01	pc	SLT-6/7	Conditioning Canvas bag for VTT Telescopic Hot stick

The second *RITZGLAS*® hot stick option must be extended in the vertical position with the grounding jumper previously connected to the head of the Hot Stick.

OPTIONAL CONDITIONING OF THE SET				
Item	Qty.	Unit.	Cat. No.	Description
11	02	pc	ATR16843-2	Canvas Bag for conditioning of the fittings and grounding cables





Temporary Grounding and Short-Circuiting Equipment for Transmission Lines up to 500 kV in Metallic Structures

(According to ASTM F 855 Standard)

Maximum Short-Circuit current in 30 cycles: 30 kA
60 cycles: 23 kA

ATR17442-1

Item	Qty.	Unit.	Cat. No.	Description
01	04	pc	RC600-1732	All-angle Grounding clamp for bus-bars, with eye-screw
02	04	pc	RC600-0085	Twisting grounding clamp, with "T"-screw
03	04	pc	RC600-2621	Shr. threaded AL ferrule 4/0AWG for 95 mm ² cables
04	04	pc	RC600-2629	Shrouded plain aluminum ferrule (no thread), 4/0AWG for 95 mm ² cables
05	32	m	CTC-95	95 mm ² extra-flexible copper grounding cable, crystal-clear (PVC) insulation, 600V, 4 (four) pieces of 8 m

COMPLEMENTARY ITEMS FOR INSTALLATION OF THE GROUNDING EQUIPMENT (OPTIONAL)

Item	Qty.	Unit.	Cat. No.	Description
06	01	pc	RC403-0343	Hinged-style Grip-all clamp stick, Ø 32 mm x 5.03 m
07	01	pc	--	Canvas bag for conditioning and transportation of the Hinged-style Grip-all clamp stick

OPTIONAL ACCESSORIES

Item	Qty.	Unit.	Cat. No.	Description
08	01	pc	RE403-2543P	Auxiliary band with ring for lifting
09	02	pc	ATR16843-5	Canvas bag for conditioning and transportation of the grounding equipment

Notes:

- 1) For installation of the grounding equipment using Hot Sticks, refer to the specific Hot Stick section.

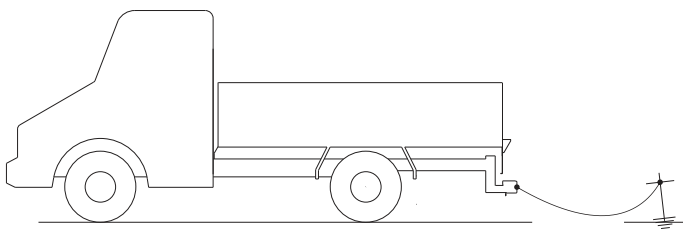
Temporary Grounding Equipment for Vehicles

This grounding equipment model provides the discharge of the capacitance or static loads of vehicles with aerial devices or service vehicles.

For safety purposes, the use of this model is limited exclusively to the grounding of vehicles, therefore it cannot be used for different purposes.

Grounding cables with different lengths are available upon request.

ATR17440-1				
Item	Qty.	Unit.	Cat. No.	Description
01	01	pc	RC600-2231	Twisting grounding clamp, with "T"-screw, for connection to the vehicle
02	01	pc	ATR17184-2	Shrouded threaded aluminum ferrule, for 25 mm ² cables
03	10	m	CTC-25	25 mm ² Extra-flexible Copper cable, crystal clear (PVC) insulation
04	01	pc	FLV17423-2	Tin-plated copper terminal, for 25 mm ² cables
05	01	pc	ATR03641	Metallic fixing reel, with bronze clamp
06	01	pc	ATR00137-2	Ø 17 mm x 1 m Copper-steel Grounding rod with brass tip end





Lifting and Installation System for Substation Grounding

This special set of tools provides the installation of the Temporary Grounding Equipment to the busbars of substations of extra-high voltage, directly from the ground, up to 8 m high.

The top sections (FLV01797-2 and VMR/S-SP) must be attached to different Hot Sticks, with lengths compatible to the height of the busbar of the substation. (The FLV01797-2 section must be attached to the busbar using the supporting hook, whereas the VMR/S-SP section will allow the lifting of the grounding clamp and cable, attached to the eye-ring head).

COMPOSITION OF THE SET			
Cat. No.	Description	Working L (m)	Approx. Weight (kg)
VMR/S-SP	Top section of the Sectional Hot Stick, with Universal Head (VMR00634-1) and hinged clamp	1.25	1.50
FLV01797-2	Top section of the Sectional Hot Stick, with supporting hook and block	1.25	3.50
VMR-I	Middle section of the Sectional Hot Stick	1.25	1.20
VMR-P	Handle section of the Sectional Hot Stick	1.45	1.10
RM1895-2	Ø 3/8" Polypropylene rope	*	0.045

* Minimum length: height of the busbar x 2 + 5m.

Static Grounding Equipment

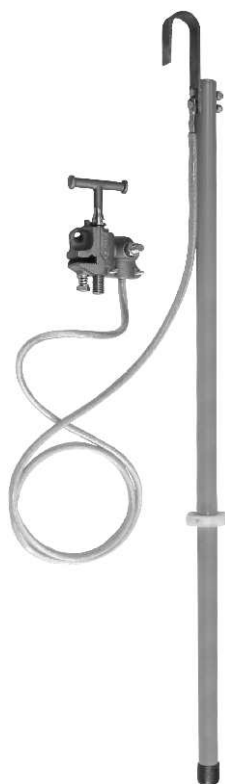
The Static Grounding Equipment has been designed for reliable removal of the static discharges on de-energized systems, such as: conductors, connection terminals, transformers or generators.

In order to operate this tool, first connect the grounding clamp to a safe grounding point.

Immediately install the stick to the point where the static discharge will happen, using the copper hook.

When finishing the maintenance procedures, reverse the sequence used for the installation, i.e. first remove the grounding stick attached to the working point, then remove the grounding clamp.

This tool is composed of a *RITZGLAS*® pole, Ø 32 mm x 1.07 m of working length, 01 (one) clamp for connection to the grounding point (RG3363-4SJ) and 2.10 m of extra-flexible copper cable, 25 mm² CTC-25.



RT600-0891

STATIC GROUNDING EQUIPMENT

Cat. No.	Description	Approx. Weight (kg)
RT600-0891	Grounding equipment for static discharges on de-energized equipment	2.60

Grounding Clamp

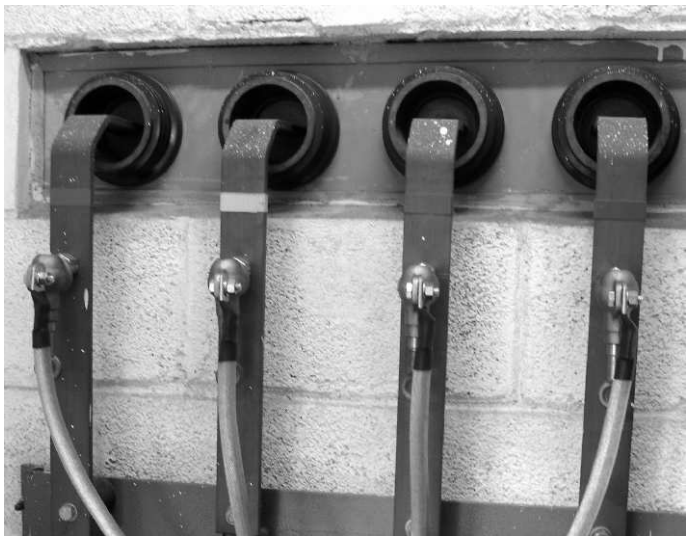
Pins and Ball-Socket Clamps for Temporary Grounding

Pins and Ball-Socket Clamps have been designed to solve several temporary grounding situations, where the physical space or the contact surfaces are limited.

In cubicles, mainly those with rectangular profile busbars, where the conventional grounding clamps dimensions make them unfeasible to use, the ball-socket clamp is suitable due to its versatile conception and easy operation.

This clamp is quite useful in electrical systems, such as:

- Cubicles;
- Indoor and outdoor substations;
- Rolling bridge;
- Live line vehicles;
- Painted Transmission Lines Structures, where there is no electrical contact with the conventional clamps;



TEMPORARY GROUNDING SOCKET BALL CLAMPS

Cat. No.	Description	Approx. Weight (kg)
RC600-2100	Ball-Socket Clamps for Temporary Grounding with eye-screw and cable connection using threaded ferrule	0.42
RC600-2300	Ball-Socket Clamps for Temporary Grounding with eye-screw and cable connection using plain ferrule	0.76
RT600-2320	Ball-Socket Clamps for Temporary Grounding with "T"-screw and cable connection using threaded ferrule	0.49
RT600-2321	Ball-Socket Clamps for Temporary Grounding with "T"-screw and cable connection using plain ferrule	0.82



RC600-2100



RC600-2300



RT600-2320



RT600-2321

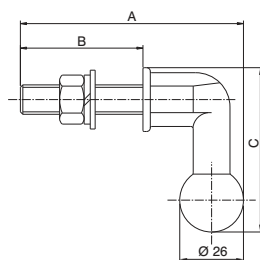
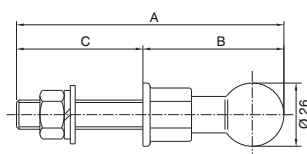
TECHNICAL CHARACTERISTICS:

- Bronze alloy;
- Tightening screw: eye-screw or T-screw;
- Connection of the grounding cable to the clamp, using threaded or plain ferrule;
- Installation Torque: 3.7 daN.m;
- Maximum Short-Circuit current: 30 kA - 30 cycles;
23 kA - 60 cycles;
- Cable ferrule: Maximum 95 mm²
Minimum 25 mm²

Pin-Ball for Temporary Grounding Points

The Pin-Balls are intended for permanent installation on busbars, on busbars joints, on terminals or on any other parts of the electrical system, establishing the points required for the suitable grounding of such systems. Therefore, it is recommended to order it in sufficient quantities for these applications.

In order to better suit customer requirements, Pin-Balls are available in 7 different dimensions and positions of the connection ball.



PIN-BALLS (STRAIGHT TYPE)

Cat. No.	A	B	C	Approx. Weight (kg)
FLV08969-1	98	58	40	0.22
FLV08969-2	118	58	60	0.24
FLV08969-3	138	58	80	0.25
FLV08969-4	108	58	50	0.23
FLV08969-5	166	114	52	0.28
FLV08969-6	158	58	100	0.30

PIN-BALL ("L"-TYPE)

Cat. No.	A	B	C	Approx. Weight (kg)
FLV13147-1	91	50	65	0.26

TECHNICAL CHARACTERISTICS:

- Body in bronze alloy and threads in tin-plated 1020 steel;
- Ø 26 mm Connection ball;
- Installation Torque: 3.5 daN.m;

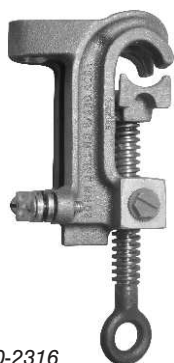
Pin-Ball Protector

The Pin-Ball Protector is intended to cover the Pin-Ball to reduce its corrosion and contamination, and also protecting from accidental contacts during the maintenance procedures. Provided with eye-ring intended for installation using insulating hot stick.



FLV10587-1

PIN-BALL RUBBER PROTECTORS		
Cat. No.	Description	Approx. Weight (kg)
FLV10587-1	Pin-Ball Rubber Protector with 58 mm head (FLV08969-1, FLV08969-2, FLV08969-3, FLV08969-4)	0.04
FLV15388-1	Pin-Ball Rubber Protector with 114 mm head (FLV08969-5)	0.04
FLV15389-1	Pin-Ball Rubber Protector with 143 mm head (FLV08969-6)	0.04



RC600-2316

Multi-connection Grounding Clamp

The RC600-2316 Grounding Clamp model provides installation on round conductors, rectangular busbars and Pin-Balls. Using the two threaded housings, it is possible attaching Pin-Balls to the body of the clamp for simultaneous lifting of two additional clamps, for a three-phase grounding system.

MULTI-CONNECTION GROUNDING CLAMP		
Cat. No.	Description	Approx. Weight (kg)
RC600-2316	Multi-connection Grounding Clamp	0.68

TECHNICAL CHARACTERISTICS:

- Aluminum body;
- Tightening eye-screw;
- Connection of the grounding cable to the clamp, using threaded ferrule;
- Maximum Short-Circuit current: 30 kA - 30 cycles;
23 kA - 60 cycles;
- Opening range:
Bare conductor: minimum 8 Cu (Ø 2.6 mm)
maximum 636MCM CAA (ACSR) Ø 25 mm
Rectangular Busbar: 6 x 32 mm
Pin-Ball: Ø 26 mm
- Installation Torque: 3.7 daN.m (applied to the eye-screw)

Grounding Clamps to be used on Low and Medium Voltage Systems

- RG3403

Characteristics:

Aluminum body; Plain jaw; Tightening eye-screw in bronze;
Bronze cable connectors for plain ferrules.



RG3403

- RG3403T

Characteristics:

Aluminum body; Plain jaw; Tightening T-screw in bronze;
Bronze cable connectors for plain ferrules.



RG3403T

- ATR17459-1

Characteristics:

Aluminum body; Plain jaw; Tightening screw in bronze, fixed
to a Ø 25 mm x 1.25 m insulating pole; Bronze cable
connectors for plain ferrules.



ATR17459-1

- ATR17461-1

Characteristics:

Aluminum body; Plain jaw; Tightening screw in bronze, fixed
to the top section of the sectional hot stick Ø 25mm x 1.25 m,
with coupling system; Bronze cable connectors for plain
ferrules.



ATR17461-1

- ATR17460-1

Characteristics:

Aluminum body; Plain jaw; Tightening screw in bronze, fixed
to a telescopic hot stick with Ø 32 mm handle, Ø 25 mm
extension, extended length: 1.80 m; Bronze cable connectors
for plain ferrules.



ATR17460-1



ATR17462-1

- ATR17462-1

Characteristics:

Aluminum body; Plain jaw; Tightening screw in bronze, fixed to a telescopic hot stick VTT-1/2, Ø 33 mm base section, extended length: 2.59 m and retracted length: 1.44 m; Bronze cable connectors for plain ferrules.



ATR03653-1

- ATR03653-1

Characteristics:

Aluminum body; Plain jaw; Spring-action installation to the conductor; Blade for connection to the Cluster (ATR04694-1), in galvanized steel; Type of connections to the cables: tin-plated copper ferrule, compression type (not included with the clamp).



ATR13628-1

- ATR03653-1

Characteristics:

Aluminum body; Plain jaw; Spring-action installation to the conductor; Self-connection system for connection to the Cluster (ATR04694-1); Type of connections to the cables: tin-plated copper ferrule, compression type (not included with the clamp).



ATR11627-1

- ATR11627-1

Characteristics:

Aluminum body; Plain jaw; Tightening eye-screw in bronze; Bronze cable connectors for plain ferrules.



ATR17348-1

- ATR17348-1

Characteristics:

Aluminum body; Plain jaw; Fixed to a insulated pole Ø 25 mm with rubber handle; spring-action installation to the conductor type of connections to the cables: tinplated copper ferrule (not included with the clamp).



ATR13047-1

- ATR13047-1 - ATR13047-2

Characteristics:

Aluminum body; Spring-action installation to the cord; Plastic handle, red to ATR13047-1 and black to ATR13047-2.

GROUNDING CLAMPS TO BE USED ON LOW AND MEDIUM VOLTAGE SYSTEMS

Electrical and Mechanical Characteristics	Cat. No.				
	RG3403	RG3403T	ATR17459-1	ATR17459-1	ATR17460-1
Nominal Current (A)	300	300	300	300	300
Short-Circuit Current (Isc) - 30 Cycles (kA)	20	20	20	20	20
Short-Circuit Current (Isc) - 60 Cycles (kA)	15	15	15	15	15
Maximum Range	477 MCM CAA (ACSR) Ø 22.5 mm	477 MCM CAA (ACSR) Ø 22.5 mm	477 MCM CAA (ACSR) Ø 22.5 mm	477 MCM CAA (ACSR) Ø 22.5 mm	477 MCM CAA (ACSR) Ø 22.5 mm
Minimum Range	6 AWG Cu 4 AWG CA Ø 4.0 mm	6 AWG Cu 4 AWG CA Ø 4.0 mm	6 AWG Cu 4 AWG CA Ø 4.0 mm	6 AWG Cu 4 AWG CA Ø 4.0 mm	6 AWG Cu 4 AWG CA Ø 4.0 mm
Maximum Cable Ferrule (mm²)	70	70	70	70	70
Minimum Cable Ferrule (mm²)	16	16	16	16	16
Recommend Torque (daN.m)	3.7	3.7	3.7	3.7	3.7
Approx. Weight (kg)	0.48	0.45	1.10	1.10	1.40
ASTM Designation	Type I Class A Degree 3	Type III Class A Degree 3	Type II Class A Degree 3	Type II Class A Degree 3	Type II Class A Degree 3

GROUNDING CLAMPS TO BE USED ON LOW AND MEDIUM VOLTAGE SYSTEMS

Electrical and Mechanical Characteristics	Cat. No.					
	ATR17462-1	ATR03653-1	ATR13628-1	ATR11627-1	ATR17348-1	ATR13047-1 ATR13047-2
Nominal Current (A)	300	-	-	-	-	-
Short-Circuit Current (Isc) - 30 Cycles (kA)	20	10	15	30	10	10
Short-Circuit Current (Isc) - 60 Cycles (kA)	15	7	8	23	7	7
Maximum Range	477 MCM CAA (ACSR) Ø 22.5 mm	336.4 MCM CAA (ACSR) Ø 19 mm	Ø 30 mm	Busbars: vertical 40 mm, horizontal 44 mm and round 35 mm	336.4 MCM CAA (ACSR) Ø 19 mm	Ø 12.5 mm
Minimum Range	6 AWG Cu 4 AWG CA Ø 4 mm	6 (AWG) Cu 4 (AWG) CA Ø 4 mm	Ø 5 mm	Busbars: vertical 6 mm, and round 6 mm	6 (AWG) Cu 4 (AWG) CA Ø 4 mm	Ø 6.5 mm
Maximum Cable Ferrule (mm²)	70	35	50	95	35	35
Minimum Cable Ferrule (mm²)	16	16	16	16	16	16
Recommend Torque (daN.m)	3.7	-	-	3.7	-	-
Approx. Weight (kg)	1.40	0.35	0.45	0.65	0.35	0.35
ASTM Designation	Type II Class A Degree 3	-	-	Type I Class A Grade 5	-	-

Grounding Clamps for Connection to the Grounding Point

- RG3363-3SJ

Characteristics:

Aluminum body; Serrated jaw; Tightening eye-screw in bronze; Bronze cable connectors for plain ferrules.

- RG3363-4SJ

Characteristics:

Aluminum body; Serrated jaw; Tightening T-screw in bronze; Bronze cable connectors for plain ferrules.

- RG3363-1

Characteristics:

Bronze body; Plain jaw; Tightening T-screw in bronze; Bronze cable connectors for plain ferrules.

- RC600-0085

Characteristics:

Aluminum body; Jaw with Bronze support for better contact with the angle plate surface; Aluminum flange (Removable) for fixing to the angle plate. Tightening T-screw in bronze; Bronze cable connectors for plain ferrules.



RG3363-3SJ



RG3363-4SJ



RG3363-1



RC600-0085

ATR11627-2



- ATR11627-2

Characteristics:

Aluminum body; Serrated jaw; Tightening T-screw in bronze;
Bronze cable connectors for plain ferrules.

RC600-1617



- RC600-1617

Characteristics:

Bronze body; Movable serrated jaw; Tightening T-screw in bronze;
Bronze cable connectors for plain ferrules.

RC600-2231



- RC600-2231

Characteristics:

Bronze body; Serrated jaw; Tightening T-screw in bronze;
Cable connections by threaded ferrules.

RC600-2232



- RC600-2232

Characteristics:

Bronze body; Serrated jaw; Tightening eye-screw in bronze;
Cable connections by threaded ferrules.

RG3622-1T



- RG3622-1T

Characteristics:

Aluminum body; Plain jaw; Tightening T-screw in bronze;
Cable connections by plain ferrules.

GROUNDING CLAMPS FOR CONNECTION TO THE GROUNDING POINT					
Electrical and Mechanical Characteristics	Cat. No.				
	RG3363-3SJ	RG3363-4SJ	RG3363-1	RC600-0085	ATR11627-2
Nominal Current (A)	400	400	400	400	400
Short-Circuit Current (Isc) - 30 Cycles (kA)	30	30	30	30	30
Short-Circuit Current (Isc) - 60 Cycles (kA)	23	23	23	23	23
Maximum Range	38 mm (rectangular busbar)	38 mm (rectangular busbar)	Ø 32 mm	51 - 102 mm (rectangular busbar)	busbars: vertical 40mm horizontal 44mm and round 35mm
Minimum Range	3.2mm (rectangular busbar)	3.2mm (rectangular busbar)	Ø 5.0 mm	-	busbars: vertical 6mm and round 6mm
Maximum Cable Ferrule (mm²)	95	95	95	95	95
Minimum Cable Ferrule (mm²)	16	16	16	16	16
Recommend Torque (daN.m)	3.7	3.7	3.7	3.7	3.7
Approx. Weight (kg)	0.75	0.84	1.20	1.70	0.70
ASTM Designation	Type I Class B Grade 5	Type III Class B Grade 5	Type III Class B Grade 5	Type III Class B Grade 5	Type III Class B Grade 5

GROUNDING CLAMPS FOR CONNECTION TO THE GROUNDING POINT

Electrical and Mechanical Characteristics	Cat. No.			
	RC600-1617	RC600-2231	RC600-2232	RG3622-1T
Nominal Current (A)	400	400	400	400
Short-Circuit Current (Isc) - 30 Cycles (kA)	30	30	30	30
Short-Circuit Current (Isc) - 60 Cycles (kA)	23	23	23	23
Maximum Range	25.4mm (rectangular busbar)	38mm (rectangular busbar)	38mm (rectangular busbar)	566 MCM Cu 900 MCM CAA (ACSR) Ø 29 mm
Minimum Range	3.0mm (rectangular busbar)	3.0mm (rectangular busbar)	3.0mm (rectangular busbar)	6 Cu Ø 4.0 mm
Maximum Cable Ferrule (mm²)	95	95	95	95
Minimum Cable Ferrule (mm²)	16	16	16	16
Recommend Torque (daN.m)	3.7	3.7	3.7	3.7
Approx. Weight (kg)	1.20	0.90	0.90	0.76
ASTM Designation	Type III Class B Grade 5	Type III Class B Grade 5	Type I Class B Grade 5	Type III Class A Grade 5

Grounding Clamps for Substations

- RG3368

Characteristics:

Aluminum body; Plain jaw; Tightening eye-screw in bronze;
Bronze cable connectors for plain ferrules.



RG3368

- RG3367-1

Characteristics:

Bronze body; Removable and plain jaw; Tightening eye-screw
in bronze; Bronze cable connectors for plain ferrules.



RG3367-1

- RG3367-2

Characteristics:

Aluminum body; Removable and plain jaw; Tightening eye-
screw in bronze; Bronze cable connectors for plain ferrules.



RG3367-2

- G3369

Characteristics:

Aluminum body and adjustable bracket; Plain jaw; Tightening
eye-screw in bronze; Bronze cable connectors for plain
ferrules.



RG3369

- RC600-0337

Characteristics:

Aluminum body and adjustable bracket; Plain jaw;
Tightening eye-screw in bronze; Bronze cable connectors for
plain ferrules.



RC600-0337

- ATR03308-2

Characteristics:

Aluminum body and adjustable bracket; Smooth Jaw;
Bronze eye-screw terminal; Bronze Connector for plain
Ferrule.



ATR03308-2

GROUNDING CLAMPS FOR SUBSTATIONS

Electrical and Mechanical Characteristics	Cat. No.					
	RG3368	RG3367-1	RG3367-2	RG3369	RC600-0337 *	ATR03308-2 *
Nominal Current (A)	400	400	400	400	400	400
Short-Circuit Current (Isc) - 30 Cycles (kA)	30	30	30	30	30	30
Short-Circuit Current (Isc) - 60 Cycles (kA)	23	23	23	23	23	23
Maximum Range	Ø 50mm or rectangular busbar 12 x 100 mm	Ø 63.5 mm	Ø 63.5 mm	Ø 100 mm	Ø 160 mm	Ø 200 mm
Minimum Range	Ø 5 mm	Ø 6 mm	Ø 6 mm	Ø 10 mm	Ø 90 mm	Ø 90 mm
Maximum Cable Ferrule (mm²)	95	95	95	95	95	95
Minimum Cable Ferrule (mm²)	16	16	16	16	16	16
Recommend Torque (daN.m)	3.7	3.7	3.7	3.7	3.7	3.7
Approx. Weight (kg)	1.00	2.20	1.20	2.20	3.20	3.20
ASTM Designation	Type I Class A Grade 5	Type I Class A Grade 5	Type I Class A Grade 5	Type I Class A Grade 5	Type I Class A Grade 5	Type I Class A Grade 5

* Allows use of 2 cables of (up to) 95 mm² each, simultaneously.

Grounding Clamps for High and Extra High Voltage Systems

- RC600-1743

Characteristics:

Aluminum body; Plain jaw; Tightening eye-screw in bronze;
Cable connection by threaded ferrules.



RC600-1743

- RG3622-1

Characteristics:

Aluminum body; Plain jaw; Tightening eye-screw in bronze;
Bronze cable connectors for plain ferrules.

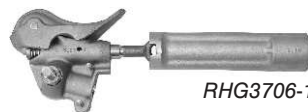


RG3622-1

- RHG3706-1

Characteristics:

Aluminum body and head; Plain jaw; Tightening screw in bronze attached to a Ø 32 mm x 1.83 m RITZGLAS® pole;
Bronze cable connectors for plain ferrules.



RHG3706-1

- RC600-0434

Characteristics:

Aluminum body; Serrated jaw; Tightening eye-screw in bronze; Bronze cable connectors for plain ferrules.



RC600-0434

- RC600-0065

Characteristics:

Aluminum body; Serrated jaw; Tightening eye-screw in bronze; Cable connection by threaded ferrules.



RC600-0065

GROUNDING CLAMPS FOR HIGH AND EXTRA HIGH VOLTAGE SYSTEMS

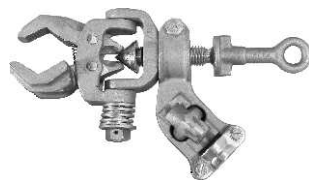
Electrical and Mechanical Characteristics	Cat. No.				
	RC600-1743	RG3622-1	RHG3706-1	RC600-0434	RC600-0065
Nominal Current (A)	400	400	400	400	400
Short-Circuit Current (Isc) - 30 Cycles (kA)	30	30	30	30	30
Short-Circuit Current (Isc) - 60 Cycles (kA)	23	23	23	23	23
Maximum Range	1000 MCM Cu 1590 MCM CAA (ACSR) Ø 38 mm	566 MCM Cu 900 MCM CAA (ACSR) Ø 29 mm	566 MCM Cu 900 MCM CAA (ACSR) Ø 29 mm	950 MCM Cu 1510 MCM CAA (ACSR) Ø 38 mm	954 MCM CAA (ACSR) Ø 30 mm
Minimum Range	6 Cu Ø 4.0 mm	6 Cu Ø 4.0 mm	6 Cu Ø 4.0 mm	6 Cu Ø 4.0 mm	6 Cu Ø 4.0 mm
Maximum Cable Ferrule (mm²)	95	95	95	95	95
Minimum Cable Ferrule (mm²)	16	16	16	16	16
Recommend Torque (daN.m)	3.7	3.7	3.7	3.7	3.7
Approx. Weight (kg)	0.72	0.70	1.95	0.92	0.52
ASTM Designation	Type I Class A Grade 5	Type I Class A Grade 5	Type II Class A Grade 5	Type I Class B Grade 5	Type I Class B Grade 5

Grounding Clamps for Transmission Lines, High and Extra-High Voltage Substations

- RG4229-1SJ

Characteristics:

Main body in aluminum; Serrated jaw; Tightening eye-screw in bronze; Bronze cable connectors for plain ferrules. Provides operation to continuous angles of up to 75°.

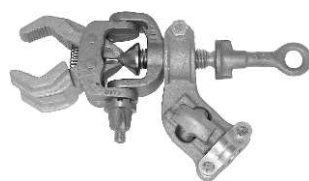


RG4229-1SJ

- ATR13159-1

Characteristics:

Main body in bronze; Serrated aluminum jaw; Tightening eye-screw in bronze; Bronze cable connectors for plain ferrules. With lock system for pre-adjusted and fixed operation angles, with wing-nut.

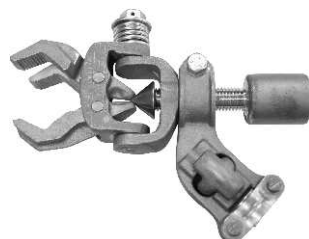


ATR13159-1

- RHG4229-6SJ

Characteristics:

Main body in aluminum; Serrated jaw; Tightening screw in bronze attached to a Ø 32 mm x 1.83 m RITZGLAS® pole; Bronze cable connectors for plain ferrules. Provides operation to continuous angles of up to 75°.



RHG4229-6SJ

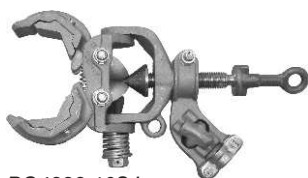
- RC600-1732

Characteristics:

Main body in aluminum; Serrated jaw; Tightening eye-screw in bronze; Cable adapter in aluminum, for threaded ferrules; Provides operation to continuous angles of up to 75°.



RC600-1732



RG4228-10SJ

- RG4228-10SJ

Characteristics:

Main body in aluminum; Serrated jaw; Tightening eye-screw in bronze; Bronze cable connectors for plain ferrules. Provides operation to continuous angles of up to 75°.

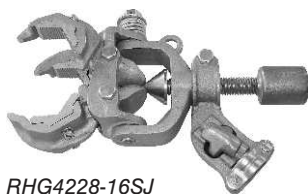


ATR10777-1

- ATR10777-1

Characteristics:

Main body in bronze; Aluminum Serrated jaw; Tightening eye-screw in bronze; Bronze cable connectors for plain ferrules. With lock system for pre-adjusted and fixed operation angles, with wing-nut.



RHG4228-16SJ

- RHG4228-16SJ

Characteristics:

Main body in aluminum; Serrated jaw; Tightening screw in bronze attached to a Ø 32 mm x 1.83 m RITZGLAS® pole; Bronze cable connectors for plain ferrules. Provides operation to continuous angles of up to 75°.

- RC600-0965

Characteristics:

Aluminum body; Serrated jaw; Tightening eye-screw in bronze; Bronze cable connectors for plain ferrules.

- RC600-2281

Characteristics:

Aluminum body; Plain jaw; Tightening eye-screw in bronze; Bronze cable connectors for plain ferrules.

- RC600-2282

Characteristics:

Aluminum body; Serrated jaw; Tightening eye-screw in bronze; Bronze cable connectors for plain ferrules.

- RC600-0386

Characteristics:

Aluminum body and head; Serrated jaw; Tightening screw in bronze attached to a Ø 32 mm x 1.83 m *RITZGLAS*® pole; Bronze cable connectors for plain ferrules.



RC600-0965



RC600-2282



RC600-2275

- RC600-2275

Characteristics:

Aluminum body; Plain jaw; Tightening eye-screw in bronze; Bronze cable connectors for plain ferrules.

- RC600-2276

Characteristics:

Aluminum body; Serrated jaw; Tightening eye-screw in bronze; Bronze cable connectors for plain ferrules.



RC600-0197

- RC600-0197

Characteristics:

Main body in aluminum; Top jaw and tightening screw in bronze; Cable adapter in aluminum, for threaded ferrules;

- RG1810-2

Characteristics:

Main body is made of Aluminum; Top jaw and tightening screw are made of bronze; Bronze cable connectors for plain ferrules.



RG1810-2

GROUNDING CLAMPS FOR TRANSMISSION LINES, HIGH AND EXTRA-HIGH VOLTAGE SUBSTATIONS

Electrical and Mechanical Characteristics	Cat. No.			
	RG4229-1SJ	ATR13159-1	RHG4229-6SJ	RC600-1732
Nominal Current (A)	400	400	400	400
Short-Circuit Current (Isc) - 30 Cycles (kA)	30	30	30	30
Short-Circuit Current (Isc) - 60 Cycles (kA)	23	23	23	23
Maximum Range	954 MCM CAA (ACSR) Ø 30 mm	954 MCM CAA (ACSR) Ø 30 mm	954 MCM CAA (ACSR) Ø 30 mm	954 Ø 73 mm
Minimum Range	2 Cu Ø 6.5 mm	2 Cu Ø 6.5 mm	2 Cu Ø 6.5 mm	2 Cu Ø 6.5 mm
Maximum Cable Ferrule (mm²)	95	95	95	95
Minimum Cable Ferrule (mm²)	16	16	16	16
Recommend Torque (daN.m)	3.7	3.7	3.7	3.7
Approx. Weight (kg)	1.15	1.90	2.00	1.50
ASTM Designation	Type I Class B Grade 5	Type I Class B Grade 5	Type II Class B Grade 5	Type I Class B Grade 5

GROUNDING CLAMPS FOR TRANSMISSION LINES, HIGH AND EXTRA-HIGH VOLTAGE SUBSTATIONS

Electrical and Mechanical Characteristics	Cat. No.		
	RG4228-10SJ	ATR10777-1	RHG4228-16SJ
Nominal Current (A)	400	400	400
Short-Circuit Current (Isc) - 30 Cycles (kA)	30	30	30
Short-Circuit Current (Isc) - 60 Cycles (kA)	23	23	23
Maximum Range	Ø 73 mm	Ø 73 mm	Ø 73 mm
Minimum Range	2 Cu Ø 6.5 mm	2 Cu Ø 6.5 mm	2 Cu Ø 6.5 mm
Maximum Cable Ferrule (mm²)	95	95	95
Minimum Cable Ferrule (mm²)	16	16	16
Recommend Torque (daN.m)	3.7	3.7	3.7
Approx. Weight (kg)	1.85	2.60	3.30
ASTM Designation	Type I Class B Grade 5	Type I Class B Grade 5	Type II Class B Grade 5

GROUNDING CLAMPS FOR TRANSMISSION LINES, HIGH AND EXTRA-HIGH VOLTAGE SUBSTATIONS

Electrical and Mechanical Characteristics	Cat. No.			
	RC600-0965	RC600-2281	RC600-2282	RC600-0386
Nominal Current (A)	400	400	400	400
Short-Circuit Current (Isc) - 30 Cycles (kA)	30	30	30	30
Short-Circuit Current (Isc) - 60 Cycles (kA)	23	23	23	23
Maximum Range	954 MCM CAA (ACSR) Ø 29.6 mm	Ø 51 mm	Ø 51 mm	Ø 51 mm
Minimum Range	6 Cu Ø 4 mm	6 Cu Ø 4 mm	6 Cu Ø 4 mm	6 Cu Ø 4 mm
Maximum Cable Ferrule (mm²)	95	95	95	95
Minimum Cable Ferrule (mm²)	16	16	16	16
Recommend Torque (daN.m)	3.7	3.7	3.7	3.7
Approx. Weight (kg)	0.73	0.90	0.90	2.15
ASTM Designation	Type I Class B Grade 5	Type I Class A Grade 5	Type I Class B Grade 5	Type II Class B Grade 5

GROUNDING CLAMPS FOR TRANSMISSION LINES, HIGH AND EXTRA-HIGH VOLTAGE SUBSTATIONS

Electrical and Mechanical Characteristics	Cat. No.			
	RC600-2275	RC600-2276	RC600-0197	RG1810-2
Nominal Current (A)	400	400	400	300
Short-Circuit Current (Isc) - 30 Cycles (kA)	30	30	30	20
Short-Circuit Current (Isc) - 60 Cycles (kA)	23	23	23	15
Maximum Range	1033 MCM CAA (ACSR) Ø 31.7 mm	1033 MCM CAA (ACSR) Ø 31.7 mm	950 MCM Cu 1510 MCM CAA (ACSR) Ø 38 mm	250 MCM Cu 4/0 (ACSR) Ø 14.5 mm
Minimum Range	8 Cu Ø 3.2 mm	8 Cu Ø 3.2 mm	6 Cu Ø 4 mm	6 Cu Ø 4 mm
Maximum Cable Ferrule (mm²)	95	95	95	70
Minimum Cable Ferrule (mm²)	16	16	16	16
Recommend Torque (daN.m)	3.7	3.7	3.7	3.7
Approx. Weight (kg)	0.60	0.60	0.82	0.6
ASTM Designation	Type I Class A Grade 5	Type I Class B Grade 5	Type I Class B Grade 5	Type I Class A Grade 3

Piercing Clamps and Grounding Equipment for Underground Cables

Temporary Grounding for Medium Voltage Underground Cables, provided with special clamps with Ø 1/2" piercing steel pins, to ensure the perfect contact with the conductor.

The model RC600-1626 is provided with chisel-shape point and the model RT600-1922 is provided with spike-shape point.

Both models of Grounding Equipment are supplied with a clamp for connection to ground, however only the models RT600-2233 and RT600-2234 are supplied with the grounding rod.

The Short-Circuit current for these sets is:

Isc = 10 kA (30 cycles)

Isc = 7 kA (60 cycles)



RC600-1626



RT600-1922



RT600-2233



RC600-1625

PIERCING CLAMPS AND GROUNDING EQUIPMENT FOR UNDERGROUND CABLES		
Cat. No.	Description	Approx. Weight (kg)
RC600-1626	Clamp with chisel-shape point	0.90
RT600-2234	MV Grounding Equipment for Underground Cable, composed of: 01 pc Clamp RC600-1626, 01 pc Clamp RC600-2276, 1.8 m x 1 m Grounding Rod, 1.8 m of Ø 35 mm ² extra-flexible copper grounding cable and threaded shrouded aluminum ferrules	4.00
RC600-1625	MV Grounding Equipment for Underground Cable, composed of: 01 pc Clamp RC600-1626, 01 pc Clamp RC600-2276, 1.8 m of Ø 35 mm ² extra-flexible copper grounding cable and threaded shrouded aluminum ferrules	2.10
RT600-1922	Clamp with spike-shape point	0.90
RT600-2233	MV Grounding Equipment for Underground Cable, composed of: 01 pc Clamp RT600-1922, 01 pc Clamp RC600-2276, 01pc x 1 m Grounding Rod, 1.8 m of Ø 35 mm ² extra-flexible copper grounding cable and threaded shrouded aluminum ferrules	4.00



RC600-0785



RC600-0861



RC600-0862



RC600-0841



RT600-2408

Grounding Clamp for Fuse Switch

This clamp has been specially designed for temporary grounding of Fuse Switches in medium voltage systems, by installing it to the bottom base of the Fuse Switch, after removal of the fuse cartridge.

This clamp provides the direct installation of a grounding cable or conventional grounding clamps using L or T supports.

This clamp is also very useful to avoid the accidental operation of the Fuse Switch, when installed on the system.

The L and T supports and clamp body are made of aluminum alloy and the eye-screw operating screw is made of bronze alloy.

Short-Circuit capacity: 20 kA in 30 cycles.

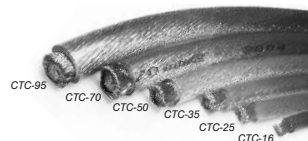
GROUNDING CLAMP FOR FUSE-SWITCH

Cat. No.	Description	Approx. Weight (kg)
RC600-0785	Grounding clamp for fuse switch	0.48
RC600-0861	Grounding clamp for fuse switch with T-support	0.73
RC600-0862	Grounding clamp for fuse switch with L-support	0.67
RC600-0841	L-support for Grounding clamp for fuse switch	0.17
RT600-2408	T-support for Grounding clamp for fuse switch	0.25

Copper Cables for Grounding Equipment

Extra-flexible electrolytic copper cable, with 750 V insulated protection made of crystal clear PVC, for the visual inspection of the perfect condition of the copper filaments, suitable for grounding equipment and terminals.

For easy identification and specification, the size, application and year of manufacture, are printed over the cable protection.



COPPER CABLE FOR GROUNDING EQUIPMENT										
Cat. No.	Nominal Profile (mm ²)	AWG Size (mm ²)	Isc Cap. (symmetric kA)		Nominal Current (A)	Max. Electrical Resistance to 20°C (ohms/km)	Wires Arrangement	Outside Ø (mm)	Sheave Thickness (mm)	Approx. Weight (kg)
			30 Cycles (0.5s)	60 Cycles (1s)						
CTC-16	16	-	5.0	3.5	100	1.210	19 x 271/0.196	9.10	2.0	0.202
CTC-25	25	-	8.0	5.0	-	0.780	19 x 42/0.202	11.52	2.0	0.318
CTC-35	35	2 (33.63)	10.0	7.0	200	0.554	37 x 30/0.202	12.90	2.0	0.421
CTC-50	50	1/0 (55.48)	15.0	8.0	250	0.386	19 x 52/0.254	14.53	2.0	0.573
CTC-70	70	2/0 (67.42)	20.0	15.0	300	0.272	61 x 23/0.254	17.00	2.2	0.793
CTC-95	95	4/0 (107.20)	30.0	23.0	400	0.206	51 x 31/0.254	19.03	2.2	1.036

Grounding Cable Ferrules

These terminals are attached to the end of the grounding cables, by crimping process, in order to provide a good electrical and mechanical connection between cables and grounding clamps.

Made of aluminum or copper, with inside diameter according to the nominal cable size.

Both the aluminum cables and bronze cables can be selected regarding the type of attachment to the cable: threaded or plain.

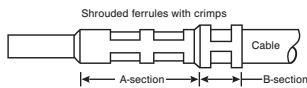
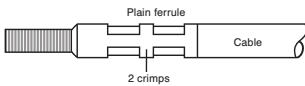
Also, both of them are provided with two types of crimping:

Shrouded ferrules:

Provided with crimping area and PVC insulating protection.

Unshrouded ferrules:

Not provided with crimps, crimping is only provided over the conductor. (One thermo-shrinking pole is applied as a final finishing, overlapping the connection points between the cable and the ferrule, preventing thus, stress on the cable).



THREADED SHROUDED ALUMINUM FERRULES

Cat. No.	For Copper Cables of Nominal Size (mm ²)	Burndy Crimping or Equivalent		Unit.	Approx. Weight (kg)
		A Section	B Section		
ATR17184-1	16	U4CRT	U4CRT	pc	0.07
ATR17184-2	25	U4CRT	U165	pc	0.07
RC600-2618	35	U165	U165	pc	0.07
RC600-2619	50	U165	U249	pc	0.07
RC600-2620	70	U165	U249	pc	0.08
RC600-2621	95	U249	UL	pc	0.08



RC600-2619

THREADED UNSHROUDED ALUMINUM FERRULES

Cat. No.	For Copper Cables of Nominal Size (mm ²)	Burndy Crimping or Equivalent	Unit.	Approx. Weight (kg)
ATR17185-1	16	U4CRT	pc	0.06
ATR17185-2	25	U4CRT	pc	0.06
RC600-2602	35	U165	pc	0.06
RC600-2603	50	U165	pc	0.06
RC600-2604	70	U165	pc	0.07
RC600-2605	95	U249	pc	0.08



RC600-2602

L



RC600-2627

PLAIN SHROUDED ALUMINUM FERRULES					
Cat. No.	For Copper Cables of Nominal Size (mm ²)	Burndy Crimping or Equivalent		Unit.	Approx. Weight (kg)
		A Section	B Section		
ATR13036-1	16	U4CRT	U4CRT	pc	0.06
ATR13036-2	25	U4CRT	U165	pc	0.06
RC600-2626	35	U165	U165	pc	0.06
RC600-2627	50	U165	U249	pc	0.06
RC600-2628	70	U165	U249	pc	0.07
RC600-2629	95	U249	UL	pc	0.07



RC600-2610

PLAIN UNSHROUDED ALUMINUM FERRULES				
Cat. No.	For Copper Cables of Nominal Size (mm ²)	Burndy Crimping or Equivalent	Unit.	Approx. Weight (kg)
ATR17179-1	16	U4CRT	pc	0.07
ATR17179-2	25	U4CRT	pc	0.07
RC600-2610	35	U165	pc	0.07
RC600-2611	50	U165	pc	0.07
RC600-2612	70	U165	pc	0.08
RC600-2613	95	U249	pc	0.08

THREADED SHROUDED COPPER FERRULES

Cat. No.	For Copper Cables of Nominal Size (mm ²)	Burndy Crimping or Equivalent		Unit.	Approx. Weight (kg)
		A Section	B Section		
ATR17184-7	16	U4CRT	U4CRT	pc	0.20
ATR17184-8	25	U4CRT	U165	pc	0.20
RC600-2622	35	U165	U165	pc	0.20
RC600-2623	50	U165	U249	pc	0.23
RC600-2624	70	U165	U249	pc	0.23
RC600-2625	95	U249	UL	pc	0.25



RC600-2624

THREADED UNSHROUDED COPPER FERRULES

Cat. No.	For Copper Cables of Nominal Size (mm ²)	Burndy Crimping or Equivalent	Unit.	Approx. Weight (kg)
ATR17185-7	16	U4CRT	pc	0.12
ATR17185-8	25	U4CRT	pc	0.12
RC600-2606	35	U165	pc	0.12
RC600-2607	50	U165	pc	0.13
RC600-2608	70	U165	pc	0.15
RC600-2609	95	U249	pc	0.16



RC600-2606

PLAIN SHROUDED COPPER FERRULES

Cat. No.	For Copper Cables of Nominal Size (mm ²)	Burndy Crimping or Equivalent		Unit.	Approx. Weight (kg)
		A Section	B Section		
ATR13036-7	16	U4CRT	U4CRT	pc	0.18
ATR13036-8	25	U4CRT	U165	pc	0.18
RC600-2630	35	U165	U165	pc	0.18
RC600-2631	50	U165	U249	pc	0.20
RC600-2632	70	U165	U249	pc	0.23
RC600-2633	95	U249	UL	pc	0.23

PLAIN UNSHROUDED COPPER FERRULES

Cat. No.	For Copper Cables of Nominal Size (mm ²)	Burndy Crimping or Equivalent	Unit.	Approx. Weight (kg)
ATR17179-7	16	U4CRT	pc	0.10
ATR17179-8	25	U4CRT	pc	0.10
RC600-2614	35	U165	pc	0.10
RC600-2615	50	U165	pc	0.20
RC600-2616	70	U165	pc	0.20
RC600-2617	95	U249	pc	0.23

HEAT-SHRINK POLES FOR FERRULES

Cat. No.	Cable	Length
ATR17923-1	16 - 25 mm ²	127 mm
ATR17923-2	35 - 50 mm ²	
ATR17923-3	70 - 95 mm ²	

TIN-PLATED COPPER FERRULES

Cat. No.	For Copper Cables of Nominal Size (mm ²)	Unit.	Approx. Weight (kg)
ATR17423-1	16	pc	0.01
ATR17423-2	25	pc	0.02
ATR17423-3	35	pc	0.02
ATR17423-4	50	pc	0.03
ATR17423-5	70	pc	0.04
ATR17423-6	95	pc	0.06



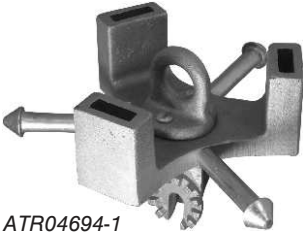
ATR17423-2

These terminals are suitable for attachment to clamps with screw-type connection.

HEAT-SHRINK POLES FOR TIN-PLATED FERRULES

Cat. No.	Cable	Length
ATR17923-4	16 - 25 mm ²	80 mm
ATR17923-5	35 - 50 mm ²	
ATR17923-6	70 - 95 mm ²	

Grounding Cluster



ATR04694-1

Grounding clusters are intended to lift simultaneously the grounding clamps to the conductors, in a safe operational sequence.

They are normally used in conventional medium voltage overhead systems maintenance.

- ATR04694-1

Made of aluminum, with galvanized steel stud and universal coupling in bronze, this cluster is suitable for installation and removal of the ATR03653-1 model grounding clamps, by pressure application.

Approximate weight: 0.53kg



ATR04116-1

- ATR04116-1

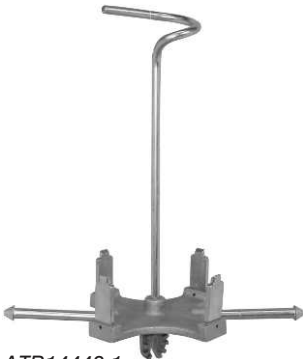
Made of aluminum, with bronze connectors for cables up to 70 mm². Suitable for medium size clamps.

Approximate weight: 1.0 kg

- ATR14442-1

Made of aluminum, with galvanized steel stud, this model is suitable for lifting, installation and removal of the ATR13628-1 model grounding clamps (spring-action mechanism).

Approximate weight: 0.68 kg



ATR14442-1

Saddle-type Cluster

The four models of Saddle-type Cluster provide an intermediary grounding point on the working structure.

- ATR03318-1

Made of aluminum, with chain wheel tightener for the perfect electrical contact with the pole.

Approximate weight: 3.17 kg



ATR03318-1

- ATR06455-1

Economical model, made of galvanized steel plate, with wing-nut, for chain adjustment to the pole.

Approximate weight: 1.70 kg



ATR06455-1

- ATR14477-1

Pole fixing mechanism with chain and nylon strap and connection of the cables with wing-nut saddle.

Approximate weight: 0.43 kg



ATR14477-1

- ATR15691-1

Made of aluminum and provided with chain binder and tightening wheel, for a perfect contact with the pole. Suitable for up to 5 clamps.

Approx. weight: 3.20 kg.

Auxiliary Equipment (supports for clamps, grounding rods, blocks and connectors)



RG3625



RG3626



RG3627



RC600-0080

Clamp Resting Supports

Accessories for the simultaneous lifting of clamps to be installed.

The clamp resting supports are adaptable to any types of clamps, being the model RC600-0080 specific for attachment of clamps with threaded ferrules.

CLAMP RESTING SUPPORTS			
Cat. No.	Material	Unit.	Approx. Weight (kg)
RG3625	Aluminum	pr	0.13
RG3626	Aluminum	pc	0.06
RG3627	Aluminum	pc	0.07
RC600-0080	Bronze	pc	0.15

Grounding Rod

- ATR00137-1

It is provided with Ø 17 mm x 1.5 m long copper-plated steel rod and bronze threaded end. Handle can be disassembled for easier storage and transportation.

Approximate weight: 3.65 kg.

- ATR00137-2

It is provided with Ø 17 mm x 1 m long copper-plated steel rod and bronze threaded end. Handle can be disassembled for easier storage and transportation.

Approximate weight: 2.60kg.

- ATR08814-2

Made of galvanized steel, 19 mm x 1.2 m long hexagonal section.

Approximate weight: 3 kg.

- ATR08814-1

Made of galvanized steel, 19 mm x 1 m long hexagonal section.

Approximate weight: 2.40 kg.



ATR00137-1



ATR08814-2

CONDITIONING			
Cat. No.	Grounding Rod	Dimensions (m)	
		Length	Width
ATR16819-1	ATR00137-2	1.15	0.12
ATR16819-2	ATR00137-1	1.57	0.12
ATR16828-1	ATR08814-1	1.07	0.25
ATR16828-2	ATR08814-2	1.27	0.25



RG4754-1



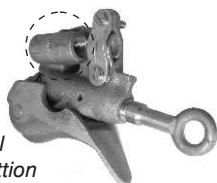
ATR17574-1



RT600-0252



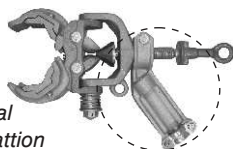
RC600-1584



Typical
Aplication



RC600-1700



Typical
Aplication



ATR03641-1

Terminal Block

Terminal blocks were designed to allow connection between the line clamp and the ground clamp.

- RG4754-1

Aluminum Block, 04 connectors for grounding cables from 25 through 95 mm².

Approx. Weight: 0.51 kg.

- ATR17574-1

Thermoplastic Block suitable for up to 5 tin-plated cooper ferrules for grounding cables up to 35 mm².

Approx. Weight: 0.32 kg

Joint Connector

- RT600-0252

Joint connectors are used for jointing two grounding cables, whenever a longer extension is required. The connector with its respective wing-nuts provides quick installation.

Approx. Weight: 0.29 kg.

Special Connector and Adapter

- RC600-1584

Threaded connector for fixing of the threaded terminal of the cable to the grounding clamp, in special situations where this clamp has no threaded connection.

Approx. Weight: 0.19 kg.

- RC600-1700

All-angle clamps adapter for connection with threaded terminal of the grounding cable.

Approx. Weight: 0.32 kg.

- ATR03641-1

Metallic Reel with bronze clamp fixing, for connection of the cable to the grounding rod, besides providing for the conditioning of the cable during transportation.

Approx. Weight: 1.85 kg.

Storage

Metallic Case

Made of painted steel plate, this metallic case is used for storage of small grounding sets.

METALLIC CASE				
Cat. No.	Dimensions (mm)			Approx. Weight (kg)
	H	W	L	
FLV10455-1	205	180	500	2.28
FLV10455-2	205	180	800	3.50
FLV10455-3	205	180	650	3.00
FLV10455-4	301	180	650	5.10



ATR10455-2

Transportation Bags

Due to the light weight, the waterproof bags are practical and safe when transportation grounding equipment. The bags are manufactured according to the following basic models:

a) Case Type:

Made of reinforced material, with fiberglass bottom, suitable for storage of cables and fittings.

STORAGE CASE				
Cat. No.	Volume (m ³)	Dimensions (mm)		
		H	W	L
ATR09962-1	0.45	290	240	645



ATR09962-1



ATR16843-1

b) Bag Type:

Made of reinforced canvas, suitable for cables and fittings of portable sets.

STORAGE BAG				
Cat. No.	Volume (m ³)	Dimensions (mm)		
		H	W	L
ATR16843-1	0.11	250	340	1350
ATR16843-2	0.13	250	340	1550
ATR16843-3	0.06	180	210	1550
ATR16843-4	0.07	280	240	1100
ATR16843-5	0.04	200	240	900
ATR16843-6	0.03	150	200	800
ATR16843-7	0.02	150	200	550

Telescopic Hot Sticks



The **RITZGLAS®** Triangular shape design Telescopic Hot Stick was designed to provide the working distance and the insulation required to perform routine works in overhead electrical systems, being one of the most useful tools in hot line maintenance.

The standard aluminum universal end fitting is suitable for a wide range of attachments so that the stick can be used to disconnect switches, replace cut-outs, change pole covers, prune trees, replace electrical bulbs and perform many other related works.

The VTT-3HD and VTT-3ED models offer higher mechanical strength with a considerable reduction of flexibility, enabling the performance of works that require a higher strength.

When using VTT Hot Sticks, the use of ladders or platforms is not required, as the works can be performed directly from ground.

Assembled with epoxy-resin reinforced fiberglass poles, the VTT complies with ASTM F-1826/99 and IEC 62193/03.

The high visibility color top sections of VTT, VTT-3HD and VTT-3ED models are manufactured with *RITZGLAS*® poles with polyurethane foam core that ensures full insulation, even when subject to the most rigorous humidity conditions.

The triangular shape requires no twisting or turning to lock each section, making the opening and closing procedure quick and easy.

Each VTT is supplied with a rubber ring and seal for fixing the end fitting to prevent the sections from sliding and consequently the extension of the VTT, during transportation.

The third section VT-3 of the VTT model can be replaced by the top section VT-3HD, transforming the VTT Hot Stick into a VTT-3HD Hot Stick, with higher mechanical strength, offering the lineman both models in a single set.



VTT-3ED

VTT TELESCOPIC HOT STICK (Light-weight Model)

Cat. No.	Qty. of Sections	Ext. Length (m)	Retracted Length (m)	Base Section Ø (mm)	Approx. Weight (kg)	Canvas Bag Cat. No. (optional)
VTT-1/2	2	2.585 ± 0.01	1.430 ± 0.01	33	1.30	SLT-2/3
VTT-1/3	3	3.823 ± 0.01	1.490 ± 0.01	37	1.90	SLT-2/3
VTT-1/4	4	5.103 ± 0.01	1.543 ± 0.01	41	2.50	SLT-4/5
VTT-1/5	5	6.440 ± 0.01	1.595 ± 0.01	45	3.20	SLT-4/5
VTT-1/6	6	7.790 ± 0.01	1.640 ± 0.01	49	3.90	SLT-6/7
VTT-1/7	7	9.180 ± 0.01	1.690 ± 0.01	52	4.70	SLT-6/7
VTT-1/8	8	10.607 ± 0.01	1.742 ± 0.01	56	5.70	SLT-8/9
VTT-1/9	9	12.070 ± 0.01	1.790 ± 0.01	61	6.90	SLT-8/9

VTT-3HD TELESCOPIC HOT STICK (Heavy-Duty Model)

Cat. No.	Qty. of Sections	Ext. Length (m)	Retracted Length (m)	Base Section Ø (mm)	Approx. Weight (kg)	Canvas Bag Cat. No. (optional)
VTT-3HD/4	2	2.740 ± 0.01	1.510 ± 0.01	41	1.80	SLT-4/5
VTT-3HD/5	3	4.075 ± 0.01	1.580 ± 0.01	45	2.50	SLT-4/5
VTT-3HD/6	4	5.427 ± 0.01	1.630 ± 0.01	49	3.20	SLT-6/7
VTT-3HD/7	5	6.815 ± 0.01	1.676 ± 0.01	52	4.00	SLT-6/7
VTT-3HD/8	6	8.243 ± 0.01	1.727 ± 0.01	56	5.00	SLT-8/9
VTT-3HD/9	7	9.708 ± 0.01	1.778 ± 0.01	61	6.20	SLT-8/9

VTT-3ED TELESCOPIC HOT STICK (Extra Heavy-Duty Model)

Cat. No.	Qty. of Sections	Ext. Length (m)	Retracted Length (m)	Base Section Ø (mm)	Approx. Weight (kg)	Canvas Bag Cat. No. (optional)
VTT-3ED/4	2	2.740 ± 0.01	1.510 ± 0.01	41	1.80	SLT-4/5
VTT-3ED/5	3	4.075 ± 0.01	1.580 ± 0.01	45	2.50	SLT-4/5
VTT-3ED/6	4	5.427 ± 0.01	1.630 ± 0.01	49	3.20	SLT-6/7
VTT-3ED/7	5	6.815 ± 0.01	1.676 ± 0.01	52	4.00	SLT-6/7
VTT-3ED/8	6	8.243 ± 0.01	1.727 ± 0.01	56	5.00	SLT-8/9
VTT-3ED/9	7	9.708 ± 0.01	1.778 ± 0.01	61	6.20	SLT-8/9

The VTT Telescopic Hot Stick must be extended and retracted vertically, with the base resting on ground.

For increased operational safety, please refer to the following chart with minimum safety distances, according to the voltage class:

MINIMUM SAFETY DISTANCE FOR TELESCOPIC HOT STICKS

Overall Length (m)	Maximum Voltage (kV)
2.60	20
3.80	150
5.10	300
6.42	400
7.77	500

Height Measuring Hot Stick

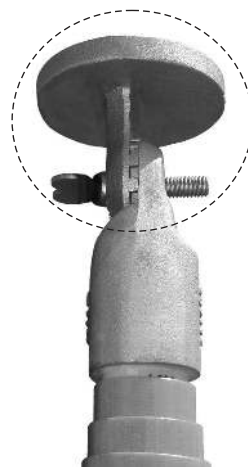
The Models VTT-1/2 through VTT-1/9 are also provided with metric measuring markings, transforming the Telescopic Hot Stick into an important tool for vertical span measurements.

The numeric markings are printed every 10 cm and the intermediary markings are printed every 1 cm. In order to make a certain measurement, the hot stick shall be placed on the ground in the vertical position and as the sections are extended, the operator can make the measurement at sight level.

In order to specify the height measuring hot stick, the suffix M should be added to the Cat. No. of the respective VTT model.
eg: VTT-1/7M (length: 9.180 ± 0.01 m)

Along with the Height Measuring Telescopic Hot Stick, one resting head (VMR14506-1) can be supplied. When installed on the universal head, the resting head enables the operator to touch the exact spot to be measured.

The modular system of the VTT hot stick allows using only the number of sections required for each work. By pressing the locking buttons, the unnecessary bottom sections are released and can be removed, making the VTT hot stick lighter and more comfortable for the performance of the works. Any section can be supplied separately, if replacement is required. Customized section lengths are available upon request.



VMR14506-1

REPLACEMENT PARTS

Complete Section w/ Locking Button	VT-9 Standard HD ED	VT-8 Standard HD ED	VT-7 Standard HD ED	VT-6 Standard HD ED	VT-5 Standard HD ED	VT-4 Standard HD ED	VT-3 Standard	VT-2 Standard	-
RITZGLAS® Tip Section	-	-	-	-	-	-	VT-3HD HD ED	-	VT-1 Standard
Rubber Base Cap	BB-9 Standard HD ED	BB-8 Standard HD ED	BB-7 Standard HD ED	BB-6 Standard HD ED	BB-5 Standard HD ED	BB-4 Standard HD ED	BB-3 Standard	BB-2 Standard	-
Ring with Rubber Seal	AF-9 Standard HD ED	AF-8 Standard HD ED	AF-7 Standard HD ED	AF-6 Standard HD ED	AF-5 Standard HD ED	AF-4 Standard HD ED	AF-3 Standard	AF-2 Standard	-
Lock.Button	For all models: Cat. No. PT/VTT								

Sectional Hot Sticks

The Sectional Hot Stick is usually supplied with a bronze universal head, which is suitable for the use of tools for operation of cut-out switches, as well as operational heads and several universal tools, specially designed for various applications, such as:

- knife-switches operation;
- fuse-switches operation;
- fuse cartridge removal and installation;
- voltage tester handling;
- installation and removal of temporary grounding equipment and live line clamps;
- Life wire installation;
- Pruning trees;
- Cleaning of Networks;
- Light bulb replacement, etc.



The Sectional Hot Stick is made of *RITZGLAS®* poles.

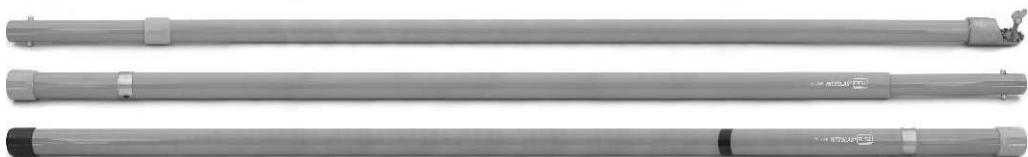
In order to make the handling, storage and transportation more practical, the Sectional Hot Stick is composed of standardized sectional elements, which are interchangeable, and attached with quick spring-action locking pins.

The total length suitable for each working voltage class can be obtained by adding more sections, which can be up to 5 sections, per the table below:

Two models of different diameters are available:

- standard model: Ø 38 mm handle and middle sections and Ø 32 mm top section;
- light model: Ø 32 mm handle and middle sections and Ø 25 mm top section;

SECTIONAL HOT STICKS										
Cat. No.	Qty. of Sections							Max. Length (m)	Max. Voltage (kV)	Approx. Weight (kg)
	Handle	Ø	Middle	Ø	Top	Ø	Total			
VMR-15	1	32	-	-	-	-	1	1.25	20	1.20
VMR-15/L	1	25	-	-	-	-	1	1.25	20	0.89
VMR-30	1	38	-	-	1	32	2	2.70	169	2.30
VMR-30/L	1	32	-	-	1	25	2	2.70	169	1.70
VMR-45	1	38	1	38	1	32	3	3.95	362	3.50
VMR-45/L	1	32	1	32	1	25	3	3.95	362	2.60
VMR-70	1	38	2	38	1	32	4	5.20	550	4.70
VMR-70/L	1	32	2	32	1	25	4	5.20	550	3.40
VMR-90	1	38	3	38	1	32	5	6.45	800	5.90
VMR-90/L	1	32	3	32	1	25	5	6.45	800	4.30



SECTIONAL HOT STICK SECTIONS

Cat. No.	Description	Ø (mm)	Length (m)		Approx. Weight (kg)
			Working	Total	
VMR-S	Top section	32	1.25	1.45	1.20
VMR/L-S	Light top section	25	1.25	1.45	0.89
VMR-I	Middle section	38	1.25	1.45	1.20
VMR/L-I	Light middle section	32	1.25	1.45	0.87
VMR-P	Handle section	38	1.45	1.45	1.10
VMR/L-P	Light handle section	32	1.45	1.45	0.80

REPLACEMENT PARTS

Cat. No.	Description	Approx. Weight (kg)
VMR00634-1	Ø 32 mm bronze-silicium support head for attachment to the top of the sectional hot stick	0.29
VMR04252-1	Ø 25 mm bronze-silicium support head for attachment to the top of the light sectional hot stick	0.26
FLV05655-2	Ø 38 mm plastic terminal for sectional hot stick handle	0.01
FLV05655-3	Ø 32 mm plastic terminal for light sect. hot stick handle	0.007
VMR03009-1	Ø 38 mm brass coupling pin for sectional hot stick	0.02
VMR04333-1	Ø 32 mm brass coupling pin for light sectional hot stick	0.01
AM-1	Ø 38 mm stainless steel ring for sectional hot stick	0.010
AM-1/L	Ø 32 mm stainless steel ring for light sectional hot stick	0.007

ACCESSORIES

- RH4455-64

Hot stick extension with storm-skirt.

This tool has been developed for attachment to insulating hot sticks, to be used in emergency situations, under rain.

Insulating Length: 0.5 m

Approx. Weight: 1.10 kg

STORAGE

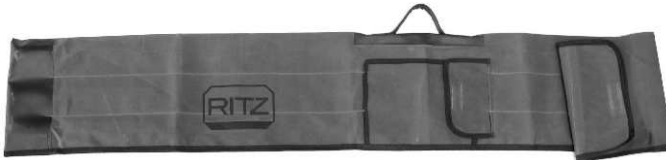
The storage canvas bag is manufactured with reinforcements on the bordering lines and both ends, suitable internal divisions for the storage of the sectional hot stick sections, transportation grip and additional pocket for the operational heads.

This bag should be ordered separately, as it is an optional accessory.

Customized color patterns are available upon request.



RH4455-64



STORAGE

Cat. No.	Grounding Rod	Internal Divisions	Dimensions (m)	
			Length	Width
VMR10484-1	ATR00137-1	4	1.51	0.38
VMR10484-2	ATR00137-2	4	1.51	0.38
VMR10484-3	-	3	1.51	0.26
VMR16824-1	-	1	1.51	0.11
VMR16824-2	-	1	1.51	0.19
VMR16825-1	-	4	1.51	0.34
VMR16825-2	ATR00137-2	5	1.51	0.42
VMR16825-3	ATR00137-1	5	1.51	0.42
VMR16826-1	-	5	1.51	0.42
VMR16826-2	ATR00137-2	6	1.51	0.51
VMR16826-3	ATR00137-1	6	1.51	0.51
VMR16826-4	ATR08814-1	6	1.51	0.51
VMR16826-5	ATR08814-2	6	1.51	0.51
VMR16827-1	-	6	1.51	0.51
VMR16827-2	ATR00137-2	7	1.51	0.59
VMR16827-3	ATR00137-1	7	1.51	0.59
VMR16827-4	ATR08814-1	7	1.51	0.59
VMR16827-5	ATR08814-2	7	1.51	0.59
VMR16972-1	ATR08814-1	4	1.51	0.34
VMR16972-2	ATR08814-2	4	1.51	0.34
VMR16973-1	ATR08814-1	5	1.51	0.42
VMR16973-2	ATR08814-2	5	1.51	0.42

L

Hot Sticks with Hex Coupling and Thread Connection

The Hot Stick with Hex coupling and thread connection is usually supplied with aluminum universal head with hex coupling, male or female, that is not only suitable for the use of tools for cut-out switch operation, but also allows the connection of operation heads and a wide range of universal tools specially developed to perform different works.

The Hot Stick with Hex Coupling and Thread Connection is made of *RITZGLAS*® poles.

In order to make handling, storage and transportation more practical, this hot stick is composed of sectional and interchangeable standard elements, attachable through hexagonal coupling and thread connection.

Available in two models, standard (Ø 38 mm) and light (Ø 32 mm). Lengths can vary according to the specification chart below.

HANDLE SECTION			
Cat. No.	Ø (mm)	Length (m)	Approx. Weight (kg)
VMR-PHX-32-1000	32	1.00	0.88
VMR-PHX-38-1000	38	1.00	1.07
VMR-PHX-32-1500	32	1.50	1.13
VMR-PHX-38-1500	38	1.50	1.45
VMR-PHX-32-2000	32	2.00	1.19
VMR-PHX-38-2000	38	2.00	1.66
VMR-PHX-32-2500	32	2.50	1.74
VMR-PHX-38-2500	38	2.50	2.01





VMR11714-1



VMR11708-1



FLV11709-1

EXTENSION

Cat. No.	Ø (mm)	Length (m)	Approx. Weight (kg)
VMR-IHX-32-1000	32	1.00	1.02
VMR-IHX-38-1000	38	1.00	1.25
VMR-IHX-32-1500	32	1.50	1.31
VMR-IHX-38-1500	38	1.50	1.68
VMR-IHX-32-2000	32	2.00	1.58
VMR-IHX-38-2000	38	2.00	1.92
VMR-IHX-32-2500	32	2.50	1.88
VMR-IHX-38-2500	38	2.50	2.33

ACCESSORIES

Cat. No.	Description	Approx. Weight (kg)
VMR11714-1	Male Universal Hex Head	0.50
VMR11708-1	Female Universal Hex Head	0.32
FLV11709-1	Plastic Cap	0.04
FLV11715-1	Protective Threading Cap	0.02
FLV10046-2	Rubber Storm-Skirt for Ø 32 mm pole	0.06
FLV10046-3	Rubber Storm-Skirt for Ø 38 mm pole	0.08

For increased operational safety, please refer to the following chart with minimum safety distances, according to the voltage class:

MINIMUM SAFETY DISTANCE FOR HOT STICKS WITH HEX COUPLING AND THREAD CONNECTION

Overall Length (m)	Maximum Voltage (kV)
1.5	20
3.0	150
4.0	300
5.0	400
6.0	500

Disconnect Hot Sticks

Disconnect Hot Sticks are made of *RITZGLAS®* poles.

Three models are available:

- Light Model - Ø 32 mm
- Standard Model - Ø 38 mm
- Sectional Model, with rigid splice for connection of two elements (Ø 32 mm and Ø 38 mm).

All disconnect hot sticks are supplied with fixed operational heads, according to following models:

LIGHT MODEL		
Cat. No.	Ø and Working Length (m)	Approx. Weight (kg)
RH3046-11	32 X 1.22	0.70
RH3046-12	32 X 1.83	0.90
RH3046-13	32 X 2.44	1.20
RH3046-14	32 X 3.05	1.50
RH3046-17	32 X 3.65	1.80

STANDARD MODEL		
Cat. No.	Ø and Working Length (m)	Approx. Weight (kg)
RH3046-22	38 X 1.86	1.10
RH3046-23	38 X 2.46	1.40
RH3046-24	38 X 3.07	1.70
RH3046-15	38 X 3.65	2.00
RH3046-16	38 X 4.90	2.50
RH3046-18	38 x 5.51	2.80
RH3046-20	38 X 6.12	3.20



RH3046-11

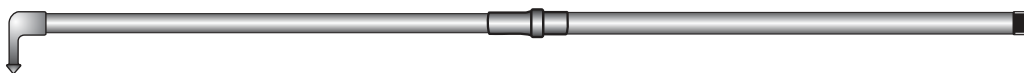


RH3046-22



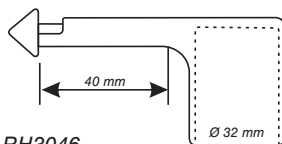
SECTIONAL MODEL WITH RIGID SPLICE (2 sections)

Cat. No.	Ø and Working Length (m)	Approx. Weight (kg)
RH3146-12	(1) Ø 32 x 1.83 e (1) Ø 38 x 1.86	2.80
RH3146-16	(1) Ø 32 x 2.43 e (1) Ø 38 x 2.46	3.50
RH3146-18	(1) Ø 32 x 2.43 e (1) Ø 38 x 3.07	3.80
RH3146-20	(1) Ø 32 x 3.05 e (1) Ø 38 x 3.07	4.20
RH3146-24	(1) Ø 32 x 3.65 e (1) Ø 38 x 3.67	4.90

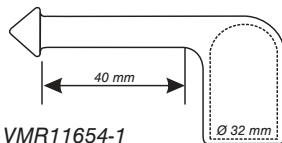


SECTIONAL MODEL WITH RIGID SPLICE (3 sections)

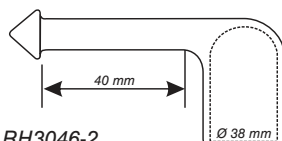
Cat. No.	Ø and Working Length (m)	Approx. Weight (kg)
VMR17575-1	(1) Ø 38 x 1.86 e (2) Ø 32 x 1.83	4.65
VMR17575-2	(1) Ø 38 x 2.43 e (2) Ø 38 x 2.43	5.75
VMR17575-3	(1) Ø 38 x 3.07 e (2) Ø 38 x 2.43	6.25



RH3046



VMR11654-1



RH3046-2

REPLACEMENT HEADS

Cat. No.	Description	Approx. Weight (kg)
RH3046	Ø 32 mm light disconnect stick bronze head	0.20
VMR11654-1	Ø 32 mm standard and sectional disconnect stick bronze head	0.25
RH3046-2	Ø 38 mm standard and sectional disconnect stick bronze head	0.37

These heads are supplied attached to the hot stick, but can be supplied as replacement parts.

Operational Heads

Heads for Grounding Clamps

The heads for grounding clamps are made of aluminum and are provided with universal coupling systems, adaptable to the hot sticks. They are used when operating the grounding clamps, by locking it with the eye-screw.

- FLV02620-1

Locking system by semi-sphere, with adjustable pressure.

Approx. Weight: 0.19 kg.

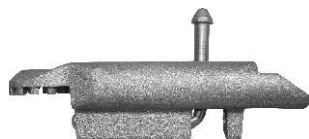


FLV02620-1

- VMR07205-1

Head with steel shaft and spring action for automatic alignment and attachment.

Approx. Weight: 0.25 kg.



VMR07205-1

- RM4455-29B

Locking and release of the clamp is performed by a twisting operation. It allows the articulation of the clamp, enabling the operation at different angles.

Approx. Weight: 0.31 kg.



RM4455-29B

Head with Fall-Protection System

These heads are used for operation of switches, installation and removal of fuse cartridges, preventing them from accidentally falling off.

They are provided with automatic safety lock device (fall protection system), aiming at ensuring the safety of the lineman.

- FLV11554-1

Main body made of hot galvanized steel, featuring bronze alloy safety lock and universal head.

Approx. Weight: 0.34 kg.



FLV11554-1

- FLV13872-1

Main body made of plastic coated steel, featuring safety lock and bronze alloy universal head.

Approx. Weight: 0.30 kg.



FLV13872-1



VMR02619-1

Heads for Operation of Fuse Switches

The heads are standardized with universal coupling, adaptable to the hot sticks.

- VMR02619-1

Bronze head, with circuit-breaker operation shaft and fitting for cartridge cut-out catch.

Approx. Weight: 0.22 kg.



VMR16483-1

- VMR16483-1

Aluminum inclined head, with circuit-breaker operation shaft and fitting for cartridge cut-out catch.

Approx. Weight: 0.25 kg.

- VMR05614-1

Bronze head for operation, installation and removal of the HXO switches fuse cartridges.

Approx. Weight: 0.28 kg.



VMR05614-1

- VMR00884-1

Bronze head with circuit-breaker operation shaft and fitting for cartridge cut-out catch.

Approx. Weight: 0.31 kg.

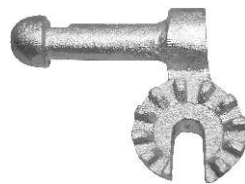


VMR00884-1

- VMR00874-1

Bronze head with circuit-breaker operation shaft.

Approx. Weight: 0.11 kg.



VMR00874-1

- VMR01479-2

Bronze disconnect head, light model.

Approx. Weight: 0.18 kg.



VMR01479-2

- VMR03414-1

Galvanized steel head with universal support.

Approx. Weight: 0.58 kg.



VMR03414-1

- VMR11560-1

Bronze disconnect head.

Approx. Weight: 0.10 kg.



VMR11560-1

Kite-Removing Stick and Accessories



FLV13907-1

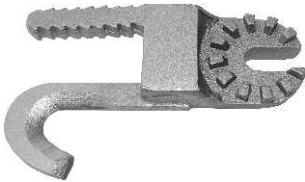
The kite-removing stick is a very practical tool for removing kites and entangled wires on electrical systems, mainly on urban areas, causing serious hazards to the functioning of the systems, as well as polluting the view.

This tool is attached to the hot stick, using the universal head.

Made of *RITZGLAS*® poles of Ø 25 mm x 0.30 m working length and features transversal steel pins through the body, aiming at capturing wires entangled in the electrical system.

Other models of heads may be attached to the end of this tool to cut and remove objects from the electrical systems.

The universal head with blade (FLV13905-1) is suitable for cutting and removing objects from the system. Composed of bronze universal head and U- shaped blade with the cutting edge on the inside to ease the cut.



FLV13905-1

The alfanje sword-type universal head (FLV09311-1) features a bronze universal head and one sharpened blade. The cutting edge on one end is on the top side and on the other end on the bottom side.



FLV09311-1

KITE-REMOVING STICK AND ACCESSORIES

Cat. No.	Description	Approx. Weight (kg)
FLV13907-1	Kite-removing stick	0.31
FLV13905-1	Universal head and blade	0.16
FLV09311-1	Alfanje sword type universal head	0.11



Group M

Aerial Devices, Fiberglass Ladders and Trailers

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QUALIDADE E SEGURANÇA
PARA SISTEMAS ELÉTRICOS



Group M

Aerial Devices, Fiberglass
Ladders and Trailers



Insulated Aerial Devices

Light Duty Models

SKYRITZ series Aerial Lifts, L models, feature single buckets, continuous rotation tower and articulated booms, full operation through hydraulic mechanisms. Suitable for maintenance work on overhead energized distribution systems.

Designed, manufactured and tested according to the ANSI-A-92.2/01 and NBR-14631/00 standards, rated for voltage classes of up to 46 kV, class C. Equipment for works on systems of higher voltage classes, according to categories A and B of above standards, can be manufactured upon request.

The dimensions and weights of these units enable assembly on small and medium trucks, reducing therefore the initial investment costs and operational costs, and also ensuring more versatility when driving in city traffic.



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SKYRITZ - LIGHT DUTY MODELS

Characteristics	Models				
	SKYRITZ-9L	SKYRITZ-10L	SKYRITZ-10HD	SKYRITZ-13L	SKYRITZ-13L/DI
Working Height	9.2 m	10.2 m	10.2 m	13.0 m	13.0 m
Height up to the bucket base	7.7 m	8.7 m	8.7 m	11.5 m	11.5 m
Maximum side reach up to the border of the bucket					
Bottom Boom at 0° and Top Boom fully extended	6.0 m	3.7 m	7,4 m	5.2 m	5.2 m
Top boom at 0° and Bottom Boom fully extended	3.7 m	4.3 m	4.3 m	5.6 m	5.6 m
Top Boom maximum opening angle	125°	90°	150°	90°	90°
Top Boom Insulating Section	yes	yes	yes	yes	yes
Bottom Boom Insulating Section	N/A	N/A	N/A	N/A	N/A
Qty of stabilizing outriggers	2	2	2	2	2
Bucket, made of fiberglass reinforced plastic, for one person, with outside step.	1	1	1	1	1
Polyethylene Insulating Liner	yes	yes	yes	yes	yes
Bucket Capacity	136 kg	136 kg	136 kg	136 kg	136 kg
Automatic Bucket Leveling System	yes	yes	yes	yes	yes
Manually operated bucket tilting system, for cleaning purposes.	Optional	Optional	Optional	Optional	Optional
Hydraulic tilting system of the bucket, for cleaning	N/A	N/A	Optional	N/A	N/A

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SKYRITZ - LIGHT DUTY MODELS

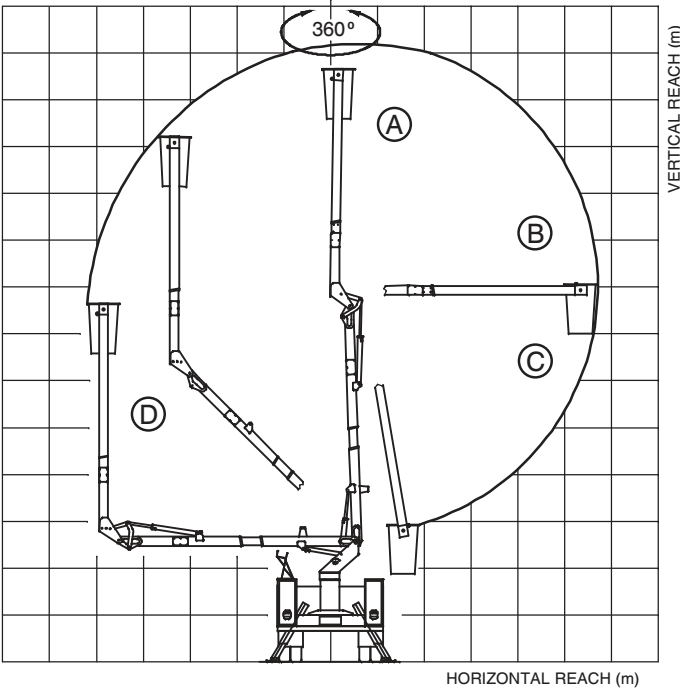
Characteristics	Models				
	SKYRITZ-9L	SKYRITZ-10L	SKYRITZ-10HD	SKYRITZ-13L	SKYRITZ-13L/DI
Hydraulic System Pressure Rating	150 bar	160 bar	150 bar	175 bar	175 bar
Hydraulic Pump Nominal Flow	11 L / min	11 L / min	13 L / min	11 L / min	11 L / min
Tower Rotation	Non-stop	Non-stop	Non-stop	Non-stop	Non-stop
Emergency Valve at the bucket	yes	yes	yes	yes	yes
Top Controls X Bottom Controls Switching Valve at the tower	yes	yes	yes	yes	yes
Outriggers hydraulic circuit X Booms hydraulic circuit Selecting Valve	yes	yes	yes	yes	yes
Safety and Counterbalance Valves at the booms hydraulic cylinders	yes	yes	yes	yes	yes
Retention Valves at the stabilizing outriggers cylinders	yes	yes	yes	yes	yes
Hydraulic Blocking Valves to automatically limit the booms movements to safe levels of stability of the equipment	yes	yes	yes	yes	yes
Emergency Hand Pump	yes	yes	N/A	yes	yes
Emergency Electric Pump	Optional	Optional	yes	Optional	Optional
Hourmeter to keep track of the equipment usage*	yes	yes	yes	yes	yes

* only for Brasil.

SKYRITZ - LIGHT DUTY MODELS

Characteristics	Models				
	SKYRITZ-9L	SKYRITZ-10L	SKYRITZ-10HD	SKYRITZ-13L	SKYRITZ-13L/DI
Protection cover for the insulating booms	yes	yes	yes	yes	yes
Protection cover for the bucket	yes	yes	yes	yes	yes
Tools box to be attached to the bucket	optional	optional	yes	optional	yes
Vehicle Motor On/Off System at the bucket	optional	optional	yes	optional	optional
Vehicle Motor Accelerator System at the bucket	optional	optional	yes	optional	optional
Plug for hydraulic tools at the bucket	optional	optional	yes	optional	optional
Plug for hydraulic tools at the base	optional	optional	optional	optional	optional
Outriggers Sound Alert	optional	optional	optional	optional	yes
Electrical motor-pump auxiliary set	optional	optional	optional	optional	optional
Eye-bolt for load lifting (max. 420 kg) at the end of the lower boom	N/A	N/A	yes	N/A	N/A
Steel or Aluminum Bins	optional (refer to the specific page of this product)	optional (refer to the specific page of this product)	optional (refer to the specific page of this product)	optional (refer to the specific page of this product)	optional (refer to the specific page of this product)
Vehicle Minimum Assembly Requirements					
Gross Vehicle Weight Rating (GVWR)	1600 kg	2000 kg	3000 kg	3000 kg	3000 kg
Wheelbase	2800 mm	2800 mm	2800 mm	3300 mm	3300 mm

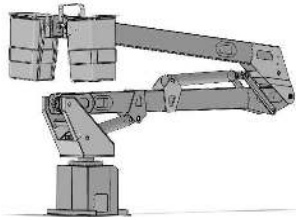
REACH DIAGRAM



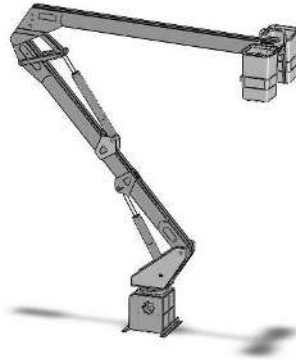
REACH LIMITS ACCORDING TO THE DIAGRAM				
Models	(A) Nominal Working Height (m)	(B) Side Reach, with Top Boom at 0° (m)	(C) Vertical Reach with the Best Side Reach Setting (m)	(D) Side Reach, with Bottom Boom at 0° (m)
SKYRITZ-9L	9.2	3.7	6.1	6.0
SKYRITZ-10L	10.2	4.3	6.8	3.7
SKYRITZ-13L	13.0	5.6	8.5	5.2
SKYRITZ-13L/DI	13.0	5.6	8.5	5.2

NOTE:
 The vertical reach was defined considering a height of 900 mm (above ground) of the vehicle platform.

HEAVY DUTY MODELS

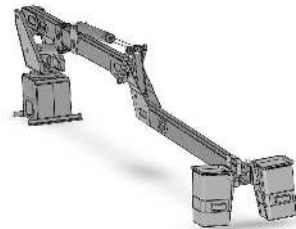


SKYRITZ series Aerial Lifts, models 2C, feature two buckets, one person each, continuous rotation tower and articulated booms, full operation through hydraulic mechanisms. Suitable for maintenance work on overhead energized distribution or transmission systems.



Designed, manufactured and tested according to the ANSI-A-92.2/2001 and NBR-14631/2000 standards, rated for voltage classes of up to 46 kV, class C. Equipment for works on systems of higher voltage classes, according to categories A and B of above standards, can be manufactured upon request.

This robust equipment can be fitted with a lifting jib capable of handling loads up to 500 kg (SKYRITZ-14/2C model). These are over-center aerial devices, requiring larger trucks for assembly.



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Note: Available from 3rd quarter 2009.

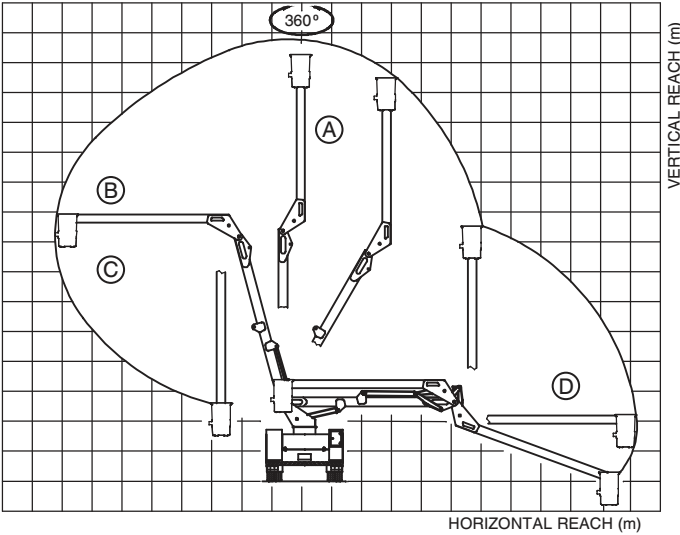
SKYRITZ - HEAVY DUTY MODELS

Characteristics	Models	
	SKYRITZ-14/2C	SKYRITZ-16/2C
Working Height	14.7 m	16.8 m
Height up to the bucket base	13.2 m	15.3 m
Maximum side reach up to the border of the bucket Bottom Boom at 0° and Top Boom fully extended	11.1 m	13.1 m
Top boom at 0° and Bottom Boom fully extended	8.1 m	9.5 m
Top Boom maximum opening angle	200°	200°
Top Boom Insulating Section	yes	yes
Bottom Boom Insulating Section	yes	yes
Qty of stabilizing outriggers (assembled at the front and rear of the truck)	4	4
610 x 610 x 1070mm Bucket, made of fiberglass reinforced plastic, for one person, with outside step.	2	2
Polyethylene Insulating Liner	yes	yes
Buckets Capacity	136 kg x 2	136 kg x 2
Automatic Buckets Leveling system	yes	yes
Hydraulically operated buckets tilting system for cleaning purposes.	yes	yes
Hydraulic Buckets Rotation system	90°	90°
Jib with hydraulic winch for lifting materials Load Rating: 500 kg	optional	N/A
Hydraulic System Pressure Rating	180 bar	180 bar
Hydraulic Pump Nominal Flow	30 L / min	30 L / min
Tower rotation	Non-stop	Non-stop
Emergency Valve at the bucket	yes	yes

SKYRITZ - HEAVY-DUTY MODELS

Characteristics	Models	
	SKYRITZ-14/2C	SKYRITZ-16/2C
Top Boom X Bottom Boom Switching Valve at the tower	yes	yes
Outriggers hydraulic circuit X Booms hydraulic circuit Selecting Valve	yes	yes
Safety and Counterbalance Valves at the hinged booms hydraulic cylinders	yes	yes
Retention Valves at the stabilizing outriggers cylinders	yes	yes
Emergency Hand Pump	yes	yes
Hourmeter to keep track of the equipment usage	yes	yes
Protection cover for the insulating booms	yes	yes
Protection cover for the bucket	yes	yes
Tools box to be attached to the bucket	optional	optional
Vehicle Motor On/Off System at the bucket	yes	yes
Vehicle Motor Accelerator System at the bucket	optional	optional
Plug for hydraulic tools at the bucket	yes	yes
Plug for hydraulic tools at the base	optional	optional
Outriggers Sound Alert	yes	yes
Electrical motor-pump auxiliary set	optional	optional
Steels or Aluminum Bins	optional (Turn to the specific page of this product)	optional (Turn to the specific page of this product)
Vehicle Basic Assembly Requirements Gross Vehicle Weight Rating (GVWR) Wheelbase	13000 kg 3900 mm	13000 kg 4500 mm

REACH DIAGRAM



REACH LIMITS ACCORDING TO THE DIAGRAM

Models	(A) Nominal Working Height (m)	(B) Side Reach, with Top Boom at 0° (m)	(C) Vertical Reach with the Best Side Reach Setting (m)	(D) Side Reach, with Bottom Boom at 0° (m)
SKYRITZ-14/2C	14/7	8.1	9.4	11.1
SKYRITZ-16/2C	16.8	9.5	10.5	13.1

NOTE:

The vertical reach was defined considering a height of 1000 mm (above ground) of the vehicle platform.

Non-Insulated Aerial Lifts

All Aerial Lifts models of the SKYRITZ series, either Light or Heavy Duty, are optionally available as Non-Insulated, with insulating protection for the top boom of 1000 V. This model features the same characteristics of the insulated units and can be supplied with the same optional accessories, except the electrical insulation characteristics, and have the suffix NI added to the catalog number (e.g.: The Insulated model SKYRITZ-13L corresponds to the Non-Insulated model SKYRITZ-13L/NI).

Additionally, for the Non-Insulated models, handling lights installed close to the bucket, as an optional accessory.

The basic vehicle requirements for assembly of the Non-Insulated units, are the same as for the Insulated models.

SKYLADDER®

SKYLADDER-LV/01

SKYLADDER-LV/01 is an equipment composed of a ladder mounted on a rotating and tilting base.

This equipment was specifically conceived for hot line works of up to 500 kV system voltage. SKYLADDER-LV/01 ladders are made of *RITZGLAS®* poles, with an orange color polyurethane enamel finish of high dielectric strength. Rungs are painted black and covered with sliding-proof material. Supplied with two sections (the first one is fixed and the second one can be extended). Optionally, an additional extension can be provided.

The rotating and tilting base is made of structural steel finished with synthetic painting.

TECHNICAL CHARACTERISTICS

- Tilting operation assisted with helical spring and counter-weight, requiring less effort for vertical positioning of the ladder.
- Rotation and extension are quick and easy manual operations.
- Safety locking devices to lock the ladder at all working positions and resting/transportation position.
- Base with continuous rotation turret, brass bushings and lubrication pins.
- Adaptable to utility vehicles with the following minimum characteristics:
 - :: Load capacity: 1000 kg
 - :: Inner (free) length of the truck: 1600 mm;
 - :: Inner (free) width of the truck: 1600 mm;
 - :: Total length of the vehicle: 4500 mm.
- Maximum height of the top rung of the ladder in the upright position (90°):
 - :: with fixed ladder portion + 01 extension: 9 m
 - :: with fixed ladder portion + 02 extensions (optional): 12.6 m



- Test Voltage: 100 kV / 300 mm
- Load Capacity: 90-150 kg, depending on the working position (refer to table below).
- Approx. weight: 350 kg



SKYLADDER-LV/01		
Working Angle	Max. Load Capacity (kg)	Test Capacity (kg)
64°	90	113
67°	100	125
70°	110	138
73°	120	150
76°	135	169
80°	140	175*
90°	150	188*

* Test has been performed using the second extension and stays.

IMPORTANT NOTES:

The RITZGLAS® poles used for the ladder siderails and handrails are manufactured and tested according to ASTM D 711 Standard and the ladders are tested before assembly on the vehicle*, according to NBR 14540 Standard.

For inquiries, following information about the vehicle on which the equipment will be assembled is necessary: brand; model; year of manufacture; type of cabin; body details.

It is recommended to use a Micro Ammeter for leakage current monitoring.

(for details, refer to RC402-0288 Micro-Tester).

NOTE:

The vertical reach was defined considering a height of 900 mm (above ground) of the vehicle platform.

(* only for Brasil.)

SKYLADDER-VI

SKYLADDER-VI is an equipment composed of a ladder mounted on a rotating and tilting base.

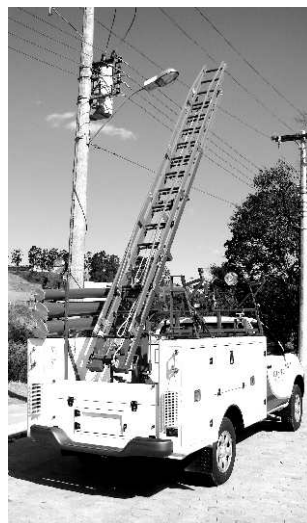
SKYLADDER-VI ladders are made of *RITZGLAS*® poles and oblong-shape profiles, with orange color polyurethane enamel finish of high dielectric strength. Suitable for works on Distribution Systems, public illumination, among other works, with ensured safety and excellent performance. Rungs are made of *RITZGLAS*® poles, painted in black and covered with sliding-proof material. Supplied with two sections (the first one is fixed and the second one can be extended).

The rotating and tilting base is made of structural steel finished with synthetic painting.

TECHNICAL CHARACTERISTICS

- Tilting operation assisted with helical spring and counter-weight, requiring less effort for vertical positioning of the ladder.
- Rotation and extension are quick and easy manual operations.
- Safety locking devices to lock the ladder at all working positions and resting/transportation position.
- Base with continuous rotation turret, brass bushings and lubrication pins.
- Adaptable to utility vehicles with minimum load capacity of 1000 kg, provided with a free space around the turret of 600 mm radius for the rotation of the equipment.
- Ladders are made of fiberglass reinforced epoxy resin of high dielectric strength and load capacity of 113 kg.
- Provided with supports at both sides to accommodate auxiliary ladders (not included), warning lights and handling lights.
- Approximate weight: 350 kg.
- Max. height at the top rung: 8.5 m.
- Working angles: 70°, 74°, 78° and 82° (*)

** Equipment to work at 65° can be manufactured, as long as the vehicle on which it will be mounted provides compatible stability and available space.*



OPTIONAL ACCESSORIES

- Metallic body and side bins, made of steel or aluminum plates (refer to the specific page of this product).

IMPORTANT NOTES:

- For inquiries, following information about the vehicle on which the equipment will be assembled is necessary: brand; model; year of manufacture; type of cabin; body details.
- The vertical reach was defined considering a height of 900 mm (above ground) of the vehicle platform.

SKYLADDER-III

The Skyladder-III is an extendable fiberglass ladder, mounted on a rotating and tilting base, on a compact mobile platform.

Being a versatile unit, it allows maintenance to be performed in various locations, such as:

- Factory sheds, supermarkets and warehouses
- Outdoor lighting
- Narrow aisles and roads
- High machinery and panels
- Side walls of buildings
- Billboards, etc.

The extendable ladder is made of fiberglass with oblong shaped siderails and 32 mm *RITZGLAS*® pole rungs with sliding-proof surface.

All mechanisms are operated mechanically, offering easy operation and maintenance.

The operation is very simple and can be safely performed by a single person.

Two movable supporting outriggers ensure perfect stabilization of the equipment allowing the use of the ladder in different working angles.



SKYLADDER-III

SKYLADDER-III

TECHNICAL CHARACTERISTICS

Working Height (max.):	8.50 m
Base Dimensions	2.0 x 1.0 m
Equipment length with the extendable ladder retracted (0°):	4.84 m
Ladder Inclination:	64°, 67°, 70°, 73°, 76°.
Max. height at 76° of inclination, measured from ground to the top of the ladder:	7.90 m
Applied load at the top rung at 76° of inclination:	135 kg.
Total Weight:	500 kg
Rotation movement from the central point.	22° to the right and 22° to the left.
Inclination Movement:	Mechanical Actuation.
Lifting and Rotation Movements:	Mechanical Actuation.
Electrical test of the extension ladder:	Acc. to ANSI-A-14.5 Standard
Base floor:	Sliding-proof steel plate.
Outriggers allowed working angle:	up to 30° from central point.
Base movement:	04 wheels.
Stability:	Stabilizing Outriggers.

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Truck Bodies

The Truck Bodies can be supplied together with the SKYRITZ Aerial Lifts, the SKYLADDER vehicle-mounted ladders, to supplement vehicles mounted with equipment manufactured by other companies, or separately, without any other equipment.

Recommended for a number of applications when performing maintenance works in general by electrical utilities and contractors, mining companies, telecommunication companies, municipalities, among others.

Bins

Bins are composed of two lateral modules fitted with compartments for storage of materials used to perform the works conducted with the vehicle. Modules can be made of steel plates or extruded structural aluminum profiles covered with aluminum plates.

Bin doors are made of steel or aluminum plates and are fitted with stainless steel hinged-type handle locks, with common lock (single lock key), and/or lock-all system (locking rods) and lock-holder. Door seals are made of tubular automotive rubber to prevent dust and moisture penetration.

BIN FINISHING

All steel or aluminum bins are finished with UV-resistant automotive polyurethane enamel using the same color as the vehicle cabin or as specified by the customer.

Bins made of steel are painted with a special protection painting with deep adherence and high corrosion resistance, which is the same technology used by the automotive industry, hence one of the most advanced anti-corrosion technologies in the world.

UNDER-STRUCTURE

Considering all mechanical efforts involved, the under-structure has been structured with steel profiles welded by the MIG process. Finished with polyurethane enamel applied after sandblasting and surface preparation with compatible paint.

Optionally, for pickup trucks mounted with light equipment or without equipment, the under-structure can be made of extruded aluminum structural profiles with or without finish painting (per customer specification).

The vehicle platform floor as well as the top parts of the bins are covered with sliding-proof aluminum-alloy plates.

REAR BUMPER

Designed and made according to the applicable resolutions of the Traffic Management and Legislation Authorities.

OPTIONAL ACCESSORIES

- Support(s) for auxiliary ladders
- Compartments for storage and transportation of hot sticks
- Support for traffic cones
- Support for crossarms
- Compartment lighting system
- Visual warning
- Handling lights
- Cable reels



Trailer for Hot Line Tools

TRAILER FOR HOT LINE TOOLS			
Cat. No.	Description	Max. Load Capacity (kg)	Approx. Weight (kg)
1-4-42/21-14	Trailer for conditioning and transport of hot line tools, Standard model, with one axle (two wheels)	800	1220
1-4-42/21-14/T	Trailer for conditioning and transport of hot line tools, Tandem model, with two axles (four wheels)	1300	1420



Standard model



Tandem model

TECHNICAL CHARACTERISTICS

Main compartment: Height: 0.60 m; Width: 1.70 m;
Length: 4.38 m.

Additional compartment: Height: 0.45 m; Width: 1.70 m;
Length: 1.18 m.

Overall length: 6.64 m;

Set of wheels: rim 16;

Chassis structure: Steel profile;

Rear cover lifting system: Scissor-type operated by shaft with handle.

Brake system:

- Standard model: Drum brake and parking brake;
- Tandem model:
 - Front axle: Disc brake;
 - Rear axle: Drum brake;
 - Parking brake.

Internal heating system:

Dual-voltage heater with selecting switch (110 or 220 V).

Electrical power system:

Electrical power between the vehicle and the trailer: wiring harnesses, with one 7 poles - 12 V plug.

Load capacity: Standard model: 800 kg;
 Tandem model: 1300 kg.

Approx. weight: Standard model: 1220 kg;
 Tandem model: 1420 kg.

Type of Suspension: Set of springs and telescopic dampers.

Type of hitch: Socket-ball or eye-ring
(per customer specification).

Optional accessory: Rubber-coated ladder supports, installed
on the rear cover.



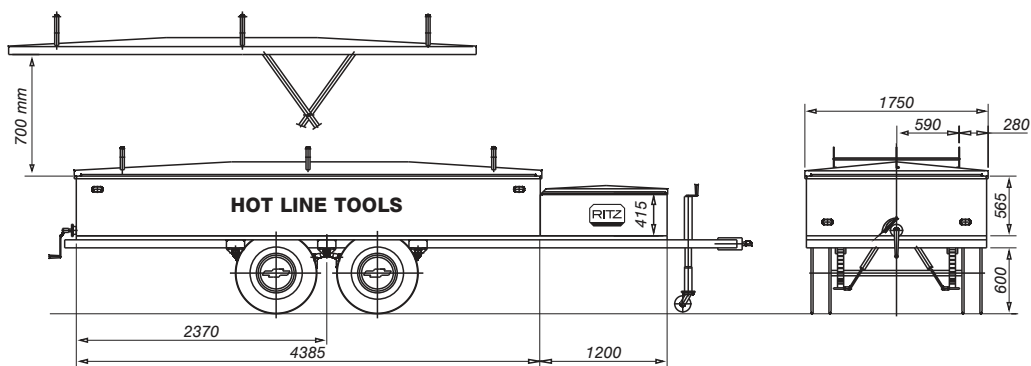
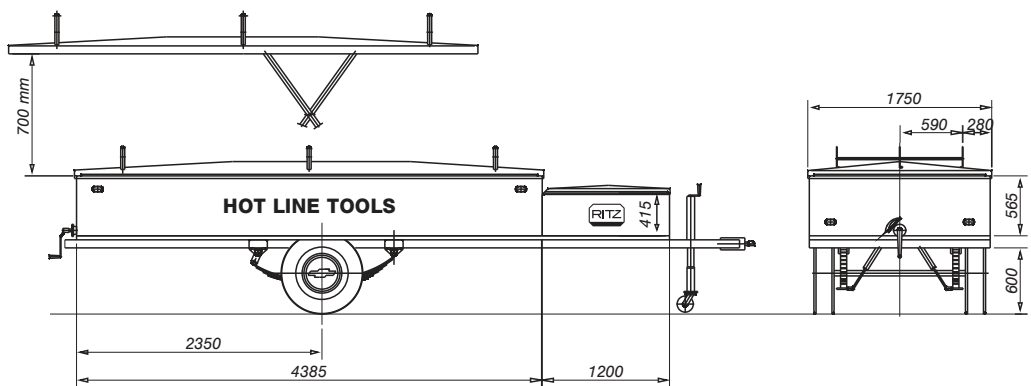
Ball-type hitch



Parking brake



Electrical cables



Insulating Crane Extensions

The Insulating Crane Extensions have been specially designed to place the lineman to the energized potential in Substations and Transmission Systems up to 500 kV (IE-500 model) and 750 kV (IE-750 model), enabling quick and safe maintenance of the system.

COMPOSITION AND CHARACTERISTICS

1) Metal Sleeve and accessories for attachment to the Crane

Characteristics and dimensions depend on crane specification. For design purposes, it is necessary to provide complete information about the section of the crane on which the Insulating Crane Extension will be attached.

IE-750 metal sleeve is equipped with parts for attachment of the rear strain pole support.

(refer to item 6 below)

2) Bottom Insulating Boom

Mechanically attached to the metal sleeve (item 1 above), the Bottom boom has an insulating section with metal band for leakage current reading/monitoring, fitted with a special connection for coaxial cable.

3) Insulating Top Boom

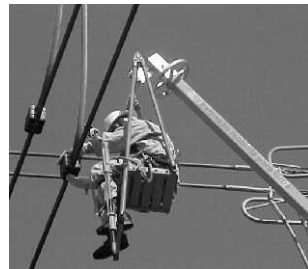
RITZGLAS® pultruded profile. Holes enable attachment through axles to the bottom boom and bare-hand chair support.

4) Bare-hand Chair Support

Metallic structure with corona ring for attachment of the Barehand Working Chair.

5) Flexible Cable

30 m long cable is provided with suitable connections for measurement/ monitoring of the leakage current, (special lengths can be provided upon request).



6) Strain poles (for IE-750 only)

RITZGLAS® strain poles specially designed to prevent bending at the end of the booms due to mechanical efforts.

7) Protection Covers

Covers are provided for all insulating parts.

8) Support for storage and transportation

All units are supplied with wooden support for storage and transportation, in order to ensure the integrity of the insulating parts.

9) Bare-hand Chair

Supplied with the Insulating Crane Extensions. FLV07654-1

TECHNICAL CHARACTERISTICS:

- Overall length of the Extension:

:: IE-500: 5980 mm

:: IE-750: 7400 mm

- Nominal length of the Insulating Section:

:: IE-500: 4850 mm

:: IE-750: 6000 mm

- Load Capacity: 120 kg

- Insulating test performed by applying 100 kV on every 300 mm of boom length, according to NBR 6936, ASTM F 711 and IEC 60855 standards.

RECOMMENDED ITEMS TO USE WITH THE INSULATING CRANE EXTENSIONS (not included)

1. Micro Ammeter
2. Light Hot Stick Cat. No. FLV08958-1
3. 50 mm phase clamp Cat.No. RG3368
4. Complete Conductive Suit
5. Conductive Boots
6. Waterproof Canvas Tarpaulin Cat.No. RT306-0014



Items required to perform works with the Crane Insulating Extension

Fork Lift Insulating Extension

- EIR-500

Insulating equipment attachable to fork lifts, for live maintenance in substations up to 500 kV.

APPLICATION

- Load transportation up to 900 kg, enabling the replacement of equipment in energized Substations.
- Lifting linemen to position with a Bare-hand Chair when performing live maintenance works.

TECHNICAL CHARACTERISTICS:

5.0 m long Insulating Section made of *RITZGLAS*® poles;

Strain pole made of *RITZGLAS*®.

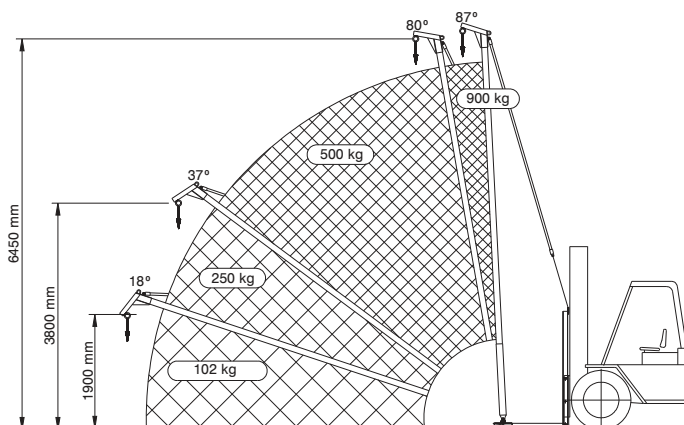
Electrical winch with maximum load capacity of 3 tons, for mast positioning, powered by the fork lift battery or auxiliary 12 V or 24 V battery (upon request);

Chassis/structure made of steel, with anti-corrosive treatment and black color painting;

Quick Fork Lift Attachment System.

For assembly on Fork Lift of minimum load capacity of 7 tons.

LOAD CAPACITY DIAGRAM



Hot Line Insulating Ladders



Available as single or extension models, with double siderails and rungs assembled with *RITZGLAS*® poles, Hot Line Insulating Ladders are suitable for live works up to 500 kV.

Provided with rubber coated nylon supporting band and fixed sliding-proof rubber shoes (except for models ET/LV).

All ladders are supplied with pre-shrunk storage canvas bag, green color.

Note:

- 1) The extension models are provided with eye-rings for staying purposes, on top of the base section.
- 2) Bending tests, when requested, will be carried out with the maximum extension of 8.50 m.

SINGLE LADDERS			
Cat. No.	Nominal Length (m)	Qty. of Rungs	Approx. Weight (kg)
ES/LV-28	2.80	8	11.00
ES/LV-37	3.70	11	14.00
ES/LV-46	4.60	14	20.00
ES/LV-59	5.90	18	21.00

Width between siderails: 293 mm

Distance between rungs: 305 mm

EXTENSION LADDERS				
Cat. No.	Nominal Length (m)		Qty. of Rungs	Approx. Weight (kg)
	Retracted	Extended		
EE/LV-71	4.02	7.04	22	35.50
EE/LV-83	4.62	8.24	26	41.50
EE/LV-96	5.22	9.44	30	45.50
EE/LV-108	6.24	10.76	34	49.50
EE/LV-120	6.84	11.84	38	53.50

Width between siderails: Bottom - 293 mm
Top - 295 mm

Distance between rungs: 305 mm

TRAPEZIUM TYPE LADDERS WITH 8" HOOKS FOR SUSPENSION			
Cat. No.	Nominal Length (m)	Qty. of Rungs	Approx. Weight (kg)
ET/LV-28	2.80	9	22.60
ET/LV-37	3.70	12	25.30
ET/LV-46	4.60	15	27.00
ET/LV-59	5.90	19	30.00

Width between siderails: 365 mm

Distance between rungs: 305 mm



Oblong-shape Profile **RITZGLAS®** Ladder



Single and extension ladders with oblong-shape siderails and sliding-proof round rungs made of **RITZGLAS®** poles and finishing with polyurethane painting. Provided with rubber coated nylon supporting band, movable or fixed sliding-proof rubber shoes, according to ANSI A14.5-2007 Standard.

Extension models are provided with nylon sliding reels for smooth sliding of the extension, metallic retaining rings close to the base rungs, steel brackets and plastic coated side-guides.

These ladders are intended for maintenance on de-energized structures or hot stick maintenance on systems of maximum 15 kV voltage class.

For rubber glove maintenance works up to 15 kV, it is recommended to use an additional insulating ladder support FLV14917-1 9 (refer to specific section in this Catalog).

SINGLE LADDERS			
Cat. No.	Nominal Length (m)	Qty. of Rungs	Approx. Weight (kg)
ES/PR-8/27	2.78	8	11.00
ES/PR-8/33	3.39	10	13.26
ES/PR-8/40	4.03	12	15.52
ES/PR-8/46	4.65	14	17.78
ES/PR-8/52	5.25	16	20.04
ES/PR-8/58	5.84	18	22.30
ES/PR-8/64	6.45	20	24.56

Width between siderails: 305 mm

Distance between rungs: 305 mm

EXTENSION LADDERS

Cat. No.	Nominal Length (m)		Qty. of Rungs	Approx. Weight (kg)
	Retracted	Extended		
EE/PR-12/34	2.23	3.38	11	19.05
EE/PR-12/46	2.84	4.62	15	24.50
EE/PR-12/58	3.45	5.86	19	30.00
EE/PR-12/70	4.05	7.08	23	35.50
EE/PR-12/82	4.64	8.28	27	39.00
EE/PR-15/95	5.25	9.52	31	50.00
EE/PR-15/10	6.28	10.76	35	54.00
EE/PR-15/11	6.88	11.98	39	61.00
EE/PR-15/14	7.80	13.84	45	67.00

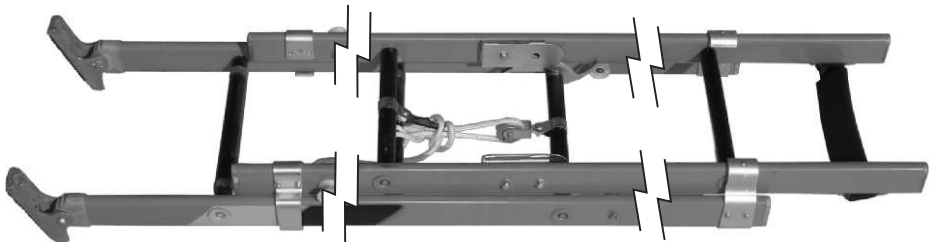
Width between siderails: Bottom - 365 mm

Top - 305 mm

Distance between rungs: 305 mm

NOTE:

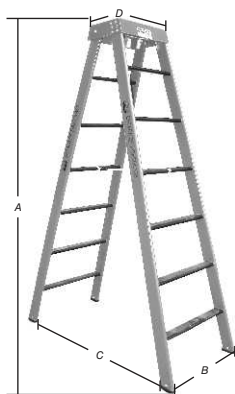
EE/PR-15/14 ladder must be stayed using the eye-rings on top rung of the base section.



"A" SHAPE LADDERS

Cat. No.	Nominal Length (m)				Qty. of Rungs at each side	Approx. Weight (kg)	
	A (m) P/PD	B (m) P/PD	C (m) P/PD	D (m) P/PD		P	PD
EA/PR-12	1.22	0.55	0.93	0.42 x 0.25	03	13.70	15.10
EA/PR-15	1.51	0.58	1.16	0.42 x 0.25	04	16.60	18.60
EA/PR-18	1.83	0.61	1.26	0.42 x 0.25	05	19.60	22.00
EA/PR-21	2.13	0.62	1.30	0.42 x 0.25	06	22.40	25.50
EA/PR-24	2.44	0.85	1.55	0.42 x 0.25	07	25.30	29.10
EA/PR-27	2.73	0.71	1.80	0.42 x 0.25	08	28.20	32.70
EA/PR-30	3.04	0.75	1.92	0.42 x 0.25	09	31.40	36.40
EA/PR-34	3.35	0.78	2.12	0.42 x 0.25	10	34.60	40.30
EA/PR-37	3.66	0.81	2.23	0.42 x 0.25	11	37.40	43.90
EA/PR-40	3.96	0.85	2.37	0.42 x 0.25	12	40.90	48.00
EA/PR-43	4.26	0.88	2.57	0.42 x 0.25	13	43.90	51.90
EA/PR-45	4.50	0.91	2.78	0.42 x 0.25	14	47.10	55.90
EA/PR-48	4.87	0.95	2.92	0.42 x 0.25	15	50.60	60.00
EA/PR-52	5.17	0.97	3.07	0.42 x 0.25	16	53.80	64.30

Change measures: ± 3 cm



Distance between rungs: 305 mm

NOTES:

"A" shape ladders are normally supplied with rungs on only one side. Part no. comes with the suffix "P".

For ladders with rungs at both sides, the suffix "/PD" must be added to the part no.

Heavy-duty "A"- shape ladders are supplied with Ø 3/8" fiberglass rods inside the rungs.

Insulating Ladder Support

The Insulating Ladder Support has been specially designed to be attached to Oblong-shape profile RITZ ladders, offering the ideal clearance between the ladder and grounded parts of the poles, enabling maintenance works up to 15 kV, with the Rubber Glove or Hot Stick Methods.

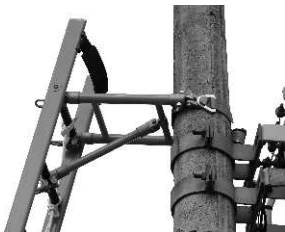
Made of *RITZGLAS®* poles and aluminum/bronze fittings, this tool is attached to the pole with a nylon strap type tightener (RT400-2007).

Main dimensions: 550 x 290 mm.

NOTE:

Using the Insulating Ladder Support requires implementing specific procedures.

LADDER SUPPORT		
Cat. No.	Description	Approx. Weight (kg)
FLV14917-1	Insulating Oblong-shape profile ladder support.	6.60



FLV14917-1



Mobile Tower Type Ladders

Made of insulating corrosion-proof profiles, the mobile tower type ladders are an excellent solution for maintenance works on electrical systems (substations and industries) and for overhead works in polluted areas.

BASIC CHARACTERISTICS:

- Framework and rungs made of *RITZGLAS*® oblong profiles.
- 1200 mm high fences and hand rails built with *RITZGLAS*® round poles.
- 600 x 600 mm sliding-proof platforms provided with 200 mm high fiberglass baseboards.
- Ø 4" wheels for easy transportation.
- Finished with UV-resistant polyurethane painting, suitable for outdoor use.

MOBILE TOWER TYPE LADDERS

Cat. No.	Heigh up to Platform (mm)	Total Height (mm)	Total Opening (mm)	Qty. of Rungs	Approx. Weight (kg)
ETM/01	420	1620	848	1	29.1
ETM/02	630	1830	972	2	33.0
ETM/03	840	2040	1096	3	36.8
ETM/04	1050	2250	1220	4	40.7
ETM/05	1260	2460	1343	5	44.6
ETM/06	1470	2670	1467	6	48.5
ETM/07	1680	2880	1591	7	52.4
ETM/08	1890	3090	1715	8	56.2
ETM/09	2100	3300	1839	9	60.1
ETM/10	2310	3510	1963	10	64.0
ETM/11	2520	3720	2087	11	67.8
ETM/12	2730	3930	2211	12	71.7
ETM/13	2940	4140	2335	13	75.6
ETM/14	3150	4350	2459	14	79.5

“U”-shape Profile Ladders

Single and extension ladders with “U”-shape fiberglass siderails and round aluminum rungs with sliding-proof grooves, meeting all ANSI A14.5-2007 Standard requirements.

Weather resistant with UV protection and provided with yellow and black safety straps.

Intended for maintenance on de-energized structures or hot stick maintenance on systems of maximum 15 kV voltage class.



SINGLE LADDERS			
Cat. No.	Nominal Length (m)	Qty. of Rungs	Approx. Weighth (kg)
ES/PU-29	3.09	09	9.20
ES/PU-32	3.39	10	10.10
ES/PU-35	3.69	11	11.00
ES/PU-38	4.00	12	11.90
ES/PU-41	4.29	13	12.80
ES/PU-44	4.59	14	13.70
ES/PU-47	4.89	15	14.60
ES/PU-50	5.20	16	15.50
ES/PU-53	5.49	17	16.40
ES/PU-56	5.80	18	17.30
ES/PU-59	6.10	19	18.20
ES/PU-62	6.40	20	19.10
ES/PU-65	6.69	21	20.00

Width between siderails: 320 mm.

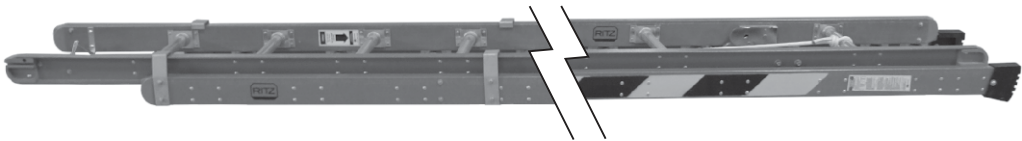
Distance between rungs: 300 mm.

EXTENSION LADDERS

Cat. No.	Nominal Length (m)		Qty. of Rungs	Approx. Weight (kg)
	Retracted	Extended		
EE/PU-35	2.68	3.67	11	16.00
EE/PU-41	2.96	4.27	13	17.70
EE/PU-47	3.28	4.87	15	18.50
EE/PU-53	3.58	5.47	17	21.20
EE/PU-59	3.88	6.07	19	23.00
EE/PU-65	4.18	6.67	21	24.80
EE/PU-71	4.48	7.27	23	26.50
EE/PU-77	4.78	7.87	25	28.30
EE/PU-84	4.08	8.47	27	30.00
EE/PU-90	5.38	9.07	29	31.70
EE/PU-97	5.95	9.67	33	34.00

Width between side rails: Top Section - 293 mm;
Bottom Section - 320 mm.

Distance between rungs: 300 mm.



Platforms for Ladders

Light-weight, resistant, easy to handle and made of insulating materials, the Platforms have been designed specially to offer more comfort and balance to the lineman while performing maintenance works using ladders.

Provided with grips for transport and lifting purposes.

Available in different models, for use on “U”-shape profile ladders (PPU) and Oblong-shape profile ladders (PPR)



FIBERGLASS PLATFORMS FOR LADDERS		
Cat. No.	Description	Approx. Weight (kg)
PPU-S	Platform for “U”-shape profile single ladders	1.50
PPU-E	Platform for “U”-shape profile extension ladders	1.20
PPR-12	Platform for Oblong-shape profile PR-12 single / extension ladders	1.35
PPR-15	Platform for Oblong-shape profile PR-15 extension ladders	1.40



Group N

Crossarm

RITZGLAS® Crossarm.....437



QUALITY AND SAFETY
FOR ELECTRICAL SYSTEMS



Group N

Crossarm

RITZGLAS® Crossarm

The **RITZGLAS®** Crossarm has been designed to replace wooden crossarms with several advantages. It can also be installed in areas having aggressive environmental conditions, such as:

- Seacoast.
- Chemical and petrochemical industries.
- Steel industries.
- Cement industries, etc.

The **RITZGLAS®** Crossarm has high dielectric strength, offering increased BIL of the system, minimizing the losses and possible phase-to-ground discharges.

Totally made of polyurethane foam-filled fiberglass, the **RITZGLAS®** Crossarm does not absorb humidity and does not allow the entrance of insects or small animals.

Provided with gray color smooth surface finish, UV resistant, for long service life even under the most severe environmental conditions.

Light-weight, the crossarm provides easy transportation, handling and installation.

The use of **RITZGLAS®** Crossarms contributes to environmental protection, since it reduces the cutting of hardwood trees for wooden crossarms.

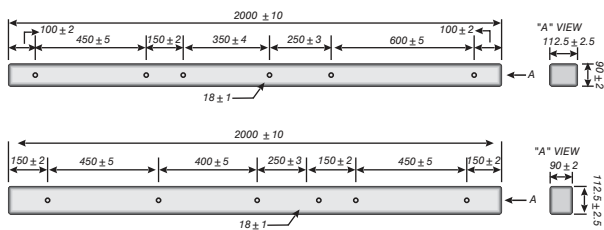




Meets NBR 8458/8459 (Brazilian Standard) and RUS
Fiberglass Crossarms Requirements (USA).

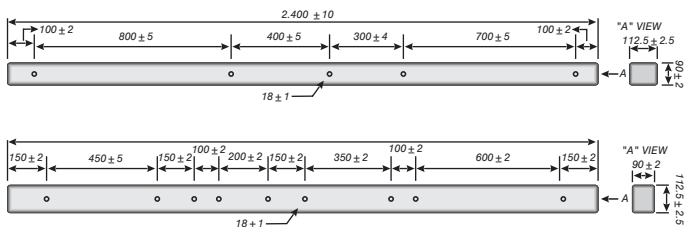
MODELS AND DIMENSIONS

- OPR17538-1 - 13.8 kV



Approximate weight: 8 kg

- OPR17539-1 - 34.5 kV



Approximate weight: 10 kg



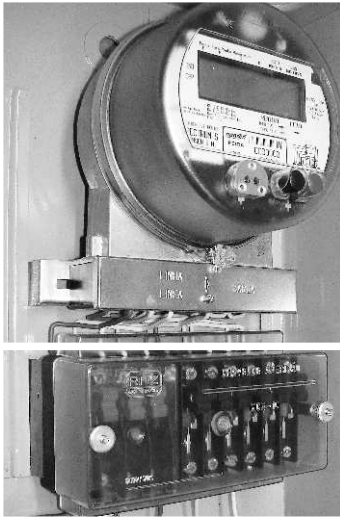
Group O

Test Switches and Terminal Blocks

Semiflush-Mounted Test Switch	
Model CER-1.....	441
Test Switches Model MCR-10.....	449
BAR Test Switch.....	452
Terminal Block.....	455



QUALIDADE E SEGURANÇA
PARA SISTEMAS ELÉTRICOS



Group O

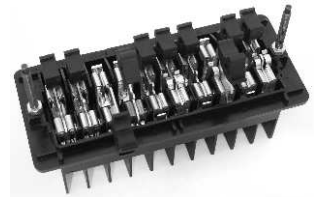
Test Switches and Terminal Blocks

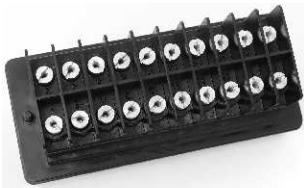
Semiflush-Mounted Test Switch Model CER-1

The base and the cover of the CER-1 Test Switch are made of special fire-retardant injected plastic, offering high mechanical strength and high dielectric strength.

Knife-blade type individual poles are separated by insulating barriers, which are part of the injected base structure. The operating handles of the knife-blades accommodate phase identification labels and are insulated. Each handle is provided with a hole for mechanical interconnection of two or more switches that need to be opened simultaneously. The current operating handles will be supplied in black color and the potencial operating handles in red color (different color pattern available upon request).

The current switches automatically short-circuit current transformer secondaries before the end of the knife-blade opening cycle.





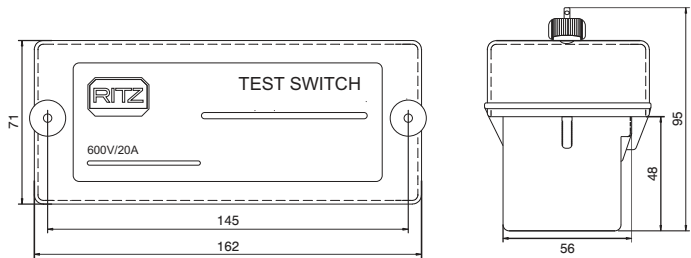
The test switches are provided with a maximum of 10 poles, with various combinations.

The connection points on the rear of the switch are separated by insulating barriers, which are part of the injected base structure. Distances are compatible with the installation of the terminals. Connections are provided with nuts and washers, allowing the use of eye-type terminals or uncovered wires.



The black color protection lid covers all conductive parts and is fitted with plastic nuts and locking device for fixing to the base.

BASIC DIMENSIONS



TECHNICAL CHARACTERISTICS:

- Number of poles: 10 maximum.
- Nominal Voltage: 600 V
- Test Voltage: 2.5 kV
- Nominal Current: 20 A

Note: P = Potential
C = Current Test Jack
C C = Right-Hand Current Assembly
(consists of Test Jack and Short-Circuiting
Current Assemblies)

SEMIFLUSH-MOUNTED TEST SWITCHES MODEL CER-1															
Cat. No.	Number of Switches	Potential	Current	Switches Location											
				Rear View											
				1	3	5	7	9	11	13	15	17	19		
				2	4	6	8	10	12	14	16	18	20		
				Front View											
A	B	C	D	E	F	G	H	I	J						
2PG01	2 SWITCHES	2	0	P	P										
2PG02		2	0	P				P							
2CG01		0	2	<u>C C</u>											
2CG02		0	2							<u>C C</u>					
2CG03		0	2									<u>C C</u>			
4PG01	4 SWITCHES	4	0	P	P	P								P	
4PG02		4	0	P	P								P	P	
4PG03		4	0	P								P	P	P	
4PG04		4	0				P	P	P	P					
2P2CG01		2	2	P	P								<u>C C</u>		
2P2CG02		2	2	P								<u>C C</u>	P		
4CG01		0	4	<u>C C</u>		<u>C C</u>									
4CG02		0	4						<u>C C</u>		<u>C C</u>				

SEMIFLUSH-MOUNTED TEST SWITCHES MODEL CER-1

Cat. No.	Number of Switches	Potential	Current	Switches Location											
				Rear View											
				1 2	3 4	5 6	7 8	9 10	11 12	13 14	15 16	17 18	19 20		
				Front View											
				A	B	C	D	E	F	G	H	I	J		
5PG01	5 SWITCHES	5	0	P	P							P	P	P	
3P2CG01		3	2	P	P							<u>C</u>	<u>C</u>	P	
3P2CG02		3	2	P	<u>C</u>	<u>C</u>	P							P	
1P4CG01		1	4		C	C		C		C				P	
5CG01		0	5	C		C		C		C		C			
6PG01	6 SWITCHES	6	0	P	P	P	P					P	P		
6PG02		6	0	P	P	P					P	P	P		
6PG03		6	0				P	P	P	P	P	P			
4P2CG01		4	2	P					P	P	<u>C</u>	<u>C</u>	P		
3P3CG01		3	3	P	P					C	<u>C</u>	<u>C</u>	P		
2P4CG01		2	4	P					<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	P		
6CG01		0	6	C		C		C			C	C	C		
6CG02		0	6		<u>C</u>	<u>C</u>		<u>C</u>	<u>C</u>		<u>C</u>	<u>C</u>			
6CG03		0	6			C	C	C	C	C	C				
6CG04		0	6				<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>			
6CG05	0	6				C	C	C	C	C	C				

SEMIFLUSH-MOUNTED TEST SWITCHES MODEL CER-1

Cat. No.	Number of Switches	Potential	Current	Switches Location																			
				Rear View																			
				1	3	5	7	9	11	13	15	17	19	2	4	6	8	10	12	14	16	18	20
				Front View																			
				A	B	C	D	E	F	G	H	I	J										
7PG01	7 SWITCHES	7	0	P	P	P	P			P	P	P											
7PG02		7	0	P	P	P	P				P	P	P										
7PG03		7	0		P	P	P	P	P	P	P	P											
7PG04		7	0	P			P	P	P	P	P	P											
7PG05		7	0	P			P	P	P		P	P	P										
5P2CG01		5	2	P	P	P	P	P			<u>C</u>	<u>C</u>											
5P2CG02		5	2	P	P				<u>C</u>	<u>C</u>	P	P	P										
5P2CG03		5	2	P	<u>C</u>	<u>C</u>	P				P												
4P3CG01		4	3	P	P	C		C		C		P	P										
3P4CG01		3	4	P	P	P			<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>											
3P4CG02		3	4	P	P				<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	P										
3P4CG03		3	4	P	C	C		C		C		P	P										

SEMIFLUSH-MOUNTED TEST SWITCHES MODEL CER-1

Cat. No.	Number of Switches	Potential	Current	Switches Location											
				Rear View											
				1	3	5	7	9	11	13	15	17	19		
				2	4	6	8	10	12	14	16	18	20		
				Front View											
				A	B	C	D	E	F	G	H	I	J		
8PG01	8 SWITCHES	8	0	P	P	P	P	P				P	P	P	
8PG02		8	0	P	P	P	P			P	P	P	P		
8PG03		8	0	P			P	P	P	P	P	P	P		
6P2CG01		6	2	P	P	P	P	P			<u>C</u>	<u>C</u>	P		
6P2CG02		6	2	P	P	P			<u>C</u>	<u>C</u>	P	P	P		
4P4CG01		4	4	P	P	P	P		<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>			
4P4CG02		4	4	P	P		C	C	C	C		P	P		
4P4CG03		4	4	P	P		<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>		P	P		
4P4CG04		4	4	P	<u>C</u>	<u>C</u>	P			P	<u>C</u>	<u>C</u>	P		
4P4CG05		4	4			P	P	P	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	P		
2P6CG01		2	6		<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	P	P			
2P6CG02		2	6		<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>		P	P		
1P7CG01		1	7	P		C	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>			
8CG01		0	8	C	C	C	C			C	C	C	C		
8CG02		0	8		C	C	C	C	C	C	C	C			
8CG03		0	8		<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>			

SEMIFLUSH-MOUNTED TEST SWITCHES MODEL CER-1

Cat. No.	Number of Switches	Potential	Current	Switches Location											
				Rear View											
				1	3	5	7	9	11	13	15	17	19		
				2	4	6	8	10	12	14	16	18	20		
				Front View											
				A	B	C	D	E	F	G	H	I	J		
9PG01	9 SWITCHES	9	0	P	P	P	P		P	P	P	P	P		
9PG02		9	0	P	P		P	P	P	P	P	P	P		
6P3CG01		6	3	P	P	P	P	P		<u>C</u>	<u>C</u>	C	C	P	
5P4CG01		5	4	P	P	P	P	P	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>			
5P4CG02		5	4	P	P	P	P		<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	P		
3P6CG01		3	6	P	P		<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	P		
9CG01		0	9	C	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>			

SEMIFLUSH-MOUNTED TEST SWITCHES MODEL CER-1

Cat. No.	Number of Switches	Potential	Current	Switches Location									
				Rear View									
				1 2	3 4	5 6	7 8	9 10	11 12	13 14	15 16	17 18	19 20
				Front View									
				A	B	C	D	E	F	G	H	I	J
10PG01	10 SWITCHES	10	0	P	P	P	P	P	P	P	P	P	P
9P1CG01		9	1	C	P	P	P	P	P	P	P	P	P
8P2CG01		8	2	P	P	P	P	P	P	P	<u>C</u>	<u>C</u>	P
7P3CG01		7	3	P	P	P	P	P	P	C	<u>C</u>	<u>C</u>	P
6P4CG01		6	4	P	P	P	P	P	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	P
6P4CG02		6	4	P	P	P	<u>C</u>	<u>C</u>	P	P	<u>C</u>	<u>C</u>	P
6P4CG03		6	4	P	<u>C</u>	<u>C</u>	P	P	P	P	<u>C</u>	<u>C</u>	P
6P4CG04		6	4	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	P	P	P	P	P	P
4P6CG01		4	6	P	P	P	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	P
4P6CG02		4	6	P	<u>C</u>	<u>C</u>	P	<u>C</u>	<u>C</u>	P	<u>C</u>	<u>C</u>	P
3P7CG01		3	7	P	P	C	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	P
2P8CG01		2	8	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	P	P
2P8CG02		2	8	P	C	C	C	C	C	C	C	C	P
2P8CG03		2	8	P	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	P
1P9CG01		1	9	C	C	C	C	C	C	C	C	C	P
10CG01		0	10	C	C	C	C	C	C	C	C	C	C
10CG02		0	10	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>

Test Switches Model MCR-10

The reduced-size generation of Test Switches are a viable solution for confined spaces.

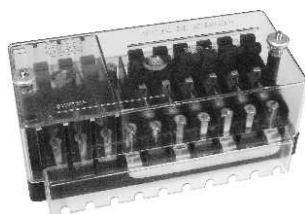
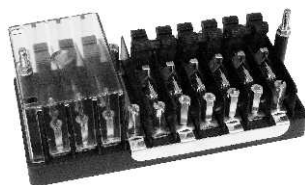
It incorporates improvements concerning protection against accidents and against frauds on the measuring system, such as:

- New protection lid design to prevent access to the energized parts.
- One additional auxiliary lid for protection of the potential poles, preventing the lineman from touching them when working on the current elements, and also protecting the knife-blades, when they are opened, reducing the risk of accidental contact with them.

Widely recommended when carrying out inspections, maintenance or tests of electrical meters.

Provide the interruption of the power to the potential and current circuits of electrical meters, ensuring the protection of the equipment interconnected to the measuring circuit.

Made of reinforced plastic with mechanical and electrical characteristics compatible to the needs of the electrical utilities and electrical equipment manufacturers in general.



TECHNICAL CHARACTERISTICS

Provided with 10 poles, being six current poles, three potential poles and one fixed neutral bar.

All poles can fit banana plugs.

- Insulating Voltage: 2.5 kV
- Maximum Working Voltage: 600 V
- Nominal Current: 20 A
- Potential and Current Terminals are separated by insulating spacers, incorporated to the base.
- The current switches automatically short-circuit current transformer secondaries.
- Fixed terminal for the neutral.
- Insulated operating handles.
- Plates for grounding and interconnection of the current circuits to the neutral.
- Connection terminals for connection of up to 03 conductors of maximum Ø 2.5 mm² each.
- Reinforced nylon base.
- Clear-vision lids made of polycarbonate.
- Lids can be fitted with locks.

- MCR-10/A

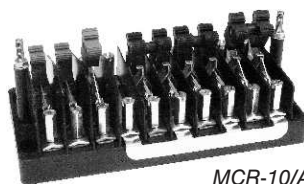
Provided with 3 current double switches with automatic short-circuiting of current transformer secondaries, without opening it, during the opening cycle of the knife-blade.

- MCR-10/B

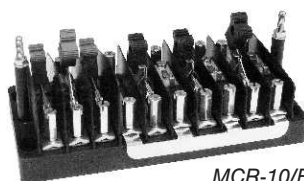
Provided with 3 conjugated single switch with interrupting device for the current circuit.

The knife-blades automatically short-circuit the current transformer secondaries, without opening it, during the opening cycle of the knife-blade.

The interrupting devices enable the connection in series of test equipment, allowing the test of the meter with the customer load.

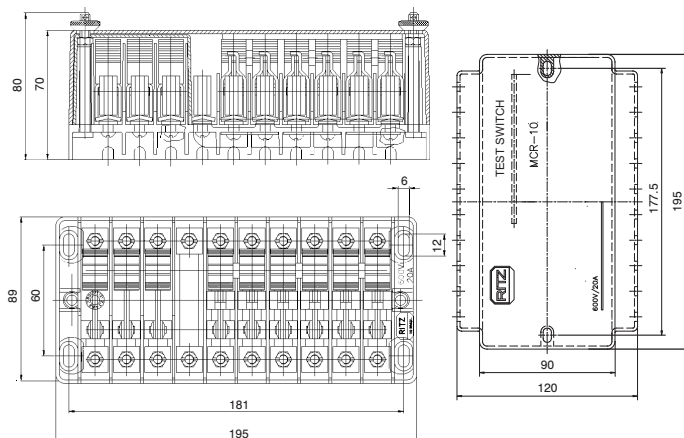


MCR-10/A



MCR-10/B

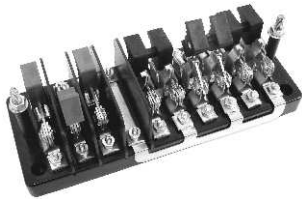
BASIC DIMENSIONS



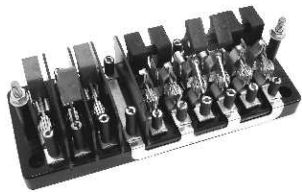
BAR Test Switch

Made of a special resin compound rigorously meeting the mechanical and electrical requirements of electrical utilities and electrical equipment manufacturers.

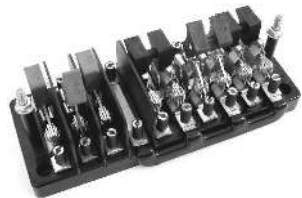
Allow carrying out inspection or test of electrical meters, disconnecting the potential and current circuits, without interrupting the protection or measurement of other instruments or relays connected to the circuit.



BAR-3I/3V N/L TU



BAR-3I/3V N/L PB



BAR-3I/3V LPBT



BAR-10V LTU

TECHNICAL CHARACTERISTICS

- Insulating Voltage 2.5 kV.
- Maximum Working Voltage: 600 V.
- Nominal Current: 30 A.
- Potential circuits separated by insulating plates.
- The current switches automatically short-circuit current transformer secondaries.
- Grounding plates and terminal for neutral.
- Connection terminals for connection of up to 03 conductors of maximum $\varnothing 2.5 \text{ mm}^2$ each.
- Insulated operating handle.
- Special base of high mechanical strength.
- Clear-vision cover with sealing device.
- Lateral output.

BAR TEST SWITCH					
Cat. No.	Current Circuit Switches (I)	Potential Circuit Switches (V)	Terminal for Neutral (N)	Terminal Outlet (U/PB)	Approx. Weight (kg)
BAR-3I/3V N/L TU	3 Double	3 Simple	Yes	U Type	1.35
BAR-3I/3V N/L PB	3 Double	3 Simple	Yes	Banana Plug	1.50
BAR-3I/3V LPBT	3 Double	3 Simple	Yes	Banana Plug	1.50
BAR-10V LTU	-	10 Simple	No	U Type	1.25

OPTIONAL ACCESSORIES

- TPR-PT

Clear Vision Protection Cover, with sealing and fixing devices.

- CI-1

Plates for interconnection of current transformers with the neutral.

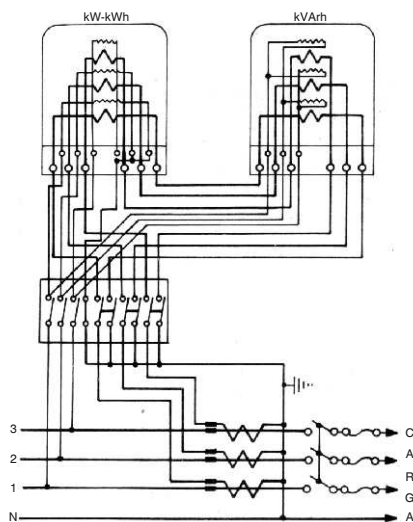
- CI-2

Plates for interconnection of the current transformers and center of the potential transformers with the neutral.

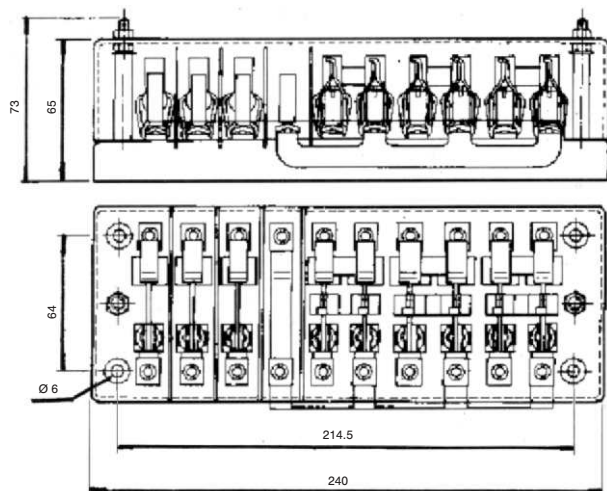
- Complete pin for the cover fixing, composed of:

- 1 set screw with locking through hole.
- 2 special nuts for cover fixing.
- 3 hex nuts.
- 2 washers.
- 1 spacer.

ELECTRICAL CONNECTION DIAGRAM



DIMENSIONS



Terminal Block

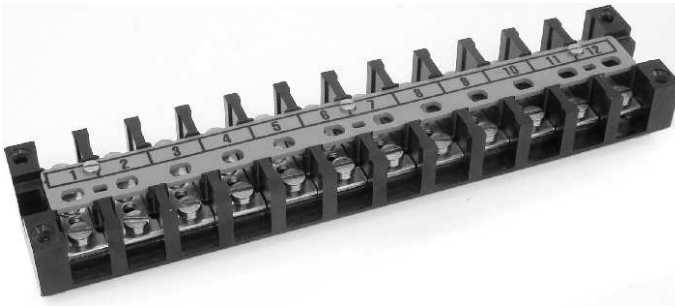
Made of a special resin compound rigorously meeting the mechanical and electrical requirements of electrical utilities and electrical equipment manufacturers.

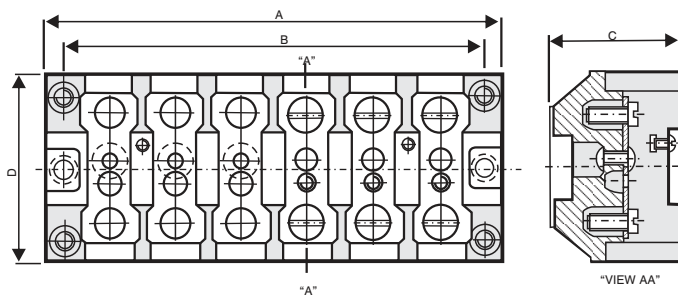
Available with 6 or 12 contact points. Widely used on systems of multiple interconnection, requiring safe connections, ensured insulation, constructive simplicity and mechanical strength.

These blocks are mainly used for control and warning connections of industrial plants and substations, on all critical boards, cubicles and electrical installations.

Connectors made of tin-plated copper and fine thread bolts made of galvanized steel.

Blocks are supplied with identification plates, with or without identification numbers, according to customer specification.



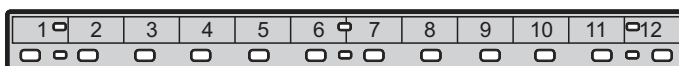


TERMINAL BLOCK						
Cat. No.	Quantity of Contacts	Dimensions (mm)				Approx. Weight (kg)
		A	B	C	D	
BTR-6/30A	6	128	118	34	50	0.27
BTR-12/30A	12	234	224	34	50	0.50
BTR-12/30M	12	195	185	27	40	0.25

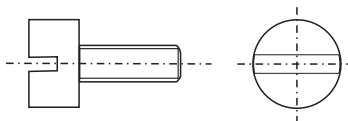
ITEMS SUPPLIED WITH THE BLOCK

- CI-6 e CI-12.

Identification Plate (stand alone), with or without identification numbers (according to customer specification), supplied in orange color (different colors are available upon request).



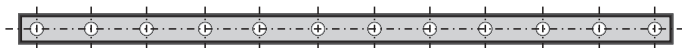
Steel Contact Bolt M-5 x 10, cylindric head.



OPTIONAL ITEMS

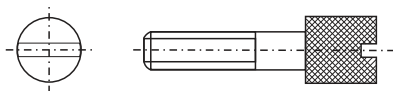
- CA-6 e CA-12.

Grounding Plates for Terminal Blocks, made with tin-plated plates, to be attached on the identification plate (only for models BTR-6/30A and BTR-12/30A).



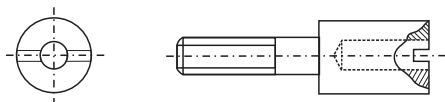
- P-1

Brass Grounding Bolt for connection of the grounding plate (only for models BTR-6/30A and BTR-12/30A).



Cat. No.: P-2

Brass Bolt for fixing contacts (also suitable for banana plug).







CROSS REFERENCE CHARTS

FORMER Cat. No	CURRENT Cat. NO	PAGE
3641	R3641	165
3861	R3861	165
3863	R3863	165
3866	R3866	165
12486	FLV12486-1	174
301644	FLV01644-1	32
059738	R059738	136
066780	R066780	62
068922	R068922	155
070184	R070184	155
070358	R070358	105
070496	R070496	32
1-4-42/21-14	1-4-42/21-14	418
1-4-42/21-14/T	1-4-42/21-14/T	418
1500E	1500E	21
20/P	FLV04417-1	245
2011-24	FLV06619-1	38
2011-36	FLV06619-2	38
2011-48	FLV06619-3	38
208352P01	FLV08352-1	54
21/P	FLV16886-1	245
2230-1	R2230-1	36
2230-2	R2230-2	36
2230-2/EP40	FLV12963-1	301
3000E	3000E	21
300167P01	FLV00167-1	54
301629P01	FLV01629-1	54
302995P01	FLV02995-1	54
303004P01	FLV03004-1	54
308353P01	FLV08353-1	54
400521P01	FLV00521-1	54
401550P01	FLV01550-1	54
401550P02	FLV01550-2	54
408356P01	FLV08356-1	54
408356P02	FLV08356-2	54
411795G01	FLV11795-1	301
411796P01	FLV11796-1	301
51.E07.D2-CE	51.E07.D2-CE	39
51.E07.D3-CE	51.E07.D3-CE	39
51.E07.D4-CE	51.E07.D4-CE	39

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51.E07.D5-CE	51.E07.D5-CE	39
750E	750E	21
AF-2	AF-2	386
AF-3	AF-3	386
AF-4	AF-4	386
AF-5	AF-5	386
AF-6	AF-6	386
AF-7	AF-7	386
AF-8	AF-8	386
AF-9	AF-9	386
AM-1	AM-1	388
AM-1/L	AM-1/L	388
BB-2	BB-2	386
BB-3	BB-3	386
BB-32	FLV17479-1	289
BB-4	BB-4	386
BB-5	BB-5	386
BB-6	BB-6	386
BB-7	BB-7	386
BB-8	BB-8	386
BB-9	BB-9	386
BDR-1-25	BDR-1-25	275
BDR-2-25	BDR-2-25	275
BDR-3-25	BDR-3-25	275
BDR-3-30	BDR-3-30	275
BDR-3-SP	BDR-3-SP	275
BLS-15	COB11612-1	242
BSR-01	FLV09429-1	90
C305-0008	RC305-0008	50
C305-0021	RC305-0021	50
C309-0323	RC309-0323	20
C309-0451	RC309-0451	22
C309-0452	RC309-0452	22
C309-0467	RC309-0467	20
C309-0468	RC309-0468	20
C312-0000	RC312-0000	20
C400-0073	RC400-0073	105
C400-0075	RC400-0075	108
C400-0090	RC400-0090	26
C400-0152	RC400-0152	160



CROSS REFERENCE CHARTS

FORMER Cat. No	CURRENT Cat. NO	PAGE
C400-0171	RC400-0171	96
C400-0172	RC400-0172	96
C400-0219	RC400-0219	150
C400-0268	RC400-0268	112
C400-0269	RC400-0269	113
C400-0289	RC400-0289	96
C400-0315	RC400-0315	26
C400-0331	RC400-0331	109
C400-0440	RC400-0440	26
C400-0445	RC400-0445	150
C400-0464	RC400-0464	30
C400-0465	RC400-0465	30
C400-0469	RC400-0469	30
C400-0470	RC400-0470	28
C400-0472	RC400-0472	28
C400-0475	RC400-0475	28
C400-0483	RC400-0483	28
C400-0517	RC400-0517	117
C400-0562	RC400-0562	109
C400-0562/E	FLV00714-2	109
C400-0573	RC400-0573	139
C400-0574	RC400-0574	138
C400-0575	RC400-0575	138
C400-0578	RC400-0578	26
C400-0600	RC400-0600	139
C400-0602	RC400-0602	32
C400-0612	RC400-0612	137
C400-0613	RC400-0613	137
C400-0648	RC400-0648	26
C400-0812	RC400-0812	120
C400-0814	RC400-0814	119
C400-0815	RC400-0815	119
C400-0816	RC400-0816	119
C400-0817	RC400-0817	119
C400-0818	RC400-0818	119
C400-0914	RC400-0914	35
C400-0915	RC400-0915	35
C400-0916	RC400-0916	35
C400-0917	RC400-0917	35
C400-0918	RC400-0918	35

FORMER Cat. No	CURRENT Cat. NO	PAGE
C400-0918A	FLV10893-3	35
C400-0919	RC400-0919	35
C400-0919A	FLV16813-1	35
C400-1016	RC400-1016	106
C400-1175	RC400-1175	23
C400-1310	RC400-1310	114
C400-1509	RC400-1509	117
C400-2399	RC400-2399	23
C400-2400	RC400-2400	23
C401-0003	RC401-0003	147
C401-0015	RC401-0015	154
C401-0095	RC401-0095	146
C401-0155	RC401-0155	147
C401-0168	RC401-0168	150
C401-0354	RC401-0354	157
C401-0355	RC401-0355	157
C401-0356	RC401-0356	157
C401-0357	RC401-0357	157
C401-0358	RC401-0358	157
C401-0359	RC401-0359	157
C401-0361	RC401-0361	158
C401-0362	RC401-0362	158
C401-0410	RC401-0410	126
C401-0411	RC401-0411	126
C401-0455	RC401-0455	158
C401-0758	RC401-0758	133
C401-1717	RC401-1717	147
C401-1718	RC401-1718	147
C401-1719	RC401-1719	147
C401-1720	RC401-1720	146
C401-1721	RC401-1721	146
C401-1722	RC401-1722	150
C401-1894	RC401-1894	146
C401-2144	RC401-2144	123
C401-2145	RC401-2145	123
C401-2146	RC401-2146	123
C401-2147	RC401-2147	123
C401-2148	RC401-2148	123
C401-2149	RC401-2149	123
C401-2174	RC401-2174	125



CROSS REFERENCE CHARTS

FORMER Cat. No	CURRENT Cat. NO	PAGE
C401-2175	RC401-2175	125
C401-2176	RC401-2176	125
C401-2177	RC401-2177	125
C401-2178	RC401-2178	125
C401-2179	RC401-2179	125
C401-2215	RC401-2215	123
C401-2216	RC401-2216	125
C401/PI	FLV03460-1	158
C402-0023	RC402-0023	201
C402-0024	RC402-0024	201
C402-0119	RC402-0119	187
C402-0139	RC402-0139	189
C402-0140	RC402-0140	189
C402-0155	RC402-0155	189
C402-0276	RC402-0276	200
C402-0277	RC402-0277	200
C402-0288	RC402-0288	262
C402-0402	RC402-0402	186
C402-0404	RC402-0404	186
C402-0407	RC402-0407	186
C402-0411	RC402-0411	186
C402-0418	RC402-0418	186
C402-0421	RC402-0421	186
C402-0422	RC402-0422	186
C402-0426	RC402-0426	199
C402-0482	RC402-0482	186
C402-0512	RC402-0512	187
C402-0513	RC402-0513	187
C402-0514	RC402-0514	187
C402-0533	RC402-0533	281
C402-0533/C	RC402-0533/C	281
C402-0534	RC402-0534	281
C402-0534/C	RC402-0534/C	281
C402-0535	RC402-0535	281
C402-0535/C	RC402-0535/C	281
C402-0558/U	RC402-0558	281
C402-0578/U	RC402-0578	281
C402-0790	RC402-0790	159
C402-1042/A	FLV17431-1	194
C402-1042/P	FLV17434-1	194

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C402-1042A/P	FLV13132-1	194
C402-1043/A	FLV17432-1	194
C402-1043/P	FLV17436-1	194
C402-1043A/P	FLV17435-1	195
C402-1055	RC402-1055	201
C402-1079	FLV17437-1	195
C402-1079/A	FLV17433-1	194
C402-1079/P	FLV17438-1	194
C403-0005	RC403-0005	68
C403-0006	RC403-0006	68
C403-0011	RC403-0011	68
C403-0126	RC403-0126	69
C403-0175	RC403-0175	69
C403-0177	RC403-0177	69
C403-0184	RC403-0184	60
C403-0185	RC403-0185	60
C403-0186	RC403-0186	60
C403-0291	RC403-0291	52
C403-0291/L	FLV08958-1	52
C403-0292	RC403-0292	52
C403-0292/E	FLV16617-1	302
C403-0292/L	FLV08958-2	52
C403-0293	RC403-0293	52
C403-0293/L	FLV08958-3	52
C403-0294	RC403-0294	52
C403-0294/L	FLV08958-4	52
C403-0295	RC403-0295	52
C403-0295/L	FLV08958-5	52
C403-0296	RC403-0296	53
C403-0297	RC403-0297	53
C403-0298	RC403-0298	53
C403-0299	RC403-0299	53
C403-0314	RC403-0314	69
C403-0320	RC403-0320	81
C403-0342	RC403-0342	53
C403-0343	RC403-0343	53
C403-0377	RC403-0377	55
C403-0378	RC403-0378	55
C403-0450	RC403-0450	81
C403-0799	RC403-0799	290



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FORMER Cat. No	CURRENT Cat. NO	PAGE
C403-0834	RC403-0834	70
C403-1071	RC403-1071	70
C403-1085EM	RC403-1085M	62
C403-1085EP	RC403-1085	62
C403-1382	RC403-1382	85
C403-1384	RC403-1384	85
C403-1416/B	RC403-1416	70
C403-1417/B	RC403-1417	70
C403-2136	RC403-2136	61
C403-2137	RC403-2137	61
C403-2270	RC403-2270	71
C403-3068	RC403-3068	56
C403-3069	RC403-3069	56
C406-0000	RC406-0000	220
C406-0009	RC406-0009	226
C406-0028	RC406-0028	220
C406-0029	RC406-0029	220
C406-0030	RC406-0030	220
C406-0046	RC406-0046	234
C406-0082	RC406-0082	235
C406-0082-6	RC406-0082-6	235
C406-0082GA	RC406-0082GA	235
C406-0083	RC406-0083	235
C406-0083-6	RC406-0083-6	235
C406-0083GA	RC406-0083GA	235
C406-0084	RC406-0084	236
C406-0084-6	RC406-0084-6	236
C406-0084GA	RC406-0084GA	236
C406-0091	RC406-0091	237
C406-0092	RC406-0092	237
C406-0097	RC406-0097	225
C406-0102	RC406-0102	224
C406-0164	RC406-0164	230
C406-0181	RC406-0181	228
C406-0181GA	RC406-0181GA	228
C406-0182	RC406-0182	229
C406-0182L	RC406-0182L	229
C406-0510	RC406-0510	236
C406-0514GA	RC406-0514GA	228
C406-0547	RC406-0547	221

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C406-0557	RC406-0557	229
C406-0557L	RC406-0557L	229
C417-0122/5	RC417-0122/5	280
C417-0123/5	RC417-0123/5	280
C417-0124	RC417-0124	280
C417-0125	RC417-0125	280
C417-0126	RC417-0126	280
C417-0133/B	RC417-0133	38
C417-0134/B	RC417-0134	38
C417-0135/B	RC417-0135	38
C417-0136/B	RC417-0136	38
C417-0137/B	RC417-0137	38
C417-0138/B	RC417-0138	38
C417-0139/B	RC417-0139	38
C417-0140/B	RC417-0140	38
C417-0141/B	RC417-0141	38
C417-0142/B	RC417-0142	38
C417-0143/B	RC417-0143	38
C417-0144/B	RC417-0144	40
C417-0146/B	RC417-0146	40
C417-0623	RC417-0623	280
C417-0624	RC417-0624	280
C417-0624/5	RC417-0624/5	280
C417-0626/5	RC417-0126/5	280
C417-0626/5	RC417-0625/5	280
C417-6067	RC417-6067	36
C600-0000	RC600-0000	151
C600-0065	RC600-0065	358
C600-0080	RC600-0080	378
C600-0085	RC600-0085	353
C600-0197	RC600-0197	366
C600-0337	RC600-0337	356
C600-0337/SP	ATR03308-2	356
C600-0386	RC600-0386	365
C600-0434	RC600-0434	358
C600-0785/B	RC600-0785	368
C600-0841/B	RC600-0841	368
C600-0861/B	RC600-0861	368
C600-0862/B	RC600-0862	368
C600-0965	RC600-0965	365



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FORMER Cat. No	CURRENT Cat. NO	PAGE
C600-1584/B	RC600-1584	380
C600-1606/E	ATR17185-8	373
C600-1617	RC600-1617	354
C600-1625	RC600-1625	367
C600-1626	RC600-1626	367
C600-1700	RC600-1700	380
C600-1732	RC600-1732	363
C600-1743	RC600-1743	170
C600-1895	RC600-1895	176
C600-1944	RC600-1944	176
C600-2100	RC600-2100	343
C600-2231	RC600-2231	354
C600-2232	RC600-2232	354
C600-2275	RC600-2275	366
C600-2276	RC600-2276	366
C600-2281	RC600-2281	365
C600-2282	RC600-2282	365
C600-2300	RC600-2300	343
C600-2316	RC600-2316	346
C600-2598	RC600-2598	167
C600-2599	RC600-2599	167
C600-2600	RC600-2600	167
C600-2601	RC600-2601	167
C600-2602	RC600-2602	371
C600-2602/E	ATR17185-2	371
C600-2603	RC600-2603	371
C600-2604	RC600-2604	371
C600-2605	RC600-2605	371
C600-2606	RC600-2606	373
C600-2607	RC600-2607	373
C600-2608	RC600-2608	373
C600-2609	RC600-2609	373
C600-2610	RC600-2610	372
C600-2610/E	ATR17179-2	372
C600-2611	RC600-2611	372
C600-2612	RC600-2612	372
C600-2613	RC600-2613	372
C600-2614	RC600-2614	374
C600-2614/E	ATR17179-8	374
C600-2615	RC600-2615	374

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C600-2616	RC600-2616	374
C600-2617	RC600-2617	374
C600-2618	RC600-2618	371
C600-2618/E	ATR17184-2	371
C600-2619	RC600-2619	371
C600-2620	RC600-2620	371
C600-2621	RC600-2621	371
C600-2622	RC600-2622	373
C600-2622/E	ATR17184-8	373
C600-2623	RC600-2623	373
C600-2624	RC600-2624	373
C600-2625	RC600-2625	373
C600-2626	RC600-2626	372
C600-2626/E	ATR13036-2	372
C600-2627	RC600-2627	372
C600-2628	RC600-2628	372
C600-2629	RC600-2629	372
C600-2630	RC600-2630	374
C600-2630/E	ATR13036-8	374
C600-2631	RC600-2631	374
C600-2632	RC600-2632	374
C600-2633	RC600-2633	374
C601-0013	RC601-0013	172
C601-0014	FLV13033-2	179
C601-0036	RC601-0036	171
C601-0037	RC601-0037	171
C601-0038	RC601-0038	171
C601-0171	RC601-0171	168
C601-0172	RC601-0172	168
C601-0173	RC601-0173	168
C601-0174	RC601-0174	168
C601-0260	RC601-0260	171
C601-0261	RC601-0261	171
C601-0262	RC601-0262	171
C601-0263	RC601-0263	171
CA-0344-FLV	FLV06858-1	284
CA-0344-FLV/ER	FLV11493-1	284
CA-0344-FLV/M	FLV02544-1	284
CAR/13043-BT	ATR13043-1	322
CAR/BT-01	ATR17439-1	319



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CAR/BT-01	ATR17439-2	319
CAR/CB-01	ATR17572-1	332
CAR/CB-36	ATR12047-1	333
CAR/CV	ATR17440-1	339
CAR/LT-138	ATR17441-1	335
CAR/LT-500	ATR17442-1	338
CAR/SC-01	ATR04514-2	318
CAR/SC-01/5	ATR04514-1	318
CAR/SC-10/4	FLV17571-1	150
CAR/SE-138	ATR17454-1	336
CAR/SE-36	ATR17455-1	334
CAR/ST-01/B	ATR09734-1	324
CAR/ST-03	ATR09729-1	326
CAR/ST-04	ATR03654-1	321
CAR/ST-05TL/18E	ATR04631-1	325
CAR/ST-36	ATR17456-1	328
CAR/ST-36TL	ATR17457-1	330
CCF-15	COB11617-1	242
CCR-15	COB11622-1	242
CF-1	ATR03641-1	380
CFR-2.000	OPR17538-1	438
CFR-2.400	OPR17539-1	438
CI/CF-27	COB08561-1	226
CIF-15	FLV11623-1	242
CP-1/U	VMR02619-1	396
CP-11/U	VMR03414-1	397
CP-13/U	VMR00884-1	396
CP-14/U	VMR09874-1	397
CP-5/U	VMR05614-1	396
CP-VTT	VMR14506-1	385
CP3/U	VMR16483-1	396
CPJ-2	COB17541-1	247
CPJ-336,4	COB17541-2	247
CPJ-4/0	COB17541-3	247
CPR-1/0AWG	COB17540-1	252
CPR-2/0AWG	COB17540-2	252
CPR-2AWG	COB17540-3	252
CPR-336,4AWG	COB17540-4	252
CPR-4/0AWG	COB17540-5	252
CPR-4AWG	COB17540-6	252

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CPR-6AWG	COB17540-7	252
CRI-14135	CPR14135-1	253
CS-U	VMR00634-1	388
CS-U/L	VMR04252-1	388
CSU/HXF	VMR11708-1	392
CSU/HXM	VMR11714-1	392
CT 0,07-1	CT 0,07-1	266
CT 10-30	CT 10-30	266
CT 10-30/SB	CT 10-30/SB	266
CT 12-36/SB	CT 12-36/SB	266
CT 180-540/SB	CT 180-540/SB	266
CT 2-6	CT 2-6	266
CT 2-6/SB	CT 2-6/SB	266
CT 25-70	CT 25-70	266
CT 25-70/SB	CT 25-70/SB	266
CT 5-15	CT 5-15	266
CT 5-15/SB	CT 5-15/SB	266
CT 60-180/SB	CT 60-180/SB	266
CT-CC 0,5-5	CT-CC 0,5-5	269
CTC-25	CTC-25	369
CTC-35	CTC-35	369
CTC-50	CTC-50	369
CTC-70	CTC-70	369
CTC-95	CTC-95	369
CTS-01	FLV11554-1	395
CTS-02	FLV13872-1	395
DMU-15	DMU-15	271
DMU-25	DMU-25	271
DST-1/U	ATR04694-1	376
DST-3	ATR04116-1	376
DST-5/V	ATR03318-1	377
DST-6	ATR06455-1	377
DST-7	ATR14442-1	376
DST-8	ATR14477-1	377
DTV-15	DTV-15	271
E-06621	COB11721-1	248
E309-0059	RE309-0059	20
E309-0262	RE309-0262	20
E309-0473	RE309-0473	22
E400-0008	RE400-0008	109



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E400-0009	RE400-0009	109
E400-0043	RE400-0043	142
E400-0044	RE400-0044	142
E400-0434	RE400-0434	28
E401-0138	RE401-0138	123
E401-1510	RE401-1510	123
E401-1998	RE401-1998	123
E401-2066	RE401-2066	136
E401-2068	RE401-2068	136
E402-0087	RE402-0087	189
E402-0092	RE402-0092	189
E402-0099	RE402-0099	189
E402-0138	RE402-0138	189
E402-0141	RE402-0141	190
E402-0525	RE402-0525	189
E402-0526	RE402-0526	189
E402-0568	RE402-0568	189
E403-2543/P	RE403-2543P	53
EA/PR-12	EA/PR-12	428
EA/PR-15	EA/PR-15	428
EA/PR-18	EA/PR-18	428
EA/PR-21	EA/PR-21	428
EA/PR-24	EA/PR-24	428
EA/PR-27	EA/PR-27	428
EA/PR-30	EA/PR-30	428
EA/PR-34	EA/PR-34	428
EA/PR-37	EA/PR-37	428
EA/PR-40	EA/PR-40	428
EA/PR-43	EA/PR-43	428
EA/PR-45	EA/PR-45	428
EA/PR-48	EA/PR-48	428
EA/PR-52	EA/PR-52	428
EE/LV-108	EE/LV-108	425
EE/LV-120	EE/LV-120	425
EE/LV-71	EE/LV-71	425
EE/LV-83	EE/LV-83	425
EE/LV-96	EE/LV-96	425
EE/PR-12/34	EE/PR-12/34	427
EE/PR-12/46	EE/PR-12/46	427
EE/PR-12/58	EE/PR-12/58	427

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EE/PR-12/70	EE/PR-12/70	427
EE/PR-12/82	EE/PR-12/82	427
EE/PR-15/10	EE/PR-15/10	427
EE/PR-15/11	EE/PR-15/11	427
EE/PR-15/14	EE/PR-15/14	427
EE/PR-15/95	EE/PR-15/95	427
EE/PU-35	EE/PU-35	432
EE/PU-41	EE/PU-41	432
EE/PU-47	EE/PU-47	432
EE/PU-53	EE/PU-53	432
EE/PU-59	EE/PU-59	432
EE/PU-65	EE/PU-65	432
EE/PU-71	EE/PU-71	432
EE/PU-77	EE/PU-77	432
EE/PU-84	EE/PU-84	432
EE/PU-90	EE/PU-90	432
EE/PU-97	EE/PU-97	432
EMT-01	ATR10455-1	381
EMT-01A	ATR10455-4	381
EMT-01B	ATR10455-4	381
EMT-205/500	ATR10455-1	381
EMT-205/650	ATR10455-3	381
EMT-205/800	ATR10455-2	381
EMT-301/650	ATR10455-4	381
ES/LV-28	ES/LV-28	424
ES/LV-37	ES/LV-37	424
ES/LV-46	ES/LV-46	424
ES/LV-59	ES/LV-59	424
ES/PR-8/27	ES/PR-8/27	426
ES/PR-8/33	ES/PR-8/33	426
ES/PR-8/40	ES/PR-8/40	426
ES/PR-8/46	ES/PR-8/46	426
ES/PR-8/52	ES/PR-8/52	426
ES/PR-8/58	ES/PR-8/58	426
ES/PR-8/64	ES/PR-8/64	426
ES/PU-29	ES/PU-29	431
ES/PU-32	ES/PU-32	431
ES/PU-35	ES/PU-35	431
ES/PU-38	ES/PU-38	431
ES/PU-41	ES/PU-41	431



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ES/PU-44	ES/PU-44	431
ES/PU-47	ES/PU-47	431
ES/PU-50	ES/PU-50	431
ES/PU-53	ES/PU-53	431
ES/PU-56	ES/PU-56	431
ES/PU-59	ES/PU-59	431
ES/PU-62	ES/PU-62	431
ES/PU-65	ES/PU-65	431
ESR-250	ESR-250	302
ESR-400	ESR-400	302
ESR-500	ESR-500	302
ESR-600	ESR-600	302
ESRC-600	ESRC-600	302
ESRG-600	ESRG-600	302
ESRH-600	ESRH-600	302
ESRO-600	ESRO-600	302
ET/LV-28	ET/LV-28	425
ET/LV-37	ET/LV-37	425
ET/LV-46	ET/LV-46	425
ET/LV-59	ET/LV-59	425
ETM/01	ETM/01	430
ETM/02	ETM/02	430
ETM/03	ETM/03	430
ETM/04	ETM/04	430
ETM/05	ETM/05	430
ETM/06	ETM/06	430
ETM/07	ETM/07	430
ETM/08	ETM/08	430
ETM/09	ETM/09	430
ETM/10	ETM/10	430
ETM/11	ETM/11	430
ETM/12	ETM/12	430
ETM/13	ETM/13	430
ETM/14	ETM/14	430
FLV-0926	FLV01946-2	306
FLV-0926-1	FLV16486-1	311
FLV-0926-5	FLV16488-1	311
FLV-0926-6	FLV16487-1	311
FLV-0926-B	FLV16489-1	311
FLV-0926N	FLV01946-1	306

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FLV-09311	FLV09311-1	398
FLV-09428	FLV17444-1	213
FLV-09428/E	FLV17444-2	213
FLV-10460	FLV10460-1	136
FLV-11047	COB11047-1	239
FLV-11050	COB11050-1	239
FLV-11051	COB11051-1	240
FLV-11147	COB11147-1	240
FLV-11170	COB11170-1	239
FLV-11179O	FLV11179-1	174
FLV-11179PI	FLV11179-2	174
FLV-11179T	FLV11179-3	174
FLV-11537	FLV11537-1	140
FLV-11630/1.1	FLV11630-1	213
FLV-11630/2.1	FLV11630-2	213
FLV-11630/2.2	FLV11630-3	213
FLV-12239	FLV12239-1	127
FLV-12419	FLV12409-1	180
FLV-12580	COB12580-1	246
FLV-13033	FLV13033-1	179
FLV-13045	FLV13045-1	179
FLV-1340	FLV02629-2	308
FLV-1340N	FLV02629-1	308
FLV-13559	COB13559-1	247
FLV-13905	FLV13905-1	398
FLV-13907	FLV13907-1	398
FLV-13917	FLV13917-1	178
FLV-14095	COB14095-1	233
FLV-14096	COB14096-1	233
FLV-14097	COB14097-1	233
FLV-14098	COB14098-1	233
FLV-1442	FLV02818-1	84
FLV-14717	FLV14917-1	429
FLV-14959	COB14959-1	246
FLV-1852	FLV03457-7	158
FLV-1852/A	FLV03457-2	158
FLV-2541	FLV04803-1	33
FLV-2830	FLV17444-3	213
FLV-2850	FLV05584-1	310
FLV-2861	FLV05613-1	112



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FORMER Cat. No	CURRENT Cat. NO	PAGE
FLV-2915	FLV05784-1	175
FLV-3022	FLV17755-1	136
FLV-3059	FLV06694-2	309
FLV-3059N	FLV06694-1	309
FLV-3094/MD	FLV06052-1	212
FLV-3094/TD-1	FLV16241-3	212
FLV-3094/TD-2	FLV16241-4	212
FLV-3094/TD-3	FLV16241-5	213
FLV-3094/TL-1	FLV16241-1	212
FLV-3094/TL-2	FLV16241-2	212
FLV-314780	COB14780-1	224
FLV-3220	FLV07654-1	282
FLV-3250	FLV05716-1	35
FLV-3250A	FLV05697-1	35
FLV-3250B	FLV07777-1	35
FLV-3585 (G01)	FLV08969-1	344
FLV-3585 (G02)	FLV08969-2	344
FLV-3585 (G03)	FLV08969-3	344
FLV-3585 (G04)	FLV08969-4	344
FLV-3585 (G05)	FLV08969-5	344
FLV-3585 (G06)	FLV08969-6	344
FLV-3585 (G07L)	FLV13147-1	344
FLV-3631	COB08835-1	232
FLV-3704	FLV09012-1	212
FLV-3727	FLV09091-1	212
FLV-3727/5P	FLV13916-1	212
FLV-413345	COB13345-1	226
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Comments

- *(A) 1000 mm Copper Rod
- *(B) 1500 mm Copper Rod
- *(C) 1000 mm Hex Rod
- *(D) 1200 mm Hex Rod
- *(E) 5 sections
- *(F) 5 sections and 1000 mm copper rod
- *(G) 5 sections and 1500 mm copper rod
- *(H) 5 sections and 1000 mm Hex Rod
- *(I) 5 sections and 1200 mm Hex Rod
- *(J) 6 sections
- *(L) 6 sections and 1000 mm copper rod
- *(M) 6 sections and 1500 mm copper rod
- *(N) 6 sections and 1000 mm Hex Rod
- *(O) 6 sections and 1200 mm Hex Rod
- *(P) 1000 mm Copper Rod
- *(Q) 1500 mm Copper Rod
- *(R) 1000 mm Hex Rod
- *(S) 1200 mm Hex Rod



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ANNOTATIONS





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