

# Fire-tested support and routing systems

# Building Connections

Digitalisation, the Energiewende (energy transition), mobility – the future is gathering speed. At OBO Bettermann, we're proud to be a driving force. And as a facilitator, we make connections. Today, we are already developing the innovative electrical infrastructure systems and solutions of tomorrow. Reliably, flexibly, sustainably.

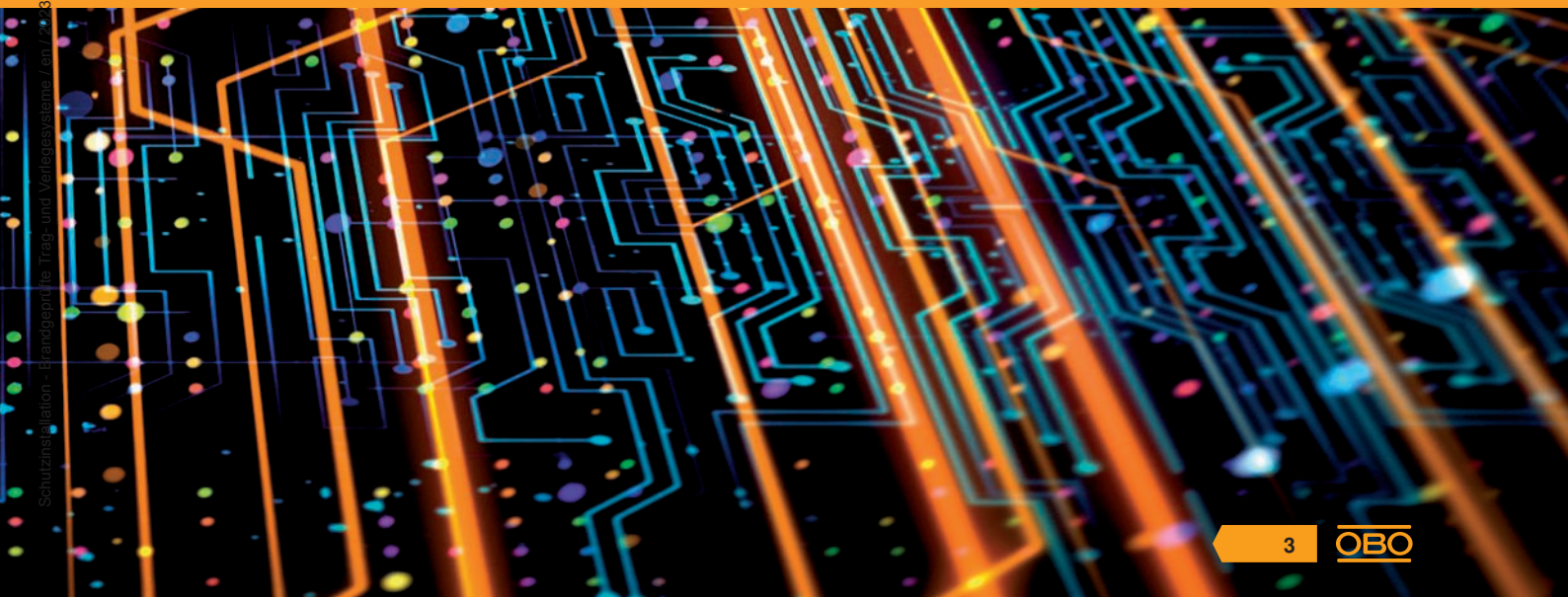
Already today, OBO is one of the leading manufacturers of installation systems for the electrical infrastructure in buildings and plants. When it comes to the friction-free flow of power, energy and data, engineers and tradespeople worldwide rely on the comprehensive range from OBO.



Schutzinstallation - Erdungs- und Verteilungssysteme / en / 24 / 3/04/26 10:49:19 10:49:19 (LLExpert\_033342) / 2023/04/26

OBO applies its slogan "Building Connections" to around 30,000 high-quality branded electrical products and services, which are used in application solutions for projects in industry, business and infrastructure.

OBO operates a global network and employs more than 4,200 people in more than 60 countries. The headquarters of the family company, which was founded in 1911, is located in Menden, Germany. In addition, more than 40 subsidiaries are present in markets on all continents.



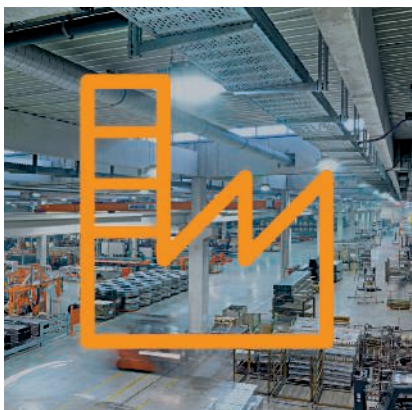
# Improved structure, sharpened profile



Each of our products carries a benefit which only the OBO brand can offer. Products are developed, manufactured and tested with a high level of competence – from the idea through to the final check. From flawless logistics through to practical information – we can provide support at every level. We can offer additional security through certificates on the conformity of our products with the most important standards and directives. In a nutshell – OBO helps you more. In every location and in every phase of a project.

To maintain this, we continually challenge ourselves. Not as an end in itself but for the better processing of each customer's requests – fast, reliably and future-oriented. That is the reason we have not only established our three central application areas, but also reworked our catalogue structure. In this way, we can display our service offers more clearly, highlight the product benefits more effectively and illustrate the respective application areas more tangibly.

# OBO Product Worlds



## Industrial installations

- Cable support systems
- Connection and routing systems
- Fastening material



## Building installations

- Cable routing systems
- Device installation ducts, trunking and poles
- Floor installation systems and underfloor applications
- Installation systems



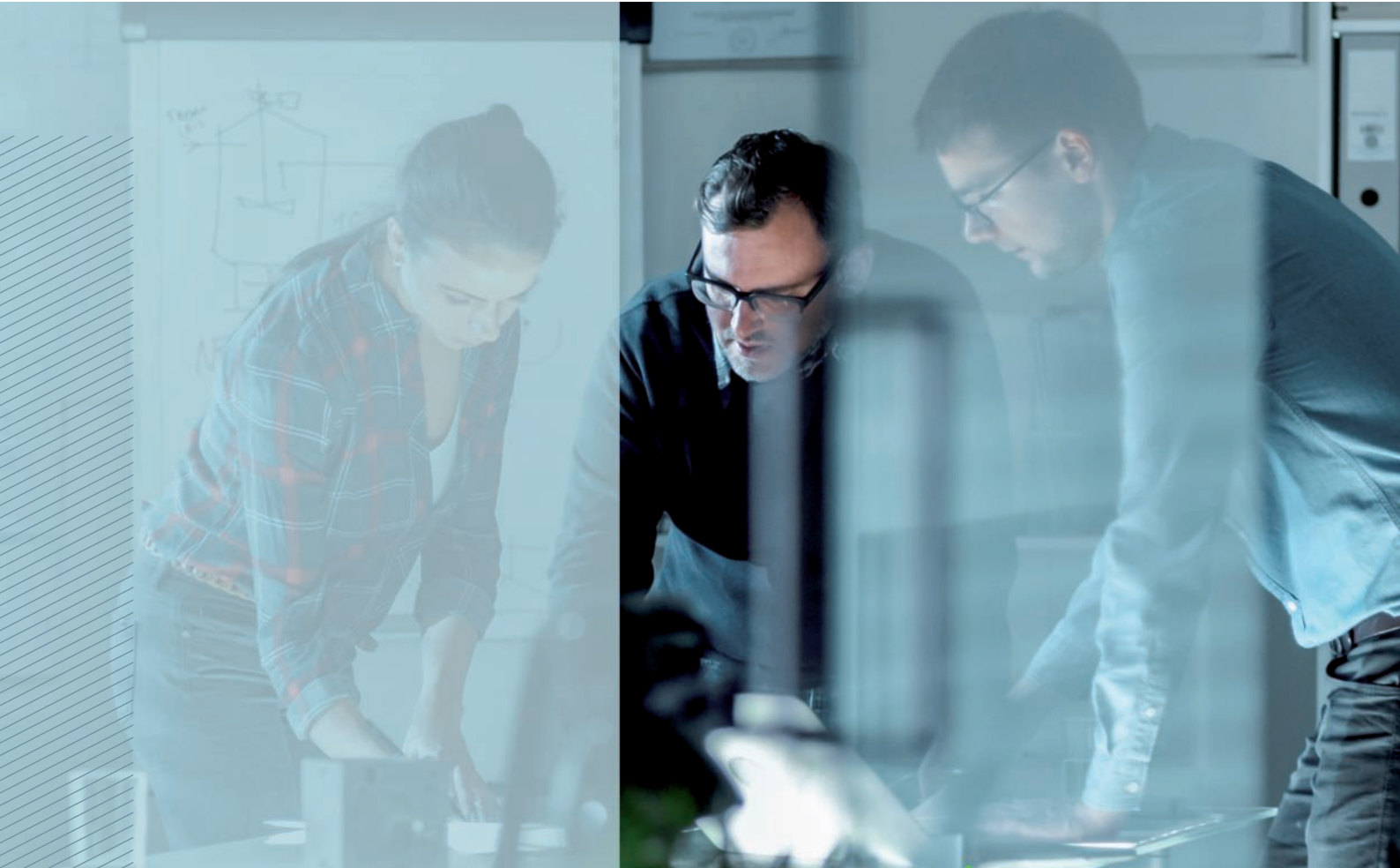
## Safety and protection installations

- Surge protection
- External lightning protection
- Equipotential bonding and earthing
- Insulation and cable bandages
- Fire-tested support and routing systems
- Fire protection ducts



It's your choice – from now on there's a catalogue for each OBO product category. Simply select the catalogues and order together with a collection case.

# OBO Support & *contact*



***You have a  
problem?  
We have the  
solution!***

OBO Bettermann is more than the sum of its products. In any situation, we are the reliable partner right by your side. You have a problem? We have the solution!

It doesn't matter in which area of industry our support is needed – from industrial and plant engineering to private, public and administrative buildings, as well as in the areas of mobility and renewable energies – we have everything that you need.

OBO can not only provide the entire electro-technical infrastructure with the best possible products. We can also support you with sound expert knowledge and more than 100 years of experience, right from the planning phase through to the realisation of your projects. OBO – solutions you can rely on.

## Customer Service

Tel.: +49 23 73 89 - 17 00

Monday–Thursday  
07.30–17.00

Friday  
07.30–15.00

export@obo.de

### What is OBO Support?

Every OBO product carries a plus inside it, which only a branded product can offer. It is developed, manufactured and tested with a high level of competence, from the idea right through to the final check. In addition, our specialists are available for consultation and can offer you assistance and training courses for products at any time.

Together with you, we plan your project and help you choose the right products, and are also available to you at any time should you need us. From flawless logistics through to practical information – we can provide support at every level. We can offer security through certificates on the conformity of our products with the most important standards and directives.

We are as flexible as you are – because we know how practical people work and what is important to them. Each step is a plus – that is the OBO Support concept.



Service



Training



Handling



Certification

#### Service – OBO can help

Everywhere and in every project phase:

- Highly competent hotline
- Product and system information, digitally or printed
- Selection and planning aids on the web, as an app, as a CAD application or in printed form
- 2D and 3D product data for planning
- Field service, branch offices and subsidiaries in 60 countries
- Engineering services for major projects

#### Training courses from OBO

- Seminars and workshops
- Local consultation and training courses
- Planner days

#### Handling – OBO delivers reliably

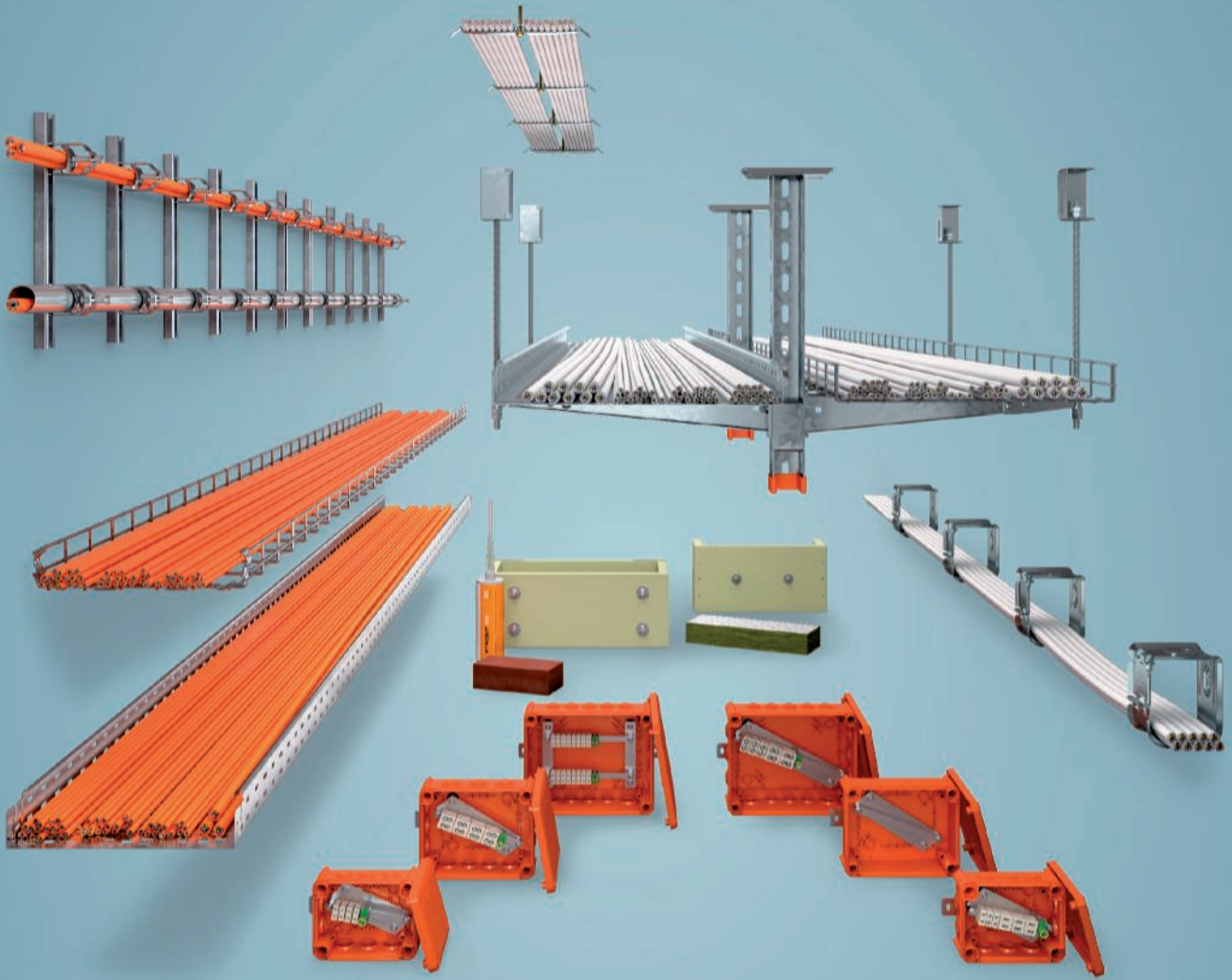
With optimised delivery processes:

- Reliable logistics
- Practical transport systems and packaging
- Loading gear handling and disposal concepts

#### Certification and guarantee

OBO offers safety. Our products fulfil the most important country-specific regulations:

- Conformity (e.g. IEC, VDE, CE, KEMA, KEUR, UL)
- Certification (e.g. DIN EN, DGNB)
- 5-year guarantee for surge protection products
- Guarantee management





## Planning aids

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## Anchoring

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# Planning aids

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# First protection aim: Maintenance of the fire sections



Insulation systems reliably seal the ceiling and wall penetrations required for installations against fire and smoke.

The division of buildings into fire sections protects unaffected building sections against the spread of fires for specific periods of time. Insulation maintains the fire sections, thus limiting the spread of fire and smoke. These constructive measures protect people and property, allowing fire brigades to prevent the spread of fires to other parts of the building through extinguishing measures.

## Function of firewalls

Firewalls should ensure that a fire cannot pass to neighbouring buildings or building sections. This creates so-called fire sections. The construction design of these firewalls (materials, fire resistance classes, stress values) is regulated by building regulations and standards.

Electrical cables and pipes may only be run through walls and ceilings at the ends of rooms when there is a guarantee that they do not present an opportunity for fire and smoke to spread. Insulation systems reliably seal the ceiling and wall penetrations required for installations against fire and smoke.

## Special requirements

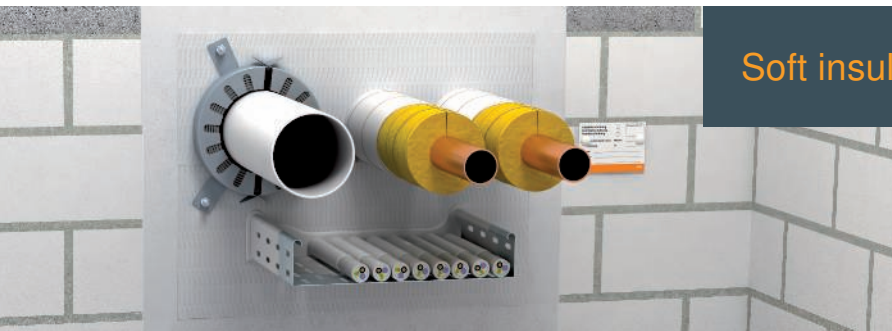
The following requirements apply to cable penetrations with cable insulation:

- The spread of fire and smoke must be prevented
- Room closure must be guaranteed
- On the side of the insulation away from the fire, the surfaces of cables, pipes, cable support systems and the surface of the insulation may not heat up to an impermissible level

# Insulation systems



Mortar insulation systems



Soft insulation systems



Foam systems



Pipe shell systems



Cable bandages

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# Second protection aim: Protection of escape routes



## 2

Approximately 95% of all deaths during fires are caused by smoke poisoning! In case of fire, emergency and escape routes are the central lifeline of the building and must remain usable under all circumstances.

### What is an emergency and escape route?

According to the construction regulations, there must be routes in buildings which not only permit access to the building in a horizontal and vertical direction in normal situations, but which also offer the option of rescue in case of fire. It is therefore obligatory to equip buildings with at least one constructive emergency and escape route. Additional emergency and escape routes may also be necessary, depending on the type of building.

These include:

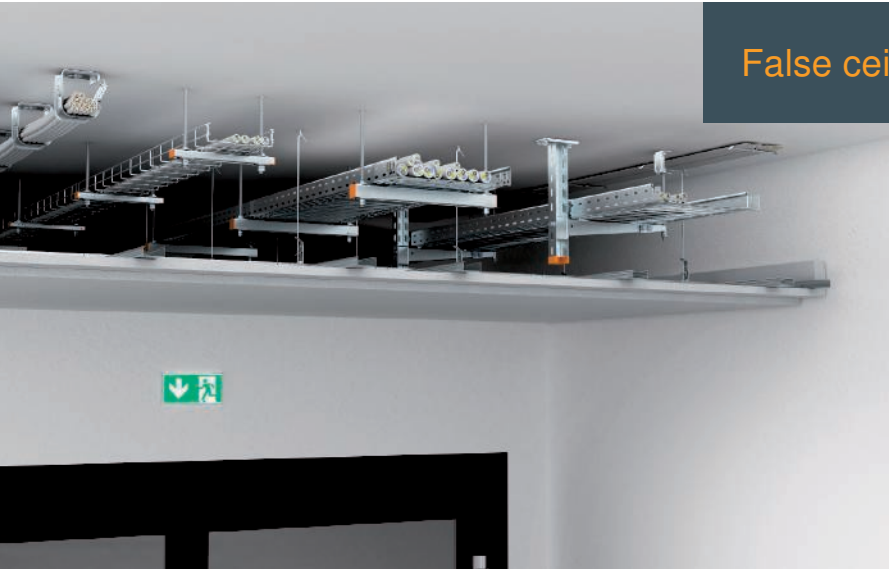
- Necessary staircases (vertical access)
- Connecting rooms between the necessary stairwells and exits to the outside
- Necessary corridors (horizontal access)

There must be a guarantee that, if there is a fire, these routes can be used to leave the building without any risk. In addition to evacuation, the emergency and escape routes also aid the local fire brigades as a point of attack.

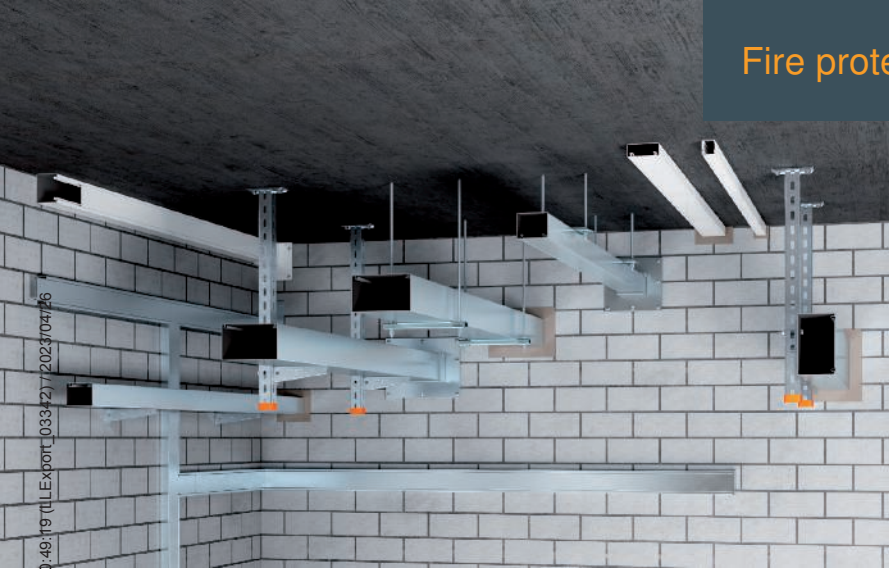
In the area of emergency and escape routes, an installation may not pose an additional fire load. This requirement can be fulfilled using an appropriate type of installation:

- Concealed installation
- Installation in fire protection duct systems
- Installation above suspended fire protection ceilings
- Use of non-combustible materials
- Routing of cables with improved behaviour in case of fire

# Escape route installations



False ceiling mounting



Fire protection ducts, metal



Fire protection ducts, concrete

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# Third protection aim: Maintaining the functionality of electrical systems



# 3

E30

E90

If there is a fire, emergency and escape routes must remain usable and important technical equipment, such as emergency lighting, fire alarm systems and smoke extraction systems, continue to function. Therefore, it is essential that the power supply for these systems is specially protected. In addition, certain technical systems must support the fire brigades in fighting fires for a sufficiently long period of time.

Where is the maintenance of electrical function required?

Technical equipment that maintains electrical function is required for the following buildings and systems:

- Hospitals
- Hotels and restaurants
- Tower blocks
- Meeting points
- Commercial buildings
- Closed large garages
- Underground railway systems
- Chemicals industry
- Power stations
- Tunnels

This could be because these constructions are regularly frequented by many people, which creates an increased safety risk for gatherings of people. However, with certain systems, property and the environment must also be protected.

## **30 minutes: Maintenance of electrical function for safe evacuation and rescue**

The first 30 minutes after the start of a fire play an important role. For the affected building to be cleared quickly the maintenance of electrical function must be guaranteed for the following equipment during this time:

- Safety lighting systems
- Lifts with fire control
- Fire alarm systems
- Alarm systems and systems to issue instructions
- Fire extraction systems

## **90 minutes: Maintenance of electrical function for effective firefighting**

To support firefighting operations, it is imperative that certain technical equipment is supplied with sufficient power even up to 90 minutes after a fire breaks out in a building. This equipment includes:

- Water pressure increase systems for fire water supply
- Mechanical smoke extraction systems and smoke protection pressure systems
- Fire brigade lifts
- Bed lifts in hospitals and similar equipment



# Systems that maintain the electrical function



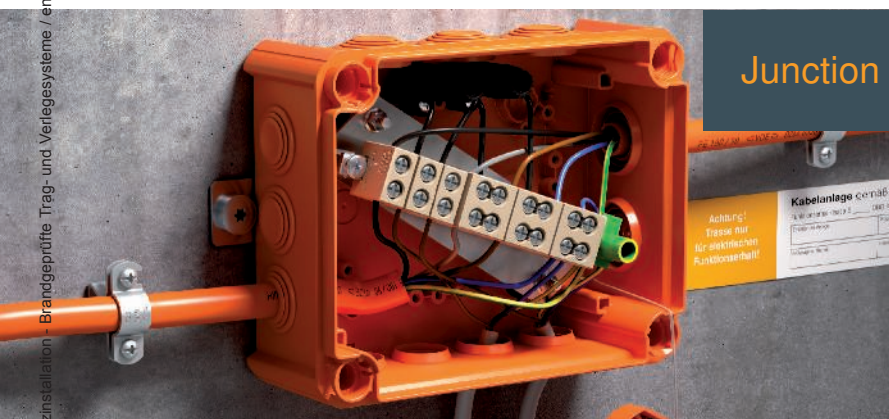
Cable trays and cable ladders



Vertical ladders



Individual routing



Junction boxes

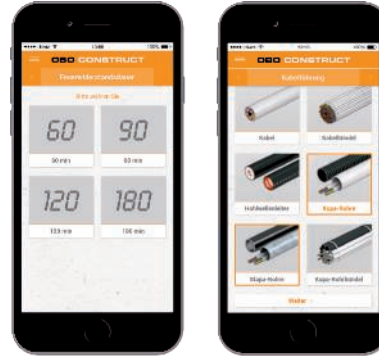
# Technical support



## **OBO BSS seminars: First-hand knowledge**

With a comprehensive programme of training courses and seminars on the subject of fire protection systems, OBO is able to support its customers with specialist knowledge from a single source. Alongside the basic theoretical principles, the programme also deals with practical implementation in everyday applications. Special calculation and application examples round off the comprehensive programme of knowledge transfer.





### The OBO construct BSS online Tool

It works on any computer with Internet access. The BSS software simplifies the planning of suitable fire protection systems. After the basic data has been entered, the user obtains an overview of the approved insulation systems, as well as of any necessary and optional system accessories. Thus, they can create, edit and export a personal shopping list in a targeted manner. All the key information on standards and approvals can be found directly with the systems.

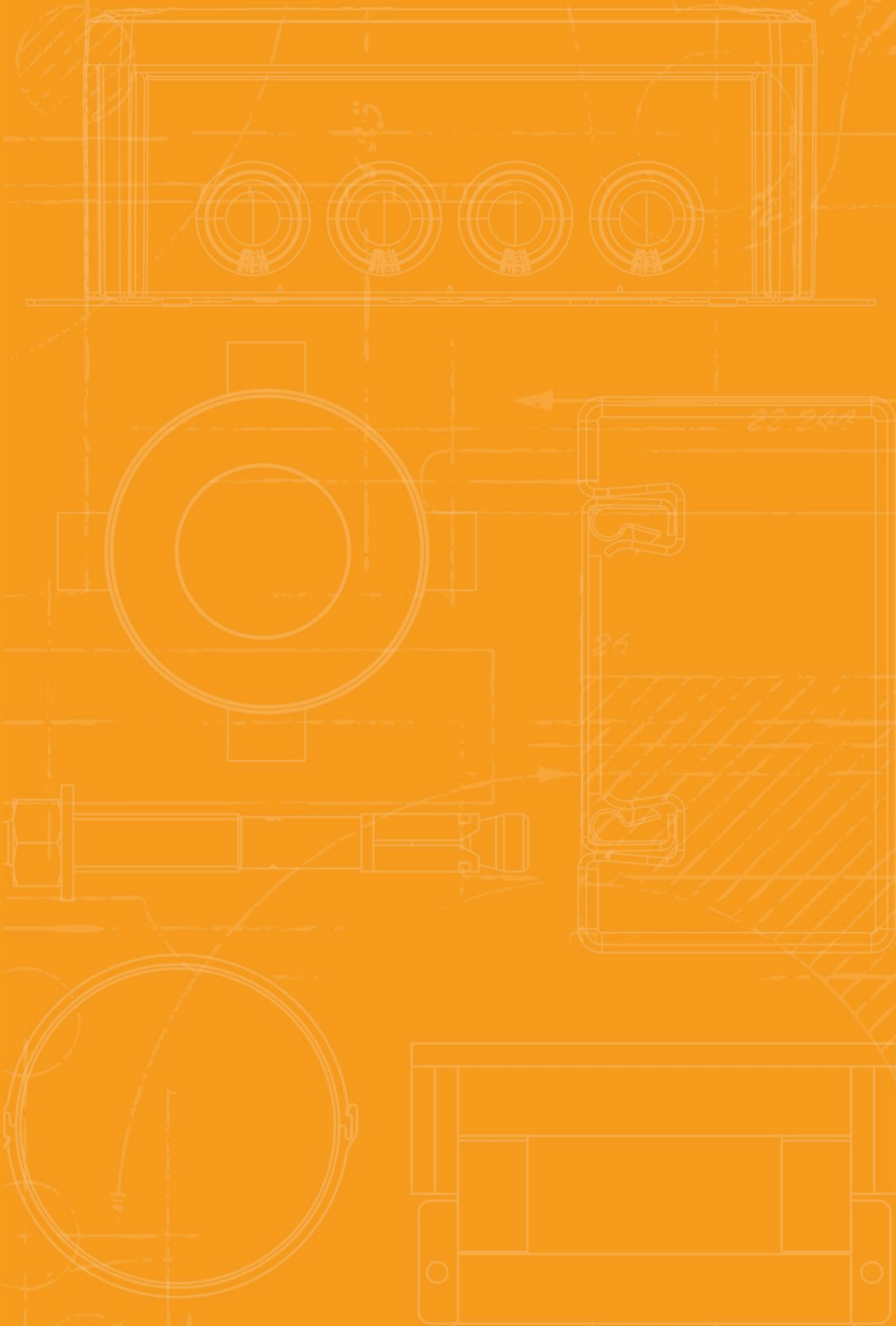
### BSS app

The OBO Construct BSS app makes finding the right product even quicker. In only a short time, the app determines the fire protection systems required for the appropriate project. It offers the full scope of the Construct BSS module, allowing simple planning and material calculations in any location. It's extremely practical, as the parts list can be sent directly by e-mail. The app is available for Android and Apple devices from Google Play Store and the iTunes App Store.



### Fire protection guide for electrical installations

In the second edition of the fire protection guide, we have again compiled lots of useful information. The interconnections of fire protection between different types of technical building equipment are now explained in even more detail. Perhaps you will find some new information in this edition which can help you in the planning and implementation of fire protection systems.



# Systems for the maintenance of electrical function, Firebox T series junction boxes



Junction boxes

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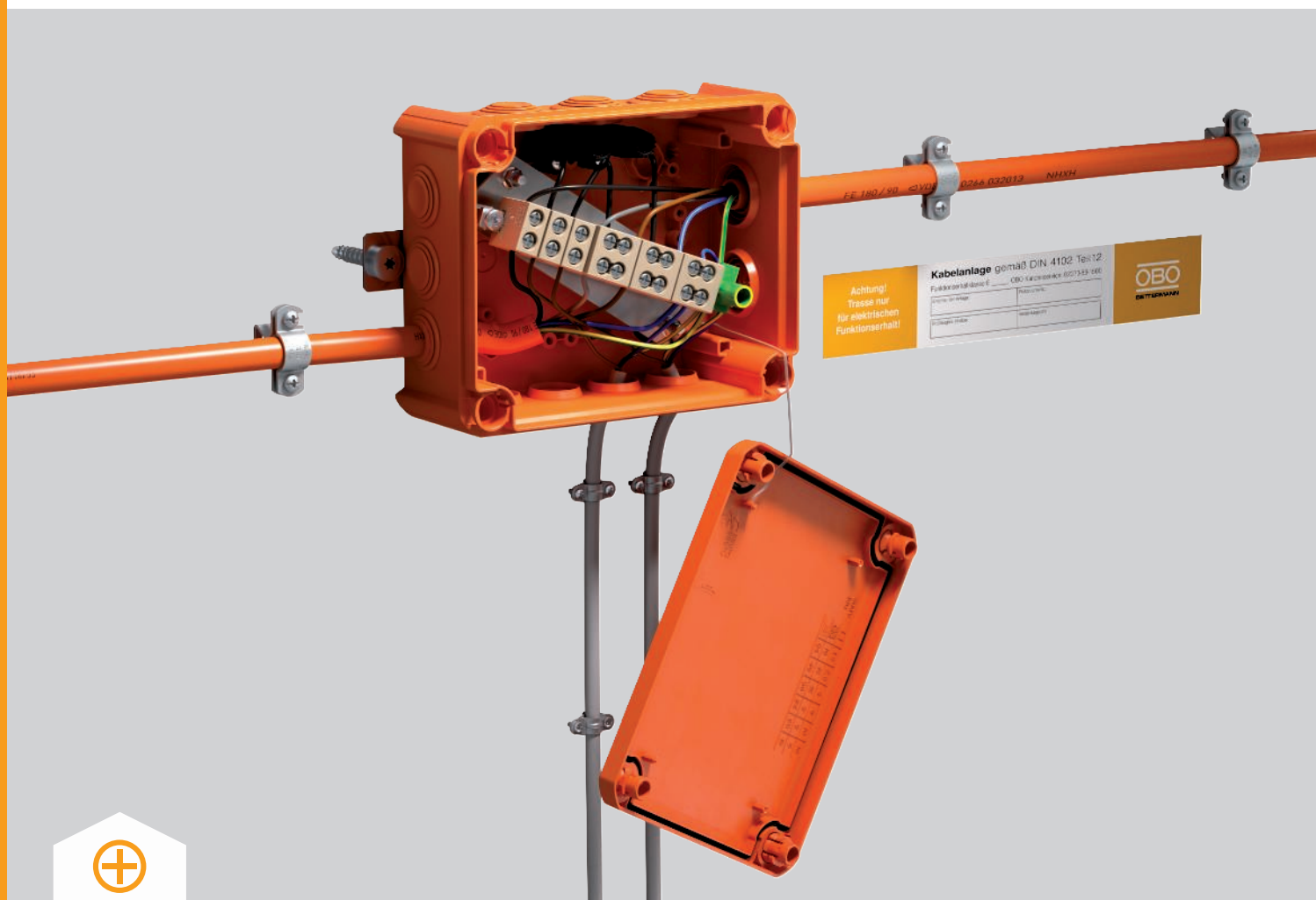


Accessories, junction boxes

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## Junction box, FireBox System description



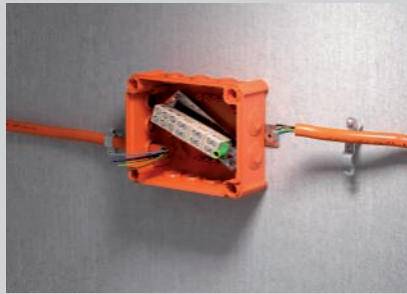
Junction boxes of the FireBox series are available for connecting and branching safety cables. These are equipped with a high-temperature-resistant connection unit with ceramic terminals and offer clamping areas of 0.5 mm<sup>2</sup> to 16 mm<sup>2</sup> of copper cross-section with single or double terminals. The T series FireBox possesses all the benefits of thermoplastic cable junction boxes, which allow the insertion of cables without tools and have a protection rating of IP66. The high-temperature-resistant terminals are pre-mounted on the connection unit. The protective conductor terminal is connected to the support clamp, meaning that covers of the metal parts are not required. The closed variants of the FireBox have support clamps and fastening elements made of stainless steel so they can also be used in aggressive environments.

In the closed sides of the boxes cable glands can be placed freely. Ceramic terminals of different nominal cross-sections can be arranged freely onto the support clamps according to electro-technical requirements. The junction boxes for data technology feature an even number of ceramic terminals. The terminals have wire protection which – with the common wire diameters of 0.5 mm<sup>2</sup> – decreases the risk of the copper being damaged. Fastening of all variants takes place on the outer straps with fire protection bolt ties. The FireBox is tested and approved as a connection socket for the maintenance of electrical function to DIN 4102 Part 12 with the classes E30, E60 and E90. A separate fuse holder allows the protection of branches.

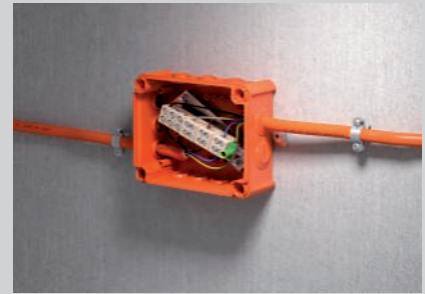
# Junction box, FireBox Installation principle



Fastening of the FireBox with a screw anchor and inserting the fuse holders.



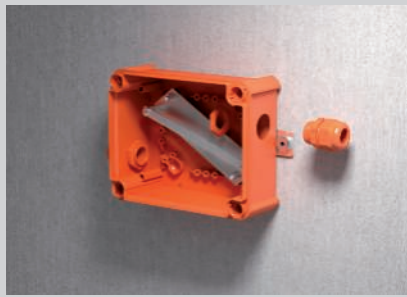
Cable insertion via plug-in seals.



Diagonally arranged terminal strip with large wiring space.



Closing the box with the lid and attaching the identification label.



Free positioning of cable glands in the closed sides of the empty variants.



Empty variants offer the option to individually equip the box with different terminals.



FireBox with mounting plate, type F, mounted to the front of a cable tray.



FireBox with mounting plate, type B, mounted to the rear of a cable ladder.



Standard-conforming mounting of the FireBox on walls and ceiling.

Classification according to DIN 4102 Part 12

E30

E60

E90



## FireBox with plug-in seals, single terminals

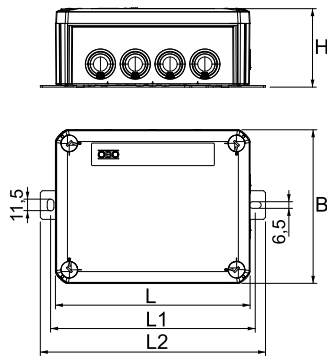


Type	Nominal cross-section mm <sup>2</sup>	Single terminals	Protective terminal	Entries	Pack Piece	Weight kg/100 pc.	Item no.
<b>T100ED 06A</b>	6	4	1	8xM25 2xM32	1	42.730	<b>7205740</b>
<b>T160ED 10A</b>	10	4	1	7xM25 5xM32	1	62.918	<b>7205742</b>
<b>T250ED 16A</b>	16	4	1	9xM25 7xM32	1	92.919	<b>7205744</b>

Connection box with soft plug-in seals. Sufficiently large wiring compartment through diagonally arranged connection unit with completely pre-mounted, high-temperature-resistant ceramic terminals. Green-yellow labelled protective conductor terminal. Fastening on easily accessible external flaps. Approved for cable systems that maintain the electrical function according to DIN 4102 Part 12 with the classes E30, E60 and E90. Ceramic clamps have been tested according to DIN EN 60998-2-1:2004.

Including 2 x MMSplus P 6x35 screw ties.

### Dimensions



Type	Dim. L mm	Dim. L1 mm	Dim. L2 mm	Dim. B mm	Dim. H mm
T100ED 06A	150	162	182	116	67
T160ED 10A	190	200	220	150	77
T250ED 16A	240	250	270	190	95

## FireBox with plug-in seals, double terminals

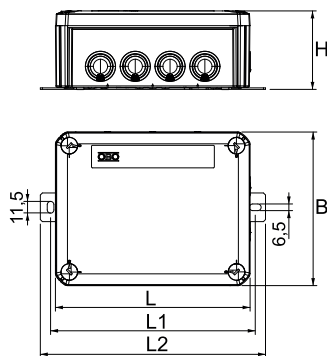


Type	Nominal cross-section mm <sup>2</sup>	Double terminals	Protective terminal	Entries	Pack Piece	Weight kg/100 pc.	Item no.
<b>T100ED 06-2A</b>	6	4	1	8xM25 2xM32	1	49.210	<b>7205746</b>
<b>T160ED 10-2A</b>	10	4	1	7xM25 5xM32	1	71.998	<b>7205748</b>
<b>T250ED 16-2A</b>	16	4	1	9xM25 7xM32	1	105.679	<b>7205750</b>

Junction box with ceramic double terminals and soft plug-in seals. Sufficiently large wiring compartment through diagonally arranged connection unit with completely pre-mounted, high-temperature-resistant ceramic terminals. Green-yellow labelled protective conductor terminal. Fastening on easily accessible external flaps. Approved for cable systems that maintain the electrical function according to DIN 4102 Part 12 with the classes E30, E60 and E90. Ceramic clamps have been tested according to DIN EN 60998-2-1:2004.

Including 2 x MMSplus P 6x35 screw ties.

### Dimensions



Type	Dim. L mm	Dim. L1 mm	Dim. L2 mm	Dim. B mm	Dim. H mm
T100ED 06-2A	150	162	182	116	67
T160ED 10-2A	190	200	220	150	77
T250ED 16-2A	240	250	270	190	95



PP

## FireBox with plug-in seals, 1 fuse holder

Type	Nominal cross-section mm <sup>2</sup>	Single terminals	Double terminals	Protective terminal	Entries	Pack Piece	Weight kg/100 pc.	Item no.
<b>T100ED 06AF</b>	6	3	2	1	8x M25 2x M32	1	48.650	<b>7205752</b>
<b>T160ED 10AF</b>	10	3	2	1	7x M25 5x M32	1	70.513	<b>7205754</b>
<b>T250ED 16AF</b>	16	3	2	1	9x M25 7x M32	1	104.854	<b>7205756</b>

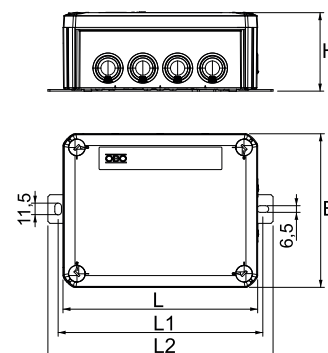


Junction box with one fuse holder and soft plug-in seals. Sufficiently large wiring compartment through diagonally arranged connection unit with completely pre-mounted, high-temperature-resistant ceramic terminals. Green-yellow labelled protective conductor terminal. Fastening on easily accessible external flaps. Approved for cable systems that maintain the electrical function according to DIN 4102 Part 12 with the classes E30, E60 and E90. Ceramic clamps have been tested according to DIN EN 60998-2-1:2004.

Including 2 x MMSplus P 6x35 screw ties.

Type	Dim. L mm	Dim. L1 mm	Dim. L2 mm	Dim. B mm	Dim. H mm
T100ED 06AF	150	162	182	116	67
T160ED 10AF	190	200	220	150	77
T250ED 16AF	240	250	270	190	95

### Dimensions



PP

## FireBox with plug-in seals, 2 fuse holders

Type	Nominal cross-section mm <sup>2</sup>	Single terminals	Double terminals	Protective terminal	Entries	Pack Piece	Weight kg/100 pc.	Item no.
<b>T100ED 06A2F</b>	6	3	3	1	8x M25 2x M32	1	52.950	<b>7205758</b>
<b>T160ED 10A2F</b>	10	3	3	1	7x M25 5x M32	1	77.188	<b>7205760</b>
<b>T250ED 16A2F</b>	16	3	3	1	9x M25 7x M32	1	113.054	<b>7205762</b>

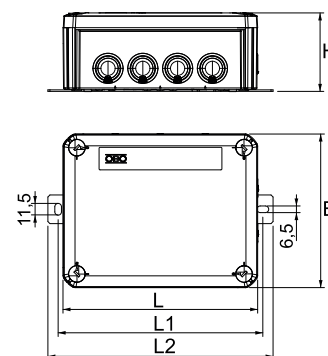


Junction box with two fuse holders and soft plug-in seals. Sufficiently large wiring compartment through diagonally arranged connection unit with completely pre-mounted, high-temperature-resistant ceramic terminals. Green-yellow labelled protective conductor terminal. Fastening on easily accessible external flaps. Approved for cable systems that maintain the electrical function according to DIN 4102 Part 12 with the classes E30, E60 and E90. Ceramic clamps have been tested according to DIN EN 60998-2-1:2004.

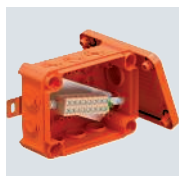
Including 2x MMSplus P 6x35 screw ties.

Type	Dim. L mm	Dim. L1 mm	Dim. L2 mm	Dim. B mm	Dim. H mm
T100ED 06A2F	150	162	182	116	67
T160ED 10A2F	190	200	220	150	77
T250ED 16A2F	240	250	270	190	95

### Dimensions



## FireBox, with plug-in seals, for data technology

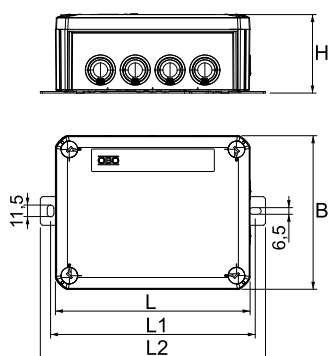


Type	Nominal cross-section mm <sup>2</sup>	Single terminals	Protective terminal	Entries	Pack Piece	Weight kg/100 pc.	Item no.
<b>T100ED 4x4AD</b>	0.5-4	4	1	8 x M25 2 x M32	1	41.690	<b>7205764</b>
<b>T100ED 4x8AD</b>	0.5-4	8	1	8 x M25 2 x M32	1	45.210	<b>7205766</b>
<b>T250ED 4x16AD</b>	0.5-4	16	4	9 x M25 7 x M32	1	91.441	<b>7205768</b>
<b>T250ED 4x24AD</b>	0.5-4	24	4	9 x M25 7 x M32	1	101.643	<b>7205770</b>
<b>T350ED 4x32AD</b>	0.5-4	32	4	16 x M32 8 x M40	1	158.251	<b>7205772</b>

Connection box for data technology with soft plug-in seals. Pairs of high-temperature-resistant ceramic terminals, suitable for data cables. Green-yellow labelled protective conductor/shield terminal. Fastening on easily accessible external flaps. Approved for cable systems that maintain the electrical function according to DIN 4102 Part 12 with the classes E30, E60 and E90. Ceramic clamps have been tested according to DIN EN 60998-2-1:2004.

Including 2x MMSplus P 6x35 screw ties.

### Dimensions



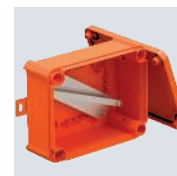
Type	Dim. L mm	Dim. B mm	Dim. H mm	Dim. L1 mm	Dim. L2 mm
T100ED 4x4AD	150	116	68	162	182
T100ED 4x8AD	150	116	68	162	182
T250ED 4x16AD	240	190	95	250	270
T250ED 4x24AD	240	190	95	250	270
T350ED 4x32AD	285	201	120	205	230



PP

Closed FireBox, empty

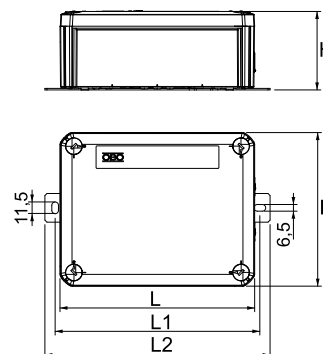
Type	Nominal cross-section mm <sup>2</sup>	Equipment	Dim. A mm	Pack Piece	Weight kg/100 pc.	Item no.
T100E OVA	0.5 - 6	Support rail	101	1	33.890	7205780
T160E OVA	0.5 - 10	Support rail	130	1	49.203	7205782
T250E OVA	0.5 - 16	Support rail	286	1	74.084	7205784
T350E OVA	0.5 - 16	Support rail	386	1	121.611	7205786



Unequipped, closed connection or junction box for free termination with ceramic terminals and cable glands Dimension A states the available support rail length for the wiring terminals. Sufficiently large wiring compartment through diagonally arranged support rail. Fastening on easily accessible external flaps made of stainless steel. Approved for cable systems that maintain the electrical function according to DIN 4102 Part 12 with the classes E30, E60 and E90.

Type	Dim. L mm	Dim. B mm	Dim. H mm	Dim. L1 mm	Dim. L2 mm
T100E OVA	150	116	67	162	182
T160E OVA	190	150	77	200	220
T250E OVA	240	190	95	250	270
T350E OVA	285	201	120	205	230

Dimensions

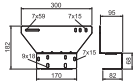
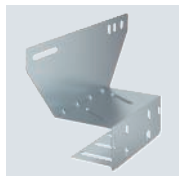


Systems for the maintenance of electrical function, FireBox T series junction boxes



## Mounting plate for FireBox T series, front side

St DD

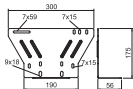


Type	Width mm	Height mm	Pack Piece	Weight kg/100 pc.	Item no.
<b>MP-T6-F</b>	300	182	1	46.134	<b>7205790</b>

Universal mounting plate to fasten the FireBox T series to the front side of cable trays and mesh cable trays as well as cable ladders of max. 60 mm side height. Enables the secure mounting of cables that maintain electrical functionality, without having to bend it over the side rail. Suitable for all FireBoxes.

## Mounting plate for FireBox T series, rear side

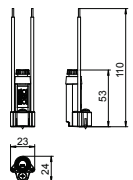
St DD



Type	Width mm	Height mm	Pack Piece	Weight kg/100 pc.	Item no.
<b>MP-T6-B</b>	300	175	1	36.566	<b>7205792</b>

Universal mounting plate to fasten the FireBox T series to the rear side of cable trays and mesh cable trays as well as cable ladders of max. 60 mm side height. Enables the secure mounting of cables that maintain electrical functionality, without having to bend it over the side rail. Suitable for all FireBoxes.

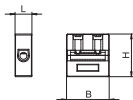
## Fuse holder for FireBox T series



Type	Pack Piece	Weight kg/100 pc.	Item no.
<b>TE-FH 520</b>	1	1.800	<b>7205570</b>

Fuse holder with bayonet lock for fine-wire fuse for dimensions  $\varnothing 5 \times 20$  mm. Connection wires that maintain electrical functionality with nominal cross-section 2.5 mm<sup>2</sup>, ready-stripped. For mounting on one of the exposed domes in the junction box of the FireBox T series using the supplied screw.

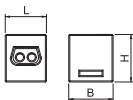
## Ceramic terminal



Type	Nominal cross-section mm <sup>2</sup>	Dim. L mm	Dim. B mm	Dim. H mm	Pack Piece	Weight kg/100 pc.	Item no.
<b>TK 04</b>	0.5-4	8.5	21.5	21.5	5	0.880	<b>7205700</b>
<b>TK 06</b>	6	8.5	21.5	21.5	5	0.880	<b>7205702</b>
<b>TK 10</b>	10	12.5	24	24	5	1.840	<b>7205704</b>
<b>TK 16</b>	16	15	28	28	5	3.160	<b>7205706</b>

High-temperature-resistant ceramic terminal for refitting of the FireBox T series. Tested according to DIN EN 60998-2-1:2004.

## Ceramic terminal, double

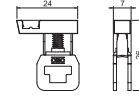


Type	Nominal cross-section mm <sup>2</sup>	Dim. L mm	Dim. B mm	Dim. H mm	Pack Piece	Weight kg/100 pc.	Item no.
<b>TK 06-2</b>	6	19.5	21	22.5	5	2.500	<b>7205703</b>
<b>TK 10-2</b>	10	24.5	26.5	26	5	4.200	<b>7205705</b>
<b>TK 16-2</b>	16	27	29.5	30.5	5	6.400	<b>7205707</b>

High-temperature-resistant ceramic terminal with four connection options for refitting of the FireBox T series. Tested according to DIN EN 60998-2-1:2004.

Protective conductor terminal

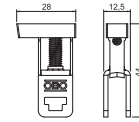
Type	Nominal cross-section mm <sup>2</sup>	Dim.			Pack Piece	Weight kg/100 pc.	Item no.
		B mm	H mm	L mm			
TPE 04	4	24	26	7	5	0.540	7205709



Productive conductor terminal for retro-fitting the FireBox T series with green-yellow identification.

Protective conductor terminal

Type	Nominal cross-section mm <sup>2</sup>	Dim.			Pack Piece	Weight kg/100 pc.	Item no.
		B mm	H mm	L mm			
TPE 35	35	28	44	12.5	5	1.870	7205714



Protective conductor terminal for refitting of the FireBox T series with green-yellow identification.

PA

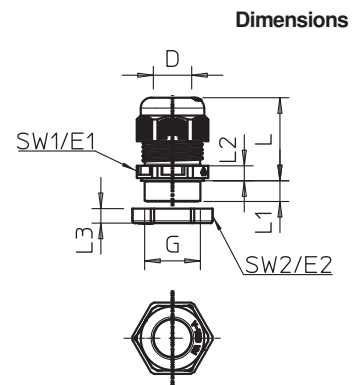
Cable gland with locknut as a set

Type	Thread	Pack Piece	Weight kg/100 pc.	Item no.
V-TEC VM16+ OR	M16x1,5	10	0.771	7205657
V-TEC VM20+ OR	M20x1,5	10	1.106	7205660
V-TEC VM25+ OR	M25x1,5	10	1.710	7205663
V-TEC VM32+ OR	M32x1,5	10	2.840	7205666
V-TEC VM40+ OR	M40x1,5	10	5.150	7205669



Robust cap nut cable gland with metric connecting thread to IEC 423, including pre-mounted locknut. For high tightness requirements. Strain relief, torsion protection and tightness over the whole clamping area. Sealing ring made of polychloroprene/acrylonitrile butadiene rubber. Moulded shaped sealing lip on intermediate support, no connection thread sealing ring required. VDE-tested according to DIN EN 50262, protection rating IP68 at 5 bar for 1 hr. For maintenance of electrical function according to DIN 4102 Part 12 in connection with the closed junction boxes of the FireBox T series. Colour: Pastel orange.

Type	Dim. G mm	Sealing range D mm	Dim. L mm		Dim. L1 mm	Dim. L2 mm	Dim. L3 mm	SW 1 mm	Dim. E1 mm	SW 2 mm	Dim. E2 mm
			min.	max.							
V-TEC VM16+ OR	M16x1,5	4.5-10	21.5	23.5	8	5	5	20	22	22	25
V-TEC VM20+ OR	M20x1,5	6-13	23.5	30.5	9	5	6	24	27	24	27
V-TEC VM25+ OR	M25x1,5	9-17	26	35	10	6	6.5	29	32	32	36
V-TEC VM32+ OR	M32x1,5	15-21	29	40	11	6	7	36	41	41	46
V-TEC VM40+ OR	M40x1,5	16-28	36	46	11	7	7.5	44	50	50	56



## Plug-in seal for FireBox T series

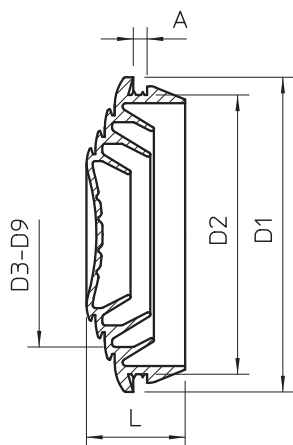
TPE



Type	Size	For Ø		Colour	Pack Piece	Weight kg/100 pc.	Item no.
		mm	mm				
EDK 25 OR	M25	0-22		Pastel orange	10	0.214	7205675
EDK 32 OR	M32	0-27		Pastel orange	10	0.328	7205677
EDK 40 OR	M40	0-34		Pastel orange	10	0.534	7205679

The soft plug-in seal can be cut back step by step to suit the relevant cable diameter.  
Colour: Pastel orange.

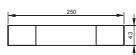
### Dimensions



Type	Dim. L mm	Dim. A mm	Dim. D1 mm	Dim. D2 mm	Dim. range D mm	Sealing range
EDK 32 OR	11.4	2.2	36.4	32.3	0-27	
EDK 40 OR	13.4	2.2	44.1	40.2	0-34	

## Identification plate for function maintenance

PVC



Type	Language		Pack Piece	Weight kg/100 pc.	Item no.
	KS-E NL	Dutch			
KS-E DE	German		10	0.600	7205423
KS-E EN	English		10	0.600	7205432

Self-adhesive identification plate for approved cable system labelling for maintenance of electrical function as required by DIN 4102 Part 12.





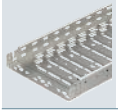


# Systems for the maintenance of electrical function, cable-specific routing variants



RKS-Magic® cable tray

34



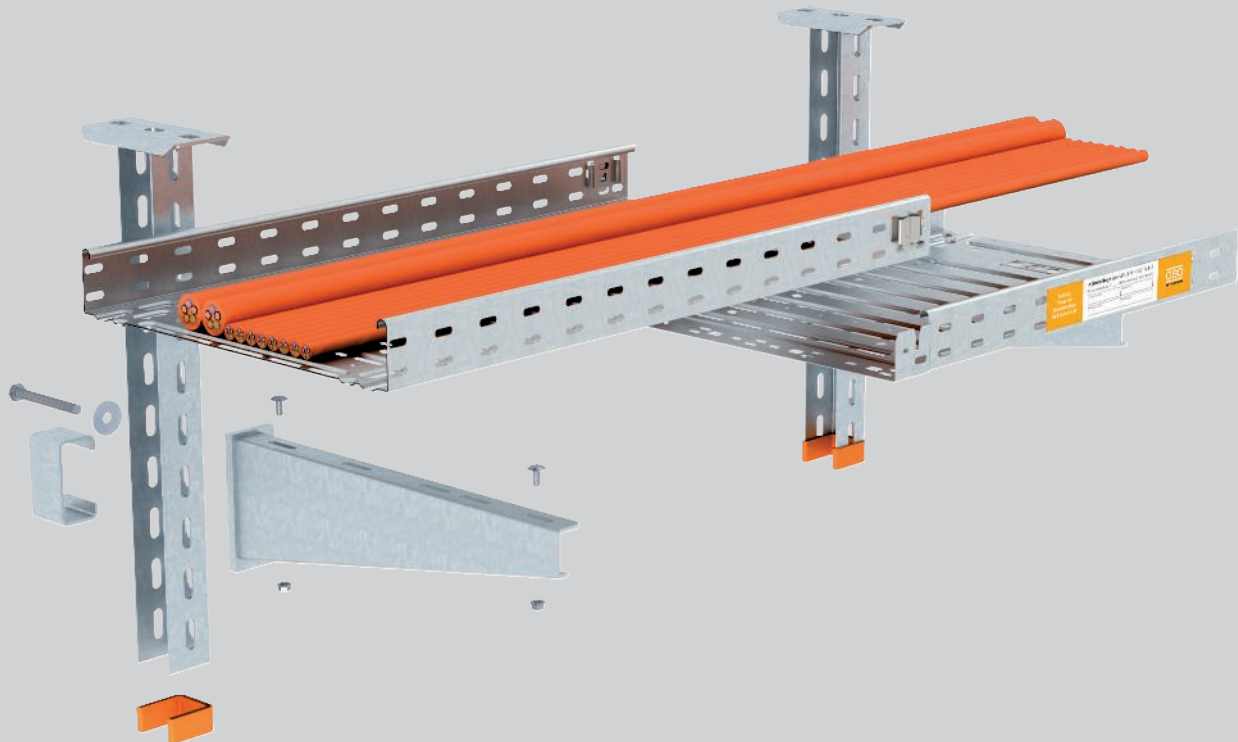
RKS-Magic® cable tray, stainless steel

62



## RKS-Magic® cable trays

### System description



The RKS-Magic® cable tray has been tested as a cable-specific support construction for the maintenance of electrical function according to DIN 4102 Part 12 and approved for maintenance of electrical function classes E 30 to E 90. A threaded rod lock is not required at the tip of the bracket. This saves not just material but also considerably simplifies and speeds up the installation of cables. The screwless connection system allows interconnection of the RKS-Magic® cable trays

without tools and in a particularly quick and economic manner. To ensure the maintenance of the electrical supply, only the locking lugs in the base need to be bent after the trays have been connected. The double material thickness in the joint area and the beading in the base mean that the cable tray has a very high load capacity. The installation of fittings in the section route is permitted, as is the mounting of separating retainers.

# RKS-Magic® cable trays

## Installation principle



Ceiling mounting on both sides with max. three layers (2+1).



One-sided arrangement with max. two layers.



Wall mounting.



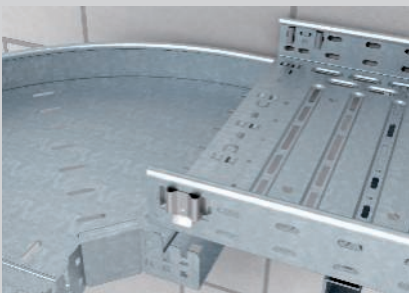
Creation of a straight connector through interconnection of the cable trays.



Bending the locking straps in the base.



Complete screwless joint connection.



Quick and simple mounting of fitting with screwless Magic connection.



Separating retainer mounting with truss-head bolts.

Classification according to DIN 4102 Part 12

**E30**

**E60**

**E90**





# RKS-Magic® cable trays

## Proof


### Maintenance of electrical functionality system according to DIN 4102 Part 12

Routing type	Cable-specific support construction
Test certificate no.	P-MPA-E-13-002
Maintenance of electrical functionality classes	E30 to E90
Testing standard	DIN 4102 Part 12
Mounting variant	Ceiling mounting with suspended support and bracket without threaded rod lock Wall mounting with bracket without threaded rod lock
Material version	Galvanised steel

### Support spacing for ceiling mounting with suspended support/bracket

Cable tray width	Cable load per cable tray				
100 mm	max. 20 kg/m	max. 1.50 m	max. 1.50 m	max. 1.50 m	max. 1.50 m
200 mm	max. 20 kg/m	max. 1.50 m	max. 1.50 m	max. 1.50 m	max. 1.50 m
300 mm	max. 20 kg/m	max. 1.50 m	max. 1.50 m	max. 1.50 m	max. 1.50 m
400 mm	max. 20 kg/m	max. 1.50 m	max. 1.50 m	max. 1.50 m	max. 1.50 m





### Support spacing for wall mounting with bracket

Cable tray width	Cable load per cable tray	
100 mm	max. 20 kg/m	max. 1.50 m
200 mm	max. 20 kg/m	max. 1.50 m
300 mm	max. 20 kg/m	max. 1.50 m
400 mm	max. 20 kg/m	max. 1.50 m

# RKS-Magic® cable trays


## Components used

### Ceiling mounting with suspended support/bracket

Component	Type	Page				
Cable tray	RKSM 6... FS	50	1	2	2	3
Support	US 5 K ... FT	55	1	1	1	1
Protective cap	US 5 KS OR	56	1	1	1	1
Wall and support brackets	AW 30 11 FT, AW 55 21 FT, ... 31 FT, ... 41 FT		1	2	2	3
Spacer	DSK 45	57	1	2	1	2
Hex set screw	SKS 10x90 F	60	1	2	1	2
Fender washer	DIN440 11 F	61	1	2	0	1
Gutter bolt	FRSB 6x 15 F	61	2	4	4	6

Choose the fastening anchors according to the substrate

### Wall mounting with bracket

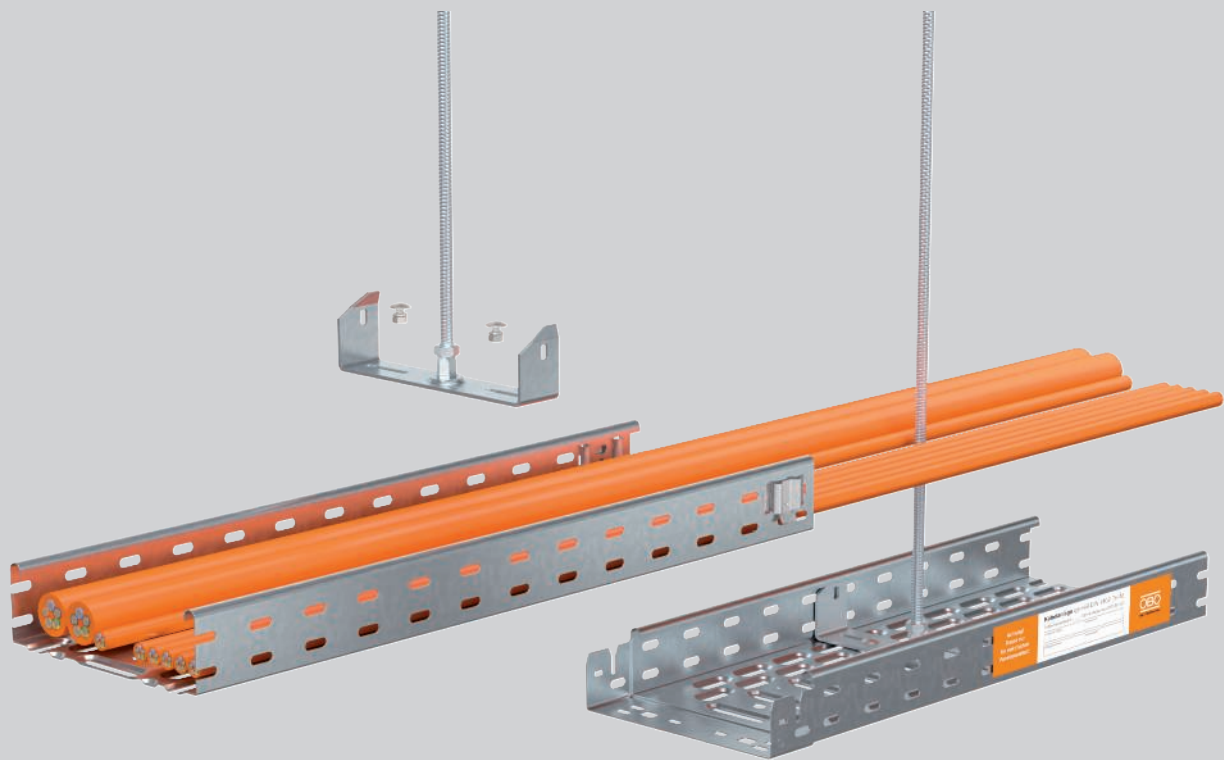
Component	Type	
Cable tray	RKSM 6... FS	1
Wall and support brackets	AW 30 11 FT, AW 55 21 FT, ... 31 FT, ... 41 FT	1
Truss-head bolt	FRSB 6x 15 F	2

Choose the fastening anchors according to the substrate



## RKS-Magic® cable trays

### System description

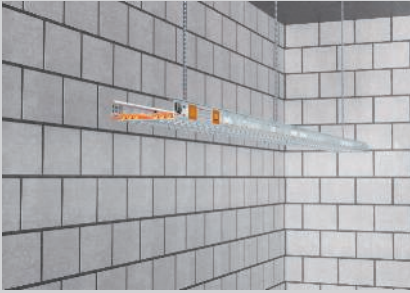


The RKS-Magic® cable tray has been tested as a cable-specific support construction for the maintenance of electrical functionality according to DIN 4102 Part 12 and approved for maintenance of electrical function classes E 30 to E 90. The support structure as a light-duty routing system consists of a centre suspension and a centrally arranged threaded rod as a suspension component and can be installed simply, quickly and with only a few components. The screwless

connection system allows interconnection of the RKS-Magic® cable trays without tools and in a particularly quick and economic manner. To ensure the maintenance of the electrical supply, only the locking lugs in the base need to be bent after the trays have been connected. The double material thickness in the joint area and the beading in the base mean that the cable tray has a very high load capacity. The installation of fittings in the section is permitted.

# RKS-Magic® cable trays

## Installation principle



Single-layer ceiling mounting of the cable tray with a centre suspension.



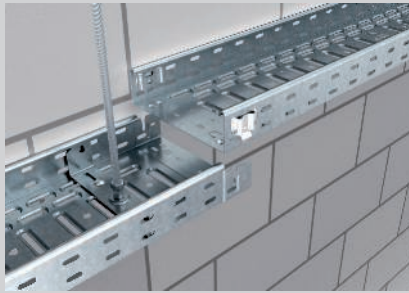
Insertion of the centre suspension in the cable tray.



Securing of the threaded rod on the centre suspension with additional hexagonal nut.



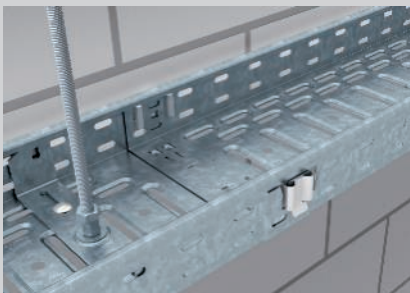
Screwing of the centre suspension in the tray base.



Creation of a straight connector through interconnection of the cable trays.



Bending the locking straps in the base.



Complete screwless joint connection.



Quick and simple mounting of the fittings with screwless Magic connection.

Classification according to DIN 4102 Part 12

E30

E60

E90


# RKS-Magic® cable trays

## Proof

### Maintenance of electrical functionality system according to DIN 4102 Part 12

Routing type	Cable-specific support construction
Test certificate no.	P-MPA-E-18-003
Maintenance of electrical functionality classes	E30 to E90
Testing standard	DIN 4102 Part 12
Mounting variant	Ceiling mounting with centre suspension
Material version	Galvanised steel

### Support spacing for ceiling mounting with centre suspension


Cable tray width	Cable load per cable tray	
100 mm	max. 7.5 kg/m	max. 1.00 m
150 mm	max. 7.5 kg/m	max. 1.00 m
200 mm	max. 7.5 kg/m	max. 1.00 m



# RKS-Magic® cable trays

## Components used

### Ceiling mounting with centre suspension

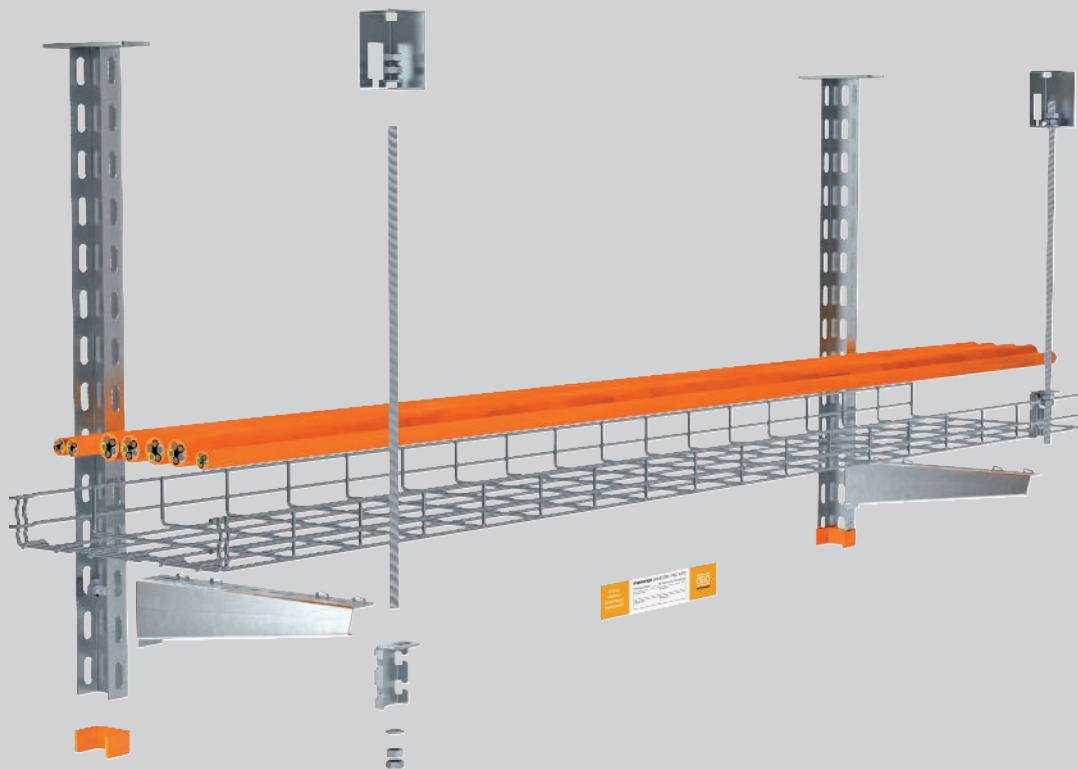
Component	Type	
Cable tray	RKSM 6... FS	1
Centre suspension	MAH 60 ... FS	1
Truss-head screw	FRSB 6x16	2
Threaded rod	TR M10 G	1
Hexagonal nut	HN M10 G	1

Choose the fastening anchors according to the substrate



## GR-Magic® mesh cable trays

### System description



The GR-Magic® mesh cable tray has been tested as a cable-specific support construction for the maintenance of electrical function according to DIN 4102 Part 12 and approved for maintenance of electrical function classes E 30 to E 90. The threaded rod lock is mounted directly on the tray rail, using the ABG connection component. This is

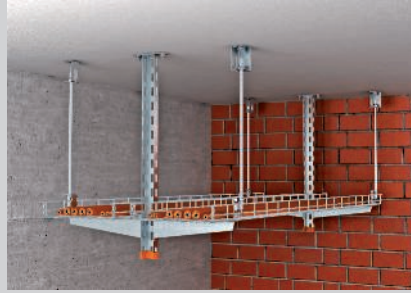
just attached to the side lengthwise wires of the mesh cable tray. When the threaded rod has been mounted, the component is secured against unintentional release. The screwless connection system of the GR-Magic® mesh cable trays ensures toolless, and thus particularly rapid and economic, mounting.

# GR-Magic® mesh cable trays

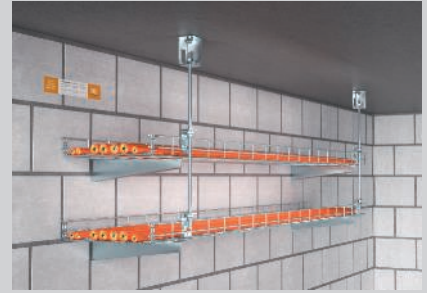
## Installation principle



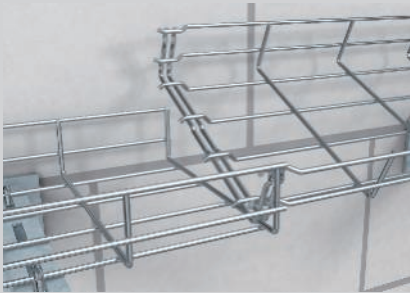
Ceiling mounting with brackets mounted on one side.



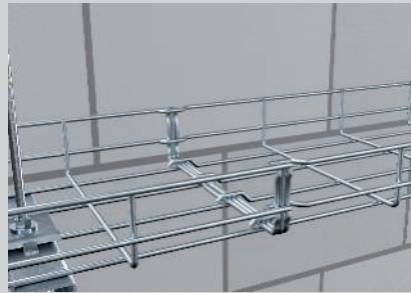
Ceiling mounting with brackets arranged on both sides.



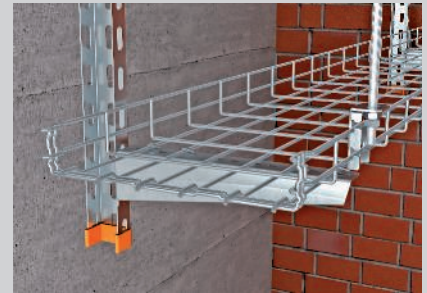
Multi-layer wall mounting.



Interconnecting of two stock lengths of the mesh cable tray.



Finished screwless joint connection.



Screwless mesh cable tray fastening on the bracket.



Screwless fastening of the connection component to the side wires.

Classification according to DIN 4102 Part 12

E30

E60

E90






## GR-Magic® mesh cable trays

### Proof




#### Maintenance of electrical functionality system according to DIN 4102 Part 12

Routing type	Cable-specific support construction
Test certificate no.	P-MPA-E-12-011
Maintenance of electrical functionality classes	E30 to E90
Testing standard	DIN 4102 Part 12
Mounting variant	Ceiling mounting with suspended support and bracket with threaded rod lock Wall mounting with bracket and threaded rod lock
Material version	Galvanised steel

#### Support spacing for ceiling mounting with suspended support/bracket

Cable tray width	Cable load per cable tray					
100 mm	max. 15 kg/m	max. 1.50 m	max. 1.50 m	max. 1.50 m	max. 1.50 m	max. 1.50 m
200 mm	max. 15 kg/m	max. 1.50 m	max. 1.50 m	max. 1.50 m	max. 1.50 m	max. 1.50 m
300 mm	max. 15 kg/m	max. 1.50 m	max. 1.50 m	max. 1.50 m	max. 1.50 m	max. 1.50 m
400 mm	max. 15 kg/m	max. 1.50 m	max. 1.50 m	max. 1.50 m	max. 1.50 m	max. 1.50 m






#### Support spacing for wall mounting with bracket

Cable tray width	Cable load per cable tray			
100 mm	max. 15 kg/m	max. 1.50 m	max. 1.50 m	max. 1.50 m
200 mm	max. 15 kg/m	max. 1.50 m	max. 1.50 m	max. 1.50 m
300 mm	max. 15 kg/m	max. 1.50 m	max. 1.50 m	max. 1.50 m
400 mm	max. 15 kg/m	max. 1.50 m	max. 1.50 m	max. 1.50 m

# GR-Magic® mesh cable trays




## Components used

### Ceiling mounting with suspended support/bracket

Component	Type					
Mesh cable tray	GRM 55 ... G	1	2	3	2	3
Support	US 3 K ... FT	1	1	1	1	1
Protective cap	US 3 KS OR	1	1	1	1	1
Wall and support brackets	AWG 15 ... FT	1	2	3	2	3
Truss-head bolt	FRS 10x 25 F	1	2	3	2	3
Connection component	ABG FT	1	2	3	2	3
Threaded rod	TR M10 G	1	2	0	2	3
Threaded rod	TR M12 G	0	0	3	0	0
Hexagonal nut	HN M10 G	4	5	0	8	9
Hexagonal nut	HN M12 G	0	0	6	0	0
Washer	WS M10 D20 G	2	3	0	4	5
Washer	WS M12 D24 G	0	0	4	0	0
Connection sleeve	CSTR M10 G	0	1	0	0	1
Connection sleeve	CSTR M12 G	0	0	2	0	0
Fire protection clamp	BSB	1	1	1	2	2

Choose the fastening anchors according to the substrate

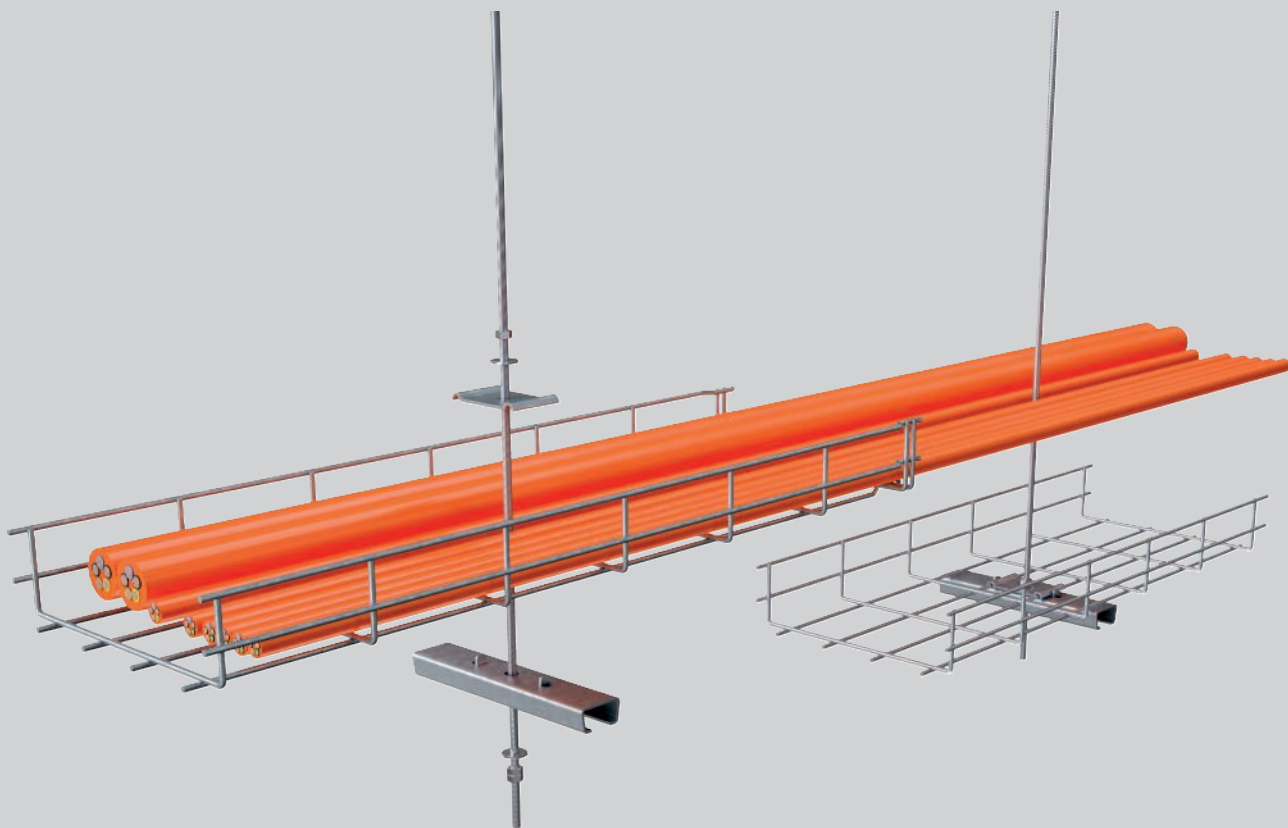
### Wall mounting with bracket

Component	Type			
Mesh cable tray	GRM 55 ... G	1	2	3
Wall and support brackets	AWG 15 ... FT	1	2	3
Connection component	ABG FT	1	2	3
Threaded rod	TR M10 G	1	2	0
Threaded rod	TR M12 G	0	0	3
Hexagonal nut	HN M10 G	4	5	0
Hexagonal nut	HN M12 G	0	0	6
Washer	WS M10 D20 G	2	3	0
Washer	WS M12 D24 G	0	0	4
Connection sleeve	CSTR M10 G	0	1	0
Connection sleeve	CSTR M12 G	0	0	2
Fire protection clamp	BSB	1	1	1

Choose the fastening anchors according to the substrate

## GR-Magic® mesh cable tray, centre suspension

### System description



The GR-Magic® mesh cable tray has been tested as a cable-specific support construction for the maintenance of electrical functionality according to DIN 4102 Part 12 and approved for maintenance of electrical function classes E 30 to E 90. The support structure as a light-duty routing system consists of a centre suspension and a centrally

arranged threaded rod as a suspension component and can be installed simply, quickly and with only a few components. The screwless connection system of the GR-Magic® mesh cable trays ensures toolless, and thus particularly rapid and economic, mounting.

# GR-Magic® mesh cable trays

## Installation principle



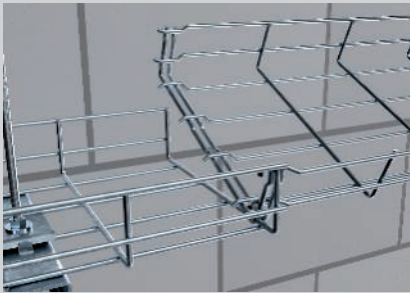
Single-layer ceiling mounting of the mesh cable tray with a centre suspension.



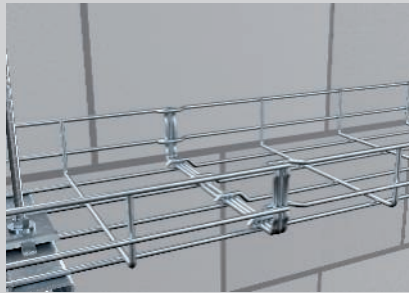
Positioning and fastening of the clamping piece with the threaded rod.



Connection of the threaded rod with the retaining rail under the mesh cable tray.



Interconnection of two stock lengths of the mesh cable tray.



Complete screwless joint connection.



Mounting of fittings with joint connector.

Classification according to DIN 4102 Part 12

E30

E60

E90

## GR-Magic® mesh cable trays

### Proof

#### Maintenance of electrical functionality system according to DIN 4102 Part 12

Routing type	Cable-specific support construction
Test certificate no.	P-MPA-E-18-004
Maintenance of electrical functionality classes	E30 to E90
Testing standard	DIN 4102 Part 12
Mounting variant	Ceiling mounting with centre suspension
Material version	Galvanised steel

#### Support spacing for ceiling mounting with centre suspension


Mesh cable tray width	Cable load per mesh cable tray	
200 mm	max. 7.5 kg/m	max. 1.0 m



# GR-Magic® mesh cable trays

## Components used

### Ceiling mounting with centre suspension

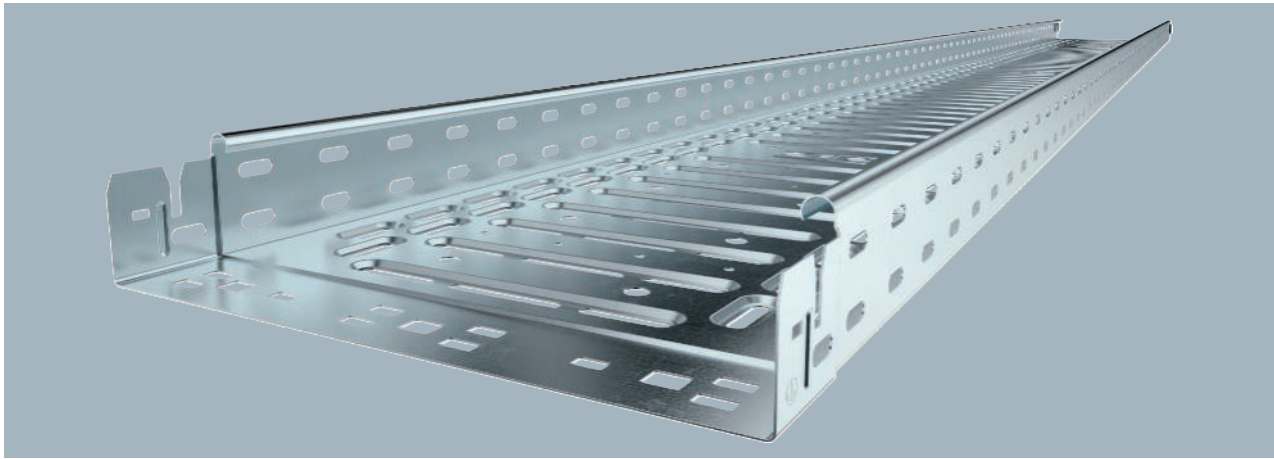
Component	Type	
Mesh cable tray	GRM 55 200 G	1
Centre suspension	GMS 170 FS	1
Threaded rod	TR M10 G	1
Hex nut	HN M10 G	3
Washer	WS 10 G	1
Fender washer	DIN440 11 F	1

Choose the fastening anchors according to the substrate



## Cable tray RKS-Magic® 60

St FS FT

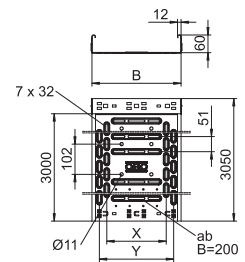


Type	Width mm	Metal thick- ness mm	BS	Pack m	Weight kg/100 m	Item no.
RKSM 610 FS	100	0.75	🔥	3	134.334	6047611
RKSM 615 FS	150	0.75		3	154.885	6047630
RKSM 620 FS	200	0.75	🔥	3	181.508	6047638
RKSM 630 FS	300	0.75	🔥	3	233.803	6047654
RKSM 640 FS	400	0.90	🔥	3	338.459	6047689
RKSM 610 FT	100	1.00	🔥	3	197.410	6047612
RKSM 615 FT	150	1.00		3	236.984	6047631
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

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.

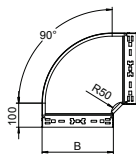
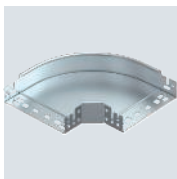
Type	Length mm	Dim. B mm	Usable cross- section cm <sup>2</sup>	Dim. x mm	Dim- en- sion y mm
RKSM 610 FS	3050	100	58	—	50
RKSM 615 FS	3050	150	88	50	100
RKSM 620 FS	3050	200	118	100	150
RKSM 630 FS	3050	300	178	200	250
RKSM 640 FS	3050	400	238	300	350

### Dimensions



## 90° Magic bend 60

St FS FT



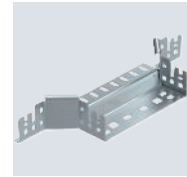
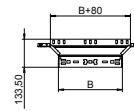
Type	Width mm	Dim. B mm	Pack Piece	Weight kg/100 pc.	Item no.
RBM 90 610 FS	100	100	1	65.700	6041130
RBM 90 615 FS	150	150	1	91.900	6041132
RBM 90 620 FS	200	200	1	121.900	6041134
RBM 90 630 FS	300	300	1	192.200	6041136
RBM 90 640 FS	400	400	1	274.700	6041138
RBM 90 610 FT	100	100	1	70.700	6041150
RBM 90 615 FT	150	150	1	99.300	6041152
RBM 90 620 FT	200	200	1	131.300	6041154
RBM 90 630 FT	300	300	1	207.500	6041156
RBM 90 640 FT	400	400	1	296.300	6041158

90° bend with quick connector system. For all cable tray types of 60 mm side height.

St FS FT

### Add-on tee 60

Type	Dim.		Pack Piece	Weight kg/100 pc.	Item no.
	Width mm	B mm			
RAAM 610 FS	100	100	1	37.700	6041230
RAAM 615 FS	150	150	1	42.046	6041232
RAAM 620 FS	200	200	1	50.100	6041234
RAAM 630 FS	300	300	1	60.940	6041236
RAAM 640 FS	400	400	1	75.700	6041238
RAAM 610 FT	100	100	1	40.800	6041250
RAAM 615 FT	150	150	1	47.500	6041252
RAAM 620 FT	200	200	1	54.200	6041254
RAAM 630 FT	300	300	1	68.000	6041257
RAAM 640 FT	400	400	1	81.800	6041259

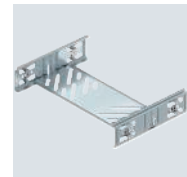
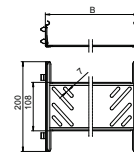


Magic add-on tee with quick connector system. For all cable tray types of 60 mm side height.

St FS DD

### Magic straight connector set 60

Type	Width mm	Side height mm	Dim. B mm	Pack Piece	Weight kg/100 pc.	Item no.
KTSMV 615 FS	150	60	150	1	34.900	6068916
KTSMV 620 FS	200	60	200	1	37.200	6068918
KTSMV 630 FS	300	60	300	1	44.000	6068920
KTSMV 640 FS	400	60	400	1	50.700	6068922
KTSMV 610 DD	100	60	100	1	30.500	6068936
KTSMV 615 DD	150	60	150	1	34.900	6068938
KTSMV 620 DD	200	60	200	1	37.200	6068940
KTSMV 630 DD	300	60	300	1	44.000	6068942
KTSMV 640 DD	400	60	400	1	50.700	6068944

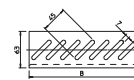


Cable tray connector with quick fastening for the screwless connection of perforated cable trays with a side height of 60 mm.

St FS DD

### Bottom end plate

Type	Dim.		Pack Piece	Weight kg/100 pc.	Item no.
	Width mm	B mm			
BEB 100 FS	100	100	1	4.599	7083106
BEB 150 FS	150	150	1	6.983	7083157
BEB 200 FS	200	200	1	9.367	7083203
BEB 300 FS	300	300	1	14.100	7083300
BEB 400 FS	400	400	1	18.900	7083408
BEB 150 DD	150	150	1	6.983	7083622

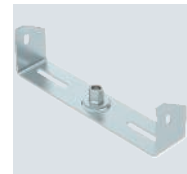
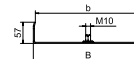


Bottom end plate for floor reinforcement at the ends of the cable tray and as cable protection.

St FS FT

### Centre suspension for cable tray, 60

Type	for width mm	For threaded rod	Dim.		F in kN	Pack Piece	Weight kg/100 pc.	Item no.
			B mm	b mm				
MAH 60 100 FS	100	M10	94	84	1.3	1	17.250	6358705
MAH 60 150 FS	150	M10	144	134	0.5	1	23.000	6358709
MAH 60 200 FS	200	M10	195	184	0.2	1	24.500	6358713
MAH 60 100 FT	100	M10	94	84	1.3	1	18.500	6358752
MAH 60 150 FT	150	M10	144	134	0.5	1	23.000	6358756
MAH 60 200 FT	200	M10	195	184	0.2	1	27.600	6358760



The centre suspension possesses a rotatable M10 threaded sleeve. When filling, ensure an even distribution of the load (avoid one-sided filling).

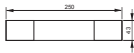
The widths 100, 150 and 200 mm have additional base perforations, in order to screw the centre suspensions to the tray base when used for the maintenance of electrical functionality according to DIN 4102 Part 12.

Centre suspension for cable trays with rolled side rail of side height 60 mm.

# Cable tray RKS-Magic®

## Identification plate for maintenance of electrical function

PVC



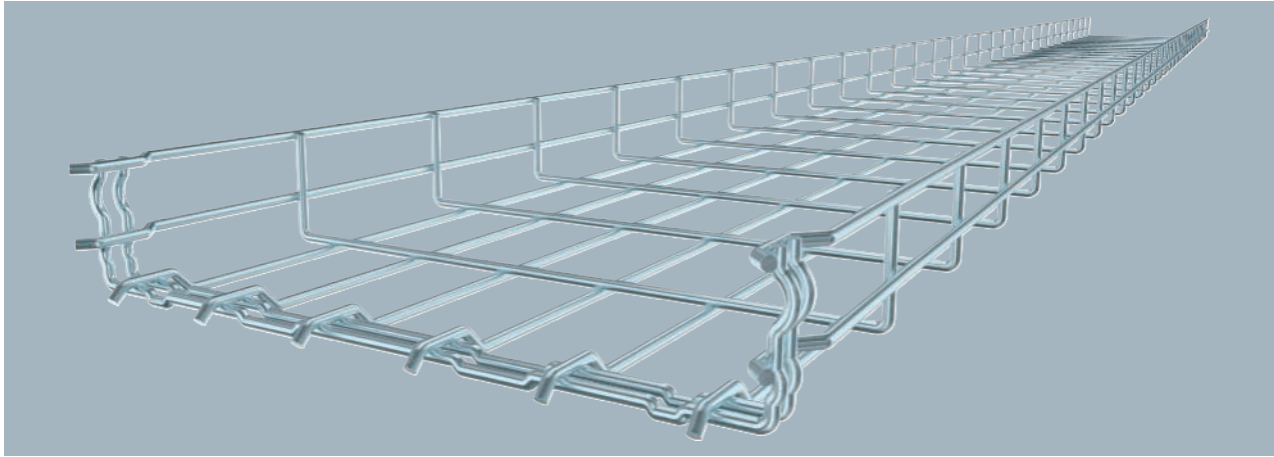
Type	Language		Pack	Weight	Item no.
			Piece	kg/100 pc.	
KS-E DE	German		10	0.600	7205423
KS-E EN	English		10	0.600	7205432

Self-adhesive identification plate for approved cable system labelling for maintenance of electrical function as required by DIN 4102 Part 12.

## Mesh cable tray GR-Magic®

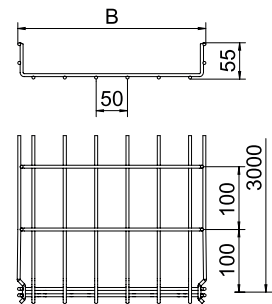
St G

### GR-Magic® 55 mesh cable tray



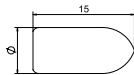
Type	Wire			Pack m	Weight kg/100 m	Item no.
	Width mm	Ø mm	BS			
GRM 55 50 G	50	3.9		3	67.000	6001441
GRM 55 100 G	100	3.9	🔥	3	72.000	6001442
GRM 55 150 G	150	3.9		3	85.667	6001444
GRM 55 200 G	200	3.9	🔥	3	100.667	6001446
GRM 55 200 4.8 G	200	4.8	🔥	3	150.000	6001447
GRM 55 300 G	300	4.8	🔥	3	192.333	6001448
GRM 55 400 G	400	4.8	🔥	3	234.667	6001450
GRM 55 450 G	450	4.8		3	241.333	6001451
GRM 55 500 G	500	4.8		3	276.667	6001452
GRM 55 600 G	600	4.8		3	320.000	6001454

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



## Protective caps

PVC



Type	Colour	Pack	Weight	Item no.
		Piece	kg/100 pc.	
GR KS 3.9 OR	Pure orange	500	0.045	6003750
GR KS 4.8 OR	Pure orange	500	0.030	6003754

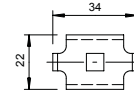
Protective cap to cover cut wire ends of mesh cable trays.

St G

### GKS 34 hold-down clamp

Type	Pack Piece	Weight kg/100 pc.	Item no.
GKS 34 G	20	2.188	6016855

Clamp for fixing mesh cable trays to wall or support brackets.

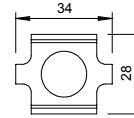


St G

### Joint connector GSV 34

Type	Pack Piece	Weight kg/100 pc.	Item no.
GSV 34 G	20	3.155	6016596

Screwed version of joint connector for mesh cable trays.

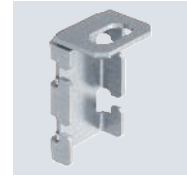
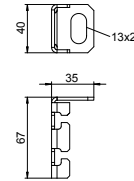


St FT

### Connection component

Type	Pack Piece	Weight kg/100 pc.	Item no.
ABG FT	20	8.500	6015345

Seat for threaded rod on mesh cable tray.

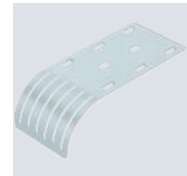
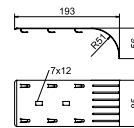


St FS

### Drop-out plate

Type	Pack Piece	Weight kg/100 pc.	Item no.
KAB GR FS	10	14.100	6220139

Drop-out plate for mesh cable trays.

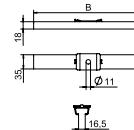


St FS

### Centre suspension mesh cable tray

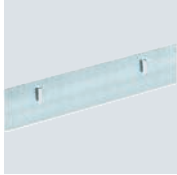
Type	Dim. B mm	Pack Piece	Weight kg/100 pc.	Item no.
GMS 170 FS	170	25	20.000	6015400

Centre suspension including hold-down clamp for mesh cable tray suspensions.



## Label holder for mesh cable trays

St FS



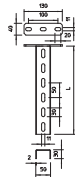
Type	Length mm	Height mm	Pack Piece	Weight kg/100 pc.	Item no.
GR-KS FS	252	45	10	5.334	7205400

Label holder for fastening on mesh cable trays for approval-suitable labelling of cable systems in accordance with DIN 4102 Part 12. Fits the KS-E identification plate. With clamping lugs for toolless mounting.

## Mounting systems

### US 3 support

St FT

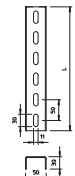
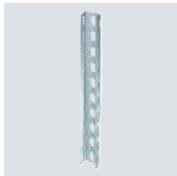


Type	Length mm	Material thickness mm	BS	Pack Piece	Weight kg/100 pc.	Item no.
US 3 K 20 FT	200	2	🔥	1	50.500	6342351
US 3 K 30 FT	300	2	🔥	1	64.400	6342353
US 3 K 40 FT	400	2	🔥	1	78.300	6342355
US 3 K 50 FT	500	2	🔥	1	92.300	6342357
US 3 K 60 FT	600	2	🔥	1	106.200	6342359
US 3 K 70 FT	700	2	🔥	1	120.200	6342362
US 3 K 80 FT	800	2	🔥	1	134.100	6342364
US 3 K 90 FT	900	2	🔥	1	147.800	6342366
US 3 K 100 FT	1000	2	🔥	1	162.000	6342368
US 3 K 110 FT	1100	2	🔥	1	175.900	6342370
US 3 K 120 FT	1200	2	🔥	1	189.900	6342372

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

### US 3 support

St FS

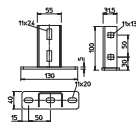


Type	Length mm	Material thickness mm	BS	Pack Piece	Weight kg/100 pc.	Item no.
US 3 20 FS	200	2	🔥	1	27.000	6342302
US 3 30 FS	300	2	🔥	1	40.000	6342304
US 3 40 FS	400	2	🔥	1	53.000	6342306
US 3 50 FS	500	2	🔥	1	67.000	6342308
US 3 60 FS	600	2	🔥	1	80.000	6342310
US 3 70 FS	700	2	🔥	1	93.000	6342312
US 3 80 FS	800	2	🔥	1	107.000	6342314
US 3 90 FS	900	2	🔥	1	120.000	6342316
US 3 100 FS	1000	2	🔥	1	133.000	6342318

U support in fixed lengths. Dimensions 30 x 50 mm.

### Head plate

St FT



Type	Pack Piece	Weight kg/100 pc.	Item no.
KU 3 FT	1	42.300	6348874

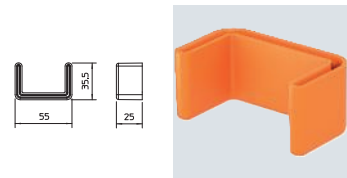
Head plate for mounting on US 3 supports.

PE

## Protective cap

Type	Colour	Pack Piece	Weight kg/100 pc.	Item no.
US 3 KS OR	Pastel orange	20	1.068	6338458

Protective cap to cover the ends of US 3 supports.

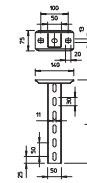


St FT

## US 5 support

Type	Length mm	Material thickness mm	Dim. L mm	BS	Pack Piece	Weight kg/100 pc.	Item no.
US 5 K 20 FT	200	2.5	200	🔥	1	85.000	6341527
US 5 K 30 FT	300	2.5	300	🔥	1	110.000	6341535
US 5 K 40 FT	400	2.5	400	🔥	1	136.000	6341543
US 5 K 50 FT	500	2.5	500	🔥	1	161.000	6341551
US 5 K 60 FT	600	2.5	600	🔥	1	185.000	6341578
US 5 K 70 FT	700	2.5	700	🔥	1	210.000	6341586
US 5 K 80 FT	800	2.5	800	🔥	1	236.000	6341594
US 5 K 90 FT	900	2.5	900	🔥	1	261.000	6341608
US 5 K 100 FT	1000	2.5	1000	🔥	1	286.000	6341616
US 5 K 110 FT	1100	2.5	1100	🔥	1	311.000	6341624
US 5 K 120 FT	1200	2.5	1200	🔥	1	337.000	6341632

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

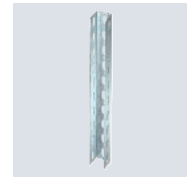


St FT

## US 5 support

Type	Length mm	Material thickness mm	Dim. L mm	BS	Pack Piece	Weight kg/100 pc.	Item no.
US 5 20 FT	200	2.5	200	🔥	1	51.000	6340881
US 5 30 FT	300	2.5	300	🔥	1	79.000	6340903
US 5 40 FT	400	2.5	400	🔥	1	106.000	6340911
US 5 50 FT	500	2.5	500	🔥	1	133.000	6340938
US 5 60 FT	600	2.5	600	🔥	1	160.000	6340946
US 5 70 FT	700	2.5	700	🔥	1	175.000	6340950
US 5 80 FT	800	2.5	800	🔥	1	200.000	6340954
US 5 90 FT	900	2.5	900	🔥	1	227.000	6340958
US 5 100 FT	1000	2.5	1000	🔥	1	265.000	6340962
US 5 150 FT	1500	2.5	1500	🔥	1	395.000	6340966

U support in fixed lengths. Dimensions 50 x 50 mm.

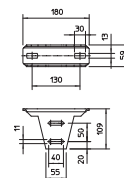


St FT

## KU 5 head plate, variable

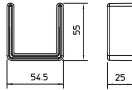
Type	Pack Piece	Weight kg/100 pc.	Item no.
KU 5 V FT	1	82.000	6348920

Variable head plate for installation on US 5 support.



## Protective cap

PE

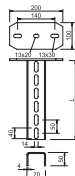


Type	Colour	Pack Piece	Weight kg/100 pc.	Item no.
US 5 KS OR	Pastel orange	20	1.300	6338462

Protective cap to cover the ends of US 5 supports.

## US 7 support

St FT

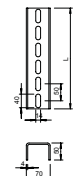


Type	Length mm	Material thickness mm	Dim. L mm	Pack Piece	Weight kg/100 pc.	Item no.
US 7 K 20 FT	200	4	200	1	177.000	6339018
US 7 K 30 FT	300	4	300	1	218.000	6339034
US 7 K 40 FT	400	4	400	1	261.000	6339050
US 7 K 50 FT	500	4	500	1	302.000	6339077
US 7 K 60 FT	600	4	600	1	344.000	6339093
US 7 K 70 FT	700	4	700	1	387.000	6339115
US 7 K 80 FT	800	4	800	1	418.000	6339131
US 7 K 90 FT	900	4	900	1	470.000	6339166
US 7 K 100 FT	1000	4	1000	1	512.000	6339182
US 7 K 110 FT	1100	4	1100	1	550.000	6339190
US 7 K 120 FT	1200	4	1200	1	591.000	6339204
US 7 K 140 FT	1400	4	1400	1	675.000	6339220
US 7 K 150 FT	1500	4	1500	1	718.000	6339239
US 7 K 180 FT	1800	4	1800	1	843.000	6339263
US 7 K 190 FT	1900	4	1900	1	884.000	6339271
US 7 K 200 FT	2000	4	2000	1	879.722	6339298
US 7 K 250 FT	2500	4	2500	1	1,140.000	6339334
US 7 K 300 FT	3000	4	3000	1	1,428.000	6339360

Suspended support (U profile) of dimensions 70 x 50 mm with welded head plate.

## US 7 support

St FT



Type	Length mm	Material thickness mm	Dim. L mm	BS	Pack Piece	Weight kg/100 pc.	Item no.
US 7 20 FT	200	4	200	🔥	1	81.000	6340016
US 7 30 FT	300	4	300	🔥	1	121.000	6340032
US 7 40 FT	400	4	400	🔥	1	160.700	6340059
US 7 50 FT	500	4	500	🔥	1	200.900	6340075
US 7 60 FT	600	4	600	🔥	1	241.100	6340091
US 7 70 FT	700	4	700	🔥	1	281.300	6340113
US 7 80 FT	800	4	800	🔥	1	323.000	6340148
US 7 90 FT	900	4	900	🔥	1	361.700	6340164
US 7 100 FT	1000	4	1000	🔥	1	416.000	6340180
US 7 110 FT	1100	4	1100	🔥	1	457.000	6340199
US 7 130 FT	1300	4	1300	🔥	1	540.000	6340210
US 7 140 FT	1400	4	1400	🔥	1	580.000	6340229
US 7 150 FT	1500	4	1500	🔥	1	620.000	6340237
US 7 160 FT	1600	4	1600	🔥	1	660.000	6340245
US 7 180 FT	1800	4	1800	🔥	1	750.000	6340261
US 7 190 FT	1900	4	1900	🔥	1	790.000	6340288
US 7 200 FT	2000	4	2000	🔥	1	803.700	6340296

U support in fixed lengths. Dimensions 70 x 50 mm.

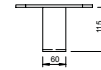
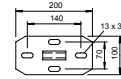


St FT

## Head plate, light-duty version

Type	Pack Piece	Weight kg/100 pc.	Item no.
<b>KU 7 FT</b>	1	144.600	<b>6349102</b>

Light-duty head plate for mounting on US 7 support.

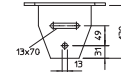
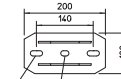


St FT

## Head plate, variable

Type	Pack Piece	Weight kg/100 pc.	Item no.
<b>KU 7 VQP FT</b>	1	181.600	<b>6349153</b>

Variable head plate for installation on US 7 support.

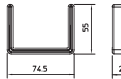


PE

## End cap

Type	Colour	Pack Piece	Weight kg/100 pc.	Item no.
<b>US 7 KS OR</b>	Pastel orange	20	1.806	<b>6338497</b>

Protective cap to cover the ends of US 7 supports.

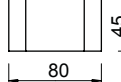
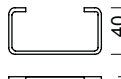


St FT

## Spacer DSK 45

Type	Pack Piece	Weight kg/100 pc.	Item no.
<b>DSK 45 FT</b>	20	18.000	<b>6416500</b>

Spacer for use in US 5 support and in the head plate, type KU 7 VQP.

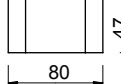
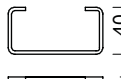


St FT

## Spacer DSK 47

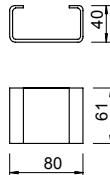
Type	Pack Piece	Weight kg/100 pc.	Item no.
<b>DSK 47 FT</b>	20	19.000	<b>6416504</b>

Spacer for use in head plate, type KU 5 V.



## DSK 61 spacer

St FT

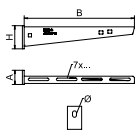


Type	Pack Piece	Weight kg/100 pc.	Item no.
<b>DSK 61 FT</b>	20	25.000	<b>6416519</b>

Spacer for use in US 7 supports.

## Wall and support bracket AW 15

St FT

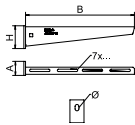


Type	Width mm	Dim. H mm	Dim. A mm	Dim. B mm	Hole Ø mm	BS	Pack Piece	Weight kg/100 pc.	Item no.
<b>AW 15 21 FT</b>	210	60	40	210	11		1	24.000	<b>6420680</b>
<b>AW 15 31 FT</b>	310	65	40	310	11		1	38.400	<b>6420710</b>
<b>AW 15 41 FT</b>	410	70	40	410	11		1	54.000	<b>6420745</b>

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

## Wall and support bracket AWG 15

St FT

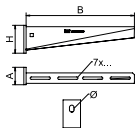


Type	Width mm	Dim. H mm	Dim. A mm	Dim. B mm	Hole Ø mm	BS	Pack Piece	Weight kg/100 pc.	Item no.
<b>AW G 15 21 FT</b>	210	60	40	210	11		1	26.000	<b>6420608</b>
<b>AW G 15 31 FT</b>	310	65	40	310	11		1	35.000	<b>6420610</b>
<b>AW G 15 41 FT</b>	410	70	40	410	11		1	56.000	<b>6420612</b>

Light-duty wall and support bracket with welded head plate for screwless mesh cable tray fastening.

## Wall and support bracket AW 30

St FT

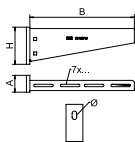


Type	Width mm	Dim. H mm	Dim. A mm	Dim. B mm	Hole Ø mm	BS	Pack Piece	Weight kg/100 pc.	Item no.
<b>AW 30 11 FT</b>	110	60	50	110	11		1	22.000	<b>6419704</b>

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

## Wall and support bracket AW 55

St FT



Type	Width mm	Dim. B mm	Dim. H mm	Dim. A mm	Hole Ø mm	BS	Pack Piece	Weight kg/100 pc.	Item no.
<b>AW 55 21 FT</b>	210	210	90	50	13.5		1	75.700	<b>6418554</b>
<b>AW 55 31 FT</b>	310	310	110	50	13.5		1	122.000	<b>6418570</b>
<b>AW 55 41 FT</b>	410	410	130	50	13.5		1	164.400	<b>6418597</b>

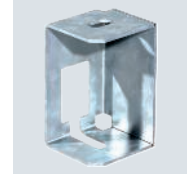
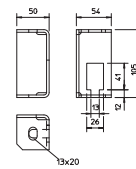
Heavy-duty wall and support bracket with welded head plate.

St FT

## Fire protection clamp

Type	Pack Piece	Weight kg/100 pc.	Item no.
<b>BSB FT</b>	20	42.400	<b>6418198</b>

Fire protection clamp for ceiling fastening of the threaded rod lock for routing types with cable ladders and cable trays for the maintenance of electrical function to DIN 4102 Part 12.

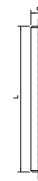


St G

## Threaded rod

Type	Thread	Dim. d mm	Dim. L mm	Pack Piece	Weight kg/100 pc.	Item no.
<b>TR M10 1M G</b>	M10	10	1000	10	49.000	<b>3141209</b>
<b>TR M12 1M G</b>	M12	12	1000	10	62.000	<b>3141306</b>

Threaded rod to DIN 976.

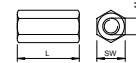


St G

## Connection sleeve

Type	Thread	Dim. L mm	SW mm	Pack Piece	Weight kg/100 pc.	Item no.
<b>CSTR M10 G</b>	M10	30	17	50	4.150	<b>6410103</b>
<b>CSTR M12 G</b>	M12	40	19	25	7.000	<b>6410111</b>

Connection sleeve with continuous internal thread.

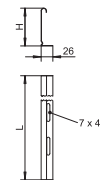


St FS

## Separating retainer 45

Type	Dim. H mm	Metal thickness mm	Dim. L mm	Pack m	Weight kg/100 m	Item no.
<b>TSG 45 FS</b>	45	0.75	3000	3	46.700	<b>6062033</b>

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

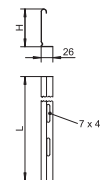


St FS

## Separating retainer 60

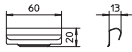
Type	Dim. H mm	Metal thickness mm	Dim. L mm	Pack m	Weight kg/100 m	Item no.
<b>TSG 60 FS</b>	60	0.75	3000	3	55.700	<b>6062068</b>

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



## Separating retainer connector

VA 2B

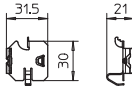
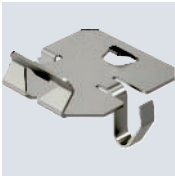


Type	Pack Piece	Weight kg/100 pc.	Item no.
<b>TSGV A2</b>	10	0.899	<b>6067970</b>

Separating retainer connector for screwless connection of the TSG separating retainer in all side heights.

## Hold-down clamp for separating retainer fastening in RKSM

VA 2B

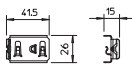


Type	Pack Piece	Weight kg/100 pc.	Item no.
<b>KS KR A2</b>	30	0.537	<b>6062280</b>

Hold-down clamp for screwless fastening of separating retainers in the cable tray types RKSM, MKS and SKS.

## Hold-down clamp for separating retainer fastening in GRM

VA 2B

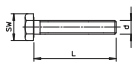


Type	Pack Piece	Weight kg/100 pc.	Item no.
<b>KS GR A2</b>	30	0.830	<b>6062282</b>

Hold-down clamp for fastening separating retainer in mesh cable trays.

## Hexagonal bolt M10

St F

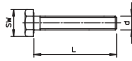


Type	Dimen- sion mm	Dim. L mm	Dim. d mm	SW mm	Resist- ance grade	Pack Piece	Weight kg/100 pc.	Item no.
<b>SKS 10x80 F</b>	M 10x80	80	10	17	8.8	20	6.900	<b>6418250</b>
<b>SKS 10x90 F</b>	M 10x90	90	10	17	8.8	20	8.950	<b>6418252</b>

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

## Hexagonal bolt M12

St F



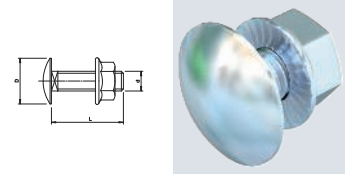
Type	Dimen- sion mm	Dim. L mm	Dim. d mm	SW mm	Resist- ance grade	Pack Piece	Weight kg/100 pc.	Item no.
<b>SKS 12x80 F</b>	M 12x80	80	12	19	8.8	20	10.000	<b>6418287</b>
<b>SKS 12x100 F</b>	M 12x100	100	12	19	8.8	20	10.981	<b>6418295</b>
<b>SKS 12x110 F</b>	M 12x110	110	12	19	8.8	20	14.500	<b>6418317</b>

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

St F

### Truss-head bolt with flange nut

Type	Dimen- sion mm	Dim. L mm	Dim. d mm	Dim. D mm	Resist- ance grade	Pack Piece	Weight kg/100 pc.	Item no.
FRSB 6x12 F	M6x12	12	6	13.5	5.6	100	0.812	6406122
FRSB 6x16 F	M6x16	16	6	13.5	5.6	100	0.890	6406157
FRSB 6x20 F	M6x20	20	6	13.5	5.6	100	0.965	6406203

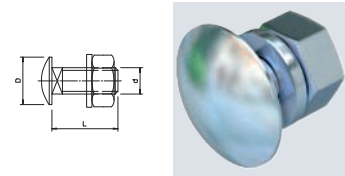


Truss-head bolt with square neck including flange nut.

St F

### Truss-head bolt with nut and washer

Type	Dimen- sion mm	Dim. L mm	Dim. d mm	Dim. D mm	Resist- ance grade	Pack Piece	Weight kg/100 pc.	Item no.
FRS 10x25 F	M 10x25	25	10	24	5.6	50	4.077	6407528

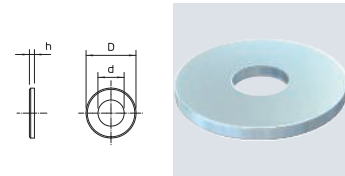


Truss-head bolt with square neck. With washer and hexagonal nut.

St F

### Large washer

Type	Dim. D mm	Dim. d mm	Dim. h mm	Pack Piece	Weight kg/100 pc.	Item no.
DIN440 11 F	34	11	3	100	1.852	6408729
DIN440 14 F	44	13.5	4	50	4.736	6408737

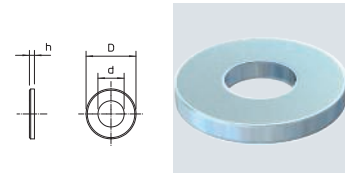


Washer of particularly large outer diameter.

St G

### Washer

Type	Thread	Dim. d mm	Dim. D mm	Dim. h mm	Pack Piece	Weight kg/100 pc.	Item no.
WS M10 D20 G	M10	10.5	20	2	100	0.408	3402096
WS M12 D24 G	M12	13	24	2.5	100	0.570	3402126

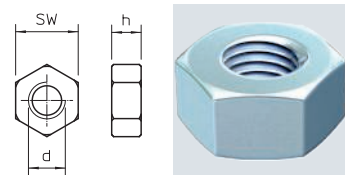


Washer according to DIN 125, shape A, for universal use.

St G

### Hexagonal nut DIN 934

Type	Thread	Dim. SW mm	Dim. h mm	Dim. d mm	Pack Piece	Weight kg/100 pc.	Item no.
HN M10 G	M10	17	8.4	10	100	1.014	3400107
HN M12 G	M12	19	10.8	12	100	1.730	3400123



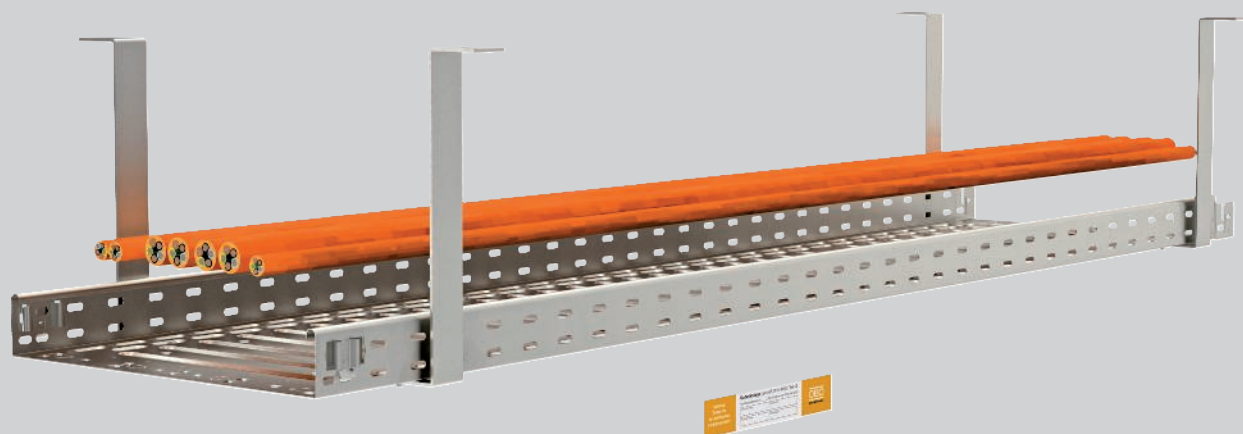
Hexagonal nut to DIN 934 with metric thread.

# RKS-Magic® cable tray, stainless steel

Systems for the maintenance of electrical function, cable-specific routing variants



## Cable trays, RKS-Magic® VA System description



The RKS-Magic® cable tray has been tested as a cable-specific support construction for the maintenance of electrical function according to DIN 4102 Part 12 and approved for maintenance of electrical function classes E 30 to E 90. The screwless connection system allows interconnection of the RKS-Magic® cable trays without tools and in a particularly quick and economic manner. To ensure the maintenance of

the electrical supply, only the locking lugs in the base need to be bent after the trays have been connected. The double material thickness in the joint area and the beading in the base mean that the cable tray has a very high load capacity. The installation of fittings in the section route is permitted, as is the mounting of separating retainers.

# Cable trays, RKS-Magic® VA

## Installation principle



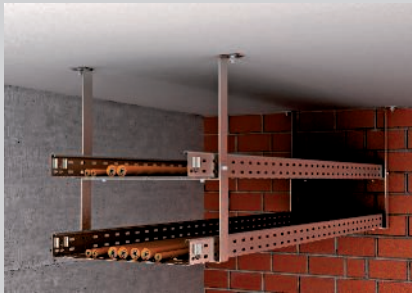
Single-layer ceiling mounting with suspension clamp.



Mounting under sloping ceiling with individually adapted suspension clamp.



Two-layer ceiling mounting with suspension clamp and intermediate clamp.



Two-layer ceiling mounting with suspension clamp and extension.



Fastening of the cable tray with truss-head bolts.



Joint connection without additional gland.

Classification according to DIN 4102 Part 12

E30

E60

E90





# Cable trays, RKS-Magic® VA

## Proof

### Maintenance of electrical functionality system according to DIN 4102 Part 12

Routing type	Cable-specific support construction
Test certificate no.	P-MPA-E-12-003
Maintenance of electrical functionality classes	E30 to E90
Testing standard	DIN 4102 Part 12
Mounting variant	Ceiling mounting with suspension clamp
Material version	Rustproof steel

### Support spacing for ceiling mounting with suspension clamp



Cable tray width	Cable load per cable tray		
100 mm	max. 30 kg/m	max. 1.50 m	max. 1.50 m
200 mm	max. 30 kg/m	max. 1.50 m	max. 1.50 m
300 mm	max. 30 kg/m	max. 1.50 m	max. 1.50 m



## Cable trays, RKS-Magic® VA

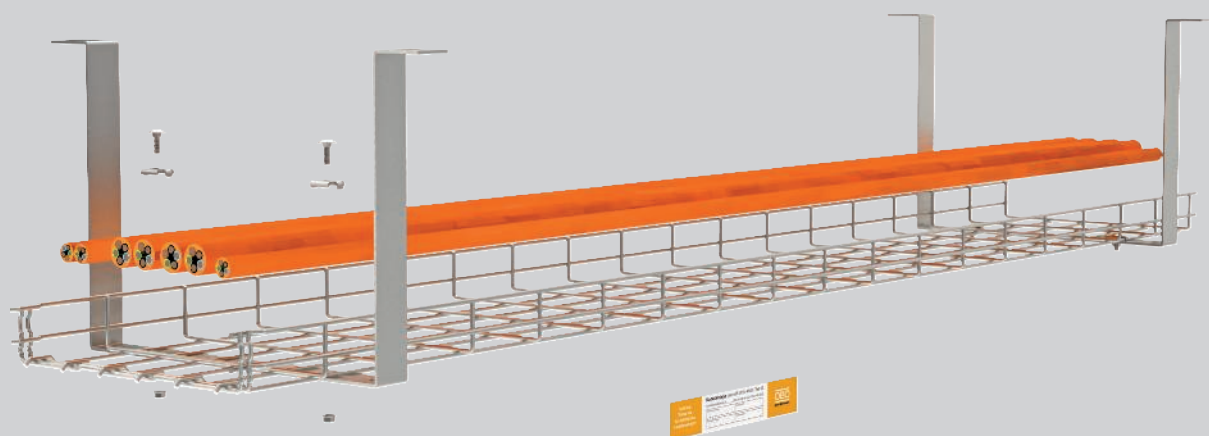
### Components used

#### Ceiling mounting with suspension clamp

Component	Type		
Cable tray	RKSM 6... VA4571	1	2
Suspension clamp	AHB-T	1	1
Truss-head bolt	FRSB 6x12 A4	2	4
Intermediate clamp	AHB-TZ	0	1
Truss-head bolt	FRSB 6x16 A4	0	2

Choose the fastening anchors according to the substrate  
 Intermediate clamp AHB-TZ on request

## GR-Magic® mesh cable trays VA System description



The GR-Magic® mesh cable tray, made from rustproof steel, has been tested as a cable-specific support structure for the maintenance of electrical function according to DIN 4102 Part 12 and approved for the maintenance of electrical function classes E 30 to E 90. The rustproof steel version permits mounting in areas with more aggressive ambient conditions. The design of the AHB-T suspension clamp means that it can be mounted on straight, slanted or curved ceilings, thus

allowing simple, space-saving installation of the mesh cable tray. The benefits of the screwless connection systems of the GR-Magic® mesh cable trays also apply to this routing type. This makes mounting of mesh cable trays, for example in the installation of long sections in increased corrosion protection requirements, an economically viable routing variant. With this system, the mounting of separating retainers and lids is permitted.

# GR-Magic® mesh cable trays VA

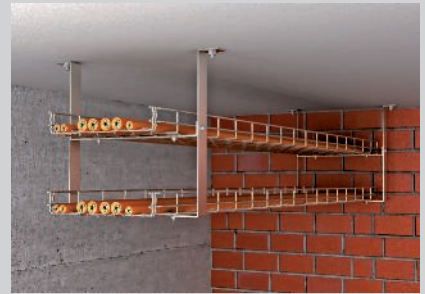
## Installation principle



Single-layer ceiling mounting with suspension clamp.



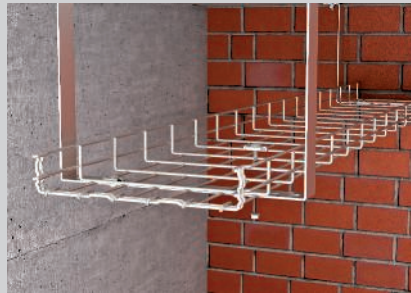
Mounting under sloping ceiling with individually adapted suspension clamp.



Two-layer ceiling mounting with suspension clamp and intermediate clamp.



Two-layer ceiling mounting with suspension clamp and extension.



Fastening of the mesh cable tray with clamping piece and truss-head bolts.



Joint connection without additional gland.

Classification according to DIN 4102 Part 12

E30

E60

E90



# GR-Magic® mesh cable trays VA

## Proof

### Maintenance of electrical functionality system according to DIN 4102 Part 12

Routing type	Cable-specific support construction
Test certificate no.	P-MPA-E-12-003
Maintenance of electrical functionality classes	E30 to E90
Testing standard	DIN 4102 Part 12
Mounting variant	Ceiling mounting with suspension clamp
Material version	Rustproof steel

### Support spacing for ceiling mounting with suspension clamp



Cable tray width	Cable load per cable tray		
100 mm	max. 20 kg/m	max. 1.50 m	max. 1.50 m
200 mm	max. 20 kg/m	max. 1.50 m	max. 1.50 m
300 mm	max. 20 kg/m	max. 1.50 m	max. 1.50 m



# GR-Magic® mesh cable trays VA

## Components used

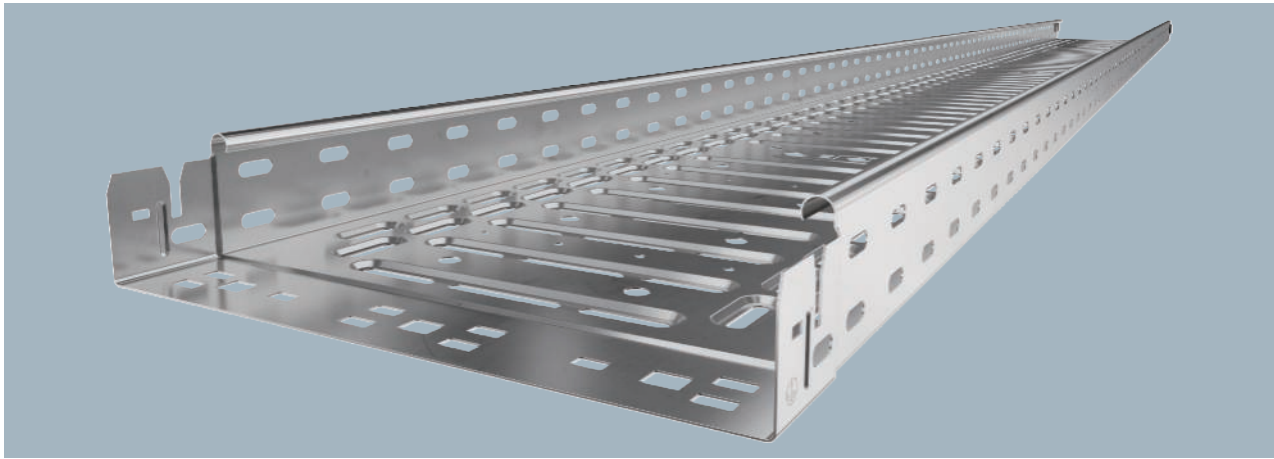
### Ceiling mounting with suspension clamp

Component	Type		
Mesh cable tray	GRM 55 ... VA4401	1	2
Suspension clamp	AHB-T	1	1
Clamping piece	GKS 34 VA4401	2	4
Intermediate clamp	AHB-TZ	0	1
Truss-head bolt	FRSB 6x16 A4	0	2

Choose the fastening anchors according to the substrate  
Intermediate clamp AHB-TZ on request

A2 A4 2B

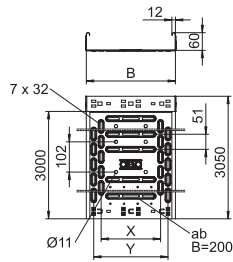
Cable tray RKS-Magic® 60



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	Pack m	Weight kg/100 m	Item no.
RKSM 610 A2	100	0.75		3	144.590	6047613
RKSM 620 A2	200	0.75		3	200.984	6047640
RKSM 630 A2	300	0.75		3	259.344	6047656
RKSM 610 A4	100	0.75		3	144.590	6047614
RKSM 620 A4	200	0.75		3	200.984	6047641
RKSM 630 A4	300	0.75		3	259.344	6047657

Dimensions

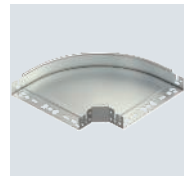
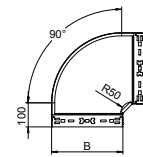


Type	Length mm	Width mm	Usable cross-section cm²	Dim. x mm	Dim. y mm
RKSM 610 A2	3050	100	58	—	50
RKSM 620 A2	3050	200	118	100	150
RKSM 630 A2	3050	300	178	200	250

A2 A4 2B

90° Magic bend 60

Type	Width mm	Dim. B mm	Pack Piece	Weight kg/100 pc.	Item no.
RBM 90 610 A2	100	100	1	65.700	6041180
RBM 90 620 A2	200	200	1	121.900	6041184
RBM 90 630 A2	300	300	1	192.200	6041186
RBM 90 610 A4	100	100	1	65.700	6041200
RBM 90 620 A4	200	200	1	121.900	6041204
RBM 90 630 A4	300	300	1	192.200	6041206

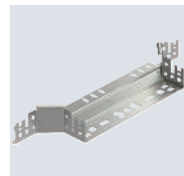
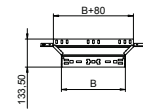


90° bend with quick connector system. For all cable tray types of 60 mm side height.

A2 A4 2B

Magic add-on tee 60

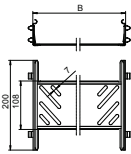
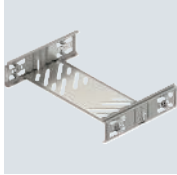
Type	Width mm	Dim. B mm	Pack Piece	Weight kg/100 pc.	Item no.
RAAM 610 A2	100	100	1	37.700	6041270
RAAM 620 A2	200	200	1	50.100	6041275
RAAM 630 A2	300	300	1	62.900	6041277
RAAM 610 A4	100	100	1	37.700	6041290
RAAM 620 A4	200	200	1	50.100	6041294
RAAM 630 A4	300	300	1	62.900	6041296



Add-on tee with quick connector system. For all cable tray types of 60 mm side height.

## Magic straight connector set 60

A2 2B

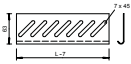


Type	Width mm	Dim.		Pack Piece	Weight kg/100 pc.	Item no.
		B mm	B mm			
KTSMV 610 A2	100	100		1	30.500	6068958
KTSMV 620 A2	200	200		1	37.200	6068962
KTSMV 630 A2	300	300		1	44.000	6068964

Cable tray connector with quick fastening for the screwless connection of perforated cable trays with a side height of 60 mm.

## Bottom end plate

A2 2B

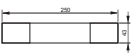


Type	Width mm	Dim.		Pack Piece	Weight kg/100 pc.	Item no.
		B mm	B mm			
BEB 100 A2	100	100		1	4.599	7084013
BEB 200 A2	200	200		1	9.367	7084048
BEB 300 A2	300	300		1	14.100	7084064

For base reinforcement at the ends of the tray and as cable protection.

## Identification plate for maintenance of electrical function

PVC



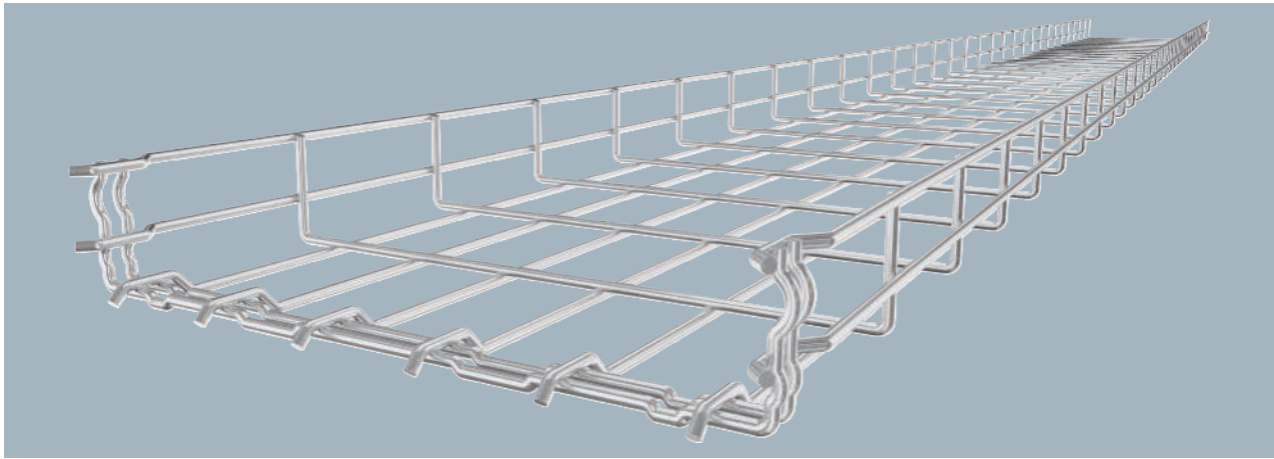
Type	Language		Pack Piece	Weight kg/100 pc.	Item no.
	German	English			
KS-E DE	German		10	0.600	7205423
KS-E EN	English		10	0.600	7205432

Self-adhesive identification plate for approved cable system labelling for maintenance of electrical function as required by DIN 4102 Part 12.



A2 VA 2B

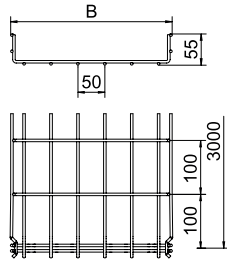
Mesh cable tray GR-Magic® 55



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

Type	Width mm	Wire Dim.		Pack m	Weight kg/100 m	Item no.
		Ø mm	B mm BS			
GRM 55 300 A2	300	4.8	300	3	192.333	6001078
GRM 55 300 A4	300	4.8	300	3	192.333	6001093

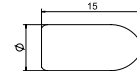
Dimensions



PVC

Type	Colour	Pack Piece	Weight kg/100 pc.	Item no.
GR KS 4.8 OR	Pure orange	500	0.030	6003754

Protective cap to cover cut wire ends of mesh cable trays.



Protective caps

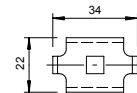


A2 VA 2B

GKS 34 hold-down clamp

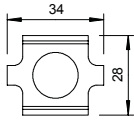
Type	Pack Piece	Weight kg/100 pc.	Item no.
GKS 34 A2	20	2.000	6016839
GKS 34 A4	10	1.976	6016859

Hold-down clamp for fixing mesh cable trays to wall or support brackets.



## Joint connector GSV 34

A2 VA 2B

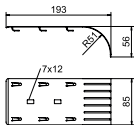
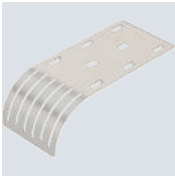


Type	Pack Piece	Weight kg/100 pc.	Item no.
GSV 34 A2	20	2.572	6016642
GSV 34 A4	20	3.000	6016648

Screwed version of joint connector for mesh cable trays.

## Drop-out plate

A2 2B



Type	Pack Piece	Weight kg/100 pc.	Item no.
KAB GR A2	10	14.100	6220145

Drop-out plate for mesh cable trays.

## Identification plate for maintenance of electrical function

PVC



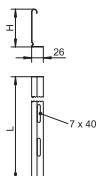
Type	Language	Pack Piece	Weight kg/100 pc.	Item no.
KS-E DE	German	10	0.600	7205423
KS-E EN	English	10	0.600	7205432

Self-adhesive identification plate for approved cable system labelling for maintenance of electrical function as required by DIN 4102 Part 12.

## Mounting systems, VA

### Separating retainer 45

A2 A4 2B

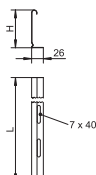


Type	Dim. H mm	Metal thickness mm	Dim. L mm	Pack m	Weight kg/100 m	Item no.
TSG 45 A2	45	0.75	3000	3	49.850	6062025
TSG 45 A4	45	0.75	3000	3	49.850	6062028

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

### Separating retainer 60

A2 A4 2B



Type	Dim. H mm	Metal thickness mm	Dim. L mm	Pack m	Weight kg/100 m	Item no.
TSG 60 A2	60	0.75	3000	3	59.265	6062084
TSG 60 A4	60	0.75	3000	3	59.256	6062086

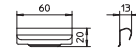
Separating retainer for the separation of cables of different voltages or functions.

VA 2B

### Separating retainer connector

Type	Pack Piece	Weight kg/100 pc.	Item no.
TSGV A2	10	0.899	6067970

Separating retainer connector for screwless connection of the TSG separating retainer in all side heights.

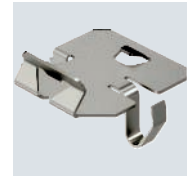
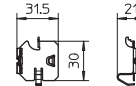


VA 2B

### Hold-down clamp for separating retainer fastening in RKSM

Type	Pack Piece	Weight kg/100 pc.	Item no.
KS KR A2	30	0.537	6062280

Hold-down clamp for screwless fastening of separating retainers in the cable tray types RKSM, MKS and SKS.

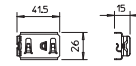


VA 2B

### Hold-down clamp for separating retainer fastening in GRM

Type	Pack Piece	Weight kg/100 pc.	Item no.
KS GR A2	30	0.830	6062282

Hold-down clamp for fastening separating retainer in mesh cable trays.

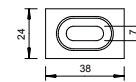


A2 VA 2B

### GKT 38 hold-down clamp

Type	Pack Piece	Weight kg/100 pc.	Item no.
GKT 38 A2	20	2.107	6017045
GKT 38 A4	10	2.200	6017092

Clamp for fastening barrier strip in mesh cable trays.

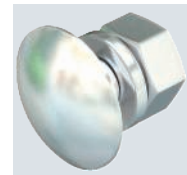
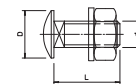


A2

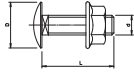
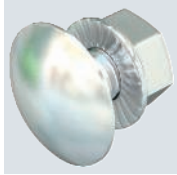
### Truss-head bolt with nut and washer

Type	Dimen- sion mm	Dim. L mm	Dim. d mm	Dim. D mm	Resist- ance grade	Pack Piece	Weight kg/100 pc.	Item no.
FRS 6x12 A2	M6x12	12	6	13.5	A2-70	100	0.760	6406521
FRS 6x16 A2	M6x16	15	6	13.5	A2-70	100	0.869	6406556

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



## Truss-head bolt with flange nut







Type	Dimension mm	Dim. L mm	Dim. d mm	Dim. D mm	Resist- ance grade	Pack Piece	Weight kg/100 pc.	Item no.
<b>FRSB 6x12 A4</b>	M6x12	12	6	13.5	A4-50	100	0.796	<b>6406142</b>
<b>FRSB 6x16 A4</b>	M6x16	16	6	13.5	A4-50	100	0.800	<b>6406193</b>

Truss-head bolt with square neck including flange nut.





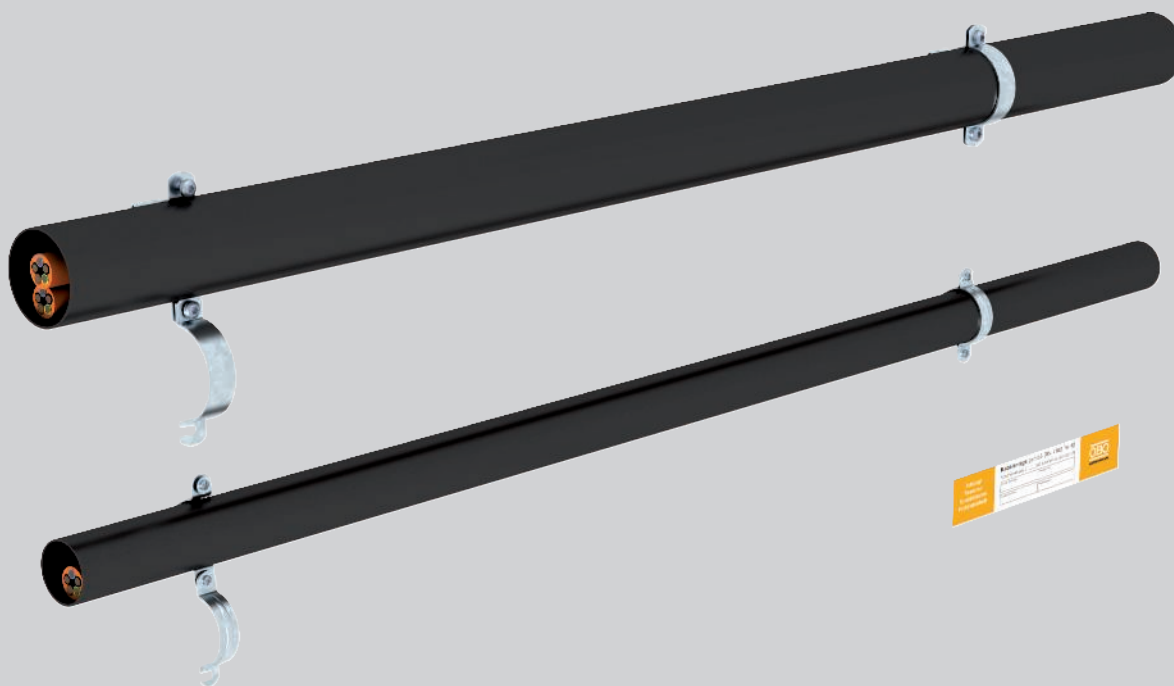
# Systems for the maintenance of electrical function, fire-tested individual routing systems

	Steel pipes	80
	LKM cable routing ducts	86
	Grip M grouped support and metal pressure clips	92
	Clamp clips, profile rails and screw-in spacer clips	100



## Cable routing in pipes

### System description



Cable routing in the steel pipe, in combination with clamp clips or with screw-in spacer clips, fulfils the requirements of DIN 4102 Part 12 as a cable-specific routing type for the maintenance of electrical functionality classes E 30, E 60 and E 90. The steel pipes may be routed horizontally on the wall or under the ceiling and offer additional mechanical protection of the installed cables. Sheet

steel clamp clips are used together with a riveted metal pressure sleeve and the appropriate profile rails, or closed screw-in spacer clips made of galvanised sheet steel. Refer to the available test certificates of the cable manufacturer for the maximum possible dimensions of the pipes, the maximum fastening spacing of the clips and the number of cables to be run in the pipe.



# Cable routing in pipes

## Installation principle



Ceiling mounting with screw-in spacer clip and clamp clip.



Horizontal wall mounting with screw-in spacer clip and clamp clip.



Space-saving installation of multiple pipes next to one another with clamp clips.



Insertion into the screw-in spacer clip by hooking the cover under the screw.



Multiple assignment according to the data of the test reports.

Classification according to DIN 4102 Part 12

**E30**

**E60**

**E90**

### System description

Routing type	Cable-specific support structure
Maintenance of electrical function classes	E30 to E90
Testing standard	DIN 4102 Part 12

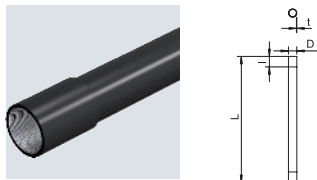
### Approved data

Cable-specific	Cable types and mounting parameters dependent on the cable manufacturer
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The data in the general construction test certificates applies.

### Armoured steel pipe with thread, black

St



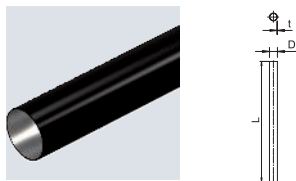
5 | 5 | 5 | 6 | 1

Type	Thread	Dim. D mm	Dim. L mm	Dim. I mm	Dim. t mm	Colour	Pack m	Weight kg/100 m	Item no.
SM16W SW	M16x1,5	16	3000	13	1.3	Jet black	30	50.000	2046500
SM20W SW	M20x1,5	20	3000	13	1.5	Jet black	30	73.000	2046501
SM25W SW	M25x1,5	25	3000	18	1.5	Jet black	30	92.000	2046502
SM32W SW	M32x1,5	32	3000	18	1.5	Jet black	21	120.000	2046503
SM40W SW	M40x1,5	40	3000	20,5	1,5	Jet black	15	152.000	2046505
SM50W SW	M50x1,5	50	3000	25	1,5	Jet black	15	190.700	2046506
SM63W SW	M63x1,5	63	3000	25	1,7	Jet black	9	287.700	2046507

Electrical installation pipe according to EN 61386-1 with threaded ends to EN 60423 for mechanical protection of cables.  
With burr-free inner wall. One coupling is already screwed onto each pipe.

### Armoured steel pipe without thread, black

St



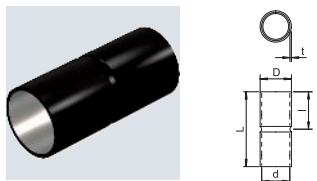
4 | 4 | 5 | 6 | 1

Type	Dim. D mm	Dim. L mm	Dim. t mm	Colour	Pack m	Weight kg/100 m	Item no.
S16W SW	16	3000	1	Jet black	30	37.000	2046565
S20W SW	20	3000	1	Jet black	30	44.700	2046566
S25W SW	25	3000	1,2	Jet black	30	70.400	2046567
S32W SW	32	3000	1,2	Jet black	21	91.200	2046568
S40W SW	40	3000	1,2	Jet black	15	139.700	2046569
S50W SW	50	3000	1,2	Jet black	15	176.000	2046570
S63W SW	63	3000	1,2	Jet black	9	223.000	2046571

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

### Armoured steel pipe connection sleeve without thread, black

St



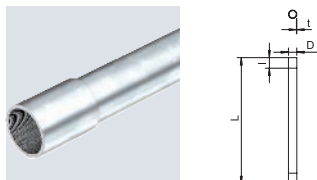
Type	Dim. D mm	Dim. d mm	Dim. L mm	Dim. I mm	Dim. t mm	Colour	Pack Piece	Weight kg/100 pc.	Item no.
SV16W SW	18,6	16,6	50	25	1	Jet black	25	2.400	2046582
SV20W SW	23,1	20,7	60	30	1,2	Jet black	50	3.200	2046583
SV25W SW	28,1	25,7	60	30	1,2	Jet black	50	5.500	2046584
SV32W SW	35,2	32,8	70	35	1,2	Jet black	50	7.900	2046585
SV40W SW	43,8	40,8	80	40	1,5	Jet black	25	13.200	2046586
SV50W SW	54	51	100	50	1,5	Jet black	10	20.000	2046587
SV63W SW	67	64	100	50	1,5	Jet black	5	28.000	2046588

Accessory part: plug-in sleeve for the connections between electrical installation pipes. With burr-free inner wall.

### Electrogalvanised steel pipe, with thread

St

G



5 | 5 | 5 | 7 | 1

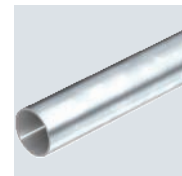
Type	Thread	Dim. D mm	Dim. L mm	Dim. I mm	Dim. t mm	Colour	Pack m	Weight kg/100 m	Item no.
SM16W G	M16x1,5	16	3000	13	1,3		30	50.390	2046861
SM20W G	M20x1,5	20	3000	13	1,5		30	66.667	2046862
SM25W G	M25x1,5	25	3000	18	1,5		30	92.290	2046863
SM32W G	M32x1,5	32	3000	18	1,5		21	120.000	2046864
SM40W G	M40x1,5	40	3000	20,5	1,5		15	151.450	2046865
SM50W G	M50x1,5	50	3000	25	1,5		15	190.000	2046866
SM63W G	M63x1,5	63	3000	25	1,7		9	287.700	2046867

Electrical installation pipe according to EN 61386-1 with threaded ends to EN 60423 for mechanical protection of cables.  
With burr-free inner wall. One coupling is already screwed onto each pipe.

St G

### Armoured steel pipe without thread, electrogalvanised

Type	Dim. D mm	Dim. L mm	Dim. t mm	Pack m	Weight kg/100 m	Item no.
S16W G	16	3000	1	30	37.000	2046840
S20W G	20	3000	1	30	44.700	2046841
S25W G	25	3000	1.2	30	70.400	2046842
S32W G	32	3000	1.2	21	91.200	2046843
S40W G	40	3000	1.2	15	139.700	2046844
S50W G	50	3000	1.2	15	176.000	2046845
S63W G	63	3000	1.2	9	223.000	2046846



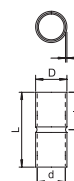
4 | 4 | 5 | 7 | 1

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

St G

### Armoured steel pipe connection sleeve without thread, electrogalvanised

Type	Dim. D mm	Dim. d mm	Dim. L mm	Dim. l mm	Dim. t mm	Pack Piece	Weight kg/100 pc.	Item no.
SV16W G	18.6	16.6	50	25	1	25	2.100	2046854
SV20W G	23.1	20.7	60	30	1.2	50	2.800	2046855
SV25W G	28.1	25.7	60	30	1.2	50	4.800	2046856
SV32W G	35.2	32.8	70	35	1.2	50	7.200	2046857
SV40W G	43.8	43.8	80	40	1.5	25	13.200	2046858
SV50W G	54	51	100	50	1.5	10	20.000	2046859
SV63W G	67	64	100	50	1.5	5	28.000	2046860

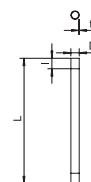


Accessory part: plug-in sleeve for the connections between electrical installation pipes. With burr-free inner wall.

St FT

### Hot-dip galvanised steel pipe, with thread

Type	Thread	Dim. D mm	Dim. L mm	Dim. l mm	Dim. t mm	Pack m	Weight kg/100 m	Item no.
SM16W FT	M16x1,5	16	3000	13	1.3	30	54.000	2046533
SM20W FT	M20x1,5	20	3000	13	1.5	30	79.000	2046534
SM25W FT	M25x1,5	25	3000	18	1.5	30	99.000	2046535
SM32W FT	M32x1,5	32	3000	18	1.5	21	130.000	2046536
SM40W FT	M40x1,5	40	3000	20.5	1.5	15	164.000	2046537
SM50W FT	M50x1,5	50	3000	25	1.5	15	206.000	2046538
SM63W FT	M63x1,5	63	3000	26	1.8	9	324.700	2046540



5 | 5 | 5 | 7 | 1

Electrical installation pipe according to EN 61386-1 with threaded ends to EN 60423 for mechanical protection of cables. With burr-free inner wall. Corrosion protection class 4 (high). One coupling is already screwed onto each pipe.

St FT

### Hot-dip galvanised steel pipe, without thread

Type	Dim. D mm	Dim. L mm	Dim. t mm	Pack m	Weight kg/100 m	Item no.
S16W FT	16	3000	1	30	37.000	2046593
S20W FT	20	3000	1	30	44.700	2046594
S25W FT	25	3000	1.2	30	70.400	2046595
S40W FT	40	3000	1.2	15	139.700	2046597
S50W FT	50	3000	1.2	15	176.000	2046598
S63W FT	63	3000	1.2	9	223.000	2046599

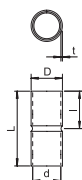


4 | 4 | 5 | 7 | 1

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).

### Hot-dip galvanised steel sleeve, without thread

St FT

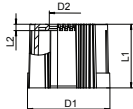
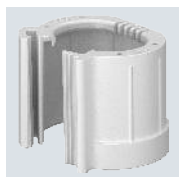


Type	Dim. D mm	Dim. d mm	Dim. L mm	Dim. l mm	Dim. t mm	Pack Piece	Weight kg/100 pc.	Item no.
SV16W FT	18.6	16.6	50	25	1	25	2.200	2046620
SV20W FT	23.1	20.7	60	30	1.2	50	3.200	2046621
SV25W FT	28.1	25.7	60	30	1.2	50	5.100	2046622
SV32W FT	35.2	32.8	70	35	1.2	50	7.500	2046623
SV40W FT	43.8	40.8	80	40	1.5	25	14.400	2046624
SV50W FT	54	51	100	50	1.5	10	22.000	2046625
SV63W FT	67	63	100	50	1.5	5	22.000	2046626

Accessory part: plug-in sleeve for the connections between electrical installation pipes. With burr-free inner wall.

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

PE

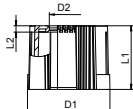


Type	Size	Dim. D1 mm	Dim. D2 mm	Dim. L1 mm	Dim. L2 mm	Colour	Pack Piece	Weight kg/100 pc.	Item no.
129 TB M16	M16	20	10	30	3	Light grey	50	0.400	2047812
129 TB M20	M20	24	13.4	30	3	Light grey	50	0.440	2047831
129 TB M25	M25	30	18.4	30	3	Light grey	50	0.500	2047839
129 TB M32	M32	36	25.4	30	3	Light grey	50	0.656	2047855
129 TB M40	M40	44	33.4	30	3	Light grey	30	0.790	2047863
129 TB M50	M50	53	43	30	3	Light grey	30	0.935	2047890
129 TB M63	M63	67	56	30	3	Light grey	20	1.140	2047898

Separable pipe end cap to slot onto metric electrical installation pipes. The separable 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.

### Pipe end cap, splittable, metric, black

PE

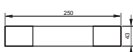


Type	Size	Dim. D1 mm	Dim. D2 mm	Dim. L1 mm	Dim. L2 mm	Colour	Pack Piece	Weight kg/100 pc.	Item no.
129 TB M16 SW	M16	20	10	30	3	Black	50	0.400	2047936
129 TB M20 SW	M20	24	13.4	30	3	Black	50	0.440	2047944
129 TB M25 SW	M25	30	18.4	30	3	Black	50	0.500	2047952
129 TB M32 SW	M32	36	25.4	30	3	Black	50	0.656	2047971
129 TB M40 SW	M40	44	33.4	30	3	Black	30	0.790	2047979
129 TB M50 SW	M50	53	43	30	3	Black	30	0.935	2047987
129 TB M63 SW	M63	67	56	30	3	Black	20	1.140	2047995

Separable pipe end cap to slot onto metric electrical installation pipes. The separable 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.

### Identification plate for maintenance of electrical function

PVC



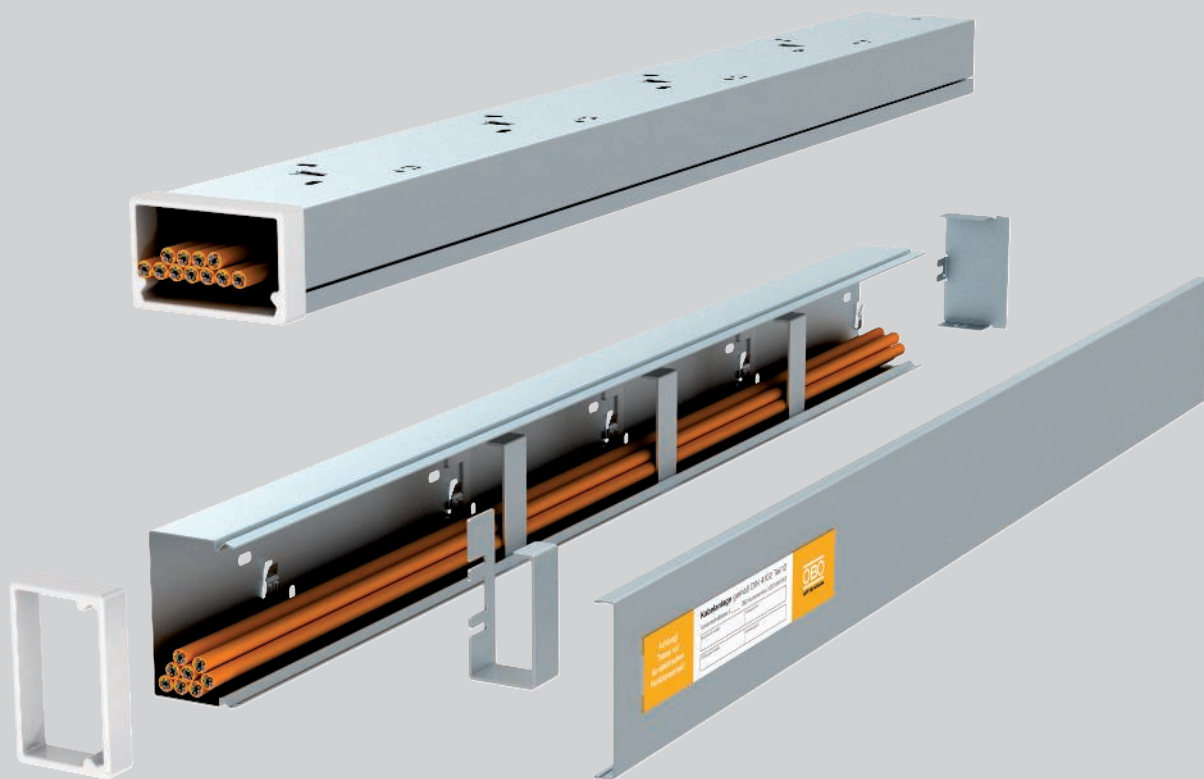
Type	Language	Pack Piece	Weight kg/100 pc.	Item no.
KS-E DE	German	10	0.600	7205423
KS-E EN	English	10	0.600	7205432

Self-adhesive identification plate for approved cable system labelling for maintenance of electrical function as required by DIN 4102 Part 12.



## LKM cable routing ducts

### System description



Cable routing with metal cable ducts, type LKM, is approved as a cable-specific routing type for the maintenance of electrical function classes E 30, E 60 and E 90 according to DIN 4102 Part 12. The ducts may be routed horizontally on the wall or under the ceiling and offer additional mechanical protection of the installed cables. This installation variant is also used if, for reasons of appearance,

open routing of the cables with the maintenance of electrical function is not wanted. A retaining clamp is available as an installation aid for the duct type LKM 60100. This prevents cables from falling out in the case of wall and ceiling mounting. When cable installation has been completed, the duct cover is locked onto the duct base.

# LKM cable routing ducts

## Installation principle



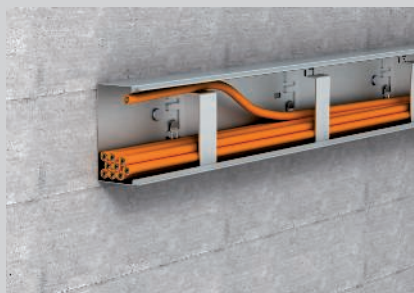
Horizontal wall and ceiling mounting.



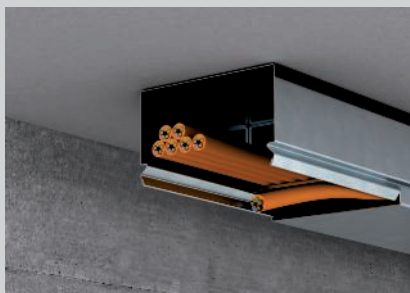
Routing of power, data or fire alarm cables in the duct, type LKM60100.



Tidy routing of data and fire alarm cables in the duct, type 20030.



Retaining clamps locked into the base as installation aid for wall mounting.



Retaining clamps as mounting aid for the insertion of cables for ceiling mounting.



Closing of the duct by simple locking of the cover onto the duct base.

Classification according to DIN 4102 Part 12

E30

E60

E90

### System description

Routing type	Cable-specific support structure
Test certificate no.	P-MPA-E-11-008
Maintenance of electrical function classes	E30 and E90
Testing standard	DIN 4102 Part 12

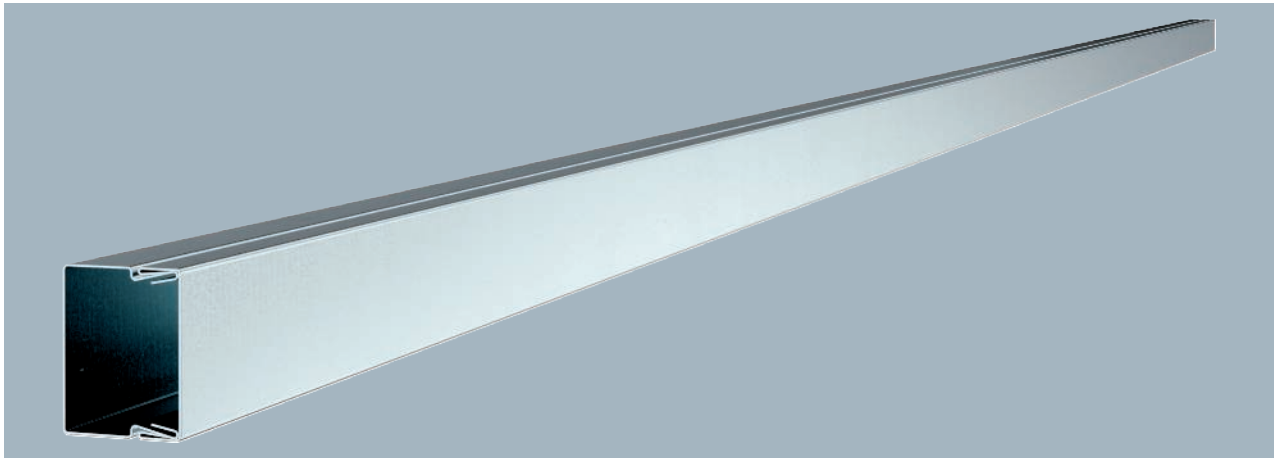
### Approved data

Type	Cable types	Fastening spacing	Cable load
LKM 20030	Data cable	max. 40 cm	max. 0.3 kg/m
LKM 60100	Power cable	max. 49 cm	max. 3.0 kg/m

The data in the general construction test certificates for the appropriate cable type applies.

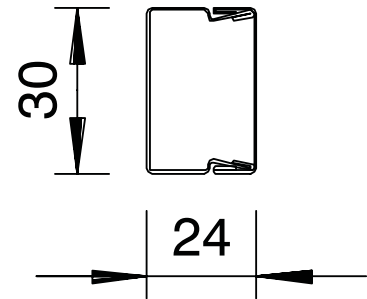
## Cable trunking, type LKM 20030

St FS



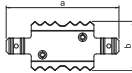
Type	Colour	Length mm	Pack m	Weight kg/100 m	Item no.
LKM20030FS	–	2000	2	58.000	6246974

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 20030, has been tested for the maintenance of electrical function as a routing system according to DIN 4102 Part 12. Please note the cable types tested in the BSS fire protection systems division!



## Joint connector LKM SV30

VA 2B

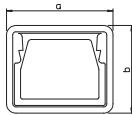


Type	Dim. a mm	Dim. b mm	Pack Piece	Weight kg/100 pc.	Item no.
LKM SV30	54	30	10	0.400	6247434

Joint connector to connect the bases. This creates the equipotential bonding between the duct bases.

## Edge protection ring KSR 20030, for LKM cable duct type 20030

PVC



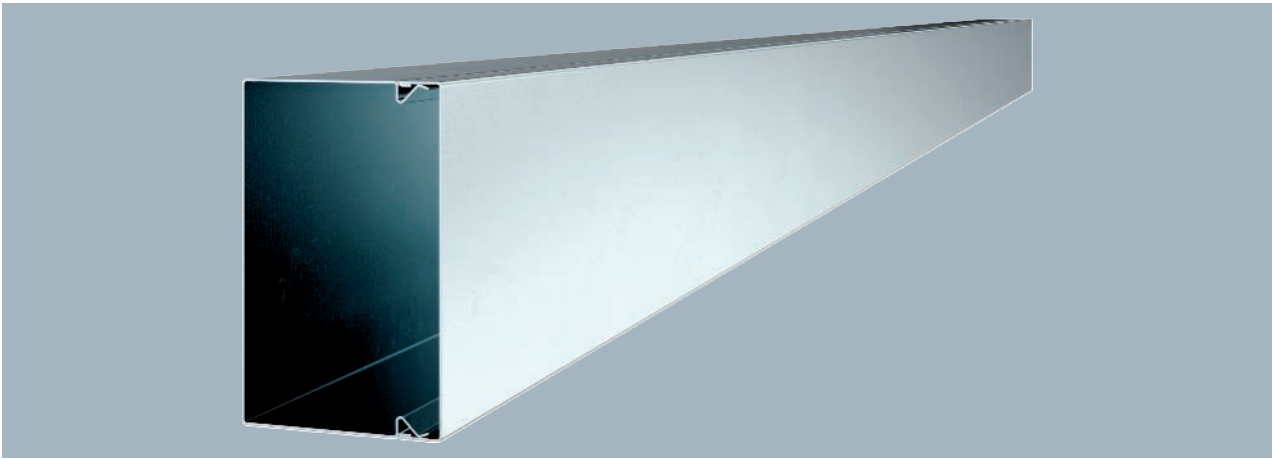
Type	Colour	Dim. a mm	Dim. b mm	Pack Piece	Weight kg/100 pc.	Item no.
KSR20030	Grey	34	28	5	1.100	6249844

Edge protection ring for the open ends of LKM cable trunking.



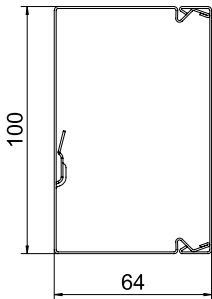
St FS FSK

Cable duct, type LKM 60100



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 note the cable types tested in the BSS fire protection systems division!

Type	Colour	Length mm	Pack m	Weight kg/100 m	Item no.
LKM60100FS	—	2000	2	221.700	6247113
LKM60100RW	Pure white	2000	2	221.700	6248624

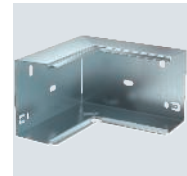
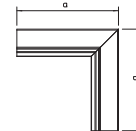


St FSK

Internal corner, for cable trunking type LKM 60100

Type	Colour	Dim. a mm	Pack Piece	Weight kg/100 pc.	Item no.
LKM I60100RW	Pure white	160	1	39.400	6249639

Internal corner for changing the direction of the LKM trunking.

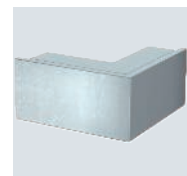
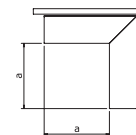


St FSK

External corner, for cable trunking type LKM 60100

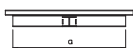
Type	Colour	Dim. a mm	Pack Piece	Weight kg/100 pc.	Item no.
LKM A60100RW	Pure white	120	1	73.100	6249574

External corner including cover for changing the direction of the LKM ducts.



T piece for cable trunking type LKM 60100

St FSK

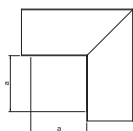


Type	Colour	Dim. a mm	Dim. b mm	Pack Piece	Weight kg/100 pc.	Item no.
LKM T60100RW	Pure white	300		1	69.200	6249701

T piece including cover for changing the direction of the LKM ducts.

Flat angle, for cable trunking type LKM 60100

St FSK

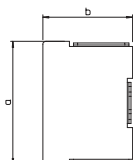
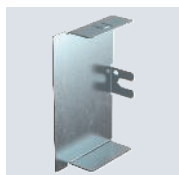


Type	Colour	Dim. a mm	Dim. b mm	Pack Piece	Weight kg/100 pc.	Item no.
LKM F60100RW	Pure white	140		1	63.400	6249507

Flat angle including cover for changing the direction of the LKM ducts.

End piece, for cable trunking type LKM 60100

St FSK

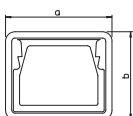


Type	Colour	Dim. a mm	Dim. b mm	Pack Piece	Weight kg/100 pc.	Item no.
LKM E60100RW	Pure white	100	64	10	6.500	6249817

End piece for closing the LKM ducts.

Edge protection ring KSR60100, for LKM cable duct type 60100

PVC

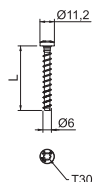


Type	Colour	Dim. a mm	Dim. b mm	Pack Piece	Weight kg/100 pc.	Item no.
KSR60100	Grey	104	68	5	3.400	6249852

Edge protection ring for the open ends of LKM cable trunking.

MMS-plus P round head tie, with panhead

St G



Type	Dimen- sion mm	Dim. L mm	Drill hole Ø mm	Head Ø mm	Screw system	Pack Piece	Weight kg/100 pc.	Item no.
MMS+ P 6x50	6x50	50	5	11.2	Torx	100	1.000	3498108

Bolt tie for direct mounting without additional anchors in cracked and uncracked concrete and masonry. With round head for universal fastenings. 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.

PVC

## Identification plate for maintenance of electrical function

Type	Language	Pack Piece	Weight kg/100 pc.	Item no.
KS-E DE	German	10	0.600	7205423
KS-E EN	English	10	0.600	7205432

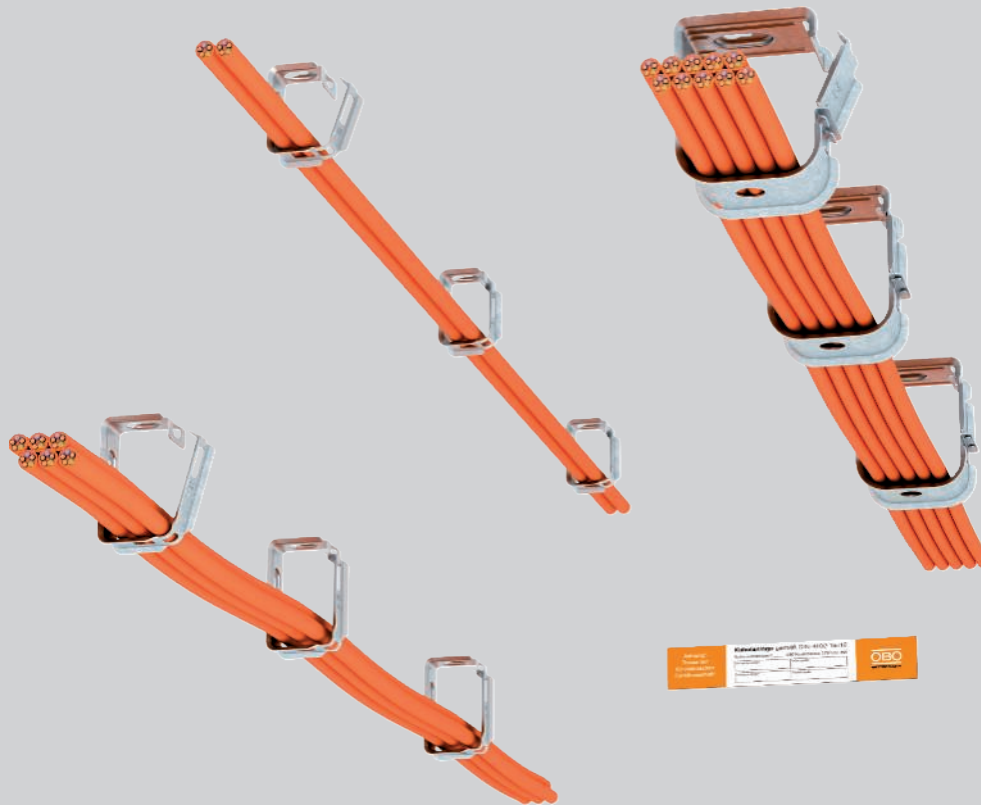


Self-adhesive identification plate for approved cable system labelling for maintenance of electrical function as required by DIN 4102 Part 12.



## Grip M grouped support

### System description



Cable routing with metal grouped supports is approved as a cable-specific routing type for the maintenance of electrical functionality classes E 30, E 60 and E 90 according to DIN 4102 Part 12. The collecting clamps used are made of sheet steel and can be opened and closed easily without the use of tools. To allow simple cable insertion, the supports can remain open during cable routing.

Grouped supports for wall and ceiling mounting are suitable. Depending on the tested cables and the grouped supports used for the tests, fastening spacings of maximum 0.8 m and a cable assignment of up to 6 kg/m are permitted. The instructions of the various cable manufacturers should be complied with.

# Grip M grouped support

## Installation principle



Horizontal wall and ceiling mounting.



Mounted grouped support 2031 M 15.



Easy insertion of the cables in the opened grouped support.

Classification according to DIN 4102 Part 12

**E30**

**E60**

**E90**

### System description

Routing type	Cable-specific support structure
Test certificate no. M15/M30/M70	P-MPA-E-09-007
Maintenance of electrical function classes	E30 to E90
Testing standard	DIN 4102 Part 12

### Approved data

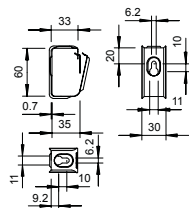
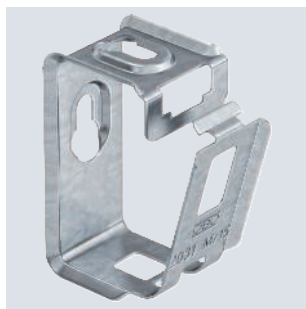
Type	Fastening spacing	Cable assignment, max.
2031 M15	0.5 m	1.1 kg/m
2031 M30	0.5 m	2.5 kg/m
2031 M70	0.6 m (0.8 m)	6.0 kg/m (3.0 kg/m)

With regard to the fastening distance and cable assignment, deviating values are possible, depending on the test certificates of the cable manufacturers.

During mounting, ensure that the closure of the grouped support is located at the side.

Grip collection clamp, metal 15

St FS

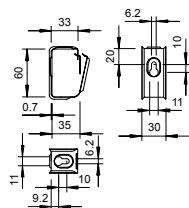
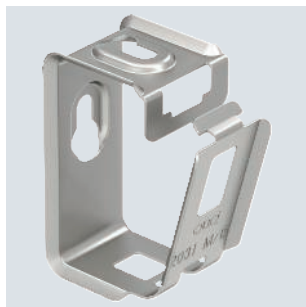


Type	No. of conductors	Shipping box	Pack Piece	Weight kg/100 pc.	Item no.
2031 M 15 FS	15	BS	50	50	2207028

Metal cable tidy for high mechanical stability, even in case of fire. Suitable for safe mounting above fire protection ceilings. Also approved as a cable-specific variant for the maintenance of electrical function to DIN 4102 part 12. For wall and ceiling mounting. Lock can be opened without tools. Detailed information on the approved routing variants can be found in the appropriate testing documentation.

Grip collection clamp, metal 15

A2 2B

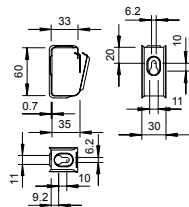
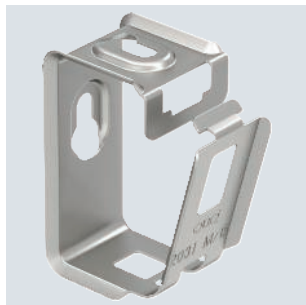


Type	No. of conductors	Shipping box	Pack Piece	Weight kg/100 pc.	Item no.
2031 M 15 A2	15	BS	50	50	2207080

Metal cable tidy for high mechanical stability, even in case of fire. Suitable for secure mounting above fire protection ceilings. Also approved as a cable-specific variant for the maintenance of electrical function to DIN 4102 part 12. For wall and ceiling mounting. Lock can be opened without tools. Detailed information on the approved routing variants can be found in the appropriate testing documentation.

Grip collection clamp, metal 15

A4 2B

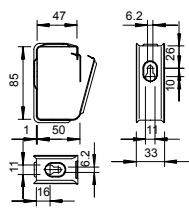


Type	No. of conductors	Shipping box	Pack Piece	Weight kg/100 pc.	Item no.
2031 M 15 A4	15	BS	50	50	2207132

Metal cable tidy for high mechanical stability, even in case of fire. Suitable for safe mounting above fire protection ceilings. Also approved as a cable-specific variant for the maintenance of electrical function to DIN 4102 part 12. For wall and ceiling mounting. Lock can be opened without tools. Detailed information on the approved routing variants can be found in the appropriate testing documentation.

Grip collection clamp, metal 30

St FS



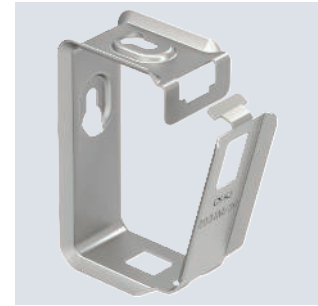
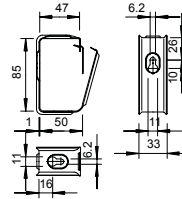
Type	No. of conductors	Shipping box	Pack Piece	Weight kg/100 pc.	Item no.
2031 M 30 FS	30	BS	25	25	2207036

Metal grouped support for high mechanical stability, even in case of fire. Suitable for safe mounting above fire protection ceilings. Also approved as a cable-specific variant for the maintenance of electrical function to DIN 4102 part 12. For wall and ceiling mounting. Lock can be opened without tools. Detailed information on the approved routing variants can be found in the appropriate testing documentation.

A2 2B

Type	No. of conductors	Shipping box	Pack Piece	Weight kg/100 pc.	Item no.
2031 M 30 A2	30	BS Piece	25	6.500	2207088

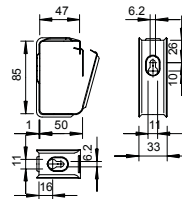
Metal grouped support for high mechanical stability, even in case of fire. Suitable for safe mounting above fire protection ceilings. Also approved as a cable-specific variant for the maintenance of electrical function to DIN 4102 part 12. For wall and ceiling mounting. Lock can be opened without tools. Detailed information on the approved routing variants can be found in the appropriate testing documentation.



A4 2B

Type	No. of conductors	Shipping box	Pack Piece	Weight kg/100 pc.	Item no.
2031 M 30 A4	30	BS Piece	25	6.500	2207140

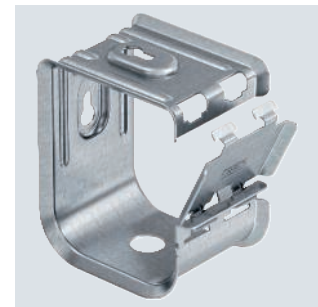
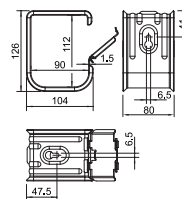
Metal grouped support for high mechanical stability, even in case of fire. Suitable for safe mounting above fire protection ceilings. Also approved as a cable-specific variant for the maintenance of electrical function to DIN 4102 part 12. For wall and ceiling mounting. Lock can be opened without tools. Detailed information on the approved routing variants can be found in the appropriate testing documentation.



St FS

Type	No. of conductors	Shipping box	Pack Piece	Weight kg/100 pc.	Item no.
2031 M 70 FS	70	BS Piece	10	34.500	2207060

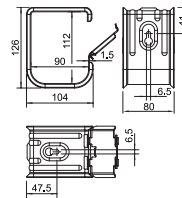
Metal grouped support for high mechanical stability, even in case of fire. Suitable for safe mounting above fire protection ceilings. Also approved as a cable-specific variant for the maintenance of electrical function to DIN 4102 part 12. For wall and ceiling mounting. Lock can be opened without tools. Detailed information on the approved routing variants can be found in the appropriate testing documentation.



A2 2B

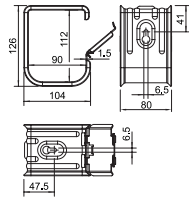
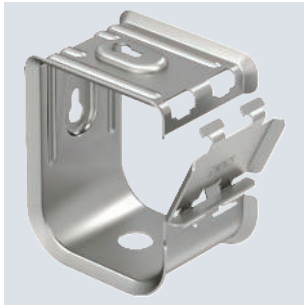
Type	No. of conductors	Shipping box	Pack Piece	Weight kg/100 pc.	Item no.
2031 M 70 A2	70	BS Piece	10	37.000	2207112

Metal grouped support for high mechanical stability, even in case of fire. Suitable for safe mounting above fire protection ceilings. Also approved as a cable-specific variant for the maintenance of electrical function to DIN 4102 part 12. For wall and ceiling mounting. Lock can be opened without tools. Detailed information on the approved routing variants can be found in the appropriate testing documentation.



## Grip collection clamp, metal 70

A4 2B

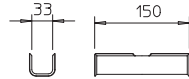


Type	No. of conductors	Shipping box	Pack Piece	Weight kg/100 pc.	Item no.
2031 M 70 A4	70	BS 10	10	37.000	2207164

Metal grouped support for high mechanical stability, even in case of fire. Suitable for safe mounting above fire protection ceilings. Also approved as a cable-specific variant for the maintenance of electrical function to DIN 4102 part 12. For wall and ceiling mounting. Lock can be opened without tools. Detailed information on the approved routing variants can be found in the appropriate testing documentation.

## Long trough for Grip collection clamp metal 15

St FS



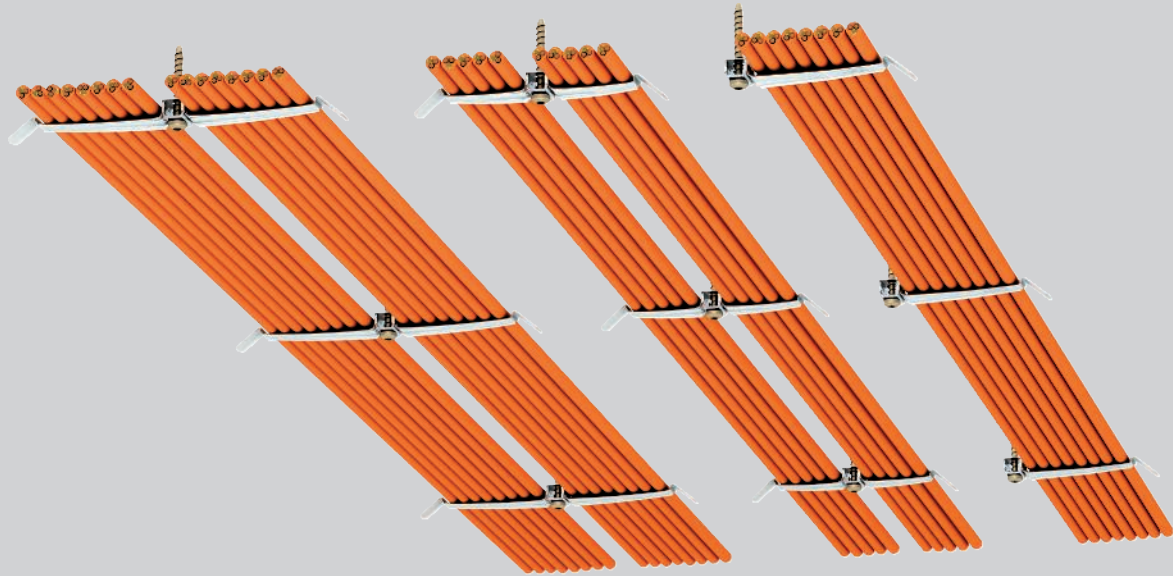
Type	Pack Piece	Weight kg/100 pc.	Item no.
2031 LW15	25	8.200	2207184

Long trough for grouped support type 2031/M15, for the maintenance of electrical function as cable-specific mounting variant.



## Pressure clips made of metal

### System description



Cable routing with rustproof steel pressure clips is approved as a cable-specific routing type for the maintenance of electrical functionality class E 30 according to DIN 4102 Part 12. This routing variant is ideal when there is only little mounting height available under the ceiling. With just small

additions, fire alarm cables and also power cables for safety lighting systems can be routed in a space-saving way. For installation, the hips of the pressure clips are simply bent downwards and the cables pushed in from the side. The clamping area can be expanded with spacers.

## Pressure clips made of metal

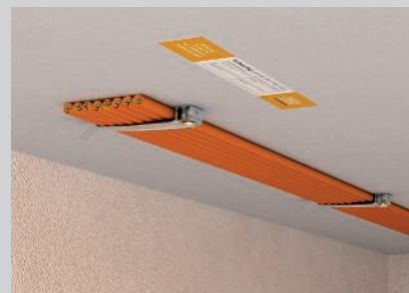
### Installation principle



Space-saving cable routing directly under the ceiling.



Simple cable installation through side insertion of the cables.



Single-sided version for low cable volume.

Classification according to DIN 4102 Part 12

**E30**

#### System description

Routing type	Cable-specific support structure
Test certificate no.	P-MPA-E-17-005
Maintenance of electrical function classes	E30
Testing standard	DIN 4102 Part 12

#### Approved data

Type	Fastening spacing	Cable assignment, max.
2033 M ...	0.5 m	2 x 9
2034 M ...	0.5 m	2 x 7
2035 M ...	0.5 m	1 x 9

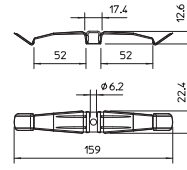
The data in the general construction test certificates of a materials testing institute for the appropriate cable type applies.

VA 2B

### Pressure clip for 10 cables

Type	BS	Shipping box Piece	Pack Piece	Weight kg/100 pc.	Item no.
2034 M A2		50	50	1.860	2204010

The metal pressure clip is halogen and fire load-free, and maintains a good mechanical stability even in fires. The pressure clip is also approved as a cable-specific variant for the maintenance of electrical functionality to DIN 4102 Part 12. The spacer 2033 D 15 x 3 G (must be ordered separately) increases the clamping height of pressure clips from 10 to 13 mm. The pressure clips are suitable for fireproof mounting above suspended fire protection ceilings in accordance with DIN 4102.

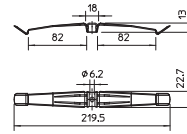


VA 2B

### Pressure clip for 16 cables

Type	BS	Shipping box Piece	Pack Piece	Weight kg/100 pc.	Item no.
2033 M A2		25	25	2.310	2204000

The metal pressure clip is halogen and fire load-free, and maintains a good mechanical stability even in fires. The pressure clip is also approved as a cable-specific variant for the maintenance of electrical functionality to DIN 4102 Part 12. The spacer 2033 D 15 x 3 G (must be ordered separately) increases the clamping height of pressure clips from 10 to 13 mm. The pressure clips are suitable for fireproof mounting above suspended fire protection ceilings in accordance with DIN 4102.



PVC

### Identification plate for maintenance of electrical function

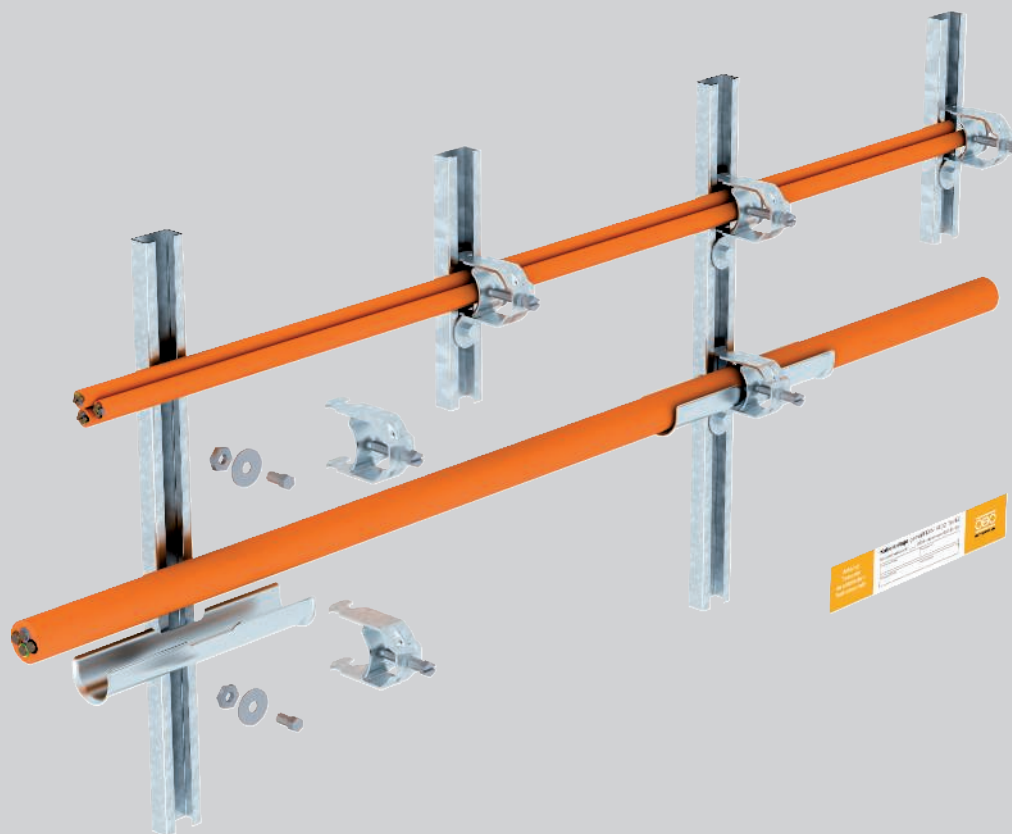
Type	Language	Pack Piece	Weight kg/100 pc.	Item no.
KS-E DE	German	10	0.600	7205423

Self-adhesive identification plate for approved cable system labelling for maintenance of electrical function as required by DIN 4102 Part 12.



## Clamp clips with profile rails

### System description



The routing types with clamp clips fulfil all the requirements of DIN 4102 Part 12 as a standard support structure for the maintenance of electrical functionality classes E30 and E90. Mounting as a cable-specific routing type is possible, depending on the specifications of the cable manufacturer. The clamp clips can be used for horizontal cable routing on walls and ceilings and vertical routing on walls. The clamp clips are made of sheet steel with a riveted metal pressure trough. Long troughs

made of galvanised sheet steel can be used to increase the support area for the cables. These are inserted loosely between the cables and the metal pressure troughs of the clamp clips. Bundling of up to three cables in a clamp clip is possible. The individual diameter of the bundled cables may not exceed 25 mm. If only individual cables are installed, then there is no limit to the cable diameter.

# Clamp clips with profile rails

## Installation principle



Horizontal mounting with clamp clips and long troughs on the wall and under the ceiling.



Horizontal cable mounting with clamp clips on the wall.



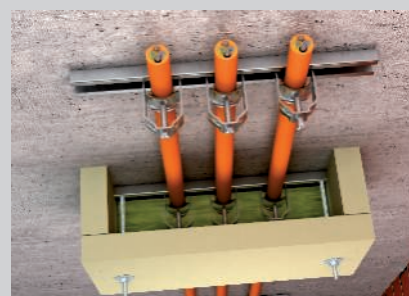
Horizontal cable mounting with clamp clips under the ceiling.



Vertical cable mounting with clamp clips on the wall.



Installation of the cables, either individually or as a bundle.



Effective support measure with ZSE90 strain relief.

Classification according to DIN 4102 Part 12

E30

E60

E90

### System description

Routing type	Standard support structure Cable-specific support construction
Surveyor's report no.	GS 3.2/17-436-5 (Norm)
Maintenance of electrical function classes	E30 to E90
Testing standard	DIN 4102 Part 12

### Approved data

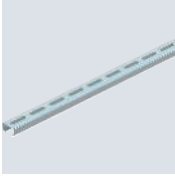
Rail fastening distance, max.	0.3 m (without long trough) as standard support structure
Rail fastening distance, max.	0.6 m (with long trough) as standard support structure
Max. anchor spacing in rail	0.25 m
Max. individual cable diameter	62 mm with long trough, 100 mm without long trough
Max. cable bundle	A standard support structure, max. 3 power cables up to $\varnothing$ 25 mm or a bundle of installation cables with a total weight of 3.0 kg/m
Cable-specific	Cable types and mounting parameters dependent on the cable manufacturer

Standard routing type: The data of the surveyor's report applies, together with a valid, general construction test certificate of a materials testing institute for the cable type to be used. Cable-specific routing type: A general construction test certificate of a materials testing institute for the cable type to be used is sufficient as proof.

With regard to the fastening distance and cable assignment, the details from the appropriate test certificate must be taken into account.

## Anchor rail AML3518, slot width 16.5 mm, perforated

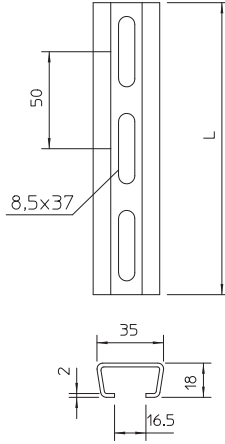
St FT



Type	Length mm	Dimension W x H mm	Material thickness mm	Dim. L mm	Pack m	Weight kg/100 m	Item no.
AML3518P2000FT	2000	35x18	1.5	2000	2	89.000	1119656

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.

### Dimensions



## CML3518 profile rail, slot 17 mm, perforated

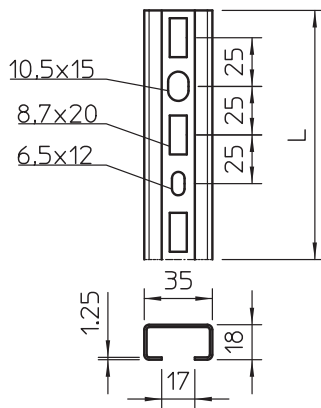
St FS



Type	Length mm	Dimension W x H mm	Material thickness mm	Dim. L mm	Pack Piece	Weight kg/100 pc.	Item no.
CML3518P0150FS	150	35x18	1.25	150	25	10.600	1104241
CML3518P0200FS	200	35x18	1.25	200	25	14.200	1104268
CML3518P0300FS	300	35x18	1.25	300	25	21.300	1104284
CML3518P0400FS	400	35x18	1.25	400	10	28.400	1104292
CML3518P0500FS	500	35x18	1.25	500	10	35.500	1104306
CML3518P0600FS	600	35x18	1.25	600	10	42.600	1104310
CML3518P0700FS	700	35x18	1.25	700	10	49.700	1104315
CML3518P0800FS	800	35x18	1.25	800	10	56.800	1104320
CML3518P0900FS	900	35x18	1.25	900	10	63.900	1104325
CML3518P1000FS	1000	35x18	1.25	1000	1	71.000	1104497
CML3518P2000FS	2000	35x18	1.25	2000	2	71.000	1104500

Light-duty profile rail, perforated, slot width 17 mm.

### Dimensions



St FT

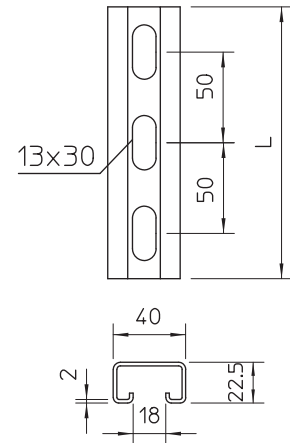
### MS4022 mounting rail, heavy duty, slot 18 mm, perforated

Type	Dimension		Material thickness mm	Dim. L mm	Pack m	Weight kg/100 m	Item no.
	Length mm	W x H mm					
MS4022P2000FT	2000	40x22,5	2	2000	2	152.500	1121979

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.



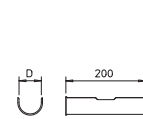
Dimensions



St FS

### Long trough

Type	Clamping range D mm	for clip 2056/M	Pack Piece	Weight kg/100 pc.	Item no.
2058 LW 10	6-10	8-12	50	4.000	1195794
2058 LW 14	10-14	12-16	50	5.340	1195808
2058 LW 26	20-26	22-28	25	9.000	1195824
2058 LW 32	26-32	28-34	25	11.000	1195832
2058 LW 38	32-38	34-40	25	12.500	1195840
2058 LW 44	38-44	40-46	25	14.300	1195859
2058 LW 50	44-50	46-52	25	16.200	1195867
2058 LW 56	50-56	52-58	25	17.800	1195875



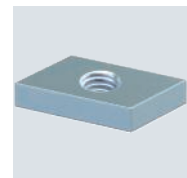
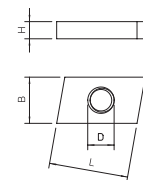
In addition to the clamp clip, to increase the support area for cables with integrated maintenance of electrical function, a long trough (L = 200 mm) is mounted.

St ZL

### Slide nut

Type	Dim. L mm	Dim. B mm	Dim. H mm	Pack Piece	Weight kg/100 pc.	Item no.
ACMSN M6 ZL	26	16,5	4	100	1.212	1147056

Slide nut for use with CM3015, CM3518 and AM3518 profile rails

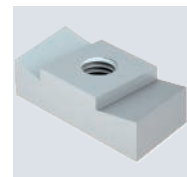
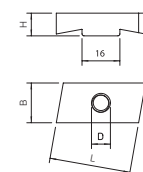


St ZL

### Slide nut

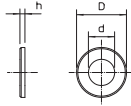
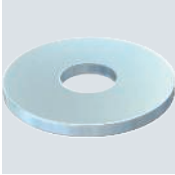
Type	Dim. L mm	Dim. B mm	Dim. H mm	Pack Piece	Weight kg/100 pc.	Item no.
MS40SN M6 ZL	30	17	10	50	3.750	1147106

Slide nut for use with MS4022 profile rail



## Large washer

St F

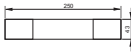


Type	Dim.	Dim.	Dim.	Pack Piece	Weight kg/100 pc.	Item no.
	D	d	h			
DIN440 7 F	22	6.6	2	100	0.535	6408702

Washer of particularly large outer diameter.

## Identification plate for maintenance of electrical function

PVC



Type	Language		Pack Piece	Weight kg/100 pc.	Item no.
	KS-E DE	KS-E EN			
KS-E DE	German		10	0.600	7205423
KS-E EN	English		10	0.600	7205432

Self-adhesive identification plate for approved cable system labelling for maintenance of electrical function as required by DIN 4102 Part 12.





## Screw-in spacer clips

### System description



The routing types with single clips fulfil all the requirements of DIN 4102 Part 12 as a standard support structure for the maintenance of electrical functionality classes E 30, E 60 and E 90. In addition, mounting of the single clips as a cable-specific routing type is possible, depending on the specifications of the cable manufacturer. The screw-in spacer clips can be used for horizontal cable routing on walls and ceilings and vertical routing on walls. The closed screw-in spacer clips

are made of galvanised sheet steel. Mounting is carried out either by pushing through the slots of the clips or by screwing onto a fire protection anchor with threaded tip M6. Bundling of up to three cables together in a single clamp clip is possible for mounting as a standard support structure. The individual diameter of the bundled cables may not exceed 25 mm. There is no limit to the diameter of installed individual cables with screw-in spacer clips.

## Screw-in spacer clips

### Installation principle



Horizontal cable mounting on the wall.



Mounting under the ceiling.



Vertical cable installation as individual and bundle routing on the wall.



Bundled cable routing under the ceiling.

Classification according to DIN 4102 Part 12

E30

E60

E90

#### System description

Routing type	Standard support structure Cable-specific support construction
Surveyor's report no.	GS 3.2/17-436-5 (Norm)
Maintenance of electrical function classes	E30 to E90
Testing standard	DIN 4102 Part 12

#### Approved data

Max. fastening spacing	0.3 m as standard support structure
Max. individual cable diameter	63 mm
Max. cable bundle	A standard support structure, max. 3 power cables up to $\varnothing$ 25 mm or bundle of installation cables with a total weight of 3.0 kg/m
Cable-specific	Cable types and mounting parameters dependent on the cable manufacturer

Standard routing type: The data of the surveyor's report applies, together with a valid, general construction test certificate of a materials testing institute for the cable type to be used. Cable-specific routing type: A general construction test certificate of a materials testing institute for the cable type to be used is sufficient as proof.

With regard to the fastening distance and cable assignment, the details from the appropriate test certificate must be taken into account.



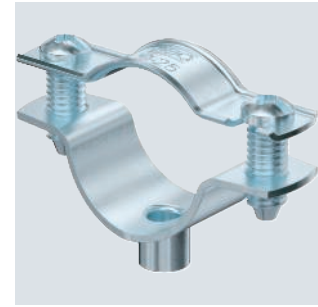
St G

E30 E60 E90



## Spacer clip 732

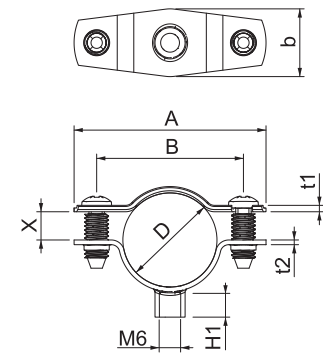
Type	Clamping range D mm	Pack Piece	Weight kg/100 pc.	Item no.
ASG 732 6 G	5-6	25	1.136	1362404
ASG 732 7 G	6-7	25	1.341	1362406
ASG 732 8 G	7-8	25	1.349	1362408
ASG 732 10 G	8-10	25	1.504	1362410
ASG 732 12 G	10-12	25	1.567	1362412
ASG 732 14 G	12-14	25	1.638	1362414
ASG 732 17 G	14-17	25	1.793	1362417
ASG 732 20 G	17-20	25	1.895	1362420
ASG 732 25 G	20-25	25	2.145	1362424
ASG 732 30 G	25-30	20	3.157	1362428
ASG 732 36 G	30-36	20	3.664	1362432
ASG 732 44 G	36-44	20	4.002	1362436
ASG 732 53 G	44-53	20	4.713	1362440
ASG 732 63 G	53-63	20	5.231	1362444



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

Type	Clamping range D mm	Dim. A mm	Dim. B mm	Dim. x mm	Dim. b mm	Dim. t1 mm	Dim. t2 mm	Dim. H1 mm
ASG 732 6 G	5-6	35	23	1.5	18	1	1.25	6.5
ASG 732 7 G	6-7	35	23	1.5	18	1	1.25	6.5
ASG 732 8 G	7-8	35	23	1.5	18	1	1.25	6.5
ASG 732 10 G	8-10	37	25	3	18	1	1.25	6.5
ASG 732 12 G	10-12	39	27	3	18	1	1.25	6.5
ASG 732 14 G	12-14	41	29	3	18	1.25	1.25	6.5
ASG 732 17 G	14-17	44	32	4.5	18	1.25	1.25	6.5
ASG 732 20 G	17-20	47	35	4.5	18	1.25	1.25	6.5
ASG 732 25 G	20-25	51	39	7.5	18	1.25	1.25	6.5
ASG 732 30 G	25-30	59	45	7.5	18	1.5	1.5	6.5
ASG 732 36 G	30-36	65	51	9	18	1.5	1.5	6.5
ASG 732 44 G	36-44	73	59	12	18	1.5	1.5	6.5
ASG 732 53 G	44-53	84	70	13.5	18	1.5	1.5	6.5
ASG 732 63 G	53-63	94	80	15	18	1.5	1.5	6.5

## Dimensions



## Spacer clip 732

A4

E30

E60

E90

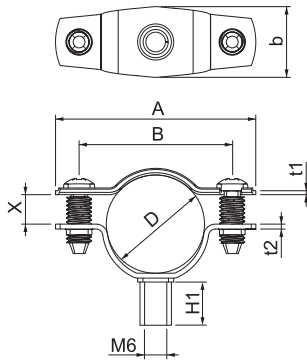


Type	Clamping range D mm	Pack Piece	Weight kg/100 pc.	Item no.
ASG 732 6 A4	5-6	25	1.558	1362454
ASG 732 8 A4	7-8	25	1.582	1362458
ASG 732 10 A4	8-10	25	1.773	1362460
ASG 732 12 A4	10-12	25	1.821	1362462
ASG 732 14 A4	12-14	25	1.885	1362464
ASG 732 17 A4	14-17	25	2.035	1362467
ASG 732 20 A4	17-20	25	2.139	1362469
ASG 732 25 A4	20-25	25	2.394	1362472
ASG 732 30 A4	25-30	20	3.370	1362474
ASG 732 36 A4	30-36	20	3.782	1362478
ASG 732 44 A4	36-44	20	4.158	1362482
ASG 732 53 A4	44-53	20	4.851	1362486
ASG 732 63 A4	53-63	20	5.379	1362489

Spacer clip for the installation of pipes and cables on walls, ceilings and floors. With self-locking cover. Fastening via attachment piece with internal thread.

Approved for the maintenance of electrical function according to DIN 4102 Part 12, maintenance of electrical function classes E 30 to E 90.

### Dimensions



Type	Clamping range D mm	Dim. A mm	Dim. B mm	Dim. x mm	Dim. b mm	Dim. t1 mm	Dim. t2 mm	Dim. H1 mm
ASG 732 6 A4	5-6	35	23	1.5	18	1	1.25	12
ASG 732 8 A4	7-8	35	23	1.5	18	1	1.25	12
ASG 732 10 A4	8-10	37	25	3	18	1	1.25	12
ASG 732 12 A4	10-12	39	27	3	18	1	1.25	12
ASG 732 14 A4	12-14	41	29	3	18	1.25	1.25	12
ASG 732 17 A4	14-17	44	32	4.5	18	1.25	1.25	12
ASG 732 20 A4	17-20	47	35	4.5	18	1.25	1.25	12
ASG 732 25 A4	20-25	51	39	7.5	18	1.25	1.25	12
ASG 732 30 A4	25-30	59	45	7.5	18	1.5	1.5	12
ASG 732 36 A4	30-36	65	51	9	18	1.5	1.5	12
ASG 732 44 A4	36-44	73	59	12	18	1.5	1.5	12
ASG 732 53 A4	44-53	84	70	13.5	18	1.5	1.5	12
ASG 732 63 A4	53-63	94	80	15	18	1.5	1.5	12

St G  
E30 E60 E90

### Spacer clip 733

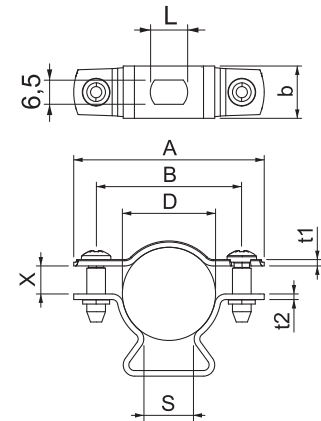
Type	Clamping range D mm	Pack Piece	Weight kg/100 pc.	Item no.
ASL 733 25 G	20-25	25	2.419	1362768
ASL 733 30 G	25-30	20	3.401	1362772
ASL 733 36 G	30-36	20	3.774	1362776
ASL 733 44 G	36-44	20	4.151	1362780
ASL 733 53 G	44-53	20	5.616	1362784
ASL 733 63 G	53-63	20	6.212	1362788



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 25 G	51	39	7.5	1.25	1.5	10	14	13.5
ASL 733 30 G	59	45	7.5	1.5	1.5	10	16	16.5
ASL 733 36 G	65	51	9	1.5	1.5	10	16	20
ASL 733 44 G	73	59	12	1.5	1.5	10	16	24
ASL 733 53 G	84	70	13.5	1.5	2	10	16	29.5
ASL 733 63 G	94	80	15	1.5	2	10	16	35.3

#### Dimensions



St FT  
E30 E60 E90

### Spacer clip 733

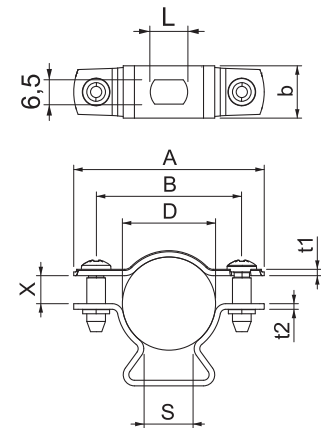
Type	Clamping range D mm	Pack Piece	Weight kg/100 pc.	Item no.
ASL 733 20 FT	17-20	25	2.000	1362714
ASL 733 25 FT	20-25	25	2.540	1362718
ASL 733 30 FT	25-30	20	3.567	1362722
ASL 733 36 FT	30-36	20	3.956	1362726
ASL 733 44 FT	36-44	20	4.356	1362730
ASL 733 53 FT	44-53	20	5.850	1362734
ASL 733 63 FT	53-63	20	6.477	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 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 30 FT	59	45	7.5	1.5	1.5	10	16	16.5
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



## Spacer clip 733

A2

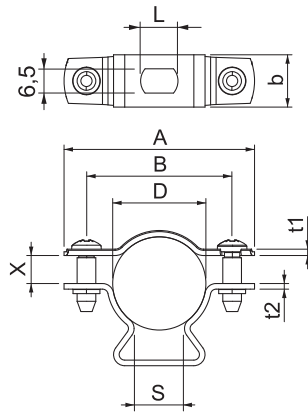
E30 E60 E90



Type	Clamping range D mm	Pack Piece	Weight kg/100 pc.	Item no.
ASL 733 20 A2	17-20	25	2.213	1362984
ASL 733 25 A2	20-25	25	2.432	1362986
ASL 733 30 A2	25-30	20	3.416	1362988
ASL 733 36 A2	30-36	20	3.792	1362990
ASL 733 44 A2	36-44	20	4.170	1362992
ASL 733 53 A2	44-53	20	5.643	1362994
ASL 733 63 A2	53-63	20	6.242	1362996

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.

### 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 20 A2	47	35	4.5	1.25	1.5	10	14	12
ASL 733 25 A2	51	39	7.5	1.25	1.5	10	14	13.5
ASL 733 30 A2	59	45	7.5	1.5	1.5	10	16	16.5
ASL 733 36 A2	65	51	9	1.5	1.5	10	16	20
ASL 733 44 A2	73	59	12	1.5	1.5	10	16	24
ASL 733 53 A2	84	70	13.5	1.5	2	10	16	29.5
ASL 733 63 A2	94	80	15	1.5	2	10	16	35.3

## Spacer clip 733

A4

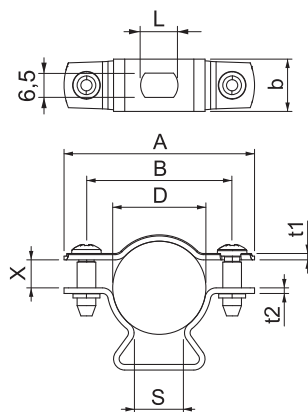
E30 E60 E90



Type	Clamping range D mm	Pack Piece	Weight kg/100 pc.	Item no.
ASL 733 20 A4	17-20	25	2.243	1362914
ASL 733 25 A4	20-25	25	2.466	1362918
ASL 733 30 A4	25-30	20	3.466	1362922
ASL 733 36 A4	30-36	20	3.846	1362926
ASL 733 44 A4	36-44	20	4.230	1362930
ASL 733 53 A4	44-53	20	5.723	1362934
ASL 733 63 A4	53-63	20	6.331	1362938

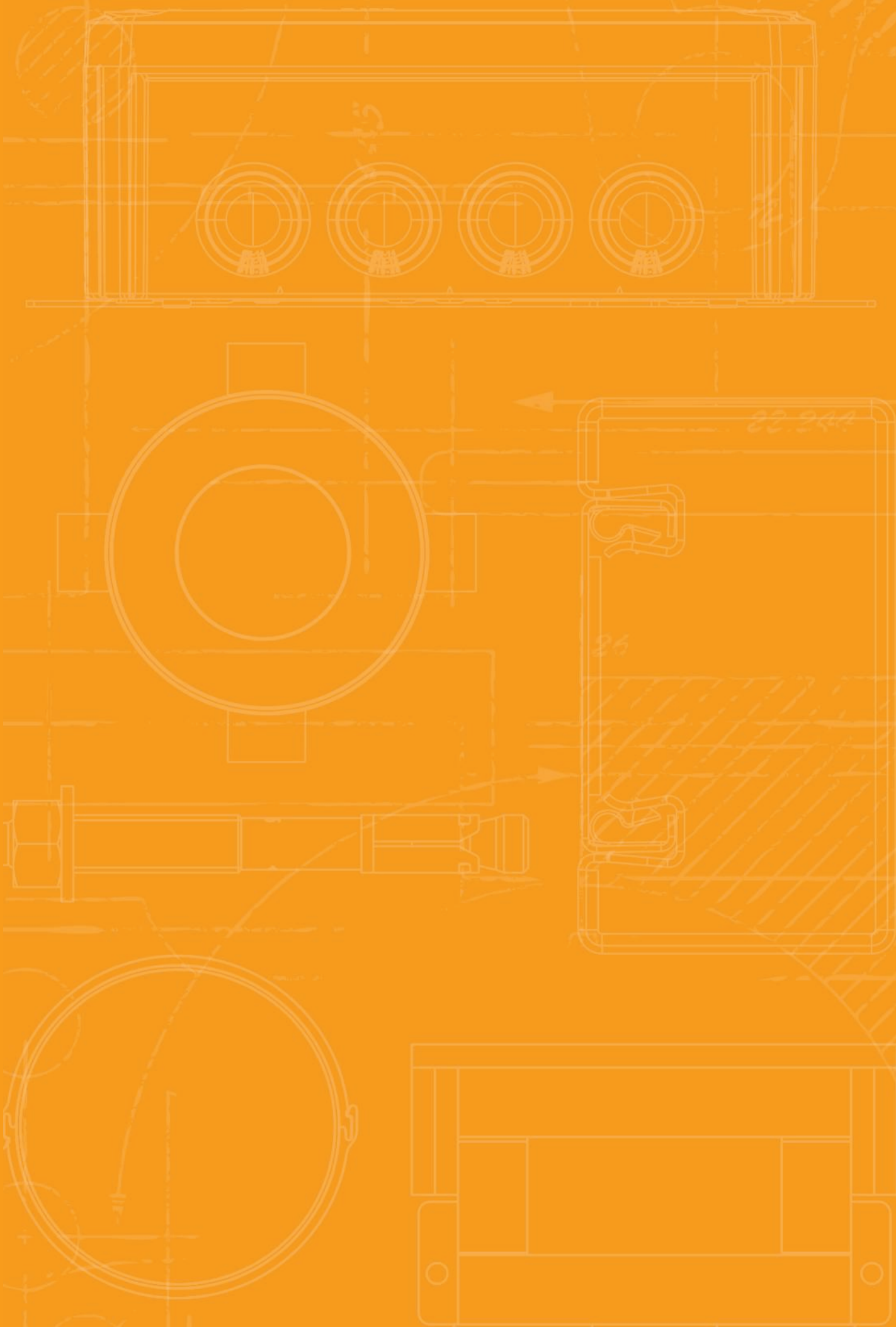
Spacer clip for the installation of pipes and cables on walls, ceilings and floors. With self-locking cover. Fastening via slot.  
Approved for the maintenance of electrical function according to DIN 4102 Part 12, maintenance of electrical function classes E 30 to E 90.

### 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 20 A4	47	35	4.5	1.25	1.5	10	14	12
ASL 733 25 A4	51	39	7.5	1.25	1.5	10	14	13.5
ASL 733 30 A4	59	45	7.5	1.5	1.5	10	16	16.5
ASL 733 36 A4	65	51	9	1.5	1.5	10	16	20
ASL 733 44 A4	73	59	12	1.5	1.5	10	16	24
ASL 733 53 A4	84	70	13.5	1.5	2	10	16	29.5
ASL 733 63 A4	94	80	15	1.5	2	10	16	35.3





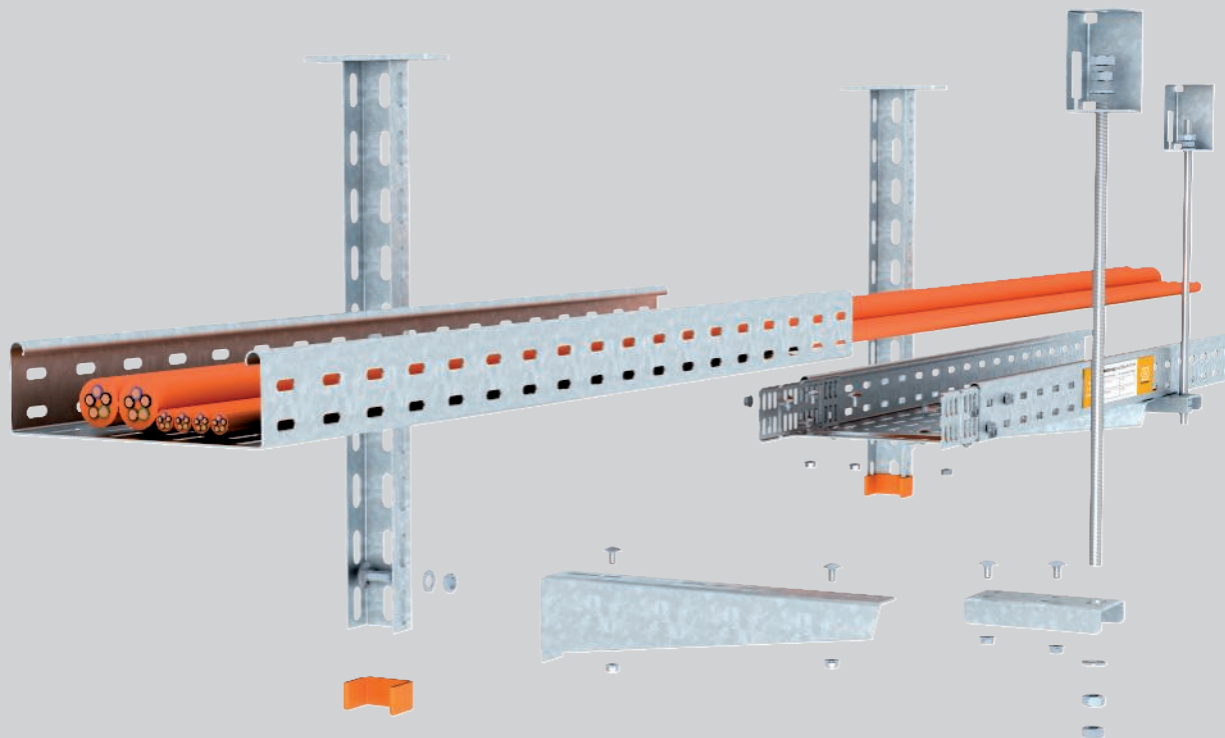


# Systems for the maintenance of electrical function, standard support structures and routing systems

	SKS cable tray, ceiling mounting	114
	Vertical ladders	140
	Strain relief	150

## SKS 6... cable tray, ceiling mounting

### System description



The routing type under the ceiling of cable trays of types SKS with U suspended supports and SKS on U transverse profiles fulfils all the requirements of DIN 4102 Part 12 as a standard support structure for the maintenance of electrical functionality classes E 30 to E 90.

The cable trays can be mounted on the U suspended support on one or both sides with up to six tray layers. The threaded rod lock is fastened with a maximum spacing of 100 mm beside the bracket. For this, the ABR connection component should be screwed under the tray base.

Due to the low construction height of the U transverse profiles of just 30 mm, the routing variant with U transverse profile and threaded rod suspension on both sides saves a lot of space. Versions with one or two-layer mounting variants are approved.

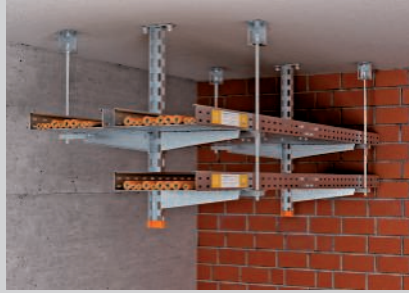
With both types, the position of the joints between the individual support points can be chosen freely. The cable trays are screwed on using connectors in the side rail and an additional joint plate in the base of the tray.

# SKS 6... cable tray, ceiling mounting

## Installation principle



Ceiling suspension with bracket arrangement on one side.



Ceiling suspension with bracket arrangement on both sides.



Mounting under sloping ceiling with variable head plate.



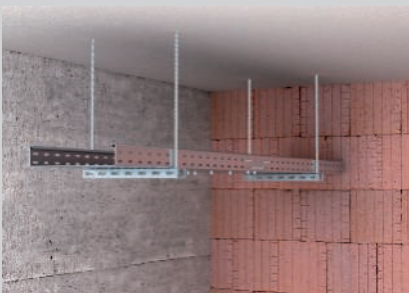
Bracket mounting on suspended support with truss-head bolt.



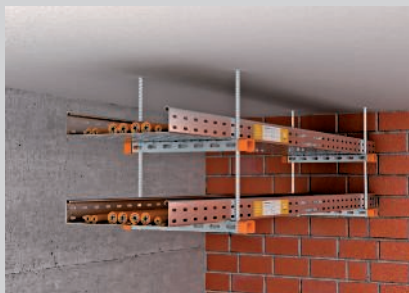
Fasten straight connectors and joint plate using truss-head bolts.



Threaded rod fastening on the tray with multi-layer arrangement.



Single-layer ceiling suspension.



Double-layer ceiling suspension.

Classification according to DIN 4102 Part 12

E30

E60

E90

## SKS 6... cable tray, ceiling mounting

### Proof






#### Maintenance of electrical function system according to DIN 4102 Part 12

Routing type	Standard support system
Proof	Surveyor's report no. 2401/808/22-CM
Maintenance of electrical function classes	E30 to E90
Testing standard	DIN 4102 Part 12
Mounting variants	Ceiling mounting with suspended support, bracket and threaded rod lock Ceiling mounting with transverse profile and threaded rod lock on both sides
Material version	Galvanised steel



Note:

The surveyor's report is only valid in conjunction with valid general construction test certificates of a testing office for the appropriate installed cable type.

#### Support spacing for ceiling mounting with suspended support, bracket and threaded rod lock






Cable tray width	Cable load per cable tray					
100 mm	max. 10 kg/m	max. 1.20 m	max. 1.20 m	max. 1.20 m	max. 1.20 m	max. 1.20 m
200 mm	max. 10 kg/m	max. 1.20 m	max. 1.20 m	max. 1.20 m	max. 1.20 m	max. 1.20 m
300 mm	max. 10 kg/m	max. 1.20 m	max. 1.20 m	max. 1.20 m	max. 1.20 m	max. 1.20 m

#### Support spacing for ceiling mounting with transverse profile and threaded rod suspension on both sides



Cable tray width	Cable load per cable tray		
100 mm	max. 10 kg/m	max. 1.20 m	max. 1.20 m
200 mm	max. 10 kg/m	max. 1.20 m	max. 1.20 m
300 mm	max. 10 kg/m	max. 1.20 m	max. 1.20 m

## SKS 6... cable tray, ceiling mounting

### Components used

Component	Type					
Cable tray	SKS 6... FS	1	2	3	2	3
Connector	RWVL 60 FS	2	4	6	4	6
Joint plate	SSLB ... FS	1	2	3	2	3
Support	US 3 K ... FT	1	1	1	1	1
Protective cap	US 3 KS OR	1	1	1	1	1
Wall and support brackets	MWA12... FS	1	2	3	2	3
Truss-head bolt	FRSB 6x 15 F	2	4	6	4	6
Connection component	ABR FT	1	2	3	2	3
Threaded rod	TR M10 G	1	2	3	2	3
Hexagonal nut	HN M10 G	4	5	6	8	9
Washer	WS M10 D20 G	2	3	4	4	5
Connection sleeve	CSTR M10 G	0	1	2	0	1
Fire protection clamp	BSB	1	1	1	2	2

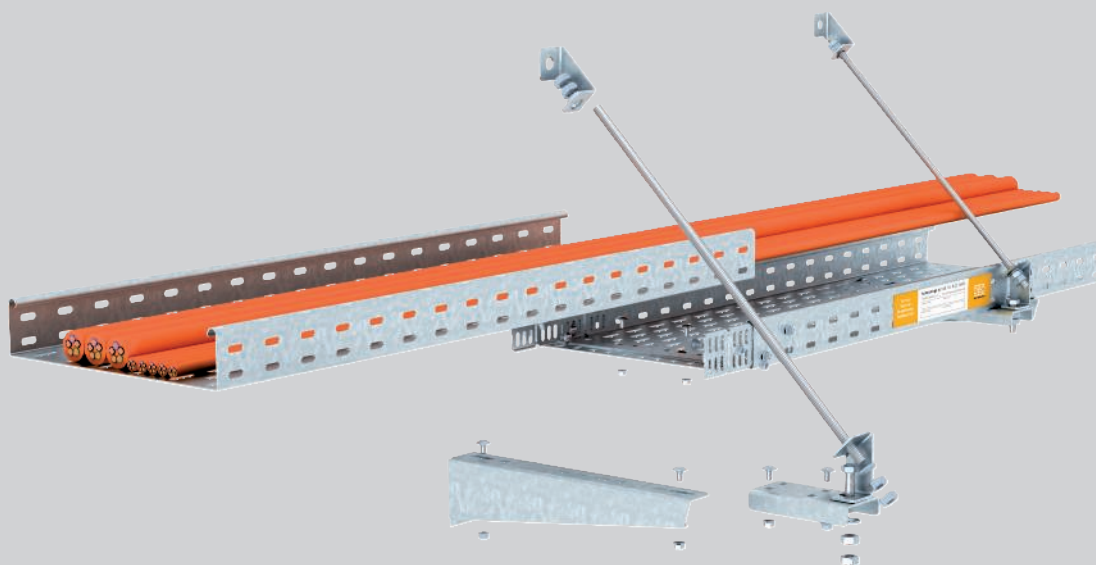
Choose the fastening anchors according to the substrate

Component	Type		
Cable tray	SKS 6... FS	1	2
Connector	RWVL 60 FS	2	4
Joint plate	SSLB ... FS	1	2
Support	US 3 ... FS	1	2
Protective cap	US 3 KS OR	2	4
Threaded rod	TR M10 G	2	4
Hexagonal nut	HN M10 G	6	10
Large washer	DIN440 11 F	4	8
Connection sleeve	CSTR M10 G	0	2
Truss-head bolt	FRSB 6x20 F	2	4
Large washer	DIN440 7 F	2	4

Choose the fastening anchors according to the substrate

## SKS 6... cable tray, wall mounting

### System description



The routing type of cable trays of type SKS with wall brackets on the wall fulfils all the requirements of DIN 4102 Part 12 as a standard support structure for the maintenance of electrical functionality classes E 30 to E 90. When the cable trays are mounted on the wall, up to three tray layers can be arranged vertically. The threaded rod lock is fastened vertically under the ceiling with a maximum spacing of 100 mm beside the bracket

using an ABR connection component screwed on beneath the tray base. In the case of one-layer section mounting, the threaded rod lock can alternatively be created using sloping connection components at an angle of 45° to the wall. Joints can be positioned freely between the individual support points. Connectors are screwed into the side rails and an additional joint plate to the base, in order to connect the cable trays.

# SKS 6... cable tray, wall mounting

## Installation principle



Wall mounting, multi-layer, with vertical threaded rod locking.



Wall mounting with diagonal threaded rod locking.



Ceiling fastening of the threaded rods with fire protection clamps.



Threaded rod fastening on the cable tray with multilayer arrangement.



Fastening of the vertical threaded rod on the lowest cable tray.



Mounting of the brackets and the sloping connection components on a wall.



Fastening of the sloping connection component.

Classification according to DIN 4102 Part 12

E30

E60

E90

## SKS 6... cable tray, wall mounting

### Proof




#### Maintenance of electrical function system according to DIN 4102 Part 12

<b>Routing type</b>	Standard support system
<b>Proof</b>	Surveyor's report no. 2401/808/22-CM
<b>Maintenance of electrical function classes</b>	E30 to E90
<b>Testing standard</b>	DIN 4102 Part 12
<b>Mounting variants</b>	Wall mounting with bracket and vertical threaded rod lock Wall mounting with bracket and diagonal threaded rod lock
<b>Material version</b>	Galvanised steel


Note:

The surveyor's report is only valid in conjunction with valid general construction test certificates of a testing office for the appropriate installed cable type.

#### Support spacing for wall mounting with bracket and vertical threaded rod lock

Cable tray width	Cable load per cable tray			
100 mm	max. 10 kg/m	max. 1.20 m	max. 1.20 m	max. 1.20 m
200 mm	max. 10 kg/m	max. 1.20 m	max. 1.20 m	max. 1.20 m
300 mm	max. 10 kg/m	max. 1.20 m	max. 1.20 m	max. 1.20 m



#### Support spacing for wall mounting with bracket and diagonal threaded rod lock

Cable tray width	Cable load per cable tray	
100 mm	max. 10 kg/m	max. 1.20 m
200 mm	max. 10 kg/m	max. 1.20 m
300 mm	max. 10 kg/m	max. 1.20 m




## SKS 6... cable tray, wall mounting

### Components used

Component	Type		
Cable tray	SKS 6... FS	1	2
Connector	RWVL 60 FS	2	4
Joint plate	SSLB ... FS	1	2
Support	US 3 K ... FT	1	1
Protective cap	US 3 KS OR	1	1
Wall and support brackets	MWA12... FS	1	2
Truss-head bolt	FRSB 6x 15 F	2	4
Connection component	ABR FT	1	2
Threaded rod	TR M10 G	1	2
Hexagonal nut	HN M10 G	4	5
Washer	WS M10 D20 G	2	3
Connection sleeve	CSTR M10 G	0	1
Fire protection clamp	BSB	1	1

Choose the fastening anchors according to the substrate

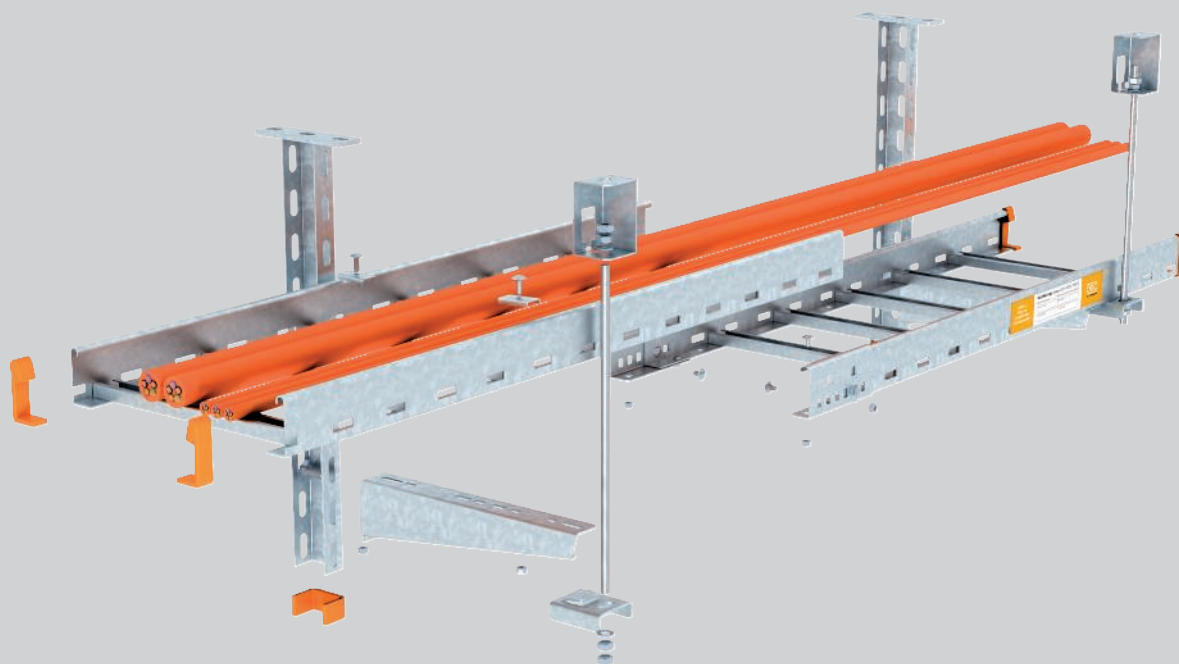
Component	Type	
Cable tray	SKS 6... FS	1
Connector	RWVL 60 FS	2
Joint plate	SSLB ... FS	1
Wall and support brackets	MWA12... FS	1
Truss-head bolt	FRSB 6x 15 F	2
Connection component	ABR FT	1
Connection component	ABS FS	2
Hexagonal bolt	SKS M10x40 F	1
Threaded rod	TR M10 G	1
Hexagonal nut	HN M10 G	5
Washer	WS M10 D20 G	2

Choose the fastening anchors according to the substrate



## LG6...VSF cable ladder, ceiling mounting

### System description



The routing type under the ceiling of cable ladders of types LG with U suspended supports and LG with U transverse profiles fulfils all the requirements of DIN 4102 Part 12 as a standard support structure for the maintenance of electrical functionality classes E 30 to E 90.

The cable ladders can be mounted on the U suspended support on one or both sides with up to three layers. The threaded rod lock is fastened with a maximum spacing of 100 mm beside the bracket. The ABL connection component need simply be attached to the lower flange of the ladder rail. Mounting of the threaded rod secures the connection component against slipping.

Due to the low construction height of the transverse profile of just 30 mm, the routing variant with U transverse profile and threaded rod suspension on both sides saves a lot of space. Versions with one or two-layer mounting variants are approved.

With both cable ladder types, the joints of the ladder rails are connected using external connectors, which are screwed to the rails. The position of the joints between the individual support points can be chosen freely. The rung spacing for both cable ladder types is 150 mm. Therefore, no additional rung support plates are required.

# LG6...VSF cable ladder, ceiling mounting

## Installation principle



Ceiling suspension with bracket arrangement on one side.



Ceiling suspension with bracket arrangement on both sides.



Mounting under sloping ceiling with variable head plate.



Mounting of the straight connectors using truss-head bolts.



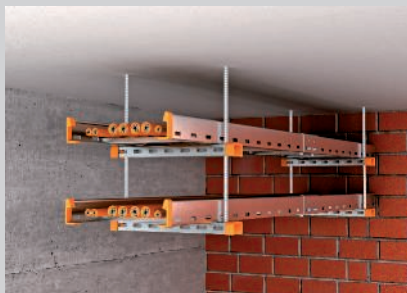
Attachment of the connection component on the lower flange of the ladder rail.



Attachment of the threaded rod in the fire protection clamp.



Single-layer ceiling mounting with U cross-section.



Two-layer ceiling mounting with U cross-section.



Mounting on transverse profile with clamping piece, truss-head bolts and large washers.

Classification according to DIN 4102 Part 12

E30

E60

E90

## LG6...VSF cable ladder, ceiling mounting

### Proof






#### Maintenance of electrical function system according to DIN 4102 Part 12

Routing type	Standard support system
Proof	Surveyor's report no. 2401/807/22-CM
Maintenance of electrical function classes	E30 to E90
Testing standard	DIN 4102 Part 12
Mounting variants	Ceiling mounting with suspended support, bracket and threaded rod lock Ceiling mounting with transverse profile and threaded rod lock on both sides
Material version	Galvanised steel



Note:

The surveyor's report is only valid in conjunction with valid general construction test certificates of a testing office for the appropriate installed cable type.

#### Support spacing for ceiling mounting with suspended support, bracket and threaded rod lock






Cable ladder width	Cable load per cable ladder					
200 mm	max. 20 kg/m	max. 1.20 m	max. 1.20 m	max. 1.20 m	max. 1.20 m	max. 1.20 m
300 mm	max. 20 kg/m	max. 1.20 m	max. 1.20 m	max. 1.20 m	max. 1.20 m	max. 1.20 m
400 mm	max. 20 kg/m	max. 1.20 m	max. 1.20 m	max. 1.20 m	max. 1.20 m	max. 1.20 m

#### Support spacing for ceiling mounting with transverse profile and threaded rod suspension on both sides



Cable ladder width	Cable load per cable ladder		
200 mm	max. 20 kg/m	max. 1.20 m	max. 1.20 m
300 mm	max. 20 kg/m	max. 1.20 m	max. 1.20 m
400 mm	max. 20 kg/m	max. 1.20 m	max. 1.20 m

## LG6...VSF cable ladder, ceiling mounting

### Components used

Component	Type					
Cable ladder	LG 6... VSF FS	1	2	3	2	3
External connector	AVL 60 FS	2	4	6	4	6
Support	US 3 K ... FT	1	1	1	1	1
Protective cap	US 3 KS OR	1	1	1	1	1
Wall and support brackets	MWA12... FS	1	2	3	2	3
Clamping piece	LKS 40 FS	2	4	6	4	6
Connection component	ABL FT	1	2	3	2	3
Threaded rod	HN M10 D20 G	1	2	0	2	3
Threaded rod	HN M12 D24 G	0	0	3	0	0
Hexagonal nut	WS M10 G	4	5	0	8	9
Hexagonal nut	WS M12 G	0	0	6	0	0
Washer	CSTR M10 G	2	3	0	4	5
Washer	CSTR M12 G	0	0	4	0	0
Connection sleeve	BSB	0	1	0	0	1
Connection sleeve	12005 M12 G	0	0	2	0	0
Fire protection clamp	BSB	1	1	1	2	2

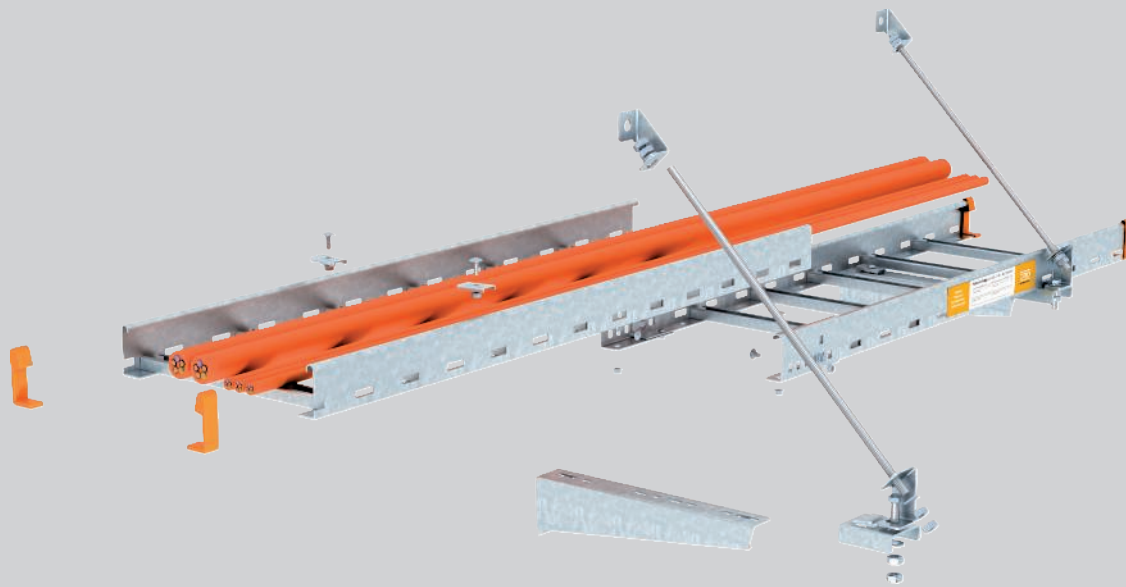
Choose the fastening anchors according to the substrate

Component	Type		
Cable ladders	LG 6... VSF FS	1	2
External connector	AVL 60 FS	2	4
Support	US 3 ... FS	1	2
Protective cap	US 3 KS OR	2	4
Threaded rod	TR M10 G	2	4
Hex nut	HN M10 G	6	10
Fender washer	DIN440 11 F	4	8
Coupling nut	CSTR M10 G	0	2
Hold-down clamp	LKS 40 FS	2	4
Fender washer	DIN440 7 F	2	4

Choose the fastening anchors according to the substrate

## LG6...VSF cable ladder, wall mounting

### System description



The routing type of cable ladders of type LG with wall brackets on the wall fulfils all the requirements of DIN 4102 Part 12 as a standard support structure. When cable ladders are mounted on the wall, up to two layers can be arranged on top of one another. The threaded rod lock to the ceiling is fastened vertically without screws using the ABL

connection component attached to the lower flange of the ladder rail. The maximum distance between the connection component and the bracket may be 100 mm. When only one cable ladder is mounted on the wall, the threaded rod lock can alternatively be created using sloping connection components at an angle of 45° to the wall.

# LG6...VSF cable ladder, wall mounting

## Installation principle



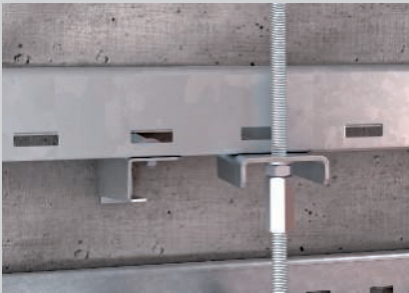
Wall mounting, multi-layer, with vertical threaded rod locking.



Wall mounting with diagonal threaded rod locking.



Ceiling fastening of the threaded rods with fire protection clamps.



Threaded rod fastening on the cable ladder with multilayer arrangement.



Fastening of the vertical threaded rod on the connection component.



Mounting of the brackets and the sloping connection components on a wall.



Diagonal mounting of the connection component using hexagonal bolt and hexagonal nuts.

Classification according to DIN 4102 Part 12

- E30
- E60
- E90

## LG6...VSF cable ladder, wall mounting

### Proof




#### Maintenance of electrical function system according to DIN 4102 Part 12

Routing type	Standard support system
Proof	Surveyor's report no. 2401/807/22-CM
Maintenance of electrical function classes	E30 to E90
Testing standard	DIN 4102 Part 12
Mounting variants	Wall mounting with bracket and vertical threaded rod lock Wall mounting with bracket and diagonal threaded rod lock
Material version	Galvanised steel


Note:

The surveyor's report is only valid in conjunction with valid general construction test certificates of a testing office for the appropriate installed cable type.

#### Support spacing for wall mounting with bracket and vertical threaded rod lock

Cable ladder width	Cable load per cable ladder			
200 mm	max. 20 kg/m	max. 1.20 m	max. 1.20 m	max. 1.20 m
300 mm	max. 20 kg/m	max. 1.20 m	max. 1.20 m	max. 1.20 m
400 mm	max. 20 kg/m	max. 1.20 m	max. 1.20 m	max. 1.20 m




#### Support spacing for wall mounting with bracket and diagonal threaded rod lock

Cable ladder width	Cable load per cable ladder	
200 mm	max. 20 kg/m	max. 1.20 m
300 mm	max. 20 kg/m	max. 1.20 m
400 mm	max. 20 kg/m	max. 1.20 m




## LG6...VSF cable ladder, wall mounting

### Components used

Component	Type			
Cable ladders	LG 6... VSF FS	1	2	3
External connector	AVL 60 FS	2	4	6
Wall and support bracket	MWA12... FS	1	2	3
Hold-down clamp	LKS 40 FS	2	4	6
Connection component	ABL FT	1	2	3
Threaded rod	TR M10 G	1	2	0
Threaded rod	TR M12 G	0	0	3
Hex nut	WS M10 G	4	5	0
Hex nut	WS M12 G	0	0	6
Washer	CSTR M10 G	2	3	0
Washer	CSTR M12 G	0	0	4
Coupling nut	CSTR M10 G	0	1	0
Coupling nut	12005 M12 G	0	0	2
Fire protection clamp	BSB	1	1	1

Choose the fastening anchors according to the substrate

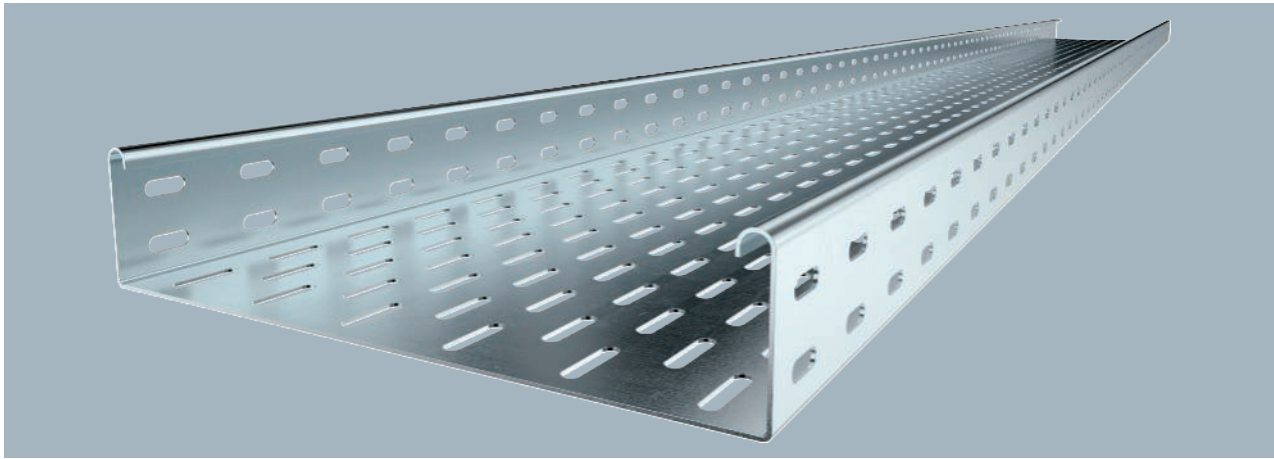
Component	Type	
Cable ladders	LG 6...VSF FS	1
External connector	AVL 60 FS	2
Wall and support bracket	MWA12... FS	1
Hold-down clamp	LKS 40 FS	2
Connection component	ABR FT	1
Connection component	ABS FS	2
Hex set screw	SKS M10x40 F	1
Threaded rod	TR M10 G	1
Hex nut	HN M10 G	5
Washer	966 M10 G	2

Choose the fastening anchors according to the substrate



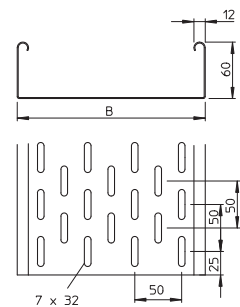
## Cable tray SKS 60

St FS



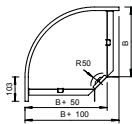
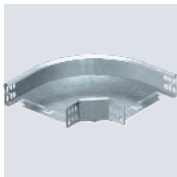
Type	Width mm	Metal thick- ness mm	Dim. B mm	BS	Pack m	Weight kg/100 m	Item no.
SKS 610 FS	100	1.50	100		3	239.400	6056105
SKS 620 FS	200	1.50	200		3	364.000	6056202
SKS 630 FS	300	1.50	300		3	463.670	6056296

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



## 90° bend 60

St FS

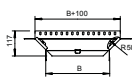
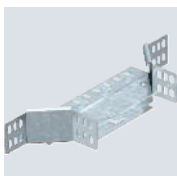


Type	Width mm	Dim. B mm	Pack Piece	Weight kg/100 pc.	Item no.
RB 90 610 FS	100	100	1	71.900	6043216
RB 90 620 FS	200	200	1	110.300	6043224
RB 90 630 FS	300	300	1	167.400	6043232

90° bend, horizontal, for all cable tray types of 60 mm side height.

## Add-on tee 60

St FS

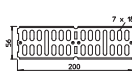
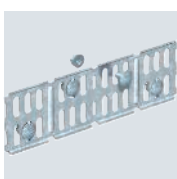


Type	Width mm	Dim. B mm	Pack Piece	Weight kg/100 pc.	Item no.
RAA 610 FS	100	100	1	44.200	6040403
RAA 620 FS	200	200	1	53.100	6040438
RAA 630 FS	300	300	1	61.900	6040446

Add-on tee for horizontal and vertical use. For all cable tray types of 60 mm side height.

## Straight and angle connector 60

St FS

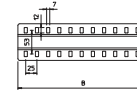


Type	Dimen- sion mm	Pack Piece	Weight kg/100 pc.	Item no.
RWVL 60 FS	200x56	10	16.400	6067115

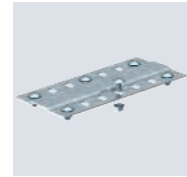
Straight and angle connector for cable trays and fittings with a side height of 60 mm.

St FS

Type	Dim. B mm	Pack Piece	Weight kg/100 pc.	Item no.
SSLB 100 FS	100	20	7.700	7070205
SSLB 200 FS	200	20	18.500	7070213
SSLB 300 FS	300	20	29.200	7070217



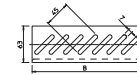
### Joint plate



Wide joint plate for use in all cable trays and wide span cable trays.

St FS

Type	Width mm	Dim. B mm	Pack Piece	Weight kg/100 pc.	Item no.
BEB 100 FS	100	100	1	4.599	7083106
BEB 200 FS	200	200	1	9.367	7083203
BEB 300 FS	300	300	1	14.100	7083300



### Bottom end plate

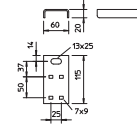


Bottom end plate for floor reinforcement at the ends of the cable tray and as cable protection.

St A4 FT

Type	Pack Piece	Weight kg/100 pc.	Item no.
ABR FT	20	24.648	6364942
ABR VA4571	20	22.000	6364947

### Connection component

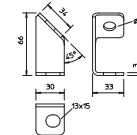


The connection component is the connection between the threaded rod lock and the suspension system for the routing types with cable trays for the maintenance of electrical function to DIN 4102 Part 12. Including bolts and nuts.

St FS FT

Type	Pack Piece	Weight kg/100 pc.	Item no.
ABS FS	20	7.200	6365027
ABS FT	20	7.800	6365035

### Connection component, sloping



The connection component is the connecting element for the sloping arrangement of the threaded rod locking for wall mounting of the standard routing types with cable ladders and cable trays for the maintenance of electrical function to DIN 4102 Part 12.

PVC

### Identification plate for maintenance of electrical function

Type	Language	Pack Piece	Weight kg/100 pc.	Item no.
KS-E DE	German	10	0.600	7205423
KS-E EN	English	10	0.600	7205432



Self-adhesive identification plate for approved cable system labelling for maintenance of electrical function as required by DIN 4102 Part 12.

# Cable ladders

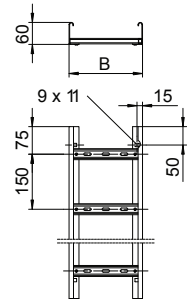
## LG 60 cable ladder, 6 m VSF

St	FS	FT
E30	E60	E90



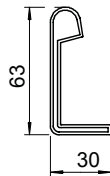
Type	Rail thickness mm	Width mm	Length mm	Rung spacing mm	Dim. B mm	BS	Pack m	Weight kg/100 m	Item no.
LG 620 VSF 6 FS	1.5	200	6000	150	200		6	311.866	6207501
LG 630 VSF 6 FS	1.5	300	6000	150	300		6	355.833	6207505
LG 640 VSF 6 FS	1.5	400	6000	150	400		6	407.166	6207509
LG 620 VSF 6 FT	1.5	200	6000	150	200		6	333.166	6207523
LG 630 VSF 6 FT	1.5	300	6000	150	300		6	379.166	6207527
LG 640 VSF 6 FT	1.5	400	6000	150	400		6	425.166	6207531

Cable ladder for the horizontal routing of cables. Can be used as a standard support structure for the maintenance of electrical functionality according to DIN 4102 Part 12. Maintenance of electrical function classes E30 to E90. With riveted C profile rung, open in an upward direction.



## Protective cap 60

PE

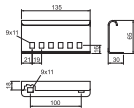


Type	Colour	Pack Pair	Weight kg/100 pairs	Item no.
SKH 60 OR	Pastel orange	40	1.072	6222537

Protective cap to cover cable ladder ends of side height 60 mm.

## AVL 60 external connector

St	FS	FT
----	----	----



Type	Width mm	Side height mm	Pack Piece	Weight kg/100 pc.	Item no.
AVL 60 FS	30	65	10	23.200	6208770
AVL 60 FT	30	65	10	23.400	6208778

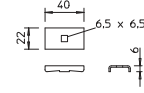
External connector for mechanical connection of cable ladder sections for routing types with cable ladders for the maintenance of electrical function to DIN 4102 Part 12. Including bolts.

St FS

### LKS 40 hold-down clamp

Type	Pack Piece	Weight kg/100 pc.	Item no.
LKS 40 FS	10	2.300	6221076

Hold-down clamp for fastening cable ladders.

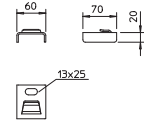


St FT

### Connection component

Type	Pack Piece	Weight kg/100 pc.	Item no.
ABL FT	20	14.300	6221467

The connection component is the connection between the threaded rod lock and the suspension system for the routing types with cable ladders that maintain electrical function to DIN 4102 Part 12. It is attached to the under-belt of the ladder rail at a distance of max. 100 mm from the bracket. When the threaded rod has been mounted, the connection component is secured against slipping.

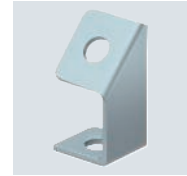
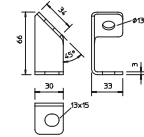


St FS

### Connection component, sloping

Type	Pack Piece	Weight kg/100 pc.	Item no.
ABS FS	20	7.200	6365027

The connection component is the connecting element for the sloping arrangement of the threaded rod locking for wall mounting of the standard routing types with cable ladders and cable trays for the maintenance of electrical function to DIN 4102 Part 12.

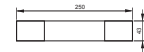


PVC

### Identification plate for maintenance of electrical function

Type	Language	Pack Piece	Weight kg/100 pc.	Item no.
KS-E DE	German	10	0.600	7205423
KS-E EN	English	10	0.600	7205432

Self-adhesive identification plate for approved cable system labelling for maintenance of electrical function as required by DIN 4102 Part 12.



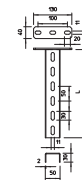
## Mounting systems

St FT

### US 3 support

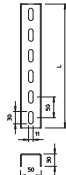
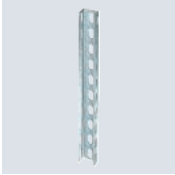
Type	Length mm	Material thickness mm	BS	Pack Piece	Weight kg/100 pc.	Item no.
US 3 K 20 FT	200	2	🔥	1	50.500	6342351
US 3 K 30 FT	300	2	🔥	1	64.400	6342353
US 3 K 40 FT	400	2	🔥	1	78.300	6342355
US 3 K 50 FT	500	2	🔥	1	92.300	6342357
US 3 K 60 FT	600	2	🔥	1	106.200	6342359
US 3 K 70 FT	700	2	🔥	1	120.200	6342362
US 3 K 80 FT	800	2	🔥	1	134.100	6342364
US 3 K 90 FT	900	2	🔥	1	147.800	6342366
US 3 K 100 FT	1000	2	🔥	1	162.000	6342368
US 3 K 110 FT	1100	2	🔥	1	175.900	6342370
US 3 K 120 FT	1200	2	🔥	1	189.900	6342372

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



## US 3 support

St FS

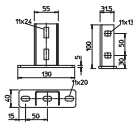


Type	Length mm	Material thickness mm	BS	Pack Piece	Weight kg/100 pc.	Item no.
US 3 20 FS	200	2	🔥	1	27.000	6342302
US 3 30 FS	300	2	🔥	1	40.000	6342304
US 3 40 FS	400	2	🔥	1	53.000	6342306
US 3 50 FS	500	2	🔥	1	67.000	6342308
US 3 60 FS	600	2	🔥	1	80.000	6342310
US 3 70 FS	700	2	🔥	1	93.000	6342312
US 3 80 FS	800	2	🔥	1	107.000	6342314
US 3 90 FS	900	2	🔥	1	120.000	6342316
US 3 100 FS	1000	2	🔥	1	133.000	6342318
US 3 150 FS	1500	2	🔥	1	200.000	6342328
US 3 200 FS	2000	2	🔥	1	266.000	6342338

U support in fixed lengths. Dimensions 30 x 50 mm.

## Head plate

St FT

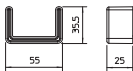


Type	Pack Piece	Weight kg/100 pc.	Item no.
KU 3 FT	1	42.300	6348874

Head plate for mounting on US 3 supports.

## Protective cap

PE

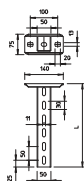


Type	Colour	Pack Piece	Weight kg/100 pc.	Item no.
US 3 KS OR	Pastel orange	20	1.068	6338458

Protective cap to cover the ends of US 3 supports.

## US 5 support

St FT



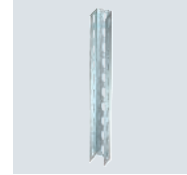
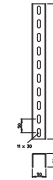
Type	Length mm	Material thickness mm	Dim. L mm	BS	Pack Piece	Weight kg/100 pc.	Item no.
US 5 K 20 FT	200	2.5	200	🔥	1	85.000	6341527
US 5 K 30 FT	300	2.5	300	🔥	1	110.000	6341535
US 5 K 40 FT	400	2.5	400	🔥	1	136.000	6341543
US 5 K 50 FT	500	2.5	500	🔥	1	161.000	6341551
US 5 K 60 FT	600	2.5	600	🔥	1	185.000	6341578
US 5 K 70 FT	700	2.5	700	🔥	1	210.000	6341586
US 5 K 80 FT	800	2.5	800	🔥	1	236.000	6341594
US 5 K 90 FT	900	2.5	900	🔥	1	261.000	6341608
US 5 K 100 FT	1000	2.5	1000	🔥	1	286.000	6341616
US 5 K 110 FT	1100	2.5	1100	🔥	1	311.000	6341624
US 5 K 120 FT	1200	2.5	1200	🔥	1	337.000	6341632

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

St FT

## US 5 support

Type	Length mm	Material thickness mm	Dim. L mm	BS	Pack Piece	Weight kg/100 pc.	Item no.
US 5 30 FT	300	2.5	300		1	79.000	6340903
US 5 40 FT	400	2.5	400		1	106.000	6340911
US 5 50 FT	500	2.5	500		1	133.000	6340938
US 5 60 FT	600	2.5	600		1	160.000	6340946
US 5 70 FT	700	2.5	700		1	175.000	6340950
US 5 80 FT	800	2.5	800		1	200.000	6340954
US 5 90 FT	900	2.5	900		1	227.000	6340958
US 5 100 FT	1000	2.5	1000		1	265.000	6340962
US 5 150 FT	1500	2.5	1500		1	395.000	6340966



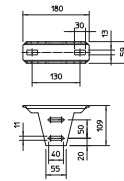
U support in fixed lengths. Dimensions 50 x 50 mm.

St FT

## KU 5 head plate, variable

Type	Pack Piece	Weight kg/100 pc.	Item no.
KU 5 V FT	1	82.000	6348920

Variable head plate for installation on US 5 support.

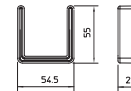


PE

## Protective cap

Type	Colour	Pack Piece	Weight kg/100 pc.	Item no.
US 5 KS OR	Pastel orange	20	1.300	6338462

Protective cap to cover the ends of US 5 supports.



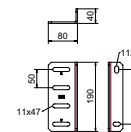
St FT

## Fastening bracket for US 3/US 5 support

Type	Pack Piece	Weight kg/100 pc.	Item no.
BW US 3/5 FT	5	71.100	6019534

Suitable for U support, type US 3 and US 5.

Fastening bracket for the creation of individual support structures with U supports.

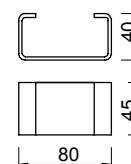


St FT

## Spacer DSK 45

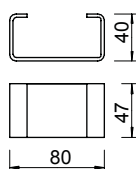
Type	Pack Piece	Weight kg/100 pc.	Item no.
DSK 45 FT	20	18.000	6416500

Spacer for use in US 5 support and in the head plate, type KU 7 VQP.



## Spacer DSK 47

St FT

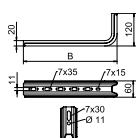


Type	Pack Piece	Weight kg/100 pc.	Item no.
DSK 47 FT	20	19.000	6416504

Spacer for use in head plate, type KU 5 V.

## Bracket TPSA

St FS

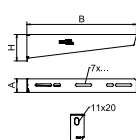


Type	for width mm	Dim. B mm	Pack Piece	Weight kg/100 pc.	Item no.
TPSA 195 FS	100	195	1	39.200	6364152
TPSA 295 FS	200	295	1	52.000	6364268
TPSA 395 FS	300	395	1	65.000	6364276

Bracket for mounting on TPS suspended supports or as wall bracket for standard cable tray routing type for function maintenance to DIN 4102 Part 12.

## Wall and support bracket MWA 12

St FS

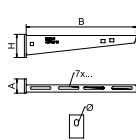


Type	Width mm	Dim. H mm	Dim. A mm	Dim. B mm	Hole Ø mm	BS	Pack Piece	Weight kg/100 pc.	Item no.
MWA 12 11S FS	110	53	32.5	110	11	🔥	1	16.400	6424716
MWA 12 21S FS	210	65	32.5	210	11	🔥	1	26.700	6424732
MWA 12 31S FS	310	75	38	310	11	🔥	1	50.300	6424740
MWA 12 41S FS	410	83	38	410	11	🔥	1	68.000	6424759

Light-duty wall and support bracket.

## Wall and support bracket AW 15

St FT

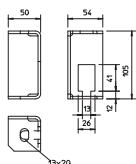
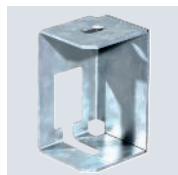


Type	Width mm	Dim. H mm	Dim. A mm	Dim. B mm	Hole Ø mm	BS	Pack Piece	Weight kg/100 pc.	Item no.
AW 15 11 FT	110	50	40	110	11	🔥	1	13.100	6420656
AW 15 21 FT	210	60	40	210	11	🔥	1	24.000	6420680
AW 15 31 FT	310	65	40	310	11	🔥	1	38.400	6420710
AW 15 41 FT	410	70	40	410	11	🔥	1	54.000	6420745

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

## Fire protection clamp

St FT



Type	Pack Piece	Weight kg/100 pc.	Item no.
BSB FT	20	42.400	6418198

Fire protection clamp for ceiling fastening of the threaded rod lock for routing types with cable ladders and cable trays for the maintenance of electrical function to DIN 4102 Part 12.

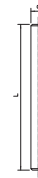


St G

## Threaded rod

Type	Thread	Dim. d mm	Dim. L mm	Pack Piece	Weight kg/100 pc.	Item no.
TR M8 1M G	M8	8	1000	10	30.000	3141128
TR M10 1M G	M10	10	1000	10	49.000	3141209
TR M12 1M G	M12	12	1000	10	62.000	3141306

Threaded rod to DIN 976.

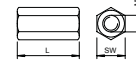


St G

## Connection sleeve

Type	Thread	Dim. L mm	Dim. SW mm	Pack Piece	Weight kg/100 pc.	Item no.
CSTR M8 G	M8	24	13	50	1.880	6410081
CSTR M10 G	M10	30	17	50	4.150	6410103
CSTR M12 G	M12	40	19	25	7.000	6410111

Connection sleeve with continuous internal thread.

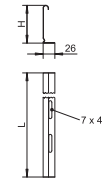


St FS

## Separating retainer 45

Type	Dim. H mm	Metal thickness mm	Dim. L mm	Pack m	Weight kg/100 m	Item no.
TSG 45 FS	45	0.75	3000	3	46.700	6062033

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

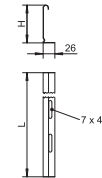


St FS

## Separating retainer 60

Type	Dim. H mm	Metal thickness mm	Dim. L mm	Pack m	Weight kg/100 m	Item no.
TSG 60 FS	60	0.75	3000	3	55.700	6062068

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

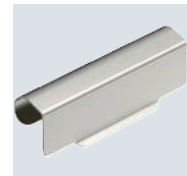
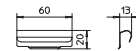


VA 2B

## Separating retainer connector

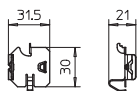
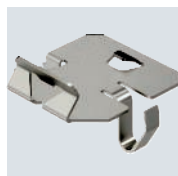
Type	Pack Piece	Weight kg/100 pc.	Item no.
TSGV A2	10	0.899	6067970

Separating retainer connector for screwless connection of the TSG separating retainer in all side heights.



## Hold-down clamp for separating retainer fastening in RKSM

VA 2B

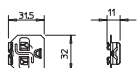


Type	Pack Piece	Weight kg/100 pc.	Item no.
<b>KS KR A2</b>	30	0.537	<b>6062280</b>

Hold-down clamp for screwless fastening of separating retainers in the cable tray types RKSM, MKS and SKS.

## Hold-down clamp for separating retainer fastening

VA 2B

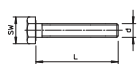


Type	Pack Piece	Weight kg/100 pc.	Item no.
<b>KS KL A2</b>	30	0.512	<b>6062284</b>

Hold-down clamp for screwless fastening of the separating retainer in cable ladders.

## Hexagonal bolt M10

St F

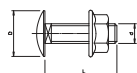
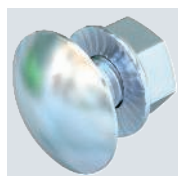


Type	Dimen- sion mm	Dim. L mm	Dim. d mm	Dim. SW mm	Resist- ance grade	Pack Piece	Weight kg/100 pc.	Item no.
<b>SKS 10x60 F</b>	M 10x60	60	10	17	8.8	20	6.000	<b>6408516</b>
<b>SKS 10x80 F</b>	M 10x80	80	10	17	8.8	20	6.900	<b>6418250</b>

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

## Truss-head bolt with flange nut

St F

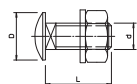
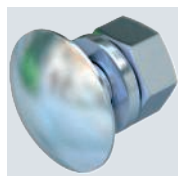


Type	Dimen- sion mm	Dim. L mm	Dim. d mm	Dim. D mm	Resist- ance grade	Pack Piece	Weight kg/100 pc.	Item no.
<b>FRSB 6x12 F</b>	M 6x12	12	6	13.5	5.6	100	0.812	<b>6406122</b>
<b>FRSB 6x16 F</b>	M 6x16	16	6	13.5	5.6	100	0.890	<b>6406157</b>
<b>FRSB 6x20 F</b>	M 6x20	20	6	13.5	5.6	100	0.965	<b>6406203</b>

Truss-head bolt with square neck including flange nut.

## Truss-head bolt with nut and washer

St F



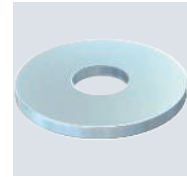
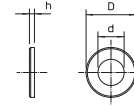
Type	Dimen- sion mm	Dim. L mm	Dim. d mm	Dim. D mm	Resist- ance grade	Pack Piece	Weight kg/100 pc.	Item no.
<b>FRS 10x25 F</b>	M 10x25	25	10	24	5.6	50	4.077	<b>6407528</b>
<b>FRS 10x25 TPS F</b>	M 10x25	25	10	18	5.6	50	4.300	<b>6407536</b>
<b>FRS 12x25 F</b>	M 12x25	25	12	30	5.6	50	6.518	<b>6406254</b>

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

St F

## Large washer

Type	Dim. D mm	Dim. d mm	Dim. h mm	Pack Piece	Weight kg/100 pc.	Item no.
DIN440 7 F	22	6.6	2	100	0.535	6408702
DIN440 11 F	34	11	3	100	1.852	6408729

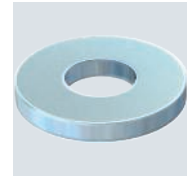
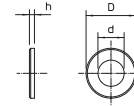


Washer of particularly large outer diameter.

St G

## Washer

Type	Thread	Dim. d mm	Dim. D mm	Dim. h mm	Pack Piece	Weight kg/100 pc.	Item no.
WS M8 D16 G	M8	8.4	16	1.6	100	0.156	3402088
WS M10 D20 G	M10	10.5	20	2	100	0.408	3402096
WS M12 D24 G	M12	13	24	2.5	100	0.570	3402126

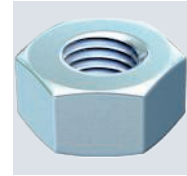
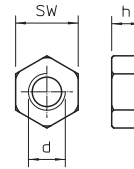


Washer according to DIN 125, shape A, for universal use.

St G

## Hexagonal nut DIN 934

Type	Thread	SW mm	Dim. h mm	Dim. d mm	Pack Piece	Weight kg/100 pc.	Item no.
HN M8 G	M8	13	6.8	8	100	0.500	3400085
HN M10 G	M10	17	8.4	10	100	1.014	3400107
HN M12 G	M12	19	10.8	12	100	1.730	3400123

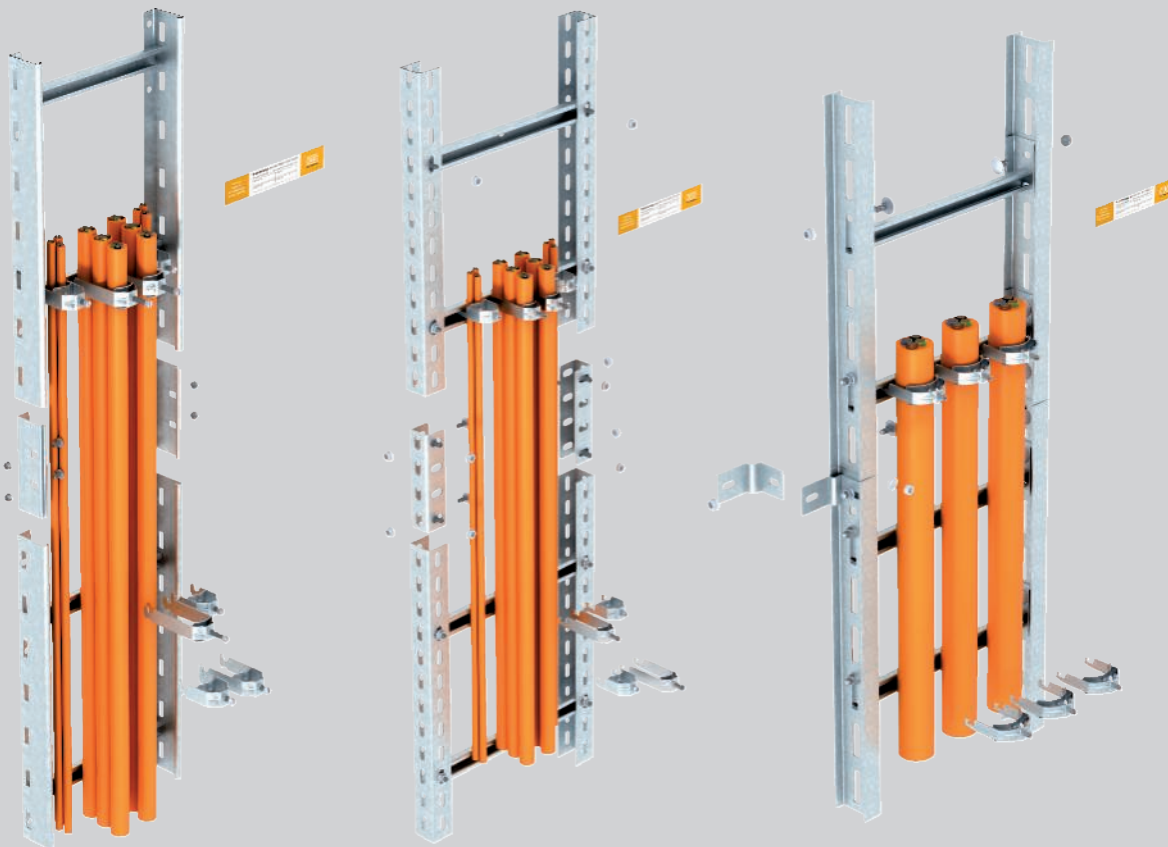


Hexagonal nut to DIN 934 with metric thread.



## Vertical ladders, wall mounting

### System description



Vertical ladders of type LG, type SLM and type SLS fulfil all the requirements of DIN 4102 Part 12 as a standard support structure for the maintenance of electrical functionality classes E30, E60 and E90. They are available in the widths 200 to 400 mm (type LG) and in the widths 400 to 600 mm (type SLM and type SLS). The vertical ladders are made up of straight profiles with riveted or screwed rungs. The rung spacing is 30 mm.

The vertical ladders are fastened directly to the wall through the ladder rails (type LG and type SLM) or

with fastening brackets (type SLS) at a spacing of maximum 1.2 m. Mounting of screwed-on connectors is approved and they can be positioned freely.

The cables must be fastened on each rung with clamp clips with a riveted metal pressure sleeve. Mounting of the strain relief, type ZSE90..., is approved for storey heights of more than 3.5 m. The vertical ladder need not be interrupted as the strain relief is mounted via the continuous vertical ladder.

# Vertical ladders, wall mounting

## Installation principle



Direct mounting of the vertical ladder on solid walls.



Joint connection with screwed-on connector.



Fastening of the cables, either individually or as a bundle with clamp clips.



Direct mounting of the rising section on solid walls.



Joint design with screwed-on connector.



Installation of the cables with clamp clips, also possible in the case of multiple assignment.



Direct mounting of the vertical ladder on solid walls.



Mounting with screwed-on fastening brackets.



Cable installation with clamp clips on the rungs of the vertical ladder.

Classification according to DIN 4102 Part 12

E30

E60

E90

## Vertical ladders, wall mounting

### Proof

#### Maintenance of electrical functionality system according to DIN 4102 Part 12

Routing type	Standard support system
Proof	Surveyor's report no. 2401/809/22-CM
Maintenance of electrical functionality classes	E30 to E90
Testing standard	DIN 4102 Part 12
Material version	Galvanised steel

Note:

The surveyor's report is only valid in conjunction with valid general construction test certificates of a testing office for the appropriate installed cable type.

#### Mounting parameters, light-duty vertical ladder (type LG)

Fastening spacing	max. 1.2 m
Cable load	max. 20 kg/m
Rung distance	30 cm
Width	max. 400 mm
Suitable U clamp	Type 2056 M ...
Individual cable diameter	Unlimited
Cable bundling	A standard support structure, max. 3 power cables up to $\varnothing$ 25 mm or bundle of installation cables with a total weight of 3.0 kg/m

#### Mounting parameters, heavy-duty vertical ladder (type SLM)

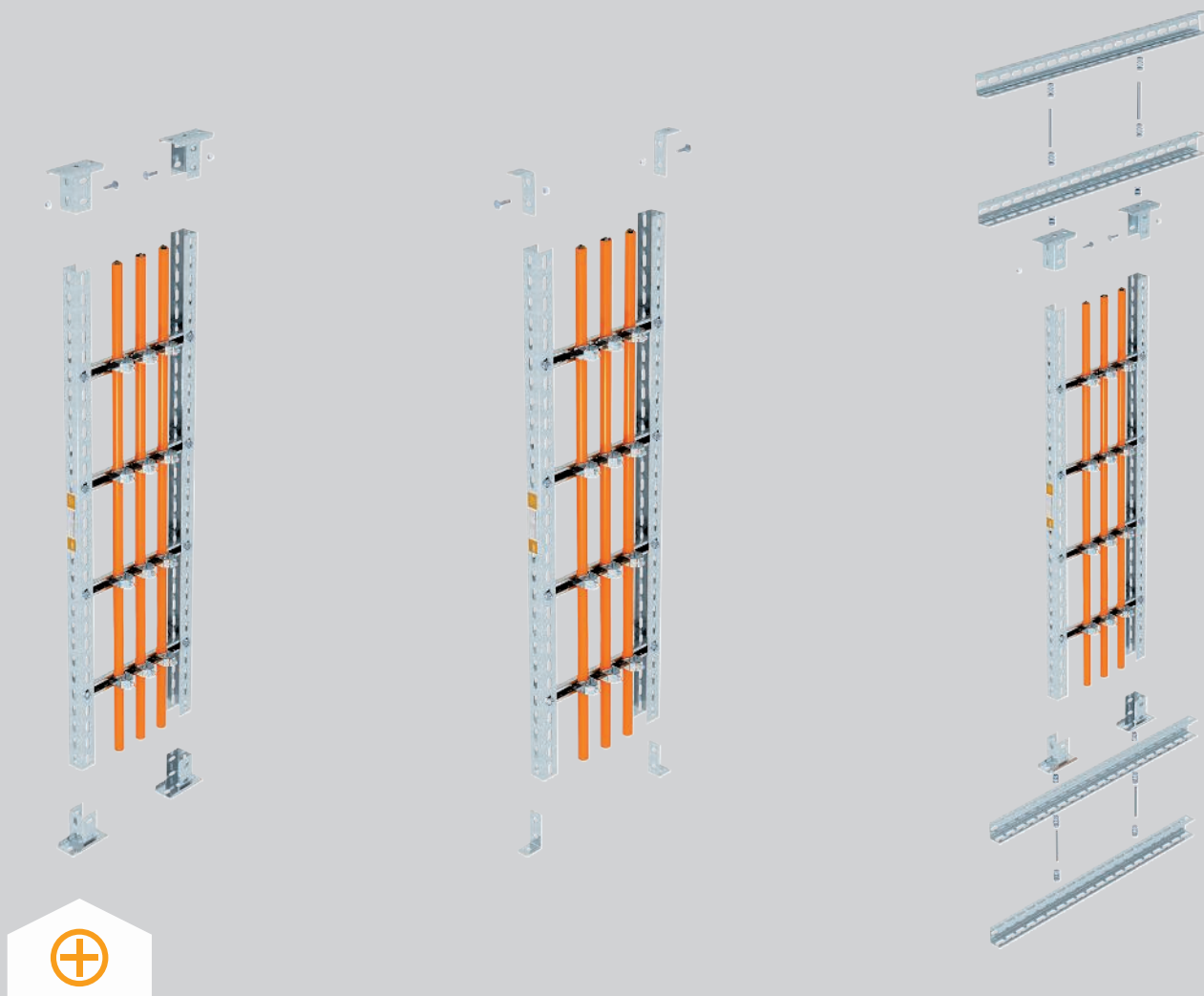
Fastening spacing	max. 1.2 m
Cable load	max. 20 kg/m
Rung distance	30 cm
Width	max. 600 mm
Suitable U clamp	Type 2056 UM ...
Individual cable diameter	Unlimited
Cable bundling	A standard support structure, max. 3 power cables up to $\varnothing$ 25 mm or bundle of installation cables with a total weight of 3.0 kg/m

#### Mounting parameters, industrial vertical ladder (type SLS)

Fastening spacing	max. 1.2 m
Cable load	max. 20 kg/m
Rung distance	30 cm
Width	max. 600 mm
Suitable U clamp	Type 2056 UM ...
Individual cable diameter	Unlimited
Cable bundling	A standard support structure, max. 3 power cables up to $\varnothing$ 25 mm or bundle of installation cables with a total weight of 3.0 kg/m

## Vertical ladders, suspended mounting

### System description

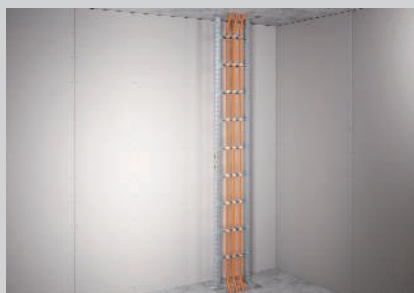


Vertical ladders, type SLM, executed as suspended mounting, fulfil all the requirements of DIN 4102-12 as a standard support structure for the maintenance of electrical function classes E 30, E 60 and E 90. Mounting can be performed in widths of up to 600 mm and a storey height of up to a maximum of 7.0 m. The vertical ladders are made up of straight profiles and screwed rungs. The rung spacing is 30 cm. The suspended mounting of the vertical ladders can be done regardless of the structure or type and of the distance to the wall. The vertical ladders are fastened using head plates

or mounting brackets under the ceiling. When the vertical ladders are mounted in a direct run under a ceiling opening, additional transverse profiles are required to bridge the opening. On the floor, the ladder rails are simply positioned and secured with head plates or mounting brackets, whereby the rails are not screwed to the head plates or brackets. Up to a storey height of 3.5 m, a distance of at least 40 mm is required between the end of the ladder rails and the floor and of at least 70 mm for storey heights between 3.5 m and 7.0 m as length compensation of the rails in the event of fire.

## Vertical ladders, suspended mounting

### Installation principle



Suspended mounting of the vertical ladder in front of a wall.



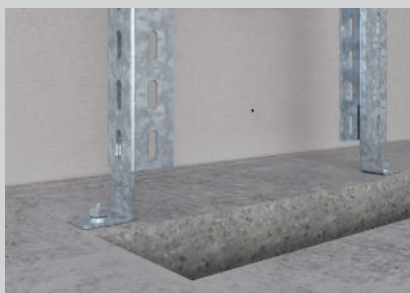
Ceiling fastening of the ladder rails with screwed-on head plates.



Ceiling fastening of the ladder rails with screwed-on mounting brackets.



Head plates mounted on the floor to secure the position of the ladder rails.



Head plates mounted on the floor to secure the position of the ladder rails.



Mounting of the vertical ladder in a direct run below a ceiling opening with cross profiles and head plates.



Mounting of the vertical ladder in a direct run on a ceiling opening with cross profiles and head plates.



Cable installation with 2056 UM clamp clips on the rungs of the vertical ladder.



Closure of the ceiling opening with an approved insulation system.

Classification according to DIN 4102 Part 12

E30

E60

E90



## Vertical ladders, suspended mounting

### Proof

#### Maintenance of electrical function system according to DIN 4102 Part 12

Routing type	Standard support system
Proof	Expert opinion no. GS 3.2/17-436-4-r1 and no. GA-2020/044-Nau
Maintenance of electrical function classes	E30 to E90
Testing standard	DIN 4102 Part 12
Mounting variant	Vertical ladder as suspended mounting
Material version	Galvanised steel

Note:

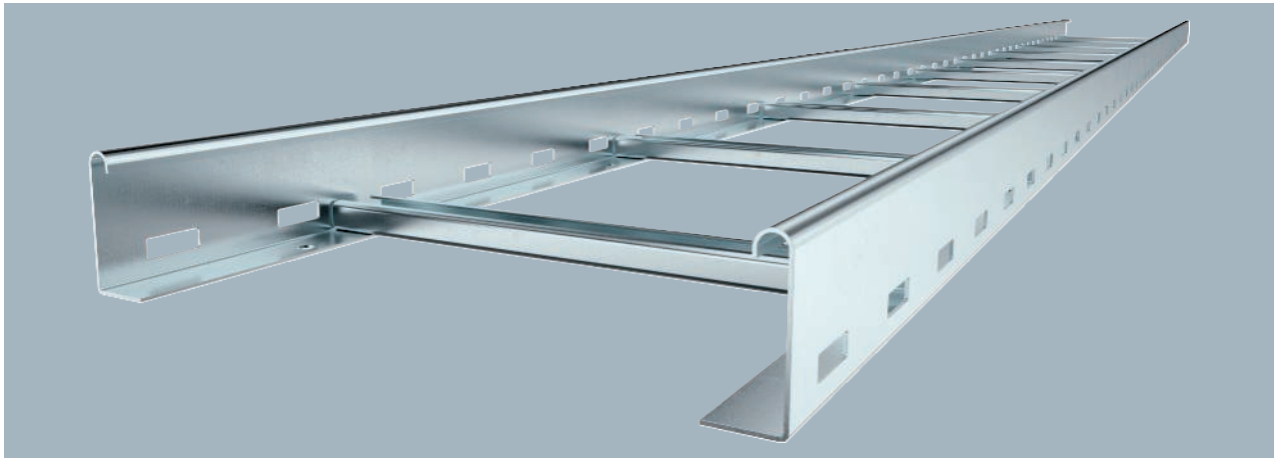
The surveyor's report is only valid in conjunction with valid general construction test certificates of a testing office for the appropriate installed cable type.

#### Mounting parameters, heavy-duty vertical ladder (type SLM)

Cable load	max. 20 kg/m
Width	max. 600 mm
Rung distance	30 cm
Storey height	max. 7.0 m
Suitable U clamp	Type 2056 UM ...
Individual cable diameter	Unlimited
Quantity of cables on bundling	max. 3
Cable diameter on bundling	max. 25 mm

## Cable ladder LG 60, 3 m VS

St FS

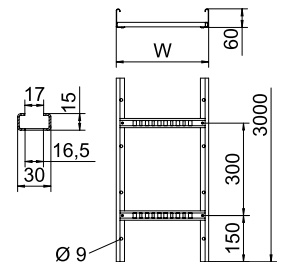


Type	Width mm	BS	Pack m	Weight kg/100 m	Item no.
LG 620 VS 3 FS	200		3	267.000	6208538
LG 630 VS 3 FS	300		3	288.933	6208541
LG 640 VS 3 FS	400		3	314.600	6208544
LG 620 VS 6 FS	200		6	267.066	6208627
LG 630 VS 6 FS	300		6	288.733	6208630
LG 640 VS 6 FS	400		6	314.400	6208633

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

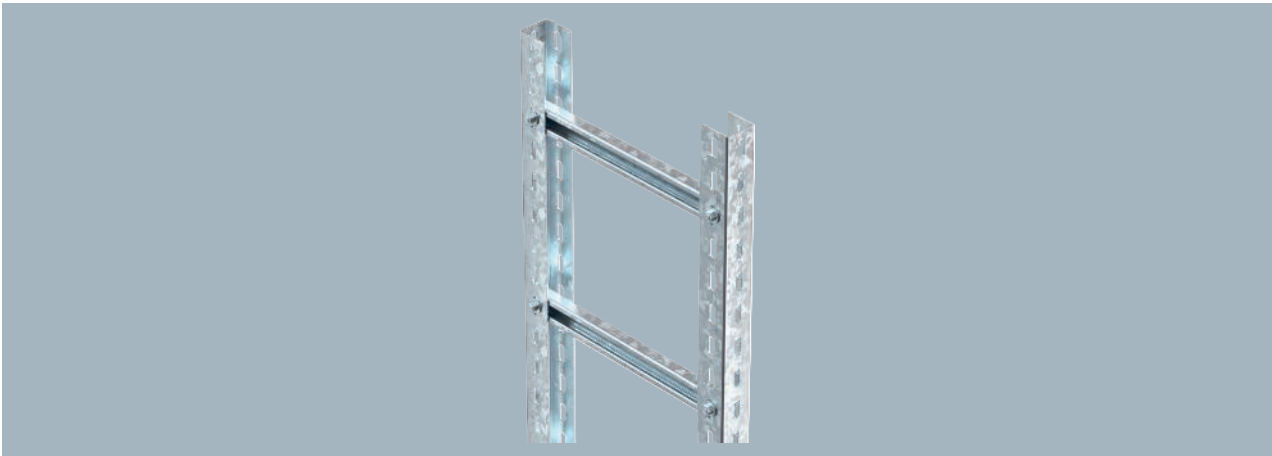
Type	Length mm	Dim. B mm	Rail thick- ness mm	Usable cross- section cm <sup>2</sup>	Rung spacing mm
LG 620 VS 3 FS	3000	200	1.5	98	300
LG 630 VS 3 FS	3000	300	1.5	148	300
LG 640 VS 3 FS	3000	400	1.5	198	300

Dimensions

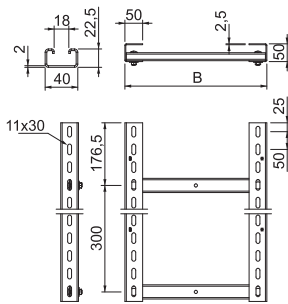


St FT

Vertical ladder, SLM50



Heavyweight vertical ladder system for the maintenance of electrical function to DIN 4102 Part 12. Approved clips, type 2056 U/M. Supplied unmounted.



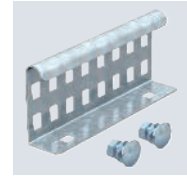
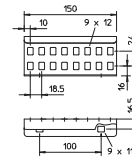
Type	Width mm	Rung spacing mm	Dim. B mm	Length mm	BS	Weight kg/100 m	Item no.
SLM50C40F 40 FT	400	300	400	3000		740.000	6010008
SLM50C40F 50 FT	500	300	500	3000		793.333	6010016
SLM50C40F 60 FT	600	300	600	3000		846.667	6010024

St FS

Straight connector 60

Type	Pack Piece	Weight kg/100 pc.	Item no.
LVG 60 FS	10	22.000	6208840

Straight connector as external connector to connect cable ladders and fittings with a side height of 60 mm and continuous rail perforation.

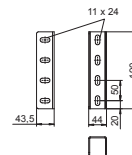


St FT

VUS 5 U support connector

Type	Pack Piece	Weight kg/100 pc.	Item no.
VUS 5 FT	10	61.000	6018505

U support connector to connect US 5 supports.

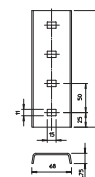


St FT

VIS 8 I support connector

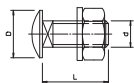
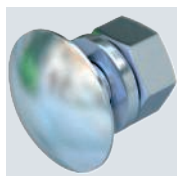
Type	Pack Piece	Weight kg/100 pc.	Item no.
VIS 8 FT	10	87.000	6018300

I support connector to connect IS 8 supports. Including appropriate fastening material.



## Truss-head bolt with nut and washer

St F

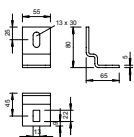
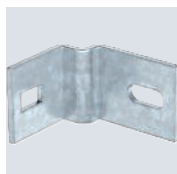


Type	Dimen- sion mm	Dim. L mm	Dim. d mm	Dim. D mm	Resist- ance grade	Pack Piece	Weight kg/100 pc.	Item no.
FRS 8x16 F 8.8	M 8x16	16	8	20	8.8	50	1.947	6406963
FRS 8x25 F	M 8x25	25	8	20	8.8	50	2.217	6406998
FRS 10x25 F 8.8	M 10x25	25	10	24	8.8	50	4.500	6407560
FRS 12x25 F	M 12x25	25	12	30	5.6	50	6.518	6406254

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

## Mounting angle BW 80

St FT

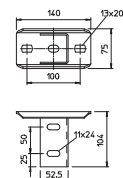


Type	Pack Piece	Weight kg/100 pc.	Item no.
BW 80 55 FT	10	32.900	6019528

Mounting angle for mounting IS 8 supports on the wall.

## Head plate US 5 NOK

St FT

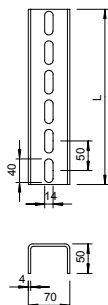


Type	Pack Piece	Weight kg/100 pc.	Item no.
KUS 5 NOK FT	1	75.000	6348939

When installing the head plate, please use the spacer, type DSK 45.  
Head plate with U support mounting rotated 90°.

## US 7 support

St FT

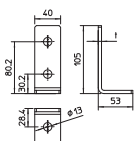
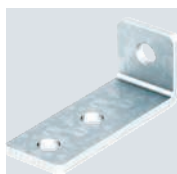


Type	Length mm	Material thickness mm	BS	Pack Piece	Weight kg/100 pc.	Item no.
US 7 60 FT	600	4	🔥	1	241.100	6340091
US 7 70 FT	700	4	🔥	1	281.300	6340113
US 7 80 FT	800	4	🔥	1	323.000	6340148
US 7 90 FT	900	4	🔥	1	361.700	6340164
US 7 100 FT	1000	4	🔥	1	416.000	6340180
US 7 110 FT	1100	4	🔥	1	457.000	6340199
US 7 130 FT	1300	4	🔥	1	540.000	6340210
US 7 140 FT	1400	4	🔥	1	580.000	6340229
US 7 150 FT	1500	4	🔥	1	620.000	6340237
US 7 160 FT	1600	4	🔥	1	660.000	6340245
US 7 170 FT	1700	4	🔥	1	686.000	6340253
US 7 180 FT	1800	4	🔥	1	750.000	6340261
US 7 190 FT	1900	4	🔥	1	790.000	6340288
US 7 200 FT	2000	4	🔥	1	803.700	6340296

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 61.  
U support in fixed lengths. Dimensions 70 x 50 mm.

## Mounting bracket, 90° with 3 holes

St FT



Type	Version	Shipping box Piece	Material thickness mm	Pack Piece	Weight kg/100 pc.	Item no.
GMS 3 VW 90 FT	90° angle	40	5	10	25.910	1124661

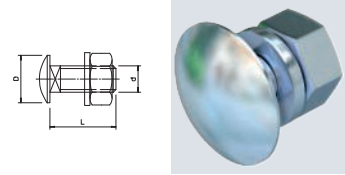
Mounting bracket with three holes to connect profile rails 41 x 41 mm and 41 x 21 mm at an angle of 90°.

St F

### Truss-head bolt with nut and washer

Type	Dimen- sion mm	Dim. L mm	Dim. d mm	Dim. D mm	Resist- ance grade	Pack Piece	Weight kg/100 pc.	Item no.
<b>FRS 10x25 F</b>	M 10x25	25	10	24	5.6	50	4.077	<b>6407528</b>

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

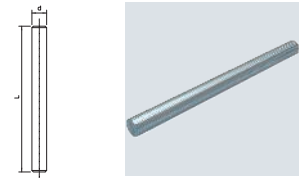


St G

### Threaded rod

Type	Thread	Dim. d mm	Dim. L mm	Break load kN	Pack Piece	Weight kg/100 pc.	Item no.
<b>TR M12 1M G</b>	M12	12	1000	33.7	10	62.000	<b>3141306</b>

Threaded rod to DIN 976.

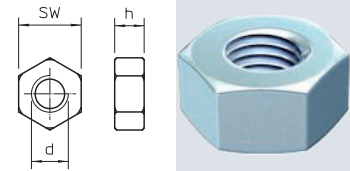


St G

### Hexagonal nut DIN 934

Type	Thread	SW mm	Dim. h mm	Dim. d mm	Pack Piece	Weight kg/100 pc.	Item no.
<b>HN M12 G</b>	M12	19	10.8	12	100	1.730	<b>3400123</b>

Hexagonal nut to DIN 934 with metric thread.

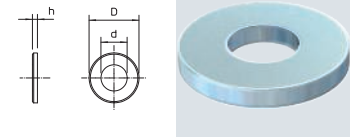


St G

### Washer

Type	Thread	Dim. d mm	Dim. D mm	Dim. h mm	Pack Piece	Weight kg/100 pc.	Item no.
<b>WS M12 D24 G</b>	M12	13	24	2.5	100	0.570	<b>3402126</b>

Washer according to DIN 125, shape A, for universal use.

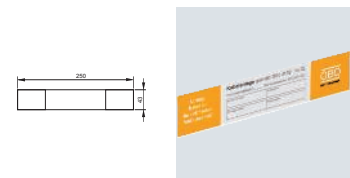


PVC

### Identification plate for maintenance of electrical function

Type	Language	Pack Piece	Weight kg/100 pc.	Item no.
<b>KS-E DE</b>	German	10	0.600	<b>7205423</b>
<b>KS-E EN</b>	English	10	0.600	<b>7205432</b>

Self-adhesive identification plate for approved cable system labelling for maintenance of electrical function as required by DIN 4102 Part 12.



## Strain relief ZSE90

### For direct wall mounting with foam filling

#### System description



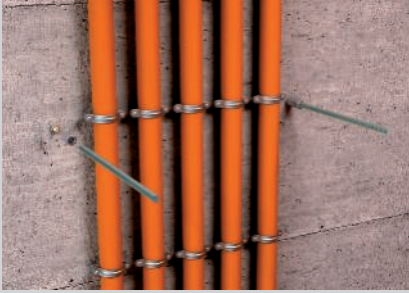
In the case of continuous, vertical routing of cables for the maintenance of electrical function according to DIN 4102 Part 12, the standard requires effective cable support at a maximum spacing of 3.5 m. This requirement can be fulfilled with the OBO ZSE90 strain relief. The ZSE90 is approved for all classes ensuring the maintenance of electrical functionality from E30 to E90 in combination with standard support structures. It can be used for all rising section widths and also for vertical single-clip installations. The ZSE90 strain relief covers the fastening point of the cables on profile rails, rungs or with single clips. In the event of fire, it prevents direct fire loads on the clips, meaning that they stay "relatively" cold. The weight of the cable is dissipated safely. There is no

risk of the cables tearing through their intrinsic weight if there is a fire. This guarantees the maintenance of electrical function. The strain relief can be fastened using slide nuts on profile rails, on the rungs of vertical ladders or on the wall next to installed cables. With this variant of the ZSE90 strain relief for direct wall mounting, the non-combustible, 3-sided housing is filled with insulation made of foams: Areas not filled with cables are filled with PYROPLUG® Block foam blocks. All the spaces beside, between and behind the cables are closed with the PYROSIT® NG fire protection foam. Thanks to the filling tip of the PYROSIT® NG cartridge, even the smallest cavity can be reached with ease.

# Strain relief ZSE90

## For direct wall mounting with foam filling

### Installation principle



Fastening points next to the cables directly on the wall.



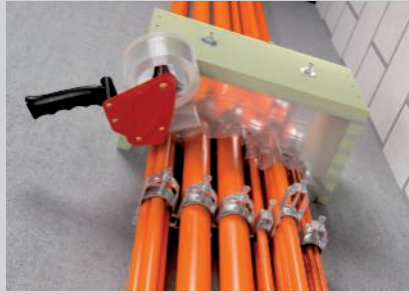
Fastening in the rungs.



Mounting using profile rails.



Mounting using cable ladders.



Creation of a lining for the safe filling of the housing.



Filling of the complete housing with high cable assignments with PYROSIT® NG fire protection foam.



Filling with PYROPLUG® Block foam blocks and filling of the cable spandrels with PYROSIT® NG fire protection foam.



Finished filled strain relief.

Classification according to DIN 4102 Part 12

E30

E60

E90

# Strain relief ZSE90

## For direct wall mounting with foam filling

### Proof

#### Proof

Routing type	Standard support structure according to DIN 4102 Part 12 Effective support for vertical routing as a direct mounting
Proof	Expert opinion no. GA-2020/049-Nau
Maintenance of electrical function classes	E30 to E90
Testing standard	DIN 4102 Part 12

Note:

The expert opinion only applies in conjunction with the valid general construction test certificates of a testing office for the appropriate installed cable type.

#### Mounting parameters

Fastening spacing	max. 3.5 m
Application area	Individual clip routing Cable routing on profile rails Vertical ladders
Fastening options	With threaded rods directly on the wall With threaded rods on profile rails With threaded rods on the rungs of the vertical ladders
Housing width (interior)	250–650 mm
Housing height (interior)	115 mm / 175 mm
Individual cable diameter	Unlimited
Cable types	No restrictions

#### Combination options of strain relief with vertical cable installations

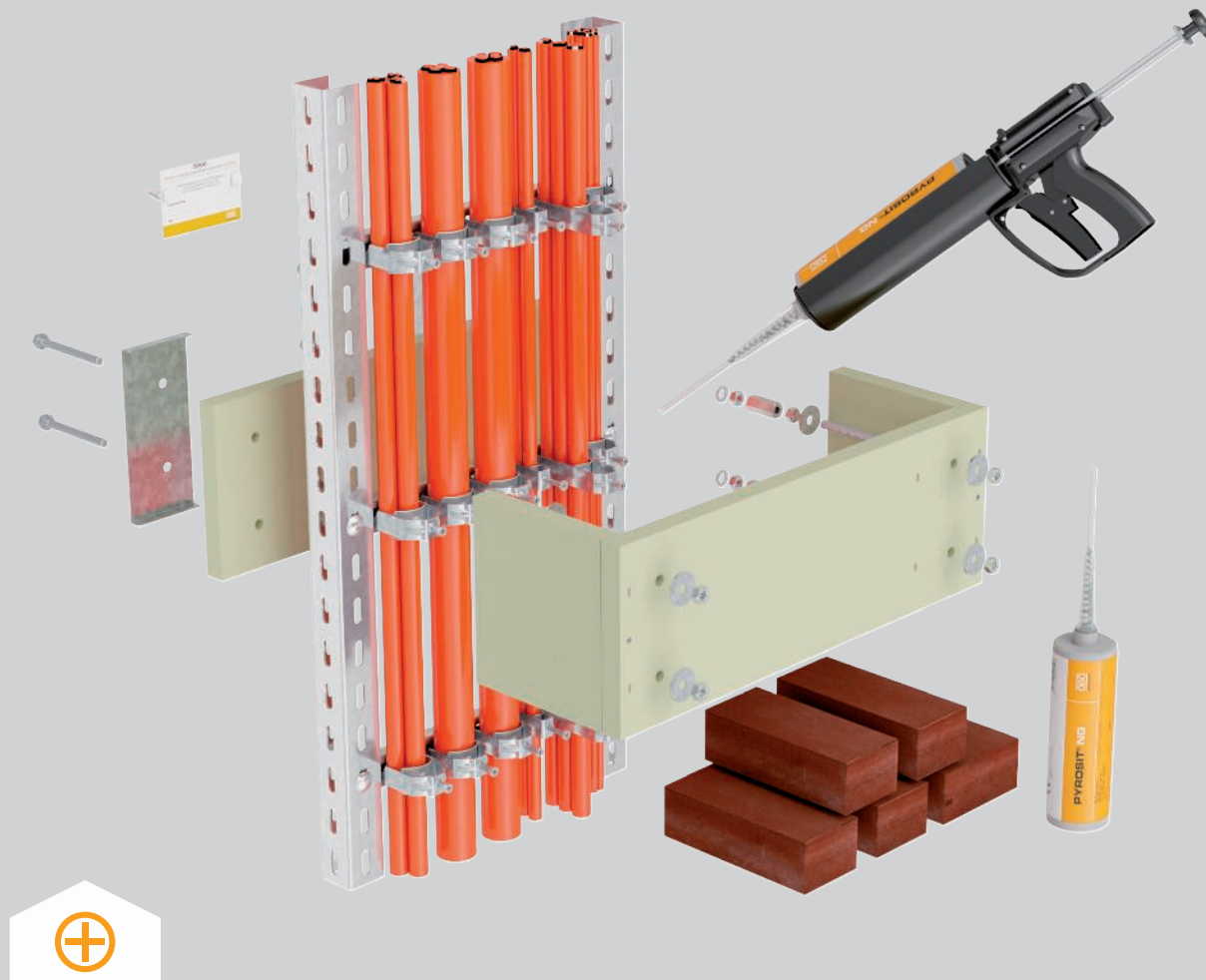
Strain relief Type	Cable routing with individual clips	Cable routing on profile rails	Vertical ladder Type LG	Vertical ladder Type SLM	Vertical ladder Type SLS
ZSE90-25-11 L	✓	✓	✓	✓	✗
ZSE90-35-11 L	✓	✓	✓	✓	✗
ZSE90-45-11 L	✓	✓	✓	✓	✓
ZSE90-25-17 L	✓	✓	✓	✓	✗
ZSE90-35-17 L	✓	✓	✓	✓	✗
ZSE90-45-17 L	✓	✓	✓	✓	✓
ZSE90-55-17 L	✓	✓	✗	✓	✓
ZSE90-65-17 L	✓	✓	✗	✓	✓



# Strain relief ZSE90

## For mounting on suspended vertical ladders

### System description



In the case of continuous, vertical routing of cables for the maintenance of electrical function according to DIN 4102 Part 12, the standard requires effective cable support at a maximum spacing of 3.5 m. This requirement can be fulfilled with the OBO ZSE90 strain relief. The ZSE90 is approved for all classes ensuring the maintenance of electrical functionality from E30 to E90 in combination with standard support structures. In the four-sided variant, the ZSE90 can be used on suspended vertical ladders. The strain relief consists of a U-shaped housing, a matching lock

plate made from the same non-combustible material and a mounting set for the installation on vertical ladders consisting of U profiles. Filling takes place with PYROPLUG® Block foam blocks and the PYROSIT® NG fire protection foam.

In the event of fire, it prevents direct fire loads on the clips, meaning that they stay "relatively" cold. The weight of the cable is dissipated safely. There is no risk of the cables tearing through their intrinsic weight if there is a fire. This guarantees the maintenance of electrical function.

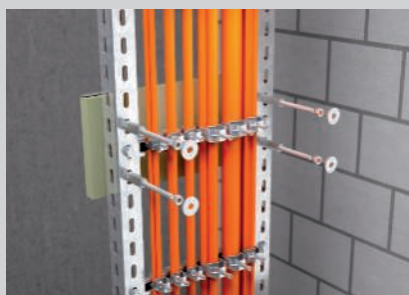
# Strain relief ZSE90

## For mounting on suspended vertical ladders

### Installation principle



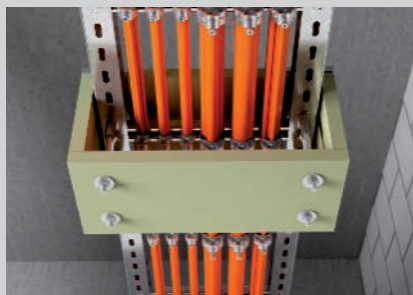
Mounting of the counter plate with hexagonal bolts on a suspended vertical ladder.



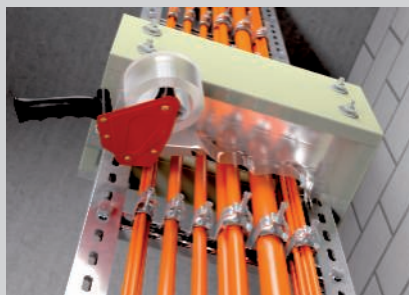
Mounting of threaded rods, lock nuts and washers to fasten the housing.



Fastening of the pre-mounted, three-sided housing on the threaded rods.



Fully mounted housing.



Creation of a lining for the safe filling of the housing.



Filling of the mounted housing with PYROPLUG® Block foam blocks.



Filling of the complete housing with high cable assignments with PYROSIT® NG fire protection foam.



Filling of the cable spandrels with PYROSIT® NG fire protection foam.



Finished filled strain relief.

Classification according to DIN 4102 Part 12

**E30**

**E60**

**E90**

# Strain relief ZSE90

## For mounting on suspended vertical ladders

### Proof

#### Proof

Routing type	Standard support structure according to DIN 4120 Part 12 Effective support for vertical routing as a suspended installation
Proof	Expert opinion no. GA-2020/049-Nau
Maintenance of electrical function classes	E30 to E90
Testing standard	DIN 4102 Part 12

Note:

The expert opinion only applies in conjunction with the valid general construction test certificates of a testing office for the appropriate installed cable type.

#### Mounting parameters

Fastening spacing	Max. 5.0 m
Application area	Laying cables in vertical ladders
Fastening options	With a mounting set on the vertical ladder
Housing width (interior)	210–610 mm
Housing height (interior)	175 mm
Individual cable diameter	Unlimited
Cable types	No restrictions

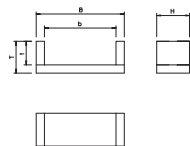
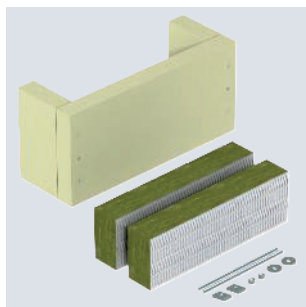
#### Combination options of strain relief with vertical cable installations

Strain relief Type	Vertical ladder Type LG	Vertical ladder Type SLM	Vertical ladder Type SLS
ZSE90-21-17 LH	✘	✔	✘
ZSE90-31-17 LH	✘	✔	✘
ZSE90-41-17 LH	✘	✔	✘
ZSE90-51-17 LH	✘	✔	✘
ZSE90-61-17 LH	✘	✔	✘



## Effective support for vertical routing

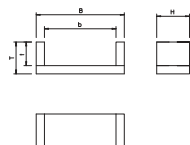
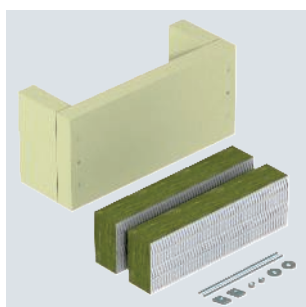
### Strain relief, three-sided, with mineral wool, interior height 115 mm



Type	Dim. b mm	Dim. t mm	Dim. H mm	Dim. B mm	Dim. T mm	Pack Piece	Weight kg/100 pc.	Item no.
ZSE90-25-11	250	115	140	340	160	1	376.000	7215702
ZSE90-35-11	350	115	140	440	160	1	466.000	7215706
ZSE90-45-11	450	115	140	540	160	1	506.000	7215709

Strain relief as an effective support measure for vertical cable routing, according to DIN 4102 Part 12, approved for all cable types and all vertical routing systems. Maintenance of electrical function classes E30 to E90. Housing including mineral fibre panels, fastening material, ASX fire protection coating in cartridge and identification plate.

### Strain relief, three-sided, with mineral wool, interior height 175 mm



Type	Dim. b mm	Dim. t mm	Dim. H mm	Dim. B mm	Dim. T mm	Pack Piece	Weight kg/100 pc.	Item no.
ZSE90-25-17	250	175	160	340	220	1	484.000	7215713
ZSE90-35-17	350	175	160	440	220	1	600.000	7215716
ZSE90-45-17	450	175	160	540	220	1	700.000	7215719
ZSE90-55-17	550	175	160	640	220	1	770.000	7215726
ZSE90-65-17	650	175	160	740	220	1	822.000	7215730

Strain relief as an effective support measure for vertical cable routing, according to DIN 4102 Part 12, approved for all cable types and all vertical routing systems. Maintenance of electrical function classes E30 to E90. Housing including mineral fibre panels, fastening material, ASX fire protection coating in cartridge and identification plate.

### Ablation coating PYROCOAT® in a cartridge



Type	Contents ml	Pack Piece	Weight kg/100 pc.	Item no.
ASX-K	310	1	50.000	7202310

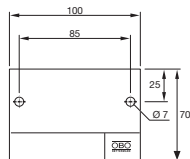
Combined, endothermic and weatherproof coating for internal and external areas. Universal protection coating for cable and cable support structures. Use as direct filler, and as paint when stirred.

Material class DIN 4102 - B2, normally flammable.

In dry, frost-free rooms, the coating can be stored at temperatures from +5 °C to +25 °C for up to 18 months in closed, upright original containers.

### Identification plate for strain relief

PVC

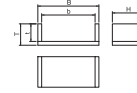


Type	Language	Pack Piece	Weight kg/100 pc.	Item no.
KS-ZSE DE	German	1	2.400	7215750

Universal identification plate to be written on with waterproof and light-resistant felt-tip pen for the ZSE90 strain relief. For approved identification, according to DIN 4102 Part 12. Including two push-fit anchors.

### Strain relief on three sides, empty housing, internal height 115 mm

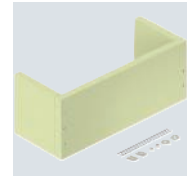
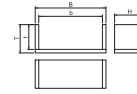
Type	Dim. b mm	Dim. t mm	Dim. H mm	Dim. B mm	Dim. T mm	Pack Piece	Weight kg/100 pc.	Item no.
ZSE90-25-11 L	250	115	200	300	140	1	320.000	7215760
ZSE90-35-11 L	350	115	200	400	140	1	390.000	7215762
ZSE90-45-11 L	450	115	200	500	140	1	410.000	7215764



Strain relief as an effective support measure for vertical cable routing, according to DIN 4102 Part 12. Approved for all cable types and all vertical routing systems, which are mounted directly on solid walls. Maintenance of electrical function classes E30 to E90. Empty housing for individual filling with the PYROSIT® NG fire protection foam and/or PYROPLUG® Block insulation systems, incl. mounting set and labelling panel.

### Strain relief on three sides, empty housing, internal height 175 mm

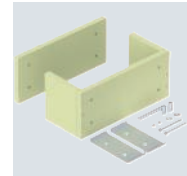
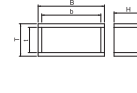
Type	Dim. b mm	Dim. t mm	Dim. H mm	Dim. B mm	Dim. T mm	Pack Piece	Weight kg/100 pc.	Item no.
ZSE90-25-17 L	250	175	200	300	200	1	380.000	7215766
ZSE90-35-17 L	350	175	200	400	200	1	430.000	7215768
ZSE90-45-17 L	450	175	200	500	200	1	475.000	7215770
ZSE90-55-17 L	550	175	200	600	200	1	530.000	7215772
ZSE90-65-17 L	650	175	200	700	200	1	575.000	7215774



Strain relief as an effective support measure for vertical cable routing, according to DIN 4102 Part 12. Approved for all cable types and all vertical routing systems, which are mounted directly on solid walls. Maintenance of electrical function classes E30 to E90. Empty housing for individual filling with the PYROSIT® NG fire protection foam and/or PYROPLUG® Block insulation systems, incl. mounting set and labelling panel.

### Strain relief on four sides, empty housing, internal height 175 mm

Type	Dim. b mm	Dim. t mm	Dim. H mm	Dim. B mm	Dim. T mm	Pack Piece	Weight kg/100 pc.	Item no.
ZSE90-21-17 LH	210	175	200	260	225	1	595.000	7215780
ZSE90-31-17 LH	310	175	200	360	225	1	690.000	7215782
ZSE90-41-17 LH	410	175	200	460	225	1	785.000	7215784
ZSE90-51-17 LH	510	175	200	560	225	1	875.000	7215786
ZSE90-61-17 LH	610	175	200	660	225	1	975.000	7215788



Strain relief as an effective support measure for vertical cable routing, according to DIN 4102 Part 12. Approved for all cable types and vertical ladders, created as suspended mounting. Maintenance of electrical function classes E30 to E90. Empty housing for individual filling with the PYROSIT® NG fire protection foam and/or PYROPLUG® Block insulation systems, incl. mounting set and labelling panel.

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

Type	Contents ml	Pack Piece	Weight kg/100 pc.	Item no.
FBS-S	380	1	64.600	7203800



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.

## Mixer pipe set



Type	Pack PU	Weight kg/100 PUs	Item no.
FBS-M	1	10.000	7203803

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

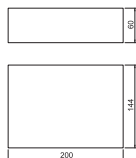
## Professional cartridge pistol



Type	Pack Piece	Weight kg/100 pc.	Item no.
FBS-PH	1	120.000	7203806

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.

## PYROPLUG® Block foam block



Type	Dimension mm	Pack Piece	Weight kg/100 pc.	Item no.
FBA-B200-14	200x144x60	4	44.800	7202505

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.

## PYROPLUG® screed filler

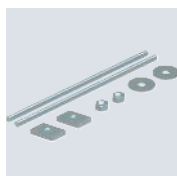


Type	Contents ml	Pack Piece	Weight kg/100 pc.	Item no.
FBA-SP	310	1	46.000	7202322

Fire protection filler in a cartridge.

Usable as small insulation and as joint closing compound in all insulation of the PYROPLUG® series. For interior application. In dry, frost-free rooms, the fire protection filler can be stored for up to 12 months at a temperature of +5 °C to +30 °C.

## Mounting set, strain relief ZSE90



Type	Pack Piece	Weight kg/100 pc.	Item no.
ZSE90 M1	1	32.000	7215741
ZSE90 M2	1	35.000	7215745
ZSE90 M3	1	97.870	7215747

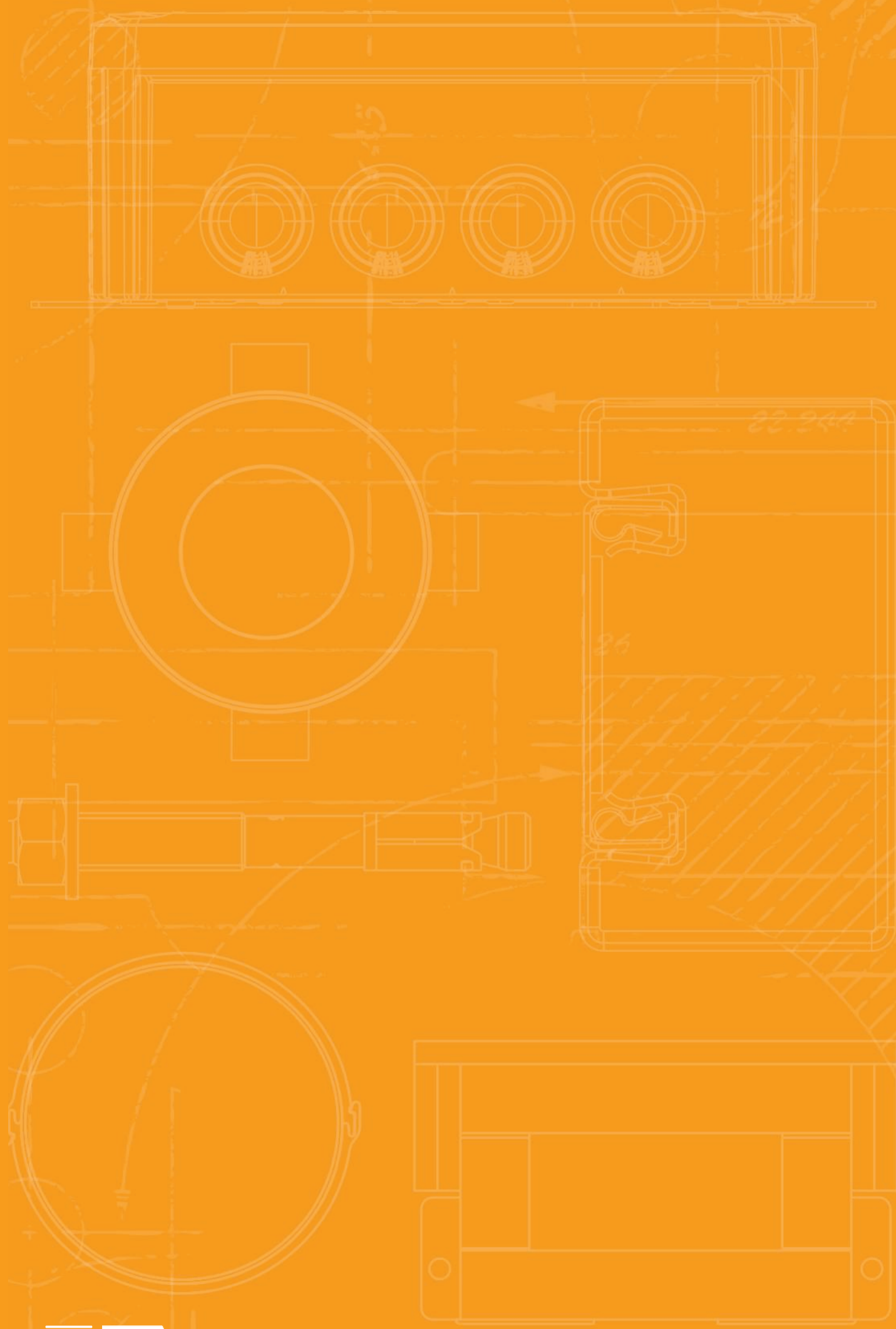
Spare parts in mounting set with all the small parts for mounting the ZSE90 strain relief on and next to rising tracks for the maintenance of electrical function.

Type ZSE90 M1 for strain relief, three-sided with internal height 115 mm,

Type ZSE90 M2 for strain relief, three-sided with internal height 175 mm,

Type ZSE90 M3 for strain relief, four-sided with internal height 175 mm.







# Escape route installations, false ceiling mounting



False ceiling cable trays and mesh cable trays

162



Grip M grouped support

186



Metal pressure clip

192



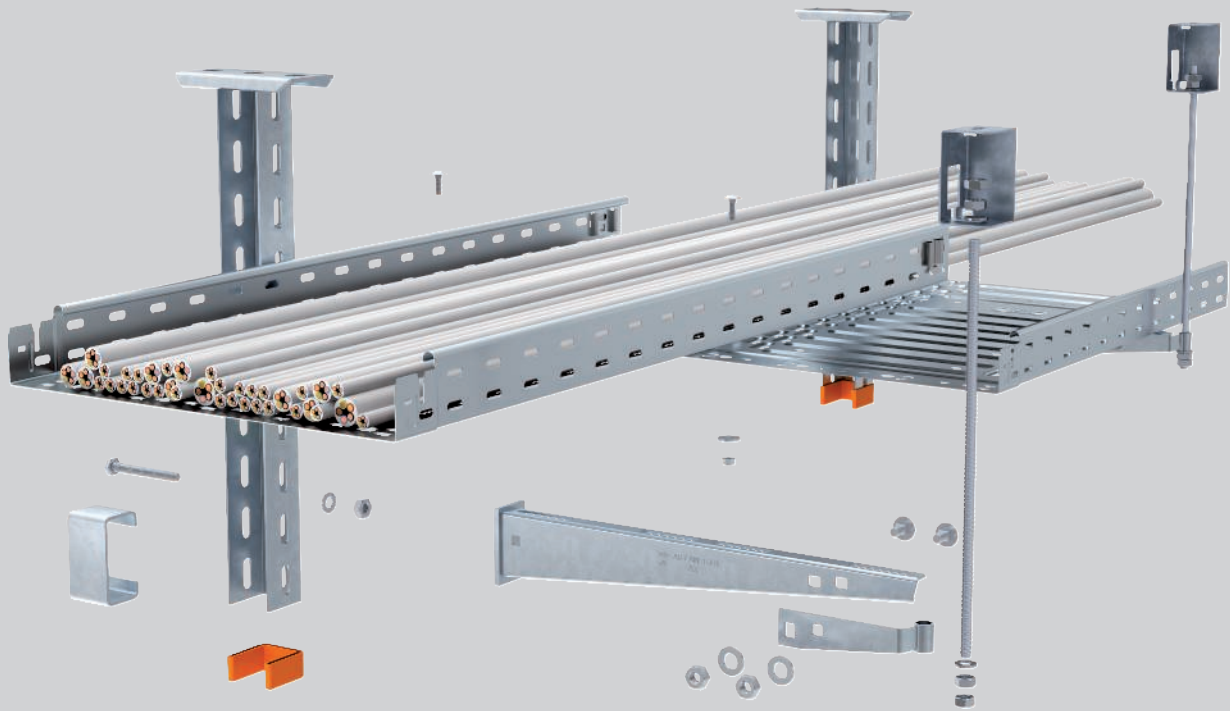
# RKS-Magic® cable tray

## System description

30

60

90



The tested RKS-Magic® cable tray system is suitable for installation in the false ceiling area of escape routes. In the event of fire, the system has a proven mechanical stability of 30, 60 and 90 minutes, depending on the system components used. The RKS-Magic® cable tray can be mounted under the ceiling or on the wall with brackets. The brackets are additionally secured on the ceiling with a threaded rod to prevent them from bending in a fire. The AW15 brackets in the widths 110 to

410 mm have the required perforations at the bracket tip to fasten the matching connection components. A further option for ceiling mounting is the support of the cable tray on profile rails, each mounted under the ceiling with two threaded rods. If the cable loads and tray widths listed in the proof of testing are maintained and the minimum spacings to the false ceiling is taken into account, then multi-layer variants can also be implemented.

### Fireproof fastening above fire protection ceilings

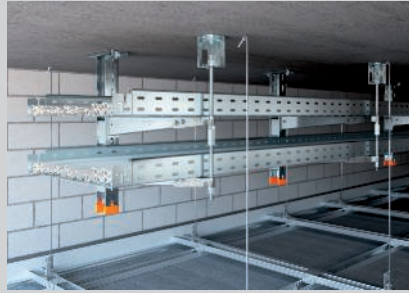
Fire load	30/60/90 minutes
Proof of testing	OBO Bettermann
Document no. - mounting with mounting rails	BS-05/190-01-01
Document no. - mounting with suspended support/bracket	BS-05/190-01-02
Testing principles	In accordance with DIN 4102

# RKS-Magic® cable tray

## Installation principle



Single-layer ceiling suspension.



Two-layer ceiling suspension with bracket arrangement on one side.



Two-layer ceiling suspension with bracket arrangement on both sides.



Wall mounting, one and two-layer possible.



Mounting of the threaded rod lock using a connection component at the bracket tip.



Complete screwless joint connection.



Single-layer ceiling mounting above suspended fire protection ceiling.



Two-layer ceiling mounting above suspended fire protection ceiling.



Clamp fastening for high load capacities.

Tested mounting options



**CAUTION: No maintenance of electrical functionality according to DIN 4102 Part 12!**

# RKS-Magic® cable tray

## Maximum support distances for wall and ceiling mounting

Cable tray width [mm]	Fire load [min] Max. cable load [kg/m]		Maximum support distance [m]						
	30	60/90	1.50	1.50	1.50	1.50	1.50	1.50	1.50
100	15	10	1.50	1.50	1.50	1.50	1.50	1.50	1.50
200	30	20							
300	45	30		1.20					
400	60	40		1.20					


## Required minimum distance „a“ for the fire load at different support distances

Maximum support distance [m]	0.50			0.75			1.00			1.25			1.50		
	30	60	90	30	60	90	30	60	90	30	60	90	30	60	90
Cable tray width [mm]	Minimum distance „a“ [mm]														
100	30	30	30	30	35	40	30	70	90	45	130	140	60	145	150
200	30	35	40	50	55	60	70	95	100	115	140	145	160	150	160
300	40	45	50	70	75	85	105	110	120	130	145	150	160	155	160
400	60	60	65	80	80	95	105	120	130	130*	155	160*	160*	160	165*

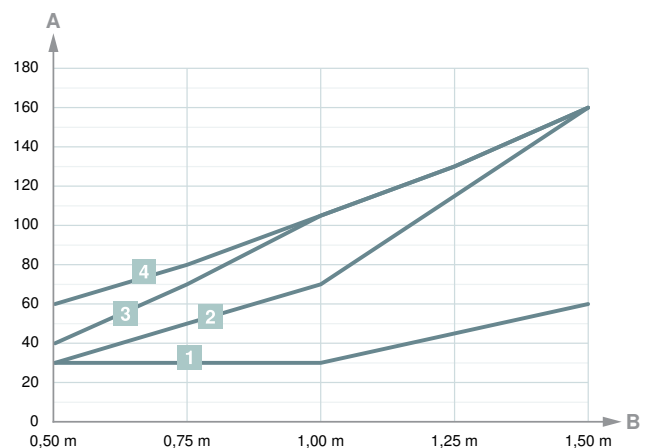
\*Observe the maximum support distances according to the table: „Maximum support distances for wall and ceiling mounting“.  
The minimum distance „a“ refers to the distance from the underside of the cable tray to the upper side of the fire protection ceiling.

- 1 RKSM 610
- 2 RKSM 620
- 3 RKSM 630
- 4 RKSM 640

A = Minimum distance "a" in mm to the fire protection ceiling  
B = Support distance in m

 The minimum spacing "a" relates to the distance of the under side of the cable tray to the top side of the fire protection ceiling.

## Deformation of the RKS-Magic® cable tray in mm for 30-minute fire load






30

60

90








## Component assignment

Components to be used for single and double layer mounting at the fire load of 30/60/90 minutes

Components	Suspended support type when mounting		Bracket Type	Mounting rail type				
				Maximum support distance [m]				
Cable tray width [mm]		 		0.50	0.75	1.00	1.25	1.50
100	US 3 K...FT	US 3 K...FT	AW 15 11 FT	MS4121P				
200			AW 15 21 FT					
300		US 5 K...FT	AW 15 31 FT	MS4121P	MSL4141P			MS4141P
400			AW 15 41 FT	MSL4141P			MS4141P*	

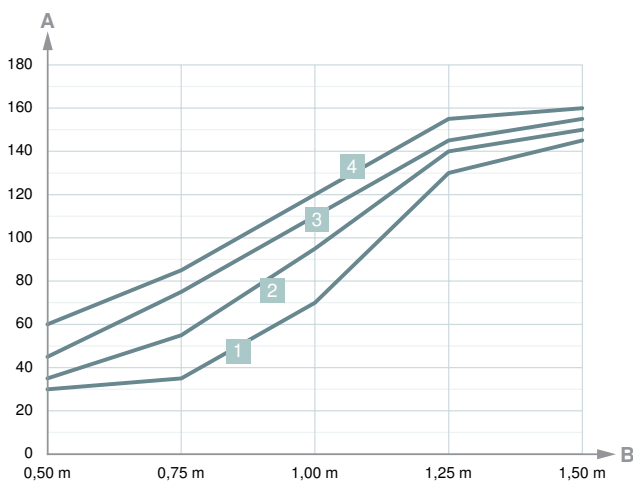
\*Observe the maximum support distances according to the table: „Maximum support distances for wall and ceiling mounting“.

Assignment of threaded rods at the fire loads of 30/60/90 minutes

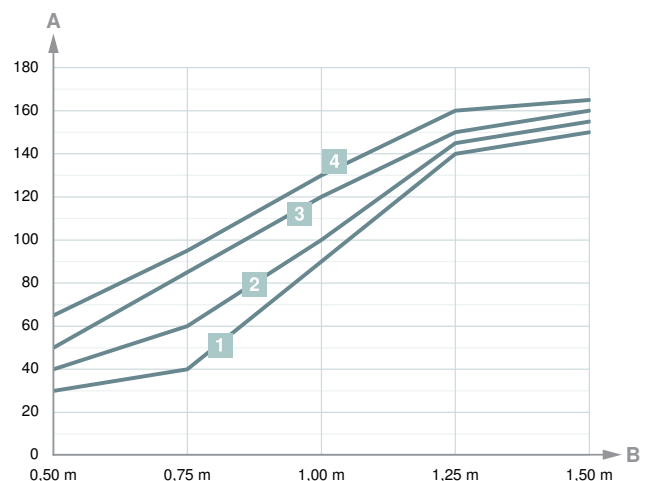
Cable tray width [mm]	Maximum support distance [m]					Maximum support distance [m]				
										
	0.50	0.75	1.00	1.25	1.50	0.50	0.75	1.00	1.25	1.50
100	M8					M8		M10		
200										
300	M8		M10			M10		M12		
400										

\*Observe the maximum support distances according to the table: „Maximum support distances for wall and ceiling mounting“.

Deformation of the RKS-Magic® cable tray in mm for 60-minute fire load

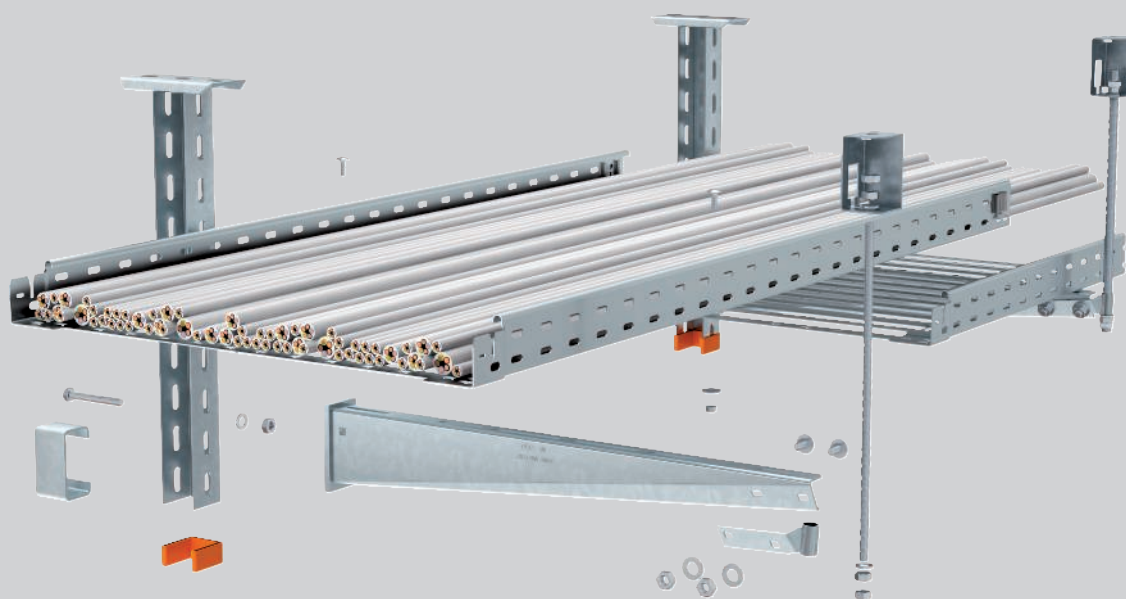


Deformation of the RKS-Magic® cable tray in mm for 90-minute fire load



## Cable tray SKS-Magic® System description

30



The tested SKS-Magic® cable tray system is suitable for installation in the false ceiling area of escape and rescue routes. In the event of fire, the system has a proven mechanical stability of 30 minutes. The SKS-Magic® cable tray can be mounted under the ceiling or on the wall using brackets. The brackets are additionally secured on the ceiling with a threaded rod to prevent them from bending in a fire. The AW15 brackets in the widths 110 to 410 mm and the AW30 brackets in the widths 510 and 610 mm have the required perforations at the bracket tip to fasten the

matching connection components. If the cable loads and tray widths listed in the proof of testing are maintained and the minimum spacings to the false ceiling is taken into account, then multi-layer variants can also be implemented. A further option for ceiling mounting is the support of the cable trays on profile rails, each mounted under the ceiling with two threaded rods. A two-layer arrangement of the cable trays is possible, providing that the approved tensile stress in the threaded rods is also maintained in the event of fire.

### Fireproof fastening above fire protection ceilings

Fire load	30 minutes
Proof of testing	OBO Bettermann
Document no. - mounting with mounting rails	BS-05/190-02-01
Document no. - mounting with suspended support/bracket	BS-05/190-02-02
Testing principles	In accordance with DIN 4102

Proofs of testing are also available for the SKS cable trays and can be requested.

# Cable tray SKS-Magic®

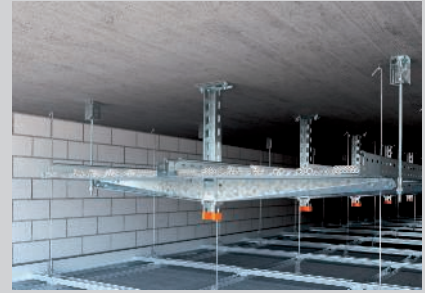
## Installation principle



Single-layer ceiling suspension.



Two-layer ceiling suspension with bracket arrangement on one side.



Two-layer ceiling suspension with bracket arrangement on both sides.



Wall mounting, one and two-layer possible.



Mounting of the threaded rod lock using a connection component at the bracket tip.



Screwless joint connection, only the base lugs need to be bent.



Single-layer ceiling mounting above suspended fire protection ceiling.



Two-layer ceiling mounting above suspended fire protection ceiling.



Clamp fastening for high load capacities.

Tested mounting options



**CAUTION: No maintenance of electrical functionality according to DIN 4102 Part 12!**

# Cable tray SKS-Magic®

## Maximum support distances for wall and ceiling mounting

Cable tray width [mm]	Fire load [min] Max. cable load [kg/m]	Maximum support distance [m]					
		1.50	1.50	1.50	1.50	1.50	1.50
100	15	1.50	1.50	1.50	1.50	1.50	1.50
200	30						
300	45						
400	60						
500	75						
600	90						

## Required minimum distance „a“ for the fire load at different support distances


Maximum support distance [m]	0.50	0.75	1.00	1.25	1.50
Fire load [min]	30				
Cable tray width [mm]	Minimum distance „a“ [mm]				
100	20	20	20	20	20
200	20	30	30	30	30
300	30	40	55	70	85
400	40	60	85	105*	130*
500	50	70	95*	120*	145*
600	60	80	105*	140*	175*

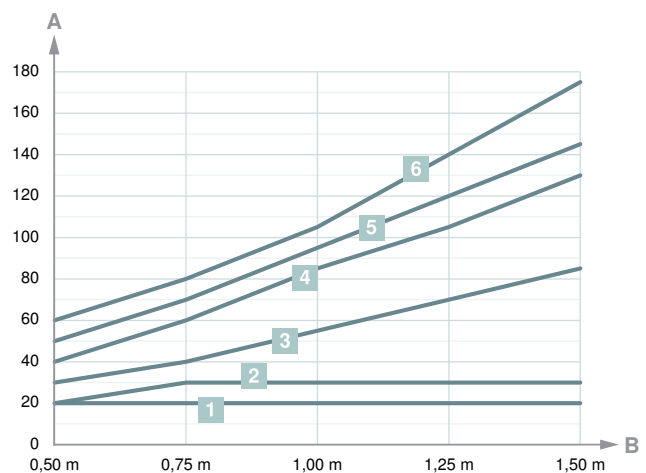
\*Observe the maximum support distances according to the table: „Maximum support distances for wall and ceiling mounting“.  
The minimum distance „a“ refers to the distance from the underside of the cable tray to the upper side of the fire protection ceiling.

## Deformation of the SKS-Magic® cable tray in mm for 30-minute fire load

1	SKSM 610
2	SKSM 620
3	SKSM 630
4	SKSM 640
5	SKSM 650
6	SKSM 660

A = Minimum distance "a" in mm to the fire protection ceiling  
B = Support distance in m




 The minimum spacing "a" relates to the distance of the under side of the cable tray to the top side of the fire protection ceiling.















## Component assignment

### Components to be used for single and double layer mounting at a fire load of 30 minutes

Components	Suspended support type when mounting		Bracket Type	Mounting rail type					
				Maximum support distance [m]					
Cable tray width [mm]		 		0.50	0.75	1.00	1.25	1.50	
100	US 3 K...FT	US 3 K...FT	AW 15 11 FT	MS4121P					
200			AW 15 21 FT						
300		US 5 K...FT	US 5 K...FT	AW 15 31 FT	MS4121P	MSL4141P		MS4141P	
400	AW 15 41 FT			MSL4141P		MS4141P*			
500	US 5 K...FT			AW 30 51 FT	MS4141P*				
600				AW 30 61 FT					

\*Observe the maximum support distances according to the table: „Maximum support distances for wall and ceiling mounting“.

### Assignment of the threaded rods at the fire load of 30 minutes

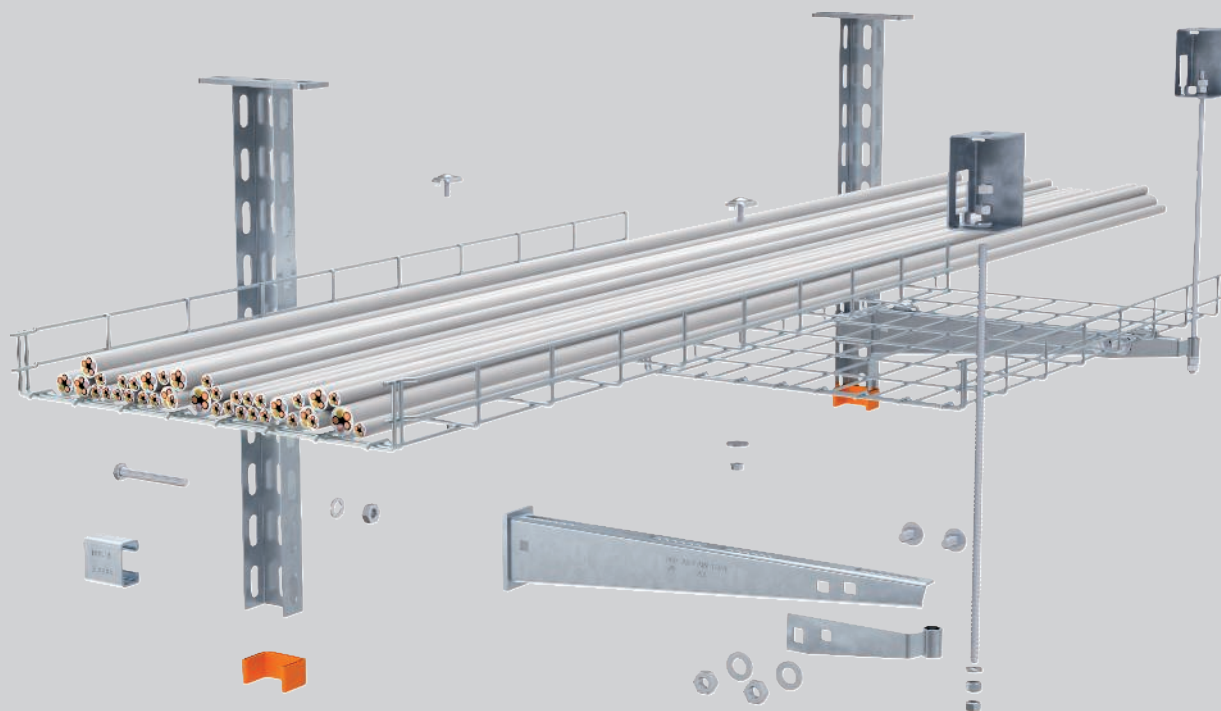
Cable tray width [mm]	Maximum support distance [m]					Maximum support distance [m]				
										
Cable tray width [mm]	0.50	0.75	1.00	1.25	1.50	0.50	0.75	1.00	1.25	1.50
100	M8					M8		M10		
200										
300	M8		M10			M10		M12		
400										
500	M10			M12		M12		M12*	-	
600								-		

\*Observe the maximum support distances according to the table: „Maximum support distances for wall and ceiling mounting“.

## GR-Magic® mesh cable tray

### System description

30



The tested GR-Magic® mesh cable tray system is suitable for installation in the false ceiling area of escape and rescue routes. In the event of fire, the system has a proven mechanical stability of 30 minutes. The GR-Magic® mesh cable tray can be mounted under the ceiling or on the wall using brackets. The brackets are additionally secured on the ceiling with a threaded rod to prevent them from bending in a fire. The AW15 brackets in the widths 110 to 410 mm have the required perforations at the bracket tip to fasten the matching connection components. If the cable

loads and tray widths listed in the proof of testing are maintained and the minimum spacings to the false ceiling is taken into account, then multi-layer variants can also be implemented. A further option for ceiling mounting is the support of the mesh cable tray on profile rails, each mounted under the ceiling with two threaded rods. With this mounting variant, sufficient distances to the false ceiling must be maintained. A two-layer arrangement of the mesh cable trays is possible, providing that the approved tensile stress in the threaded rods is also maintained in the event of fire.

#### Fireproof fastening above fire protection ceilings

Fire load	30 minutes
Proof of testing	OBO Bettermann
Document no. - mounting with mounting rails	BS-05/190-03-01
Document no. - mounting with suspended support/bracket	BS-05/190-03-02
Testing principles	In accordance with DIN 4102

# GR-Magic® mesh cable tray

## Installation principle



Single-layer ceiling suspension with suspended support and bracket.



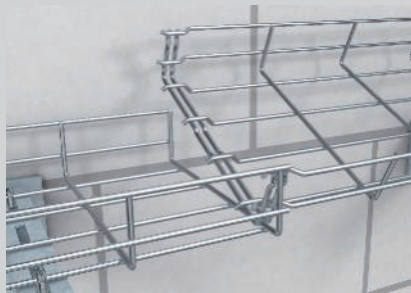
Two-layer ceiling suspension with bracket arrangement on one side.



Two-layer ceiling suspension with bracket arrangement on both sides.



Wall mounting, one and two-layer possible.



Screwless joint connection through interconnection of two delivery lengths of the mesh cable tray.



Mounting of the threaded rod lock using a connection component at the bracket tip.



Single-layer ceiling mounting above suspended fire protection ceiling.



Two-layer ceiling mounting above suspended fire protection ceiling.



Clamp fastening for high load capacities.

Tested mounting options



**CAUTION: No maintenance of electrical functionality according to DIN 4102 Part 12!**



# GR-Magic® mesh cable tray

## Maximum support distances for wall and ceiling mounting

Mesh cable tray width [mm]	Fire load [min] Max. cable load [kg/m]								
	30	Maximum support distance [m]							
100	10	1.50							
200	20								
300	30								
400	40								

## Required minimum distance „a“ for the fire load at different support distances


Maximum support distance [m]	0.50	0.75	1.00	1.25	1.50
Fire load [min]	30				
Mesh cable tray width [mm]	Minimum distance „a“ [mm]				
100	40	60	80	105	150
200	45	65	85	110	155
300	60	80	100	130	160
400	65	85	105	135	165

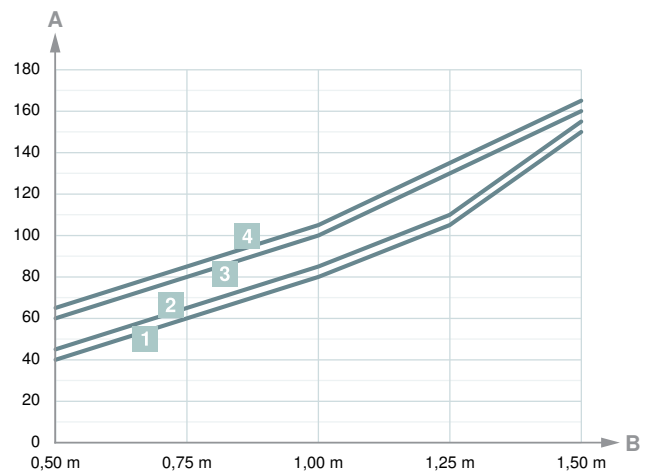
The minimum distance „a“ refers to the distance of the underside of the cable tray to the upper side of the fire protection ceiling.

## Deformation of the GR-Magic® mesh cable tray in mm for 30-minute fire load

- 1 GRM 55 100
- 2 GRM 55 200
- 3 GRM 55 300
- 4 GRM 55 400



A = Minimum distance "a" in mm to the fire protection ceiling  
B = Support distance in m

 The minimum spacing "a" relates to the distance of the underside of the mesh cable tray to the top side of the fire protection ceiling.



## Component assignment

### Components to be used for single and double layer mounting at a fire load of 30 minutes

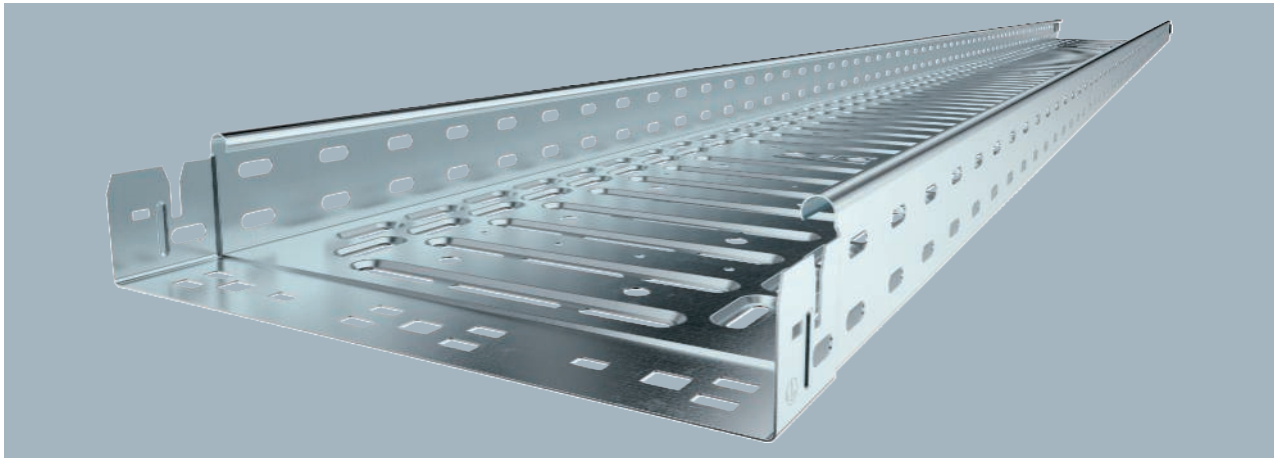
Components	Suspended support type when mounting		Bracket Type	Mounting rail type				
				Maximum support distance [m]				
Mesh cable tray width [mm]				0.50	0.75	1.00	1.25	1.50
100	US 3 K...FT	US 3 K...FT	AW 15 11 FT	MS4121P				
200			AW 15 21 FT					
300		US 5 K...FT	AW 15 31 FT	MS4121P			MS4141P	
400			AW 15 41 FT	MSL4141P	MS4141P			

### Assignment of the threaded rods at the fire load of 30 minutes

Mesh cable tray width [mm]	Maximum support distance [m]					Maximum support distance [m]														
																				
	0.50	0.75	1.00	1.25	1.50	0.50	0.75	1.00	1.25	1.50										
100	M8					M8														
200						M8					M8									
300											M8					M8		M10		
400																M8				

### Cable tray RKS-Magic® 60

St FS

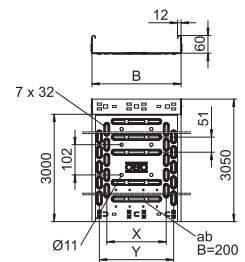


Type	Width mm	Metal thick- ness mm	BS	Pack m	Weight kg/100 m	Item no.
RKSM 610 FS	100	0.75		3	134.334	6047611
RKSM 620 FS	200	0.75		3	181.508	6047638
RKSM 630 FS	300	0.75		3	233.803	6047654
RKSM 640 FS	400	0.90		3	338.459	6047689

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.

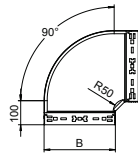
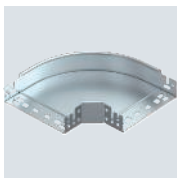
Type	Length mm	Width mm	Usable cross- section cm <sup>2</sup>	Dim- en- sion x y mm
RKSM 610 FS	3050	100	58	— 50
RKSM 620 FS	3050	200	118	100 150
RKSM 630 FS	3050	300	178	200 250
RKSM 640 FS	3050	400	238	300 350

#### Dimensions



### 90° Magic bend 60

St FS

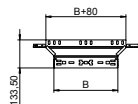
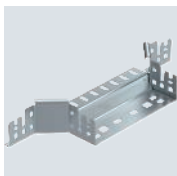


Type	Width mm	Dim. B mm	Pack Piece	Weight kg/100 pc.	Item no.
RBM 90 610 FS	100	100	1	65.700	6041130
RBM 90 620 FS	200	200	1	121.900	6041134
RBM 90 630 FS	300	300	1	192.200	6041136
RBM 90 640 FS	400	400	1	274.700	6041138
RBM 90 650 FS	500	500	1	376.300	6041140
RBM 90 660 FS	600	600	1	487.000	6041142

90° bend with quick connector system. For all cable tray types of 60 mm side height.

### Add-on tee 60

St FS



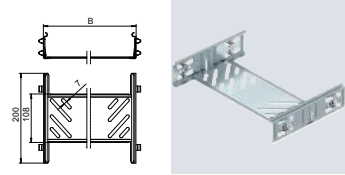
Type	Width mm	Dim. B mm	Pack Piece	Weight kg/100 pc.	Item no.
RAAM 610 FS	100	100	1	37.700	6041230
RAAM 620 FS	200	200	1	50.100	6041234
RAAM 630 FS	300	300	1	60.940	6041236
RAAM 640 FS	400	400	1	75.700	6041238
RAAM 650 FS	500	500	1	89.300	6041240
RAAM 660 FS	600	600	1	102.700	6041242

Magic add-on tee with quick connector system. For all cable tray types of 60 mm side height.

St FS

### Magic straight connector set 60

Type	Width mm	Side height mm	Dim. B mm	Pack Piece	Weight kg/100 pc.	Item no.
KTSMV 610 FS	100	60	100	1	30.500	6068914
KTSMV 620 FS	200	60	200	1	37.200	6068918
KTSMV 630 FS	300	60	300	1	44.000	6068920
KTSMV 640 FS	400	60	400	1	50.700	6068922
KTSMV 650 FS	500	60	500	1	57.400	6068924
KTSMV 660 FS	600	60	600	1	64.200	6068926

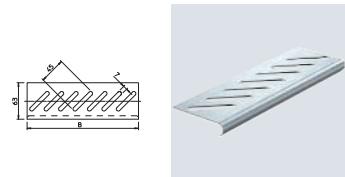


Cable tray connector with quick fastening for the screwless connection of perforated cable trays with a side height of 60 mm.

St FS

### Bottom end plate

Type	Width mm	Dim. B mm	Pack Piece	Weight kg/100 pc.	Item no.
BEB 100 FS	100	100	1	4.599	7083106
BEB 200 FS	200	200	1	9.367	7083203
BEB 300 FS	300	300	1	14.100	7083300
BEB 400 FS	400	400	1	18.900	7083408
BEB 500 FS	500	500	1	23.700	7083505
BEB 600 FS	600	600	1	28.400	7083602

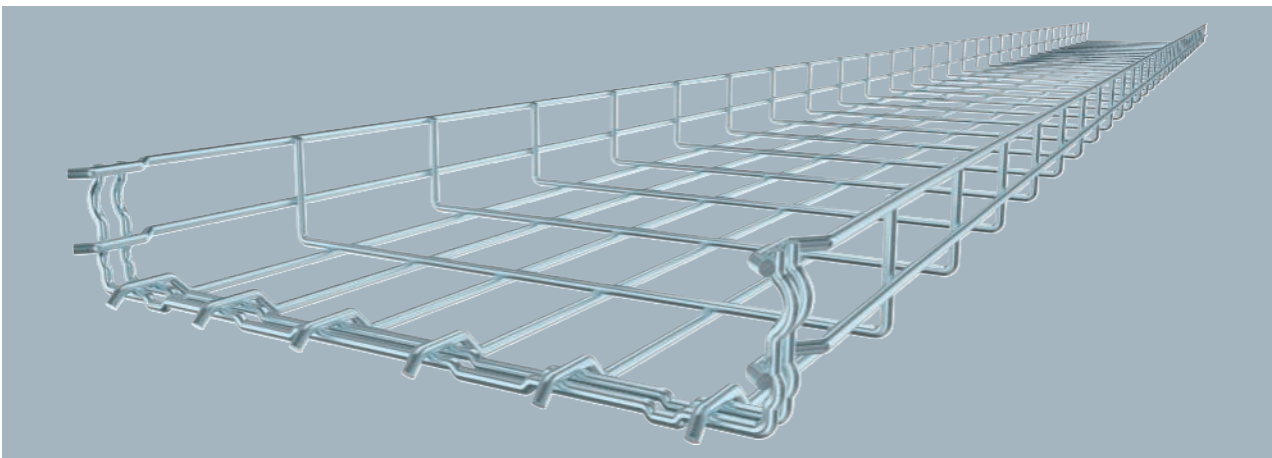


Bottom end plate for floor reinforcement at the ends of the cable tray and as cable protection.

### False ceiling, mesh cable tray

St G

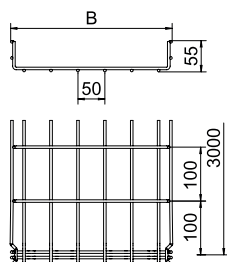
### GR-Magic® 55 mesh cable tray



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

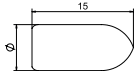
Type	Width mm	Wire Ø mm	Dim. B mm	BS	Pack m	Weight kg/100 m	Item no.
GRM 55 100 G	100	3.9	100		3	72.000	6001442
GRM 55 200 G	200	3.9	200		3	100.667	6001446
GRM 55 300 G	300	4.8	300		3	192.333	6001448
GRM 55 400 G	400	4.8	400		3	234.667	6001450

#### Dimensions



## Protective caps

PVC

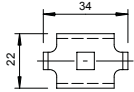


Type	Colour	Pack Piece	Weight kg/100 pc.	Item no.
GR KS 3.9 OR	Pure orange	500	0.045	6003750
GR KS 4.8 OR	Pure orange	500	0.030	6003754

Protective cap to cover cut wire ends of mesh cable trays.

## GKS 34 hold-down clamp

St G

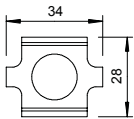


Type	Pack Piece	Weight kg/100 pc.	Item no.
GKS 34 G	20	2.188	6016855

Clamp for fixing mesh cable trays to wall or support brackets.

## Joint connector GSV 34

St G



Type	Pack Piece	Weight kg/100 pc.	Item no.
GSV 34 G	20	3.155	6016596

Screwed version of joint connector for mesh cable trays.



St FT

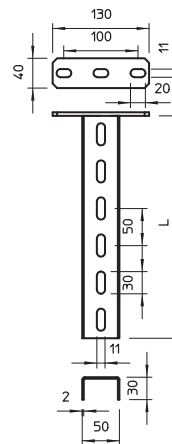
US 3 support

Type	Length mm	Material thickness mm	Tensile load		Pack Piece	Weight kg/100 pc.	Item no.
			kN	BS			
US 3 K 20 FT	200	2	5		1	50.500	6342351
US 3 K 30 FT	300	2	5		1	64.400	6342353
US 3 K 40 FT	400	2	5		1	78.300	6342355
US 3 K 50 FT	500	2	5		1	92.300	6342357
US 3 K 60 FT	600	2	5		1	106.200	6342359
US 3 K 70 FT	700	2	5		1	120.200	6342362
US 3 K 80 FT	800	2	5		1	134.100	6342364
US 3 K 90 FT	900	2	5		1	147.800	6342366
US 3 K 100 FT	1000	2	5		1	162.000	6342368
US 3 K 110 FT	1100	2	5		1	175.900	6342370
US 3 K 120 FT	1200	2	5		1	189.900	6342372



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.

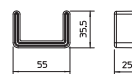


PE

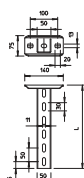
Type	Colour	Pack Piece	Weight kg/100 pc.	Item no.
US 3 KS OR	Pastel orange	20	1.068	6338458

Protective cap to cover the ends of US 3 supports.

Protective cap



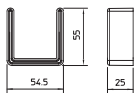
US 5 support



Type	Length mm	Material thickness mm	Dim. L mm	BS	Pack Piece	Weight kg/100 pc.	Item no.
US 5 K 20 FT	200	2.5	200		1	85.000	6341527
US 5 K 30 FT	300	2.5	300		1	110.000	6341535
US 5 K 40 FT	400	2.5	400		1	136.000	6341543
US 5 K 50 FT	500	2.5	500		1	161.000	6341551
US 5 K 60 FT	600	2.5	600		1	185.000	6341578
US 5 K 70 FT	700	2.5	700		1	210.000	6341586
US 5 K 80 FT	800	2.5	800		1	236.000	6341594
US 5 K 90 FT	900	2.5	900		1	261.000	6341608
US 5 K 100 FT	1000	2.5	1000		1	286.000	6341616
US 5 K 110 FT	1100	2.5	1100		1	311.000	6341624
US 5 K 120 FT	1200	2.5	1200		1	337.000	6341632

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

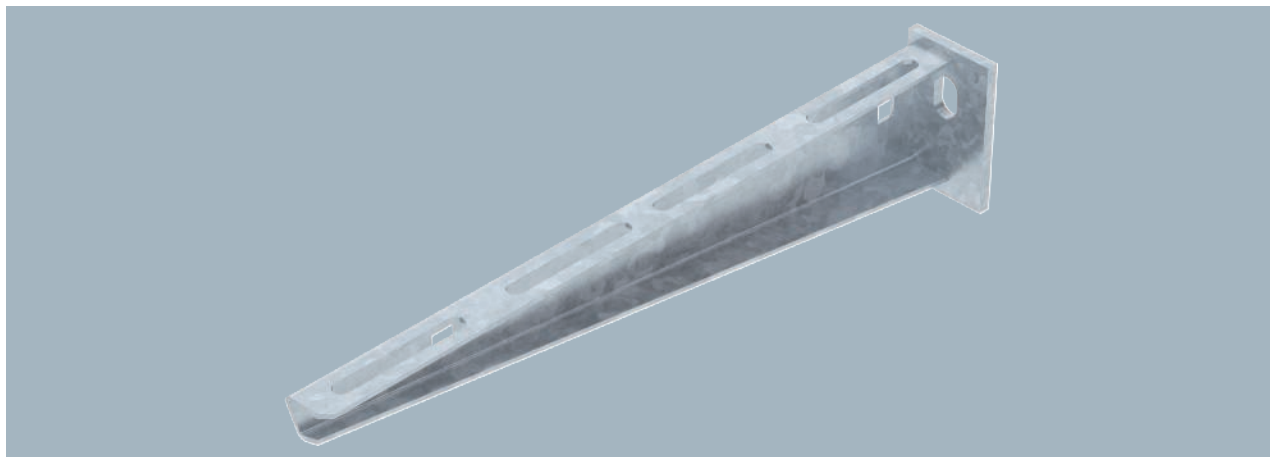
Protective cap



Type	Colour	Pack Piece	Weight kg/100 pc.	Item no.
US 5 KS OR	Pastel orange	20	1.300	6338462

Protective cap to cover the ends of US 5 supports.

Wall and support bracket AW 15



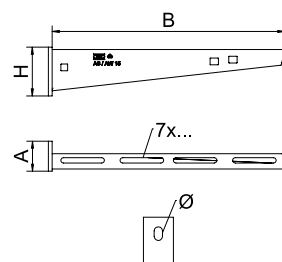
Type	Width mm	F in kN	Pack Piece	Weight kg/100 pc.	Item no.
AW 15 11 FT	110	1.5	1	13.100	6420656
AW 15 21 FT	210	1.5	1	24.000	6420680
AW 15 31 FT	310	1.5	1	38.400	6420710
AW 15 41 FT	410	1.5	1	54.000	6420745

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.

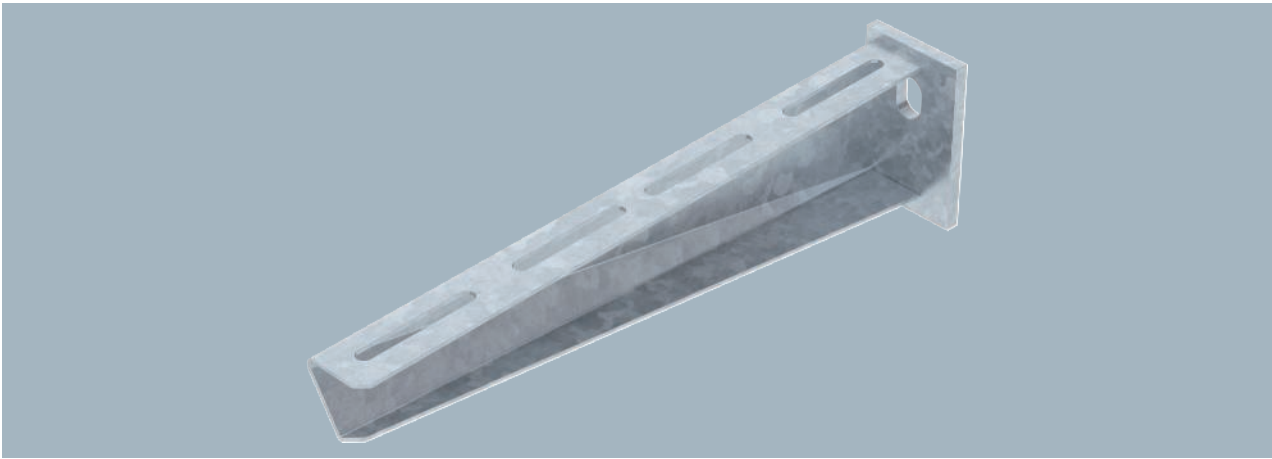
Type	Dim. B mm	Dim. A mm	Dim. H mm
AW 15 11 FT	110	40	50
AW 15 21 FT	210	40	60
AW 15 31 FT	310	40	65
AW 15 41 FT	410	40	70

Dimensions



St FT

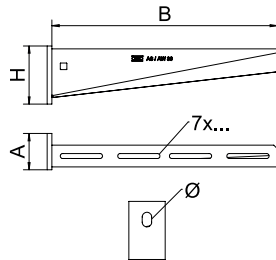
Wall and support bracket AW 30



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	Width		F in kN	Pack Piece	Weight kg/100 pc.	Item no.
	mm					
AW 30 51 FT	510	3		1	129.000	6419798
AW 30 61 FT	610	3		1	157.000	6419828

Dimensions



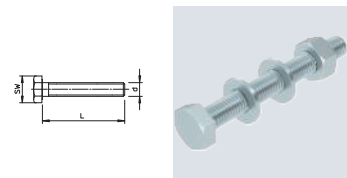
Type	Dim.	Dim.	Dim.	Hole Ø
	B	A	H	
AW 30 51 FT	510	50	90	13
AW 30 61 FT	610	50	100	13

St F

Hexagonal bolt M10

Type	Dimension mm	Dim. L mm	Dim. d mm	SW mm	Resistance grade	Pack Piece	Weight kg/100 pc.	Item no.

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

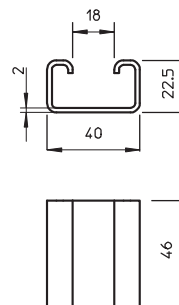


St FT

DSK 25 spacer

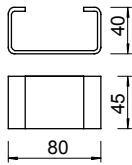
Type	Pack Piece	Weight kg/100 pc.	Item no.
DSK 25 FT	20	7.500	6416446

Spacer for use in US 3 supports.



Spacer DSK 45

St FT

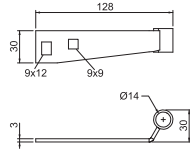


Type	Pack Piece	Weight kg/100 pc.	Item no.
DSK 45 FT	20	18.000	6416500

Spacer for use in US 5 support and in the head plate, type KU 7 VQP.

Connection component for bracket, type AW15

St FT

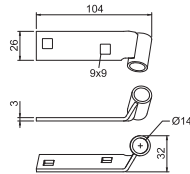


Type	Pack Piece	Weight kg/100 pc.	Item no.
AB AW 15 FT	1	8.500	7207060

Connection component to accept a threaded rod. Mounting on the tip of the bracket, type AW15. Prevents sagging of the cable support system when subjected to fire load. Including 2 M8 x 16 truss-head bolts and combination nuts.

Connection component for bracket, type AW 30

St FT

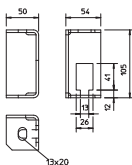
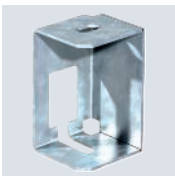


Type	Pack Piece	Weight kg/100 pc.	Item no.
AB AW 30 FT	1	8.200	7207062

Connection component to accept a threaded rod. Mounting on the tip of the bracket, type AW30. Prevents sagging of the cable support system when subjected to fire load. Including 2 M8 x 16 truss-head bolts and combination nuts.

Fire protection clamp

St FT



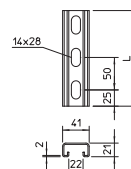
Type	Pack Piece	Weight kg/100 pc.	Item no.
BSB FT	20	42.400	6418198

Fire protection clamp for ceiling fastening of the threaded rod lock for routing types with cable ladders and cable trays for the maintenance of electrical function to DIN 4102 Part 12.

St FS FT

### MS4121 mounting rail, slot 22 mm, perforated

Type	Length mm	Dimension W x H mm	Material thickness mm	Dim.		Pack Piece	Weight kg/100 pc.	Item no.
				L mm	BS			
MS4121P0200FS	200	41x21	2	200		1	35.000	1122950
MS4121P0300FS	300	41x21	2	300		1	52.500	1122951
MS4121P0400FS	400	41x21	2	400		1	70.000	1122953
MS4121P0500FS	500	41x21	2	500		1	87.500	1122955
MS4121P0200FT	200	41x21	2	200		1	35.100	1122933
MS4121P0300FT	300	41x21	2	300		1	53.000	1122934
MS4121P0400FT	400	41x21	2	400		1	70.000	1122935
MS4121P0500FT	500	41x21	2	500		1	87.000	1122936

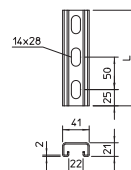


Heavy-duty C profile rail for individual installation of support constructions, e.g. for cable trays or as a panel for switchgear cabinets. Can also be used for cable routing, in conjunction with clamp clips with a U foot.

St FS FT

### MS4121 mounting rail, slot 22 mm, perforated

Type	Length mm	Dimension W x H mm	Material thickness mm	Dim.		Pack m	Weight kg/100 m	Item no.
				L mm	BS			
MS4121P2000FS	2000	41x21	2	2000		2	175.000	1122918
MS4121P3000FS	3000	41x21	2	3000		3	141.900	1122920
MS4121P2000FT	2000	41x21	2	2000		2	183.000	1122923
MS4121P3000FT	3000	41x21	2	3000		3	151.300	1122924



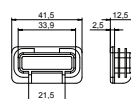
Heavy-duty C profile rail for individual installation of support constructions, e.g. for cable trays or as a panel for switchgear cabinets. Can also be used for cable routing, in conjunction with clamp clips with a U foot.

PE

### End cap MS4121

Type	Colour	Pack Piece	Weight kg/100 pc.	Item no.
MS4121 EK	Pastel orange	50	0.645	1122904

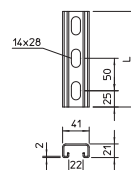
End cap for profile rail, type MS4121.



St FS

### MSL4141 mounting rail, slot 22 mm, perforated

Type	Length mm	Dimension W x H mm	Material thickness mm	Dim.		Pack Piece	Weight kg/100 pc.	Item no.
				L mm	BS			
MSL4141P0400FS	400	41x41	2	400		1	80.800	1123266
MSL4141P0500FS	500	41x41	2	500		1	101.000	1123268

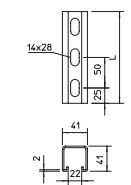


Heavy-duty C profile rail for individual installation of support constructions, e.g. for cable trays or as a panel for switchgear cabinets. Can also be used for cable routing, in conjunction with clamp clips with a U foot.

St FS FT

### MSL4141 mounting rail, slot 22 mm, perforated

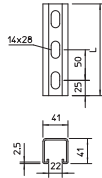
Type	Length mm	Dimension W x H mm	Material thickness mm	Dim.		Pack m	Weight kg/100 m	Item no.
				L mm	BS			
MSL4141P1000FS	1000	41x41	2	1000		1	201.100	1122970
MSL4141P3000FS	3000	41x41	2	3000		3	201.100	1122972
MSL4141P1000FT	1000	41x41	2	1000		1	214.700	1122962
MSL4141P3000FT	3000	41x41	2	3000		3	214.700	1122964



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.

MS4141 mounting rail, slot 22 mm, perforated

St FT

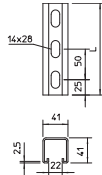


Type	Length mm	Dimension W x H mm	Material thickness mm	Dim. L mm	BS	Pack Piece	Weight kg/100 pc.	Item no.
MS4141P0400FT	400	41x41	2.5	400	🔥	1	104.700	1122525
MS4141P0500FT	500	41x41	2.5	500	🔥	1	130.800	1122533
MS4141P0600FT	600	41x41	2.5	600	🔥	1	156.900	1122541
MS4141P0700FT	700	41x41	2.5	700	🔥	1	183.000	1122568

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.

MS4141 mounting rail, slot 22 mm, perforated

St FS FT

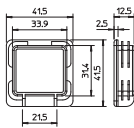


Type	Length mm	Dimension W x H mm	Material thickness mm	Dim. L mm	BS	Pack m	Weight kg/100 m	Item no.
MS4141P1000FS	1000	41x41	2.5	1000	🔥	1	247.500	1122908
MS4141P3000FS	3000	41x41	2.5	3000	🔥	3	247.500	1122910
MS4141P1000FT	1000	41x41	2.5	1000	🔥	1	261.400	1122606
MS4141P3000FT	3000	41x41	2.5	3000	🔥	3	261.400	1122622

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.

End cap MS4141

PE

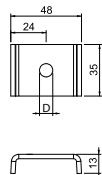
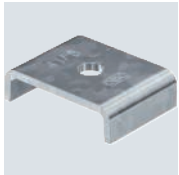


Type	Colour	Pack Piece	Weight kg/100 pc.	Item no.

End cap for profile rail, type MS4141.

Connection component for mounting rails MS41

St FT

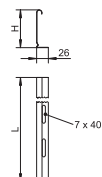


Type	Version	Dim. D Ø mm	Pack Piece	Weight kg/100 pc.	Item no.
PLF 41 10 FT	M10	11	20	5.100	7207054
PLF 41 12 FT	M12	13	20	5.000	7207056

Component for mounting threaded rods on mounting rails MSL4141P, MS4141P and MS4121P. For mounting cable tray and mesh cable tray systems above suspended fire protection ceilings in escape and rescue routes. If there is a fire, this prevents bending of the mounting rails. Suitable for threaded rods M8, M10 and M12. No additional washer necessary.

Separating retainer 45

St FS



Type	Metal Dim. H mm	thick- ness mm	Dim. L mm	Pack m	Weight kg/100 m	Item no.

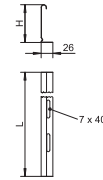
Separating retainer for separation of cables of different voltages or functions.

St FS

### Separating retainer 60

Type	Dim. H mm	Metal thickness		Dim. L mm	Pack m	Weight kg/100 m	Item no.
		mm	mm				
TSG 60 FS	60	0.75	3000		3	55.700	6062068

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

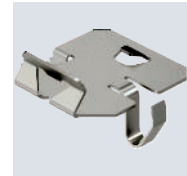
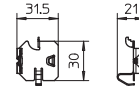


VA 2B

### Hold-down clamp for separating retainer fastening in RKSM

Type	Pack Piece	Weight kg/100 pc.	Item no.
KS KR A2	30	0.537	6062280

Hold-down clamp for screwless fastening of separating retainers in the cable tray types RKSM, MKS and SKS.

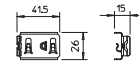


VA 2B

### Hold-down clamp for separating retainer fastening in GRM

Type	Pack Piece	Weight kg/100 pc.	Item no.
KS GR A2	30	0.830	6062282

Hold-down clamp for fastening separating retainer in mesh cable trays.

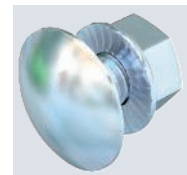
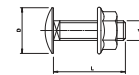


St F

### Truss-head bolt with flange nut

Type	Dimen- sion mm	Dim. L mm	Dim. d mm	Dim. D mm	Resist- ance grade	Pack Piece	Weight kg/100 pc.	Item no.
FRSB 6x16 F	M6x16	16	6	13.5	5.6	100	0.890	6406157

Truss-head bolt with square neck including flange nut.

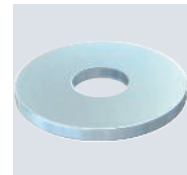
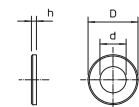


St F

### Large washer

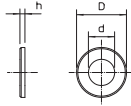
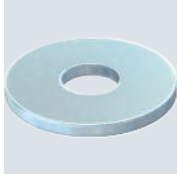
Type	Dim. D mm	Dim. d mm	Dim. h mm	Pack Piece	Weight kg/100 pc.	Item no.
DIN440 7 F	22	6.6	2	100	0.535	6408702

Washer of particularly large outer diameter.



## Fender washer

St G



Type	Thread	Dim. d mm	Dim. D mm	Dim. h mm	Pack Piece	Weight kg/100 pc.	Item no.
<b>WS M8 G20 G</b>	M8	8.4	20	1.25	100	0.227	<b>3403122</b>

Washer of particularly large outer diameter.

## Threaded rod

St G

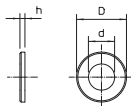
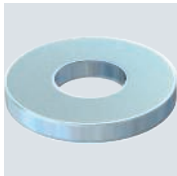


Type	Thread	Dim. d mm	Dim. L mm	Pack Piece	Weight kg/100 pc.	Item no.
<b>TR M8 1M G</b>	M8	8	1000	10	30.000	<b>3141128</b>
<b>TR M10 1M G</b>	M10	10	1000	10	49.000	<b>3141209</b>
<b>TR M12 1M G</b>	M12	12	1000	10	62.000	<b>3141306</b>

Threaded rod to DIN 976.

## Washer

St G

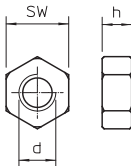
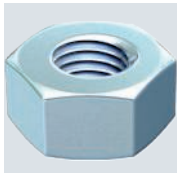


Type	Thread	Dim. d mm	Dim. D mm	Dim. h mm	Pack Piece	Weight kg/100 pc.	Item no.
<b>WS M10 D20 G</b>	M10	10.5	20	2	100	0.408	<b>3402096</b>
<b>WS M12 D24 G</b>	M12	13	24	2.5	100	0.570	<b>3402126</b>

Washer according to DIN 125, shape A, for universal use.

## Hexagonal nut DIN 934

St G



Type	Thread	Dim. SW mm	Dim. h mm	Dim. d mm	Pack Piece	Weight kg/100 pc.	Item no.
<b>HN M8 G</b>	M8	13	6.8	8	100	0.500	<b>3400085</b>
<b>HN M10 G</b>	M10	17	8.4	10	100	1.014	<b>3400107</b>
<b>HN M12 G</b>	M12	19	10.8	12	100	1.730	<b>3400123</b>

Hexagonal nut to DIN 934 with metric thread.

## Connection sleeve

St G



Type	Thread	Dim. L mm	Dim. SW mm	Pack Piece	Weight kg/100 pc.	Item no.
<b>CSTR M8 G</b>	M8	24	13	50	1.880	<b>6410081</b>
<b>CSTR M10 G</b>	M10	30	17	50	4.150	<b>6410103</b>
<b>CSTR M12 G</b>	M12	40	19	25	7.000	<b>6410111</b>

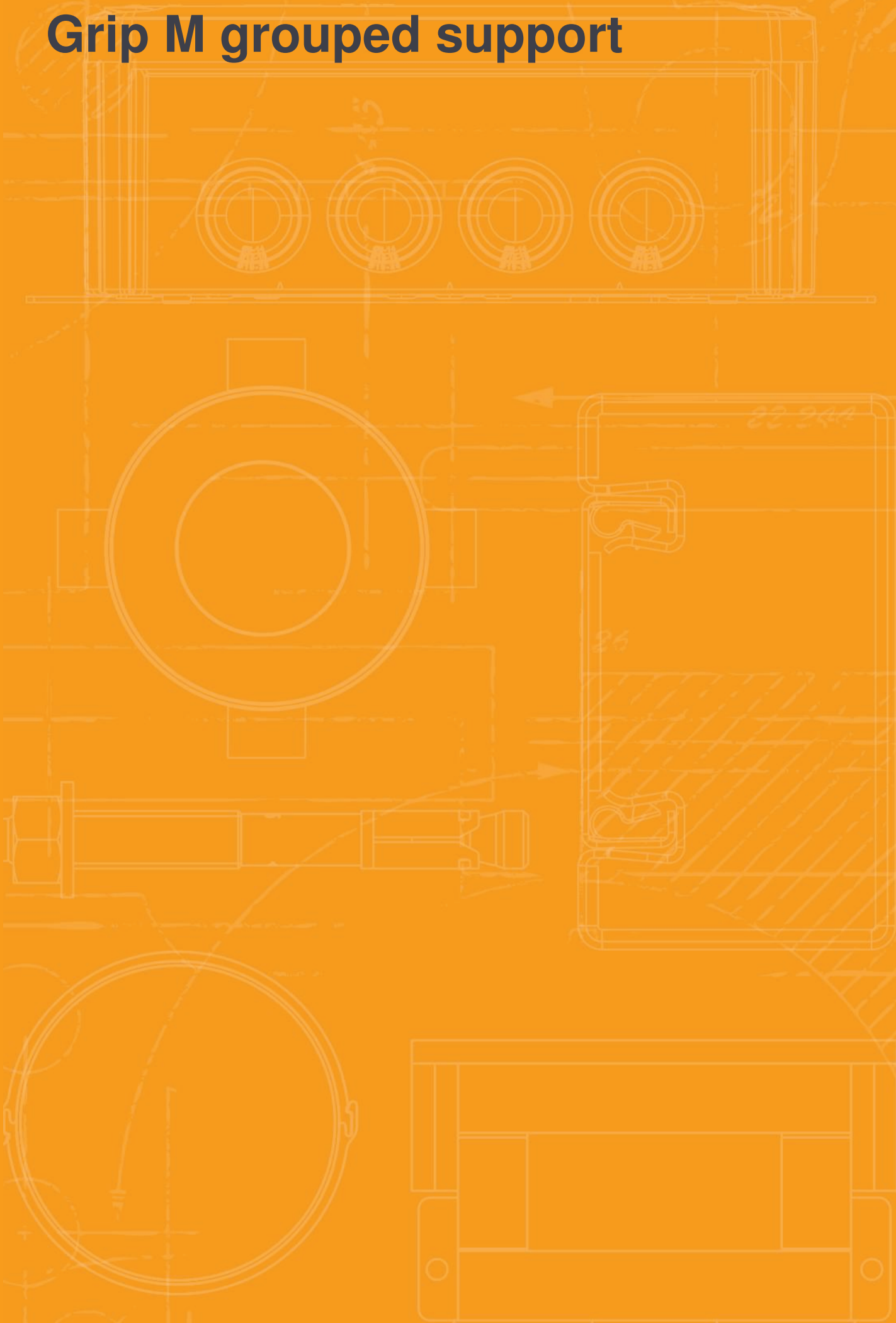
Connection sleeve with continuous internal thread.





# Grip M grouped support

Escape route installations, false ceiling mounting



## Grip M grouped support

### System description

30

60

90

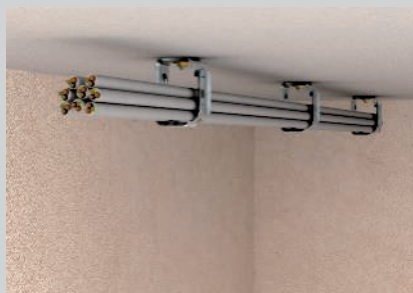


The tested Grip M grouped supports are suitable for installation in the false ceiling area of escape and rescue routes. In the event of fire, the grouped supports have a proven mechanical stability of 30, 60 and 90 minutes. They can be mounted under the ceiling or on the wall. The grouped supports are made of sheet steel and can be opened and

closed easily without the use of tools. To allow simple cable insertion, the supports remain open during cable routing. Then, the grouped supports are closed through simple locking. The construction of the grouped support and weight of the installed cables prevent the lock from opening itself unintentionally.



## Grip M grouped support Installation principle



Ceiling mounting of the grouped supports 2031 M15 and 2031 M 30.



Wall-mounted grouped supports 2031 M15 and 2031 M 30.



Grouped support 2031 M 70 as wall and ceiling mounting for large cable volume.



Opening of the grouped support and insertion of the cables.



Simple insertion the cables in the opened grouped support.

Tested mounting options



**CAUTION: No maintenance of electrical functionality according to DIN 4102 Part 12!**

# Grip M grouped support

## Proof

### Fireproof fastening above fire protection ceilings

Fire load	30, 60 and 90 minutes
Proof of testing	OBO Bettermann
Document no.	BS-05/190-04-01
Testing principles	In accordance with DIN 4102

### Mounting parameters and required minimum distance „a“ [mm] at the fire load of 30 minutes

Type	Fastening distance [m]	Cable assignment [kg/m]		
2031 M15	0.6	3.3	80	100
	0.8	2.5	100	120
2031 M30	0.6	5.8	80	110
	0.8	4.3	100	130
2031 M70	0.6	20.0	80	120
	0.8	15.0	100	140

The minimum distance „a“ refers to the distance of the under side of the grouped support to the upper side of the fire protection ceiling.

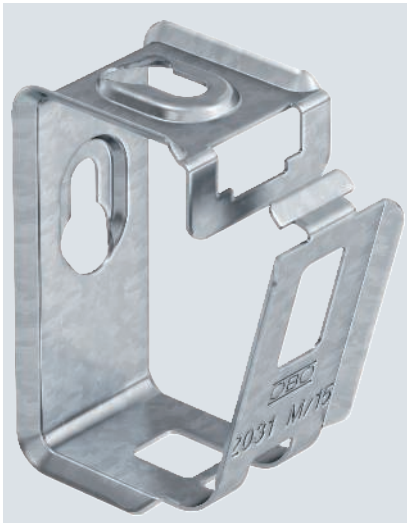
### Mounting parameters and required minimum distance „a“ [mm] at the fire loads of 60/90 minutes

Type	Fastening distance [m]	Cable assignment [kg/m]		
2031 M15	0.6	3.3	100	120
	0.8	2.5	120	140
2031 M30	0.6	5.8	100	130
	0.8	4.3	120	150
2031 M70	0.6	13.0	100	140
	0.8	10.0	120	160

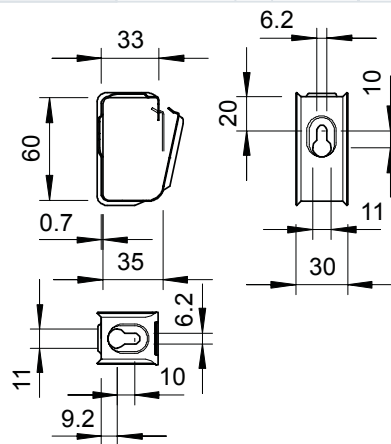
The minimum distance „a“ refers to the distance from the underside of the grouped support to the upper side of the fire protection ceiling.

Grip collection clamp, metal 15

St FS



Type	No. of conductors NYM 3 x 1.5	Shipping box BS Piece	Pack Piece	Weight kg/100 pc.	Item no.
2031 M 15 FS	15	50	50	3.700	2207028



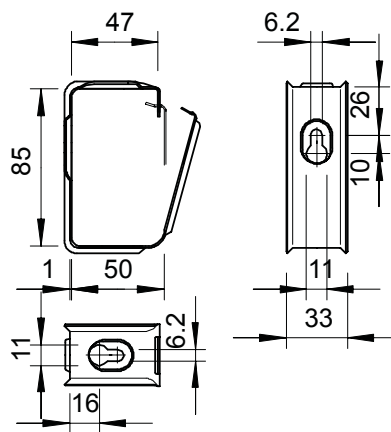
Metal cable tidy for high mechanical stability, even in case of fire. Suitable for safe mounting above fire protection ceilings. Also approved as a cable-specific variant for the maintenance of electrical function to DIN 4102 part 12. For wall and ceiling mounting. Lock can be opened without tools. Detailed information on the approved routing variants can be found in the appropriate testing documentation.

Grip collection clamp, metal 30

St FS



Type	No. of conductors NYM 3 x 1.5	Shipping box BS Piece	Pack Piece	Weight kg/100 pc.	Item no.
2031 M 30 FS	30	25	25	6.200	2207036

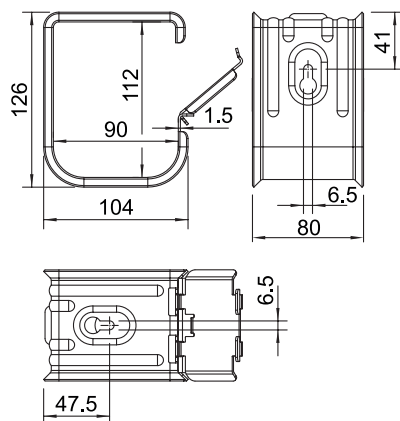


Metal grouped support for high mechanical stability, even in case of fire. Suitable for safe mounting above fire protection ceilings. Also approved as a cable-specific variant for the maintenance of electrical function to DIN 4102 part 12. For wall and ceiling mounting. Lock can be opened without tools. Detailed information on the approved routing variants can be found in the appropriate testing documentation.

St FS

## Grip collection clamp, metal 70

Type	No. of conductors	Shipping box	Pack Piece	Weight kg/100 pc.	Item no.
2031 M 70 FS	70	BS Piece	10	34.500	2207060

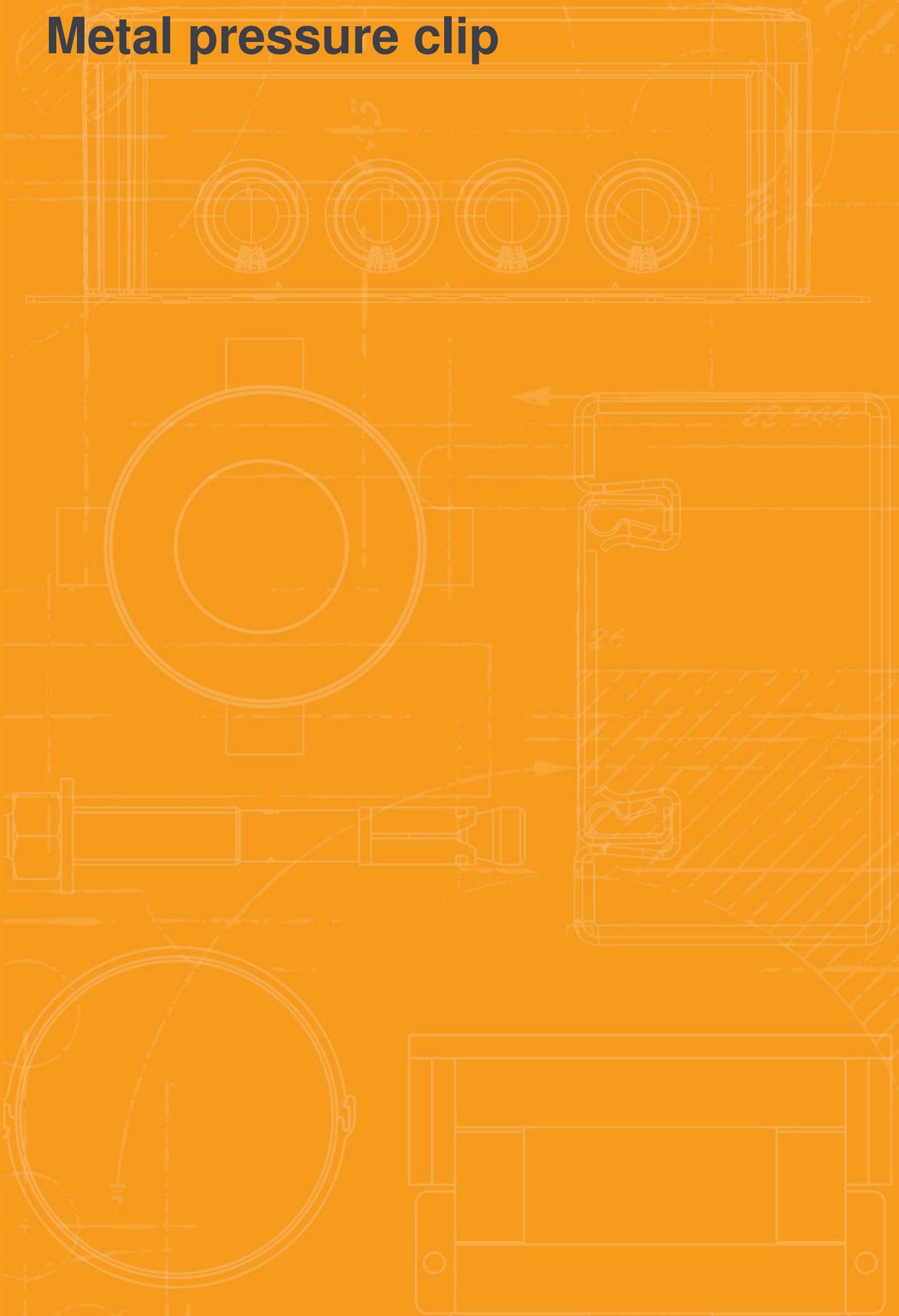


Metal grouped support for high mechanical stability, even in case of fire. Suitable for safe mounting above fire protection ceilings. Also approved as a cable-specific variant for the maintenance of electrical function to DIN 4102 part 12. For wall and ceiling mounting. Lock can be opened without tools. Detailed information on the approved routing variants can be found in the appropriate testing documentation.



# Metal pressure clip

Escape route installations, false ceiling mounting

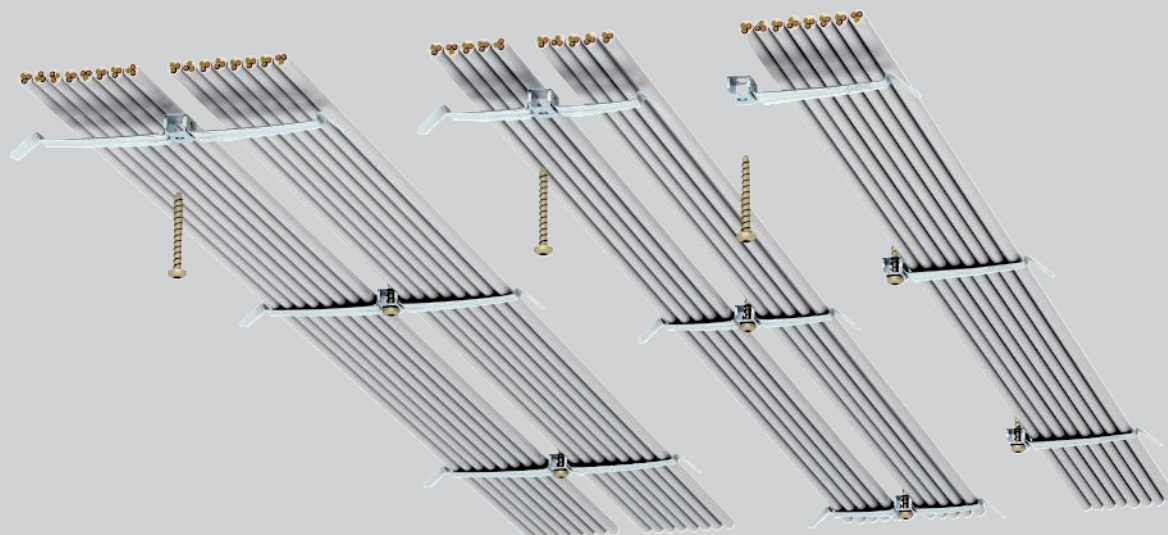




## Metal pressure clip

### System description

30



The tested pressure clips are suitable for installation in the false ceiling area of escape and rescue routes. In the event of fire, the pressure clips have a proven mechanical stability of 30 minutes. They are mounted under the ceiling. The pressure clips are made of sprung, rustproof steel.

For installation, the hips of the pressure clips are simply bent downwards without tools and the cables pushed in from the side. The edges of the clip slope to exclude the possibility of damage to the cables.



## Metal pressure clip Installation principle



Ceiling mounting with pressure clip 2034 M.



Ceiling mounting with pressure clip 2033 M.



Ceiling mounting with pressure clip 2035 M.



Simple cable installation through side insertion of the cables.



Space-saving and fireproof mounting of cables above a fire protection ceiling.

Tested mounting options



**CAUTION: No maintenance of electrical functionality according to DIN 4102 Part 12!**


## Metal pressure clip

### Proof


#### Fireproof fastening above fire protection ceilings

Fire load	30 minutes
Proof of testing	OBO Bettermann
Document no.	BS-05/190-05-01
Testing principles	In accordance with DIN 4102


#### Pressure clip 2033 M, mounting parameter and required minimum spacing "a"

Fire load	Fastening spacing	Cable assignment	
30 minutes	max. 0.5 m	2x max. 1.84 kg/m	70 mm

#### Pressure clip 2034 M, mounting parameter and required minimum spacing "a"

Fire load	Fastening spacing	Cable assignment	
30 minutes	max. 0.5 m	2x max. 1.15 kg/m	50 mm

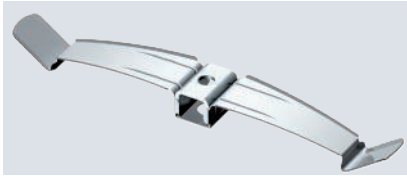
#### Pressure clip 2035 M, mounting parameter and required minimum spacing "a"

Fire load	Fastening spacing	Cable assignment	
30 minutes	max. 0.5 m	1x max. 1.84 kg/m	70 mm

The minimum spacing "a" relates to the distance of the underside of the pressure clip to the top side of the fire protection ceiling.

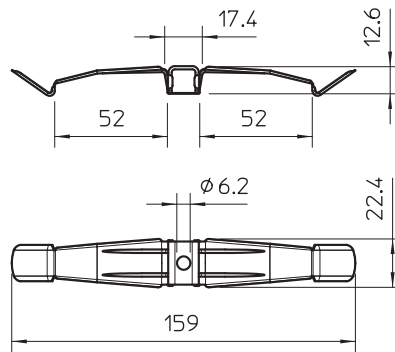


## Pressure clip for 10 cables



The metal pressure clip is halogen and fire load-free, and maintains a good mechanical stability even in fires. The pressure clip is also approved as a cable-specific variant for the maintenance of electrical functionality to DIN 4102 Part 12. The spacer 2033 D 15 x 3 G (must be ordered separately) increases the clamping height of pressure clips from 10 to 13 mm. The pressure clips are suitable for fireproof mounting above suspended fire protection ceilings in accordance with DIN 4102.

Type	BS	Shipping box Piece	Pack Piece	Weight kg/100 pc.	Item no.
2034 M A2		50	50	1.860	2204010

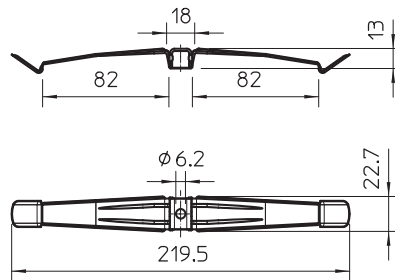


## Pressure clip for 16 cables

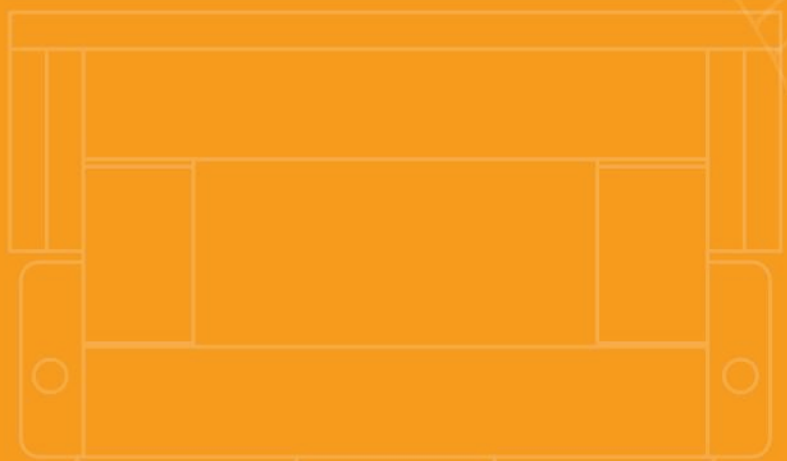


The metal pressure clip is halogen and fire load-free, and maintains a good mechanical stability even in fires. The pressure clip is also approved as a cable-specific variant for the maintenance of electrical functionality to DIN 4102 Part 12. The spacer 2033 D 15 x 3 G (must be ordered separately) increases the clamping height of pressure clips from 10 to 13 mm. The pressure clips are suitable for fireproof mounting above suspended fire protection ceilings in accordance with DIN 4102.







Type	BS	Shipping box Piece	Pack Piece	Weight kg/100 pc.	Item no.
2033 M A2		25	25	2.310	2204000





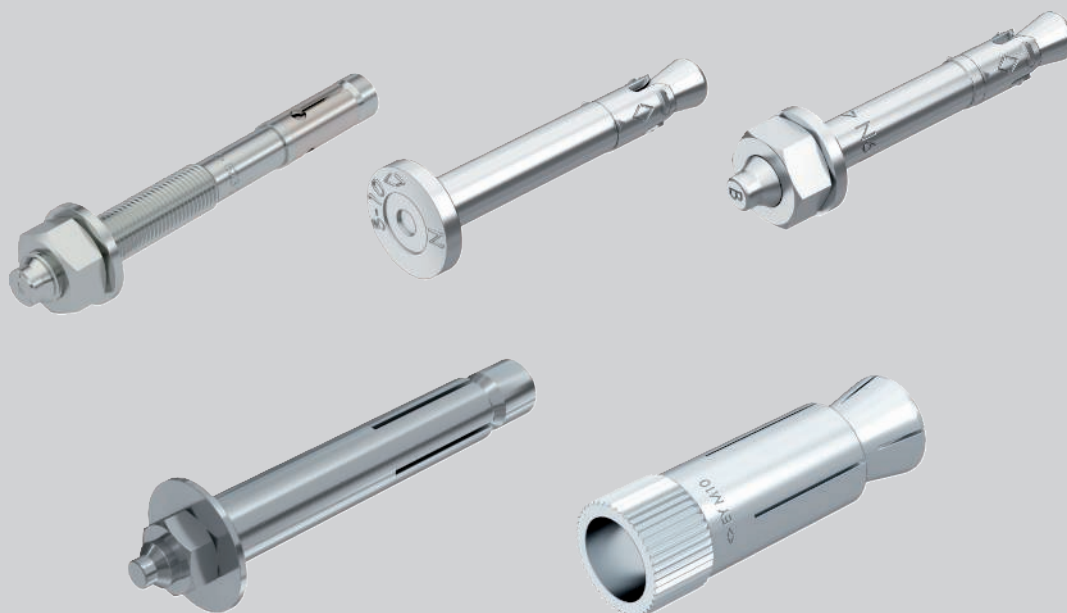


# Anchoring

	Metal spreading anchors	200
	Porous concrete anchors	204
	Bolt ties	206
	Injection ties	212
	Wood screws	216
	Mounting material for insulated ceilings	220



## Metal spreading anchor System description



OBO Bettermann's metal spreading anchors for mounting in concrete components were tested for fire protection. Appropriate proofs are available for the tests carried out. Depending on the fire resistance length (up to 120 minutes), a maximum load capacity was determined when anchored in concrete. This load data is contained in the appropriate European technical approvals and

appropriate test documentation. Although the load capacity of the anchors during a fire is below the load capacity when cold, this load capacity is completely sufficient for fireproof fastening of the different routing types. Special metal spreading anchors are offered for false ceilings with a low concrete strength.





# Metal spreading anchor

## Installation principle



Nail tie, type N 6, with thread end.



Nail tie, type N-K 6, with flat head.



Bolt tie, type BZ.



Bolt tie, type BZ-IG.



Hollow core anchor, Easy type.

Classification according to proof of application

R30

R60

R90

R120

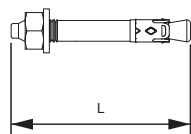
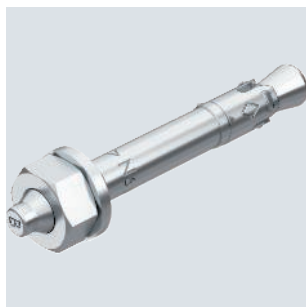
### System description

<b>Anchoring type</b>	Anchor with spreading metal cone
<b>Fire resistance classes</b>	To R120 according to European Technical Approval ETA and general building inspectorate approval
<b>Substrate</b>	Concrete

The data of the approval documents and any fire testing reports apply



## Nail anchor N with thread



Type	Thread	Drill hole Ø mm	Drill hole depth mm	Clamping range mm	Dim. L mm	Pack Piece	Weight kg/100 pc.	Item no.
<b>N 6-5-10/49</b>	M6	6	40	5-10	49	100	1.160	<b>3498396</b>

The nail anchor N can be used for multiple fastenings of non-load-bearing systems and in cracked and non-cracked concrete, thereby combining the benefits of a bolt tie with even easier mounting.

The nail tie only needs to be hammered into the drill hole. It is not necessary to apply torque subsequently. When the load occurs, the nail tie spreads itself and bolts itself in the drill hole.

## BZ3 bolt tie



Type	Thread	Dim. L mm	D2 washer, external mm	Pack Piece	Weight kg/100 pc.	Item no.
<b>BZ3 8x75/0-20</b>	M8	75	24*	50	3.000	<b>3498683</b>
<b>BZ3 8x95/0-40</b>	M8	95	24*	50	4.000	<b>3498685</b>
<b>BZ3 10x90/0-30</b>	M10	90	30*	50	6.100	<b>3498691</b>
<b>BZ3 10x110/0-50</b>	M10	110	30*	50	7.100	<b>3498693</b>
<b>BZ310x180/60-120</b>	M10	180	30*	25	10.680	<b>3498698</b>
<b>BZ3 12x110/0-35</b>	M12	110	24*	25	5.220	<b>3498703</b>

Bolt tie BZ3 for the anchoring of medium-duty to heavy-duty loads, both in cracked and non-cracked concrete. Suitable for heavy loads with small edge and axial distances. For knocking in.

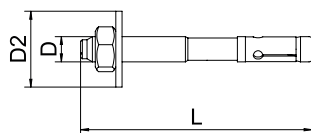
European Technical Approval ETA-19/0619, including characteristic values under fire exposure to fire resistance R 120.

Proof of suitability in the event of seismic impacts, categories C1 and C2.

Shock approval by the Federal Office for Civil Protection in Bern, Switzerland.

\* With large washer to DIN EN ISO 7093-1 (DIN 9021)

### Dimensions



#### Standard anchoring depth

Loads and characteristic values	Drill hole Ø mm	Drill hole depth mm	Anchoring depth mm	Clamping strength mm	Permitted load area, tension zone kN
BZ3 8x75/0-20	8	55	45	10	4.5
BZ3 8x95/0-40	8	55	45	30	4.5
BZ3 8x165/55-110	8	55	45	100	4.5
BZ3 10x90/0-30	10	71	60	10	7.1
BZ3 10x110/0-50	10	71	60	30	7.1
BZ3 10x155/35-95	10	71	60	75	7.1
BZ310x180/60-120	10	71	60	100	7.1
BZ3 12x110/0-35	12	83	70	15	10.0
BZ312x180/30-105	12	83	70	85	10.0
BZ312x200/50-125	12	83	70	105	10.0
BZ3 16x135/0-35	16	102	85	15	13.4

#### Reduced anchoring depth

Loads and characteristic values	Drill hole Ø mm	Drill hole depth mm	Anchoring depth mm	Clamping strength mm	Permitted load area, tension zone kN
BZ3 8x65/0-10	8	45	35	10	3.5
BZ3 8x75/0-20	8	45	35	20	3.5
BZ3 8x95/0-40	8	45	35	40	3.5
BZ3 8x165/55-110	8	45	35	110	3.5
BZ3 10x70/0-10	10	51	40	10	4.3
BZ3 10x90/0-30	10	51	40	30	4.3
BZ3 10x110/0-50	10	51	40	50	4.3
BZ3 10x155/35-95	10	51	40	95	4.3
BZ310x180/60-120	10	51	40	120	4.3
BZ3 12x85/0-10	12	63	50	10	6.1
BZ3 12x110/0-35	12	63	50	35	6.1
BZ312x180/30-105	12	63	50	105	6.1
BZ312x200/50-125	12	63	50	125	6.1
BZ3 16x135/0-35	16	82	65	35	9.0



A4 2B

## Bolt tie BZ3, A4

Type	Thread	Dim.		Pack Piece	Weight kg/100 pc.	Item no.
		L mm	D2 washer, external mm			
<b>BZ3 8x75/0-20A4</b>	M8	75	24*	50	3.000	<b>3498716</b>
<b>BZ3 10x90/0-30A4</b>	M10	90	30*	50	6.100	<b>3498720</b>

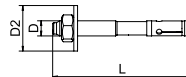
Bolt tie BZ3 for the anchoring of medium-duty to heavy-duty loads, both in cracked and non-cracked concrete. Suitable for heavy loads with small edge and axial distances. For knocking in.

European Technical Approval ETA-19/0619, including characteristic values under fire exposure to fire resistance R 120.

Proof of suitability in the event of seismic impacts, categories C1 and C2.

Shock approval by the Federal Office for Civil Protection in Bern, Switzerland.

\* With large washer to DIN EN ISO 7093-1 (DIN 9021)



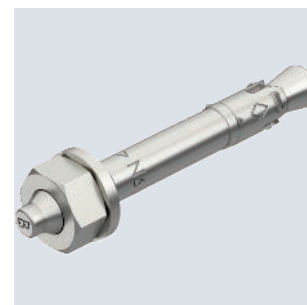
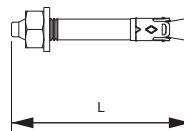
A4 2B

## Metal spreading anchor VA

### Nail anchor N with thread, V4A

Type	Thread	Drill hole Ø mm	Drill hole depth mm	Fix- ture thick- ness mm	Dim. L mm	Pack Piece	Weight kg/100 pc.	Item no.

The nail anchor N can be used for multiple fastenings of non-load-bearing systems, indoors and outdoors, in cracked and non-cracked concrete, thereby combining the benefits of a bolt tie with even easier mounting. The nail anchor only needs to be hammered into the drill hole. It is not necessary to apply torque subsequently. When the load occurs, the nail anchor spreads itself and bolts itself in the drill hole.



Porous concrete anchor with external thread

St G

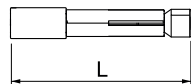


Type	Thread	Fix- ture thick- ness mm	Dim. L mm	Pack Piece	Weight kg/100 pc.	Item no.
PBD M6x10	M6	10	86	25	4.900	3497600
PBD M8x10	M8	10	88	25	7.600	3497608
PBD M10x10	M10	10	90	25	11.400	3497616

Steel spreading anchor tested for fire protection properties and approved for use in porous concrete.

Porous concrete anchor with internal thread

St G

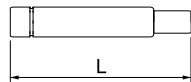
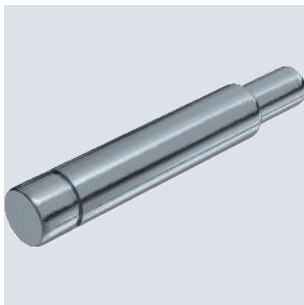


Type	Thread	Dim. L mm	Pack Piece	Weight kg/100 pc.	Item no.
PBD i M6	M6	82	25	4.500	3497700
PBD i M8	M8	82	25	6.200	3497702
PBD i M10	M10	92	25	9.300	3497704
PBD i M12	M12	92	25	8.900	3497706

Steel spreading anchor tested for fire protection properties and approved for use in porous concrete.

Setting tool for hand hammer

St G

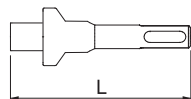
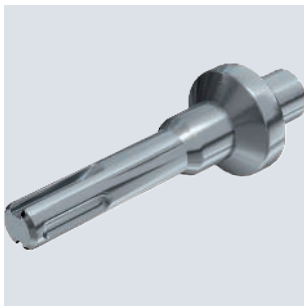


Type	Size	Dim. L mm	Pack Piece	Weight kg/100 pc.	Item no.
EWP 6x10	M6x10	170	1	32.500	3497640
EWP 8x10	M8x10	10	1	39.800	3497648
EWP 10x10	M10x10	10	1	47.600	3497656

Setting tool PBD porous concrete anchors – for hand hammer.

Setting tool for rotary hammer

St G



Type	Size	Dim. L mm	Pack Piece	Weight kg/100 pc.	Item no.
SDS-EWP 10x10	M10x10	10	1	25.600	3497684

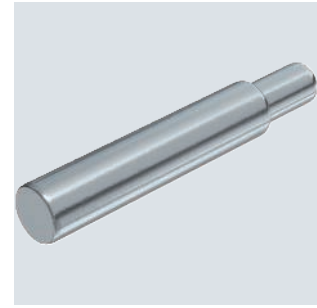
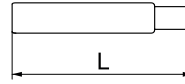
Setting tool for PBD porous concrete anchors – for rotary hammer with SDS seat.

St G

Setting tool for hand hammer

Type	Size	Dim. L mm	Pack Piece	Weight kg/100 pc.	Item no.
<b>EWP 6 i</b>	M6x10	170	1	30.000	<b>3497720</b>
<b>EWP 8 i</b>	M8x10	170	1	37.100	<b>3497722</b>
<b>EWP 10 i/ 12 i</b>	M10/M12x10	170	1	44.800	<b>3497724</b>

Setting tool for PBDi porous concrete anchors – for hand-hammer.



## Bolt tie

### System description



OBO Bettermann's fire protection bolt ties were fire-tested according to ETAG 001 Part 3. The maximum load capacity, depending on fire resistance periods of up to 120 minutes, was determined for different types of solid masonry. These values are documented in the appropriate test certificates. Taking the occurring loads for the maintenance of electrical function application and for false ceiling mounting into account, the

determined load capacities for the different masonry types are absolutely sufficient. The fire protection bolt ties are screwed directly into the drill hole. There is no need for an additional anchor. No spreading forces develop and mounting near masonry edges is not required. The bolt tie is equally suitable for cracked concrete in ceilings.



## Bolt tie

### Installation principle



Version with truss head and T drive.



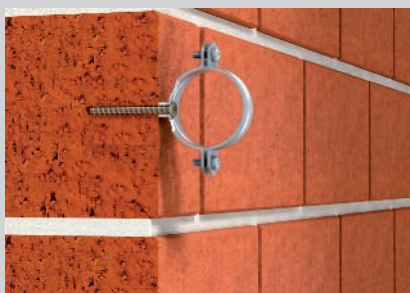
Version with large truss head and T drive.



Version with hexagonal head.



Version as shaft tie with M6 threaded tip.



Version with countersunk cone head and T drive.



Version with M8/M10 female thread sleeve for the connection of threaded rods.

Classification according to proof of application

F30

F60

F90

F120

#### System description

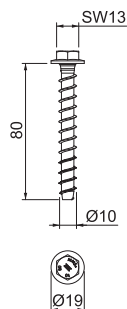
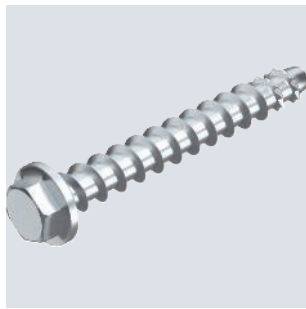
<b>Anchoring type</b>	Spread-free connection with self-tapping thread
<b>Fire resistance classes</b>	Up to F120 according to general type approval
<b>Substrate</b>	Concrete Masonry: Solid calcareous limestone brick, porous calcareous limestone brick, full brick

The data of the approval documents and any fire testing reports apply



### MMS-plus SS hexagonal tie, with pressed washer

St G

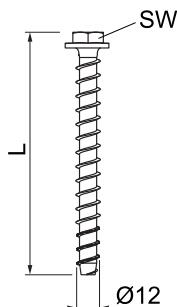
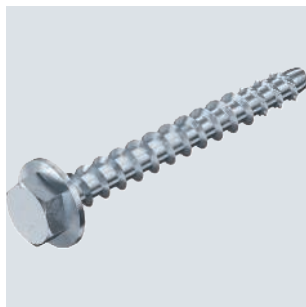


Type	Dimen- sion mm	Dim. L mm	Drill hole		Pack Piece	Weight kg/100 pc.	Item no.
			Ø	SW			
MMS+ SS 10x80	10x80	80	8	13	25	4.000	3498124
MMS+ SS 10x100	10x100	100	8	13	25	4.800	3498159

Bolt tie for direct mounting without additional anchors in cracked and uncracked concrete and masonry. With hex head drive and pressed washer to accept large loads. Suitable for fastening suspended loads from suspended supports and wall brackets. 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.

### MMS-plus hexagonal tie, with pressed washer

St

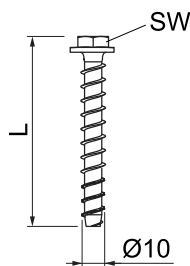


Type	Dimen- sion mm	Dim. L mm	Drill hole		Pack Piece	Weight kg/100 pc.	Item no.
			Ø	SW			
MMS+ SS 12x100	12x100	100	10	15	25	7.800	3498170
MMS+ SS 12x120	12x120	120	10	15	25	8.900	3498172

Stainless steel screw-in anchor for direct mounting without additional anchors in cracked and uncracked concrete and masonry. With hex head drive and pressed washer to accept large loads. Suitable for fastening suspended loads from suspended supports and wall brackets in wet rooms and in outdoor areas. 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.

### MMS-plus SS hexagonal tie, with pressed washer, made of A4 stainless steel

VA

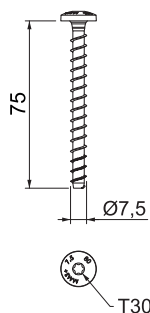


Type	Dimen- sion mm	Dim. L mm	Drill hole		Pack Piece	Weight kg/100 pc.	Item no.
			Ø	SW			
MMS+ SS 10x75 A4	10x75	75	8	13	25	3.700	3498126
MMS+ SS 10x95 A4	10x95	95	8	13	25	4.600	3498128
MMS+ SS12x105 A4	12x105	105	10	15	25	8.200	3498174
MMS+ SS12x120 A4	12x120	120	10	15	25	9.400	3498176

Stainless steel screw-in anchor for direct mounting without additional anchors in cracked and uncracked concrete and masonry. With hex head drive and pressed washer to accept large loads. Suitable for fastening suspended loads from suspended supports and wall brackets in wet rooms and in outdoor areas. 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.

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

VA



Type	Dimen- sion mm	Drill hole Ø	Head Ø	Screw system	Length mm	Pack Piece	Weight kg/100 pc.	Item no.

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.

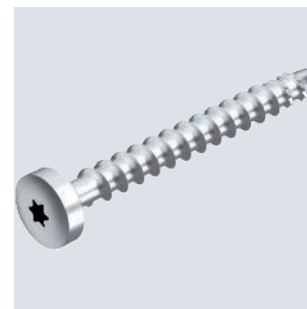
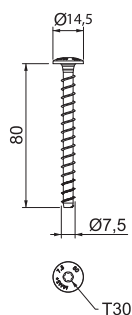


St G

### MMS-plus P round head tie, with panhead

Type	Dimension mm	Drill hole Ø mm	Head Ø mm	Screw system	Pack Piece	Weight kg/100 pc.	Item no.
MMS+ P 7.5x80	7,5x80	6	14,5	Torx	50	1.600	3498272

Bolt tie for direct mounting without additional anchors in cracked and uncracked concrete and masonry. With round head for universal fastenings. 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.

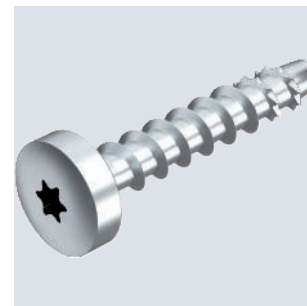
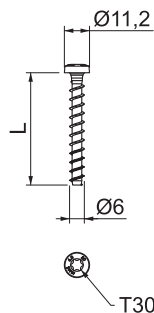


St G

### MMS-plus P round head tie, with panhead

Type	Dimension mm	Drill hole L mm	Head Ø mm	Screw system	Pack Piece	Weight kg/100 pc.	Item no.	
								Drill hole Ø mm
MMS+ P 6x35	6x35	35	5	11,2	Torx	100	0.710	3498103
MMS+ P 6x40	6x40	40	5	11,2	Torx	100	1.000	3498105
MMS+ P 6x50	6x50	50	5	11,2	Torx	100	1.000	3498108

Bolt tie for direct mounting without additional anchors in cracked and uncracked concrete and masonry. With round head for universal fastenings. 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.

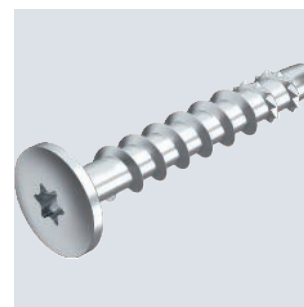
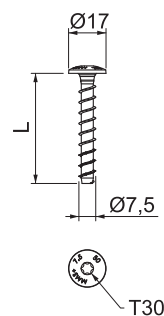


St

### MMS-plus MS mounting rail tie, with flat panhead

Type	Dimension mm	Drill hole L mm	Head Ø mm	Screw system	Pack Piece	Weight kg/100 pc.	Item no.	
								Drill hole Ø mm
MMS+ MS 7.5x60	7,5x60	60	6	17	Torx	50	1.800	3498262

Bolt tie for direct mounting without additional anchors in cracked and uncracked concrete and masonry. With large round head to fasten mounting and profile rails. 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.

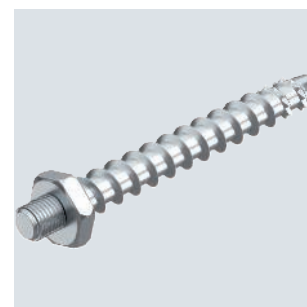
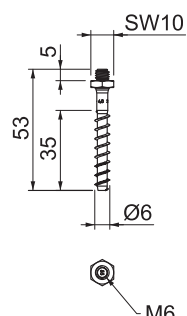


St G

### MMS-plus ST push-in tie, with connection thread

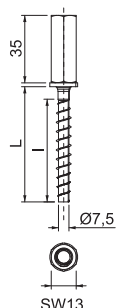
Type	Dimension mm	Drill hole mm	SW	Pack Piece	Weight kg/100 pc.	Item no.	
							Thread
MMS+ ST 6x55	6x55	5	M6	10	100	1.030	3498264

Bolt tie for direct mounting without additional anchors in cracked and uncracked concrete and masonry. M6 connection thread for fastening clips with threaded foot. 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.



### MMS-plus I internal thread tie, with combination thread sleeve

St G

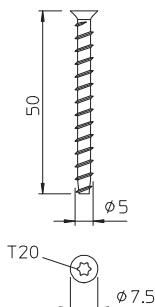


Type	Dimension mm	Dim. L mm	Drill hole Ø mm	Thread	SW mm	Pack Piece	Weight kg/100 pc.	Item no.
MMS+ I 7.5x40	7,5x40	40	6	M8/M10	13	40	3.810	3498266
MMS+ I 7.5x60	7,5x60	60	6	M8/M10	13	40	4.230	3498268

Bolt tie for direct mounting without additional anchors in cracked and uncracked concrete and masonry. With M8/M10 combination thread sleeve for fastening threaded rods. 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.

### MMS-plus KS countersunk head tie, for cable clip

St G

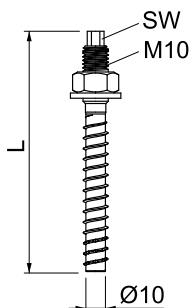


Type	Dimension mm	Drill hole Ø mm	Head Ø mm	Screw system	Pack Piece	Weight kg/100 pc.	Item no.
MMS+ KS 5x50	5x50	4	7.5	Torx	200	0.460	3498204

Bolt tie for direct mounting without additional anchors in concrete and masonry. With small countersunk head to fasten cable clips through the threaded foot. Load-bearing capacities under fire loads proven up to fire resistance class R120.

### MMS-plus V pre-push tie, with connection thread

St

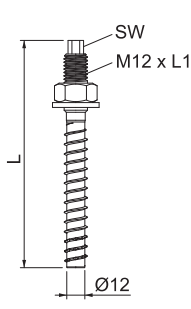


Type	Dimension mm	Dim. L mm	Drill hole Ø mm	Thread	SW mm	Pack Piece	Weight kg/100 pc.	Item no.
MMS+ V 10x90	10x90	90	8	M10x20	7	25	5.500	3498190
MMS+ V 10x110	10x110	110	8	M10x40	7	25	6.660	3498192

Bolt tie for direct mounting without additional anchors in cracked and uncracked concrete and masonry. With connection thread and washer to accept large loads. Suitable for fastening suspended loads from suspended supports and wall brackets in push-through mounting. 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.

### MMS-plus V pre-push tie, with connection thread

St



Type	Dimension mm	Dim. L mm	Drill hole Ø mm	Thread	SW mm	Pack Piece	Weight kg/100 pc.	Item no.
MMS+ V 12x110	12x110	110	10	M12x30	8	25	6.900	3498196

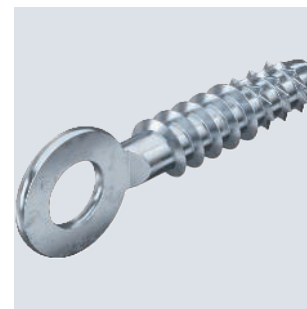
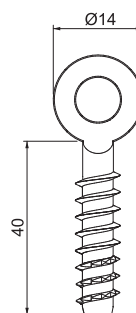
Bolt tie for direct mounting without additional anchors in cracked and uncracked concrete and masonry. With connection thread and washer to accept large loads. Suitable for fastening suspended loads from suspended supports and wall brackets in push-through mounting. Construction product tested according 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.

St

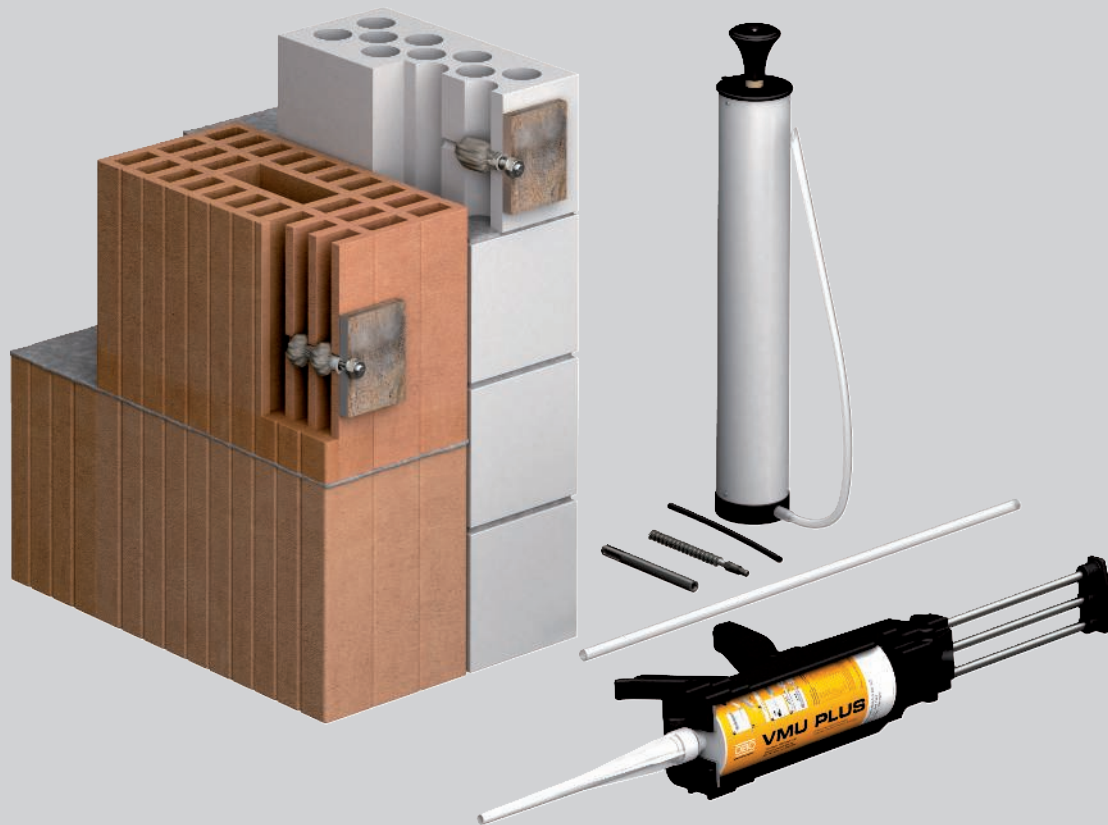
## MMS-plus R ring tie, with setting tool

Type	Dimension mm	Drill hole Ø mm	Head Ø mm	Pack Piece	Weight kg/100 pc.	Item no.
<b>MMS+ R 6x40</b>	6x40	5	14	200	0.790	<b>3498180</b>

Bolt tie for direct mounting without additional anchors in cracked and uncracked concrete and masonry. With ring eyelet for universal fastenings. Setting tool contained in the scope of delivery.



## Injection tie VMU Plus System description



The VMU Plus injection mortar system is particularly suitable for fire protection fastening in hollow brick, concrete and porous concrete, calcareous limestone, sand-lime brick and masonry. The connection is free from spreading pressure and is created through the form fitting of the injection mortar with the substrate and an anchor rod. The components are tested and approved for a fire resistance period of 90 minutes.

The maximum load capacity depending on the fire resistance period and the fastening substrate is documented accordingly in the available fire protection certificate. Although the load capacity of the injection mortar system is below the load capacity when cold, this load capacity is completely sufficient for fireproof fastening of the different routing types.

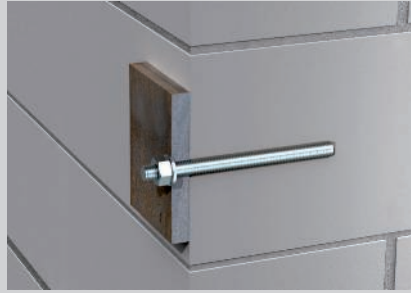


# Injection tie VMU Plus

## Installation principle



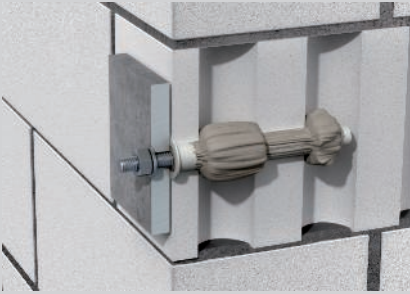
Anchor rod mounted in concrete without wire sleeve.



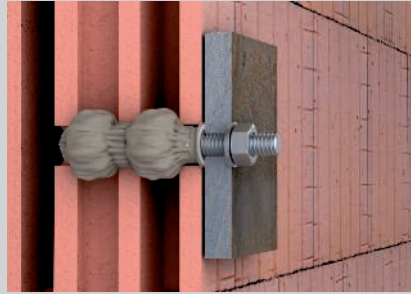
Anchor rod mounted in calcareous limestone full brick without wire sleeve.



In full brick, mount the anchor rod without a wire sleeve.



Anchor rod mounted in hollow calcareous limestone with wire sleeve.



Anchor rod mounted in hollow brick with wire sleeve.

Classification according to proof of application

R30

R60

R90

### System description

<b>Anchoring type</b>	Spread-free connection with special mortar
<b>Fire resistance classes</b>	To R90 according to proof of fire protection
<b>Substrate</b>	Concrete, solid calcareous limestone brick, porous calcareous limestone brick, porous brick, full brick, porous concrete block
<b>Load classes</b>	Dependent on the resistances of the substrates, see approval

The data of the approval documents and any fire testing reports apply



## Injection mortar in cartridge, 420 ml



Type	Contents		Pack Piece	Weight kg/100 pc.	Item no.
	ml				
<b>VMU plus 420</b>	420		1	83.000	<b>3497803</b>

Styrene-free, vinyl ester composite mortar for spread-free anchoring of high loads with threaded anchor rods. Coaxial cartridge, including one mixing tube, to be worked with the pressing gun, type VM-P 380 Profi.

European Technical Assessment for cracked and uncracked concrete, as well as for masonry of full and hollow brick. Earthquake-proof in concrete according to Category C1. Fire protection approval for concrete and masonry with fire resistance classes up to 120 minutes.

Substrate temperature during processing  $-10\text{ }^{\circ}\text{C}$  to  $+40\text{ }^{\circ}\text{C}$  (concrete), ambient temperature after complete hardening  $-40\text{ }^{\circ}\text{C}$  to  $+120\text{ }^{\circ}\text{C}$  (in concrete). If stored in a dark, cool and dry place, will keep for at least 18 months.

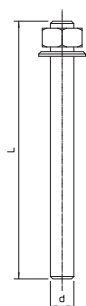
## Pressing gun for standard cartridges and side-by-side cartridges



Type	Pack Piece	Weight kg/100 pc.	Item no.

Side-by-side cartridge pistol for the use of standard cartridges or side-by-side cartridges. The cartridge pistol is suitable for the injection mortar VMU plus 280 and can also be used with normal 300 ml cartridges.

## Anchor rod

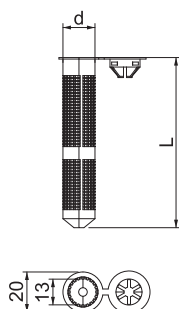


Type	Dim.		SW	Pack Piece	Weight kg/100 pc.	Item no.
	L mm	d mm				
<b>VMU-A 12-155A4</b>	155	9.9	M12	10	13.850	<b>3497834</b>

With the anchor rod and matching plastic wire sleeve, loads are fastened without spreading pressure in masonry walls using the VMS plus injection mortar. The system is also used for fastening in concrete ceilings. On concrete and full brick walls, the anchor rod is only mounted with the injection mortar VMU plus, without a wire sleeve.

## Plastic wire sleeve

PA



Type	Dim.		Pack Piece	Weight kg/100 pc.	Item no.
	L mm	d mm			
<b>VMU-SH 12x80</b>	80	12	10	0.200	<b>3497860</b>

The plastic wire sleeve is a supplement to the anchor rod or internal thread sleeve and is used to install components on masonry.



PA

## Mixer pipe for mortar cartridge

Type	Pack Piece	Weight kg/100 pc.	Item no.
VM-X	12	1.000	3497981

Mixing tubes for attachment to the cartridges of the VMU plus injection mortar system.



## Wood screws

### System description



Wood is a combustible material and, as with steel constructions, wooden components are firstly only suitable under certain conditions for the fastening of fire-tested electrical installations. Coatings and panelling are also used in the constructions, in order to achieve a fire resistance class at all. However, if there is a fire, wood has a very good property: When burning, an insulated layer is created which delays further combustion. The wooden component must be dimensioned in such a way that failure of the carrying capacity cannot occur at an early stage. The combustion rates are a standard means for calculating the required wood cross-section, depending on the desired fire

resistance class. The combustion rates depend on the type of wood and the moisture content of the wood. Taking the combustion rates into account, various cable support systems for electrical safety systems with the maintenance of electrical functionality classes E30 and E60 can be fastened to wooden components. Wood screws with a suitable steel cross-section and sufficient embedment depth are used for fastening. The long screws drill deep into the cross-section of the wooden beam, ensuring a secure hold of the mounted support systems, despite burning. Various mounting variants are documented in a fire protection survey.



# Wood screws

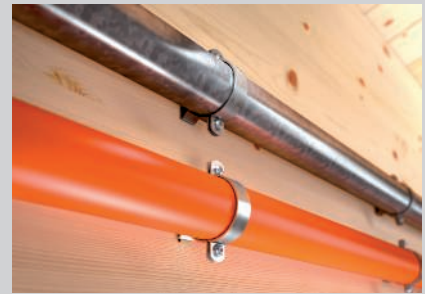
## Installation principle



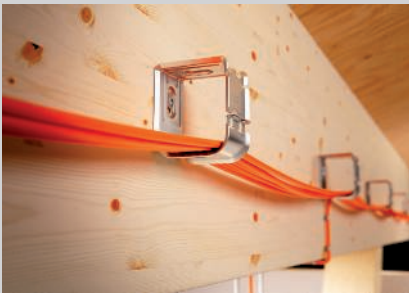
Bracket mounting on the side of the wooden beam with rear fire protection plate.



Suspended support mounting under the wooden beam with rear fire protection plate.



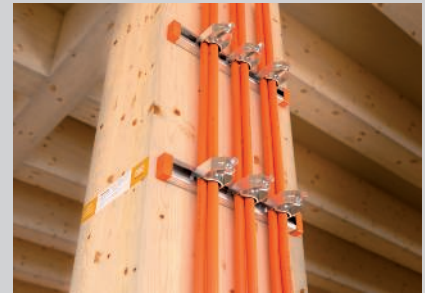
Cable routing with single clips and in the pipe, at the side on the wooden beam.



Cable routing with grouped support on the side on the wooden beam.



Mounting of the OBO FireBox on a wooden beam.



Vertical cable routing with rails and clips on a wooden beam.

Classification according to proof of application

**E30**

**E60**

### System description

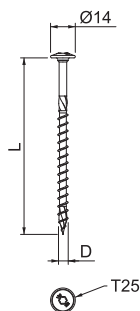
<b>Anchoring type</b>	Self-tapping wood screw
<b>Maintenance of electrical function classes</b>	E30 to E60
<b>Substrate</b>	Supporting components, that close off or do not close off rooms, (walls, ceiling or supports) made of solid wood
<b>Proof of application</b>	Surveyor's report of Ingenieurbüro für Brandschutz von Bauarten, IBB
<b>Certificate number</b>	GA-2016/034-Mey

The data in the named proofs of applicability applies



### Flange head-screw HT 6

St G

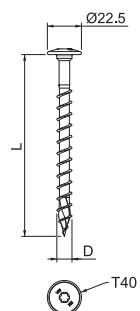


Type	Dim.		Head Ø	Screw system	Pack Piece	Weight kg/100 pc.	Item no.
	D mm	L mm					
HT 6x80 TD	6	80	14	Torx	100	1.100	3498132
HT 6x100 TD	6	100	14	Torx	100	1.300	3498134

Self-tapping wood screw for fireproof fastening of cable systems for the maintenance of electrical function according to DIN 4102 Part 12 on supporting wooden structures. The flange head shape allows installation without an additional washer.

### Flange head-screw HT 10

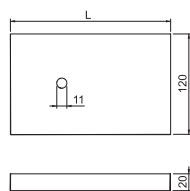
St G



Type	Dim.		Head Ø	Screw system	Pack Piece	Weight kg/100 pc.	Item no.
	D mm	L mm					
HT 10x140 TD	10	140	22.5	Torx	50	4.900	3498146

Self-tapping wood screw for fireproof fastening of cable systems for the maintenance of electrical function according to DIN 4102 Part 12 on supporting wooden structures. The flange head shape allows installation without an additional washer.

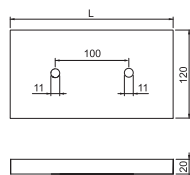
### Fire protection plate, single perforated



Type	Dim.	Pack Piece	Weight kg/100 pc.	Item no.
	L mm			
GLB-PG1	150	1	25.200	7205460
GLB-PG2	190	1	32.000	7205462

Perforated fire protection plate (material class A1) as effective panelling measure for fastening on supporting wooden components for the maintenance of electrical functionality according to DIN 4102 Part 12. Made of fibre-glass light concrete which is resistant to water and frost.

### Fire protection plate, double perforated



Type	Dim.	Pack Piece	Weight kg/100 pc.	Item no.
	L mm			
GLB-PG3	220	1	37.000	7205464

Perforated fire protection plate (material class A1) as effective panelling measure for fastening on supporting wooden components for the maintenance of electrical functionality according to DIN 4102 Part 12. Made of fibre-glass light concrete which is resistant to water and frost.



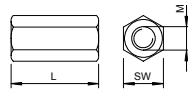
## Threaded rod



Type	Thread	Dim. d mm	Dim. L mm	Pack Piece	Weight kg/100 pc.	Item no.
<b>TR M8 1M G</b>	M8	8	1000	10	30.000	<b>3141128</b>
<b>TR M10 1M G</b>	M10	10	1000	10	49.000	<b>3141209</b>
<b>TR M12 1M G</b>	M12	12	1000	10	62.000	<b>3141306</b>

Threaded rod to DIN 976.

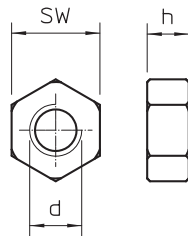
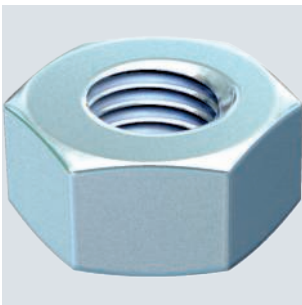
## Connection sleeve



Type	Thread	Dim. L mm	SW mm	Pack Piece	Weight kg/100 pc.	Item no.
<b>CSTR M8 G</b>	M8	24	13	50	1.880	<b>6410081</b>
<b>CSTR M10 G</b>	M10	30	17	50	4.150	<b>6410103</b>
<b>CSTR M12 G</b>	M12	40	19	25	7.000	<b>6410111</b>

Connection sleeve with continuous internal thread.

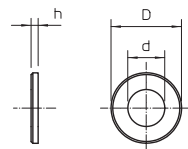
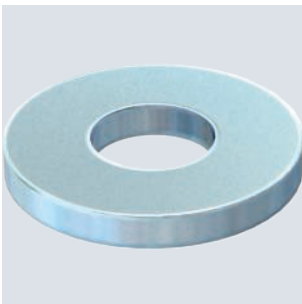
## Hexagonal nut DIN 934



Type	Thread	SW mm	Dim. h mm	Dim. d mm	Pack Piece	Weight kg/100 pc.	Item no.
<b>HN M8 G</b>	M8	13	6.8	8	100	0.500	<b>3400085</b>
<b>HN M10 G</b>	M10	17	8.4	10	100	1.014	<b>3400107</b>
<b>HN M12 G</b>	M12	19	10.8	12	100	1.730	<b>3400123</b>

Hexagonal nut to DIN 934 with metric thread.

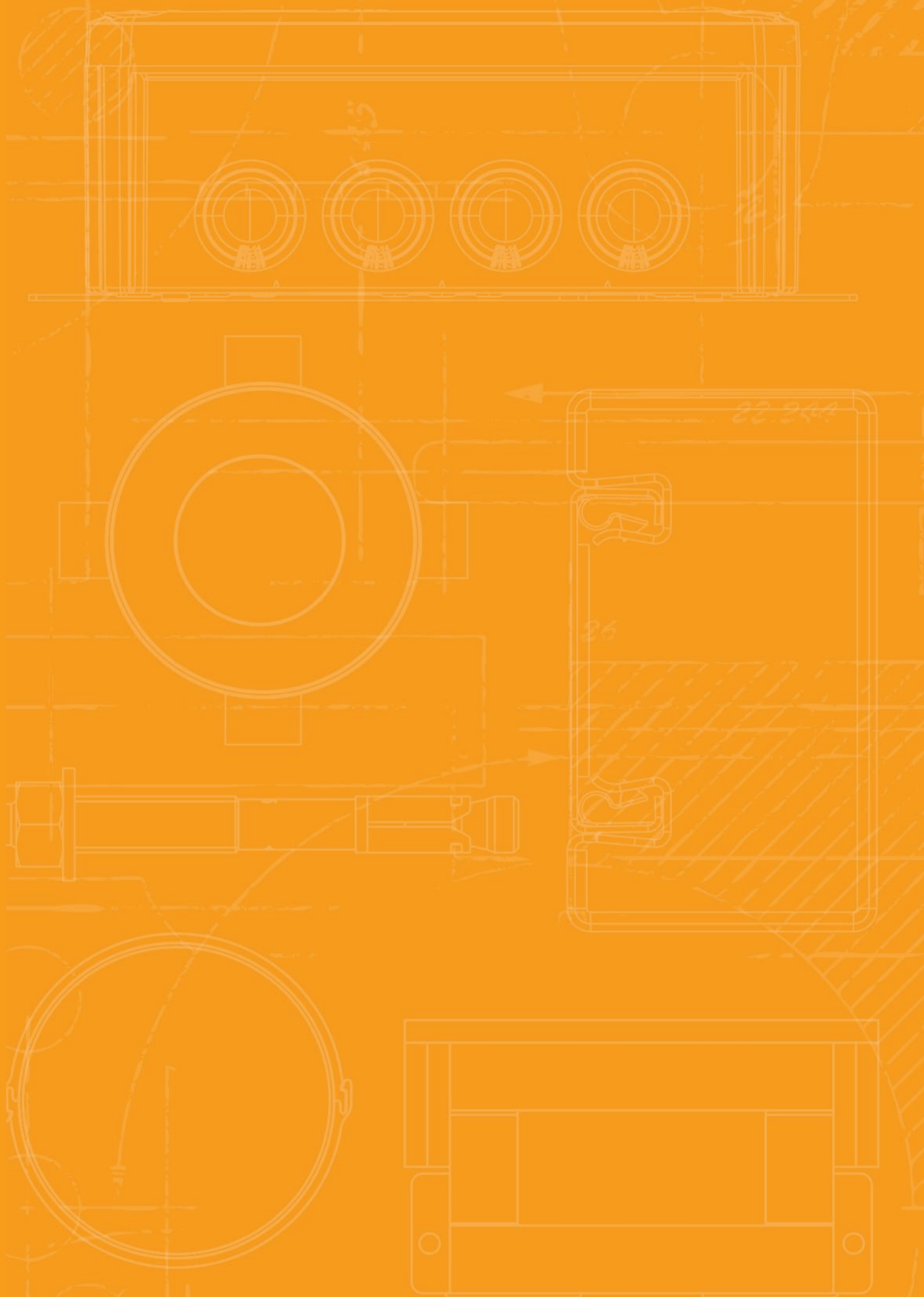
## Washer









Type	Thread	Dim. d mm	Dim. D mm	Dim. h mm	Pack Piece	Weight kg/100 pc.	Item no.
<b>WS M8 D16 G</b>	M8	8.4	16	1.6	100	0.156	<b>3402088</b>
<b>WS M10 D20 G</b>	M10	10.5	20	2	100	0.408	<b>3402096</b>
<b>WS M12 D24 G</b>	M12	13	24	2.5	100	0.570	<b>3402126</b>

Washer according to DIN 125, shape A, for universal use.












































# Directories

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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; without chlorine, fluorine and bromine
	Flame resistant 650 °C
	Flame resistant 750 °C
	Flame resistant 960 °C
	UV-resistant




## Specific product symbols

	Diameter 60 mm
	Diameter 68 mm
	Protection device to DIN EN 61643-11 or IEC 61643-11
	Transition from LPZ 2 to LPZ 3
	Acoustic signalling



## Applications

	Remote signalling
	Acoustic signalling
	Integrated Service Digital Network, ISDN applications
	Digital Subscriber Line, DSL applications
	Analogue telecommunication
	Category 5 TwisterPair
	Channel Performance to American EIA/TIA standard
	Measuring, controlling and regulating systems
	TV applications
	SAT-TV applications
	MultiBase base
	LifeControl
	Intrinsically safe protection device for potentially explosive areas
	Channel Performance to ISO/IEC 11801
	Power over Ethernet
	230/400 V system
	Protection rating IP 54
	Protection rating IP 65







## Lightning protection classes

	Protection device to DIN EN 61643-11 or IEC 61643-11
	Combination protection device made of type 1 and 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

	Phillips screw
	Torx screw
	Phillips screw
	Pozidriv











## Firing devices

	Bolt-firing tool
	Nail device





## 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, rustproof
	Stainless steel, rustproof
	Stainless steel, rustproof
	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 PE</b>	Cellular polyethylene



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KS-E DE	5847830	7205423	30			/pc.	
KS-E EN	5811688	7205432	52	MAH 60 100 FS	6939374	6358705	51
KS-E EN	5811688	7205432	72	MAH 60 100 FT	6947171	6358752	51
KS-E EN	5811688	7205432	74	MAH 60 150 FS	6939435	6358709	51
KS-E EN	5811688	7205432	77	MAH 60 150 FT	6947232	6358756	51
KS-E EN	5811688	7205432	84	MAH 60 200 FS	6939497	6358713	51
KS-E EN	5811688	7205432	91	MAH 60 200 FT	6947294	6358760	51
KS-E EN	5811688	7205432	104			/pc.	
KS-E EN	5811688	7205432	131	MMS+ I 7.5x40	6710881	3498266	210
KS-E EN	5811688	7205432	133	MMS+ I 7.5x60	6710911	3498268	210
KS-E EN	5811688	7205432	149			/100 pc.	
KS-E EN	5811688	7205432	30	MMS+ KS 5x50	5964100	3498204	210
KS-E NL	6593705	7205405	30	MMS+ MS 7.5x60	6842568	3498262	209
		/pc.		MMS+ P 6x35	6651290	3498103	209
KSR20030	6018710	6249844	88	MMS+ P 6x40	6952175	3498105	209
		/pc.				/100 pc.	
KSR60100	5020325	6249852	90	MMS+ P 6x50	6559657	3498108	209
		/pc.		MMS+ P 7.5x75 A4	6952243	3498274	208
KS-ZSE DE	5809654	7215750	156			/100 pc.	
		/pc.		MMS+ P 7.5x80	6559640	3498272	209
KTSMV 610 A2	5889571	6068958	72	MMS+ R 6x40	6842698	3498180	211
KTSMV 610 DD	5890492	6068936	51			/100 pc.	
KTSMV 610 FS	5889502	6068914	51	MMS+ SS 10x100	6559633	3498159	208
KTSMV 610 FS	5889502	6068914	175	MMS+ SS 10x75 A4	6952182	3498126	208
KTSMV 615 DD	5890508	6068938	51			/100 pc.	
KTSMV 615 FS	5889519	6068916	51	MMS+ SS 10x80	6559626	3498124	208
KTSMV 620 A2	5889595	6068962	72	MMS+ SS 10x95 A4	6952199	3498128	208
KTSMV 620 DD	5890515	6068940	51	MMS+ SS 12x100	6842575	3498170	208
KTSMV 620 FS	5889526	6068918	175	MMS+ SS 12x120	6842582	3498172	208
KTSMV 620 FS	5889526	6068918	51	MMS+ SS12x105 A4	6952205	3498174	208
KTSMV 630 A2	5889601	6068964	72	MMS+ SS12x120 A4	6952236	3498176	208
KTSMV 630 DD	5890522	6068942	51			/100 pc.	
KTSMV 630 FS	5889533	6068920	175	MMS+ ST 6x55	6559671	3498264	209
KTSMV 630 FS	5889533	6068920	51	MMS+ V 10x110	6842636	3498192	210
KTSMV 640 DD	5890560	6068944	51	MMS+ V 10x90	6842629	3498190	210
KTSMV 640 FS	5889540	6068922	175	MMS+ V 12x110	6842643	3498196	210
KTSMV 640 FS	5889540	6068922	51			/pc.	
KTSMV 650 FS	5889557	6068924	175	MP-T6-B	6842254	7205792	28
KTSMV 660 FS	5889564	6068926	175	MP-T6-F	6842223	7205790	28
		/pc.				price/100	
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KU 3 FT	6340217	6348874	134			/100 pc.	
		/pc.		MS40SN M6 ZL	6489398	1147106	103
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KU 5 V FT	6901456	6348920	135			/100 pc.	

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MS4121P0200FT	5697626	1122933	181	RB 90 620 FS	6050536	6043224	130
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MWA 12 41S FS	6637096	6424759	136	RKSM 615 FS	5391197	6047630	50
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RAAM 610 A2	5878797	6041270	71	S16W FT	5782148	price/100 2046593	83
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SM32W G	5924883	2046864	82	TK 06-2	6810222	7205703	28
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				TK 10	6396030	7205704	28
SM40W FT	5781493	2046537	83	TK 10-2	6810239	7205705	28
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				TK 16-2	6810246	7205707	28
SM50W FT	5781509	2046538	83				
SM50W G	5924906	2046866	82	TPE 04	7272463	7205709	29
SM50W SW	5781134	2046506	82	TPE 35	7272517	7205714	29
						/pc.	
SM63W FT	5781547	2046540	83	TPSA 195 FS	6199037	6364152	136
SM63W G	5924913	2046867	82	TPSA 295 FS	6199150	6364268	136
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SV16W G	5924784	2046854	83	TR M12 1M G	5253457	3141306	137
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				TR M12 1M G	5253457	3141306	220
SV20W FT	5782391	2046621	84	TR M8 1M G	5253334	3141128	137
SV20W G	5924791	2046855	83	TR M8 1M G	5253334	3141128	184
SV20W SW	5781783	2046583	82	TR M8 1M G	5253334	3141128	220
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				TSG 45 FS	5694489	6062033	137
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				TSG 60 FS	5694540	6062068	59
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US 3 K 100 FT	6225132	6342368	177	US 5 K 80 FT	6536412	6341594	178
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US 3 K 110 FT	6225378	6342370	177	US 5 K 90 FT	6536351	6341608	178
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US 5 90 FT	6044160	6340958	135	US 7 K 300 FT	6457458	6339360	56
US 5 90 FT	6044160	6340958	55	US 7 K 40 FT	6186679	6339050	56
US 5 K 100 FT	6536290	6341616	55	US 7 K 50 FT	6186730	6339077	56
US 5 K 100 FT	6536290	6341616	134	US 7 K 60 FT	6186792	6339093	56
US 5 K 100 FT	6536290	6341616	178	US 7 K 70 FT	6186792	6339093	56
US 5 K 110 FT	6536238	6341624	55	US 7 K 80 FT	6186853	6339115	56
US 5 K 110 FT	6536238	6341624	134	US 7 K 80 FT	6186914	6339131	56
US 5 K 110 FT	6536238	6341624	178	US 7 K 90 FT	6186976	6339166	56
US 5 K 120 FT	6536177	6341632	55	US 7 KS OR	5668060	6338497	57
US 5 K 120 FT	6536177	6341632	134	VIS 8 FT	6014231	6018300	147
US 5 K 120 FT	6536177	6341632	178	VM-P 345 Profi	6464661	3497906	214
US 5 K 20 FT	6536771	6341527	55	VMU plus 420	6606986	3497803	214
US 5 K 20 FT	6536771	6341527	134	VMU-A 12-155A4	6606832	3497834	214
US 5 K 20 FT	6536771	6341527	178				



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V-TEC VM25+ OR	6028245	7205663	29
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V-TEC VM40+ OR	6028290	7205669	29
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WS M10 D20 G	5300137	3402096	220
WS M10 D20 G	5300137	3402096	184
WS M12 D24 G	5300199	3402126	149
WS M12 D24 G	5300199	3402126	61
WS M12 D24 G	5300199	3402126	139
WS M12 D24 G	5300199	3402126	220
WS M12 D24 G	5300199	3402126	184
WS M8 D16 G	5300076	3402088	139
WS M8 D16 G	5300076	3402088	220
WS M8 G20 G	5868217	3403122	184
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ZSE90 M3	6839506	7215747	158
ZSE90-21-17 LH	6814725	7215780	157
ZSE90-25-11	5958857	/pc. 7215702	156
ZSE90-25-11 L	6814602	7215760	157
ZSE90-25-17	5958901	/pc. 7215713	156
ZSE90-25-17 L	6814657	7215766	157
ZSE90-31-17 LH	6814732	7215782	157
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ZSE90-35-11 L	6814619	7215762	157
ZSE90-35-17	5958918	/pc. 7215716	156
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ZSE90-41-17 LH	6814749	7215784	157
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5038238	<b>1104241</b>	102	6599769	<b>1362460</b>	108	5782490	<b>2046626</b>	84		/pc.		6013579	<b>6017045</b>	75
5038290	<b>1104268</b>	102	6599776	<b>1362462</b>	108		price/100		6606986	<b>3497803</b>	214	6120499	<b>6017092</b>	75
5038351	<b>1104284</b>	102	6599783	<b>1362464</b>	108	5924647	<b>2046840</b>	83	6606832	<b>3497834</b>	214			
5836353	<b>1104292</b>	102	6599790	<b>1362467</b>	108	5924654	<b>2046841</b>	83	6606900	<b>3497860</b>	214	6014231	<b>6018300</b>	147
5038412	<b>1104306</b>	102	6599806	<b>1362469</b>	108	5924661	<b>2046842</b>	83	6464661	<b>3497906</b>	214	6446896	<b>6018505</b>	147
5036678	<b>1104310</b>	102	6599813	<b>1362472</b>	108	5924678	<b>2046843</b>	83	6464937	<b>3497981</b>	215			
5036739	<b>1104315</b>	102	6599820	<b>1362474</b>	108	5924685	<b>2046844</b>	83				6014538	<b>6019528</b>	148
5036791	<b>1104320</b>	102	6599837	<b>1362478</b>	108	5924692	<b>2046845</b>	83	6651290	<b>3498103</b>	209	6653652	<b>6019534</b>	135
5036852	<b>1104325</b>	102	6599844	<b>1362482</b>	108	5924708	<b>2046846</b>	83	6952175	<b>3498105</b>	209			
	price/100		6599851	<b>1362486</b>	108		/100 pc.			/100 pc.		6379392	<b>6040403</b>	130
5694458	<b>1104497</b>	102	6599868	<b>1362489</b>	108	5924784	<b>2046854</b>	83	6559657	<b>3498108</b>	90	6379453	<b>6040438</b>	130
5038771	<b>1104500</b>	102	6599929	<b>1362714</b>	109	5924791	<b>2046855</b>	83	6559626	<b>3498124</b>	208	6379514	<b>6040446</b>	130
			6599936	<b>1362718</b>	109	5924807	<b>2046856</b>	83	6952182	<b>3498126</b>	208			
5047599	<b>1119656</b>	102	6599943	<b>1362722</b>	109	5924814	<b>2046857</b>	83	6952199	<b>3498128</b>	208	5881810	<b>6041130</b>	50
			6599981	<b>1362726</b>	109	5924821	<b>2046858</b>	83		/100 pc.		5881827	<b>6041132</b>	50
5050230	<b>1121979</b>	103	6599998	<b>1362730</b>	109	5924838	<b>2046859</b>	83	6563937	<b>3498132</b>	218	5881834	<b>6041134</b>	50
			6600007	<b>1362734</b>	109	5924845	<b>2046860</b>	83	6563944	<b>3498134</b>	218	5881841	<b>6041136</b>	50
	/100 pc.		6600014	<b>1362738</b>	109		price/100		6563999	<b>3498146</b>	218	5881858	<b>6041138</b>	50
5486251	<b>1122525</b>	182	6600076	<b>1362768</b>	109	5924852	<b>2046861</b>	82	6559633	<b>3498159</b>	208	5881865	<b>6041140</b>	174
5486794	<b>1122533</b>	182	6600083	<b>1362772</b>	109	5924869	<b>2046862</b>	82	6842575	<b>3498170</b>	208	5881872	<b>6041142</b>	174
5486916	<b>1122541</b>	182	6600090	<b>1362776</b>	109	5924876	<b>2046863</b>	82	6842582	<b>3498172</b>	208	5881889	<b>6041150</b>	50
5487036	<b>1122568</b>	182	6600106	<b>1362780</b>	109	5924883	<b>2046864</b>	82	6952205	<b>3498174</b>	208	5881896	<b>6041152</b>	50
	price/100		6600113	<b>1362784</b>	109	5924890	<b>2046865</b>	82	6952236	<b>3498176</b>	208	5881902	<b>6041154</b>	50
5487272	<b>1122606</b>	182	6600120	<b>1362788</b>	109	5924906	<b>2046866</b>	82	6842698	<b>3498180</b>	211	5881919	<b>6041156</b>	50
5487876	<b>1122622</b>	182	6600298	<b>1362914</b>	110	5924913	<b>2046867</b>	82	6842629	<b>3498190</b>	210	5881926	<b>6041158</b>	50
	/100 pc.		6600304	<b>1362918</b>	110				6842636	<b>3498192</b>	210	5881957	<b>6041180</b>	71
6255726	<b>1122904</b>	181	6600335	<b>1362922</b>	110		/100 pc.		6842643	<b>3498196</b>	210	5878322	<b>6041184</b>	71
5894117	<b>1122906</b>	182	6600311	<b>1362926</b>	110	6332243	<b>2047812</b>	84		/100 pc.		5878339	<b>6041186</b>	71
	price/100		6600328	<b>1362930</b>	110	6332250	<b>2047831</b>	84	5964100	<b>3498204</b>	210	5878407	<b>6041200</b>	71
5697503	<b>1122908</b>	182	6600359	<b>1362934</b>	110	6332267	<b>2047839</b>	84	6842568	<b>3498262</b>	209	5878452	<b>6041204</b>	71
5686224	<b>1122910</b>	182	6600366	<b>1362938</b>	110	6332274	<b>2047855</b>	84		/100 pc.		5878469	<b>6041206</b>	71
5686262	<b>1122918</b>	181	6608904	<b>1362984</b>	110	6332281	<b>2047863</b>	84	6559671	<b>3498264</b>	209	5878568	<b>6041230</b>	51
5686279	<b>1122920</b>	181	6608911	<b>1362986</b>	110	6332311	<b>2047890</b>	84	6710881	<b>3498266</b>	210	5878575	<b>6041232</b>	51
5697541	<b>1122923</b>	181	6608928	<b>1362988</b>	110	6332328	<b>2047898</b>	84	6710911	<b>3498268</b>	210	5878582	<b>6041234</b>	51
5686293	<b>1122924</b>	181	6608935	<b>1362990</b>	110	6332335	<b>2047936</b>	84		/100 pc.		5878629	<b>6041236</b>	51
	/100 pc.		6608942	<b>1362992</b>	110	6332342	<b>2047944</b>	84	6559640	<b>3498272</b>	209	5878636	<b>6041238</b>	51
5697626	<b>1122933</b>	181	6608959	<b>1362994</b>	110	6332373	<b>2047952</b>	84	6952243	<b>3498274</b>	208	5878643	<b>6041240</b>	174
5697664	<b>1122934</b>	181	6608966	<b>1362996</b>	110	6332380	<b>2047971</b>	84		/100 pc.		5878681	<b>6041242</b>	174
5697671	<b>1122935</b>	181				6332397	<b>2047979</b>	84	6411948	<b>3498396</b>	202	5878698	<b>6041250</b>	51
5697688	<b>1122936</b>	181		price/100		6332403	<b>2047987</b>	84	6429585	<b>3498399</b>	203	5878704	<b>6041252</b>	51
6471119	<b>1122950</b>	181	5781028	<b>2046500</b>	82	6332434	<b>2047995</b>	84	7357238	<b>3498683</b>	202	5878742	<b>6041254</b>	51
6471126	<b>1122951</b>	181	5781066	<b>2046501</b>	82				7357276	<b>3498685</b>	202	5878759	<b>6041257</b>	51
6471157	<b>1122953</b>	181	5781073	<b>2046502</b>	82	5036616	<b>2204000</b>	99	7357399	<b>3498691</b>	202	5878766	<b>6041259</b>	51
6471164	<b>1122955</b>	181	5781080	<b>2046503</b>	82	5210672	<b>2204010</b>	99	7357436	<b>3498693</b>	202	5878797	<b>6041270</b>	71
	price/100		5781127	<b>2046505</b>	82				7357511	<b>3498698</b>	202	5878810	<b>6041275</b>	71
5698081	<b>1122962</b>	181	5781134	<b>2046506</b>	82	5863953	<b>2207028</b>	94	7357597	<b>3498703</b>	202	5878827	<b>6041277</b>	71
5698098	<b>1122964</b>	181	5781141	<b>2046507</b>	82	5798798	<b>2207036</b>	94	7357030	<b>3498716</b>	203	5878865	<b>6041290</b>	71
5698142	<b>1122970</b>	181	5781424	<b>2046533</b>	83	5022497	<b>2207060</b>	95	7357115	<b>3498720</b>	203	5878889	<b>6041294</b>	71
5698159	<b>1122972</b>	181	5781431	<b>2046534</b>	83	5809395	<b>2207080</b>	94				5878926	<b>6041296</b>	71
			5781448	<b>2046535</b>	83	5809401	<b>2207088</b>	95		price/m				
	/100 pc.		5781486	<b>2046536</b>	83	5809449	<b>2207112</b>	95	6101771	<b>6001078</b>	73	6050475	<b>6043216</b>	130
6471270	<b>1123266</b>	181	5781493	<b>2046537</b>	83	5809456	<b>2207132</b>	94	5166078	<b>6001093</b>	73	6050536	<b>6043224</b>	130
6471287	<b>1123268</b>	181	5781509	<b>2046538</b>	83	5809463	<b>2207140</b>	95	5430957	<b>6001441</b>	52	6050598	<b>6043232</b>	130
			5781547	<b>2046540</b>	83	5809470	<b>2207164</b>	96	6858552	<b>6001442</b>	52			
5486107	<b>1124661</b>	148	5782032	<b>2046565</b>	82	5864011	<b>2207184</b>	96	6078974	<b>6001444</b>	52		price/m	
			5782049	<b>2046566</b>	82				6858613	<b>6001446</b>	52	5390879	<b>6047611</b>	50
6488810	<b>1147056</b>	103	5782070	<b>2046567</b>	82	5253334	<b>3141128</b>	137	5045274	<b>6001447</b>	52	5903895	<b>6047612</b>	50
6489398	<b>1147106</b>	103	5782087	<b>2046568</b>	82	5253396	<b>3141209</b>	59	6858675	<b>6001448</b>	52	5706083	<b>6047613</b>	71
			5782094	<b>2046569</b>	82	5253457	<b>3141306</b>	59	6858736	<b>6001450</b>	52	5706113	<b>6047614</b>	71
5082033	<b>1195794</b>	103	5782100	<b>2046570</b>	82				6018185	<b>6001451</b>	52	5391197	<b>6047630</b>	50
5082095	<b>1195808</b>	103	5782131	<b>2046571</b>	82	5298151	<b>3400085</b>	139	6858798	<b>6001452</b>	52	5903901	<b>6047631</b>	50
5082217	<b>1195824</b>	103				5298212	<b>3400107</b>	61	6858859	<b>6001454</b>	52	5391203	<b>6047638</b>	50
5082279	<b>1195832</b>	103	5781776	<b>2046582</b>	82	5298274	<b>3400123</b>	61				5903932	<b>6047639</b>	50
5082330	<b>1195840</b>	103	5781783	<b>2046583</b>	82					/100 pc.		5706144	<b>6047640</b>	71
5082392	<b>1195859</b>	103	5781790	<b>2046584</b>	82	5300076	<b>3402088</b>	139	5872887	<b>6003750</b>	52	5706175	<b>6047641</b>	71
5082453	<b>1195867</b>	103	5781806</											



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5694656	6062284	138	6187157	6339204	56	6947171	6358752	51	6231492	7083602	175	5958925	7215719	156
			6187270	6339220	56	6947232	6358756	51	6026883	7083622	51	5958932	7215726	156
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6065530	6067115	130	6187515	6339263	56				6232031	7084013	72	5447504	7215741	158
5694724	6067970	60	6187577	6339271	56	6199037	6364152	136	6232093	7084048	72	5447511	7215745	158
			6187638	6339298	56	6199150	6364268	136	6232154	7084064	72	6839506	7215747	158
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5889519	6068916	51	6457458	6339360	56	6501731	6364942	131	5850182	7202310	156	5809654	7215750	156
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5889533	6068920	51	6187690	6340016	56				6434459	7202505	158	6814619	7215762	157
5889540	6068922	51	6187751	6340032	56	6469819	6365027	131				6814626	7215764	157
5889557	6068924	175	6187812	6340059	56	6469635	6365035	131	5817499	7203800	157	6814657	7215766	157
5889564	6068926	175	6187874	6340075	56							6814664	7215768	157
5890492	6068936	51	6187935	6340091	56				5817505	7203803	158	6814671	7215770	157
5890508	6068938	51	6187997	6340113	56	6199815	6406122	61				6814688	7215772	157
5890515	6068940	51	6188055	6340148	56	6078370	6406142	76	5817536	7203806	158	6814718	7215774	157
5890522	6068942	51	6188116	6340164	56	6199877	6406157	61				6814725	7215780	157
5890560	6068944	51	6188178	6340180	56	6078431	6406193	76	6812639	7205400	54	6814732	7215782	157
5889571	6068958	72	6188239	6340199	56	6199990	6406203	61	6593705	7205405	30	6814749	7215784	157
5889595	6068962	72	6188352	6340210	56	6200054	6406254	138				6814770	7215786	157
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5299639	6207501	132	6188598	6340253	148	6201372	6406998	148	6814176	7205460	218			
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			6959129	6340911	55	6202157	6408516	138	6632800	7205657	29			
5064022	6208538	146	6959181	6340938	55	6479955	6408702	104	6028238	7205660	29			
5064053	6208541	146	6601752	6340946	55	6480074	6408729	61	6028245	7205663	29			
5064060	6208544	146	6043927	6340950	55	6480135	6408737	61	6028269	7205666	29			
5064251	6208627	146	6044047	6340954	55				6028290	7205669	29			
5064268	6208630	146	6044160	6340958	55	6202218	6410081	137	6280551	7205675	30			
5064299	6208633	146	6284177	6340962	55	6202270	6410103	59	6280568	7205677	30			
			6437597	6340966	55	6202331	6410111	59	6280582	7205679	30			
6960262	6208770	132							6396016	7205700	28			
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5065555	6208840	147	6536719	6341535	55	6229277	6416446	179	6810222	7205703	28			
			6536658	6341543	55	6202812	6416500	57						
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5807155	6220145	74	6536535	6341578	55	6202874	6416519	58	6810239	7205705	28			
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6976881	6221467	133	6536351	6341608	55				6810246	7205707	28			
			6536290	6341616	55	6437474	6418250	60	7272463	7205709	29			
			6536238	6341624	55	6518470	6418252	60	7272517	7205714	29			
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			6221776	6342302	54	6204557	6418317	60	6812349	7205744	24			
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			6222070	6342306	54	6204731	6418554	58	6812264	7205748	24			
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			6222377	6342310	54	6204854	6418597	58	6812288	7205752	25			
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			6222490	6342314	54	6206599	6419704	58	6812387	7205756	25			
			6223510	6342316	54	6206896	6419798	179	6812394	7205758	25			
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6575770	6249817	90	6224715	6342359	54	6207251	6420710	58	6820238	7205780	27			
6018710	6249844	88	6224777	6342362	54	6207312	6420745	58	6820245	7205782	27			
5020325	6249852	90	6225019	6342364	54				6820252	7205784	27			
			6225071	6342366	54	6636853	6424716	136	6820269	7205786	27			
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5668046	6338462	56	6225378	6342370	54	6637034	6424740	136	6842254	7205792	28			
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									6675289	7207052	182			
6186556	6339018	56	6340217	6348874	54	6079971	7070205	131	6675296	7207054	182			
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6186792	6339093	56	6191413	6349102	57	6231072	7083106	51						
6186853	6339115	56	6191475	6349153	57	6231133	7083157	51						



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**OBO Bettermann  
Holding GmbH & Co. KG**  
P.O. Box 1120  
58694 Menden  
GERMANY

[www.obo-bettermann.com](http://www.obo-bettermann.com)

**Customer Service**  
Tel.: +49 23 73 89 - 17 00  
[export@obo.de](mailto:export@obo.de)

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