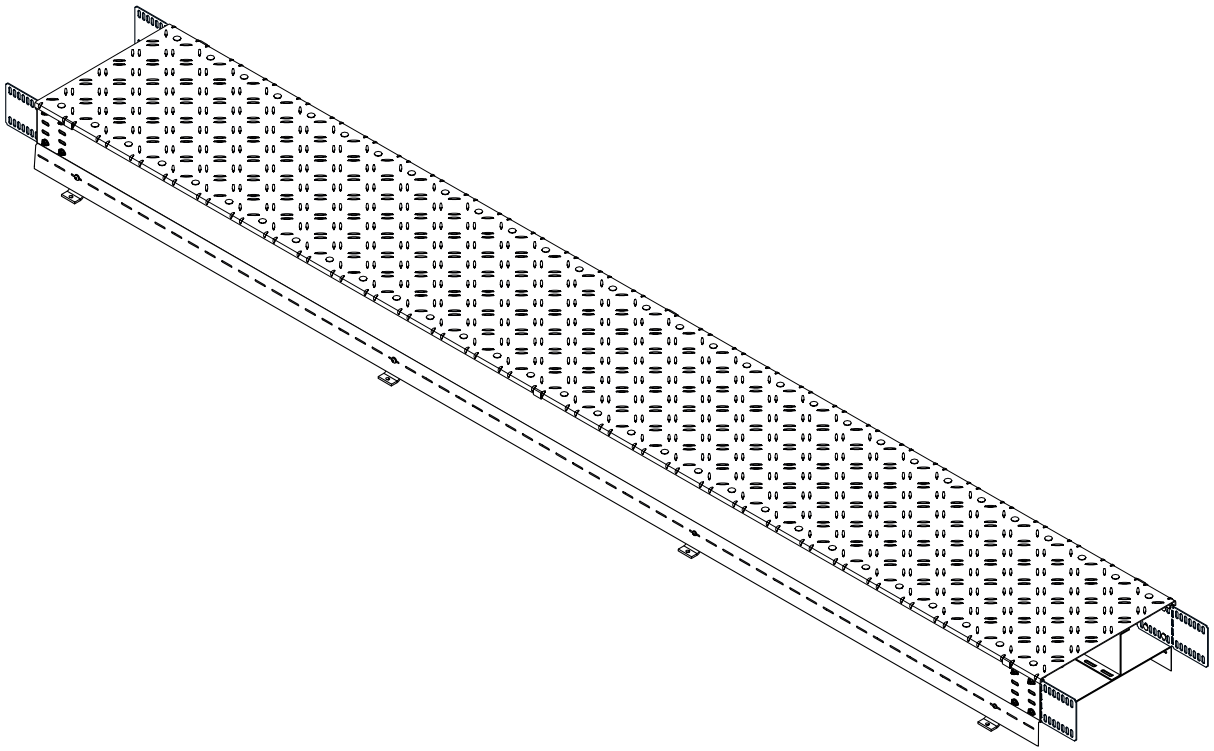

Mounting instructions

BKRS/MKS walkable cable tray systems for BMW AG

OBO BETTERMANN

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BKRS walkable cable tray systems, BMW AG
Mounting instructions

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1 General information

1.1 Target group

These instructions are intended for specialists and/or instructed technical personnel (e.g. engineers, architects, heads of construction and mounting and installation engineers) charged with the installation of the BKRS walkable cable tray system.

1.2 Using these instructions

– These instructions are based on the standards valid at the time of compilation (July 2023).

– Before commencing work, read these instructions through once completely. In particular, please observe the safety instructions.

– Keep all the documents supplied with the BKRS walkable cable tray system safe, so that the information is available should you need it.

– We will not accept any warranty claims for damage caused through non-observance of these instructions.

– Any images are intended merely as examples. Mounting results may look different.

1.3 Types of warning information

⚠ WARNING

Type of risk!
Shows a possibly risky situation. If the situation is not avoided, then death or serious injury may result.

Note! *Indicates important information or assistance.*

1.4 Intended use

The BKRS cable tray systems (walkable cable trays) and MKS (medium-duty cable trays, screw-on) are used as walkable cable trays. They are used to install and protect power and data cables in industrial areas. The BKRS systems are mounted on Z supports or C profile rails and the MKS systems on C profile rails.

The BKRS and MKS cable tray systems are suitable for use at ambient temperatures of –20 °C to +120 °C. At temperatures below –20 °C, the metal will become brittle and may not be processed further.

1.5 Basic standards

– The BKRS and MKS cable tray systems correspond to the standards:

– IEC 61537 – Cable management

– Based on EN 50085-2-2 – Cable trunking systems and cable ducting systems for electrical installations

– EN 50174 – Information technology – Cabling installation (EMC)

– DIN 51130 – Testing of floor coverings – Determination of the anti-slip property – Workrooms and fields of activities with slip danger – Walking method – Ramp test

2 General safety information

Observe the following general safety information on handling the BKRS and MKS walkable cable tray systems:

– Protective gloves must be worn during all mechanical mounting work.

– The BKRS and MKS walkable cable tray systems must be included in the protection measures and/or the equipotential bonding.

– The inclusion in the equipotential bonding of the overall system must be performed by specialist personnel.

3 Product description

3.1 Product features

The BKRS and MKS walkable cable tray systems are characterised by the following product features:

– Two installation options for BKRS: Mounting on Z supports for additional installation or mounting on C profile rails

– Installation option for MKS: Mounting on C profile rails

– Walkable thanks to solid cover

– Cover with different fastening options on the cable tray:

  – Flexible fastening of turn buckles in pre-marked break-out openings,

  – Fastening with cover clamps

– Walkable and non-slip thanks to chequering

- With bottom perforation for ventilation, as water drainage and for more flexible mounting
- Resistant to dirt and dust through protection plates and dust protection elements on BKRS
- EMC-compatible separation of power and data cables through barrier strips
- Side heights 100 mm and 110 mm on BKRS
- Side height 60 mm and 85 mm on MKS
- Self-supporting, no screwing with machines required

3.2 BKRS product overview

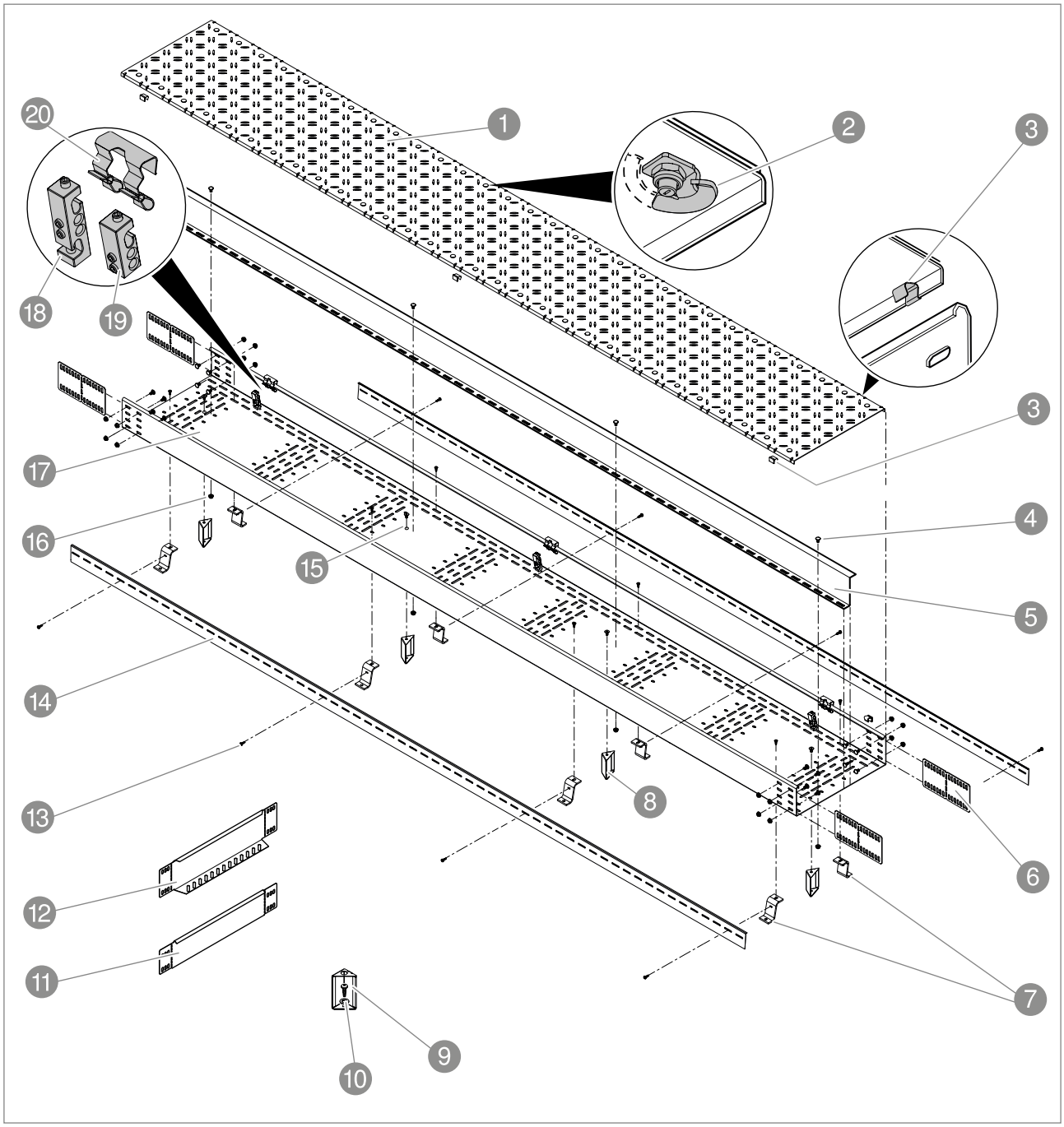

Fig. 1: BKRS system components

Item	Designation	Function
1	Cover, type DBKR, made of strip galvanised, chequered sheet steel with increased slip protection	Walkable cover of the cable tray
2	Turn buckle Fastening of the DBKR cover to the cable tray	Fastening of the DBKR cover to the cable tray
3	Cover clamp	Fastening of the DBKR cover to the cable tray
4	Truss-head bolt with hexagonal nut	Mounting of barrier strips
5	Z-shaped barrier strip	Cover support for cable tray widths of > 200 mm With perforation for the installation of earthing terminals
6	Straight and angle connector	Connection of cable trays
7	Z support	Raised cable tray mounting (enabling additional media to be routed under the cable tray)
8	Additional support	Additional support of cable trays ≥ 500 mm
9	Cover support	Support of covers and fitting covers in cross-over areas
10	BS BKS KP drilling screw	Fastening of cover support to the cable tray
11	Reducing bracket/end closure 100 mm	Closure of open points, if cable trays of different widths are connected, as well as closure of cable tray ends
12	Reducer/end closure 110 mm	
13	Lens metal screw, type SPHS	Fastening of the protective panels on Z supports
14	Protective panel	Side protection of the installations against kicking and dirt
15	Flat-head screw FKS 6x12	Fastening of additional support to the cable tray
16	Hexagonal nut with flange	Connection of the cable trays with straight and angle connectors, reducers/end closures
17	Cable tray	Acceptance of the power and data cables
18	Connection terminal, double, for conductor cable	Connection of the cable tray system with the protective equipotential bonding of the overall system
19	Connection terminal, single, for conductor cable	
20	Clamp spring for conductor cable	

3.3 MKS product overview

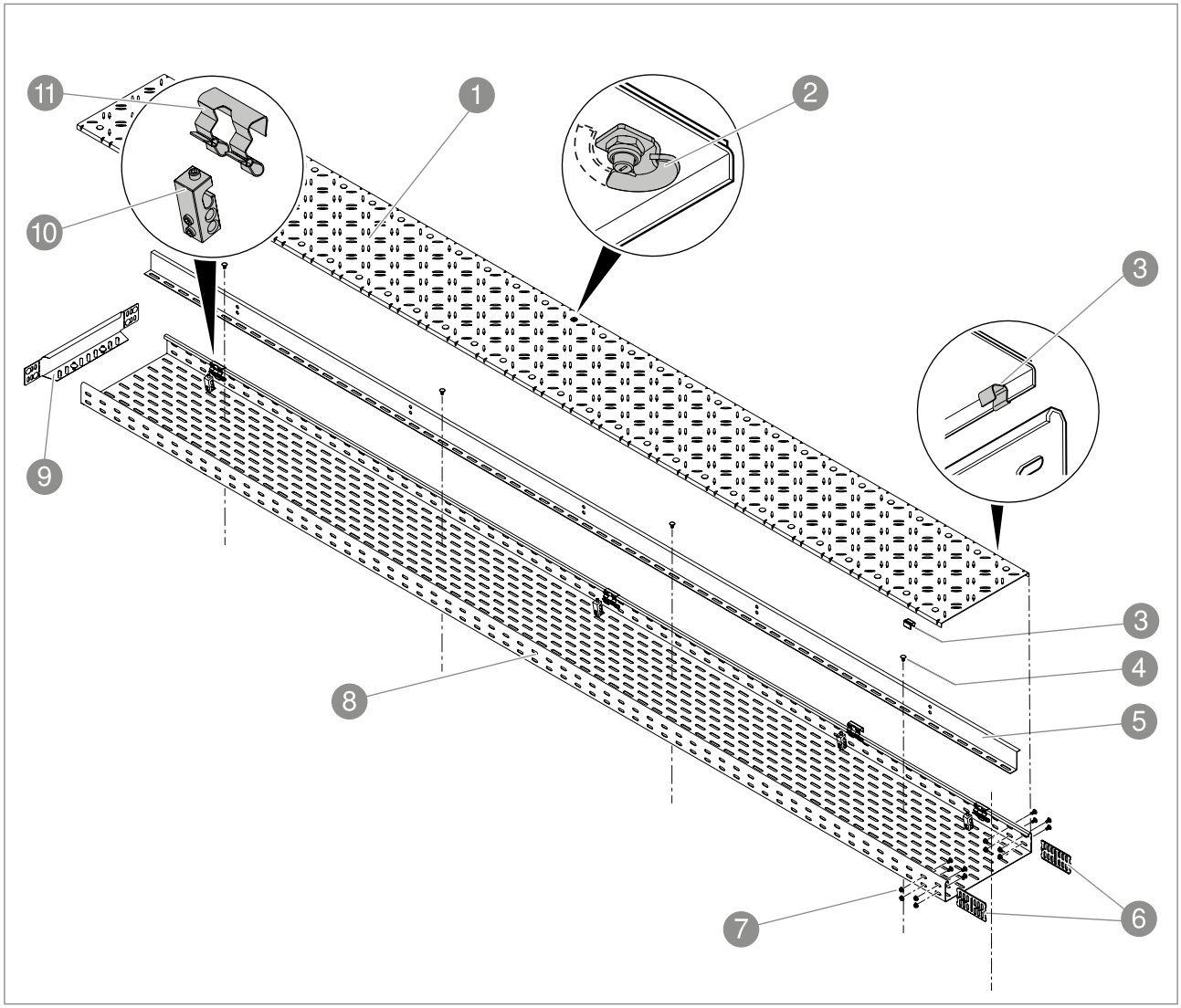

Fig. 2: MKS system components

Item	Designation	Function
1	Cover, type DBKR, made of strip galvanised, chequered sheet steel with increased slip protection	Walkable cover of the cable tray
2	Turn buckle Type DRL H S for break-out openings	Fastening of the DBKR cover to the cable tray
3	Cover clamp DK DBKR G	Fastening of the DBKR cover to the cable tray
4	Truss-head bolt with hexagonal nut	Mounting of barrier strips
5	Barrier strip with Z shape (side height 60 or 85 mm)	Cover support for cable tray widths of > 200 mm With perforation for the installation of earthing terminals
6	Straight and angle connector, type RLVK	Connection of cable trays
7	Hexagonal nut with flange	Connection of the cable trays with straight and angle connectors, reducers/end closures
8	Cable tray	Acceptance of the power and data cables
9	Reducing bracket/end closure (side height 60 or 85 mm)	Closure of open points, if cable trays of different widths are connected, as well as closure of cable tray ends
10	Connection terminal, single, for conductor cable	Connection of the cable tray system with the protective equipotential bonding of the overall system
11	Clamp spring for conductor cable	

4 Mounting

The channels are suitable for mounting on C profile rails or Z supports.

The maximum spacing of the C profile rails or Z supports must be 900 mm if the stated load limits are to be achieved (approved loads can be found under "BKRS cable tray" at www.obo-bettermann.com).

Note! *Depending on the circumstances on the construction site, the sequence of mounting steps for the BKRS walkable tray systems may change!*

4.1 Mounting the cable tray

4.1.1 Mounting the Z supports on the cable tray

The Z supports are mounted on the cable tray base through the slots in the base of the cable trays with FRSB 6x16 truss-head bolts and combination nuts.

Note! *Corner connections or cross-overs of cable trays must also be supported with Z supports.*

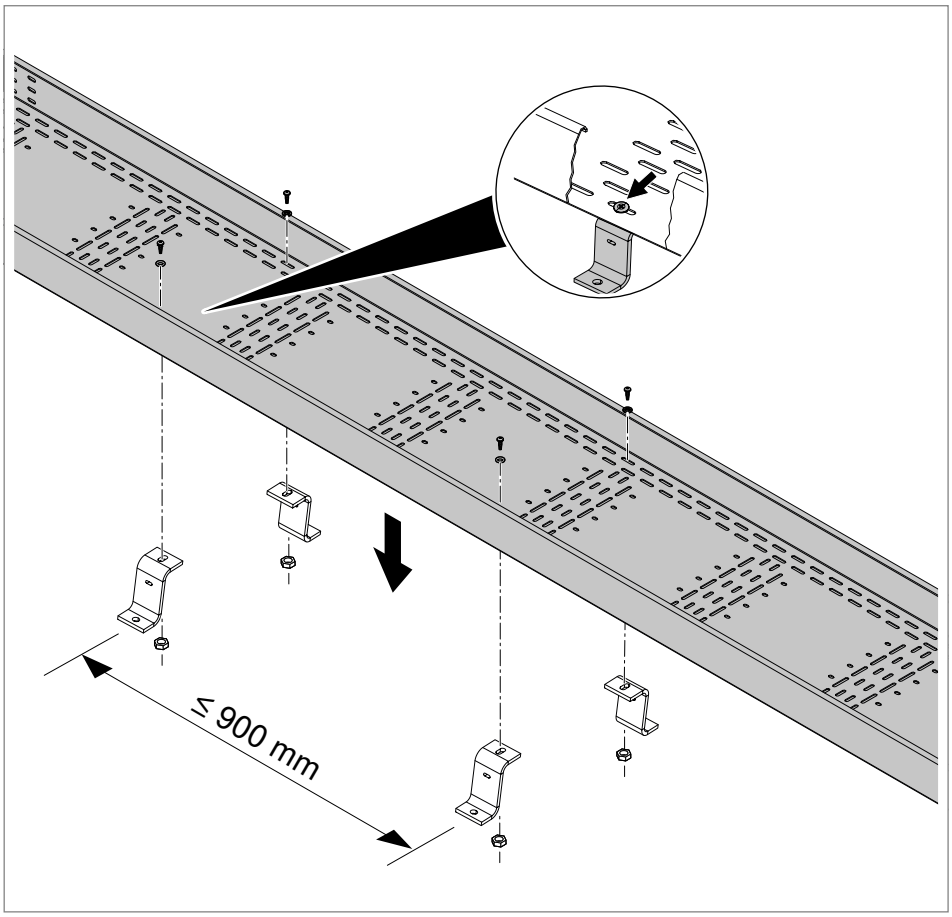

Fig. 3: Mounting of the Z support on the cable tray

1. Mount the first Z support in the area of the slots at the start of the cable tray.

2. From above, push the bolt through the cable tray base and Z support.

3. Lock the bolt on the underside of the Z support with a nut.

4. Mount an additional Z support at least every 900 mm (at least 3 supports per tray side).

4.1.2 Mounting the additional support on cable trays ≥ 500 mm

From a cable tray width of 500 mm, the tray must also be support with additional supports between the Z supports. The additional supports have a threaded gland and are fastened to the cable tray with FKS 6x12 flat-head screws. Fixing on the floor is not necessary.

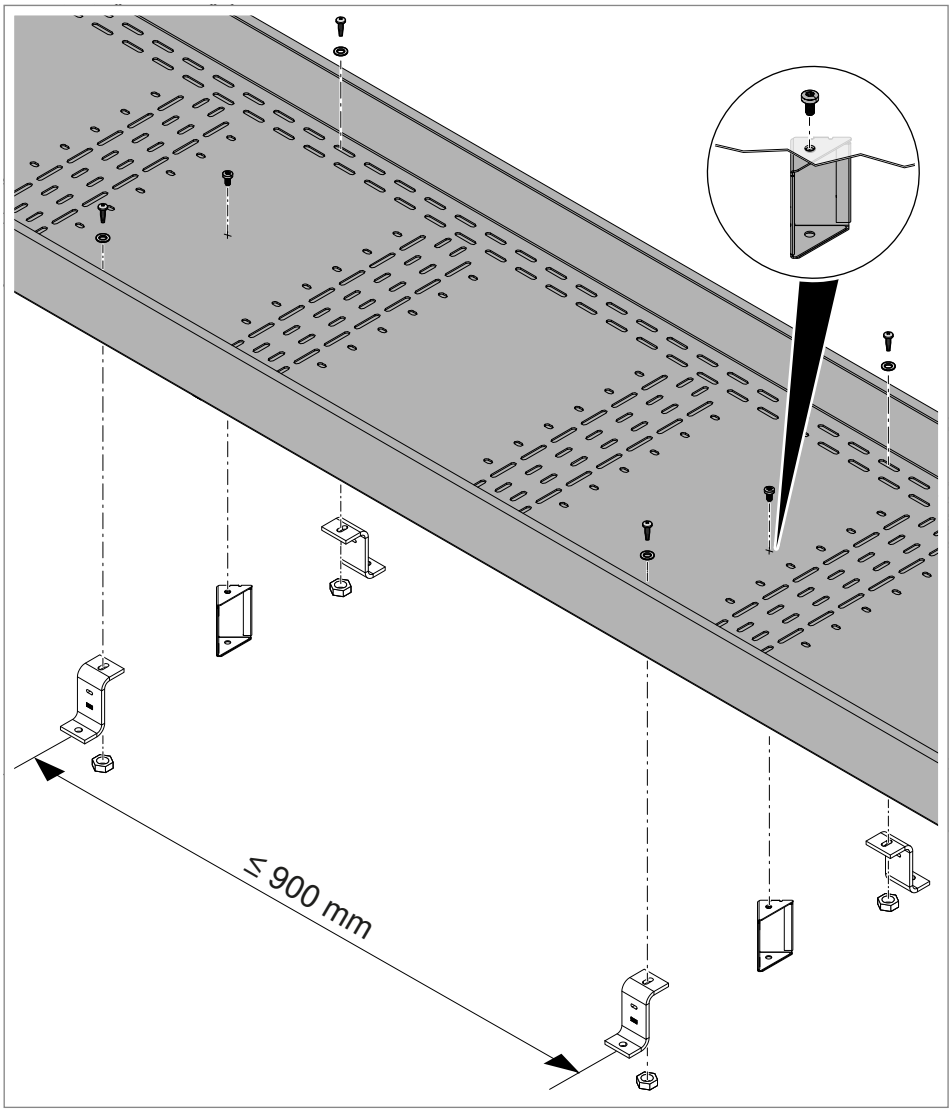

Fig. 4: Mounting of additional support on cable tray ≥ 500 mm

1. Drill the hole for the flat-head screw centrally between the Z supports in the cable tray base.

2. Push the flat-head screw through the drill hole from above.

3. Screw the additional support to the cable tray base using the flat-head screw.

4.1.3 Mounting the cable trays on C profile rails

The C profile rails are mounted to the floor. The cable trays can be mounted to the C profile rails with different fastening materials.

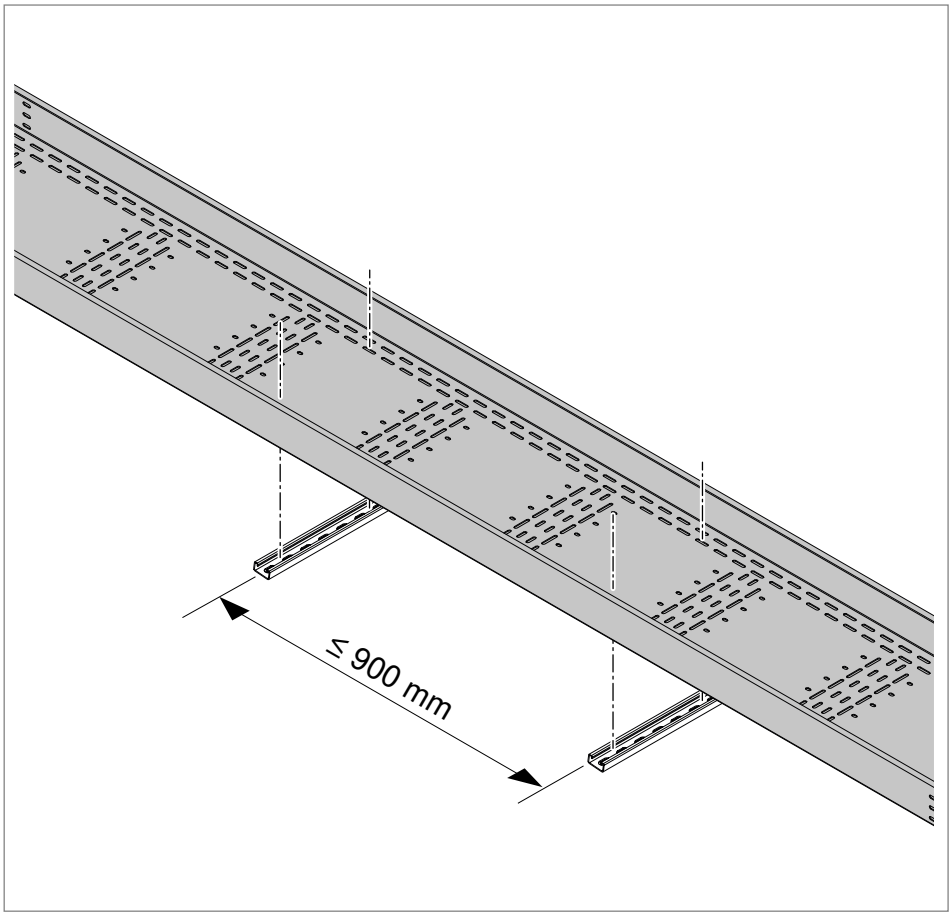

Fig. 5: Mounting on C profile rails

Mounting the Z supports with cable trays to the ground

The Z supports are mounted on the floor with bolt ties.

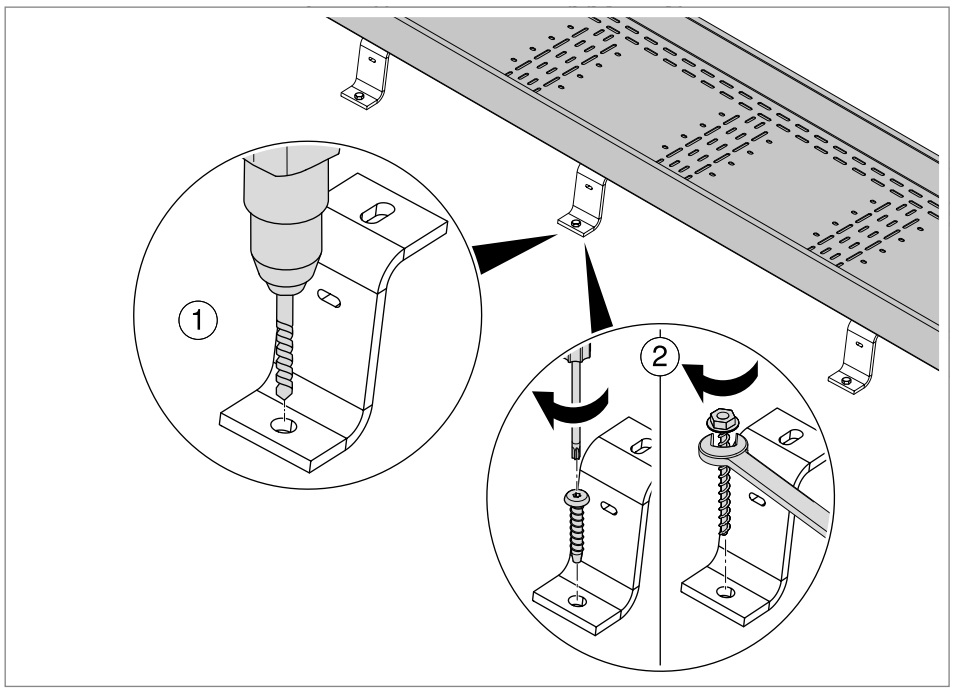

Fig. 6: Mounting crossbeam on base

1. Align the Z supports properly.
2. Drill the hole for the bolt tie ①.
3. Turn in the bolt tie using a screwdriver or wrench ②.

4.2 Connecting cable trays

Cable trays are connected using straight and angle connectors.

The straight and angle connectors are screwed to the sides of the cable trays using the supplied fastening material.

Connect the cable trays so that they abut.

Note! *The straight and angle connectors are mounted on the inside. The nuts are screwed on to the outside.*

4.2.1 Connecting cable trays in lengthwise direction

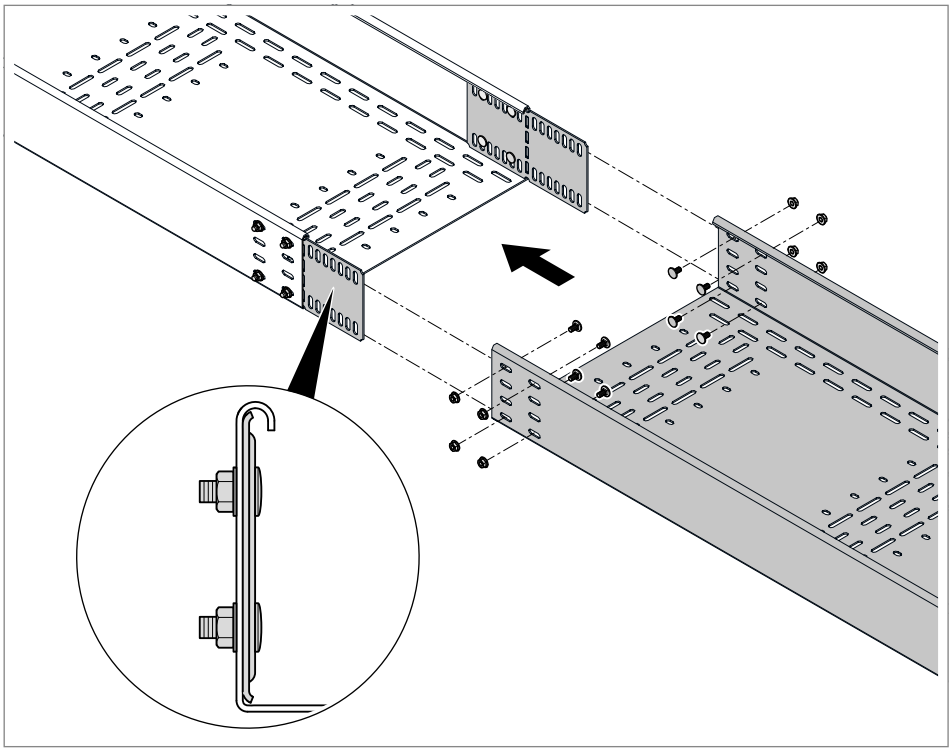

Fig. 7: Straight connection

1. If necessary, create fastening holes (4x ø8 mm) for the connectors on the side sections of the cable trays.

Note! *The DH DBKR cover lifter with integrated drill template can be used to create the connector holes.*

2. Screw two straight and two angle connectors to the first cable tray.

3. Push the second cable tray over the straight and angle connectors of the first cable tray.

4. Screw the second cable tray to the straight and angle connectors.

4.2.2 Connecting cable trays as a corner

Note! *With corner connections, the cable trays are mounted so that they overlap.*

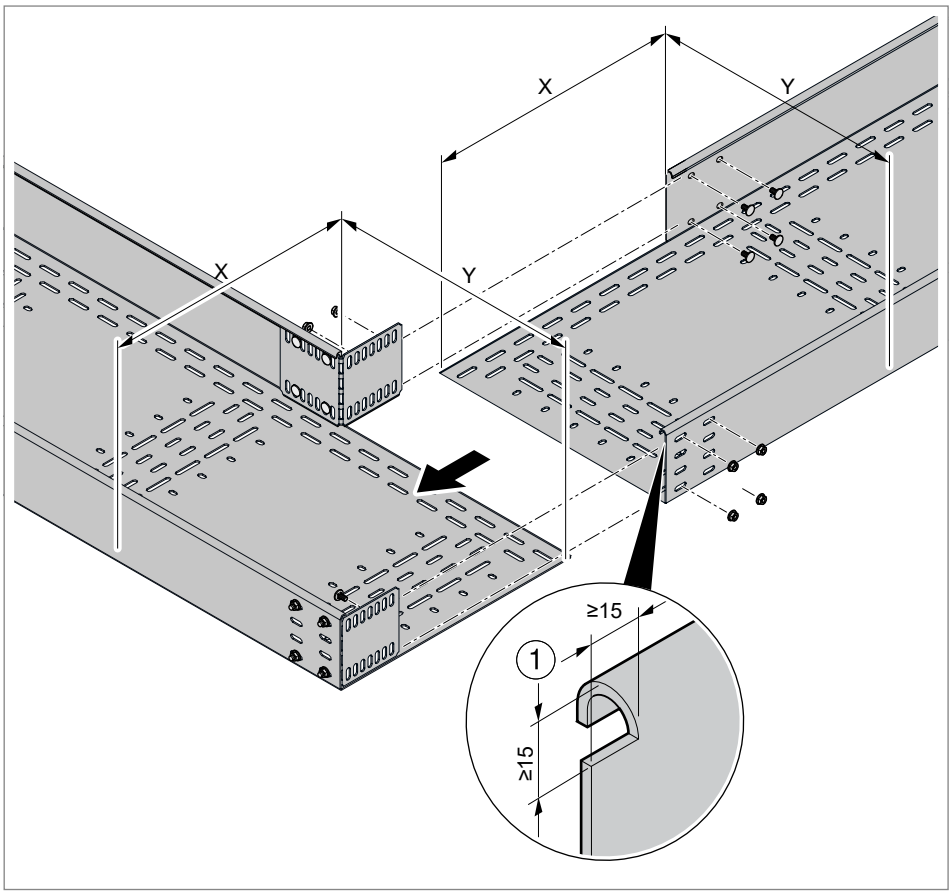

Fig. 8: Corner connection

1. Cut out the side parts of the cable trays by the dimensions x and y.
2. Notch out the corner (①).
3. Deburr cut edges to avoid cable damage.
4. If necessary, create fastening holes (4x ø8 mm) for the connectors on the side sections of the cable trays.
5. Bend the straight and angle connector in a 90° angle.
6. Screw the angle connector to the first cable tray.
7. Push the second cable tray over the straight and angle connectors of the first cable tray.
8. Screw the straight and angle connectors to the second cable tray.

4.2.3 Connecting cable trays as a cross-over

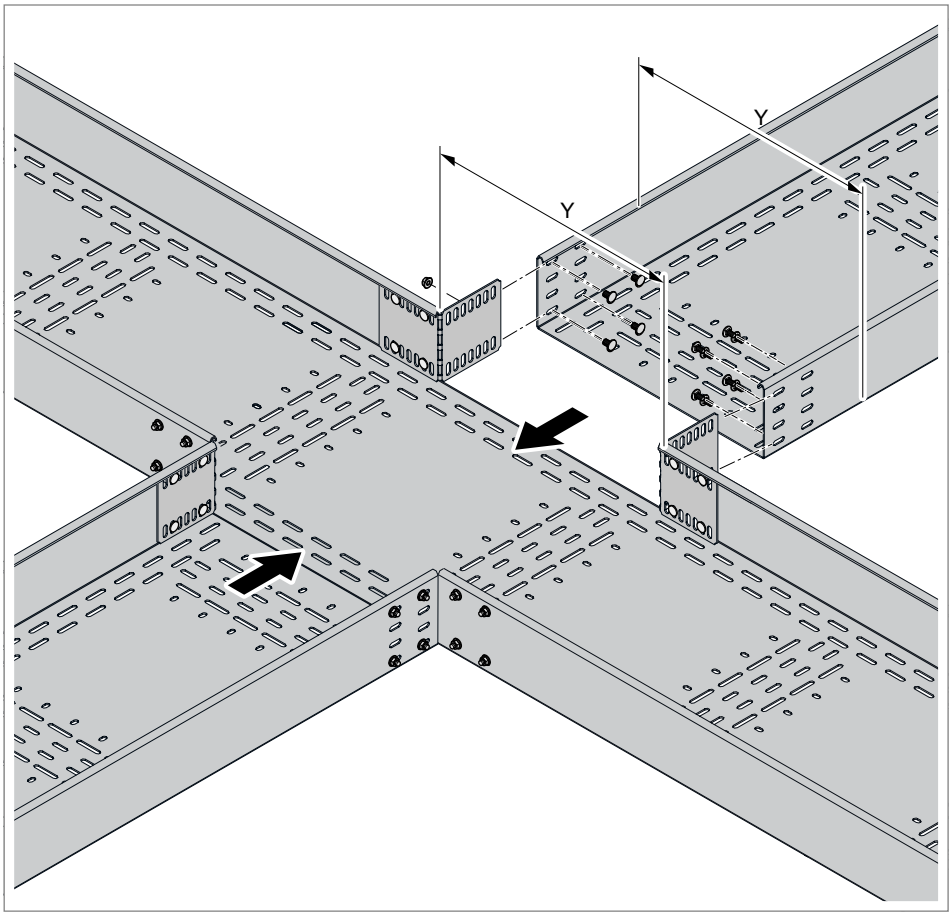

Fig. 9: Cross-connection

1. Cut out the side parts of the cable trays.
2. Deburr cut edges to avoid cable damage.
3. If necessary, create fastening holes (4x ø8 mm) for the connectors.
4. Bend the straight and angle connector in a 90° angle.
5. Screw the angle connector to the first cable tray.
6. Push the second cable tray over the straight and angle connectors of the first cable tray.
7. Screw the straight and angle connectors to the second cable tray.

4.2.4 Changing the cable tray width

If two cable trays with different widths are connected, then a straight and angle connector is replaced by a reducer/end closure.

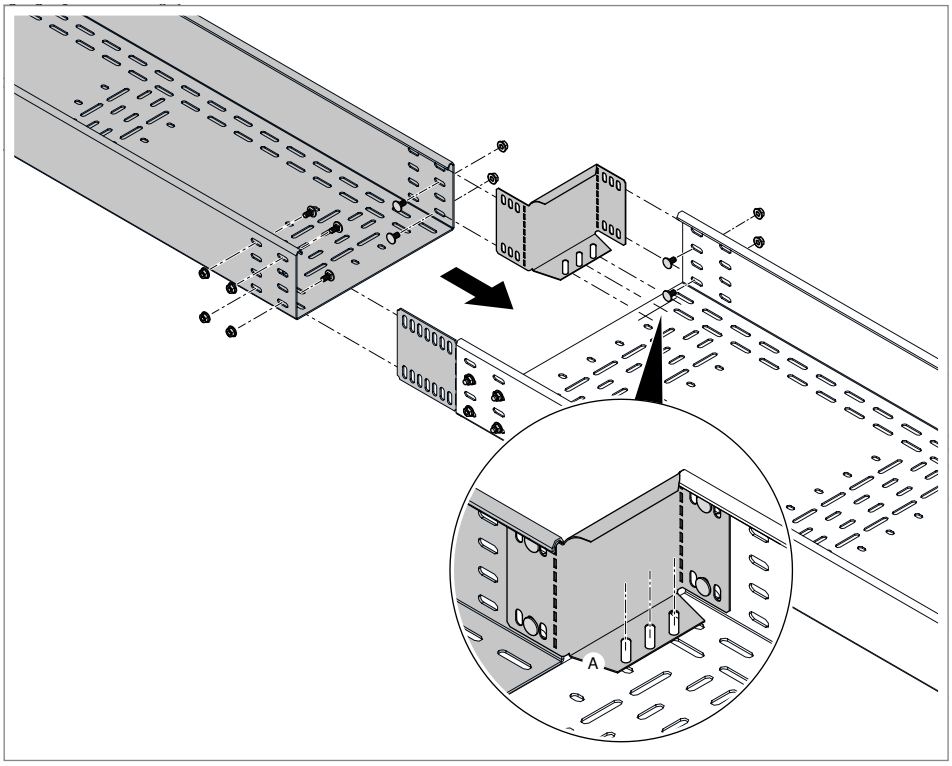

Fig. 10: Changing the cable tray width

1. Screw the first cable tray to the straight and angle connector on one side.
2. Bend the straps of the reducer/end closure through a 90° angle.

Note! *The lower flange (A) points into the cable tray during mounting.*

Note! *At widths above 150 mm, reducers/end closures for 110 mm cable trays have a perforation in the lower flange, which can be used for screwing to the cable tray.*

3. Screw the reducer/end closure to the first cable tray.
4. Push the second cable tray over the straight and angle connector and the reducer/end closure of the first cable tray and screw it tight.
5. If necessary, screw the base of the cable tray to the lower flange of the reducer/end closure.

4.2.5 Closing the open ends of the cable trays

The open ends of the cable trays are closed with a reducer/end closure.

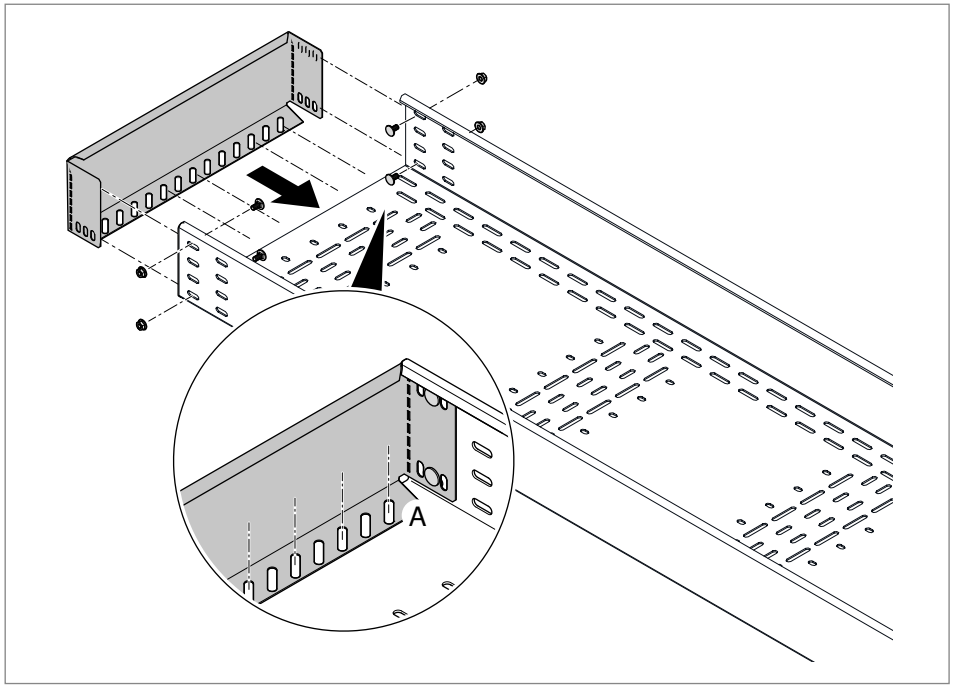

Fig. 11: Closure of open ends

1. If necessary, create fastening holes (2x ø8 mm on each side) for the connectors on the side sections of the cable trays.
2. Bend the straps of the reducer/end closure through a 90° angle.

Note! *The lower flange (A) points into the cable tray during mounting.*

3. Push the reducer/end closure into the cable tray.
4. Screw the reducer/end closure to the cable tray.
5. If necessary, screw the base of the cable tray to the lower flange of the reducer/end closure.

4.3 Mounting Z-shaped barrier strips

In order to achieve the maximum permitted load, Z-shaped barrier strips must be placed in cable trays with a width > 200 mm. The distance between the barrier strips and the side wall or the next barrier strip may not exceed 220 mm.

The barrier strips can be shortened to any length.

Note! *The cable tray is divided asymmetrically by the barrier strips.*

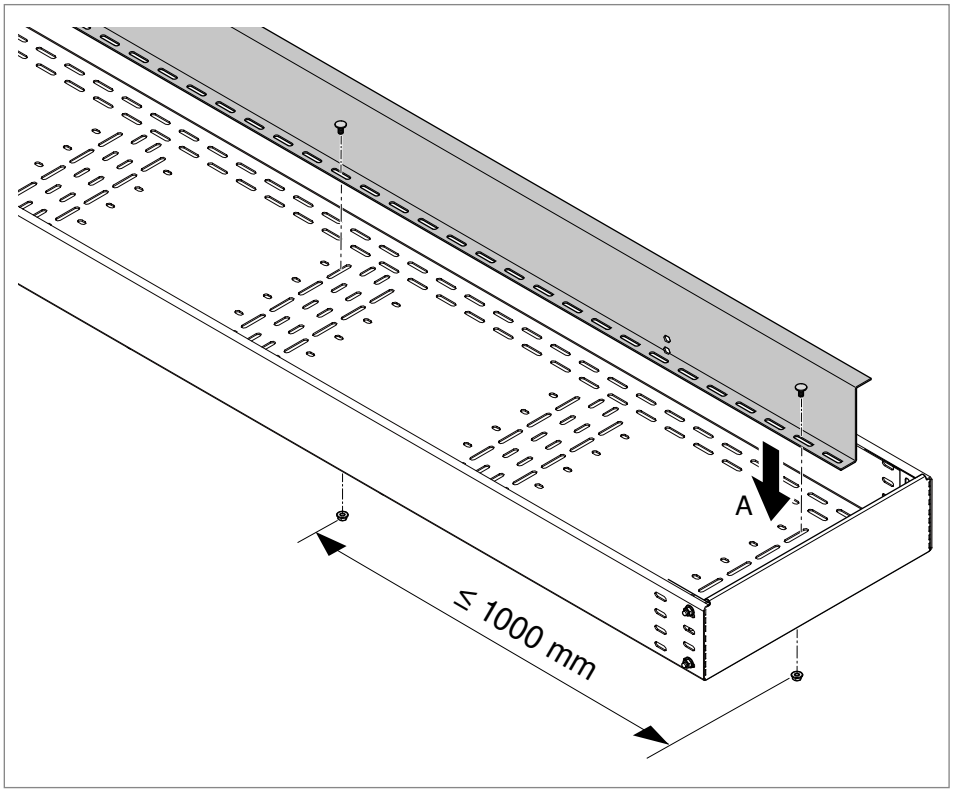

Fig. 12: Barrier strip mounting

1. If necessary, cut the barrier strips to size.
2. Screw on the barrier strips through the bottom perforation at the start of the cable tray (A) using truss-head bolts and hexagonal nuts.
3. Screw on an additional truss-head bolt with hexagonal nut at least every 1,000 mm (at least 3 per cable tray length).

4.4 Mounting protective panels

If the cable trays are mounted on Z supports, then the space between the cable trays can be closed off with protective panels.

The protective panels can be shortened to any length.

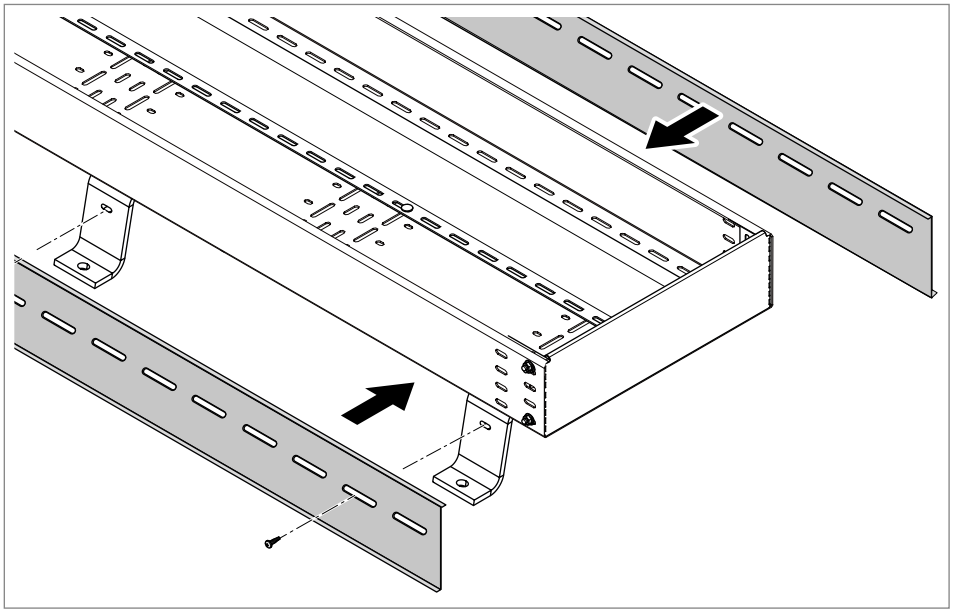

Fig. 13: Protective panel mounting

1. If necessary, cut the protective panels to size.

2. Push the type SPHS metal screws through the slots and screw them to the Z support.

4.5 Creating protective equipotential bonding

Protective equipotential bonding is created with conductor cable and clamp springs. A connection terminal (single or double version) can be mounted to branch off the conductor cable. The clamp spring is clamped onto the edge of the cable tray and then the conductor cable is clamped into the support of the clamp spring. The connection terminal is screwed to the conductor cable if required, so that contact with the entire system is established via the clamp spring.

WARNING

Risk of electric shock!
Contact with electrical current can lead to an electric shock. Fatal or serious injuries are possible. Work on the electrical system may only be performed by electrical specialists.

Note! *When mounting the system components, the clamping and screw connections automatically create continuous protective equipotential bonding of the entire walkable cable tray system. The system must be connected to the protective equipotential bonding of the overall system at least once. The clamp spring must be mounted to the cable tray at least every 1,500 mm.*

Note! *A separate test report of the electrical conduction properties of earthing connections is available for the earthing components.*

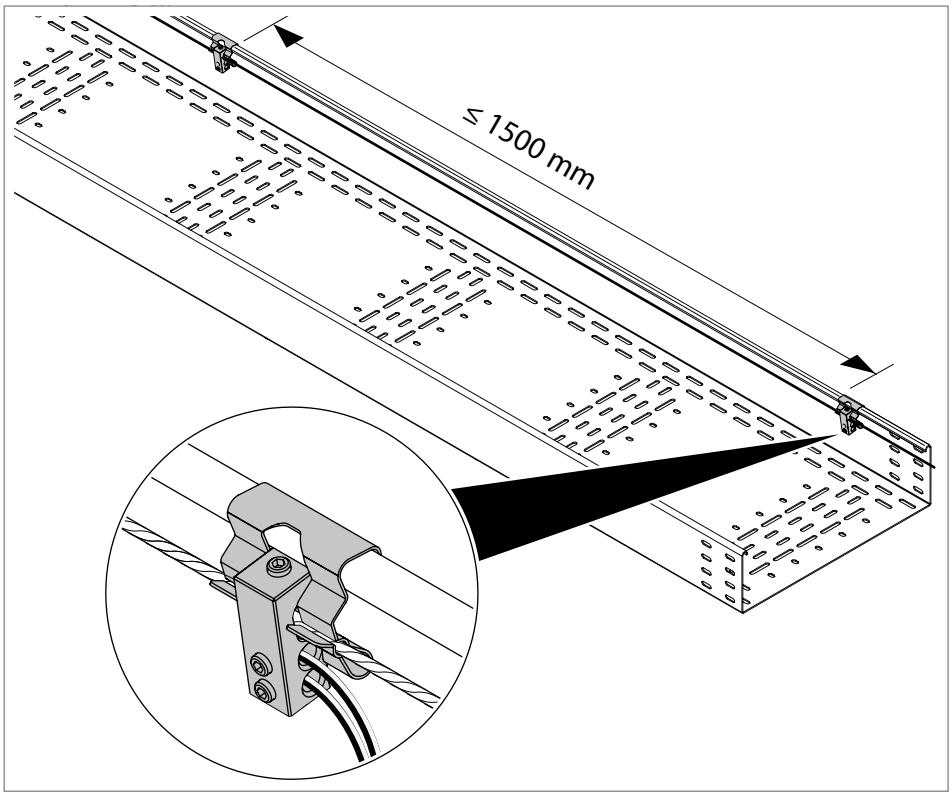

Fig. 14: Spacing of clamp springs with connection terminal

Protective equipotential bonding with connection terminal, single

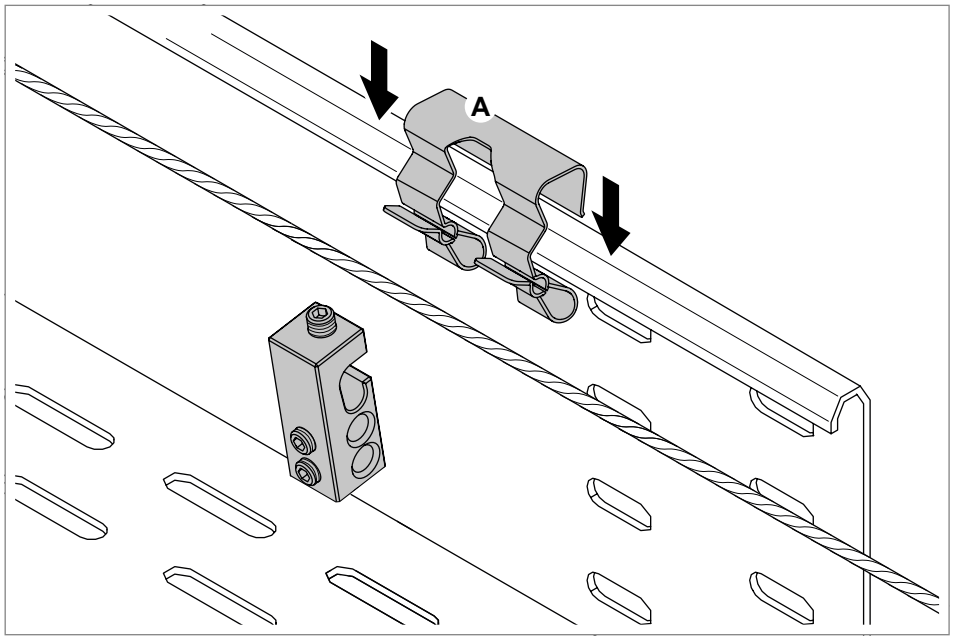

Fig. 15: Mounting the clamp spring

1. Clamp the clamp spring (A) to the edge of the cable tray.

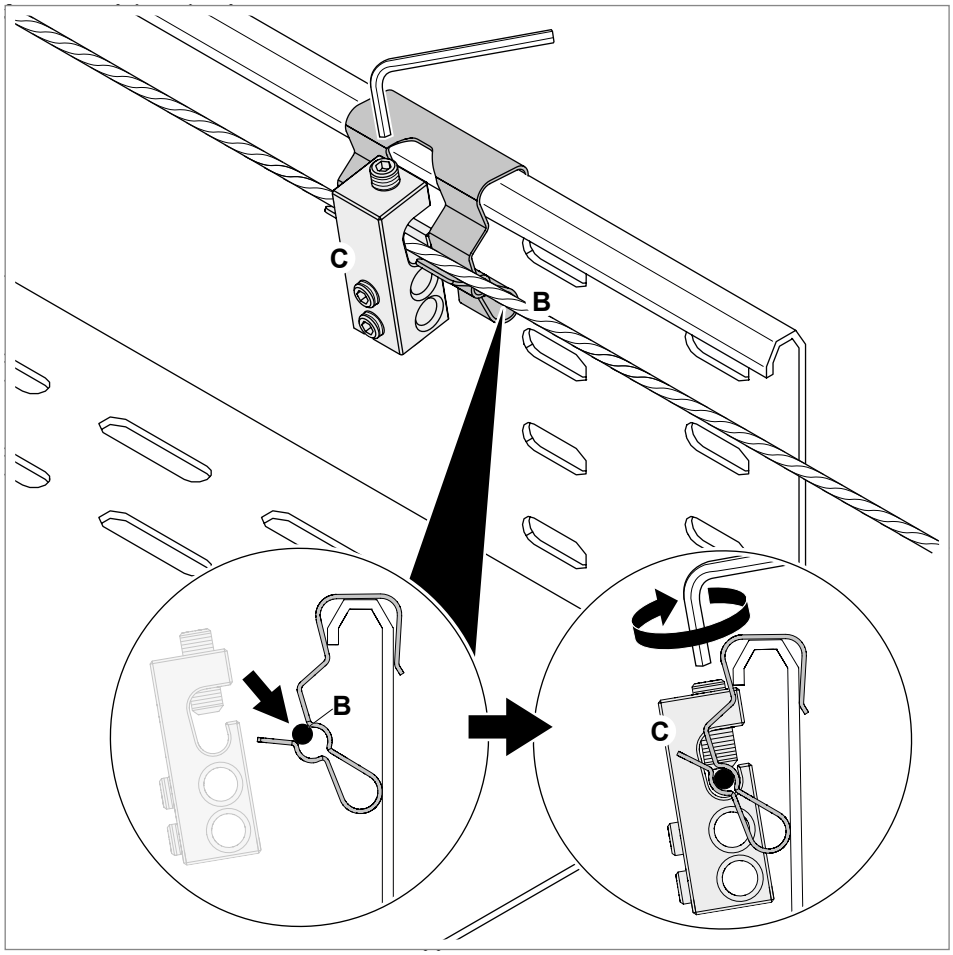

Fig. 16: Connection of clamp spring, conductor cable and connection terminal

2. Clamp the conductor cable (B) in the clamp spring.

3. If necessary, attach a connection terminal (C) to the conductor cable.

4. Screw in the connection terminal screw to make conductive contact.

Conductor cable branch with connection terminal, double, on BKRS

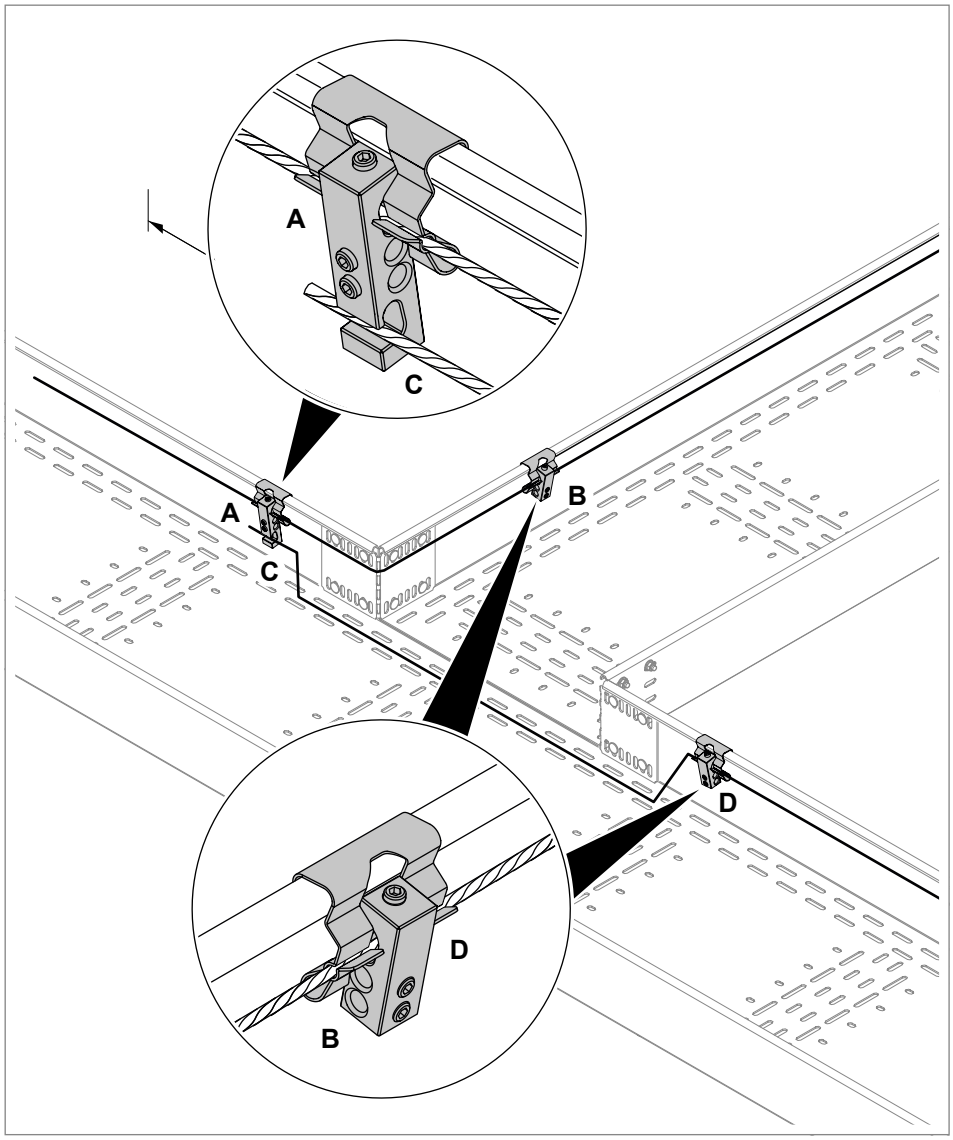

Fig. 17: BKRS, mounting of conductor cable branch, double connection terminal

1. Attach the double connection terminal to the conductor cable (A).

2. Screw in the upper screw of the connection terminal to make conductive contact.

3. Branch off the conductor cable and mount with clamp spring and single connection terminal (B).

4. Mount the second conductor cable in the lower contact of the double connection terminal (C).

5. Mount the second conductor cable in another clamp spring and single connection terminal (D).

Cross-over of conductor cable with connection terminal, double, on BKRS

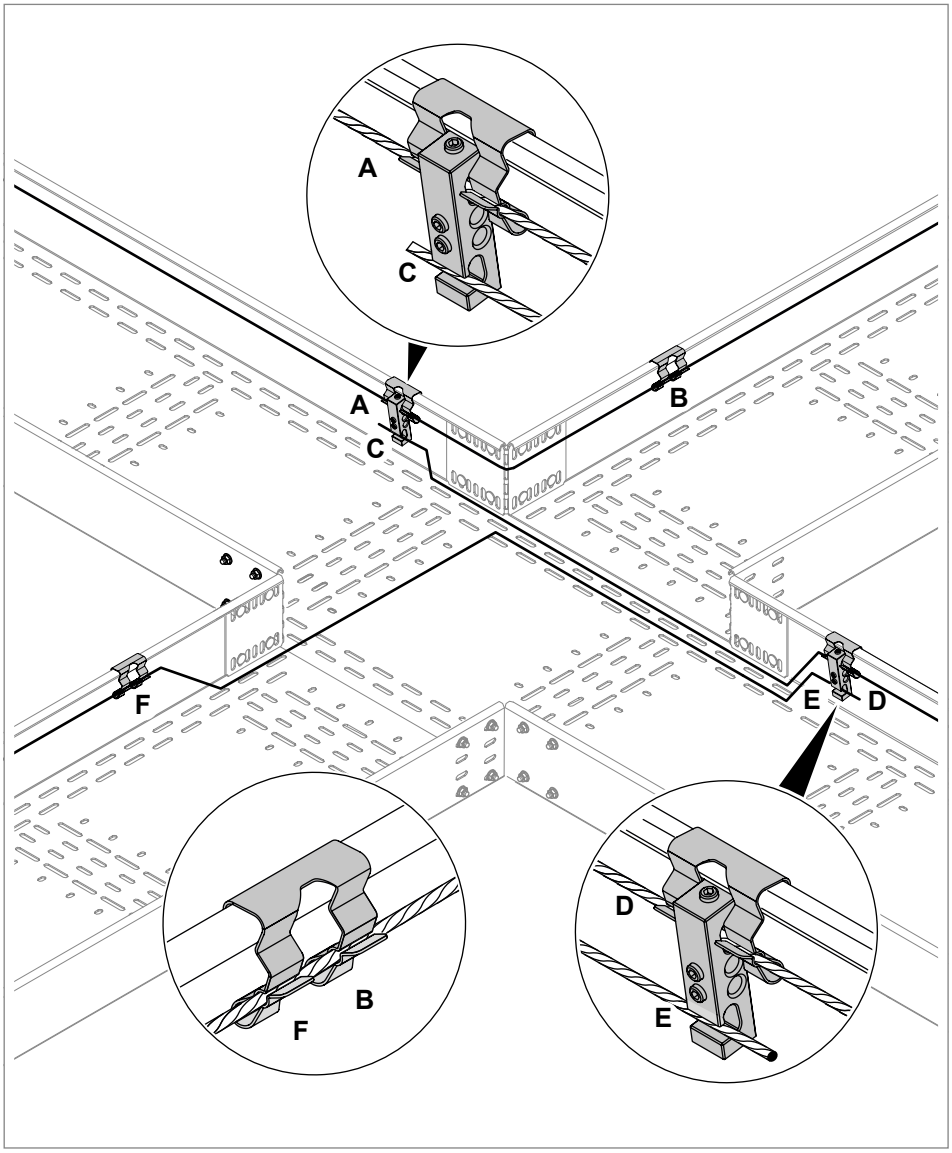

Fig. 18: BKRS, mounting of conductor cross-over, double connection terminal

1. Attach the double connection terminal to the conductor cable (A).
2. Screw in the upper screw of the connection terminal to make conductive contact.
3. Branch off the conductor cable and mount with clamp spring (B).
4. Mount the second conductor cable in the lower contact of the double connection terminal (C).
5. Mount the second conductor cable in another clamp spring and double connection terminal (D).
6. Mount the third conductor cable in the lower contact of the double connection terminal (E).
7. Branch off the third conductor cable cross-wise and mount with

clamp spring (F).

Conductor cable branch with connection terminal, single, on MKS

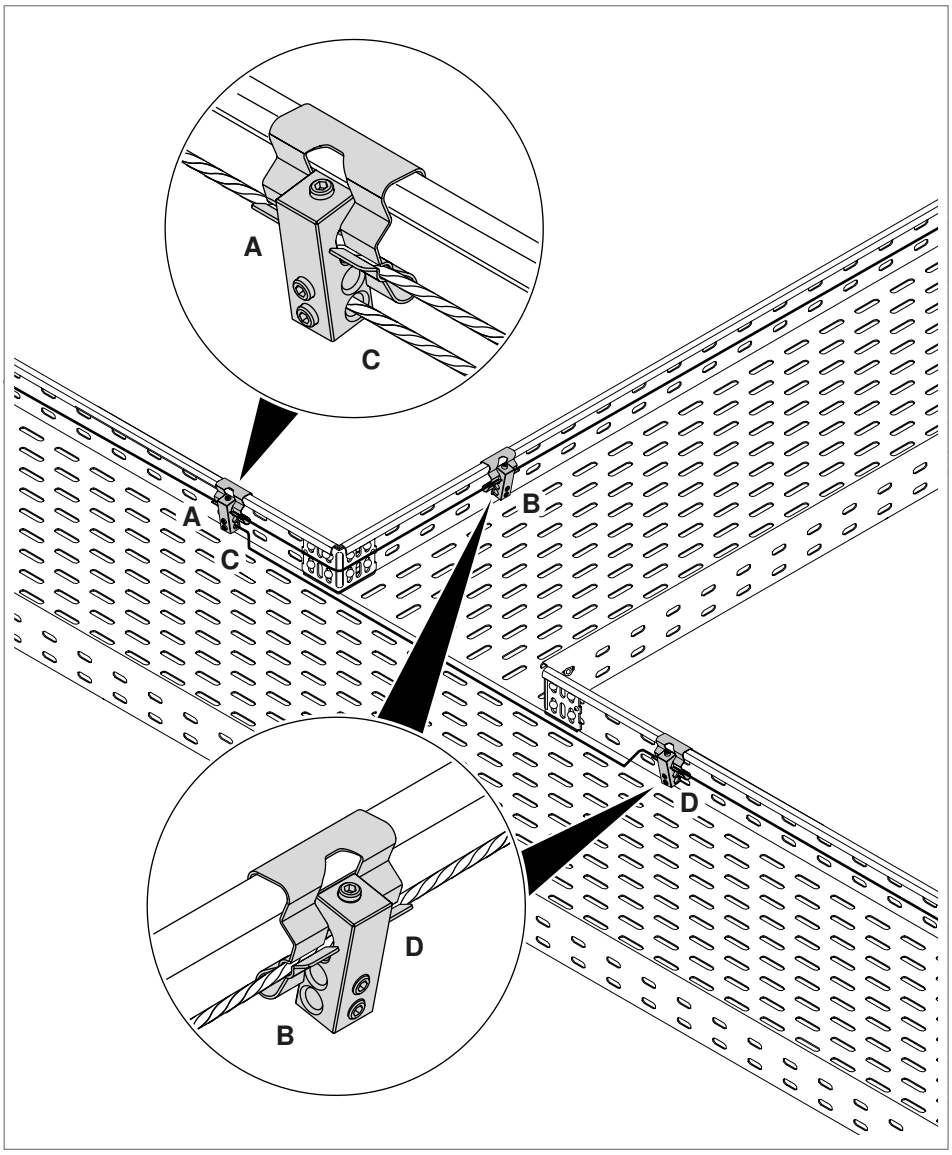

Fig. 19: MKS, mounting of conductor cable branch, single connection terminal

1. Attach the single connection terminal to the conductor cable (A).
2. Screw in the upper screw of the connection terminal to make conductive contact.
3. Branch off the conductor cable and mount with clamp spring and single connection terminal (B).
4. Mount the second conductor cable in the lower contact of the second connection terminal (C).
5. Mount the second conductor cable in another clamp spring and single connection terminal (D).

Cross-over of conductor cable with connection terminal, single, on MKS

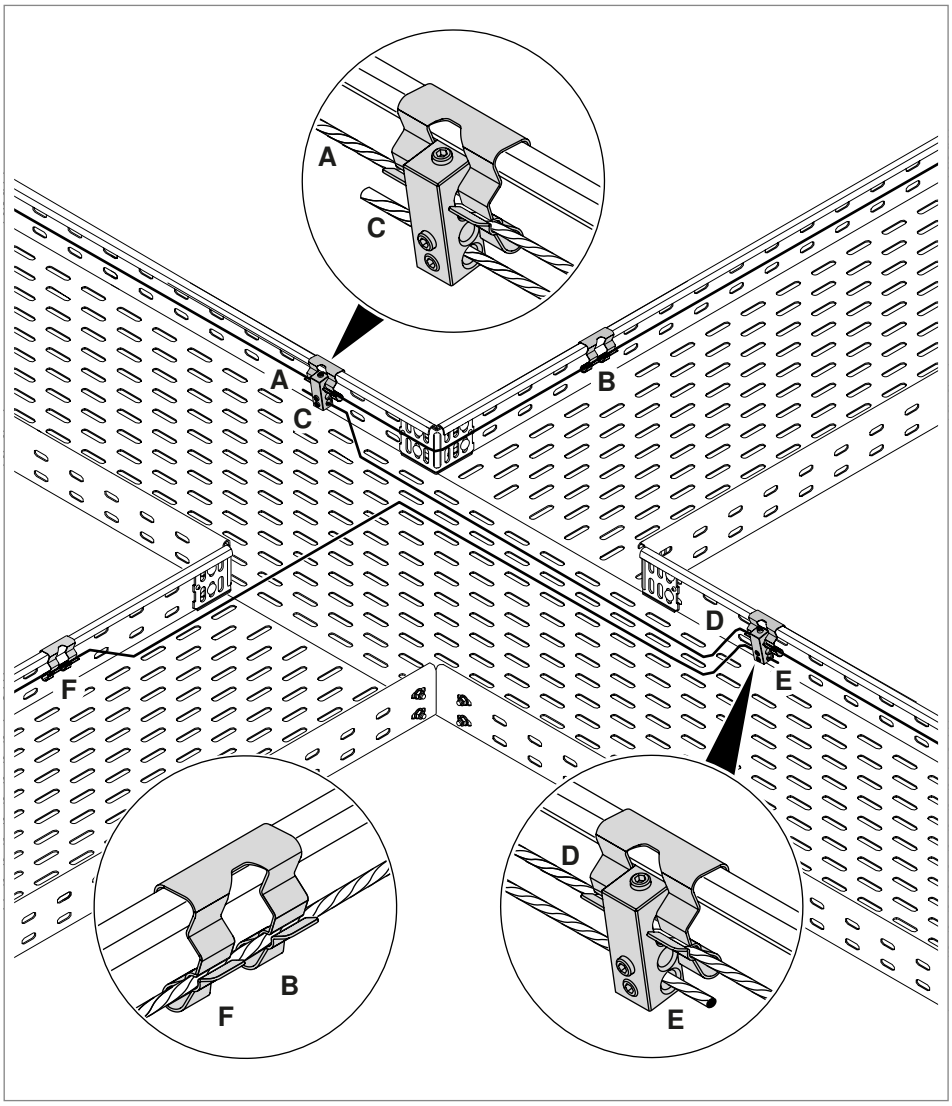

Fig. 20: MKS, mounting of conductor cable cross-over, single connection terminal

1. Attach the single connection terminal to the conductor cable (A).
2. Screw in the upper screw of the connection terminal to make conductive contact.
3. Branch off the conductor cable and mount with clamp spring (B).
4. Mount the second conductor cable in the lower contact of the second connection terminal (C).
5. Mount the second conductor cable in another clamp spring and single connection terminal (D).
6. Mount the third conductor cable in the lower contact of the second connection terminal (E).
7. Branch off the third conductor cable cross-wise and mount with clamp spring (F).

4.6 Mounting covers

The covers can be shortened to any length.

The covers are always cut straight and not with a mitre.

The cover, type DBKR, is mounted to the cable tray either with cover clamps or turn buckles, which are inserted in the cover at a later time.

4.6.1 Mounting the cover support

In cross-over and corner areas, a cover support must be mounted instead of the missing barrier strip. This is always mounted in the centre of the cross-over or corner area.

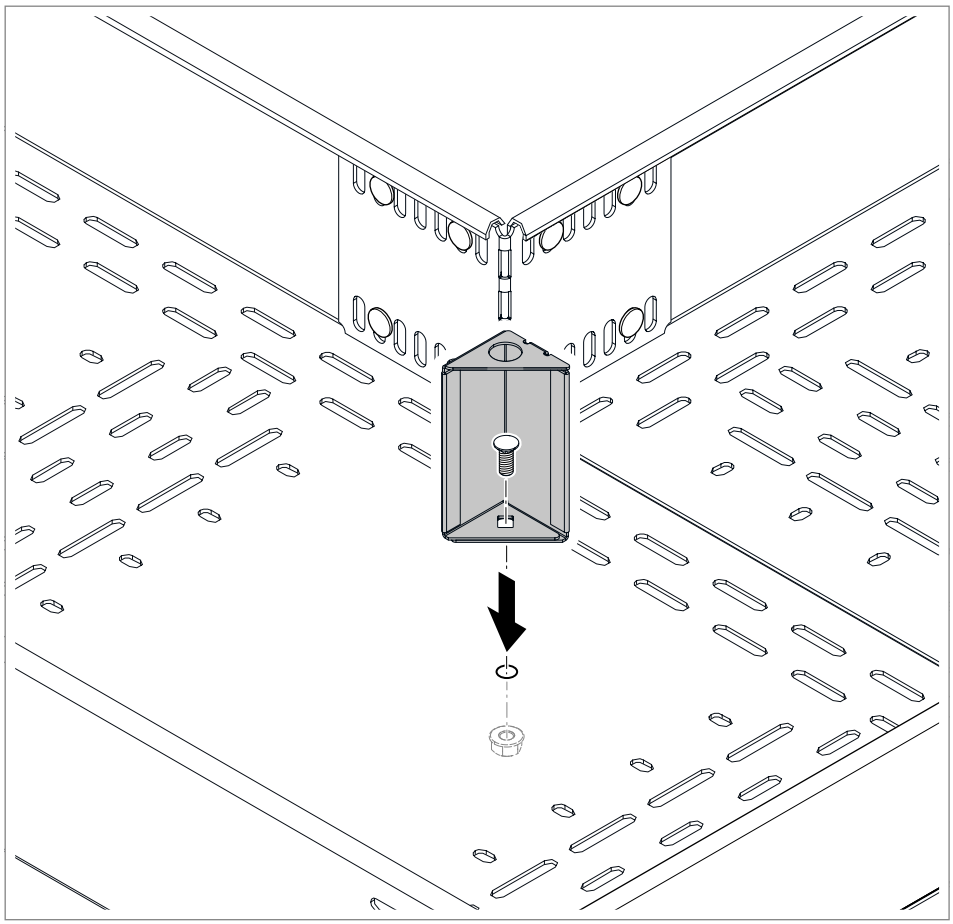

Fig. 21: Installation of cover support

1. Drill hole in the base of the cable tray for FRSB M6x16 truss-head bolt.

2. Screw the cover support to the base of the cable tray with a truss-head bolt and flange nut.

Note! *Alternatively, the cover support can be mounted with a drilling screw and washer.*

Note! *The metal plate of the cover support is double-folded at the edges, to protect the cables from damage when being pulled through or laid.*

4.6.2 Mounting the cover with cover clamps

The cover clamps are mounted at the edge of the cover between two ribs of a pair of corrugations.

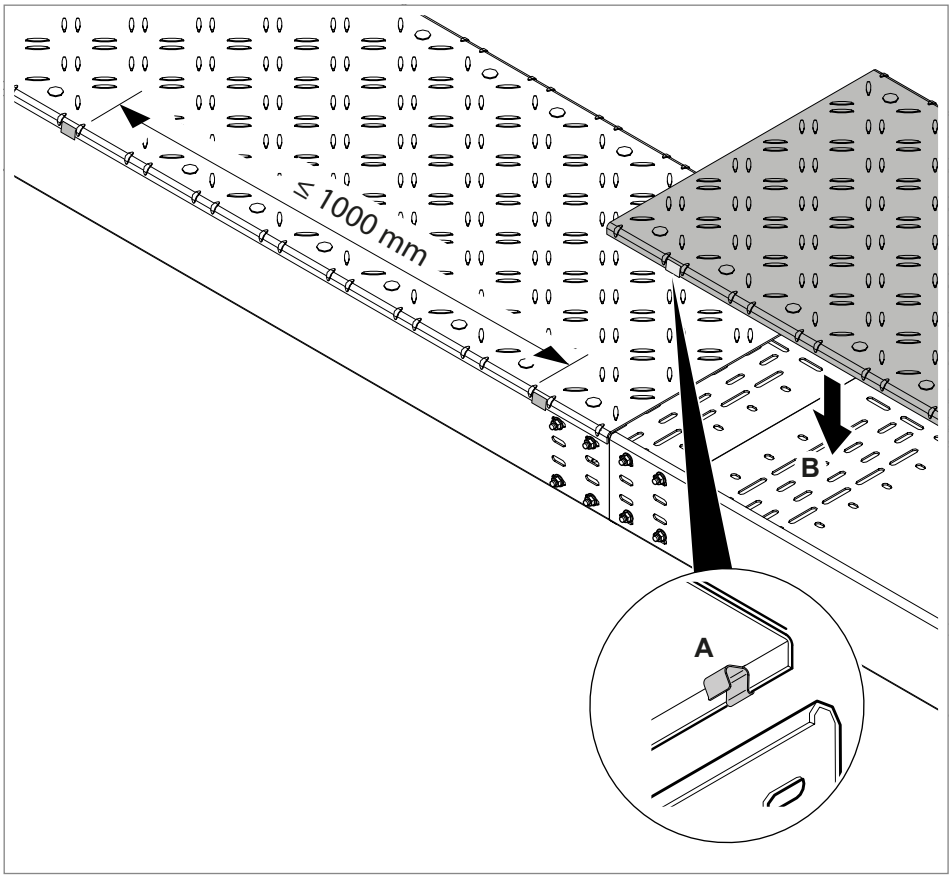

Fig. 22: Mounting the cover, type DBKR, with cover clamps

1. Fasten the cover clamp at the start of the cover (A).
2. Mount an additional cover clamp at least every 1,000 mm (at least 3 supports per cover side).
3. Fasten the cover to the cable tray with cover clamps (B).
4. Fasten the next cover to the cable tray with cover clamps.

Note! *The last cover at end of each system must also be fixed to the cover clamps, e.g. with a turn buckle, to prevent it from slipping when walked on.*

4.6.3 Mounting the cover with turn buckles

Mounting the turn buckle, type DRL H S FT

The turn buckle, type DRL H S FT, is screwed to the cover.

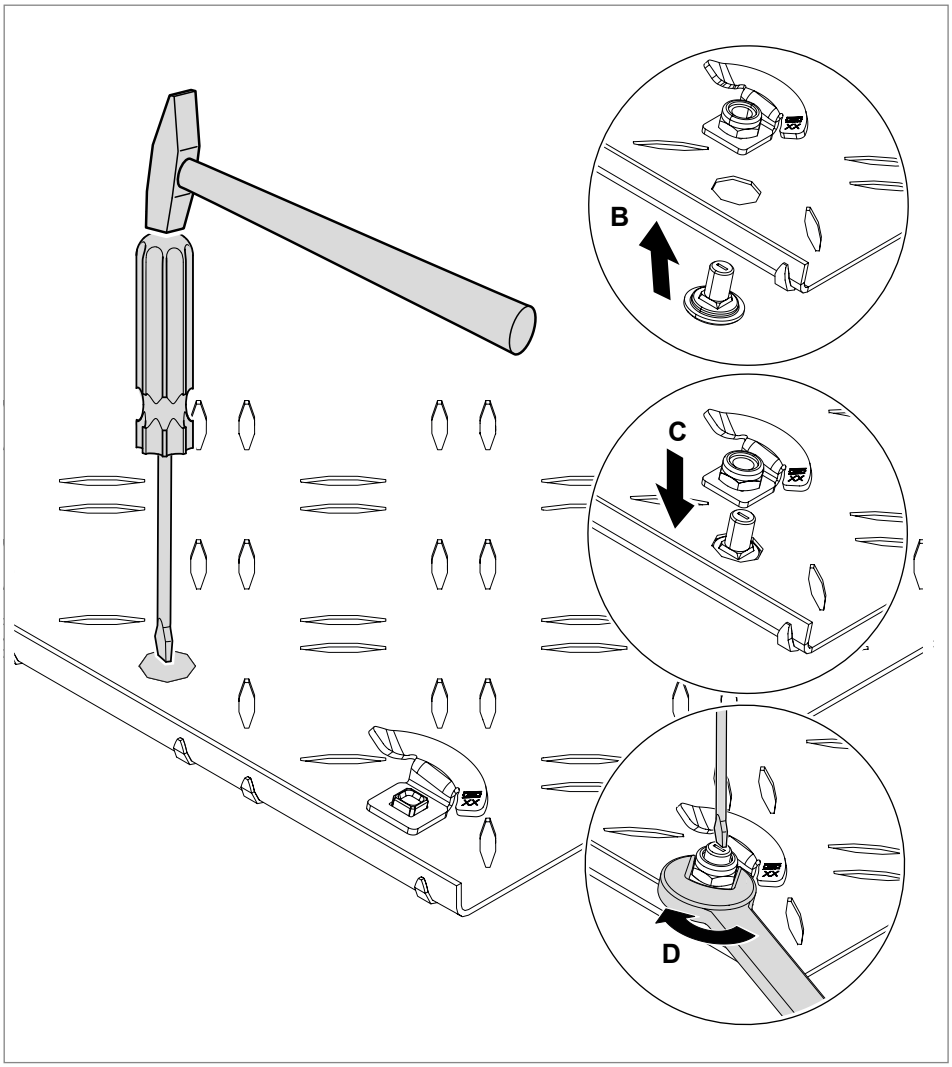

Fig. 23: Mounting the turn buckle, type DRL H S FT

1. Knock out the break-out opening on the cover using a flattener (16–20 mm) or screwdriver (A).
2. Insert the turn buckle button to the top side of the cover (B).
3. From below, place the helical shape against the turn buckle button (C).
4. Lock the nut on the helical shape (D).
5. Mount an additional turn buckle at least every 900–1,000 mm (at least 3 supports per tray side).

Mounting the cover with turn buckle

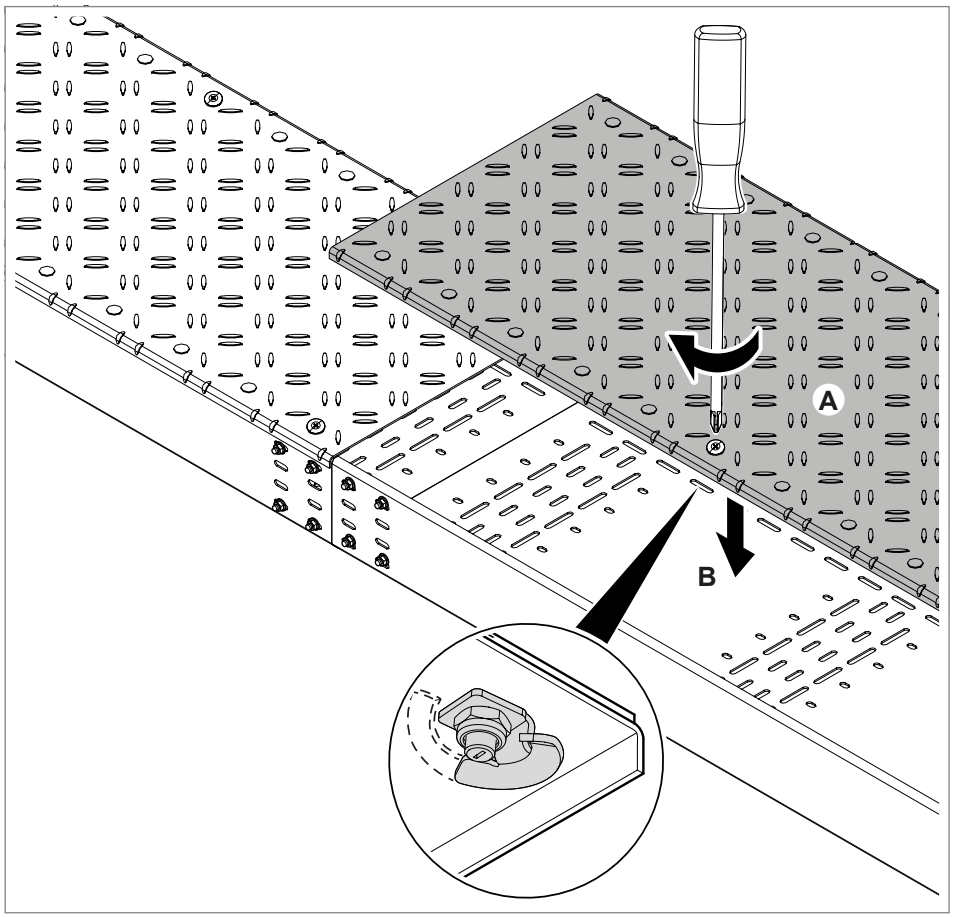

Fig. 24: Mounting of cover type DBKR with turn buckle

1. Attach the first cover.
2. Fasten the turn buckle of the cover to the cable tray (A).
3. Fasten the next cover to the cable tray with turn buckles (B).

4.6.4 Mounting the cover on a corner connection

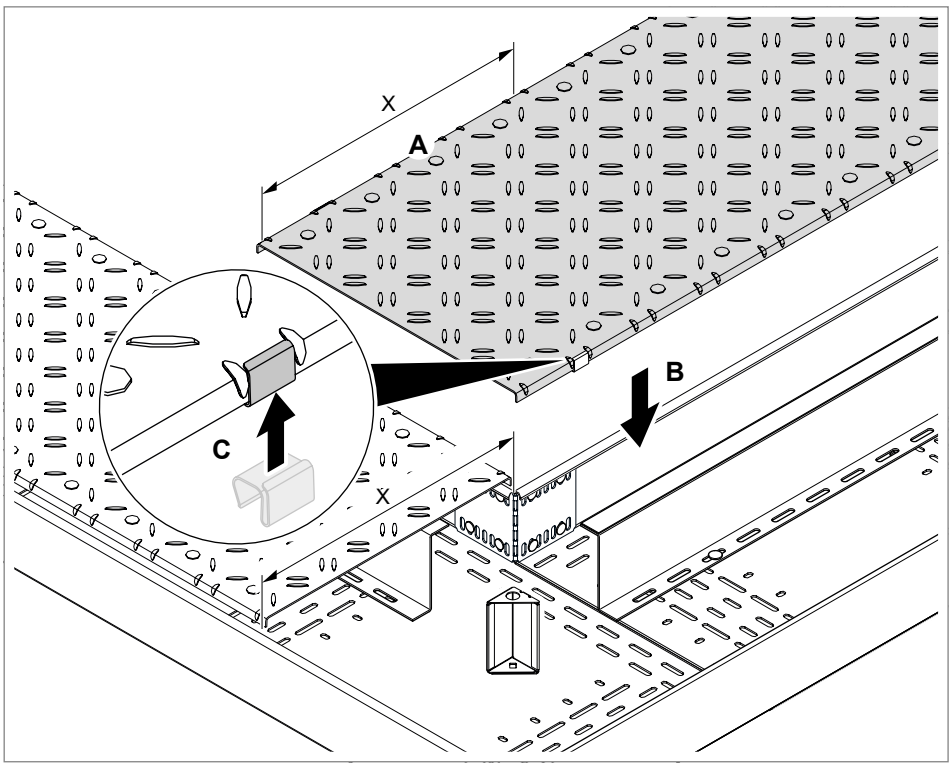

Fig. 25: Mounting the cover on a corner connection

1. If necessary, cut the cover to size.
2. Notch out the joint edge of the cover along length x (A).
3. Attach the cover (B).
4. Fasten the cover to the cable tray with cover clamps (C) or turn buckles.

4.6.5 Mounting the cover on a cross-connection

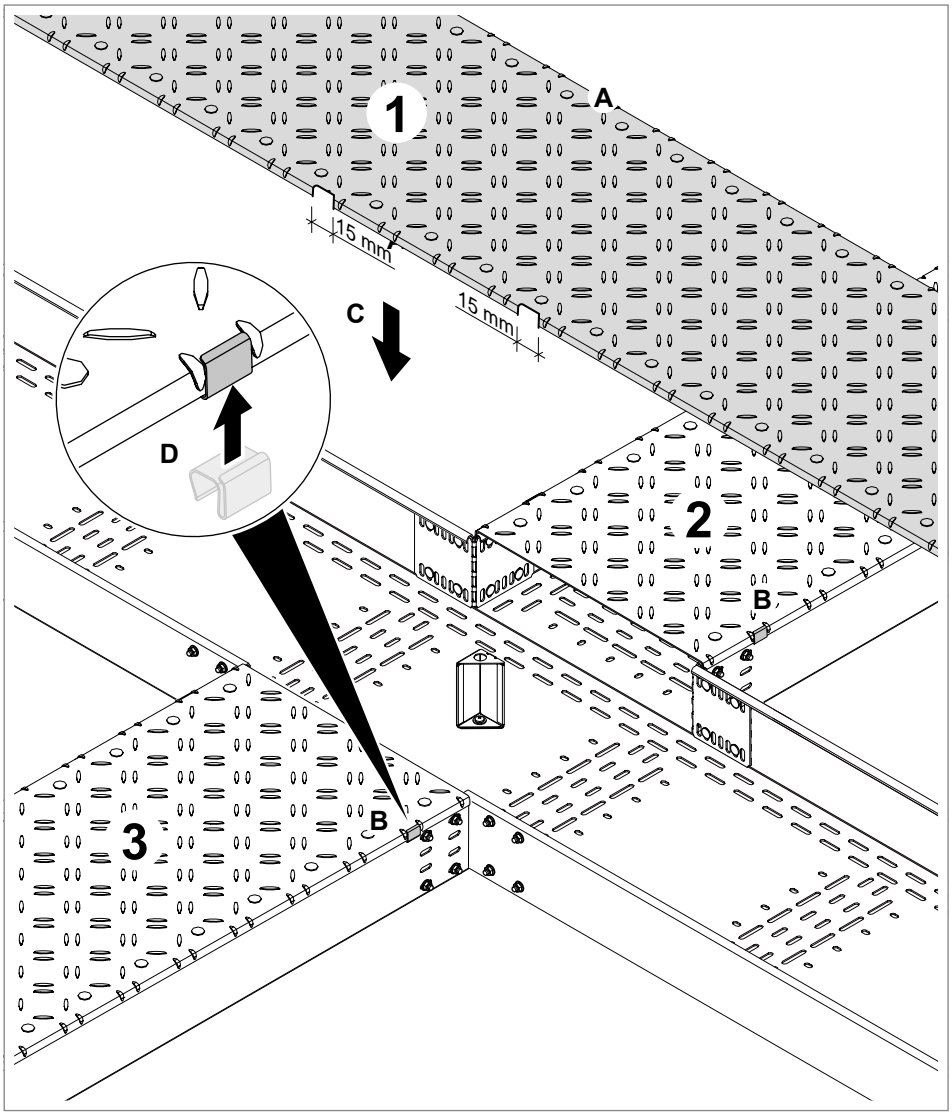

Fig. 26: Mounting the cover on a cross-connection

1. If necessary, cut the cover to size.
2. In order to be able to position cover 1 on the upper edges of the cable tray that are at right angles to each other, cut out 15 mm from both sides of cover 1 in the joint area (A).
3. Deburr cut edges to avoid cable damage.
4. Fasten covers 2 and 3 to the cable tray with cover clamps (B) or turn buckles.
5. Attach cover 1 (C).
6. Fasten cover 1 to the cable tray with cover clamps (D) or turn buckles.

5 Maintenance

The stability and function of the BKRS walkable cable tray systems can be impaired by external influences, such as damage or machine vibrations.

Loose connection elements must be retightened and damaged parts replaced. In addition, we recommend regular checks to see if the connection to the overall equipotential bonding is still intact.

6 Dismantling

The BKRS walkable cable tray system is dismantled in the reverse order to mounting.

7 Disposal

1. Residual metal: As scrap metal
2. Packaging: As household waste

Comply with the local waste disposal regulations.

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Building Connections