Telescopic covers.

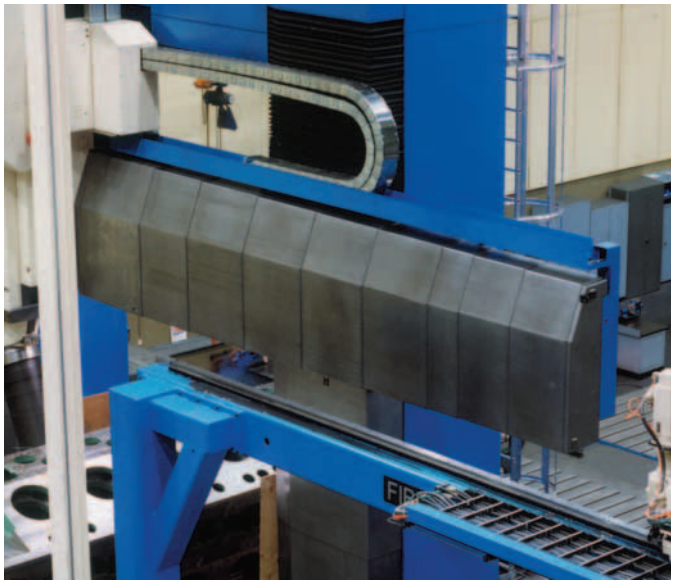
Perfect protection for guideways on machine tools.

Wherever guideways on machines have to be protected, we have a suitable solution. Our guideway protections systems boast a high degree of operational reliability, a long service life, and make use of innovative technical solutions.

Every production machine requires protection for its guideway

Today, modern machine tools process workpieces at ever-greater cutting and travel speeds. The protection of guideways, measuring systems, drive elements and other vulnerable parts is absolutely essential. Accelerations and speeds of machines are constantly increasing.

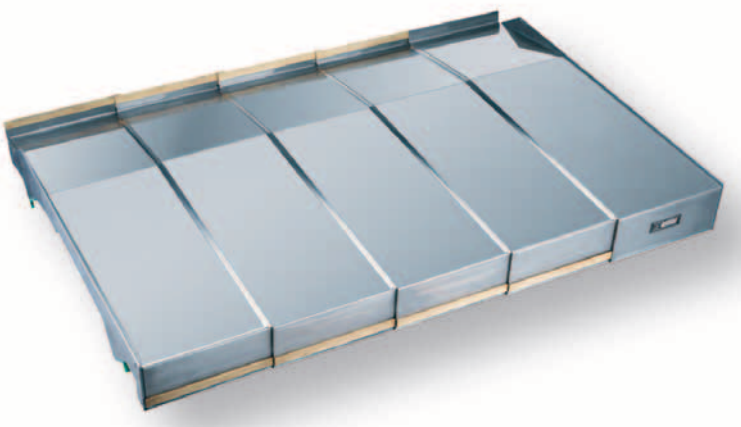
Telescopic covers must also be able to cope with these challenges.
This is where telescopic covers with harness mechanisms are used.



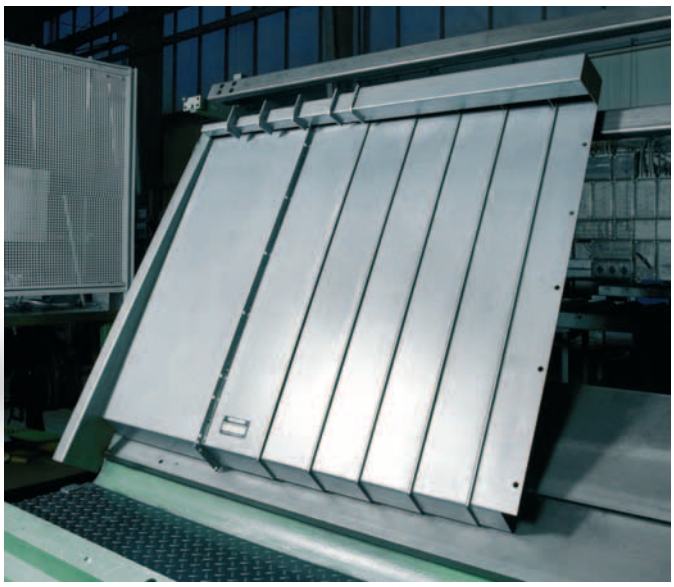
■ Cross-beam cover at a milling machine

From individual manufacture to series production – we have a solution

The number of varieties is immense, no cover for a machine is exactly the same as any other.



■ Series cover



■ Special form of an inclined bed cover on a test framework

Designs and areas of application

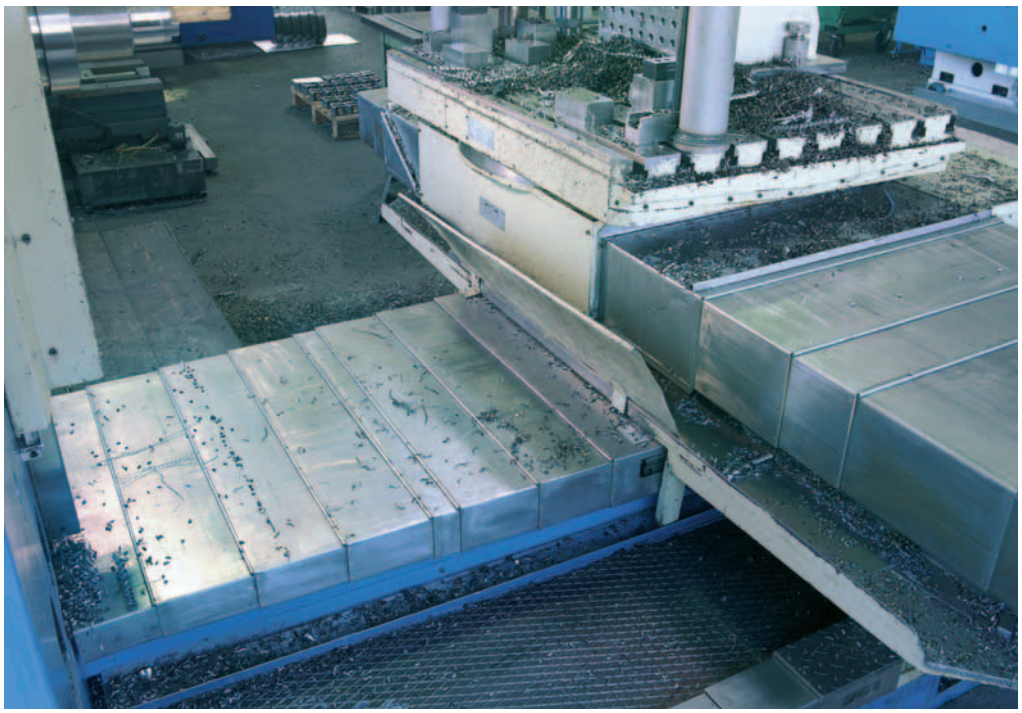
Until the 1970s, telescopic covers seldom moved in speed ranges any greater than 15 m/min.

The expansion and compression of the individual boxes took place sequentially. Due to the low speed, there was hardly any impact noise.

Over the years, however, Improvements in drive technology have increased the travel speeds of the machines and thus also the speeds of the cover.

At high travel speeds, the impact pulse exerted on the cover becomes truly enormous. This results in loud impact noises. What is more, the telescopic cover is subjected to very large mechanical stresses.

The landscape for telescopic covers has changed greatly in the last few years. "Old" designs are less and less in demand, with modern concepts such as covers with differential drives taking their place.



■ Telescopic cover with flat shape on a boring machine

Telescopic covers are generally produced from cold-rolled uncoated thin plates in thicknesses from 1 to 3 mm.

In case of extremely aggressive environmental conditions (e.g. aggressive cooling lubricants), corrosion-resistant stainless steel plates may also be used.

The new generation of KABELSCHLEPP telescopic covers also allows the use of semi-finished products with surface finishings such as:

- Plates with pure zinc coatings
- Plates with zinc/nickel coatings
- Plates with lead/zinc coatings

This ensures substantial protection against corrosion.

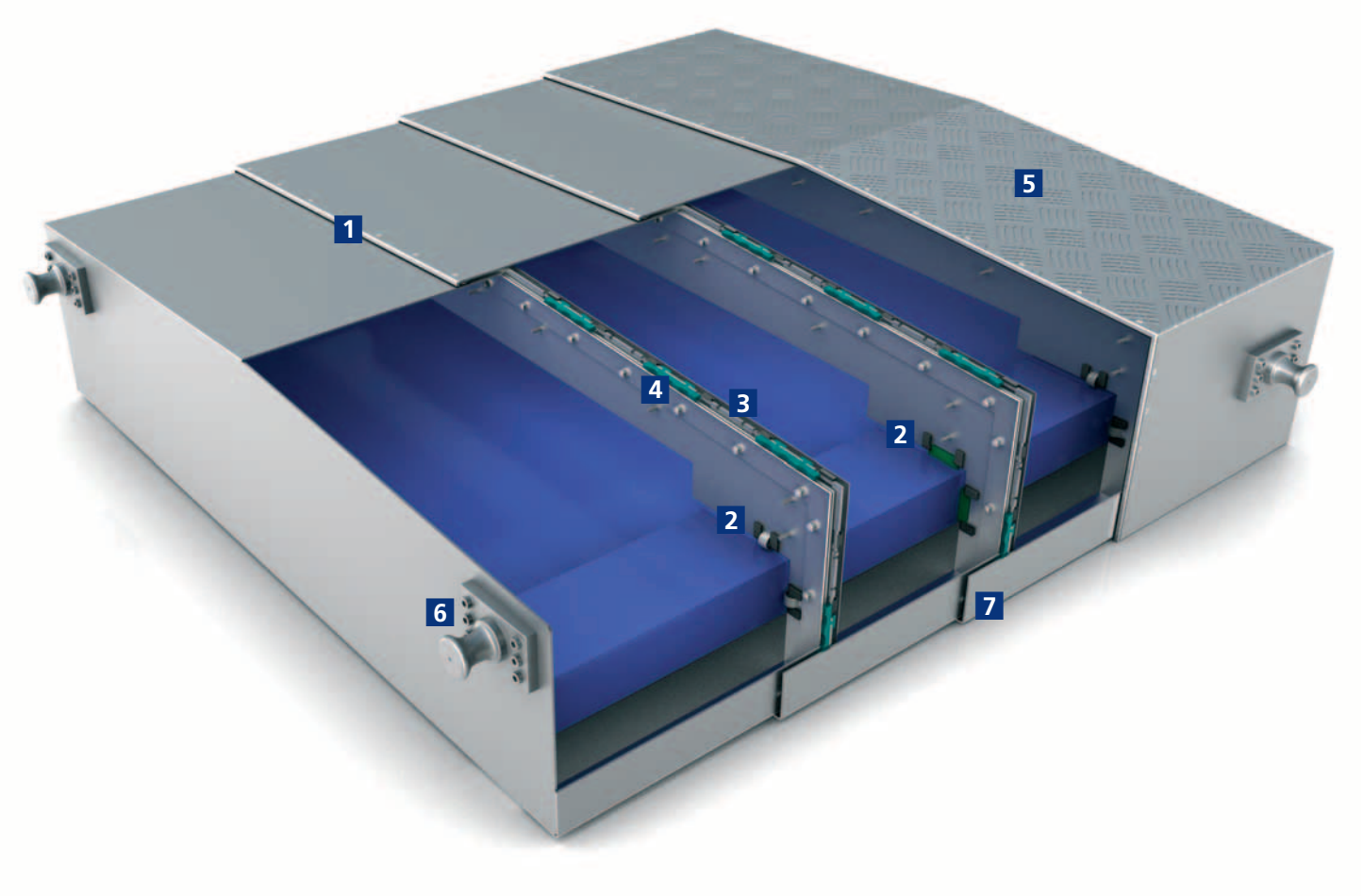
Telescopic covers.

The speed is decisive.

At speeds below 15 m/min a telescopic cover can still be built in the conventional form of box synchronization. At higher speeds, however, the inevitable impact noises become clearly audible and unpleasant.

So-called differential drives serve to synchronize the boxes and eliminate the impact noises. KABELSCHLEPP has chosen the old, proven harness mechanism principle, in which special materials are used.

Telescopic cover with damping elements



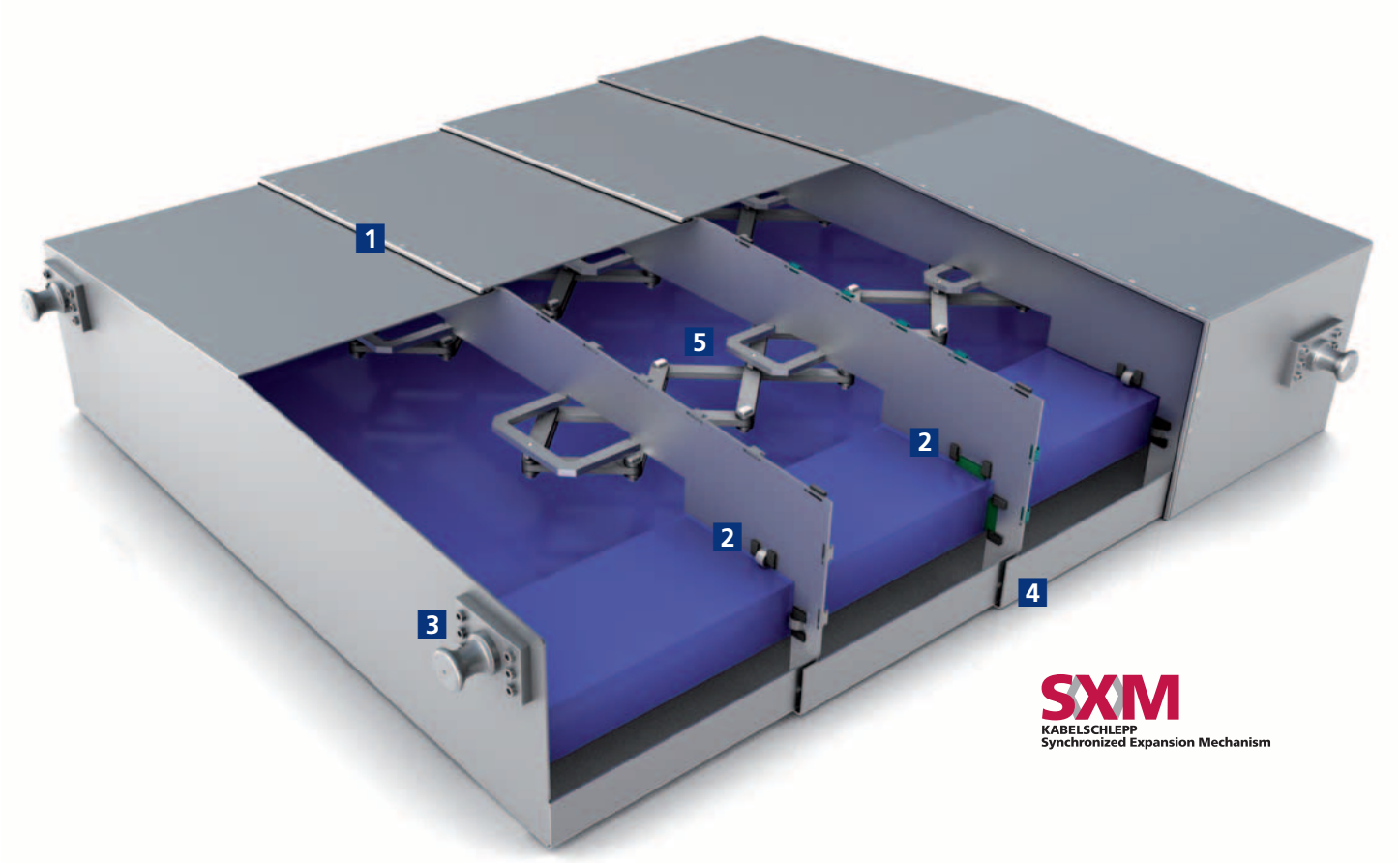
1 Wiper systems in various designs
2 Rollers / sliders
3 Gully in various designs
4 Damping systems in various designs
5 Structural metal plates to prevent slipping (on the largest box)
6 Lifting element
7 Locking system

Subject to change.

Travel speed	Damper elements / harnesses
Up to 15 m/min	Not required
Up to 30 m/min	Damper elements
Up to 60 m/min	Damper elements / harnesses

The use of damping elements depends on the travel speed and the moving mass. The information in the table should therefore only be viewed as guide values.

Telescopic cover with harness mechanism

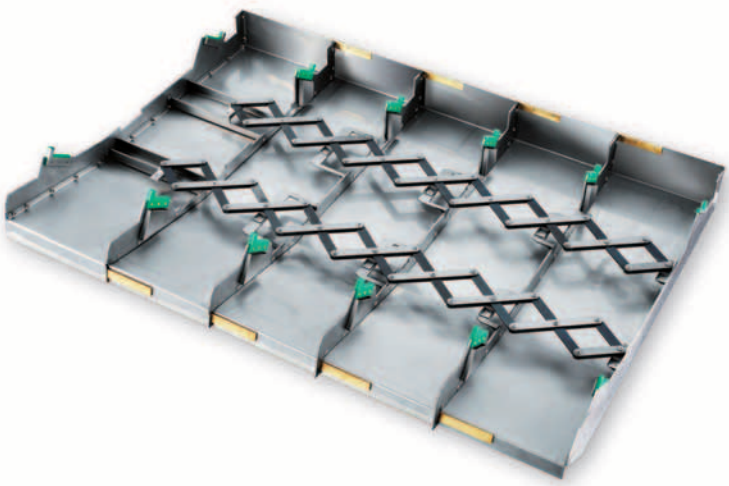


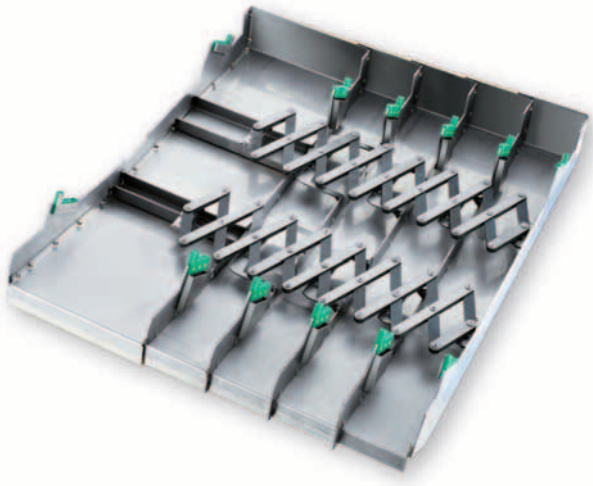
1 Wiper systems in various designs
2 Rollers / sliders
3 Lifting element
4 Locking system
5 Synchronising device (harnesses) for fast-running telescopic covers

SXM – Mechanical elements with harnesses.

KABELSCHLEPP sets the mark.

To ensure impact-free expansion / compression of telescopic covers, they are used with so-called synchronisers (harnesses).
As a result, all of the cover boxes move evenly during expansion and compression. The individual boxes move relative to each other only at a differential speed.





- Telescopic cover with proven harness mechanism in various expansion states.

SXM
KABELSCHLEPP
Synchronized Expansion Mechanism

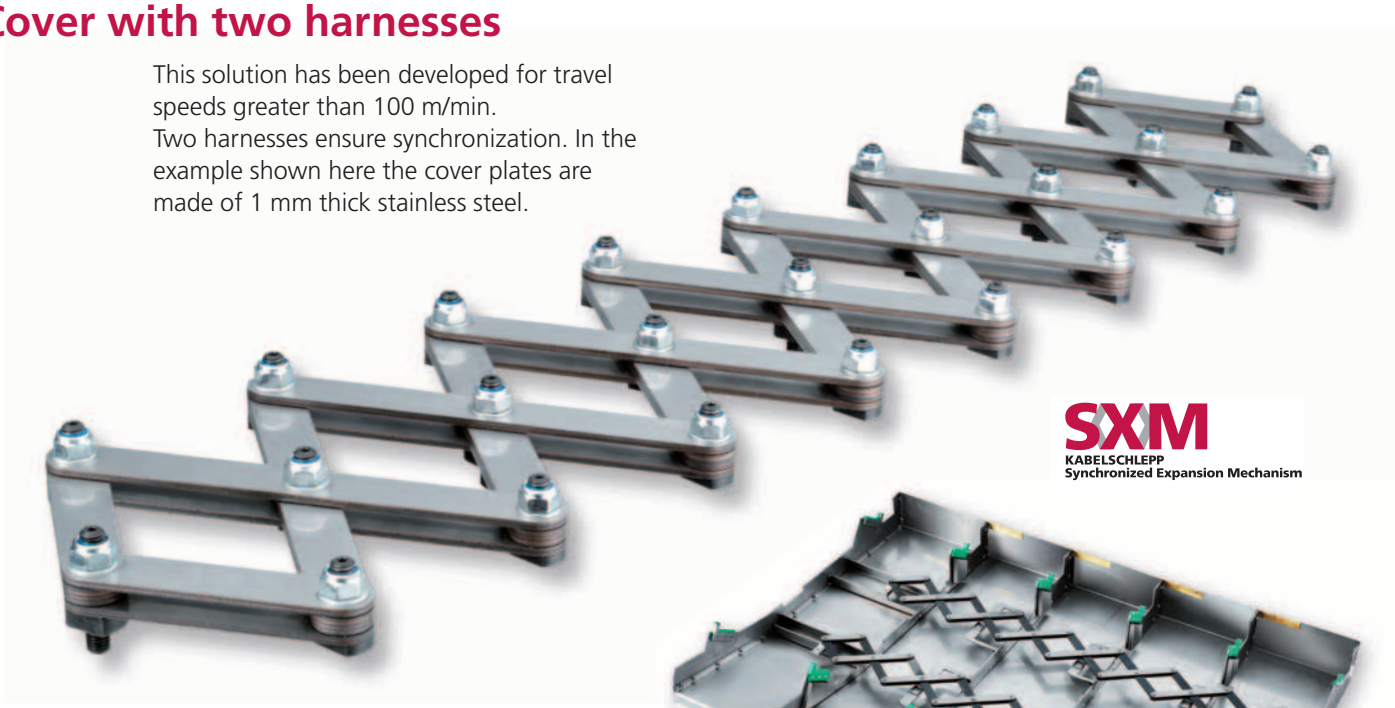
SXM – Synchronized Expansion Mechanism.
The KABELSCHLEPP harness technology is used wherever you find this symbol.

Telescopic covers with harness mechanisms have many advantages:

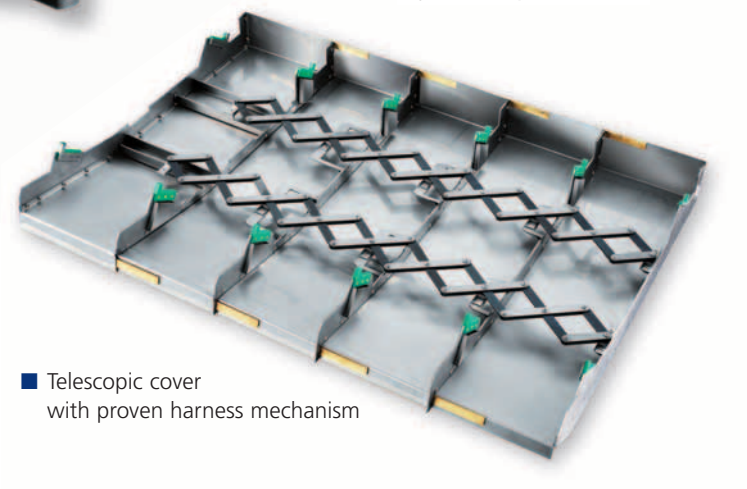
- High travel speeds up to 200 m/min are possible.
- **Acceleration forces** and speeds are **uniformly distributed across all the plates.** This also applies to the resultant inertial forces.
- The **force peaks** that would normally occur when the telescopic covers dashed against each other **do not occur.**
- The disruptive **impact noise** of the boxes **is eliminated.**

Cover with two harnesses

This solution has been developed for travel speeds greater than 100 m/min.
Two harnesses ensure synchronization. In the example shown here the cover plates are made of 1 mm thick stainless steel.



The cover plates are riveted to the rear wall. Welding and the resulting heat effects have been avoided. Only the wiper is spot-welded.



■ Telescopic cover with proven harness mechanism

Cover with one harness

This particularly lightweight solution has been developed for "small" machine tools. The cover plates are made of 1 mm thick normal steel.

The travel speed in this special application is only 30 m/min. The harness mechanism serves to ensure synchronization, however, and the reduced mass of all the elements means that it was possible to develop an especially cost-effective solution here.

SXM
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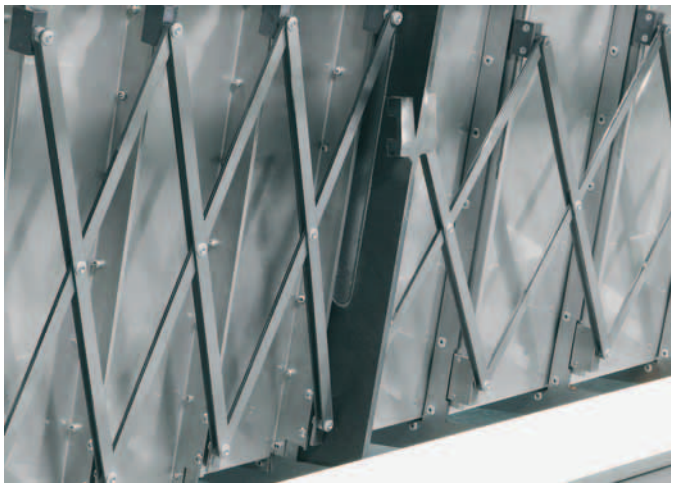
Synchronized Expansion Mechanism



■ Telescopic cover with only one harness

Telescopic covers.

Perfect protection for guideways on machine tools.

Photograph: Waldrich Siegen Werkzeugmaschinen GmbH

Designs

Machine tools come in a wide variety of designs. That is why a modern lathe needs another type of telescopic cover than, for example, a large bed-type milling machine. The following designs provide an overview of typical designs.

Flat shape

The U-shaped design is generally used in a horizontal, lying position for milling table guides. With this design the maximum width of the telescopic cover should be limited to 1.5 m.

Roof shape, centric (eccentric)

This design is always advisable when cooling lubricants are used. The inclined surface allows the water – and naturally also the chips – to run off more easily. With large covers (> 3 m width) for reasons of stability, etc. at least three roof angles should be provided.

Flattened roof shape

The flattened roof shape is a special construction method with two roof angles. Primarily for dry operation and widths > 3 m.

Shape with incline to one side

The shape with incline to one side has a special roof shape. Depending on the possible incline, covers can be constructed with widths of up to 1.5 m. This shape is likewise a recommended solution when large amounts of coolant are present. Depending on the angle of incline, this form also helps to discharge coolants / chips.

Vertically-installed telescopic cover

Standing covers are used on larger machine tools, mostly in the area above and below the cross beam. They can take many different shapes.

Blind cover

With blind telescopic covers, the cover plates move in separate guide rails, each of which is mounted on the machine at the sides. It is used exclusively in a vertical arrangement. The guide rails are generally made of brass.

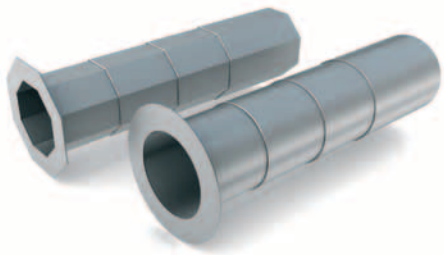
Cross-beam cover

These covers are predominantly used on large gantry machine tools on a cross beam to the left and right of the support. The boxes are suspended vertically and protect the support guides from chips and cooling lubricants.

The enquiry form and the design dimensions can be found on page 75ff.

Tubular cover, polygonal cover

Tubular covers or covering shafts, spindles, etc. They can be made either with a round or a polygonal shape.



Other forms and special designs tailored to your specific requirements are possible. Please do get in touch with us, we will be happy to advise you!

Wipers on telescopic covers.

Wipers on telescopic covers keep the cover boxes clean and prevent the penetration of dirt and chips.

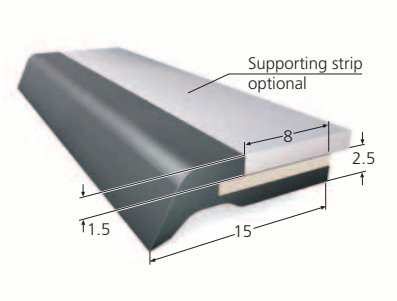
Welded-on and riveted-on wipers

With these types the support profile is spot-welded or riveted to the cover box.

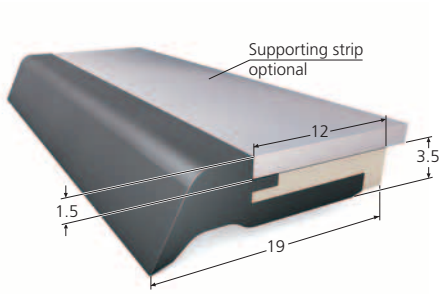
Type MA 8 / MA 12

These wipers consist of an NBR profile vulcanized onto a steel strip.

Necessary calculated distance of the cover plates 2.5 to 3.5 mm.



■ Wiper type MA 8

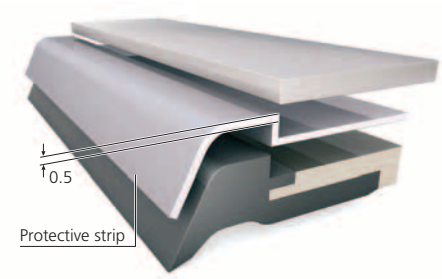


■ Wiper type MA 12

Type MA 8S / MA 12S

Wipers MA 8 and MA 12 are covered with a protective strip for protection against hot chips.

Necessary calculated distance of the cover plates 3.5 to 4 mm.

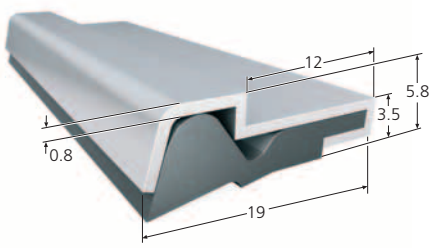


■ Wiper type MA -S

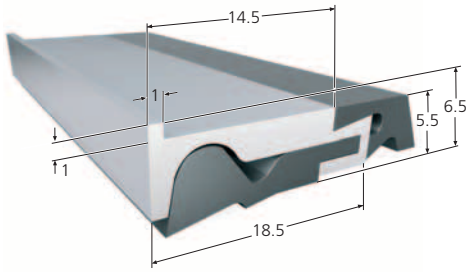
Type MA 12.1 / MA 18

A specially-milled steel plate profile is spot-welded to the boxes and a PUR wiper lip is inserted.

Necessary calculated distance of the cover plates 3.5 to 5.5 mm.



■ Wiper type MA 12.1



■ Wiper type MA 18

Subject to change.

Welded-on and riveted-on wipers

Steel plate wiper made of spring band steel

A specially shaped, approximately 0.4 mm thick, approximately 25 mm wide band of stainless spring band steel is spot-welded to the cover plate. This wiper is recommended for dry machining.

Necessary calculated distance of the cover plates 1 mm.

Types with replaceable wiper lips – the new generation

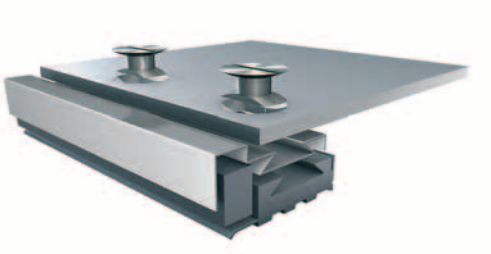
The replaceable wiper with a PU lip

This new generation of wipers can be replaced directly on the machine, without disassembling the telescopic cover.

The wiper consists of four parts: a retaining section of steel, a wiper lip of PU, a spring profile of plastic and a fastening pin.

By rotating the fastening pin through 90°, the wiper system is fastened to the cover plate, or loosened from it. The spring profile generates a defined pressure.

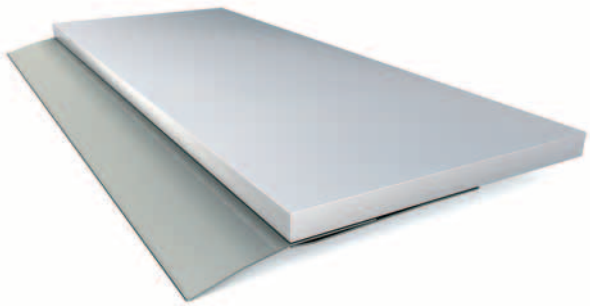
Necessary calculated distance of the cover plates 5 to 5.5 mm.



The replaceable wiper made of steel

Here a solution has been developed that makes the above-mentioned spring band steel wipers replaceable. A specially-shaped support plate is spot-welded to the box. The wiper can then be pushed in. The spring force of the support plate holds the wiper in place. The holding forces are increased by defined fixing points.

Necessary calculated distance of the cover plates 1 mm.



Damping elements on telescopic covers.

Telescopic covers with travel speeds greater than 15 m/min must be provided with dampers in order to reduce impact noises.

Wiper type MA 18 with damping

The support profile is made of aluminium and is screwed or riveted on. The wiper lip is identical to MA 12.1. The special damping profile can be installed in the rear aperture formed onto the support profile.

Necessary calculated distance of the cover plates 5.5 mm.

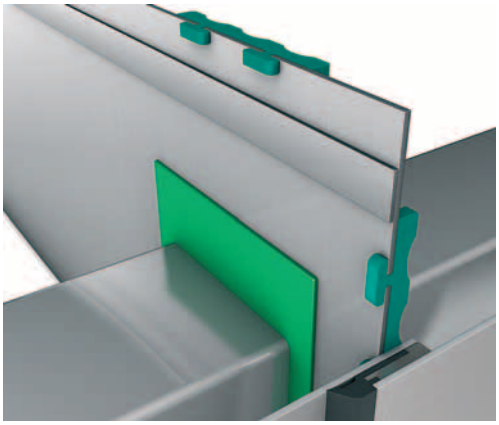
Brass strips with damping

Brass strips are used primarily on standing covers. The damping profile described above can likewise be mounted on an appropriately drawn brass profile.

Necessary calculated distance of the cover plates 5.5 mm.

Vibration absorber

To damp impact noise effectively, vibration absorbers can be fitted in the rear walls of the covers. Depending on the individual situation and travel speed, the number of dampers is varied in order to achieve an optimum result.



Damping elements for compression

Damping elements that only work during expansion require an additional element for compression. Here simple rubber buffers mounted at an appropriate point on the rear wall have proven themselves over many years.

Splash- and hose-proof protection on telescopic covers.

Over time cooling emulsion and fine chips can be "pumped" under the individual boxes and make it over the rear wall into the machinery space that is being protected. In many cases this is undesirable.

Machine tools with hydrostatic bearings require "watertight" covers.

Gullies for telescopic covers

In order to catch coolant and chips that make it over the rear wall, a gully is generally installed on the back of the rear wall. This gully allows the fluids to be drained off to the sides.

Aluminium gully type AL 19

This gully is an extruded aluminium profile which is screwed onto the rear walls of the cover.

The cover plate is bent downwards so that it projects into the gully. This allows the coolant between the plates to flow into the moulded gully.

Condensation water that forms under the cover plates is wiped off by a lip and drained into gullies to the front and back. This makes it possible to achieve a very high level of waterproofing.

Gully type ST 05

This gully is screwed onto the rear wall. This has the advantage of, among other things, meaning that galvanized metal plates can be used (no welding necessary).

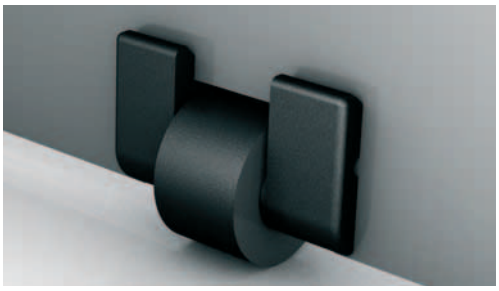
The enquiry form can be found on page 75.

Rollers and sliders on telescopic covers.

The individual boxes of telescopic covers are supported by rollers or sliders on the guideways or corresponding supplementary guides. In addition, there are various solutions depending on the qualities of the way:

Plastic rollers

- Gentle rolling on the guideway
- For low travel speeds

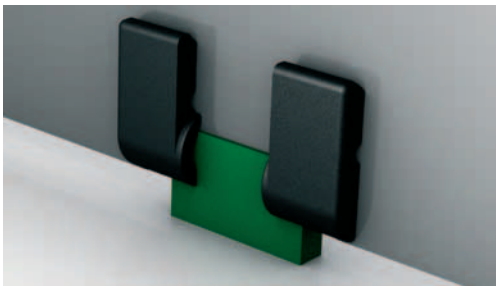


Steel rollers

- For high support loads
- For high travel speeds

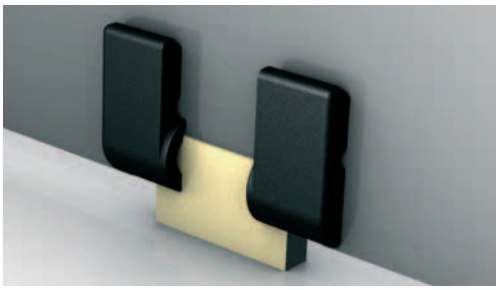
Plastic sliders

- Good sliding characteristics on the guideway
- For high travel speeds
- Can also be used for linear guides



Metal sliders

- For high support loads
- For low travel speeds



Telescopic covers – the new generation.

New developments from KABELSCHLEPP.

DUPLEX, the vertically traversing cover

These covers are used to separate two machining cells of a machining center.

Thus, a tool change can be carried out in one machining cell, while work continues in the other one.

The partitioning of these two machining cells has to be nearly "bulletproof", because there are several persons working in one of them, who would be in grave danger without protection.

The vertically traversing telescopic cover DUPLEX is guided by two inside harness mechanisms.

Owing to the double-construction, a high degree of puncture-proofness is achieved, which more than satisfies the requirements. Of course, this construction principle can also be employed for "normal" covering tasks.

Since the covering elements are simply suspended on the harness, very inexpensive solutions are obtained.

SXM
KABELSCHLEPP
Synchronized Expansion Mechanism

■ DUPLEX cover

Telescopic covers – the new generation.

New developments from KABELSCHLEPP.

CROSS-COVER, the ready-to-install solution

Today machining spindles of horizontal drilling machines move in the vertical and horizontal direction with accelerations in the 2 g range and high speeds.

Cover elements for the transverse motion are always in a vertically standing arrangement and move laterally, cover elements for the vertical motion of the spindle move upwards and downwards, and all of their lamellas are arranged horizontally.

Today the machinery space is often protected with bellows, whose fabric structure is often protected against flying chips by means of supplementary lamellas made of stainless steel.

KABELSCHLEPP has developed the turnkey system CROSS-COVER.

The entire machinery space covering is supplied as a pre-finished unit.

The CROSS-COVER is constructed of slim, light plates, which move evenly thanks to integrated harness mechanisms. This eliminates disruptive impact noise, minimises wear and increases service life significantly. The vertically moving plates are preferably made of very hard stainless spring band steel with an integrated wiper.

Due to the greater lengths of the plates, the side covers are made, for example, of 1 mm steel, and the wiper is generally mounted separately.

The construction with harnesses is superior to "normal" covers and other protective systems such as bellows with regard to durability and stability. This pays for itself in the long run, since there is virtually no wear (tested so far: 300,000 motion cycles). At the same time, the weight has been kept low, and ball bearing guide rails ensure smooth, low-friction operation.

With CROSS-COVER you save valuable time

We ship the **entire cover unit** to you **ready for mounting** – you can completely cover the spindle side with just a few installation steps. Installation is aided by a frame running around the machine. We design this frame according to your specifications, and ship it to you together with all of the necessary fastening elements.

■ Ready-to-install CROSS-COVER cover

SXM
KABELSCHLEPP
Synchronized Expansion Mechanism

IN-LINE-COVER, the alternative to bellows and link apron covers

Wherever up until now bellows or link apron cover solutions have been used to prevent entry of chips, now there is a slim, robust, cost-effective alternative.

KABELSCHLEPP IN-LINE-COVERS offer the resistance capacity of telescopic covers with less weight and lower costs.

For example, you can use IN-LINE-COVERS as a cross-beam cover on gantry machine tools to protect their vulnerable drive systems against particles and fluids. Or as an alternative to link apron covers when machine components have to move in one dimension.

With the IN-LINE-COVER, the harness mechanisms provide more even motion and very smooth operation.

Here, too, the KABELSCHLEPP SXM harness principle prevents force peaks and excessive noise generation. A construction method which has proven itself thousands of times over.

New, on the other hand, is the suspension of the plates at the central pivot point of two harnesses and guidance of the harness points on one or two guide rails.

This design saves weight, and at the same time increases stability and allows narrow lamellas. It also reduces weight significantly compared to a telescopic cover.

- IN-LINE-COVER with harness mechanism

SXM
KABELSCHLEPP
Synchronized Expansion Mechanism

The individual plates of the cover are made of 0.5 -1.5 mm thick spring band steel, normal steel or stainless steel, depending on the length of the specific element:

- very light (reduced weight)
- Corrosion-resistant when stainless steel is used
- Long service life

Telescopic covers question form.

Machine data:

Machine type: _____

Use of telescopic cover:
☐ Machine base
☐ Standing
☐ Cross-beam

Machine travel (travel distance LS_K) _____ mm

Travel speed v: _____ m/s

Acceleration a: _____ m/s^2

Width of guideway B_B: _____ mm

Guideway lubrication:
☐ Hydrostatic
☐ Aerostatic
☐ Other _____


Photograph: Waldrich Siegen Werkzeugmaschinen GmbH

Data for the design of the telescopic cover:

Travel length of telescopic cover L_S: _____ mm

Maximum compression of telescopic cover L_Z: _____ mm

Possible width of the telescopic cover B_A: _____ mm

Possible height of the telescopic cover above the guideway $H_{1.x}$: _____ mm

Possible total height of telescopic cover H_G: _____ mm

Connection of telescopic cover: _____

Wiper with protective strip for protection against hot chips: ☐ yes ☐ no

Additional information:

Interference contours around the telescopic cover (way wipers, lines, etc.):

_____

Design of the telescopic cover: ☐ Not walkable-on ☐ Walkable-on when at rest

Quantity of chips: _____ kg/h

Type of chips: _____

Coolant: _____

Type: _____

Quantity: _____ l/min

Can consoles be attached? ☐ yes ☐ no

Should consoles be attached? ☐ yes ☐ no

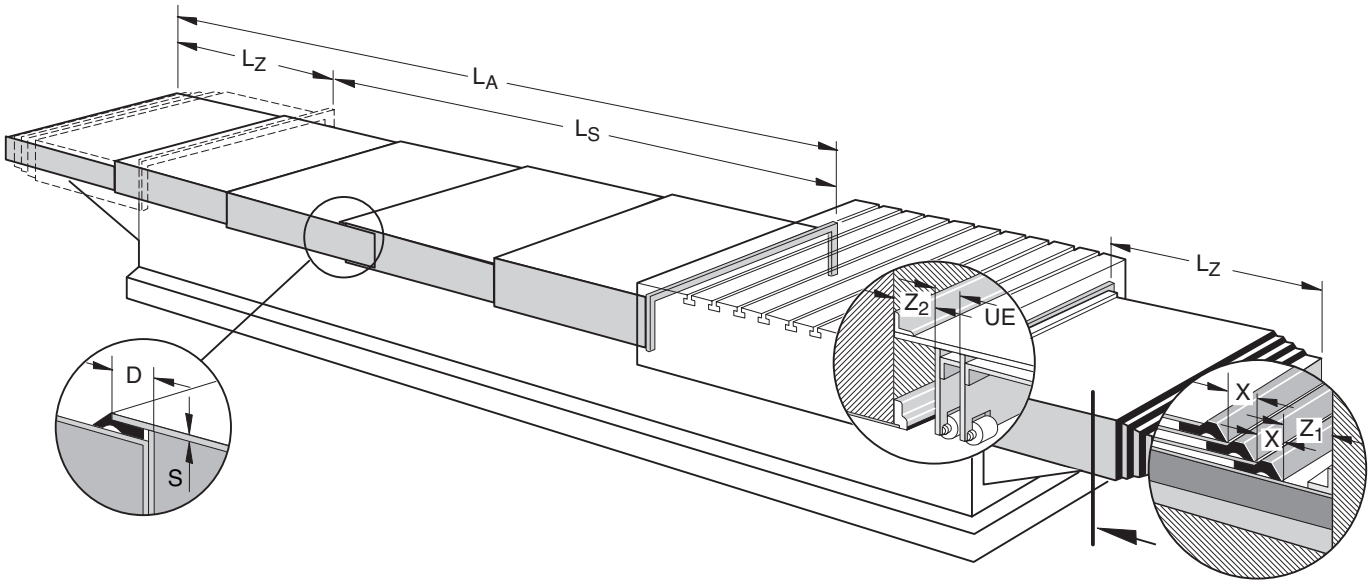
Other information

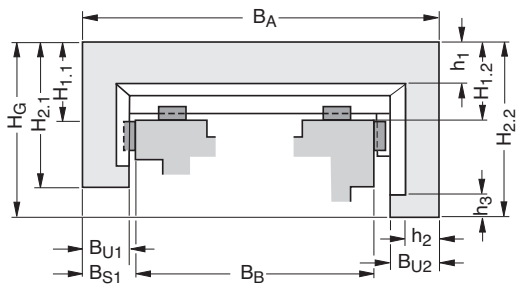
_____

Technical information on telescopic covers can be found on pages 76 – 78.

Horizontally-installed telescopic covers.

Technical information.





Explanation of terms
Technical explanations

B_A = Maximum width of the telescopic cover
B_B = Width of guideway
B_{U1} = Width of undergrip – left
B_{U2} = Width of undergrip – right
h_1 = Thickness of upper bundle of plates
h_2 = Thickness of side bundle
h_3 = Thickness of undergrip bundle
$H_{1.1}$ = Height of telescopic cover above the contact surface – left
$H_{1.2}$ = Height of telescopic cover above the contact surface – right
$H_{2.1}$ = Height of side leg piece – left
$H_{2.2}$ = Height of side leg piece – right
H_G = Total height of telescopic cover
Z_1 = Console plate extension
Z_2 = Support plate extension
v = Travel speed
L_{SK} = Machine travel length
The travel length of the machine is the distance that a moving machine component travels from one end position to the other.

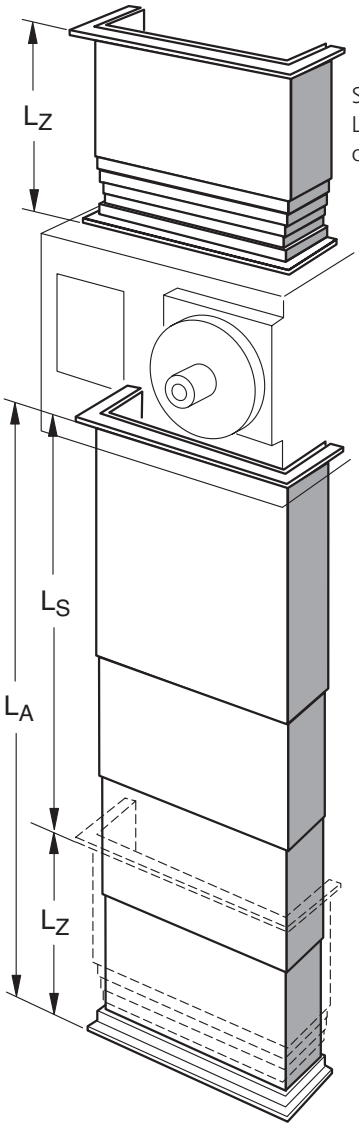
L_S = Travel length of telescopic cover

$$L_S = L_{SK} + \text{reserve}$$

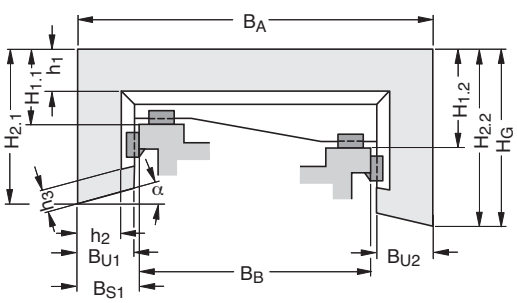
L_Z = Compression
If the individual sheet metal elements are compressed in an end position, then the compression is the length of the bundle of metal plates.
n = Number of plates
s = Plate thickness
D = Sheathing (non-expandable plate length)
UE = Distance between the plates at the support
X = Gradation of metal plate at the driver wiper
l = Plate length
The relationship between the plate length and plate width is selectable up to a ratio of **1:8**.

Vertically-installed telescopic covers.

Technical information.



Standard:
Largest cover box on top



Explanation of terms
Technical explanations

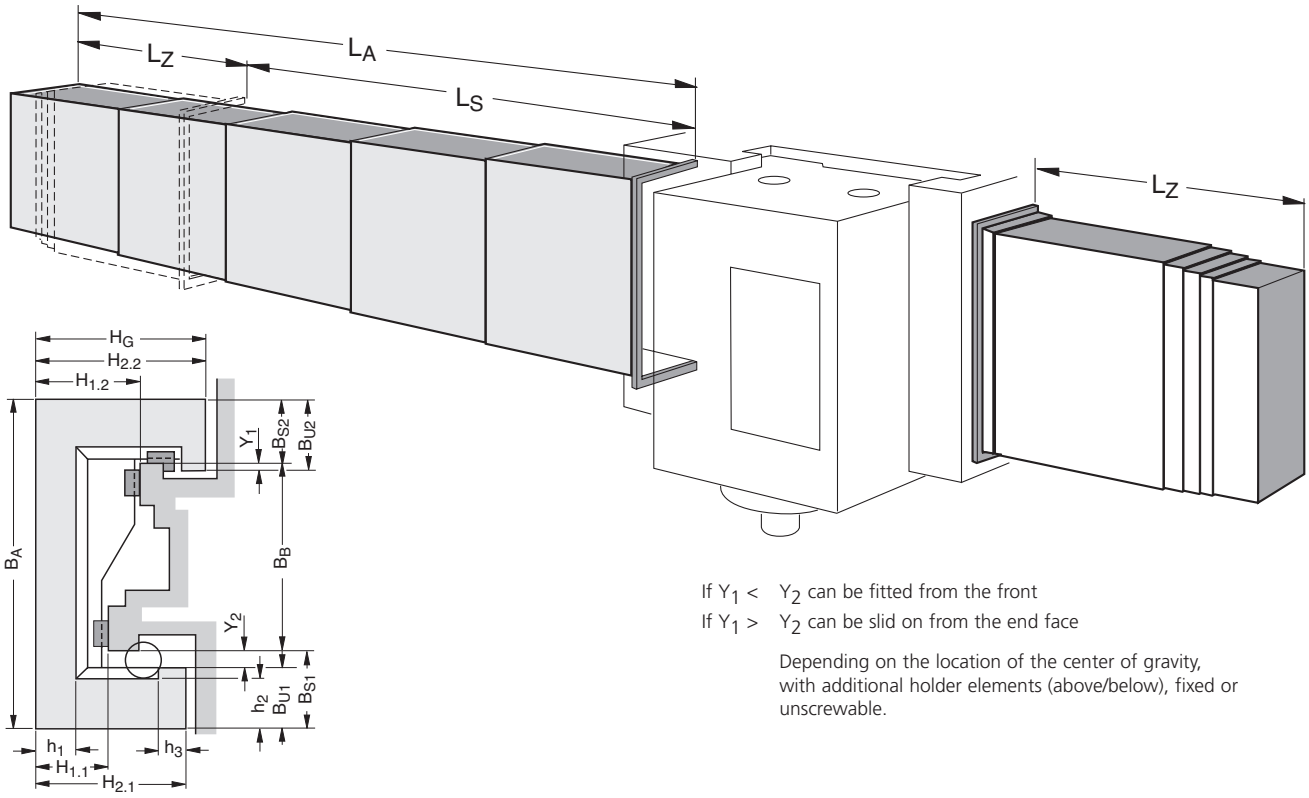
B_A = Maximum width of the telescopic cover
B_B = Width of guideway
B_{U1} = Width of undergrip – left
B_{U2} = Width of undergrip – right
h_1 = Thickness of upper bundle of plates
h_2 = Thickness of side bundle
h_3 = Thickness of undergrip bundle
a = Angle at undergrip
$H_{1.1}$ = Height of telescopic cover above the contact surface – left
$H_{1.2}$ = Height of telescopic cover above the contact surface – right
$H_{2.1}$ = Height of side leg piece – left
$H_{2.2}$ = Height of side leg piece – right
H_G = Total height of telescopic cover
v = Travel speed
L_{SK} = Machine travel length
The travel length of the machine is the distance that a moving machine component travels from one end position to the other.
L_S = Travel length of telescopic cover

$L_S = L_{SK}$ + reserve

L_Z = Compression
If the individual sheet metal elements are compressed in an end position, then the compression is the length of the bundle of metal plates.
n = Number of plates
s = Plate thickness
D = Sheathing (non-expandable plate length)
UE = Distance between the plates at the support
X = Gradation of metal plate at the driver wiper
l = Plate length
The relationship between the plate length and plate width is selectable up to a ratio of **1:8**.

Horizontal, handing telescopic covers.

Technical information.



If $Y_1 <$ Y_2 can be fitted from the front
If $Y_1 >$ Y_2 can be slid on from the end face

Depending on the location of the center of gravity, with additional holder elements (above/below), fixed or unscrewable.

Explanation of terms
Technical explanations

B_A = Maximum width of the telescopic cover
B_B = Width of guideway
B_{U1} = Width of undergrip – left
B_{U2} = Width of undergrip – right
h_1 = Thickness of upper bundle of plates
h_2 = Thickness of side bundle
h_3 = Thickness of undergrip bundle
$H_{1.1}$ = Height of telescopic cover above the contact surface – left
$H_{1.2}$ = Height of telescopic cover above the contact surface – right
$H_{2.1}$ = Height of side leg piece – left
$H_{2.2}$ = Height of side leg piece – right
H_G = Total height of telescopic cover
v = Travel speed
L_{SK} = Machine travel length

The travel length of the machine is the distance that a moving machine component travels from one end position to the other.

L_S = Travel length of telescopic cover

$$L_S = L_{SK} + \text{reserve}$$

L_Z = Compression

If the individual sheet metal elements are compressed in an end position, then the compression is the length of the bundle of metal plates.

n = Number of plates
s = Plate thickness
D = Sheathing (non-expandable plate length)
UE = Distance between the plates at the support
X = Gradation of metal plate at the driver wiper
l = Plate length

The relationship between the plate length and plate width is selectable up to a ratio of **1:8**.