



Product Catalog 2010

Contact line equipment for mass transit and main line railways

siemens.com/mobility

SIEMENS

Product Catalog 2010

Contact line equipment for mass transit and main-line railways

Preface

Systems and applications	01
User notes, addresses	02
Order number index	03
Index	04

Chap. 1

Standard Products

Tensioning equipment	01
Thimbles, connectors, sleeves	02
GRP cantilevers	03
Aluminium cantilevers	04
Steel cantilevers	05
Headspan supports	06
Insulators	07
Contact lines under structures and bridge protection	08
Clamps	09
Tension wheel equipment	10
Section insulators	11
Disconnectors and drive mechanism	12
Earthing and protecting equipment	13
Contact wires, conductors, span wires	14
Monitoring systems	15
Installation tools and equipment	16

Chap. 2

Obsolescent Products

Trolleybus	01
Other parts	02

Chap. 3

Preface

This Product Catalog 2010 – Contact line equipment for mass transit and main-line railways describes the products which Siemens provides for the construction of modern contact line systems that supply power to electric railways used for mass transit, main-line railways, industry and mining, trolleybus systems and truck trolley systems, as well as for systems of their customers.

With these products, it is possible to construct overhead contact line systems for railbound railways of all kinds, such as:

- Vertical catenary systems,
- Trolley-type systems,
- Longitudinal span wire systems,
- Overhead contact line systems in tunnels and under structures and
- Overhead conductor rails

as well as overhead contact line systems for electrically driven road vehicles, such as overhead contact lines for trolleybus systems or trucks with hybrid-drives in open-cast mines.

This product range covers the usual power supply voltages between 600 V DC and 3000 V DC for mass transit and up to 25 kV AC for main-line railways in accordance with the standards listed in the Chapter „User notes, addresses“.

The components for cantilevers and supports basically are divided into three types:

- Products of copper-aluminium alloys combined with rods and tubes of glass-reinforced plastics
- Products of aluminium alloys combined with aluminium tubes and composite, cast resin insulators or GRP loop insulators
- Products of hot-dip galvanized malleable cast iron combined with steel tubes and composite, cast resin, ceramic insulators or GRP loop insulators

The further products like tensioning equipment, insulators, tension wheel equipments, section insulators etc. have to be selected according to the desired system design. Factors like mechanical, electrical, operational, architectural and environmental requirements as well as life cycle costs affect dimensioning, material and design of the products.

We are continuously developing and expanding our range of products and are thus in a position to offer products that reflect high quality and the latest state of the art.

The present catalog contains up-to-date products, which cover the current needs and new developments. Nevertheless, should you require older products, Siemens will offer alternative solutions compatible with your system.

In addition to the technical information provided in this catalog, we are happy to make our years of experience available to you in the form of consulting and planning help. We will support you in the use of our products in conjunction with project planning, construction and operation, as well as with dimensioning and proper use in overhead contact line systems.

This catalog has been prepared with the greatest of care, but errors and omissions cannot be ruled out entirely. If you have any questions, please feel free to contact your regional Siemens AG sales office.

Catalog outline

General

In the Chapter General you can find an overview about our systems and their typical application, notes for using the catalog as well as the index and the order number index.

Standard products

This catalog is structured according to the functions of the individual products in an overhead contact line system:

Tensioning equipment

Products, that are required to make up headspans as well as terminations and fixed terminations in catenary systems and in trolley-type contact lines.

Thimbles, connectors, sleeves

Products that connect ropes and wires to each other and to other products.

GRP cantilevers

Products that are required for construction and attachment of GRP cantilevers.

Aluminium cantilevers

Products that are required for construction and attachment of aluminium cantilevers.

Steel cantilevers

Products that are required for construction and attachment of steel cantilevers.

Headspan supports

Products that are required for the assembly of contact wire and catenary wire supports in headspans of catenary systems and in trolley-type contact lines.

Insulators

Insulators for the various voltages and applications on cantilevers, in headspans and in contact lines.

Contact lines under structures and bridge protection

Products that are suitable for overhead contact lines in restricted spaces in tunnels or under structures.

Clamps

Products that connect ropes and wires to each other and to other components.

Tension wheel equipment

Products that tension overhead contact lines automatically to maintain constant tension forces.

Section insulators

Products that electrically separate overhead contact lines into individual sections while allowing the passage of pantographs along the catenary.

Disconnectors and drive mechanism

Products that are required for the feeding and connection of overhead contact line sections.

Earthing and protecting equipment

Products for traction current return and earthing of system parts, as well as for overvoltage protection and prevention of stray currents.

Contact wires, conductors, span wires

Products for overhead contact lines, such as contact wires, various ropes, and wires.

Monitoring systems

Components for monitoring systems such as the Catenary Monitoring System and Disconnector Monitoring System.

Installation tools and equipment

Typical special tools, measuring and test equipment as well as operational safety concerning devices used for overhead line construction which differ from conventional tools.

Obsolescent Products

Trolleybus

Products adapted for the special conditions of trolleybus systems.

Other parts

Further components for special applications.



Chapter 01

Preface

Systems and applications	01	01-22
User notes, addresses	02	01-14
Order number index	03	01-16
Index	04	01-16

Expertise in contact lines – systems and components

Securing the competitiveness of cities and the growth of industrial locations – those are Siemens' goals. With „Complete Mobility“, we offer integrated transportation and logistics solutions for the safe, economically efficient and environmentally compatible transport of people and goods. Siemens possesses all the necessary expertise: for rail-based transportation ranging from infrastructure such as railway electrification and automation to rolling stock and intelligent solutions for road traffic control.

Siemens has set innovative milestones for electrically operated railway lines time and again:

1879	First electric railway
1882	First electric tram using an overhead contact line in Berlin Charlottenburg
1889	First electric tram equipped with bow pantograph
1905	First overhead catenary line
1911	First overhead contact line system with auxiliary catenary wire
1933	Locomotive built for the Höllentalbahn (first railway line operated with 20 kV / 50 Hz)
1960	Contact lines for a running speed of up to 200 km/h
1980	Major involvement in the development of overhead contact lines with aluminum components for DB's new high-speed railway network
1988	Contact line for high speed record of 407 km/h
2002	Sicat® H1.0: the first system to be certified under TSI Energy for the transeuropean high-speed network, implemented on the Cologne – Rhine/Main route and built for running speeds of up to 300 km/h

These Siemens innovations were important prerequisites for the development of electrically operated railway lines. Today's contact line systems have a high current-carrying capacity and enable railway operation at speeds of well over 300 km/h.



System and component expertise

With the experience we have gained over many years, we are one of the few providers of complete solutions for railway electrification – from consulting and financing to installation and maintenance.

Our comprehensive portfolio of products and services covers the whole range of modern railway electrification – for direct and alternating current systems for mass transit and mainline services at speeds of up to 350 km/h:

- Trams and light railways
- Metros
- Main line railways
- Industrial and mining railways
- Truck trolley systems

Tailor-made solutions take all project-specific requirements into account, including traveling speed, train headway, level of traction current, type of power supply and regenerative feedback, route topography, energy efficiency, civil engineering structures and climatic conditions.

Combined with the lowest possible investment and life cycle costs, our systems know-how ensures the consistent high quality of our contact lines. We advise our customers on the selection and design of electrification solutions that meet their specific requirements, while at the same time keeping costs down.



Sicat contact line systems – requirements and common features

A clear profile for efficient operation

Sicat® contact line systems are characterized by their functional design and their reliable, corrosion-resistant, low-maintenance components. The decisive benefit of our modular Sicat systems lies in the realization of customer-specific solutions employing universally applicable, service-proven components. This keeps investment and maintenance costs at a consistent minimum and creates systems which display a high level of availability.

Sicat – contact line systems for every task

Sicat contact line systems are designed to cover the entire range of requirements that may arise in connection with

- open line sections, tunnels, stations and depots
- all speed ranges
- various power levels.

Besides cost-effectiveness, a long service life and consistently high quality are the hallmarks of Sicat contact line systems. They facilitate high quality pantograph passage and meet both national and international safety standards.

Running speed	DC	AC
≤ 80 km/h	Sicat 3S (mass transit)	–
≤ 120 km/h	Sicat LD (mass transit)	–
≤ 140 km/h	Sicat SR (mass transit)	Sicat SR (main line)
≤ 160 km/h	Sicat SD (mass transit and main line)	Sicat LA (main line)
≤ 250 km/h	Sicat HD (main line)	Sicat SA (main line)
> 230 km/h	–	Sicat HA (main line)

Perfect technology – vast experience translated into efficient design

Whether disconnectors, elastic supports or electrically operated mechanisms, the crucial factors in the economic efficiency of components for contact line systems are not only their technical performance capability but also their long service life, which we can guarantee thanks to our well thought-out designs and use of corrosion-resistant materials.

However, there are also other benefits to consider: Components, such as the lightweight section insulator, are designed so that they can be installed with minimum personnel expenditure. That saves time and money. The latest generation of our tension wheel assemblies can handle tension forces of up to 40 kN, thus covering all requirements. Our vandal-proof, silicone composite insulators are a further example of our economically designed components. These insulators are encased in a flexible sheath which is resistant to mechanical influences. Extensive testing and the increasing number of certifications by rail companies around the world go to confirm the high level of acceptance of our components.



Sicat LD – DC overhead contact lines for urban lines

Sicat LD – many versions for just one function

Sicat LD unites the various preferred solutions for DC contact line systems for mass transit. Sicat LD has the following features:

- Catenary without stitch wire
- Auto-tensioned and fixed-tension single contact line
- Supports for overhead contact lines in the form of cantilevers, headspans or elastic supports
- Overhead conductor rail made of copper

Supports for overhead contact lines

Various designs are possible, depending upon the task, the technical and architectural requirements, and the investment capacity:

- Glass-reinforced plastic (GRP) tubes and bars, as well as copper-aluminium alloy fittings – fully insulating and corrosion-resistant for low maintenance costs.
- Aluminium can also be used as an alternative material in the cantilevers and fittings.
- Investment costs can be reduced by using galvanized steel for the cantilevers and hot-dip galvanized, malleable cast iron for the fittings.
- Our elastic supports are made of corrosion-resistant materials, such as copper-aluminium, aluminium and GRP.

Insulators

We use, almost exclusively, our proven, composite insulators for aluminium and steel cantilevers, as well as for headspans and terminations.

Contact line and headspan

- Contact wire made of copper or copper alloys
- Copper catenary wires for catenary systems
- Headspans and curve sections made of bronze or stainless steel in connection with insulators and GRP rods



Sicat LD – catenaries

The following criteria are major factors in deciding in favor of catenaries, in particular with regard to new lines and track upgrades:

- Transmission of high levels of electrical power through large transmission cross-sections in the longitudinal catenary system
- Reduced power losses, thanks to modular cross-section design such as the installation of a second catenary wire
- Avoiding additional feeder lines or feeder cables
- Greater distances between supports reduces the numbers of poles and foundations
- Uniform elasticity of the catenary system and little contact wire sag
- Reduction of maintenance work to a minimum, thanks to less wear on the contact wire and the carbon contacts
- High level of safety by suspending the contact wire in a vertical catenary system

Further criteria include the high level of operational reliability and the low number of feeding points.

Design

The simple catenary system is implemented using a vertical catenary system. The catenary wire runs vertically above the contact wire.

For optimum utilization of the traversing quality, the catenary is designed with separately tensioned contact wires and catenary wires. The fixed point of the catenary wire and of the contact wire as well as the tension wheel assemblies on both sides are included in the tensioning length.



Regular values	
Nominal voltage	up to 1.5 kV DC
Running speed	up to 120 km/h
Ambient temperature	-30 °C to +40 °C
System height	1.50 m
Contact wire acc. to EN 50149	AC-100 to AC-120, Cu-ETP/CuAg0.1
Catenary wire acc. to DIN 48201	up to 2× 150 mm ² , BzII/Cu-ETP
Dropper wire	10 mm ² , 16 mm ² , BzII
Contact wire tension force	10 kN at AC-100 12 kN at AC-120
Tension force per catenary wire	10 to 15 kN, depending on catenary wire cross-section
Span length	up to 65 m
Mechanical advantage reduction ratio of tension wheel assembly	1:3
Tensioning length	1500 m

Various combinations of catenary wire and contact wire are possible, depending on requirements and performance capability.

Catenary systems for a higher electrical load often consist of two catenary wires and one contact wire. The droppers are either of conductive or insulated design.

Supports can be economically installed as angled or straight cantilevers spanning two tracks.

Headspans can also be mounted on poles or buildings and similar structures – depending on the number of tracks to be spanned and/or the widths of roads or platforms.

Sicat LD – single contact lines

Single contact lines are especially suited to city centers with densely built-up areas and grand architecture or even listed buildings. They are also very practical for complex track arrangements such as can be found at inner-city intersections. By reducing the size of the contact line system to a minimum, the technical installation blends unobtrusively into the background of the urban environment.

The capacity of a single contact line largely depends on the cross-section of the contact wire used. Underground feeder cables or elevated feeder wires are laid to provide higher capacities.

Elastic supports enable the contact line to have a particularly low design height in tunnel systems and under bridges. The system's good traversing characteristics are comparable to those of a catenary contact line.

Design

As far as single contact lines are concerned, the contact line is suspended by:

- Bridle-and-pulley suspensions (with and without steady arms)
- Elastic supports
- Line hangers

Tensioning length of the single contact line includes the fixed point of the contact wire with the fixed point anchors as well as the tension wheel assemblies for the contact wire on both sides.

Regular values	
Nominal voltage	up to 1.5 kV DC
Running speed	up to 50 km/h (70 km/h)
Ambient temperature	-30 °C to +40 °C
Contact wire acc. to EN 50149	AC-100 to AC-120, Cu-ETP/CuAg0.1
Number of contact wires	1 or 2
Bridle-and-pulley suspension	synthetic wire
Tension force per contact wire	10 kN at AC-100 12 kN at AC-120
Span length	up to 35 m
– auto-tensioned with bridle-and-pulley suspension	
– fixed tension	up to 25 m
– with elastic supports	up to 12 m
Mechanical advantage reduction ratio of tension wheel assembly	1:3
Tensioning length	1400 m

Angled and straight cantilevers spanning two tracks have proven to be an economical solution in many projects. In inner-city areas, simple headspans help reduce the visual impact of contact line systems. These are used for tracks at intersections and near points as well as in depots.

Curve sections on bends in the track reduce the number of supports and make the contact line system less obtrusive.

Insulated line hangers are often used with fixed-tension single contact lines. These bear and guide the contact wire in just one component.



Sicat LD – special designs

We also offer contact line types suitable for special applications. Like any other electrification project, these systems depend on a number of local parameters. The majority of applications demand auto-tensioned overhead catenaries – sometimes with additional line feeders. Auto-tensioned single contact lines are also used, for example for bulk material bunkers or for loading tracks.

Mining / power industry:

- Lateral contact lines in the loading areas of power stations and opencast mines
- Bench contact lines for movable trackworks in opencast mines and dumping areas

Individually selected solutions ensure safety for people, the environment and the equipment.

- Overhead conductor rails made of copper in depots and tunnel systems
- Cantilevers with ceramic insulators for special environmental requirements
- Safety solutions for overhead contact lines for tracks in depots with roof work platforms
- Protective covers and protective insulation above overhead contact line systems when used on bridges and structures
- Special safety measures in connection with rail grounding and return current to minimize stray currents and avoid electric shocks
- Depots: Swiveling overhead contact line sections in maintenance and repair halls

The same principles apply to the technical design as to those in public transportation.



Sicat LA – AC overhead contact lines for simple applications

Sicat LA is a cost-effective type of overhead line for AC railways. It is used on main lines with low to medium power demands. It is particularly attractive for the electrification of lines previously served by diesel vehicles and for system modernization.

Design

Sicat LA is characterized by the simple design of its contact line system and the use of low-cost, standard components with good traversing characteristics.

- Use of cantilevers made of aluminum or hot dip galvanized steel
- Use of registration tube droppers between catenary wire support and registration tube
- Contact wire and catenary wire auto-tensioned together
- Increased power supply thanks to use of feeder lines
- Elastic supports where there is a shortage of space in tunnels or under structures

Regular values	
Nominal voltage	15 kV AC / 16.7 Hz 25 kV AC / 50/60 Hz
Running speed	up to 160 km/h
Ambient temperature	-30 °C to +40 °C
System height	1.80 m
Contact wire acc. to EN 50149	AC-100, Cu-ETP
Catenary wire acc. to DIN 48201	50 mm ² , BzII
Dropper wire	10 mm ² , bronze, highly flexible
Contact wire tension force	10 kN
Catenary wire tension force	10 kN
Span length	up to 80 m
Distance between droppers	12 m
Mechanical advantage reduction ratio of tension wheel assembly	1:3
Tensioning length	up to 1500 m



Sicat SR – aluminium overhead conductor rail

The Sicat SR overhead conductor rail is mainly designed for use in tunnels and under bridges as well as in maintenance halls and depots. It is positioned on the roof of the tunnel and represents a low-cost, space-saving alternative to other overhead contact systems. It can also be used for track sections with swiveling overhead contact lines in depots.

The overhead conductor rail consists of a rigid aluminium profile and a clamped contact wire.

- Low design height compared to single contact and overhead catenary lines
- The safety measure for traction system grounding is simplified by elimination of the overhead line section
- No need for tension wheel assemblies for contact wire and catenary wire
- Simple design thanks to use of few components
- Long lifetime thanks to higher level of permissible contact wire wear
- High current carrying capacity and short-circuit strength in overhead conductor rail although no feeder lines are used
- Use of extremely robust extruded profile materials, also for connecting fittings
- Stable and vibration-proof joints through conductor rail guide grooves and screw locking devices
- High clamping and retention force as well as high conductivity of clamps at connection point to conductor rail thanks to special design of the conductor rail profile

Design

Regular values	
Nominal voltage	up to 3 kV DC up to 25 kV AC
Permanent current load at 50 K excess temperature	3400 A
Short-circuit current	45 kA
Ambient temperature	-30 °C to +40 °C
Distance between supports	up to 12 m
Running speed	max. 140 km/h
Conductor rail cross section without contact wire	2300 mm ²
Conductor rail material	aluminium
Clampable contact wire acc. to EN 50149	AC-/BC-80 to 150
Specific mass of conductor rail without contact wire	6.2 kg/m

There are two functionally equivalent methods of suspending the Sicat SR overhead conductor rail:

- Supports with sliding conductor rails, preferred in small spaces where rotating support arms can only be very short (e.g. small round tunnels)
- Rotating supports, particularly suitable for small track radii

Sicat S – standard overhead contact lines

Sicat SA

The Sicat SA AC overhead contact line is suitable for new and expanding AC railways throughout the world, and complies with the Interoperability Directive for transeuropean high-speed railway systems. Sicat SA is certified as an interoperability component under TSI Energy.

- Medium-range electrical power capacities
- Overhead contact line supports as aluminium or steel cantilevers and headspans
- Little wear and long useful lifetime with low maintenance requirement thanks to optimized interaction between pantograph and contact line

Design

Sicat SA is an auto-tensioned catenary with stitch wires on the supports. Thanks to its design, it meets the demands of the interoperability directive for span lengths of 80m.

The fixed point of the catenary wire and of the contact wire as well as the tension wheel assemblies for the contact wire and the catenary wire on both sides are included in the tensioning length. There are three-span transition areas between the tensioning lengths.

Regular values

Nominal voltage	15 kV AC / 16.7 Hz 25 kV AC / 50/60 Hz
Running speed	up to 230 km/h
Ambient temperature	-30 °C to +40 °C
System height	1.60 m
Contact wire acc. to EN 50149	AC-100 to AC-120, Cu-ETP
Catenary wire acc. to DIN 48201	70 mm ² , BzII
Stitch wire acc. to DIN 48201	25 mm ² , BzII
Dropper wire	10 mm ² , Bz
Contact wire tension force	12 kN
Catenary wire tension force	12 kN
Span length	up to 80 m
Distance between droppers	10 m
Mechanical advantage reduction ratio of tension wheel assembly	1:3
Tensioning length	up to 1800 m



Sicat SD

The Sicat SD DC overhead contact line is particularly suited for the upgrading or refurbishment of existing systems. Its current carrying capacity is of major significance due to the high traction currents. The suspension of the contact wires is designed to interact with pantographs with high contact forces in DC systems.

The overhead contact line supports are designed as aluminium or steel cantilevers, or as headspans.

Design

Sicat SD is an auto-tensioned catenary with twin contact wire. Its dynamic characteristics meet the requirements of EN 50119.

Its high current carrying capacity comes from two parallel, silver alloyed contact wires with high thermal stability. The design of the contact wire suspensions ensures an optimal power transfer between the contact wires and the pantograph.

Regular values	
Nominal voltage	up to 3 kV DC
Running speed	up to 160 km/h
Ambient temperature	-30 °C to +40 °C
System height	1.60 m
Contact wire acc. to EN 50149	2x AC-120, CuAg0.1
Catenary wire acc. to DIN 48201	120 mm ² , Cu
Dropper wire	16 mm ² , BzII
Contact wire tension force	2x 12 kN
Catenary wire tension force	12 kN
Span length	up to 70 m
Distance between droppers	10 m
Mechanical advantage reduction ratio of tension wheel assembly	1:3 or 1:1.5
Tensioning length	up to 2000 m

Connecting elements such as droppers and line feeder clamps are also designed for a high current carrying capacity.

In cramped spaces, such as in tunnels or under bridges, elastic supports with two contact wires and feeder lines are used.



Sicat SX

The Sicat SX overhead line system is characterized by savings in terms of material and a reduced number of parts. This helps to cut the cost of the first-time electrification of railway lines. The non-parallel design of the catenary and the high tensile forces in the contact wire and catenary wire are intended to achieve, among other things, a maximization of the span lengths and, as a result, a reduction in the number of overhead contact line supports in the contact line system.

Alternative materials to copper or copper alloys help cut material costs. Valuable resources are saved, and the theft of raw materials is reduced..

- Catenary without stitch wire
- Overhead contact line supports in the form of fully zinc-coated steel cantilevers
- Low installation costs
- Resources are conserved thanks to the use of less material

Design

Sicat SX is an auto-tensioned catenary without stitch wires on the supports and with outstanding dynamic traversing characteristics. The catenary wire and contact wire of the catenary system are installed with oppositely aligned lateral positions with low impact from own weight. This design ensures a high degree of elasticity in the overhead contact line.

Regular values

Nominal voltage	up to 25 kV AC
Running speed	up to 230 km/h
Ambient temperature	-30 °C to +40 °C
System height	1.40 m
Contact wire acc. to EN 50149	AC-80, CuMg0.5
Catenary wire acc. to EN 50182	152.8 mm ² , aluminium-steel
Dropper wire	10 mm ² , Bz
Contact wire tension force	15 kN
Catenary wire tension force	30 kN
Span length	up to > 100 m
Distance between droppers	≤ 10 m
Mechanical advantage reduction ratio of tension wheel assembly	1:1.5
Tensioning length	up to 2000 m

As with all Sicat systems, service-proven standard components are used.



Sicat H – high-speed overhead contact lines

Sicat HA

The Sicat HA AC overhead contact line is extremely suitable for new lines for AC railways all around the world. It was the first high-speed overhead line to be certified under the Interoperability Directive for transeuropean high-speed railway systems and the associated TSI Energy Directive.

- High electrical power capacities up to 20MW per train
- Overhead contact line supports as aluminium or steel cantilevers
- Little wear and long useful lifetime with low maintenance requirement thanks to optimized interaction between pantograph and contact line; can be traversed with one or with two pantographs

Sicat HA is suitable for cross-border traffic and can be traversed by pantographs with 1600mm and 1950mm-wide pan heads.

The low maintenance requirement and the long lifetime play a particularly important role here, as train services can often only be interrupted for a short time to carry out maintenance work.

Design

Sicat HA is an auto-tensioned catenary with stitch wires on the supports. High-strength contact wires and high tensile forces in the contact wire ensure compliance with the requirements for speeds above 350 km/h, even with span lengths of up to 70 m.



Regular values

Nominal voltage	15 kV AC / 16.7 Hz 25 kV AC / 50/60 Hz
Running speed	up to 350 km/h
Ambient temperature	-30 °C to +40 °C
System height	1.60 m
Contact wire acc. to EN 50149	AC-120, CuMg0.5
Catenary wire acc. to DIN 48201	120 mm ² , BzII
Stitch wire acc. to DIN 48201	25 mm ²
Dropper wire	10 mm ² , Bz
Contact wire tension force	27 kN
Catenary wire tension force	21 kN
Span length	up to 70 m
Distance between droppers	10 m
Mechanical advantage reduction ratio of tension wheel assembly	1:3
Tensioning length	up to 1400 m

There are types with a lower system height and modified span lengths for situations in which space requirements need to be kept to a minimum.

The fixed point of the catenary wire and of the contact wire as well as the tension wheel assemblies for the contact wire and the catenary wire on both sides are included in the tensioning length. The contact wire and the catenary wire are tensioned separately. There are three and five-span versions of the transition areas between the tensioning lengths

Sicat HD

The Sicat HD DC overhead contact line is particularly suited for the expansion or refurbishment of existing systems. Its current-carrying capacity is of major significance due to the high traction currents. This is the reason for using double contact wires. The suspension of the contact wires is designed to interact with pantographs with high contact forces in DC systems.

The overhead contact line supports are aluminium or steel cantilevers.

Design

Sicat HD is an auto-tensioned catenary with stitch wires on the supports.

Its high current carrying capacity comes from two parallel, silver-alloyed double contact wires with high thermal stability. The design also ensures an optimal power transfer between the contact wires and the pantograph.

Connecting elements such as droppers and line feeder clamps are also designed for a high current carrying capacity.

Regular values	
Nominal voltage	3 kV DC
Running speed	up to 250 km/h
Ambient temperature	-30 °C to +40 °C
System height	1.60 m
Contact wire acc. to EN 50149	2× AC-120, CuAg0.1
Catenary wire acc. to DIN 48201	150 mm², Cu
Stitch wire acc. to DIN 48201	25 mm², BzII
Dropper wire	16 mm², BzII
Contact wire tension force	2× 15 kN
Catenary wire tension force	15 kN
Span length	up to 70 m
Distance between droppers	10 m
Mechanical advantage reduction ratio of tension wheel assembly	1:3 or 1:1.5
Tensioning length	up to 1500 m



Sicat TT – overhead contact lines for truck-trolley systems

Large opencast mines are a typical field of operation for large diesel-electric dump trucks. However, the high level of fuel consumption and diesel exhaust emissions often cause both economic and ecological problems. Our truck-trolley system provides a convincing solution.

Sicat TT is the overhead contact line system that supplies the dump trucks with electrical power. The vehicles are supplied with electrical power via the overhead contact line to ease the load on the diesel drives when the trucks drive up inclines and need to work under full load. As soon as the pantographs make contact with the contact line, the dump trucks automatically switch over from diesel-electric to electric operation with the help of a control unit.

High nominal voltages of up to 2400 V DC lead to lower power losses and ease the strain on the contact wires while ensuring a longer useful lifetime for the system.

The overhead contact line systems and the substation containers can be moved quickly and flexibly to adapt to changes in the mine working areas.

Design

Two separate, parallel catenaries are responsible for infeed and return current in the Sicat TT system. The catenary cantilevers are installed on lateral poles. The dump trucks need to be equipped with two pantographs besides their electrical equipment.



Regular values	
Nominal voltage	1200 V to 2400 V DC
Contact wire height	up to 9 m
Catenary per pole	2 contact wires 2 catenary wires, 150 mm ² each
Current connectors in catenary	120 mm ²
Earthing cable	150 mm ²
Tensioning	tension wheel assemblies
Tensioning length	up to 1500 m
Tension force per catenary	2 × 20 kN or 2 × 24 kN
Poles	steel round slip-over pole with flange plate, height up to 15 m
Cantilevers	steel profile, length up to 11 m
Foundations	drilled foundation with flange plate

Separately tensioned contact wires and catenary wires compensate for temperature-related changes in the length of the catenary system. This ensures a high traversing quality for the contact line with little wear on the pantographs. Current connectors between the contact wire and the catenary wire boost the performance of the catenaries.

Drilled foundations with flange plates in connection with standardized slip-over poles ensure that the overhead line system is easy to relocate.

Poles, cantilevers and foundations are integrated into the overall power supply protection system by means of an earthing cable.

Sicat 3S – conductor rail contact systems

A third rail laid parallel to the running rails is a solution recommended for supplying power to commuter rail lines and metros running for the most part in tunnels or on rights-of-way not accessible to the public. It has proven itself many times in practice

Requiring little space and providing a high level of power transfer, these systems are particularly attractive for tunnels with small cross sections and for powerful metros. The third rail makes little or no visual impact, is extremely rugged and transfers high levels of power.

Design

Borne by insulating conductor rail supports attached to the sleepers or structures, conductor rails can be contacted by current collectors from different sides. In new systems, current collection from underneath has become the most commonly used system: As the rail is covered for the most part, it cannot be touched accidentally, thereby offering the highest possible levels of safety. It is also protected from precipitation.

Good operating experience has led to aluminium-stainless steel compound rails becoming the international standard. They transfer high levels of electric power to the traction unit and display good conductivity while keeping power losses low. Aluminium-stainless steel compound rails are connected current-carrying with aluminium straps. Soft steel conductor rails can be used as an alternative.

Regular values	
Nominal voltage	1.5 kV DC
Running speed	up to 80 km/h, 100 km/h if required
Conductor rail system	– contacted from below – contacted from above
Conductor rail	– aluminium stainless steel compound rail – soft-iron conductor rail
Conductor rail supports	– fully insulating – steel wire with insulators
Protective covers	– halogen-free plastics (GRP) – PVC

Expansion joints or gaps in the system are used to compensate for changes in length due to temperature fluctuations in the conductor rail. The third rail slides in the insulating mountings of the conductor rail supports.

At points and crossings, gaps with suitable ramps ensure a smooth and therefore low-wear passage of the current collectors.

The conductor rail covers have a modular design and are easy to mount. Halogen-free plastics meet high fire protection safety requirements.



Engineering contact line systems

Overhead contact line systems for mass transit and main line railways are frequently part of a complex infrastructure project with many interfaces. In the context of such projects, overhead contact line systems can only be implemented if all the necessary aspects are thoroughly thought out and linked together logically.

Preliminary planning

Preliminary planning includes selection of the systems and design of the installations for the respective electrification project. We advise our customers, analyze the project requirements in close collaboration with them and work out the requirements so that we can design the system they need.

Systemgestaltung

When an overhead contact line system for a given application has to be designed, the basic parameters of the overhead contact line equipment are defined on the basis of the mechanical and electrical investigations. The result is an optimized system design for the planned application.

IT systems support the simulation of the dynamic interaction between the pantograph and the overhead contact line. We also carry out basic simulations and calculations to take various operating requirements and exceptional circumstances into account. Traction current return and the earthing and bonding systems are also designed in relation to the system as a whole.

Basic design

Standard solutions are used for contact line equipment such as cantilevers and tension wheel assemblies. In the basic design phase, this equipment is adapted to suit any specific requirements the application may demand. Complex projects require a great variety of solutions, not only for open sections of track but also for tunnels, stations and depots.

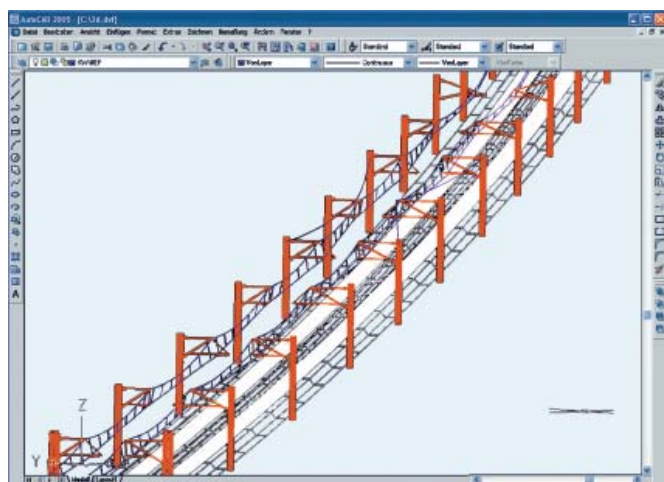
Allocation design

Allocation design supplies the necessary planning documents for construction work and material procurement, thereby forming the basis for future maintenance of the contact line system.

In addition to the parameters for the selected system, local conditions along the route, such as tunnels, bridges or way structures, play an important role. The IT tools used for this task increase the planning quality and reduce the amount of time needed.

Construction design

Construction design supplements the basic design and allocation design by providing individual solutions. These may be, for example, designing equipment for bridges and for tunnels with a particular cross-section or designing system separation sections. These individual solutions can also be largely implemented with standard components. The design effort and construction time can therefore be reduced.



Installation and service

Installation

Our installation service includes the construction of complete overhead contact line systems with our own personnel as well as the integration of personnel employed by the operator or by local companies. We assume responsibility for site management and the supervision of work performed by third parties as well as the training and instruction of personnel.

Contact lines often have to be installed under the most adverse conditions. Our skilled personnel are prepared for everything, have mastered highly demanding installation technologies, and can assess hazards appropriately. We keep the personnel up to the mark in technical matters through specific training and advanced training courses. And we attach a great deal of importance to industrial safety.

Maintenance

Although Siemens systems are designed for low maintenance, appropriate measures are necessary in order to make sure they remain in good working condition. Siemens produces maintenance recommendations for this purpose.

Depending on requirements, maintenance can be carried out by the customer's own personnel or alternatively by local companies. In such cases, we can provide supervising services.

Documentation

With comprehensive documentation according to IEC 62079, such as operating and installation instructions, we support reliable and safe product use in connection with the installation and maintenance of contact line systems.



High-quality contact line components, competent engineering

Efficient overhead contact line systems require high-quality, durable materials for the components used. Modern types of overhead contact lines must require little maintenance so that a high level of availability is ensured while keeping down lifecycle costs.

Although requirements vary, we place a great deal of importance on the practical, efficient standardization of our components. Fewer components speed up the configuration process and reduce maintenance costs.

Component engineering

Requirements

The ideal materials are selected according to function, safety requirements and product costs. The following requirements are taken into account:

- Mechanical loads such as tensile and thrust forces, bending and torsion, taking high safety standards into account
- Safe transfer of electrical power in the contact line system and in the return current system taking thermal conditions and short circuit strength into account
- High level of environmental compatibility and resistance against weather and operating influences

Component development

Sound knowledge of system design for contact line systems and experience gathered from many years of product support are the best prerequisites for successful component development.

Draft designs of components and constructions are verified by means of FEM calculations during the development phase. Producing models and prototypes using modern methods such as Rapid Prototyping represents an important

milestone for making decisions in the development process. The test criteria for the contact line components are determined on the basis of the required product characteristics and the relevant standards.

Tests

The reliability of the contact line components in operation with railway operators around the world is given top priority at Siemens. Our components meet current national and international standards, also in terms of safety.

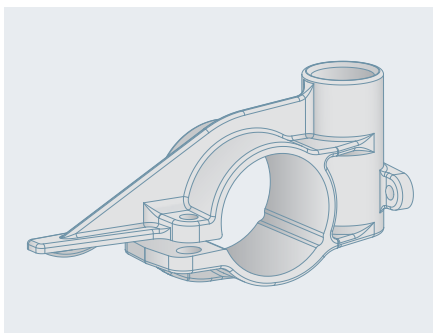
Design reviews are held to verify sophisticated fundamental developments. The components and modules we develop undergo electrical and mechanical type testing by certified test laboratories.

All our products are subject to continuous improvement. This is based on our intensive research and development work and on the close contact we have with our customers. From the experience we accumulate from everyday operational practice, we know what is particularly important in our contact line components.

The high quality of our components is confirmed by the growing number of certifications, which are issued by railway authorities only after extensive tests.

Quality assurance

The consistent high quality of Siemens contact line components is maintained by means of a certified quality assurance management system. Our logistics center has its own test laboratory at its disposal, where tests can be conducted quickly and in line with requirements.



Materials and their use

The following materials are used for contact line components:

- **Electrolytic copper and copper alloys with silver and magnesium, primarily for contact wires and stranded wires**

Magnesium-alloy contact wires are characterized by their outstanding mechanical strength and high resistance to abrasion, particularly in high-speed applications. Silver-alloyed contact wires combine high strength and thermal stability and are especially well-suited for DC systems. Copper alloys with magnesium or electrolytic copper are also used for catenary wires. This depends on whether strength or electrical conductivity is more important.

- **Electrolytic copper and copper alloys for clamps**

Connecting elements made of copper alloys with a high current-carrying capacity are used to connect catenary wires and contact wires with droppers, feeder lines, switch wires and disconnectors.

- **Copper-aluminium alloys for components for GRP cantilevers**

Copper-aluminium alloys combine high strength with slim designs, and are also highly resistant to environmental influences.

- **Aluminium and aluminium alloys for cantilevers**

Aluminium is not only low in cost but also corrosion-resistant, thus requiring little maintenance.

- **Hot-dip galvanized steel and malleable cast iron for cantilevers**

Hot-dip galvanized steel together with hot-dip galvanized malleable cast iron fittings offer the most advantages in terms of procurement costs.

- **Plastics for cantilevers and insulators**

Using GRP tubes and rods in overhead contact line supports saves additional insulators. They provide a high level of safety and come in a slim design.

- **Silicone composites for insulators in overhead contact line supports, catenary systems and single catenaries, as well as in disconnectors and grounding switches**

Components with composite insulators and silicone sheaths not only have hydrophobic properties for high electrical resistance, but are also resistant to vandalism.

- **Stainless steel and stainless steel precision castings for high-strength connecting elements and standard parts**

In addition to their great strength, connecting elements made of stainless steel and fittings made of stainless steel precision castings also offer advantages in terms of dimensional precision and resistance to environmental influences.

New materials and innovations

Besides using proven material and solutions, more prominence is being given to increasingly sophisticated contact line components which provide innovative answers to increasingly demanding requirements. Take our switch contacts, for example, with silver graphite to minimize maintenance or the Sicat CMS catenary monitoring system.

Chapter 01

Preface

Systems and applications	01	01-22
User notes, addresses	02	01-14
Order number index	03	01-16
Index	04	01-16

Product designations

The product designations are the names customarily used in contact line construction. It cannot be avoided, however, that different product types may be listed under the same nominal designation. To ensure unambiguous identification, each part is given a machine-readable factory designation which begins with the preliminary number 8WL and consists of a four-digit number followed by a hyphen and a further digit (or a number and a letter). These identify the various

types of a specific product, for example, if it is available in different materials or sizes.

Drawings in different scales are also connected to the products listed and indicate the major dimensions and functions of the products. In the drawings, the load direction is indicated with F →.

Material designations

Abbreviations are used in this text for the materials customarily used in contact line construction. The most important ones are explained below:

AC	Grooved contact wire circular, clamping groove type A acc. to EN 50149
Al	Aluminium wrought alloy (AlMgSi0.5 or AlMgSi1.0)
AL1	Hard drawn aluminium (for wires)
AlCu	Aluminium-copper sheet
BC	Grooved contact wire circular, clamping groove type B acc. to EN 50149
BF	Grooved contact wire flat, clamping groove type B acc. to EN 50149
BzII	Bronze, strength grade II
ctAl	Cast aluminium alloy (AlSi7Mg or AlSi12Mg)
Cu	Copper
Cu-ETP	Electrolytic copper
Cu5	Copper-nickel wrought alloy for screws and nuts (CuNi1SiF59)
CuAg	Copper-silver alloy (for contact wires)
CuAl	Copper-aluminium alloy (aluminium bronze)
CuMg	Copper-magnesium alloy (for contact wires)
CuNiSi	Copper-nickel wrought alloy for products (CuNi1Si, CuNi2Si or CuNi3Si)
CuSn	Copper-tin alloy (tin bronze)
CuZn	Copper-zinc alloy (brass)

EP resin	Epoxy resin
GF-EP	Glass-fiber reinforced plastic with epoxy resin
GF-UP	Glass-fiber reinforced plastic with unsaturated polyester resin
GG	Cast iron with lamellar graphit (grey cast iron)
GRP	Glass-fiber reinforced plastic
htgSt	Steel, hot-dip galvanized
mICI	Malleable cast iron white, hot-dip galvanized
PTFE	Polytetrafluorethylen
PVC	Polyvinyl chloride
SG iron-htg	Spheroidal graphite iron, hot-dip galvanized
St	Steel
St+PTFE	Steel + Polytetrafluorethylene
stlSt	Stainless steel
ST1A	Zinc coated steel (for wires)

The following thread designations are used in this catalog:

M.....	Metric ISO thread acc. to DIN 13-1
R.....	Whitworth pipe thread acc. to EN 10226-1
G.....	Pipe thread acc. to ISO 228-1

Regulations and standards

The products contained in this catalog correspond to the standards listed and to the relevant provisions or guidelines listed below.

Standard	Edition	Title
IEC 61109	2008-05	Insulators for overhead lines – Composite suspension and tension insulators for a.c. systems with a nominal voltage greater than 1000 V – Definitions, test methods and acceptance criteria
IEC 61952	2008-05	Insulators for overhead lines – Composite line post insulators for a.c. systems with a nominal voltage greater than 1000 V – Definitions, test methods and acceptance criteria
IEC 62271-1	2007-10	High-voltage switchgear and controlgear – Part 1: Common specifications
IEC/TS 60815-1	2008-10 (Prestandard)	Selection and dimensioning of high-voltage insulators intended for use in polluted conditions – Part 1: Definitions, information and general principles
ISO 228-1	2000-09	Pipe threads where pressure-tight joints are not made on the threads – Part 1: Dimensions, tolerances and designation
ISO 1234	1997-11	Split pins
EN 10226-1	2004-07	Pipe threads where pressure tight joints are made on the threads – Part 1: Taper external threads and parallel internal threads – Dimensions, tolerances and designation
EN 10305-1	2010-01	Steel tubes for precision applications – Technical delivery conditions – Part 1: Seamless cold drawn tubes
EN 12385-4 + Amendment 1	2008-03 2009-01	Steel wire ropes – Safety – Part 4: Stranded ropes for general lifting applications
EN 50119	2009-09	Railway applications – Fixed installations – Electric traction overhead contact lines
EN 50122-1	1997-06	Railway applications – Fixed installations – Part 1: Protective provisions relating to electrical safety and earthing
EN 50122-2 + Amendment 1	1998-05 2002-04	Railway applications – Fixed installations – Part 2: Protective provisions against the effects of stray currents caused by d.c. traction systems
EN 50123-1	2003-02	Railway applications – Fixed installations; D.C. switchgear – Part 1: General
EN 50123-4	2003-02	Railway applications – Fixed installations; D.C. switchgear – Part 4: Outdoor d.c. switch-disconnectors, switch-disconnectors and earthing switches
EN 50124-1 + Amendment 1	2003-01 2003-10	Railway applications – Insulation coordination – Part 1: Basic requirements; Clearances and creepage distances for all electrical and electronic equipment
EN 50149	2001-03	Railway applications – Fixed installations; Electric traction – Copper and copper alloy grooved contact wires
EN 50151	2003-01	Railway applications – Fixed installations – Electric traction – Special requirements for composite insulators
EN 50152-1	2007-12	Railway applications – Fixed installations – Particular requirements for AC switchgear – Part 1: Single-phase circuit-breakers with U_n above 1 kV
EN 50152-2	2007-12	Railway applications – Fixed installations – Particular requirements for AC switchgear – Part 2: Single-phase disconnectors, earthing switches and switches with U_n above 1 kV
EN 50153	2002-06	Railway applications – Rolling stock – Protective provisions relating to electrical hazards
EN 50163	2004-11	Railway applications – Supply voltages of traction systems
EN 50182	2001-05	Conductors for overhead lines – Round wire concentric lay stranded conductors
EN 60383-1 + Amendment 11	1996-11 1999-10	Insulators for overhead lines with a nominal voltage above 1 kV – Part 1: Ceramic or glass insulator units for a.c. systems – Definitions, test methods and acceptance criteria Note: Also applies to insulators in DC contact lines.
EN 60865-1	1993-12	Short-circuit currents – Calculation of effects – Part 1: Definitions and calculation methods
EN 755-1	2008-03	Aluminium and aluminium alloys – Extruded rod/bar, tube and profiles – Part 1: Technical conditions for inspection and delivery
EN 755-2	2008-03	Aluminium and aluminium alloys – Extruded rod/bar, tube and profiles – Part 2: Mechanical properties

Standard	Edition	Title
DIN 13-1	1999-11	ISO general purpose metric screw threads – Part 1: Nominal sizes for coarse pitch threads; nominal diameter from 1 mm to 68 mm
DIN 2448	1981-02	Seamless steel pipes and tubes, dimensions, conventional masses per unit length
DIN 43136	1978-12	Span wires for overhead equipment
DIN 43137	1978-06	Electric traction; wires for earthing and return current
DIN 43138	1980-09	Flexible cables for overhead equipment and return current
DIN 43154	1977-04	Open thimbles for wires and cables
DIN 43156	1978-03	Electric traction; conductor rail; dimensions and characteristics
DIN 43161	1983-06	Pins for overhead equipment
DIN 43167-1	1987-12	Rod-type insulator for overhead contact lines for operating voltages up to 1000 V AC and 1500 V DC; assembly
DIN 43167-2	1987-12	Rod-type insulator for overhead contact lines for operating voltages up to 1000 V AC and 1500 V DC; caps, U-bolts and hook bolt
DIN 43167-3	1987-12	Rod-type insulator for overhead contact lines for operating voltages up to 1000 V AC and 1500 V DC; insulator
DIN 46235	1983-07	Cable lugs; for compression connections, cover plate type, for copper conductors
DIN 48075	1967-05	Parallel groove clamps for stranded conductors and for aluminium conductors steel-reinforced for overhead power lines
DIN 48085-2	1985-04	Full tension compression joints, for aluminium conductors, for overhead lines
DIN 48085-3	1985-04	Full tension compression joints, for ACSR-conductors, for overhead lines
DIN 48201-1	1981-04	Copper stranded conductors
DIN 48201-2	1981-04	Bronze stranded conductors
DIN 48217	1978-06	Notch connectors for high-tension contact wires and rail overhead equipment
DIN VDE 0141	2000-01	Earthing system for special power installations with nominal voltages above 1 kV
DIN VDE 0216	1986-02	Fittings for overhead and conductor rail equipment; static mechanical behaviour; requirements and testing
DIN VDE 0228-3	1988-09	Proceedings in the case of interference on telecommunication installations by electric power installations; interference by alternating current traction systems
DIN VDE 0228-4	1987-12	Proceedings in the case of interference on telecommunication; installations by electric power installations; interference by d.c. traction systems
DIN VDE 0446-2	1971-03	Regulations for insulators for overhead power lines, overhead equipment and telecommunication lines; Part 2: Regulations for insulators for high-tension overhead lines and overhead equipment up to 1000 V as well as telecommunication overhead lines
DIN VDE 0446-3	1973-05	Regulations for insulators for overhead power lines, overhead equipment and telecommunication lines; Part 3: Regulations for fittings permanently connected to the insulators

Quality management

It is the stated aim of the Electrification division in the Transportation Systems Group of Siemens AG to make products of the highest quality.

The management of the division has therefore authorized the required measures to

- fulfill the agreed or required expectations of the customers,
- to meet legal specifications, standards, technical regulations and environmental provisions,
- to apply the methods of quality management consistently at all levels of the value creation chain,
- and to constantly improve all methods and instructions based on experience in daily application.

The group Transportation Systems of the Siemens AG has established and maintains for the scope:

Project Planning, Aquisition, Engineering, Procurement, Production, Assembly, Commissioning and Service of Products, Systems and Services in the fields of Rail Automation, Electrification, Locomotives, Trains, Mass Transit, Bogies, Turnkey Systems and Integrated Services

an integrated quality, safety, health and environmental management system in conformity with the standards:

ISO 9001:2000

ISO 14001:2004

OHSAS 18001:1999

Certification was issued by the DNV Zertifizierung und Umweltgutachter GmbH and confirmed by regular audits.

Ordering

Siemens asks you to send your queries or orders to our offices to the addresses listed below. We will process your queries and orders immediately.

In particular, we ask you to come to us when you require products or systems that you cannot find in our catalog. We hope to be able to offer you products that meet your requirements in these cases as well.

The delivery conditions listed below for the electrical industry apply to the execution of your orders. We will be happy to provide them to you in their complete wording.

In connection with the use of the SAP system at Siemens, we have assigned the corresponding A2V number to the 8WL product numbers in the order number index.

Conditions of sale and delivery

Domestic business

The general sales conditions and general delivery conditions for products and services of the electrical industry apply.

Prices are in € ex works, exclusive of transport and packaging.

Prices do not include sales tax (VAT). These are invoiced separately.

International business

The general sales conditions and general delivery conditions for products and services of the electrical industry and all other conditions agreed upon with the price list recipients apply.

Note

Unless otherwise noted on the individual pages of the catalog, we reserve the right to make changes, in particular to the values, dimensions and weights stated. All graphics are non-binding.

We reserve the right to change prices and will invoice the prices valid at the time of delivery.

Safety notes

All applicable national and international standards, guidelines and regulations, etc., must be observed in the planning and erection of the systems in which the products of this catalog will be used.

The operating and installation instructions of the individual products must be observed.

The products in this catalog must be assembled, installed, operated and maintained by qualified personnel only.

The user is responsible both for the proper handling of the products and for their use in accordance with legal, etc., provisions. Your Siemens representatives are naturally available to you in case of questions.

If the aforementioned measures are not observed, this can result in death, serious physical injury, considerable damage to property and environmental damage.

Replaced products

In the following list you can find an overview about the products no longer available in this catalog edition and their respective replacements.

Dispensed product	replaced by
8WL2006-0	8WL2006-0A
8WL2097-8A	8WL2097-8C
8WL2097-8B	8WL2097-8D
8WL2112-5A	8WL2112-5G
8WL2112-5B	8WL2112-5H
8WL2827-7	8WL2827-7A
8WL2850-2	8WL2850-6
8WL2876-5	8WL2878-1
8WL3500-5A	8WL3500-3A
8WL3500-5B	8WL3500-3B
8WL3500-5C	8WL3500-3C
8WL3500-5D	8WL3500-3D
8WL3500-5E	8WL3500-3E
8WL3500-5F	8WL3500-3F
8WL3500-5G	8WL3500-3G
8WL3500-5H	8WL3500-3H
8WL3500-5K	8WL3500-3K
8WL3500-8A	8WL3500-8L
8WL3500-8B	8WL3500-8M
8WL3500-8C	8WL3500-8N
8WL3500-8D	8WL3500-8O
8WL3500-8E	8WL3500-8P
8WL3500-8F	8WL3500-8T
8WL3500-8G	8WL3500-8U
8WL4587-0	8WL4587-2 with 8WL1583-1
8WL4591-5	8WL4591-5A
8WL5000-0B	8WL5070-0B

Dispensed product	replaced by
8WL5000-0C	8WL5070-0B
8WL5005-0B	8WL5078-0A
8WL5005-0C	8WL5078-0B
8WL5050-0	8WL5070-1
8WL5050-1	8WL5078-0C
8WL5020-0	8WL5078-1A
8WL5021-0	8WL5078-1C
8WL5030-0	8WL5078-1C
8WL5031-0	8WL5078-1D
8WL5010-0	8WL5078-2
8WL5110-7	8WL5110-7A
8WL5146-0	8WL5146-3
8WL5146-1	8WL5146-3
8WL5162-1	8WL5162-1A
8WL5168-0	8WL5168-0A
8WL6124-0	8WL6134-0
8WL6124-2	8WL6134-0
8WL6124-1	8WL6134-0A
8WL6124-3	8WL6134-0A
8WL6114-0	8WL6134-3
8WL6114-2	8WL6134-3
8WL6114-1	8WL6134-3A
8WL6114-3	8WL6134-3A
8WL6114-4	8WL6134-5
8WL6114-6	8WL6134-5
8WL7161-5A	8WL7168-0
8WL7161-6A	8WL7168-1
8WL7161-6D	8WL7168-7
8WL7170-0	8WL7175-0
8WL8016-0A	8WL8016-1

Addresses

Siemens Railway Electrification in Germany

Location	Postal address	Telephone	Telefax
Head office Erlangen	Siemens AG Industry Sector Mobility Division Complete Transportation Electrification Mozartstraße 33b 91052 Erlangen Germany	+49 9131 7-22457	+49 9131 7-27969
Halle	Magdeburger Str. 51 06112 Halle Germany	+49 345 223 2031	+49 345 223 2030
Ludwigshafen	Bruchwiesenstraße 5 67059 Ludwigshafen am Rhein Germany	+49 621 57905-52	+49 621 57905-28

Siemens Railway Electrification worldwide

Location	Postal address	Telephone	Telefax
Argentina	Siemens S.A. Administración Central Av. Pte. Julio A. Roca 516 AR-1076 Buenos Aires Argentina	+54 11 4340-8349	+54 11 4340-8319
Australia	Siemens Ltd. Infrastructure Products & Services 885 Mountain Highway AU-3153 Bayswater VIC Australia	+61 3 9721-7254	+61 3 9721-7244
Austria	Siemens AG Österreich Transportation Systems Rail Automation & Power Leberstraße 34 AT-1110 Wien Austria	+43 51707-41803	+43 51707-51786
Belgium	Siemens S.A./N.V. Industry Sector, Mobility Division Demeurslaan 132 BE-1654 Huizingen Belgium	+32 2 536-3787	+32 2 536-3780
Brazil	Siemens Ltda. Sistemas de Transporte Av. Mutinga, 3800 - Pirituba BR-05110-901 Sao Paulo, SP Caixa Postal 1375 BR-05069-900 Sao Paulo, SP Brazil	+55 11 3908-2986	+55 11 3908-2027

Location	Postal address	Telephone	Telefax
Bulgaria	Siemens EOOD Transportation Systems 2, Kukush str. BG-1309 Sofia Bulgaria	+359 2 811-5634	+359 2 811-5661
Canada	Siemens Canada Ltd. Industry Sector, Mobility Division 1550 Appleby Line Burlington ON L7L 6X7 Canada	+1 905 315-6964	+1 905 315-6966
Chile	Siemens S.A. Transportation Systems Av. Providencia 1760 - Piso 11 CL-Santiago de Chile Chile	+56 2 477-1374	+56 2 477-1030
China	Siemens Ltd., China 26th Floor, SCB No.7 Wangjing Zhonghuan Nanlu Chaoyang District CN-100102 Beijing P. R. China	+86 10 6476-2938	+86 10 6476-4822
China	Siemens Ltd. 1, Pu Dong Avenue Pu Dong New Area CN-200120 Shanghai P. R. China	+86 21 5888 2000 (6627)	+86 21 5879 5037
China	Siemens Ltd. 58/F Central Plaza 18 Harbour Road Wanchai Hong Kong	+852 2583 3388	+852 2802 9802
Czech Republic	Siemens s.r.o. Siemensova 1 CZ-15500 Praha Czech Republic	+420 23303 2260	+420 23303 2269
Denmark	Siemens A/S Industry Sector, Mobility Division Borupvang 3 DK-2750 Ballerup Denmark	+45 4477-4859	+45 4477-4083
Finland	Siemens Osakeyhtiö Industry Sector, Mobility Division Majurinkatu 6 FI-02600 Espoo P.O. Box 60 FI-02601 Espoo Finland	+358 10 511-6723	+358 10 511-5783
France	Siemens S.A.S. 150, avenue de la Republique FR-92320 Chatillon France	+33 1 4965-7660	+33 1 4965-7848
Great Britain	Siemens plc. Transportation Systems Ltd. Industry Sector, Mobility Division Unit 4, Highlands Court Cranmore Avenue B90 4LE Solihull United Kingdom	+44 121 713-4445	+44 121 713-4374

Location	Postal address	Telephone	Telefax
Greece	Siemens A.E. Elektrotechn. Projekte und Erzeugnisse Artemidos 8 GR-15125 Athen Greece	+30 210 6864-232	+30 210 6864-706
Hungary	Siemens Rt. Transportation Systems Gizella út 51-57 HU-1143 Budapest Hungary	+36 1 471-1660	+36 1 471-1612
India	Siemens Ltd. 6th Floor/Sector 2, Plot 2 Kharghar Node IN-410210 Mumbai Navi India	+91 22 27568-111	+91 22 27568-147
Indonesia	PT. Siemens Indonesia Arkadia Office Park, Tower F, Level 15 Jl. T.B. Simatupang Kav. 88 Pasar Minggu ID-Jakarta 12520 P.O. Box 2469/ JKT ID-Jakarta 10001 Indonesia	+62 21 2754 3000	+62 21 2754 3488
Iran	Siemens S.S.K. Transportation Avenue Ayatollah Taleghani 349 IR-1593649119 Teheran P.O. Box 15875-4773 IR-15936 Teheran Iran	+98 21 8518-2521	+98 21 8894-4110
Ireland	Siemens Ltd. Energy & Transportation Leeson Close IE-Dublin 2 Ireland	+353 1 216-2424	+353 1 216-2458
Israel	Siemens Israel Ltd. 14 Hamelacha Street Afeq Industrial Park IL-48091 Rosh Ha ayin Israel	+972 3 915-1921	+972 3 915-1522
Italy	Siemens S.p.A. Sede sociale, Direzione Via Piero e Alberto Pirelli 10 IT-20126 Milano MI Italia	+39 2 243-64464	+39 2 243-64300
Korea (South)	Siemens Ltd. 10th Floor, Asia Tower Building 726, Yeoksam-dong, Kangnam-gu KR-Seoul 135-719 Korea	+82 2 3450-7034	+82 2 3450-7039
Mexico	Siemens S.A. de C.V. Transportation Systems Poniente 116 No. 590 Industrial Vallejo, Azcapotzalco MX-02300 Mexico, D.F. C.P. 15-064, Col. Pro-Hogar, Del. Azc. MX-02300 Mexico, D.F. Mexico	+52 55 5328-2068	+52 55 5328-2066

Location	Postal address	Telephone	Telefax
Netherlands	Siemens Nederland N.V. Industry Sector, Mobility Division Prinses Beatrixlaan 800 NL-2595 BN Den Haag Postbus 16068 NL-2500 BB Den Haag Nederland	+31 70 333-2701	+31 70 333-3788
Norway	Siemens A/S Oestre Aker Vei 90 NO-0596 Oslo Postboks 1 NO-0613 Oslo Norway	+47 2263 4054	+47 2263 4399
Poland	Siemens Sp.z.o.o. Industry Sector ul. Zupnicza 11 PL-03-821 Warszawa Poland	+48 22 870-9762	+48 22 870-9769
Portugal	Siemens S.A. TS EL RA Rua Irmaos Siemens, 1 PT-2720-93 Amadora Apartado 60300 PT-2720-93 Amadora Portugal	+351 1 417-8662	+351 1 417-8077
Romania	Siemens S.R.L. Transportation Systems Strada Preciziei, nr. 24, Corp H3 RO-062204 Bucuresti Romania	+40 21 6296-589	+40 21 6296-402
Russia	OOO Siemens Moskau Transportation Systems ul. Letnikovskaya, 16 RU-115114 Moscow Russian Federation	+7 495 737-1845	+7 495 737-2325
Saudi Arabia	Siemens Ltd. Flour Building P.O. Box 719 Al-Khubar 31952 Saudi Arabia	+966 3 865-9670	+966 3 865-9663
Singapore	Siemens Pte. Ltd. Transportation Systems 60, MacPherson Road SG-348615 Singapur Singapur	+65 6490-6098	+65 6490-6099
South Africa	Siemens Ltd. Rolling Stock & Traction Power Siemens Park 300, Janadel Ave, Midrand ZA-1685 Halfway House Private Bag X71 ZA-1685 Halfway House South Africa	+27 11 652-2194	+27 11 652-2189
Spanien	Siemens S.A. Sede Centrales Ronda de Europa 5 ES-28760 Madrid – Tres Contas Spain	+34 91 514-4603	+34 91 514-8010

Location	Postal address	Telephone	Telefax
Sweden	Siemens AB Energy Sector Power Transportation Division Johanneslundvägen 12-14 SE-19487 Uppland Väsby (Stockholm) Sweden	+46 8 728-1248	+46 8 728-1008
Switzerland	Siemens Schweiz AG Industry Sector, Mobility Division Freilagerstraße 28 CH-8047 Zürich Schweiz	+41 585 585 032	+41 585 545 979
Taiwan	Siemens Ltd. 8F, No. 3, Yuan Qu Street Nan Gang District TW-11503 Taipei P.O. Box 191-32 TW-Taipei City 11599 Taiwan, R.O.C.	+886 2 2652-8708	+886 2 2652-8664
Thailand	Siemens Ltd. Charn Issara Tower II, 25th Floor 2922/283 New Petchburi Road Bangkapi, Huay Kwang TH-Bangkok 10310 Thailand	+66 2 715-4994	+66 2 715-4911
Turkey	Siemens Sanayi ve Ticaret A.S. Industry Sector, Mobility Division Esentepe mahallesi Yakacik Caddesi No. 111, Kartal TR-34870 Istanbul P.K. 26 TR-34861 Kartal-Istanbul Turkey	+90 216 459-3405	+90 216 459-3405
USA	Siemens Industry Inc. Industry Sector, Mobility Division West Coast Office 300 Oswego Point-Drive Suite 106 Lake Oswego, OR 97034 United States	+1 503 675-3614	+1 503 699-0076
Uzbekistan	Vertretung der Siemens AG Amir Temur str. 107B UZ-100084 Taschkent Uzbekistan	+998 71 120 4126	+998 71 120 6402

Chapter 01

Preface

Systems and applications	01	01-22
User notes, addresses	02	01-14
Order number index	03	01-16
Index	04	01-16

8WL1010-5..... A2V00000201330..... 02-01-05	8WL1082-0..... A2V00000201431..... 02-01-29
8WL1013-2..... A2V00000201334..... 02-01-06	8WL1082-1..... A2V00000201432..... 02-01-29
8WL1016-6..... A2V00000201339..... 02-01-06	8WL1082-2..... A2V00000201433..... 02-01-29
8WL1018-0..... A2V00000201340..... 02-01-06	8WL1082-3..... A2V00000201434..... 02-01-29
8WL1018-2..... A2V00000201342..... 02-01-06	8WL1082-4..... A2V00000201435..... 02-01-29
8WL1018-3..... A2V00000200707..... 02-01-07	8WL1082-5..... A2V00000201436..... 02-01-29
8WL1023-2..... A2V00000201346..... 02-01-08	8WL1086-5A..... A2V00001007264..... 02-01-32
8WL1026-5..... A2V00000201350..... 02-01-08	8WL1090-0..... A2V00000200023..... 02-01-33
8WL1028-0..... A2V00000200681..... 02-01-08	8WL1090-1..... A2V00000200022..... 02-01-33
8WL1028-2..... A2V00000201354..... 02-01-08	8WL1091-0..... A2V00000200021..... 02-01-35
8WL1028-3..... A2V00000200708..... 02-01-08	8WL1091-1..... A2V00000200039..... 02-01-35
8WL1033-2..... A2V00000201358..... 02-01-09	8WL1092-0..... A2V00000200027..... 02-01-36
8WL1036-7..... A2V00000201363..... 02-01-09	8WL1092-1..... A2V00000200040..... 02-01-36
8WL1038-0..... A2V00000201364..... 02-01-10	8WL1093-0..... A2V00000200028..... 02-01-37
8WL1038-2..... A2V00000201366..... 02-01-10	8WL1093-1..... A2V00000200041..... 02-01-37
8WL1038-3..... A2V00000201367..... 02-01-11	8WL1094-0..... A2V00000201463..... 02-01-34
8WL1043-2..... A2V00000201368..... 02-01-12	8WL1094-1..... A2V00000201464..... 02-01-34
8WL1046-5..... A2V00000201378..... 02-01-12	8WL1097-3A..... A2V00001071032..... 02-01-28
8WL1047-3..... A2V00000201380..... 02-01-20	8WL1100-2..... A2V00000201473..... 02-01-44
8WL1048-0..... A2V00000200684..... 02-01-13	8WL1101-2..... A2V00000201476..... 02-01-44
8WL1048-2..... A2V00000201383..... 02-01-13	8WL1102-2..... A2V00000201478..... 02-01-44
8WL1048-3..... A2V00000201384..... 02-01-13	8WL1104-2..... A2V00000201484..... 02-01-44
8WL1052-0..... A2V00000201387..... 02-01-18	8WL1105-0..... A2V00000201485..... 02-01-44
8WL1052-1..... A2V00000200682..... 02-01-19	8WL1105-2..... A2V00000201487..... 02-01-44
8WL1053-2..... A2V00000201391..... 02-01-14	8WL1106-2..... A2V00000201490..... 02-01-44
8WL1056-2..... A2V00000201394..... 02-01-15	8WL1110-0..... A2V00000201497..... 02-01-44
8WL1058-2..... A2V00000201397..... 02-01-15	8WL1110-2..... A2V00000201499..... 02-01-44
8WL1063-2..... A2V00000201399..... 02-01-16	8WL1110-3..... A2V00000200901..... 02-01-44
8WL1066-2..... A2V00000201401..... 02-01-17	8WL1111-0..... A2V00000200904..... 02-01-44
8WL1068-2..... A2V00000201405..... 02-01-17	8WL1111-2..... A2V00000201502..... 02-01-44
8WL1076-0..... A2V00000201408..... 02-01-21	8WL1111-3..... A2V00000201503..... 02-01-44
8WL1076-2..... A2V00000201410..... 02-01-22	8WL1112-0..... A2V00000200906..... 02-01-44
8WL1077-7D..... A2V00001020844..... 02-01-23	8WL1112-2..... A2V00000201507..... 02-01-45
8WL1077-7E..... A2V00001020845..... 02-01-23	8WL1112-3..... A2V00000200905..... 02-01-45
8WL1078-1..... A2V00000201415..... 02-01-24	8WL1114-8..... A2V00000200737..... 02-01-46
8WL1078-3..... A2V00000201417..... 02-01-25	8WL1115-1..... A2V00000201510..... 02-01-46
8WL1078-4..... A2V00000201418..... 02-01-26	8WL1115-2..... A2V00000201511..... 02-01-46
8WL1078-5..... A2V00000201419..... 02-01-26	8WL1115-3..... A2V00000201512..... 02-01-46
8WL1078-7A..... A2V00001064198..... 02-01-30	8WL1115-4..... A2V00000201513..... 02-01-46
8WL1078-7B..... A2V00001064199..... 02-01-31	8WL1116-4..... A2V00000201520..... 02-01-44
8WL1080-5..... A2V00000201424..... 02-01-27	8WL1118-4..... A2V00000201530..... 02-01-47

8WL1118-5..... A2V00000201531..... 02-01-47	8WL1210-0..... A2V00000201642..... 02-01-71
8WL1118-6..... A2V00000201532..... 02-01-47	8WL1211-0..... A2V00000201644..... 02-01-71
8WL1118-7..... A2V00000201533..... 02-01-47	8WL1212-0..... A2V00000201646..... 02-01-71
8WL1123-1..... A2V00000200685..... 02-01-49	8WL1213-0..... A2V00000201649..... 02-01-72
8WL1124-0..... A2V00000201538..... 02-01-48	8WL1214-0..... A2V00000201651..... 02-01-72
8WL1127-1..... A2V00000200590..... 02-01-51	8WL1215-0..... A2V00000201653..... 02-01-72
8WL1134-5..... A2V00000200589..... 02-01-52	8WL1220-2..... A2V00001140784..... 02-01-71
8WL1135-0..... A2V00000201550..... 02-01-50	8WL1220-5..... A2V00001150731..... 02-01-72
8WL1135-6..... A2V00000204851..... 02-01-53	8WL1236-0..... A2V00001000026..... 02-01-73
8WL1135-7..... A2V00000201553..... 02-04-30	8WL1236-2..... A2V00001151324..... 02-01-74
8WL1137-2..... A2V00000201555..... 02-03-60	8WL1237-0..... A2V00000201657..... 02-01-73
8WL1137-5..... A2V00000201557..... 02-03-60	8WL1237-2..... A2V00000200661..... 02-01-74
8WL1137-8..... A2V00000201559..... 02-03-60	8WL1240-0..... A2V00000201668..... 02-01-75
8WL1138-2..... A2V00000201561..... 02-03-61	8WL1240-1..... A2V00000201669..... 02-01-75
8WL1138-5..... A2V00000201563..... 02-03-61	8WL1240-2..... A2V00000201670..... 02-01-75
8WL1138-8..... A2V00000201564..... 02-03-61	8WL1272-1..... A2V00000200664..... 02-01-38
8WL1141-0..... A2V00000201565..... 02-01-54	8WL1272-2..... A2V00000200665..... 02-01-38
8WL1141-1..... A2V00000201566..... 02-01-54	8WL1272-3..... A2V00000200666..... 02-01-38
8WL1141-7..... A2V00000201568..... 02-01-55	8WL1272-5..... A2V00000200668..... 02-01-38
8WL1142-5..... A2V00000201574..... 02-01-56	8WL1276-0..... A2V00000205906..... 02-01-40
8WL1143-3..... A2V00000201577..... 02-01-57	8WL1277-0..... A2V00000205909..... 02-01-40
8WL1145-1..... A2V00000201579..... 02-01-58	8WL1500-0..... A2V00000200636..... 02-02-05
8WL1160-8..... A2V00000201588..... 02-01-59	8WL1500-2..... A2V00001177085..... 02-02-04
8WL1170-8..... A2V00000201599..... 02-01-60	8WL1501-0..... A2V00000200638..... 02-02-05
8WL1180-7..... A2V00000201609..... 02-01-62	8WL1501-1..... A2V00000200639..... 02-02-06
8WL1180-8..... A2V00000201610..... 02-01-63	8WL1502-0..... A2V00000200637..... 02-02-05
8WL1181-7..... A2V00000201614..... 02-01-64	8WL1503-0..... A2V00000201722..... 02-02-05
8WL1190-3..... A2V00000201621..... 02-01-65	8WL1515-0..... A2V00000201732..... 02-02-08
8WL1192-0..... A2V00001086625..... 02-01-39	8WL1516-1..... A2V00000201734..... 02-02-07
8WL1195-5..... A2V00000201626..... 02-01-68	8WL1516-2..... A2V00000201735..... 02-02-07
8WL1195-7..... A2V00000201628..... 02-01-61	8WL1516-3..... A2V00000201736..... 02-02-07
8WL1195-8..... A2V00000201629..... 02-01-61	8WL1518-0..... A2V00000201740..... 02-02-09
8WL1200-0..... A2V00000200655..... 02-01-66	8WL1520-0..... A2V00000200630..... 02-02-10
8WL1201-0..... A2V00000200657..... 02-01-66	8WL1521-1..... A2V00000201744..... 02-02-10
8WL1201-1..... A2V00000201632..... 02-01-66	8WL1521-2..... A2V00000201745..... 02-02-10
8WL1202-0..... A2V00000200658..... 02-01-67	8WL1522-0..... A2V00000201746..... 02-02-10
8WL1202-1..... A2V00000201634..... 02-01-67	8WL1522-1..... A2V00000201747..... 02-02-10
8WL1202-3..... A2V00000201635..... 02-01-68	8WL1523-0..... A2V00000201748..... 02-02-10
8WL1203-0..... A2V00000200659..... 02-01-67	8WL1523-1..... A2V00000201749..... 02-02-10
8WL1203-1..... A2V00000201637..... 02-01-67	8WL1524-0..... A2V00000201750..... 02-02-10
8WL1207-0..... A2V00000201638..... 02-01-70	8WL1524-1..... A2V00000201751..... 02-02-10

8WL1525-0..... A2V00000201752..... 02-02-10	8WL1601-1..... A2V00000201800..... 02-02-20
8WL1550-2..... A2V00000201757..... 02-02-11	8WL1602-0..... A2V00000200624..... 02-02-20
8WL1551-2..... A2V00000201758..... 02-02-11	8WL1602-1..... A2V00000200616..... 02-02-20
8WL1553-0..... A2V00000200635..... 02-02-13	8WL1602-3..... A2V00000200617..... 02-02-20
8WL1554-0..... A2V00000206308..... 02-02-13	8WL1603-1..... A2V00000200626..... 02-02-20
8WL1560-0..... A2V00000200645..... 02-02-11	8WL1603-2..... A2V00000201809..... 02-02-20
8WL1560-2..... A2V00000200290..... 02-02-12	8WL1603-3..... A2V00000201810..... 02-02-20
8WL1561-0..... A2V00000200646..... 02-02-11	8WL1604-0..... A2V00000201811..... 02-02-21
8WL1561-2..... A2V00000200291..... 02-02-12	8WL1604-1..... A2V00000201812..... 02-02-21
8WL1562-0..... A2V00000200647..... 02-02-11	8WL1604-2..... A2V00000200627..... 02-02-21
8WL1563-0..... A2V00000200648..... 02-02-11	8WL1604-3..... A2V00000200623..... 02-02-21
8WL1563-2..... A2V00000200293..... 02-02-12	8WL1604-4..... A2V00000201815..... 02-02-21
8WL1564-0..... A2V00000201764..... 02-02-11	8WL1606-0..... A2V00000201823..... 02-02-21
8WL1565-4..... A2V00001026053..... 02-02-14	8WL1606-0A..... A2V00000200619..... 02-02-21
8WL1566-4..... A2V00001159309..... 02-02-14	8WL1606-1..... A2V00000201824..... 02-02-21
8WL1575-0..... A2V00000201765..... 02-02-15	8WL1606-2..... A2V00000201825..... 02-02-21
8WL1576-0..... A2V00000200924..... 02-02-15	8WL1606-4..... A2V00000201827..... 02-02-21
8WL1577-0..... A2V00000201767..... 02-02-15	8WL1607-0..... A2V00000201828..... 02-02-21
8WL1578-0..... A2V00000200925..... 02-02-15	8WL1607-1..... A2V00000201829..... 02-02-21
8WL1578-1..... A2V00000201769..... 02-02-15	8WL1608-3..... A2V00000201830..... 02-02-20
8WL1578-2..... A2V00000200931..... 02-02-16	8WL1614-0..... A2V00000200447..... 02-02-22
8WL1580-0..... A2V00000201770..... 02-02-16	8WL1614-1..... A2V00000200449..... 02-02-22
8WL1580-1..... A2V00000201771..... 02-02-16	8WL1614-2..... A2V00000200452..... 02-02-22
8WL1580-2..... A2V00000200933..... 02-02-16	8WL1614-3..... A2V00000200453..... 02-02-22
8WL1581-1..... A2V00000201774..... 02-02-16	8WL1614-4..... A2V00000201845..... 02-02-22
8WL1581-2..... A2V00000201775..... 02-02-16	8WL1615-0..... A2V00000201846..... 02-02-23
8WL1582-0..... A2V00000201776..... 02-02-16	8WL1616-0..... A2V00000201847..... 02-02-23
8WL1582-1..... A2V00000201777..... 02-02-16	8WL1620-0..... A2V00000201848..... 02-02-23
8WL1583-1..... A2V00000201779..... 02-02-16	8WL1631-0..... A2V00000200448..... 02-02-24
8WL1584-0..... A2V00000201780..... 02-02-16	8WL1631-3..... A2V00001810726..... 02-02-24
8WL1585-0..... A2V00000201782..... 02-02-17	8WL1650-1..... A2V00000201851..... 02-02-12
8WL1587-2..... A2V00001861946..... 02-02-18	8WL1650-2..... A2V00000201852..... 02-02-12
8WL1588-2..... A2V00001861948..... 02-02-18	8WL1650-3..... A2V00000201853..... 02-02-12
8WL1590-1..... A2V00000207036..... 02-02-19	8WL2000-0..... A2V00000200111..... 02-05-36
8WL1590-2..... A2V00001861949..... 02-02-18	8WL2003-3..... A2V00000201858..... 02-05-34
8WL1591-1..... A2V00000207035..... 02-02-19	8WL2004-0..... A2V00000201859..... 02-05-35
8WL1591-2..... A2V00001861950..... 02-02-18	8WL2005-0..... A2V00000201862..... 02-05-37
8WL1591-4..... A2V00000200398..... 02-02-19	8WL2006-0A..... A2V00001391603..... 02-03-57
8WL1592-2..... A2V00001861951..... 02-02-18	8WL2006-0B..... A2V00001394865..... 02-03-58
8WL1600-0..... A2V00000200622..... 02-02-20	8WL2006-8..... A2V00000201867..... 02-03-55
8WL1601-0..... A2V00000201799..... 02-02-20	8WL2006-8A..... A2V00001715011..... 02-03-56

8WL2007-1	A2V00000201868	02-03-10	8WL2097-8C	A2V00001410246	02-03-13
8WL2012-4	A2V00000201879	02-04-66	8WL2097-8D	A2V00001403595	02-03-15
8WL2027-0A	A2V00001386513	02-04-47	8WL2097-8E	A2V00001445954	02-03-14
8WL2027-0B	A2V00001386514	02-04-47	8WL2097-8F	A2V00001445955	02-03-16
8WL2027-0C	A2V00001386515	02-04-48	8WL2097-8G	A2V00001842636	02-03-17
8WL2027-0D	A2V00001386766	02-04-48	8WL2097-8H	A2V00001842637	02-03-18
8WL2031-4A	A2V00001159484	02-05-18	8WL2097-8L	A2V00001881358	02-03-12
8WL2031-4B	A2V00001159645	02-05-18	8WL2100-0	A2V00000200113	02-05-23
8WL2031-5A	A2V00001159646	02-05-19	8WL2101-0	A2V00000200107	02-05-24
8WL2031-5B	A2V00001159647	02-05-19	8WL2101-4	A2V00000201967	02-04-52
8WL2032-2	A2V00001955168	02-04-42	8WL2102-2	A2V00001220488	02-05-25
8WL2032-3	A2V00001096361	02-04-42	8WL2102-7	A2V00000201973	02-04-53
8WL2033-3	A2V00001096362	02-04-42	8WL2103-4	A2V00000201976	02-05-25
8WL2034-2	A2V00001127797	02-04-43	8WL2104-1	A2V00000201978	02-04-54
8WL2034-3	A2V00001096363	02-04-43	8WL2104-2	A2V00000201979	02-04-54
8WL2034-4	A2V00001096364	02-04-43	8WL2104-5	A2V00001077911	02-05-25
8WL2036-3A	A2V00001158708	02-05-20	8WL2105-6D	A2V00001705130	02-04-24
8WL2036-3B	A2V00001863286	02-05-20	8WL2105-6E	A2V00001705133	02-04-24
8WL2037-3	A2V00001139307	02-04-41	8WL2105-8	A2V00001705128	02-04-23
8WL2037-5A	A2V00001132752	03-02-03	8WL2112-5D	A2V00001159654	02-05-39
8WL2054-7	A2V00001126805	02-03-11	8WL2112-5G	A2V00001951977	02-04-77
8WL2064-4	A2V00001063236	02-04-44	8WL2112-5H	A2V00001951978	02-04-77
8WL2065-4	A2V00001063238	02-04-44	8WL2112-8B	A2V00000206366	02-04-78
8WL2067-4	A2V00001028663	02-04-45	8WL2113-1	A2V00000200148	02-04-31
8WL2068-4	A2V00001028662	02-04-45	8WL2113-5	A2V00000202000	02-05-16
8WL2071-4	A2V00001135589	02-04-40	8WL2114-0	A2V00000202006	02-05-16
8WL2072-4	A2V00001135590	02-04-40	8WL2114-1	A2V00000200150	02-04-31
8WL2080-8	A2V00000201933	02-06-04	8WL2114-1A	A2V00001701857	02-04-64
8WL2082-0	A2V00000201938	02-06-05	8WL2114-4	A2V00000200149	02-04-31
8WL2082-6	A2V00000201941	02-06-06	8WL2114-4A	A2V00001701858	02-04-64
8WL2083-4	A2V00000201946	02-06-08	8WL2114-7	A2V00001121629	02-05-16
8WL2083-5	A2V00000201947	02-06-08	8WL2115-0	A2V00000202007	02-04-32
8WL2091-1	A2V00000201949	02-06-09	8WL2115-1	A2V00000200123	02-04-32
8WL2095-0	A2V00000201953	02-06-07	8WL2115-2A	A2V00001827323	02-04-33
8WL2097-0	A2V00000201956	02-04-36	8WL2115-2B	A2V00001827324	02-04-33
8WL2097-0B	A2V00001828856	02-04-36	8WL2115-4	A2V00001121630	02-05-17
8WL2097-1	A2V00000201957	02-04-37	8WL2116-0	A2V00000200124	02-04-32
8WL2097-1B	A2V00001813005	02-04-37	8WL2116-6B	A2V00001159669	02-05-28
8WL2097-1C	A2V00001842638	02-04-38	8WL2116-6C	A2V00001159670	02-05-28
8WL2097-6	A2V00000201962	02-04-36	8WL2116-7A	A2V00001075434	02-04-60
8WL2097-7	A2V00000201963	02-04-37	8WL2116-7B	A2V00001135591	02-04-60

8WL2117-5..... A2V00000202015..... 02-05-26	8WL2130-0..... A2V00000202060..... 02-06-12
8WL2118-1..... A2V00000200156..... 02-04-56	8WL2131-0..... A2V00000202061..... 02-06-10
8WL2118-2..... A2V00000200157..... 02-04-56	8WL2131-6..... A2V00001000086..... 02-06-11
8WL2118-2A..... A2V00001787558..... 02-04-57	8WL2132-0..... A2V00000202068..... 02-06-13
8WL2118-4A..... A2V00001028696..... 02-04-58	8WL2137-4..... A2V00000200323..... 02-10-22
8WL2118-4B..... A2V00001028697..... 02-04-58	8WL2140-0..... A2V00000200268..... 02-06-14
8WL2120-3..... A2V00000200127..... 02-04-59	8WL2140-2..... A2V00000202078..... 02-06-15
8WL2120-4..... A2V00000202027..... 02-04-19	8WL2142-0..... A2V00000200258..... 02-06-17
8WL2120-7..... A2V00000202030..... 02-04-16	8WL2142-1..... A2V00000200259..... 02-06-17
8WL2121-4..... A2V00000202036..... 02-04-16	8WL2142-8..... A2V00000200063..... 02-06-18
8WL2121-4B..... A2V00000200128..... 02-04-20	8WL2144-0..... A2V00000200247..... 02-06-21
8WL2121-5..... A2V00000202037..... 02-04-16	8WL2144-1..... A2V00000200246..... 02-06-22
8WL2121-5B..... A2V00000200129..... 02-04-20	8WL2146-0..... A2V00000200255..... 02-06-19
8WL2121-8..... A2V00000202040..... 02-05-12	8WL2146-1..... A2V00000200256..... 02-06-19
8WL2122-5E..... A2V00001705196..... 02-04-18	8WL2147-0..... A2V00000200261..... 02-06-20
8WL2122-5F..... A2V00001705197..... 02-04-18	8WL2148-5..... A2V00000202095..... 02-04-49
8WL2122-6D..... A2V00001834016..... 02-04-55	8WL2148-6..... A2V00000202096..... 02-04-49
8WL2122-6E..... A2V00001834019..... 02-04-55	8WL2148-7..... A2V00000200132..... 02-04-51
8WL2123-3..... A2V00000200204..... 02-04-11	8WL2148-7A..... A2V00000200133..... 02-04-50
8WL2123-8..... A2V00000202043..... 02-03-19	8WL2148-7B..... A2V00000200134..... 02-04-50
8WL2124-0..... A2V00000202044..... 02-03-20	8WL2150-0..... A2V00000202097..... 02-06-27
8WL2124-3..... A2V00000202045..... 02-04-12	8WL2158-0A..... A2V00001020552..... 02-06-16
8WL2124-4..... A2V00000200212..... 02-04-13	8WL2160-0..... A2V00000200689..... 02-05-40
8WL2125-5..... A2V00000202048..... 02-03-21	8WL2161-0..... A2V00001162099..... 02-04-79
8WL2126-0..... A2V00000202049..... 02-05-08	8WL2162-0..... A2V00001081109..... 02-05-40
8WL2126-1..... A2V00000200203..... 02-04-14	8WL2164-0..... A2V00000202112..... 02-05-40
8WL2126-2..... A2V00000202051..... 02-03-22	8WL2165-0..... A2V00001162100..... 02-04-79
8WL2126-3..... A2V00000200188..... 02-04-14	8WL2166-0..... A2V00000202116..... 02-05-40
8WL2127-0..... A2V00000202052..... 02-05-09	8WL2167-0..... A2V00001162101..... 02-04-79
8WL2127-1..... A2V00000200207..... 02-04-15	8WL2170-0..... A2V00001162102..... 02-04-79
8WL2127-2..... A2V00000202054..... 02-03-23	8WL2173-0..... A2V00001175718..... 02-04-79
8WL2127-3..... A2V00000202055..... 02-03-23	8WL2175-0A..... A2V00001085295..... 02-05-41
8WL2128-0..... A2V00000200117..... 02-04-35	8WL2175-1B..... A2V00001129299..... 02-05-41
8WL2128-4..... A2V00000200119..... 02-04-35	8WL2175-2B..... A2V00001128840..... 02-05-41
8WL2128-5A..... A2V00001056641..... 02-04-34	8WL2175-4B..... A2V00001121627..... 02-05-41
8WL2128-5B..... A2V00001056640..... 02-04-61	8WL2184-0..... A2V00000202127..... 02-04-80
8WL2128-5C..... A2V00001075095..... 02-04-62	8WL2184-1..... A2V00000200702..... 02-05-42
8WL2128-6A..... A2V00001159673..... 02-05-32	8WL2184-2..... A2V00000202129..... 02-04-80
8WL2128-6B..... A2V00001159667..... 02-05-29	8WL2184-3..... A2V00000200700..... 02-04-80
8WL2128-6C..... A2V00001159668..... 02-05-30	8WL2184-4..... A2V00000200701..... 02-04-80
8WL2128-7..... A2V00001159674..... 02-05-33	8WL2184-5..... A2V00000202132..... 02-05-42

8WL2184-6 A2V00000202133 02-05-42	8WL2813-1 A2V00000202208 02-03-28
8WL2184-7 A2V00000200703 02-04-80	8WL2815-0 A2V00000202212 02-03-29
8WL2184-8 A2V00000202135 02-05-42	8WL2815-1 A2V00000202214 02-03-29
8WL2185-0 A2V00001042611 02-04-80	8WL2824-2 A2V00000202216 02-03-31
8WL2188-3 A2V00001168082 02-05-10	8WL2824-6 A2V00000202220 02-03-32
8WL2190-3 A2V00000202144 02-05-11	8WL2824-8 A2V00000202221 02-03-33
8WL2196-2 A2V00001028695 02-04-46	8WL2825-0 A2V00000202222 02-03-34
8WL2196-3 A2V00001028694 02-04-46	8WL2825-3 A2V00001085162 02-03-41
8WL2196-4 A2V00001147720 02-05-21	8WL2826-1 A2V00000202224 02-03-35
8WL2196-5 A2V00001159648 02-05-21	8WL2826-7 A2V00000202227 02-03-40
8WL2196-6 A2V00001159650 02-05-22	8WL2827-0 A2V00000202228 02-03-36
8WL2200-0 A2V00000202152 02-04-21	8WL2827-3 A2V00000202229 02-03-37
8WL2200-1 A2V00000202153 02-04-21	8WL2827-5 A2V00000202230 02-03-38
8WL2201-0 A2V00000202154 02-04-22	8WL2827-7A A2V00001413977 02-03-39
8WL2205-0 A2V00000202156 02-04-25	8WL2828-0 A2V00000202232 02-03-42
8WL2206-0 A2V00000202158 02-04-25	8WL2828-4 A2V00001857423 02-03-46
8WL2207-0 A2V00000202159 02-04-25	8WL2830-1 A2V00000202234 02-03-43
8WL2210-0 A2V00000202160 02-04-26	8WL2830-3 A2V00000202235 02-03-43
8WL2214-0 A2V00000202163 02-04-27	8WL2830-5 A2V00000202236 02-03-44
8WL2215-0 A2V00000202164 02-04-28	8WL2830-7 A2V00000202237 02-03-44
8WL2216-0 A2V00000202165 02-04-29	8WL2832-1 A2V00000202241 02-03-45
8WL2217-0 A2V00001386768 02-04-39	8WL2833-0 A2V00000202247 02-03-47
8WL2244-0 A2V00001386732 02-04-63	8WL2833-1 A2V00000202248 02-03-48
8WL2244-1 A2V00001386734 02-04-63	8WL2833-4 A2V00000202251 02-03-49
8WL2720-0 A2V00000202187 02-03-24	8WL2837-1 A2V00000202259 02-03-50
8WL2721-0 A2V00000202190 02-03-24	8WL2838-1 A2V00000202260 02-03-51
8WL2721-2 A2V00001664563 02-03-25	8WL2838-3 A2V00000202261 02-03-52
8WL2723-0 A2V00001159665 02-05-27	8WL2844-1 A2V00000202277 02-03-53
8WL2723-1 A2V00001159666 02-05-27	8WL2847-6 A2V00000202283 02-03-54
8WL2723-3 A2V00001159671 02-05-31	8WL2848-3 A2V00000202286 02-03-54
8WL2723-4 A2V00001159672 02-05-31	8WL2850-6 A2V00001391419 02-03-59
8WL2724-0 A2V00001159651 02-05-14	8WL2860-0 A2V00000202311 02-03-63
8WL2724-1 A2V00001159652 02-05-15	8WL2860-6 A2V00000202313 02-03-64
8WL2800-0 A2V00000202192 02-03-26	8WL2861-0 A2V00000202315 02-03-64
8WL2801-0 A2V00000202194 02-03-26	8WL2861-6 A2V00000202317 02-03-64
8WL2802-0 A2V00000202196 02-03-26	8WL2861-7 A2V00000202318 02-03-64
8WL2810-0 A2V00000202198 02-03-27	8WL2862-0 A2V00000202319 02-03-63
8WL2810-1 A2V00000202200 02-03-27	8WL2862-1 A2V00000202320 02-03-63
8WL2811-0 A2V00000202202 02-03-27	8WL2862-6 A2V00000202321 02-03-63
8WL2811-1 A2V00000202204 02-03-28	8WL2862-7 A2V00000202322 02-03-63
8WL2813-0 A2V00000202206 02-03-28	8WL2870-0 A2V00000202335 02-03-65

8WL2870-3..... A2V00000202336..... 02-03-65	8WL3080-3..... A2V00000202443..... 02-07-20
8WL2871-6..... A2V00000202338..... 02-03-65	8WL3080-3A..... A2V00001119228..... 02-07-24
8WL2872-0..... A2V00000202339..... 02-03-65	8WL3080-4..... A2V00000202444..... 02-07-20
8WL2878-1..... A2V00001660153..... 02-03-30	8WL3080-8..... A2V00000202445..... 02-07-24
8WL3001-0A..... A2V00001019606..... 02-07-05	8WL3088-1A..... A2V00001173136..... 02-07-21
8WL3001-2..... A2V00001220610..... 02-07-04	8WL3088-1B..... A2V00001171269..... 02-07-21
8WL3001-8..... A2V00000202363..... 02-07-06	8WL3088-2E..... A2V00001220490..... 02-07-22
8WL3002-2..... A2V00000202364..... 02-07-07	8WL3092-1A..... A2V00001256788..... 02-07-34
8WL3002-5..... A2V00000202366..... 02-07-08	8WL3092-1B..... A2V00001256789..... 02-07-34
8WL3002-7..... A2V00000202367..... 02-07-08	8WL3092-1C..... A2V00001256790..... 02-07-34
8WL3004-2..... A2V00000202371..... 02-07-09	8WL3120-5..... A2V00000202454..... 02-07-17
8WL3006-1..... A2V00000202376..... 02-03-62	8WL3122-1..... A2V00000202456..... 02-07-14
8WL3006-3..... A2V00000202378..... 02-03-62	8WL3122-2..... A2V00000202457..... 02-07-15
8WL3007-0..... A2V00000202383..... 02-03-27	8WL3122-3..... A2V00000202458..... 02-07-14
8WL3007-1..... A2V00000202385..... 02-03-27	8WL3122-4..... A2V00000202459..... 02-07-16
8WL3020-1..... A2V00000202388..... 02-07-10	8WL3126-0..... A2V00000202462..... 02-07-18
8WL3020-6..... A2V00000202390..... 02-07-10	8WL3500-3A..... A2V00001872484..... 02-04-68
8WL3020-8..... A2V00000202393..... 02-16-22	8WL3500-3B..... A2V00001872485..... 02-04-68
8WL3021-0..... A2V00000202396..... 02-07-11	8WL3500-3BS..... A2V00001872827..... 02-04-70
8WL3021-1..... A2V00000202397..... 02-07-11	8WL3500-3C..... A2V00001872526..... 02-04-68
8WL3021-1A..... A2V00001125115..... 02-07-11	8WL3500-3D..... A2V00001872527..... 02-04-68
8WL3021-2..... A2V00000202398..... 02-07-12	8WL3500-3E..... A2V00001872528..... 02-04-68
8WL3021-3..... A2V00000202399..... 02-07-12	8WL3500-3ES..... A2V00001872830..... 02-04-70
8WL3021-3B..... A2V00001007768..... 02-07-12	8WL3500-3F..... A2V00001872529..... 02-04-69
8WL3021-7..... A2V00000204223..... 02-07-13	8WL3500-3G..... A2V00001872530..... 02-04-69
8WL3021-8..... A2V00000204918..... 02-12-51	8WL3500-3GS..... A2V00001872832..... 02-04-70
8WL3022-6..... A2V00000202404..... 03-02-04	8WL3500-3H..... A2V00001872531..... 02-04-69
8WL3022-7..... A2V00000202405..... 03-02-04	8WL3500-3K..... A2V00001872532..... 02-04-69
8WL3061-0..... A2V00000202430..... 02-07-19	8WL3500-8L..... A2V00001872533..... 02-04-71
8WL3061-1..... A2V00000202431..... 02-07-23	8WL3500-8LS..... A2V00001872833..... 02-04-73
8WL3077-3..... A2V00001924177..... 03-02-05	8WL3500-8M..... A2V00001872534..... 02-04-71
8WL3078-1A..... A2V00001095055..... 02-07-25	8WL3500-8N..... A2V00001872535..... 02-04-71
8WL3078-2A..... A2V00001095056..... 02-07-26	8WL3500-8NS..... A2V00001872835..... 02-04-73
8WL3078-2B..... A2V00001164337..... 02-07-26	8WL3500-8O..... A2V00001872617..... 02-04-71
8WL3078-2C..... A2V00001126537..... 02-07-27	8WL3500-8P..... A2V00001872618..... 02-04-71
8WL3078-2D..... A2V00001125948..... 02-07-28	8WL3500-8PS..... A2V00001872857..... 02-04-73
8WL3078-2L..... A2V00001137606..... 02-07-29	8WL3500-8T..... A2V00001872619..... 02-04-72
8WL3078-2M..... A2V00001137607..... 02-07-30	8WL3500-8U..... A2V00001872620..... 02-04-72
8WL3078-6A..... A2V00001056636..... 02-07-33	8WL3501-2A..... A2V00001966507..... 03-02-06
8WL3078-6D..... A2V00001840568..... 02-07-31	8WL3501-5A..... A2V00001720585..... 02-04-67
8WL3078-7A..... A2V00001159476..... 02-07-32	8WL3501-5B..... A2V00001720661..... 02-04-67

8WL3501-5D..... A2V00001720664..... 02-04-67	8WL3570-6..... A2V00001090649..... 02-08-07
8WL3501-5E..... A2V00001720665..... 02-04-67	8WL3575-0..... A2V00000202604..... 02-08-10
8WL3503-5A..... A2V00001149570..... 02-05-38	8WL3581-1..... A2V00000202609..... 02-08-35
8WL3503-5F..... A2V00001112001..... 02-05-38	8WL3582-5..... A2V00001057499..... 02-08-30
8WL3503-5K..... A2V00001112003..... 02-05-38	8WL3584-6..... A2V00000204960..... 02-08-32
8WL3503-8A..... A2V00000200445..... 02-04-75	8WL3584-6A..... A2V00001135682..... 02-08-31
8WL3503-8B..... A2V00000200446..... 02-04-75	8WL3586-0..... A2V00000202615..... 02-08-36
8WL3508-0..... A2V00000202507..... 02-03-66	8WL3586-5..... A2V00001000062..... 02-08-33
8WL3508-4..... A2V00001447248..... 02-04-76	8WL3600-1..... A2V00000202619..... 02-06-34
8WL3508-5..... A2V00001447250..... 02-04-76	8WL3600-3..... A2V00000202620..... 02-06-35
8WL3508-7..... A2V00001075321..... 02-04-74	8WL3600-5..... A2V00000204897..... 02-06-35
8WL3508-8..... A2V00001447251..... 02-04-74	8WL4000-0..... A2V00000202623..... 02-08-09
8WL3514-0..... A2V00000202521..... 02-03-67	8WL4044-0A..... A2V00001173195..... 02-08-11
8WL3514-3..... A2V00000202522..... 02-03-68	8WL4044-1A..... A2V00001173196..... 02-08-11
8WL3515-6..... A2V00000202524..... 02-03-67	8WL4044-2..... A2V00000202694..... 02-08-34
8WL3515-7..... A2V00000202525..... 02-03-68	8WL4044-3A..... A2V00001173197..... 02-08-12
8WL3517-5..... A2V00001355212..... 03-01-10	8WL4044-4A..... A2V00001173198..... 02-08-12
8WL3517-6..... A2V00001037375..... 03-01-10	8WL4061-0..... A2V00000202709..... 02-16-19
8WL3520-2..... A2V00000202533..... 02-06-23	8WL4200-0..... A2V00000204234..... 02-08-13
8WL3520-2A..... A2V00001158663..... 02-06-23	8WL4200-0A..... A2V00000202711..... 02-08-14
8WL3520-3..... A2V00000202534..... 02-06-24	8WL4200-0B..... A2V00000202712..... 02-08-14
8WL3520-3A..... A2V00001158705..... 02-06-24	8WL4200-0C..... A2V00001109559..... 02-08-13
8WL3521-0..... A2V00000202535..... 02-06-26	8WL4200-0D..... A2V00001801596..... 02-08-14
8WL3523-0..... A2V00000202540..... 02-06-25	8WL4203-2..... A2V00000202728..... 02-16-20
8WL3524-0..... A2V00000202543..... 02-11-32	8WL4500-0..... A2V00000202730..... 02-09-05
8WL3526-8..... A2V00001016572..... 02-08-04	8WL4501-0..... A2V00000200275..... 02-09-06
8WL3527-0..... A2V00000202547..... 02-08-05	8WL4502-0..... A2V00000200456..... 02-09-07
8WL3534-4..... A2V00000202557..... 02-06-36	8WL4505-0..... A2V00000202735..... 02-09-08
8WL3537-1..... A2V00000202561..... 03-01-07	8WL4505-1..... A2V00000202736..... 02-09-08
8WL3537-3..... A2V00001900102..... 03-01-08	8WL4505-2..... A2V00000202737..... 02-09-08
8WL3553-7..... A2V00001029238..... 02-06-32	8WL4505-3..... A2V00000202738..... 02-09-08
8WL3553-7A..... A2V00001047570..... 02-06-33	8WL4505-5..... A2V00000200306..... 02-09-09
8WL3553-8..... A2V00001047571..... 02-06-33	8WL4505-6..... A2V00001000891..... 02-09-10
8WL3554-6..... A2V00001029239..... 02-06-28	8WL4505-7..... A2V00000205005..... 02-09-11
8WL3554-7..... A2V00001047811..... 02-06-29	8WL4507-0..... A2V00000202740..... 02-09-12
8WL3554-8..... A2V00001047812..... 02-06-29	8WL4507-1..... A2V00000202741..... 02-09-12
8WL3555-6..... A2V00001029240..... 02-06-30	8WL4507-3..... A2V00000202742..... 02-09-12
8WL3555-7..... A2V00001047813..... 02-06-31	8WL4517-1E..... A2V00001166183..... 02-09-15
8WL3555-8..... A2V00001047814..... 02-06-31	8WL4517-1K..... A2V00001187051..... 02-09-13
8WL3570-4..... A2V00001090648..... 02-08-06	8WL4517-1L..... A2V00001187052..... 02-09-14
8WL3570-5..... A2V00001090647..... 02-08-07	8WL4517-1M..... A2V00001187113..... 02-09-16

8WL4517-1N..... A2V00001187114..... 02-09-16	8WL4578-2..... A2V00000202881..... 02-09-41
8WL4517-2B..... A2V00001149528..... 02-09-17	8WL4578-8A..... A2V00000200954..... 02-09-57
8WL4517-2C..... A2V00001149529..... 02-09-19	8WL4578-8B..... A2V00001070243..... 02-09-57
8WL4517-2D..... A2V00001149530..... 02-09-19	8WL4580-2..... A2V00000200402..... 02-09-43
8WL4517-2E..... A2V00001204936..... 02-09-18	8WL4581-2..... A2V00000202893..... 02-09-42
8WL4517-2H..... A2V00001155935..... 02-09-32	8WL4582-2..... A2V00000202900..... 02-09-45
8WL4517-3H..... A2V00001827991..... 02-09-33	8WL4583-0..... A2V00000202902..... 02-09-44
8WL4524-0..... A2V00001067750..... 02-09-20	8WL4584-0..... A2V00000202908..... 02-09-46
8WL4524-1A..... A2V00001071269..... 02-09-21	8WL4588-0..... A2V00000202923..... 02-09-47
8WL4524-1B..... A2V00001071270..... 02-09-21	8WL4591-0..... A2V00000202931..... 02-09-48
8WL4530-5..... A2V00000202802..... 02-09-22	8WL4591-1..... A2V00000202932..... 02-09-48
8WL4530-5A..... A2V00000202803..... 02-09-22	8WL4591-2..... A2V00000202933..... 02-09-48
8WL4532-5..... A2V00000204917..... 02-09-23	8WL4591-5A..... A2V00001958850..... 02-09-49
8WL4533-1..... A2V00000202819..... 02-09-24	8WL4591-6..... A2V00000202935..... 02-09-50
8WL4533-8..... A2V00000202821..... 02-09-26	8WL4591-7..... A2V00000202936..... 02-09-50
8WL4534-0..... A2V00000202822..... 02-09-25	8WL4591-8..... A2V00000202937..... 02-09-51
8WL4534-1..... A2V00001847095..... 03-02-07	8WL4592-5..... A2V00000202939..... 02-09-52
8WL4534-2..... A2V00000204235..... 03-02-08	8WL4592-8..... A2V00000202941..... 02-09-53
8WL4536-1..... A2V00000202827..... 02-09-28	8WL4593-5..... A2V00000202943..... 02-09-53
8WL4537-2..... A2V00000202828..... 02-09-29	8WL4597-2..... A2V00000202952..... 02-10-34
8WL4538-0..... A2V00000200649..... 02-09-30	8WL4600-0..... A2V00000202959..... 02-09-61
8WL4538-4..... A2V00000200650..... 02-09-34	8WL4600-1..... A2V00001071488..... 02-09-62
8WL4540-1..... A2V00000202837..... 02-09-36	8WL4601-7..... A2V00000202963..... 02-11-33
8WL4542-0..... A2V00000202846..... 02-09-35	8WL4602-4..... A2V00001780180..... 02-09-37
8WL4545-2..... A2V00000202855..... 02-09-31	8WL4604-0..... A2V00000202967..... 02-09-63
8WL4550-0..... A2V00000200469..... 02-09-38	8WL4605-0..... A2V00000202968..... 02-09-63
8WL4551-0..... A2V00000200463..... 02-09-38	8WL4606-0..... A2V00000202969..... 02-09-63
8WL4552-0..... A2V00000200464..... 02-09-38	8WL4610-0..... A2V00000202976..... 02-09-64
8WL4553-0..... A2V00000200462..... 02-09-38	8WL4612-0..... A2V00000202977..... 02-09-65
8WL4555-0..... A2V00000200465..... 02-09-38	8WL4613-0..... A2V00000202981..... 02-09-76
8WL4555-1..... A2V00000200471..... 02-09-38	8WL4618-0..... A2V00000200582..... 02-09-58
8WL4556-0..... A2V00000200467..... 02-09-38	8WL4618-0A..... A2V00001002319..... 02-09-59
8WL4556-1..... A2V00000200470..... 02-09-38	8WL4618-1..... A2V00000200581..... 02-09-58
8WL4560-0..... A2V00000200460..... 02-09-38	8WL4618-5..... A2V00000200579..... 02-09-60
8WL4560-1..... A2V00001075428..... 02-09-38	8WL4618-5A..... A2V00001148110..... 02-09-60
8WL4567-0A..... A2V00000200401..... 02-09-54	8WL4620-0..... A2V00000200282..... 02-09-66
8WL4567-1A..... A2V00000200428..... 02-09-56	8WL4620-1..... A2V00000200283..... 02-09-67
8WL4567-8..... A2V00000200376..... 02-09-55	8WL4621-3..... A2V00000202998..... 02-11-33
8WL4570-0..... A2V00000200459..... 02-09-39	8WL4622-0..... A2V00000200295..... 02-09-70
8WL4571-0..... A2V00000200458..... 02-09-40	8WL4622-1..... A2V00000200296..... 02-09-70
8WL4572-0..... A2V00000200457..... 02-09-40	8WL4622-2..... A2V00000200297..... 02-09-70

8WL4622-4..... A2V00000203006..... 02-09-74	8WL5078-1A..... A2V00001660725..... 02-10-10
8WL4622-4A..... A2V00001013250..... 02-09-74	8WL5078-1C..... A2V00001448443..... 02-10-11
8WL4623-3..... A2V00000203008..... 02-09-71	8WL5078-1D..... A2V00001941490..... 02-10-11
8WL4623-5..... A2V00000203010..... 02-09-72	8WL5078-2..... A2V00001885152..... 02-10-12
8WL4624-0..... A2V00000203014..... 02-09-68	8WL5078-3..... A2V00001938835..... 02-10-13
8WL4624-1..... A2V00000203015..... 02-09-68	8WL5100-0..... A2V00000200334..... 02-10-28
8WL4624-2..... A2V00000200299..... 02-09-68	8WL5101-0..... A2V00000200333..... 02-10-28
8WL4624-3..... A2V00000200298..... 02-09-68	8WL5102-0..... A2V00000200336..... 02-10-29
8WL4624-4..... A2V00000203018..... 02-09-68	8WL5103-0..... A2V00000200335..... 02-10-29
8WL4626-2..... A2V00001134220..... 02-09-69	8WL5104-0..... A2V00000200337..... 02-10-29
8WL4626-3..... A2V00001134497..... 02-09-69	8WL5106-0..... A2V00000200332..... 02-10-30
8WL4627-0..... A2V00001808563..... 03-02-09	8WL5106-1..... A2V00001159517..... 02-10-30
8WL4628-0..... A2V00001808559..... 03-02-10	8WL5110-1..... A2V00000203098..... 02-10-31
8WL4628-3..... A2V00001808560..... 03-02-11	8WL5110-4..... A2V00000203101..... 02-10-32
8WL4628-3A..... A2V00001875741..... 02-09-73	8WL5110-5A..... A2V00001020383..... 02-10-33
8WL4630-0A..... A2V00000204362..... 02-09-75	8WL5110-7A..... A2V00001350140..... 02-10-35
8WL4636-0..... A2V00000203030..... 02-09-77	8WL5112-0..... A2V00000207964..... 02-10-36
8WL4637-0..... A2V00001117917..... 02-09-78	8WL5112-1..... A2V00000200749..... 02-10-37
8WL4640-0..... A2V00000203032..... 02-09-79	8WL5130-0..... A2V00000203104..... 02-10-38
8WL4645-0..... A2V00000203034..... 02-09-81	8WL5131-0..... A2V00000203105..... 02-10-39
8WL4645-1..... A2V00000203035..... 02-09-82	8WL5133-0..... A2V00000203106..... 02-10-38
8WL4647-2..... A2V00001177806..... 02-09-27	8WL5134-0..... A2V00000215738..... 02-10-38
8WL4650-0..... A2V00000203038..... 02-09-83	8WL5148-0..... A2V00000203108..... 02-10-40
8WL4650-1..... A2V00000203039..... 02-09-83	8WL5148-8..... A2V00000203116..... 02-10-41
8WL4651-0..... A2V00000207235..... 02-09-80	8WL5150-0..... A2V00001085728..... 02-10-42
8WL4652-0..... A2V00001842442..... 02-04-65	8WL5152-0..... A2V00000200673..... 02-10-42
8WL4652-1..... A2V00001842791..... 02-04-65	8WL5154-0..... A2V00000200674..... 02-10-42
8WL4652-2..... A2V00001842792..... 02-04-65	8WL5155-0..... A2V00000203118..... 02-10-42
8WL4655-0..... A2V00000203043..... 02-09-84	8WL5157-0..... A2V00000203119..... 02-10-42
8WL4655-1..... A2V00000203044..... 02-09-84	8WL5160-0..... A2V00000203120..... 02-10-17
8WL5006-1A..... A2V00001036068..... 02-10-25	8WL5162-1A..... A2V00001406858..... 02-10-18
8WL5006-2A..... A2V00000200318..... 02-10-26	8WL5165-0..... A2V00000200328..... 02-10-19
8WL5006-3A..... A2V00001036822..... 02-10-27	8WL5167-0..... A2V00000200572..... 02-10-20
8WL5055-3K..... A2V00001972716..... 03-02-12	8WL5167-4..... A2V00000200168..... 02-10-21
8WL5067-0..... A2V00001825265..... 02-15-04	8WL5167-5..... A2V00001177189..... 02-10-23
8WL5070-0B..... A2V00001134224..... 02-10-14	8WL5168-0A..... A2V00001406564..... 02-10-24
8WL5070-1..... A2V00001141365..... 02-10-15	8WL5170-0..... A2V00000200330..... 02-10-43
8WL5071-0B..... A2V00001880221..... 02-10-16	8WL5170-1..... A2V00001007767..... 02-10-43
8WL5078-0A..... A2V00001448442..... 02-10-08	8WL5172-0..... A2V00000203139..... 02-10-46
8WL5078-0B..... A2V00001674211..... 02-10-08	8WL5172-1..... A2V00000203140..... 02-10-46
8WL5078-0C..... A2V00001452207..... 02-10-09	8WL5173-0..... A2V00000203141..... 02-10-44

8WL5173-2..... A2V00001007097..... 02-10-45	8WL6127-1E..... A2V00001355759..... 02-12-31
8WL5510-0..... A2V00000203168..... 02-11-06	8WL6134-0..... A2V00001439221..... 02-12-17
8WL5517-5C..... A2V00001801600..... 02-11-08	8WL6134-0A..... A2V00001439238..... 02-12-19
8WL5517-7A..... A2V00001801602..... 02-11-24	8WL6134-2..... A2V00001215401..... 02-12-25
8WL5530-0..... A2V00000203217..... 02-11-21	8WL6134-2A..... A2V00001802915..... 02-12-27
8WL5531-0..... A2V00000203218..... 02-11-21	8WL6134-2C..... A2V00001802984..... 02-12-21
8WL5531-0A..... A2V00001000029..... 02-11-20	8WL6134-2D..... A2V00001802985..... 02-12-23
8WL5533-0..... A2V00000203219..... 02-11-21	8WL6134-3..... A2V00001407197..... 02-12-07
8WL5533-0A..... A2V00001000050..... 02-11-20	8WL6134-3A..... A2V00001439218..... 02-12-09
8WL5534-0..... A2V00000203220..... 02-11-21	8WL6134-4..... A2V00001215400..... 02-12-11
8WL5545-0A..... A2V00001159902..... 02-11-11	8WL6134-4A..... A2V00001714023..... 02-12-13
8WL5545-1A..... A2V00001159903..... 02-11-12	8WL6134-5..... A2V00001439656..... 02-12-15
8WL5545-2A..... A2V00001160176..... 02-11-15	8WL6135-2A..... A2V00001215568..... 02-12-34
8WL5545-3A..... A2V00001159904..... 02-11-13	8WL6136-0..... A2V00001982567..... 02-15-05
8WL5545-4A..... A2V00001160175..... 02-11-14	8WL6137-0..... A2V00001883060..... 02-15-06
8WL5545-4AC..... A2V00001447705..... 02-11-14	8WL6200-2G..... A2V00001084371..... 02-12-40
8WL5545-4D..... A2V00001675519..... 02-11-16	8WL6200-2P..... A2V00001986211..... 02-12-40
8WL5545-4F..... A2V00001825760..... 02-11-17	8WL6202-0..... A2V00001183657..... 02-12-35
8WL5545-5A..... A2V00001362062..... 02-11-25	8WL6202-0A..... A2V00001719858..... 02-12-36
8WL5545-6A..... A2V00001365822..... 02-11-26	8WL6202-2..... A2V00001183605..... 02-12-35
8WL5545-6C..... A2V00001675518..... 02-11-27	8WL6202-5..... A2V00001183607..... 02-12-35
8WL5545-7A..... A2V00001160177..... 02-11-09	8WL6203-0..... A2V00001371813..... 02-12-37
8WL5545-8A..... A2V00001160178..... 02-11-10	8WL6203-1..... A2V00001666972..... 02-12-37
8WL5545-8AC..... A2V00001362063..... 02-11-10	8WL6203-3..... A2V00001666973..... 02-12-37
8WL5546-3..... A2V00001750726..... 02-11-07	8WL6203-4..... A2V00001371907..... 02-12-37
8WL5560-0..... A2V00000200356..... 02-11-28	8WL6203-5..... A2V00001371906..... 02-12-37
8WL5563-3..... A2V00000200364..... 02-11-29	8WL6203-8EA..... A2V00001381152..... 02-12-39
8WL5565-0..... A2V00000200352..... 02-11-30	8WL6203-8EB..... A2V00001381154..... 02-12-39
8WL5565-1..... A2V00000203305..... 02-11-31	8WL6203-8L..... A2V00001381151..... 02-12-38
8WL5570-0A..... A2V00001149277..... 02-11-05	8WL6207-0..... A2V00000200432..... 02-12-43
8WL5570-1A..... A2V00001004473..... 02-11-04	8WL6210-0..... A2V00000200409..... 02-12-41
8WL5575-0..... A2V00000203316..... 02-11-22	8WL6210-1..... A2V00000200010..... 02-12-41
8WL5575-1..... A2V00000203317..... 02-11-23	8WL6212-0..... A2V00000200406..... 02-12-42
8WL5575-5A..... A2V00001912520..... 02-11-18	8WL6214-1..... A2V00000203424..... 02-12-44
8WL5575-5B..... A2V00001921294..... 02-11-19	8WL6215-0..... A2V00000203426..... 02-12-38
8WL5578-0..... A2V00000203321..... 02-16-21	8WL6217-8..... A2V00001841551..... 03-02-13
8WL6127-0..... A2V00001355760..... 02-12-29	8WL6220-1..... A2V00000203446..... 02-12-56
8WL6127-0E..... A2V00001355757..... 02-12-29	8WL6221-1A..... A2V00000200058..... 02-01-41
8WL6127-0F..... A2V00001839626..... 02-12-29	8WL6221-2..... A2V00000206340..... 02-12-60
8WL6127-1..... A2V00001355763..... 02-12-31	8WL6221-4..... A2V00001000084..... 02-05-13
8WL6127-1A..... A2V00001355764..... 02-12-33	8WL6221-7..... A2V00000203453..... 02-05-12

8WL6222-0..... A2V00000203454..... 02-12-57	8WL6538-0..... A2V00001046700..... 02-13-07
8WL6222-4..... A2V00001705135..... 02-04-17	8WL6538-1..... A2V00000203557..... 02-13-07
8WL6223-0A..... A2V00000200059..... 02-01-42	8WL6541-4..... A2V00000203563..... 02-13-11
8WL6223-1..... A2V00000200208..... 02-12-61	8WL6541-4A..... A2V00000203564..... 02-13-12
8WL6225-0..... A2V00000203458..... 02-12-55	8WL6563-0..... A2V00001121772..... 02-13-13
8WL6225-2..... A2V00000203459..... 02-12-48	8WL6610-0..... A2V00000203587..... 02-16-11
8WL6226-0A..... A2V00000200060..... 02-01-43	8WL6712-5..... A2V00001055538..... 02-08-08
8WL6226-1..... A2V00000200209..... 02-12-59	8WL6715-0..... A2V00000203606..... 02-08-29
8WL6227-2..... A2V00001396482..... 02-12-45	8WL6730-5..... A2V00000203609..... 02-01-76
8WL6228-0..... A2V00000203464..... 02-12-62	8WL6730-6..... A2V00000203610..... 02-01-76
8WL6228-1..... A2V00000203465..... 02-12-62	8WL6731-5..... A2V00000203612..... 02-01-77
8WL6228-2A..... A2V00001797492..... 03-02-14	8WL6731-6..... A2V00000203613..... 02-01-77
8WL6228-2B..... A2V00001797493..... 03-02-14	8WL6731-7..... A2V00000203614..... 02-01-77
8WL6228-2C..... A2V00001797494..... 03-02-14	8WL6731-8..... A2V00000203615..... 02-01-77
8WL6230-0A..... A2V00000203466..... 02-12-53	8WL6732-5..... A2V00000203616..... 02-01-78
8WL6230-0D..... A2V00000203469..... 02-12-53	8WL6732-6..... A2V00000203617..... 02-01-78
8WL6230-1A..... A2V00000204244..... 02-12-54	8WL6732-7..... A2V00000203618..... 02-01-78
8WL6230-1D..... A2V00000204328..... 02-12-54	8WL6732-8..... A2V00000203619..... 02-01-78
8WL6230-5B..... A2V00001027457..... 02-12-46	8WL6738-1..... A2V00000203622..... 02-01-80
8WL6230-6B..... A2V00001109406..... 02-12-47	8WL6738-2..... A2V00000203623..... 02-01-80
8WL6231-6..... A2V00000203472..... 02-12-49	8WL6738-3..... A2V00000203624..... 02-01-80
8WL6231-8A..... A2V00001000733..... 02-12-52	8WL6738-4..... A2V00000203625..... 02-01-81
8WL6233-5..... A2V00001841554..... 03-02-15	8WL6740-0..... A2V00000203630..... 02-01-84
8WL6233-5B..... A2V00001972694..... 03-02-16	8WL6740-1..... A2V00000203631..... 02-01-82
8WL6237-0..... A2V00000203480..... 02-12-58	8WL6742-0..... A2V00000203632..... 02-01-84
8WL6247-8..... A2V00000203501..... 02-12-50	8WL6743-0..... A2V00000203633..... 02-01-84
8WL6247-8A..... A2V00001000731..... 02-12-50	8WL6745-0..... A2V00000203635..... 02-01-85
8WL6503-0A..... A2V00001133575..... 02-13-04	8WL6747-0..... A2V00000203636..... 02-01-85
8WL6503-1A..... A2V00001133576..... 02-13-04	8WL6748-0..... A2V00000203637..... 02-01-85
8WL6503-7A..... A2V00001140217..... 02-13-05	8WL6748-1..... A2V00000203638..... 02-01-85
8WL6504-0..... A2V00000203513..... 02-13-06	8WL6748-6..... A2V00000203640..... 02-01-84
8WL6504-1..... A2V00000203514..... 02-13-06	8WL6750-3..... A2V00000203641..... 02-01-82
8WL6504-2..... A2V00000203515..... 02-13-06	8WL6751-0..... A2V00000203642..... 02-01-83
8WL6504-3..... A2V00000200555..... 02-13-06	8WL6751-1..... A2V00000203643..... 02-01-83
8WL6504-5..... A2V00001075988..... 02-13-06	8WL6751-3..... A2V00000203644..... 02-01-83
8WL6504-6..... A2V00001184630..... 02-13-06	8WL6751-4..... A2V00000203645..... 02-01-83
8WL6504-7..... A2V00001184631..... 02-13-06	8WL6751-5..... A2V00000203646..... 02-01-83
8WL6504-8..... A2V00001184632..... 02-13-06	8WL6752-0..... A2V00000203647..... 02-01-79
8WL6537-2A..... A2V00001683916..... 02-13-09	8WL6752-1..... A2V00000203648..... 02-01-79
8WL6537-3..... A2V00001441833..... 02-13-10	8WL6752-2..... A2V00000203649..... 02-01-79
8WL6537-4..... A2V00001003672..... 02-13-08	8WL6752-3..... A2V00000203650..... 02-01-79

8WL6752-4..... A2V00000203651..... 02-01-79	8WL7070-0..... A2V00000203707..... 02-14-13
8WL7000-0..... A2V00000203653..... 02-14-04	8WL7071-0..... A2V00000203708..... 02-14-13
8WL7000-1..... A2V00000203655..... 02-14-05	8WL7072-0..... A2V00000200600..... 02-14-13
8WL7001-0..... A2V00000203656..... 02-14-04	8WL7073-0..... A2V00000203711..... 02-14-13
8WL7001-1..... A2V00000203658..... 02-14-05	8WL7074-0..... A2V00000203712..... 02-14-13
8WL7001-2..... A2V00001003920..... 02-14-06	8WL7075-0..... A2V00000200602..... 02-14-13
8WL7002-0..... A2V00000203663..... 02-14-04	8WL7076-0..... A2V00000200603..... 02-14-13
8WL7002-1..... A2V00000200612..... 02-14-05	8WL7077-0..... A2V00000203715..... 02-14-13
8WL7002-2..... A2V00001003921..... 02-14-06	8WL7083-3..... A2V00000204441..... 02-14-14
8WL7003-0..... A2V00000203670..... 02-14-04	8WL7084-3..... A2V00000204884..... 02-14-15
8WL7003-1..... A2V00000203672..... 02-14-05	8WL7090-0..... A2V00000200610..... 02-14-16
8WL7004-0..... A2V00001105514..... 02-14-04	8WL7090-0C..... A2V00001155165..... 02-14-18
8WL7006-0A..... A2V00000203673..... 02-08-27	8WL7090-0G..... A2V00001880777..... 02-14-18
8WL7006-1ZA..... A2V00001000027..... 02-08-28	8WL7090-1C..... A2V00001155165..... 02-14-17
8WL7010-0..... A2V00000203675..... 02-14-07	8WL7090-1G..... A2V00001977507..... 02-14-17
8WL7011-0..... A2V00000203677..... 02-14-07	8WL7090-2A..... A2V00001880779..... 02-14-19
8WL7011-1..... A2V00000203678..... 02-14-07	8WL7091-6..... A2V00001071757..... 02-14-21
8WL7015-1..... A2V00000203679..... 02-14-07	8WL7091-7..... A2V00001097442..... 02-14-21
8WL7020-0..... A2V00000200607..... 02-14-08	8WL7093-2..... A2V00000200604..... 02-14-20
8WL7025-0..... A2V00000200608..... 02-14-08	8WL7093-3..... A2V00000203731..... 02-14-20
8WL7032-0..... A2V00000200597..... 02-14-09	8WL7093-4..... A2V00000203732..... 02-14-20
8WL7033-0..... A2V00000200598..... 02-14-09	8WL7095-0..... A2V00000203734..... 02-14-22
8WL7034-0..... A2V00000200599..... 02-14-09	8WL7097-0..... A2V00000203736..... 02-14-22
8WL7034-1..... A2V00000203686..... 02-14-09	8WL7101-1..... A2V00000203743..... 03-01-04
8WL7035-0..... A2V00000204486..... 02-14-09	8WL7103-5..... A2V00000203751..... 03-01-05
8WL7035-5..... A2V00001748351..... 02-13-14	8WL7108-2..... A2V00000203757..... 03-01-06
8WL7035-5E..... A2V00001896291..... 02-13-14	8WL7108-8..... A2V00000203759..... 03-01-09
8WL7035-5F..... A2V00001897045..... 02-13-14	8WL7110-0..... A2V00000203760..... 03-01-11
8WL7036-0..... A2V00000203688..... 02-14-09	8WL7110-5..... A2V00000203762..... 03-01-11
8WL7037-0..... A2V00000203689..... 02-14-09	8WL7140-0..... A2V00000203766..... 02-16-17
8WL7051-0..... A2V00000203693..... 02-14-10	8WL7142-7..... A2V00000203781..... 02-16-18
8WL7052-0..... A2V00000203694..... 02-14-10	8WL7145-0..... A2V00001230819..... 02-16-23
8WL7053-0..... A2V00000203695..... 02-14-10	8WL7152-0..... A2V00000203784..... 02-16-05
8WL7054-0..... A2V00000204552..... 02-14-10	8WL7152-1..... A2V00000203785..... 02-16-05
8WL7055-0..... A2V00000203697..... 02-14-10	8WL7152-1A..... A2V00001195034..... 02-16-06
8WL7056-0..... A2V00000203698..... 02-14-10	8WL7152-2..... A2V00000203786..... 02-16-05
8WL7060-2..... A2V00001200194..... 02-14-11	8WL7152-3..... A2V00000203787..... 02-16-05
8WL7061-0..... A2V00000203703..... 02-14-11	8WL7152-4..... A2V00000203788..... 02-16-05
8WL7061-1..... A2V00000203704..... 02-14-11	8WL7152-5..... A2V00000203789..... 02-16-05
8WL7062-0..... A2V00000203705..... 02-14-11	8WL7152-7..... A2V00000203790..... 02-16-05
8WL7063-0..... A2V00000203706..... 02-14-12	8WL7152-8..... A2V00001396173..... 02-16-07

8WL7153-4..... A2V00000203791..... 02-16-08	8WL8102-4..... A2V00001016096..... 02-08-42
8WL7153-6..... A2V00000203792..... 02-16-08	8WL8102-5..... A2V00001016097..... 02-08-40
8WL7153-8..... A2V00000203793..... 02-16-08	8WL8102-6..... A2V00001023746..... 02-08-41
8WL7154-0..... A2V00000203794..... 02-16-08	8WL8102-7A..... A2V00001220609..... 02-08-39
8WL7154-1..... A2V00000203795..... 02-16-08	
8WL7154-2..... A2V00000203796..... 02-16-08	
8WL7154-3..... A2V00000203797..... 02-16-08	
8WL7154-5..... A2V00000203798..... 02-16-08	
8WL7154-6..... A2V00001114932..... 02-16-08	
8WL7156-0..... A2V00000203800..... 02-16-19	
8WL7157-0..... A2V00000203801..... 02-16-04	
8WL7164-1..... A2V00000203824..... 02-16-16	
8WL7168-0..... A2V00001878567..... 02-16-09	
8WL7168-1..... A2V00001878568..... 02-16-10	
8WL7168-7..... A2V00001915500..... 02-16-12	
8WL7171-0..... A2V00001002975..... 02-16-14	
8WL7173-0..... A2V00000203848..... 02-16-15	
8WL7175-0..... A2V00001839518..... 02-16-13	
8WL7230-0A..... A2V00001972381..... 02-08-15	
8WL7230-1A..... A2V00001972383..... 02-08-25	
8WL7230-2A..... A2V00001937257..... 02-08-26	
8WL7231-0..... A2V00001937258..... 02-08-16	
8WL7232-0..... A2V00001937319..... 02-08-17	
8WL7232-3..... A2V00001938086..... 02-08-18	
8WL7233-0..... A2V00001967067..... 02-08-19	
8WL7233-4..... A2V00001975551..... 02-08-20	
8WL7234-0A..... A2V00001975561..... 02-08-21	
8WL7234-3..... A2V00001937323..... 02-08-22	
8WL7235-0A..... A2V00001937387..... 02-08-23	
8WL7235-0B..... A2V00001975564..... 02-08-24	
8WL8015-0..... A2V00000203883..... 02-16-22	
8WL8016-1..... A2V00001806105..... 02-16-24	
8WL8037-0..... A2V00000203926..... 02-10-47	
8WL8037-0A..... A2V00001351972..... 02-10-48	
8WL8037-1..... A2V00000203927..... 02-10-47	
8WL8037-1A..... A2V00001351973..... 02-10-48	
8WL8037-2..... A2V00000203928..... 02-10-47	
8WL8037-2A..... A2V00001351975..... 02-10-48	
8WL8101-1A..... A2V00001220605..... 02-08-37	
8WL8101-3..... A2V00000203946..... 02-08-42	
8WL8101-4..... A2V00000203947..... 02-08-38	



Chapter 01

Preface

Systems and applications	01	01-22
User notes, addresses	02	01-14
Order number index	03	01-16
Index	04	01-16

A

Accessories	02-13-08
Adapter	02-08-35
Adapter for tension wheel assemblies 8WL5078-	03-02-12
Additional electrical connector	02-04-75
Adjustable washer	02-01-36
Adjusting spanner	02-16-19, 02-16-20
Adjusting strap for tension wheel assembly in tunnel	02-10-27
Adjusting strap for tension wheel assembly, asymmetrical	02-10-26
Adjusting strap for tension wheel assembly, symmetrical	02-10-25
Aluminium tube	02-04-79
Anchoring bracket	02-01-05
Anchoring clamp	02-08-22

B

Ball socket	02-10-19
Ball washer 24	02-01-35
Ball with eye	02-10-20
Base element for cable holder	02-01-80
Baseplate for weight set	02-10-36
Beta-Split pin	02-01-46
Bracket for disconnecter	03-02-15
Bracket for manual operating mechanism 8WL6214-	03-02-13
Bracket for surge arrester	03-02-16
Bridle guiding device 2x55	02-03-16
Bridle guiding device 42-70	02-04-37
Bridle guiding device 55	02-03-15
Bridle suspension dead-end clamp, left-hand	02-09-81
Bridle suspension dead-end clamp, right-hand	02-09-82
Bridle suspension 2x55	02-03-14
Bridle suspension 38	02-03-12
Bridle suspension 42-70	02-04-36
Bridle suspension 55	02-03-13
Bridle-and-pulley suspension with bronze wire	02-06-24
Bridle-and-pulley suspension with synthetic wire	02-06-23
Bronze wedge	02-01-68

C

Cable holder for two cables	02-01-81
Cable lug (DIN 46235)	02-02-15
Cable lug 2/12	02-02-18

Cable lug 2/16	02-02-19
Cable sealing box	02-12-42
Cable strap	02-01-76, 02-01-77, 02-01-78
Cantilever swivel bracket	02-03-21
Cantilever swivel bracket 100-120	02-04-13
Cantilever swivel bracket at concrete pole	02-04-11
Cantilever swivel bracket at steel pole	02-03-19
Cantilever swivel bracket for fastening of punch-lock band	02-03-20, 02-04-12
Catenary wire insulation up to 3 kV DC and 25 kV AC	02-13-14
Catenary wire support clamp 40-60.3, insulated	02-05-20
Catenary wire support clamp 40-60.3/12	02-05-18
Catenary wire support clamp 40-60.3/18	02-05-19
Catenary wire support clamp 42-70, insulated	02-04-40
Catenary wire support clamp 42-80/14	02-04-42
Catenary wire support clamp 42-80/19	02-04-43
Catenary wire support clamp 55	02-03-11
Catenary wire support clamp 55-70	02-04-47
Catenary wire support clamp 55-70 with hook	02-04-48
Catenary wire support clamp 55-80/14	02-04-44
Catenary wire support clamp 55-80/19	02-04-45
Catenary wire support clamp 55/16, insulated	02-04-41
Catenary wire support clamp 60.3-21/30, insulated	03-02-03
Clamp for support bar 26	02-10-43
Clamp holder 55 for twin tube clamp 55	02-03-39
Clamp holder 55 with threaded bush M16	02-03-59
Clamp holder for contact wire	02-04-76
Clamp holder for wire	02-09-21
Clamp hoop 38 with clevis	02-03-43
Clamp hoop 55 with clevis	02-03-44
Clamping jaw for twin tube clamp 55	02-03-40
Clamping plate for I-beam	02-08-39
Clevis end fitting 26	02-01-41, 02-04-17, 02-12-60
Clevis end fitting 26/26.9-16	02-12-56
Clevis end fitting 32/33.7	02-05-13
Clevis end fitting 38, clamped	02-03-45
Clevis end fitting 42-55	02-04-18, 02-04-20, 02-04-21
Clevis end fitting 42-60.3 with hook	02-05-12
Clevis end fitting 42-70	02-04-16
Clevis end fitting 42/42.4	02-05-14
Clevis end fitting 55	02-03-46
Clevis end fitting 55 with hook	02-04-19
Clevis end fitting 55-60.3	02-05-15
Clevis end fitting for connection with insulator	02-04-22
Clevis end fitting for twin tube	02-04-26
Clevis for twin tube clamp	02-03-38
Clip	02-01-79, 02-09-70

Composite insulator up to 3 kV DC, tongue/tongue	02-07-21
Composite insulator 25 kV AC with flat connections	02-07-31
Composite insulator 25 kV AC, tongue/tongue	02-07-25
Composite insulator 25 kV AC, tongue/tube 34-51	02-07-27
Composite insulator 25 kV AC, tongue/tube 55-70	02-07-26, 02-07-29
Composite insulator 25 kV AC, tongue/tube 60.3	02-07-28
Composite insulator 25 kV AC, tube/tube 55-70	02-07-30
Composite insulator up to 3 kV DC, tongue/tube 55	02-07-22
Composite line post insulator 25 kV AC	02-07-32, 02-07-33
Composite line post insulator up to 3 kV DC	03-02-05
Compression clamp	02-02-12, 02-02-13
Compression conductor clamp	02-09-38
Compression joint	02-02-11, 02-02-12, 02-02-13
Compression joint, high-tensile (DIN 48085)	02-02-14
Compression sleeve	02-10-34
Compression thimble	02-02-09
Concave washer for adjustable washer	02-01-37
Conductor clamp	02-09-42
Conductor crossing clamp	02-09-07
Conductor rail clamp	02-08-30
Conductor rail support 1.5 kV DC	02-08-31, 02-08-32
Conductor rail support 1.5 kV DC, support frame [adjustable up to 30°	02-08-33
Conductor suspension clamp	02-06-08
Conductor suspension clamp 13 with hook	02-06-05
Conductor suspension clamp 16 with hook	02-06-06
Conductor suspension clamp with hook, twisted 90°	02-06-07
Conductor suspension clamp, twisted 90°	02-06-04
Cone-type dead-end clamp 13	02-01-70
Cone-type dead-end clamp 16	02-01-71, 02-01-73
Cone-type dead-end clamp 19	02-01-72, 02-01-74
Connection clamp	02-09-09, 02-09-10
Contact spring	02-08-20
Contact wire clip 16R	02-09-13
Contact wire clip 16R with U-pin	02-09-14, 02-09-15
Contact wire clip M16-5/8"	02-09-16
Contact wire clip for wire crossing	02-09-22
Contact wire connection clamp	02-09-31
Contact wire connection clamp 1.5	02-09-34
Contact wire connection clamp 1.5 with two bolts	02-09-35
Contact wire connection clamp 13.5	02-09-36
Contact wire connection clamp for three contact wires	02-09-37
Contact wire connection clamp with two bolts	02-09-32
Contact wire connection clamp with two bolts for three contact wires	02-09-33
Contact wire insulator 3 kV DC to 25 kV AC	02-07-34
Contact wire measuring instrument	02-16-24
Contact wire splice with four bolts	03-02-07

Contact wire splice with six bolts	02-09-25
Contact wire splice, adjustable	02-09-23
Contact wire splice, bolted	02-09-24, 02-09-26
Contact wire stringing grips	02-16-17
Coupling socket 55	02-03-30
Crimped/compression connector	02-02-10
Cross link 19 eye/clevis	02-01-53
Cross link 19 eye/eye	02-01-52
Cross link clevis/clevis	02-03-61, 02-04-30
Cross link eye/clevis	02-03-60
Cross-span drop bracket	02-06-19
Cross-span eye clamp	02-06-16, 02-06-17
Cross-span hook clamp	02-06-27
Cross-span tensioning spring with integrated turnbuckle	02-01-32
Cross-span wire clamp 16	02-06-15
Cross-span wire clamp 19	02-06-14
Crossing clamp, adjustable	02-09-05
Crossing clamp, fixed	02-09-06

D

Damping device clevis/clevis	02-01-22
Damping device eye/clevis	02-01-21
Damping device made of synthetic wire up to 1.5 kV DC, insulating	02-01-23
Dead-end clamp	02-03-62
Dead-end clamp 16 with cup-point screws	02-01-75
Disconnecter 15/25 kV AC and 25 kV AC	02-12-28, 02-12-30
Disconnecter bracket	02-12-34
Disconnecter up to 3 kV DC, operating current 2000 A	02-12-06, 02-12-08, 02-12-16, 02-12-18
Disconnecter up to 3 kV DC, operating current 3000 A	02-12-10, 02-12-12
Disconnecter up to 3 kV DC, operating current 4000 A	02-12-14
Dog	02-01-33, 02-01-34
Double U-clamp	02-09-08
Double eye clamp	02-06-18
Double line hanger 16R, insulated	02-06-30
Double line hanger M16-5/8", insulated	02-06-31
Double strap 400, offset	02-01-18
Drop bracket 32-42.4	02-05-26
Drop bracket 33.7-60.3 H=70/90	02-05-27
Drop bracket 38-55	02-03-24
Drop bracket 42-55 H=70	02-04-56
Drop bracket 42-55 H=90	02-04-58
Drop bracket 42-55 H=90, steplessly adjustable	02-04-59
Drop bracket 48.3 H=70	02-05-29
Drop bracket 48.3 H=90	02-05-30

Drop bracket 55 H=70	02-04-61
Drop bracket 55 H=90	02-04-62
Drop bracket 70/80 H=70	02-04-57
Dropper clip	02-09-68, 02-09-69, 02-09-71, 02-09-72, 02-09-73
Dropper clip 150	03-02-11
Dropper clip 25	02-09-67
Dropper clip 50	02-09-66
Dropper clip 70	03-02-10
Dropper clip for twin catenary wire	02-09-63
Dropper clip with hoop	02-09-76
Dropper strap	02-11-33

E

Earthing clamp	02-08-21, 02-13-13
Earthing equipment 1.5 kV DC with earthing clamp	02-16-09
Earthing equipment 1.5 kV DC with earthing magnet	02-16-10
Earthing switch 15/25 kV AC	02-12-32
Earthing wire	02-14-07
Earthing wire with plastic sheath	02-14-08
Elastic support 1.5 kV DC	02-08-09
Elastic support 1.5 kV DC with GRP steady arm	02-08-11, 02-08-12
Elastic support 25 kV AC, single contact wire	02-08-13
Elastic support 25 kV AC, twin contact wire	02-08-14
Electrohydraulic operated mechanism	02-12-35, 02-12-36, 02-12-37
End cap	02-04-80, 02-05-42
Equalizing pulley 75	02-10-22
Equalizing pulley 75 with straps	02-10-17
Equalizing pulley 98 with clevis	02-10-18
Extension piece	02-06-36
Eye clamp 26	02-05-23
Eye clamp 32-60.3	02-05-16
Eye clamp 38	02-03-31
Eye clamp 42-55 for windstay	02-04-77
Eye clamp 42-70	02-04-31
Eye clamp 42-80	02-04-32
Eye clamp 55	02-03-32
Eye clamp 55-70	02-04-33
Eye clamp 60.3	02-05-17
Eye clamp for tube-type drop bracket 55-70	02-04-64
Eye clamp for windstay	02-05-39
Eye for twin tube clamp	02-03-37
Eye-bolt	02-12-62
Eye-bolt 19	02-05-11
Eye-bolt M22 with nut	02-01-38

F

Feeder and dropper clamp	02-09-48, 02-09-49
Feeder clamp	02-08-23, 02-09-43, 02-09-44, 02-09-45, 02-09-46
Feeder clamp for soffit conductor rail	02-08-29
Feeder compression clamp	02-09-39, 02-09-40
Feeder line and earth wire support clamp	02-09-79
Fitting for guiding of operating linkage	02-12-49
Flange with cable gland M32x1,5	02-12-39
Four pin clevis link 13	02-01-14
Four pin clevis link 16-19	02-01-15
Four pin strap 13	02-01-16
Four pin strap 16-19	02-01-17

G

GRP oval rod	02-03-29
GRP round rod	02-03-27
GRP tube	02-03-26
Groove clamp	02-09-74
Grooved contact wire AC, Cu-ETP	02-14-04
Grooved contact wire AC, CuAg0.1	02-14-05
Grooved contact wire AC, CuMg0.5	02-14-06
Guard plate	02-08-42
Guide 26	02-12-50
Guide clamp	02-09-80
Guide strap 32/33.7	02-10-38, 02-10-39
Guy clamp	02-08-24, 02-09-83
Guy clamp contact wire - catenary wire	02-09-27
Guy clevis with eye-bolt	02-10-21
Guy clevis with pulley	02-10-23

H

Hand crank	02-12-41
Headspan wire clamp with suspension for clevis connection	02-06-22
Headspan wire clamp with suspension for tongue connection	02-06-21
Hexagon pressing die	02-16-08
Hook bolt	02-10-46
Hook clip 33.7-60.3	02-05-22
Hook clip 40-80 for U-bolt M16	02-05-21
Hook clip 42-55	02-04-49, 02-04-50
Hook clip 42-80 for U-bolt M16	02-04-46
Hook clip 55, clamped	02-03-53

Hook clip 70/80	02-04-51
Hook end clamp 26	02-04-52, 02-05-24
Hook end clamp for GRP rod	02-03-49
Hook end fitting 26	02-04-53
Hook end fitting 26, clamped	02-03-50
Hook end fitting 26-42.4	02-05-25
Hook end fitting 38, clamped	02-03-51
Hook end fitting 42-55	02-04-54, 02-04-55
Hook end fitting 55, clamped	02-03-52
Hook end fitting for GRP rod	02-03-47

I

I-beam	02-08-38
Insulated plate	02-08-37
Insulated thimble 10f	02-02-08
Insulating rod 10 clevis/clevis	02-07-10
Insulating rod 26 clevis/clevis	02-07-12
Insulating rod 26 eye/clevis	02-07-13
Insulating rod 26 eye/eye	02-07-11
Insulating rod 26 with eye	02-12-51
Insulator body 1.5 kV DC	02-07-14, 02-07-15, 02-07-16
Insulator body 3 kV DC	02-07-17
Intermediate line hanger 16R, insulated	02-06-32
Intermediate line hanger M16-5/8", insulated	02-06-33

K

Key	02-12-41
Key lock with locking plate	02-12-45
Key with male square	02-12-38

L

L-section for guard plate	02-08-42
Lightning protection gap up to 1.5 kV DC	02-13-11, 02-13-12
Lightweight section insulator 15 kV AC	02-11-11, 02-11-12
Lightweight section insulator 25 kV AC	02-11-13, 02-11-14, 02-11-15
Lightweight section insulator up to 3 kV DC	02-11-09, 02-11-10
Line hanger 16R, insulated	02-06-28, 02-06-34
Line hanger M16-5/8", insulated	02-06-29, 02-06-35
Lock for punch-lock band	02-01-82
Lock, adjustable	02-01-84

Locking ring 36	02-10-44
Locking ring 45	02-10-45
Loop	02-01-85
Loop insulator up to 1,5 kV DC	02-07-06
Loop insulator up to 1.2 kV DC	02-07-05
Loop insulator up to 1.5 kV DC	02-07-07
Loop insulator with silicone coating up to 1.5 kV DC	02-07-04

M

Manual operating mechanism	02-12-44
Mechanical hand pressing pliers	02-16-04
Motor-operated mechanism, radial stroke	02-12-40
Mounting pulley, simple	02-16-16
Mounting tool for dead-end clamps	02-16-22
Multiple purpose clamp for pull-offs	02-01-58

N

Neutral section 25 kV AC	02-11-16, 02-11-17
--------------------------------	--------------------

O

One-hole wedge	02-01-66
One-hole wedge 19-0	02-01-66
Operating linkage made of GRP rods	02-12-47
Operating linkage made of GRP rods for manual operating mechanism	02-12-46
Operating linkage made of steel tubes	02-12-53, 02-12-54
Oval pressing die	02-16-05, 02-16-06, 02-16-07
Overhead line crossing	02-09-77, 02-09-78

P

Packer	02-02-23
Padlock	02-12-38
Parallel groove clamp	02-09-41
Parallel groove clamp (DIN 48075)	02-09-57
Parallel groove clamp 22	02-09-28
Parallel groove clamp 34	02-09-30
Parallel groove clamp 35	02-09-29
Parallel groove clamp with two bolts	03-02-08
Pin (DIN 43161)	02-01-44

Plate	02-09-55
Portable short-circuiting device with earthing magnet	02-16-12
Protection cap	02-07-18
Protection sleeve (Alcu)	02-02-22
Protection sleeve (Cu-ETP)	02-02-20
Pull-off arm	02-06-25
Pull-off clamp	02-01-54
Pull-off clamp for stranded wires	02-09-20
Pull-off clamp for twin catenary wires	02-01-55
Pulley 130 with suspension	02-06-13
Pulley 200 for tensioning weight guidance	02-10-24
Pulley 88 with suspension, single	02-06-10, 02-06-11
Pulley 88 with suspension, twin	02-06-12
Pulley 90 with hoop	02-11-28
Punch-lock band	02-01-82, 02-01-83, 02-01-84
Punch-lock band holder for guide	03-02-14

R

Rail joint, bolted (Al)	02-08-16
Rail joint, bolted (Cu)	02-08-28
Rapid opener	02-12-58
Reducing socket 60.3/48.3	02-05-32
Reducing socket 70/55	02-04-34
Reducing socket 80/70-70/55	02-04-35
Rod insulator 60 up to 1.5 kV DC, tongue/tongue	02-07-19
Rod insulator 60 up to 1.5 kV DC, tongue/tube 42-60.3	02-07-20
Rod insulator 60 up to 3 kV DC, tongue/tongue	02-07-23
Rod insulator 60 up to 3 kV DC, tongue/tube 42-60.3	02-07-24
Rod pulley	02-11-32
Rolling door insulator up to 1.5 kV DC	02-11-18
Rolling door insulator up to 3 kV DC	02-11-19
Rope pulley	02-06-26
Rotation angle sensor for DMS (Disconnecter Monitoring System)	02-15-05, 02-15-06
Round bar 26 for pole anchor	02-01-40
Ruler for section insulators	02-16-21

S

Section insulator	02-11-08
Section insulator with copper runners up to 750 V DC	02-11-04, 02-11-05
Section insulator with insulating runners up to 1.5 kV DC	02-11-06, 02-11-07
Sensor for CMS (Catenary Monitoring System)	02-15-04
Setting loop	02-11-20, 02-11-21

Shackle 13 with pin	02-01-48
Shackle 19 with pin	02-01-49
Shackle with pin	02-07-08, 02-07-09
Shackle with threaded pin and split pin ring	02-01-47
Short-circuit signal relay in additional casing	02-12-43
Short-circuiting device 750 V DC	02-16-11
Sliding dropper clip	02-09-75
Sliding dropper clip for catenary wire	02-09-65
Sliding dropper clip for twin catenary wire	02-09-64
Sliding tube	02-11-29
Sling	02-16-18
Soffit conductor rail (Al)	02-08-15
Soffit conductor rail (Cu)	02-08-27
Soffit conductor rail ramp	02-08-25
Solid wire made of stainless steel	02-14-08
Spacer tube	02-11-33
Spade end fitting 26	02-04-23
Spade end fitting 42-55	02-04-24
Special grease paste	02-16-22
Special wedge	02-01-68
Split pin (ISO 1234)	02-01-46
Stainless steel wire rope with wire strand core	02-14-20
Stay tube holder 55	02-04-63
Steady arm made of aluminium	03-02-06
Steady arm made of aluminium H=70	02-04-67, 02-05-38
Steady arm made of aluminium H=90	02-04-68
Steady arm made of aluminium H=90, angled	02-04-71
Steady arm made of aluminium H=90, angled, current carrying	02-04-73
Steady arm made of aluminium H=90, current carrying	02-04-70
Steady arm made of aluminium, curved	02-04-74
Steady arm with GRP rod and hook end clamp	02-03-68
Steady arm with GRP rod and hook end fitting	02-03-66, 02-03-67
Steady arm with GRP rod/tube and hook end clamp	02-03-63
Steady arm with GRP rod/tube and hook end fitting	02-03-65
Steel sleeve	02-02-11
Steel tube	02-05-40
Steel tube (DIN 2448)	02-05-41
Steel wire 26 with connecting fittings	02-14-17
Steel wire 50 with connecting fittings	02-14-18
Steel wire 50, flexible	02-14-16
Steel wire d=11 mm with connecting fitting	02-14-19
Steel wire rope with wire strand core	02-14-21
Stitch wire clamp	02-09-11
Strain hinge	02-01-51
Strap 100, offset	02-01-57
Strap 170, offset	02-01-19

Strap 60, offset	02-01-56
Support angle	02-08-40
Support bar 22	02-10-42
Support bar 26	02-10-40, 02-10-41
Support clamp	02-08-08
Support frame	02-08-34
Support frame, adjustable up to 30°	02-08-36
Surge arrester with polymeric casing	02-13-10
Surge arrester with polymeric composite casing	02-13-09
Surge arrester with porcelain casing	02-13-07
Suspension	02-11-23, 02-11-24
Suspension bracket for twin tube clamp	02-03-36
Suspension clamp	02-09-59
Suspension clamp with straps	02-09-58
Suspension clamp, fixed	02-08-17
Suspension clamp, pivotable	02-08-18
Suspension clamp, sliding	02-08-19
Suspension insulated up to 1.5 kV DC	02-11-22
Suspension with catenary wire insulation	02-11-25, 02-11-26, 02-11-27
Swivel clip holder 16R for GRP rod	02-03-48
Swivel clip holder 26	02-03-10
Swivel clip holder 26, insulated	02-04-66
Swivel clip holder 26-38 for contact wire clip 16R	02-03-54
Swivel clip holder 26/26.9-100 with hook	02-05-35
Swivel clip holder 26/26.9-60	02-05-34
Swivel clip holder 26/26.9-60 with hook	02-05-36
Swivel clip holder 38 for contact wire clip 16R	02-03-55
Swivel clip holder 38 for contact wire clip M16	02-03-56
Swivel clip holder 42/42.4	02-05-37
Swivel clip holder 55 for contact wire clip 16R	02-03-57
Swivel clip holder 55 for contact wire clip M16	02-03-58
Swivel with clevis	02-03-22, 02-04-14, 02-05-08
Swivel with eye	02-03-23, 02-04-15, 02-05-09
Synthetic wire (Minoroc wire)	02-14-22

T

T-connection clamp	02-09-56
T-flat connection clamp	02-09-54
Tandem disconnector up to 3 kV DC, operating I _{current} 2000 A	02-12-20, 02-12-22, 02-12-24, 02-12-26
Telescopic height measuring rod up to 1 kV DC with carrying bag	02-16-14
Telescopic height measuring rod with mounting beam and carrying bag	02-16-15
Telescopic voltmeter up to 1 kV DC with carrying bag	02-16-13
Tension wheel assembly up to 24 kN	02-10-08, 02-10-09, 02-10-10
Tension wheel assembly up to 24 kN (1:1.5) for I _{tubular steel pole}	02-10-13

Tension wheel assembly up to 24 kN for tubular steel pole	02-10-12
Tension wheel assembly up to 24 kN on structures	02-10-11
Tension wheel assembly up to 40 kN	02-10-14
Tension wheel assembly up to 40 kN (1:1.5)	02-10-16
Tension wheel assembly up to 40 kN on structures	02-10-15
Tension wire	02-14-07
Tensioning spring 6-10 kN	02-10-47
Tensioning spring 7-12 kN	02-10-48
Terminal ring	02-01-50
Thimble	02-02-07
Thimble (DIN 43154)	02-02-05, 02-02-06
Thimble 10f	02-02-04
Thimble insert	03-02-04
Three pin clevis link 13-16	02-01-09
Three pin clevis link 19	02-01-10
Three pin clevis link 19 (Al)	02-01-11
Three pin connection strap	02-01-20
Three pin strap 13-16	02-01-12
Three pin strap 19	02-01-13
Three-hole wedge	02-01-67
Tie bar	02-08-41
Tongue end fitting 26, offset	02-01-43, 02-12-48, 02-12-55, 02-12-59
Tongue end fitting 26, straight	02-01-42, 02-12-61
Tongue end fitting 26/26.9-16	02-12-57
Transition element	02-08-26
Triple tube clamp 55	02-03-41
Trolleybus contact wire clip M16	03-01-04
Trolleybus contact wire clip for straight line	03-01-06
Trolleybus contact wire splice	03-01-05
Trolleybus crossing 10°	03-01-11
Trolleybus dropper strap	03-01-09
Trolleybus pull-off hoop	03-01-10
Trolleybus suspension hoop	03-01-10
Trolleybus trailing switch frog 5°	03-01-11
Trolleybus wire holder 5/8", insulated	03-01-08
Trolleybus wire holder with dropper strap, insulated	03-01-07
Tube clamp 48.3/42-60.3	02-05-33
Tube connecting fitting 42-70	02-04-65
Tube end fitting 42-70	02-04-25
Tube end fitting 55	02-03-42
Tube end fitting 60.3	02-05-10
Turnbuckle M12 clevis/clevis	02-01-24
Turnbuckle M12 eye/clevis	02-01-26
Turnbuckle M12 eye/eye	02-01-25
Turnbuckle M16 eye/eye	02-01-27
Turnbuckle M20 eye/clevis	02-01-31

Turnbuckle M20 eye/eye	02-01-28, 02-01-30
Turnbuckle clevis/clevis	02-01-29
Turnbuckle with ring-shaped hook and wire clamp	02-11-30
Turnbuckle with two ring-shaped hooks	02-11-31
Twin bridle guiding device 55-60.3	02-04-38
Twin bridle guiding device 2x55	02-03-18
Twin bridle guiding device 55	02-03-17
Twin catenary suspension clamp with eye	02-06-09
Twin contact wire clip 16R	02-09-17
Twin contact wire clip 16R with U-pin	02-09-18
Twin contact wire clip M16-5/8"	02-09-19
Twin drop bracket 42-60.3 H=70/90	02-05-28, 02-05-31
Twin drop bracket 42/42.4-55 H=70/90	02-04-60
Twin drop bracket 55	02-03-25
Twin dropper clip	02-09-61, 02-09-62, 03-02-09
Twin eye clamp 55	02-03-33
Twin swivel	02-03-34
Twin tube clamp	02-04-27
Twin tube clamp 55	02-03-35
Twin tube clamp 55-70	02-04-39
Twin tube clamp with double eye	02-04-29
Twin tube clamp with eye	02-04-28
Twisting lever for grooved contact wire	02-16-19
Two pin clevis link 13-16-19	02-01-06
Two pin clevis link 19 (Al)	02-01-07
Two pin strap 13-16-19	02-01-08
Two-hole wedge	02-01-67

U

U-clamp (DIN 1142)	02-09-12
Underbride fastening	02-08-10
Underbridge and tunnel support for contact wire 16R, insulated	02-08-06
Underbridge and tunnel support for contact wire M16-5/8", insulated	02-08-07
Underbridge and tunnel support for one catenary wire, insulated	02-08-04
Underbridge and tunnel support for two catenary wires, insulated	02-08-05
Universal dropper clip	02-09-50, 02-09-51, 02-09-52, 02-09-53
Universal parallel groove clamp	02-09-47
Upper operating linkage, insulated	02-12-52

V

Voltage limiter	02-13-04, 02-13-05
Voltage limiter element	02-13-06

Voltage limiter element, lightning resistant 02-13-06

W

Washer, rectangular 02-02-24
 Washer, round 02-02-24
 Wedge-type dead-end clamp 13 02-01-59
 Wedge-type dead-end clamp 16 02-01-60
 Wedge-type dead-end clamp 16-19 02-01-61
 Wedge-type dead-end clamp 19 02-01-62, 02-01-63, 02-01-64
 Wedge-type dead-end clamp 19-0 02-01-65
 Wedge-type dead-end clamp for pole anchor 02-01-39
 Wedge-type tension clamp 02-09-60
 Weight made of lead 02-10-35
 Weight plate 02-10-37
 Weight with guide groove, square 02-10-31
 Weight with wire guide, square 02-10-32
 Weight, circular 02-10-28, 02-10-29, 02-10-30
 Weight, hexagon 02-10-33
 Winding tape 02-02-23
 Windstay for steady arm 02-04-78
 Wire 10, flexible made of Bronze 02-14-11
 Wire 16, flexible made of BzII 02-14-11
 Wire cleaning brush 02-16-23
 Wire clip 02-09-84
 Wire made of aluminium 02-14-14
 Wire made of aluminium-steel 02-14-15
 Wire, flexible made ob BzII 02-14-12
 Wire, flexible made of Cu-ETP 02-14-13
 Wire, stranded made of BzII 02-14-09
 Wire, stranded made of Cu-ETP 02-14-10

Y

Yoke for steady arm 02-06-20

Chapter 02

Standard Products

Tensioning equipment	01	01-86
Thimbles, connectors, sleeves	02	01-24
GRP cantilevers	03	01-68
Aluminium cantilevers	04	01-80
Steel cantilevers	05	01-42
Headspan supports	06	01-36
Insulators	07	01-34
Contact lines under structures and bridge protection	08	01-42
Clamps	09	01-84
Tension wheel equipment	10	01-48
Section insulators	11	01-34
Disconnectors and drive mechanism	12	01-62
Earthing and protecting equipment	13	01-14
Contact wires, conductors, span wires	14	01-22
Monitoring systems	15	01-06
Installation tools and equipment	16	01-24

Adjustable washer	02-01-36
Anchoring bracket	02-01-05
Ball washer 24	02-01-35
Base element for cable holder	02-01-80
Beta-Split pin	02-01-46
Bronze wedge	02-01-68
Cable holder for two cables	02-01-81
Cable strap	02-01-76, 02-01-77, 02-01-78
Clevis end fitting 26	02-01-41
Clip	02-01-79
Concave washer for adjustable washer	02-01-37
Cone-type dead-end clamp 13	02-01-70
Cone-type dead-end clamp 16	02-01-71, 02-01-73
Cone-type dead-end clamp 19	02-01-72, 02-01-74
Cross link 19 eye/clevis	02-01-53
Cross link 19 eye/eye	02-01-52
Cross-span tensioning spring with integrated turnbuckle	02-01-32
Damping device clevis/clevis	02-01-22
Damping device eye/clevis	02-01-21
Damping device made of synthetic wire up to 1.5 kV DC, insulating	02-01-23
Dead-end clamp 16 with cup-point screws	02-01-75
Dog	02-01-33, 02-01-34
Double strap 400, offset	02-01-18
Eye-bolt M22 with nut	02-01-38
Four pin clevis link 13	02-01-14
Four pin clevis link 16-19	02-01-15
Four pin strap 13	02-01-16
Four pin strap 16-19	02-01-17
Lock for punch-lock band	02-01-82
Lock, adjustable	02-01-84
Loop	02-01-85
Multiple purpose clamp for pull-offs	02-01-58
One-hole wedge	02-01-66
One-hole wedge 19-0	02-01-66
Pin (DIN 43161)	02-01-44
Pull-off clamp	02-01-54
Pull-off clamp for twin catenary wires	02-01-55
Punch-lock band	02-01-82, 02-01-83, 02-01-84
Round bar 26 for pole anchor	02-01-40
Shackle 13 with pin	02-01-48
Shackle 19 with pin	02-01-49
Shackle with threaded pin and split pin ring	02-01-47
Special wedge	02-01-68
Split pin (ISO 1234)	02-01-46
Strain hinge	02-01-51
Strap 100, offset	02-01-57

Strap 170, offset	02-01-19
Strap 60, offset	02-01-56
Terminal ring	02-01-50
Three pin clevis link 13-16	02-01-09
Three pin clevis link 19	02-01-10
Three pin clevis link 19 (AI)	02-01-11
Three pin connection strap	02-01-20
Three pin strap 13-16	02-01-12
Three pin strap 19	02-01-13
Three-hole wedge	02-01-67
Tongue end fitting 26, offset	02-01-43
Tongue end fitting 26, straight	02-01-42
Turnbuckle clevis/clevis	02-01-29
Turnbuckle M12 clevis/clevis	02-01-24
Turnbuckle M12 eye/clevis	02-01-26
Turnbuckle M12 eye/eye	02-01-25
Turnbuckle M16 eye/eye	02-01-27
Turnbuckle M20 eye/clevis	02-01-31
Turnbuckle M20 eye/eye	02-01-28, 02-01-30
Two pin clevis link 13-16-19	02-01-06
Two pin clevis link 19 (AI)	02-01-07
Two pin strap 13-16-19	02-01-08
Two-hole wedge	02-01-67
Wedge-type dead-end clamp 13	02-01-59
Wedge-type dead-end clamp 16	02-01-60
Wedge-type dead-end clamp 16-19	02-01-61
Wedge-type dead-end clamp 19	02-01-62, 02-01-63, 02-01-64
Wedge-type dead-end clamp 19-0	02-01-65
Wedge-type dead-end clamp for pole anchor	02-01-39

Technical comments

Application

Tensioning equipment from Siemens is suitable for multiple uses in all overhead contact line systems, such as for the installation of cross catenaries, terminations, supports or cable fixings. All products are distinguished in particular by high corrosion resistance, long service life and minimal maintenance work.

The use of punch-lock bands in conjunction with loops or locks has proven to be an economical solution for optimal installation of cantilever swivel brackets for inclined cantilevers, straight cantilevers, headspan construction, etc

Types

Depending on the use and application, the products are available in various geometrical designs and materials:

- Stainless steel
- Copper alloys
- Aluminium alloys
- Cast steel or malleable cast iron, hot-dip galvanized

Notes

The products are designed to the loads and connecting dimensions of the cables, wires and fittings and are divided into the following three groups.

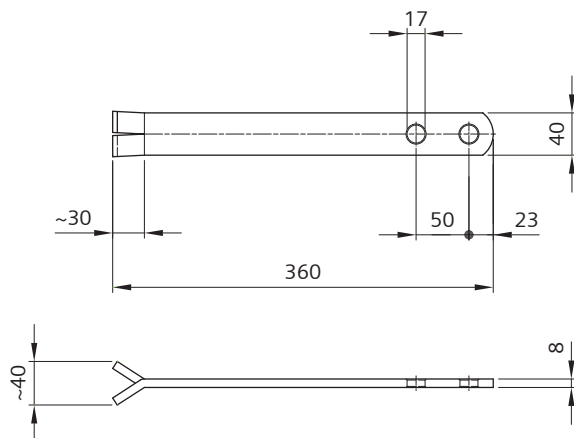
Minimum failing load	Pin diameter
up to 36 kN	13 mm
up to 60 kN	16 mm
up to 96 kN	19 mm

The minimum failing loads indicated for all clevis links with pins and split pins apply only to a lateral play of less than 2 mm between the straps.

The load-bearing capacity of the punch-lock bands depends on the mast diameters and the cantilever swivel brackets used as well as on the load directions. If necessary, the application criteria are to be reviewed on a case-by-case basis, taking into account the local conditions.

Anchoring bracket

for terminations at buildings

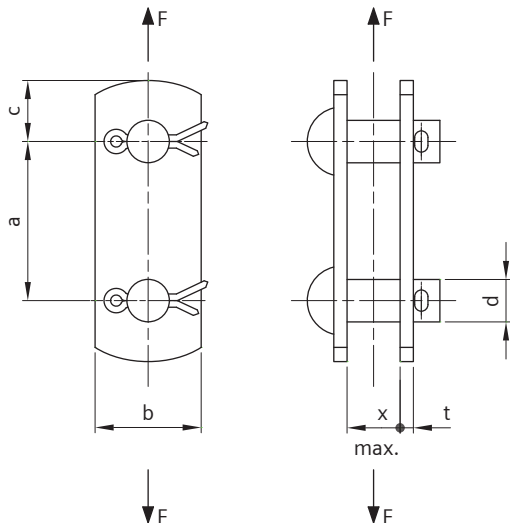


Order no.	8WL1010-5
Designation	Anchoring bracket 360
Material	stlSt
Weight	0.84 kg

The bearing capacity of the anchoring bracket depends on the wall and has to be checked from case to case.
Other lengths on request.

Two pin clevis link 13-16-19

for span guy arrangements

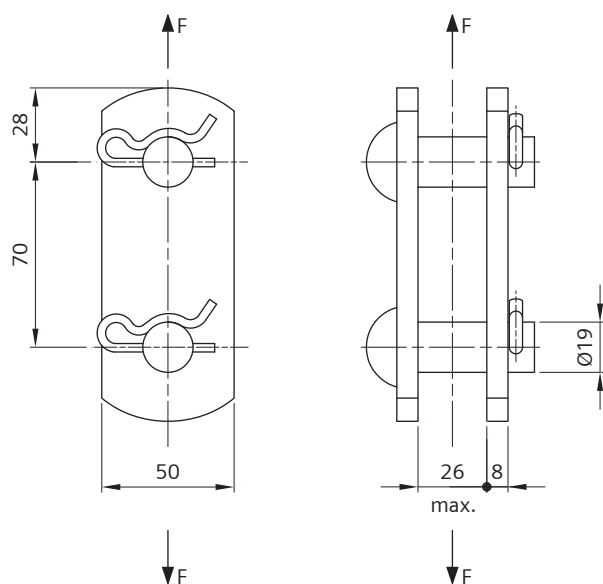


Order no.	8WL1013-2	8WL1016-6	8WL1018-0	8WL1018-2
Designation	Two pin clevis link 13	Two pin clevis link 16	Two pin clevis link 19	Two pin clevis link 19
Material				
Straps	stlSt	stlSt	htgSt	stlSt
Pins 13x34	stlSt	-	-	-
Pins 16x40	-	stlSt	-	-
Pins 19x52	-	-	htgSt	stlSt
Split pins 5x28	Cu	Cu	Cu	Cu
Weight	0.22 kg	0.46 kg	0.98 kg	0.74 kg
Perm. operating load	12 kN	20 kN	32 kN	32 kN
Min. failing load	36 kN	60 kN	96 kN	96 kN
a	50 mm	60 mm	70 mm	70 mm
b	35 mm	40 mm	50 mm	50 mm
c	20 mm	23 mm	28 mm	28 mm
d	13 mm	16 mm	19 mm	19 mm
t	3 mm	5 mm	8 mm	5 mm
x	18 mm	20 mm	26 mm	32 mm

The loads indicated only apply for a lateral play of less than 2 mm between the straps.

Two pin clevis link 19 (Al)

for span guy arrangements

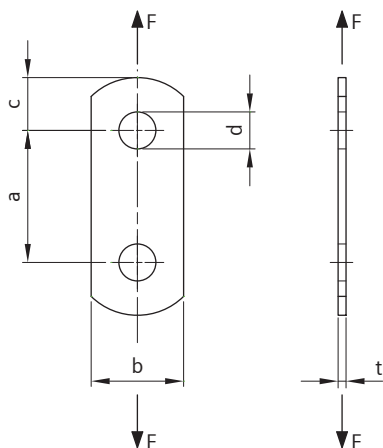


Order no.	8WL1018-3
Designation	Two pin clevis link 19
Material	
Straps	Al
Pins 19x52	Al
Beta-Split pins	stlSt
Weight	0.34 kg
Perm. operating load	32 kN
Min. failing load	96 kN

The loads indicated only apply for a lateral play of less than 2 mm between the straps.

Two pin strap 13-16-19

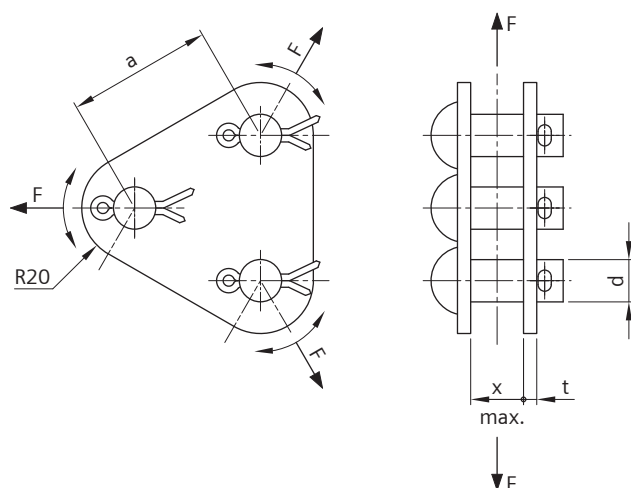
for span guy arrangements



Order no.	8WL1023-2	8WL1026-5	8WL1028-2	8WL1028-0	8WL1028-3
Designation	Two pin strap 13	Two pin strap 16	Two pin strap 19	Two pin strap 19	Two pin strap 19
Material	stlSt	stlSt	stlSt	htgSt	Al
Weight	0.07 kg	0.14 kg	0.20 kg	0.33 kg	0.12 kg
Perm. operating load	6 kN	10 kN	16 kN	16 kN	16 kN
Min. failing load	18 kN	30 kN	48 kN	48 kN	48 kN
a	50 mm	60 mm	70 mm	70 mm	70 mm
b	35 mm	40 mm	50 mm	50 mm	50 mm
c	20 mm	23 mm	28 mm	28 mm	28 mm
d	14 mm	17 mm	20 mm	20 mm	20 mm
t	3 mm	5 mm	5 mm	8 mm	8 mm

Three pin clevis link 13-16

for span guy arrangements

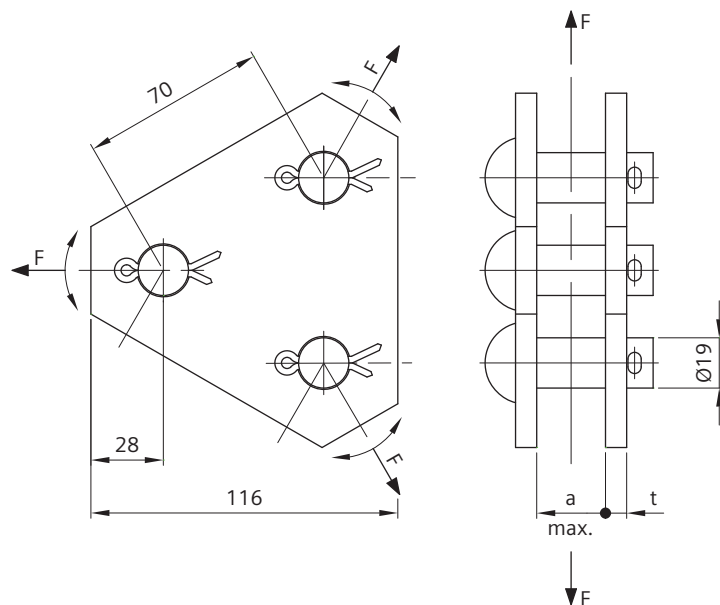


Order no.	8WL1033-2	8WL1036-7
Designation	Three pin clevis link 13	Three pin clevis link 16
Material		
Straps	stlSt	stlSt
Pins 13x40	stlSt	-
Pins 16x40	-	stlSt
Split pins 5x28	Cu	Cu
Weight	0.38 kg	0.68 kg
Perm. operating load	12 kN	20 kN
Min. failing load	36 kN	60 kN
a	45 mm	55 mm
d	13 mm	16 mm
t	3 mm	5 mm
x	24 mm	20 mm

The loads indicated only apply for a lateral play of less than 2 mm between the straps.

Three pin clevis link 19

for span guy arrangements

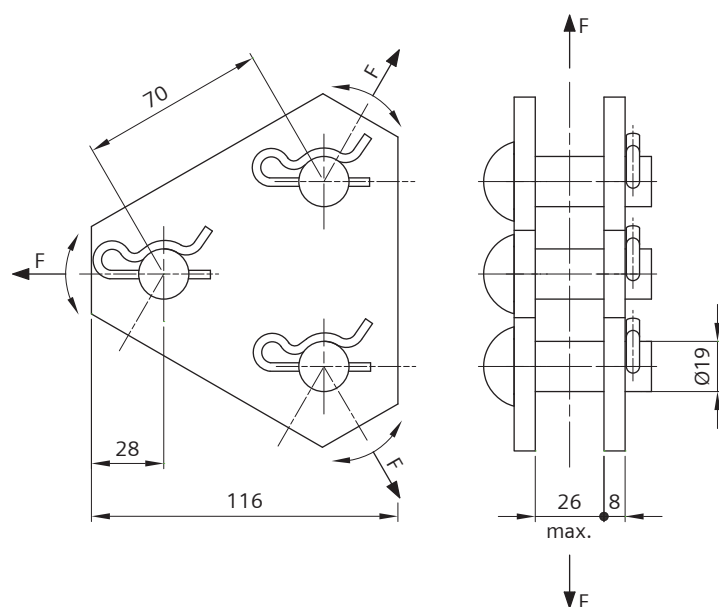


Order no.	8WL1038-0	8WL1038-2
Designation	Three pin clevis link 19	Three pin clevis link 19
Material		
Straps	htgSt	stlSt
Pins 19x52	htgSt	stlSt
Split pins 5x28	Cu	Cu
Weight	1.78 kg	1.10 kg
Perm. operating load	32 kN	32 kN
Min. failing load	96 kN	96 kN
a	26 mm	34 mm
t	8 mm	4 mm

The loads indicated only apply for a lateral play of less than 2 mm between the straps.

Three pin clevis link 19 (Al)

for span guy arrangements

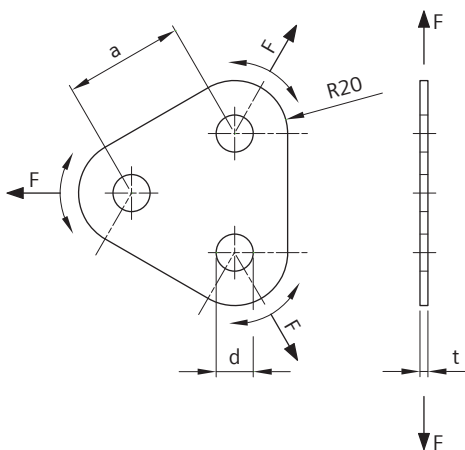


Order no.	8WL1038-3
Designation	Three pin clevis link 19
Material	
Straps	Al
Pins 19x52	Al
Beta-Split pins	stlSt
Weight	0.60 kg
Perm. operating load	32 kN
Min. failing load	96 kN

The loads indicated only apply for a lateral play of less than 2 mm between the straps.

Three pin strap 13-16

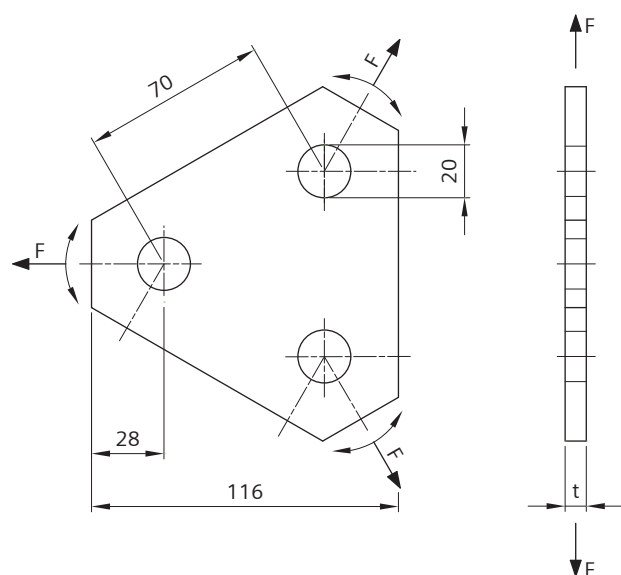
for span guy arrangements



Order no.	8WL1043-2	8WL1046-5
Designation	Three pin strap 13	Three pin strap 16
Material	stlSt	stlSt
Weight	0.11 kg	0.20 kg
Perm. operating load	6 kN	10 kN
Min. failing load	18 kN	30 kN
a	45 mm	55 mm
d	14 mm	17 mm
t	3 mm	5 mm

Three pin strap 19

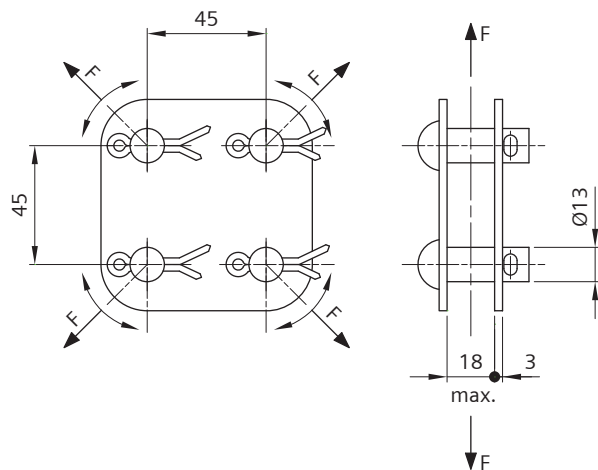
for span guy arrangements



Order no.	8WL1048-0	8WL1048-2	8WL1048-3
Designation	Three pin strap 19	Three pin strap 19	Three pin strap 19
Material	htgSt	stlSt	Al
Weight	0.61 kg	0.31 kg	0.22 kg
Perm. operating load	16 kN	16 kN	16 kN
Min. failing load	48 kN	48 kN	48 kN
t	8 mm	4 mm	8 mm

Four pin clevis link 13

for span guy arrangements

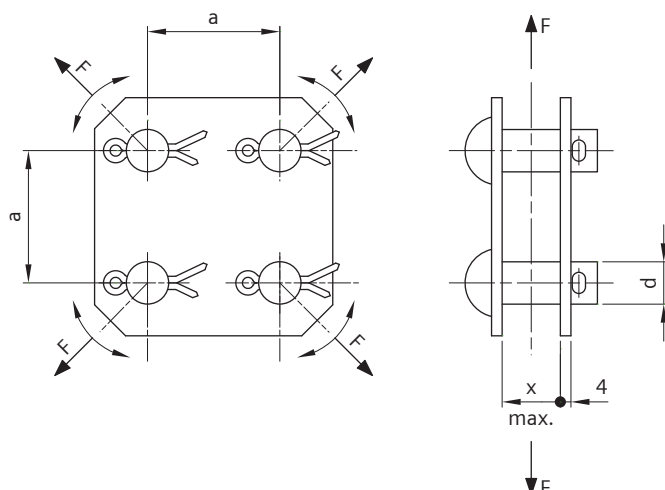


Order no.	8WL1053-2
Designation	Four pin clevis link 13
Material	
Straps	stlSt
Pins 13x34	stlSt
Split pins 5x28	Cu
Weight	0.46 kg
Perm. operating load	12 kN
Min. failing load	36 kN

The loads indicated only apply for a lateral play of less than 2 mm between the straps.

Four pin clevis link 16-19

for span guy arrangements

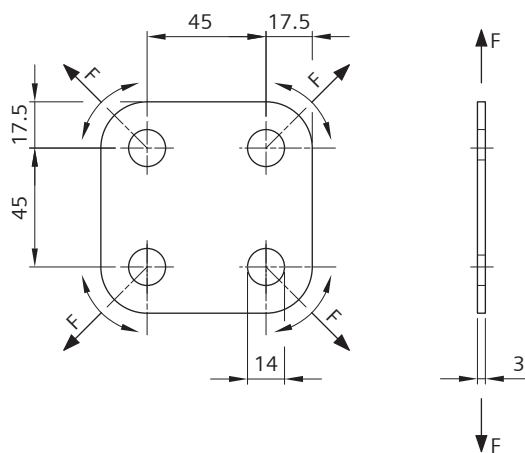


Order no.	8WL1056-2	8WL1058-2
Designation	Four pin clevis link 16	Four pin clevis link 19
Material		
Straps	stlSt	stlSt
Pins 16x40	stlSt	-
Pins 19x52	-	stlSt
Split pins 5x28	Cu	Cu
Weight	1.23 kg	1.65 kg
Perm. operating load	20 kN	32 kN
Min. failing load	60 kN	96 kN
a	50 mm	70 mm
d	16 mm	19 mm
x	22 mm	32 mm

The loads indicated only apply for a lateral play of less than 2 mm between the straps.

Four pin strap 13

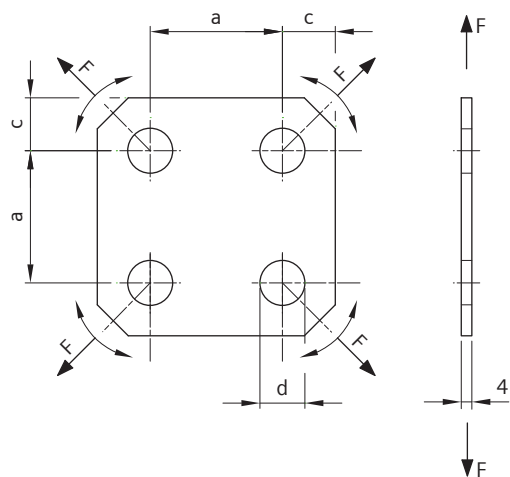
for span guy arrangements



Order no.	8WL1063-2
Designation	Four pin strap 13
Material	stlSt
Weight	0.13 kg
Perm. operating load	6 kN
Min. failing load	18 kN

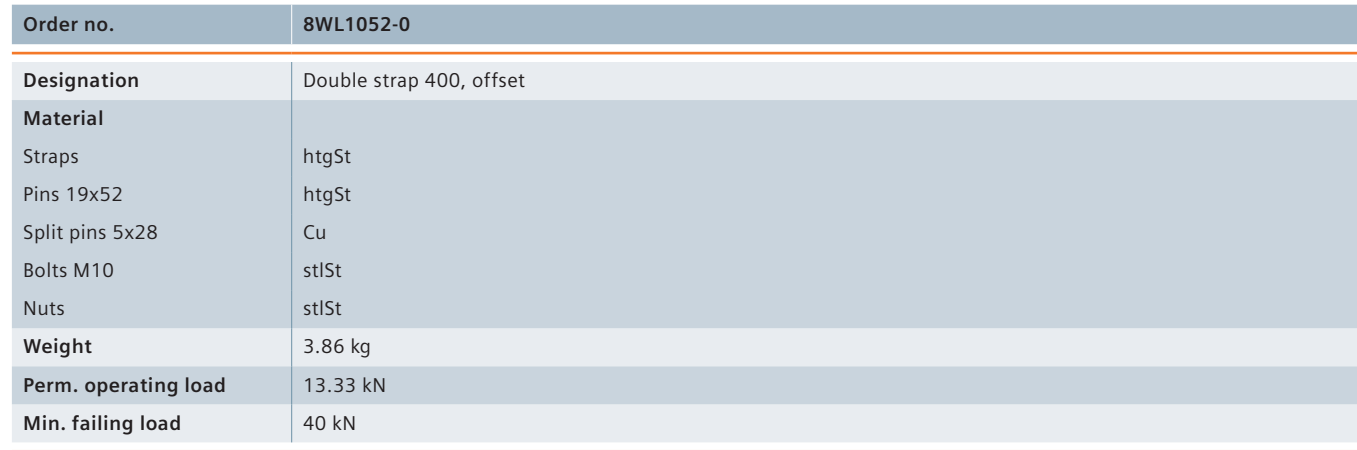
Four pin strap 16-19

for span guy arrangements



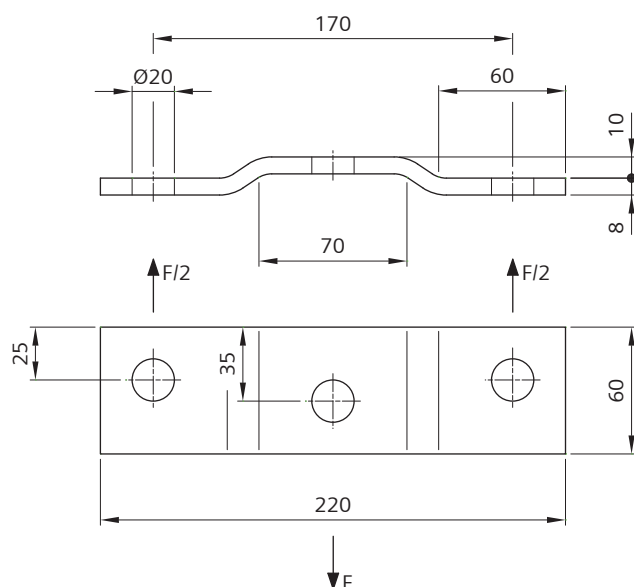
Order no.	8WL1066-2	8WL1068-2
Designation	Four pin strap 16	Four pin strap 19
Material	stlSt	stlSt
Weight	0.22 kg	0.52 kg
Perm. operating load	10 kN	16 kN
Min. failing load	30 kN	48 kN
a	50 mm	70 mm
c	20 mm	28 mm
d	17 mm	20 mm

for insulation of headspan wires, fixed terminations in headspans and suspensions



Strap 170, offset

for intermediate insulation of cross-span wire, fixed point in headspan and spring-loaded termination

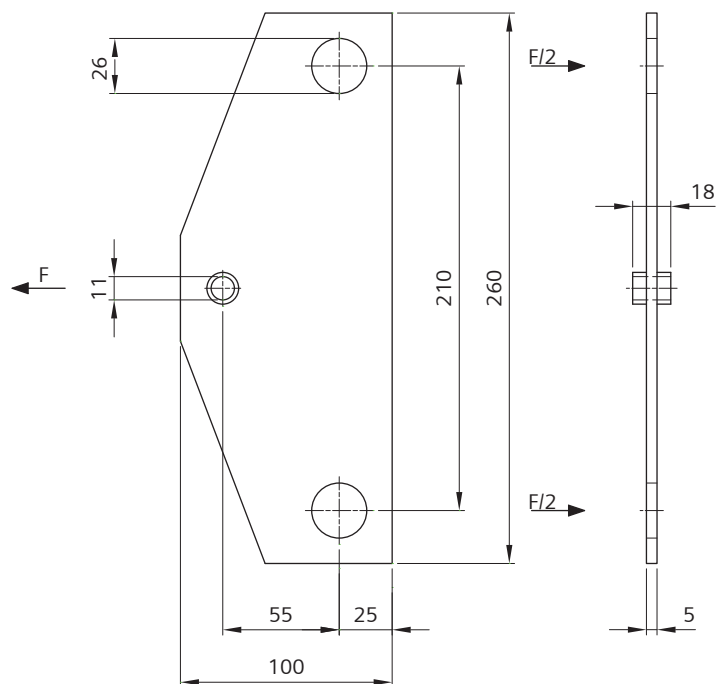


Order no.	8WL1052-1
Designation	Strap 170, offset
Material	htgSt
Weight	0.82 kg
Perm. operating load	12 kN
Min. failing load	36 kN

To be used by pairs.

Three pin connection strap

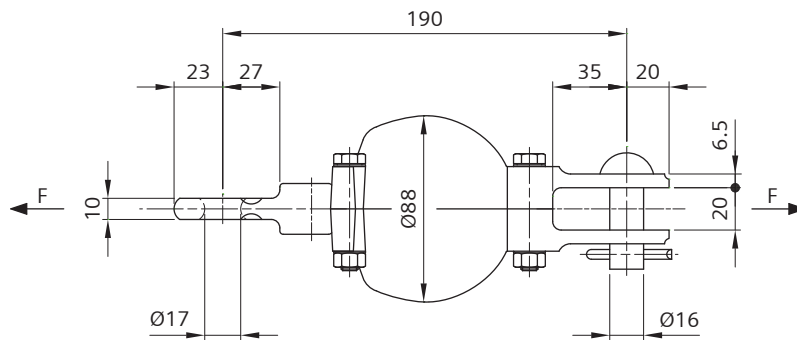
for pull-off



Order no.	8WL1047-3
Designation	Three pin connection strap
Material	stlSt
Weight	0.80 kg
Perm. operating load	5 kN
Min. failing load	15 kN

Damping device eye/clevis

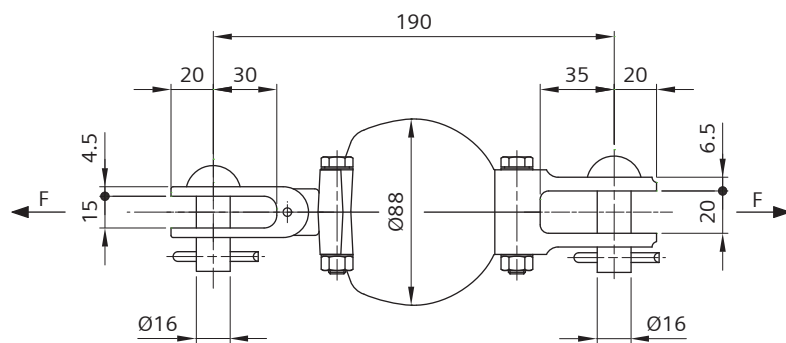
for terminations at buildings



Order no.	8WL1076-0
Designation	Damping device eye/clevis 16
Material	
Casing	CuAl
Fittings	CuAl
Torsion element	Rubber
Pin 16x45	stlSt
Split pin 5x28	Cu
Bolts M8	stlSt
Nuts	stlSt
Weight	1.78 kg
Perm. operating load	10 kN
Min. failing load	30 kN

Damping device clevis/clevis

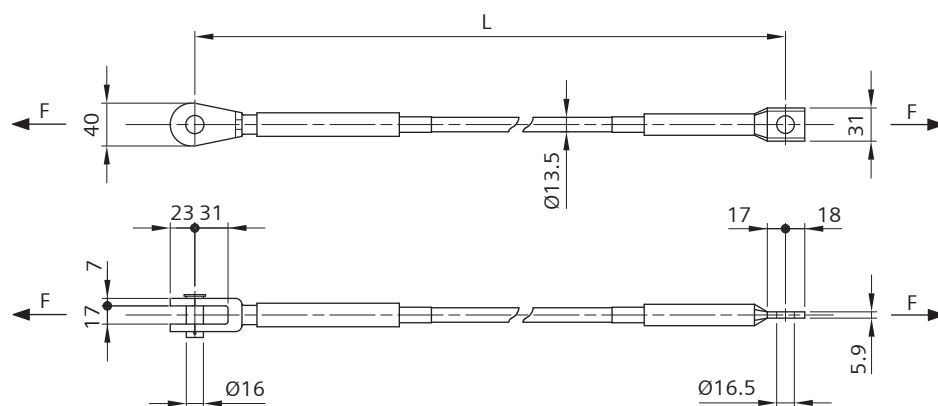
for terminations at buildings



Order no.	8WL1076-2
Designation	Damping device clevis/clevis 16
Material	
Casing	CuAl
Fittings	CuAl
Torsion element	Rubber
Pins 16x40, 16x45	stlSt
Split pins 5x28	Cu
Bolts M8	stlSt
Nuts	stlSt
Weight	1.86 kg
Perm. operating load	10 kN
Min. failing load	30 kN

Damping device made of synthetic wire up to 1.5 kV DC, insulating

for sound attenuation and insulation for terminations at buildings

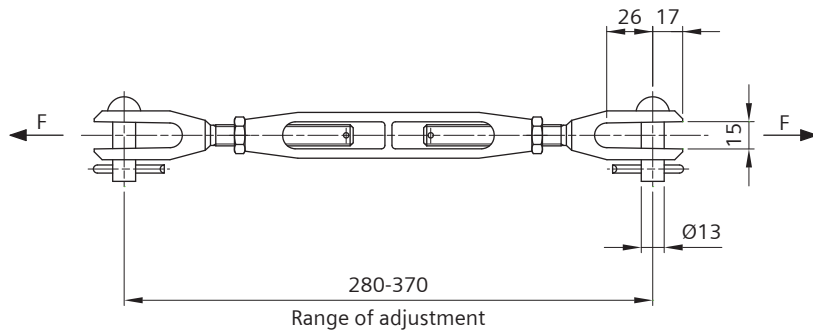


Order no.	8WL1077-7D	8WL1077-7E
Designation	Damping device eye/clevis 16	Damping device eye/clevis 16
Material		
Fittings	stlSt	stlSt
Synthetic wire	Parafil-wire (Polyester with polyethylene sheath)	Parafil-wire (Polyester with polyethylene sheath)
Weight	0.63 kg	0.70 kg
Perm. operating load	10 kN (2.5 % extension)	10 kN (2.5 % extension)
Min. failing load	35 kN (≥ 6.5 % extension)	35 kN (≥ 6.5 % extension)
Nominal voltage	1.5 kV DC	1.5 kV DC
Min. creepage distance	1150 mm	1650 mm
L	1500 mm	2000 mm

Other lengths or type with clevis/clevis connecting fittings on request.

Turnbuckle M12 clevis/clevis

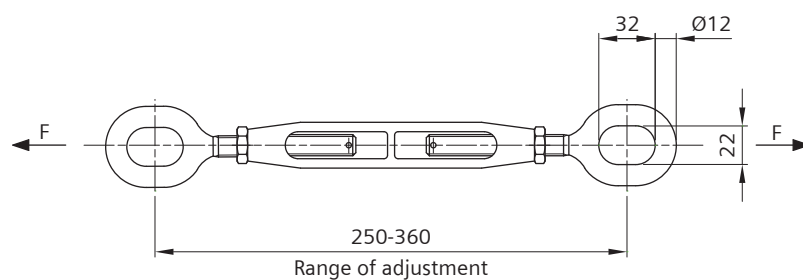
for terminations



Order no.	8WL1078-1
Designation	Turnbuckle M12
Material	
Turnbuckle	CuAl
Pins 13x40	Cu
Split pins 5x28	Cu
Weight	0.65 kg
Perm. operating load	11 kN
Min. failing load	33 kN

Turnbuckle M12 eye/eye

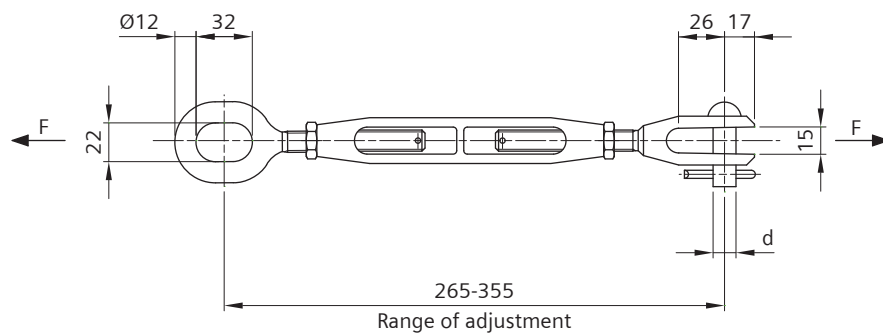
for terminations



Order no.	8WL1078-3
Designation	Turnbuckle M12
Material	CuAl
Weight	0.63 kg
Perm. operating load	11 kN
Min. failing load	33 kN

Turnbuckle M12 eye/clevis

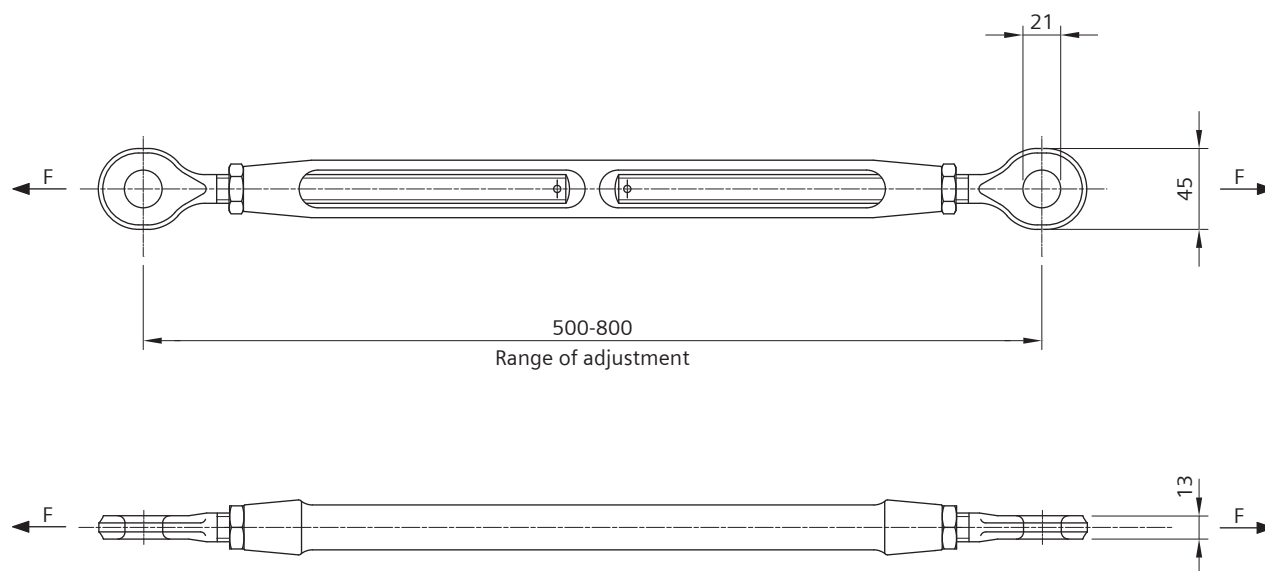
for terminations



Order no.	8WL1078-4	8WL1078-5
Designation	Turnbuckle M12	Turnbuckle M12
Material		
Turnbuckle	CuAl	CuAl
Pin 13x40	Cu	-
Pin 16x40	-	Cu
Split pin 5x28	Cu	Cu
Weight	0.68 kg	0.72 kg
Perm. operating load	11 kN	11 kN
Min. failing load	33 kN	33 kN
d	13 mm	16 mm

Turnbuckle M16 eye/eye

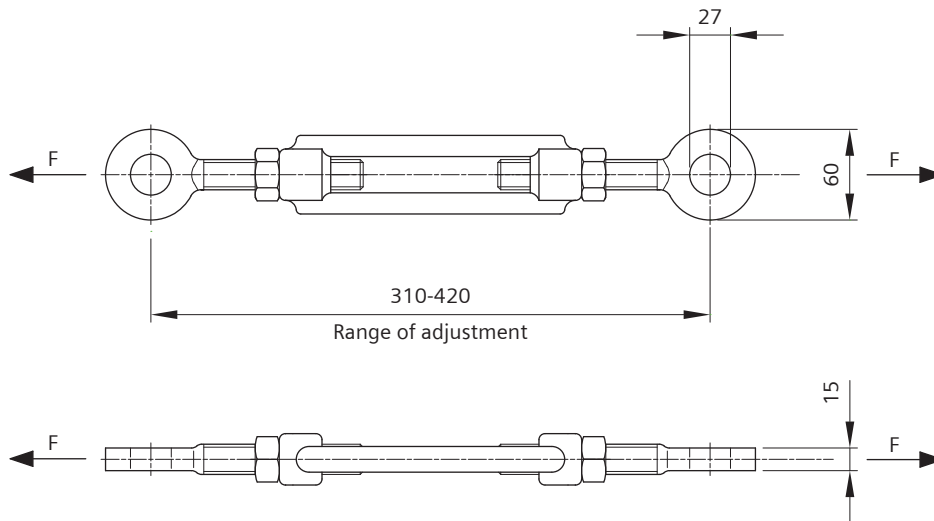
for terminations



Order no.	8WL1080-5
Designation	Turnbuckle M16
Material	CuAl
Weight	1.66 kg
Perm. operating load	22 kN
Min. failing load	66 kN

Turnbuckle M20 eye/eye

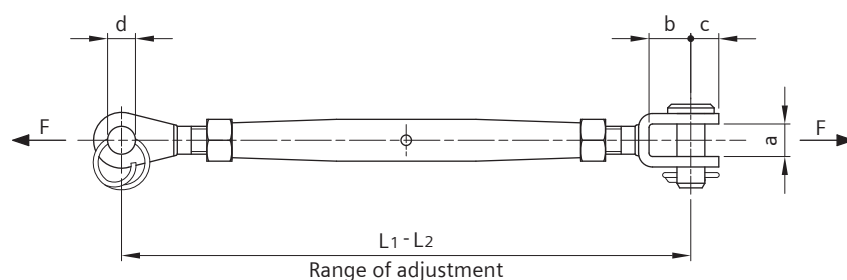
for terminations



Order no.	8WL1097-3A
Designation	Turnbuckle M20
Material	htgSt
Weight	1.80 kg
Perm. operating load	15 kN
Min. failing load	45 kN

Turnbuckle clevis/clevis

for terminations



Part 1

Order no.	8WL1082-0	8WL1082-1	8WL1082-2	8WL1082-3	8WL1082-4
Designation	Turnbuckle M6	Turnbuckle M8	Turnbuckle M10	Turnbuckle M12	Turnbuckle M16
Material	stlSt	stlSt	stlSt	stlSt	stlSt
Weight	0.09 kg	0.14 kg	0.24 kg	0.52 kg	1.02 kg
Perm. operating load	3.34 kN	5.00 kN	9.34 kN	12.34 kN	21.67 kN
Min. failing load	10 kN	15 kN	28 kN	37 kN	65 kN
a	7 mm	10 mm	10 mm	14 mm	22 mm
b	11 mm	13 mm	16 mm	25 mm	35 mm
c	6 mm	7 mm	8 mm	13 mm	18 mm
d	5 mm	6 mm	8 mm	12 mm	14 mm
L ₁ - L ₂	140 - 210 mm	165 - 240 mm	190 - 270 mm	245 - 360 mm	310 - 450 mm

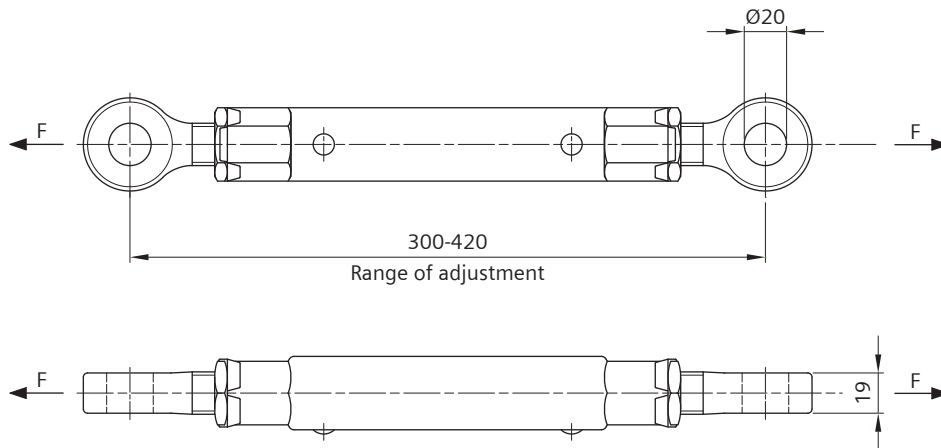
Part 2

Order no.	8WL1082-5
Designation	Turnbuckle M20
Material	stlSt
Weight	2.02 kg
Perm. operating load	36.67 kN
Min. failing load	110 kN
a	26 mm
b	49 mm
c	21 mm
d	19 mm
L ₁ - L ₂	385 - 545 mm

Types eye/eye on request.

Turnbuckle M20 eye/eye

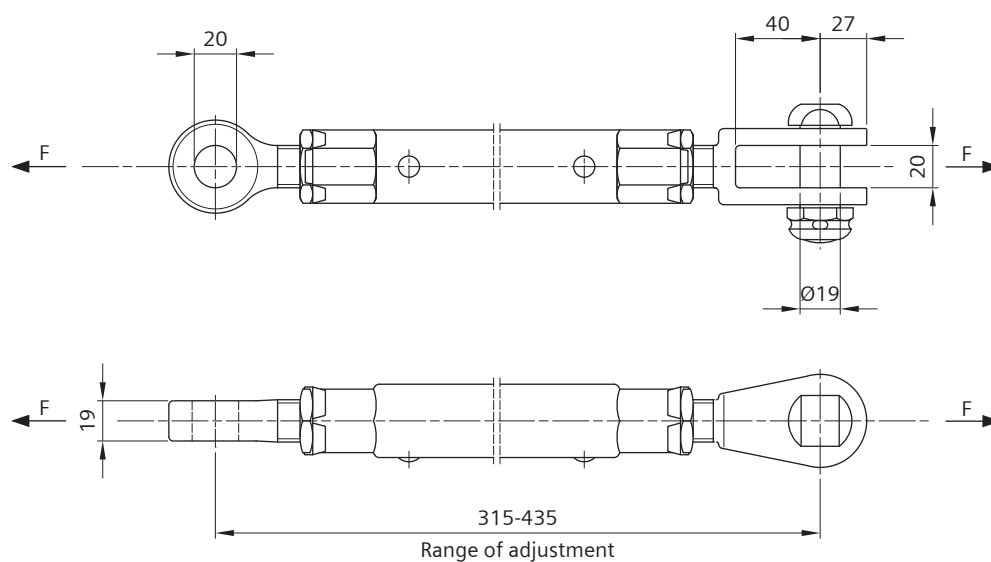
for terminations



Order no.	8WL1078-7A
Designation	Turnbuckle M20
Material	htgSt
Weight	2.05 kg
Perm. operating load	61.7 kN
Min. failing load	185 kN

Turnbuckle M20 eye/clevis

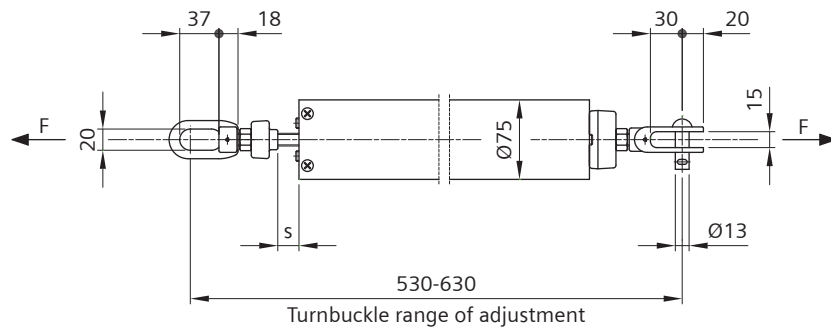
for terminations



Order no.	8WL1078-7B
Designation	Turnbuckle M20
Material	htgSt
Weight	2.15 kg
Perm. operating load	61.7 kN
Min. failing load	185 kN

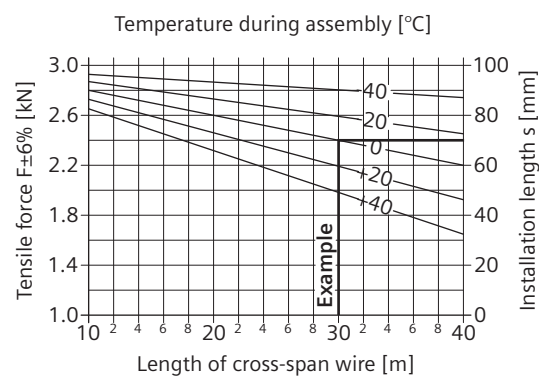
Cross-span tensioning spring with integrated turn-buckle

for tensioning cross-span wire



Order no.	8WL1086-5A
Designation	Cross-span tensioning spring
Material	
Casing	Plastic
Eye-bolt, nuts	stlSt
Spring	Spring steel
Spring plate	Al
Eye-bolt flange	Al
Clevis, eye	CuAl
Pin 13x40	stlSt
Split pin 5x28	Cu
Weight	4.48 kg
Tensile force	1 - 3 kN (working range)
Working stroke (spring)	100 mm
Pretension of spring	1 kN

Diagram for determination of installation length "s":

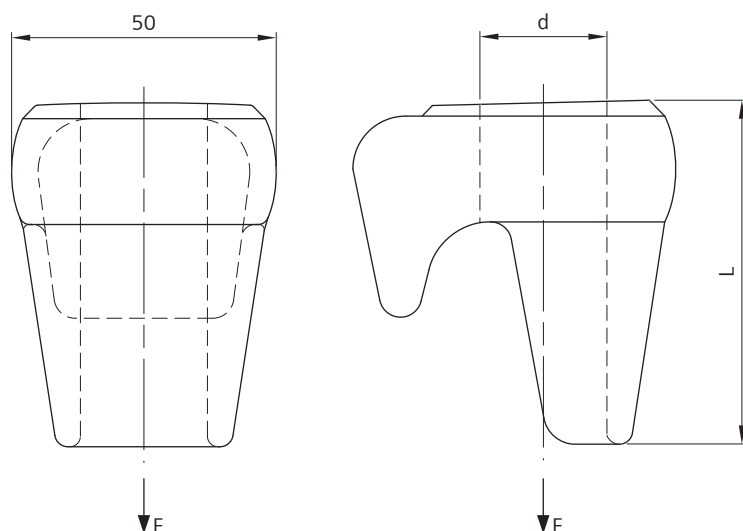


Example:

Length of cross-span wire = 30 m, temperature during assembly = 0 °C, results in an installation length s of = 70 mm

Dog

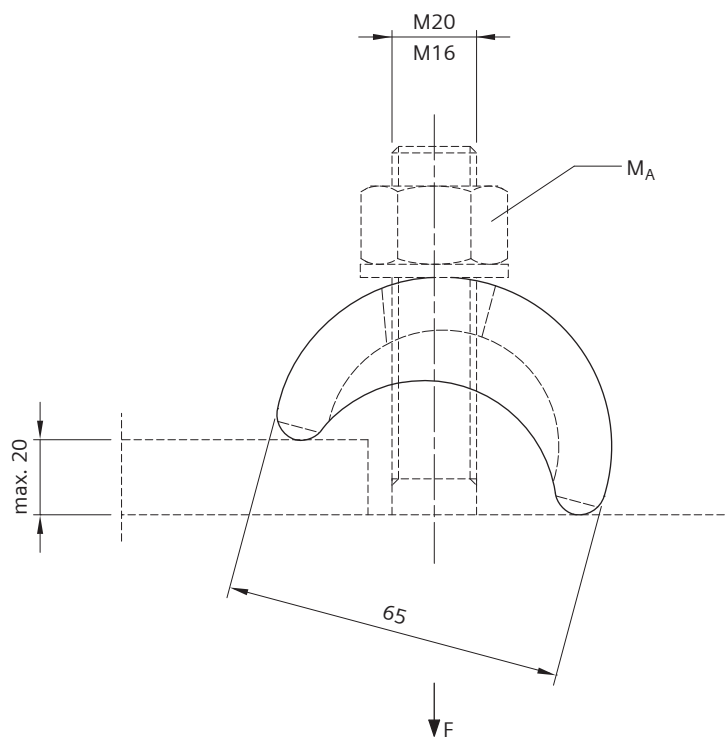
for fixing of components at L- and U-sections



Order no.	8WL1090-0	8WL1090-1
Designation	Dog M12/16	Dog M20/22
Material	mICI	mICI
Weight	0.16 kg	0.48 kg
Perm. operating load	13.34 kN	26.7 kN
Min. failing load	40 kN	80 kN
d	17 mm	24 mm
L	32 mm	65 mm

Dog

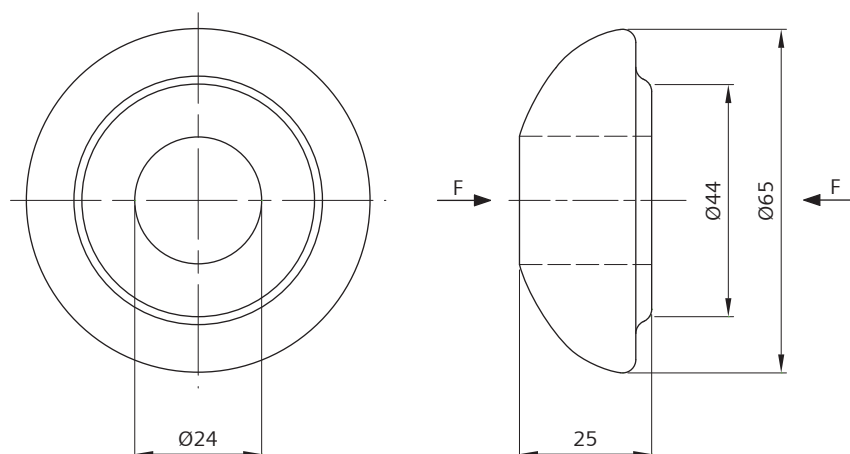
for fixing of components at steel section poles



Order no.	8WL1094-0	8WL1094-1
Designation	Dog M16	Dog M20
Material	mICI	mICI
Weight	0.24 kg	0.24 kg
Perm. operating load	26.7 kN	20 kN
Min. failing load	80 kN	60 kN
Tightening torque M _A	60 Nm	80 Nm

Ball washer 24

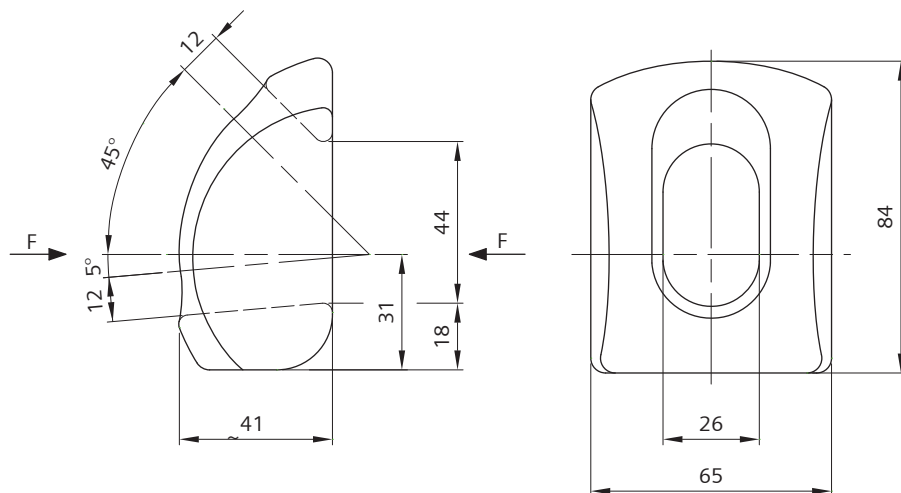
for fixed terminations



Order no.	8WL1091-0	8WL1091-1
Designation	Ball washer 24	Ball washer 24
Material	htgSt	ctAl
Weight	0.36 kg	0.12 kg
Perm. operating load	32 kN	32 kN
Min. failing load	96 kN	96 kN

Adjustable washer

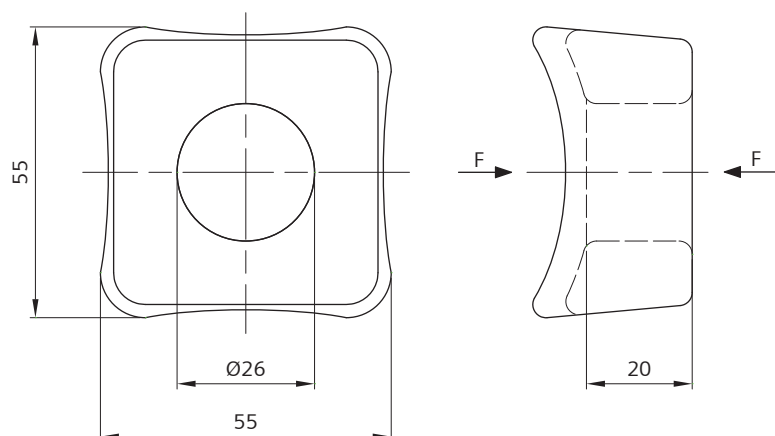
for fixed terminations



Order no.	8WL1092-0	8WL1092-1
Designation	Adjustable washer	Adjustable washer
Material	mICI	ctAl
Weight	0.86 kg	0.29 kg
Perm. operating load	32 kN	32 kN
Min. failing load	96 kN	96 kN

Concave washer for adjustable washer

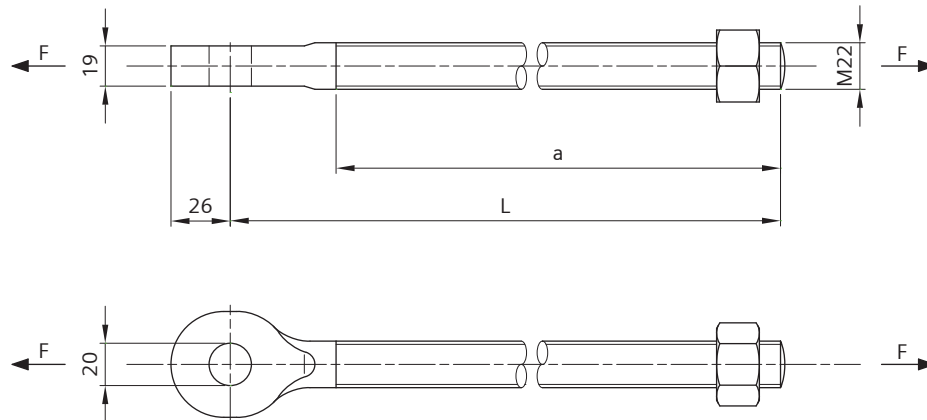
for adjustable washer 8WL1092-0/-1



Order no.	8WL1093-0	8WL1093-1
Designation	Concave washer for adjustable washer 8WL1092-0	Concave washer for adjustable washer 8WL1092-1
Material	htgSt	ctAl
Weight	0.40 kg	0.13 kg
Perm. operating load	32 kN	32 kN
Min. failing load	96 kN	96 kN

Eye-bolt M22 with nut

for anchoring of poles, for terminations at lattice steel poles and cantilever fixing

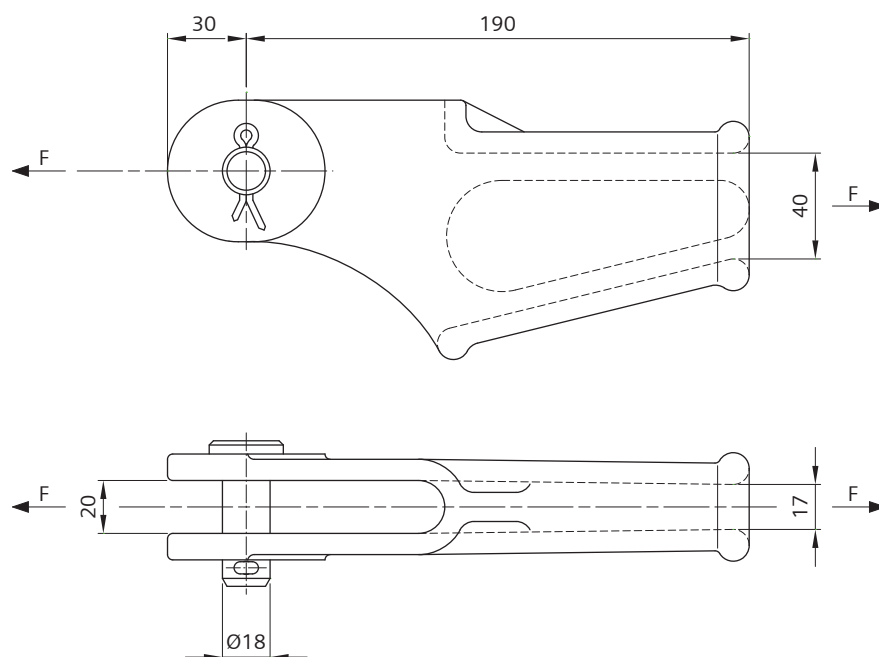


Order no.	8WL1272-1	8WL1272-2	8WL1272-3	8WL1272-5
Designation	Eye-bolt M22x350	Eye-bolt M22x650	Eye-bolt M22x900	Eye-bolt M22x1300
Material	htgSt	htgSt	htgSt	htgSt
Weight	1.34 kg	1.92 kg	2.64 kg	4.16 kg
Perm. operating load	32 kN	32 kN	32 kN	32 kN
Min. failing load	96 kN	96 kN	96 kN	96 kN
a	300 mm	500 mm	500 mm	500 mm
L	350 mm	650 mm	900 mm	1300 mm

Other lengths on request.

Wedge-type dead-end clamp for pole anchor

for anchoring of poles with wire 8WL7091-7

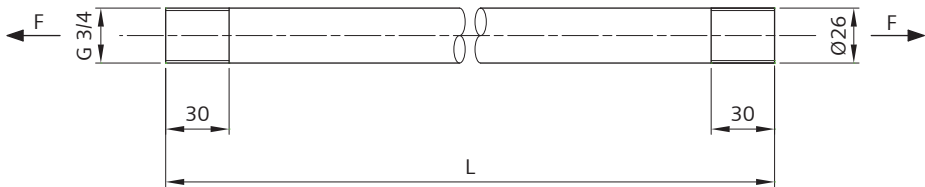


Order no.	8WL1192-0
Designation	Wedge-type dead-end clamp
Material	
Clamp body	mICI
Wedge	mICI
Pin 18x50	stISt
Split pin 5x28	Cu
Weight	2.05 kg

The clamp supports the wire given with at least 85 % of its rated failing load.

Round bar 26 for pole anchor

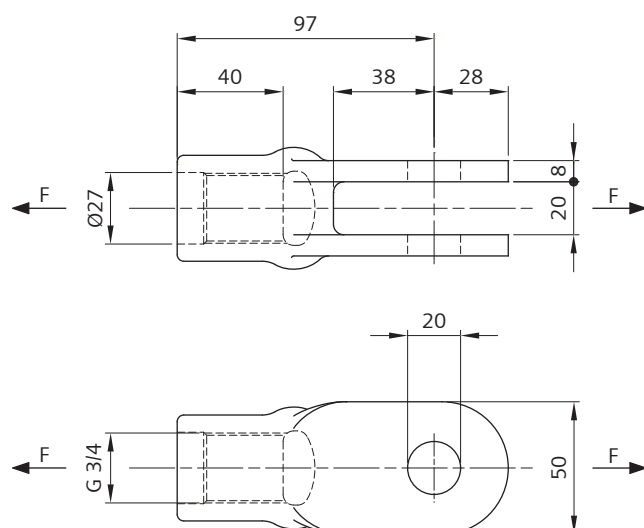
for anchoring of poles



Order no.	8WL1276-0	8WL1277-0
Designation	Round bar 26	Round bar 26
Material	htgSt	htgSt
Weight	19.8 kg	28.6 kg
Perm. operating load	40 kN	40 kN
Min. failing load	120 kN	120 kN
L	4500 mm	6500 mm

Clevis end fitting 26

for anchoring of poles

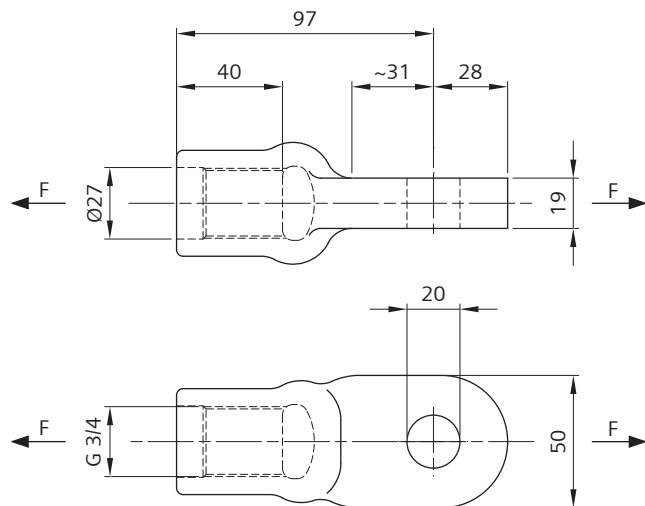


Order no.	8WL6221-1A
Designation	Clevis end fitting 26
Material	mICI
Weight	0.72 kg
Perm. operating load	40 kN
Min. failing load	120 kN

Pin 8WL1110-0 (19x52-htgSt) and split pin 8WL1115-1 (5x28-Cu) must be ordered separately, see Chapter 02-01

Tongue end fitting 26, straight

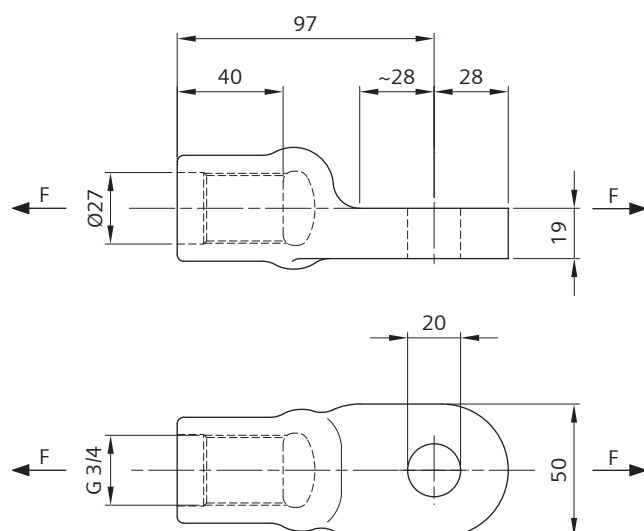
for anchoring of poles



Order no.	8WL6223-0A
Designation	Tongue end fitting 26
Material	mICI
Weight	0.78 kg
Perm. operating load	40 kN
Min. failing load	120 kN

Tongue end fitting 26, offset

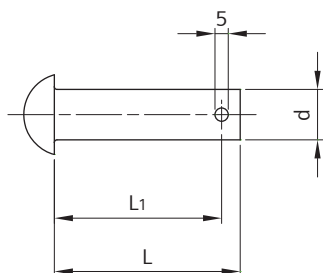
for anchoring of poles



Order no.	8WL6226-0A
Designation	Tongue end fitting 26
Material	mICI
Weight	0.74 kg
Perm. operating load	40 kN
Min. failing load	120 kN

Pin (DIN 43161)

for clevis links, clamps, tensioning straps etc.



Part 1

Order no.	8WL1100-2	8WL1101-2	8WL1102-2	8WL1116-4	8WL1104-2
Designation	Pin 13x34	Pin 13x40	Pin 13x45	Pin 13x55	Pin 16x40
Material	stlSt	stlSt	stlSt	stlSt	stlSt
Weight	0.043 kg	0.053 kg	0.054 kg	0.066 kg	0.087 kg
d	13 mm	13 mm	13 mm	13 mm	16 mm
L	34 mm	40 mm	45 mm	55 mm	40 mm
L₁	27 mm	33 mm	38 mm	48 mm	33 mm

Part 2

Order no.	8WL1105-0	8WL1105-2	8WL1106-2	8WL1110-0	8WL1110-2
Designation		Pin 16x45	Pin 16x50	Pin 19x52	Pin 19x52
Material	htgSt	stlSt	stlSt	htgSt	stlSt
Weight	0.092 kg	0.097 kg	0.103 kg	0.157 kg	0.156 kg
d	16 mm	16 mm	16 mm	19 mm	19 mm
L	45 mm	45 mm	50 mm	52 mm	52 mm
L₁	38 mm	38 mm	43 mm	45 mm	45 mm

Part 3

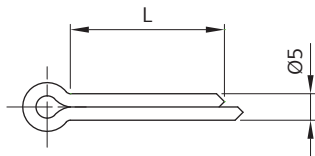
Order no.	8WL1110-3	8WL1111-0	8WL1111-2	8WL1111-3	8WL1112-0
Designation	Pin 19x52	Pin 19x70	Pin 19x70	Pin 19x70	Pin 19x100
Material	Al	htgSt	stlSt	Al	htgSt
Weight	0.054 kg	0.197 kg	0.192 kg	0.069 kg	0.264 kg
d	19 mm	19 mm	19 mm	19 mm	19 mm
L	52 mm	70 mm	70 mm	70 mm	100 mm
L₁	45 mm	63 mm	63 mm	63 mm	93 mm

Part 4

Order no.	8WL1112-2	8WL1112-3
Designation	Pin 19x100	Pin 19x100
Material	stlSt	Al
Weight	0.263 kg	0.090 kg
d	19 mm	19 mm
L	100 mm	100 mm
L ₁	93 mm	93 mm

Split pin (ISO 1234)

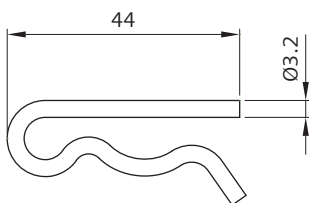
for securing pins and prestressed sleeves



Order no.	8WL1115-1	8WL1115-2	8WL1115-3	8WL1115-4
Designation	Split pin 5x28	Split pin 5x28	Split pin 5x28	Split pin 5x80
Material	Cu	stlSt	Al	Al
Weight	5.0 kg/1000 pcs.	5.0 kg/1000 pcs.	2.0 kg/1000 pcs.	4.0 kg/1000 pcs.
L	28 mm	28 mm	28 mm	80 mm

Beta-Split pin

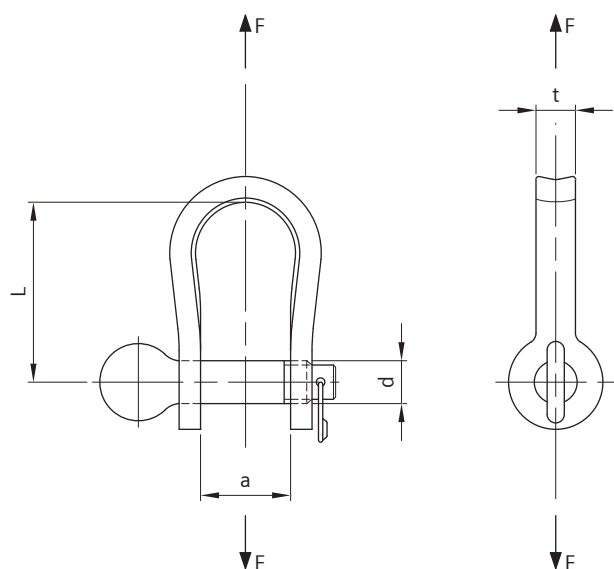
for securing pins, for pins d=19 mm



Order no.	8WL1114-8
Designation	Beta-Split pin
Material	stlSt
Weight	6.0 kg/1000 pcs.

Shackle with threaded pin and split pin ring

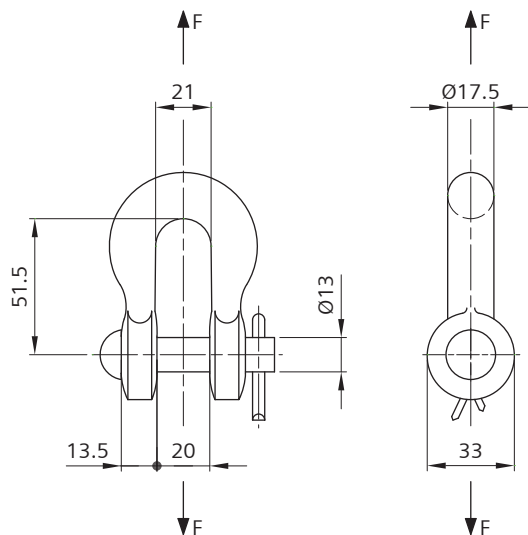
for terminations



Order no.	8WL1118-4	8WL1118-5	8WL1118-6	8WL1118-7
Designation	Shackle 6	Shackle 8	Shackle 10	Shackle 12
Material	stlSt	stlSt	stlSt	stlSt
Weight	0.023 kg	0.045 kg	0.09 kg	0.17 kg
Perm. operating load	5 kN	8 kN	12 kN	16 kN
Min. failing load	15 kN	24 kN	36 kN	48 kN
a	~16 mm	~18 mm	~21 mm	~27 mm
d	6 mm	8 mm	10 mm	12 mm
t	8 mm	8 mm	11.5 mm	14.5 mm
L	~23 mm	~30 mm	~40 mm	~50 mm

Shackle 13 with pin

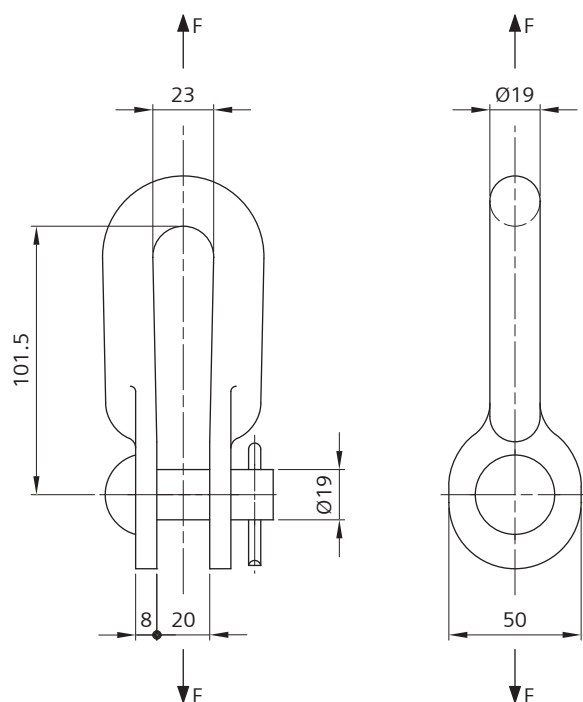
for terminations



Order no.	8WL1124-0
Designation	Shackle 13-50
Material	
Shackle	htgSt
Pin 13x58	htgSt
Split pin 5x28	Cu
Weight	0.38 kg
Perm. operating load	12 kN
Min. failing load	36 kN

Shackle 19 with pin

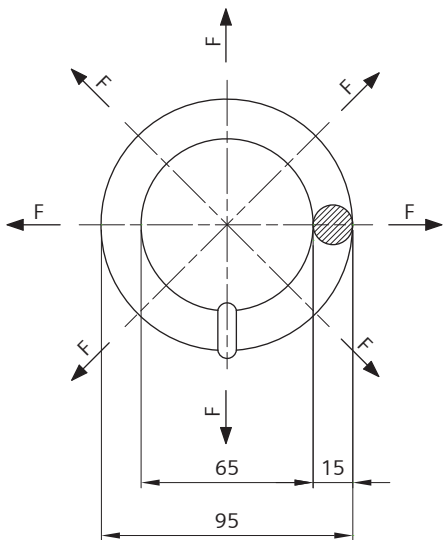
for terminations



Order no.	8WL1123-1
Designation	Shackle 19-90
Material	
Shackle	htgSt
Pin 19x52	htgSt
Split pin 5x28	Cu
Weight	0.84 kg
Perm. operating load	32 kN
Min. failing load	96 kN

Terminal ring

for terminations

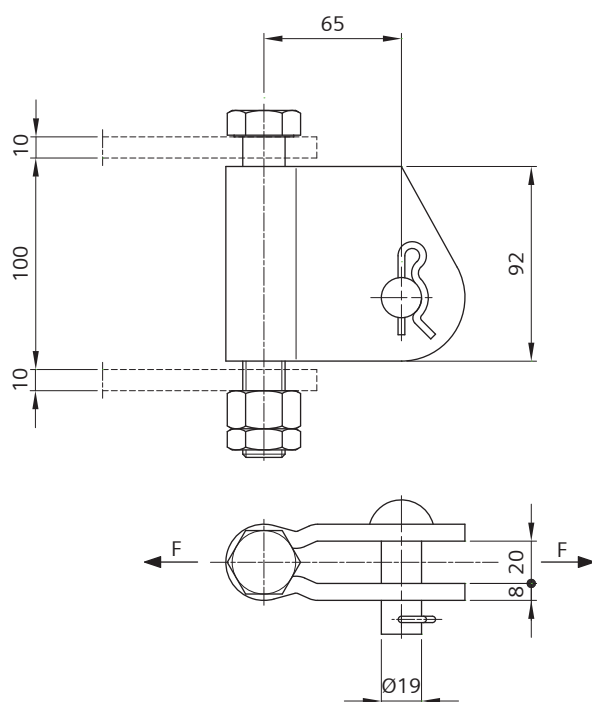


Order no.	8WL1135-0
Designation	Terminal ring
Material	stlSt
Weight	0.36 kg
Perm. operating load	12.5 kN
Min. failing load	37.5 kN

The stated loads apply for max. 8 equally distributed terminations only.

Strain hinge

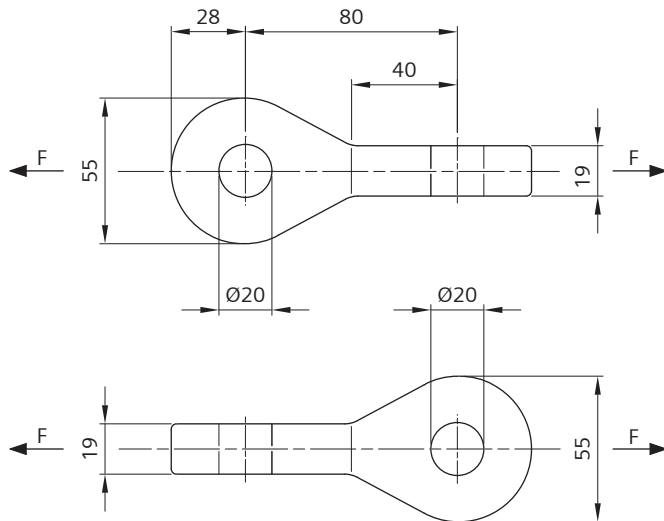
for terminations of feeder lines



Order no.	8WL1127-1
Designation	Strain hinge BN19-19-100-8
Material	
Strain hinge	stlSt
Bolt M20	stlSt
Nuts	stlSt
Pin 19x25	stlSt
Beta-Split pin	stlSt
Weight	1.72 kg
Perm. operating load	53.33 kN
Min. failing load	160 kN

Cross link 19 eye/eye

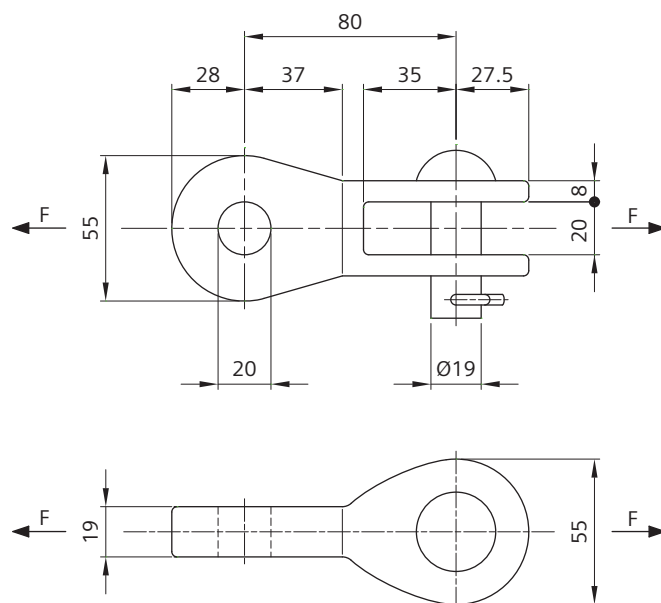
for span guy arrangements



Order no.	8WL1134-5
Designation	Cross link 19
Material	ctAl
Weight	0.24 kg
Perm. operating load	20 kN
Min. failing load	60 kN

Cross link 19 eye/clevis

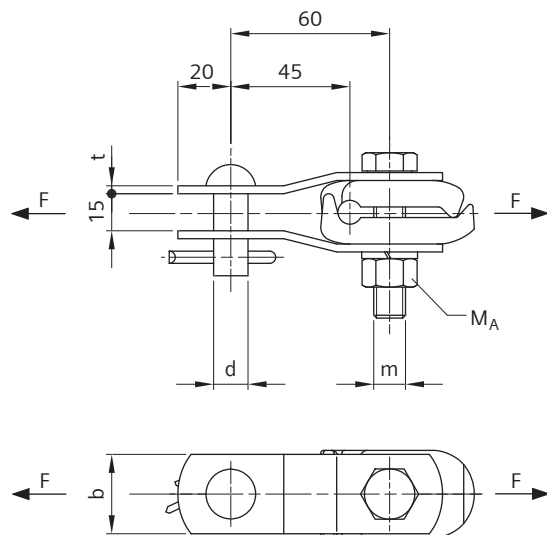
for span guy arrangements



Order no.	8WL1135-6
Designation	Cross link 19
Material	
Cross link	ctAl
Pin 19x52	Al
Beta-Split pin	stlSt
Weight	0.34 kg
Perm. operating load	20 kN
Min. failing load	60 kN

Pull-off clamp

for pull-off made of copper/bronze stranded wires $d=6$ to 10.5 mm acc. to DIN 48201 or wire ropes $d=6$ to 10 mm (8WL7093-2, -3 or -4)

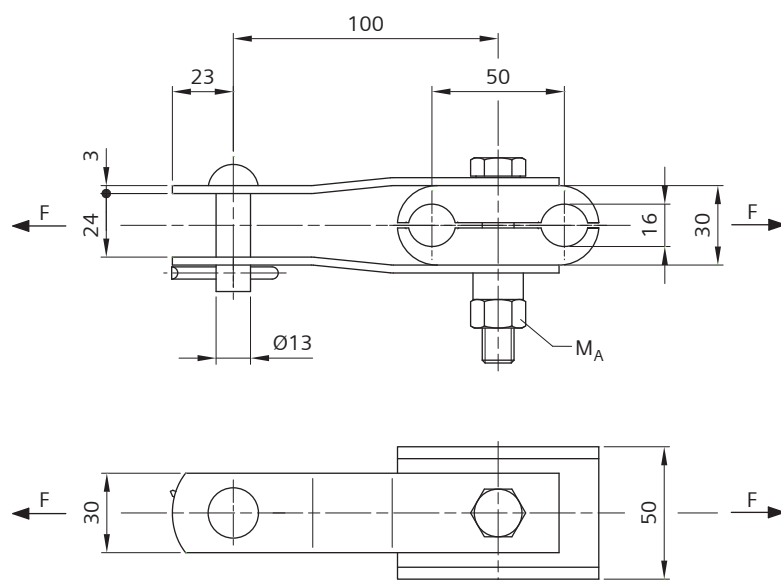


Order no.	8WL1141-0	8WL1141-1
Designation	Pull-off clamp 13-70	Pull-off clamp 16-70
Material		
Clamp body	CuZn	CuZn
Straps	stlSt	stlSt
Pin 13x34	stlSt	-
Pin 16x40	-	stlSt
Split pin 5x28	Cu	Cu
Bolt M12	stlSt	-
Bolt M16	-	stlSt
Nut, spring washer	stlSt	stlSt
Weight	0.50 kg	0.66 kg
Perm. operating load	10 kN	12 kN
Min. failing load	30 kN	36 kN
Tightening torque M_A	56 Nm	135 Nm
b	30 mm	35 mm
d	13 mm	16 mm
t	3 mm	4 mm
m	M12	M16

Protection sleeves must be ordered separately, see Chapter 02-02.

Pull-off clamp for twin catenary wires

for pull-off with twin catenary wires made of copper or bronze up to 150 mm² acc. to DIN 48201



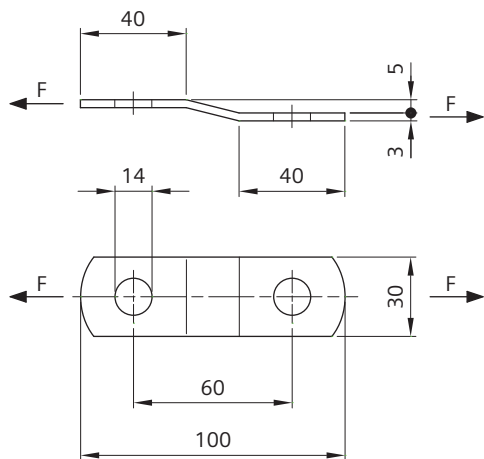
Order no.	8WL1141-7
Designation	Pull-off clamp 13-150
Material	
Clamp body	CuAl
Straps	stlSt
Pin 13x40	Cu
Split pin 5x28	Cu
Spacer	Cu5
Bolt M12	stlSt
Nut	stlSt
Weight	0.72 kg
Perm. operating load	6 kN
Min. failing load	18 kN
Tightening torque M_A	56 Nm

Protection sleeves must be ordered separately, see Chapter 02-02.

Two straps 8WL1143-3 for twin pull-off clamp must be ordered separately, see page 02-01-57.

Strap 60, offset

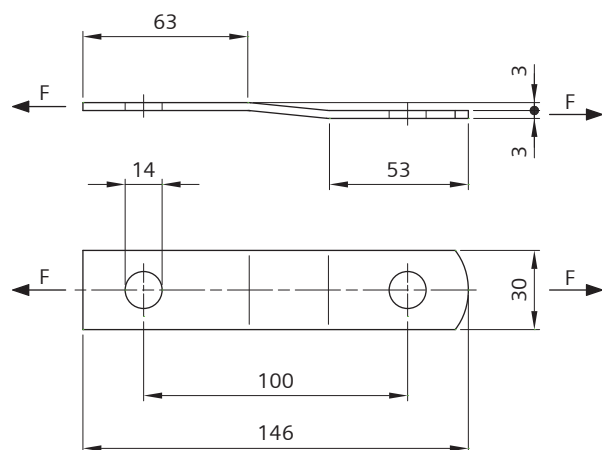
for pull-off clamp 8WL1141-0



Order no.	8WL1142-5
Designation	Strap 60, offset
Material	stlSt
Weight	0.06 kg
Perm. operating load	5 kN
Min. failing load	15 kN

Strap 100, offset

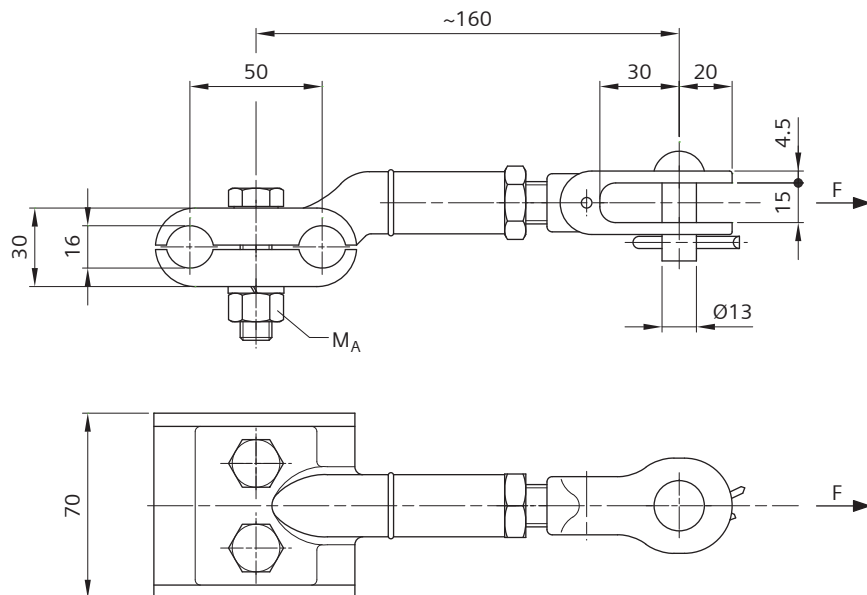
for pull-off clamp 8WL1141-7



Order no.	8WL1143-3
Designation	Strap 100, offset
Material	stlSt
Weight	0.09 kg
Perm. operating load	3 kN
Min. failing load	9 kN

Multiple purpose clamp for pull-offs

for wires up to 150 mm² acc. to DIN 48201

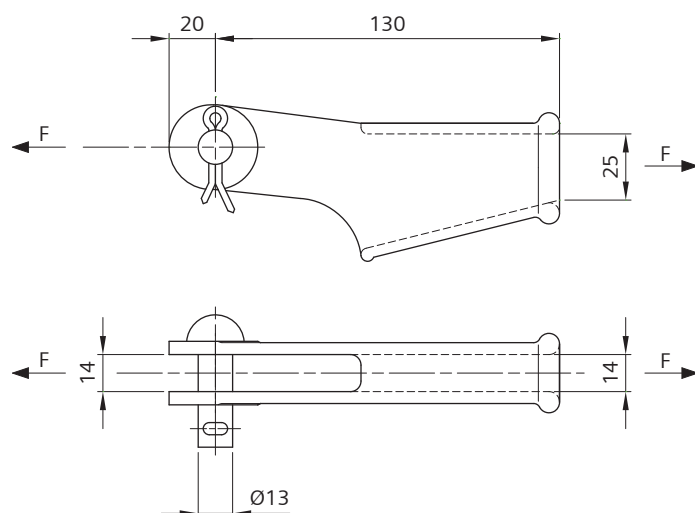


Order no.	8WL1145-1
Designation	Multiple purpose clamp clevis 13
Material	
Clamp body	CuAl
Pin 13x34	Cu
Split pin 5x28	Cu
Bolts M12	stlSt
Nuts	stlSt, Cu2
Spring washers	stlSt
Grooved pin	stlSt
Weight	1.09 kg
Perm. operating load	6 kN
Min. failing load	18 kN
Tightening torque M _A	56 Nm

Protection sleeves must be ordered separately, see Chapter 02-02.

Wedge-type dead-end clamp 13

for terminating single wires $d=5$ and 6 mm acc. to DIN 43146, stranded wires 25 to 70 mm² acc. to DIN 48201 and contact wires AC-80 to AC/BC-100 made of Cu-ETP or CuAg0.1 acc. to EN 50149



Order no.	8WL1160-8
Designation	Wedge-type dead-end clamp 13
Material	
Clamp body	CuAl
Pin 13x40	stlSt
Split pin 5x28	Cu
Weight	0.42 kg

The clamp supports the wires or contact wires given with at least 85 % of their rated failing load.

Wedge in CuZn must be ordered separately:

One-hole wedge 8WL1201-1

Two-hole wedge 8WL1202-1

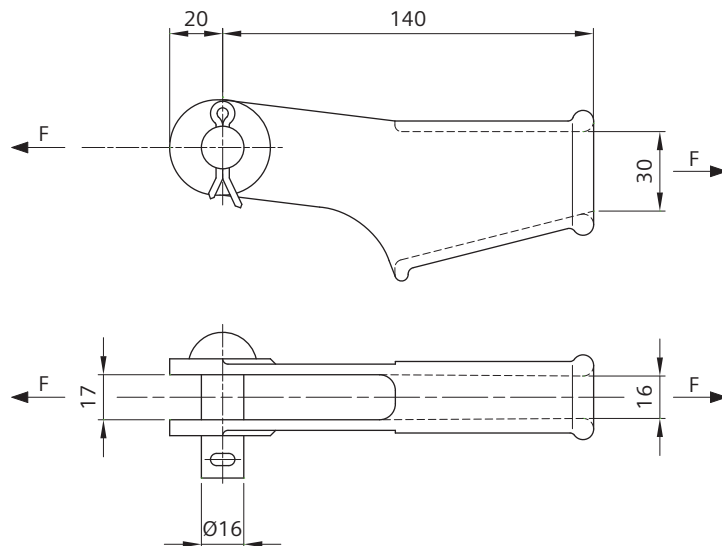
Three-hole wedge 8WL1203-1

Applications see page 02-01-69.

Type made of mICI on request.

Wedge-type dead-end clamp 16

for terminating single wires $d=6$ mm acc. to DIN 43146, stranded wires 25 to 95 mm² acc. to DIN 48201 and contact wires AC-80/BC-100 to AC/BC-120 made of Cu-ETP or CuAg0.1 acc. to EN 50149



Order no.	8WL1170-8
Designation	Wedge-type dead-end clamp 16
Material	
Clamp body	CuAl
Pin 16x45	stlSt
Split pin 5x28	Cu
Weight	0.60 kg

The clamp supports the wires or contact wires given with at least 85 % of their rated failing load.

Wedge in CuZn must be ordered separately:

One-hole wedge 8WL1201-1

Two-hole wedge 8WL1202-1

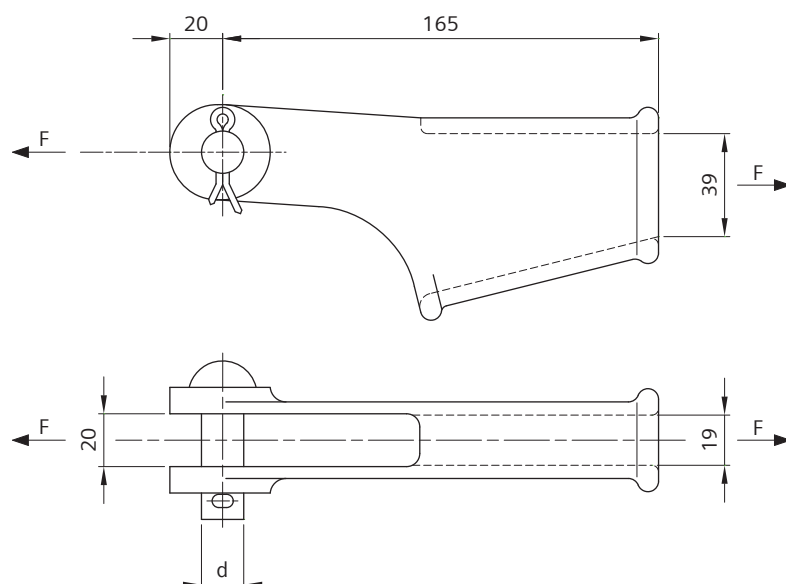
Three-hole wedge 8WL1203-1

Applications see page 02-01-69.

Type made of mICI on request.

Wedge-type dead-end clamp 16-19

for terminating wires 120 bis 150 mm² acc. to DIN 48201 and contact wires AC/BC-120 to AC/BC-150 made of Cu-ETP or CuAg0.1 acc. to EN 50149



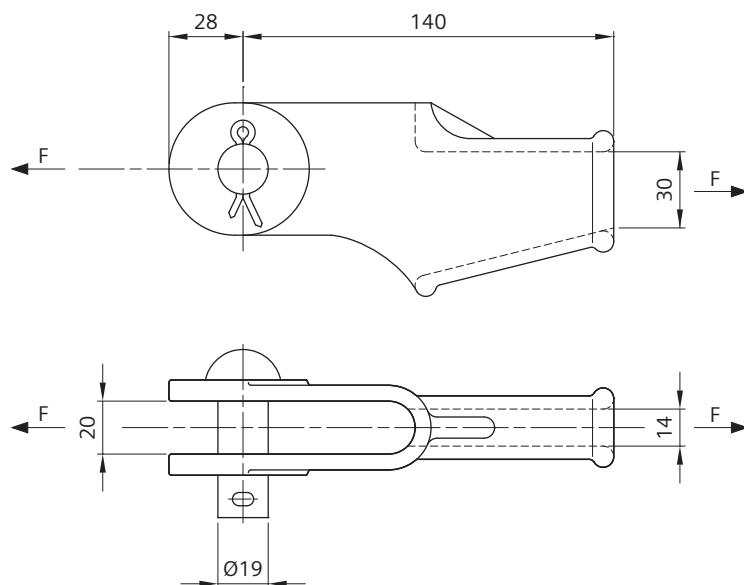
Order no.	8WL1195-7	8WL1195-8
Designation	Wedge-type dead-end clamp 16	Wedge-type dead-end clamp 19
Material		
Clamp body	CuAl	CuAl
Pin 16x50	stlSt	-
Pin 19x52	-	stlSt
Split pin 5x28	Cu	Cu
Weight	0.91 kg	0.94 kg
d	16 mm	19 mm

The clamp supports the wires or contact wires given with at least 85 % of their rated failing load.

Bronze wedge 8WL1195-5 must be ordered separately, see page 02-01-68.

Wedge-type dead-end clamp 19

for terminating single wires $d=6$ mm acc. to DIN 43146, stranded wires 25 to 95 mm² acc. to DIN 48201 and contact wires AC-80/BC-100 to AC/BC-120 made of Cu-ETP or CuAg0.1 acc. to EN 50149



Order no.	8WL1180-7
Designation	Wedge-type dead-end clamp 19
Material	
Clamp body	mICI
Pin 19x52	stISt
Split pin 5x28	Cu
Weight	0.92 kg

The clamp supports the wires or contact wires given with at least 85 % of their rated failing load.

Wedge in mICI must be ordered separately:

One-hole wedge 8WL1201-0

Two-hole wedge 8WL1202-0

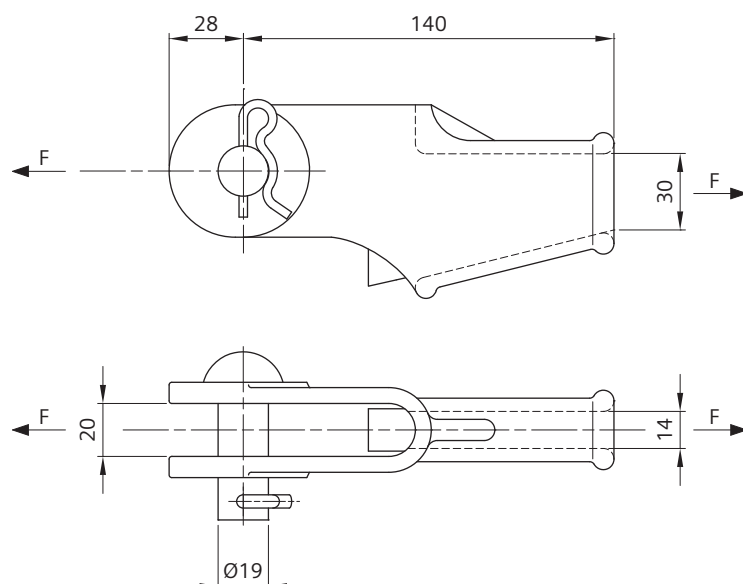
Three-hole wedge 8WL1203-0

Special wedge 50 8WL1202-3 for steel wire 8WL7090-0/-0A

Applications see page 02-01-69.

Wedge-type dead-end clamp 19

for terminating stranded wires 25 to 95 mm² acc. to DIN 48201 and contact wires AC-80/BC-100 to AC/BC-120 made of Cu-ETP or CuAg0.1 acc. to EN 50149



Order no.	8WL1180-8
Designation	Wedge-type dead-end clamp 19
Material	
Clamp body	ctAl
Wire casing	Alcu
Pin 19x52	Al
Beta-Split pin	stlSt
Weight	0.45 kg

The clamp supports the wires or contact wires given with at least 85 % of their rated failing load.

Wedge in mICI must be ordered separately:

One-hole wedge 8WL1201-0

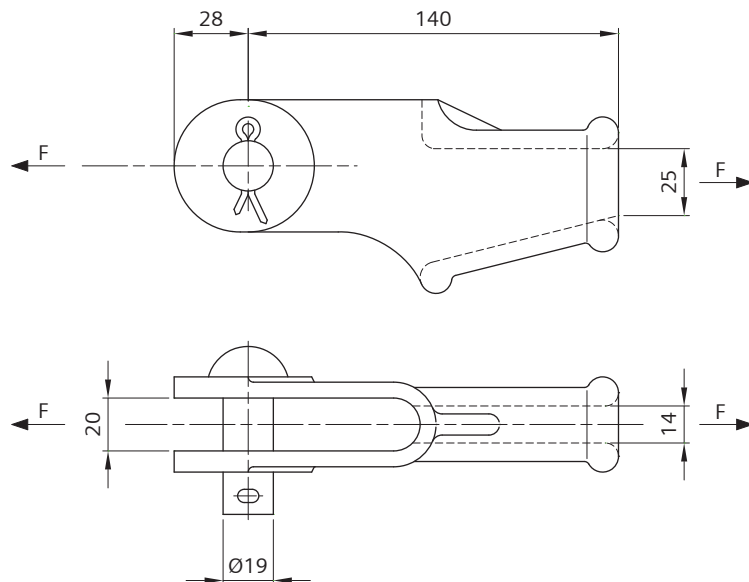
Two-hole wedge 8WL1202-0

Three-hole wedge 8WL1203-0

Applications see page 02-01-69.

Wedge-type dead-end clamp 19

for stainless steel wire ropes d=6 mm (8WL7093-2) and 8 mm (8WL7093-3)



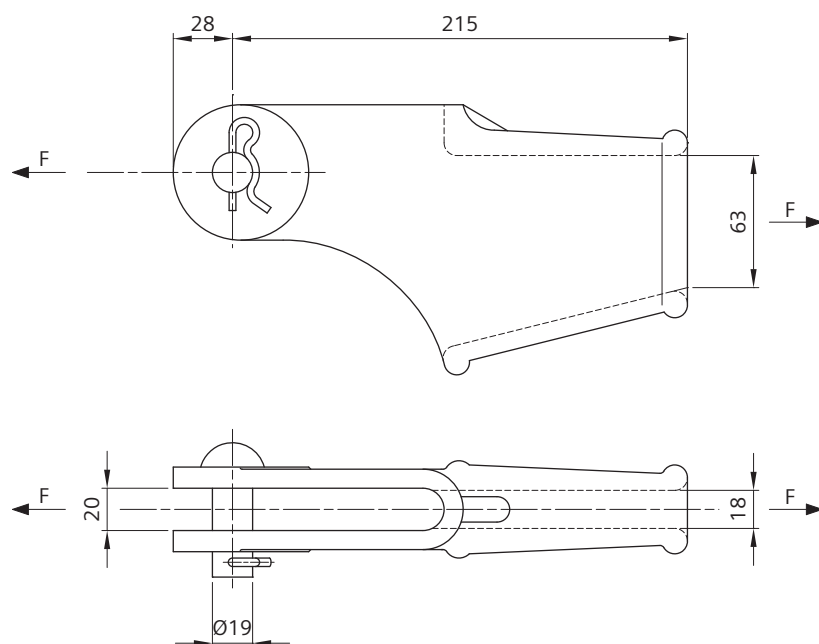
Order no.	8WL1181-7
Designation	Wedge-type dead-end clamp 19
Material	
Clamp body	ctAl
Pin 19x52	Al
Split pin 5x28	Al
Weight	0.41 kg

The clamp supports the wires given with at least 85 % of their rated failing load.

Three-hole wedge 8WL1203-0 (mICI) must be ordered separately, see page 02-01-67

Wedge-type dead-end clamp 19-0

for terminating stranded wires 95 to 150 mm² acc. to DIN 48201 and contact wires AC/BC-150 made of Cu-ETP or CuAg0.1 acc. to EN 50149 or Ri161 made of Cu-ETP (British Standard 23)



Order no.	8WL1190-3
Designation	Wedge-type dead-end clamp 19-0
Material	
Clamp body	mICI
Pin 19x52	htgSt
Beta-Split pin	stlSt
Weight	3.34 kg

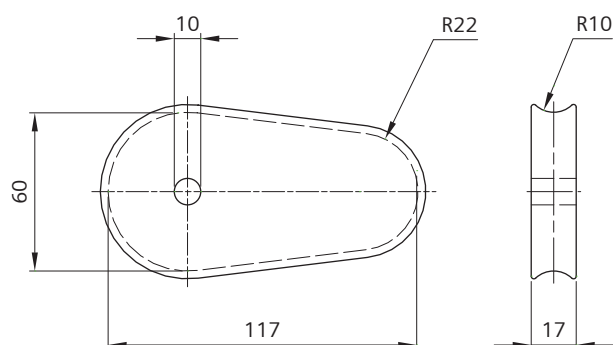
The clamp supports the wires or contact wires given with at least 85 % of their rated failing load.

Wedge 8WL1200-0 (mICI) must be ordered separately, see page 02-01-66.

Can also be supplied with wedge, order no. 8WL1190-0.

One-hole wedge 19-0

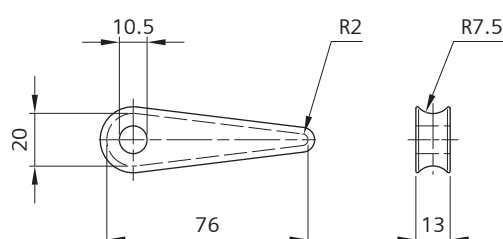
for wedge-type dead-end clamp 8WL1190-3



Order no.	8WL1200-0
Designation	One-hole wedge 19-0
Material	mICI
Weight	0.69 kg

One-hole wedge

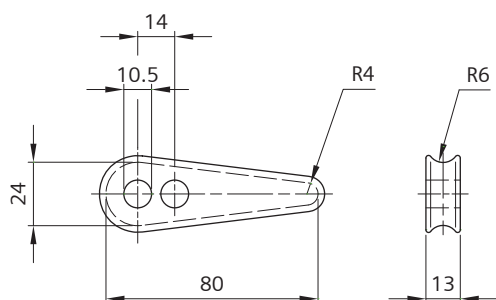
for wedge-type dead-end clamps 13, 16, 19



Order no.	8WL1201-0	8WL1201-1
Designation	One-hole wedge	One-hole wedge
Material	mICI	CuZn
Weight	0.09 kg	0.12 kg

Two-hole wedge

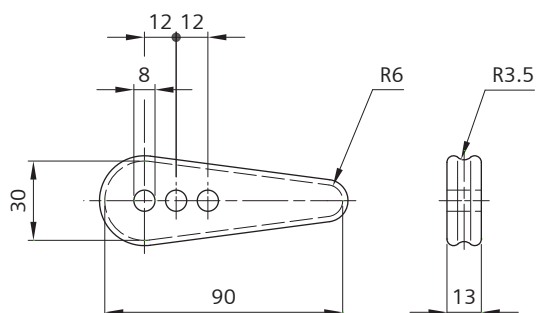
for wedge-type dead-end clamps 13, 16, 19



Order no.	8WL1202-0	8WL1202-1
Designation	Two-hole wedge	Two-hole wedge
Material	mICI	CuZn
Weight	0.13 kg	0.15 kg

Three-hole wedge

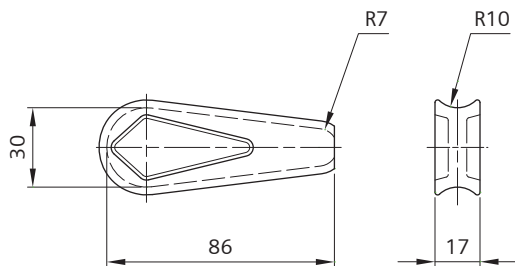
for wedge-type dead-end clamps 13, 16, 19



Order no.	8WL1203-0	8WL1203-1
Designation	Three-hole wedge	Three-hole wedge
Material	mICI	CuZn
Weight	0.17 kg	0.22 kg

Bronze wedge

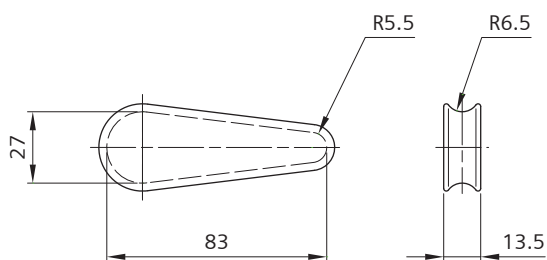
for wedge-type dead-end clamps 8WL1195-7 and 8WL1195-8



Order no.	8WL1195-5
Designation	Bronze wedge
Material	CuAl
Weight	0.23 kg

Special wedge

for steel wire 50 mm² (8WL7090-0/-0A)



Order no.	8WL1202-3
Designation	Special wedge 50
Material	mICI
Weight	0.18 kg

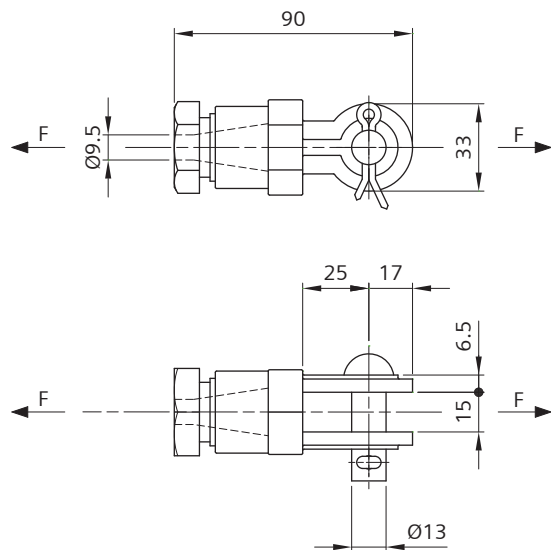
Applications for wedge-type dead-end clamps and wedges

	Dia- meter [mm]	Wedge-type dead- end clamp Three-hole wedge			Wedge-type dead- end clamp Two-hole wedge			Wedge-type dead- end clamp One-hole wedge			19-0	Wedge-type dead-end clamp Special wedge 19
		13	16	19	13	16	19	13	16	19		
Tension wire acc. to DIN 43136												
	5	•••										
	6	•••	•••	•••								
Wire, stranded (Cu-ETP/Bz) acc. to DIN 48201												
25 mm ²	6.3	•••	•••	•••								
35 mm ²	7.5		•••	•••	••							
50 mm ²	9.0				••	••	••	•				
70 mm ²	10.5					••	••	•				
95 mm ²	12.5								•	•	•	
120 mm ²	14.0										•	
150 mm ²	15.8										•	
Wire, flexible (Cu-ETP/Bz) acc. to DIN 43138 (not high-tensile)												
35 mm ²	9.0		•••	•••	••	••	••	•				
50 mm ²	10.5					••	••	•				
70 mm ²	13.0								•	•		
Steel wire 8WL7090-0/-0A												
50 mm ²	9.5											•
Contact wire acc. to EN 50149												
AC-80 Cu-ETP/CuAg0.1	10.6					••	••	•	•	•		
AC-100 Cu-ETP/CuAg0.1	12.0					••	••	•	•	•		
AC-107 Cu-ETP	12.3						••			•		
AC-120 Cu-ETP/CuAg0.1	13.2								•	•		
AC-150 Cu-ETP/CuAg0.1	14.8										•	

Wedge-type dead-end clamp 8WL1237-2 must be used for contact wire AC-120 made of CuMg0.5.

Cone-type dead-end clamp 13

for terminating bronze and copper wires 50/7 mm² acc. to DIN 48201

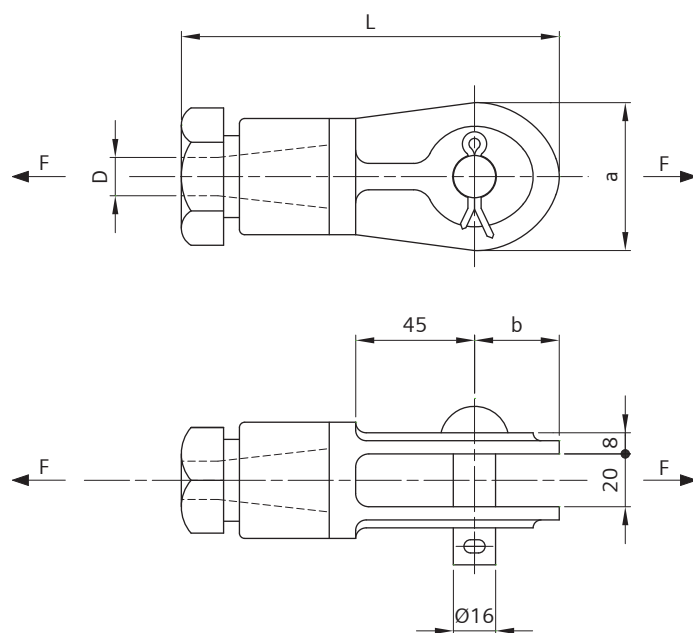


Order no.	8WL1207-0
Designation	Cone-type dead-end clamp 13-50/7
Material	
Clevis head	CuAl
Adjusting screw	CuAl
Clamping cone	CuAl
Pin 13x40	Cu
Split pin 5x28	Cu
Weight	0.36 kg

The clamp supports the wires given with at least 85 % of their rated failing load.

Cone-type dead-end clamp 16

for terminating bronze and copper wires acc. to DIN 48201

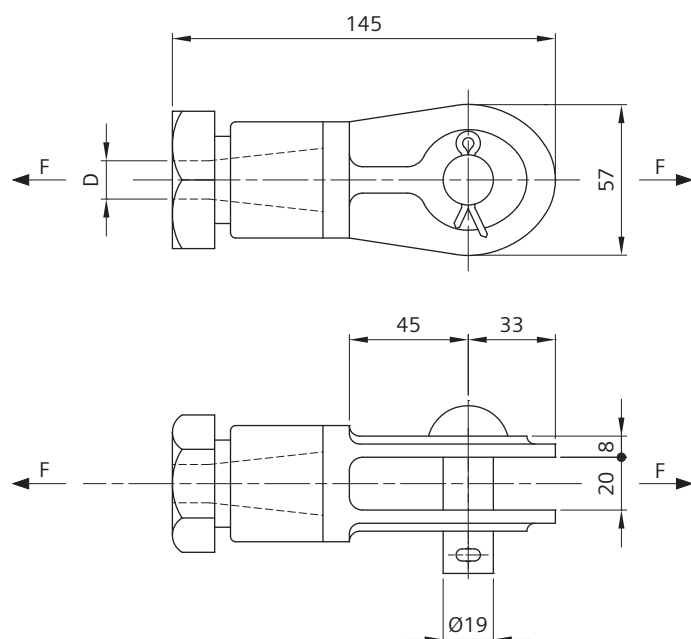


Order no.	8WL1220-2	8WL1210-0	8WL1211-0	8WL1212-0
Designation	Cone-type dead-end clamp 16-70	Cone-type dead-end clamp 16-95	Cone-type dead-end clamp 16-120	Cone-type dead-end clamp 16-150
Material				
Clevis head	CuAl	CuAl	CuAl	CuAl
Adjusting screw	CuAl	CuAl	CuAl	CuAl
Clamping cone	CuAl	CuAl	CuAl	CuAl
Pin 16x50	Cu	Cu	Cu	Cu
Split pin 5x28	Cu	Cu	Cu	Cu
for wire	70 mm ²	95 mm ²	120 mm ²	150 mm ²
Weight	0.66 kg	0.66 kg	1.02 kg	1.02 kg
a	50 mm	50 mm	50 mm	57 mm
b	29 mm	29 mm	29 mm	33 mm
L	125 mm	125 mm	125 mm	145 mm
D	11 mm	13 mm	14.5 mm	16.5 mm

The clamp supports the wires given with at least 85 % of their rated failing load.

Cone-type dead-end clamp 19

for terminating bronze and copper wires acc. to DIN 48201

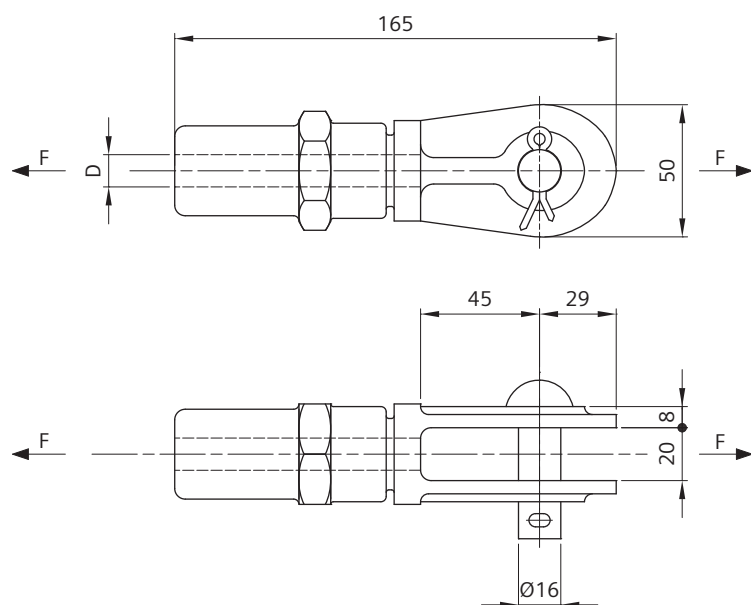


Order no.	8WL1220-5	8WL1213-0	8WL1214-0	8WL1215-0
Designation	Cone-type dead-end clamp 19-70	Cone-type dead-end clamp 19-95	Cone-type dead-end clamp 19-120	Cone-type dead-end clamp 19-150
Material				
Clevis head	CuAl	CuAl	CuAl	CuAl
Adjusting screw	CuAl	CuAl	CuAl	CuAl
Clamping cone	CuAl	CuAl	CuAl	CuAl
Pin 19x52	Cu	Cu	Cu	Cu
Split pin 5x28	Cu	Cu	Cu	Cu
for wire	70 mm ²	95 mm ²	120 mm ²	150 mm ²
Weight	0.70 kg	0.60 kg	1.09 kg	1.09 kg
a	50 mm	50 mm	57 mm	57 mm
b	29 mm	29 mm	33 mm	33 mm
L	125 mm	125 mm	145 mm	145 mm
D	11 mm	13 mm	14.5 mm	16.5 mm

The clamp supports the wires given with at least 85 % of their rated failing load.

Cone-type dead-end clamp 16

for terminating contact wires AC-100 and AC-120 made of Cu-ETP or CuAg0.1 acc. to EN 50149

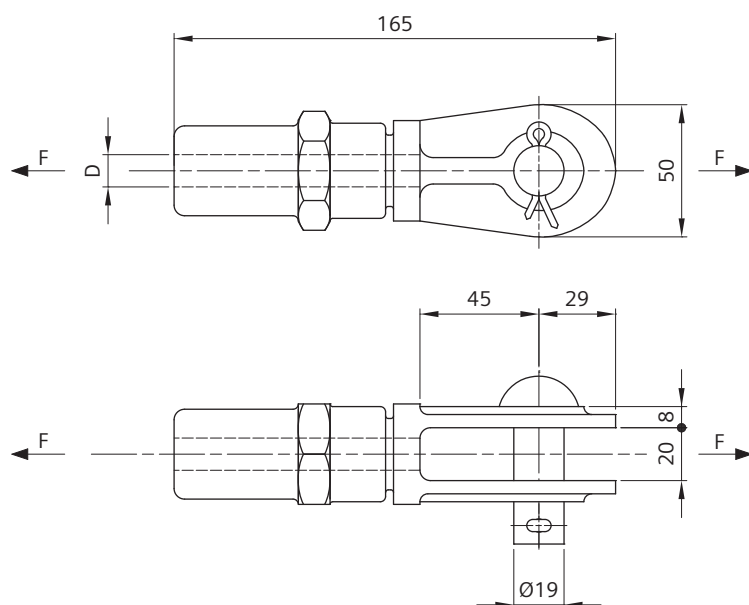


Order no.	8WL1236-0	8WL1237-0
Designation	Cone-type dead-end clamp 16	Cone-type dead-end clamp 16
Material		
Clevis head	CuAl	CuAl
Sleeve nut	CuAl	CuAl
Clamping cone	CuAl	CuAl
Clamping ring	CuAl	CuAl
Pin 16x50	Cu	Cu
Split pin 5x28	Cu	Cu
for contact wire	AC-100	AC-120
Weight	0.94 kg	0.94 kg
D	12.2 mm	13.5 mm

The clamp supports the contact wires given with at least 85 % of their rated failing load.

Cone-type dead-end clamp 19

for terminating contact wires AC-100 made of Cu-ETP or CuAg0.1 and AC-120 made of Cu-ETP, CuAg0.1 or CuMg0.5 acc. to EN 50149

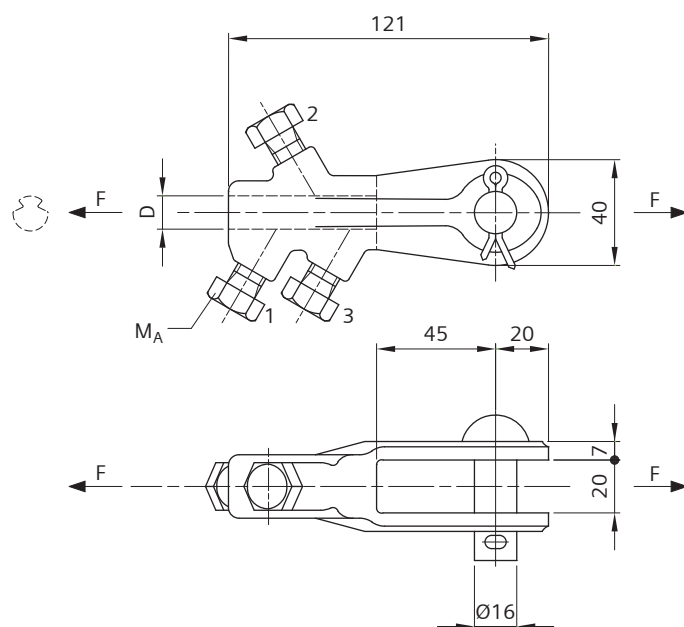


Order no.	8WL1236-2	8WL1237-2
Designation	Cone-type dead-end clamp 19	Cone-type dead-end clamp 19
Material		
Clevis head	CuAl	CuAl
Sleeve nut	CuAl	CuAl
Clamping cone	CuAl	CuAl
Clamping ring	CuAl	CuAl
Pin 19x52	Cu	Cu
Split pin 5x28	Cu	Cu
for contact wire	AC-100	AC-120
Weight	1.12 kg	0.98 kg
D	12.2 mm	13.5 mm

The clamp supports the contact wires given with at least 85 % of their rated failing load.

Dead-end clamp 16 with cup-point screws

for terminating contact wire AC-80 to AC-150 made of Cu-ETP or CuAg0.1 acc. to EN 50149



Order no.	8WL1240-0	8WL1240-1	8WL1240-2
Designation	Dead-end clamp 16	Dead-end clamp 16	Dead-end clamp 16
Material			
Clamp body	CuAl	CuAl	CuAl
Cup-point screws M10	stlSt	stlSt	stlSt
Pin 16x45	Cu	Cu	Cu
Split pin 5x28	Cu	Cu	Cu
for contact wire	AC-80 to AC-100	AC-120	AC-150
Weight	0.54 kg	0.54 kg	0.54 kg
Tightening torque M_A	20 Nm ¹⁾ 30 Nm ²⁾	40 Nm ³⁾	40 Nm ³⁾
D	12.6 mm	13.50 mm	15.25 mm

¹⁾ for AC-80 (2x following 1 to 3)

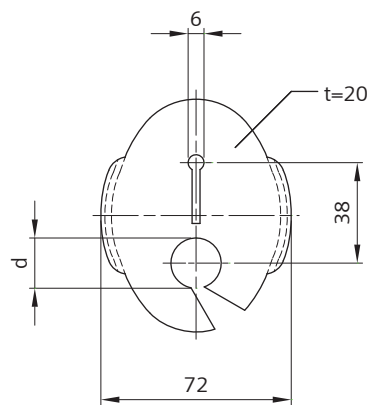
²⁾ for AC-100 (2x following 1 to 3)

³⁾ 2x following 1 to 3

The clamp supports the contact wires given with at least 85 % of their rated failing load.

Cable strap

for attachment at cross-span wires

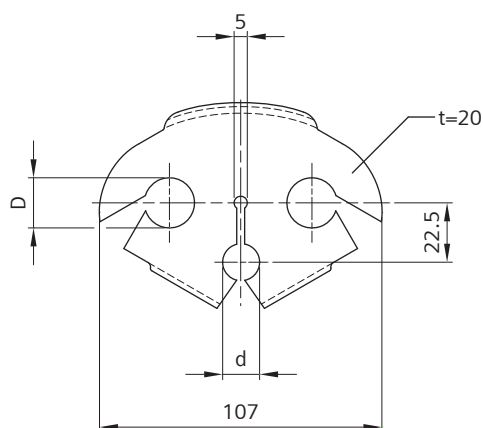


Order no.	8WL6730-5	8WL6730-6
Designation	Cable strap for 1 cable d=20-24 mm	Cable strap for 1 cable d=25-30 mm
Material	Rubber, black	Rubber, black
Weight	0.08 kg	0.08 kg
d	19 mm	24 mm

Punch-lock bands 8WL6751-0 to 5 (see page 02-01-83) or 8WL6740-1 (see page 02-01-82) must be ordered separately.

Cable strap

for attachment at cross-span wires

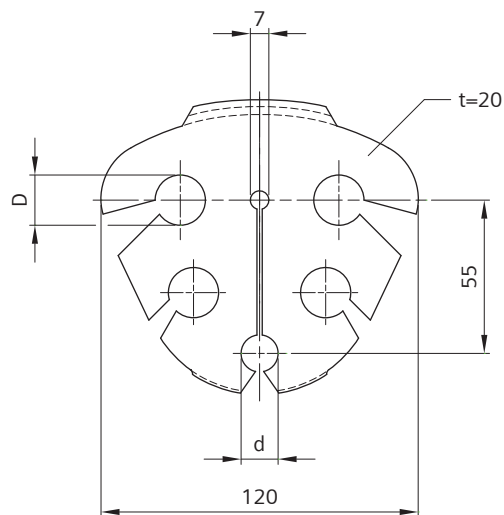


Order no.	8WL6731-5	8WL6731-6	8WL6731-7	8WL6731-8
Designation	Cable strap for 2 cables d=20-24 mm and 1 cable d=14 mm	Cable strap for 2 cables d=25-30 mm and 1 cable d=14 mm	Cable strap for 3 cables d=20-24 mm	Cable strap for 3 cables d=25-30 mm
Material	Rubber, black	Rubber, black	Rubber, black	Rubber, black
Weight	0.12 kg	0.12 kg	0.12 kg	0.12 kg
d	14 mm	14 mm	19 mm	24 mm
D	19 mm	24 mm	19 mm	24 mm

Punch-lock bands 8WL6751-0 to 5 (see page 02-01-83) or 8WL6740-1 (see page 02-01-82) must be ordered separately.

Cable strap

for attachment at cross-span wires

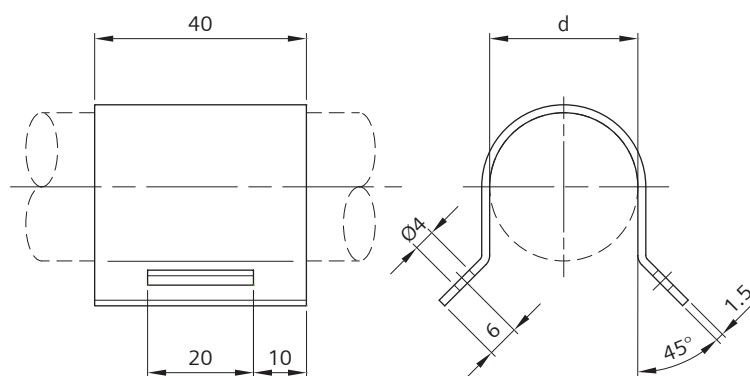


Order no.	8WL6732-5	8WL6732-6	8WL6732-7	8WL6732-8
Designation	Cable strap for 4 cables d=20-24 mm and 1 cable d=14 mm	Cable strap for 4 cables d=25-30 mm and 1 cable d=14 mm	Cable strap for 5 cables d=20-24 mm	Cable strap for 5 cables d=25-30 mm
Material	Rubber, black	Rubber, black	Rubber, black	Rubber, black
Weight	0.18 kg	0.18 kg	0.18 kg	0.18 kg
d	14 mm	14 mm	19 mm	24 mm
D	19 mm	24 mm	19 mm	24 mm

Punch-lock bands 8WL6751-0 to 5 (see page 02-01-83) or 8WL6740-1 (see page 02-01-82) must be ordered separately.

Clip

for plastic tubes acc. to DIN 49016

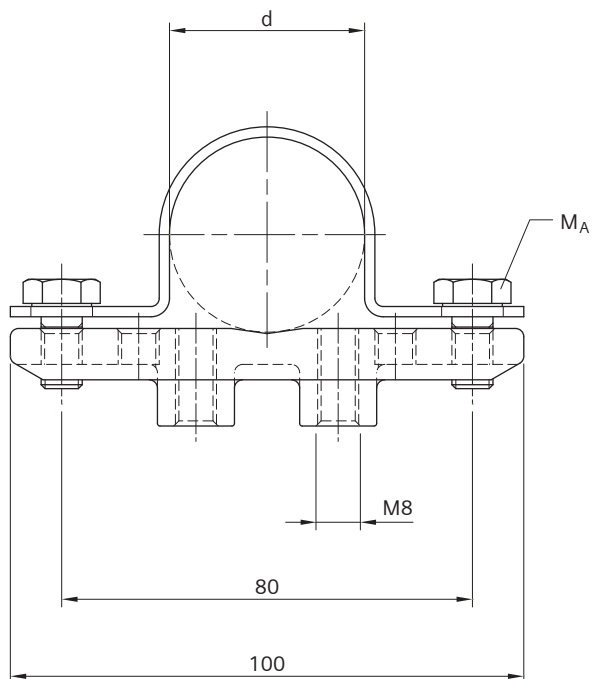


Order no.	8WL6752-0	8WL6752-1	8WL6752-2	8WL6752-3	8WL6752-4
Designation	Clip for plastic tube 16	Clip for plastic tube 21	Clip for plastic tube 29	Clip for plastic tube 36	Clip for plastic tube 42
Material	stlSt	stlSt	stlSt	stlSt	stlSt
Weight	0.038 kg	0.044 kg	0.056 kg	0.070 kg	0.075 kg
Cable d	22 mm	28 mm	37 mm	47 mm	54 mm

Punch-lock band 8WL6743-0 must be ordered separately, see page 02-01-84.

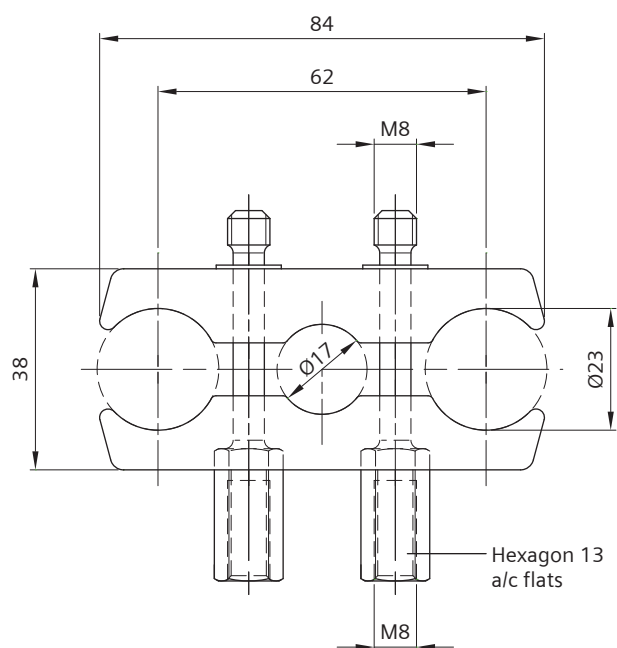
Clips for plastic tubes acc. to EN 61386 on request.

Base element for cable holder



Order no.	8WL6738-1	8WL6738-2	8WL6738-3
Designation	Base element for cable holder at tube 55	Base element for cable holder at tube 38	Base element for cable holder at wire d=7.5-10.5 mm
Material			
Mounting plate	CuAl	CuAl	CuAl
Hoop	stlSt	stlSt	stlSt
Bolts M8	stlSt	stlSt	stlSt
Weight	0.25 kg	0.23 kg	0.22 kg
Tightening torque M_A	16 Nm	16 Nm	16 Nm
d	55 mm	38 mm	7.5 - 10.5 mm

Cable holder for two cables

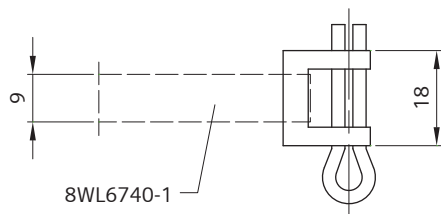


Order no.	8WL6738-4
Designation	Cable holder for two cables d=23 mm and 1 cable d=17 mm
Material	
Clamping jaws	Polyamide
Clamping bolts M8	stlSt
Locking washers	CuSn
Weight	0.15 kg

The quantity of holders can be extended as needed to install any number of cables.

Lock for punch-lock band

for cable straps



Order no.	8WL6750-3
Designation	Lock for punch-lock band 9x0.4 mm
Material	stlSt
Weight	0.008 kg

Punch-lock band 8WL6740-1 must be ordered separately.

Punch-lock band

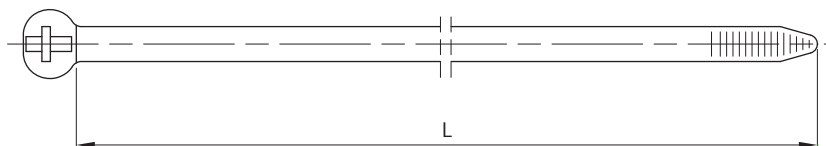
for lock 8WL6750-3

Order no.	8WL6740-1
Designation	Punch-lock band 9x0.4 mm
Material	stlSt
Weight	0.04 kg/m

Punch-lock band on reels 30.5 m long each.

Punch-lock band

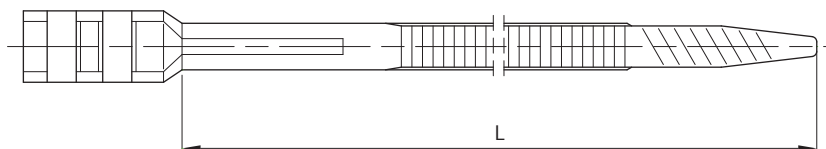
for cable straps



Order no.	8WL6751-0	8WL6751-1
Designation	Punch-lock band for one to three cables	Punch-lock band for four and five cables
Material	Polyamide, black	Polyamide, black
Weight	0.004 kg	0.011 kg
L	330 mm	760 mm

Punch-lock band

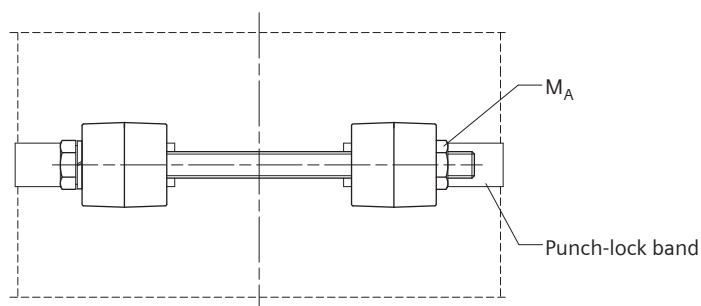
for cable straps



Order no.	8WL6751-3	8WL6751-4	8WL6751-5
Designation	Punch-lock band for four and five cables	Punch-lock band for one to three cables	Punch-lock band
Material	Polyamide, black	Polyamide, black	Polyamide, black
Weight	0.014 kg	0.005 kg	0.004 kg
L	760 mm	350 mm	260 mm

Lock, adjustable

for punch-lock band 8WL6743-0, to be used with cantilever swivel brackets 8WL2124-0/-3



Order no.	8WL6748-6
Designation	Lock, adjustable
Material	
Lock	CuAl
Bolt M10x150	stlSt
Nut	stlSt
Spring washer	stlSt
Weight	0.42 kg
Tightening torque M_A	20 Nm

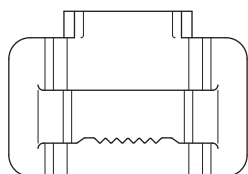
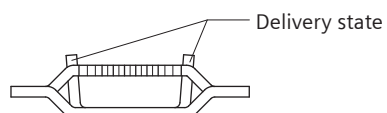
The bearing capacity of the punch-lock band depends of the pole cross-section and load direction and has to be checked from case to case.

Punch-lock band

Order no.	8WL6740-0	8WL6742-0	8WL6743-0
Designation	Punch-lock band 9.5x0.63 mm	Punch-lock band 16x0.76 mm	Punch-lock band 19x1.00 mm
Material	stlSt	stlSt	stlSt
Weight	0.05 kg/m	0.09 kg/m	0.135 kg/m
Min. failing load	4.0 kN	8.3 kN	13.2 kN

Punch-lock band on reels 30 m long each.

Loop



Order no.	8WL6745-0	8WL6747-0	8WL6748-0	8WL6748-1
Designation	Loop 10	Loop 16	Loop 20	Loop 20 without teeth
Material	stlSt	stlSt	stlSt	stlSt
for punch-lock band	8WL6740-0	8WL6742-0	8WL6743-0	8WL6743-0
Weight	0.004 kg	0.014 kg	0.024 kg	0.024 kg

Chapter 02

Standard Products

Tensioning equipment	01	01-86
Thimbles, connectors, sleeves	02	01-24
GRP cantilevers	03	01-68
Aluminium cantilevers	04	01-80
Steel cantilevers	05	01-42
Headspan supports	06	01-36
Insulators	07	01-34
Contact lines under structures and bridge protection	08	01-42
Clamps	09	01-84
Tension wheel equipment	10	01-48
Section insulators	11	01-34
Disconnectors and drive mechanism	12	01-62
Earthing and protecting equipment	13	01-14
Contact wires, conductors, span wires	14	01-22
Monitoring systems	15	01-06
Installation tools and equipment	16	01-24

Cable lug (DIN 46235)	02-02-15
Cable lug 2/12	02-02-18
Cable lug 2/16	02-02-19
Compression clamp	02-02-12, 02-02-13
Compression joint	02-02-11, 02-02-12, 02-02-13
Compression joint, high-tensile (DIN 48085)	02-02-14
Compression thimble	02-02-09
Crimped/compression connector	02-02-10
Insulated thimble 10f	02-02-08
Packer	02-02-23
Protection sleeve (Alcu)	02-02-22
Protection sleeve (Cu-ETP)	02-02-20
Steel sleeve	02-02-11
Thimble	02-02-07
Thimble (DIN 43154)	02-02-05, 02-02-06
Thimble 10f	02-02-04
Washer, rectangular	02-02-24
Washer, round	02-02-24
Winding tape	02-02-23

Technical comments

Application

The products listed in this section provide a comprehensive program for the mechanical connection and protection of wires.

Thimbles ensure that the specified bending radii of wires are not exceeded and that wires safely transfer the loads.

Wire connectors provide a joint between the two wires to be connected which has approximately the same properties as the conductors themselves.

Sleeves, packers and washers not only protect the wire against mechanical damage in clamping and installation points but also compensate for differences in cross section in proper use.

The compression cable lug is the proper connecting element for connecting electric lines. The products listed in this section provide a comprehensive program for the mechanical connection and protection of wires.

Types

Depending on the application and cross section of the wire used, thimbles are available in copper, stainless steel and plastic.

Siemens provides both crimped connectors and compression joints. Crimped connectors are used for connecting copper and bronze wires. The compression joints are used for connecting copper, bronze, aluminium and aluminium steel wires with resistance to tensile stress.

Aluminium compression clamps are used together with stainless steel thimbles to crimp stainless steel wires. Protection sleeves and packers made of copper are preferably used.

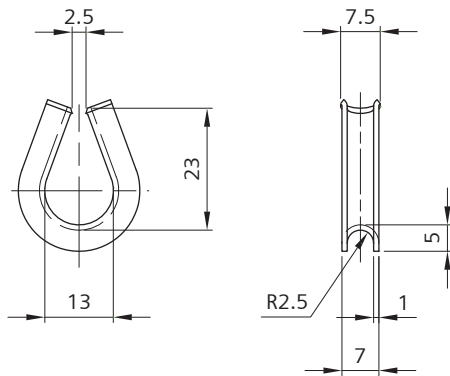
Notes

In the crimped connector, the wire ends being connected parallel to one another are squeezed in a sleeve.

In the compression joint, two wires come in contact with one another in a sleeve and are crimped at several points all round with the sleeve. They hold the cable with at least 85 % of the calculated minimum breaking load.

Thimble 10f

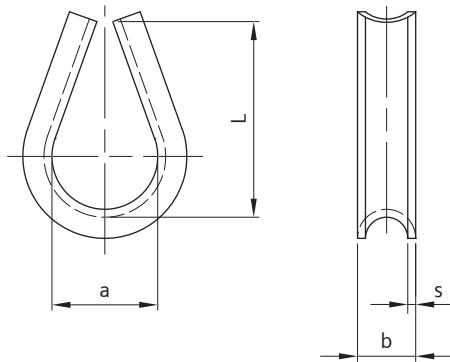
for bronze wire 10 mm² 8WL7060-2



Order no.	8WL1500-2
Designation	Thimble 10f
Material	stlSt
Weight	0.30 kg/100 pcs.

Thimble (DIN 43154)

for bronze, copper and steel wires acc. to DIN 48201 or DIN 43138

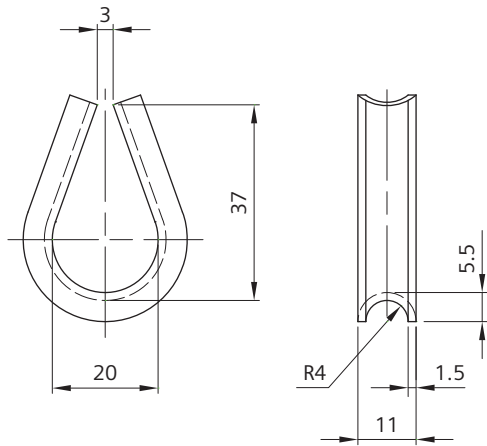


Order no.	8WL1500-0	8WL1501-0	8WL1502-0	8WL1503-0
Designation	Thimble 16	Thimble 16f, 35	Thimble 50	Thimble 70
Material	Cu-ETP	Cu-ETP	Cu-ETP	Cu-ETP
for wire	up to 16 mm ²	16f, 25 to 35 mm ²	50 mm ²	70 mm ²
Weight	0.70 kg/100 pcs.	1.90 kg/100 pcs.	2.00 kg/100 pcs.	5.50 kg/100 pcs.
a	14 mm	20 mm	24 mm	30 mm
b	8 mm	11 mm	13 mm	15 mm
s	1.2 mm	1.5 mm	1.5 mm	2.0 mm
L	21 mm	37 mm	45 mm	58 mm

f = wires acc. to DIN 43138

Thimble (DIN 43154)

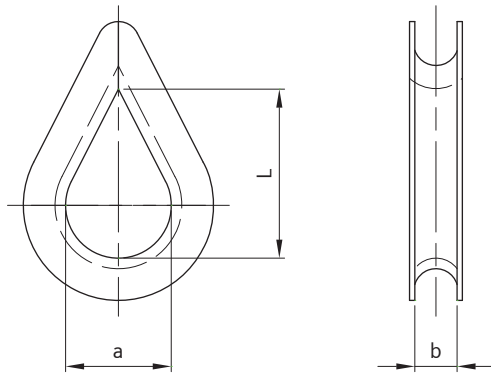
for stainless steel wires up to $d=8$ mm or bronze wire 16 mm^2 acc. to DIN 43138



Order no.	8WL1501-1
Designation	Thimble 16f, 35
Material	stlSt
Weight	1.60 kg/100 pcs.

Thimble

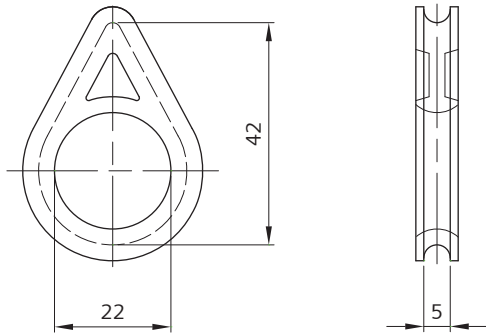
for stainless steel wires



Order no.	8WL1516-1	8WL1516-2	8WL1516-3
Designation	Thimble 6	Thimble 8	Thimble 10
Material	stlSt	stlSt	stlSt
for wire up to Ø	6 mm	8 mm	10 mm
Weight	1.00 kg/100 pcs.	1.90 kg/100 pcs.	2.70 kg/100 pcs.
a	16 mm	20 mm	26 mm
b	6 mm	8 mm	10 mm
L	25 mm	32 mm	40 mm

Insulated thimble 10f

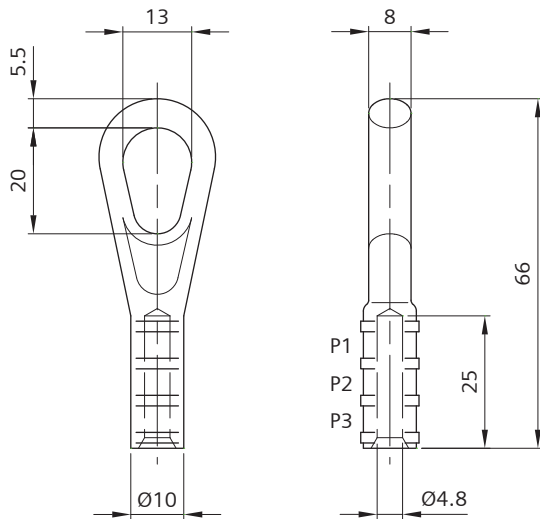
for insulated and current-carrying droppers, for bronze wire 10 mm² 8WL7060-2 or acc. to DIN 43138



Order no.	8WL1515-0
Designation	Insulated thimble 10f
Material	Polypropylene
Weight	0.30 kg/100 pcs.

Compression thimble

for bronze wire 10 mm² acc. to DIN 43138 (8WL7060-0)



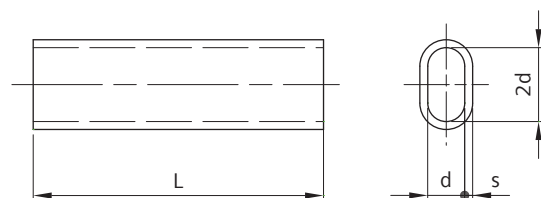
Order no.	8WL1518-0
Designation	Compression thimble 10f
Material	Cu-ETP
Weight	0.04 kg
Pressing die	8WL7153-6
Pressing markings	P1 to P3

Pressing according to markings (following P1 to P3)

The compression thimble supports the wire given with at least 85% of its rated failing load.

Crimped/compression connector

for bronze and copper wires acc. to DIN 48201 or DIN 43138 or bronze wire 10 mm² 8WL7060-2



Part 1

Order no.	8WL1520-0	8WL1521-2	8WL1521-1	8WL1522-0	8WL1522-1
Designation	Crimped/compression connector 10f-20	Crimped/compression connector 16-98	Crimped/compression connector 25-20	Crimped/compression connector 25-55	Crimped/compression connector 25-112
Material	Cu-ETP	Cu-ETP	Cu-ETP	Cu-ETP	Cu-ETP
for wire	10f mm ²	16 mm ²	16f, 25 mm ²	16f, 25 mm ²	16f, 25 mm ²
Weight	0.40 kg/100 pcs.	4.40 kg/100 pcs.	1.10 kg/100 pcs.	3.30 kg/100 pcs.	6.00 kg/100 pcs.
Pressing die	8WL7152-1 ¹⁾ 8WL7152-1A ²⁾	8WL7152-2	8WL7152-3	8WL7152-3	8WL7152-3
d	5 mm	6 mm	7 mm	7 mm	7 mm
s	0.75 mm	1.5 mm	1.5 mm	1.5 mm	1.5 mm
L	20 mm	98 mm	20 mm	55 mm	112 mm

Part 2

Order no.	8WL1523-0	8WL1523-1	8WL1524-0	8WL1524-1	8WL1525-0
Designation	Crimped/compression connector 35-126	Crimped/compression connector 35-60	Crimped/compression connector 50-180	Crimped/compression connector 50-90	Crimped/compression connector 70-198
Material	Cu-ETP	Cu-ETP	Cu-ETP	Cu-ETP	Cu-ETP
for wire	25f, 35 mm ²	25f, 35 mm ²	35f, 50 mm ²	35f, 50 mm ²	50f, 70 mm ²
Weight	8.10 kg/100 pcs.	3.90 kg/100 pcs.	14.0 kg/100 pcs.	6.9 kg/100 pcs.	16.0 kg/100 pcs.
Pressing die	8WL7152-4	8WL7152-4	8WL7152-5	8WL7152-5	8WL7152-7
d	8 mm	8 mm	10 mm	10 mm	11.5 mm
s	1.5 mm	1.5 mm	1.5 mm	1.5 mm	1 mm
L	126 mm	60 mm	180 mm	90 mm	198 mm

f = wires acc. to DIN 43138

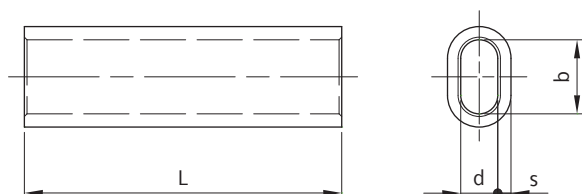
¹⁾ for wires acc. to DIN 43138

²⁾ for wire 8WL7060-2

Pressing according to markings on the component.

Steel sleeve

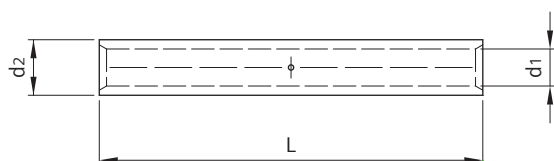
for steel wires $d=5$ mm (8WL7010-0) and $d=6$ mm (8WL7011-0)



Order no.	8WL1550-2	8WL1551-2
Designation	Steel sleeve 5-50	Steel sleeve 6-60
Material	stlSt	stlSt
for wire Ø	5 mm	6 mm
Weight	3.50 kg/100 pcs.	5.30 kg/100 pcs.
b	11 mm	13 mm
d	6 mm	7 mm
s	2.5 mm	2.5 mm
L	50 mm	60 mm

Compression joint

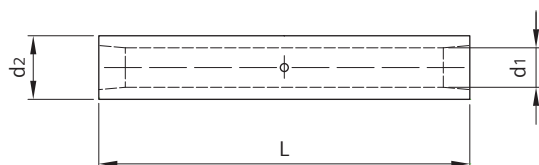
for high-tensile connections of copper wires acc. to DIN 48201



Order no.	8WL1560-0	8WL1561-0	8WL1562-0	8WL1563-0	8WL1564-0
Designation	Compression joint 50	Compression joint 70	Compression joint 95	Compression joint 120	Compression joint 150
Material	Cu-ETP	Cu-ETP	Cu-ETP	Cu-ETP	Cu-ETP
for wire	50 mm ²	70 mm ²	95 mm ²	120 mm ²	150 mm ²
Weight	7.4 kg/100 pcs.	9.5 kg/100 pcs.	28.0 kg/100 pcs.	36.0 kg/100 pcs.	38.0 kg/100 pcs.
Pressing die	8WL7154-1	8WL7154-2	8WL7154-3	8WL7154-5	8WL7154-6
L	95 mm	95 mm	145 mm	160 mm	160 mm
d₁	10 mm	11.5 mm	14 mm	15 mm	17 mm
d₂	14.5 mm	16.5 mm	21 mm	23 mm	25 mm

Compression joint

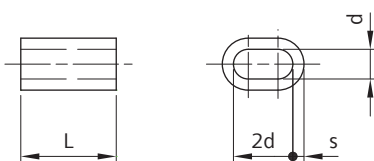
for high-tensile connections of bronze and steel-copper wires 50 to 120 mm² acc. to DIN 48201



Order no.	8WL1560-2	8WL1561-2	8WL1563-2
Designation	Compression joint 50	Compression joint 70	Compression joint 120
Material	CuNiSi	CuNiSi	CuNiSi
Weight	15.2 kg/100 pcs.	19.6 kg/100 pcs.	32.5 kg/100 pcs.
Pressing die	8WL7154-1	8WL7154-2	8WL7154-5
L	110 mm	110 mm	140 mm
d₁	10 mm	11.4 mm	14.9 mm
d₂	17.5 mm	20 mm	24 mm

Compression clamp

for stainless steel wires

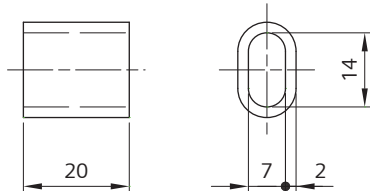


Order no.	8WL1650-1	8WL1650-2	8WL1650-3
Designation	Compression clamp 5	Compression clamp 6	Compression clamp 8
Material	Al	Al	Al
for wire	5 mm	6 mm	8 mm
Weight	0.30 kg/100 pcs.	0.60 kg/100 pcs.	1.20 kg/100 pcs.
Pressing die	8WL7152-0	8WL7152-3	8WL7152-5
d	5.6 mm	6.6 mm	8.8 mm
s	2.1 mm	2.5 mm	3.3 mm
L	18 mm	21 mm	28 mm

Please don't use material containing copper near (above) the compression connections.

Compression joint

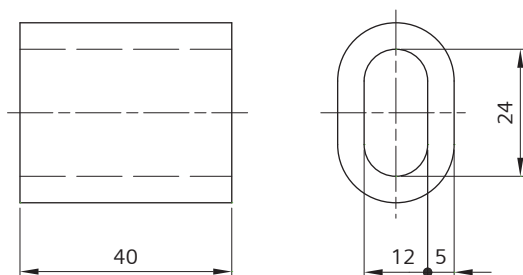
for stainless steel wire rope 8WL7093-2 (d=6 mm)



Order no.	8WL1553-0
Designation	Compression joint 16f-20
Material	stlSt
Weight	1.30 kg/100 pcs.
Pressing die	8WL7152-3

Compression clamp

for Z-wires 70 mm² acc. to DIN 48201 at fixed point

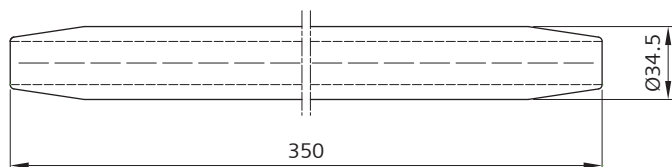


Order no.	8WL1554-0
Designation	Compression clamp 70-40
Material	Cu
Weight	0.30 kg/100 pcs.
Pressing die	on request ¹⁾

¹⁾ with hydraulic press only

Compression joint, high-tensile (DIN 48085)

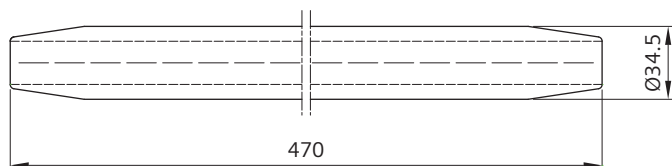
for aluminium wires $d=20.3$ mm acc. to EN 50182



Order no.	8WL1565-4
Designation	Compression joint
Material	Al
Weight	63.0 kg/100 pcs.
Pressing die	on request (Characteristic number 34)

Compression joint, high-tensile (DIN 48085)

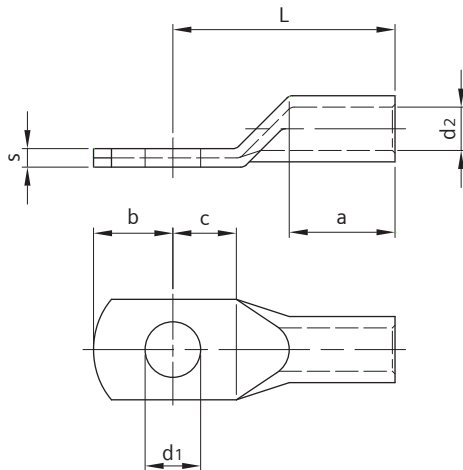
for aluminium-steel wires $d=21.8$ mm acc. to EN 50182



Order no.	8WL1566-4
Designation	Compression joint
Material	Al, htgSt
Weight	77.0 kg/100 pcs.
Pressing die	on request (Characteristic number 34)

Cable lug (DIN 46235)

for copper wires acc. to DIN 48201 or DIN 43138



Part 1

Order no.	8WL1575-0	8WL1576-0	8WL1577-0	8WL1578-0	8WL1578-1
Designation	Cable lug 10-16	Cable lug 10-25	Cable lug 10-35	Cable lug 10-50	Cable lug 12-50
Material	Cu-ETP	Cu-ETP	Cu-ETP	Cu-ETP	Cu-ETP
for wire	10f, 16 mm ²	16f, 25 mm ²	25f, 35 mm ²	35f, 50 mm ²	35f, 50 mm ²
Weight	1.3 kg/100 pcs.	1.5 kg/100 pcs.	2.9 kg/100 pcs.	4.2 kg/100 pcs.	4.0 kg/100 pcs.
Pressing die	8WL7153-4	8WL7153-6	8WL7153-8	8WL7154-1	8WL7154-1
a	20 mm	20 mm	20 mm	28 mm	28 mm
b	15 mm	15 mm	15 mm	15 mm	16 mm
c	12 mm	12 mm	12 mm	12 mm	13 mm
s	2.5 mm	3 mm	3.5 mm	4 mm	4 mm
L	36 mm	38 mm	42 mm	52 mm	52 mm
d₁	10.5 mm	10.5 mm	10.5 mm	10.5 mm	13 mm
d₂	5.5 mm	7 mm	8.2 mm	10 mm	10 mm

Part 2

Order no.	8WL1578-2	8WL1580-0	8WL1580-1	8WL1580-2	8WL1581-1
Designation	Cable lug 16-50	Cable lug 10-70	Cable lug 12-70	Cable lug 16-70	Cable lug 12-95
Material	Cu-ETP	Cu-ETP	Cu-ETP	Cu-ETP	Cu-ETP
for wire	35f, 50 mm ²	50f, 70 mm ²	50f, 70 mm ²	50f, 70 mm ²	70f, 95 mm ²
Weight	4.5 kg/100 pcs.	6.0 kg/100 pcs.	6.0 kg/100 pcs.	6.0 kg/100 pcs.	9.0 kg/100 pcs.
Pressing die	8WL7154-1	8WL7154-2	8WL7154-2	8WL7154-2	8WL7154-3
a	28 mm	28 mm	28 mm	28 mm	35 mm
b	19 mm	15 mm	16 mm	19 mm	16 mm
c	16 mm	12 mm	13 mm	16 mm	13 mm
s	4 mm	4.5 mm	4.5 mm	4.5 mm	5 mm
L	52 mm	55 mm	55 mm	55 mm	65 mm
d₁	17 mm	10.5 mm	13 mm	17 mm	13 mm
d₂	10 mm	11.5 mm	11.5 mm	11.5 mm	13.5 mm

Part 3

Order no.	8WL1581-2	8WL1582-0	8WL1582-1	8WL1583-1	8WL1584-0
Designation	Cable lug 16-95	Cable lug 12-120	Cable lug 16-120	Cable lug 16-150	Cable lug 16-185
Material	Cu-ETP	Cu-ETP	Cu-ETP	Cu-ETP	Cu-ETP
for wire	70f, 95 mm ²	95f, 120 mm ²	95f, 120 mm ²	120f, 150 mm ²	185 mm ²
Weight	10.0 kg/100 pcs.	11.8 kg/100 pcs.	12.0 kg/100 pcs.	16.0 kg/100 pcs.	18.0 kg/100 pcs.
Pressing die	8WL7154-3	8WL7154-5	8WL7154-5	8WL7154-6	on request (characteristic number 25)
a	35 mm	35 mm	35 mm	35 mm	40 mm
b	19 mm	16 mm	19 mm	19 mm	19 mm
c	16 mm	13 mm	16 mm	16 mm	16 mm
s	5 mm	5.5 mm	5.5 mm	6 mm	6 mm
L	65 mm	70 mm	70 mm	78 mm	82 mm
d₁	17 mm	13.0 mm	17.0 mm	17 mm	17,0 mm
d₂	13.5 mm	15.5 mm	15.5 mm	17.5 mm	19 mm

Part 4

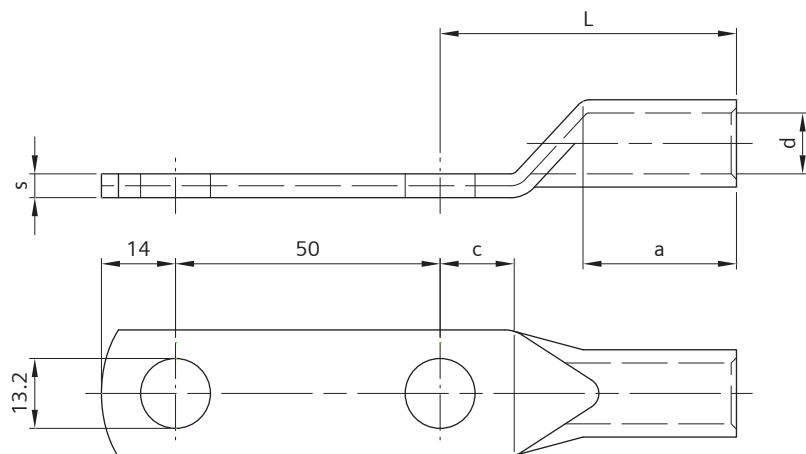
Order no.	8WL1585-0
Designation	Cable lug 16-240
Material	Cu-ETP
for wire	240 mm ²
Weight	26.0 kg/100 pcs.
Pressing die	on request (Characteristic number 28)
a	40 mm
b	19 mm
c	16 mm
s	6.5 mm
L	92 mm
d ₁	17 mm
d ₂	21.5 mm

f = wires acc. to DIN 43138 (have to be re-pressed with the next smaller characteristic number of pressing die)

Types tin-plated on request.

Cable lug 2/12

for copper wires acc. to DIN 48201 or DIN 43138, suitable for tube connecting fittings 8WL4652-0 to 8WL4652-2

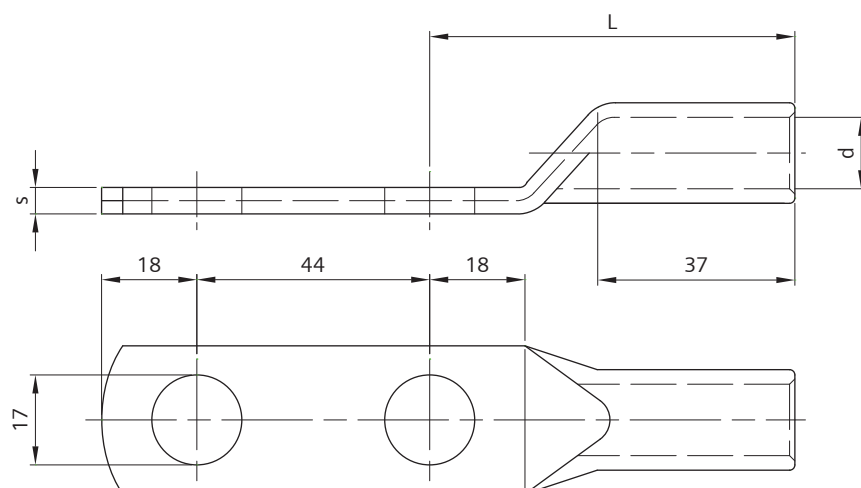


Order no.	8WL1587-2	8WL1588-2	8WL1590-2	8WL1591-2	8WL1592-2
Designation	Cable lug 2/12-50	Cable lug 2/12-70	Cable lug 2/12-95	Cable lug 2/12-120	Cable lug 2/12-150
Material	Cu-ETP, tin-coated	Cu-ETP, tin-coated	Cu-ETP, tin-coated	Cu-ETP, tin-coated	Cu-ETP, tin-coated
for wire	35f, 50 mm ²	50f, 70 mm ²	70f, 95 mm ²	95f, 120 mm ²	120f, 150 mm ²
Weight	8.0 kg/100 pcs.	10.8 kg/100 pcs.	15.2 kg/100 pcs.	18.6 kg/100 pcs.	26.1 kg/100 pcs.
Pressing die	8WL7154-1	8WL7154-2	8WL7154-3	8WL7154-5	8WL7154-6
a	29 mm	29 mm	36 mm	40 mm	40 mm
c	14 mm	14 mm	14 mm	18 mm	19 mm
d	10 mm	11.5 mm	13.5 mm	15.5 mm	17 mm
s	4 mm	4.5 mm	5 mm	5.5 mm	6 mm
L	56 mm	56 mm	66 mm	71 mm	79 mm

f = wires acc. to DIN 43138 (have to be re-pressed with the next smaller characteristic number of pressing die)

Cable lug 2/16

for copper wires acc. to DIN 48201 or DIN 43138

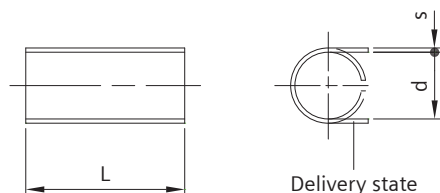


Order no.	8WL1590-1	8WL1591-1	8WL1591-4
Designation	Cable lug 2/16-95	Cable lug 2/16-120	Cable lug 2/16-150
Material	Cu-ETP	Cu-ETP	Cu-ETP
for wire	70f, 95 mm ²	95f, 120 mm ²	120f, 150 mm ²
Weight	13.5 kg/100 pcs.	23.5 kg/100 pcs.	21.5 kg/100 pcs.
Pressing die	8WL7154-3	8WL7154-5	8WL7154-6
d	13.5 mm	15.0 mm	17.2 mm
s	5 mm	5.5 mm	6 mm
L	69 mm	70 mm	71 mm

f = wires acc. to DIN 43138 (have to be re-pressed with the next smaller characteristic number of pressing die)

Protection sleeve (Cu-ETP)

for protecting wires or wire cross-section adjustment, for bronze and copper wires acc. to DIN 48201 or DIN 43138



Part 1

Order no.	8WL1600-0	8WL1601-0	8WL1601-1	8WL1602-0	8WL1602-1
Designation	Protection sleeve 25-35	Protection sleeve 35-35	Protection sleeve 35-60	Protection sleeve 50-80	Protection sleeve 50-130
Material	Cu-ETP	Cu-ETP	Cu-ETP	Cu-ETP	Cu-ETP
for wire	25 mm ²	35 mm ²	35 mm ²	50 mm ²	50 mm ²
Weight	1.10 kg/100 pcs.	0.60 kg/100 pcs.	2.0 kg/100 pcs.	2.0 kg/100 pcs.	5.0 kg/100 pcs.
d	6.5 mm	7.7 mm	7.7 mm	9.2 mm	9.2 mm
s	1.5 mm	0.8 mm	1.5 mm	1.0 mm	1.5 mm
L	35 mm	35 mm	60 mm	80 mm	130 mm

Part 2

Order no.	8WL1602-3	8WL1603-1	8WL1603-2	8WL1608-3	8WL1603-3
Designation	Protection sleeve 50-900	Protection sleeve 70f-40	Protection sleeve 70-80	Protection sleeve 70-120	Protection sleeve 70-130
Material	Cu-ETP	Cu-ETP	Cu-ETP	Cu-ETP	Cu-ETP
for wire	50 mm ²	70f mm ²	70 mm ²	70 mm ²	70 mm ²
Weight	35.0 kg/100 pcs.	2.00 kg/100 pcs.	2.0 kg/100 pcs.	7.10 kg/100 pcs.	3.00 kg/100 pcs.
d	9.2 mm	13 mm	10.7 mm	10.7 mm	10.5 mm
s	1.5 mm	1.5 mm	0.8 mm	2.0 mm	0.8 mm
L	900 mm	40 mm	70 mm	120 mm	130 mm

Part 3

Order no.	8WL1604-0	8WL1604-3	8WL1604-1	8WL1604-2	8WL1604-4
Designation	Protection sleeve 95-30	Protection sleeve 95-80	Protection sleeve 95f-40	Protection sleeve 95f-70	Protection sleeve 95f-80
Material	Cu-ETP	Cu-ETP	Cu-ETP	Cu-ETP	Cu-ETP
for wire	95 mm ²	70f, 95 mm ²	95f mm ²	95f mm ²	95f mm ²
Weight	0.90 kg/100 pcs.	2.80 kg/100 pcs.	1.30 kg/100 pcs.	2.80 kg/100 pcs.	3.20 kg/100 pcs.
d	12.7 mm	13.5 mm	14.9 mm	14.9 mm	14.9 mm
s	0.8 mm	1.0 mm	0.8 mm	1.0 mm	1.0 mm
L	30 mm	80 mm	40 mm	70 mm	80 mm

Part 4

Order no.	8WL1606-0	8WL1606-0A	8WL1606-1	8WL1606-2	8WL1606-4
Designation	Protection sleeve 120-70	Protection sleeve 120-80	Protection sleeve 120-130	Protection sleeve 120-130	Protection sleeve 120f-80
Material	Cu-ETP	Cu-ETP	Cu-ETP	Cu-ETP	Cu-ETP
for wire	120 mm ²	120 mm ²	120 mm ²	120 mm ²	120f mm ²
Weight	4.0 kg/100 pcs.	1.50 kg/100 pcs.	2.50 kg/100 pcs.	10.0 kg/100 pcs.	1.80 kg/100 pcs.
d	14.2 mm	14 mm	14.2 mm	14.2 mm	16.6 mm
s	1.5 mm	0.5 mm	0.5 mm	2.0 mm	0.5 mm
L	70 mm	80 mm	130 mm	130 mm	80 mm

Part 5

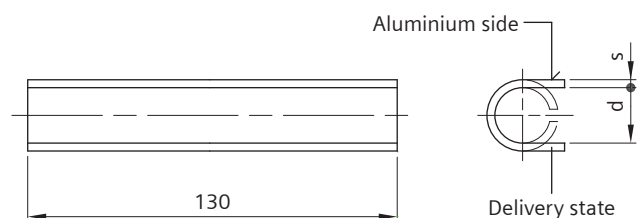
Order no.	8WL1607-0	8WL1607-1
Designation	Protection sleeve 150-70	Protection sleeve 150-130
Material	Cu-ETP	Cu-ETP
for wire	150 mm ²	150 mm ²
Weight	3.10 kg/100 pcs.	8.70 kg/100 pcs.
d	16 mm	16 mm
s	1.0 mm	1.5 mm
L	70 mm	130 mm

f = wires acc. to DIN 43138

Other types on request.

Protection sleeve (Alcu)

for corrosion protection between bronze or copper wires and aluminium components, for bronze and copper wires acc. to DIN 48201 or DIN 43138

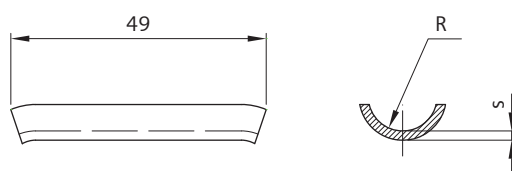


Order no.	8WL1614-0	8WL1614-1	8WL1614-2	8WL1614-3	8WL1614-4
Designation	Protection sleeve 50-130	Protection sleeve 70-130	Protection sleeve 95-130	Protection sleeve 120-130	Protection sleeve 150-130
Material	Alcu	Alcu	Alcu	Alcu	Alcu
for wire	35f, 50 mm ²	50f, 70 mm ²	70f, 95 mm ²	95f, 120 mm ²	120f, 150 mm ²
Weight	3.40 kg/100 pcs.	2.60 kg/100 pcs.	5.30 kg/100 pcs.	4.10 kg/100 pcs.	4.10 kg/100 pcs.
d	9 mm	10.5 mm	13 mm	14 mm	15.8 mm
s	2 mm	1.5 mm	2 mm	1.5 mm	1.5 mm

f = wires acc. to DIN 43138

Packer

for protecting wires and wire cross-section adjustment, for bronze and copper wires acc. to DIN 43138

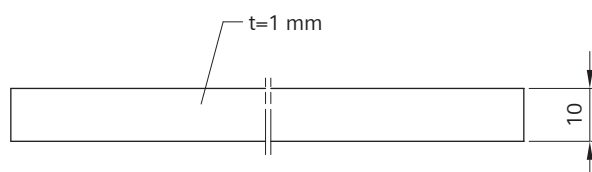


Order no.	8WL1615-0	8WL1616-0
Designation	Packer 70f	Packer 95f
Material	Cu-ETP	Cu-ETP
for wire	70f mm ²	95f mm ²
Weight	1.90 kg/100 pcs.	1.00 kg/100 pcs.
s	1.5 mm	0.8 mm
R	6.5 mm	7.4 mm

Please order by pairs.

Winding tape

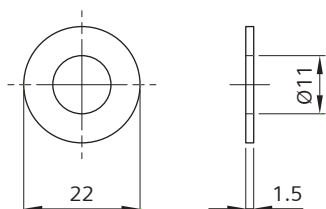
for protecting wires at catenary wire clamps



Order no.	8WL1620-0
Designation	Winding tape
Material	Cu-ETP
Weight	0.09 kg/m

Washer, round

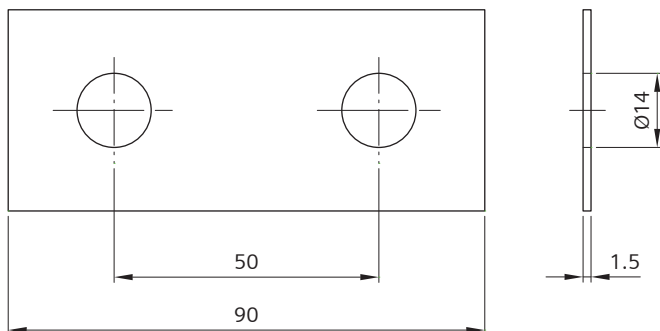
for corrosion protection between copper and aluminium components



Order no.	8WL1631-0
Designation	Washer
Material	Alcu
Weight	0.20 kg/100 pcs.

Washer, rectangular

for corrosion protection between copper and aluminium components, suitable for tube connecting fittings
8WL4652-0 to 8WL4652-2



Order no.	8WL1631-3
Designation	Washer
Material	Alcu
Weight	2.60 kg/100 pcs.

Chapter 02

Standard Products

Tensioning equipment	01	01-86
Thimbles, connectors, sleeves	02	01-24
GRP cantilevers	03	01-68
Aluminium cantilevers	04	01-80
Steel cantilevers	05	01-42
Headspan supports	06	01-36
Insulators	07	01-34
Contact lines under structures and bridge protection	08	01-42
Clamps	09	01-84
Tension wheel equipment	10	01-48
Section insulators	11	01-34
Disconnectors and drive mechanism	12	01-62
Earthing and protecting equipment	13	01-14
Contact wires, conductors, span wires	14	01-22
Monitoring systems	15	01-06
Installation tools and equipment	16	01-24

Bridle guiding device 2x55	02-03-16
Bridle guiding device 55	02-03-15
Bridle suspension 2x55	02-03-14
Bridle suspension 38	02-03-12
Bridle suspension 55	02-03-13
Cantilever swivel bracket	02-03-21
Cantilever swivel bracket at steel pole	02-03-19
Cantilever swivel bracket for fastening of punch-lock band	02-03-20
Catenary wire support clamp 55	02-03-11
Clamp holder 55 for twin tube clamp 55	02-03-39
Clamp holder 55 with threaded bush M16	02-03-59
Clamp hoop 38 with clevis	02-03-43
Clamp hoop 55 with clevis	02-03-44
Clamping jaw for twin tube clamp 55	02-03-40
Clevis end fitting 38, clamped	02-03-45
Clevis end fitting 55	02-03-46
Clevis for twin tube clamp	02-03-38
Coupling socket 55	02-03-30
Cross link clevis/clevis	02-03-61
Cross link eye/clevis	02-03-60
Dead-end clamp	02-03-62
Drop bracket 38-55	02-03-24
Eye clamp 38	02-03-31
Eye clamp 55	02-03-32
Eye for twin tube clamp	02-03-37
GRP oval rod	02-03-29
GRP round rod	02-03-27
GRP tube	02-03-26
Hook clip 55, clamped	02-03-53
Hook end clamp for GRP rod	02-03-49
Hook end fitting 26, clamped	02-03-50
Hook end fitting 38, clamped	02-03-51
Hook end fitting 55, clamped	02-03-52
Hook end fitting for GRP rod	02-03-47
Steady arm with GRP rod and hook end clamp	02-03-68
Steady arm with GRP rod and hook end fitting	02-03-66, 02-03-67
Steady arm with GRP rod/tube and hook end clamp	02-03-63
Steady arm with GRP rod/tube and hook end fitting	02-03-65
Suspension bracket for twin tube clamp	02-03-36
Swivel clip holder 16R for GRP rod	02-03-48
Swivel clip holder 26	02-03-10
Swivel clip holder 26-38 for contact wire clip 16R	02-03-54
Swivel clip holder 38 for contact wire clip 16R	02-03-55
Swivel clip holder 38 for contact wire clip M16	02-03-56
Swivel clip holder 55 for contact wire clip 16R	02-03-57
Swivel clip holder 55 for contact wire clip M16	02-03-58

Swivel with clevis	02-03-22
Swivel with eye	02-03-23
Triple tube clamp 55	02-03-41
Tube end fitting 55	02-03-42
Twin bridle guiding device 2x55	02-03-18
Twin bridle guiding device 55	02-03-17
Twin drop bracket 55	02-03-25
Twin eye clamp 55	02-03-33
Twin swivel	02-03-34
Twin tube clamp 55	02-03-35

Technical comments

Application

This section lists all the products that are used to support the overhead contact line as cantilevers made of GRP with fittings made of copper-aluminium alloys.

Cantilever tubes and steady arms are used to fix the catenary wire and contact wire relative to the track axis and to fasten it at the desired distance from the supporting pole, registration post or wall fastening.

Types

The design of the cantilever tubes, steady arms, etc. depends on the parameters of the power supply system, the type of support and the static requirements of the system. Top wires made of bronze are additionally insulated with loop insulators. See chapter 13 for selecting the appropriate contact wire clips for the specific application.

Tubes and solid rods made of GRP

For tubes made of glass-fiber reinforced epoxy resin (GF-EP), glass-fibers soaked in resin are wound around a core of closed-cell polyurethane. This type of production prevents the formation of an electrically conductive layer on the inside. The low weight of the GRP tubes makes installation considerably easier.

Solid plastic rods are made of glass-fiber reinforced polyester (GF-UP). They have a very smooth surface and outstanding electrical insulation values due to the additional looped woven surface fleece.

Both tubes and rods are highly protective against atmospheric exposure and UV radiation because of the materials used.

Copper-aluminium alloys

For the production of overhead line fittings, Siemens uses a copper-aluminium multi-alloy bronze that is corrosion-resistant even in salty air.

The outstanding characteristics of these alloys permit the production of especially secure fittings with high strength and low weight compared to conventional bronze.

Special features

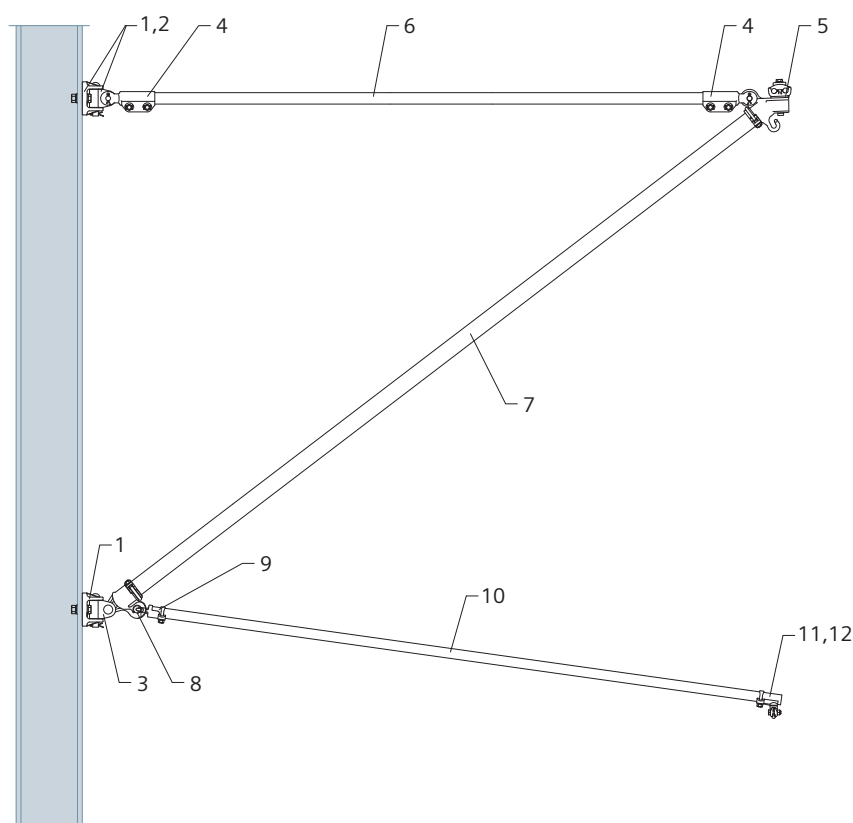
- No inter-crystalline corrosion
- High accuracy due to high-precision chilled casting method
- Aggressive materials do not penetrate due to smooth, unbroken surface
- Extremely high breaking elongation of the material
- Outstanding tensile strength and elastic limits
- No brittling at low temperatures

Examples for assemblies

On the following pages you can find a number of typical application examples for the configuration of GRP cantilevers.

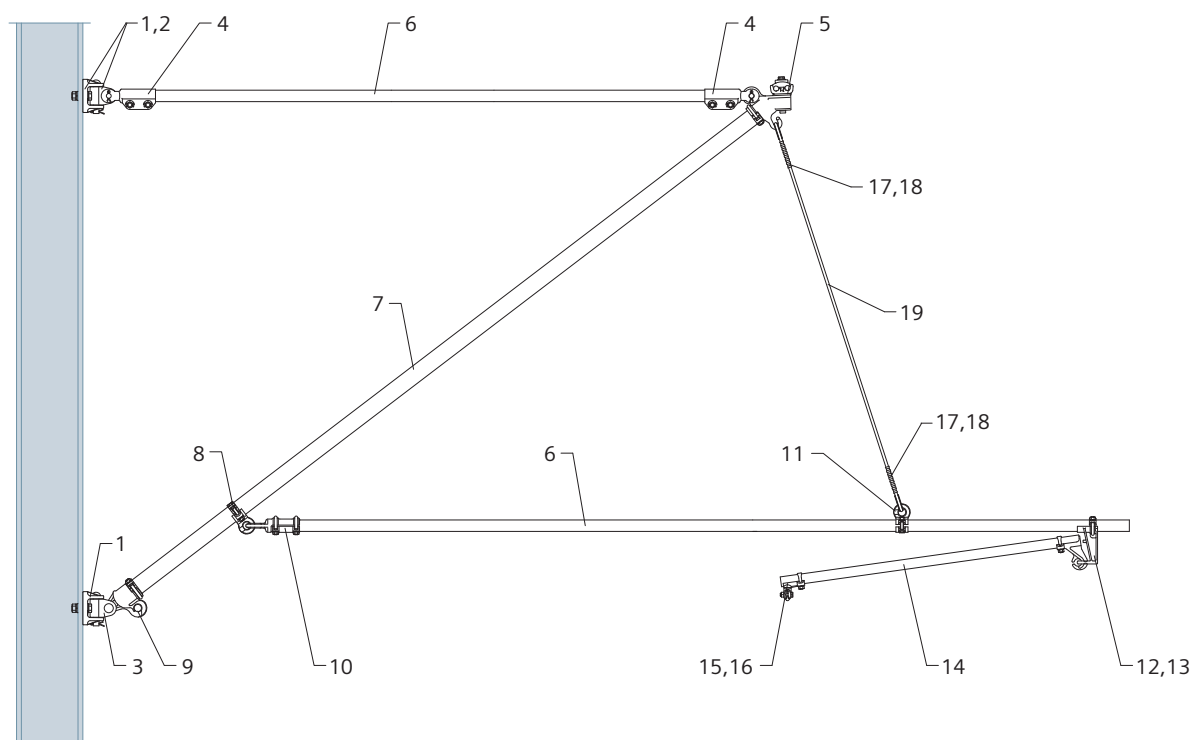
The exact configuration of the cantilever depends on the specific plant and the local situation.

Single cantilever on steel pole for catenary system



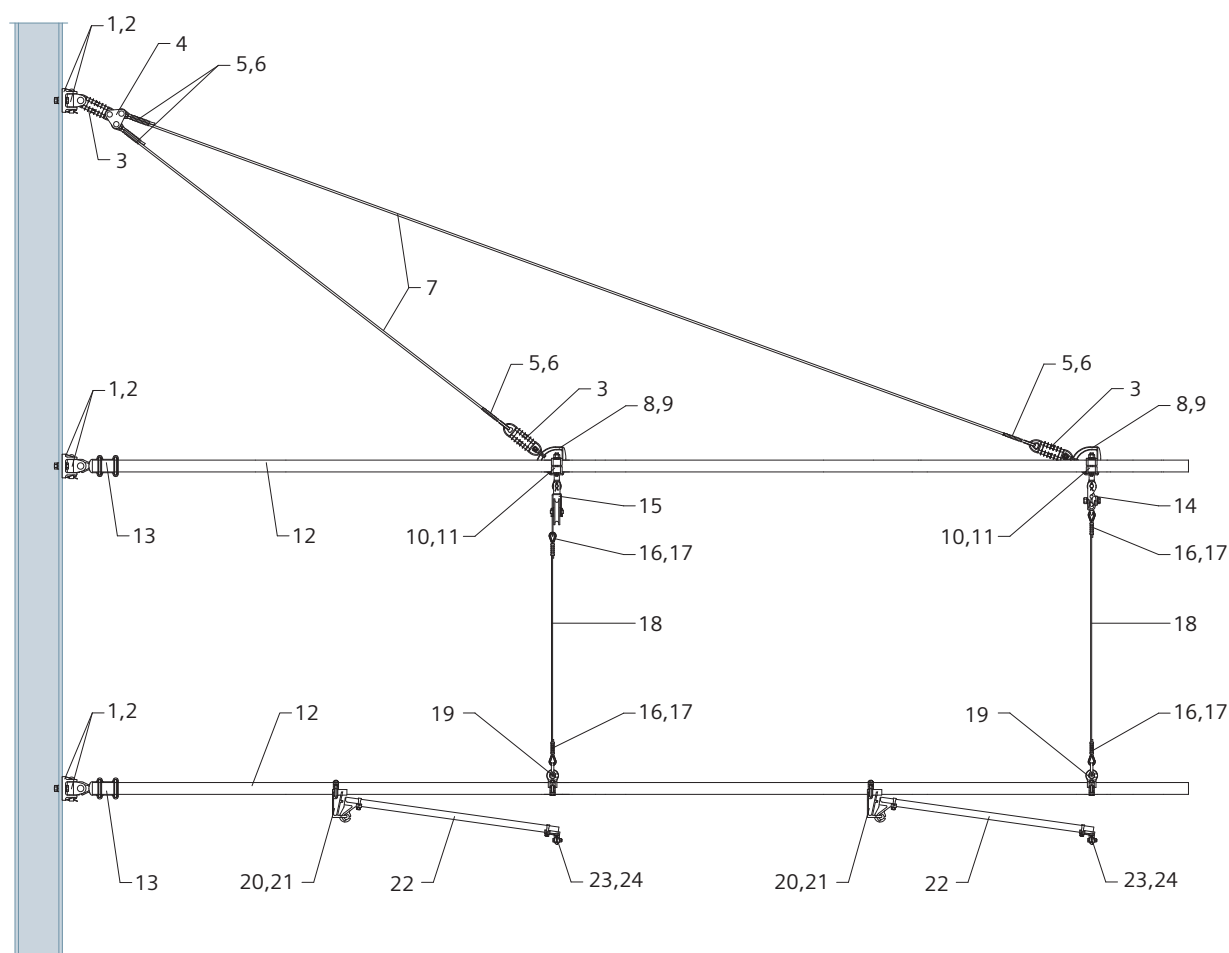
Position	Designation	Order no.
1	Cantilever swivel bracket	8WL2123-8
2	Swivel with eye	8WL2127-3
3	Swivel with clevis	8WL2126-2
4	Clevis end fitting 38, clamped	8WL2832-1
5	Catenary wire support clamp	8WL2054-6
6	GRP round rod 38 (length and color as needed)	8WL2811-0/-1
7	GRP round rod 55 (length and color as needed)	8WL2813-0/-1
8	Tube end fitting 55	8WL2828-0
9	Hook end fitting for GRP oval rod 23x33	8WL2833-0
10	GRP oval rod 23x33 (length and color as needed)	8WL2815-0/-1
11	Swivel clip holder for GRP oval rod 23x33	8WL2833-1
12	Contact wire clip	8WL4517-1K

Cantilever on steel pole for catenary system



Position	Designation	Order no.
1	Cantilever swivel bracket	8WL2123-8
2	Swivel with eye	8WL2127-3
3	Swivel with clevis	8WL2126-2
4	Clevis end fitting 38, clamped	8WL2832-1
5	Catenary wire support clamp	8WL2054-6
6	GRP round rod 38 (length and color as needed)	8WL2811-0/-1
7	GRP round rod 55 (length and color as needed)	8WL2813-0/-1
8	Eye clamp 55	8WL2824-6
9	Tube end fitting 55	8WL2828-0
10	Hook end fitting 38, clamped	8WL2838-1
11	Eye clamp 38	8WL2824-2
12	Drop bracket 38	8WL2720-0
13	Hook end clamp for GRP oval rod 23x33	8WL2833-4
14	GRP oval rod 23x33 (length and color as needed)	8WL2815-0/-1
15	Swivel clip holder for GRP oval rod 23x33	8WL2833-1
16	Contact wire clip	8WL4517-1K
17	Thimble 50	8WL1502-0
18	Compression/crimped connector 50-90	8WL1524-0
19	Synthetic wire d=9 mm (length as needed)	8WL7097-0

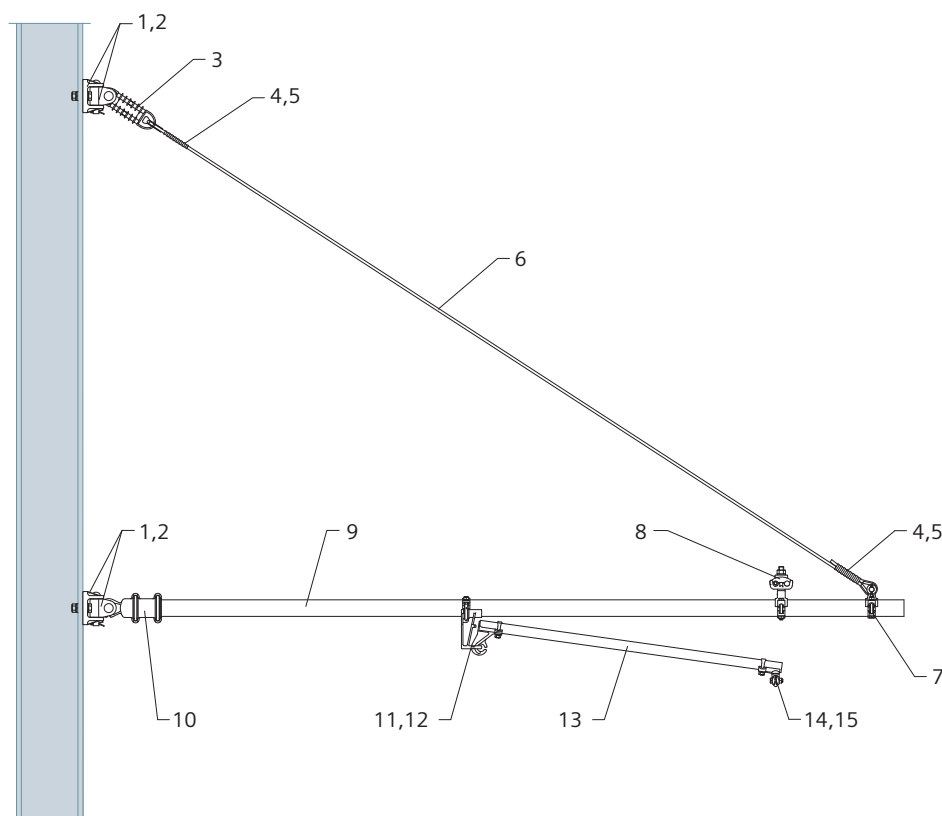
Cantilever across two tracks on steel pole for catenary sytem



Pos.	Designation	Order no.
1	Cantilever swivel bracket	8WL2123-8
2	Swivel with clevis	8WL2126-2
3	Loop insulator 1.5 kV DC	8WL3001-2
4	Three pin clevis link 16	8WL1036-7
5	Thimble 50	8WL1502-0
6	Compression/crimped connector 50-90	8WL1524-0
7	Bronze wire 50 (length as needed)	8WL7034-0
8	Shackle 12	8WL1118-7
9	Suspension bracket for twin tube clamp	8WL2827-0
10	Twin tube clamp 55	8WL2826-1
11	Eye for twin tube clamp	8WL2827-3
12	GRP round rod 55 (length and color as needed)	8WL2813-0/-1

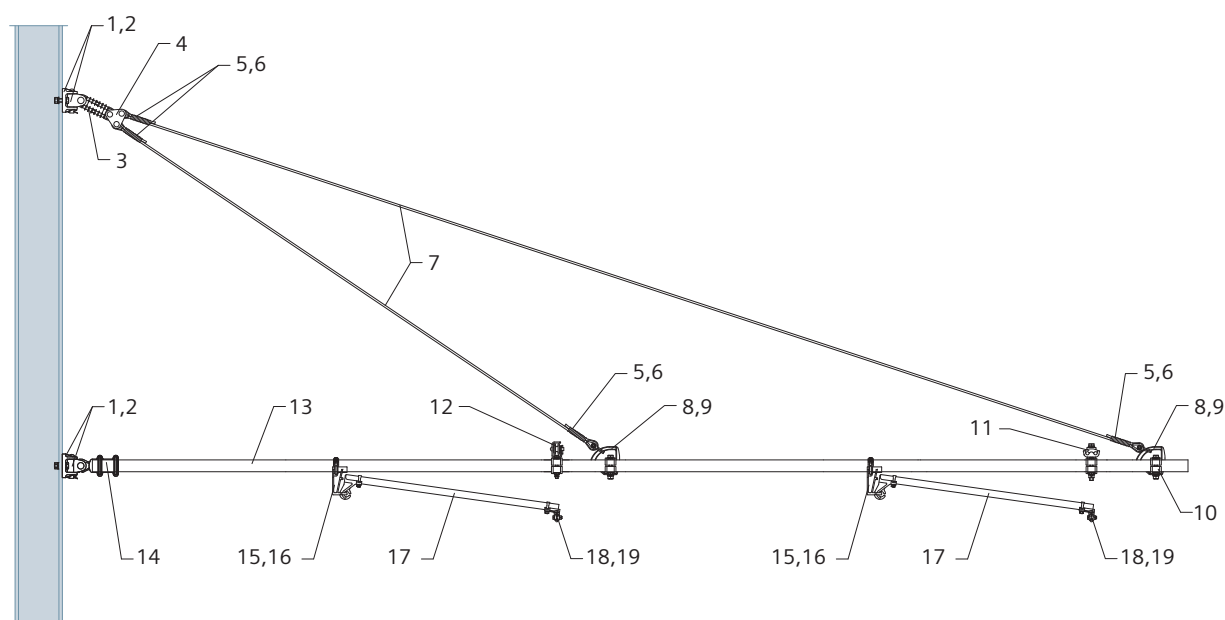
Pos.	Designation	Order no.
13	Hook end fitting 55, clamped	8WL2838-3
14	Pulley 88 with suspension	8WL2131-0
15	Conductor suspension clamp with hook	8WL2095-0
16	Thimble 35	8WL1501-0
17	Compression/crimped connector 25-55	8WL1522-0
18	Synthetic wire d=6 mm (length as needed)	8WL7095-0
19	Eye clamp 55	8WL2824-6
20	Drop bracket 55	8WL2721-0
21	Hook end clamp for GRP oval rod 23x33	8WL2833-4
22	GRP oval rod 23x33 (length and color as needed)	8WL2815-0/-1
23	Swivel clip holder for GRP oval rod 23x33	8WL2833-1
24	Contact wire clip	8WL4517-1K

Cantilever on steel pole for single contact wire system



Position	Designation	Order no.
1	Cantilever swivel bracket	8WL2123-8
2	Swivel with clevis	8WL2126-2
3	Loop insulator 1.5 kV DC	8WL3001-2
4	Thimble 50	8WL1502-0
5	Compression/cripped connector 50-90	8WL1524-0
6	Bronze wire 50 (length as needed)	8WL7034-0
7	Clamp hoop 55 with clevis	8WL2830-7
8	Bridle suspension 55	8WL2097-8C
9	GRP round rod 55 (length and color as needed)	8WL2813-0/-1
10	Hook end fitting 55, clamped	8WL2838-3
11	Drop bracket 55	8WL2721-0
12	Hook end clamp for GRP oval rod 23x33	8WL2833-4
13	GRP oval rod 23x33 (length and color as needed)	8WL2815-0/-1
14	Swivel clip holder for GRP oval rod 23x33	8WL2833-1
15	Contact wire clip	8WL4517-1K

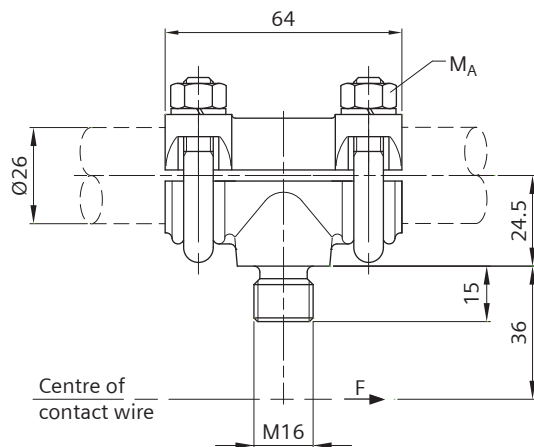
Cantilever across two tracks on steel pole for single contact wire sytem



Position	Designation	Order no.
1	Cantilever swivel bracket	8WL2123-8
2	Swivel with clevis	8WL2126-2
3	Loop insulator 1.5 kV DC	8WL3001-2
4	Three pin clevis link 16	8WL1036-7
5	Thimble 50	8WL1502-0
6	Compression/crimped connector 50-90	8WL1524-0
7	Bronze wire 50 (length as needed)	8WL7034-0
8	Shackle 12	8WL1118-7
9	Suspension bracket for twin tube clamp	8WL2827-0
10	Twin tube clamp 55	8WL2826-1
11	Bridle suspension 2x55	8WL2097-8E
12	Bridle guiding device 2x55	8WL2097-8F
13	GFK-Rundstab 55 (Länge und Farbe nach Bedarf)	8WL2813-0/-1
14	Hook end fitting 55, clamped	8WL2838-3
15	Drop bracket 55	8WL2721-0
16	Hook end clamp for GRP oval rod 23x33	8WL2833-4
17	GRP oval rod 23x33 (length and color as needed)	8WL2815-0/-1
18	Swivel clip holder for GRP oval rod 23x33	8WL2833-1
19	Contact wire clip	8WL4517-1K

Swivel clip holder 26

for GRP tube/rod d=26 mm

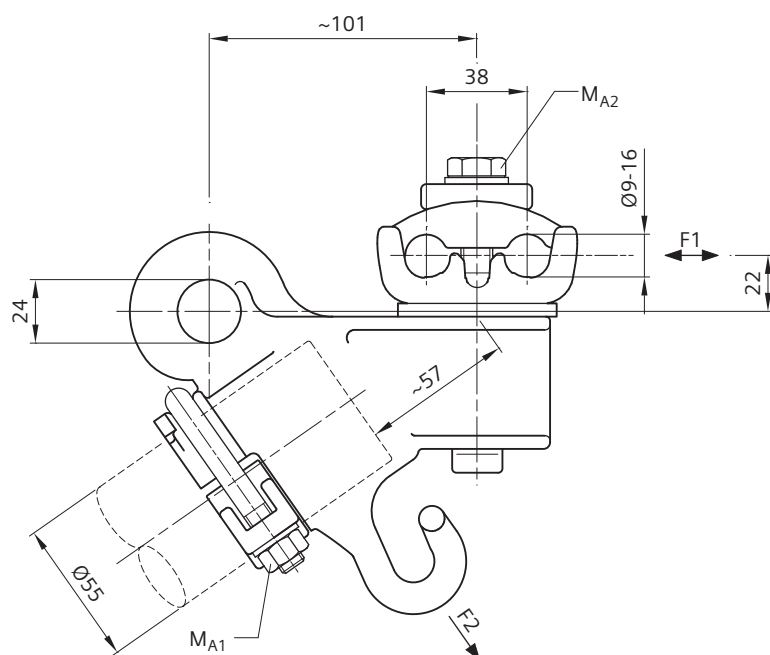


Order no.	8WL2007-1
Designation	Swivel clip holder 26
Material	
Swivel clip holder	CuAl
U-bolts M8	stlSt
Nuts, spring washers	stlSt
Weight	0.34 kg
Perm. operating load	2.0 kN
Min. failing load	6.0 kN
Tightening torque M_A	12.5 Nm

Contact wire clips see Chapter 02-09.

Catenary wire support clamp 55

for GRP tubes/rods $d=55$ mm, for bronze and copper wires 50 to 150 mm² acc. to DIN 48201

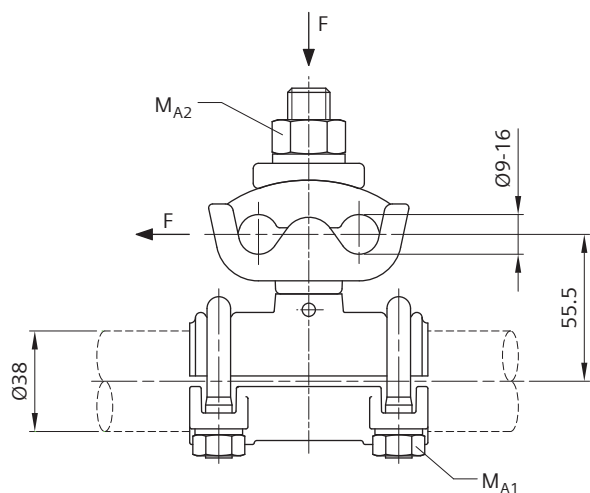


Order no.	8WL2054-7
Designation	Catenary wire support clamp 55/16
Material	
Clamp body	CuAl
Clamp cover	CuAl
Clamp holder	CuAl
U-bolt M10	stlSt
Bolt M12	stlSt
Nuts, washers	stlSt
Weight	2.33 kg
Perm. operating load (F1)	10 kN
Min. failing load (F1)	30 kN
Perm. operating load (F2)	2.5 kN
Min. failing load (F2)	7.5 kN
Tightening torque M_{A1}	25 Nm
Tightening torque M_{A2}	56 Nm

Protection sleeves must be ordered separately, see Chapter 02-02.

Bridle suspension 38

for fixed bridle or catenary wire suspension at GRP tubes/rods $d=38$ mm, for bronze or copper wires 50 to 150 mm² and bronze wire 35 mm² acc. to DIN 48201 or synthetic wire 8WL7097-0 ($d=9$ mm)

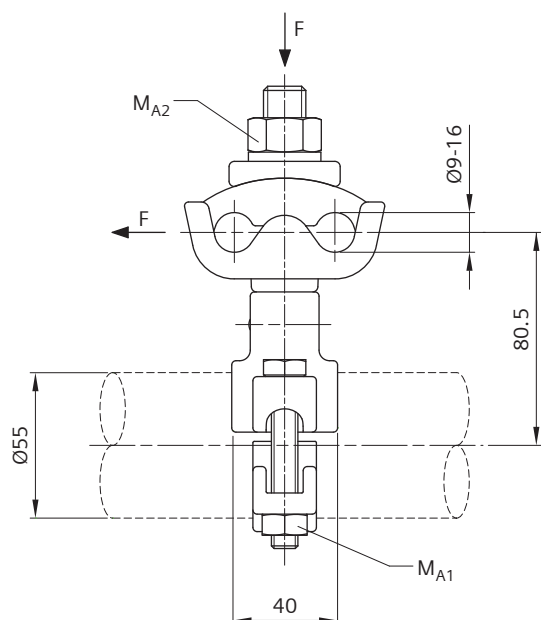


Order no.	8WL2097-8L
Designation	Bridle suspension 38
Material	
Clamp body	CuAl
Clamp cover	CuAl
Clamp holder	CuAl
Equalizer washer	CuAl
Threaded pin M16	stlSt
U-bolts M10	stlSt
Nuts, spring washers	stlSt
Prestressed sleeve	stlSt
Weight	1.55 kg
Perm. operating load	1 kN
Min. failing load	3 kN
Tightening torque M_{A1}	32 Nm
Tightening torque M_{A2}	70 Nm

Protection sleeves for bronze wire 35 mm² must be ordered separately, see Chapter 02-02.

Bridle suspension 55

for fixed bridle or catenary wire suspension at GRP tubes/rods $d=55$ mm, for bronze or copper wires 50 to 150 mm² and bronze wire 35 mm² acc. to DIN 48201 or synthetic wire 8WL7097-0 ($d=9$ mm)



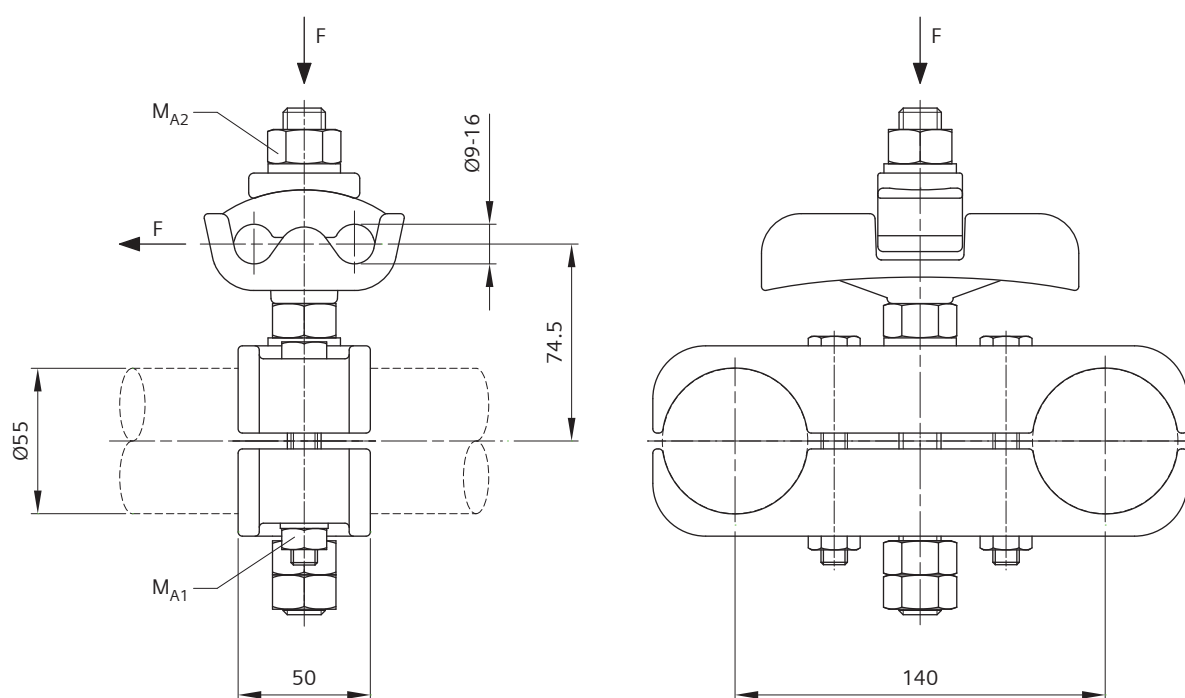
Order no.	8WL2097-8C
Designation	Bridle suspension 55
Material	
Clamp body	CuAl
Clamp cover	CuAl
Clamp holder	CuAl
Equalizer washer	CuAl
Threaded pin M16	stlSt
Bolts M10	stlSt
Nuts, spring washer	stlSt
Prestressed sleeve	stlSt
Weight	1.43 kg
Perm. operating load	1 kN
Min. failing load	3 kN
Tightening torque M_{A1}	32 Nm
Tightening torque M_{A2}	70 Nm

Protection sleeves for bronze wire 35 mm² must be ordered separately, see Chapter 02-02.

Substitute for 8WL2097-8A.

Bridle suspension 2x55

for fixed bridle or catenary wire suspension at cantilevers across two tracks made of GRP tubes/rods
 $d=55$ mm, for bronze or copper wires 50 to 150 mm² and bronze wire 35 mm² acc. to DIN 48201 or synthetic wire 8WL7097-0 ($d=9$ mm)

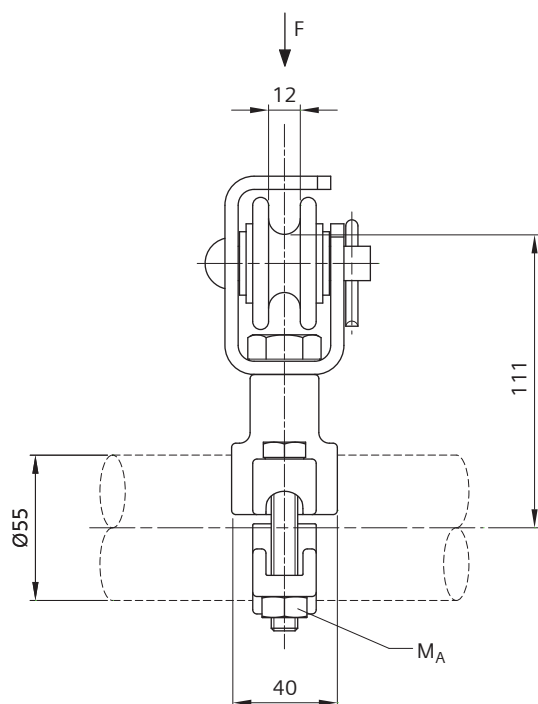


Order no.	8WL2097-8E
Designation	Bridle suspension 2x55
Material	
Clamp body	CuAl
Clamp cover	CuAl
Twin tube clamp	CuAl
Equalizer washer	CuAl
Threaded pin M16	stlSt
Bolts M10	stlSt
Nuts, washers	stlSt
Spring washers	stlSt
Weight	2.78 kg
Perm. operating load	1 kN
Min. failing load	3 kN
Tightening torque M_{A1}	32 Nm
Tightening torque M_{A2}	70 Nm

Protection sleeves for bronze wire 35 mm² must be ordered separately, see Chapter 02-02.

Bridle guiding device 55

for flexible bridle or catenary wire suspension at GRP tubes/rods $d=55$ mm, for bronze wires 35 to 70 mm² acc. to DIN 48201 or synthetic wire 8WL7097-0 ($d=9$ mm)

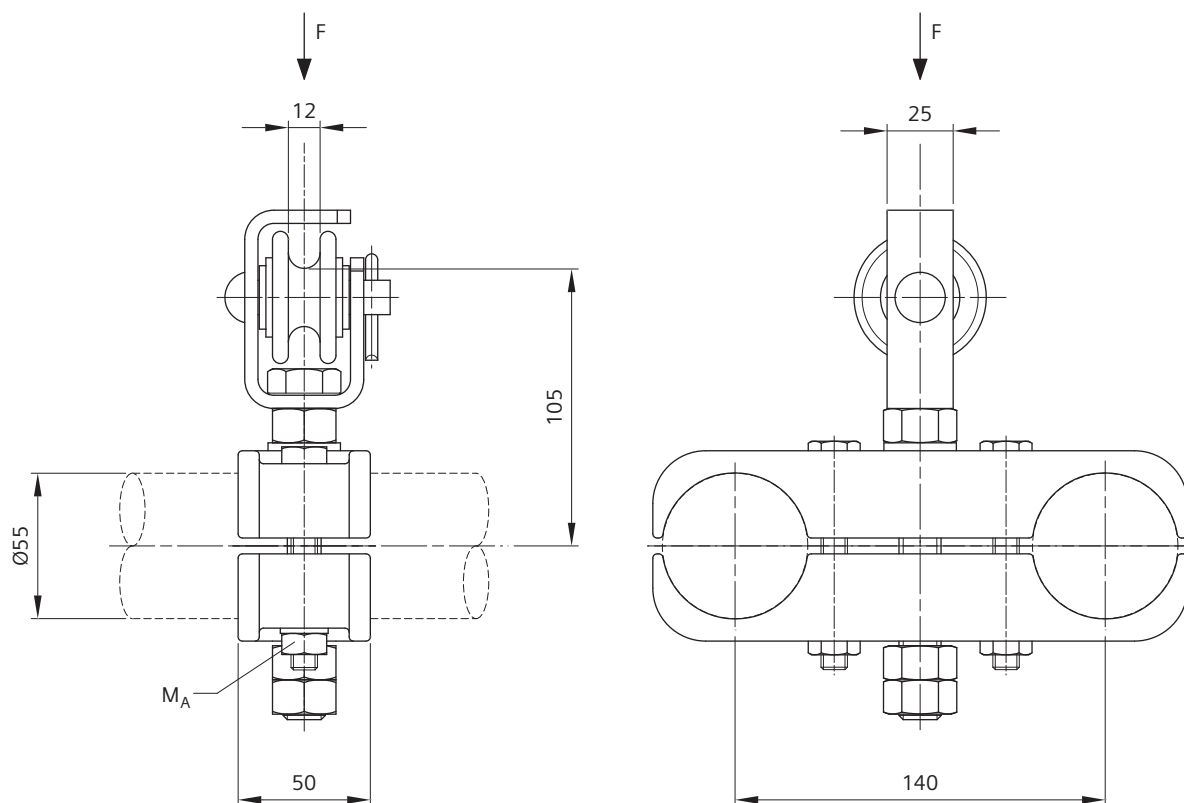


Order no.	8WL2097-8D
Designation	Bridle guiding device 55
Material	
Clamp holder	CuAl
Pulley	Polyamide
Clevis, pin 13x55	stlSt
Split pin 5x28	Cu
Bolts M10	stlSt
Nuts, washers	stlSt
Weight	0.9 kg
Perm. operating load	1 kN
Min. failing load	3 kN
Tightening torque M_A	32 Nm

Substitute for 8WL2097-8B.

Bridle guiding device 2x55

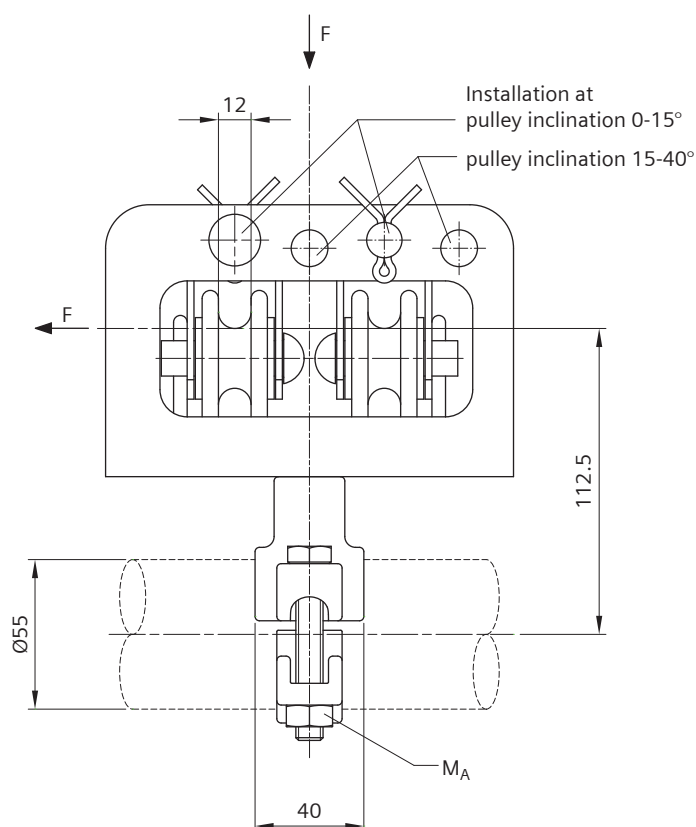
for flexible bridle or catenary wire suspension at cantilevers across two tracks made of GRP tubes/rods
 $d=55$ mm, for bronze wires 35 to 70 mm² acc. to DIN 48201 or synthetic wire 8WL7097-0 ($d=9$ mm)



Order no.	8WL2097-8F
Designation	Bridle guiding device 2x55
Material	
Twin tube clamp	CuAl
Pulley	Polyamide
Clevis, pin 13x55	stlSt
Split pin 5x28	Cu
Bolt M16	stlSt
Bolts M10	stlSt
Nuts, washers	stlSt
Spring washers	stlSt
Weight	2.25 kg
Perm. operating load	1 kN
Min. failing load	3 kN
Tightening torque M_A	32 Nm

Twin bridle guiding device 55

as flexible suspension for two bridle-and-pulley suspensions or catenary wires at GRP tubes or rods $d=55$ mm, for bronze wire 35 to 70 mm² acc. to DIN 48201 or synthetic wire 8WL7097-0 ($d=9$ mm)

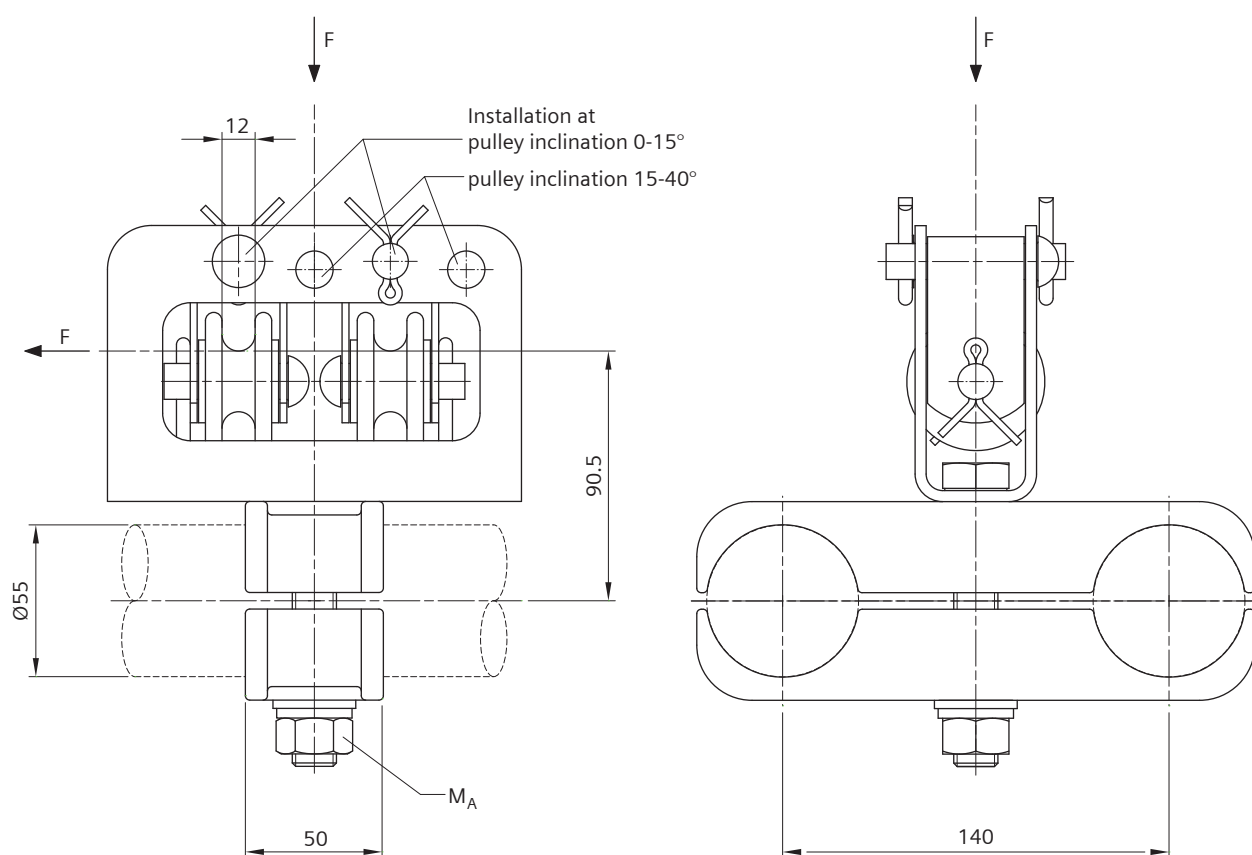


Order no.	8WL2097-8G
Designation	Twin bridle guiding device 55
Material	
Clamp holder	CuAl
Pulleys	Polyamide
Pulley holders	stlSt
Pins 13x45, 13x55	stlSt
Split pins 5x28	Cu
Bolts M10	stlSt
Nuts, washers	stlSt
Weight	1.78 kg
Perm. operating load	1 kN
Min. failing load	3 kN
Tightening torque M_A	32 Nm

Pulley movable in the Z-axis of 0° to 40°.

Twin bridle guiding device 2x55

as flexible suspension for two bridle-and-pulley suspensions or catenary wires for cantilevers across two tracks made of GRP tubes or rods $d=55$ mm, for bronze wire 35 to 70 mm² acc. to DIN 48201 or sythetic wire 8WL7097-0 ($d=9$ mm)

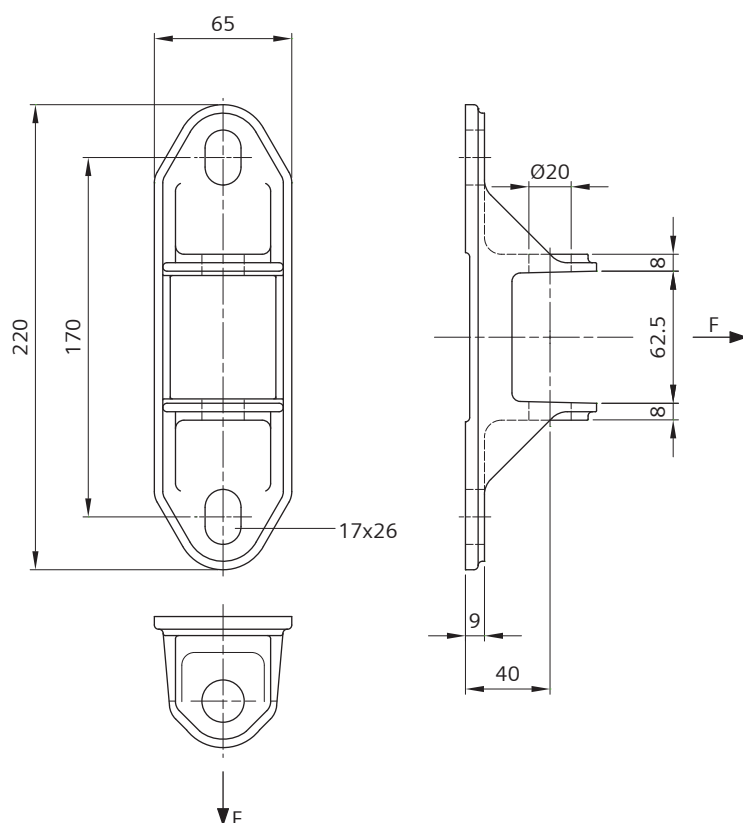


Order no.	8WL2097-8H
Designation	Twin bridle guiding device 2x55
Material	
Tube clamp	CuAl
Pulleys	Polyamide
Pulley holders	stlSt
Pins 13x45, 13x55	stlSt
Split pins 5x28	Cu
Bolt M16	stlSt
Nut, washer	stlSt
Weight	2.90 kg
Perm. operating load	1 kN
Min. failing load	3 kN
Tightening torque M_A	135 Nm

Pulley movable in the Z-axis of 0° to 40°.

Cantilever swivel bracket at steel pole

for hinged cantilevers



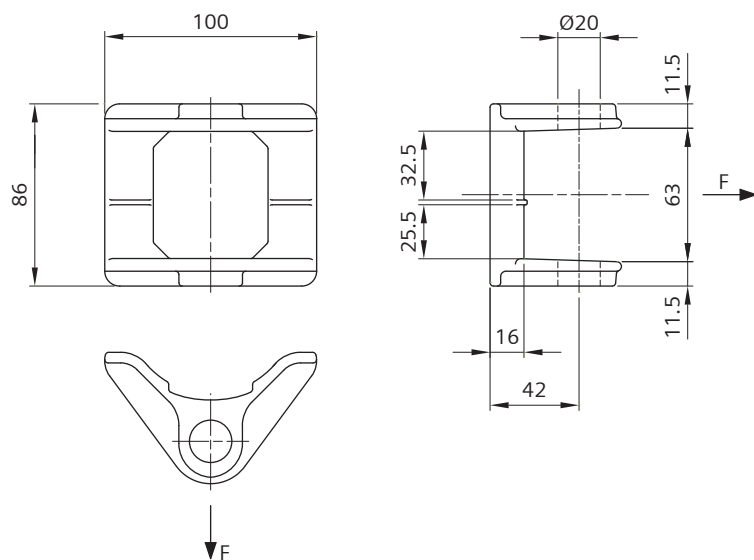
Order no.	8WL2123-8
Designation	Cantilever swivel bracket
Material	CuAl
Weight	0.66 kg
Perm. operating load	17 kN
Min. failing load	51 kN

Pin 8WL1112-2 (19x100-stlSt) and split pin 8WL1115-1 (5x28-Cu) must be ordered separately, see Chapter 02-01

Can also be supplied completely mounted.

Cantilever swivel bracket for fastening of punch-lock band

for hinged cantilevers at circular shaped pole d=120 to 260 mm



Order no.	8WL2124-0
Designation	Cantilever swivel bracket
Material	CuAl
Weight	0.48 kg
Perm. operating load	9 kN
Min. failing load	27 kN

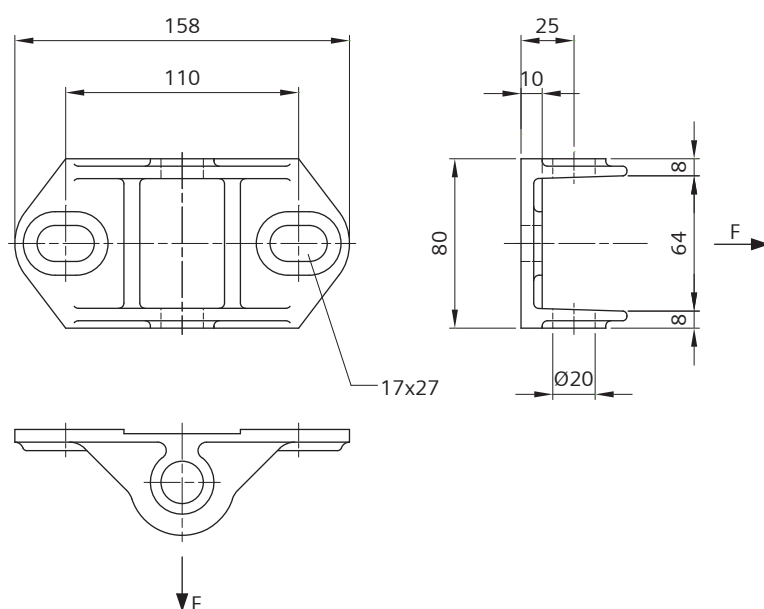
For greater pole diameters (max. 400 mm) the bearing capacity has to be checked from case to case.

Pin 8WL1112-2 (19x100-stlSt), split pin 8WL1115-1 (5x28-Cu), punch-lock band 8WL6743-0 and lock 8WL6748-6 or loop 8WL6748-1 must be ordered separately, see Chapter 02-01

Can also be supplied completely mounted.

Cantilever swivel bracket

for hinged cantilevers



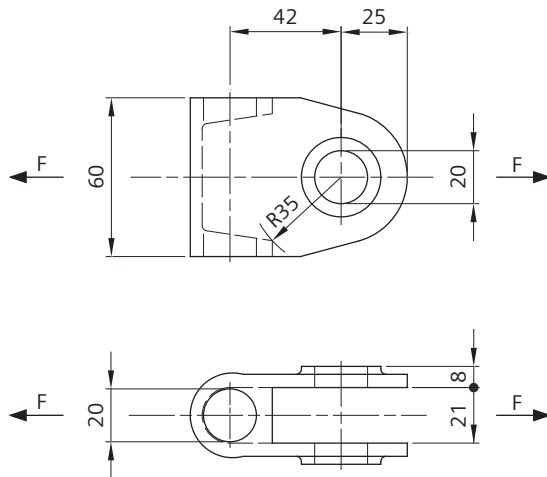
Order no.	8WL2125-5
Designation	Cantilever swivel bracket
Material	CuAl
Weight	0.56 kg
Perm. operating load	21.7 kN
Min. failing load	65 kN

Pin 8WL1112-2 (19x100-stlSt) and split pin 8WL1115-1 (5x28-Cu) must be ordered separately, see Chapter 02-01

Can also be supplied completely mounted.

Swivel with clevis

for hinged cantilevers



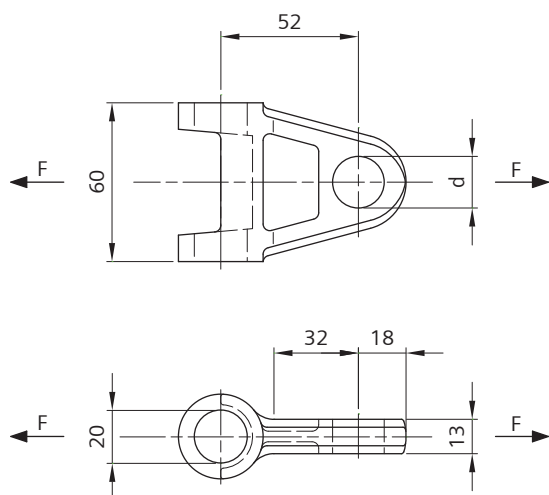
Order no.	8WL2126-2
Designation	Swivel with clevis 21
Material	CuAl
Weight	0.34 kg
Perm. operating load	26.7 kN
Min. failing load	80 kN

Pin 8WL1110-2 (19x52-stlSt) and split pin 8WL1115-1 (5x28-Cu) must be ordered separately, see Chapter 02-01

Can also be supplied completely mounted.

Swivel with eye

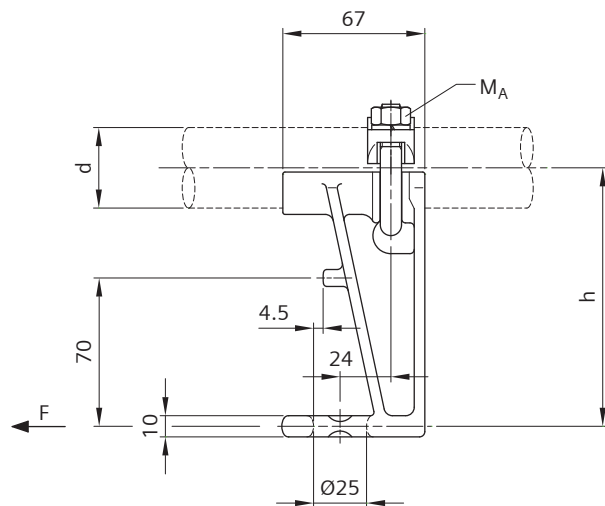
for hinged cantilevers



Order no.	8WL2127-2	8WL2127-3
Designation	Swivel with eye 20	Swivel with eye 17
Material	CuAl	CuAl
Weight	0.26 kg	0.27 kg
Perm. operating load	13.4 kN	13.4 kN
Min. failing load	40 kN	40 kN
d	19.5 mm	16.5 mm

Drop bracket 38-55

for GRP steady arm connection at registration tube d=38 or 55 mm

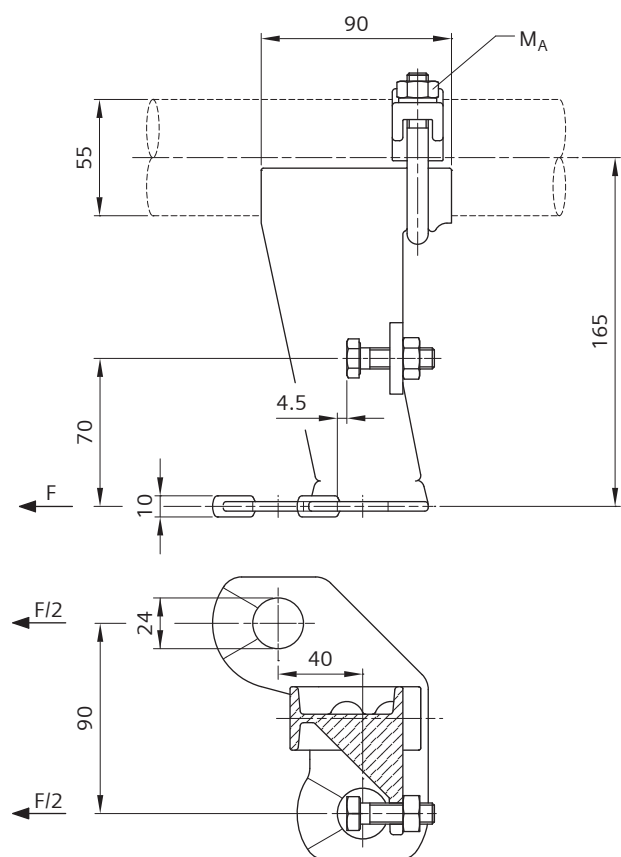


Order no.	8WL2720-0	8WL2721-0
Designation	Drop bracket 38	Drop bracket 55
Material		
Drop bracket	CuAl	CuAl
U-bolt M10	stlSt	stlSt
Nuts	stlSt	stlSt
Spring washers	stlSt	stlSt
Weight	0.65 kg	0.80 kg
Perm. operating load	2.5 kN	2.5 kN
Min. failing load	7.5 kN	7.5 kN
Tightening torque M_A	25 Nm	25 Nm
d	38 mm	55 mm
h	122 mm	130 mm

For steady arms 8WL2860- and 8WL2870- to 8WL2872-.

Twin drop bracket 55

for GRP steady arms connection at registration tube $d=55$ mm

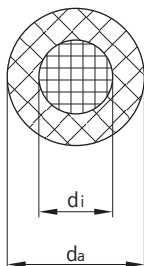


Order no.	8WL2721-2
Designation	Twin drop bracket 55
Material	
Drop bracket	CuAl
U-bolt M10	stlSt
Bolt M10	stlSt
Nuts	stlSt
Spring washers	stlSt
Weight	1.41 kg
Perm. operating load	5 kN
Min. failing load	15 kN
Tightening torque M_A	25 Nm

For steady arms 8WL2860- to 8WL2862- and 8WL2870- to 8WL2872-.

GRP tube

for insulated cantilevers or steady arms



Order no.	8WL2800-0	8WL2801-0	8WL2802-0
Designation	Tube 26	Tube 38	Tube 55
Material	GF-EP, color RAL7034 (yellow grey)	GF-EP, color RAL7034 (yellow grey)	GF-EP, color RAL7034 (yellow grey)
Weight	0.73 kg/m	1.40 kg/m	2.35 kg/m
Max. delivery length	3.00 m	6.00 m	6.00 m
Tensile/Bending strength	550 N/mm ²	550 N/mm ²	550 N/mm ²
Pressure strength, axial	400 N/mm ²	400 N/mm ²	400 N/mm ²
Elastic modulus	40000 N/mm ²	40000 N/mm ²	40000 N/mm ²
Ambient temperature	-50 °C to +80 °C	-50 °C to +80 °C	-50 °C to +80 °C
Disruptive strength, transversal	20 kV/mm	20 kV/mm	20 kV/mm
Disruptive strength, longitudinal	15 - 30 kV/cm	15 - 30 kV/cm	15 - 30 kV/cm
Discharge current, dry/wet ¹⁾	approx. 20 µA/approx. 1 mA	approx. 20 µA/approx. 1 mA	approx. 20 µA/approx. 1 mA
d_i	14 mm	24 mm	40 mm
d_a	26 mm	38 mm	55 mm

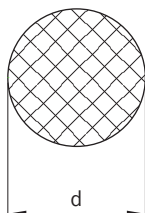
¹⁾ at 100 kV, 50 Hz (tube length 3 m)

Other lengths up to 6.0 m and colors on request.

If necessary, the end cap 8WL2184-0, -2 or -3 must be ordered separately, see page 02-04-80.

GRP round rod

for insulated cantilevers



Part 1

Order no.	8WL3007-0	8WL3007-1	8WL2810-0	8WL2810-1	8WL2811-0
Designation	Round rod 10	Round rod 10	Round rod 26	Round rod 26	Round rod 38
Material	GF-UP ¹⁾ , color RAL1022 (olive yellow)	GF-UP ¹⁾ , color RAL6022 (olive drab)	GF-UP ¹⁾ , color RAL1022 (olive yellow)	GF-UP ¹⁾ , color RAL6022 (olive drab)	GF-UP ¹⁾ , color RAL1022 (olive yellow)
Weight	0.15 kg/m	0.15 kg/m	1.00 kg/m	1.00 kg/m	2.15 kg/m
Max. delivery length	6.00 m	6.00 m	8.00 m	8.00 m	8.00 m
Tensile strength	> 500 N/mm ²	> 500 N/mm ²	–	–	–
Tensile/Bending strength	–	–	500 N/mm ²	500 N/mm ²	500 N/mm ²
Pressure strength, axial	–	–	400 N/mm ²	400 N/mm ²	400 N/mm ²
Elastic modulus	> 40000 N/mm ²	> 40000 N/mm ²	30000 N/mm ²	30000 N/mm ²	30000 N/mm ²
Ambient temperature	-50 °C to +80 °C	-50 °C to +80 °C	-50 °C to +80 °C	-50 °C to +80 °C	-50 °C to +80 °C
Dielectric power factor	$\tan \delta$ 12.9x10 ⁻³	$\tan \delta$ 12.9x10 ⁻³	$\tan \delta$ 12.9x10 ⁻³	$\tan \delta$ 12.9x10 ⁻³	$\tan \delta$ 12.9x10 ⁻³
Tracking resistance	> CTI 600	> CTI 600	> CTI 600	> CTI 600	> CTI 600
Discharge current, dry/wet ²⁾	approx. 20 µA/ approx. 2 mA	approx. 20 µA/ approx. 2 mA	approx. 20 µA/ approx. 2 mA	approx. 20 µA/ approx. 2 mA	approx. 20 µA/ approx. 2 mA
d	10 mm	10 mm	26 mm	26 mm	38 mm

Part 2

Order no.	8WL2811-1	8WL2813-0	8WL2813-1
Designation	Round rod 38	Round rod 55	Round rod 55
Material	GF-UP ¹⁾ , color RAL6022 (olive drab)	GF-UP ¹⁾ , color RAL1022 (olive yellow)	GF-UP ¹⁾ , color RAL6022 (olive drab)
Weight	2.15 kg/m	4.51 kg/m	4.51 kg/m
Max. delivery length	8.00 m	8.00 m	8.00 m
Tensile strength	–	–	–
Tensile/Bending strength	500 N/mm ²	500 N/mm ²	500 N/mm ²
Pressure strength, axial	400 N/mm ²	400 N/mm ²	400 N/mm ²
Elastic modulus	30000 N/mm ²	30000 N/mm ²	30000 N/mm ²
Ambient temperature	-50 °C to +80 °C	-50 °C to +80 °C	-50 °C to +80 °C
Dielectric power factor	$\tan \delta 12.9 \times 10^{-3}$	$\tan \delta 12.9 \times 10^{-3}$	$\tan \delta 12.9 \times 10^{-3}$
Tracking resistance	> CTI 600	> CTI 600	> CTI 600
Discharge current, dry/wet ²⁾	approx. 20 µA/approx. 2 mA	approx. 20 µA/approx. 2 mA	approx. 20 µA/approx. 2 mA
d	38 mm	55 mm	55 mm

¹⁾ with surface fleece

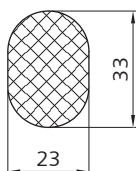
²⁾ 100 kV, 50 Hz (rod length 3 m)

Other lengths and colors on request.

If necessary, the end cap 8WL2184-0, -2 or -3 must be ordered separately, see page 02-04-80.

GRP oval rod

for insulated cantilevers



Order no.	8WL2815-0	8WL2815-1
Designation	Oval rod 23x33	Oval rod 23x33
Material	GF-UP ¹⁾ , color RAL1022 (olive yellow)	GF-UP ¹⁾ , color RAL6022 (olive drab)
Weight	1.22 kg/m	1.22 kg/m
Max. delivery length	6.00 m	6.00 m
Tensile/Bending strength	500 N/mm ²	500 N/mm ²
Pressure strength, axial	400 N/mm ²	400 N/mm ²
Elastic modulus	30000 N/mm ²	30000 N/mm ²
Ambient temperature	-50 °C to +80 °C	-50 °C to +80 °C
Dielectric power factor	$\tan \delta 12.9 \times 10^{-3}$	$\tan \delta 12.9 \times 10^{-3}$
Tracking resistance	> CTI 600	> CTI 600
Discharge current, dry/wet ²⁾	approx. 20 µA/approx. 2 mA	approx. 20 µA/approx. 2 mA

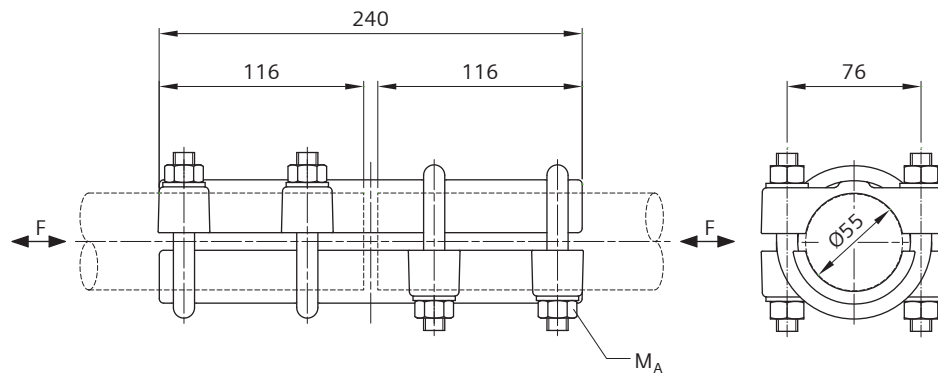
¹⁾ with surface fleece

²⁾ at 100 kV, 50 Hz (rod length 3 m)

Other lengths and colors on request.

Coupling socket 55

for connection of GRP tubes/rods d=55 mm

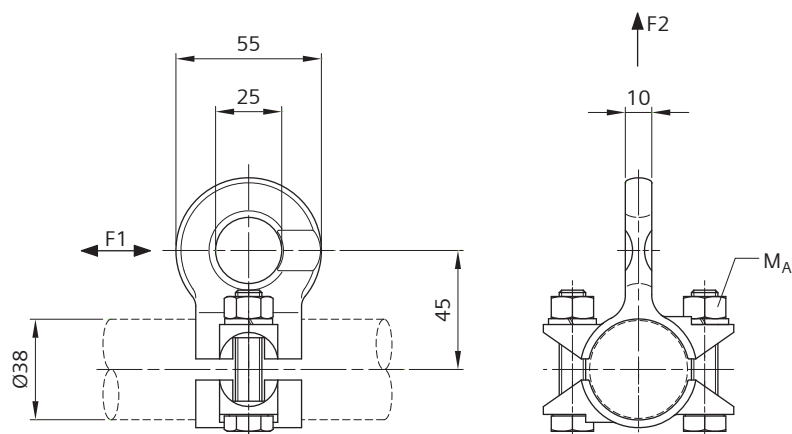


Order no.	8WL2878-1
Designation	Coupling socket 55
Material	
Clamp bodies	CuAl
U-bolts M12	stlSt
Nuts, washers	stlSt
Weight	3.34 kg
Perm. operating load	20 kN
Min. failing load	60 kN
Tightening torque M_A	56 Nm

The bearing capacity of the cantilever has to be proved project-specifically.
Substitute for 8WL2876-5.

Eye clamp 38

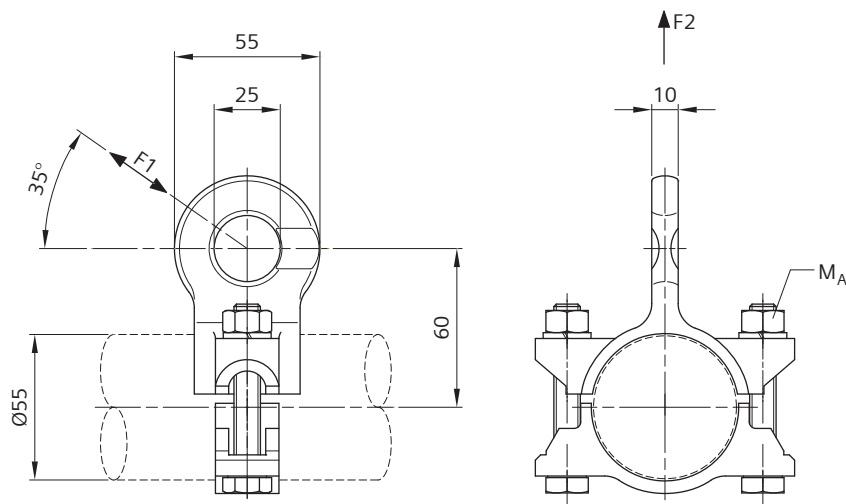
for clamping at GRP tube/rod $d=38$ mm



Order no.	8WL2824-2
Designation	Eye clamp 38
Material	
Eye clamp	CuAl
Clamp hoop	CuAl
Bolts M10	stlSt
Nuts	stlSt
Spring washers	stlSt
Weight	0.36 kg
Perm. operating load (F1)	5 kN
Min. failing load (F1)	15 kN
Perm. operating load (F2)	8 kN
Min. failing load (F2)	24 kN
Tightening torque M_A	32 Nm

Eye clamp 55

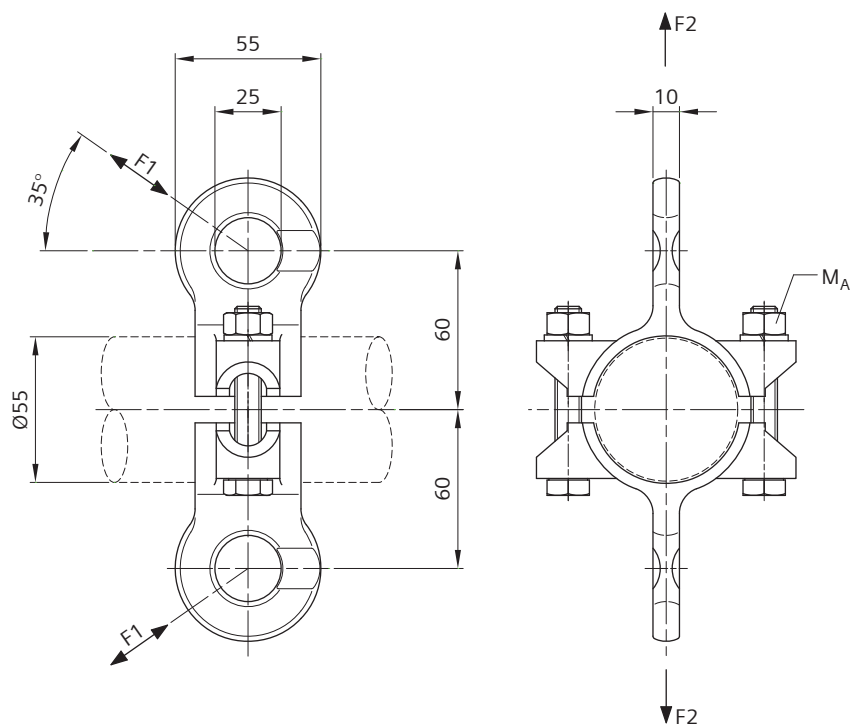
for clamping at GRP tube/rod d=55 mm



Order no.	8WL2824-6
Designation	Eye clamp 55
Material	
Eye clamp	CuAl
Clamp hoop	CuAl
Bolts M10	stlSt
Nuts	stlSt
Spring washers	stlSt
Weight	0.58 kg
Perm. operating load (F1)	6 kN
Min. failing load (F1)	18 kN
Perm. operating load (F2)	8 kN
Min. failing load (F2)	24 kN
Tightening torque M_A	32 Nm

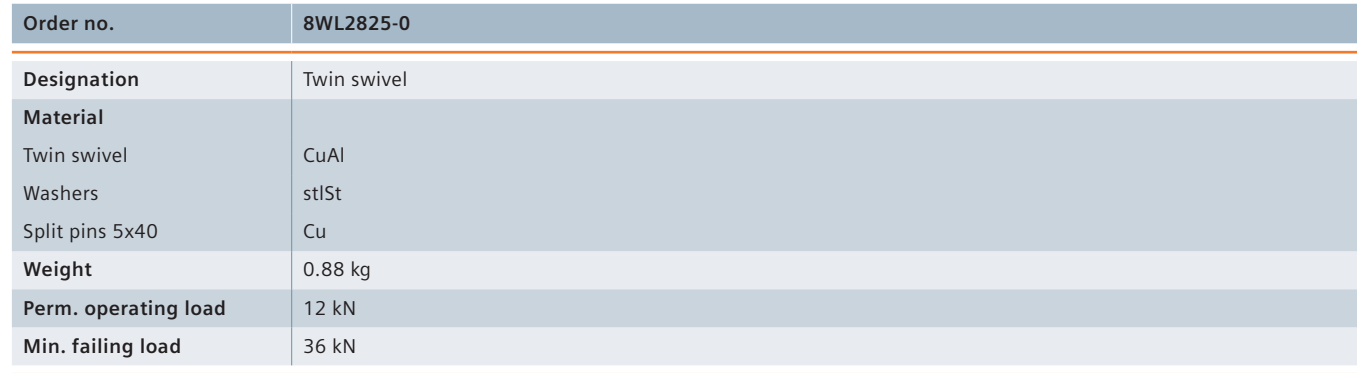
Twin eye clamp 55

for clamping at GRP tube/rod $d=55$ mm



Order no.	8WL2824-8
Designation	Twin eye clamp 55
Material	
Eye clamp	CuAl
Clamp hoop	CuAl
Bolts M10	stlSt
Nuts	stlSt
Spring washers	stlSt
Weight	0.80 kg
Perm. operating load (F1)	6 kN
Min. failing load (F1)	18 kN
Perm. operating load (F2)	8 kN
Min. failing load (F2)	24 kN
Tightening torque M_A	32 Nm

for cantilevers across two tracks made of GRP tubes/rods, for connection of hook end fitting 8WL2837-1 or 8WL2838-1/-3

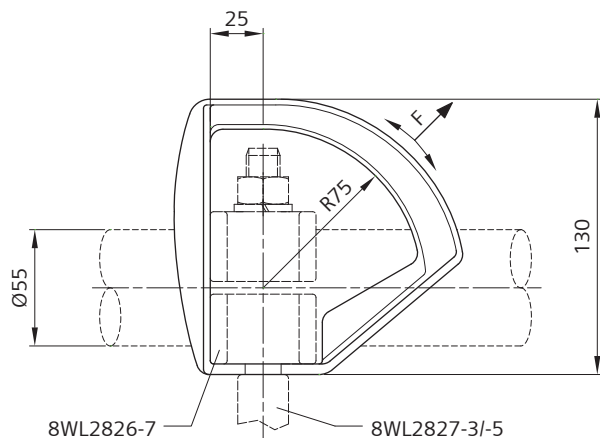


for cantilevers across two tracks made of GRP tubes/rods $d=55$ mm



Suspension bracket for twin tube clamp

for cantilevers across two tracks made of GRP tubes/rods d=55 mm

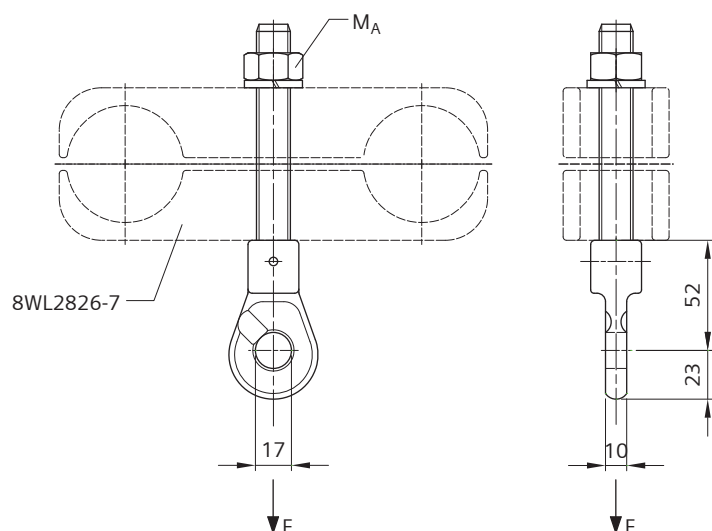


Order no.	8WL2827-0
Designation	Suspension bracket for twin tube clamp 55
Material	CuAl
Weight	0.43 kg
Perm. operating load	8 kN
Min. failing load	24 kN

Two clamping jaws 8WL2826-7 and eye 8WL2827-3 or clevis 8WL2827-5 must be ordered separately, see pages 02-03-37 to 02-03-40.

Eye for twin tube clamp

for cantilevers across two tracks made of GRP tubes/rods $d=55$ mm

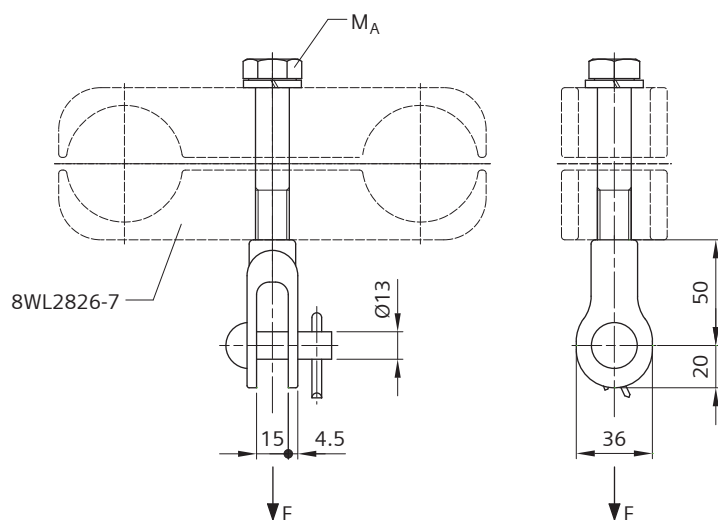


Order no.	8WL2827-3
Designation	Eye for twin tube clamp 55
Material	
Eye	CuAl
Threaded pin M16	stlSt
Nut	stlSt
Spring washer	stlSt
Grooved pin	stlSt
Weight	0.35 kg
Perm. operating load	8 kN
Min. failing load	24 kN
Tightening torque M_A	135 Nm

Two clamping jaws 8WL2826-7 must be ordered separately, see page 02-03-40

Clevis for twin tube clamp

for cantilevers across two tracks made of GRP tubes/rods d=55 mm

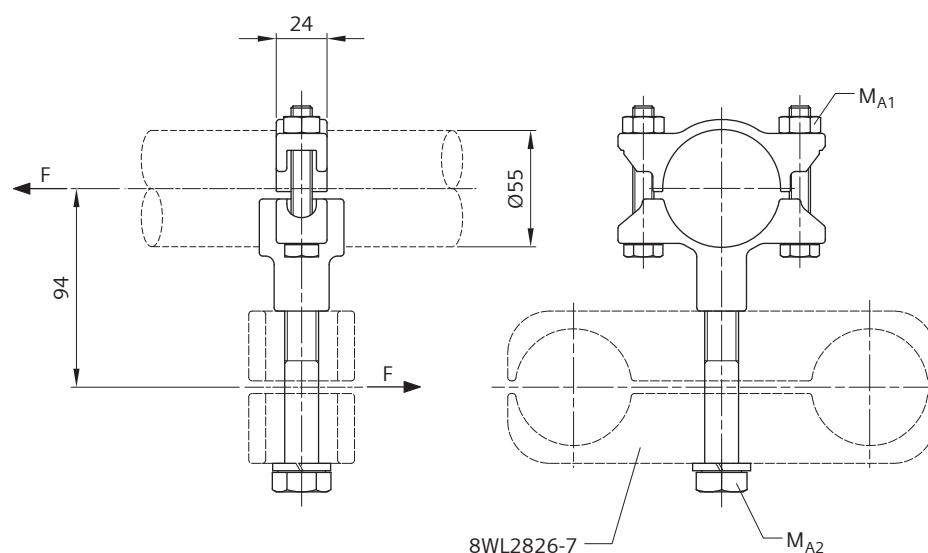


Order no.	8WL2827-5
Designation	Clevis for twin tube clamp 55
Material	
Clevis	CuAl
Bolt M16x90	stlSt
Spring washer	stlSt
Pin 13x40	stlSt
Split pin 5x28	Cu
Weight	0.36 kg
Perm. operating load	8 kN
Min. failing load	24 kN
Tightening torque M_A	135 Nm

Two clamping jaws 8WL2826-7 must be ordered separately, see page 02-03-40.

Clamp holder 55 for twin tube clamp 55

for triple strut at cantilever across two tracks made of GRP tubes/rods d=55 mm



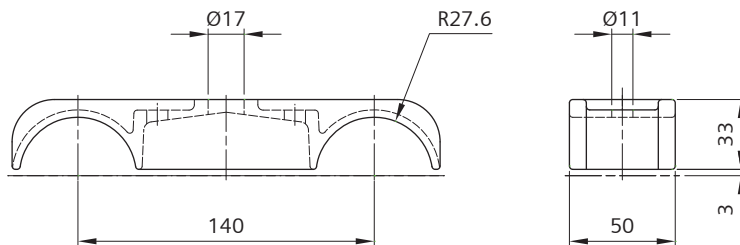
Order no.	8WL2827-7A
Designation	Clamp holder 55 for twin tube clamp 55
Material	
Clamp holder	CuAl
Bolts M10	stlSt
Bolt M16	stlSt
Nuts	stlSt
Spring washer	stlSt
Weight	0.71 kg
Perm. operating load	2.5 kN
Min. failing load	7.5 kN
Tightening torque M_{A1}	32 Nm
Tightening torque M_{A2}	135 Nm

Two clamping jaws 8WL2826-7 must be ordered separately, see page 02-03-40.

Substitute for 8WL2827-7.

Clamping jaw for twin tube clamp 55

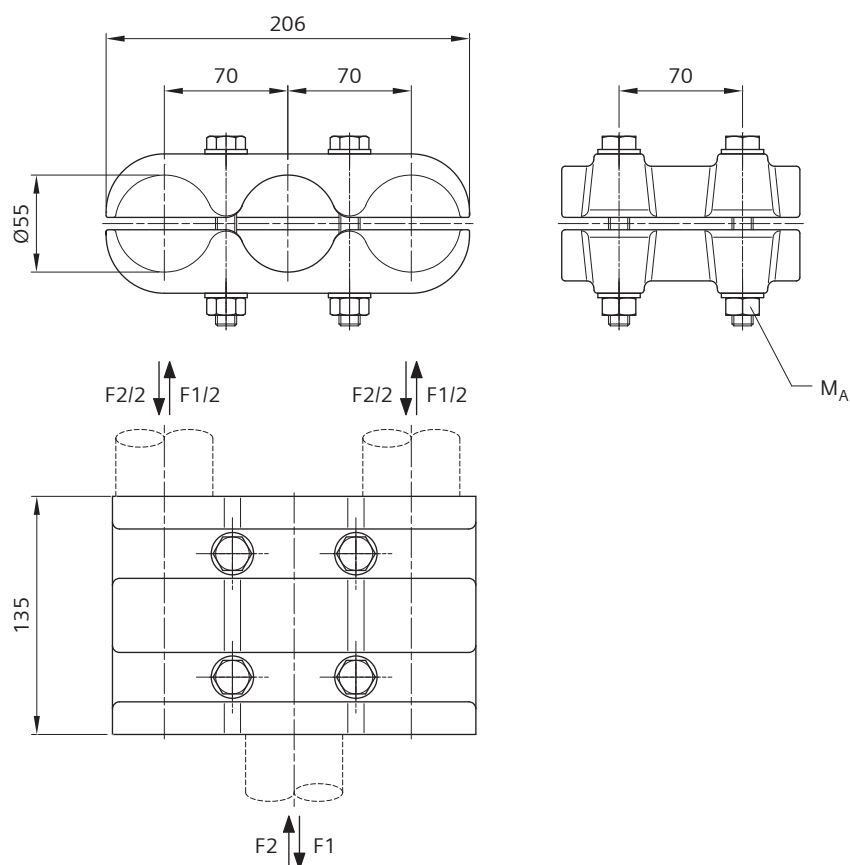
for use with eye 8WL2827-3, clevis 8WL2827-5 or clamp holder 8WL2827-7A



Order no.	8WL2826-7
Designation	Clamping jaw
Material	CuAl
Weight	0.76 kg

Triple tube clamp 55

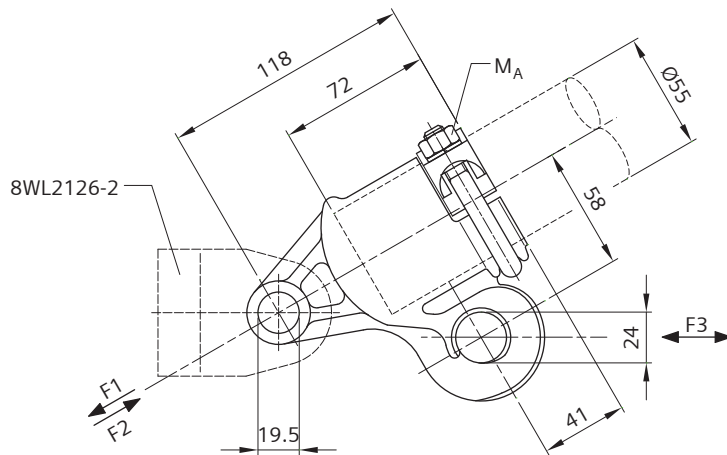
for cantilevers across two tracks made of GRP tubes/rods $d=55$ mm



Order no.	8WL2825-3
Designation	Triple tube clamp 55
Material	
Tube clamp	CuAl
Bolts M12	stlSt
Nuts, washers	stlSt
Weight	3.83 kg
Perm. operating load/ tension (F1)	2 kN
Min. failing load/ tension (F1)	6 kN
Perm. operating load/ pressure (F2)	20 kN
Min. failing load/ pressure (F2)	60 kN
Tightening torque M_A	56 Nm

Tube end fitting 55

for cantilever tube/rod $d=55$ mm

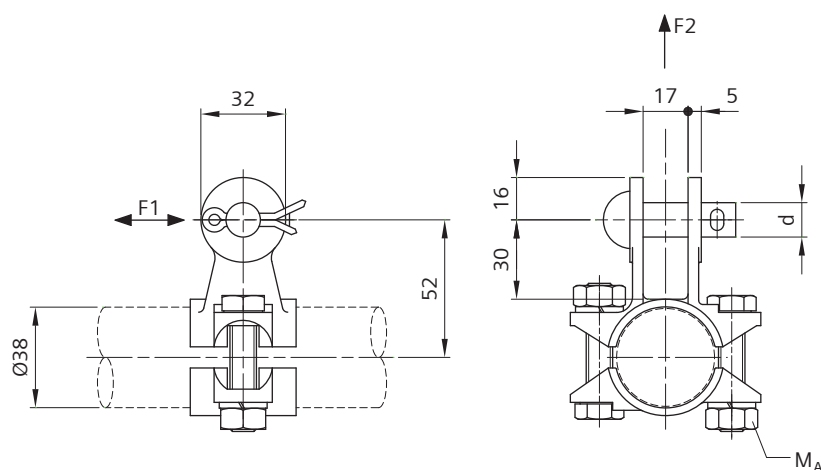


Order no.	8WL2828-0
Designation	Tube end fitting 55
Material	
Tube end fitting	CuAl
U-bolt M10	stlSt
Nuts	stlSt
Spring washers	stlSt
Weight	0.92 kg
Perm. operating load/ tension (F1)	6 kN
Min. failing load/ tension (F1)	18 kN
Perm. operating load/ pressure (F2)	20 kN
Min. failing load/ pressure (F2)	60 kN
Perm. operating load (F3)	6 kN
Min. failing load (F3)	18 kN
Tightening torque M_A	32 Nm

Swivel 8WL2126-2 (CuAl) must be ordered separately, see page 02-03-22.

Clamp hoop 38 with clevis

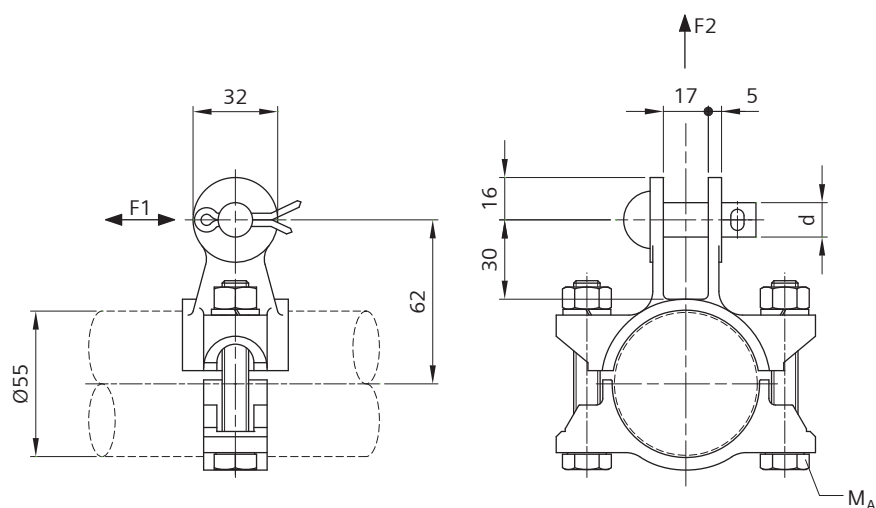
for registration or cantilever tube/rod $d=38$ mm



Order no.	8WL2830-1	8WL2830-3
Designation	Clamp hoop 38-13	Clamp hoop 38-16
Material		
Clamp hoop	CuAl	CuAl
Bolts M10	stlSt	stlSt
Nuts	stlSt	stlSt
Spring washers	stlSt	stlSt
Pin 13x40	stlSt	-
Pin 16x40	-	stlSt
Split pin 5x28	Cu	Cu
Weight	0.37 kg	0.41 kg
Perm. operating load (F1)	5 kN	5 kN
Min. failing load (F1)	15 kN	15 kN
Perm. operating load (F2)	9 kN	9 kN
Min. failing load (F2)	27 kN	27 kN
Tightening torque M_A	32 Nm	32 Nm
d	13 mm	16 mm

Clamp hoop 55 with clevis

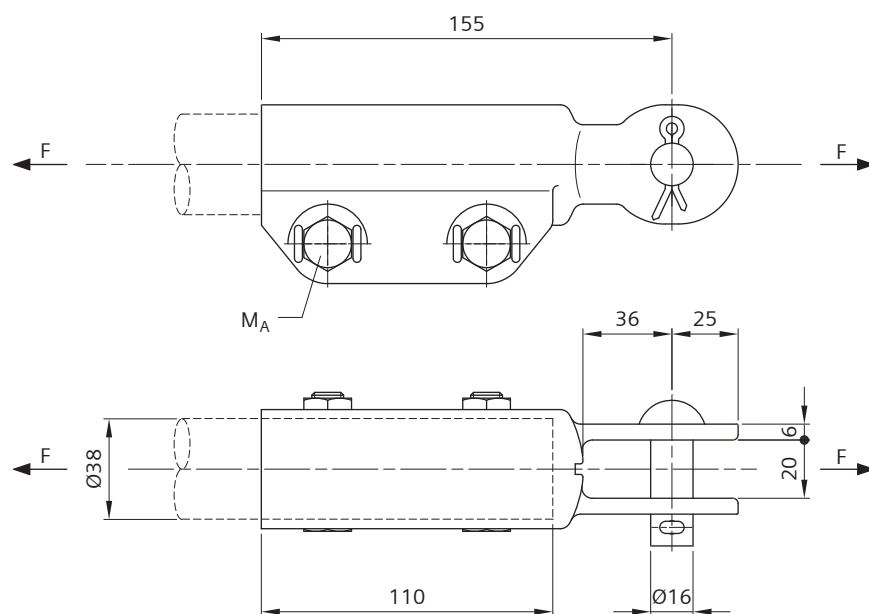
for registration or cantilever tube/rod $d=55$ mm



Order no.	8WL2830-5	8WL2830-7
Designation	Clamp hoop 55-13	Clamp hoop 55-16
Material		
Clamp hoop	CuAl	CuAl
Bolts M10	stlSt	stlSt
Nuts	stlSt	stlSt
Spring washers	stlSt	stlSt
Pin 13x40	stlSt	-
Pin 16x40	-	stlSt
Split pin 5x28	Cu	Cu
Weight	0.58 kg	0.62 kg
Perm. operating load (F1)	5 kN	5 kN
Min. failing load (F1)	15 kN	15 kN
Perm. operating load (F2)	9 kN	9 kN
Min. failing load (F2)	27 kN	27 kN
Tightening torque M_A	32 Nm	32 Nm
d	13 mm	16 mm

Clevis end fitting 38, clamped

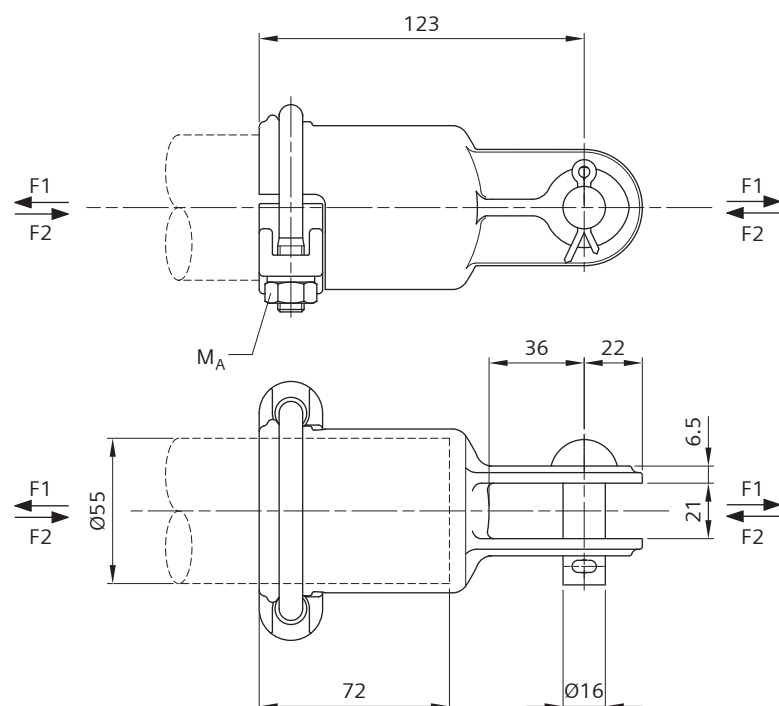
for GRP tube/rod d=38 mm



Order no.	8WL2832-1
Designation	Clevis end fitting 38-16
Material	
Clamping clevis	CuAl
Bolts M12	stlSt
Nuts	stlSt
Spring washers	stlSt
Pin 16x45	stlSt
Split pin 5x28	Cu
Weight	1.04 kg
Perm. operating load	10 kN
Min. failing load	30 kN
Tightening torque M_A	56 Nm

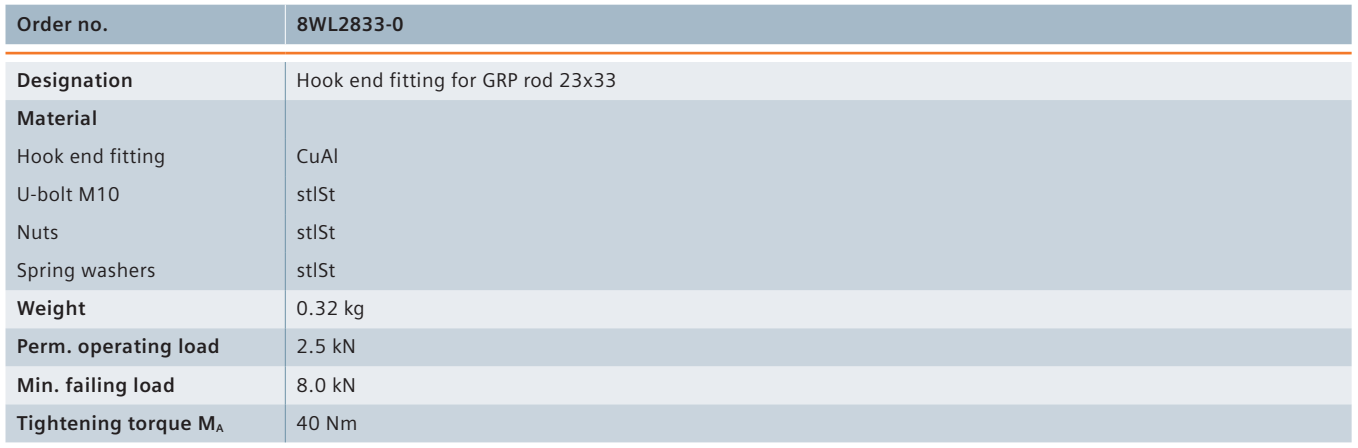
Clevis end fitting 55

for GRP tube/rod d=55 mm



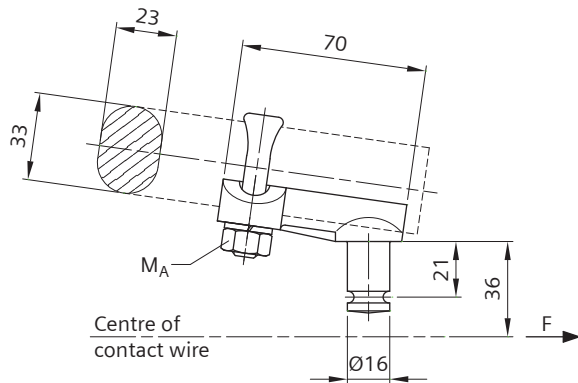
Order no.	8WL2828-4
Designation	Clevis end fitting 55-16, clamped
Material	
Clamping clevis	CuAl
Clamp hoop	CuAl
U-bolt M10	stlSt
Nuts	stlSt
Spring washers	stlSt
Pin 16x45	stlSt
Split pin 5x28	Cu
Weight	0.93 kg
Perm. operating load/ tension (F1)	6 kN
Min. failing load/ tension (F1)	18 kN
Perm. operating load/ pressure (F2)	20 kN
Min. failing load/ pressure (F2)	60 kN
Tightening torque M_A	32 Nm

for steady arms made of GRP rod 23x33 mm



Swivel clip holder 16R for GRP rod

for steady arms made of GRP rod 23x33 mm



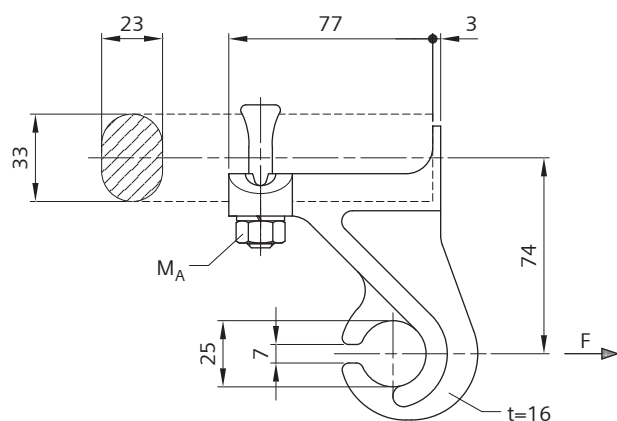
Order no.	8WL2833-1
Designation	Swivel clip holder 16R for GRP rod 23x33
Material	
Swivel clip holder	CuAl
U-bolt M10	stlSt
Nuts	stlSt
Spring washers	stlSt
Weight	0.24 kg
Perm. operating load	2.5 kN
Min. failing load	8.0 kN
Tightening torque M_A	40 Nm

Contact wire clips see Chapter 02-09.

Types with threaded stud M16 or 5/8" on request.

Hook end clamp for GRP rod

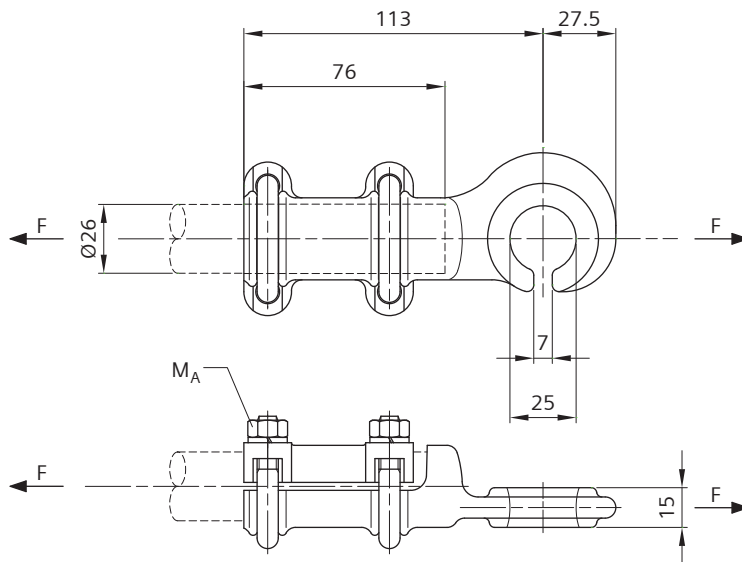
for steady arms made of GRP rod 23x33 mm



Order no.	8WL2833-4
Designation	Hook end clamp for GRP rod 23x33
Material	
Hook end clamp	CuAl
U-bolt M10	stlSt
Nuts	stlSt
Spring washers	stlSt
Weight	0.38 kg
Perm. operating load	2.5 kN
Min. failing load	8.0 kN
Tightening torque M_A	40 Nm

Hook end fitting 26, clamped

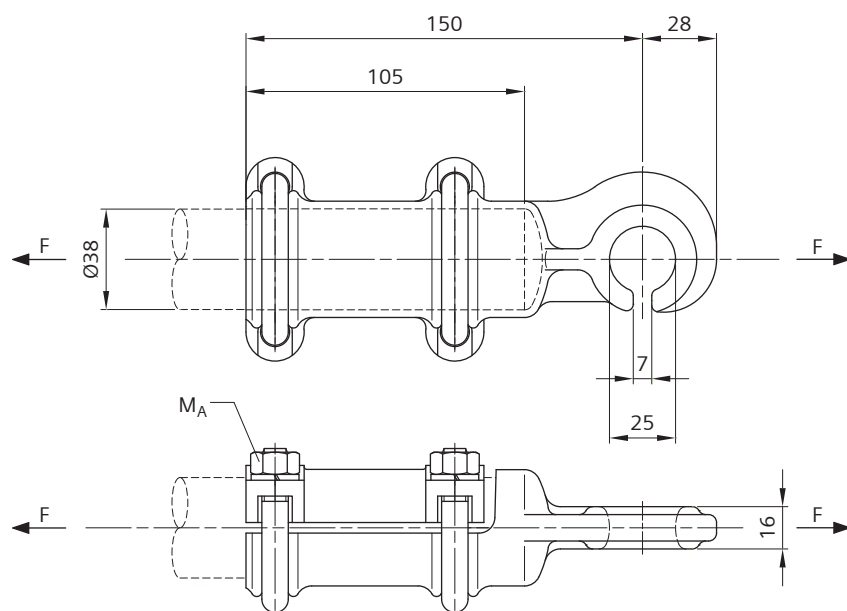
for GRP tube/rod d=26 mm



Order no.	8WL2837-1
Designation	Hook end fitting 26
Material	
Hook end fitting	CuAl
U-bolts M8	stlSt
Nuts	stlSt
Spring washers	stlSt
Weight	0.44 kg
Perm. operating load	2.5 kN
Min. failing load	7.5 kN
Tightening torque M_A	16 Nm

Hook end fitting 38, clamped

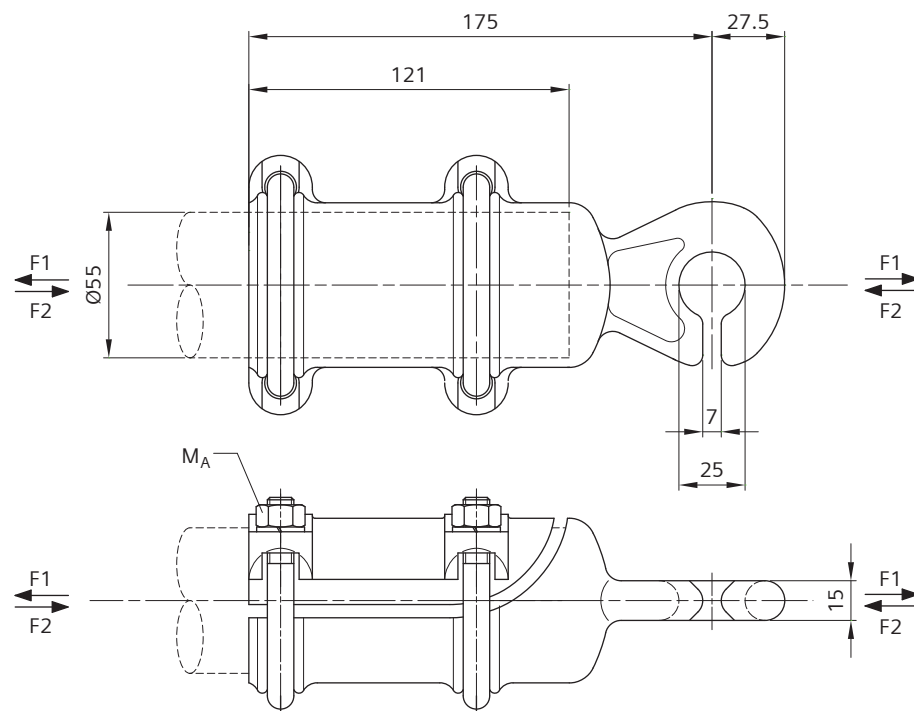
for GRP tube/rod $d=38$ mm



Order no.	8WL2838-1
Designation	Hook end fitting 38
Material	
Hook end fitting	CuAl
U-bolts M10	stlSt
Nuts	stlSt
Spring washers	stlSt
Weight	0.84 kg
Perm. operating load	2.5 kN
Min. failing load	7.5 kN
Tightening torque M_A	40 Nm

Hook end fitting 55, clamped

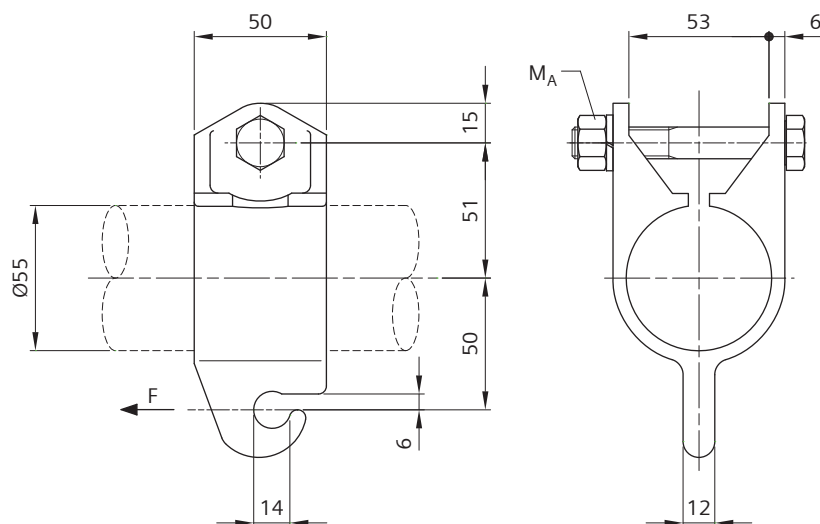
for GRP tube/rod d=55 mm



Order no.	8WL2838-3
Designation	Hook end fitting 55
Material	
Hook end fitting	CuAl
U-bolts M10	stlSt
Nuts	stlSt
Spring washers	stlSt
Weight	1.26 kg
Perm. operating load/ tension (F1)	6 kN
Min. failing load/ tension (F1)	18 kN
Perm. operating load/ pressure (F2)	8 kN
Min. failing load/ pressure (F2)	24 kN
Tightening torque M _A	32 Nm

Hook clip 55, clamped

for registration or cantilever tubes/rods $d=55$ mm made of GRP, for suspension of steady arms or bridle-and-pulley suspensions



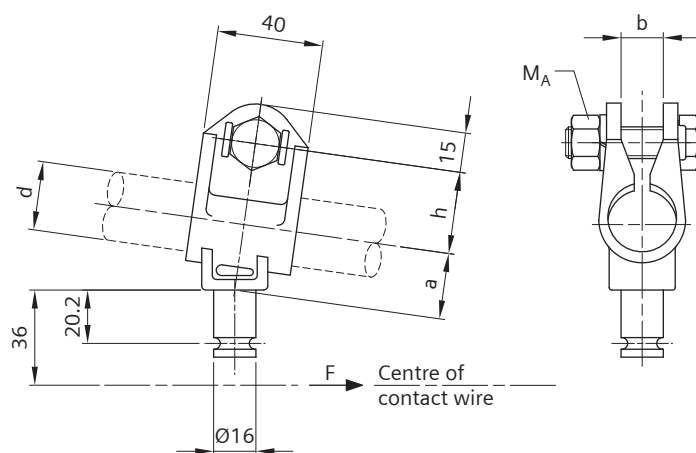
Order no.	8WL2844-1
Designation	Hook clip 55
Material	
Clamp holder	CuAl
Bolt M12	stlSt
Nut	stlSt
Spring washer	stlSt
Weight	0.76 kg
Perm. operating load	2.5 kN
Min. failing load	7.5 kN
Tightening torque M_A	35 Nm

Bridle-and-pulley suspensions 8WL3520- see pages 02-06-23 and 02-06-24.

Steady arms on request.

Swivel clip holder 26-38 for contact wire clip 16R

for GRP steady arms, for tube d=26 or 38 mm



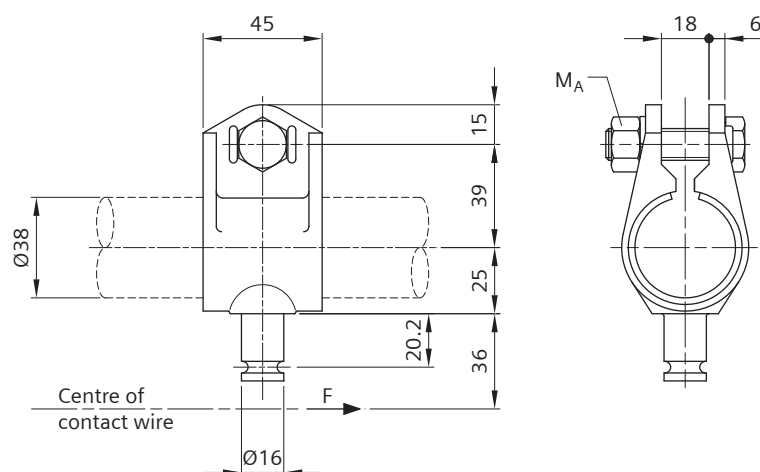
Order no.	8WL2847-6	8WL2848-3
Designation	Swivel clip holder 26-16R	Swivel clip holder 38-16R
Material		
Swivel clip holder	CuAl	CuAl
Bolt M12	stlSt	stlSt
Nut	stlSt	stlSt
Spring washer	stlSt	stlSt
Weight	0.32 kg	0.34 kg
Perm. operating load	2.5 kN	2.5 kN
Min. failing load	7.5 kN	7.5 kN
Tightening torque M_A	35 Nm	35 Nm
a	25 mm	26 mm
b	16 mm	18 mm
d	26 mm	38 mm
h	31 mm	37 mm

Contact wire clips see Chapter 02-09.

Types with threaded pin M16 or 5/8" on request.

Swivel clip holder 38 for contact wire clip 16R

for GRP tubes/rods $d=38$ mm

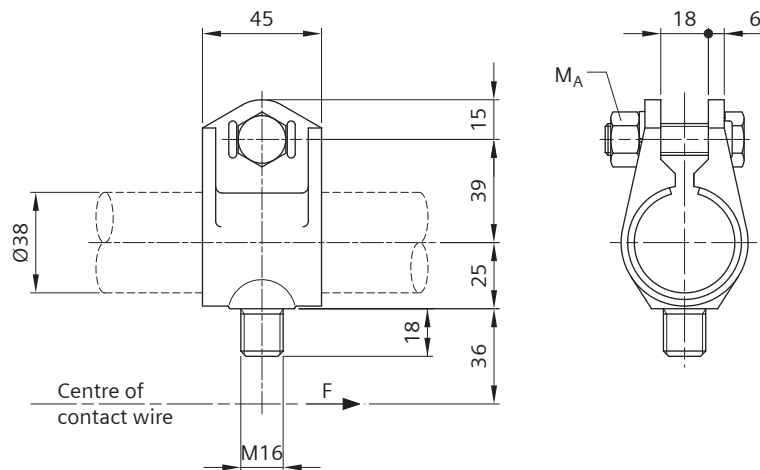


Order no.	8WL2006-8
Designation	Swivel clip holder 38-16R
Material	
Swivel clip holder	CuAl
Insert	Cu-ETP
Bolt M12	stlSt
Nut	stlSt
Spring washer	stlSt
Weight	0.45 kg
Perm. operating load	2.5 kN
Min. failing load	7.5 kN
Tightening torque M_A	35 Nm

Contact wire clips see Chapter 02-09.

Swivel clip holder 38 for contact wire clip M16

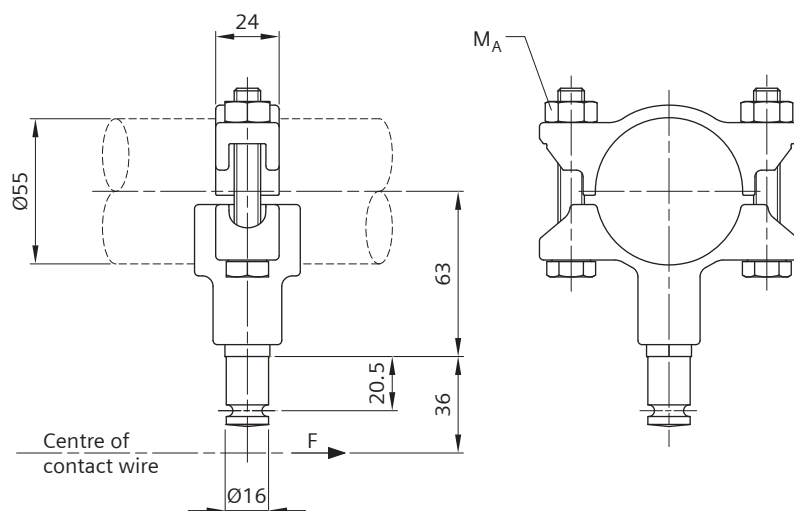
for GRP tubes/rods d=38 mm



Order no.	8WL2006-8A
Designation	Swivel clip holder 38-M16
Material	
Swivel clip holder	CuAl
Insert	Cu-ETP
Bolt M12	stlSt
Nut	stlSt
Spring washer	stlSt
Weight	0.45 kg
Perm. operating load	2.5 kN
Min. failing load	7.5 kN
Tightening torque M_A	35 Nm

Contact wire clips see Chapter 02-09.

for GRP tubes/rods $d=55$ mm

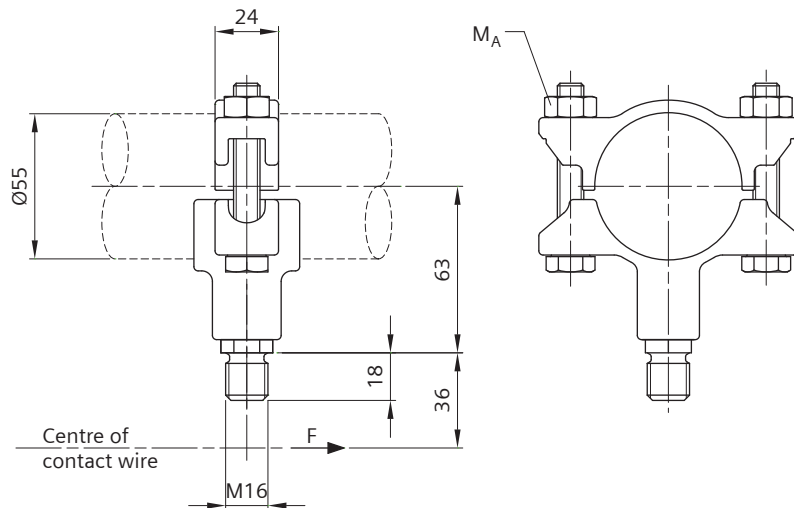


Order no.	8WL2006-0A
Designation	Swivel clip holder 55-16R
Material	
Swivel clip holder	CuAl
Grooved stud	stlSt
Bolts M10	stlSt
Nuts	stlSt
Weight	0.59 kg
Perm. operating load	2.5 kN
Min. failing load	7.5 kN
Tightening torque M _A	32 Nm

Substitute for 8WL2006-0.

Swivel clip holder 55 for contact wire clip M16

for GRP tubes/rods d=55 mm

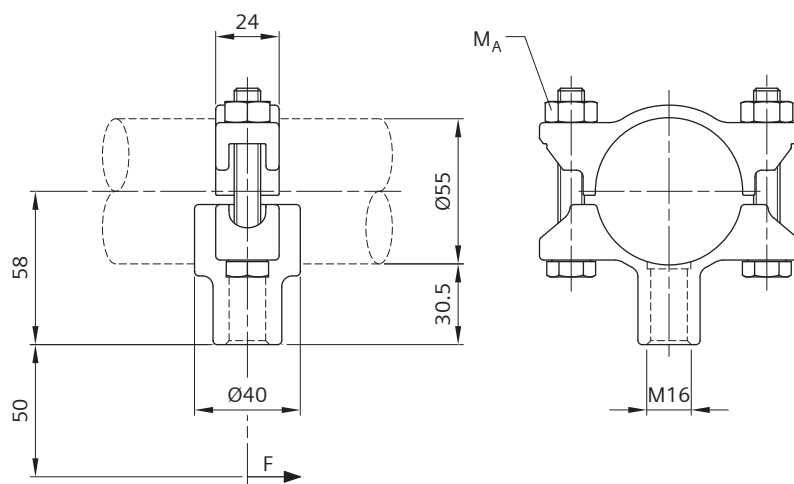


Order no.	8WL2006-08
Designation	Swivel clip holder 55-M16
Material	
Swivel clip holder	CuAl
Threaded stud	stlSt
Bolts M10	stlSt
Nuts	stlSt
Weight	0.59 kg
Perm. operating load	2.5 kN
Min. failing load	7.5 kN
Tightening torque M_A	32 Nm

Contact wire clips see Chapter 02-09.

Clamp holder 55 with threaded bush M16

for GRP tube/rod d=55 mm

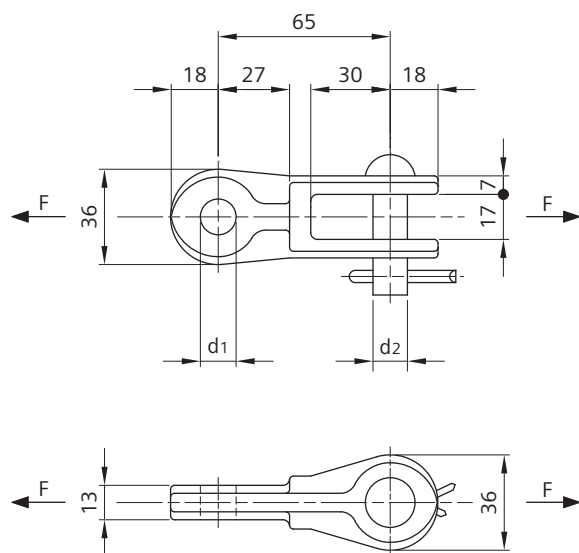


Order no.	8WL2850-6
Designation	Clamp holder 55 with threaded bush M16
Material	
Clamp holder	CuAl
Bolts M10	stlSt
Nuts	stlSt
Weight	0.52 kg
Perm. operating load	2.5 kN
Min. failing load	7.5 kN
Tightening torque M_A	32 Nm

Substitute for 8WL2850-2.

Cross link eye/clevis

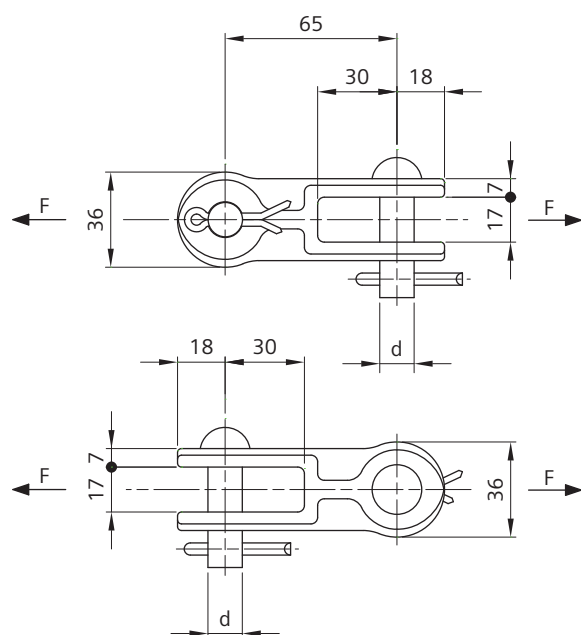
for catenary wire supports in cantilevers across several tracks and headspan



Order no.	8WL1137-2	8WL1137-5	8WL1137-8
Designation	Cross link 13	Cross link 16	Cross link 19
Material			
Cross link	CuAl	CuAl	CuAl
Pin 13x45	stlSt	-	-
Pin 16x45	-	stlSt	-
Pin 19x52	-	-	stlSt
Split pin 5x28	Cu	Cu	Cu
Weight	0.30 kg	0.32 kg	0.42 kg
Perm. operating load	12 kN	20 kN	20 kN
Min. failing load	36 kN	60 kN	60 kN
d₁	13.5 mm	17.5 mm	19.5 mm
d₂	13 mm	16 mm	19 mm

Cross link clevis/clevis

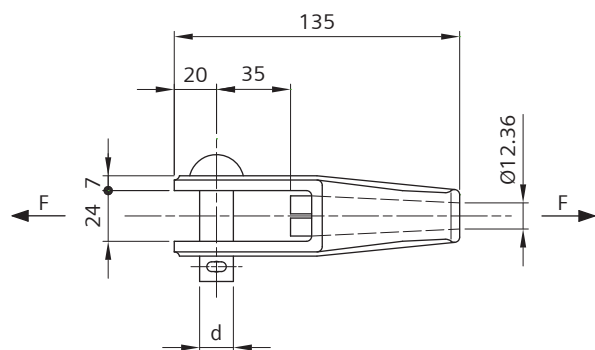
for catenary wire supports in cantilevers across several tracks and headspan



Order no.	8WL1138-2	8WL1138-5	8WL1138-8
Designation	Cross link 13	Cross link 16	Cross link 19
Material			
Cross link	CuAl	CuAl	CuAl
Pins 13x45	stlSt	-	-
Pins 16x45	-	stlSt	-
Pins 19x52	-	-	stlSt
Split pins 5x28	Cu	Cu	Cu
Weight	0.39 kg	0.45 kg	0.59 kg
Perm. operating load	12 kN	20 kN	20 kN
Min. failing load	36 kN	60 kN	60 kN
d	13 mm	16 mm	19 mm

Dead-end clamp

for GRP rod 10 (8WL3007-0/-1)



Order no.	8WL3006-1	8WL3006-3
Designation	Dead-end clamp 16	Dead-end clamp 19
Material		
Clamping sleeve	CuAl	CuAl
Clamping cone	CuZn	CuZn
Pin 16x50	stlSt	-
Pin 19x52	-	stlSt
Split pin 5x28	Cu	Cu
Weight	0.54 kg	0.56 kg
Perm. operating load	10 kN	10 kN
Min. failing load	32 kN	32 kN
d	16 mm	19 mm

Mounting tool 8WL3020-8 see page 02-16-22.

Order no.	8WL2862-0	8WL2862-6	8WL2862-1	8WL2862-7	8WL2860-0
-----------	-----------	-----------	-----------	-----------	-----------

Part 2

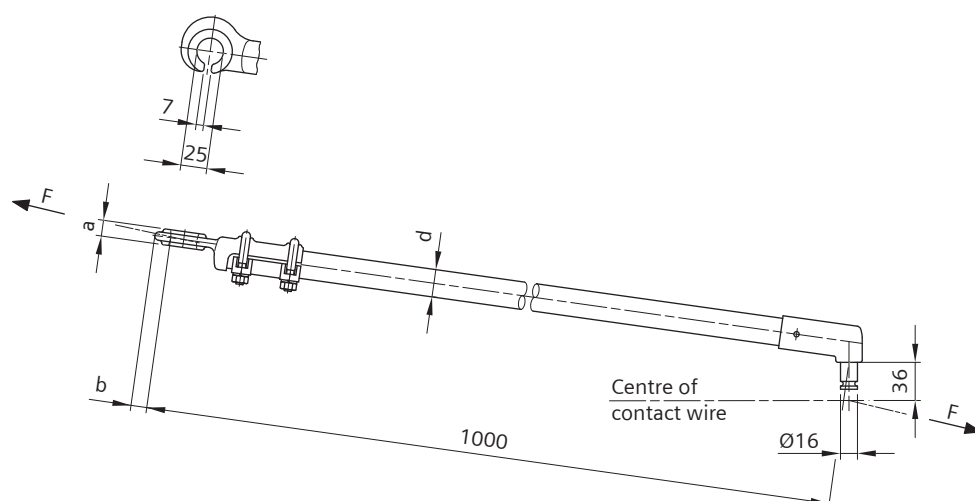
Order no.	8WL2861-0	8WL2860-6	8WL2861-6	8WL2861-7
Designation	Steady arm rod 26	Steady arm rod 26	Steady arm rod 26	Steady arm rod 38
Material				
Fittings	CuAl	CuAl	CuAl	CuAl
Insulating part	GRP, color RAL1020 (olive yellow)	GRP, color RAL6022 (olive drab)	GRP, color RAL6022 (olive drab)	GRP, color RAL6022 (olive drab)
Grooved pins	stlSt	stlSt	stlSt	stlSt
Weight	1.54 kg	1.34 kg	1.54 kg	2.87 kg
Perm. operating load	2.0 kN	2.0 kN	2.0 kN	2.5 kN
Min. failing load	6.0 kN	6.0 kN	6.0 kN	7.5 kN
Min. creepage distance	845 mm	645 mm	845 mm	830 mm
d	26 mm	26 mm	26 mm	38 mm
h	70 mm	70 mm	70 mm	67 mm
L	1000 mm	800 mm	1000 mm	1000 mm

Hook end clamp and clip holder bonded.

Other lengths, colors and with threaded pin M16 or 5/8" on request.

Contact wire clips see Chapter 02-09.

Steady arm with GRP rod/tube and hook end fitting



Order no.	8WL2870-3	8WL2870-0	8WL2871-6	8WL2872-0
Designation	Steady arm tube 26	Steady arm rod 26	Steady arm rod 26	Steady arm rod 38
Material				
Fittings	CuAl	CuAl	CuAl	CuAl
Insulating part	GRP, color RAL7034 (yellow grey)	GRP, color RAL1020 (olive yellow)	GRP, color RAL6022 (olive drab)	GRP, color RAL1020 (olive yellow)
Grooved pin	stlSt	stlSt	stlSt	stlSt
Weight	1.38 kg	1.65 kg	1.65 kg	3.20 kg
Perm. operating load	2.0 kN	2.0 kN	2.0 kN	2.5 kN
Min. failing load	6.0 kN	6.0 kN	6.0 kN	7.5 kN
Min. creepage distance	800 mm	800 mm	800 mm	755 mm
a	15 mm	15 mm	15 mm	16 mm
b	15.0 mm	15.0 mm	15.0 mm	15.5 mm
d	26 mm	26 mm	26 mm	38 mm

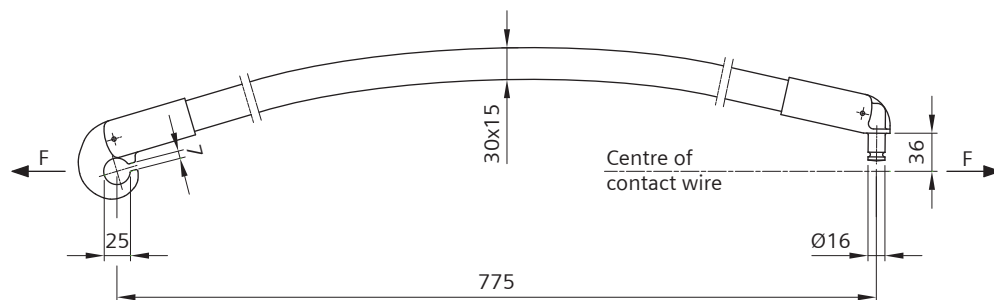
Hook end clamp and clip holder bonded.

Other lengths, colors and with threaded pin M16 or 5/8" on request.

Contact wire clips see Chapter 02-09.

Steady arm with GRP rod and hook end fitting

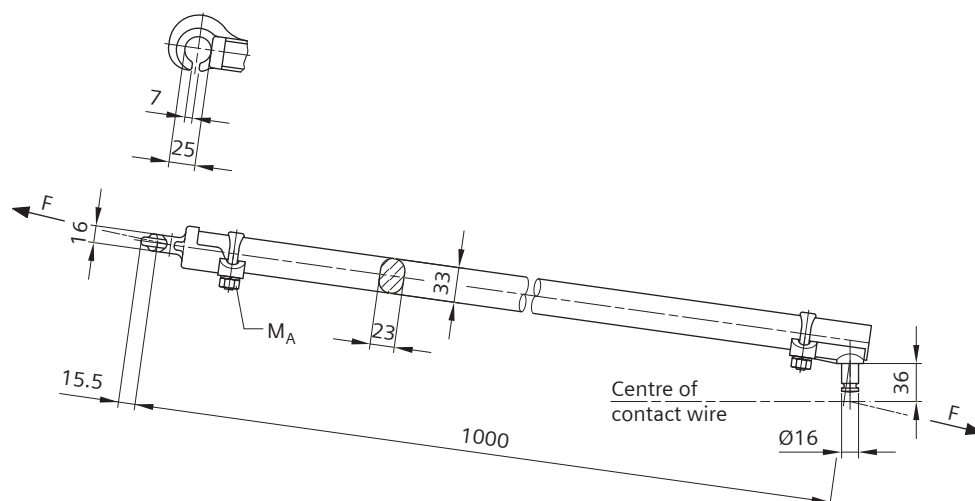
for insulated pull-off



Order no.	8WL3508-0
Designation	Steady arm with GRP rod 30x15
Material	
Fittings	CuAl
Insulating part	GRP
Grooved pins	stlSt
Weight	1.18 kg
Perm. operating load	2.5 kN
Min. failing load	7.5 kN

Contact wire clips see Chapter 02-09.

Steady arm with GRP rod and hook end fitting

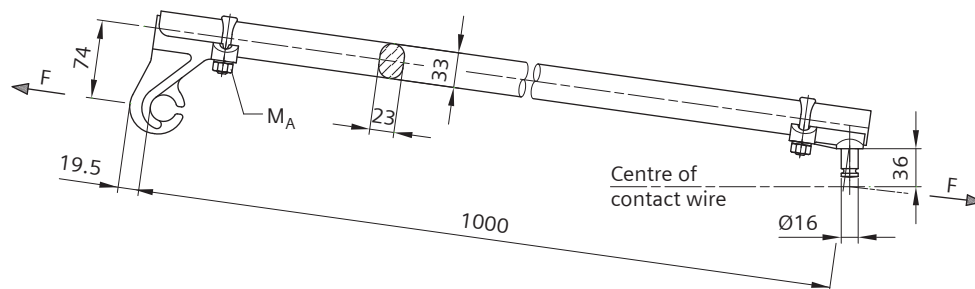


Order no.	8WL3514-0	8WL3515-6
Designation	Steady arm with GRP rod 23x33	Steady arm with GRP rod 23x33
Material		
Fittings	CuAl	CuAl
Insulating part	GRP, color RAL1020 (olive yellow)	GRP, color RAL6022 (olive drab)
U-bolts M10	stlSt	stlSt
Nuts	stlSt	stlSt
Weight	1.80 kg	1.80 kg
Perm. operating load	2.5 kN	2.5 kN
Min. failing load	7.5 kN	7.5 kN
Tightening torque M_A	40 Nm	40 Nm
Min. creepage distance	850 mm	850 mm

Other lengths and colors on request.

Contact wire clips see Chapter 02-09.

Steady arm with GRP rod and hook end clamp



Order no.	8WL3514-3	8WL3515-7
Designation	Steady arm with GRP rod 23x33	Steady arm with GRP rod 23x33
Material		
Fittings	CuAl	CuAl
Insulating part	GRP, color RAL1020 (olive yellow)	GRP, color RAL6022 (olive drab)
U-bolts M10	stlSt	stlSt
Nuts	stlSt	stlSt
Weight	2.00 kg	2.00 kg
Perm. operating load	2.5 kN	2.5 kN
Min. failing load	7.5 kN	7.5 kN
Tightening torque M_A	40 Nm	40 Nm
Min. creepage distance	860 mm	860 mm

Other lengths and colors on request.

Contact wire clips see Chapter 02-09.

Chapter 02

Standard Products

Tensioning equipment	01	01-86
Thimbles, connectors, sleeves	02	01-24
GRP cantilevers	03	01-68
Aluminium cantilevers	04	01-80
Steel cantilevers	05	01-42
Headspan supports	06	01-36
Insulators	07	01-34
Contact lines under structures and bridge protection	08	01-42
Clamps	09	01-84
Tension wheel equipment	10	01-48
Section insulators	11	01-34
Disconnectors and drive mechanism	12	01-62
Earthing and protecting equipment	13	01-14
Contact wires, conductors, span wires	14	01-22
Monitoring systems	15	01-06
Installation tools and equipment	16	01-24

Additional electrical connector	02-04-75
Aluminium tube	02-04-79
Bridle guiding device 42-70	02-04-37
Bridle suspension 42-70	02-04-36
Cantilever swivel bracket 100-120	02-04-13
Cantilever swivel bracket at concrete pole	02-04-11
Cantilever swivel bracket for fastening of punch-lock band	02-04-12
Catenary wire support clamp 42-70, insulated	02-04-40
Catenary wire support clamp 42-80/14	02-04-42
Catenary wire support clamp 42-80/19	02-04-43
Catenary wire support clamp 55/16, insulated	02-04-41
Catenary wire support clamp 55-70	02-04-47
Catenary wire support clamp 55-70 with hook	02-04-48
Catenary wire support clamp 55-80/14	02-04-44
Catenary wire support clamp 55-80/19	02-04-45
Clamp holder for contact wire	02-04-76
Clevis end fitting 26	02-04-17
Clevis end fitting 42-55	02-04-18, 02-04-20, 02-04-21
Clevis end fitting 42-70	02-04-16
Clevis end fitting 55 with hook	02-04-19
Clevis end fitting for connection with insulator	02-04-22
Clevis end fitting for twin tube	02-04-26
Cross link clevis/clevis	02-04-30
Drop bracket 42-55 H=70	02-04-56
Drop bracket 42-55 H=90	02-04-58
Drop bracket 42-55 H=90, steplessly adjustable	02-04-59
Drop bracket 55 H=70	02-04-61
Drop bracket 55 H=90	02-04-62
Drop bracket 70/80 H=70	02-04-57
End cap	02-04-80
Eye clamp 42-55 for windstay	02-04-77
Eye clamp 42-70	02-04-31
Eye clamp 42-80	02-04-32
Eye clamp 55-70	02-04-33
Eye clamp for tube-type drop bracket 55-70	02-04-64
Hook clip 42-55	02-04-49, 02-04-50
Hook clip 42-80 for U-bolt M16	02-04-46
Hook clip 70/80	02-04-51
Hook end clamp 26	02-04-52
Hook end fitting 26	02-04-53
Hook end fitting 42-55	02-04-54, 02-04-55
Reducing socket 70/55	02-04-34
Reducing socket 80/70-70/55	02-04-35
Spade end fitting 26	02-04-23
Spade end fitting 42-55	02-04-24
Stay tube holder 55	02-04-63

Steady arm made of aluminium H=70	02-04-67
Steady arm made of aluminium H=90	02-04-68
Steady arm made of aluminium H=90, current carrying	02-04-70
Steady arm made of aluminium H=90, angled	02-04-71
Steady arm made of aluminium H=90, angled, current carrying	02-04-73
Steady arm made of aluminium, curved	02-04-74
Swivel clip holder 26, insulated	02-04-66
Swivel with clevis	02-04-14
Swivel with eye	02-04-15
Tube connecting fitting 42-70	02-04-65
Tube end fitting 42-70	02-04-25
Twin bridle guiding device 55-60.3	02-04-38
Twin drop bracket 42/42.4-55 H=70/90	02-04-60
Twin tube clamp	02-04-27
Twin tube clamp 55-70	02-04-39
Twin tube clamp with double eye	02-04-29
Twin tube clamp with eye	02-04-28
Windstay for steady arm	02-04-78

Technical comments

Application

The products listed in this section are used to support the overhead contact line as aluminium cantilevers.

Cantilever tubes and steady arms are used to fix the catenary wire and contact wire relative to the track axis and to fasten it at the desired distance from the supporting pole, soffit post or wall fastening.

With the aid of electrically designed fittings, cantilevers can not only be used for supporting functions. They also can be used for carrying operating currents and replace current connectors and current-carrying droppers.

Types

The design of the cantilever tubes, steady arms, etc., depends on the parameters of the power supply system, the type of support and the static requirements of the system.

Insulation in cantilever tubes takes place optionally by composite or cast-resin, for top wires with loop insulators. Insulation in tube type steady arms is carried out with cast-resin insulators. For selecting the appropriate contact wire clips for the specific application, see QV.

New in the portfolio are components that enable cantilever configurations for the following requirements:

- Low system heights due to suspended catenary wires
- Low distances between pole and track due to vertical registration tubes
- Drop bracket for use of angled or curved steady arms
- Operating current-carrying cantilevers

Aluminium alloys

The aluminium alloys used meet all of the requirements that are important for overhead contact line construction. The aluminium tubes are made using an extrusion process. The fittings are cast from an aluminium-magnesium-silicon alloy and subsequently heat-treated once more.

Special features

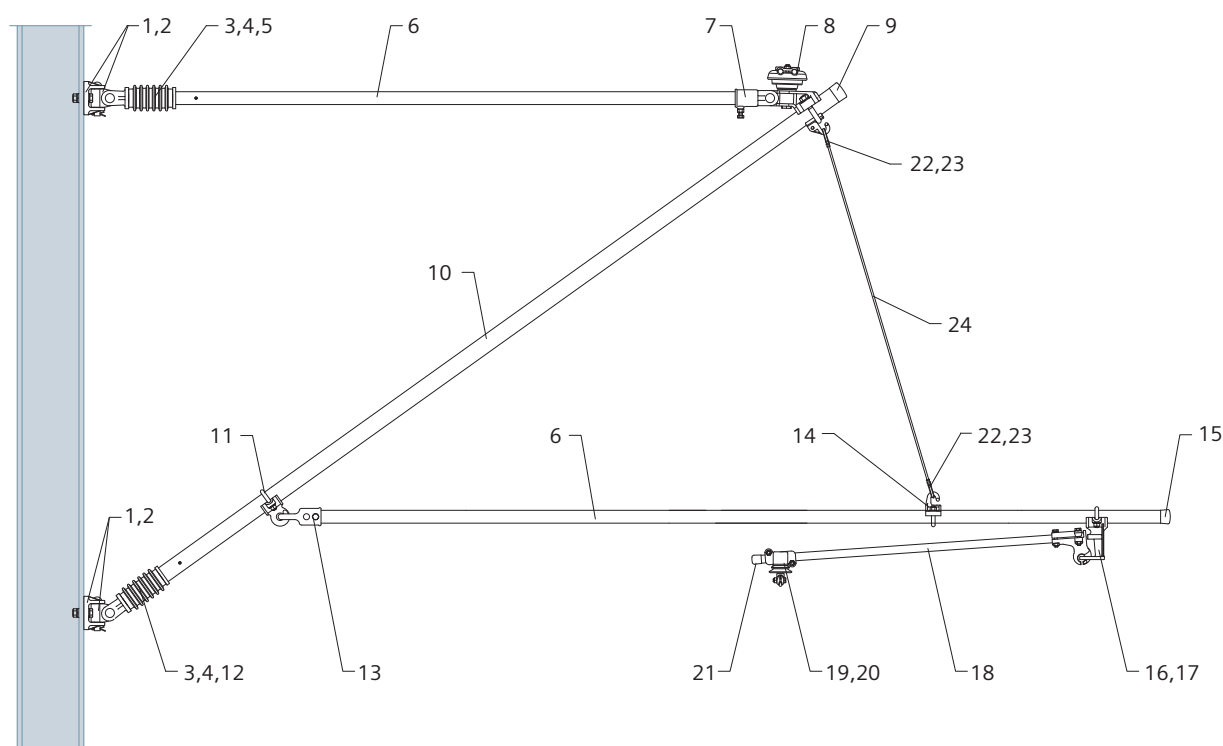
- High mechanical strength for high load capacity
- Easy installation due to the low weight of the components
- Low maintenance expenditure due to the elimination of corrosion protection tasks
- Long service life due to the corrosion resistance

Examples for assemblies

On the following pages you can find a number of typical application examples for the configuration of aluminium cantilevers.

The exact configuration of the cantilever depends on the specific plant and the local situation.

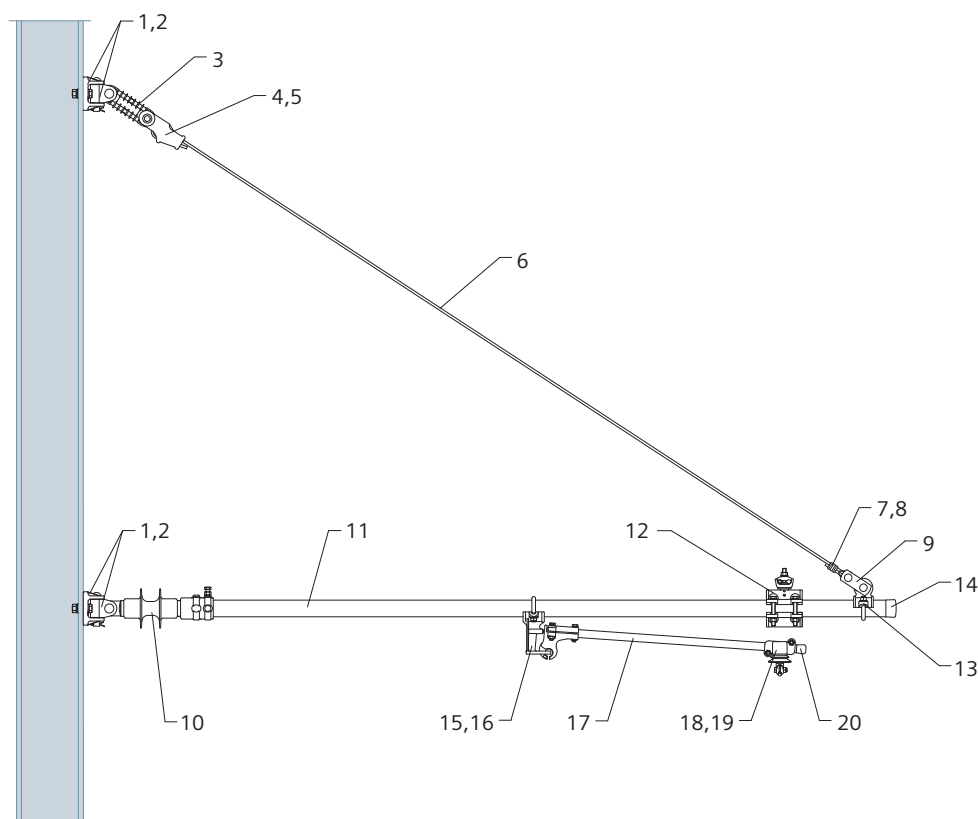
Cantilever on steel pole for catenary system in mass transit



Pos.	Designation	Order no.
1	Cantilever swivel bracket	8WL2124-4
2	Swivel with clevis	8WL2126-1
3	Clevis end fitting for connection with insulator	8WL2201-0
4	Insulator body 3 kV DC	8WL3120-5
5	Tube end fitting 42	8WL2207-0
6	Aluminium tube 42x4 (length as needed)	8WL2165-0
7	Clevis end fitting 42	8WL2121-4
8	Catenary wire support clamp, insulated	8WL2071-4
9	End cap 55	8WL2184-3
10	Aluminium tube 55x6 (length as needed)	8WL2167-0
11	Eye clamp 55	8WL2114-1
12	Tube end fitting 55	8WL2206-0

Pos.	Designation	Order no.
13	Hook end fitting 42	8WL2104-1
14	Hook clip 42	8WL2148-5
15	End cap 42	8WL2184-7
16	Drop bracket 42	8WL2118-1
17	Hook end clamp 26	8WL2101-4
18	Aluminium tube 26x3.5 (length as needed)	8WL2161-0
19	Swivel clip holder, insulated	8WL2012-4
20	Contact wire clip	8WL4517-1K
21	End cap 26	8WL2184-0
22	Thimble 6	8WL1516-1
23	Compression joint	8WL1553-0
24	Wire rope 6 (length as needed)	8WL7093-2

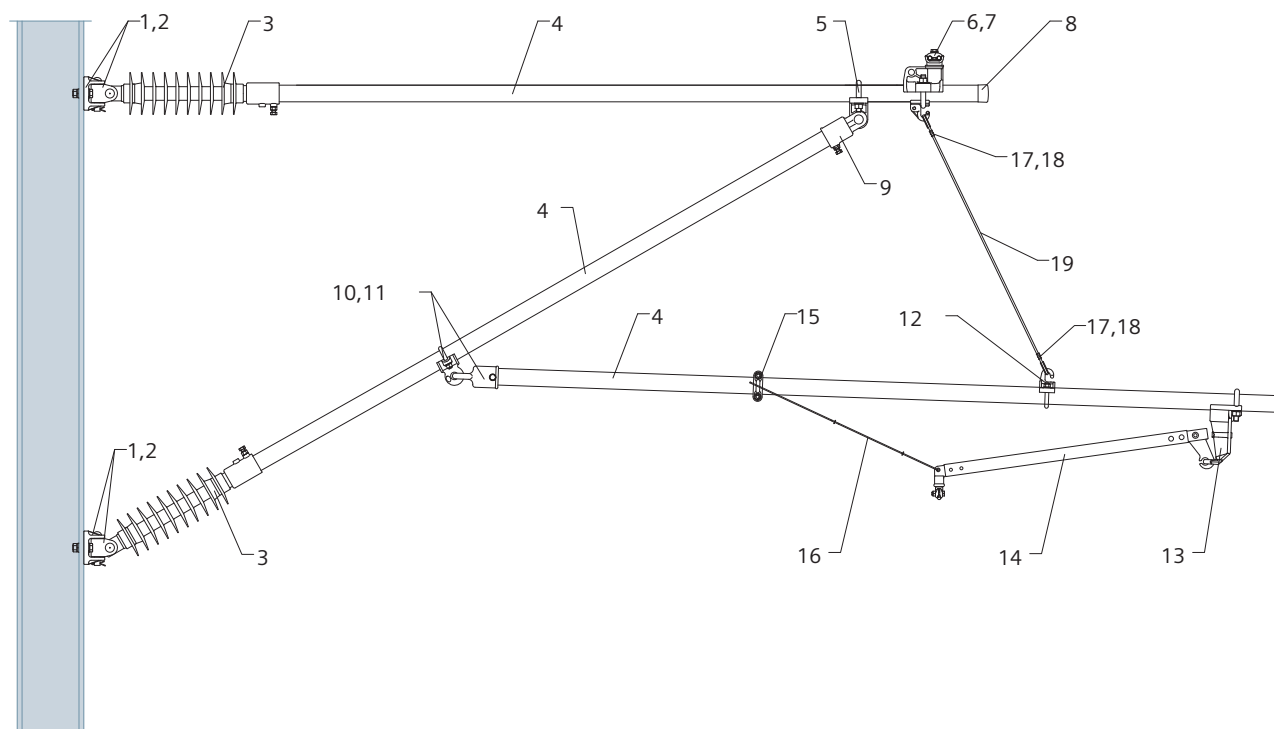
Cantilever on steel pole for single contact wire system in mass transit



Pos.	Designation	Order no.
1	Cantilever swivel bracket	8WL2124-4
2	Swivel with clevis	8WL2126-1
3	Loop insulator 1,5 kV DC	8WL3001-2
4	Wedge-type dead-end clamp	8WL1181-7
5	Three-hole wedge	8WL1203-0
6	Wire rope 8 (length as needed)	8WL7093-2
7	Compression clamp 8	8WL1650-3
8	Thimble 8	8WL1516-2
9	Two pin clevis link	8WL1016-6
10	Composite insulator up to 3 kV DC	8WL3088-2E

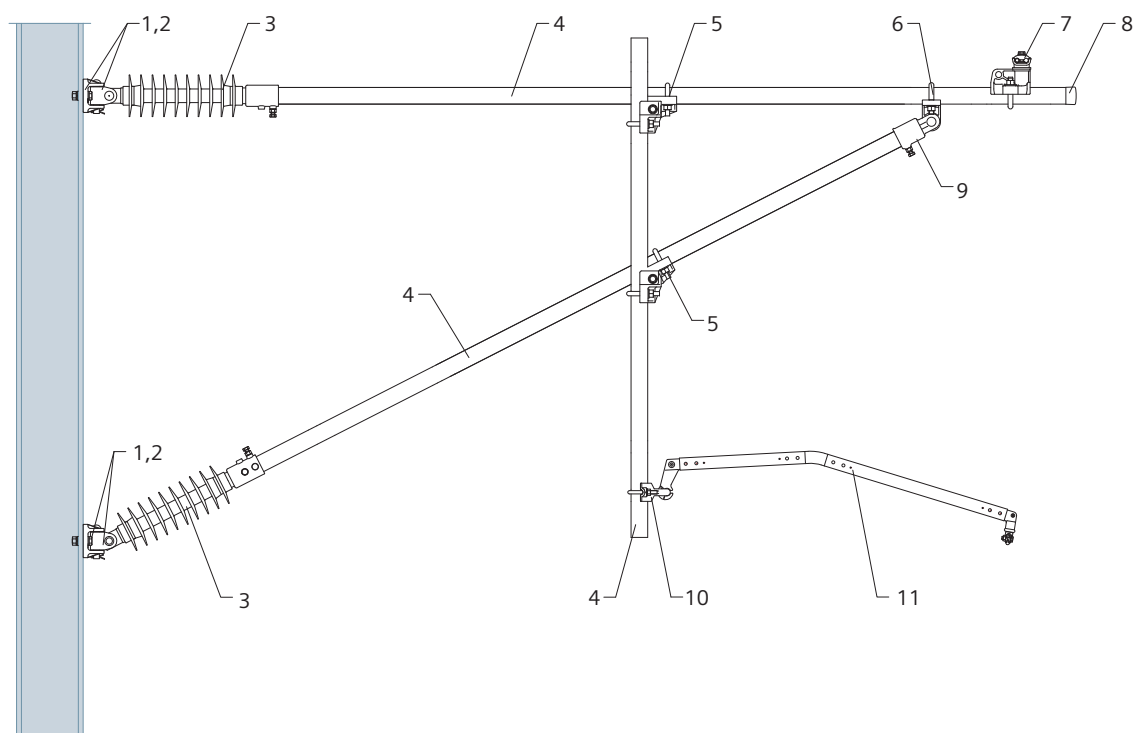
Pos.	Designation	Order no.
11	Aluminium tube 55x6 (length as needed)	8WL2167-0
12	Bridle suspension	8WL2097-0
13	Eye clamp 55	8WL2114-1
14	End cap 55	8WL2184-3
15	Drop bracket 42	8WL2118-1
16	Hook end clamp 26	8WL2101-4
17	Aluminium tube 26x3.5 (length as needed)	8WL2161-0
18	Swivel clip holder, insulated	8WL2012-4
19	Contact wire clip	8WL4517-1K
20	End cap 26	8WL2184-0

Cantilever, push-off on steel pole in main-line railways



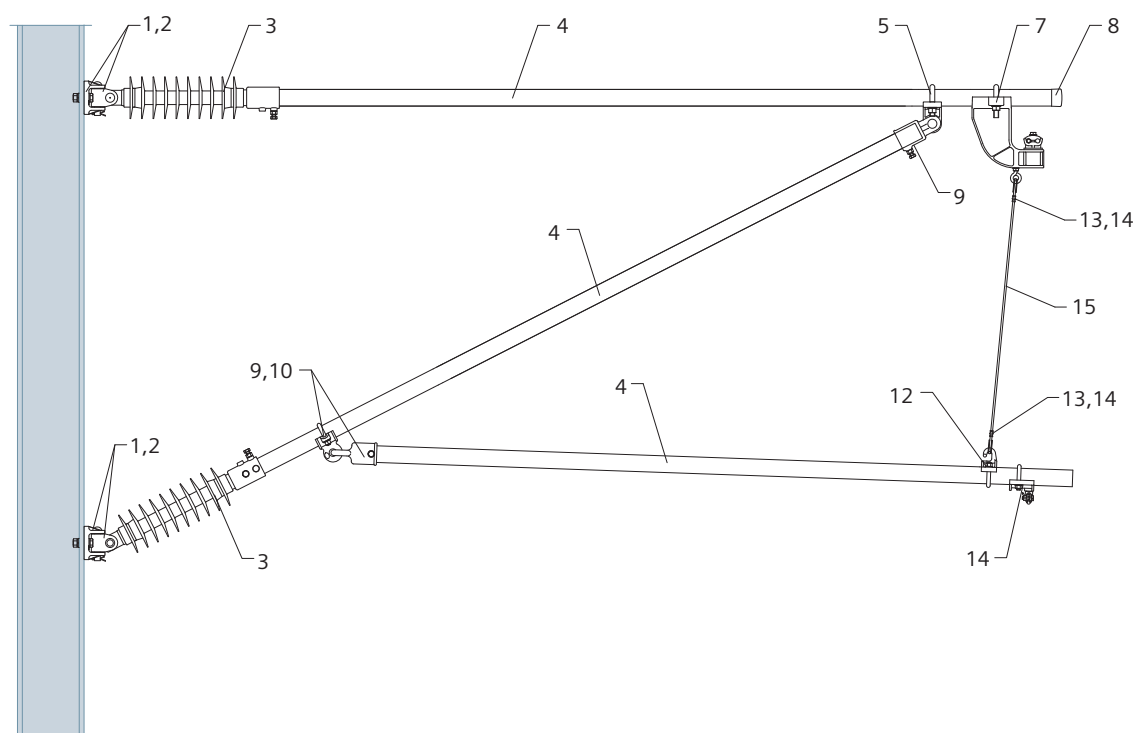
Position	Designation	Order no.
1	Cantilever swivel bracket	8WL2124-4
2	Swivel with clevis	8WL2126-1
3	Composite insulator 25 kV AC	8WL3078-2A
4	Aluminium tube 55x6 (length as needed)	8WL2167-0
5	Eye clamp 55	8WL2115-1
6	Catenary wire support clamp 55/14	8WL2032-3
7	Hook clip for U-bolt	8WL2196-3
8	End cap 55	8WL2184-3
9	Clevis end fitting 55	8WL2121-5
10	Eye clamp 55	8WL2114-1
11	Hook end fitting 55	8WL2104-2
12	Hook clip 55	8WL2148-6
13	Drop bracket 55	8WL2118-4B
14	Steady arm (length as needed)	8WL3500-3A to -3K
15	Eye clamp 55 for windstay	8WL2112-5H
16	Windstay for steady arm	8WL2112-8B
17	Thimble 35	8WL1501-1
18	Compression joint	8WL1553-0
19	Wire rope 6 (length as needed)	8WL7093-2

Cantilever with vertical registration tube on steel pole in main-line railways



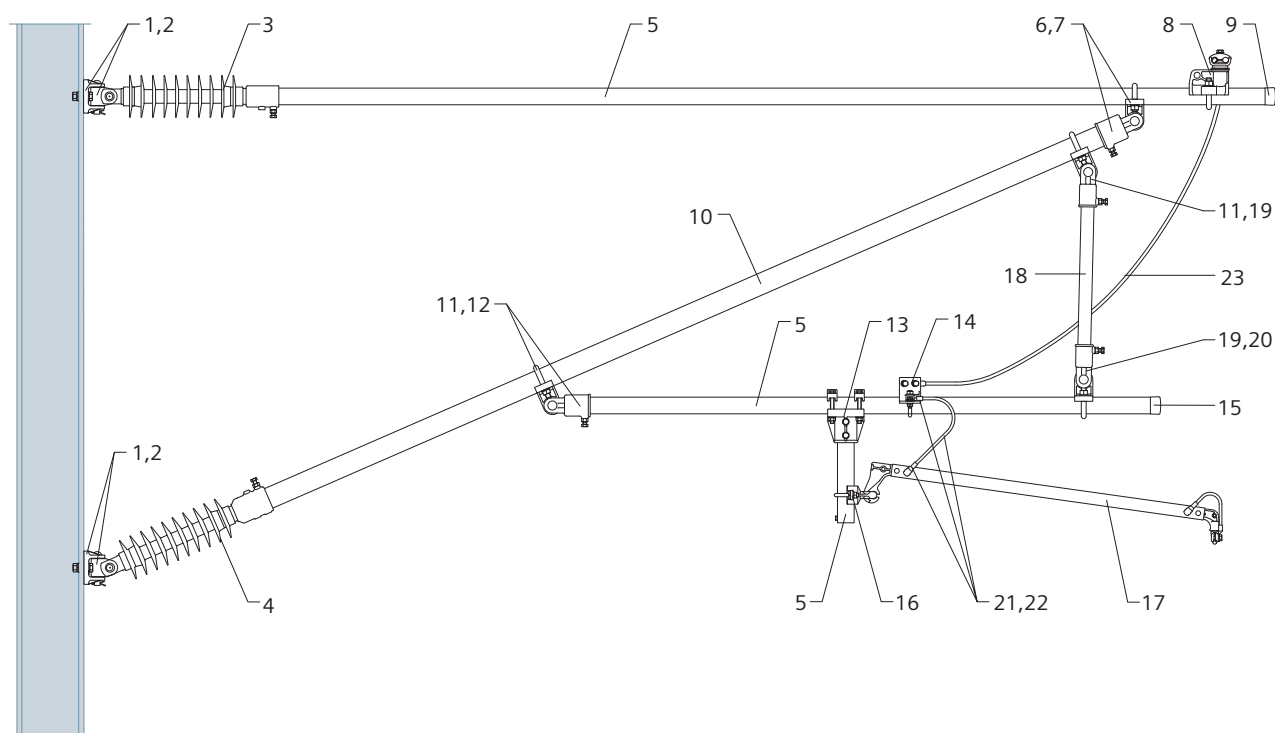
Position	Designation	Order no.
1	Cantilever swivel bracket	8WL2124-4
2	Swivel with clevis	8WL2126-1
3	Composite insulator 25 kV AC	8WL3078-2A
4	Aluminium tube 55x6 (length as needed)	8WL2167-0
5	Twin tube clamp 55-70	8WL2217-0
6	Eye clamp 55	8WL2115-1
7	Catenary wire support clamp 55/14	8WL2032-3
8	End cap 55	8WL2184-3
9	Clevis end fitting 55	8WL2121-5
10	Eye clamp for tube-type drop bracket 55	8WL2114-1A
11	Steady arm, angled (length as needed)	8WL3500-8L bis -8U

Cantilever, lifted for low system heights on steel pole in main-line railways



Position	Designation	Order no.
1	Cantilever swivel bracket	8WL2124-4
2	Swivel with clevis	8WL2126-1
3	Composite insulator 25 kV AC	8WL3078-2A
4	Aluminium tube 55x6 (length as needed)	8WL2167-0
5	Eye clamp 55	8WL2115-1
6	Catenary wire support clamp 55/14 with hook	8WL2027-0C
7	End cap 55	8WL2184-3
8	Clevis end fitting 55	8WL2121-5
9	Eye clamp 55	8WL2114-1
10	Hook end fitting 55	8WL2104-2
11	Hook clip 55	8WL2148-6
12	Thimble 35	8WL1501-1
13	Compression joint	8WL1553-0
14	Wire rope 6 (length as needed)	8WL7093-2

Cantilever, current-carrying on steel pole in main-line railways

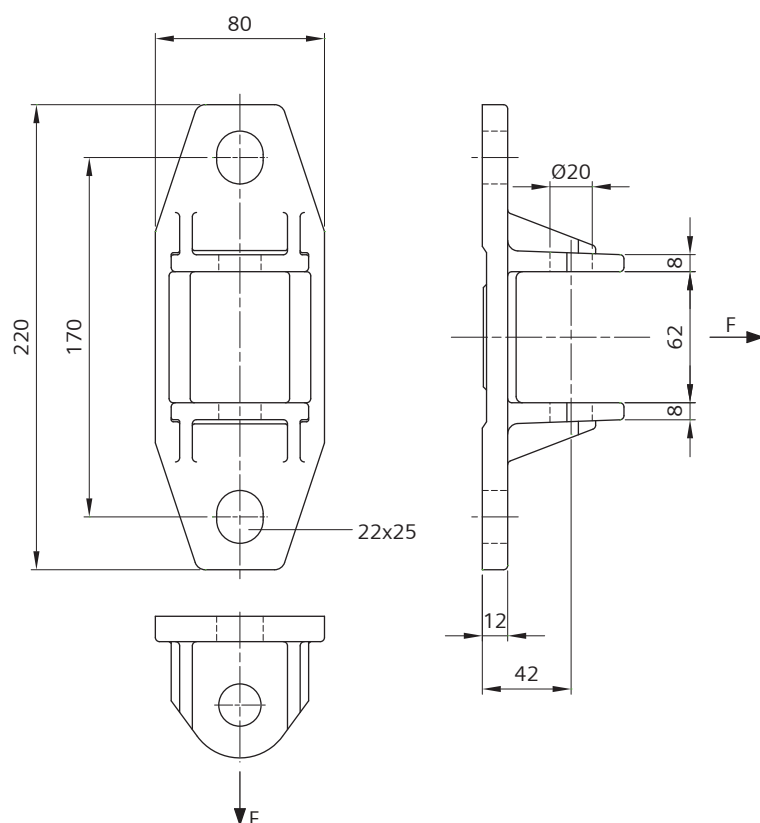


Pos.	Designation	Order no.
1	Cantilever swivel bracket	8WL2124-4
2	Swivel with clevis	8WL2126-1
3	Composite insulator 25 kV AC for tube 55	8WL3078-2A
4	Composite insulator 25 kV AC for tube 70	8WL3078-2B
5	Aluminium tube 55x6 (length as needed)	8WL2167-0
6	Eye clamp 55	8WL2115-1
7	Clevis end fitting 70	8WL2120-7
8	Catenary wire support clamp 55/19	8WL2034-3
9	End cap 55	8WL2184-3
10	Aluminium tube 70x6 (length as needed)	8WL2170-0
11	Eye clamp 70	8WL2116-0
12	Clevis end fitting 55	8WL2121-5

Pos.	Designation	Order no.
13	Stay tube holder 55 for registration tube 55	8WL2244-0
14	Tube connecting fitting 55	8WL4652-1
15	End cap 55	8WL2184-3
16	Eye clamp for tube-type drop bracket 55	8WL2114-1A
17	Steady arm, current carrying (length as needed)	8WL3500-3BS bis -3GS
18	Aluminium tube 42x4 (length as needed)	8WL2165-0
19	Clevis end fitting 42	8WL2121-4
20	Eye clamp 55	8WL2115-1
21	Cable lug 10-35	8WL1577-0
22	Copper wire 25x133	8WL7071-0
23	Wire and connecting parts at tube connecting fitting and catenary wire have to be defined project-specifically.	

Cantilever swivel bracket at concrete pole

for hinged cantilevers



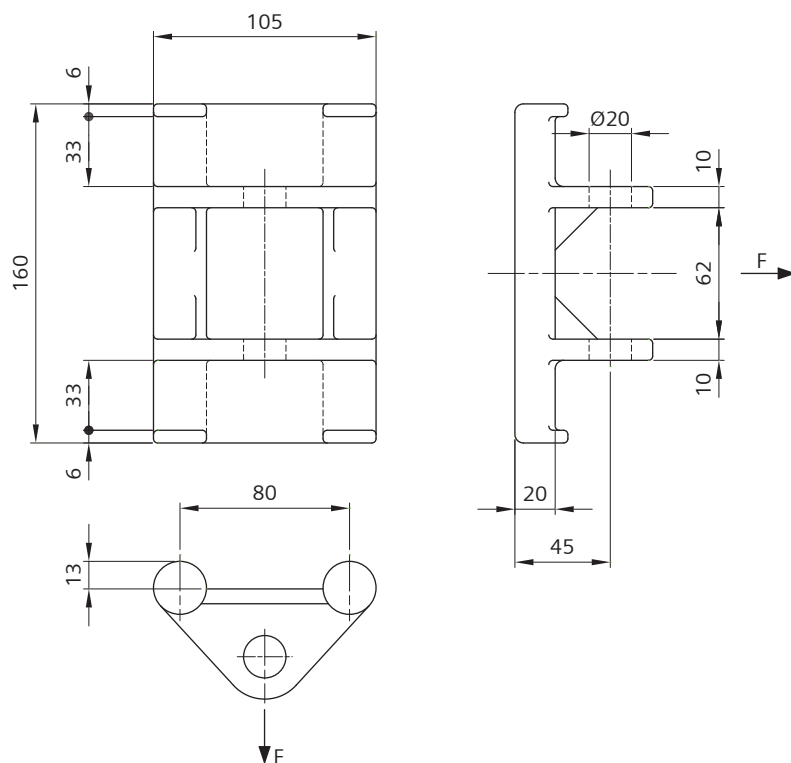
Order no.	8WL2123-3
Designation	Cantilever swivel bracket
Material	ctAl
Weight	0.61 kg
Perm. operating load	18.4 kN
Min. failing load	55 kN

Pin 8WL1112-3 (19x100-Al) and split pin 8WL1115-3 (5x28-Al) must be ordered separately, see Chapter 02-01.

Can also be supplied completely mounted.

Cantilever swivel bracket for fastening of punch-lock band

for hinged cantilevers made at round pole



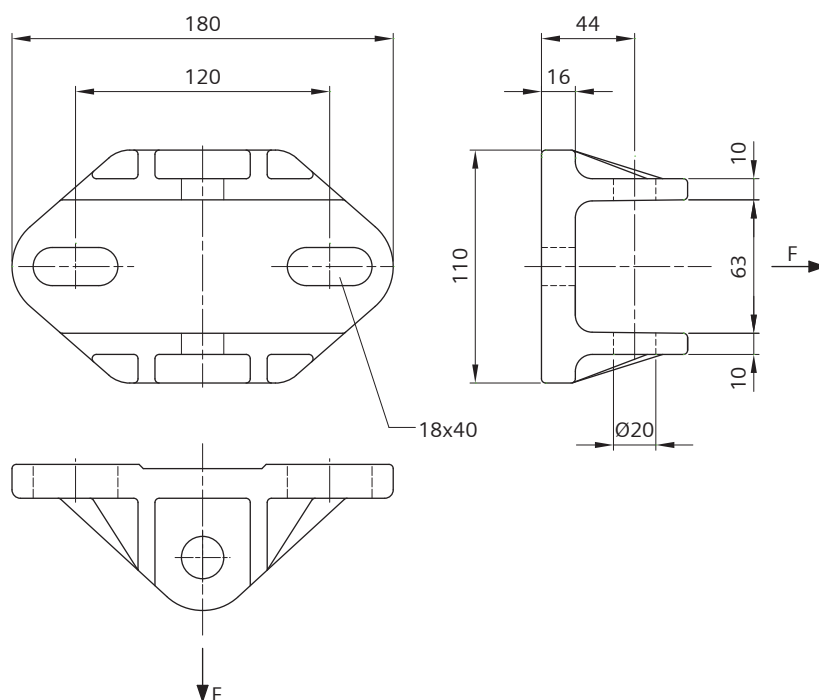
Order no.	8WL2124-3
Designation	Cantilever swivel bracket
Material	ctAl
Weight	0.58 kg
Perm. operating load	13.4 kN
Min. failing load	40 kN

Pin 8WL1112-3 (19x100-Al), split pin 8WL1115-3 (5x28-Al), punch-lock band 8WL6743-0 and lock 8WL6748-6 or loop 8WL6748-1 must be ordered separately, see Chapter 02-01.

Can also be supplied completely mounted.

Cantilever swivel bracket 100-120

for hinged cantilevers, for fixing at U-sections 100 to 120



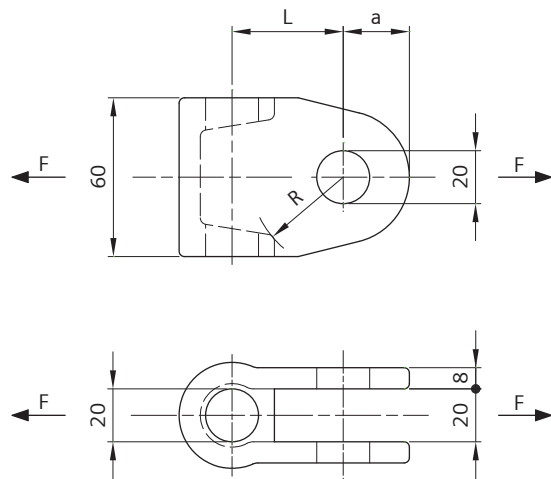
Order no.	8WL2124-4
Designation	Cantilever swivel bracket
Material	ctAl
Weight	0.78 kg
Perm. operating load	21.7 kN
Min. failing load	65 kN

Pin 8WL1112-3 (19x100-Al) and split pin 8WL1115-3 (5x28-Al) must be ordered separately, see Chapter 02-01.

Can also be supplied completely mounted.

Swivel with clevis

for hinged cantilevers



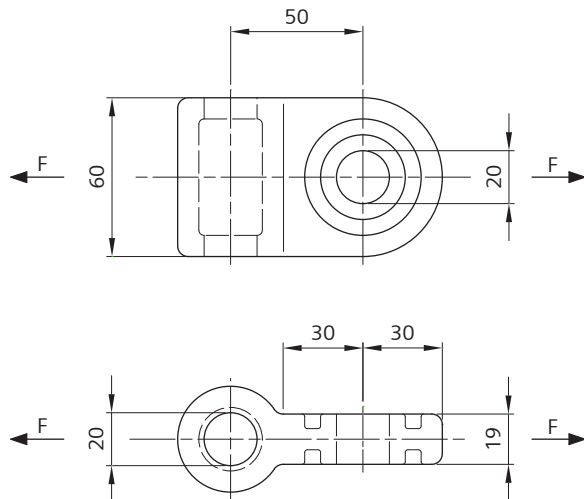
Order no.	8WL2126-1	8WL2126-3
Designation	Swivel with clevis 20	Swivel with clevis 20
Material	ctAl	ctAl
Weight	0.20 kg	0.29 kg
Perm. operating load	21.7 kN	21.7 kN
Min. failing load	65 kN	65 kN
a	25 mm	28 mm
L	42 mm	62 mm
R	35 mm	41 mm

Pin 8WL1110-3 (19x52-Al) and split pin 8WL1115-3 (5x28-Al) must be ordered separately, see Chapter 02-01.

Can also be supplied completely mounted.

Swivel with eye

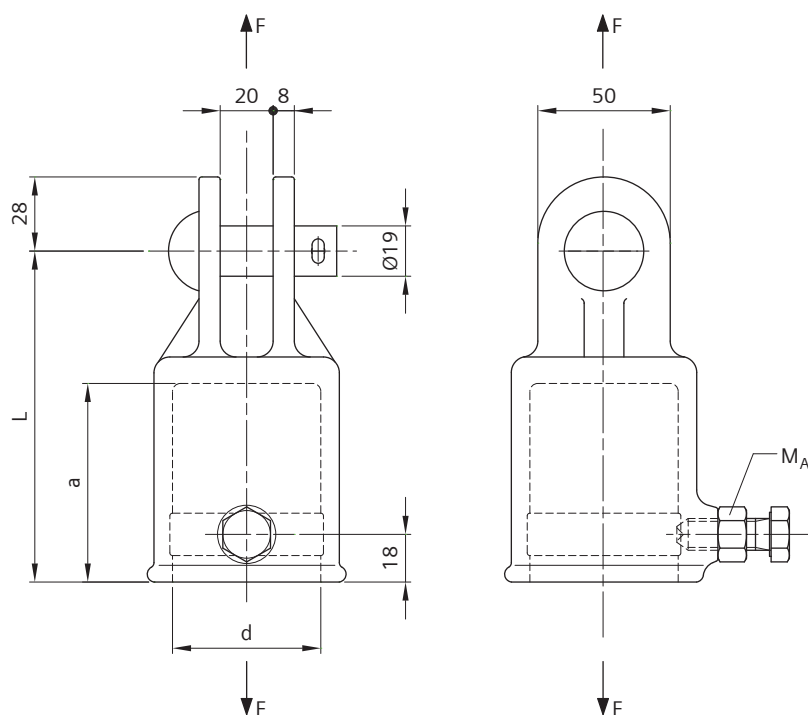
for hinged cantilevers



Order no.	8WL2127-1
Designation	Swivel with eye 20
Material	ctAl
Weight	0.25 kg
Perm. operating load	21.7 kN
Min. failing load	65 kN

Clevis end fitting 42-70

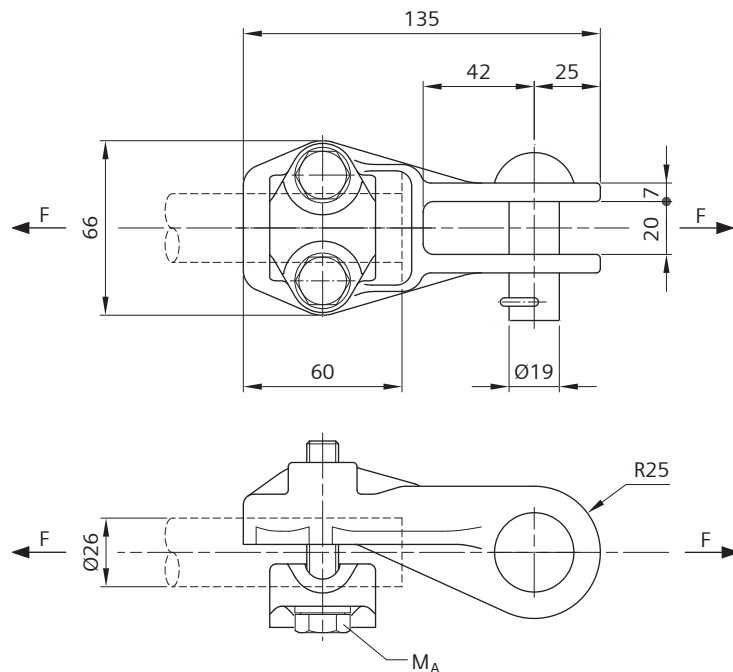
for hinged cantilevers, for tube d=42 to 70 mm



Order no.	8WL2121-4	8WL2121-5	8WL2120-7
Designation	Clevis end fitting 42	Clevis end fitting 55	Clevis end fitting 70
Material			
Clevis end fitting	ctAl	ctAl	ctAl
Cup-point screw M12	stlSt	stlSt	stlSt
Nut	stlSt	stlSt	stlSt
Pin 19x52	Al	Al	Al
Split pin 5x28	Al	Al	Al
Weight	0.48 kg	0.68 kg	0.72 kg
Perm. operating load	4 kN	4 kN	4 kN
Min. failing load	12 kN	12 kN	12 kN
Tightening torque M_A	50 Nm	50 Nm	50 Nm
a	65 mm	75 mm	75 mm
d	43 mm	56 mm	71 mm
L	115 mm	125 mm	125 mm

Clevis end fitting 26

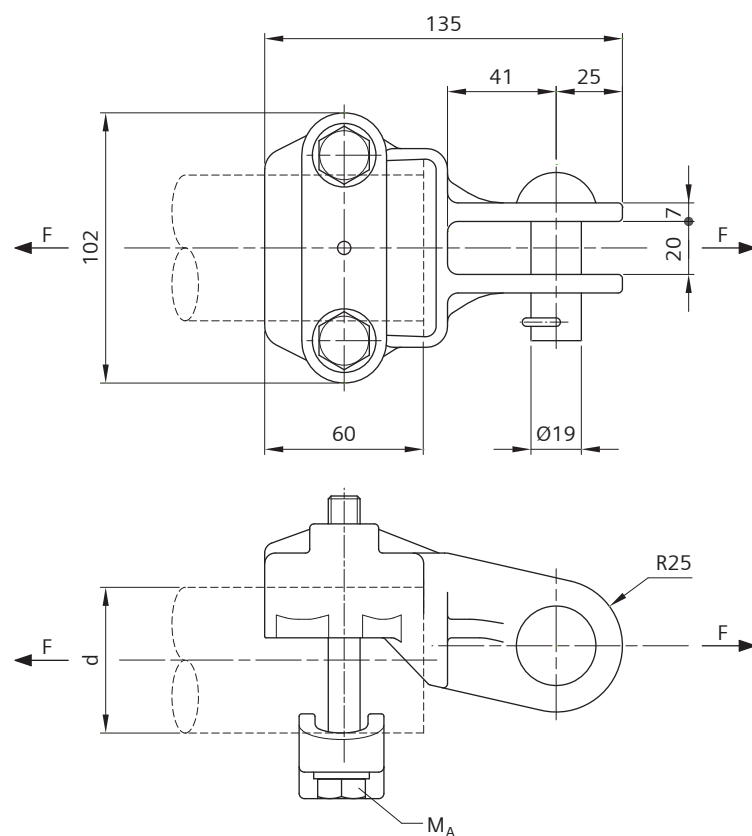
for hinged cantilevers and operating linkages, for tube d=26 mm



Order no.	8WL6222-4
Designation	Clevis end fitting 26
Material	
Clevis end fitting	ctAl
Clamp cover	ctAl
Bolts M12	stlSt
Pin 19x52	Al
Beta-Split pin	stlSt
Spring washers	stlSt
Weight	0.54 kg
Perm. operating load	10 kN
Min. failing load	30 kN
Tightening torque M_A	35 Nm

Clevis end fitting 42-55

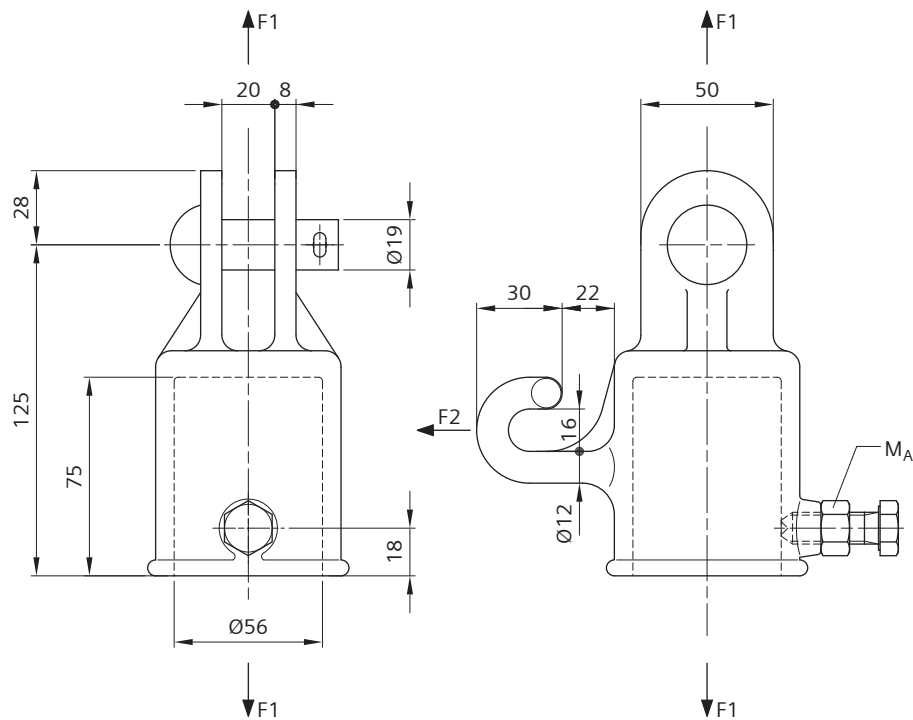
for hinged cantilevers, for tube d=42 mm to 55 mm



Order no.	8WL2122-5E	8WL2122-5F
Designation	Clevis end fitting 42	Clevis end fitting 55
Material		
Clevis end fitting	ctAl	ctAl
Clamp cover	ctAl	ctAl
Bolts M12	stlSt	stlSt
Pin 19x52	Al	Al
Beta-Split pin	stlSt	stlSt
Spring washers	stlSt	stlSt
Weight	0.74 kg	0.76 kg
Perm. operating load	12.5 kN	12.5 kN
Min. failing load	37.5 kN	37.5 kN
Tightening torque M_A	56 Nm	56 Nm
d	42 mm	55 mm

Clevis end fitting 55 with hook

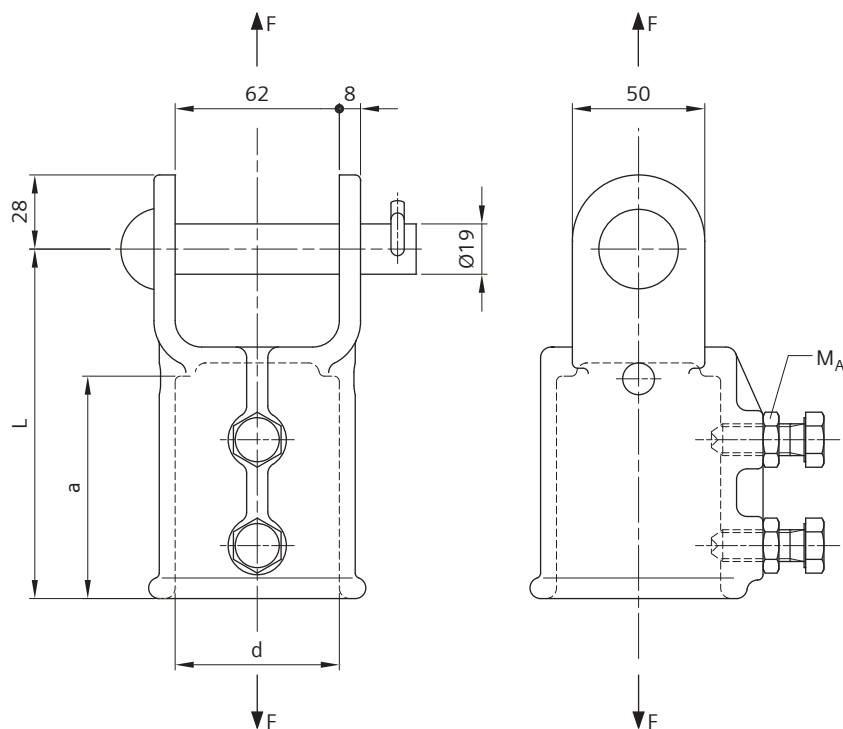
for hinged cantilevers, for tube d=55 mm



Order no.	8WL2120-4
Designation	Clevis end fitting 55
Material	
Clevis end fitting	ctAl
Cup-point screw M12	stlSt
Nut	stlSt
Pin 19x52	Al
Split pin 5x28	Al
Weight	0.72 kg
Perm. operating load (F1)	4 kN
Min. failing load (F1)	12 kN
Perm. operating load (F2)	1.25 kN
Min. failing load (F2)	3.75 kN
Tightening torque M_A	50 Nm

Clevis end fitting 42-55

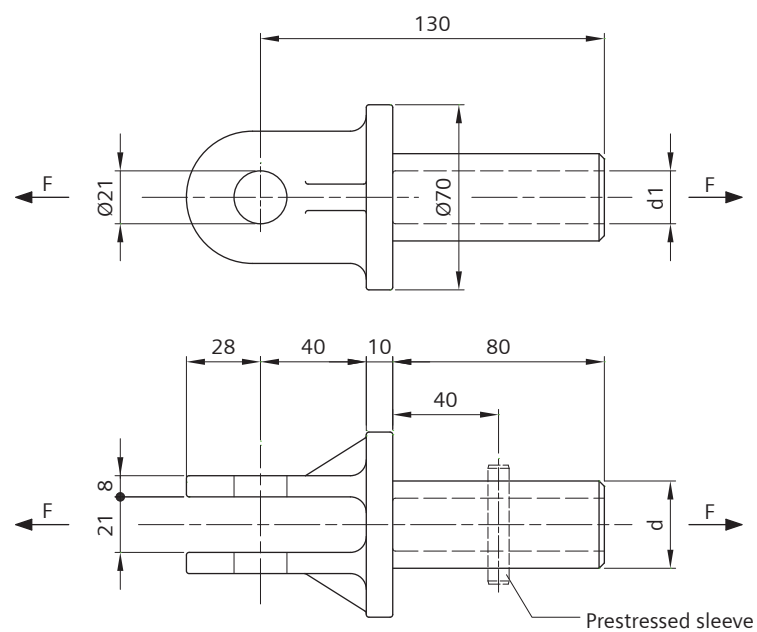
for connection of registration tube d=42 or 55 mm at cantilever tube d=80 mm



Order no.	8WL2121-4B	8WL2121-5B
Designation	Clevis end fitting 42	Clevis end fitting 55
Material		
Clevis end fitting	ctAl	ctAl
Cup-point screws M12	stlSt	stlSt
Nuts	stlSt	stlSt
Pin 19x100	Al	Al
Beta-Split pin	stlSt	stlSt
Weight	0.68 kg	0.76 kg
Perm. operating load	12 kN	10 kN
Min. failing load	36 kN	30 kN
Tightening torque M_A	50 Nm	50 Nm
a	70 mm	84 mm
d	48 mm	62 mm
L	118 mm	132 mm

Clevis end fitting 42-55

for hinged cantilevers



Order no.	8WL2200-0	8WL2200-1
Designation	Clevis end fitting 42	Clevis end fitting 55
Material	ctAl	ctAl
Weight	0.34 kg	0.42 kg
Perm. operating load	13.4 kN	13.4 kN
Min. failing load	40 kN	40 kN
Prestressed sleeve	8x45 mm	8x55 mm
d	33 mm	42 mm
d₁	20 mm	25 mm

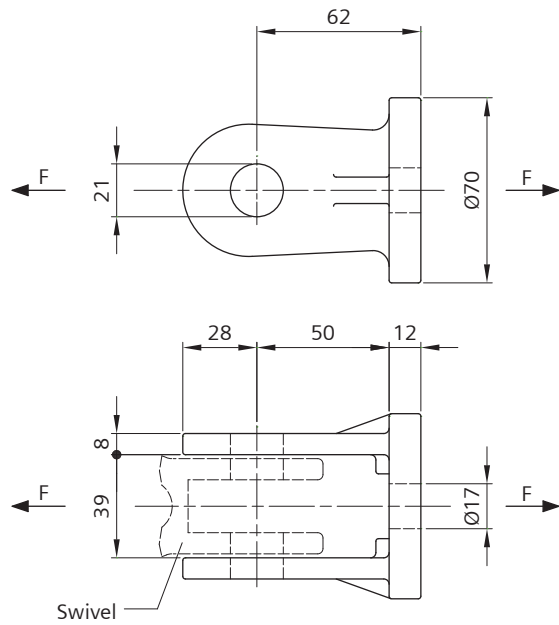
Pin 8WL1110-3 (19x52-Al) and split pin 8WL1115-3 (5x28-Al) must be ordered separately, see Chapter 02-01

The stated loads apply only for the installation mode shown.

Prestressed sleeve EN ISO 8752 (stISt) must be ordered separately.

Clevis end fitting for connection with insulator

for hinged cantilevers, for connection at swivels with clevis 8WL2126-1/-3

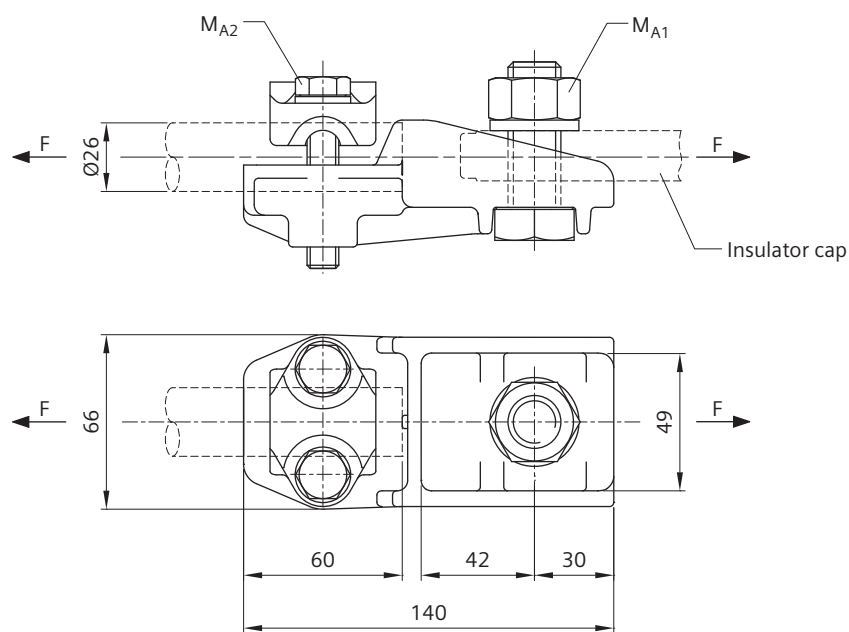


Order no.	8WL2201-0
Designation	Clevis end fitting
Material	ctAl
Weight	0.26 kg
Perm. operating load	13.4 kN
Min. failing load	40 kN

Pin 8WL1111-3 (19x70-Al) and split pin 8WL1115-3 (5x28-Al) must be ordered separately, see Chapter 02-01.

Spade end fitting 26

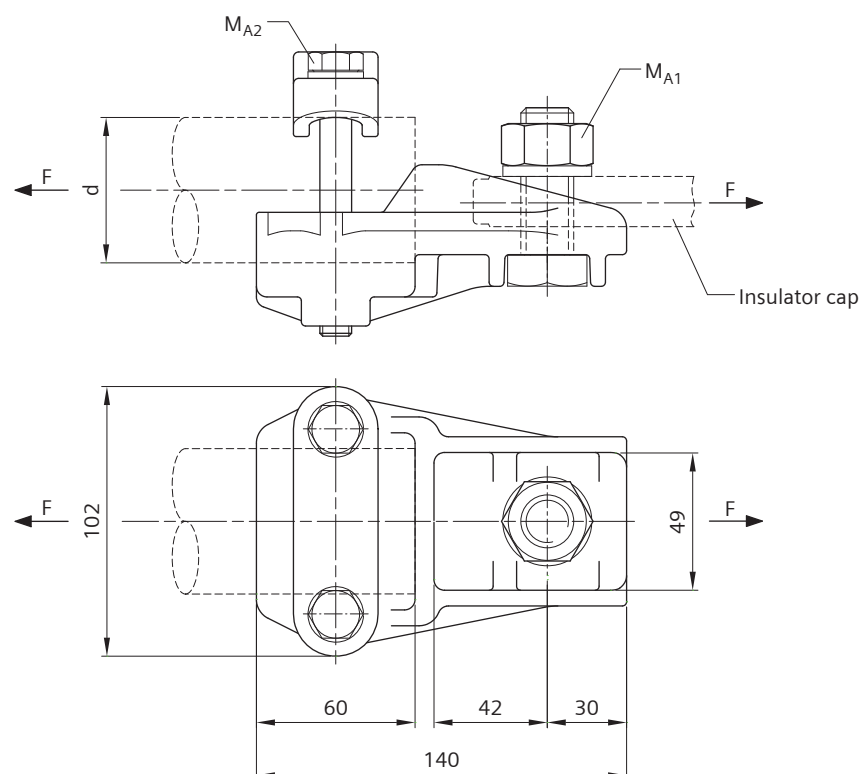
for insulator connection at top tube d=26 mm



Order no.	8WL2105-8
Designation	Spade end fitting 26
Material	
Spade end fitting	ctAl
Clamp cover	ctAl
Bolts M12	stlSt
Bolt M20	stlSt
Nut	stlSt
Spring washers	stlSt
Weight	0.79 kg
Perm. operating load	10 kN
Min. failing load	30 kN
Tightening torque M_{A1}	135 Nm
Tightening torque M_{A2}	56 Nm

Spade end fitting 42-55

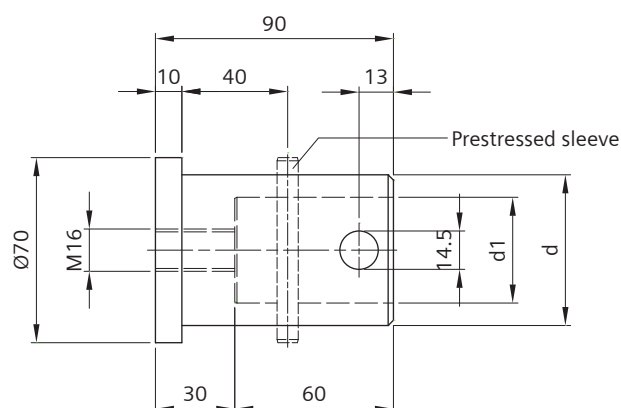
for insulator connection at top tube d=42 to 55 mm



Order no.	8WL2105-6D	8WL2105-6E
Designation	Spade end fitting 42	Spade end fitting 55
Material		
Spade end fitting	ctAl	ctAl
Clamp cover	ctAl	ctAl
Bolts M12	stlSt	stlSt
Bolt M20	stlSt	stlSt
Nut	stlSt	stlSt
Spring washers	stlSt	stlSt
Weight	1.10 kg	1.12 kg
Perm. operating load	12.5 kN	12.5 kN
Min. failing load	37.5 kN	37.5 kN
Tightening torque M_{A1}	135 Nm	135 Nm
Tightening torque M_{A2}	56 Nm	56 Nm
d	42 mm	55 mm

Tube end fitting 42-70

for tube d=42, 55 or 70 mm

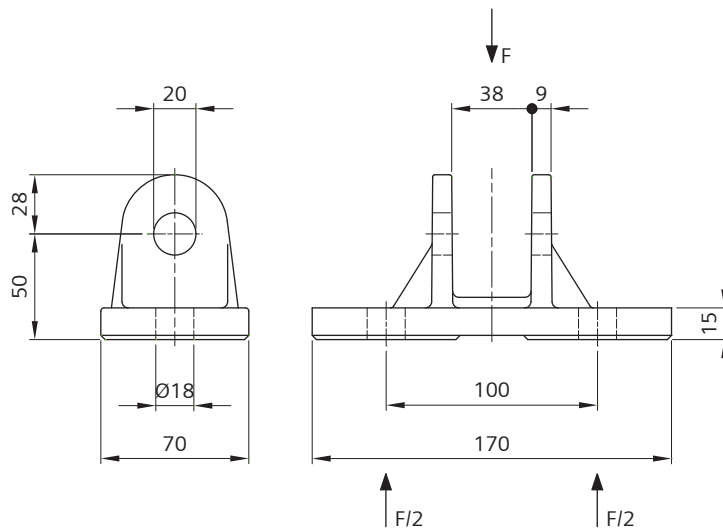


Order no.	8WL2207-0	8WL2206-0	8WL2205-0
Designation	Tube end fitting 42	Tube end fitting 55	Tube end fitting 70
Material	Al	Al	Al
Weight	0.24 kg	0.31 kg	0.42 kg
Prestressed sleeve	8x45 mm	8x55 mm	8x70 mm
d	33 mm	42 mm	57 mm
d ₁	13.5 mm	25.0 mm	40.0 mm

Prestressed sleeve acc. to EN ISO 8752 (stISt) must be ordered separately.

Clevis end fitting for twin tube

for cantilevers across two tracks

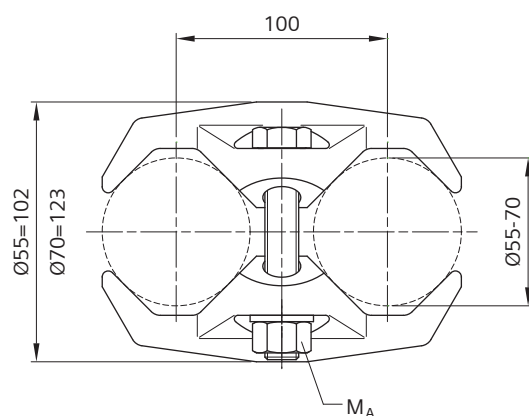


Order no.	8WL2210-0
Designation	Clevis end fitting
Material	ctAl
Weight	0.55 kg
Perm. operating load	13.4 kN
Min. failing load	40 kN

Pin 8WL1111-3 (19x70-Al) and split pin 8WL1115-3 (5x28-Al) must be ordered separately, see Chapter 02-01.

Twin tube clamp

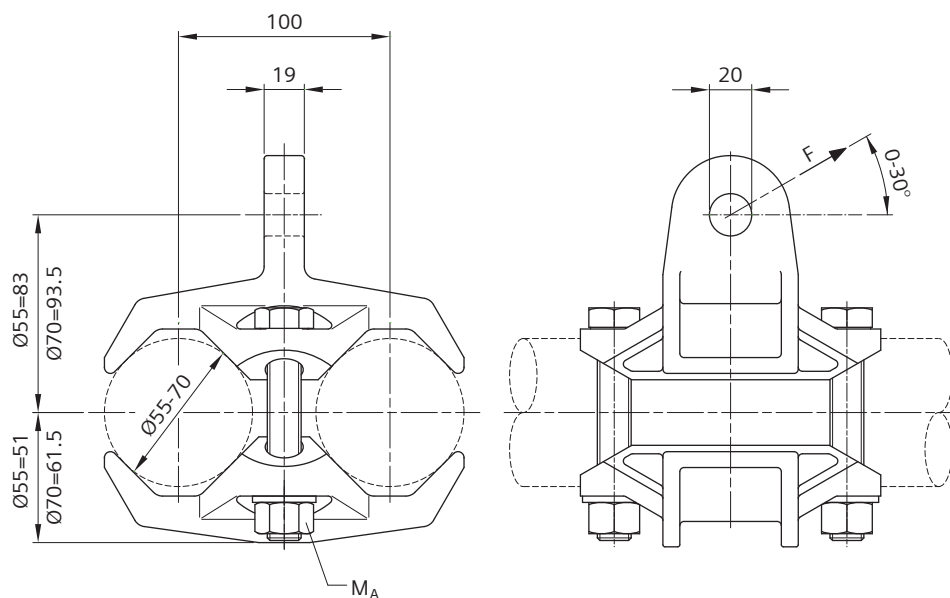
for cantilevers across two tracks, for tubes d=55 to 70 mm



Order no.	8WL2214-0
Designation	Twin tube clamp 55-70
Material	
Tube clamps	ctAl
Bolts M16x100	stlSt
Nuts	stlSt
Washers	stlSt
Weight	1.81 kg
Tightening torque M_A	135 Nm

Twin tube clamp with eye

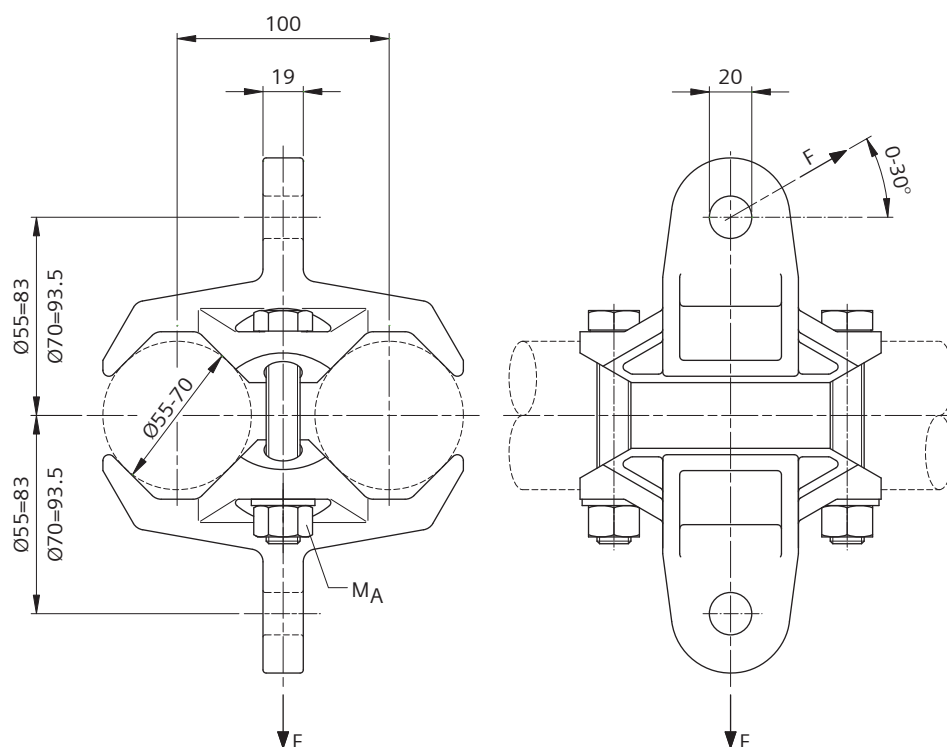
for cantilevers across two tracks, for tubes d=55 to 70 mm



Order no.	8WL2215-0
Designation	Twin tube clamp 55-70
Material	
Tube clamps	ctAl
Bolts M16x100	stlSt
Nuts	stlSt
Washers	stlSt
Weight	1.95 kg
Perm. operating load	8 kN
Min. failing load	24 kN
Tightening torque M_A	135 Nm

Twin tube clamp with double eye

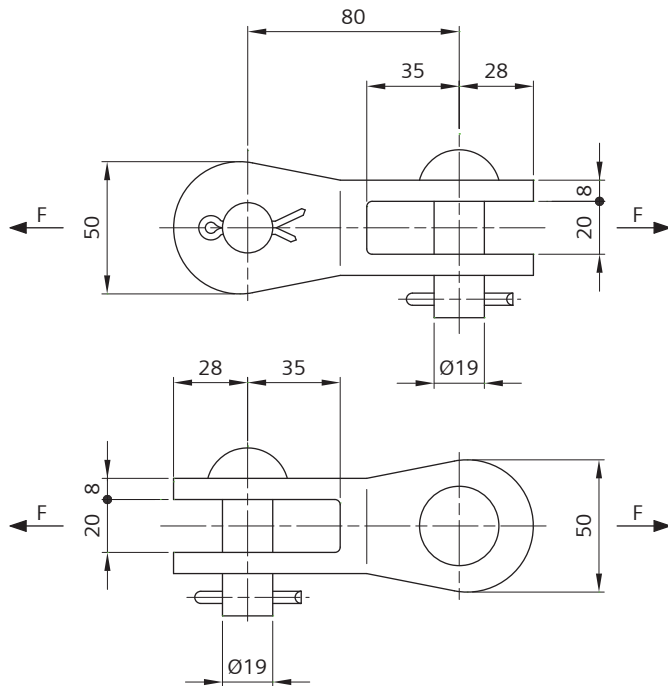
for cantilevers across two tracks, for tubes d=55 to 70 mm



Order no.	8WL2216-0
Designation	Twin tube clamp 55-70
Material	
Tube clamps	ctAl
Bolts M16x100	stlSt
Nuts	stlSt
Washers	stlSt
Weight	2.08 kg
Perm. operating load	8 kN
Min. failing load	24 kN
Tightening torque M_A	135 Nm

Cross link clevis/clevis

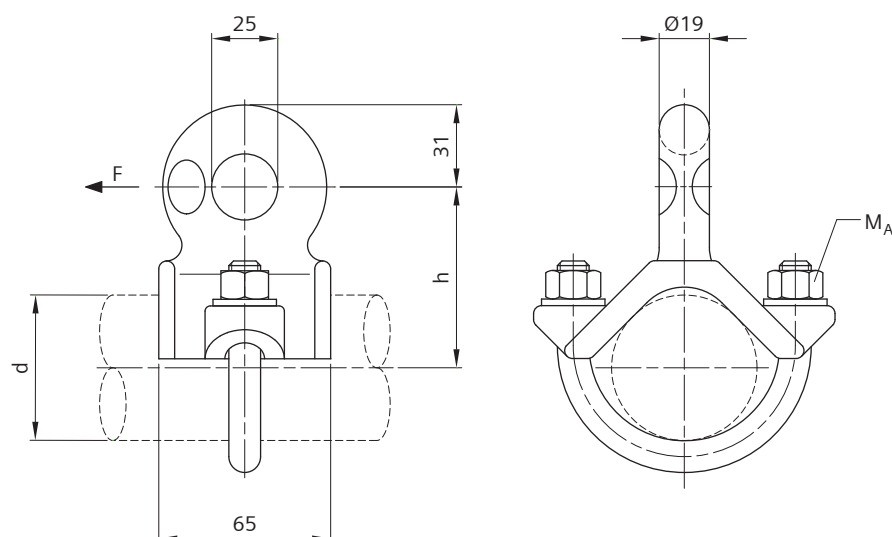
for catenary wire supports in cantilevers across several tracks



Order no.	8WL1135-7
Designation	Cross link 19
Material	
Cross link	ctAl
Pins 19x52	Al
Split pins 5x28	Al
Weight	0.34 kg
Perm. operating load	20 kN
Min. failing load	60 kN

Eye clamp 42-70

for hinged cantilevers

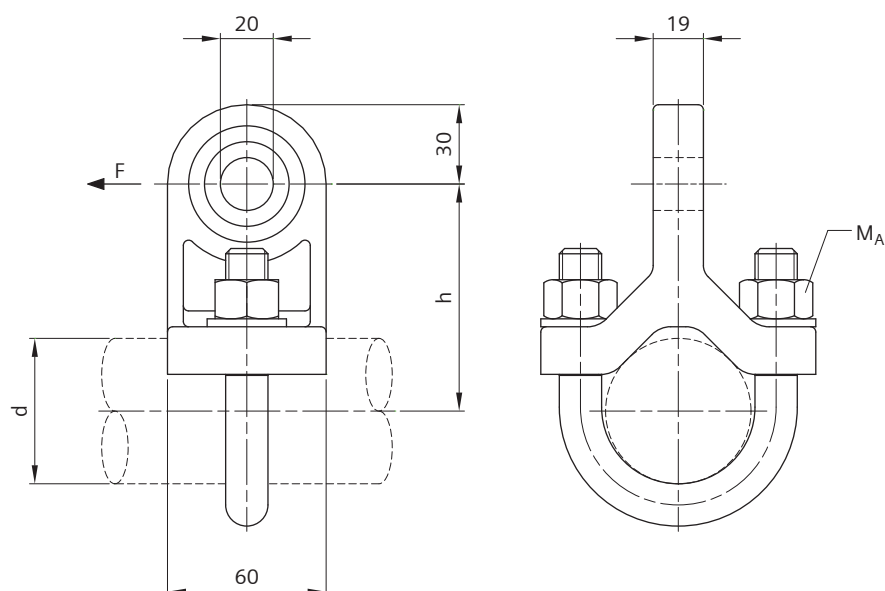


Order no.	8WL2113-1	8WL2114-1	8WL2114-4
Designation	Eye clamp 42	Eye clamp 55	Eye clamp 70
Material			
Eye clamp	ctAl	ctAl	ctAl
U-bolt M12	stlSt	stlSt	stlSt
Nuts	stlSt	stlSt	stlSt
Washers	stlSt	stlSt	stlSt
Weight	0.40 kg	0.45 kg	0.48 kg
Perm. operating load	3.4 kN	3.4 kN	3.4 kN
Min. failing load	10 kN	10 kN	10 kN
Tightening torque M_A	35 Nm	35 Nm	35 Nm
d	42 mm	55 mm	70 mm
h	63 mm	70 mm	78 mm

Eye clamp for tube d=80 mm on request.

Eye clamp 42-80

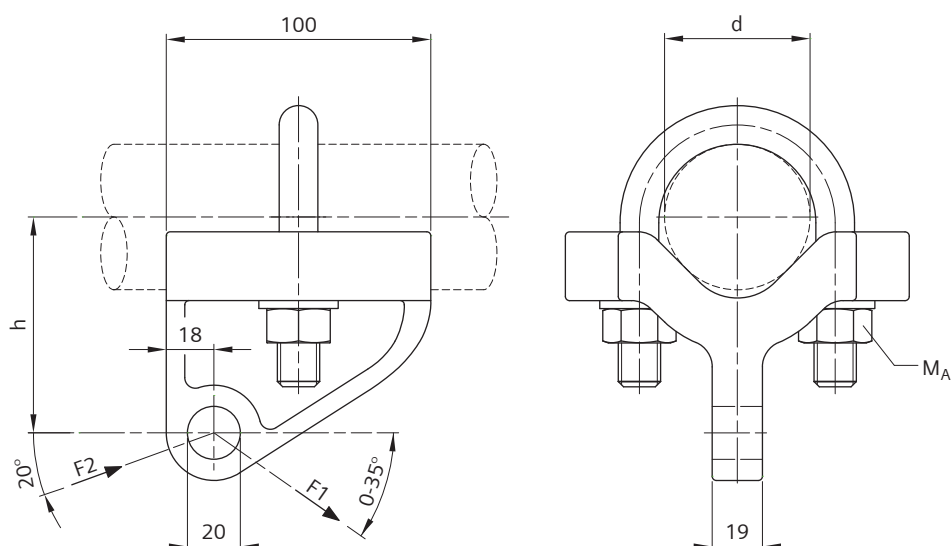
for hinged cantilevers and soffit posts



Order no.	8WL2115-0	8WL2115-1	8WL2116-0
Designation	Eye clamp 42	Eye clamp 55	Eye clamp 70/80
Material			
Eye clamp	ctAl	ctAl	ctAl
U-bolt M16	stlSt	stlSt	stlSt
Nuts	stlSt	stlSt	stlSt
Washers	stlSt	stlSt	stlSt
Weight	0.60 kg	0.67 kg	0.78 kg
Perm. operating load	5 kN	5 kN	5 kN
Min. failing load	15 kN	15 kN	15 kN
Tightening torque M_A	70 Nm	70 Nm	70 Nm
d	42 mm	55 mm	70/80 mm
h	75 mm	85 mm	93/100 mm

Eye clamp 55-70

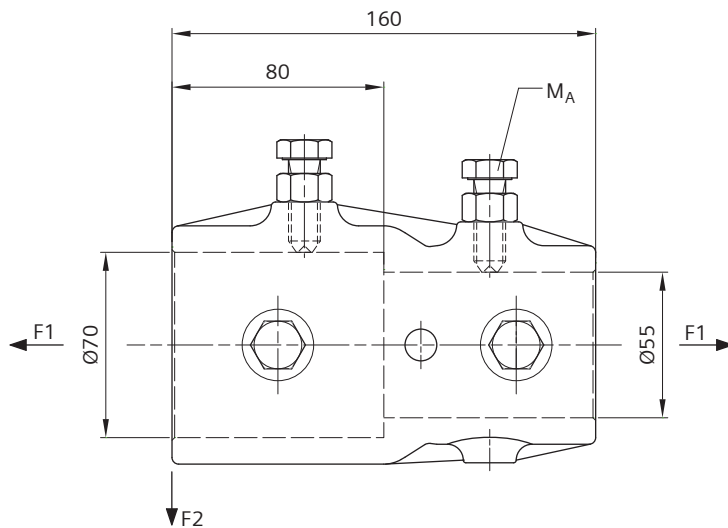
for hinged cantilevers and soffit posts, for higher loads



Order no.	8WL2115-2A	8WL2115-2B
Designation	Eye clamp 55	Eye clamp 70
Material		
Eye clamp	ctAl	ctAl
U-bolt M16	stlSt	stlSt
Nuts	stlSt	stlSt
Washers	stlSt	stlSt
Weight	0.99 kg	1.01 kg
Perm. operating load/ tension (F1)	10 kN	10 kN
Min. failing load/ tension (F1)	30 kN	30 kN
Perm. operating load/ pressure (F2)	16 kN	16 kN
Min. failing load/ pressure (F2)	48 kN	48 kN
Tightening torque M_A	70 Nm	70 Nm

Reducing socket 70/55

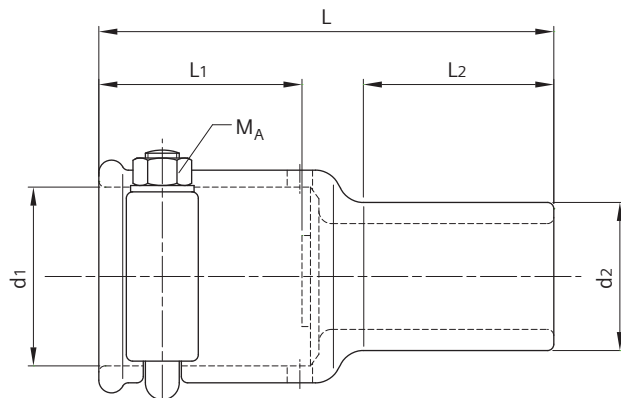
for hinged cantilevers



Order no.	8WL2128-5A
Designation	Reducing socket 70/55
Material	
Reducing socket	ctAl
Cup-point screws M12	stlSt
Nuts	stlSt
Weight	1.20 kg
Perm. operating load/ tension (F1)	4 kN
Min. failing load/ tension (F1)	12 kN
Perm. operating load/ bending (F2)	2 kN
Min. failing load/ bending (F2)	6 kN
Tightening torque M_A	50 Nm

Reducing socket 80/70-70/55

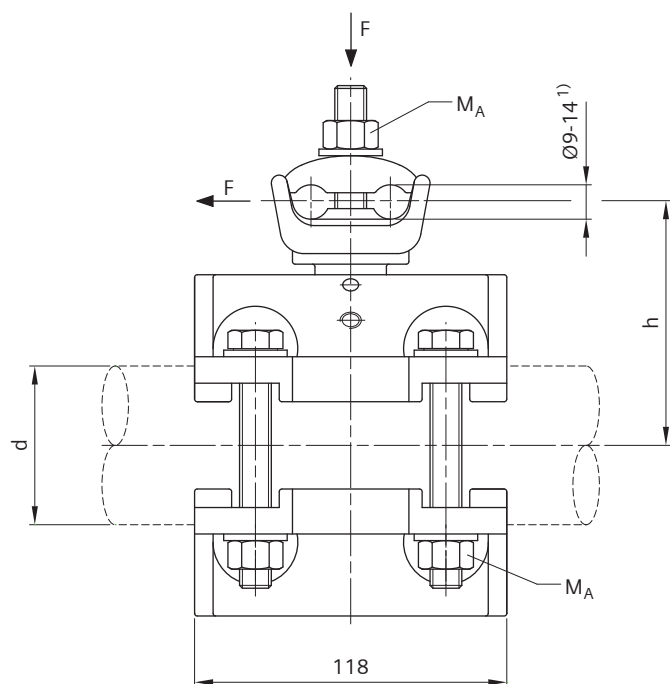
for hinged cantilevers



Order no.	8WL2128-0	8WL2128-4
Designation	Reducing socket 70/55	Reducing socket 80/70
Material		
Reducing socket	ctAl	ctAl
U-bolt M16	stlSt	stlSt
Nuts	stlSt	stlSt
Washers	stlSt	stlSt
Weight	1.48 kg	1.87 kg
Tightening torque M_A	70 Nm	70 Nm
L	190 mm	215 mm
L₁	84 mm	96 mm
L₂	85 mm	90 mm
d₁	74 mm	84.5 mm
d₂	55 mm	70 mm

Bridle suspension 42-70

for fixed bridle suspension at aluminium tubes $d=42, 55$ or 70 mm and steel tubes $d=42.4$ mm (1 1/4") or 60.3 mm (2")



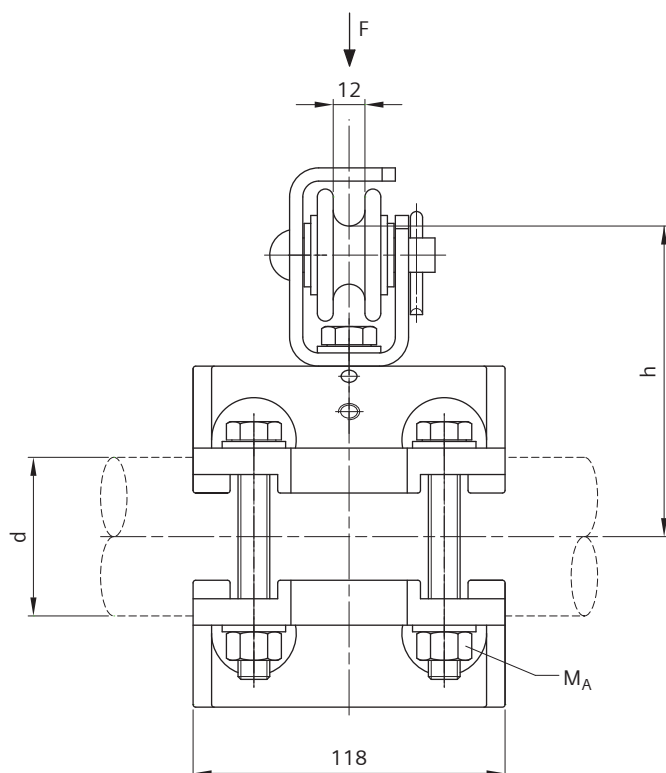
Order no.	8WL2097-6	8WL2097-0	8WL2097-0B
Designation	Bridle suspension 42/42.4	Bridle suspension 55-60.3	Bridle suspension 70
Material			
Clamp body	ctAl	ctAl	ctAl
Clamp cover	ctAl	ctAl	ctAl
Clamping cover	ctAl	ctAl	ctAl
Bolts M12	stlSt	stlSt	stlSt
Nuts, washers	stlSt	stlSt	stlSt
Weight	1.67 kg	1.72 kg	1.79 kg
Perm. operating load	1 kN	1 kN	1 kN
Min. failing load	3 kN	3 kN	3 kN
Tightening torque M_A	56 Nm	56 Nm	56 Nm
d	42/42.4 mm (1 1/4")	55-60.3 mm (2")	70 mm
h	103/106.5 mm	89/92.5 mm	100 mm

¹⁾ Diameter including protection sleeve

Protection sleeves must be ordered separately, see Chapter 02-02.

Bridle guiding device 42-70

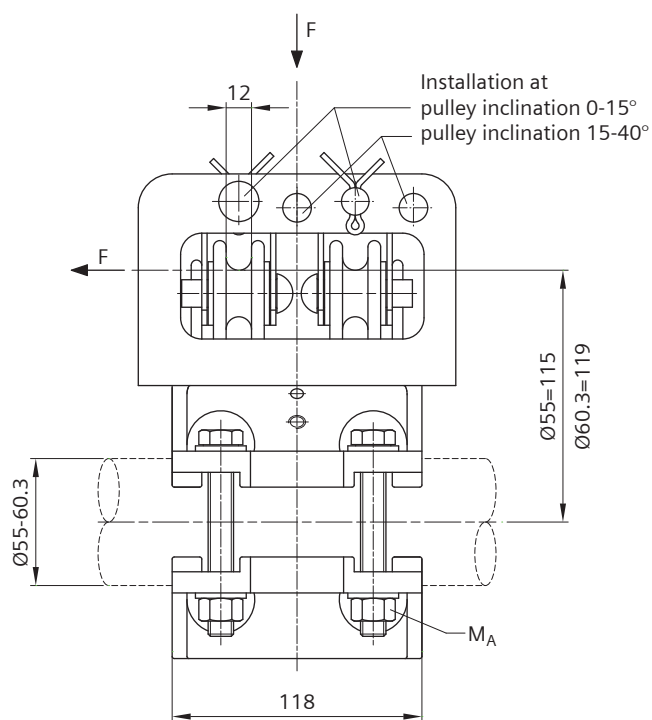
for flexible bridle suspension at aluminium tubes $d=42, 55$ or 70 mm or steel tubes $d=42.4$ mm (1 1/4") or 60.3 mm (2")



Order no.	8WL2097-7	8WL2097-1	8WL2097-1B
Designation	Bridle guiding device 42/42.4	Bridle guiding device 55-60.3	Bridle guiding device 70
Material			
Clamping covers	ctAl	ctAl	ctAl
Pulley	Polyamide	Polyamide	Polyamide
Clevis	stlSt	stlSt	stlSt
Pin 13x55	stlSt	stlSt	stlSt
Split pin 5x28	Cu	Cu	Cu
Bolts M12	stlSt	stlSt	stlSt
Nuts, washers	stlSt	stlSt	stlSt
Weight	1.73 kg	1.78 kg	1.86 kg
Perm. operating load	1 kN	1 kN	1 kN
Min. failing load	3 kN	3 kN	3 kN
Tightening torque M_A	56 Nm	56 Nm	56 Nm
d	42/42.4 mm (1 1/4")	55-60.3 mm (2")	70 mm
h	105 mm	114/117.5 mm	125 mm

Protection sleeves must be ordered separately, see Chapter 02-02.

as flexible suspension for two bridle-and-pulley suspensions or catenary wires at aluminium tubes $d=55$ mm or steel tubes $d=60.3$ mm (2"), for bronze wire 35 to 70 mm² acc. to DIN 48201 or synthetic wire 8WL7097-0 ($d=9$ mm)

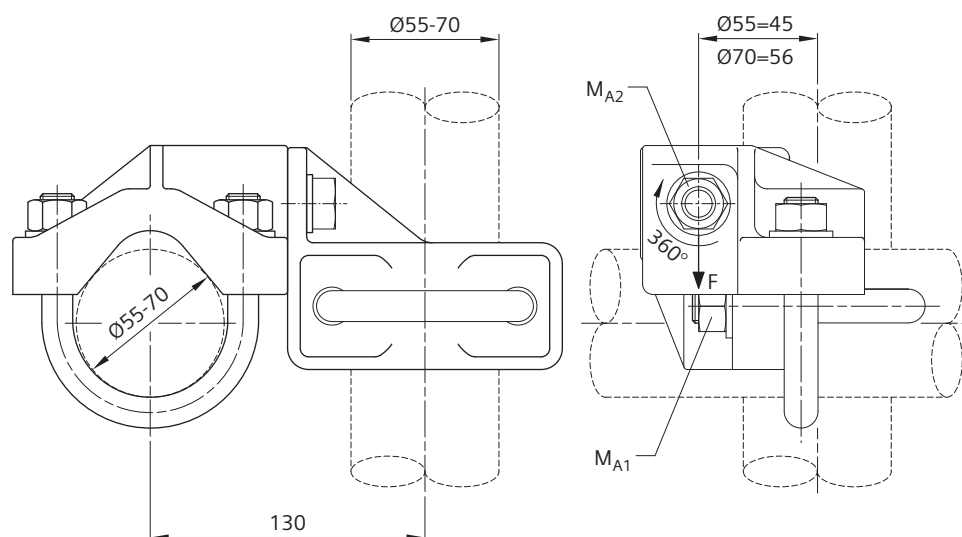


Order no.	8WL2097-1C
Designation	Twin bridle guiding device 55-60.3
Material	
Clamping covers	ctAl
Pulleys	Polyamide
Pulley holders	stlSt
Pins 13x45, 13x55	stlSt
Split pins 5x28	Cu
Bolts M12	stlSt
Nuts, washers	stlSt
Weight	2.76 kg
Perm. operating load	1 kN
Min. failing load	3 kN
Tightening torque M _A	56 Nm

Pulley movably in the Z-axis of 0° to 40°.

Twin tube clamp 55-70

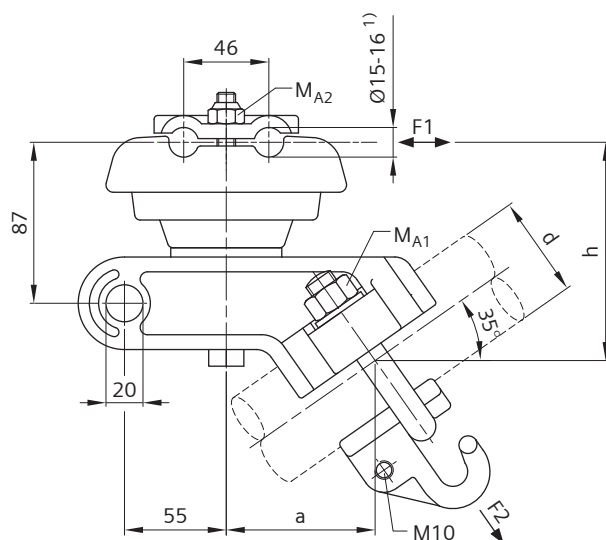
for connection of vertical registration tube $d=55$ to 70 mm at top or cantilever tube $d=55$ to 70 mm



Order no.	8WL2217-0
Designation	Twin tube clamp 55-70
Material	
Tube clamps	ctAl
U-bolts M16	stlSt
Bolt M16	stlSt
Nuts, washers	stlSt
Spring washer	stlSt
Weight	2.02 kg
Perm. operating load	6 kN
Min. failing load	18 kN
Tightening torque M_{A1}	70 Nm
Tightening torque M_{A2}	135 Nm

Catenary wire support clamp 42-70, insulated

adjustable at cantilever tube d=42 to 70 mm, for bronze and copper wires acc. to DIN 48201



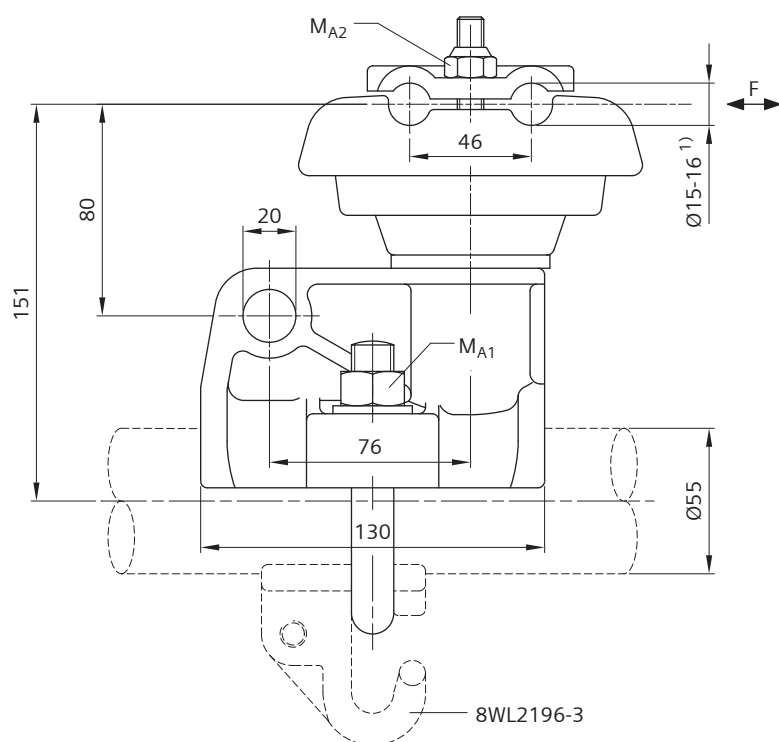
Order no.	8WL2071-4	8WL2072-4
Designation	Catenary wire support clamp 42-55/16	Catenary wire support clamp 70/16
Material		
Clamp body	Cast resin, brown	Cast resin, brown
Clamp cover	CuAl	CuAl
Clamp holder	ctAl	ctAl
Hook clip	ctAl	ctAl
U-bolt M16	stlSt	stlSt
Bolt M10	stlSt	-
Stud bolts M10	-	stlSt
Nuts, washers	stlSt	stlSt
Weight	2.55 kg	2.65 kg
Perm. operating load (F1)	2.5 kN/wire	2.5 kN/wire
Min. failing load (F1)	8.0 kN/wire	8.0 kN/wire
Perm. operating load (F2)	1.5 kN	1.5 kN
Min. failing load (F2)	4.5 kN	4.5 kN
Tightening torque M_{A1}	70 Nm	70 Nm
Tightening torque M_{A2}	25 Nm	25 Nm
Nominal voltage	1.5 kV DC	1.5 kV DC
a	77/83 mm	87 mm
d	42/55 mm	70 mm
h	113/121 mm	126 mm

¹⁾ Diameter including protection sleeve

Protection sleeves must be ordered separately, see Chapter 02-02.

Catenary wire support clamp 55/16, insulated

adjustable at top tube d=55 mm, for bronze and copper wires acc. to DIN 48201



Order no.	8WL2037-3
Designation	Catenary wire support clamp 55/16
Material	
Clamp body	Cast resin, brown
Clamp cover	CuAl
Clamp holder	ctAl
U-bolt M16	stlSt
Stud bolts M10	stlSt
Nuts, washers	stlSt
Weight	2.56 kg
Perm. operating load	2.5 kN/wire
Min. failing load	8.0 kN/wire
Tightening torque M_{A1}	70 Nm
Tightening torque M_{A2}	25 Nm
Nominal voltage	1.5 kV DC

¹⁾ Diameter including protection sleeve

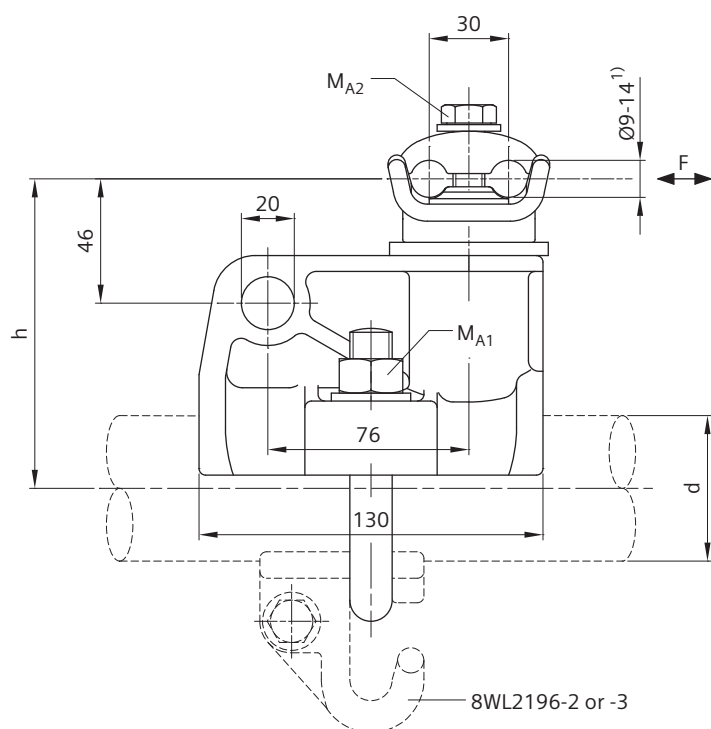
If necessary, the hook clip 8WL2196-3 must be ordered separately, see page 02-04-46.

Protection sleeves must be ordered separately, see Chapter 02-02.

Types for other tubes diameter on request.

Catenary wire support clamp 42-80/14

adjustable at top tube d=42 to 80 mm, for bronze and copper wires acc. to DIN 48201



Order no.	8WL2032-2	8WL2032-3	8WL2033-3
Designation	Catenary wire support clamp 42/14	Catenary wire support clamp 55/14	Catenary wire support clamp 70-80/14
Material			
Clamp body, clamp cover, Clamp holder	ctAl	ctAl	ctAl
U-bolt M16, bolt M12, nuts, washers	stlSt	stlSt	stlSt
Weight	1.73 kg	1.66 kg	1.75 kg
Perm. operating load	6 kN	6 kN	6 kN
Min. failing load	18 kN	18 kN	18 kN
Tightening torque M_{A1}	70 Nm	70 Nm	70 Nm
Tightening torque M_{A2}	56 Nm	56 Nm	56 Nm
d	42 mm	55 mm	70/80 mm
h	118 mm	117 mm	127.5/134.5 mm

¹⁾ Diameter including protection sleeve

If necessary, the hook clip 8WL2196-2 or -3 must be ordered separately, see page 02-04-46.

Protection sleeves must be ordered separately, see Chapter 02-02.

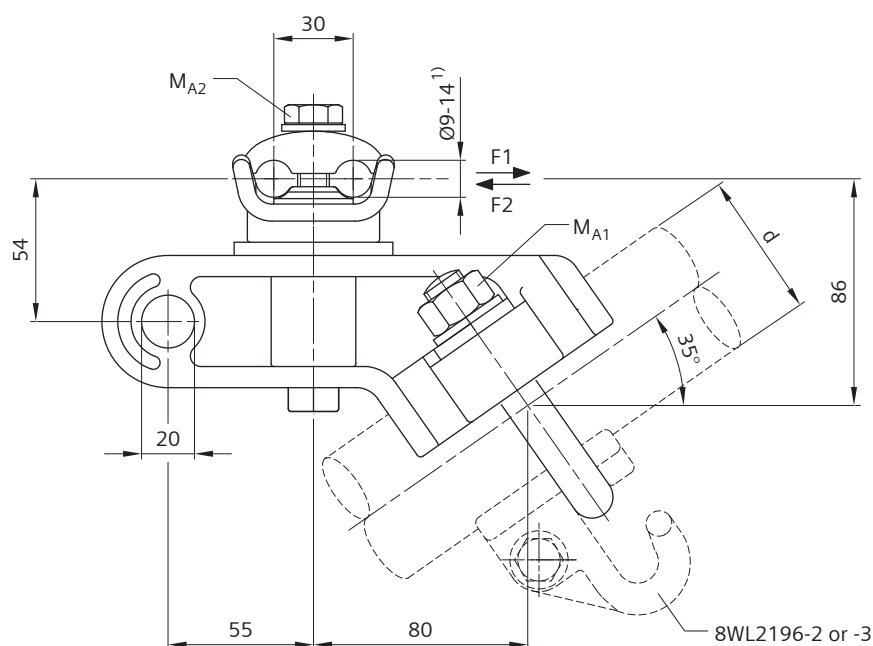
adjustable at top tube d=42 to 80 mm, for bronze and copper wires acc. to DIN 48201



Protection sleeves must be ordered separately, see Chapter 02-02.

Catenary wire support clamp 55-80/14

adjustable at cantilever tube d=55 to 80 mm, for bronze and copper wires acc. to DIN 48201



Order no.	8WL2064-4	8WL2065-4
Designation	Catenary wire support clamp 55/14	Catenary wire support clamp 70-80/14
Material		
Clamp body, clamp cover, Clamp holder	ctAl	ctAl
U-bolt M16, bolt M12, nuts, washers	stlSt	stlSt
Weight	1.54 kg	1.60 kg
Perm. operating load/ tension (F1)	9 kN	9 kN
Min. failing load/ tension (F1)	27 kN	27 kN
Perm. operating load/ pressure (F2)	8 kN	8 kN
Min. failing load/ pressure (F2)	24 kN	24 kN
Tightening torque M_{A1}	70 Nm	70 Nm
Tightening torque M_{A2}	56 Nm	56 Nm
a	80 mm	87/91 mm
d	55 mm	70/80 mm
h	86 mm	95/101 mm

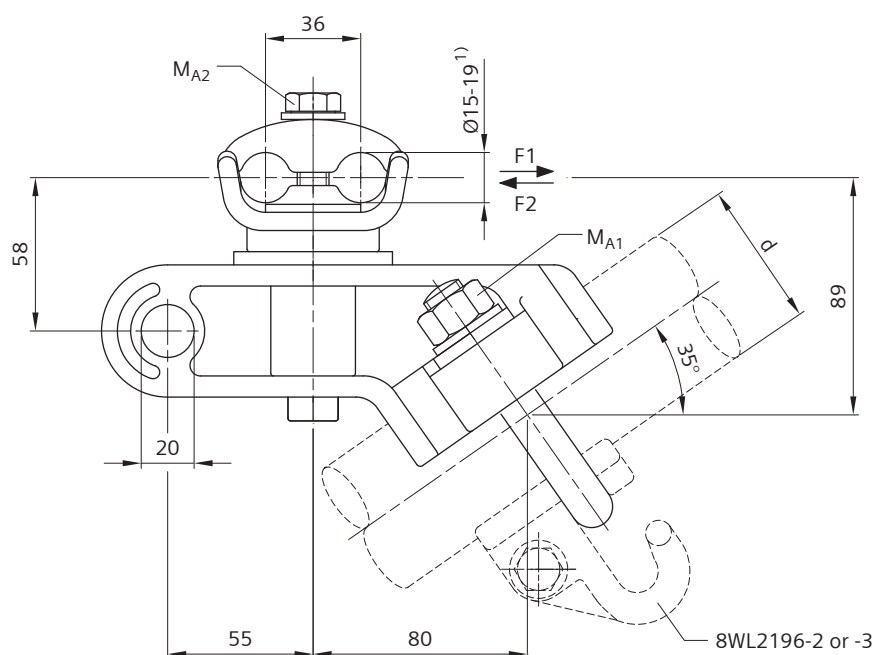
¹⁾ Diameter including protection sleeve

If necessary, the hook clip 8WL2196-2 or -3 must be ordered separately, see page 02-04-46.

Protection sleeves must be ordered separately, see Chapter 02-02.

Catenary wire support clamp 55-80/19

adjustable at cantilever tube d=55 to 80 mm, for bronze and copper wires acc. to DIN 48201



Order no.	8WL2067-4	8WL2068-4
Designation	Catenary wire support clamp 55/19	Catenary wire support clamp 70-80/19
Material		
Clamp body, clamp cover, Clamp holder	ctAl	ctAl
U-bolt M16, bolt M12, nuts, washers	stlSt	stlSt
Weight	1.68 kg	1.79 kg
Perm. operating load/ tension (F1)	9 kN	9 kN
Min. failing load/ tension (F1)	27 kN	27 kN
Perm. operating load/ pressure (F2)	8 kN	8 kN
Min. failing load/ pressure (F2)	24 kN	24 kN
Tightening torque M_{A1}	70 Nm	70 Nm
Tightening torque M_{A2}	56 Nm	56 Nm
a	80 mm	87/91 mm
d	55 mm	70/80 mm
h	89 mm	97/103 mm

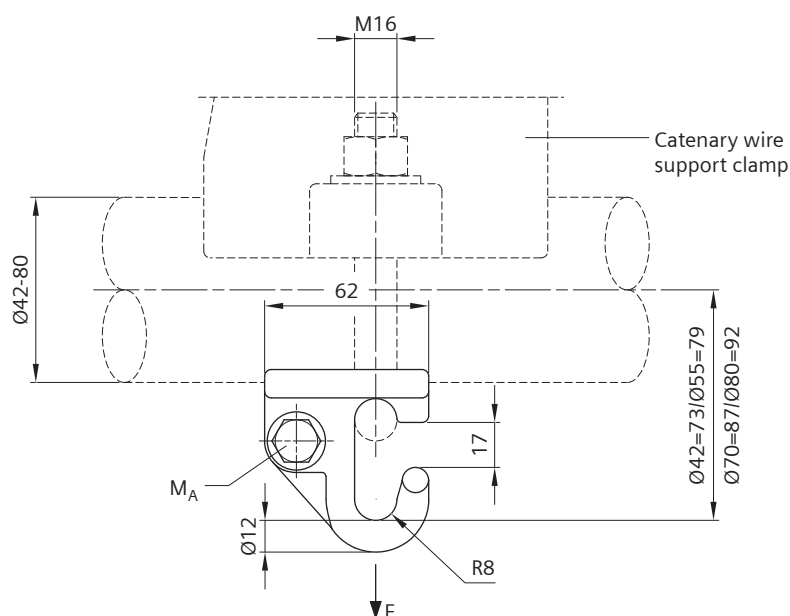
¹⁾ Diameter including protection sleeve

If necessary, the hook clip 8WL2196-2 or -3 must be ordered separately, see page 02-04-46.

Protection sleeves must be ordered separately, see Chapter 02-02.

Hook clip 42-80 for U-bolt M16

for dropper connection at catenary wire support clamps adjustable at top or cantilever tube d=42 to 80 mm, with current connector

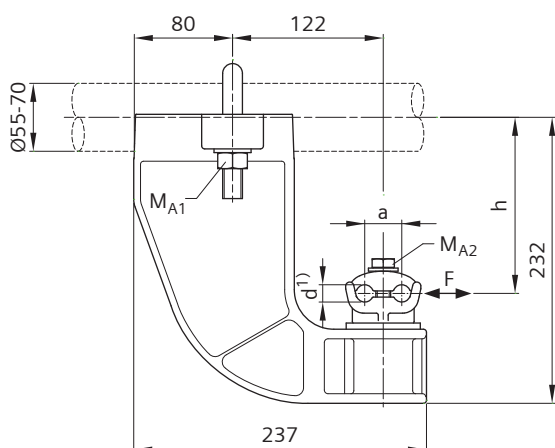


Order no.	8WL2196-2	8WL2196-3
Designation	Hook clip 42-80	Hook clip 42-80, without bolt and washer
Material		
Hook clip	ctAl	ctAl
Bolt M10	stlSt	-
Washer	stlSt	-
Weight	0.14 kg	0.11 kg
Perm. operating load	1.5 kN	1.5 kN
Min. failing load	4.5 kN	4.5 kN
Tightening torque M_A	32 Nm	–

Catenary wire support clamp must be ordered separately.

Catenary wire support clamp 55-70

adjustable at top tube $d=55$ to 70 mm, for cantilevers with low system height, for bronze and copper wires acc. to DIN 48201



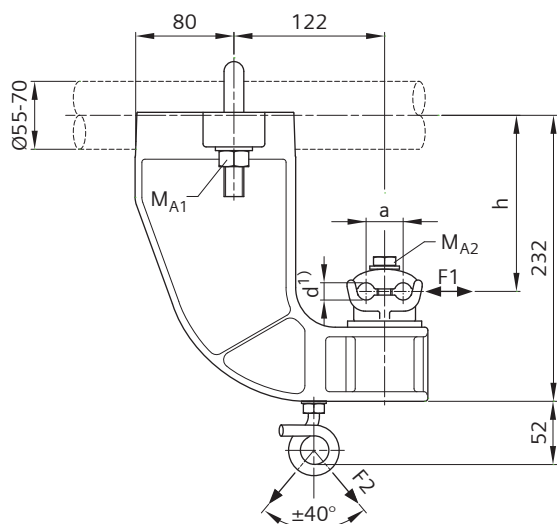
Order no.	8WL2027-0A	8WL2027-0B
Designation	Catenary wire support clamp 55-70/14	Catenary wire support clamp 55-70/19
Material		
Clamp body	ctAl	ctAl
Clamp cover	ctAl	ctAl
Clamp holder	ctAl	ctAl
U-bolt M16	stlSt	stlSt
Bolt M12	stlSt	stlSt
Nuts, washers	stlSt	stlSt
Weight	2.44 kg	2.54 kg
Perm. operating load	10 kN	10 kN
Min. failing load	30 kN	30 kN
Tightening torque M_{A1}	70 Nm	70 Nm
Tightening torque M_{A2}	56 Nm	56 Nm
a	30 mm	36 mm
d	9-14 mm ¹⁾	15-19 mm ¹⁾
h	141/153 mm	138/150 mm

¹⁾ Diameter including protection sleeve

Protection sleeves must be ordered separately, see Chapter 02-02.

Catenary wire support clamp 55-70 with hook

for dropper connection, adjustable at top tube d=55 to 70 mm, for cantilevers with low system height, for bronze and copper wires acc. to DIN 48201



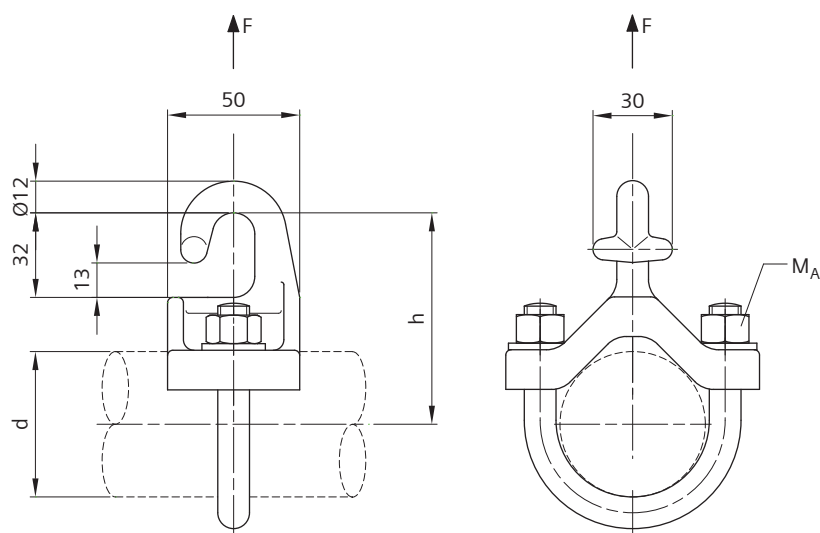
Order no.	8WL2027-0C	8WL2027-0D
Designation	Catenary wire support clamp 55-70/14	Catenary wire support clamp 55-70/19
Material		
Clamp body	ctAl	ctAl
Clamp cover	ctAl	ctAl
Clamp holder	ctAl	ctAl
U-bolt M16	stlSt	stlSt
Bolt M12	stlSt	stlSt
Ring shaped hook M10	stlSt	stlSt
Nuts, washers	stlSt	stlSt
Weight	2.55 kg	2.64 kg
Perm. operating load (F1)	10 kN	10 kN
Min. failing load (F1)	30 kN	30 kN
Perm. operating load (F2)	2 kN	2 kN
Min. failing load (F2)	6 kN	6 kN
Tightening torque M_{A1}	70 Nm	70 Nm
Tightening torque M_{A2}	56 Nm	56 Nm
a	30 mm	36 mm
d	9-14 mm ¹⁾	15-19 mm ¹⁾
h	141/153 mm	138/150 mm

¹⁾ Diameter including protection sleeve

Protection sleeves must be ordered separately, see Chapter 02-02.

Hook clip 42-55

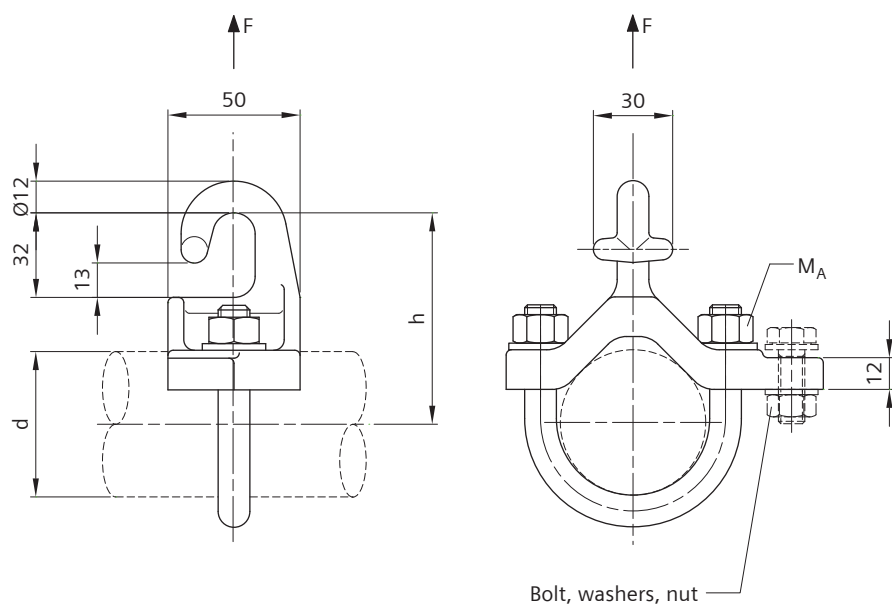
for dropper connection at registration tube $d=42$ or 55 mm



Order no.	8WL2148-5	8WL2148-6
Designation	Hook clip 42	Hook clip 55
Material		
Hook clip	ctAl	ctAl
U-bolt M12	stlSt	stlSt
Nuts	stlSt	stlSt
Washers	stlSt	stlSt
Weight	0.33 kg	0.34 kg
Perm. operating load	1.5 kN	1.5 kN
Min. failing load	4.5 kN	4.5 kN
Tightening torque M_A	35 Nm	35 Nm
d	42 mm	55 mm
h	70 mm	80 mm

Hook clip 42-55

for dropper connection at registration tube $d=42$ or 55 mm, with current connector

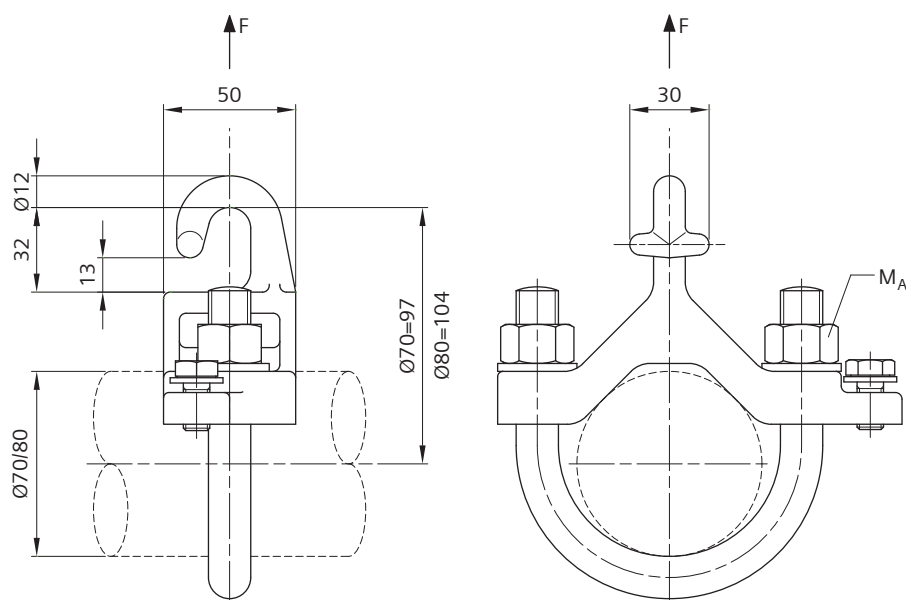


Order no.	8WL2148-7A	8WL2148-7B
Designation	Hook clip 42	Hook clip 55
Material		
Hook clip	ctAl	ctAl
U-bolt M12	stlSt	stlSt
Nuts, washers	stlSt	stlSt
Weight	0.33 kg	0.34 kg
Perm. operating load	1.5 kN	1.5 kN
Min. failing load	4.5 kN	4.5 kN
Tightening torque M_A	35 Nm	35 Nm
d	42 mm	55 mm
h	70 mm	79.5 mm

Bolt ISO 4017-M10x30 (stlSt), two washers ISO 7089-A10.5 (stlSt) and nut ISO 4032-M10 (stlSt) must be ordered separately.

Hook clip 70/80

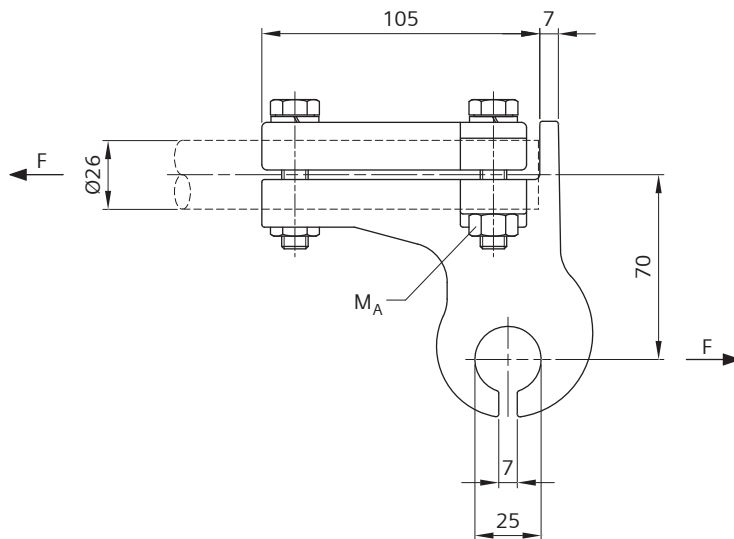
for dropper connection at registration tube $d=70$ or 80 mm, with current connector



Order no.	8WL2148-7
Designation	Hook clip 70/80
Material	
Hook clip	ctAl
U-bolt M16	stlSt
Bolt M10	stlSt
Nuts, washers	stlSt
Weight	0.73 kg
Perm. operating load	1.5 kN
Min. failing load	4.5 kN
Tightening torque M_A	70 Nm

Hook end clamp 26

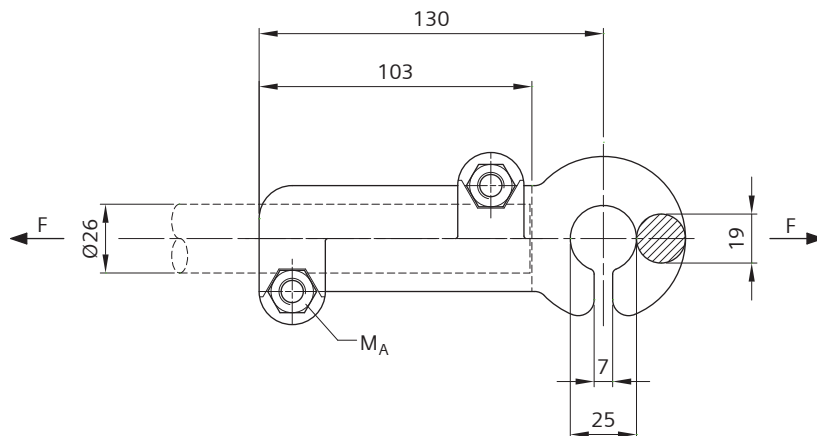
for aluminium tube or insulating rod $d=26$ mm



Order no.	8WL2101-4
Designation	Hook end clamp 26
Material	
Hook end clamp	ctAl
Clamp cover	ctAl
Bolts M10	stlSt
Nuts	stlSt
Spring washers	stlSt
Weight	0.44 kg
Perm. operating load	2.5 kN
Min. failing load	7.5 kN
Tightening torque M_A	32 Nm

Hook end fitting 26

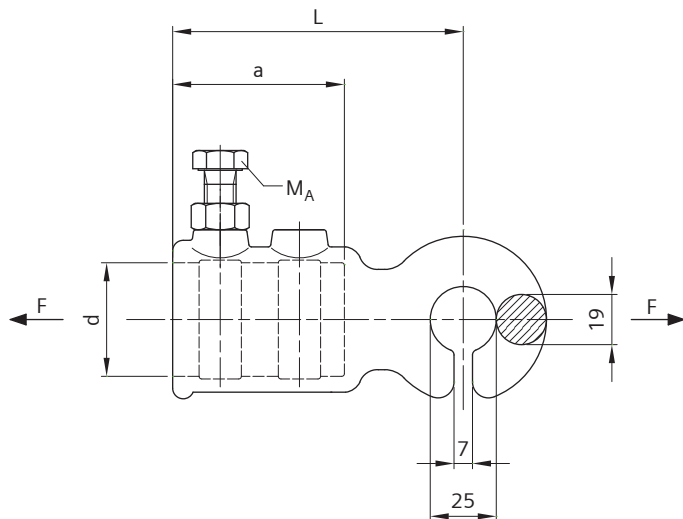
for aluminium tube or insulating rod $d=26$ mm



Order no.	8WL2102-7
Designation	Hook end fitting 26
Material	
Hook end fitting	ctAl
Clamp cover	ctAl
Bolts M10	stlSt
Nuts	stlSt
Spring washers	stlSt
Weight	0.44 kg
Perm. operating load	2.5 kN
Min. failing load	7.5 kN
Tightening torque M_A	32 Nm

Hook end fitting 42-55

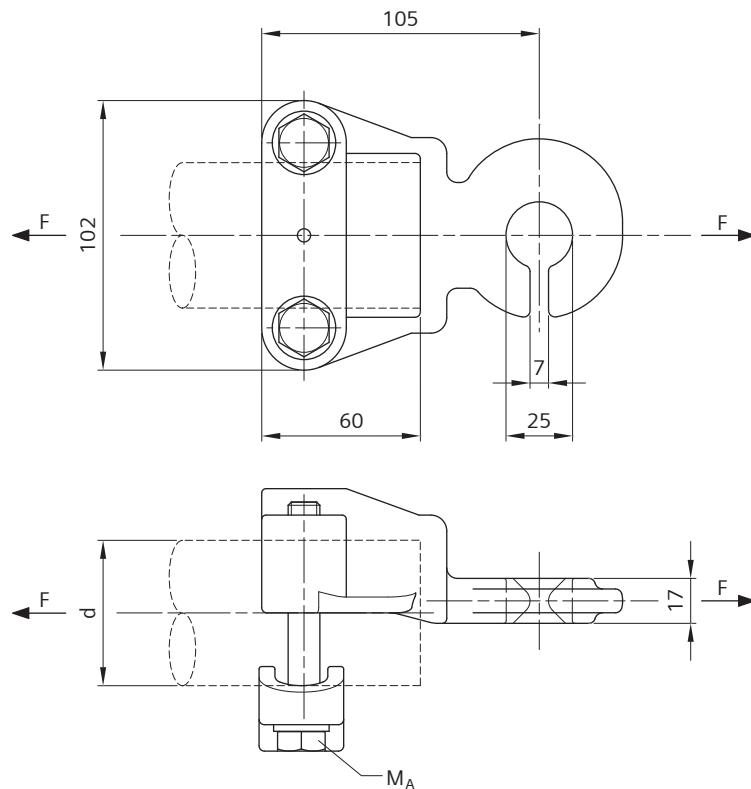
for registration tube connection at cantilever tube d=42 or 55 mm



Order no.	8WL2104-1	8WL2104-2
Designation	Hook end fitting 42	Hook end fitting 55
Material		
Hook end fitting	ctAl	ctAl
Cup-point screw M12	stlSt	stlSt
Nut	stlSt	stlSt
Weight	0.36 kg	0.52 kg
Perm. operating load	2.5 kN	2.5 kN
Min. failing load	7.5 kN	7.5 kN
Tightening torque M_A	50 Nm	50 Nm
a	65 mm	75 mm
d	43 mm	56 mm
L	110 mm	120 mm

Hook end fitting 42-55

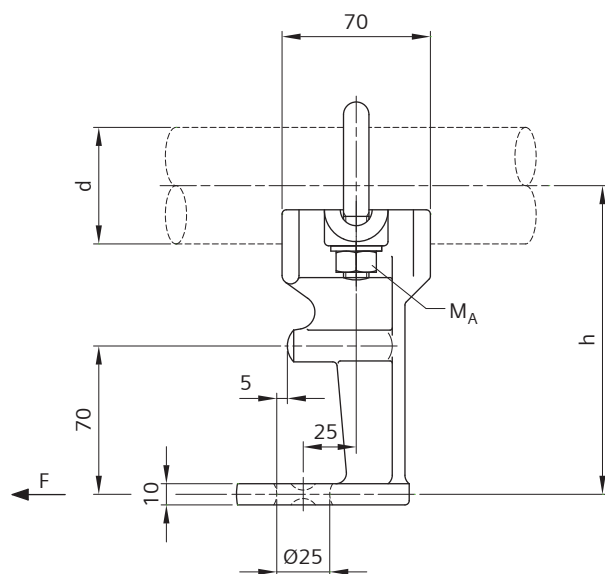
for registration tube connection at cantilever tube $d=42$ or 55 mm



Order no.	8WL2122-6D	8WL2122-6E
Designation	Hook end fitting 42	Hook end fitting 55
Material		
Hook end fitting	ctAl	ctAl
Clamp cover	ctAl	ctAl
Bolts M12	stlSt	stlSt
Spring washers	stlSt	stlSt
Weight	0.63 kg	0.66 kg
Perm. operating load	3.5 kN	3.5 kN
Min. failing load	10.5 kN	10.5 kN
Tightening torque M_A	56 Nm	56 Nm
d	42 mm	55 mm

Drop bracket 42-55 H=70

for steady arm connection at registration tube d=42 or 55 mm

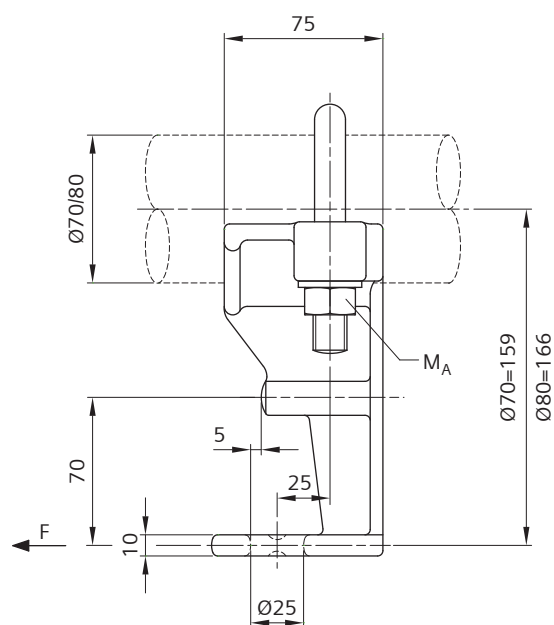


Order no.	8WL2118-1	8WL2118-2
Designation	Drop bracket 42	Drop bracket 55
Material		
Drop bracket	ctAl	ctAl
U-bolt M12	stlSt	stlSt
Nuts, washers	stlSt	stlSt
Weight	0.51 kg	0.53 kg
Perm. operating load	3.5 kN	3.5 kN
Min. failing load	10.5 kN	10.5 kN
Tightening torque M_A	35 Nm	35 Nm
d	42 mm	55 mm
h	136 mm	146 mm

For steady arms 8WL3501-, see page 02-04-67.

Drop bracket 70/80 H=70

for steady arm connection at registration tube d=70 and 80 mm

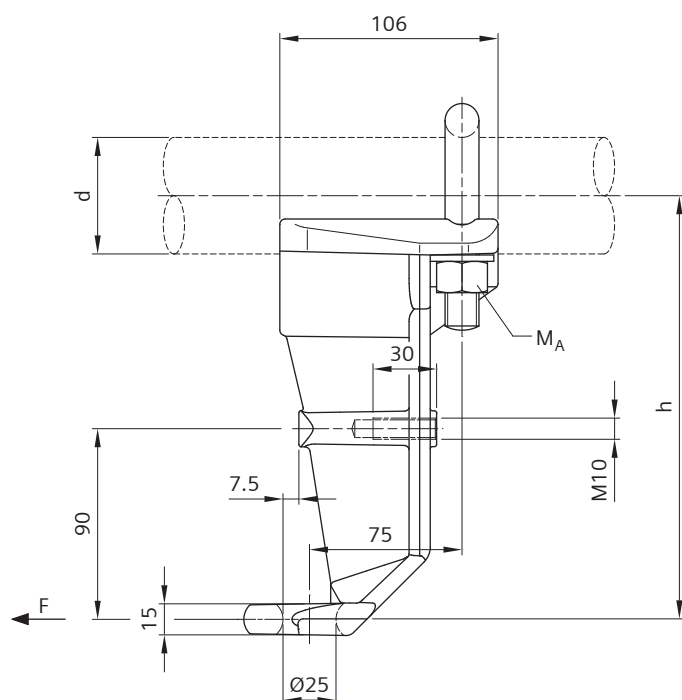


Order no.	8WL2118-2A
Designation	Drop bracket 70/80
Material	
Drop bracket	ctAl
U-bolt M16	stlSt
Nuts, washers	stlSt
Weight	0.94 kg
Perm. operating load	3.5 kN
Min. failing load	10.5 kN
Tightening torque M_A	70 Nm

For steady arms 8WL3501-, see page 02-04-67.

Drop bracket 42-55 H=90

for steady arm connection at registration tube d=42 or 55 mm, with current connector

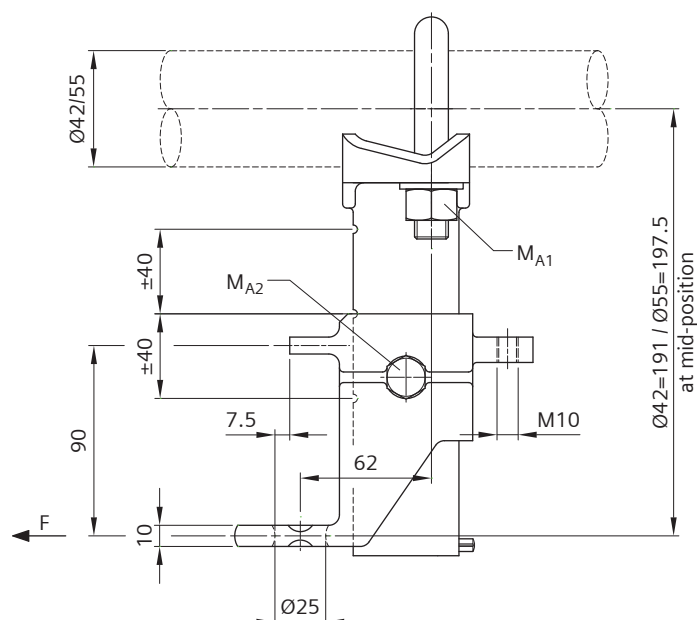


Order no.	8WL2118-4A	8WL2118-4B
Designation	Drop bracket 42	Drop bracket 55
Material		
Drop bracket	ctAl	ctAl
U-bolt M16	stlSt	stlSt
Nuts, washers	stlSt	stlSt
Weight	1.19 kg	1.24 kg
Perm. operating load	3.5 kN	3.5 kN
Min. failing load	10.5 kN	10.5 kN
Tightening torque M_A	70 Nm	70 Nm
d	42 mm	55 mm
h	191 mm	200 mm

For steady arms 8WL3500-, see page 02-04-68.

Drop bracket 42-55 H=90, steplessly adjustable

for steady arm connection at registration tube d=42 or 55 mm, with current connector

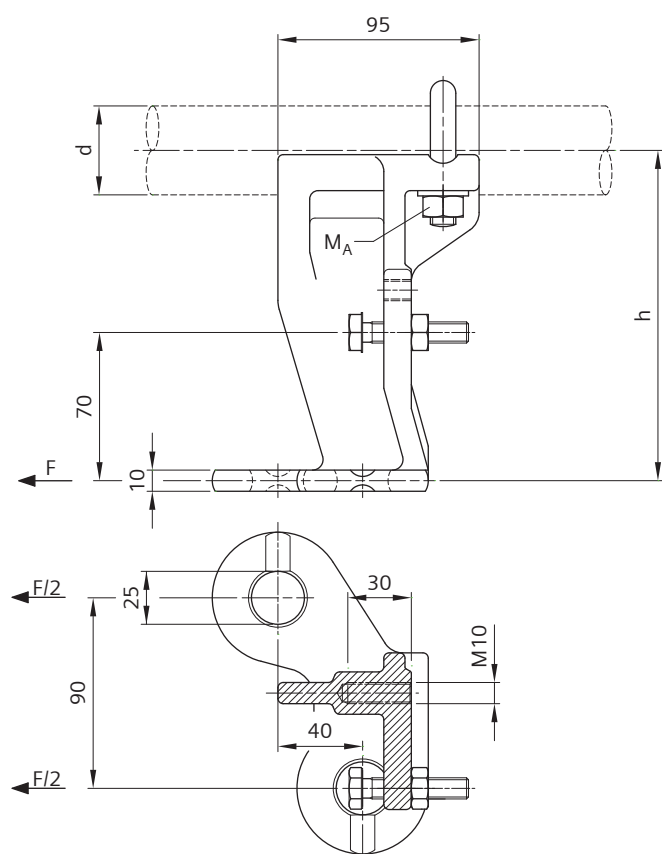


Order no.	8WL2120-3
Designation	Drop bracket 42-55
Material	
Drop bracket	ctAl
U-bolt M16	stlSt
Nuts, washers	stlSt
Cup-point screw M12	stlSt
Grooved pin	stlSt
Weight	0.99 kg
Perm. operating load	3.5 kN
Min. failing load	10.5 kN
Tightening torque M_{A1}	70 Nm
Tightening torque M_{A2}	50 Nm

For steady arms 8WL3500-, see page 02-04-68.

Twin drop bracket 42/42.4-55 H=70/90

for steady arm connection at registration tube d=42 and 55 mm or steel d=42.4 mm (1 1/4"),
with current connector

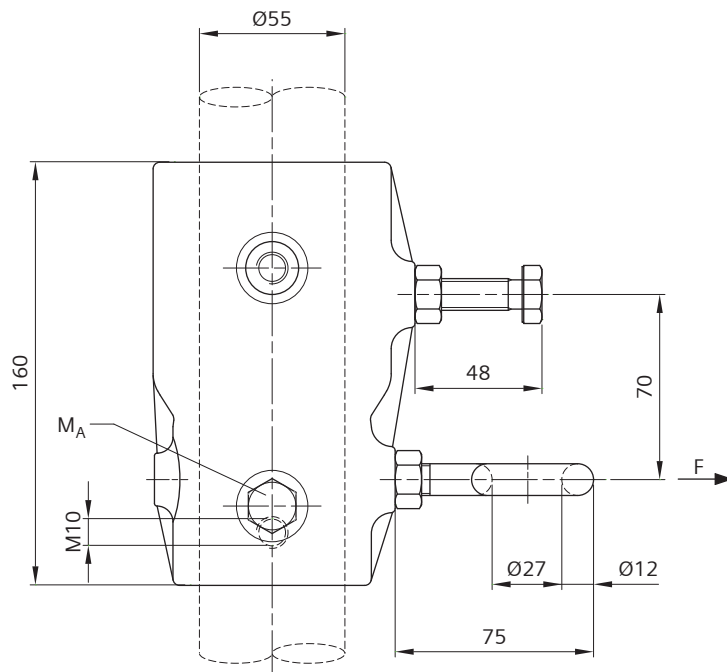


Order no.	8WL2116-7A	8WL2116-7B
Designation	Twin drop bracket 42/42.4	Twin drop bracket 55
Material		
Drop bracket	ctAl	ctAl
U-bolt M12	stlSt	stlSt
Bolt M10	stlSt	stlSt
Nuts, washers	stlSt	stlSt
Weight	1.12 kg	1.14 kg
Perm. operating load	5 kN	5 kN
Min. failing load	15 kN	15 kN
Tightening torque M_A	35 Nm	35 Nm
d	42/42.4 mm	55 mm
h	156 mm	165 mm

For steady arms 8WL3501- (H=70 mm) or 8WL3500- (H=90 mm), see pages 02-04-67 and 02-04-68.

Drop bracket 55 H=70

for steady arm connection at vertical tube d=55 mm, with current connector

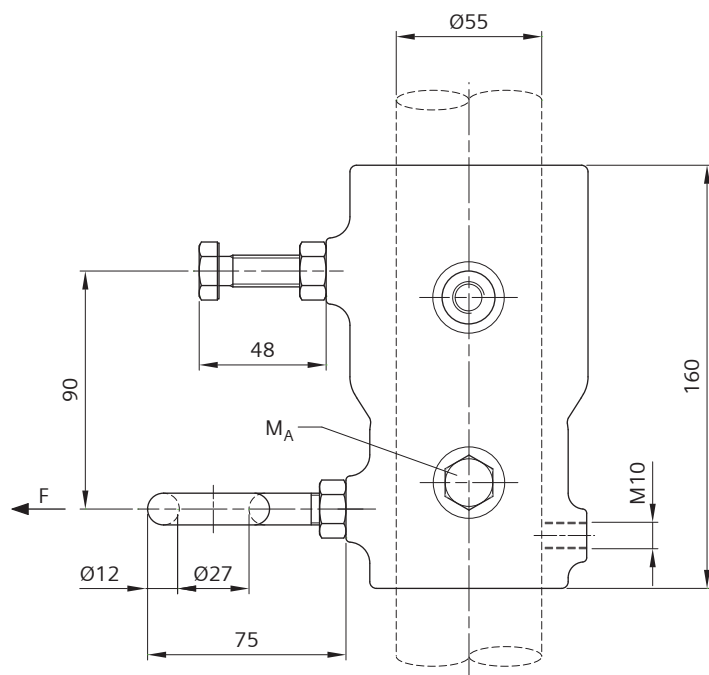


Order no.	8WL2128-5B
Designation	Drop bracket 55
Material	
Drop bracket	ctAl
Cup-point screw M12	stlSt
Eye bolt M12	stlSt
Bolt M12	stlSt
Nuts	stlSt
Weight	1.23 kg
Perm. operating load	4 kN
Min. failing load	12 kN
Tightening torque M_A	50 Nm

For steady arm 8WL3501-, see page 02-04-67.

Drop bracket 55 H=90

for steady arm connection at vertical tube d=55 mm, with current connector

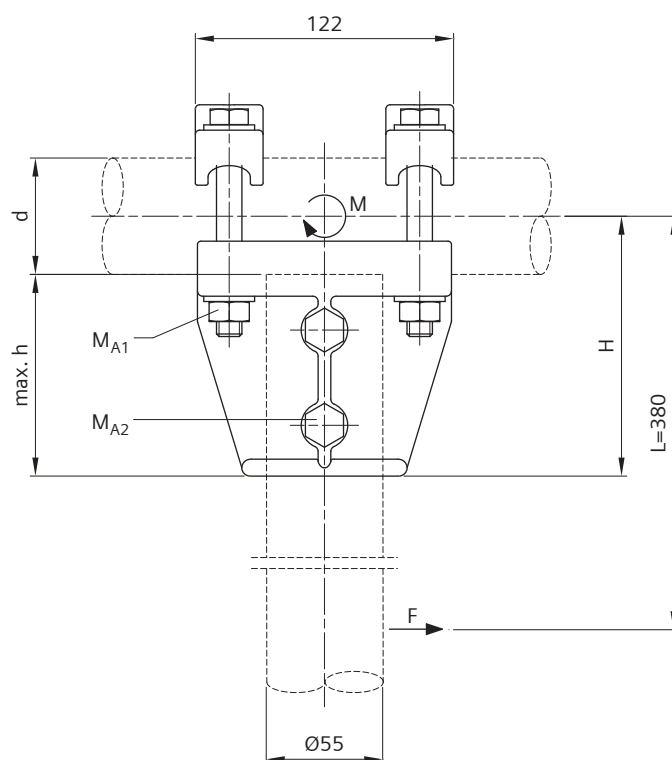


Order no.	8WL2128-5C
Designation	Drop bracket 55
Material	
Drop bracket	ctAl
Cup-point screw M12	stlSt
Eye bolt M12	stlSt
Bolt M12	stlSt
Nuts	stlSt
Weight	1.23 kg
Perm. operating load	4 kN
Min. failing load	12 kN
Tightening torque M_A	50 Nm

For steady arm 8WL3500-, see page 02-04-68.

Stay tube holder 55

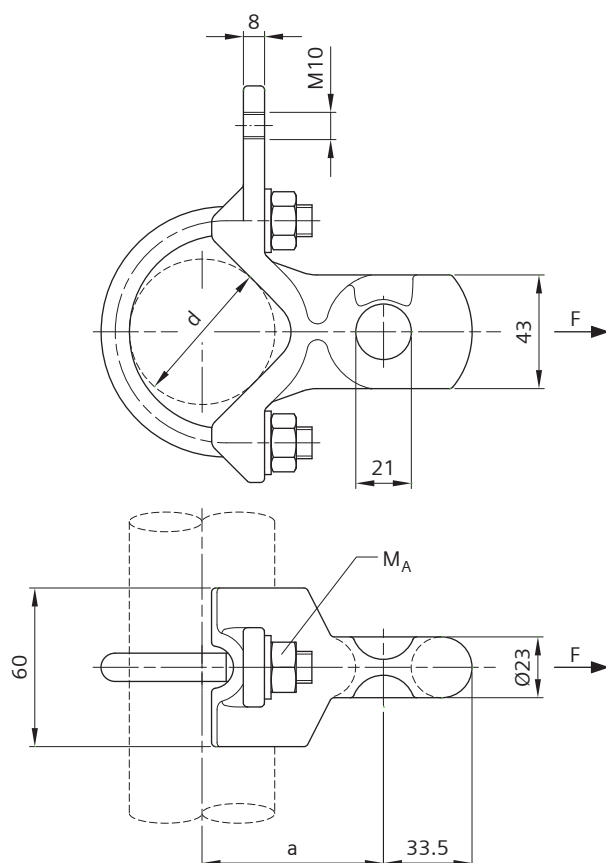
for connection of stay tube $d=55$ mm at registration tube $d=55$ or 70 mm



Order no.	8WL2244-0	8WL2244-1
Designation	Stay tube holder 55-55	Stay tube holder 55-70
Material		
Tube holder	ctAl	ctAl
Clamp cover	ctAl	ctAl
Bolts M12	stlSt	stlSt
Nuts, washers	stlSt	stlSt
Cup-point screws M12	stlSt	stlSt
Weight	1.65 kg	1.75 kg
Perm. operating load	4.7 kN	4.7 kN
Min. failing load	14.2 kN	14.2 kN
Max. operating moment M (F×L)	1.8 kNm	1.8 kNm
Tightening torque M_{A1}	56 Nm	56 Nm
Tightening torque M_{A2}	40 Nm	40 Nm
d	55 mm	70 mm
Max. h	95 mm	98 mm
H	123 mm	133 mm

Eye clamp for tube-type drop bracket 55-70

for steady arm connection at vertical tube d=55 or 70 mm, with current connector

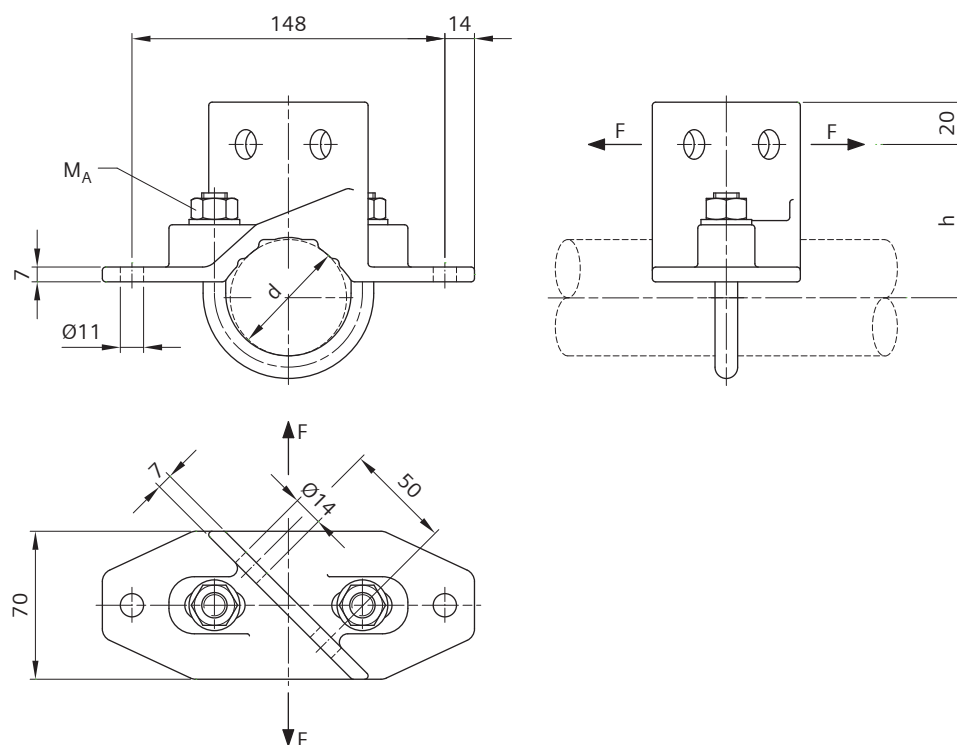


Order no.	8WL2114-1A	8WL2114-4A
Designation	Eye clamp 55	Eye clamp 70
Material		
Eye clamp	ctAl	ctAl
U-bolt M12	stlSt	stlSt
Nuts, washers	stlSt	stlSt
Weight	0.48 kg	0.45 kg
Perm. operating load	3.5 kN	3.5 kN
Min. failing load	10.5 kN	10.5 kN
Tightening torque M_A	35 Nm	35 Nm
a	68.6 mm	79.2 mm
d	55 mm	70 mm

For steady arms 8WL3500- and 8WL3501-, see pages 02-04-68 and 02-04-67.

Tube connecting fitting 42-70

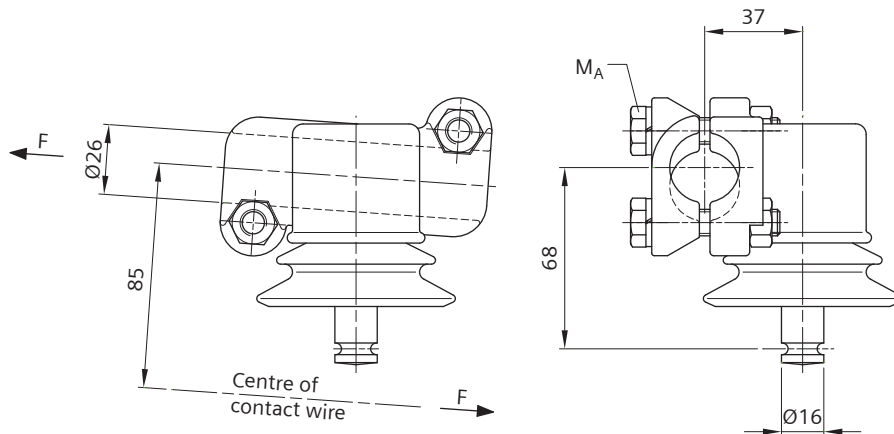
for current carrying cantilevers, for current connector at tube $d=42, 55$ or 70 mm



Order no.	8WL4652-0	8WL4652-1	8WL4652-2
Designation	Tube connecting fitting 42	Tube connecting fitting 55	Tube connecting fitting 70
Material			
Clamping body	ctAl	ctAl	ctAl
U-bolt M12	stlSt	stlSt	stlSt
Nuts, washers	stlSt	stlSt	stlSt
Weight	0.55 kg	0.58 kg	0.61 kg
Perm. operating load	1 kN	1 kN	1 kN
Min. failing load	3 kN	3 kN	3 kN
Tightening torque M_A	35 Nm	35 Nm	35 Nm
Perm. permanent current at 50 K temperature rise	420 A	420 A	420 A
Rated short-time current	54.9 kA	54.9 kA	54.9 kA
Rated short-time duration	60 ms	60 ms	60 ms
d	42 mm	55 mm	70 mm
h	65 mm	73 mm	83 mm

Swivel clip holder 26, insulated

for aluminium and steel tube or insulating rod d=26 mm

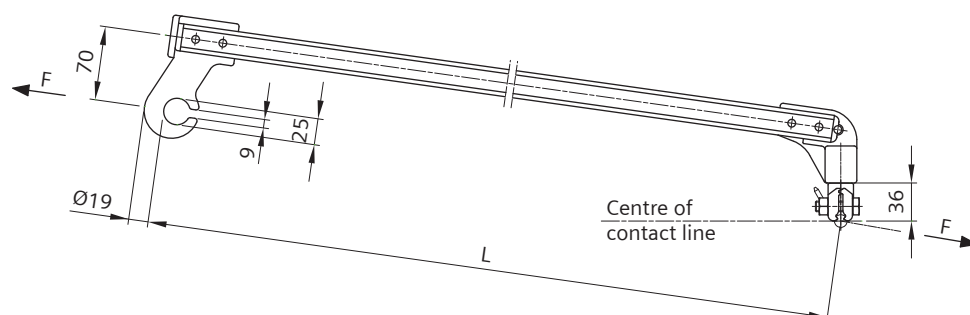


Order no.	8WL2012-4
Designation	Swivel clip holder 26, insulated
Material	
Swivel clip holder	ctAl
Clamp cover	ctAl
Insulator body	Cast resin, brown
Grooved stud	stlSt
Bolts M10	stlSt
Nuts	stlSt
Spring Washers	stlSt
Weight	0.74 kg
Perm. operating load	2.5 kN
Min. failing load	8.0 kN
Tightening torque M_A	32 Nm
Nominal voltage	1.5 kV DC
Creepage distance	73 mm

Contact wire clips see Chapter 02-09.

Steady arm made of aluminium H=70

for contact wires AC-80 to AC-150 acc. to EN 50149, with connection for windstay



Order no.	8WL3501-5A	8WL3501-5B	8WL3501-5D	8WL3501-5E
Designation	Steady arm L=650	Steady arm L=875	Steady arm L=1050	Steady arm L=1200
Material				
Hook end clamp	ctAl	ctAl	ctAl	ctAl
U-section	Al	Al	Al	Al
Clip holder	Al	Al	Al	Al
Grooved stud	CuNiSi	CuNiSi	CuNiSi	CuNiSi
Round head rivets	Al	Al	Al	Al
Contact wire clip 16R	CuAl	CuAl	CuAl	CuAl
U-pin	Cu	Cu	Cu	Cu
Weight	0.96 kg	1.07 kg	1.15 kg	1.25 kg
Perm. operating load	2.5 kN	2.5 kN	2,5 kN	2.5 kN
Min. failing load	7.5 kN	7.5 kN	7.5 kN	7.5 kN
L	650 mm	875 mm	1050 mm	1200 mm

Can also supplied with contact wire clip, Order no:

8WL3501-1A for L=650 mm

8WL3501-1B for L=875 mm

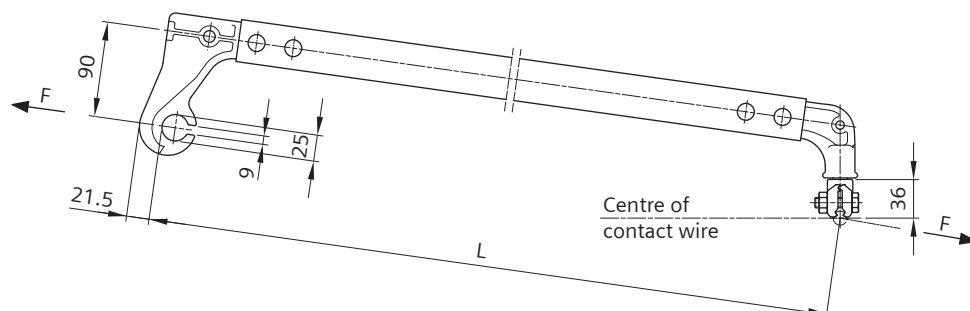
8WL3501-1C for L=1050 mm

8WL3501-1D for L=1200 mm

Other lengths on request.

Steady arm made of aluminium H=90

for contact wires AC-80 to AC-150 acc. to EN 50149, with connection for windstay and current connector



Part 1

Order no.	8WL3500-3A	8WL3500-3B	8WL3500-3C	8WL3500-3D	8WL3500-3E
Designation	Steady arm L=900	Steady arm L=1000	Steady arm L=1050	Steady arm L=1100	Steady arm L=1150
Material					
Hook end clamp, clip holder	ctAl	ctAl	ctAl	ctAl	ctAl
Tube rectangular, round head rivets	Al	Al	Al	Al	Al
Threaded stud	CuNiSi	CuNiSi	CuNiSi	CuNiSi	CuNiSi
Contact wire clip M16	CuAl	CuAl	CuAl	CuAl	CuAl
Weight	1.41 kg	1.48 kg	1.52 kg	1.56 kg	1.60 kg
Perm. operating load	3 kN	3 kN	3 kN	3 kN	3 kN
Min. failing load	9 kN	9 kN	9 kN	9 kN	9 kN
L	900 mm	1000 mm	1050 mm	1100 mm	1150 mm

Part 2

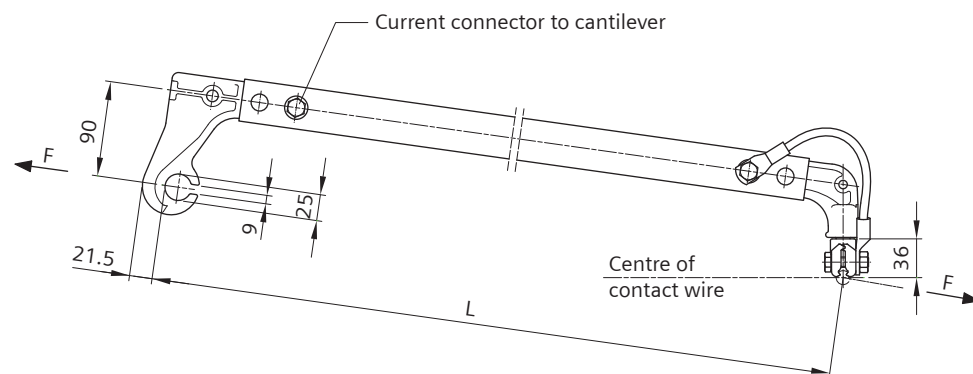
Order no.	8WL3500-3F	8WL3500-3G	8WL3500-3H	8WL3500-3K
Designation	Steady arm L=1250	Steady arm L=1300	Steady arm L=1350	Steady arm L=1450
Material				
Hook end clamp, clip holder	ctAl	ctAl	ctAl	ctAl
Tube rectangular, round head rivets	Al	Al	Al	Al
Threaded stud	CuNiSi	CuNiSi	CuNiSi	CuNiSi
Contact wire clip M16	CuAl	CuAl	CuAl	CuAl
Weight	1.67 kg	1.71 kg	1.75 kg	1.82 kg
Perm. operating load	3 kN	3 kN	3 kN	3 kN
Min. failing load	9 kN	9 kN	9 kN	9 kN
L	1250 mm	1300 mm	1350 mm	1450 mm

Other lengths on request.

Substitute for 8WL3500-5A to 8WL3500-5K.

Steady arm made of aluminium H=90, current carrying

for current carrying cantilevers, for contact wires AC-80 to AC-150 acc. to EN 50149

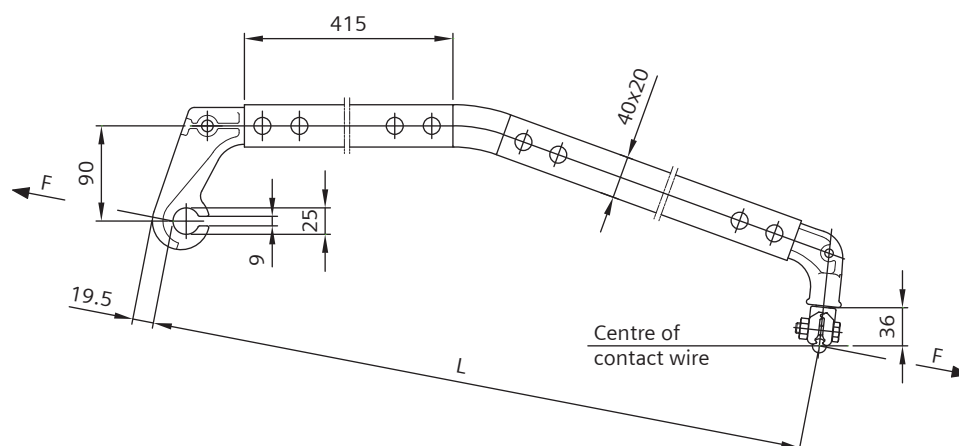


Order no.	8WL3500-3BS	8WL3500-3ES	8WL3500-3GS
Designation	Steady arm L=1000	Steady arm L=1150	Steady arm L=1300
Material			
Hook end clamp	ctAl	ctAl	ctAl
Tube rectangular	Al	Al	Al
Clip holder	ctAl	ctAl	ctAl
Threaded stud	CuNiSi	CuNiSi	CuNiSi
Round head rivets	Al	Al	Al
Contact wire clip M16	CuAl	CuAl	CuAl
Bolts, nuts	stlSt	stlSt	stlSt
Washers	stlSt, Alcu	stlSt, Alcu	stlSt, Alcu
Cable lugs	Cu-ETP	Cu-ETP	Cu-ETP
Wire 25x133	Cu-ETP	Cu-ETP	Cu-ETP
Weight	1.73 kg	1.84 kg	1.95 kg
Perm. operating load	3 kN	3 kN	3 kN
Min. failing load	9 kN	9 kN	9 kN
Perm. permanent current at 50 K temperature rise	600 A	600 A	600 A
Rated short-time current	44.2 kA	44.2 kA	44.2 kA
Rated short-time duration	60 ms	60 ms	60 ms
L	1000 mm	1150 mm	1300 mm

Other lengths on request.

Steady arm made of aluminium H=90, angled

for contact wires AC-80 to AC-150 acc. to EN 50149, with connection for windstays and current connector



Part 1

Order no.	8WL3500-8L	8WL3500-8M	8WL3500-8N	8WL3500-8O	8WL3500-8P
Designation	Steady arm L=1000	Steady arm L=1050	Steady arm L=1150	Steady arm L=1250	Steady arm L=1300
Material					
Hook end clamp	ctAl	ctAl	ctAl	ctAl	ctAl
Angle bar	Al	Al	Al	Al	Al
Tube rectangular	Al	Al	Al	Al	Al
Clip holder	ctAl	ctAl	ctAl	ctAl	ctAl
Threaded stud	CuNiSi	CuNiSi	CuNiSi	CuNiSi	CuNiSi
Round head rivets	Al	Al	Al	Al	Al
Contact wire clip M16	CuAl	CuAl	CuAl	CuAl	CuAl
Weight	1.76 kg	1.79 kg	1.87 kg	1.95 kg	1.98 kg
Perm. operating load	3 kN	3 kN	3 kN	3 kN	3 kN
Min. failing load	9 kN	9 kN	9 kN	9 kN	9 kN
L	1000 mm	1050 mm	1150 mm	1250 mm	1300 mm

Part 2

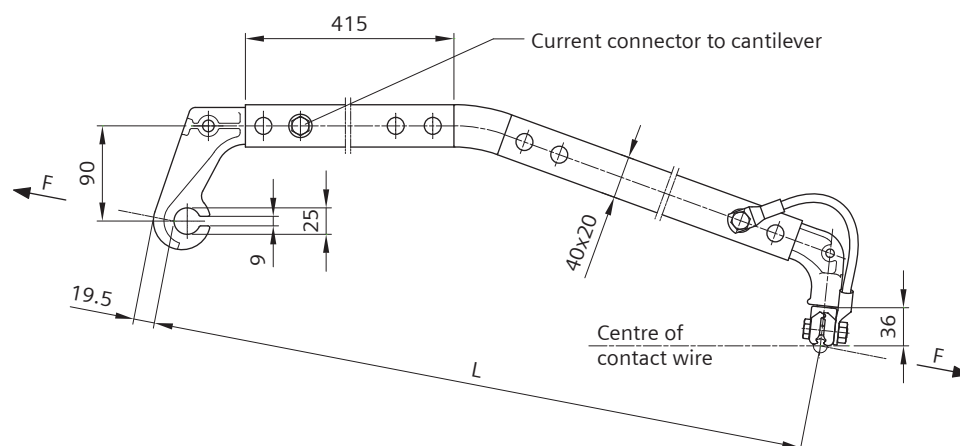
Order no.	8WL3500-8T	8WL3500-8U
Designation	Steady arm L=1350	Steady arm L=1450
Material		
Hook end clamp	ctAl	ctAl
Angle bar	Al	Al
Tube rectangular	Al	Al
Clip holder	ctAl	ctAl
Threaded stud	CuNiSi	CuNiSi
Round head rivets	Al	Al
Contact wire clip M16	CuAl	CuAl
Weight	2.02 kg	2.10 kg
Perm. operating load	3 kN	3 kN
Min. failing load	9 kN	9 kN
L	1350 mm	1450 mm

Other lengths on request.

Substitute for 8WL3500-8A to 8WL3500-8G.

Steady arm made of aluminium H=90, angled, current carrying

for current carrying cantilevers, for contact wires AC-80 to AC-150 acc. to EN 50149

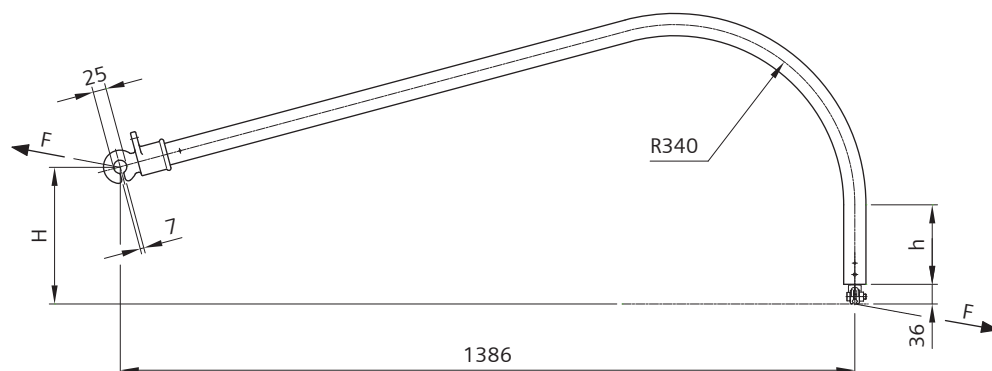


Order no.	8WL3500-8LS	8WL3500-8NS	8WL3500-8PS
Designation	Steady arm L=1000	Steady arm L=1150	Steady arm L=1300
Material			
Hook end clamp	ctAl	ctAl	ctAl
Tube rectangular	Al	Al	Al
Clip holder	ctAl	ctAl	ctAl
Threaded stud	CuNiSi	CuNiSi	CuNiSi
Round head rivets	Al	Al	Al
Contact wire clip M16	CuAl	CuAl	CuAl
Bolts, nuts	stlSt	stlSt	stlSt
Washers	stlSt, Alcu	stlSt, Alcu	stlSt, Alcu
Cable lugs	Cu-ETP	Cu-ETP	Cu-ETP
Wire 25x133	Cu-ETP	Cu-ETP	Cu-ETP
Weight	2.00 kg	2.12 kg	2.23 kg
Perm. operating load	3 kN	3 kN	3 kN
Min. failing load	9 kN	9 kN	9 kN
Perm. permanent current at 50 K temperature rise	600 A	600 A	600 A
Rated short-time current	44.2 kA	44.2 kA	44.2 kA
Rated short-time duration	60 ms	60 ms	60 ms
L	1000 mm	1150 mm	1350 mm

Other lengths on request.

Steady arm made of aluminium, curved

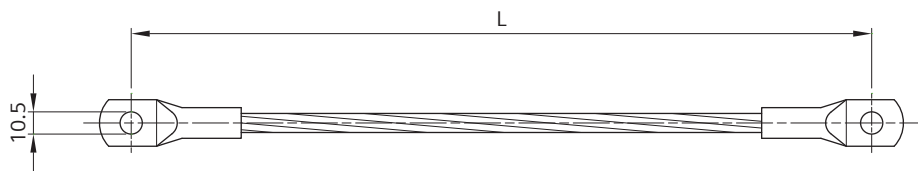
for contact wires AC-80 to AC-150 acc. to EN 50149, with connection for current connector



Order no.	8WL3508-7	8WL3508-8
Designation	Steady arm for high speed routes	Steady arm
Material		
Hook end fitting	ctAl	ctAl
Tube 42x4	Al	Al
Grooved stud	CuNiSi	CuNiSi
Contact wire clip 16R	CuAl	CuAl
Weight	2.97 kg	2.68 kg
Perm. operating load	1.5 kN	2.5 kN
Min. failing load	4.5 kN	7.5 kN
h	150 mm	60 mm
H	266 mm	258 mm

Additional electrical connector

for steady arm with current connector

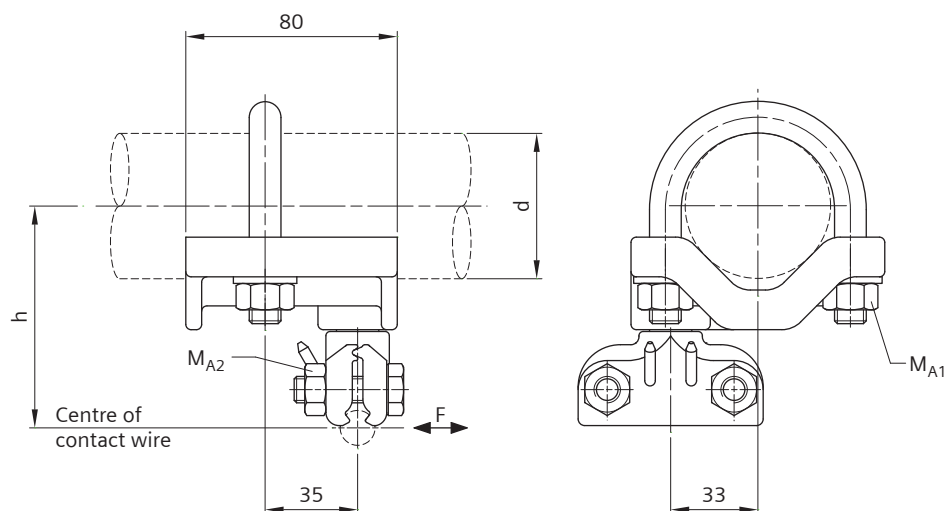


Order no.	8WL3503-8A	8WL3503-8B
Designation	Additional electrical connector	Additional electrical connector
Material		
Cable lugs	Cu-ETP	Cu-ETP
Wire 35x133	Cu-ETP	Cu-ETP
Weight	0.19 kg	0.23 kg
L	350 mm	450 mm

Other lengths on request.

Clamp holder for contact wire

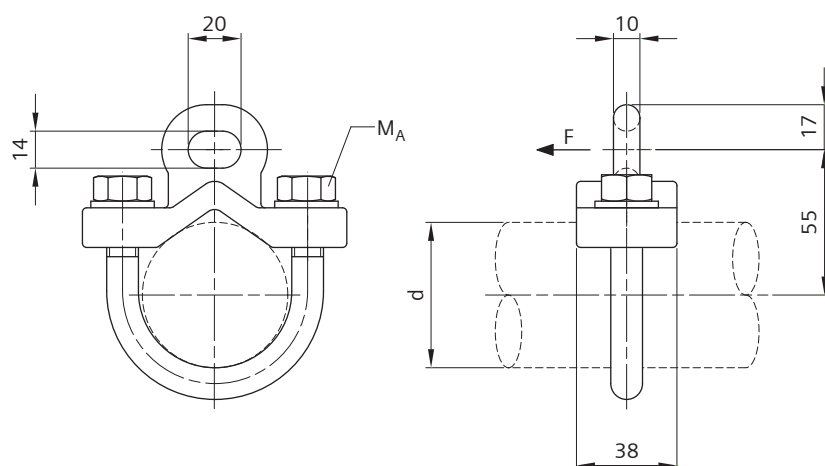
for contact wires AC-80 to AC-150 acc. to EN 50149



Order no.	8WL3508-4	8WL3508-5
Designation	Clamp holder 42	Clamp holder 55
Material		
Clamp holder	ctAl	ctAl
U-bolt M12	stlSt	stlSt
Nuts, washers	stlSt	stlSt
Contact wire clip 16R	CuAl	CuAl
Weight	0.76 kg	0.77 kg
Perm. operating load	3.5 kN	3.5 kN
Min. failing load	10.5 kN	10.5 kN
Tightening torque M_{A1}	35 Nm	35 Nm
Tightening torque M_{A2}	32 Nm	32 Nm
d	42 mm	55 mm
h	75 mm	84 mm

Eye clamp 42-55 for windstay

for aluminium tubes $d=42$ to $d=55$ mm

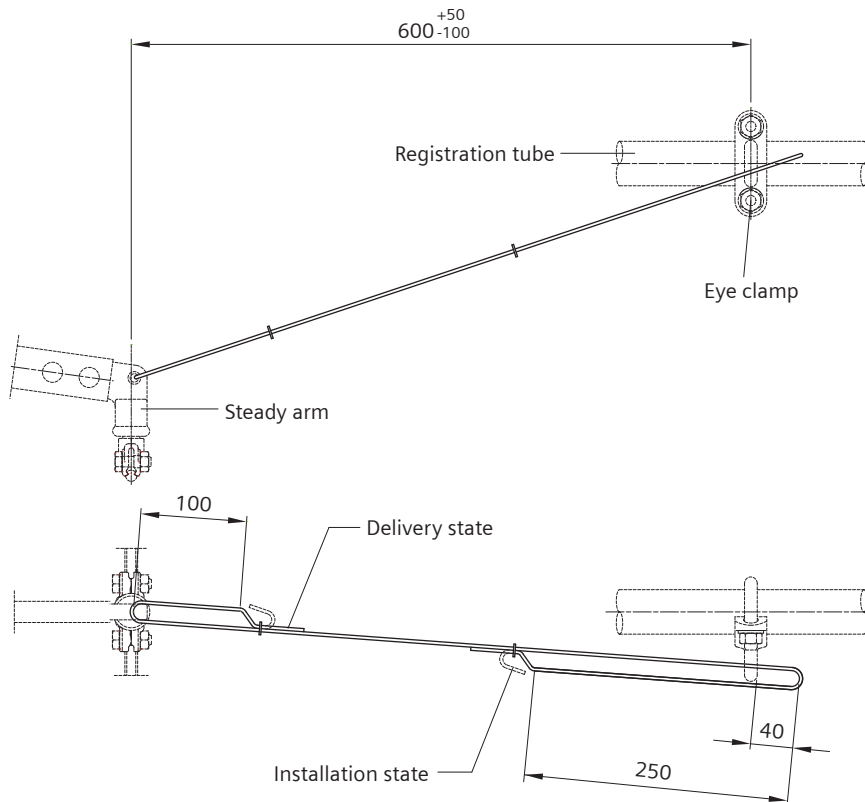


Order no.	8WL2112-5G	8WL2112-5H
Designation	Eye clamp 42 for windstay	Eye clamp 55 for windstay
Material		
Eye clamp	ctAl	ctAl
U-bolt M12	stlSt	stlSt
Nuts, washers	stlSt	stlSt
Weight	0.26 kg	0.28 kg
Perm. operating load	1.75 kN	1.75 kN
Min. failing load	5.25 kN	5.25 kN
Tightening torque M_A	35 Nm	5.25 kN
d	42 mm	55 mm

Substitute for 8WL2112-5A and 8WL2112-5B.

Windstay for steady arm

for steady arm 8WL3500- or 8WL3501- at registration tube

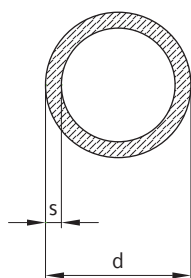


Order no.	8WL2112-8B
Designation	Windstay for steady arm
Material	
Wire d=3 mm	stlSt
Washers	stlSt
Weight	0.15 kg

Eye clamp must be installed always in the direction of the tension wheel assembly.

Aluminium tube

for cantilevers, tensioning weight guidance and operating linkage



Order no.	8WL2161-0	8WL2165-0	8WL2167-0	8WL2170-0	8WL2173-0
Designation	Aluminium tube 26x3.5	Aluminium tube 42x4.0	Aluminium tube 55x6.0	Aluminium tube 70x 6.0	Aluminium tube 80x 6.0
Material	¹⁾	¹⁾	¹⁾	¹⁾	¹⁾
Weight	0.67 kg/m	1.29 kg/m	2.50 kg/m	3.26 kg/m	3.79 kg/m
Max. delivery length	8.0 m	8.0 m	8.0 m	8.0 m	8.0 m
Tensile strength R_m (at 20 °C)	310 N/mm ²	310 N/mm ²	310 N/mm ²	310 N/mm ²	310 N/mm ²
Proof strength $R_{p0.2}$ (at 20 °C)	250 N/mm ²	250 N/mm ²	260 N/mm ²	260 N/mm ²	260 N/mm ²
Elastic modulus (at 20 °C)	70000 N/mm ²	70000 N/mm ²	70000 N/mm ²	70000 N/mm ²	70000 N/mm ²
d	26 mm	42 mm	55 mm	70 mm	80 mm
s	3.5 mm	4.0 mm	6.0 mm	6.0 mm	6.0 mm

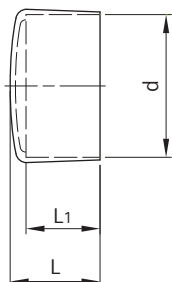
¹⁾ EN AW-ALSiMgMn acc. to EN 755-2, temper T6 acc. to EN 515

Other lengths on request.

End caps see page 02-04-80.

End cap

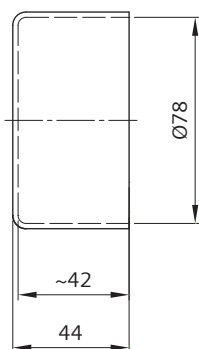
for tubes made of aluminium and steel $d=26$ to 70 mm or GRP $d=26$ and 55 mm



Order no.	8WL2184-0	8WL2184-2	8WL2184-7	8WL2184-3	8WL2184-4
Designation	End cap 26	End cap 38	End cap 42/42.4 (1 1/4")	End cap 55	End cap 70
Material	Plastic-soft, black	Plastic-soft, black	Plastic-soft, black	Plastic-soft, black	Plastic-soft, black
Weight	0.50 kg/100 pcs.	1.30 kg/100 pcs.	1.30 kg/100 pcs.	1.80 kg/100 pcs.	3.30 kg/100 pcs.
d	26.0 mm	37.5 mm	41.0 mm	54.0 mm	69.0 mm
L	~30.0 mm	~32.0 mm	~32.0 mm	~35.0 mm	~37.0 mm
L₁	~24.0 mm	~25.0 mm	~24.5 mm	~28.0 mm	~27.0 mm

End cap

for tube made of aluminium $d=80$ mm



Order no.	8WL2185-0
Designation	End cap 80
Material	Plastic, black
Weight	4.50 kg/100 pcs.

Chapter 02

Standard Products

Tensioning equipment	01	01-86
Thimbles, connectors, sleeves	02	01-24
GRP cantilevers	03	01-68
Aluminium cantilevers	04	01-80
Steel cantilevers	05	01-42
Headspan supports	06	01-36
Insulators	07	01-34
Contact lines under structures and bridge protection	08	01-42
Clamps	09	01-84
Tension wheel equipment	10	01-48
Section insulators	11	01-34
Disconnectors and drive mechanism	12	01-62
Earthing and protecting equipment	13	01-14
Contact wires, conductors, span wires	14	01-22
Monitoring systems	15	01-06
Installation tools and equipment	16	01-24

Catenary wire support clamp 40-60.3, insulated	02-05-20
Catenary wire support clamp 40-60.3/12	02-05-18
Catenary wire support clamp 40-60.3/18	02-05-19
Clevis end fitting 32/33.7	02-05-13
Clevis end fitting 42/42.4	02-05-14
Clevis end fitting 42-60.3 with hook	02-05-12
Clevis end fitting 55-60.3	02-05-15
Drop bracket 32-42.4	02-05-26
Drop bracket 33.7-60.3 H=70/90	02-05-27
Drop bracket 48.3 H=70	02-05-29
Drop bracket 48.3 H=90	02-05-30
End cap	02-05-42
Eye clamp 26	02-05-23
Eye clamp 32-60.3	02-05-16
Eye clamp 60.3	02-05-17
Eye clamp for windstay	02-05-39
Eye-bolt 19	02-05-11
Hook clip 33.7-60.3	02-05-22
Hook clip 40-80 for U-bolt M16	02-05-21
Hook end clamp 26	02-05-24
Hook end fitting 26-42.4	02-05-25
Reducing socket 60.3/48.3	02-05-32
Steady arm made of aluminium H=70	02-05-38
Steel tube	02-05-40
Steel tube (DIN 2448)	02-05-41
Swivel clip holder 26/26.9-100 with hook	02-05-35
Swivel clip holder 26/26.9-60	02-05-34
Swivel clip holder 26/26.9-60 with hook	02-05-36
Swivel clip holder 42/42.4	02-05-37
Swivel with clevis	02-05-08
Swivel with eye	02-05-09
Tube clamp 48.3/42-60.3	02-05-33
Tube end fitting 60.3	02-05-10
Twin drop bracket 42-60.3 H=70/90	02-05-28, 02-05-31

Technical comments

Application

The products listed in this section are used to support the overhead contact lines as steel cantilevers.

Cantilever tubes and steady arms are used to fix the catenary wire and contact wire relative to the track axis and to fasten it at the pole, registration post or wall fastening

Types

The design of the cantilever tubes, steady arms etc. depends on the parameters of the power supply system, the type of support and the static requirements of the system.

Insulation in cantilever tubes takes place optionally by composite, cast-resin or ceramic insulators, for top wires with loop insulators. See chapter QV for selecting the appropriate contact wire clips for the specific application. Insulated steady arm components can be offered either made of cast resin or GRP materials.

Hot-dip galvanized malleable cast iron

The fittings can be used with:

- Hot-dip galvanized steel tubes for the „inch“ system of measurement, according to international use
- Hot-dip galvanized precision steel tubes

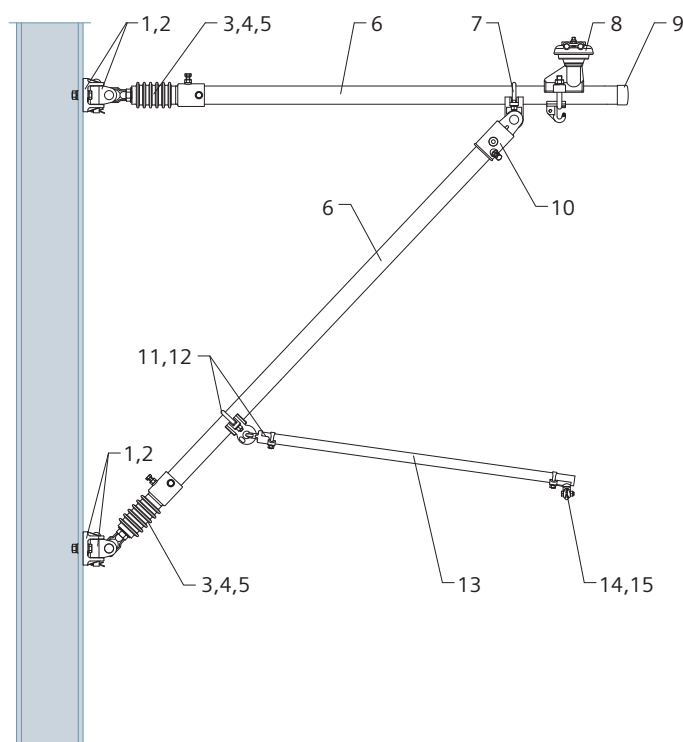
Malleable cast iron is processed using the sand-casting method. Heat treatment gives the material good serviceability characteristics. The hot-dip galvanization gives the malleable cast iron fittings and the steel tubes that are used permanent corrosion protection. This treatment also gives the materials excellent characteristics under extreme climate conditions and high static loads.

Examples for assemblies

On the following pages you can find a number of typical application examples for the configuration of steel cantilevers.

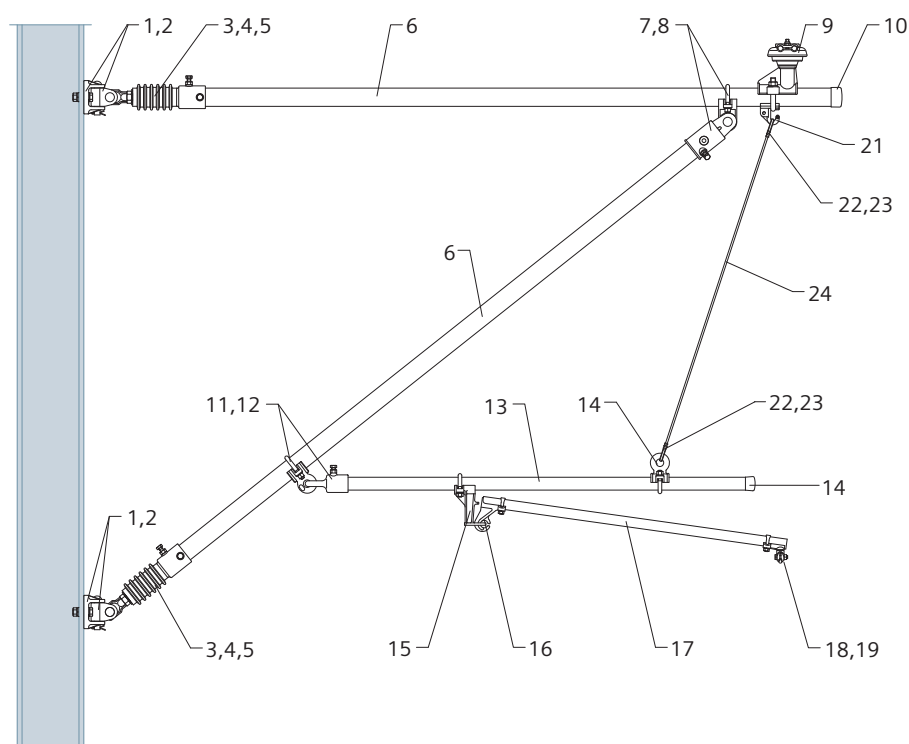
The exact configuration of the cantilever depends on the specific plant and the local situation.

Single cantilever on steel pole for catenary systems in mass transit



Position	Designation	Order no.
1	Cantilever swivel bracket	8WL2124-4
2	Swivel with clevis	8WL2126-0
3	Eye-bolt	8WL2190-3
4	Insulator body 3 kV DC	8WL3120-5
5	Tube end fitting 60.3	8WL2188-3
6	Steel tube 60.3x4 (length as needed)	8WL2175-4B
7	Eye clamp 60.3	8WL2115-4
8	Catenary wire support clamp 60.3/16, insulated	8WL2036-3A
9	End cap 60.3	8WL2184-8
10	Clevis end fitting 60.3	8WL2724-1
11	Eye clamp 60.3	8WL2114-7
12	Hook end fitting for GRP oval rod 23x33	8WL2833-0
13	GRP oval rod 23x33 (length and color as needed)	8WL2815-0/-1
14	Swivel clip holder for GRP oval rod 23x33	8WL2833-1
15	Contact wire clip	8WL4517-1K

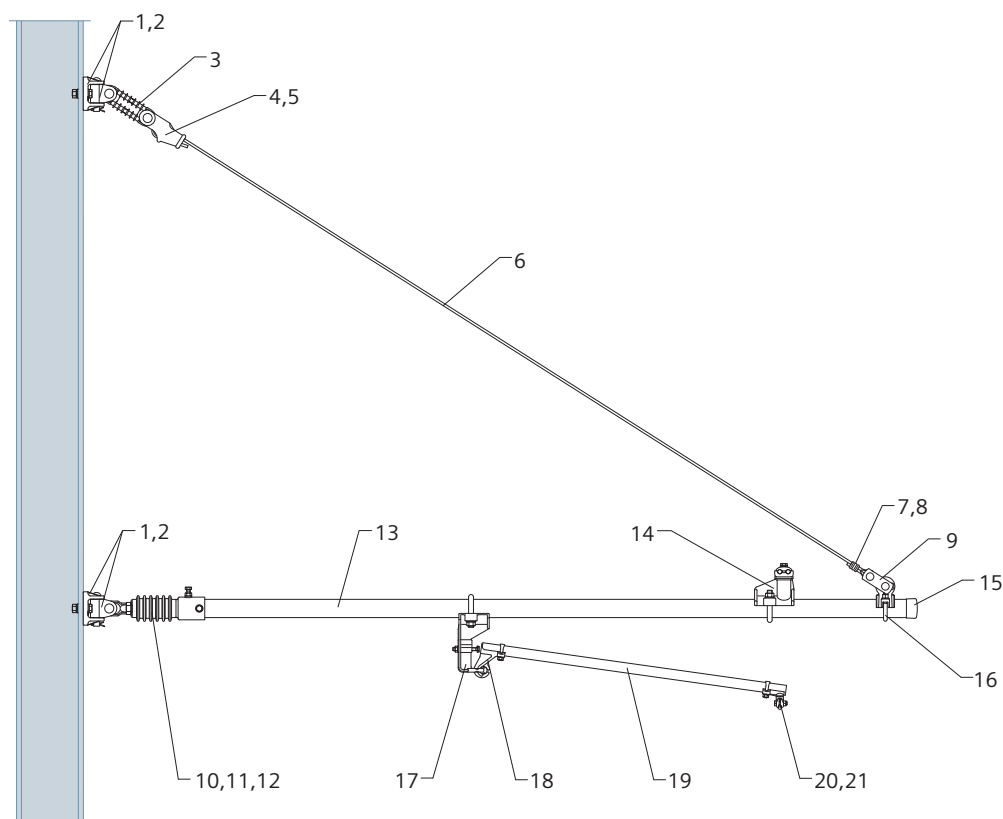
Cantilever on steel pole for catenary system in mass transit



Pos.	Designation	Order no.
1	Cantilever swivel bracket	8WL2124-4
2	Swivel with clevis	8WL2126-0
3	Eye-bolt	8WL2190-3
4	Insulator body 3 kV DC	8WL3120-5
5	Tube end fitting 60.3	8WL2188-3
6	Steel tube 60.3x4 (length as needed)	8WL2175-4B
7	Eye clamp 60.3	8WL2115-4
8	Clevis end fitting 60.3	8WL2724-1
9	Catenary wire support clamp 60.3/16, insulated	8WL2036-3A
10	End cap 60.3	8WL2184-8
11	Eye clamp 60.3	8WL2114-7
12	Hook end fitting 42/42.4	8WL2104-5

Pos.	Designation	Order no.
13	Steel tube 42.4x4 (length as needed)	8WL2175-2B
14	End cap 42/42.4	8WL2184-7
15	Drop bracket 33.7-42.4	8WL2117-5
16	Hook end clamp for GRP oval rod 23x33	8WL2833-4
17	GRP oval rod 23x33 (length and color as needed)	8WL2815-0/-1
18	Swivel clip holder for GRP oval rod 23x33	8WL2833-1
19	Contact wire clip	8WL4517-1K
20	Eye clamp 33.7-42.4	8WL2113-5
21	Hook clip 40-80	8WL2196-4
22	Thimble 35	8WL1501-1
23	Compression joint	8WL1553-0
24	Wire rope 6 (length as needed)	8WL7093-2

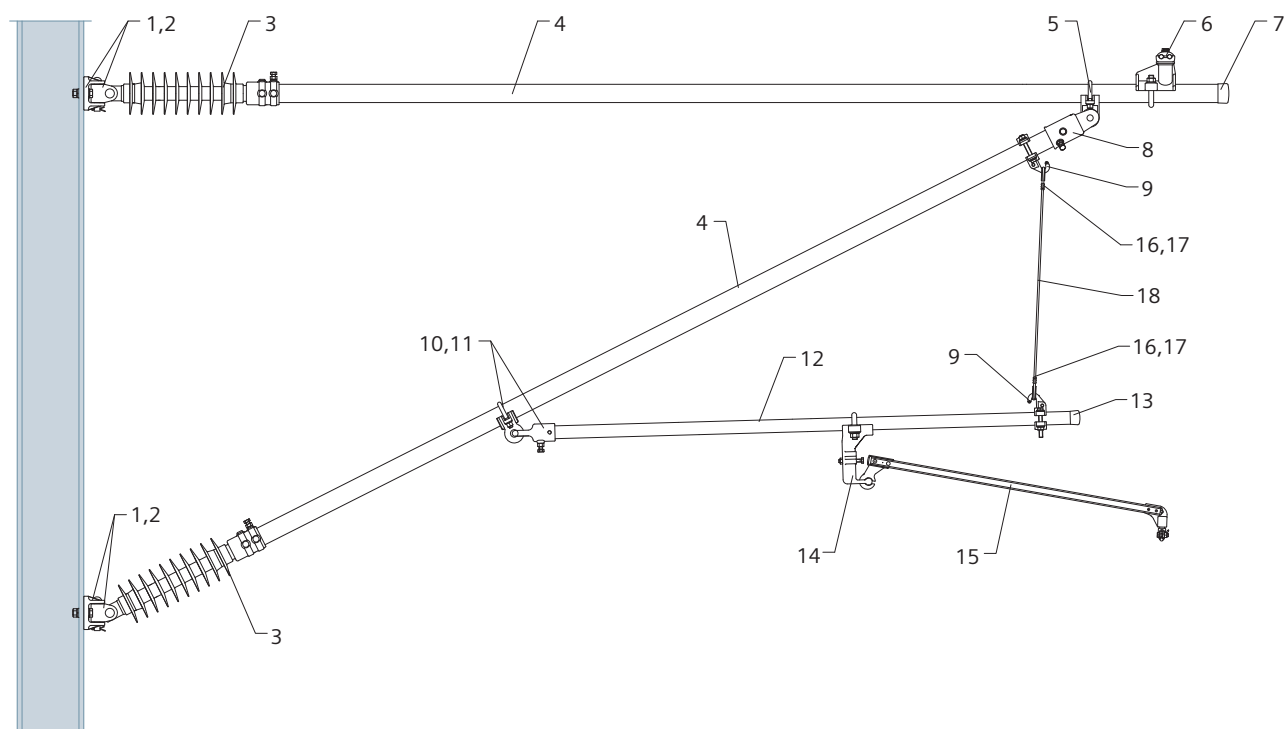
Cantilever on steel pole for single contact wire system in mass transit



Pos.	Designation	Order no.
1	Cantilever swivel bracket	8WL2124-4
2	Swivel with clevis	8WL2126-0
3	Loop insulator 1.5 kV DC	8WL3001-2
4	Wedge-type dead-end clamp	8WL1181-7
5	Three-hole wedge	8WL1203-0
6	Wire rope 8 (length as needed)	8WL7093-2
7	Compression clamp 8	8WL1650-3
8	Thimble 8	8WL1516-2
9	Two pin clevis link	8WL1016-6
10	Eye-bolt	8WL2190-3
11	Insulator body 3 kV DC	8WL3120-5

Pos.	Designation	Order no.
12	Tube end fitting 60.3	8WL2188-3
13	Steel tube 60.3x4 (length as needed)	8WL2175-4B
14	Catenary wire support clamp 60.3/12	8WL2031-4B
15	End cap 60.3	8WL2184-8
16	Eye clamp 60.3	8WL2114-7
17	Drop bracket 60.3	8WL2723-1
18	Hook end clamp for GRP oval rod 23x33	8WL2833-4
19	GRP oval rod 23x33 (length and color as needed)	8WL2815-0/-1
20	Swivel clip holder for GRP oval rod 23x33	8WL2833-1
21	Contact wire clip	8WL4517-1K

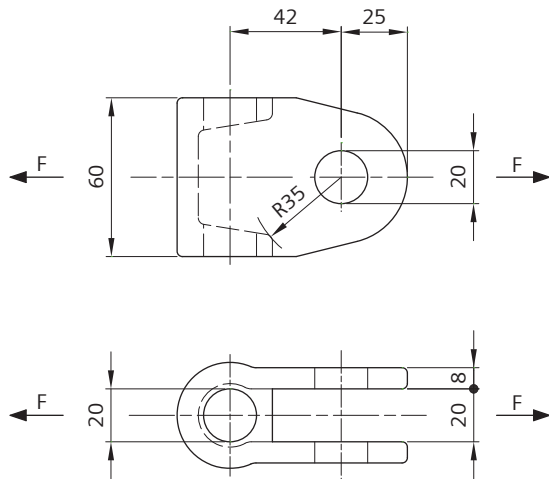
Cantilever, pull-off on steel pole in main-line railways



Position	Designation	Order no.
1	Cantilever swivel bracket	8WL2124-4
2	Swivel with clevis	8WL2126-0
3	Composite insulator 25 kV AC	8WL3078-2A
4	Steel tube 60.3x4 (length as needed)	8WL2175-4B
5	Eye clamp 60.3	8WL2115-4
6	Catenary wire support clamp 60.3/12	8WL2031-4B
7	End cap 60.3	8WL2184-8
8	Clevis end fitting 60.3	8WL2724-1
9	Hook clip 33.7-60.3	8WL2196-6
10	Eye clamp 60.3	8WL2114-7
11	Hook end fitting 42/42.4	8WL2104-5
12	Steel tube 42.4x4 (length as needed)	8WL2175-2B
13	End cap 42/42.4	8WL2184-7
14	Drop bracket 33.7-42.4	8WL2723-0
15	Steady arm (length as needed)	8WL3500-5A to -5K
16	Thimble 35	8WL1501-0
17	Compression/crimped connector 16-20	8WL1521-1
18	Bronze wire 16x84	8WL7061-1

Swivel with clevis

for hinged cantilevers



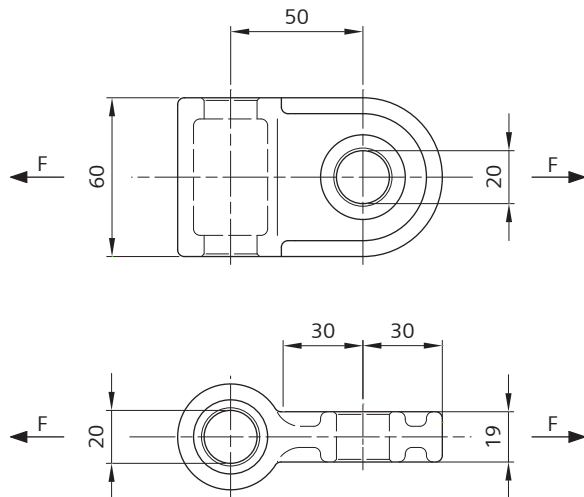
Order no.	8WL2126-0
Designation	Swivel with clevis 20
Material	mICI
Weight	0.51 kg
Perm. operating load	26.7 kN
Min. failing load	80 kN

Pin 8WL1110-0 (19x52-St-tZn) and split pin 8WL1115-1 (5x28-Cu) must be ordered separately, see Chapter 02-01.

Can also be supplied completely mounted.

Swivel with eye

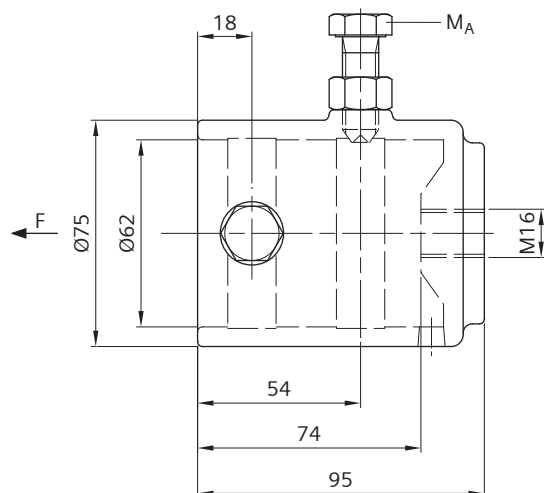
for hinged cantilevers



Order no.	8WL2127-0
Designation	Swivel with eye 20
Material	mICI
Weight	0.64 kg
Perm. operating load	15.8 kN
Min. failing load	47.4 kN

Tube end fitting 60.3

for hinged cantilevers, for tube d=60.3 mm (2")

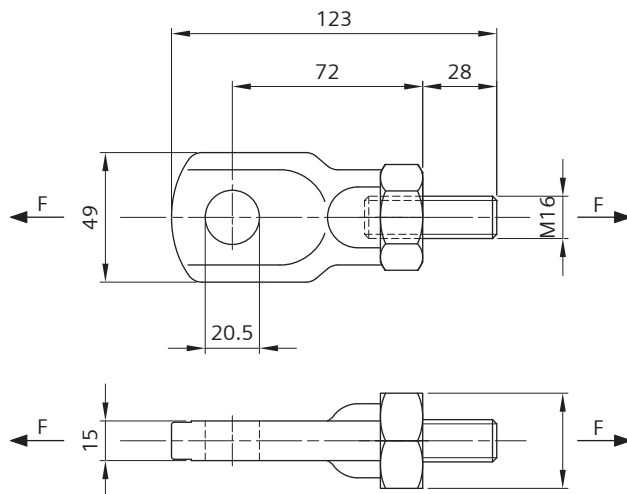


Order no.	8WL2188-3
Designation	Tube end fitting 60.3
Material	
Tube end fitting	mICI
Cup-point screws M12	stlSt
Nuts	stlSt
Weight	1.29 kg
Perm. operating load/ tension	7.5 kN
Min. failing load/tension	22.5 kN
Tightening torque M_A	40 Nm

Can also be supplied without cup-point screws and nuts, order no. 8WL2188-2.

Eye-bolt 19

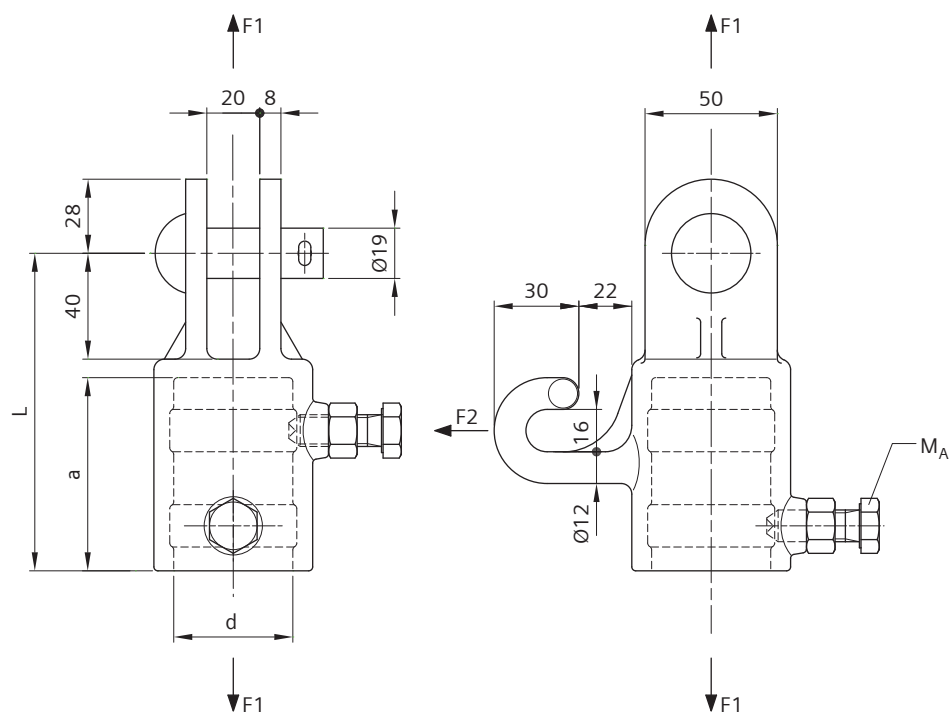
for joining insulator bodies with threaded bush M16



Order no.	8WL2190-3
Designation	Eye-bolt 19
Material	
Eye-bolt	mICI
Threaded pin M16x50	stISt
Weight	0.40 kg
Perm. operating load	20 kN
Min. failing load	60 kN

Clevis end fitting 42-60.3 with hook

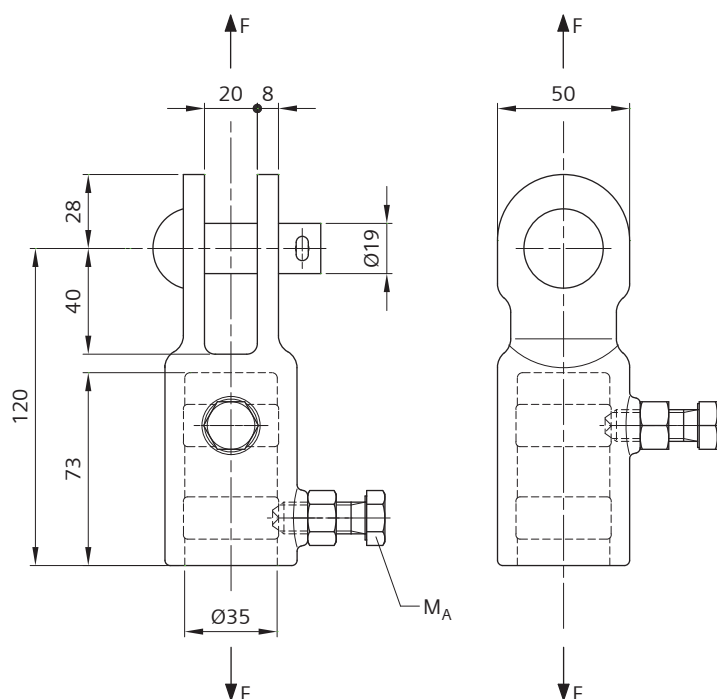
for hinged cantilevers, for tube d=42 and 42.4 mm (1 1/4") or 60.3 mm (2")



Order no.	8WL2121-8	8WL6221-7
Designation	Clevis end fitting 42/42.4	Clevis end fitting 60.3
Material		
Clevis end fitting	mICI	mICI
Cup-point screws M12	stlSt	stlSt
Nuts	stlSt	stlSt
Pin 19x52	htgSt	htgSt
Split pin 5x28	Cu	Cu
Weight	1.38 kg	1.71 kg
Perm. operating load (F1)	7.5 kN	7.5 kN
Min. failing load (F1)	22.5 kN	22.5 kN
Perm. operating load (F2)	2.6 kN	2.6 kN
Min. failing load (F2)	8 kN	8 kN
Tightening torque M_A	40 Nm	40 Nm
a	73 mm	75 mm
d	45 mm	62 mm
L	120 mm	122 mm

Clevis end fitting 32/33.7

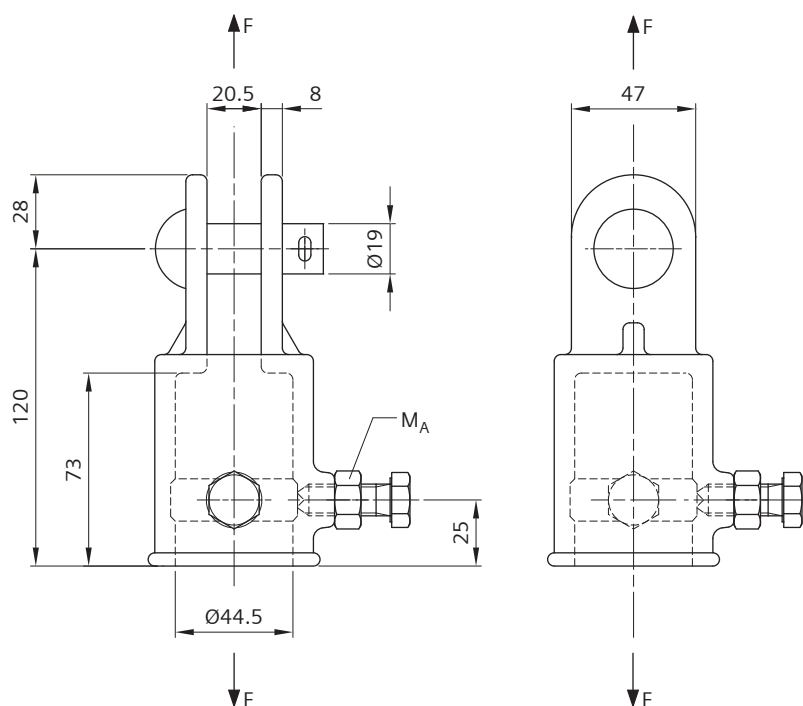
for hinged cantilevers, for tube d=32 and 33.7 mm (1")



Order no.	8WL6221-4
Designation	Clevis end fitting 32/33.7
Material	
Clevis end fitting	mICI
Cup-point screws M12	stlSt
Nuts	stlSt
Pin 19x52	htgSt
Split pin 5x28	Cu
Weight	1.00 kg
Perm. operating load	8.4 kN
Min. failing load	25 kN
Tightening torque M_A	40 Nm

Clevis end fitting 42/42.4

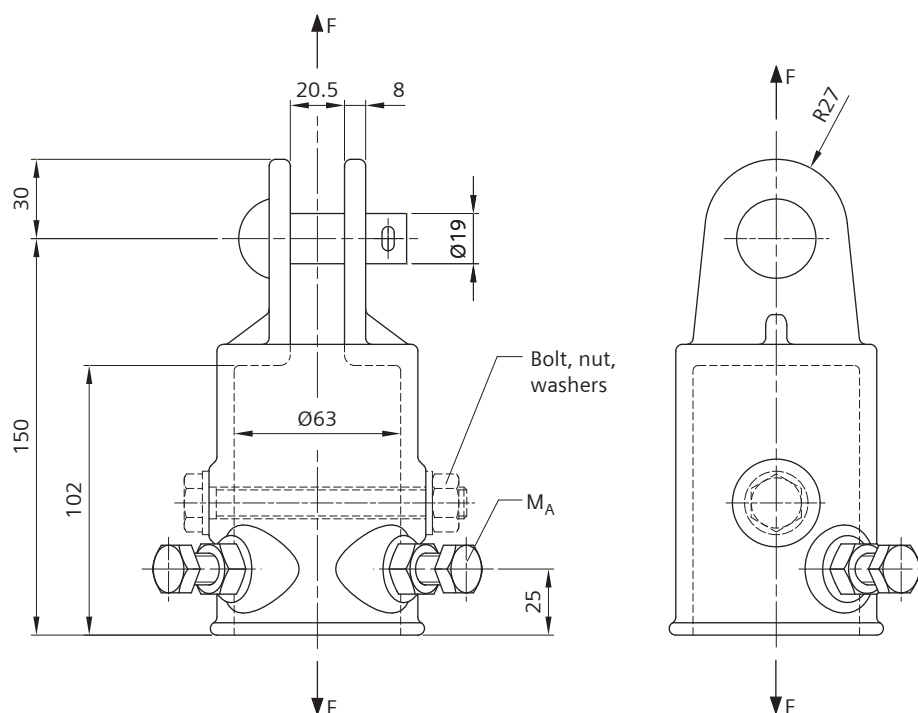
for hinged cantilevers, for tube d=42 und 42.4 mm (1 1/4")



Order no.	8WL2724-0
Designation	Clevis end fitting 42/42.4
Material	
Clevis end fitting	mICI
Cup-point screws M12	stlSt
Nuts	stlSt
Pin 19x52	htgSt
Split pin 5x28	Cu
Weight	1.44 kg
Perm. operating load	7 kN
Min. failing load	21 kN
Tightening torque M _A	50 Nm

Clevis end fitting 55-60.3

for hinged cantilevers, for tube d=55 und 60.3 mm (2")

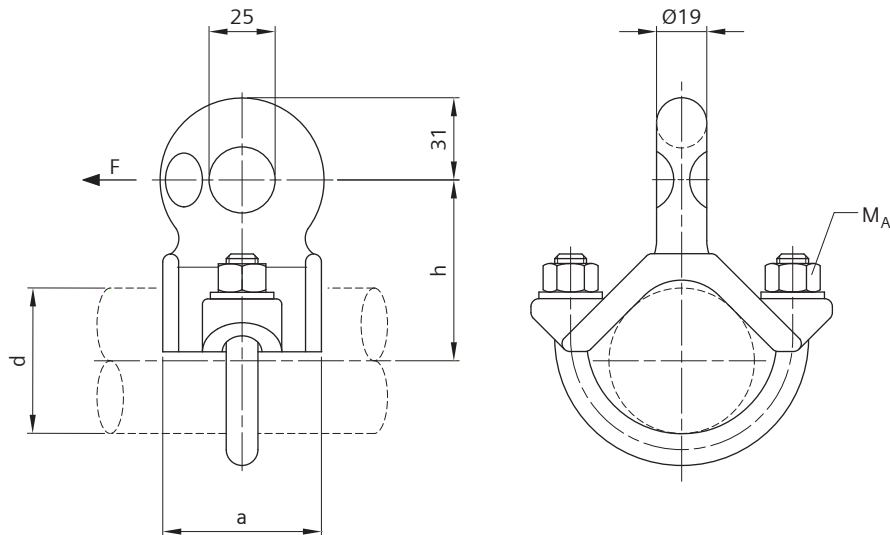


Order no.	8WL2724-1
Designation	Clevis end fitting 55-60.3
Material	
Clevis end fitting	mICI
Cup-point screws M12	stlSt
Nuts	stlSt
Pin 19x52	stlSt
Split pin 5x28	Cu
Weight	2.07 kg
Perm. operating load	9 kN
Min. failing load	27 kN
Tightening torque M_A	50 Nm

One bolt ISO 4017-M12x100 (stlSt), with nut ISO 4032-M12 (stlSt) and two washers ISO 7089-A13 (stlSt) must be used additional for operating load of more than 9 kN to 15.8 kN. Please order separately.

Eye clamp 32-60.3

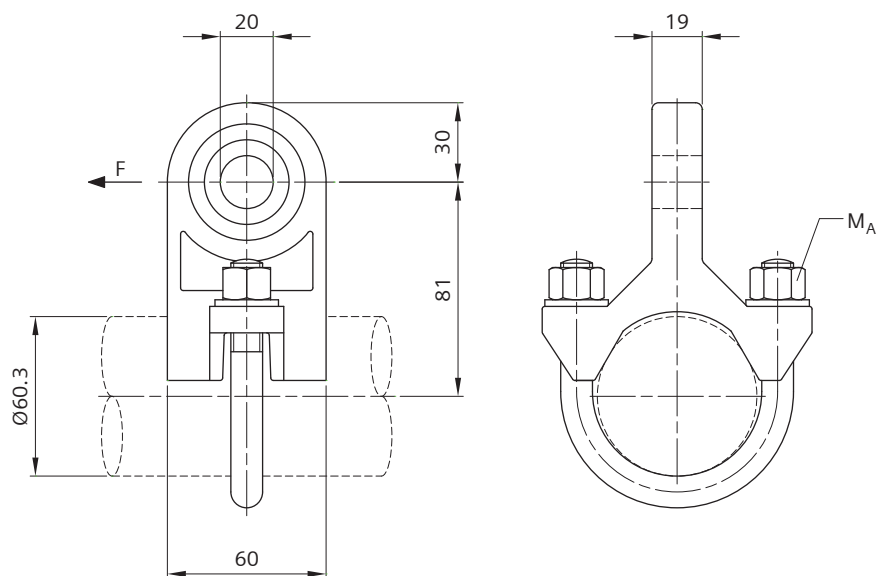
for hinged cantilevers, for tube d=32 and 33.7 mm (1") to 42 and 42.4 mm (1 1/4"), 55 mm or 60.3 mm (2")



Order no.	8WL2113-5	8WL2114-0	8WL2114-7
Designation	Eye clamp 32/33.7 to 42/42.4	Eye clamp 55	Eye clamp 60.3
Material			
Eye clamp	mICI	mICI	mICI
U-bolt M12	htgSt	stlSt	htgSt
Nuts	htgSt	stlSt	htgSt
Washers	htgSt	stlSt	htgSt
Weight	0.85 kg	0.92 kg	1.10 kg
Perm. operating load	5 kN	5 kN	5 kN
Min. failing load	15 kN	15 kN	15 kN
Tightening torque M_A	25 Nm	35 Nm	25 Nm
a	65 mm	60 mm	65 mm
d	32/33.7 - 42/42.4 mm	55 mm	60.3 mm
h	60/70 mm	70 mm	73 mm

Eye clamp 60.3

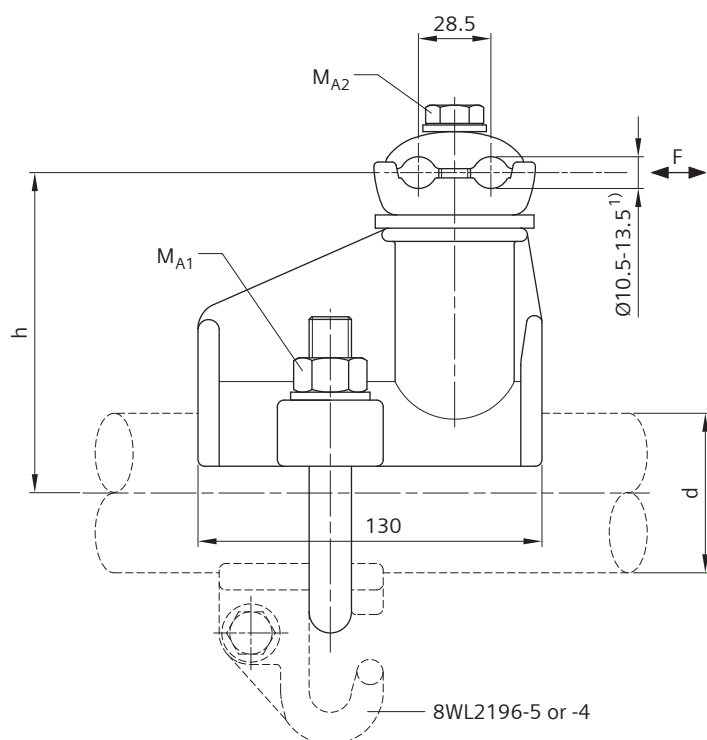
for hinged cantilevers and soffit posts, for tube $d=60.3$ mm (2")



Order no.	8WL2115-4
Designation	Eye clamp 60.3
Material	
Eye clamp	mICI
U-bolt M12	htgSt
Nuts	htgSt
Washers	htgSt
Weight	1.10 kg
Perm. operating load	7 kN
Min. failing load	21 kN
Tightening torque M_A	25 Nm

Catenary wire support clamp 40-60.3/12

adjustable at top tube d=40 to 60.3 mm (2"), for bronze and copper wires acc. to DIN 48201



Order no.	8WL2031-4A	8WL2031-4B
Designation	Catenary wire support clamp 40-42.4/12	Catenary wire support clamp 55-60.3/12
Material		
Clamp body	mICI	mICI
Clamp cover	mICI	mICI
Clamp holder	mICI	mICI
U-bolt M16	stlSt	stlSt
Bolt M12	stlSt	stlSt
Nuts, washers	stlSt	stlSt
Weight	2.57 kg	2.66 kg
Perm. operating load	12 kN	12 kN
Min. failing load	36 kN	36 kN
Tightening torque M_{A1}	70 Nm	70 Nm
Tightening torque M_{A2}	56 Nm	56 Nm
d	40 - 42.4 mm (1 1/4")	55 - 60.3 mm (2")
h	107 mm	117/121 mm

¹¹ Diameter including protection sleeve

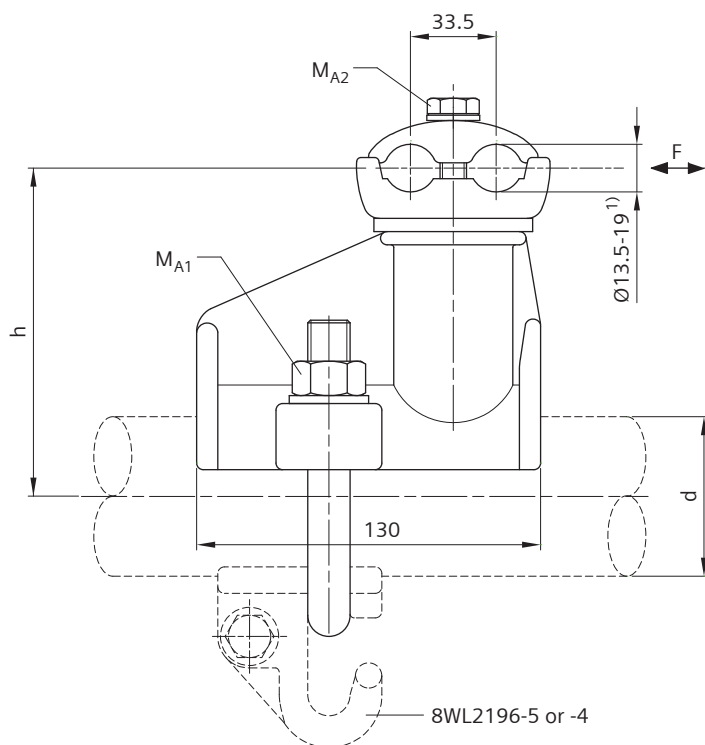
If necessary, the hook clip 8WL2196-5 or -4 must be ordered separately, see page 02-05-21.

Protection sleeves must be ordered separately, see Chapter 02-02.

Types for other tube diameters on request.

Catenary wire support clamp 40-60.3/18

adjustable at top tube $d=40$ to 60.3 mm (2"), for bronze and copper wires acc. to DIN 48201



Order no.	8WL2031-5A	8WL2031-5B
Designation	Catenary wire support clamp 40-42.4/18	Catenary wire support clamp 55-60.3/18
Material		
Clamp body	mICI	mICI
Clamp cover	mICI	mICI
Clamp holder	mICI	mICI
U-bolt M16	stlSt	stlSt
Bolt M12	stlSt	stlSt
Nuts, washers	stlSt	stlSt
Weight	2.71 kg	2.80 kg
Perm. operating load	12 kN	12 kN
Min. failing load	36 kN	36 kN
Tightening torque M_{A1}	70 Nm	70 Nm
Tightening torque M_{A2}	56 Nm	56 Nm
d	40 - 42.4 mm (1 1/4")	55 - 60.3 mm (2")
h	109 mm	119/123 mm

¹⁾ Diameter including protection sleeve

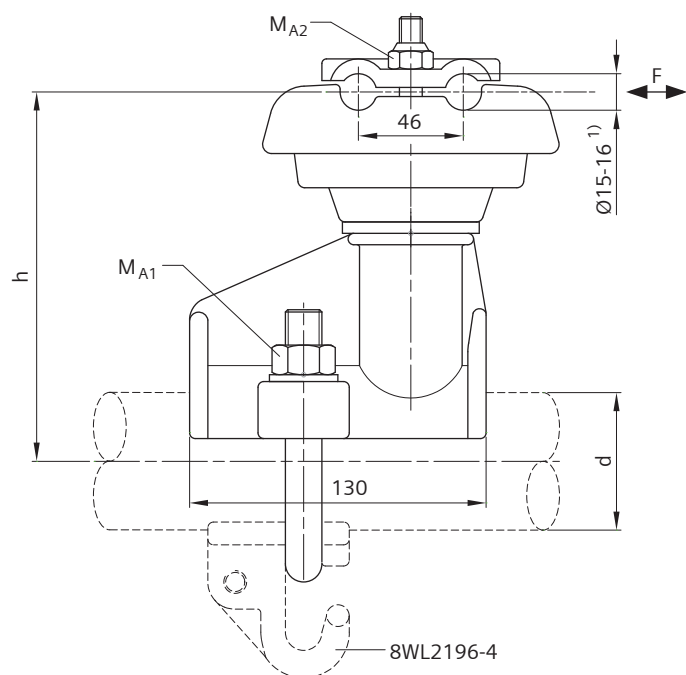
If necessary, the hook clip 8WL2196-5 or -4 must be ordered separately, see page 02-05-21.

Protection sleeves must be ordered separately, see Chapter 02-02.

Types for other tube diameters on request.

Catenary wire support clamp 40-60.3, insulated

adjustable at top tube d=40 to 60.3 mm (2"), for bronze and copper wires up to d=16 mm acc. to DIN 48201



Order no.	8WL2036-3B	8WL2036-3A
Designation	Catenary wire support clamp 40-42.4/16	Catenary wire support clamp 55-60.3/16
Material		
Clamp body	Cast resin, brown	Cast resin, brown
Clamp cover	CuAl	CuAl
Clamp holder	mICI	mICI
U-bolt M16	stlSt	stlSt
Stud bolts M10	stlSt	stlSt
Nuts, washers	stlSt	stlSt
Weight	3.38 kg	3.57 kg
Perm. operating load	2.5 kN/wire	2.5 kN/wire
Min. failing load	8.0 kN/wire	8.0 kN/wire
Tightening torque M_{A1}	70 Nm	70 Nm
Tightening torque M_{A2}	25 Nm	25 Nm
Nominal voltage	1.5 kV DC	1.5 kV DC
d	40 - 42.4 mm (1 1/4")	55 - 60.3 mm (2")
h	150 mm	158/162 mm

¹⁾ Diameter including protection sleeve

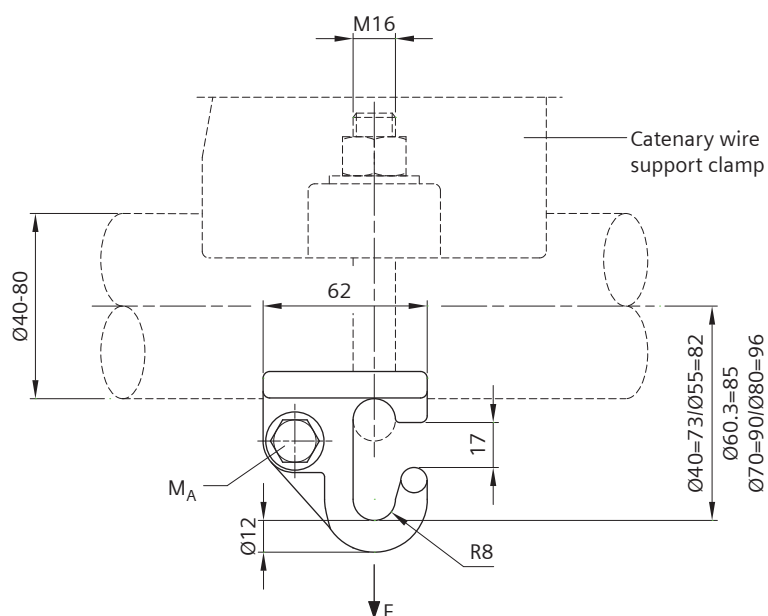
If necessary, the hook clip 8WL2196-4 must be ordered separately, see page 02-05-21.

Protection sleeves must be ordered separately, see Chapter 02-02.

Types for other tube or wire diameters on request.

Hook clip 40-80 for U-bolt M16

for dropper connection at catenary wire support clamps adjustable at top tube d=40 to 80 mm, with current connector

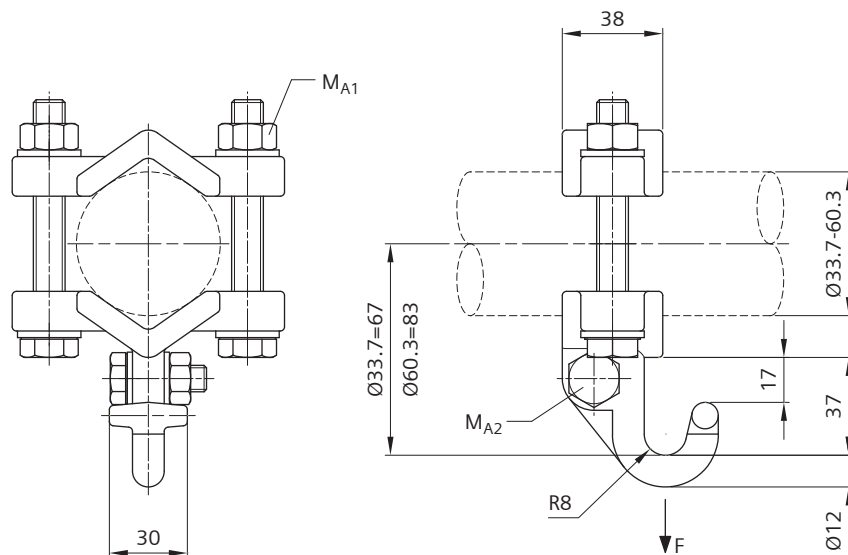


Order no.	8WL2196-5	8WL2196-4
Designation	Hook clip 40-80	Hook clip 40-80, without nut and washer
Material		
Hook clip	mICI	mICI
Hook clip	mICI	mICI
Bolt M10	stlSt	-
Washer	stlSt	-
Weight	0.38 kg	0.35 kg
Perm. operating load	2 kN	2 kN
Min. failing load	6 kN	6 kN
Tightening torque M_A	32 Nm	-

Catenary wire support clamp must be ordered separately.

Hook clip 33.7-60.3

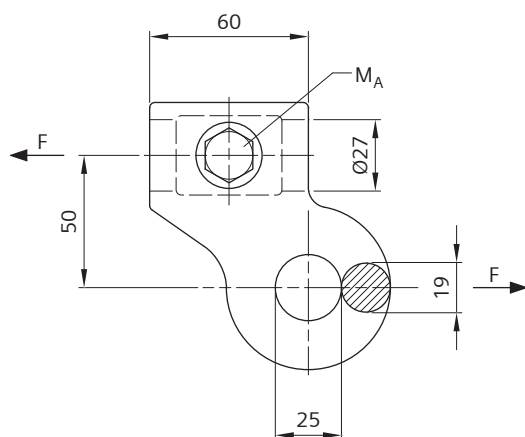
for dropper connection at cantilever tube $d=33.7$ mm (1") to 60.3 mm (2"), with current connector



Order no.	8WL2196-6
Designation	Hook clip 33.7-60.3
Material	
Hook clip	mICI
Clamp cover	mICI
Bolts M12	stlSt
Bolt M10	stlSt
Nuts, washers	stlSt
Weight	0.79 kg
Perm. operating load	2 kN
Min. failing load	6 kN
Tightening torque M_{A1}	56 Nm
Tightening torque M_{A2}	32 Nm

Eye clamp 26

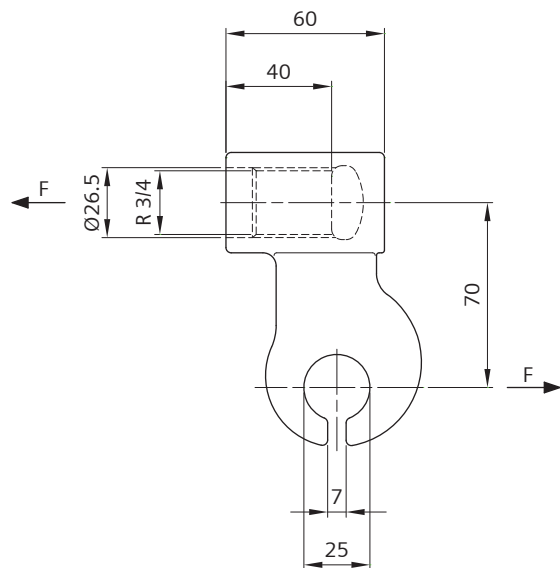
for second tube-type steady arms $d=26$ mm made of steel or aluminium



Order no.	8WL2100-0
Designation	Eye clamp 26
Material	
Tongue end fitting	mICI
Cup-point screw M12	stlSt
Nut	stlSt
Weight	0.66 kg
Perm. operating load	5 kN
Min. failing load	15 kN
Tightening torque M_A	40 Nm

Hook end clamp 26

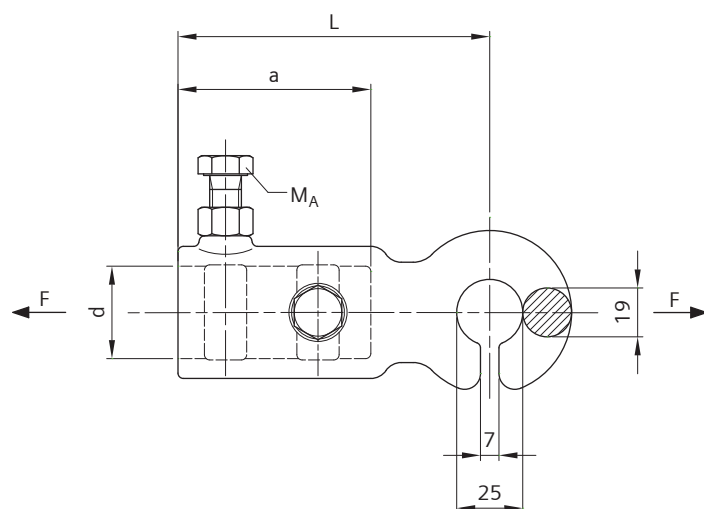
for tube-type steady arms $d=26$ mm made of steel or aluminium



Order no.	8WL2101-0
Designation	Hook end clamp 26
Material	mICI
Weight	0.54 kg
Perm. operating load	6 kN
Min. failing load	18 kN

Hook end fitting 26-42.4

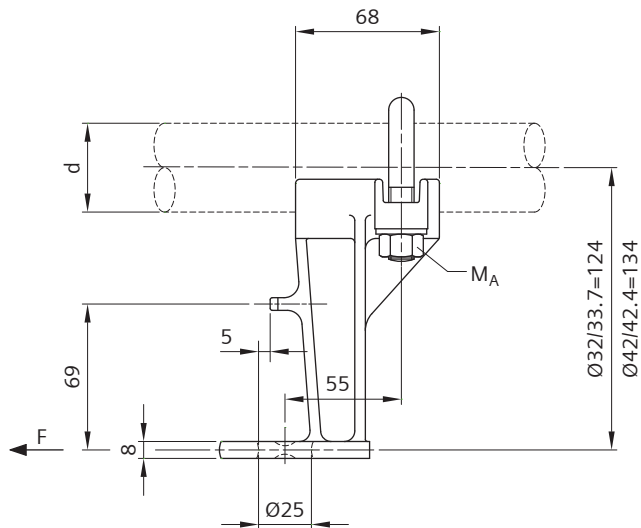
for steel tube-type steady arms $d=26$ and 26.9 mm ($3/4"$), 32 and 33.7 mm ($1"$) or 42 and 42.4 mm ($1\ 1/4"$)



Order no.	8WL2102-2	8WL2103-4	8WL2104-5
Designation	Hook end fitting 26/26.9	Hook end fitting 32/33.7	Hook end fitting 42/42.4
Material			
Hook end fitting	mICI	mICI	mICI
Cup-point screws M12	stlSt	stlSt	stlSt
Nuts	stlSt	stlSt	stlSt
Weight	1.0 kg	1.00 kg	1.06 kg
Perm. operating load	6 kN	6 kN	6 kN
Min. failing load	18 kN	18 kN	18 kN
Tightening torque M_A	40 Nm	40 Nm	40 Nm
a	73 mm	73 mm	65 mm
d	28.5 mm	35 mm	45 mm
L	118 mm	118 mm	110 mm

Drop bracket 32-42.4

for steady arm connection at registration tube $d=32$ and 33.7 mm (1") to 42 and 42.4 mm (1 1/4")

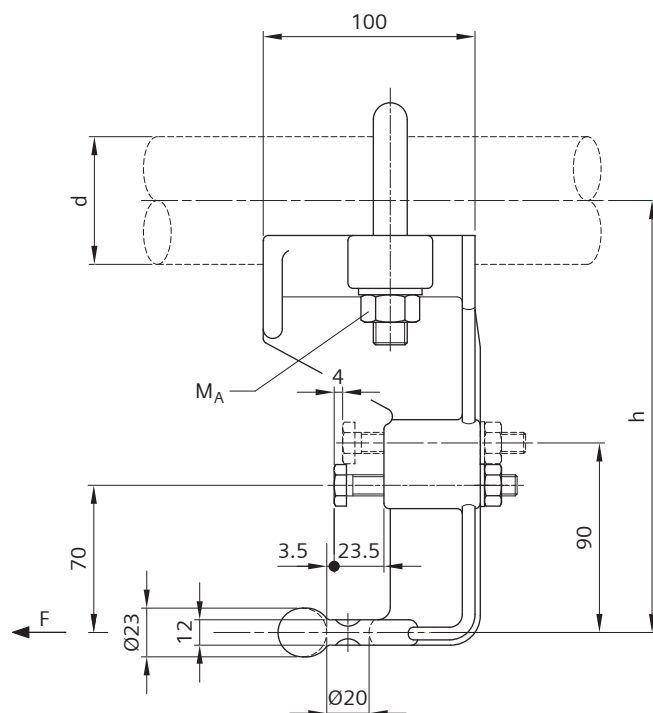


Order no.	8WL2117-5
Designation	Drop bracket 32/33.7 to 42/42.4
Material	
Drop bracket	mICI
U-bolt M12	htgSt
Nuts, washers	htgSt
Weight	0.90 kg
Perm. operating load	4 kN
Min. failing load	12 kN
Tightening torque M_A	25 Nm

Steady arms 8WL3501- see page 02-04-67.

Drop bracket 33.7-60.3 H=70/90

for steady arm connection at registration tube $d=33.7$ mm (1") to 60.3 mm (2"), with current connector



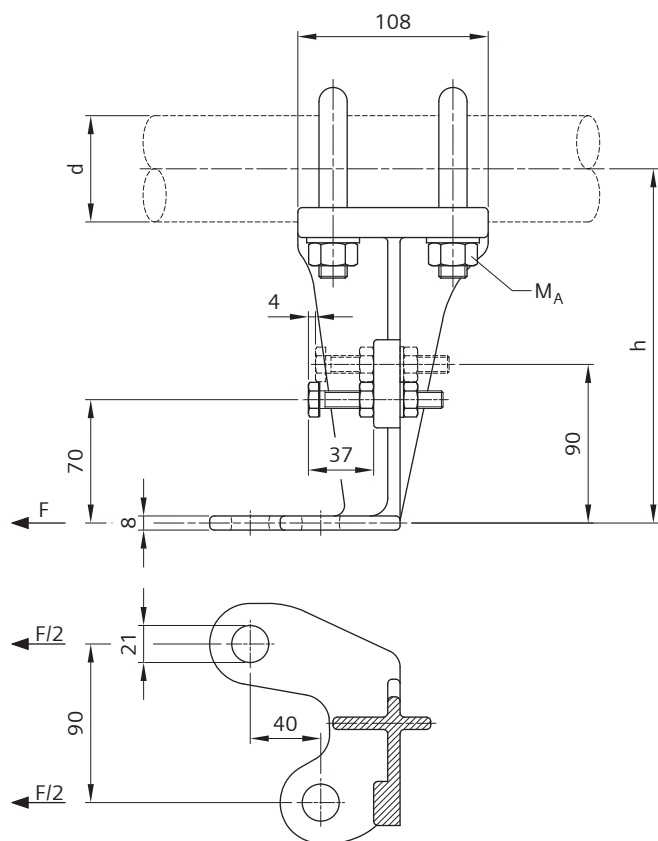
Order no.	8WL2723-0	8WL2723-1
Designation	Drop bracket 33.7-42.4	Drop bracket 48.3-60.3
Material		
Drop bracket	mICI	mICI
U-bolt M16	stlSt	stlSt
Bolt M10	stlSt	stlSt
Nuts, washers	stlSt	stlSt
Weight	2.16 kg	2.24 kg
Perm. operating load	4.3 kN	4.3 kN
Min. failing load	12.9 kN	12.9 kN
Tightening torque M_A	70 Nm	70 Nm
d	33.7 - 42.4 mm (1 1/4")	48.3 - 60.3 mm (2")
h	186/191 mm	198/201 mm

Steady arms for H=70 mm 8WL3503- see page 02-05-38.

Steady arm for H=90 mm on request.

Twin drop bracket 42-60.3 H=70/90

for steady arm connection at registration tube $d=42$ mm and 42.4 mm (1 1/4") to 60.3 mm (2"), with current connector



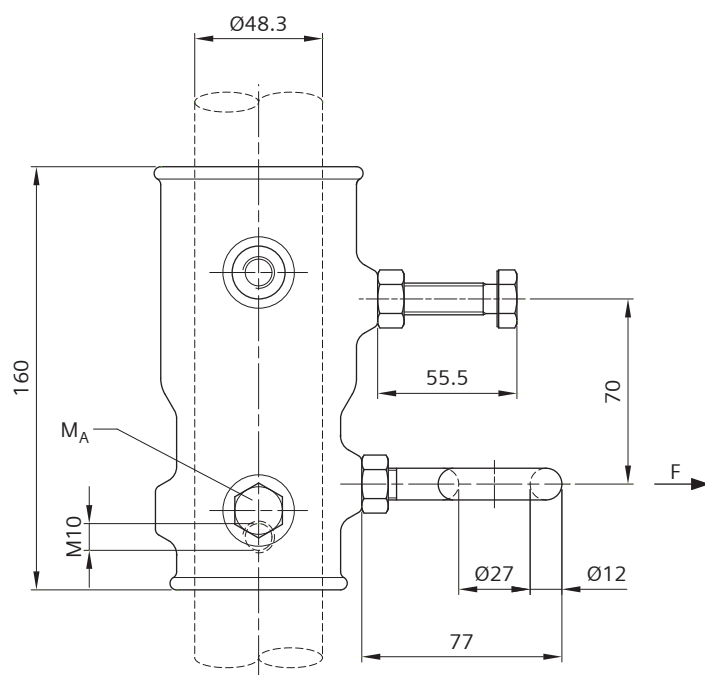
Order no.	8WL2116-6B	8WL2116-6C
Designation	Twin drop bracket 42/42.4	Twin drop bracket 48.3-60.3
Material		
Drop bracket	mICI	mICI
U-bolts M16	stlSt	stlSt
Bolt M10	stlSt	stlSt
Nuts, washers	stlSt	stlSt
Weight	3.42 kg	3.58 kg
Perm. operating load	7 kN	7 kN
Min. failing load	21 kN	21 kN
Tightening torque M_A	70 Nm	70 Nm
d	42/42.4 mm	48.3 - 60.3 mm
h	190 mm	195/201 mm

Steady arms for H=70 mm 8WL3503- see page 02-05-38.

Steady arms for H=90 mm on request.

Drop bracket 48.3 H=70

for steady arm connection at vertical tube $d=48.3$ mm (1 3/4"), with current connector

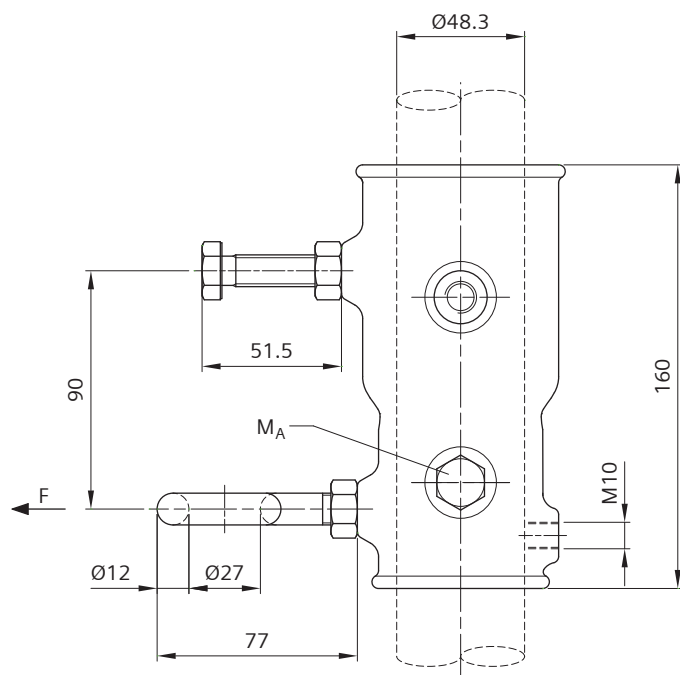


Order no.	8WL2128-6B
Designation	Drop bracket 48.3
Material	
Drop bracket	mIcI
Cup-point screw M12	stISt
Eye-bolt M12	stISt
Bolt M12	stISt
Nuts	stISt
Weight	1.78 kg
Perm. operating load	4.3 kN
Min. failing load	12.9 kN
Tightening torque M_A	40 Nm

Steady arms 8WL3503- see page 02-05-38.

Drop bracket 48.3 H=90

for steady arm connection at vertical tube d=48.4 mm (1 3/4"), with current connector

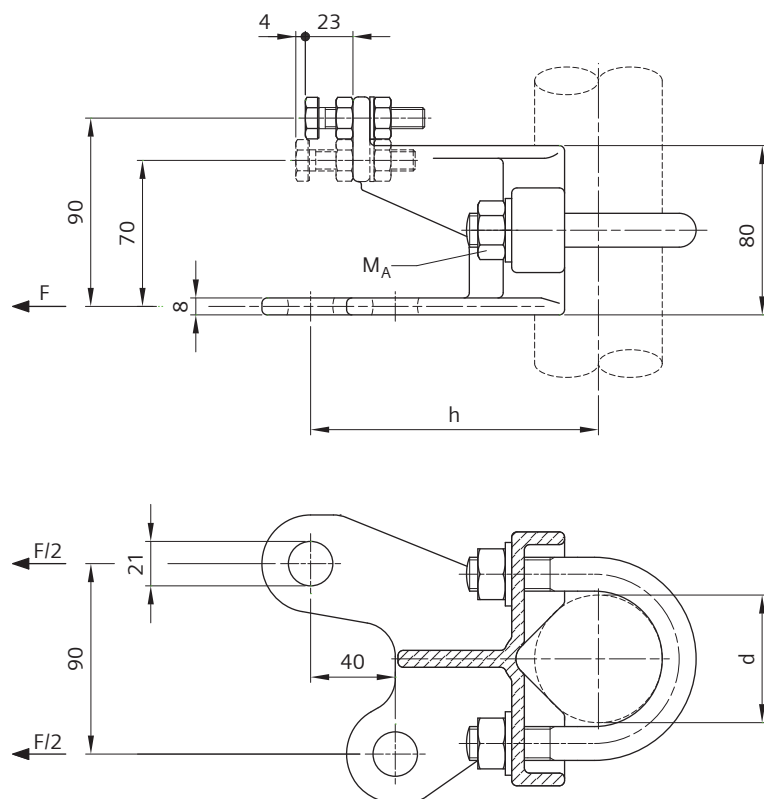


Order no.	8WL2128-6C
Designation	Drop bracket 48.3
Material	
Drop bracket	mICI
Cup-point screw M12	stlSt
Eye-bolt M12	stlSt
Bolt M12	stlSt
Nuts	stlSt
Weight	1.78 kg
Perm. operating load	4.3 kN
Min. failing load	12.9 kN
Tightening torque M _A	40 Nm

Steady arms on request.

Twin drop bracket 42-60.3 H=70/90

for steady arm connection at vertical tube $d=42$ mm and 42.4 mm (1 1/4") to 60.3 mm (2"), with current connector

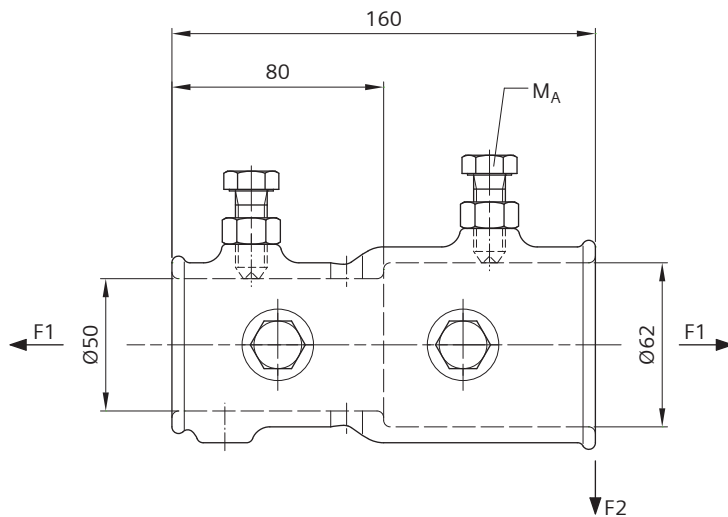


Order no.	8WL2723-3	8WL2723-4
Designation	Twin drop bracket 42/42.4-48.3	Twin drop bracket 55-60.3
Material		
Drop bracket	mICI	mICI
U-bolt M16	stlSt	stlSt
Bolt M10	stlSt	stlSt
Nuts, washers	stlSt	stlSt
Weight	1.83 kg	1.93 kg
Perm. operating load	7 kN	7 kN
Min. failing load	21 kN	21 kN
Tightening torque M_A	70 Nm	70 Nm
d	42/42.4 - 48.3 mm	55 - 60.3 mm
h	123/128 mm	133/136 mm

Steady arm for H=70 mm see page 02-05-38.

Steady arm for H=90 mm on request.

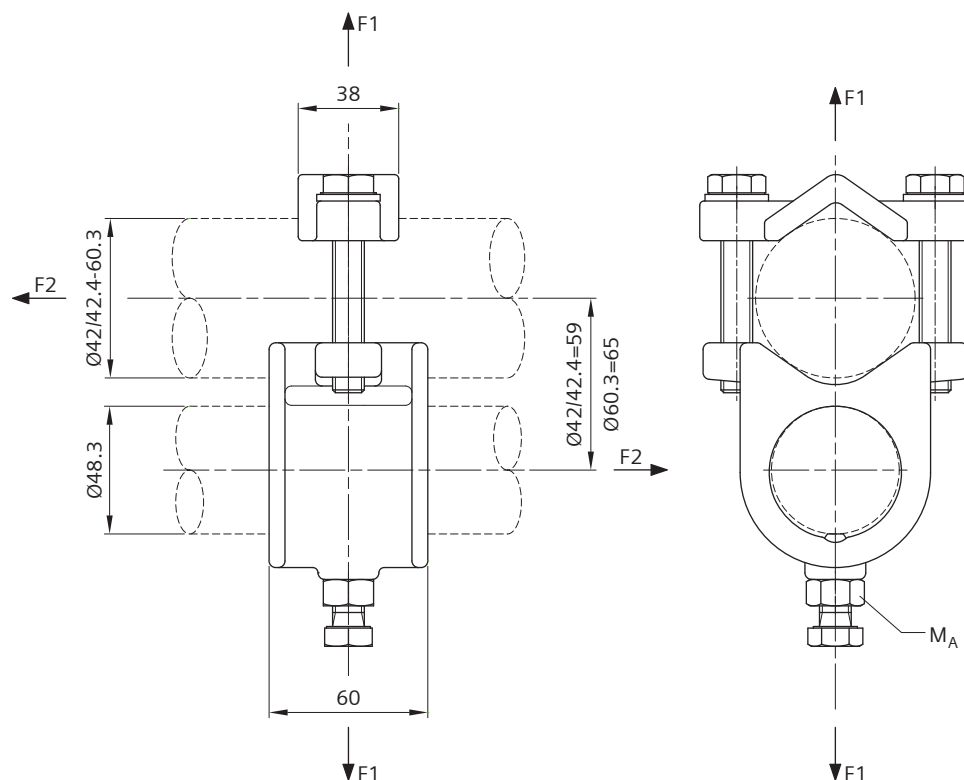
Reducing socket 60.3/48.3



Order no.	8WL2128-6A
Designation	Reducing socket 60.3/48.3
Material	
Reducing socket	mICI
Cup-point screws M12	stISt
Nuts	stISt
Weight	1.73 kg
Perm. operating load/ tension (F1)	4 kN
Min. failing load/ tension (F1)	12 kN
Perm. operating load/ bending (F2)	2 kN
Min. failing load/ bending (F2)	6 kN
Tightening torque M_A	40 Nm

Tube clamp 48.3/42-60.3

for tube d=42 mm and 42.4 mm (1 1/4") to 60.3 mm (2")

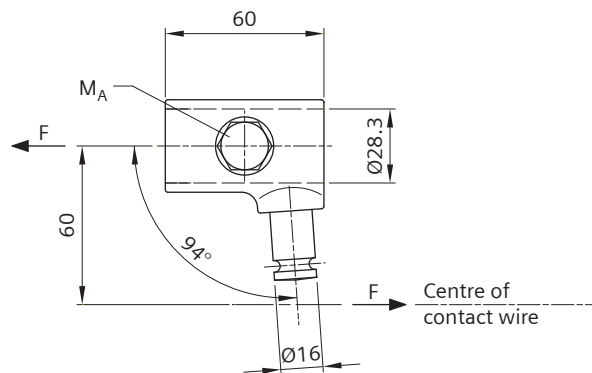


Order no.	8WL2128-7
Designation	Tube clamp
Material	
Tube clamp	mICI
Clamp cover	mICI
Cup-point screw M12	stlSt
Bolts M12	stlSt
Nut, washers	stlSt
Weight	1.34 kg
Perm. operating load/ tension (F1)	6 kN
Min. failing load/ tension (F1)	18 kN
Perm. operating load/ bending (F2)	4 kN
Min. failing load/ bending (F2)	12 kN
Tightening torque M_A	40 Nm

This part must be used by pairs in distance of approx. 200 mm.

Swivel clip holder 26/26.9-60

for tube-type steady arms $d=26$ and 26.9 mm ($3/4"$)

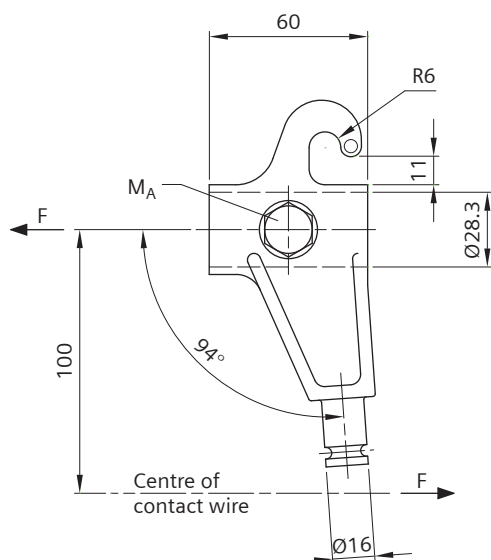


Order no.	8WL2003-3
Designation	Swivel clip holder 26/26.9-60-R
Material	
Swivel clip holder	CuAl
Cup-point screw M12	stlSt
Weight	0.24 kg
Perm. operating load	2.5 kN
Min. failing load	7.5 kN
Tightening torque M_A	40 Nm

Contact wire clips see Chapter 02-09.

Swivel clip holder 26/26.9-100 with hook

for tube-type steady arms $d=26$ mm and 26.9 mm (3/4")

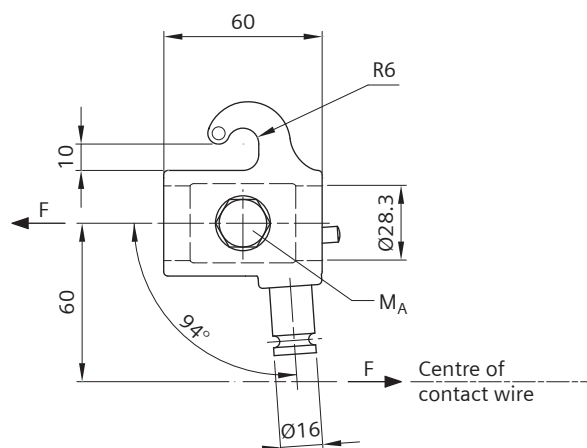


Order no.	8WL2004-0
Designation	Swivel clip holder 26/26.9-100-R
Material	
Swivel clip holder	CuAl
Cup-point screw M12	stlSt
Weight	0.40 kg
Perm. operating load	2.5 kN
Min. failing load	7.5 kN
Tightening torque M_A	40 Nm

Contact wire clips see Chapter 02-09.

Swivel clip holder 26/26.9-60 with hook

for tube-type steady arms $d=26$ and 26.9 mm ($3/4"$)

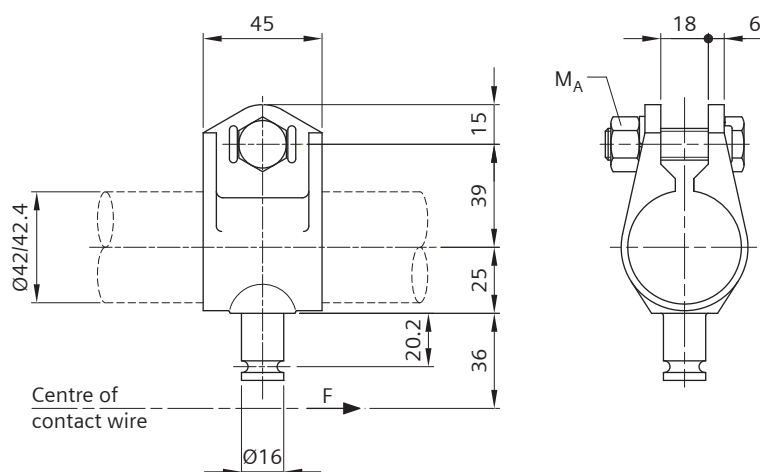


Order no.	8WL2000-0
Designation	Swivel clip holder 26/26,9-60-R
Material	
Swivel clip holder	mICI
Cup-point screw M12	stISt
Grooved stud 16R	CuNiSi
Prestressed sleeve	stISt
Weight	0.45 kg
Perm. operating load	3.5 kN
Min. failing load	10.5 kN
Tightening torque M_A	40 Nm

Contact wire clips see Chapter 02-09.

Swivel clip holder 42/42.4

for tubes and tube-type steady arms $d=42$ or 42.4 mm ($1\frac{1}{4}$ ")



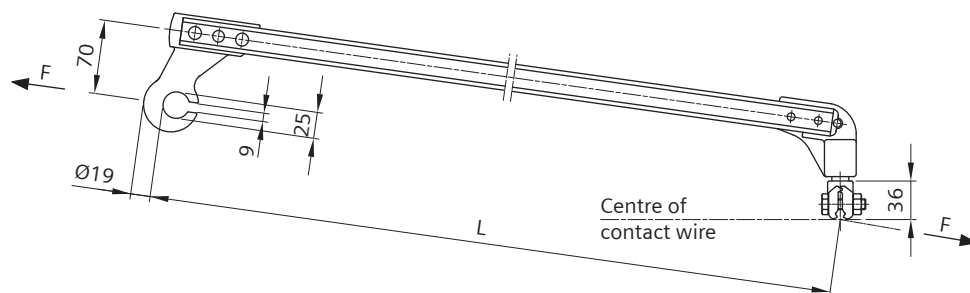
Order no.	8WL2005-0
Designation	Swivel clip holder 42/42.4-16R
Material	
Swivel clip holder	CuAl
Bolt M12	stlSt
Nut	stlSt
Spring washer	stlSt
Weight	0.36 kg
Perm. operating load	2.5 kN
Min. failing load	7.5 kN
Tightening torque M_A	35 Nm

Types with threaded stud M16 or 5/8" on request.

Contact wire clips see Chapter 02-09.

Steady arm made of aluminium H=70

with hook end clamp made of stainless steel, for contact wires AC-80 to AC-150 acc. to EN 50149,
with connection for windstay

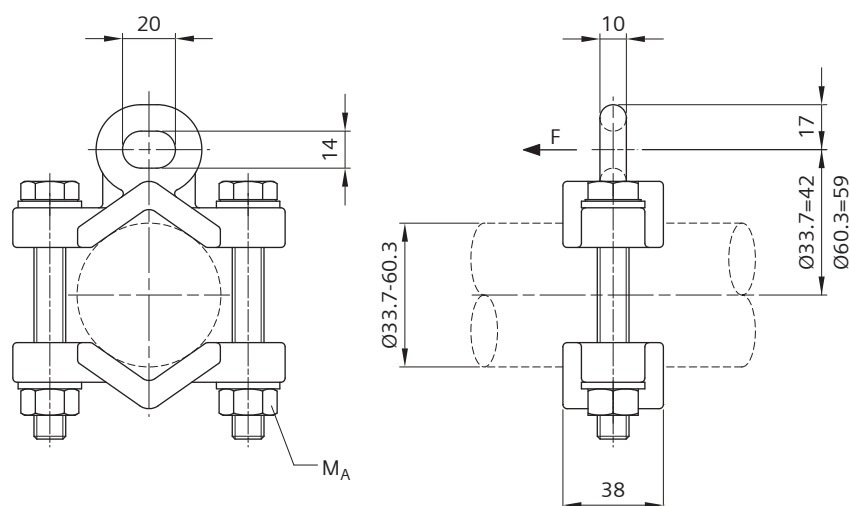


Order no.	8WL3503-5A	8WL3503-5F	8WL3503-5K
Designation	Steady arm L=650	Steady arm L=875	Steady arm L=1050
Material			
Hook end clamp	stlSt	stlSt	stlSt
U-section	Al	Al	Al
Clip holder	Al	Al	Al
Grooved stud	CuNiSi	CuNiSi	CuNiSi
Contact wire clip 16R	CuAl	CuAl	CuAl
Round head rivets	Al	Al	Al
Weight	1.08 kg	1.19 kg	1.28 kg
Perm. operating load	2.5 kN	2.5 kN	2.5 kN
Min. failing load	7.5 kN	7.5 kN	7.5 kN
L	650 mm	875 mm	1050 mm

Other lengths on request.

Eye clamp for windstay

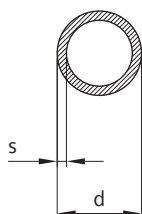
for tube d=33.7 mm (1") to 60.3 mm (2")



Order no.	8WL2112-5D
Designation	Eye clamp 33.7-60.3
Material	
Eye clamp	mICI
Clamp cover	mICI
Bolts M12	stlSt
Nuts	stlSt
Washers	stlSt
Weight	0.70 kg
Perm. operating load	1.7 kN
Min. failing load	5.1 kN
Tightening torque M_A	56 Nm

Steel tube

for steady arms, tensioning weight guidance, operating linkage and cantilevers



Order no.	8WL2160-0	8WL2162-0	8WL2164-0	8WL2166-0
Designation	Steel tube 26x3.5	Steel tube 32x3.5	Steel tube 42x4.0	Steel tube 55x4.0
Material	E355+A hot dip galv. acc. to EN 10305	E355+A hot dip galv. acc. to EN 10305	E355+A hot dip galv. acc. to EN 10305	E355+A hot dip galv. acc. to EN 10305
Weight	2.04 kg/m	2.64 kg/m	3.87 kg/m	5.20 kg/m
Max. delivery length	7.0 m	7.0 m	7.0 m	7.0 m
d	26 mm	32 mm	42 mm	55 mm
s	3.5 mm	3.5 mm	4.0 mm	4.0 mm

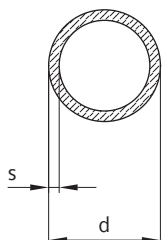
Other lengths on request.

End caps for tube 26 mm, 42 mm and 55 mm see page QUERVERWEIS-NICHT-GEFUNDEN.

End cap for tube 32 mm see page QUERVERWEIS-NICHT-GEFUNDEN.

Steel tube (DIN 2448)

for steady arms, tensioning weight guidance, operating linkage and cantilevers



Order no.	8WL2175-0A	8WL2175-1B	8WL2175-2B	8WL2175-4B
Designation	Steel tube 26.9x3.6 (3/4")	Steel tube 33.7x3.2 (1")	Steel tube 42.4x4.0 (1 1/4")	Steel tube 60.3x4.0 (2")
Material	St37-hot dip galv.	St52-hot dip galv.	St52-hot dip galv.	St52-hot dip galv.
Weight	2.07 kg/m	2.41 kg/m	3.79 kg/m	5.55 kg/m
Max. delivery length	7.0 m	7.0 m	7.0 m	7.0 m
d	26.9 mm	33.7 mm	42.4 mm	60.3 mm
s	3.6 mm	3.2 mm	4.0 mm	4.0 mm

Other lengths on request.

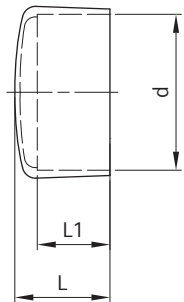
End caps for tube 26.9 mm, 33.7 mm and 60.3 mm see page 02-05-42.

End cap for tube 42.4 mm see page 02-04-80.

Steel tube 48.3 mm (1 3/4") on request.

End cap

for steel tubes $d=26.9 \text{ mm}$ (3/4") to 60.3 mm (2")



Order no.	8WL2184-5	8WL2184-1	8WL2184-6	8WL2184-8
Designation	End cap 26.9 (3/4")	End cap 32	End cap 33.7 (1")	End cap 60.3 (2")
Material	Plastic-soft, black	Plastic-soft, black	Plastic-soft, black	Plastic-soft, black
Weight	0.50 kg/100 pcs.	0.90 kg/100 pcs.	1.00 kg/100 pcs.	2.10 kg/100 pcs.
d	27.0 mm	31.0 mm	33.0 mm	59.0 mm
L	~30.0 mm	~31.0 mm	~31.5 mm	~36.0 mm
L₁	~25.5 mm	~26.0 mm	~25.0 mm	~27.5 mm

Chapter 02

Standard Products

Tensioning equipment	01	01-86
Thimbles, connectors, sleeves	02	01-24
GRP cantilevers	03	01-68
Aluminium cantilevers	04	01-80
Steel cantilevers	05	01-42
Headspan supports	06	01-36
Insulators	07	01-34
Contact lines under structures and bridge protection	08	01-42
Clamps	09	01-84
Tension wheel equipment	10	01-48
Section insulators	11	01-34
Disconnectors and drive mechanism	12	01-62
Earthing and protecting equipment	13	01-14
Contact wires, conductors, span wires	14	01-22
Monitoring systems	15	01-06
Installation tools and equipment	16	01-24

Bridle-and-pulley suspension with bronze wire	02-06-24
Bridle-and-pulley suspension with synthetic wire	02-06-23
Conductor suspension clamp	02-06-08
Conductor suspension clamp 13 with hook	02-06-05
Conductor suspension clamp 16 with hook	02-06-06
Conductor suspension clamp with hook, twisted 90°	02-06-07
Conductor suspension clamp, twisted 90°	02-06-04
Cross-span drop bracket	02-06-19
Cross-span eye clamp	02-06-16, 02-06-17
Cross-span hook clamp	02-06-27
Cross-span wire clamp 16	02-06-15
Cross-span wire clamp 19	02-06-14
Double eye clamp	02-06-18
Double line hanger 16R, insulated	02-06-30
Double line hanger M16-5/8", insulated	02-06-31
Extension piece	02-06-36
Headspan wire clamp with suspension for clevis connection	02-06-22
Headspan wire clamp with suspension for tongue connection	02-06-21
Intermediate line hanger 16R, insulated	02-06-32
Intermediate line hanger M16-5/8", insulated	02-06-33
Line hanger 16R, insulated	02-06-28, 02-06-34
Line hanger M16-5/8", insulated	02-06-29, 02-06-35
Pulley 130 with suspension	02-06-13
Pulley 88 with suspension, single	02-06-10, 02-06-11
Pulley 88 with suspension, twin	02-06-12
Pull-off arm	02-06-25
Rope pulley	02-06-26
Twin catenary suspension clamp with eye	02-06-09
Yoke for steady arm	02-06-20

Technical comments

Application

Headspan supports perform the immediate holding function for catenary wires and contact wires. Their functionality and thus their design are very important due to their requirements. Headspan supports ensure the optimal position of the power-conducting components. Through planning and configuration, it is possible to achieve specified dimensions, such as the lateral position of the contact wire, with such supports.

Conductor suspension clamps and pulleys hold wires and bridles-and-pulley suspensions. Cross-span eye clamps, cross-span hook clamps and line hangers are used to install contact wire supports.

Types

Siemens offers the following types of supports

- Catenary wire supports in the headspan construction on straight cantilevers
- Contact wire supports in the headspan construction on straight cantilevers
- Bridle-and-pulley suspension supports
- Contact wire holders

Depending on the use and application, the products are available in various geometrical designs and materials:

- Copper alloys
- Hot-dip galvanized malleable cast iron
- Stainless steel

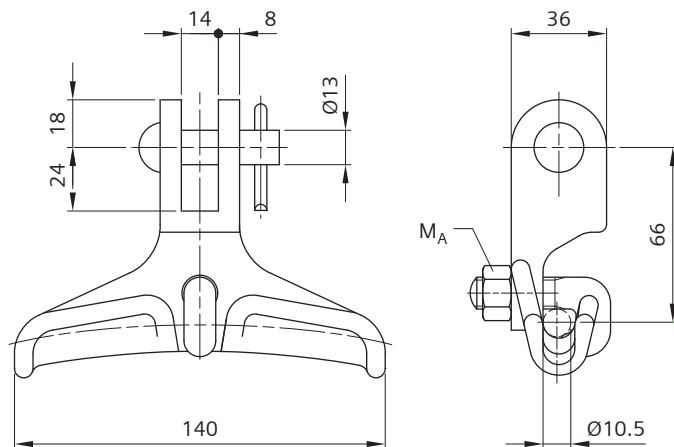
Pulleys made of plastic or copper-aluminium are used in such applications.

Note

Steady arms and steady arm components are found in chapters QV, QV and QV, depending on the product line. See Chapter QV for selecting the appropriate contact wire clips for the specific application.

Conductor suspension clamp, twisted 90°

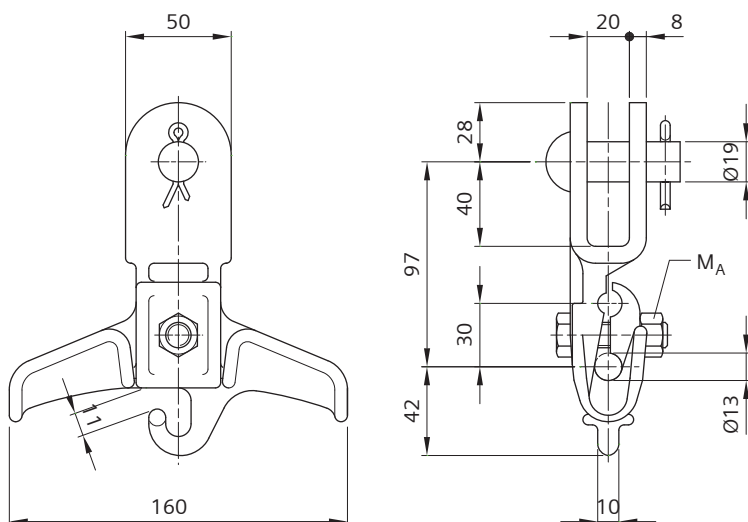
for suspensions in headspans, for wires 35 to 70 mm² acc. to DIN 48201



Order no.	8WL2080-8
Designation	Conductor suspension clamp 35-70/13
Material	
Clamp body	CuSn
Pin 13x40	stlSt
Split pin 5x28	Cu
Hook bolt M12	Cu5
Nut	stlSt
Weight	0.80 kg
Tightening torque M _A	56 Nm

Conductor suspension clamp 13 with hook

for catenary wire suspension, for wires 50 to 70 mm² acc. to DIN 48201

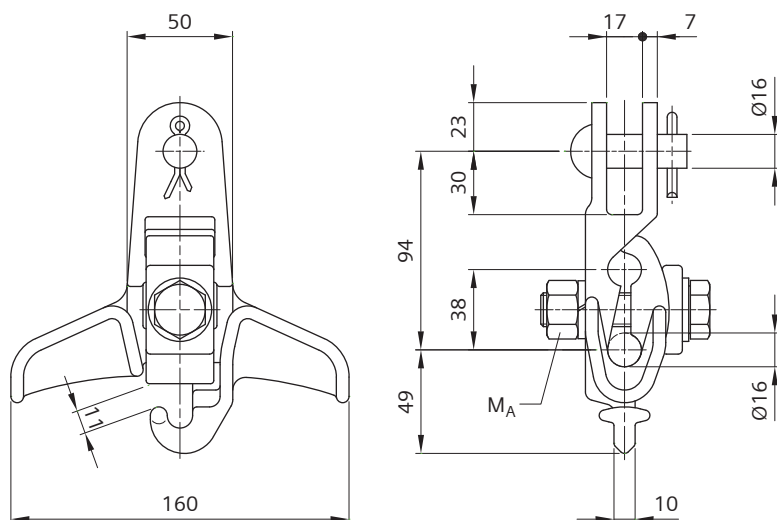


Order no.	8WL2082-0
Designation	Conductor suspension clamp 13-19
Material	
Clamp body	mICI
Pin 19x52	stlSt
Split pin 5x28	Cu
Bolt M12	stlSt
Nut	stlSt
Weight	1.30 kg
Tightening torque M _A	56 Nm

Protection sleeves must be ordered separately, see Chapter 02-02.

Conductor suspension clamp 16 with hook

for catenary wire suspension, for wires 50 to 150 mm² acc. to DIN 48201

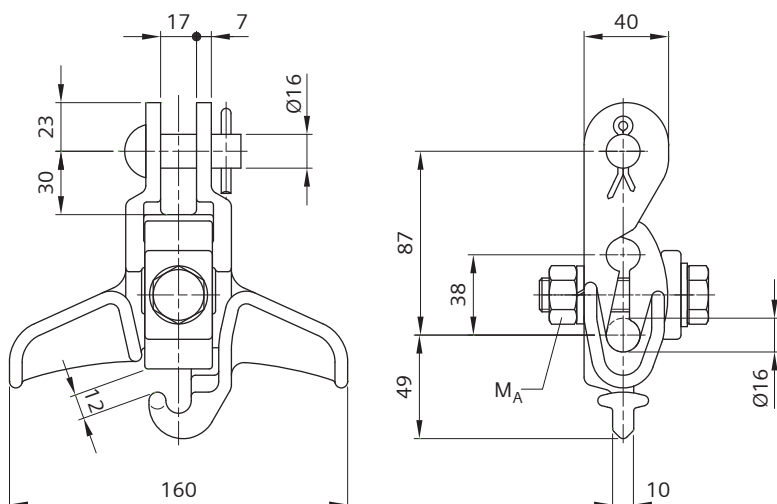


Order no.	8WL2082-6
Designation	Conductor suspension clamp 16-16
Material	
Clamp body	CuSn
Pin 16x45	stlSt
Split pin 5x28	Cu
Bolt M16	stlSt
Nut, washer	stlSt
Spring washer	stlSt
Weight	1.48 kg
Tightening torque M_A	135 Nm

Protection sleeves must be ordered separately, see Chapter 02-02.

Conductor suspension clamp with hook, twisted 90°

for catenary wire suspension, for wires 50 to 150 mm² acc. to DIN 48201

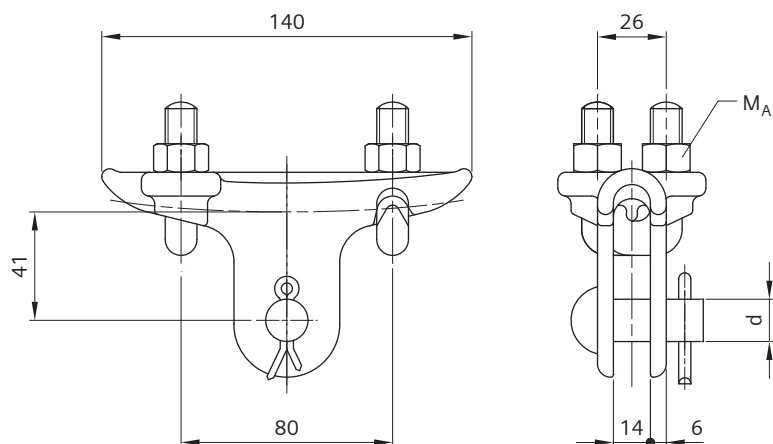


Order no.	8WL2095-0
Designation	Conductor suspension clamp 16-16
Material	
Clamp body	CuSn
Pin 16x45	stlSt
Split pin 5x28	Cu
Bolt M16	stlSt
Nut, washer	stlSt
Spring washer	stlSt
Weight	1.60 kg
Tightening torque M _A	135 Nm

Protection sleeves must be ordered separately, see Chapter 02-02.

Conductor suspension clamp

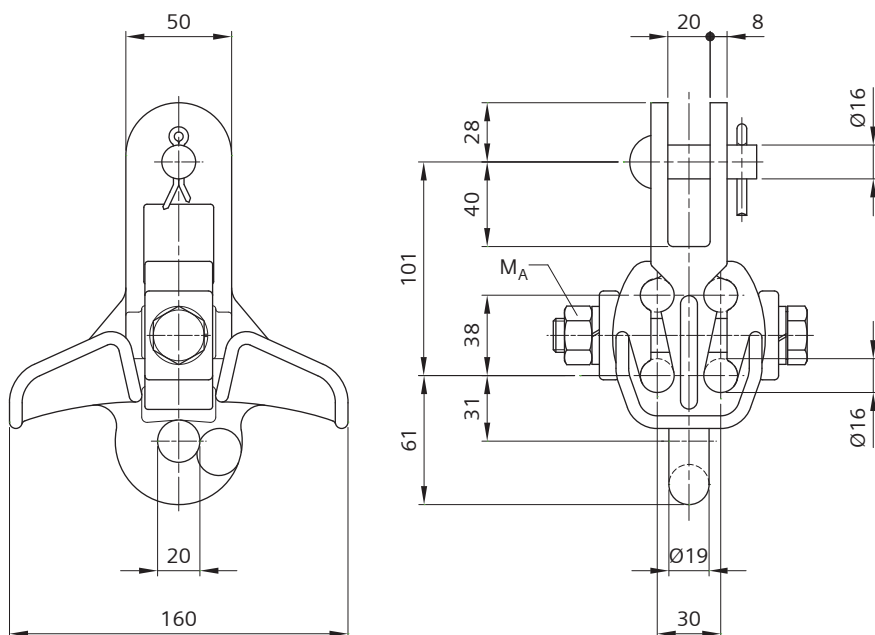
for suspensions in headspans, for wires 35 to 70 mm² acc. to DIN 48201



Order no.	8WL2083-4	8WL2083-5
Designation	Conductor suspension clamp 35-70/13	Conductor suspension clamp 35-70/16
Material		
Clamp body	CuAl	CuAl
Pin 13x40	stlSt	-
Pin 16x40	-	stlSt
Split pin 5x28	Cu	Cu
Hook bolts M12	stlSt	stlSt
Nuts	stlSt	stlSt
Weight	0.85 kg	0.87 kg
Tightening torque M_A	56 Nm	56 Nm
d	13 mm	16 mm

Twin catenary suspension clamp with eye

for supports with two catenary wires, for wires 50 to 150 mm² acc. to DIN 48201

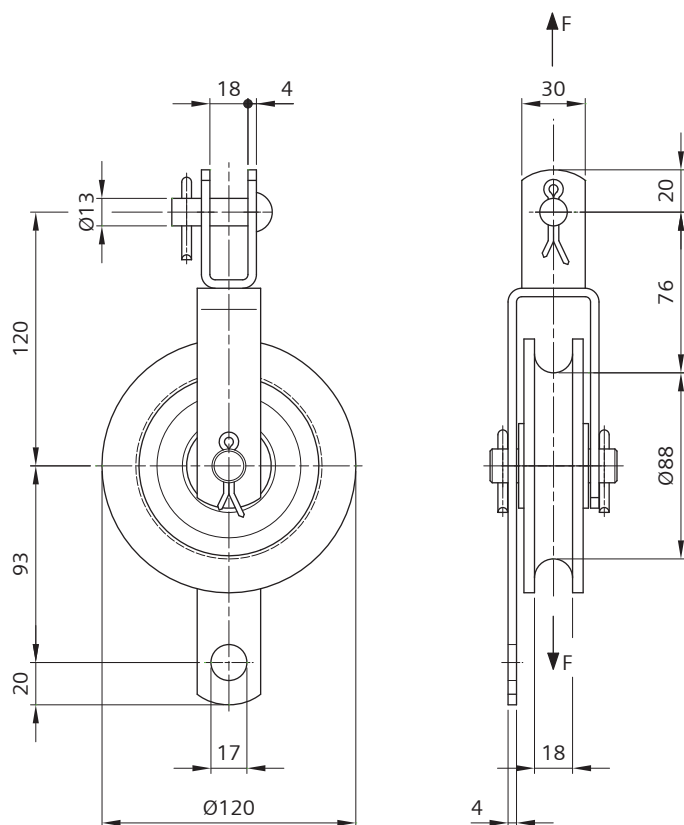


Order no.	8WL2091-1
Designation	Twin catenary suspension clamp 16-16
Material	
Suspension clamp	CuSn
Pin 16x50	stlSt
Split pin 5x28	Cu
Bolt M16	stlSt
Nut	stlSt
Spring washers	stlSt
Weight	2.56 kg
Tightening torque M _A	135 Nm

Protection sleeves must be ordered separately, see Chapter 02-02.

Pulley 88 with suspension, single

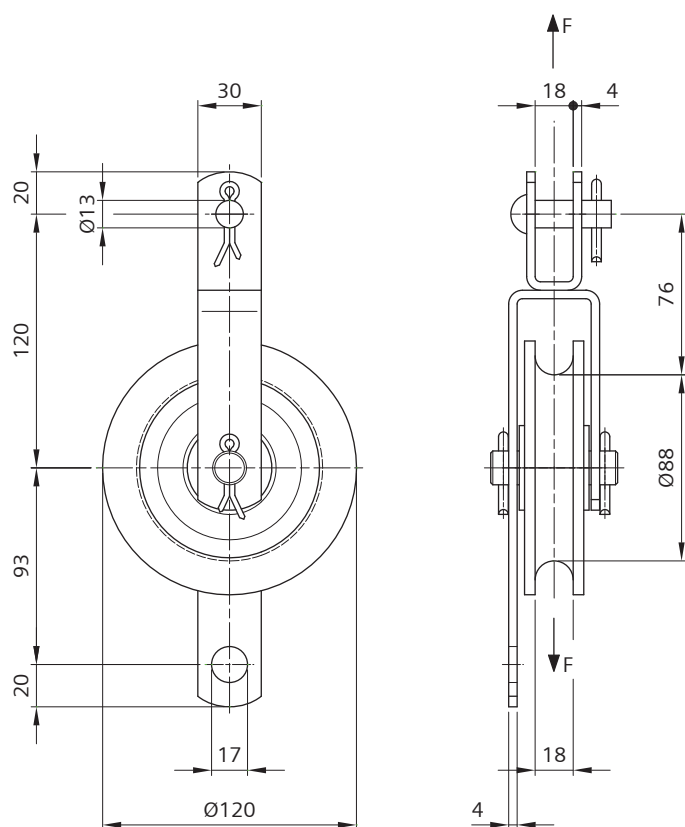
for suspension of auto-tensioned wires in headspan, for wires up to $d=18$ mm



Order no.	8WL2131-0
Designation	Pulley 88, single
Material	
Pulley	Plastic
Suspension	stlSt
Axle	stlSt
Pin 13x40	stlSt
Split pins 5x28	Cu
Weight	0.75 kg
Perm. operating load	4 kN
Min. failing load	12 kN

Pulley 88 with suspension, single

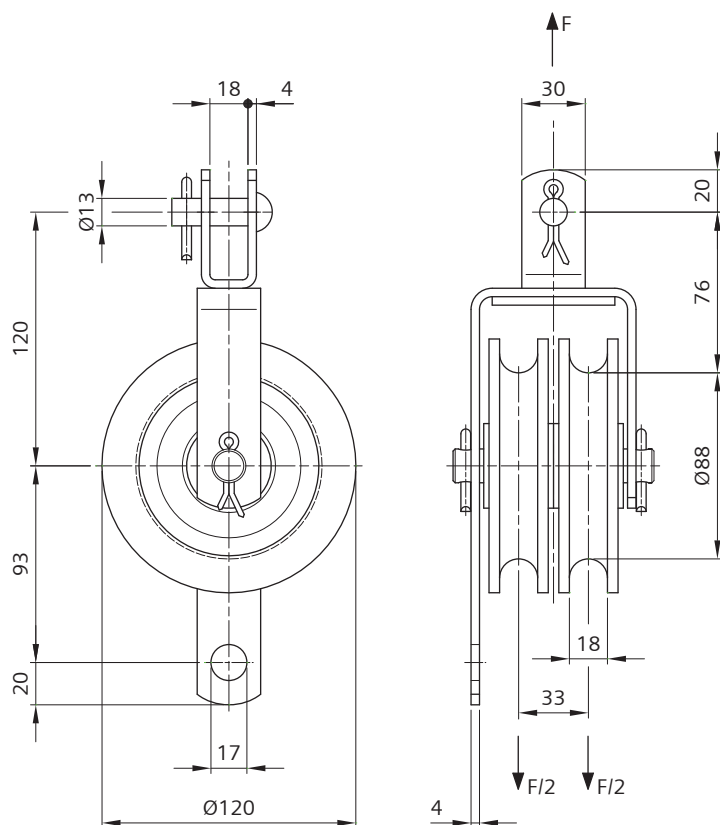
for suspension of auto-tensioned wires in headspan, for wires up to $d=18$ mm



Order no.	8WL2131-6
Designation	Pulley 88, single, connecting clevis parallel
Material	
Pulley	Plastic
Suspension	stlSt
Axle	stlSt
Pin 13x40	stlSt
Split pins 5x28	Cu
Weight	0.75 kg
Perm. operating load	4 kN
Min. failing load	12 kN

Pulley 88 with suspension, twin

for suspension of auto-tensioned wires in headspan, for wires up to $d=18$ mm

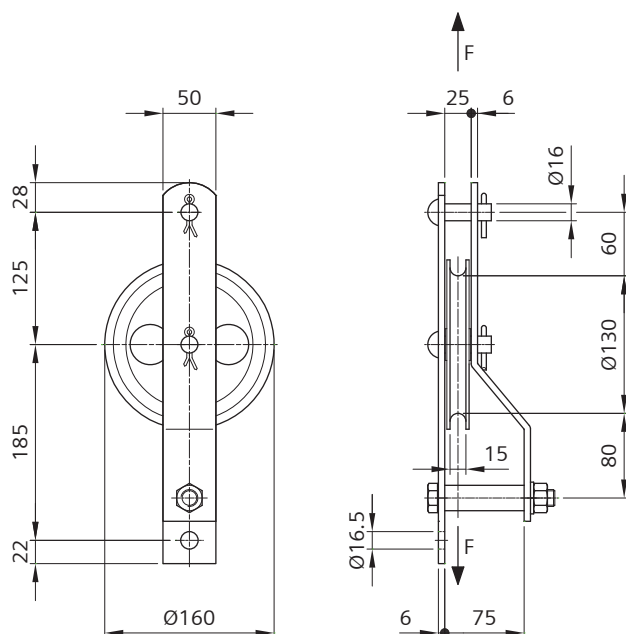


Order no.	8WL2130-0
Designation	Pulley 88, twin, connecting clevis twisted 90°
Material	
Pulley	Plastic
Suspension	stlSt
Axle	stlSt
Pin 13x40	stlSt
Split pins 5x28	Cu
Weight	1.06 kg
Perm. operating load	4 kN
Min. failing load	12 kN

Pulley with connecting clevis parallel on request.

Pulley 130 with suspension

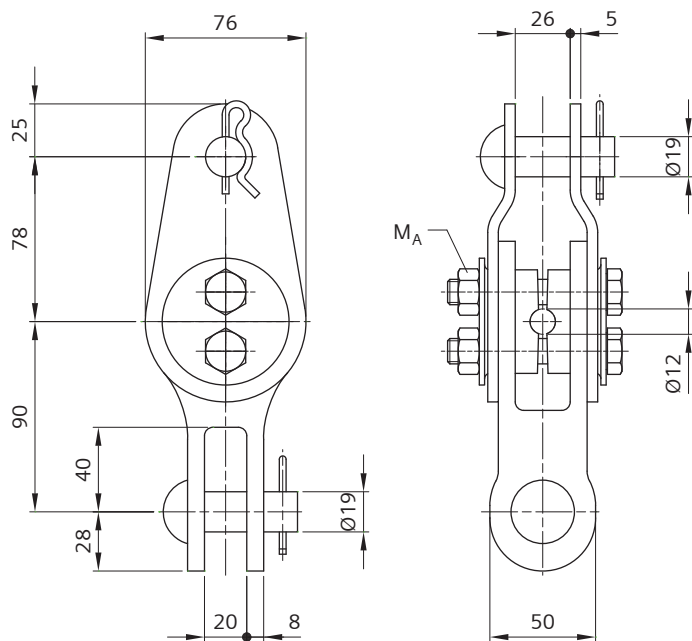
for suspension of auto-tensioned catenary wires, for wires up to $d=15$ mm



Order no.	8WL2132-0
Designation	Pulley 130
Material	
Pulley	CuAl
Suspension	Cu
Spacer tube	Cu
Bolt M16	stlSt
Nut, washer	stlSt
Pins 16x50	stlSt
Split pins 5x28	Cu
Weight	3.06 kg
Perm. operating load	5 kN
Min. failing load	15 kN

Cross-span wire clamp 19

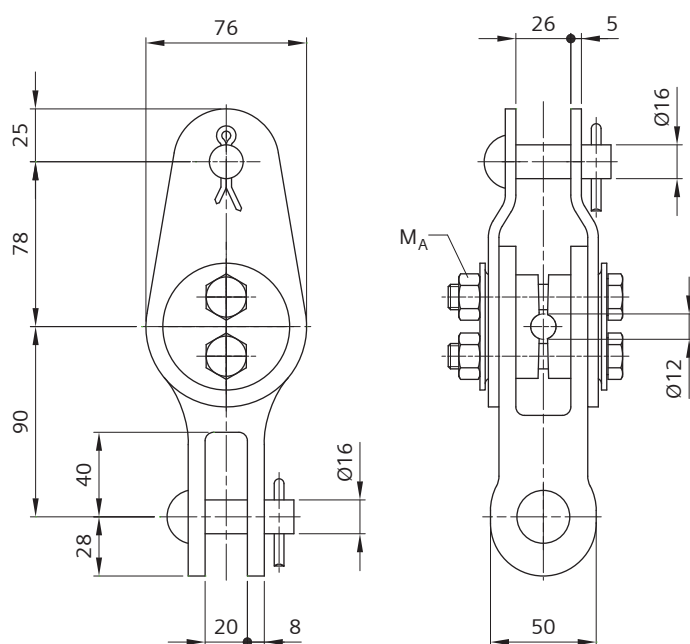
for wires 50 to 95 mm² acc. to DIN 48201



Order no.	8WL2140-0
Designation	Cross-span wire clamp 50-95/19
Material	
Cranked clevis	mICI
Straps	htgSt
Adjustable washers	CuSn
Bolts M12	stlSt
Nuts	stlSt
Pins 19x52	htgSt
Beta-Split pins	stlSt
Weight	2.33 kg
Tightening torque M_A	56 Nm

Cross-span wire clamp 16

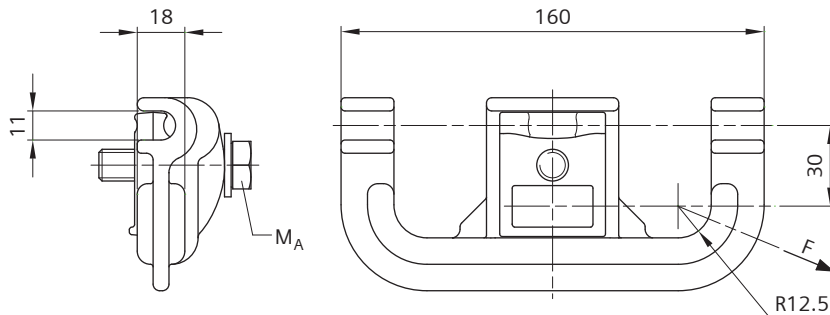
for wires 50 to 95 mm² acc. to DIN 48201



Order no.	8WL2140-2
Designation	Cross-span wire clamp 50-95/16
Material	
Cranked clevis	CuSn
Straps	CuSn
Adjustable washers	CuSn
Bolts M12	stlSt
Nuts	stlSt
Pins 16x50	stlSt
Split pins 5x28	Cu
Weight	2.44 kg
Tightening torque M _A	56 Nm

Cross-span eye clamp

for fixing of steady arms or pull-offs at lower cross-span wire, for bronze wires 25 to 70 mm² acc. to DIN 48201 and stainless steel wire rope d=8 mm (8WL7093-3)



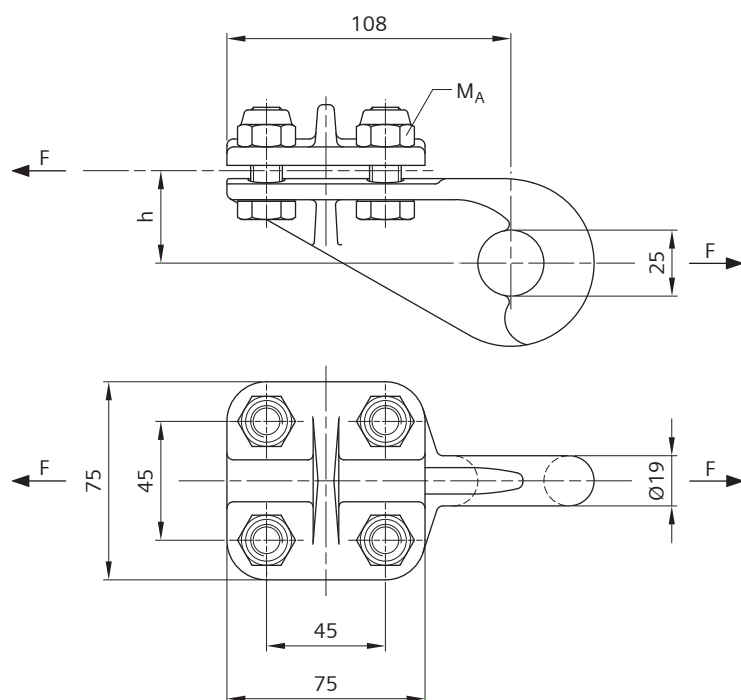
Order no.	8WL2158-0A
Designation	Cross-span eye clamp 25-70
Material	
Hoop	CuAl
Clamp cover	CuAl
Bolt M12	stlSt
Washer	stlSt
Weight	0.95 kg
Perm. operating load	3 kN
Min. failing load	9 kN
Tightening torque M _A	56 Nm

The clamp cover shows one wire groove each side for wires 25 to 35 mm² respectively 50 to 70 mm².

The small groove has to be used for the stainless steel wire rope.

Cross-span eye clamp

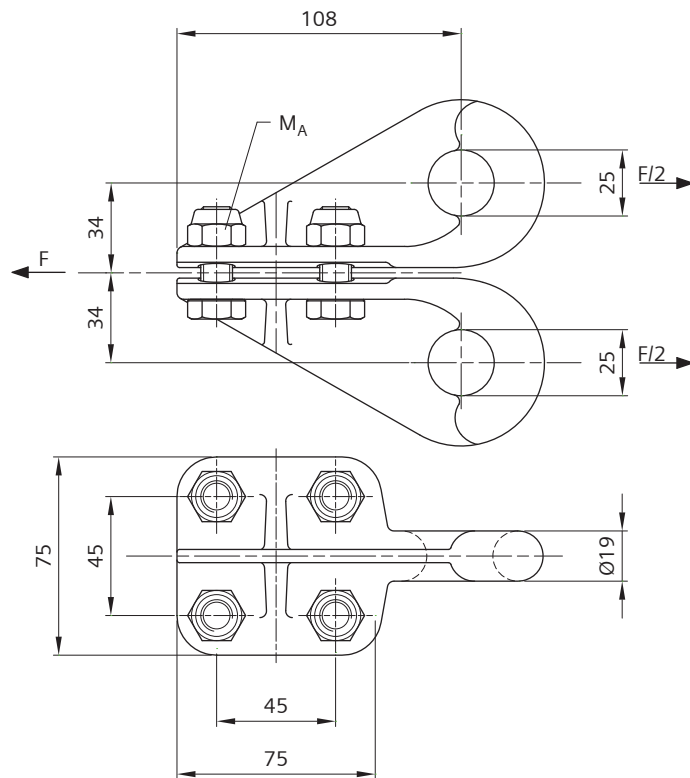
for fixing of steady arms or pull-offs at lower cross-span wire, for wires 50 and 70 or 95 mm² acc. to DIN 48201



Order no.	8WL2142-0	8WL2142-1
Designation	Cross-span eye clamp 50/70	Cross-span eye clamp 95
Material		
Clamp body	mICI	mICI
Clamp cover	mICI	mICI
Bolts M12	stlSt	stlSt
Nuts	stlSt	stlSt
Weight	1.04 kg	1.06 kg
Perm. operating load	2.5 kN	2.5 kN
Min. failing load	7.5 kN	7.5 kN
Tightening torque M_A	56 Nm	56 Nm
h	35 mm	37 mm

Double eye clamp

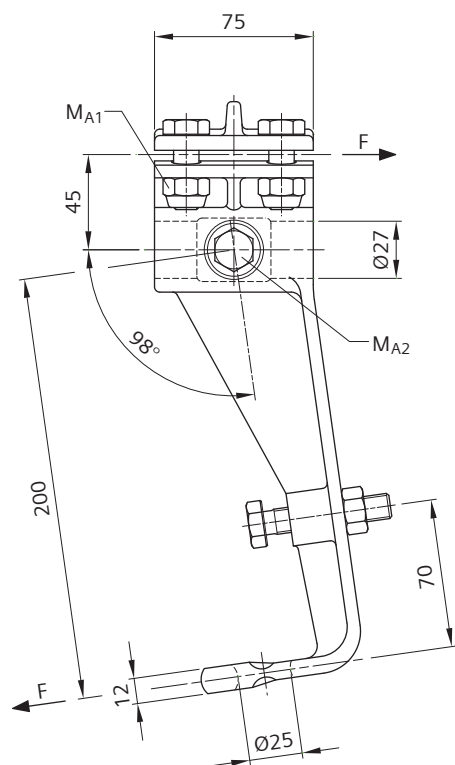
for fixing of pull-offs at lower cross-span wire, for wires 50 and 70 mm² acc. to DIN 48201



Order no.	8WL2142-8
Designation	Double eye clamp 50/70
Material	
Clamp body	mICI
Bolts M12	stlSt
Nuts	stlSt
Weight	1.39 kg
Perm. operating load	2.5 kN
Min. failing load	7.5 kN
Tightening torque M_A	56 Nm

Cross-span drop bracket

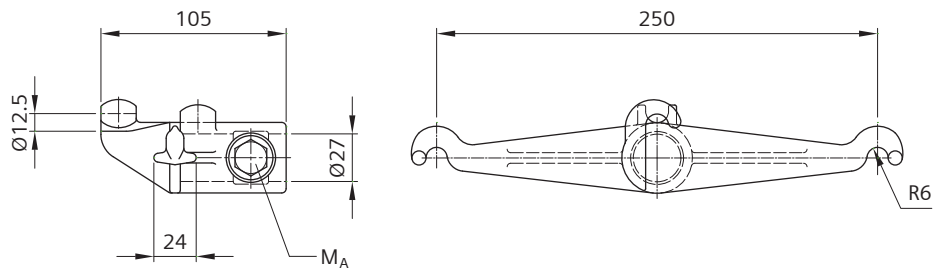
at lower cross-span wire, for wires 50 and 70 or 95 mm² acc. to DIN 48201, for steel tube d=26 mm



Order no.	8WL2146-0	8WL2146-1
Designation	Cross-span drop bracket 50/70	Cross-span drop bracket 95
Material		
Clamp body	mICI	mICI
Clamp cover	mICI	mICI
Cup-point screw M12	stlSt	stlSt
Bolts M12	stlSt	stlSt
Nuts	stlSt	stlSt
Weight	2.08 kg	2.14 kg
Perm. operating load	2.5 kN	2.5 kN
Min. failing load	7.5 kN	7.5 kN
Tightening torque M_{A1}	56 Nm	56 Nm
Tightening torque M_{A2}	40 Nm	40 Nm

Yoke for steady arm

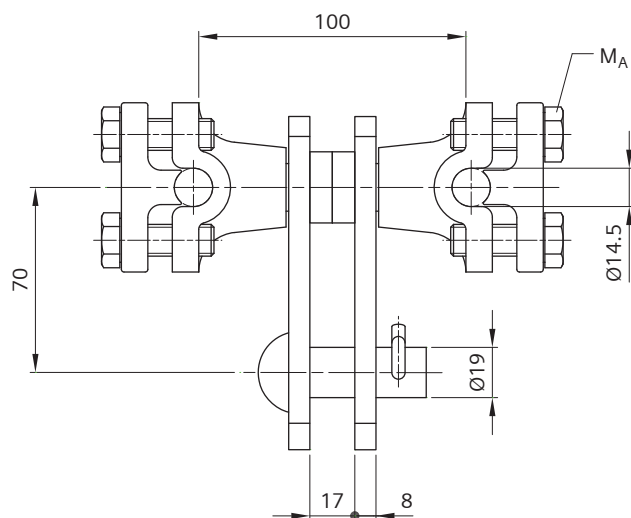
for suspension of steady arm made of steel tube $d=26$ mm at lower cross-span wire, for wire 50 to 95 mm² acc. to DIN 48201



Order no.	8WL2147-0
Designation	Yoke 50-95 for steady arm 26
Material	
Yoke	mICI
Cup-point screw M12	stlSt
Weight	0.88 kg
Tightening torque M_A	40 Nm

Headspan wire clamp with suspension for tongue connection

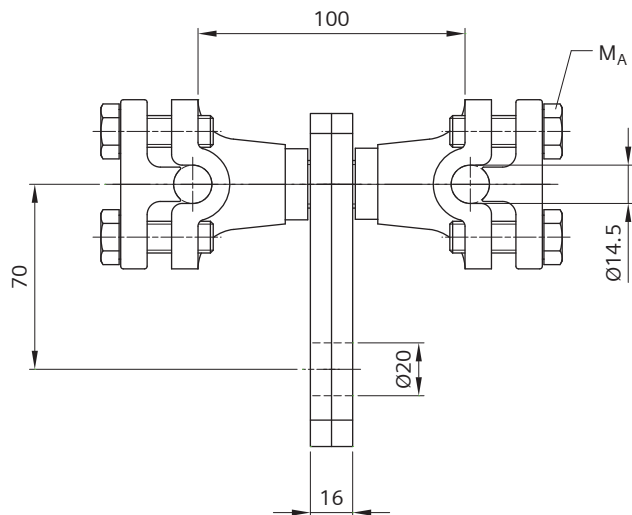
for supports on two parallel headspan wires, for bronze and copper wires 50 to 120 mm² acc. to DIN 48201



Order no.	8WL2144-0
Designation	Headspan wire clamp
Material	
Clamp body, cover	mICI
Straps	Al
Bolts M12	stlSt
Nuts	stlSt
Pin 19x52	htgSt
Beta-Split pin	stlSt
Weight	1.48 kg
Tightening torque M_A	56 Nm

Headspan wire clamp with suspension for clevis connection

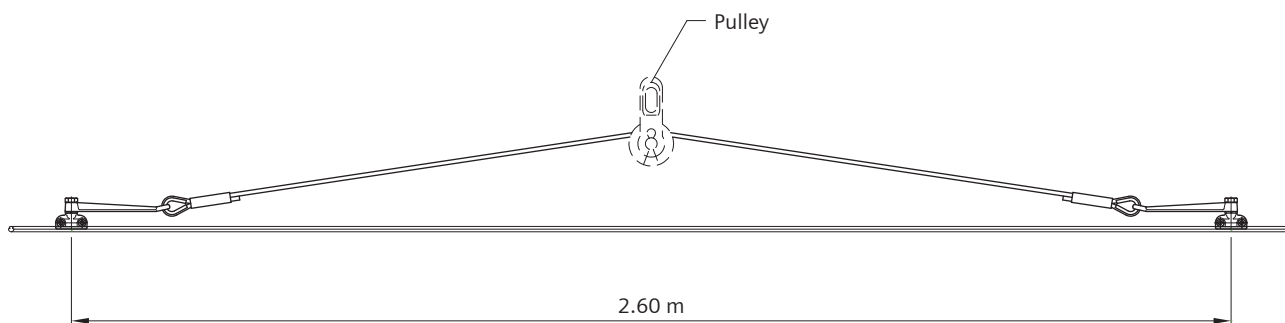
for supports on two parallel headspan wires, for bronze and copper wires 50 to 120 mm² acc. to DIN 48201



Order no.	8WL2144-1
Designation	Headspan wire clamp
Material	
Clamp body, cover	mICI
Straps	Al
Bolts M12	stISt
Nuts	stISt
Weight	1.30 kg
Tightening torque M _A	56 Nm

Bridle-and-pulley suspension with synthetic wire

for auto-tensioned trolley contact wire at cantilever and cross-span support, without pulley
for contact wires AC-80 to AC-150 acc. to EN 50149



Order no.	8WL3520-2	8WL3520-2A
Designation	Bridle-and-pulley suspension for single contact wire	Bridle-and-pulley suspension for twin contact wire
Material		
Synthetic wire d=9 mm	Polyester with polyamide sheath (Minoroc-wire)	Polyester with polyamide sheath (Minoroc-wire)
Contact wire clips	CuAl	-
Twin contact wire clips	-	CuAl
Pull-off arms	CuAl	CuAl
Thimbles	Cu-ETP	Cu-ETP
Crimped connectors	Cu-ETP	Cu-ETP
Spring washers	stlSt	stlSt
Bolts M16	stlSt	stlSt
Weight	1.71 kg	1.91 kg
Pressing die	8WL7152-8	8WL7152-8

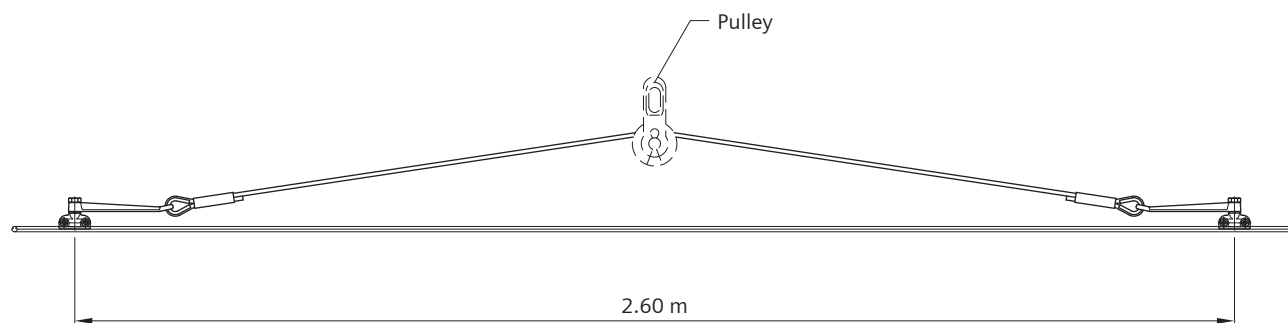
Pulley 8WL3521-0 must be ordered separately, see page 02-06-26.

Types for other contact wires on request.

Bridle-and-pulley suspension with bronze wire

for auto-tensioned trolley contact wire at cantilever and cross-span support, without pulley

for contact wires AC-80 to AC-150 acc. to EN 50149



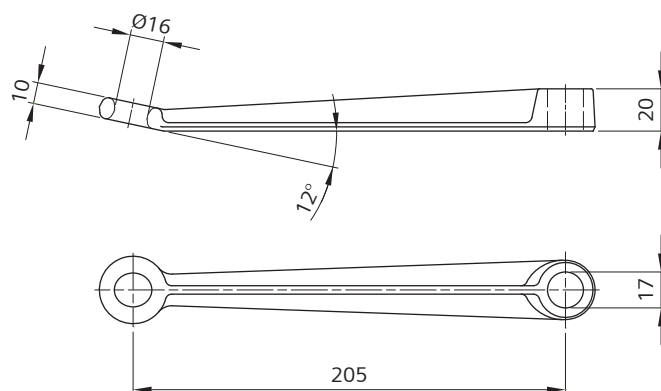
Order no.	8WL3520-3	8WL3520-3A
Designation	Bridle-and-pulley suspension for single contact wire	Bridle-and-pulley suspension for twin contact wire
Material		
Wire DIN 48201-35/7	BzII	BzII
Contact wire clips	CuAl	-
Twin contact wire clips	-	CuAl
Pull-off arms	CuAl	CuAl
Thimbles	Cu-ETP	Cu-ETP
Crimped connectors	Cu-ETP	Cu-ETP
Spring washers	stlSt	stlSt
Bolts M16	stlSt	stlSt
Weight	2.34 kg	2.54 kg
Pressing die	8WL7152-4	8WL7152-4

Pulley 8WL3521-0 must be ordered separately, see page 02-06-26.

Types for other contact wires on request.

Pull-off arm

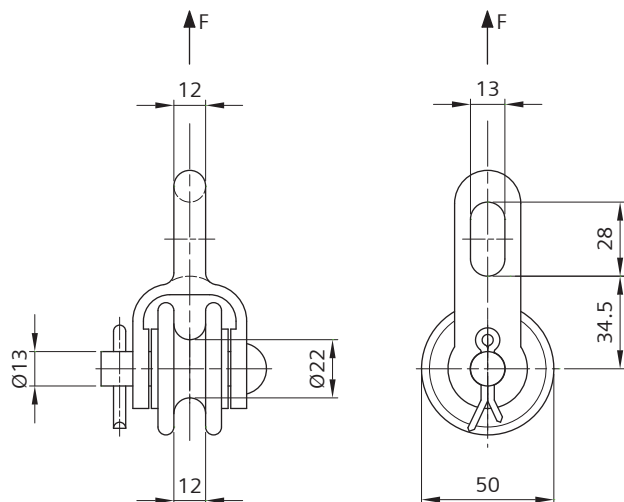
for bridle-and-pulley suspension



Order no.	8WL3523-0
Designation	Pull-off arm
Material	CuAl
Weight	0.28 kg

Rope pulley

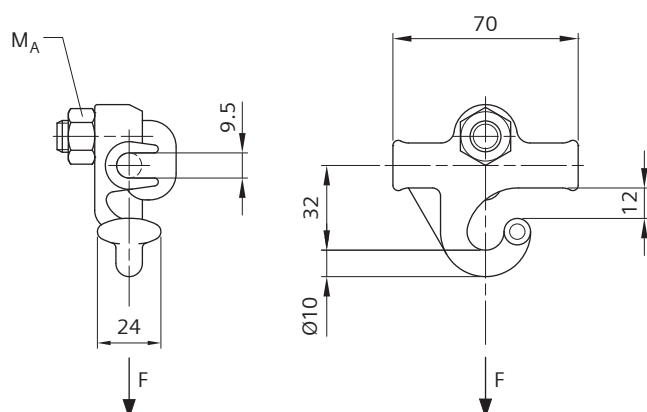
for bridle-and-pulley suspension, for wires up to $d=12$ mm



Order no.	8WL3521-0
Designation	Rope pulley
Material	
Clevis	CuAl
Pulley	Polyamide
Pin 13x55	Cu
Split pin 5x28	Cu
Weight	0.26 kg
Perm. operating load	1.5 kN
Min. failing load	4.5 kN

Cross-span hook clamp

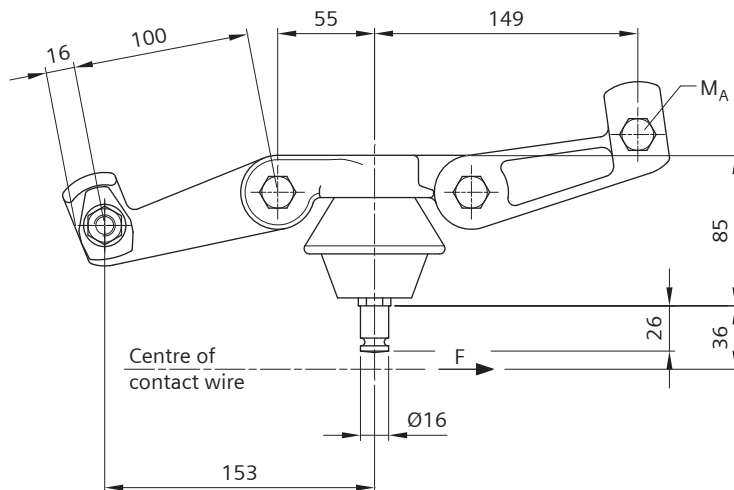
for suspension of auto-tensioned contact wires in cross-span, for wires 25 to 50 mm² acc. to DIN 48201



Order no.	8WL2150-0
Designation	Cross-span hook clamp 25-50
Material	
Cross-span hook clamp	CuAl
Hook bolt M12	CuNiSi
Nut	Cu5
Weight	0.22 kg
Perm. operating load	2.5 kN
Min. failing load	7.5 kN
Tightening torque M _A	68 Nm

Line hanger 16R, insulated

for curves and straight lines, for single wires $d=5$ to 6 mm and stranded wires 35 to 50 mm² acc. to DIN 48201

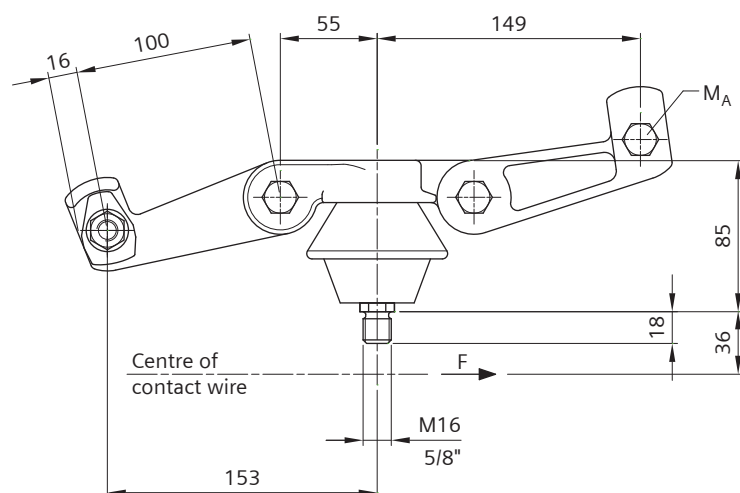


Order no.	8WL3554-6
Designation	Line hanger 16R
Material	
Insulator body	Cast resin, brown
Fittings	CuAl
Grooved stud	stlSt
Bolts M12	stlSt
Nuts, washers	stlSt
Weight	2.0 kg
Perm. operating load	2.5 kN
Min. failing load	8.0 kN
Tightening torque M_A	56 Nm
Nominal voltage	1.5 kV DC
Creepage distance	75 mm

Contact wire clips see Chapter 02-09.

Line hanger M16-5/8", insulated

for curves and straight lines, for single wires $d=5$ to 6 mm and stranded wires 35 to 50 mm² acc. to DIN 48201

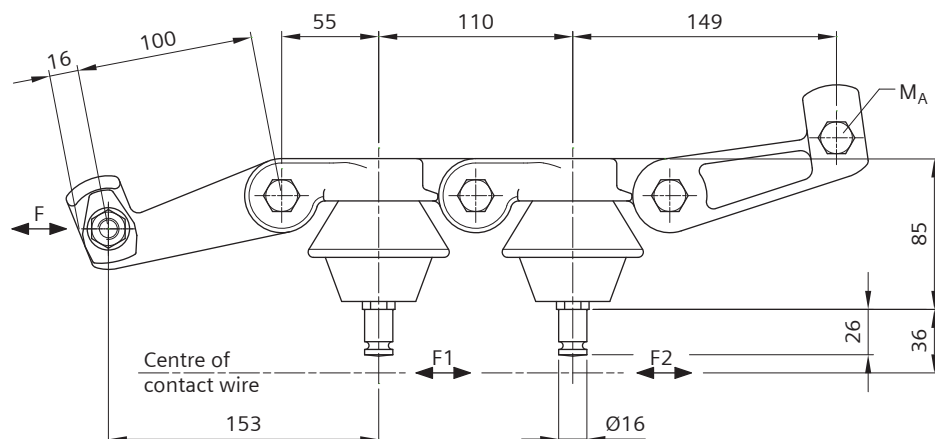


Order no.	8WL3554-7	8WL3554-8
Designation	Line hanger M16	Line hanger 5/8"
Material		
Insulator body	Cast resin, brown	Cast resin, brown
Fittings	CuAl	CuAl
Threaded stud	stlSt	stlSt
Bolts M12	stlSt	stlSt
Nuts, washers	stlSt	stlSt
Weight	2.0 kg	2.0 kg
Perm. operating load	2.5 kN	2.5 kN
Min. failing load	8.0 kN	8.0 kN
Tightening torque M_A	56 Nm	56 Nm
Nominal voltage	1.5 kV DC	1.5 kV DC
Creepage distance	75 mm	75 mm

Contact wire clips see Chapter 02-09.

Double line hanger 16R, insulated

for curves and straight lines, for single wires $d=5$ to 6 mm and stranded wires 35 to 50 mm² acc. to DIN 48201

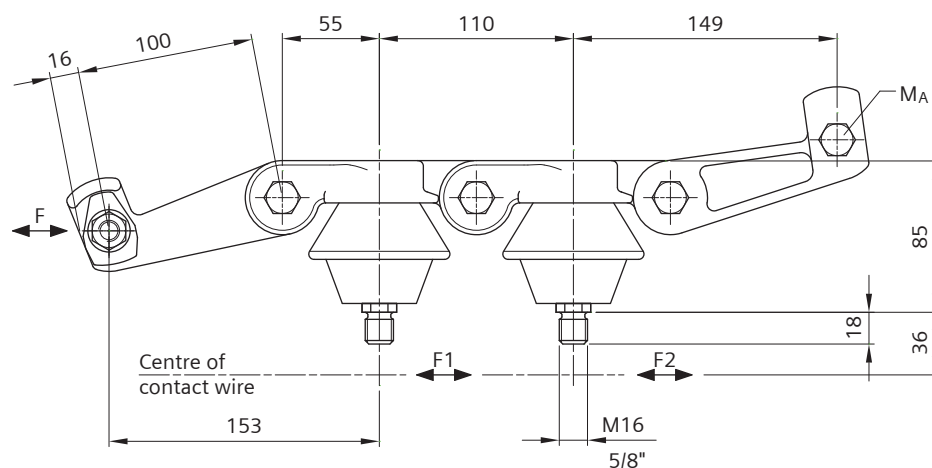


Order no.	8WL3555-6
Designation	Double line hanger 16R
Material	
Insulator bodies	Cast resin, brown
Fittings	CuAl
Grooved studs	stlSt
Bolts M12	stlSt
Nuts, washers	stlSt
Weight	3.0 kg
Perm. operating load (F1/F2)	2.5 kN
Min. failing load (F1/F2)	8.0 kN
Perm. operating load (F)	3.0 kN
Min. failing load (F)	9.6 kN
Tightening torque M_A	56 Nm
Nominal voltage	1.5 kV DC
Creepage distance	75 mm

Contact wire clips see Chapter 02-09.

Double line hanger M16-5/8", insulated

for curves and straight lines, for single wires $d=5$ to 6 mm and stranded wires 35 to 50 mm² acc. to DIN 48201

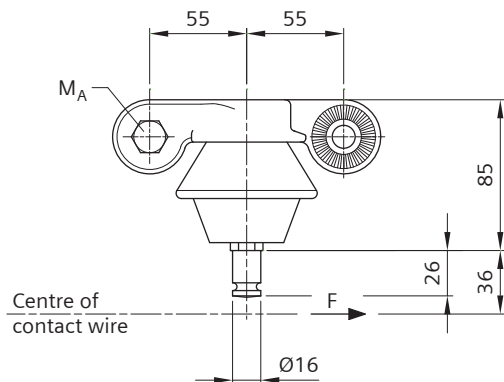


Order no.	8WL3555-7	8WL3555-8
Designation	Double line hanger M16	Double line hanger 5/8"
Material		
Insulator bodies	Cast resin, brown	Cast resin, brown
Fittings	CuAl	CuAl
Threaded studs	stlSt	stlSt
Bolts M12	stlSt	stlSt
Nuts, washers	stlSt	stlSt
Weight	3.0 kg	3.0 kg
Perm. operating load (F1/F2)	2.5 kN	2.5 kN
Min. failing load (F1/F2)	8.0 kN	8.0 kN
Perm. operating load (F)	3.0 kN	3.0 kN
Min. failing load (F)	9.6 kN	9.6 kN
Tightening torque M_A	56 Nm	56 Nm
Nominal voltage	1.5 kV DC	1.5 kV DC
Creepage distance	75 mm	75 mm

Contact wire clips see Chapter 02-09.

Intermediate line hanger 16R, insulated

for triple line hanger, for single wires $d=5$ to 6 mm and stranded wires 35 to 50 mm² acc. to DIN 48201



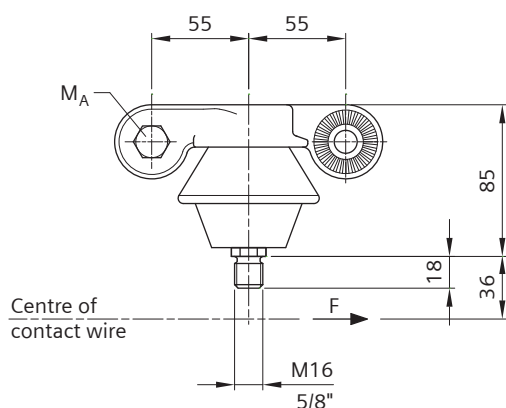
Order no.	8WL3553-7
Designation	Intermediate line hanger 16R
Material	
Insulator body	Cast resin, brown
Fittings	CuAl
Grooved stud	stlSt
Bolt M12	stlSt
Nut, washer	stlSt
Weight	1.2 kg
Perm. operating load	2.5 kN
Min. failing load	8.0 kN
Tightening torque M_A	56 Nm
Nominal voltage	1.5 kV DC
Creepage distance	75 mm

The load limit is 2.5 respectively 8.0 kN summed up for several intermediate line hangers following each other.

Contact wire clips see Chapter 02-09.

Intermediate line hanger M16-5/8", insulated

for triple line hanger, for single wires $d=5$ to 6 mm and stranded wires 35 to 50 mm² acc. to DIN 48201



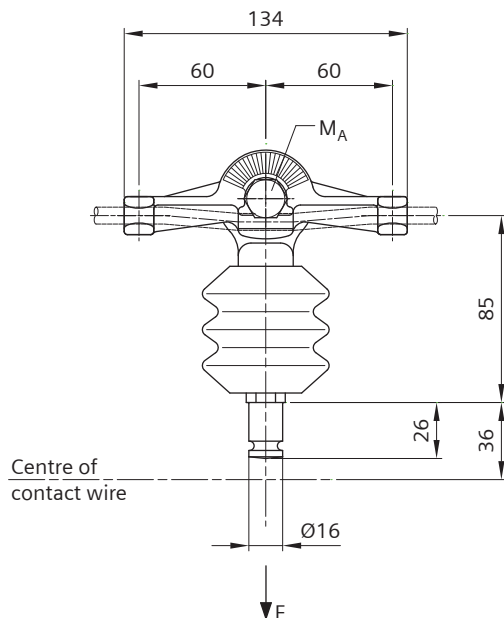
Order no.	8WL3553-7A	8WL3553-8
Designation	Intermediate line hanger M16	Intermediate line hanger 5/8"
Material		
Insulator body	Cast resin, brown	Cast resin, brown
Fittings	CuAl	CuAl
Threaded stud	stlSt	stlSt
Bolt M12	stlSt	stlSt
Nut, washer	stlSt	stlSt
Weight	1.2 kg	1.2 kg
Perm. operating load	2.5 kN	2.5 kN
Min. failing load	8.0 kN	8.0 kN
Tightening torque M_A	56 Nm	56 Nm
Nominal voltage	1.5 kV DC	1.5 kV DC
Creepage distance	75 mm	75 mm

The load limit is 2.5 respectively 8.0 kN summed up for several intermediate line hangers following each other.

Contact wire clips see Chapter 02-09.

Line hanger 16R, insulated

for supports at cross-spans in straight line, for single wires $d=5$ to 6 mm and stranded wires up to 50 mm² acc. to DIN 48201



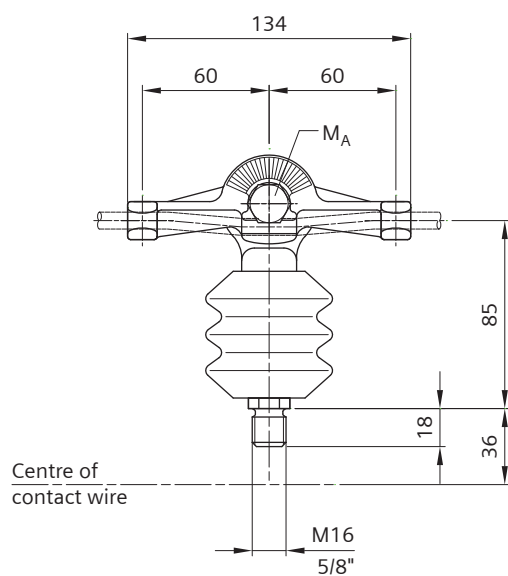
Order no.	8WL3600-1
Designation	Line hanger 16R
Material	
Insulator body	Cast resin, brown
Fittings	CuAl
Grooved stud	stlSt
Bolt M12	stlSt
Nut	stlSt
Spring washer	stlSt
Weight	0.70 kg
Perm. operating load	1 kN
Min. failing load	3.2 kN
Tightening torque M_A	35 Nm
Nominal voltage	1.5 kV DC
Creepage distance	85 mm

Twin arm adjustable up to 25°.

Contact wire clips see Chapter 02-09.

Line hanger M16-5/8", insulated

for supports at cross-spans in straight line, for single wires $d=5$ to 6 mm and stranded wires 50 mm² acc. to DIN 48201



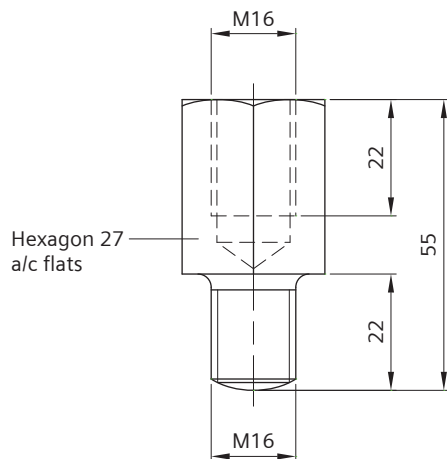
Order no.	8WL3600-3	8WL3600-5
Designation	Line hanger M16	Line hanger 5/8"
Material		
Insulator body	Cast resin, brown	Cast resin, brown
Fittings	CuAl	CuAl
Threaded stud	stlSt	stlSt
Bolt M12	stlSt	stlSt
Nut	stlSt	stlSt
Spring washer	stlSt	stlSt
Weight	0.70 kg	0.70 kg
Perm. operating load	1 kN	1 kN
Min. failing load	3.2 kN	3.2 kN
Tightening torque M_A	35 Nm	35 Nm
Nominal voltage	1.5 kV DC	1.5 kV DC
Creepage distance	85 mm	85 mm

Twin arm adjustable up to 25°.

Contact wire clips see Chapter 02-09.

Extension piece

for line hanger



Order no.	8WL3534-4
Designation	Extension piece M16
Material	stlSt
Weight	0.16 kg

Other sizes and threads on request.

Chapter 02

Standard Products

Tensioning equipment	01	01-86
Thimbles, connectors, sleeves	02	01-24
GRP cantilevers	03	01-68
Aluminium cantilevers	04	01-80
Steel cantilevers	05	01-42
Headspan supports	06	01-36
Insulators	07	01-34
Contact lines under structures and bridge protection	08	01-42
Clamps	09	01-84
Tension wheel equipment	10	01-48
Section insulators	11	01-34
Disconnectors and drive mechanism	12	01-62
Earthing and protecting equipment	13	01-14
Contact wires, conductors, span wires	14	01-22
Monitoring systems	15	01-06
Installation tools and equipment	16	01-24

Composite insulator up to 3 kV DC, tongue/tongue	02-07-21
Composite insulator 25 kV AC with flat connections	02-07-31
Composite insulator 25 kV AC, tongue/tongue	02-07-25
Composite insulator 25 kV AC, tongue/tube 34-51	02-07-27
Composite insulator 25 kV AC, tongue/tube 55-70	02-07-26, 02-07-29
Composite insulator 25 kV AC, tongue/tube 60.3	02-07-28
Composite insulator 25 kV AC, tube/tube 55-70	02-07-30
Composite insulator up to 3 kV DC, tongue/tube 55	02-07-22
Composite line post insulator 25 kV AC	02-07-32, 02-07-33
Contact wire insulator 3 kV DC to 25 kV AC	02-07-34
Insulating rod 10 clevis/clevis	02-07-10
Insulating rod 26 clevis/clevis	02-07-12
Insulating rod 26 eye/clevis	02-07-13
Insulating rod 26 eye/eye	02-07-11
Insulator body 1.5 kV DC	02-07-14, 02-07-15, 02-07-16
Insulator body 3 kV DC	02-07-17
Loop insulator up to 1,5 kV DC	02-07-06
Loop insulator up to 1.2 kV DC	02-07-05
Loop insulator up to 1.5 kV DC	02-07-07
Loop insulator with silicone coating up to 1.5 kV DC	02-07-04
Protection cap	02-07-18
Rod insulator 60 up to 1.5 kV DC, tongue/tongue	02-07-19
Rod insulator 60 up to 1.5 kV DC, tongue/tube 42-60.3	02-07-20
Rod insulator 60 up to 3 kV DC, tongue/tongue	02-07-23
Rod insulator 60 up to 3 kV DC, tongue/tube 42-60.3	02-07-24
Shackle with pin	02-07-08, 02-07-09

Technical comments

Application

Insulators separate energized components of the contact wire and traction power lines from each other and from earth. They must fulfill both electrical and mechanical requirements. Environmental resistance plays an equally important role.

Types

Siemens provides insulators made of the following materials:

- Loop insulators to insulate cables and wires against maximum environmental pollution as well as a cost-effective alternative for normal environmental pollution
- Insulating rods of GRP, such as for operating linkage
- Silicone composite insulators for catenary systems and cantilevers
- Ceramic rod insulators for tensioning equipment and cantilevers
- Insulator bodies of cast resin for steady arms, line hangers, cantilevers, elastic supports, etc.
- Contact wire insulators with emergency traversing properties

The silicone composite insulators of the Sicat CI family offer additional outstanding advantages in comparison to ceramic and glass insulators:

- Soil- and water-repellent plastic surface of the composite insulators
- Resistant to breakage and against vandalism due to suitable materials
- Much lower weight compared to ceramic and glass insulators, therefore savings on transport, storage and installation

Contact wire insulators with emergency traversing properties are installed in the lifted terminated contact wire of parallel sections.

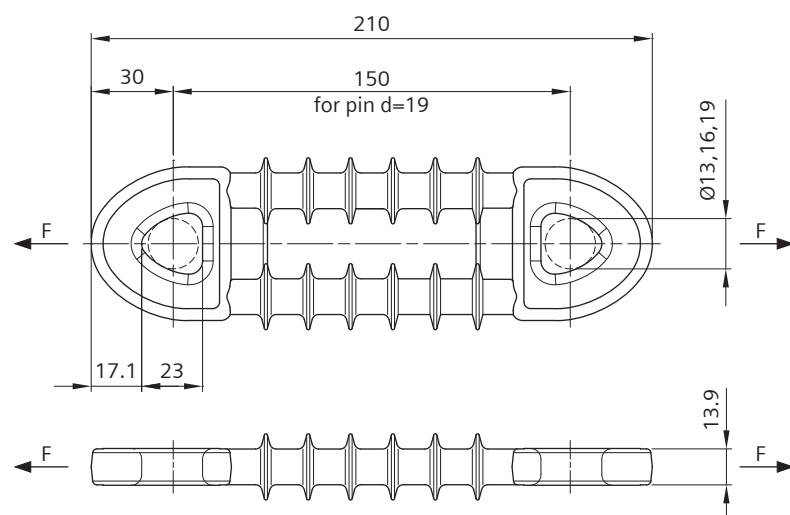
Due to their low height and their low weight, the insulators reduce the vertical installation height of the insulators and enhance the traversing quality of the overhead contact line.

Note

You have to consider after all the required creepage distance depending on potential fouling and additionally the technical information given in the catalog when selecting insulators. Please also keep to the relevant standards. Further informations in the relevant product descriptions.

Loop insulator with silicone coating up to 1.5 kV DC

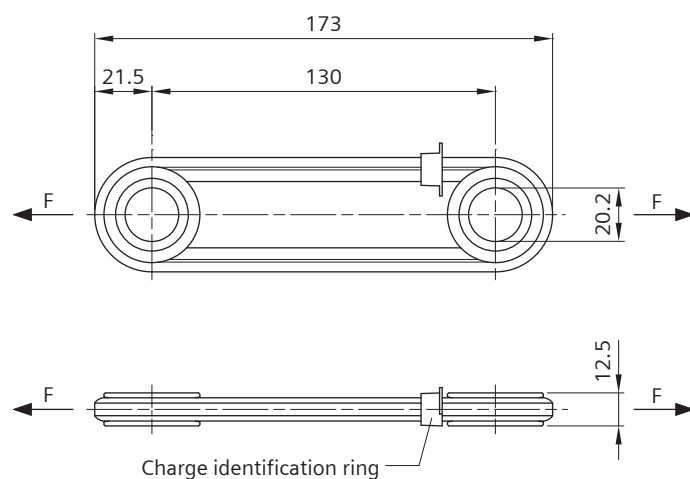
for insulation of wires and section insulator suspension, for pin diameter 13, 16 and 19 mm and thimbles



Order no.	8WL3001-2
Designation	Loop insulator with silicone coating
Material	
Insulating strip	ECR glass, EP resin
Strip coating, sheds	Silicone, color grey
Thimbles	stlSt
Weight	0.31 kg
Specified Mechanical Load (SML)	70 kN
Perm. operating load (OML)	23 kN
Nominal voltage	1.5 kV DC
Rated insulation voltage	1.8 kV DC
Min. creepage distance	150 mm
Min. clearance in air	108 mm
Lightning impulse withstand voltage	84 kV
Power-frequency withstand voltage, wet	31 kV

Loop insulator up to 1.2 kV DC

for section insulator suspension and insulation of wires

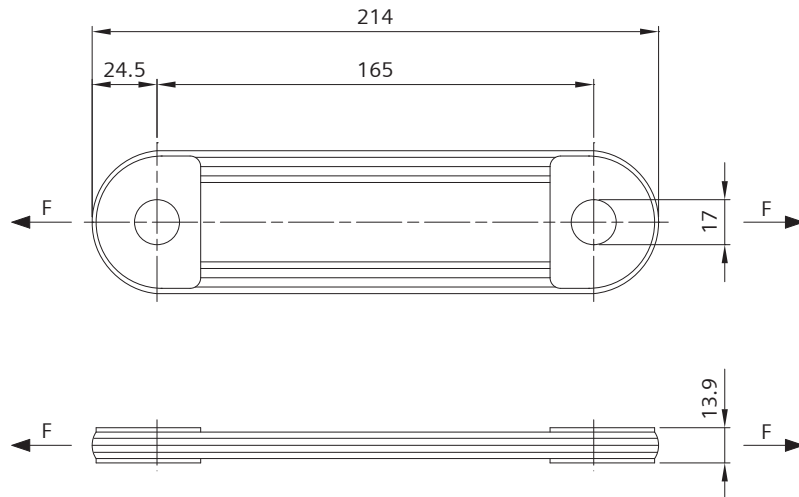


Order no.	8WL3001-0A
Designation	Loop insulator
Material	
Insulating strip	ECR glass, EP resin, color brown
Ring eyes	stlSt
Weight	0.10 kg
Specified Mechanical Load (SML)	30 kN
Perm. operating load (OML)	10 kN
Nominal voltage	1.2 kV DC
Min. creepage distance/ clearance in air	90 mm
Lightning impulse withstand voltage	75 kV
Power-frequency withstand voltage, wet	20 kV

Only for optimal environmental conditions. The optical appearance of the surface can decrease due to environmental influences.

Loop insulator up to 1,5 kV DC

for section insulator suspension and insulation of wires



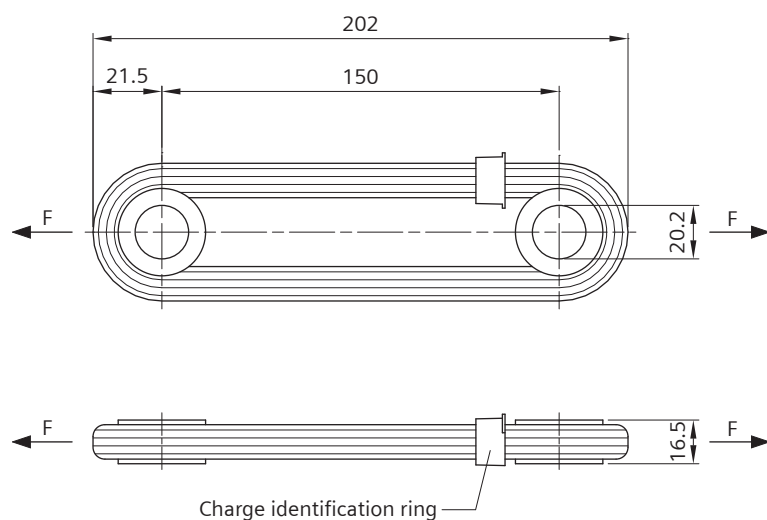
Order no.	8WL3001-8
Designation	Loop insulator
Material	
Insulating strip	ECR glass, EP resin, color brown
Thimbles	CuAl
Weight	0.24 kg
Specified Mechanical Load (SML)	70 kN
Perm. operating load (OML)	23 kN
Nominal voltage	1.5 kV DC
Min. creepage distance/ clearance in air	130 mm
Lightning impulse withstand voltage	95 kV
Power-frequency withstand voltage, wet	21 kV

Only for optimal environmental conditions. The optical appearance of the surface can decrease due to environmental influences.

Thimble inserts 8WL3022-6 and 8WL3022-7 see page 03-02-04.

Loop insulator up to 1.5 kV DC

for section insulator suspension and insulation of wires

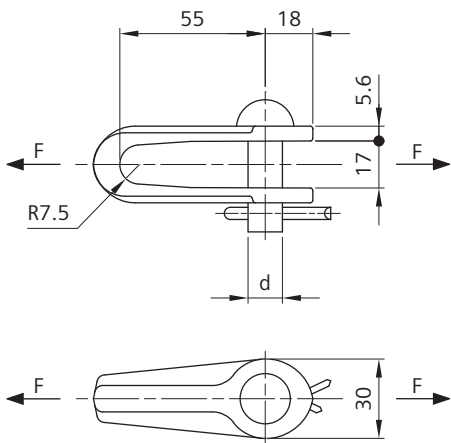


Order no.	8WL3002-2
Designation	Loop insulator
Material	
Insulating strip	ECR glass, EP resin, color brown
Ring eyes	stlSt
Weight	0.19 kg
Specified Mechanical Load (SML)	60 kN
Perm. operating load (OML)	20 kN
Nominal voltage	1.5 kV DC
Min. creepage distance/ clearance in air	110 mm
Lightning impulse withstand voltage	75 kV
Power-frequency withstand voltage, wet	20 kV

Only for optimal environmental conditions. The optical appearance of the surface can decrease due to environmental influences.

Shackle with pin

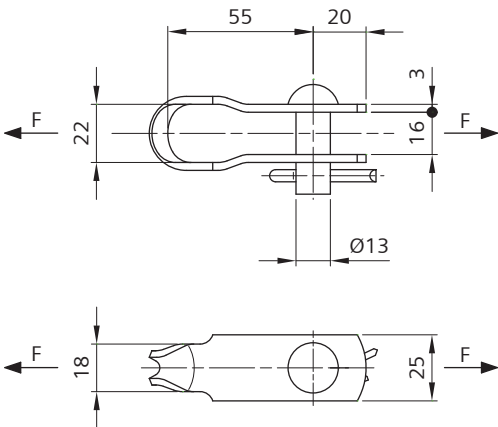
for loop insulators



Order no.	8WL3002-5	8WL3002-7
Designation	Shackle 13	Shackle 16
Material		
Shackle	CuAl	CuAl
Pin 13x40	stlSt	-
Pin 16x40	-	stlSt
Split pin 5x28	Cu	Cu
Weight	0.20 kg	0.22 kg
Perm. operating load	12 kN	20 kN
Min. failing load	36 kN	60 kN
d	13 mm	16 mm

Shackle with pin

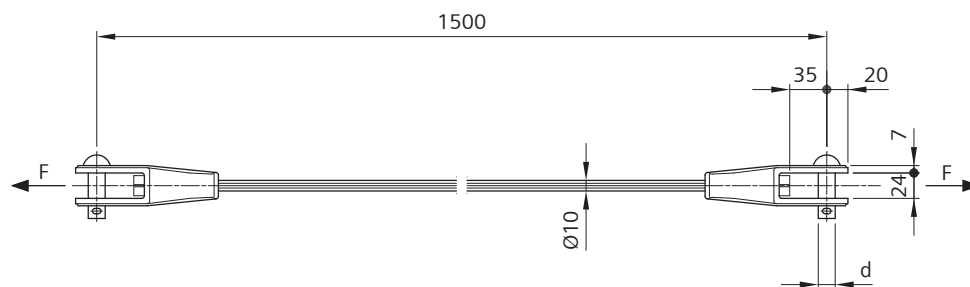
for loop insulators



Order no.	8WL3004-2
Designation	Shackle 13
Material	
Shackle	stlSt
Pin 13x34	stlSt
Split pin 5x28	Cu
Weight	0.12 kg
Perm. operating load	10 kN
Min. failing load	32 kN

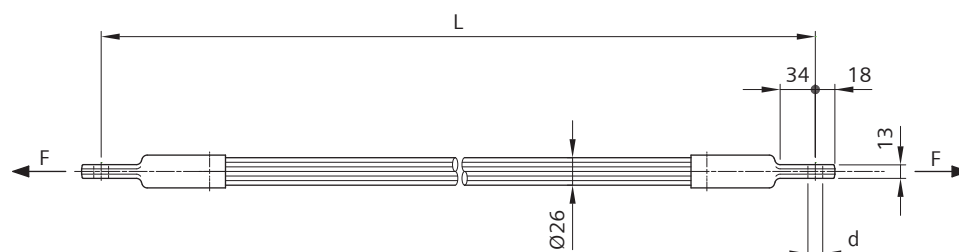
Insulating rod 10 clevis/clevis

for insulation of tension-loaded components



Order no.	8WL3020-1	8WL3020-6
Designation	Insulating 10 rod clevis/clevis 16	Insulating rod 10 clevis/clevis 19
Material		
Insulating rod	GRP, color RAL1020 (olive yellow)	GRP, color RAL1020 (olive yellow)
End fittings	CuAl	CuAl
Pins 16x50	stlSt	-
Pins 19x52	-	stlSt
Split pins 5x28	Cu	Cu
Weight	1.20 kg	1.20 kg
Perm. operating load	10 kN	10 kN
Min. failing load	32 kN	32 kN
Nominal voltage	1.5 kV DC	1.5 kV DC
Min. creepage distance	1270 mm	1270 mm
d	16 mm	19 mm

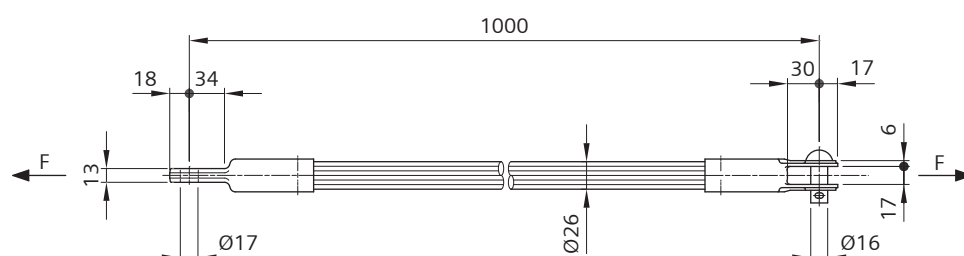
Insulating rod 26 eye/eye



Order no.	8WL3021-0	8WL3021-1	8WL3021-1A
Designation	Insulating rod 26 eye/eye 14	Insulating rod 26 eye/eye 17	Insulating rod 26 eye/eye 17
Material			
Insulating rod	GRP, color RAL1020 (olive yellow)	GRP, color RAL1020 (olive yellow)	GRP, color RAL1020 (olive yellow)
End fittings	CuAl	CuAl	CuAl
Grooved pins	stlSt	stlSt	stlSt
Weight	1.45 kg	1.45 kg	1.90 kg
Perm. operating load	10 kN	20 kN	20 kN
Min. failing load	32 kN	66 kN	66 kN
Nominal voltage	1.5 kV DC	1.5 kV DC	1.5 kV DC
Min. creepage distance	760 mm	760 mm	1260 mm
d	14 mm	17 mm	17 mm
L	1000 mm	1000 mm	1500 mm

Other lengths and colors on request.

Insulating rod 26 eye/clevis

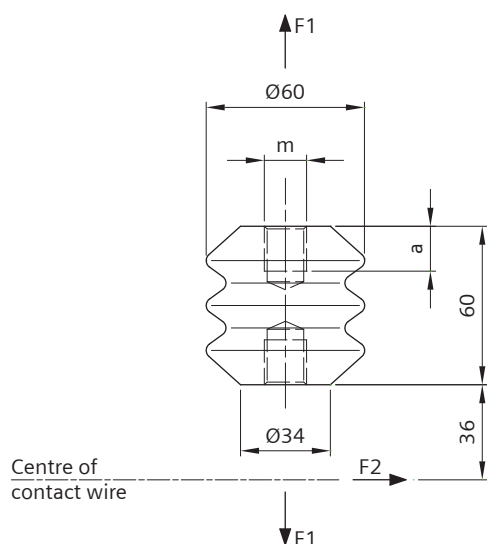


Order no.	8WL3021-7
Designation	Insulating rod 26 eye/clevis 16
Material	
Insulating rod	GRP, color RAL1020 (olive yellow)
End fittings	CuAl
Grooved pins	stlSt
Pin 16x45	stlSt
Split pin 5x28	Cu
Weight	2.00 kg
Perm. operating load	20 kN
Min. failing load	66 kN
Nominal voltage	1.5 kV DC
Min. creepage distance	770 mm

Other lengths and colors on request.

Insulator body 1.5 kV DC

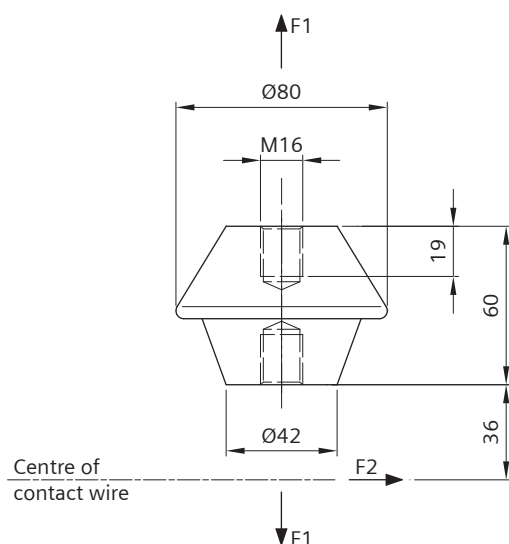
for steady arms, contact wire and elastic supports, cantilevers and feeder lines



Order no.	8WL3122-3	8WL3122-1
Designation	Insulator body M10/M10	Insulator body M16/M16
Material	Cycloaliphatic cast resin, brown	Cycloaliphatic cast resin, brown
Weight	0.26 kg	0.27 kg
Perm. operating load/ tension (F1)	3.75 kN	7.5 kN
Min. failing load/ tension (F1)	12 kN	24 kN
Perm. operating load/ bending (F2)	1.0 kN	2.0 kN
Min. failing load/ bending (F2)	3.2 kN	6.4 kN
Nominal voltage	1.5 kV DC	1.5 kV DC
Creepage distance	85 mm	85 mm
Lightning impulse withstand voltage	60 kV	60 kV
Power-frequency withstand voltage, wet	15 kV	15 kV
a	15 mm	17 mm
m	M10	M16

Insulator body 1.5 kV DC

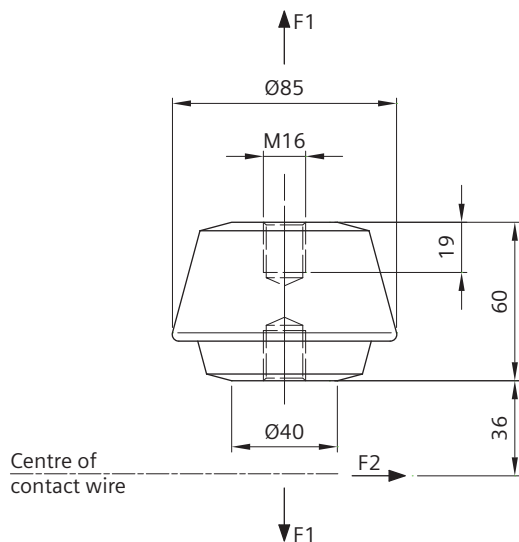
for steady arms, contact wire and elastic supports, cantilevers and feeder lines



Order no.	8WL3122-2
Designation	Insulator body M16/M16
Material	Cycloaliphatic cast resin, brown
Weight	0.34 kg
Perm. operating load/ tension (F1)	9.4 kN
Min. failing load/ tension (F1)	30 kN
Perm. operating load/ bending (F2)	2.5 kN
Min. failing load/ bending (F2)	8.0 kN
Nominal voltage	1.5 kV DC
Creepage distance	75 mm
Lightning impulse withstand voltage	60 kV
Power-frequency withstand voltage, wet	15 kV

Insulator body 1.5 kV DC

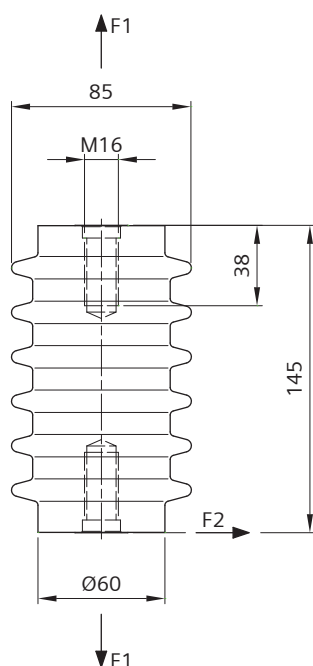
for steady arms, contact wire and elastic supports, cantilevers and feeder lines



Order no.	8WL3122-4
Designation	Insulator body M16/M16
Material	Cycloaliphatic cast resin, brown
Weight	0.54 kg
Perm. operating load/ tension (F1)	10 kN
Min. failing load/ tension (F1)	32 kN
Perm. operating load/ bending (F2)	2.5 kN
Min. failing load/ bending (F2)	8.0 kN
Nominal voltage	1.5 kV DC
Creepage distance	90 mm
Lightning impulse withstand voltage	60 kV
Power-frequency withstand voltage, wet	15 kV

Insulator body 3 kV DC

for cantilevers and feeder lines



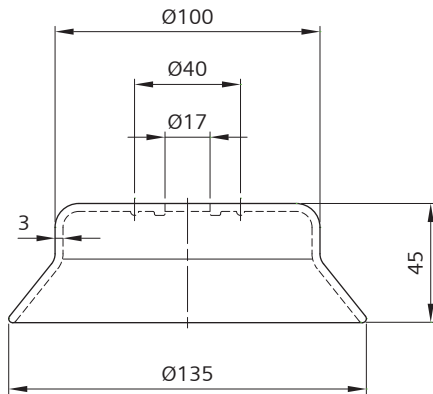
Order no.	8WL3120-5
Designation	Insulator body M16/M16
Material	Cycloaliphatic cast resin, brown
Weight	1.24 kg
Perm. operating load/ tension (F1)	16 kN
Min. failing load/ tension (F1)	51 kN
Perm. operating load/ bending (F2)	3.0 kN
Min. failing load/ bending (F2)	9.6 kN
Nominal voltage	3 kV DC
Creepage distance	220 mm
Lightning impulse withstand voltage	95 kV
Power-frequency withstand voltage, wet	35 kV

Min. screwed-in depth of threaded pins: 25 to 30 mm.

Cantilever connecting parts 8WL2188-3 and 8WL2190-3 see Chapter 02-05.

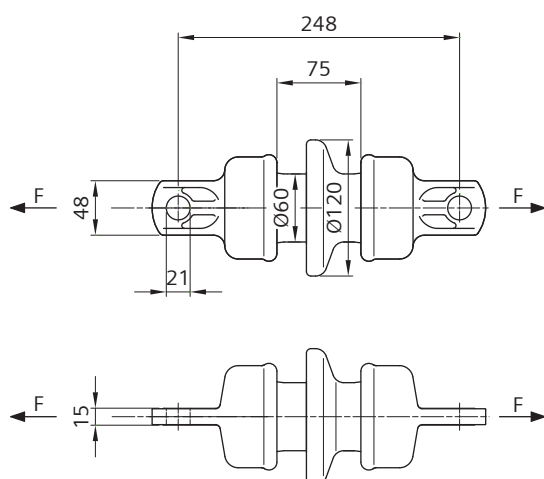
Protection cap

for insulator body 8WL3120-5



Order no.	8WL3126-0
Designation	Protection cap
Material	Polyamide
Weight	0.06 kg

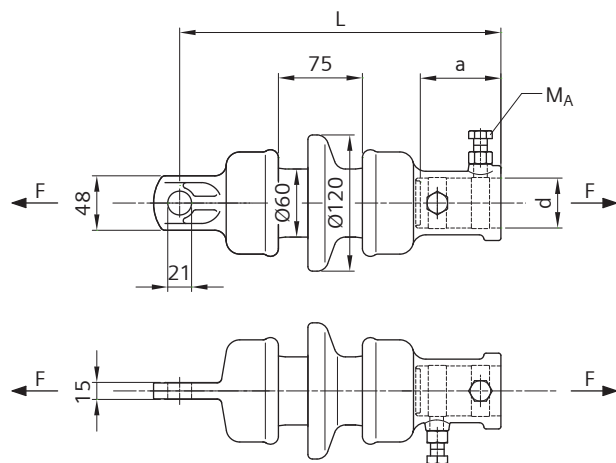
Rod insulator 60 up to 1.5 kV DC, tongue/tongue for terminations



Order no.	8WL3061-0
Designation	AS60-1-19-PZ
Material	
Insulator body	Ceramic, brown
Caps	mICI, black
Cementing	Portland cement
Weight	3.72 kg
Perm. operating load	30 kN
Min. failing load	96 kN
Nominal voltage	1.5 kV DC
Creepage distance	130 mm
Lightning impulse withstand voltage	95 kV
Power-frequency withstand voltage, wet	15 kV

Rod insulator 60 up to 1.5 kV DC, tongue/tube 42-60.3

for steel cantilevers, for tube d=42 and 42.4 mm (1 1/4") or d=60.3 mm (2")

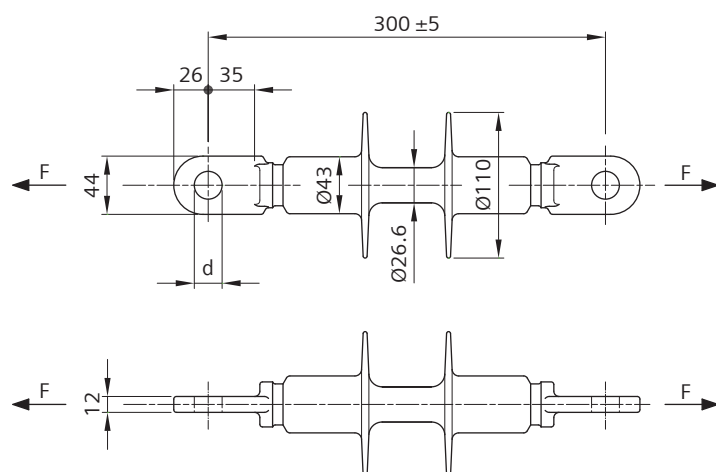


Order no.	8WL3080-3	8WL3080-4
Designation	HS60-1-42.4-19-PZ	HS60-1-60.3-19-PZ
Material		
Insulator body	Ceramic, brown	Ceramic, brown
Caps	mICI, black	mICI, black
Cup-point screws M12	stlSt	stlSt
Nuts	stlSt	stlSt
Cementing	Portland cement	Portland cement
Weight	4.26 kg	6.50 kg
Perm. operating load	30 kN	30 kN
Min. failing load	96 kN	96 kN
Tightening torque M_A	40 Nm	40 Nm
Nominal voltage	1.5 kV DC	1.5 kV DC
Creepage distance	130 mm	130 mm
Lightning impulse withstand voltage	95 kV	95 kV
Power-frequency withstand voltage, wet	15 kV	15 kV
a	71 mm	89 mm
d	44 mm	62.5 mm
L	283 mm	302 mm

The stated loads apply for positive connection of tubes to the insulator cap. When fixing the tubes with two cup-point screws the min. failing load is 30 kN under tensile force.

Composite insulator up to 3 kV DC, tongue/tongue

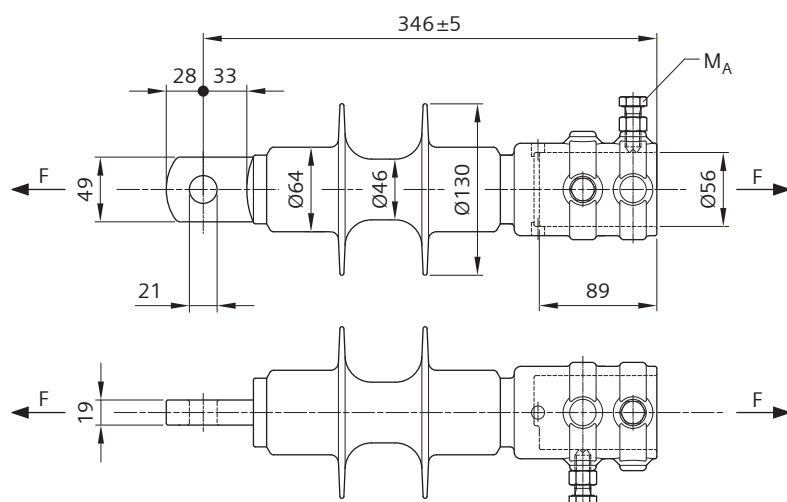
for catenaries and terminations



Order no.	8WL3088-1A	8WL3088-1B
Designation	Composite insulator tongue 21	Composite insulator tongue 17
Material		
Insulator body	GRP, silicone	GRP, silicone
Fittings	htgSt	htgSt
Insert	-	stlSt
Weight	1.5 kg	1.5 kg
Specified Mechanical Load (SML)	90 kN	90 kN
Perm. operating load (OML)	30 kN	30 kN
Nominal voltage	3 kV DC	3 kV DC
Min. creepage distance	320 mm	320 mm
Lightning impulse withstand voltage	100 kV	100 kV
Power-frequency withstand voltage, wet	42 kV	42 kV
d	21 mm	17 mm

Composite insulator up to 3 kV DC, tongue/tube 55

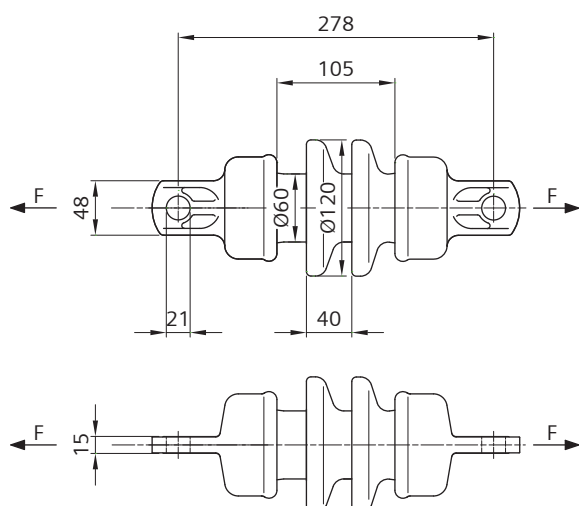
for cantilevers, for aluminium tube d=55 mm



Order no.	8WL3088-2E
Designation	Composite insulator tongue 21/tube 55
Material	
Insulator body	GRP, silicone
Fittings	ctAl
Cup-point screws M12	stlSt
Weight	2.0 kg
Specified Cantilever Load (SCL)	6 kN
Max. Design Cantilever Load (MDCL)	1.9 kN
Specified Tensile Load (STL)	60 kN
Perm. operating load/tension	10 kN
Tightening torque M_A	50 Nm
Nominal voltage	3 kV DC
Min. creepage distance	300 mm
Lightning impulse withstand voltage	100 kV
Power-frequency withstand voltage, wet	42 kV

Types for other tube diameters or with steel fittings on request.

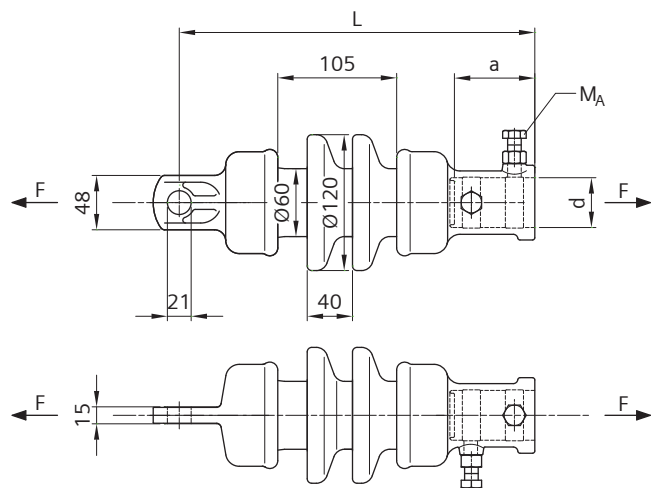
Rod insulator 60 up to 3 kV DC, tongue/tongue for terminations



Order no.	8WL3061-1
Designation	AS60-2-19-PZ
Material	
Insulator body	Ceramic, brown
Caps	mICI, black
Cementing	Portland cement
Weight	4.42 kg
Perm. operating load	30 kN
Min. failing load	96 kN
Nominal voltage	3 kV DC
Creepage distance	210 mm
Lightning impulse withstand voltage	95 kV
Power-frequency withstand voltage, wet	27 kV

Rod insulator 60 up to 3 kV DC, tongue/tube 42-60.3

for steel cantilevers, for tube d=42 and 42.4 mm (1 1/4") or d=60.3 mm (2")

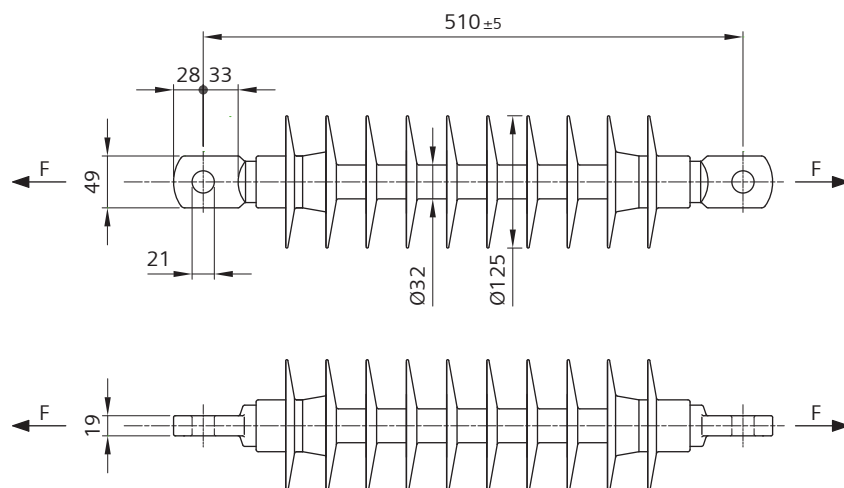


Order no.	8WL3080-3A	8WL3080-8
Designation	HS60-2-42.4-19-PZ	HS60-2-60.3-19-PZ
Material		
Insulator body	Ceramic, brown	Ceramic, brown
Caps	mICI, black	mICI, black
Cup-point screws M12	stlSt	stlSt
Nuts	stlSt	stlSt
Cementing	Portland cement	Portland cement
Weight	4.76 kg	7.0 kg
Perm. operating load	30 kN	30 kN
Min. failing load	96 kN	96 kN
Tightening torque M_A	40 Nm	40 Nm
Nominal voltage	3 kV DC	3 kV DC
Creepage distance	210 mm	210 mm
Lightning impulse withstand voltage	95 kV	95 kV
Power-frequency withstand voltage, wet	27 kV	27 kV
a	71 mm	89 mm
d	44.0 mm	62.5 mm
L	313 mm	332 mm

The stated loads apply for positive connection of tubes to the insulator cap. When fixing the tubes with two cup-point screws the min. failing load is 30 kN under tensile force.

Composite insulator 25 kV AC, tongue/tongue

for catenaries and terminations

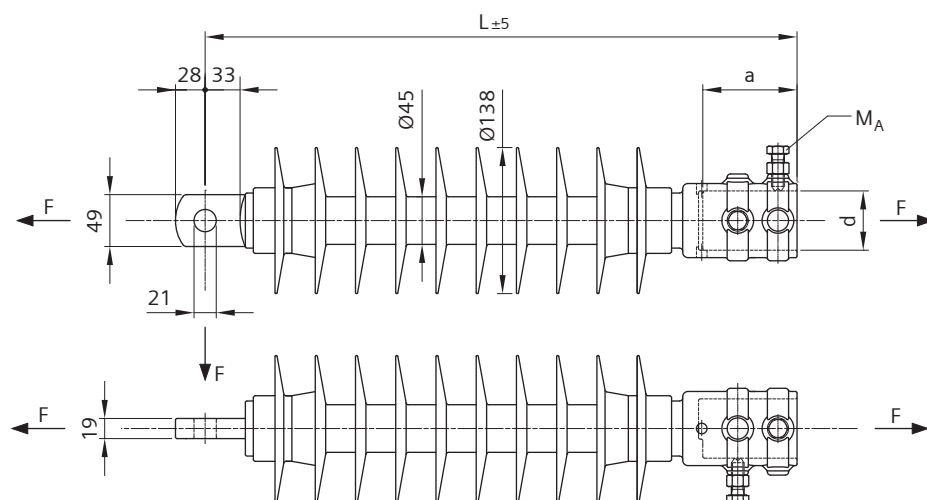


Order no.	8WL3078-1A
Designation	Composite insulator tongue/tongue
Material	
Insulator body	GRP, silicone
Fittings	htgSt
Weight	2.9 kg
Specified Mechanical Load (SML)	135 kN
Perm. operating load (OML)	30 kN
Nominal voltage	25 kV AC
Min. creepage distance	1230 mm
Lightning impulse withstand voltage	250 kV
Power-frequency withstand voltage, wet	125 kV

Types with other fittings on request.

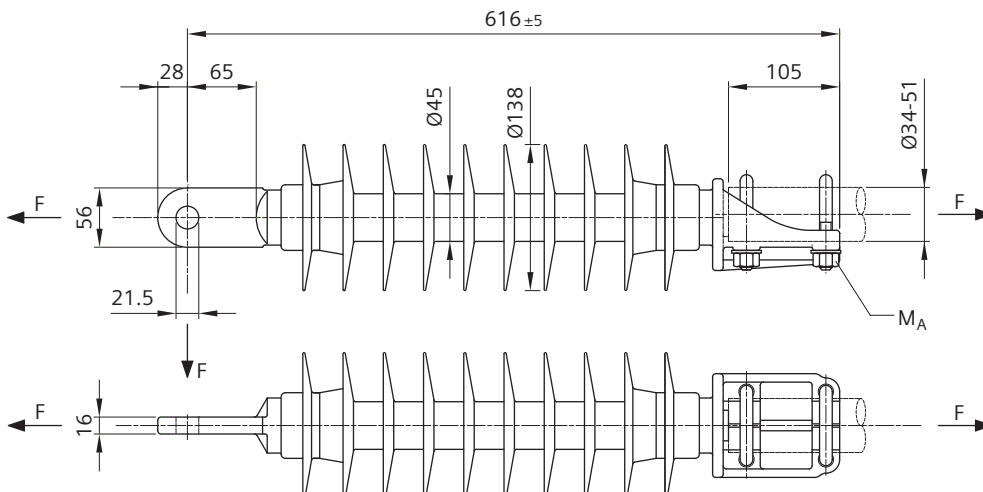
Composite insulator 25 kV AC, tongue/tube 55-70

for cantilevers, for aluminium tube d=55 or 70 mm



Order no.	8WL3078-2A	8WL3078-2B
Designation	Composite insulator tongue/tube 55	Composite insulator tongue/tube 70
Material		
Insulator body	GRP, silicone	GRP, silicone
Fittings	ctAl	ctAl
Cup-point screws M12	stlSt	stlSt
Weight	3.2 kg	3.6 kg
Specified Cantilever Load (SCL)	6 kN	6 kN
Max. Design Cantilever Load (MDCL)	1.9 kN (equivalent to 1060 Nm)	1.9 kN (equivalent to 1085 Nm)
Specified Tensile Load (STL)	60 kN	60 kN
Perm. operating load/ tension	12 kN	12 kN
Tightening torque M_A	50 Nm	50 Nm
Nominal voltage	25 kV AC	25 kV AC
Min. creepage distance	1215 mm	1215 mm
Lightning impulse withstand voltage	250 kV	250 kV
Power-frequency withstand voltage, wet	125 kV	125 kV
a	89 mm	100 mm
d	56 mm	71.5 mm
L	559 mm	573 mm

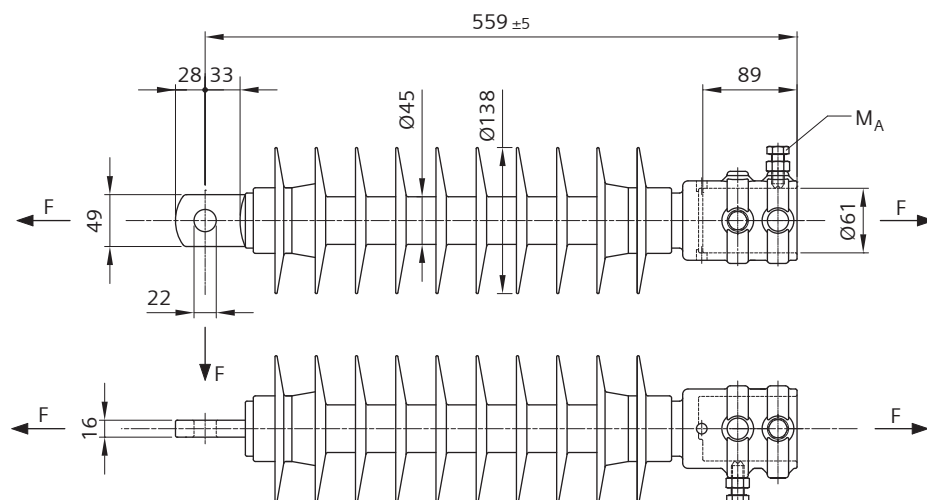
for cantilevers, for steel tube $d=34$ to 51 mm



Order no.	8WL3078-2C
Designation	Composite insulator tonque/tube 34-51
Material	
Insulator body	GRP, silicone
Fittings	htgSt
U-bolts M12	stlSt
Nuts, washers	stlSt
Weight	6.6 kg
Specified Cantilever Load (SCL)	6 kN
Max. Design Cantilever Load (MDCL)	1.9 kN (equivalent to 1170 Nm)
Specified Tensile Load (STL)	60 kN
Perm. operating load/ tension	12 kN
Tightening torque M _A	35 Nm
Nominal voltage	25 kV AC
Min. creepage distance	1215 mm
Lightning impulse withstand voltage	250 kV
Power-frequency withstand voltage, wet	125 kV

Composite insulator 25 kV AC, tongue/tube 60.3

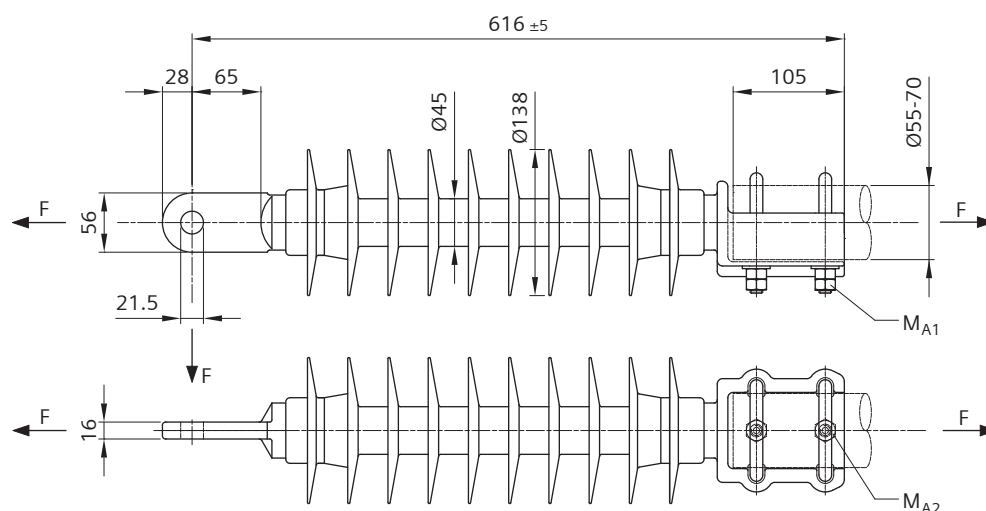
for cantilevers, for steel tube d=60.3 mm (2")



Order no.	8WL3078-2D
Designation	Composite insulator tongue/tube 60.3
Material	
Insulator body	GRP, silicone
Fittings	ctAl
Cup-point screws M12	stlSt
Weight	3.2 kg
Specified Cantilever Load (SCL)	6 kN
Max. Design Cantilever Load (MDCL)	1.9 kN (equivalent to 1060 Nm)
Specified Tensile Load (STL)	40 kN
Perm. operating load/tension	12 kN
Tightening torque M_A	40 Nm
Nominal voltage	25 kV AC
Min. creepage distance	1215 mm
Lightning impulse withstand voltage	250 kV
Power-frequency withstand voltage, wet	125 kV

Composite insulator 25 kV AC, tongue/tube 55-70

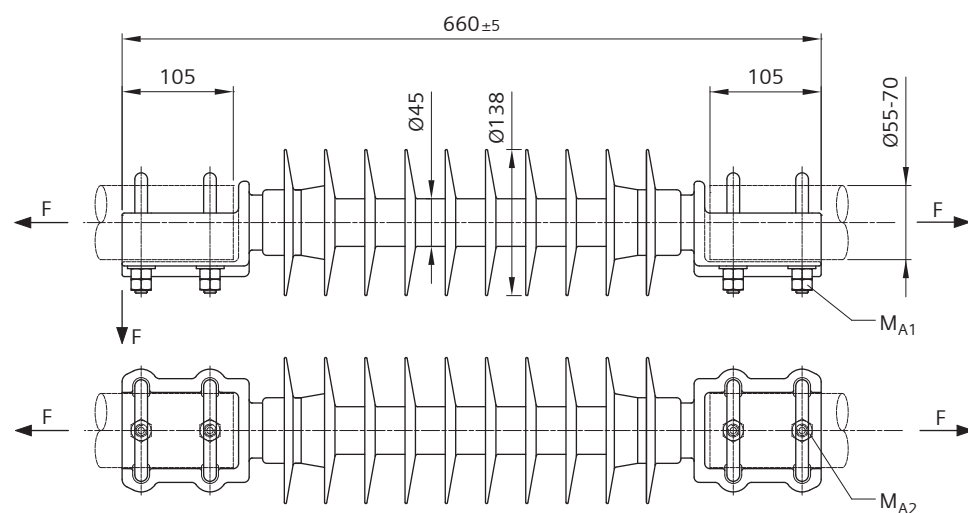
for cantilevers, for tube d=55 to 70 mm



Order no.	8WL3078-2L
Designation	Composite insulator tongue/tube 55-70
Material	
Insulator body	GRP, silicone
Fittings	htgSt
U-bolts M12	stlSt
Nuts, washers	stlSt
Cup-point screws M12	stlSt
Weight	8.1 kg
Specified Cantilever Load (SCL)	6 kN
Max. Design Cantilever Load (MDCL)	1.9 kN (equivalent to 1170 Nm)
Specified Tensile Load (STL)	60 kN
Perm. operating load/tension	12 kN
Tightening torque M_{A1}	35 Nm
Tightening torque M_{A2}	50 Nm
Nominal voltage	25 kV AC
Min. creepage distance	1215 mm
Lightning impulse withstand voltage	250 kV
Power-frequency withstand voltage, wet	125 kV

Composite insulator 25 kV AC, tube/tube 55-70

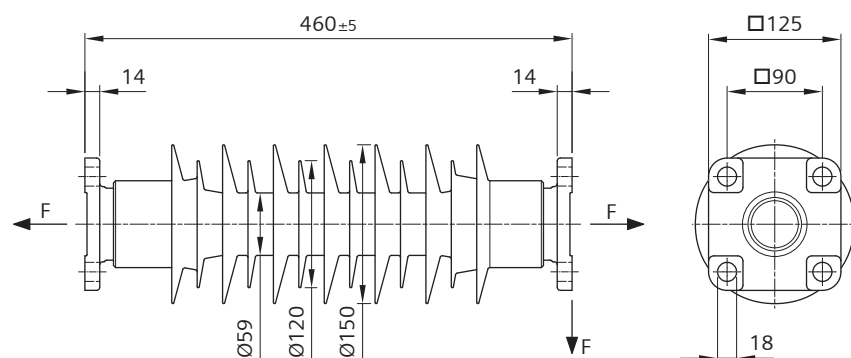
for cantilevers, for tube d=55 to 70 mm



Order no.	8WL3078-2M
Designation	Composite insulator tube/tube 55-70
Material	
Insulator body	GRP, silicone
Fittings	htgSt
U-bolts M12	stlSt
Nuts, washers	stlSt
Cup-point screws M12	stlSt
Weight	9.0 kg
Specified Cantilever Load (SCL)	6 kN
Max. Design Cantilever Load (MDCL)	1.9 kN (equivalent to 1250 Nm)
Specified Tensile Load (STL)	60 kN
Perm. operating load/tension	12 kN
Tightening torque M_{A1}	35 Nm
Tightening torque M_{A2}	50 Nm
Nominal voltage	25 kV AC
Min. creepage distance	1215 mm
Lightning impulse withstand voltage	250 kV
Power-frequency withstand voltage, wet	125 kV

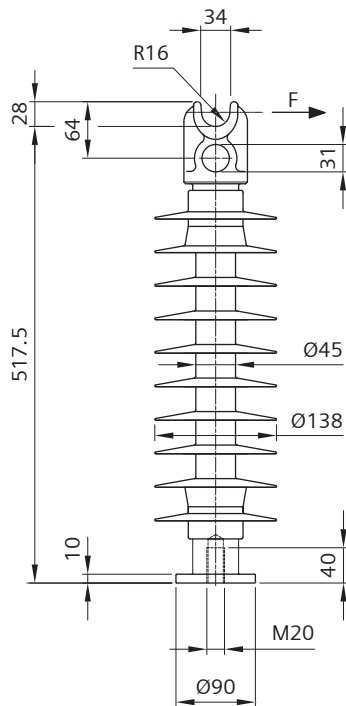
Composite insulator 25 kV AC with flat connections

for soffit conductor rail

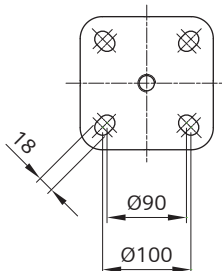


Order no.	8WL3078-6D
Designation	Composite insulator with flat connections
Material	
Insulator body	GRP, silicone
Fittings	SG iron-htg
Weight	7.2 kg
Specified Cantilever Load (SCL)	19.2 kN
Max. Design Cantilever Load (MDCL)	6.0 kN (equivalent to 2760 Nm)
Specified Tensile Load (STL)	60 kN
Perm. operating load/tension	12 kN
Nominal voltage	25 kV AC
Min. creepage distance	1255 mm
Lightning impulse withstand voltage	250 kV
Power-frequency withstand voltage, wet	125 kV

for feeder lines

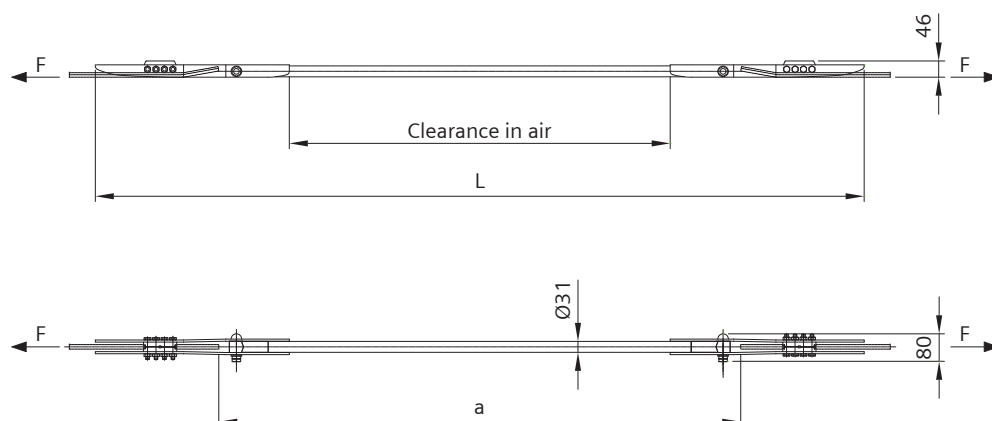


for feeder lines

Siemens Product Catalog 2010 Contact line equipment

Contact wire insulator 3 kV DC to 25 kV AC

with emergency traversing properties as a substitute for contact wire insulators, for contact wires AC/BC-100 to 150 made of Cu-ETP or CuAg0.1 or AC-100 to AC-120 made of CuMg0.5 acc. to EN 50149 and Chinese contact wires CTHA-85/-120



Order no.	8WL3092-1A	8WL3092-1B	8WL3092-1C
Designation	Contact wire insulator 3 kV DC	Contact wire insulator 15 kV AC	Contact wire insulator 25 kV AC
Material			
Insulating rod	ECR glass, EP resin with silicone coating	ECR glass, EP resin with silicone coating	ECR glass, EP resin with silicone coating
Clamps, straps	stlSt	stlSt	stlSt
Connecting strips	htgSt	htgSt	htgSt
Bolts, nuts	stlSt	stlSt	stlSt
Washers	stlSt	stlSt	stlSt
Weight	5.73 kg	6.13 kg	6.68 kg
Perm. operating load	30 kN	30 kN	30 kN
Min. failing load	90 kN	90 kN	90 kN
Nominal voltage	3 kV DC	15 kV AC	25 kV AC
Creepage distance	450 mm	760 mm	1200 mm
Clearance in air	330 mm	640 mm	1080 mm
a	730 mm	1040 mm	1480 mm
L	1430 mm	1740 mm	2180 mm

In exceptions the pantograph can slide over the insulator.

Chapter 02

Standard Products

Tensioning equipment	01	01-86
Thimbles, connectors, sleeves	02	01-24
GRP cantilevers	03	01-68
Aluminium cantilevers	04	01-80
Steel cantilevers	05	01-42
Headspan supports	06	01-36
Insulators	07	01-34
Contact lines under structures and bridge protection	08	01-42
Clamps	09	01-84
Tension wheel equipment	10	01-48
Section insulators	11	01-34
Disconnectors and drive mechanism	12	01-62
Earthing and protecting equipment	13	01-14
Contact wires, conductors, span wires	14	01-22
Monitoring systems	15	01-06
Installation tools and equipment	16	01-24

Adapter	02-08-35
Anchoring clamp	02-08-22
Clamping plate for I-beam	02-08-39
Conductor rail clamp	02-08-30
Conductor rail support 1.5 kV DC	02-08-31, 02-08-32
Conductor rail support 1.5 kV DC, support frame [adjustable up to 30°]	02-08-33
Contact spring	02-08-20
Earthing clamp	02-08-21
Elastic support 1.5 kV DC	02-08-09
Elastic support 1.5 kV DC with GRP steady arm	02-08-11, 02-08-12
Elastic support 25 kV AC, single contact wire	02-08-13
Elastic support 25 kV AC, twin contact wire	02-08-14
Feeder clamp	02-08-23
Feeder clamp for soffit conductor rail	02-08-29
Guard plate	02-08-42
Guy clamp	02-08-24
I-beam	02-08-38
Insulated plate	02-08-37
L-section for guard plate	02-08-42
Rail joint, bolted (Al)	02-08-16
Rail joint, bolted (Cu)	02-08-28
Soffit conductor rail (Al)	02-08-15
Soffit conductor rail (Cu)	02-08-27
Soffit conductor rail ramp	02-08-25
Support angle	02-08-40
Support clamp	02-08-08
Support frame	02-08-34
Support frame, adjustable up to 30°	02-08-36
Suspension clamp, fixed	02-08-17
Suspension clamp, pivotable	02-08-18
Suspension clamp, sliding	02-08-19
Tie bar	02-08-41
Transition element	02-08-26
Underbridge fastening	02-08-10
Underbridge and tunnel support for contact wire 16R, insulated	02-08-06
Underbridge and tunnel support for contact wire M16-5/8", insulated	02-08-07
Underbridge and tunnel support for one catenary wire, insulated	02-08-04
Underbridge and tunnel support for two catenary wires, insulated	02-08-05

Technical comments

Application

In this chapter, you can select from products for the construction of contact lines under structures or in tunnels including mechanical and electrical protection.

Types

Elastic supports serve to provide an elastic suspension of fixed terminated and auto-tensioned overhead contact lines without catenaries in tunnels and at underpasses. The low design height and the special dynamics make the elastic support an optimal solution for tunnel sections in mass transit and main line railways. They can also be applied for limiting the uplift under low bridges.

For low vehicle clearance envelopes in tunnels and for the equipment for stations and workshops, Siemens offers overhead conductor rails made of fixed, massive conductor rails

that are mounted on the tunnel roof. As they can be traversed with standard pantographs, they represent a space-saving alternative to overhead contact lines in tunnels. Siemens offers two types of overhead contactor rails:

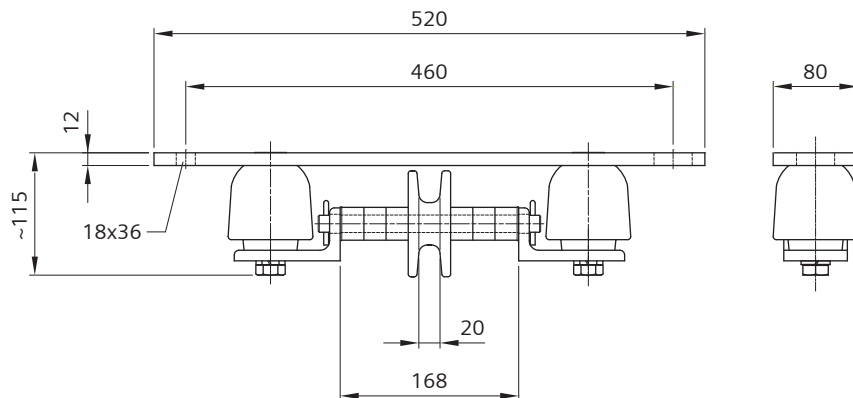
- With aluminium hollow profile or
- with copper solid profile.

The rigid profiles ensure the transmission of high operating currents. Depending on the type, the temperature depending variation in length can be compensated via swiveling and sliding suspensions or via a sinusoidal lateral deflection.

The bridge protection serves to provide insulating coverage of structures such as bridges and supporting structures, as well as contact protection for contact line sections that are live. The bridge protection consists of insulating GRP guard plates in a sandwich construction and the appropriate fastening material.

Underbridge and tunnel support for one catenary wire, insulated

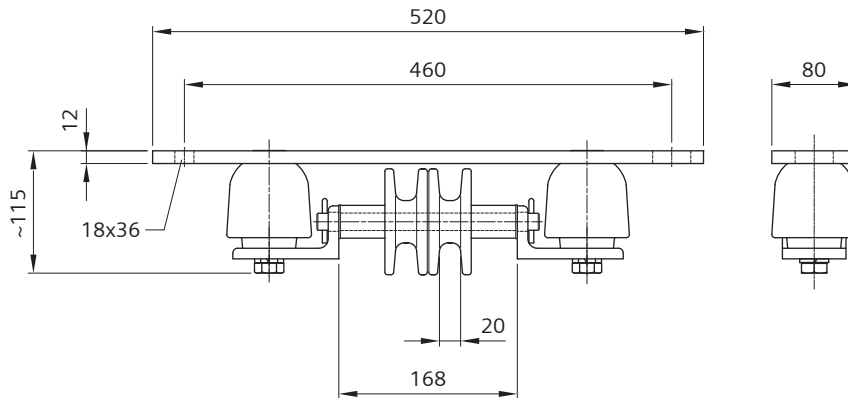
for supports of auto-tensioned catenary wires under structures, for wires up to 185 mm² acc. to DIN 48201



Order no.	8WL3526-8
Designation	Underbridge and tunnel support
Material	
Plate	GF-UP
Pulley, spacer tube	Polyamide
Support angles	htgSt
Insulators	Cast resin
Axle	stlSt
Bolts	stlSt
Spring washers	stlSt
Split pins 5x28	Cu
Weight	4.75 kg
Nominal voltage	750 V DC
Creepage distance	96 mm

Underbridge and tunnel support for two catenary wires, insulated

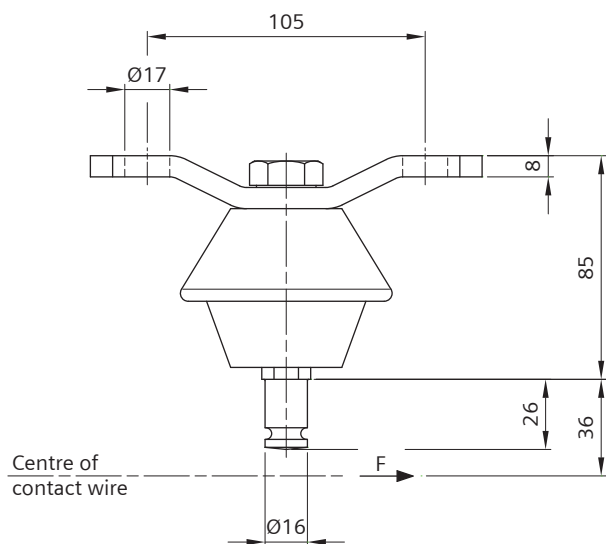
for supports of auto-tensioned catenary wires under structures, for wires up to 185 mm² acc. to DIN 48201



Order no.	8WL3527-0
Designation	Underbridge and tunnel support
Material	
Plate	GF-UP
Pulleys, spacer tube	Polyamide
Support angles	htgSt
Insulators	Cast resin
Axle	stlSt
Bolts	stlSt
Spring washers	stlSt
Split pins 5x28	Cu
Weight	5.0 kg
Nominal voltage	750 V DC
Creepage distance	96 mm

Underbridge and tunnel support for contact wire 16R, insulated

for contact wire supports under structures



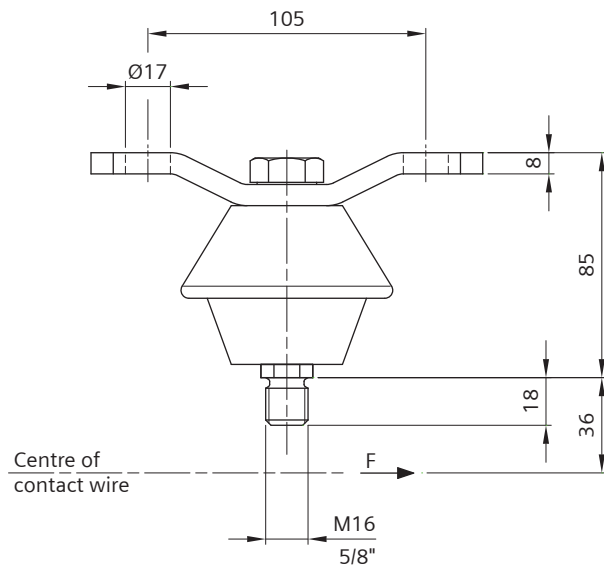
Order no.	8WL3570-4
Designation	Underbridge and tunnel support for contact wire 16R
Material	
Insulator body	Cast resin, brown
Underbridge fastening	htgSt
Grooved stud	stlSt
Bolt M16	stlSt
Weight	1.02 kg
Perm. operating load	2.5 kN
Min. failing load	8.0 kN
Nominal voltage	1.5 kV DC
Creepage distance	75 mm

Fastening bolts must be ordered separately.

Contact wire clips see Chapter 02-09.

Underbridge and tunnel support for contact wire M16-5/8", insulated

for contact wire supports under structures



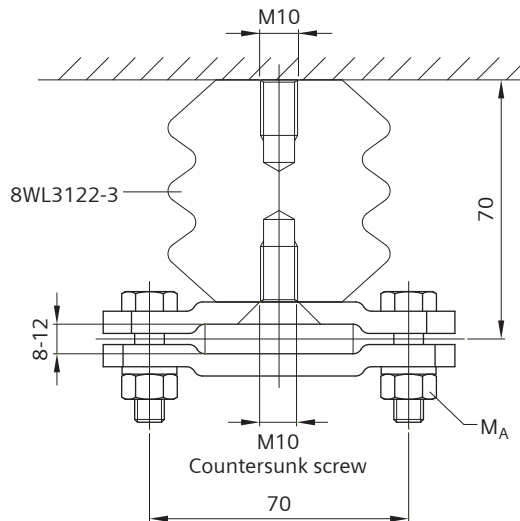
Order no.	8WL3570-5	8WL3570-6
Designation	Underbridge and tunnel support for contact wire M16	Underbridge and tunnel support for contact wire 5/8"
Material		
Insulator body	Cast resin, brown	Cast resin, brown
Underbridge fastening	htgSt	htgSt
Threaded stud	stlSt	stlSt
Bolt M16	stlSt	stlSt
Weight	0.82 kg	0.82 kg
Perm. operating load	2.5 kN	2.5 kN
Min. failing load	8.0 kN	8.0 kN
Nominal voltage	1.5 kV DC	1.5 kV DC
Creepage distance	75 mm	75 mm

Fastening bolts must be ordered separately.

Contact wire clips see Chapter 02-09.

Support clamp

for feeder line in tunnel, for flat copper 40x8 to 40x12 mm

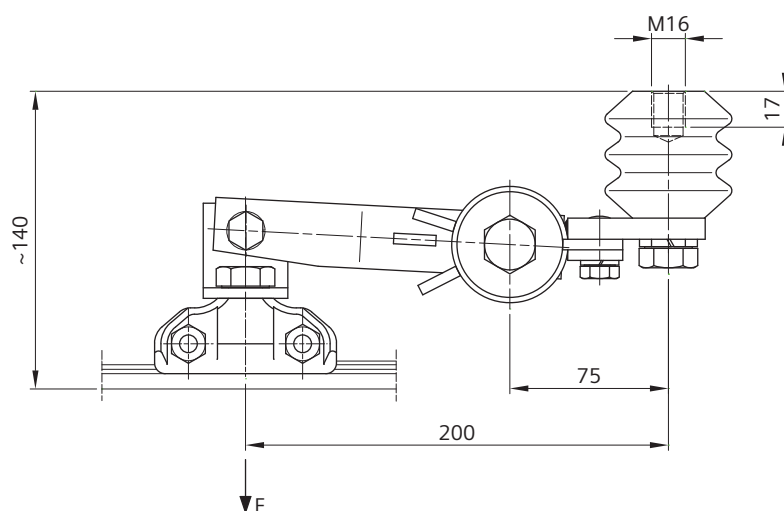


Order no.	8WL6712-5
Designation	Support clamp
Material	
Straps	Cu-ETP
Bolts M8	stlSt
Nuts	stlSt
Spring washers	stlSt
Weight	0.47 kg
Tightening torque M_A	16 Nm

Insulator body 8WL3122-3 (see page QUERVERWEIS-NICHT-GEFUNDEN) and fastening bolts M10 must be ordered separately.

Elastic support 1.5 kV DC

for fixed terminated contact wire

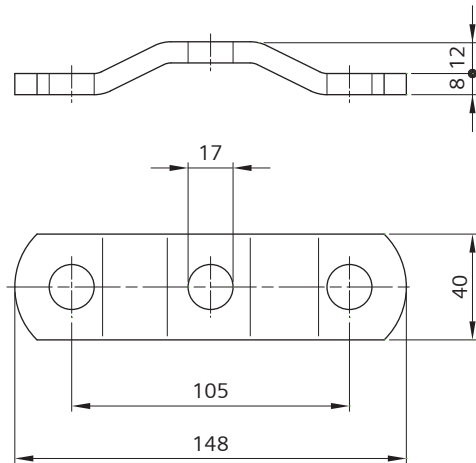


Order no.	8WL4000-0
Designation	Elastic support without underbridge fastening
Material	
Basic frame	htgSt
Torsion element	stlSt, rubber
Insulator body	Cast resin, brown
Contact wire clip	CuAl
Bolts, nuts	stlSt
Spring washers	stlSt
Weight	2.50 kg
Perm. operating load	0.4 kN
Min. failing load	1.28 kN
Nominal voltage	1.5 kV DC
Creepage distance	85 mm

Underbridge fastening 8WL3575-0 must be ordered separately, see page 02-08-10.

Underbride fastening

for elastic support 8WL4000-0

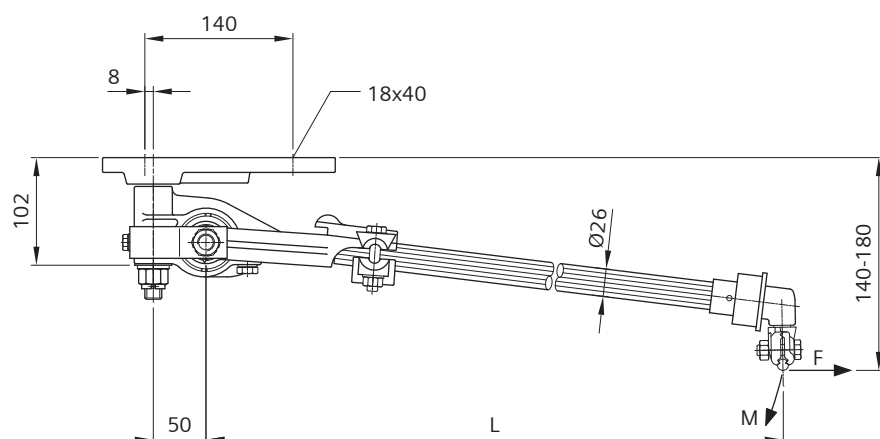


Order no.	8WL3575-0
Designation	Underbride fastening
Material	htgSt
Weight	0.34 kg

Bolt EN ISO 4017-M16x20-stlSt must be ordered separately.

Elastic support 1.5 kV DC with GRP steady arm

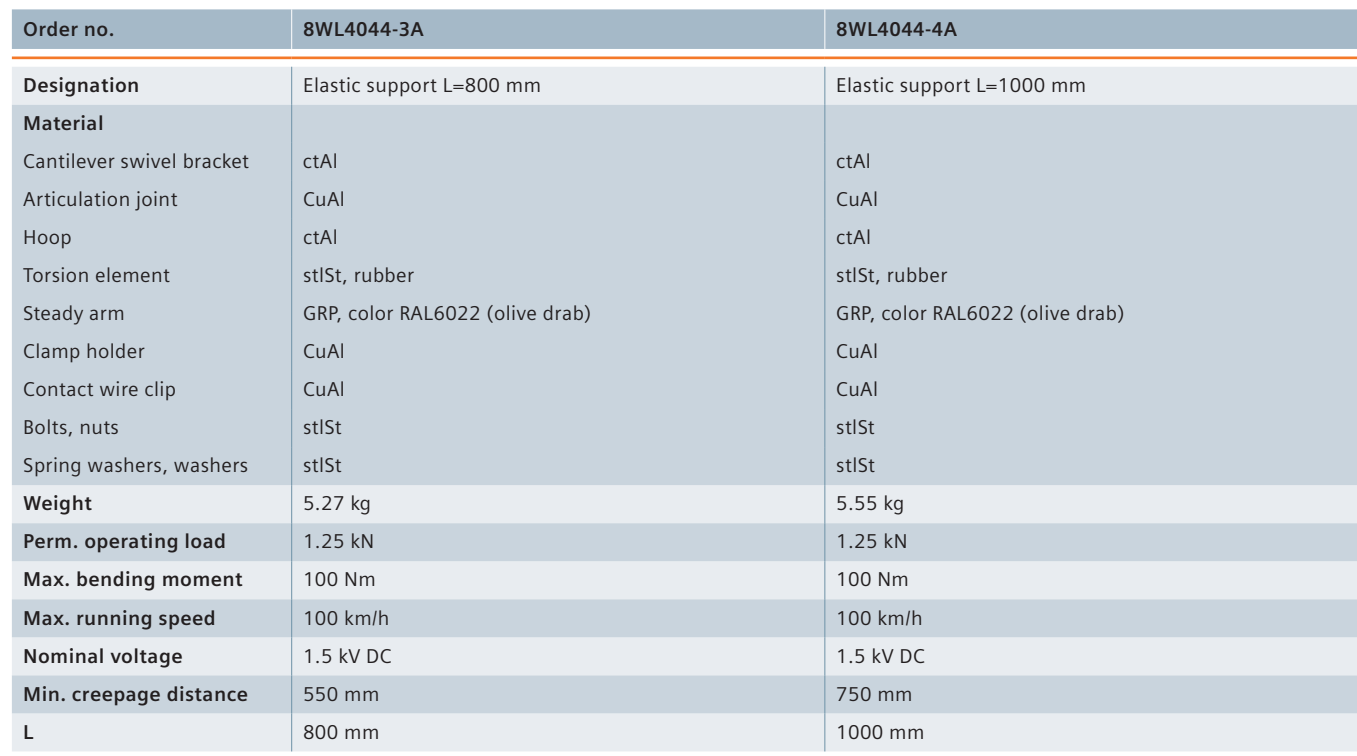
for auto-tensioned contact wire, fastening directly onto tunnel soffit



Order no.	8WL4044-0A	8WL4044-1A
Designation	Elastic support L=800 mm	Elastic support L=1000 mm
Material		
Baseplate	ctAl	ctAl
Articulation joint	CuAl	CuAl
Hoop	ctAl	ctAl
Torsion element	stlSt, rubber	stlSt, rubber
Steady arm	GRP, color RAL6022 (olive drab)	GRP, color RAL6022 (olive drab)
Clamp holder	CuAl	CuAl
Contact wire clip	CuAl	CuAl
Bolts, nuts	stlSt	stlSt
Spring washers, washers	stlSt	stlSt
Weight	5.04 kg	5.32 kg
Perm. operating load	1.25 kN	1.25 kN
Max. bending moment	100 Nm	100 Nm
Max. running speed	100 km/h	100 km/h
Nominal voltage	1.5 kV DC	1.5 kV DC
Min. creepage distance	550 mm	750 mm
L	800 mm	1000 mm

Adjusting spanner 8WL4061-0 must be ordered separately, see page 02-16-19.

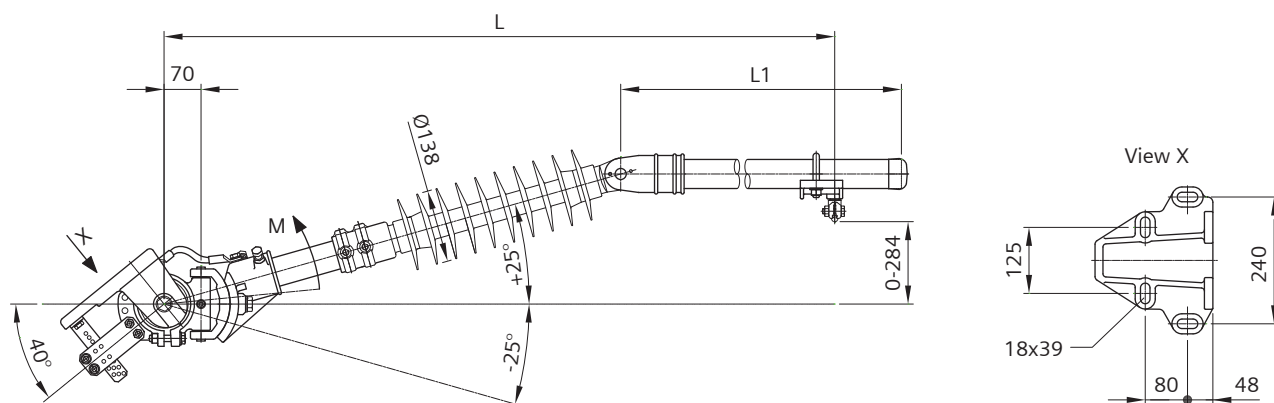
for auto-tensioned contact wire, fastening on soffit post for different tunnel heights, steplessly adjustable



Adjusting spanner 8WL4061-0 must be ordered separately, see page 02-16-19.

Elastic support 25 kV AC, single contact wire

for fixed-terminated or auto-tensioned contact wire in tunnel or under structures with limited space, for contact wire AC-80 to AC-150 acc. to EN 50149



Order no.	8WL4200-0	8WL4200-0C
Designation	Elastic support L=1400 mm	Elastic support L=1530 mm
Material		
Basic frame	ctAl	ctAl
Torsion element	stlSt, rubber	stlSt, rubber
Insulator	GRP, silicone	GRP, silicone
Tubes 55x6	Al	Al
Clamp holder	ctAl	ctAl
Contact wire clip	CuAl	CuAl
End cap	Plastic	Plastic
Bolts, nuts	stlSt	stlSt
Washers, spring washers	stlSt	stlSt
Weight	18.38 kg	18.70 kg
Max. bending moment	500 Nm	500 Nm
Torsion constant	60 Nm/degree	60 Nm/degree
Max. running speed	160 km/h ¹⁾ 130 km/h ²⁾	160 km/h ¹⁾ 130 km/h ²⁾
Nominal voltage	25 kV AC	25 kV AC
Min. creepage distance	1200 mm	1200 mm
L	1400 mm	1530 mm
L1	665 mm	795 mm

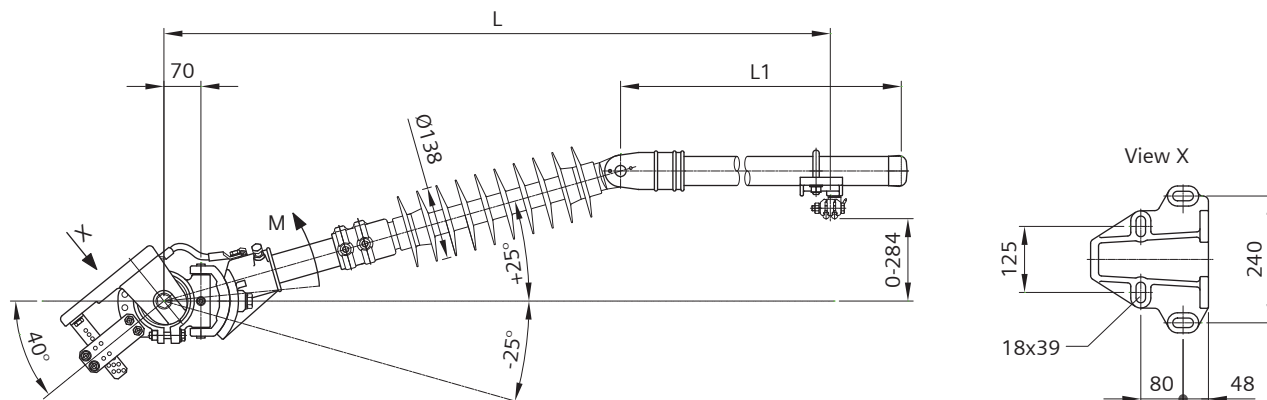
¹⁾ at two supports arranged in succession

²⁾ at more than two supports arranged in succession

Adjusting spanner 8WL4203-2 must be ordered separately, see page 02-16-20.

Elastic support 25 kV AC, twin contact wire

for fixed-terminated or auto-tensioned contact wire in tunnel or under structures with limited space, for contact wire AC-80 to AC-150 acc. to EN 50149



Order no.	8WL4200-0A	8WL4200-0B	8WL4200-0D
Designation	Elastic support L=1420 mm	Elastic support L=1570 mm	Elastic support L=1740 mm
Material			
Basic frame	ctAl	ctAl	ctAl
Torsion element	stlSt, rubber	stlSt, rubber	stlSt, rubber
Insulator	GRP, silicone	GRP, silicone	GRP, silicone
Tubes 55x6	Al	Al	Al
Clamp holder	ctAl	ctAl	ctAl
Twin contact wire clip	CuAl	CuAl	CuAl
End cap	Plastic	Plastic	Plastic
Bolts, nuts	stlSt	stlSt	stlSt
Washers, spring washers	stlSt	stlSt	stlSt
Bolts, nuts	stlSt	stlSt	stlSt
Washers, spring washers	stlSt	stlSt	stlSt
Weight	18.55 kg	18.93 kg	19.14 kg
Max. bending moment	500 Nm	500 Nm	500 Nm
Torsion constant	60 Nm/degree	60 Nm/degree	60 Nm/Grad
Max. running speed	160 km/h ¹⁾ 130 km/h ²⁾	160 km/h ¹⁾ 130 km/h ²⁾	160 km/h ¹⁾ 130 km/h ²⁾
Nominal voltage	25 kV AC	25 kV AC	25 kV AC
Min. creepage distance	1200 mm	1200 mm	1200 mm
L	1420 mm	1570 mm	1740 mm
L1	695 mm	845 mm	1045 mm

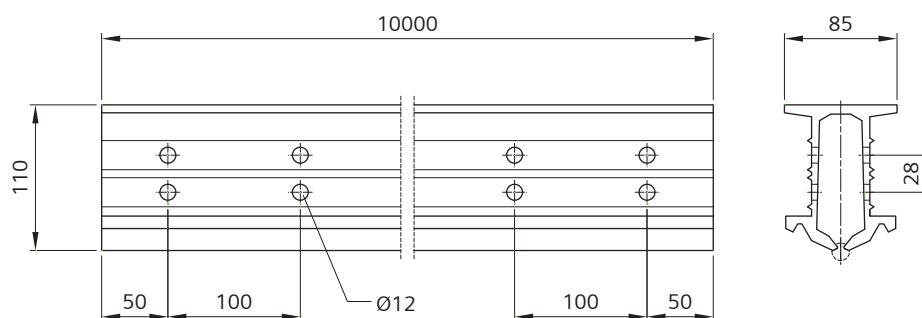
¹⁾ at two supports arranged in succession

²⁾ at more than two supports arranged in succession

Adjusting spanner 8WL4203-2 must be ordered separately, see page 02-16-20.

Soffit conductor rail (Al)

for overhead contact line in tunnel or on structures, for AC/BC contact wires acc. to EN 50149



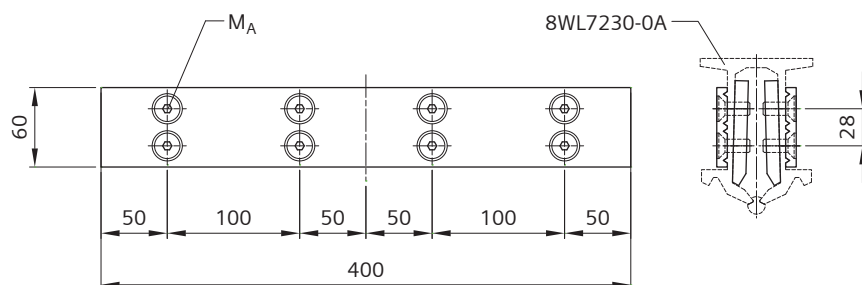
Order no.	8WL7230-0A
Designation	Soffit conductor rail L=10 m
Material	Al
Weight	62.18 kg
Nominal cross-section	2300 mm ²
Perm. permanent current at 50 K temperature rise	2900 A
Rated short-time current	45 kA
Rated short-time duration	100 ms

Drilled holes suitable to rail joint 8WL7231-0.

Other lengths on request (max. 12 m).

Rail joint, bolted (Al)

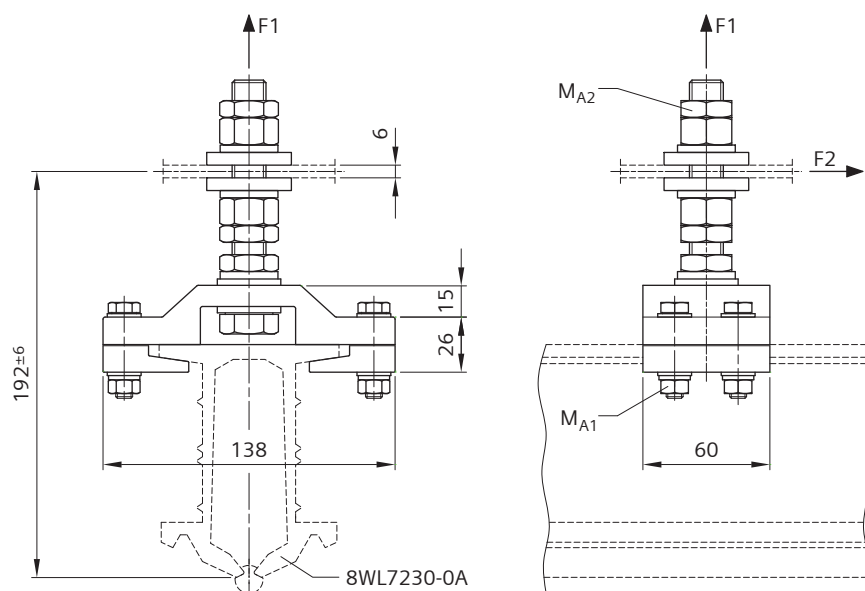
for soffit conductor rail 8WL7230-0A



Order no.	8WL7231-0
Designation	Rail joint, bolted
Material	
Straps	Al
Countersunk head screws M10	stlSt
Weight	2.86 kg
Tightening torque M_A	40 Nm
Perm. permanent current at 50 K temperature rise	2900 A
Rated short-time current	45 kA
Rated short-time duration	100 ms

Suspension clamp, fixed

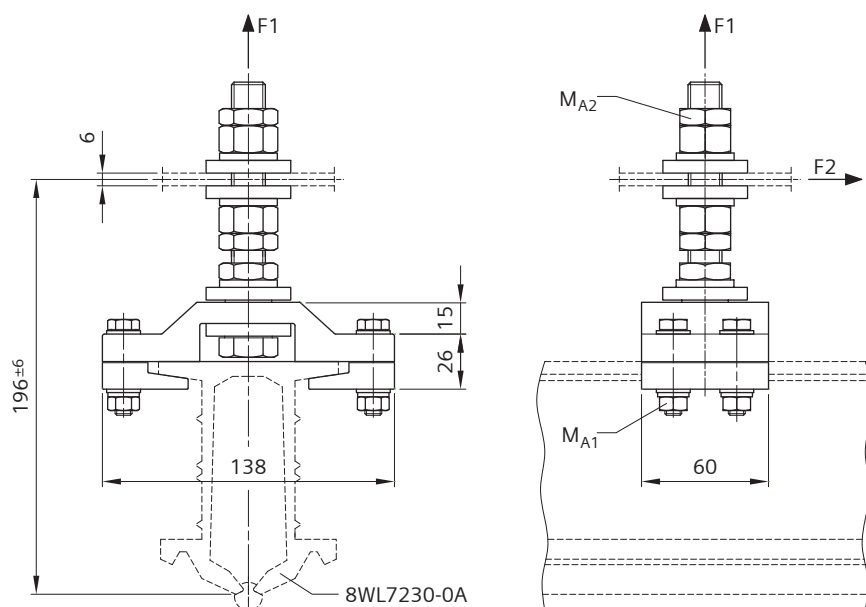
for connection of soffit conductor rail 8WL7230-0A at fixed point



Order no.	8WL7232-0
Designation	Suspension clamp, fixed
Material	
Clamp body	Al
Bolts M8, M16	stlSt
Nuts, washers	stlSt
Spring washers	stlSt
Weight	1.0 kg
Perm. operating load (F1)	5 kN
Min. failing load (F1)	15 kN
Perm. operating load (F2)	4 kN
Min. failing load (F2)	12 kN
Tightening torque M_{A1}	16 Nm
Tightening torque M_{A2}	135 Nm

Suspension clamp, pivotable

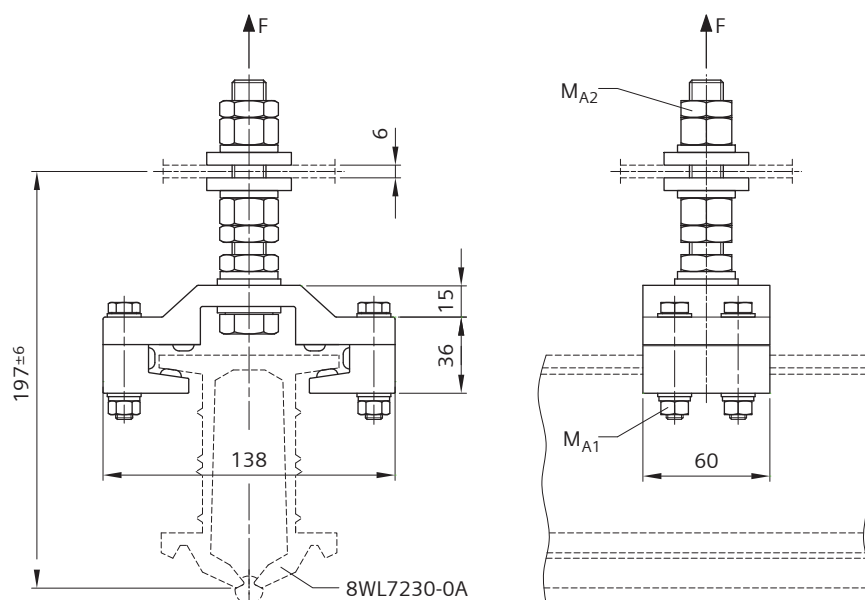
for connection of soffit conductor rail 8WL7230-0A at pivotable support



Order no.	8WL7232-3
Designation	Suspension clamp, pivotable
Material	
Clamp body	Al
Distance sleeve	stlSt
Bolts M8, M16	stlSt
Nuts, washers	stlSt
Spring washers	stlSt
Weight	1.1 kg
Perm. operating load (F1)	5 kN
Min. failing load (F1)	15 kN
Perm. operating load (F2)	4 kN
Min. failing load (F2)	12 kN
Tightening torque M_{A1}	16 Nm
Tightening torque M_{A2}	135 Nm

Suspension clamp, sliding

for connection of soffit conductor rail 8WL7230-0A at sliding support

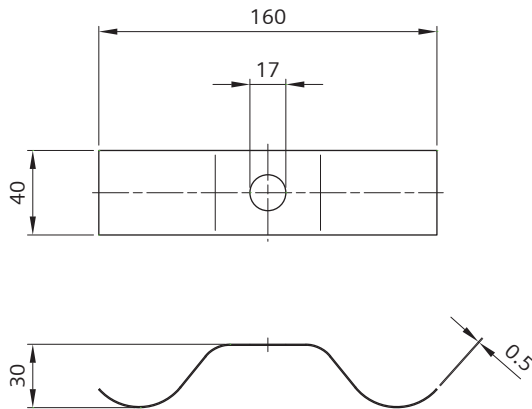


Order no.	8WL7233-0
Designation	Suspension clamp, sliding
Material	
Clamp body	Al
Sliding elements	Plastic
Bolts M8, M16	stlSt
Nuts, washers	stlSt
Spring washers	stlSt
Weight	1.08 kg
Perm. operating load	5 kN
Min. failing load	15 kN
Tightening torque M_{A1}	16 Nm
Tightening torque M_{A2}	135 Nm

At use in AC systems contact spring 8WL7233-4 must be ordered separately, see page 02-08-20.

Contact spring

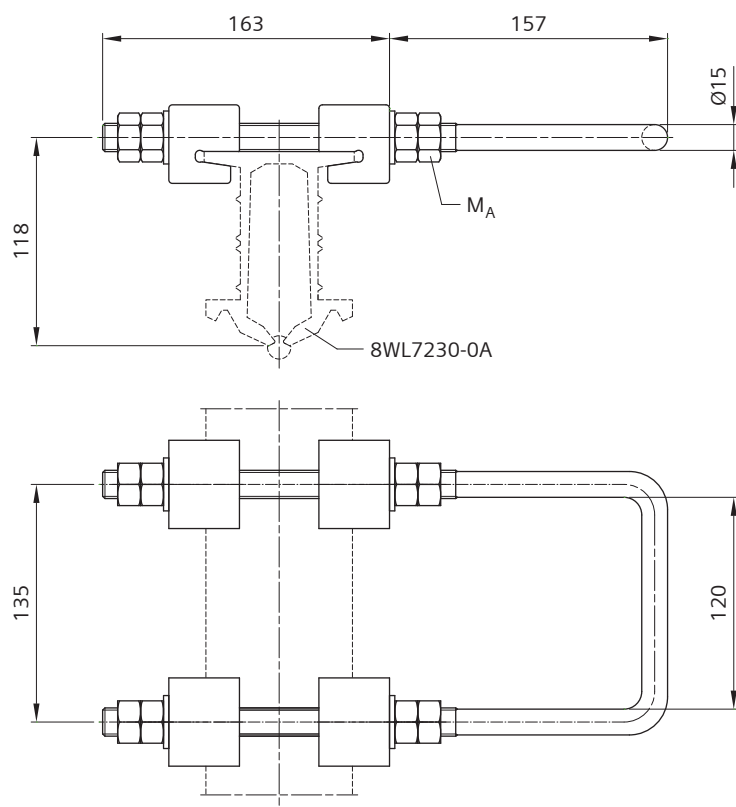
for sliding suspension clamps 8WL7233-0, as potential equalization between support and conductor rail at use in AC systems



Order no.	8WL7233-4
Designation	Contact spring
Material	Spring steel
Weight	0.03 kg

Earthing clamp

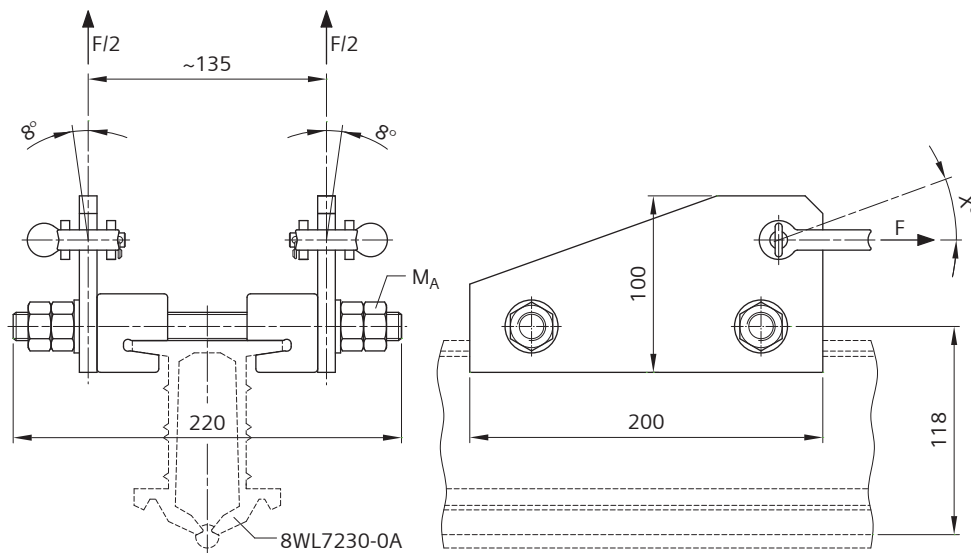
for soffit conductor rail 8WL7230-0A, for connection of earthing sticks



Order no.	8WL7234-0A
Designation	Earthing clamp
Material	
Clamping jaws	Al
U-bolt M16	stlSt
Nuts, washers	stlSt
Weight	2.32 kg
Tightening torque M_A	60 Nm
Rated short-time current	45 kA
Rated short-time duration	100 ms

Anchoring clamp

for soffit conductor rail 8WL7230-0A, for fixed termination of contact wire in transition from catenary to conductor rail

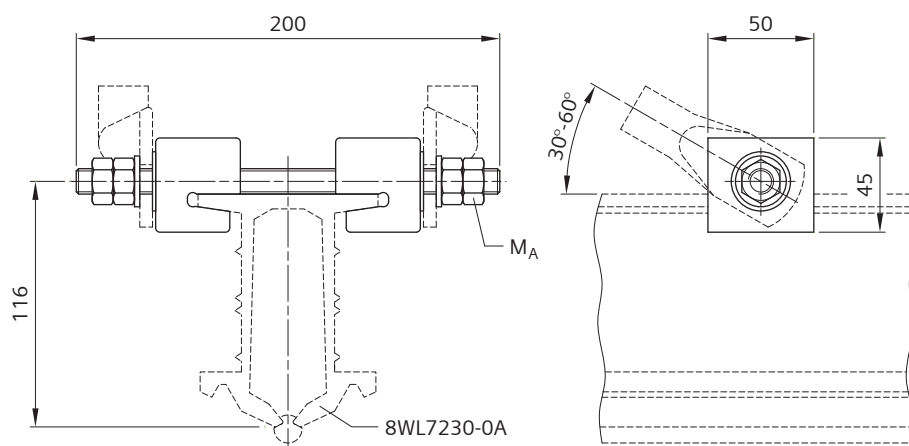


Order no.	8WL7234-3
Designation	Anchoring clamp
Material	
Clamping jaws	Al
Straps	Al
Shackles 10	stlSt
Threaded pin M16	stlSt
Nuts, washers	stlSt
Weight	2.74 kg
Perm. operating load	16 kN
Min. failing load	48 kN
Tightening torque M_A	60 Nm

Angle X has to be defined project-specifically.

Feeder clamp

for soffit conductor rail 8WL7230-0A

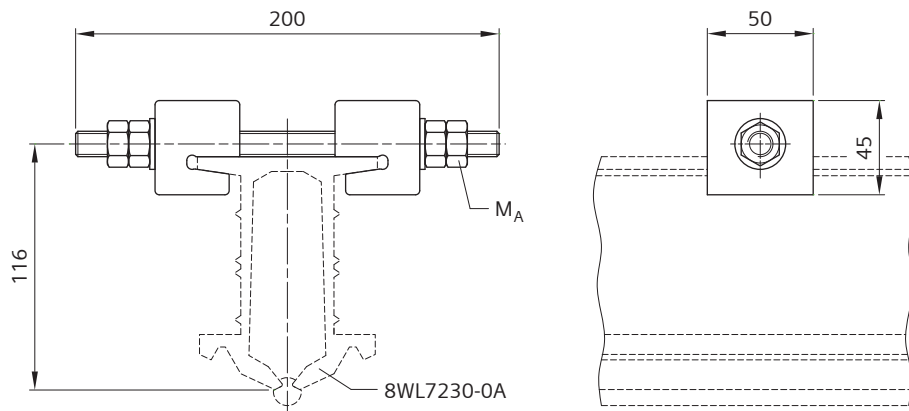


Order no.	8WL7235-0A
Designation	Feeder clamp
Material	
Clamping jaws	Al
Threaded pin M12	stlSt
Nuts, washers	stlSt
Washers	Alcu
Weight	0.64 kg
Tightening torque M_A	60 Nm
Perm. permanent current at 50 K temperature rise	2900 A
Rated short-time current	45 kA
Rated short-time duration	100 ms

Cable lugs must be ordered separately depending on wire diameter, see Chapter 02-02.

Guy clamp

for connection of soffit conductor rail 8WL7230-0A at fixed point with sliding suspension clamp 8WL7233-0

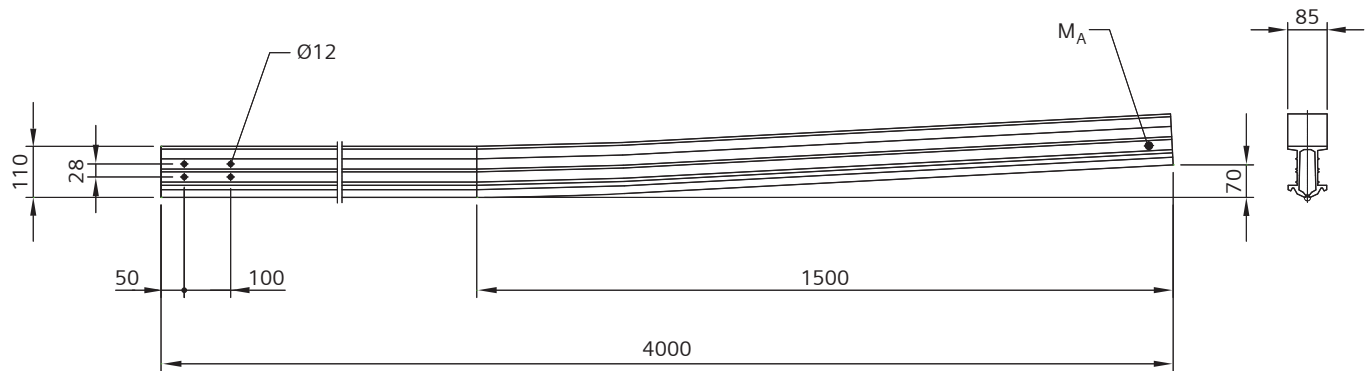


Order no.	8WL7235-0B
Designation	Guy clamp
Material	
Clamping jaws	Al
Threaded pin M12	stlSt
Nuts, washers	stlSt
Weight	0.63 kg
Tightening torque M_A	60 Nm

Mounting on the both sides of the suspension clamp.

Soffit conductor rail ramp

for section change

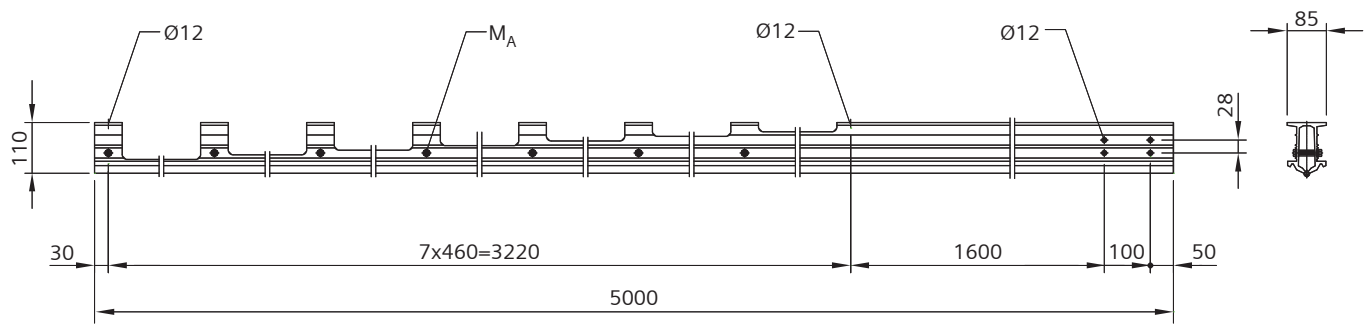


Order no.	8WL7230-1A
Designation	Soffit conductor rail ramp
Material	
Ramp	Al
Distance sleeve	stlSt
Bolt M8	stlSt
Nut, washers	stlSt
Spring washer	stlSt
Weight	24.77 kg
Tightening torque M_A	16 Nm
Nominal cross-section	2300 mm ²
Perm. permanent current at 50 K temperature rise	2900 A
Rated short-time current	45 kA
Rated short-time duration	100 ms

Drilled holes suitable for rail joint 8WL7231-0.

Transition element

for connection of soffit conductor rail on the catenary

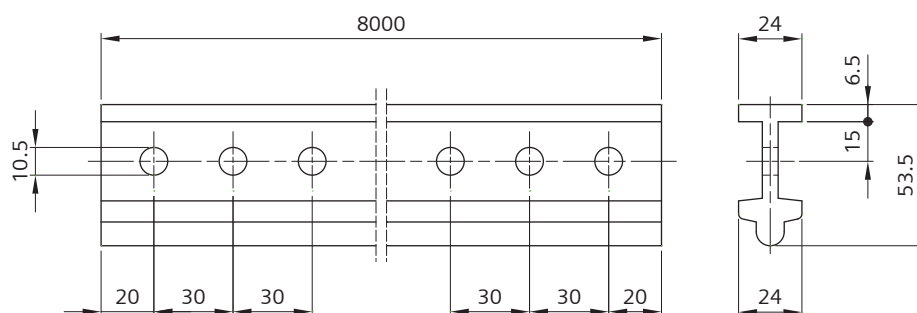


Order no.	8WL7230-2A
Designation	Transition element
Material	
Transition element	Al
Distance sleeves	stlSt
Bolts M8	stlSt
Nuts, washers	stlSt
Spring washers	stlSt
Weight	31.44 kg
Tightening torque M _A	16 Nm

Drilled holes suitable for rail joint 8WL7231-0.

Soffit conductor rail (Cu)

for overhead contact line in tunnel



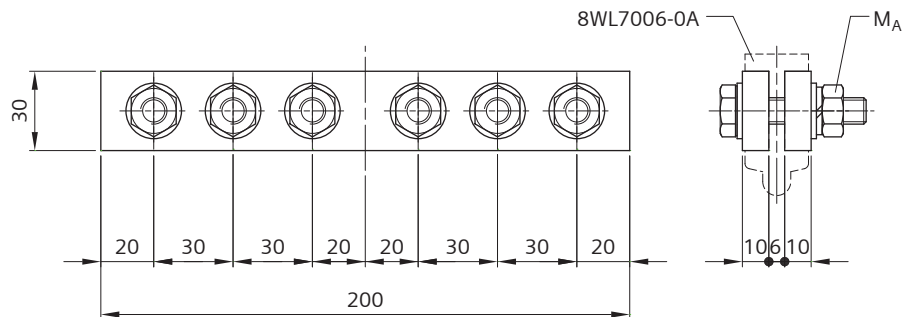
Order no.	8WL7006-0A
Designation	Soffit conductor rail 600 mm ²
Material	Cu-ETP
Weight	42.96 kg

Drilled holes suitable for rail joint 8WL7006-1ZA.

Other lengths on request.

Rail joint, bolted (Cu)

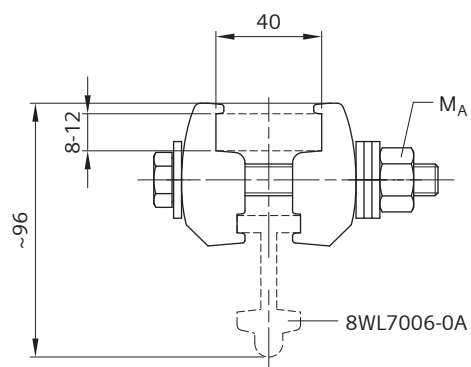
for soffit conductor rail 8WL7006-0A



Order no.	8WL7006-1ZA
Designation	Rail joint, bolted
Material	
Straps	Cu-ETP
Bolts M10	stlSt
Nuts	stlSt
Washers	stlSt
Spring washers	stlSt
Weight	1.25 kg
Tightening torque M_A	32 Nm

Feeder clamp for soffit conductor rail

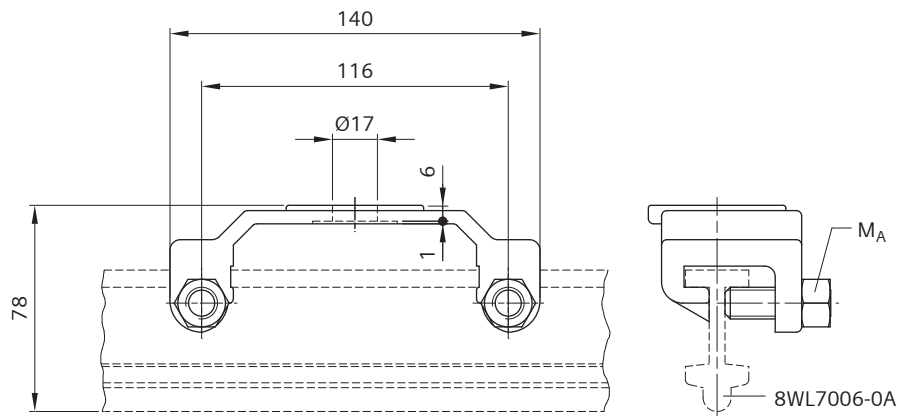
for connection of flat sections 40x8 to 40x12 mm on soffit conductor rail 8WL7006-0A



Order no.	8WL6715-0
Designation	Feeder clamp
Material	
Clamp body	Cu-ETP
Bolt M12	stlSt
Nut	stlSt
Locking washers	Spring steel
Weight	0.62 kg
Tightening torque M_A	56 Nm

Conductor rail clamp

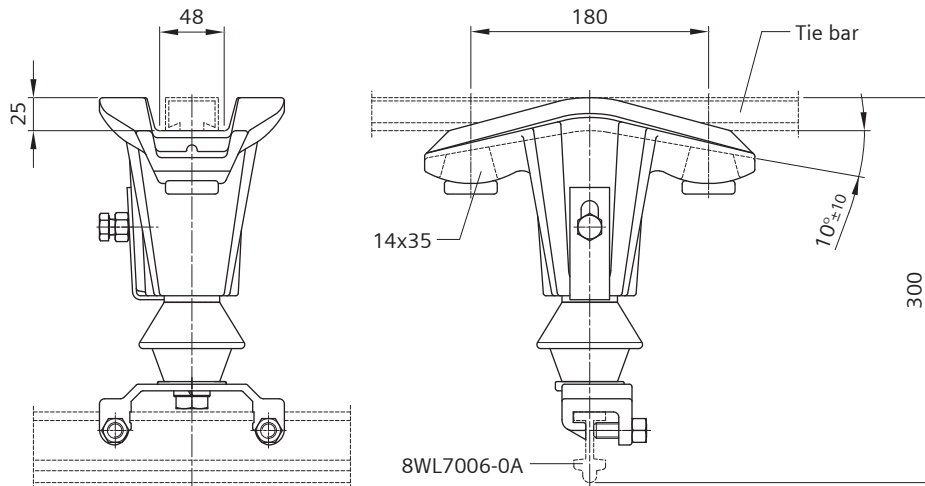
for conductor rail support on soffit conductor rail 8WL7006-0A



Order no.	8WL3582-5
Designation	Conductor rail clamp
Material	
Clamp body	CuAl
Threaded pins M12	stlSt
Nuts	stlSt
Weight	0.60 kg
Tightening torque M_A	20 Nm

Conductor rail support 1.5 kV DC

for fastening of conductor rail 8WL7006-0A on soffit, for installation heights 300 mm, for straight lines and curves, support frame adjustable up to 10°



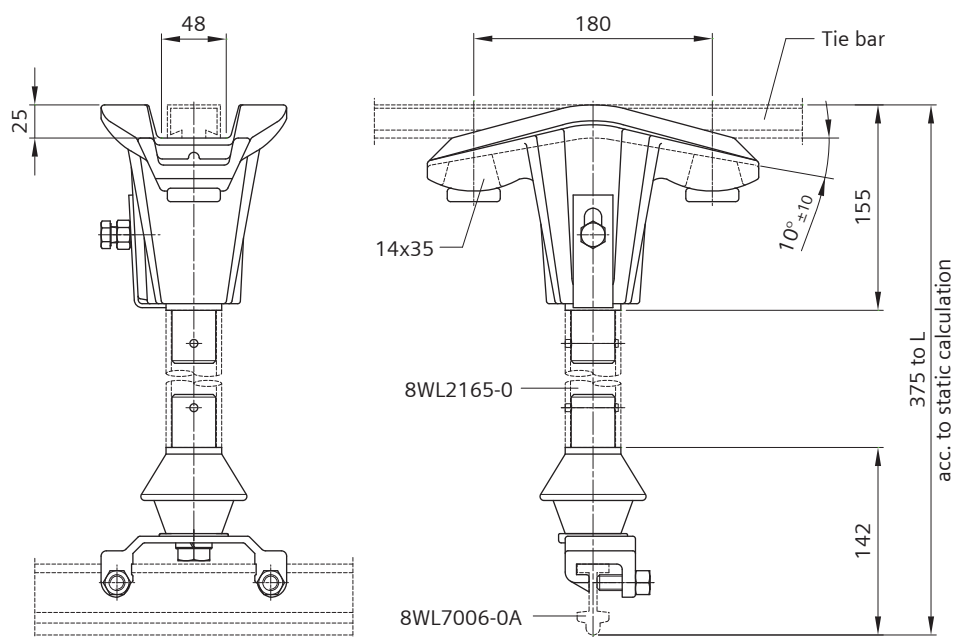
Order no.	8WL3584-6A
Designation	Conductor rail support
Material	
Support frame	ctAl
Equalizer washer	ctAl
Torsion element	stlSt, rubber
Insulator body	Cast resin, brown
Flange bushings	stlSt
Conductor rail clamp	CuAl
Bolts	stlSt
Weight	4.0 kg
Nominal voltage	1.5 kV DC
Creepage distance	75 mm

Tie bar must exist.

Fastening bolts must be ordered separately.

Conductor rail support 1.5 kV DC

for fastening of conductor rail 8WL7006-0A on soffit, for installation heights from 375 mm, for straight lines and curves, support frame adjustable up to 10°



Order no.	8WL3584-6
Designation	Conductor rail support
Material	
Support frame	ctAl
Equalizer washer	ctAl
Torsion element	stlSt, rubber
Insulator body	Cast resin, brown
Flange bushings	stlSt, Al
Conductor rail clamp	CuAl
Bolts	stlSt
Prestressed sleeves	stlSt
Weight	4.20 kg
Nominal voltage	1.5 kV DC
Creepage distance	75 mm

Tube 8WL2165-0 (42x4-Al) must be ordered separately (length as needed).

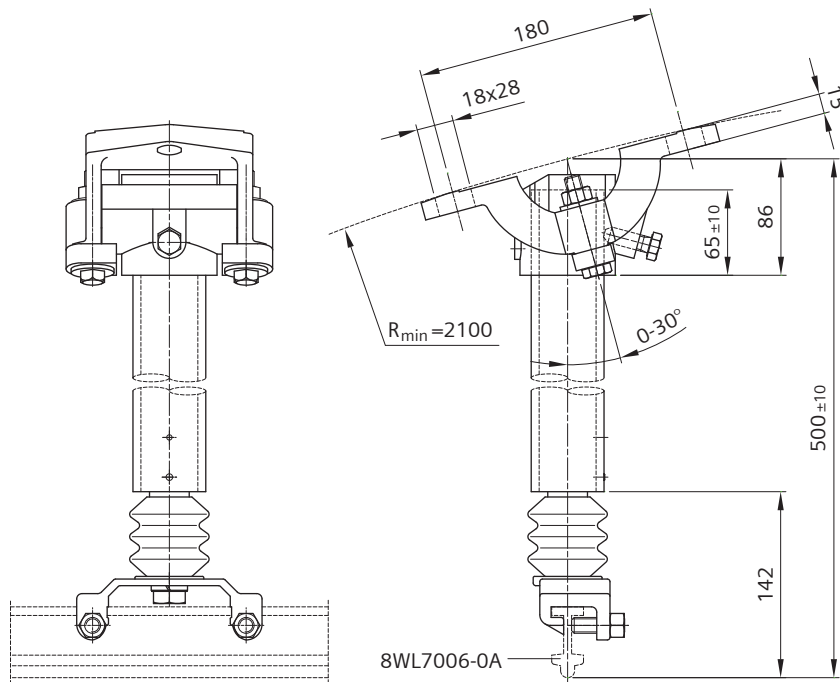
Tie bar must exist.

Fastening bolts must be ordered separately.

Types for other heights on request.

Conductor rail support 1.5 kV DC, support frame adjustable up to 30°

for fastening of conductor rail 8WL7006-0A on soffit in circular-shaped tunnel, radius of tunnel ≥ 2.10 m

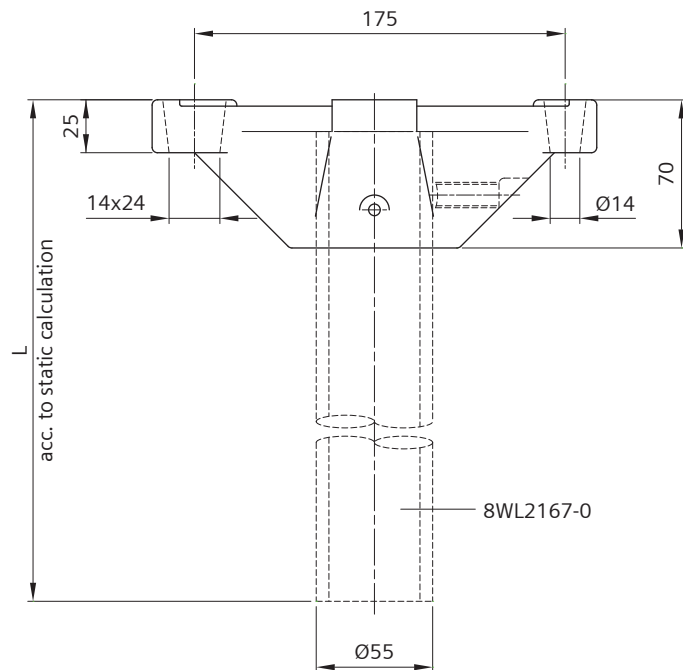


Order no.	8WL3586-5
Designation	Conductor rail support
Material	
Support frame	ctAl
Torsion element	stlSt, rubber
Insulator body	Cast resin, brown
Conductor rail clamp	CuAl
Tube 55x6	Al
Bolts, nuts	stlSt
Spring washers, washers	stlSt
Prestressed sleeves	stlSt
Weight	4.78 kg
Nominal voltage	1.5 kV DC
Creepage distance	85 mm

Other lengths on request.

Support frame

for conductor rail and elastic supports on soffit posts d=55 mm



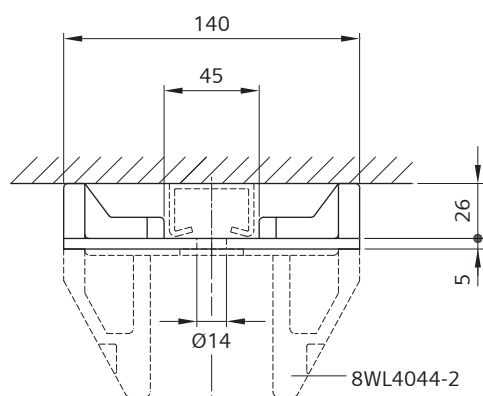
Order no.	8WL4044-2
Designation	Support frame for tube 55
Material	
Support frame	ctAl
Prestressed sleeve	stlSt
Threaded pin M12	stlSt
Weight	0.92 kg

Tube 8WL2167-0 (55x6-Al) must be ordered separately (length as needed).

Adapter for installation on tie bars see 8WL3581-1.

Adapter

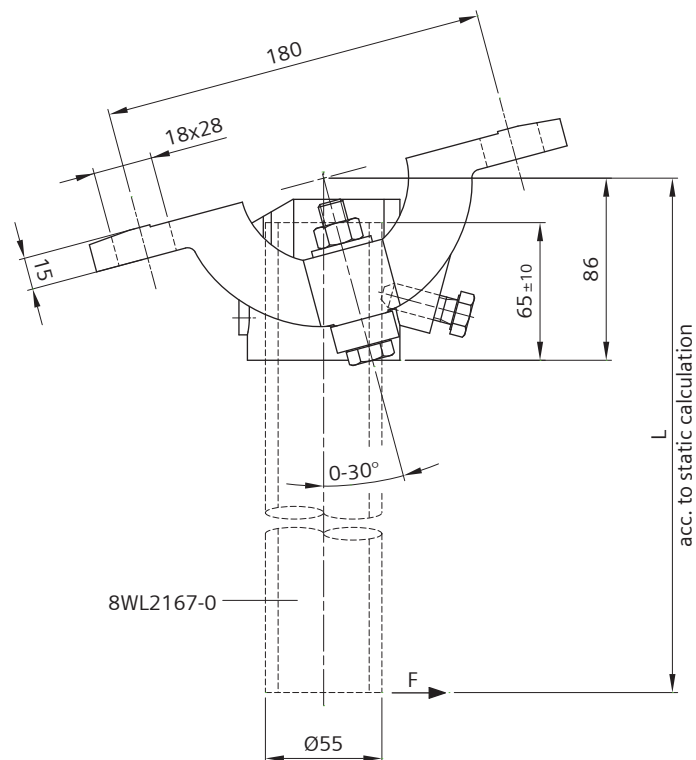
for installation of conductor rail supports on tie bars, for support frame 8WL4044-2



Order no.	8WL3581-1
Designation	Adapter
Material	ctAl
Weight	0.35 kg

Support frame, adjustable up to 30°

for conductor rail and elastic supports on soffit posts d=55 mm, for radius of tunnel ≥ 2.10 m



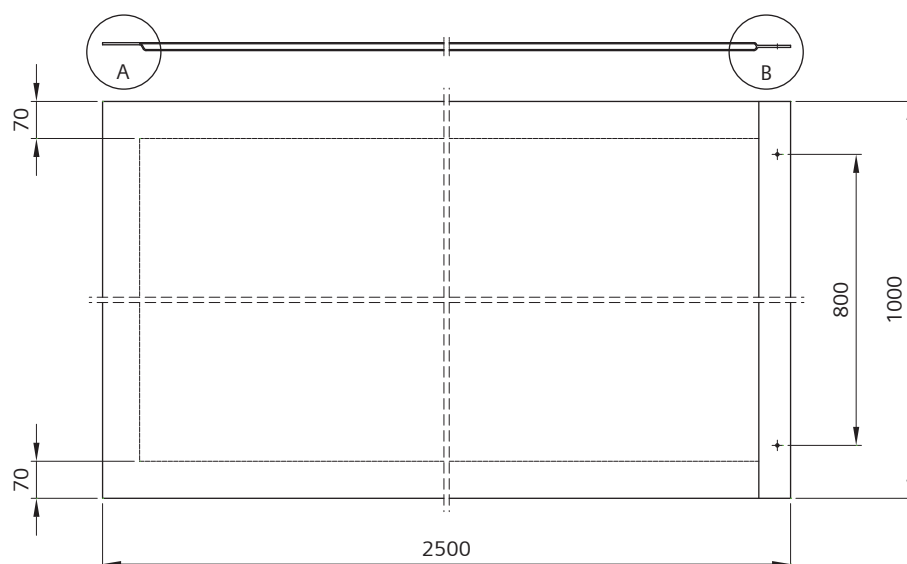
Order no.	8WL3586-0
Designation	Support frame for tube 55
Material	
Support frame	ctAl
Bolts, nuts	stlSt
Prestressed sleeve Ø6	stlSt
Weight	1.90 kg
Perm operating moment (F×L)	400 Nm

Tube 8WL2167-0 (55x6-Al) must be ordered separately (length as needed).

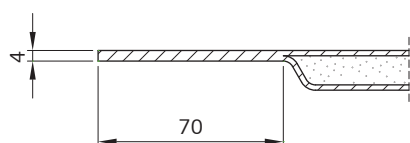
When trespassing the permissible operating moment the use of an anchoring wire is unavoidable.

Insulated plate

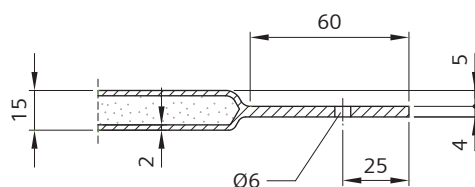
for protection under structures



Detail A



Detail B

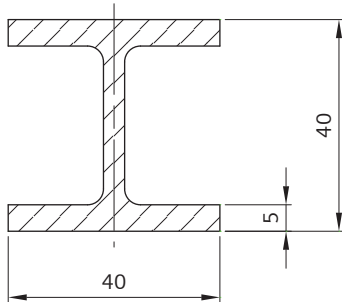


Order no.	8WL8101-1A
Designation	Insulated plate 1000 x 2500
Material	GF-UP, mat reinforced, color RAL6022 (olive drab)
Weight	14.0 kg
Nominal voltage	1.5 kV DC

Other colors on request.

I-beam

for insulated plates 8WL8101-1A

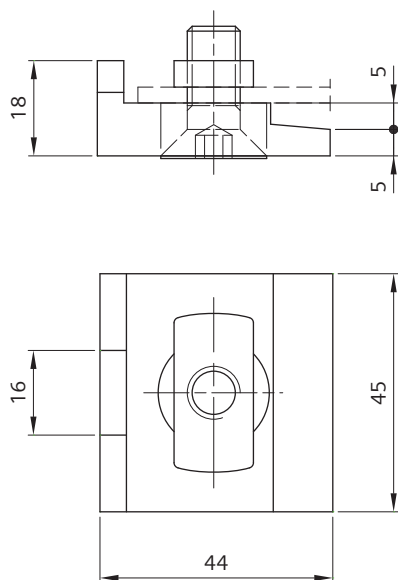


Order no.	8WL8101-4
Designation	I-beam
Material	GF-UP, color RAL6022 (olive drab)
Weight	1.15 kg/m
Max. delivery length	6.00 m
Tensile strength	> 250 N/mm ²
Bending strength, longitudinal	> 250 N/mm ²
Bending strength, transversal	> 150 N/mm ²
Elastic modulus	> 20000 N/mm ²
Water absorption	< 3 %
Tracking resistance	CTI 380

Other colors on request.

Clamping plate for I-beam

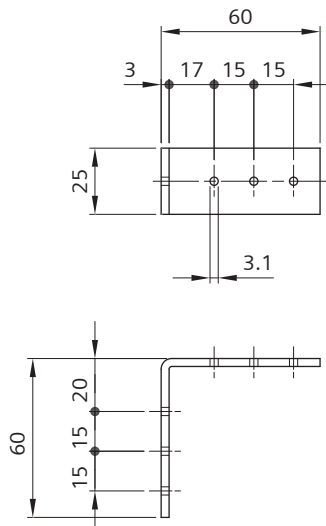
for fixing of I-beam 8WL8101-4 on tie bar 8WL8102-6



Order no.	8WL8102-7A
Designation	Clamping plate for I-beam
Material	
Clamping plate	htgSt
Threaded plate M10	stlSt
Countersunk head screw M10x25	stlSt
Weight	0.15 kg

Support angle

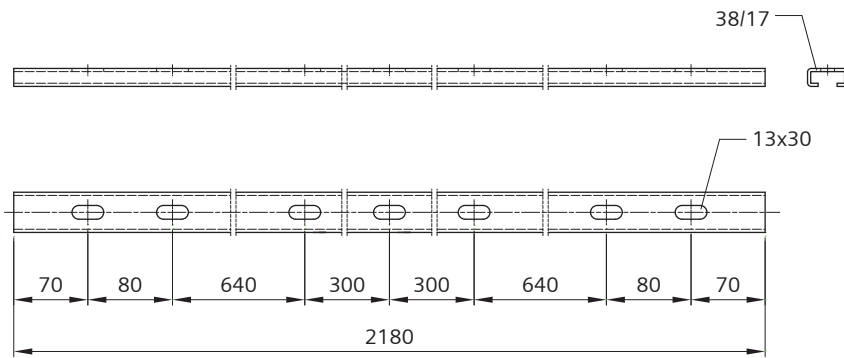
for guard plate 8WL8102-4



Order no.	8WL8102-5
Designation	Support angle
Material	stlSt
Weight	0.07 kg

Tie bar

for fixing of I-beam 8WL8101-4 onto soffit

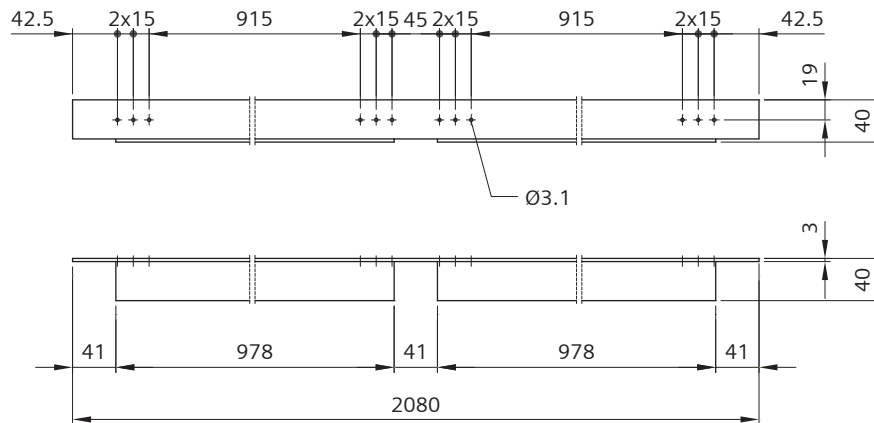


Order no.	8WL8102-6
Designation	Tie bar 38/17
Material	stlSt
Weight	4.20 kg

Other lengths and types on request.

Guard plate

as visual protection at beginning or end of bridge

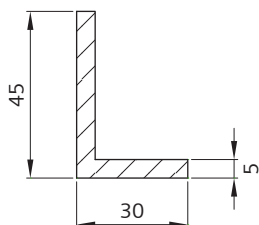


Order no.	8WL8102-4
Designation	Guard plate
Material	GRP, color RAL6022 (olive drab)
Weight	1.06 kg

Other colors on request.

L-section for guard plate

as visual protection at beginning or end of bridge



Order no.	8WL8101-3
Designation	L-section 45x30x5
Material	GF-UP, color RAL6022 (olive drab)
Weight	0.60 kg/m

Other colors on request.

Chapter 02

Standard Products

Tensioning equipment	01	01-86
Thimbles, connectors, sleeves	02	01-24
GRP cantilevers	03	01-68
Aluminium cantilevers	04	01-80
Steel cantilevers	05	01-42
Headspan supports	06	01-36
Insulators	07	01-34
Contact lines under structures and bridge protection	08	01-42
Clamps	09	01-84
Tension wheel equipment	10	01-48
Section insulators	11	01-34
Disconnectors and drive mechanism	12	01-62
Earthing and protecting equipment	13	01-14
Contact wires, conductors, span wires	14	01-22
Monitoring systems	15	01-06
Installation tools and equipment	16	01-24

Bridle suspension dead-end clamp, left-hand	02-09-81
Bridle suspension dead-end clamp, right-hand	02-09-82
Clamp holder for wire	02-09-21
Clip	02-09-70
Compression conductor clamp	02-09-38
Conductor clamp	02-09-42
Conductor crossing clamp	02-09-07
Connection clamp	02-09-09, 02-09-10
Contact wire clip 16R	02-09-13
Contact wire clip 16R with U-pin	02-09-14, 02-09-15
Contact wire clip for wire crossing	02-09-22
Contact wire clip M16-5/8"	02-09-16
Contact wire connection clamp	02-09-31
Contact wire connection clamp 1.5	02-09-34
Contact wire connection clamp 1.5 with two bolts	02-09-35
Contact wire connection clamp 13.5	02-09-36
Contact wire connection clamp for three contact wires	02-09-37
Contact wire connection clamp with two bolts	02-09-32
Contact wire connection clamp with two bolts for three contact wires	02-09-33
Contact wire splice with six bolts	02-09-25
Contact wire splice, adjustable	02-09-23
Contact wire splice, bolted	02-09-24, 02-09-26
Crossing clamp, adjustable	02-09-05
Crossing clamp, fixed	02-09-06
Double U-clamp	02-09-08
Dropper clip	02-09-68, 02-09-69, 02-09-71, 02-09-72, 02-09-73
Dropper clip 25	02-09-67
Dropper clip 50	02-09-66
Dropper clip for twin catenary wire	02-09-63
Dropper clip with hoop	02-09-76
Feeder and dropper clamp	02-09-48, 02-09-49
Feeder clamp	02-09-43, 02-09-44, 02-09-45, 02-09-46
Feeder compression clamp	02-09-39, 02-09-40
Feeder line and earth wire support clamp	02-09-79
Groove clamp	02-09-74
Guide clamp	02-09-80
Guy clamp	02-09-83
Guy clamp contact wire - catenary wire	02-09-27
Overhead line crossing	02-09-77, 02-09-78
Parallel groove clamp	02-09-41
Parallel groove clamp (DIN 48075)	02-09-57
Parallel groove clamp 22	02-09-28
Parallel groove clamp 34	02-09-30
Parallel groove clamp 35	02-09-29
Plate	02-09-55
Pull-off clamp for stranded wires	02-09-20

Sliding dropper clip	02-09-75
Sliding dropper clip for catenary wire	02-09-65
Sliding dropper clip for twin catenary wire	02-09-64
Stitch wire clamp	02-09-11
Suspension clamp	02-09-59
Suspension clamp with straps	02-09-58
T-connection clamp	02-09-56
T-flat connection clamp	02-09-54
Twin contact wire clip 16R	02-09-17
Twin contact wire clip 16R with U-pin	02-09-18
Twin contact wire clip M16-5/8"	02-09-19
Twin dropper clip	02-09-61, 02-09-62
U-clamp (DIN 1142)	02-09-12
Universal dropper clip	02-09-50, 02-09-51, 02-09-52, 02-09-53
Universal parallel groove clamp	02-09-47
Wedge-type tension clamp	02-09-60
Wire clip	02-09-84

Technical comments

Application

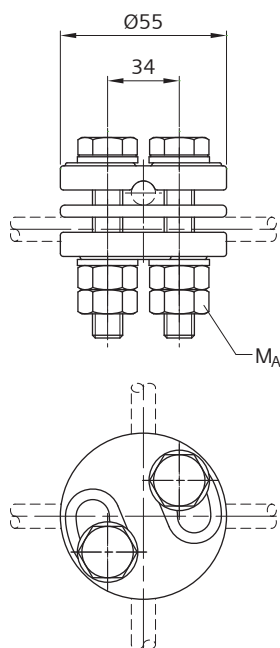
Clamps are generally used to establish a structural connection between components as well as ensure mechanical and electrical connections in trolley-type contact lines, in the longitudinal catenary system and within the cross-span equipment.

Types

- Bridle suspension dead-end clamps
- Clip holder
- Compression conductor clamps
- Connection clamps
- Contact wire clips
- Contact wire connection clamps
- Contact wire splices
- Crossing clamps
- Double U-clamps
- Dropper clips
- Feeder clamps
- Parallel groove clamps
- Sliding dropper clips
- Stitch wire clamps
- Suspension clamps
- U-clamps

Crossing clamp, adjustable

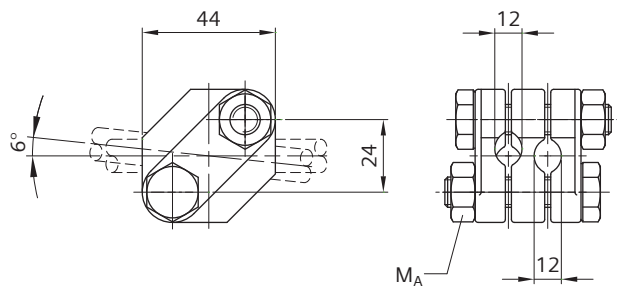
for span guy arrangements, for wires up to 50 mm² acc. to DIN 48201



Order no.	8WL4500-0
Designation	Crossing clamp, adjustable
Material	
Clamping plates	CuZn
Bolts M10	stlSt
Nuts, washers	stlSt
Weight	0.46 kg
Tightening torque M_A	32 Nm

Crossing clamp, fixed

for acute-angled and right-angled crossings of catenary wires and earthing of cross-span wires, for wires up to 70 mm² acc. to DIN 48201

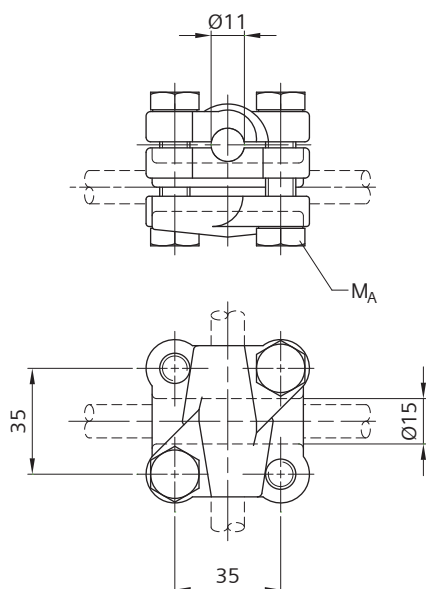


Order no.	8WL4501-0
Designation	Crossing clamp, fixed
Material	
Clamping jaws	CuNiSi
Bolts M10	stlSt
Nuts	stlSt
Weight	0.40 kg
Tightening torque M_A	32 Nm

For wire cross-sections < 50 mm² protection sleeves must be ordered separately, see Chapter 02-02.

Conductor crossing clamp

for crossing of catenary wires 50, 70 and 95 mm² acc. to DIN 48201

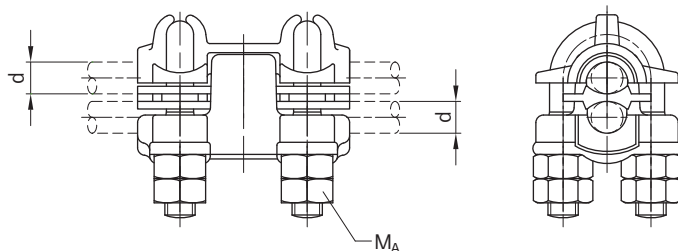


Order no.	8WL4502-0
Designation	Conductor crossing clamp 50-95
Material	
Clamping jaws	CuNiSi
Bolts M10	stlSt
Weight	0.54 kg
Tightening torque M_A	32 Nm

For wire cross-sections < 50 mm² protection sleeves must be ordered separately, see Chapter 02-02.

Double U-clamp

for mechanically high-tensile and current-carrying wire connections, for wires acc. to DIN 48201

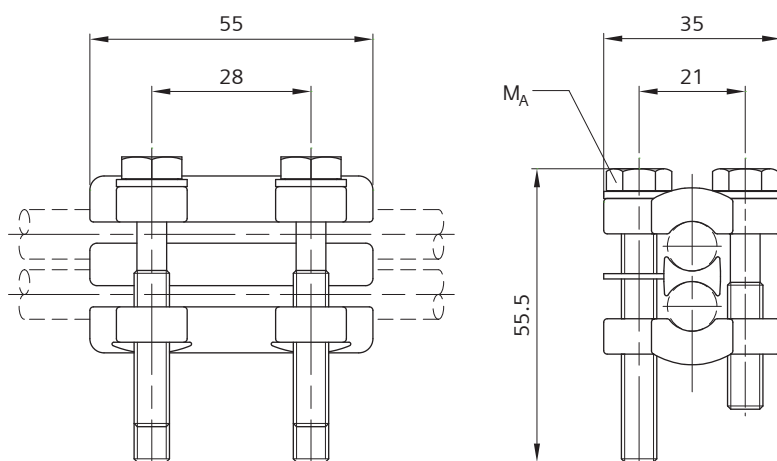


Order no.	8WL4505-0	8WL4505-1	8WL4505-2	8WL4505-3
Designation	Double U-clamp 16-25	Double U-clamp 35-50	Double U-clamp 70-95	Double U-clamp 120-150
Material				
Clamp body	CuSn	CuSn	CuSn	CuSn
U-bolts M6	stlSt	-	-	-
U-bolts M8	-	stlSt	-	-
U-bolts M10	-	-	stlSt	-
U-bolts M12	-	-	-	stlSt
Nuts	stlSt	stlSt	stlSt	stlSt
for wire	16 - 25 mm ²	35 - 50 mm ²	70 - 95 mm ²	120 - 150 mm ²
Weight	0.14 kg	0.28 kg	0.58 kg	1.02 kg
Tightening torque M_A	6.5 Nm	16 Nm	32 Nm	56 Nm
d	5.1 - 6.3 mm	7.5 - 9.0 mm	10.4 - 12.5 mm	14.0 - 15.8 mm

The clamp supports the wires given with least 85 % of their rated failing load.

Connection clamp

mechanically high-tensile for bronze and copper wires acc. to DIN 48201 in the following wire connections:
 25 mm² with 25 to 70 mm², 35 mm² with 35 to 70 mm², 50 mm² with 50 to 70 mm² and 70 mm² with 70 mm²



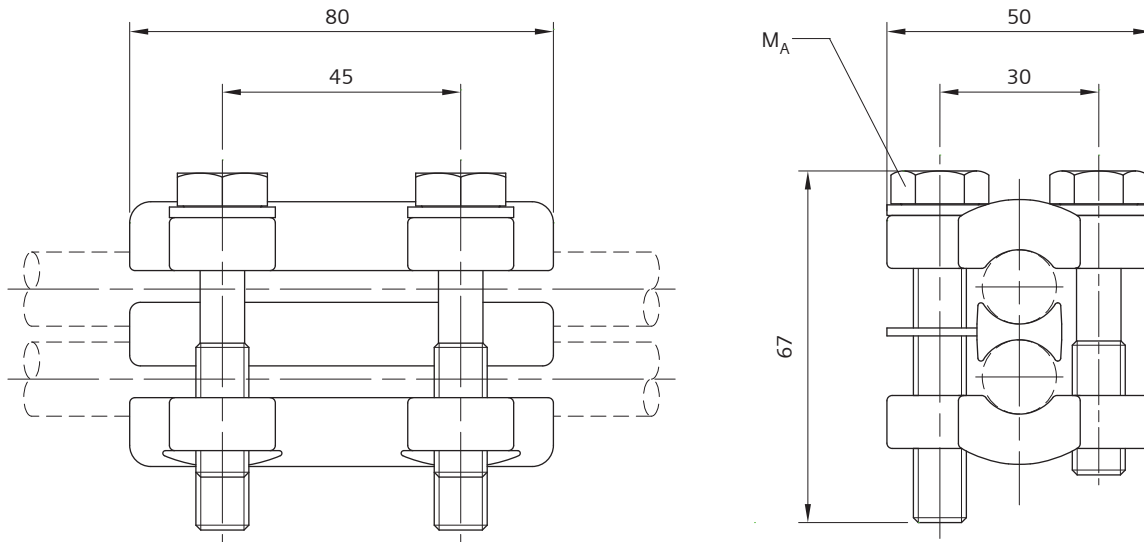
Order no.	8WL4505-5
Designation	Connection clamp 25-70
Material	
Clamp body	CuNiSi
Bolts M8	stlSt
Washers	Cu
Weight	0.28 kg
Tightening torque M_A	23 Nm

The clamp supports the wires given with at least 85 % of their rated failing load.

Two clamps must be used for connection of two bronze wires 70 mm².

Connection clamp

mechanically high-tensile for bronze and copper wires acc. to DIN 48201 in the following wire connections:
70 mm² with 70 to 150 mm² and 95 mm² with 95 to 150 mm²



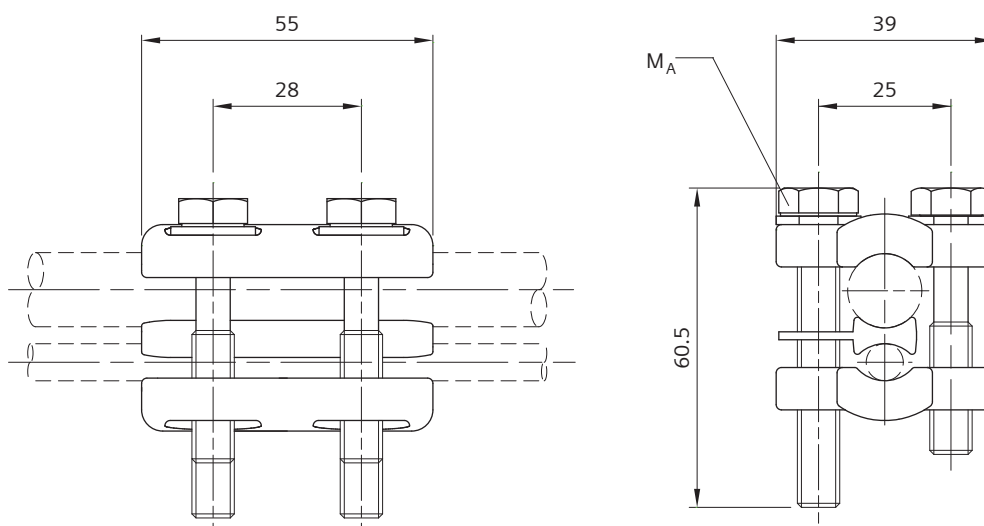
Order no.	8WL4505-6
Designation	Connection clamp 70-150
Material	
Clamp body	CuNiSi
Bolts M10	stlSt
Washers	Cu
Weight	0.67 kg
Tightening torque M_A	46 Nm

The clamp supports the wires given with at least 85 % of their rated failing load.

Two clamps must be used for wire connections 120 mm² with 120 to 150 mm² and 150 mm² with 150 mm².

Stitch wire clamp

mechanically high-tensile for bronze and copper wires acc. to DIN 48201 in the following wire connections:
25 and 35 mm² with 35 to 150 mm² and 50 mm² with 50 to 150 mm²



Order no.	8WL4505-7
Designation	Stitch wire clamp 25-50/35-150
Material	
Clamp body	CuNiSi
Bolts M8	stlSt
Washers	Cu
Weight	0.31 kg
Tightening torque M_A	23 Nm

The clamp supports the wires given with at least 85 % of their rated failing load.

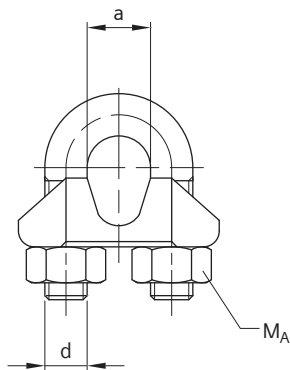
Connection clamp 8WL4505-6 must be used for other wire connections.

Installation note:

The centre piece must not contact the clamping parts. The upper and lower clamping parts must be tightened parallel.

U-clamp (DIN 1142)

for stranded or single wire connections under low tensile loads, for bronze/copper wires acc. to DIN 48201

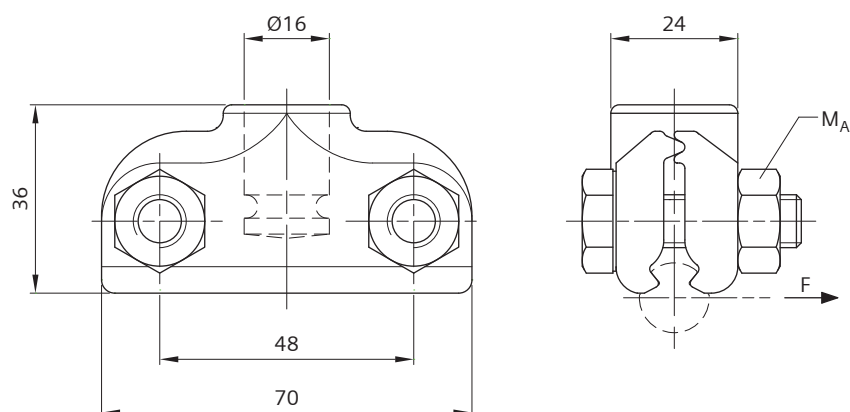


Order no.	8WL4507-0	8WL4507-1	8WL4507-3
Designation	U-clamp 8	U-clamp 10	U-clamp 13
Material			
Clamp body	Malleable cast iron, galvanic galv.	Malleable cast iron, galvanic galv.	Malleable cast iron, galvanic galv.
U-bolt M8	Steel, galvanic galv.	Steel, galvanic galv.	-
U-bolt M12	-	-	Steel, galvanic galv.
Nuts	Steel, galvanic galv.	Steel, galvanic galv.	Steel, galvanic galv.
for wire	35 mm ²	50 mm ²	95 mm ²
Weight	0.08 kg	0.10 kg	0.24 kg
Tightening torque M_A	6 Nm	9 Nm	33 Nm
a	10 mm	12 mm	15 mm
d	M8	M8	M12

If wire connections are subjected to heavy loads, other clamps must be used, e. g. the double U-clamp 8WL4505-0 to 3.

Contact wire clip 16R

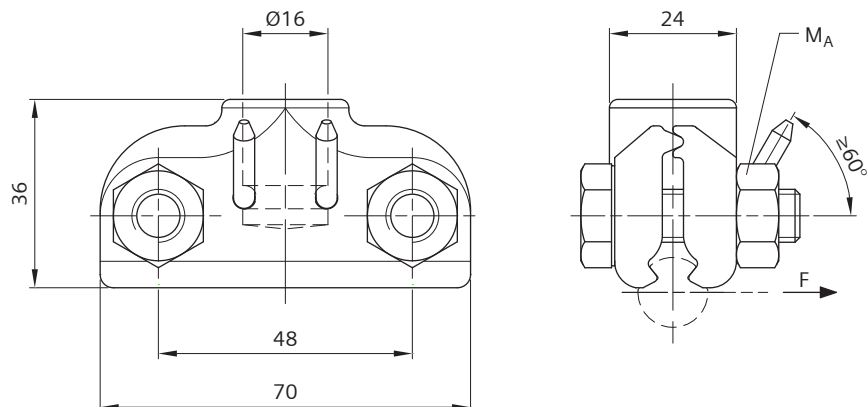
for contact wires AC-80 to AC-150 acc. to EN 50149, for grooved stud installation without U-pin



Order no.	8WL4517-1K
Designation	Contact wire clip 16R
Material	
Clamp body	CuAl
Bolts M10	stlSt
Nuts	stlSt
Weight	0.30 kg
Perm. operating load	2.5 kN
Min. failing load	7.5 kN
Tightening torque M_A	32 Nm

Contact wire clip 16R with U-pin

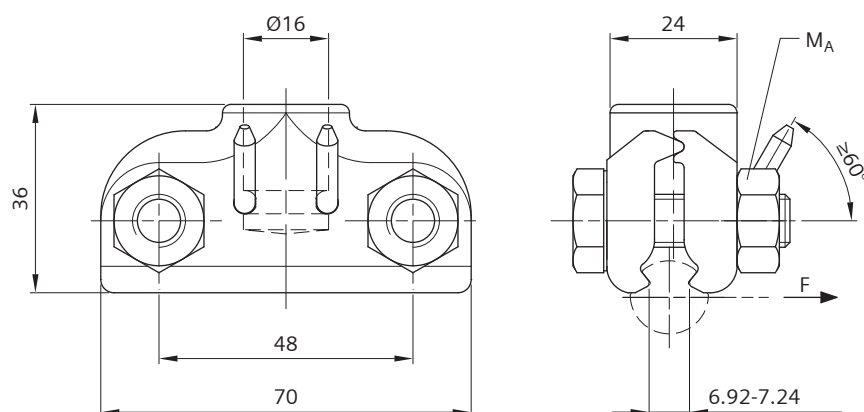
for contact wires AC-80 to AC-150 acc. to EN 50149, for grooved stud installation with U-pin



Order no.	8WL4517-1L
Designation	Contact wire clip 16R with U-pin
Material	
Clamp body	CuAl
U-pin	Cu
Bolts M10	stlSt
Nuts	stlSt
Weight	0.30 kg
Perm. operating load	2.5 kN
Min. failing load	7.5 kN
Tightening torque M_A	32 Nm

Contact wire clip 16R with U-pin

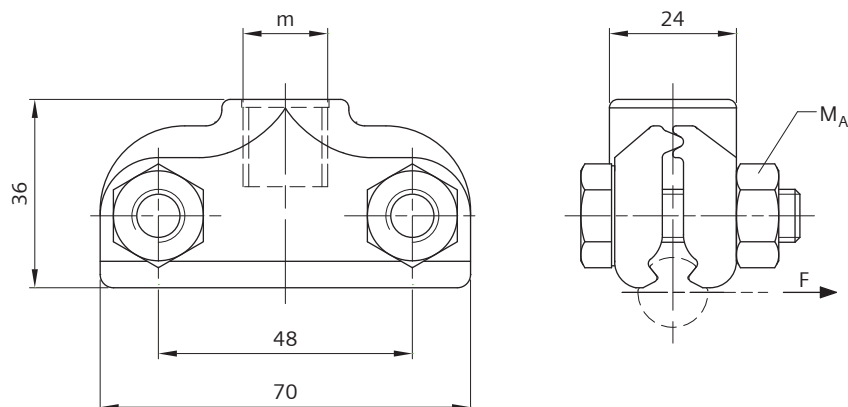
for contact wires BC/BF-100 to BC/BF-150 acc. to EN 50149 and CTHA-85/-120 made in China,
for grooved stud installation with U-pin



Order no.	8WL4517-1E
Designation	Contact wire clip 16R with U-pin
Material	
Clamp body	CuAl
U-pin	Cu
Bolts M10	stlSt
Nuts	stlSt
Weight	0.30 kg
Perm. operating load	2.5 kN
Min. failing load	7.5 kN
Tightening torque M_A	32 Nm

Contact wire clip M16-5/8"

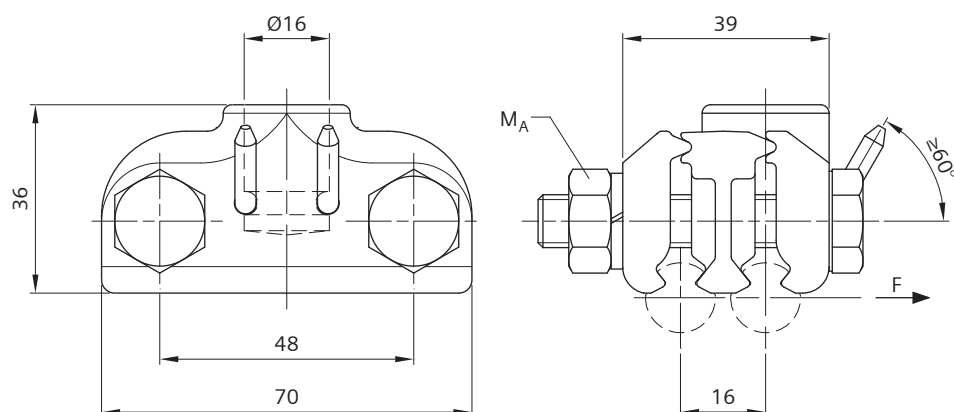
for contact wires AC-80 to AC-150 acc. to EN 50149



Order no.	8WL4517-1M	8WL4517-1N
Designation	Contact wire clip M16	Contact wire clip 5/8"
Material		
Clamp body	CuAl	CuAl
Bolts M10	stlSt	stlSt
Nuts	stlSt	stlSt
Weight	0.29 kg	0.29 kg
Perm. operating load	2.5 kN	2.5 kN
Min. failing load	7.5 kN	7.5 kN
Tightening torque M_A	32 Nm	32 Nm
m	M16	5/8"

Twin contact wire clip 16R

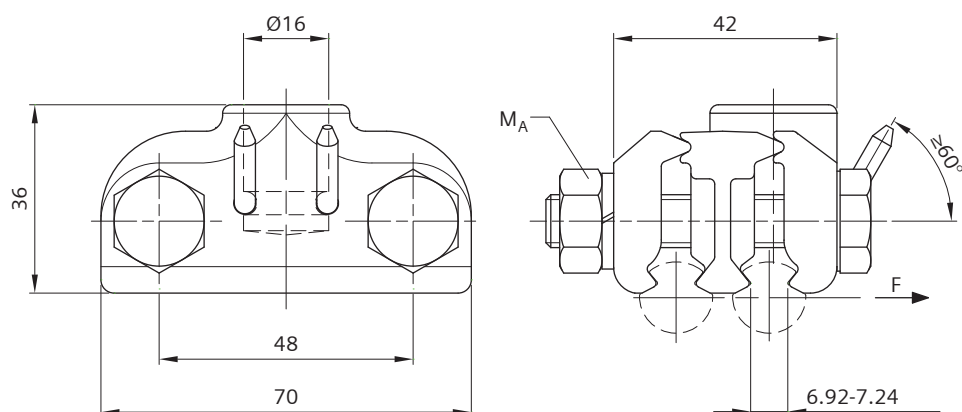
for contact wires AC-80 to AC-150 acc. to EN 50149, for grooved stud installation with U-pin



Order no.	8WL4517-2B
Designation	Twin contact wire clip 16R with U-pin
Material	
Clamp body	CuAl
U-pin	Cu
Bolts M10	stlSt
Nuts	stlSt
Spring washers	stlSt
Weight	0.40 kg
Perm. operating load	2.5 kN
Min. failing load	7.5 kN
Tightening torque M_A	32 Nm

Twin contact wire clip 16R with U-pin

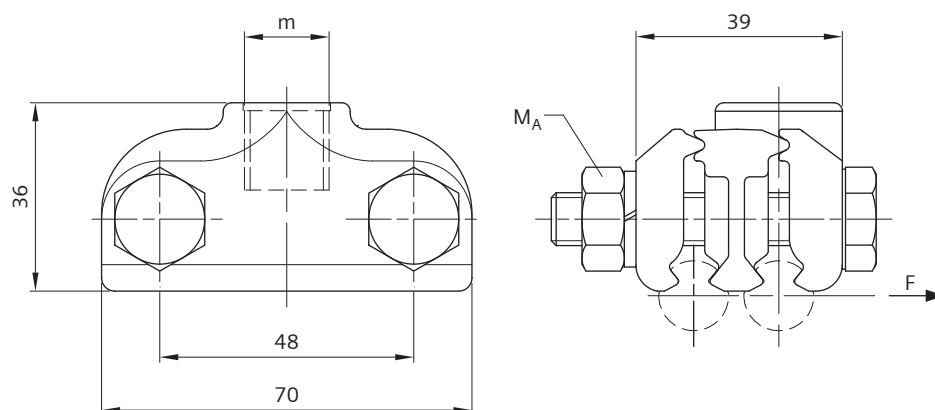
for contact wires BC/BF-100 to BC/BF-150 acc. to EN 50149 and CTHA-85/-120 made in China, for grooved stud installation with U-pin



Order no.	8WL4517-2E
Designation	Twin contact wire clip 16R with U-pin
Material	
Clamp body	CuAl
U-pin	Cu
Bolts M10	stlSt
Nuts	stlSt
Spring washers	stlSt
Weight	0.40 kg
Perm. operating load	2.5 kN
Min. failing load	7.5 kN
Tightening torque M_A	32 Nm

Twin contact wire clip M16-5/8"

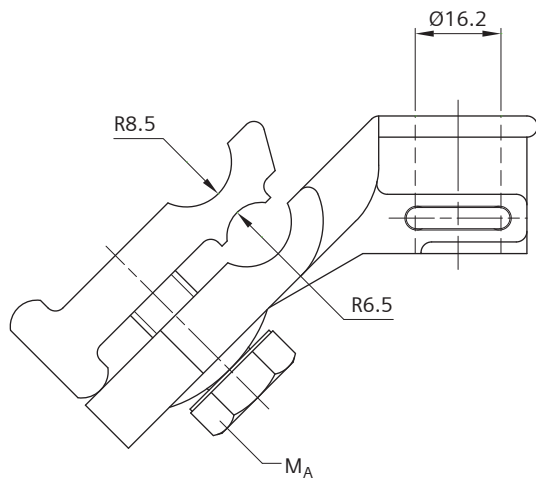
for contact wires AC-80 to AC-150 acc. to EN 50149



Order no.	8WL4517-2C	8WL4517-2D
Designation	Twin contact wire clip M16	Twin contact wire clip 5/8"
Material		
Clamp body	CuAl	CuAl
Bolts M10	stlSt	stlSt
Nuts	stlSt	stlSt
Spring washers	stlSt	stlSt
Weight	0.39 kg	0.39 kg
Perm. operating load	2.5 kN	2.5 kN
Min. failing load	7.5 kN	7.5 kN
Tightening torque M_A	32 Nm	32 Nm
m	M16	5/8"

Pull-off clamp for stranded wires

for clamp holders with grooved stud, for wires 50 to 150 mm² acc. to DIN 48201



Order no.	8WL4524-0
Designation	Pull-off clamp 50-150
Material	
Clamp body	CuSn
Bolt M12	stlSt
U-pin	Cu
Weight	0.75 kg
Tightening torque M_A	56 Nm

The clamp discription corresponds with the delivery state.

The clamp cover must be turned for 120 and 150 mm² wires.

Protection sleeves must be ordered separately, see page QUERVERWEIS-NICHT-GEFUNDEN:

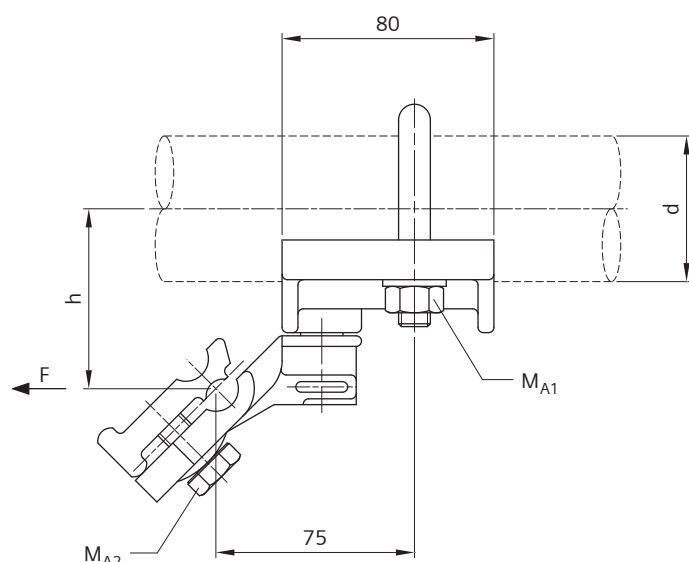
8WL1602-0 for wire 50 mm²

8WL1603-2 for wire 70 mm²

8WL1606-0 for wire 120 mm²

Clamp holder for wire

for wire fixing at aluminium tubes $d=42$ or 55 mm without the vertical load capacity, for wires 50 to 150 mm² acc. to DIN 48201



Order no.	8WL4524-1A	8WL4524-1B
Designation	Clamp holder 42 for wire	Clamp holder 55 for wire
Material		
Clamp holder	ctAl	ctAl
Pull-off clamp	CuSn	CuSn
U-bolt M12	stlSt	stlSt
Bolt M12	stlSt	stlSt
Nuts, washers	stlSt	stlSt
U-pin	Cu	Cu
Weight	0.93 kg	0.95 kg
Perm. operating load	2.5 kN	2.5 kN
Min. failing load	7.5 kN	7.5 kN
Tightening torque M_{A1}	35 Nm	35 Nm
Tightening torque M_{A2}	56 Nm	56 Nm
d	42 mm	55 mm
h	~59 mm	~68 mm

The pull-off clamp description corresponds with the delivery state.

The clamp cover must be turned for 120 and 150 mm² wires.

Protection sleeves must be ordered separately, see page 02-02-20:

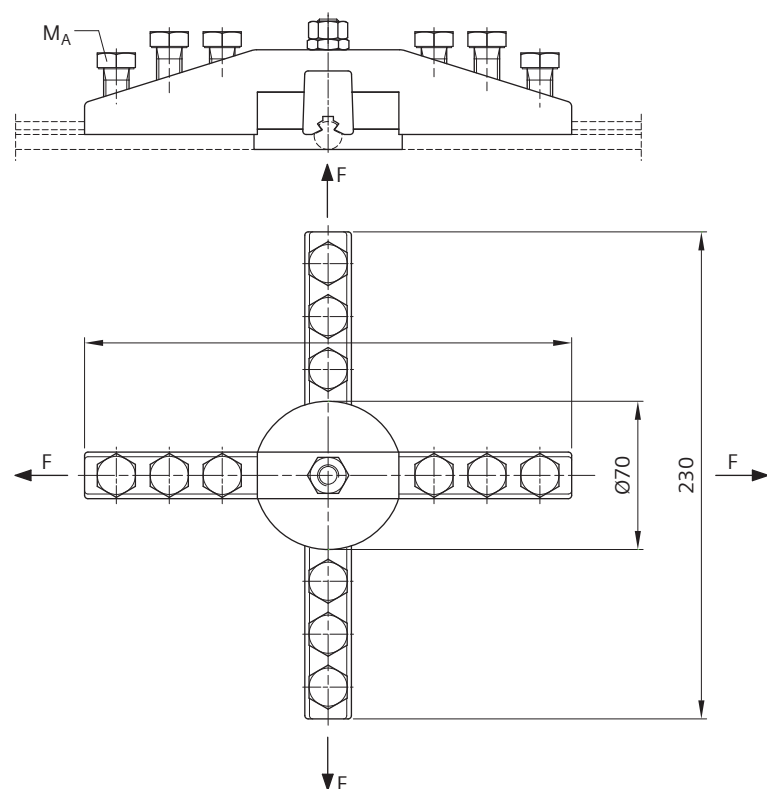
8WL1602-0 for wire 50 mm²,

8WL1603-2 for wire 70 mm²,

8WL1606-0 for wire 120 mm²

Contact wire clip for wire crossing

for connection of contact wires at crossings, for contact wire AC-100 or AC-120 acc. to EN 50149

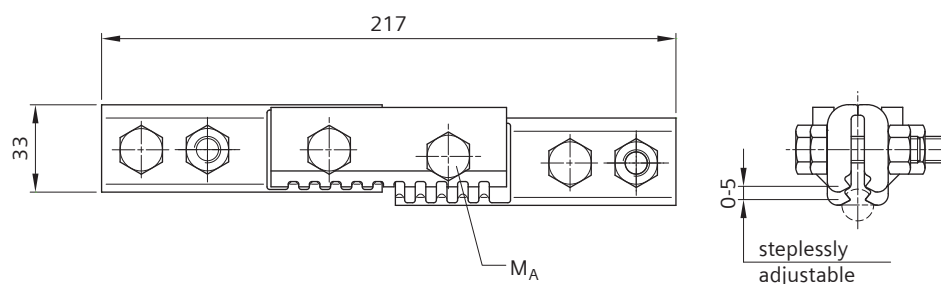


Order no.	8WL4530-5	8WL4530-5A
Designation	Contact wire clip for wire crossing for contact wire AC-120	Contact wire clip for wire crossing for contact wire AC-100
Material		
Clamp body	CuAl	CuAl
Washer Ø70	Cu	Cu
Cup-point screws M12	stlSt	stlSt
Bolt M10, nuts	stlSt	stlSt
Weight	2.60 kg	2.48 kg
Perm. operating load	8 kN	8 kN
Min. failing load	24 kN	24 kN
Tightening torque M_A	1 turning after contacting contact wire	1 turning after contacting contact wire

Not to be used in wheel-tensioned contact lines.

Contact wire splice, adjustable

for contact wires AC-80 to AC-150 made of Cu-ETP or CuAg0.1 acc. to EN 50149

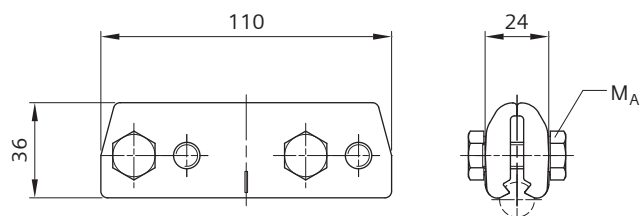


Order no.	8WL4532-5
Designation	Contact wire splice
Material	
Clamp body	CuNiSi
Bolts M10	stlSt
Nuts	stlSt
Weight	1.35 kg
Tightening torque M_A	50 Nm (the bolts are fastened in sequence starting near the joint and working outwards)

The clamp supports the contact wires given with at least 85 % of their rated failing load.

Contact wire splice, bolted

for high-tensile connection of contact wires AC-80 to AC-120 made of Cu-ETP or CuAg0.1 acc. to EN 50149

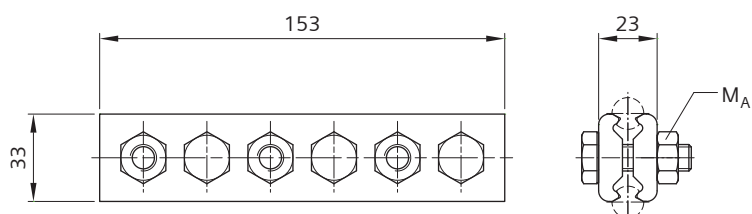


Order no.	8WL4533-1
Designation	Contact wire splice
Material	
Clamp body	CuNiSi
Bolts M10	stlSt
Weight	0.64 kg
Tightening torque M_A	50 Nm (the bolts are fastened in sequence starting near the joint and working outwards)

The clamp supports the contact wires given with at least 85 % of their rated failing load.

Contact wire splice with six bolts

for high-tensile connection of contact wires AC-80 to 150 and BC/BF-100 to 150 made of Cu-ETP or CuAg0.1 acc. to EN 50149

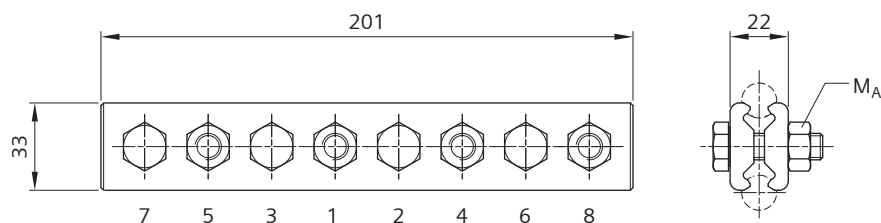


Order no.	8WL4534-0
Designation	Contact wire splice with 6 bolts
Material	
Clamp body	CuNiSi
Bolts M10	stlSt
Nuts	stlSt
Weight	0.81 kg
Tightening torque M_A	50 Nm (the bolts are fastened in sequence starting near the joint and working outwards)

The clamps supports the contact wires given with at least 85 % of their rated failing load.

Contact wire splice, bolted

for high-tensile connection of contact wires AC-120 made of Cu-ETP, CuAg0.1 or CuMg0.5 acc. to EN 50149

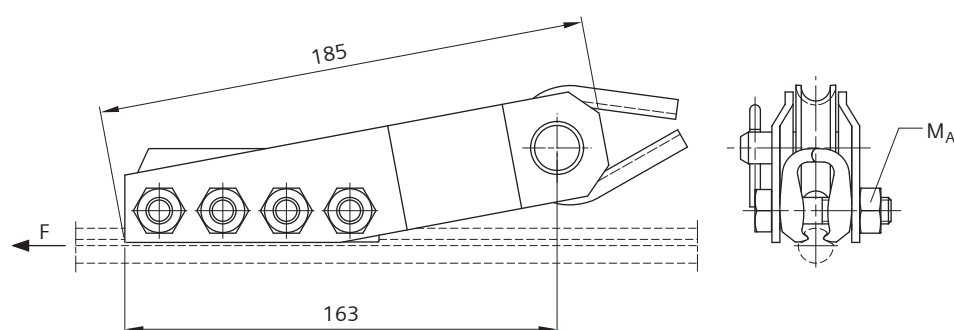


Order no.	8WL4533-8
Designation	Contact wire splice, bolted
Material	
Clamp body	CuNiSi
Bolts M10	stlSt
Nuts	stlSt
Weight	1.08 kg
Tightening torque M_A	50 Nm (the bolts are fastened in sequence starting near the joint and working outwards, 3x following 1 to 8)

The clamp supports the contact wires given with at least 85 % of their rated failing load.

Guy clamp contact wire - catenary wire

for connecting contact wire with catenary wire at fixed point, for contact wire AC-80 to 150 or BC-100 to 150 made of Cu-ETP or CuAg0.1 and AC-80 to 150 or BC-100 to 120 made of CuMg0.5 acc. to EN 50149, Ri161 made of Cu-ETP (British Standard 23) and CTHA-85/-120 made in China

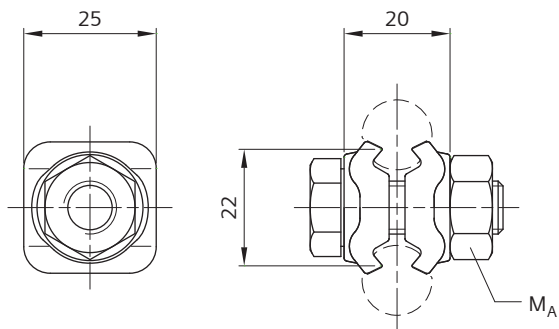


Order no.	8WL4647-2
Designation	Guy clamp
Material	
Clamping jaws	stlSt
Straps	stlSt
Bolts M10	stlSt
Nuts, washers	stlSt
Thimble 70	Cu
Pin	stlSt
Split pin 4x25	Cu
Weight	0.95 kg
Tightening torque M_A	60 Nm

The clamp supports the contact wires given with at least 85 % of their rated failing load.

Parallel groove clamp 22

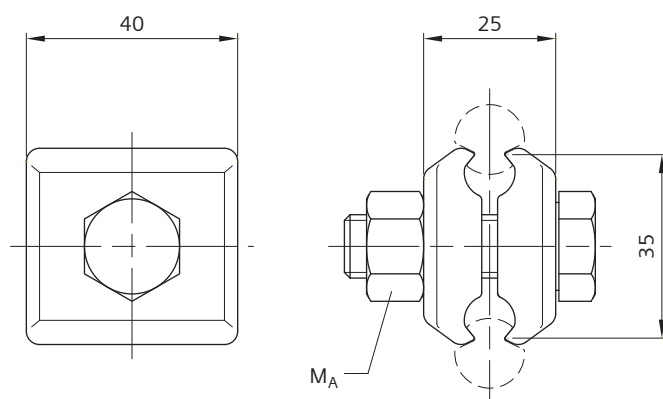
for contact wire bridging at switches, for contact wires AC-80 to AC-150 acc. to EN 50149



Order no.	8WL4536-1
Designation	Parallel groove clamp 22
Material	
Clamping jaws	CuNiSi
Bolt M10	stlSt
Nut	stlSt
Weight	0.10 kg
Tightening torque M_A	32 Nm

Parallel groove clamp 35

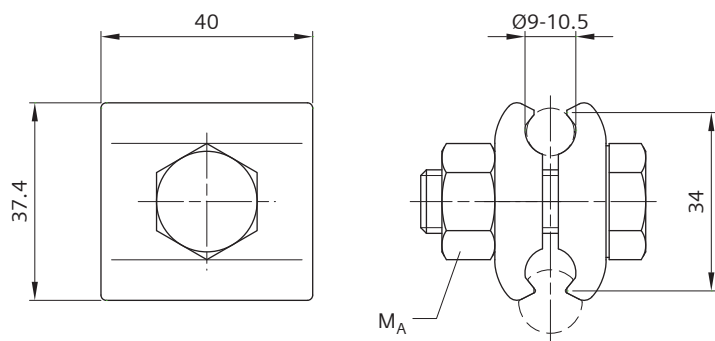
for contact wire connections, for contact wires AC-80 to AC-150 acc. to EN 50149



Order no.	8WL4537-2
Designation	Parallel groove clamp 35
Material	
Clamp body	CuZn
Bolt M12	stlSt
Nut	stlSt
Weight	0.26 kg
Tightening torque M_A	56 Nm

Parallel groove clamp 34

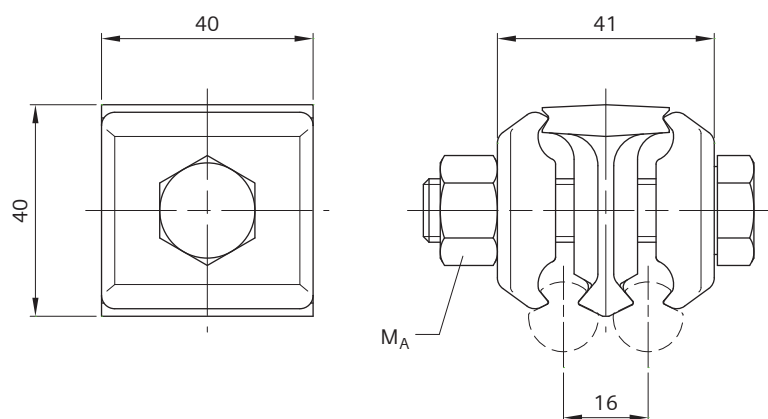
for bronze/copper wires 50 to 70 mm² acc. to DIN 48201 and 50 mm² acc. to DIN 43138, for contact wires AC-80 to AC-150 acc. to EN 50149, for earthing wire 8WL7015-1



Order no.	8WL4538-0
Designation	Parallel groove clamp 34
Material	
Clamp body	CuNiSi
Bolt M12	stlSt
Nut	stlSt
Weight	0.25 kg
Tightening torque M_A	56 Nm

Contact wire connection clamp

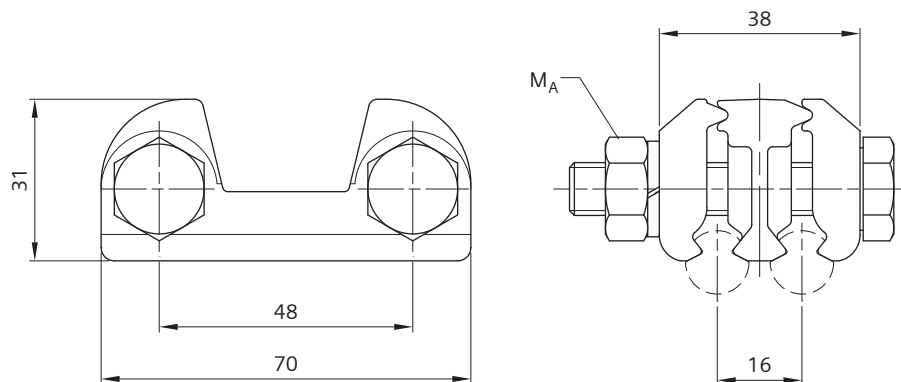
for connection of two parallel or crossing contact wires AC-80 to AC-150 acc. to EN 50149



Order no.	8WL4545-2
Designation	Contact wire connection clamp
Material	
Clamp body	CuZn
Centre piece	CuZn
Bolt M12	stlSt
Nut	stlSt
Weight	0.42 kg
Tightening torque M_A	56 Nm

Contact wire connection clamp with two bolts

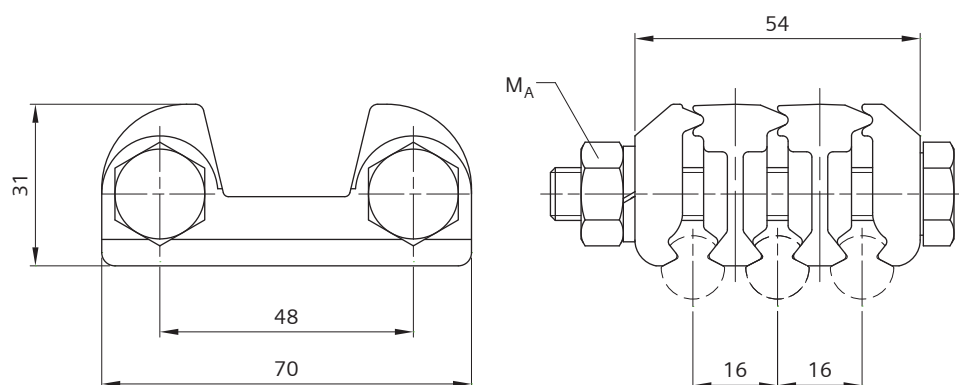
for connection of two parallel or crossing contact wires AC-80 to AC-150 acc. to EN 50149



Order no.	8WL4517-2H
Designation	Contact wire connection clamp
Material	
Clamp body	CuAl
Centre piece	CuAl
Bolts M10	stlSt
Nuts	stlSt
Spring washers	stlSt
Weight	0.34 kg
Tightening torque M_A	32 Nm

Contact wire connection clamp with two bolts for three contact wires

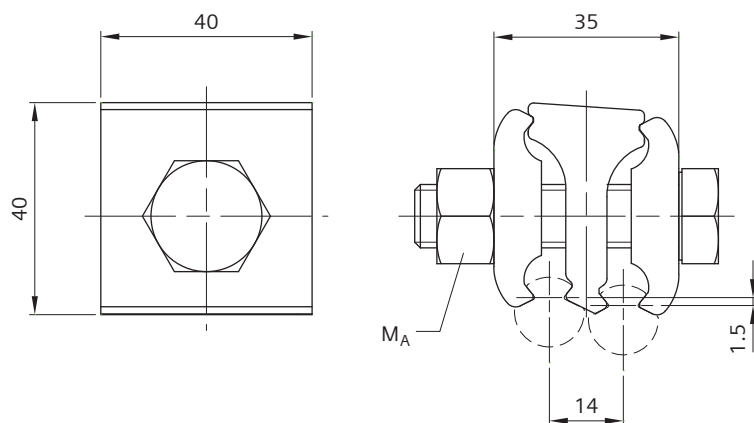
for connection of three parallel or crossing contact wires AC-80 to AC-150 acc. to EN 50149



Order no.	8WL4517-3H
Designation	Contact wire connection clamp with two bolts for three contact wires
Material	
Clamp body	CuAl
Centre pieces	CuAl
Bolts M10	stlSt
Nuts	stlSt
Spring washers	stlSt
Weight	0.44 kg
Tightening torque M_A	32 Nm

Contact wire connection clamp 1.5

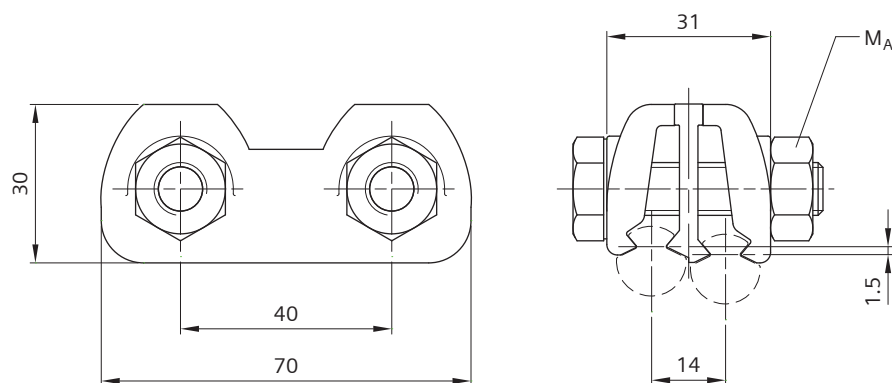
for connection of two parallel or crossing contact wires AC-80 to AC-150 acc. to EN 50149 with 1.5 mm difference in height between contact wires



Order no.	8WL4538-4
Designation	Contact wire connection clamp 1.5
Material	
Clamp body	CuNiSi
Centre piece	CuNiSi
Bolt M12	stlSt
Nut	stlSt
Weight	0.35 kg
Tightening torque M_A	56 Nm

Contact wire connection clamp 1.5 with two bolts

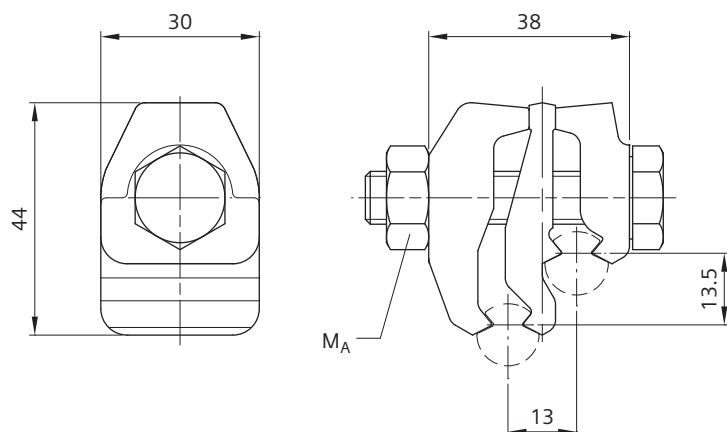
for connection of two parallel or crossing contact wires AC-80 to AC-150 acc. to EN 50149 with 1.5 mm difference in height between contact wires



Order no.	8WL4542-0
Designation	Contact wire connection clamp 1.5
Material	
Clamp body	CuZn
Centre piece	CuZn
Bolts M10	stlSt
Nuts	stlSt
Weight	0.30 kg
Tightening torque M_A	32 Nm

Contact wire connection clamp 13.5

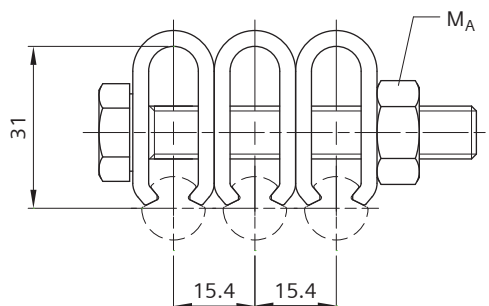
for connection of two parallel or crossing contact wires AC-80 to AC-120 acc. to EN 50149 with 13.5 mm difference in height between contact wires



Order no.	8WL4540-1
Designation	Contact wire connection clamp 13.5
Material	
Clamp body	CuZn
Centre piece	CuZn
Bolt M12	stlSt
Nut	stlSt
Weight	0.24 kg
Tightening torque M_A	32 Nm

Contact wire connection clamp for three contact wires

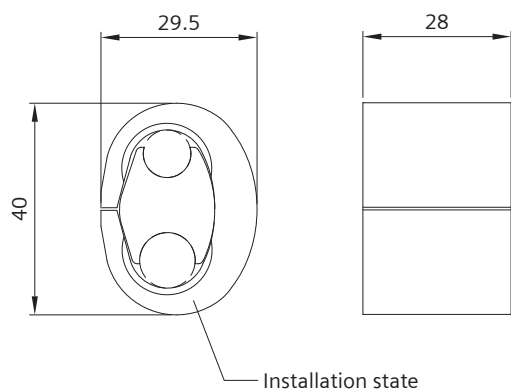
for contact wires AC-80 to AC-150 acc. to EN 50149



Order no.	8WL4602-4
Designation	Contact wire connection clamp for three contact wires
Material	
Clamp hoops	CuNiSi
Bolt M10	stlSt
Nut	stlSt
Weight	0.21 kg
Tightening torque M_A	10 Nm

Compression conductor clamp

for short-circuit-proof and maintenance-free connection of copper wires acc. to DIN 43138 and bronze or copper wires acc. to DIN 48201



Part 1

Order no.	8WL4550-0	8WL4551-0	8WL4552-0	8WL4553-0	8WL4555-0
Designation	Compression conductor clamp	Compression conductor clamp	Compression conductor clamp	Compression conductor clamp	Compression conductor clamp
Material					
Compression body	Cu-ETP	Cu-ETP	Cu-ETP	Cu-ETP	Cu-ETP
Packer	Cu-ETP	Cu-ETP	Cu-ETP	Cu-ETP	Cu-ETP
of wire	35f, 50 mm ²	50 mm ²	50 mm ²	50 mm ²	70 mm ²
with wire	70 mm ²	35f, 50 mm ²	70f, 95 mm ²	95f, 120 mm ²	70f, 95 mm ²
Weight	0.18 kg	0.16 kg	0.19 kg	0.17 kg	0.18 kg

Part 2

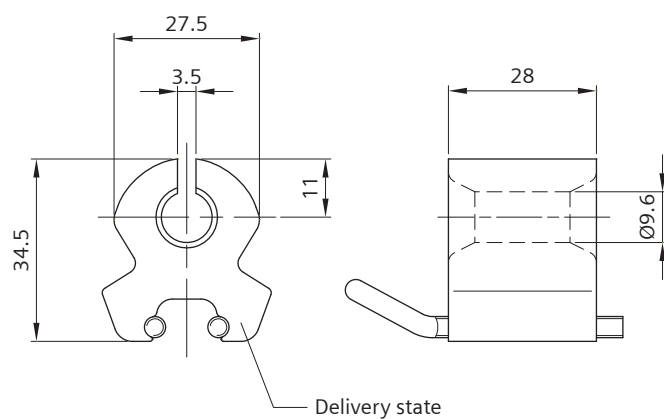
Order no.	8WL4555-1	8WL4556-1	8WL4556-0	8WL4560-0	8WL4560-1
Designation	Compression conductor clamp	Compression conductor clamp	Compression conductor clamp	Compression conductor clamp	Compression conductor clamp
Material					
Compression body	Cu-ETP	Cu-ETP	Cu-ETP	Cu-ETP	Cu-ETP
Packer	Cu-ETP	Cu-ETP	Cu-ETP	Cu-ETP	Cu-ETP
of wire	70 mm ²	70 mm ²	70f, 95 mm ²	95f, 120 mm ²	120 mm ²
with wire	70 mm ²	95f, 120 mm ²	95f, 120 mm ²	95f, 120 mm ²	120f mm ²
Weight	0.20 kg	0.20 kg	0.17 kg	0.17 kg	0.20 kg

f = wires acc. to DIN 43138

The different wire diameters are accommodated by the appropriate packers.

Feeder compression clamp

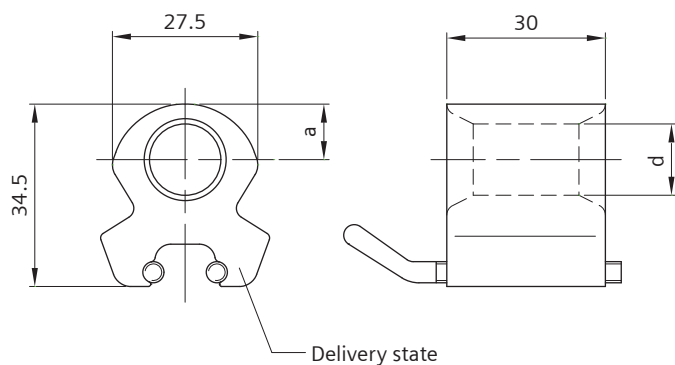
for short-circuit-proof connection of copper wire 35 mm² acc. to DIN 43138 with contact wires AC-80 to AC-150 acc. to EN 50149



Order no.	8WL4570-0
Designation	Feeder compression clamp 35f
Material	
Compression body	Cu-ETP
Clip	Cu
Weight	0.15 kg

Feeder compression clamp

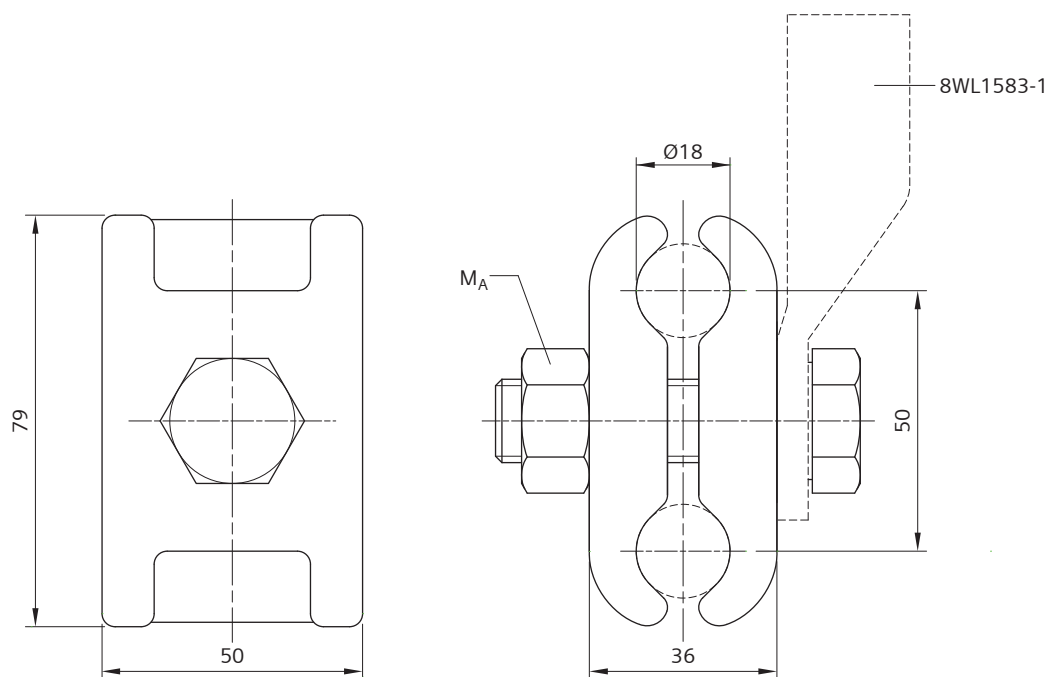
for short-circuit-proof connection of copper wire 70 or 95 mm² acc. to DIN 43138 with contact wires AC-80 to AC-150 acc. to EN 50149



Order no.	8WL4571-0	8WL4572-0
Designation	Feeder compression clamp 70f	Feeder compression clamp 95f
Material		
Compression body	Cu-ETP	Cu-ETP
Clip	Cu	Cu
Weight	0.17 kg	0.15 kg
a	10.5 mm	11.5 mm
d	13.5 mm	15.5 mm

Parallel groove clamp

for bronze and copper wires 120 to 185 mm² acc. to DIN 48201

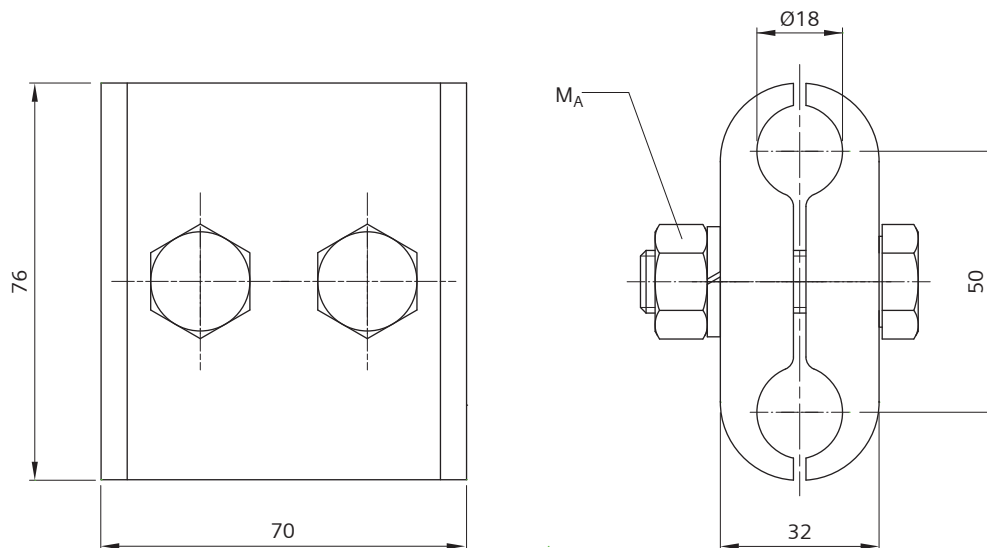


Order no.	8WL4578-2
Designation	Parallel groove clamp 120-185
Material	
Clamping jaws	CuAl
Bolt M16	stlSt
Nut	stlSt
Weight	0.75 kg
Tightening torque M _A	135 Nm

With cable lug 8WL1583-1 use as feeder clamp for connection of wires 120 mm² acc. to DIN 43138 and substitute for 8WL4587-0.
Cable lug must be ordered separately, see page 02-02-16.

Conductor clamp

for copper wires 95 to 150 mm² acc. to DIN 43138 and 120 to 185 mm² acc. to DIN 48201



Order no.	8WL4581-2
Designation	Conductor clamp 95f-150f/120-185
Material	
Clamping jaws	CuAl
Bolts M12	stlSt
Nuts	stlSt
Spring washers	stlSt
Weight	0.65 kg
Tightening torque M _A	56 Nm

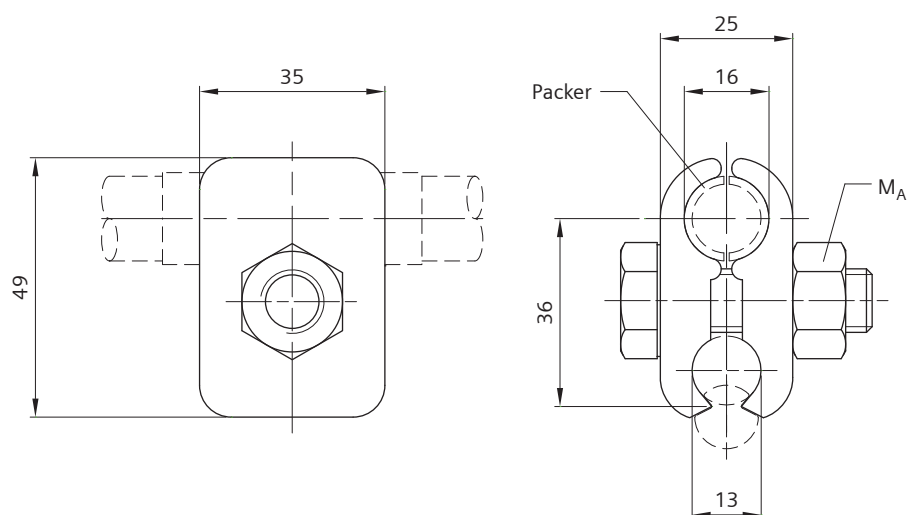
Protection sleeves must be ordered separately, see Chapter 02-02:

8WL1604-2 for wire 95 mm² acc. to DIN 43138

8WL1606-2 for wire 120 mm² acc. to DIN 48201

Feeder clamp

for connecting feeder wires made of copper 70 to 120 mm² acc. to DIN 43138 at contact wires AC-80 to AC-150 acc. to EN 50149



Order no.	8WL4580-2
Designation	Feeder clamp 120f
Material	
Clamping jaws	Cu
Bolt M12	stlSt
Nut	stlSt
Weight	0.24 kg
Tightening torque M_A	56 Nm

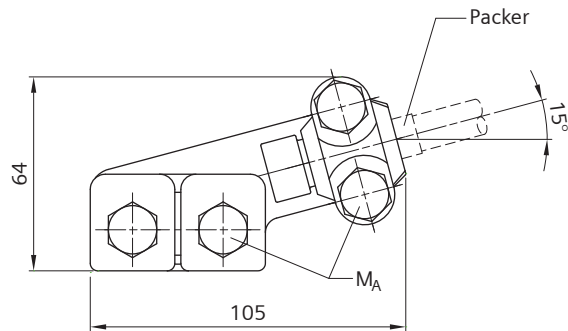
Packers (by pairs) must be ordered separately, see page 02-02-23:

8WL1615-0 for wire 70 mm²

8WL1616-0 for wire 95 mm²

Feeder clamp

for connecting feeder wires made of copper 70 to 120 mm² acc. to DIN 43138 at contact wires AC-80 to AC-150 acc. to EN 50149 for small mounting height



Order no.	8WL4583-0
Designation	Feeder clamp 120f
Material	
Clamp body	Cu
Bolts M10	stlSt
Weight	0.54 kg
Tightening torque M_A	30 Nm

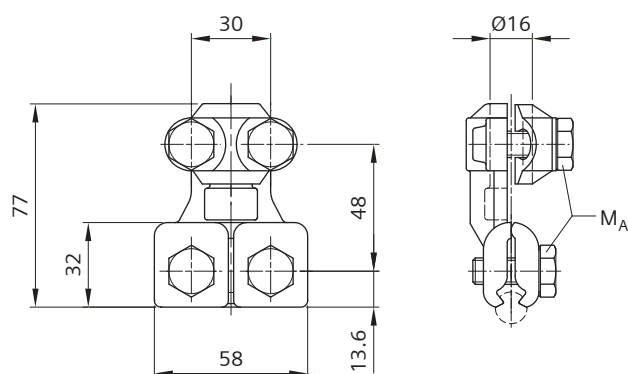
Packers (by pairs) must be ordered separately, see page 02-02-23:

8WL1615-0 for wire 70 mm²

8WL1616-0 for wire 95 mm²

Feeder clamp

for connecting feeder wires made of copper 70 to 120 mm² acc. to DIN 43138 at contact wires AC-80 to AC-150 acc. to EN 50149



Order no.	8WL4582-2
Designation	Feeder clamp 120f
Material	
Clamp body	Cu
Bolts M10	stlSt
Weight	0.52 kg
Tightening torque M _A	30 Nm

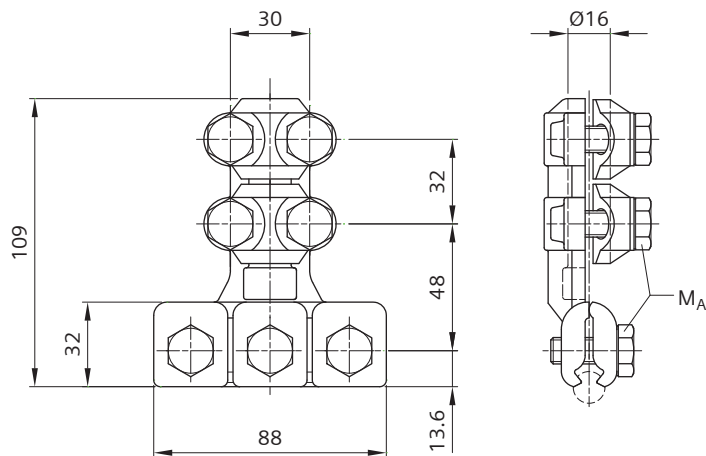
Packers (by pairs) must be ordered separately, see page 02-02-23:

8WL1615-0 for wire 70 mm²

8WL1616-0 for wire 95 mm²

Feeder clamp

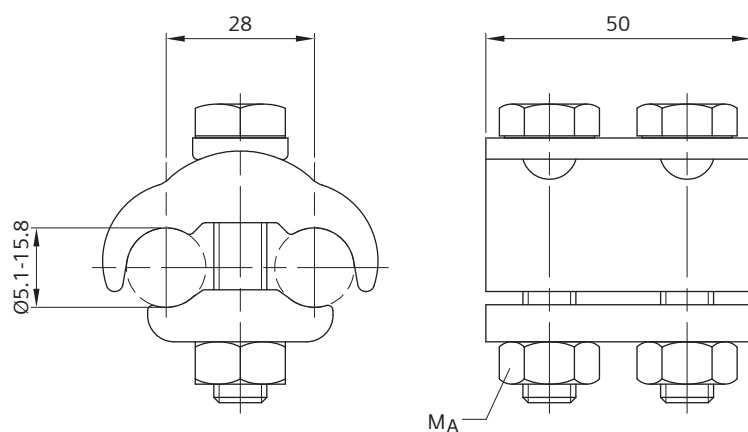
for connecting feeder wires made of copper 120 mm² acc. to DIN 43138 at contact wires AC-80 to AC-150 acc. to EN 50149



Order no.	8WL4584-0
Designation	Feeder clamp 120f
Material	
Clamp body	Cu
Bolts M10	stlSt
Weight	0.88 kg
Tightening torque M_A	30 Nm

Universal parallel groove clamp

for copper wires 16 to 150 mm² acc. to DIN 48201 and 16 to 95 mm² acc. to DIN 43138

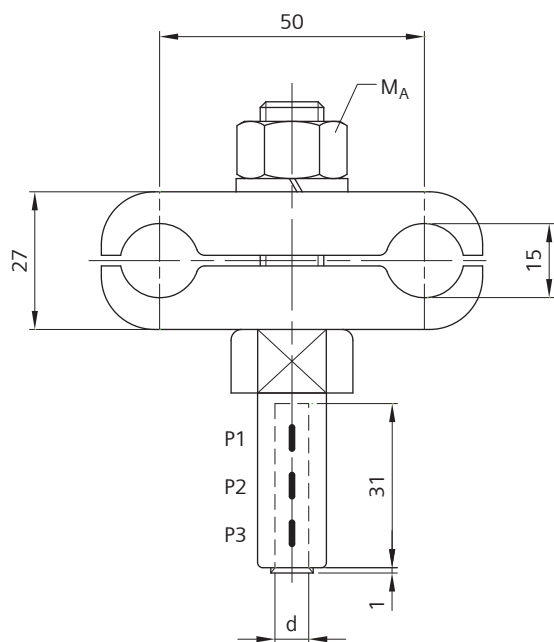


Order no.	8WL4588-0
Designation	Universal parallel groove clamp 16-150
Material	
Clamp body	Cu
Bolts M10x50	Cu5
Nuts	Cu5
Weight	0.42 kg
Tightening torque M_A	39 Nm

If wires acc. to DIN 43138 are used, protection sleeves must be applied. Please order separately, see Chapter 02-02.

Feeder and dropper clamp

for bronze/copper twin catenary wires 95 to 150 mm² acc. to DIN 48201 and dropper/current wires 10 to 25 mm² acc. to DIN 43138



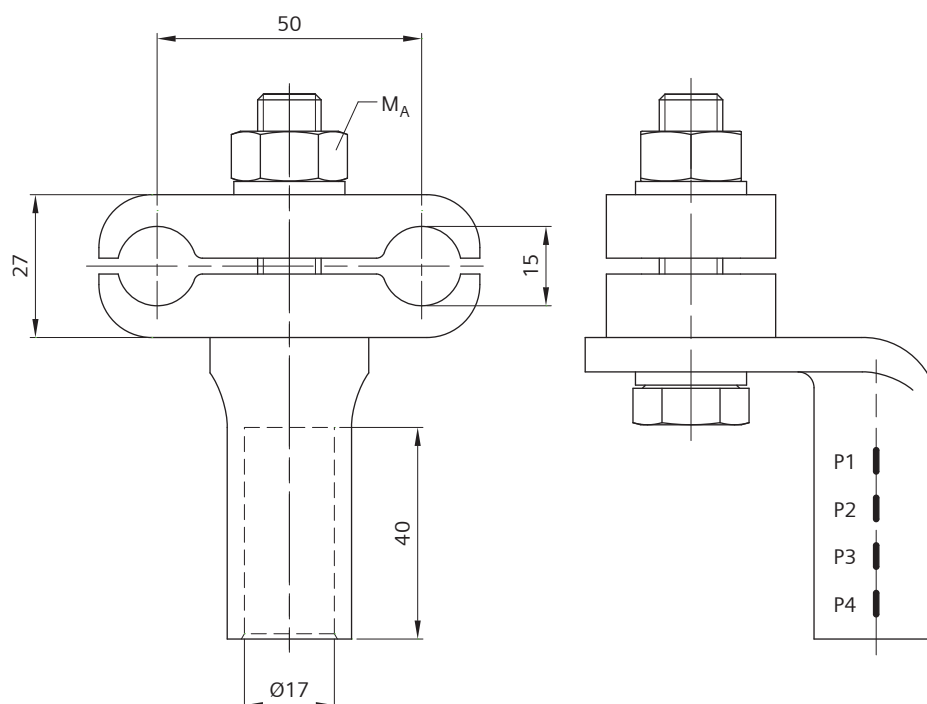
Order no.	8WL4591-0	8WL4591-1	8WL4591-2
Designation	Feeder and dropper clamp 120/150-10f	Feeder and dropper clamp 120/150-16f	Feeder and dropper clamp 120/150-25f
Material			
Clamp body	CuAl	CuAl	CuAl
Compression sleeve	CuAl	CuAl	CuAl
Nut M12	stlSt	stlSt	stlSt
Spring washer	stlSt	stlSt	stlSt
Weight	0.36 kg	0.36 kg	0.34 kg
Tightening torque M_A	56 Nm	56 Nm	56 Nm
Pressing die	8WL7154-0	8WL7154-0	8WL7154-0
Pressing markings	P1 to P3	P1 to P3	P1 to P3
d	5.0 mm	6.4 mm	7.5 mm

Pressing according to markings (following P1 to P3).

Two protection sleeves 8WL1604-3 for twin catenary wires 95 mm² must be ordered separately, see page 02-02-21.

Feeder and dropper clamp

for bronze/copper twin catenary wires 95 to 150 mm² acc. to DIN 48201 and dropper/current wires 120 mm² acc. to DIN 43138



Order no.	8WL4591-5A
Designation	Feeder and dropper clamp 120/150-120f
Material	
Clamp body	CuAl
Compression cable lug	Cu-ETP
Bolt M12	stlSt
Nut	stlSt
Spring washer	stlSt
Weight	0.53 kg
Tightening torque M _A	56 Nm
Pressing die	8WL7154-6, 8WL7154-5
Pressing markings	P1 to P4

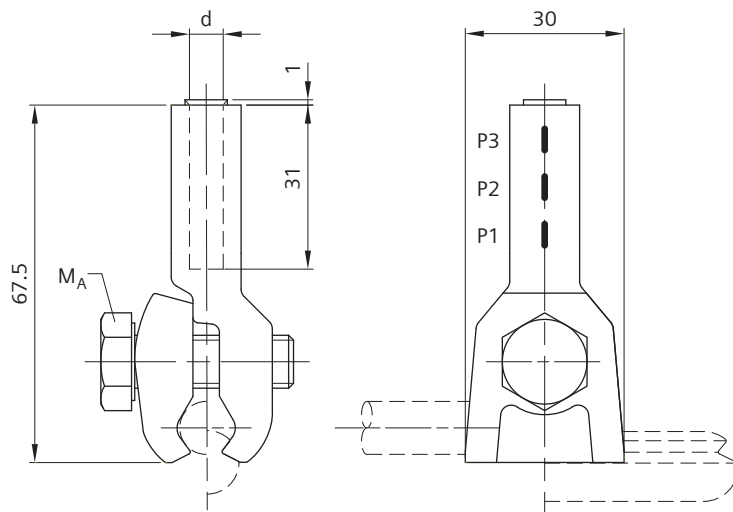
Pressing according to markings (following P1 to P4) with pressing die 8WL7154-6, re-pressing with 8WL7154-5.

Two protection sleeves 8WL1604-3 for twin catenary wires 95 mm² must be ordered separately, see page 02-02-21.

Substitute for 8WL4591-5.

Universal dropper clip

for dropper/current wires 10 mm² or 16 mm² acc. to DIN 43138 at catenary wires 35 to 95 mm² acc. to DIN 48201 or contact wires AC-80 to AC-150 acc. to EN 50149

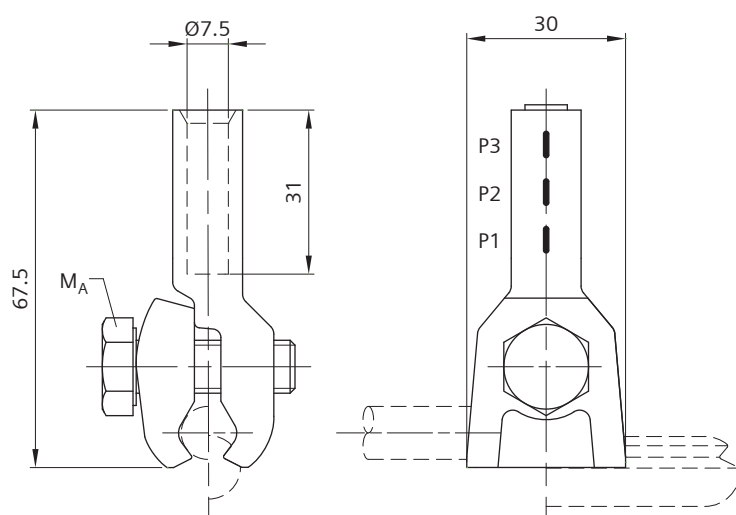


Order no.	8WL4591-6	8WL4591-7
Designation	Universal dropper clip 10f/35-95	Universal dropper clip 16f/35-95
Material		
Clamp body	CuAl	CuAl
Bolt M10	stlSt	stlSt
Weight	0.14 kg	0.14 kg
Tightening torque M_A	32 Nm	32 Nm
Pressing die	8WL7154-0	8WL7154-0
Pressing markings	P1 to P3	P1 to P3
d	5.0 mm	6.4 mm

Pressing according to markings (following P1 to P3).

Universal dropper clip

for dropper/current wires 25 mm² acc. to DIN 43138 at catenary wires 35 to 95 mm² acc. to DIN 48201 or contact wires AC-80 to AC-150 acc. to EN 50149

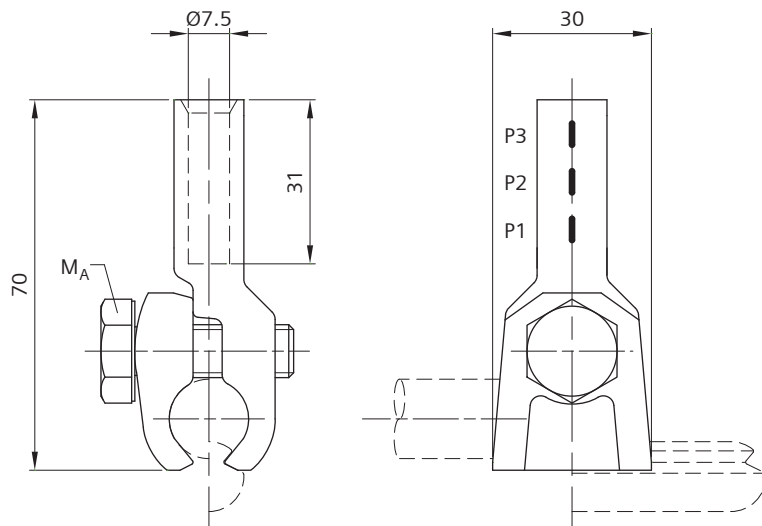


Order no.	8WL4591-8
Designation	Universal dropper clip 25f/35-95
Material	
Clamp body	CuAl
Bolt M10	stlSt
Weight	0.14 kg
Tightening torque M_A	32 Nm
Pressing die	8WL7154-0
Pressing markings	P1 to P3

Pressing according to markings (following P1 to P3).

Universal dropper clip

for dropper/current wires 25 mm² acc. to DIN 43138 at catenary wires 120 to 150 mm² acc. to DIN 48201 or contact wires AC-80 to AC-150 acc. to EN 50149

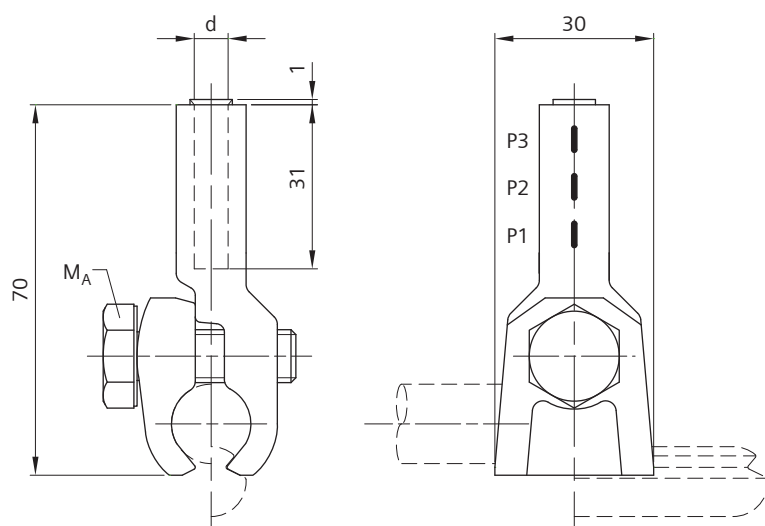


Order no.	8WL4592-5
Designation	Universal dropper clip 25f/120-150
Material	
Clamp body	CuAl
Bolt M10	stlSt
Weight	0.15 kg
Tightening torque M _A	32 Nm
Pressing die	8WL7154-0
Pressing markings	P1 to P3

Pressing according to markings (following P1 to P3).

Universal dropper clip

for dropper/current wires 10 to 16 mm² acc. to DIN 43138 at catenary wires 120 to 150 mm² acc. to DIN 48201 or contact wires AC-80 to AC-150 acc. to EN 50149

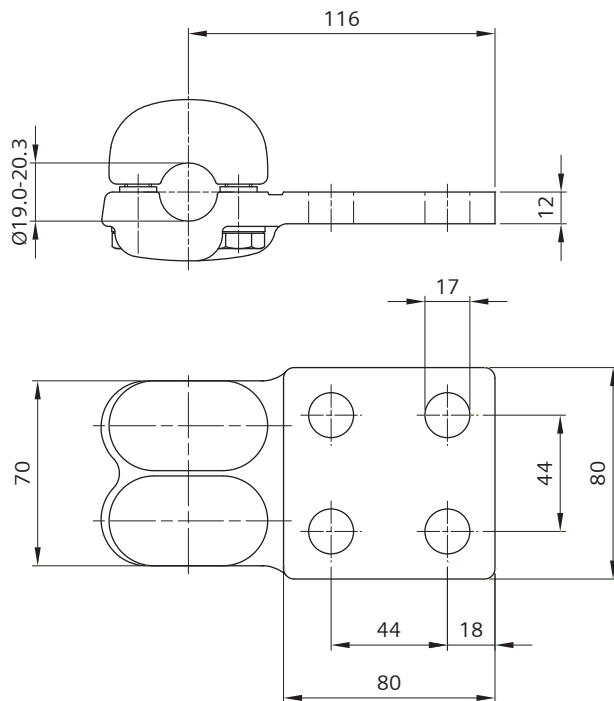


Order no.	8WL4593-5	8WL4592-8
Designation	Universal dropper clip 10f/120-150	Universal dropper clip 16f/120-150
Material		
Clamp body	CuAl	CuAl
Bolt M10	stlSt	stlSt
Weight	0.15 kg	0.15 kg
Tightening torque M_A	32 Nm	32 Nm
Pressing die	8WL7154-0	8WL7154-0
Pressing markings	P1 to P3	P1 to P3
d	5.0 mm	6.4 mm

Pressing according to markings (following P1 to P3).

T-flat connection clamp

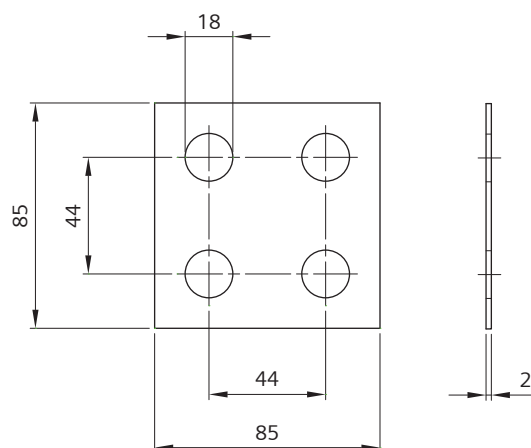
for aluminium and aluminium-steel wires $d=19.0$ to 20.3 mm



Order no.	8WL4567-0A
Designation	T-flat connection clamp
Material	Al
Weight	0.68 kg
Rated short-time current	65 kA
Rated short-time duration	1 s

Plate

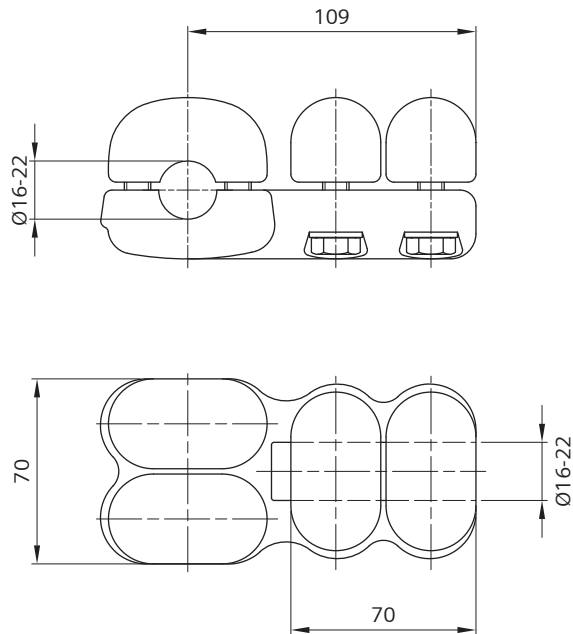
for corrosion protection between copper and aluminium components, for T-flat connection clamp 8WL4567-0A



Order no.	8WL4567-8
Designation	Plate
Material	Alcu
Weight	5.2 kg/100 pcs.

T-connection clamp

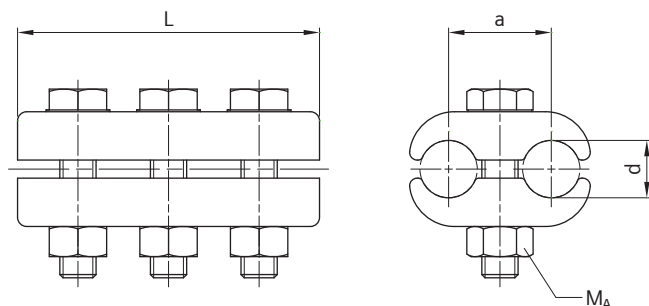
for aluminium wires d=16 to 22 mm



Order no.	8WL4567-1A
Designation	T-connection clamp
Material	Al
Weight	1.04 kg
Rated short-time current	65 kA
Rated short-time duration	1 s

Parallel groove clamp (DIN 48075)

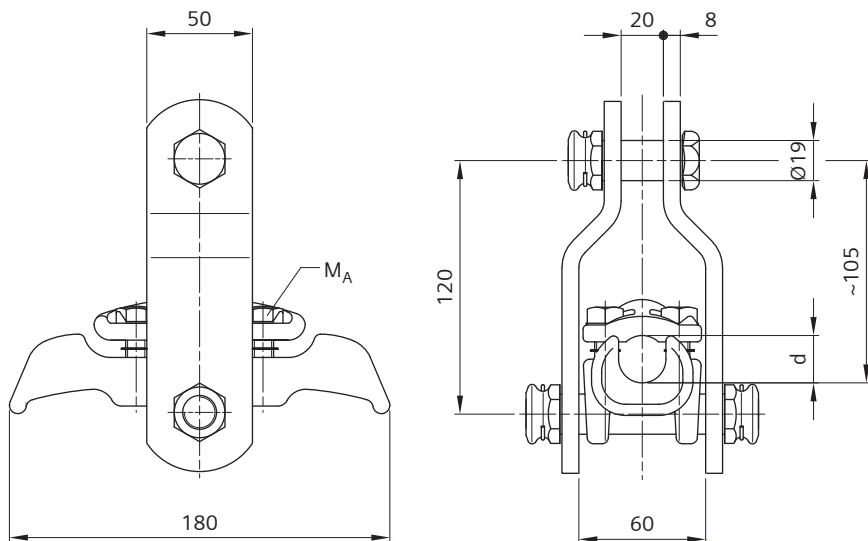
for aluminium and aluminium-steel-wires $d=19.1$ to 23.4 mm



Order no.	8WL4578-8A	8WL4578-8B
Designation	Parallel groove clamp DIN 48075-Al21	Parallel groove clamp DIN 48075-Al23
Material		
Clamp body	Al	Al
Bolts M12	htgSt	htgSt
Nuts	htgSt	htgSt
Weight	0.62 kg	0.80 kg
Tightening torque M_A	25 Nm	25 Nm
a	34 mm	40 mm
d	19.1 - 21.0 mm	21.1 - 23.4 mm
L	100 mm	120 mm

Suspension clamp with straps

for aluminium and aluminium-steel wires d=19 to 22.4 mm

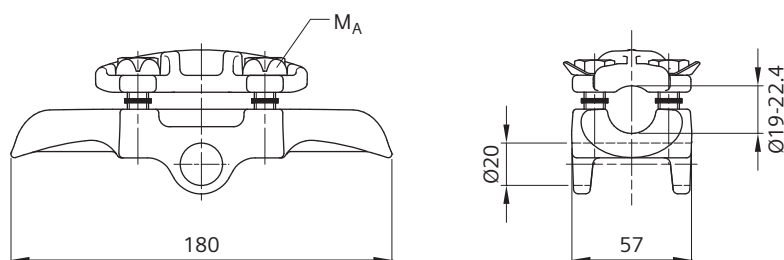


Order no.	8WL4618-0	8WL4618-1
Designation	Suspension clamp with straps	Suspension clamp with straps
Material		
Clamp body	Al	Al
Straps	Al	htgSt
Screw bolts	Al	htgSt
Bolts M10	stlSt	stlSt
Weight	1.42 kg	2.0 kg
Tightening torque M_A	44 Nm	44 Nm

Types for other wire diameters on request.

Suspension clamp

for aluminium and aluminium-steel wires $d=19$ to 22.4 mm

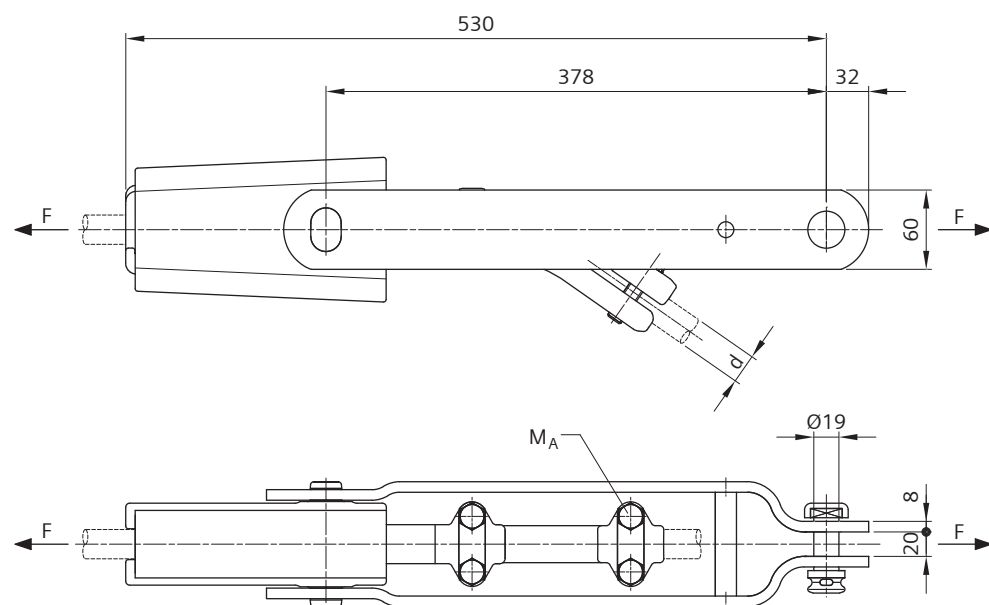


Order no.	8WL4618-0A
Designation	Suspension clamp
Material	
Clamp body	Al
Bolts M10	stlSt
Weight	0.30 kg
Tightening torque M_A	44 Nm

Types for other wires diameters on request.

Wedge-type tension clamp

for aluminium and aluminium-steel wires $d=20.1$ to 22.5 mm

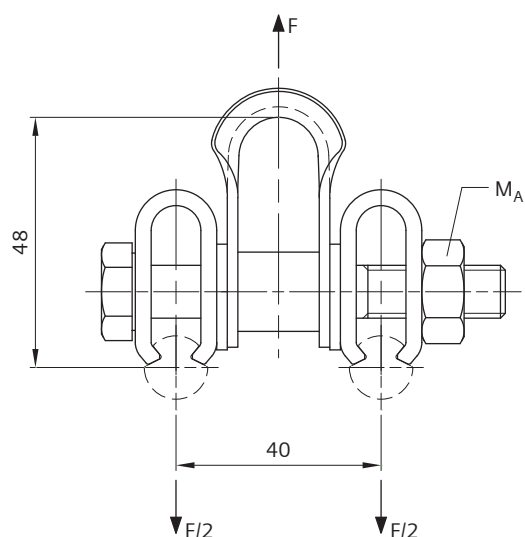


Order no.	8WL4618-5A	8WL4618-5
Designation	Wedge-type tension clamp	Wedge-type tension clamp
Material		
Clamp body	Al	Al
Straps	Al	htgSt
Screw bolt	Al	htgSt
Bolts M12	stlSt	stlSt
Weight	4.8 kg	6.8 kg
Perm. operating load	53.3 kN	53.3 kN
Min. failing load	160 kN	160 kN
Tightening torque M_A	44 Nm	44 Nm

Types for other wires diameters on request.

Twin dropper clip

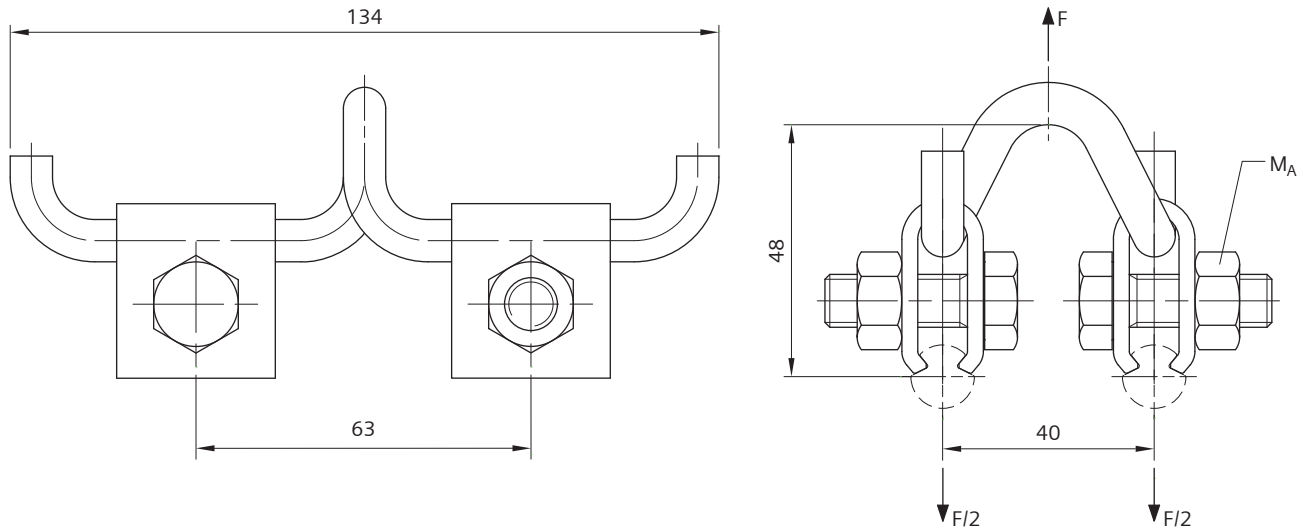
for contact wires AC-80 to AC-150 acc. to EN 50149



Order no.	8WL4600-0
Designation	Twin dropper clip
Material	
Clamp hoop	CuNiSi
Dropper strap	CuNiSi
Spacer tube	Cu
Bolt M10	stlSt
Nut, washers	stlSt
Weight	0.20 kg
Perm. operating load	1.1 kN
Min. failing load	2.75 kN
Tightening torque M_A	25 Nm

Twin dropper clip

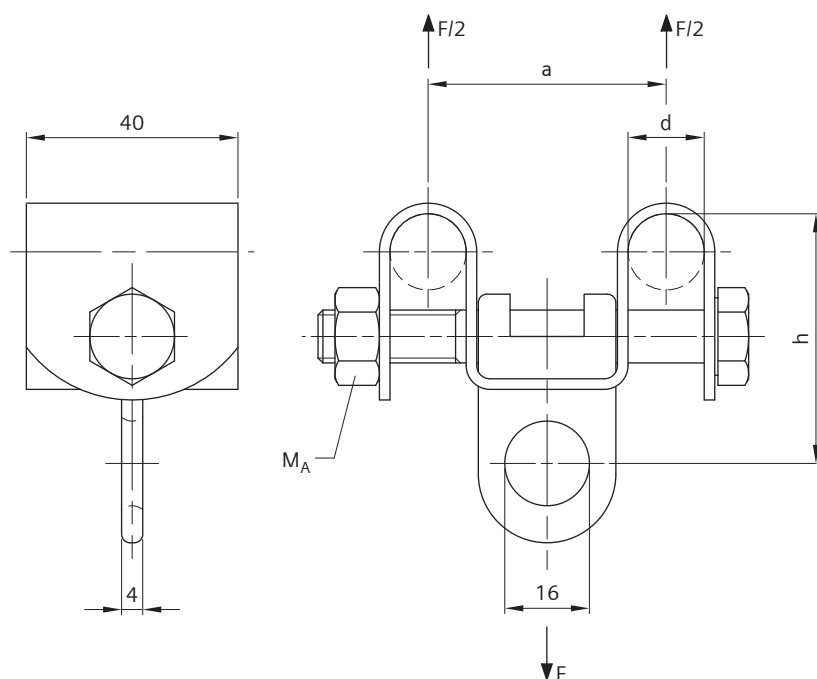
for contact wires AC-80 to AC-150 acc. to EN 50149



Order no.	8WL4600-1
Designation	Twin dropper clip
Material	
Clamp hoop	CuNiSi
Dropper strap	stlSt
Bolts M10	stlSt
Nuts	stlSt
Weight	0.35 kg
Perm. operating load	1.10 kN
Min. failing load	2.75 kN
Tightening torque M_A	25 Nm

Dropper clip for twin catenary wire

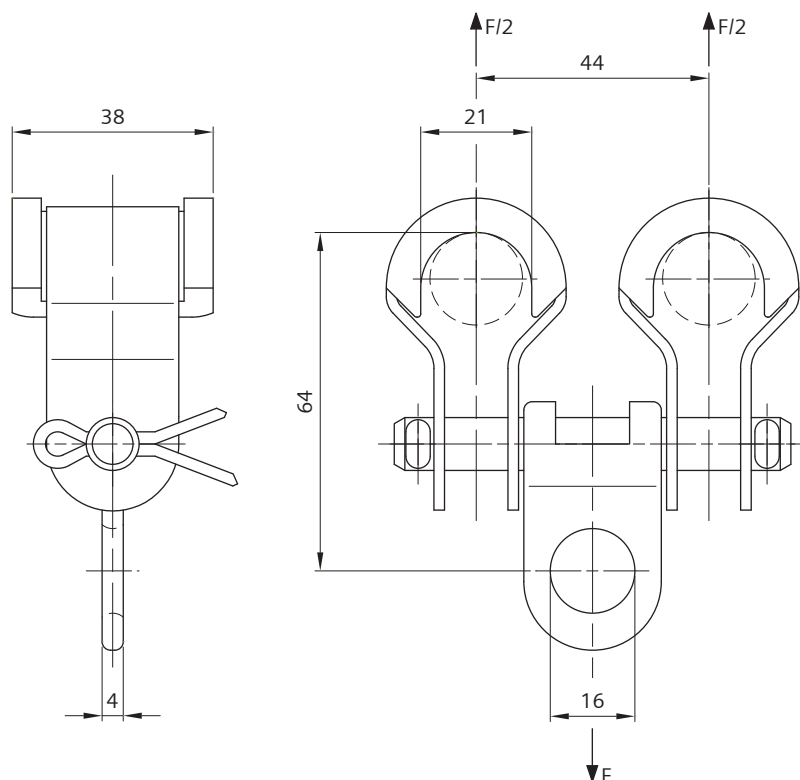
for bronze or copper wires 95, 120 or 150 mm² acc. to DIN 48201



Order no.	8WL4604-0	8WL4605-0	8WL4606-0
Designation	Dropper clip for twin catenary wire 95 mm ²	Dropper clip for twin catenary wire 120 mm ²	Dropper clip for twin catenary wire 150 mm ²
Material			
Hoop	Cu-ETP	Cu-ETP	Cu-ETP
Suspension strap	CuAl	CuAl	CuAl
Bolt M10	stlSt	stlSt	stlSt
Nut	stlSt	stlSt	stlSt
Weight	0.22 kg	0.22 kg	0.22 kg
Perm. operating load	1.1 kN	1.1 kN	1.1 kN
Min. failing load	2.75 kN	2.75 kN	2.75 kN
Tightening torque M_A	24 Nm	24 Nm	24 Nm
a	44 mm	45 mm	47 mm
d	13.0 mm	14.4 mm	16.0 mm
h	46.5 mm	47 mm	48 mm

Sliding dropper clip for twin catenary wire

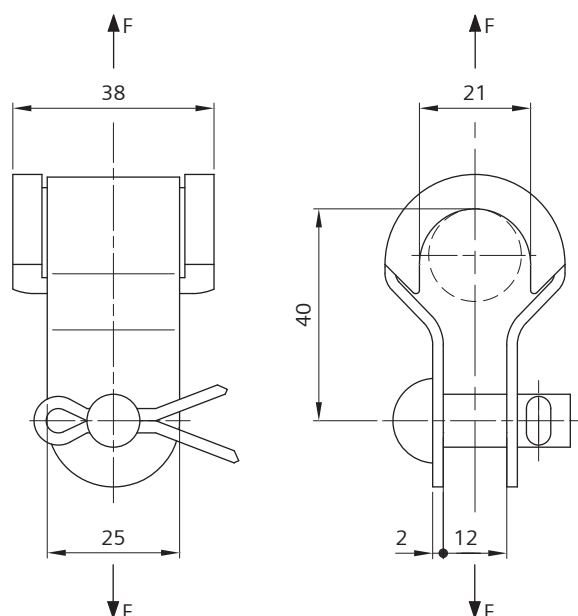
for wires 95 to 185 mm² acc. to DIN 48201



Order no.	8WL4610-0
Designation	Sliding dropper clip for twin catenary wire
Material	
Suspension strap	CuAl
Sliding insert	Polyamide
Dropper strap	CuNiSi
Pin Ø10	stlSt
Split pins 5x28	Cu
Weight	0.21 kg
Perm. operating load	1.1 kN
Min. failing load	2.75 kN

Sliding dropper clip for catenary wire

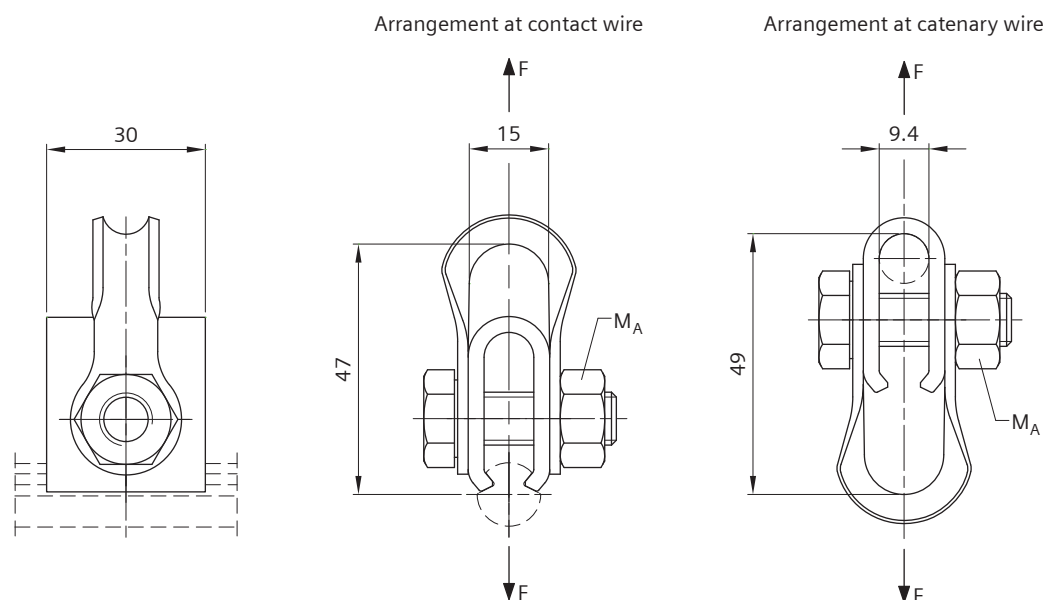
for wires 35 to 185 mm² acc. to DIN 48201



Order no.	8WL4612-0
Designation	Sliding dropper clip for catenary wire
Material	
Dropper strap	CuNiSi
Sliding insert	Polyamide
Pin 10x26	Cu
Split pin 5x28	Cu
Weight	0.10 kg
Perm. operating load	1.1 kN
Min. failing load	2.75 kN

Dropper clip 50

for connecting dropper wires with catenary wires 50 mm² acc. to DIN 48201 or contact wires AC-80 to AC-150 acc. to EN 50149

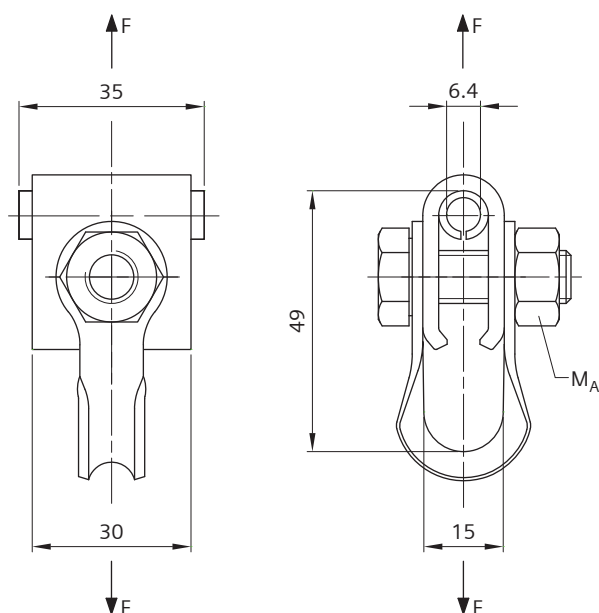


Order no.	8WL4620-0
Designation	Dropper clip 50
Material	
Clamp hoop	CuNiSi
Dropper strap	CuNiSi
Bolt M10	stlSt
Nut	stlSt
Weight	0.11 kg
Perm. operating load	0.55 kN
Min. failing load	1.375 kN
Tightening torque M_A	25 Nm

Clip 8WL4622-0 for current-carrying droppers must be ordered separately, see page 02-09-70.

Dropper clip 25

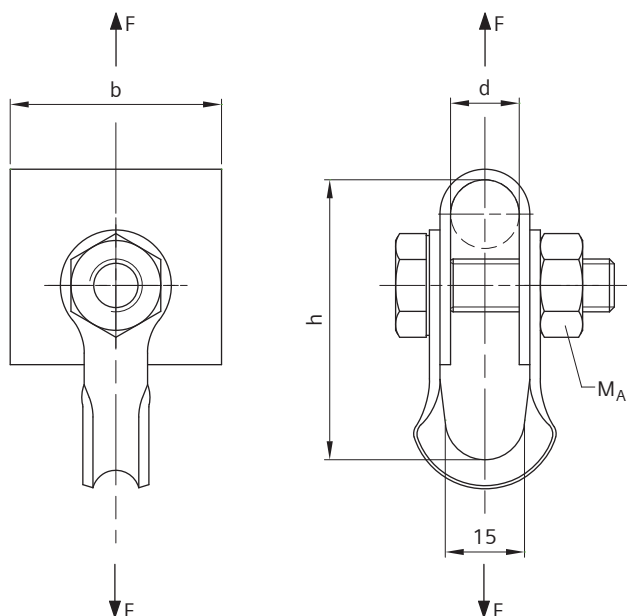
for connecting dropper wires with stitch wires 25 mm² acc. to DIN 48201



Order no.	8WL4620-1
Designation	Dropper clip 25
Material	
Clamp hoop	CuNiSi
Dropper strap	CuNiSi
Bolt M10	stlSt
Nut	stlSt
Protection sleeve	Cu
Weight	0.12 kg
Perm. operating load	0.55 kN
Min. failing load	1.375 kN
Tightening torque M_A	25 Nm

Dropper clip

for connecting dropper wires with catenary or cross-span wires 35, 70 to 150 mm² acc. to DIN 48201



Order no.	8WL4624-2	8WL4624-3	8WL4624-0	8WL4624-4	8WL4624-1
Designation	Dropper clip 35	Dropper clip 70	Dropper clip 95	Dropper clip 120	Dropper clip 150
Material					
Clamp hoop	CuNiSi	CuNiSi	Cu-ETP	CuNiSi	Cu-ETP
Dropper strap	CuNiSi	CuNiSi	CuNiSi	CuNiSi	CuNiSi
Bolt M10	stlSt	stlSt	stlSt	stlSt	stlSt
Nut	stlSt	stlSt	stlSt	stlSt	stlSt
Weight	0.11 kg	0.12 kg	0.12 kg	0.11 kg	0.12 kg
Perm. operating load	0.55 kN	0.55 kN	0.55 kN	1.10 kN	1.10 kN
Min. failing load	1.375 kN	1.375 kN	1.375 kN	2.750 kN	2.750 kN
Tightening torque M_A	25 Nm	25 Nm	25 Nm	25 Nm	25 Nm
b	30 mm	30 mm	40 mm	30 mm	40 mm
d	7.6 mm	10.6 mm	13.0 mm	14.0 mm	17.0 mm
h	47 mm	51 mm	53 mm	55 mm	56 mm

Clip for current-carrying droppers must be ordered separately, see page 02-09-70:

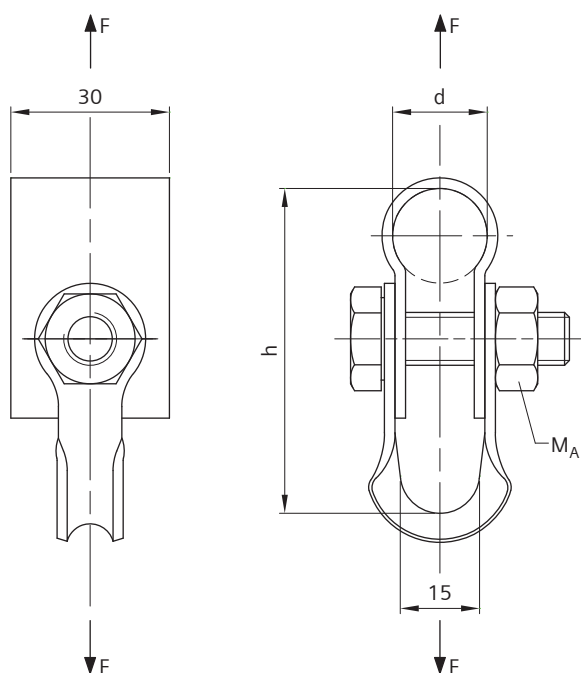
8WL4622-2 for wire 35 mm²

8WL4622-0 for wire 50/70 mm²

8WL4622-1 for wire 95 mm²

Dropper clip

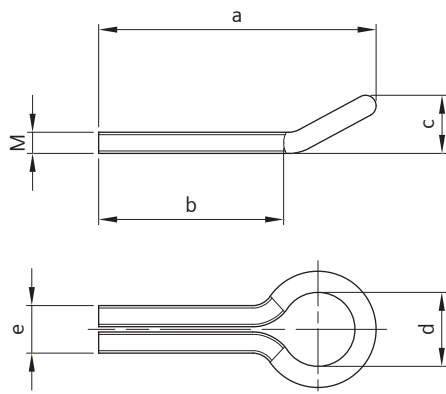
for connecting dropper wires with catenary or cross-span wires 185 and 240 mm² acc. to DIN 48201



Order no.	8WL4626-2	8WL4626-3
Designation	Dropper clip 185	Dropper clip 240
Material		
Clamp hoop	Cu-ETP	Cu-ETP
Dropper strap	CuNiSi	CuNiSi
Bolt M10	stlSt	stlSt
Nut	stlSt	stlSt
Weight	0.18 kg	0.20 kg
Perm. operating load	1.10 kN	1.10 kN
Min. failing load	2.75 kN	2.75 kN
Tightening torque M_A	25 Nm	25 Nm
d	17.9 mm	21 mm
h	61.5 mm	65.5 mm

Clip

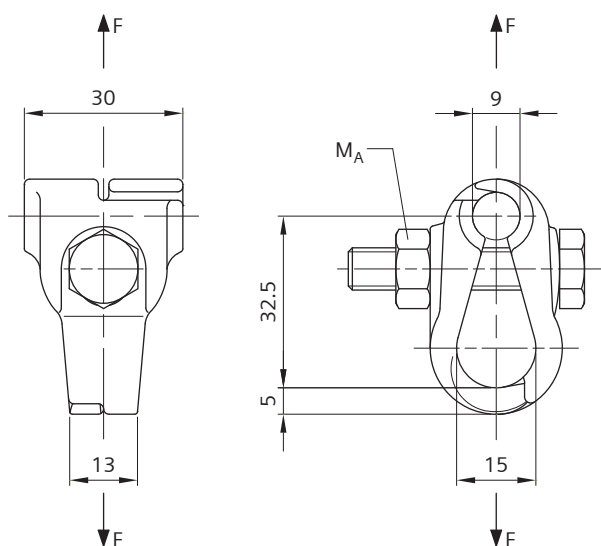
for current-carrying dropper clips, for bronze and copper wires acc. to DIN 48201



Order no.	8WL4622-2	8WL4622-0	8WL4622-1
Designation	Clip M3	Clip M4	Clip M4.5
Material	BzII	BzII	BzII
for wire	35 mm ²	50/70 mm ²	95 mm ²
Weight	0.50 kg/100 pcs.	1.00 kg/100 pcs.	1.70 kg/100 pcs.
a	52.5 mm	52.5 mm	72.0 mm
b	35 mm	35 mm	45 mm
c	11 mm	11 mm	15 mm
d	14 mm	14 mm	20 mm
e	9 mm	9 mm	13 mm
M	M3	M4	M4.5

Dropper clip

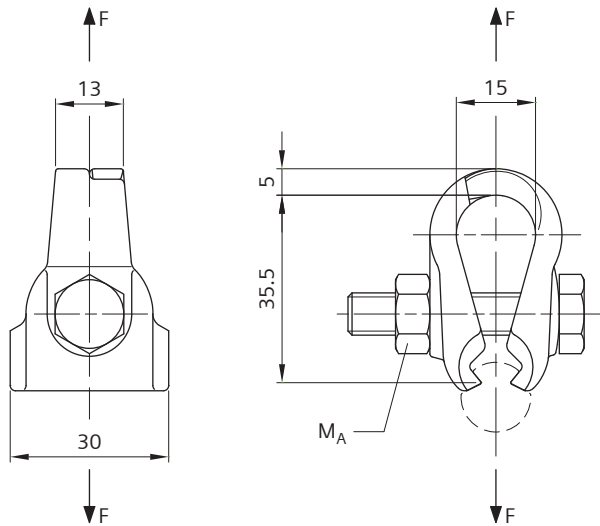
for connecting dropper wires with catenary wires 25 to 70 mm² acc. to DIN 48201



Order no.	8WL4623-3
Designation	Dropper clip 25-70
Material	
Clamping jaws	CuAl
Bolt M8	stlSt
Nut	stlSt
Weight	0.07 kg
Perm. operating load	0.55 kN
Min. failing load	1.375 kN
Tightening torque M_A	16 Nm

Dropper clip

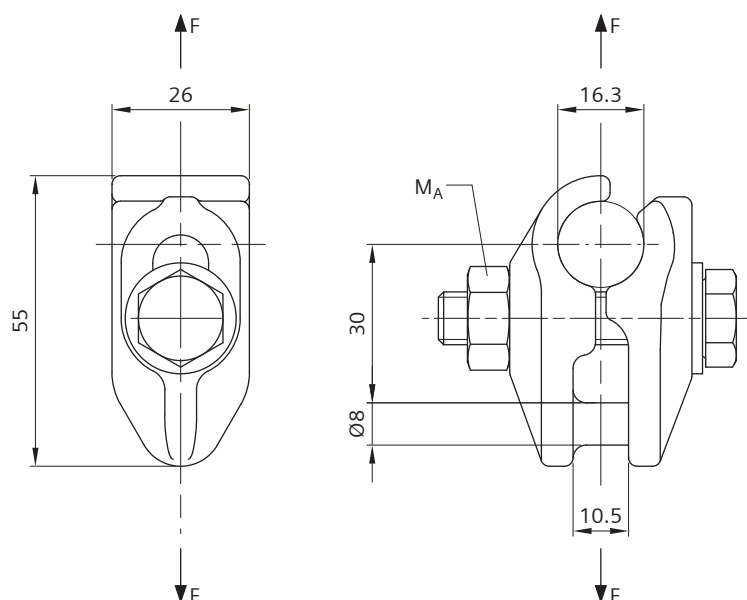
for connecting dropper wires with contact wires AC-80 to AC-150 acc. to EN 50149



Order no.	8WL4623-5
Designation	Dropper clip AC-80 to AC-150
Material	
Clamping jaws	CuAl
Bolt M8	stlSt
Nut	stlSt
Weight	0.06 kg
Perm. operating load	0.55 kN
Min. failing load	1.375 kN
Tightening torque M_A	16 Nm

Dropper clip

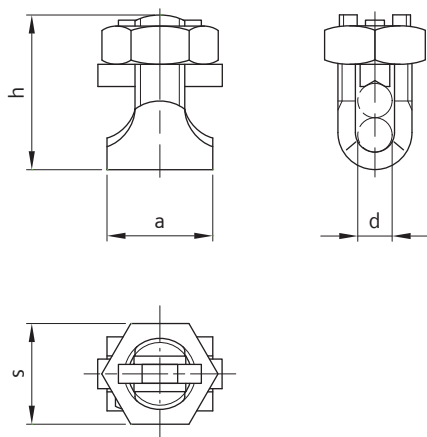
for connection dropper wires with catenary wires $d=15.8$ to 16.3 mm acc. to EN 50182



Order no.	8WL4628-3A
Designation	Dropper clip
Material	
Clamping jaws	ctAl
Bolt M10	stlSt
Nut, washer	stlSt
Weight	0.10 kg
Perm. operating load	1 kN
Min. failing load	3 kN
Tightening torque M_A	32 Nm

Groove clamp

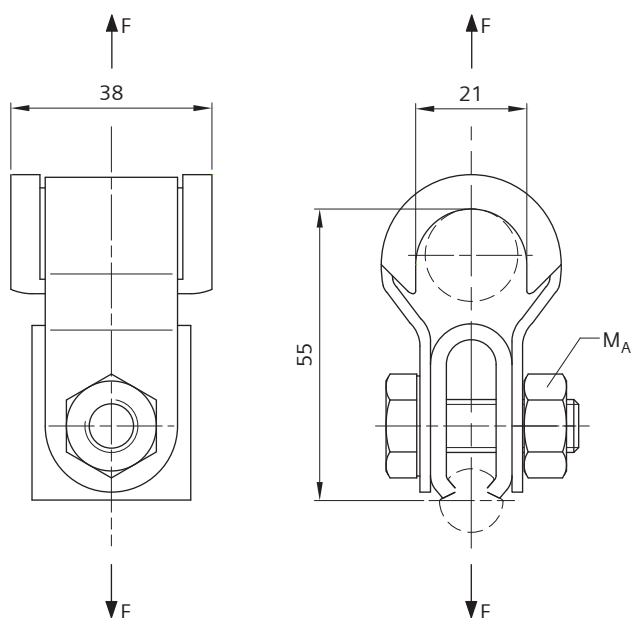
for height-adjustable droppers, for wires up to d=5.1 mm and 6.5 mm



Order no.	8WL4622-4	8WL4622-4A
Designation	Groove clamp 16	Groove clamp 25
Material		
Clamp bolt	Cu	Cu
Adjustable washer	Cu	Cu
Nut	Cu	Cu
Weight	2.3 kg/100 pcs.	4.5 kg/100 Stk.
a	15 mm	20 mm
d	5.1 mm	6.5 mm
s	17 mm	19 mm
h	24 mm	29 mm

Sliding dropper clip

for droppers at catenary wires up to 185 mm² acc. to DIN 48201 and contact wires AC-80 to AC-150 acc. to EN 50149

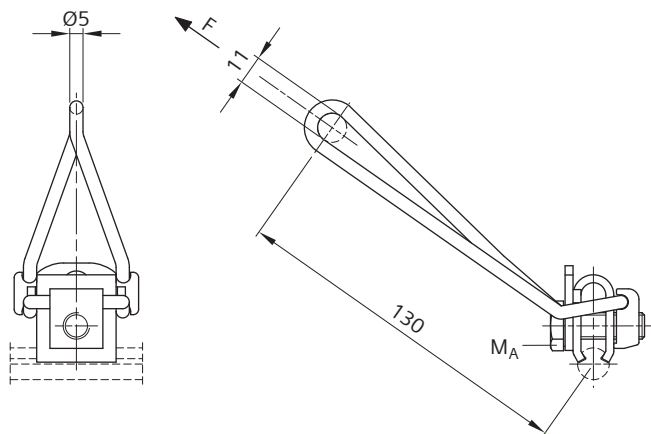


Order no.	8WL4630-0A
Designation	Sliding dropper clip
Material	
Clamp hoop	CuNiSi
Dropper strap	CuNiSi
Sliding insert	Polyamide
Bolt M10	stlSt
Nut	stlSt
Weight	0.15 kg
Perm. operating load	0.55 kN
Min. failing load	1.375 kN
Tightening torque M _A	25 Nm

Other heights on request.

Dropper clip with hoop

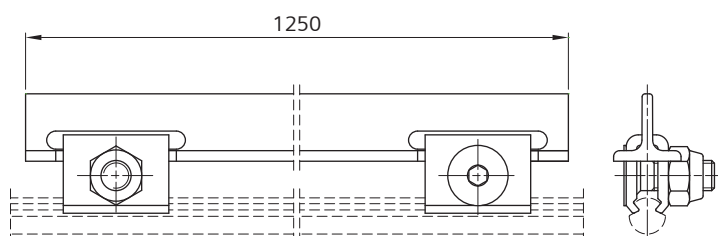
for catenary with stitch wires, for contact wires AC-80 to AC-150 acc. to EN 50149



Order no.	8WL4613-0
Designation	Dropper clip with hoop
Material	
Clamp hoop	CuNiSi
Adjusting plate	CuNiSi
Clamp cover	CuNiSi
Wire hoop	CuSn
Bolt M10	Cu5
Weight	0.20 kg
Perm. operating load	1.0 kN
Min. failing load	3.0 kN
Tightening torque M_A	32 Nm

Overhead line crossing

for crossing of contact wires AC-80 to AC-150 acc. to EN 50149

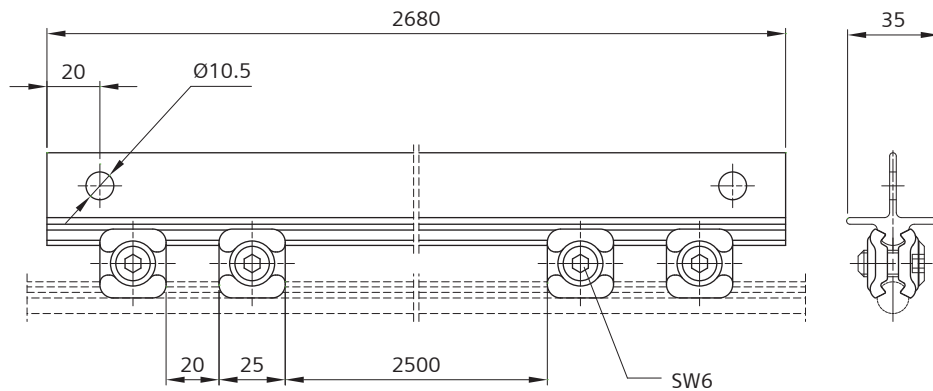


Order no.	8WL4636-0
Designation	Overhead line crossing
Material	
Guide strap	stlSt
Clamping jaws	Cu
Countersunk head screws M10	stlSt
Nuts	stlSt
Weight	1.8 kg

Other lengths on request.

Overhead line crossing

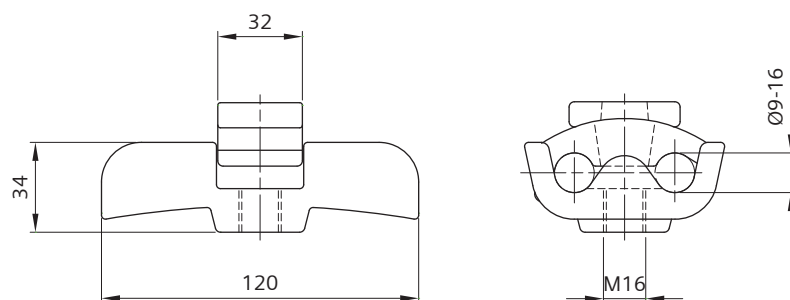
for crossing of contact wires AC-80 to AC-150 acc. to EN 50149



Order no.	8WL4637-0
Designation	Overhead line crossing
Material	
Guide bar	Cu-ETP
Clamping jaws	CuNiSi
Countersunk head screws M10	stlSt
Weight	5.50 kg

Feeder line and earth wire support clamp

for suspending feeder lines and earth wires 50 to 150 mm² made of copper, bronze, aluminium and stainless steel

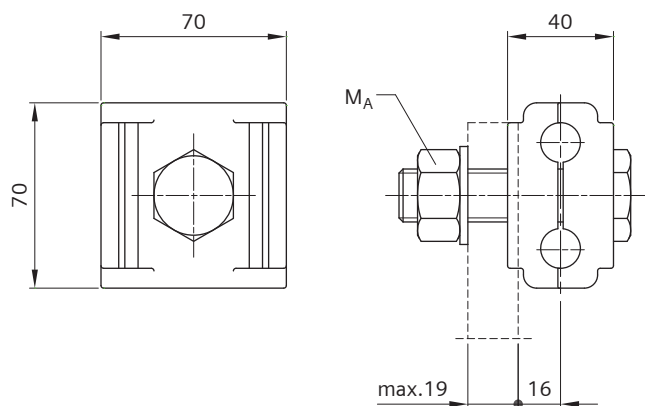


Order no.	8WL4640-0
Designation	Feeder line and earth wire support clamp 50-150
Material	
Clamp body	CuAl
Clamping jaw	CuAl
Equalizer washer	CuAl
Weight	0.30 kg

Corresponding protection sleeves (inside in Al, outside in Cu) have to be used for aluminium wires.

Guide clamp

for guiding of wire on insulator tongue cap, for copper wires 70 and 95 mm² acc. to DIN 43138 or 95 and 120 mm² acc. to DIN 48201



Order no.	8WL4651-0
Designation	Guide clamp 95f
Material	
Clamping jaws	CuZn
Bolt M20	stlSt
Nut, washer	stlSt
Weight	1.19 kg
Tightening torque M_A	145 Nm

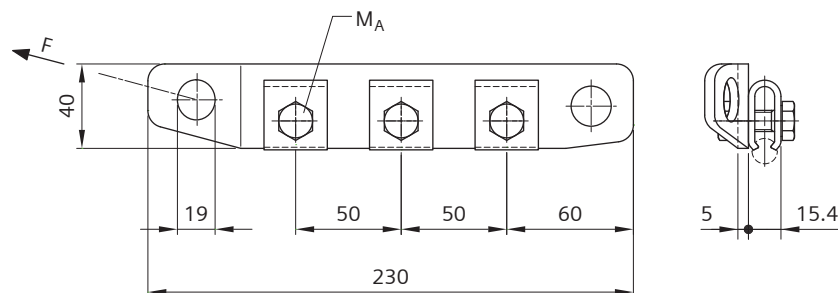
Two protection sleeves must be ordered separately, see page 02-02-21:

8WL1604-3 for wire 70 mm² acc. to DIN 43138 and for wire 95 mm² acc. to DIN 48201

8WL1606-0A for wire 120 mm² acc. to DIN 48201

Bridle suspension dead-end clamp, left-hand

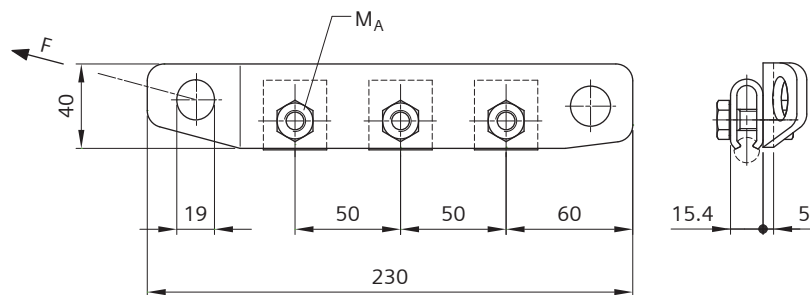
for bridle suspension, for contact wires AC-80 to AC-150 acc. to EN 50149



Order no.	8WL4645-0
Designation	Bridle suspension dead-end clamp, left-hand
Material	
Strap	Cu-ETP
Clamp hoop	CuNiSi
Bolts M10	stlSt
Nuts	stlSt
Weight	0.64 kg
Perm. operating load	5 kN
Min. failing load	15 kN
Tightening torque M_A	32 Nm

Bridle suspension dead-end clamp, right-hand

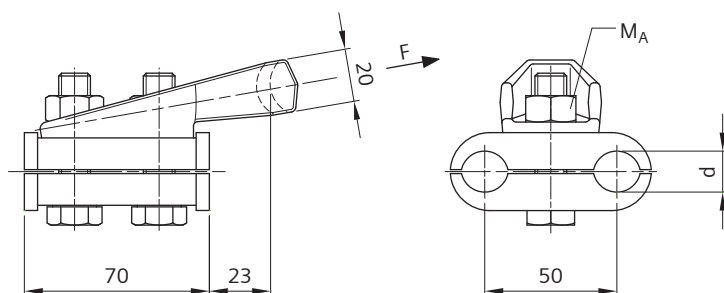
for bridle suspension, for contact wires AC-80 to AC-150 acc. to EN 50149



Order no.	8WL4645-1
Designation	Bridle suspension dead-end clamp, right-hand
Material	
Strap	Cu-ETP
Clamp hoop	CuNiSi
Bolts M10	stlSt
Nuts	stlSt
Weight	0.64 kg
Perm. operating load	5 kN
Min. failing load	15 kN
Tightening torque M_A	32 Nm

Guy clamp

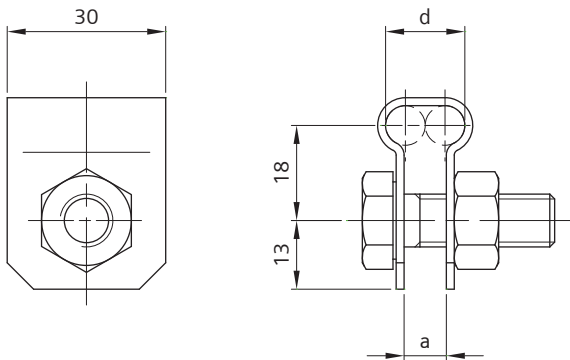
for fixed point on twin catenary wire 120 and 150 mm² acc. to DIN 48201



Order no.	8WL4650-1	8WL4650-0
Designation	Guy clamp 120	Guy clamp 150
Material		
Clamping jaws	CuAl	CuAl
Hoop	CuAl	CuAl
Bolts M12	stlSt	stlSt
Nuts	stlSt	stlSt
Weight	0.77 kg	0.80 kg
Perm. operating load	10 kN	10 kN
Min. failing load	30 kN	30 kN
Tightening torque M_A	56 Nm	56 Nm
d	14 mm	18 mm

Wire clip

for fixing of wire loops around poles, for wires 35 and 50 mm² acc. to DIN 48201



Order no.	8WL4655-0	8WL4655-1
Designation	Wire clip 35	Wire clip 50
Material		
Clip	Cu	Cu
Bolt M10	stlSt	stlSt
Nut	stlSt	stlSt
for wire	35 mm ²	50 mm ²
Weight	0.065 kg	0.070 kg
a	8 mm	10 mm
d	15 mm	18 mm

Chapter 02

Standard Products

Tensioning equipment	01	01-86
Thimbles, connectors, sleeves	02	01-24
GRP cantilevers	03	01-68
Aluminium cantilevers	04	01-80
Steel cantilevers	05	01-42
Headspan supports	06	01-36
Insulators	07	01-34
Contact lines under structures and bridge protection	08	01-42
Clamps	09	01-84
Tension wheel equipment	10	01-48
Section insulators	11	01-34
Disconnectors and drive mechanism	12	01-62
Earthing and protecting equipment	13	01-14
Contact wires, conductors, span wires	14	01-22
Monitoring systems	15	01-06
Installation tools and equipment	16	01-24

Adjusting strap for tension wheel assembly in Γ tunnel	02-10-27
Adjusting strap for tension wheel assembly, Γ asymmetrical	02-10-26
Adjusting strap for tension wheel assembly, Γ symmetrical	02-10-25
Ball socket	02-10-19
Ball with eye	02-10-20
Baseplate for weight set	02-10-36
Clamp for support bar 26	02-10-43
Compression sleeve	02-10-34
Equalizing pulley 75	02-10-22
Equalizing pulley 75 with straps	02-10-17
Equalizing pulley 98 with clevis	02-10-18
Guide strap 32/33.7	02-10-38, 02-10-39
Guy clevis with eye-bolt	02-10-21
Guy clevis with pulley	02-10-23
Hook bolt	02-10-46
Locking ring 36	02-10-44
Locking ring 45	02-10-45
Pulley 200 for tensioning weight guidance	02-10-24
Support bar 22	02-10-42
Support bar 26	02-10-40, 02-10-41
Tension wheel assembly up to 24 kN	02-10-08, 02-10-09, 02-10-10
Tension wheel assembly up to 24 kN (1:1.5) for Γ tubular steel pole	02-10-13
Tension wheel assembly up to 24 kN for Γ tubular steel pole	02-10-12
Tension wheel assembly up to 24 kN on structures	02-10-11
Tension wheel assembly up to 40 kN	02-10-14
Tension wheel assembly up to 40 kN (1:1.5)	02-10-16
Tension wheel assembly up to 40 kN on structures	02-10-15
Tensioning spring 6-10 kN	02-10-47
Tensioning spring 7-12 kN	02-10-48
Weight made of lead	02-10-35
Weight plate	02-10-37
Weight with guide groove, square	02-10-31
Weight with wire guide, square	02-10-32
Weight, circular	02-10-28, 02-10-29, 02-10-30
Weight, hexagon	02-10-33

Technical comments

Application

Tension wheel equipment serve to tension contact wires and/or messenger wires either jointly or separately at the end of each tension section for tensile forces up to a maximum of 40 kN. Tensioning with tension wheel equipment ensures a predetermined, constant tensile force in both contact and catenary wires, irrespective of variations in contact and catenary wire lengths caused by temperature changes. The latching function of the tension wheel equipment engages in case of rupture of contact and/or catenary wire. It minimizes subsequent damage to the catenary system and prevents the weights from falling on the track, side paths, etc.

The tensioning spring serves to tension contact or catenary wires in tensioning sections with tension lengths of up to 180 m in order to compensate for temperature-related changes in the length of the wires. The tensioning spring can be used to apply tension forces up to 12 kN.

Types

Siemens sells tension wheel equipments for the following installation situations:

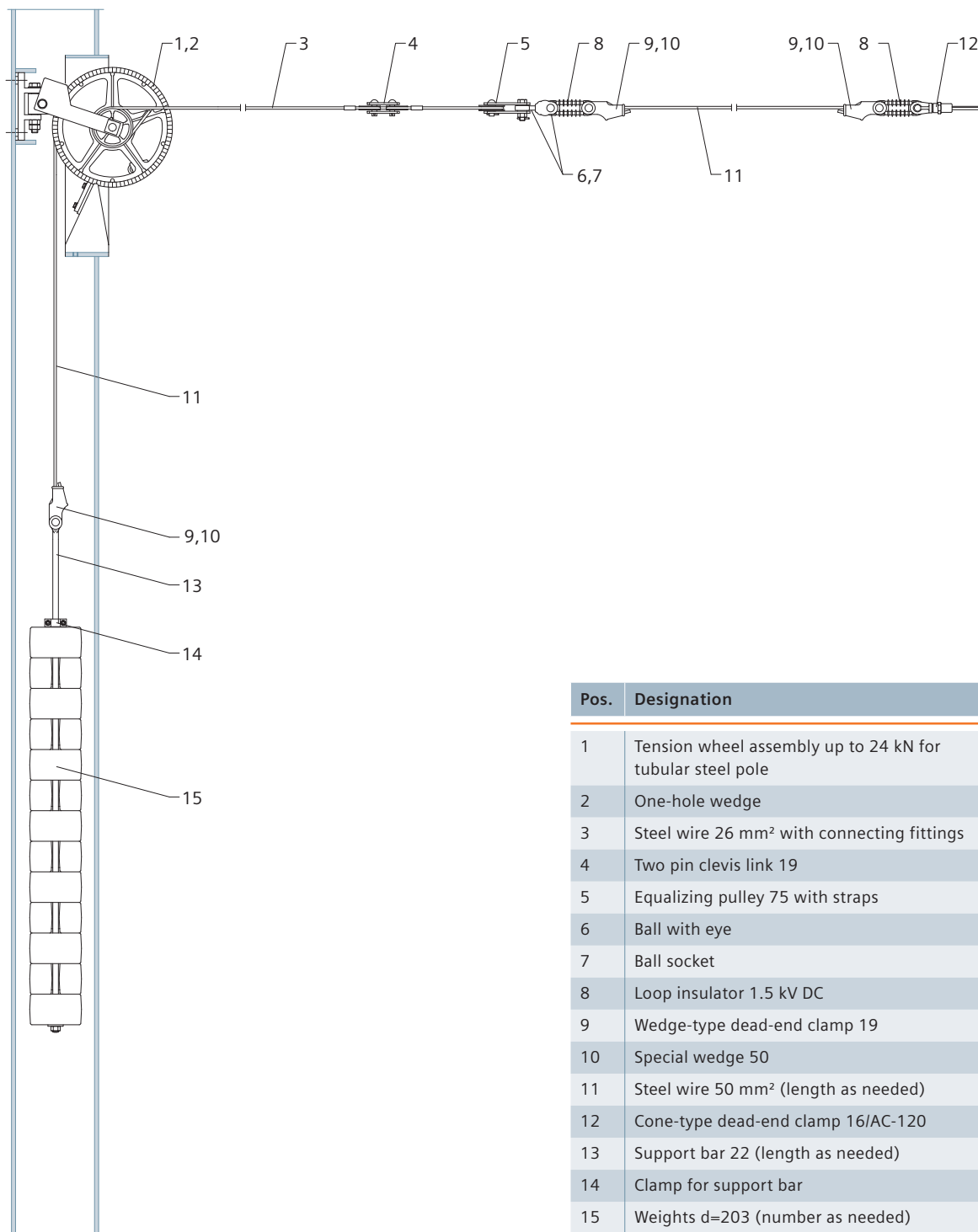
- With mechanical advantage reduction ration 1:3 or 1:1.5
- For tension forces up to 24 kN or up to 40 kN
- On open sections
- In tunnels with cut-outs
- In rectangular tunnels or on straight structures
- On the pole with weights carried externally or internally
- In the pole with weights carried internally
- For narrow installation space
- Fixing on steel or concrete poles

Examples for assemblies

On the following pages you can find a number of typical application examples for the configuration of tension wheel assemblies.

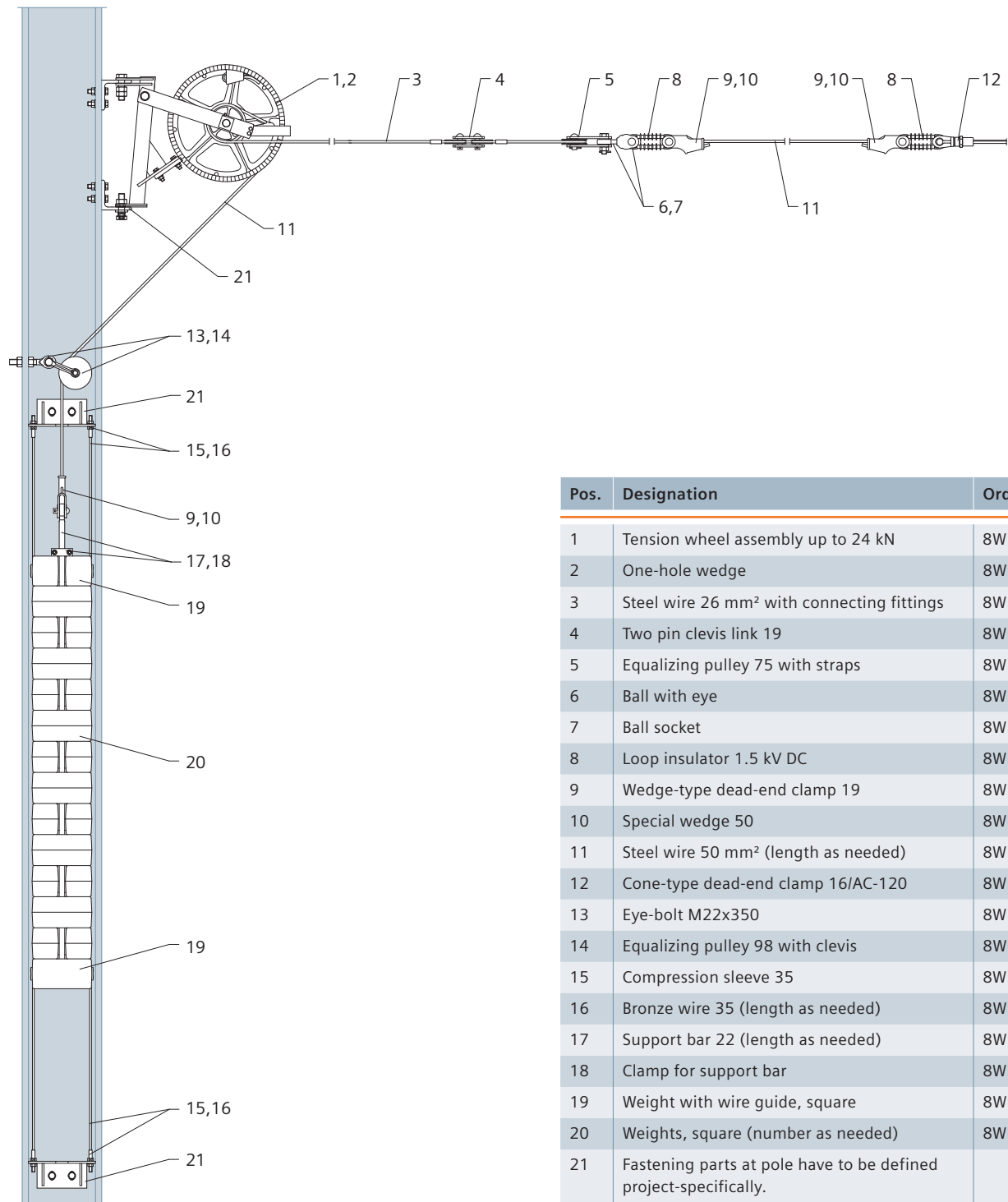
The exact configuration of the tension wheel assembly depends on the specific plant and the local situation.

Flexible termination up to 24 kN in tubular steel pole

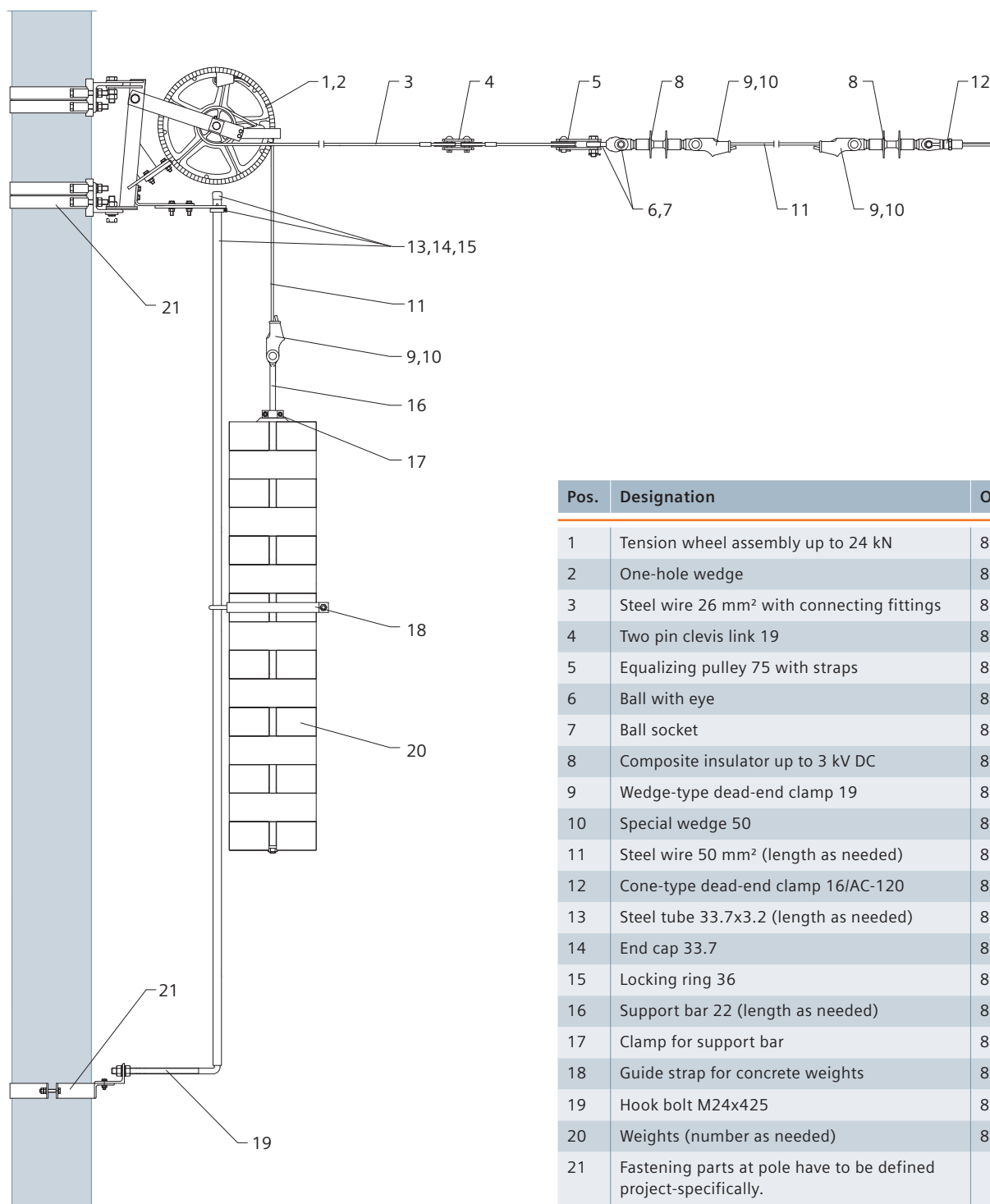


Pos.	Designation	Order no.
1	Tension wheel assembly up to 24 kN for tubular steel pole	8WL5078-2
2	One-hole wedge	8WL1201-0
3	Steel wire 26 mm ² with connecting fittings	8WL7090-1C
4	Two pin clevis link 19	8WL1018-0
5	Equalizing pulley 75 with straps	8WL5160-0
6	Ball with eye	8WL5167-0
7	Ball socket	8WL5165-0
8	Loop insulator 1.5 kV DC	8WL3001-2
9	Wedge-type dead-end clamp 19	8WL1180-7
10	Special wedge 50	8WL1202-3
11	Steel wire 50 mm ² (length as needed)	8WL7090-0
12	Cone-type dead-end clamp 16/AC-120	8WL1237-0
13	Support bar 22 (length as needed)	8WL5155-0
14	Clamp for support bar	8WL5170-0
15	Weights d=203 (number as needed)	8WL5101-0

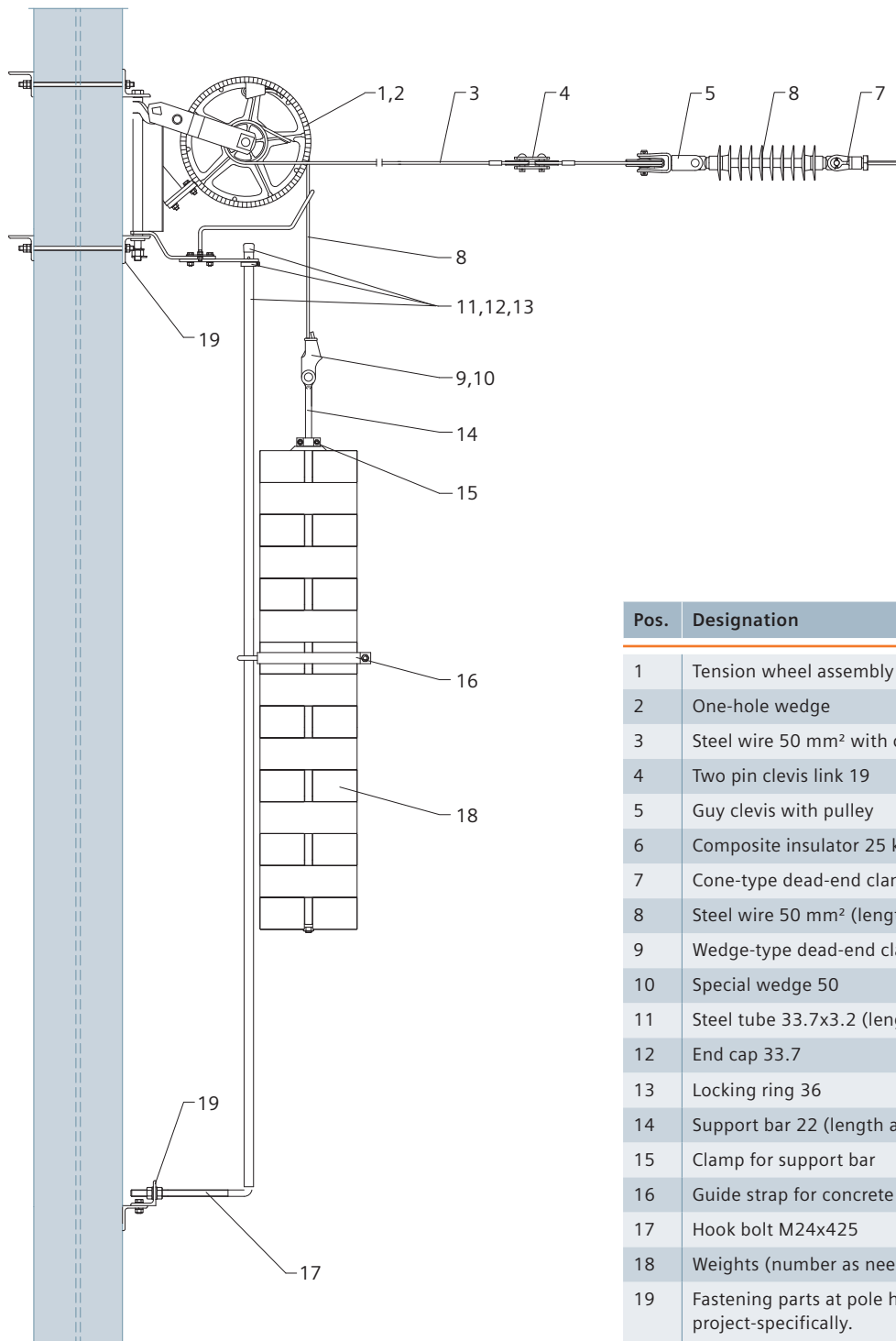
Flexible termination up to 24 kN at HE pole



Flexible termination up to 24 kN at round pole



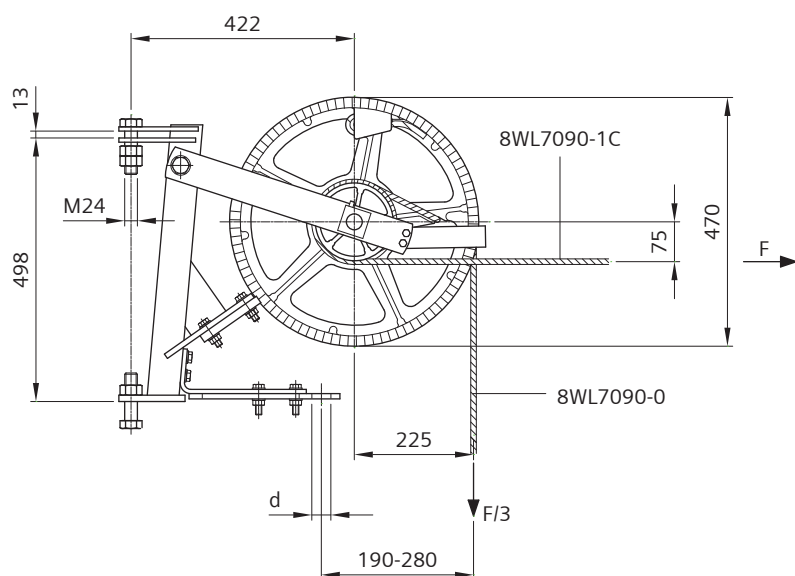
Flexible termination up to 40 kN at HE pole



Pos.	Designation	Order no.
1	Tension wheel assembly up to 40 kN	8WL5070-0B
2	One-hole wedge	8WL1201-0
3	Steel wire 50 mm ² with connecting fittings	8WL7090-0C
4	Two pin clevis link 19	8WL1018-0
5	Guy clevis with pulley	8WL5167-5
6	Composite insulator 25 kV AC	8WL3078-1A
7	Cone-type dead-end clamp 19/AC-120	8WL1237-2
8	Steel wire 50 mm ² (length as needed)	8WL7090-0
9	Wedge-type dead-end clamp 19	8WL1180-7
10	Special wedge 50	8WL1202-3
11	Steel tube 33.7x3.2 (length as needed)	8WL2175-1B
12	End cap 33.7	8WL2184-6
13	Locking ring 36	8WL5173-0
14	Support bar 22 (length as needed)	8WL5155-0
15	Clamp for support bar	8WL5170-0
16	Guide strap for concrete weights	8WL5130-0
17	Hook bolt M24x425	8WL5172-1
18	Weights (number as needed)	8WL5106-0
19	Fastening parts at pole have to be defined project-specifically.	

Tension wheel assembly up to 24 kN

with maintenance-free bush bearings, for automatic tensioning of contact and/or catenary wire at lattice steel or concrete poles, for guide tube up to $d=36$ or 43.5 mm



Order no.	8WL5078-0A	8WL5078-0B
Designation	Tension wheel assembly for guide tube up to $d=36$ mm ¹⁾	Tension wheel assembly for guide tube up to $d=43.5$ mm ²⁾
Material		
Tension wheel	ctAl	ctAl
Suspension	htgSt	htgSt
Swing lever, hoop	htgSt	htgSt
Bolts	stlSt	stlSt
Nuts, washers	stlSt	stlSt
Weight	28.5 kg	28.5 kg
Perm. operating load	24 kN	24 kN
Min. failing load	72 kN	72 kN
Ambient temperature	-40 °C to +48 °C	-40 °C to +48 °C
Mechanical advantage reduction ratio	1:3	1:3
Max. perm. variation of length of contact and catenary wire	1.50 m	1.50 m
d	36 mm	43.5 mm

One wedge 8WL1201-0 (mICI) must be ordered separately, see page 02-01-66.

Steel wires 8WL7090-0 (length as needed) and 8WL7090-1C (L=7.5 m) must be ordered separately, see page 02-14-16.

The tension wheel assemblies can also be supplied with fitted wires.

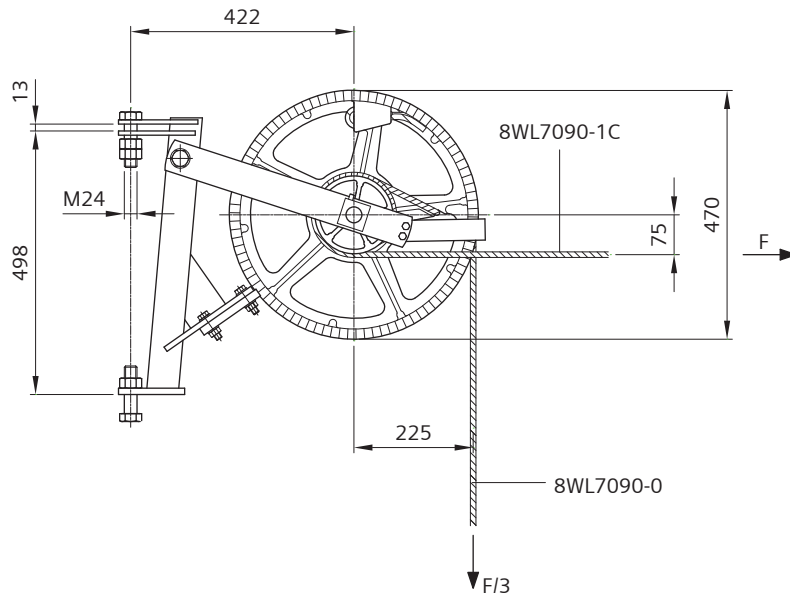
Adapter 8WL5055-3K for fastening at hexagon-section or HE-pole see see page 03-02-12.

¹⁾ Substitute for 8WL5005-0B.

²⁾ Substitute for 8WL5005-0C.

Tension wheel assembly up to 24 kN

with maintenance-free bush bearings, for automatic tensioning of contact and/or catenary wire at lattice steel or concrete poles, without mounting support for guide tube



Order no.	8WL5078-0C
Designation	Tension wheel assembly without mounting support for guide tube
Material	
Tension wheel	ctAl
Suspension	htgSt
Swing lever, hoop	htgSt
Bolts	stlSt
Nuts, washers	stlSt
Weight	28 kg
Perm. operating load	24 kN
Min. failing load	72 kN
Ambient temperature	-40 °C to +48 °C
Mechanical advantage reduction ratio	1:3
Max. perm. variation of length of contact and catenary wire	1.50 m

One wedge 8WL1201-0 (mICI) must be ordered separately, see page 02-01-66.

Steel wires 8WL7090-0 (length as needed) and 8WL7090-1C (L=7.5 m) must be ordered separately, see page 02-14-16.

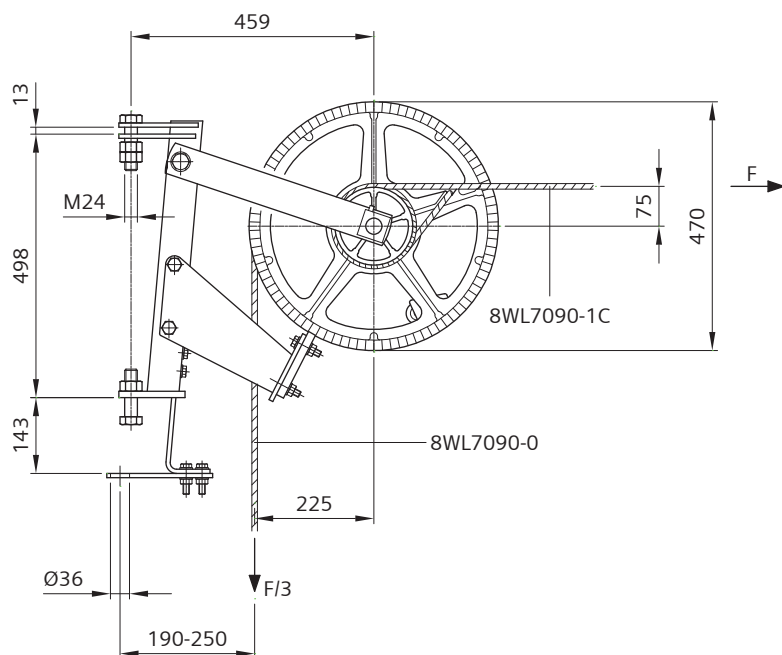
The tension wheel assembly can also be supplied with fitted wires.

Adapter 8WL5055-3K for fastening at hexagon-section or HE-pole see see page 03-02-12.

Substitute for 8WL5050-1.

Tension wheel assembly up to 24 kN

with maintenance-free bush bearings, for automatic tensioning of contact and/or catenary wire at lattice steel or concrete poles, for guide tube up to $d=36$ mm, for narrow installation space



Order no.	8WL5078-1A
Designation	Tension wheel assembly for guide tube up to $d=36$ mm
Material	
Tension wheel	ctAl
Suspension	htgSt
Swing lever	htgSt
Bolts, Nuts	stlSt
Washers	stlSt
Weight	30.5 kg
Perm. operating load	24 kN
Min. failing load	72 kN
Ambient temperature	-40 °C to +48 °C
Mechanical advantage reduction ratio	1:3
Max. perm. variation of length of contact and catenary wire	1.50 m

One wedge 8WL1201-0 (mICI) must be ordered separately, see page 02-01-66.

Steel wires 8WL7090-0 (length as needed) and 8WL7090-1C ($L=7.5$ m) must be ordered separately, see page QUERVERWEIS-NICHT-GEFUNDEN.

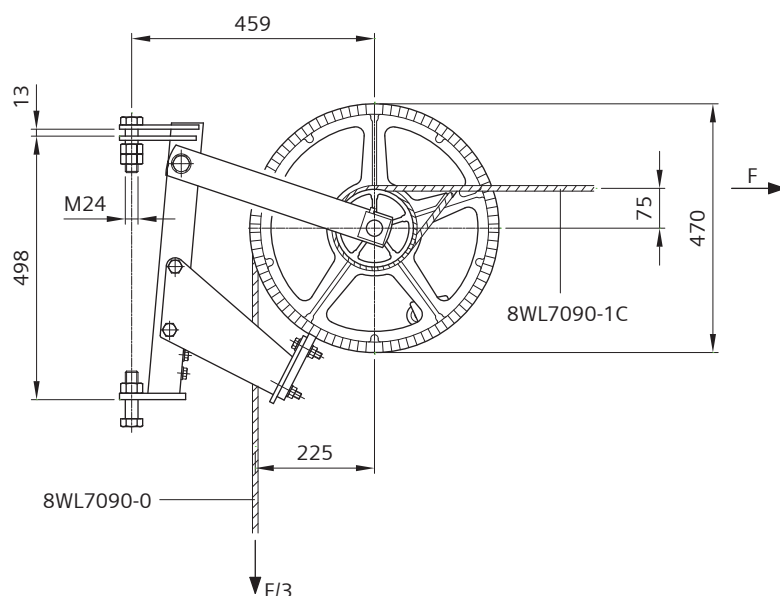
The tension wheel assembly can also be supplied with fitted wires.

Adapter 8WL5055-3K for fastening at hexagon-section or HE-pole see see page 03-02-12.

Substitute for 8WL5020-0.

Tension wheel assembly up to 24 kN on structures

with maintenance-free bush bearings, for automatic tensioning of contact and/or catenary wire on HE-poles or structures, for round weights up to $d=410$ mm or rectangular weights in tunnel



Order no.	8WL5078-1C	8WL5078-1D
Designation	Tension wheel assembly on structures ¹⁾	Tension wheel assembly on structures ²⁾
Material		
Tension wheel	ctAl	ctAl
Suspension	htgSt	stlSt
Swing lever	htgSt	stlSt
Bolts, Nuts	stlSt	stlSt
Washers	stlSt	stlSt
Weight	30 kg	30 kg
Perm. operating load	24 kN	24 kN
Min. failing load	72 kN	72 kN
Ambient temperature	-40 °C to +48 °C	-40°C to +48°C
Mechanical advantage reduction ratio	1:3	1:3
Max. perm. variation of length of contact and catenary wire	1.50 m	1.50 m

One wedge 8WL1201-0 (mICI) must be ordered separately, see page 02-01-66.

Steel wires 8WL7090-0 (length as needed) and 8WL7090-1C (L=7.5 m) must be ordered separately, see page 02-14-16.

The tension wheel assemblies can also be supplied with fitted wires.

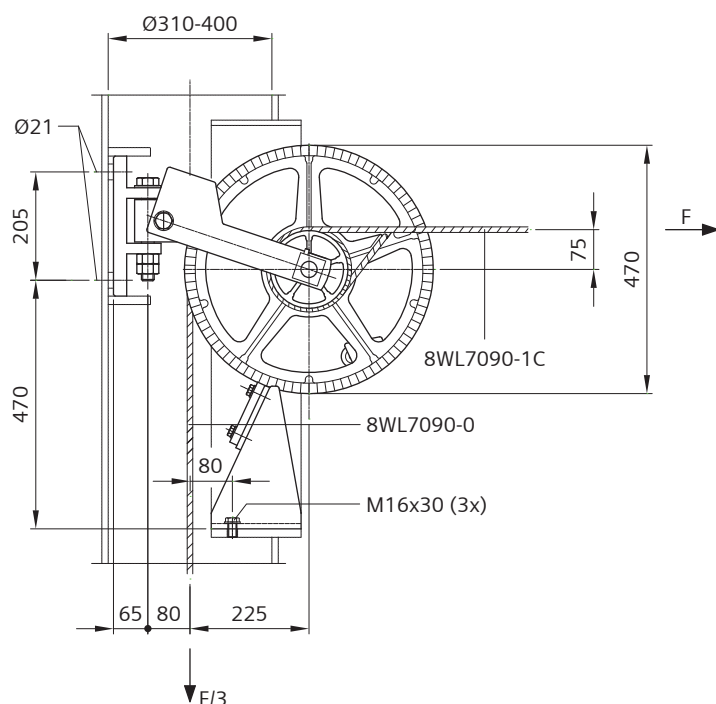
Adapter 8WL5055-3K for fastening at hexagon-section or HE-pole see see page 03-02-12.

¹⁾ Substitute for 8WL5021-0 and 8WL5030-0.

²⁾ Substitute for 8WL5031-0.

Tension wheel assembly up to 24 kN for tubular steel pole

with maintenance-free bush bearings, for automatic tensioning of contact and/or catenary wire, arrangement of weight sets inside the pole



Order no.	8WL5078-2
Designation	Tension wheel assembly for tubular steel pole
Material	
Tension wheel	ctAl
Suspension, swing lever	htgSt
Locking device	htgSt
Bolts, nuts	stlSt
Washers	stlSt
Weight	31.5 kg
Perm. operating load	24 kN
Min. failing load	72 kN
Ambient temperature	-40°C to +48°C
Mechanical advantage reduction ratio	1:3
Max. perm. variation of length of contact and catenary wire	1.50 m

One wedge 8WL1201-0 (mICI) must be ordered separately, see page 02-01-66.

Steel wires 8WL7090-0 (length as needed) and 8WL7090-1C (L=7.5 m) must be ordered separately, see page 02-14-16.

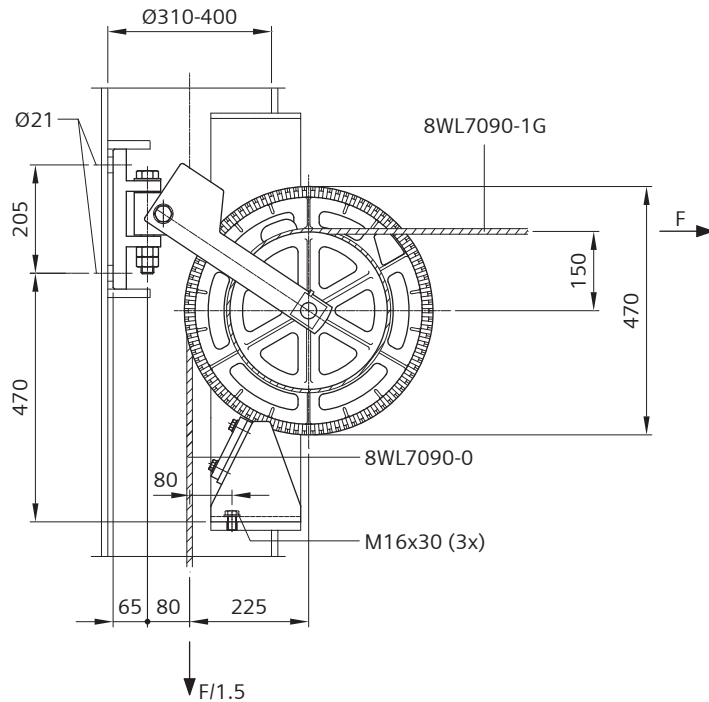
Information about pole construction on request.

The tension wheel assembly can also be supplied with fitted wires.

Substitute for 8WL5010-0.

Tension wheel assembly up to 24 kN (1:1.5) for tubular steel pole

with maintenance-free bush bearings, for automatic tensioning of contact and/or catenary wire, arrangement of weight sets inside the pole



Order no.	8WL5078-3
Designation	Tension wheel assembly for tubular steel pole
Material	
Tension wheel	ctAl
Suspension, swing lever	htgSt
Locking device	htgSt
Bolts, nuts	stlSt
Washers	stlSt
Weight	33.5 kg
Perm. operating load	24 kN
Min. failing load	72 kN
Ambient temperature	-40°C to +48°C
Mechanical advantage reduction ratio	1:1.5
Max. perm. variation of length of contact and catenary wire	2.30 m

One wedge 8WL1201-0 (mICI) must be ordered separately, see page 02-01-66.

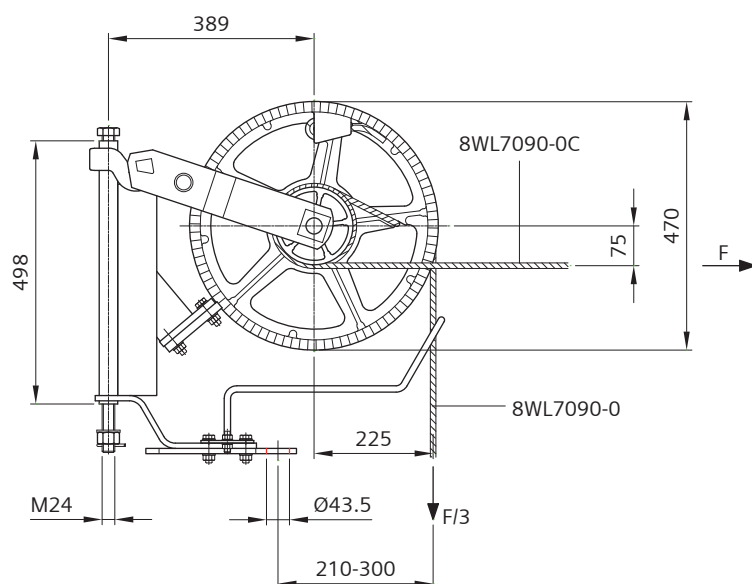
Steel wires 8WL7090-0 (length as needed) and 8WL7090-1G (L=9.5 m) must be ordered separately, see page 02-14-16.

Information about pole construction on request.

The tension wheel assembly can also be supplied with fitted wires.

Tension wheel assembly up to 40 kN

with maintenance-free bush bearings, for automatic tensioning of contact and/or catenary wire at lattice steel or concrete poles, for guide tube up to $d=43.5$ mm



Order no.	8WL5070-0B
Designation	Tension wheel assembly for guide tube up to $d=43.5$ mm
Material	
Tension wheel	ctAl
Suspension, swing lever	htgSt
Hoop, bolts	stlSt
Nuts, washers	stlSt
Weight	32.5 kg
Perm. operating load	40 kN
Min. failing load	120 kN
Ambient temperature	-40 °C to +48 °C
Mechanical advantage reduction ratio	1:3
Max. perm. variation of length of contact and catenary wire	1.50 m

One wedge 8WL1201-0 (mICI) must be ordered separately, see page 02-01-66.

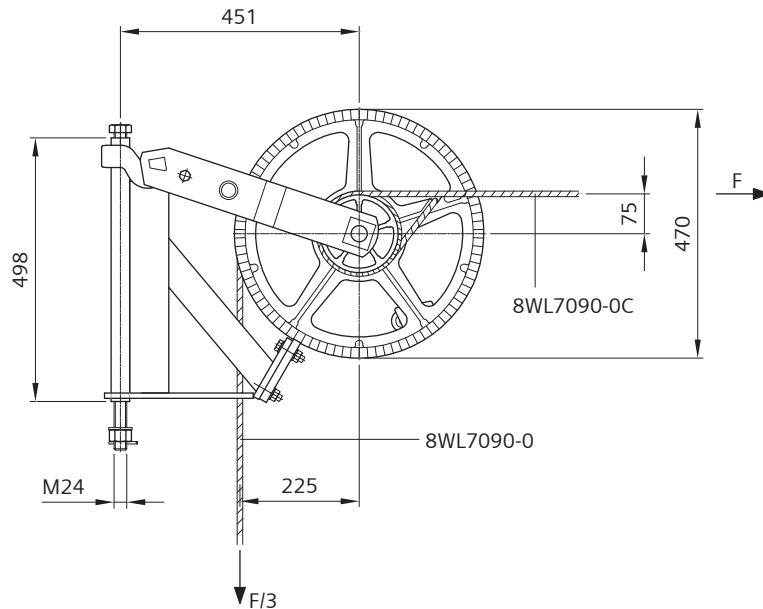
Steel wires 50 mm² 8WL7090-0 (length as needed) and 8WL7090-0C (L=7.5 m) must be ordered separately, see page 02-14-16.

The tension wheel assembly can also be supplied with fitted wires.

Substitute for 8WL5000-0B and 8WL5000-0C.

Tension wheel assembly up to 40 kN on structures

with maintenance-free bush bearings, for automatic tensioning of contact and/or catenary wire on HE-poles or structures, for round weights up to $d=410$ mm or rectangular weights in tunnel



Order no.	8WL5070-1
Designation	Tension wheel assembly on structures
Material	
Tension wheel	ctAl
Suspension	htgSt
Swing lever	htgSt
Bolts	stlSt
Nuts	stlSt
Washers	stlSt
Weight	31 kg
Perm. operating load	40 kN
Min. failing load	120 kN
Ambient temperature	-40 °C to +48 °C
Mechanical advantage reduction ratio	1:3
Max. perm. variation of length of contact and catenary wire	1.50 m

One wedge 8WL1201-0 (mICI) must be ordered separately, see page 02-01-66.

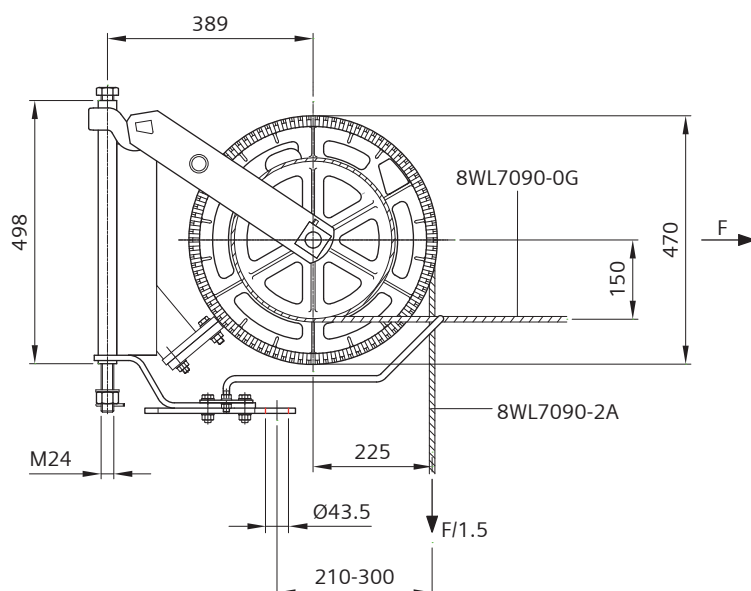
Steel wires 50 mm² 8WL7090-0 (length as needed) and 8WL7090-0C (L=7.5 m) must be ordered separately, see page 02-14-16.

The tension wheel assembly can also be supplied with fitted wires.

Substitute for 8WL5050-0.

Tension wheel assembly up to 40 kN (1:1.5)

with maintenance-free bush bearings, for automatic tensioning of contact and/or catenary wire at lattice steel or concrete poles, for guide tube up to $d=43.5$ mm



Order no.	8WL5071-0B
Designation	Tension wheel assembly for guide tube up to $d=43.5$ mm
Material	
Tension wheel	ctAl
Suspension	htgSt
Swing lever, hoop	htgSt
Bolts	stlSt
Nuts	stlSt
Washers	stlSt
Weight	37.9 kg
Perm. operating load	40 kN
Min. failing load	120 kN
Ambient temperature	-40°C to +48°C
Mechanical advantage reduction ratio	1:1.5
Max. perm. variation of length of contact and catenary wire	2.30 m

One wedge 8WL1201-0 (mICI) must be ordered separately, see page 02-01-66.

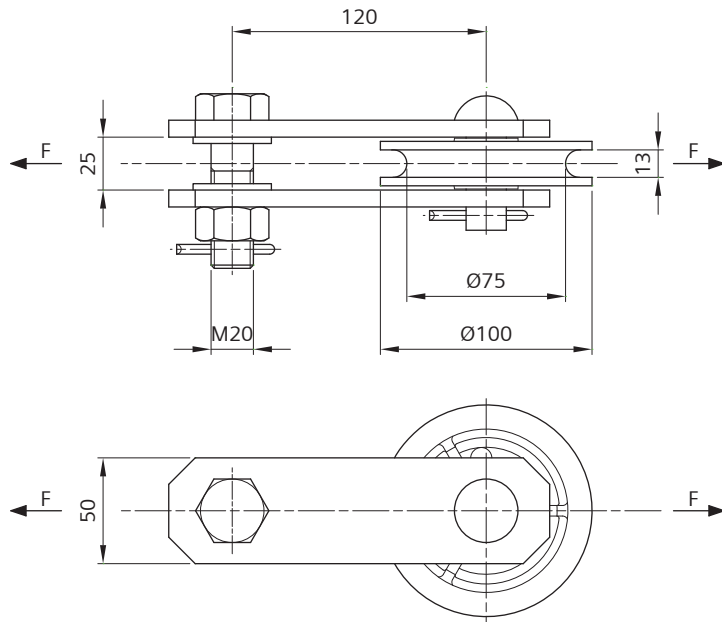
Steel wires 8WL7090-0G (L=9.5 mm) and 8WL7090-2A (L=5.83 m) must be ordered separately, see page 02-14-16.

The tension wheel assembly can also be supplied with fitted wires.

Further types on request.

Equalizing pulley 75 with straps

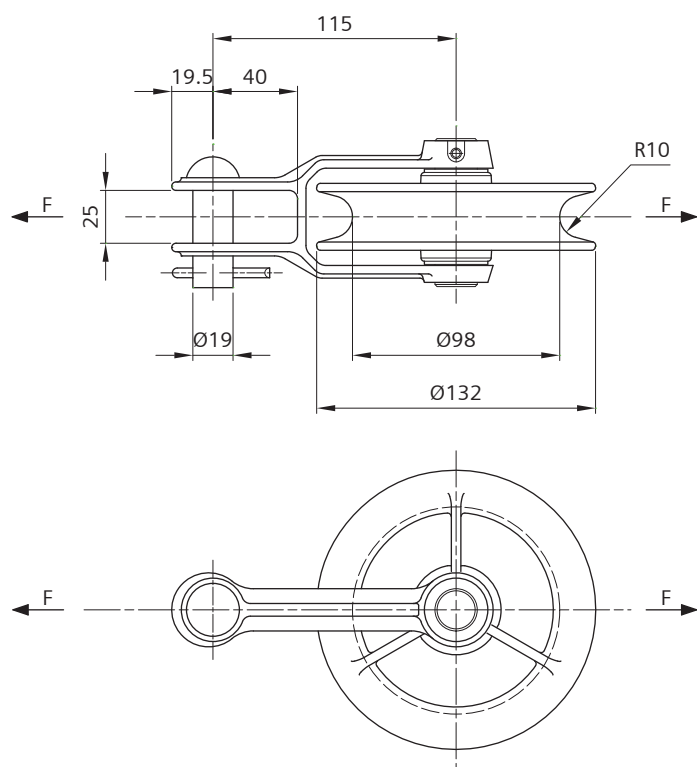
for connection of tension wheel assembly with contact or catenary wire, for steel wire 8WL7090-0/-0A and 8WL7090-1C/-1G



Order no.	8WL5160-0
Designation	Equalizing pulley 75
Material	
Pulley	mICI
Straps	htgSt
Bolt M20	htgSt
Nut	htgSt
Washers	htgSt
Pin 19x52	htgSt
Split pins 5x28	Cu
Weight	2.16 kg
Perm. operating load	32 kN
Min. failing load	96 kN

Equalizing pulley 98 with clevis

as running or load-equalizing pulley between contact and catenary wire when being tensioned in common, pulley with self-lubricating and maintenance-free sliding bearings



Order no.	8WL5162-1A
Designation	Equalizing pulley 98
Material	
Pulley	CuAl
Dropper strap	CuAl
Axle	stlSt
Flange bushing	Bronze+PTFE
Pin 19x52	stlSt
Split pin 5x28	Cu
Prestressed sleeve	stlSt
Weight	1.58 kg
Perm. operating load	20 kN
Min. failing load	60 kN

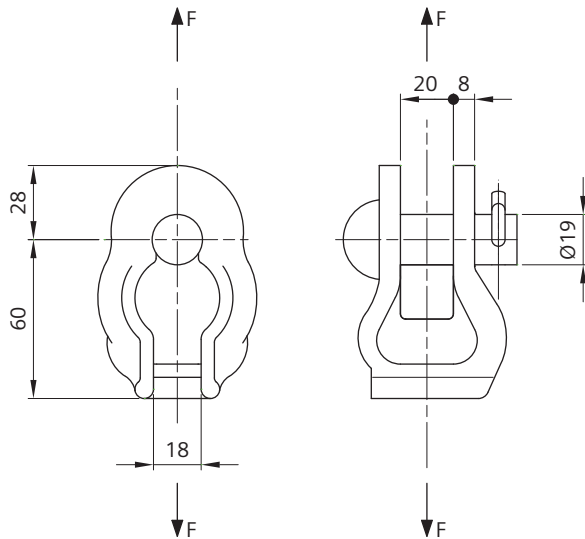
Installation note:

The load transmission should happen central. If necessary, use washers.

Substitute for 8WL5162-1.

Ball socket

for connection of contact or catenary wire and equalizing pulley with tension wheel assembly



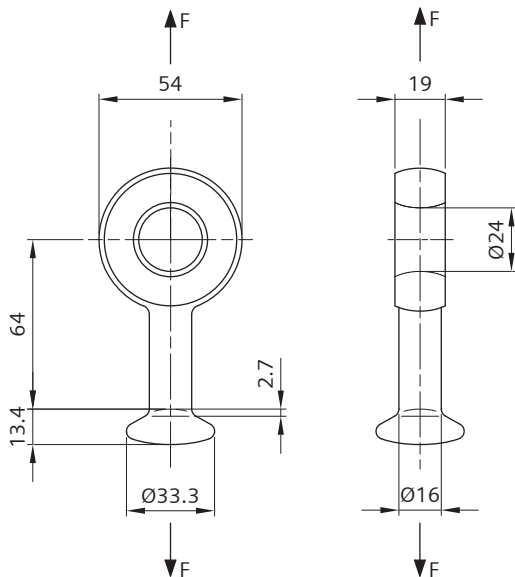
Order no.	8WL5165-0
Designation	Ball socket
Material	
Ball socket	mICI
Pin 19x52	htgSt
Beta-Split pin	stlSt
Weight	0.67 kg
Perm. operating load	32 kN
Min. failing load	96 kN

To be used with ball with eye 8WL5167-0 only.

The connection to the overhead contact line allow to turn out contact or catenary wire in an unloaded but assembled state.

Ball with eye

for connection of contact or catenary wire and equalizing pulley with tension wheel assembly



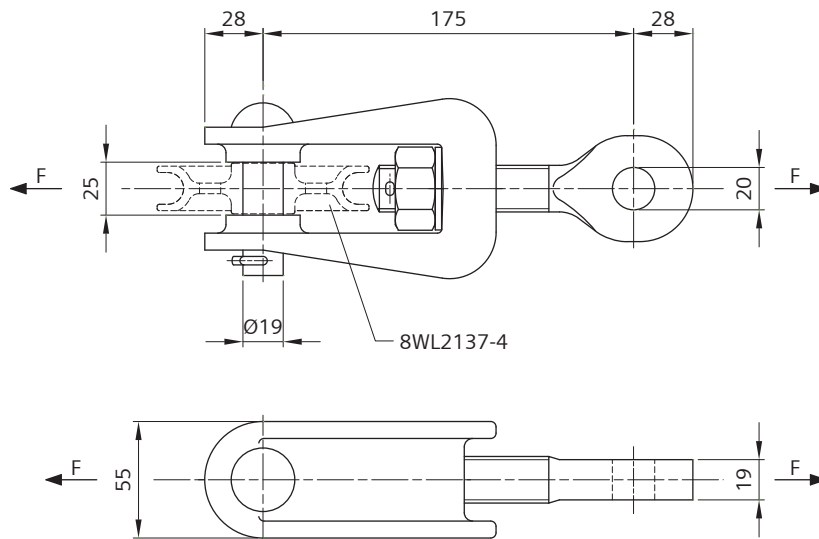
Order no.	8WL5167-0
Designation	Ball with eye
Material	htgSt
Weight	0.36 kg
Perm. operating load	32 kN
Min. failing load	96 kN

To be used with ball socket 8WL5165-0 only.

The connection to the overhead contact line allows to turn out contact or catenary wire in an unloaded but assembled state.

Guy clevis with eye-bolt

for connection of contact or catenary wire and equalizing pulley with tension wheel assembly

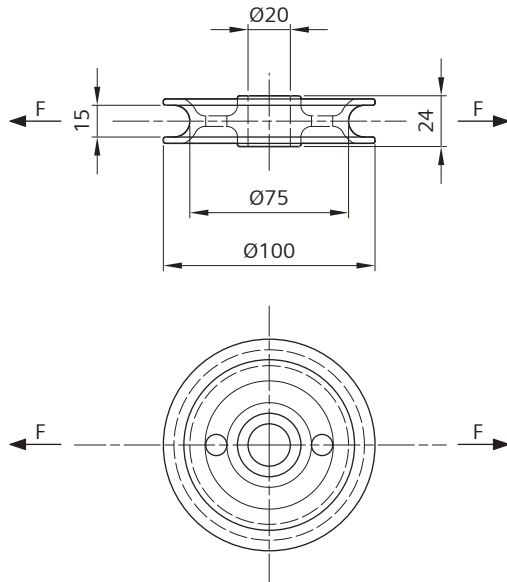


Order no.	8WL5167-4
Designation	Guy clevis with eye-bolt
Material	
Guy clevis	ctAl
Eye-bolt M22	htgSt
Nut, washer	stlSt
Pin 19x70	htgSt
Split pin 5x28	stlSt
Beta-Split pin	stlSt
Weight	1.22 kg
Perm. operating load	27 kN
Min. failing load	81 kN

Pulley 8WL2137-4 must be ordered separately, see page 02-10-22.

Equalizing pulley 75

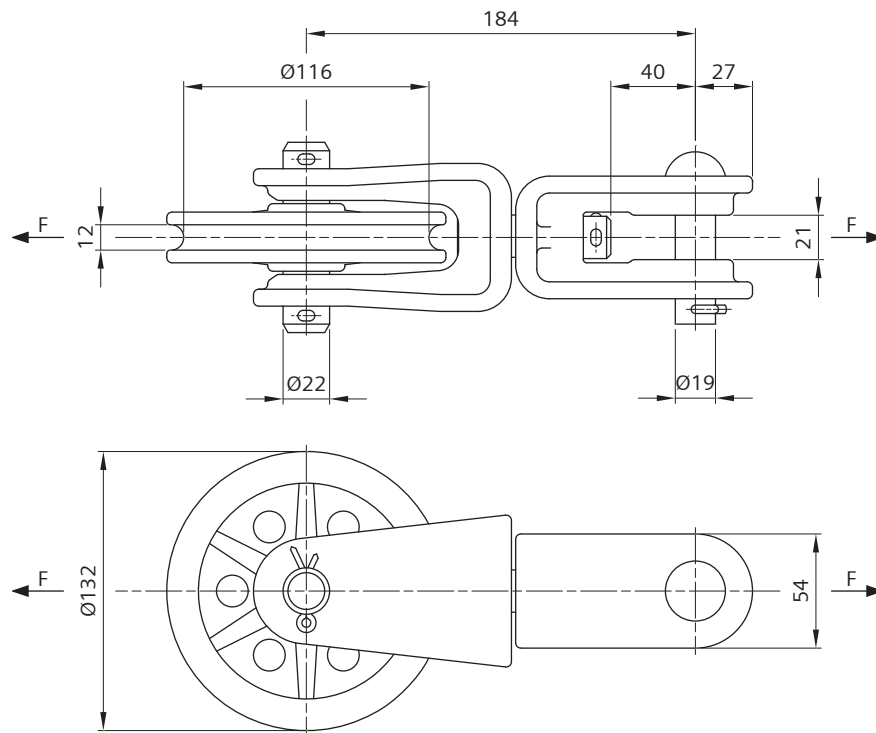
for connection of contact or catenary wire and guy clevis 8WL5167-4 with tension wheel assembly, for steel wire 8WL7090-0/-0A nd 8WL7090-1C/-1G



Order no.	8WL2137-4
Designation	Equalizing pulley 75
Material	ctAl
Weight	0.16 kg
Perm. operating load	27 kN
Min. failing load	81 kN

Guy clevis with pulley

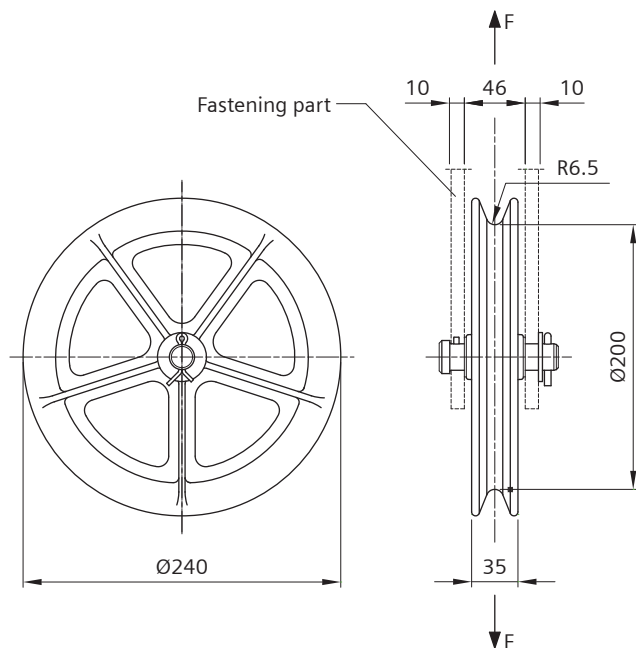
for connection of contact or catenary wire with tension wheel assembly up to 40 kN, for steel wire
8WL7090-0C/-0G



Order no.	8WL5167-5
Designation	Guy clevis with pulley
Material	
Guy clevis	mICI
Pulley	mICI
Pin Ø22	htgSt
Pin 19x70	htgSt
Bolt, washer	stlSt
Split pins 5x28	stlSt
Beta-Split pin	stlSt
Weight	4.42 kg
Perm. operating load	45 kN
Min. failing load	135 kN

Pulley 200 for tensioning weight guidance

for tension wheel assemblies in tunnel, pulley with self-lubricating and maintenance-free sliding bearings



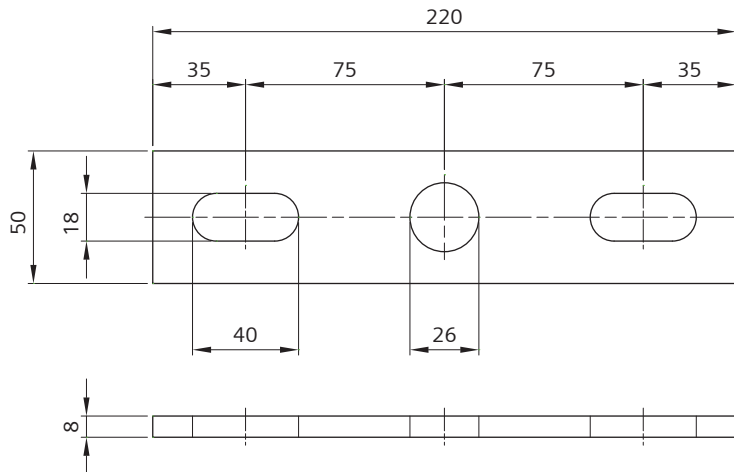
Order no.	8WL5168-0A
Designation	Pulley 200
Material	
Pulley	ctAl
Axle	stlSt
Plain bearings	Plastic
Washer	stlSt
Parallel pin	stlSt
Split pin 5x28	Cu
Weight	1.30 kg
Perm. operating load	21.3 kN
Min. failing load	64 kN

The fastening part has to be defined project-specifically.

Substitute for 8WL5168-0.

Adjusting strap for tension wheel assembly, symmetrical

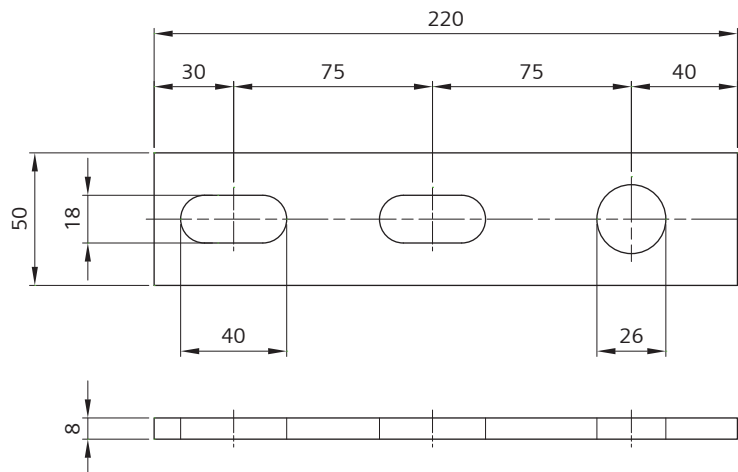
for perpendicular adjusting the axle of the tension wheel assembly at the fixing element



Order no.	8WL5006-1A
Designation	Adjusting strap for tension wheel assembly, symmetrical
Material	htgSt
Weight	0.59 kg

Adjusting strap for tension wheel assembly, asymmetrical

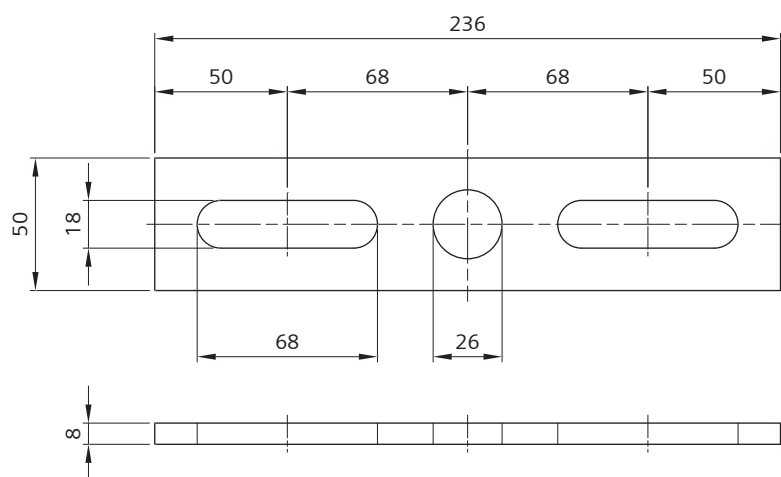
for perpendicular adjusting the axle of the tension wheel assembly at the fixing element



Order no.	8WL5006-2A
Designation	Adjusting strap for tension wheel assembly, asymmetrical
Material	htgSt
Weight	0.59 kg

Adjusting strap for tension wheel assembly in tunnel

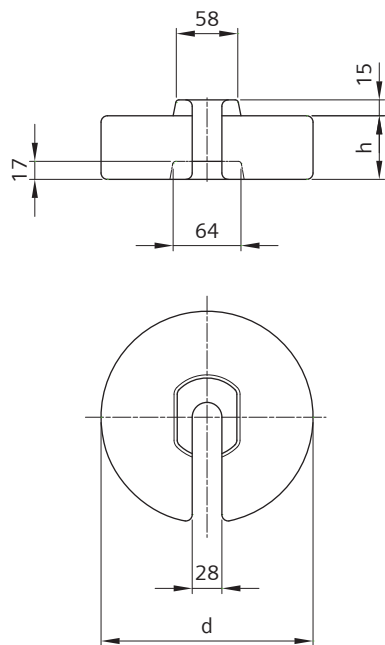
for perpendicular adjusting the axle of the tension wheel assembly at the fixing element



Order no.	8WL5006-3A
Designation	Adjusting strap for tension wheel assembly in tunnel
Material	htgSt
Weight	0.74 kg

Weight, circular

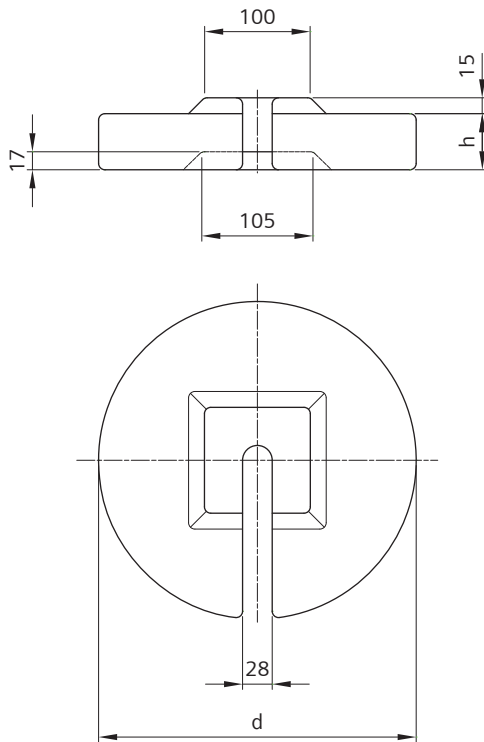
for weight sets of tension wheel assemblies



Order no.	8WL5100-0	8WL5101-0
Designation	Weight	Weight
Material	GG, coated with zinc powder paint (grey)	GG, coated with zinc powder paint (grey)
Weight	12.5 kg (±0.3 kg)	25.0 kg (±0.5 kg)
d	200 mm	203 mm
h	60 mm	120 mm

Weight, circular

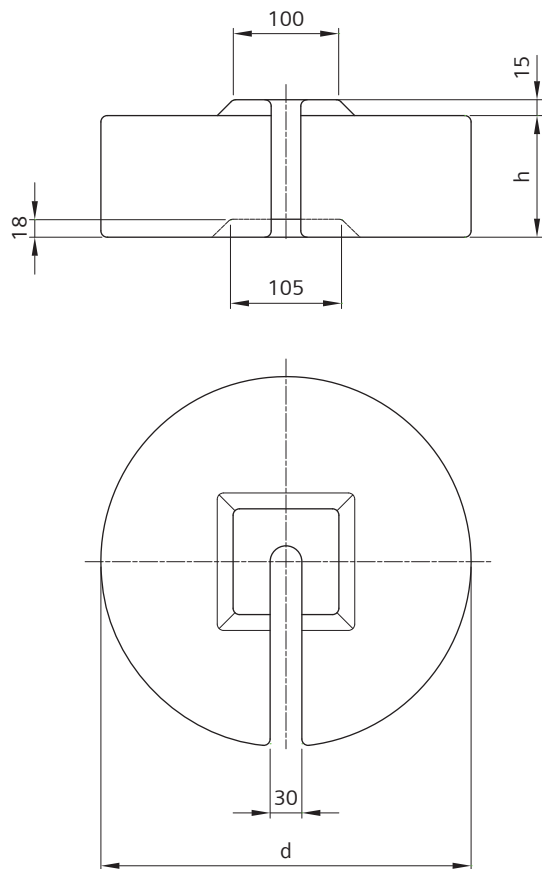
for weight sets of tension wheel assemblies



Order no.	8WL5102-0	8WL5103-0	8WL5104-0
Designation	Weight	Weight	Weight
Material	GG, coated with zinc powder paint (grey)	GG, coated with zinc powder paint (grey)	GG, coated with zinc powder paint (grey)
Weight	12.5 kg (± 0.3 kg)	25.0 kg (± 0.5 kg)	50.0 kg (± 1.0 kg)
d	300 mm	300 mm	410 mm
h	26 mm	53 mm	55 mm

Weight, circular

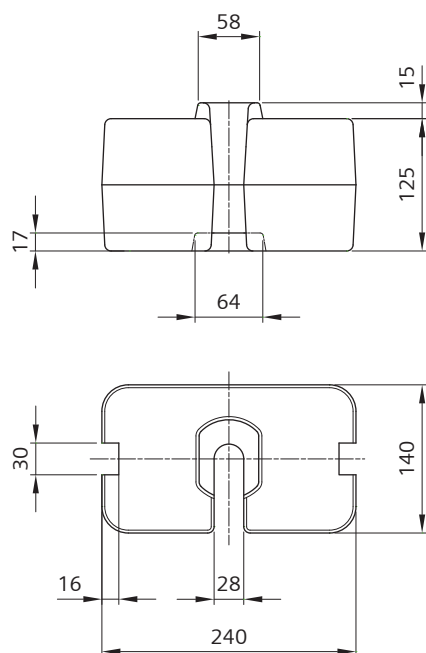
for weight sets of tension wheel assemblies



Order no.	8WL5106-0	8WL5106-1
Designation	Weight	Weight, circular
Material	Concrete B25	Concrete B25
Weight	25.0 kg (±0.5 kg)	25.0 kg (±0.5 kg)
d	350 mm	410 mm
h	115 mm	84 mm

Weight with guide groove, square

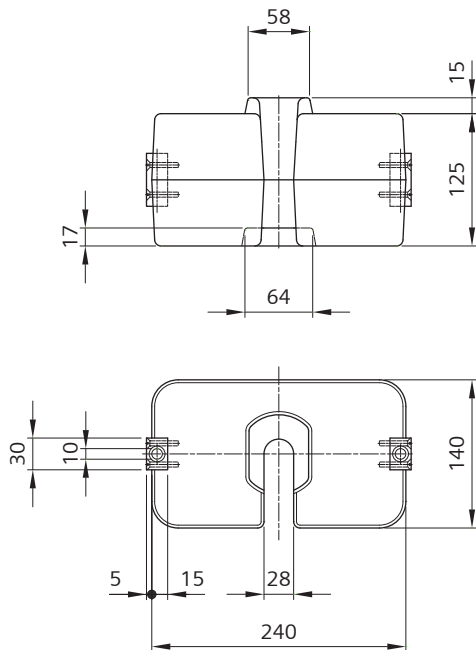
for weight sets of tension wheel assemblies in poles from HE-B/M320



Order no.	8WL5110-1
Designation	Weight
Material	GG, coated with zinc powder paint (grey)
Weight	25.0 kg (± 0.5 kg)

Weight with wire guide, square

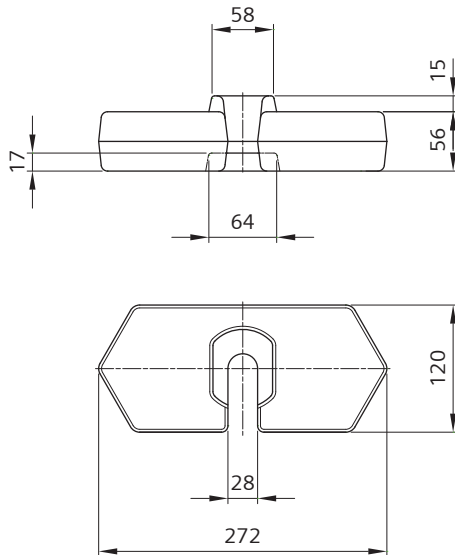
for weight sets of tension wheel assemblies in HE-B/M320 poles, wire guide for bronze wire d=7.5 mm



Order no.	8WL5110-4
Designation	Weight
Material	
Weight	GG, coated with zinc powder paint (grey)
Wire guide	CuZn
Countersunk head screws M6	stlSt
Weight	25.0 kg (±0.5 kg)

Weight, hexagon

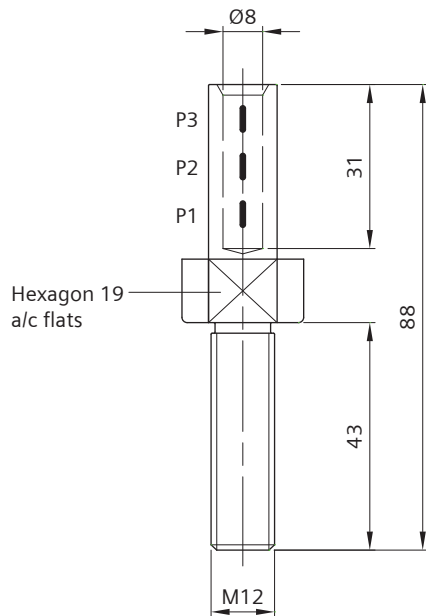
for weight sets of tension wheel assemblies in hexagon-section poles



Order no.	8WL5110-5A
Designation	Weight
Material	GG, coated with zinc powder paint (grey)
Weight	10.0 kg (± 0.25 kg)

Compression sleeve

for weight sets of tension wheel assemblies in HE-B/M poles, for bronze wires 35 mm² acc. to DIN 48201

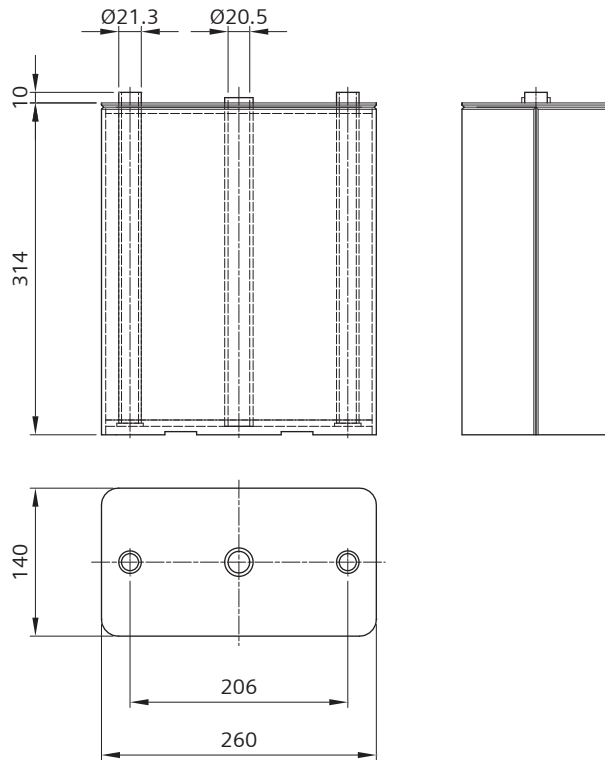


Order no.	8WL4597-2
Designation	Compression sleeve 35
Material	CuAl
Weight	0.083 kg
Pressing die	8WL7154-0
Pressing markings	P1 to P3

Pressing according to markings (following P1 to P3).

Weight made of lead

for weight sets of tension wheel assemblies in HE-B/M320 pole



Order no.	8WL5110-7A
Designation	Weight
Material	
Casing	stlSt
Filling	Lead
Weight	110 kg (±3 kg)

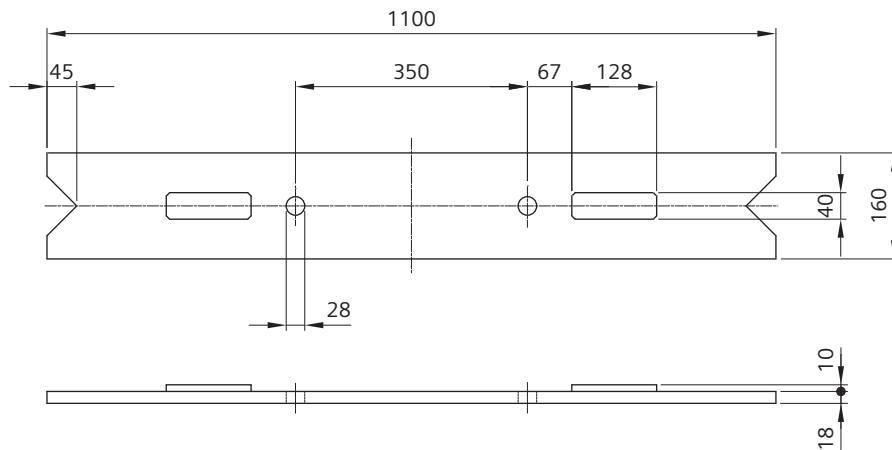
Support bar DIN 975-M16-stlSt (length depending on the number of weights used) must be ordered separately.

Substitute for 8WL5110-7.

Other weights on request.

Baseplate for weight set

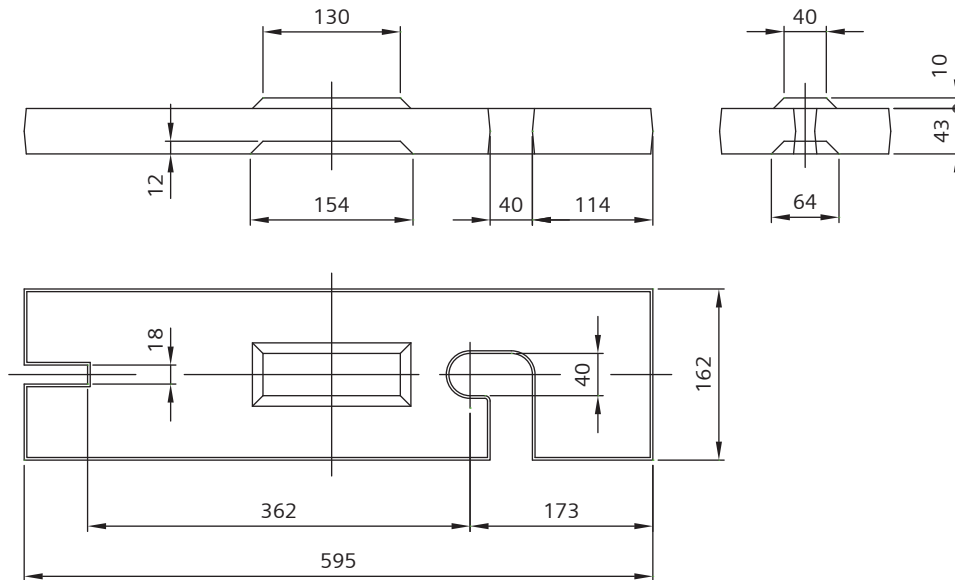
for tension wheel assemblies in tunnel



Order no.	8WL5112-0
Designation	Baseplate for weight set
Material	htgSt
Weight	25.7 kg

Weight plate

for weight sets of tension wheel assemblies

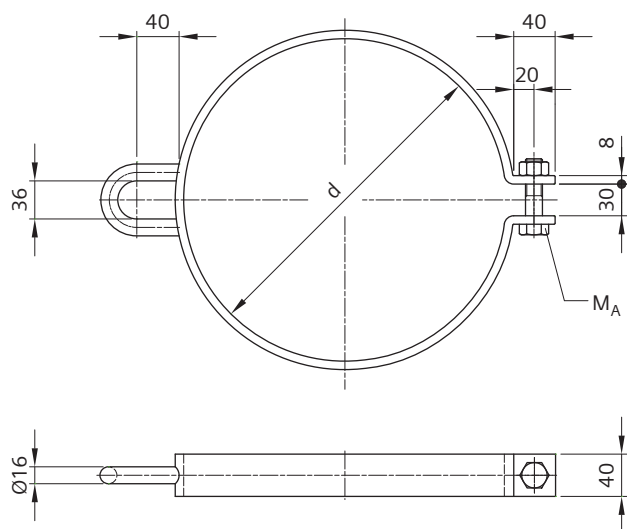


Order no.	8WL5112-1
Designation	Weight plate
Material	GG, coated with zinc powder paint (grey)
Weight	26.5 kg (± 0.5 kg)

Details about tensioning weight guidance on request.

Guide strap 32/33.7

for guide tube made of steel d=32 and 33.7 mm (1")

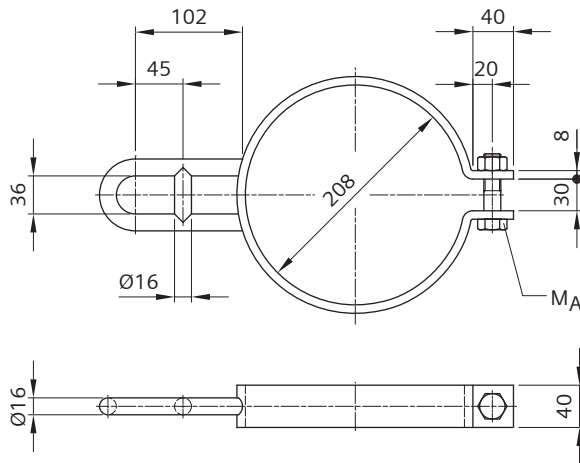


Order no.	8WL5134-0	8WL5130-0	8WL5133-0
Designation	Guide strap for cast iron weights 8WL5104-0	Guide strap for concrete weights 8WL5106-0	Guide strap for cast iron weights 8WL5102-0 and 8WL5103-0
Material			
Clamp	htgSt	htgSt	htgSt
Bolt M16	htgSt	htgSt	htgSt
Nut	htgSt	htgSt	htgSt
Weight	3.80 kg	3.32 kg	3.08 kg
Tightening torque M_A	60 Nm	60 Nm	60 Nm
d	415 mm	355 mm	305 mm

Guide straps for tube 42/42.4 mm or made of stainless steel on request.

Guide strap 32/33.7

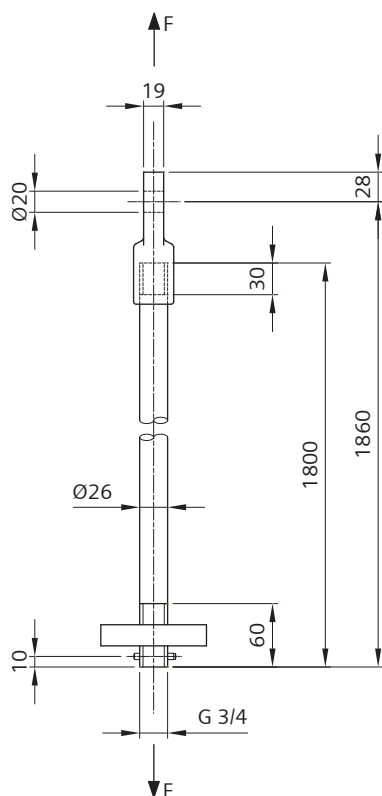
for guide tube made of steel $d=32$ and 33.7 mm (1"), for cast iron weights 8WL5100-0 and 8WL5101-0



Order no.	8WL5131-0
Designation	Guide strap
Material	
Clamp	htgSt
Bolt M16	htgSt
Nut	htgSt
Weight	2.54 kg
Tightening torque M_A	60 Nm

Support bar 26

for arrangement of weight sets on tension wheel assembly, for concrete weights 8WL5106-0 (max. 13 weights)
or cast iron weights 8WL5102-0, 8WL5103-0, 8WL5104-0

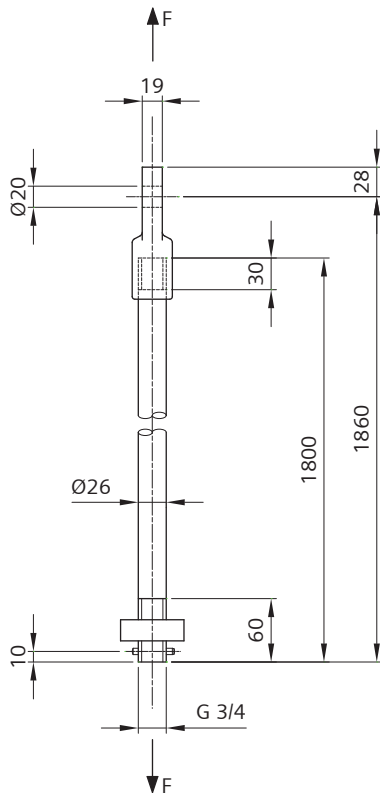


Order no.	8WL5148-0
Designation	Support bar 26 L=1860
Material	
Tongue end fitting	ctAl
Tube 26x3.5	Al
Plate 20x100x100	Al
Grooved pin	stlSt
Weight	1.94 kg
Perm. operating load	10 kN
Min. failing load	30 kN

Other lengths on request.

Support bar 26

for arrangement of weight sets on tension wheel assembly, for concrete weights 8WL5100-0, 8WL5101-0, 8WL5110-1, 8WL5110-4 and 8WL5110-5A

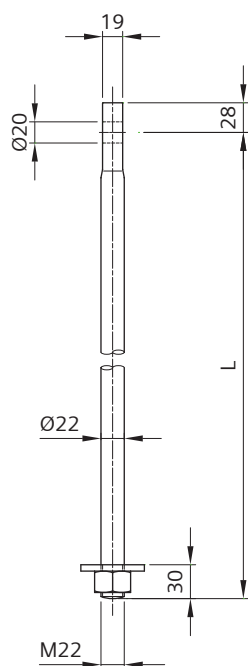


Order no.	8WL5148-8
Designation	Support bar 26 L=1860
Material	
Tongue end fitting	ctAl
Tube 26x3.5	Al
Plate 20x50x50	Al
Grooved pin	stlSt
Weight	1.54 kg
Perm. operating load	10 kN
Min. failing load	30 kN

Other lengths on request.

Support bar 22

for arrangement of weight sets on tension wheel assembly, for cast iron weights 8WL5101-0 or 8WL5100-0

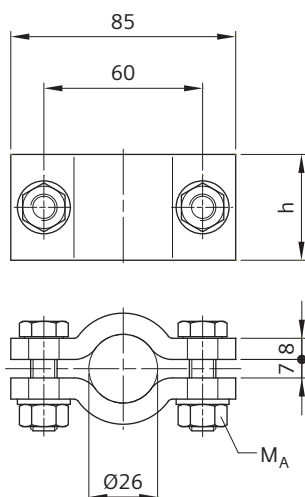


Order no.	8WL5150-0	8WL5152-0	8WL5154-0	8WL5155-0	8WL5157-0
Designation	Support bar 22	Support bar 22	Support bar 22	Support bar 22	Support bar 22
Material					
Bar	htgSt	htgSt	htgSt	htgSt	htgSt
Plate 6x60x60	htgSt	htgSt	htgSt	htgSt	htgSt
Nut	htgSt	htgSt	htgSt	htgSt	htgSt
Weight	3.0 kg	4.6 kg	5.9 kg	6.0 kg	7.8 kg
Weight 8WL5101-0	max. 8	max. 11	max. 14	max. 15	max. 20
Weight 8WL5100-0	max. 16	max. 22	max. 28	max. 31	max. 41
L	1000 mm	1400 mm	1800 mm	2000 mm	2600 mm

Other lengths on request.

Clamp for support bar 26

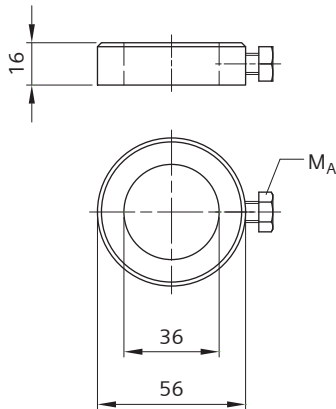
for securing weights, for steel or aluminium tube up to $d=26$ mm



Order no.	8WL5170-0	8WL5170-1
Designation	Clamp for support bar 26	Clamp for support bar 26
Material		
Clamp	htgSt	Al
Bolts M10x35	htgSt	stlSt
Nuts, washers	htgSt	htgSt
Weight	0.39 kg	0.24 kg
Tightening torque M_A	32 Nm	32 Nm
h	30 mm	40 mm

Locking ring 36

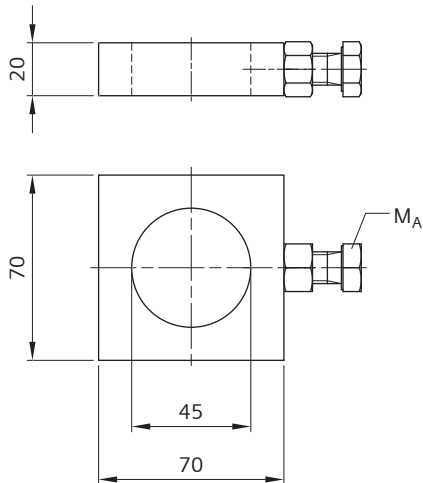
for securing the upper end of the guide tube made of steel d=32 and 33.7 mm (1")



Order no.	8WL5173-0
Designation	Locking ring 36
Material	
Locking ring	htgSt
Hexagon bolt M8	stlSt
Weight	0.19 kg
Tightening torque M_A	16 Nm

Locking ring 45

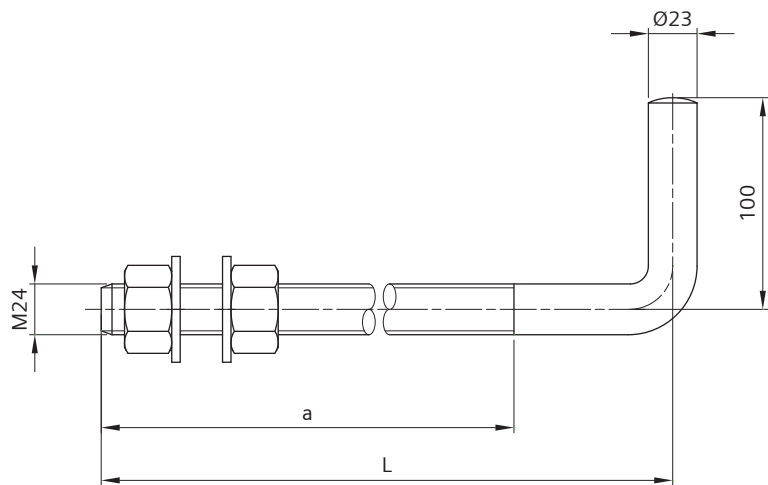
for securing the upper end of the guide tube made of aluminium $d=42$ mm or steel $d=42.4$ mm (1 1/4"), for tension wheel assembly up to 40 kN



Order no.	8WL5173-2
Designation	Locking ring 45
Material	
Locking ring	Al
Cup-point screw M12	stlSt
Nut	stlSt
Weight	0.15 kg
Tightening torque M_A	50 Nm

Hook bolt

for fixing the lower end of the guide tube made of steel d=32 and 33.7 mm (1")

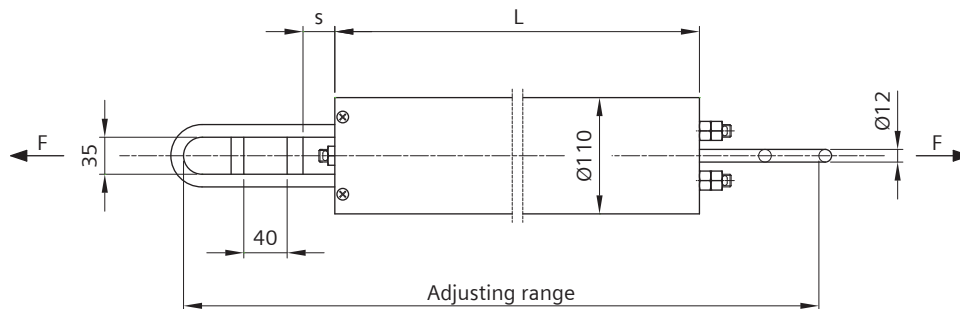


Order no.	8WL5172-0	8WL5172-1
Designation	Hook bolt M24x120	Hook bolt M24x425
Material		
Hook bolt	htgSt	htgSt
Nuts, washers	htgSt	htgSt
Weight	0.90 kg	1.78 kg
a	70 mm	350 mm
L	120 mm	425 mm

Fastening for guide tube 42/42.4 mm on request.

Tensioning spring 6-10 kN

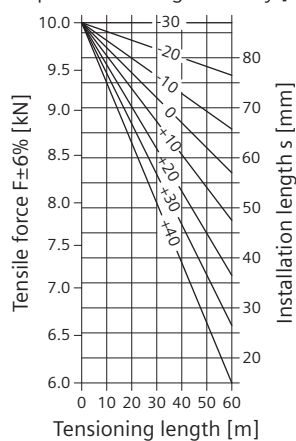
for tensioning contact wires, tensioning length 60, 120, 180 m



Order no.	8WL8037-0	8WL8037-1	8WL8037-2
Designation	Tensioning spring 60	Tensioning spring 120	Tensioning spring 180
Material			
Casing	Plastic	Plastic	Plastic
Eye-bolt, nuts	stlSt	stlSt	stlSt
Spring, spring plate	Spring steel, htgSt	Spring steel, htgSt	Spring steel, htgSt
Weight	10.58 kg	18.82 kg	27.72 kg
Tensile force	6 - 10 kN (working range)	6 - 10 kN (working range)	6 - 10 kN (working range)
Working stroke (spring)	72 mm	145 mm	215 mm
Adjusting range	650 - 740 mm	1045 - 1205 mm	1440 - 1670 mm
L	425 mm	820 mm	1210 mm

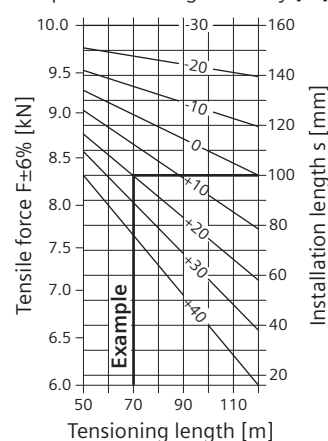
Diagram for determination of installation length "s":

Temperature during assembly [°C]



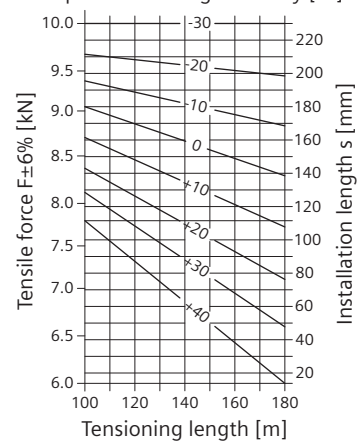
8WL8037-0

Temperature during assembly [°C]



8WL8037-1

Temperature during assembly [°C]



8WL8037-2

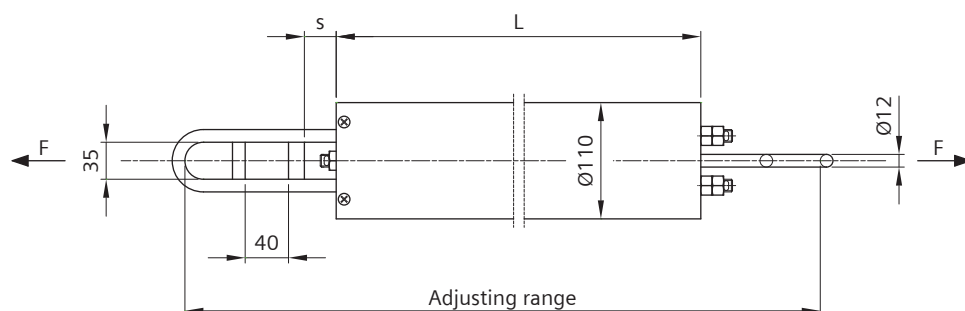
Example:

Tensioning length = 70 m, temperature during assembly = +20 °C, results in an installation length s of = 100 mm

The diagram must be adjusted depending on changing operating, temperature or tensioning range.

Tensioning spring 7-12 kN

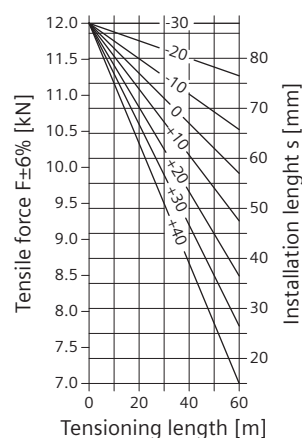
for tensioning contact wires, tensioning contact wires 60, 120, 180 m



Order no.	8WL8037-0A	8WL8037-1A	8WL8037-2A
Designation	Tensioning spring 60	Tensioning spring 120	Tensioning spring 180
Material			
Casing	Plastic	Plastic	Plastic
Eye-bolt, nuts	stlSt	stlSt	stlSt
Spring, spring plate	Spring steel, htgSt	Spring steel, htgSt	Spring steel, htgSt
Weight	11.5 kg	20.6 kg	30.4 kg
Tensile force	7 - 12 kN (working range)	7 - 12 kN (working range)	7 - 12 kN (working range)
Working stroke (spring)	72 mm	145 mm	215 mm
Adjusting range	650 - 740 mm	1045 - 1205 mm	1440 - 1670 mm
L	425 mm	820 mm	1210 mm

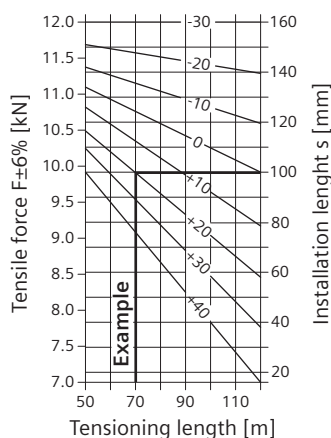
Diagram for determination of installation length "s":

Temperature during assembly [°C]



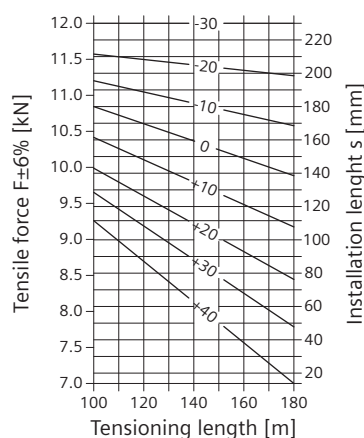
8WL8037-0A

Temperature during assembly [°C]



8WL8037-1A

Temperature during assembly [°C]



8WL8037-2A

Example:

Tensioning length = 70 m, temperature during assembly = +20 °C, results in an installation length s of = 100 mm

The diagram must be adjusted depending on changing operating, temperature or tensioning range.

Chapter 02

Standard Products

Tensioning equipment	01	01-86
Thimbles, connectors, sleeves	02	01-24
GRP cantilevers	03	01-68
Aluminium cantilevers	04	01-80
Steel cantilevers	05	01-42
Headspan supports	06	01-36
Insulators	07	01-34
Contact lines under structures and bridge protection	08	01-42
Clamps	09	01-84
Tension wheel equipment	10	01-48
Section insulators	11	01-34
Disconnectors and drive mechanism	12	01-62
Earthing and protecting equipment	13	01-14
Contact wires, conductors, span wires	14	01-22
Monitoring systems	15	01-06
Installation tools and equipment	16	01-24

Dropper strap	02-11-33
Lightweight section insulator 15 kV AC	02-11-11, 02-11-12
Lightweight section insulator 25 kV AC	02-11-13, 02-11-14, 02-11-15
Lightweight section insulator up to 3 kV DC	02-11-09, 02-11-10
Neutral section 25 kV AC	02-11-16, 02-11-17
Pulley 90 with hoop	02-11-28
Rod pulley	02-11-32
Rolling door insulator up to 1.5 kV DC	02-11-18
Rolling door insulator up to 3 kV DC	02-11-19
Section insulator	02-11-08
Section insulator with copper runners up to 750 V DC	02-11-04, 02-11-05
Section insulator with insulating runners up to 1.5 kV DC	02-11-06, 02-11-07
Setting loop	02-11-20, 02-11-21
Sliding tube	02-11-29
Spacer tube	02-11-33
Suspension	02-11-23, 02-11-24
Suspension insulated up to 1.5 kV DC	02-11-22
Suspension with catenary wire insulation	02-11-25, 02-11-26, 02-11-27
Turnbuckle with ring-shaped hook and wire clamp	02-11-30
Turnbuckle with two ring-shaped hooks	02-11-31

Technical comments

Application

Section insulators serve to separate the overhead contact line system into individual switching and feeder sections and to insulate them from each other. Thus they enable the contact line to be selectively switched off. Section insulators can be employed for the electrical isolation of the contact lines between the main tracks, between main tracks and sidings and also for section insulation or, in pairs, as phase or system separation.

Electric traction units can traverse the section insulators at different running speeds, depending on the type of unit. The insulators are installed with suspensions in the single trolley wire and in the catenary system. Section insulators have high mechanical strength, good properties during pantograph passage, constantly high electrical insulation under all environmental influences, high wear resistance and, above all, operational reliability. Lightweight section insulators are used for especially high requirements.

Types

Section insulators with:

- Insulating runners
- Traversed copper runners
- Insulation made of GRP profiles
- Insulation with Teflon encased GRP rods

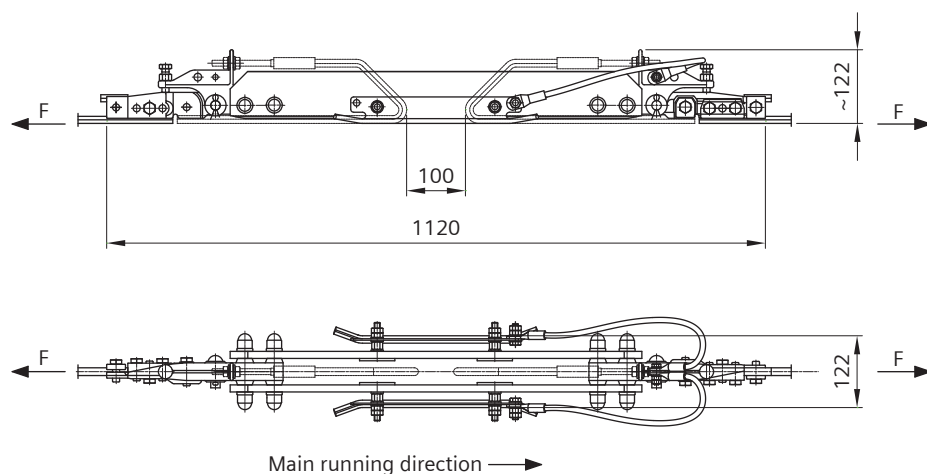
The Sicat 8WL5545 lightweight section insulators are distinguished by:

- Low weight
- High running speed up to 200 km/h
- Superior arc extinguishing capability
- Universal application
- Easy to fit
- Corrosion-resistant materials
- For single and twin contact wires

You can find further information in the relevant product descriptions.

Section insulator with copper runners up to 750 V DC

for single contact wire AC-80 to AC-150 made of Cu-ETP or CuAg0.1 acc. to EN 50149, without setting loops



Order no.	8WL5570-1A
Designation	Section insulator
Material	
Runners	Cu
Insulated runners	GRP
Tension bodies	CuAl
Contact wire dead-end clamps	CuNiSi
Bolts, nuts	stlSt
Current connectors	Cu-ETP
Weight	10.9 kg
Perm. operating load	15 kN
Min. failing load	48 kN
Max. running speed	80 km/h
Nominal voltage	750 V DC
Creepage distance	160 mm

Setting loops for clearance in air 100 mm must be ordered separately, see page 02-11-20:

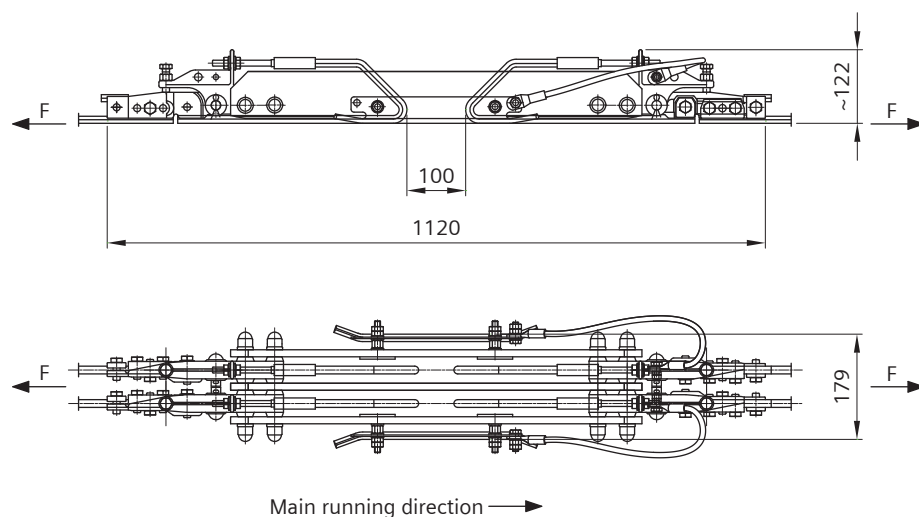
8WL5531-0A for AC-100

8WL5533-0A for AC-120

Setting loops for other contact wire cross-sections or clearances in air on request.

Section insulator with copper runners up to 750 V DC

for twin contact wire AC-80 to AC-150 made of Cu-ETP or CuAg0.1 acc. to EN 50149, without setting loops



Order no.	8WL5570-0A
Designation	Section insulator
Material	
Runners	Cu
Insulated runners	GRP
Tension bodies	CuAl
Contact wire dead-end clamps	CuNiSi
Bolts, nuts	stlSt
Current connectors	Cu-ETP
Weight	15.8 kg
Perm. operating load	24 kN
Min. failing load	76.8 kN
Max. running speed	80 km/h
Nominal voltage	750 V DC
Creepage distance	160 mm

Setting loops for clearance in air 100 mm must be ordered separately, see page 02-11-20:

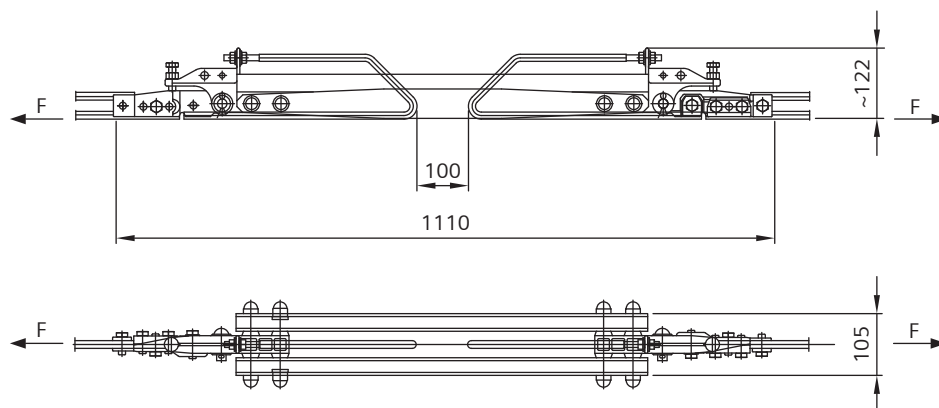
8WL5531-0A for AC-100

8WL5533-0A for AC-120

Setting loops for other contact wire cross-sections or clearances in air on request.

Section insulator with insulating runners up to 1.5 kV DC

for contact wire AC-80 to AC-150 made of Cu-ETP or CuAg0.1 acc. to EN 50149, without setting loops



Order no.	8WL5510-0
Designation	Section insulator
Material	
Runners	GRP
Arcing protection	GRP
Tension bodies	CuAl
Contact wire dead-end clamps	CuNiSi
Bolts, nuts	stlSt
Weight	8.3 kg
Perm. operating load	12 kN
Min. failing load	38.4 kN
Max. running speed	80 km/h
Nominal voltage	1.5 kV DC
Creepage distance	300 mm

Setting loops for clearance in air 100 mm must be ordered separately, see page 02-11-21:

8WL5530-0 for AC-80

8WL5531-0 for AC-100

8WL5533-0 for AC-120

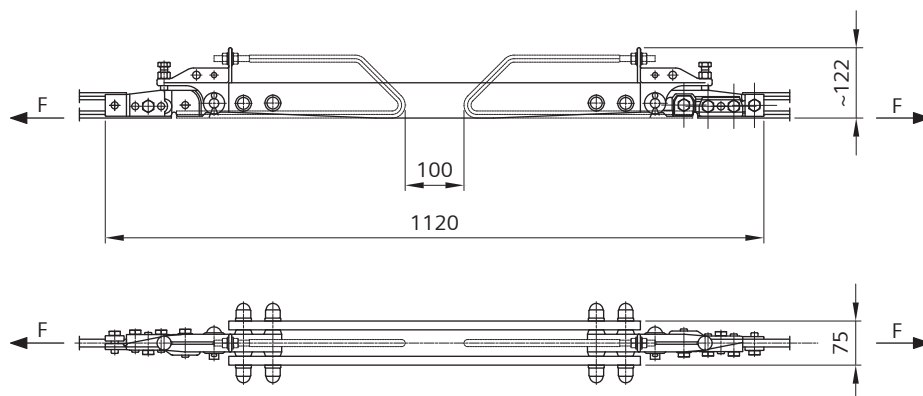
8WL5534-0 for AC-150

Setting loops for other cross-sections or clearances in air on request.

Type for twin contact wire or BC-contact wires on request.

Section insulator with insulating runners up to 1.5 kV DC

for contact wire AC-80 up to AC-150 made of Cu-ETP or CuAg0.1 acc. to EN 50149, without setting loops



Order no.	8WL5546-3
Designation	Section insulator
Material	
Runners	GRP
Tension bodies	CuAl
Contact wire dead-end clamps	CuNiSi
Bolts, nuts	stlSt
Weight	8.62 kg
Perm. operating load	12 kN
Min. failing load	38.4 kN
Max. running speed	80 km/h
Nominal voltage	1.5 kV DC
Creepage distance	300 mm

The runner material is self-extinguishing.

Setting loops for clearance in air 100 mm must be ordered separately, see page 02-11-21:

8WL5530-0 for AC-80

8WL5531-0 for AC-100

8WL5533-0 for AC-120

8WL5534-0 for AC-150

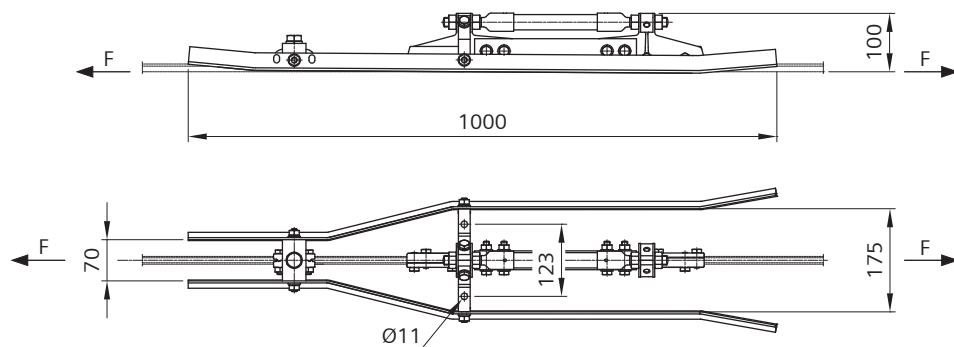
Setting loops for other cross-sections or clearances in air on request.

Type for twin contact wire or BC-contact wires on request.

Substitute for 8WL5546-0 and 8WL5546-1.

Section insulator

for contact wire AC-100 and AC-120 made of Cu-ETP or CuAg0.1 acc. to EN 50149

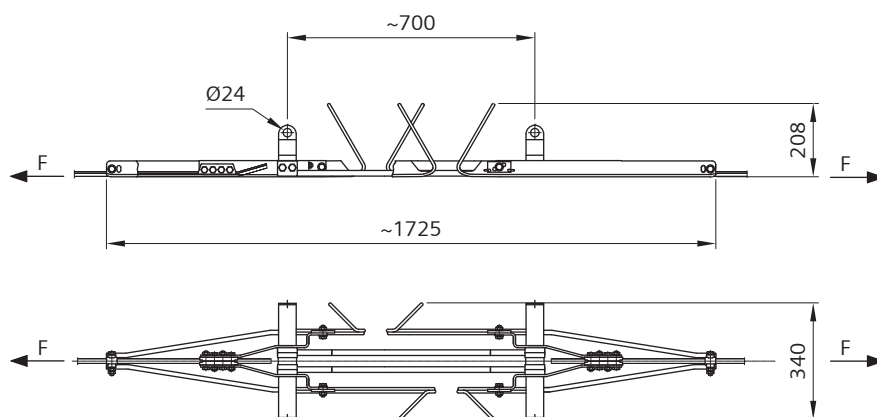


Order no.	8WL5517-5C
Designation	Section insulator
Material	
Clamping fittings	CuAl
Pressure tube	GRP
Insulating beam	GRP
Runners	Cu
Straps	stlSt, Cu-ETP
Bolts, nuts	stlSt
Washers, spring washers	stlSt
Weight	7.4 kg
Perm. operating load	12 kN
Min. failing load	38.4 kN
Max. running speed	80 km/h
Creepage distance	140 mm
Clearance in air	65 mm

Suspension 8WL5517-7A must be ordered separately, see page QUERVERWEIS-NICHT-GEFUNDEN.

Lightweight section insulator up to 3 kV DC

for single contact wire AC-80/BC-100 to AC/BC-150 made of Cu-ETP or CuAg0.1, AC-80/BC-100 to AC/BC-120 made of CuMg0.5 acc. to EN 50149, Ri161 made of Cu-ETP (British Standard 23) and Chinese contact wires CTHA-85/120

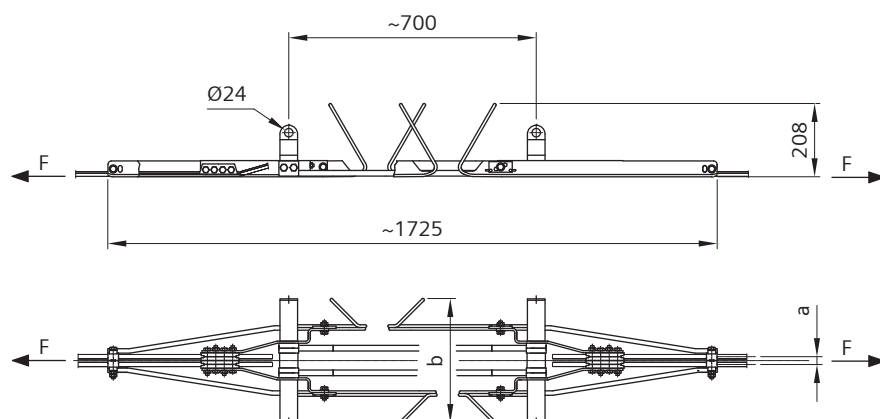


Order no.	8WL5545-7A
Designation	Lightweight section insulator
Material	
Clamping fittings	stlSt, Al, CuNiSi
Straps	stlSt
Runners	Cu
Arcing horns	Cu
Insulating rods	GRP
Bolts, nuts	stlSt
Weight	13.0 kg
Perm. operating load	30 kN
Min. failing load	90 kN
Max. running speed	200 km/h
Nominal voltage	3 kV DC
Creepage distance	450 mm
Clearance in air	60 mm

Suspension 8WL5545-5A must be ordered separately, see page 02-11-25.

Lightweight section insulator up to 3 kV DC

for twin contact wires AC-80/BC-100 to AC/BC-150 made of Cu-ETP or CuAg0.1, AC-80/BC-100 to AC/BC-120 made of CuMg0.5 acc. to EN 50149, Ri161 made of Cu-ETP (British Standard 23) and Chinese contact wires CTHA-85/120

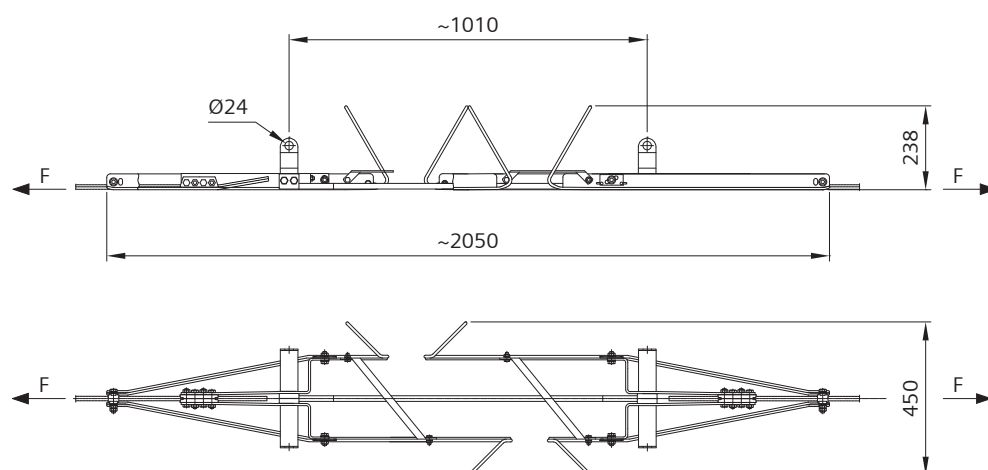


Order no.	8WL5545-8A	8WL5545-8AC
Designation	Lightweight section insulator	Lightweight section insulator
Material		
Clamping fittings	stlSt, Al, CuNiSi	stlSt, Al, CuNiSi
Straps	stlSt	stlSt
Runners	Cu	Cu
Arcing horns	Cu	Cu
Insulating rods	GRP	GRP
Bolts, nuts	stlSt	stlSt
Weight	13.8 kg	15.1 kg
Perm. operating load	30 kN	30 kN
Min. failing load	90 kN	90 kN
Max. running speed	200 km/h	200 km/h
Nominal voltage	3 kV DC	3 kV DC
Creepage distance	450 mm	450 mm
Clearance in air	60 mm	60 mm
a	28 mm	40 mm
b	366 mm	375 mm

Suspension 8WL5545-5A must be ordered separately, see page 02-11-25.

Lightweight section insulator 15 kV AC

for single contact wire AC-80/BC-100 to AC/BC-150 made of Cu-ETP or CuAg0.1, AC-80/BC-100 to AC/BC-120 made of CuMg0.5 acc. to EN 50149, Ri161 made of Cu-ETP (British Standard 23) and Chinese contact wires CTHA-85/120

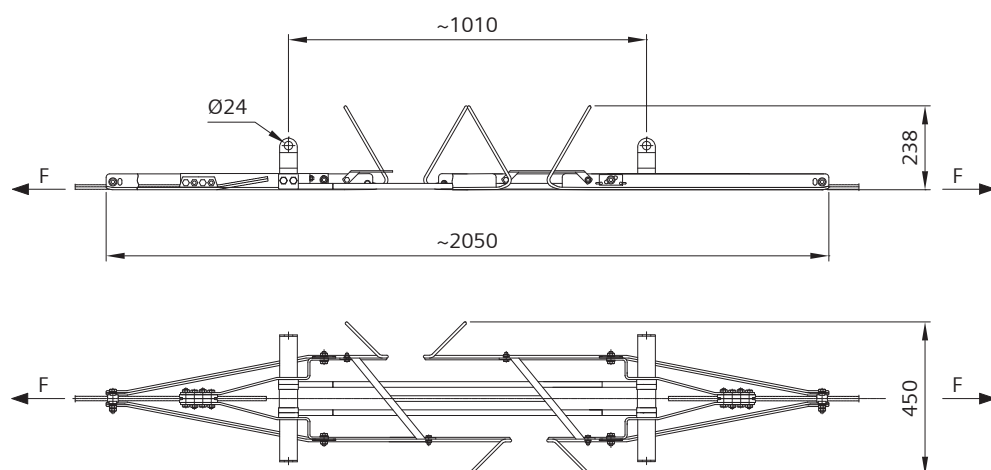


Order no.	8WL5545-0A
Designation	Lightweight section insulator
Material	
Clamping fittings	stlSt, Al, CuNiSi
Straps	stlSt
Runners	Cu
Arcing horns	Cu
Insulating rod	GRP
Bolts, nuts	stlSt
Weight	13.0 kg
Perm. operating load	15 kN
Min. failing load	45 kN
Max. running speed	200 km/h
Nominal voltage	15 kV AC
Creepage distance	760 mm
Clearance in air	120 mm

Suspension 8WL5545-5A must be ordered separately, see page 02-11-25.

Lightweight section insulator 15 kV AC

for single contact wire AC-80/BC-100 to AC/BC-150 made of Cu-ETP or CuAg0.1, AC-80/BC-100 to AC/BC-120 made of CuMg0.5 acc. to EN 50149, Ri161 made of Cu-ETP (British Standard 23) and Chinese contact wires CTHA-85/120

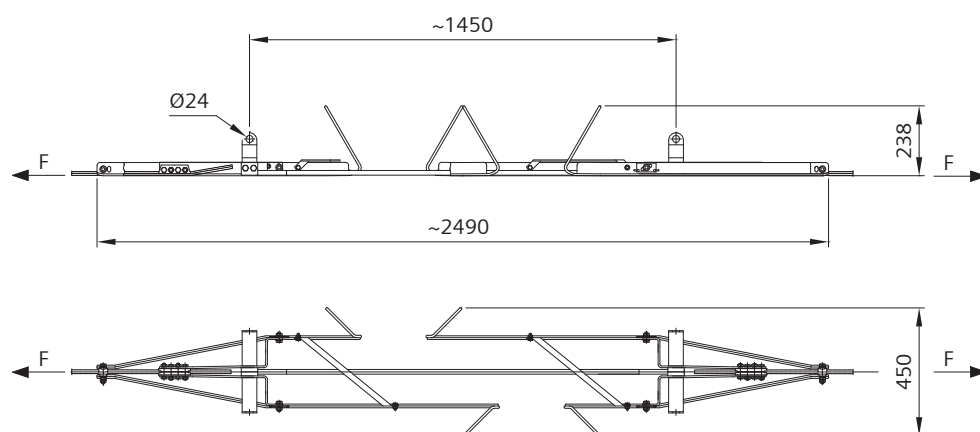


Order no.	8WL5545-1A
Designation	Lightweight section insulator
Material	
Clamping fittings	stlSt, Al, CuNiSi
Straps	stlSt
Runners	Cu
Arcing horns	Cu
Insulating rods	GRP
Bolts, nuts	stlSt
Weight	14.9 kg
Perm. operating load	30 kN
Min. failing load	90 kN
Max. running speed	200 km/h
Nominal voltage	15 kV AC
Creepage distance	760 mm
Clearance in air	120 mm

Suspension 8WL5545-5A must be ordered separately, see page 02-11-25.

Lightweight section insulator 25 kV AC

for single contact wire AC-80/BC-100 to AC/BC-150 made of Cu-ETP or CuAg0.1, AC-80/BC-100 to AC/BC-120 made of CuMg0.5 acc. to EN 50149, Ri161 made of Cu-ETP (British Standard 23) and Chinese contact wires CTHA-85/120

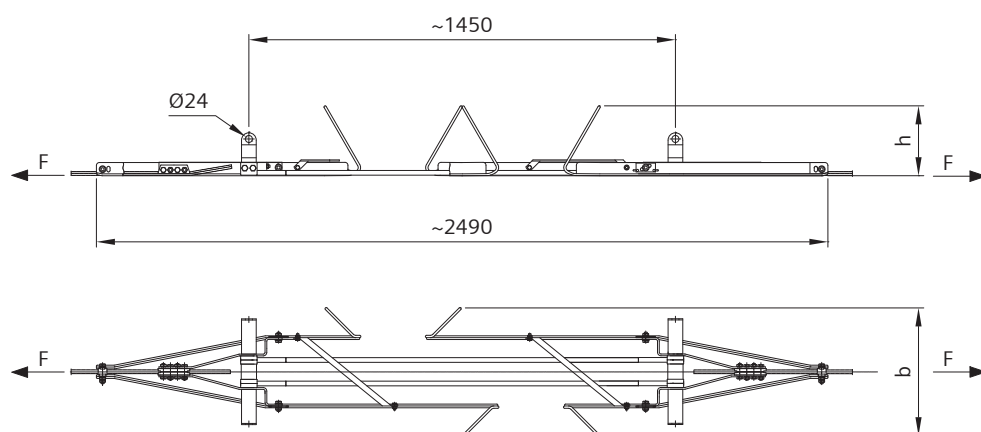


Order no.	8WL5545-3A
Designation	Lightweight section insulator
Material	
Clamping fittings	stlSt, Al, CuNiSi
Straps	stlSt
Runners	Cu
Arcing horns	Cu
Insulating rod	GRP
Bolts, nuts	stlSt
Weight	14.1 kg
Perm. operating load	15 kN
Min. failing load	45 kN
Max. running speed	200 km/h
Nominal voltage	25 kV AC
Creepage distance	1200 mm
Clearance in air	220 mm

Suspension 8WL5545-6A must be ordered separately, see page 02-11-26.

Lightweight section insulator 25 kV AC

for single contact wire AC-80/BC-100 to AC/BC-150 made of Cu-ETP or CuAg0.1, AC-80/BC-100 to AC/BC-120 made of CuMg0.5 acc. to EN 50149, Ri161 made of Cu-ETP (British Standard 23) and Chinese contact wires CTHA-85/120

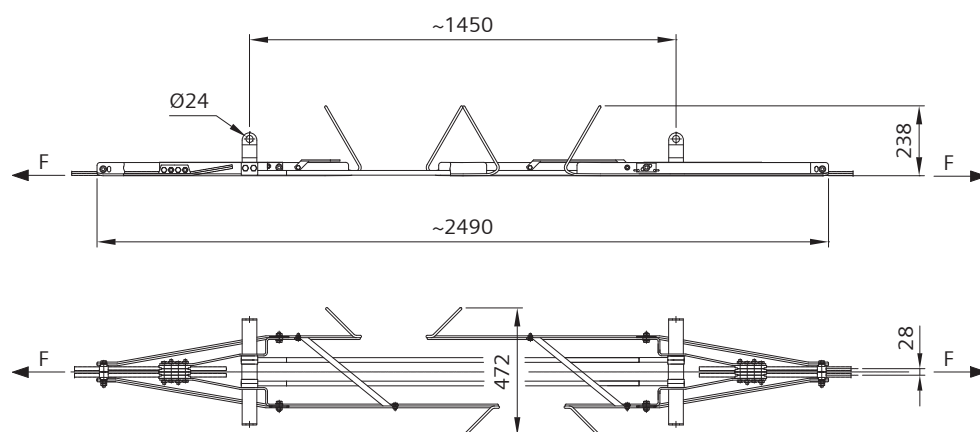


Order no.	8WL5545-4A	8WL5545-4AC
Designation	Lightweight section insulator	Lightweight section insulator
Material		
Clamping fittings	stlSt, Al, CuNiSi	stlSt, Al, CuNiSi
Straps	stlSt	stlSt
Runners	Cu	Cu
Arcing horns	Cu	Cu
Insulating rods	GRP	GRP
Bolts, nuts	stlSt	stlSt
Weight	15.9 kg	16.5 kg
Perm. operating load	30 kN	30 kN
Min. failing load	90 kN	90 kN
Max. running speed	200 km/h	200 km/h
Nominal voltage	25 kV AC	25 kV AC
Creepage distance	1200 mm	1200 mm
Clearance in air	220 mm	300 mm
b	450 mm	539 mm
h	238 mm	242 mm

Suspension 8WL5545-6A must be ordered separately, see page 02-11-26.

Lightweight section insulator 25 kV AC

for twin contact wires AC-80/BC-100 to AC/BC-150 made of Cu-ETP or CuAg0.1, AC-80/BC-100 to AC/BC-120 made of CuMg0.5 acc. to EN 50149, Ri161 made of Cu-ETP (British Standard 23) and Chinese contact wires CTHA-85/120

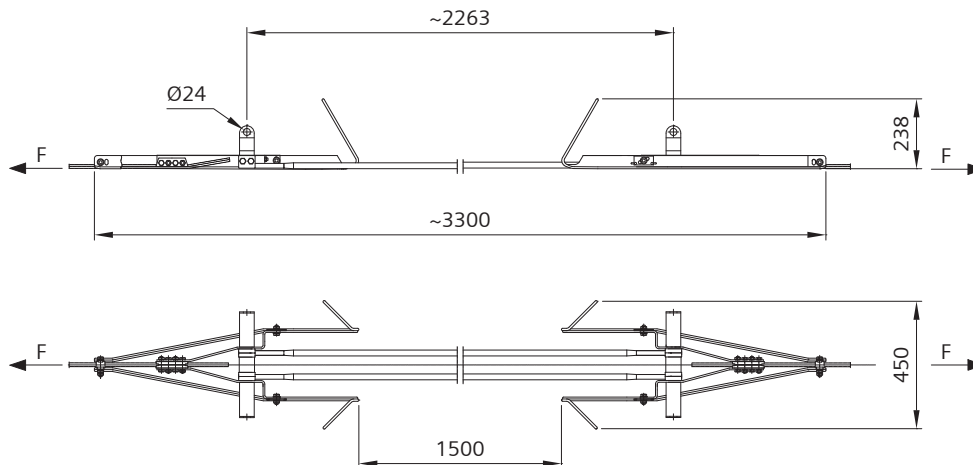


Order no.	8WL5545-2A
Designation	Lightweight section insulator
Material	
Clamping fittings	stlSt, Al, CuNiSi
Straps	stlSt
Runners	Cu
Arcing horns	Cu
Insulating rods	GRP
Bolts, nuts	stlSt
Weight	15.9 kg
Perm. operating load	30 kN
Min. failing load	90 kN
Max. running speed	200 km/h
Nominal voltage	25 kV AC
Creepage distance	1200 mm
Clearance in air	220 mm

Suspension 8WL5545-6A must be ordered separately, see page 02-11-26.

Neutral section 25 kV AC

for single contact wire AC-80/BC-100 to AC/BC-150 made of Cu-ETP or CuAg0.1, AC-80/BC-100 to AC/BC-120 made of CuMg0.5 acc. to EN 50149, Ri161 made of Cu-ETP (British Standard 23) and Chinese contact wires CTHA-85/120



Order no.	8WL5545-4D
Designation	Neutral section
Material	
Clamping fittings	stlSt, Al, CuNiSi
Straps	stlSt
Runners	Cu
Arcing horns	Cu
Insulating rods	GRP
Bolts, nuts	stlSt
Weight	14.8 kg
Perm. operating load	30 kN
Min. failing load	90 kN
Max. running speed	160 km/h
Nominal voltage	25 kV AC
Creepage distance	2010 mm
Clearance in air	1500 mm

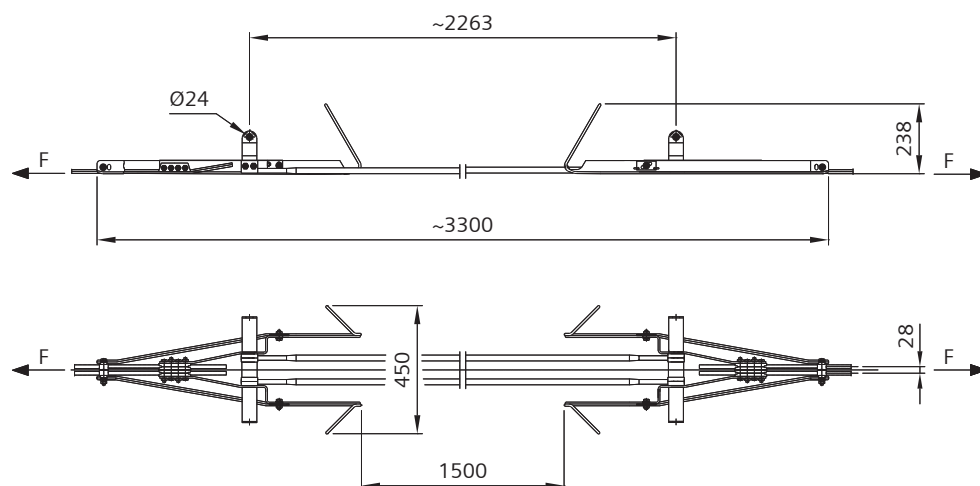
Suspension 8WL5545-6C must be ordered separately, see page 02-11-27.

Two neutral sections and two suspensions have to be ordered for one phase separation section.

The connection between this one sections and the earthing have to be defined project-specifically.

Neutral section 25 kV AC

for twin contact wires AC-80/BC-100 to AC/BC-150 made of Cu-ETP or CuAg0.1, AC-80/BC-100 to AC/BC-120 made of CuMg0.5 acc. to EN 50149, Ri161 made of Cu-ETP (British Standard 23) and Chinese contact wires CTHA-85/120



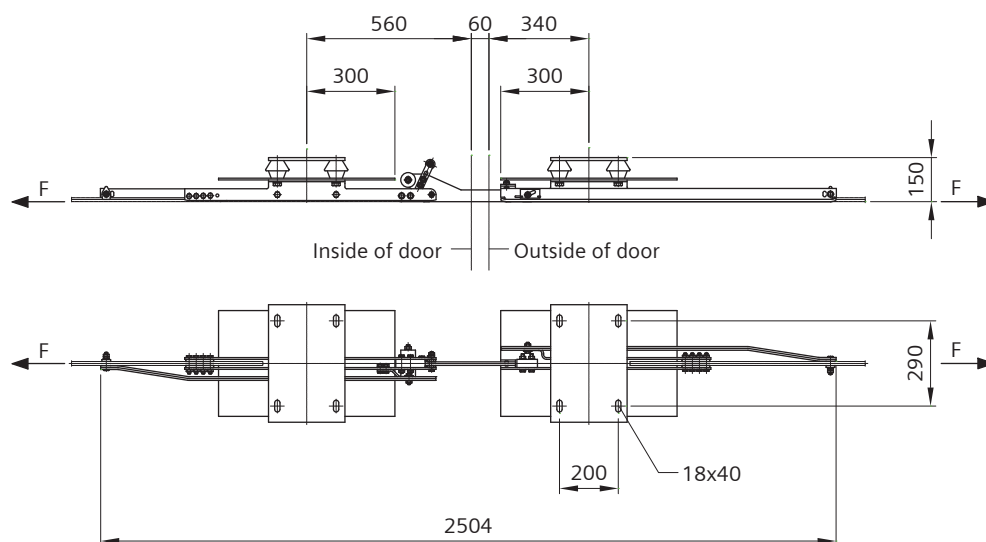
Order no.	8WL5545-4F
Designation	Neutral section
Material	
Clamping fittings	stlSt, Al, CuNiSi
Straps	stlSt
Runners	Cu
Arcing horns	Cu
Insulating rods	GRP
Bolts, nuts	stlSt
Weight	17.2 kg
Perm. operating load	30 kN
Min. failing load	90 kN
Max. running speed	160 km/h
Nominal voltage	25 kV AC
Creepage distance	2010 mm
Clearance in air	1500 mm

Suspension 8WL5545-6C must be ordered separately, see page 02-11-27.

Two neutral sections and two suspensions have to be ordered for one phase separation section.
The connection between this one sections and the earthing have to be defined project-specifically.

Rolling door insulator up to 1.5 kV DC

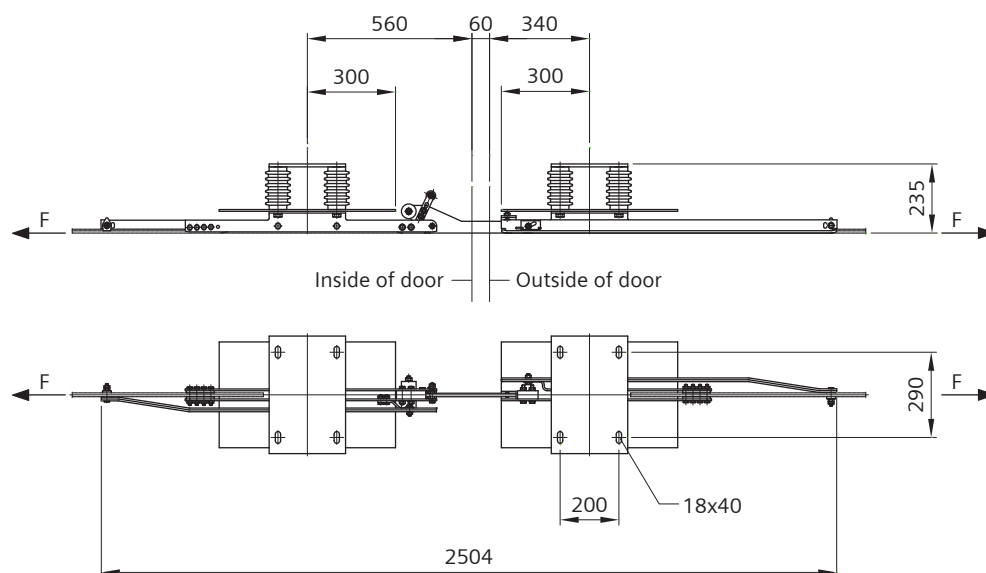
for automatic separation of contact line under rolling doors, for contact wire AC-80/BC-100 to AC/BC-150 made of Cu-ETP or CuAg0.1 acc. to EN 50149 and CTHA-85/120 made in China



Order no.	8WL5575-5A
Designation	Rolling door insulator
Material	
Mounting plates	stlSt
Straps	stlSt
Runners	Cu
Cover plates	GRP
Latch, stop	GRP
Insulator bodies	Cast resin, brown
Clamps	stlSt, CuNiSi
Bolts, nuts	stlSt
Weight	42.8 kg
Perm. operating load	10 kN
Min. failing load	32 kN
Max. running speed	10 km/h
Nominal voltage	1.5 kV DC

Rolling door insulator up to 3 kV DC

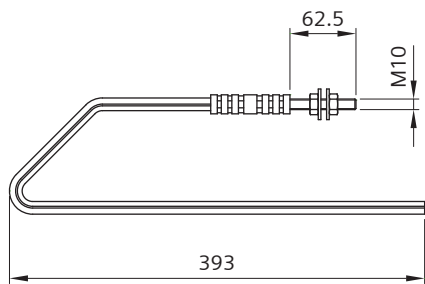
for automatic separation of contact line under rolling doors, for contact wire AC-80/BC-100 to AC/BC-150 made of Cu-ETP or CuAg0.1 acc. to EN 50149 and CTHA-85/120 made in China



Order no.	8WL5575-5B
Designation	Rolling door insulator
Material	
Mounting plates	stlSt
Straps	stlSt
Runners	Cu
Cover plates	GRP
Latch, stop	GRP
Insulator bodies	Cast resin, brown
Clamps	stlSt, CuNiSi
Bolts, nuts	stlSt
Weight	50.5 kg
Perm. operating load	10 kN
Min. failing load	32 kN
Max. running speed	10 km/h
Nominal voltage	3 kV DC

Setting loop

with pressured thread peace M10 for section insulators 8WL5570-0A and -1A, for clearance in air 100 mm

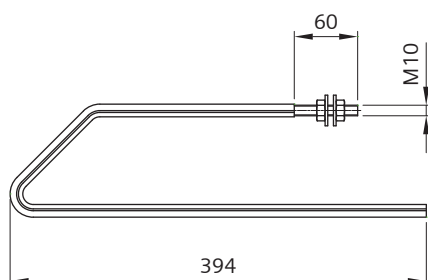


Order no.	8WL5531-0A	8WL5533-0A
Designation	Setting loop AC-100	Setting loop AC-120
Material		
Setting loop	CuAg0.1	CuAg0.1
Compression joint	Cu	Cu
Nuts M10	stlSt	stlSt
Locking washers	stlSt	stlSt
Weight	0.76 kg	0.88 kg

Setting loops for other contact wire cross-sections or clearances in air on request.

Setting loop

for section insulators 8WL5510-0 and 8WL5546-3, for clearance in air 100 mm

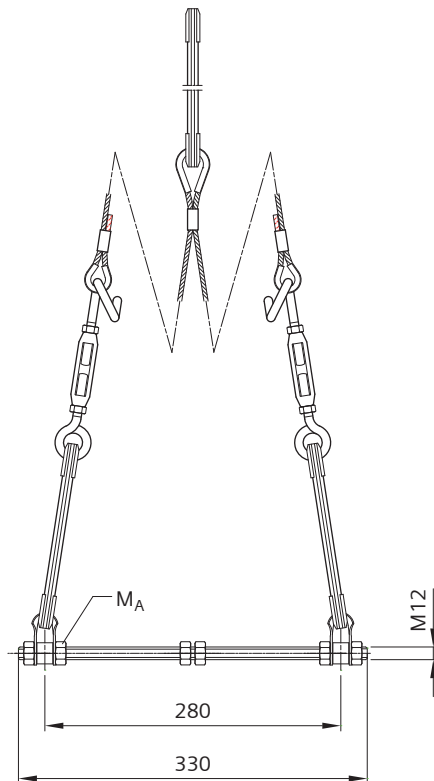


Order no.	8WL5530-0	8WL5531-0	8WL5533-0	8WL5534-0
Designation	Setting loop AC-80	Setting loop AC-100	Setting loop AC-120	Setting loop AC-150
Material				
Setting loop	Cu-ETP	CuAg0.1	CuAg0.1	Cu-ETP
Nuts M10	stlSt	stlSt	stlSt	stlSt
Locking washers	stlSt	stlSt	stlSt	stlSt
Weight	0.57 kg	0.71 kg	0.84 kg	1.04 kg

Setting loops for other contact wire cross-sections or clearances in air on request.

Suspension insulated up to 1.5 kV DC

for section insulators 8WL5510-0 and 8WL5546-3

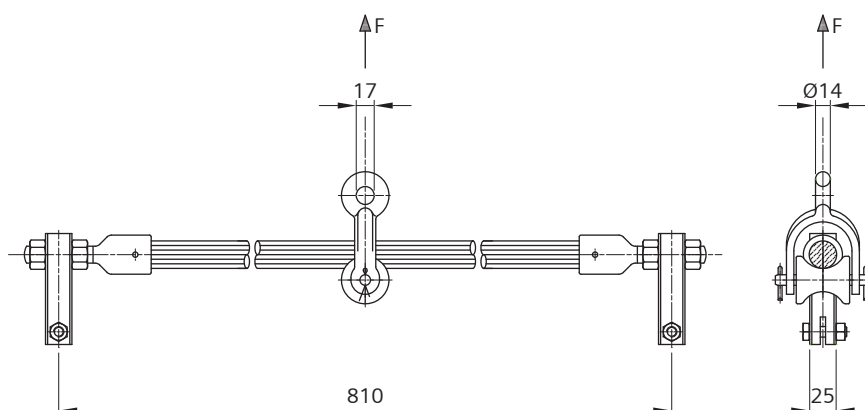


Order no.	8WL5575-0
Designation	Suspension
Material	
Loop insulators	GRP
Thimbles	Cu-ETP
Crimped connectors	Cu-ETP
Dropper wire 10 mm ²	BzII
Turnbuckles	CuSn, stlSt
Dropper straps	CuNiSi
Threaded pin M12	stlSt
Nuts	stlSt
Spacer tube	Sintered bronze
Weight	1.42 kg
Tightening torque M _A	56 Nm

Parts are delivered unassembled.

Suspension

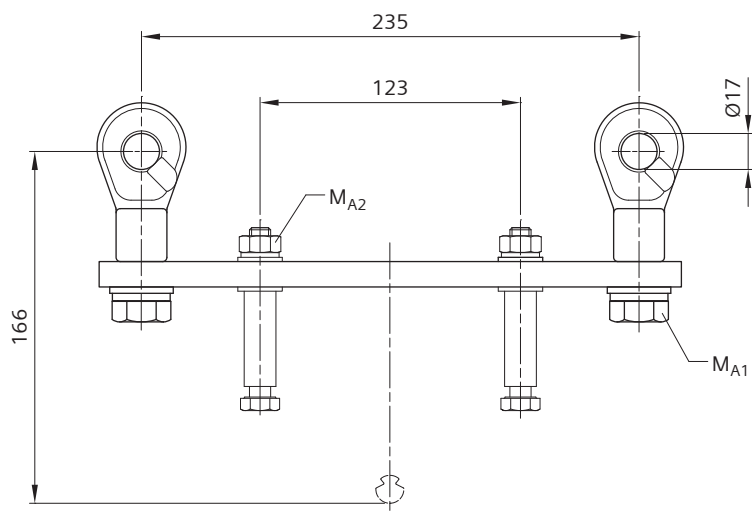
for section insulators 8WL5510-0 and 8WL5546-3



Order no.	8WL5575-1
Designation	Suspension
Material	
Square tubes	stlSt
Insulating rod 26	GRP
Sleeves	CuAl
Rod pulley	Polyamide, CuSn
Pin Ø10	Al
Split pins 4x25	Cu
Bolts, nuts	stlSt, Cu2
Weight	2.08 kg
Perm. operating load	0.6 kN
Min. failing load	1.8 kN

Suspension

for section insulator 8WL5517-5C

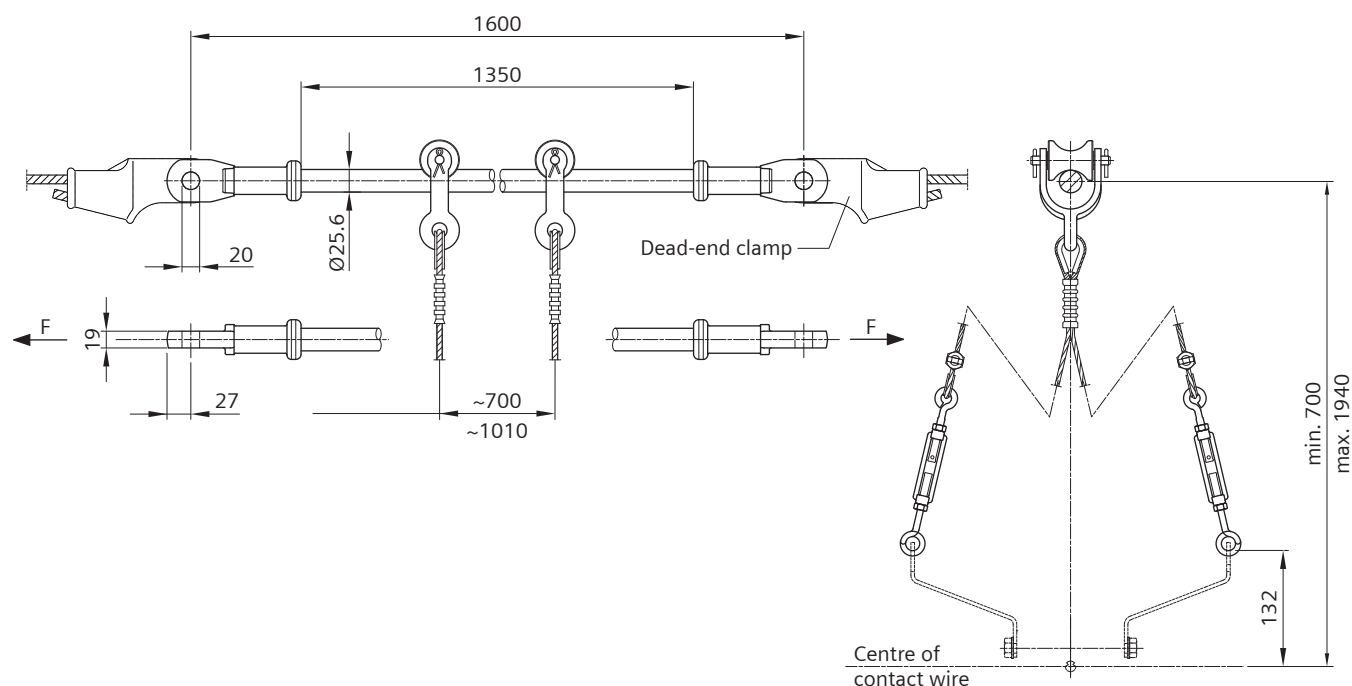


Order no.	8WL5517-7A
Designation	Suspension
Material	
Clamping fittings	CuAl
Insulating beam	GRP
Spacer tubes	stlSt
Bolts M16	stlSt
Bolts M10	stlSt
Nuts, washers	stlSt
Spring washers	stlSt
Weight	0.93 kg
Tightening torque M _{A1}	135 Nm
Tightening torque M _{A2}	32 Nm

Substitute for 8WL5517-7.

Suspension with catenary wire insulation

for lightweight section insulators up to 3 kV DC 8WL5545-7AI/-8AI/-8AC and 15 kV AC 8WL5545-0AI/-1A

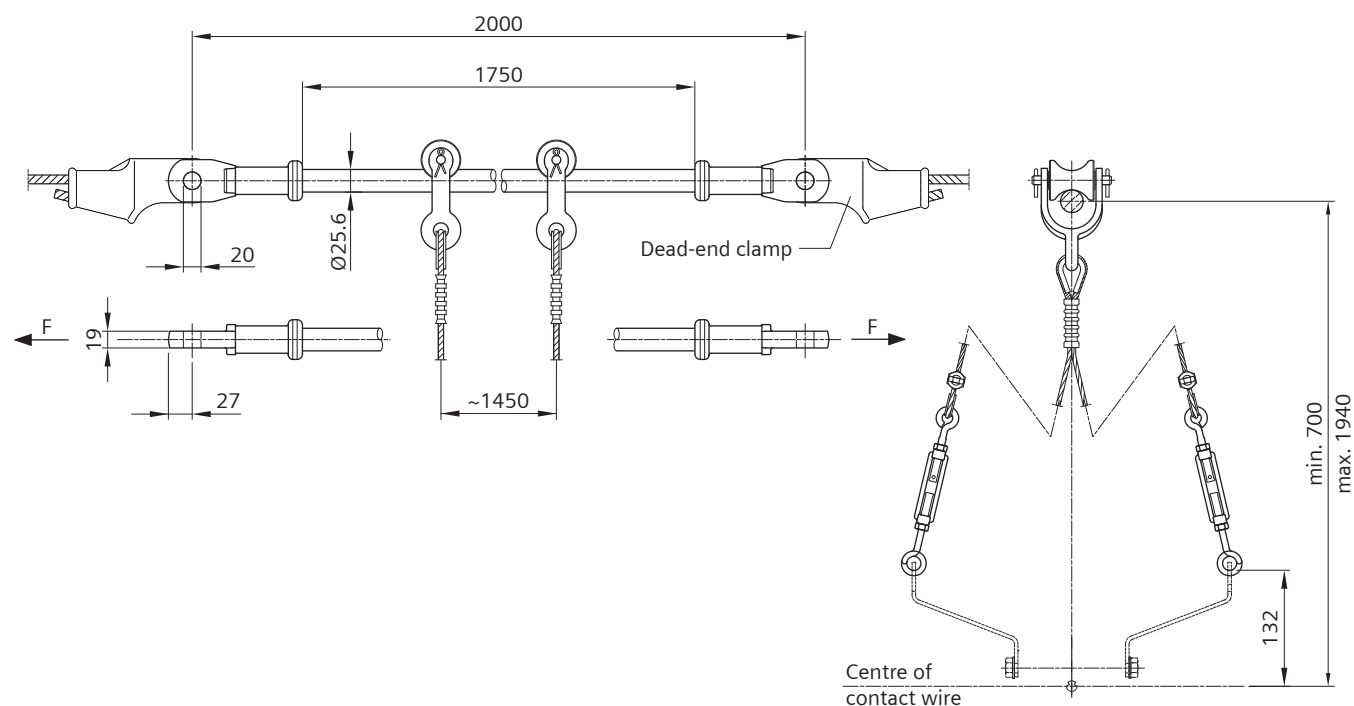


Order no.	8WL5545-5A
Designation	Suspension
Material	
Insulating rod	GRP, silicone
End fittings	stlSt
Rod pulleys	Polyamide, CuSn
Pins, split pins	stlSt, Cu
Dropper wire 16f	BzII
Thimbles	stlSt
Crimped connectors	Cu-ETP
Turnbuckles	stlSt
Weight	6.13 kg
Perm. operating load	30 kN
Min. failing load	90 kN
Min. creepage distance	1350 mm

Dead-end clamps must be ordered separately depending on the catenary wire.

Suspension with catenary wire insulation

for lightweight section insulators 25 kV AC 8WL5545-2A/-3A/-4A/-4AC

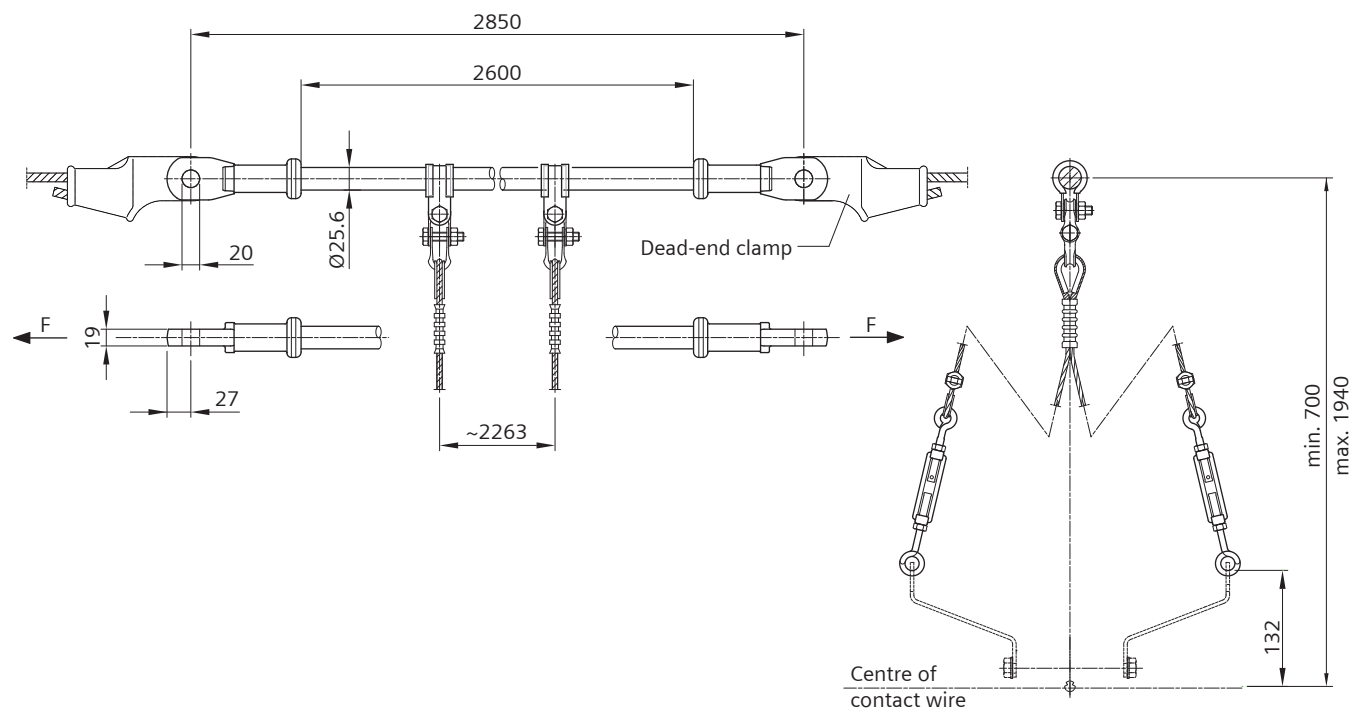


Order no.	8WL5545-6A
Designation	Suspension
Material	
Insulating rod	GRP, silicone
End fittings	stlSt
Rod pulleys	Polyamide, CuSn
Pins, split pins	stlSt, Cu
Dropper wire 16f	BzII
Thimbles	stlSt
Crimped connectors	Cu-ETP
Turnbuckles	stlSt
Weight	6.63 kg
Perm. operating load	30 kN
Min. failing load	90 kN
Min. creepage distance	1750 mm

Dead-end clamps must be ordered separately depending on the catenary wire.

Suspension with catenary wire insulation

for neutral section 8WL5545-4D and -4F

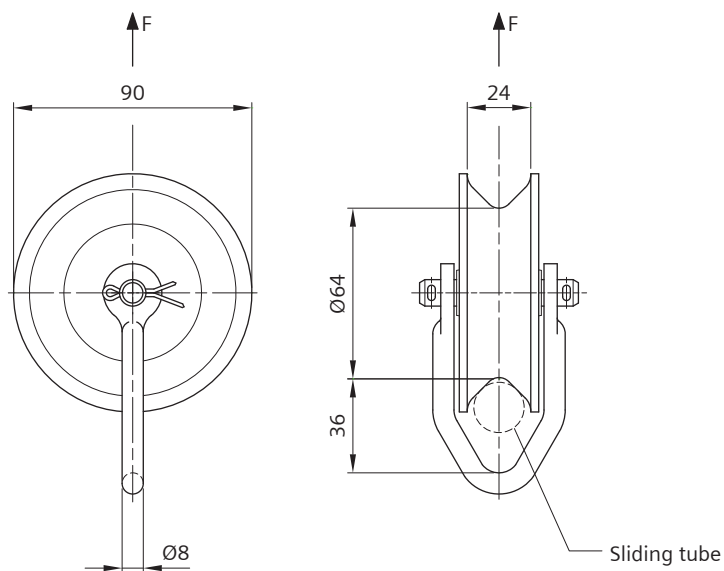


Order no.	8WL5545-6C
Designation	Suspension
Material	
Insulating rod	GRP, silicone
End fittings	stlSt
Suspension clamps	stlSt
Dropper straps	CuNiSi
Pins, split pins	stlSt, Cu
Dropper wire 16f	BzII
Thimbles	stlSt
Crimped connectors	Cu-ETP
Turnbuckles	stlSt
Weight	6.6 kg
Perm. operating load	30 kN
Min. failing load	90 kN
Min. creepage distance	2600 mm

Dead-end clamps must be ordered separately depending on the catenary wire.

Pulley 90 with hoop

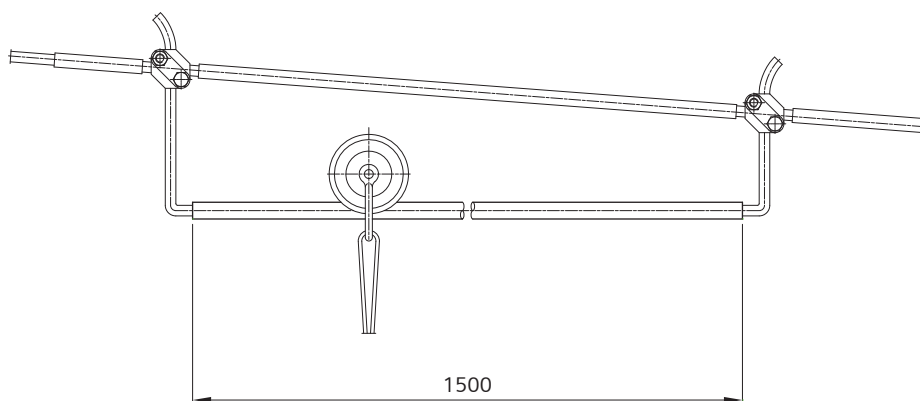
for section insulator suspension at sliding tube 8WL5563-3



Order no.	8WL5560-0
Designation	Pulley 90
Material	
Pulley	CuSn
Hoop	CuSn
Axle Ø10	stlSt
Split pins 3.2x18	Cu
Weight	0.60 kg
Perm. operating load	0.6 kN
Min. failing load	1.8 kN

Sliding tube

for section insulator suspension with pulley 8WL5560-0

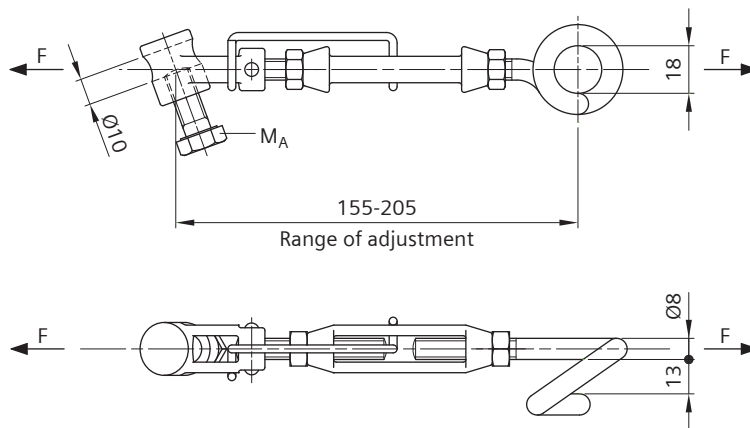


Order no.	8WL5563-3
Designation	Sliding tube 19x3
Material	Cu5
Weight	2.00 kg

Distance from fixed point above 500 m. Other lengths on request.

Turnbuckle with ring-shaped hook and wire clamp

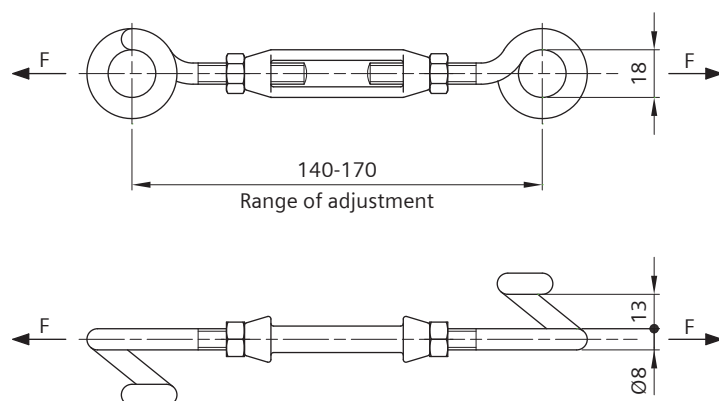
for section insulator suspension, for wires up to $d=9$ mm acc. to DIN 43138



Order no.	8WL5565-0
Designation	Turnbuckle
Material	
Turnbuckle	CuSn
Wire clamp	CuSn
Ring-shaped hook	stlSt
Threaded pin	stlSt
Locking hoop	stlSt
Bolt M10	stlSt
Nuts M8	stlSt
Weight	0.25 kg
Perm. operating load	1 kN
Min. failing load	3 kN
Tightening torque M_A	32 Nm

Turnbuckle with two ring-shaped hooks

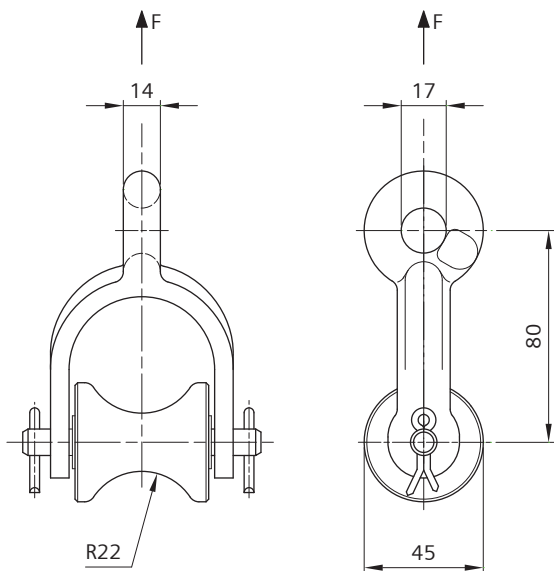
for section insulator suspension



Order no.	8WL5565-1
Designation	Turnbuckle
Material	
Turnbuckle	CuSn
Ring-shaped hooks	stlSt
Nuts M8	stlSt
Weight	0.16 kg
Perm. operating load	1 kN
Min. failing load	3 kN

Rod pulley

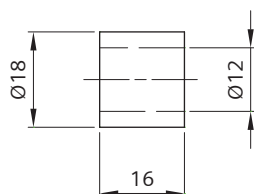
for section insulator suspension



Order no.	8WL3524-0
Designation	Rod pulley
Material	
Clevis	CuSn
Pulley	Polyamide
Pin Ø10	stlSt
Split pins 4x25	Cu
Washers	stlSt
Weight	0.48 kg
Perm. operating load	0.6 kN
Min. failing load	1.8 kN

Spacer tube

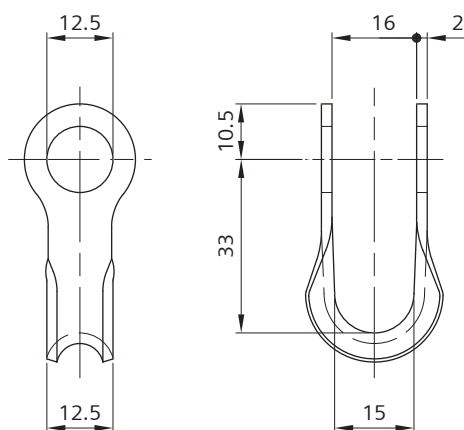
for section insulator suspension



Order no.	8WL4601-7
Designation	Spacer tube D18/12
Material	Sintered bronze
Weight	0.02 kg

Dropper strap

for section insulator suspension



Order no.	8WL4621-3
Designation	Dropper strap
Material	CuNiSi
Weight	0.03 kg

Chapter 02

Standard Products

Tensioning equipment	01	01-86
Thimbles, connectors, sleeves	02	01-24
GRP cantilevers	03	01-68
Aluminium cantilevers	04	01-80
Steel cantilevers	05	01-42
Headspan supports	06	01-36
Insulators	07	01-34
Contact lines under structures and bridge protection	08	01-42
Clamps	09	01-84
Tension wheel equipment	10	01-48
Section insulators	11	01-34
Disconnectors and drive mechanism	12	01-62
Earthing and protecting equipment	13	01-14
Contact wires, conductors, span wires	14	01-22
Monitoring systems	15	01-06
Installation tools and equipment	16	01-24

Cable sealing box	02-12-42
Clevis end fitting 26	02-12-60
Clevis end fitting 26/26.9-16	02-12-56
Disconnecter 15/25 kV AC and 25 kV AC	02-12-28, 02-12-30
Disconnecter bracket	02-12-34
Disconnecter up to 3 kV DC, operating current 2000 A	02-12-06, 02-12-08, 02-12-16, 02-12-18
Disconnecter up to 3 kV DC, operating current 3000 A	02-12-10, 02-12-12
Disconnecter up to 3 kV DC, operating current 4000 A	02-12-14
Earthing switch 15/25 kV AC	02-12-32
Electrohydraulic operated mechanism	02-12-35, 02-12-36, 02-12-37
Eye-bolt	02-12-62
Fitting for guiding of operating linkage	02-12-49
Flange with cable gland M32x1,5	02-12-39
Guide 26	02-12-50
Hand crank	02-12-41
Insulating rod 26 with eye	02-12-51
Key	02-12-41
Key lock with locking plate	02-12-45
Key with male square	02-12-38
Manual operating mechanism	02-12-44
Motor-operated mechanism, radial stroke	02-12-40
Operating linkage made of GRP rods	02-12-47
Operating linkage made of GRP rods for manual operating mechanism	02-12-46
Operating linkage made of steel tubes	02-12-53, 02-12-54
Padlock	02-12-38
Rapid opener	02-12-58
Short-circuit signal relay in additional casing	02-12-43
Tandem disconnector up to 3 kV DC, operating current 2000 A	02-12-20, 02-12-22, 02-12-24, 02-12-26
Tongue end fitting 26, offset	02-12-48, 02-12-55, 02-12-59
Tongue end fitting 26, straight	02-12-61
Tongue end fitting 26/26.9-16	02-12-57
Upper operating linkage, insulated	02-12-52

Technical comments

Application

Disconnectors are used to subdivide track sections, to connect parallel contact lines, and to provide feeders. They are operated under no-load conditions but can also interrupt currents to a limited extent. The installation conditions, electric loads and safety distances must be taken into consideration.

Disconnectors with earth contacts also earth their switching section when they are opened.

Disconnectors are operated either via a manually-operated mechanism with linkage or an electrohydraulic-operated mechanism (remote controlled).

Types

Disconnectors:

- Without and with earth contact
- Up to 3 kV DC, 2000 A to 4000 A
- For 15 kV AC and 25 kV AC, 1700 A to 2500 A
- For 16,7 Hz and 50/60 Hz
- For creepage distances up to 1200 mm
- With composite insulators
- Tandem disconnector

Drives:

- Manually-operated mechanism with linkage
- Electrohydraulic-operated mechanism in GRP casing with linkage, remote controllable
- Electrohydraulic-operated mechanism in casing made of stainless steel with linkage, remote controllable
- Electric operated mechanism with radial hub, remote controllable

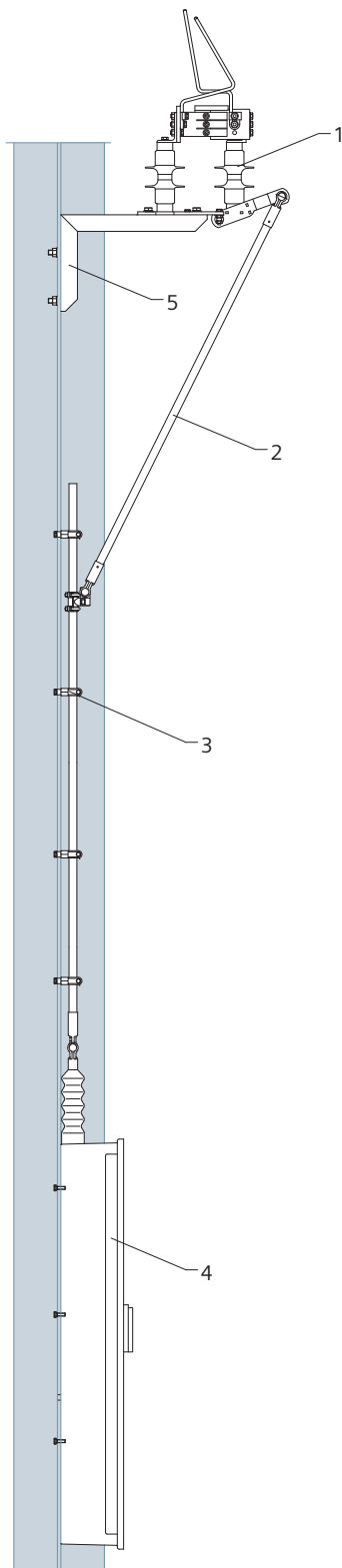
Further informations in the relevant product descriptions.

Examples for assemblies

On the following pages you can find a number of typical application examples for the configuration of disconnectors with linkages and drives.

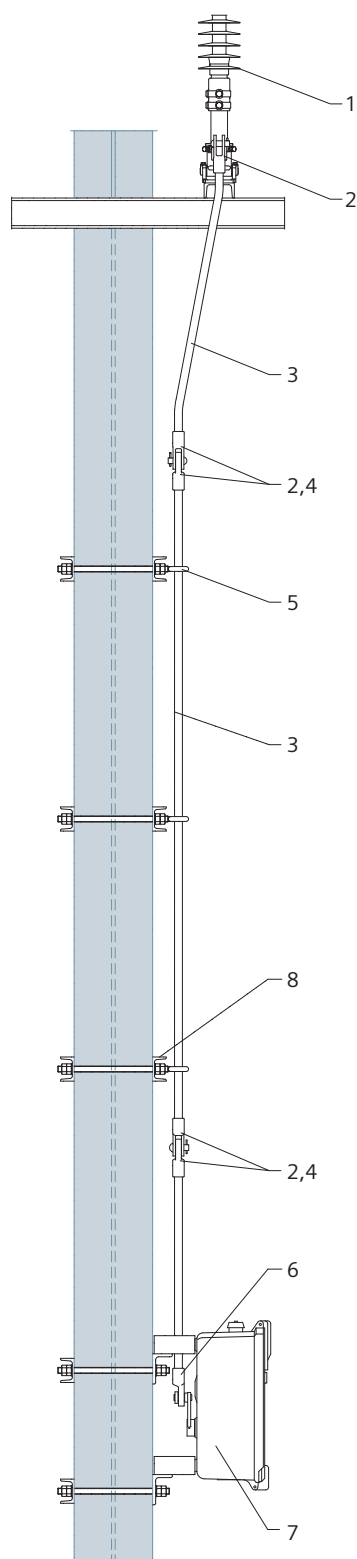
The exact configuration of the assembly depends on the specific plant and the local situation.

Disconnector up to 3 kV DC with electrohydraulic mechanism and GRP operating linkage



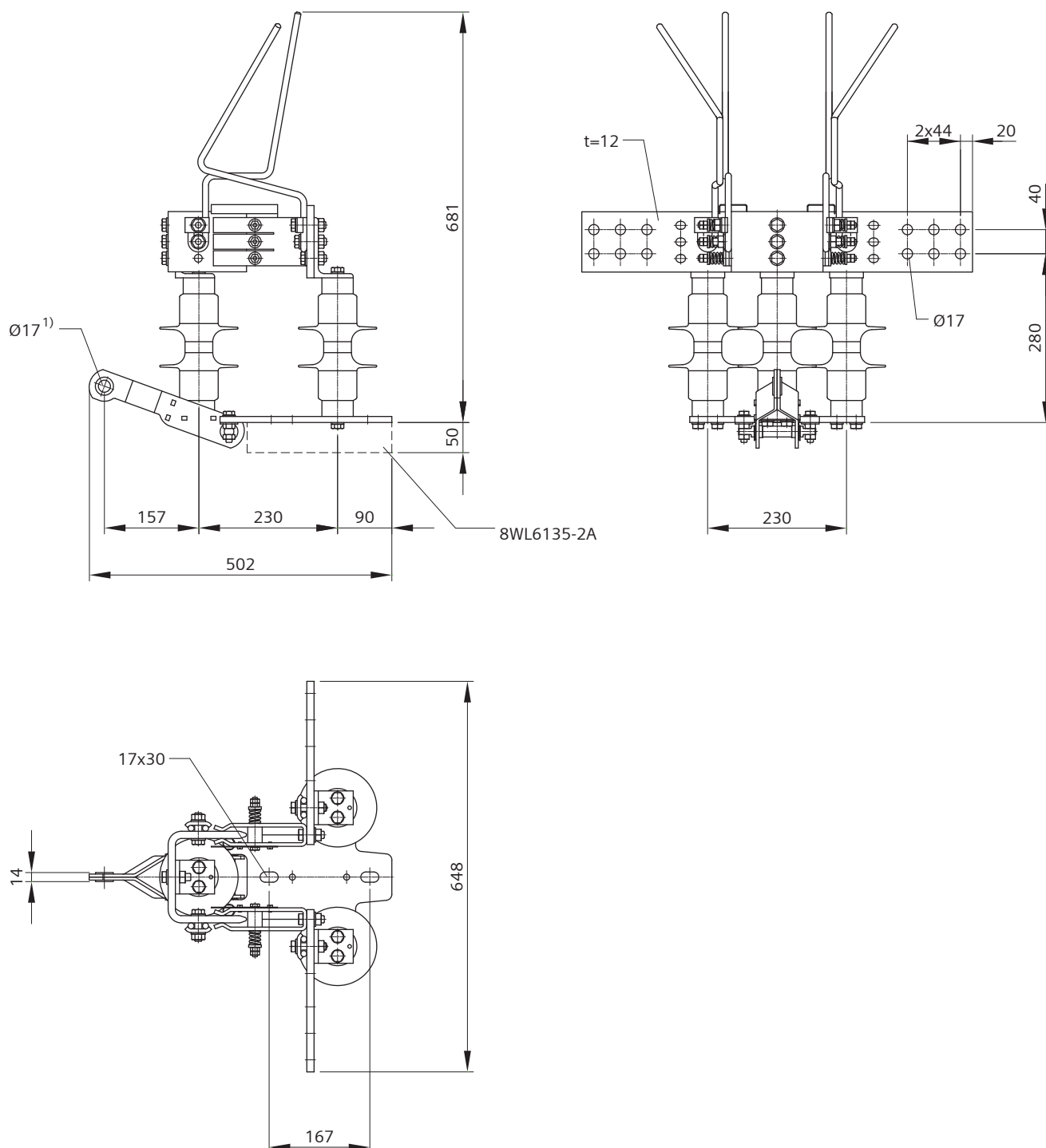
Pos.	Designation	Order no.
1	Disconnector up to 3 kV DC	8WL6134-3
2	GRP operating linkage	8WL6230-6B
3	Guide for operating linkage (number as needed)	8WL6247-8
4	Electrohydraulic operated mechanism in GRP casing (type as needed)	8WL6202-
5	Fastening parts at pole have to be defined project-specifically.	

Disconnector up to 25 kV AC with motor-operated mechanism and aluminium operating linkage



Pos.	Designation	Order no.
1	Disconnector up to 25 kV AC	8WL6127-0
2	Clevis end fitting 26	8WL6221-2
3	Aluminium tube 26x3.5 (length as needed)	8WL2161-0
4	Tongue end fitting 26, straight	8WL6223-1
5	Eye-bolt M16x160 (number as needed)	8WL6228-0
6	Tongue end fitting 26, offset	8WL6226-1
7	Motor-operated mechanism (type as needed)	8WL6200-
8	Fastening parts at pole have to be defined project-specifically.	

with rigid connections



Order no.	8WL6134-3
Designation	Disconnector
Material	
Baseplate	stlSt
Insulator bodies	GRP, silicone
Insulator caps	stlSt
Contact sets	Cu-ETP
Arcing horns	Cu-ETP
Weight	31.1 kg
Stroke	200 mm
Min. operating force	1.2 kN ²⁾
Ambient temperature	-40 °C to +45 °C
Class of ice coating	10 mm
Nominal voltage	3 kV DC
Rated insulation voltage	4.8 kV DC
Operating current	2000 A
Creepage distance	300 mm
Clearance in air to earth/ above the isolating gap	180/90 mm
Rated impulse withstand voltage	40 kV
Power-frequency withstand voltage, wet	18.5 kV
Rated short-time current	40 kA
Short-time current dura- tion	250 ms

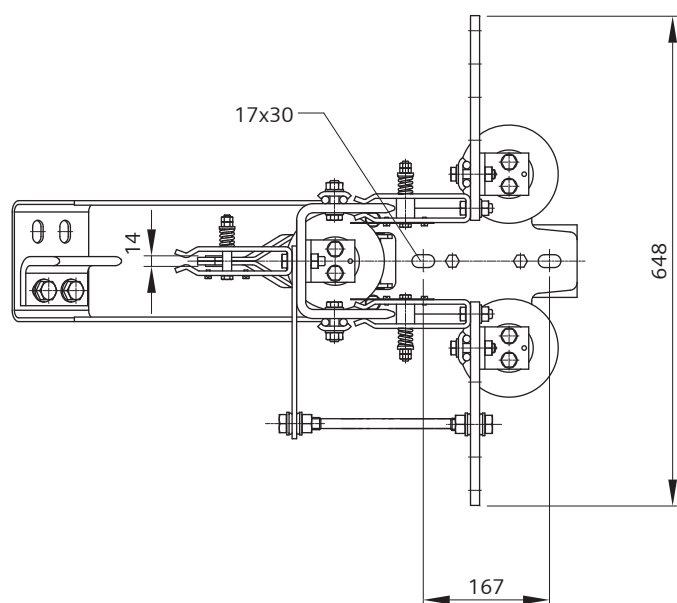
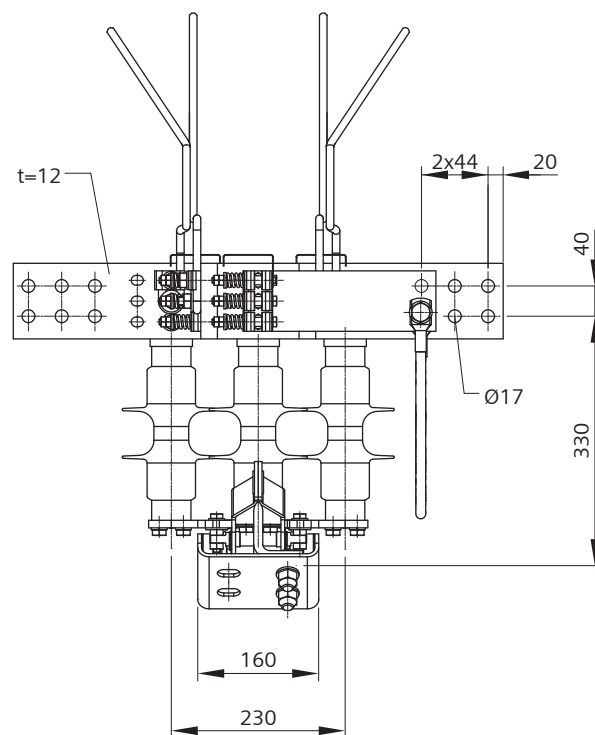
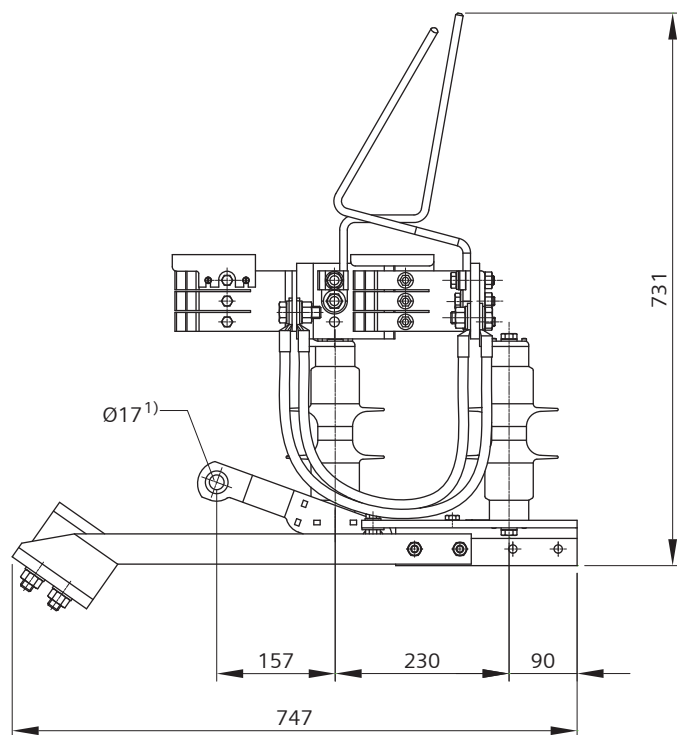
¹⁾ without bush Ø20

²⁾ At ice coating this value is exceeded.

If necessary, the disconnector bracket 8WL6135-2A must be ordered separately, see page 02-12-34.

Substitute for 8WL6114-0 and 8WL6114-2.

with earth contact and rigid connections



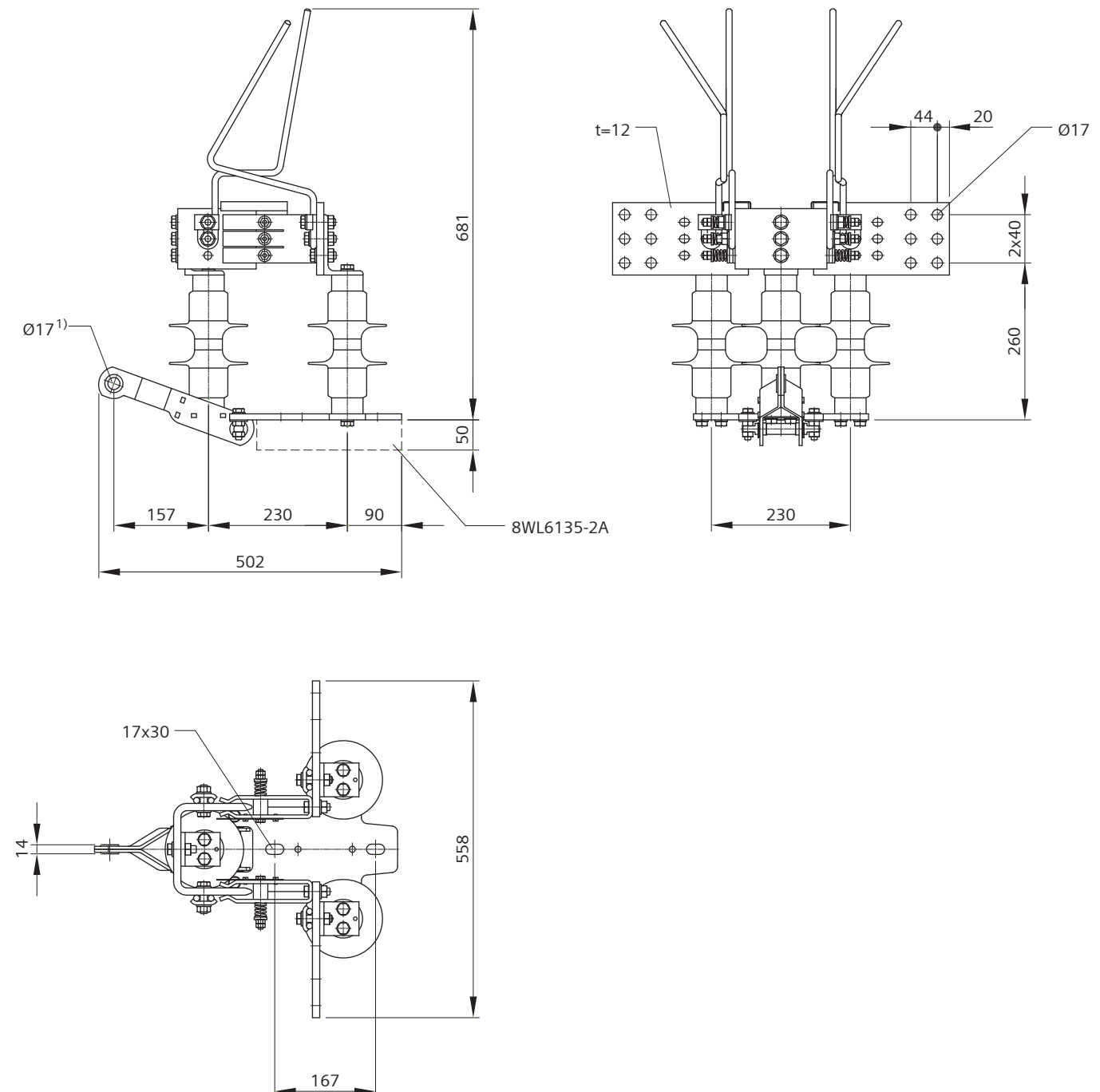
Order no.	8WL6134-3A
Designation	Disconnecter
Material	
Baseplate	stlSt
Insulator bodies	GRP, silicone
Insulator caps	stlSt
Contact sets	Cu-ETP
Arcing horns	Cu-ETP
Weight	41.6 kg
Stroke	200 mm
Min. operating force	1.2 kN ²⁾
Ambient temperature	-40 °C to +45 °C
Class of ice coating	10 mm
Nominal voltage	3 kV DC
Rated insulation voltage	4.8 kV DC
Operating current	2000 A
Creepage distance	300 mm
Clearance in air to earth/ above the isolating gap	180/90 mm
Rated impulse withstand voltage	40 kV
Power-frequency withstand voltage, wet	18.5 kV
Rated short-time current	40 kA
Short-time current dura- tion	250 ms

¹⁾ without bush Ø20

²⁾ At ice coating this value is exceeded.

Substitute for 8WL6114-1 and 8WL6114-3.

with rigid connections, for higher current-load capacity and environmental resistance



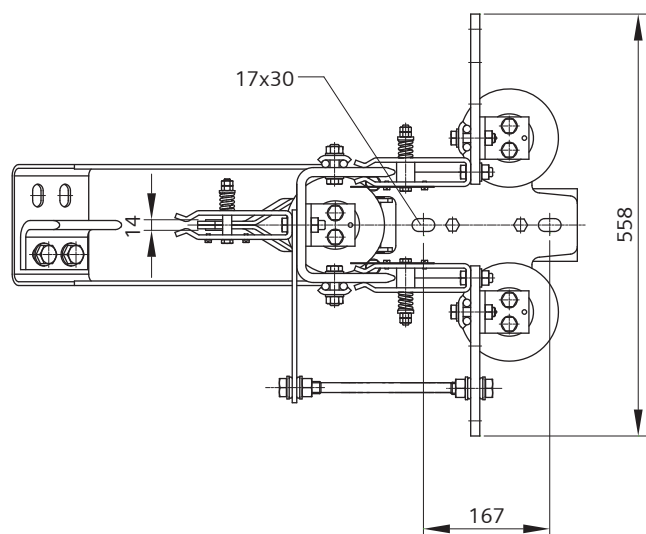
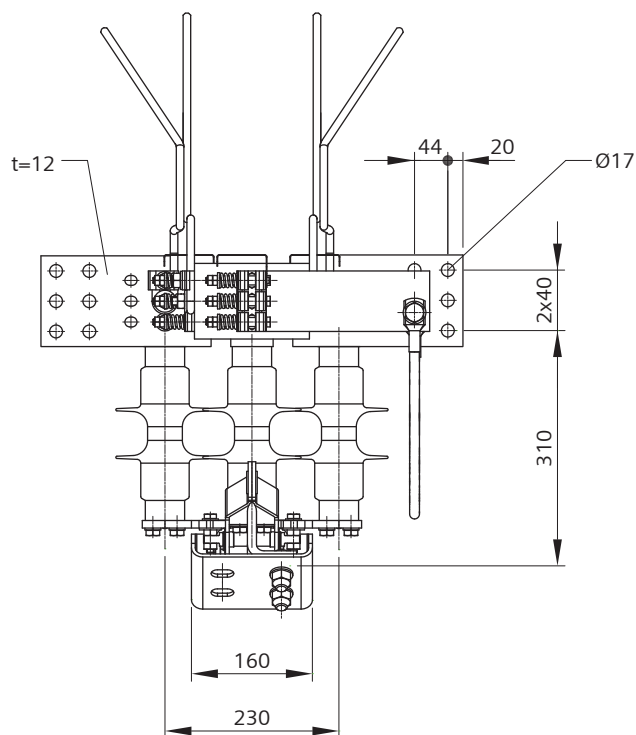
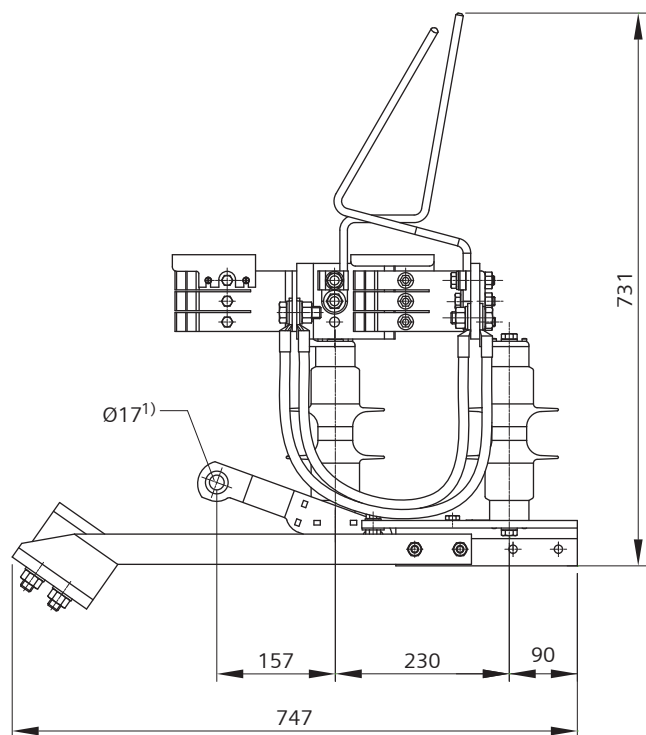
Order no.	8WL6134-4
Designation	Disconnector
Material	
Baseplate	stlSt
Insulator bodies	GRP, silicone
Insulator caps	stlSt
Contact sets	Cu-ETP, silver-coated
Arcing horns	Cu-ETP
Weight	30.2 kg
Stroke	200 mm
Min. operating force	1.2 kN ²⁾
Ambient temperature	-40 °C to +45 °C
Class of ice coating	10 mm
Nominal voltage	3 kV DC
Rated insulation voltage	4.8 kV DC
Operating current	3000 A
Creepage distance	300 mm
Clearance in air to earth/ above the isolating gap	180/90 mm
Rated impulse withstand voltage	40 kV
Power-frequency withstand voltage, wet	18.5 kV
Rated short-time current	40 kA
Short-time current dura- tion	250 ms

¹⁾ without bush Ø20

²⁾ At ice coating this value is exceeded.

If necessary, the disconnector bracket 8WL6135-2A must be ordered separately, see page 02-12-34.

with earth contact and rigid connections, for higher current-load capacity and environmental resistance



Order no.	8WL6134-4A
Designation	Disconnector
Material	
Baseplate	stlSt
Insulator bodies	GRP, silicone
Insulator caps	stlSt
Contact sets	Cu-ETP, silver-coated
Arcing horns	Cu-ETP
Weight	40.7 kg
Stroke	200 mm
Min. operating force	1.2 kN ²⁾
Ambient temperature	-40 °C to +45 °C
Class of ice coating	10 mm
Nominal voltage	3 kV DC
Rated insulation voltage	4.8 kV DC
Operating current	2000 A
Creepage distance	300 mm
Clearance in air to earth/ above the isolating gap	180/90 mm
Rated impulse withstand voltage	40 kV
Power-frequency withstand voltage, wet	18.5 kV
Rated short-time current	40 kA
Short-time current dura- tion	250 ms

¹⁾ without bush Ø20

²⁾ At ice coating this value is exceeded.

Order no.	8WL6134-5
Designation	Disconnector
Material	
Baseplate	stlSt
Insulator bodies	GRP, silicone
Insulator caps	stlSt
Contact sets	Cu-ETP
Arcing horns	Cu-ETP
Weight	40.9 kg
Stroke	200 mm
Min. operating force	1.8 kN ²⁾
Ambient temperature	-40 °C to +45 °C
Class of ice coating	5 mm
Nominal voltage	3 kV DC
Rated insulation voltage	4.8 kV DC
Operating current	4000 A
Creepage distance	300 mm
Clearance in air to earth/ above the isolating gap	180/90 mm
Rated impulse withstand voltage	40 kV
Power-frequency withstand voltage, wet	18.5 kV
Rated short-time current	40 kA
Short-time current dura- tion	1 s

¹⁾ without bush Ø20

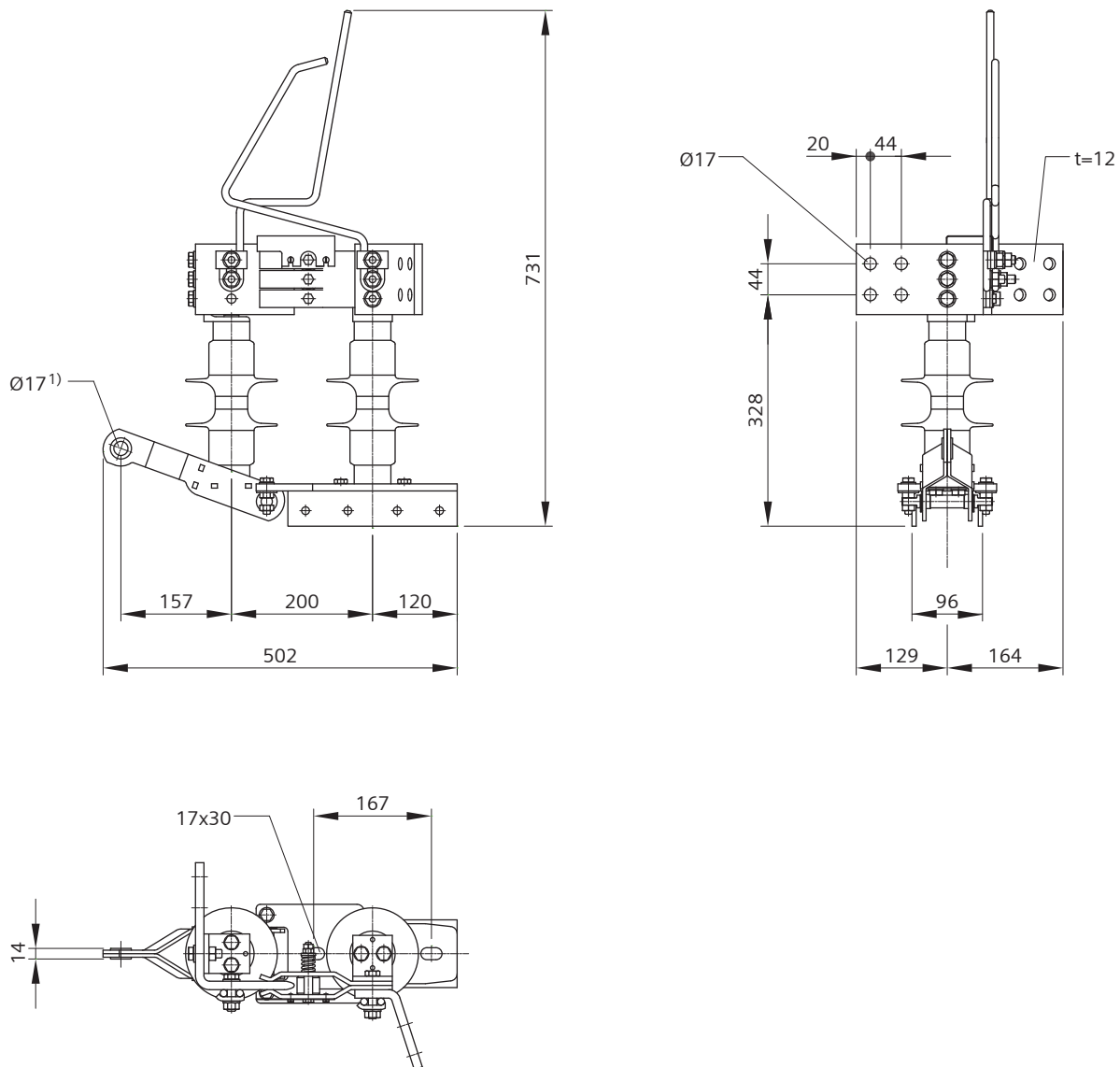
²⁾ At ice coating this value is exceeded.

If necessary, the disconnector bracket 8WL6135-2A must be ordered separately, see page 02-12-34.

Substitute for 8WL6114-4 and 8WL6114-6.

Disconnector up to 3 kV DC, operating current 2000 A

with flexible connections



Order no.	8WL6134-0
Designation	Disconnector
Material	
Baseplate	stlSt
Bracket	stlSt
Insulator bodies	GRP, silicone
Insulator caps	stlSt
Contact sets	Cu-ETP
Arcing horns	Cu-ETP
Weight	20 kg
Stroke	200 mm
Min. operating force	0.8 kN ²⁾
Ambient temperature	-40 °C to +45 °C
Class of ice coating	10 mm
Nominal voltage	3 kV DC
Rated insulation voltage	4.8 kV DC
Operating current	2000 A
Creepage distance	300 mm
Clearance in air to earth/ above the isolating gap	180/90 mm
Rated impulse withstand voltage	40 kV
Power-frequency withstand voltage, wet	18.5 kV
Rated short-time current	40 kA
Short-time current dura- tion	250 ms

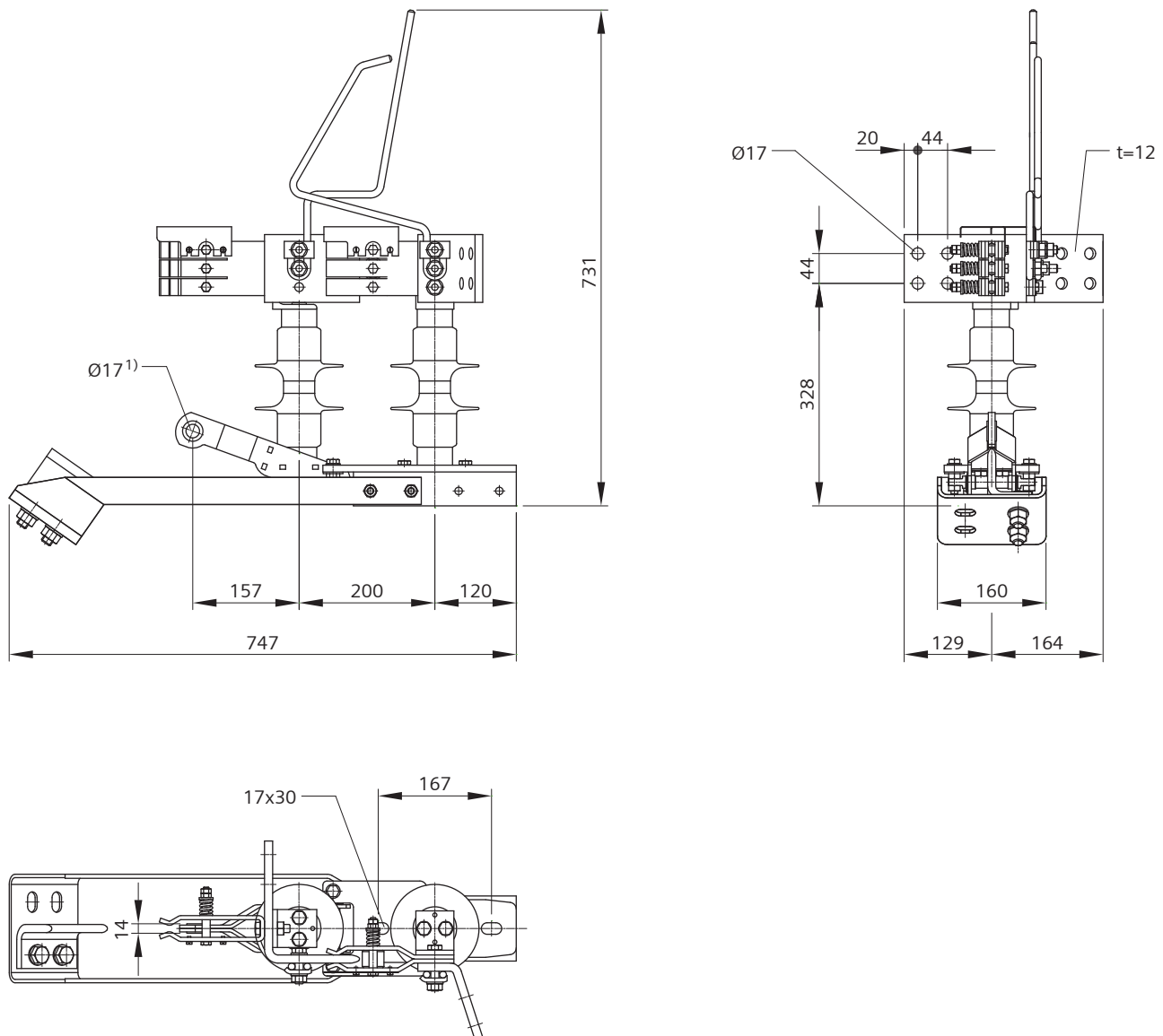
¹⁾ without bush Ø20

²⁾ At ice coating this value is exceeded.

Substitute for 8WL6124-0 and 8WL6124-2.

Disconnector up to 3 kV DC, operating current 2000 A

with earth contact and flexible connections



Order no.	8WL6134-0A
Designation	Disconnecter
Material	
Baseplate	stlSt
Bracket	stlSt
Insulator bodies	GRP, silicone
Insulator caps	stlSt
Contact sets	Cu-ETP
Arcing horns	Cu-ETP
Weight	27 kg
Stroke	200 mm
Min. operating force	0.8 kN ²⁾
Ambient temperature	-40 °C to +45 °C
Class of ice coating	10 mm
Nominal voltage	3 kV DC
Rated insulation voltage	4.8 kV DC
Operating current	2000 A
Creepage distance	300 mm
Clearance in air to earth/ above the isolating gap	180/90 mm
Rated impulse withstand voltage	40 kV
Power-frequency withstand voltage, wet	18.5 kV
Rated short-time current	40 kA
Short-time current dura- tion	250 ms

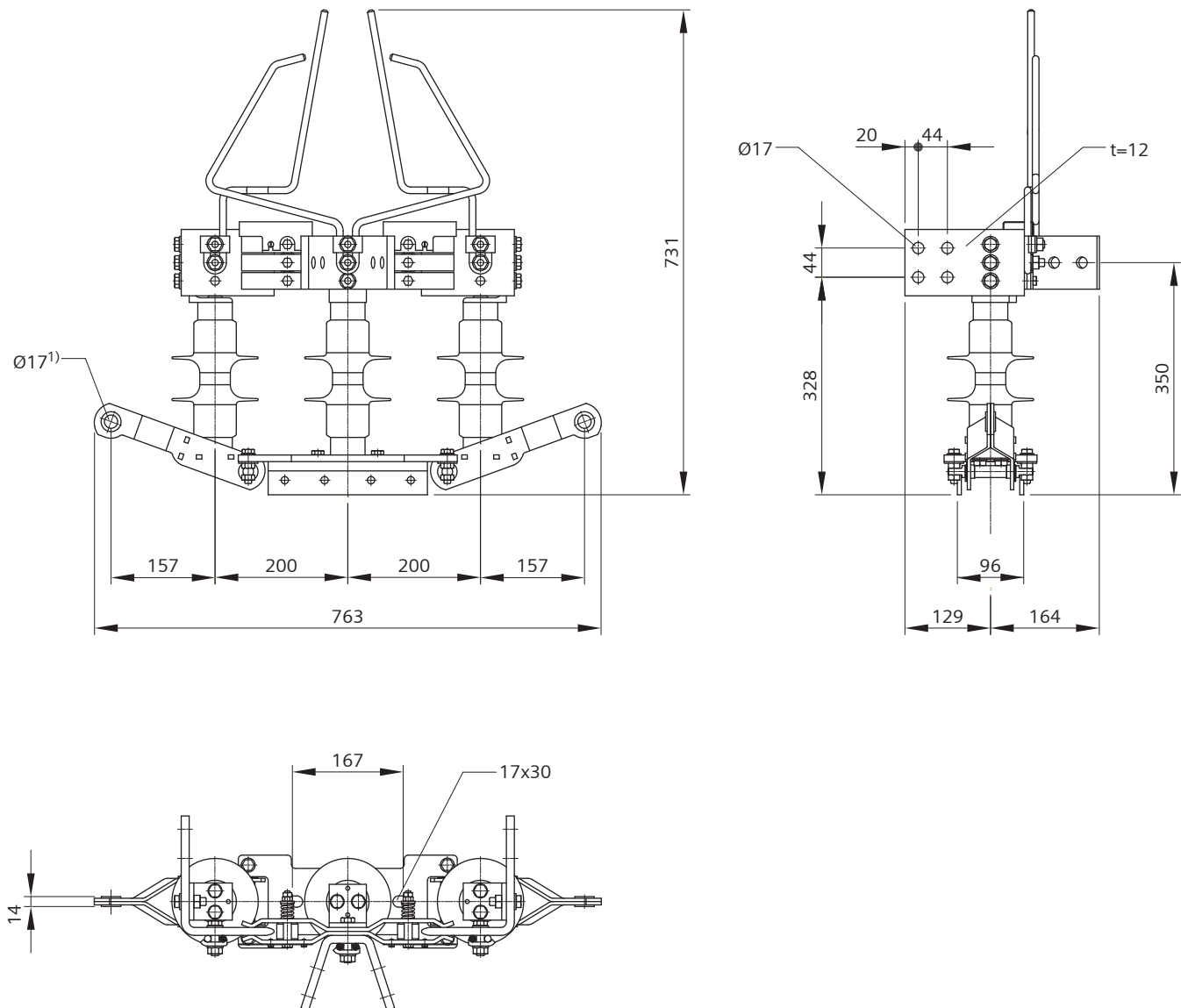
¹⁾ without bush Ø20

²⁾ At ice coating this value is exceeded.

Substitute for 8WL6124-1 and 8WL6124-3.

Tandem disconnector up to 3 kV DC, operating current 2000 A

with flexible connections



Order no.	8WL6134-2C
Designation	Tandem disconnector
Material	
Baseplate	stlSt
Bracket	stlSt
Insulator bodies	GRP, silicone
Insulator caps	stlSt
Contact sets	Cu-ETP
Arcing horns	Cu-ETP
Weight	31.9 kg
Stroke	200 mm
Min. operating force	0.8 kN ^{2) 4)} 1,2 kN ^{3) 4)}
Ambient temperature	-40 °C to +45 °C
Class of ice coating	10 mm
Nominal voltage	3 kV DC
Rated insulation voltage	4.8 kV DC
Operating current	2000 A
Creepage distance	300 mm
Clearance in air to earth/ above the isolating gap	180/90 mm
Rated impulse withstand voltage	40 kV
Power-frequency withstand voltage, wet	18.5 kV
Rated short-time current	40 kA
Short-time current dura- tion	250 ms

¹⁾ without bush Ø20

²⁾ at operation of one connection

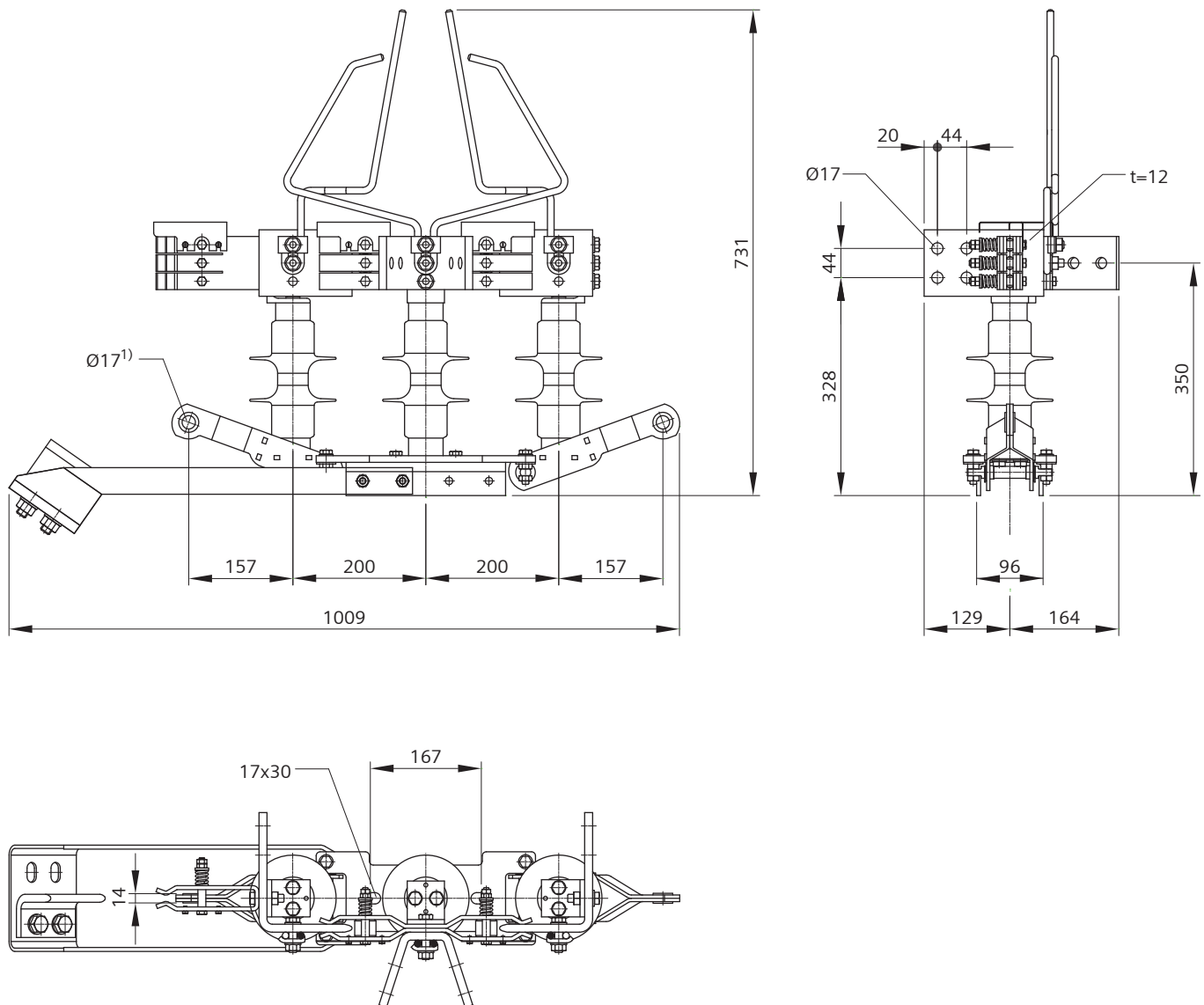
³⁾ at operation of both connections

⁴⁾ At ice coating this value is exceeded.

Type with one flexible connection or with earth contact on request.

Tandem disconnector up to 3 kV DC, operating current 2000 A

with one earth contact and flexible connections



Order no.	8WL6134-2D
Designation	Tandem disconnector
Material	
Baseplate	stlSt
Bracket	stlSt
Insulator bodies	GRP, silicone
Insulator caps	stlSt
Contact sets	Cu-ETP
Arcing horns	Cu-ETP
Weight	38.1 kg
Stroke	200 mm
Min. operating force	0.8 kN ^{2) 4)} 1,2 kN ^{3) 4)}
Ambient temperature	-40 °C to +45 °C
Class of ice coating	10 mm
Nominal voltage	3 kV DC
Rated insulation voltage	4.8 kV DC
Operating current	2000 A
Creepage distance	300 mm
Clearance in air to earth/ above the isolating gap	180/90 mm
Rated impulse withstand voltage	40 kV
Power-frequency withstand voltage, wet	18.5 kV
Rated short-time current	40 kA
Short-time current dura- tion	250 ms

¹⁾ without bush Ø20

²⁾ at operation of one connection

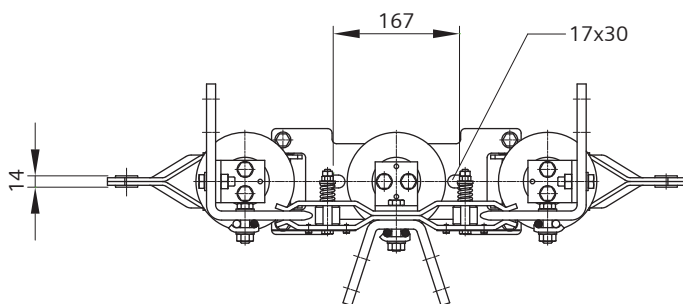
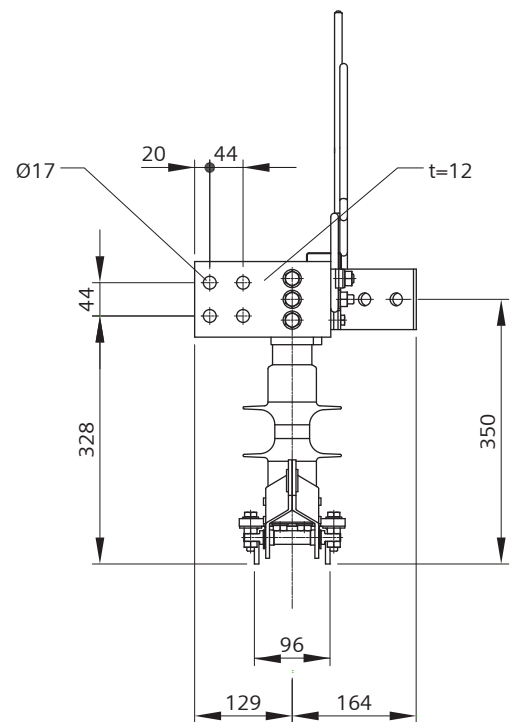
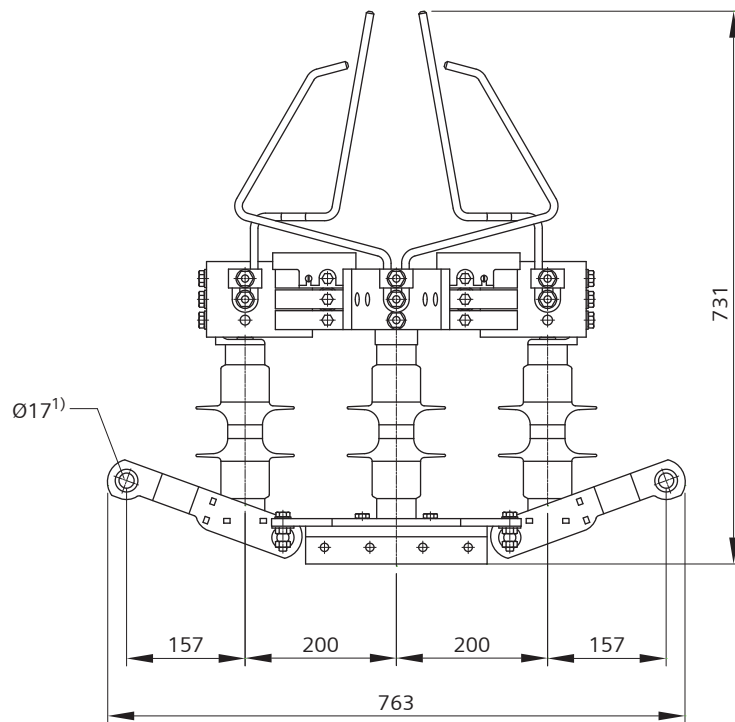
³⁾ at operation of both connections

⁴⁾ At ice coating this value is exceeded.

Type with one flexible connection or with earth contact on request.

Tandem disconnector up to 3 kV DC, operating current 2000 A

with flexible connections, for higher environmental resistance



Order no.	8WL6134-2
Designation	Tandem disconnector
Material	
Baseplate	stlSt
Bracket	stlSt
Insulator bodies	GRP, silicone
Insulator caps	stlSt
Contact sets	Cu-ETP, silver-coated
Arcing horns	Cu-ETP
Weight	31.9 kg
Stroke	200 mm
Min. operating force	0.8 kN ^{2) 4)} 1,2 kN ^{3) 4)}
Ambient temperature	-40 °C to +45 °C
Class of ice coating	10 mm
Nominal voltage	3 kV DC
Rated insulation voltage	4.8 kV DC
Operating current	2000 A
Creepage distance	300 mm
Clearance in air to earth/ above the isolating gap	180/90 mm
Rated impulse withstand voltage	40 kV
Power-frequency withstand voltage, wet	18.5 kV
Rated short-time current	40 kA
Short-time current dura- tion	250 ms

¹⁾ without bush Ø20

²⁾ at operation of one connection

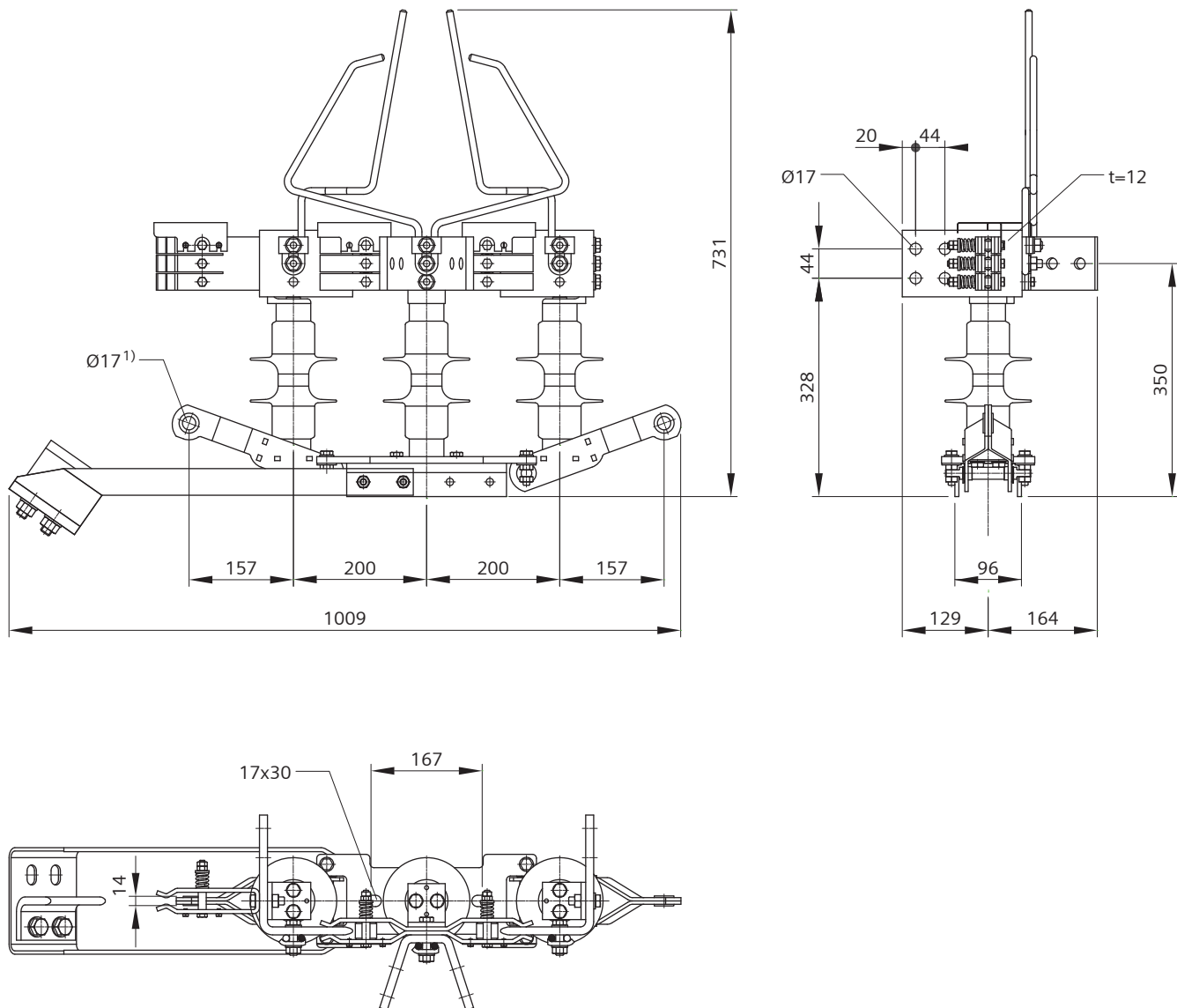
³⁾ at operation of both connections

⁴⁾ At ice coating this value is exceeded.

Type with one flexible connection or with earth contact on request.

Tandem disconnector up to 3 kV DC, operating current 2000 A

with one earth contact and flexible connections, for higher environmental resistance



Order no.	8WL6134-2A
Designation	Tandem disconnector
Material	
Baseplate	stlSt
Bracket	stlSt
Insulator bodies	GRP, silicone
Insulator caps	stlSt
Contact sets	Cu-ETP, silver-coated
Arcing horns	Cu-ETP
Weight	38.1 kg
Stroke	200 mm
Min. operating force	0.8 kN ^{2) 4)} 1,2 kN ^{3) 4)}
Ambient temperature	-40 °C to +45 °C
Class of ice coating	10 mm
Nominal voltage	3 kV DC
Rated insulation voltage	4.8 kV DC
Operating current	2000 A
Creepage distance	300 mm
Clearance in air to earth/ above the isolating gap	180/90 mm
Rated impulse withstand voltage	40 kV
Power-frequency withstand voltage, wet	18.5 kV
Rated short-time current	40 kA
Short-time current dura- tion	250 ms

¹⁾ without bush Ø20

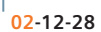
²⁾ at operation of one connection

³⁾ at operation of both connections

⁴⁾ At ice coating this value is exceeded.

Type with one flexible connection or with earth contact on request.

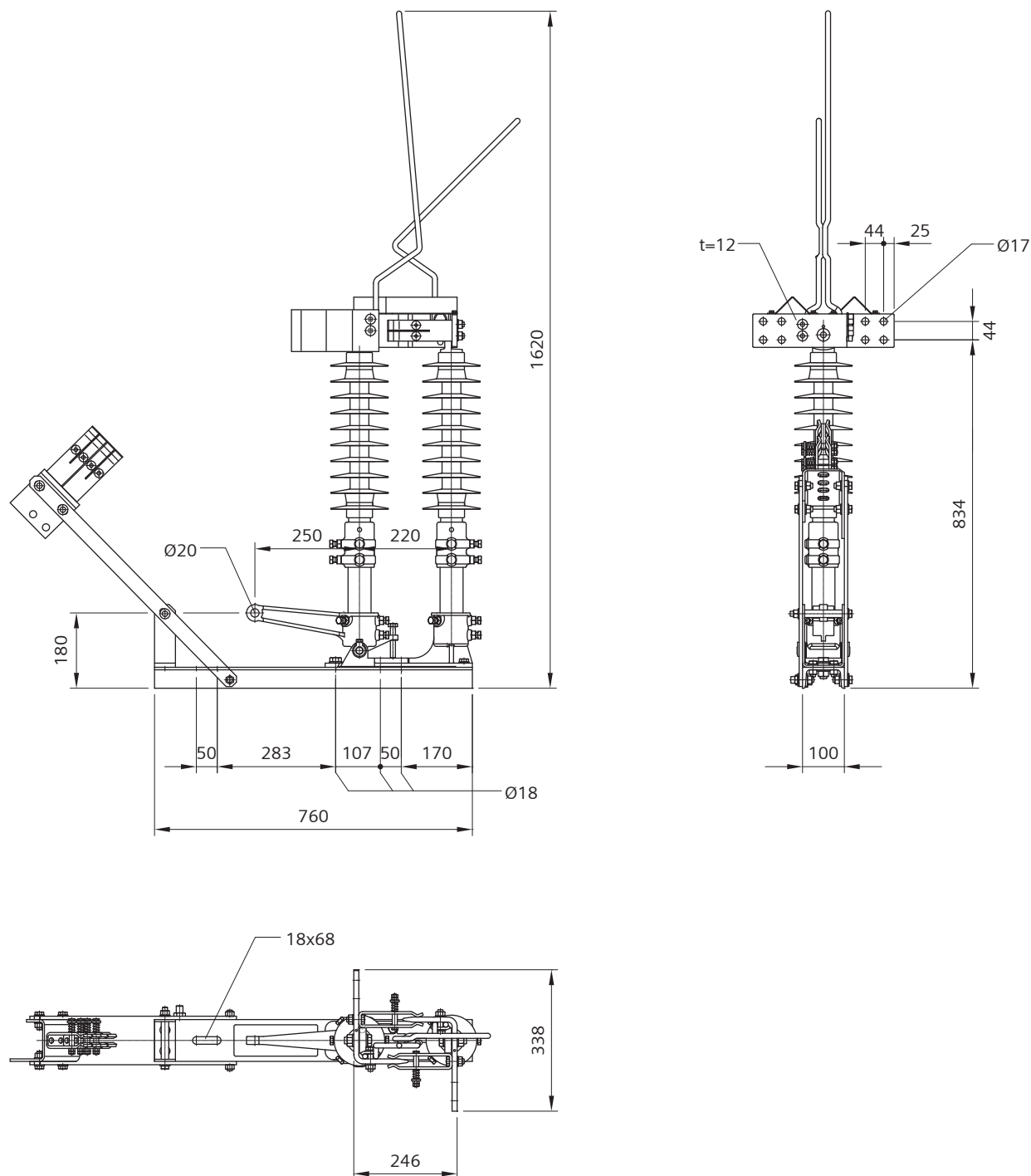
without earth contact



Order no.	8WL6127-0	8WL6127-0E	8WL6127-0F
Designation	Disconnector	Disconnector	Disconnector
Material			
Baseplate	htgSt	htgSt	htgSt
Insulator bodies	GRP, silicone	GRP, silicone	GRP, silicone
Insulator caps	ctAl	ctAl	ctAl
Contact sets	Cu-ETP	Cu-ETP	Cu-ETP, silver-coated
Arcing horns	Cu-ETP	Cu-ETP	Cu-ETP
Weight	31.0 kg	31.0 kg	31.0 kg
Stroke	200 mm	200 mm	200 mm
Min. operating force	1 kN	1 kN	1 kN
Ambient temperature	-30 °C to +45 °C	-30 °C to +45 °C	-30 °C to +45 °C
Class of ice coating	10 mm	10 mm	10 mm
Nominal voltage	15/25 kV AC	25 kV AC	25 kV AC
Nominal frequency	16.7 Hz	50/60 Hz	50/60 Hz
Operating current	1700 A	1700 A	2500 A
Min. creepage distance	1200 mm	1200 mm	1200 mm
Clearance in air to earth/ above the isolating gap	420/460 mm	420/460 mm	420/460 mm
Lightning impulse withstand voltage	250 kV	250 kV	250 kV
Power-frequency withstand voltage, wet	95 kV	95 kV	95 kV
Rated short-time current	50 kA	40 kA	40 kA
Short-time current dura- tion	1 s	0.5 s	0.5 s

Disconnecter 15/25 kV AC and 25 kV AC

with earth contact



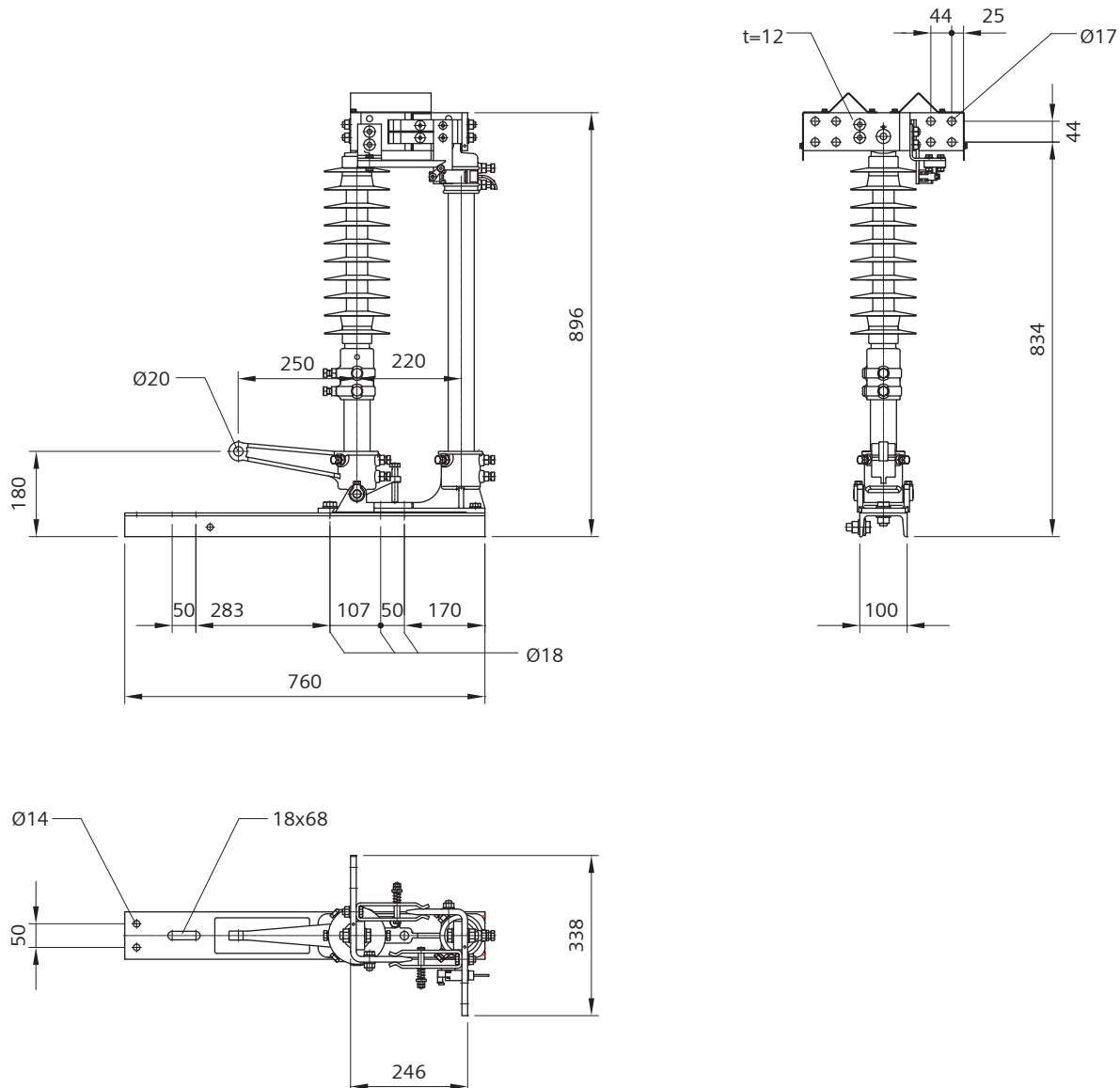
Order no.	8WL6127-1	8WL6127-1E
Designation	Disconnector	Disconnector
Material		
Baseplate	htgSt	htgSt
Insulator bodies	GRP, silicone	GRP, silicone
Insulator caps	ctAl	ctAl
Contact sets	Cu-ETP	Cu-ETP
Arcing horns	Cu-ETP	Cu-ETP
Weight	36.0 kg	36.0 kg
Stroke	200 mm	200 mm
Min. operating force	1 kN	1.0 kN
Ambient temperature	-30 °C to +45 °C	-30 °C to +45 °C
Class of ice coating	10 mm	10 mm
Nominal voltage	15/25 kV AC	25 kV AC
Nominal frequency	16.7 Hz	50/60 Hz
Operating current	1700 A	1700 A
Min. creepage distance	1200 mm	1200 mm
Clearance in air to earth/ above the isolating gap	420/460 mm	420/460 mm
Lightning impulse withstand voltage	250 kV	250 kV
Power-frequency withstand voltage, wet	95 kV	95 kV
Rated short-time current	50 kA ¹⁾ 40 kA ²⁾	40 kA
Short-time current dura- tion	1 s	0.5 s ¹⁾ 1 s ²⁾

¹⁾ main contacts

²⁾ earth contact

Earthing switch 15/25 kV AC

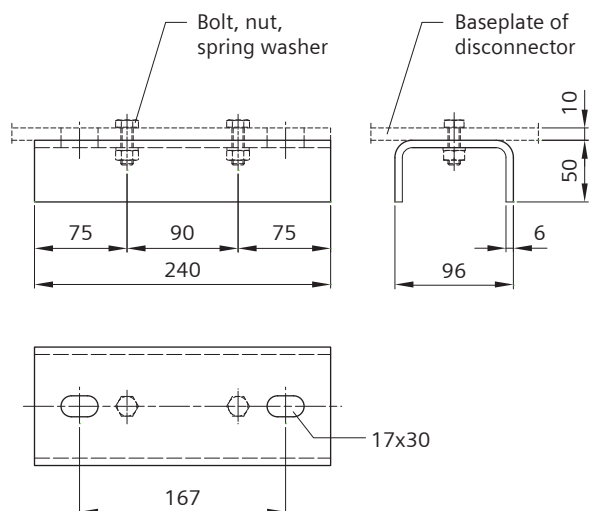
with insertion monitoring



Order no.	8WL6127-1A
Designation	Earthing switch
Material	
Baseplate	htgSt
Insulator body	GRP, silicone
Tube 55x4	htgSt
Insulator caps	ctAl
Contact sets	Cu-ETP
Weight	33.0 kg
Stroke	200 mm
Min. operating force	1 kN
Ambient temperature	-30 °C to +45 °C
Class of ice coating	10 mm
Nominal voltage	15/25 kV AC
Nominal frequency	16.7 Hz
Operating current	1700 A
Min. creepage distance	1200 mm
Clearance in air to earth/ above the isolating gap	420/460 mm
Lightning impulse withstand voltage	250 kV
Power-frequency withstand voltage, wet	95 kV
Rated short-time current	50 kA
Short-time current dura- tion	1 s

Disconnector bracket

as accessories for disconnector with rigid connections 8WL6134-3, 8WL6134-4 and 8WL6134-5

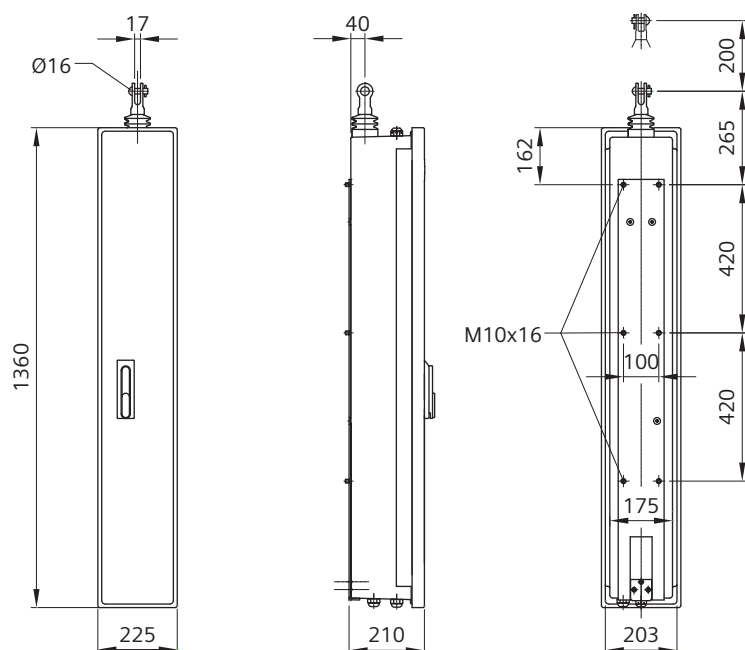


Order no.	8WL6135-2A
Designation	Disconnector bracket
Material	stlSt
Weight	1.9 kg

Two bolts ISO 4017-M10x30 (stlSt), two nuts ISO 4032-M10 (stlSt) and two spring washers 8WL1128-3 (stlSt) must be ordered separately.

Electrohydraulic operated mechanism

for remote-controlled operation of disconnectors up to 3 kV DC, vertical stroke 200 mm



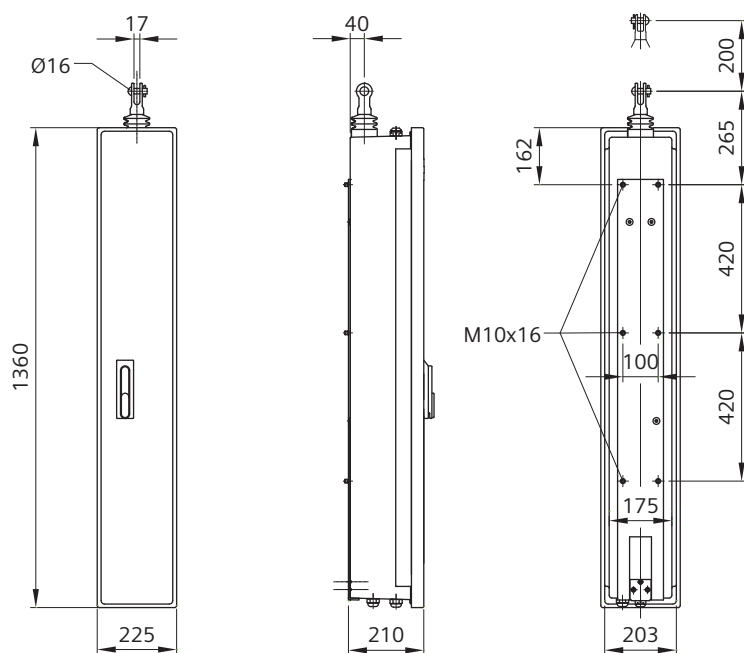
Order no.	8WL6202-5	8WL6202-2	8WL6202-0
Designation	Operated mechanism 24 V DC	Operated mechanism 60 V DC	Operated mechanism 230 V AC
Material			
Casing	GRP, color RAL6009 (fir green)	GRP, color RAL6009 (fir green)	GRP, color RAL6009 (fir green)
Casing support, linkage	stlSt	stlSt	stlSt
Bellow	Plastic, black	Plastic, black	Plastic, black
Connecting clevis	CuAl	CuAl	CuAl
Pin 16x40	stlSt	stlSt	stlSt
Split pin 5x28	Cu	Cu	Cu
Weight	41 kg	41 kg	41 kg
Push/pull force	4.5/3.0 kN	4.5/3.0 kN	4.5/3.0 kN
Stroke speed ON/OFF	approx. 30/40 mm/s	approx. 30/40 mm/s	approx. 25/35 mm/s
Ambient temperature	-25 °C to +45 °C	-25 °C to +45 °C	-25 °C to +45 °C
Nominal voltage	24 V DC	60 V DC	230 V AC
Nominal frequency	–	–	50/60 Hz
Perm. voltage difference	±10 %	±10 %	±10 %
Nominal current	15.0 A	6.0 A	1.5 A
Protection class	IP54	IP54	IP54
Connection	with 7 wires	with 7 wires	with 4 wires + PE

Other colors on request.

The operating linkage made of GRP 8WL6230-6B has to be used exclusively.

Electrohydraulic operated mechanism

with additional floating contacts, for remote-controlled operation of disconnectors up to 3 kV DC, vertical stroke 200 mm

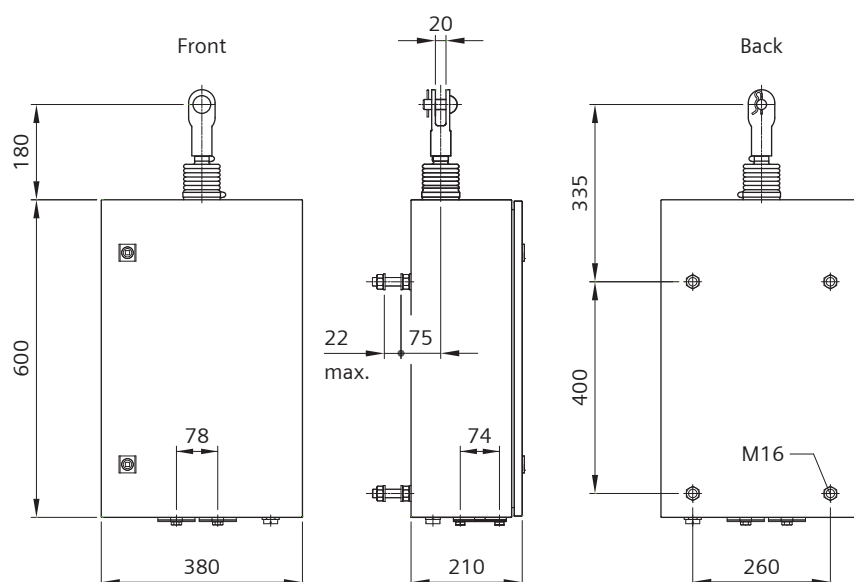


Order no.	8WL6202-0A
Designation	Operated mechanism 230 V AC
Material	
Casing	GRP, color RAL6009 (fir green)
Casing support, linkage	stlSt
Bellow	Plastic, black
Connecting clevis	CuAl
Pin 16x40	stlSt
Split pin 5x28	Cu
Weight	42 kg
Push/pull force	4.0/3.0 kN
Stroke speed ON/OFF	approx. 25/35 mm/s
Ambient temperature	-25 °C to +45 °C
Nominal voltage	230 V AC
Nominal frequency	50/60 Hz
Perm. voltage difference	±10 %
Nominal current	1.5 A
Protection class	IP54
Connection	with 4 wires + PE
Additional contacts	1 NO, 1 NC for each end position

Other colors on request. The operating linkage 8WL6230-6B made of GRP has to be used exclusively.

Electrohydraulic operated mechanism

for remote-controlled operation of disconnectors up to 3 kV DC and 25 kV AC, vertical stroke 200 mm

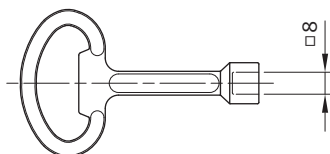


Order no.	8WL6203-4	8WL6203-3	8WL6203-1	8WL6203-5	8WL6203-0
Designation	Operated mechanism 24 V DC	Operated mechanism 48 V DC	Operated mechanism 110-136 V AC/DC	Operated mechanism 220 V DC	Operated mechanism 230 V AC
Material					
Casing	stlSt	stlSt	stlSt	stlSt	stlSt
Bellow	Plastic, black	Plastic, black	Plastic, black	Plastic, black	Plastic, black
Clevis	mICI	mICI	mICI	mICI	mICI
Pin 19x52	stlSt	stlSt	stlSt	stlSt	stlSt
Beta-Split pin	stlSt	stlSt	stlSt	stlSt	stlSt
Weight	46 kg	46 kg	46 kg	46 kg	46 kg
Push/pull force	4.0/3.0 kN	4.0/3.0 kN	4.0/3.0 kN	4.0/3.0 kN	4.0/3.0 kN
Stroke speed ON/OFF	approx. 35/25 mm/s	approx. 45/45 mm/s	approx. 45/45 mm/s	approx. 45/45 mm/s	approx. 55/45 mm/s
Ambient temperature	-30 °C to +45 °C	-30 °C to +45 °C	-30 °C to +45 °C	-30 °C to +45 °C	-30 °C to +45 °C
Nominal voltage	24 V DC	48 V DC	110-136 V AC/DC	220 V DC	230 V AC
Nominal frequency	–	–	–	–	50-60 Hz
Perm. voltage difference	±10 %	±10 %	±10 %	±10 %	±10 %
Nominal current	15 A	10 A	5 A	2.5 A	2.5 A
Protection class	IP54	IP54	IP54	IP54	IP54
Connection	with 13 wires	with 13 wires	with 3 wires + PE	with 3 wires + PE	with 3 wires + PE

Key with male square 8WL6203-8L (page 02-12-38), padlock 8WL6215-0 (page 02-12-38), flange with cable gland 8WL6203-8EA or -8EB (page 02-12-39) must be ordered separately.

Key with male square

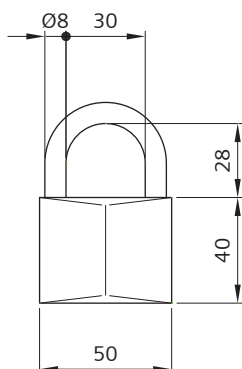
for electrohydraulic operated mechanism 8WL6203-



Order no.	8WL6203-8L
Designation	Key with male square
Material	St
Weight	0.04 kg

Padlock

for manual operating mechanism 8WL6214- and electrohydraulic operated mechanism 8WL6203-

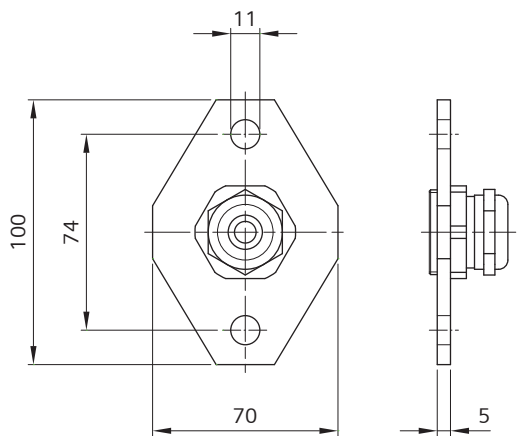


Order no.	8WL6215-0
Designation	Padlock
Material	CuZn
Weight	0.28 kg

incl. two keys

Flange with cable gland M32x1,5

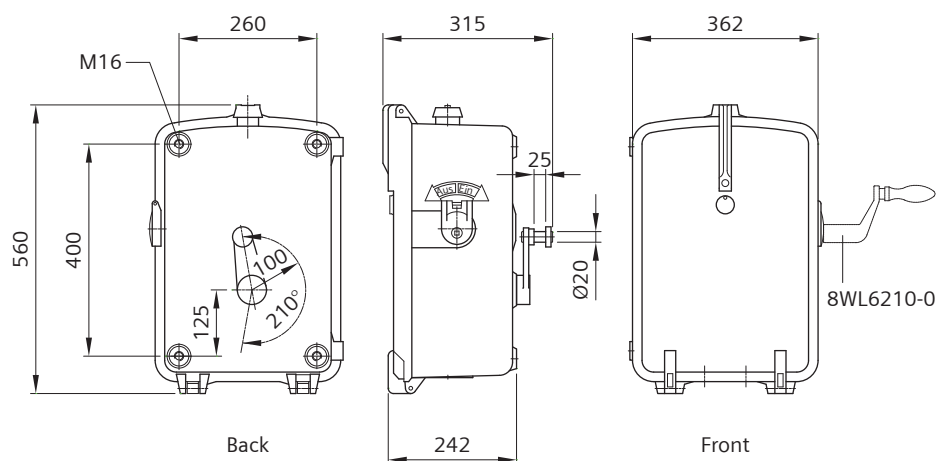
for electrohydraulic operated mechanism 8WL6203-



Order no.	8WL6203-8EA	8WL6203-8EB
Designation	Flange for connecting lines d=9-13 mm	Flange for connecting lines d=14-18 mm
Material		
Plate	stlSt	stlSt
Cable gland	Brass with plastic insert	Brass with plastic insert
Weight	0.32 kg	0.32 kg

Motor-operated mechanism, radial stroke

for remote-controlled operation of disconnectors and earthing switches



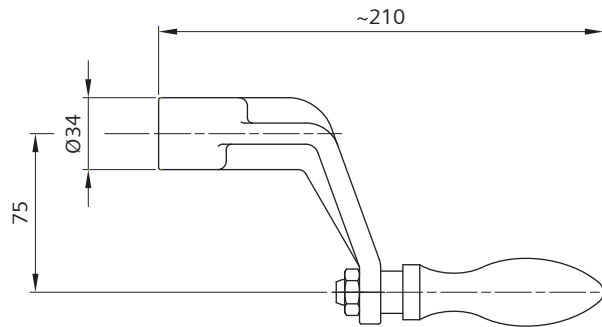
Order no.	8WL6200-2G	8WL6200-2P
Designation	Motor-operated mechanism (English lettering)	Motor-operated mechanism (English lettering)
Material	ctAl	ctAl
Weight	43.0 kg	43.0 kg
Torque at the crank	125 Nm	250 Nm
Vertical stroke	200 mm	200 mm
Max. power transmission (slipping clutch)	125 - 145 Nm	250 to 290 Nm
Operating time	3 - 10 s ¹⁾	3 bis 10 s
Nominal voltage/frequency	230 V AC / 50 Hz	230 V AC/50 Hz
Protection class (casing)	IP24D	IP24D
Connection type	three-wire principle	six-wire principle

¹⁾ depending on series resistance and cables

Hand crank 8WL6210-0, key 8WL6210-1 and fastening bolts M16 must be ordered separately.

Hand crank

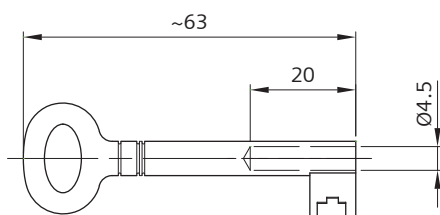
for motor-operated mechanism 8WL6200-



Order no.	8WL6210-0
Designation	Hand crank
Material	ctAl
Weight	0.36 kg

Key

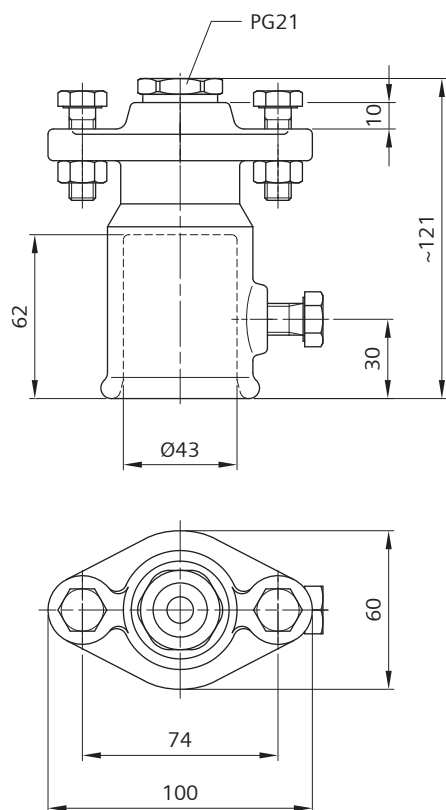
for motor-operated mechanism 8WL6200-



Order no.	8WL6210-1
Designation	Key
Material	St
Weight	0.017 kg

Cable sealing box

for motor-operated mechanism 8WL6200-

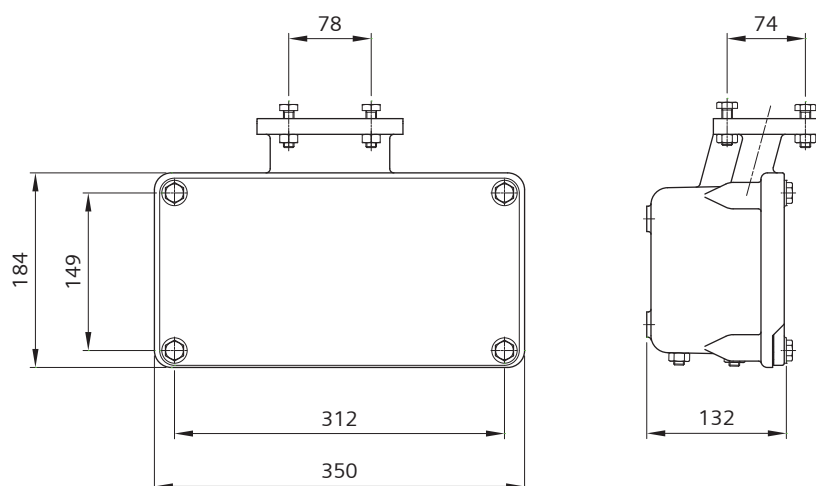


Order no.	8WL6212-0
Designation	Cable sealing box
Material	
Casing, flange	ctAl
Compression ring	htgSt
Sealing ring	Rubber
Compression bolt	Plastic
Bolts M10	stlSt
Nuts	stlSt
Cup-point screw M12	stlSt
Weight	0.43 kg

Cable sealing box for electrohydraulic operated mechanism 8WL6203- on request.

Short-circuit signal relay in additional casing

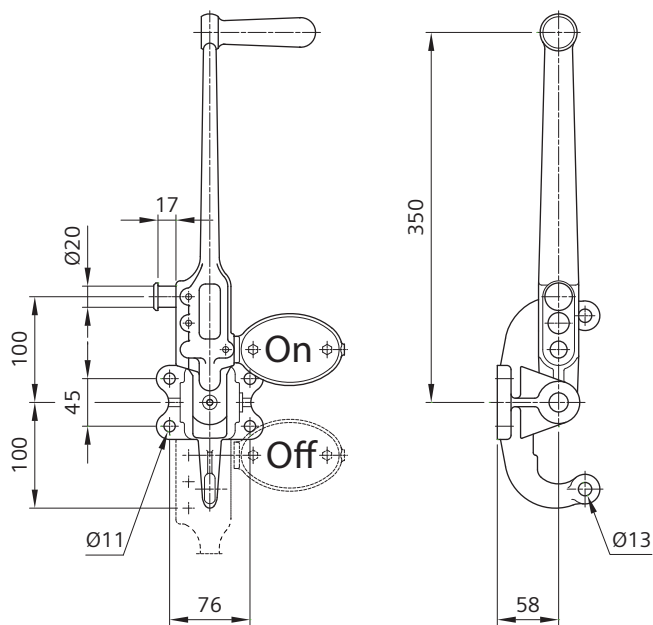
for electrohydraulic operated mechanism 8WL6203- and motor-operated mechanism 8WL6200-



Order no.	8WL6207-0
Designation	Short-circuit signal relay in additional casing
Material	
Casing, flange	ctAl
Sealings	Rubber
Bolts	stlSt
Nuts	stlSt
Washers	stlSt
Weight	6.62 kg
Nominal voltage	230 V AC
Nominal frequency	50 Hz
Max. short-time carrying capacity	40 - 50 A

Manual operating mechanism

for disconnector operation, stroke 200 mm



Order no.	8WL6214-1
Designation	Manual operating mechanism (English lettering)
Material	
Base	ctAl
Handle	ctAl
Indicator plates	ctAl
Pins	stlSt
Prestressed sleeves	stlSt
Weight	1.64 kg

Padlock 8WL6215-0 must be ordered separately, see page 02-12-38.

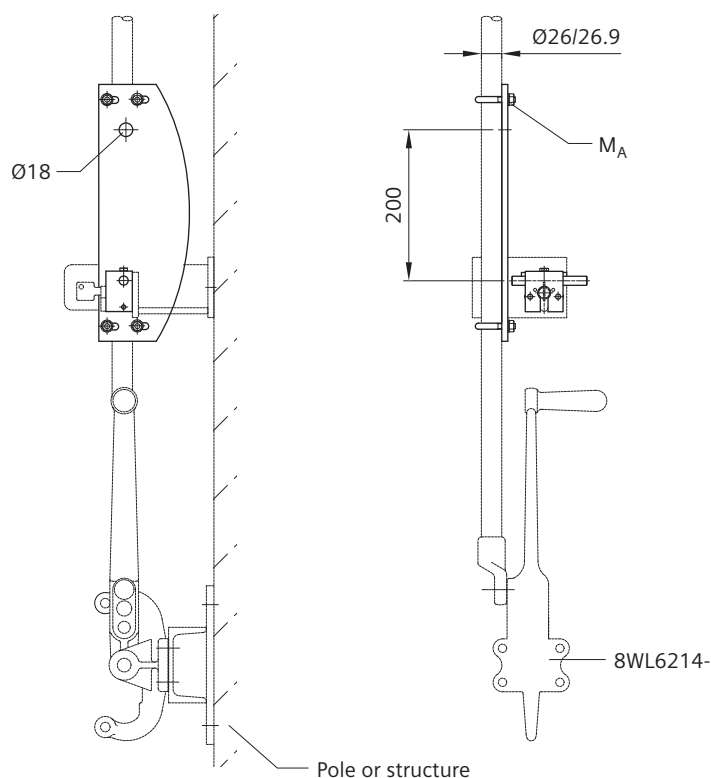
Can also be supplied in other languages:

- 8WL6214-0 (German lettering)
- 8WL6214-2 (French lettering)
- WL6214-3 (Spanish lettering)
- 8WL6214-4 (Dutch lettering)
- 8WL6214-8 (Swedish lettering)

Bracket 8WL6217-8 for fastening at pole with punch-look band see page 03-02-13.

Key lock with locking plate

as mechanical safety device for manual operating mechanism 8WL6214- in depots or workshops, for operating linkage made of tubes $d=26$ and 26.9 mm ($3/4"$)



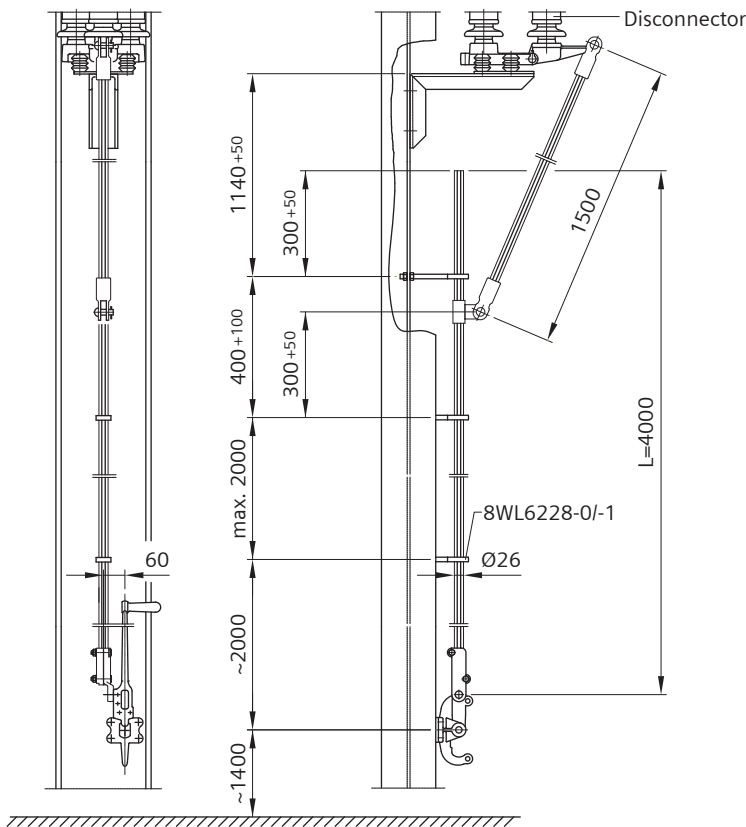
Order no.	8WL6227-2
Designation	Key lock
Material	
Lock (casing)	CuZn
Locking plate	htgSt
U-bolts M8	stlSt
Nuts, washers	stlSt
Weight	2.93 kg
Tightening torque M_A	16 Nm

Lock barrel acc. to DIN 18252 and key must be ordered separately.

Can also be supplied without locking plate and U-bolts, order no. 8WL6227-3.

Operating linkage made of GRP rods for manual op- erating mechanism

for manual operating mechanism 8WL6214-, for disconnectors up to 3 kV DC 8WL6134-



Order no.	8WL6230-5B
Designation	GRP operating linkage
Material	
Insulating rods	GRP, color RAL6022 (olive drab)
Fittings	ctAl, CuAl
Bolts	stlSt
Nuts	stlSt
Weight	12.0 kg
Max. pressure load	2.0 kN

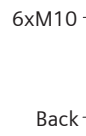
Fastening parts 8WL6228-0 or -1 (3x) must be ordered separately, see page 02-12-62.

Further single components see pages 02-12-48 to 02-12-52.

Other colors and lengths on request.

Type for pressure load higher than 2 kN on request.

for electrohydraulic operated mechanism 8WL6202-, for disconnectors up to 3 kV DC 8WL6134-



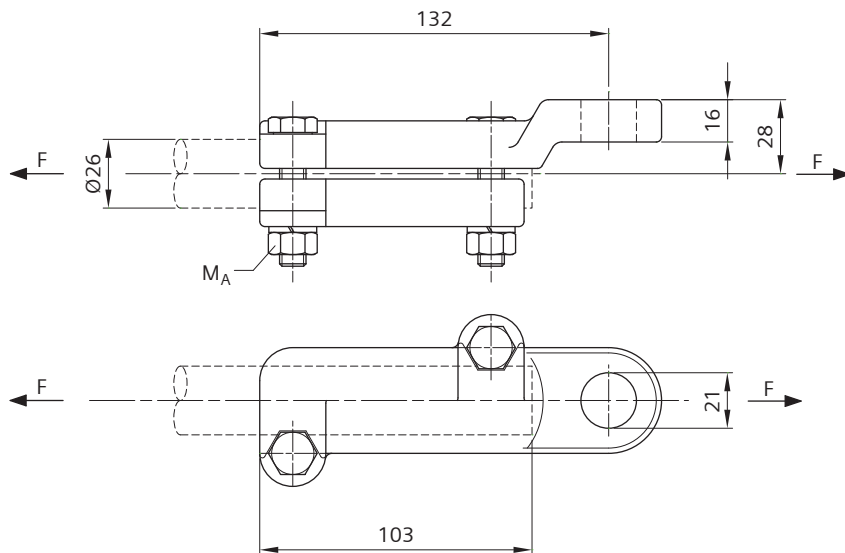
Order no.	8WL6230-6B
Designation	GRP operating linkage
Material	
Insulating rods	GRP, color RAL6022 (olive drab)
Fittings	CuAl
Bolts	stlSt
Nuts	stlSt
Weight	12.0 kg
Max. pressure load	2.0 kN

Further single components see pages 02-12-49 to 02-12-52.

Type for pressure load higher than 2 kN on request.

Tongue end fitting 26, offset

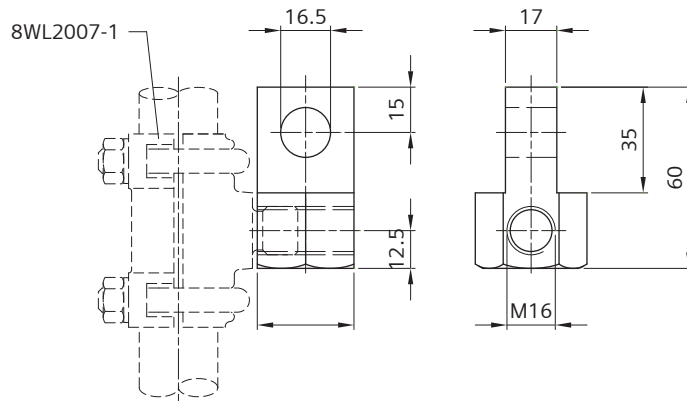
for connection of GRP operating linkage at manual operating mechanism 8WL6214-1, for insulating rod d=26 mm



Order no.	8WL6225-2
Designation	Tongue end fitting
Material	
Tongue end fitting	ctAl
Clamp cover	ctAl
Bolts M10	stlSt
Nuts	stlSt
Spring washers	stlSt
Weight	0.38 kg
Perm. operating load	3.4 kN
Min. failing load	10 kN
Tightening torque M_A	32 Nm

Fitting for guiding of operating linkage

for operating linkage made of GRP, for connection at swivel clip holder 8WL2007-1

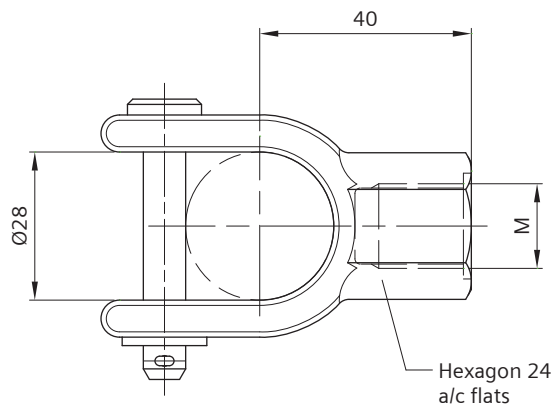


Order no.	8WL6231-6
Designation	Fitting
Material	CuZn
Weight	0.26 kg

Clip holder 8WL2007-1 see page 02-03-10.

Guide 26

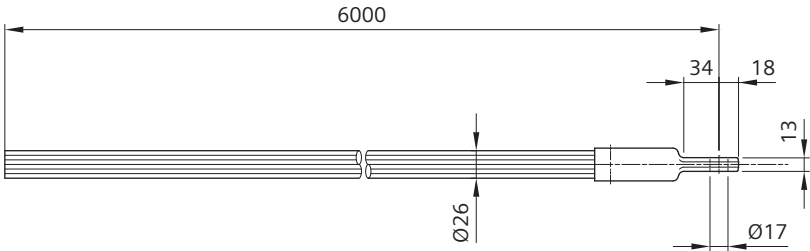
for operating linkage made of GRP



Order no.	8WL6247-8	8WL6247-8A
Designation	Guide M10	Guide M16
Material		
Guide	CuAl	CuAl
Pin 8x50	stlSt	stlSt
Split pin 2x20	stlSt	stlSt
Washer	stlSt	stlSt
Weight	0.19 kg	0.17 kg
M	M10	M16

Insulating rod 26 with eye

for GRP operating linkage

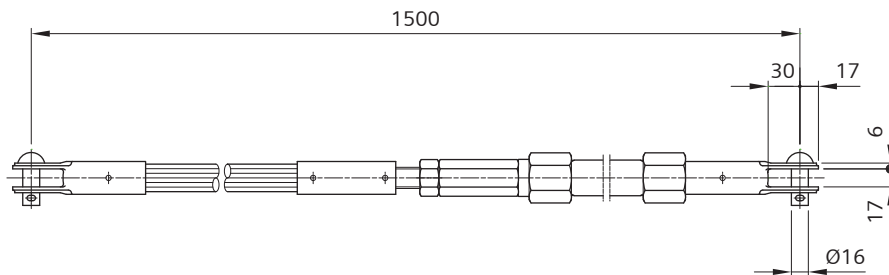


Order no.	8WL3021-8
Designation	Insulating rod 26 with eye 17
Material	
Insulating rod	GRP, color RAL6022 (olive drab)
End fitting	CuAl
Grooved pin	stlSt
Weight	6.73 kg

Other lengths and colors on request.

Upper operating linkage, insulated

with rapid opening, for GRP operating linkage



Order no.	8WL6231-8A
Designation	Upper operating linkage
Material	
Linkage insert	stlSt, CuZn
Clevis fittings	CuAl
Threaded rod M20	stlSt
Sleeve	CuAl
Insulating rod 26	GRP, color RAL6022 (olive drab)
Grooved pins	stlSt
Pins 16x45	stlSt
Split pins 5x28	Cu
Weight	5.00 kg
Max. pressure load	2.0 kN

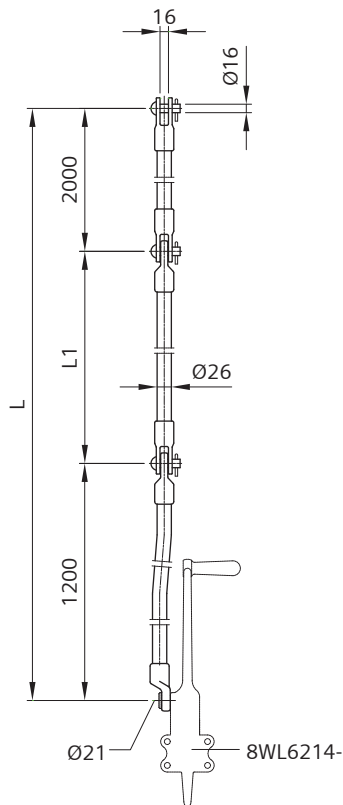
It should only be used when the operating stroke is 200 mm.

Not suitable for disconnectors with earth contact.

Other colors on request.

Operating linkage made of steel tubes

for manual operating mechanism 8WL6214-, for disconnectors up to 3 kV DC 8WL6134-



Order no.	8WL6230-0A	8WL6230-0D
Designation	Operating linkage	Operating linkage
Material		
Tubes 26	htgSt	htgSt
Fittings	mICI	mICI
Pins 16x45	htgSt	htgSt
Split pins 5x28	Cu	Cu
Weight	12.0 kg	14.4 kg
Max. pressure load	4.5 kN	4.5 kN
L	6000 mm	7200 mm
L₁	2800 mm	4000 mm

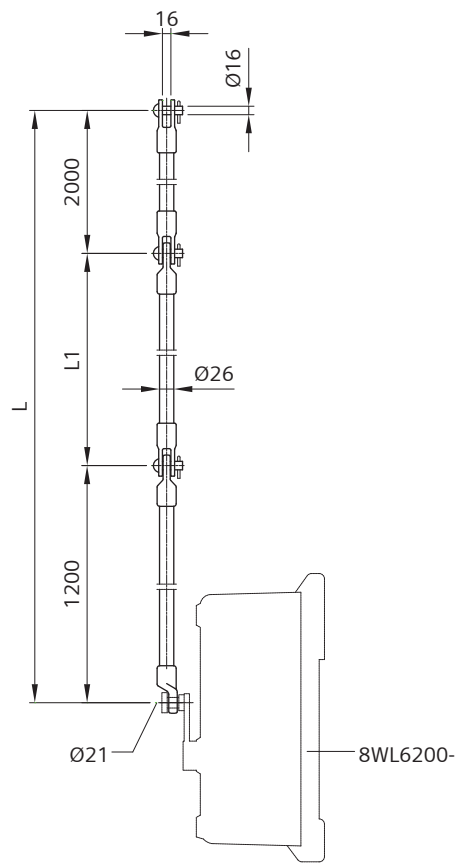
Fastening parts 8WL6228-0/-1 (see page 02-12-62) or 8WL6247-8 (see page 02-12-50) must be ordered separately.

Other lengths on request.

Single components see pages 02-12-55 to 02-12-57.

Operating linkage made of steel tubes

for motor-operated mechanism 8WL6200-, for disconnectors up to 3 kV DC 8WL6134-



Order no.	8WL6230-1A	8WL6230-1D
Designation	Operating linkage	Operating linkage
Material		
Tubes 26	htgSt	htgSt
Fittings	mICI	mICI
Pins 16x45	htgSt	htgSt
Split pins 5x28	Cu	Cu
Weight	12.0 kg	14.4 kg
Max. pressure load	4.5 kN	4.5 kN
L	6000 mm	7200 mm
L ₁	2800 mm	4000 mm

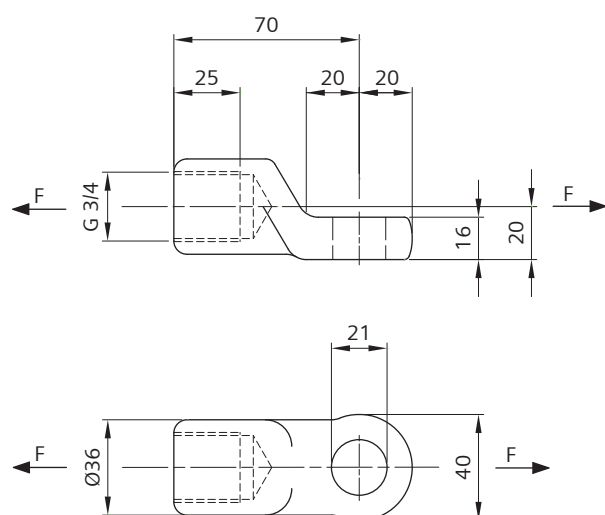
Fastening parts 8WL6228-0/-1 (see page 02-12-62) or 8WL6247-8 (see page 02-12-50) must be ordered separately.

Other lengths on request.

Single components see pages 02-12-55 to 02-12-57.

Tongue end fitting 26, offset

for connection of operating linkage at manual operating mechanism 8WL6214- for disconnectors up to 3 kV DC 8WL6134- or 25 kV AC 8WL6127- and at motor-operated mechanism 8WL6200- for disconnectors up to 3 kV DC 8WL6134- , for aluminium tube d=26 mm and steel tube d=26 mm or 26,9 mm (3/4")



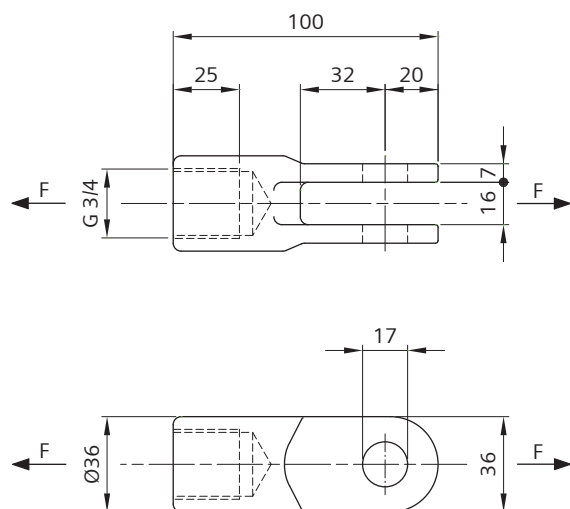
Order no.	8WL6225-0
Designation	Tongue end fitting
Material	mICI
Weight	0.34 kg
Perm. operating load	10 kN
Min. failing load	30 kN

Aluminium tube 26 mm see page 02-04-79.

Steel tube 26 mm or 26.9 mm see pages 02-05-40 and 02-05-41.

Clevis end fitting 26/26.9-16

for operating linkage to disconnectors up to 3 kV DC 8WL6134-, for steel tube d=26 mm or 26,9 mm (3/4")

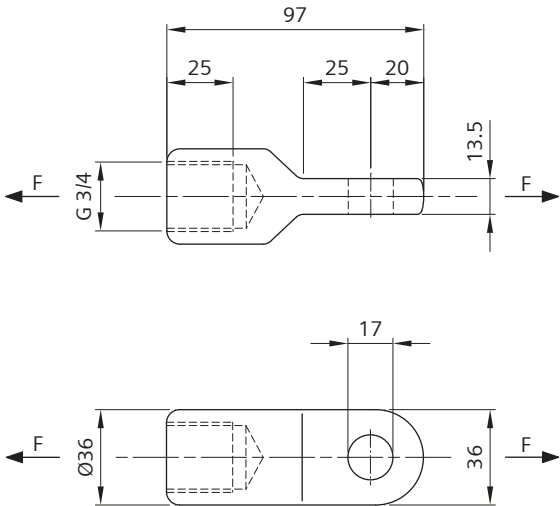


Order no.	8WL6220-1
Designation	Clevis end fitting
Material	mICI
Weight	0.39 kg
Perm. operating load	20 kN
Min. failing load	60 kN

Pin 8WL1105-0 (16x45-htgSt) and split-pin 8WL1115-1 (5x28-Cu) must be ordered separately, see Chapter 02-01.

Tongue end fitting 26/26.9-16

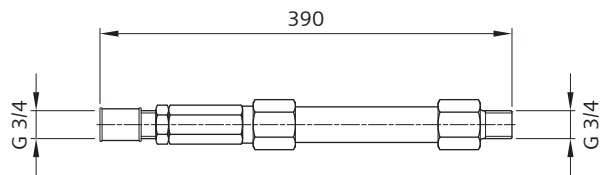
for operating linkage to disconnectors up to 3 kV DC 8WL6134-, for steel tube d=26 mm or 26,9 mm (3/4")



Order no.	8WL6222-0
Designation	Tongue end fitting
Material	mICI
Weight	0.32 kg
Perm. operating load	20 kN
Min. failing load	60 kN

Rapid opener

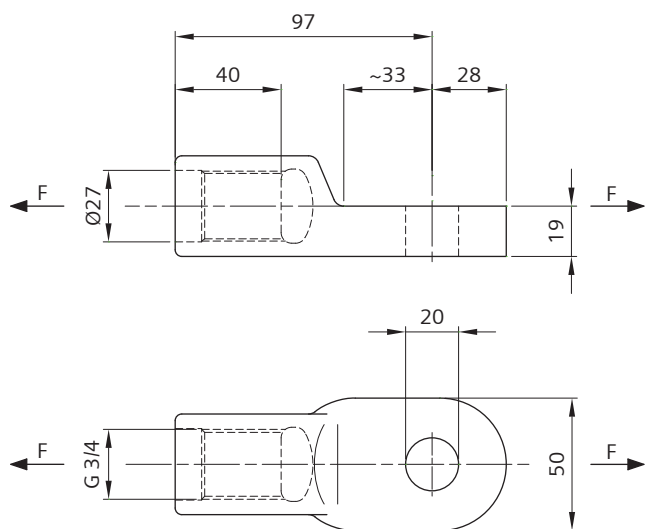
for operating linkage made of steel tubes



Order no.	8WL6237-0
Designation	Rapid opener
Material	
Coupling socket	mICI
Compression spring	stlSt
Tube-type sheath	stlSt
Coupling nuts	CuZn
Tension rod	stlSt
Sealing ring	Rubber
Grooved pins	stlSt
Weight	2.12 kg

It should only be used when the operating stroke is 200 mm.
 Not suitable for disconnectors with earth contact.

for connection of operating linkage to disconnectors up to 25 kV AC 8WL6127- at motor-operated mechanism 8WL6200-, for aluminium or steel tube d=26 mm

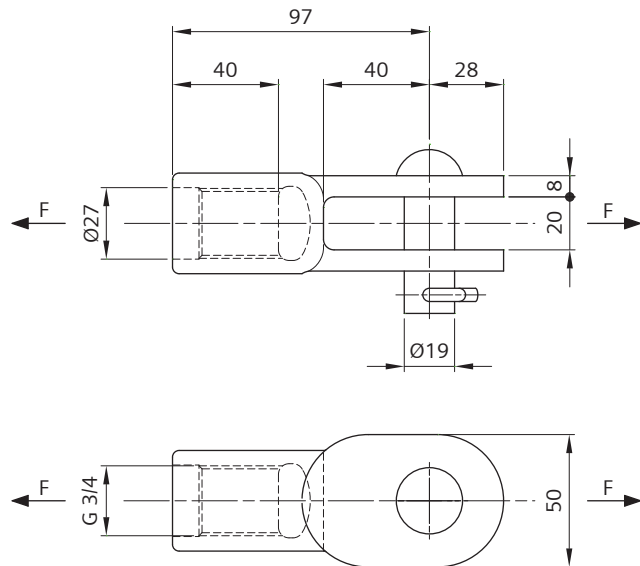


Order no.	8WL6226-1
Designation	Tongue end fitting
Material	ctAl
Weight	0.24 kg
Perm. operating load	9.4 kN
Min. failing load	28 kN

Steel tube 26 mm see page 02-05-40.

Clevis end fitting 26

for operating linkage to disconnectors up to 25 kV AC 8WL6127- and cantilevers with top tube, for aluminium or steel tube d=26 mm



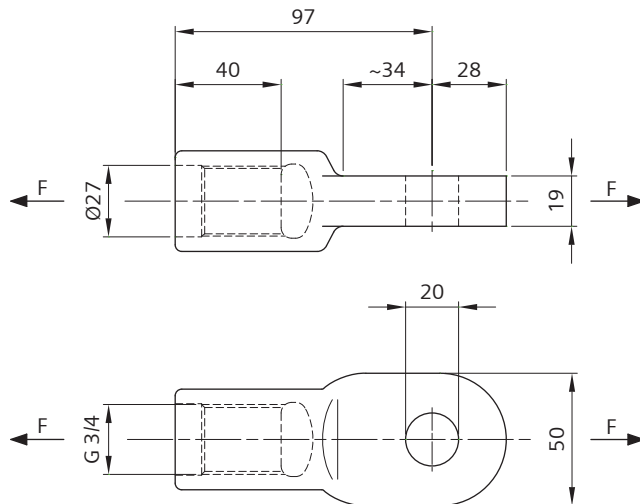
Order no.	8WL6221-2
Designation	Clevis end fitting
Material	
Clevis end fitting	ctAl
Pin 19x52	Al
Beta-Split pin	stlSt
Weight	0.28 kg
Perm. operating load	9.4 kN
Min. failing load	28 kN

Aluminium tube 26 mm see page 02-04-79.

Steel tube 26 mm see page 02-05-40.

Tongue end fitting 26, straight

for operating linkage to disconnectors up to 25 kV AC 8WL6127-, for aluminium or steel tube d=26 mm



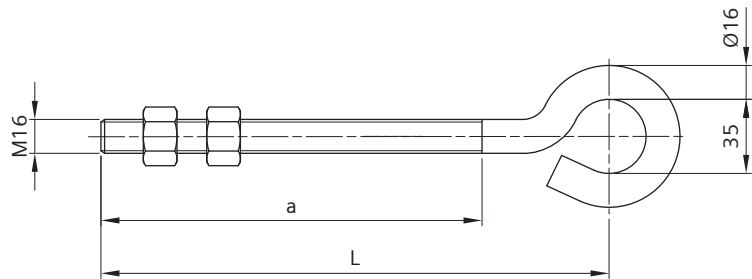
Order no.	8WL6223-1
Designation	Tongue end fitting
Material	ctAl
Weight	0.24 kg
Perm. operating load	9.4 kN
Min. failing load	28 kN

Aluminium tube 26 mm see page 02-04-79.

Steel tube 26 mm see page 02-05-40.

Eye-bolt

for guiding of operating linkage made of tubes d=26 to 33.7 mm (1")



Order no.	8WL6228-0	8WL6228-1
Designation	Eye-bolt M16x160	Eye-bolt M16x240
Material		
Eye-bolt	stlSt	stlSt
Nuts	stlSt	stlSt
Weight	0.48 kg	0.56 kg
a	100 mm	180 mm
L	160 mm	240 mm

Punch-lock band holder for guide 8WL6228-2A to -2C see page 03-02-14.

Chapter 02

Standard Products

Tensioning equipment	01	01-86
Thimbles, connectors, sleeves	02	01-24
GRP cantilevers	03	01-68
Aluminium cantilevers	04	01-80
Steel cantilevers	05	01-42
Headspan supports	06	01-36
Insulators	07	01-34
Contact lines under structures and bridge protection	08	01-42
Clamps	09	01-84
Tension wheel equipment	10	01-48
Section insulators	11	01-34
Disconnectors and drive mechanism	12	01-62
Earthing and protecting equipment	13	01-14
Contact wires, conductors, span wires	14	01-22
Monitoring systems	15	01-06
Installation tools and equipment	16	01-24

Accessories	02-13-08
Catenary wire insulation up to 3 kV DC and 25 kV AC	02-13-14
Earthing clamp	02-13-13
Lightning protection gap up to 1.5 kV DC	02-13-11, 02-13-12
Surge arrester with polymeric casing	02-13-10
Surge arrester with polymeric composite casing	02-13-09
Surge arrester with porcelain casing	02-13-07
Voltage limiter	02-13-04, 02-13-05
Voltage limiter element	02-13-06
Voltage limiter element, lightning resistant	02-13-06

Technical comments

Application

Electric railways can affect other electrotechnical devices and systems. Increased rail potentials can occur in operation. Overhead contact line systems can be exposed to overvoltages or high voltage peaks, which overload the system's insulation. Siemens offers many products for personal, animal and equipment protection, which offer protective measures that are in line with the standards and VDV codes.

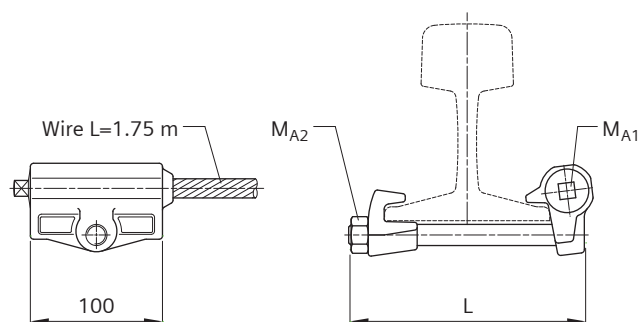
Types

The function of voltage limiting devices – be they resistant to lightning strike or not – is to earth in a short-circuit proof manner all system components that are not earthed in operation if a specific voltage is exceeded. This protects people and system components from the danger of impermissibly high voltages. The use of voltage limiting devices prevents stray currents and ensures the required protection of neighbouring systems.

In order to protect transformer substations and overhead contact line equipment from overvoltage, which, for example, may occur as a result of a lightning strike, protective equipment must be installed. Siemens supplies different surge arresters. Depending on the type, the surge arresters are suitable for use both outdoors and indoors.

Voltage limiter

for fastening to rail S49, S54, S64 and UIC60



Order no.	8WL6503-0A	8WL6503-1A
Designation	for rail foot width up to 125 mm (rail S49 and S54)	for rail foot width up to 150 mm (rail S64 and UIC60)
Material		
Casing	CuAl	CuAl
Contact bolt	CuAl	CuAl
Jaw	CuAl	CuAl
Earthing wire 50 mm ²	Cu with PVC-sheath	Cu with PVC-sheath
Insulating sleeve	Polyamide	Polyamide
Compression sleeve	Cu-ETP	Cu-ETP
Screw bolt M16	stlSt	stlSt
Nut	stlSt	stlSt
Weight	2.14 kg	2.18 kg
Tightening torque M_{A1}	10 Nm ¹⁾ 15 Nm ²⁾	10 Nm ¹⁾ 15 Nm ²⁾
Tightening torque M_{A2}	90 Nm	90 Nm
Short-time current	36 kA	36 kA
Short-time current duration	60 ms	60 ms
L	178 mm	203 mm

¹⁾ for voltage limiter element 8WL6504-0 to -3

²⁾ for voltage limiter element 8WL6504-5 to -8

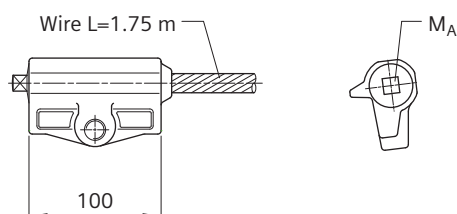
The voltage limiter element 8WL6504-0 to -3 or 8WL6504-5 to -8 (lightning resistant) must be ordered separately according to the operating voltage required, see page 02-13-06.

Cable lug 8WL1580-1 (12-70, Cu-ETP) must be ordered separately, see page 02-02-16.

Types for other rail foot widths on request.

Voltage limiter

for fastening at pole or structure



Order no.	8WL6503-7A
Designation	for fastening at pole or structure
Material	
Casing	CuAl
Contact bolt	CuAl
Insulating sleeve	Polyamide
Compression sleeve	Cu-ETP
Earthing wire 50 mm ²	Cu with PVC-sheath
Weight	1.85 kg
Tightening torque M_A	10 Nm ¹⁾ 15 Nm ²⁾
Short-time current	36 kA
Short-time current duration	60 ms

¹⁾ for voltage limiter element 8WL6504-2 and -3

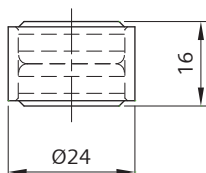
²⁾ for voltage limiter element 8WL6504-5

The voltage limiter element 8WL6504-0 to -3 or 8WL6504-5 to -8 (lightning resistant) must be ordered separately according to the operating voltage required, see page 02-13-06.

Details for fastening at pole or structure on request.

Voltage limiter element

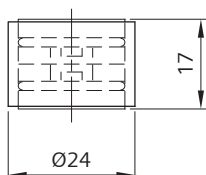
for voltage limiter 8WL6503-0A, -1A and -7A



Order no.	8WL6504-0	8WL6504-1	8WL6504-2	8WL6504-3
Designation	Voltage limiter element 200 V DC	Voltage limiter element 300 V DC	Voltage limiter element 350 V DC	Voltage limiter element 1100 V AC
Material	Cu	Cu	Cu	Cu
Weight	0.04 kg	0.04 kg	0.04 kg	0.04 kg
Operating voltage	200 - 350 V	260 - 450 V	300 - 500 V	1000 - 1300 V
Withstand voltage	180 V	240 V	280 V	980 V

Voltage limiter element, lightning resistant

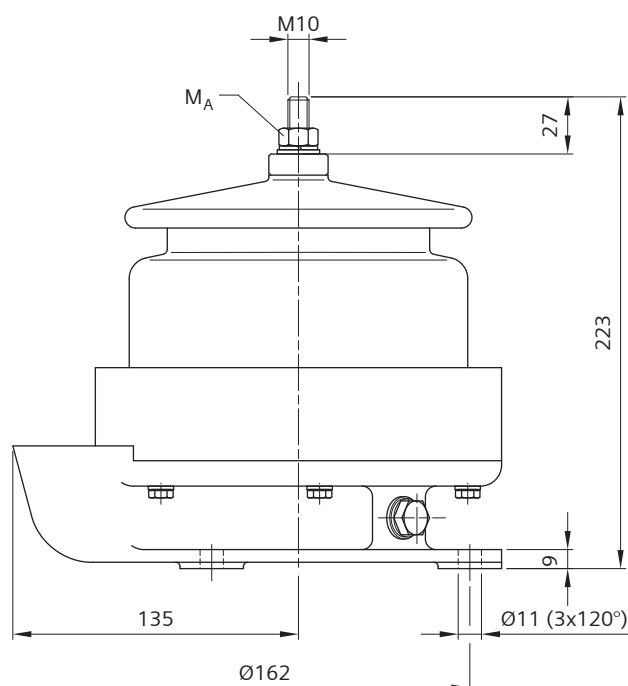
for voltage limiter 8WL6503-0A, -1A and -7A



Order no.	8WL6504-8	8WL6504-7	8WL6504-6	8WL6504-5
Designation	Voltage limiter element 120 V DC	Voltage limiter element 230 V DC	Voltage limiter element 350 V DC	Voltage limiter element 1000 V AC / 600 V DC
Material	Cu	Cu	Cu	Cu
Weight	0.04 kg	0.04 kg	0.04 kg	0.04 kg
Operating voltage	120 V DC ± 20 %	230 V DC ± 20 %	350 V DC ± 20 %	600 V DC ± 20 % < 940 V AC
Lightning impulse current (8/20 μs), reversible	20 kA	20 kA	10 kA	10 kA

Surge arrester with porcelain casing

as protection for electrical equipment up to 1 kV DC or 2 kV DC



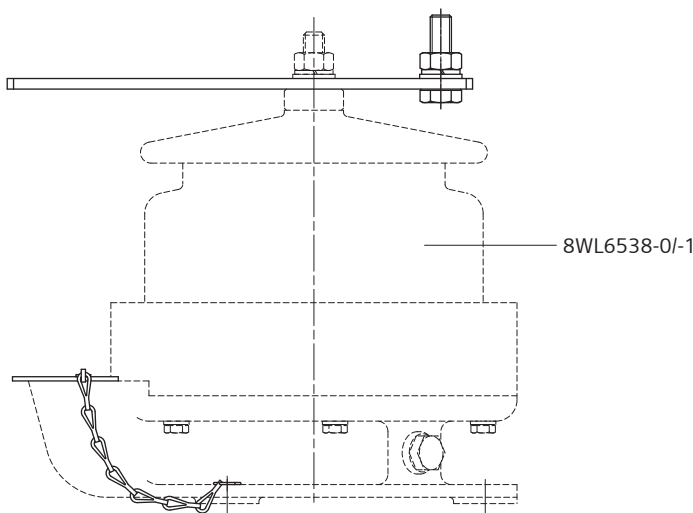
Order no.	8WL6538-0	8WL6538-1
Designation	Surge arrester 3EC3010	Surge arrester 3EC3020
Material	–	–
Weight	6.0 kg	6.2 kg
Tightening torque M_A	20 Nm	20 Nm
Nominal voltage	0.75 kV DC	1.5 kV DC
Rated voltage	1 kV DC	2 kV DC
Continuous operating voltage	1 kV DC	2 kV DC
Nominal discharge current (8/20 μ s)	10 kA	10 kA
Peak current (4/10 μ s)	100 kA	100 kA
Residual voltage at 10 kA (8/20 μ s)	2.4 kV DC	4.8 kV DC
Min. creepage distance	165 mm	165 mm
Flashover distance	135 mm	135 mm
Lightning impulse withstand voltage	65 kV	65 kV
Power-frequency withstand voltage, wet	25 kV	25 kV

Accessories 8WL6537-4 must be ordered separately.

Other types on request.

Accessories

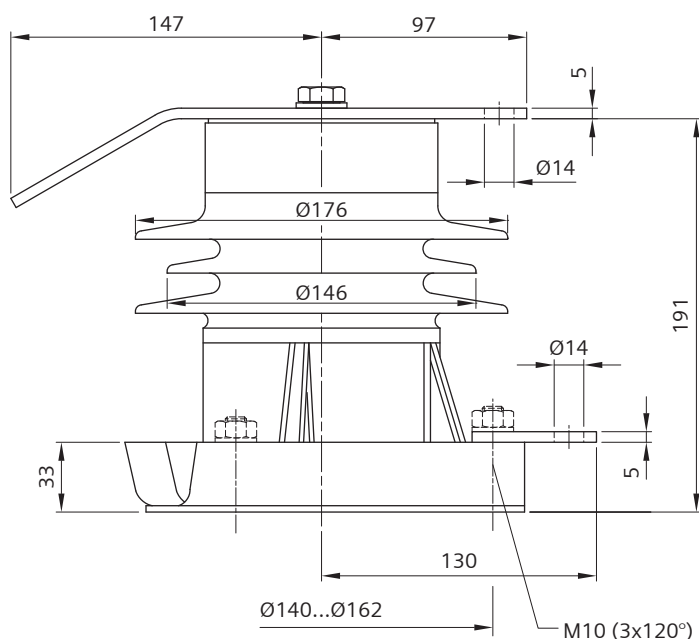
for surge arrester 8WL6538-0 and 8WL6538-1



Order no.	8WL6537-4
Designation	Accessories
Material	
Cover	Al, stlSt
Strap	Cu
Bolt M10x35	stlSt
Nut	stlSt
Washer	stlSt
Spring washer	stlSt
Weight	0.50 kg

Surge arrester with polymeric composite casing

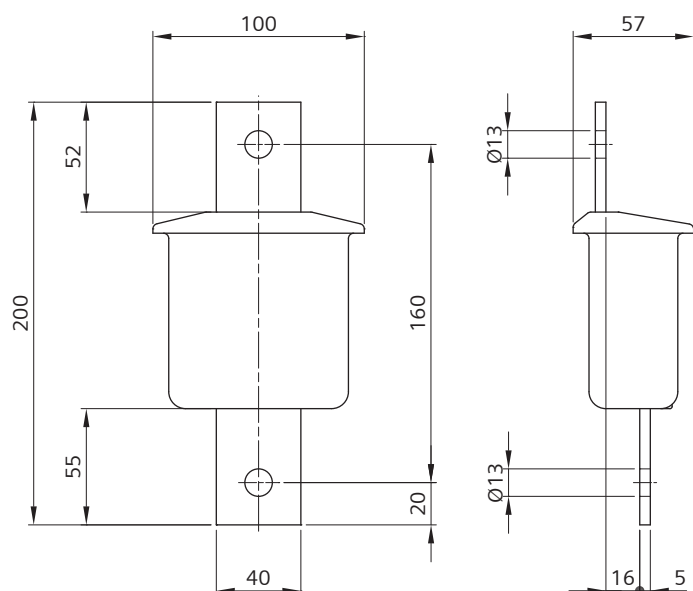
as protection for electrical equipment up to 1 kV DC



Order no.	8WL6537-2A
Designation	Surge arrester 3EB4010
Material	–
Weight	5.7 kg
Rated voltage	1 kV DC
Continuous operating voltage	1 kV DC
Nominal discharge current (8/20 µs)	10 kA
Peak current (4/10 µs)	100 kA
Residual voltage at 10 kA (8/20 µs)	2.4 kV DC
Min. creepage distance	248 mm
Lightning impulse withstand voltage	55 kV
Power-frequency withstand voltage, wet	23 kV

Surge arrester with polymeric casing

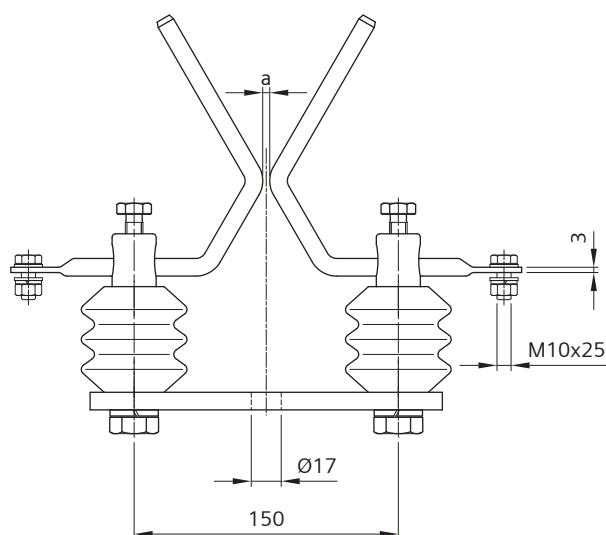
as protection against overvoltage, for connection between return conductor and earth



Order no.	8WL6537-3
Designation	Surge arrester 3EB2003
Material	–
Weight	1.2 kg
Rated voltage	0.3 kV DC
Continuous operating voltage	0.3 kV DC
Nominal discharge current (8/20 µs)	10 kA
Peak current (4/10 µs)	100 kA
Residual voltage at 10 kA (8/20 µs)	0.7 kV DC
Min. creepage distance	133 mm
Lightning impulse withstand voltage	25 kV
Power-frequency withstand voltage, wet	10 kV

Lightning protection gap up to 1.5 kV DC

as protection against overvoltage

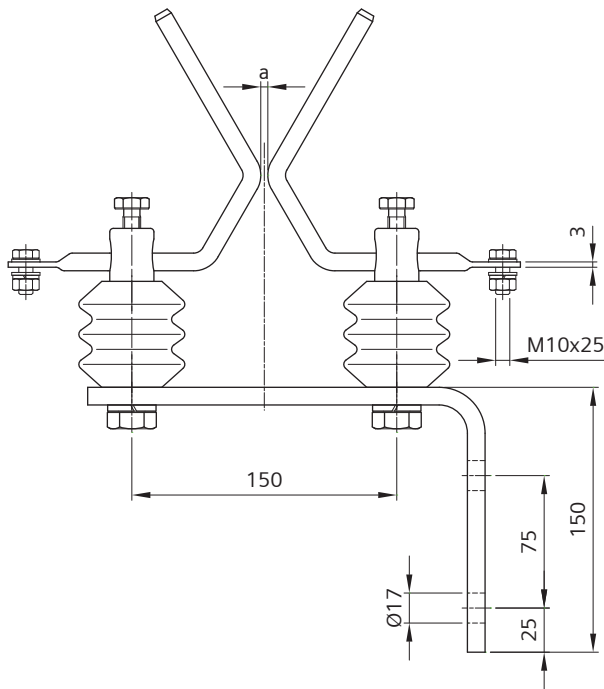


Order no.	8WL6541-4
Designation	Lightning protection gap, baseplate plane
Material	
Baseplate	Cu
Insulator body	Cast resin, brown
Arcing horns	Cu-ETP
Bolts, nuts	stlSt
Washers, spring washers	stlSt
Weight	2.00 kg
Nominal voltage	1.5 kV DC

Distance "a" must be adjusted depending on the relevant operating voltage (a=2 mm for nominal voltage 750 V DC).

Type up to 3 kV DC on request.

as protection against overvoltage

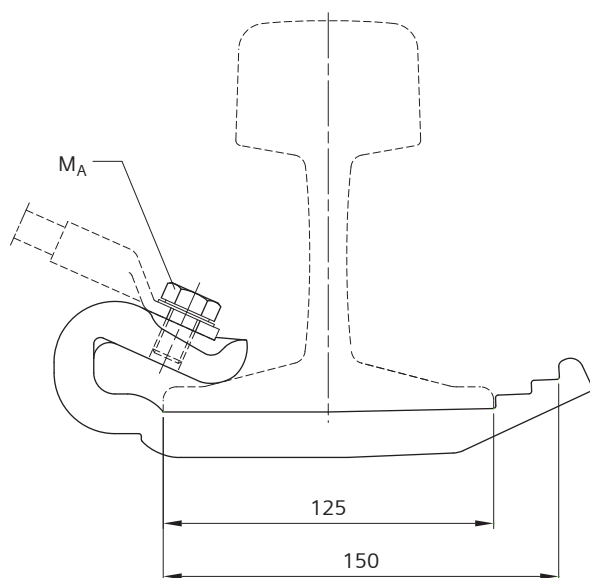


Order no.	8WL6541-4A
Designation	Lightning protection gap, baseplane bent
Material	
Baseplate	Cu
Insulator body	Cast resin, brown
Arcing horns	Cu-ETP
Bolts, nuts	stlSt
Washers, spring washers	stlSt
Weight	2.20 kg
Nominal voltage	1.5 kV DC

Type up to 3 kV DC on request.

Earthing clamp

for rail foot width 125 to 150 mm, for connecting of earthing cables at rails S49, S54, S64 and UIC60



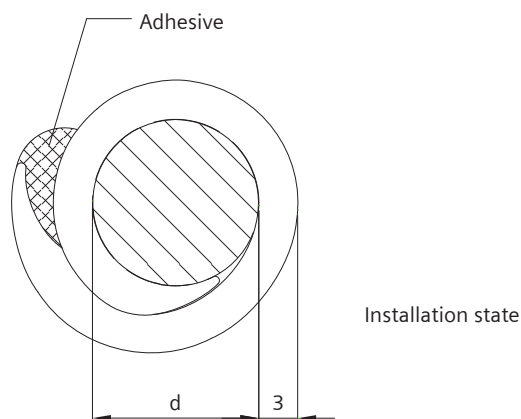
Order no.	8WL6563-0
Designation	Earthing clamp
Material	
Clamp	htgSt
Bolt M12	htgSt
Ribbed washer	htgSt
Locking plate	htgSt
Weight	0.86 kg
Tightening torque M_A	70 Nm

Cable lug must be ordered separately depending on the cable used.

Types for other rail foot widths on request.

Catenary wire insulation up to 3 kV DC and 25 kV AC

as animal guard for bronze wire 70, 120 and 150 mm² acc. to DIN 48201



Order no.	8WL7035-5	8WL7035-5E	8WL7035-5F
Designation	Catenary wire insulation 70 mm ²	Catenary wire insulation 120 mm ²	Catenary wire insulation 150 mm ²
Material	Silicone rubber, color black	Silicone rubber, color black	Silicone rubber, color black
Weight	0.19 kg/m	0.25 kg/m	0.28 kg/m
Electric strength	37.5 kV	37.5 kV	37.5 kV
d	10.6 mm	14.0 mm	15.8 mm

Adhesive 8WL7035-6 (Silicone rubber liquid, color black) must be ordered separately.

Chapter 02

Standard Products

Tensioning equipment	01	01-86
Thimbles, connectors, sleeves	02	01-24
GRP cantilevers	03	01-68
Aluminium cantilevers	04	01-80
Steel cantilevers	05	01-42
Headspan supports	06	01-36
Insulators	07	01-34
Contact lines under structures and bridge protection	08	01-42
Clamps	09	01-84
Tension wheel equipment	10	01-48
Section insulators	11	01-34
Disconnectors and drive mechanism	12	01-62
Earthing and protecting equipment	13	01-14
Contact wires, conductors, span wires	14	01-22
Monitoring systems	15	01-06
Installation tools and equipment	16	01-24

Earthing wire	02-14-07
Earthing wire with plastic sheath	02-14-08
Grooved contact wire AC, CuAg0.1	02-14-05
Grooved contact wire AC, Cu-ETP	02-14-04
Grooved contact wire AC, CuMg0.5	02-14-06
Solid wire made of stainless steel	02-14-08
Stainless steel wire rope with wire strand core	02-14-20
Steel wire 26 with connecting fittings	02-14-17
Steel wire 50 with connecting fittings	02-14-18
Steel wire 50, flexible	02-14-16
Steel wire d=11 mm with connecting fitting	02-14-19
Steel wire rope with wire strand core	02-14-21
Synthetic wire (Minoroc wire)	02-14-22
Tension wire	02-14-07
Wire 10, flexible made of Bronze	02-14-11
Wire 16, flexible made of BzII	02-14-11
Wire made of aluminium	02-14-14
Wire made of aluminium-steel	02-14-15
Wire, flexible made ob BzII	02-14-12
Wire, flexible made of Cu-ETP	02-14-13
Wire, stranded made of BzII	02-14-09
Wire, stranded made of Cu-ETP	02-14-10

Technical comments

Application

Siemens supplies wires and cables for all contact line arrangements and applications and recommends the best suited materials and dimensions when designing overhead line systems with regard to the selection and particular application.

Depending on application and selection of the electrical and/or mechanical functions the wires and cables serve for optimized energy transfer to the vehicle and suspension respectively.

Types

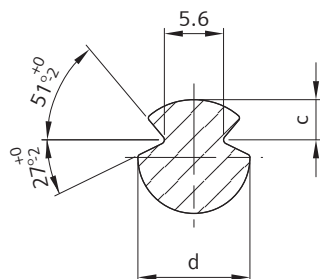
- Contact wires made of electrolytic copper
- Contact wires made of copper-silver alloy
- Bronze cables
- Copper cables
- Steel cables
- Steel wires
- Synthetic wires

Standards

The permissible operating loads for the different wires and cables can be determined with reference to the relevant standards and specifications.

Grooved contact wire AC, Cu-ETP

acc. to EN 50149



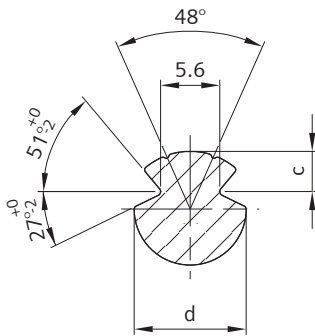
Order no.	8WL7000-0	8WL7001-0	8WL7004-0	8WL7002-0	8WL7003-0
Designation	Contact wire AC-80	Contact wire AC-100	Contact wire AC-107	Contact wire AC-120	Contact wire AC-150
Material	Cu-ETP	Cu-ETP	Cu-ETP	Cu-ETP	Cu-ETP
Weight	0.71 kg/m	0.89 kg/m	0.95 kg/m	1.07 kg/m	1.33 kg/m
Nominal cross-section	80 mm ²	100 mm ²	107 mm ²	120 mm ²	150 mm ²
Min. tensile strength	355 N/mm ²	355 N/mm ²	350 N/mm ²	330 N/mm ²	310 N/mm ²
Min. breaking load	27.5 kN	34.5 kN	36.3 kN	38.4 kN	45.1 kN
Perm. permanent current	370 A	455 A	468 A	490 A	540 A
Resistance at 20 °C	0.22 Ω/km	0.18 Ω/km	0.17 Ω/km	0.15 Ω/km	0.12 Ω/km
Conductivity at DC (20 °C)	57 m/Ω mm ²	57 m/Ω mm ²	57 m/Ω mm ²	57 m/Ω mm ²	57 m/Ω mm ²
c	3.8 mm	4.0 mm	4.0 mm	4.0 mm	4.0 mm
d	10.6 mm	12.0 mm	12.3 mm	13.2 mm	14.8 mm

Available on drums in lengths up to 1500 m or as straightened rods in lengths up to 4 m.

Grooved contact wire BC and BF on request.

Grooved contact wire AC, CuAg0.1

acc. to EN 50149



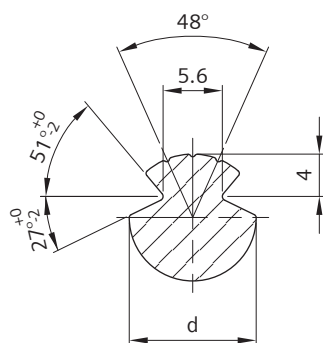
Order no.	8WL7000-1	8WL7001-1	8WL7002-1	8WL7003-1
Designation	Contact wire AC-80	Contact wire AC-100	Contact wire AC-120	Contact wire AC-150
Material	CuAg0.1	CuAg0.1	CuAg0.1	CuAg0.1
Weight	0.71 kg/m	0.89 kg/m	1.07 kg/m	1.33 kg/m
Nominal cross-section	80 mm ²	100 mm ²	120 mm ²	150 mm ²
Min. tensile strength	365 N/mm ²	360 N/mm ²	350 N/mm ²	350 N/mm ²
Min. breaking load	28.3 kN	34.9 kN	40.7 kN	50.9 kN
Perm. permanent current	620 A	705 A	750 A	875 A
Resistance at 20 °C	0.22 Ω/km	0.18 Ω/km	0.15 Ω/km	0.12 Ω/km
Conductivity at DC (20 °C)	56 m/Ω mm ²	56 m/Ω mm ²	56 m/Ω mm ²	56 m/Ω mm ²
c	3.8 mm	4.0 mm	4.0 mm	4.0 mm
d	10.6 mm	12.0 mm	13.2 mm	14.8 mm

Available on drums in lengths up to 1500 m or as straightened rods in lengths up to 4 m.

Grooved contact wire BC and BF on request.

Grooved contact wire AC, CuMg0.5

acc. to EN 50149



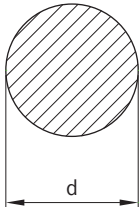
Order no.	8WL7001-2	8WL7002-2
Designation	Contact wire AC-100	Contact wire AC-120
Material	CuMg0.5	CuMg0.5
Weight	0.89 kg/m	1.07 kg/m
Nominal cross-section	100 mm ²	120 mm ²
Min. tensile strength	510 N/mm ²	490 N/mm ²
Min. breaking load	49.5 kN	57.0 kN
Perm. permanent current	580 A	615 A
Resistance at 20 °C	0.29 Ω/km	0.24 Ω/km
Conductivity at DC (20 °C)	36 m/Ω mm ²	36 m/Ω mm ²
d	12.0 mm	13.2 mm

Available on drums in lengths up to 1500 m or as straightened rods in lengths up to 4 m.

Other cross-sections on request.

Tension wire

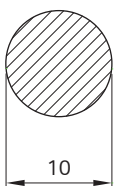
acc. to DIN 43136, for cross-span arrangements



Order no.	8WL7010-0	8WL7011-0	8WL7011-1
Designation	Tension wire 5	Tension wire 6	Tension wire 6
Material	St80-htg	St80-htg	BzII
Weight	0.154 kg/m	0.222 kg/m	0.252 kg/m
Nominal cross-section	19.6 mm ²	28.3 mm ²	28.3 mm ²
Min. tensile strength	800 N/mm ²	800 N/mm ²	600 N/mm ²
d	5 mm	6 mm	6 mm

Earthing wire

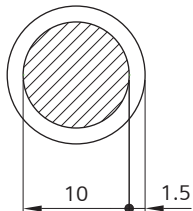
acc. to DIN 43137, for earth connections



Order no.	8WL7015-1
Designation	Earthing wire 10
Material	St34-htg
Weight	0.70 kg/m
Nominal cross-section	80 mm ²

Earthing wire with plastic sheath

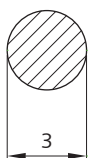
acc. to DIN 43137, for earth connections



Order no.	8WL7020-0
Designation	Earthing wire 10
Material	St34-htg, plastic sheath light- and weather-resistant
Weight	0.70 kg/m
Nominal cross-section	80 mm ²

Solid wire made of stainless steel

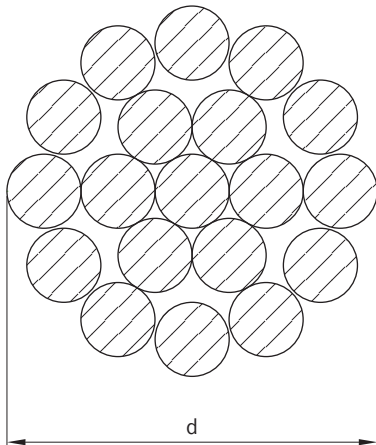
for windstay in steady arm arrangements



Order no.	8WL7025-0
Designation	Solid wire 3
Material	stlSt
Weight	0.055 kg/m
Nominal cross-section	7 mm ²

Wire, stranded made of BzII

acc. to DIN 48201, for span guy arrangements, catenary wires and stitch wires



Part 1

Order no.	8WL7032-0	8WL7033-0	8WL7034-0	8WL7034-1	8WL7035-0
Designation	Wire 25	Wire 35	Wire 50	Wire 50/19	Wire 70
Material	BzII	BzII	BzII	BzII	BzII
Weight	0.22 kg/m	0.31 kg/m	0.45 kg/m	0.45 kg/m	0.60 kg/m
Nominal cross-section	25 mm ²	35 mm ²	50 mm ²	50 mm ²	70 mm ²
Number of wires	7	7	7	19	19
Calculated breaking load	14.24 kN	20.17 kN	28.58 kN	28.39 kN	38.64 kN
Perm. permanent current	130 A	160 A	200 A	200 A	245 A
d	6.3 mm	7.5 mm	9.0 mm	9.0 mm	10.5 mm

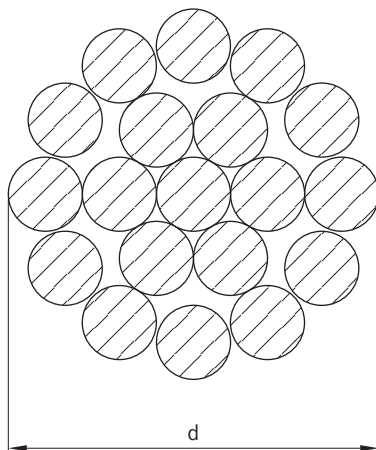
Part 2

Order no.	8WL7036-0	8WL7037-0
Designation	Wire 95	Wire 120
Material	BzII	BzII
Weight	0.85 kg/m	1.06 kg/m
Nominal cross-section	95 mm ²	120 mm ²
Number of wires	19	19
Calculated breaking load	54.76 kN	67.57 kN
Perm. permanent current	305 A	350 A
d	12.5 mm	14.0 mm

Further wire cross-sections on request.

Wire, stranded made of Cu-ETP

acc. to DIN 48201, for line feeders and catenary wires



Part 1

Order no.	8WL7051-0	8WL7052-0	8WL7053-0	8WL7054-0	8WL7055-0
Designation	Wire 35	Wire 50	Wire 70	Wire 95	Wire 120
Material	Cu-ETP	Cu-ETP	Cu-ETP	Cu-ETP	Cu-ETP
Weight	0.31 kg/m	0.45 kg/m	0.60 kg/m	0.85 kg/m	1.06 kg/m
Nominal cross-section	35 mm ²	50 mm ²	70 mm ²	95 mm ²	120 mm ²
Number of wires	7	7	19	19	19
Calculated breaking load	13.77 kN	19.84 kN	26.38 kN	37.40 kN	46.90 kN
Perm. permanent current	200 A	250 A	310 A	380 A	440 A
d	7.5 mm	9.0 mm	10.5 mm	12.5 mm	14.0 mm

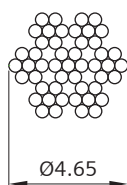
Part 2

Order no.	8WL7056-0
Designation	Wire 150
Material	Cu-ETP
Weight	1.34 kg/m
Nominal cross-section	150 mm ²
Number of wires	37
Calculated breaking load	58.98 kN
Perm. permanent current	510 A
d	15.8 mm

Further wire cross-sections on request.

Wire 10, flexible made of Bronze

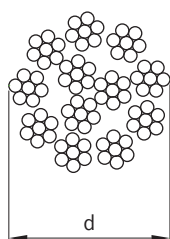
for droppers



Order no.	8WL7060-2
Designation	Wire 10x49
Material	Bronze
Weight	0.09 kg/m
Nominal cross-section	10 mm ²
Number of wires	49
Min. tensile strength	589 N/mm ²
Perm. permanent current	75 A
Electric conductivity	36 Sm/mm ²

Wire 16, flexible made of BzII

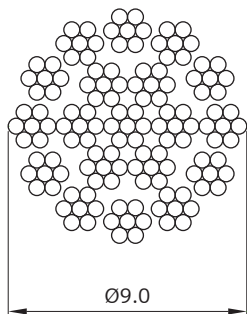
acc. to DIN 43138, for droppers



Order no.	8WL7061-0	8WL7061-1	8WL7062-0
Designation	Wire 16x49	Wire 16x84	Wire 25x133
Material	BzII	BzII	BzII
Weight	0.15 kg/m	0.15 kg/m	0.25 kg/m
Nominal cross-section	16 mm ²	16 mm ²	25 mm ²
Number of wires	49	84	133
Min. tensile strength	589 N/mm ²	589 N/mm ²	589 N/mm ²
Perm. permanent current	110 A	115 A	145 A
d	5.9 mm	6.2 mm	7.5 mm

Wire, flexible made of BzII

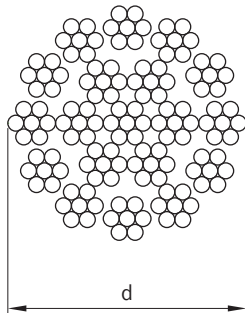
acc. to DIN 43138, for switch wires



Order no.	8WL7063-0
Designation	Wire 35x133
Material	BzII
Weight	0.35 kg/m
Nominal cross-section	35 mm ²
Number of wires	133
Min. tensile strength	589 N/mm ²
Perm. permanent current	180 A

Wire, flexible made of Cu-ETP

acc. to DIN 43138, for energized connections



Part 1

Order no.	8WL7070-0	8WL7071-0	8WL7072-0	8WL7073-0	8WL7074-0
Designation	Wire 16x49	Wire 25x133	Wire 35x133	Wire 50x133	Wire 70x189
Material	Cu-ETP	Cu-ETP	Cu-ETP	Cu-ETP	Cu-ETP
Weight	0.15 kg/m	0.25 kg/m	0.35 kg/m	0.48 kg/m	0.68 kg/m
Nominal cross-section	16 mm ²	25 mm ²	35 mm ²	50 mm ²	70 mm ²
Number of wires	49	133	133	133	189
Min. tensile strength	< 300 N/mm ²	< 300 N/mm ²	< 300 N/mm ²	< 300 N/mm ²	< 300 N/mm ²
Perm. permanent current	135 A	180 A	225 A	280 A	340 A
d	5.9 mm	7.5 mm	9.0 mm	10.5 mm	13.0 mm

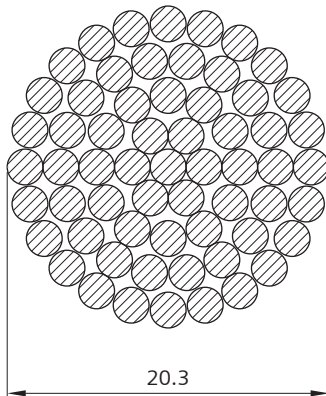
Part 2

Order no.	8WL7075-0	8WL7076-0	8WL7077-0
Designation	Wire 95x259	Wire 120x336	Wire 150x392
Material	Cu-ETP	Cu-ETP	Cu-ETP
Weight	0.93 kg/m	1.12 kg/m	1.42 kg/m
Nominal cross-section	95 mm ²	120 mm ²	150 mm ²
Number of wires	259	336	392
Min. tensile strength	< 300 N/mm ²	< 300 N/mm ²	< 300 N/mm ²
Perm. permanent current	420 A	485 A	570 A
d	14.7 mm	16.4 mm	18.3 mm

Further wire cross-sections on request.

Wire made of aluminium

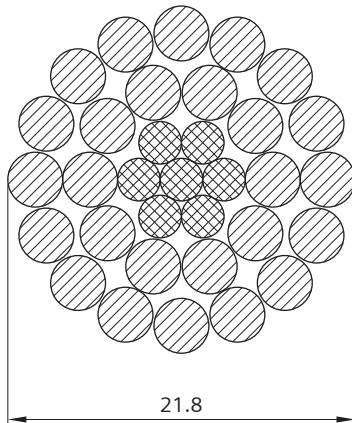
acc. to EN 50182, for feeder lines and return circuits



Order no.	8WL7083-3
Designation	Wire 243
Material	AL1
Weight	0.67 kg/m
Cross-section	242.5 mm ²
Number of wires	61
Calculated breaking load	43.66 kN
Perm. permanent current	625 A

Wire made of aluminium-steel

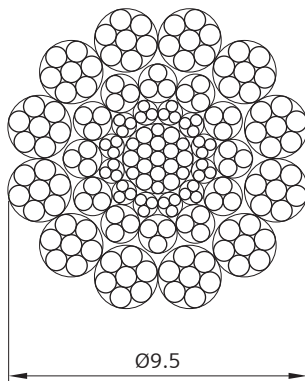
acc. to EN 50182, for feeder lines and return circuits



Order no.	8WL7084-3
Designation	Wire 243/39
Material	AL1/ST1A
Weight	0.98 kg/m
Nominal cross-section	282.5 mm ²
Number of wires	33 (26+7)
Calculated breaking load	85.12 kN
Perm. permanent current	645 A

Steel wire 50, flexible

for tension wheel assemblies

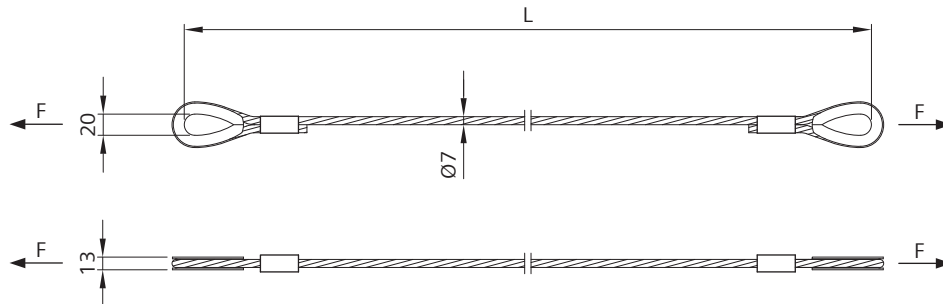


Order no.	8WL7090-0
Designation	Steel wire 50
Material	Stranded wires hot-dip galvanized, wires without twist, torsion-free, each strand coated with bitumen, without fibre core
Weight	0.42 kg/m
Nominal cross-section	50 mm ²
Number of wires	175
Calculated breaking load	74 kN

Can also be supplied on reels 13 m long each, order no. 8WL7090-0A.

Steel wire 26 with connecting fittings

for connection of tension wheel assemblies up to 24 kN 8WL5078- to the catenary system

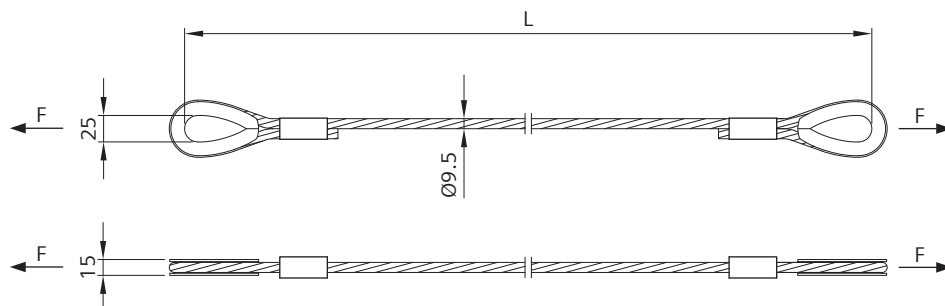


Order no.	8WL7090-1C	8WL7090-1G
Designation	Steel wire 26 for tension wheel assemblies 8WL5078- (1:3)	Steel wire 26 for tension wheel assemblies 8WL5078- (1:1.5)
Material		
Steel wire 26 mm ²	Stranded wires hot-dip galvanized, wires without twist, torsion-free, each strand coated with bitumen, without fibre core	Stranded wires hot-dip galvanized, wires without twist, torsion-free, each strand coated with bitumen, without fibre core
Thimbles	htgSt	htgSt
Compression clamps	Al	Al
Weight	2.1 kg	2.7 kg
Perm. operating load	2x12 kN	2x12 kN
Min. failing load	2x36 kN	2x36 kN
L	7.5 m	9.5 m

Connection strap 8WL1018-0 must be ordered separately, see page 02-01-06.

Steel wire 50 with connecting fittings

for connection of tension wheel assemblies up to 40 kN 8WL5070- and 8WL5071- to the catenary system

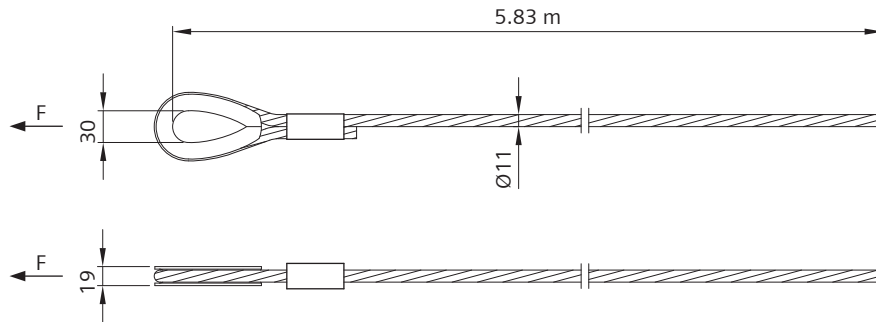


Order no.	8WL7090-0C	8WL7090-0G
Designation	Steel wire 50 for tension wheel assemblies 8WL5070-	Steel wire 50 for tension wheel assemblies 8WL5071-
Material		
Steel wire 50 mm ²	Stranded wires hot-dip galvanized, wires without twist, torsion-free, each strand coated with bitumen, without fibre core	Stranded wires hot-dip galvanized, wires without twist, torsion-free, each strand coated with bitumen, without fibre core
Thimbles	htgSt	htgSt
Compression clamps	Al	Al
Weight	4.1 kg	5.7 kg
Perm. operating load	2x20 kN	2x20 kN
Min. failing load	2x60 kN	2x60 kN
L	7.5 m	9.5 m

Connection strap 8WL1018-0 must be ordered separately, see page 02-01-06.

Steel wire d=11 mm with connecting fitting

for connection of tension wheel assemblies up to 40 kN 8WL5071- to the weight set

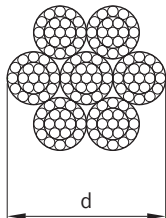


Order no.	8WL7090-2A
Designation	Steel wire d=11 mm
Material	
Steel wire	Stranded wires hot-dip galvanized, wires without twist, torsion-free, each strand coated with bitumen, without fibre core
Thimbles	htgSt
Compression clamps	Al
Weight	3.6 kg
Min. breaking force	128 kN

Connection strap to the weight set on request.

Stainless steel wire rope with wire strand core

for span guy arrangements

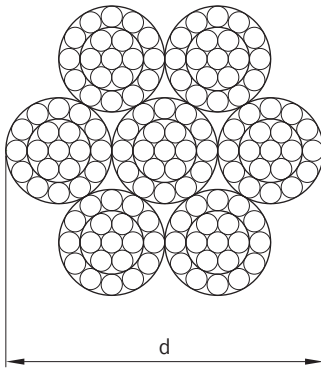


Order no.	8WL7093-2	8WL7093-3	8WL7093-4
Designation	Wire rope 6	Wire rope 8	Wire rope 10
Material	stlSt	stlSt	stlSt
Weight	0.138 kg/m	0.243 kg/m	0.381 kg/m
Rope class with core	6x19M-WSC ¹⁾	6x19M-WSC ¹⁾	6x19M-WSC ¹⁾
Rope grade	1570	1570	1570
Min. breaking force	18.80 kN	35.65 kN	54.50 kN
d	6 mm	8 mm	10 mm

¹⁾ acc. to EN 12385-4

Steel wire rope with wire strand core

acc. to EN 12385-4, for anchoring of poles



Order no.	8WL7091-6	8WL7091-7
Designation	Steel wire rope 12	Steel wire rope 14
Material	–	–
Weight	0.548 kg/m	0.75 kg/m
Rope class with core	6x19M-WSC	6x19M-WSC
Rope grade	1770	1770
Min. breaking force	92.62 kN	125.6 kN
Surface finish	B ¹⁾	A(Zn/Al) ²⁾
Lay type and direction	sZ ³⁾	sZ ³⁾
d	12 mm	14 mm

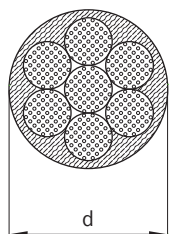
¹⁾ Zinc coated class B

²⁾ Zinc alloy coated class A

³⁾ ordinary lay, right

Synthetic wire (Minoroc wire)

for bridle-and-pulley suspensions and plastic cantilevers



Order no.	8WL7095-0	8WL7097-0
Designation	Synthetic wire 6	Synthetic wire 9
Material	Wire core made of 7 high-tensile fibres of polyester, the outer protective sheath made of polyamide	Wire core made of 7 high-tensile fibres of polyester, the outer protective sheath made of polyamide
Weight	0.03 kg/m	0.07 kg/m
Min. failing load	4 kN ¹⁾	15 kN ¹⁾
Thimble	8WL1501-0	8WL1502-0
Crimped connector	8WL1522-1	8WL1524-1
Pressing die	8WL7152-3	8WL7152-8
Number of pressures	6	9
d	6.0 mm	9.0 mm

¹⁾ The proved loads only in combination with the specified components.
The perm. operating load must be determined acc. to EN 50119.

Properties:

light in weight, high breaking strength, corrosion-resistant, maintenance-free, weather-resistant, antimagnetic, insulating, easy to process

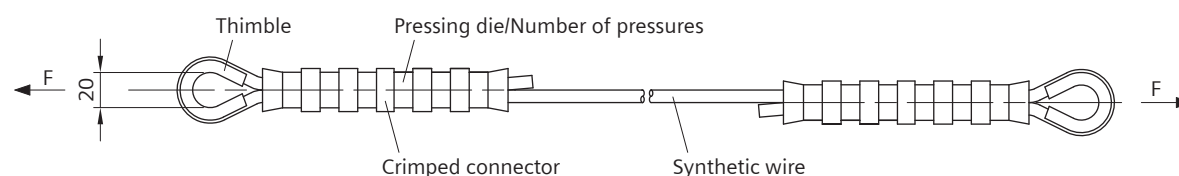
Hint:

When using as insulating wire consider that the interfaces must be protected against humidity penetrating the wire nucleus.

Tests acc. to EN 50345.

Thimbles, crimped connectors and pressing die must be ordered separately.

Example for wire connection/dead-end fitting:



Chapter 02

Standard Products

Tensioning equipment	01	01-86
Thimbles, connectors, sleeves	02	01-24
GRP cantilevers	03	01-68
Aluminium cantilevers	04	01-80
Steel cantilevers	05	01-42
Headspan supports	06	01-36
Insulators	07	01-34
Contact lines under structures and bridge protection	08	01-42
Clamps	09	01-84
Tension wheel equipment	10	01-48
Section insulators	11	01-34
Disconnectors and drive mechanism	12	01-62
Earthing and protecting equipment	13	01-14
Contact wires, conductors, span wires	14	01-22
Monitoring systems	15	01-06
Installation tools and equipment	16	01-24

Rotation angle sensor for DMS (Disconnecter Monitoring System)	02-15-05, 02-15-06
Sensor for CMS (Catenary Monitoring System)	02-15-04

Technical comments

Sicat CMS

The contactless catenary monitoring system Sicat CMS continuously monitors the tensile forces in the contact wire and catenary wire and also acquires the information of the sensor units at the tension wheels and evaluates them. The filtered sensor information is transmitted to the control center via the system infrastructure. The status of the overhead contact line and the location of selected damage events can be detected quickly and precisely, thereby increasing the availability of the system.

Sicat DMS

The contactless disconnector monitoring system Sicat DMS monitors the position of the disconnector. The position indication for the SCADA (Supervisory Control and Data Acquisition) concept is generated by detecting the position of the moving contact blade of the main contact and the contact spring of the earth contact, respectively by means of a rotary encoder.

Data transmission for remote controlled disconnectors is carried out by integration into the control of the drive mechanism. For manually operated mechanisms, an additional evaluation unit is necessary.

The monitoring of the switch position directly on the disconnector rules out any indication errors as a result of linkage failure.

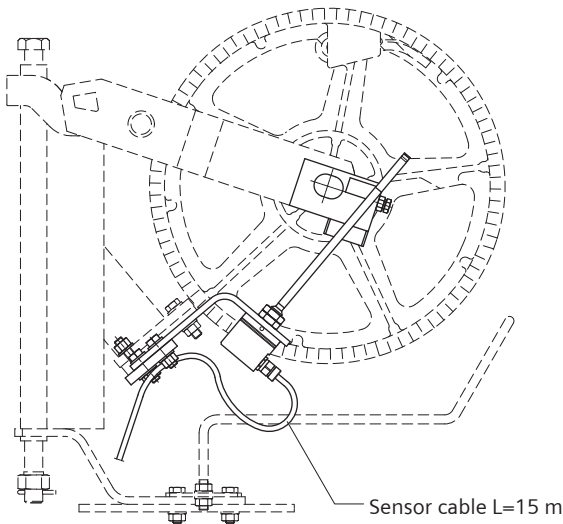
Notes

The here listed products serve as additional equipment for our standardized contact line components.

The system integration of the both monitoring systems depends on the specific plant and the local situation.

Sensor for CMS (Catenary Monitoring System)

on tension wheel assemblies up to 40 kN 8WL5070-/8WL5071- and up to 24 kN 8WL5078- (without 8WL5078-2/-3)



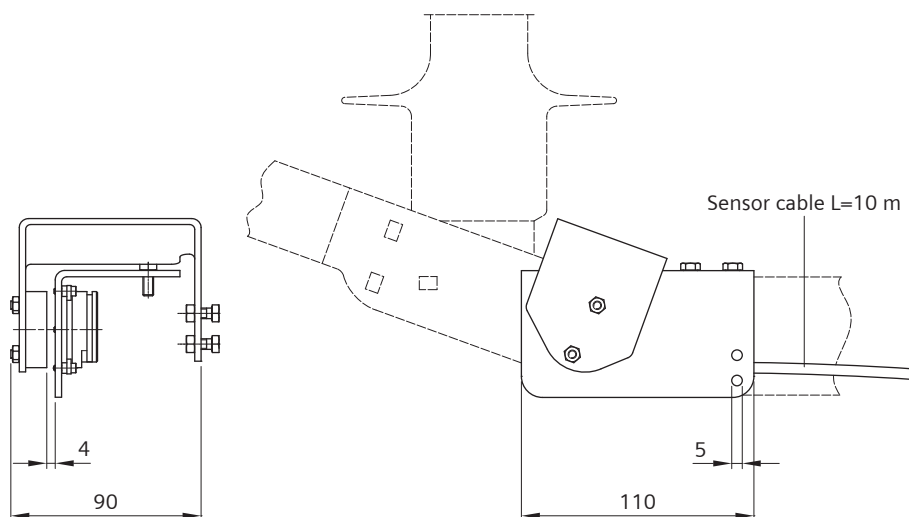
Order no.	8WL5067-0
Designation	Sensor for CMS (Catenary Monitoring System)
Material	
Fastening parts	Al
Bolts, nuts	stlSt
Washers	stlSt
Position indicator/perma- nent magnet (casing)	Plastic
Sensor (casing)	stlSt
Weight	3.33 kg

Parts are delivered unassembled.

CMS function in connection with data acquisition and evaluation station only. These have to be defined project-specifically.

Rotation angle sensor for DMS (Disconnecter Monitoring System)

for disconnectors up to 3 kV DC 8WL6134-



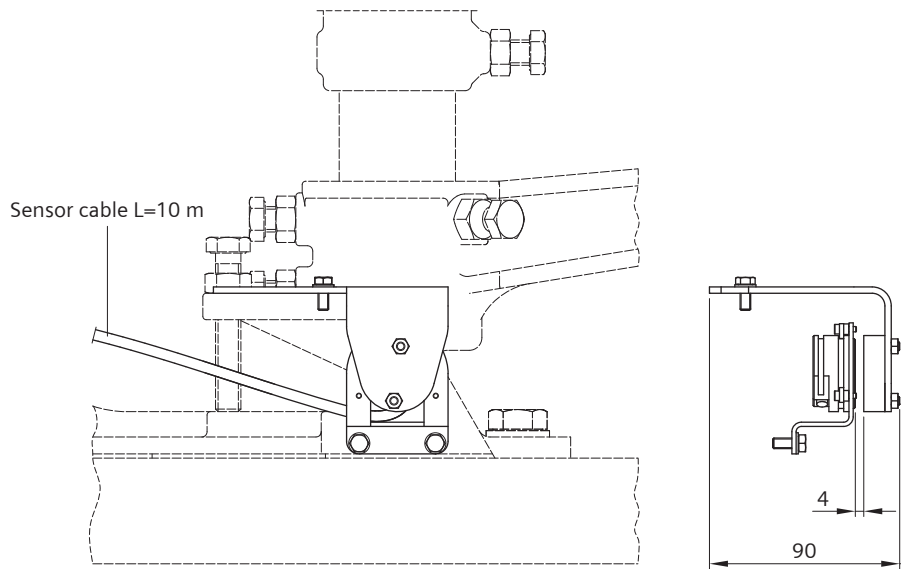
Order no.	8WL6136-0
Designation	Rotation angle sensor
Material	
Fastening parts	stlSt
Bolts, nuts	stlSt
Washers	stlSt
Position indicator/permanent magnet (casing)	Al
Sensor (casing)	Al
Weight	0.55 kg

Parts are delivered unassembled.

DMS function in connection with evaluation station only. This has to be defined project-specifically.

Rotation angle sensor for DMS (Disconnecter Monitoring System)

for disconnectors 15/25 kV AC 8WL6127-



Order no.	8WL6137-0
Designation	Rotation angle sensor
Material	
Fastening parts	stlSt
Bolts, nuts	stlSt
Washers	stlSt
Position indicator/perma- nent magnet (casing	Al
Sensor (casing)	Al
Weight	0.48 kg

Parts are delivered unassembled.
DMS function in connection with evaluation station only. This has to be defined project-specifically.

Chapter 02

Standard Products

Tensioning equipment	01	01-86
Thimbles, connectors, sleeves	02	01-24
GRP cantilevers	03	01-68
Aluminium cantilevers	04	01-80
Steel cantilevers	05	01-42
Headspan supports	06	01-36
Insulators	07	01-34
Contact lines under structures and bridge protection	08	01-42
Clamps	09	01-84
Tension wheel equipment	10	01-48
Section insulators	11	01-34
Disconnectors and drive mechanism	12	01-62
Earthing and protecting equipment	13	01-14
Contact wires, conductors, span wires	14	01-22
Monitoring systems	15	01-06
Installation tools and equipment	16	01-24

Adjusting spanner	02-16-19, 02-16-20
Contact wire measuring instrument	02-16-24
Contact wire stringing grips	02-16-17
Earthing equipment 1.5 kV DC with earthing magnet	02-16-10
Earthing equipment 1.5 kV DC with earthing clamp	02-16-09
Hexagon pressing die	02-16-08
Mechanical hand pressing pliers	02-16-04
Mounting pulley, simple	02-16-16
Mounting tool for dead-end clamps	02-16-22
Oval pressing die	02-16-05, 02-16-06, 02-16-07
Portable short-circuiting device with earthing magnet	02-16-12
Ruler for section insulators	02-16-21
Short-circuiting device 750 V DC	02-16-11
Sling	02-16-18
Special grease paste	02-16-22
Telescopic height measuring rod up to 1 kV DC with carrying bag	02-16-14
Telescopic height measuring rod with mounting beam and carrying bag	02-16-15
Telescopic voltmeter up to 1 kV DC with carrying bag	02-16-13
Twisting lever for grooved contact wire	02-16-19
Wire cleaning brush	02-16-23

Technical comments

Application

Most of the work to be done in connection with the installation and maintenance of overhead contact lines can be performed with standard tools. Siemens offers a number of special tools and equipment for especially efficient installation and maintenance.

Types

- Special tools for contact line installation, for crimping and notching cables and for mounting various specific fittings
- Occupational safety measuring devices and equipment for the safe performance of overhead contact line work
- Measuring devices for quality assurance during installation and maintenance of overhead contact lines

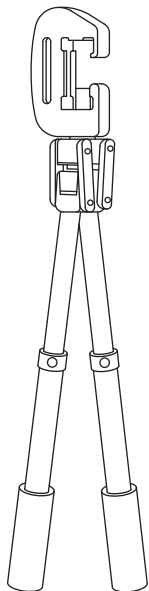
Notes

Testing, repairing and replacing spare parts in safety-relevant measuring devices and equipment may be performed by the manufacturer only.

Damaged safety-relevant measuring and test equipment have to be suspended from usage.

Mechanical hand pressing pliers

open design with swivel compression head and steplessly adjustable telescopic handles, for pressing dies 8WL7152-, 8WL7153- and 8WL7154-

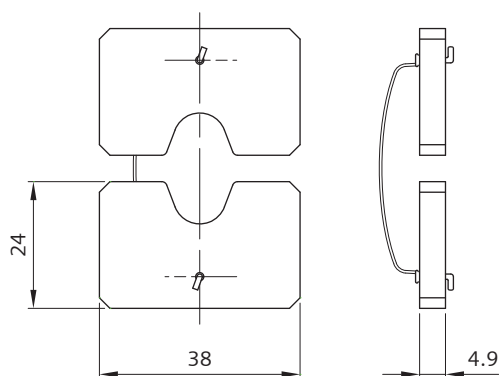


Order no.	8WL7157-0
Designation	Mechanical hand pressing pliers G06-T
Material	–
Weight	3.48 kg
Nominal compression force	60 kN

The open pressing head design simplifies the attachment and removal of the pliers and the replacement of the dies.
The pressing process ist terminated when the handles are closed and the pressing dies then rest on each other.

Oval pressing die

for hand-pressing pliers 8WL7157-0, for compression collars and conductor clamps, pressing width 5 mm



Part 1

Order no.	8WL7152-0	8WL7152-1	8WL7152-2	8WL7152-3	8WL7152-4
Designation	Oval pressing die	Oval pressing die	Oval pressing die	Oval pressing die	Oval pressing die
Material	–	–	–	–	–
Weight	0.08 kg/1 pair	0.08 kg/1 pair	0.08 kg/1 pair	0.07 kg/1 pair	0.06 kg/1 pair
Characteristic number	8PO	10PO	12PO	16PO	18PO
Wire cross-section	10 mm ² (solid wire)	16 mm ² (solid wire) and 10 mm ² ¹⁾	16 mm ² ¹⁾ and 10 mm ² ²⁾	25 mm ² ¹⁾ and 16 mm ² ²⁾	35 mm ² ¹⁾ and 25 mm ² ²⁾

Part 2

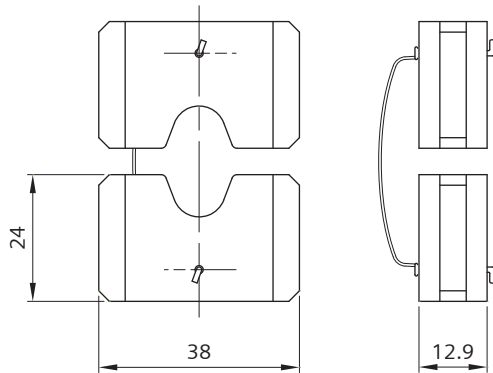
Order no.	8WL7152-5	8WL7152-7
Designation	Oval pressing die	Oval pressing die
Material	–	–
Weight	0.06 kg/1 pair	0.075 kg/1 pair
Characteristic number	20PO	22PO
Wire cross-section	50 mm ² ¹⁾ and 35 mm ² ²⁾	70 mm ² ¹⁾ and 50 mm ² ²⁾

¹⁾ for wires acc. to DIN 48201

²⁾ for wires acc. to DIN 43138

Oval pressing die

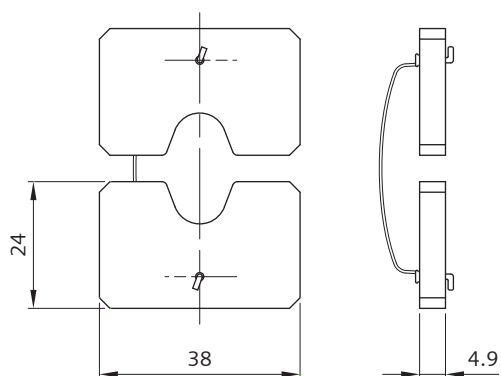
for hand-pressing pliers 8WL7157-0, for dropper wire 8WL7060-2, pressing width 13 mm



Order no.	8WL7152-1A
Designation	Oval pressing die
Material	–
Weight	0.20 kg/1 pair
Characteristic number	10PO
Wire cross-section	10 mm ²

Oval pressing die

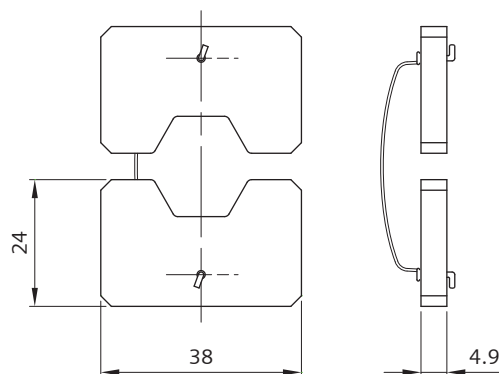
for hand-pressing pliers 8WL7157-0, for synthetic wire d=9 mm (Minoroc wire), pressing width 5 mm



Order no.	8WL7152-8
Designation	
Material	–
Weight	0.07 kg/1 pair
Characteristic number	KS 9PO

Hexagon pressing die

for hand-pressing pliers 8WL7157-0, for copper wires acc. to DIN 48201, pressing width 5 mm



Part 1

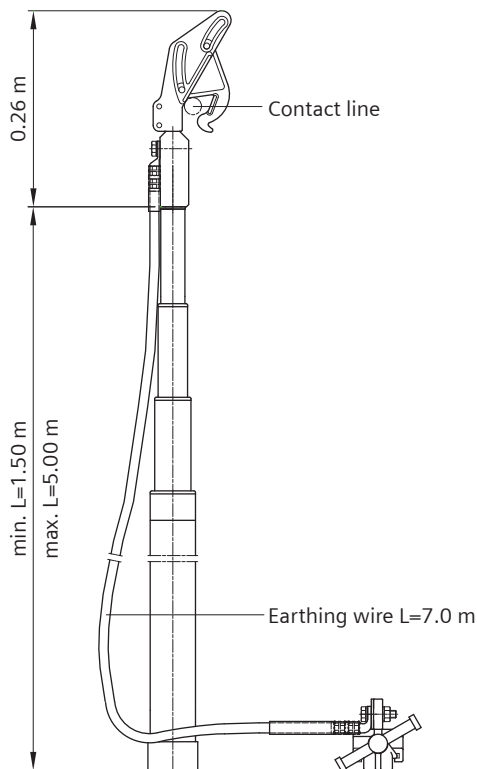
Order no.	8WL7153-4	8WL7153-6	8WL7153-8	8WL7154-1	8WL7154-2
Designation	Hexagon pressing die	Hexagon pressing die	Hexagon pressing die	Hexagon pressing die	Hexagon pressing die
Material	–	–	–	–	–
Weight	0.073 kg/1 pair	0.072 kg/1 pair	0.06 kg/1 pair	0.07 kg/1 pair	0.06 kg/1 pair
Characteristic number	8	10	12	14	16
Wire cross-section	16 mm ²	25 mm ²	35 mm ²	50 mm ²	70 mm ²

Part 2

Order no.	8WL7154-3	8WL7154-5	8WL7154-6	8WL7154-0
Designation	Hexagon pressing die	Hexagon pressing die	Hexagon pressing die	Hexagon pressing die for dropper clamps
Material	–	–	–	–
Weight	0.064 kg/1 pair	0.089 kg/1 pair	0.09 kg/1 pair	0.06 kg/1 pair
Characteristic number	18	20	22	13
Wire cross-section	95 mm ²	120 mm ²	150 mm ²	–

Earthing equipment 1.5 kV DC with earthing clamp

for bronze/copperwires 50 mm² to 240 mm² acc. to DIN 48201 or aluminium/aluminium-steel wires d=17.5 to 21.8 mm acc. to EN 50182 and contact wires AC-80 to 150 or BC/BF-100 to 150 made of Cu-ETP or CuAg0.1 acc. to EN 50149, transportation length 1.50 m

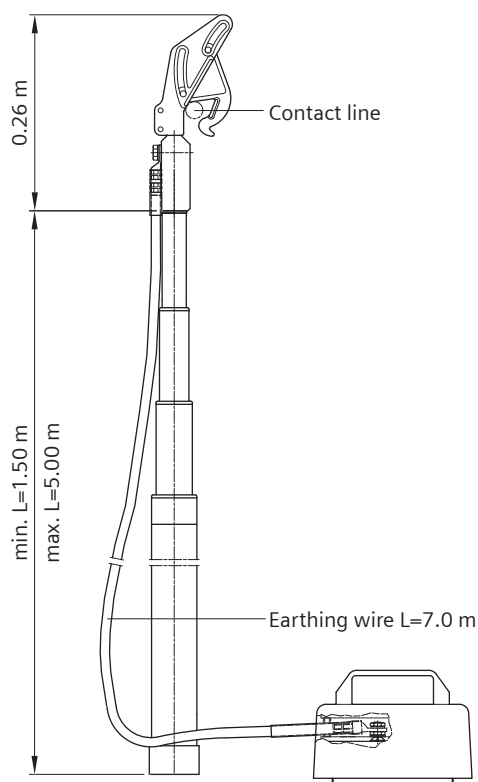


Order no.	8WL7168-0
Designation	Earthing equipment
Material	
Contact line clamp	Al
Earthing stick, 4-part	GRP
Earthing clamp	CuAl
Cable lugs	Cu, tin-coated
Earthing wire 50 mm ²	Cu with PVC-sheath
Weight	12.3 kg
Nominal voltage	1.5 kV DC
Rated short-circuit current	30 kA
Rated short-circuit duration	60 ms
Peak current factor	1.42

Substitute for 8WL7161-5A.

Earthing equipment 1.5 kV DC with earthing magnet

for bronze/copperwires 50 mm² to 240 mm² acc. to DIN 48201 or aluminium/aluminium-steel wires d=17.5 to 21.8 mm acc. to EN 50182 and contact wires AC-80 to 150 or BC/BF-100 to 150 made of Cu-ETP or CuAg0.1 acc. to EN 50149, transportation length 1.50 m

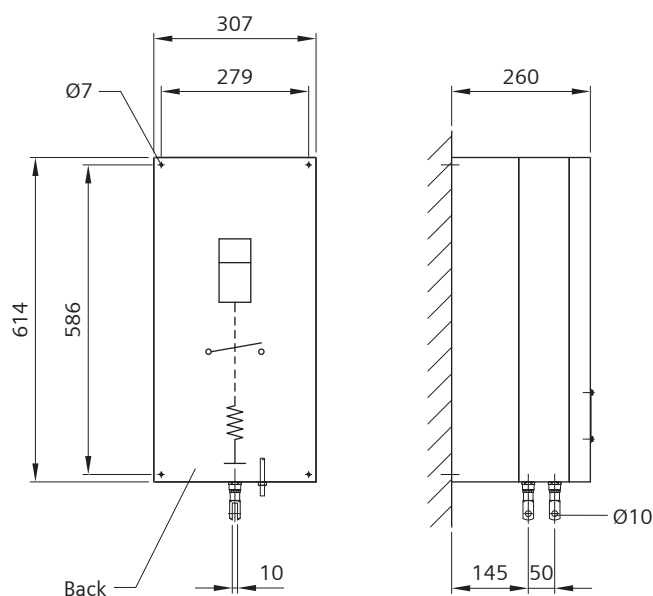


Order no.	8WL7168-1
Designation	Earthing equipment
Material	
Contact line clamp	Al
Earthing stick, 4-part	GRP
Earthing magnet (casing)	Plastic
Cable lugs	Cu, tin-coated
Earthing wire 50 mm ²	Cu with PVC-sheath
Weight	13.5 kg
Nominal voltage	1.5 kV DC
Rated short-circuit current	22 kA
Rated short-circuit duration	60 ms
Peak current factor	1.42

Earthing magnet can not be used again in case of short-circuit.
Substitute for 8WL7161-6A.

Short-circuiting device 750 V DC

for short-circuiting, for installation in tunnels and buildings, for permanent and provisional use

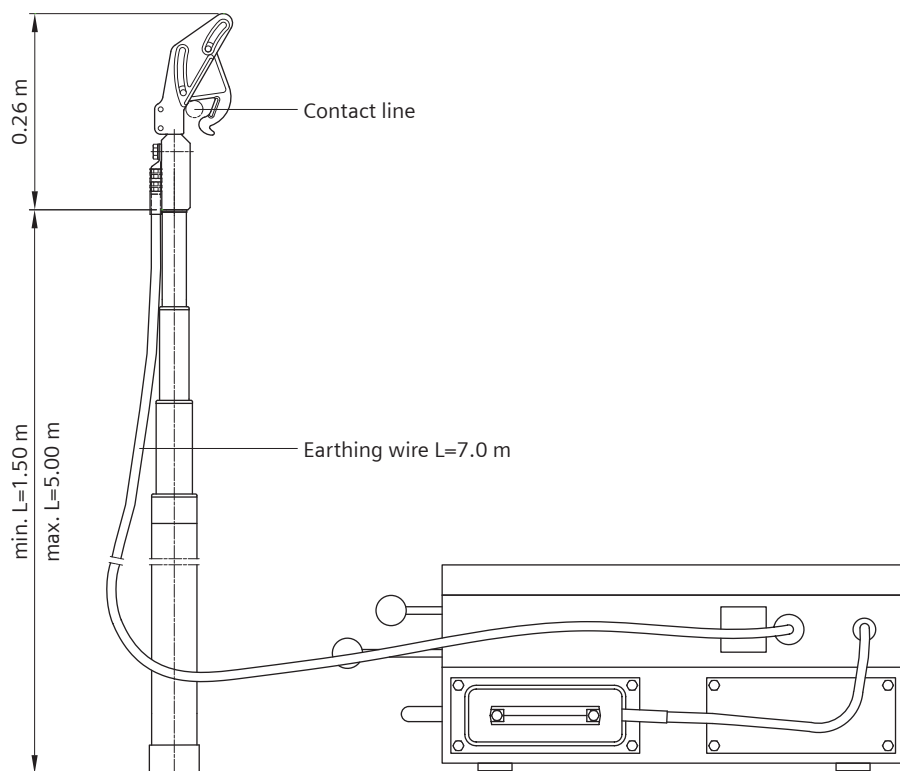


Order no.	8WL6610-0
Designation	Short-circuiting device
Material	Plastic
Weight	12.3 kg
Nominal voltage	750 V DC
Rated short-circuit current	10 kA
Rated short-circuit duration	200 ms

The unit carries the CE symbol.

Portable short-circuiting device with earthing magnet

for contact wires AC-80 to 150 or BC/BF-100 to 150 made of Cu-ETP or CuAg0.1 acc. to EN 50149, transportation length 1.50 m



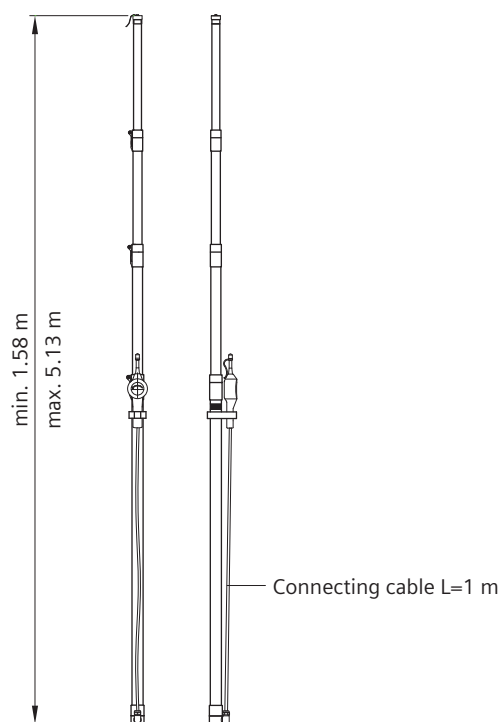
Order no.	8WL7168-7
Designation	Portable short-circuit device
Material	
Contact line clamp	Al
Earthing stick, 4-part	GRP
Earthing magnet (casing)	Plastic
Short-circuiting device (casing)	Plastic
Earthing wire 50 mm ²	Cu with PVC-sheath
Weight	31 kg
Nominal voltage	750 V DC
Rated voltage	900 V DC
Rated short-circuit current	10 kA
Rated short-circuit duration	200 ms
Peak current factor	1.42

Earthing magnet can not be used again in case of short-circuit.

Substitute for 8WL7161-6D.

Telescopic voltmeter up to 1 kV DC with carrying bag

for testing of the overhead contact line voltage



Order no.	8WL7175-0
Designation	Telescopic voltmeter
Material	
Rod	GRP
Weight	4.0 kg
Max. testing height	approx. 6.0 m
Internal resistance (of the whole measuring equipment)	87 kΩ
Test current	< 11.5 mA
Protection class ¹⁾	IP65
Power-on duration ²⁾	30 s
Display on the measuring instrument	200-1000 V

¹⁾ casing of the indicator

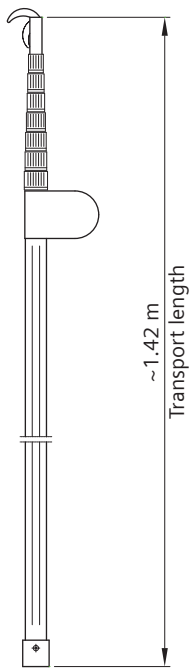
²⁾ max. testing duration of the overhead contact line

The unit carries the CE-symbol.

Substitute for 8WL7170-0.

Telescopic height measuring rod up to 1 kV DC with carrying bag

for measuring distances of energised overhead contact line components

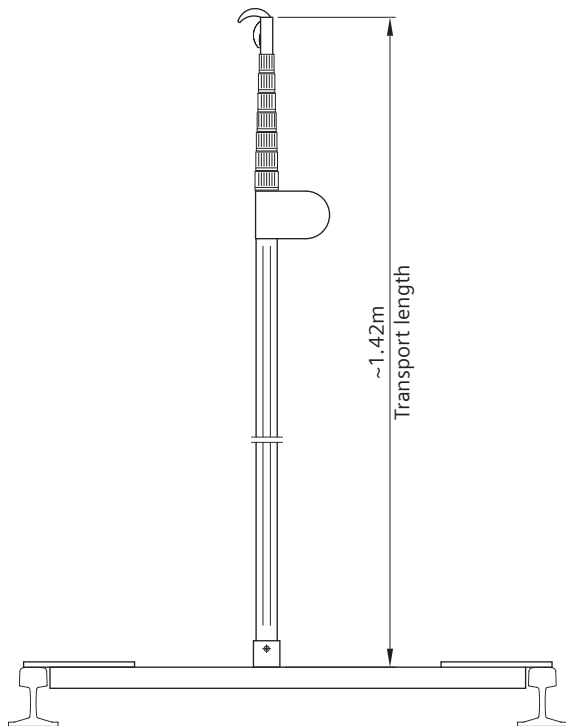


Order no.	8WL7171-0
Designation	Telescopic height measuring rod
Material	Plastic
Weight	3.0 kg
Measuring range	1.42 to 8.0 m
Measuring duration	max. 3 min (on energized parts)

The unit can also be used during precipitation and fog.
The unit carries the GS-symbol for "Verified safety".

Telescopic height measuring rod with mounting beam and carrying bag

for measuring distances of energised overhead contact line components, for nominal voltages up to 3 kV DC and up to 30 kV AC, 16.7 and 50/60 Hz



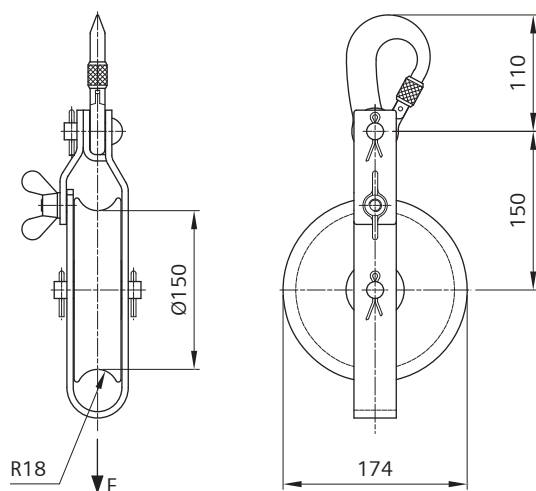
Order no.	8WL7173-0
Designation	Telescopic height measuring rod
Material	
Measuring rod	Plastic
Mounting beam	GRP
Weight	4.54 kg
Measuring range	2.4 - 8.0 m
Measuring duration	max. 3 min (on energized parts)

The unit can also be used during precipitation and fog.

The unit carries the GS-symbol for "Verified safety".

Mounting pulley, simple

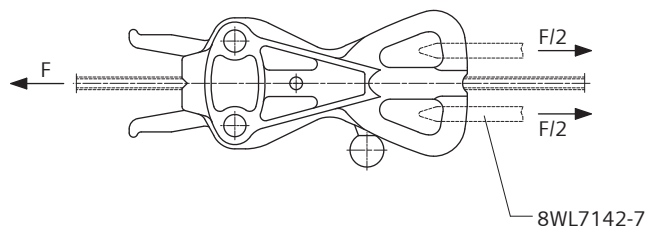
for stringing of catenary wire



Order no.	8WL7164-1
Designation	Mounting pulley, simple
Material	
Hoop, strap	htgSt
Snap hook	Al
Setting nut	Al
Pulley	Polyamide
Butterfly nut M12	Cu2
Pin, washer	stlSt
Pins 16x45	htgSt
Split pins 5x28	Cu
Weight	2.32 kg
Perm. operating load	4 kN
Min. failing load	12 kN

Contact wire stringing grips

as stringing grips for stringing or dead ending of contact wires and stranded wires, for contact wires AC-80 made of Cu-ETP, AC-100 to AC-120 made of Cu-ETP or CuAg0.1 and AC-120 made of CuMg0.5 acc. to EN 50149, for bronze wires 25 to 70 mm² acc. to DIN 48201

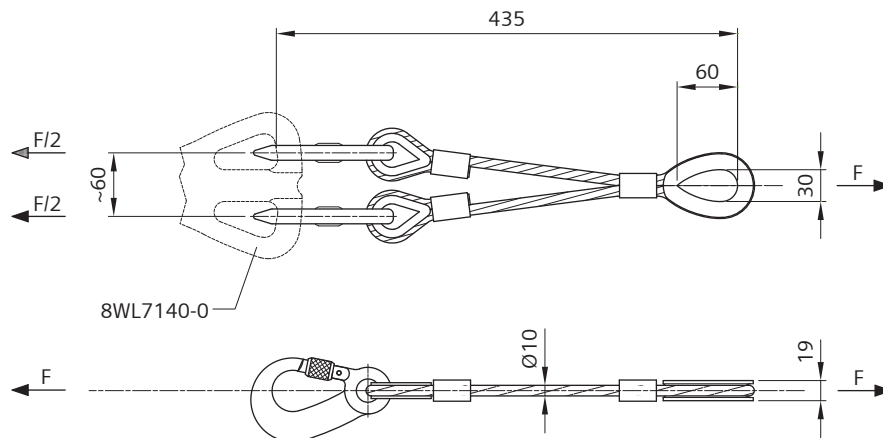


Order no.	8WL7140-0
Designation	Contact wire stringing grips
Material	ctAl, stlSt
Weight	2.14 kg
Perm. operating load	7.0 kN for wire 25 mm ² 10.0 kN for wire 35 mm ² and AC-80 Cu-ETP 12.5 kN for AC-100 Cu-ETP 14.0 kN for wire 50 mm ² 15.0 kN for AC-120 Cu-ETP/CuMg0.5 16.0 kN for AC-100 CuAg0.1 19.0 kN for wire 70 mm ² and AC-120 CuAg0.1

The stated loads only apply for use with sling 8WL7142-7. Please order separately.

Sling

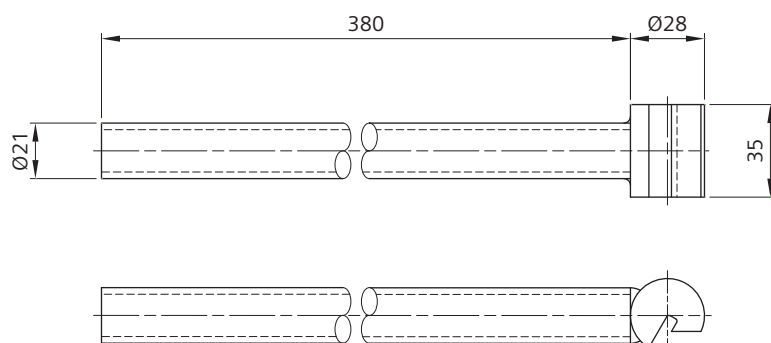
for contact wire stringing grips 8WL7140-0



Order no.	8WL7142-7
Designation	Sling
Material	
Snap hook	Al
Thimbles	htgSt
Compression clamps	Al
Wire 10 mm ²	St
Weight	1.12 kg
Perm. operating load	19 kN
Min. failing load	57 kN

Twisting lever for grooved contact wire

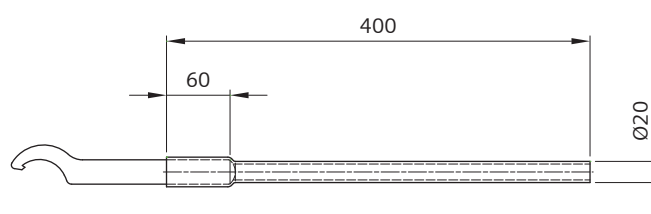
for alignment of grooved contact wires AC-80 to AC-150 made of Cu-ETP or CuAg0.1 acc. to EN 50149



Order no.	8WL7156-0
Designation	Twisting lever for grooved contact wire
Material	St
Weight	0.59 kg

Adjusting spanner

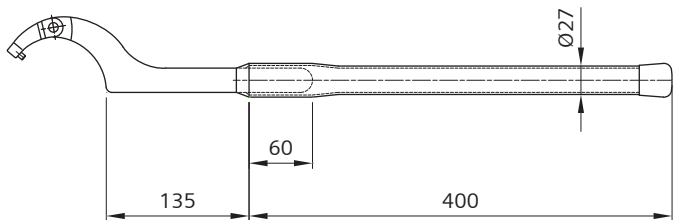
for elastic supports 1.5 kV DC 8WL4044-



Order no.	8WL4061-0
Designation	Adjusting spanner
Material	htgSt
Weight	0.58 kg

Adjusting spanner

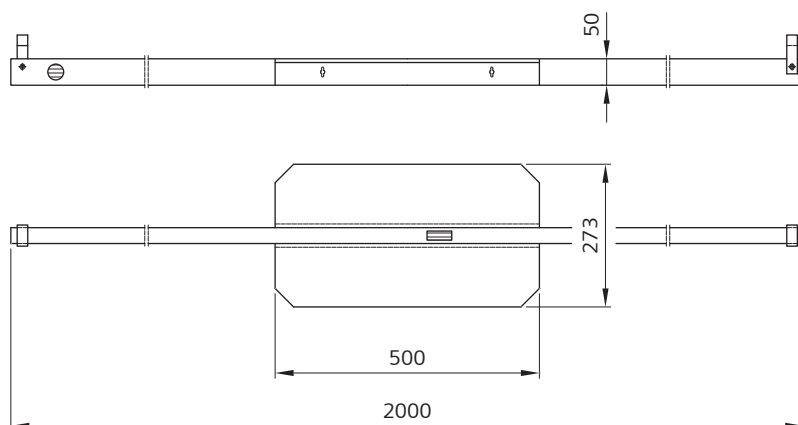
for elastic supports 25 kV AC 8WL4200-



Order no.	8WL4203-2
Designation	Adjusting spanner
Material	
Spanner	htgSt
End cap	Plastic
Weight	1.08 kg

Ruler for section insulators

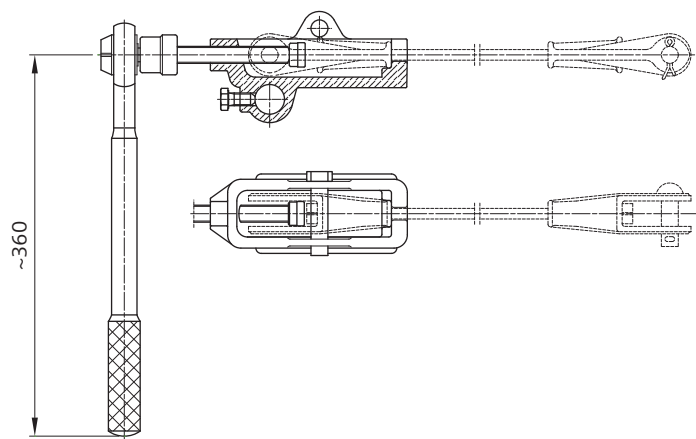
for installation of section insulators 8WL5510-, 8WL5546- and 8WL5570-



Order no.	8WL5578-0
Designation	Ruler
Material	
Spirit level	Al
Bracket	Al
Bolts	stlSt
Nuts	stlSt
Weight	3.08 kg

Mounting tool for dead-end clamps

for mounting of dead-end clamps 8WL3006-1 and -3 on GRP rods 8WL3007-0 and -1 (d=10 mm)



Order no.	8WL3020-8
Designation	Mounting tool for dead-end clamps
Material	
Casing	CuSn
Compression bolt M16	St
Adjustable washer	St
Torque wrench	St
Torque wrench insert (hexagon 24 a/c flats)	Chromium-vanadium-steel
Cup-point screw M12	stlSt
Weight	4.12 kg

Special grease paste 8WL8015-0 must be ordered separately, see page 02-16-22.

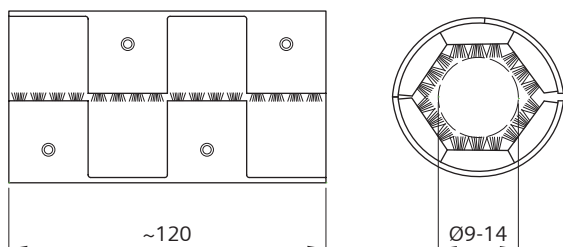
Special grease paste

for mounting tool 8WL3020-8

Order no.	8WL8015-0
Designation	Special grease paste (tin)
Material	–
Weight	1.0 kg

Wire cleaning brush

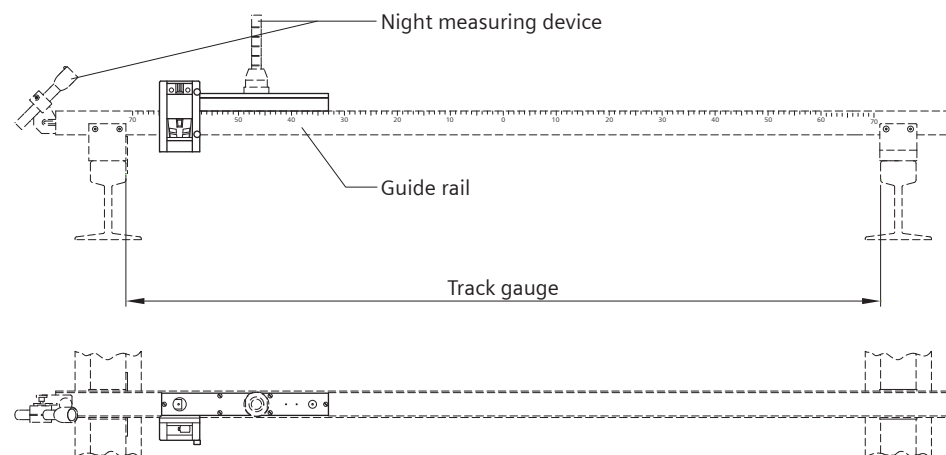
for removing oxide and soiling layers from the terminal-clamping points of used and corroded wires, for bronze wires 50 to 120 mm² and copper wires 95 to 120 mm² acc. to DIN 48201



Order no.	8WL7145-0
Designation	Wire cleaning brush
Material	
Casing	Al
Bristles	stlSt
Weight	0.20 kg

Contact wire measuring instrument

for measurement of vertical and lateral position of catenary



Order no.	8WL8016-1
Designation	Measuring device for contact wire
Material	–
Weight	5.5 kg
Measuring range (lateral deviation)	to the left 65 cm to the right 65 cm
Accuracy (lateral deviation)	±10 mm
Measuring range (contact wire height)	approx. 50 m
Accuracy (contact wire height)	±3 mm

Delivery scope:

optical instrument with laser in aluminium case, laser glasses

If necessary, accessories must be ordered separately:

8WL8016-1A Night measuring device

8WL8016-1B Guide rail for track gauge 1000 mm

8WL8016-1C Guide rail for track gauge 1435 mm

8WL8016-1D Universal guide rail for track gauges 1000 to 1458 mm

8WL8016-1E Guide rail for track gauge 1435 mm, 2-section

8WL8016-1F Universal guide rail for track gauges 1000 to 1458 mm, 2-section

Substitute for 8WL8016-0A.

Chapter 03

Obsolescent Products

Trolleybus	01	01-12
Other parts	02	01-16

Trolleybus contact wire clip for straight line	03-01-06
Trolleybus contact wire clip M16	03-01-04
Trolleybus contact wire splice	03-01-05
Trolleybus crossing 10°	03-01-11
Trolleybus dropper strap	03-01-09
Trolleybus pull-off hoop	03-01-10
Trolleybus suspension hoop	03-01-10
Trolleybus trailing switch frog 5°	03-01-11
Trolleybus wire holder 5/8", insulated	03-01-08
Trolleybus wire holder with dropper strap, insulated	03-01-07

Technical Comments

Application

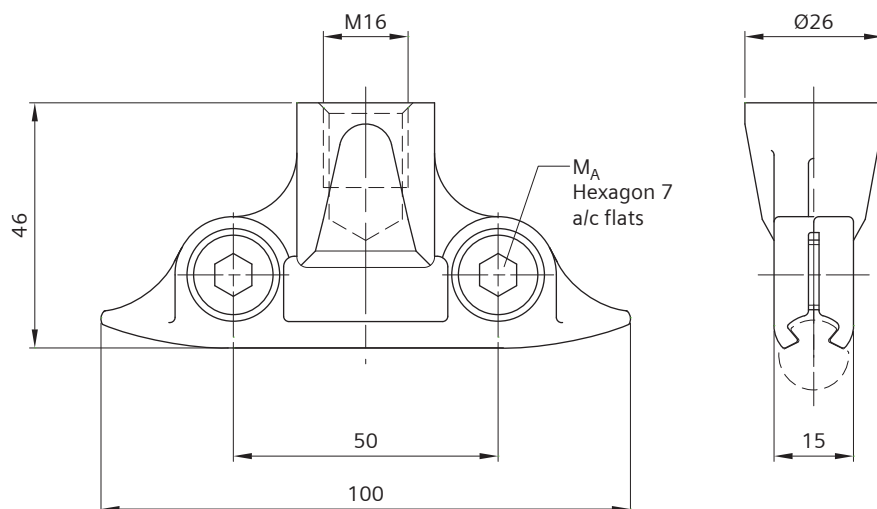
The following chapter lists products which are especially designed for trolleybus operation. This applies particularly to the fittings for trolley wire guidance and suspension, for points and crossings, as well as pendant-type suspensions. The components for constructing the cantilevers, the connections to the poles and for feeder cables and line feeders are the same as those used for railway catenary systems and can be taken from the appropriate chapters.

Types

The products are mainly made of corrosion-resistant copper alloys and stainless steel. They meet the requirements for a low-maintenance design of overhead contact line system.

Trolleybus contact wire clip M16

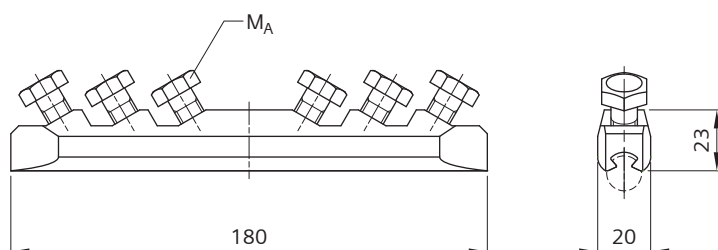
for contact wires AC-80 to 150 acc. to EN 50149 and BRi 80 to 150 acc. to DIN 43141



Order no.	8WL7101-1
Designation	Trolleybus contact wire clip M16
Material	
Clamp body	CuZn
Hollow bolts	stlSt
Weight	0.24 kg
Tightening torque M_A	25 Nm

Trolleybus contact wire splice

for contact wires AC-80 to 150 acc. to EN 50149 and BRi 80 to 100 acc. to DIN 43141

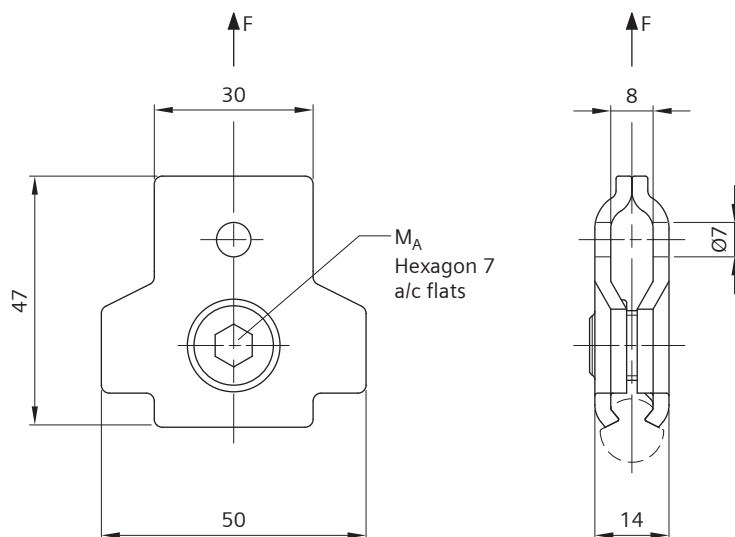


Order no.	8WL7103-5
Designation	Trolleybus contact wire splice
Material	
Clamp body	CuNiSi
Cup-point screws M10	stlSt
Weight	0.59 kg
Tightening torque M_A	25 Nm (the bolts are fastened in sequence starting near the joint and working outwards)

The clamp supports the contact wires given with at least 85 % of their rated failing load.

Trolleybus contact wire clip for straight line

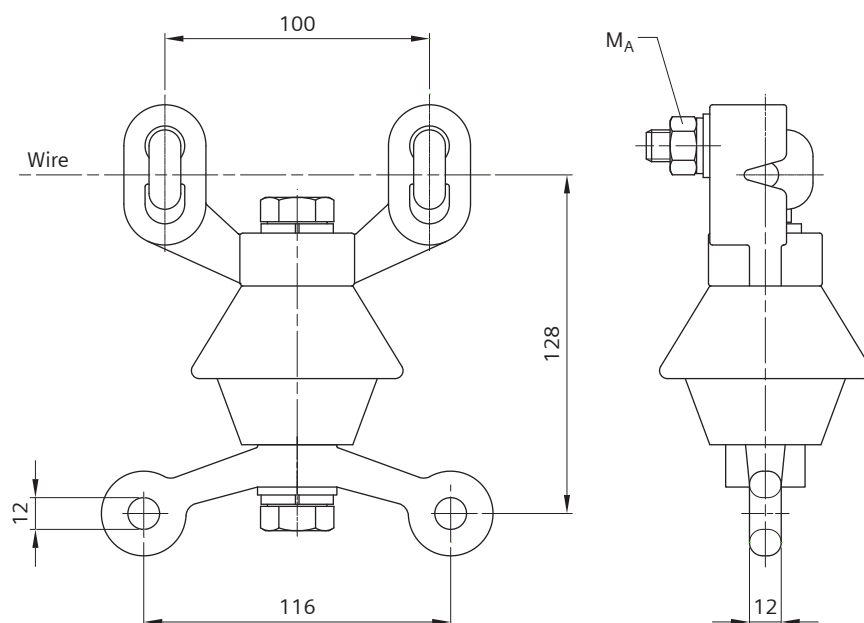
for contact wires AC-80 to 150 acc. to EN 50149 and BRi 80 to 150 acc. to DIN 43141



Order no.	8WL7108-2
Designation	Trolleybus contact wire clip for straight line
Material	
Clamp body	CuNiSi
Hollow bolts	stlSt
Weight	0.11 kg
Perm. operating load	1 kN
Min. failing load	3 kN
Tightening torque M_A	25 Nm

Trolleybus wire holder with dropper strap, insulated

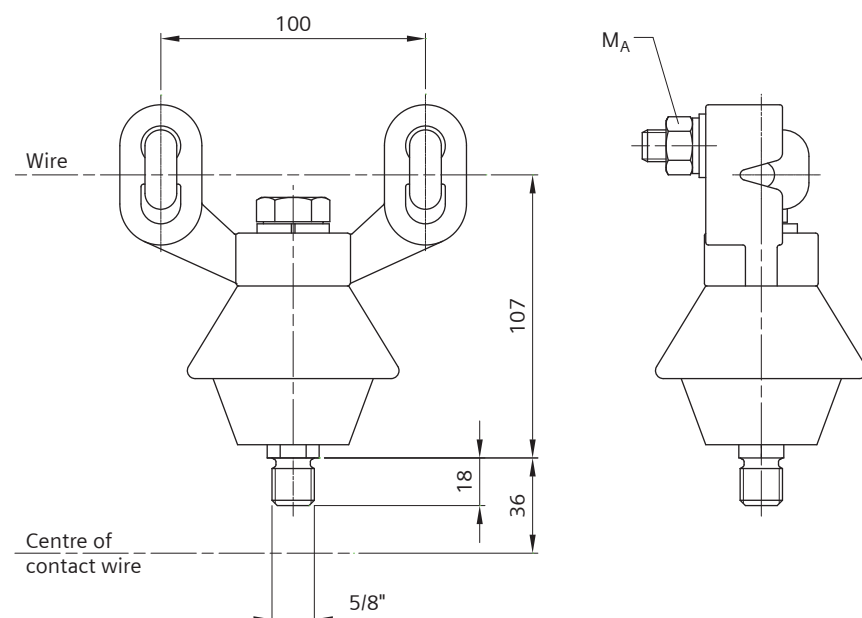
for pendant-type suspension, for bronze wires 25 to 50 mm² acc. to DIN 48201 and tension wires d=6 mm acc. to DIN 43136



Order no.	8WL3537-1
Designation	Trolleybus wire holder
Material	
Insulator body	Cast resin, brown
Suspension strap	CuSn
Hook bolts M12	stlSt
Dropper strap	CuAl
Bolts M16	stlSt
Nuts, washers	stlSt
Spring washers	stlSt
Weight	1.53 kg
Tightening torque M_A	56 Nm
Nominal voltage	1.5 kV DC

Trolleybus wire holder 5/8", insulated

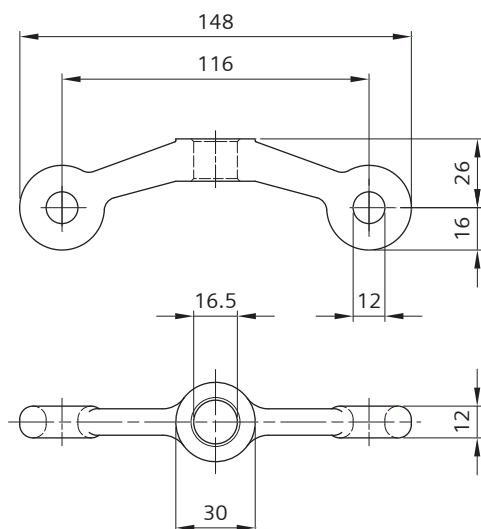
for bronze wires 25 to 50 mm² acc. to DIN 48201 and tension wires d=6 mm acc. to DIN 43136



Order no.	8WL3537-3
Designation	Trolleybus wire holder 5/8", insulated
Material	
Insulator body	Cast resin, brown
Suspension strap	CuSn
Hook bolts M12	stlSt
Threaded pin	stlSt
Bolt M16	stlSt
Nuts, washers	stlSt
Spring washers	stlSt
Weight	1.27 kg
Tightening torque M_A	56 Nm
Nominal voltage	1.5 kV DC

Trolleybus dropper strap

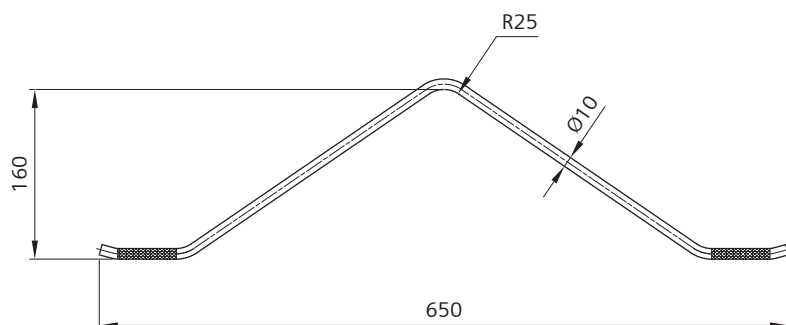
for insulated or uninsulated clamp holder



Order no.	8WL7108-8
Designation	Trolleybus dropper strap
Material	CuAl
Weight	0.22 kg

Trolleybus pull-off hoop

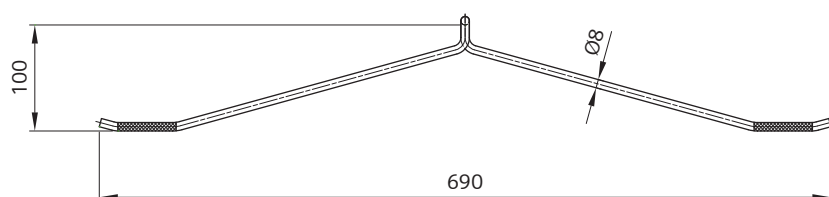
for contact wire pendant-type suspension



Order no.	8WL3517-5
Designation	Trolleybus pull-off hoop
Material	stlSt
Weight	0.47 kg

Trolleybus suspension hoop

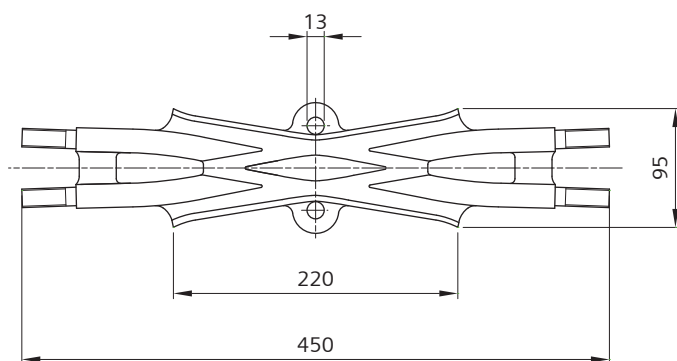
for contact wire pendant-type suspension



Order no.	8WL3517-6
Designation	Trolleybus suspension hoop
Material	stlSt
Weight	0.25 kg

Trolleybus crossing 10°

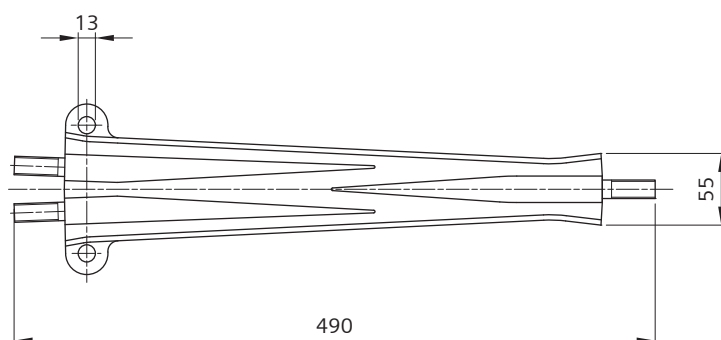
for contact wire crossings



Order no.	8WL7110-0
Designation	Trolleybus crossing 10°
Material	CuAl
Weight	4.54 kg

Trolleybus trailing switch frog 5°

for contact wire connections at switches



Order no.	8WL7110-5
Designation	Trolleybus trailing switch frog 5°
Material	CuAl
Weight	3.85 kg

Chapter 03

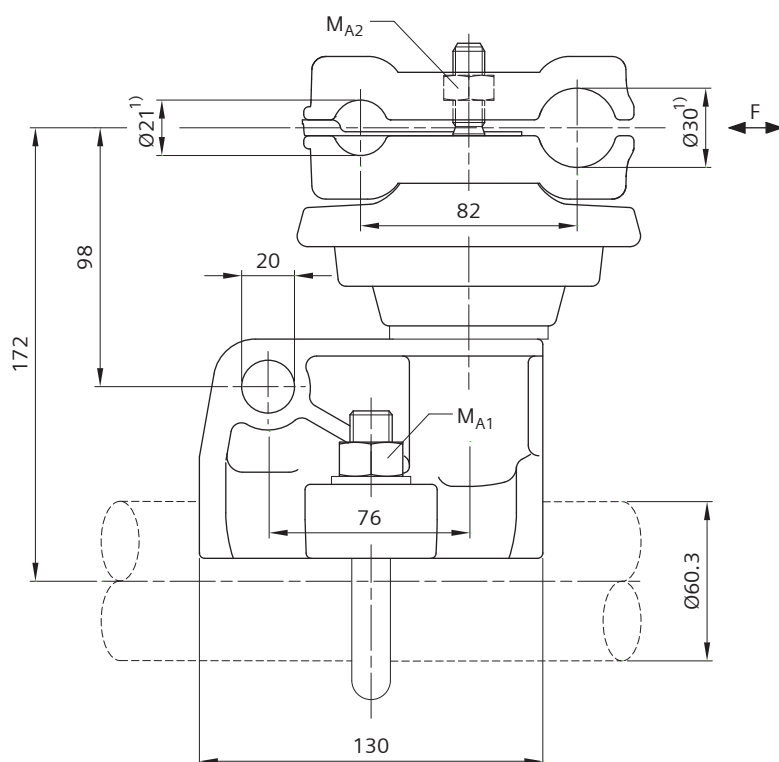
Obsolescent Products

Trolleybus	01	01-12
Other parts	02	01-16

Adapter for tension wheel assemblies 8WL5078-	03-02-12
Bracket for disconnector	03-02-15
Bracket for manual operating mechanism 8WL6214-	03-02-13
Bracket for surge arrester	03-02-16
Catenary wire support clamp 60.3-21/30, insulated	03-02-03
Composite line post insulator up to 3 kV DC	03-02-05
Contact wire splice with four bolts	03-02-07
Dropper clip 150	03-02-11
Dropper clip 70	03-02-10
Parallel groove clamp with two bolts	03-02-08
Punch-lock band holder for guide	03-02-14
Steady arm made of aluminium	03-02-06
Thimble insert	03-02-04
Twin dropper clip	03-02-09

Catenary wire support clamp 60.3-21/30, insulated

adjustable at top tube made of steel $d=60.3\text{ mm}$ (2"), for bronze and copper wires up to 500 mm^2



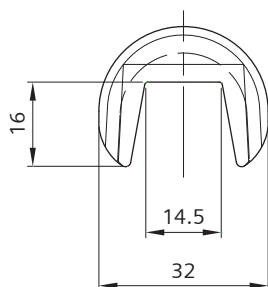
Order no.	8WL2037-5A
Designation	Catenary wire support clamp 60.3-21/30
Material	
Clamp body	Cast resin, brown
Clamp cover	CuAl
Clamp holder	ctAl
U-bolt M16	stlSt
Stud bolts M12	stlSt
Nuts, washers	stlSt
Weight	4.05 kg
Perm. operating load	6.25 kN
Min. failing load	20 kN
Tightening torque M_{A1}	70 Nm
Tightening torque M_{A2}	50 Nm
Nominal voltage	1.5 kV DC

¹⁾ Diameter including protection sleeve

Protection sleeves must be ordered separately, see Chapter 02-02.

Thimble insert

for loop insulator 8WL3001-8, for bronze and copper wires up to 70 mm² acc. to DIN 48201

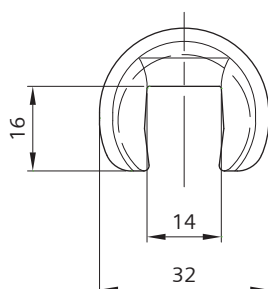


Order no.	8WL3022-6
Designation	Thimble insert
Material	CuAl
Weight	2.5 kg/100 pcs.

After inserting into the thimble of the loop insulator the insert must be squeezed.

Thimble insert

for loop insulator 8WL3001-8, for bronze and copper wires up to 70 mm² acc. to DIN 48201

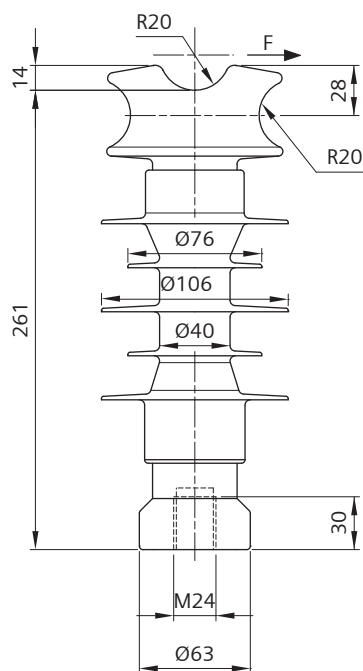


Order no.	8WL3022-7
Designation	Thimble insert
Material	Polyamide
Weight	0.4 kg/100 pcs.

After inserting into the thimble of the loop insulator the insert must be squeezed.

Composite line post insulator up to 3 kV DC

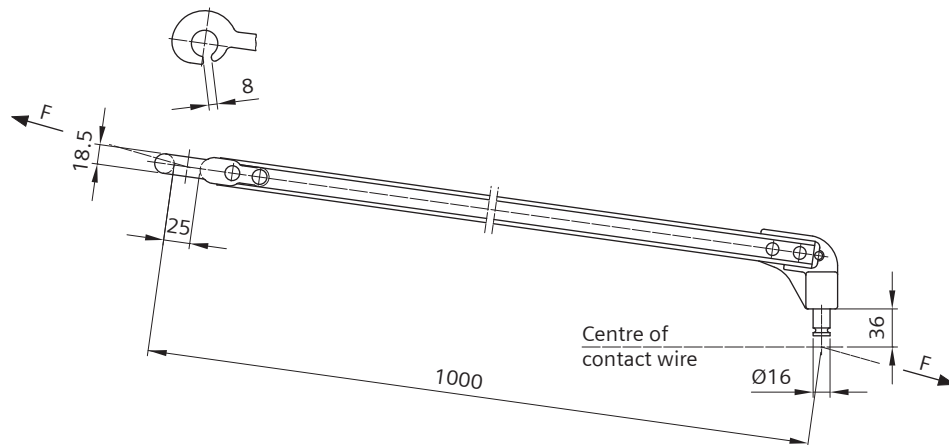
for feeder lines



Order no.	8WL3077-3
Designation	Composite line post insulator
Material	
Insulator body	GRP, silicone
Fitting (head)	ctAl
Fitting (base)	htgSt
Weight	5.0 kg
Specified Cantilever Load (SCL)	15 kN
Max. Design Cantilever Load (MDCL)	5 kN
Specified Tensile Load (STL)	35 kN
Nominal voltage	3 kV DC
Min. creepage distance	392 mm
Lightning impulse withstand voltage	170 kV
Power-frequency withstand voltage, wet	48 kV

Steady arm made of aluminium

hook end clamp straight, without contact wire clip, with connection for windstay



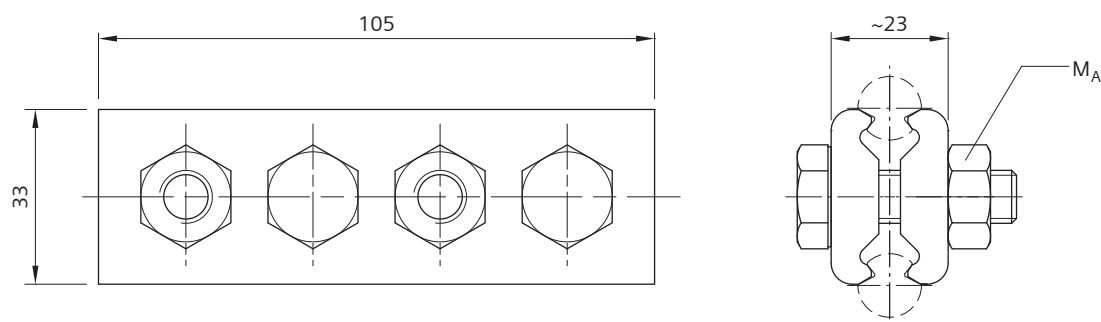
Order no.	8WL3501-2A
Designation	Steady arm L=1000
Material	
Hook end clamp	ctAl
U-section	Al
Clip holder	Al
Grooved stud 16R	CuNiSi
Round head rivets	Al
Weight	0.83 kg
Perm. operating load	2.5 kN
Min. failing load	7.5 kN

Contact wire clip 16R must be ordered separately, see page QUERVERWEIS-NICHT-GEFUNDEN.

Can also supplied in other lengths.

Contact wire splice with four bolts

for high-tensile connection of contact wires AC-80 to 150 and BC/BF-100 to 150 made of Cu-ETP or CuAg0,1 acc. to DIN EN 50149

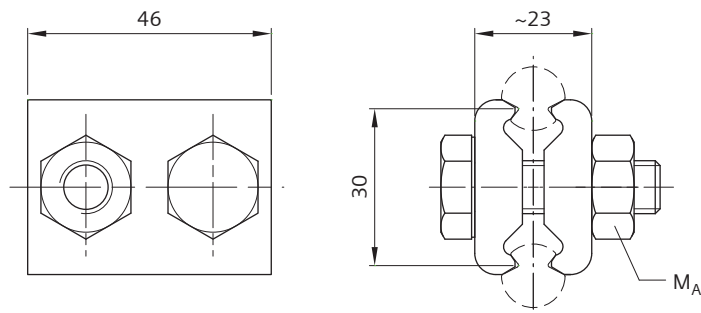


Order no.	8WL4534-1
Designation	Contact wire splice
Material	
Clamp body	CuNiSi
Bolts M10	stlSt
Nuts	stlSt
Weight	0.55 kg
Tightening torque M_A	50 Nm (the bolts are fastening in sequence starting near the join and working outwards)

The clamp supports the contact wires given with at least 85 % of their rated failing load.

Parallel groove clamp with two bolts

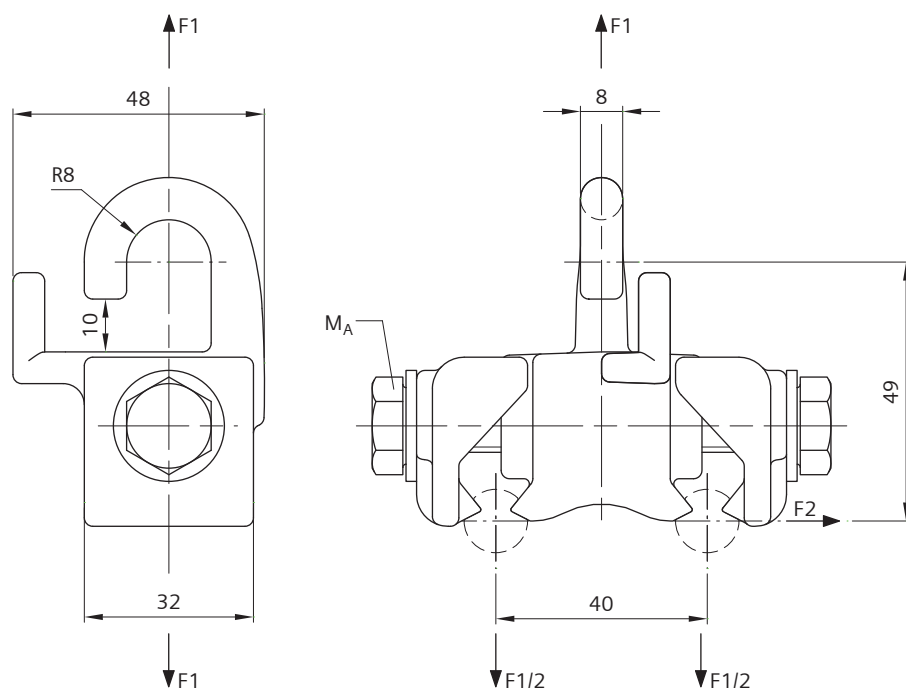
for connection of contact wires AC-80 to 150 and BC/BF-100 to 150 acc. to EN 50149



Order no.	8WL4534-2
Designation	Parallel groove clamp
Material	
Clamping jaws	CuNiSi
Bolts M10	stlSt
Nuts	stlSt
Weight	0.25 kg
Tightening torque M_A	32 Nm

Twin dropper clip

for contact wires AC-80 to 150 acc. to DIN EN 50149

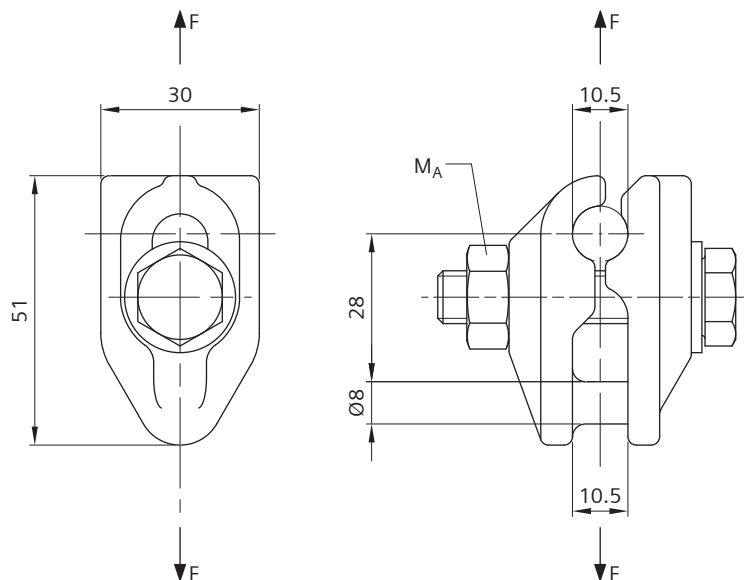


Order no.	8WL4627-0
Designation	Twin dropper clip
Material	
Clamp body	CuAl
Bolts M10	stlSt
Washers	stlSt
Weight	0.37 kg
Perm. operating load (F1)	1 kN
Min. failing load (F1)	3 kN
Perm. operating load (F2)	2 kN
Min. failing load (F2)	6 kN
Tightening torque M_A	32 Nm

Use with insulating thimble acc. to drawing 13-062 NS Nederlandse Spoorwegen only.

Dropper clip 70

for bronze and copper catenary wires 70 mm² acc. to DIN 48201

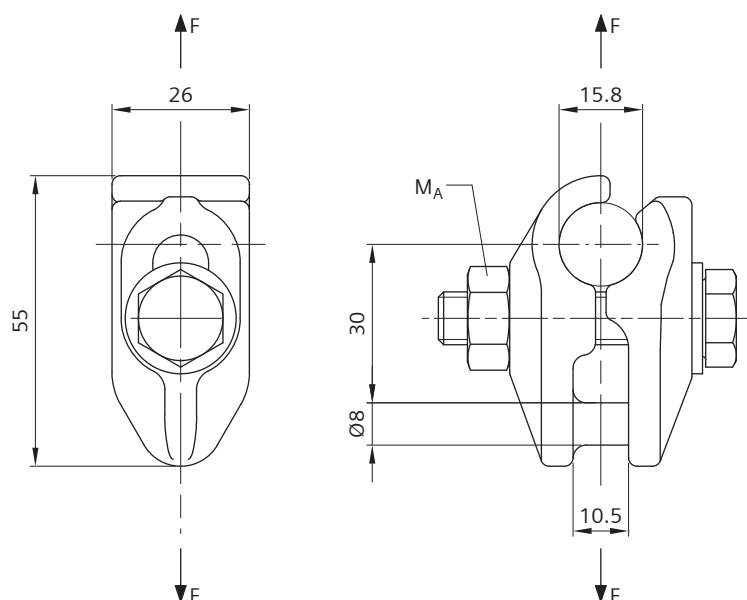


Order no.	8WL4628-0
Designation	Dropper clip 70
Material	
Clamping jaws	CuAl
Bolt M10	stlSt
Nut	stlSt
Washer	stlSt
Weight	0.20 kg
Perm. operating load	1 kN
Min. failing load	3 kN
Tightening torque M_A	32 Nm

Use with insulating thimble acc. to drawing 13-062 NS Nederlandse Spoorwegen.

Dropper clip 150

for bronze and copper catenary wires 150 mm² acc. to DIN 48201

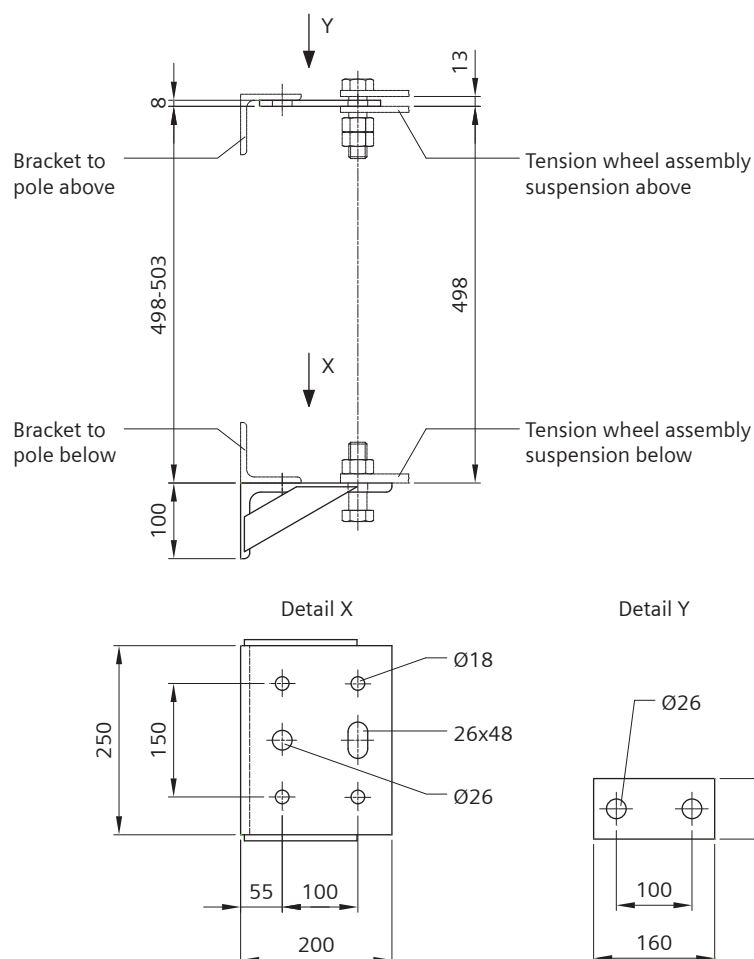


Order no.	8WL4628-3
Designation	Dropper clip 150
Material	
Clamping jaws	CuAl
Bolt M10	stlSt
Nut	stlSt
Washer	stlSt
Weight	0.20 kg
Perm. operating load	1 kN
Min. failing load	3 kN
Tightening torque M _A	32 Nm

Use with insulating thimble acc. to drawing 13-062 NS Nederlandse Spoorwegen.

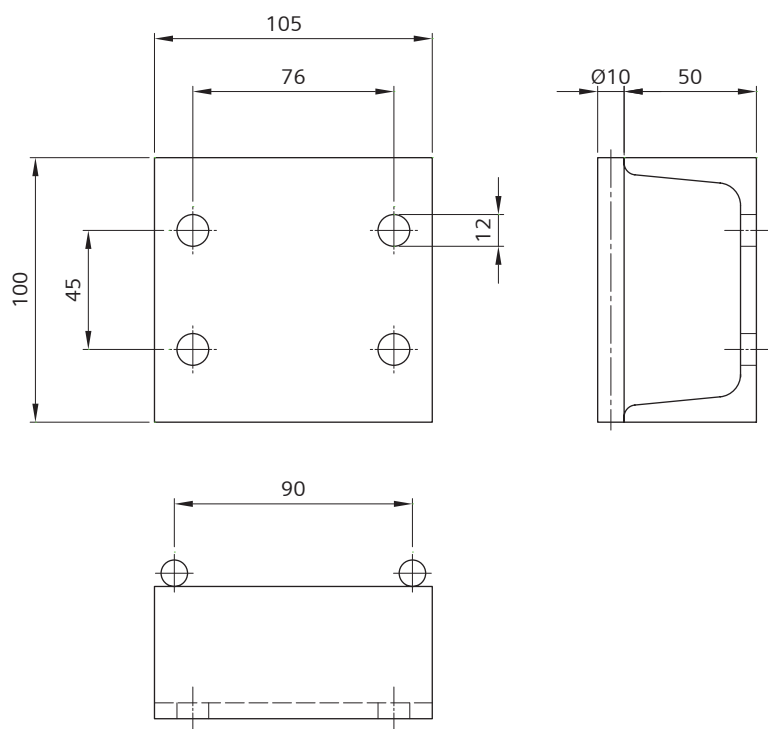
Adapter for tension wheel assemblies 8WL5078-

for fastening at hexagon-section or HE pole



Order no.	8WL5055-3K
Designation	Adapter for tension wheel assemblies 8WL5078-
Material	htgSt
Weight	8.5 kg

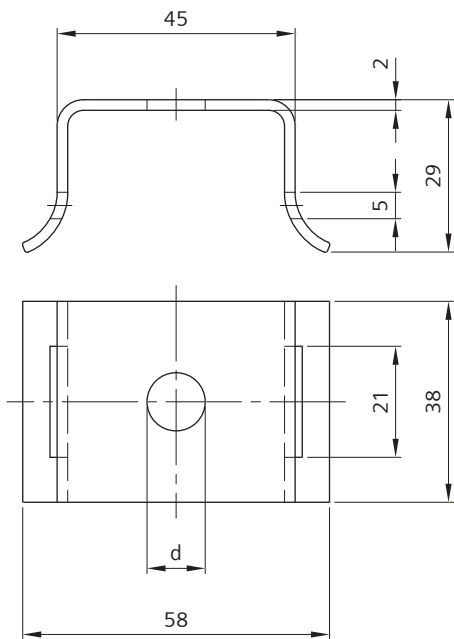
Bracket for manual operating mechanism 8WL6214- for fastening with punch-lock band



Order no.	8WL6217-8
Designation	Bracket
Material	htgSt
Weight	1.25 kg

Punch-lock band holder for guide

for punch-lock band width up to 19 mm

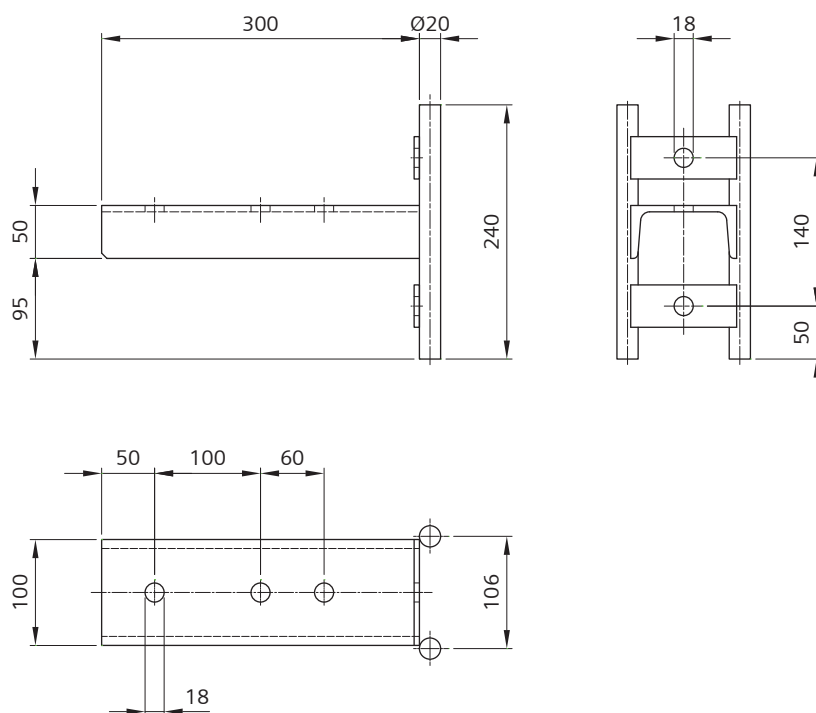


Order no.	8WL6228-2A	8WL6228-2B	8WL6228-2C
Designation	Punch-lock band holder d=11 mm	Punch-lock band holder d=13 mm	Punch-lock band holder d=17 mm
Material	stlSt	stlSt	stlSt
Weight	0.46 kg	0.46 kg	0.46 kg
d	11 mm	13 mm	17 mm

The bearing capacity of the punch-lock band holder depends of the pole cross-section.

Bracket for disconnecter

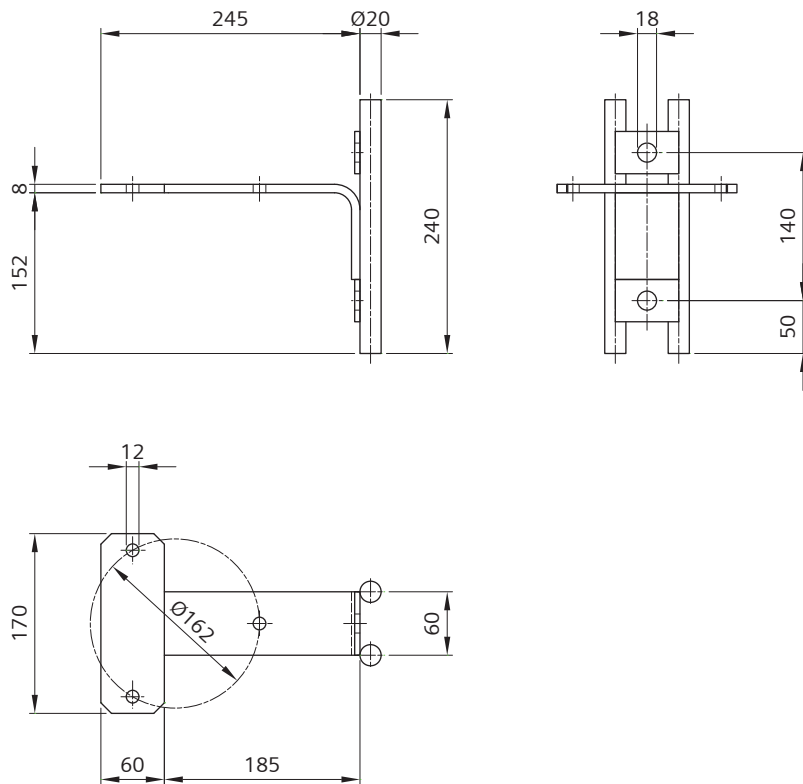
for punch-lock band and support fastening



Order no.	8WL6233-5
Designation	Bracket
Material	htgSt
Weight	4.60 kg

Bracket for surge arrester

for punch-lock band and support fastening



Order no.	8WL6233-5B
Designation	Bracket
Material	htgSt
Weight	3.0 kg

Siemens AG
Industry Sector
Mobility Division
Complete Transportation
Mozartstraße 33b
91052 Erlangen
Deutschland

electrification.mobility@siemens.com
www.siemens.com/mobility/electrification

Order No.: A19100-V300-B705-X-7600
© Siemens AG 2010

Sicat® is a registered trademark of Siemens AG.

The information in this document contains general descriptions of technical possibilities which may not always be provided. The desired features therefore need to be determined individually by contractual agreement.

