MANUFACTURING COMPONENTS FOR
CRANES AND LIFTING EQUIPMENT

COSTRUZIONE COMPONENTI
PER APPARECCHI DI SOLLEVAMENTO

PIZZAMIGLIO SRL
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AQ TROLLEY BUSBAR TRUNKING SYSTEM

Installation Manual - Rev. 12.1

Our company

Our surplus values are experience and the passion for the prestige of quality.

We look forward to measuring against the market and test what we are able to do. Our yen for growing is evident through our courage not to choose the easiest way, but rather to pursue ambitious goals.

Pizzamiglio company was born to answer the need for bridge crane components already present on the market, moreover it aims at developing them and improving their quality.

Our organization blends together the founder's experience and the enthusiasm of the new generation in a dynamic team. We boast an exiguous staff turnover and our youngest workers are always supported so they can get to know the secrets of mechanics, a field which is constantly improving. In this way, they have the opportunity to learn to spot the faults and think about possible remedies; understand the problems and invent new solutions. The result is the creation of products manufactured following tradition, but with the care and flexibility of an agile modern business.

Our mission is to fully satisfy the customer providing high quality products and customized solutions in a fast and flexible way through our professionally fulfilled workers.

The result is the good repute of a business which is at the leading edge in its sector and invests its one-off experience legacy in the new generation.

Our business makes use of the most advanced technologies and equipment both in design and production. Pizzamiglio products are widely appreciated especially for their quality and reliability and their use is therefore widespread in the national market.

Our manufacturing plant in Valeggio, province of Verona, in the North-East of Italy, is the tangible and gratifying fruit of an unique constant growth path: a spacious indoor area which

includes the workshop and well-provided and rationally organized warehouse. Next to these facilities, a bright building houses the counting house, the administrative office and the technical department.

Production range:

- Feeding festoon system “Olivares” for bridge-cranes, and similar.;
- Electro-hydraulic drum brakes according DIN 15435 standard;
- Lifting force limiters;
- Telescopic limit switch for bridge-cranes;
- Metal bumpers;
- Rubber bumpers;
- **Bus-bar system “Trolley AQ” for bridge-cranes.**

INDEX

Chapter

1

Introduction

This manual has been created for AQ Trolley installation and maintenance firms and includes the instructions for a correct installation of the system and its proper working through time and for the safe use by the end user. Many of the indications given may seem unnecessary or obvious, but we want to include them to give a more complete picture and for the formal obligations imposed by current regulation.

This documentation and its possible enclosures must be read carefully by the personnel at any level before starting the installation of the system. Ogni intervento deve essere condotto con l'aiuto ed in accordo con quanto contenuto nel presente manuale. The employer has the obligation to verify the knowledge and qualification of the personnel before giving the authorization to make any intervention to the system.

Chapter

2

Constructor and Product Identification Data

Constructor Data:

PIZZAMIGLIO SRL

Registered and head office and operating base:

Via degli Imprenditori, 79

37067 Valeggio sul Mincio (Verona) - ITALY

Tel. +39 (0) 45 795 220 9

Fax +39 (0) 45 795 217 4

VAT No. 0316570 023 2

http://www.pizzamigliosrl.com

E-mail: info@pizzamigliosrl.com

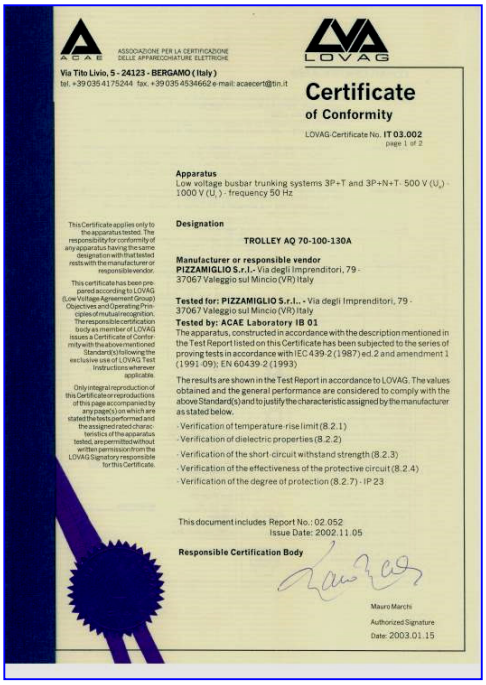
Product Data:

Product name:

AQ TROLLEY busbar trunking system

Certifications

Following the strict laboratory tests, the AQ TROLLEY busbar system obtained the certification according to the general and specific regulation on this kind of product by the EAMA-LOVAG - the authoritative international certification institution for electrical equipment.



ASSOCIAZIONE PER LA CERTIFICAZIONE DELLE APPARECCHIATURE ELETTRICHE

Via Tito Livio, 5 - 24123 - BERGAMO (Italy)
tel. +39 035 4175244 fax. +39 035 4534662 e-mail: acaecert@tin.it

Certificate of Conformity

LOVAG-Certificate No. **IT 03.002**
page 1 of 2

Apparatus
Low voltage busbar trunking systems 3P+T and 3P+N+T - 500 V (U_n) - 1000 V (U_i) - frequency 50 Hz

This Certificate applies only to the apparatus tested. The responsibility for conformity of any apparatus having the same designation with that tested rests with the manufacturer or responsible vendor.

This certificate has been prepared according to LOVAG (Low Voltage Agreement Group) Objectives and Operating Principles of mutual recognition. The responsible certification body as member of LOVAG issues a Certificate of Conformity with the above mentioned Standard(s) following the exclusive use of LOVAG Test Instructions wherever applicable.

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Designation
TROLLEY AQ 70-100-130A

Manufacturer or responsible vendor
PIZZAMIGLIO S.r.l. - Via degli Imprenditori, 79 - 37067 Valeggio sul Mincio (VR) Italy

Tested for: PIZZAMIGLIO S.r.l. - Via degli Imprenditori, 79 - 37067 Valeggio sul Mincio (VR) Italy
Tested by: ACAE Laboratory IB 01
The apparatus, constructed in accordance with the description mentioned in the Test Report listed on this Certificate has been subjected to the series of proving tests in accordance with IEC 439-2 (1987) ed.2 and amendment 1 (1991-09); EN 60439-2 (1993)

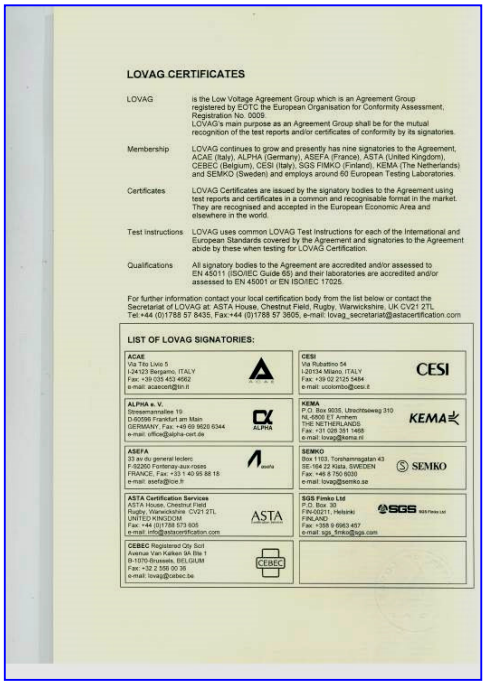
The results are shown in the Test Report in accordance to LOVAG. The values obtained and the general performance are considered to comply with the above Standard(s) and to justify the characteristic assigned by the manufacturer as stated below.

- Verification of temperature-rise limit (8.2.1)
- Verification of dielectric properties (8.2.2)
- Verification of the short-circuit withstand strength (8.2.3)
- Verification of the effectiveness of the protective circuit (8.2.4)
- Verification of the degree of protection (8.2.7) - IP 23

This document includes Report No.: 02.052
Issue Date: 2002.11.05

Responsible Certification Body

Mauro Marchi
Authorized Signature
Date: 2003.01.15



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Membership — LOVAG continues to grow and presently has nine signatories to the Agreement, ACAE (Italy), ALPHA (Germany), ASEFA (France), ASTA (United Kingdom), CEBEC (Belgium), CESI (Italy), SGS FIMKO (Finland), KEMA (The Netherlands) and SEMKO (Sweden) and employs around 60 European Testing Laboratories.

Certificates — LOVAG Certificates are issued by the signatory bodies to the Agreement using test reports and certificates in a common and recognisable format in the market. They are recognised and accepted in the European Economic Area and elsewhere in the world.

Test Instructions — LOVAG uses common LOVAG Test Instructions for each of the International and European Standards covered by the Agreement and signatories to the Agreement abide by these when testing for LOVAG Certification.

Qualifications — All signatory bodies to the Agreement are accredited and/or assessed to EN 45011 (ISO/IEC Guide 65) and their laboratories are accredited and/or assessed to EN 45001 or EN ISO/IEC 17025.

For further information contact your local certification body from the list below or contact the Secretariat of LOVAG at: ASTA House, Chestnut Field, Rugby, Warwickshire, UK CV21 2TL
Tel:+44 (0)1788 57 8435, Fax:+44 (0)1788 57 3605, e-mail: lovag_secretariat@astacertification.com

LIST OF LOVAG SIGNATORIES:

ACAE — Via Tito Livio 5 — I-24123 Bergamo, ITALY — Fax: +39 035 453 4662 — e-mail: acaecert@tin.it
CESI — Via Rubattino 54 — I-20134 Milano, ITALY — Fax: +39 02 2125 5484 — e-mail: ucolombo@cesi.it
ALPHA e. V. — Stresemannallee 19 — D-60596 Frankfurt am Main GERMANY — Fax: +49 69 9620 6344 — e-mail: office@alpha-cert.de
KEMA — P.O. Box 9035, Utrechtseweg 310 — NL-6800 ET Arnhem THE NETHERLANDS — Fax: +31 026 351 1468 — e-mail: lovag@kema.nl
ASEFA — 33 av du general leclerc — F-92260 Fontenay-aux-roses FRANCE, Fax: +33 1 40 95 88 18 — e-mail: asefa@tce.fr
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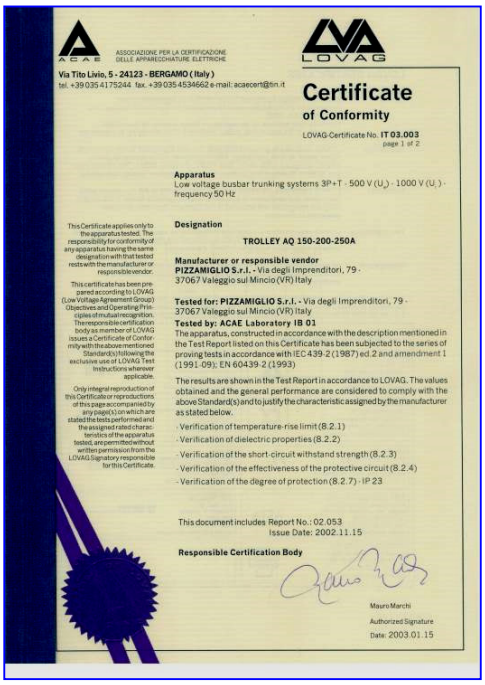
SGS Fimko Ltd — P.O. Box 30 — FIN-00211, Helsinki FINLAND — Fax: +358 9 6963 457 — e-mail: sgs_fimko@sgs.com
CEBEC — Registered Qty Scrl — Avenue Van Kalken 9A Bte 1 — B-1070 Brussels, BELGIUM — Fax: +32 2 556 00 35 — e-mail: lovag@cebec.be



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Via Tito Livio, 5 - 24123 - BERGAMO (Italy)
tel. +39 035 4175244 fax. +39 035 4534662 e-mail: acaecert@tin.it

Certificate of Conformity

LOVAG-Certificate No. **IT 03.003**
page 1 of 2

Apparatus
Low voltage busbar trunking systems 3P+T - 500 V (U_n) - 1000 V (U_i) - frequency 50 Hz

This Certificate applies only to the apparatus tested. The responsibility for conformity of any apparatus having the same designation with that tested rests with the manufacturer or responsible vendor.

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Designation
TROLLEY AQ 150-200-250A

Manufacturer or responsible vendor
PIZZAMIGLIO S.r.l. - Via degli Imprenditori, 79 - 37067 Valeggio sul Mincio (VR) Italy

Tested for: PIZZAMIGLIO S.r.l. - Via degli Imprenditori, 79 - 37067 Valeggio sul Mincio (VR) Italy
Tested by: ACAE Laboratory IB 01
The apparatus, constructed in accordance with the description mentioned in the Test Report listed on this Certificate has been subjected to the series of proving tests in accordance with IEC 439-2 (1987) ed.2 and amendment 1 (1991-09); EN 60439-2 (1993)

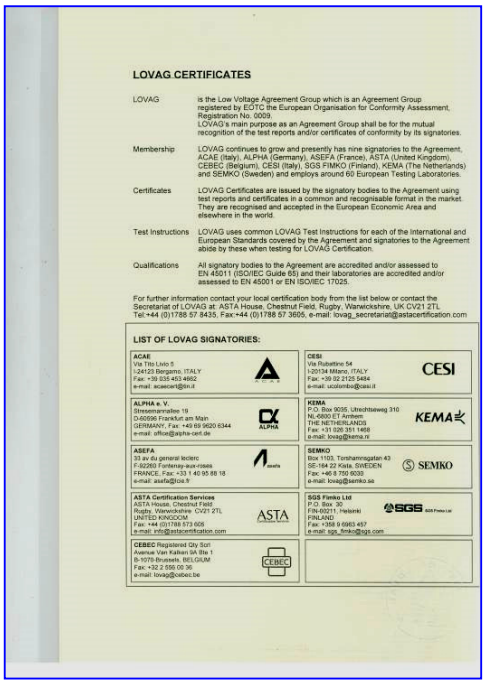
The results are shown in the Test Report in accordance to LOVAG. The values obtained and the general performance are considered to comply with the above Standard(s) and to justify the characteristic assigned by the manufacturer as stated below.

- Verification of temperature-rise limit (8.2.1)
- Verification of dielectric properties (8.2.2)
- Verification of the short-circuit withstand strength (8.2.3)
- Verification of the effectiveness of the protective circuit (8.2.4)
- Verification of the degree of protection (8.2.7) - IP 23

This document includes Report No.: 02.053
Issue Date: 2002.11.15

Responsible Certification Body

Mauro Marchi
Authorized Signature
Date: 2003.01.15



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Chapter

3

Product Description

THE PACKAGING INCLUDES

- Light blue pvc sections
- Metal suspensions with threaded steel insert
- Black ABS centre joints
- End or centre feed unit
- End cover
- Copper strap already cut at the correct length
- Tensioning device (spring)
- Possible fixing brackets

The AQ Trolley busbar system is an electric line for mobile applications with sliding trolley. The central part of the system is made up of a plastic structure which is provided in four-metres-length sections with the conductor not yet inserted. Infact, the copper strap is provided separately, winded up and already cut to the correct length. The installer can easily insert the conductor after assembling the central part of the system using the accessories given and following these simple instructions. The standard run can reach 100 metres length (200 m with the centre feed unit). For longer systems, special devices are available.

The AQ Trolley busbar trunking system has been specially designed for mobile applications in the field of lifting gears as, for example, bridge cranes. In comparison with other products on the market, the main innovation of our truck is that we can supply lines until 250A. The most important elements of this kind of electric line are its limited cost and the installation rapidity with the following reduction of installation costs, as well as the possibility to extend the line.

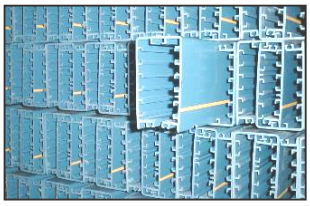
The working area features have to be in line whose of the polymers used during the printing/extrusion of the components that can successfully work with temperatures between -20 and +60 °C, both indoor or in the open air.

Uncorrect uses: Do not install in any case the AQ Trolley busbar trunking system in an explosive area. Do not install the line at a height lower than 3.5m from the floor or for areas accessible to the staff before adopting the precautions described in the paragraph titles "Safety Features".

Do not put any further load on the trolleys or structure as, despite its strength, they are designed to bear their own weight and that of their accessories.

Do not install the line in the open air or in areas subject to sprinklings of water or other liquids that could reach the line before adopting the instructions described in the paragraph titled "Installation in the open air". Contact the constructor for any doubt on the use of the system in special environment conditions.

Existing versions: the PVC structure allows to install up to seven conductors, included the equipotential bonding one (grounding). The copper strap is available in many different sizes and the conductors can be used as single or coupled to obtain different operating powers. The product versatility allows also to use one of the conductors as the neutral one.



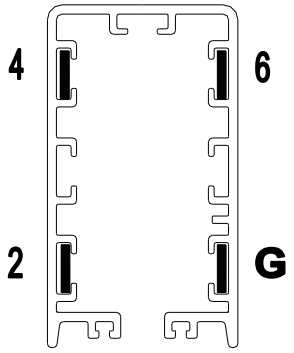
Important Security Note !

Comply with the position of the Neutral and Ground conductors!

Code	Nominal strength	Conductors size	Number of conductors		Conductors
AQCBLI070AMP	70A	1,2 x 13 mm	4	3P+G	②④⑥ G
AQCBLI070AMP5	70A	1,2 x 13 mm	5	3P+N+G	②④⑤ ⑥ G
AQCBLI100AMP	100A	2.0 x 13 mm	4	3P+G	②④⑥ G
AQCBLI100AMP5	100A	2.0 x 13 mm	5	3P+N+G	②④⑤ ⑥ G
AQCBLI130AMP	130A	2.4 x 13 mm	4	3P+G	②④⑥ G
AQCBLI130AMP5	130A	2.4 x 13 mm	5	3P+N+G	②④⑤ ⑥ G
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
AQCBLI200AMP	200A	2.0 x 13 mm	7	3P*+G	②③④ ⑤⑥⑦ G
AQCBLI250AMP	250A	2.4 x 13 mm	7	3P*+G	②③④ ⑤⑥⑦ G

* NOTE: In the systems with 7 bars, the phase conductors are coupled, while the ground conductor is single, no neutral conductor is present in these systems.

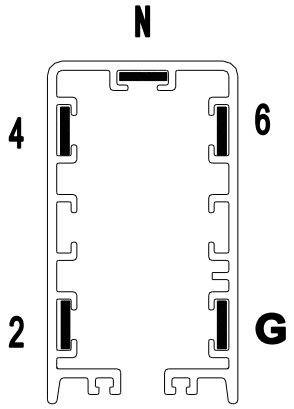
Disposition of the copper conductors



FOUR CONDUCTORS

3P + G

The ground conductor is in the lower corner on the right next to the yellow line.

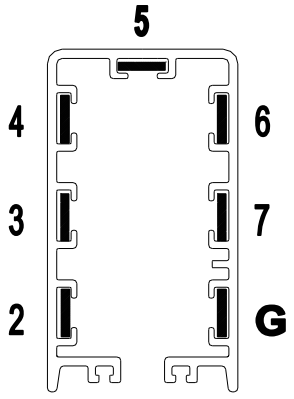


FIVE CONDUCTORS

3P + N + G

The ground conductor is in the lower corner on the right next to the yellow line.

The neutral conductor is in the upper part, in horizontal position next to the position 5.



SEVEN CONDUCTORS

3P + G

The ground conductor is in the lower corner on the right next to the yellow line.

To create the phases, couple the following conductors: 2+3 4+5 6+7

Chapter

4

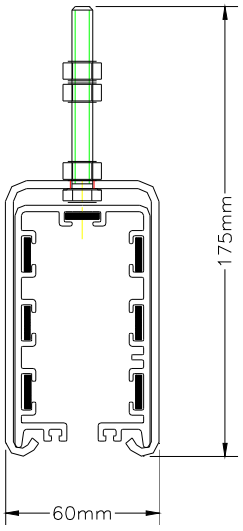
Installation and Connection

To carry out a security installation of the system the work of two people is needed and it is advisable to use a scaffolding and a jack-up platform..

The trolley drive arm can overcome possible differences of level along the run both in the lateral and height wise within few centimetres.

Fixing of the brackets. In case wall or girder brackets are used, they have to be fixed in such a way as to allow the system installation at the correct distance in order to make the arm fixed to the bridge crane meet the clamp of the trolley drive arm. It is important to pay attention to the brackets alignment both in the lateral and height wise. To support correctly the structure near the junction elements, the brackets have to be positioned every 2 metres so that the joints are at a distance between 30 and 50 cm from the suspensions.

Screw M8

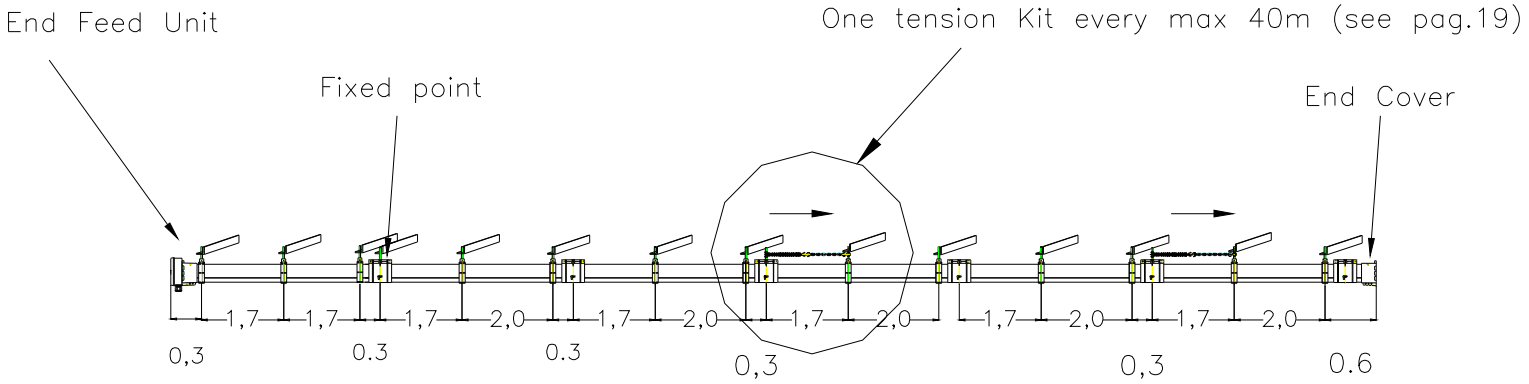


Suspensions installation: We supply you with two flanged nuts M8 each suspension. These flanged nuts are to be used for fixing the suspension but, before tightening the nut and the check nut, install the structure as described below in order to ensure the correct vertical alignment of the system.

The fixed point: the plastic structure has to be able to slide inside the suspensions to allow the regular expansion of the materials. The fixed point is created next to the power feeding point thanks to support joint. Every joint, once connected, has got a through hole in the upper part with an hexagon socketed shape in its inner side. The hole is designed for a galvanized screw 8x70 -supplied with the feeding kit- that has to be inserted with the head in the inner part and the threaded part to the exterior side and then the screw has to be tighten with a flanged nut. In the case a end feed unit is used, the joint fixed in this way has to be used to connect the first two parts of the system. In the case the centre feed unit is installed, the fixed points must be two: one for each side of the power feed unit.

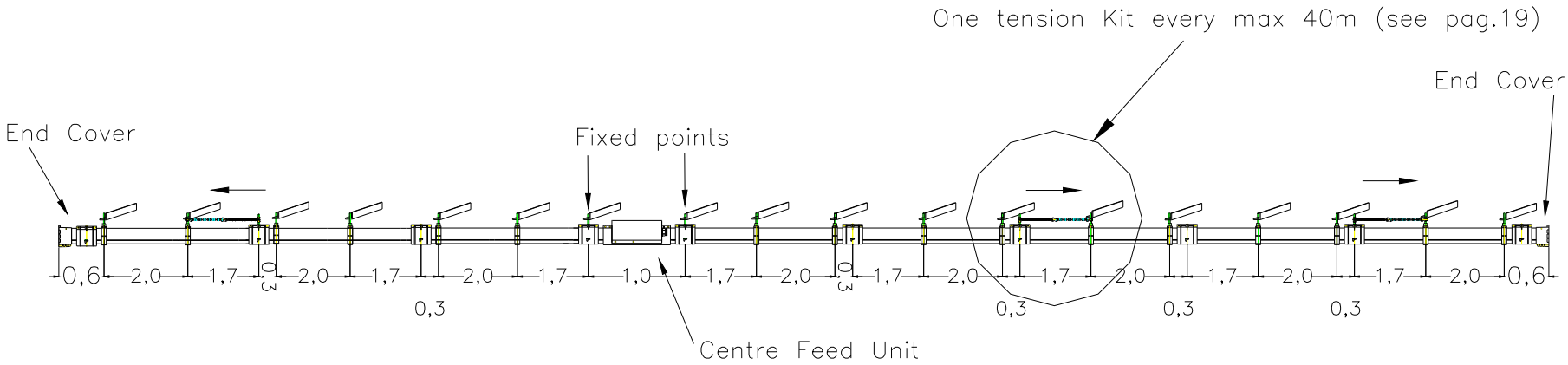
End Feed Line

Max length 100m



Centre Feed Line

Max length 100+100m



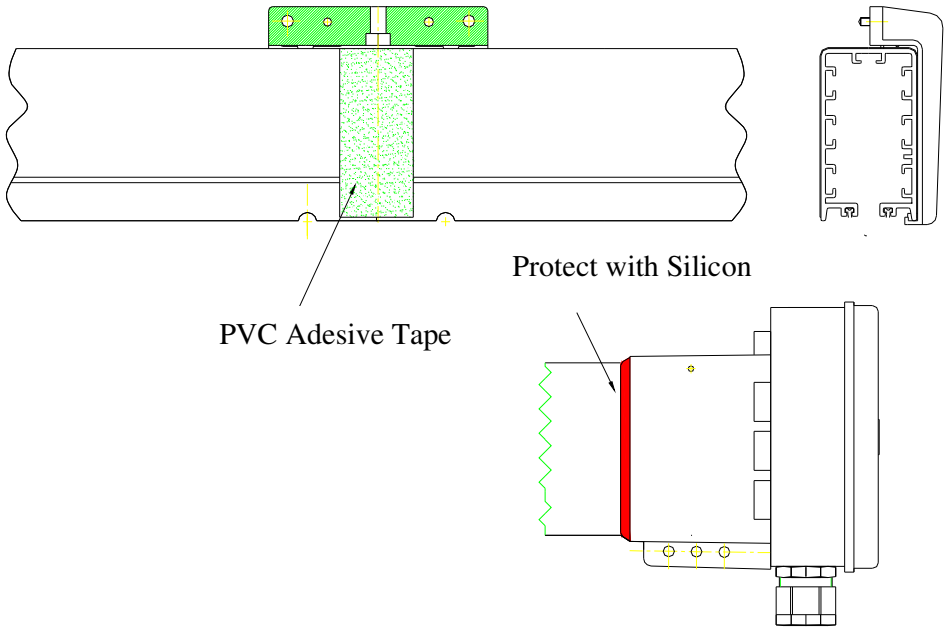
Fix the suspensions to the first section of the structure, the insertion is rapid and simple, by pressure and without bolts and screws. Insert the second section always by pressure. The yellow line on the right side of each part of the section indicates that the ground conductor must be inserted there. Evidently, every section must be installed in succession with the yellow line on to the same side.

Install the first joint to connect the first two parts of the section: fix the two elements of the joint to the section sides, directly where they have to be installed, insert the two flanged screws 6x20 given and tighten firmly the joint using the two flanged nuts M6. Note that at each end of the blue sections there is a milling in which the two notches in the internal inferior part of the joint must be inserted; they fix the sections lengthwise.

Open Air Installation In the case the AQ Trolley busbar system has to be installed in the open air, it is necessary to cover the junctions with PVC adhesive isolating tape, the correct width is 50mm: cut a 23cm-long piece and make it adhere along each junction line, leaving the lower part free in order to allow the trolley slide. The two elements of the joint have to be coupled regularly, on the adhesive tape following the instructions described above. The tape is available by our warehouse under the code SL3574. In this way the degree of protection will be IP13 and can be upgraded to IP23 installing also the protective gasket against fortuitous contacts the degree of protection. The gasket is described at page 19

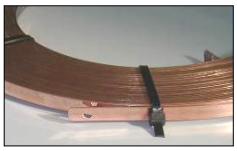
The junction point between the end feed unit and the structure must be properly sealed with silicone or another suitable bonding agent.

Junction section



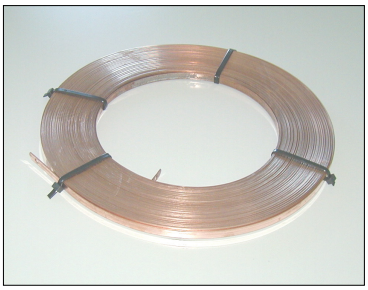
During the installation of the other parts and joints, set the height of the line adjusting the suspensions nut and check nut and tightening them definitively. Check the horizontal alignment.

It is advisable to fix the scaffolding uncoiler in horizontal position to ease the unrolling of the strap without any friction. Place the uncoiler next to each of the conductors that are being fixed.



The copper conductors are placed on the opposite side of that on which the end feed unit is fixed. Take the first strap coil, insert it in the uncoiler and cut the packaging clamps. The copper strap has already been cut and faced by the constructor. The hole for the connection to the power feed unit is useful during the installation phase for the sliding of the conductor through the insertion trolley(available on demand under the code SL3565).

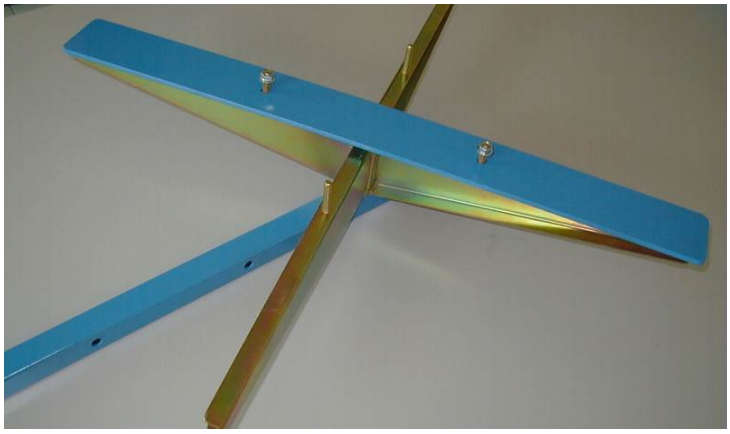
It is important to take away any possible burr due to the cut of the strap using a file in order to avoid any friction with the structure during the sliding.



The dummy brush of the insertion trolley can be pulled out easily. Unscrew the screw at its end, insert it in the strap hole and screw the brush. Place once again the brush in the trolley and put the first part of the copper wire in the correct part of the structure. Once a short rope has been fixed to the lower part of the trolley that sticks out the structure, a staff person from the ground drags the trolley and inserts the whole strap. Check at the top of the structure that the coiling of the copper wire is correct and without any obstacle. No lubricant is needed as the strap has already been refaced. Once the first conductor has been inserted, extract the trolley and carry out the same procedure for every conductor. Pay attention to the position of the neutral and ground conductors that have already been fixed by the constructor.

Note:

The uncoiler and the copper insertion trolley are always available at a really low price and are essential material for the installation..

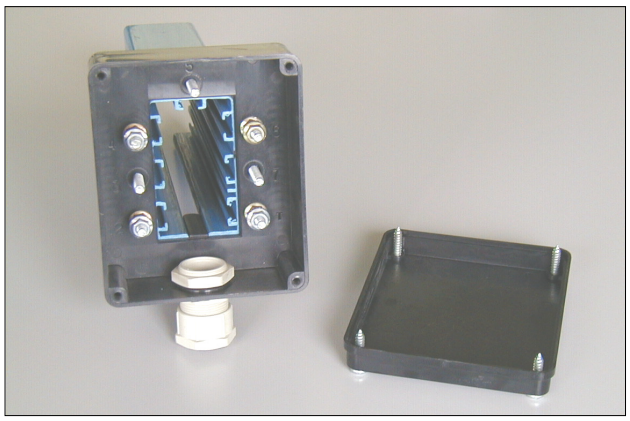


Uncoiler

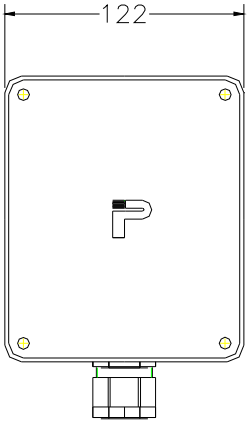
(code AQSVOLGITORE)

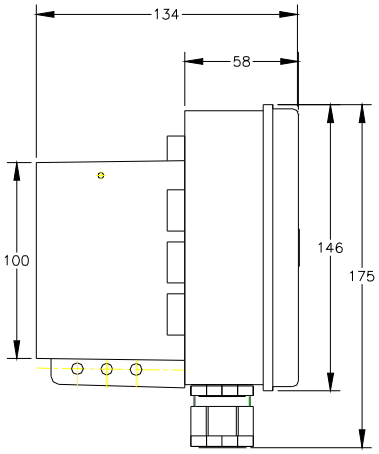
End feed unit. Open the power feed unit. Inside it you will find the threaded bars in the abs structure on each of which there are three nuts. Fix the end feed unit to the bar tightening the two little screws and the bolt on the lower part.

At this point, unscrew only the first nut of each threaded bar and check that the other two nuts are firmly tightened. Bend with a 90° angle the end of each conductor and make it go back into the strap inserting the threaded part in the correct hole. The electrical connection has to be installed with eyelet terminals that will be inserted in the threaded bars. During this phase pay attention to the ground conductor that must be placed next to the yellow line on the external side of the PVC structure. Tighten firmly every nut to ensure a correct electrical connection. Close the lid of the power feed unit with the four given screws.



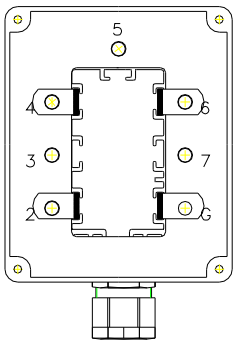
Overall dimensions of the end feed unit:



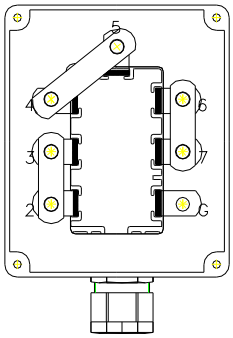


Electric connection:

with four conductors 3P+G



with seven conductors 3P+G



Centre feed unit (for more than 100m-length lines).

During the installation of the structure it is necessary to leave about 1m-space where the centre feed unit is to be placed. Then, insert in this point the two sections equipped with the millings and support joints that will be fixed to the structure to support the power feed unit and create two fixed points in the system by the sides of the power feed unit itself.

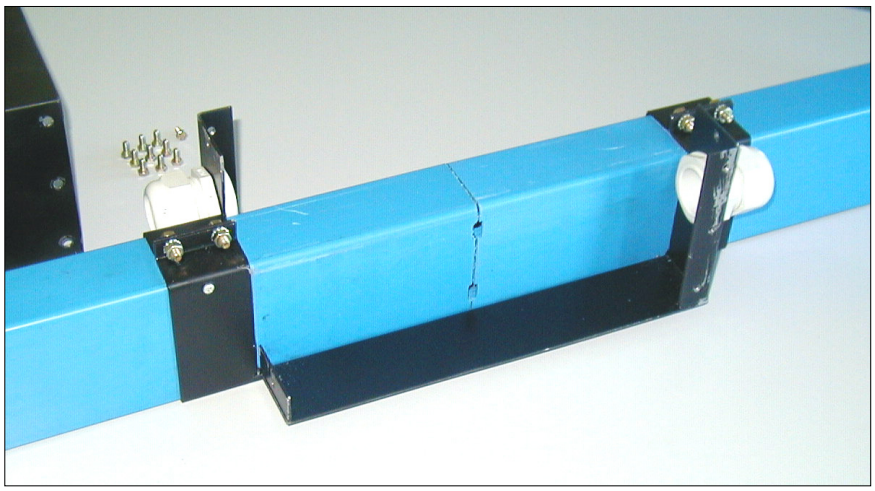
Before installing the milled elements, insert the copper strap of every phase in the line starting from the ends. When there are still the two ends of the wire strip with the hole next to the feed point leave them stick out in the middle for about 60cm: the length needed to insert them in the two milled elements.

Now insert the two milled elements and make the strap slide inside them leaving it stick out the milled slits and form 90° angles.

Install the first part of the power feed unit fixing it with 4 screws TCEI 6x16 and 4 nuts.

The maximum length of the copper conductor segment without interruptions is 100m. For longer distances it is advisable to install a centre feed unit or to use a different conductor size. For further information ask our technicians: they will suggest you the best solution.

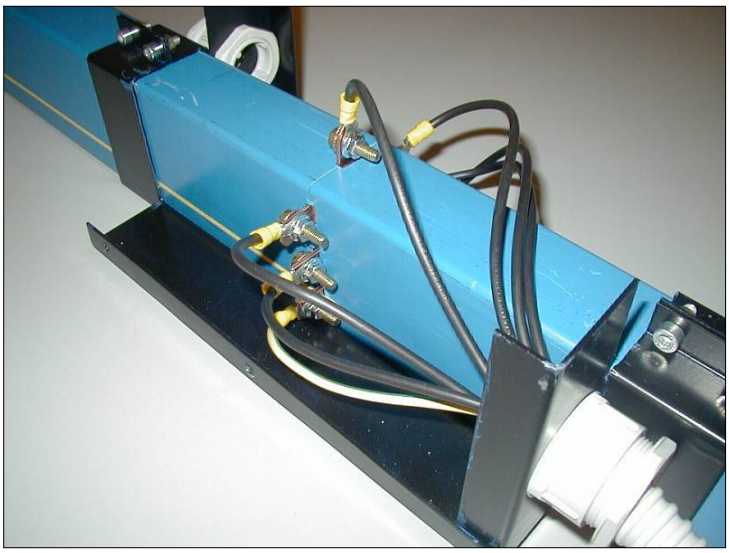
SUGGESTION: The installation of double draft trolleys ensures the supply with no micro interruptions also in case of centre feed unit crossing.



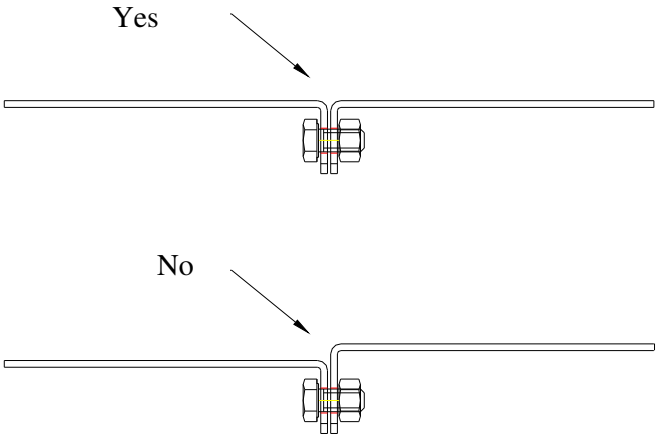
Block the wire strips so that in the inner part they are aligned and without any difference in level, shorten them, place them next to one another and make a 6mm diameter hole.

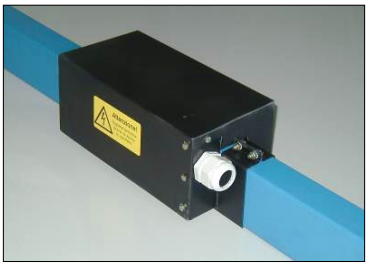
Install the electric connection using eyelet terminals, screws and nuts. Tighten firmly every nut to ensure a correct electrical connection.

(See the picture in the following page)



The main asset of this kind of line is, as said before, its continuous copper bar. This only junction has to be made with the utmost care: in fact, it is necessary to reduce to the minimum the gap between the two parts of the conductor that could otherwise cause the early wear and tear of brushes and trolleys.



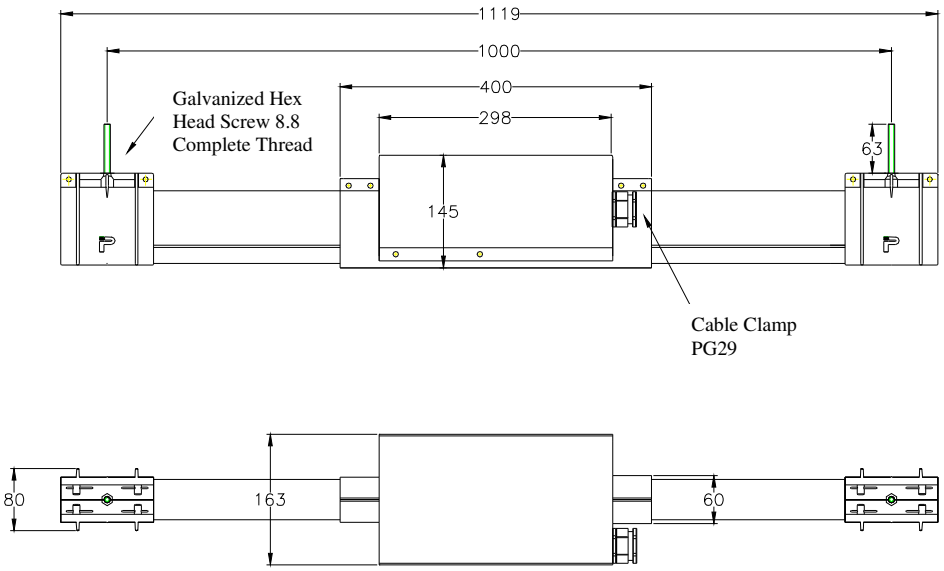


Once the connections have been completed, close the metal lid of the power feed unit with the screws given.

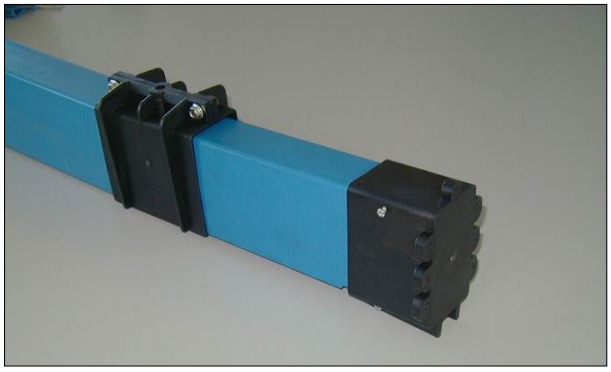
Important Security Note !

The line must be correctly protected by the circuit breaker and the differential gear.

Overall dimensions of the centre feed unit:



The end cover is an accessory that has to be installed on the side of the line opposite to the feed point. It is made up of a blue structure and a black lid. It's purpose is to protect the final part of the line. When a centre feed unit is installed the terminal covers are two.



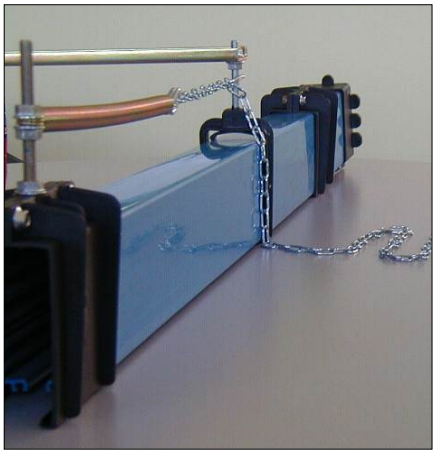
Note:

The copper of the conductor and the PVC of the structure are materials that respond to the temperature changes in different ways and with different expansions. The suspensions are designed to support the structure without blocking it and to allow it to expand an slide lengthwise. As far as the copper is concerned, it has its fixed point by the side of the power feed unit, but it can slide inside the structure towards the end cover filling the place of the end cover. During the installation, make sure that there is enough space for the copper to expand, whether there is not, please cut the wire to the correct length.

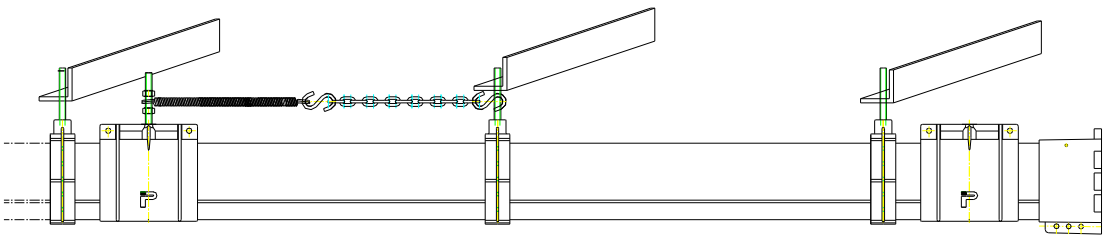
The purpose of the tensioning accessory is to keep the busbar well outstretched in order to allow the elements to expand and slide in the suspensions. The tensioning kit has to be installed between the second last joint and the second last suspension. The other tensioners must be installed along the line, with a maximum distance of 40m between one another and verifying that the traction direction is towards the end cover. In case a centre feed unit is installed, the tensioning kits have to keep the structure outstretched working on the two terminal covers. Install the centre tensioners at a maximum distance of 40m.

THE TENSIONING KIT INCLUDES

- a spring
- a chain
- two S hooks
- a galvanized hex head screw (8x70)
- three flanged nuts M8



To install the tensioning system, insert a screw up-side-down in the second last joint and follow the same instructions as for the creation of a fixed point in the line. This time the screw will only be used to hook the spring and will not be fixed to the support structure. Now insert the spring in the projecting joint screw and fix it with two nuts. Unite the other end of the spring with the chain using one of the S hooks given. Use the other hook to anchor one link in the chain to the second last suspension that will be less than two metres far from the joint with the projecting screw.

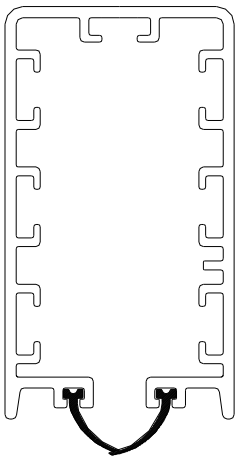


The spring has to be stretched, whether it is not, please shorten the chain. The tensioner is effective when it tends towards the end of the structure, that is to say towards the side opposite to the fixed point created next to the power feed unit.

Important note!

The line must have just one fixed point next to the end feed unit, never use joints to support the line as the notches inside the joint will obstruct the thermal dilatation of materials. In the installation of the centre feed unit the fixed points are two and are positioned directly at the sides of the power supply and the materials will expand towards the ends of the line.

Insertion of the protective gasket: the black PVC gasket is an optional accessory. It is advisable to use it when the line is installed in dusty areas or when sprinklings of water or other liquids can reach it from below. It is not necessary when the line is installed in the open air.



The gasket has to be inserted in the slit in the lower part of the structure and the two edges of the gasket must overlap along the whole length. The trolley will open, but they will immediately close behind it.

This gasket allows the installation of the line at heights accessible to the staff and/or in presence of small sprinklings coming from any direction (even from below). If the gaskets are installed as described at page 12 of this manual, their degree of protection is IP23.

Suggestions for the insertion of the PVC gasket

The first gasket will be inserted with extreme simplicity in the structure, while the second one tends to adhere to the first one, this is one of the features that determined the choice of the material. To ease the insertion, it is advisable to follow these instructions:

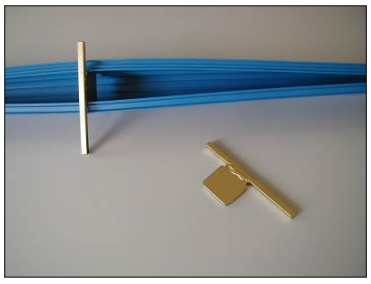
1. Insert the first part of the gasket in only one side of the structure, the right or left side.
2. Cut the gasket that has to be inserted in the other side in three-metres-long segments in order to prevent the friction during the following insertion phase.
3. Insert one segment of gasket at a time making them slide to the end one after the other.

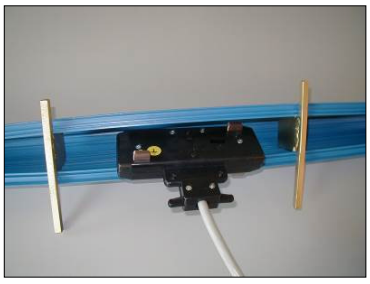
Trolley system

For the codes see page 31

Kind of trolley	Nominal strength	Kinds of compatible lines		Conductors involved
four brushes trolley (without case)	30°	3P+G	Lines 70A / 100A / 130A	②④⑥ G
five brushes trolley (without case)	30°	3P+N+G	Lines 70A / 100A / 130A	②④⑤ ⑥ G
seven brushes trolley (without case)	70A	3P+G	Lines 200A / 250A	②③④ ⑤⑥⑦ G

To slot in the trolley, first of all check that the voltage is not applied. The insertion of the trolley can be facilitate by sliding it at the end of the line after removing the end cover or in any other part of the line (avoiding the junction points where they are overlapped by the structure) following these instructions: spread the structure using the flat part of two insertion brackets at a distance of about 50cm from one another and turn by 90°, insert the trolley always paying attention to the ground contact brush on the side of the corresponding conductor. Anyway, in case the trolley is slotted in in the wrong way the tag shape projection on one side of the trolley obstacles the sliding.

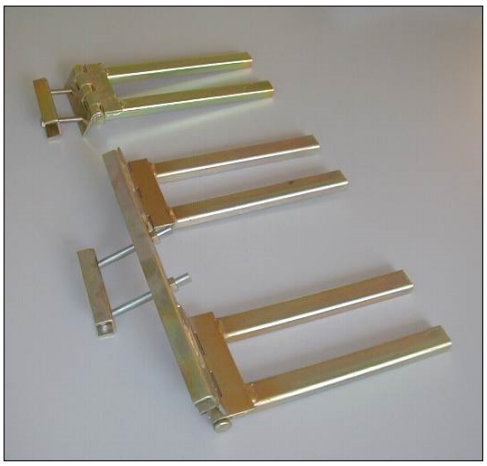


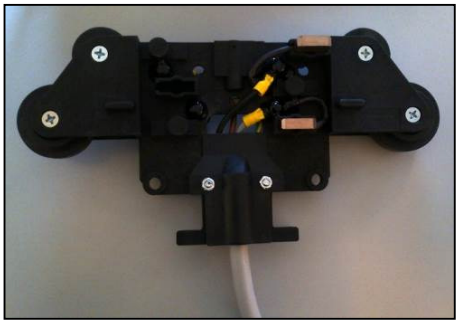


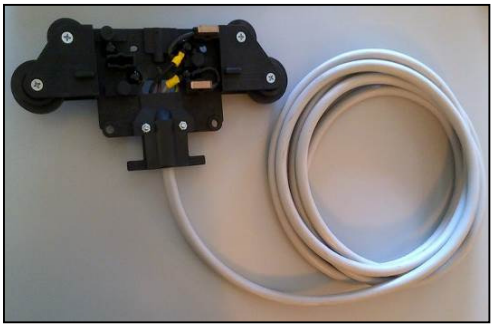
At any rate, DO NOT open the trolley : the internal cabling is particularly complex also due to the presence of the springs that pull the brushes.

How to carry out the electric connection according to the installed trolley :

- 30Amp trolley with 4 or 5 conductors: use the cables already placed out of each trolley.
- 30+30Amp double trolleys with 4 or 5 conductors: couple the cables already placed out of each trolley.
- 70Amp trolleys with 7 conductors: use the clamps in the connector block.



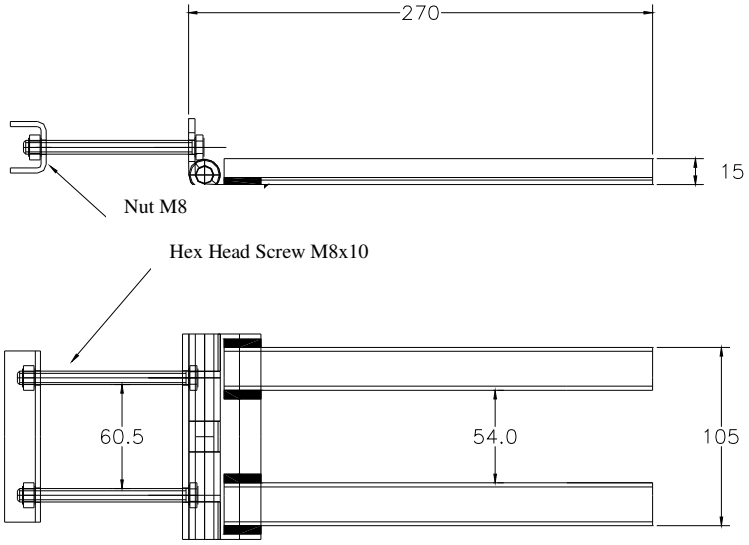




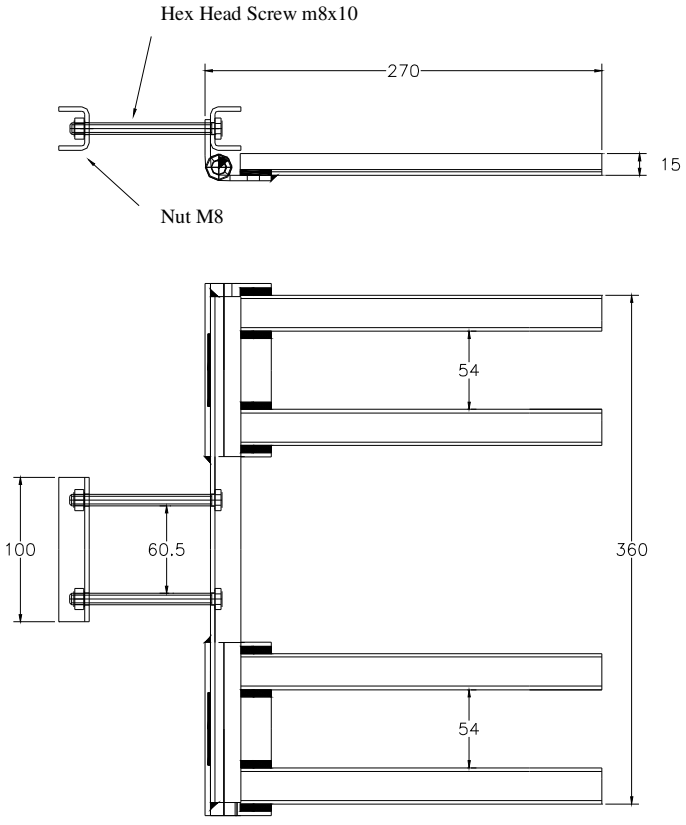
Fixing of the drive arm. Special attention must be given to the fixing of the trolley drive arm: please note that the arm is free in the vertical wise in order to overcome the small differences of level in the line. Considering the length of the bars, considerable horizontally deviations are also possible. Special attention must be given to the staple which ends have to be always inserted in the lower part of the trolley and should not find obstacles (structure elements) on its path.

Apply voltage to the AQ trolley electric line only after having checked its correct installation. Carry out an operational testing along the whole length: in particular, check that the trolley slides freely. For possible problems, see the paragraph "Problem Solving" of this manual.

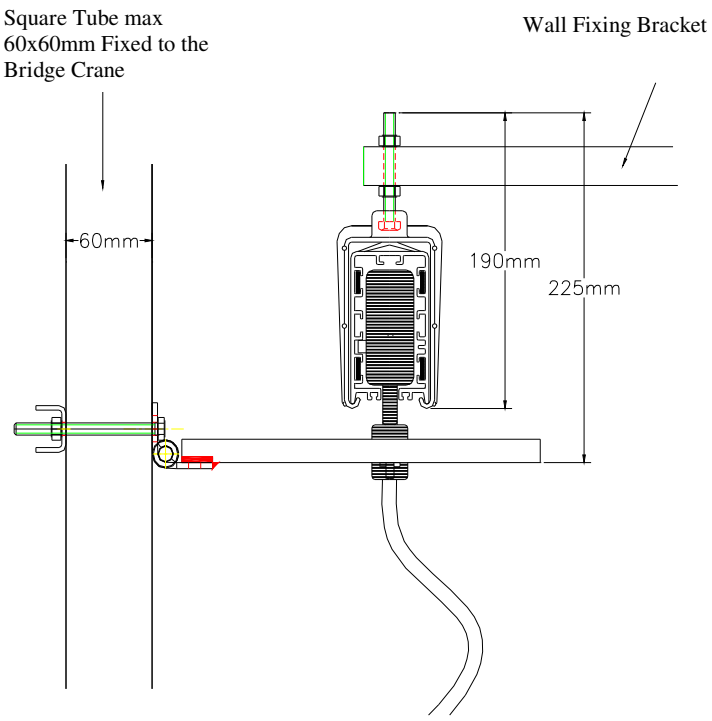
Overall dimensions of a simple drive arm:



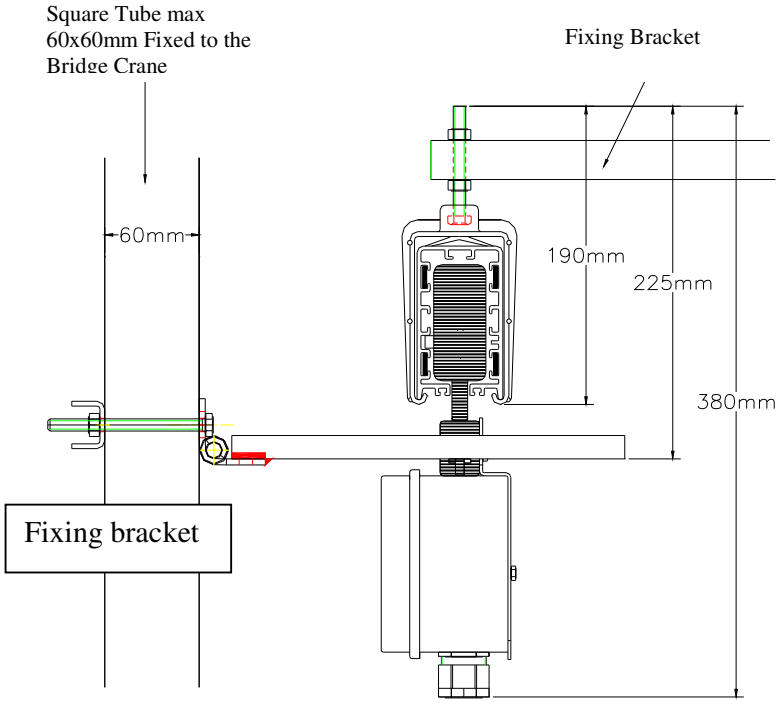
Overall dimensions of the double drive arm:



Overall dimensions of the 30Amp 3P+G trolley once installed:



Overall dimensions of the 70Amp trolley once installed:

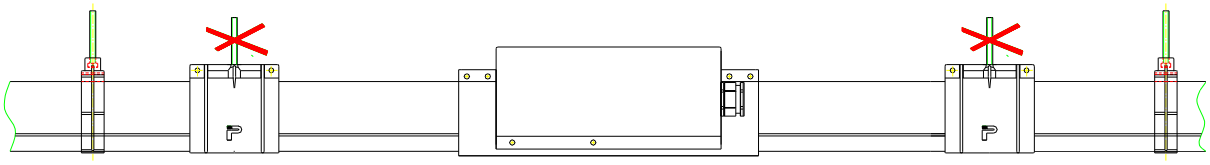


Instructions for the extension of an existing line

To extend an already existing line two different procedures are possible:

through a centre feed unit

In this case, to extend the line it is necessary to buy the structure, the copper bars and a centre feed unit that is not to be used to feed the line, but only to connect the ends of the copper bars easily. In this way, the connection will be protected by the metal case. The centre feed unit must be supported by two brackets without inserting any screw in the joints (as described at page 15) in order not to obstacle the extension of the elements.



Through the soldering of the copper bars

The copper bars can be jointed simply soldering the ends that have to be united and carefully file and polish the soldering. In this way, it won't be necessary to buy the centre feed unit.

In calculating the length of the structure it is necessary to take into account that the power feed unit and its two shot bars cover a tract of 1m. At any rate, to install the extension, one or two PVC bars have to be slipped off to reach the conductors. Then, install the bars again with a different order, when necessary, to re-create the length wanted. The same instructions are valid for the conductors length. For any further explanation, please contact our trade office.

When the line has got one or more joint it is advisable to use double trolleys to avoid possible feeding micro-interruptions that could interfere with electronic equipment installed on the machine such as inverters, PCs, weighing instruments or others.

After the extension, always check the tensioning springs.

Important note!

In case of the extension of a line already feed in a centre point, only the soldering extension method is possible. Otherwise the copper bars would not be able to slide inside the structure due to the thermal dilatation and the line would tend to bend.

Chapter 5

Declaration of conformity

Constructor: PIZZAMIGLIO SRL

Via degli Imprenditori, 79

37067 Valeggio sul Mincio (Verona) - ITALY

Product: **AQ TROLLEY busbar trunking system**

The constructor declares under its own responsibility that the product described in this manual, if installed and maintained in accordance to the rules in force, its stated purpose, the instructions of the constructor and the state of the art, complies with the following Directives:

73/23/EEC	On the approximation of the laws of the Member States relating to electrical equipment to be used within certain voltage limits.
89/336/EEC	On the approximation of the laws of the Member States relating to electromagnetic compatibility.
93/68/EEC	On the EC marking of the electric equipment to be used within certain voltage limits.
IEC EN 61000-2-4	On the electromagnetic compatibility (EMC) - Part 2: Environment - Section 4: Compatibility levels in industrial plants for low-frequency conducted disturbances.
IEC EN 60439-1	Low-voltage switchgear and control gear assemblies (LV) - Part 1: Type-tested and partially type-tested assemblies(TTA and PTTA).
IEC EN 60439-2	Low-voltage switchgear and control gear assemblies (low-voltage switchgear) - Part 2: Particular requirements for busbar trucking systems.

Valeggio sul Mincio, 25 July 2002

Pizzamiglio srl

Chief Executive Officer

Renato Pizzamiglio

Chapter

6

Technical Features

The materials used in the structure extrusion is polyvinyl chloride (PVC), the phase, neutral and protective conductors are always copper made.

Product name	70 A	70 A	100 A	100 A	130 A	130 A		200 A	250 A
Number of Conductors (No)	3P+G	3P+N+G	3P+G	3P+N+G	3P+G	3P+N+G		3P+G	3P+G
Phase Conductors Size Cu (mmq)	15.6	15.6	26	26	31.2	31.2		42	62.4
Equipotential Bonding Conductor Size Cu (mmq)	15.6	15.6	26	26	31.2	31.2		21	31.2
Rated Current (A)	70	70	100	100	130	130		200	250
Rated Current (V)	500	500	500	500	500	500		500	500
Rated Frequency (HZ)	50/60	50/60	50/60	50/60	50/60	50/60		50/60	50/60
Phase Resistance R [mΩ/m]	1.105	1.105	0.663	0.663	0.552	0.552		0.332	0.276
Phase Reactance X [mΩ/m]	0,285	0.285	0.252	0.252	0.240	0.240		0.126	0.120
Phase Impedance X [mΩ/m]	1.141	1.141	0.709	0.709	0.601	0.601		0.355	0.300
Rated short-time Current ICW [kA]	3	3	4.5	4.5	6	6		7.5	11
Rated Peak Current Ipk [kA]	4.5	4.5	6.75	6.75	10.2	10.2		12.75	22
Resistance of the fault loop Ro [mΩ/m]	1.3	1.3	0.76	0.76	0.6	0.6		0.63	0.46
Reactance of the fault loop Xo [mΩ/m]	1.01	1.01	0.87	0.87	0.64	0.64		0.71	0.28
Impedance of the fault loop Zo [mΩ/m]	1.65	1.65	1.16	1.16	0.88	0.88		0.95	0.54
Degree of Protection	IP 13	IP 13	IP 13	IP 13	IP 13	IP 13		IP 13	IP 13
Degree of Protection with Gaskets*	IP 23	IP 23	IP 23	IP 23	IP 23	IP 23		IP 23	IP 23
Working Temperature min/max (°C)	-20 +60	-20 +60	-20 +60	-20 +60	-20 +60	-20 +60		-20 +60	-20 +60
Maximum Length without Interruptions of the Conductors (m)	100	100	100	100	100	100		100	100
Max Trolley Speed (m/min)	120	120	120	120	120	120		120	120
Casing weight comprehensive of conductors (Kg/m)	2.2	2.4	2.6	2.7	2.7	3.1		3.2	3.6
Profile dimensions width x height (mm)	52x95	52x95	52x95	52x95	52x95	52x95		52x95	52x95

* with the junction made according to the instruction at page 12. The technical data are indicative and can be changed for technical reasons without notice.

Chapter

7

Safety features

The Trolley AQ busbar trunking system must be always upstream protected by the suitable circuit breaker and the differential gear.

The part of profile that includes the copper conductors is in PVC: an highly insulating material. Any possible support structure, metal brackets or others need a proper grounding of the system according the rules in force.

According to the IEC 70-1, the degree of protection of the line is IP13. In the lower part of the profile there is a port for the trolley sliding which dimensions are less than 12mm. For a better security and according to the elasticity features of the profile, if the line is installed at a **height lower than 3.5m** from the floor or areas accessible to the staff, it is necessary to install the protective PVC gasket following the instructions in chapter 3. With these accessories the product has a IP23 degree of protection.

For the **open air installation** it is necessary to cover every profile joint with a strip of adhesive isolating tape.

The protective gaskets are needed in areas subject to **sprinklings of water or other liquids that could come from below** and reach the AQ trolley electrical line.

Installation advice

During the installation please follow security information by the Risk Prevention and Protection Unit using, in particular, approved ladders, scaffoldings or platforms and personal protective equipment according to the rules in force.

Code of Conduct: wear accident-prevention equipment according to the rules in force; use only approved ladders, lifting platforms or other similar devices; open the devices with the utmost care in order not to create dangerous situations for people or things; dispose of the packaging according the rules in force in the country where the installation is carried out.

Residual Risk

Despite the solutions adopted during the product design phase, some risks still remain for the installation and maintenance staff, mainly due to the electricity and to the features of the installation area:

Electrocution in case the trolleys are inserted when the voltage is still applied, the same can happen if a finger or any other foreign object is inserted in the trolley sliding port when voltage is applied.

Fall from high structures The staff could fall during the installation and maintenance phase if they do not use approved ladders, scaffoldings or platforms and or personal protective equipment.

Usage instructions

A part from the standard procedures regarding the use of electrical equipment, the installer has to explain the user the following aspects regarding the personnel safety: do not allow any non-qualified member of the staff carry out maintenance on the AQ Trolley electric line; do not make any intervention on the line when the voltage is still applied, do not insert fingers or any other foreign object in the profile or sprinkle water or other substances towards it .

Chapter

8

Problem Solving

SWITCH OFF THE TROLLEY VOLTAGE BEFORE CARRYING OUT ANY MAINTENANCE ACTIVITY.

Problem: The profile line is not aligned and tends to bend.

Possible causes: There have been normal material extensions, mainly on the copper bars and the tensioner (spring) has not been installed correctly. Check that it acts with a force that tends towards the end of the line, where the end cover is installed. Check that the spring is stretched. Make sure you haven't use, in any part of the line, junction elements as hangers, in this case you would have created more than one fixed point.

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Problem: The end cover is expelled and it falls to the ground.

Possible causes: There have been normal material extensions, mainly on the copper bars and the tensioner (spring) has not been installed correctly. Shorten the copper bars by the end side of some centimetres. The last part of the profile, about 25cm long, provided together with the end cover, has to be empty to allow room for the conductors to extend.

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Problem: The trolley "blazes up" next to the centre feed unit.

Possible causes: There is a gap in the junction of the two copper segments next to the centre feed unit. Align the conductors in the junction point to eliminate the gap.

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Problem: The trolley does not slide freely inside the profile.

Possible causes: The trolley has been probably slotted in the wrong way: the tag shape projection on the trolley knocks against the purpose-made rib inside the profile. This rib has been expressly created to prevent that, due to a wrong slotting in of the trolley, the current could be discharged on the ground contact with unconceivable serious consequences. Slot the trolley in the other way.

Or else, the trolley has been slotted in the right way, but only partially and the brushes haven't reach the correct sliding position.

Frequently Asked Questions

Q. Is it possible to have the line extended at a later date?

A. Yes, it is; using a copper conductors joint similar to a centre feed point and creating, where necessary, another feed point or soldering the extension conductors. Contact the constructor for further information.

Q. Is it possible to install more than one trolley on the same line?

R. Yes, it is; as long as they do not exceed the line nominal flow-rate.

D. Is it possible to install not-bended lines?

A. No, it isn't with this kind of product.

Installation equipment

We have designed some tools to ease the copper strap insertion: an uncoiler for the copper strap and the copper insertion trolley equipped with a dummy brush to which it is possible to fix the end of the strap, in this way it is more easy to lug it from the ground.

The trolleys can be slotted in the profile from the end or any other part of the line far from the joints thanks to a bracket that spread apart the profile without damaging it. ALWAYS SWITCH OFF THE VOLTAGE BEFORE THE TROLLEYS ARE SLOTTED IN .

These tools are supplied on demand, our trade office will provide you with any information you will need:

SL3565	TROLLEY FOR THE COPPER WIRE INSERTION (to be used only during the installation phase)
SL3569	SPARE DUMMY BRUSH FOR THE INSERTION TROLLEY WITH SCREW
AQSVOLGITORE	UNCOILER FOR THE COPPER WIRE
SL3567	BRACKET FOR THE TROLLEY INSERTION (to spread the profile)

Trolleys and Spare Parts

The line parts that wears out most are the feed elements and especially the brushes. As the cabling of any bush needs the utmost care, it is always advisable to substitute the whole trolley. Moreover, the wear and tear of the brushes is the sign of a prolonged dragging of the trolley that will be in the same situation.

AQCARBRATR35/1	TROLLEY WITH WHEELS WITH TOWING ARM 30A FOR SYSTEMS WITH 4 CONDUCTORS (3P+G)
AQCARBRATR35/1.5	TROLLEY WITH WHEELS WITH TOWING ARM 30A FOR SYSTEMS WITH 5 CONDUCTORS (3P+G)
AQCARBRATR35/2	DOUBLE TROLLEY WITH WHEELS WITH DOUBLE TOWING ARM 60AMP FOR SYSTEMS WITH 4 CONDUCTORS (3P+G)
AQCARBRATR35/2.5	DOUBLE TROLLEY WITH WHEELS WITH DOUBLE ARM 60A FOR SYSTEMS WITH 5 CONDUCTORS (3P+G)
AQCARBRATR70C/S	TROLLEY WITH CONNECTION BOX AND TOWING ARM 70A FOR LINES WITH 7 CONDUCTORS
SL3609	TROLLEY WITH WHEELS FOR 4 CONDUCTORS LINES WITHOUT TOWING ARM (3P+G)
SL3622	TROLLEY WITH WHEELS FOR 5 CONDUCTORS LINES WITHOUT DRIVE ARM (3P+G)
SL3610	TROLLEY WITH WHEELS FOR 7 CONDUCTORS LINES WITH CONNECTION BOX WITHOUT DRIVE ARM
SL3563	CENTRE FEED UNIT WITH 4/5/7 CONDUCTORS
SL3574	BLACK PVC ISOLATING TAPE IMQ 50MM 25M ROLL (for outdoor installations)

We have been rarely asked for spare parts. Anyway, every element of the line is available on demand under the following codes:

SL3621	TRIPLE TOWING ARM FOR AQ TROLLEYS WITH CLAMP AND SCREWS
SL3620	DOUBLE TOWING ARM FOR AQ TROLLEYS WITH CLAMP AND SCREWS
SL3509	SINGLE TOWING ARM FOR AQ TROLLEYS WITH CLAMP AND SCREWS
SL3504	END COVER FOR AQ LINE (COUPLED)
SL3527	HANGER JOINT FOR AQ LINE AND TENSIONER
SL3505	CENTRE JOINT FOR AQ BLINDO
SL3524	COPPER STRIP 1.2X13
SL3531	COPPER STRIP 2.0X13
SL3532	COPPER STRAP 2.4X13
SL3502	PVC AQ PROFILE IN BARS 2m LENGTH WITHOUT CONDUCTORS
SL3501	PVC AQ PROFILE IN BARS 3m LENGTH WITHOUT CONDUCTORS
SL3500	PVC AQ PROFILE IN BARS 4m LEBGHT WITHOUT CONDUCTORS
SL3503	END FEED UNIT FOR AQ LINE WITH 7 CONDUCTORS
SL3506	PLASTIC HANGERS FOR AQ LINE WITH NUTS
SL3590	METAL HANGERS FOR AQ LINE WITH NUTS
SL3547	END FEED UNIT FOR AQ LINE WITH 4 CONDUCTORS

Chapter

9

Guarantee Conditions

The constructor guarantees its products for a 12-months period from the delivery date. This warranty covers only the free repair and replacement of those parts that, after a careful examination of the constructor are found to be faulty. The warranty, except for the responsibility for direct or indirect damages, covers the defective goods and is not valid for elements broken or repaired by other companies than the constructor. The elements subject to wear (trolley body and brushes) are not covered by the warranty. The removal or non-installation of the safety devices supplied with the line or those set by the installator (curcuit breaker and differential gear, grounding) will immediately make the Pizzamiglio Srl warranty decay. The warranty decays also in case the spare parts used are not original. The damaged parts, even if under warranty, must be returned carriage paid. For all the other guarantee conditions, refer to the sale contract.

Warehousing: if the line is not installed immediately, it is necessary to warehouse the components in a well-sheltered place. Pay special attention to the copper components and the trolleys.

Due to the constant improving of its production, Pizzamiglio Srl reserves the right to modify its products without notice. For this reason, the description and technical data of this manual do not represent an obligation. Pizzamiglio Srl reserves the right to make changes without notice.

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