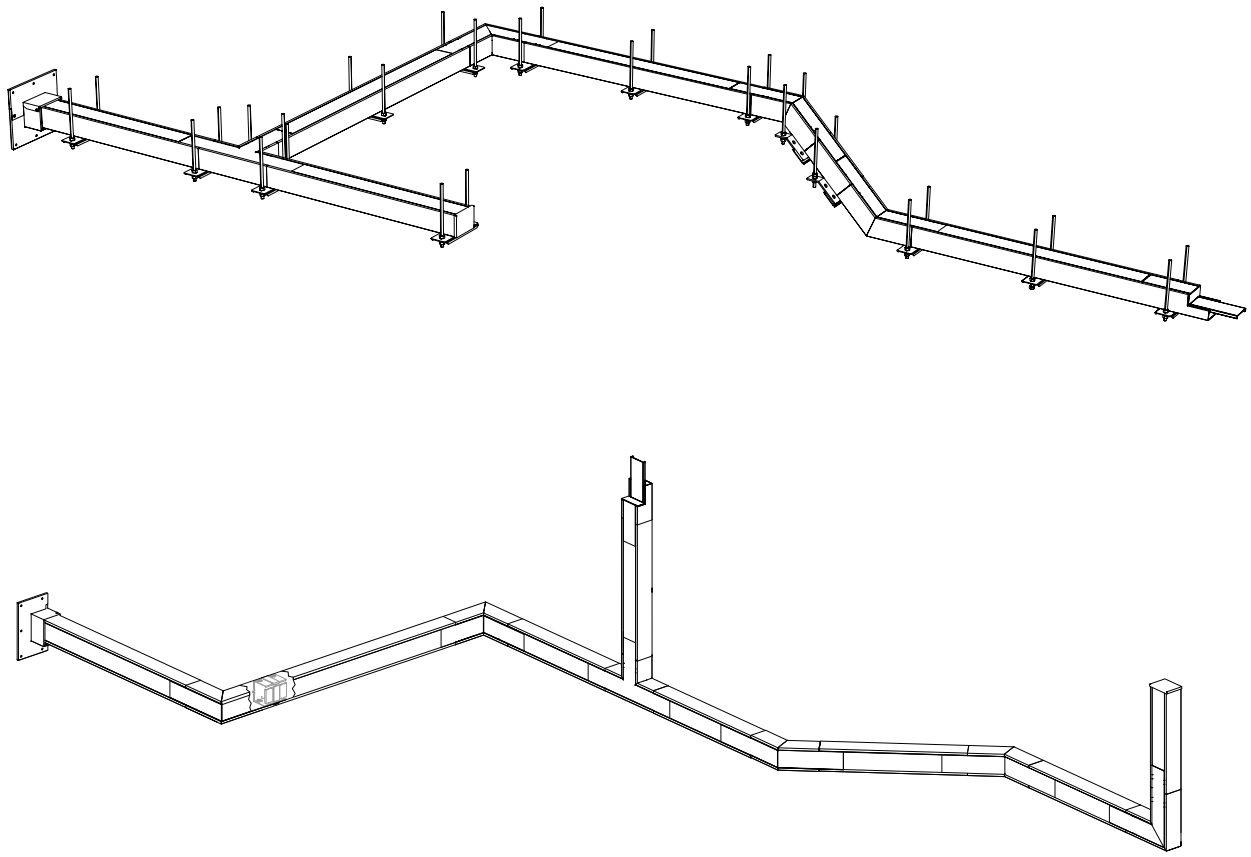


Mounting instructions

PYROLINE® Rapid installation duct system

OBO BETTERMANN

PYROLINE® Rapid installation duct system
Mounting instructions

Table of contents

1 About these instructions

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) with technical and fire protection expertise, familiar with the installation of fire-resistant installation ducts.

1.2 Relevance of these instructions

These instructions are based on the standards valid at the time of compilation (01/2025).

Please read the instructions carefully before commencing mounting. 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.

In these instructions, cables and lines are referred to simply as cables.

These instructions describe standard solutions for mounting the PYRO-LINE® Rapid installation duct system. Special solutions for specific structural conditions are possible, but must be planned on-site with the authorities.

To find out more about planning and mounting the product, we recommend a comprehensive training course.

1.3 Types of warning information

WARNING

Type of risk!
Shows a risky situation. If the warning information is not observed, then serious or fatal injuries may occur.

CAUTION

Type of risk!
Shows a risky situation. If the warning information is not observed, then medium or minor injuries may occur.

Note! *Indicates important information or assistance.*

1.4 Basic standards and regulations

– DIN EN 1363-1:2020-05 Fire resistance tests – Part 1: General requirements

– DIN EN 1366-5:2021-05 Fire resistance tests for service installations – Part 5: Service ducts and shafts

– DIN EN 13501-2: 2023-12 Fire classification of construction products and building elements – Part 2: Classification using data from fire

resistance tests, excluding ventilation services

– EU construction products ordinance no. EU 305/2011

– EAD 350003-01-1109 Kit for fire resistant service ducts consisting of pre-fabricated connection pieces and accessories

National specifications – Germany:
– Sample Administrative Provision, Technical Construction Regulations 2023-1 (M VV TB*), Appendix 4, Sections 8.2 and 8.3
*According to national law

1.5 Applicable documents

– European Technical Assessment ETA 22/0096

– Declaration of performance 05-DOP-016

– Safety data sheets of the products (www.obo-bettermann.com).

2 Intended use

The PYROLINE® Rapid installation duct is used for the installation and guidance of cables up to a maximum diameter of d = 30 mm in escape and rescue routes in interior areas of buildings. If there is a fire, the PYROLINE® Rapid installation duct ensures active fire load encapsulation and prevents the spread of fire for up to 90 minutes. The PYROLINE® Rapid installation duct can be mounted on solid walls and ceilings, either directly or with a support system. Mounting must take place with fastening material with fire protection testing. Ceilings and walls at the mounting location must be made of masonry, concrete, reinforced concrete, porous concrete or solid wooden parts, and have a minimum thickness of 10 cm (walls) or 15 cm (ceilings). Only then can the correct function of the installation duct be guaranteed.

The PYROLINE® Rapid installation duct is not suitable for any purposes other than those described here. The installation duct is not designed to support walls in wall penetrations. Ensure that the wall penetrations can support themselves. Mounting the installation duct on dry or lightweight construction walls or suspended ceilings is not considered proper use. Using the installation duct to maintain electrical function is likewise forbidden.

3 Safety

3.1 General safety information

Observe the following general safety information:

– All the appropriate regulations and technical regulations of other units, in particular those for electrical engineering, must be complied with.

– The installation duct may not be loaded with heavy weights or used as a support.

– The approved cable load may not be exceeded, as otherwise the support and function capability is no longer guaranteed.

3.2 Personal protective equipment

List of personal protective equipment to be used:

Use hand protection!
During cutting work, metal chips or sharp cut edges can cause injuries to hands! Wear hand protection.

Use eye protection!
During cutting work, metal chips or sharp cut edges can cause injuries to eyes! Wear eye protection.

Use hearing protection!
Cutting work on metal ducts can lead to an increased noise level. Wear hearing protection.

Wear head protection!
The installation duct can lead to head injuries when working overhead. Wear a safety helmet when performing overhead work.

Wear breathing protection!
If there is a fire, burning cable insulation can create corrosive gases. When disposing of fire protection ducts which have been subjected to a fire, wear breathing protection.

4 Necessary tools

List of tools to be used:

– Angle grinder with metal separating disc

– Knife

– Metal file

– Metal drill bit

– Drill with masonry/concrete bit

– Battery-operated screwdriver

– Screwdrivers, flat, Philips and Torx

– Adjustable spanner/ratchet wrench

– Tape measure

– Spirit level

5 System description

The PYROLINE® Rapid installation duct system is a closed system, made of sheet steel with a profiled cover closure contour, which helps to protect the surrounding area in case of an electrical cable fire by intumescence of the internal fire protection fabric. When a cable fire develops in the interior of the duct, the internal fabric foams up, encapsulating the fire.

5.1 System features

– PYROLINE® Rapid PLM, for wall and ceiling mounting with a support system of wall brackets or suspended supports and brackets or threaded rods and profile rails

– 4 system sizes with duct cross-section 40 x 44 mm, 40 x 100 mm, 80 x 100 mm or 120 x 200 mm

– Enclosure (E) and insulation (I) under fire exposure up to 90 minutes (classification EI30–EI90)

– Material from sheet steel with profile cover locking contour and intumescent fire protection fabric

– Standard surface coating optionally as strip galvanised sheet steel to EN 10143 or with external surface coating in RAL 9010 (Pure white)

– Factory-made base perforation in the duct trough for quicker

attachment to walls and ceilings

– Internal connector with additional sealing from the inside to the outside, installation without tools

– Standardised connection technology between ducts and between ducts and fittings for direction changes

– Joint offset between duct trough and duct cover possible due to internal connector

– Processing with standard tools such as angle grinder and ratchet wrench

– Installation of the duct cover by snapping in without tools

– Simple inspection and retrofitting

– Factory-made fittings for direction changes

– Routing of standard cable types up to a maximum outside diameter of d = 30 mm or a maximum wire cross-section of 25 mm²

– Mounting on OBO support systems

5.2 System overview

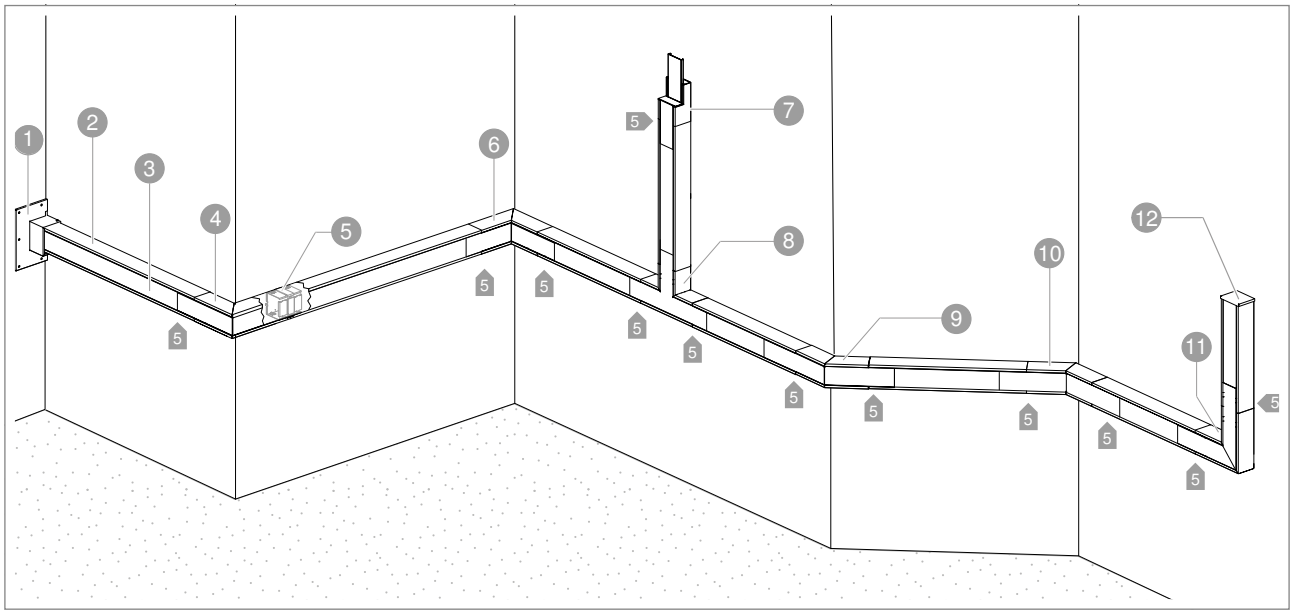


Fig. 1: System overview for wall mounting

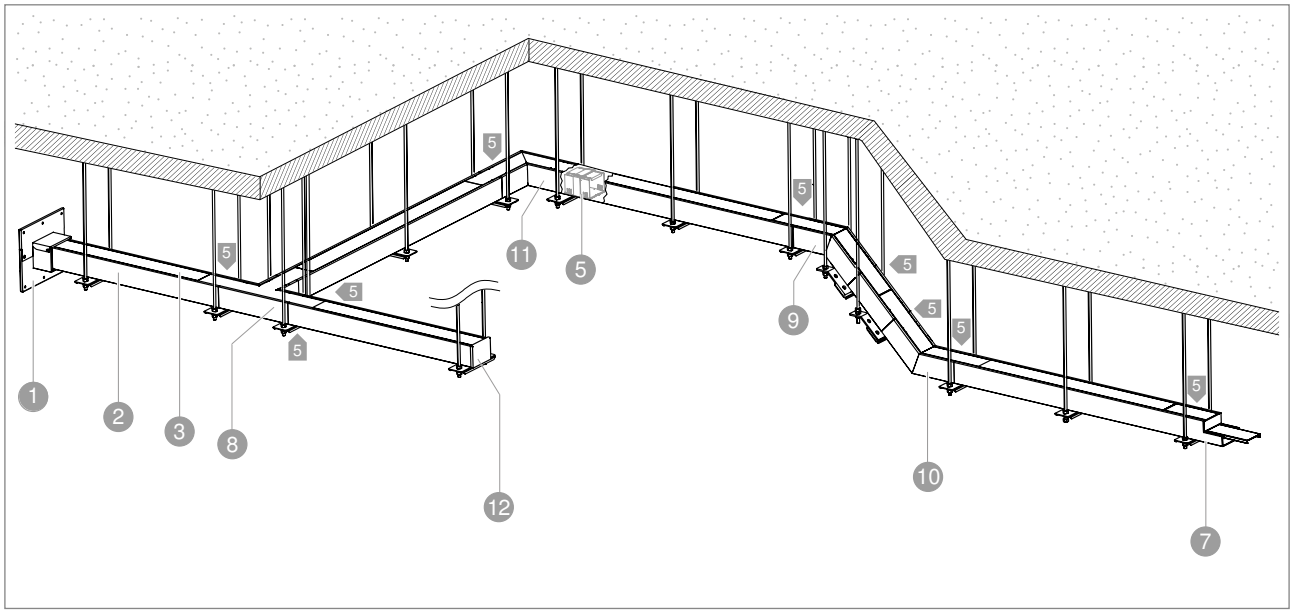


Fig. 2: System overview for suspended mounting

Component/duct system		PLM D 0404 40 x 40 mm	PLM D 0410 40 x 100 mm	PLM D 0810 80 x 100 mm	PLM D 1220 120 x 200 mm
1	Wall connection collar PLM WC	–	✓	✓	✓
2	Installation duct PLM D	✓	✓	✓	✓
3	Installation duct cover PLM LI	–	✓	✓	✓
4	External corner PLM EC	–	✓	✓	✓
5	Joint connector PLM SI	✓	✓	✓	✓
6	Internal corner PLM IC	–	✓	✓	✓
7	Reducer PLM RP	–	✓	✓	✓
8	T branch piece PLM TB	–	✓	✓	✓
9	45° bend, falling PLM BF	–	–	✓	✓
10	45° bend, rising PLM BR	–	–	✓	✓
11	Flat angle PLM FA	–	✓	✓	✓
12	End piece PLM EP	–	✓	✓	✓

5.3 Mounting options for direct mounting

The PYROLINE® Rapid installation duct can be mounted in the following ways:

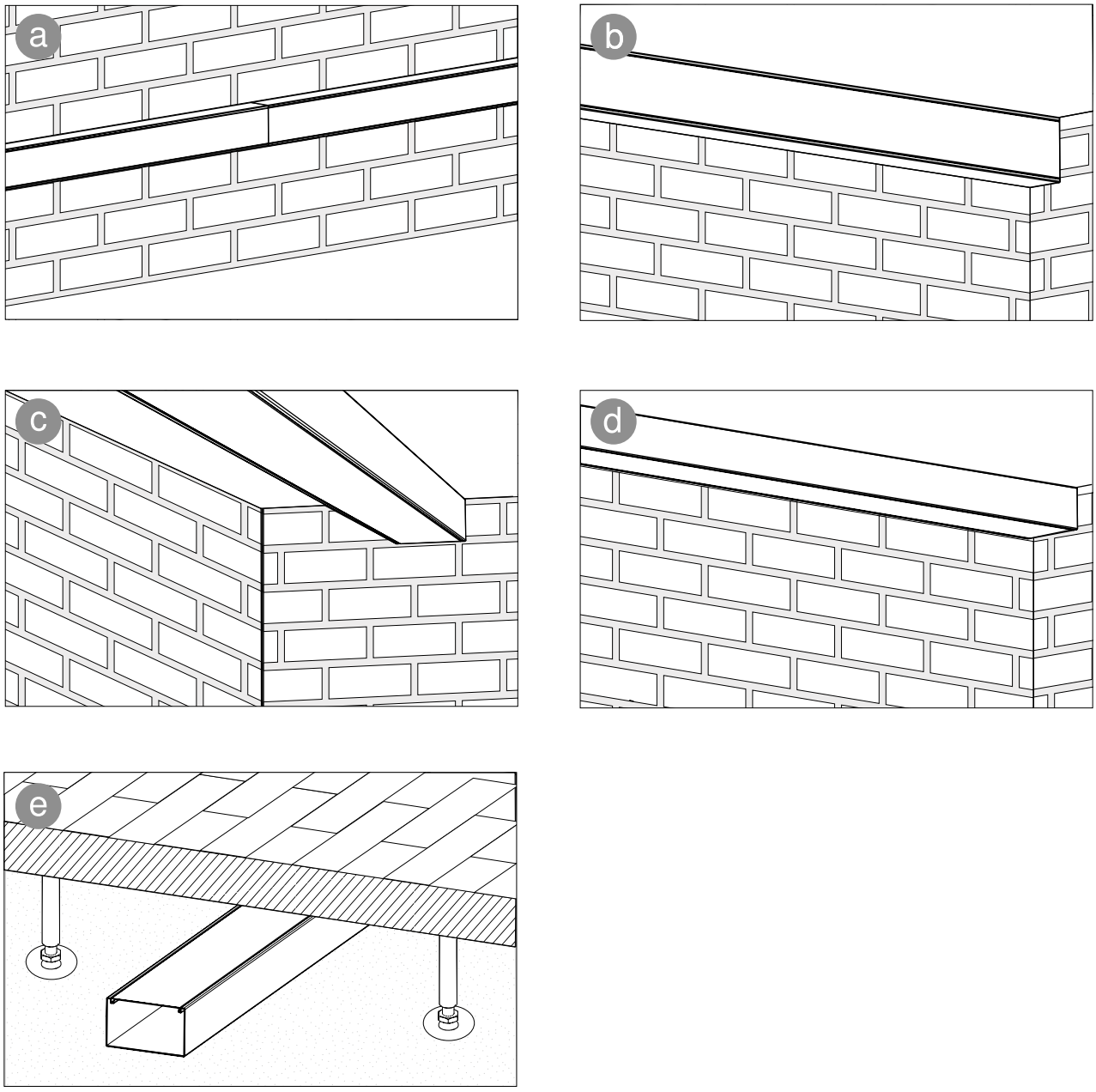


Fig. 3: Direct mounting overview

a Wall mounting

b Corner mounting on the wall

c Ceiling mounting

d Corner mounting under the ceiling

e Mounting below system bases

5.4 Mounting options on support systems

The PYROLINE® Rapid installation duct can be mounted on the following support systems:

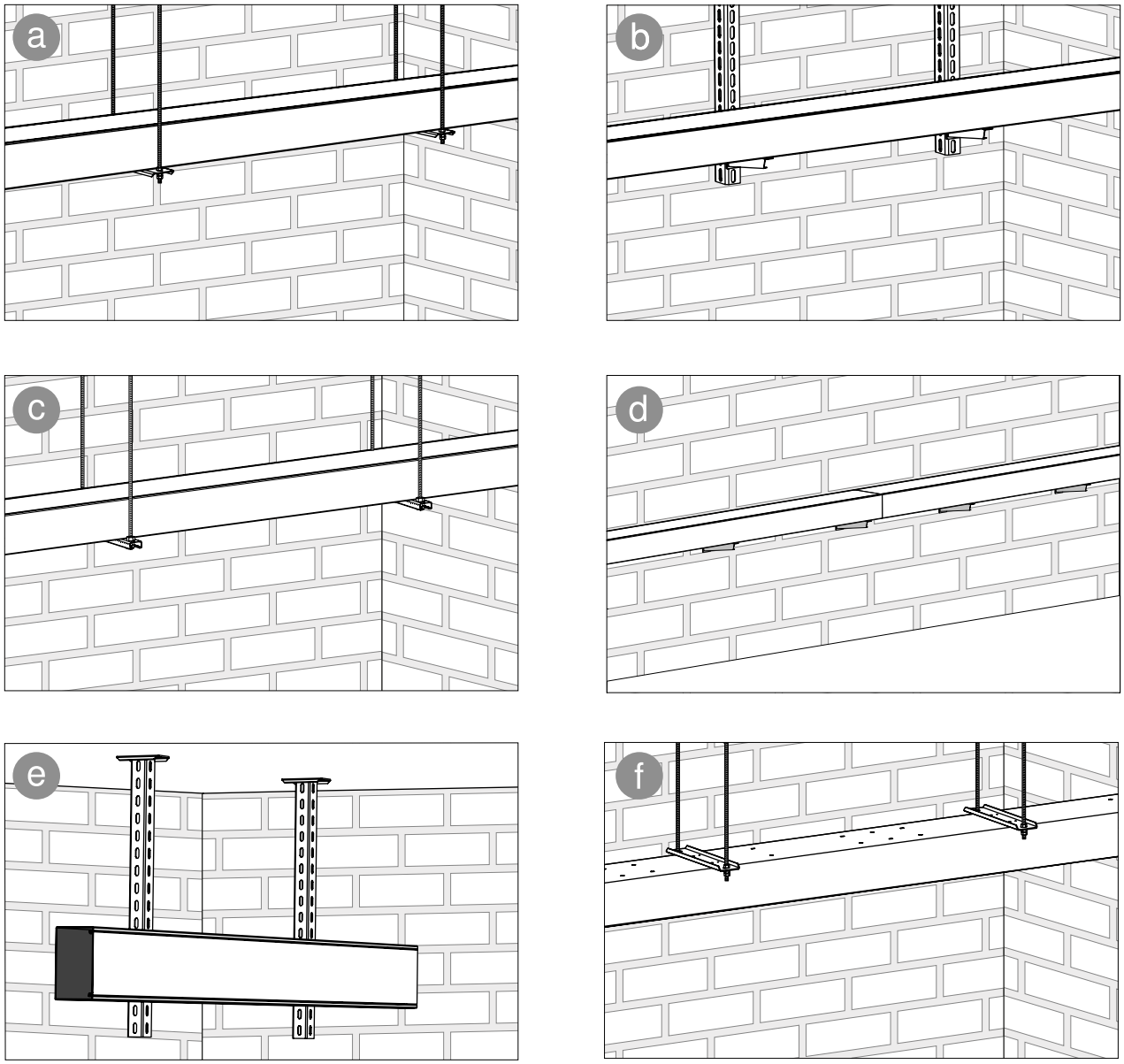


Fig. 4: Overview of mounting on support systems

a Suspended mounting with threaded rod and support profile

b Suspended mounting with U support and wall and support brackets

c Suspended mounting with threaded rod and profile rail

d Mounting on wall brackets

e Suspended mounting on U supports

f Suspended mounting below from threaded rod and support profile

5.5 Accessories

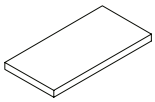
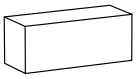
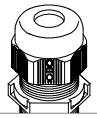
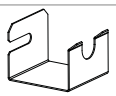
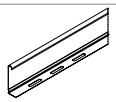
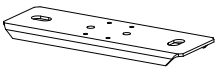
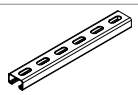
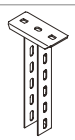
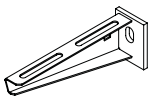
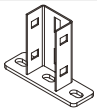
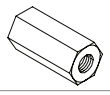
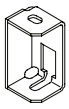
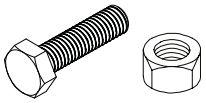
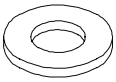
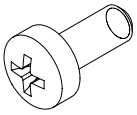
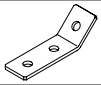
Figure	Designation/type	Function
	MIW-S mineral wool	Sealing of remaining openings for wall penetration
	Mineral wool plates	Sealing of remaining openings and support of the installation duct in the wall opening
	Joint spatula	Sealing of remaining openings
	PYROCOAT ASX-K or ASX-E ablation coating	Sealing of remaining openings for multiple cable outlets
	Foam cable outlet PLM CO...	Multiple cable inlets and outlets
	Brass cable gland, M12–M50, with locknut Plastic cable gland, M12–M50, With locknut	Version for single cables
	Cable clamp PLM CB...	Cable holder for ceiling mounting
	Cable clamp PLM WB...	Cable holder for horizontal wall mounting
	Conductor brackets	Cable holder for vertical wall mounting
	Separating retainer	Separation of different electrical voltage levels
	Locking bracket	Subsequent attachment of upper and lower parts
	Threaded rod TR M10.. G/TR M8... G	Mounting the support system a, c, f
	Support profile	Mounting the support system a, f
	Profile rail MS 4121P ... FS	Mounting the support system c
	Connection component M8/M10	Mounting the support system c
	Suspended support US 5 K... FT	Mounting the support system b, e
	Wall and support bracket AW 15 ... FT	Mounting the support system b, d

Figure	Designation/type	Function
	DSK 45 spacer FT	Mounting the support system e
	US 5 U support	Mounting the support system b, e in conjunction with head plate
	Head plate/U support	Mounting the support system b, e in conjunction with U support without head plate
	Variable head plate	Mounting the support system b, e under sloping ceilings in conjunction with U support without head plate
	Connection sleeve CSTR M8 G/CSTR M10 G	Connecting 2 threaded rods
	Fire protection clamp BSB FT	Connection piece between anchor and threaded rod for mounting the support system a, c, f
	Bolts and nuts M8	Mounting of support system for suspended mounting
	Washers M8	
	Self-tapping screw 4x8	Mounting ducts and fittings on the supports for suspended mounting
	GMS mounting bracket	Vertical suspension
	Joint cover	Lamination of sawn duct joint edges

Tab. 1: Accessories

6 Planning an installation

To ensure the functionality of the installation duct, installations and installation locations must fulfil technical and structural requirements.

6.1 Structural conditions

If there are uncertainties about the load capacity of walls and ceilings, corresponding proof of the load capacity must be provided.

– Walls must be made of concrete, reinforced concrete or masonry (e.g. calcareous sandstone, porous calcareous sandstone, full brick) with a minimum thickness of 10 cm.

– Ceilings must be made of concrete, reinforced concrete or porous concrete with a minimum thickness of 15 cm.

– Walls and ceilings serving as a mounting surface must have at least the same fire resistance length as the mounted installation duct.

– If various electrical voltage levels are to be separated in an installation duct, the spacing of the various electrical voltage levels must be at least 10 mm. Choose an installation duct with the appropriate width/height and use separating clamps or brackets.

– Lightweight walls/partitions, wooden walls and ceilings, as well as steel structures and trapezoidal roofs, are only suitable to a limited extent for the fastening of fire protection ducts. If they fulfil the required fire resistance classes, threaded rods can be used for fastening, e.g. with push-through mounting. Ceiling mounting may only take place on solid ceilings or on such ceilings (e.g. wooden beams or false ceilings) that have been classified into a fire resistance class and for which a sufficient carrying capacity has been guaranteed, e.g. through anchor extraction experiments.

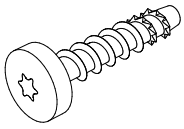
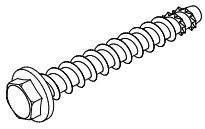
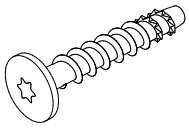
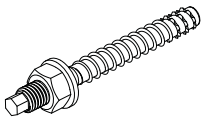
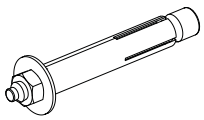
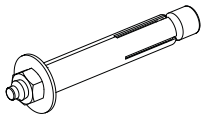
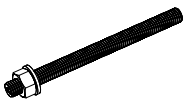
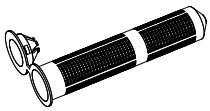
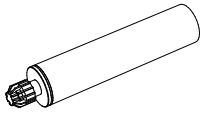
6.2 Recommended fastening materials

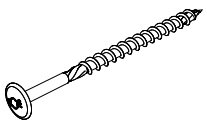
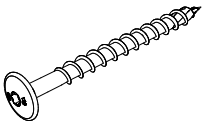
The fastening materials used must be fire protection-tested and certified. The OBO products listed in Tab. 2 and Tab. 3 or equivalent fasteners can be used for wall and ceiling mounting.

Note! *Observe the information in the respective usability or applicability certificates.*

Note! *The specifications refer to the respective maximum load and dimensions as well as the maximum permissible classification of the installation duct. Smaller dimensions and cable loads may have an impact on the choice of fastening material.*

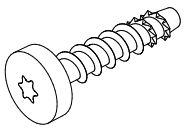
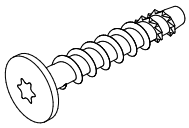
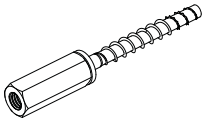
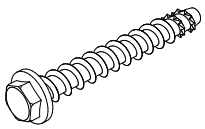
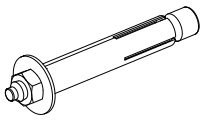
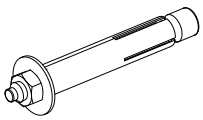
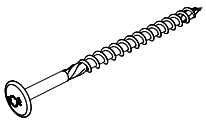
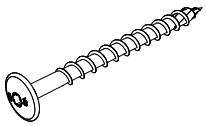
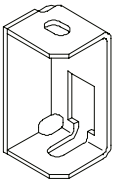
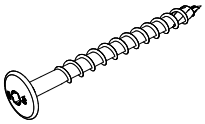
Wall mounting

Fastening substrate	Direct mounting	Mounting on wall bracket AW15
Reinforced or unreinforced normal concrete Wall bricks Solid calcareous sandstone	 MMS+ P 6x35 (Item no. 3498103)	 MMS+ SS 10x80 (Item no. 3498124)
Porous calcareous sandstone	 MMS+ MS 7.5x50 (Item no. 3498261)	 MMS+ V 10x90 (Item no. 3498190)
Porous concrete	 PBD M8x10 (Item no. 3497608)	 PBD M10x10 (Item no. 3497616)
Hollow and porous stone	 VMU-A 8-110vz (Item no. 3497820)  With VMU-SH 12x80 (Item no. 3497860)  With VMUplus injection mortar (Item no. 3497800)	—

Fastening substrate	Direct mounting	Mounting on wall bracket AW15
Timber construction	 HT 6 ... (e.g. Item no. 3498130)	 HT 10 ... (e.g. Item no. 3498140)

Tab. 2: Fastening material for wall mounting

Ceiling mounting

Fastening substrate	Direct mounting	Suspended with threaded rod	Suspended with U support
Cracked or uncracked concrete	 MMS+P 6x35 (Item no. 3498103)  MMS+MS 7.5x50 (Item no. 3498261)	 MMS+ I 7.5x60 (Item no. 3498268)	 MMS+ SS 10x80 (Item no. 3498124)
Porous concrete	 PBD M8x10 (Item no. 3497608)	—	 PBD M10x10 (Item no. 3497616)
Timber construction	 HT 6 ... (e.g. Item no. 3498130)  HT 10 ... (e.g. Item no. 3498140)	 BSB FT (Item no. 6418198)  HT 10 ... (e.g. Item no. 3498140)[1)]	—

[1)] In wooden ceilings, suspension with threaded rod is only possible in conjunction with fire protection clamp BSB FT.

Tab. 3: Fastening material for ceiling mounting

6.3 Approved cables

All standard cable types up to a maximum outside diameter of d = 30 mm or a maximum wire cross-section of 25 mm², including optical fibre cables, can always be routed. This excludes hollow core cables and wire cables.

Note! *When dimensioning the cables, note that the electrical resistance of the conductors in the cable is increased through heating. A larger conductor cross-section may be required.*

7 Mounting the duct trough

The PYROLINE® Rapid installation duct can be mounted on either the wall, ceiling or floor or on support systems.

7.1 Shortening ducts

If the installation duct has to be cut due to the duct routing, proceed as described below. To avoid waste, plan duct lengths from room corners.

Note! *A noticeable odour will occur when cutting the installation duct. This is not harmful. If necessary, carry out the cutting operation in a well-ventilated location.*

CAUTION

Risk of cutting!
During cutting work, metal chips or sharp cut edges can cause injuries to eyes and hands!
– Wear protective glasses and gloves.
– Deburr cut edges.

1. Cut installation ducts to the desired length, e.g. using an angle grinder or metal band saw.

2. Deburr cut edges.

Note! *When cutting with an angle grinder, the fire protection material may react slightly at the cut edge. This does not impair the fire protection properties of the installation duct. Cut swollen material as thinly as possible with a knife.*

7.2 Direct wall, ceiling, floor mounting

For every 2 m of duct length, there must be 5 fixing points at a distance of 400 mm.

The duct trough has a corresponding bottom perforation (∅ 8 x 12 mm), which is sealed flue gas-tight by the fire protection fabric inside:

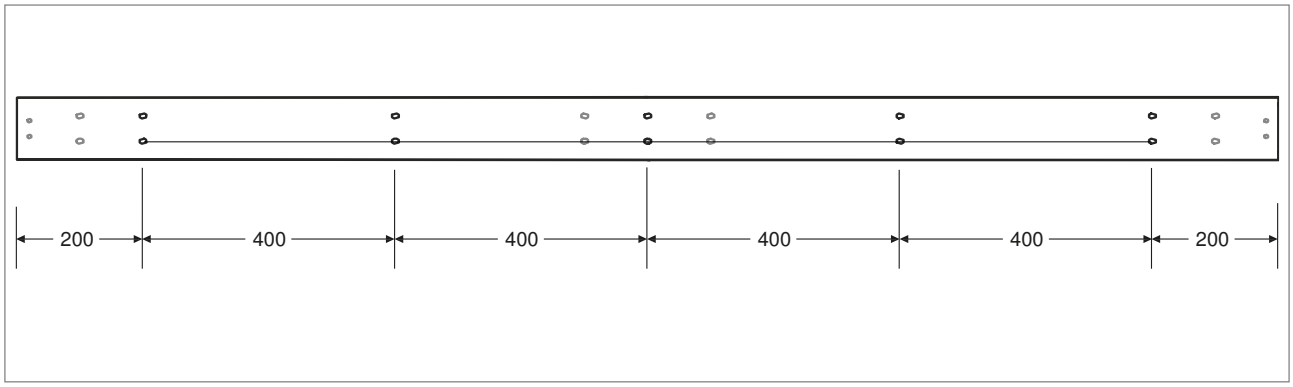


Fig. 5: Hole pattern for horizontal wall mounting

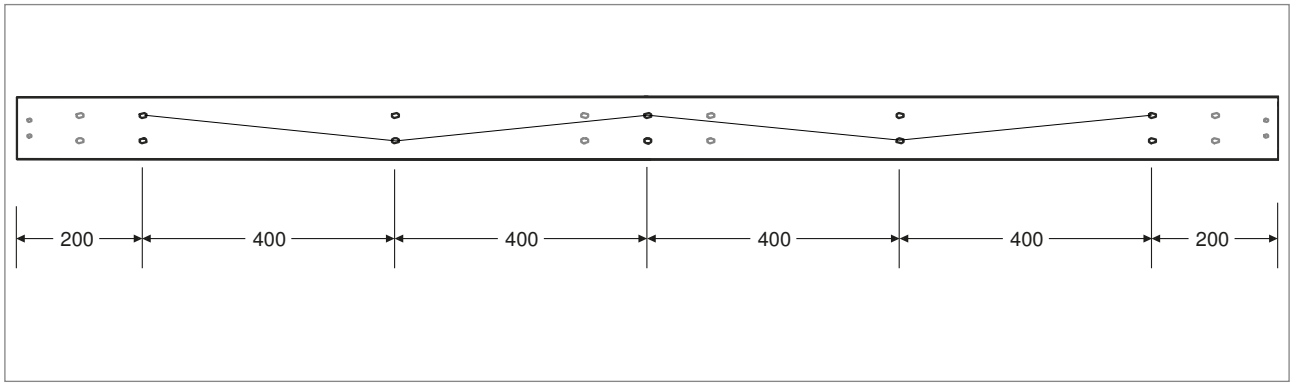


Fig. 6: Hole pattern for vertical wall and ceiling mounting

Note! *The fastening points of the installation duct on the wall and ceiling also serve as mounting points for cable clamps.*
– With horizontal wall mounting, cable clamps can be used only in the lower level.
– For vertical wall mounting and ceiling mounting, the diagonal arrangement of the cable clamps enables the separation of 2 voltage levels in the installation duct.

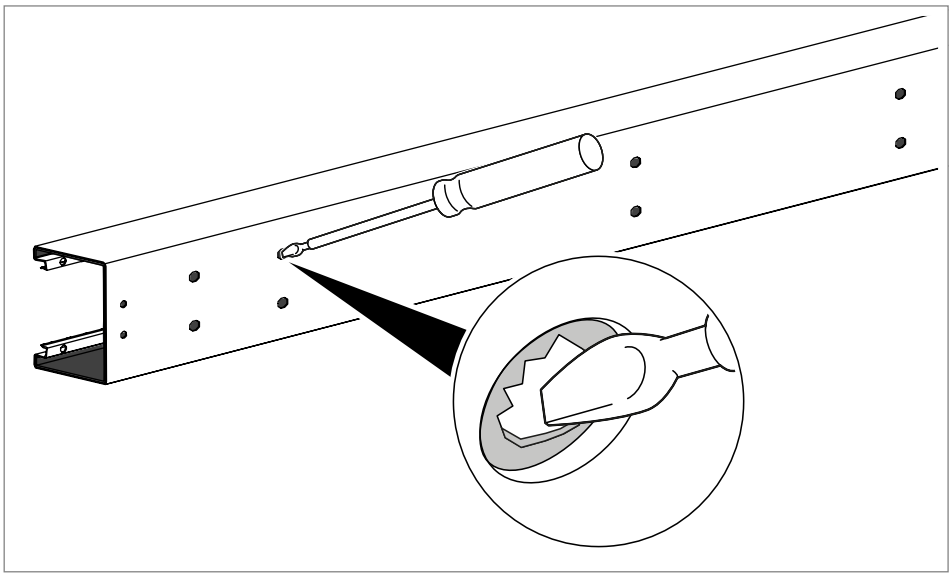


Fig. 7: Piercing the fire protection fabric at the fastening points

1. Pierce the inner fire protection fabric at the fastening points with a pointed object.

2. Transfer the drill holes to the fastening substrate.

WARNING

Loss of function in case of fire!
Drilling depth and drill hole diameter according to the approval of the fire protection tested fastening material, see also “6.2 Recommended fastening materials” on page 16.

3. Drill fastening holes.

4. Clean the drill holes carefully, e.g. through suction or blowing-out.

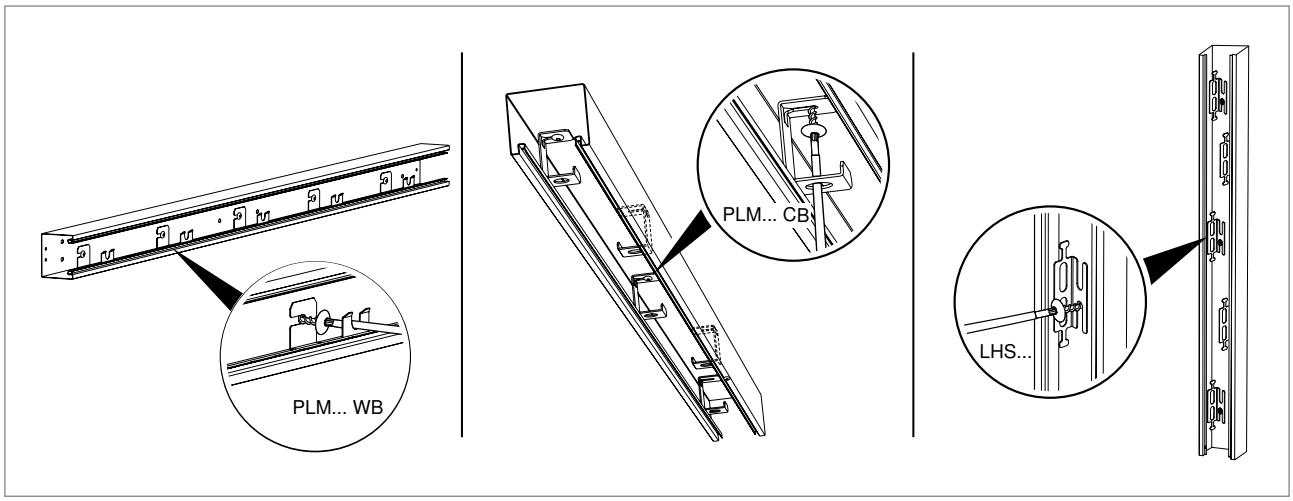


Fig. 8: Mounting the duct trough

5. Mount the installation duct on the substrate. For wall and ceiling mounting fix the installation duct together with PLM... WB, PLM... CB or LHS....

7.2.1 Direct mounting on wooden ceilings or wooden walls

The installation duct can be fastened to load-bearing ceilings or walls made of wood provided basic requirements for the load capacity of the fastening and wooden components are met, ensuring that the classified performance of the fire-resistant installation duct is maintained sufficiently.

The following requirements for fastening to ceilings or walls made of wood must be met:

– Wooden components must be made of solid wood.

– Fastening must be done using screws approved by the building authorities (see “6.2 Recommended fastening materials” on page 16).

– Static dimensioning of the wood screw and its dimensions is done in accordance with the specifications of the proof of application.

– The minimum edge distances and minimum screw-in depth/insertion depth of the wood screws depend on the required fire resistance class and must be complied with.

Note! *If you intend to fasten the installation duct to load-bearing ceilings or walls made of wood, consult with the technical office. Describe the structural conditions in as much detail as possible.*

7.3 Mounting on support systems

7.3.1 Support system options

The support systems described in “5.4 Mounting options on support systems” on page 12 are available for mounting on support systems. These can be mounted from the following components:

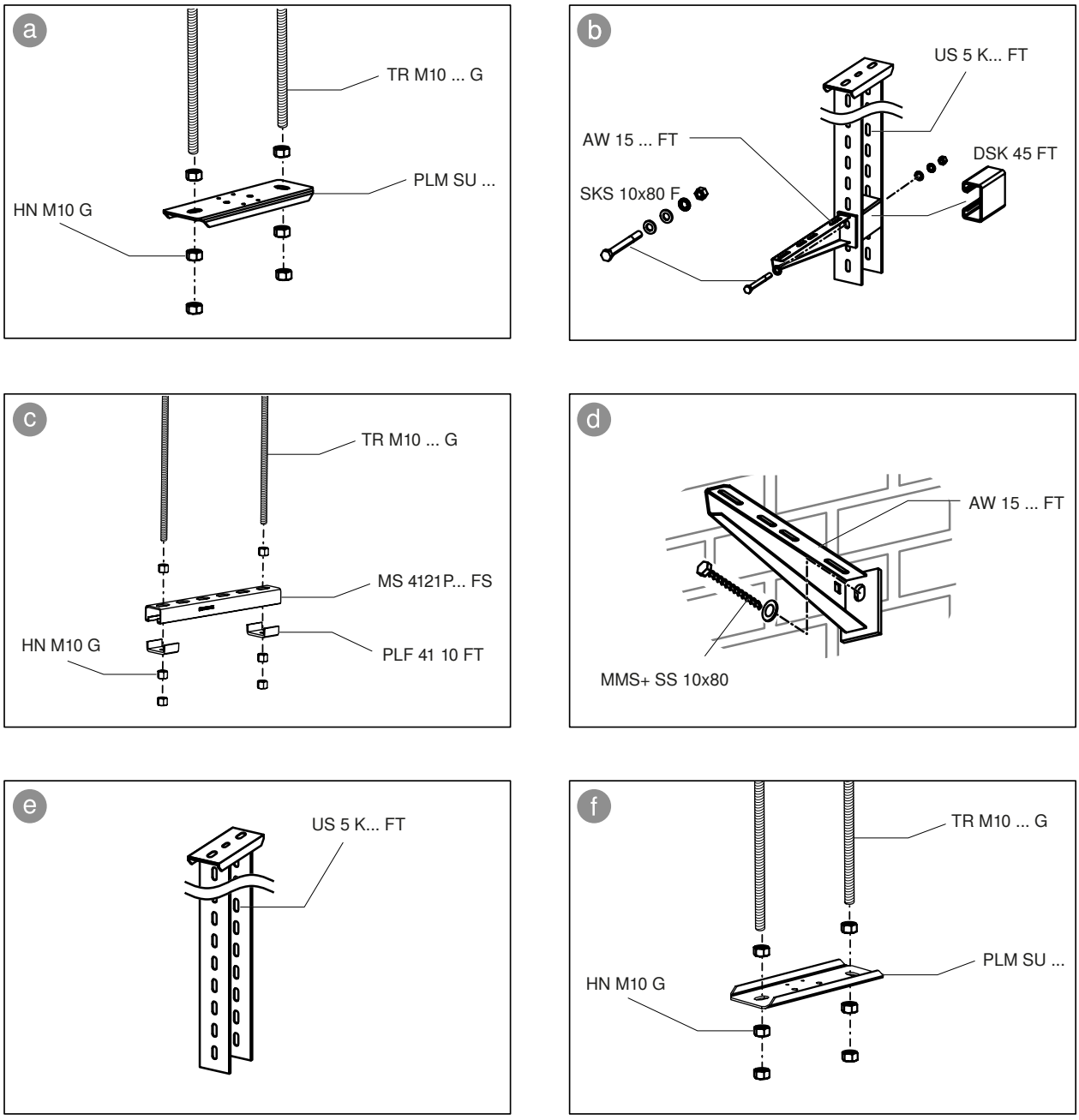


Fig. 9: Mounting support systems

7.3.2 Support spacings

The maximum support spacing for suspended mounting is 1 m. When mounting with mounting rail c to Fig. 9, cantilever b, d or U support e, the distance to the joint must be at least 100 mm so that the PLM SI... joint connector can be mounted without any problems.

Note! *Alternatively, when mounting with support profiles a to Fig. 9 and f, the suspended support can be mounted directly beneath the joint, e.g. when mounting fittings (see also "8.2.1 Mounting fittings on support system a / f" on page 27). For this purpose, use the connector bolt PLM SF 4x8 item no. 3498092 to continue to ensure problem-free mounting of the joint connector.*

The duct trough has a corresponding bottom perforation, which is sealed by the fire protection fabric inside:

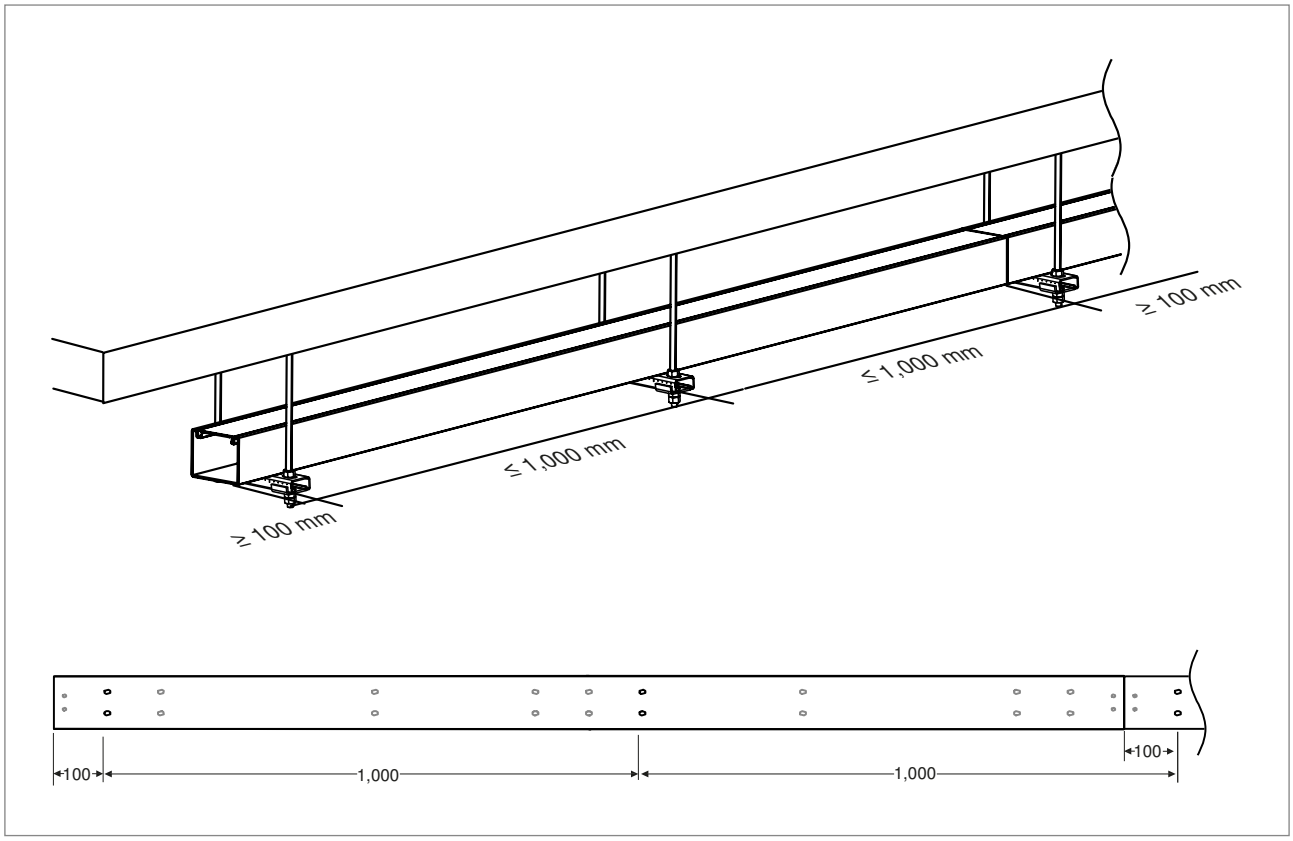


Fig. 10: Support spacings and fastening points on the duct

7.3.3 Mounting the support system and installation duct

WARNING

Loss of function in case of fire!
Use only the support systems listed above and fastening materials that have been tested for fire protection, for examples see “6.2 Recommended fastening materials” on page 16.

1. Pre-drill fastening holes according to the support spacing to suit the support system and fastening material.
2. Clean the drill holes carefully, e.g. through suction or blowing-out.
3. Mount the support system in accordance with Fig. 9.

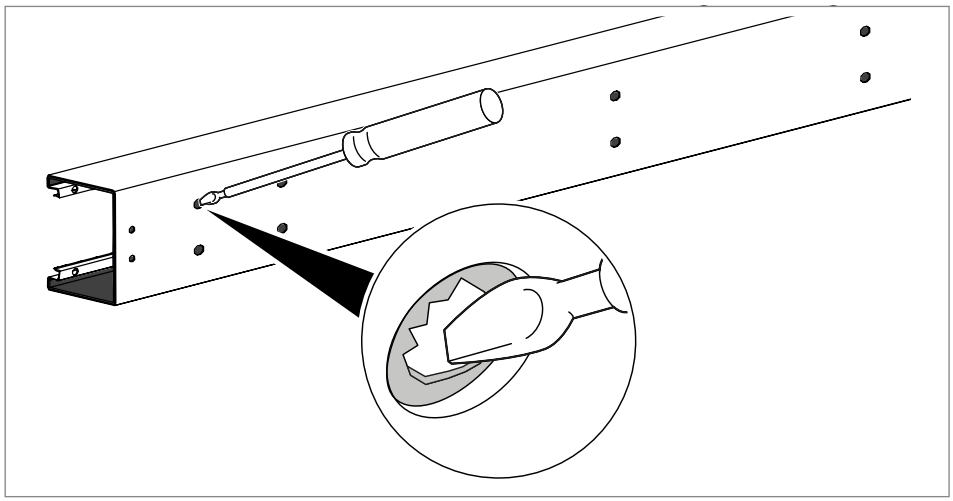


Fig. 11: Piercing the fire protection fabric at the fastening points

4. Pierce the inner fire protection fabric of the installation duct at the fastening points with a pointed object.

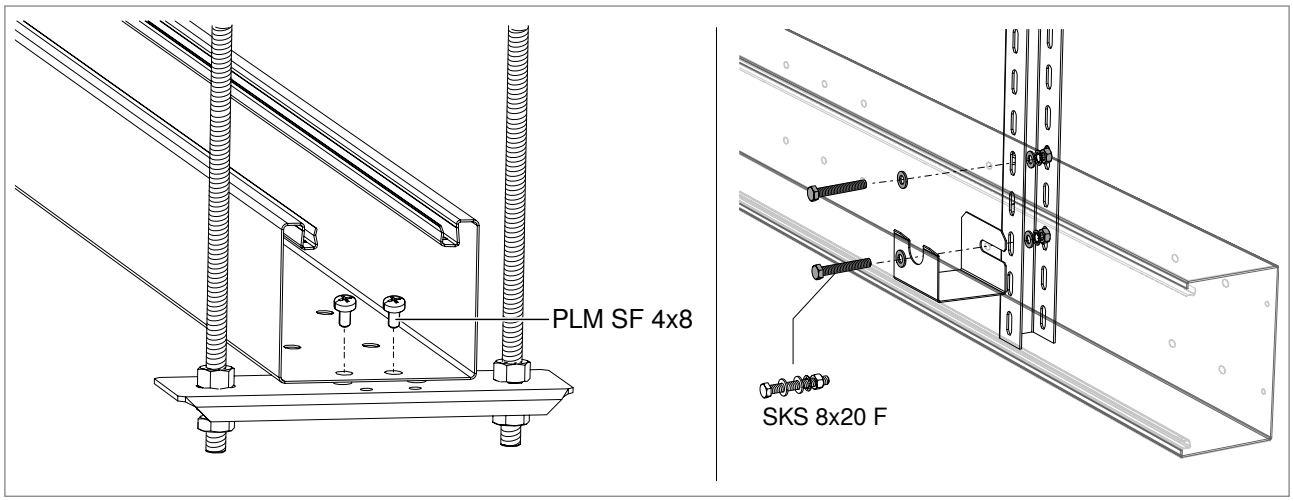


Fig. 12: Fixing the duct troughs on the support system

5. Fix the duct trough at the fastening points on the support system with 2 bolts PLM SF 4x8.

8 Mounting fittings

The fittings for the PYROLINE® Rapid PLM installation duct can be mounted on either the wall, ceiling or floor or on support systems.

8.1 Mounting fittings directly on walls and ceilings

Note! *The mounting of fittings on walls, ceilings or floors is described using the flat angle as an example. Install all fittings of the installation duct system in accordance with this principle.*

1. Mount the duct troughs as described in chapter “7.2 Direct wall, ceiling, floor mounting” on page 19.

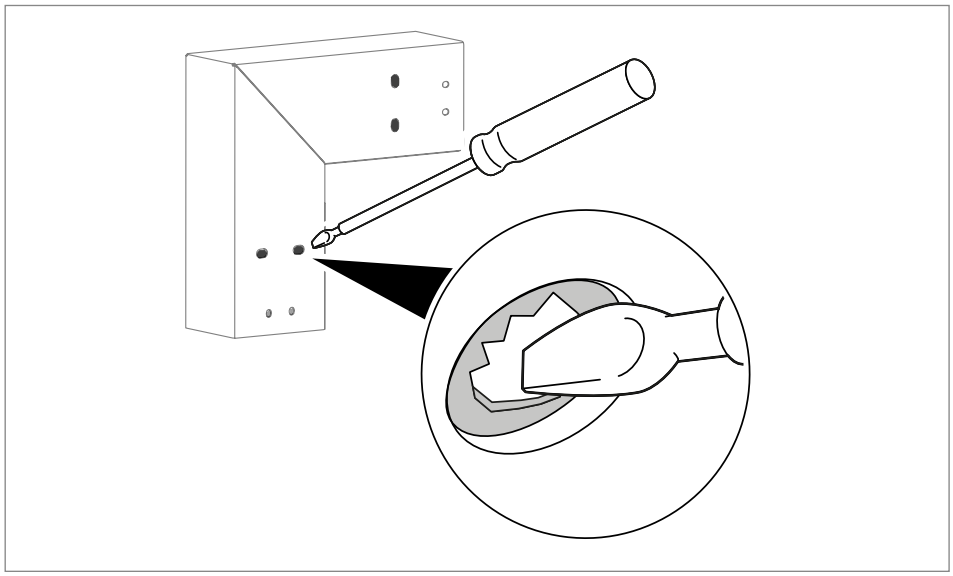


Fig. 13: Piercing the fire protection fabric at the fastening points

2. Pierce the fire protection fabric at the fastening points.
3. Transfer the drill holes to the fastening substrate.
4. Drill fastening holes.

Note! *Drilling depth and drill hole diameter according to the approval of the fire protection-tested fastening material, see also “6.2 Recommended fastening materials” on page 16.*

5. Clean the drill holes carefully, e.g. through suction or blowing-out.

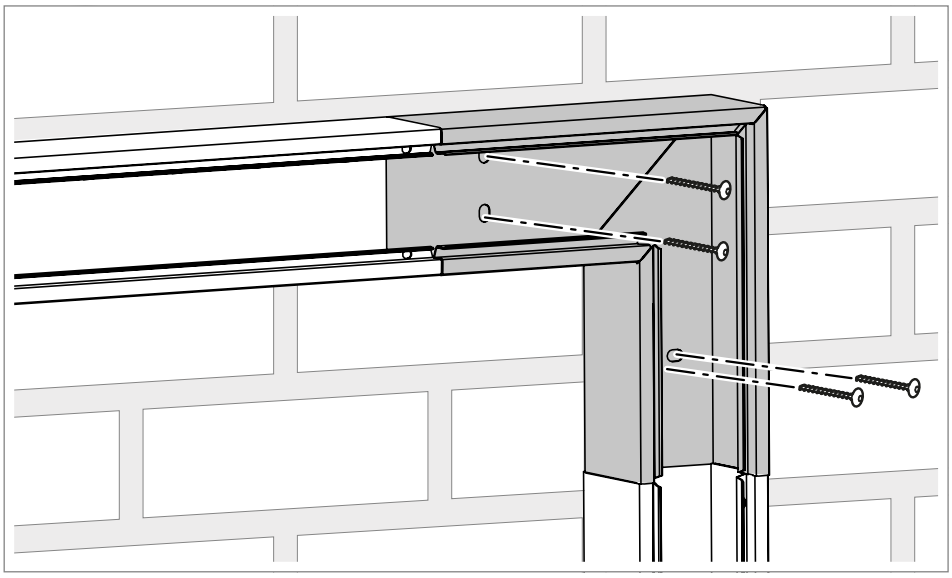


Fig. 14: Mounting fitting

6. Mount fittings using suitable fastening material, see “6.2 Recommended fastening materials” on page 16.

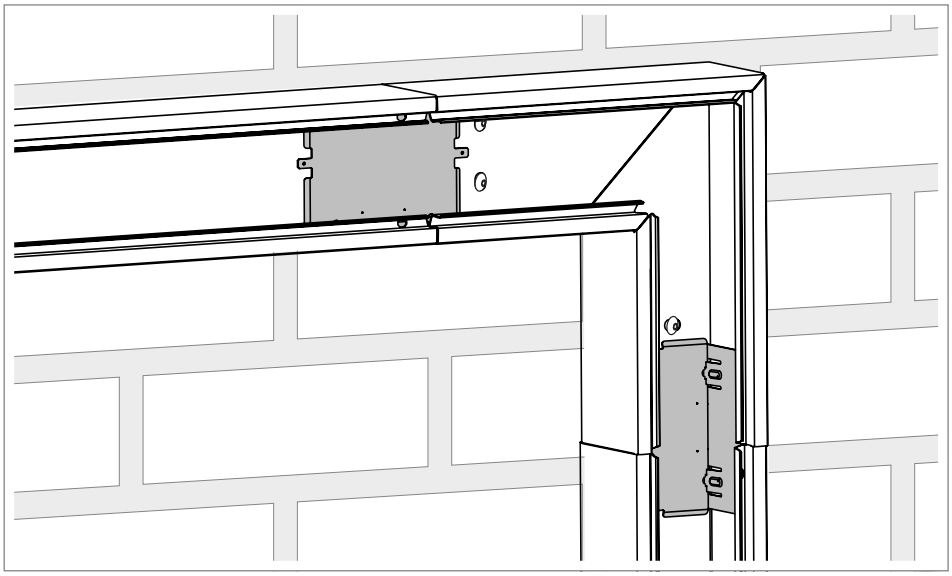


Fig. 15: Mounting joint connectors

7. Mount joint connector at all joints of the fittings as described in chapter “9 Mounting joint connectors” on page 32.

– Lay cables as described in chapter “10 Routing cables” on page 38.

– Mount duct cover and fitting cover as described in “11 Mounting the duct cover” on page 39.

8.2 Mounting fittings on support systems

8.2.1 Mounting fittings on support system ⓐ / ⓕ

Note! *The mounting of fittings is described using example ⓐ with a flat angle. Install all fittings of the installation duct system in accordance with this principle. Implement the mounting variant ⓕ accordingly.*

1. Mount the duct troughs as described in chapter “7.3 Mounting on support systems” on page 22.

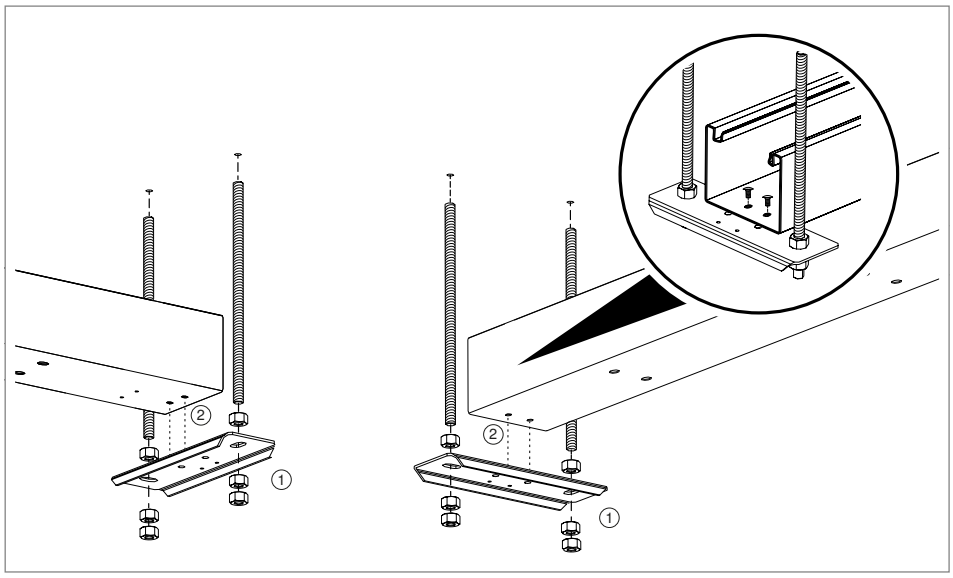


Fig. 16: Mounting the suspension at the joint

2. Mount the suspensions at the joints centrally beneath the joint 1.

3. Fix the installation duct with 2 self-tapping screws (PLM SF 4x8) on the support profile ②.

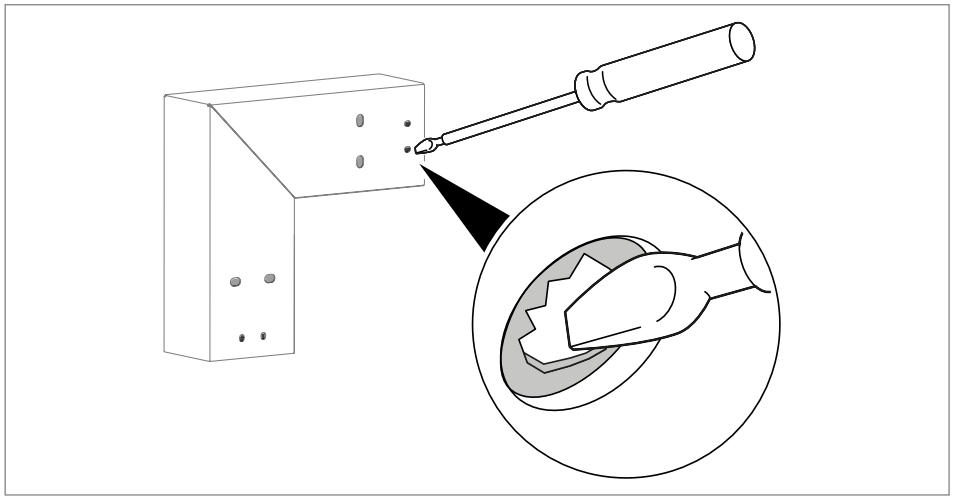


Fig. 17: Piercing the fire protection fabric at the fastening points

4. Pierce the fire protection fabric at the 4 fastening points.

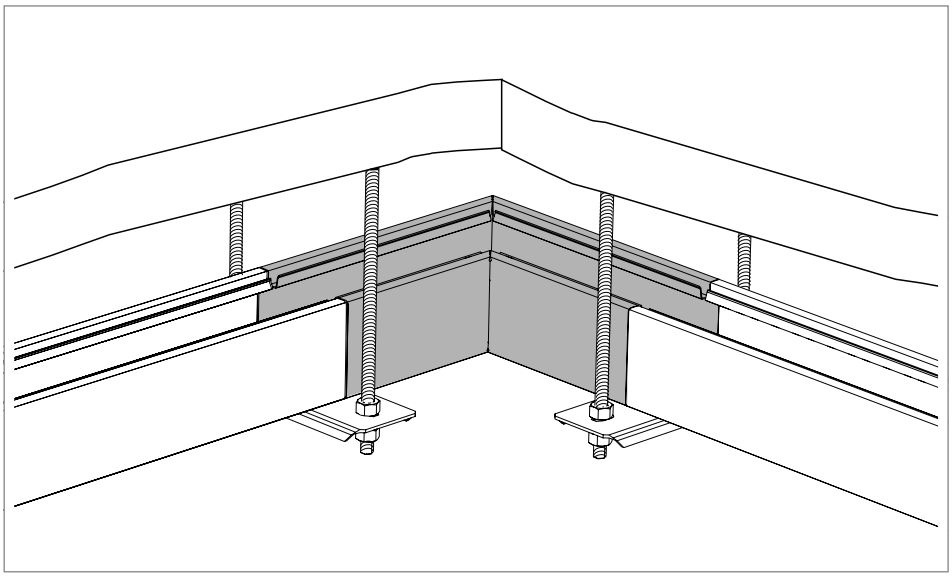


Fig. 18: Mounting fittings on supports

5. Fix the fittings to the fastening points with 2 self-tapping screws each (PLM SF 4x8) on the support profile.

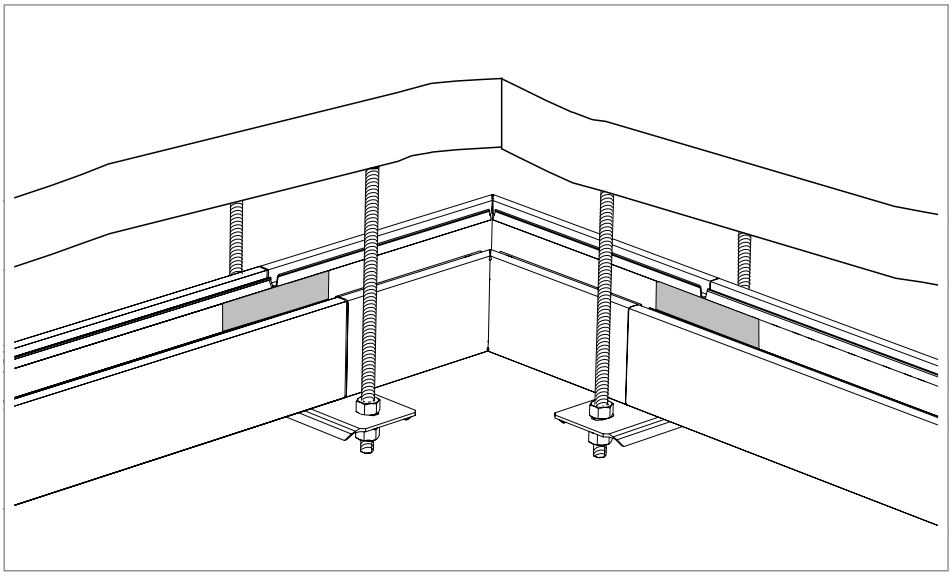


Fig. 19: Mounting the joint connectors

6. Mount joint connector at all joints of the fittings as described in chapter “9 Mounting joint connectors” on page 32.

– Lay cables as described in chapter “10 Routing cables” on page 38.

– Mount duct cover and fitting cover as described in chapter “11 Mounting the duct cover” on page 39.

8.2.2 Mounting fittings on support system b - e

Note! *A suspension must be installed 100 mm from every fitting joint. At least one suspension must be placed beneath the fitting. When mounting the T branch piece, 2 suspensions must be placed beneath the fitting.*

1. Mount the duct troughs as described in chapter “7.3 Mounting on support systems” on page 22.

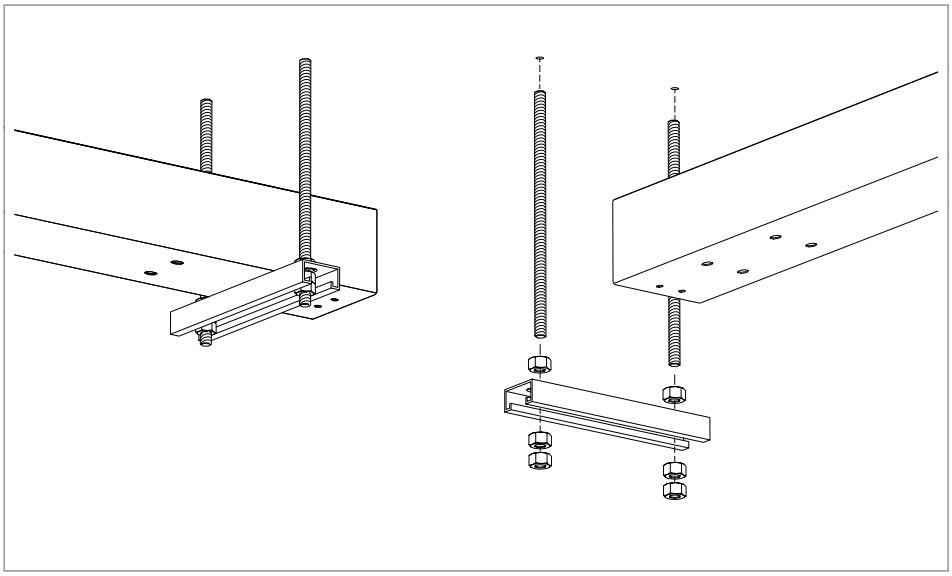


Fig. 20: Mounting support system for fitting

2. Mount support system for the fitting.

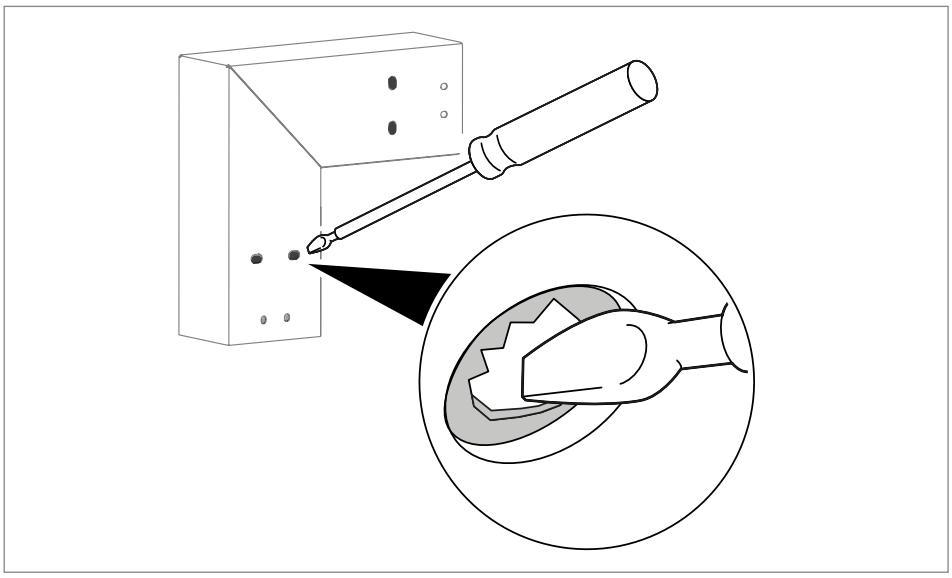


Fig. 21: Piercing the fire protection fabric at the fastening points

3. Pierce the fire protection fabric at the 2 fastening points.

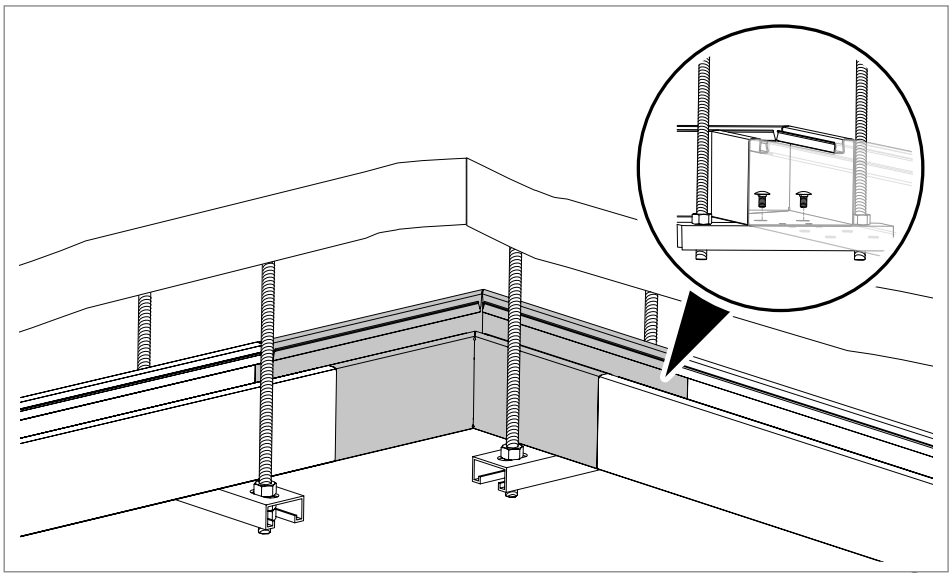


Fig. 22: Mounting fitting

4. Fix the fitting at the fastening points on the support system with 2 truss-head bolts (FRSB 6x15 F).

– Mount joint connector at all joints of the fittings as described in chapter “9 Mounting joint connectors” on page 32.

– Lay cables as described in chapter “10 Routing cables” on page 38.

– Mount duct cover and fitting cover as described in chapter “11 Mounting the duct cover” on page 39.

8.2.3 Mounting 45° rising/falling bends

The fittings 45° rising bend and 45° falling bend must be suspended at or next to every joint. To do this, mount the support systems a with support profile and b with mounting rail with mounting angle GMS.

Note! *The mounting of the support system is shown using support system a as an example. When mounting with support system b, with mounting rail, the mounting of the mounting angle is identical. The suspension points are 100 mm in front of and behind the joint, as described in chapter “5.4 Mounting options on support systems” on page 12.*

1. Mount the installation duct and support system as described in chapter “7.3 Mounting on support systems” on page 22.

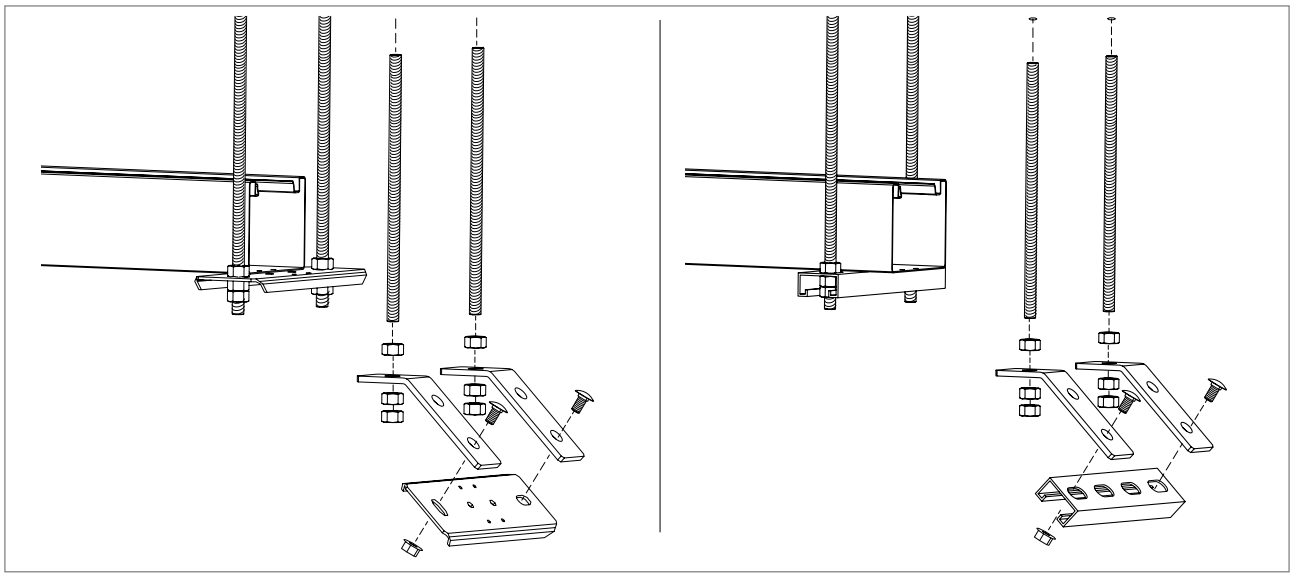


Fig. 23: Mounting the mounting angle

2. Mount the support system on the vertical suspension point with mounting angle GMS.

3. Pierce the fire protection fabric at the 2 fastening points of the fitting.

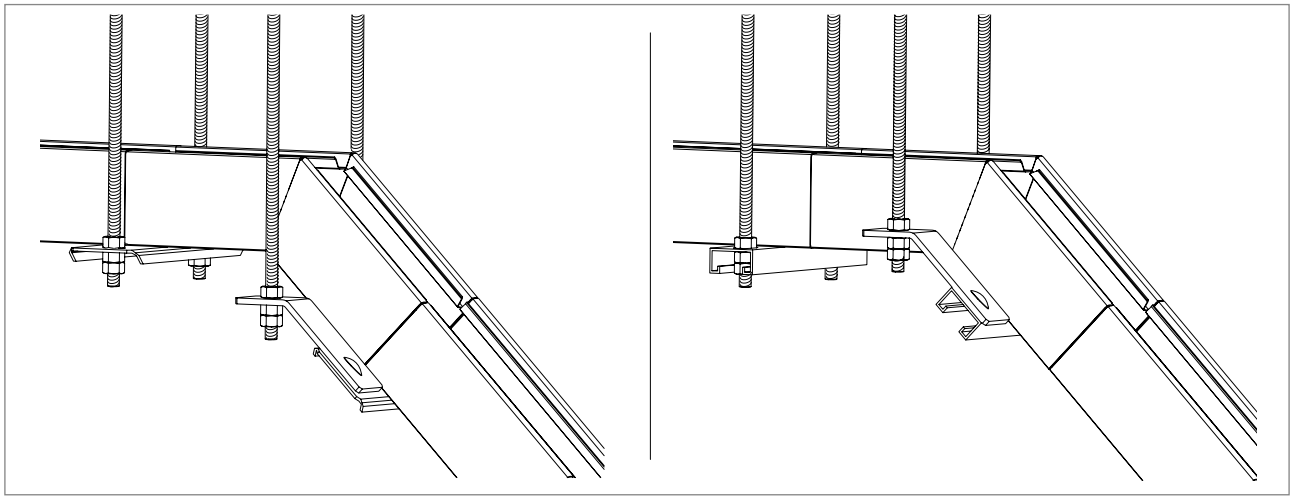


Fig. 24: Mounting fitting

4. Fix the fittings to the fastening points with 2 self-tapping screws each (PLM SF 4x8) on the support profile or truss-head bolts M6 to other support systems.

– Mount joint connector at all joints of the fittings as described in chapter “9 Mounting joint connectors” on page 32.

– Lay cables as described in chapter “10 Routing cables” on page 38.

– Mount duct cover and fitting cover as described in chapter “11 Mounting the duct cover” on page 39.

9 Mounting joint connectors

Note! *Joints between 2 installation ducts as well as between an installation duct and a fitting are produced in the same way for all mounting versions and for all fittings using the connector set type PLM SI....*

Joint connectors ensure the conductivity and mechanical strength of the installation. A joint connector must be mounted at every joint between installation ducts or installation duct and fitting.

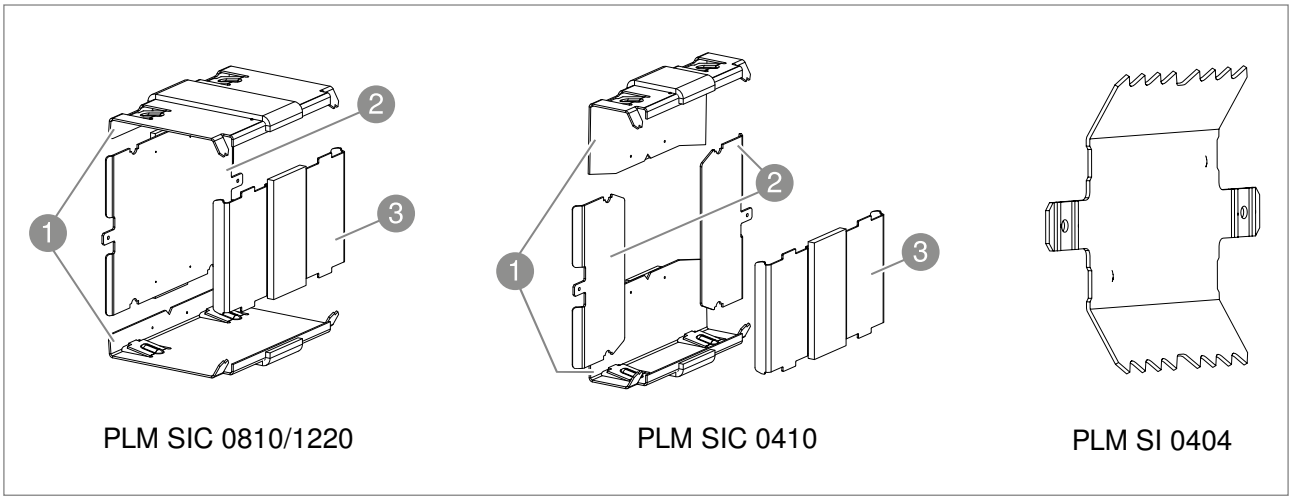


Fig. 25: Joint connection PLM SI...

1 Side section

2 Floor plate

3 Cover support

9.1 Mounting joint connectors for PLM D 0810 and PLM D 1220

– Suitable connector set for PLM D 0810: PLM SIC 0810

– Suitable connector set for PLM D 1220: PLM SIC 1220

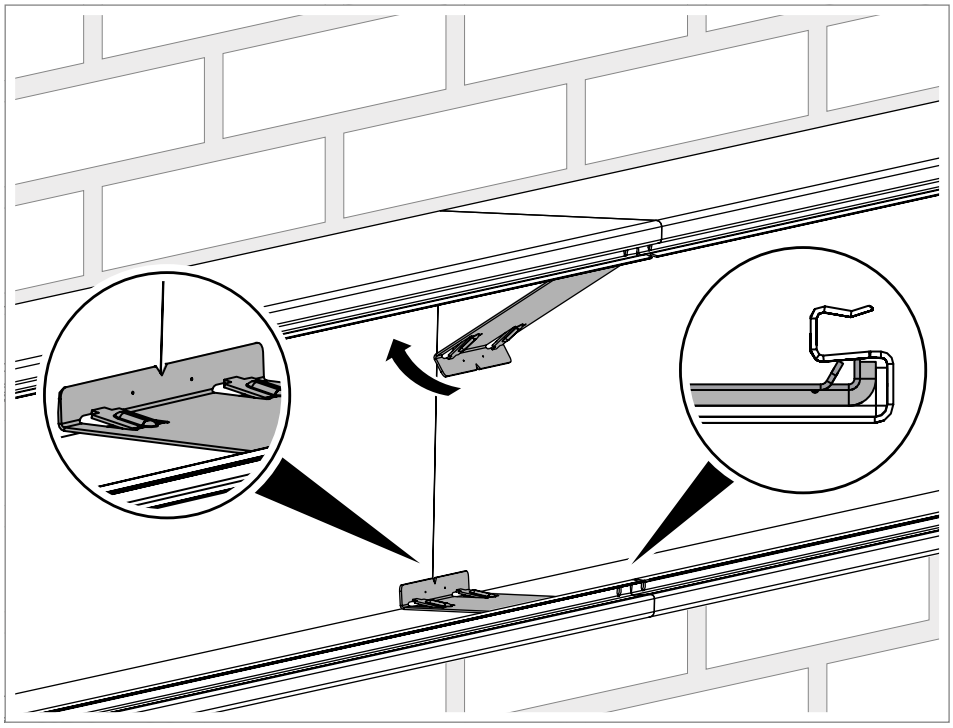


Fig. 26: Inserting the side sections of the connector set

1. Clamp the side sections centrally over the joint behind the closing contour of the installation duct and press onto the duct wall.

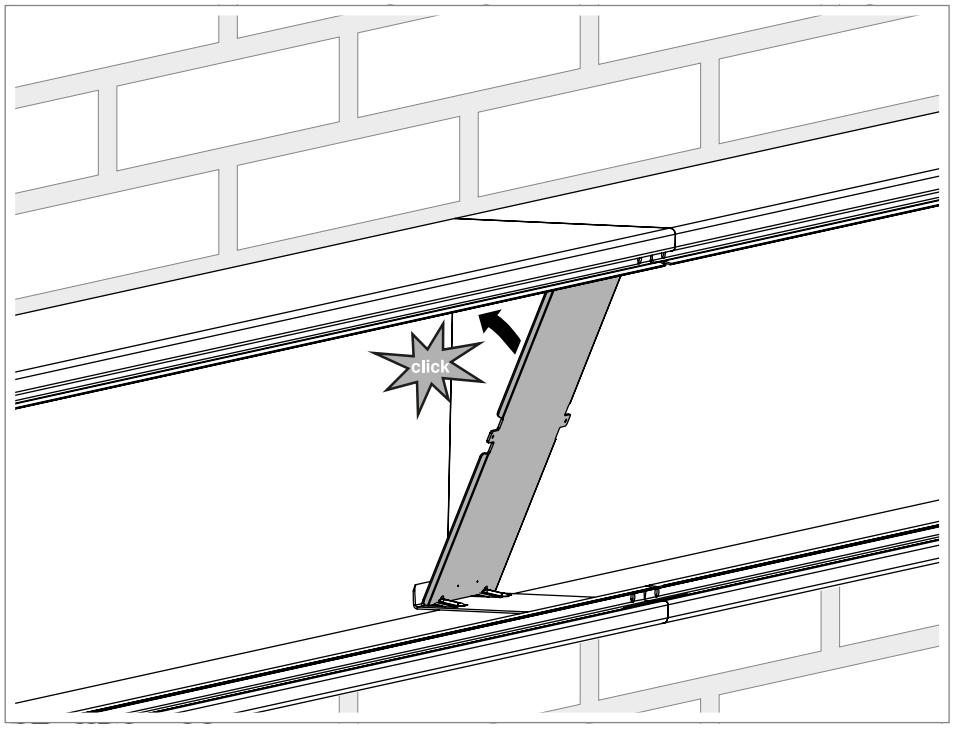


Fig. 27: Inserting the floor plate

2. Position the floor plate on one side with the notches behind the clamp springs of the side section and snap-in to the opposite side section.

Note! *The cover support is used for the cover mounting after the cable assignment, see also chapter “11 Mounting the duct cover” on page 39.*

9.2 Mounting joint connectors for installation duct PLM D 0410

– Suitable connector set for PLM D 0410: PLM SI 0410

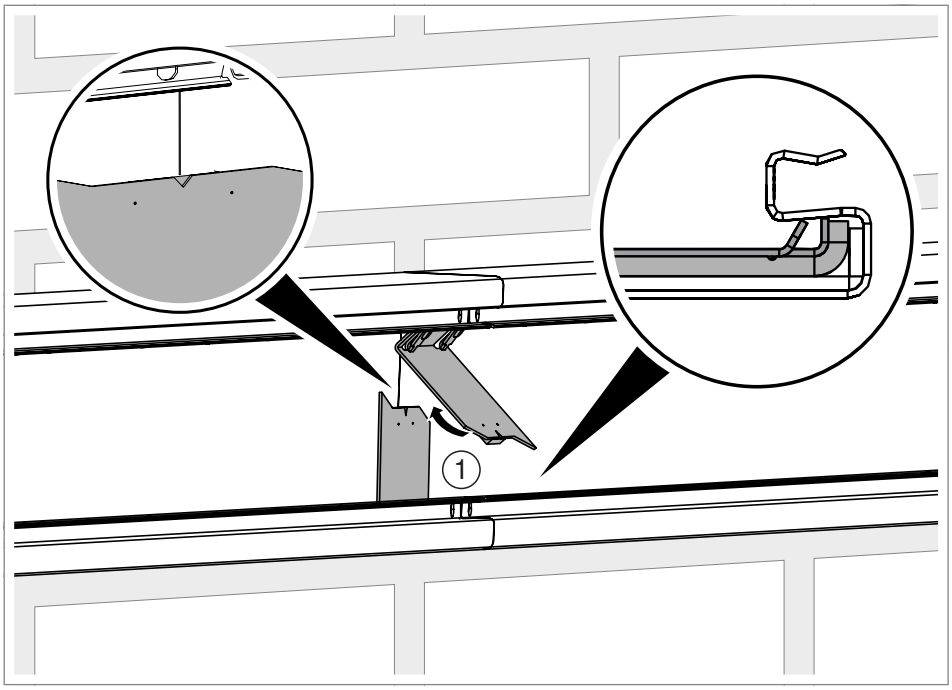


Fig. 28: Inserting the side sections of the connector set

1. Clamp the side sections centrally over the joint behind the closing contour of the installation duct and press onto the duct wall.

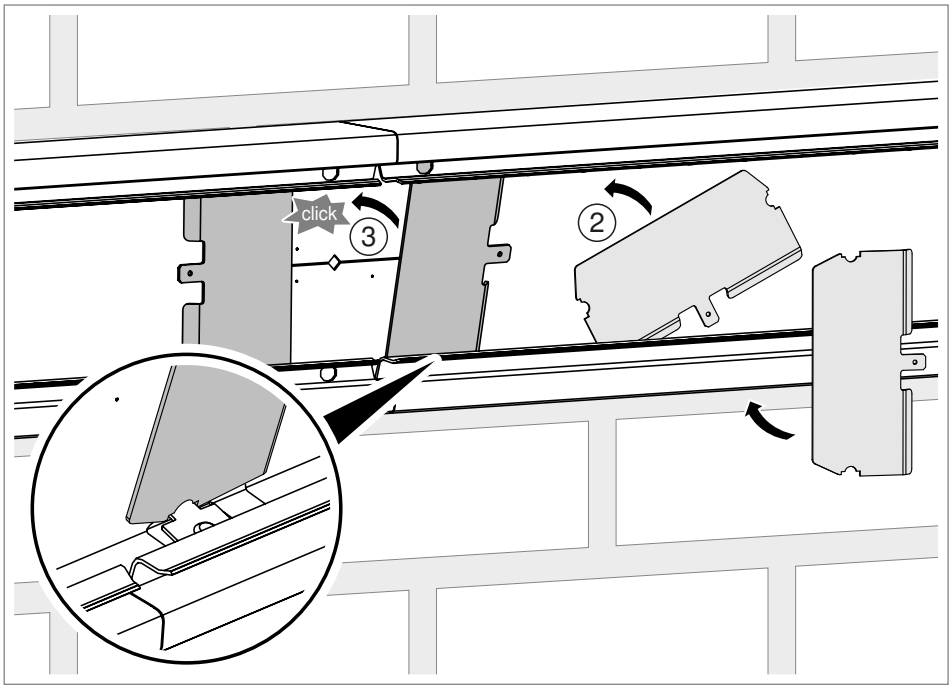


Fig. 29: Inserting the floor plates of the connector set

2. Turn the floor plates slightly to position them in the installation duct.

3. Position the side with the narrow notch below the clamp spring and snap-in to the opposite clamp spring.

Note! *The cover support is used for the cover mounting after the cable assignment, see also chapter “11 Mounting the duct cover” on page 39.*

9.3 Mounting joint connectors for installation duct PLM D 0404

– Mounting suitable connector for PLM D 0404: PLM SI 0404

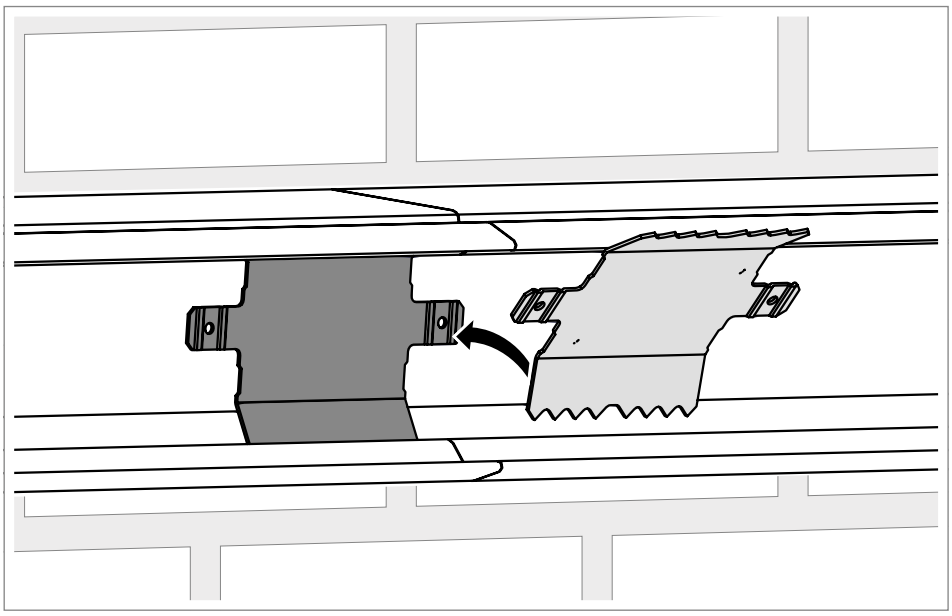


Fig. 30: Mounting connector PLM 0404

1. Insert the joint connector centrally above the joint in the installation duct and press onto the duct wall.

Note! *During cover mounting, after the cable assignment, a foam cable outlet PLM CO 0410 must be inserted at the joint, see also chapter “11 Mounting the duct cover” on page 39.*

9.4 Mounting the joint cover

At joints between two duct sections, a gap may form due to structural factors. The joint cover is used to hide cut duct joint edges. The joint cover can be used anywhere there is a joint, for visual reasons.

Note! *The joint cover does not provide fire resistance or fireproof performance.*

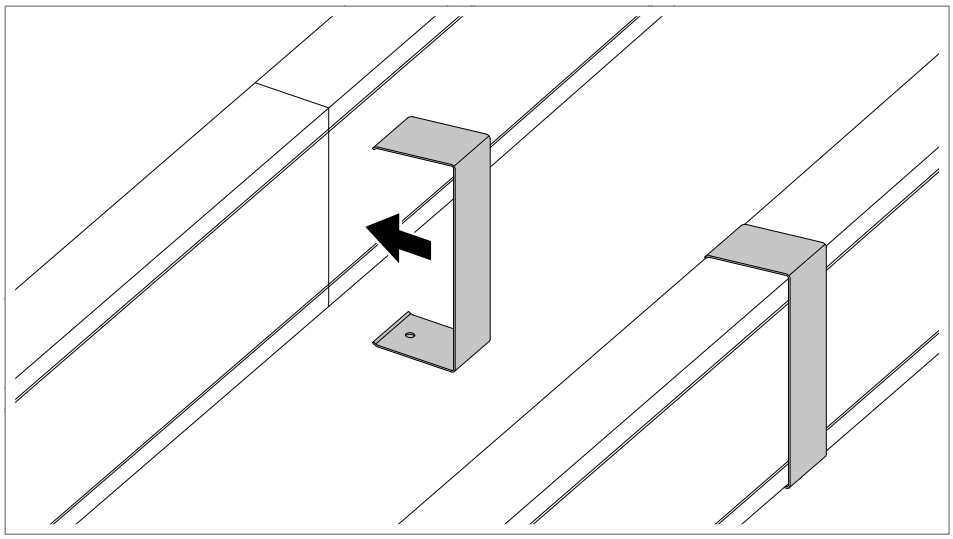


Fig. 31: Attaching joint cover

1. Remove the film from the adhesive strips inside the joint cover.
2. Slide the joint cover straight up to the desired joint and press down at the level of the adhesive strips.

10 Routing cables

WARNING

Loss of bearing capacity and function!
The maximum approved cable load is 20 kg per running duct metre. Do not exceed the total load, as otherwise the support and function capability is no longer guaranteed.

When filling the installation duct system, lay the cables in if possible and do not pull them in.

If it is not possible to lay in the cables, observe the following information when pulling in the cables:

– Use a suitable pulling apparatus to pull the cables inside in a straight direction. Use an appropriate aid at the start of the cable (e.g. cable stocking, cable pulling eye).

– Use suitable steering rollers to pull the cables around bends and T branch pieces, in order to avoid damage to the duct system and cable insulation.

– Never pull cables over sharp edges to exclude the risk of insulation errors.

– Comply with the tensile forces and minimum bend radii specified by the cable manufacturer.

11 Mounting the duct cover

Duct covers and fitting covers are mounted in exactly the same way. Mounting is described using the duct cover as an example.

Note! *If possible, always install the duct cover offset from the joint of the base (duct trough).*

11.1 Mounting the duct cover for PLM D 0410, PLM D 0810 and PLM D 1220

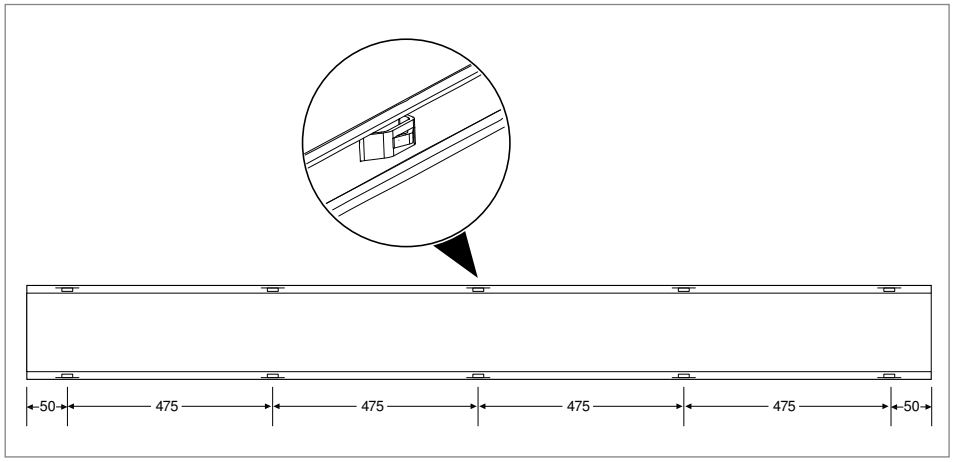


Fig. 32: Number and spacing of the latching beads in the duct cover

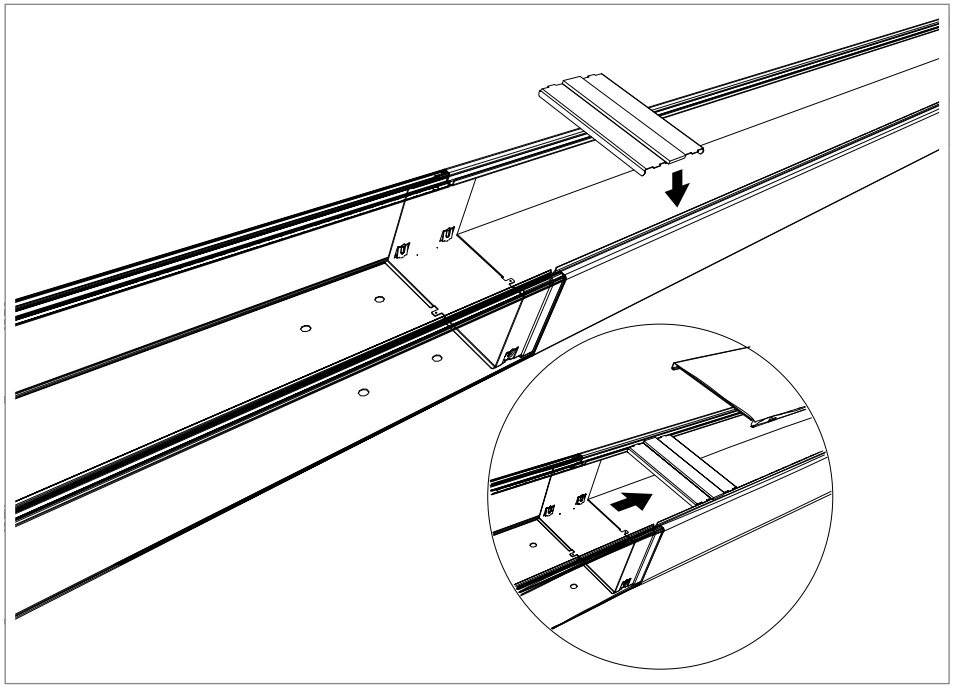


Fig. 33: Inserting cover support offset from duct joint

1. Insert the cover support at the required position in the installation duct.

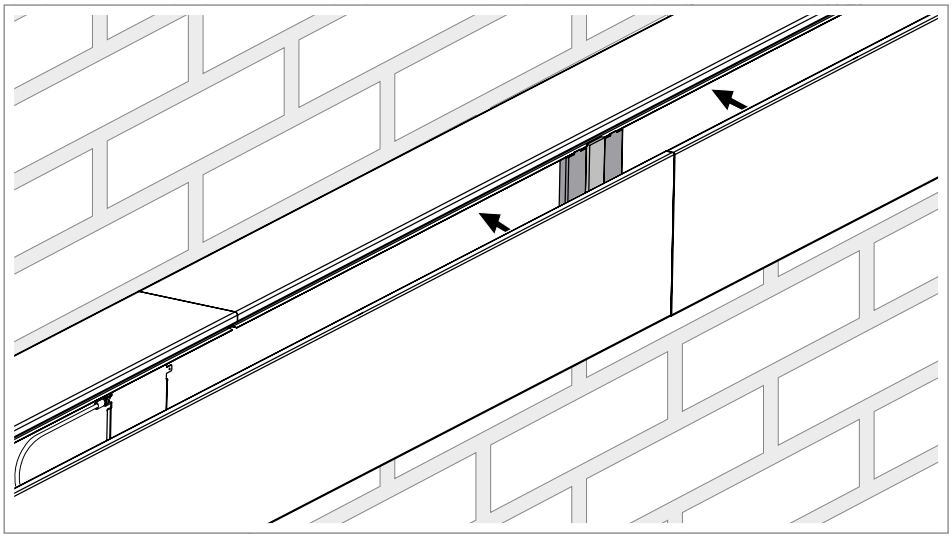


Fig. 34: Snapping-in the duct cover offset

2. Snap-in the duct cover centrally above the cover support.

11.2 Mounting the duct cover for shortened PLM D 0410, PLM D 0810 and PLM D 1220

1. With shortened duct covers, insert locking brackets on both sides at a distance of 50 mm to the cut ends if no latching beads remain in the area from 0 mm to 50 mm.

2. Attach the locking brackets at the top and push them back with a flat screwdriver.

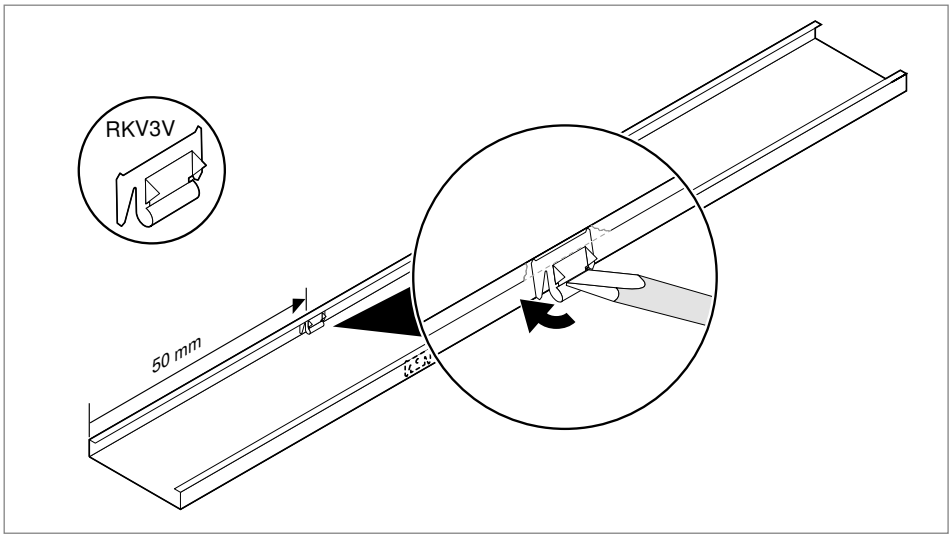


Fig. 35: Inserting a locking bracket on the shortened duct cover

Note! *Additional locking brackets can be reordered under item no. 6288700.*

Note! *During shortening, only shorten the duct cover if possible, and not the fitting cover. This automatically results in the ideal offset of the joint in*

the installation duct with that in the cover.

11.3 Mounting the duct cover for PLM D 0404

For adequate flue gas tightness, a foam cable outlet PLM CO 0410 must be inserted at every duct joint and the required cover joint.

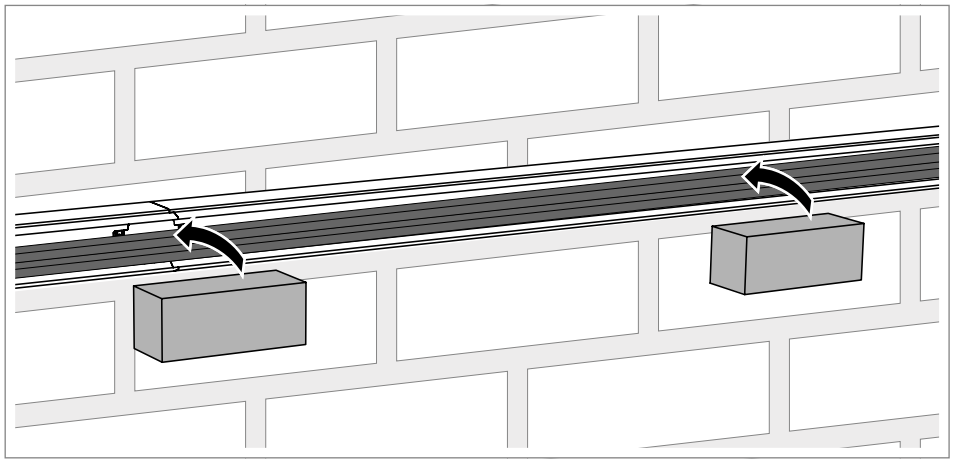


Fig. 36: Inserting the foam cable outlet

1. Insert the foam cable outlet at the duct joint.
2. Insert the foam cable outlet at the required cover joint.

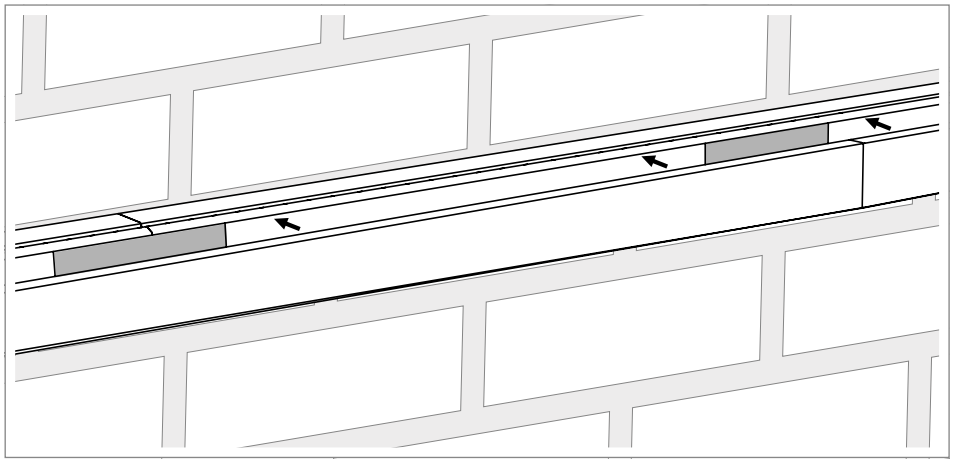


Fig. 37: Snapping-in the duct cover offset

3. Snap-in the duct cover centrally above the foam cable outlet.

12 Creating cable outlets

12.1 Creating an individual outlet

Individual cable outlets can be made on the duct bases with V-TEC cable glands made of brass or polyamide in diameters up to M50.

Note! *Cable outlets cannot be created in the area of a joint connector. The distance between a cable outlet and a wall/ceiling penetration must be at least 750 mm.*

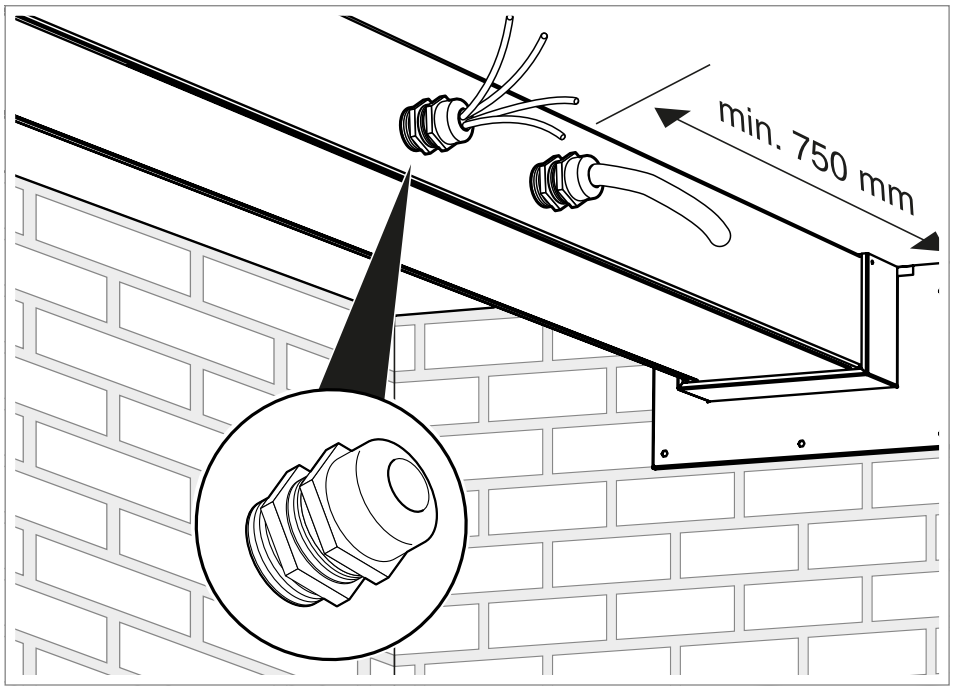


Fig. 38: Creating individual cable outlets

1. Create the openings in the installation duct/fitting with a step drill and deburr them carefully.

2. Attach the cable gland.

12.2 Creating multiple cable outlets

Use foam seal PLM CO... to run several cables or whole cable bundles out of the end of the duct.

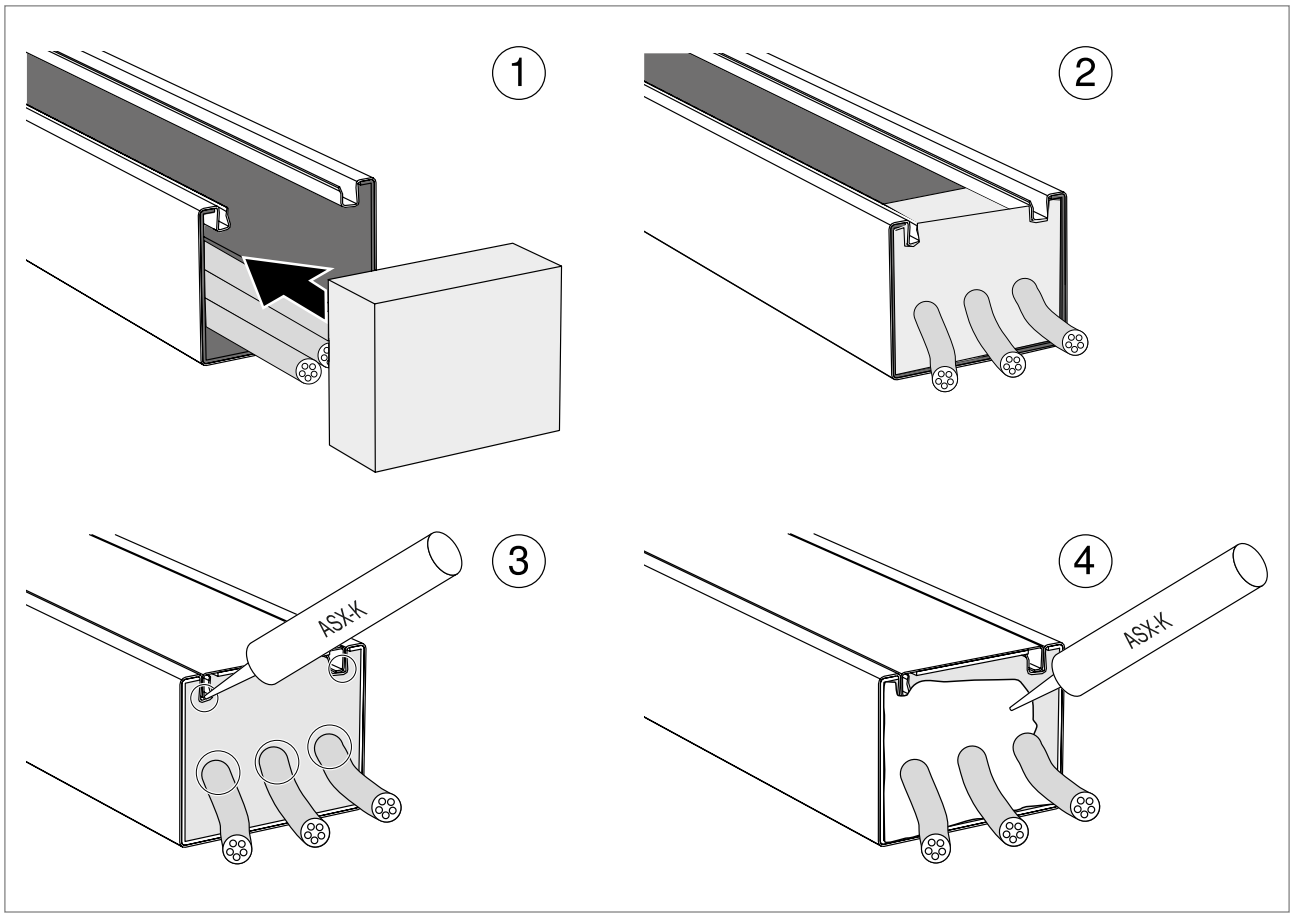


Fig. 39: Multiple cable outlet

Note! *The distance between a multiple outlet to a wall/ceiling penetration must be at least 500 mm.*

1. Push the foam seal fully into the installation duct.
2. Create openings (e.g. by drilling) and run the cables through individually, or adjust the foam seal to the existing installation with a knife.
3. Attach the duct cover and seal the residual openings fully with ASX.
4. Fully seal the surface of the foam seal in this way with ASX, creating a dry layer thickness of ≥ 1 mm.

12.3 Creating a rear-side cable outlet

With installation ducts that are fastened on the rear side to a solid wall or ceiling, create an opening on the rear side and use it as a cable outlet (see Fig. 41).

Note! *If a classified insulation system is used, observe the maximum opening sizes for the wall or ceiling indicated in the proof of application.*

Choose a maximum opening size of the rear cable outlet so that the length a is a maximum of 250 mm and a minimum strut width b of 20 mm (PLM D 0410, PLM D 0810, PLM S 1220) or 5 mm (PLM D 0404) remains to the side wall of the installation duct.

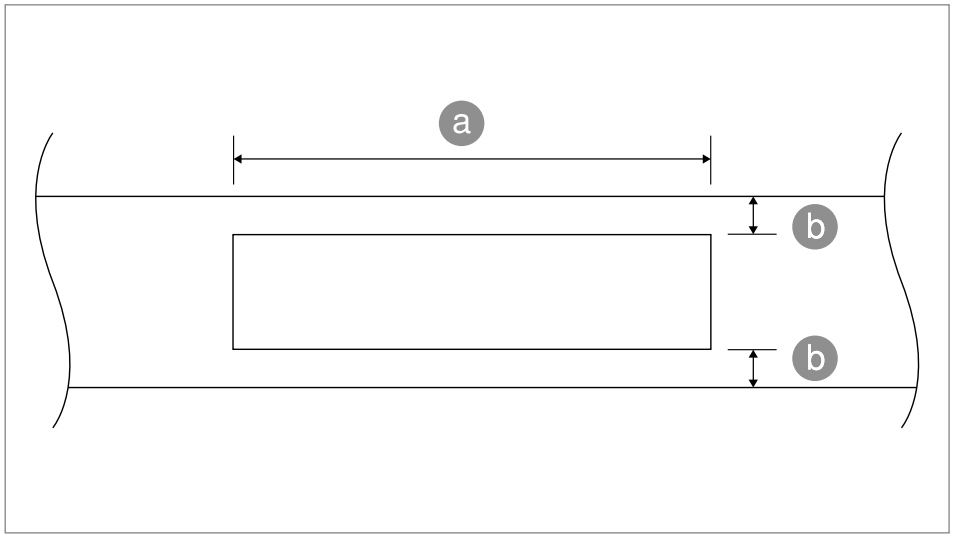


Fig. 40: Opening size of the rear-side cable outlet

1. Create an opening on the rear side of the duct, e.g. with a step drill for round openings or with an angle grinder for rectangular openings.
2. Carefully deburr the edges.
3. Run the core drill hole through the masonry.
4. Pass the cables through.
5. Seal the component opening with a suitable insulation system in order to restore the original state of the component's classification.

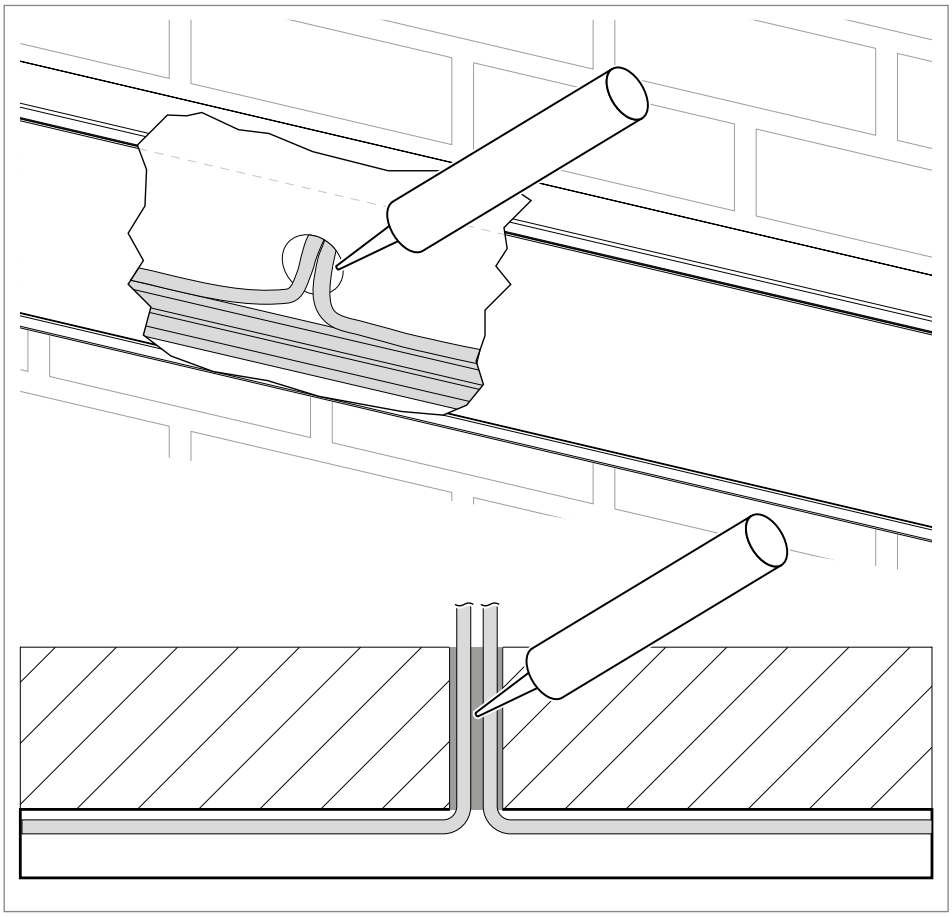


Fig. 41: Sealing the rear-side cable outlet

12.4 Junction with PLM D 0404

In order to route branch lines to consumers, a junction can be created with the PLM D 0404 installation duct for direct wall and ceiling mounting.

Note! *A junction can be created with the installation duct PLM D 0404 for mounting on a support system.*

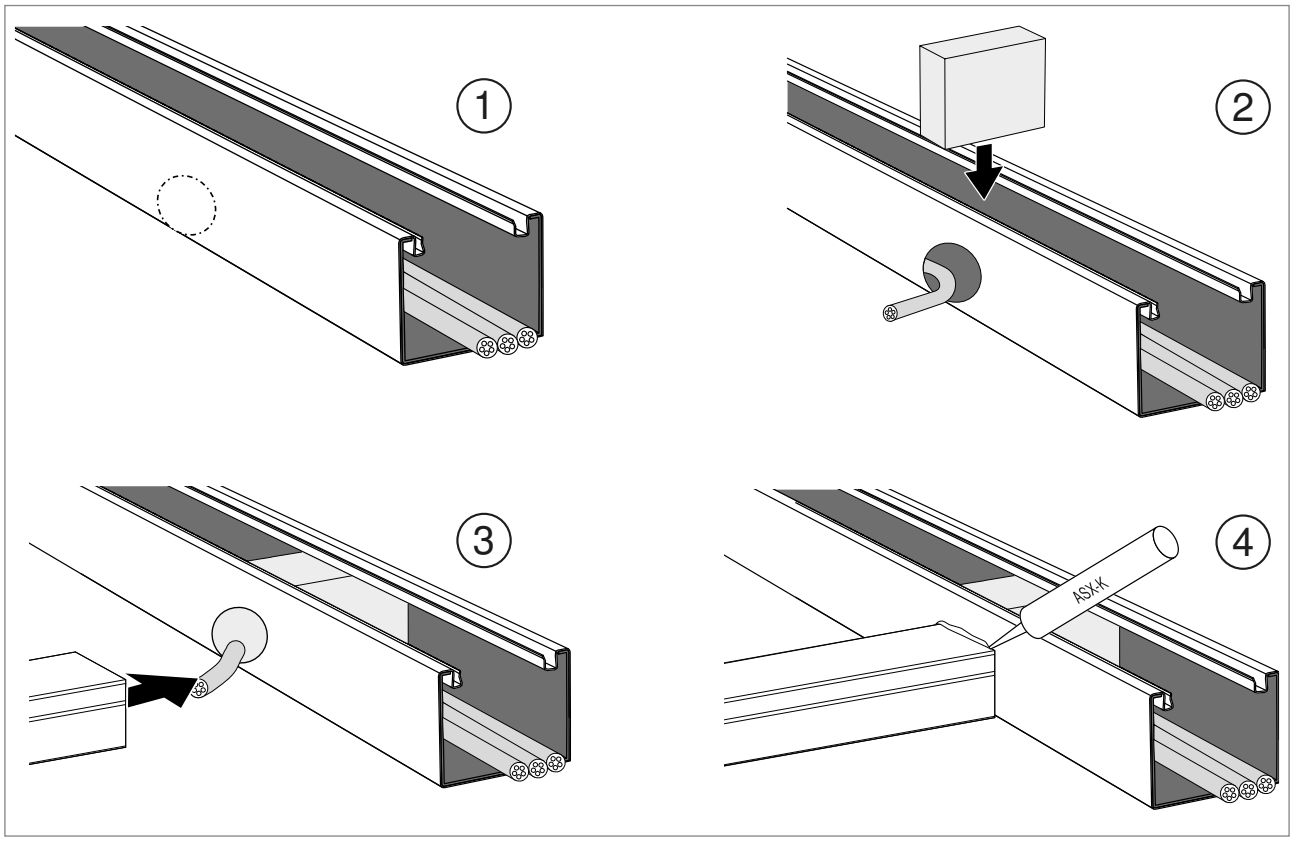


Fig. 42: Junction with PLM D 0404

1. Create an opening < 40 x 40 mm for the junction in the side wall of the installation duct and carefully deburr.
2. Insert foam seal PLM CO....
3. Install installation duct PLM D 0404 immediately in front of the duct opening.
4. Fully seal the joint with ASX.

13 Wall connection and wall penetration

Wall connections and wall penetrations must be designed differently depending on the fire resistance duration and component opening.

Note! *The wall connections and wall penetrations are shown using the example of a suspended installation on support systems. For other mounting methods, mounting must be arranged in the same way.*

Note! *Lightweight partitions and solid walls must be at least 100 mm thick.*

13.1 Arrangement in the component opening

If the component opening is larger than the duct cross-section, the installation duct can be connected to, or passed through, the wall symmetrically or asymmetrically. The minimum and maximum edge distances between the installation duct and the component opening must be respected, depending on the classification.

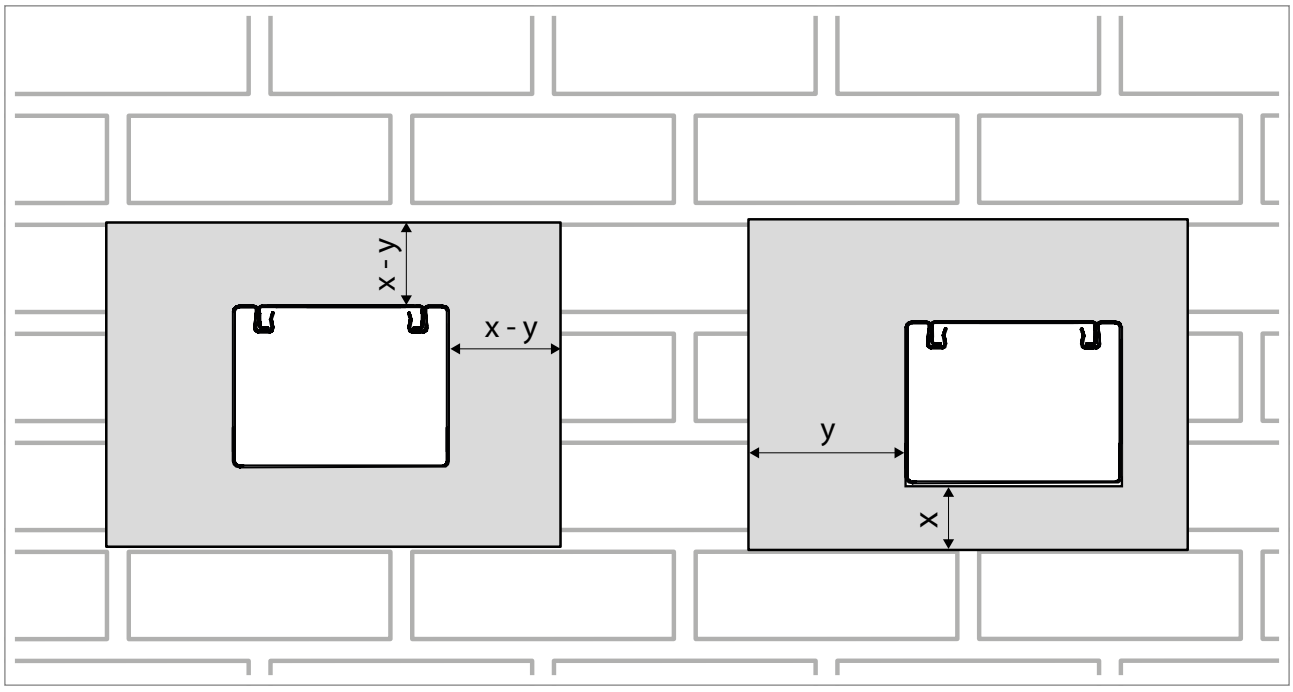


Fig. 43: Symmetric and asymmetric arrangement for the wall connection or wall penetration

Classification	x	y
EI30-EI60	≥ 10 mm	≤ 50 mm
EI30-EI90		≤ 30 mm

13.2 Wall connection versions

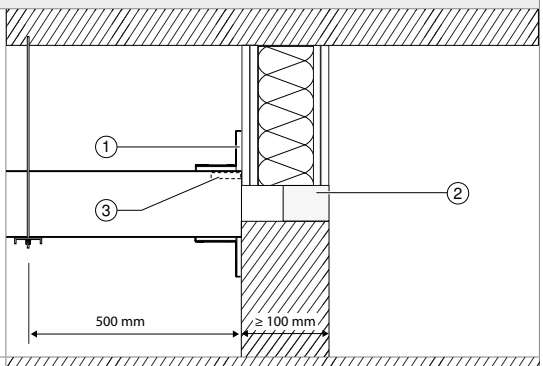
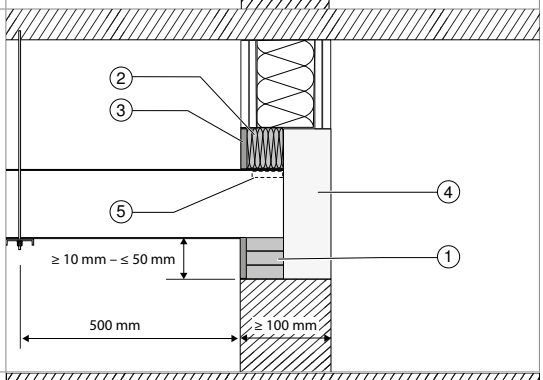
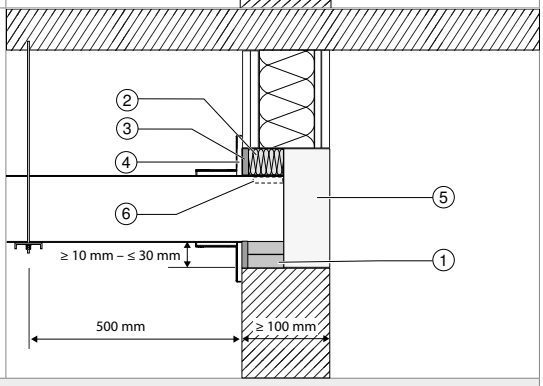
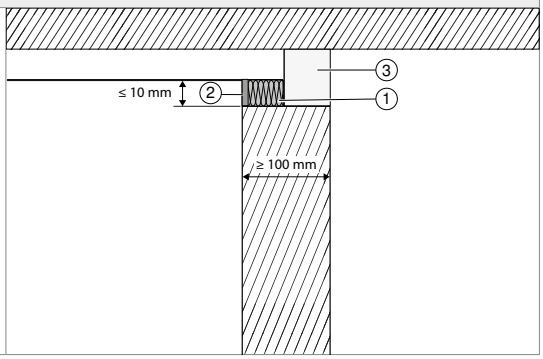
No.	Mounting situation		Version for	
PLM D 0410, PLM D 0810, PLM D 1220				
1	Component opening < duct	EI30-EI90	① Wall connection collar ② Insulation seals component opening ③ Cover support (for mounting variants with overlying cover)	
2	Component opening < duct	EI30-EI60	① Mineral fibre plates, density ≥ 90 kg/m³ ② Stuffing wool ≥ 250 kg/m³ in remaining opening ③ Filler ≥ 2 mm ④ Insulation seals component opening ⑤ Cover support (for mounting variants with overlying cover)	
3	Component opening < duct	EI30-EI90	① Mineral fibre plates, density ≥ 90 kg/m³ ② Stuffing wool ≥ 250 kg/m³ in remaining opening ③ Filler ≥ 2 mm ④ Wall connection collar ⑤ Insulation seals component opening ⑥ Cover support (for mounting variants with overlying cover)	
PLM D 0404				
4	Component opening > duct	EI30-EI90	① Stuffing wool ≥ 250 kg/m³ in remaining opening ② Filler ≥ 2 mm ③ Insulation seals component opening	

Fig. 44: Wall connection

13.3 Wall penetration versions

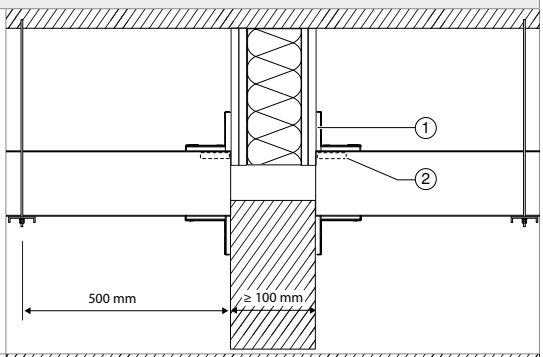
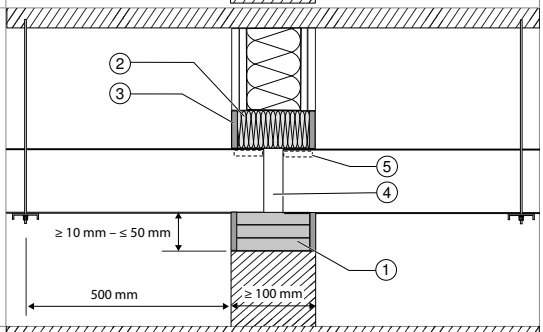
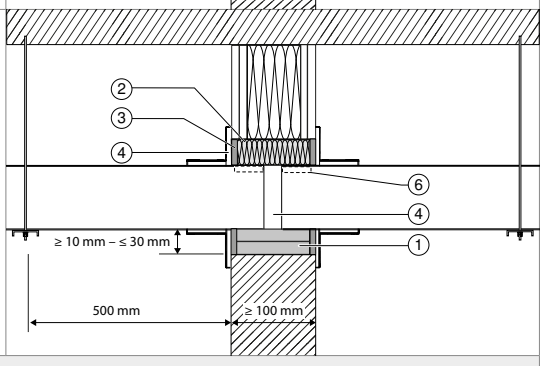
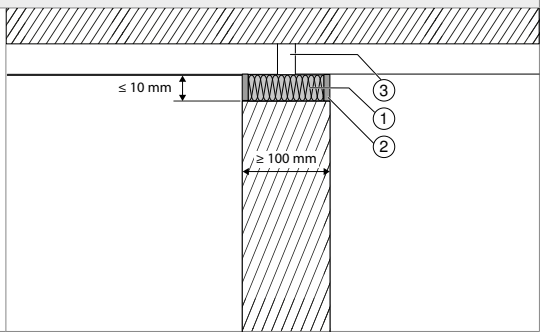
No.	Mounting situation		Version for	
PLM D 0410, PLM D 0810, PLM D 1220				
5	Component opening > duct	EI30-EI90	① Wall connection collar on both sides ② Cover support (for mounting variants with overlying cover)	
6	Component opening > duct	EI30-EI60	① Mineral fibre plates, density ≥ 90 kg/m³ ② Stuffing wool (≥ 250 kg/m³) in remaining opening ③ Filler ≥ 2 mm ④ Gap 5–10 mm ⑤ Cover support (for mounting variants with overlying cover)	
7	Component opening > duct	EI30-EI90	① Mineral fibre plates, density ≥ 90 kg/m³ ② Stuffing wool (≥ 250 kg/m³) in remaining opening ③ Filler ≥ 2 mm ④ Wall connection collar ⑤ Gap 5–10 mm ⑥ Cover support (for mounting variants with overlying cover)	
PLM D 0404				
8	Component opening > duct	EI30-EI90	① Stuffing wool ≥ 250 kg/m³ in remaining opening ② Filler ≥ 2 mm ③ Gap 5–10 mm	

Fig. 45: Wall penetration

13.4 Wall connection collar versions

If a wall connection collar is required for the wall connection or wall penetration, a 2-, 3- or 4-sided wall connection collar is available for the different installation variants:

Wall connection collar PLM WC...

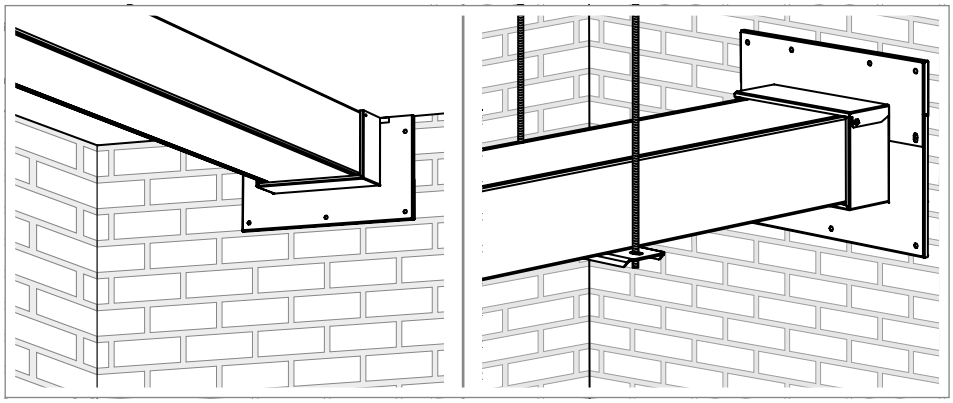


Fig. 46: Wall connection collar PLM WC... 3-sided and 4-sided

– 3-sided for direct wall or ceiling mounting

– 4-sided for mounting on support systems

Wall connection collar set PLM CC...

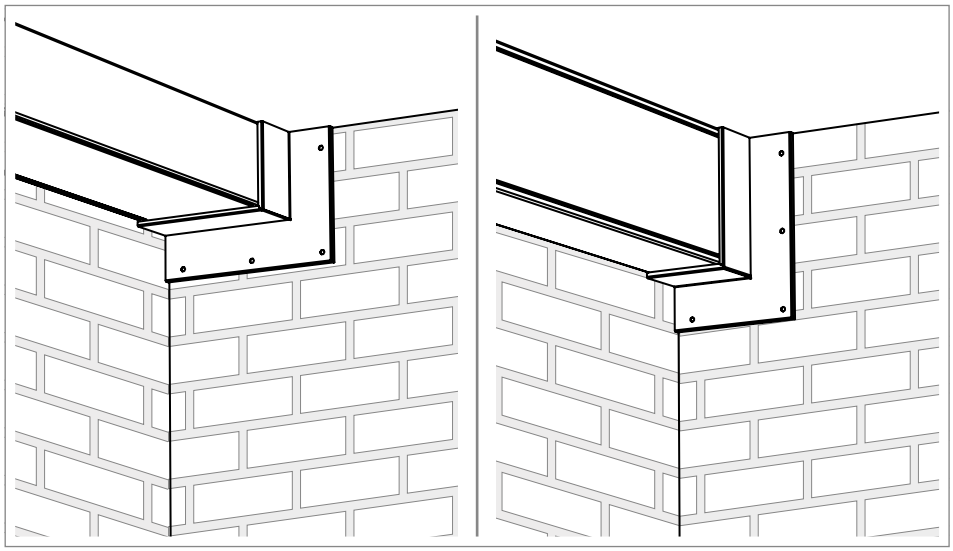


Fig. 47: Wall connection collar set 2-sided

– Set of 2 wall connection collars 2-sided for corner mounting

13.5 Creating a wall connection

Note! *The installation steps are shown using the example of an EI90 classification and a component opening larger than the installation duct. The installation steps and sequence for the other versions are to be carried out according to the information in Fig. 39 and Fig. 42.*

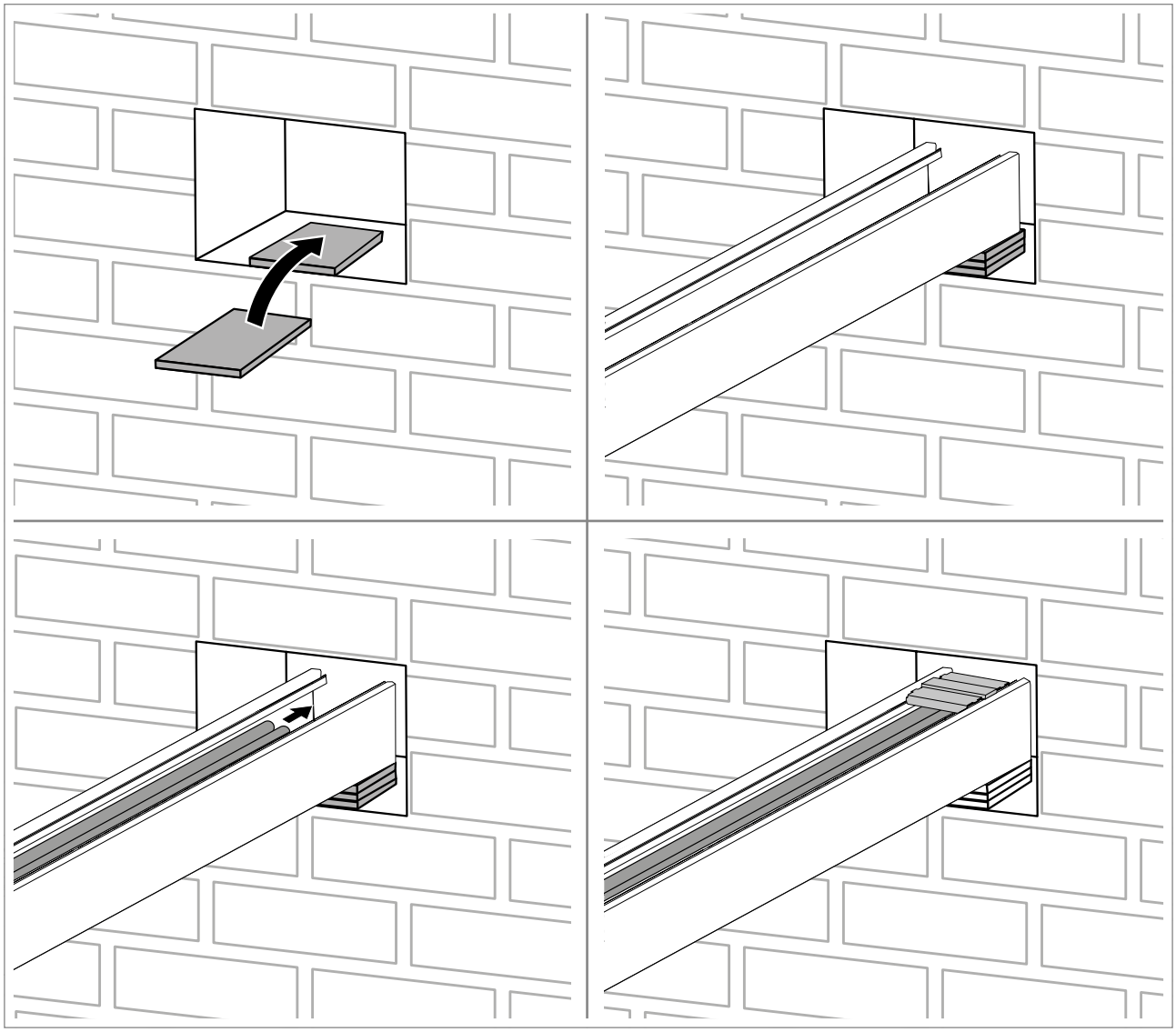


Fig. 48: Installing ducts

1. Place mineral fibre plates on the lower reveal of the component opening across the width of the installation duct.
2. Install the installation duct and place in the component opening on the mineral fibre plates.
3. Lay in the cable, see also chapter “10 Routing cables” on page 38.
4. Insert cable support at the duct end.
5. Seal the installation duct with the duct cover, see also chapter “11 Mounting the duct cover” on page 39.

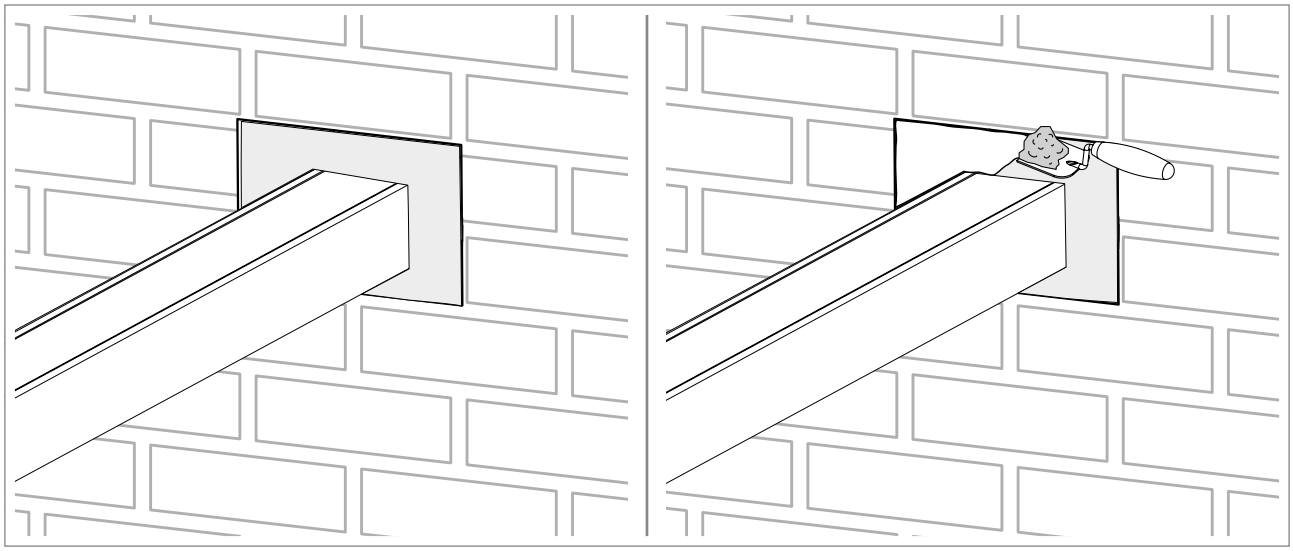


Fig. 49: Sealing the remaining opening

6. Seal the complete remaining opening with stuffing wool, density ≥ 250 kg/m^3

7. Completely seal the stuffing wool surface with filler, dry layer thickness ≥ 2 mm.

8. Transfer the fixing holes of the wall connection collar to the substrate and pre-drill them according to the type of substrate.

Note! *Drilling depth and drill hole diameter according to the approval of the fire protection-tested fastening material, see also chapter “6.2 Recommended fastening materials” on page 16.*

Note! *The wall connection collar can be fixed to lightweight partitions using the drywall screw KRS 6x30 (3498100). Fastening by pushing through threaded rods is not required.*

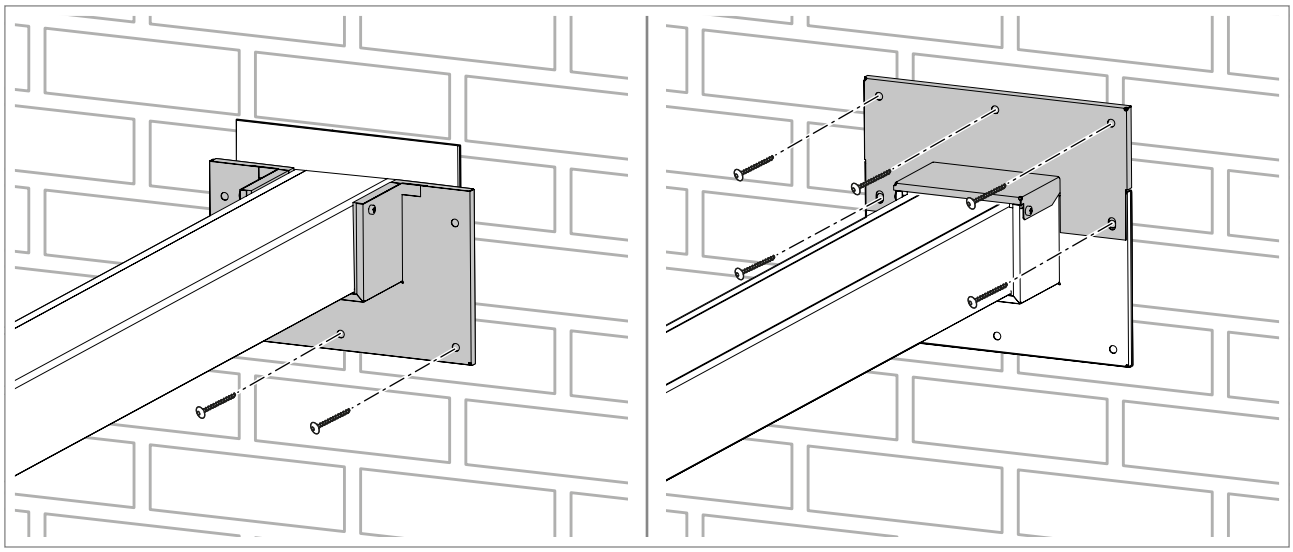


Fig. 50: Mounting the wall connection collar

9. Place the wall connection collar on 3 sides around the installation duct from below and fasten it to the 3 lower fastening points.

10. Place the cover for the 4-sided wall connection collar on the installation duct from above and fasten.

Note! *No cover is required with 3-sided and 2-sided wall connection collars. Place the wall connection collar around the installation duct and fasten all fastening points.*

Note! *Seal the component opening from the other side with an approved insulation or, for a wall penetration, carry out the installation on the other side in exactly the same way. There must be a gap of 5–10 mm between the fire protection ducts in the component opening to prevent heat transfer from installation duct to installation duct in the event of fire.*

14 Ceiling connector

Ceiling connectors are only permissible for solid ceilings with a thickness of 150 mm and a component opening smaller than the duct cross-section.

The ceiling connector is executed identically for all fire resistance classes.

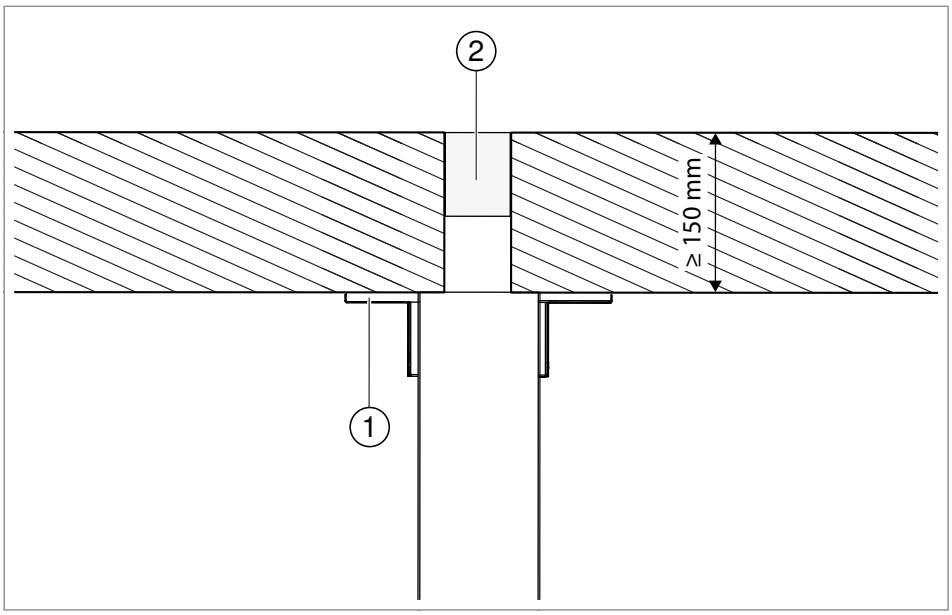


Fig. 51: Ceiling connector EI30-EI90

1. Let the installation duct butt-up in front of the wall.
2. Mount the wall connection collar ① as in Fig. 50.
3. Seal the component opening from the other side with an approved insulation ②.

15 Protection measures for metal fire protection ducts

15.1 Protective conductor connection

For safety and EMC reasons, it makes sense to protect the fire-resistant installation ducts from indirect contact.

Note! *Arrange the cover joints offset on the bases to ensure clean contacting. The system installer must ensure that the continuity of the protective measure is ensured. Check protective measure.*

Note! *If duct covers are shortened on-site, additional locking brackets may be required to fix the duct cover and to create the equipotential bonding, see also chapter 11.2 on page 40.*

Note! *Joint connectors are self-contacting, so no additional PE connection cable is required after mounting. A protective conductor connection only has to be established once anywhere throughout the entire installation.*

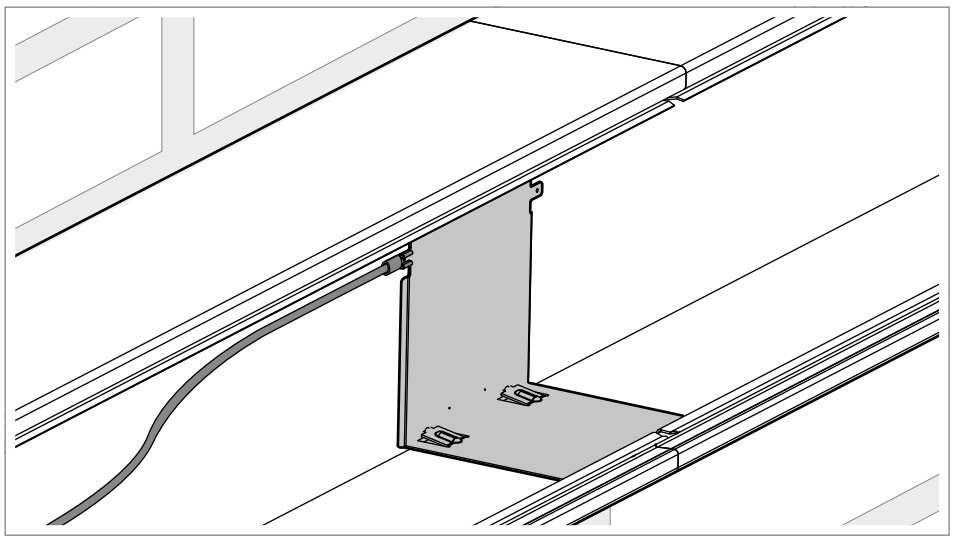


Fig. 52: Protective conductor connection to the internal connector

1. Connect the protective conductor to the flat connector.
2. Connect the flat connector to the mounting clamp of the joint connector (plug width 6.3 mm) anywhere in the installation.

16 Completing mounting

16.1 Identification plate

For IT reasons, it makes sense to label the fire-resistant installation duct with an identification plate.

The identification plate contains the following information, which must be completed by the installer:

– Installed system

– Fire resistance class

– Year of construction

Note! *If the installation duct with a pure white surface is installed, for visual reasons, the identification plate can be attached on the inside of the installation duct.*

Attach the identification plate as follows:

– Clearly visible

– Directly on the installation duct or on the wall next to the installation duct

– At least in every storey, ideally in each construction segment

Fig. 53: Identification plate

16.2 Declaration of conformity

National specifications – Germany:

According to Annex 4 Section 8.3MVV-TB, the installer is obliged to confirm the proper installation in accordance with the mounting instructions in the form of the declaration of conformity after the installation of the fire-resistant installation duct system. The declaration of conformity and the mounting instructions must be handed over to the client.

A template for the declaration of conformity can be found in the annex to these mounting instructions.

17 Maintaining the system

The PYROLINE® Rapid installation duct is maintenance-free.

Carry out a visual inspection of the installation duct as part of the inspection of the electrical systems. Replace any duct parts that may be damaged.

Function is guaranteed as part of the external monitoring procedure in accordance with ETA.

18 Dismantling the system

Dismantling of all the elements of the installation duct system takes place in the reverse order to mounting.

19 Disposing of the system

National laws and regulations must be observed for disposal.

Disposal during mounting

– The residual material of the installation duct and the mortar can be disposed of as mixed construction site waste.

– Dispose of the residual material of the support system, as well as separating retainers, separating clamps and brackets, in the same way as scrap metal.

Disposal during building demolition

– The fire protection ducts must be disposed of as mixed construction waste.

– The support systems, as well as separating retainers, separating clamps and brackets, must be disposed of in the same way as scrap metal.

Disposal after a fire

WARNING

Danger of falling components!
If there is a fire, support systems and fastenings of the installation duct can be massively impaired in their function and can fall. Falling components can cause serious injuries. During disposal, proceed with extreme caution. Before dismantling, check components for instability. Wear safety shoes and a helmet.

CAUTION

Irritant effect!
If there is a fire, burning cable insulation can create corrosive gases, which have an irritant and corrosive effect. When disposing of fire protection ducts which have been subjected to a fire, wear breathing protection and protective clothing.

If the PYROLINE® Rapid installation duct has suffered fire damage, the complete installation duct must be replaced. If the fire damage occurred in an installation duct, then check whether a replacement of the support system is necessary. In all other cases, the support system must be replaced.

We recommend obtaining the advice of a local fire damage restorer during disposal.

20 Technical data

Type	Designation	Dimensions [mm]	Surface finish	Item no.
Installation duct				
PLM D 0404	Installation duct	40 x 40 x 2,000	FS	7218000
			Pure white; RAL 9010	7218002
PLM D 0410	Installation duct	40 x 100 x 2,000	FS	7218004
			Pure white; RAL 9010	7218006
PLM D 0810	Installation duct	80 x 100 x 2,000	FS	7218008
			Pure white; RAL 9010	7218010
PLM D 1220	Installation duct	120 x 200 x 2,000	FS	7218012
			Pure white; RAL 9010	7218014
Fittings				
PLM EC 0410	External corner	320 x 100 x 320	FS	7218038
			Pure white; RAL 9010	7218040
PLM EC 0810	External corner	320 x 100 x 320	FS	7218042
			Pure white; RAL 9010	7218044
PLM EC 1220	External corner	370 x 200 x 370	FS	7218046
			Pure white; RAL 9010	7218048
PLM IC 0410	Internal corner	290 x 100 x 290	FS	7218050
			Pure white; RAL 9010	7218052
PLM IC 0810	Internal corner	330 x 100 x 330	FS	7218054
			Pure white; RAL 9010	7218056
PLM IC 1220	Internal corner	330 x 200 x 330	FS	7218058
			Pure white; RAL 9010	7218060
PLM FA 0410	Flat angle	350 x 350 x 40	FS	7218062
			Pure white; RAL 9010	7218064
PLM FA 0810	Flat angle	350 x 350 x 80	FS	7218066
			Pure white; RAL 9010	7218068
PLM FA 1220	Flat angle	350 x 350 x 120	FS	7218070
			Pure white; RAL 9010	7218072
PLM TB 0410	T branch piece	500 x 300 x 40	FS	7218074
			C	7218076
PLM TB 0810	T branch piece	500 x 300 x 80	FS	7218078
			Pure white; RAL 9010	7218080
PLM TB 1220	T branch piece	500 x 400 x 120	FS	7218082
			Pure white; RAL 9010	7218084
PLM BR 0810	45° bend, rising	435 x 100 x 257	FS	7218114
			Pure white; RAL 9010	7218116
PLM BR 1220	45° bend, rising	422 x 200 x 291	FS	7218118
			Pure white; RAL 9010	7218120
PLM BF 0810	45° bend, falling	455 x 100 x 197	FS	7218106
			Pure white; RAL 9010	7218108
PLM BF 1220	45° bend, falling	498 x 100 x 215	FS	7218110
			Pure white; RAL 9010	7218112
PLM RP 0810	Reduction	360 x 100 x 80	FS	7218098
			Pure white; RAL 9010	7218100
PLM RP 1220	Reduction	160 x 200 x 120	FS	7218102
			Pure white; RAL 9010	7218104

Type	Designation	Dimensions [mm]	Surface finish	Item no.
PLM CC 0410	Wall connection collar set	85 x 175 x 117	FS	7218134
			Pure white; RAL 9010	7218136
PLM CC 0810	Wall connection collar set	85 x 175 x 157	FS	7218138
			Pure white; RAL 9010	7218140
PLM CC 1220	Wall connection collar set	85 x 275 x 197	FS	7218142
			Pure white; RAL 9010	7218144
PLM WC 0410	Wall connection collar	85 x 253 x 193	FS	7218122
			Pure white; RAL 9010	7218124
PLM WC 0810	Wall connection collar	85 x 253 x 233	FS	7218126
			Pure white; RAL 9010	7218128
PLM WC 1220	Wall connection collar	85 x 253 x 273	FS	7218130
			Pure white; RAL 9010	7218132
PLM SI 0404	Joint connector	54 x 39 x 5	BK	7218027
PLM SIC 0410	Joint connector	118 x 94 x 38	FS	7218029
PLM SIC 0810	Joint connector	118 x 94 x 78	FS	7218031
PLM SIC 1220	Joint connector	118 x 194 x 118	FS	7218033
PLM LS 100	Cover support	65 x 110 x 9	FS	7218034
PLM LS 200	Cover support	165 x 110 x 9	FS	7218036
PLM EP 0410	End piece	105 x 20 x 41	FS	7218086
			Pure white; RAL 9010	7218088
PLM EP 0810	End piece	105 x 21 x 81	FS	7218090
			Pure white; RAL 9010	7218092
PLM EP 1220	End piece	205 x 20 x 121	FS	7218094
			Pure white; RAL 9010	7218096
Accessories				
PLM CO 0410	Foam seal	40 x 40 x 100	-	7218158
PLM CO 0810	Foam seal	80 x 40 x 100	-	7218160
PLM CO 1220	Foam seal	120 x 40 x 200	-	7218162
PLM WB 0410	Cable clamp, wall	22 x 60 x 49	FS	7218152
PLM WB 0810	Cable clamp, wall	62 x 60 x 49	FS	7218154
PLM WB 1220	Cable clamp, wall	102 x 60 x 132	FS	7218156
PLM CB 0410	Cable clamp, ceiling	44 x 40 x 22	FS	7218146
PLM CB 0810	Cable clamp, ceiling	44 x 45 x 62	FS	7218148
PLM CB 1220	Cable clamp, ceiling	94 x 45 x 102	FS	7218150

Type	Designation	Dimensions [mm]	Surface finish	Item no.
PLM LI 100	Installation duct cover	12 x 77 x 2,000	FS	7218020
			Pure white; RAL 9010	7218022
PLM LI 200	Installation duct cover	12 x 177 x 2,000	FS	7218024
			Pure white; RAL 9010	7218026
PLM SU 100	Support profile	200 x 67 x 12	FS	7218164
			Pure white; RAL 9010	7218166
PLM SU 200	Support profile	300 x 67 x 12	FS	7218168
			Pure white; RAL 9010	7218170
PLM SV 0404	Joint cover	44.6 x 30 x 42.6	FS	7218172
			Pure white; RAL 9010	7218174
PLM SV 0410	Joint cover	40.9 x 30 x 102.6	FS	7218176
			Pure white; RAL 9010	7218178
PLM SV 0810	Joint cover	80.9 x 30 x 102.6	FS	7218180
			Pure white; RAL 9010	7218182
PLM SV 1220	Joint cover	120.9 x 30 x 202.6	FS	7218184
			Pure white; RAL 9010	7218186
IP PYL EN	Identification plate	250 x 43	-	7214741

Tab. 4: Technical data

Confirmation of installation

Name and address of the company that carried out the mounting of the installation duct

Construction project and building

Creation date

It is hereby confirmed that the fire-resistant installation duct (subject of approval) has been completed and erected professionally with respect to all details and in compliance with the Declaration of Performance No. 05-DOP-016, all provisions of the European Technical Assessment No. ETA. 22/0096 from 20.04.2022, as well as the mounting instructions dated 01/2025.

Place, date

Stamp and signature

This confirmation must be given to the client for forwarding, if necessary, to the responsible construction supervisory board.

OBO Bettermann Holding GmbH & Co. KG
P.O. Box 1120
58694 Menden
GERMANY

Technical Office
Tel.: +49 (0)2373 89-1300

technical-office@obo.de

www.obo-bettermann.com

Date 01/2025

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Building Connections