



# Solutions for photovoltaic systems

From mounting systems and cable management, to lightning and surge protection all the way to fire protection

# Taking responsibility, securing the system

The erection of a photovoltaic system often requires major intervention in the electrical infrastructure of a building. This is reflected in the wide range of standards and regulations to be complied with. The person erecting the system is liable for correct fulfilment for 30 years, and the requirements of the insurance company come on top of that.

The specialist company installing a PV system is required by law to hand it over in perfect condition.

## Responsibility of the operator

Through the feed-in of the gained energy, almost every PV system is subject to the requirements for commercial use. For the system operator, this creates the obligation to give the system the proper maintenance, checking and repairs. These regular recurring checks of the electrical system components may only be carried out by an electrical technician.

*"The overall responsibility for electrical safety is in the hands of the commissioner."*

**Photovoltaics working party**

*"People, animals and property must be protected against damage from surge voltages, the consequences of atmospheric impacts or switching surges."*

**VDE 0100-100 (IEC 60364-1)**

”

## Relevant standards

### Low-voltage electrical installations

- DIN VDE 0100-100 (IEC 60364-1)
- DIN VDE 0100-534 (IEC 60364-5-53)
- DIN VDE 0100-410 (IEC 60364-4-41)
- DIN VDE 0100-443 (IEC 60364-4-44)
- DIN EN 60664-1 (IEC 60664-1)

### Tests (commissioning test) and documentation

- VDE 0100-600 (IEC 60364-6)
- VDE 0105-100 (EN 50110-1)

### Requirements for PV power supply systems

- DIN VDE 0100-712 (IEC 60364-7-712)
- DIN EN 62446 (IEC 62446)
- DIN CLC/TS 61643-12 (IEC 61643-12)
- DIN CLC/TS 50539-12 (CLC/TS 51643-32, IEC 61643-32)
- VDE 0185-305-3 Supplement 5

### Lightning protection systems and earthing systems

- DIN EN 62305-1 to -4 (IEC 62305-1 to -4)
- Local additional requirements (e.g. state building regulations in Germany)
- DIN 18014
- DIN VDE 0100-540 (IEC 60364-5-54)

### Fire protection in the PV area

- VDE-AR-E 2510-2

### Construction regulations

- EN 13501-1/-2, DIN 4102-1/-2 Fire classification of construction products and building elements
- The national and regional construction regulations must be observed with regard to the use of construction products. These include, for example, the state construction regulations in Germany, VKF regulations in Switzerland and OIB directives in Austria.

### VdS guidelines for fire protection and safety of electrical and photovoltaic systems

- VdS 2025 – Electrical cabling systems
- VdS 3145 – Photovoltaic systems
- VdS 6023 – Photovoltaic systems on roofs with flammable building materials

*This list makes no claim to completeness! Please observe the appropriate local and statutory requirements.*

# Install the future!



With OBO, you are on the (b)right side from the start: This is because we not only offer you a complete system for almost every electrical requirement of a photovoltaic system, but also future-oriented solutions for flexible installations. Leading the way are our innovative mounting systems for pitched roofs, flat roofs and free-standing systems: the Magic PV solution. For more efficiency – solar, so good!

## The benefits of the Magic PV Solution

- Less work: A slim overall portfolio offers a simplified product selection and reduces warehouse storage to a minimum.
- More flexibility: With the Magic PV Solution, countless customer-specific solutions and structural implementation options can be implemented.
- More security: Correct installation of all standard PV module dimensions is very simple.
- Versatile: The OBO systems can be adapted to different installation conditions with ease.
- More future: Digital planning tools and an innovative product configurator provide support in advising your customers.

# Planning the Magic PV Solution with OBO Construct



PV mounting systems have never been easier to plan: The OBO Construct Tool for the Magic PV Solution makes planning mounting systems for flat and pitched roofs intuitive, organised and fast. Step by step, a custom system solution emerges, tailored exactly to your requirements.

The tool automatically identifies all required components, creates suitable planning drawings and provides relevant documents, such as tender texts and documents for static calculation, for download.

## Advantages at a glance

- Explained step by step
- Intuitive to use
- The right PV mounting system in just a few clicks
- Order list created automatically based on configured quantities
- Download option for static calculation documentation
- Seamless user experience thanks to Elbridge. The configured products can easily be transferred to online wholesaler shops



**Magic PV Solution, PV mounting systems**

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**External lightning protection**

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**Building fire protection**

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**Equipotential bonding for photovoltaic systems**

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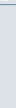
**Surge protection for photovoltaic systems**

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**Earthing systems**

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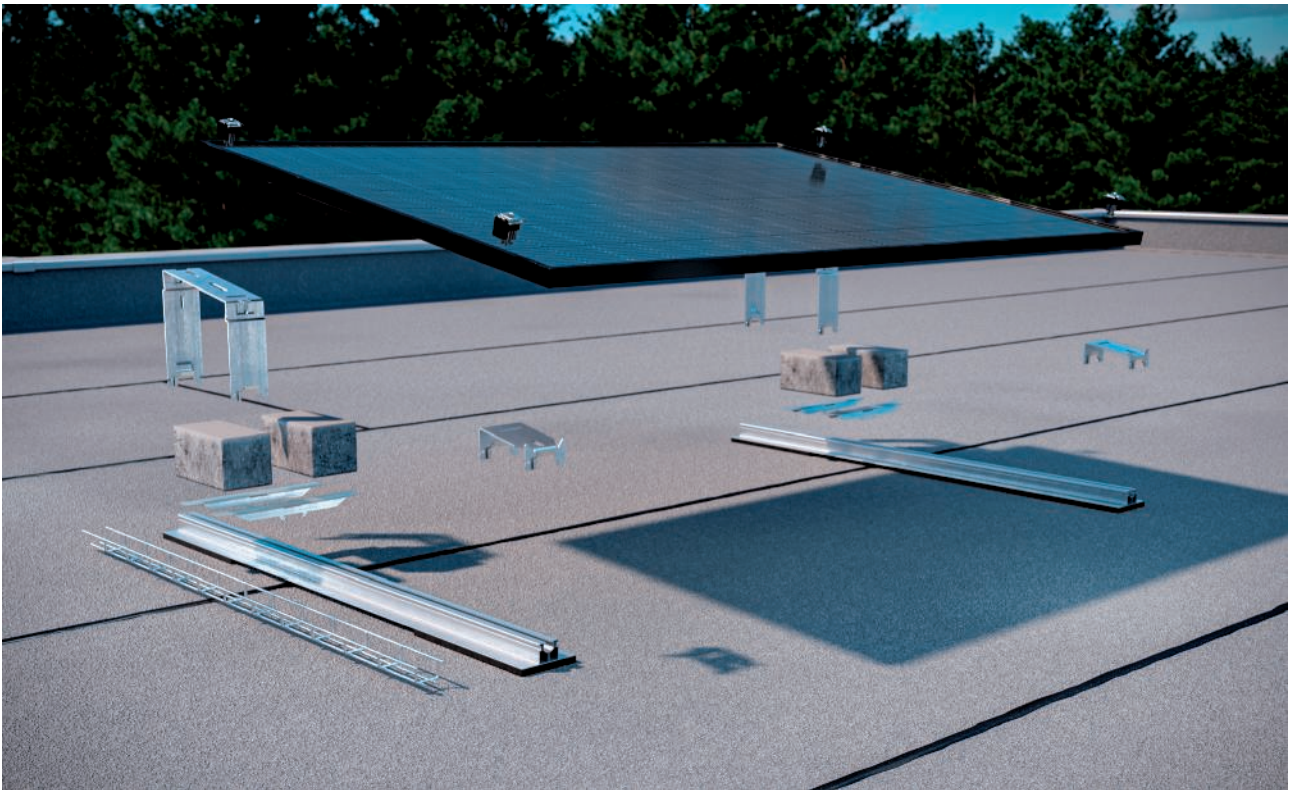
**Directories**

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# Magic PV Flat Basic

## Flat-roof systems



Photovoltaic systems positioned on flat roofs can have a decisive advantage, as the PV modules can be mounted independently of a given roof orientation. Our long-lasting, highly resilient Magic PV Flat Basic system provides even more benefits with a streamlined product range that offers the highest levels of flexibility. For even better overall system performance, the Magic PV Flat Basic can be extended with multiple components featuring optimised aerodynamics. With new short and long supports – for both south or east-west orientation – a ballast support plate and a wind protection panel.

### Advantages at a glance

- Integrated system for cable routing and simultaneous ballasting
- Stepless system design thanks to flexible ridge gap
- Lean product portfolio with the greatest-possible flexibility
- Enables various system structures in flexible east-west and south versions
- Flatter structure height (~10°) – reduces wind load and shading
- Lower required ballast volume – reduces the load on the roof structure and enables applications on lighter roof structures
- Cost-effective logistics – thanks to some components that are folded

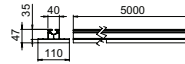


Alu BK

### Support profile for PV module mounting, flat roof

Type	Length mm	Min. ordering quantity Piece	Weight kg/100 pc.	Item no.
TPF 35 5000 ALU	5000	4	716.300	5900370

Non-slip support profile for PV module mounting on flat roofs. Basis for installation of short and long supports STK and STL. Screwable connection of multiple support profiles with LV 35 straight connectors.



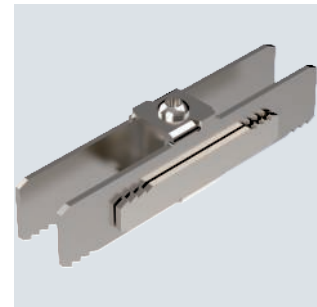
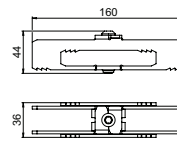
St DD

CE

### Straight connector support profile, flat roof

Type	Min. ordering quantity Piece	Weight kg/100 pc.	Item no.
LV 35 DD	20	36.800	5901180

Straight connector for connecting support profiles type TPF 35 for photovoltaic flat roof systems. Fastening with pre-installed M6 screw, screwable with Torx 30 key.



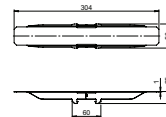
St DD

CE

### Ballast plate for PV mounting systems, flat roofs

Type	Min. ordering quantity Piece	Weight kg/100 pc.	Item no.
BTP 35 DD	20	13.000	5901674

Metal ballast plate to take, for example, paving stones for ballasting PV mounting systems for flat roofs. Toolless installation by clamping onto truss profile rails of types TPF 35 and TP 45.



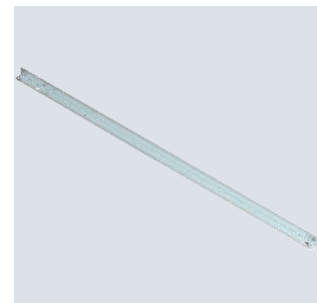
St DD

CE

### Ballast rail for flat-roof PV mounting systems

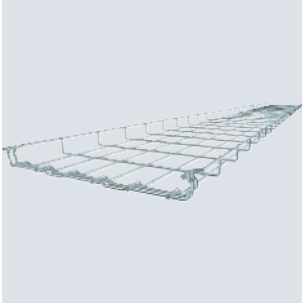
Type	Min. ordering quantity Piece	Weight kg/100 pc.	Item no.
BS DD	4	311.000	5901686

Ballast rail to ballast PV mounting systems on flat roofs, suitable to accept blocks or concrete slabs, for example. Screw fastening on support profile TPF 35, flexible length adaptation to support profile distances.



Mesh cable tray GR-Magic® 35

St FT



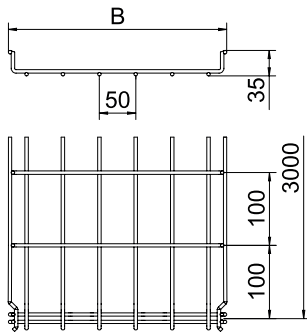
Type	Width mm	Ø mm	Wire quantity m	Min. ordering quantity	Item no.
GRM 35 50 FT	50	3.9	3		6000069

No additional connection components are required for the mesh cable tray, it is simply interlocked. The grid width is 50 x 100 mm (exception: GRM 35/50 = 20 x 100 mm).

Mesh cable tray with shaped connector of side height 35 mm.

Magnetic shield insulation without cover 15 dB, with cover 25 dB.

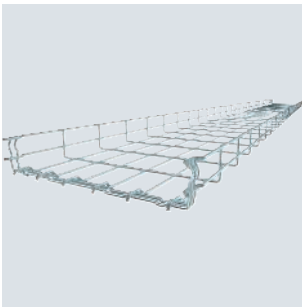
Dimensions



Type	Length mm	Dim. B mm	Usable cross-section cm <sup>2</sup>
GRM 35 50 FT	3000	52	9.4

GR-Magic® 55 mesh cable tray

St FT



Type	Width mm	Ø mm	Wire quantity m	Min. ordering quantity	Item no.
GRM 55 100 FT	100	3.9	3		6001416
GRM 55 200 FT	200	3.9	3		6001420
GRM 55 300 FT	300	4.8	3		6001424
GRM 55 400 FT	400	4.8	3		6001428
GRM 55 500 FT	500	4.8	3		6001432
GRM 55 600 FT	600	4.8	3		6001436

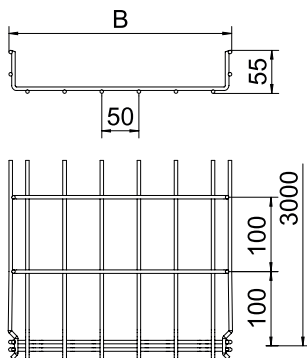
Mesh cable tray with shaped connector of side height 55 mm.

Magnetic shield insulation without cover 15 dB, with cover 25 dB.

You can find detailed information regarding the UL classification in the respective certification.

No additional connection components are required for the mesh cable tray, it is simply interlocked. The grid width is 50 x 100 mm (exception: GRM 55/50 = 20 x 100 mm).

Dimensions



Type	Length mm	Dim. B mm	Usable cross-section cm <sup>2</sup>
GRM 55 100 FT	3000	100	40
GRM 55 200 FT	3000	200	87
GRM 55 300 FT	3000	300	129
GRM 55 400 FT	3000	400	175
GRM 55 500 FT	3000	500	220
GRM 55 600 FT	3000	600	265

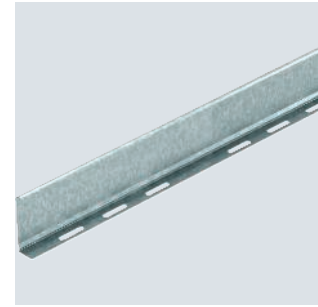
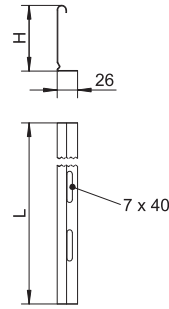
St DD



### Separating retainer 45

Type	Dim. H mm	Metal thickness mm	Dim. L mm	Min. ordering quantity	Item no.
TSG 45 DD	45	0.75	3000	3	6062321

Separating retainer for separation of cables of different voltages or functions.



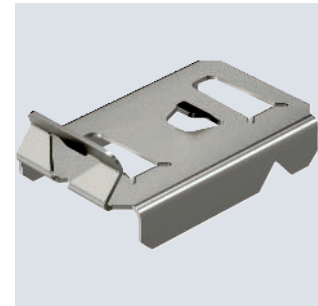
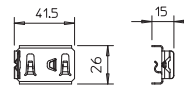
A2 2B



### Clamping piece for separating retainer fastening in GRM

Type	Min. ordering quantity	Weight kg/100 pc.	Item no.
KS GR A2	30	0.830	6062282

Clamping piece for fastening separating retainer in mesh cable trays.

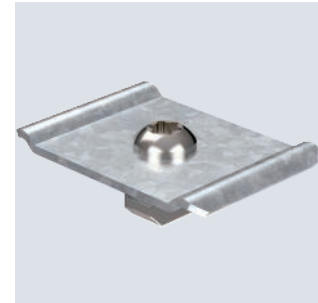
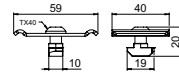


St FT

### Fastening set mesh cable tray, PV mounting system, flat roof

Type	Min. ordering quantity	Weight kg/100 pc.	Item no.
BF GR	20	5.000	5901770

Fastening set for fastening mesh cable trays to support profiles type TPF 35 for PV mounting systems for flat roofs. Consisting of clamping piece, sliding nut and screw.



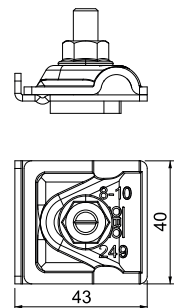
A2

### Earthing terminal for PV mounting systems

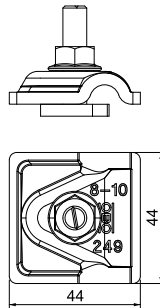
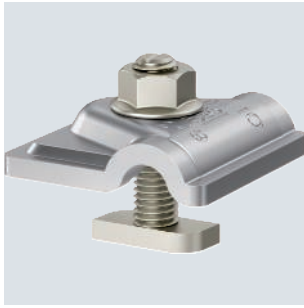
Type	Length mm	Width mm	Height mm	Min. ordering quantity	Weight kg/100 pc.	Item no.
249 PV10 6-50V2A	40	43	34	8	8.460	5051520

Pre-mounted earthing terminal for the inclusion of PV mounting systems in the equipotential bonding. Suitable for the inclusion of the PV mounting systems in an external lightning protection system.

- Lightning current-compatible up to 100 kA (10/350)
- Rapid mounting through integrated spring mechanism
- For round conductor fastening RD 8–10
- To fasten single/multi-wire cables: 6–50 mm<sup>2</sup>
- For profiles with 10 mm groove
- Meets the requirements of DIN EN 62561-1



### Earthing terminal for PV mounting systems



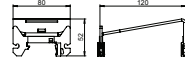
Type	Length mm	Width mm	Height mm	Min. order- ing quan- tity Piece	Weight kg/100 pc.	Item no.
249 PV8-10 ALU	44	44	34	10	4.500	5051526

Earthing terminal for the inclusion of PV mounting systems in the equipotential bonding.

- For round conductor fastening RD 8–10
- For profiles with 10 mm groove

### Short support for PV module mounting, 10°, flat roof

St DD

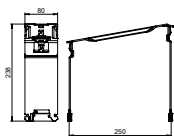


Type	Min. order- ing quan- tity Piece	Item no.
STK AD DD	8	5901660

Short support for PV module mounting on flat roofs. Mounting in combination with support profile TPF 35 and universal clamp KLU or end and connection clamps with springs (KLE F/KLZ F). Angle of inclination 10°. Lockable fastening on support profile.

### Long support for PV module mounting in east-west orientation, flat roof

St DD

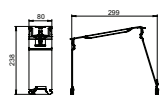


Type	Min. order- ing quan- tity Piece	Item no.
STLOW AD DD	8	5901667

Long support for PV module mounting on flat roofs in east-west orientation. Mounting in combination with support profile TPF 35 and universal clamp KLU or end and connection clamps with springs (KLE F/KLZ F). Angle of inclination 10°. Lockable fastening on support profile.

### Long support for PV module mounting, south orientation, flat roof

St DD



Type	Min. order- ing quan- tity Piece	Item no.
STLS AD DD	8	5901665

Long support for PV module mounting on flat roofs in south orientation. Mounting in combination with support profile TPF 35 and universal clamp KLU or end and connection clamps with springs (KLE F/KLZ F). Angle of inclination 10°. Lockable fastening on support profile.

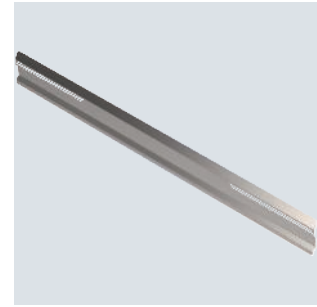
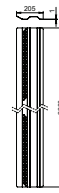
St DD

## Windbreak for photovoltaic systems



Type	Min. ordering quantity Piece	Weight kg/100 pc.	Item no.
WSB 2200 AD DD	4	382.000	5901618

Windbreak for use with photovoltaic systems with south alignment and standard inclinations of 10°. As protection against wind loads during extreme wind conditions. Lockable and screwable fastening to STLS AD long support.



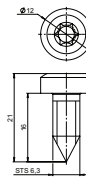
A2

## Flat-head screw for windbreak WSB 2200 AD



Type	Min. ordering quantity Piece	Item no.
STS 6,3x16C A2	100	5901875

Self-tapping flat-head screw with hexalobular internal to fasten windbreaks type WSB 2200 AD to the STLS AD DD long supports of photovoltaic mounting systems for flat roofs. Matching Torx 30 key.



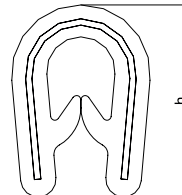
PVC

## Edge protection strip



Type	For metal thickness mm	Dim. h mm	Colour	Length mm	Min. ordering quantity m	Item no.
KSB 2 PVC	0.75-2	10	Black	10000	10	6072909

Edge protection strip with steel inlay to cover cut plate ends. Black version, UV-resistant.



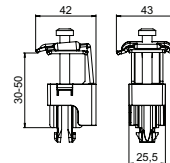
A2 BK

## Universal clamp for PV module mounting



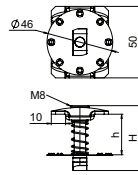
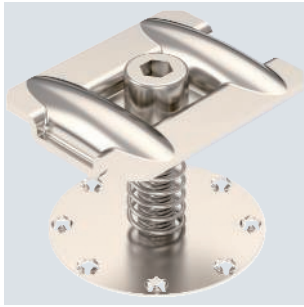
Type	For frame height mm	Min. ordering quantity Piece	Weight kg/100 pc.	Item no.
KLU A2	30-50	20	6.590	5901010

Universal clamp to mount photovoltaic modules on flat and pitched roofs, suitable as a clamp between 2 modules or as an end clamp. Lockable pre-fastening on TP 45 support profile and on STK and STL supports. Suitable for 10 mm slot width. Can be rotated through 90° after engaging. Lockable fastening of the PV module with Torx 30 wrench.



Connection clamp with spring for PV module mounting

A2

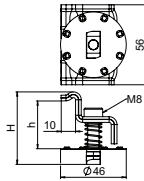
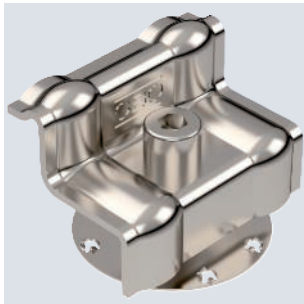


Type	For frame height mm	Min. ordering quantity Piece	Weight kg/100 pc.	Item no.
<b>KLZ F 25 A2</b>	25	50	6.150	<b>5901062</b>
<b>KLZ F 30 A2</b>	30	50	6.330	<b>5901063</b>
<b>KLZ F 35 A2</b>	35	50	6.620	<b>5901064</b>
<b>KLZ F 40 A2</b>	40	50	6.720	<b>5901065</b>

Connection clamp with spring for fastening photovoltaic modules on support profiles. Suitable for slot width 10 mm. Lockable fastening of the PV module with Allen key size 6.

End clamp with spring for PV module mounting

A2

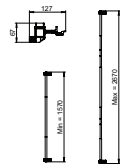


Type	For frame height mm	Min. ordering quantity Piece	Weight kg/100 pc.	Item no.
<b>KLE F 25 A2</b>	25	50	7.850	<b>5901092</b>
<b>KLE F 30 A2</b>	30	50	8.210	<b>5901093</b>
<b>KLE F 35 A2</b>	35	50	8.770	<b>5901094</b>
<b>KLE F 40 A2</b>	40	50	9.620	<b>5901095</b>

End clamp with spring for fastening photovoltaic modules on support profiles. Suitable for slot width 10 mm. Lockable fastening of the PV module with Allen key size 6.

Distance gauge for flat roof systems

Alu BK

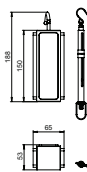


Type	Min. ordering quantity Piece	Item no.
<b>AASL FD</b>	1	<b>5901620</b>

Distance gauge as a mounting aid for PV mounting systems on flat roofs. For more exact positioning of supports on support profiles and to adjust the distances of the support profiles among each other. Flexibly adjustable telescopic rod with 4 terminals.

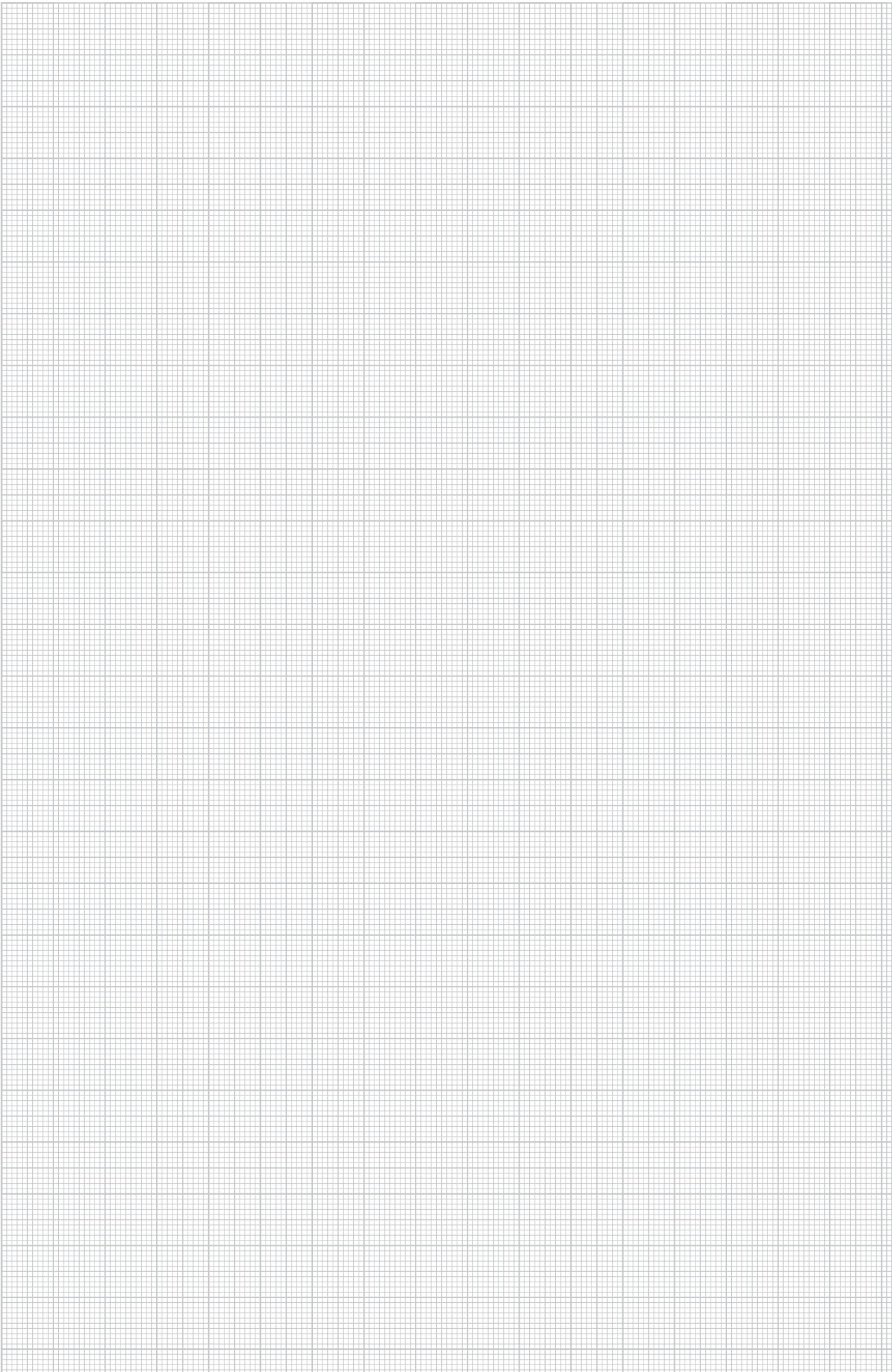
Friction coefficient meter

Alu

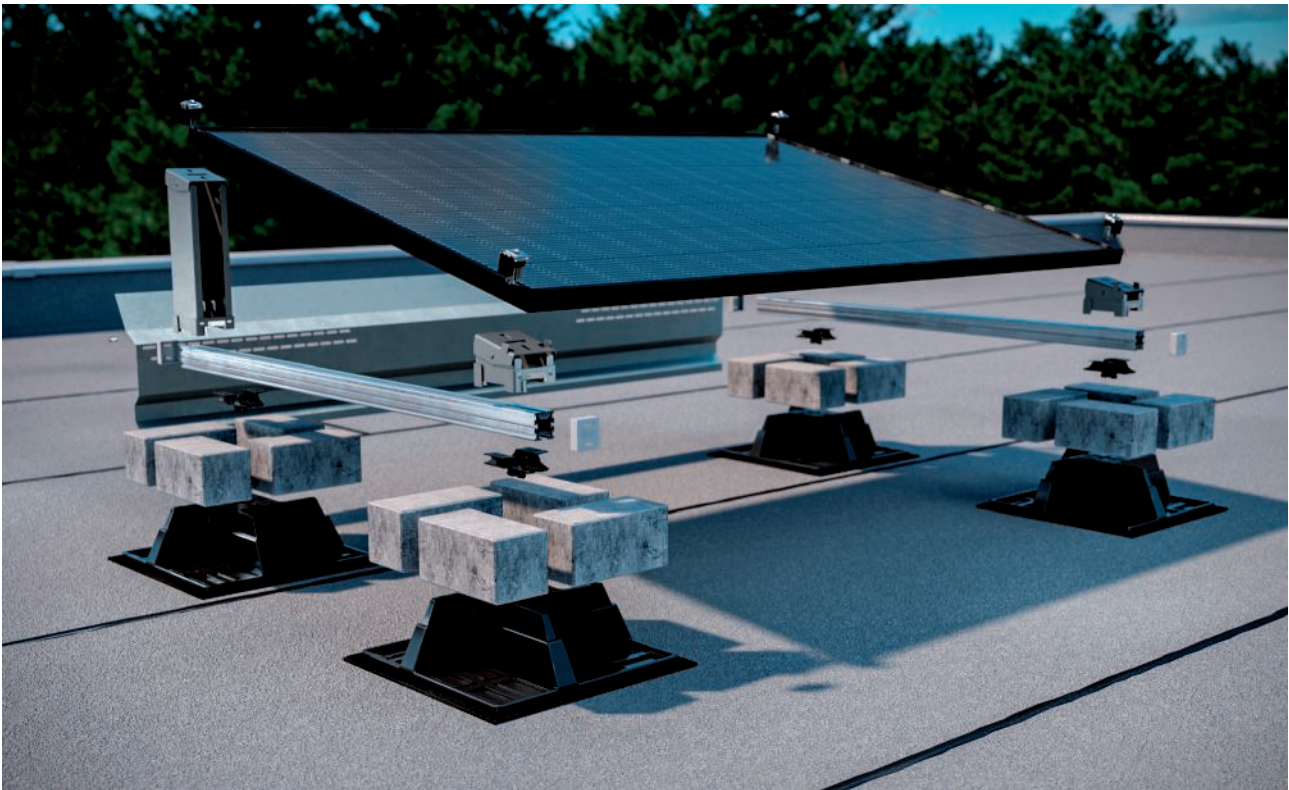


Type	Height mm	Min. ordering quantity Piece	Item no.
<b>MG RBKOEFF</b>	130	1	<b>5901990</b>

Friction coefficient meter for determining the friction coefficient  $\mu$  on flat roofs with plastic or bitumen waterproofing.



# Magic PV Flat Pro Flat-roof systems



Thanks to the Magic technology, the Magic PV Flat Pro system for flat-roof systems is installed without the need for screws or tools. High-quality materials and system components with a high maximum load-bearing capacity form the basis for a long-lasting installation system. A cable routing system with mesh cable trays can also be integrated.

The UniBase ballast system provides variable weighting of the overall system by using rectangular blocks – even possible at any time after the installation. Thanks to the flexible system components, the products for flat-roof and pitched-roof systems can be combined. This reduces the number of individual components required considerably.

## Advantages at a glance

- High-quality material selection and professional cable routing
- Flexible system components
- UniBase ballast system for variable weighting of the entire system
- Also suitable for extensive green roofs



## Magic PV Flat Pro: Harness the full power of your PV system with the right configuration

In addition to the classic orientation with the module surface inclined towards the south, module rows inclined towards each other in east-west orientation are also possible. While the south orientation is ideal for smaller to medium-sized roofs with a sufficient surface when the goal is to maximise the annual yield per installed module, the east-west orientation is typically chosen for large industrial and commercial roofs. Here, the focus is on consistent power generation throughout the entire day.

Our comparison, with details and characteristics, helps you choose the right module alignment for your PV system:



### South orientation

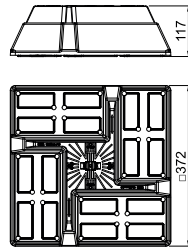
- Maximum specific energy yield per individual PV module
- Ideal for south- or south-east/south-west-oriented roof surfaces
- Only suitable to a limited extent as a system in case of low roof load reserve
- Cable paths usually longer than in east-west systems
- Proven, trusted solution
- Typical angle of inclination in the OBO product range: 10 to 15°



### East-west orientation

- Optimised space utilisation – especially on large roofs
- Consistent generation: grid relief and optimised self-consumption
- Low height, meaning less of the system is visible
- Faster mounting thanks to modular, symmetrical structure
- Good cooling and uniform wind distribution
- Maintenance-friendly with walkable central aisles between the rows

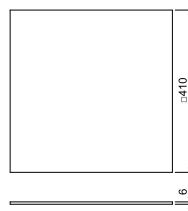
### UniBase universal stand



Type	Length mm	Width mm	Height mm	Fit mm	Min. order- ing quan- tity Piece	Weight kg/100 pc.	Item no.
UniBase 10	372	372	117	5	8	91.500	5403393

Universal stand for ballasting with standard blocks up to a dimension of 200 x 100 x 100 mm. Can be used on flat roofs, e.g. for mounting PV mounting systems or for cable routing with cable trays or with mesh cable trays in conjunction with roof cable holder 165 MBG HGRM. Blocks not contained in the scope of delivery.

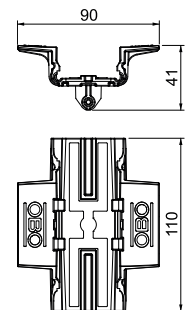
### Building protection mat, flat roof



Type	Length mm	Width mm	Height mm	Min. order- ing quan- tity Piece	Weight kg/100 pc.	Item no.
UniBase BSM	410	410	6	16	73.950	5403402
UniBase BSM ALU	410	410	6	16	75.330	5403404

Building protection mat as an underlay under stands of type UniBase 6 + UniBase 10 for flat roof PV mounting systems, as protection of the roof seal on flat roofs according to DIN 18531. Also suitable for height compensation of the PV mounting system. Made of recycled material; depending on the version, also available with aluminium lining.

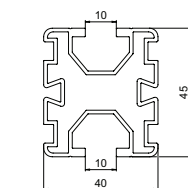
### Adapter for TP 45 support profile



Type	Min. order- ing quan- tity Piece	Weight kg/100 pc.	Item no.
UniBase TMP	16	4.200	5403397

Adapter for TP 45 support profile, for mounting on UniBase universal stand. Toolless mounting through snapping. With side holes for optional screwing and with base perforation for locking screw. Toolless mounting and dismantling of the support profile possible. With non-slip support surface.

### Support profile for PV module mounting



Type	Length mm	Min. order- ing quan- tity Piece	Weight kg/100 pc.	Item no.
TP 45 2350 ALU	2350	4	242.520	5900405
TP 45 4700 ALU	4700	4	485.040	5900410

Support profile to mount photovoltaic modules on flat and pitched roofs. Flat roof mounting in combination with UniBase universal stand and STK and STL short and long supports. Lockable fastening of the profile on the stand with UniBase AMP adapter. Pitched roof mounting in combination with universal DHU roof hook. Lockable fastening of the profile on roof hooks. Screwable connection of multiple support profiles with LV 45 straight connectors and KV 45 cross-connectors. With 10 mm groove on both sides to accept slide nuts and universal and earthing clamps.

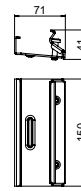
St DD



### Straight connector for TP support profiles

Type	Min. ordering quantity	Weight kg/100 pc.	Item no.
LV 45 DD	20	38.600	5901210

Straight connector for TP support profiles. Can be screwed on with Torx 30 spanner.



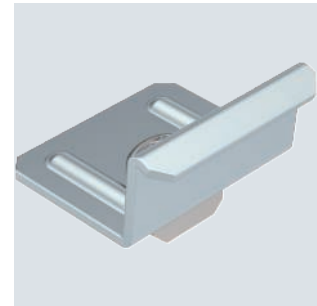
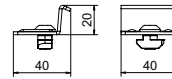
St DD



### Cross-connector for TP support profiles

Type	Min. ordering quantity	Weight kg/100 pc.	Item no.
KV 45 DD	20	5.000	5901250

Cross-connector for TP support profiles. Can be screwed on with Torx 40 spanner.



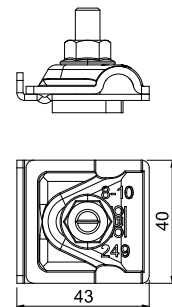
A2

### Earthing terminal for PV mounting systems

Type	Length mm	Width mm	Height mm	Min. ordering quantity Piece	Weight kg/100 pc.	Item no.
249 PV10 6-50V2A	40	43	34	8	8.460	5051520

Pre-mounted earthing terminal for the inclusion of PV mounting systems in the equipotential bonding. Suitable for the inclusion of the PV mounting systems in an external lightning protection system.

- Lightning current-compatible up to 100 kA (10/350)
- Rapid mounting through integrated spring mechanism
- For round conductor fastening RD 8–10
- To fasten single/multi-wire cables: 6–50 mm<sup>2</sup>
- For profiles with 10 mm groove
- Meets the requirements of DIN EN 62561-1

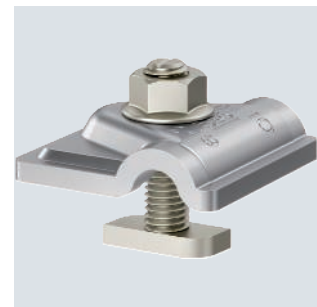
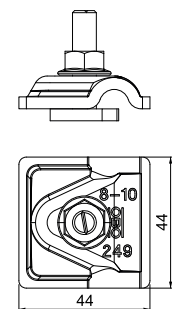


### Earthing terminal for PV mounting systems

Type	Length mm	Width mm	Height mm	Min. ordering quantity Piece	Weight kg/100 pc.	Item no.
249 PV8-10 ALU	44	44	34	10	4.500	5051526

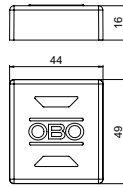
Earthing terminal for the inclusion of PV mounting systems in the equipotential bonding.

- For round conductor fastening RD 8–10
- For profiles with 10 mm groove



Support profile end cap

PE

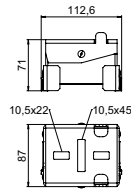
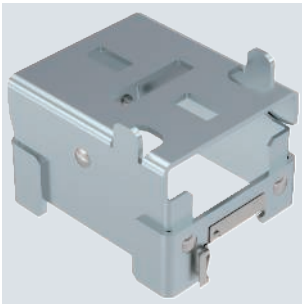


Type	Colour	Min. ordering quantity	Piece	Weight kg/100 pc.	Item no.
EK 45 G	Grey	20		0.740	5901722

End cap for TP support profiles, as protection against injuries and contamination.

Short support for PV module mounting, flat roof

St DD

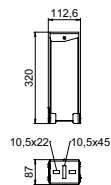


Type	Min. ordering quantity	Piece	Weight kg/100 pc.	Item no.
STK DD	8		93.000	5901650

Short support to mount photovoltaic modules on flat roofs in combination with the TP 45/4700 support profile and KLU universal clamp. Slope angle 15°. Lockable fastening on support profile.

Long support for PV module mounting, flat roof

St DD

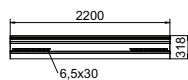
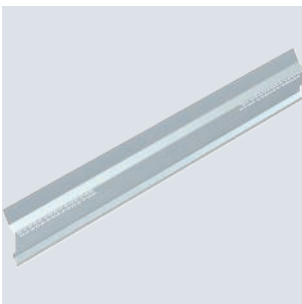


Type	Min. ordering quantity	Piece	Weight kg/100 pc.	Item no.
STL 15 DD	4		210.000	5901655

Long support to mount photovoltaic modules on flat roofs in combination with the TP 45/4700 support profile and KLU universal clamp. Slope angle 15°. Lockable fastening on support profile.

Windbreak for photovoltaic systems

St DD



Type	Length mm	Min. ordering quantity	Piece	Weight kg/100 pc.	Item no.
WSB 2200 DD	2200	4		631.000	5901610

Windbreak for use with photovoltaic systems with south alignment and standard inclinations of 15°. As protection against wind loads during extreme wind conditions. Lockable and screwable fastening to STL 15 long support.

A2 2B



Flat-head screw for windbreak

Type	Dimension mm	Min. ordering quantity Piece	Weight kg/100 pc.	Item no.
<b>FKS M6x25 A2</b>	M6x25	100	0.700	<b>5901880</b>

Flat-head screw with hexalobular internal to fasten windbreaks to the STL 15 long support of photovoltaic mounting systems for flat roofs. Matching Torx 30 key.



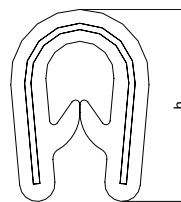
PVC



Edge protection strip

Type	For metal thickness mm	Dim. h mm	Colour	Length mm	Min. ordering quantity m	Item no.
<b>KSB 2 PVC</b>	0.75-2	10	Black	10000	10	<b>6072909</b>

Edge protection strip with steel inlay to cover cut plate ends. Black version, UV-resistant.



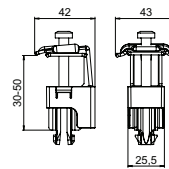
A2 BK



Universal clamp for PV module mounting

Type	For frame height mm	Min. ordering quantity Piece	Weight kg/100 pc.	Item no.
<b>KLU A2</b>	30-50	20	6.590	<b>5901010</b>

Universal clamp to mount photovoltaic modules on flat and pitched roofs, suitable as a clamp between 2 modules or as an end clamp. Lockable pre-fastening on TP 45 support profile and on STK and STL supports. Suitable for 10 mm slot width. Can be rotated through 90° after engaging. Lockable fastening of the PV module with Torx 30 wrench.



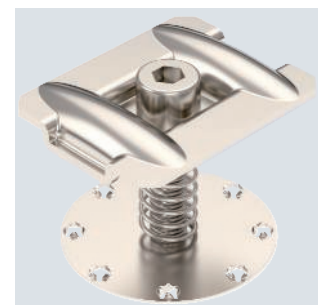
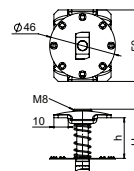
A2



Connection clamp with spring for PV module mounting

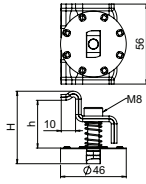
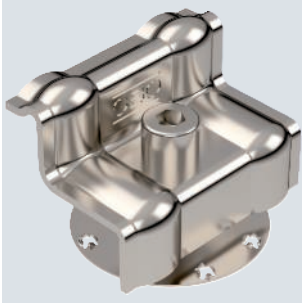
Type	For frame height mm	Min. ordering quantity Piece	Weight kg/100 pc.	Item no.
<b>KLZ F 25 A2</b>	25	50	6.150	<b>5901062</b>
<b>KLZ F 30 A2</b>	30	50	6.330	<b>5901063</b>
<b>KLZ F 35 A2</b>	35	50	6.620	<b>5901064</b>
<b>KLZ F 40 A2</b>	40	50	6.720	<b>5901065</b>

Connection clamp with spring for fastening photovoltaic modules on support profiles. Suitable for slot width 10 mm. Lockable fastening of the PV module with Allen key size 6.



End clamp with spring for PV module mounting

A2

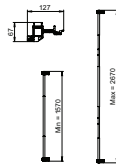


Type	For frame height mm	Min. order- ing quan- tity Piece	Weight kg/100 pc.	Item no.
KLE F 25 A2	25	50	7.850	5901092
KLE F 30 A2	30	50	8.210	5901093
KLE F 35 A2	35	50	8.770	5901094
KLE F 40 A2	40	50	9.620	5901095

End clamp with spring for fastening photovoltaic modules on support profiles. Suitable for slot width 10 mm. Lockable fastening of the PV module with Allen key size 6.

Distance gauge for flat roof systems

Alu BK

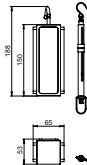


Type	Min. order- ing quan- tity Piece	Item no.
AASL FD	1	5901620

Distance gauge as a mounting aid for PV mounting systems on flat roofs. For more exact positioning of supports on support profiles and to adjust the distances of the support profiles among each other. Flexibly adjustable telescopic rod with 4 terminals.

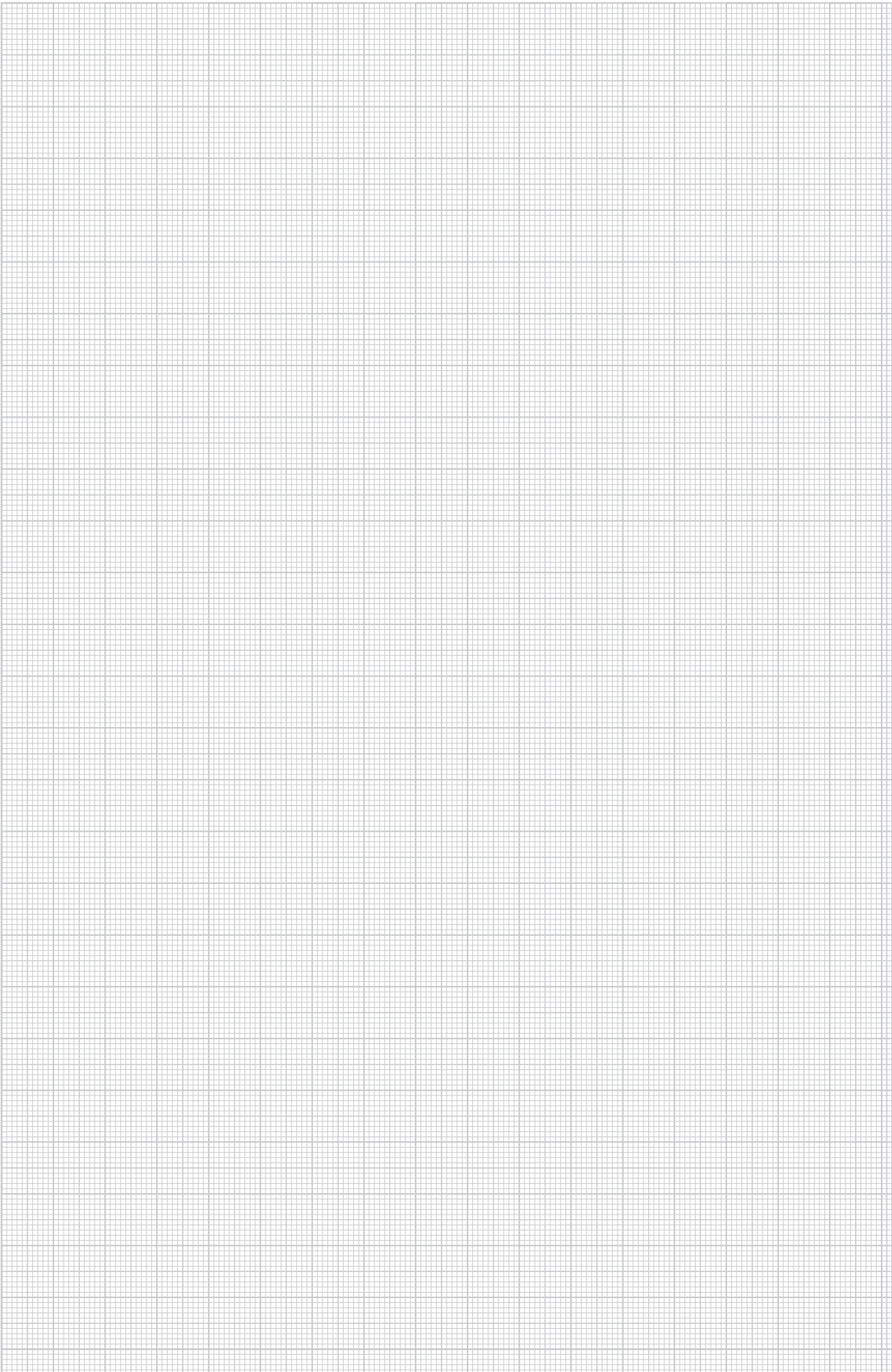
Friction coefficient meter

Alu

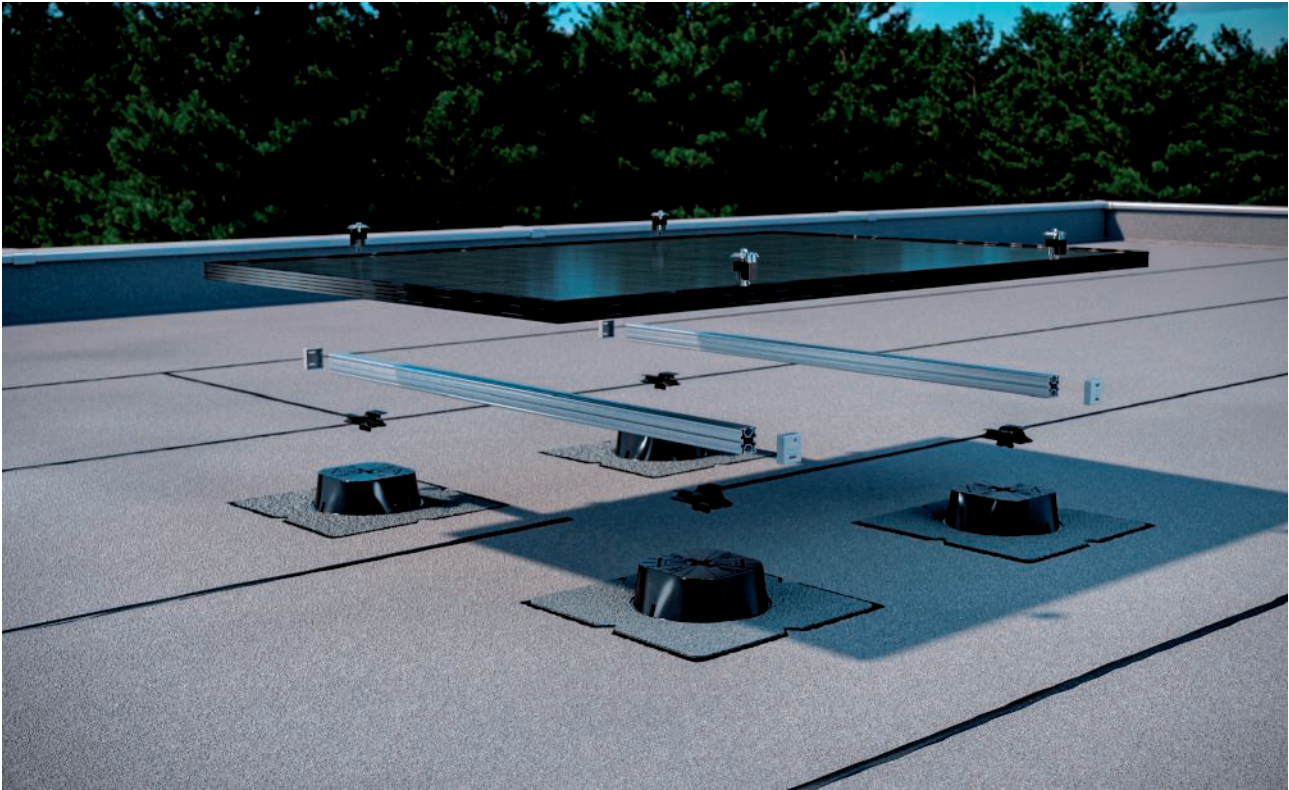


Type	Height mm	Min. order- ing quan- tity Piece	Item no.
MG RBKOEFF	130	1	5901990

Friction coefficient meter for determining the friction coefficient  $\mu$  on flat roofs with plastic or bitumen waterproofing.



# Magic PV Flat Glue Flat-roof systems



The Magic PV Flat Glue universal base can be used as a ballast-free PV mounting system up to a maximum of 5° (corresponding to approx. 8%) on bitumen seals and up to a maximum of 10° (corresponding to approx. 17%) on plastic roof membranes. Its use on pitched roofs with a significant slope is only possible following consultation with OBO and a static analysis. In line with the OBO standard, it is mounted parallel to the roof. A stand-off version is possible as a special solution on request.

## Advantages at a glance

- Uncomplicated installation: The universal base is joined to the existing roof seal with seamless welds via a sleeve available separately
- Systematic: Can be combined with other OBO products, such as the adapter for mounting mesh cable trays, making it ideal for optional cable management within the entire PV system
- High-quality: Plastic type ASA ensures maximum service life outdoors

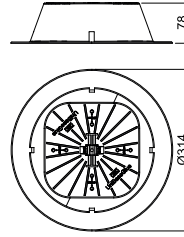


ASA

### UniBase Glue universal base for bonding

Type	Height mm	Fit mm	Min. order- ing quan- tity Piece	Weight kg/100 pc.	Item no.
UniBase Glue	78	5	16	39.400	5403395

Universal stand for gluing on flat roofs. Can be used for routing cables with cable trays or mesh cable trays in conjunction with 165 MBG HGRM roof conductor holders. Gluing collar must be selected according to the substrate.

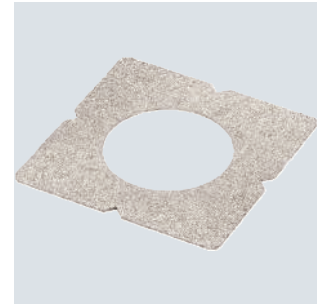
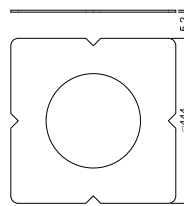


CE

### Fastening sleeve UniBase Glue Bit

Type	Length mm	Width mm	Height mm	Min. order- ing quan- tity Piece	Weight kg/100 pc.	Item no.
UniBase Glue Bit	444	444	5,2	16	70.000	5403410

Bitumen fastening sleeve for the adhesive fastening of the universal stand UniBase Glue. Can be used on flat roofs with bitumen waterproofing with a roof pitch of a maximum of 5°.

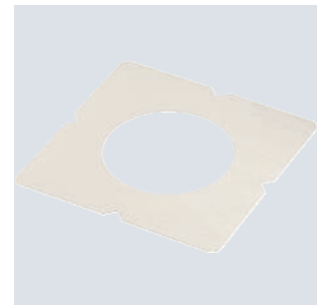
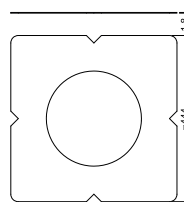


CE

### Fastening sleeve UniBase Glue FPO

Type	Length mm	Width mm	Height mm	Min. order- ing quan- tity Piece	Weight kg/100 pc.	Item no.
UniBase Glue FPO	444	444	1,8	16	25.000	5403412

FPO fastening sleeve for the adhesive fastening of the universal stand UniBase Glue. Can be used on flat roofs with FPO waterproofing with a roof pitch of a maximum of 10°.

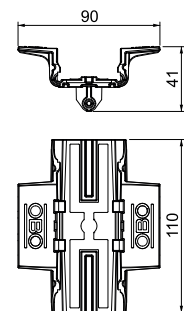


ASA

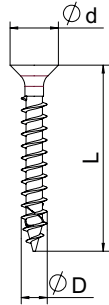
### Adapter for TP 45 support profile

Type	Min. order- ing quan- tity Piece	Weight kg/100 pc.	Item no.
UniBase TMP	16	4.200	5403397

Adapter for TP 45 support profile, for mounting on UniBase universal stand. Toolless mounting through snapping. With side holes for optional screwing and with base perforation for locking screw. Toolless mounting and dismantling of the support profile possible. With non-slip support surface.



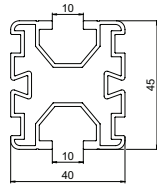
**Chipboard screw, with Torx, countersunk head, stainless steel**



Type	Dim. L mm	Dim. D mm	Min. ordering quantity Piece	Item no.
<b>OTSC 6,0x40 A4</b>	40	6	100	<b>3191082</b>

Stainless steel wood screw with countersunk head and Torx drive for fastenings in interior and exterior areas.  
Areas of use: Wood, chipboard, plasterboard panels and plastic anchors.

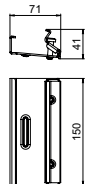
**Support profile for PV module mounting**



Type	Length mm	Min. ordering quantity Piece	Weight kg/100 pc.	Item no.
<b>TP 45 2350 ALU</b>	2350	4	242.520	<b>5900405</b>
<b>TP 45 4700 ALU</b>	4700	4	485.040	<b>5900410</b>

Support profile to mount photovoltaic modules on flat and pitched roofs. Flat roof mounting in combination with UniBase universal stand and STK and STL short and long supports. Lockable fastening of the profile on the stand with UniBase AMP adapter. Pitched roof mounting in combination with universal DHU roof hook. Lockable fastening of the profile on roof hooks. Screwable connection of multiple support profiles with LV 45 straight connectors and KV 45 cross-connectors. With 10 mm groove on both sides to accept slide nuts and universal and earthing clamps.

**Straight connector for TP support profiles**



Type	Min. ordering quantity Piece	Weight kg/100 pc.	Item no.
<b>LV 45 DD</b>	20	38.600	<b>5901210</b>

Straight connector for TP support profiles. Can be screwed on with Torx 30 spanner.

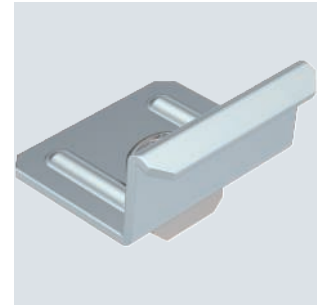
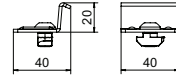
St DD

Cross-connector for TP support profiles



Type	Min. ordering quantity	Weight kg/100 pc.	Item no.
KV 45 DD	20	5.000	5901250

Cross-connector for TP support profiles. Can be screwed on with Torx 40 spanner.



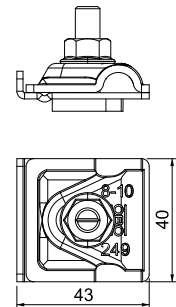
A2

Earthing terminal for PV mounting systems

Type	Length mm	Width mm	Height mm	Min. ordering quantity Piece	Weight kg/100 pc.	Item no.
249 PV10 6-50V2A	40	43	34	8	8.460	5051520

Pre-mounted earthing terminal for the inclusion of PV mounting systems in the equipotential bonding. Suitable for the inclusion of the PV mounting systems in an external lightning protection system.

- Lightning current-compatible up to 100 kA (10/350)
- Rapid mounting through integrated spring mechanism
- For round conductor fastening RD 8–10
- To fasten single/multi-wire cables: 6–50 mm<sup>2</sup>
- For profiles with 10 mm groove
- Meets the requirements of DIN EN 62561-1

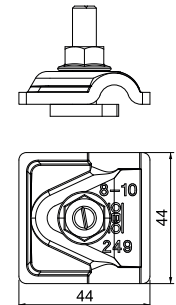


Earthing terminal for PV mounting systems

Type	Length mm	Width mm	Height mm	Min. ordering quantity Piece	Weight kg/100 pc.	Item no.
249 PV8-10 ALU	44	44	34	10	4.500	5051526

Earthing terminal for the inclusion of PV mounting systems in the equipotential bonding.

- For round conductor fastening RD 8–10
- For profiles with 10 mm groove



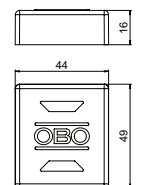
PE

Support profile end cap



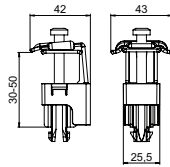
Type	Colour	Min. ordering quantity Piece	Weight kg/100 pc.	Item no.
EK 45 G	Grey	20	0.740	5901722

End cap for TP support profiles, as protection against injuries and contamination.



### Universal clamp for PV module mounting

A2 BK  
CE

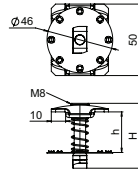
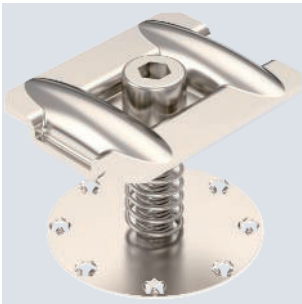


Type	For frame height mm	Min. ordering quantity Piece	Weight kg/100 pc.	Item no.
<b>KLU A2</b>	30-50	20	6.590	<b>5901010</b>

Universal clamp to mount photovoltaic modules on flat and pitched roofs, suitable as a clamp between 2 modules or as an end clamp. Lockable pre-fastening on TP 45 support profile and on STK and STL supports. Suitable for 10 mm slot width. Can be rotated through 90° after engaging. Lockable fastening of the PV module with Torx 30 wrench.

### Connection clamp with spring for PV module mounting

A2  
CE

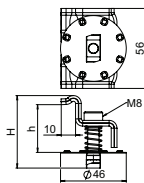
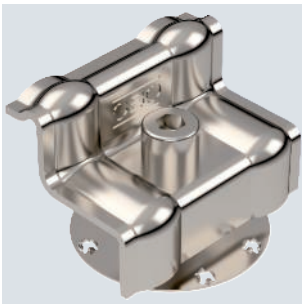


Type	For frame height mm	Min. ordering quantity Piece	Weight kg/100 pc.	Item no.
<b>KLZ F 25 A2</b>	25	50	6.150	<b>5901062</b>
<b>KLZ F 30 A2</b>	30	50	6.330	<b>5901063</b>
<b>KLZ F 35 A2</b>	35	50	6.620	<b>5901064</b>
<b>KLZ F 40 A2</b>	40	50	6.720	<b>5901065</b>

Connection clamp with spring for fastening photovoltaic modules on support profiles. Suitable for slot width 10 mm. Lockable fastening of the PV module with Allen key size 6.

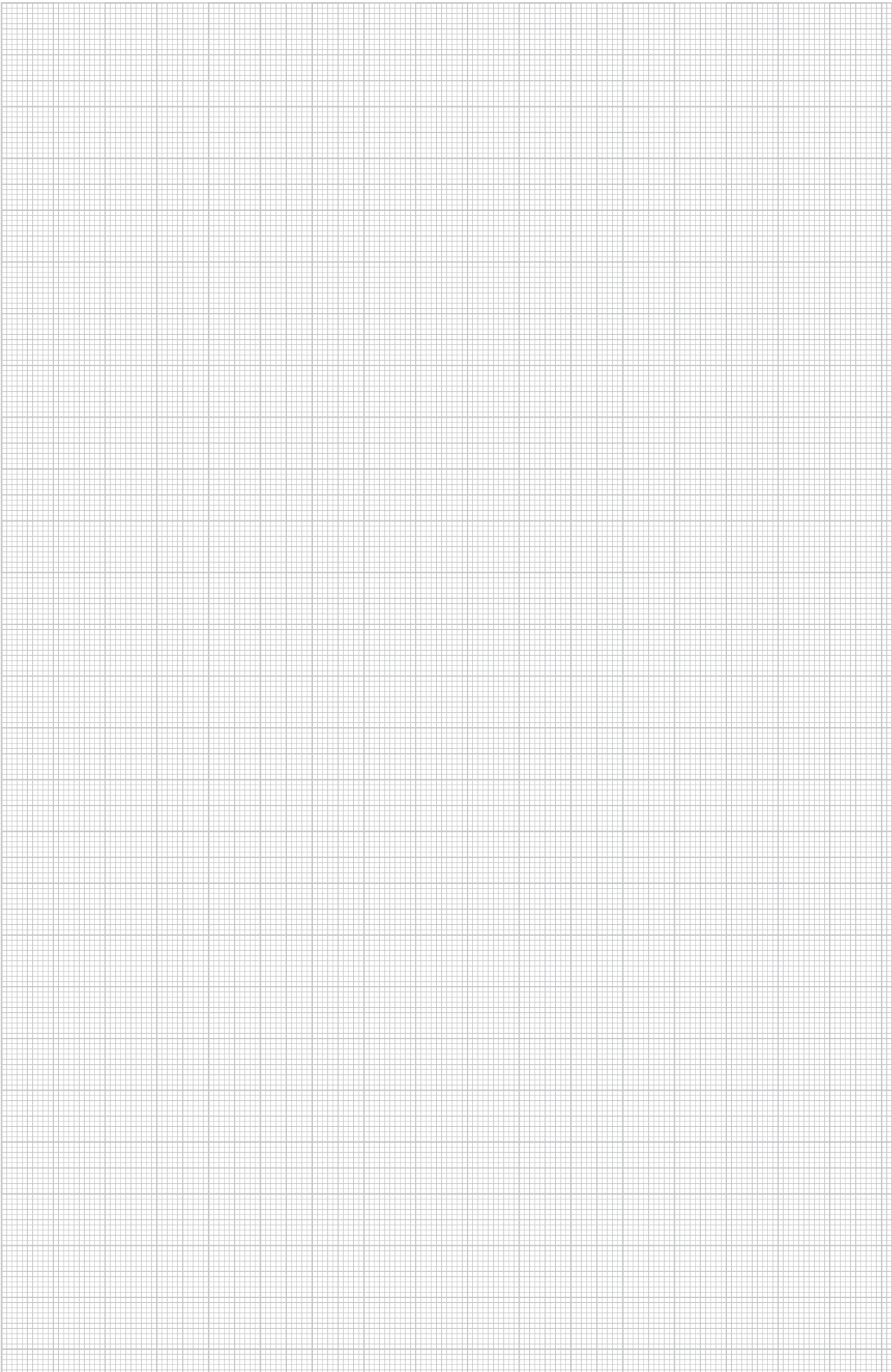
### End clamp with spring for PV module mounting

A2  
CE

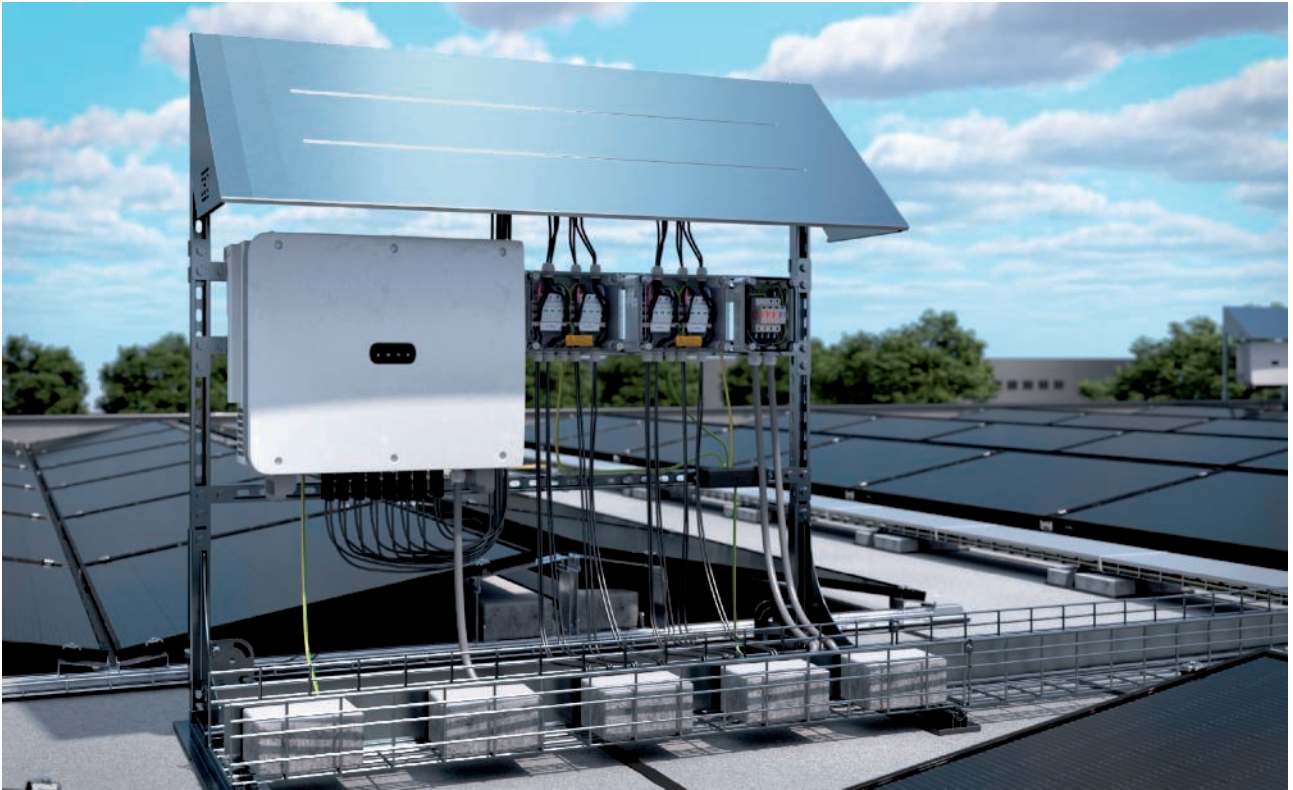


Type	For frame height mm	Min. ordering quantity Piece	Weight kg/100 pc.	Item no.
<b>KLE F 25 A2</b>	25	50	7.850	<b>5901092</b>
<b>KLE F 30 A2</b>	30	50	8.210	<b>5901093</b>
<b>KLE F 35 A2</b>	35	50	8.770	<b>5901094</b>
<b>KLE F 40 A2</b>	40	50	9.620	<b>5901095</b>

End clamp with spring for fastening photovoltaic modules on support profiles. Suitable for slot width 10 mm. Lockable fastening of the PV module with Allen key size 6.



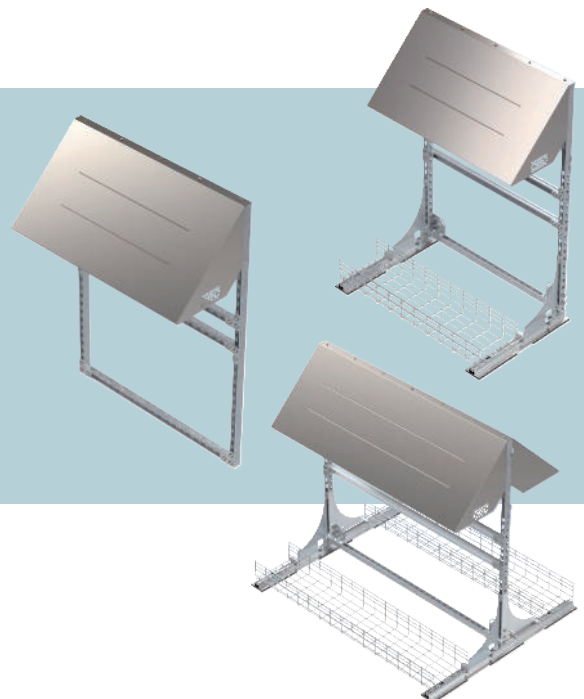
# Magic PV Mount Inverter frame



The Magic PV Mount inverter frame system acts a stand for inverters, for instance, but also for many other components such as the DC connection boxes or combiner boxes. The robust protective roof minimises the thermal load, which ensures top performance and maximum service life, while also providing protection against precipitation.

## Advantages at a glance

- Fast mounting thanks to preassembled modules and sophisticated design
- Compatible with PV mounting systems from the OBO portfolio
- Integrated cable management
- Designed for international wind and snow load zones, including documentation according to Eurocode

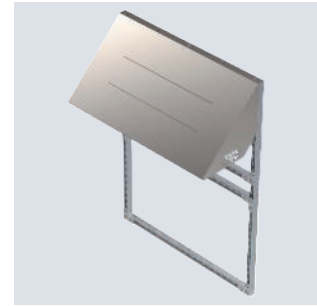
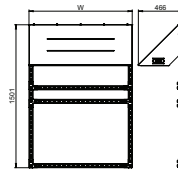


St FT/VA

Inverter frame for wall mounting

Type	Length mm	Width mm	Height mm	Min. order- ing quan- tity Piece	Item no.
WRR W1000	468	1082	1501	1	5904005
WRR W1500	468	1582	1501	1	5904007

Inverter frame for the protected installation of several inverters for PV systems on flat roofs. Mounting on the wall.

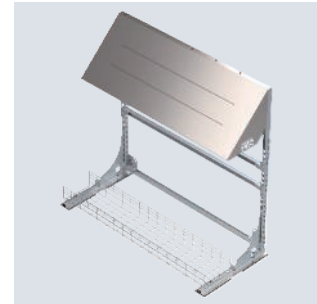
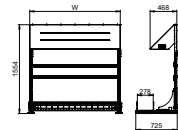


St FT/VA

Inverter frame, free-standing

Type	Length mm	Width mm	Height mm	Min. order- ing quan- tity Piece	Item no.
WRR F1000	725	1151	800	1	5904013
WRR F1500	725	1651	1554	1	5904015

Inverter frame for the protected installation of several inverters for PV systems on flat roofs. Free-standing. Mesh cable tray included for ballasting and for the routing of cables.

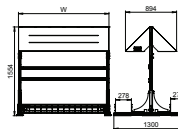


St FT/VA

Inverter frame, free-standing, double-sided.

Type	Length mm	Width mm	Height mm	Min. order- ing quan- tity Piece	Item no.
WRR D1000	1300	1151	1554	1	5904026
WRR D1500	1300	1651	1300	1	5904029

Inverter frame for the protected installation of several inverters for PV systems on flat roofs. Free-standing. Loading on both sides possible. 2 mesh cable trays included for ballasting and for the routing of cables.



# Cable management for flat-roof systems

## Wind loads and wind load securing

Wind loads are a climatic force that affects structures and components. These forces can be both horizontal and vertical and have the potential to significantly impact the stability and integrity of buildings and engineering systems. The intensity of wind loads must be assessed separately by the installer for each construction project and depends on many factors. This includes, for example, the location, wind direction, surfaces, roof shape, and size and dimensions of the respective building.

Regions with similar conditions are defined as wind load zones in accordance with EN 1991-1-4. In conjunction with the corresponding national annex, this standard applicable across Europe (also referred to as Eurocode) stipulates basic parameters for determining the effects of natural wind on buildings and engineering structures. The national annexes contain provisions that go beyond the Eurocode rules, i.e. the provisions that were previously part of the national standards.

Zone	Wind speed in m/s	Speed pressure in kN/m <sup>2</sup>
1	1.3	0.32
2	25.0	0.39
3	27.5	0.47
4	30.0	0.56

Basic speeds and speed pressures



Wind zones according to DIN EN 1991-1-4/NA



### Terrain category 1

Open sea; lake with at least 5 km of open water in the wind direction and even, flat land without obstacles



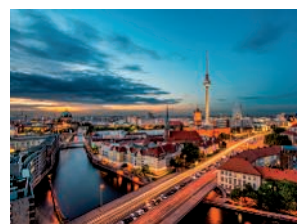
### Terrain category 2

Terrain with hedges, individual farmsteads, buildings or trees, e.g. agricultural areas



### Terrain category 3

Suburbs, industrial or commercial areas and forests



### Terrain category 4

Urban areas in which at least 15% of the area is built up with buildings whose average height is higher than 15 m

Terrain categories according to DIN EN 1991-1-4/NA

### Use of covers outdoors: consider external mechanical forces

When installing covers outdoors, remember that they are subjected to external mechanical forces. This includes wind, snow and water. These additional loads are not covered by the international standard DIN EN 61537 and therefore have to be assessed separately for each construction project. The installer is responsible for this. Their assessment lays the foundation for additional safety measures that help ensure a permanently stable and safe electrical installation.

When using covers outdoors in areas that are subject to increased wind, there is a risk of the covers being lifted due to different pressure ratios. Suitable safety precautions have to be taken to prevent possible damage and minimise risks.

OBO offers a variety of solutions for additional support even in strong winds. The selection of a suitable system depends both on the specific construction project and the location. We'll be happy to help.

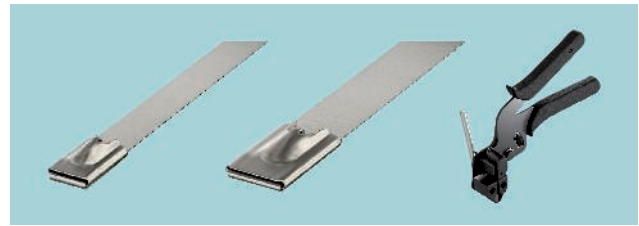
### Secure fastening even under an increased wind load

Different metal and tightening straps can be used for the weather-resistant fastening of covers and wind load securing. This ensures especially robust and resistant support, even under high wind loads. OBO offers the following solutions and more:



### Tightening straps

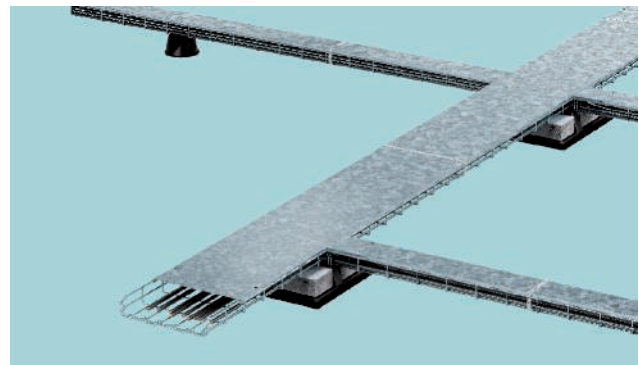
The SBR tightening strap made of galvanised steel, stainless steel or with an additional plastic coating is extremely robust and friction-resistant. It is tested for tensile strength (kN) according to the material (strength) and is available in various colours. Widths of 8 and 15 mm enable flexible adjustment to different cable trays, cable ladders and cable volumes. With the help of the matching SBV tightening strap locks and 576 spring chuck, the tightening straps can be installed simply, quickly and safely.



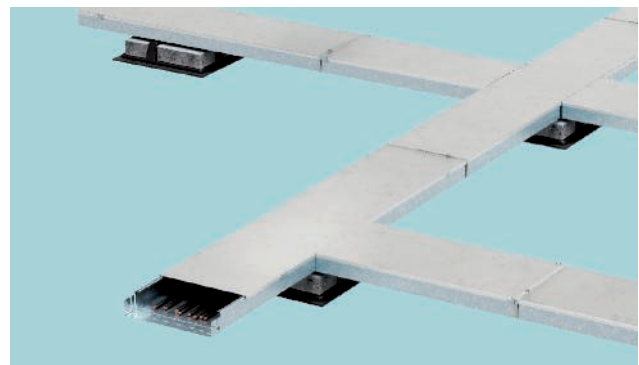
### Metal strip clips

The MBS strip clips made of metal and with ball lock offer reliable fastening that withstands even high temperatures and adverse weather conditions. With widths of 7, 9 and 12 millimetres as well as different fixed lengths, a wide range of applications is possible. The MBS-Z spring chuck with integrated cutter ensures precise, efficient installation.

### Installation principles, flat-roof mounting



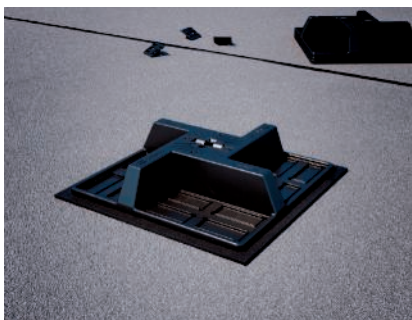
Flat-roof mounting, GRM mesh cable tray



Flat-roof mounting, MSKMU unperforated cable tray

# Mounting aid for flat-roof mounting

## Mesh cable tray GRM



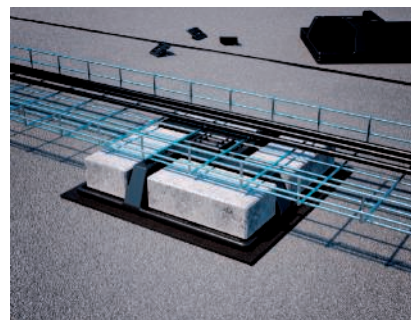
### Placing UniBase 6

Place the UniBase 6 according to the roof assignment plan and place the UniBase BSM building protection mat under the stands if required. The maximum support spacing between the stands is 1.5 m.



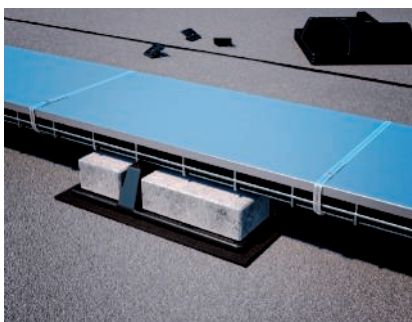
### Ballasting UniBase 6

The UniBase 6 stand is weighed down using standard blocks of size (length x width x height) 10 x 20 x 6 cm.



### Placing the GRM mesh cable tray

The GRM mesh cable tray is fastened to the UniBase 6 universal stand without screws using the type 165 MBG HGRM adapter.



### Mounting and fixing the DGRR cover

Lock the DGRR mesh cable tray cover on the mesh cable tray and fix it with MBS metal strip clips.

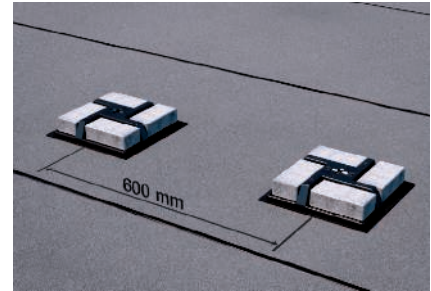
# Example static calculation

## Cable routing on the roof

### Basis of calculation

#### 1) UniBase spacing

When installing cable support systems, for example on the UniBase universal stand, make sure that the support surface corresponds to the full width of the installed system. This ensures an even load distribution and increases stability against wind loads. In the following example static calculation, the spacing between the individual UniBase units is 0.6 metres.

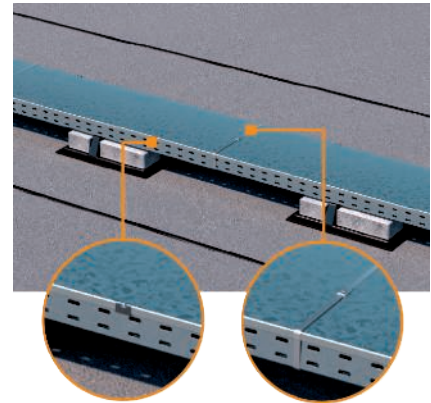


#### 2) Number of cover clamps

At least 6 cover clamps should be mounted for each 3 metres of cover.

#### 3) Metal strip clip spacing

The following is recommended for the spacing between the metal strip clips: Insert three clips per cover at 500, 1,500 and 2,500 mm.



### System components used

Item no.	Type	Designation
5403391	UniBase 6	Universal stand, ballasting, blocks up to 6 cm
6047655	RKSM 630 FT	RKSM Magic cable tray, with quick connector
3191032	OTSP 6.0x40 A4	Chipboard screw, panhead, TX 25
6052656	DRLU 300 DD	Unperforated cover, for cable trays and cable ladders
6052810	DK DRLU A2	Cover clamp, for unperforated covers
7203111	MBS 100 A2	Strip clip

### Formula for proof of stability (sliding + lifting):

$$W_h \times Y_Q \leq (G_{stab} \times Y_{stab} - W_{vh} \times Y_Q) \times \mu$$

### Designations

$W_h$	Characteristic wind load, horizontal
$W_{vh}$	Characteristic wind load, vertical for proof of lifting
$G_{stab}$	Stabilising weight forces
$Y_Q$	Partial safety factor for wind load
$Y_{stab}$	Partial safety factor for stabilising forces
$\mu$	Coefficient of friction

# Example static calculation

## Cable routing on the roof

### Step 1: Calculate the horizontal wind force on the cable tray

First, the wind pressure applied horizontally to the side wall of the cable tray is calculated. The pressure is calculated by multiplying the wind gust velocity pressure, the side height, the force coefficient, the safety factor and the block spacing.

$$W_{h1} \times Y_Q = 0.5 \text{ kN/m}^2 \text{ (wind gust velocity pressure)} \times 60 \text{ mm (side height)} \times 1.0 \text{ (force coefficient)} \times 1.2 \text{ (safety)} \times 0.6 \text{ m (UniBase spacing)} = 21.6 \text{ N}$$

### Step 2: Calculate impact on the ballast block

To calculate the impact of the wind load on the ballast block, the block width/height is multiplied by the wind gust velocity pressure, a force coefficient and the safety factor.

$$W_{h2} \times Y_Q = 372 \text{ mm (block width)} \times 80 \text{ mm (block height)} \times 0.5 \text{ kN/m}^2 \text{ (wind gust velocity pressure)} \times 2.1 \text{ (force coefficient)} \times 1.2 \text{ (safety)} = 37.5 \text{ N}$$

### Step 3: Calculate system weight

The total system weight, including cable tray, cover and ballast block, is calculated taking the gravitational acceleration and safety factor into consideration.

$$G_{stab} \times Y_{stab} = (6.12 \text{ kg/m (tray + cover)} \times 0.6 \text{ m (block spacing)} + 10 \text{ kg (block weight)}) \times 9.81 \text{ m/s}^2 \text{ (gravitational acceleration)} \times 0.9 \text{ (safety)} = 120.7 \text{ N}$$

### Step 4: Determine the lifting load

To determine the lifting load, first the length exposed to wind is calculated from the block spacing and block width. Multiplying these values results in the area with wind load. Together with the gust velocity pressure, force coefficient and safety factor, this results in the lifting wind load.

$$W_{vh} \times Y_{Qv} = (0.6 \text{ m (block spacing)} - 372 \text{ mm (block width)}) \times 300 \text{ mm (tray width)} \times 0.5 \text{ kN/m}^2 \text{ (wind gust velocity pressure)} \times 0.5 \text{ (vertical force coefficient)} \times 1.2 \text{ (safety)} = 20.5 \text{ N}$$

### Step 5: Proof of stability

First, the sum of the horizontal wind forces is determined. The system weight minus the previously determined lifting load with the coefficient of friction results in the maximum possible stabilising force. This determines whether stability is ensured.

$$W_{h1} \times Y_Q + W_{h2} \times Y_Q \leq (G_{stab} \times Y_{stab} - W_{vh} \times Y_{Qv}) \times \mu$$
$$21.6 \text{ N} + 37.5 \text{ N} < (120.7 \text{ N} - 20.5 \text{ N}) \times 0.6 \text{ (coefficient of friction } \mu)$$
$$59.1 \text{ N} < 60.1 \text{ N} \quad \text{Proof provided}$$

# Example of national standards for wind and snow loads

## General effects – snow loads

Europe:	EN 1991-1-3
Germany:	DIN EN 1991-1-3
Belgium:	NBN EN 1991-1-3
Austria:	ÖNORM B 1991-1-3
The Netherlands:	NEN-EN 1991-1-3
Switzerland:	SIA 261
Spain:	CTE DB SE-AE
USA:	ASCE/SEI 7-16; ASCE/SEI 7-22
India:	IS 875-4

## General effects – wind loads

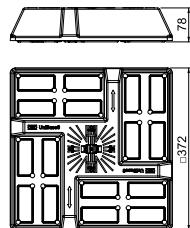
Europe:	EN 1991-1-4
Germany:	DIN EN 1991-1-4
Belgium:	NBN EN 1991-1-4
Austria:	ÖNORM B 1991-1-4
The Netherlands:	NEN-EN 1991-1-4
Switzerland:	SIA 261
Spain:	CTE DB SE-AE
USA:	ASCE/SEI 7-16; ASCE/SEI 7-22
India:	IS 875-3

## Service@OBOWe support you in every phase of your project

In regions with special climatic challenges in particular, close coordination with specialists and engineers is essential to identify suitable safety measures. This is the only way to ensure a permanently stable electrical installation outdoors.

We are happy to support you throughout every phase of your project. Simply contact our OBO Customer Service, and we will work with you to fulfil your project-specific designs. If necessary, our internal statics expert can be consulted for an additional fee.

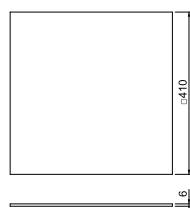
## UniBase universal stand



Type	Length mm	Width mm	Height mm	Fit mm	Min. order- ing quan- tity Piece	Weight kg/100 pc.	Item no.
UniBase 6	372	372	78	5	16	81.000	5403391

Universal stand for ballasting with standard blocks up to a dimension of 200 x 100 x 100 mm. Can be used on flat roofs, e.g. for mounting PV mounting systems or for cable routing with cable trays or with mesh cable trays in conjunction with roof cable holder 165 MBG HGRM. Blocks not contained in the scope of delivery.

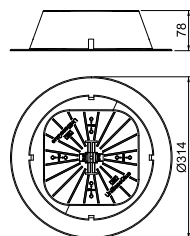
## Building protection mat, flat roof



Type	Length mm	Width mm	Height mm	Min. order- ing quan- tity Piece	Weight kg/100 pc.	Item no.
UniBase BSM	410	410	6	16	73.950	5403402
UniBase BSM ALU	410	410	6	16	75.330	5403404

Building protection mat as an underlay under stands of type UniBase 6 + UniBase 10 for flat roof PV mounting systems, as protection of the roof seal on flat roofs according to DIN 18531. Also suitable for height compensation of the PV mounting system. Made of recycled material; depending on the version, also available with aluminium lining.

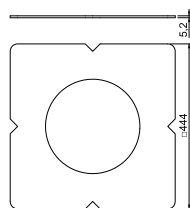
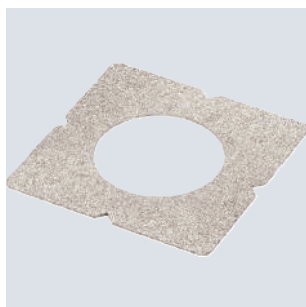
## UniBase Glue universal base for bonding



Type	Height mm	Fit mm	Min. order- ing quan- tity Piece	Weight kg/100 pc.	Item no.
UniBase Glue	78	5	16	39.400	5403395

Universal stand for gluing on flat roofs. Can be used for routing cables with cable trays or mesh cable trays in conjunction with 165 MBG HGRM roof conductor holders. Gluing collar must be selected according to the substrate.

## Fastening sleeve UniBase Glue Bit



Type	Length mm	Width mm	Height mm	Min. order- ing quan- tity Piece	Weight kg/100 pc.	Item no.
UniBase Glue Bit	444	444	5.2	16	70.000	5403410

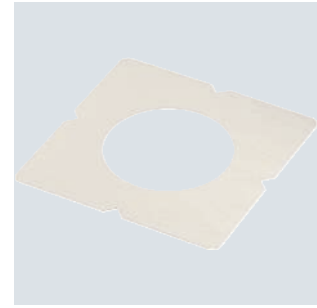
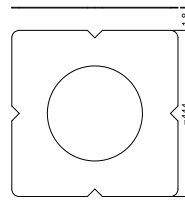
Bitumen fastening sleeve for the adhesive fastening of the universal stand UniBase Glue. Can be used on flat roofs with bitumen waterproofing with a roof pitch of a maximum of 5°.



### Fastening sleeve UniBase Glue FPO

Type	Length mm	Width mm	Height mm	Min. order- ing quan- tity Piece	Weight kg/100 pc.	Item no.
UniBase Glue FPO	444	444	1,8	16	25.000	5403412

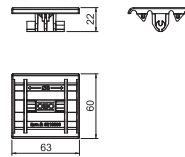
FPO fastening sleeve for the adhesive fastening of the universal stand UniBase Glue. Can be used on flat roofs with FPO waterproofing with a roof pitch of a maximum of 10°.



### Mesh cable tray adapter for roof conductor holder

Type	Material	Fit mm	Min. order- ing quan- tity Piece	Weight kg/100 pc.	Item no.
165 MBG HGRM	PP	Rd 8	50	1.340	5218886

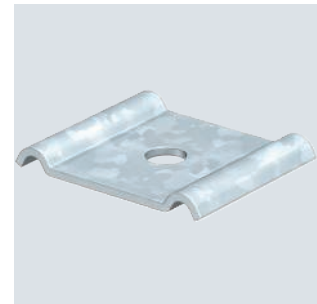
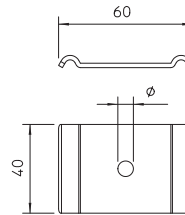
- Adapter for GR-Magic® mesh cable trays with a mesh width of 50 mm or 20 mm
- For fastening to type 165 MBG 8-10 and UniBase
- Mounting without tools
- Made from polypropylene, black, UV-resistant and weatherproof
- Toolless installation



### GKS 50 hold-down clamp

Type	Hole Ø mm	Min. order- ing quan- tity Piece	Item no.
GKS 50 07 FT	7	50	6015271

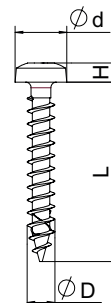
Use on mesh cable trays with 50 x 100 mm grid only.  
Hold-down clamp for fastening mesh cable trays on the ground or on stand-off brackets of type DBL.



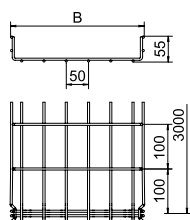
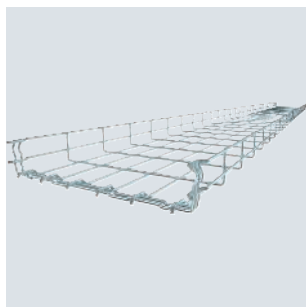
### Chipboard screw, with Torx, panhead, stainless steel

Type	Dim. L mm	Dim. D mm	Min. order- ing quan- tity Piece	Item no.
OTSP 6,0x40 A4	40	6	100	3191032

Stainless steel wood screw with lens head and Torx drive for fastenings in interior and exterior areas.  
Areas of use: Wood, chipboard, plasterboard panels and plastic anchors.



## GR-Magic® 55 mesh cable tray



Type	Width mm	Wire Ø mm	Length mm	Min. order- ing quan- tity m	Weight kg/100 m	Item no.
GRM 55 100 FT	100	3.9	3000	3	74.667	6001416
GRM 55 200 FT	200	3.9	3000	3	102.000	6001420
GRM 55 200 4.8FT	200	4.8	3000	3	156.667	6001421
GRM 55 300 FT	300	4.8	3000	3	200.667	6001424
GRM 55 400 FT	400	4.8	3000	3	245.000	6001428
GRM 55 500 FT	500	4.8	3000	3	288.333	6001432
GRM 55 600 FT	600	4.8	3000	3	331.333	6001436

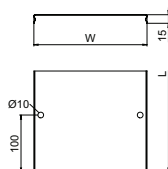
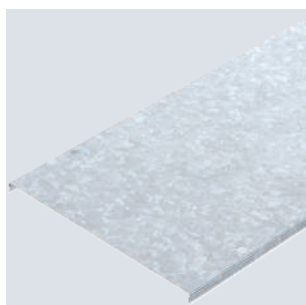
Mesh cable tray with shaped connector of side height 55 mm.

Magnetic shield insulation without cover 15 dB, with cover 25 dB.

You can find detailed information regarding the UL classification in the respective certification.

No additional connection components are required for the mesh cable tray, it is simply interlocked. The grid width is 50 x 100 mm (exception: GRM 55/50 = 20 x 100 mm).

## Cover for mesh cable tray, latchable



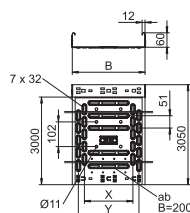
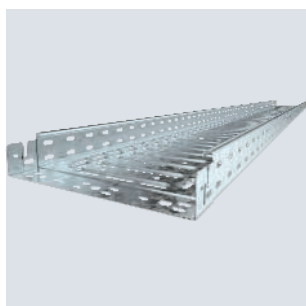
Type	Width mm	Min. order- ing quan- tity m	Weight kg/100 m	Item no.
DGRR 100 FT	98	3	83.000	6001822
DGRR 200 FT	198	3	149.667	6001826
DGRR 300 FT	298	3	216.333	6001828
DGRR 400 FT	398	3	282.667	6001830
DGRR 500 FT	498	3	349.667	6001832
DGRR 600 FT	598	3	418.000	6001834

With transverse bead from 400 mm width.

Lockable cover for mesh cable trays of type GR and GRM. Protects cables from damage, contamination and moisture from above. Suitable for industrial areas such as mechanical engineering.

When using covers outdoors, additional measures against the influence of wind may need to be taken.

## Cable tray RKS-Magic® 60



Type	Width mm	Metal thick- ness mm	BS	Min. order- ing quan- tity m	Weight kg/100 m	Item no.
RKSM 610 FT	100	1.00	🔥	3	197.410	6047612
RKSM 620 FT	200	1.00	🔥	3	251.115	6047639
RKSM 630 FT	300	1.00	🔥	3	356.295	6047655
RKSM 640 FT	400	1.00	🔥	3	437.180	6047690
RKSM 650 FT	500	1.00	🔥	3	518.295	6047720
RKSM 660 FT	600	1.00	🔥	3	599.443	6047736

Cable tray with integrated quick fastening system. The usable length of the cable tray is 3,000 mm.

The cable tray has continuous side perforations of 7 x 20 mm for the installation of additional connection and mounting components.

The perforation for direct threaded rod suspension has a diameter of 11 mm.

St DD

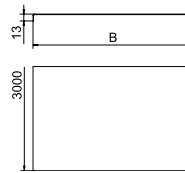


Type	Dim. B mm	Metal thickness mm	Length mm	Min. ordering quantity m	Weight kg/100 m	Item no.
DRLU 100 DD	100	1.00	3000	3	99.000	6052643
DRLU 200 DD	200	1.00	3000	3	177.500	6052650
DRLU 300 DD	300	1.00	3000	3	256.000	6052656
DRLU 400 DD	400	1.00	3000	3	334.500	6052662
DRLU 500 DD	500	1.50	3000	3	619.234	6052668
DRLU 600 DD	600	1.50	3000	3	737.000	6052674

Cover for cable trays and mesh cable trays.

When using covers outdoors, additional measures against the influence of wind must be taken.

Transverse bead from 500 mm width.



## Unperforated cover



St FT

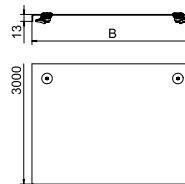


Type	Dim. B mm	Metal thickness mm	Length mm	Min. ordering quantity m	Item no.
DRL 100 FT	100	1.00	3000	3	6051340
DRL 200 FT	200	1.00	3000	3	6051367
DRL 300 FT	300	1.00	3000	3	6051383
DRL 400 FT	400	1.50	3000	3	6051413
DRL 500 FT	500	1.50	3000	3	6051448
DRL 600 FT	600	1.50	3000	3	6051472

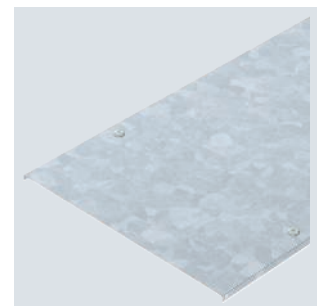
Transverse bead from 500 mm width.

Cover for cable trays and cable ladders with three pairs of sash locks.

When using covers outdoors, additional measures against the influence of wind must be taken.



## Cover with sash lock



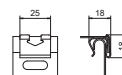
A2 2B



Type	Min. ordering quantity Piece	Weight kg/100 pc.	Item no.
DK DRLU A2	30	0.842	6052810

Cover clamp for secure fastening of covers on cable trays and cable ladders.

At least 6 cover clamps should be mounted for each 3 metres of cover.



## Cover clamp

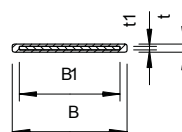


A2 K

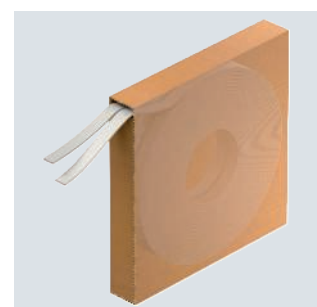


Type	Avg. breaking load kN	Colour	Dim. B mm	Dim. t mm	Dim. B1 mm	Min. ordering quantity m	Weight kg/100 m	Item no.
SBR 8 A2K	1.16	Jet black	9.3	1	8	40	1.704	6490192

Tightening strap made of rustproof steel with plastic jacketing to fasten cables on cable support systems.

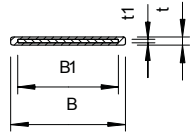
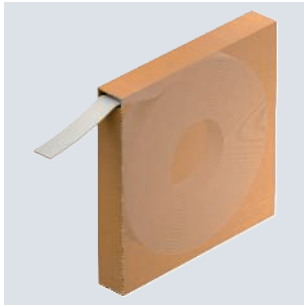


## SBR 8 tightening strap



## SBR 15 tightening strap

F1 K

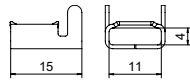


Type	Avg. breaking load kN	Colour	Min. ordering quantity m	Weight kg/100 m	Item no.
<b>SBR 15 F1K</b>	4.19	Jet black	25	7.628	<b>6490282</b>

Tightening strap made of rustproof steel with plastic jacketing to fasten cables on cable support systems.

## SBV 8 tightening strap lock

A2 2B

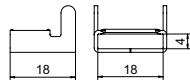
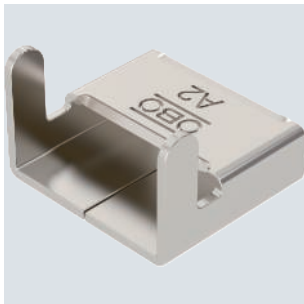


Type	Colour	Min. ordering quantity Piece	Weight kg/100 pc.	Item no.
<b>SBV 8 A2</b>	stainless steel	100	0.250	<b>6490942</b>

Tightening strap lock made of rustproof steel, suitable for portfolio with 8 mm width.

## SBV 15 tightening strap lock

A2 2B



Type	Colour	Min. ordering quantity Piece	Item no.
<b>SBV 15 A2</b>	stainless steel	100	<b>6490964</b>

Tightening strap lock made of rustproof steel, suitable for a range of products with a 15 mm width.

## Metal strip clip, narrow

A2 2B



Type	Length mm	Width mm	Min. ordering quantity Piece	Weight kg/100 pc.	Item no.
<b>MBS 015 A2</b>	150	7.9	100	0.380	<b>7203099</b>
<b>MBS 030 A2</b>	300	7.9	100	0.610	<b>7203103</b>
<b>MBS 045 A2</b>	450	7.9	50	0.820	<b>7203105</b>
<b>MBS 061 A2</b>	610	7.9	50	1.080	<b>7203107</b>

Metal strip clip in a smooth finish with ball lock. For high-temperature and weather-resistant fastening. Use spring chuck MBS-Z for tightening.

A2 2B

Type	Length mm	Width mm	Min. order- ing quan- tity Piece	Weight kg/100 pc.	Item no.
<b>MBS 075 A2</b>	750	12	25	2.010	<b>7203109</b>
<b>MBS 100 A2</b>	1000	12	25	2.550	<b>7203111</b>
<b>MBS 120 A2</b>	1200	12	25	3.000	<b>7203113</b>
<b>MBS 150 A2</b>	1500	12	25	3.670	<b>7203115</b>

Metal strip clip in a smooth finish with ball lock. For high-temperature and weather-resistant fastening. Use spring chuck MBS-Z for tightening.

## Metal strip clip, wide

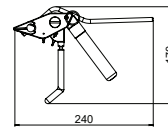


St



Type	Min. order- ing quan- tity Piece	Item no.
<b>576</b>	1	<b>6498027</b>

Clamping tool for all OBO tightening straps in conjunction with appropriate tightening strap locks. With high clamping force, ratchet function, shortening unit and round grips for comfortable handling.



## Spring chuck



St

Type	Min. order- ing quan- tity Piece	Item no.
<b>MBS-Z</b>	1	<b>7203120</b>

High-quality spring chuck with cutting tool for metal strip clips, type MBS.

## Pliers for metal strip clips



# Magic PV Pitch Pitched-roof systems



Most pitched-roof systems are mounted on existing building roofs as so-called on-roof systems. Here, the PV modules are attached to the roof rafters using roof hooks, mounting rails and module clamps made of metal.

## Advantages at a glance

- Magic technology: Enables the profiles to be installed without screws or tools, thus saving time.
- Roof hook solution: Can be mounted on all standard pitched-roof types and adjusted infinitely and down to the millimetre in all directions at any time.
- Universal clamp: Simultaneously functions as an connection or end clamp, covering a clamping range of 30–50 mm. For easy fixing of all standard PV modules.



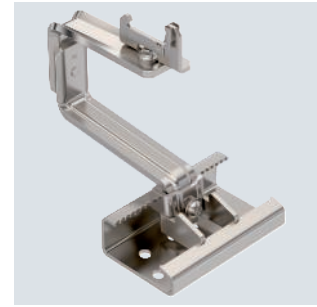
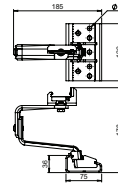
A2 2B

### Universal roof hook for PV module mounting, tiled roof



	Min. ordering quantity		Weight	
<b>Type</b>	Piece		kg/100 pc.	<b>Item no.</b>
<b>DHU A2</b>	10		108.500	<b>5901410</b>

Roof hook to mount photovoltaic modules on pitched roofs in combination with the TP 45 support profile. Suitable for tiled roofs. Lockable fastening on support profile. Mounting on rafters with TKS wafer-head screws. Roof hook can be infinitely adjusted horizontally and vertically using glands, correct spanner Torx 40. Height adjustment in the range of the roof slat between 40–54 mm, side adjustment option up to 76 mm, height adjustment of the support profile up to 18 mm.



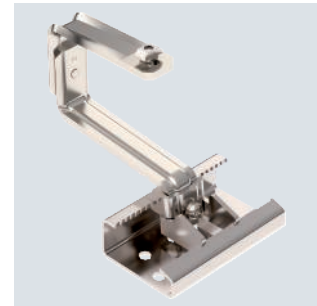
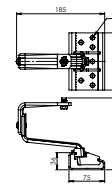
A2 2B

### Roof hook for PV module mounting, screwable profile, tiled roof



	Min. ordering quantity		Weight	
<b>Type</b>	Piece		kg/100 pc.	<b>Item no.</b>
<b>DHU T A2</b>	10		100.700	<b>5901404</b>

Roof hook to mount photovoltaic modules on pitched roofs in combination with the TP 45 support profile. Suitable for tiled roofs. Screwable fastening on support profile. Mounting on rafters with TKS wafer-head screws. Roof hook can be infinitely adjusted horizontally and vertically using glands, correct spanner Torx 40. Height adjustment in the range of the roof slat between 40–54 mm, side adjustment option up to 76 mm, height adjustment of the support profile up to 18 mm.



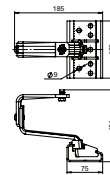
A2 P

### Roof hook for PV module mounting, screwable profile, tiled roof, black



	Min. ordering quantity		<b>Item no.</b>
<b>Type</b>	Piece		<b>5901406</b>
<b>DHU T A2K S</b>	10		

Roof hook to mount photovoltaic modules on pitched roofs in combination with the TP 45 support profile. Suitable for tiled roofs. Screwable fastening on the support profile. Mounting on rafters with TKS wafer-head screws. The roof hook can be adjusted horizontally as well as vertically continuously via glands, correct Torx 40 key. Height adjustment in the range of the roof slat between 40–54 mm, side adjustment option up to 76 mm, height adjustment of the support profile up to 18 mm. Black version.



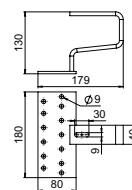
A2 GB

### Heavy roof hook for PV module mounting, tiled roof



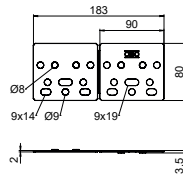
	Min. ordering quantity		Weight	
<b>Type</b>	Piece		kg/100 pc.	<b>Item no.</b>
<b>DHS A2</b>	10		137.000	<b>5901416</b>

Heavy roof hook to mount photovoltaic modules on pitched roofs in combination with the TP 45 support profile. Suitable for tiled roofs. Fastening on support profile through bolt with hammer nut, type SKSHM A2. Mounting on rafters with TKS wafer-head screws.



Support plate for ceiling hooks

PE

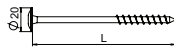


		Min. ordering quantity	Weight	
<b>Type</b>	Piece		kg/100 pc.	<b>Item no.</b>
<b>UP DH</b>	20		2.440	<b>5901490</b>

Polyethylene support plate for the height compensation of roof hooks, as used during the mounting of PV modules on sloping roofs. Suitable for universal roof hooks and heavy-duty roof hooks. A combination of multiple support plates is possible. Plate thickness max. 2 mm.

Wafer-head screw for roof hooks

A2

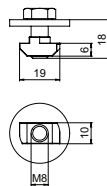
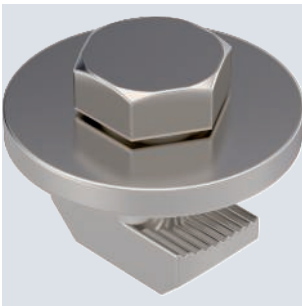


		Min. ordering quantity	Weight	
<b>Type</b>	Length mm	Piece	kg/100 pc.	<b>Item no.</b>
<b>TKS 8x100 A2</b>	100	100	2.377	<b>5901800</b>
<b>TKS 8x120 A2</b>	120	100	2.789	<b>5901802</b>
<b>TKS 8x200 A2</b>	200	50	4.452	<b>5901804</b>

Wafer-head screw for fastening roof hooks to rafters when mounting photovoltaic modules on pitched roofs. Matching Torx 40 key.

Screw with hammer nut for truss profile mounting on solar support tiles

A2



		Min. ordering quantity	Weight	
<b>Type</b>	Thread	Piece	kg/100 pc.	<b>Item no.</b>
<b>SKS HM A2</b>	M8	20	2.500	<b>5901850</b>

Screw with hammer nut for fastening the TP 45 truss profile to solar support tiles from manufacturers such as Fleck, Braas, Lehmann, Marzari and others.

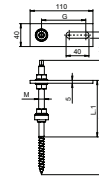
A2



## Hanger bolt set for PV module mounting, trapezoidal/corrugated roof

Type	Length mm	Dia- meter mm	Min. order- ing quan- tity Piece	Weight kg/100 pc.	Item no.
STSS 10x200 A2	200	10	20	26.690	5901820
STSS 12x200 A2	200	12	20	32.800	5901826
STSS 12x300 A2	300	12	20	39.620	5901828

Hanger bolt set to mount photovoltaic modules on pitched roofs in combination with the TP 45 support profile. Suitable for fastening in the wooden substructure of corrugated roofs made out of plastic, tin or fibre cement. Set consists of hanger bolt with pre-mounted EPDM seal, adapter plate for the support profile and additional nuts for the optional height adjustment. Fastening of the support profile with screw with slot nut, type SKS HM (please order separately).

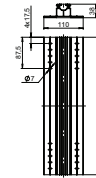


Alu BK

## Adapter for PV module mounting, trapezoidal roof

Type	Min. order- ing quan- tity Piece	Weight kg/100 pc.	Item no.
ADU TPD ALU	20	42.820	5901904

Short profile rail for mounting PV modules on trapezoidal roofs. Suitable for the universal terminal type KLU. With pre-mounted slip-resistant sealing mat, including fastening material.



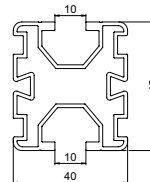
Alu BK

## Support profile for PV module mounting



Type	Length mm	Min. order- ing quan- tity Piece	Weight kg/100 pc.	Item no.
TP 45 2350 ALU	2350	4	242.520	5900405
TP 45 4700 ALU	4700	4	485.040	5900410

Support profile to mount photovoltaic modules on flat and pitched roofs. Flat roof mounting in combination with UniBase universal stand and STK and STL short and long supports. Lockable fastening of the profile on the stand with UniBase AMP adapter. Pitched roof mounting in combination with universal DHU roof hook. Lockable fastening of the profile on roof hooks. Screwable connection of multiple support profiles with LV 45 straight connectors and KV 45 cross-connectors. With 10 mm groove on both sides to accept slide nuts and universal and earthing clamps.

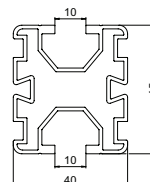


Alu EL

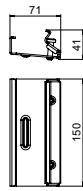
## Support profile for PV module mounting, black

Type	Length mm	Min. order- ing quan- tity Piece	Weight kg/100 pc.	Item no.
TP 45 4700 ALU S	4700	4	485.040	5900412

Support profile, black anodised, to mount photovoltaic modules on flat and pitched roofs. Flat roof mounting in combination with UniBase universal stand and STK and STL short and long supports. Lockable fastening of the profile on the stand with UniBase AMP adapter. Pitched roof mounting in combination with universal DHU roof hook. Lockable fastening of the profile on roof hooks. Screwable connection of multiple support profiles with LV 45 straight connectors and KV 45 cross-connectors. With 10 mm groove on both sides to accept slide nuts and universal and earthing clamps.



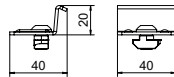
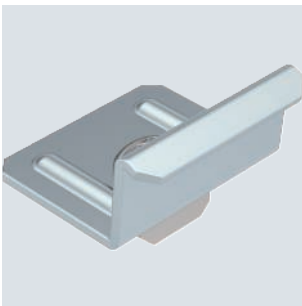
### Straight connector for TP support profiles



<b>Type</b>	Min. ordering quantity		Weight	
	Piece		kg/100 pc.	<b>Item no.</b>
<b>LV 45 DD</b>	20		38.600	<b>5901210</b>

Straight connector for TP support profiles. Can be screwed on with Torx 30 spanner.

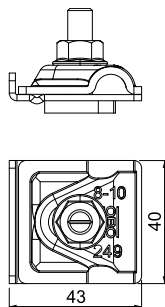
### Cross-connector for TP support profiles



<b>Type</b>	Min. ordering quantity		Weight	
	Piece		kg/100 pc.	<b>Item no.</b>
<b>KV 45 DD</b>	20		5.000	<b>5901250</b>

Cross-connector for TP support profiles. Can be screwed on with Torx 40 spanner.

### Earthing terminal for PV mounting systems

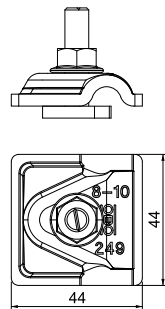


<b>Type</b>	Length	Width	Height	Min. ordering quantity	Weight	<b>Item no.</b>
	mm	mm	mm	Piece		
<b>249 PV10 6-50V2A</b>	40	43	34	8	8.460	<b>5051520</b>

Pre-mounted earthing terminal for the inclusion of PV mounting systems in the equipotential bonding. Suitable for the inclusion of the PV mounting systems in an external lightning protection system.

- Lightning current-compatible up to 100 kA (10/350)
- Rapid mounting through integrated spring mechanism
- For round conductor fastening RD 8–10
- To fasten single/multi-wire cables: 6–50 mm<sup>2</sup>
- For profiles with 10 mm groove
- Meets the requirements of DIN EN 62561-1

### Earthing terminal for PV mounting systems



<b>Type</b>	Length	Width	Height	Min. ordering quantity	Weight	<b>Item no.</b>
	mm	mm	mm	Piece		
<b>249 PV8-10 ALU</b>	44	44	34	10	4.500	<b>5051526</b>

Earthing terminal for the inclusion of PV mounting systems in the equipotential bonding.

- For round conductor fastening RD 8–10
- For profiles with 10 mm groove

PE



Support profile end cap

Type	Colour	Piece	Min. ordering quantity	Weight kg/100 pc.	Item no.
EK 45 G	Grey	20		0.740	5901722

End cap for TP support profiles, as protection against injuries and contamination.



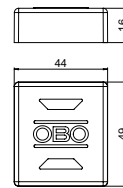
PE



Support profile end cap

Type	Colour	Piece	Min. ordering quantity	Weight kg/100 pc.	Item no.
EK 45 S	Black	20		0.740	5901720

End cap for TP support profiles, as protection against injuries and contamination.



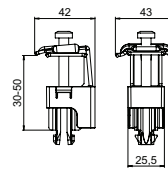
A2 BK



Universal clamp for PV module mounting

Type	For frame height mm	Piece	Min. ordering quantity	Weight kg/100 pc.	Item no.
KLU A2	30-50	20		6.590	5901010

Universal clamp to mount photovoltaic modules on flat and pitched roofs, suitable as a clamp between 2 modules or as an end clamp. Lockable pre-fastening on TP 45 support profile and on STK and STL supports. Suitable for 10 mm slot width. Can be rotated through 90° after engaging. Lockable fastening of the PV module with Torx 30 wrench.



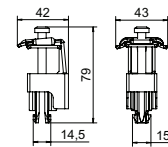
A2 K



Universal clamp for PV module mounting

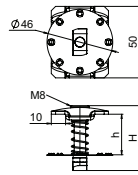
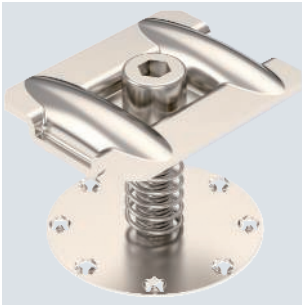
Type	For frame height mm	Piece	Min. ordering quantity	Weight kg/100 pc.	Item no.
KLU A2 S	30-50	20		6.590	5901012

Universal clamp for mounting photovoltaic modules on flat and pitched roofs, suitable as a clamp between 2 modules or as an end clamp. Lockable pre-fastening on TP 45 support profile and on STK and STL supports. Suitable for 10 mm slot width. Can be rotated through 90° after engaging. Screwable fastening of the PV module with Torx 30 key. Black version.



Connection clamp with spring for PV module mounting

A2

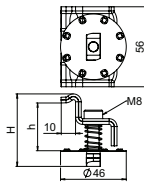


Type	For frame height mm	Min. order- ing quan- tity Piece	Weight kg/100 pc.	Item no.
<b>KLZ F 25 A2</b>	25	50	6.150	<b>5901062</b>
<b>KLZ F 30 A2</b>	30	50	6.330	<b>5901063</b>
<b>KLZ F 35 A2</b>	35	50	6.620	<b>5901064</b>
<b>KLZ F 40 A2</b>	40	50	6.720	<b>5901065</b>

Connection clamp with spring for fastening photovoltaic modules on support profiles. Suitable for slot width 10 mm. Lockable fastening of the PV module with Allen key size 6.

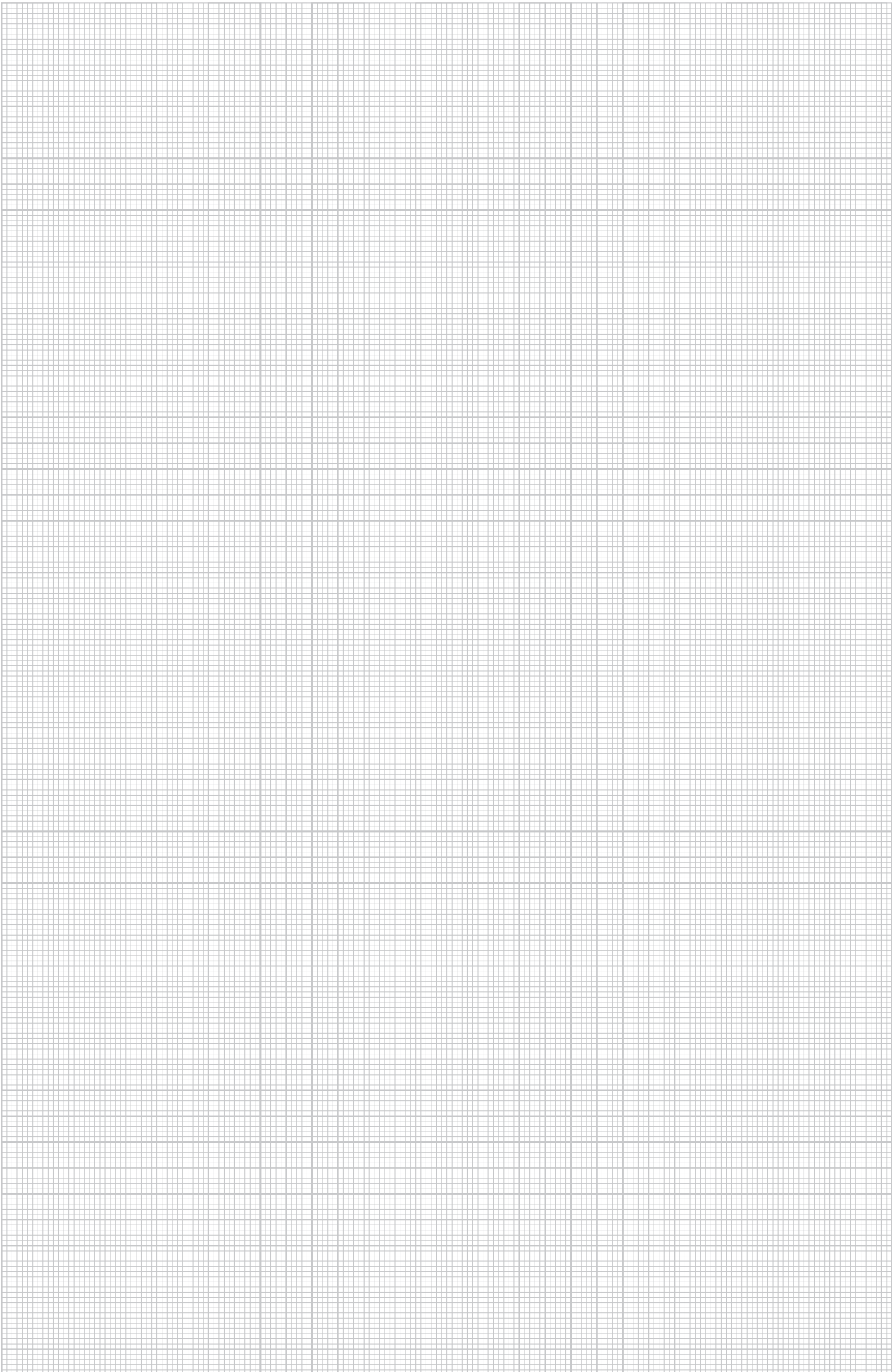
End clamp with spring for PV module mounting

A2



Type	For frame height mm	Min. order- ing quan- tity Piece	Weight kg/100 pc.	Item no.
<b>KLE F 25 A2</b>	25	50	7.850	<b>5901092</b>
<b>KLE F 30 A2</b>	30	50	8.210	<b>5901093</b>
<b>KLE F 35 A2</b>	35	50	8.770	<b>5901094</b>
<b>KLE F 40 A2</b>	40	50	9.620	<b>5901095</b>

End clamp with spring for fastening photovoltaic modules on support profiles. Suitable for slot width 10 mm. Lockable fastening of the PV module with Allen key size 6.



# Magic PV Field

## Free-standing systems



Free-standing photovoltaics means the erection of PV modules on large areas not used for agriculture. Under favourable conditions, these photovoltaic systems can produce increased yields.

### Advantages at a glance

- The highest level of flexibility: Both rammed and anchored versions are available.
- Little installation work: We can offer you system components partly pre-mounted at the factory.
- Maximum mounting options: The profile with flexible length and perforation allows for almost any type of mounting.
- Besides the intended OBO terminals, also using standard fastening materials, such as standard bolts, is possible.

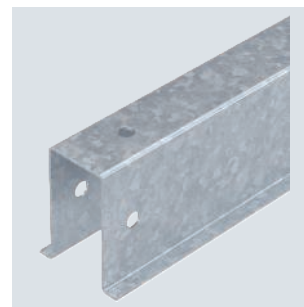
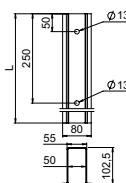


St FT

### Ramming pile, free-standing system

Type	Length mm	Min. order- ing quan- tity Piece	Weight kg/100 pc.	Item no.
RP 1800 FT	1800	1	970.000	5900106
RP 2300 FT	2300	1	1,240.000	5900110

Ramming pile as a bracket for pre-mounted supports to mount free-standing photovoltaic systems. Mounting in the earth through ramming.

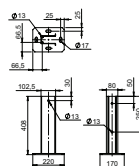


St FT

### Stand, free-standing system

Type	Min. order- ing quan- tity Piece	Weight kg/100 pc.	Item no.
SF 400 FT	1	431.000	5900900

Stand as a bracket for pre-mounted supports to mount free-standing PV systems. Mounting on concrete foundations with M16 bolt ties. Fastening material must be ordered separately.



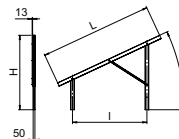
St FT



### Pre-mounted supports for PV module mounting, free-standing system

Type	Angle $\alpha$ °	Dim. H mm	Dim. L mm	Dim. I mm	Module height mm	Min. order- ing quan- tity Piece	Weight kg/100 pc.	Item no.
VT 10S FT	10	1.38	2.71	2.27	20-50	1	2,900.000	5901550
VT 10M FT	10	1.41	3.12	2.27	20-50	1	3,150.000	5901552
VT 10L FT	10	1.45	3.49	2.27	20-50	1	3,350.000	5901554
VT 25S FT	25	2.00	2.52	2.09	20-50	1	3,250.000	5901556
VT 25M FT	25	2.09	2.90	2.09	20-50	1	3,450.000	5901558
VT 25L FT	25	2.16	3.24	2.09	20-50	1	3,650.000	5901560
VT 30S FT	30	2.19	2.41	1.99	20-50	1	3,350.000	5901562
VT 30M FT	30	2.29	2.78	1.99	20-50	1	3,550.000	5901564
VT 30L FT	30	2.29	2.78	1.99	20-50	1	3,750.000	5901566

Pre-mounted support in small, medium or large size to mount free-standing photovoltaic systems in combination with support profiles and end/connection clamps. Mounting with ramming piles in the earth or with stands on concrete foundations.





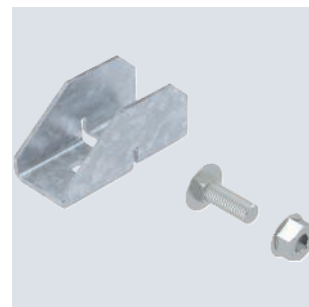
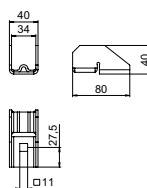
St FT



### Cross-connector for TP support profiles, free-standing system

	Min. ordering quantity		Weight kg/100 pc.	Item no.
Type	Piece			
KV FT	50		19.000	5901255

Cross-connector to connect support profiles for free-standing photovoltaic systems. Fastening with pre-installed M12 screw, screw-on with Torx 40 wrench.



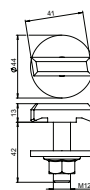
A2



### Hook-head bolt for free-standing systems

	Min. ordering quantity		Weight kg/100 pc.	Item no.
Type	Piece			
MS50HB M12x45 A2	25		14.750	5901865

Hook-head bolt for the use with profile rail MS4022, in free-standing PV mounting systems.



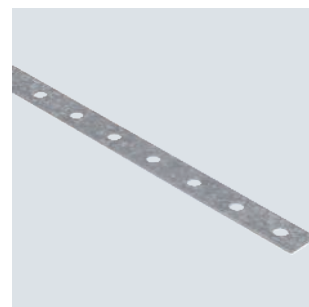
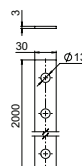
St FT



### Perforated strip for PV free-standing system

	Min. ordering quantity		Weight kg/100 pc.	Item no.
Type	Piece			
LB FT	10		144.000	5901950

Perforated strip for cross-connecting the rear supports of pre-mounted supports type VT 10/25/30. For stiffening free-standing PV mounting systems. Fastening with screw set for perforated strip type SVLB. Fastening material not included in scope of delivery.



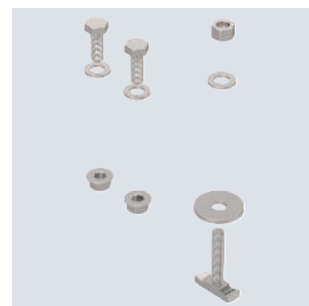
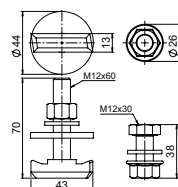
A2



### Screw set for perforated strip

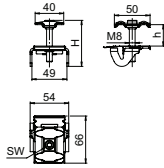
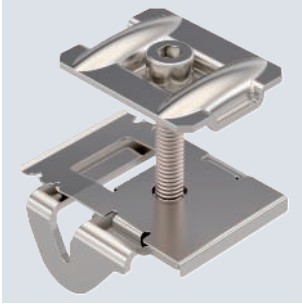
	Min. ordering quantity		Weight kg/100 pc.	Item no.
Type	Piece			
SVLB	1		23.800	5901960

Screw set including hexagonal screws M12, hexagonal nuts with flange M12, hook-head bolt and washers. For the fastening of perforated straps, type LB FT, on rear supports on pre-assembled beams of PV open-field mounting systems.



### Connection clamp for PV module mounting, free-standing system

A2  
CE

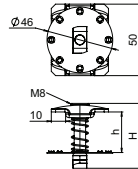
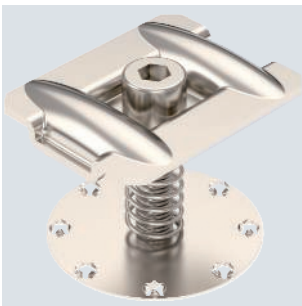


Type	For frame height mm	Min. ordering quantity Piece	Weight kg/100 pc.	Item no.
KLZ 2030 A2	20-30	50	13.800	5901050
KLZ 3040 A2	30-40	50	14.400	5901054
KLZ 4050 A2	40-50	50	14.800	5901058

Connection clamp for fastening photovoltaic modules on support profiles of free-standing systems. Lockable pre-fastening of the module frames on the support profile. Suitable for slot width 10 mm. Screwable fastening of the PV module with size 6 Allen key.

### Connection clamp with spring for PV module mounting

A2  
CE

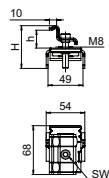
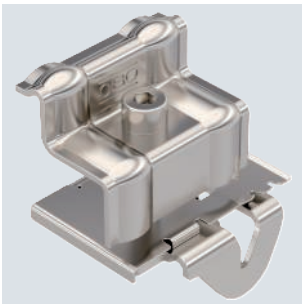


Type	For frame height mm	Min. ordering quantity Piece	Weight kg/100 pc.	Item no.
KLZ F 25 A2	25	50	6.150	5901062
KLZ F 30 A2	30	50	6.330	5901063
KLZ F 35 A2	35	50	6.620	5901064
KLZ F 40 A2	40	50	6.720	5901065

Connection clamp with spring for fastening photovoltaic modules on support profiles. Suitable for slot width 10 mm. Lockable fastening of the PV module with Allen key size 6.

### End clamp for PV module mounting, free-standing system

A2  
CE



Type	For frame height mm	Min. ordering quantity Piece	Weight kg/100 pc.	Item no.
KLE 20 A2	20	50	16.000	5901070
KLE 25 A2	25	50	16.900	5901072
KLE 30 A2	30	50	17.400	5901074
KLE 35 A2	35	50	18.300	5901076
KLE 40 A2	40	50	18.800	5901078
KLE 45 A2	45	50	19.700	5901080
KLE 50 A2	50	50	20.200	5901082

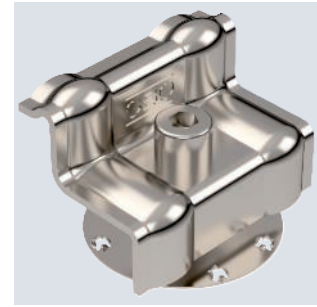
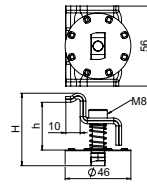
End clamp for fastening photovoltaic modules on support profiles of free-standing systems. Lockable pre-fastening of the module frames on the support profile. Suitable for slot width 10 mm. Screwable fastening of the PV module with size 6 Allen key.

A2



## End clamp with spring for PV module mounting

Type	For frame height mm	Min. ordering quantity Piece	Weight kg/100 pc.	Item no.
KLE F 25 A2	25	50	7.850	5901092
KLE F 30 A2	30	50	8.210	5901093
KLE F 35 A2	35	50	8.770	5901094
KLE F 40 A2	40	50	9.620	5901095



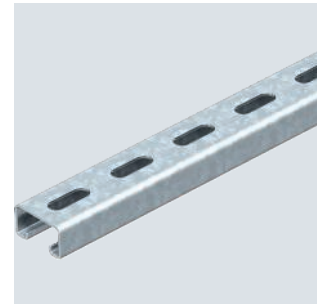
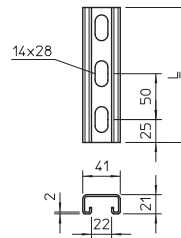
End clamp with spring for fastening photovoltaic modules on support profiles. Suitable for slot width 10 mm. Lockable fastening of the PV module with Allen key size 6.

St FT



## MS4121 mounting rail, slot 22 mm, perforated

Type	Length mm	Material thickness mm	BS	Min. ordering quantity m	Item no.
MS4121P2000FT	2000	2		2	1122923
MS4121P3000FT	3000	2		3	1122924
MS4121P6000FT	6000	2		6	1122926



Heavy-duty C profile rail for individual installation of support constructions, e.g. for cable trays or as a panel for switchgear cabinets. Can also be used for cable routing, in conjunction with clamp clips with a U foot.

St FT



## Wall and support bracket AW 30

Type	Width mm	F in kN	BS	Min. ordering quantity Piece	Item no.
AW 30 11 FT	110	3		1	6419704
AW 30 21 FT	210	3		1	6419720
AW 30 31 FT	310	3		1	6419747
AW 30 41 FT	410	3		1	6419763
AW 30 51 FT	510	3		1	6419798
AW 30 61 FT	610	3		1	6419828

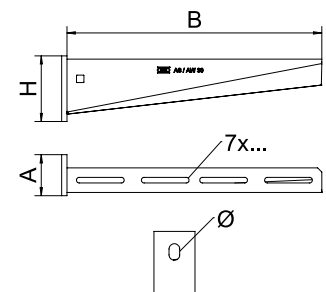


Fastening of the bracket to the U support of width 400 mm or greater using a hexagonal bolt through both sides of the support. Please insert suitable spacers.

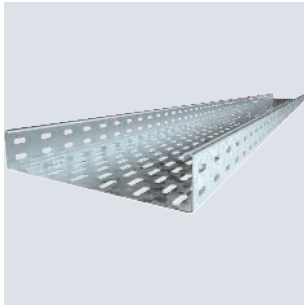
Medium-duty wall and support bracket with welded head plate.

Type	Dim. B mm	Dim. A mm	Dim. H mm	Hole Ø mm
AW 30 11 FT	110	50	60	11
AW 30 21 FT	210	50	70	13
AW 30 31 FT	310	50	80	13
AW 30 41 FT	410	50	80	13
AW 30 51 FT	510	50	90	13
AW 30 61 FT	610	50	100	13

Dimensions



Cable tray SKS 60

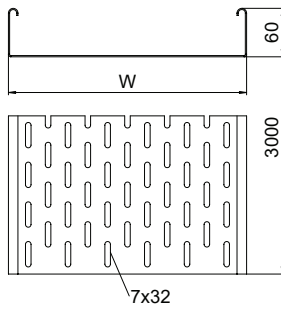


Type	Width mm	Metal thick- ness mm	Min. order- ing quan- tity m	Item no.
<b>SKS 610 FT</b>	100	1.50	3	6056636
<b>SKS 620 FT</b>	200	1.50	3	6056652
<b>SKS 630 FT</b>	300	1.50	3	6056679
<b>SKS 640 FT</b>	400	1.50	3	6056695
<b>SKS 650 FT</b>	500	1.50	3	6056717
<b>SKS 660 FT</b>	600	1.50	3	6056733

The cable tray, type SKS, should also be used for the maintenance of electrical function. For additional data, please refer to BSS fire protection systems.

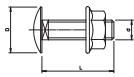
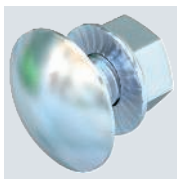
SKS 60 = Heavy-duty cable tray system with 60 mm side height.

Dimensions



Type	Length mm	Dimension W mm	Usable cross- section cm <sup>2</sup>
SKS 610 FT	3000	100	58
SKS 620 FT	3000	200	118
SKS 630 FT	3000	300	178
SKS 640 FT	3000	400	238
SKS 650 FT	3000	500	298
SKS 660 FT	3000	600	358

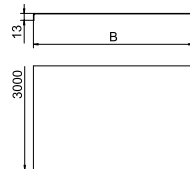
Truss-head bolt with flange nut



Type	Dimen- sion mm	Dim. L mm	Dim. d mm	Dim. D mm	Resist- ance grade	Min. order- ing quan- tity Piece	Item no.
<b>FRSB 6x12 F</b>	M6x12	12	6	13.5	5.6	100	6406122

Truss-head bolt with square neck including flange nut.

Unperforated cover



Type	Dim. B mm	Metal thick- ness mm	Length mm	Min. order- ing quan- tity m	Item no.
<b>DRLU 100 DD</b>	100	1.00	3000	3	6052643
<b>DRLU 200 DD</b>	200	1.00	3000	3	6052650
<b>DRLU 300 DD</b>	300	1.00	3000	3	6052656
<b>DRLU 400 DD</b>	400	1.00	3000	3	6052662
<b>DRLU 500 DD</b>	500	1.50	3000	3	6052668
<b>DRLU 600 DD</b>	600	1.50	3000	3	6052674

Cover for cable trays and mesh cable trays.

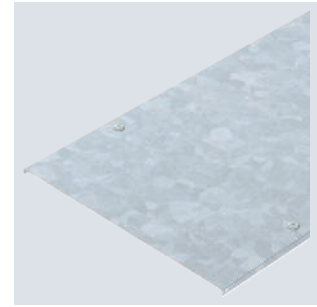
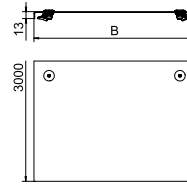
When using covers outdoors, additional measures against the influence of wind must be taken.

Transverse bead from 500 mm width.



Cover with sash lock

Type	Dim. B mm	Metal thickness mm	Length mm	Min. ordering quantity	Item no.
DRL 100 FT	100	1.00	3000	3	6051340
DRL 200 FT	200	1.00	3000	3	6051367
DRL 300 FT	300	1.00	3000	3	6051383
DRL 400 FT	400	1.50	3000	3	6051413
DRL 500 FT	500	1.50	3000	3	6051448
DRL 600 FT	600	1.50	3000	3	6051472

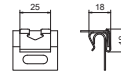


Transverse bead from 500 mm width.  
 Cover for cable trays and cable ladders with three pairs of sash locks.  
 When using covers outdoors, additional measures against the influence of wind must be taken.



Cover clamp

Type	Min. ordering quantity	Weight kg/100 pc.	Item no.
DK DRLU A2	30	0.842	6052810



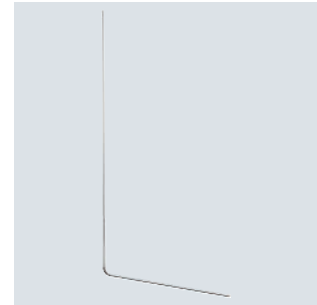
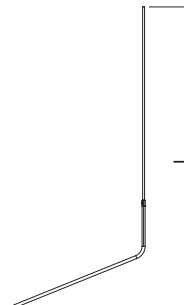
Cover clamp for secure fastening of covers on cable trays and cable ladders.  
 At least 6 cover clamps should be mounted for each 3 metres of cover.



Angled air-termination rod for PV frames

Type	Length mm	Nominal size Ø mm	Min. ordering quantity	Item no.
101 VL2000 112	2000	10/16	10	5401950

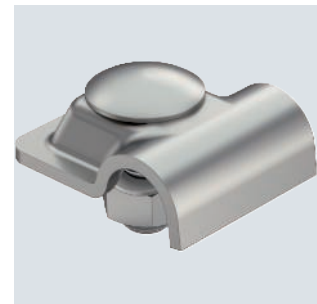
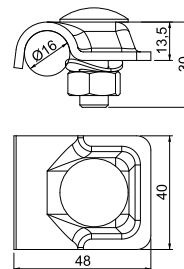
- Suitable for wind loads according to Eurocode 1: DIN EN 1991-1-4
- Last metre is tapered from Ø 16 mm to Ø 10 mm, material: AlMgSi
- Angled to 112°



Quick connector RD 16

Type	Min. ordering quantity	Item no.
249 16 VA 101 VL	20	5311610

- To fasten round conductors RD 16



# External lightning protection

Lightning protection for roof systems



The inclusion of a photovoltaic system into the existing lightning protection concept of a building is often neglected during refitting work. This significantly increases the risk of considerable damage through a direct lightning strike. For public buildings, for example, the LBO (state construction regulations) require a lightning protection system as fire and personal protection.



## Complete product range, decades of experience

Our comprehensive product range, tested in the OBO BET laboratory, and our experience mean that we can offer the right solutions for almost any type of system. Lightning strikes are intercepted safely and run to the earth in a controlled manner with the following OBO systems:

- Air-termination rods
- Rod holders
- Ridge conductor holders
- Roof conductor holder for ridge tiles
- Roof conductor holders for various roofing types
- Conventional insulated lightning protection
- Insulated isCon® lightning protection system
- Conductor bracket
- Round and flat conductors
- Connection clamps and connection terminals

### Our products are available in four different materials:

- Steel, hot-dip galvanised
- Copper
- Aluminium
- Stainless steel

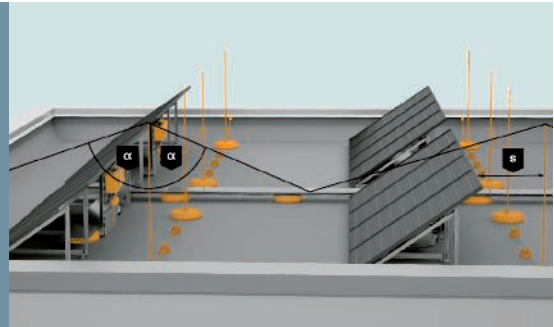


# Five steps to comprehensive protection of PV systems

## Step 1

### Lightning protection

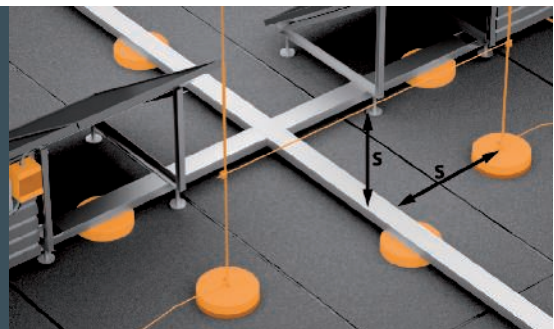
Establish protection areas for buildings and PV modules.



## Step 2

### Check the separation distance

If the required separation distance cannot be complied with, then the metallic parts must be interconnected to be able to carry lightning current.



## Step 3

### Check the protection measures

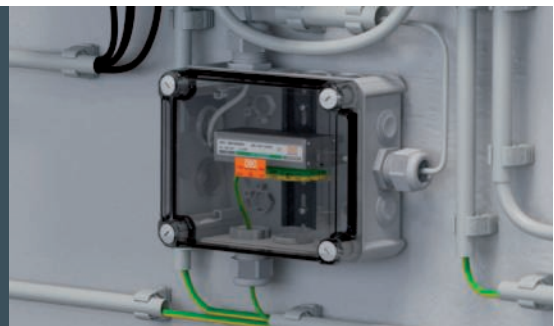
Measures for lightning protection equipotential bonding and surge protection are used on the DC and the AC side, e.g. lightning current arrester (type 1) and surge arrester T2.



## Step 4

### Include data cables

Data cables must be included in the protection concept.














## Step 5

### Carry out the equipotential bonding

Local equipotential bonding must be provided on the inverter.





Overview of protection measures					
Initial situation	Measure	Separation distance according to IEC 62305 maintained	Equipotential bonding	Surge protection	Sample product picture
<p>External lightning protection system (according to DIN EN 62305)</p> 	<p>Adapt the lightning protection system according to DIN EN 62305</p>	Yes	min. 6 mm <sup>2</sup>	<p>DC: Type 2 V20-C 3PH-1000 5094608</p> 	
		No	min. 16 mm <sup>2</sup>	<p>AC: Type 1+2 V50 3+NPE 5093526</p> 	<p>AC: Type 1+2 PV-T1+2 1100 5094250</p> 
				<p>AC: Type 1+2 V50 3+NPE 5093526</p> 	
				<p>AC: Type 2 V20-C 3PH-1000 50946008</p> 	<p>AC: Type 2 V20-C 3+NPE 50945253</p> 
<p>No outside lightning protection system earthing cable connection</p> 	<p>Requirements testing: LBO, Vds 2010, risk analysis, ...</p>	—	—	<p>AC: Type 2 V20-C 3PH-1000 50946008</p> 	<p>AC: Type 2 V20-C 3+NPE 50945253</p> 

# Planning process

Different planning processes can be used for positioning the air-termination rods: The protective angle method and the rolling sphere method. On the following pages, we present these to you in detail.

## Protective angle method

Using the protective angle method is only advisable in simple or small buildings and for individual building sections. It should therefore only be used where the building is already protected with air-termination rods whose positions were determined using the rolling sphere or grid method. The protective angle method is well suited for positioning air-termination rods providing merely additional protection for a small number of protruding building parts or structures.

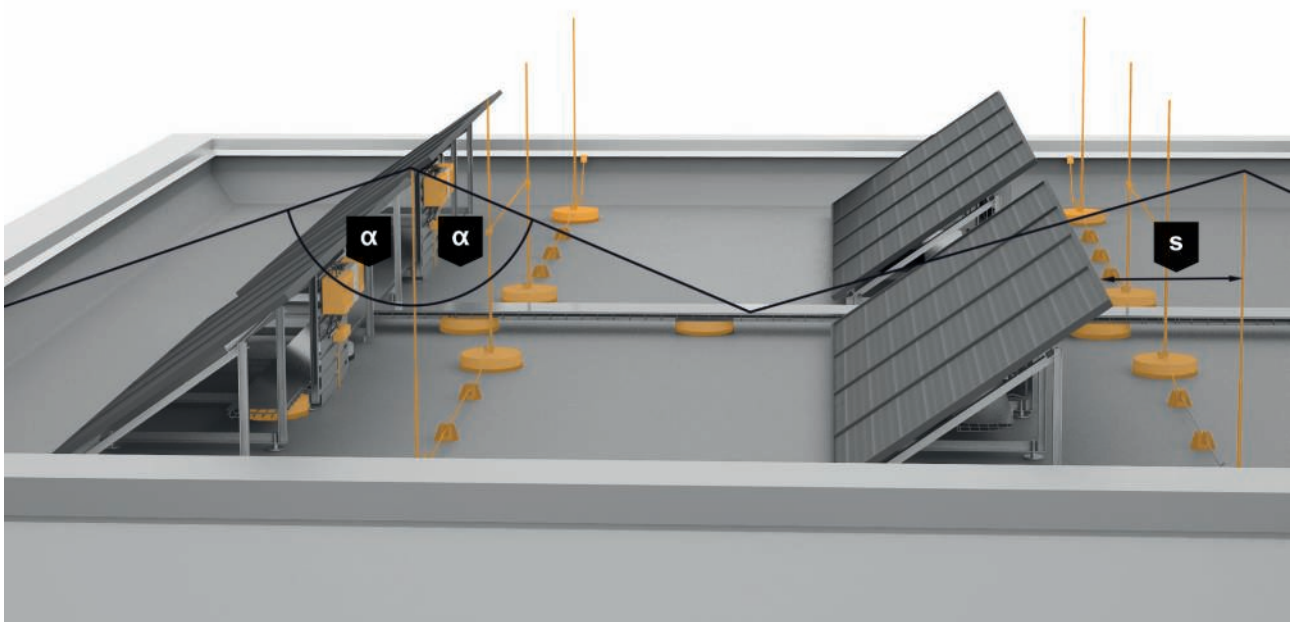
All roof structures must be protected with air-termination rods. Here, it is necessary to observe the relevant separation distance (s) between earthed roof structures and metal systems. If the roof structure has a conductive continuation into the building (e.g. with a stainless steel pipe with a connection to the ventilation or air-conditioning system), then the air-termination rod must be erected at the separation distance (s) from the object to be protected. This distance safely prevents arcing of the lightning current and dangerous spark creation.

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**α** Protective angle

---

**s** Separation distance



*Protective angle and separation distance of air-termination rods on a photovoltaic system*

The protective angle ( $\alpha$ ) for air-termination rods varies according to the lightning protection class. You can find the protective angle ( $\alpha$ ) in the table below for the most common air-termination rods of up to 2 m in length.

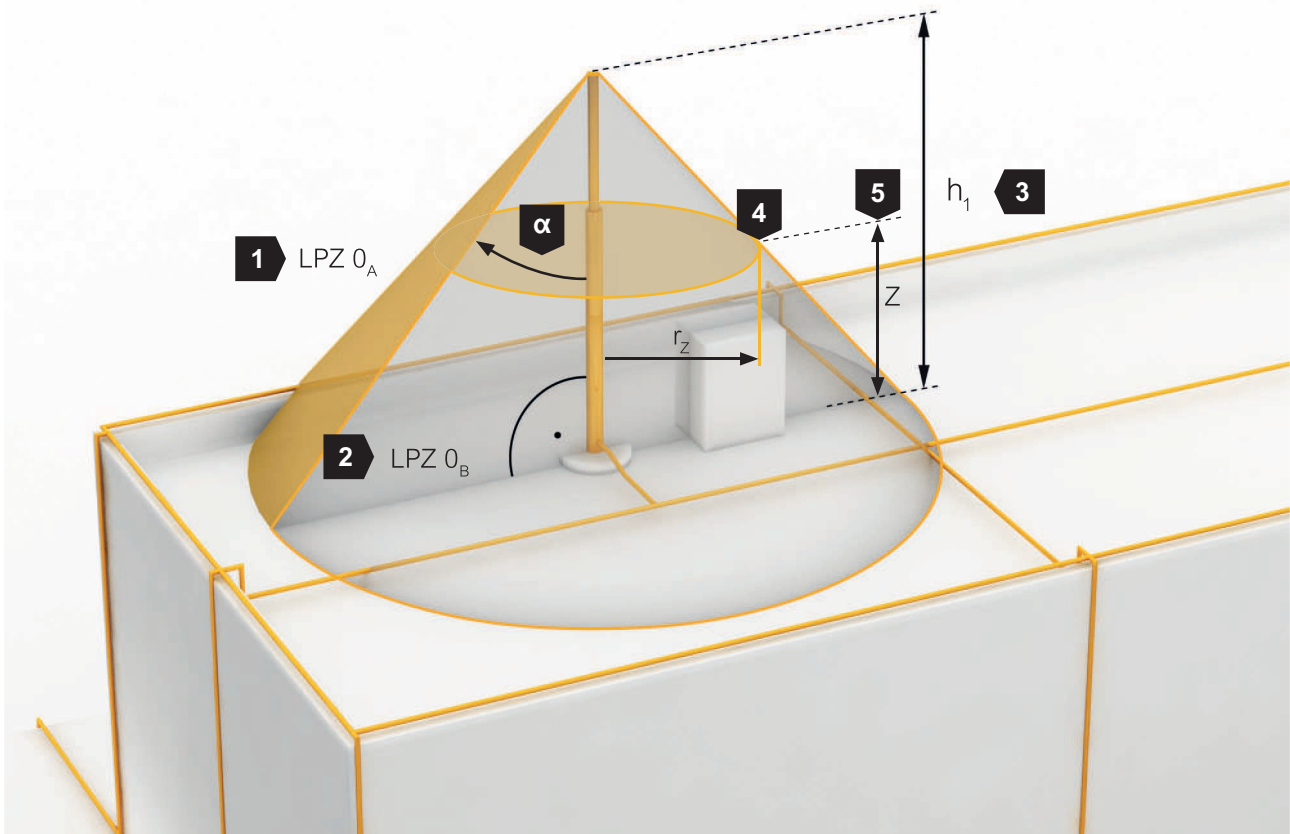
The structure to be protected (e.g. a building part or device) must be fitted with one or several air-termination rods in such a way that the structure fits fully underneath a cone sheath formed by the tips of the air-termination rods and whose top angle is taken from the table.

The areas bordered by the horizontal plane (roof surface) and the areas enclosed by the cone sheath can be considered protected areas. Should the height of the roof object to be protected be known, then the formula  $r_z = (h_1 - z) \times \tan(\alpha)$  can be used to determine the protection area of the air-termination rod or a formula conversion can be used to determine the required air-termination rod length.

$\alpha$	Protective angle
1	LPZ 0 <sub>A</sub> : Danger posed by direct lightning strikes
2	LPZ 0 <sub>B</sub> : Protected from direct lightning strikes but at risk
3	$h_1$ : Air-termination rod height
4	$r_z$ : Radius of the protected area
5	Z: Height of the protected area

Lightning protection class	Protective angle $\alpha$ for air-termination rods up to 2 m in length
I	70°
II	72°
III	76°
IV	79°

Protective angle based on lightning protection class according to VDE 0185-305-3 (IEC 62305-3) for air-termination rods up to 2 m in length



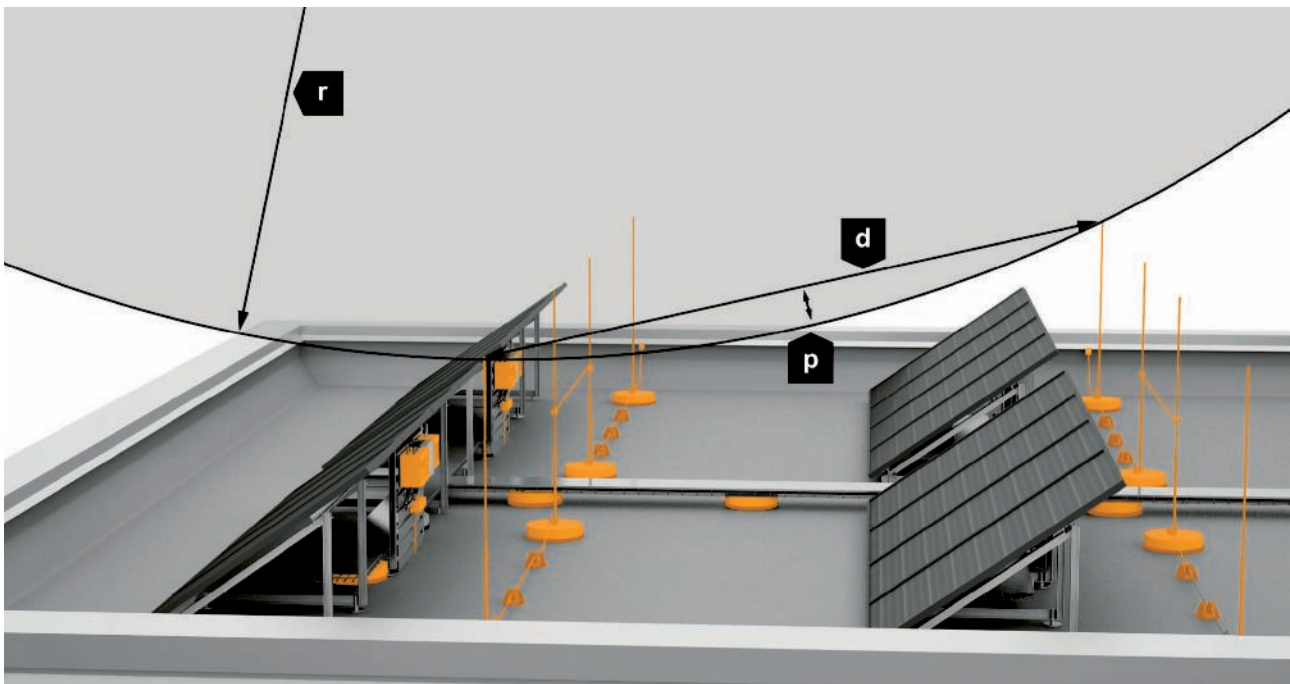
Protected area of an air-termination rod calculated with the simplified protective angle method

## Rolling sphere method: Protect roof structures with multiple air-termination rods

If you use several air-termination rods to protect an object, you must take into consideration the penetration depth between them. For a brief overview, see the table below or, to calculate the penetration depth, use the following formula:

$$p = r - \sqrt{r^2 - \left(\frac{d}{2}\right)^2}$$

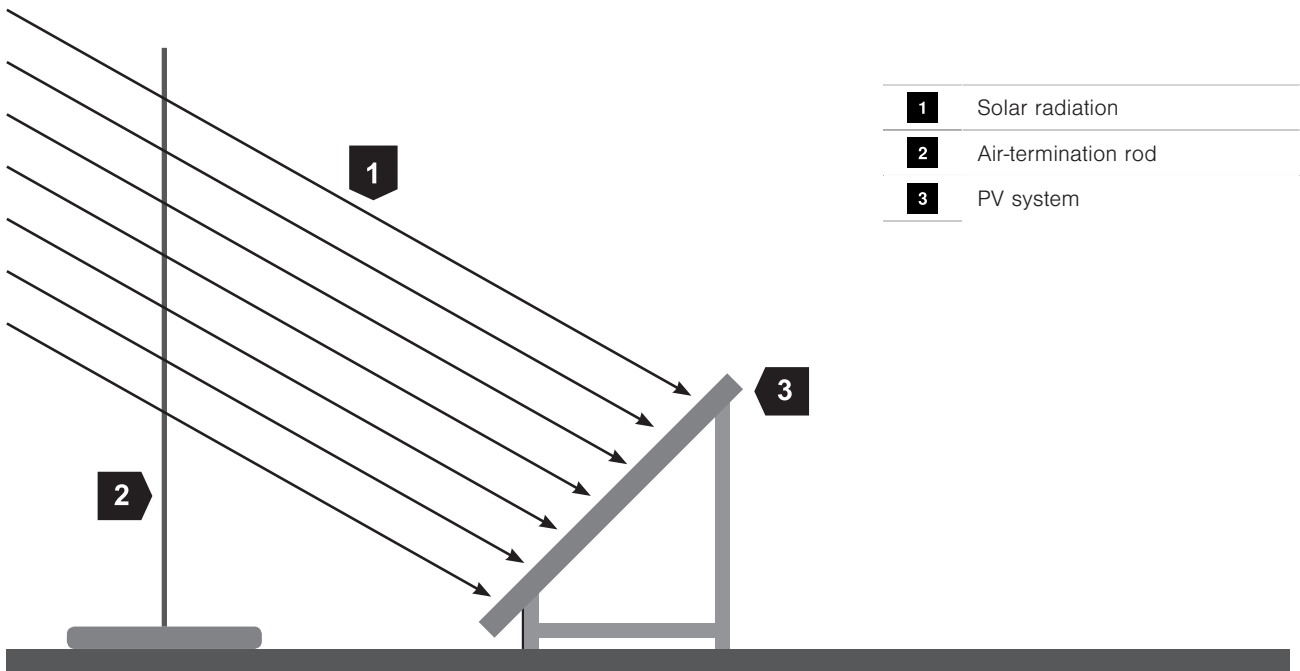
<b>p</b>	Penetration depth
<b>r</b>	Radius of rolling sphere
<b>d</b>	Distance of air-termination system



Penetration depth (p) according to the lightning protection class according to VDE 0185-305 (IEC 62305)

Distance of air-termination system (d) in m	Penetration depth, lightning protection class I, rolling sphere: r = 20 m	Penetration depth, lightning protection class II, rolling sphere: r = 30 m	Penetration depth, lightning protection class III, rolling sphere: r = 45 m	Penetration depth, lightning protection class IV, rolling sphere: r = 60 m
2	0.03	0.02	0.01	0.01
3	0.06	0.04	0.03	0.02
4	0.10	0.07	0.04	0.04
5	0.16	0.10	0.07	0.05
10	0.64	0.42	0.28	0.21
15	1.46	0.96	0.63	0.47
20	2.68	1.72	1.13	0.84

Penetration depth (p) according to the lightning protection class according to VDE 0185-305 (IEC 62305)



An air-termination rod casting a shadow on a PV module

## Avoiding shade from the lightning protection system

The position of the air-termination rods should be chosen so that there is no shading of the PV modules. This is because a core shadow can cause performance reductions of the whole string.

For this reason, an air-termination rod must be at least 108 x diameter from the PV module (DIN EN 62305-3 Suppl. 5). Please note that the PV system must remain in the protection area of the air-termination rod.

Diameter of the air-termination system (m)	Distance between the air-termination system and the PV module (m)
0.008	0.86
0.010	1.08
0.016	1.73

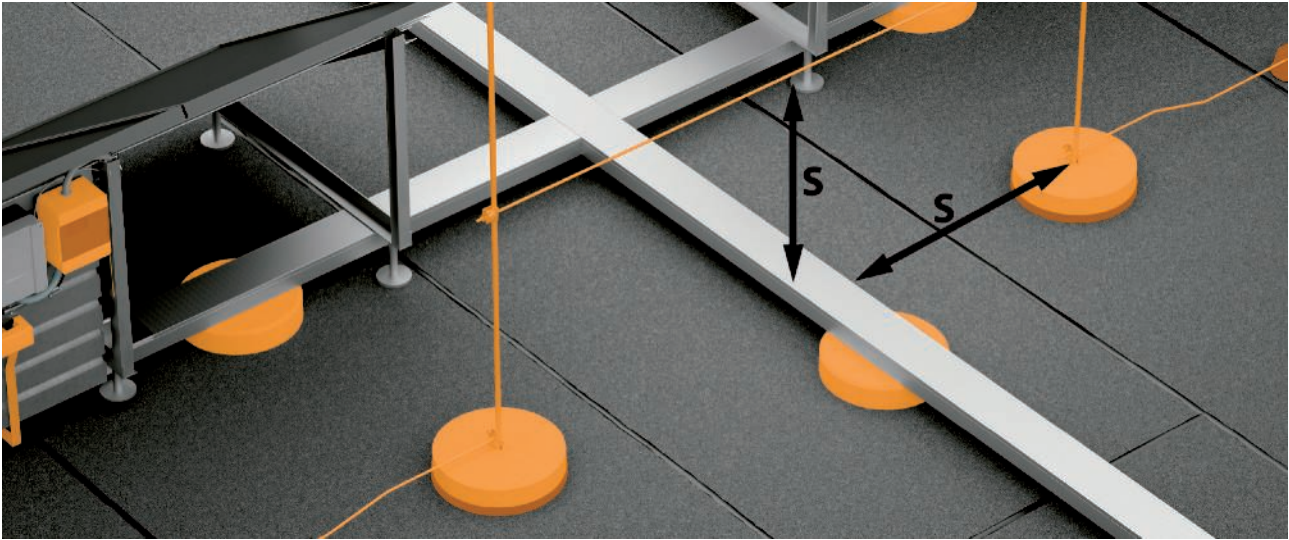
Minimum distance from the air-termination systems, to avoid a core shadow

# Plan the distance, increase the protection



*Insulated lightning protection with OBO isCon® to maintain the separation distance (s)*

The physical distance of a PV system to the external lightning protection system should be maintained as much as possible, in order to protect it. The typical values are between 0.5 m and 1 m. If this is not possible due to local circumstances, then the necessary distance may be undershot, if the system is included in the external lightning protection system or an insulated system is being created, e.g. with the high-voltage-resistant, insulated isCon® conductor.

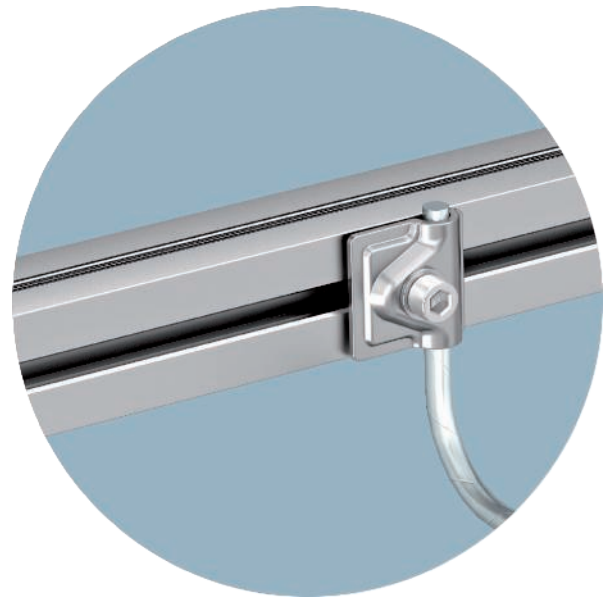


Insulated lightning protection with correctly maintained separation distance (s)

## The decisive factor: The separation distance (s)

If there is an adequate distance between the conductor through which the lightning current flows and the metallic building parts, the risk of flashover, e.g. on the supply lines to the inverter, is virtually eliminated. This distance is described as the separation distance (s).

**The separation distance (s) does not prevent inductively coupled surge voltages!**



Lightning protection equipotential bonding system on PV mounting system

$$s = k_i \frac{k_c}{k_m} L(m)$$

Formula for calculating the separation distance

$k_i$	Dependent on the selected protection class of the lightning protection system
$k_c$	Dependent on the (partial) lightning current that flows in the conductors
$k_m$	Dependent on the material of the electrical insulation
L (m)	Vertical distance from the point at which the separation distance (s) is to be calculated up to the closest point of the equipotential bonding



*Lightning protection conductor on a rainwater downpipe*



*Direct connection of the PV mounting frames to the lightning protection system*

## If the separation distance cannot be maintained

If the separation distance according to VDE 0185-305-3 (IEC/EN 62305-3) cannot be maintained for construction reasons, then the PV system must be connected to the lightning protection system using tested components with 16 mm<sup>2</sup> CU or 50 mm<sup>2</sup> aluminium (RD8).

Lightning protection components for connection must be tested according to VDE 0185-561-1 (IEC/EN 62561-1). In these cases, type 1 (class I) surge protective devices or combination arresters of type 1+2 (class I+II) are required on the DC side, as lightning currents cannot be managed within buildings.

The necessary lightning protection equipotential bonding achieved in this way connects all the metallic and electrically conductive components of the system, including the earthing system, with the standardised lightning protection system. According to VDE 0185-305 Parts 3 and 4 (IEC/EN 62305-3, -4), surge protective devices (SPDs) of type 1 (class I) or combination arresters of type 1+2 (class I+II) must be used for the cables running into the building.

This applies both on roofs and on the ground, and for the AC and the DC side of the PV power supply system. Of importance for the question regarding the necessity of surge protection measures are DIN VDE 0100-443 (VDE 0100-443) and DIN VDE 0100-712 (VDE 0100-712).



*SPD type 1+2 for the PV DC side*

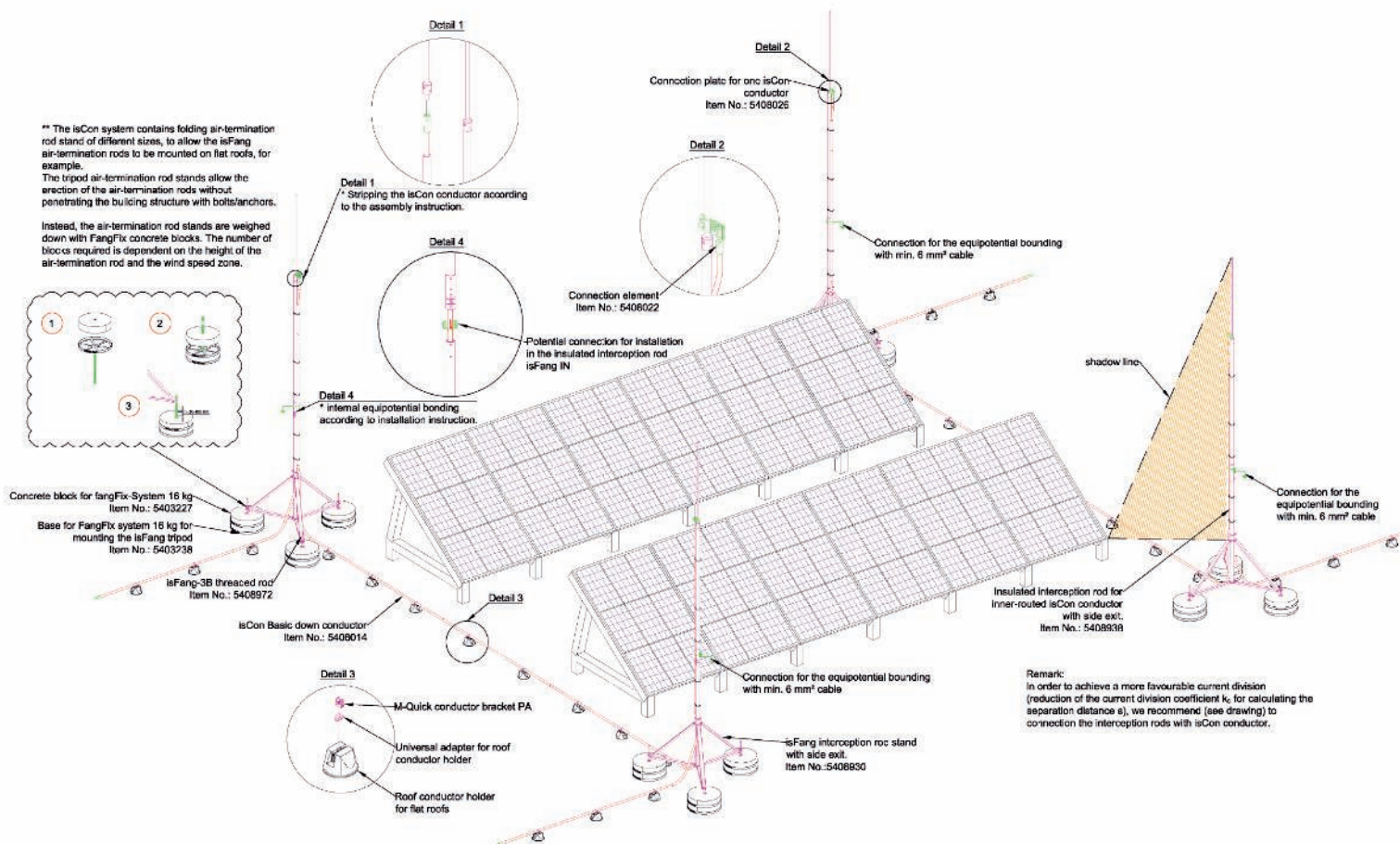


## **Metallic building components and external lightning protection**

A separation distance does not have to be observed in buildings with cross-connected, durable walls and roofs or with cross-connected metal facades and metal roofs. Metallic components with no conductive lead into the building to be protected, and whose distance to the conductor of the external lightning protection system is less than one metre, must be connected directly to the lightning protection system. These include, although are not limited to, metallic railings, doors, pipes (with non-flammable and/or explosive contents) and facade elements.

# The safe solution: OBO isCon®

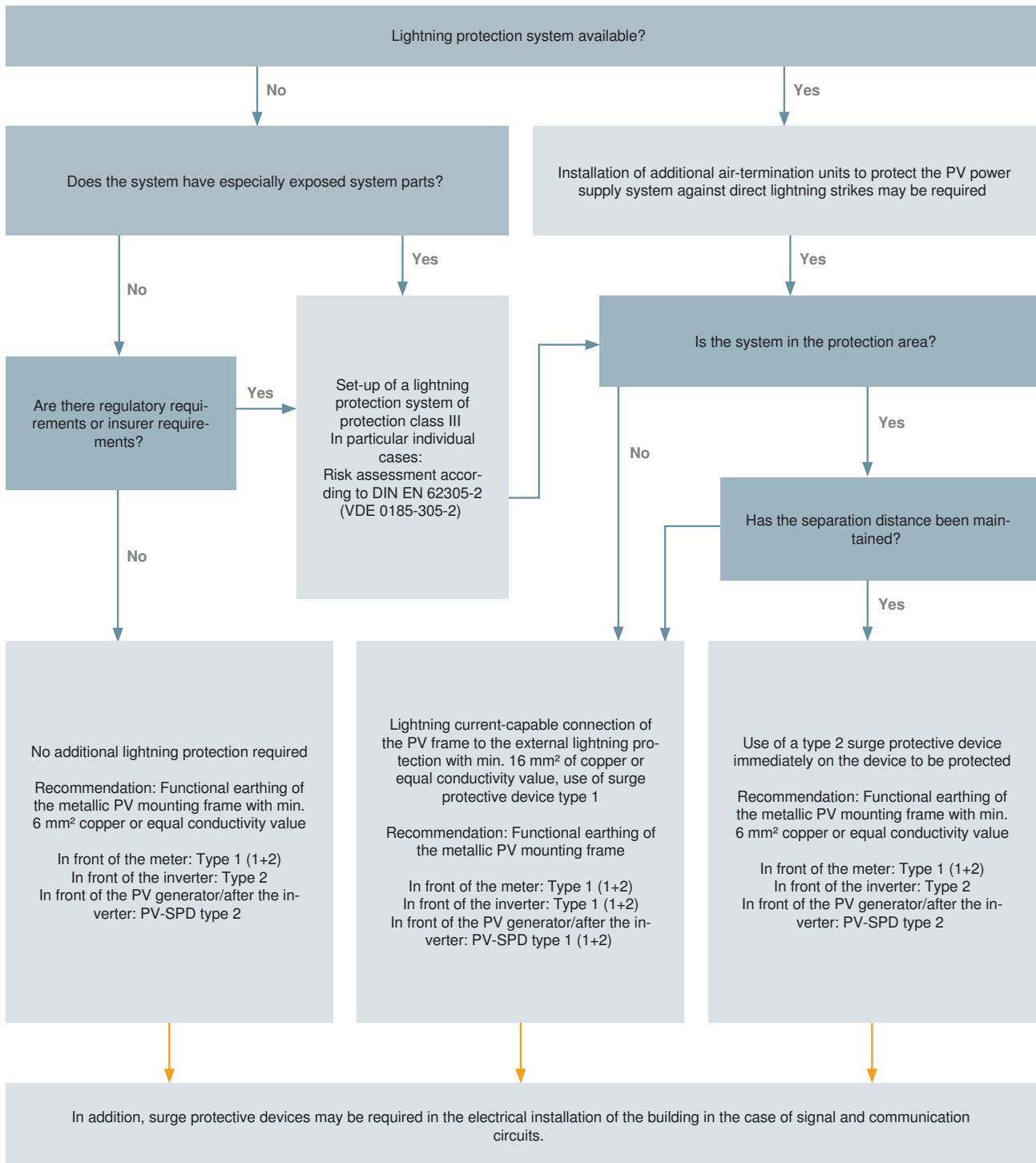
The separation distance can be maintained safely using the high-voltage-resistant, insulated isCon® system from OBO. The insulated isFang air-termination systems with the isCon® conductor are tested according to VDE V 0185-561-8 (IEC TS 62561-8) and, with correct planning, can minimise shading. This increases the cost-effectiveness of the entire system.



Example of a planned, insulated lightning protection system with isCon®

# Selection of protection measures

according to DIN EN 62305-3 Suppl. 5 (VDE 0185-305-3 Suppl. 5):2014-02



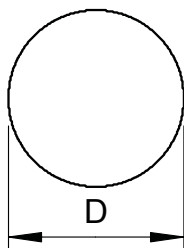
**Relevant standard**

- VDE 0185-305-1 to -4 (IEC 62305-1 to -4)
- E DIN VDE 0100-712
- DIN VDE 0185-305-3, Supplement 5

*This data makes no claim to completeness!  
Please observe the appropriate local and statutory requirements.*

## Round conductor, aluminium

Alu

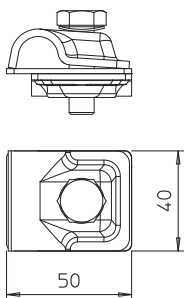
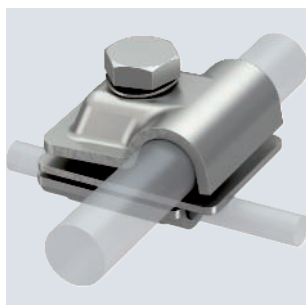


Type	Nominal size Ø mm	Cross-section mm <sup>2</sup>	Normal ring ca. m	Normal ring ca. kg	Min. ordering quantity m	Item no.
<b>RD 8-ALU-T</b>	8	50	150	20	150	<b>5021294</b>
<b>RD 8-ALU-T 75</b>	8	50	75	10	75	<b>5021296</b>

- According to DIN EN 62561-2 (VDE 0185-561-2)
- Corresponds to the requirements of VDE 0185-305 (IEC 62305)
- RD 8 ALU: Semi-hard (E-ALMgSi0.5 corresponds to DIN 48801)
- RD 8 ALU-T: Can be subjected to torsion (E-ALMgSi0.5 corresponds to DIN 48801)
- RD 10 ALU: Pure aluminium (E-Al corresponds to DIN 48801)
- AL and ALMgSi may not be routed directly on, in or under plaster, mortar or concrete, nor routed in the earth

## Vario quick connector Rd 8-10x16

A2

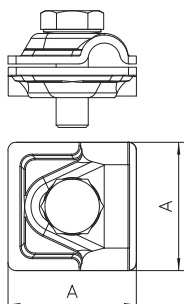
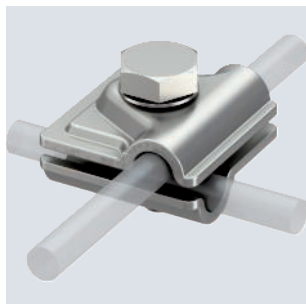


Type	Fit mm	Dim. A mm	Lightning current carrying capacity kA	Min. ordering quantity Piece	Item no.
<b>249 8-10X16 VA</b>	8-10x16	40	H/100	10	<b>5311590</b>

- For T, cross-over and parallel connections with adapter plates
- Quick mounting using an M10 x 30 bolt, made from rustproof stainless steel
- With sprung washer to DIN 137
- Corresponds to the requirements of VDE 0185-305 (IEC 62305)

## Vario quick connector

A2

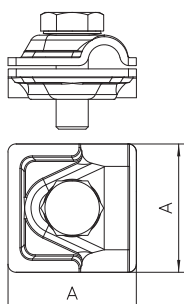
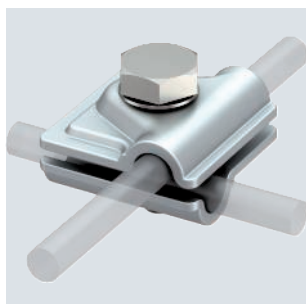


Type	Fit mm	Dim. A mm	Lightning current carrying capacity kA	Min. ordering quantity Piece	Item no.
<b>249 8-10 VA</b>	Rd 8-10	40	H/100	10	<b>5311551</b>

- For T, cross and parallel connectors
- Quick installation using hexagonal bolt M10 x 30, high-grade stainless steel
- Conforms to the requirements according to DIN VDE 0185-305 (IEC 62305)

## Vario quick connector

Alu



Type	Fit mm	Dim. A mm	Lightning current carrying capacity kA	Min. ordering quantity Piece	Item no.
<b>249 8-10 ALU</b>	Rd 8-10	44	H/100	30	<b>5311519</b>

- For T, cross and parallel connectors
- Quick installation using hexagonal bolt M10 x 30, high-grade stainless steel
- Conforms to the requirements according to DIN VDE 0185-305 (IEC 62305)

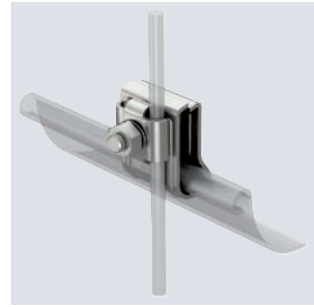
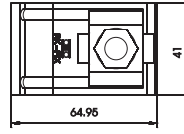
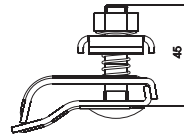
A2



### Gutter clamp RK-FIX

Type	Fit mm	Lightning current carrying capacity kA	Dim. A mm	Material	Min. order- ing quan- tity Piece	Item no.
<b>RK-FIX VA</b>	2 x Rd 8/ 2 x Rd 6	H/100		A2	10	<b>5316459</b>

- For up to 2 round conductors Rd 6 or Rd 8
- Suitable for all bead thicknesses (15–25 mm)
- With 1 truss-head bolt M10 x 45
- With spring for prefixing on rain gutter
- Clamp body and crossbar made of rustproof stainless steel (V2A)
- Nut, bolt and spring made of stainless steel (V2A)
- Tested to VDE 0185-561-1 (IEC/EN 62561-1)

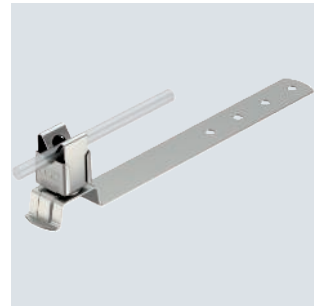
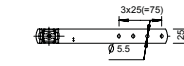
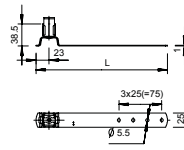


A2

### Roof conductor holder for tiled roofs, Rd 8

Type	Fit mm	Installation height mm	Length mm	Min. order- ing quan- tity Piece	Item no.
<b>157 F-VA 280</b>	Rd 8	38.5	280	20	<b>5215579</b>

- Conductor holder from stainless steel (V2A)
- Including drill hole in bottom section for quick installation

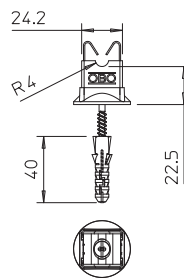


A2

### Cable bracket for Rd 8 mm, fastening with screw and anchor

Type	Fit mm	Installation height mm	Min. order- ing quan- tity Piece	Item no.
<b>177 20 VA B-HD</b>	Rd 8	20	50	<b>5207901</b>

- With female thread M8 or through hole Ø 5 mm
- From stainless steel (V2A)
- With pre-mounted wood screws (5 x 60) and plastic dowels (8 x 40)



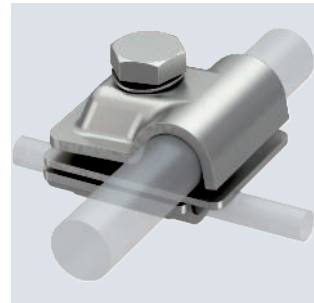
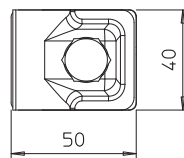
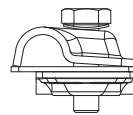
A2



### Vario quick connector Rd 8-10x16

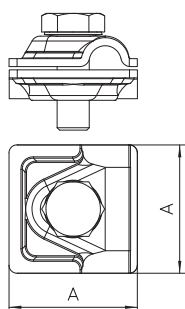
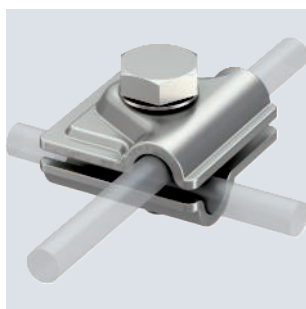
Type	Fit mm	Dim. A mm	Lightning current carrying capacity kA	Min. order- ing quan- tity Piece	Item no.
<b>249 8-10X16 VA</b>	8-10x16	40	H/100	10	<b>5311590</b>

- For T, cross-over and parallel connections with adapter plates
- Quick mounting using an M10 x 30 bolt, made from rustproof stainless steel
- With sprung washer to DIN 137
- Corresponds to the requirements of VDE 0185-305 (IEC 62305)



## Vario quick connector

A2

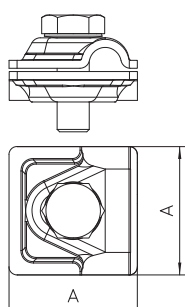
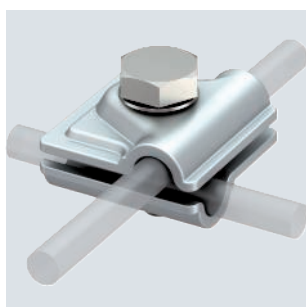


Type	Fit mm	Dim. A mm	Lightning current carrying capacity kA	Min. order- ing quan- tity Piece	Item no.
<b>249 8-10 VA</b>	Rd 8-10	40	H/100	10	<b>5311551</b>

- For T, cross and parallel connectors
- Quick installation using hexagonal bolt M10 x 30, high-grade stainless steel
- Conforms to the requirements according to DIN VDE 0185-305 (IEC 62305)

## Vario quick connector

Alu

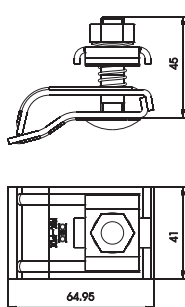
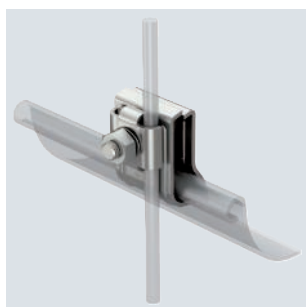


Type	Fit mm	Dim. A mm	Lightning current carrying capacity kA	Min. order- ing quan- tity Piece	Item no.
<b>249 8-10 ALU</b>	Rd 8-10	44	H/100	30	<b>5311519</b>

- For T, cross and parallel connectors
- Quick installation using hexagonal bolt M10 x 30, high-grade stainless steel
- Conforms to the requirements according to DIN VDE 0185-305 (IEC 62305)

## Gutter clamp RK-FIX

A2

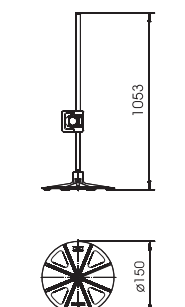


Type	Fit mm	Lightning current carrying capacity kA	Material	Min. order- ing quan- tity Piece	Item no.
<b>RK-FIX VA</b>	2xRd 8/ 2xRd 6	H/100	A2	10	<b>5316459</b>

- For up to 2 round conductors Rd 6 or Rd 8
- Suitable for all bead thicknesses (15–25 mm)
- With 1 truss-head bolt M10 x 45
- With spring for prefixing on rain gutter
- Clamp body and crossbar made of rustproof stainless steel (V2A)
- Nut, bolt and spring made of stainless steel (V2A)
- Tested to VDE 0185-561-1 (IEC/EN 62561-1)

## Stand for FangFix Junior system

Alu



Type	Length mm	Nominal size Ø mm	Min. order- ing quan- tity Piece	Item no.
<b>F-FIX-JUNIOR</b>	1000	10	10	<b>5403308</b>

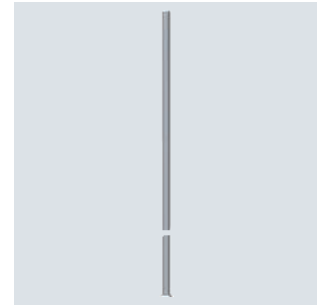
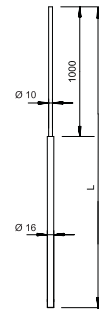
- Incl. aluminium air-termination rod 1,000 mm long (Ø 10 mm)
- Quick mounting of the air-termination rod in the base using plug technology
- With Vario quick connector 249

Alu

Tapered pipe air-termination rod

Type	Length mm	Nominal size Ø mm	Min. ordering quantity Piece	Item no.
101 VL1500	1500	10/16	1	5401980
101 VL2000	2000	10/16	1	5401983
101 VL3000	3000	10/16	1	5401989

- Suitable for wind loads according to Eurocode 1: DIN EN 1991-1-4
- From a free length of > 2.5 m, an additional fastening, e.g. insulated spacer is recommended
- Last metre is tapered from Ø 16 mm to Ø 10 mm, material: AlMgSi
- Matches stand system FangFix

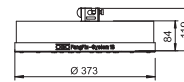


BET

Stand for FangFix system, min. 16 kg

Type	Fit mm	Nominal size Ø mm	Min. ordering quantity Piece	Item no.
F-FIX-16	Rd 8	373	1	5403200

- System consisting of FangFix block with edge protection and clamp
- FangFix clamp made of VA; complies with the requirements of VDE 0185-305 (IEC 62305)
- Min. 16 kg block of Ø 365 mm, high level of stability
- Quick and easy installation of air-termination rod using anchors
- Frost-resistant concrete
- The FangFix block can be stacked
- Suitable for Ø 16 mm pipe air-termination rods

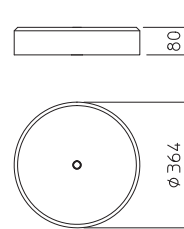


BET

Concrete base for FangFix system, min. 16 kg

Type	Nominal size Ø mm	Min. ordering quantity Piece	Item no.
F-FIX-S16	365	1	5403227

- Min. 16 kg block of Ø 365 mm, high level of stability
- Frost-resistant concrete
- Stackable

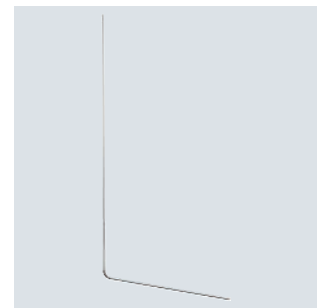
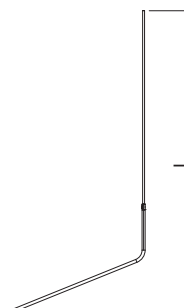


Alu

Angled air-termination rod for PV frames

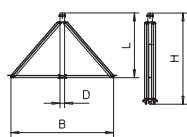
Type	Length mm	Nominal size Ø mm	Min. ordering quantity Piece	Item no.
101 VL2000 112	2000	10/16	10	5401950

- Suitable for wind loads according to Eurocode 1: DIN EN 1991-1-4
- Last metre is tapered from Ø 16 mm to Ø 10 mm, material: AlMgSi
- Angled to 112°



## isFang tripod

A2 Alu

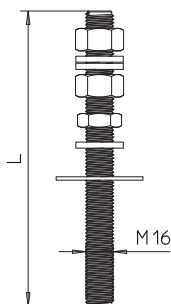


Type	Dim. B mm	Dim. D Ø mm	Dim. L mm	Dim. H mm	Min. ordering quantity Piece	Item no.
isFang 3B-150 AL	1500	40	900	1275	1	5408967
isFang 3B-100	1000	40	600	885	1	5408968

- Installation of free-standing air-termination rods as well as insulated air-termination rods with 40 mm diameter
- Roof slope to max. 5 degrees
- Incl. Rd 8–10 crossbar for quick round conductor fastening
- Concrete base as well as threaded rods should be ordered separately

## isFang-3B threaded rod

A2

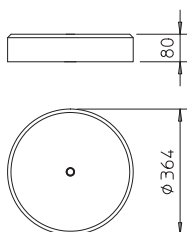


Type	Dim. L mm	Min. ordering quantity Piece	Item no.
isFang 3B-G2	340	3	5408972
isFang 3B-G3	430	3	5408973

- For fastening on one, two, three or four FangFix concrete bases with tripod stand

## Concrete base for FangFix system, min. 16 kg

BET

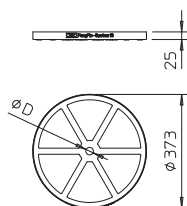
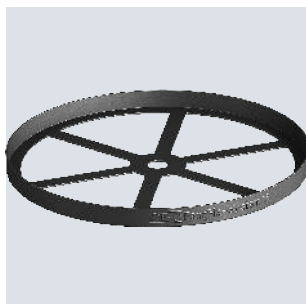


Type	Nominal size Ø mm	Min. ordering quantity Piece	Item no.
F-FIX-S16	365	1	5403227

- Min. 16 kg block of Ø 365 mm, high level of stability
- Frost-resistant concrete
- Stackable

## Base for FangFix system 16 kg for mounting the isFang tripod

PP



Type	Nominal size Ø mm	Dim. D Ø mm	Min. ordering quantity Piece	Item no.
F-FIX-B16 3B	373	25	10	5403238

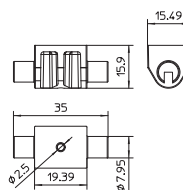
- Edge protection with through hole
- For mounting isFang-3B threaded rod and FangFix concrete block F-FIX-S16

PP

### Universal flat conductor adapter for roof conductor holder, type 165/MBG

Type	Colour	Fit mm	Min. ordering quantity Piece	Item no.
165 MBG UH	Black	Rd 8	25	5218882

- Universal adapter with drill hole Ø 2.5 mm
- E.g. for OBO Golden Sprint screw, type 4758 4 x L (L = depending on application)
- For fastening to 165/MBG

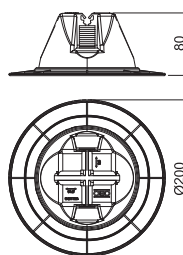


PP/PE

### Roof conductor holder for flat roofs, with increased base section

Type	Fit mm	Min. ordering quantity Piece	Item no.
165 MBG-8-10 200	Rd 8-10	4	5218716

- Closed form with base
- With double conductor holder
- Filling weight 1 kg (frost-resistant concrete)
- Sleeve made from polyethylene, black, UV-resistant and weatherproof
- Base made of polypropylene, black, UV-resistant and weather-resistant
- With larger base section (Ø 200 mm) for better stability

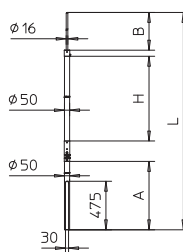


GFK

### Insulated air-termination rod for inner-routed isCon® conductor with side exit

Type	Dim. D Ø mm	Dim. A mm	Dim. H mm	Dim. B mm	Dim. Length mm	Min. ordering quantity Piece	Item no.
isFang IN-A 4000	50	1325	1500	1000	4000	1	5408938
isFang IN-A 6000	50	3325	1500	1000	6000	1	5408940

- For installation of the OBO isCon® Pro+ conductor in the pipe
- With side conductor outlet matching isFang air-termination rod stand with side outlet, type isFang 3B-A
- Suitable for wind loads according to Eurocode 1: DIN EN 1991-1-4
- Inclusive connection element (type isCon IN connect)
- Inclusive potential connection (type isCon In PAE)
- Aluminium standpipe and air-termination tip
- Centre section made of fibre-glass reinforced plastic (GRP)

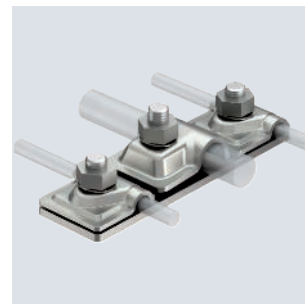
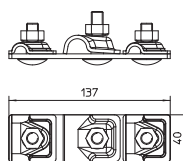


A2

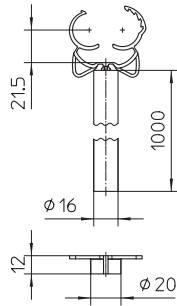
### Connection plate for two isCon® conductors

Type	Dimension	Min. ordering quantity Piece	Item no.
isCon AP2-16 VA	16x8-10mm	1	5408028
isCon AP1-16 VA	16x8-10mm	1	5408026

- Connection plate to connect two isCon® conductors with air-termination rod Ø 16 mm, tested up to 150 kA (lightning protection class II)



## Spacer

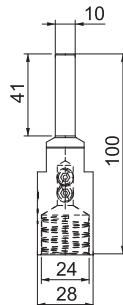


Type	Clamping range D mm	Min. ordering quantity Piece	Item no.
isCon DH	23-26	2	5408043

For stand-off installation of the isCon® conductor in the area of the connection, incl. reducing sleeve for mounting on FangFix concrete block 10 Kg.

## isCon® connection element

A2

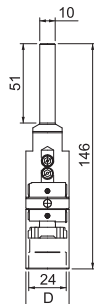


Type	Dim. D Ø mm	Fit mm	Lightning current carrying capacity kA	Min. ordering quantity Piece	Item no.
isCon connect	28	23	H1/150	2	5408022

- Screw-on termination of the connection for the isCon® conductor
- Incl. heat-shrinkable sleeve, hexagonal
- Tested up to 200 kA (lightning protection class I)

## isCon® connection element set ASE, testable

A2



Type	Dim. D Ø mm	Fit mm	Min. ordering quantity Piece	Item no.
isCon ASE 23	28	23	1	5408080

- For the isCon® Pro+ and Premium conductor
- Set consisting of 2 testable connection elements
- For function and state determination with integrated ASE technology (Adaptive Switching Element)
- For comprehensive repeat testing according to VDE 0185-305-3 (IEC/EN 62305-3)
- Screw-on termination
- Testable with the simplest insulation measuring devices ( $\geq 1$  kV DC)
- Can be used in all lightning protection classes
- For highest system availability – no switch-off, dismantling or testing with dangerous pulse voltages
- QR code to open the test report
- Incl. heat-shrinkable hose and Allen key

A2

### isCon® connection elements set ASE, testable for isFang IN

Type	Dim.		Fit	Min. ordering quantity	Item no.
	Ø mm	mm			
isCon ASE 23 IN	28	23	1		5408082

- For the isCon® Pro+ and Premium conductor
- Set consisting of 2 testable connection elements
- Connection and routing of the cable in the insulated air-termination mast
- For function and state determination with integrated ASE technology (Adaptive Switching Element)
- For comprehensive repeat testing according to VDE 0185-305-3 (IEC/EN 62305-3)
- Screw-on termination
- Testable with the simplest insulation measuring devices ( $\geq 1$  kV DC)
- Can be used in all lightning protection classes
- For highest system availability – no switch-off, dismantling or testing with dangerous pulse voltages
- QR code to open the test report
- Incl. heat-shrinkable hose and Allen key

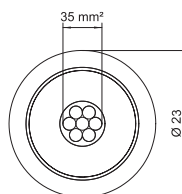


### isCon® conductor, Professional plus, black

Type	Cross-section mm <sup>2</sup>	Nominal size Ø mm	Equivalent separation distance m	Min. ordering quantity m	Item no.
isCon Pro+ 75 SW	35	23	0.75	100	5408004
isCon Pro+ 75 SW	35	23	0.75	250	5408006

Please refer to the mounting instructions for information on routing the OBO isCon® conductor.

- Highly voltage-resistant, insulated conductor
- Floating discharge-free
- Additional mechanical protection (black protective jacket)
- For maintenance of the separation distance according to IEC 62305 (VDE 0185-305-3)
- Tested according to IEC/EN 62561-1 (VDE 0185-561-1) with H1/150 kA
- Equivalent separation distance  $se \leq 0.75$  m (air) and  $se \leq 1.5$  (solid material)
- Tested according to IEC TS 62561-8 (VDE V 0185-561-8)
- Halogen-free
- Fire load 4.3 kWh/m
- Can be used in potentially explosive areas Ex zone 1/2 and 21/22 when taking the current mounting instructions into account

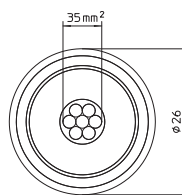


### isCon® conductor, Professional plus, grey

Type	Cross-section mm <sup>2</sup>	Nominal size Ø mm	Equivalent separation distance m	Min. ordering quantity m	Item no.
isCon Pro+ 75 GR	35	26	0.75	100	5407997

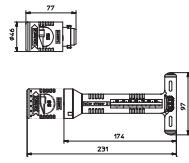
Please refer to the mounting instructions for information on routing the OBO isCon® conductor.

- Highly voltage-resistant, insulated conductor
- Protection against contact voltage during rain (VDE 0432-1 (IEC/EN 60060-1))
- Floating discharge-free
- Additional mechanical protection (double protective jacket)
- For maintenance of the separation distance according to IEC 62305 (VDE 0185-305-3)
- Tested according to IEC/EN 62561-1 (VDE 0185-561-1) with H1/150 kA
- Equivalent separation distance  $se \leq 0.75$  m (air) and  $se \leq 1.5$  (solid material)
- Tested according to IEC TS 62561-8 (VDE V 0185-561-8)
- Halogen-free
- Fire load 5.1 kWh/m
- Protection against contact voltage under sprinkling (VDE 0432-1 (IEC/EN 60060-1))
- Can be used in potentially explosive areas Ex zone 1/2 and 21/22 when taking the current mounting instructions into account



## Stripping tool for isCon® conductor

PA/  
PE

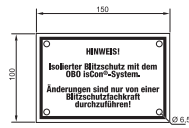
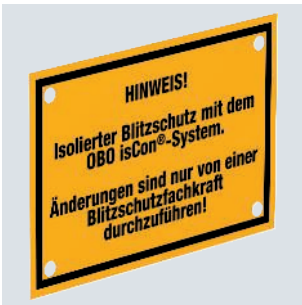


Type	Clamping range D mm	Min. ordering quantity Piece	Item no.
isCon stripper 2	20-23	1	5408013

Stripping tool to remove the insulation of the OBO isCon® conductor.

## isCon® information panel

PS

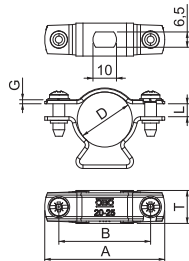


Type	Min. ordering quantity Piece	Item no.
isCon HWS	1	5408058

Label: "NOTE! Insulated lightning protection with the OBO isCon® system. Only a lightning protection specialist may carry out changes"  
 • To label the lightning protection system  
 • Self-adhesive and with 4 fastening holes  $\varnothing$  6.5 mm

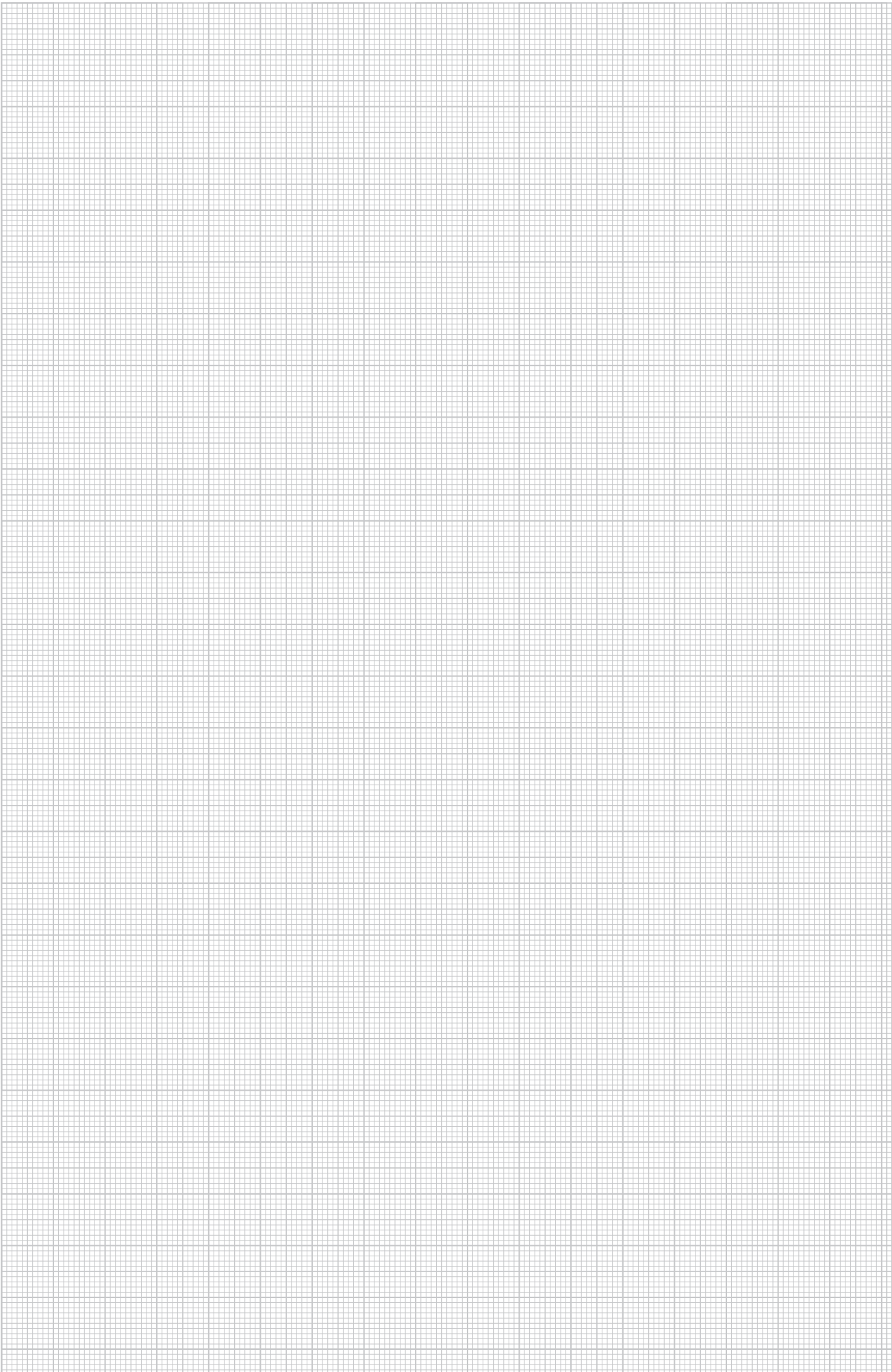
## VA cable bracket for isCon® conductor for mounting on roof/wall structures

A2

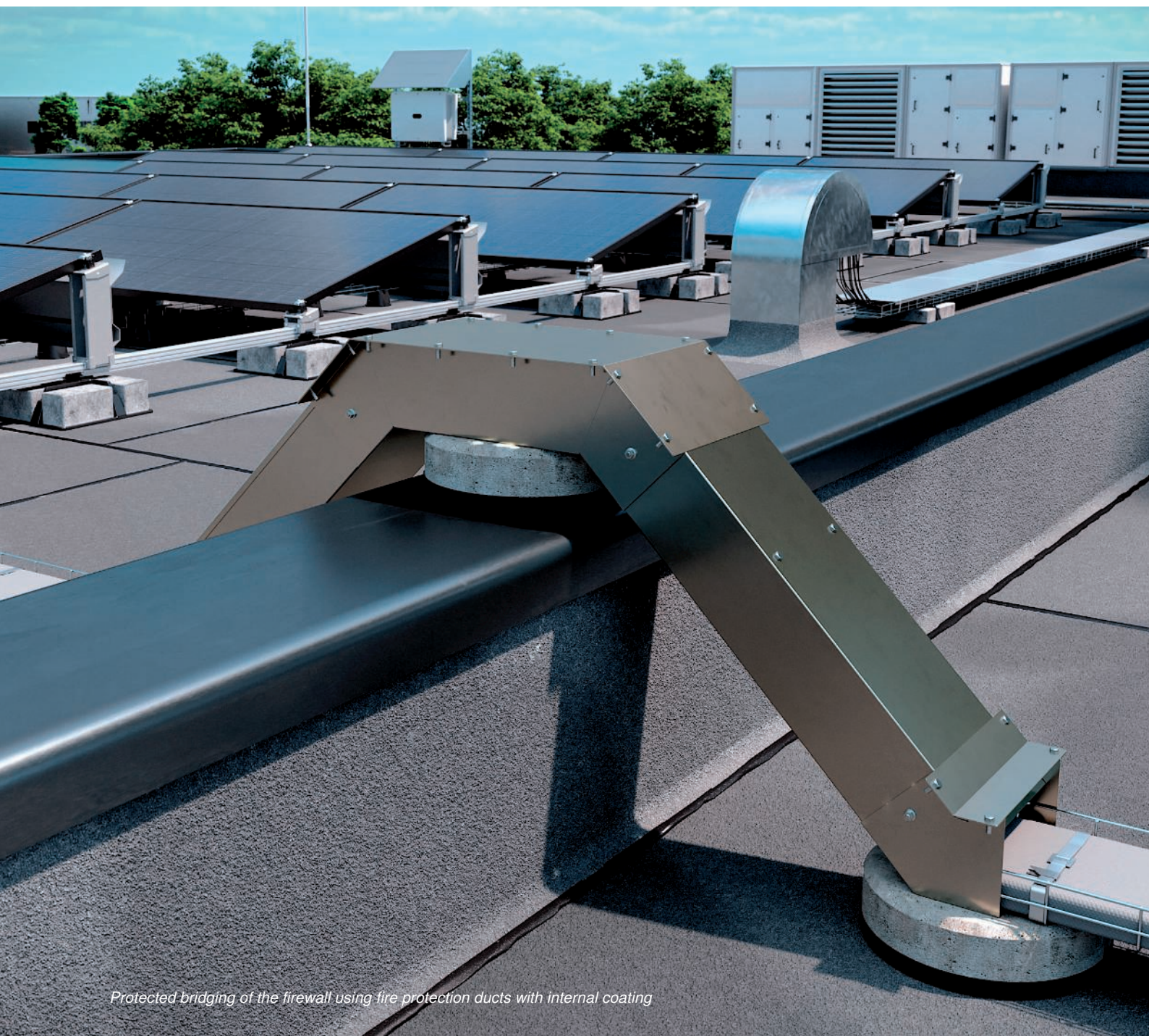


Type	Dim. D $\varnothing$ mm	Dim. A mm	Dim. B mm	Dim. L mm	Dim. T mm	Min. ordering quantity Piece	Item no.
isCon H VA	23	51	39	2.5	14	50	5408056

• For isCon® conductor for mounting on roof/wall structures  
 • With sprung discs to protect the screws against loosening



# Building fire protection for outdoor applications



*Protected bridging of the firewall using fire protection ducts with internal coating*

## Cable routing over firewalls

Combustible cables may not be run over firewalls without fire protection measures. In the event of a fire, they would spread the fire to the neighbouring roof area.

Two solutions are available to bridge firewalls in a protected manner, thus preventing fire from spreading:

- Routing of the PV cables in extremely robust PYROLINE® PLMR stainless steel ducts
- Wrapping of the cable bundles with the flexible, weatherproof PYROWRAP® Wet FSB-WB cable bandage

When there is a fire, the substances forming an insulation layer, which are contained in both solutions, foam up and prevent the spread of fire via the PV cables.

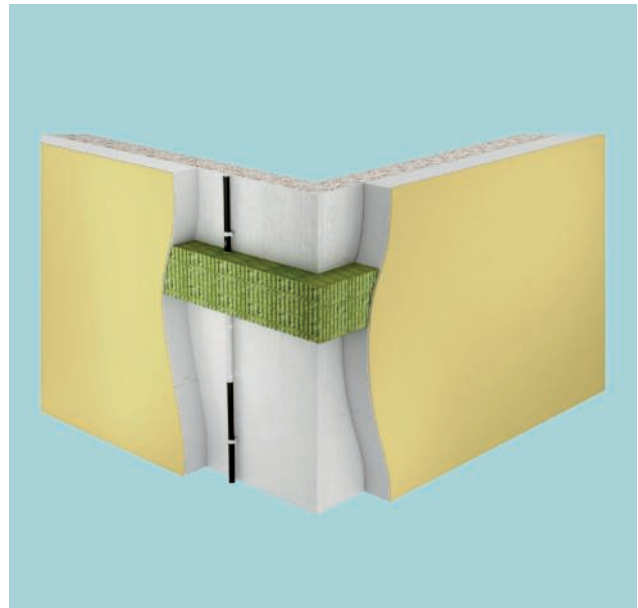
Alternatively, this solution can be used on the insulated isCon® lightning protection conductor.



*Fire protection bandage to prevent fire from spreading*

#### **Insulated lightning protection under external thermal insulation composite systems (ETICS)**

If isCon® cables are routed within an external thermal insulation composite system (ETICS), then they may penetrate fire locks made of non-combustible substances. If there is a fire, the fire locks may even fail. Here, the PYROWRAP® Wet FSB-WB cable bandage is again used, which prevents the fire from spreading. Whilst the insulation burns and openings are created, the insulation layer creator foams them up again. This safely prevents a chimney effect via the isCon® conductor.



*Fire protection bandage to prevent fire from spreading via isCon® in external thermal insulation composite systems (ETICS)*

# Building fire protection

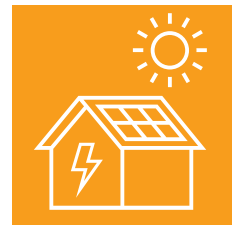


In some cases, the cables carrying direct current must still be routed through the building up to the inverter. If the installations are in rescue routes, then the PV DC cables must either be routed out of reach or in encapsulated form. The OBO PYROLINE® Sun PV fire protection ducts are suitable for this. They are made of non-conductive lightweight concrete and fulfil the construction requirements as installation ducts with proven fire protection. In addition, the fire protection duct fulfils the requirements of the application rule VDE-AR-E 2100-712 for fireproof and contact-proof installations (Sections 6.2 and 6.4). This also offers additional protection for the rescue services against electric shocks during extinguishing work.

If installations are routed through fire-resistant ceilings or walls in the building, the openings have to be sealed with permitted insulations to prevent the fire from spreading. One suitable solution is fire protection foam PYROSIT® NG in combination with foam blocks PYROPLUG® Block.

## Protection through organisational measures

At the transition point of the electrical system, e.g. house connection box and main distribution, VDE 0100-712 and VDE-AR-E 2100-712 require the attachment of the standardised information sign/fire brigade sign. The fire brigade can recognise the PV system through the identification and fireproof routing of the energised DC cables.



## Construction regulations

- EN 13501-1/-2, DIN 4102-1/-2 Fire classification of construction products and building elements

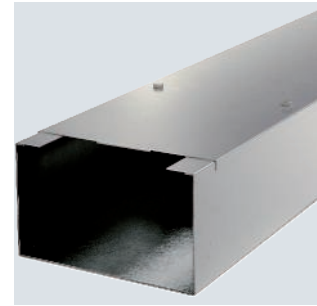
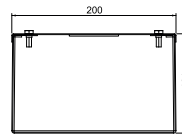
*The national and regional construction regulations must be observed with regard to the use of construction products. These include, for example, the state construction regulations in Germany, VKF regulations in Switzerland and OIB directives in Austria.*

A2 BK

### Metal installation duct PLMR for outdoor applications

Type	Length mm	Min. order- ing quan- tity m	Item no.
PLMR 1220 A2	2000	2	7218200

Installation duct made from metal with intumescent fire protection mesh. Prevents the spread of fire and protects against the impacts of cable fires. Fire resistance of up to 90 minutes. With matching fittings, obstacles in outdoor areas can be overcome easily. Suitable for the mounting on FangFix concrete block. Can be used as a special solution when laying cables over firewalls, according to expert opinion. Solution according to EitAnlagen 2020 of BMI +AMEV. Only certified pre-terminated fittings may be used. Screws included for fastening the duct cover. When used with photovoltaic cables over firewalls, this may need to be coordinated with the relevant authorities.

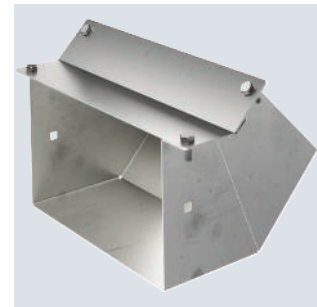
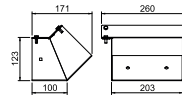


A2 BK

### Rising level, for installation duct PLMR

Type	Length mm	Width mm	Height mm	Min. order- ing quan- tity Piece	Item no.
PLMR LR 1220 A2	171	260	158	1	7218202

Level, rising version. Suitable for the installation duct PLMR. To overcome obstacles in outdoor areas. Screws and nuts included.

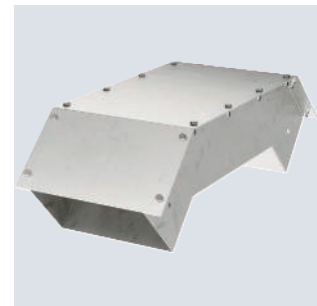
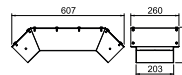


A2 BK

### Metal installation duct PLMR for outdoor applications

Type	Length mm	Width mm	Height mm	Min. order- ing quan- tity Piece	Item no.
PLMR LFD	607	260	187	1	7218204

Level, rising version. Suitable for the installation duct PLMR. To overcome obstacles in outdoor areas. Screws and nuts included.

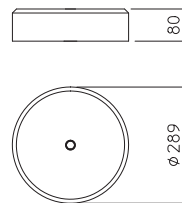


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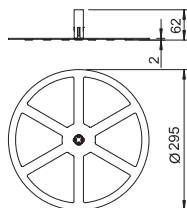
### Concrete base for FangFix system, min. 10 kg

Type	Nominal size Ø mm	Min. order- ing quan- tity Piece	Item no.
F-FIX-S10	289	1	5403117

- Min. 10 kg block of Ø 289 mm, high level of stability
- Frost-resistant concrete
- Stackable



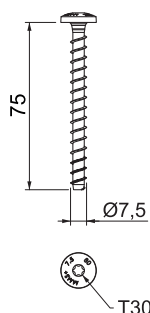
### Base for FangFix system 10 kg



Type	Nominal size Ø mm	Min. ordering quantity Piece	Item no.
F-FIX-B10	295	10	5403124

Edge protection with integrated dowel (basic) suitable for FangFix 10 kg system.

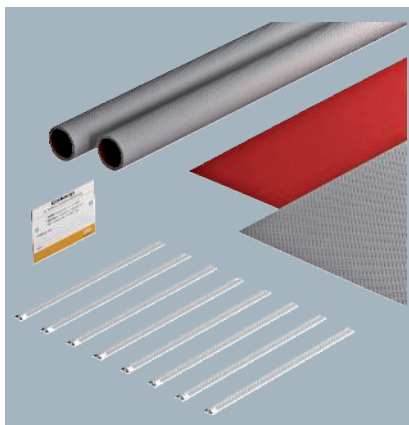
### MMS-plus P round head tie, with pan head, made of A4 stainless steel



Type	Dimension mm	Drill hole Ø mm	Head Ø mm	Screw system	Length mm	Min. ordering quantity Piece	Item no.
MMS+ P 7.5x75 A4	7,5x75	6	14.5	Torx	75	50	3498274

Stainless steel screw-in anchor for direct mounting without additional anchors in cracked and uncracked concrete and masonry. With round head for universal fastenings in wet rooms and outdoor areas. Torx drive T30. Construction product tested according to EAD and CE mark, with European Technical Assessment (ETA) and proof of suitability. Load-bearing capacities under fire loads proven up to fire resistance class R120.

### Bandage set for outdoor applications



Type	Length mm	Width mm	Min. ordering quantity Piece	Item no.
FSB-K32	550	380	1	7203150
FSB-K82	550	880	1	7203154

Complete set for covering cable bundles or cable support systems without cover to prevent a fire spreading. Application in outdoor areas. Each of the sets contains 4 sections of the weather-resistant cable bandage PYROWRAP® Wet, 8 metal strip clips and an identification plate. Sufficient for approx. 2 m length.

Dimension data: Sections of the FSB-WB bandage

Scope of the surrounding cable support systems:

FSB-K32 maximum 320 mm  
 FSB-K82 maximum 820 mm  
 (including min. 5 cm bandage overlap)

Use with photovoltaic cables over firewalls may require the approval of the local construction authorities. A positive special report is available.

**PYROSIT® NG 2-component fire protection foam**

Type	Contents ml	Min. ordering quantity Piece	Item no.
<b>FBS-S</b>	380	1	<b>7203800</b>

PYROSIT® NG 2-component fire protection foam in a cartridge, including 2 mixing tubes.  
 To create cable and combination insulation in interior areas; always process the coaxial cartridge 5:1 with FBS-PH or FBS-PA cartridge pistols.  
 In dry, frost-free rooms, the cartridge can be stored closed and standing upright at temperatures from +5 °C to +30 °C for up to 12 months.

Processing of products containing diisocyanate is subject to training in accordance with the REACH ordinance (EG) 1907/2006, as amended by Regulation (EU) 2020/1149 of 4.8.2020. The training can be carried out online. Information on this can be found in the technical info under downloads on the product.



Type	Min. ordering quantity	Item no.
<b>FBS-M</b>	1	<b>7203803</b>

10 mixing tubes and 5 extension tubes in a set for PYROSIT® NG fire protection foam. Must be used with the 5:1 coaxial cartridge.

**Mixer pipe set**



St

Type	Min. ordering quantity Piece	Item no.
<b>FBS-PH</b>	1	<b>7203806</b>

High-quality 2-component cartridge pistol for use with the PYROSIT® NG fire protection foam. The action of the trigger parallel to the handle ensures easy working. Suitable for 5:1 coaxial cartridges. Free the moving parts, push rods and pressure plate from any foam residues and maintain them with a re-greasing cleaning agent.

**Professional cartridge pistol**



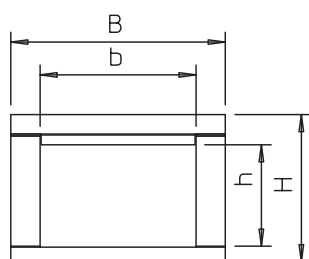
## PYROLINE® Sun PV I30 fire protection duct



Type	Length mm	Min. order- ing quan- tity m	Item no.
BSKP03-K0406	1000	1	7214701

Fire protection duct made from water- and frost-proof glass fibre lightweight concrete of building material class A1 according to EN 13501-1 for fireproof laying of photovoltaic cables inside and outside of buildings. The requirements of accidental contact protection for emergency forces are met. Classification I30 as I duct according to DIN 4102 Part 11 for the protection of rescue and emergency routes.  
Mounting of the duct directly on walls or under ceilings and on support systems.  
Including countersunk head screws and sealing strip.

### Dimensions



Type	Dim. h mm	Dim. b mm	Dim. H mm	Dim. B mm
BSKP03-K0406	40	60	85	100

## Identification plate

PVC



Type	Language	Min. order- ing quan- tity Piece	Item no.
KS-BSKP DE	German	1	7214725

Information panel to label the fire protection duct as a photovoltaic duct according to the VDE application rule. Including two push-fit anchors.

## Fire protection case



Type	Min. order- ing quan- tity Piece	Item no.
FBS-K	1	7203809

The PYROSIT® NG fire protection case contains all the required products to create foam insulations. The complete set contains 3 foam cartridges, 1 professional cartridge pistol, 6 mixing and 5 extension pipes. For interior application.

**PYROPLUG® Block foam block**

Type	Dimension mm	Min. ordering quantity Piece	Item no.
<b>FBA-B200-14</b>	200x144x60	4	<b>7202505</b>

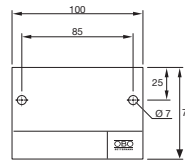
Soft, permanently elastic foam block for cable and combination insulation. Vertical and transverse installation to achieve different fire resistance classes. Can be combined with the two-component fire protection foam PYROSIT® NG. Can be used in solid ceilings and walls and in light-duty partitions and is approved for many installations. For interior application. CE-labelled construction product according to ETA-15/0803 for applications with fire resistance periods of up to 120 minutes. Details on the applications can be found in the approval documents. Protect the surface of the foam insulation against water in order to guarantee safe expansion in the event of fire. Coating with standard silicone is approved.



**PS**

Type	Language	Min. ordering quantity Piece	Item no.
<b>KS-S DE</b>	German	1	<b>7205425</b>

Identification plate to be written on with waterproof and light-resistant felt-tip pen for fire-safe cable glands, including 2 push-fit anchors.



**Identification plate**



# Cable management outdoors

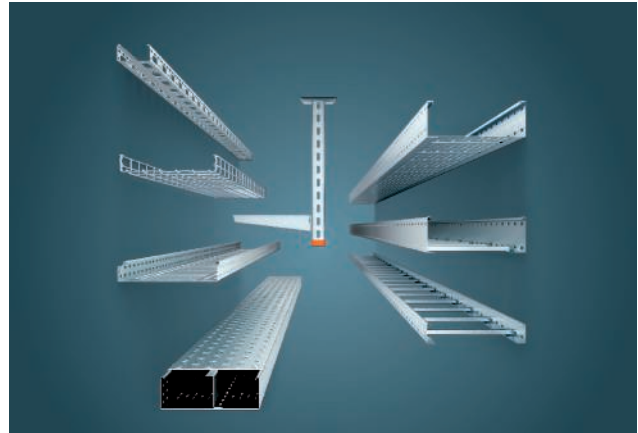


## Solid connections, easy installation

Cables outside the building are particularly exposed to the weather. Rain, snow, heat, UV radiation and wind continually attack the PV system. OBO cable support systems combine the best possible protection with rapid mounting. Our product range comprises closed cable tray systems, wide span tray and mesh cable tray systems, and cable ladders. Using clever details, such as the mounting adapter, you can fix mesh cable trays to the OBO FangFix concrete blocks and the OBO UniBase system in a single action. Wind load securing is optional and can be implemented using OBO tightening straps. This must be tailored to the specific project as it varies, for example, depending on the local wind load.

## Cable support systems: quickly mounted and safe

- Cable trays
- Mesh cable trays
- Cable ladders
- Vertical ladders
- Suspended supports
- Wall and support bracket

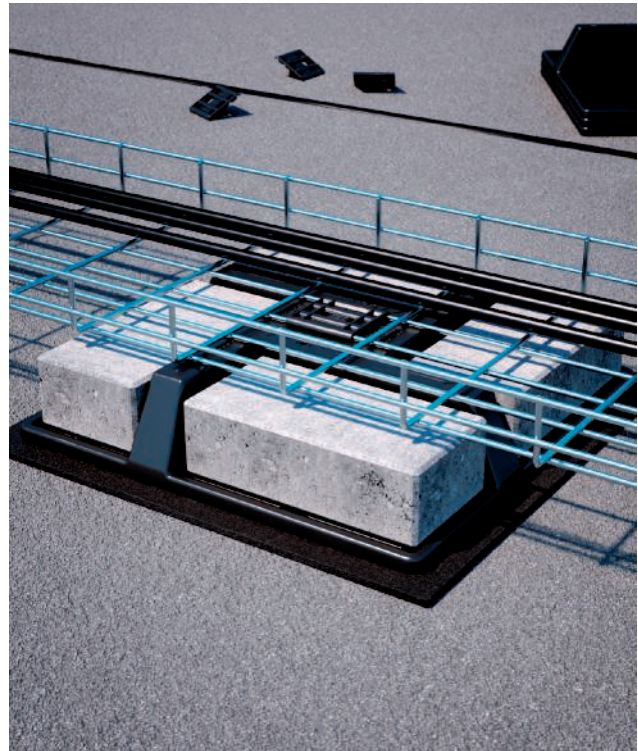


## Shielding of cables

The passive shielding of cables with OBO cable support systems with covers permits attenuation of up to 60 dB. This means that electronic system components are protected against electromagnetic interference, and economic losses through failure or damage are prevented.

## Area shielding

Direct and local lightning strikes create a magnetic field which causes induced currents in electrical and electronic systems. Professional cable routing with the OBO TrayFix systems or the OBO UniBase system can, under certain conditions according to VDE 0185-305-4 (IEC/EN 62305-4), reduce the necessary surge protection measures. The same applies to optimised cable shielding, for example with EMC-tested cable support systems from OBO.



## Strain relief for vertical cable routing

When cables are routed vertically, appropriate strain relief must be ensured. Our product range comprises vertical ladder systems with various profiles for direct wall mounting, for free-standing mounting or mounting on existing steel structures.



## Perfect protection in buildings

Even in buildings, cables are subject to mechanical loads, which, in the worst-case scenario, can lead to the failure of the system. Combination of the OBO products creates reliable protection of cabling, from the roof through to the inverter. Wall and ceiling ducts of different dimensions are complemented with appropriate fittings. Plastic and metal cable and pipe fastening systems and clips protect small cable volumes and individual cables. In this way, you can protect the system against failure through torn or worn-through cables for decades to come.

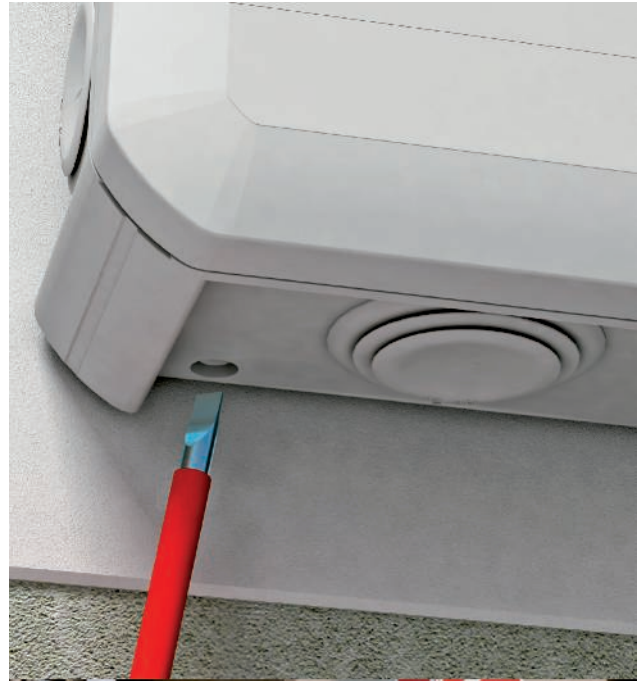


## For tidy cable routing in buildings

- Wall and ceiling duct
- Cable and pipe fastening systems made of plastic and metal
- Screw-in and knock-in systems
- Rail systems



*Metal pipe systems: The first choice for protection under tough conditions*



*Pre-marked openings to minimise condensation caused by temperature variations*

## Precautions for water removal

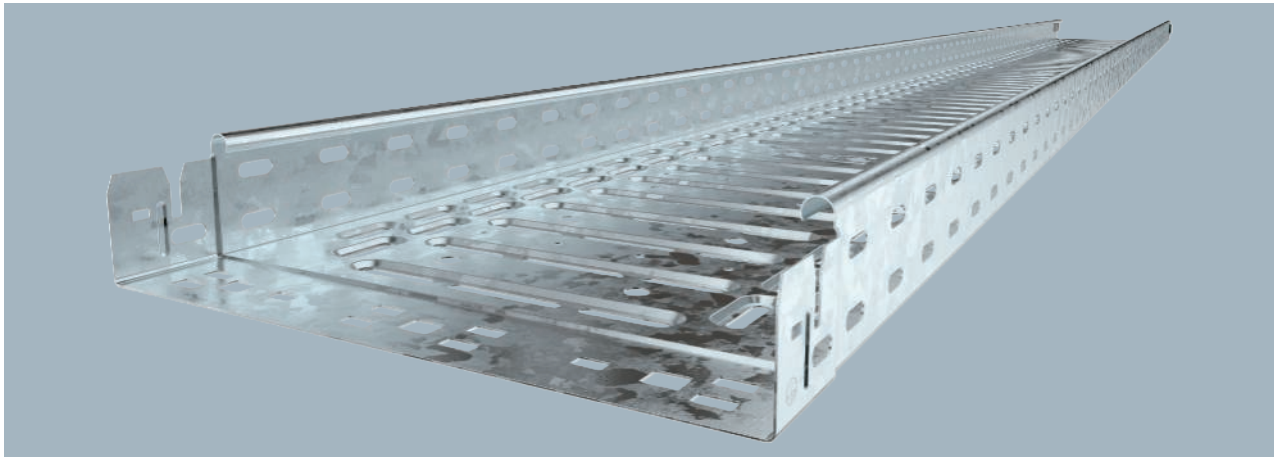
According to DIN VDE 0100-520 (Erection of power installations – rated nominal voltages up to 1,000 V), precautions must be taken for water drainage if water or condensation of water can occur within cable or pipe systems.

## Protection against sunlight and high temperatures

Strong UV radiation can cause damage and destruction to plastics. Electrical devices generate heat through power loss. In conjunction with high ambient temperatures and direct sunlight, the internal temperature can increase. Based on the local loads, the installation engineer may need to perform additional measures. For example, the installation must be protected by an additional roof against direct sunlight and loads from rain and snow.



## Cable tray RKS-Magic® 60

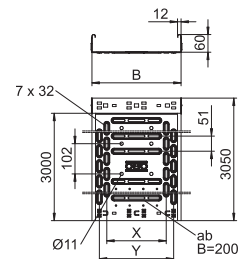


Type	Width mm	Metal thickness mm	BS	Min. ordering quantity	Item no.
RKSM 610 FT	100	1.00	3	3	6047612
RKSM 620 FT	200	1.00	3	3	6047639
RKSM 630 FT	300	1.00	3	3	6047655
RKSM 640 FT	400	1.00	3	3	6047690
RKSM 650 FT	500	1.00	3	3	6047720
RKSM 660 FT	600	1.00	3	3	6047736

Cable tray with integrated quick fastening system. The usable length of the cable tray is 3,000 mm. The cable tray has continuous side perforations of 7 x 20 mm for the installation of additional connection and mounting components. The perforation for direct threaded rod suspension has a diameter of 11 mm.

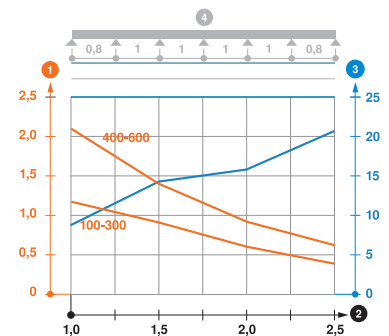
Type	Usable Length mm	Dim. B mm	cross-section cm <sup>2</sup>	Dim. x mm	Dim. y mm
RKSM 610 FT	3050	100	58	—	50
RKSM 620 FT	3050	200	118	100	150
RKSM 630 FT	3050	300	178	200	250
RKSM 640 FT	3050	400	238	300	350
RKSM 650 FT	3050	500	298	400	450
RKSM 660 FT	3050	600	358	450	550

### Dimensions



	1.0 m	1.5 m	2.0 m	2.5 m	NEMA load class
RKSM 610 FT	1.2	0.9	0.6	0.4	8AA
RKSM 620 FT	1.2	0.9	0.6	0.4	8AA
RKSM 630 FT	1.2	0.9	0.6	0.4	8AA
RKSM 640 FT	2.1	1.35	0.9	0.6	8AA
RKSM 650 FT	2.1	1.35	0.9	0.6	8AA
RKSM 660 FT	2.1	1.35	0.9	0.6	8AA

### Load

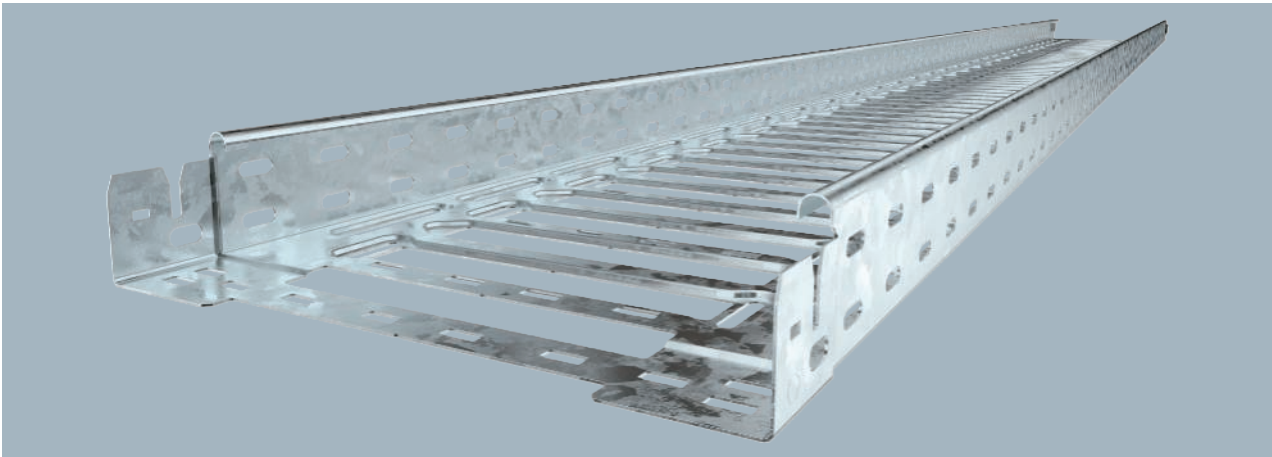


### Load diagram, cable tray, type RKSM 60

- ① Permitted cable tray/ladder load in kN/m without man load
- ② Support width in m
- ③ Rail bend in mm at permitted kN/m
- ④ Load scheme during testing
- Load curve with cable tray/ladder width in mm
- Strut bend curve according to support width



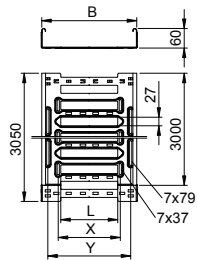
Cable tray MKS-Magic® 60



Cable tray with integrated quick fastening system. The usable length of the cable tray is 3,000 mm. The cable tray has continuous side perforations of 7 x 20 mm for the installation of additional connection and mounting components. From a cable tray width of 200 mm with 30% hole surface, suitable for use under sprinkler systems according to VdS guideline 2092.

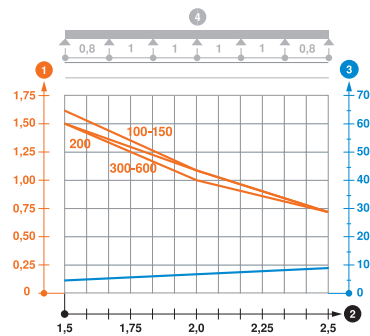
Type	Width mm	Metal thickness mm	Min. ordering quantity m	Item no.
MKSM 610 FT	100	1.00	3	6059018
MKSM 620 FT	200	1.00	3	6059022
MKSM 630 FT	300	1.00	3	6059025
MKSM 640 FT	400	1.00	3	6059027
MKSM 650 FT	500	1.00	3	6059029
MKSM 660 FT	600	1.00	3	6059032

Dimensions



Type	Length mm	Dim. B mm	Dim. cross-section cm²	Dim. L mm	Dim. x mm	Dim. y mm
MKSM 610 FT	3050	100	58	30	—	62
MKSM 620 FT	3050	200	118	80	96	162
MKSM 630 FT	3050	300	178	180	196	262
MKSM 640 FT	3050	400	238	280	296	362
MKSM 650 FT	3050	500	298	380	396	462
MKSM 660 FT	3050	600	358	480	496	562

Load

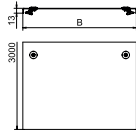


	1.5 m kN/m	2.0 m kN/m	2.5 m kN/m
MKSM 610 FT	1.6	1.1	0.7
MKSM 620 FT	1.5	1.1	0.7
MKSM 630 FT	1.5	1	0.7
MKSM 640 FT	1.5	1	0.7
MKSM 650 FT	1.5	1	0.7
MKSM 660 FT	1.5	1	0.7

Load diagram, cable tray, type MKSM 60

- ① Permitted cable tray/ladder load in kN/m without man load
- ② Support width in m
- ③ Rail bend in mm at permitted kN/m
- ④ Load scheme during testing
- Load curve with cable tray/ladder width in mm
- Strut bend curve according to support width

## Cover with sash lock



Type	Dim. B mm	Metal thickness mm	Length mm	Min. ordering quantity m	Item no.
<b>DRL 100 DD</b>	100	1.00	3000	3	<b>6052703</b>
<b>DRL 200 DD</b>	200	1.00	3000	3	<b>6052709</b>
<b>DRL 300 DD</b>	300	1.00	3000	3	<b>6052712</b>
<b>DRL 400 DD</b>	400	1.00	3000	3	<b>6052715</b>

Transverse bead from 500 mm width.

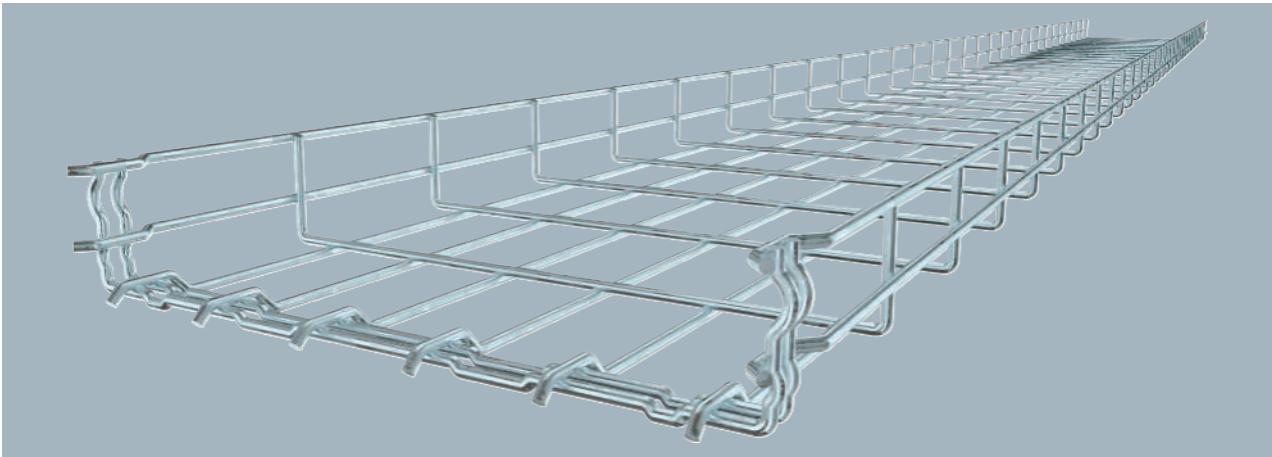
Cover for cable trays and cable ladders with turn buckles.

When using covers outdoors, additional measures against the influence of wind must be taken.

St FT



GR-Magic® 55 mesh cable tray

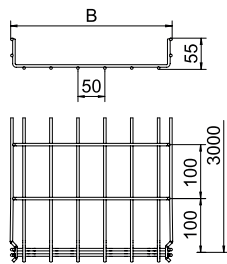


Mesh cable tray with shaped connector of side height 55 mm. Magnetic shield insulation without cover 15 dB, with cover 25 dB. You can find detailed information regarding the UL classification in the respective certification.

No additional connection components are required for the mesh cable tray, it is simply interlocked. The grid width is 50 x 100 mm (exception: GRM 55/50 = 20 x 100 mm).

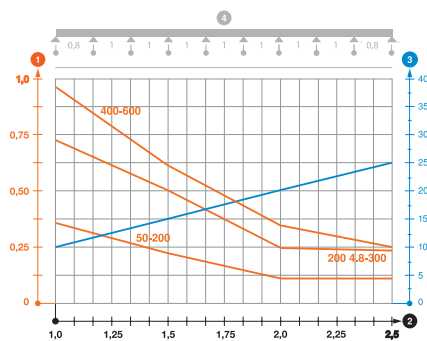
Type	Width mm	Wire Ø mm	Min. ordering quantity m	Item no.
GRM 55 50 FT	50	3.9	3	6001415
GRM 55 100 FT	100	3.9	3	6001416
GRM 55 200 FT	200	3.9	3	6001420
GRM 55 300 FT	300	4.8	3	6001424
GRM 55 400 FT	400	4.8	3	6001428
GRM 55 500 FT	500	4.8	3	6001432
GRM 55 600 FT	600	4.8	3	6001436

Dimensions



Type	Length mm	Dim. B mm	Usable cross-section cm²
GRM 55 50 FT	3000	52	16
GRM 55 100 FT	3000	100	40
GRM 55 200 FT	3000	200	87
GRM 55 300 FT	3000	300	129
GRM 55 400 FT	3000	400	175
GRM 55 500 FT	3000	500	220
GRM 55 600 FT	3000	600	265

Load

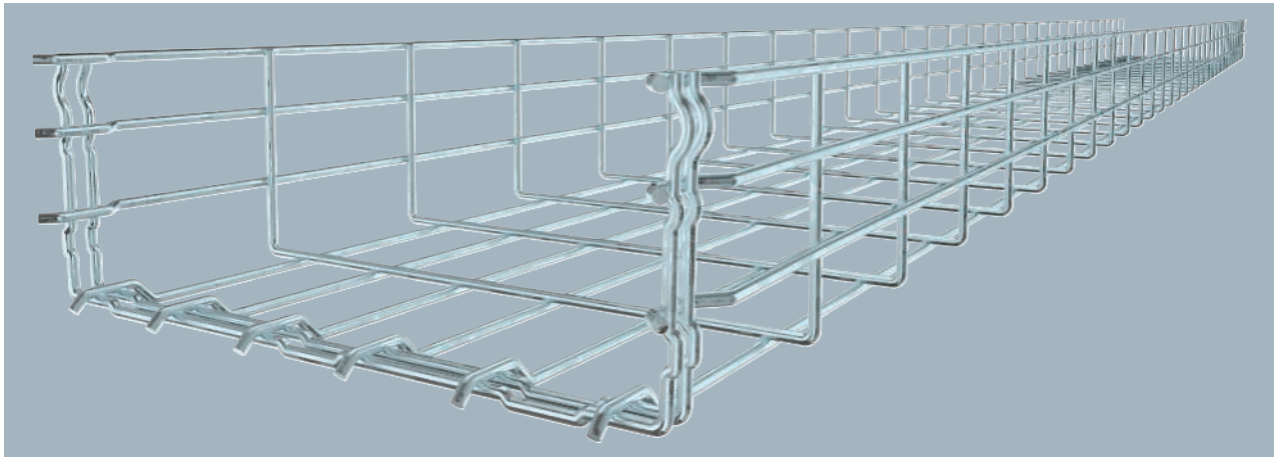


	1.0 m	1.5 m	2.0 m	2.5 m
	kN/m	kN/m	kN/m	kN/m
GRM 55 50 FT	0.35	0.2	0.1	0.1
GRM 55 100 FT	0.35	0.2	0.1	0.1
GRM 55 200 FT	0.35	0.2	0.1	0.1
GRM 55 300 FT	0.7	0.5	0.25	0.2
GRM 55 400 FT	0.9	0.6	0.3	0.25
GRM 55 500 FT	0.9	0.6	0.3	0.25
GRM 55 600 FT	0.9	0.6	0.3	0.25

Load diagram, GR-Magic mesh cable tray, type GRM 55

- 1 Permitted cable tray/ladder load in kN/m without man load
- 2 Support width in m
- 3 Rail bend in mm at permitted kN/m
- 4 Load scheme during testing
- Load curve with cable tray/ladder width in mm
- Strut bend curve according to support width

## Mesh cable tray GR-Magic® 105

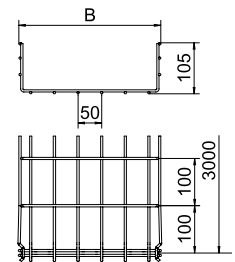


Type	Width mm	Wire Ø mm	Wire quantity m	Min. ordering quantity m	Item no.
GRM 105 100 FT	100	3.9	3		6002431
GRM 105 200 FT	200	4.8	3		6002435
GRM 105 300 FT	300	4.8	3		6002437
GRM 105 400 FT	400	4.8	3		6002439
GRM 105 500 FT	500	4.8	3		6002443
GRM 105 600 FT	600	4.8	3		6002445

Mesh cable tray with shaped connector of side height 105 mm. Magnetic shield insulation without cover 15 dB, with cover 25 dB. No additional connection components are required for the mesh cable tray, it is simply interlocked. The grid width is 50 x 100 mm.

Type	Length mm	Dim. B mm	Usable cross-section cm <sup>2</sup>
GRM 105 100 FT	3000	100	82
GRM 105 200 FT	3000	200	175
GRM 105 300 FT	3000	300	268
GRM 105 400 FT	3000	400	363
GRM 105 500 FT	3000	500	459
GRM 105 600 FT	3000	600	554

### Dimensions

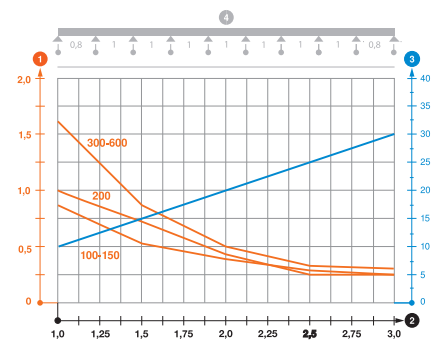


	1.0 m kN/m	1.5 m kN/m	2.0 m kN/m	3.0 m kN/m
GRM 105 100 FT	0.8	0.55	0.37	0.25
GRM 105 200 FT	1	0.7	0.4	0.25
GRM 105 300 FT	1.6	0.8	0.5	0.3
GRM 105 400 FT	1.6	0.8	0.5	0.3
GRM 105 500 FT	1.6	0.8	0.5	0.3
GRM 105 600 FT	1.6	0.8	0.5	0.3

### Load diagram, mesh cable tray, type GRM 105

- ① Permitted cable tray/ladder load in kN/m without man load
- ② Support width in m
- ③ Rail bend in mm at permitted kN/m
- ④ Load scheme during testing
- Load curve with cable tray/ladder width in mm
- Strut bend curve according to support width

### Load

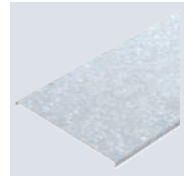
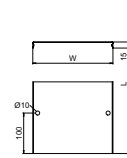


St FS FT

### Cover for mesh cable tray, latchable



Type	Dim. B mm	Metal thickness mm	Length mm	Min. ordering quantity	Item no.
DGRR 50 FT	50	0.75	3000	3	6001820
DGRR 100 FT	98	0.75	3000	3	6001822
DGRR 200 FT	198	0.75	3000	3	6001826
DGRR 300 FT	298	0.75	3000	3	6001828
DGRR 400 FT	398	0.75	3000	3	6001830
DGRR 500 FS	498	0.75	3000	3	6001852
DGRR 600 FS	598	0.75	3000	3	6001854



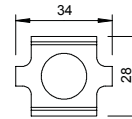
With transverse bead from 400 mm width.  
 Lockable cover for mesh cable trays of type GR and GRM. Protects cables from damage, contamination and moisture from above. Suitable for industrial areas such as mechanical engineering.  
 When using covers outdoors, additional measures against the influence of wind may need to be taken.

St FT

### Joint connector GSV 34



Type	Min. ordering quantity	Item no.
GSV 34 FT	20	6016634



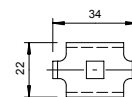
Screwed version of joint connector for mesh cable trays.  
 Figure: Positioning and quantity of mesh cable tray connectors.  
 50–150 mm = 2 units  
 200–300 mm = 3 units  
 400–450 mm = 4 units  
 500–600 mm = 5 units  
 Including FRS M6 x 20 bolt with flange nut.

St FT

### GKS 34 hold-down clamp



Type	Min. ordering quantity	Item no.
GKS 34 FT	20	6016820



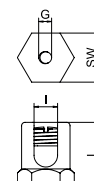
Including FRS M6 x 20 bolt with flange nut.  
 Hold-down clamp for fixing mesh cable trays to wall or support brackets.

CuZn 37

### Earthing terminal with fastening thread

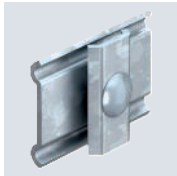


Type	Dim. L mm	Dim. I mm	Cross-section mm <sup>2</sup>	Thread metric	Min. ordering quantity	Item no.
EKL 35 M6	26	10	75	6	50	6404014



Earthing terminal for fastening the equipotential bonding wire to the cable support system. M12 threaded pin with slot.  
 Suitable for conductor cross sections of 4–50 mm<sup>2</sup>.

## K 11/262 side connector

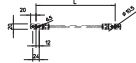


Min. ordering quantity		25
Type		K 11 262 FT
Piece		25
Item no.		6015107

Screwed version of joint connector for mesh cable trays.  
Including screw of type FRS M6 x 20.

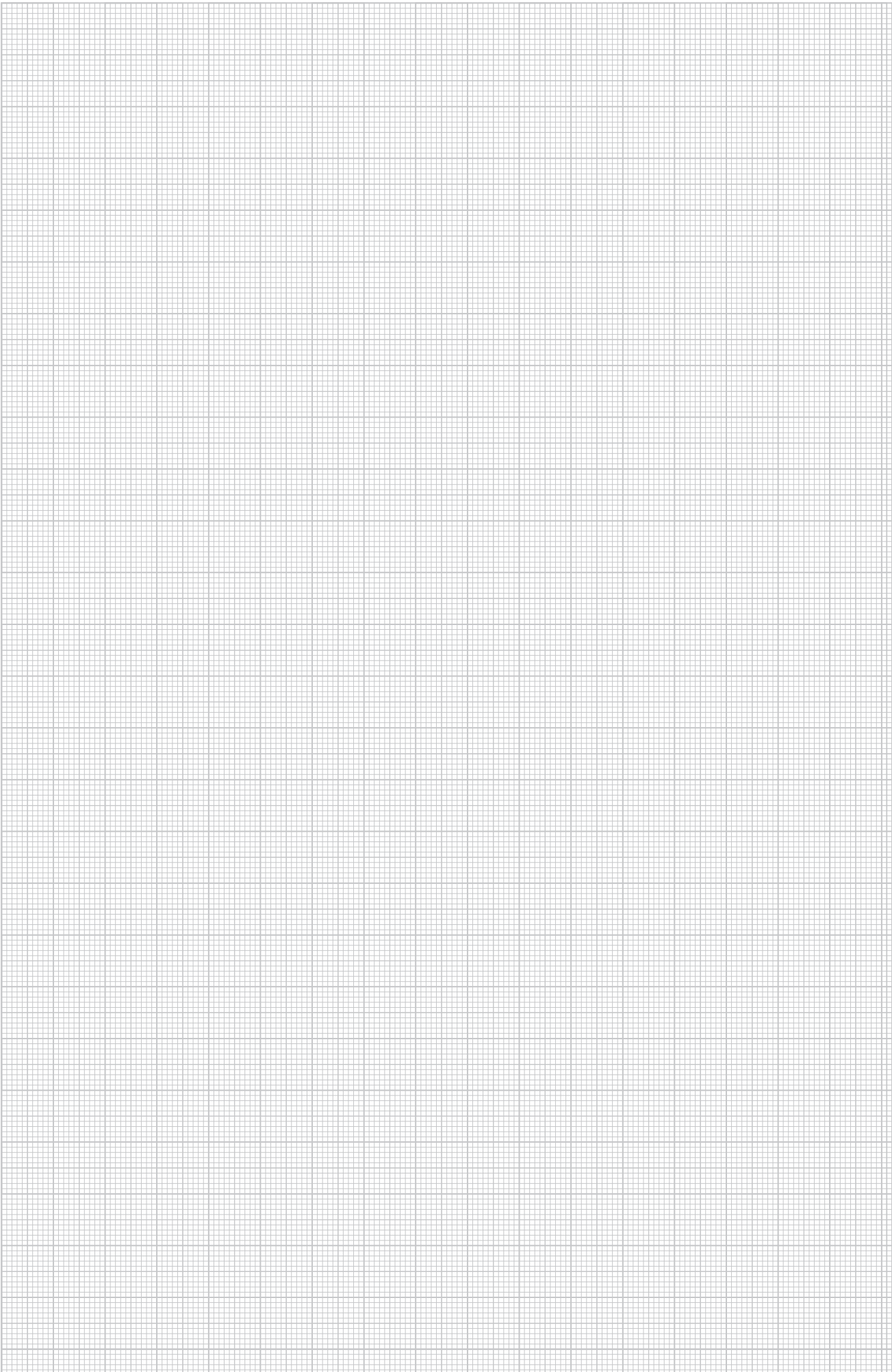
## Bridging cable

Cu



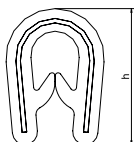
Min. ordering quantity		10
Dim. L		200
Type		853 200
mm		200
Piece		10
Item no.		5331008

- With aluminium cable lugs
- From flexible copper cable 16 mm<sup>2</sup>
- Coating: Black, chlorinated EM5 natural rubber mixture
- With 1 fastening hole Ø 10.5 mm per attachment side
- With 2 fastening holes Ø 6.5 mm per attachment side
- Suitable for applications outside or inside
- Temperature range -25 °C to +80 °C (moved) and -40 °C to +80 °C (not moved)
- UV-resistant



## Edge protection strip

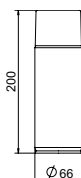
PVC



Type	For metal thickness mm	Dim. h mm	Colour	Length mm	Min. ordering quantity m	Item no.
KSB 4 PVC	1.5-4	15	Black	10000	10	6072895

Edge protection strip with steel core for covering cut metal edges. Black version, UV-resistant.

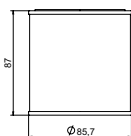
## Zinc repair spray



Type	Min. ordering quantity Piece	Item no.
ZSF	1	2362970

The zinc spray can be used in the temperature range -10 °C to +40 °C.  
Zinc spray for treatment of unprotected surfaces and cutting edges. Can contents: 400 ml.

## Zinc repair paint

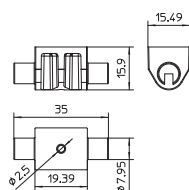


Type	Min. ordering quantity Piece	Item no.
ZABF	1	2362979

Zinc repair paint for blank areas on the hot galvanised steel parts, to eliminate grinding and welding damage on the galvanisation and to adapt ungalvanised small parts on galvanised structures.  
Resistant to normal weathering influences. Light shade, similar to zinc. Before paint application, the substrate must be carefully cleaned and roughened. Paint application with a brush.

## Universal flat conductor adapter for roof conductor holder, type 165/MBG

PP



Type	Colour	Fit mm	Min. ordering quantity Piece	Item no.
165 MBG UH	Black	Rd 8	25	5218882

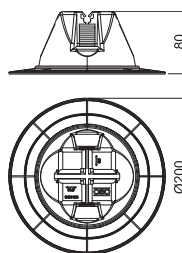
- Universal adapter with drill hole Ø 2.5 mm
- E.g. for OBO Golden Sprint screw, type 4758 4 x L (L = depending on application)
- For fastening to 165/MBG

PP/  
PE

### Roof conductor holder for flat roofs, with increased base section

Type	Fit mm	Min. ordering quantity Piece	Item no.
165 MBG-8-10 200	Rd 8-10	4	5218716

- Closed form with base
- With double conductor holder
- Filling weight 1 kg (frost-resistant concrete)
- Sleeve made from polyethylene, black, UV-resistant and weatherproof
- Base made of polypropylene, black, UV-resistant and weather-resistant
- With larger base section (Ø 200 mm) for better stability

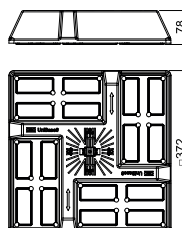


ASA

### UniBase universal stand

Type	Length mm	Width mm	Height mm	Fit mm	Min. ordering quantity Piece	Weight kg/100 pc.	Item no.
UniBase 6	372	372	78	5	16	81.000	5403391

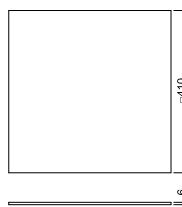
Universal stand for ballasting with standard blocks up to a dimension of 200 x 100 x 100 mm. Can be used on flat roofs, e.g. for mounting PV mounting systems or for cable routing with cable trays or with mesh cable trays in conjunction with roof cable holder 165 MBG HGRM. Blocks not contained in the scope of delivery.



### Building protection mat, flat roof

Type	Length mm	Width mm	Height mm	Min. ordering quantity Piece	Weight kg/100 pc.	Item no.
UniBase BSM	410	410	6	16	79.950	5403402
UniBase BSM ALU	410	410	6	16	75.330	5403404

Building protection mat as an underlay under stands of type UniBase 6 + UniBase 10 for flat roof PV mounting systems, as protection of the roof seal on flat roofs according to DIN 18531. Also suitable for height compensation of the PV mounting system. Made of recycled material; depending on the version, also available with aluminium lining.

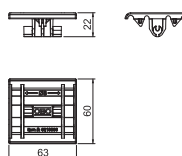


PP

### Mesh cable tray adapter for roof conductor holder

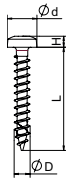
Type	Colour	Fit mm	Min. ordering quantity Piece	Item no.
165 MBG HGRM	Black	Rd 8	50	5218886

- Adapter for GR-Magic® mesh cable trays with a mesh width of 50 mm or 20 mm
- For fastening to type 165 MBG 8-10 and UniBase
- Mounting without tools
- Made from polypropylene, black, UV-resistant and weatherproof
- Toolless installation



Chipboard screw, with Torx, panhead, stainless steel

A4 2B



Type	Dim. L mm	Dim. D mm	Min. ordering quantity Piece	Item no.
OTSP 4,0x25 A4	25	4	100	3191006
OTSP 4,0x30 A4	30	4	100	3191008
OTSP 4,0x40 A4	40	4	100	3191010
OTSP 5,0x40 A4	40	5	100	3191024
OTSP 6,0x40 A4	40	6	100	3191032

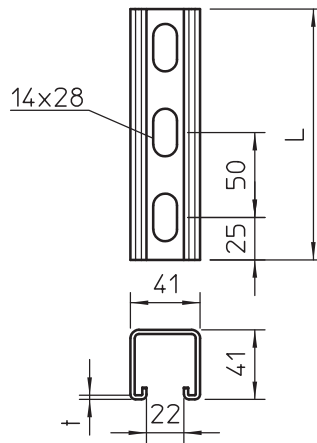
Stainless steel wood screw with lens head and Torx drive for fastenings in interior and exterior areas.  
Areas of use: Wood, chipboard, plasterboard panels and plastic anchors.

MS4141 mounting rail, slot width 22 mm, side perforation



Type	Length mm	Material thickness mm	Min. ordering quantity m	Item no.
MS4141PP1000FT	1000	2.5	1	1122479
MS4141PP3000FT	3000	2.5	3	1122483

Heavy-duty C profile rail for individual installation of support constructions, e.g. for cable trays or as a panel for switchgear cabinets. Can also be used for cable routing, in conjunction with clamp clips with a U foot.



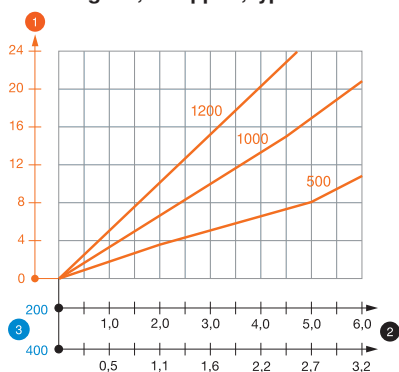


US 5 support

Type	Length mm	Material thickness mm	Tensile load kN	BS	Min. ordering quantity Piece	Item no.
US 5 K 20 FT	200	2,5	10		1	6341527
US 5 K 30 FT	300	2,5	10		1	6341535
US 5 K 40 FT	400	2,5	10		1	6341543
US 5 K 50 FT	500	2,5	10		1	6341551
US 5 K 60 FT	600	2,5	10		1	6341578
US 5 K 70 FT	700	2,5	10		1	6341586
US 5 K 80 FT	800	2,5	10		1	6341594
US 5 K 90 FT	900	2,5	10		1	6341608
US 5 K 100 FT	1000	2,5	10		1	6341616
US 5 K 110 FT	1100	2,5	10		1	6341624
US 5 K 120 FT	1200	2,5	10		1	6341632

Load

Load diagram, U support, type US 5 K



- 1 Bending of the end of the suspended support at permitted bracket load
  - 2 Permitted bracket load in kN without man load
  - 3 Bracket length in mm
- Load curves with support lengths in mm

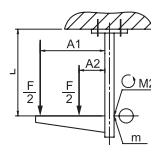


For fastening to horizontal concrete ceilings and steel girders. For bracket widths of 400 mm or more, or if the bracket is mounted at the end of a suspended support, we recommend the use of the spacer, type DSK 45.

U support of dimensions 50 x 50 mm with welded head plate.

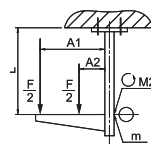
Testing of the bending torque on the support with bracket

Item on test	US 5 K 80	US 5 K 120
Deformation measuring point m	AW 30 31 FT	AW 30 31 FT
A1 lever arm	310 mm	310 mm
A2 lever arm	10 mm	10 mm
Length L	500 mm	1,000 mm
Force F	1.253 kN	1.358 kN
Bending torque M2 (SWL)	240 Nm	260 Nm



Testing of the bending torque on the support with bracket with spacer

Item on test	US 5 K 80	US 5 K 120
Deformation measuring point m	AW 30 71 FT	AW 30 71 FT
A1 lever arm	710 mm	710 mm
A2 lever arm	10 mm	10 mm
Length L	500 mm	1,000 mm
Force F	1.272 kN	1.094 kN
Bending torque M2 (SWL)	500 Nm	430 Nm



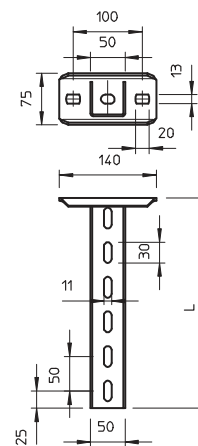
According to IEC 61537, Chapter 10.8.2.3

Characteristic anchor load values for US 5 K support

Anchor type	Single-sided load					
	Max. load [kN]					
	Bracket width [mm]					
BZ3 10x90/0-30	110%	210	310	410		
		4,31	3,18	2,51	2,06	
BZ3 12x110/0-35		5,82	4,29	3,39	2,77	

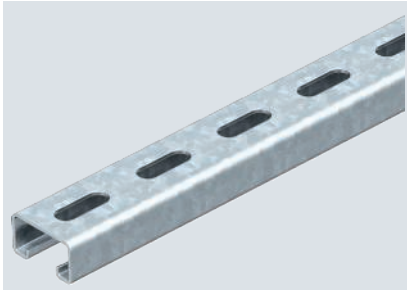
  

Anchor type	Double-sided load						
	Max. load [kN]						
	Bracket width [mm]						
BZ3 10x90/0-30	110%	210	310	410	510	610	
		8,56	7,24	6,20	5,17	4,58	4,12
BZ3 12x110/0-35		11,58	9,79	8,38	6,99	6,19	5,57



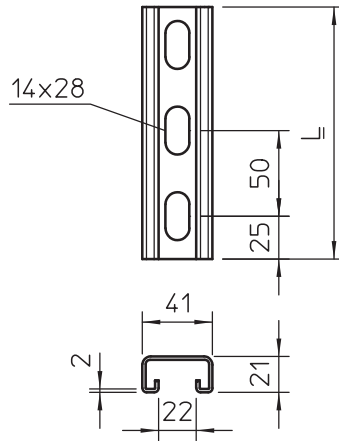
Max. total load F = cable weight + cable tray + bracket + suspended support.  
 The tabular values for double-sided loads take the available axis spacing  $a_i = 10$  cm into account.  
 The stated values are based on uncracked concrete of compressive strength C20/25. Please comply with the installation conditions of ETA(anchors).

MS4121 mounting rail, slot 22 mm, perforated

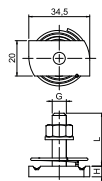


Heavy-duty C profile rail for individual installation of support constructions, e.g. for cable trays or as a panel for switchgear cabinets. Can also be used for cable routing, in conjunction with clamp clips with a U foot.

Type	Length mm	Material thickness mm	BS	Min. ordering quantity m	Item no.
MS4121P2000FT	2000	2		2	1122923
MS4121P3000FT	3000	2		3	1122924
MS4121P6000FT	6000	2		6	1122926



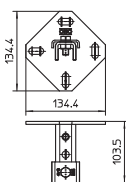
Hammer-head bolt with spring



Type	Length mm	Width mm	Height mm	Thread	Torque Nm	Min. ordering quantity Piece	Item no.
MS41HBF M6x30 FT	34.5	20	6	M 8x30	8	50	1148376
MS41HBF M10x30FT	34.5	20	8	M 10x30	16.1	50	1148384
MS41HBF M12x30FT	34.5	20	9	M 12x30	27	50	1148392

Hammer-head bolt with spring for use with MS4121 and MS4141 profile rails

Wall, floor and ceiling bracket with 3 holes



Type	Version	Dimension W x H mm	Material thickness mm	Length mm	Min. ordering quantity Piece	Item no.
WBDHE 41 FT	Perforated	134x110	5	102	10	1123191

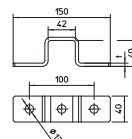
The wall, floor and ceiling bracket can ideally be used as a panel for wall, floor and ceiling mounting. Also suitable for stand and frame construction in conjunction with the mounting rails MS4141.

St FT



### Omega clamp

Type	Material thickness mm	Min. ordering quantity Piece	Item no.
GMS 3 O 4141 FT	5	10	1124673



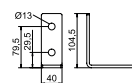
Fastening clamp with 3 holes for cross-wise connection of profile rails 41 x 41 mm.

St FT



### Mounting bracket, 90° with 4 holes

Type	Version	Shipping box Piece	Material thickness mm	Min. ordering quantity Piece	Item no.
GMS 4 VW 90 FT	90° angle	40	5	10	1124663



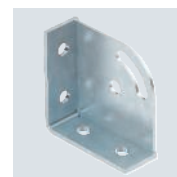
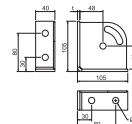
Mounting bracket with four holes to connect profile rails 41 x 41 mm and 41 x 21 mm at an angle of 90°.

St FT



### Mounting bracket, 90° with 6 holes

Type	Version	Material thickness mm	Min. ordering quantity Piece	Item no.
GMS 6 KD FT	90° bracket	5	10	1124792



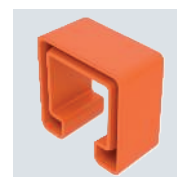
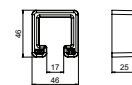
Reinforced mounting bracket with 6 holes to connect profile rails 41 x 41 mm and 41 x 21 mm at an angle of 90°. Additional fastening option for a strut at an angle of 45° with an adjusting range of +/- 30°. Can be used for angles between 15° and 75°.

PE



### End cap MS4141

Type	Colour	Min. ordering quantity Piece	Item no.
MS4141 SK	Pastel orange	25	1122900



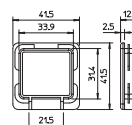
End cap for profile rail, type MS4141.

PE



### Protective cap MS4141

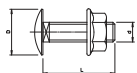
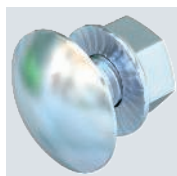
Type	Colour	Min. ordering quantity Piece	Item no.
MS4141 EK	Pastel orange	50	1122906



Protective cap for profile rail, type MS4141.

## Truss-head bolt with flange nut

St F

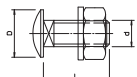
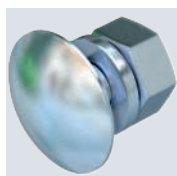


Type	Dimen- sion mm	Dim. L mm	Dim. d mm	Dim. D mm	Resist- ance grade	Min. order- ing quan- tity Piece	Item no.
<b>FRSB 6x12 VZ F</b>	M6x12	12	6	13,5	5,6	10	<b>6406125</b>

Truss-head bolt with square neck including flange nut.

## Truss-head bolt with nut and washer

St F



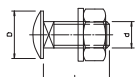
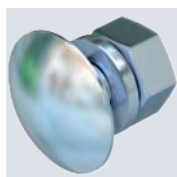
Type	Dimen- sion mm	Dim. L mm	Dim. d mm	Dim. D mm	Resist- ance grade	Min. order- ing quan- tity Piece	Item no.
<b>FRS 8x25 F</b>	M8x25	25	8	20	8,8	50	<b>6406998</b>

Truss-head bolt with square neck. With washer and hexagonal nut.

The truss-head bolt can be used in combination with hot-dip and double-dip galvanised articles.

## Truss-head bolt with nut and washer

St F



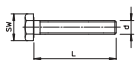
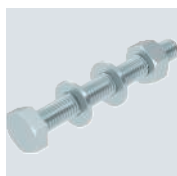
Type	Dimen- sion mm	Dim. L mm	Dim. d mm	Dim. D mm	Resist- ance grade	Min. order- ing quan- tity Piece	Item no.
<b>FRS 10x25 TPS F</b>	M10x25	25	10	18	5,6	50	<b>6407536</b>
<b>FRS 12x25 F</b>	M12x25	25	12	30	5,6	50	<b>6406254</b>

Truss-head bolt with square neck. With washer and hexagonal nut.

The truss-head bolt can be used in combination with hot-dip and double-dip galvanised articles.

## Hexagonal bolt M10

St F



Type	Dimen- sion mm	Dim. L mm	Dim. d mm	SW mm	Resist- ance grade	Min. order- ing quan- tity Piece	Item no.
<b>SKS 10x90 F</b>	M10x90	90	10	17	8,8	20	<b>6418252</b>

Hexagonal bolt for universal fastening of construction components. With hexagonal nut and 2 washers.

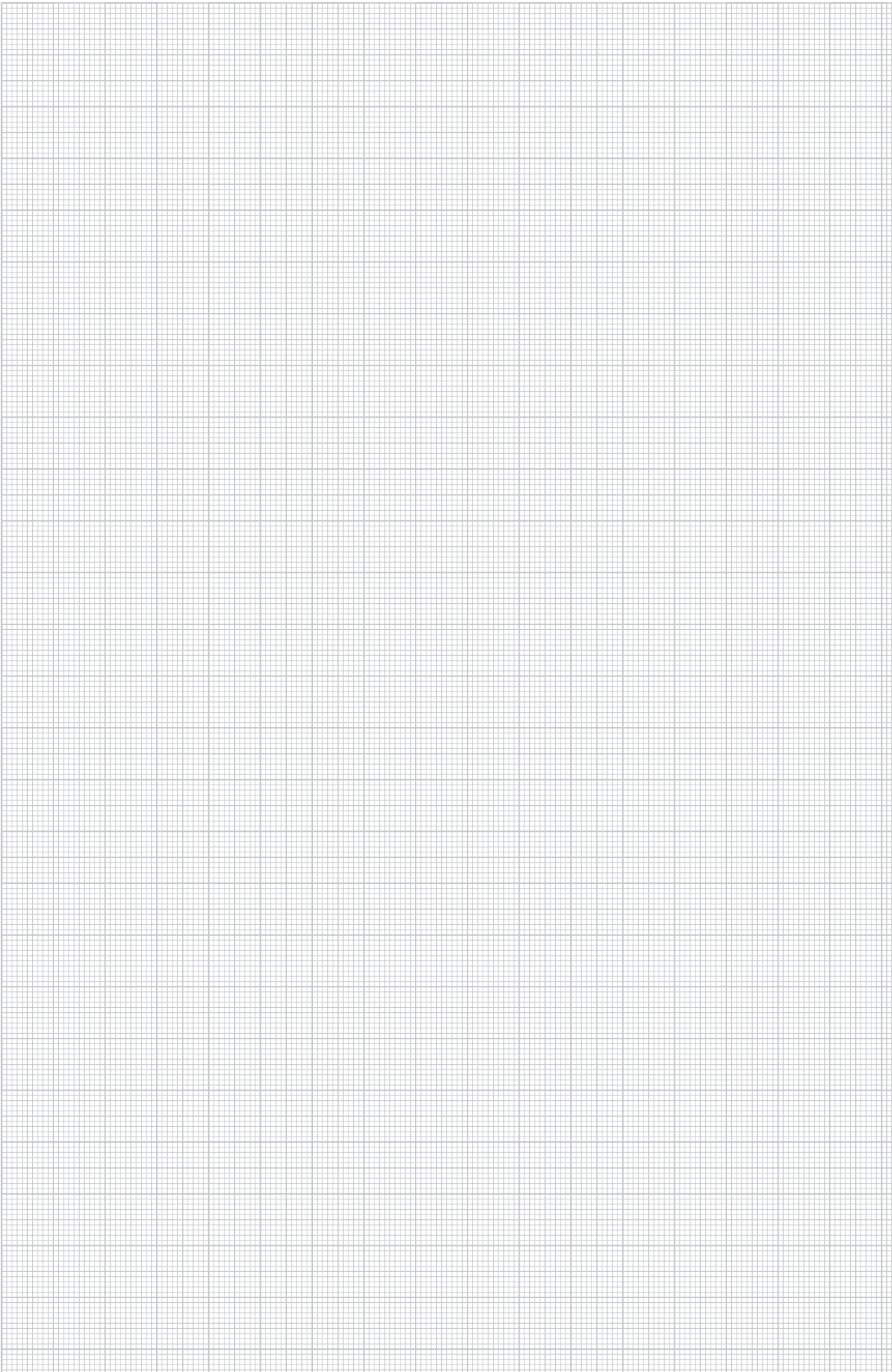
## Hexagonal bolt M12

St F

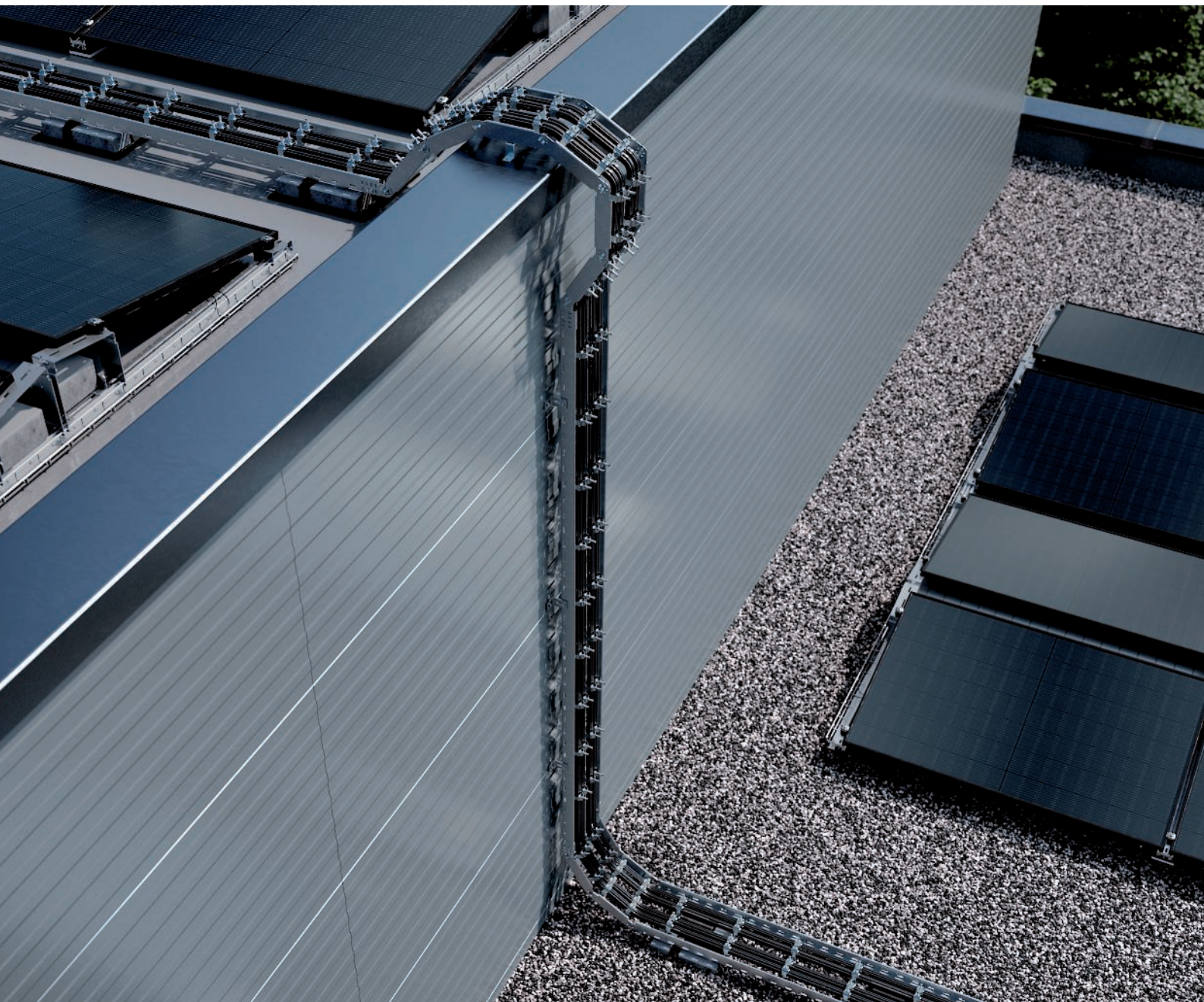


Type	Dimen- sion mm	Dim. L mm	Dim. d mm	SW mm	Resist- ance grade	Min. order- ing quan- tity Piece	Item no.
<b>SKS 12x30 F</b>	M12x30	30	12	19	8,8	20	<b>3163091</b>

Hexagonal bolt for universal fastening of construction components. With hexagonal nut and 2 washers.



# Safe routing of PV cables outdoors



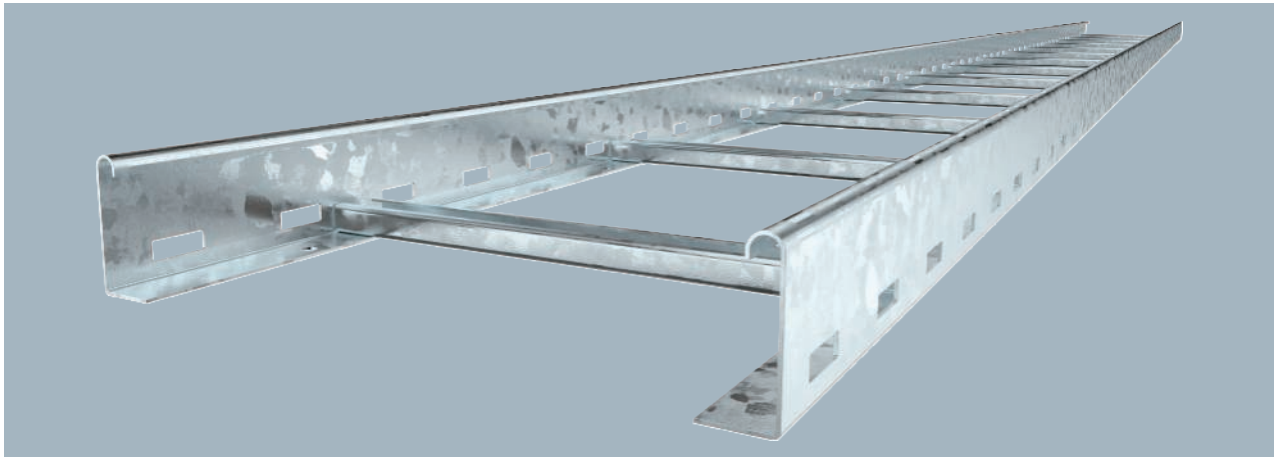
## PV cable routing in outdoor areas with OBO vertical ladders

OBO vertical cable ladders enable the tidy routing of, for example, string and distributing cables as well as protective earthing and functional bonding conductors along the facade, specifically for PV systems. Generally, they are fastened directly to the facade and adapted to the respective structural conditions. They easily bridge the height differences between the PV system on the roof and the technical room or mains connection point.



- Corrosion-resistant version made of hot-dip galvanised steel for outdoor applications
- Meeting the requirements according to DIN EN 61537 (cable support systems)
- The modular structure makes it easy to adapt the system to the building structures and ensures rapid mounting
- Designed for multiple cable harnesses routed in parallel, including with larger cross-sections (e.g. DC distributing main)
- Open design promotes heat dissipation
- Can be combined with other OBO solutions such as cable trays, earthing systems and lightning protection

## Cable ladder LG 60, 6 m VS



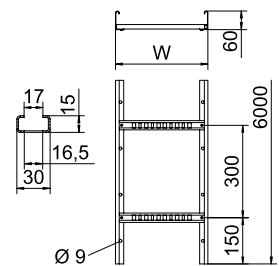
Type	Width mm	BS	Min. order- ing quan- tity m	Item no.
LG 620 VS 6 FT	200		6	6208650
LG 630 VS 6 FT	300		6	6208653
LG 640 VS 6 FT	400		6	6208656
LG 650 VS 6 FT	500		6	6208659
LG 660 VS 6 FT	600		6	6208661

Cable ladder with perforated side rail of side height 60 mm with riveted C profile frames, open in an upwards direction (VS version).

The cable ladder is shipped folded up. Cables can be mounted with the matching clamp clip, type 2056. The cable ladders in the widths 200 mm to 400 mm are also approved for vertical mounting as a vertical ladder in systems that guarantee the maintenance of electrical functionality according to DIN 4102 Part 12. Cables can be mounted with the clamp clip approved for maintenance of electrical function, type 2056 M.

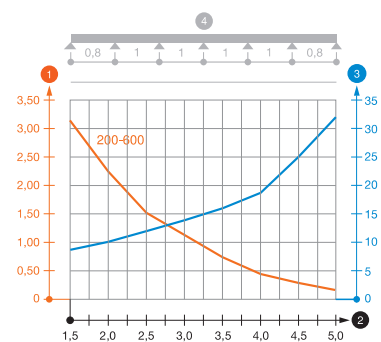
Type	Length mm	Dim. B mm	Rail thick- ness mm	Usable cross- section cm <sup>2</sup>	Rung spacing mm
LG 620 VS 6 FT	6000	200	1.5	98	300
LG 630 VS 6 FT	6000	300	1.5	148	300
LG 640 VS 6 FT	6000	400	1.5	198	300
LG 650 VS 6 FT	6000	500	1.5	248	300
LG 660 VS 6 FT	6000	600	1.5	298	300

### Dimensions



	1.5 m kN/m	2.0 m kN/m	2.5 m kN/m	3.0 m kN/m	4.0 m kN/m	4.5 m kN/m	5.0 m kN/m
LG 620 VS 6 FT	3.1	2.25	1.5	1.1	0.45	0.3	0.15
LG 630 VS 6 FT	3.1	2.25	1.5	1.1	0.45	0.3	0.15
LG 640 VS 6 FT	3.1	2.25	1.5	1.1	0.45	0.3	0.15
LG 650 VS 6 FT	3.1	2.25	1.5	1.1	0.45	0.3	0.15
LG 660 VS 6 FT	3.1	2.25	1.5	1.1	0.45	0.3	0.15

### Load



### Load diagram, LG 60 VS

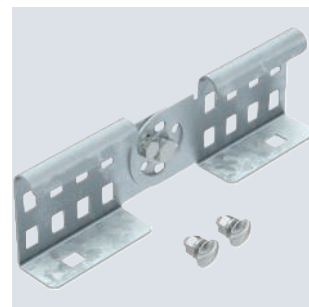
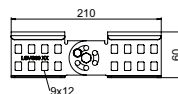
- ① Permitted cable tray/ladder load in kN/m without man load
- ② Support width in m
- ③ Rail bend in mm at permitted kN/m
- ④ Load scheme during testing
- Load curve with cable tray/ladder width in mm
- Strut bend curve according to support width



### Adjustable connector 60

Type	Side height mm	Min. ordering quantity Piece	Item no.
LGVG 60 FT	60	10	6208944

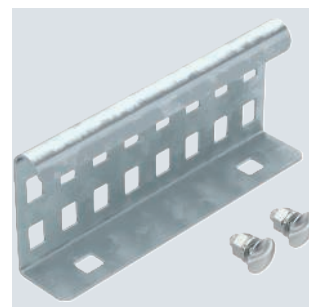
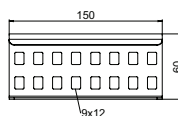
Adjustable connector as external connector to join cable ladders and fittings with a side height of 60 mm and continuous rail perforation. Angle can be adjusted vertically. The bolt fastening ensures the continuity of the equipotential bonding.



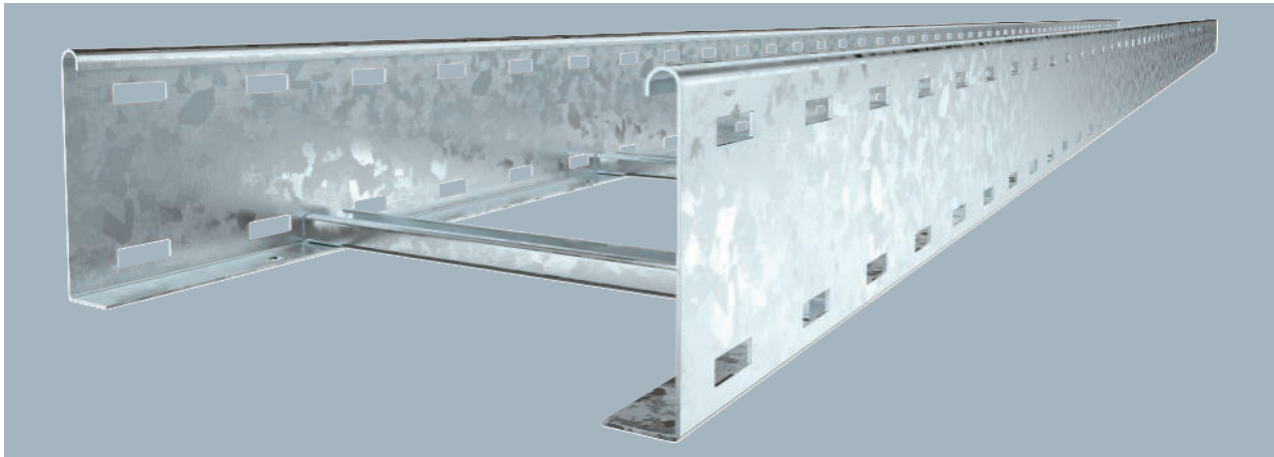
### Straight connector 60

Type	Side height mm	Min. ordering quantity Piece	Item no.
LVG 60 FT	60	10	6208843

Straight connector as external connector to connect cable ladders and fittings with a side height of 60 mm and continuous rail perforation. The bolt fastening ensures the continuity of the equipotential bonding.



## Cable ladder LG 110, 6 m VS

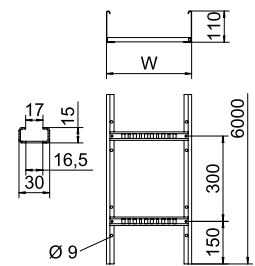


Type	Width mm	Min. ordering quantity m	Item no.
LG 112 VS 6 FT	200	6	6216465
LG 113 VS 6 FT	300	6	6216468
LG 114 VS 6 FT	400	6	6216471
LG 115 VS 6 FT	500	6	6216474
LG 116 VS 6 FT	600	6	6216477

Cable ladder with perforated side rail of side height 110 mm with riveted C profile rungs, open in an upwards direction. The cable ladder is shipped folded up. You can find the appropriate type 2056 clamp clip in the vertical ladder systems section.

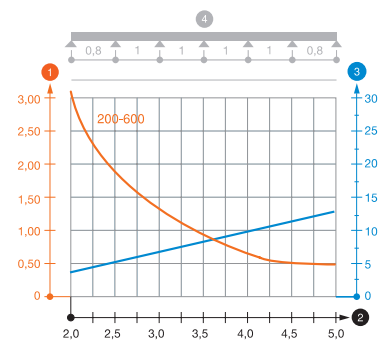
Type	Length mm	Dim. B mm	Rail thickness mm	Usable cross-section cm <sup>2</sup>	Rung spacing mm
LG 112 VS 6 FT	6000	200	1.5	188	300
LG 113 VS 6 FT	6000	300	1.5	283	300
LG 114 VS 6 FT	6000	400	1.5	378	300
LG 115 VS 6 FT	6000	500	1.5	475	300
LG 116 VS 6 FT	6000	600	1.5	568	300

### Dimensions



	2.0 m	3.0 m	4.0 m	5.0 m	6.0 m
	kN/m	kN/m	kN/m	kN/m	kN/m
LG 112 VS 6 FT	3.1	1.4	0.65	0.5	0.15
LG 113 VS 6 FT	3.1	1.4	0.65	0.5	0.15
LG 114 VS 6 FT	3.1	1.4	0.65	0.5	0.15
LG 115 VS 6 FT	3.1	1.4	0.65	0.5	0.15
LG 116 VS 6 FT	3.1	1.4	0.65	0.5	0.15

### Load



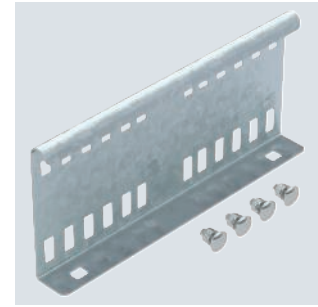
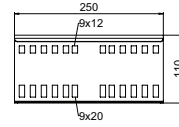
### Load diagram, cable ladder, type LG 110 VS

- ① Permitted cable tray/ladder load in kN/m without man load
- ② Support width in m
- ③ Rail bend in mm at permitted kN/m
- ④ Load scheme during testing
- Load curve with cable tray/ladder width in mm
- Strut bend curve according to support width



Type	Side height mm	Min. ordering quantity Piece	Item no.
LVG 110 FT	110	10	6216548

Straight connector as external connector to connect cable ladders and fittings with a side height of 110 mm and continuous rail perforation. The bolt fastening ensures the continuity of the equipotential bonding.

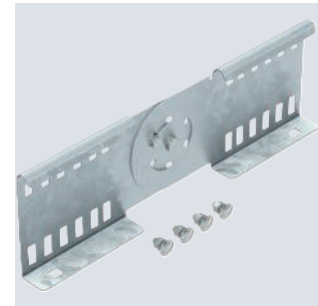
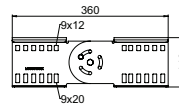


### Straight connector 110



Type	Side height mm	Min. ordering quantity Piece	Item no.
LGVG 110 FT	110	10	6216653

Adjustable connector as internal connector to join cable ladders and fittings with a side height of 110 mm. Angle can be adjusted vertically. The bolt fastening ensures the continuity of the equipotential bonding.

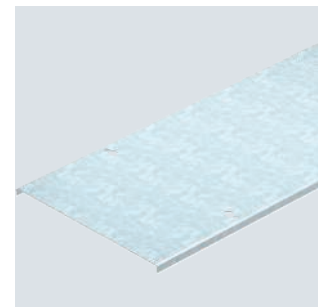
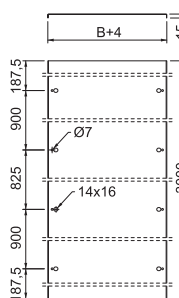


### Adjustable connector 110



Type	Width mm	Metal thickness mm	Length mm	Min. ordering quantity m	Item no.
DRL FAM 230 FT	230	1.50	3000	3	6051222
DRL FAM 330 FT	330	1.50	3000	3	6051224
DRL FAM 430 FT	430	1.50	3000	3	6051226
DRL FAM 530 FT	530	1.50	3000	3	6051228
DRL FAM 630 FT	630	1.50	3000	3	6051230

Cover for stand-off mounting. Not suitable for the vertical ladders SLM and SLS. Spacers must be ordered separately for every 3 m under article number 6065475 for cable trays and cable ladders as well as under article number 6065477 for wide span systems. When using covers outdoors, additional measures against the influence of wind must be taken.

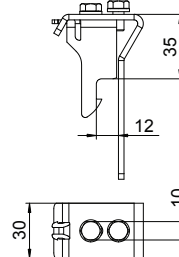


### Cover for stand-off mounting



Type	Side height mm	Min. ordering quantity Piece	Item no.
AH 35 A2	35	8	6065475

Spacer for stand-off cover mounting on cable trays and cable ladders. Space height 35 mm, stainless steel 1.4301.



### Spacer for cover

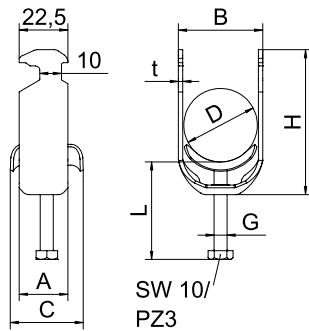
## Clamp clip 2056 H-foot, 1-fold, metal pressure sleeve



Type	Clamping range D mm	BS	Min. ordering quantity Piece	Item no.
BS-H1-M-12 FT	8-12	🔥	100	1186002
BS-H1-M-16 FT	12-16	🔥	100	1186009
BS-H1-M-22 FT	16-22	🔥	100	1186016
BS-H1-M-28 FT	22-28	🔥	100	1186022
BS-H1-M-34 FT	28-34	🔥	100	1186029
BS-H1-M-40 FT	34-40	🔥	100	1186036
BS-H1-M-46 FT	40-46	🔥	100	1186042
BS-H1-M-52 FT	46-52	🔥	100	1186049
BS-H1-M-58 FT	52-58	🔥	100	1186056
BS-H1-M-64 FT	58-64	🔥	100	1186062
BS-H1-M-70 FT	64-70	🔥	50	1186069
BS-H1-M-76 FT	70-76	🔥	25	1186076
BS-H1-M-82 FT	76-82	🔥	25	1186082
BS-H1-M-90 FT	82-90	🔥	25	1186089
BS-H1-M-100 FT	90-100	🔥	25	1186097

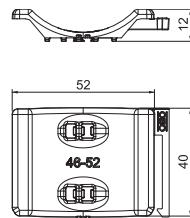
Clamp clip with hammerhead foot, metal pressure sleeve with rounded edges to protect the cable. For vertical and horizontal mounting of 1 single cable on a C-profile rail. For a slot width 16–17 mm. With 1-start screw thread on pressure sleeve, universal hexagonal screw head WAF10, with slot and cross recess. Suitable for assembly indoors and outdoors. The counter-sleeve must be ordered separately.

### Dimensions



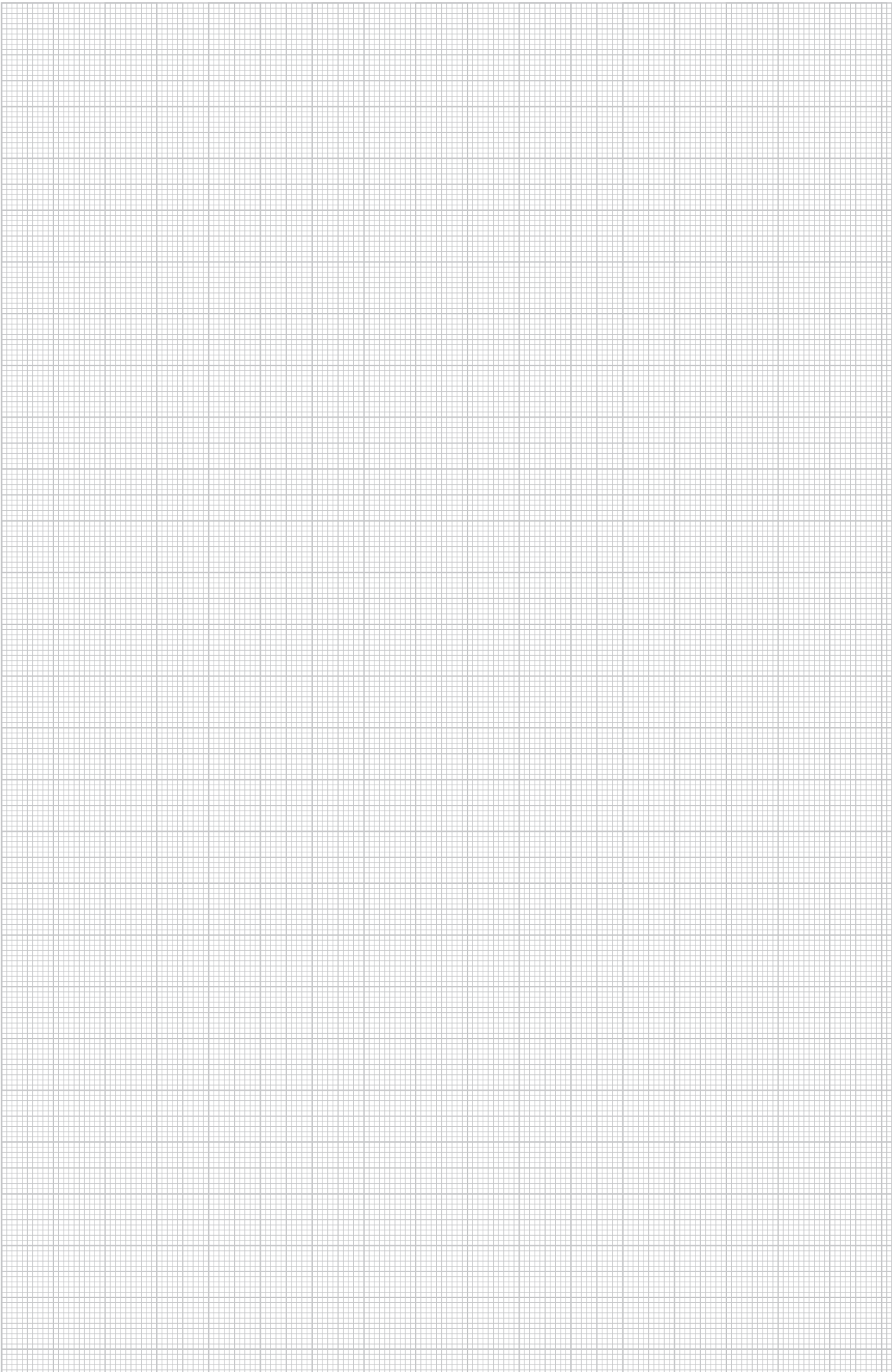
Type	Clamping range D mm	Dim. A mm	Dim. B mm	Dim. C mm	Dim. G mm	Dim. t mm	Dim. H mm	Dim. L mm	Max. torque Nm
BS-H1-M-12 FT	8-12	22.5	17	28	M6	1.5	42	34	3
BS-H1-M-16 FT	12-16	22.5	20	28	M6	1.5	46	34	3
BS-H1-M-22 FT	16-22	22.5	27	28	M6	1.5	52	34	3
BS-H1-M-28 FT	22-28	22.5	33	28	M6	2	59	34	3
BS-H1-M-34 FT	28-34	22.5	39	34	M6	2	67	46	3
BS-H1-M-40 FT	34-40	22.5	45	33	M6	2	74	46	3
BS-H1-M-46 FT	40-46	25	51	33	M8	2	82	43	5
BS-H1-M-52 FT	46-52	25	57	33	M8	2	89	43	5
BS-H1-M-58 FT	52-58	25	64	33	M8	2.5	96	43	5
BS-H1-M-64 FT	58-64	25	70	33	M8	2.5	102	43	5
BS-H1-M-70 FT	64-70	25	76	33	M8	2.5	109	43	5
BS-H1-M-76 FT	70-76	25	82	37	M8	2.5	115	55	5
BS-H1-M-82 FT	76-82	25	88	37	M8	2.5	122	55	5
BS-H1-M-90 FT	82-90	27	97	38	M8	3	132	55	5
BS-H1-M-100 FT	90-100	27	107	38	M8	3	143	55	5

## Universal counter-trough, plastic

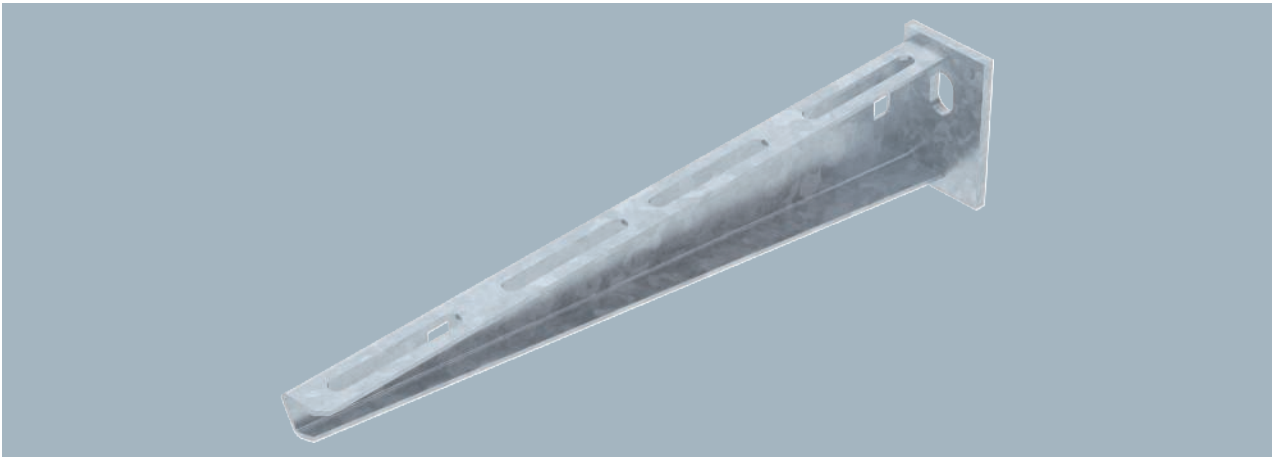


Type	Clamping range D mm	Dim. L mm	Dim. B mm	Dim. H mm	Colour	Shipping box Piece	Min. ordering quantity Piece	Item no.
2058UW 12 LGR	8-12	37	18.5	5.8	Light grey	1500	100	1198012
2058UW 16 LGR	12-16	37	21.5	5.8	Light grey	1600	100	1198016
2058UW 22 LGR	16-22	37	27.5	6.8	Light grey	1500	100	1198022
2058UW 28 LGR	22-28	37	33.5	8.3	Light grey	1200	100	1198028
2058UW 34 LGR	28-34	37	45.5	9.8	Light grey	1200	100	1198034
2058UW 40 LGR	34-40	37	45.5	10.8	Light grey	600	50	1198040
2058UW 46 LGR	40-46	40	51.5	11.8	Light grey	600	50	1198046
2058UW 52 LGR	46-52	40	57.5	11.8	Light grey	600	50	1198052
2058UW 58 LGR	52-58	40	63.5	11.8	Light grey	600	50	1198058
2058UW 64 LGR	58-64	40	69.5	11.8	Light grey	600	50	1198064
2058UW 70 LGR	64-70	40	75.5	12.3	Light grey	300	25	1198070
2058UW 76 LGR	70-76	40	81.5	12.3	Light grey	300	25	1198076
2058UW 82 LGR	76-82	40	87.5	12.3	Light grey	300	25	1198082
2058UW 90 LGR	82-90	40	96	12.8	Light grey	300	25	1198090
2058UW 100 LGR	90-100	40	106	12.8	Light grey	300	25	1198100

Regardless of the type of rail, the counter-trough can be used by applying it onto one side of the clamp clip. Due to an intelligent contour on the backside, the counter-trough can be combined to a double trough. Retrofitting possible without the need to dismantle.



## Wall and support bracket AW 15



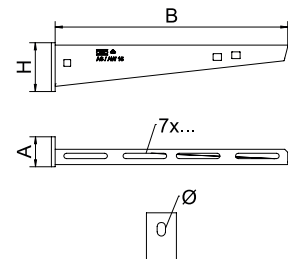
Type	Width mm	F in kN	Min. order- ing quan- tity Piece	Item no.
AW 15 11 FT	110	1.5	1	6420656
AW 15 21 FT	210	1.5	1	6420680
AW 15 31 FT	310	1.5	1	6420710
AW 15 41 FT	410	1.5	1	6420745
AW 15 51 FT	510	1.5	1	6420788
AW 15 61 FT	610	1.5	1	6420826

Fastening of the bracket to the U support of width 400 mm or greater using a hexagonal bolt through both sides of the support. Please insert suitable spacers.

Light-duty wall and support bracket with welded head plate.

Type	Dim. B mm	Dim. A mm	Dim. H mm
AW 15 11 FT	110	40	50
AW 15 21 FT	210	40	60
AW 15 31 FT	310	40	65
AW 15 41 FT	410	40	70
AW 15 51 FT	510	40	75
AW 15 61 FT	610	40	80

### Dimensions



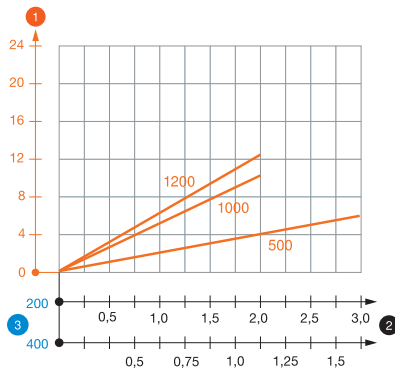


US 3 support

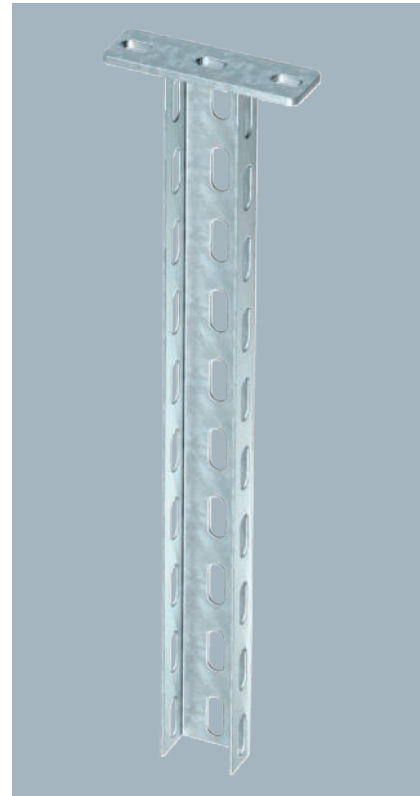
Type	Length mm	Material thickness mm	Tensile load kN	BS	Min. ordering quantity Piece	Item no.
US 3 K 20 FT	200	2	5	🔥	1	6342351
US 3 K 30 FT	300	2	5	🔥	1	6342353
US 3 K 40 FT	400	2	5	🔥	1	6342355
US 3 K 50 FT	500	2	5	🔥	1	6342357
US 3 K 60 FT	600	2	5	🔥	1	6342359
US 3 K 70 FT	700	2	5	🔥	1	6342362
US 3 K 80 FT	800	2	5	🔥	1	6342364
US 3 K 90 FT	900	2	5	🔥	1	6342366
US 3 K 100 FT	1000	2	5	🔥	1	6342368
US 3 K 110 FT	1100	2	5	🔥	1	6342370
US 3 K 120 FT	1200	2	5	🔥	1	6342372

Load

Load diagram, U support, type US 3 K

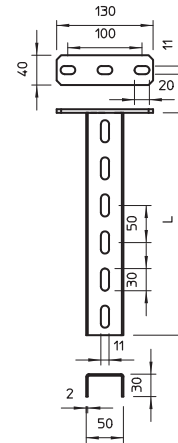


- 1 Bending of the end of the suspended support at permitted bracket load
  - 2 Permitted bracket load in kN without man load
  - 3 Bracket length in mm
- Load curves with support lengths in mm



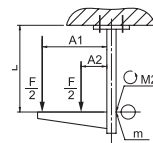
For fastening to horizontal concrete ceilings and steel girders. For bracket widths of 400 mm or more, or if the bracket is mounted at the end of a suspended support, we recommend the use of the spacer, type DSK 25.

Suspended support (U profile) of dimensions 50 x 30 mm with welded head plate.



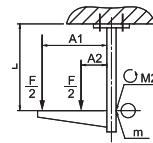
Testing of the bending torque on the support with bracket

Item on test	US 3 K 80	US 3 K 120
Deformation measuring point m	AW 15 31	AW 15 31
A1 lever arm	310 mm	310 mm
A2 lever arm	10 mm	10 mm
Length L	500 mm	1,000 mm
Force F	0.947 kN	0.790 kN
Bending torque M2 (SWL)	180 Nm	150 Nm



Testing of the bending torque on the support with bracket with spacer

Item on test	US 3 K 80	US 3 K 120
Deformation measuring point m	AW 15 61	AW 15 61
A1 lever arm	610 mm	610 mm
A2 lever arm	10 mm	10 mm
Length L	500 mm	1,000 mm
Force F	0.850 kN	0.850 kN
Bending torque M2 (SWL)	290 Nm	290 Nm



According to IEC 61537, Chapter 10.8.2.3, without spacer

Characteristic anchor load values for US 3 K suspended support

Anchor type	Single-sided load			
	Max. load [kN]			
	Bracket width [mm]			
	110%	210	310	410
BZ-U 8-10-21/75	2,18	1,59	1,25	1,02
BZ3 10x90/0-30	3,05	2,00	1,49	1,18

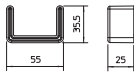
  

Anchor type	Double-sided load			
	Max. load [kN]			
	Bracket width [mm]			
	110%	210	310	410
BZ-U 8-10-21/75	4,54	3,78	3,21	1,50
BZ3 10x90/0-30	7,17	5,96	5,07	4,50

Max. total load F = cable weight + cable tray + bracket + suspended support.  
 The tabular values for double-sided loads take the available axis spacing  $a_i = 10$  cm into account.  
 The stated values are based on uncracked concrete of compressive strength C20/25. Please comply with the installation conditions of ETA(anchors).

## Protective cap

PE

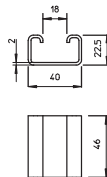


Type	Colour	Min. ordering quantity	Piece	Item no.
US 3 KS OR	Pastel orange	20		6338458

Protective cap to cover the ends of US 3 supports.

## DSK 25 spacer

St FT



Type	Min. ordering quantity	Piece	Item no.
DSK 25 FT	20		6416446

Spacer for use in US 3 supports. The spacer increases the stability of the U-profile and prevents deformation of the support when tightening continuous hexagonal bolts.



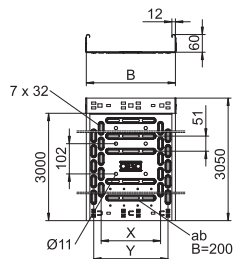
## Cable tray RKS-Magic® 60



Cable tray with integrated quick fastening system. The usable length of the cable tray is 3,000 mm. The cable tray has continuous side perforations of 7 x 20 mm for the installation of additional connection and mounting components. The perforation for direct threaded rod suspension has a diameter of 11 mm.

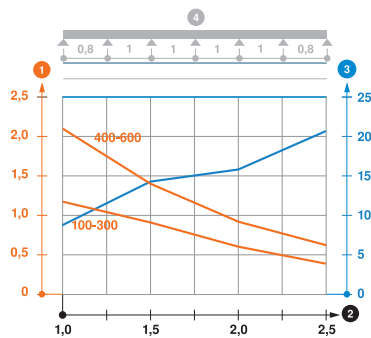
Type	Width mm	Metal thickness mm	BS	Min. ordering quantity m	Item no.
<b>RKSM 610 FS</b>	100	0.75	🔥	3	<b>6047611</b>
<b>RKSM 620 FS</b>	200	0.75	🔥	3	<b>6047638</b>
<b>RKSM 630 FS</b>	300	0.75	🔥	3	<b>6047654</b>
<b>RKSM 640 FS</b>	400	0.90	🔥	3	<b>6047689</b>
<b>RKSM 650 FS</b>	500	0.90		3	<b>6047719</b>
<b>RKSM 660 FS</b>	600	0.90		3	<b>6047735</b>

### Dimensions



Type	Length mm	Dim. B mm	Usable cross-section cm <sup>2</sup>	Dim. x mm	Dim. y mm
RKSM 610 FS	3050	100	58	—	50
RKSM 620 FS	3050	200	118	100	150
RKSM 630 FS	3050	300	178	200	250
RKSM 640 FS	3050	400	238	300	350
RKSM 650 FS	3050	500	298	400	450
RKSM 660 FS	3050	600	358	450	550

### Load

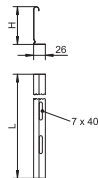
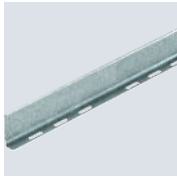


	1.0 m kN/m	1.5 m kN/m	2.0 m kN/m	2.5 m kN/m	NEMA load class
<b>RKSM 610 FS</b>	1.2	0.9	0.6	0.4	8AA
<b>RKSM 620 FS</b>	1.2	1	0.55	0.4	8AA
<b>RKSM 630 FS</b>	1.2	1	0.55	0.4	8AA
<b>RKSM 640 FS</b>	2.1	1.35	0.8	0.6	8AA
<b>RKSM 650 FS</b>	2.1	1.35	0.8	0.6	8AA
<b>RKSM 660 FS</b>	2.1	1.4	0.8	0.6	8AA

#### Load diagram, cable tray, type RKSM 60

- ① Permitted cable tray/ladder load in kN/m without man load
- ② Support width in m
- ③ Rail bend in mm at permitted kN/m
- ④ Load scheme during testing
- Load curve with cable tray/ladder width in mm
- Strut bend curve according to support width

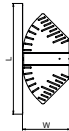
## Separating retainer 45



Type	Dim. H mm	Metal thickness mm	Dim. L mm	Min. ordering quantity m	Item no.
<b>TSG 45 DD</b>	45	0.75	3000	3	<b>6062321</b>

Separating retainer for separation of cables of different voltages or functions.

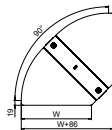
## Bend, angle-adjustable, 60



Type	Side height mm	Dim. B mm	Dim. L mm	Min. ordering quantity Piece	Item no.
<b>RB W 610 FT</b>	60	100	364	1	<b>6037120</b>
<b>RB W 620 FT</b>	60	200	522	1	<b>6037124</b>
<b>RB W 630 FT</b>	60	300	678	1	<b>6037126</b>
<b>RB W 640 FT</b>	60	400	834	1	<b>6037128</b>

Angle-adjustable bend for the creation of a horizontal branch, fitting for lock and screw-on cable trays of side height 60 mm. Adjustable angle 0–90°. Screwless mounting with double clamps or screw connection with FRS truss-head screws and M6 combination nuts. Can be used indoors and outdoors. Fastening material must be ordered separately.

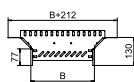
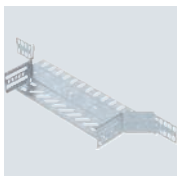
## Cover for angle-adjustable bend



Type	Dim. B mm	Metal thickness mm	Min. ordering quantity Piece	Item no.
<b>RBD W 100 DD</b>	100	0.75	1	<b>6037540</b>
<b>RBD W 200 DD</b>	200	0.75	1	<b>6037544</b>
<b>RBD W 300 DD</b>	300	0.75	1	<b>6037546</b>
<b>RBD W 400 DD</b>	400	1.00	1	<b>6037548</b>

Cover for angle-adjustable bend fitting for lockable and screw-on cable trays in indoor and outdoor areas, to protect cables against damage and soiling. Fastening with pre-mounted sash locks and through attachment of the section cover. Suitable for all side heights.

## Add-on tee 60



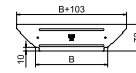
Type	Side height mm	Dim. B mm	Min. ordering quantity Piece	Item no.
<b>RAA 610 FT</b>	60	100	1	<b>6042211</b>
<b>RAA 620 FT</b>	60	200	1	<b>6042215</b>
<b>RAA 630 FT</b>	60	300	1	<b>6042217</b>
<b>RAA 640 FT</b>	60	400	1	<b>6042219</b>

Add-on tee for the creation of a horizontal branch or cross-over, fitting for lock and screw-on cable trays of side height 60 mm. Screwless mounting with double clamps or screw connection with FRS truss-head screws and M6 combination nuts. Can be used indoors and outdoors. Fastening material must be ordered separately.



## Cover, add-on tee

Type	Dim. B mm	Metal thickness mm	Min. ordering quantity Piece	Item no.
RAAD 100 DD	100	0.75	1	6042431
RAAD 200 DD	200	0.75	1	6042435
RAAD 300 DD	300	0.75	1	6042437
RAAD 400 DD	400	1.00	1	6042439



Cover for add-on tee fitting for lockable and screw-on cable trays in indoor and outdoor areas, to protect cables against damage and soiling. Fastening through attachment of the section cover. Suitable for all side heights.

## Cable ladder LG 60, 3 m VS



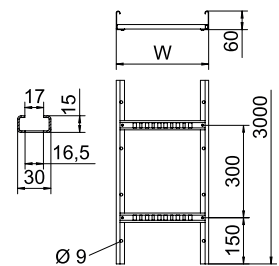
Type	Width mm	BS	Min. order- ing quan- tity m	Item no.
LG 620 VS 3 FT	200		3	6208562
LG 630 VS 3 FT	300		3	6208566
LG 640 VS 3 FT	400		3	6208570
LG 650 VS 3 FT	500		3	6208574
LG 660 VS 3 FT	600		3	6208578

Cable ladder with perforated side rail of side height 60 mm with riveted C profile frames, open in an upwards direction (VS version).

The cable ladder is shipped folded up. Cables can be mounted with the matching clamp clip, type 2056. The cable ladders in the widths 200 mm to 400 mm are also approved for vertical mounting as a vertical ladder in systems that guarantee the maintenance of electrical functionality according to DIN 4102 Part 12. Cables can be mounted with the clamp clip approved for the maintenance of electrical function, type 2056 M.

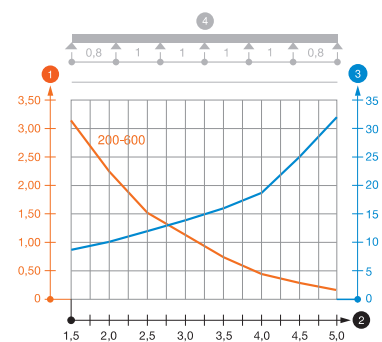
Type	Length mm	Dim. B mm	Rail thick- ness mm	Usable cross- section cm <sup>2</sup>	Rung spacing mm
LG 620 VS 3 FT	3000	200	1.5	98	300
LG 630 VS 3 FT	3000	300	1.5	148	300
LG 640 VS 3 FT	3000	400	1.5	198	300
LG 650 VS 3 FT	3000	500	1.5	248	300
LG 660 VS 3 FT	3000	600	1.5	298	300

### Dimensions



	1.5 m kN/m	2.0 m kN/m	2.5 m kN/m	3.0 m kN/m	4.0 m kN/m	4.5 m kN/m	5.0 m kN/m
LG 620 VS 3 FT	3.1	2.25	1.5	1.1	0.45	0.3	0.15
LG 630 VS 3 FT	3.1	2.25	1.5	1.1	0.45	0.3	0.15
LG 640 VS 3 FT	3.1	2.25	1.5	1.1	0.45	0.3	0.15
LG 650 VS 3 FT	3.1	2.25	1.5	1.1	0.45	0.3	0.15
LG 660 VS 3 FT	3.1	2.25	1.5	1.1	0.45	0.3	0.15

### Load



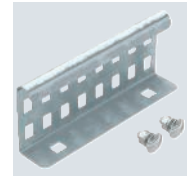
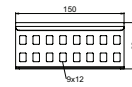
### Load diagram, LG 60 VS

- ① Permitted cable tray/ladder load in kN/m without man load
- ② Support width in m
- ③ Rail bend in mm at permitted kN/m
- ④ Load scheme during testing
- Load curve with cable tray/ladder width in mm
- Strut bend curve according to support width



### Straight connector 60

Type	Side height mm	Min. ordering quantity Piece	Item no.
LVG 60 FT	60	10	6208843

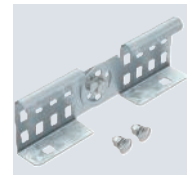
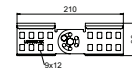


Straight connector as external connector to connect cable ladders and fittings with a side height of 60 mm and continuous rail perforation. The bolt fastening ensures the continuity of the equipotential bonding.



### Adjustable connector 60

Type	Side height mm	Min. ordering quantity Piece	Item no.
LGVG 60 FT	60	10	6208944

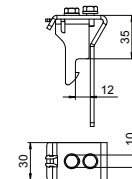


Adjustable connector as external connector to join cable ladders and fittings with a side height of 60 mm and continuous rail perforation. Angle can be adjusted vertically. The bolt fastening ensures the continuity of the equipotential bonding.



### Spacer for cover

Type	Side height mm	Min. ordering quantity Piece	Item no.
AH 35 A2	35	8	6065475

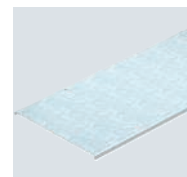
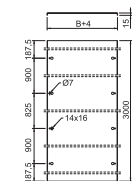


Spacer for stand-off cover mounting on cable trays and cable ladders. Space height 35 mm, stainless steel 1.4301.



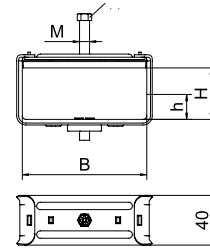
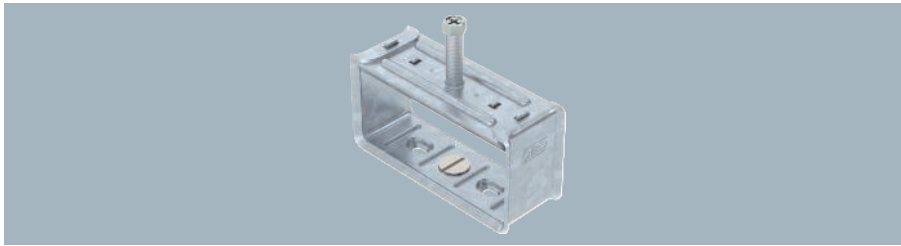
### Cover for stand-off mounting

Type	Width mm	Metal thickness mm	Length mm	Min. ordering quantity m	Item no.
DRL FAM 230 FT	230	1.50	3000	3	6051222
DRL FAM 330 FT	330	1.50	3000	3	6051224
DRL FAM 430 FT	430	1.50	3000	3	6051226
DRL FAM 530 FT	530	1.50	3000	3	6051228
DRL FAM 630 FT	630	1.50	3000	3	6051230



Cover for stand-off mounting. Not suitable for the vertical ladders SLM and SLS. Spacers must be ordered separately for every 3 m under article number 6065475 for cable trays and cable ladders as well as under article number 6065477 for wide span systems. When using covers outdoors, additional measures against the influence of wind must be taken.

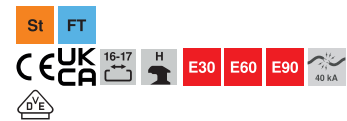
## Bundle clip



Type	Height x Width mm	Dim. h mm	Dim. H mm	Dim. B mm	Min. order- ing quantity Piece	Item no.
2056 B 35 FT	35 x 50	20	35	50	100	1194054
2056 B 40 FT	40 x 100	15	40	100	50	1194046
2056 B 80 FT	80 x 100	55	80	100	25	1194089

Clip and bolt made of hot-dip galvanised steel, countersunk head bolt made of rustproof stainless steel, slide nut made of electrogalvanised stainless steel.

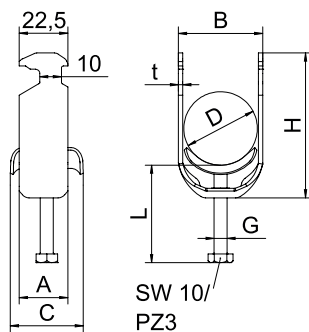
## Clamp clip 2056 H-foot, 1-fold, metal pressure sleeve



Type	Clamping range D mm	BS	Min. order- ing quantity Piece	Item no.
BS-H1-M-12 FT	8-12	🔥	100	1186002
BS-H1-M-16 FT	12-16	🔥	100	1186009
BS-H1-M-22 FT	16-22	🔥	100	1186016
BS-H1-M-28 FT	22-28	🔥	100	1186022
BS-H1-M-34 FT	28-34	🔥	100	1186029
BS-H1-M-40 FT	34-40	🔥	100	1186036
BS-H1-M-46 FT	40-46	🔥	100	1186042
BS-H1-M-52 FT	46-52	🔥	100	1186049
BS-H1-M-58 FT	52-58	🔥	100	1186056
BS-H1-M-64 FT	58-64	🔥	100	1186062
BS-H1-M-70 FT	64-70	🔥	50	1186069
BS-H1-M-76 FT	70-76	🔥	25	1186076
BS-H1-M-82 FT	76-82	🔥	25	1186082
BS-H1-M-90 FT	82-90	🔥	25	1186089
BS-H1-M-100 FT	90-100	🔥	25	1186097

Clamp clip with hammerhead foot, metal pressure sleeve with rounded edges to protect the cable. For vertical and horizontal mounting of 1 single cable on a C-profile rail. For a slot width 16–17 mm. With 1-start screw thread on pressure sleeve, universal hexagonal screw head WAF10, with slot and cross recess. Suitable for assembly indoors and outdoors. The counter-sleeve must be ordered separately.

### Dimensions



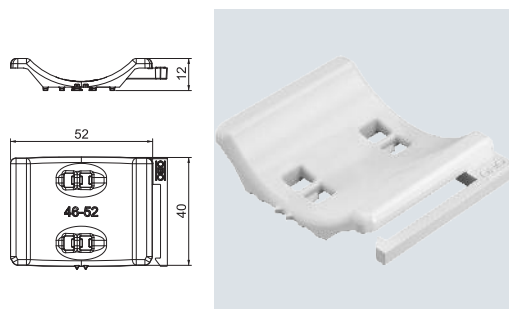
Type	Clamping range D mm	Dim. A mm	Dim. B mm	Dim. C mm	Dim. G mm	Dim. t mm	Dim. H mm	Dim. L mm	Max. torque Nm
BS-H1-M-12 FT	8-12	22.5	17	28	M6	1.5	42	34	3
BS-H1-M-16 FT	12-16	22.5	20	28	M6	1.5	46	34	3
BS-H1-M-22 FT	16-22	22.5	27	28	M6	1.5	52	34	3
BS-H1-M-28 FT	22-28	22.5	33	28	M6	2	59	34	3
BS-H1-M-34 FT	28-34	22.5	39	34	M6	2	67	46	3
BS-H1-M-40 FT	34-40	22.5	45	33	M6	2	74	46	3
BS-H1-M-46 FT	40-46	25	51	33	M8	2	82	43	5
BS-H1-M-52 FT	46-52	25	57	33	M8	2	89	43	5
BS-H1-M-58 FT	52-58	25	64	33	M8	2.5	96	43	5
BS-H1-M-64 FT	58-64	25	70	33	M8	2.5	102	43	5
BS-H1-M-70 FT	64-70	25	76	33	M8	2.5	109	43	5
BS-H1-M-76 FT	70-76	25	82	37	M8	2.5	115	55	5
BS-H1-M-82 FT	76-82	25	88	37	M8	2.5	122	55	5
BS-H1-M-90 FT	82-90	27	97	38	M8	3	132	55	5
BS-H1-M-100 FT	90-100	27	107	38	M8	3	143	55	5

PP



### Universal counter-trough, plastic

Type	Clamping range D mm	Dim. L mm	Dim. B mm	Dim. H mm	Colour	Shipping box Piece	Min. ordering quantity Piece	Item no.
2058UW 12 LGR	8-12	37	18.5	5.8	Light grey	1500	100	1198012
2058UW 16 LGR	12-16	37	21.5	5.8	Light grey	1600	100	1198016
2058UW 22 LGR	16-22	37	27.5	6.8	Light grey	1500	100	1198022
2058UW 28 LGR	22-28	37	33.5	8.3	Light grey	1200	100	1198028
2058UW 34 LGR	28-34	37	45.5	9.8	Light grey	1200	100	1198034
2058UW 40 LGR	34-40	37	45.5	10.8	Light grey	600	50	1198040
2058UW 46 LGR	40-46	40	51.5	11.8	Light grey	600	50	1198046
2058UW 52 LGR	46-52	40	57.5	11.8	Light grey	600	50	1198052
2058UW 58 LGR	52-58	40	63.5	11.8	Light grey	600	50	1198058
2058UW 64 LGR	58-64	40	69.5	11.8	Light grey	600	50	1198064
2058UW 70 LGR	64-70	40	75.5	12.3	Light grey	300	25	1198070
2058UW 76 LGR	70-76	40	81.5	12.3	Light grey	300	25	1198076
2058UW 82 LGR	76-82	40	87.5	12.3	Light grey	300	25	1198082
2058UW 90 LGR	82-90	40	96	12.8	Light grey	300	25	1198090
2058UW 100 LGR	90-100	40	106	12.8	Light grey	300	25	1198100



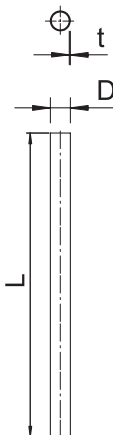
Regardless of the type of rail, the counter-trough can be used by applying it onto one side of the clamp clip. Due to an intelligent contour on the backside, the counter-trough can be combined to a double trough. Retrofitting possible without the need to dismantle.

Alu



### Aluminium pipe, without thread

Type	Dim. D mm	Dim. L mm	Dim. t mm	Min. ordering quantity m	Item no.
S16W ALU	16	3000	1.2	30	2046002
S20W ALU	20	3000	1.2	30	2046003
S25W ALU	25	3000	1.3	30	2046004
S32W ALU	32	3000	1.3	30	2046005
S40W ALU	40	3000	1.4	15	2046006
S50W ALU	50	3000	1.4	15	2046007
S63W ALU	63	3000	1.7	15	2046008



Electrical installation pipe without threaded ends to EN 61386-1 for mechanical protection of cables. With burr-free inner wall.

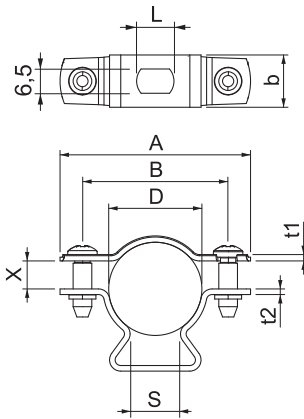
Spacer clip 733



Type	Clamping range D mm	Min. ordering quantity Piece	Item no.
ASL 733 17 ALU	14-17	25	1362812
ASL 733 20 ALU	17-20	25	1362814
ASL 733 25 ALU	20-25	25	1362818
ASL 733 36 ALU	30-36	20	1362826
ASL 733 44 ALU	36-44	20	1362830
ASL 733 53 ALU	44-53	20	1362834
ASL 733 63 ALU	53-63	20	1362838

Spacer clip for the installation of pipes and cables on walls, ceilings and floors. With self-locking upper part. Fastening via slot.

Dimensions



Type	Dim. A mm	Dim. B mm	Dim. x mm	Dim. t1 mm	Dim. t2 mm	Dim. L mm	Dim. b mm	Dim. s mm
ASL 733 17 ALU	44	32	4.5	1.25	1.5	10	14	9.5
ASL 733 20 ALU	47	35	4.5	1.25	1.5	10	14	12
ASL 733 25 ALU	51	39	7.5	1.25	1.5	10	14	13.5
ASL 733 36 ALU	65	51	9	1.5	1.5	10	16	20
ASL 733 44 ALU	73	59	12	1.5	1.5	10	16	24
ASL 733 53 ALU	84	70	13.5	1.5	2	10	16	29.5
ASL 733 63 ALU	94	80	15	1.5	2	10	16	35.3

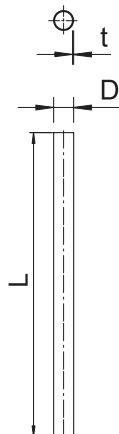
Hot-dip galvanised steel pipe, without thread



4 | 4 | 5 | 7 | 1

Electrical installation pipe without threaded ends according to EN 61386-1 for mechanical protection of cables. With burr-free inner wall. Corrosion protection class 4 (high).

Type	Dim. D mm	Dim. L mm	Dim. t mm	Min. ordering quantity m	Item no.
S16W FT	16	3000	1	30	2046593
S20W FT	20	3000	1	30	2046594
S25W FT	25	3000	1.2	30	2046595
S32W FT	32	3000	1.2	21	2046596
S40W FT	40	3000	1.2	15	2046597
S50W FT	50	3000	1.2	15	2046598
S63W FT	63	3000	1.2	9	2046599





### Spacer clip 733

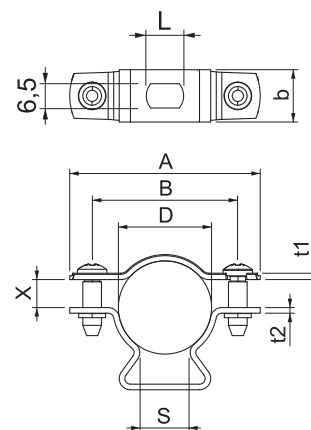
Type	Clamping range D mm	Min. ordering quantity Piece	Item no.
ASL 733 17 FT	14-17	25	1362712
ASL 733 20 FT	17-20	25	1362714
ASL 733 25 FT	20-25	25	1362718
ASL 733 36 FT	30-36	20	1362726
ASL 733 44 FT	36-44	20	1362730
ASL 733 53 FT	44-53	20	1362734
ASL 733 63 FT	53-63	20	1362738



Spacer clip for the installation of pipes and cables on walls, ceilings and floors. With self-locking cover. Fastening via slot.  
Approved for the maintenance of electrical function according to DIN 4102 Part 12, maintenance of electrical function classes E 30 to E 90.

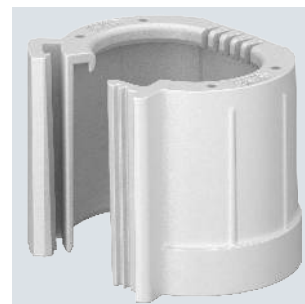
Type	Dim. A mm	Dim. B mm	Dim. x mm	Dim. t1 mm	Dim. t2 mm	Dim. L mm	Dim. b mm	Dim. s mm
ASL 733 17 FT	44	32	4.5	1.25	1.5	10	14	9.5
ASL 733 20 FT	47	35	4.5	1.25	1.5	10	14	12
ASL 733 25 FT	51	39	7.5	1.25	1.5	10	14	13.5
ASL 733 36 FT	65	51	9	1.5	1.5	10	16	20
ASL 733 44 FT	73	59	12	1.5	1.5	10	16	24
ASL 733 53 FT	84	70	13.5	1.5	2	10	16	29.5
ASL 733 63 FT	94	80	15	1.5	2	10	16	35.3

#### Dimensions



### Pipe end cap, splittable, metric, light grey

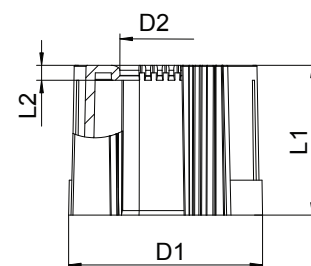
Type	Size	Colour	Min. ordering quantity Piece	Item no.
129 TB M16	M16	Light grey	50	2047812
129 TB M20	M20	Light grey	50	2047831
129 TB M25	M25	Light grey	50	2047839
129 TB M32	M32	Light grey	50	2047855
129 TB M40	M40	Light grey	30	2047863
129 TB M50	M50	Light grey	30	2047890
129 TB M63	M63	Light grey	20	2047898



Splittable pipe end cap to slot onto metric electrical installation pipes.  
The splittable pipe end cap can be used for repairs on existing installations according to regulations. It is not necessary to disconnect the cables, allowing quick mounting.

Type	Dim. D1 mm	Dim. D2 mm	Dim. L1 mm	Dim. L2 mm
129 TB M16	20	10	30	3
129 TB M20	24	13.4	30	3
129 TB M25	30	18.4	30	3
129 TB M32	36	25.4	30	3
129 TB M40	44	33.4	30	3
129 TB M50	53	43	30	3
129 TB M63	67	56	30	3

#### Dimensions



Pipe end cap, splittable, metric, black

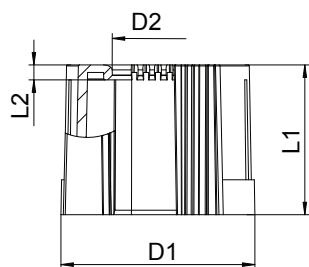
PE



Type	Size	Colour	Piece	Min. ordering quantity	Item no.
129 TB M16 SW	M16	Black	50		2047936
129 TB M20 SW	M20	Black	50		2047944
129 TB M25 SW	M25	Black	50		2047952
129 TB M32 SW	M32	Black	50		2047971
129 TB M40 SW	M40	Black	30		2047979
129 TB M50 SW	M50	Black	30		2047987
129 TB M63 SW	M63	Black	20		2047995

Splittable pipe end cap to slot onto metric electrical installation pipes. The splittable pipe end cap can be used for repairs on existing installations according to regulations. It is not necessary to disconnect the cables, allowing quick mounting.

Dimensions



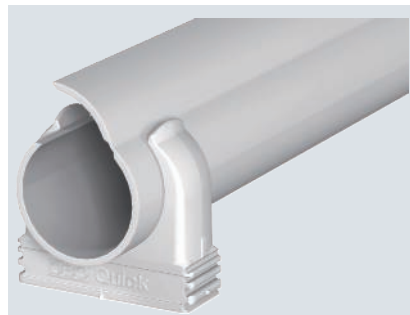
Type	Dim. D1	Dim. D2	Dim. L1	Dim. L2
	mm	mm	mm	mm
129 TB M16 SW	20	10	30	3
129 TB M20 SW	24	13.4	30	3
129 TB M25 SW	30	18.4	30	3
129 TB M32 SW	36	25.4	30	3
129 TB M40 SW	44	33.4	30	3
129 TB M50 SW	53	43	30	3
129 TB M63 SW	67	56	30	3

PVC



Set of Quick clips and Quick-Pipe® pipes

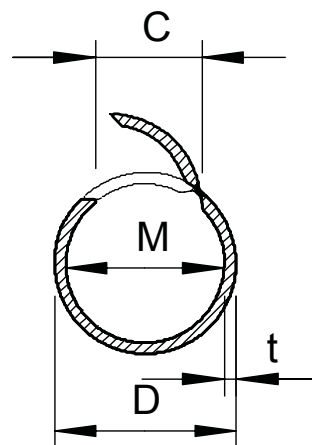
Type	Size	Colour	Set consisting of	Min. ordering quantity	Item no.
2954 M16 LGR	M16	Light grey	50 m Quick pipe and 156x OBO Quick clip	1	2154501
2954 M20 LGR	M20	Light grey	40 m Quick pipe and 120x OBO Quick clip	1	2154528
2954 M25 LGR	M25	Light grey	30 m Quick pipe and 96x OBO Quick clip	1	2154536
2954 M32 LGR	M32	Light grey	20 m Quick pipe and 60x OBO Quick clip	1	2154544



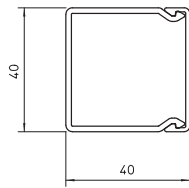
Set consisting of Quick-Pipe® electrical installation pipes and Quick clip surface-mounted clips. For surface-mounted routing of cables in interiors and protected outdoor areas. Universal fastening on wall and ceiling. Depending on diameter, the set comprises up to 50 m of pipe each of 2 metres in length and up to 156 Quick clips. Can be used in a temperature range of -25 to + 60 °C.

Type	Dimension M mm	Dim. t mm	Dim. C mm	Dim. D mm
2954 M16 LGR	13.2	1.2	8.2	15.6
2954 M20 LGR	17	1.5	10	20
2954 M25 LGR	21.8	1.6	13.6	25
2954 M32 LGR	28.6	1.7	17	32

Dimensions



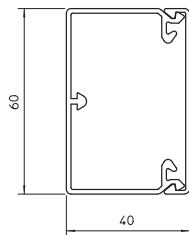
Duct, type WDK 40040



Type	Colour	Length mm	Length m	Min. order- ing quan- tity m	Item no.
WDK40040RW	Pure white	2000	36		6191126

Duct cover and base with base perforation.

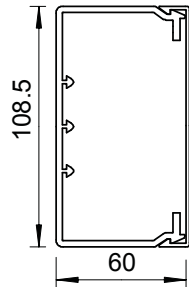
Duct, type WDK 40060



Type	Colour	Length mm	Length m	Min. order- ing quan- tity m	Item no.
WDK40060RW	Pure white	2000	32		6191134

Duct cover and base with base perforation.

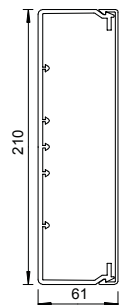
Duct, type WDK 60110



Type	Colour	Length mm	Length m	Min. order- ing quan- tity m	Item no.
WDK60110RW	Pure white	2000	16		6191215

Duct cover and base with base perforation.

Duct, type WDK 60210



Type	Colour	Length mm	Length m	Min. order- ing quan- tity m	Item no.
WDK60210RW	Pure white	2000	8		6191266

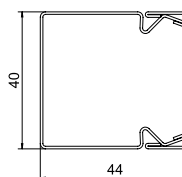
Duct cover and base with base perforation.



Cable duct, type LKM 40040

Type	Colour	Length mm	Length m	Min. order- ing quan- tity m	Pack m	Weight kg/100 m	Item no.
LKM40040RW	Pure white	2000	2		2	132.600	6248497

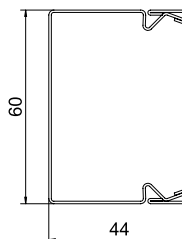
Duct cover and base with base perforation. Equipotential bonding is guaranteed between the cover and the base without any additional aids.



Cable duct, type LKM 40060

Type	Colour	Length mm	Length m	Min. order- ing quan- tity m	Pack m	Weight kg/100 m	Item no.
LKM40060RW	Pure white	2000	2		2	157.300	6248519

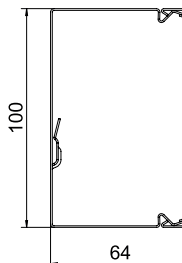
Duct cover and base with base perforation. Equipotential bonding is guaranteed between the cover and the base without any additional aids.



Cable duct, type LKM 60100

Type	Colour	Length mm	Length m	Min. order- ing quan- tity m	Pack m	Weight kg/100 m	Item no.
LKM60100RW	Pure white	2000	2		2	230.200	6248624

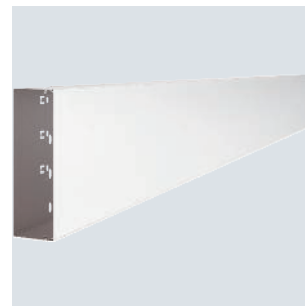
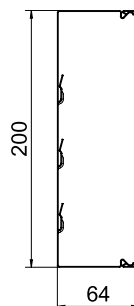
Duct cover and base with base perforation. Equipotential bonding is guaranteed between the cover and the base without any additional aids. The LKM cable duct, type LKM 60100, has been tested for the maintenance of electrical function as a routing system according to DIN 4102 Part 12. Please refer to the cable types tested in the BSS fire protection systems division!



Cable duct, type LKM 60200

Type	Colour	Length mm	Length m	Min. order- ing quan- tity m	Pack m	Weight kg/100 m	Item no.
LKM60200RW	Pure white	2000	2		2	352.500	6248667

Duct cover and base with base perforation. Equipotential bonding is guaranteed between the cover and the base without any additional aids.



## Safe and efficient system operation with equipotential bonding



Equipotential bonding plays a key role in the safe operation of PV systems. After all, it equalises dangerous voltage differences between various conductive parts of the system. Various equipotential bonding rails are used for this, for example. This ensures optimal safety and functionality for your system – today and in the future.



## Equipotential bonding for photovoltaic systems

PV systems must always be equipped with equipotential bonding. This arises from the “Requirements for protection against electric shock” which are set out in the standard DIN VDE 0100-410 and E VDE 0100-712.

- Prevents electric shock
- Reduces the risk of fires and short-circuits
- Reduces electromagnetic interference

When it comes to equipotential bonding in PV systems, connection terminals are often used for the mounting frames and equipotential bonding rails, e.g. near the inverters. In a next step, the PV installation is connected to the building’s grounding system. This prevents dangerous voltage differences.



## Equipotential busbar for outside installation, metal base plate

A2



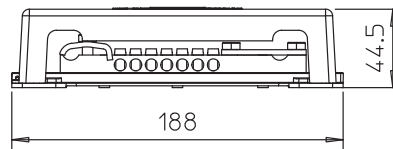
Type	Colour	Length mm	Width mm	Height mm	Min. ordering quantity Piece	Item no.
1809 AM	Black	188	52	44.5	1	5015105

Equipotential busbar for equipotential bonding according to DIN VDE 0100-410/-540 and lightning protection equipotential bonding according to DIN VDE 0185-305

- Cover hood made of polystyrene
- Base plate made of steel, zinc-iron surface
- Colour: Black, UV-resistant
- Screws and crossbar made of VA
- Capable of carrying lightning current 100 kA (10/350)

Connection options:

- 7 single or multi-wire cables to 25 mm<sup>2</sup> or fine-wire cables to 16 mm<sup>2</sup>
- 1 round conductor Rd 8–10
- 1 flat strip to FL30 or round conductor Rd 8–10



## Equipotential busbar for indoors, VDE-tested

CuZn  
37

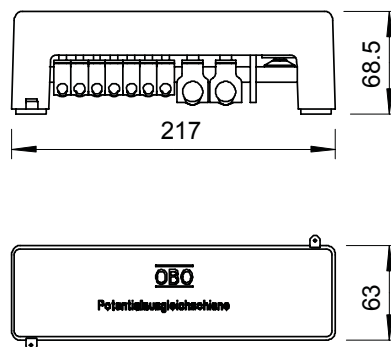
Type	Colour	Min. ordering quantity	Min. ordering quantity Piece	Item no.
1801 VDE	Grey	1		5015650

Equipotential busbar for equipotential bonding according to DIN VDE 0100-410/-540 as well as lightning protection equipotential bonding according to DIN VDE 0185-305

- With 10 x 10 mm clamping rail made of nickel-plated brass
- With contact-secure series terminals made of electrogalvanised steel
- Cover and rail stands made of grey polystyrene
- Sealable / labellable cover
- Lightning current carrying capacity 100 kA (10/350)
- Tension clamp with screw lock against self-loosening (e.g. required in industry)

Connection options:

- 12 single or multi-wire cables 2.5–25 mm<sup>2</sup> or fine-wire cables with wire end sleeve to 16 mm<sup>2</sup> (max. Ø 7 mm)
- 1 single or multi-wire cable 25–95 mm<sup>2</sup> or fine-wire cable with wire end sleeve to 70 mm<sup>2</sup> (max. Ø 13.5 mm)



## Equipotential busbar for indoors



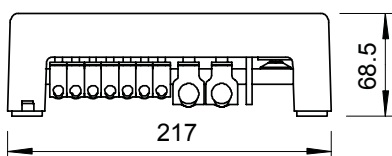
Type	Colour	Min. ordering quantity	Piece	Item no.
1801 12x25 1x95	Grey	1		5015683

Equipotential busbar for equipotential bonding according to DIN VDE 0100-410/-540 as well as lightning protection equipotential bonding according to DIN VDE 0185-305

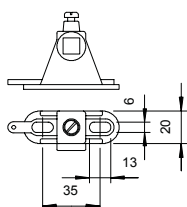
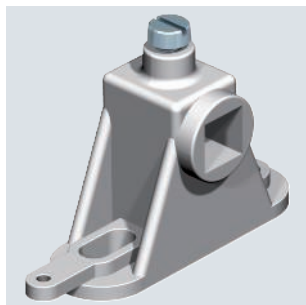
- With 10 x 10 mm clamping rail made of nickel-plated brass
- With contact-secure series terminals made of electrogalvanised steel
- Cover and rail stands made of grey polystyrene
- Sealable / labellable cover
- Lightning current carrying capacity 100 kA (10/350)
- Tension clamp with screw lock against self-loosening (e.g. required in industry)

Connection options:

- 12 single or multi-wire cables 2.5–25 mm<sup>2</sup> or fine-wire cables with wire end sleeve to 16 mm<sup>2</sup> (max. Ø 7 mm)
- 1 single or multi-wire cable 25–95 mm<sup>2</sup> or fine-wire cable with wire end sleeve to 70 mm<sup>2</sup> (max. Ø 13.5 mm)



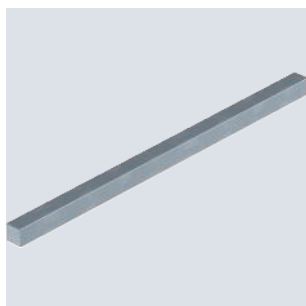
## Busbar stand for 1801 VDE



Type	Colour	Min. ordering quantity	Piece	Item no.
1801 SCH	Grey	10		5015715

- 2 rail stands required per 14 units
- With 6 x 13 mm slot

## Contact strip for 1801 VDE



Type	Length mm	Min. ordering quantity	Piece	Item no.
1801 KL1	212	1		5015723
1801 KL2	430	1		5015804
1801 KL3	645	1		5015812

- 10 x 10 mm made of nickel-plated brass
- 1801 KL1: 14 subunits
- 1801 KL2: 28 subunits
- 1801 KL3: 42 subunits

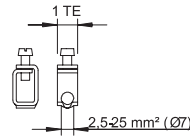
St G

Round conductor terminal to 25 mm<sup>2</sup> for 1801 VDE



Type	Connection option	Min. ordering quantity	Item no.
1801 RK25	2.5-25 mm <sup>2</sup>	10	5015758

- For single or multi-wire cables 2.5–25 mm<sup>2</sup>
- For fine-wire cables to 16 mm<sup>2</sup> (max. Ø 7 mm)
- 1 division unit
- Lightning current carrying capacity 100 kA (10/350)
- Electrogalvanised steel
- Tension clamp with screw lock against self-loosening (e.g. required in industry and in explosion-protected areas)



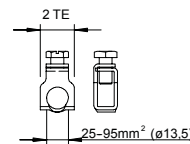
St G

Round conductor terminal from 25 mm<sup>2</sup> for 1801 VDE



Type	Connection option	Min. ordering quantity	Item no.
1801 RK95	25-95 mm <sup>2</sup>	10	5015766

- For single or multi-wire cables 25–95 mm<sup>2</sup>
- For fine-wire cables to 70 mm<sup>2</sup> (max. Ø 13.5 mm)
- 2 division units
- Lightning current carrying capacity 100 kA (10/350)
- Electrogalvanised steel
- Tension clamp with screw lock against self-loosening (e.g. required in industry and in explosion-protected areas)



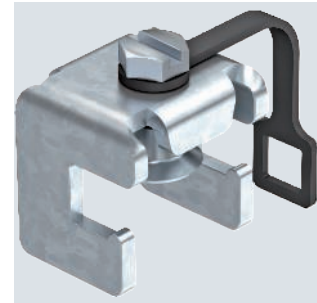
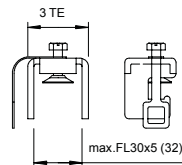
St G

Flat conductor terminal to FL 30 for 1801 VDE



Type	Connection option	Min. ordering quantity	Item no.
1801 RK30	FL 30x5	1	5015731

- For flat conductors to FL 30 and thickness to 5 mm
- Captive design with plastic safety strap
- 3 division units
- Lightning current carrying capacity 100 kA (10/350)
- Electrogalvanised steel

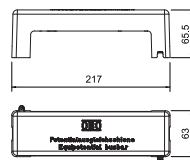


PS

Cover hood for 1801 VDE

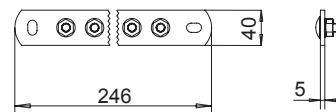
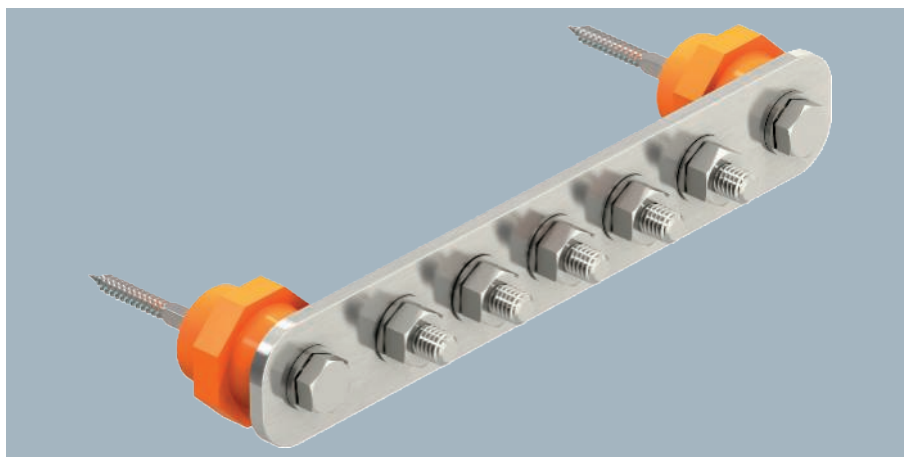
Type	Colour	Length mm	Width mm	Height mm	Min. ordering quantity	Item no.
1801 AH	Grey	217	63	65.5	1	5015707

- 1 covering hood required per 14 division units
- Fastening to rail stands 1801 SCH
- Sealable



## Equipotential busbar BigBar for industrial application

A2



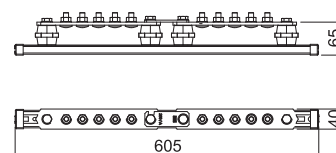
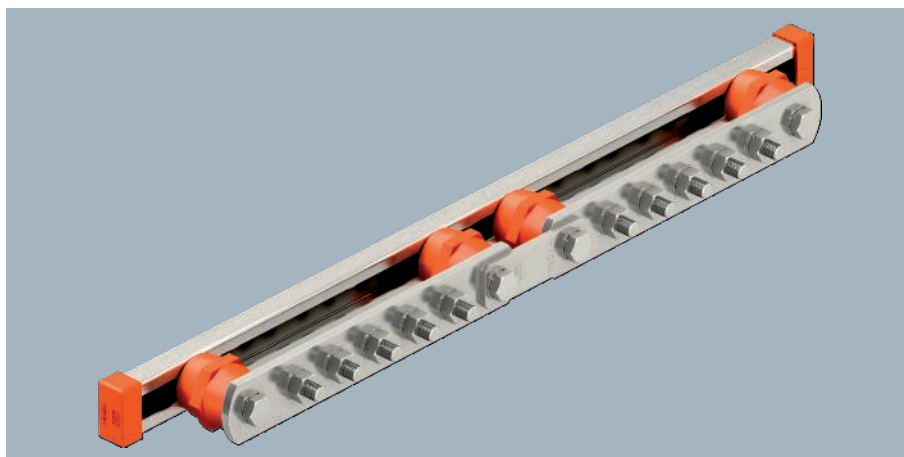
Type	Number of connections	Width mm	Length mm	Height mm	Min. ordering quantity Piece	Item no.
1802 5 VA	5	40	246	5	1	5015854
1802 10 VA	10	40	408.5	5	1	5015866

Main equipotential busbar for equipotential bonding to VDE 0100-410/-540, and also lightning protection equipotential bonding to VDE 0185-305 (IEC 62305)

- Insulation feet
- Quick and simple mounting of connection cables using lock bolts M10
- The high-grade stainless steel versions (V2A) are suitable for outdoor use
- Complete with anchors and bolts for wall mounting
- With spring washer (DIN 137) for bolt locking against loosening (e.g. required in industry and explosion-protected areas)

## Equipotential busbar for flexible wall mounting with separation point

A2



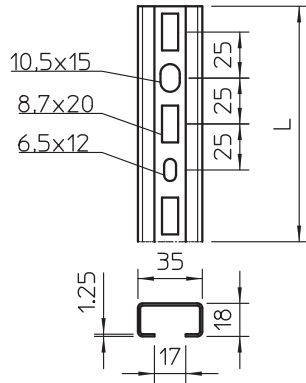
Type	Number of connections	Width mm	Length mm	Height mm	Min. ordering quantity Piece	Item no.
1802 DC 5+5 VA	10	40	605	85	1	5015876

Main equipotential busbar for equipotential bonding to VDE 0100-410/-540, and also lightning protection equipotential bonding to VDE 0185-305 (IEC 62305)

- Insulation feet
- Quick and simple mounting of connection cables using lock bolts M10
- The high-grade stainless steel versions (V2A) are suitable for outdoor use
- Complete with anchors and bolts for wall mounting
- With spring washer (DIN 137) for bolt locking against loosening (e.g. required in industry and explosion-protected areas)



## CM3518 profile rail, slot 17 mm, perforated



Central C profile rail for cable routing, in conjunction with clamp clips with a hammerhead foot. Can also be used as suspension construction for cable support systems.

Type	Length mm	Dimension W x H mm	Material thickness mm	Dim. L mm	Min. order- ing quantity m	Item no.
CML3518P2000FT	2000	35x18	1.25	2000	20	1104570

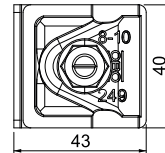
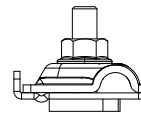
A2

## Earthing terminal for PV mounting systems

Type	Length mm	Width mm	Height mm	Min. order- ing quan- tity Piece	Weight kg/100 pc.	Item no.
249 PV10 6-50V2A	40	43	34	8	8.460	5051520

Pre-mounted earthing terminal for the inclusion of PV mounting systems in the equipotential bonding. Suitable for the inclusion of the PV mounting systems in an external lightning protection system.

- Lightning current-compatible up to 100 kA (10/350)
- Rapid mounting through integrated spring mechanism
- For round conductor fastening RD 8–10
- To fasten single/multi-wire cables: 6–50 mm<sup>2</sup>
- For profiles with 10 mm groove
- Meets the requirements of DIN EN 62561-1

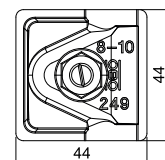
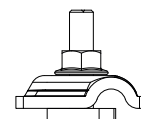


## Earthing terminal for PV mounting systems

Type	Length mm	Width mm	Height mm	Min. order- ing quan- tity Piece	Weight kg/100 pc.	Item no.
249 PV8-10 ALU	44	44	34	10	4.500	5051526

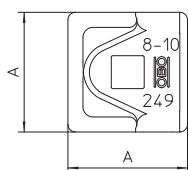
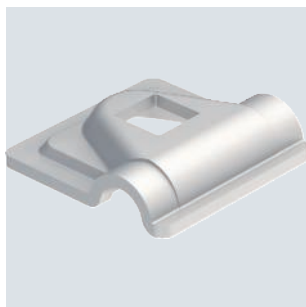
Earthing terminal for the inclusion of PV mounting systems in the equipotential bonding.

- For round conductor fastening RD 8–10
- For profiles with 10 mm groove



Alu

## Quick connector, upper part Rd 8–10 mm

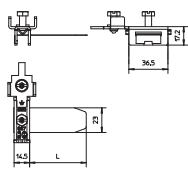


Type	Fit	Dim. A	Min. ordering quantity	Item no.
	mm	mm	Piece	
249 8-10 ALU-OT	Rd 8-10	44	100	5311585

- For round conductor fastening Rd 8-10
- Suitable for M10 bolts

## Potential connection clamp for mounting on isFang

A2

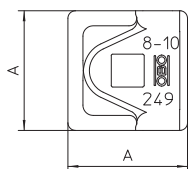
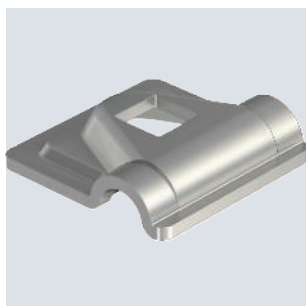


Type	For pipe Ø	Dim. L	For pipe Ø	Min. ordering quantity	Item no.
	inch	mm	mm	Piece	
927 2 6-K	3/8 4	595	17.2-114	10	5057599

- Potential connection for isCon® conductor for mounting on insulated air-termination rods of type isFang.

## Quick connector, upper part Rd 8–10 mm

A2

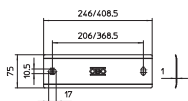


Type	Fit	Dim. A	Min. ordering quantity	Item no.
	mm	mm	Piece	
249 8-10 VA-OT	Rd 8-10	40	100	5311584

- For round conductor Rd 8-10
- Suitable for M10 bolts

## Cover for BigBar equipotential busbar

A2



Type	Number of connections	Min. ordering quantity	Item no.
		Piece	
1802 AH 5	5	1	5015880
1802 AH 10	10	1	5015884

- Complete with all mounting components
- Labellable

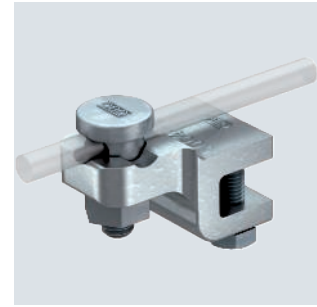
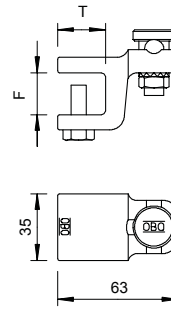
SG FT



## Folding and construction clamp, 12 mm

Type	Fit mm	Clamping range mm	Dim. T mm	Lightning current carrying capacity kA	Min. order- ing quan- tity Piece	Item no.
<b>5004 DIN-FT 12</b>	Rd 8-10	12	20	N/50	10	<b>5304407</b>
<b>5004 DIN-FT 20</b>	Rd 8-10	10-20	25	N/50	10	<b>5304504</b>

- Flange thickness to 12 or 10–20 mm
- With pre-mounted fix contact clamping screw 5000
- 2 hexagonal bolts M8 x 20, bolts made of hot galvanised steel
- Terminal block made of malleable iron, hot galvanised
- Mounting of the round conductors either vertical or transverse to structure
- Corresponds to the requirements of DIN VDE 0185-305-3



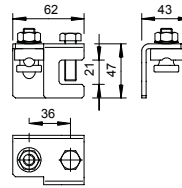
St FT



## Construction clamp to 20 mm

Type	Fit mm	Clamping range mm	Lightning current carrying capacity kA	Min. order- ing quan- tity Piece	Item no.
<b>5010 20 FT</b>	Rd 8-10	4-20	N/50	10	<b>5304520</b>

- Mounting of the round conductor possible vertically or transverse to construction
- For fastening to constructions up to a flange thickness of 20 mm
- Fastening to constructions using a hexagonal bolt M10
- Meets the requirements of VDE 0185-305 (IEC 62305)



# Surge protection for photovoltaic systems



## The complete range

OBO's surge protection programme is set up in modules and offers solutions for almost all application cases. It includes:

- Type 1 and type 1+2 lightning current arrester, photovoltaics, DC side
- Type 2 surge protection, photovoltaics, DC side
- Type 1+2 lightning current arrester, AC side, 230/400 V
- Surge protection type 2, AC side, 230/400 V
- Surge protection for information and data technology

Particularly useful are the ready-made photovoltaic systems for the most common requirements, as they demand minimal installation only. Do you require special solutions, such as insulators or fuses? Please get in touch with us.

## Buildings without lightning protection

Recommendation: from 10 m cable length  
(MD to power inverter):

The diagram shows a house with solar panels on the roof. Internal components include a kWh meter, a distribution board (D), and two transformer units (T2). A power inverter is connected to the system. Recommended components are listed below:

- V20-3+NPE-280**  
Item no.: 5095253
- MCF30-NAR-TT**  
Item no.: 5096961
- 1,000 V, per tracker**  
PVG-C-1000K 200  
Item no.: 5088435
- 1,000 V, 2 trackers**  
PVG-C-1000K 110  
Item no.: 5088415
- 1,000 V, per tracker**  
V20-C 3-PH-1000  
Item no.: 5094608
- 1,500 V, per tracker**  
PV-T2-1500  
Item no.: 5094288
- Data cable protection CAT6**  
ND-CAT6/EA  
Item no.: 5081800

## Building with lightning protection

with correctly maintained separation distance (LPC 3 or 4)

The diagram shows a house with solar panels on the roof. Internal components include a kWh meter, a distribution board (D), and two transformer units (T2). A power inverter is connected to the system. Recommended components are listed below:

- V20-3+NPE-280**  
Item no.: 5095253
- MCF50-NAR-TT**  
Item no.: 5096975
- 1,000 V, per tracker**  
PVG-C-1000K 200  
Item no.: 5088435
- 1,000 V, 2 trackers**  
PVG-C-1000K 110  
Item no.: 5088415
- 1,000 V, per tracker**  
V20-C 3-PH-1000  
Item no.: 5094608
- 1,500 V, per tracker**  
PV-T2-1500  
Item no.: 5094288
- Data cable protection CAT6**  
ND-IP66-RJ-RJ  
Art.-Nr. 5081807

## Building with lightning protection

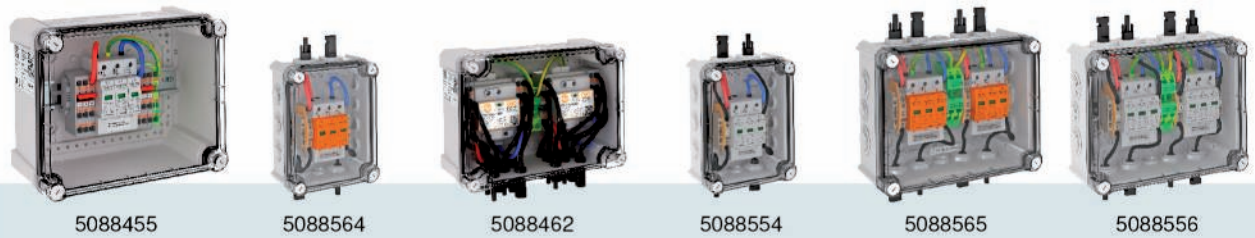
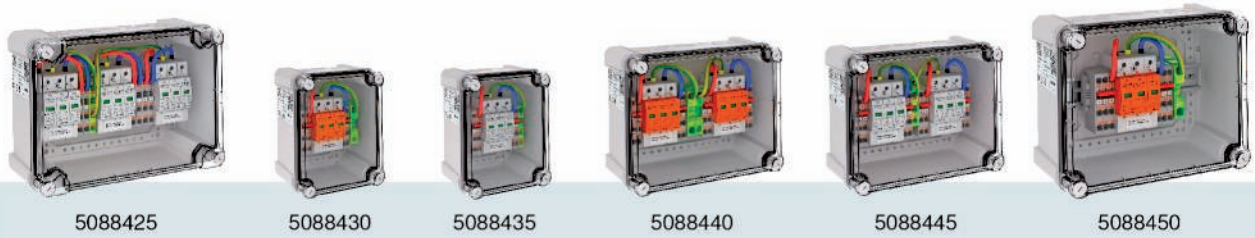
with not correctly maintained separation distance (LPC 3 or 4)

The diagram shows a house with solar panels on the roof. Internal components include a kWh meter, a distribution board (D), and two transformer units (T1+2). A power inverter is connected to the system. Recommended components are listed below:

- V50-3+NPE-280**  
Item no.: 5093526
- MCF100-3+NPE+FS**  
Item no.: 5096987
- MCF50-NAR-TT**  
Item no.: 5096975
- 900 V, 1 tracker**  
PVG-BC 900K 200  
Item no.: 5088430
- 900 V, 2 trackers**  
PVG-BC 900K 220  
Item no.: 5088440
- 900 V, per tracker**  
V25-B+C 3-PH900  
Item no.: 5097447
- 1,500 V, per tracker**  
PV-T1+2-1500  
Item no.: 5094252
- Data cable protection CAT6**  
ND-IP66-RJ-LSA  
Item no. 5081808

# Effectively protect PV systems from surge voltages

OBO has redesigned its portfolio of generator connection boxes for the DC protection of PV systems: The boxes pre-terminated with lightning and surge protection now safeguard the PV inverter input even more effectively and reliably.



Application	Arrester class (type)	U <sub>max</sub>	Number of MPP trackers	Max. number of strings per MPP entry  exit	Type	Item no.
DC	T2	1000 V	1	1 > 1	PVG-C1000K 100	5088405
DC	T2	1000 V	1	1 > 1	VG-C DC-TS1000	5088660
DC	T2	1000 V	1	3 > 2	PVG-C1000K 200	5088435
DC	T2	1000 V	1	4 > 1	VG-C DCPH1000-4S	5088651
DC	T2	1000 V	1	4 > 1	VG-C PV1000KS4	5088654
DC	T2	1000 V	1	4 > 4 or 5 > 3	PVG-C1000K 400	5088455
DC	T2	1000 V	1	MC4: 1 > 1	PVG-C1000S100	5088554
DC	T2	1000 V	2	1 > 1	PVG-C1000K 110	5088415
DC	T2	1000 V	2	3 > 2	PVG-C1000K 220	5088445
DC	T2	1000 V	2	MC4: 1 > 1	PVG-C1000S110	5088556
DC	T2	1000 V	3	1 > 1	PVG-C1000K 111	5088425
DC	T1+2	900 V	1	1 > 1	PVG-BC 900K 100	5088400
DC	T1+2	900 V	1	1 > 1	VG-BC DC TS900	5088635
DC	T1+2	900 V	1	3 > 2	PVG-BC 900K 200	5088430
DC	T1+2	900 V	1	4 > 1	VG-BC PV900KS4	5088640
DC	T1+2	900 V	1	4 > 4 or 5 > 3	PVG-BC 900K 400	5088450
DC	T1+2	900 V	1	MC4: 1 > 1	VG-BC900S1	5088564
DC	T1+2	900 V	2	1 > 1	PVG-BC 900K 110	5088410
DC	T1+2	900 V	2	3 > 2	PVG-BC 900K 220	5088440
DC	T1+2	900 V	2	MC4: 1 > 1	VG-BC900S11	5088565
DC	T1+2	900 V	3	1 > 1	PVG-BC 900K 111	5088420
DC	T1+2	900 V	3	2 > 1	PVG-BC 900K 222	5088460
DC	T1+2	1500 V	2	MC4: 3 > 1	PVG-BC 1500M 110	5088462
AC	T1+2	230/400 V AC	TN-C, TN-S, TT	1 > 1	VG-V50-3+NPE-280	5093596
AC	T2	230/400 V AC	TN-C, TN-S, TT	1 > 1	VG-V20-3+NPE-280	5095383
Data	D1+C1+2	48 V	Cat 6A	RJ45 > LSA+	ND-IP66-RJ-LSA	5081808
Data	D1+C1+2	48 V	Cat 6A	RJ45 > RJ45	ND-IP66-RJ-RJ	5081807
<b>Heat and weather protection cover</b>		stainless steel, black powder-coated			WB WPR	6570105

# Surge protective devices for safe arresting of partial lightning currents

Thanks to their exposed position on roofs or open fields, photovoltaic systems are particularly at risk of lightning strikes and surge voltages. To ensure continuous availability of the system, comprehensive lightning and surge protection is essential. OBO offers an entire range of surge protective devices that reliably arrest partial lightning currents – for a protected PV system.

## For DC applications



5094605



5094576



5094608



5094574



5094286  
5094294



5094288  
5094296



5093623



5093625



5097447



5097448



5094250



5094258

## For AC applications



5094252



5094260



5095253



5095333



5093526



5093533



5096961



5096975



5096987

## Data technology

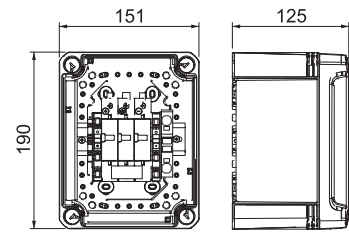


5081800

Appli- cation	Arrester class (type)	U <sub>max</sub>	Number of MPP trackers/strings	Remote Signaling / Changeo- ver Contact	Protection level	Discharge capacity	Type	Item no.
DC	T2	600 V	1	No	< 2,6	40 kA (8/20)	V20-C 3PH-600	5094605
DC	T2	600 V	1	Yes	< 2,6	40 kA (8/20)	V20-C 3PHFS-600	5094576
DC	T2	1000 V	1	No	< 4,0	40 kA (8/20)	V20-C 3PH-1000	5094608
DC	T2	1000 V	1	Yes	< 4,0	40 kA (8/20)	V20-C 3PHFS-1000	5094574
DC	T2	1100 V	1	No	< 3,8	50 kA (8/20)	PV-T2-1100	5094286
DC	T2	1100 V	1	Yes	< 3,8	50 kA (8/20)	PV-T2+FS-1100	5094294
DC	T2	1500 V	1	No	< 5	40 kA (8/20)	PV-T2-1500	5094288
DC	T2	1500 V	1	Yes	< 5	40 kA (8/20)	PV-T2+FS-1500	5094296
DC	T1+2	600 V	1	No	< 2,6	12,5 kA (10/350)	V50-B+C 3PH600	5093623
DC	T1+2	600 V	1	Yes	< 2,6	12,5 kA (10/350)	V50-B+C 3PHFS600	5093625
DC	T1+2	900 V	1	No	< 3,0	12,5 kA (10/350)	V25-B+C 3PH900	5097447
DC	T1+2	900 V	1	Yes	< 3,0	7 kA (10/350)	V25-B+C 3PHFS900	5097448
DC	T1+2	1100 V	1	No	< 3,8	12,5 kA (10/350)	PV-T1+2-1100	5094250
DC	T1+2	1100 V	1	Yes	< 3,8	12,5 kA (10/350)	PV-T1+2+FS-1100	5094258
DC	T1+2	1500 V	1	No	< 5	10 kA (10/350)	PV-T1+2-1500	5094252
DC	T1+2	1500 V	1	Yes	< 5	10 kA (10/350)	PV-T1+2+FS-1500	5094260
AC	T2	280 V	TNC, TN-S, TT	No	< 1,3	60 kA (8/20)	V20-3+NPE-280	5095253
AC	T2	280 V	TNC, TN-S, TT	Yes	< 1,3	60 kA (8/20)	V20-3+NPE+FS-280	5095333
AC	T1+2	280 V	TNC, TN-S, TT	No	< 1,5	50 kA (10/350)	V50-3+NPE-280	5093526
AC	T1+2	280 V	TNC, TN-S, TT	Yes	< 1,5	50 kA (10/350)	V50-3+NPE+FS-280	5093533
AC	T1+2	255 V	TNC, TN-S, TT	No	< 1,3	30 kA (10/350)	MCF30-NAR-TT	5096961
AC	T1+2	255 V	TNC, TN-S, TT	Yes	< 1,3	30 kA (10/350)	MCF30-NAR-TT+FS	5096963
AC	T1+2	255 V	TNC, TN-S, TT	No	< 1,5	50 kA (10/350)	MCF50-NAR-TT	5096975
AC	T1+2	255 V	TNC, TN-S, TT	Yes	< 1,5	50 kA (10/350)	MCF50-NAR-TT+FS	5096977
AC	T1+2	255 V	TNC, TN-S, TT	No	< 1,5	100 kA (10/350)	MCF100-3+NPE+FS	5096987
AC		255 V	Voltage tap MCF-NAR	for APZ/ RFZ, 5A			MCF-NAR-SMG	5096900
Data	C1+2	58 V	Cat 6A		< 0,7	7 kA (8/20)	ND-CAT6A/EA	5081800

## Generator connection box, type 1 + 2, for 1 string

Type 1+2 LPZ 0-2   



Type	U max DC V	Version	Min. ordering quantity Piece	Item no.
PVG-BC 900K 100	900	For 1 MPPT and with push-in terminal	1	5088400

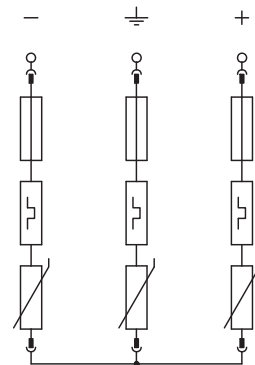
Generator connection box, type 1 + 2, for photovoltaic systems, to connect 1 string. For DC protection of the inverter.

- Varistor arrester, plug-in, with separation device in error-resistant Y circuit according to VDE 0100-712 (50539-12)
- Low DC protection level: < 3.0 kV ( $U_{oc\ max} = 900\ V\ DC$ )
- 1 protection device with 2 push-in terminals of up to 6 mm<sup>2</sup> pre-installed in the housing, up to 41 A DC per terminal
- Polycarbonate housing (IP67), UV-resistant for exterior use, incl. cable gland set and pressure compensation element

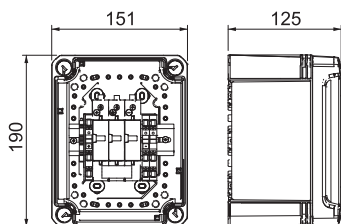
Additional measures may be required if there is the risk of condensation formation through wind, ice, temperature or sun!

PVG-BC 900K 100		U <sub>c</sub> DC	900 V
U max DC		Type 1+2	
SPD to EN 61643-11		0-2	
Lightning protection zone LPZ		7 kA	
Impulse discharge current (10/350 μs)	I <sub>imp</sub>	30 kA	
Nominal discharge current (8/20)	I <sub>n</sub>	50 kA	
Maximum discharge current (8/20 μs)	I <sub>max</sub>	< 3,0 kV	
Protection level	U <sub>p</sub>	< 25 ns	
Response time	t <sub>A</sub>	-25 - +60 °C	
Temperature range	θ	IP 67	
Protection rating			

### Connection options



## Generator connection box, type 2, for 1 string



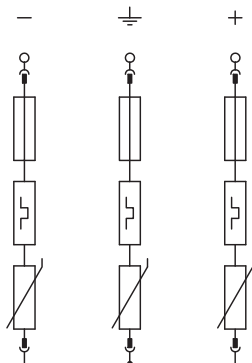
Generator connection box, type 2, for photovoltaic systems, to connect 1 string. For DC protection of the inverter.

- Varistor arrester, plug-in, with separation device in error-resistant Y circuit according to VDE 0100-712 (50539-12)
- Low DC protection level: < 4.0 kV ( $U_{oc\ max} = 1,000\ V\ DC$ )
- 1 protection device with 2 push-in terminals of up to 6 mm<sup>2</sup> pre-installed in the housing, up to 41 A DC per terminal
- Polycarbonate housing (IP67), UV-resistant for exterior use, incl. cable gland set and pressure compensation element

Additional measures may be required if there is the risk of condensation formation through wind, ice, temperature or sun!

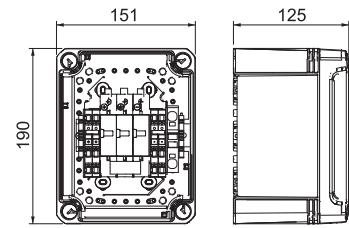
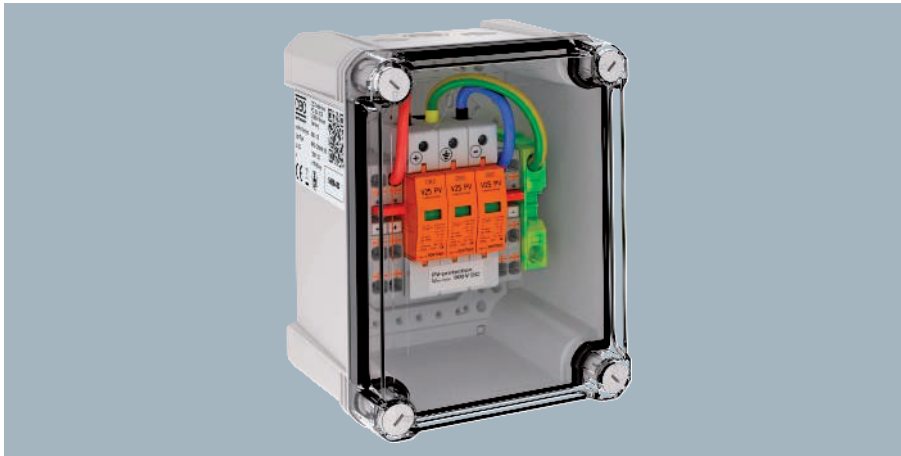
Type	U max DC V	Version	Min. ordering quantity Piece	Item no.
PVG-C1000K 100	1000	For 1 MMPT and with push-in terminals	1	5088405

### Connection options



PVG-C1000K 100		
U max DC	U <sub>c</sub> DC	1000 V
SPD to EN 61643-11		Type 2
Lightning protection zone LPZ		1→2
Nominal discharge current (8/20)	I <sub>n</sub>	20 kA
Maximum discharge current (8/20 μs)	I <sub>max</sub>	40 kA
Protection level	U <sub>p</sub>	< 4,0 kV
Response time	t <sub>A</sub>	< 25 ns
Temperature range	ϑ	-25 - +65 °C
Protection rating		IP 67

## Generator connection box, type 1 + 2, for 2 strings



Type	U max DC V	Version	Min. ordering quantity Piece	Item no.
<b>PVG-BC 900K 200</b>	900	For 1 MPPT and with push-in terminal	1	<b>5088430</b>

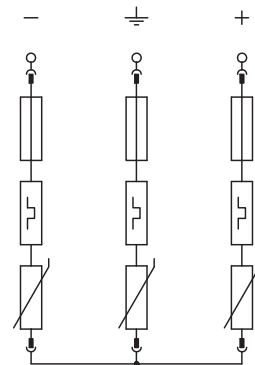
Generator connection box, type 1 + 2, for photovoltaic systems, to connect 2 strings. For DC protection of the inverter.

- Varistor arrester, plug-in, with separation device in error-resistant Y circuit according to VDE 0100-712 (50539-12)
- Low DC protection level: < 3.0 kV (Uoc max = 900 V DC)
- 1 protection device with 5 push-in terminals of up to 6 mm<sup>2</sup> pre-installed in the housing, up to 41 A DC per terminal
- Polycarbonate housing (IP67), UV-resistant for exterior use, incl. cable gland set and pressure compensation element

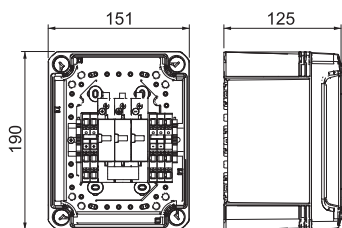
Additional measures may be required if there is the risk of condensation formation through wind, ice, temperature or sun!

PVG-BC 900K 200	
U max DC	U <sub>c</sub> DC 900 V
SPD to EN 61643-11	Type 1+2
Lightning protection zone LPZ	0-2
Impulse discharge current (10/350 μs)	I <sub>imp</sub> 7 kA
Nominal discharge current (8/20)	I <sub>n</sub> 30 kA
Maximum discharge current (8/20 μs)	I <sub>max</sub> 50 kA
Protection level	U <sub>p</sub> < 3,0 kV
Response time	t <sub>A</sub> < 25 ns
Temperature range	ϑ -25 - +60 °C
Protection rating	IP 67

### Connection options



## Generator connection box, type 2, for 2 x 2 strings



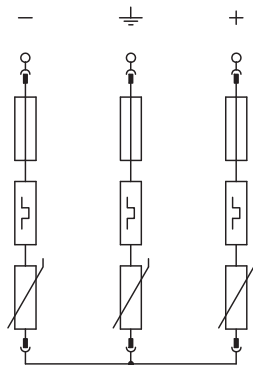
Generator connection box, type 2, for photovoltaic systems, to connect 2 x 2 strings. For DC protection of the inverter.

- Varistor arrester, plug-in, with separation device in error-resistant Y circuit according to VDE 0100-712 (50539-12)
- Low DC protection level: < 4.0 kV ( $U_{oc\ max} = 1,000\ V\ DC$ )
- 1 protection device with 5 push-in terminals of up to 6 mm<sup>2</sup> pre-installed in the housing, up to 41 A DC per terminal
- Polycarbonate housing (IP67), UV-resistant for exterior use, incl. cable gland set and pressure compensation element

Additional measures may be required if there is the risk of condensation formation through wind, ice, temperature or sun!

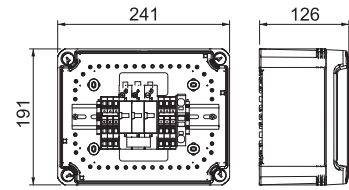
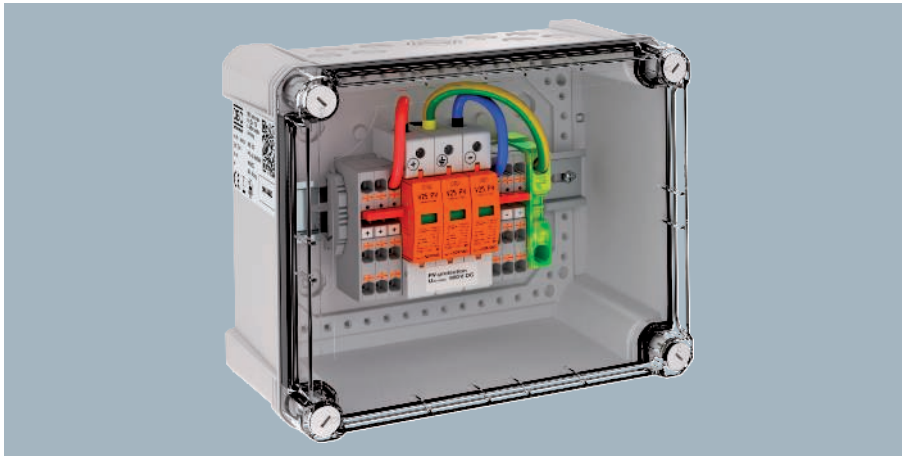
Type	U max DC V	Version	Min. ordering quantity Piece	Item no.
PVG-C1000K 200	1000	For 1 MMPT and with push-in terminals	1	5088435

### Connection options



PVG-C1000K 200	
U max DC	U <sub>c</sub> DC 1000 V
SPD to EN 61643-11	Type 2
Lightning protection zone LPZ	1→2
Impulse discharge current (10/350 μs)	I <sub>imp</sub> — kA
Nominal discharge current (8/20)	I <sub>n</sub> 20 kA
Maximum discharge current (8/20 μs)	I <sub>max</sub> 40 kA
Protection level	U <sub>p</sub> < 4,0 kV
Response time	t <sub>A</sub> < 25 ns
Temperature range	ϑ -25 - +65 °C
Protection rating	IP 67

## Generator connection box, type 1 + 2, for 4 strings



Type	U max DC V	Version	Min. ordering quantity Piece	Item no.
PVG-BC 900K 400	900	For 1 MPPT and with push-in terminal	1	5088450

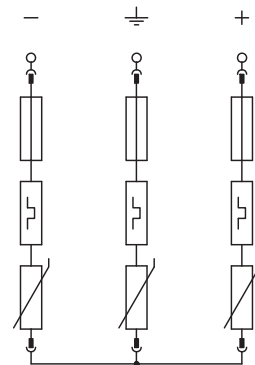
Generator connection box, type 1 + 2, for photovoltaic systems, to connect 4 strings. For DC protection of the inverter.

- Varistor arrester, plug-in, with separation device in error-resistant Y circuit according to VDE 0100-712 (50539-12)
- Low DC protection level: < 3.0 kV (Uoc max = 900 V DC)
- 1 protection device with 8 push-in terminals of up to 6 mm<sup>2</sup> pre-installed in the housing, up to 41 A DC per terminal
- Polycarbonate housing (IP67), UV-resistant for exterior use, incl. cable gland set and pressure compensation element

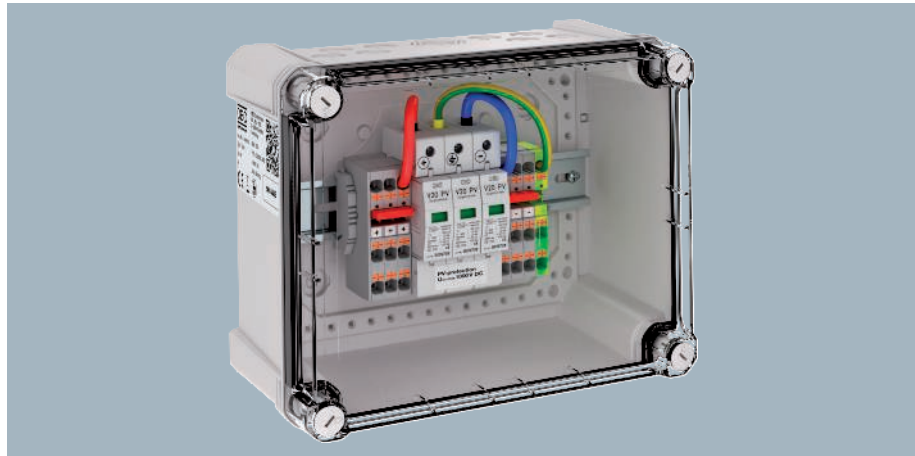
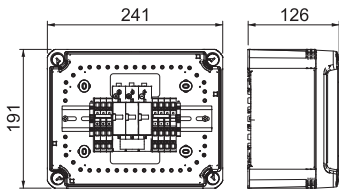
Additional measures may be required if there is the risk of condensation formation through wind, ice, temperature or sun!

PVG-BC 900K 400	
U max DC	U <sub>c</sub> DC 900 V
SPD to EN 61643-11	Type 1+2
Lightning protection zone LPZ	0-2
Impulse discharge current (10/350 μs)	I <sub>imp</sub> 7 kA
Nominal discharge current (8/20)	I <sub>n</sub> 30 kA
Maximum discharge current (8/20 μs)	I <sub>max</sub> 50 kA
Protection level	U <sub>p</sub> < 3,0 kV
Response time	t <sub>A</sub> < 25 ns
Temperature range	ϑ -25 - +60 °C
Protection rating	IP 67

### Connection options



## Generator connection box, type 2, for 4 strings



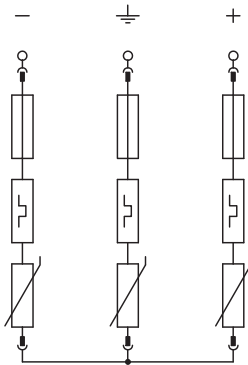
Generator connection box, type 2, for photovoltaic systems, to connect 4 strings. For DC protection of the inverter.

- Varistor arrester, plug-in, with separation device in error-resistant Y circuit according to VDE 0100-712 (50539-12)
- Low DC protection level: < 4.0 kV ( $U_{oc\ max} = 1,000\ V\ DC$ )
- 1 protection device with 8 push-in terminals of up to 6 mm<sup>2</sup> pre-installed in the housing, up to 41 A DC per terminal
- Polycarbonate housing (IP67), UV-resistant for exterior use, incl. cable gland set and pressure compensation element

Additional measures may be required if there is the risk of condensation formation through wind, ice, temperature or sun!

Type	U max DC V	Version	Min. ordering quantity Piece	Item no.
PVG-C1000K 400	1000	For 1 MMPT and with push-in terminals	1	5088455

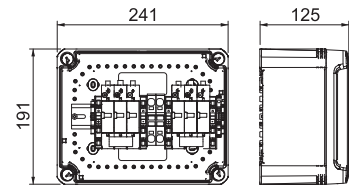
### Connection options



### PVG-C1000K 400

U max DC	U <sub>c</sub> DC	1000 V
SPD to EN 61643-11		Type 2
Lightning protection zone LPZ		1→2
Impulse discharge current (10/350 μs)	I <sub>imp</sub>	— kA
Nominal discharge current (8/20)	I <sub>n</sub>	20 kA
Maximum discharge current (8/20 μs)	I <sub>max</sub>	40 kA
Protection level	U <sub>p</sub>	< 4,0 kV
Response time	t <sub>A</sub>	< 25 ns
Temperature range	ϑ	-25 - +65 °C
Protection rating		IP 67

## Generator connection box, type 1 + 2, for 2 x 1 string



Type	U max DC V	Version	Min. ordering quantity Piece	Item no.
PVG-BC 900K 110	900	For 2 MPPT and with push-in terminal	1	5088410

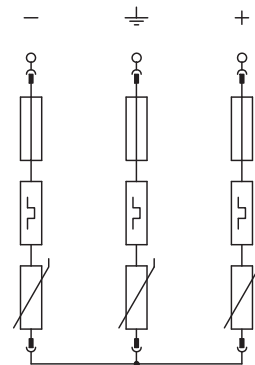
Generator connection box, type 1 + 2, for photovoltaic systems, to connect 2 x 1 string. For DC protection of the inverter.

- Varistor arrester, plug-in, with separation device in error-resistant Y circuit according to VDE 0100-712 (50539-12)
- Low DC protection level: < 3.0 kV (Uoc max = 900 V DC)
- 2 protection devices with 2 push-in terminals each of up to 6 mm<sup>2</sup> pre-installed in the housing, up to 41 A DC per terminal
- Polycarbonate housing (IP67), UV-resistant for exterior use, incl. cable gland set and pressure compensation element

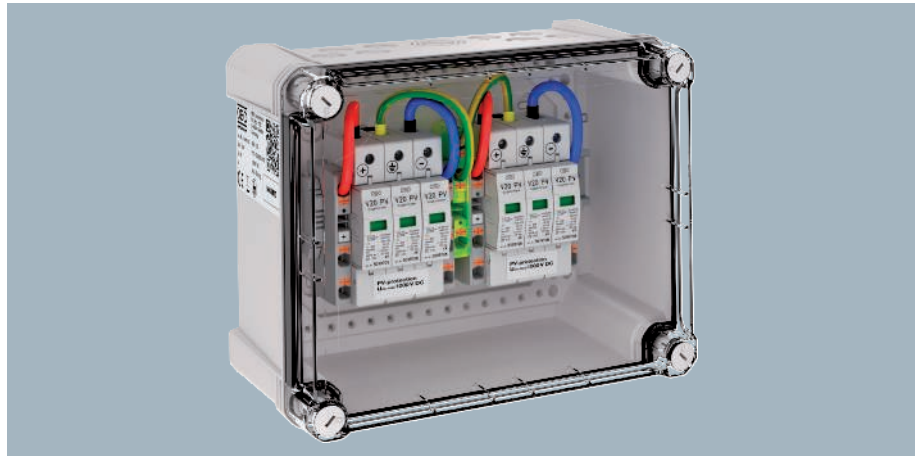
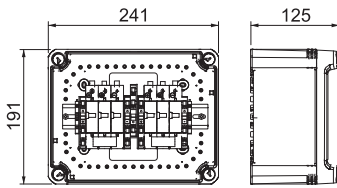
Additional measures may be required if there is the risk of condensation formation through wind, ice, temperature or sun!

PVG-BC 900K 110	
U max DC	U <sub>c</sub> DC 900 V
SPD to EN 61643-11	Type 1+2
Lightning protection zone LPZ	0-2
Impulse discharge current (10/350 μs)	I <sub>imp</sub> 7 kA
Nominal discharge current (8/20)	I <sub>n</sub> 30 kA
Maximum discharge current (8/20 μs)	I <sub>max</sub> 50 kA
Protection level	U <sub>p</sub> < 3,0 kV
Response time	t <sub>A</sub> < 25 ns
Temperature range	ϑ -25 - +60 °C
Protection rating	IP 67

### Connection options



## Generator connection box, type 2, for 2 x 1 string



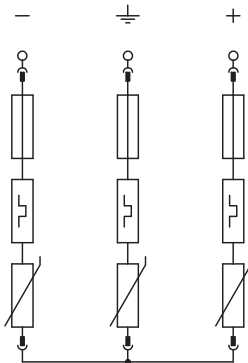
Generator connection box, type 2, for photovoltaic systems, to connect 2 x 1 string. For DC protection of the inverter.

- Varistor arrester, plug-in, with separation device in error-resistant Y circuit according to VDE 0100-712 (50539-12)
- Low DC protection level: < 4.0 kV ( $U_{oc\ max} = 1,000\ V\ DC$ )
- 2 protection devices with 2 push-in terminals each of up to 6 mm<sup>2</sup> pre-installed in the housing, up to 41 A DC per terminal
- Polycarbonate housing (IP67), UV-resistant for exterior use, incl. cable gland set and pressure compensation element

Additional measures may be required if there is the risk of condensation formation through wind, ice, temperature or sun!

Type	U max DC V	Version	Min. ordering quantity Piece	Item no.
PVG-C1000K 110	1000	For 2 MMPT and with push-in terminals	1	5088415

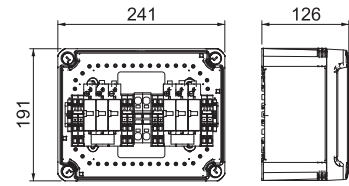
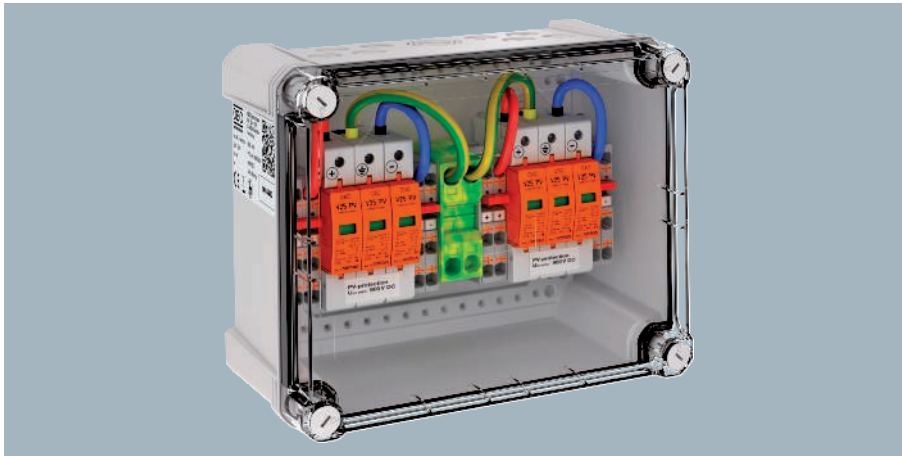
### Connection options



### PVG-C1000K 110

U max DC	U <sub>c</sub> DC	1000 V
SPD to EN 61643-11		Type 2
Lightning protection zone LPZ		1→2
Nominal discharge current (8/20)	I <sub>n</sub>	20 kA
Maximum discharge current (8/20 μs)	I <sub>max</sub>	40 kA
Protection level	U <sub>p</sub>	< 4,0 kV
Response time	t <sub>A</sub>	< 25 ns
Temperature range	ϑ	-25 - +65 °C
Protection rating		IP 67

## Generator connection box, type 1 + 2, for 2 x 2 strings



Type	U max DC V	Version	Min. ordering quantity Piece	Item no.
PVG-BC 900K 220	900	For 2 MPPT and with push-in terminal	1	5088440

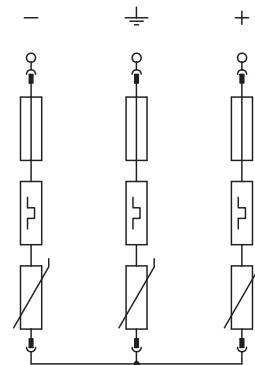
Generator connection box, type 1 + 2, for photovoltaic systems, to connect 2 x 2 strings. For DC protection of the inverter.

- Varistor arrester, plug-in, with separation device in error-resistant Y circuit according to VDE 0100-712 (50539-12)
- Low DC protection level: < 3.0 kV (Uoc max = 900 V DC)
- 2 protection devices with 5 push-in terminals each of up to 6 mm<sup>2</sup> pre-installed in the housing, up to 41 A DC per terminal
- Polycarbonate housing (IP67), UV-resistant for exterior use, incl. cable gland set and pressure compensation element

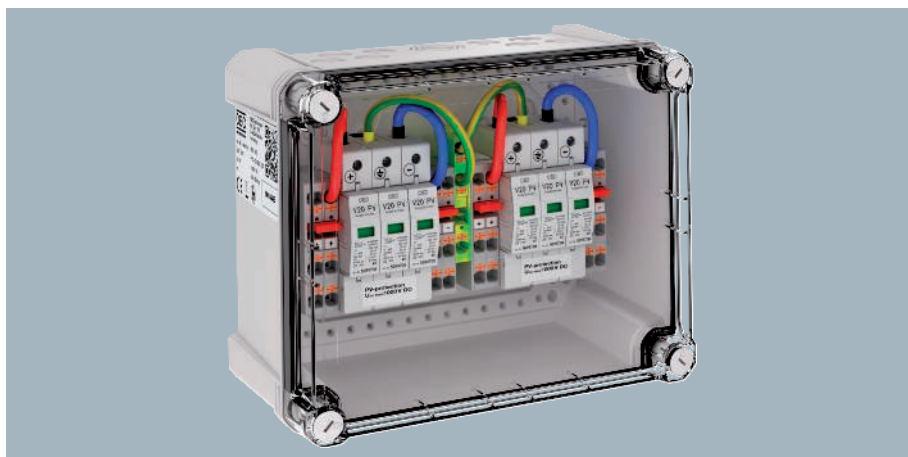
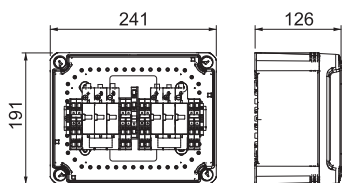
Additional measures may be required if there is the risk of condensation formation through wind, ice, temperature or sun!

PVG-BC 900K 220	
U max DC	U <sub>c</sub> DC 900 V
SPD to EN 61643-11	Type 1+2
Lightning protection zone LPZ	0-2
Impulse discharge current (10/350 μs)	I <sub>imp</sub> 7 kA
Nominal discharge current (8/20)	I <sub>n</sub> 30 kA
Maximum discharge current (8/20 μs)	I <sub>max</sub> 50 kA
Protection level	U <sub>p</sub> < 3,0 kV
Response time	t <sub>A</sub> < 25 ns
Temperature range	ϑ -25 - +60 °C
Protection rating	IP 67

### Connection options



## Generator connection box, type 2, for 2 x 2 strings



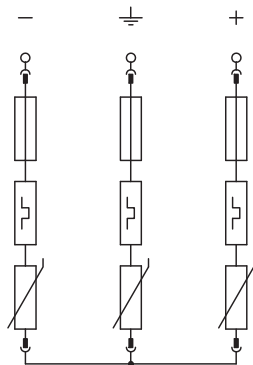
Generator connection box, type 2, for photovoltaic systems, to connect 2 x 2 strings. For DC protection of the inverter.

- Varistor arrester, plug-in, with separation device in error-resistant Y circuit according to VDE 0100-712 (50539-12)
- Low DC protection level: < 4.0 kV ( $U_{oc\ max} = 1,000\ V\ DC$ )
- 2 protection devices with 5 push-in terminals each of up to 6 mm<sup>2</sup> pre-installed in the housing, up to 41 A DC per terminal
- Polycarbonate housing (IP67), UV-resistant for exterior use, incl. cable gland set and pressure compensation element

Additional measures may be required if there is the risk of condensation formation through wind, ice, temperature or sun!

Type	U max DC V	Version	Min. ordering quantity Piece	Item no.
PVG-C1000K 220	1000	For 2 MMPT and with push-in terminals	1	5088445

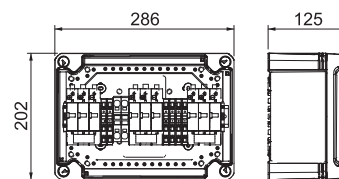
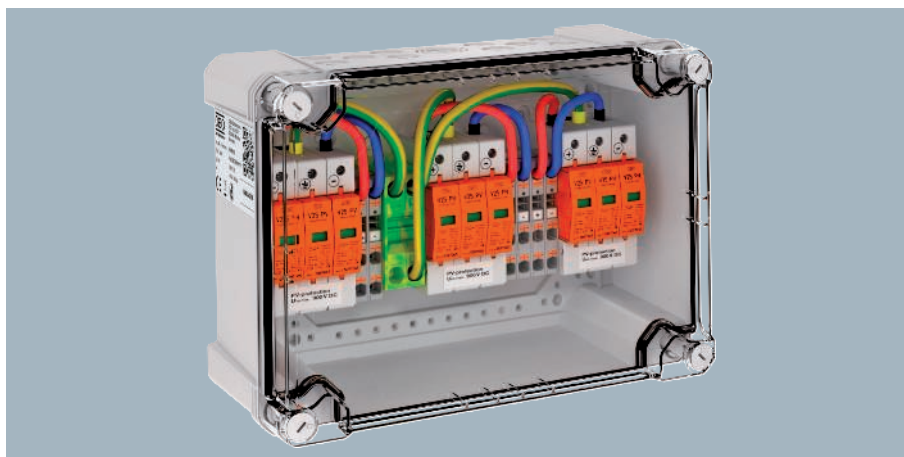
### Connection options



PVG-C1000K 220	
U max DC	U <sub>c</sub> DC 1000 V
SPD to EN 61643-11	Type 2
Lightning protection zone LPZ	1→2
Impulse discharge current (10/350 μs)	I <sub>imp</sub> — kA
Nominal discharge current (8/20)	I <sub>n</sub> 20 kA
Maximum discharge current (8/20 μs)	I <sub>max</sub> 40 kA
Protection level	U <sub>p</sub> < 4,0 kV
Response time	t <sub>A</sub> < 25 ns
Temperature range	ϑ -25 - +65 °C
Protection rating	IP 67

## Generator connection box, type 1 + 2, for 3 x 1 string

Type 1+2 LPZ 0-2   



Type	U max DC V	Version	Min. ordering quantity Piece	Item no.
PVG-BC 900K 111	900	For 3 MPPT and with push-in terminal	1	5088420

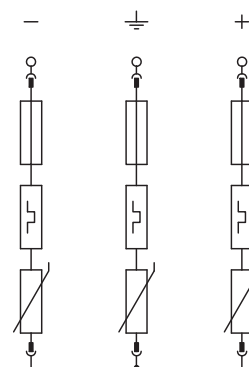
Generator connection box, type 1 + 2, for photovoltaic systems, to connect 3 x 1 string. For DC protection of the inverter.

- Varistor arrester, plug-in, with separation device in error-resistant Y circuit according to VDE 0100-712 (50539-12)
- Low DC protection level: < 3.0 kV (Uoc max = 900 V DC)
- 3 protection devices with 2 push-in terminals each of up to 6 mm<sup>2</sup> pre-installed in the housing, up to 41 A DC per terminal
- Polycarbonate housing (IP67), UV-resistant for exterior use, incl. cable gland set and pressure compensation element

Additional measures may be required if there is the risk of condensation formation through wind, ice, temperature or sun!

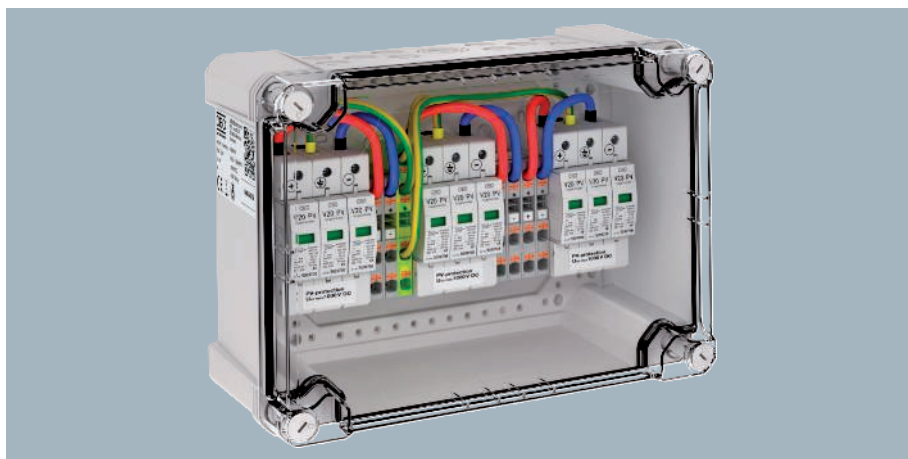
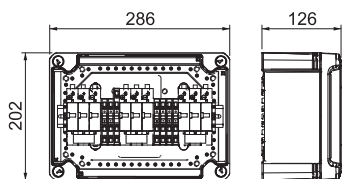
PVG-BC 900K 111		U <sub>c</sub> DC	900 V
U max DC			900 V
SPD to EN 61643-11		Type 1+2	
Lightning protection zone LPZ		0-2	
Impulse discharge current (10/350 μs)	I <sub>imp</sub>	7 kA	
Nominal discharge current (8/20)	I <sub>n</sub>	30 kA	
Maximum discharge current (8/20 μs)	I <sub>max</sub>	50 kA	
Protection level	U <sub>p</sub>	< 3,0 kV	
Response time	t <sub>A</sub>	< 25 ns	
Temperature range	θ	-25 - +60 °C	
Protection rating		IP 67	

### Connection options





## Generator connection box, type 2, for 3 x 1 string



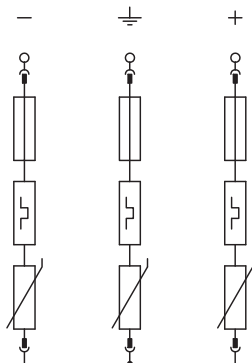
Generator connection box, type 2, for photovoltaic systems, to connect 3 x 1 string. For DC protection of the inverter.

- Varistor arrester, plug-in, with separation device in error-resistant Y circuit according to VDE 0100-712 (50539-12)
- Low DC protection level: < 4.0 kV ( $U_{oc\ max} = 1,000\ V\ DC$ )
- 3 protection devices with 2 push-in terminal points each of up to 6 mm<sup>2</sup> pre-installed in the housing, up to 41 A DC per terminal
- Polycarbonate housing (IP67), UV-resistant for exterior use, incl. cable gland set and pressure compensation element

Additional measures may be required if there is the risk of condensation formation through wind, ice, temperature or sun!

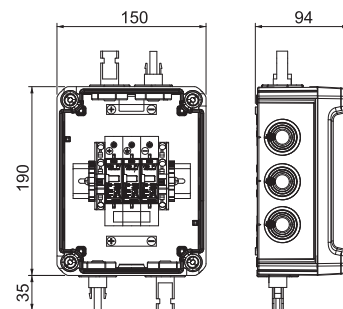
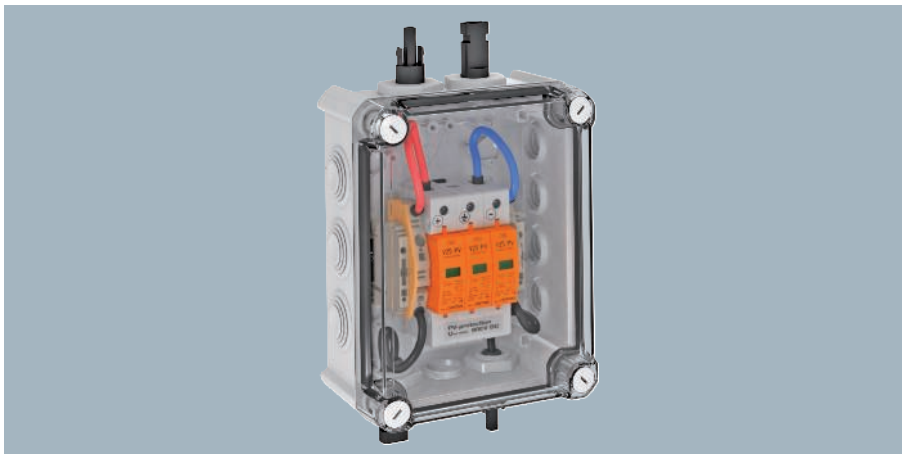
Type	U max DC V	Version	Min. ordering quantity Piece	Item no.
PVG-C1000K 111	1000	For 3 MMPT and with push-in terminals	1	5088425

### Connection options



PVG-C1000K 111		
U max DC	U <sub>c</sub> DC	1000 V
SPD to EN 61643-11		Type 2
Lightning protection zone LPZ		1→2
Nominal discharge current (8/20)	I <sub>n</sub>	20 kA
Maximum discharge current (8/20 μs)	I <sub>max</sub>	40 kA
Protection level	U <sub>p</sub>	< 4,0 kV
Response time	t <sub>A</sub>	< 25 ns
Temperature range	ϑ	-25 - +65 °C
Protection rating		IP 67

## Generator connection box, type 1+2, with MC4 connector for 1 x 1 string



Type	U max DC V	Version	Min. ordering quantity Piece	Item no.
<b>VG-BC900S1</b>	900	For one MPP and with MC4 connection	1	<b>5088564</b>

System solution, type 1+2, with MC4 connector for photovoltaic inverter with one MPP tracker

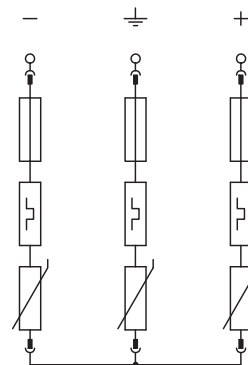
- Varistor arrester, connectable with cut-off unit in error-resistant Y circuit to VDE 0100-712 (50539-12)
- Type 1+2 combination arrester for lightning protection equipotential bonding to EN 62305 (VDE 0185-305)
- Low DC protection level: < 3.0 kV (Voc max = 900 V DC with V25-B+C/0-450PV)
- One PV string input (MC4 plug connector) at one MPP inverter input, up to 30 A DC per terminal
- Pre-mounted in polycarbonate housing (IP65), UV-resistant for use outside

For DC protection of the inverter of photovoltaic systems. If there is a danger of condensation forming through wind, ice, temperature or sunlight, further measures may be necessary!

### VG-BC900S1

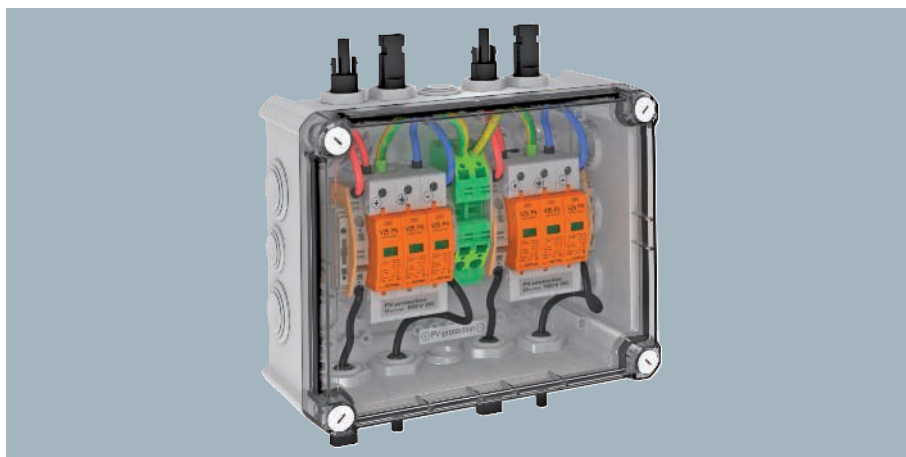
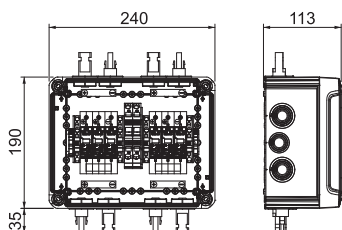
U max DC	U <sub>c</sub> DC	900 V
SPD to EN 61643-11		Type 1+2
Lightning protection zone LPZ		0-2
Impulse discharge current (10/350)	I <sub>imp</sub>	7 kA
Nominal discharge current (8/20)	I <sub>n</sub>	30 kA
Maximum discharge current (8/20 μs)	I <sub>max</sub>	50 kA
Protection level	U <sub>p</sub>	< 3,0 kV
Response time	t <sub>A</sub>	< 25 ns
Temperature range	θ	-40 - +80 °C
Protection rating		IP66

### Connection options





## Generator connection box, type 1+2, with MC4 connector for 2 x 1 string



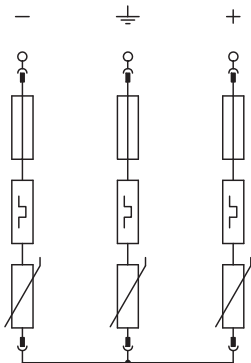
System solution, type 1+2, with MC4 connector for photovoltaic inverter with 2 separate MPP trackers

- Varistor arrester, connectable with cut-off unit in error-resistant Y circuit to VDE 0100-712 (50539-12)
- Type 1+2 combination arrester for lightning protection equipotential bonding to EN 62305 (VDE 0185-305)
- Low DC voltage protection level: < 3.0 kV (Voc max = 900 V DC with V25-B+C/0-450PV)
- One PV string input (MC4 plug connector) at one MPP inverter input, up to 30A DC per terminal
- Pre-mounted in polycarbonate housing (IP66), UV-resistant for use outside

For DC protection of the inverter of photovoltaic systems.  
If there is a danger of condensation forming through wind, ice, temperature or sunlight, further measures may be necessary!

Type	Max. continuous voltage DC V	Version	Min. ordering quantity Piece	Item no.
VG-BC900S11	900	For two MPPs and with MC4 connection	1	5088565

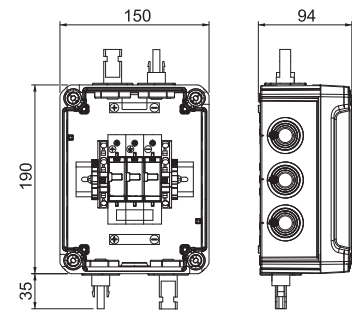
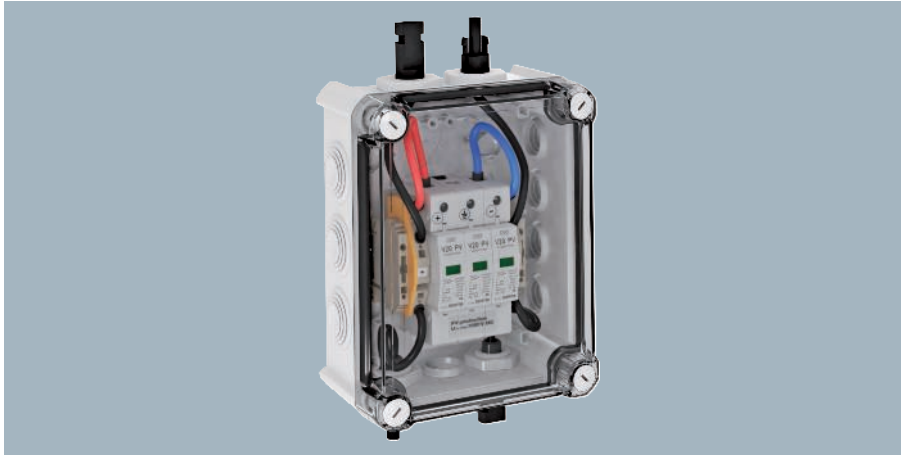
### Connection options



### VG-BC900S11

U max DC	U <sub>c</sub> DC	900 V
SPD to EN 61643-11		Type 1+2
Lightning protection zone LPZ		0→2
Impulse discharge current (10/350)	I <sub>imp</sub>	7 kA
Nominal discharge current (8/20)	I <sub>n</sub>	30 kA
Maximum discharge current (8/20 μs)	I <sub>max</sub>	50 kA
Protection level	U <sub>p</sub>	< 3,0 kV
Response time	t <sub>A</sub>	< 25 ns
Temperature range	θ	-40 - +80 °C
Protection rating		IP66

## Generator connection box, type 2, with MC4 connector for 1 x 1 string



Type	U max DC V	Version	Min. ordering quantity Piece	Item no.
PVG-C1000S100	1000	For one MPP tracker and with MC4 connection	1	5088554

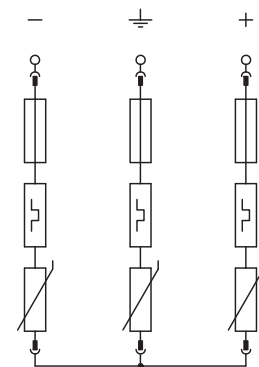
System solution, type 2, with MC4 connector for photovoltaic inverter with 1 MPP tracker

- Varistor arrester, connectable with cut-off unit in error-resistant Y circuit to VDE 0100-712 (50539-12)
- Low DC voltage protection level: < 4.0 kV (Voc max = 1,000 V DC with V20-C/0-500PV)
- One PV string input (MC4 plug connector) at one MPP inverter input, up to 30A DC per terminal
- Pre-mounted in polycarbonate housing (IP66), UV-resistant for use outside

For DC protection of the inverter of photovoltaic systems. If there is a danger of condensation forming through wind, ice, temperature or sunlight, further measures may be necessary!

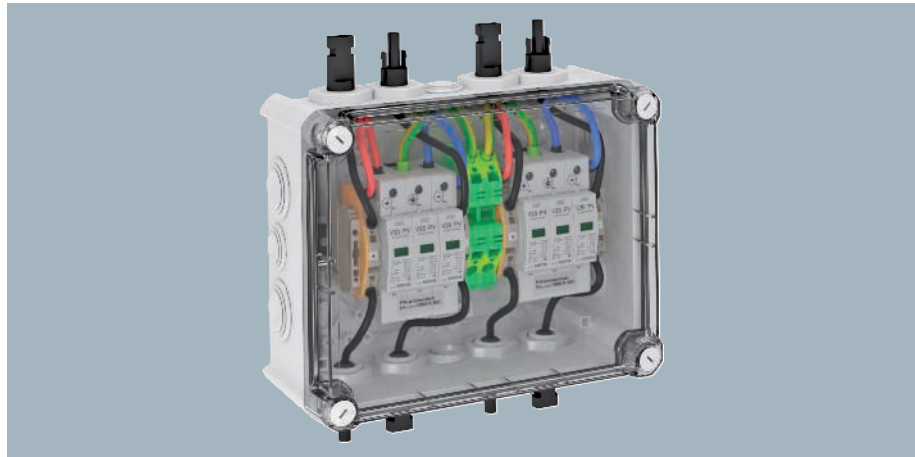
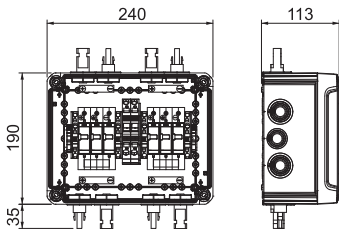
PVG-C1000S100		U <sub>c</sub> DC	1000 V
U max DC			Type 2
SPD to EN 61643-11			1→2
Lightning protection zone LPZ			20 kA
Nominal discharge current (8/20)	I <sub>n</sub>		40 kA
Maximum discharge current (8/20 μs)	I <sub>max</sub>		< 4,0 kV
Protection level	U <sub>p</sub>		< 25 ns
Response time	t <sub>A</sub>		-40 - +80 °C
Temperature range	θ		IP66
Protection rating			

### Connection options





## Generator connection box, type 2, with MC4 connector for 2 x 1 string



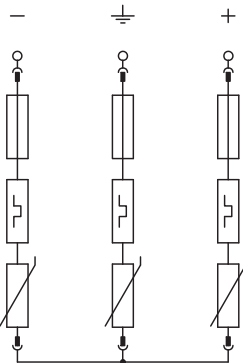
System solution, type 2, with MC4 connector for photovoltaic inverter with 2 separate MPP trackers

- Varistor arrester, connectable with cut-off unit in error-resistant Y circuit to VDE 0100-712 (50539-12)
- Low DC voltage protection level: < 4.0 kV (Voc max = 1,000 V DC with V20-C/0-500PV)
- One PV string input (MC4 plug connector) at one MPP inverter input, up to 30A DC per terminal
- Pre-mounted in polycarbonate housing (IP66), UV-resistant for use outside

For DC protection of the inverter of photovoltaic systems. If there is a danger of condensation forming through wind, ice, temperature or sunlight, further measures may be necessary!

Type	U max DC V	Version	Min. ordering quantity Piece	Item no.
PVG-C1000S110	1000	For two MPP trackers and with MC4 connection	1	5088556

### Connection options



PVG-C1000S110	
U max DC	U <sub>c</sub> DC 1000 V
SPD to EN 61643-11	Type 2
Lightning protection zone LPZ	1→2
Nominal discharge current (8/20)	I <sub>n</sub> 20 kA
Maximum discharge current (8/20 μs)	I <sub>max</sub> 40 kA
Protection level	U <sub>b</sub> < 4,0 kV
Response time	t <sub>A</sub> < 25 ns
Temperature range	θ -40 - +80 °C
Protection rating	IP66

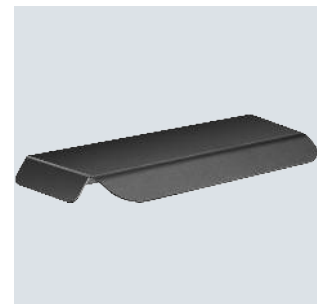
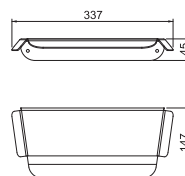
A2 L



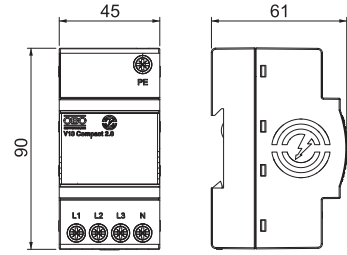
## Weather protection roof for Ion charging station Basic/Key

Type	Length mm	Width mm	Height mm	Min. ordering quantity Piece	Item no.
WB WPR	147	337	45	1	6570105

Weather protection roof for the Ion charging stations Basic and Key when mounted outdoors, pressure balance plug and mounting kit for brick walls included.



Surge arrester V10 Compact



Type	Highest continuous voltage V	Version	Min. ordering quantity Piece	Item no.
V10 Compact2.0	255	3+NPE	1	5093381

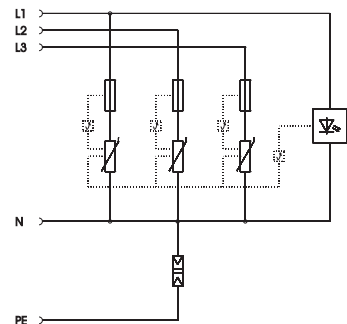
Surge protective device, compact module, type 2+3

- Surge protection in main and sub-distributions according to IEC 60364-4-44
- Arresting capacity up to 60 kA (8/20) in total
- Integrated 3+1 solution for TN and TT network systems on 45 mm module width
- High-performance varistor technology
- Including thermic and dynamic cut-off unit and visual status display

Application: Main and sub-distribution as well as device protection in three-phase current systems.

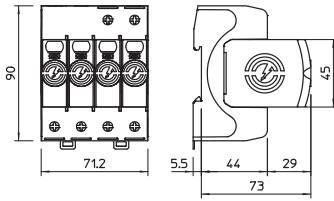
V10 Compact2.0	
Nominal voltage AC (50/60 Hz)	$U_n$ 230 V
Maximum continuous voltage AC	$U_c$ 255 V
SPD to EN 61643-11	Type 2+3
SPD to IEC 61643-11	Class II+III
Lightning protection zone LPZ	1→3
Nominal discharge current (8/20 $\mu$ s) [L-N]	$I_n / L-N$ 10 kA
Nominal discharge current (8/20 $\mu$ s) [N-PE]	$I_n / N-PE$ 40 kA
Maximum discharge current (8/20 $\mu$ s) [L-N]	$I_{max} / L-N$ 20 kA
Maximum discharge current (8/20 $\mu$ s) [N-PE]	$I_{max} / N-PE$ 60 kA
Maximum discharge current (8/20 $\mu$ s) [total]	$I_{total}$ 60 kA
Protection level [L-N]	$U_p$ 1.1 kV
Protection level [N-PE]	$U_p / N-PE$ 1.5 kV
Response time	$t_A$ < 25 ns
Max. mains-side overcurrent protection	63 A gG
Operating temperature range	$T_u$ -40 - +70 °C
Division unit TE (17.5 mm)	1.5
Protection rating	IP20
Conductor cross-section, flexible (fine-wire)	2.5 - 10 mm <sup>2</sup>
Conductor cross-section, flexible (fine-wire)	13 - 8 AWG
Conductor cross-section, rigid (single wire/multi-wire)	2.5 - 10 mm <sup>2</sup>
Conductor cross-section, rigid (single wire/multi-wire)	13 - 8 AWG

Connection options





Surge arrester V20, 3-pole + NPE, 280 V



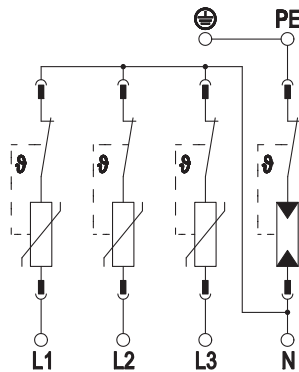
Surge arrester, type 2

- For surge voltage protection equipotential bonding to VDE 0100-443 (IEC 60364-4-44)
- Arresting capacity to 40 kA (8/20) per pole through high-performance varistors
- Modular connectable arrester with cut-off unit and visual status display
- Locking mechanism with vibration protection and voltage keying
- Plastic to UL 94 V-0
- The remote signalling variants (FS) have a potential-free changeover contact for remote signalling

Application: Equipotential bonding in main and sub-distributions.

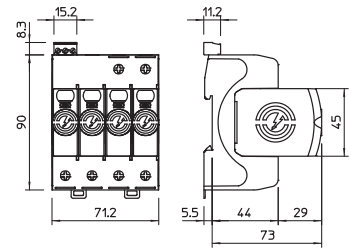
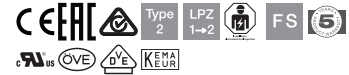
Type	Max. continuous voltage AC V	Pole version	Protection rating	Min. ordering quantity Piece	Item no.
V20-3+NPE-280	280	3+N/PE	IP20	1	5095253

Connection options



V20-3+NPE-280	
SPD to EN 61643-11	Type 2
SPD to IEC 61643-11	Class II
SPD to UL 1449	Type 4
Nominal voltage AC (50/60 Hz)	$U_n$ 230 V
Maximum continuous voltage AC	$U_C$ 280 V
Nominal discharge current (8/20 $\mu$ s)	$I_n / L-N$ 20 kA
Maximum discharge current (8/20 $\mu$ s)	$I_{max}$ 40 kA
Maximum discharge current (8/20 $\mu$ s) [total]	$I_{total}$ 60 kA
Protection level [L-N]	$U_p$ 1.3 kV
Combined voltage protection level [L-PE]	$U_{D/L-PE}$ 1.5 kV
Residual voltage [L-N] @ 1 kA	$U_{res}$ 0,8 kV
Residual voltage [L-N] @ 5 kA	$U_{res}$ 1,0 kV
Max. mains-side overcurrent protection	160 A gL/gG
Short-circuit withstand for max. mains-side overcurrent protection	50 kA eff
Operating temperature range	$T_u$ -40 - +80 °C
Protection rating	IP20
Approvals	UL, ÖVE, VDE, KEMA
Conductor cross-section, flexible (fine-wire)	1.5 - 35 mm <sup>2</sup>
Conductor cross-section, rigid (single wire/multi-wire)	1.5 - 35 mm <sup>2</sup>
Conductor cross-section, flexible (fine-wire)	16 - 2 AWG
Conductor cross-section, rigid (single wire/multi-wire)	16 - 2 AWG

Surge arrester V20, 3-pole + NPE and remote signalling, 280 V



Type	Max. continuous AC voltage V	Pole version	Protection rating	Min. ordering quantity Piece	Item no.
V20-3+NPE+FS-280	280	3+N/PE	IP20	1	5095333

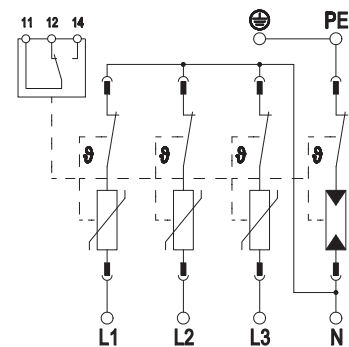
Surge arrester, type 2

- For surge voltage protection equipotential bonding to VDE 0100-443 (IEC 60364-4-44)
- Arresting capacity to 40 kA (8/20) per pole through high-performance varistors
- Modular connectable arrester with cut-off unit and visual status display
- Locking mechanism with vibration protection and voltage keying
- Plastic to UL 94 V-0
- The remote signalling variants (FS) have a potential-free changeover contact for remote signalling

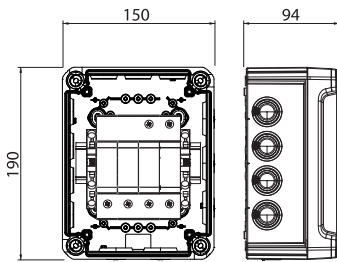
Application: Equipotential bonding in main and sub-distributions.

V20-3+NPE+FS-280		Type 2
SPD to EN 61643-11		Class II
SPD to IEC 61643-11		Type 4
SPD to UL 1449		
Nominal voltage AC (50/60 Hz)	$U_n$	230 V
Maximum continuous voltage AC	$U_C$	280 V
Nominal discharge current (8/20 $\mu$ s)	$I_{n/L-N}$	20 kA
Maximum discharge current (8/20 $\mu$ s)	$I_{max}$	40 kA
Maximum discharge current (8/20 $\mu$ s) [total]	$I_{total}$	60 kA
Protection level [L-N]	$U_p$	1.3 kV
Combined voltage protection level [L-PE]	$U_{p/L-PE}$	1.5 kV
Residual voltage [L-N] @ 1 kA	$U_{res}$	0,8 kV
Residual voltage [L-N] @ 5 kA	$U_{res}$	1,0 kV
Max. mains-side overcurrent protection		160 A gL/gG
Short-circuit withstand for max. mains-side overcurrent protection		50 kA eff
Operating temperature range	$T_u$	-40 - +80 °C
Protection rating		IP20
Approvals		UL, ÖVE, VDE, KEMA
FM contacts		Changeover
Switching power AC		230 V; 0,5 A
Switching power DC		230 V; 0,1 A / 75 V; 0,5 A
Connection cross-section, FM terminals		0,5 - 1,5 mm <sup>2</sup>
Connection cross-section, FM terminals		21 - 16 AWG
Conductor cross-section, flexible (fine-wire)		1.5 - 35 mm <sup>2</sup>
Conductor cross-section, rigid (single wire/multi-wire)		1.5 - 35 mm <sup>2</sup>
Conductor cross-section, flexible (fine-wire)		16 - 2 AWG
Conductor cross-section, rigid (single wire/multi-wire)		16 - 2 AWG

Connection options



## System solution, surge arrester V20 in housing, 3-pole + NPE, 280 V



Surge arrester, type 2, according to DIN EN 61643-11

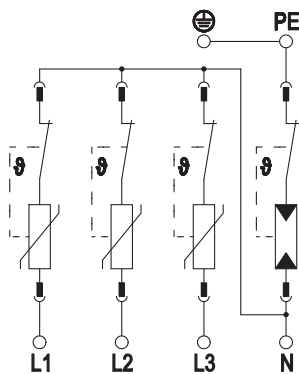
- Ideal for protecting charging stations and any vehicles connected to them
- For surge voltage protection equipotential bonding to VDE 0100-443 (IEC 60364-4-44)
- Complete unit, pre-mounted and ready for connection in polycarbonate housing (IP66)
- Arresting capacity to 40 kA (8/20) per pole through high-performance varistors

Application: AC charging device up to 22 kW, equipotential bonding in main and sub-distributors.

If there is a danger of condensation forming through wind, ice, temperature or sunlight, further measures may be necessary!

Type	Max. continuous voltage AC V	Pole version	Min. ordering quantity Piece	Item no.
<b>VG-V20-3+NPE-280</b>	280	3+N/PE	1	<b>5095383</b>

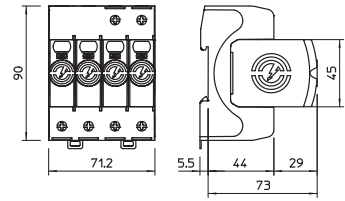
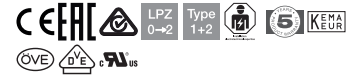
### Connection options



### VG-V20-3+NPE-280

SPD to EN 61643-11	Type 2
SPD to IEC 61643-11	Class II
SPD to UL 1449	Type 4
Nominal voltage AC (50/60 Hz)	$U_n$ 230 V
Maximum continuous voltage AC	$U_C$ 280 V
Nominal discharge current (8/20 $\mu$ s)	$I_n / L-N$ 20 kA
Maximum discharge current (8/20 $\mu$ s)	$I_{max}$ 40 kA
Maximum discharge current (8/20 $\mu$ s) [total]	$I_{total}$ 60 kA
Protection level [L-N]	$U_p$ 1,3 kV
Residual voltage [L-N] @ 1 kA	$U_{res}$ 0,7 kV
Residual voltage [L-N] @ 5 kA	$U_{res}$ 0,9 kV
Max. mains-side overcurrent protection	160 A gL/gG
Short-circuit withstand for max. mains-side overcurrent protection	50 kA eff
Operating temperature range	$T_u$ -40 - +80 °C
Protection rating	IP66
Approvals	ÖVE, UL
Conductor cross-section, flexible (fine-wire)	1.5 - 35 mm <sup>2</sup>
Conductor cross-section, rigid (single wire/multi-wire)	1.5 - 35 mm <sup>2</sup>
Conductor cross-section, flexible (fine-wire)	16 - 2 AWG
Conductor cross-section, rigid (single wire/multi-wire)	16 - 2 AWG

Combination arrester V50, 3-pole + NPE 280 V



Type	Max. continuous voltage AC V	Pole version	Protection rating	Min. ordering quantity Piece	Item no.
V50-3+NPE-280	280	3+N/PE	IP20	1	5093526

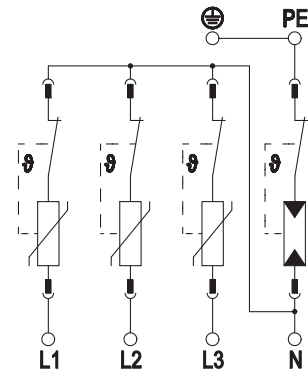
Lightning current combination arrester, type 1+2

- For lightning current equipotential bonding to VDE 0185-305 (IEC 62305)
- Lightning current arresting capacity of 12.5 kA (10/350) per pole and up to 50 kA (10/350) in total
- Modular, plug-in arrester with cut-off unit and visual status display
- Locking mechanism with vibration protection and voltage keying
- Plastic to UL 94 V-0
- The remote signalling (FS) variants have a potential-free changeover contact for remote signalling

Application: Lightning current equipotential bonding for buildings of class III and IV.

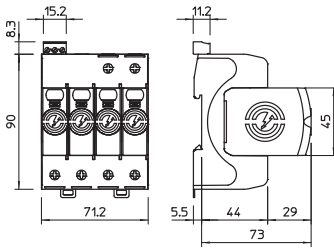
V50-3+NPE-280	
SPD to EN 61643-11	Type 1+2
SPD to IEC 61643-11	Class II
SPD to UL 1449	Type 4
Nominal voltage AC (50/60 Hz)	$U_n$ 230 V
Maximum continuous voltage AC	$U_c$ 280 V
Nominal discharge current (8/20 $\mu$ s)	$I_n / L-N$ 30 kA
Maximum discharge current (8/20 $\mu$ s)	$I_{max}$ 50 kA
Impulse discharge current (10/350 $\mu$ s)	$I_{imp}$ 12.5 kA
Total discharge current (10/350)	$I_{total}$ 50 kA
Maximum discharge current (8/20 $\mu$ s) [total]	$I_{total}$ 80 kA
Protection level [L-N]	$U_p$ 1.3 kV
Combined voltage protection level [L-PE]	$U_{p/L-PE}$ 2.5 kV
Residual voltage [L-N] @ 1 kA	$U_{res}$ 0,7 kV
Residual voltage [L-N] @ 5 kA	$U_{res}$ 0,8 kV
Max. mains-side overcurrent protection	160 A gL/gG
Short-circuit withstand for max. mains-side overcurrent protection	50 kA eff
Operating temperature range	$T_u$ -40 - +80 °C
Protection rating	IP20
Approvals	UL, KEMA, ÖVE, VDE
Conductor cross-section, flexible (fine-wire)	1.5 - 35 mm <sup>2</sup>
Conductor cross-section, rigid (single wire/multi-wire)	1.5 - 35 mm <sup>2</sup>
Conductor cross-section, flexible (fine-wire)	16 - 2 AWG
Conductor cross-section, rigid (single wire/multi-wire)	16 - 2 AWG

Connection options





## Combination arrester V50, 3-pole + NPE with FS 280 V



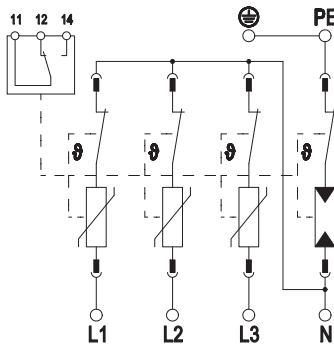
Lightning current combination arrester, type 1+2

- For lightning current equipotential bonding to VDE 0185-305 (IEC 62305)
- Lightning current arresting capacity of 12.5 kA (10/350) per pole and up to 50 kA (10/350) in total
- Modular, plug-in arrester with cut-off unit and visual status display
- Locking mechanism with vibration protection and voltage keying
- Plastic to UL 94 V-0
- The remote signalling (FS) variants have a potential-free changeover contact for remote signalling

Application: Lightning current equipotential bonding for buildings of class III and IV.

Type	Max. continuous voltage AC V	Pole version	Protection rating	Min. ordering quantity Piece	Item no.
V50-3+NPE+FS-280	280	3+N/PE	IP20	1	5093533

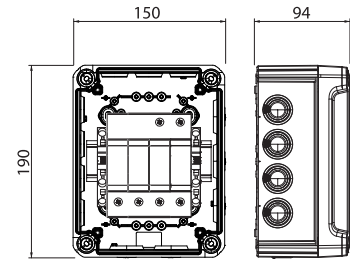
### Connection options



### V50-3+NPE+FS-280

SPD to EN 61643-11	Type 1+2
SPD to IEC 61643-11	Class I+II
SPD to UL 1449	Type 4
Nominal voltage AC (50/60 Hz)	$U_n$ 230 V
Maximum continuous voltage AC	$U_c$ 280 V
Nominal discharge current (8/20 $\mu$ s)	$I_n / L-N$ 30 kA
Maximum discharge current (8/20 $\mu$ s)	$I_{max}$ 50 kA
Impulse discharge current (10/350 $\mu$ s)	$I_{imp}$ 12.5 kA
Total discharge current (10/350)	$I_{total}$ 50 kA
Maximum discharge current (8/20 $\mu$ s) [total]	$I_{total}$ 80 kA
Protection level [L-N]	$U_p$ 1.3 kV
Combined voltage protection level [L-PE]	$U_{p/L-PE}$ 2.5 kV
Residual voltage [L-N] @ 1 kA	$U_{res}$ 0,7 kV
Residual voltage [L-N] @ 5 kA	$U_{res}$ 0,8 kV
Max. mains-side overcurrent protection	160 A gL/gG
Short-circuit withstand for max. mains-side overcurrent protection	50 kA eff
Operating temperature range	$T_u$ -40 - +80 °C
Protection rating	IP20
Approvals	UL, KEMA, ÖVE, VDE
FM contacts	Changeover
Switching power AC	230 V; 0,5 A
Switching power DC	230 V; 0,1 A / 75 V; 0,5 A
Connection cross-section, FM terminals	0,5 - 1,5 mm <sup>2</sup>
Connection cross-section, FM terminals	21 - 16 AWG
Conductor cross-section, flexible (fine-wire)	1,5 - 35 mm <sup>2</sup>
Conductor cross-section, rigid (single wire/multi-wire)	1,5 - 35 mm <sup>2</sup>
Conductor cross-section, flexible (fine-wire)	16 - 2 AWG
Conductor cross-section, rigid (single wire/multi-wire)	16 - 2 AWG

Combination arrester V50, 3-pole + NPE 280 V



Type	Max. continuous voltage AC V	Pole version	Min. ordering quantity Piece	Item no.
<b>VG-V50-3+NPE-280</b>	280	3+N/PE	1	<b>5093596</b>

Lightning current combination arrester, type 1+2 to DIN EN 61643-11

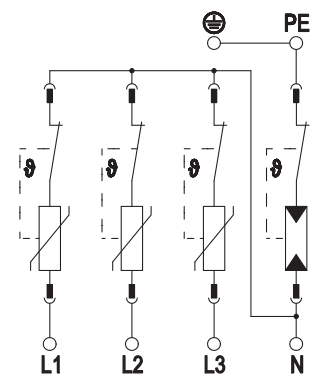
- Ideal for protecting charging stations and any vehicles connected to them
- For lightning protection equipotential bonding to VDE 0185-305 (IEC 62305)
- Complete unit, pre-mounted and ready for connection in polycarbonate housing (IP66)
- Lightning current arresting capacity 12.5 kA (10/350) per pole and up to 50 kA (10/350) in total

Application: AC charging device up to 22 kW, lightning protection equipotential bonding for buildings of Class III and IV.  
If there is a danger of condensation forming through wind, ice, temperature or sunlight, further measures may be necessary!

**VG-V50-3+NPE-280**

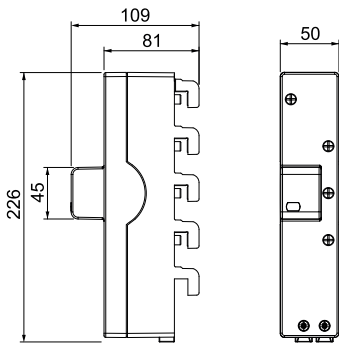
SPD to EN 61643-11	Type 1+2
SPD to IEC 61643-11	Class I+II
SPD to UL 1449	Type 4
Nominal voltage AC (50/60 Hz)	$U_n$ 230 V
Maximum continuous voltage AC	$U_C$ 280 V
Nominal discharge current (8/20 $\mu$ s)	$I_n / L-N$ 30 kA
Maximum discharge current (8/20 $\mu$ s)	$I_{max}$ 50 kA
Impulse discharge current (10/350 $\mu$ s)	$I_{imp}$ 12.5 kA
Total discharge current (10/350)	$I_{total}$ 50 kA
Maximum discharge current (8/20 $\mu$ s) [total]	$I_{total}$ 50 kA
Protection level [L-N]	$U_p$ 1.3 kV
Residual voltage [L-N] @ 1 kA	$U_{res}$ 0,7 kV
Residual voltage [L-N] @ 5 kA	$U_{res}$ 0,8 kV
Max. mains-side overcurrent protection	160 A gL/gG
Short-circuit withstand for max. mains-side overcurrent protection	50 kA eff
Operating temperature range	$T_u$ -40 - +80 °C
Protection rating	IP66
Approvals	UL, ÖVE, VDE
Conductor cross-section, flexible (fine-wire)	1.5 - 35 mm <sup>2</sup>
Conductor cross-section, rigid (single wire/multi-wire)	1.5 - 35 mm <sup>2</sup>
Conductor cross-section, flexible (fine-wire)	16 - 2 AWG
Conductor cross-section, rigid (single wire/multi-wire)	16 - 2 AWG

Connection options





LightningController - MCF25-NAR-TNC



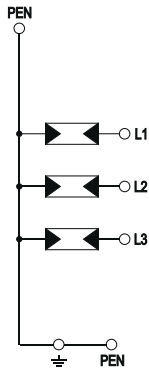
Combination arrester, type 1+2, for mounting on 40 mm busbars, for TN-C systems

- Protection level  $\leq 1.5$  kV to protect the terminals
- Lightning protection equipotential bonding according to VDE 0185-305 (IEC 62305)
- Lightning current arresting capacity up to 25 kA (10/350) 3-pole
- Fulfills the requirements of VDE 0100-534 (IEC 60364-5-53)
- Line follow current quenching up to 50 kA and max. backup fuse up to 160 A gL/gG
- Spark gaps for use in the pre-meter area according to VDE-AR-N 4100

Application: Building with outside cable infeed.

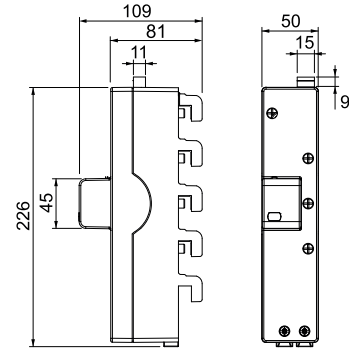
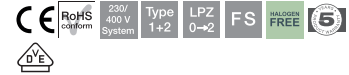
Type	Max. continuous voltage AC V	Pole version	Protection rating	Min. ordering quantity Piece	Item no.
MCF25-NAR-TNC	255	3	IP20	1	5096950

Connection options



MCF25-NAR-TNC		Type 1+2
SPD to EN 61643-11		Class I+II
SPD to IEC 61643-11		
Nominal voltage AC (50/60 Hz)	$U_n$	230 V
Maximum continuous voltage AC	$U_c$	255 V
Nominal discharge current (8/20 $\mu$ s)	$I_n / L-N$	20 kA
Maximum discharge current (8/20 $\mu$ s)	$I_{max}$	50 kA
Impulse discharge current (10/350 $\mu$ s)	$I_{imp}$	8.5 kA
Total discharge current (10/350)	$I_{total}$	25 kA
Maximum discharge current (8/20 $\mu$ s) [total]	$I_{total}$	60 kA
Combined voltage protection level [L-PEN]	$U_{p/L-PEN}$	1.5 kV
TOV voltage [L-N] – fail safe mode – 120 min.	$U_{T/L-N, 120 min}$	442 V
Max. mains-side overcurrent protection		160 A
Short-circuit withstand for max. mains-side overcurrent protection		50 kA eff
Operating temperature range	$T_u$	-40 - +80 °C
Protection rating		IP20
Approvals		VDE
Conductor cross-section, flexible (fine-wire)		10 - 35 mm <sup>2</sup>
Conductor cross-section, rigid (single wire/multi-wire)		10 - 35 mm <sup>2</sup>

LightningController - MCF25-NAR-TNC+FS



Type	Max. continuous voltage AC V	Pole version	Protection rating	Min. ordering quantity Piece	Item no.
MCF25-NAR-TNC+FS	255	3	IP20	1	5096953

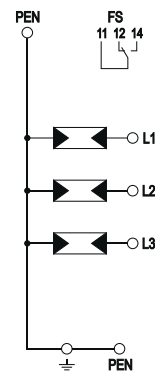
Combination arrester, type 1+2, for mounting on 40 mm busbars, for TN-C systems

- Protection level  $\leq 1.5$  kV to protect the terminals
- Lightning protection equipotential bonding according to VDE 0185-305 (IEC 62305)
- Lightning current arresting capacity up to 25 kA (10/350) 3-pole
- Fulfills the requirements of VDE 0100-534 (IEC 60364-5-53)
- Line follow current quenching up to 50 kA and max. backup fuse up to 160 A gL/gG
- Spark gaps for use in the pre-meter area according to VDE-AR-N 4100
- With potential-free changeover contact for remote signalling

Application: Building with outside cable infeed.

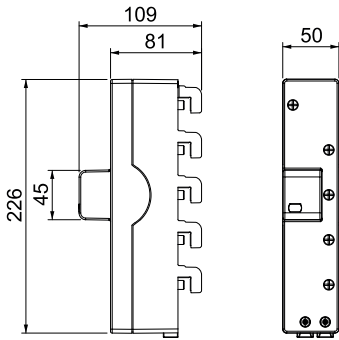
MCF25-NAR-TNC+FS		Type 1+2
SPD to EN 61643-11		Class III
SPD to IEC 61643-11		Class III
Nominal voltage AC (50/60 Hz)	$U_n$	230 V
Maximum continuous voltage AC	$U_C$	255 V
Nominal discharge current (8/20 $\mu$ s)	$I_n / L-N$	20 kA
Maximum discharge current (8/20 $\mu$ s)	$I_{max}$	50 kA
Impulse discharge current (10/350 $\mu$ s)	$I_{imp}$	8.5 kA
Total discharge current (10/350)	$I_{total}$	25 kA
Maximum discharge current (8/20 $\mu$ s) [total]	$I_{total}$	60 kA
Combined voltage protection level [L-PEN]	$U_{d / L-PEN}$	1.5 kV
TOV voltage [L-N] – fail safe mode – 120 min.	$U_{T / L-N, 120 min}$	442 V
Max. mains-side overcurrent protection		160 A
Short-circuit withstand for max. mains-side overcurrent protection		50 kA eff
Operating temperature range	$T_u$	-40 - +80 °C
Protection rating		IP20
Approvals		VDE
Conductor cross-section, flexible (fine-wire)		10 - 35 mm <sup>2</sup>
Conductor cross-section, rigid (single wire/multi-wire)		10 - 35 mm <sup>2</sup>
FM contacts		Changeover
Switching power AC		250 V/ 2 A
Switching power DC		250 V/ 0,1 A
Connection cross-section, FM terminals		0,5 - 1,5 mm <sup>2</sup>

Connection options





LightningController - MCF30-NAR-TT



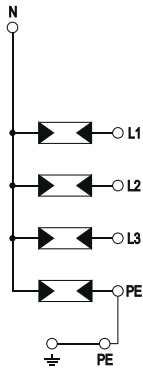
Combination arrester, type 1+2, for mounting on 40 mm busbars, for TN-S and TT systems

- Protection level  $\leq 1.5$  kV to protect the terminals
- Lightning protection equipotential bonding according to VDE 0185-305 (IEC 62305)
- Lightning current arresting capacity up to 30 kA (10/350) 3+NPE
- Fulfills the requirements of VDE 0100-534 (IEC 60364-5-53)
- Line follow current quenching up to 50 kA and max. backup fuse up to 160 A gL/gG
- Spark gaps for use in the pre-meter area according to VDE-AR-N 4100

Application: Building with outside cable infeed.

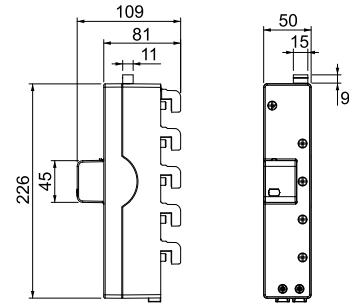
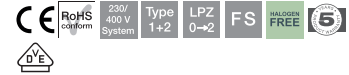
Type	Max. continuous voltage AC V	Pole version	Protection rating	Min. ordering quantity Piece	Item no.
MCF30-NAR-TT	255	3+N/PE	IP20	1	5096961

Connection options



MCF30-NAR-TT		Type 1+2
SPD to EN 61643-11		Class I+II
SPD to IEC 61643-11		
Nominal voltage AC (50/60 Hz)	$U_n$	230 V
Maximum continuous voltage AC	$U_c$	255 V
Nominal discharge current (8/20 $\mu$ s)	$I_n / L-N$	20 kA
Maximum discharge current (8/20 $\mu$ s)	$I_{max}$	50 kA
Impulse discharge current (10/350 $\mu$ s)	$I_{imp}$	7.5 kA
Total discharge current (10/350)	$I_{total}$	30 kA
Maximum discharge current (8/20 $\mu$ s) [total]	$I_{total}$	80 kA
Protection level [L-N]	$U_p$	1.5 kV
Protection level [N-PE]	$U_p / N-PE$	1.5 kV
Combined voltage protection level [L-PE]	$U_p / L-PE$	2.5 kV
TOV voltage [L-N] – fail safe mode – 120 min.	$U_T / L-N, 120 \text{ min}$	442 V
TOV voltage [N-PE] – withstand mode – 200 ms	$U_t / N-PE, 200 \text{ ms}$	1200 V
Max. mains-side overcurrent protection		160 A
Short-circuit withstand for max. mains-side overcurrent protection		50 kA eff
Operating temperature range	$T_u$	-40 - +80 °C
Protection rating		IP20
Approvals		VDE
Conductor cross-section, flexible (fine-wire)		10 - 35 mm <sup>2</sup>
Conductor cross-section, rigid (single wire/multi-wire)		10 - 35 mm <sup>2</sup>

LightningController - MCF30-NAR-TT+FS



Type	Max. continuous voltage AC (V)	Pole version	Protection rating	Min. ordering quantity	Min. ordering quantity Piece	Item no.
MCF30-NAR-TT+FS	255	3+N/PE	IP20	1		5096963

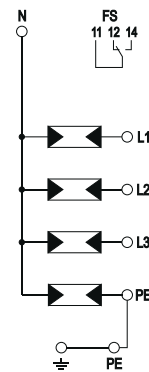
Combination arrester, type 1+2, for mounting on 40 mm busbars, for TN-S and TT systems

- Protection level  $\leq 1.5$  kV to protect the terminals
- Lightning protection equipotential bonding according to VDE 0185-305 (IEC 62305)
- Lightning current arresting capacity up to 30 kA (10/350) 3+NPE
- Fulfills the requirements of VDE 0100-534 (IEC 60364-5-53)
- Line follow current quenching up to 50 kA and max. backup fuse up to 160 A gL/gG
- Spark gaps for use in the pre-meter area according to VDE-AR-N 4100
- With potential-free changeover contact for remote signalling

Application: Building with outside cable infeed.

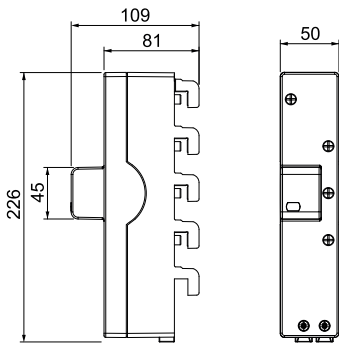
MCF30-NAR-TT+FS		Type 1+2
SPD to EN 61643-11		Class II
SPD to IEC 61643-11		Class II
Nominal voltage AC (50/60 Hz)	$U_n$	230 V
Maximum continuous voltage AC	$U_C$	255 V
Nominal discharge current (8/20 $\mu$ s)	$I_n / L-N$	20 kA
Maximum discharge current (8/20 $\mu$ s)	$I_{max}$	50 kA
Impulse discharge current (10/350 $\mu$ s)	$I_{imp}$	7.5 kA
Total discharge current (10/350)	$I_{total}$	30 kA
Maximum discharge current (8/20 $\mu$ s) [total]	$I_{total}$	80 kA
Protection level [L-N]	$U_d$	1.5 kV
Protection level [N-PE]	$U_{d / N-PE}$	1.5 kV
Combined voltage protection level [L-PE]	$U_{d / L-PE}$	2.5 kV
TOV voltage [L-N] – fail safe mode – 120 min.	$U_T / L-N, 120 \text{ min}$	442 V
TOV voltage [N-PE] – withstand mode – 200 ms	$U_{t / N-PE, 200 \text{ ms}}$	1200 V
Max. mains-side overcurrent protection		160 A
Short-circuit withstand for max. mains-side overcurrent protection		50 kA eff
Operating temperature range	$T_u$	-40 - +80 °C
Protection rating		IP20
Approvals		VDE
Conductor cross-section, flexible (fine-wire)		10 - 35 mm <sup>2</sup>
Conductor cross-section, rigid (single wire/multi-wire)		10 - 35 mm <sup>2</sup>
FM contacts		Changeover
Switching power AC		250 V/ 2 A
Switching power DC		250 V/ 0,1 A
Connection cross-section, FM terminals		0,5 - 1,5 mm <sup>2</sup>

Connection options





LightningController - MCF38-NAR-TNC



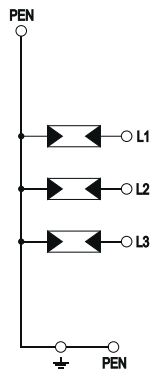
Combination arrester, type 1+2, for mounting on 40 mm busbars, for TN-C systems

- Protection level  $\leq 1.5$  kV to protect the terminals
- Lightning protection equipotential bonding according to VDE 0185-305 (IEC 62305)
- Lightning current arresting capacity up to 38 kA (10/350) 3-pole
- Fulfills the requirements of VDE 0100-534 (IEC 60364-5-53)
- Line follow current quenching up to 50 kA and max. backup fuse up to 160 A gL/gG
- Spark gaps for use in the pre-meter area according to VDE-AR-N 4100

Application: Building with lightning protection or outside cable infeed.

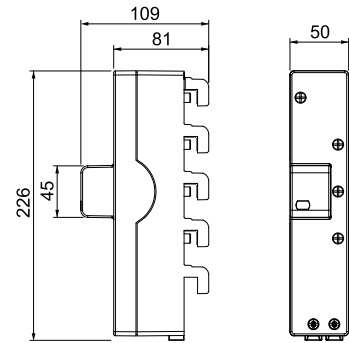
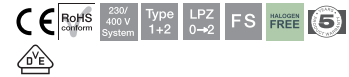
Type	Max. continuous voltage AC V	Pole version	Protection rating	Min. ordering quantity Piece	Item no.
MCF38-NAR-TNC	255	3	IP20	1	5096971

Connection options



MCF38-NAR-TNC		Type 1+2
SPD to EN 61643-11		Class I+II
SPD to IEC 61643-11		
Nominal voltage AC (50/60 Hz)	$U_n$	230 V
Maximum continuous voltage AC	$U_C$	255 V
Nominal discharge current (8/20 $\mu$ s)	$I_n / L-N$	20 kA
Maximum discharge current (8/20 $\mu$ s)	$I_{max}$	50 kA
Impulse discharge current (10/350 $\mu$ s)	$I_{imp}$	12.5 kA
Total discharge current (10/350)	$I_{total}$	38 kA
Maximum discharge current (8/20 $\mu$ s) [total]	$I_{total}$	60 kA
Combined voltage protection level [L-PEN]	$U_D / L-PEN$	1.5 kV
TOV voltage [L-N] – fail safe mode – 120 min.	$U_T / L-N, 120 \text{ min}$	442 V
Max. mains-side overcurrent protection		160 A
Short-circuit withstand for max. mains-side overcurrent protection		50 kA eff
Operating temperature range	$T_u$	-40 - +80 °C
Protection rating		IP20
Approvals		VDE
Conductor cross-section, flexible (fine-wire)		10 - 35 mm <sup>2</sup>
Conductor cross-section, rigid (single wire/multi-wire)		10 - 35 mm <sup>2</sup>

LightningController - MCF38-NAR-TNC+FS



Type	Max. continuous voltage AC V	Pole version	Protection rating	Min. ordering quantity Piece	Item no.
MCF38-NAR-TNC+FS	255	3	IP20	1	5096973

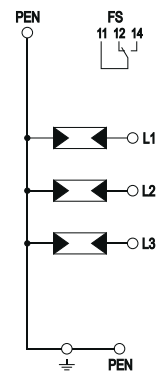
Combination arrester, type 1+2, for mounting on 40 mm busbars, for TN-C systems

- Protection level  $\leq 1.5$  kV to protect the terminals
- Lightning protection equipotential bonding according to VDE 0185-305 (IEC 62305)
- Lightning current arresting capacity up to 38 kA (10/350) 3-pole
- Fulfills the requirements of VDE 0100-534 (IEC 60364-5-53)
- Line follow current quenching up to 50 kA and max. backup fuse up to 160 A gL/gG
- Spark gaps for use in the pre-meter area according to VDE-AR-N 4100
- With potential-free changeover contact for remote signalling

Application: Buildings with lightning protection or outside cable infeed.

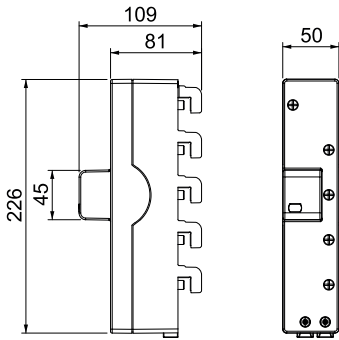
MCF38-NAR-TNC+FS		Type 1+2
SPD to EN 61643-11		Class III
SPD to IEC 61643-11		Class III
Nominal voltage AC (50/60 Hz)	$U_n$	230 V
Maximum continuous voltage AC	$U_c$	255 V
Nominal discharge current (8/20 $\mu$ s)	$I_n / L-N$	20 kA
Maximum discharge current (8/20 $\mu$ s)	$I_{max}$	50 kA
Impulse discharge current (10/350 $\mu$ s)	$I_{imp}$	12.5 kA
Total discharge current (10/350)	$I_{total}$	38 kA
Maximum discharge current (8/20 $\mu$ s) [total]	$I_{total}$	60 kA
Combined voltage protection level [L-PEN]	$U_{p/L-PEN}$	1.5 kV
TOV voltage [L-N] – fail safe mode – 120 min.	$U_{T/L-N, 120 min}$	442 V
Max. mains-side overcurrent protection		160 A
Short-circuit withstand for max. mains-side overcurrent protection		50 kA eff
Operating temperature range	$T_u$	-40 - +80 °C
Protection rating		IP20
Approvals		VDE
Conductor cross-section, flexible (fine-wire)		10 - 35 mm <sup>2</sup>
Conductor cross-section, rigid (single wire/multi-wire)		10 - 35 mm <sup>2</sup>
FM contacts		Changeover
Switching power AC		250 V/ 2 A
Switching power DC		250 V/ 0,1 A
Connection cross-section, FM terminals		0,5 - 1,5 mm <sup>2</sup>

Connection options





## LightningController - MCF50-NAR-TT



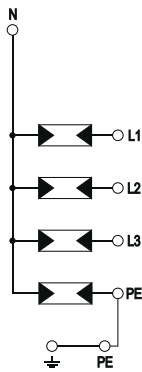
Combination arrester, type 1+2, for mounting on 40 mm busbars, for TN-S and TT systems

- Protection level  $\leq 1.5$  kV to protect the terminals
- Lightning protection equipotential bonding according to VDE 0185-305 (IEC 62305)
- Lightning current arresting capacity up to 50 kA (10/350) 3+NPE
- Fulfills the requirements of VDE 0100-534 (IEC 60364-5-53)
- Line follow current quenching up to 50 kA and max. backup fuse up to 160 A gL/gG
- Spark gaps for use in the pre-meter area according to VDE-AR-N 4100

Application: Building with lightning protection or outside cable infeed.

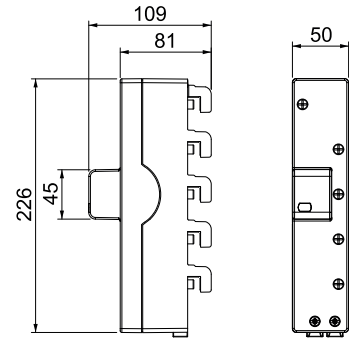
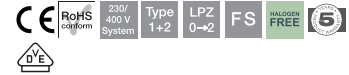
Type	Max. continuous voltage AC V	Pole version	Protection rating	Min. ordering quantity Piece	Item no.
MCF50-NAR-TT	255	3+N/PE	IP20	1	5096975

### Connection options



MCF50-NAR-TT		Type 1+2
SPD to EN 61643-11		Class II
SPD to IEC 61643-11		
Nominal voltage AC (50/60 Hz)	$U_n$	230 V
Maximum continuous voltage AC	$U_C$	255 V
Nominal discharge current (8/20 $\mu$ s)	$I_n / L-N$	20 kA
Maximum discharge current (8/20 $\mu$ s)	$I_{max}$	50 kA
Impulse discharge current (10/350 $\mu$ s)	$I_{imp}$	12.5 kA
Total discharge current (10/350)	$I_{total}$	50 kA
Maximum discharge current (8/20 $\mu$ s) [total]	$I_{total}$	80 kA
Protection level [L-N]	$U_d$	1.5 kV
Protection level [N-PE]	$U_{d / N-PE}$	1.5 kV
Combined voltage protection level [L-PE]	$U_{d / L-PE}$	2.5 kV
TOV voltage [L-N] – fail safe mode – 120 min.	$U_{T / L-N, 120 min}$	442 V
TOV voltage [N-PE] – withstand mode – 200 ms	$U_{1 / N-PE, 200 ms}$	1200 V
Max. mains-side overcurrent protection		160 A
Short-circuit withstand for max. mains-side overcurrent protection		50 kA eff
Operating temperature range	$T_u$	-40 - +80 °C
Protection rating		IP20
Approvals		VDE
Conductor cross-section, flexible (fine-wire)		10 - 35 mm <sup>2</sup>
Conductor cross-section, rigid (single wire/multi-wire)		10 - 35 mm <sup>2</sup>

LightningController - MCF50-NAR-TT+FS



Type	Max. continuous voltage AC (V)	Pole version	Protection rating	Min. ordering quantity (Piece)	Item no.
MCF50-NAR-TT+FS	255	3+N/PE	IP20	1	5096977

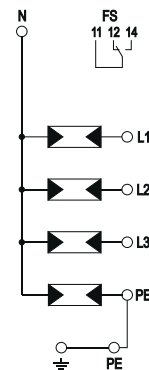
Combination arrester, type 1+2, for mounting on 40 mm busbars, for TN-S and TT systems

- Protection level  $\leq 1.5$  kV to protect the terminals
- Lightning protection equipotential bonding according to VDE 0185-305 (IEC 62305)
- Lightning current arresting capacity up to 50 kA (10/350) 3+NPE
- Fulfills the requirements of VDE 0100-534 (IEC 60364-5-53)
- Line follow current quenching up to 50 kA and max. backup fuse up to 160 A gL/gG
- Spark gaps for use in the pre-meter area according to VDE-AR-N 4100
- With potential-free changeover contact for remote signalling

Application: Building with lightning protection or outside cable infeed.

MCF50-NAR-TT+FS		Type 1+2
SPD to EN 61643-11		Class II
SPD to IEC 61643-11		Class II
Nominal voltage AC (50/60 Hz)	$U_n$	230 V
Maximum continuous voltage AC	$U_C$	255 V
Nominal discharge current (8/20 $\mu$ s)	$I_n / L-N$	20 kA
Maximum discharge current (8/20 $\mu$ s)	$I_{max}$	50 kA
Impulse discharge current (10/350 $\mu$ s)	$I_{imp}$	12.5 kA
Total discharge current (10/350)	$I_{total}$	50 kA
Maximum discharge current (8/20 $\mu$ s) [total]	$I_{total}$	80 kA
Protection level [L-N]	$U_d$	1.5 kV
Protection level [N-PE]	$U_{d / N-PE}$	1.5 kV
Combined voltage protection level [L-PE]	$U_{d / L-PE}$	2.5 kV
TOV voltage [L-N] – fail safe mode – 120 min.	$U_T / L-N, 120 \text{ min}$	442 V
TOV voltage [N-PE] – withstand mode – 200 ms	$U_{t / N-PE, 200 \text{ ms}}$	1200 V
Max. mains-side overcurrent protection		160 A
Short-circuit withstand for max. mains-side overcurrent protection		50 kA eff
Operating temperature range	$T_u$	-40 - +80 °C
Protection rating		IP20
Approvals		VDE
Conductor cross-section, flexible (fine-wire)		10 - 35 mm <sup>2</sup>
Conductor cross-section, rigid (single wire/multi-wire)		10 - 35 mm <sup>2</sup>
FM contacts		Changeover
Switching power AC		250 V/ 2 A
Switching power DC		250 V/ 0,1 A
Connection cross-section, FM terminals		0,5 - 1,5 mm <sup>2</sup>

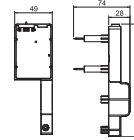
Connection options





## Voltage tap for MCF-NAR series

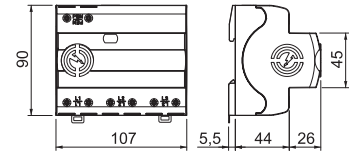
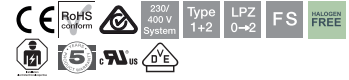
Type	Nominal voltage AC (50/60 Hz) V	Protection rating	Min. ordering quantity Piece	Item no.
MCF-NAR-SMG	230	IP20	1	5096900



## Adapter for voltage tap in power-side connection compartment

- Simple and space-saving voltage taps for the termination point meter position (APZ) and the space for additional applications (RfZ)
- With spring contacts for easy connection of wires
- Includes 2 plug sockets
- Safety screw to prevent unwanted loosening
- Replaceable 5 A fine-wire fuse with a breaking capacity of 50 kA
- Fuse holder 6.3 x 32 mm

LightningController Compact - MCF75



Type	Max. continuous voltage AC V	Pole version	Protection rating	Min. ordering quantity Piece	Item no.
MCF75-3+FS	255	3	IP20	1	5096981

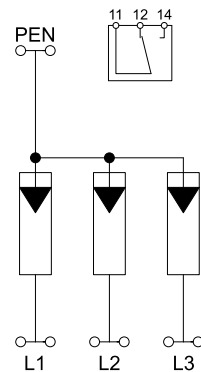
Combination arrester, lightning current and surge arrester, type 1+2

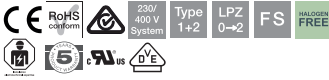
- Protection level  $\leq 1.5$  kV
- For lightning protection equipotential bonding to VDE 0185-305 (IEC 62305)
- Lightning current arresting capacity to 75 kA (10/350), 3-pole
- Line following current quenching 50 kA Ipeak, arrester backup fuse to 315 A gL/gG
- Fulfills the requirements of VDE-AR-N 4100 for use in pre-meter area
- Encapsulated, non-extinguishing spark gap arrester for use in distributor housings

Application: Industrial systems and buildings with external lightning protection of the highest class I to IV.

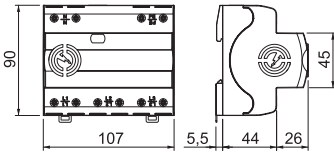
MCF75-3+FS		Type 1+2
SPD to EN 61643-11		Type 4
SPD to IEC 61643-11		Class I+II
SPD to UL 1449		Type 4
Nominal voltage AC (50/60 Hz)	$U_n$	230 V
Maximum continuous voltage AC	$U_c$	255 V
Nominal discharge current (8/20 $\mu$ s)	$I_n / L-N$	35 kA
Maximum discharge current (8/20 $\mu$ s)	$I_{max}$	50 kA
Impulse discharge current (10/350 $\mu$ s)	$I_{imp}$	25 kA
Total discharge current (10/350)	$I_{total}$	75 kA
Maximum discharge current (8/20 $\mu$ s) [total]	$I_{total}$	75 kA
Combined voltage protection level [L-PEN]	$U_{d/L-PEN}$	1.5 kV
Max. mains-side overcurrent protection		315 A
Short-circuit withstand for max. mains-side overcurrent protection		50 kA eff
Operating temperature range	$T_u$	-40 - +80 °C
Protection rating		IP20
Approvals		VDE, UL
Conductor cross-section, flexible (fine-wire)		1.5 - 25 mm <sup>2</sup>
Conductor cross-section, rigid (single wire/multi-wire)		1.5 - 35 mm <sup>2</sup>
Conductor cross-section, flexible (fine-wire)		16 - 3 AWG
Conductor cross-section, rigid (single wire/multi-wire)		16 - 2 AWG

Connection options





LightningController Compact - MCF100



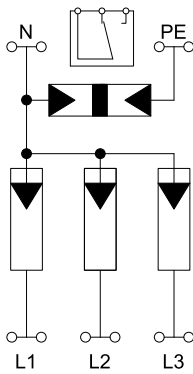
Combination arrester, lightning current and surge arrester, type 1+2

- Protection level  $\leq 1.5$  kV
- For lightning protection equipotential bonding to VDE 0185-305 (IEC 62305)
- Lightning current arresting capacity up to 100 kA (10/350), 3+NPE
- Line following current quenching 50 kA I<sub>peak</sub>, arrester backup fuse to 315 A gL/gG
- Fulfills the requirements of VDE-AR-N 4100 for use in pre-meter area
- Encapsulated, non-extinguishing spark gap arrester for use in distributor housings

Application: Industrial systems and buildings with external lightning protection of the highest class I to IV.

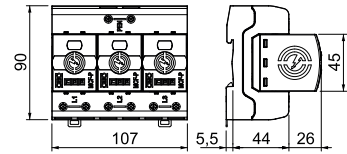
Type	Max. continuous voltage AC V	Pole version	Protection rating	Min. ordering quantity Piece	Item no.
MCF100-3+NPE+FS	255	3+N/PE	IP20	1	5096987

Connection options



MCF100-3+NPE+FS	
SPD to EN 61643-11	Type 1+2
SPD to IEC 61643-11	Class I+II
SPD to UL 1449	Type 4
Nominal voltage AC (50/60 Hz)	U <sub>n</sub> 230 V
Maximum continuous voltage AC	U <sub>c</sub> 255 V
Nominal discharge current (8/20 $\mu$ s)	I <sub>n</sub> / L-N 35 kA
Maximum discharge current (8/20 $\mu$ s)	I <sub>max</sub> 50 kA
Impulse discharge current (10/350 $\mu$ s)	I <sub>imp</sub> 25 kA
Total discharge current (10/350)	I <sub>total</sub> 100 kA
Maximum discharge current (8/20 $\mu$ s) [total]	I <sub>total</sub> 100 kA
Protection level [L-N]	U <sub>p</sub> 1.5 kV
Max. mains-side overcurrent protection	315 A
Short-circuit withstand for max. mains-side overcurrent protection	50 kA eff
Operating temperature range	T <sub>u</sub> -40 - +80 °C
Protection rating	IP20
Approvals	VDE, UL
Conductor cross-section, flexible (fine-wire)	1.5 - 25 mm <sup>2</sup>
Conductor cross-section, rigid (single wire/multi-wire)	1.5 - 35 mm <sup>2</sup>
Conductor cross-section, flexible (fine-wire)	16 - 3 AWG
Conductor cross-section, rigid (single wire/multi-wire)	16 - 2 AWG

Lightning current arrester MCF-P, 3-pole



Type	Maximum continuous voltage (L-N) V	Pole version	Protection rating	Min. ordering quantity Piece	Item no.
MCF-P-3	255	3	IP20	1	5096945

Lightning current arrester type 1+2+3

- Lightning current arresting capacity to 35 kA (10/350) per pole
- Voltage protection level < 1.5 kV
- Lightning protection equipotential bonding according to VDE 0185-305 (IEC 62305)
- Follow current quenching rating I<sub>fi</sub> 50 kA
- Fulfills the requirements of VDE-AR-N 4100 for use in the pre-meter area

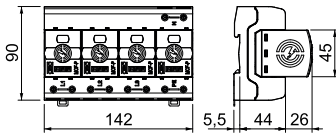
Application: Industrial systems and buildings with external lightning protection of the classes I to IV.

MCF-P-3	
Nominal voltage AC (50/60 Hz)	U <sub>n</sub> 230 V
Maximum continuous voltage (L-N)	U <sub>c</sub> 255 V
SPD to EN 61643-11	Type 1+2
SPD to IEC 61643-11	Class II
Impulse discharge current (10/350 μs)	I <sub>imp</sub> 35 kA
Total discharge current (10/350)	I <sub>total</sub> 105 kA
Nominal discharge current (8/20 μs) [L-N]	I <sub>n / L-N</sub> 35 kA
Maximum discharge current (8/20 μs) [L-N]	I <sub>max / L-N</sub> 50 kA
Protection level [L-N]	U <sub>p</sub> 1.5 kV
Combined voltage protection level [L-PEN]	U <sub>p / L-PEN</sub> 1.5 kV
Response time [L-N]	t <sub>A / L-N</sub> <100 ns
Max. mains-side overcurrent protection	315 A gL/gG
Operating temperature range	T <sub>u</sub> -40 - +70 °C
Size	6 part units
Protection rating	IP20
Conductor cross-section, flexible (fine-wire)	1.5 - 35 mm <sup>2</sup>
Conductor cross-section, rigid (single wire/multi-wire)	1.5 - 35 mm <sup>2</sup>
Conductor cross-section, flexible (fine-wire)	16 - 2 AWG
Conductor cross-section, rigid (single wire/multi-wire)	16 - 2 AWG

Connection options



## Lightning current arrester MCF-P, 3+NPE



## Lightning current arrester type 1+2+3

- Lightning current arresting capacity to 35 kA (10/350) per pole
- Lightning current arresting capacity to 100 kA (10/350) total
- Voltage protection level < 1.5 kV
- Lightning protection equipotential bonding according to VDE 0185-305 (IEC 62305)
- Follow current quenching rating I<sub>fi</sub> 50 kA
- Fulfills the requirements of VDE-AR-N 4100 for use in the pre-meter area

Application: Industrial systems and buildings with external lightning protection of the classes I to IV.

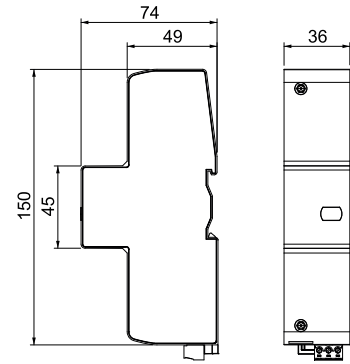
Type	Maximum continuous voltage (L-N) V	Pole version	Protection rating	Min. ordering quantity Piece	Item no.
MCF-P-3+NPE	255	3+N/PE	IP20	1	5096947

## Connection options

MCF-P-3+NPE		
Nominal voltage AC (50/60 Hz)	$U_n$	230 V
Maximum continuous voltage (L-N)	$U_c$	255 V
Maximum continuous voltage (N-PE)	$U_c$	255 V
SPD to EN 61643-11		Type 1+2
SPD to IEC 61643-11		Class II
Impulse discharge current (10/350 $\mu$ s)	$I_{imp}$	35 kA
Impulse discharge current (10/350 $\mu$ s) [N/PE]	$I_{imp / N-PE}$	100 kA
Total discharge current (10/350)	$I_{total}$	100 kA
Nominal discharge current (8/20 $\mu$ s) [L-N]	$I_n / L-N$	35 kA
Nominal discharge current (8/20 $\mu$ s) [L-PE]	$I_n / L-PE$	35 kA
Nominal discharge current (8/20 $\mu$ s) [N-PE]	$I_n / N-PE$	100 kA
Maximum discharge current (8/20 $\mu$ s) [L-N]	$I_{max / L-N}$	50 kA
Maximum discharge current (8/20 $\mu$ s) [N-PE]	$I_{max / N-PE}$	100 kA
Protection level [L-N]	$U_d$	1.5 kV
Protection level [N-PE]	$U_d / N-PE$	1.5 kV
Combined voltage protection level [L-PE]	$U_d / L-PE$	2.5 kV
Response time [L-N]	$t_A / L-N$	<100 ns
Response time [N-PE]	$t_A / N-PE$	<100 ns
Max. mains-side overcurrent protection		315 A gL/gG
Operating temperature range	$T_u$	-40 - +70 °C
Size		8 part units
Protection rating		IP20
Conductor cross-section, flexible (fine-wire)		1.5 - 35 mm <sup>2</sup>
Conductor cross-section, rigid (single wire/multi-wire)		1.5 - 35 mm <sup>2</sup>
Conductor cross-section, flexible (fine-wire)		16 - 2 AWG
Conductor cross-section, rigid (single wire/multi-wire)		16 - 2 AWG

Lightning current arrester MCF-C

Type 1 LPZ 230/400 V System



Type	Max. continuous voltage AC V	Pole version	Protection rating	Min. ordering quantity Piece	Item no.
MCF-C+FS-440	440	1	IP20	1	5096917

Lightning current arrester type 1+2

- Voltage protection level < 2.5 kV
- Lightning protection equipotential bonding according to VDE 0185-305 (IEC 62305)
- Lightning current arresting capacity to 25 kA (10/350)
- Follow current quenching rating I<sub>fi</sub> 50 kA
- Max. pre-fuse 315 A gL/gG
- Fulfills the requirements of VDE-AR-N 4100 for use in the pre-meter area
- The FS variant possesses a potential-free changeover contact for remote signalling

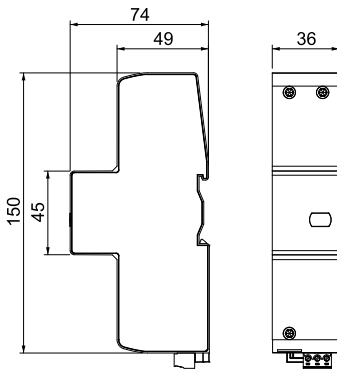
Application: For 400/690 V network systems and for lightning protection classes I to IV without exception.

MCF-C+FS-440		
Nominal voltage AC (50/60 Hz)	U <sub>n</sub>	400 V
Maximum continuous voltage (L-N)	U <sub>c</sub>	440 V
Maximum continuous voltage (N-PE)	U <sub>c</sub>	- V
SPD to EN 61643-11		Type 1+2
SPD to IEC 61643-11		Class I+II
Impulse discharge current (10/350 μs)	I <sub>imp</sub>	25 kA
Nominal discharge current (8/20 μs) [L-N]	I <sub>n</sub> / L-N	35 kA
Maximum discharge current (8/20 μs) [L-N]	I <sub>max</sub> / L-N	- kA
Protection level [L-N]	U <sub>p</sub>	2.5 kV
Response time [L-N]	t <sub>A</sub> / L-N	<100 ns
Max. mains-side overcurrent protection		315 A gL/gG
Operating temperature range	T <sub>u</sub>	-40 - +80 °C
Size		2 part units
Protection rating		IP20
Conductor cross-section, flexible (fine-wire)		6 - 25 mm <sup>2</sup>
Conductor cross-section, rigid (single wire/multi-wire)		6 - 35 mm <sup>2</sup>
Conductor cross-section, flexible (fine-wire)		10 - 3 AWG
Conductor cross-section, rigid (single wire/multi-wire)		10 - 2 AWG
FM contacts		Changeover
Switching power AC		230 V; 0,5 A
Switching power DC		230 V; 0,1 A / 75 V; 0,5 A
Connection cross-section, FM terminals		0,5 - 1,5 mm <sup>2</sup>
Connection cross-section, FM terminals		21 - 16 AWG

Connection options



## Lightning current arrester MC-C-NPE



## Lightning current arrester type 1+2

- Voltage protection level < 2.5 kV
- Lightning protection equipotential bonding according to VDE 0185-305 (IEC 62305)
- Lightning current arresting capacity to 100 kA (10/350)
- Follow current interrupt rating I<sub>fi</sub> 100 A
- Fulfils the requirements of VDE-AR-N 4100 for use in the pre-meter area
- The FS variant possesses a potential-free changeover contact for remote signalling

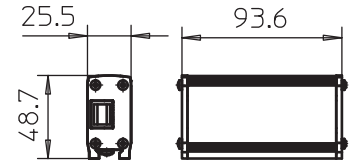
Application: For 400/690 V network systems and for lightning protection classes I to IV without exception.

Type	Highest continuous voltage V	Version	Min. ordering quantity Piece	Item no.
MC-C-NPE+FS-440	—	—	1	5096922

## Connection options

MC-C-NPE+FS-440			
Nominal voltage AC (50/60 Hz)	U <sub>n</sub>	400 V	
Maximum continuous voltage (L-N)	U <sub>c</sub>	— V	
Maximum continuous voltage (N-PE)	U <sub>c</sub>	440 V	
SPD to EN 61643-11		Type 1+2	
SPD to IEC 61643-11		Class I+II	
Impulse discharge current (10/350 μs)	I <sub>imp</sub>	100 kA	
Nominal discharge current (8/20 μs) [L-N]	I <sub>n</sub> / L-N	100 kA	
Maximum discharge current (8/20 μs) [L-N]	I <sub>max</sub> / L-N	— kA	
Protection level [L-N]	U <sub>p</sub>	— kV	
Response time [L-N]	t <sub>A</sub> / L-N	— ns	
Max. mains-side overcurrent protection		—	
Operating temperature range	T <sub>u</sub>	-40 - +80 °C	
Size		2 part units	
Protection rating		IP20	
Conductor cross-section, flexible (fine-wire)		6 - 25 mm <sup>2</sup>	
Conductor cross-section, rigid (single wire/multi-wire)		6 - 35 mm <sup>2</sup>	
Conductor cross-section, flexible (fine-wire)		10 - 3 AWG	
Conductor cross-section, rigid (single wire/multi-wire)		10 - 2 AWG	
FM contacts		Changeover	
Switching power AC		230 V; 0,5 A	
Switching power DC		230 V; 0,1 A / 75 V; 0,5 A	
Connection cross-section, FM terminals		0,5 - 1,5 mm <sup>2</sup>	
Connection cross-section, FM terminals		21 - 16 AWG	

**Surge protection for high-speed networks up to 1 GBit  
(Class ND-CAT6/E-F)**



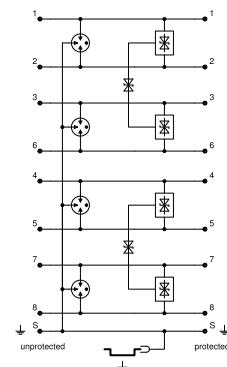
Type	Version	Connection system	Min. ordering quantity	Piece	Item no.
<b>ND-CAT6/E-F</b>	Fine protection, 8 wires + shield	RJ45 8(8)	1		<b>5081802</b>

- Data cable protection device for high-speed networks
- High-quality RJ45 sockets
  - Low protection level at high current load
  - Earthing via DIN rail or connection cable
  - Support of Power over Ethernet ++ (PoE++/4PPoE) to 1 A in accordance with IEEE 802.3
  - Tested transmission quality in networks up to 1 GBit/s (Class E) or CAT6
  - Fast installation through plug-in version
  - Incl. DIN rail fastening set and earthing cable

Application example: 1 GBit Ethernet, 10/100 MBit Ethernet, PoE applications, IP camera systems, ISDN S0 interfaces

ND-CAT6/E-F	
Maximum continuous voltage AC	$U_c$ 41 V
Maximum continuous voltage DC	$U_c$ 58 V
Category	Type 2+3 / C2+C1
Lightning protection zone LPZ	1→3
Channel performance ISO/IEC	Class E
Channel performance Ansi/EA	CAT 6
Number of poles	8
Rated current	$I_L$ 1 A
Impulse durability wire-wire	C1: 0,3 kV / 0,15 kA (8/20 $\mu$ s)
Impulse durability wire-earth	C2: 3 kV / 1,5 kA (8/20 $\mu$ s)
Total discharge current (8/20)	5 kA
Protection level wire-wire	<40 V
Protection level wire-earth	<900 V
Frequency range	0 - 250 MHz
Temperature range	$\vartheta$ -40 - +80 °C
Installation type	Connector/cable adapter
Connection system	RJ45 8(8)
Protection rating	IP20
Shielding connection available	Yes
Shield connection	Direct
Earthing via:	Connection cable / DIN rail
Testing standard	IEC 61643-21

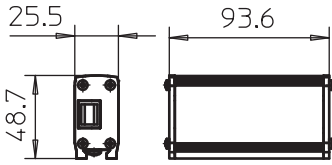
**Connection options**



Alu



## Surge protection for high-speed networks up to 1 GBit (Class ND-CAT6/E-B)



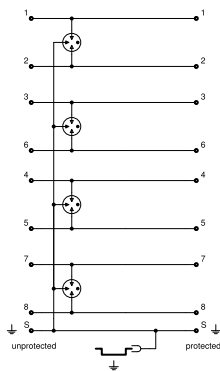
Data cable protection device for high-speed networks

- Protection class: Basic protection
- High-quality RJ45 sockets
- Low protection level at high current load
- Earthing via DIN rail or connection cable
- Support of Power over Ethernet ++ (PoE++/4PPoE) to 1 A in accordance with IEEE 802.3
- Tested transmission quality in networks up to 1 GBit/s (Class E) or CAT6
- Rapid installation through plug-in version
- Incl. DIN rail fastening set and earthing cable

Application example: 1 GBit Ethernet, 10/100 MBit Ethernet, PoE applications, IP camera systems, ISDN S0 interfaces

Type	Version	Connection system	Min. ordering quantity	Item no.
ND-CAT6/E-B	Basic protection, 8 wires + shield	RJ45 8(8)	1	5081804

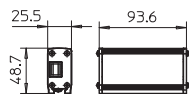
### Connection options



### ND-CAT6/E-B

Maximum continuous voltage AC	$U_c$	46 V
Maximum continuous voltage DC	$U_c$	65 V
Category		Type 1 / D1
Lightning protection zone LPZ		0→1
Channel performance ISO/IEC		Class E
Channel performance Ansi/EA		CAT 6
Number of poles		8
Rated current	$I_L$	1 A
Impulse durability wire-wire		C2: 3 kV / 1,5 kA (8/20 $\mu$ s)
Impulse durability wire-earth		C2: 3 kV / 1,5 kA (8/20 $\mu$ s)
Total discharge current (8/20)		10 kA
Protection level wire-wire		<1100 V
Protection level wire-earth		<900 V
Frequency range		0 - 250 MHz
Temperature range	$\vartheta$	-40 - +80 °C
Installation type		Connector/cable adapter
Connection system		RJ45 8(8)
Protection rating		IP20
Shielding connection available		Yes
Shield connection		Direct
Earthing via:		Connection cable / DIN rail
Testing standard		IEC 61643-21

# Surge protection for high-speed networks up to 10 GBit (Class EA/CAT6A)



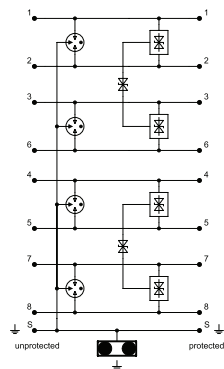
Type	Version	Connection system	Min. ordering quantity Piece	Item no.
ND-IP66-RJ-RJ	Fine protection, 8 wires + shield	RJ45 8(8)	1	5081807
ND-IP66-RJ-LSA	Combined protection, 8 wires + shield	RJ45 8(8)	1	5081808

Data cable protection device for high-speed networks

- Protection class: Fine protection
- Unprotected connection: RJ45 socket
- Protected connection: RJ45 socket
- Low voltage protection level at a high current load
- Earthing via external PE connection
- Support for Power over Ethernet ++ (PoE++/4PPoE) up to 1 A according to IEEE 802.3
- Tested transmission quality in networks to 10 GBit (class EA) or CAT6A
- For wall and mast mounting indoors and outdoors
- Robust aluminium housing, protection rating IK code: IK08, protection type: IP66
- Voltage protection level PoE: <160 V

Application example: 10 GBit Ethernet, 10/100 MBit Ethernet, PoE applications, IP camera systems, high-quality industrial systems

## Connection options



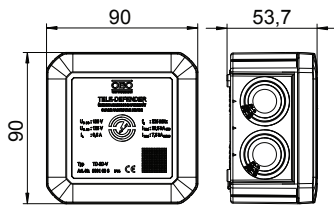
### ND-IP66-RJ-RJ

Maximum continuous voltage DC	$U_c$	58 V
Category	Type	1+2+3 / D1+C2+C1
Lightning protection zone LPZ		1→3
Channel performance ISO/IEC		Class EA
Channel performance Ansi/EA		CAT 6A
Number of poles		8
Rated current	$I_L$	1 A
Impulse durability wire-wire		C1: 0,5 kV / 0,25 kA (8/20µs)
Impulse durability wire-earth		C2: 3 kV / 1,5 kA (8/20µs)
Total discharge current (8/20)		10 kA
Protection level wire-wire		<70 V
Protection level wire-earth		<700 V
Frequency range		>500 MHz
Temperature range	$\vartheta$	-20 - +65 °C
Installation type		Wall mounting
Connection system		RJ45 8(8)
Protection rating		IP66
Shielding connection available		Yes
Shield connection		Direct
Earthing via:		Connection cable
Testing standard		IEC 61643-21

### ND-IP66-RJ-LSA

Maximum continuous voltage DC	$U_c$	58 V
Category	Type	1+2+3 / D1+C2+C1
Lightning protection zone LPZ		1→3
Channel performance ISO/IEC		Class EA
Channel performance Ansi/EA		CAT 6A
Number of poles		8
Rated current	$I_L$	1 A
Impulse durability wire-wire		C1: 0,5 kV / 0,25 kA (8/20µs)
Impulse durability wire-earth		C2: 5 kV / 2,5 kA (8/20µs)
Total discharge current (8/20)		10 kA
Protection level wire-wire		<70 V
Protection level wire-earth		<700 V
Frequency range		>500 MHz
Temperature range	$\vartheta$	-20 - +65 °C
Installation type		Wall mounting
Connection system		RJ45 8(8)
Protection rating		IP66
Shielding connection available		Yes
Shield connection		Direct
Earthing via:		Connection cable
Testing standard		IEC 61643-21

## Combination protection device TD-2D-V for VDSL systems



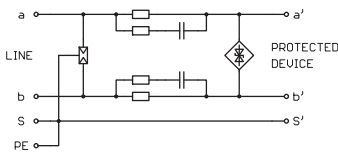
Data cable protection device for telecommunications equipment

- Low protection level at a high current load
- "Push-in" clamps for quick installation
- Bandwidth-optimised for secure transmission up to 225 MHz
- Surface mounting

Application: Ideal for all DSL systems, IP connections, ISDN or analogue telecommunications

Type	Max. continuous voltage AC V	Max. continuous voltage DC V	Number of poles	Connection system	Min. ordering quantity Piece	Item no.
<b>TD-2D-V</b>	125	180	2	Terminal	1	<b>5081698</b>

### Connection options



TD-2D-V		
Maximum continuous voltage AC	$U_C$	125 V
Maximum continuous voltage DC	$U_C$	180 V
Category		Type 1+2+3 / D1+C2+C1
Lightning protection zone LPZ		0→3
Number of poles		2
Rated current	$I_L$	0.5 A
Capacity (wire-wire)		<10 pF
Capacity (wire-earth)		<20 pF
Series resistance per wire		2,2 $\Omega$ $\pm$ 5 %
Impulse durability wire-wire		C2: 15 kV / 7,5 kA (8/20 $\mu$ s)
Impulse durability wire-earth		C2: 15 kV / 7,5 kA (8/20 $\mu$ s)
Impulse discharge current (10/350)	$I_{imp}$	2.5 kA
Total discharge current (8/20)		22,5 kA
Total discharge current (10/350)		D1: 7,5 kA
Protection level wire-wire		<350 V
Protection level wire-earth		<600 V
Frequency range		0 - 225 MHz
Insertion loss	$S_{21}$	$\leq$ 3 dB
Temperature range	$\vartheta$	-40 - +80 °C
Installation type		Surface-mounted
Connection system		Terminal
Protection rating		IP54
Shielding connection available		Yes
Connection cross-section, flexible		0.14 - 1 mm <sup>2</sup>
Connection cross-section, multi-wire		0.14 - 1 mm <sup>2</sup>
Connection cross-section, rigid		0.08 - 1.5 mm <sup>2</sup>
Testing standard		IEC 61643-21

## Junction box X 06 with DIN rail

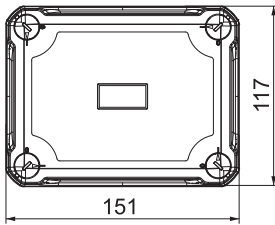
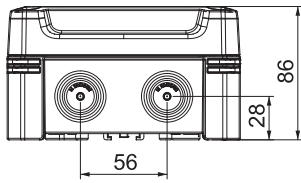


Type	Colour	Entries	Min. ordering quantity	Item no.
X06 R LGR-TR	grey / transparent	4 x Ø20/25, 4 x Ø20/25/32	1 Piece	2005092

Junction box with DIN rail for the connection of cables and lines indoors and in outdoor areas. Rectangular design with knock-out entries. Suitable for wall and ceiling mounting with the option to fasten outside, inside or to mount via the corner domes. Particularly impact resistant with IK09. Transparent cover with quick lock, sealable. Made from halogen-free and UV-resistant materials. With DIN rail type 2069.

Junction box according to DIN EN 60670. Flame-resistant to DIN EN 60695/2/11, test temperature 650 °C. Impact resistance IK09 according to DIN EN 50102. Protection rating IP67 according to DIN EN 60529.

### Dimensions



Type	Dimension L x W x H mm	Clear internal dimensions mm
X06 R LGR-TR	151x117x86	137x105x68

PC



## Junction box X 10 with DIN rail

Type	Colour	Entries	Min. ordering quantity Piece	Item no.
X10 R LGR-TR	grey / transparent	10 x Ø20/25/32	1	2005096

Junction box with DIN rail for the connection of cables and lines indoors and in outdoor areas. Rectangular design with knock-out entries. Suitable for wall and ceiling mounting with the option to fasten outside, inside or to mount via the corner domes. Particularly impact resistant with IK09. Transparent cover with quick lock, sealable. Made from halogen-free and UV-resistant materials.

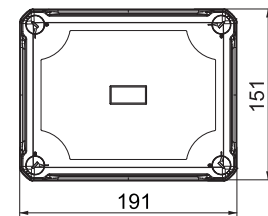
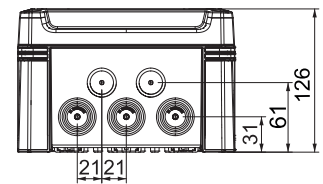
With DIN rail type 2069.

Junction box according to DIN EN 60670. Flame-resistant to DIN EN 60695/2/11, test temperature 650 °C. Impact resistance IK09 according to DIN EN 50102. Protection rating IP67 according to DIN EN 60529.



Type	Dimension L x W x H mm	Clear internal dimensions mm
X10 R LGR-TR	191x151x126	177x137x110

Dimensions



## Junction box X 16 with DIN rail

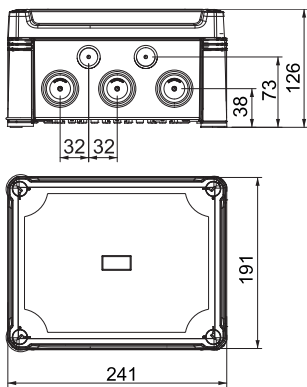


Type	Colour	Entries	Min. ordering quantity	Item no.
X16 R LGR-TR	grey / transparent	10 x Ø25/32/40	1 Piece	2005100

Junction box with DIN rail for the connection of cables and lines indoors and in outdoor areas. Rectangular design with knock-out entries. Suitable for wall and ceiling mounting with the option to fasten outside, inside or to mount via the corner domes. Particularly impact resistant with IK09. Transparent cover with quick lock, sealable. Made from halogen-free and UV-resistant materials. With DIN rail type 2069.

Junction box according to DIN EN 60670. Flame-resistant to DIN EN 60695/2/11, test temperature 650 °C. Impact resistance IK09 according to DIN EN 50102. Protection rating IP67 according to DIN EN 60529.

### Dimensions



Type	Dimension L x W x H mm	Clear internal dimensions mm
X16 R LGR-TR	241x191x126	227x177x110

PC



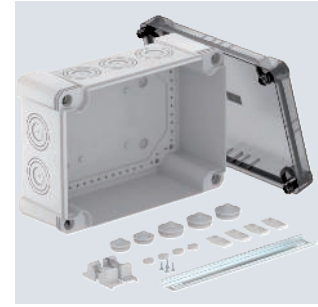
### Junction box X 25 with DIN rail

Type	Colour	Entries	Min. ordering quantity Piece	Item no.
X25 R LGR-TR	grey / transparent	10 x Ø25/40/50	1	2005104

Junction box with DIN rail for the connection of cables and lines indoors and in outdoor areas. Rectangular design with knock-out entries. Suitable for wall and ceiling mounting with the option to fasten outside, inside or to mount via the corner domes. Particularly impact resistant with IK09. Transparent cover with quick lock, sealable. Made from halogen-free and UV-resistant materials.

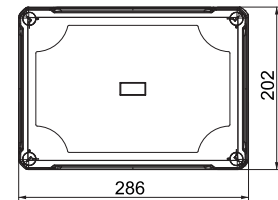
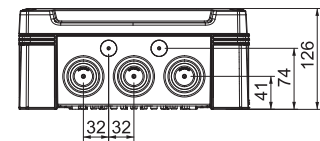
With DIN rail type 2069.

Junction box according to EN 60670. Flame-resistant to EN 60695/2/11, test temperature 650 °C. Impact resistance IK09 according to EN 50102. Protection rating IP67 according to EN 60529.



Type	Dimension L x W x H mm	Clear internal dimensions mm
X25 R LGR-TR	286x202x126	271x187x110

#### Dimensions



PC



### Distribution box, 12 division units, with terminal strip

Type	Colour	Dimension L x W x H mm	Min. ordering quantity Piece	Item no.
SDB 12 PC	Light grey	286x202x126	1	2008852

Distribution box with terminal strip for surface mounting, for the current sub-distribution in interior and exterior areas, in accordance with IEC 439-3. With pre-mounted 35 mm DIN rail. IP66 protection type and IK08 protection rating. Transparent cover to screw on, with cut-out.

- Protection-insulated for a maximum of 12 division units
- Terminal strip set consisting of: One each of: PE/N terminal (1x25 mm<sup>2</sup> and 1x16 mm<sup>2</sup> screw terminals, 2x4 mm<sup>2</sup> and 12x2.5 mm<sup>2</sup> screwless terminals), mini DIN rail, mounting instructions and fastening set
- Identification plates for connected consumers
- 8 elastic cable entries Ø20 mm for cable diameters of 0–17 mm
- 1 elastic cable entry Ø25 mm for cable diameters of 0–22 mm
- 1 elastic cable entry Ø32 mm for cable diameters of 0–28 mm
- 10 Ø 20 mm break-out openings each at the top and bottom
- 1 Ø 20/25/32 mm combination break-out opening each at the top and bottom
- 4 screw cover caps
- 2 stainless steel external fastenings
- Cover strips for unused division units



# Earthing systems

Elementary for effective lightning protection



In Germany, a foundation earth electrode complying to DIN 18014 must be installed for new buildings with on-roof PV systems without a lightning protection system. In the case of on-roof PV systems with a lightning protection system, the requirements of VDE 0185-305-3 (IEC/EN 62305-3) must be taken into account (earthing resistance < 10 Ohm). With free-standing PV systems, the requirements of VDE 0185-305-3 (IEC/EN 62305-3) must also be taken into account. Here, a distinction between two earthing types must be made.

## Earthing systems, type A

Type A earthing systems include, for example, screw and ram foundations, if they correspond to the requirements of VDE 0185-561-2 (IEC/EN 62561-2). Here, not only a minimum cross-section must be maintained according to the selected material, but also mechanical and electrical properties as well.

## Earthing systems, type B

Plate and strip foundations are appropriate type B earthing systems. According to VDE 0185-305-3, Supplement Sheet 5, they have a reduced earth impact and should be expanded using additional earthing measures such as grid earth electrodes (20 m x 20 m) or earth rods.



1	Type: OMEX
2	Type: BP
3	Type: Standard
4	Type: LightEarth

Earth rod versions

For both cases, OBO's portfolio contains suitable earth rods of Ø 20 mm or Ø 25 mm and wires of Ø 10 mm, as well as strips of various dimensions, such as 30 x 3.5 mm or 40 x 4 mm.

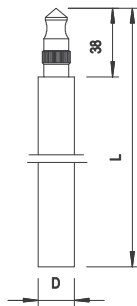
In the case of foundations with reinforcement steel, a tin-plated or copper-plated earth electrode in the earth is not permitted. In the earth, a high-alloy stainless steel with a molybdenum content of at least 2%, such as those in the material nos. 1.4401, 1.4404 or 1.4571, must be used. This is primarily neutral towards other, more or less precious materials, thus guaranteeing a high system availability.

## Functional earthing of metallic substructures

To guarantee functional earthing of metallic substructures or module underframes, VDE 0185-305-3, Supplement Sheet 5, distinguishes between the following situations:

Situation	Minimum cross-section, copper functional earthing
PV system without lightning protection system or PV system with lightning protection system and the separation distance is maintained	6 mm <sup>2</sup>
PV system with lightning protection system and the separation distance is not maintained	16 mm <sup>2</sup>

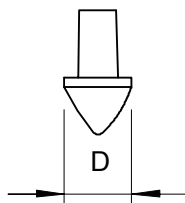
## Earth rod V4A 20 mm



Type	Length mm	External Ø mm	Short-circuit current (50 Hz) (1 s; ≤300 °C) kA	Lightning current carrying capacity kA	Min. order- ing quan- tity Piece	Item no.
219 20 BP V4A	1500	20	4.2	H1/150	5	5000866

- "BP" system (Bundespost)
- Very good contacting properties with soft metal inlay in the bore hole
- With peg and bore for linking together
- Conforms to the requirements according to VDE 0185-305 (IEC 62305) and DIN EN 62561-2
- Short circuit current I<sub>k</sub> (50 Hz), time 1 s, max. temp. 300 °C: 4.5 kA (219 20 BP V4A)

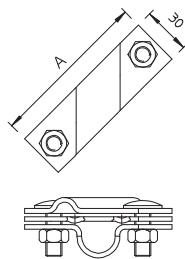
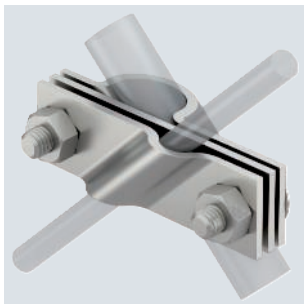
## Driving spike for ST and BP earth rod



Type	For earth rods Ø mm	Dim. D mm	Min. order- ing quan- tity Piece	Item no.
1819 20BP	20	20	5	3041212

- Suitable for ST and BP system

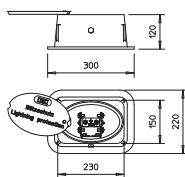
## Connection clamp for earth rod, universal



Type	Dim. A mm	For earth rods Ø mm	Fit mm	Min. order- ing quan- tity Piece	Item no.
2760 20 V4A	101	20	Rd 8-10/FL40	5	5001633

- Meets the requirements of VDE 0185-305-3 (IEC/ EN 62305-3)
- Suitable for connecting round conductors Rd 8-10 or flat conductors to FL 40
- With adapter plate
- Mounted with 2 hexagonal bolts M10 x 30 and 2 hexagonal bolts M10

## Inspection pit with integrated separation piece



Type	Min. order- ing quan- tity Piece	Item no.
5700 SP	1	5106003

- Without base
- Cast iron, painted black
- With built-in cut-off unit for round conductors Rd 8-10 and flat conductors to FL 40
- To VDE 0185-561-5 (IEC 62561-5) suitable for heavy loads (up to 40 kN/4.0 t)

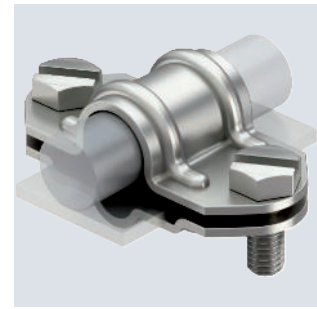
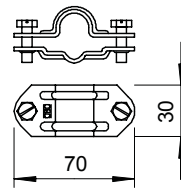
A2



### Universal separating piece

Type	Fit mm	Min. ordering quantity Piece	Item no.
<b>226 VA</b>	Rd 8-10/FL30x16	10	<b>5336058</b>

- For fitting round conductors Rd 8–10 to Rd 16 or flat conductors FL30
- Including 2 hexagonal bolts M8 x 20 high-grade stainless steel (V2A)
- Conforms to the requirements according to VDE 0185-305 (IEC 62305)

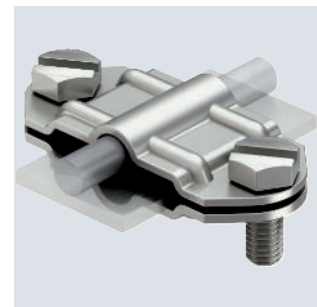
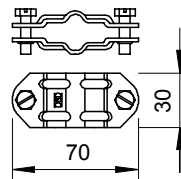


A2

### Separating piece for Rd 8–10 and FL 30 mm

Type	Fit mm	Min. ordering quantity Piece	Item no.
<b>233 VA</b>	Rd 8-10/FL30xRd 8-10/FL30	10	<b>5336341</b>

- For fitting of round conductor Rd 8–10 or flat conductor FL 30
- Including 2 hexagonal bolts M8 x 20 made from rustproof stainless steel (VA)



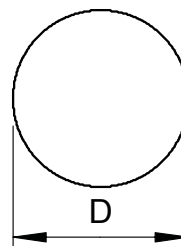
A4



### Round conductor, stainless steel

Type	Nominal size Ø mm	Cross-section mm <sup>2</sup>	Normal ring ca. m	Normal ring ca. kg	Min. ordering quantity m	Item no.
<b>RD 10-V4A 20</b>	10	78	20	12	20	<b>5021640</b>
<b>RD 10-V4A</b>	10	78	50	32	50	<b>5021642</b>
<b>RD 10-V4A</b>	10	78	80	50	80	<b>5021647</b>

- According to DIN EN 62561-2 (VDE 0185-561-2)
- Corresponds to the requirements of VDE 0185-305 (IEC 62305)
- RD 10-V4A for applications in the earth
- According to the foundation earth electrode standard DIN 18014, V4A is required in the earth



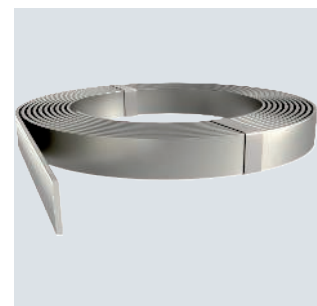
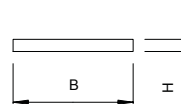
A4



### Stainless steel flat conductor A4

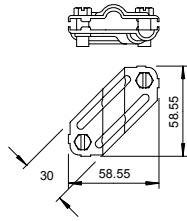
Type	Dim. B mm	Dim. H mm	Cross-section mm <sup>2</sup>	Normal ring ca. kg	Min. ordering quantity m	Item no.
<b>5052 V4A 30X3.5</b>	30	3.5	105	42	50	<b>5018706</b>
<b>5052 V4A 30X3.5</b>	30	3.5	105	21	25	<b>5018730</b>

- According to DIN EN 62561-2 (VDE 0185-561-2)
- Corresponds to the requirements of VDE 0185-305 (IEC 62305)
- According to the foundation earth electrode standard DIN 18014, V4A is required in the earth
- For use in areas at risk of corrosion
- For lightning protection, earthing systems and ring equipotential bonding



## Cross-connector for flat conductors and round conductors

A4

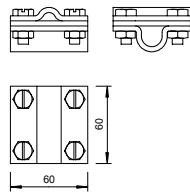
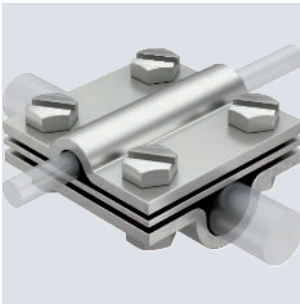


Type	Fit mm	Lightning current carrying capacity kA	Short-circuit current (50 HZ) (1 s; ≤300 °C) kA	Min. order- ing quan- tity Piece	Item no.
250 V4A	Rd 8-10/FL30	H/100	1.4	10	5312925

- Meets the requirements of VDE 0185-305-3 (IEC/ EN 62305-3)
- Fit: Rd 8-10 x Rd 8-10
- Fit: Rd 8-10 x FL 30
- Fit: FL 30 x FL 30
- Mounted with 2 hexagonal bolts M8 x 20

## Cross-connector with intermediate plate for Rd 8–10 x Rd 16

A4

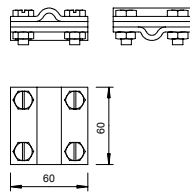
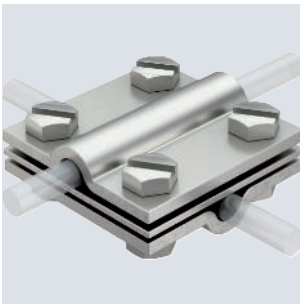


Type	Fit mm	Lightning current carrying capacity kA	Min. order- ing quan- tity Piece	Item no.
252 8-10x16 V4A	Rd 8-10 x 16	H/100	10	5312346

- Meets the requirements of VDE 0185-305-3 (IEC/ EN 62305-3)
- Fit: Rd 8-10 x Rd 16 / FL 30
- With adapter plate
- Mounted with 4 hexagonal bolts M8 x 25 and 4 hexagonal nuts M8

## Cross-connector with intermediate plate for Rd 8–10 mm

A4

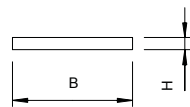
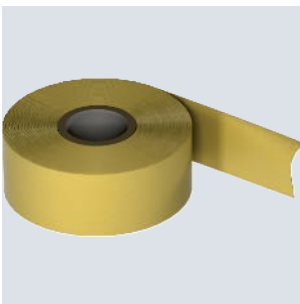


Type	Fit mm	Lightning current carrying capacity kA	Min. order- ing quan- tity Piece	Item no.
252 8-10 V4A	Rd 8-10	H/100	10	5312318

- Meets the requirements of VDE 0185-305-3 (IEC/ EN 62305-3)
- Fit: Rd 8-10 x Rd 8-10 / FL 30
- With adapter plate
- Mounted with 4 hexagonal bolts M8 x 25 and 4 hexagonal nuts M8

## Corrosion protection strip

PETR



Type	Width mm	Length m	Min. order- ing quan- tity Piece	Item no.
356 50	50	10	1	2360055
356 100	100	10	1	2360101

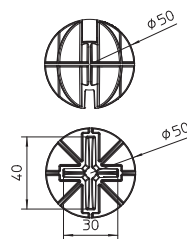
- Approx. 1.1 mm thick
- Width: 50 mm or 100 mm, made of petrolatum-coated chemical fibre fabric
- Can be processed cold

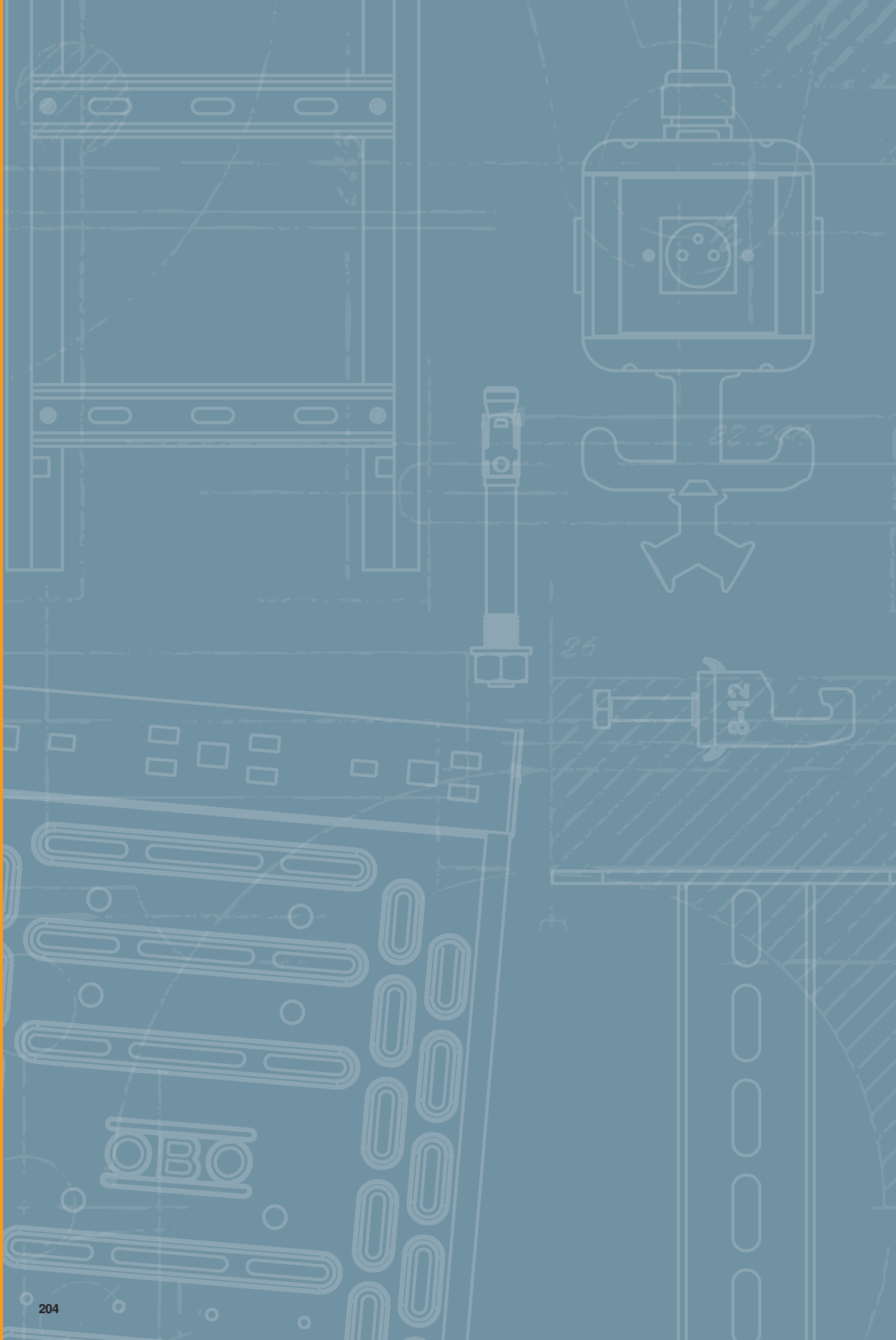
PE

## Protective cap for connection lugs, reflective







Type	Fit mm	Min. order- ing quan- tity Piece	Item no.
ProtectionBall	RD 8-10/ FL 25/ 30/ 40	25	5018014

- For snapping onto round conductors or flat conductors
- Noticeable, reflective label
- For accident protection during the construction phase












































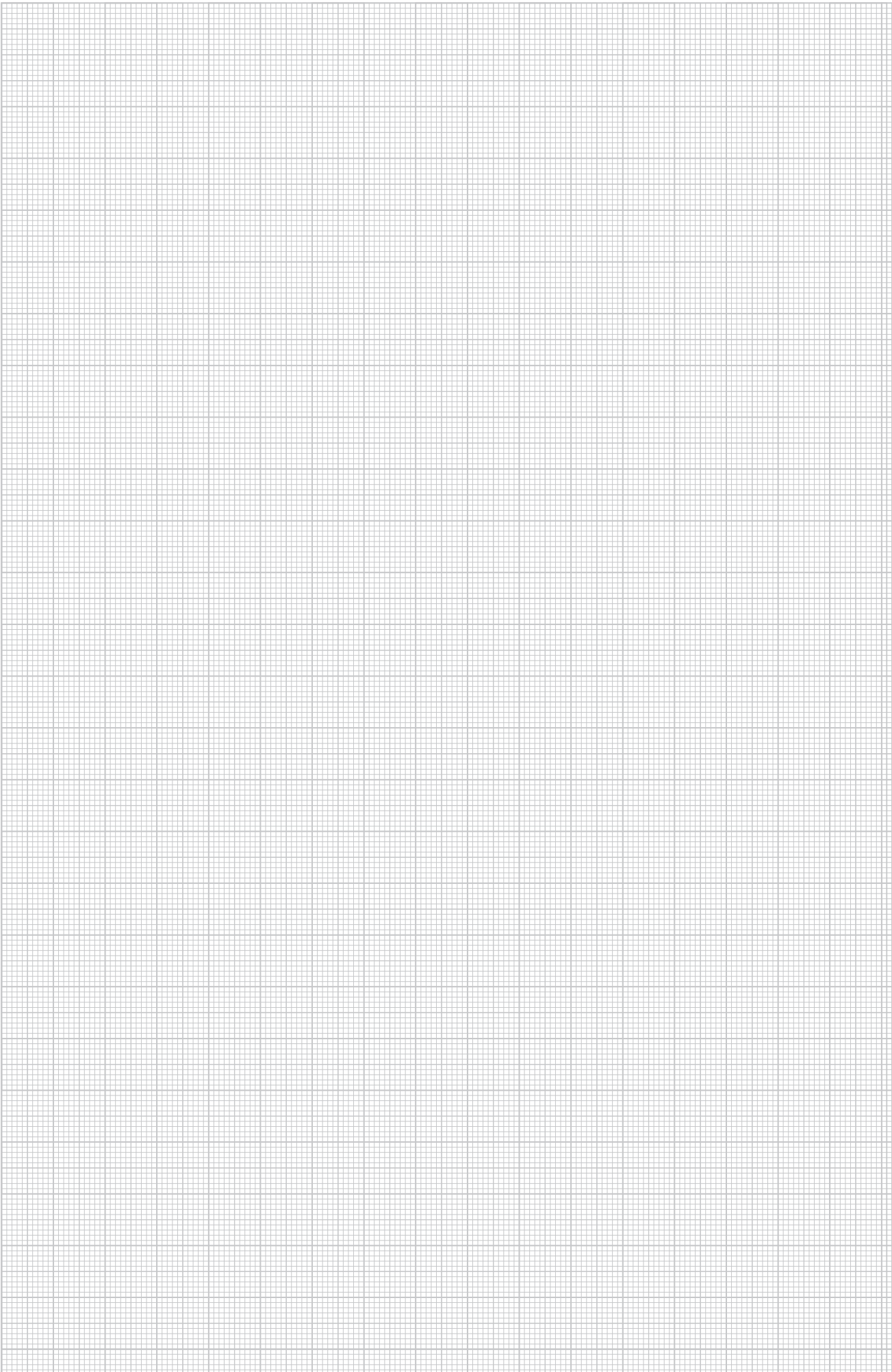
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	For the latest general conditions of sale and delivery please see <a href="http://www.obo.global/general-purchasing-conditions/">www.obo.global/general-purchasing-conditions/</a>	


























## Test marks

	American Bureau of Shipping, USA		Underwriters Laboratories Inc., USA + CSA, Canada
	AENOR, Producto Certificado, Spain		Österreichischer Verband für Elektrotechnik, Austria
	STOWARZYSZENIE ELEKTRYKÓW POLSKICH, Poland		ISTITUTO ITALIANO DEL MARCHO DI QUALITÀ, Italy
	Lightning current-tested		RINA 1861, Ship Classification, Certification and Services
	Lightning current-tested, Class H (100 kA)		Underwriters Laboratories Inc., USA
	CEBEC, Belgium		SEMKO An Inchcape Testing Services Company, Sweden
	Canadian Standards Association, Canada		Eidgenössisches Starkstrominspektorat, Switzerland
	DEMKO, Danmarks Elektriske Materielkontrol, Denmark		South African Bureau of Standards
	Deutsches Institut für Bautechnik Berlin, Germany		Shock-tested, Bundesamt für Zivilschutz, Germany
	Det Norske Veritas		Sähkötarkastuskeskus Elinspektionscentralen Electrical Inspectorate, Finland
	ENEC Austria		Underwriters Laboratories Inc., USA
	ATEX certificate for explosive areas		Underwriters Laboratories Inc., USA
	ELEKTROTECHNICKÝ ZKUŠEBNÍ ÚSTAV, Czech Republic		Verband der Elektrotechnik, Elektronik, Informationstechnik e.V., Germany
	FIMKO, Finland		German Association of Electricians, tested safety
	Forschungs- und Materialprüfungsanstalt, Germany		5-year warranty
	Russia, GOST The State Committee for Standards		
	Test marks for technical resources, VDE Prüf- und Zertifizierungsinstitut Offenbach, Germany		
	Halogen-free; without chlorine, fluorine and bromine		
	INMETRO, Brazil		
	KEMA-KEUR, Netherlands		
	Indication of metric products		
	MAGYAR ELEKTROTECHNIKAI ELLENŐRZŐ INTÉZET Budapest, Hungary		
	NEMKO, Norway		
	AFNOR Quality symbol of the French standardisation institute		





# Pictogram explanation






## Surfaces

 FS	Strip galvanised
 FSK	Strip galvanised/plastic-coated
 DD	Strip galvanised zinc/aluminium, double dip
 BK	Bright
 2B	Bright, reworked
 EL	Anodised
 F	Hot-dip galvanised
 G	Electrogalvanised
 GK	Electrogalvanised/plastic-coated
 GCL	Electrogalvanised, yellow-chromatised
 GGP	Electrogalvanised, yellow passivated
 GTP	Electrogalvanised, transparently passivated
 GR	Primed
 L	Painted
 SG	Welding primed
 FT	Hot-dip galvanised
 FT SO	Hot-dip galvanised 85 µm
 Cu	Copper-plated
 N	Nickel-plated
 ZD	Galvanised, Deltatone 500
 ZDM	Galvanised, MAGNI 565
 GA	Zinc-aluminium coated, Galfan
 ZL	Zinc scale






## Conformity symbol

 CE	Communautés Européennes, EC declaration of conformity according to EC directives
 RoHS	RoHS-conformant



















## Quality marks

 Halogen-free	Halogen-free; without chlorine, fluorine and bromine
 650°C	Flame resistant 650 °C
 750°C	Flame resistant 750 °C
 960°C	Flame resistant 960 °C
 UV	UV-resistant




## Specific product symbols

 Ø 60	Diameter 60 mm
 Ø 68	Diameter 68 mm
 Type 3	Protection device to DIN EN 61643-11 or IEC 61643-11
 LPZ 2-3	Transition from LPZ 2 to LPZ 3
 AS	Acoustic signalling

## Applications

 FS	Remote signalling
 AS	Acoustic signalling
 ISDN	Integrated Service Digital Network, ISDN applications
 DSL	Digital Subscriber Line, DSL applications
 Analogue TK	Analogue telecommunication
 Cat 5	Category 5 TwisterPair
 Cat 6	Channel performance to American EIA/TIA standard
 MSR	Measuring, controlling and regulating systems
 TV	TV applications
 SAT	SAT-TV applications
 Mu	MultiBase base
 LifeControl	LifeControl
 EX	Intrinsically safe protection device for potentially explosive areas
 Class E	Channel performance to ISO/IEC 11801
 PoE	Power over Ethernet
 230/400 V System	230/400 V system
 IP 54	Protection rating IP 54
 IP 65	Protection rating IP 65



## Lightning protection classes

 Type 1	Protection device to DIN EN 61643-11 or IEC 61643-11
 Type 1+2	Combination protection device made of type 1 and type 2
 Type 2	Protection device to DIN EN 61643-11 or IEC 61643-11
















## Lightning protection classes

	Protection device to DIN EN 61643-11 or IEC 61643-11
	Protection device to DIN EN 61643-11 or IEC 61643-11



## Lightning protection zone

	Transition from LPZ 0 to LPZ 1
	Transition from LPZ 0 to LPZ 2
	Transition from LPZ 0 to LPZ 3
	Transition from LPZ 1 to LPZ 2
	Transition from LPZ 1 to LPZ 3
	Transition from LPZ 2 to LPZ 3



## BSS maintenance of electrical function installation

	Fire-tested systems
	Escape route ceiling mounting with pressure clip
	OBO Grip, wall routing type
	OBO Grip, ceiling routing type
	Pressure clip for maintenance of electrical function, ceiling mounting




## BSS anchor

	Fire protection anchor
	Fire protection bolt tie

## BSS test marks/material class

	Maintenance of electrical function class E30
	Maintenance of electrical function class E90














## Clamp clip base shapes

	Clamp clip for C profile rail, slot width 11–12 mm
	Clamp clip for C profile rail, slot width 16–17 mm
	Clamp clip for C profile rail, slot width 18–22 mm



## Diameter

	Diameter 60 mm
	Diameter 68 mm
	Diameter 70 mm
	Diameter 74 mm





## Entries

	4 cable entries
	6 cable entries
	7 cable entries
	8 cable entries
	9 cable entries
	10 cable entries
	12 cable entries
	10 cable entries ECO
	12 cable entries ECO
	14 cable entries ECO
	16 cable entries
	18 cable entries ECO
	24 cable entries






## Gland thread

	Thread metric
	Thread Pg





## Entry size

	M20 entry
	M25 entry
	M32 entry
	M40 entry

## KTS side heights










	Cable tray, side height 35 mm
	Cable tray, side height 60 mm
	Cable tray, side height 85 mm
	Mesh cable tray, side height 35 mm
	Mesh cable tray, side height 55 mm

## Materials




	Flat steel
	Angular steel
	U steel
	Round material

# Pictogram explanation




## Nominal cross-section

	Nominal cross-section 1.5 mm <sup>2</sup>
	Nominal cross-section 1.5–2.5 mm <sup>2</sup>
	Nominal cross-section 2.5 mm <sup>2</sup>
	Nominal cross-section 2.5–4 mm <sup>2</sup>
	Nominal cross-section 4 mm <sup>2</sup>
	Nominal cross-section 4–6 mm <sup>2</sup>
	Nominal cross-section 6 mm <sup>2</sup>
	Nominal cross-section 10 mm <sup>2</sup>
	Nominal cross-section 16 mm <sup>2</sup>


## Nominal voltage

	Nominal voltage 400 V
	Nominal voltage 500 V
	Nominal voltage 660 V





## Polarity

	3-pole
	5-pole
	7-pole
	8-pole
	10-pole
	12-pole



## Slot widths

	Slot width 7.5 mm
	Slot width 11 mm
	Slot width 11–12 mm
	Slot width 12 mm
	Slot width 15 mm
	Slot width 16 mm
	Slot width 16.5 mm
	Slot width 16–17 mm
	Slot width 17 mm
	Slot width 18 mm
	Slot width 22 mm
	Slot width 35 mm











## Screw heads

	Philips screw
	Torx screw
	Phillips screw
	Pozidriv











## Firing devices

	Bolt-firing tool
	gas-/battery-actuated setting tool





## Protection rating

	Protection rating IP 20
	Protection rating IP 30
	Protection rating IP 31
	Protection rating IP 44
	Protection rating IP 54
	Protection rating IP 55
	Protection rating IP 65
	Protection rating IP 66
	Protection rating IP 67
	Protection rating IP 68

## Metals

	Aluminium
	Aluminium/steel
	Stainless steel
	Stainless steel
	Stainless steel
	Copper
	Brass
	Steel
	Malleable iron
	Die-cast zinc

## Plastics

	Acrylonitrile butadiene styrene
	Duroplast, Aminoplast, type 131.5
	Duroplast, melamine resin, type 150
	Ethylene vinyl acetate



## Plastics

<b>FA</b>	Fibre-proof material DIN 28091
<b>GFK</b>	Fibreglass-reinforced plastic
<b>NBR SBR</b>	Rubber mixture
<b>NBR</b>	Nitrile rubber
<b>PETR</b>	Petrolatum
<b>PA</b>	Polyamide
<b>PA/ GF</b>	Polyamide, fibreglass reinforced
<b>PBPT</b>	Polybutylene terephthalate
<b>PC</b>	Polycarbonate
<b>PE</b>	Polyethylene
<b>PP</b>	Polypropylene
<b>PP/ GF</b>	Polypropylene, fibreglass reinforced
<b>PS</b>	Polystyrene
<b>PVC</b>	Polyvinylchloride
<b>ZELL PC</b>	Cellular polyethylene



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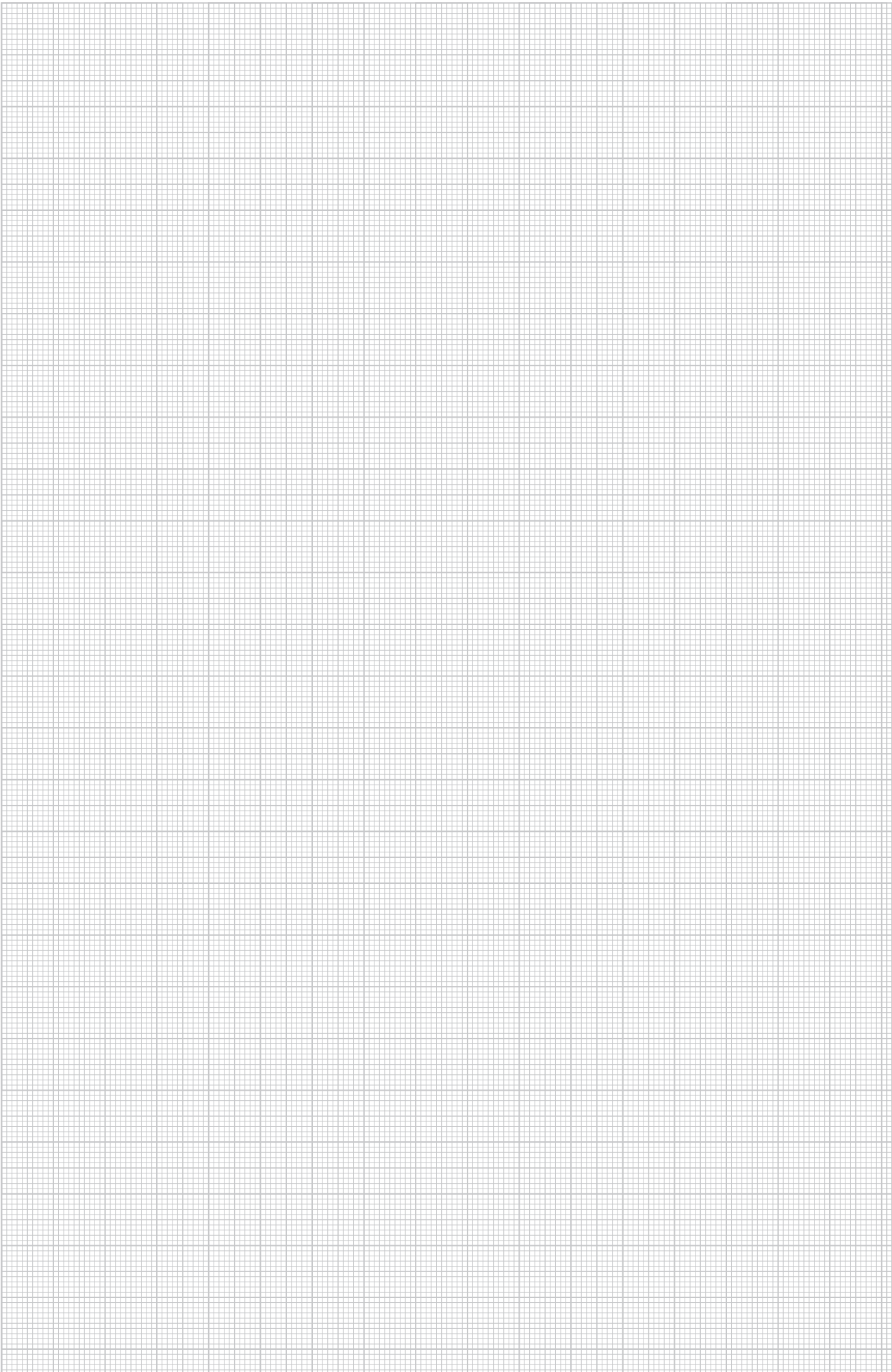
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6611898	<b>6051367</b>	41				5817499	<b>7203800</b>	89
6611775	<b>6051383</b>	41	6536771	<b>6341527</b>	107		price/pac	
6611713	<b>6051413</b>	41	6536719	<b>6341535</b>	107	5817505	<b>7203803</b>	89
6087792	<b>6051448</b>	41	6536658	<b>6341543</b>	107		/pc.	
6595631	<b>6051472</b>	41	6536597	<b>6341551</b>	107	5817536	<b>7203806</b>	89
			6536535	<b>6341578</b>	107	5817543	<b>7203809</b>	90
6657551	<b>6052643</b>	41	6536474	<b>6341586</b>	107			
6657674	<b>6052650</b>	41	6536412	<b>6341594</b>	107	5448259	<b>7205425</b>	91
6336678	<b>6052656</b>	41	6536351	<b>6341608</b>	107			
6336739	<b>6052662</b>	41	6536290	<b>6341616</b>	107	7308681	<b>7214701</b>	90
6336791	<b>6052668</b>	41	6536238	<b>6341624</b>	107		/pc.	
6336913	<b>6052674</b>	41	6536177	<b>6341632</b>	107	5918899	<b>7214725</b>	90
6038770	<b>6052703</b>	98						
6038893	<b>6052709</b>	98	6224470	<b>6342351</b>	121	7422783	<b>7218200</b>	87
6038954	<b>6052712</b>	98	6224531	<b>6342353</b>	121	7422806	<b>7218202</b>	87
6039012	<b>6052715</b>	98	6224593	<b>6342355</b>	121	7422837	<b>7218204</b>	87
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129 TB M20 SW	6332342	2047944	132	2058UW 90 LGR	6636297	1198090	118
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165 MBG HGRM	6991921	5218886	39	249 8-10 ALU	5417736	5311519	76
165 MBG HGRM	6991921	5218886	105	249 8-10 ALU-OT	5466192	5311585	144
		/pc.		249 8-10 VA	5417910	5311551	74
165 MBG UH	5674580	5218882	79	249 8-10 VA	5417910	5311551	76
165 MBG UH	5674580	5218882	104	249 8-10 VA-OT	5835349	5311554	144
		/100 pc.		249 8-10X16 VA	5925446	5311590	74
165 MBG-8-10 200	6648320	5218716	79	249 8-10X16 VA	5925446	5311590	75
165 MBG-8-10 200	6648320	5218716	105	249 PV10 6-50V2A	7368715	5051520	11
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177 20 VA B-HD	5915836	5207901	75	249 PV10 6-50V2A	7368715	5051520	27
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1801 KL2	5378976	5015804	140	249 PV8-10 ALU	7490324	5051526	143
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LG 640 VS 3 FT	5434207	6208570	126	MS4121P2000FT	5697541	1122923	108
LG 640 VS 6 FT	5064367	6208656	114	MS4121P3000FT	5686293	1122924	57
LG 650 VS 3 FT	5434214	6208574	126	MS4121P3000FT	5686293	1122924	108
LG 650 VS 6 FT	5064374	6208659	114	MS4121P6000FT	5686309	1122926	57
LG 660 VS 3 FT	5434221	6208578	126	MS4121P6000FT	5686309	1122926	108
LG 660 VS 6 FT	5064381	6208661	114			/100 pc.	
				MS4141 EK	5894117	1122906	109
LGVG 110 FT	5065746	/pc. 6216653	117	MS4141 SK	5686200	1122900	109
LGVG 60 FT	5065630	6208944	115			price/100	
LGVG 60 FT	5065630	6208944	127	MS4141PP1000FT	5697961	1122479	106
				MS4141PP3000FT	5050735	1122483	106
						/100 pc.	
LKM40040RW	6651856	price/m 6248497	135	MS41HBF M10x30FT	6490233	1148384	108
LKM40060RW	6313570	6248519	135	MS41HBF M12x30FT	6490257	1148392	108
				MS41HBF M8x30 FT	6490196	1148376	108
LKM60100RW	6313815	6248624	135				
LKM60200RW	6313938	6248667	135	MS50HB M12x45 A2	7512361	5901865	55
LV 35 DD	7449063	5901180	9			/pc.	
LV 45 DD	7376376	5901210	19	ND-CAT6/E-B	6532773	5081804	191
LV 45 DD	7376376	5901210	26	ND-CAT6/E-F	6532766	5081802	190
LV 45 DD	7376376	5901210	48				
				ND-IP66-RJ-LSA	7447809	5081808	192
LV FT	7394509	5901215	54	ND-IP66-RJ-RJ	7447762	5081807	192
						/100 pc.	
				OTSC 6,0x40 A4	6621675	3191082	26
		/pc.					
LVG 110 FT	5065685	6216548	117	OTSP 4,0x25 A4	6621415	3191006	106
LVG 60 FT	5065562	6208843	115	OTSP 4,0x30 A4	6621422	3191008	106
LVG 60 FT	5065562	6208843	127	OTSP 4,0x40 A4	6621439	3191010	106
				OTSP 5,0x40 A4	6621484	3191024	106
MBS 015 A2	7436896	7203099	42	OTSP 6,0x40 A4	6621514	3191032	39
MBS 030 A2	7436926	7203103	42	OTSP 6,0x40 A4	6621514	3191032	106
MBS 045 A2	7436902	7203105	42				
MBS 061 A2	7436940	7203107	42	PLMR 1220 A2	7422783	7218200	87
MBS 075 A2	7436964	7203109	43	PLMR LFD	7422837	7218204	87
MBS 100 A2	7436988	7203111	43	PLMR LR 1220 A2	7422806	7218202	87
MBS 120 A2	7437008	7203113	43			/100 pc.	
MBS 150 A2	7437022	7203115	43	ProtectionBall	6409327	5018014	203
MBS-Z	5693420	/pc. 7203120	43	PVG- C1000K 100	7365080	5088405	153
MC-C-NPE+FS-440	7431884	5096922	189	PVG- C1000K 111	7365127	5088425	163
				PVG- C1000K 200	7365165	5088435	155
				PVG- C1000K 400	7365202	5088455	157
		/pc.		PVG-BC 900K 100	7365066	5088400	152
MCF100-3+NPE+FS	6487332	5096987	185	PVG-BC 900K 111	7365103	5088420	162
				PVG-BC 900K 200	7365141	5088430	154
MCF25-NAR-TNC	6585588	5096950	175	PVG-BC 900K 400	7365189	5088450	156
MCF25-NAR-TNC+FS	6585595	5096953	176	PVG-BC 900K 110	7365028	5088410	158
				PVG-BC 900K 220	7364984	5088440	160
MCF30-NAR-TT	6585564	5096961	177	PVG-C1000K 110	7365042	5088415	159
MCF30-NAR-TT+FS	6585571	5096963	178	PVG-C1000K 220	7365004	5088445	161
MCF38-NAR-TNC	6608805	5096971	179	PVG-C1000S100	6816095	5088554	166
MCF38-NAR-TNC+FS	6608812	5096973	180	PVG-C1000S110	6816088	5088556	167
MCF50-NAR-TT	6608782	5096975	181	RAA 610 FT	7342364	6042211	124
MCF50-NAR-TT+FS	6608799	5096977	182	RAA 620 FT	7342425	6042215	124
				RAA 630 FT	7342456	6042217	124
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				RAAD 100 DD	7406813	6042431	125
MCF-C+FS-440	7431808	5096917	188	RAAD 200 DD	7406851	6042435	125
MCF-NAR-SMG	6776368	5096900	183	RAAD 300 DD	7406875	6042437	125
MCF-P-3	7505165	5096945	186	RAAD 400 DD	7406899	6042439	125
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MKSM 620 FT	5830047	6059022	97	RBD W 200 DD	7407650	6037544	124
MKSM 630 FT	5830085	6059025	97	RBD W 300 DD	7407674	6037546	124
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