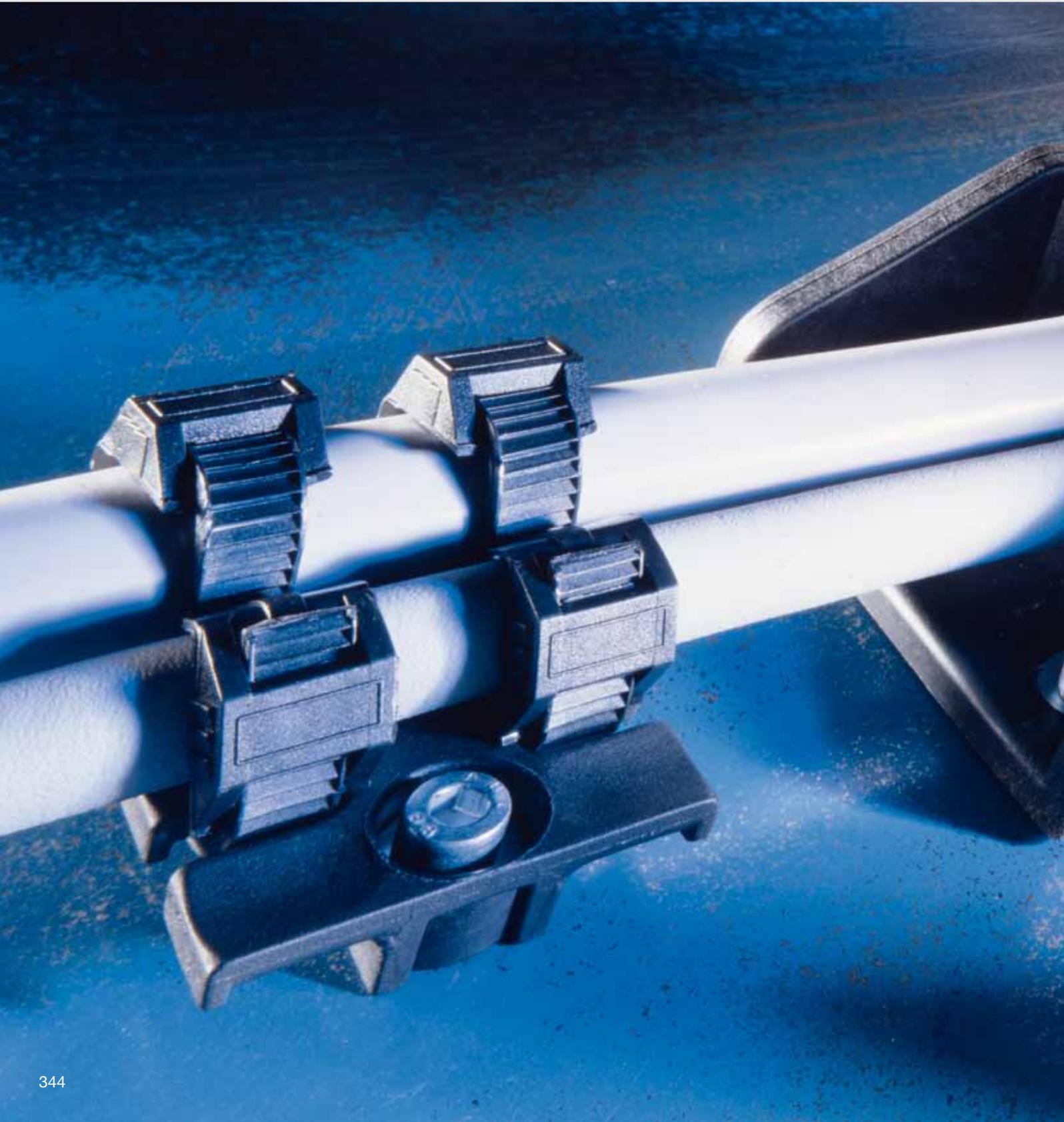


Strain relief systems





Introduction





**For every system:
the right strain relief**

Cables and conduits that are to be routed in a cable drag chain should always be secured using a strain relief mechanism.

The right strain relief mechanism has a positive effect on the durability of the cables and conduits.

ZL (strain relief plate)

This strain relief mechanism offers a safe and cost-effective system using cable ties. The insertable bushing (ELB) stops the cold extrusion characteristic of plastic from affecting the secure fixing of the plate. Use of a stand-off (DH) offers a two-tier construction option.

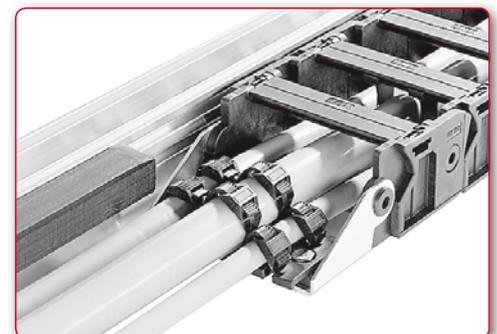
RS-ZL (frame bridge strain relief plate)

The frame bridge strain relief plate is snapped-in to the cable drag chain's chain brackets. Two RS-ZL units can be mounted on each of the two chain ends (on the inside and the outside bend). The cables are secured using cable ties.

Steel Fix bow clamp

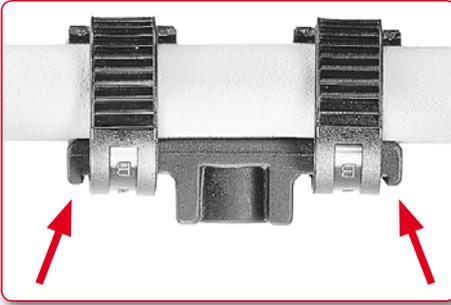
A c-profile (slot width 11 mm), integrated into the chain bracket, serves to secure the Steel Fix bow clamps.

The bow clamps can be used for strain relief of one, two or three cables arranged on top of each other. In the standard design, the housing body is protected against corrosion by cathodic dip painting. A stainless steel model is also available.



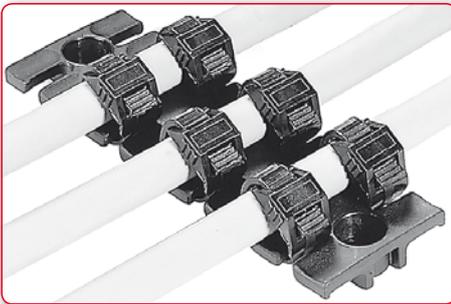
*Strain relief plate (ZL)
mounted in a cable drag
chain's chain bracket.*

Advantages



Secure hold

The undercut on the underside of the plate prevents the cable tie from slipping off – even with very large cable diameters.



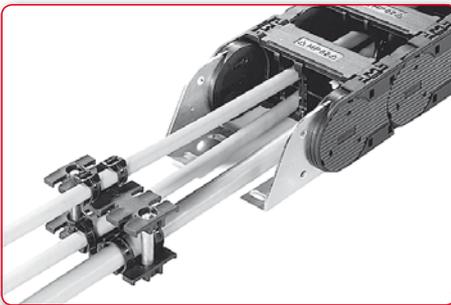
Longer life

Each cable is secured by 2 power cable ties on each end. This spreads the pressure on the cable and thereby minimises the risk of damage to the cable core.



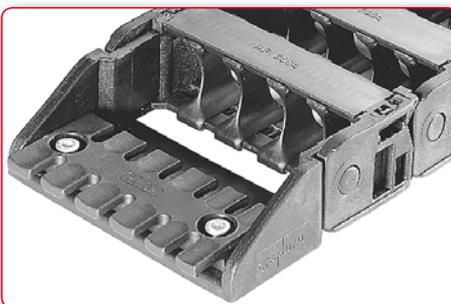
Wide support face on the individual plate tongues

The cables are optimally secured by the wide supporting surfaces of the individual strain relief tongues. The wide power cable ties help to facilitate strain relief which is quick and simple but gentle on the cables.



Two-tier assembly

2-tier installation is possible by using the DH stand-offs.



Compatible fixing holes

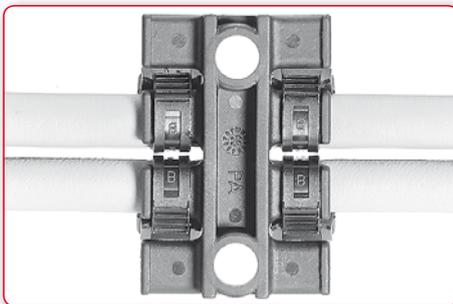
The dimensions of the holes on the plates system match those on the chain brackets.

Please note the dimension of the holes on the strain relief plate when using strain relief in the chain bracket (see page 350/351).



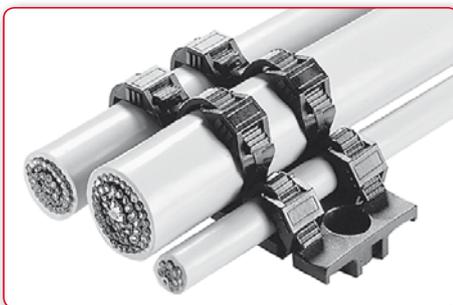
Durable fastening with metal bush

The metal bushes inhibit cold flow properties. Metal is screwed onto metal. The screws are prevented from working loose. (Please order separately.)



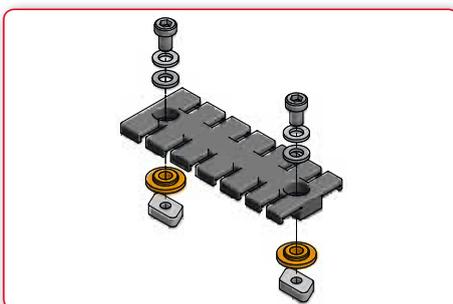
Easy assembly

Even if two cables are immediately next to each other, it is possible to secure them with two power cable ties.



Different cable diameters

The flexible use of power cable ties provides strain relief which is quick and simple but very gentle on the cables, even for cables of very different diameters with extremely high packing density.



Single or as a complete set

Our strain relief plates are available singly or in a set, e. g. for mounting on a C-rail:

A strain relief plate, complete with cylinder head bolt, plain and serrated washer, insert bushings and T-slot nut.



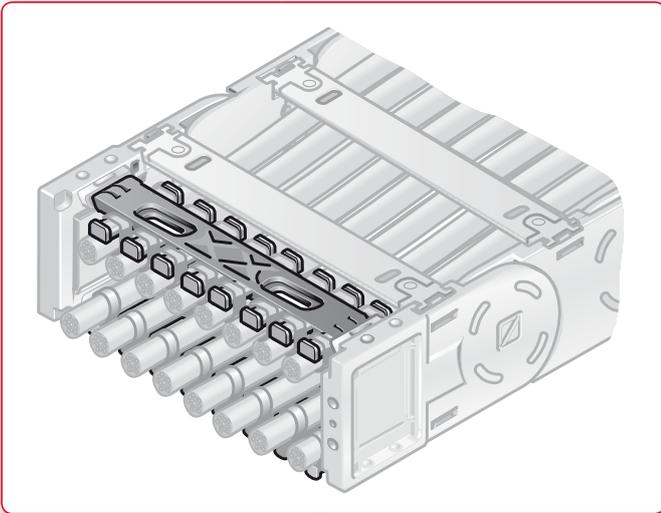
Steel Fix bow clamps

- for C-rails with a groove width of 11 mm
- for one, two or three cables on top of each other
- Corrosion protection via cathodic dip painting (CDP)
- trough elements with low-wear cable design
- stainless steel design available on request

Selection criteria / engineering notes

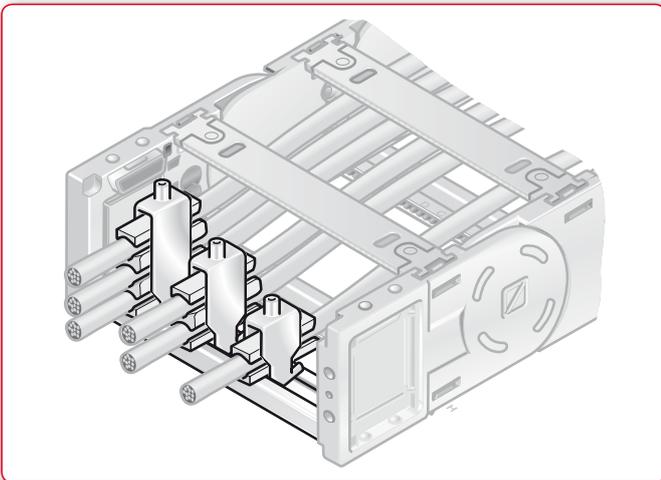
Where is the strain relief situated?

For cable drag chains with standard inside widths of up to 243 mm, frame bridge strain relief plates (RS-ZL) are the ideal solution for relieving power cabling and media conduits from strain in a space-saving, secure way. They are supplied in the same widths as the frame bridges for the respective chain type.



They are secured in much the same way as the frame bridges themselves, by snapping them into pre-cut recesses in the chain brackets. This enables two strain relief plates to be integrated into the cable drag chain per cable end, both for the inside bend and the outside bend.

As an alternative, the same recesses that accept a frame bridge strain relief plate can also be used for the fixed integration of a C-section rail. This ena-



bles the provision of rapid and reliable strain relief even for individual chain inside widths that differ from the grid spacings.

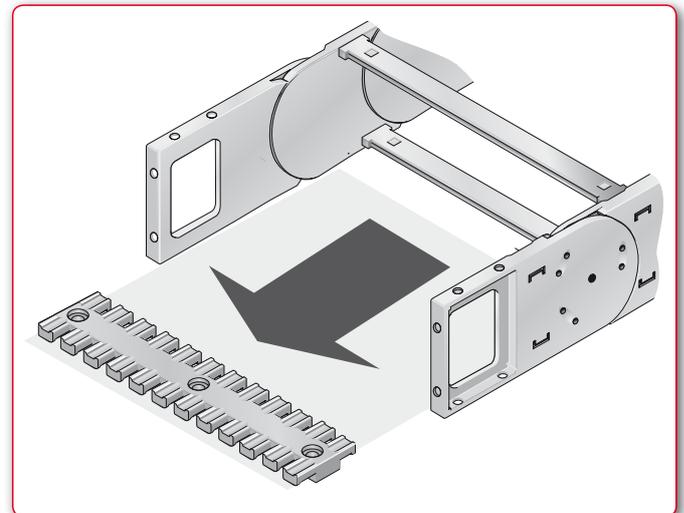
We offer two separate strain relief systems for this specific application:

The first is to use our Steel Fix bow clamps, which accept up to three power cables on top of one another per fixing element. The second option is ZL-format strain relief plates, which match frame bridge strain relief plates in form and function.

The options described above assume that the distance from the last movable point of the cable drag chain to the strain relief mechanism is sufficient for all of the installed power cabling/media conduits (depends on the minimum bending radius).

If this is not the case, then you will need to use one of the options as described below:

1. Reposition strain relief in front of chain

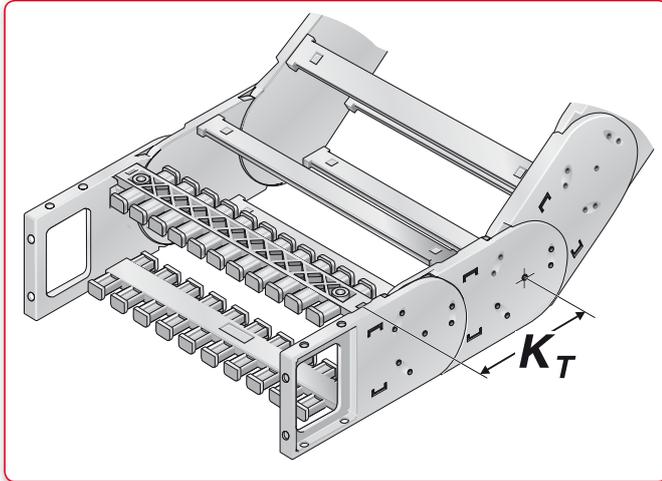


To increase the distance from the strain relief to the first movable point, the strain relief can be moved to a position outside the chain bracket. To do so, you can utilise our Steel Fix bow clamps and ZL-C strain relief plates, which are mounted on C-section rails. The ZL strain relief plates can also be secured to a load-bearing substrate directly, without using C-section rails.

A further positive effect of this option is that the chain bracket itself remains free of additional pulling forces.

Design / structure

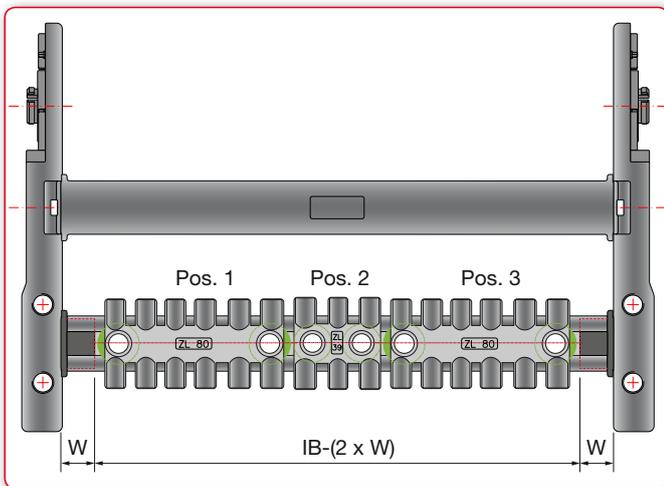
2. Lengthening the chain



If the installation space available permits and the circular arc distance may be increased still further, then the installation of additional chain links can also be used to achieve the necessary distance between the strain relief and the first movable point of the chain.

Note on installation width when using a permanently installed C-section rail.

To secure a C-section rail within the chain bracket (order no.: 81661610), one fixing clip is inserted into the C-section rail on both sides. This slightly reduces the installation space available for strain relief plates or for bow clamps. The space required for the mounting clip depends on the chain type deployed and is in the range 4–15 mm. Please contact our layout experts.



Solutions for inside widths over 243 mm

For our HeavyLine and PowerLine chains, the RS-ZL strain relief plate offers standard solutions up to an inside width of 243 mm. For larger inside widths, multiple strain relief plates are combined together and mounted on a C-section rail (order no.: 81661610).

We recommend the following solutions:

Nominal	Inside width in mm		Recommended ZL combinations			
	-2 x W	Effective	Item 1	Item 2	Item 3	Item 4
246	30	216	ZL 87	ZL 39	ZL 87	--
268	30	238	ZL 62	ZL 87	ZL 87	--
293	30	263	ZL 87	ZL 87	ZL 87	--
296	30	266	ZL 87	ZL 178	--	--
318	30	288	ZL 62	ZL 86	ZL 140	--
343	30	313	ZL 87	ZL 103	ZL 121	--
346	30	316	ZL 87	ZL 87	ZL 140	--
396	30	366	ZL 121	ZL 103	ZL 140	--
418	30	388	ZL 87	ZL 121	ZL 178	--
446	30	416	ZL 87	ZL 121	ZL 121	ZL 87
468	30	438	ZL 86	ZL 87	ZL 87	ZL 178
496	30	466	ZL 121	ZL 121	ZL 103	ZL 121
518	30	488	ZL 86	ZL 103	ZL 121	ZL 178
546	30	516	ZL 39	ZL 121	ZL 178	ZL 178

How is the strain relief applied?

The strain relief itself should be fitted with two power cable ties on each side of the cable and secured approx. 20 to 30 x cable diameters away from the last moving chain link.

The strain relief is suitable for cables up to approx. 40 mm in diameter.

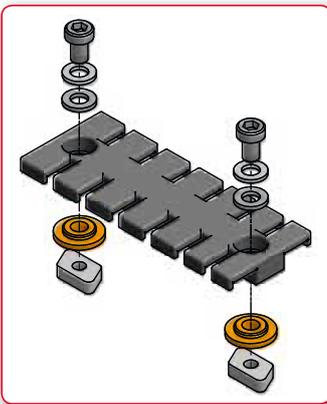
All electric cables must be relieved of strain at both the moving and fixed end. For longer travel distances (and gliding applications), strain relief on one side at the moving end is recommended. Care must be taken to ensure pressure on the power cabling is applied broadly across its outer jacket.

Strain relief plate, type ZL-C set and ZL

The ZL-C set and ZL type strain relief plates are used for strain relief when laying various different cables on machines and installations. When used in cable drag chains, the cables are secured to the strain relief plates on both sides of the chain with type KB 28 power cable ties (order no.: 87661258).

The undercut on the strain relief plates prevent the power cable ties from slipping off, even when the routed cable diameter is itself larger than the plate tongue. Every cable is clamped twice at each end with cable ties.

The actual strain relief is accomplished using cable ties. We recommend using our own type KB power cable ties. These are equipped with a special locking mechanism and are especially suitable for heavy-duty applications. Wide, highly flexible power cable ties increase the surface pressure and ensure longer service life.



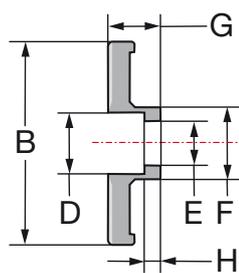
ZL-C set

In addition to a type ZL strain relief plate, the ZL-C sets contain a complete set of installation materials, such as washers, serrated and spacer washers, plus T-slot nuts for installation in the C-rail.

Legend for dimensions (in mm)

- Z = Installation width = C+X+Y
- A = Length
- B = Width
- C = Hole spacing
- X = Hole spacing to edge
- Y = Hole spacing to edge
- Z = Installation width
- D = Inside diameter (above)
- E = Inside diameter (below)
- F = Outside diameter (below)
- G = Assembly height
- H = Material thickness

Cross-section



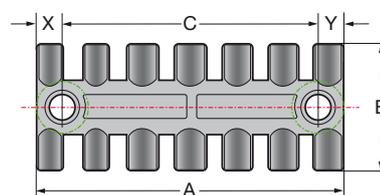
Type	ZL-C 39 set	Type	ZL 39
Order no.	87702810	Order no.	87701014
A	38.5 mm	X	9.0 mm
B	40.0 mm	Y	9.0 mm
C	19.5 mm		
D	12.0 mm	G	10.0 mm
E	9.0 mm	H	3.1 mm
F	14 mm		

Type	ZL-C 60 set	Type	ZL 60
Order no.	87702812	Order no.	87701016
A	99.5 mm	X	9.0 mm
B	40.0 mm	Y	7.0 mm
C	43.5 mm	Z	61.5 mm
D	12.0 mm	G	10.0 mm
E	9.0 mm	H	3.1 mm
F	14 mm		

Type	ZL-C 80 set	Type	ZL 80
Order no.	87702814	Order no.	87701015
A	79.5 mm	X	5.7 mm
B	40.0 mm	Y	5.7 mm
C	68.0 mm	Z	86.0 mm
D	12.0 mm	G	10.0 mm
E	9.0 mm	H	3.1 mm
F	14 mm		

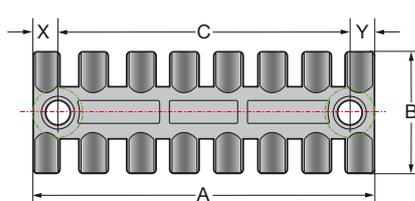
Type	ZL-C 87 set	Type	ZL 87
Order no.	87702816	Order no.	87701018
A	86.5 mm	X	9.0 mm
B	40.0 mm	Y	9.5 mm
C	68.5 mm		
D	12.0 mm	G	10.0 mm
E	9.0 mm	H	3.1 mm
F	14 mm		

Type	ZL-C 103 set	Type	ZL 103
Order no.	87702818	Order no.	87701020
A	102.5 mm	X	9.0 mm
B	40.0 mm	Y	9.5 mm
C	19.5 mm	D	12.0 mm
		E	9.0 mm
		F	14 mm
		G	10.0 mm
		H	3.1 mm

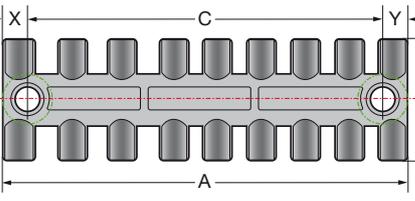


Strain relief plate, type ZL / two-tier strain relief plate

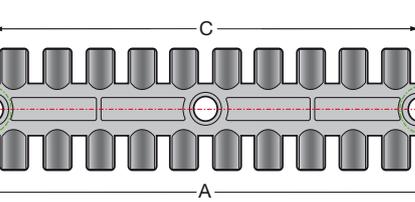
Type	ZL-C 121 set	Type	ZL 121
Order no.	87702820	Order no.	87701022
A = 121.0 mm	X = 9.0 mm	D = 12.0 mm	G = 10.0 mm
B = 40.0 mm	Y = 9.5 mm	E = 9.0 mm	H = 3.1 mm
C = 102.5 mm		F = 14 mm	



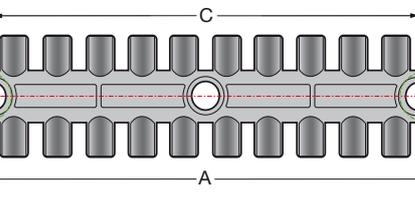
Type	ZL-C 140 set	Type	ZL 140
Order no.	87702822	Order no.	87701024
A = 139.5 mm	X = 9.0 mm	D = 12.0 mm	G = 10.0 mm
B = 40.0 mm	Y = 9.5 mm	E = 9.0 mm	H = 3.1 mm
C = 121.5 mm		F = 14 mm	



Type	ZL-C set 180/6	Type	ZL 180/6
Order no.	87702824	Order no.	87701026
A = 177.9 mm	X = 9.0-11.7	D = 12.0 mm	G = 11.5 mm
B = 42.0 mm	Y = 9.0-11.7	E = 9.0 mm	H = 3.2 mm
C = 154.5-160 mm		F = 16 mm	

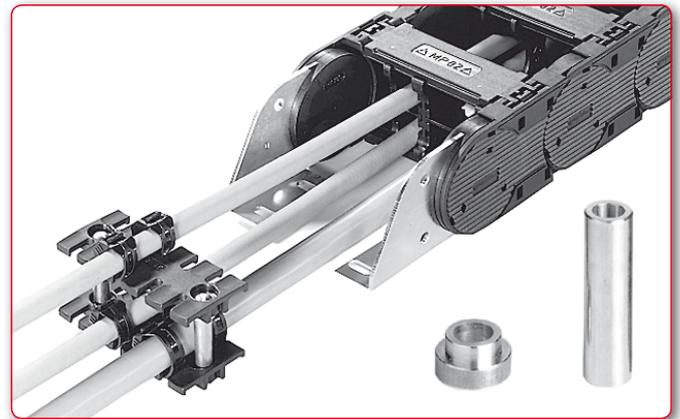


Type	Not a set	Type	ZL 180/8
Order no.	--	Order no.	87701027
A = 177.9 mm	X = 9.0-11.7	D = 13.5 mm	G = 11.5 mm
B = 42.0 mm	Y = 9.0-11.7	E = 11.0 mm	H = 3.2 mm
C = 154.5-160 mm		F = 16 mm	

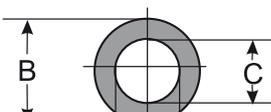


Two-tier installation

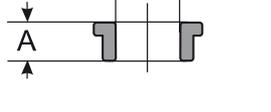
When deploying a shelving system and to achieve higher packing densities, you can also install two strain relief plates above each other. The necessary distance between the levels is ensured by using type DH stand-offs.



Type	ELB / 6
Order no.	87701050
A = 6.5 / B = 12.0 / C = 6.2	



Type	ELB / 8
Order no.	87701060
A = 6.5 / B = 13.4 / C = 8.2	

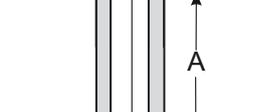


Dimensions in mm

Type	DH 32/6
Order no.	87701052
A = 32.0 / B = 12.0 / C = 6.3	

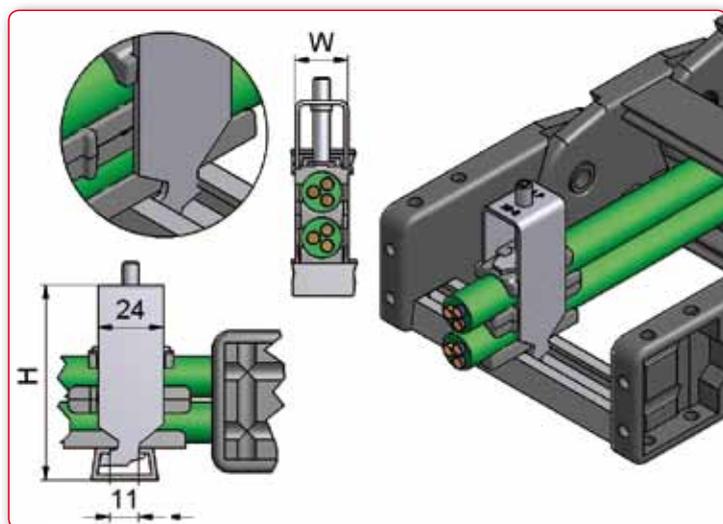


Type	DH 32/8
Order no.	87701062
A = 32.0 / B = 13.0 / C = 8.3	



Dimensions in mm

Steel Fix bow clamp



A permanently integrated C-section rail (cathodic dip painted, order no. 81661610) for accommodating the Steel Fix bow clamps in the chain brackets.

The bow clamps can take up to 3 cables and are suitable for C-rails with a slot width of 11 mm. Due to the design of the trough elements a cable preserving cable guidance is ensured. Adjusted to all chain inside widths up to 200 mm in size. May be assembled on the inside and outside flexure curves at both chain endings.

A stainless steel model is also available.

The entire height entered is a guide only. The actual height is, amongst other things, dependent on the diameter and the quality of the cable. A safety distance of 10 mm at the fixed point above the strain relief must be kept during gliding applications.

Type	Order no.	Cable Ø	Width (W)	Height (H)*	Pitch (T)
Single hooped clamp (for 1 cable)					
STF 12-1 Steel Fix	81661801	6 – 12	16	55	24
STF 14-1 Steel Fix	81661802	12 – 14	18	52	24
STF 16-1 Steel Fix	81661803	14 – 16	20	54	24
STF 18-1 Steel Fix	81661804	16 – 18	22	56	24
STF 20-1 Steel Fix	81661805	18 – 20	24	59	24
STF 22-1 Steel Fix	81661806	20 – 22	26	61	24
STF 26-1 Steel Fix	81661807	22 – 26	30	70	24
STF 30-1 Steel Fix	81661808	26 – 30	34	74	24
STF 34-1 Steel Fix	81661809	30 – 34	38	78	24
STF 38-1 Steel Fix	81661810	34 – 38	42	82	24
STF 42-1 Steel Fix	81661811	38 – 42	46	91	24
Double hooped clamp (for 2 cables)					
STF 12-2 Steel Fix	81661821	6 – 12	16	73	24
STF 14-2 Steel Fix	81661822	12 – 14	18	74	24
STF 16-2 Steel Fix	81661823	14 – 16	20	82	24
STF 18-2 Steel Fix	81661824	16 – 18	22	86	24
STF 20-2 Steel Fix	81661825	18 – 20	24	91	24
STF 22-2 Steel Fix	81661826	20 – 22	26	95	24
STF 26-2 Steel Fix	81661827	22 – 26	30	108	24
STF 30-2 Steel Fix	81661828	26 – 30	34	121	24
STF 34-2 Steel Fix	81661829	30 – 34	38	129	24
Triple hooped clamp (for 3 cables)					
STF 12-3 Steel Fix	81661841	6 – 12	16	98	24
STF 14-3 Steel Fix	81661842	12 – 14	18	98	24
STF 16-3 Steel Fix	81661843	14 – 16	20	105	24
STF 18-3 Steel Fix	81661844	16 – 18	22	111	24
STF 20-3 Steel Fix	81661845	18 – 20	24	118	24
STF 22-3 Steel Fix	81661846	20 – 22	26	130	24

* Total height with max. cable diameter, including C-rail