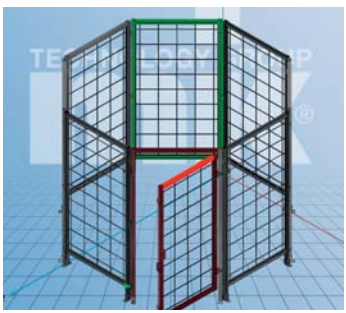
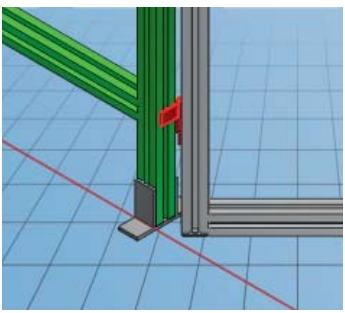
Notes on Guarding

www.mk-group.com/en/guarding

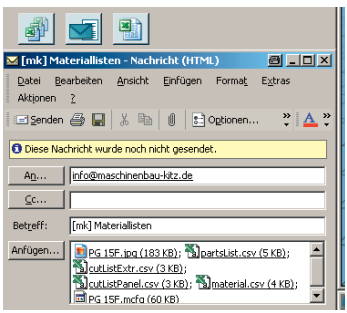
Guarding Configurator



- Reduce your development and design time
- Large selection of panelling materials and door variants
- Standardised components for reduced costs
- No CAD system or CAD knowledge necessary
- Design in three dimensions with intuitive user guidance



- Option to import DXF layouts
- Export 3D drawings to IGES, STEP and JPEG format
- Automatically generate saw lists, weight estimates and bills of materials for individual parts and assemblies
- Choose your preferred degree of assembly (raw material/ assemblies/turnkey)



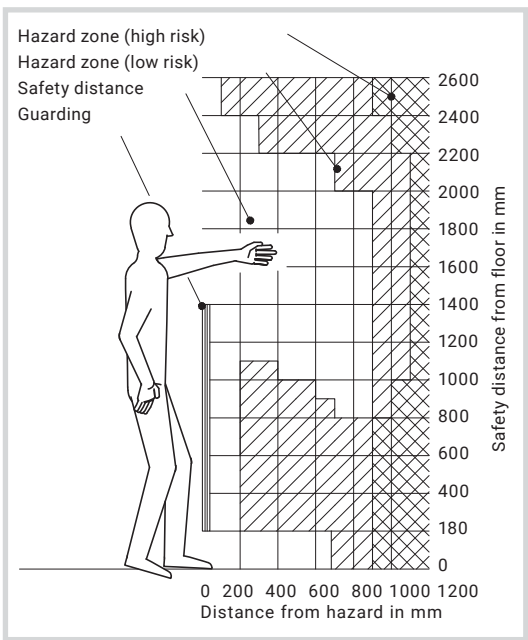
- Posts and partitions can be connected at variable angles from 0° bis 135°
- Automatic determination of support brackets
- Full/half support brackets and end caps can be manually selected and combined
- Pillar-panel solution: End cap options allows for quick disassembly using straight plate fasteners

Safety Distances

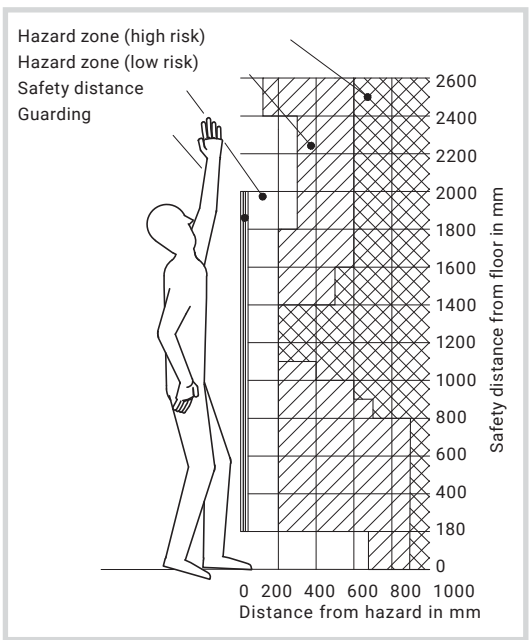
Our guarding has a flexible, modular design to allow you to secure your systems, machines and production areas effectively and economically. Choose from a wide range of machine housings, protective fences, panelling, doors and windows, all of which can be electronically secured if desired. It is also a cinch to connect pneumatically, hydraulically or electrically operated door elements to your machine control system. All mk guarding is designed and manufactured in accordance with the safety standards applicable in your country. You can be sure that you and your employees are always on the safe side.

Legally mandated safety distances to hazards are defined to ensure safety. Choose the appropriate panelling for your required safety distance. Closed panelling such as sheet metal, polycarbonate or glass have a required safety distance of 0 mm. Open panelling such as welded grids or wire meshes have a required safety distance of 200 mm (for 40 x 40 mm openings). With the preferred partition method, standard frame heights of 1400/2000 mm and 1460/2060 mm are available according to the height of your particular hazard. Custom heights are available on request.

Distance from hazard for 1400 mm frame height

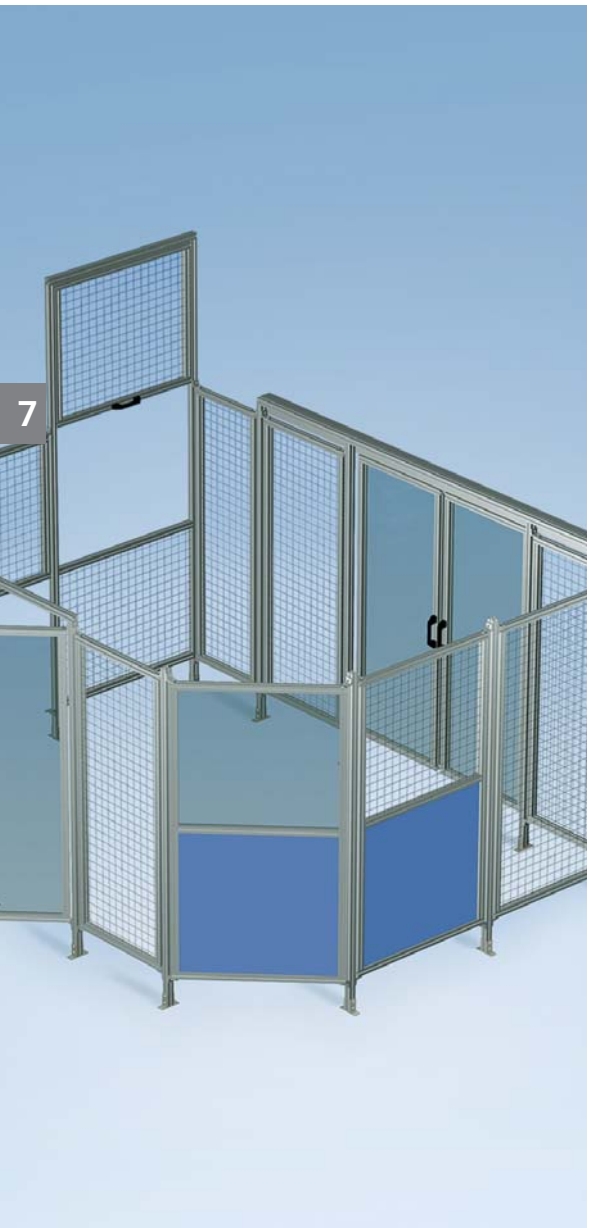


Distance from hazard for 2000 mm frame height



These distances are in accordance with the DIN EN ISO 13857:2008-06 standard (Safety distances to prevent hazard zones being reached by upper and lower limbs).

Notes on Guarding



7

» Machine housings and protective fences for increased occupational safety. «

Our guarding range is based on the mk profile system and offers functional machine housings, enclosures and protective fences. Their flexible, modular design ensures that systems, machines and production areas can be secured effectively and economically.

The System Selection section below shows the three possible variants. The partition method is the preferred method and the standard design used by mk. Therefore, the various modules are shown in full only for the partition method in the following section.

The various methods are based on the same grid dimensions. This ensures that all systems remain modular and compatible. mk also offers custom solutions tailored to our customers' specific needs.

The floor clearance of the guarding is 180 mm as standard, which allows for floor cleaning without compromising safety. The profile structure's favourable mass-to-strength ratio offer ergonomic benefits when handling and installing the elements.

System Selection

ECO Solution

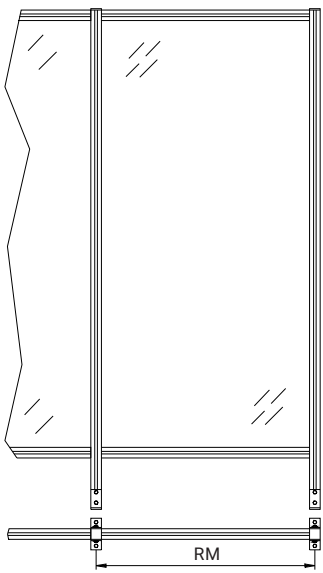
Because it requires less material, the ECO solution is the most cost-effective alternative, but it requires significantly more installation work. mk therefore prefers the partition method, since the individual partitions can be quickly and easily installed on site.

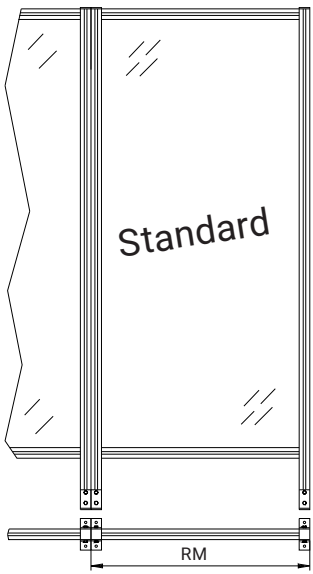
Partition Method

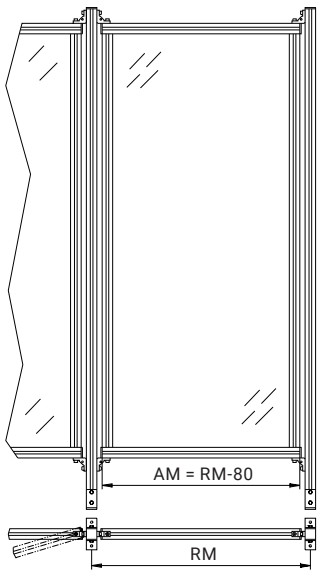
The partition method, which is the standard at mk, is an economical, sturdy and easy-to-install type of guarding. Because of the flush connections between the partitions, this method is excellently suited for both long, straight paths and for designs with variable angles.

Pillar-Panel Solution

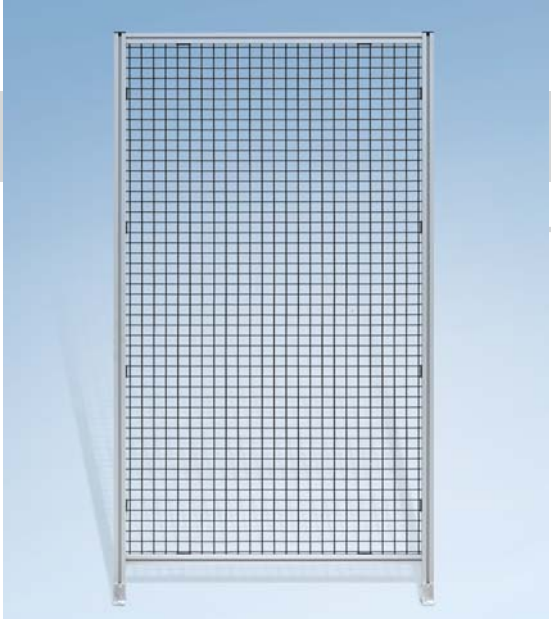
The pillar-panel solution features separate panel frames that are mounted between posts anchored to the floor. This allows you to easily remove individual partitions, and the captive fastening system allows you to do so in accordance with the Machinery Directive.





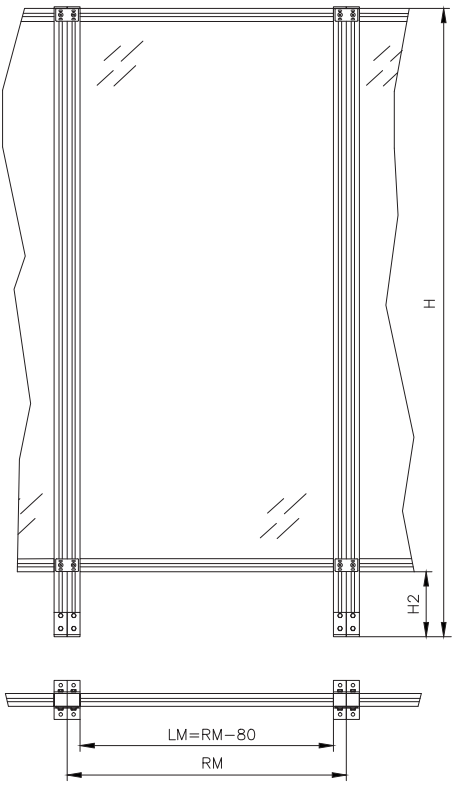


AM = outer dimension RM = grid dimension



Panelling starting on page 232
Corner blocks on page 95

Fastening example



LM = clear dimension
RM = grid dimension

Partitions

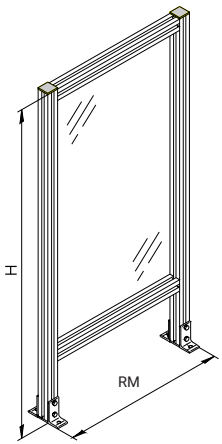
... for the Partition Method

Our standard partitions and doors for the partition method are presented below, each with a fastening example. Plate fastening is the preferred method for connecting a partition to the adjacent partitions. The heights and grid dimensions can be adapted to customer-specific requirements.

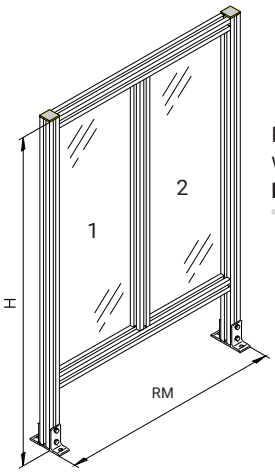
Information required for ordering

- RM (500, 750, 1000, 1250 as standard, also 1500 and 2000 mm with vertical brace)
- H (2060 or 1460 mm as standard)
- H2 (180 mm as standard)
- H4 (optional for partitions with horizontal brace)
- Panelling

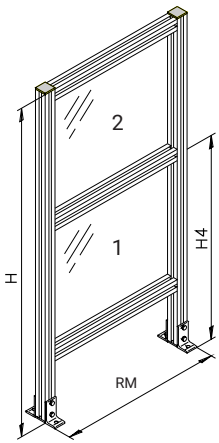
The panelling (e.g. polycarbonate) must be specified when ordering; otherwise the assemblies (B...) will be delivered without panelling.



Simple partition
B69.51.001



Partition
with vertical brace
B69.51.003



Partition
with horizontal brace
B69.51.002

Assemblies (B...):

mk 2040.31 profile, connecting elements, support brackets, end caps, panelling (if specified when ordering, otherwise none).

Panelling starting on page 232
Locks starting on page 256

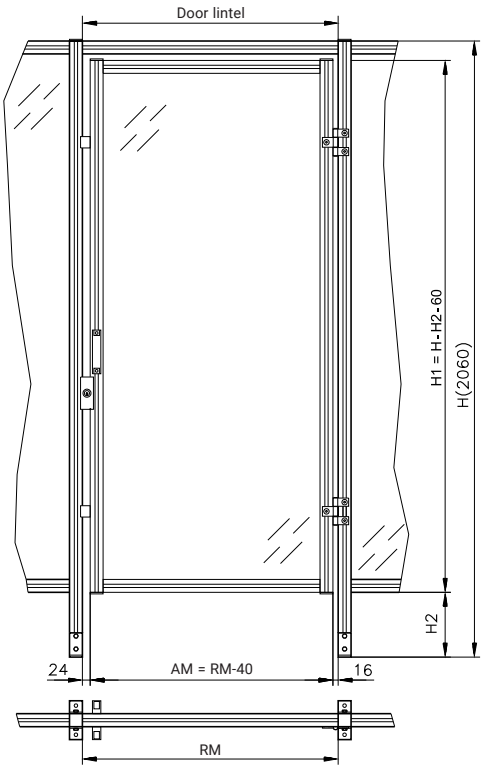
Swing Doors

... for the Partition Method

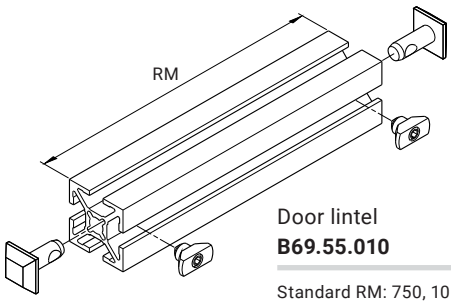
A swing door is connected to the sides of partitions using hinges. The door lintel that connects the partitions provides the necessary stability. It can be used for both single-leaf and double-leaf swing doors.

The dimensions of the doors can be selected freely. The standard height from floor level is 2000 mm; based on the standard brush height of 180 mm, this means H1 = 1820 mm. Various panelling options, lock types and safety interlocks are available.

Fastening example



AM = outer dimension of swing door
RM = grid dimension between two partitions

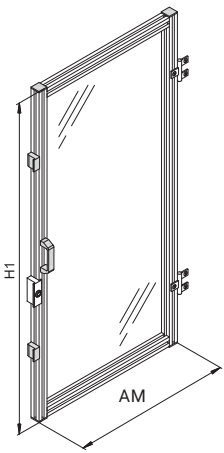


Door lintel
B69.55.010

Standard RM: 750, 1000, 1250, 1500, 2000 mm

Assemblies (B...):
mk 2040.40 profile, connecting elements

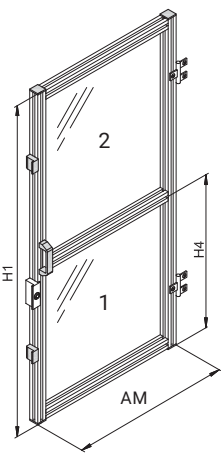
Single Swing Doors



Swing door, single-leaf

DIN right
B69.60.001

DIN left
B69.60.002



Swing door, single-leaf with horizontal brace

DIN right
B69.60.003

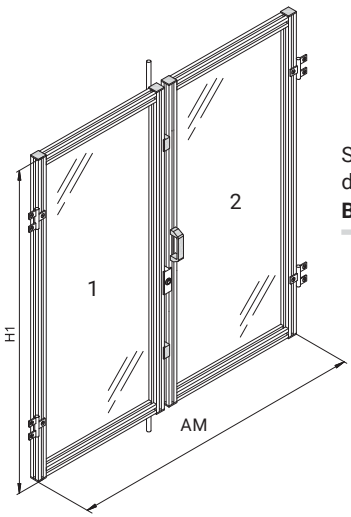
DIN left
B69.60.004

Assemblies (B...):

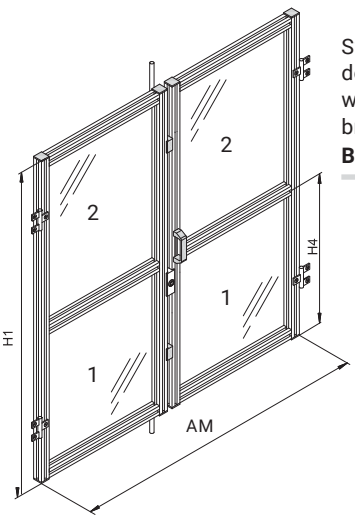
mk 2040.40 profile, connecting elements, stops, handles, end caps, hinges, lock, panelling (if specified when ordering, otherwise none).

Double Swing Doors

Double swing doors are equipped with additional interlocks on the top and bottom.



Swing door, double-leaf
B69.60.005



Swing door, double-leaf with horizontal brace
B69.60.006

Information required for ordering

- RM, H1, H4 optional, panelling, lock type

Sliding Doors

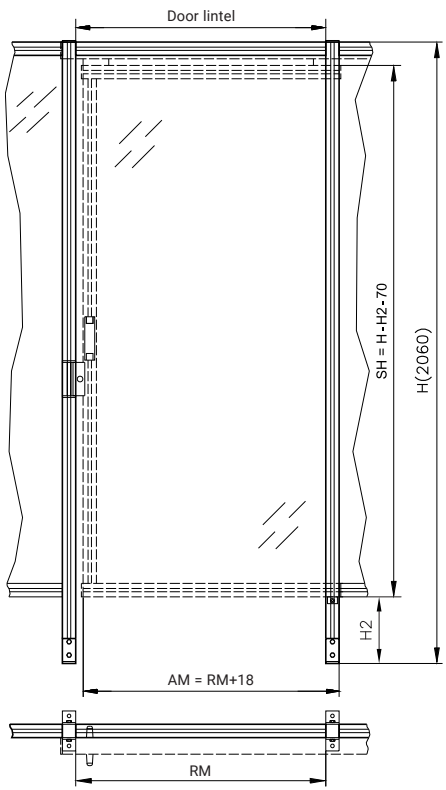
... for the Partition Method

The combination of track and B38.00.045 roller carriage provides an extremely sturdy sliding mechanism while also offering the benefits of a closed rail system. As with swing doors, sliding doors are mounted on the sides of two partitions, which are connected by the door lintel included in the assembly.

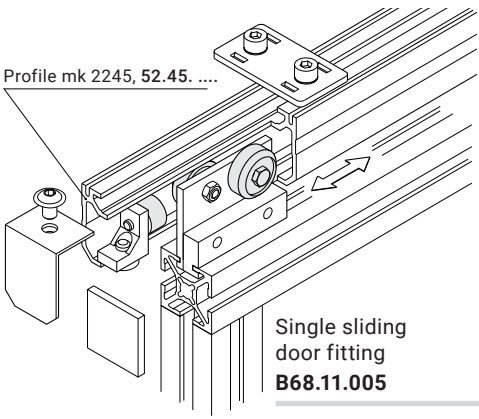
Panelling starting on page 232
Locks starting on page 256

7

Fastening example



AM = outer dimension of sliding door
RM = grid dimension
SH = sliding door height



Single sliding door fitting
B68.11.005

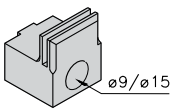
L = 2 x RM + 40

Double sliding door fitting
B68.11.006

L = 4 x RM + 40

Sliding door roller carriage
B38.00.045

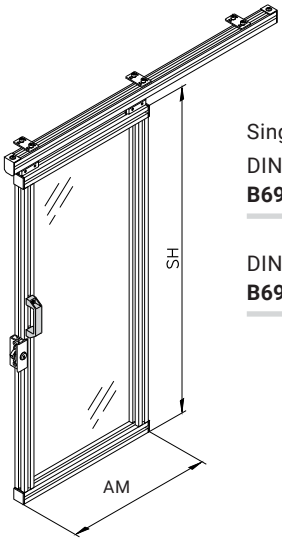
Max. 30 kg



M8x25

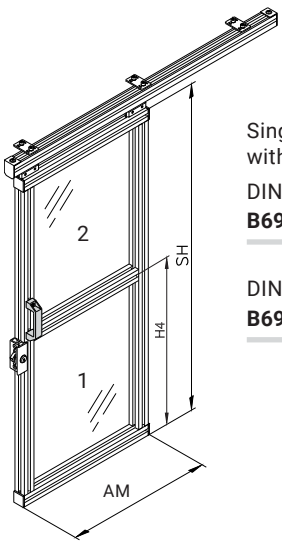
Guide piece
19.00.0005

Black plastic



Single sliding door
DIN right
B69.61.015

DIN left
B69.61.016

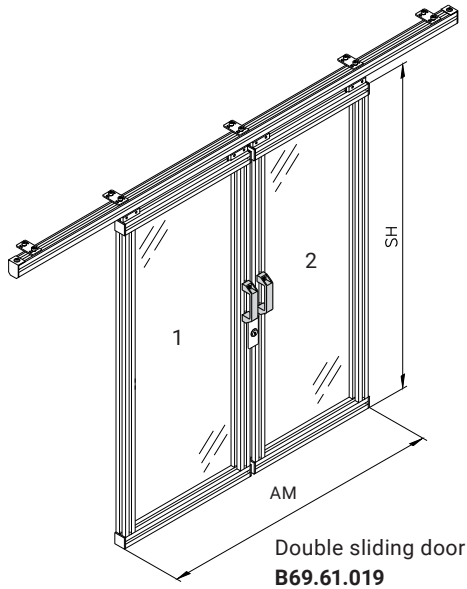


Single sliding door
with horizontal brace
DIN right
B69.61.017

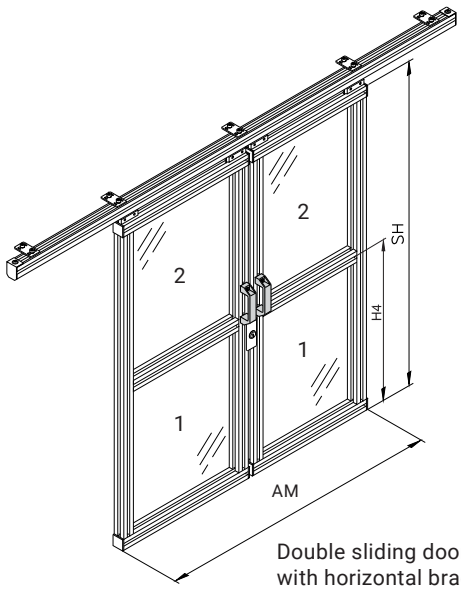
DIN left
B69.61.018

Assemblies (B...):

mk 2040.31 and mk 2245 profiles, connecting elements, fitting set, handles, end caps, buffer, lock, panelling (if specified when ordering, otherwise none).



Double sliding door
B69.61.019



Double sliding door
with horizontal brace
B69.61.020

Information required for ordering

- RM, SH, H4 optional, panelling, lock type

7

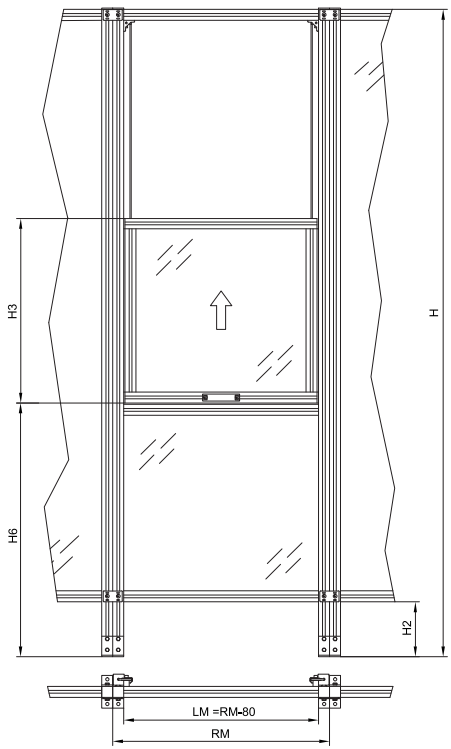
Panelling
starting on page 232

Simple Lifting Doors

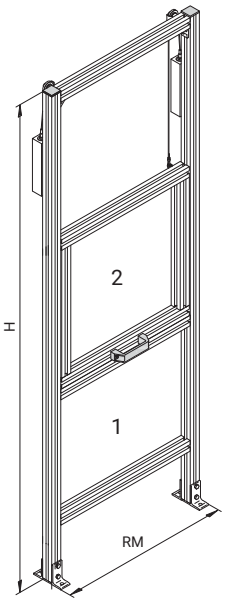
... for the Partition Method

Lifting doors consist of a solid partition and a lifting element, which is balanced using steel cables that are connected to counterweights via idler pulleys. This lets you easily lift and lower the door manually. Pneumatic or electronic activators are available on request.

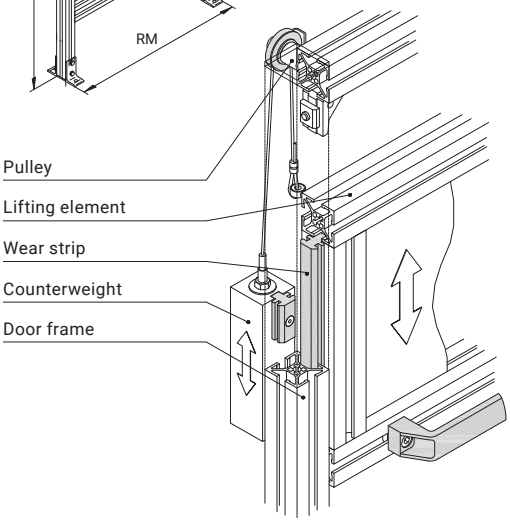
Fastening example



LM = clear dimension
RM = grid dimension



Simple lifting door
B69.62.001



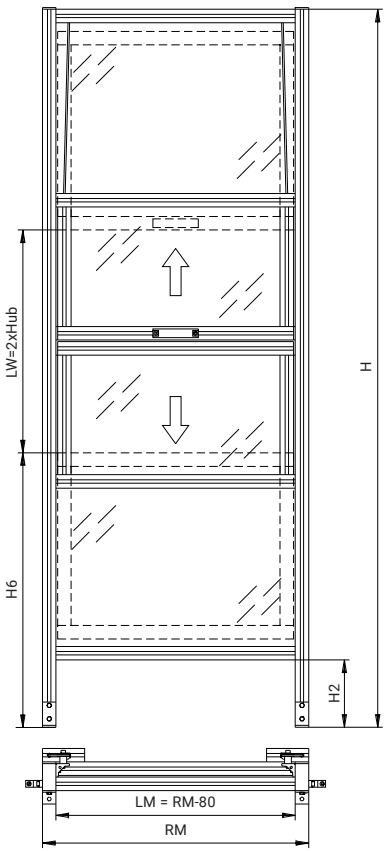
Information required for ordering

- RM, H, H2, H3, H6, Hub, panelling

Scissor Doors

... for the Partition Method

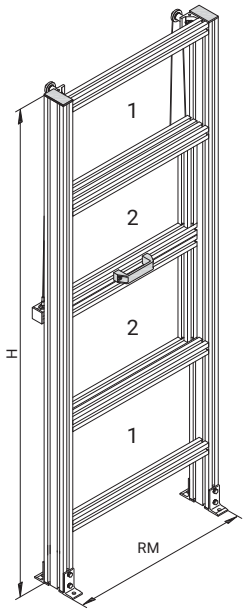
With opposing lifting doors, lifting is facilitated by the weight balancing provided by the other door moving in the opposite direction. Pneumatic or electronic activators are available on request.



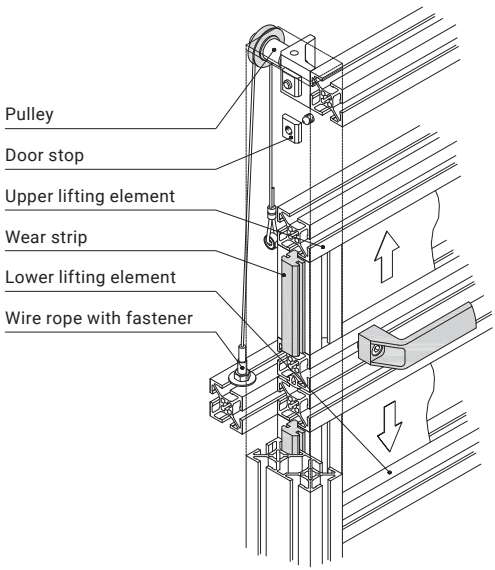
LM = clear dimension
RM = grid dimension

Assemblies (B...):

mk 2040.40 and mk 2040.41 profiles, connecting elements, support brackets, handle, wear strips, idler pulleys, panelling (if specified when ordering, otherwise none).



Scissor door
B69.62.002

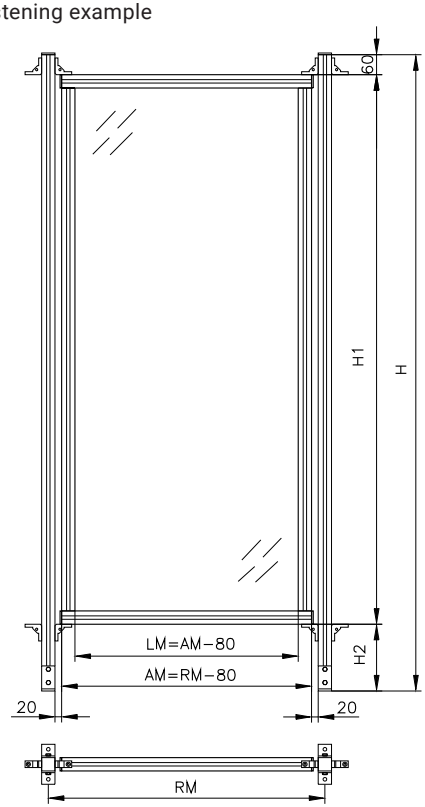


Information required for ordering

- RM, H, H2, LW, H6, panelling

Panelling starting on page 232
Captive fastening system on page 224

Fastening example



LM = clear dimension
AM = outer dimension
RM = grid dimension

Posts

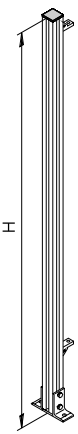
... for the Pillar-Panel Solution

The pillar-panel solution features separate panel frames that are mounted between posts anchored to the floor. This allows you to easily remove individual partitions, and the captive fastening system allows you to do so in accordance with the Machinery Directive (see below). The angle mounting method allows them to be installed at various angular degrees. The heights and grid dimensions can be adapted to customer-specific requirements.

Information required for panel frame orders

- RM (500, 750, 1000, 1250 as standard, also 1500 and 2000 mm with vertical brace)
- H (2060 as standard)
- H2 (180 mm as standard)
- H4 (optional for partitions with horizontal brace)
- Panelling

The panelling (e.g. polycarbonate) must be specified when ordering; otherwise the assemblies (B...) will be delivered without panelling.



Post 1
B69.65.001 H ....

Post (without angle)
B69.65.000 H ....

Not pictured

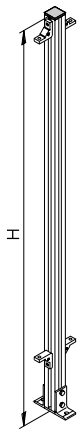
Assemblies (B...):

mk 2040.31 profile, angle B20/40, nuts with screws, end cap, support bracket

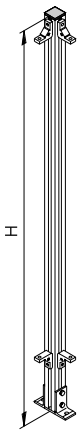
Panel Frames

... for the Pillar-Panel Solution

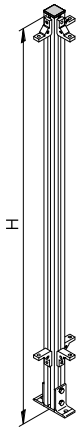
Outer dimension AM: RM - 80 mm
Standard height H1: 1820/1220 mm



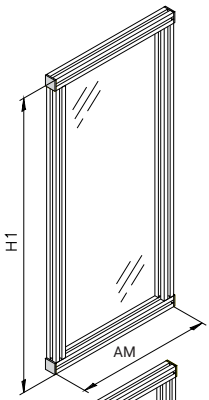
Post 2
B69.65.002 H ....



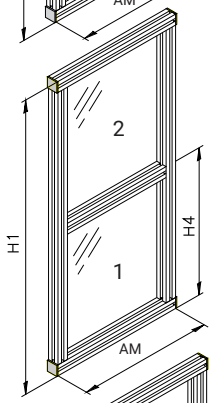
Post 3
B69.65.003 H ....



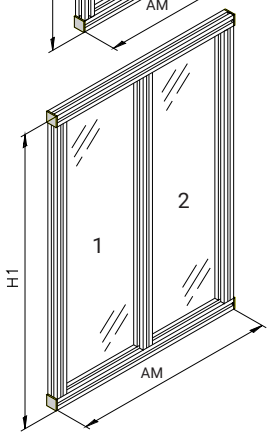
Post 4
B69.65.004 H ....



Simple panel frame
B69.50.001



Panel frame
with horizontal brace
B69.50.002



Panel frame
with vertical brace
B69.50.003

Assemblies (B...):

mk 2040.31 profile, connecting elements, end caps, panelling (if specified when ordering, otherwise none).

7

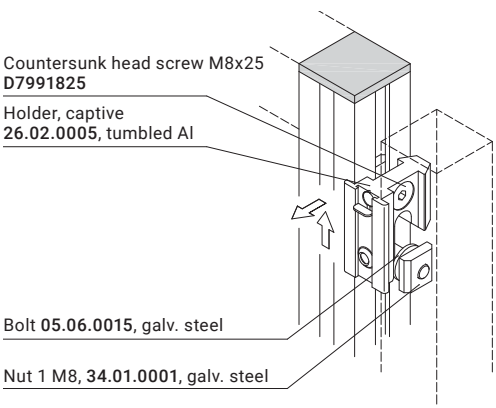
Captive Fastening System

... for the Pillar-Panel Solution

The captive fastening system allows you to quickly and conveniently install and remove partitions, for instance during maintenance work. In accordance with the Machinery Directive, the parts to be undone for removing the partition are designed so that they cannot be detached from the machine. The guarding features a robust construction, can be attached and detached using widely available tools. You can choose between two different variants based on your particular application.

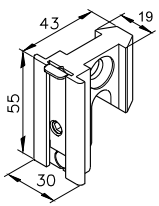
25 | 40 | 50 | 60

Fastening example



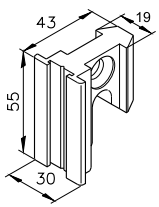
The following is required to mount a partition:

- If captive fastening is required: 2 x B46.00.243 (top) and 2 x B46.00.245 (bottom)
- If locking is not required: 4 x B46.00.245 (top and bottom)



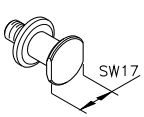
Holder, captive
B46.00.243

Complete, including bolts and fastening accessories



Holder, open
B46.00.245

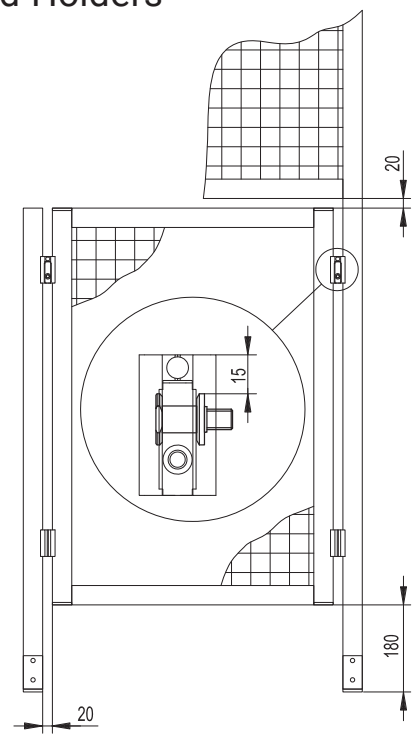
Complete, including bolts and fastening accessories



Bolt
05.06.0015

Galv. steel

Installing the bolts and Holders



- Attach two (top) holders to both sides of the partition to be removed using a countersunk head screw and a nut. Make sure they are the same height.
- Screw two bolts into the profiles to the left and right of the partition to be removed using nut 1 M8. The distance from the top edge of the holder to the top edge of the bolt should be 15 mm.
- Attach two (bottom) holders as described above. Make sure they are the same height. Measure the distance between the top and bottom holders.
- Screw in two bolts as described above. Make sure the distances from top to bottom bolt are equal.
- If you need the partition to fall out when the guarding is unlocked (caution: risk of injury!), the bolts must be fastened to the partition and the holders fastened to the posts.

Installing the Partitions

- For installation, the cover sheet must be in the upper position and the threaded pin must be unscrewed from the opening in the sheet (against the retaining sheet). The red marking is now visible.

- Place the lower holder on the lower bolts. Tip the partition slightly to do so.

- Swivel the partition so that the upper holders lean against the upper bolts, then lift by about 20 mm and swivel to vertical.
- Lower the partition and allow all four holders to lock into the bolts.

- Tighten the threaded pins integrated in the holders to lock the partition. If using captive holders, the cover sheet falls to its lower position, thereby covering the red marking and exposing the green one. This way you can always tell whether the partition is secured.

- Perform the same procedure in reverse to remove the partition.

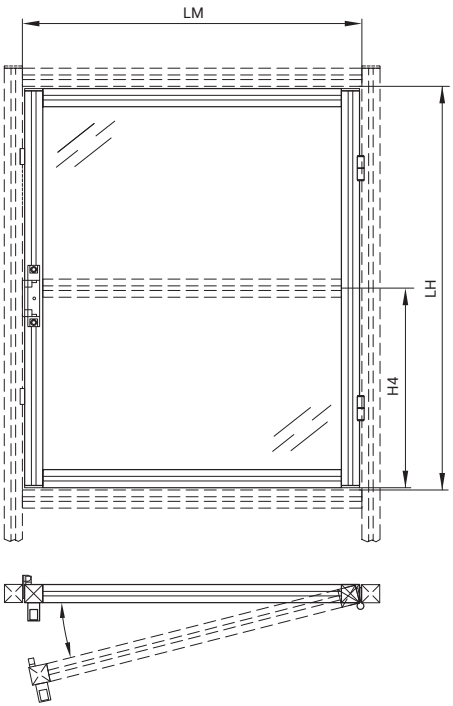
Single-Leaf Windows with Ball Latch

The ball latch ensures that the window can be reliably and securely locked in the profile frame. Safety interlocks should be used in openings that are critical for safety.

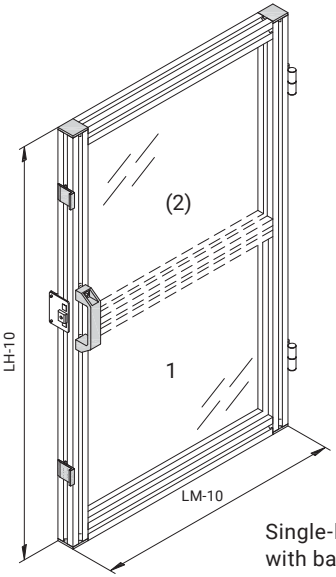
Panelling starting on page 232
Locks starting on page 256

7

Fastening example



5 mm gap along the perimeter



Single-leaf window with ball latch
B68.07.001

Cross brace optional

Assemblies (B...):

mk 2040.31 profile, connecting elements, handle, end caps, hinges, stops and ball latches, without panelling.

Information required for ordering

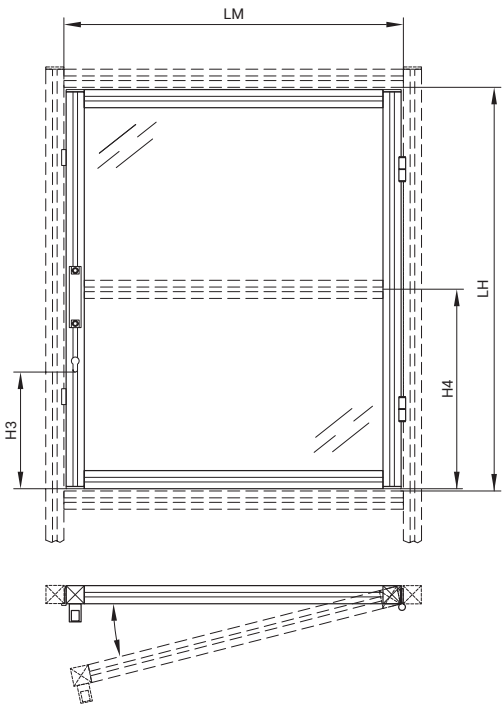
- LM, LH, H4 optional, panelling

Single-Leaf Windows with Cylinder Lock

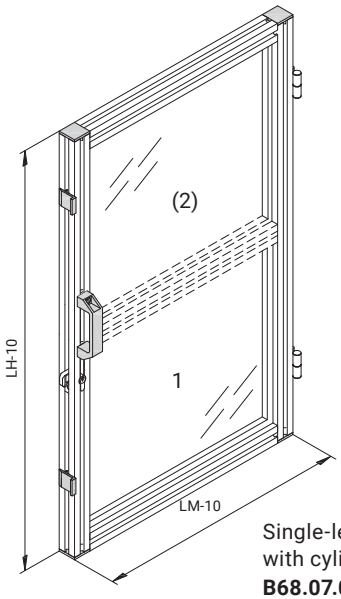
mk also offers a window with a cylinder lock in the profile as an alternative to windows with a ball latch lock.

Panelling starting on page 232
Locks starting on page 256

Fastening example



5 mm gap along the perimeter



Single-leaf window with cylinder lock
B68.07.002

Cross brace optional

Assemblies (B...):

mk 2040.31 profile, connecting elements, handle, end caps, hinges, stops, cylinder lock, panelling (if specified when ordering, otherwise none).

Information required for ordering

- LM, LH, H3, H4 optional, panelling

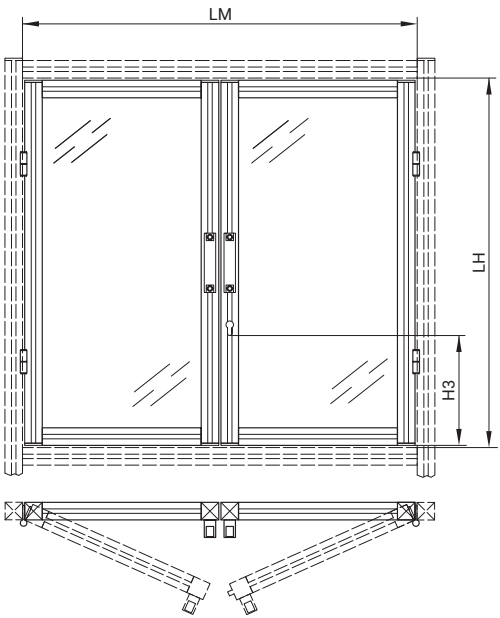
Double-Leaf Windows

The double-leaf variant should be used if the space requirements do not permit a single-leaf window.

Panelling starting on page 232
Locks starting on page 256

7

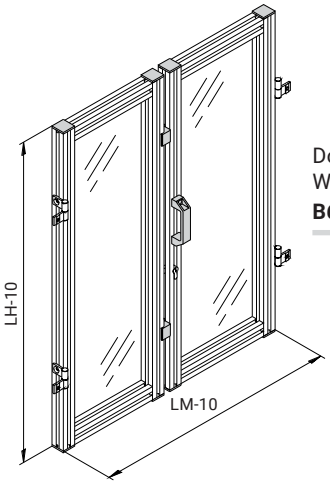
Fastening example



Max. clear dimension (LM) = 1200 mm
Max. clear height (LH) = 1800 mm

Assemblies (B...):

mk 2040.31 profile, connecting elements, handle, end caps, hinges, lock, panelling (if specified when ordering, otherwise none).



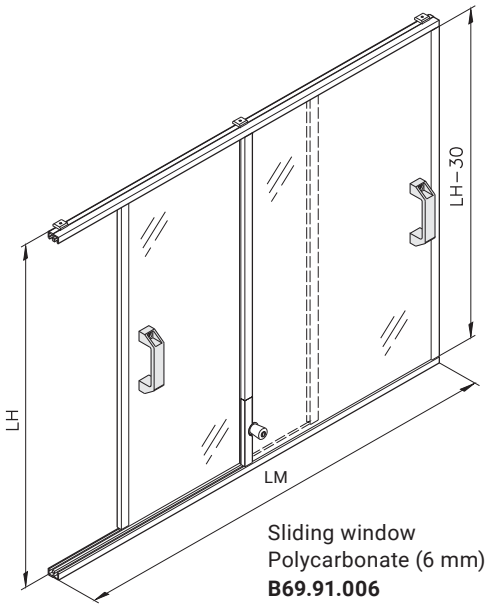
Double-Leaf Windows
B68.07.003

Information required for ordering

- LM, LH, H3, panelling

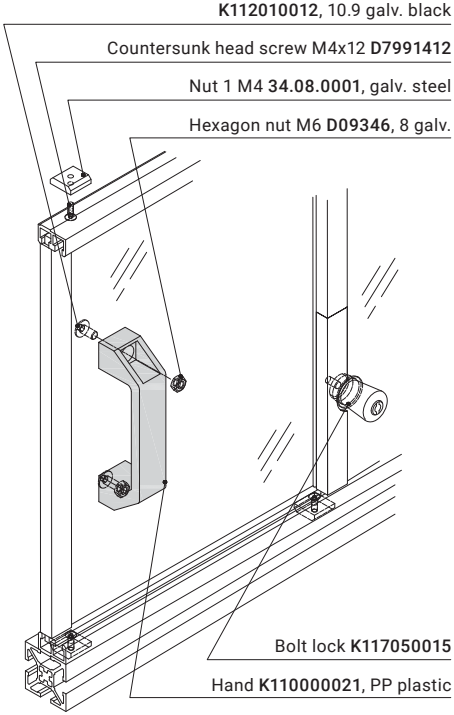
Sliding Windows

The mk 2240 and mk 2241 profiles can be used in Series 40 and 50 structures. When the window is not completely closed, both sliding elements can be installed or removed as needed. When closed, they are locked using a bolt lock.



Sliding window
Polycarbonate (6 mm)
B69.91.006

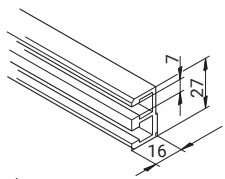
Fastening example



Max. clear dimension (LM) = 1200 mm
Max. clear height (LH) = 1000 mm

Assemblies (B...):

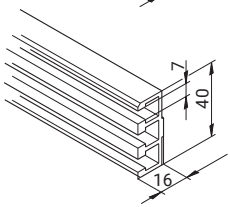
mk 2240, mk 2207 profiles, connecting elements, handle, stops, lock and panelling.



Profile mk 2240

0.47 kg/m

Stock length	**52.40.5100**
Cut	**52.40. ....**



Profile mk 2241

0.67 kg/m

Stock length	**52.41.5100**
Cut	**52.41. ....**

Information required for ordering

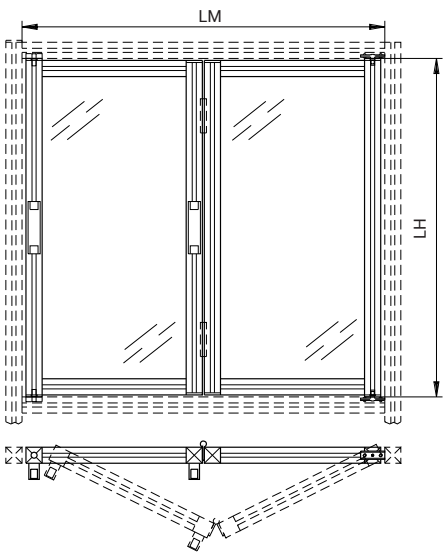
- LM, LH

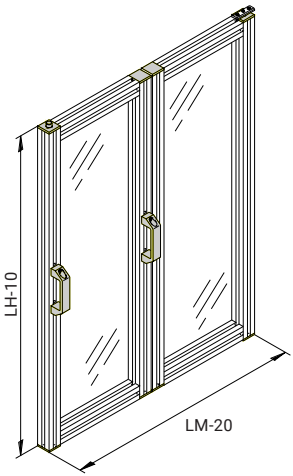
Folding Windows

Folding windows require a smaller swivel range than casement windows and are therefore a space-saving alternative.

Panelling
starting on page 232

Fastening example





Folding window
Acrylic glass
B69.91.004

Folding window
Polycarbonate
B69.91.005

Information required for ordering

- LM, LH, panelling

Assemblies (B...):

mk 2040.31 profile, connecting elements, handle, end caps, hinges, panelling (if specified when ordering, otherwise none).

Max. LM = 1200 mm
Max. LH = 1000 mm

Notes

Panelling

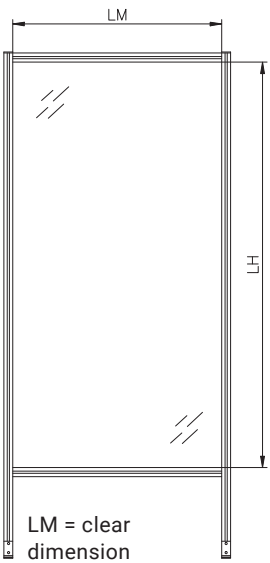
Information about Panelling

The panelling listed below can be used in partitions, frames and both door and window elements. Fastening accessories for mounting the panelling in a profile frame are presented on the following pages. You will also find order information for the corresponding assemblies, which contain both the panelling and the appropriate fastening accessories. Other panelling, such as safety glass, is available on request.

Information required for ordering

- Whole sheet panelling: material item no.
- Cut panelling: item no. for cut section along with width, height and colour (clear, tinted grey or RAL colour)

If the panelling is to be mounting in a profile frame, the width and height will vary according to the mounting method and the panelling, as shown in the table below.



LM = clear dimension
LH = clear height

Cut Lengths by Fastening Method

Fastening method	Width	Height
... with holders	LM	LH
... with panel clamp	LM - 31 mm	LH - 31 mm
... with angles	LM	LH
... with clamping profile	LM + 10 mm	LH + 10 mm
... with fence clip	LM + 20 mm	LH + 20 mm
... with sealing strip	LM + 20 mm	LH + 20 mm

Closed Panels

Clear Acrylic Glass

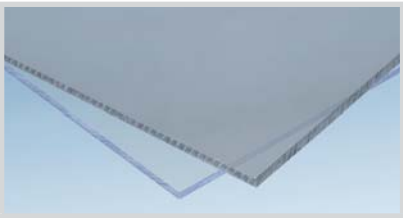
Acrylic glass (PMMA) is a thermoplastic material, also known under the brand name Plexiglas. It exhibits high strength, hardness and transparency. It is more resistant to breakage than traditional glass, but more sensitive to breakage and impacts than polycarbonate.

Material item no.	Size [mm]	Thickness [mm]	Cut item no.
K01D211004	2050x3050	4	50.15.6014
K01D211005	2050x3050	5	50.15.6000
K01D211006	2050x3050	6	50.15.6001

Clear PETG

PETG is a modified, transparent PET plastic that exhibits higher impact resistance than acrylic glass and is easier to work with. PETG offers better optical properties and higher chemical resistance than polycarbonate.

Material item no.	Size [mm]	Thickness [mm]	Cut item no.
K01P211005	2050x3050	5	50.15.6019
K01P211006	2050x3050	6	50.15.6017



Clear or Grey-Tinted Polycarbonate

Polycarbonate (PC), also known under the brand name Makrolon, is an impact-resistant and rigid thermoplastic material. Its durability and sturdiness makes it the most used type of transparent panelling.

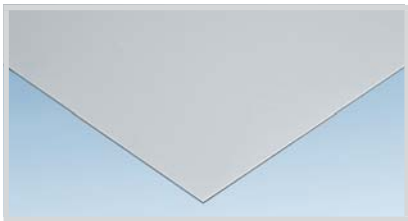
Material item no.	Size [mm]	Thickness [mm]	Cut item no.
Clear			
K01B211004	2050x3050	4	50.15.6009
K01B211005	2050x3050	5	50.15.6002
K01B211006	2050x3050	6	50.15.6003
Tinted grey			
K01B231004	2050x3050	4	50.15.6009
K01B231005	2050x3050	5	50.15.6002

Closed Panels

Silver Anodised Alucobond®

Alucobond® plates consist of two silver-anodised aluminium covering sheets with a black plastic core. This type of panelling provides slight damping and an attractive design.

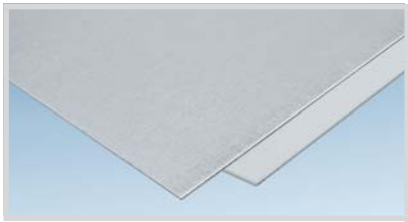
Material item no.	Size [mm]	Thickness [mm]	Cut item no.
K00316223004	1500x3000	4	50.15.4001
K00316223006	1500x3000	6	50.15.4002



Silver Anodised Aluminium Sheet

Silver anodised aluminium sheet is easy to machine and provides an attractive look that matches the aluminium profiles. It is easy to clean and resists corrosion.

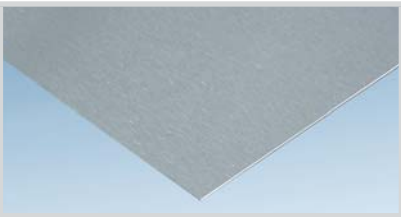
Material item no.	Size [mm]	Thickness [mm]	Cut item no.
K00305321150	1000x2000	1.5	07.30.
K00305321200	1000x2000	2	07.33.
K00305321250	1000x2000	2.5	07.36.



Galvanised or Painted Steel

Steel is available in a galvanised or painted design, and all cut sections are delivered deburred. Please note that the cut edges are not galvanised. Please specify the RAL colour when ordering painted steel.

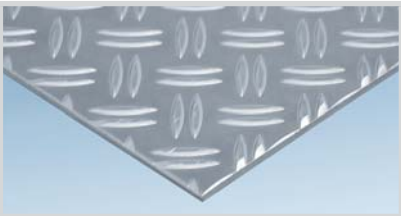
Material item no.	Size [mm]	Thickness [mm]	Cut item no.
Galvanised			
K00112121150	1000x2000	1.5	07.28.
Painted			
K00112131150	1000x2000	1.5	07.28.



Ground Stainless Steel Sheet

Ground V2A stainless steel sheet is resistant to corrosion and suitable for use in food production applications.

Material item no.	Size [mm]	Thickness [mm]	Cut item no.
K00205121150	1000x2000	1.5	07.29.
K00205121200	1000x2000	2	07.32.



“Duet” Chequer Sheet

Aluminium chequer sheets with a slip-resistant “Duet” chequer pattern are used primarily as stepping surfaces for platforms and steps.

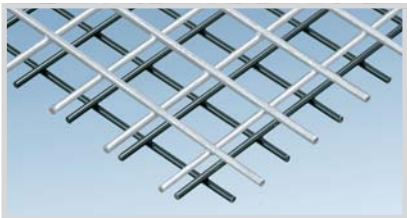
Material item no.	Size [mm]	Thickness [mm]	Cut item no.
K0030641125	1000x2000	2.5/4	07.21.1125
K0030641135	1000x2000	3.5/5	07.21.1135
K0030641150	1000x2000	5/6.5	07.21.1150

Grid Panels

Aluminium or Galvanised Steel Wire Mesh

Wire mesh is suitable for guarding intended to separate areas and is easy to work with. The wire is 4 mm thick, and the mesh size is 40 x 40 mm. Various RAL colours are available on request.

Material item no.	Size [mm]	Thickness [mm]	Cut item no.
Aluminium			
K00315121.40	1000x2000	4	24.00.
K00315122.40	2000x3000	4	24.00.
Galvanised steel			
K00128221.40	1000x2000	4	24.02.
K00128222.40	2000x3000	4	24.02.

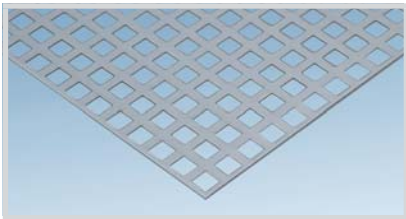


Welded Steel Grids, Powder-Coated or Galvanised

Welded grids are suitable for guarding intended to separate areas. They are sturdy, easy to work with and exhibit high load capacity. The wire is 4 mm thick, and the mesh size is 40 x 40 mm. You can select from galvanised steel and black powder-coated steel versions.

Material item no.	Size [mm]	Thickness [mm]	Cut item no.
Black powder coated			
K00128321.40	1000x2000	4	24.05.
K00128323.40	1250x2000	4	24.05.
K00128324.40	1500x2000	4	24.05.
Galvanised			
K00128421.40	1000x2000	4	24.06.
K00128423.40	1250x2000	4	24.06.

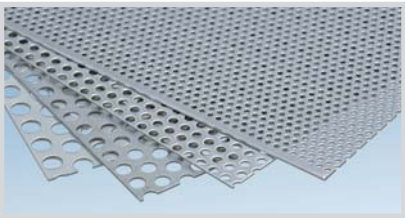
Perforated Sheets



“Square Hole” Perforated Sheets

Galvanised steel perforated sheets with square holes serve as a protective guard while also ensuring good ventilation. They can also be used as grates for draining liquids or for hanging tools. 10 x 10 mm square holes, 15 mm spacing (Qg 10-15).

Material item no.	Size [mm]	Thickness [mm]	Cut item no.
Galvanised steel			
K0011312121510	1250x2500	1.5	07.19.2110
K0011312122010	1250x2500	2	07.19.2210
Stainless steel			
K002061211150	1000x2000	1.5	07.45.0000



Galvanised “Round Hole” Perforated Sheet

Galvanised steel perforated sheets with round holes in various diameters and offset rows serve as protective guards while also ensuring good ventilation. They can also be used as grates for draining liquids or for hanging tools.

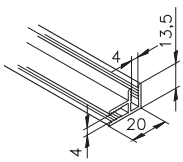
Material item no.	Ro* [mm]	Size [mm]	Thickness [mm]	Cut item no.
K0011311121503	3-5	1250x2500	1.5	07.19.1103
K0011311121505	5-8	1250x2500	1.5	07.19.1105
K0011311121508	8-12	1250x2500	1.5	07.19.1108
K0011311121510	10-15	1250x2500	1.5	07.19.1110
K0011311122003	3-5	1250x2500	2	07.19.1203
K0011311122005	5-8	1250x2500	2	07.19.1205
K0011311122008	8-12	1250x2500	2	07.19.1208
K0011311122010	10-15	1250x2500	2	07.19.1210

* Offset round holes (Ro) = hole ø - spacing

Edge Profiles

Edge profiles provide seamless closure for panelling. The protect against sharp cut edges and increase stability. They allow you to create simple contours, as shown at left. Simply place the edge profiles on the panelling and the teeth will fix them in place.

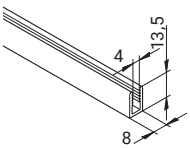
Material: Anodised aluminium



Profile mk 2210

0.25 kg/m

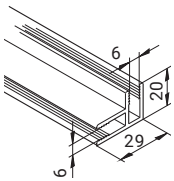
Stock length	**52.10.6000**
Cut	**52.10. ....**



Profile mk 2206

0.14 kg/m

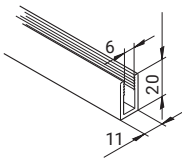
Stock length	**52.06.6000**
Cut	**52.06. ....**



Profile mk 2211

0.47 kg/m

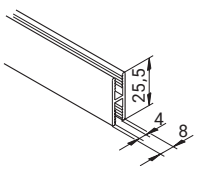
Stock length	**52.11.6000**
Cut	**52.11. ....**



Profile mk 2207

0.27 kg/m

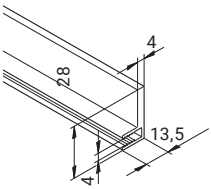
Stock length	**52.07.6000**
Cut	**52.07. ....**



Profile mk 2214

0.25 kg/m

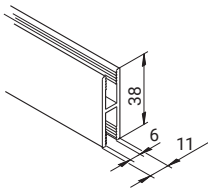
Stock length	**52.14.6000**
Cut	**52.14. ....**



Profile mk 2203

0.35 kg/m

Stock length	**52.03.6000**
Cut	**52.03. ....**



Profile mk 2215

0.47 kg/m

Stock length	**52.15.6000**
Cut	**52.15. ....**

Notes

Panelling with Fastening Accessories

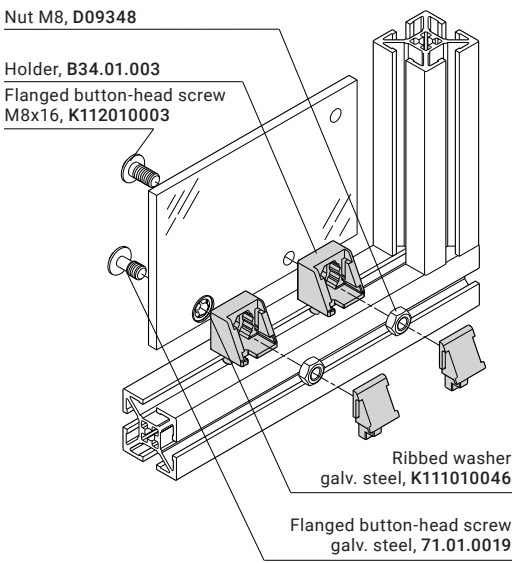
... with Holder

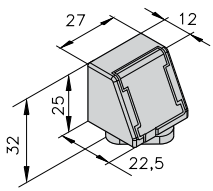
The holder is used to retrofit panelling into existing structures in accordance with the Machinery Directive. The holder is available in two designs: with a simple flanged button-head screw, or as a captive connection with an undercut flanged button-head screw and a ribbed washer. The holder is closed by snapping on the cover, and the nut is secured so that it cannot be slid out.

Material: Fibre-reinforced plastic

7

Fastening example





25 | 40 | 50 | 60

Holder with cover
B34.01.003
without fastening accessories

B34.01.004
with fastening accessories

B34.01.004A2
with VA fastening accessories

B34.01.005
with captive fastening accessories

B34.01.005A2
with captive VA fastening accessories

Polycarbonate
Clear or tinted grey

5 mm	**B69.90.206**	**LM ....**	**LH ....**
6 mm	**B69.90.207**	**LM ....**	**LH ....**

LM and LH represent the clear dimensions of the profile frame.

Panelling requires ø 9 mm bores at a distance of 10 to 15 mm from the profile frame.

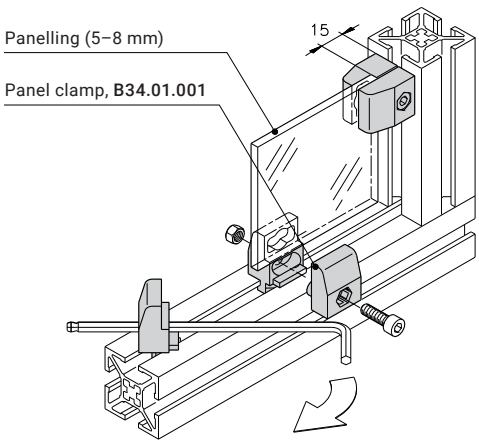
Panelling with Fastening Accessories

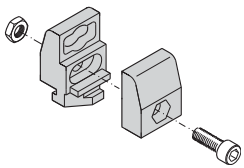
... with Panel Clamp

Panel clamps are used to fasten panelling from 5 to 8 mm in thickness. There is a gap of 15 mm all around between profile frame and panelling.

Material: Fibre-reinforced plastic

Fastening example





25 | **40** | 50 | 60

Panel clamp 40
B34.01.001

25 | 40 | **50** | 60

Panel clamp 50
B34.01.002

Acrylic glass			
Clear			
5 mm	**B69.90.103**	**LM ....**	**LH ....**
6 mm	**B69.90.104**	**LM ....**	**LH ....**
Polycarbonate			
Clear or tinted grey			
5 mm	**B69.90.204**	**LM ....**	**LH ....**
6 mm	**B69.90.205**	**LM ....**	**LH ....**

LM and LH represent the clear dimensions of the profile frame.

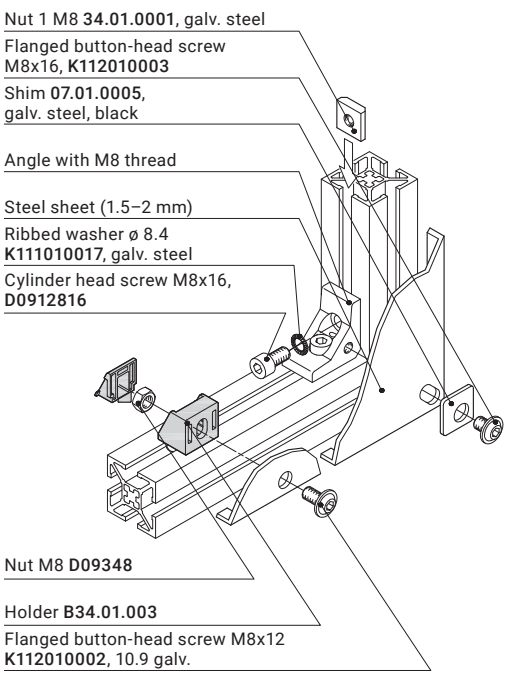
Panelling with Fastening Accessories

... with Angle

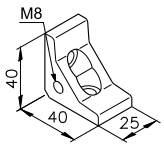
Threads for inserting panelling elements are tapped into the angles' lateral bore. Angles E25 and E25s are the preferred angles. A holder can be used to support larger side lengths. Please specify the RAL colour when ordering painted steel.

Material: Tumbled aluminium

Fastening example

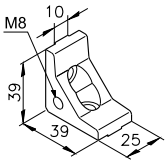


LM and LH represent the clear dimensions of the profile frame.



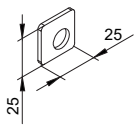
25 | 40 | 50 | 60

Angle, E25, M8
82.40.0721



25 | 40 | 50 | 60

Angle, E25s, M8
82.40.0761



Shim
07.01.0005

Galv. steel, black

Steel sheet

Galvanised or painted

1.5 mm	**B69.90.310**	**LM > 300**	**LH < 300**
1.5 mm	**B69.90.311**	**LM ....**	**LH ....**
For side lengths up to 1200 mm			
2 mm	**B69.90.312**	**LM ....**	**LH ....**
With additional B34.01.003 holders for side lengths over 1200 mm			

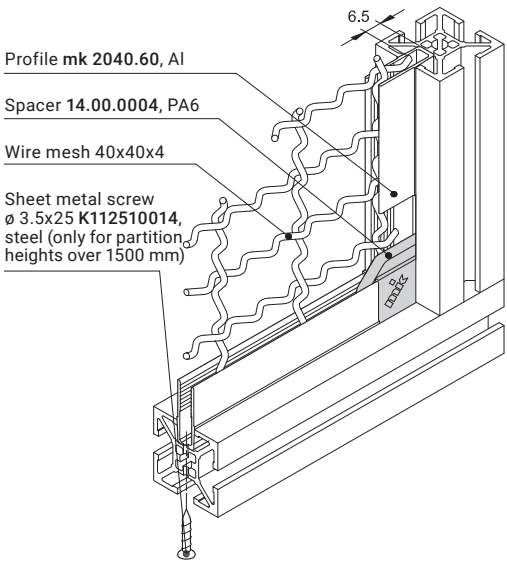
Panelling with Fastening Accessories

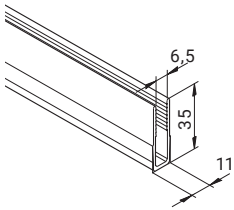
... with Clamping Profile

When using the mk 2040.60 profile to fasten wire mesh, an additional screw is needed to secure the profile when the side is longer than 1500 mm; see the fastening example. The spacer eliminates the need for time-consuming mitre cuts.

Material: Anodised aluminium

Fastening example

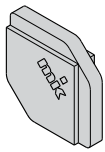




Profile mk 2040.60

0.30 kg/m

Stock length	**54.60.6100**
Cut	**54.60. ....**



Spacer
14.00.0004

PA6 plastic

LM and LH represent the clear dimensions of the profile frame.

Wire mesh Aluminium			
40x40x4 mm	**B69.90.001**	**LM ....**	**LH ....**

Wire mesh Galvanised steel			
40x40x4 mm	**B69.90.002**	**LM ....**	**LH ....**

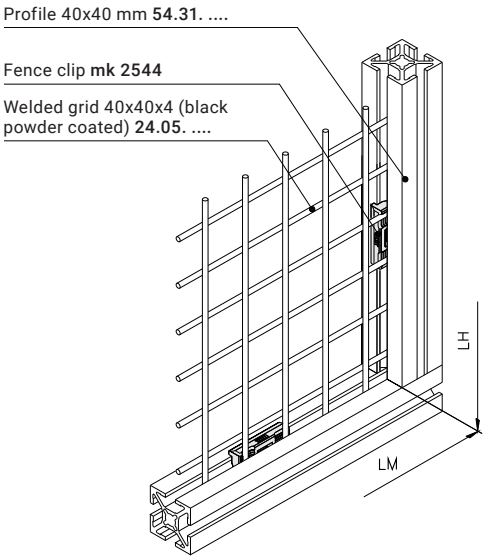
Panelling with Fastening Accessories

... with Fence Clip

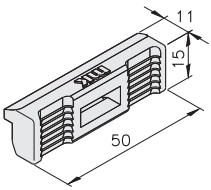
Fence clips can be used to fasten welded grids easily, quickly and cheaply. The fence clip is simply hammered into the profile slot, which fixes the protective grate in the frame. The terminal is designed for 4 mm thick welded grids.

Material: ABS plastic

Fastening example



LM and LH represent the clear dimensions of the profile frame.



25 | **40** | 50 | 60

Fence clip
mk 2544

Welded grid Black powder coated			
40x40x4 mm	**24.05.**	**LM ....**	**LH ....**
complete with fence clips	**B69.90.003**	**LM ....**	**LH ....**

Welded grid Galvanised steel*			
40x40x4 mm	**24.06.**	**LM ....**	**LH ....**
complete with fence clips	**B69.90.005**	**LM ....**	**LH ....**

*Special RAL paint colours optional

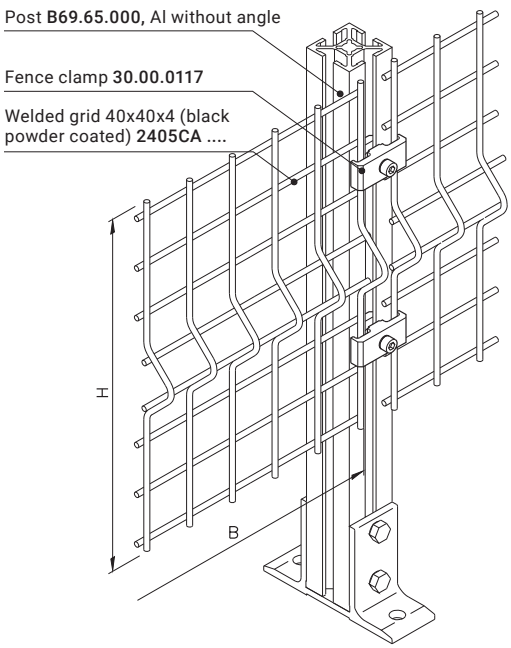
Panelling with Fastening Accessories

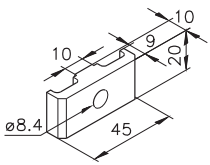
... with Fence Clamp

Fence clamps can be used to easily retrofit welded grids onto existing structures. The “custom solution” variant is frequently used for this purpose. The stability of the welded grid is increased by two horizontal folds in the grid fencing.

Material: Aluminium

Fastening example





M8x20

25 | 40 | 50 | 60

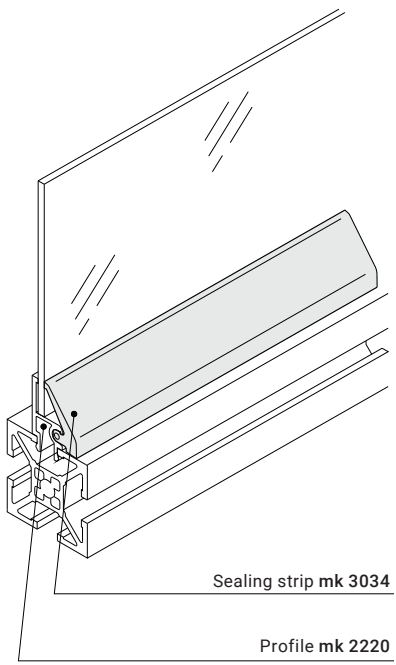
Fence clamp
30.00.0117

Welded grid
Black powder coated

40x40x4 mm	**B69.90.004**	**B ....**	**H ....**

Dimensions: B = RM - 10 mm, H = max. 1880 mm
RM = centre post to centre post

Fastening example



LM and LH represent the clear dimensions of the profile frame.

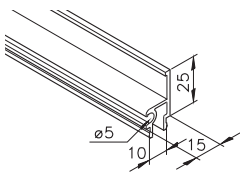
Panelling with Fastening Accessories

... with Sealing Strip

The combination of mk 2220 profile with mk 3034 sealing strip is a universal holder for panelling from 2 to 8 mm in thickness. All Series 40 and 50 construction profiles are suitable for use as the mounting profile.

Information required for ordering

- Item number
- Length in mm

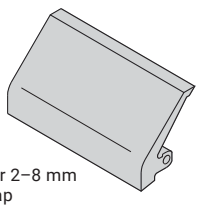


Profile mk 2220

0.32 kg/m

Stock length	**52.20.6100**
Cut	**52.20. ....**

Anodised aluminium



for 2–8 mm gap

25 | 40 | 50 | 60

Sealing strip
mk 3034

Black EPDM rubber

Polycarbonate			
Clear or tinted grey			
4 mm	**B69.90.701**	**LM ....**	**LH ....**
6 mm	**B69.90.702**	**LM ....**	**LH ....**
Acrylic glass			
Clear			
5 mm	**B69.90.710**	**LM ....**	**LH ....**
6 mm	**B69.90.711**	**LM ....**	**LH ....**
Steel sheet			
Galvanised or painted			
2 mm	**B69.90.720**	**LM ....**	**LH ....**

Not permitted for guarding intended to separate areas.

Panelling with Fastening Accessories

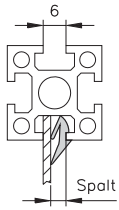
... with Sealing Strip

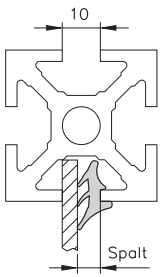
Sealing strips are used to fix panelling from 1.5 to 6.5 mm thick in the profile slot. They seal the profile slot to produce a seamless transition.

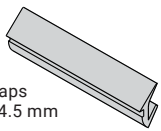
Information required for ordering

- Item number
- Length in mm

Fastening example





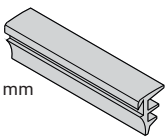


for gaps 3.5–4.5 mm

25 | 40 | 50 | 60

Sealing strip **mk 3027** black

TPE-V rubber

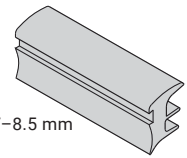


for 4-6 mm gap

25 | 40 | 50 | 60

Sealing strip **mk 3020** black

TPE-V rubber

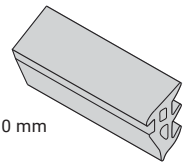


for 7–8.5 mm gap

25 | 40 | 50 | 60

Sealing strip **mk 3021** black

TPE-V rubber

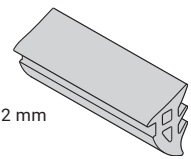


for 10 mm gap

25 | 40 | 50 | 60

Sealing strip **mk 3023** black

EPDM rubber



for 12 mm gap

25 | 40 | 50 | 60

Sealing strip **mk 3024** black

EPDM rubber

Alucobond® Silver anodised			
4 mm	**B69.90.501**	**LM ....**	**LH ....**
6 mm	**B69.90.502**	**LM ....**	**LH ....**
Acrylic glass Clear			
5 mm	**B69.90.101**	**LM ....**	**LH ....**
6 mm	**B69.90.102**	**LM ....**	**LH ....**
Polycarbonate Clear or tinted grey			
4 mm	**B69.90.201**	**LM ....**	**LH ....**
5 mm	**B69.90.202**	**LM ....**	**LH ....**
6 mm	**B69.90.203**	**LM ....**	**LH ....**

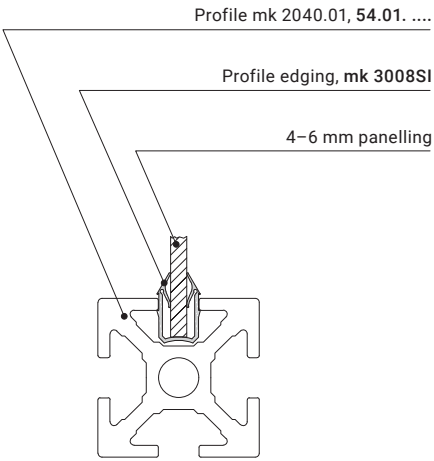
Panelling with Fastening Accessories

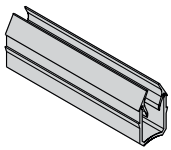
... with Profile Edging

Profile edging is suitable for holding panelling from 4 to 6 mm in thickness. During mounting, the profile edging together with the panelling is pressed into the slot of the profile. Due to the geometry, the side flanks are pressed against the panelling. This produces a seamless transition.

Material: PP plastic

Fastening example





for 4–6 mm panelling

25 | 40 | 50 | 60

Profile edging
mk 3008

Black

mk 3008SI

Silver grey

2000 mm stock length

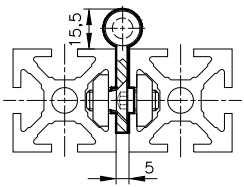
Notes

Hinges

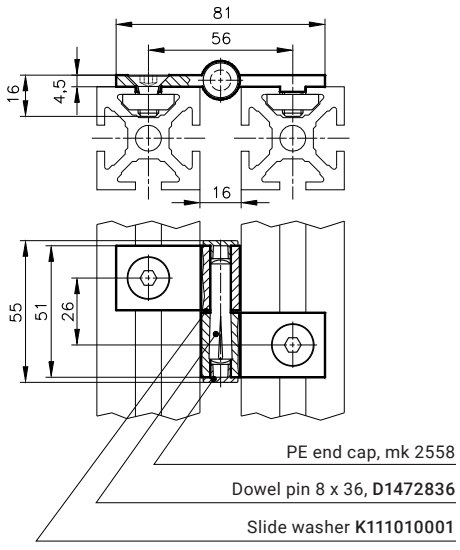
The various hinge leaves allow you to combine profiles from different series. You can, for example, install a door built from Series 25 profiles into a structure built from Series 50. You can use two-leaf or three-leaf hinges, depending on whether you want to be able to unhinge the door later. A slide bushing can be inserted in the three-leaf hinges to allow for frequent opening even under high loads.

Material: Tumbled aluminium

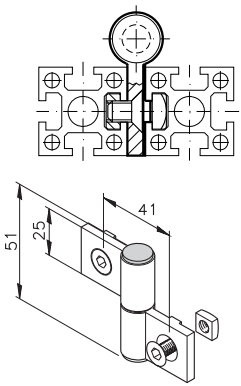
Example of installation position A



Example of installation position B



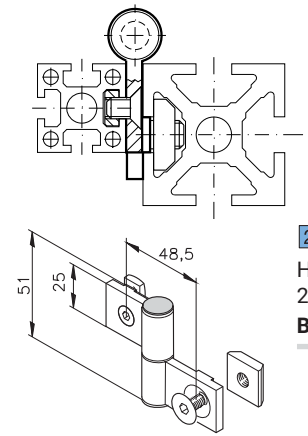
Hinge combination 25-1/25-1



25 | 40 | 50 | 60

Hinge
25-1/25-1
B46.01.012*

Hinge combination 25-1/40-1

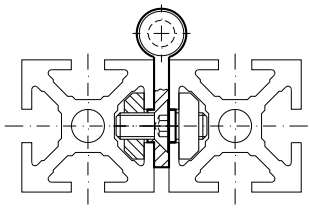


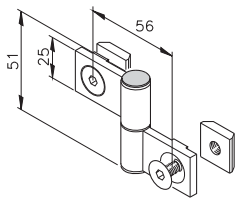
25 | 40 | 50 | 60

Hinge
25-1/40-1
B46.01.013*

*With fastening accessories

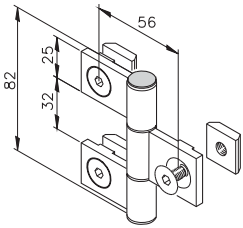
Hinge combination 40-1/40-1 and 40-1/40-7/40-1





25 | 40 | 50 | 60

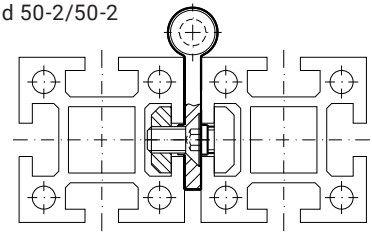
Hinge
40-1/40-1
B46.01.010*

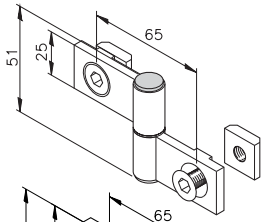


25 | 40 | 50 | 60

Hinge
40-1/40-7/40-1
B46.01.030*

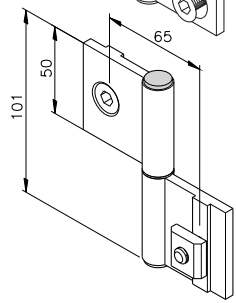
Hinge combination 50-1/50-1 and 50-2/50-2





25 | 40 | 50 | 60

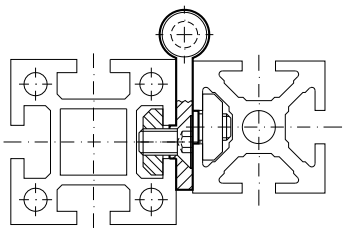
Hinge
50-1/50-1
B46.01.001*

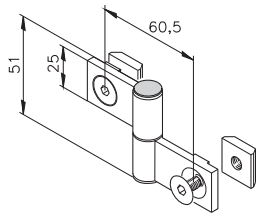


25 | 40 | 50 | 60

Hinge
50-2/50-2
B46.01.002*

Hinge combination 40-1/50-1

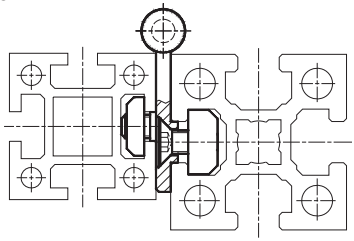


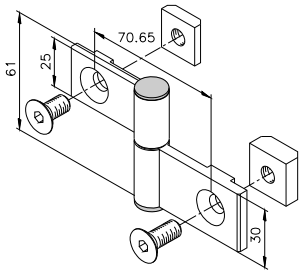


25 | 40 | 50 | 60

Hinge
40-1/50-1
B46.01.011*

Hinge combination 50-1/60-1





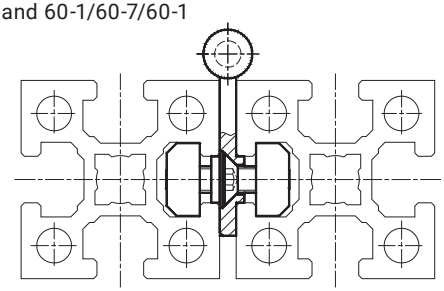
25 | 40 | 50 | 60

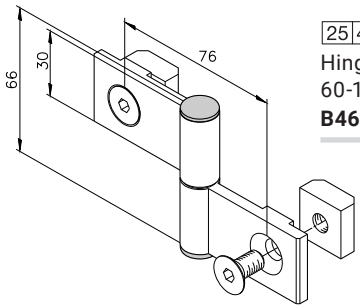
Hinge
50-1/60-1
B46.01.064*

*With fastening accessories

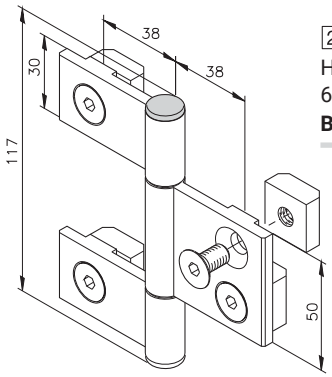
Hinges

Hinge combination 60-1/60-1
and 60-1/60-7/60-1



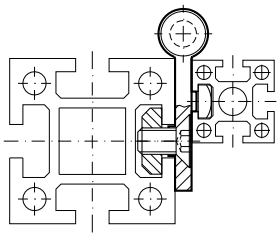


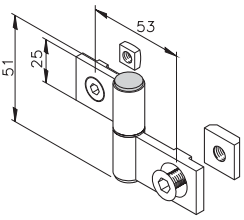
25 | 40 | 50 | **60**
Hinge
60-1/60-1
B46.01.058*



25 | 40 | 50 | **60**
Hinge
60-1/60-2/60-1
B46.01.059*

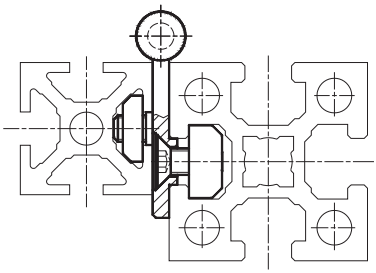
Hinge combination 25-1/50-1

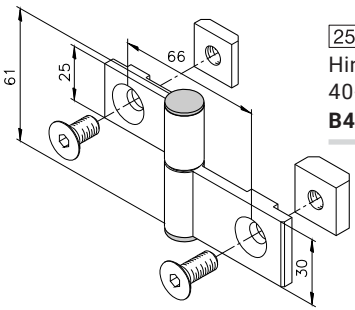




25 | 40 | 50 | **60**
Hinge
25-1/50-1
B46.01.014*

Hinge combination 40-1/60-1





25 | **40** | 50 | 60
Hinge
40-1/60-1
B46.01.063*

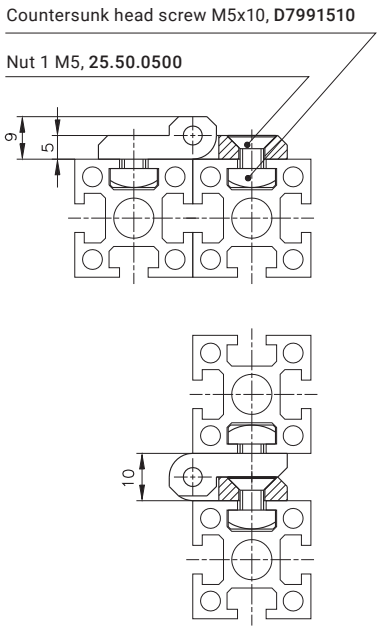
*With fastening accessories

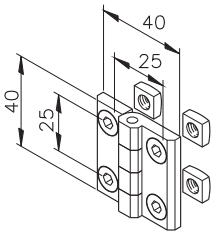
Hinges

The following hinges have been designed exclusively for mounting on Series 25 profiles for small doors and flaps.

25	40	50	60

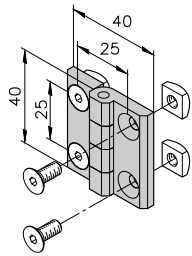
Fastening example





Hinge 25
B46.01.015*

Black powder-coated die-cast zinc hinge leaf



Plastic hinge
B46.01.033*

PA6 plastic hinge leaf

*With fastening accessories

Hinges for Panelling

The following hinges can be used to attach panelling directly without an additional frame structure.

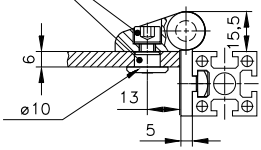
Material: Tumbled aluminium

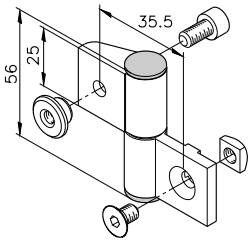
7

Fastening example

Plate nut M6, **41.00.0018**

Cylinder head screw M6x12, **D0912612**



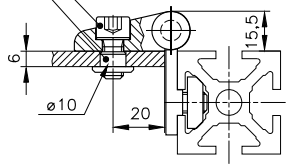


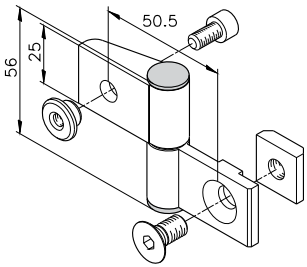
25 | 40 | 50 | 60

Hinge
25-1/25-3
B46.01.044*

Plate nut M8, **41.00.0017**

Cylinder head screw M8x16, **D0912816**



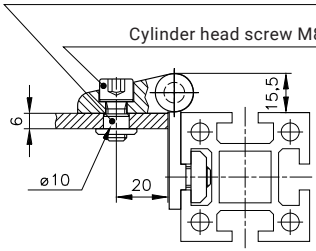


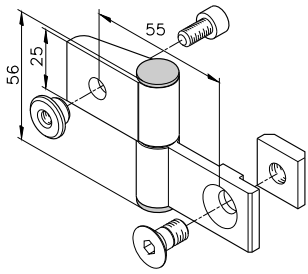
25 | 40 | 50 | 60

Hinge
40-1/40-3
B46.01.050*

Plate nut M8, **41.00.0017**

Cylinder head screw M8x16, **D0912816**





25 | 40 | 50 | 60

Hinge
50-1/40-3
B46.01.055*

*With fastening accessories

Ball latch

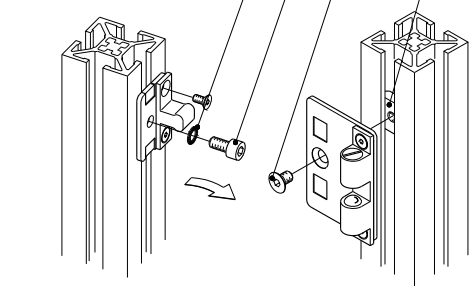
Material: Brass

25 | 40 | 50 | 60

Nut 1, M6 **34.02.0008**, galv. steel

Countersunk head screw M6x12, **D7991612**

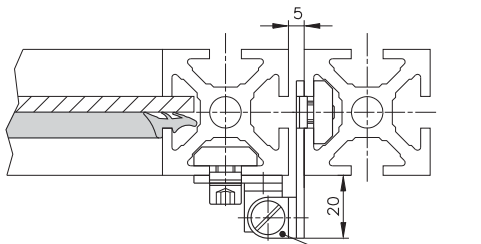
Cylinder head screw M6x12, **D0912612**
Ribbed washer ø 6.4
K111010016, galv. steel



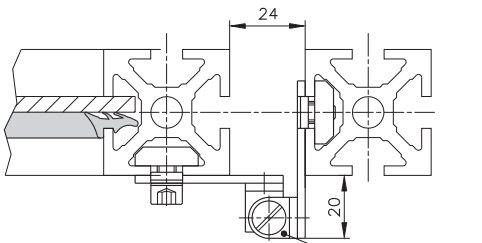
Ball latch
B68.02.101* for 5 mm door gap

B68.02.102* for 24 mm door gap

Fastening example



Ball latch for 5 mm door gap,
B68.02.101

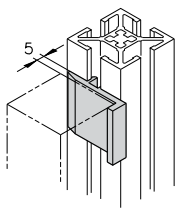


Ball latch for 24 mm door gap,
B68.02.102

Door stop

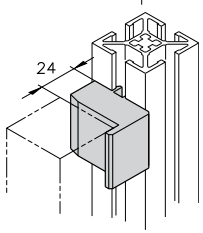
Material: PE-1000 plastic

25 | 40 | 50 | 60



Stop profile
22.90.0035

for 5 mm door gap



Stop profile
22.92.0035

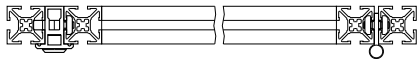
for 24 mm door gap

*With fastening accessories

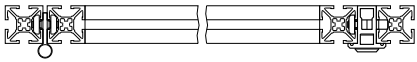
Fastening example

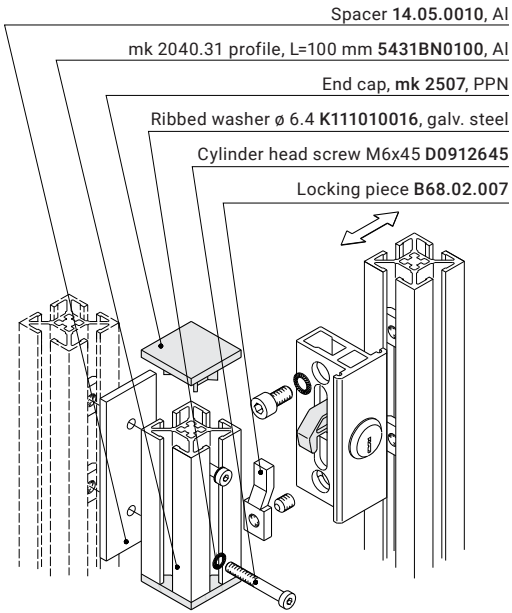
7

Swing door, DIN right



Swing door, DIN left



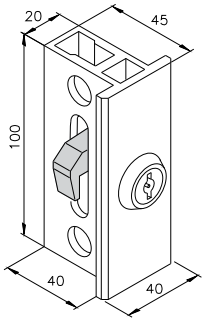


External Locks

External locks are attached to the side of the profile. The distance between the frame and door must be 24 mm. They can be used for sliding doors and hinged doors.

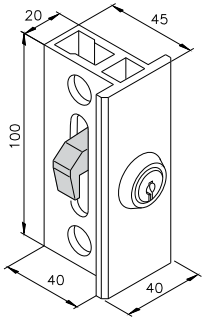
Material: Tumbled aluminium

25 | **40** | 50 | 60



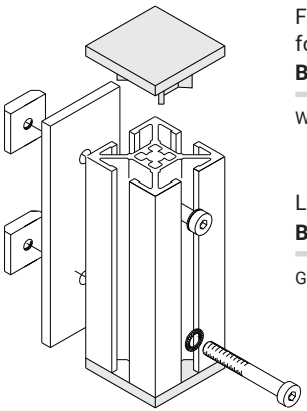
External
double-bit lock
DIN right
B68.02.017

DIN left
B68.02.018



External cylinder lock
DIN right
B68.02.019

DIN left
B68.02.020

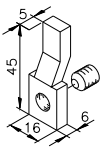


Frame extender
for sliding door
B68.06.005

With locking piece

Locking piece
B68.02.007

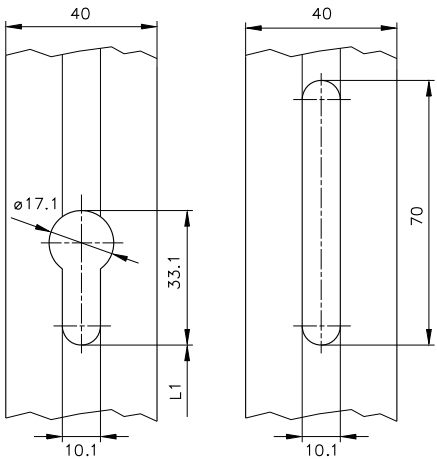
Galv. steel



Internal Locks

Internal locks are cylinder locks that are installed directly in the door profile. The distance between the frame and door must be 5 mm.

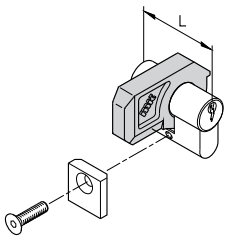
Drilling pattern for cylinder lock



25 | 40 | 50 | 60

Cylinder lock, complete
B68.02.051

L = 42 mm

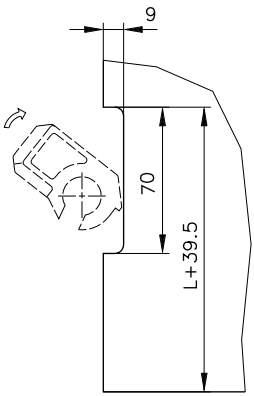


25 | 40 | 50 | 60

Cylinder lock, complete
B68.02.052

L = 52 mm

Removal of panelling material for the cylinder lock



Profile machining for mk 2040.01 profile
5401BC ....

Profile machining for mk 2040.40 profile
5440BC ....

Profile machining for mk 2040.31 profile
5431BI ....

Please specify L1 when ordering

Tower Bolts

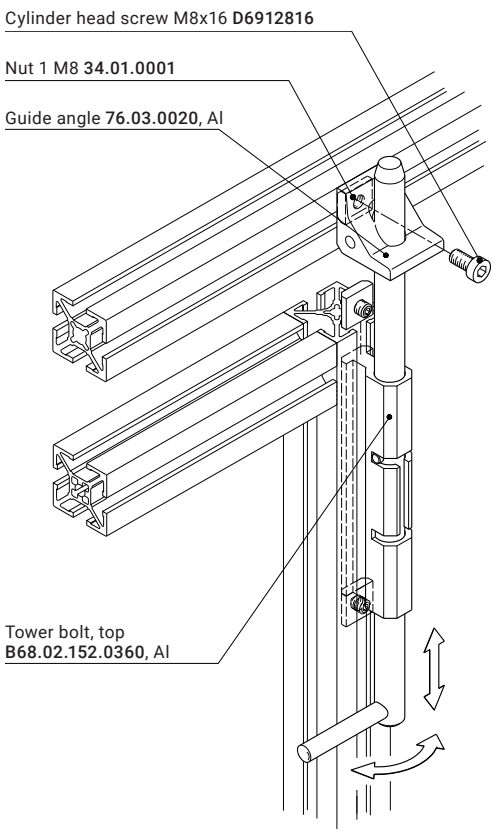
For locking swing doors at the top frame profile and/or at the floor. A guide angle must be attached to the top frame profile, while a bolt strike plate is used on the floor. When fastening to the floor, you must form-tap an M8 thread into the mk 2040.31 vertical strut.
360 mm standard length.

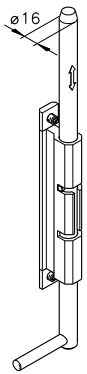
Material: Tumbled aluminium

25 | **40** | 50 | 60

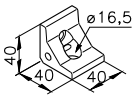
7

Fastening example

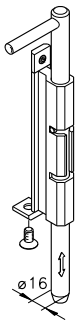




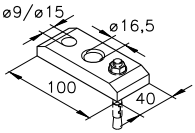
Tower bolt, top
B68.02.152.0360



Guide angle
76.03.0020



Tower bolt, bottom
B68.02.151.0360



Bolt strike plate
76.03.0018

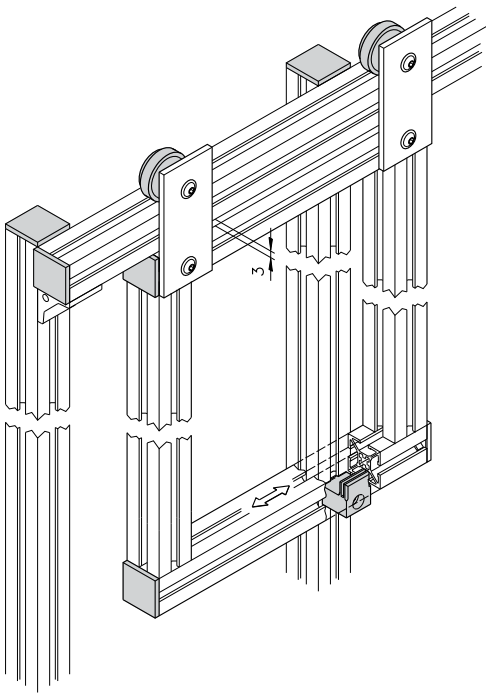
Anchor

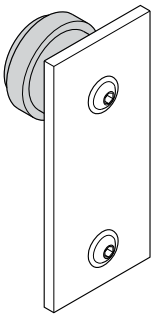
Roller Unit

This sliding mechanism is a cost-effective and easy-to-install variant. The plastic guide roller is simply guided through a collar in the profile slot. The roller unit assembly consists of a plate, roller, bolt, extra-wide washer, flanged button-head screw and nut.

25 | **40** | 50 | 60

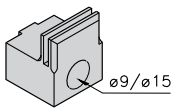
Fastening example





Roller unit
B68.11.003

Roller: POM
Plate: Tumbled Al



M8x25

Guide piece
19.00.0005

Black plastic

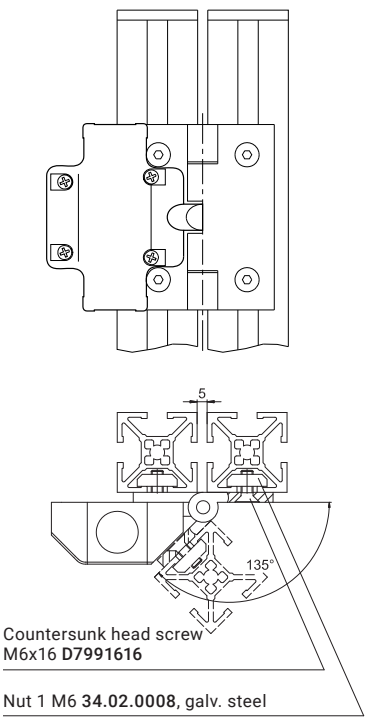
Hinged Safety Interlock

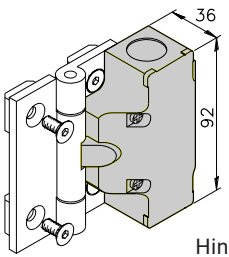
The hinged safety interlock is suitable for swing doors that must be closed to ensure the required operational safety.

Properties

- Plastic housing
- Protective earthing
- High resistance to oil and petrol
- Dimensions: 111.5 mm x 92 mm x 36 mm
- Easy installation, especially on 40 mm profiles
- Universal installation in guarding with hinges on the left or right
- Mounting bores for M6 countersunk head screws according to DIN 965
- Two M20x1.5 cable openings

Fastening example





Hinged safety interlock
TESZ1102/S
K370000030

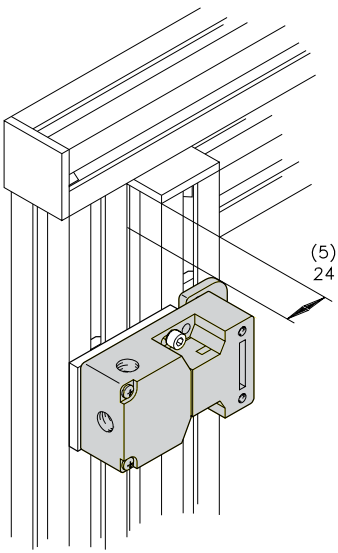
Max. safety category/ performance level:	Without 2nd switch: max. SC 4, PL “e”
Contacts:	1 normally open, 2 normally closed
Degree of protection:	IP 65
Control voltage:	24 V DC

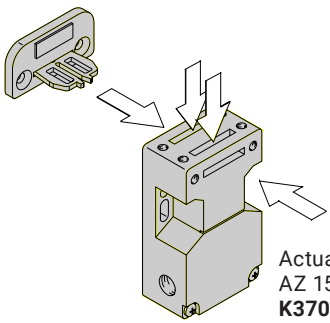
Safety interlock with separate actuating key

Properties

- Plastic housing
- Protective earthing
- Large space for connecting cables
- Dimensions: 52 mm x 90 mm x 30 mm
- Multiple coding
- Long service life
- High contact reliability at low currents
- Oblong bores for adjusting, round bores for fixing
- Three M16x1.5 cable openings

The safety interlock with separate actuating key is suitable for guarding that is laterally adjustable and/or rotatable, and especially for removable guarding that has to be shut in order to ensure the necessary operational safety. The switching element and actuating keys for the safety interlocks are not connected to each other, but are functionally combined or separated when switching. The actuating key is separated from the basic device when the guarding is opened. In doing so, the normally closed contacts are opened and the normally open contacts are closed in the safety interlock.





Actuating key
AZ 15/16-B1-1747
K370000011

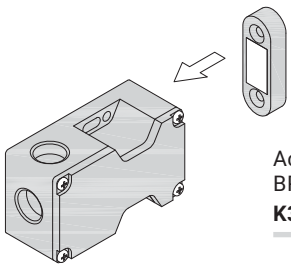
Safety interlock
AZ 16ZVRK – M16
K370000010

Max. safety category/ performance level:	Without 2nd switch: max. SC 3, PL “d”
Contacts:	1 normally open, 2 normally closed
Degree of protection:	IP 67
Retaining force:	30 N
Control voltage:	24 V DC

Magnetic safety interlock

Properties

- Plastic housing
- Suitable for food production
- Concealed installation possible
- Dimensions: 52 mm x 90 mm x 39 mm
- Long service life
- Resists lateral misalignment
- No mechanical wear
- Resistant to dirt
- Three M20x1.5 cable openings
- Cable connection space
- Max. 6 mm locking distance



Actuating key
BPS 16 magnet
K370000013

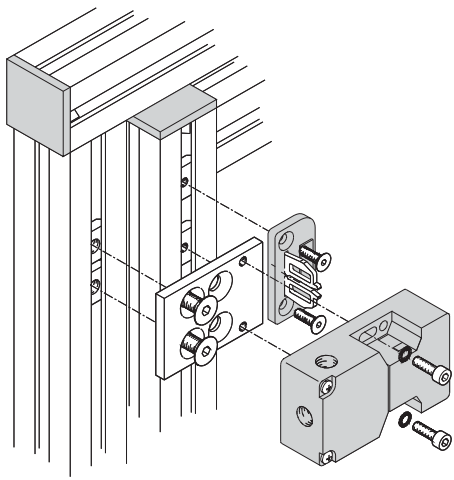
Safety interlock
BNS 16-12ZV
K370000012

Max. safety category/ performance level:	Without 2nd switch: max. SC 3, PL “d”
Contacts:	1 normally open, 2 normally closed
Degree of protection:	IP 67
Control voltage:	24 V DC

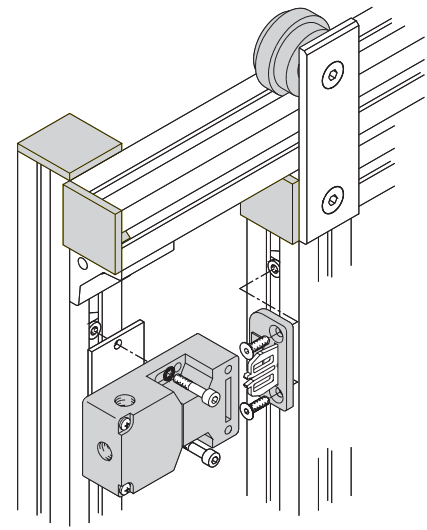
Fasteners for Safety Interlocks

The fastener set for safety interlocks can be used on swing doors with a gap of 5 to 24 mm.

Material: Tumbled aluminium plate



Safety interlock fastener set for swing doors
B16.03.001



Safety interlock fastener set for sliding doors
B16.03.002

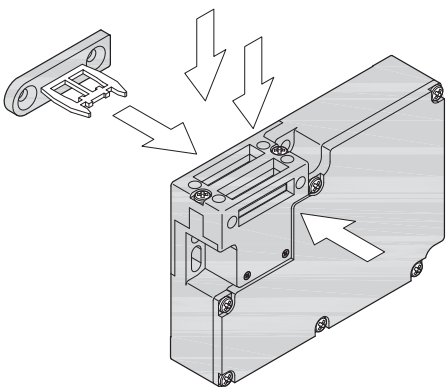
Mechanical solenoid latches

Properties

- Plastic housing
- Protective earthing
- Failsafe locking
- Dimensions: 130 mm x 90 mm x 30 mm
- Six contacts
- Long service life
- Large space for connecting cables
- Manual release
- Four M16x1.5 cable openings
- De-energise to trip

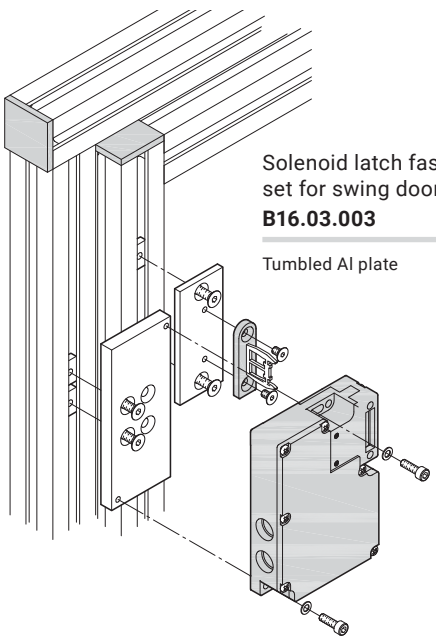
The solenoid latch ensures that sliding, rotating or removable guarding cannot be opened until the hazardous situation, e.g. coasting motion, has ended.

Protective doors that are secured with solenoid latches are generally only opened in exceptional cases. Solenoid latches use electric magnets to activate an interlock, which blocks or triggers the actuating key of the switch.



Actuating key AZM 161-B1
K370000021

Solenoid latch
AZM 161SK-12/12RK-024
K370000020



Solenoid latch fastener set for swing doors
B16.03.003

Tumbled Al plate

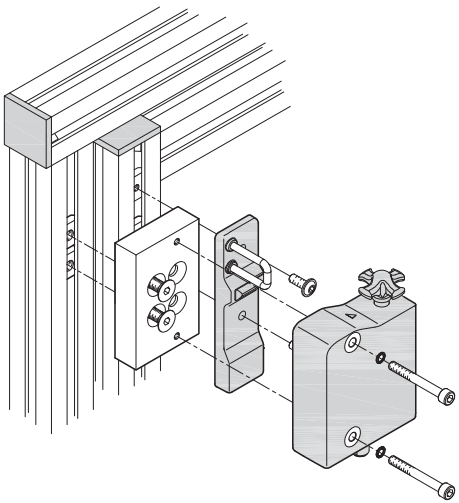
Max. safety category/ performance level:	Without 2nd switch: max. SC 3, PL “d”
Contacts:	2 normally open, 4 normally closed
Degree of protection:	IP 67
Retaining force:	2000 N
Control voltage:	24 V DC

With lock monitoring

Electronic solenoid latch

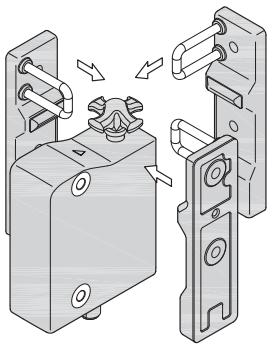
Properties

- Plastic housing
- Three different actuation directions
- Compact design
- Non-contact, coded electronic system
- Three LEDs for displaying operating states
- Resistant to cleaning agents
- Suitable for hinged and sliding doors
- Series circuit
- Manual release
- M12, eight-pin plug connector
- De-energise to trip
- Lock monitoring
- Diagnostics output



Fastener set for solenoid latch
B16.03.008

Tumbled Al plate



Actuating key
AZ/AZM 300-B1
K370000023

Electronic solenoid latch
AZM 300Z-ST-1P2P
K370000022

Performance level:	max. PL “e”
Contacts:	1 sourcing diagnostic output (Out), 2 sourcing safety outputs Out: guarding closed/ guarding closed and locked
Degree of protection:	IP66, IP67, IP69
Retaining force:	1000 N
Locking force:	25 N/50 N, set using rotating cross
Control voltage:	24 V DC

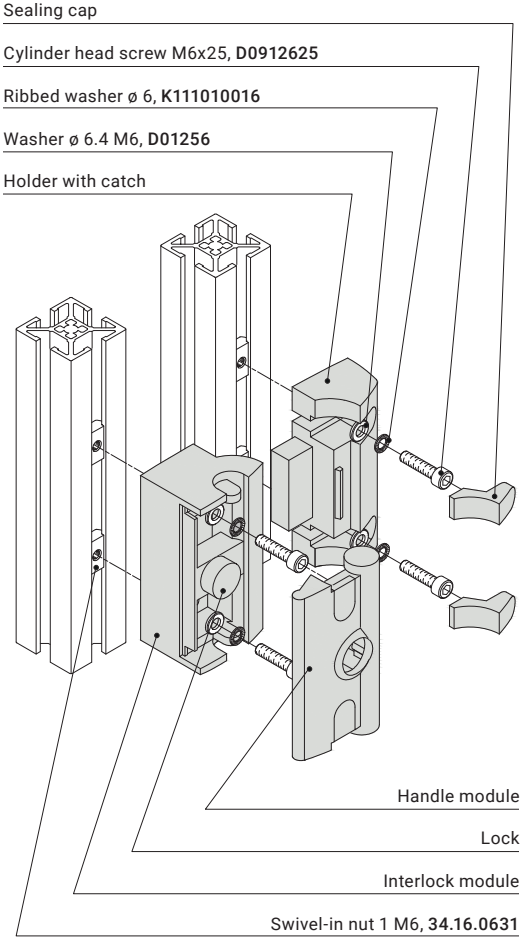
Slam Latches

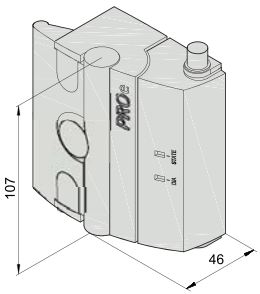
Slam latches are multi-functional door handles for securing and monitoring guarding. They consist of a handle and an interlock module. The PROe lock has additional transponder-coded safety technology according to EN ISO 13849-1 (Cat. 4/PL e).

- Can be installed without machining
- For use with left-hinged and right-hinged doors
- Lockable to prevent unwanted shutdowns
- Secured against disassembly in closed state

Material: Black power-coasted die-cast aluminium

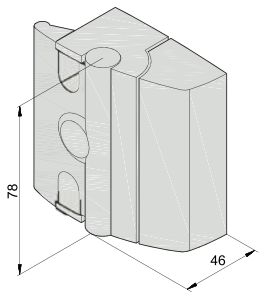
Fastening example



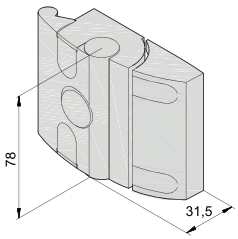


PROe slam latch
B68.02.032*

LED status indicators



PRO slam latch
B68.02.031*



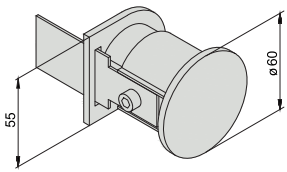
Compact slam latch
B68.02.030*

*With fastening accessories

Emergency Opener

For rear emergency release of the PROe, PRO and Compact slam latches.

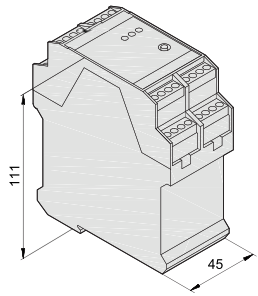
Material: PA 6 plastic, glass fibre reinforced



Emergency opener
B68.02.033*

AR Evaluation Unit for PROe

This electronic evaluation unit allows you to connect up to 20 PROe slam latches in series.



AR evaluation unit
K370000046

Connection Accessories for PROe

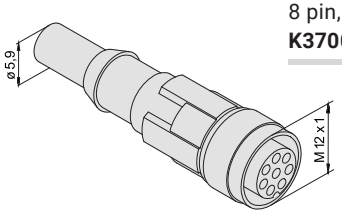
The PROe is connected using an M12 plug connector (8 pin). It is available with a cable length of 5 m, 10 m or 20 m.

Material: PVC

Connection cable,
8 pin, 5 m
K370000043

Connection cable,
8 pin, 10 m
K370000044

Connection cable,
8 pin, 20 m
K370000045



*With fastening accessories

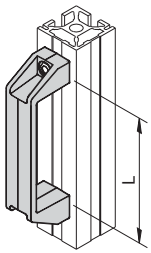
Handles

Bracket Handles

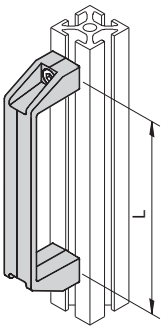
Bracket handles enable better handling of maintenance doors, windows and various covers and flaps.

Material: PA plastic

25 40 50 60



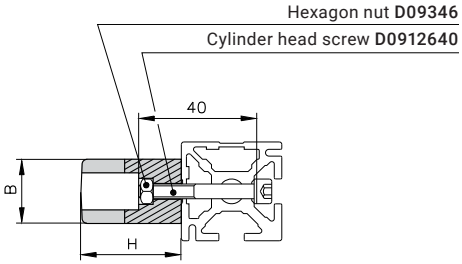
Bracket handle	Length [mm]	Width [mm]	Height [mm]
K110000021	122	26	41
K110000020	152	28	60



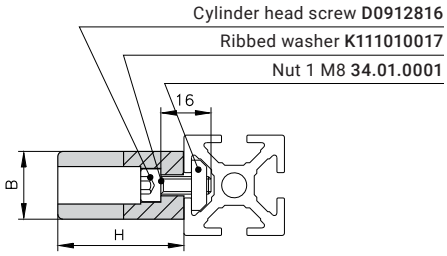
Bracket handle	Length [mm]	Width [mm]	Height [mm]
K110000009	117	26	41
K110000010	179	28	50

7

Fastening example for **K110000021** and **K110000020**



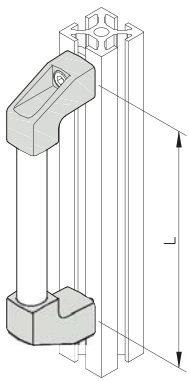
Fastening example for **K110000009** and **K110000010**



Bracket Handles

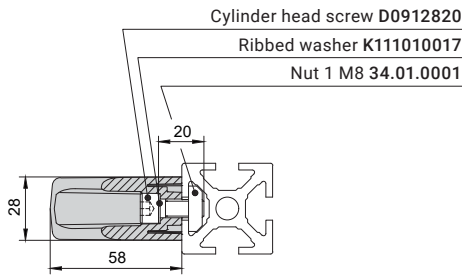
Material: PA6 plastic end pieces,
anodised aluminium tube

25 | 40 | 50 | 60



Bracket handle	Length [mm]	Width [mm]	Height [mm]
K110000011	200	28	58
K110000012	300	28	58
K110000013	400	28	58

Fastening example for **K110000011**



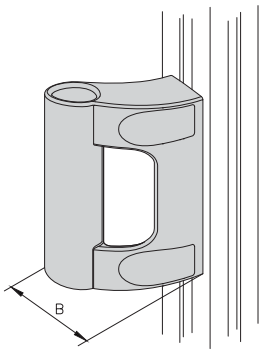
Handles

Machine Handles

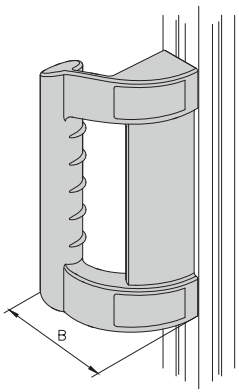
Machine handles enable better handling of maintenance doors, windows and various covers and flaps. They are delivered with caps.

Material: PA plastic

25 | 40 | 50 | 60



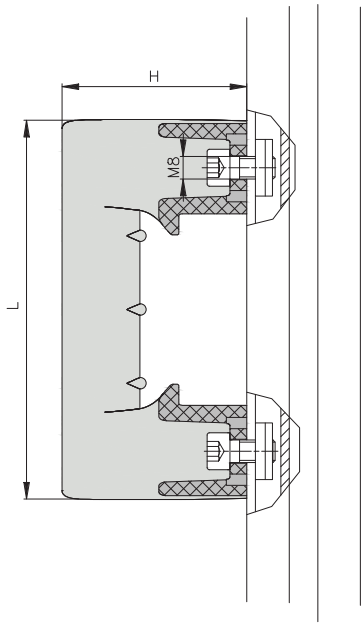
Machine handle	Length [mm]	Width [mm]	Height [mm]
K110000023	135	65	72



Machine handle	Length [mm]	Width [mm]	Height [mm]
K110000025	240	80	100

7

Fastening example for **K110000023**

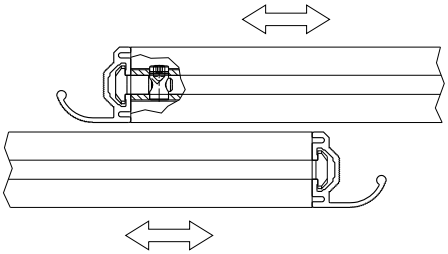


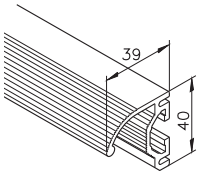
Profile for Strip Handles

The mk 2244 application profile is used as a strip handle for sliding doors. The ribbing provides the perfect structured surface for easily opening and closing sliding doors along their entire height.

Material: Anodised aluminium

Fastening example





Profile mk 2244

0.87 kg/m

Stock length	**52.44.5100**
Cut	**52.44. ....**

Section 8 Industrial Workstations

Notes on Industrial Workstations

Table Frames

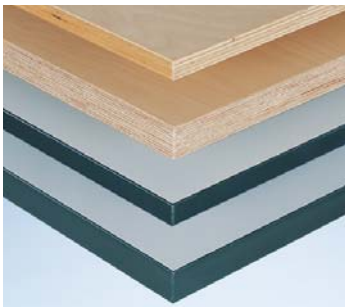


Table Tops

Drawer Cabinets 286

Risers 289

Provision of Material

Notes on Industrial Workstations

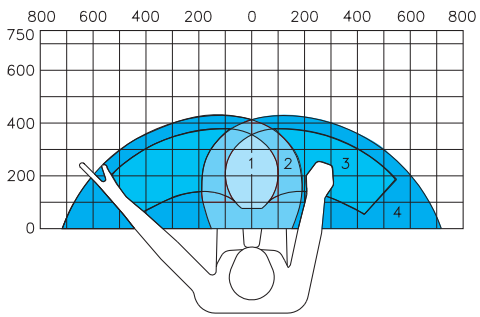
8

Benefits of mk Industrial Workstations

- Ergonomic and highly functional industrial workstations for optimal productivity
- Aluminium profile construction for ultimate flexibility to expand and make changes
- Table frame with an adjustable height and variable material provision systems allow the workstation to be adapted to the employee
- Extensively customisable, with risers, shelving systems, electrical and pneumatic supply options, tool hangers and drawer cabinets
- mk's extensive experience in expanding these stations into complete assembly lines, including workstation interlinking
- Custom solutions to fit existing processes, including requirements relating to lean production, kanban, ESD or cleanroom processes

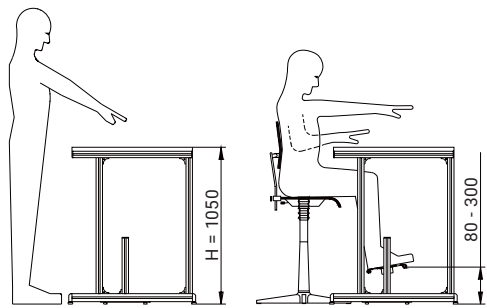
Workstation Ergonomics

Ergonomic Reach Zones



Zone 1	Work area
Zone 2	Extended work zone
Zone 3	One-hand zone
Zone 4	Extended one-hand zone

Ergonomic Sit-to-Stand Workstation



The option to sit or stand can be provided with a height adjustment mechanism or using a chair and footrest, as shown here. This reduces strain on the employee's spine and intervertebral discs.

The word "ergonomics" comes from Greek and translates roughly to the study of human work. Having ergonomically designed industrial workstations not only increases productivity and reduces the rate of mistakes, but also improves employee health and therefore improves morale and the working environment. mk industrial workstations can be quickly and easily adjusted each employee's particular physical needs. This includes a height adjustment mechanism and a design that allows the workpiece, the tools and the bins for providing materials to be optimally positioned within the employee's reach for the particular task. This helps employees avoid unhealthy postures and optimises productivity. Providing optimal lighting for the particular task is another critical factor that mk has incorporated with its variable lighting system.

Standards and Regulations

In designing its industrial workstations, mk has followed all applicable standards and regulations, for example DIN EN ISO 6385 (Ergonomics principles in the design of work systems).

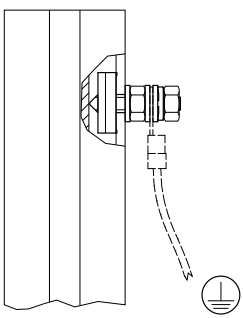
Earthing and Protective Conductors

If industrial workstations are electrified (e.g. lighting, electrical sockets, etc.), DIN VDE 0100- 410 specifies that all of a workstation's conductive components must be connected together and with the protective conductor of the supply line so that protection against electric shock is ensured in the event of a fault.

Connecting the profiles with angles and ESD nuts, sometimes known as PE nuts, ensures conductivity throughout the entire workstation. If the workstation is electrified after construction, this means that the protective conductor has to be connected to the workstation in only one location to provide earthing.

Earth Terminal

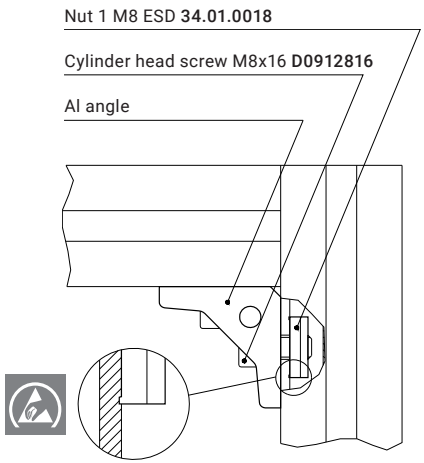
The earth terminal is used to connect the protective conductor to the industrial workstation to ensure protection against electric shock. This also protects sensitive components against electrostatic discharge.



Earth terminal
B02.99.151

Angle Fastener with ESD Nuts

The pressed protrusion on the nut penetrates the profile's insulating anodised coating and ensures that the connection is conductive through the screw connection.



Notes

Table Frames

Fixed Working Height

Our table frames with a fixed working height are made from mk's Series 40 profiles and feature a sturdy pedestal design. The standard dimensions shown here allow it to be used as a sit-to-stand workstation. Custom dimensions can also be implemented, although our standard range complies with ergonomics recommendations from the applicable standards.

For table tops, see page 284

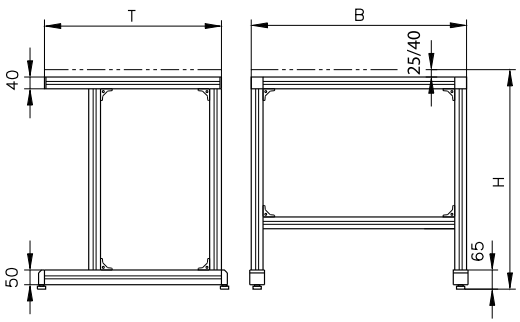


Table frame C1

B02.13.030

Loads

Load scenario	Top thickness	Surface load	Total load
Static load	< 35 mm	2000 N/m²	2000 N
Static load	> 35 mm	2500 N/m²	4000 N

Standard dimensions (mm)

Height H*	Depth T	Width B
850	600	1200
1050	750	1400
		1600

*Including 25 mm table top

Other dimensions possible. Heavy-duty design for high loads available on request. Steel privacy panelling in various RAL colours available.

Manual Height Adjustment

Our table frames with an adjustable working height are made from mk's Series 40 profiles and feature a sturdy pedestal design. In this table design, the height is adjusted using telescoping profiles with a fastening screw. This allows the working height to be easily adjusted while maintaining stability and load capacity.

For telescoping profiles, see page 306
For table tops, see page 284

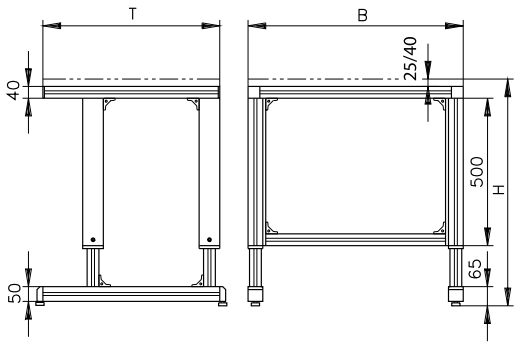


Table frame D1

B02.13.040

Loads

Load scenario	Top thickness	Surface load	Total load
Static load	< 35 mm	2000 N/m²	2000 N
Static load	> 35 mm	2500 N/m²	4000 N

Standard dimensions (mm)

Height H*	Depth T	Width B
680 to 1070	600 750	1200 1400 1600

*Including 25 mm table top

Other dimensions possible. Heavy-duty design for high loads available on request. Steel privacy panelling in various RAL colours available.

Table Frames

Manual-Hydraulic Height Adjustment

Our table frames with an adjustable working height are made from mk's Series 40 profiles and feature a sturdy pedestal design. In this table design, the height is adjusted using telescoping profiles with a matching gliding assembly and a hand crank. This allows you to quickly adapt the working height to the user or the workpiece. The employee can also switch between sitting and standing. The required driving torque of about 6 Nm is within the boundaries of the ergonomics requirements for the design of control actuators, DIN EN 894-3, for manual actuation. 5 mm stroke per crank rotation.

For telescoping profiles, see page 306
For table tops, see page 284

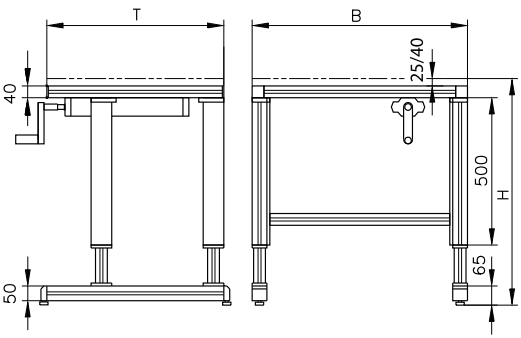


Table frame D4

B02.13.043

Loads

Load scenario	Top thickness	Surface load	Total load
Static load	< 35 mm	2000 N/m²	2000 N
	> 35 mm	2500 N/m²	2800 N
Dynamic load*	< 35 mm	1600 N/m²	1600 N
	> 35 mm	1600 N/m²	1600 N

*Maximum load under which the table can still be moved

Standard dimensions (mm)

Height H*	Depth T	Width B
680 to 1070	750 800	1200 1400 1600

*Including 25 mm table top

Other dimensions possible. Heavy-duty design for high loads available on request. Steel privacy panelling in various RAL colours available.

Notes

Table Frames

Electrical Height Adjustment

Our table frames with electrical height adjustment made from mk's Series 40 profiles are suitable for both sitting and standing. A button with an optional memory function is used to adjust the height of the workbench within a 400 mm range. A selection of different table tops, accessory components and additions such as risers are presented on the following pages.

Technical data

Travel speed	v = 12 mm/s
Voltage/frequency	230 V/50 Hz
Operating voltage (secondary)	24 V DC
Controller protection class	IP20
Motor/remote control protection class	IP30
Turnkey system with 3 m mains cable	

For table tops, see page 284

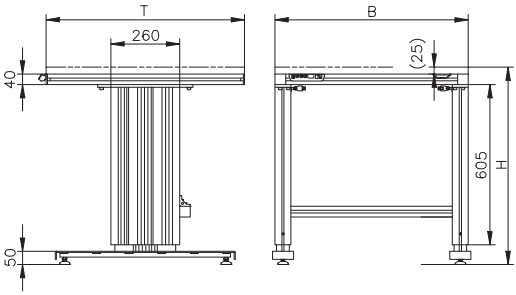


Table frame J1

B02.13.090

Loads

Load scenario	Top thickness	Surface load	Total load
Static load	25-40 mm	2000 N/m²	3000 N

Standard dimensions (mm)

Height H	Depth T	Width B
720 to 1120	700	1200
+ table top thickness	750	1600
	800	2000

Other dimensions possible.

For table tops, see page 284

Heavy-Duty with Electrical Height Adjustment

The heavy-duty version of the workbench with electrical height adjustment features a table frame made from mk 2040.02 profiles that goes around the entire table and a maximum load capacity of 4500 N. A button with an optional memory function is used to adjust the height of the workbench within a 400 mm range. A selection of different table tops, accessory components and additions such as risers are presented on the following pages.

Technical data

Travel speed	v = 9 mm/s
Voltage/frequency	230 V/50 Hz
Operating voltage (secondary)	24 V DC
Controller protection class	IP20
Motor/remote control protection class	IP30
Turnkey system with 3 m mains cable	

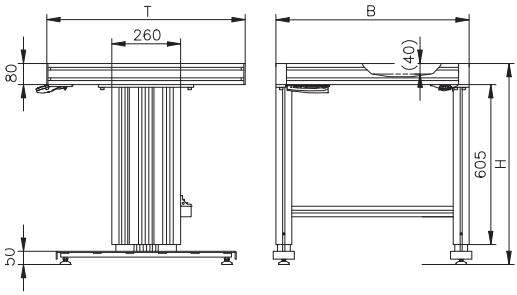


Table frame K1 (heavy duty) B02.13.100

Loads

Load scenario	Top thickness	Surface load	Total load
Static load	40 mm	3000 N/m²	4500 N

Standard dimensions (mm)

Height H	Depth T	Width B
760 to 1160	700	1200
	750	1600
	800	2000

Other dimensions possible.

Table Tops

Table Top Materials

Potential factors for choosing a table top material include the stability and material of the workpiece and the wear resistance of the table top. Environmental conditions such as moisture or high temperatures can also influence the choice of material. On request, other surface materials such as stainless steel sheet or laminated wood can be used. ESD-compatible tops are also available on request.

8

Beechwood Multiplex Tops

- Multi-bonded beechwood
- Resistant to warping
- Jointless
- Ground natural surface, waterproofed on request

Thickness	Mass	Item no.
25 mm	18.9 kg/m2	**50.13.5005**
40 mm	30.0 kg/m2	**50.13.5008**

Painted surfaces on request.

Laminated Tops

- Laminated particleboard
- Light grey standard colour
- Black edge band with rounded edges (grey on request)
- High resistance to shocks and impacts

Thickness	Mass	Item no.
20.6 mm	15.5 kg/m2	**50.13.6004**
26.6 mm	20.0 kg/m2	**50.13.6005**
39.6 mm	27.2 kg/m2	**50.13.6008**

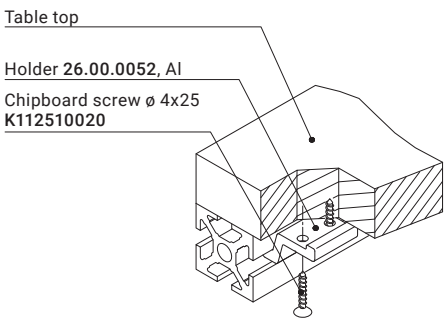
Conductive design (ESD) on request.

Table Top Fasteners

The table tops can be mounted using angles or with the fastener set shown here. Holders such as angles can be used for both multiplex and laminated tops in any thickness offered.

Angles
starting on page 76

Fastening example



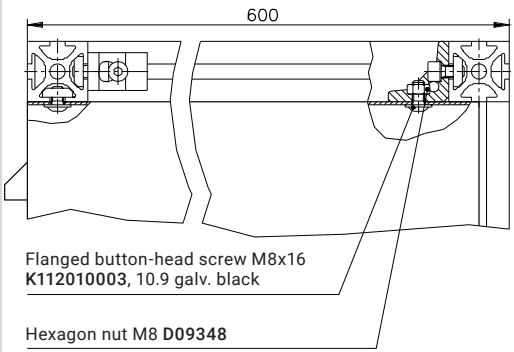
Fastener set
for 20 to 40 mm table tops
B02.99.050

Consists of:
6 x holders **26.00.0052**
12 x chipboard screws ø 4x25 **K112510020**

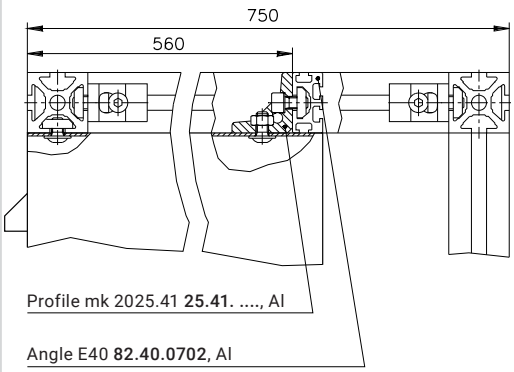
Drawer Cabinets

Drawer cabinets provide storage space without reducing the actual working area. The casing has a solid sheet steel construction. It can withstand loads up to 200 kg. All drawer cabinets are equipped with a cylinder lock and painted in RAL 7035.

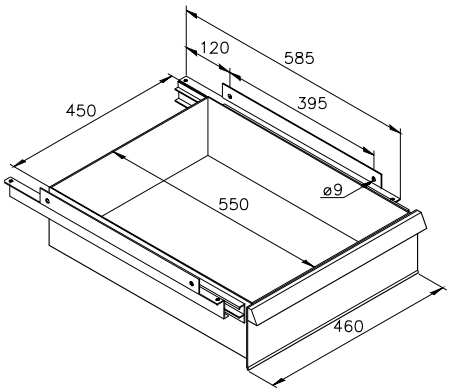
Fastening example for table depth T = 600



Fastening example for table depth T = 750



Drawer cabinet, single drawer

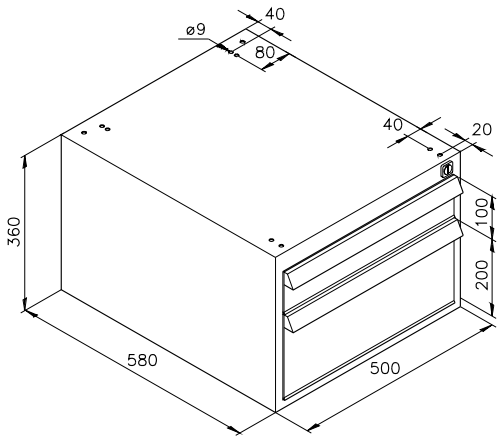


Single drawer
B02.23.903

m = 8 kg

Fastener set
B02.99.004

Drawer cabinet, two drawers



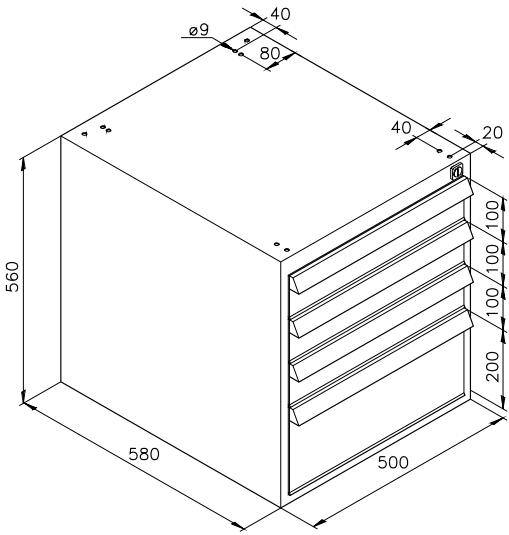
Two drawers
B02.23.902

m = 23 kg

Fastener set
Table depth T = 600 mm
B02.99.001

Fastener set
Table depth T = 750 mm
B02.99.002

Drawer cabinet, four drawers



Four drawers
B02.23.901

m = 35 kg

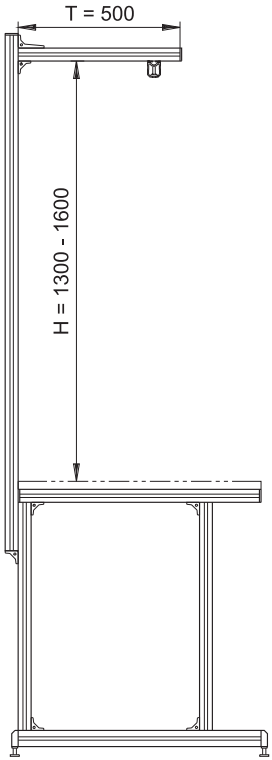
Fastener set
Table depth T = 600 mm
B02.99.001

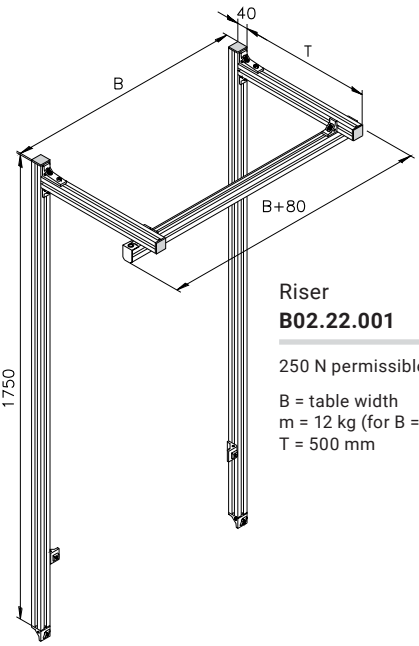
Fastener set
Table depth T = 750 mm
B02.99.002

Risers

Risers are used for mounting additional parts above the table top, for example shelves, electrical/ pneumatic supply components or tools. They come equipped with a C-rail as standard for attaching tool sliders. The heights of the riser's beams and cantilevers can be adjusted. We offer a heavy-duty riser design for higher load requirements.

For table tops, see page 284

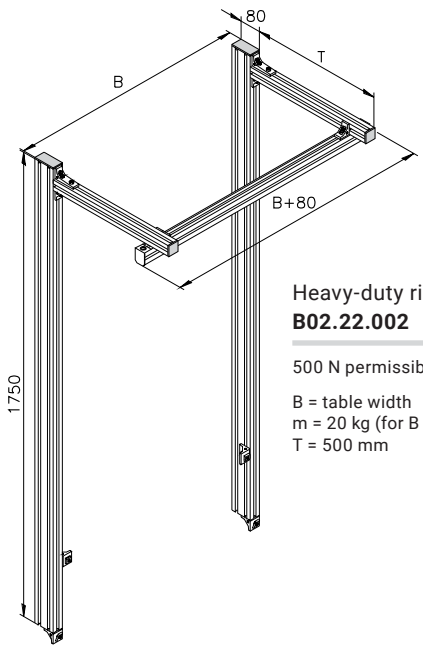




Riser
B02.22.001

250 N permissible load

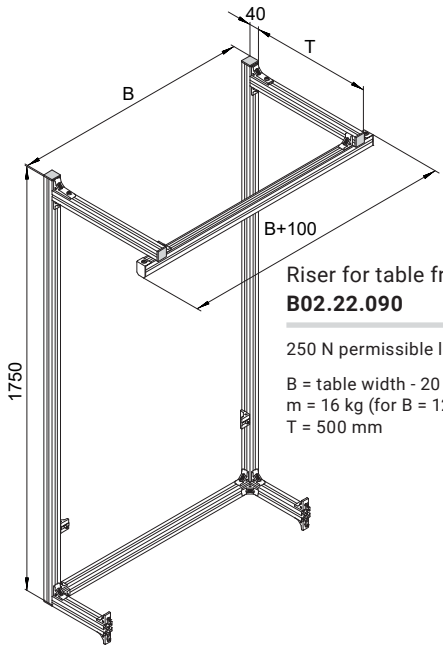
B = table width
m = 12 kg (for B = 1200 mm)
T = 500 mm



Heavy-duty riser
B02.22.002

500 N permissible load

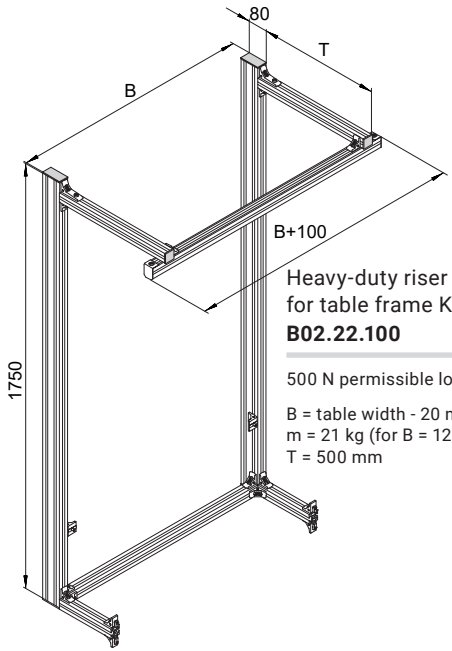
B = table width
m = 20 kg (for B = 1200 mm)
T = 500 mm



Riser for table frame J1
B02.22.090

250 N permissible load

B = table width - 20 mm
m = 16 kg (for B = 1200 mm)
T = 500 mm



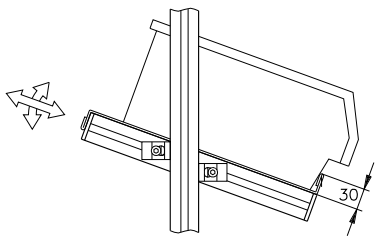
Heavy-duty riser
for table frame K1
B02.22.100

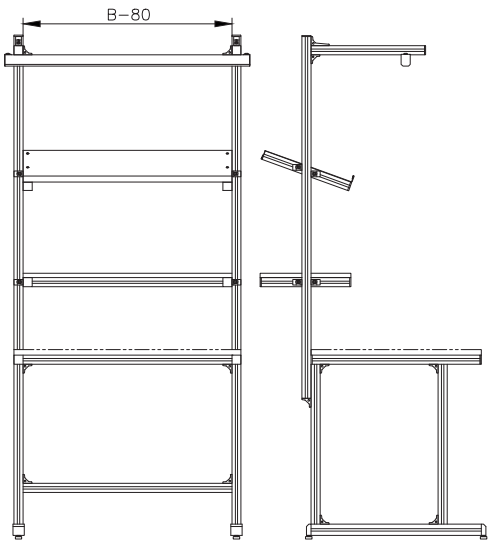
500 N permissible load

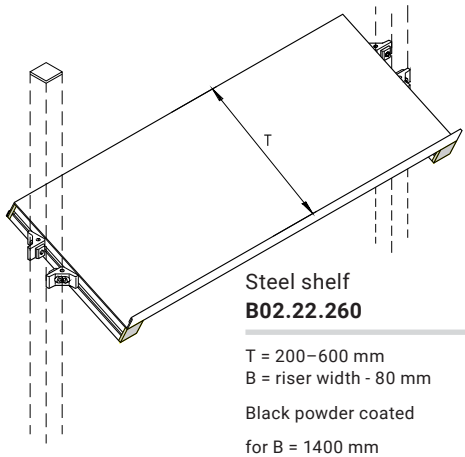
B = table width - 20 mm
m = 21 kg (for B = 1200 mm)
T = 500 mm

Rack Systems

Rack systems are used to hold bins, tools, measuring instruments or components to be mounted. You can use various angles to adapt the depth, height and incline of the rack system for optimal positioning. Please specify the width and depth when ordering.





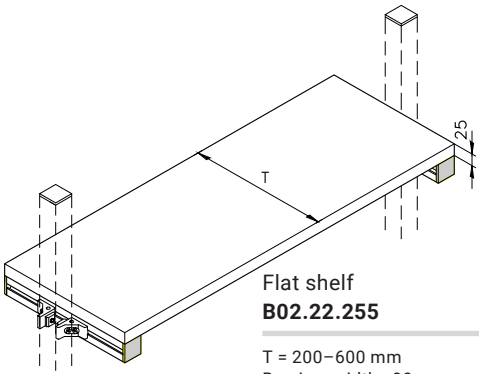


Steel shelf
B02.22.260

T = 200–600 mm
B = riser width - 80 mm

Black powder coated

for B = 1400 mm
m = 8 kg
F_s = 800 N
F_p = 500 N



Flat shelf
B02.22.255

T = 200–600 mm
B = riser width - 80 mm

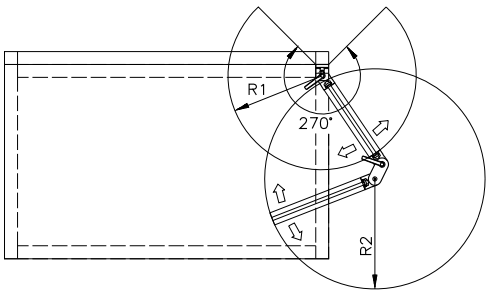
for B = 1400 mm
m = 14 kg
F_s = 1200 N
F_p = 800 N

F_s = surface load

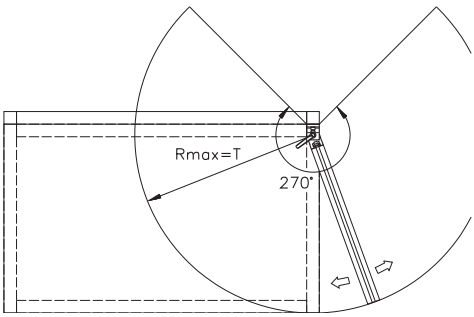
F_p = point load (max. load on a surface of at least 200 x 200 mm)

Swivel Arms

Uses for swivel arms range from holding shelves, to holding containers for small parts, to connecting monitors. In addition to creating additional work space, they can be adjusted to provide an ergonomically optimal layout for the worker. The clamping lever or cylinder head screw can be used for attachment.

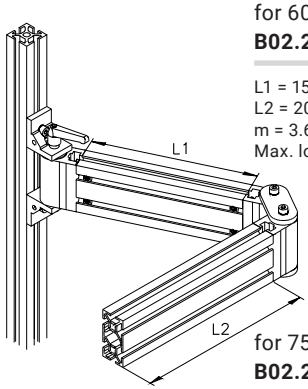


R1 max = 290 mm
R2 max = 340 mm



T = table depth

Double swivel arm
for 600 mm table depth
B02.24.360

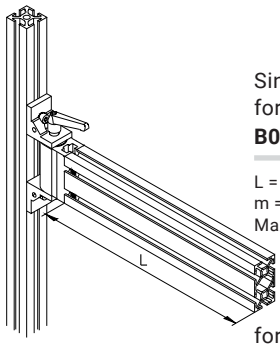


L1 = 150 mm
L2 = 200 mm
m = 3.6 kg
Max. load = 300 N

for 750 mm table depth
B02.24.361

L1 = 200 mm
L2 = 300 mm
m = 4 kg
Max. load = 300 N

Single swivel arm
for 600 mm table depth
B02.24.362



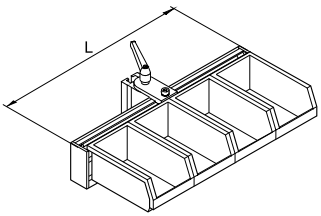
L = 250 mm
m = 1.7 kg
Max. load = 300 N

for 750 mm table depth
B02.24.363

L = 400 mm
m = 2.2 kg
Max. load = 300 N

Bin Mounts

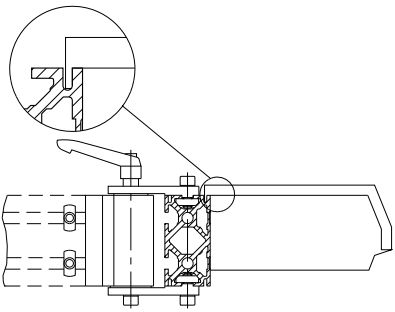
With bin holders, bins can be attached to swivel arms to allow for optimal ergonomic positioning. Alternatively, bins can be mounted on mk 2040.22 profiles.

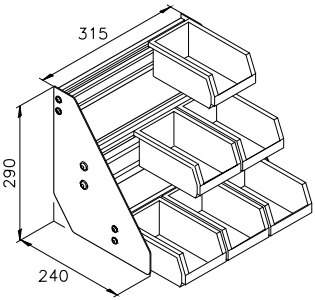


Bin holder
B02.24.366

L = (bin width + 1 mm) x N

Series 40, 2.75 mm slot width, for bin LF211/LF221





Rack
B02.24.367

with swivel arm connection

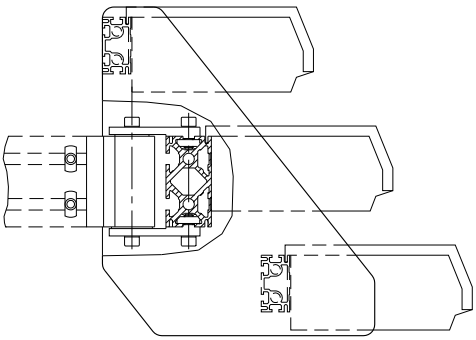
m = 3.4 kg

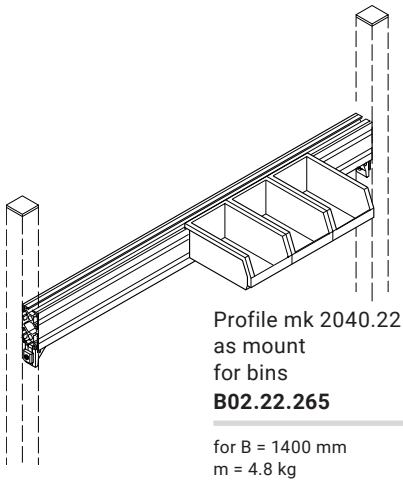
Rack
B02.24.356

without swivel arm connection

m = 2.5 kg

Series 25, 2.75 mm slot width, for bin LF211 only



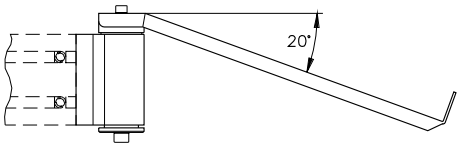


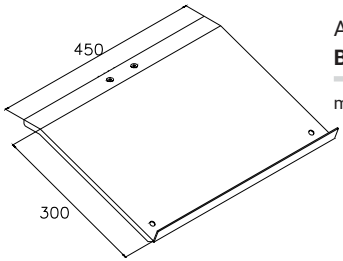
Profile mk 2040.22 as mount for bins
B02.22.265

for B = 1400 mm
m = 4.8 kg

Shelves

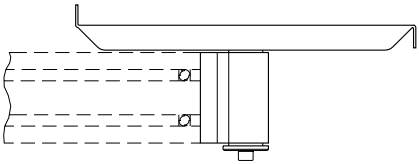
Angled or straight shelves are connected to a swivel arm and can thus be brought into the ideal ergonomic position.

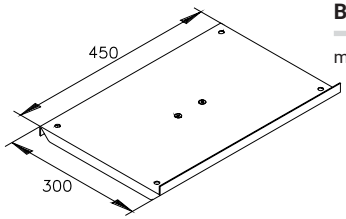




Angled shelf
B02.24.364

m = 3.6 kg





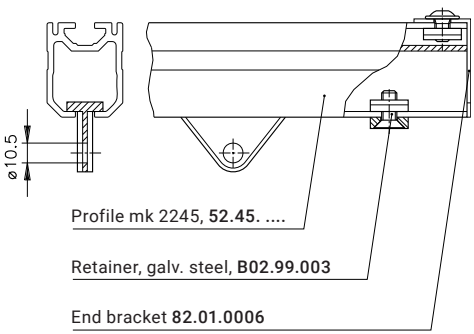
Straight shelf
B02.24.365

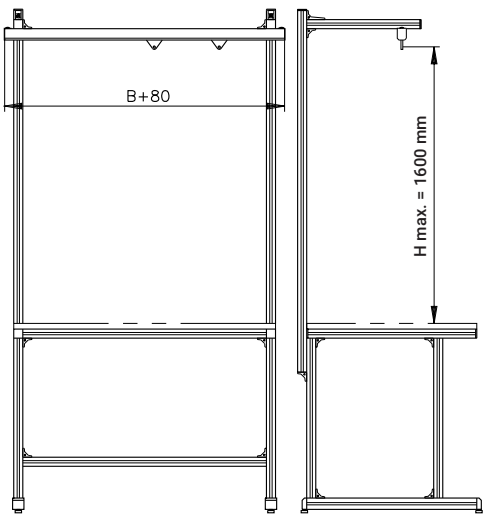
m = 3.4 kg

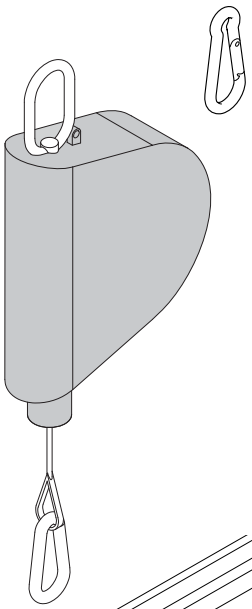
Provision of Material

Tool Hangers

The tool hanger components shown here are just our standard selection. Custom components are also available on request. Tools hangers improve organisation and safety at the workstation. They also make tools available without encroaching on the work space. The adjustable spring tension system reduces strain and improves ergonomics for the user.







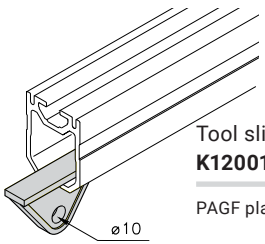
Snap hook
K120010003

Spring balancer F2
K120010006

Load capacity: 0.5–2.0 kg
Max. rope extension: 2.5 m
Min. installation length: 0.36 m

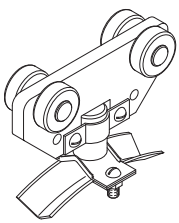
Spring balancer F3
K120010005

Load capacity: 1.5-3.0 kg
Max. rope extension: 2.5 m
Min. installation length: 0.36 m

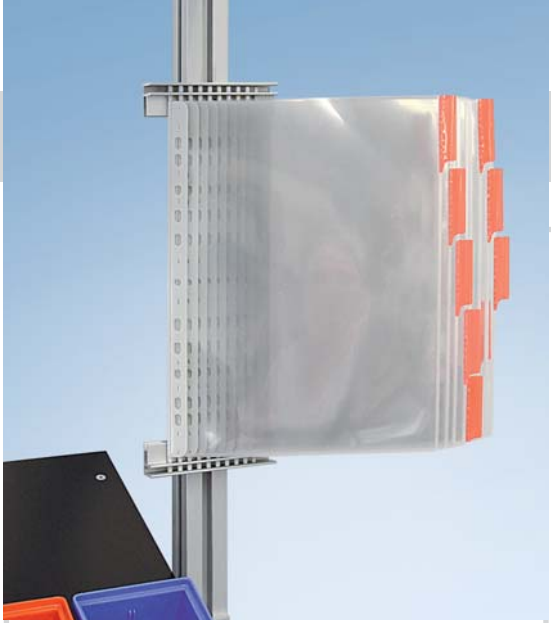


Tool slider
K120010004

PAGF plastic

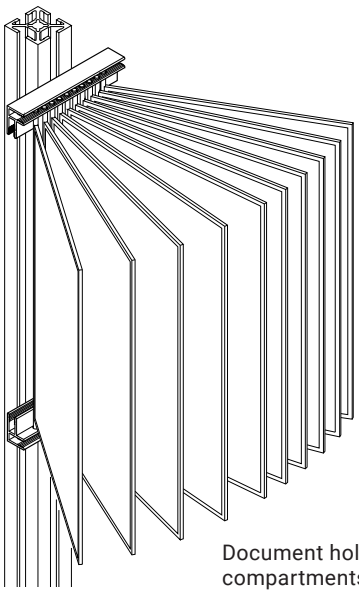


Roller unit for carrying cables and hoses
K120010001



Document Holders

Document holders allow you to protect and store documents, such as instructions for mounting, etc., at the workplace in an orderly manner.



Document holder, 10 compartments, A4 height
B02.99.041

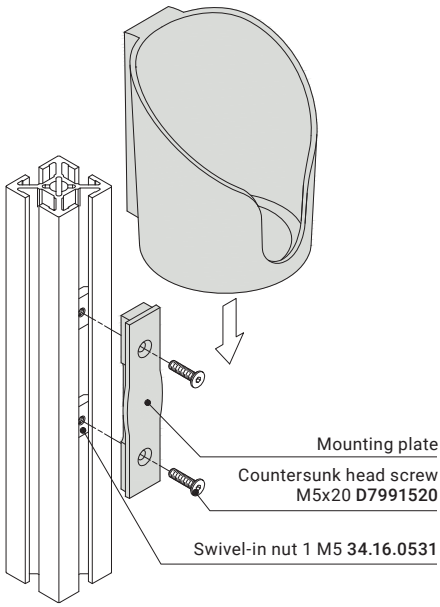
Bottle Holders

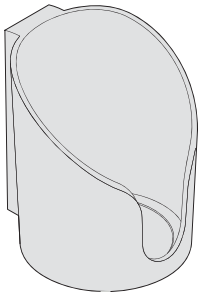
Bottle holders have a diameter of 100 mm and are designed for the secure storage of all common beverage bottles, cans, cups and drink boxes. The cut-out at the front makes the holders suitable for cups with a handle. The version with an open bottom can also be used to store a screwdriver or other such equipment.

Material: PA plastic

25 | 40 | 50 | 60

Fastening example

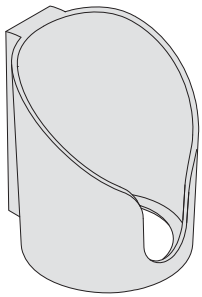




Bottle holder
with closed bottom
K120000120

Including mounting plate

Total load = max. 5 kg



Bottle holder
with open bottom
K120000121

Including mounting plate

Total load = max. 5 kg

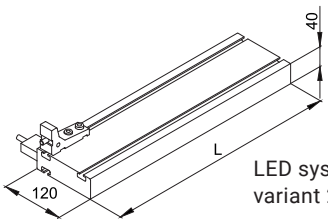
Notes

LED System Lamps

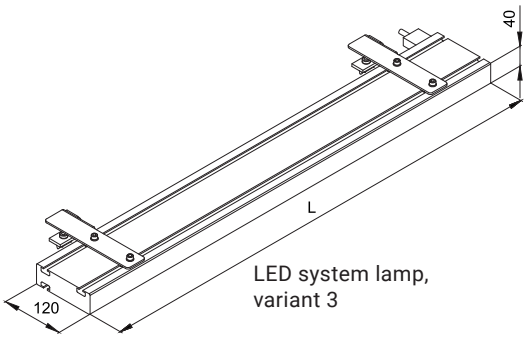
mk's LED system lamps provide bright, even lighting of the work space without glare. The colour temperature is 5000K at a power of 15 to 64 watts, depending on the variant. The lamps are CE certified, designed for operation with a 230V mains voltage and delivered with a three-metre connection cable. They can be rigidly mounted or can be made to swivel using a flexible holder set. The swivel range is from 25° backwards to 90° forwards. Variants 1 and 2 function as swivelling side lighting and are attached on the right or left side using angles.

LED

Dimensional sketches



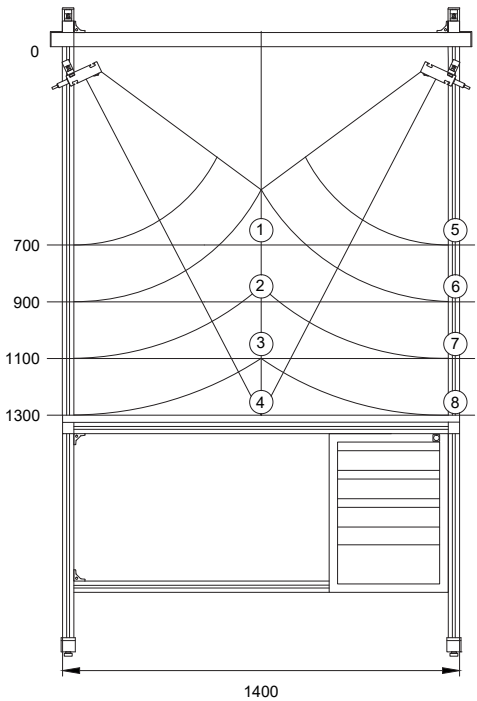
LED system lamp, variant 2



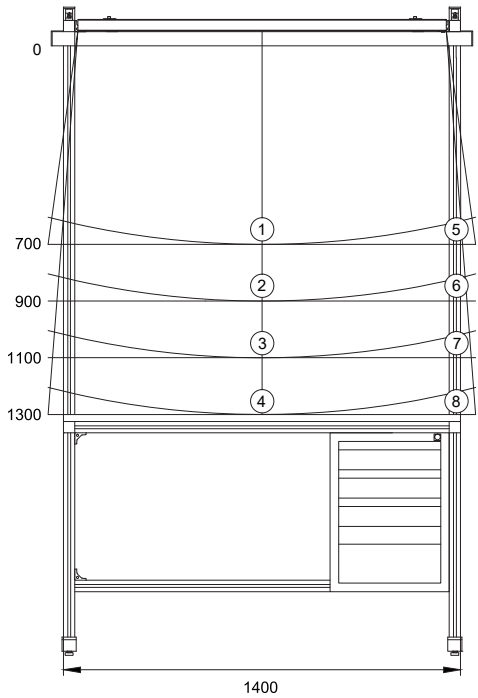
LED system lamp, variant 3

Vari-ant	Item no.	L [mm]	Power [W]	Mounting
1	**B02.23.806 001**	449	15	Left/ swivelling
2	**B02.23.806 002**	449	15	Right/ swivelling
3	**B02.23.806 003**	899	35	Swivelling
4	**B02.23.806 004**	899	35	Rigid
5	**B02.23.806 005**	1199	40	Swivelling
6	**B02.23.806 006**	1199	40	Rigid
7	**B02.23.806 007**	1499	64	Swivelling
8	**B02.23.806 008**	1499	64	Rigid

Measurement points for variants 1 + 2



Measurement points for variants 3 to 8



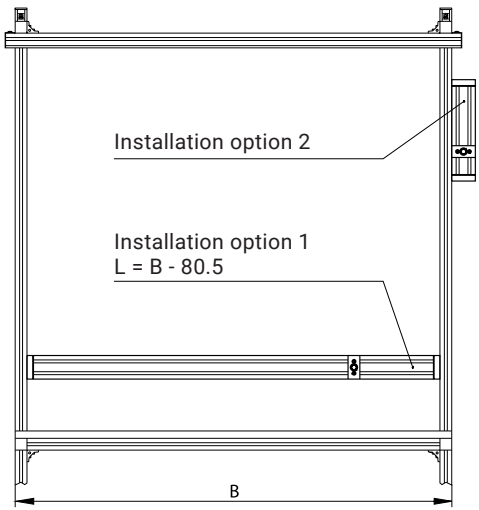
Illuminance

Measurement point	Variant 1 + 2 (lux)	Variant 3/4 (lux)	Variant 5/6 (lux)	Variant 7/8 (lux)
1	500	1550	1650	2000
2	450	1350	1450	1800
3	380	1150	1250	1600
4	300	1000	1100	1400
5	400	700	700	1000
6	350	650	650	820
7	300	580	600	750
8	250	500	550	7000

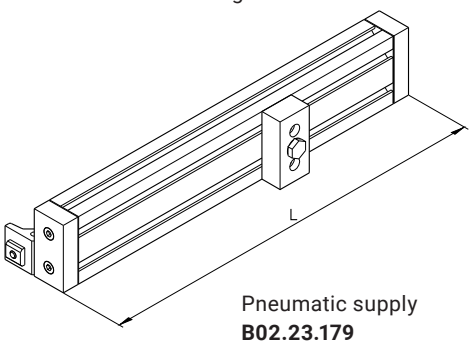
Pneumatic Supply

Pneumatic power is supplied via the mk 2040.02 construction profile. A major advantage of using profiles to supply the air is that it allows for great flexibility in the position and quantity of connection/distributor plates. The pneumatic supply system is designed for a maximum operating pressure of 6 bar.

Pneumatic components
see page 196



Base unit with connection plates, assembly available in various configurations



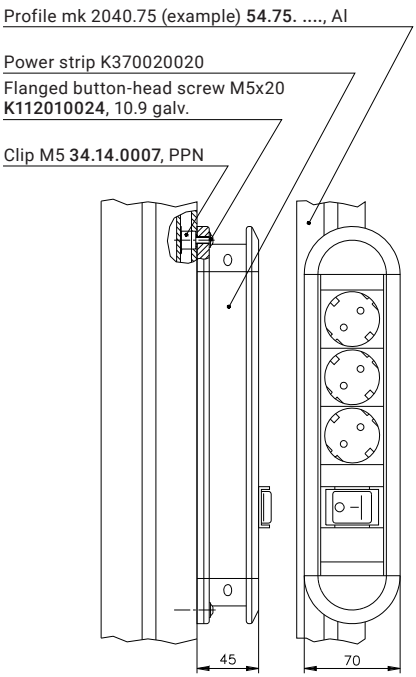
Pneumatic supply
B02.23.179

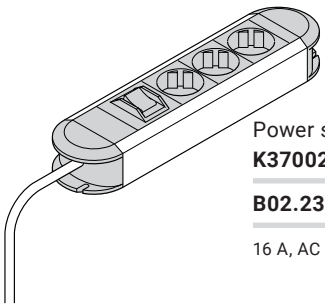
for B = 1400 mm
m = approx. 5.5 kg

Electrical Supply

The simplest way to supply electricity is using power strips in two different designs. The strips have an illuminated 16 A rocker switch, which has a 2-pole switch-off. The supply lines are 1.75 m long. They contain a longitudinal slot and eyelet for fastening them in various positions on the profile.

Fastening example

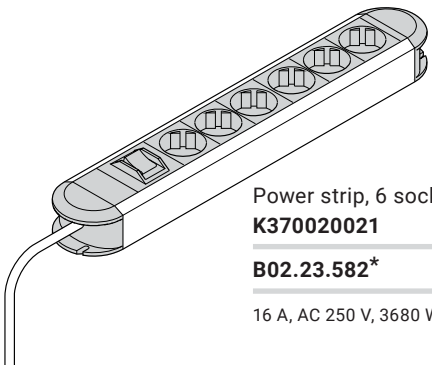




Power strip, 3 sockets
K370020020

B02.23.581*

16 A, AC 250 V, 3680 W



Power strip, 6 sockets
K370020021

B02.23.582*

16 A, AC 250 V, 3680 W

*With fastening accessories

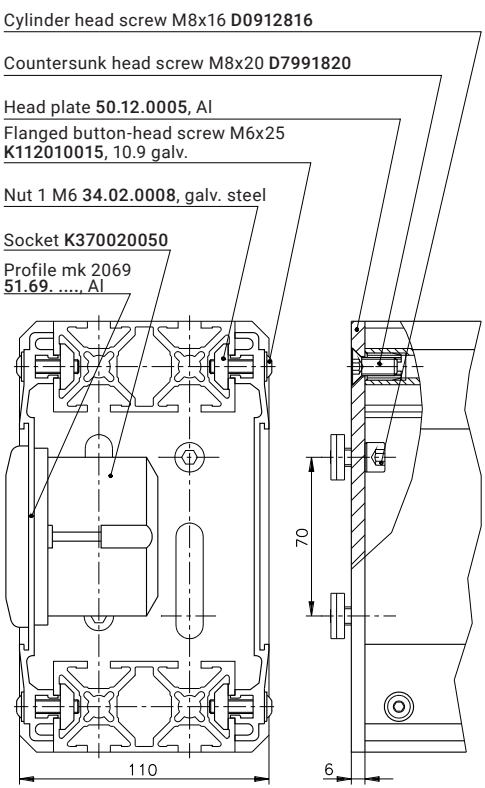
Power Supply

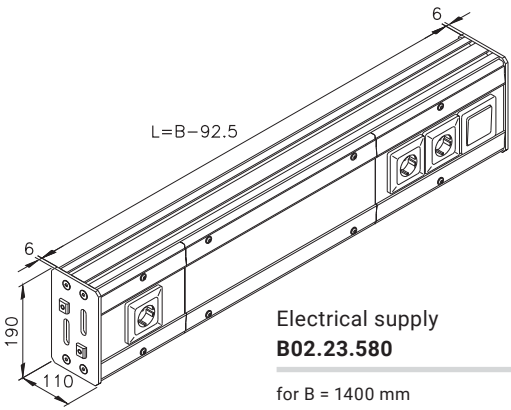
Electrical Supply

The standard electrical supply system is a combination of mk 2040.41 and mk 2069 profiles. The unit features exceptional stability and a closed design. Various sockets and switch combinations can be freely positioned along the entire working width. A major advantage of this system is that you can change or add equipment very easily, even custom components. The power supply system is tested in accordance with DIN VDE 0100-410 and includes a circuit diagram. The unit is delivered with a 3 m cable and plug.

Material: Anodised aluminium

Fastening example





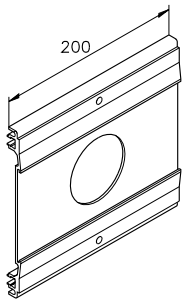
Electrical supply
B02.23.580

for B = 1400 mm

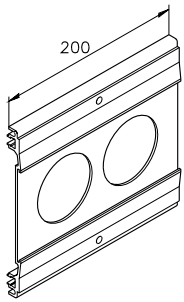
m = 11 kg

Permitted up to max. 16 A

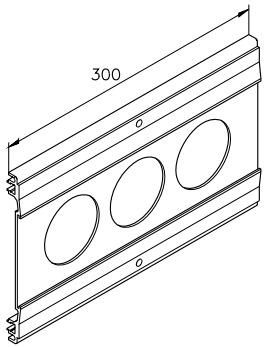
Choice of equipment
on the strip



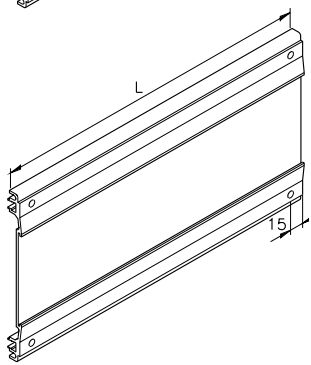
Single module
5169BB0200



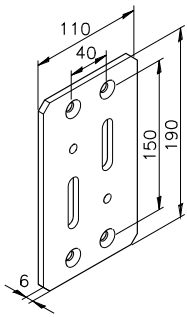
Double module
5169BC0200



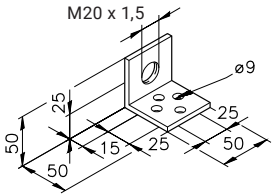
Triple module
5169BD0300



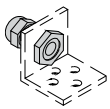
Cover module
5169BA ....



Head plate
50.12.0005

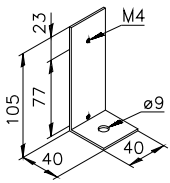


Tension relief angle
16.05.0030

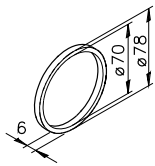


Cable gland
K399010001

Plastic



Angle for
junction box
82.01.0007



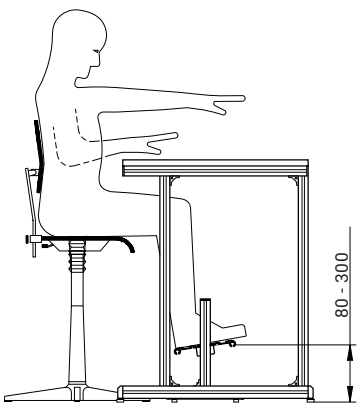
Spacer ring
for hollow wall box
16.01.0038

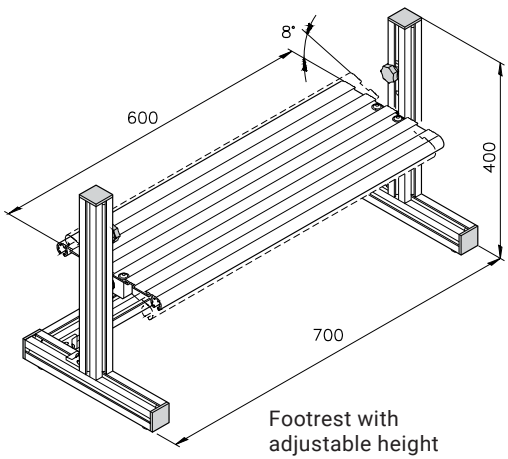
8

Accessories

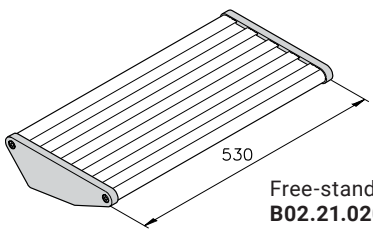
Support Brackets

The correct seat height adjustment is an important prerequisite for low-stress work at the workbench. This is correct when the forearms/upper arms are parallel to the table surface, the upper and lower leg are at an angle of at least 90° and the feet are resting completely on the floor. If the workbench is too high, a footrest can compensate for the distance between the feet and the floor. The infinitely adjustable footrest ensures the most comfortable foot position and relieves the legs ensuring pleasant working conditions.





Footrest with
adjustable height
H min - 83 mm
H max - 300 mm
B02.21.030



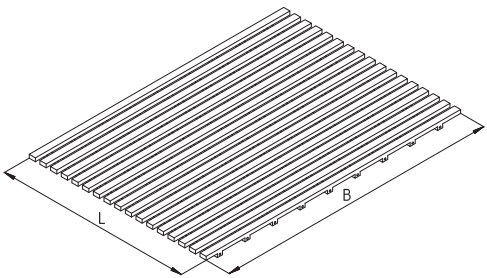
Free-standing footrest
B02.21.020

Floor Mats

Floor mats made from black TPE-V ensure that workers do not slip at industrial workstations while also reducing strain on their musculature and skeletal systems.

Benefits:

- Hollow spaces reduce strain on the musculature and joints
- Anti-slip
- Oil resistant
- Various dimensions up to 1.2 m wide and 15 m long with 3 mm thickness
- Highly flame-resistant version available



Floor mat

Item no.	Width B [mm]	Length L [m]
K12002.0600	600	max. 15
K12002.0800	800	max. 15
K12002.1000	1000	max. 15
K12002.1200	1200	max. 15

Floor mat B1
(highly flame resistant according to DIN 4102-1 B1)

Item no.	Width B [mm]	Length L [m]
K12003.0600	600	max. 15
K12003.0800	800	max. 15
K12003.1000	1000	max. 15
K12003.1200	1200	max. 15

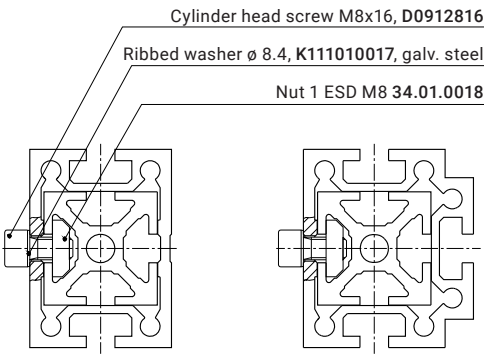
Application Profiles for Workstations

Profiles for Telescoping

The following components can be used to construct telescoping/height-adjustable table frames and other support frames.

Material: Anodised aluminium

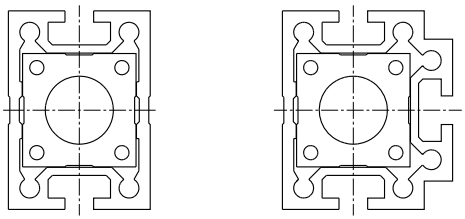
Telescoping profiles for manual height adjustment



mk 2040.75 and
mk 2040.01 profiles

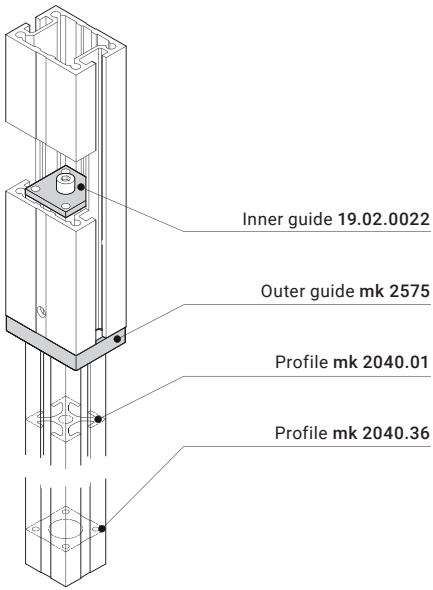
mk 2040.74 and
mk 2040.01 profiles

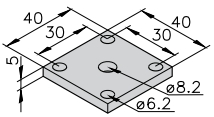
Telescoping profiles for hydraulic height adjustment



mk 2040.75 and
mk 2040.36 profiles

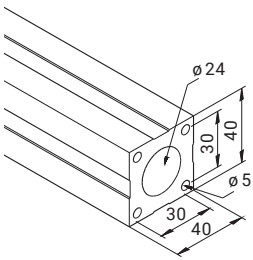
mk 2040.74 and
mk 2040.36 profiles





Guide
19.02.0022

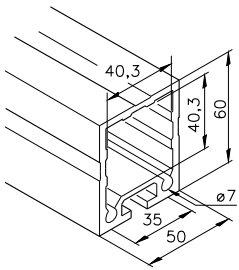
PA plastic



Profile mk 2040.36

2.83 kg/m

Stock length	**54.36.5100**
Cut	**54.36. ....**



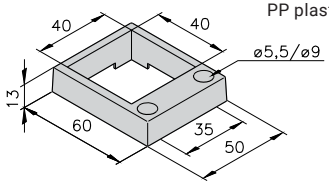
Profile mk 2040.38

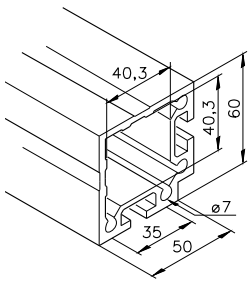
2.52 kg/m

Stock length	**54.38.5100**
Cut	**54.38. ....**

Guide
mk 2538

PP plastic





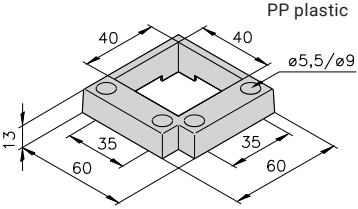
Profile mk 2040.39

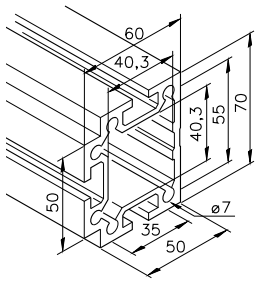
3.00 kg/m

Stock length	**54.39.5100**
Cut	**54.39. ....**

Guide
mk 2539

PP plastic

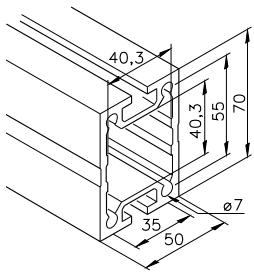




Profile mk 2040.74

3.50 kg/m

Stock length	**54.74.5100**
Cut	**54.74. ....**



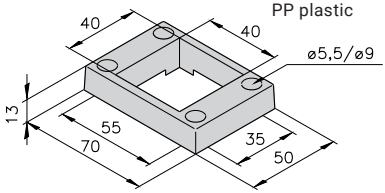
Profile mk 2040.75

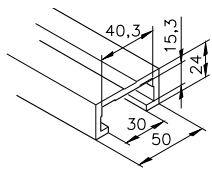
3.01 kg/m

Stock length	**54.75.5100**
Cut	**54.75. ....**

Guide
mk 2575

PP plastic





Profile mk 2040.37

1.17 kg/m

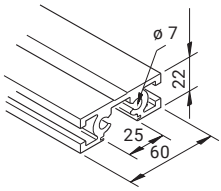
Stock length	**54.37.5100**
Cut	**54.37. ....**

Application Profiles for Workstations

Profiles for Table and Machine Frames

The following profiles can be used to build frames for tables, signs, presentation stands, desks, etc.

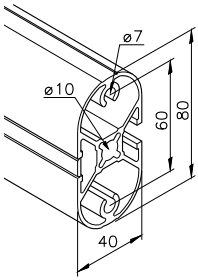
Material: Anodised aluminium



Profile mk 2040.35

1.61 kg/m

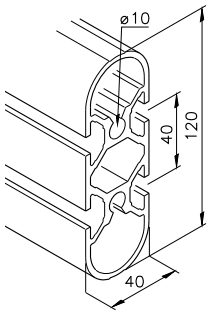
Stock length	**54.35.5100**
Cut	**54.35. ....**



Profile mk 2040.23

2.12 kg/m

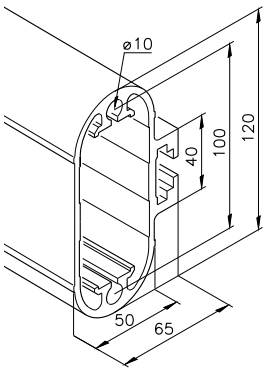
Stock length	**54.23.5100**
Cut	**54.23. ....**



Profile mk 2040.34

3.56 kg/m

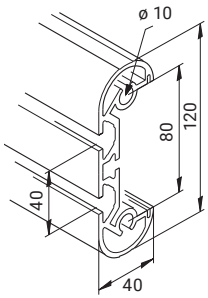
Stock length	**54.34.7100**
Cut	**54.34. ....**



Profile mk 2040.30

4.29 kg/m

Stock length	**54.30.5100**
Cut	**54.30. ....**



Profile mk 2040.33

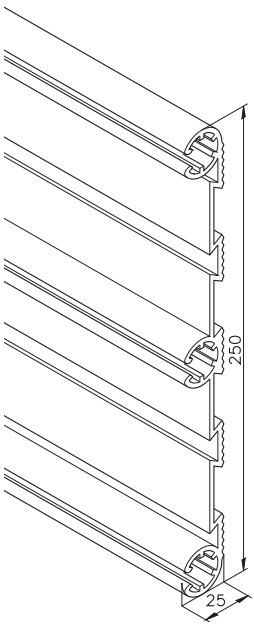
3.16 kg/m

Stock length	**54.33.5100**
Cut	**54.33. ....**

Profile for Footrests

The following profile is used to build footrests and can also be used as a stepping surface.

Material: Anodised aluminium



Profile mk 2040.70

3.53 kg/m

Stock length	**54.70.5100**
Cut	**54.70. ....**

Section 9 Stairs and Platforms

Stairs

Platforms

Guardrails

Notes on Stairs and Platforms

9

» Safe access
for safe work. «

With our platforms, we offer custom solutions for safely accessing work areas and performing work on vehicles, machines and systems. The platforms we offer include custom assembly and maintenance platforms, simple standard platforms, and footbridges for use in production areas.

mk platforms are planned and manufactured to order. We take into account the specific conditions on site, such as large heights or the need for extended reach. Appropriate functions are then planned, such as height adjustment, mobile capabilities or integrated rotary joints. By utilising the mk profile system, we can fulfil virtually any requirement in terms of effective area, travel distance or minimum clearance, depending on the specific application.

The size of the platforms can vary from simple footbridges to assembly platforms that are 15 m long and 6 m high. Foamed combined profiles can be used to construct free-standing bridges of up 8 m.

Benefits of Stairs and Platforms

- Variety of designs and options that fulfil safety requirements and improve workstation ergonomics
- Modular design allows for easy assembly and disassembly using standard tools
- Large selection of configurations provided by the profile system gives us maximum flexibility to implement customer-specific functions
- High material quality, sturdy connection technology and high-quality accessories ensure high load capacities and long service lives
- Compatible modules and removable connection technology allow for easy modifications and additions
- High-quality aluminium profiles for an attractive design
- Mobile designs available with fixed or swivel casters or air cushions

Ergonomics

Safety

Flexibility

Stairs

Notes/Technical Data

Stairs are made from mk 2040.68, mk 2040.69 and mk 2040.06 profiles. The profiles used in the stairs have a slip-reducing surface structure. The screw connections in the profile slots eliminate the need for machining components.

Sample order

Width (B)	=	1000 mm
Height (H)	=	1800 mm
Angle	=	45°
Number of steps	=	10

Incline angle

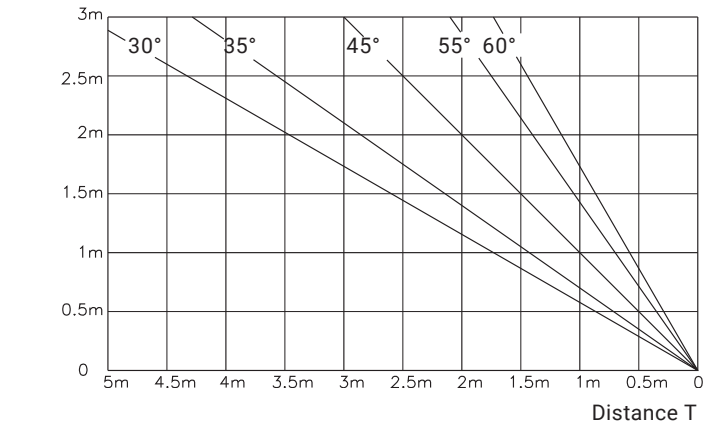
Stairs can be designed with various inclines depending on the intended function or available space. The recommended inclines for the stairs are based on the type of use. Our standard stairs have angles up to 45° For frequently used stairs on which loads are transported, the stairs should have an incline angle of 30° or 35°. If space is limited, the stairs can have a 60° incline.

Note:

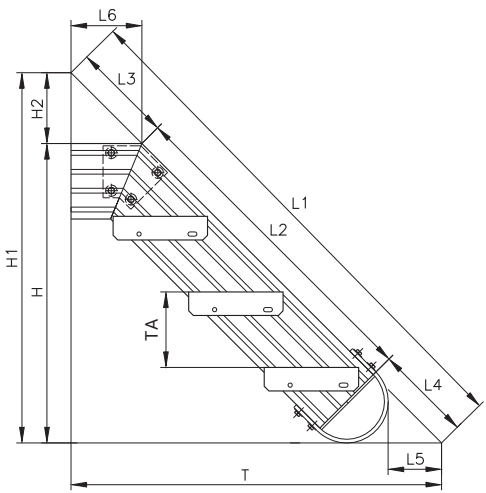
The distance between steps of 160 mm is suitable for climbing while transporting heavy loads.

Step distance TA = 160 mm
Number of steps = (height H ÷ 160) - 1
(rounded down)

Step distance TA = 190 mm
Number of steps = (height H ÷ 190) - 1
(rounded down)



Step height 160 mm		Step height 190 mm	
No. of steps	Height	No. of steps	Height
18	3040	15	3040
17	2880	14	2850
16	2720	13	2660
15	2560	12	2470
14	2400	11	2280
13	2240	10	2090
12	2080	9	1900
11	1920	8	1710
10	1760	7	1520
9	1600	6	1330
8	1440	5	1140
7	1280	4	950
6	1120	3	760
5	960	2	570
4	800	1	380
3	640	0	190
2	480		0
1	320		
0	160		
	0		



Formulas for calculation:

30° T = H1 x 1.732
L2 = H x 2 - 314.5

35° T = H1 x 1.428
L2 = H x 1.743 - 267.5

45° T = H1
L2 = H x 1.414 - 204.4

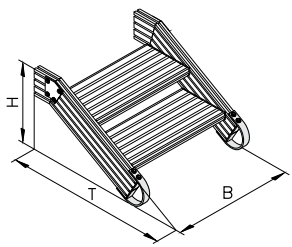
55° T = H1 x 0.7002
L2 = H x 1.22 - 163.5

60° T = H1 x 0.5774
L2 = H x 1.155 - 147.7

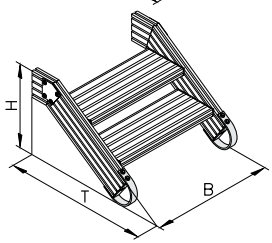
	H1	H2	L1	L3	L4	L5	L6
30°	H+86.6	86.6	L1=L2+487.5	173.2	314.5	224.5	150
35°	H+105	105	L1=L2+450.5	183.1	267.5	177	150
45°	H+150	150	L1=L2+416.5	212.1	204.5	113	150
55°	H+214	214	L1=L2+425	261.5	163.5	71	150
60°	H+260	260	L1=L2+448	300	148	55	150

H = platform height

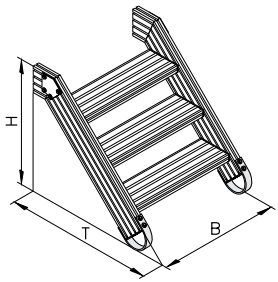
Stairs



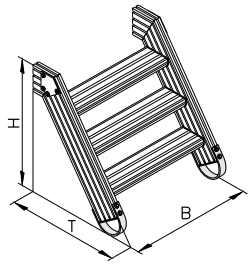
Stairs 30°
B02.31.005



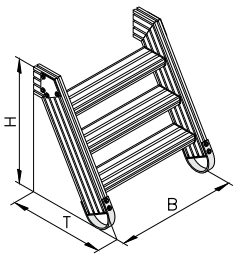
Stairs 35°
B02.31.006



Stairs 45°
B02.31.007

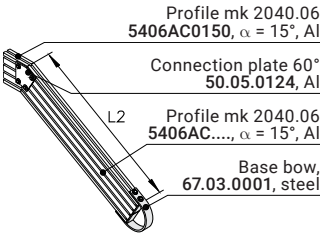


Stairs 55°
B02.31.008

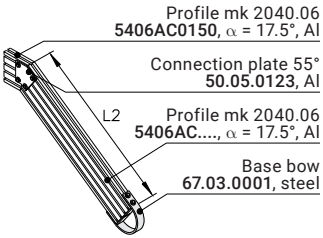


Stairs 60°
B02.31.009

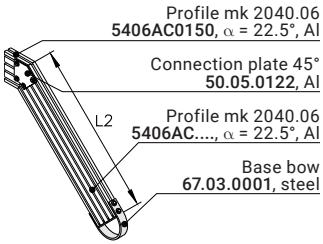
Side Walls



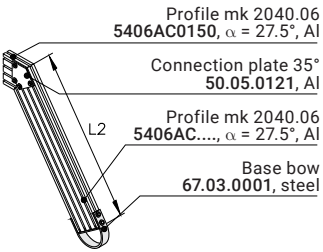
Side wall 40/30°
B02.34.006



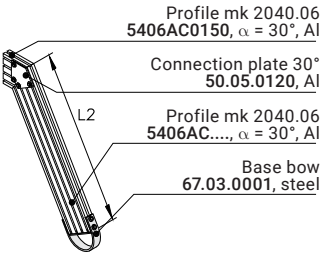
Side wall 40/35°
B02.34.007



Side wall 40/45°
B02.34.008



Side wall 40/55°
B02.34.009

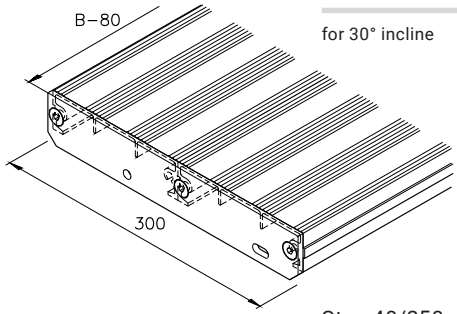


Side wall 40/60°
B02.34.010

Steps

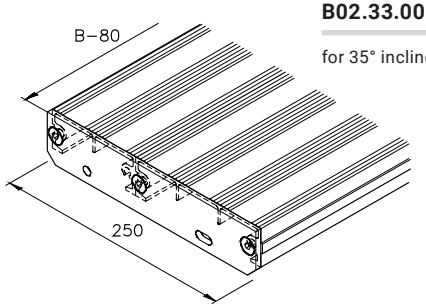
Step 40/300
B02.33.004

for 30° incline



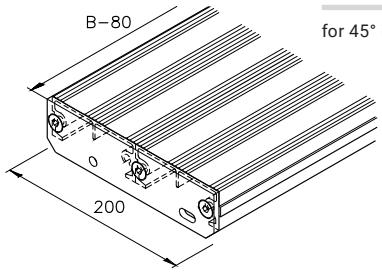
Step 40/250
B02.33.003

for 35° incline



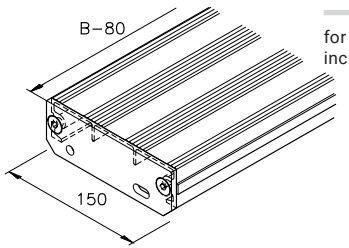
Step 40/200
B02.33.005

for 45° incline



Step 40/150
B02.33.002

for 55° and 60° incline

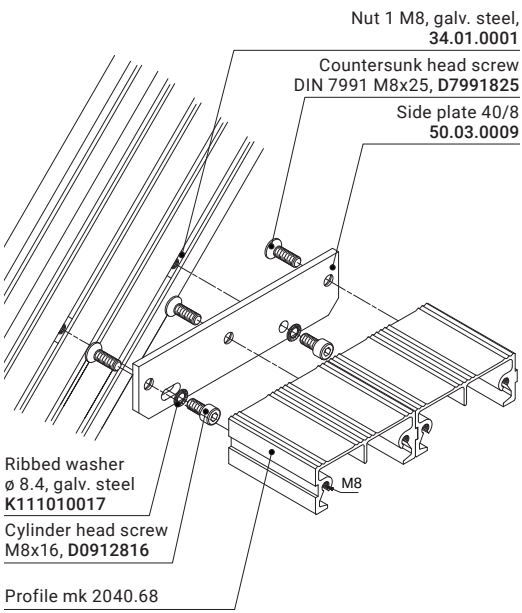


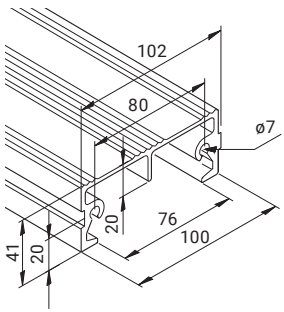
Profiles for Steps

Special profiles for building steps, machine platforms, walkways and platforms. The profiles can be connected side to side to create large stepping surfaces.

Material: Anodised aluminium

Fastening example

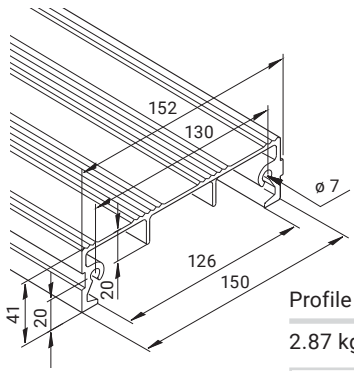




Profile mk 2040.68

2.37 kg/m

Stock length	**54.68.6100**
Cut	**54.68. ....**



Profile mk 2040.69

2.87 kg/m

Stock length	**54.69.6100**
Cut	**54.69. ....**

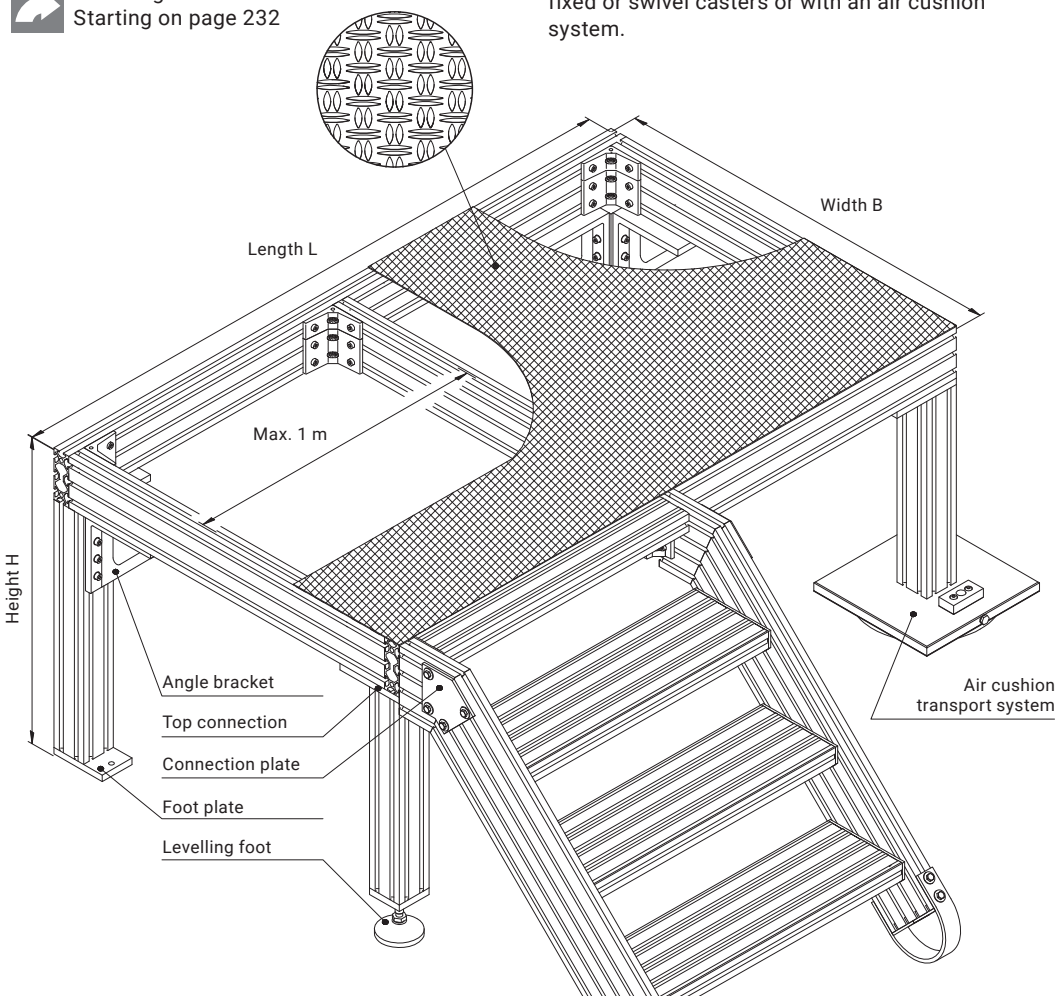
Platforms

Notes/Technical Data

With its four series of profiles, the mk profile system offers nearly endless combinations for constructing platforms. Span widths of up to 8 m can be achieved, for example with foamed combined profiles. The components listed below are only our basic components.

Platforms are covered with chequer sheets as standard or with profiles on request. For industrial applications, the platform's outer contours are equipped with toe kicks (100 mm minimum height) in accordance with DIN EN ISO 14122-2. Platforms can also have a mobile design, for example with fixed or swivel casters or with an air cushion system.

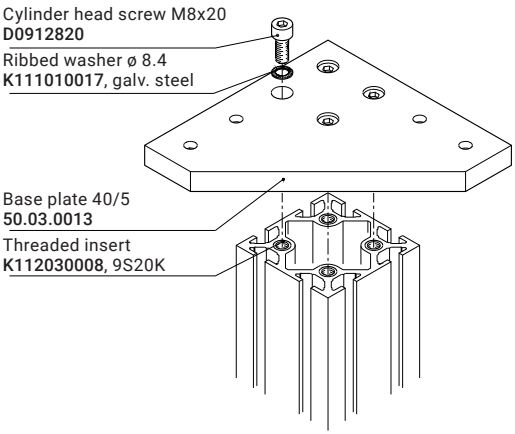
Panelling
Starting on page 232



Connection Details

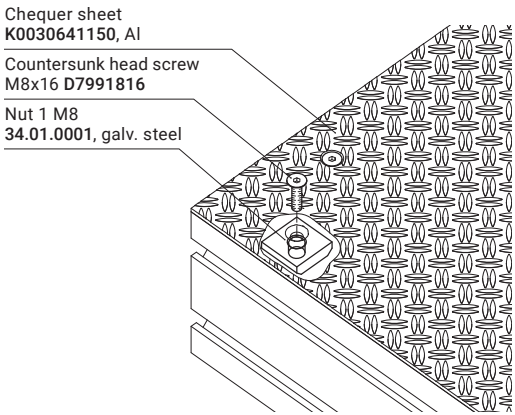
Base plate connection

A base plate is a safe and simple option for connecting the stairs. Three profiles are connected with single element.



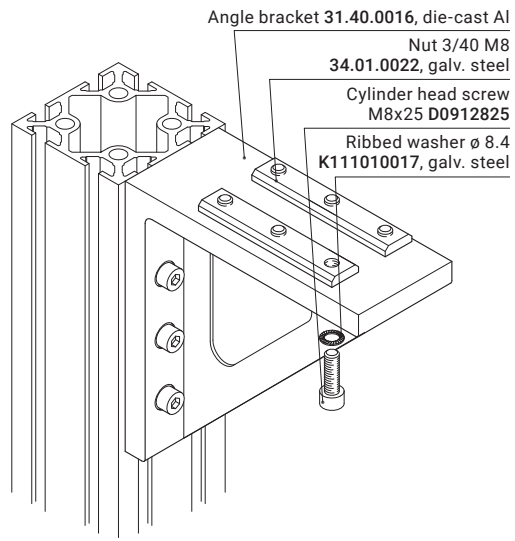
Floor fastening

The Duet chequer sheet can be used as the floor surface as an alternative to floor profiles. It is easily screwed onto the base structure.



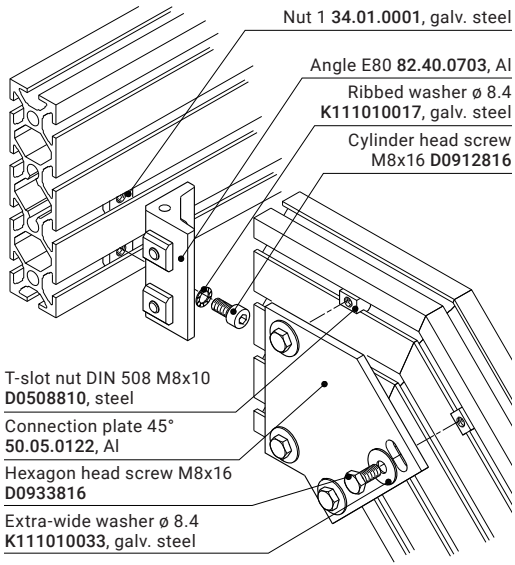
Angle bracket connection

The angle bracket connection option is intended for the most demanding stability requirements. The die-cast aluminium angle brackets have 12 mounting bores and are designed for large span widths.



Side wall fastening

The stair's side walls consist of two cut profile sections each that are connected at their mitre-cut ends with a connection plate, allowing the horizontal profile section to be screwed to the platform using angle E80.



Guardrails

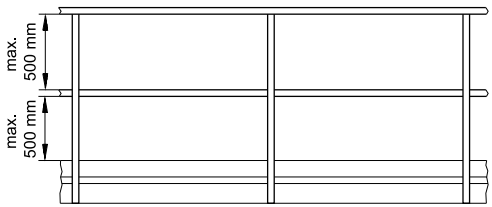
Notes/Technical Data

Guardrails have many applications, such as stairs, work platforms and other platforms. Stairs with four or more steps must have a guardrail.

For steps up to 1500 mm in width, the guardrail must be mounted on the right side in the descending direction. Steps wider than this require a guardrail on both sides.

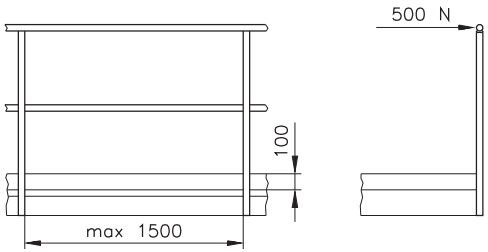
Knee braces

Guardrails are always equipped with knee braces (cross struts between two rail posts). The distance from the knee brace to the platform floor can be 500 mm at maximum.



Post spacing

The distance between the posts must be less than 1500 mm. The distance must be chosen so that the guardrail can support a lateral force of 500 N/m.



Hand rail

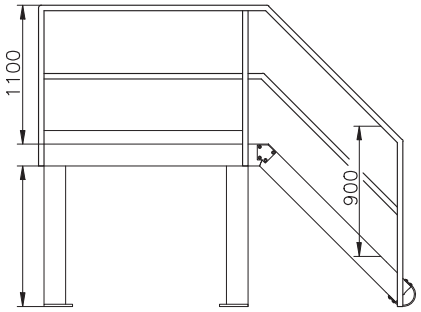
The mk 2040.16 profile has a diameter of 40 mm that complies with the requirements of the DIN EN ISO 14122-3 standard. Both the connection equipment and the end caps of the hand rails have large radii to prevent injuries.

Rail height

Legal regulations specify various minimum heights for guardrails. Guardrails on stairs must be at least 900 mm height, and guardrails on platforms must be 1100 mm.

Toe kicks

Min. height = 100 mm

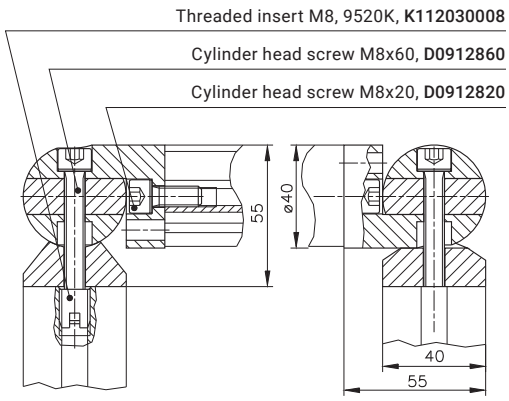


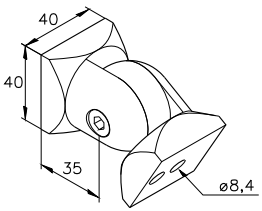
Hinges for Hand Rails

Our lightweight and sturdy hinges for hand rails are always used in combination with mk 2040.01 and mk 2040.16 profiles. The hinges are also available in optional surface variants, such as anodised or painted in various RAL colours.

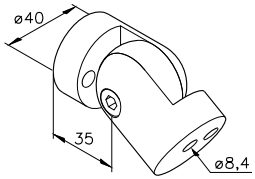
Material: Tumbled aluminium

Fastening example with hinge 40/H5 **B46.01.026**

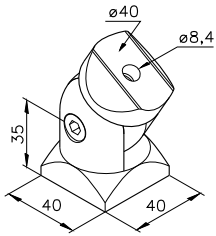




Hinge 40/H1
B46.01.022*



Hinge 40/H2
B46.01.023*



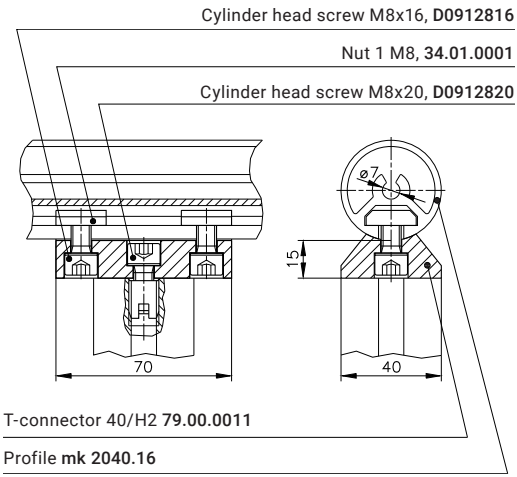
Hinge 40/H4
B46.01.025*

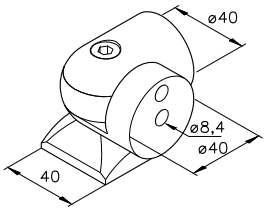
*With fastening accessories

Hinges for hand rails

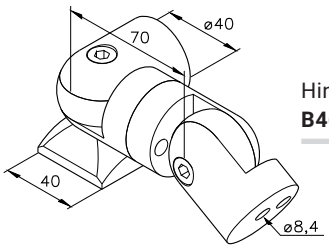
Material: Tumbled aluminium

Fastening example with T-connector

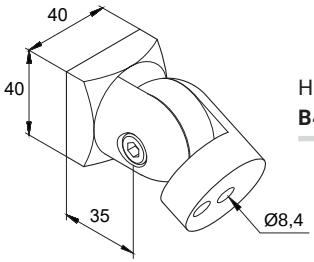




Hinge 40/H5
B46.01.026*



Hinge 40/H3
B46.01.024*

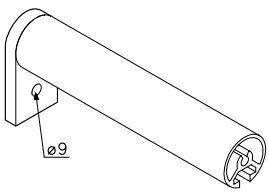


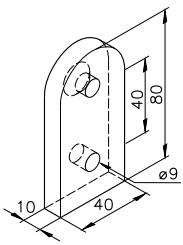
Hinge 40/H6
B46.01.027*

*With fastening accessories

Wall Joint

Material: Tumbled aluminium

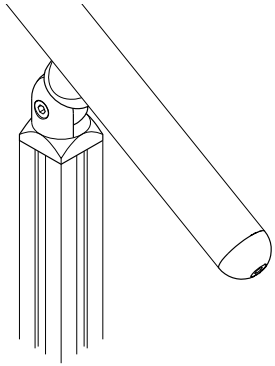


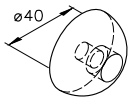


Wall joint
50.03.0034

Cap

Material: Tumbled aluminium

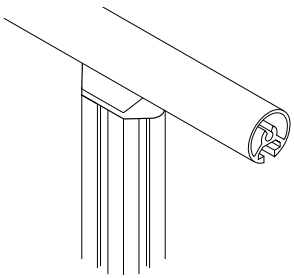


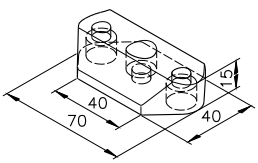


Cap
76.01.0002

T-connection

Material: Tumbled aluminium





T-connector 40/H2
79.00.0011

Section 10 Tools

Drills

Taps and Forming Taps

Installation Tools

10

Drilling Jigs