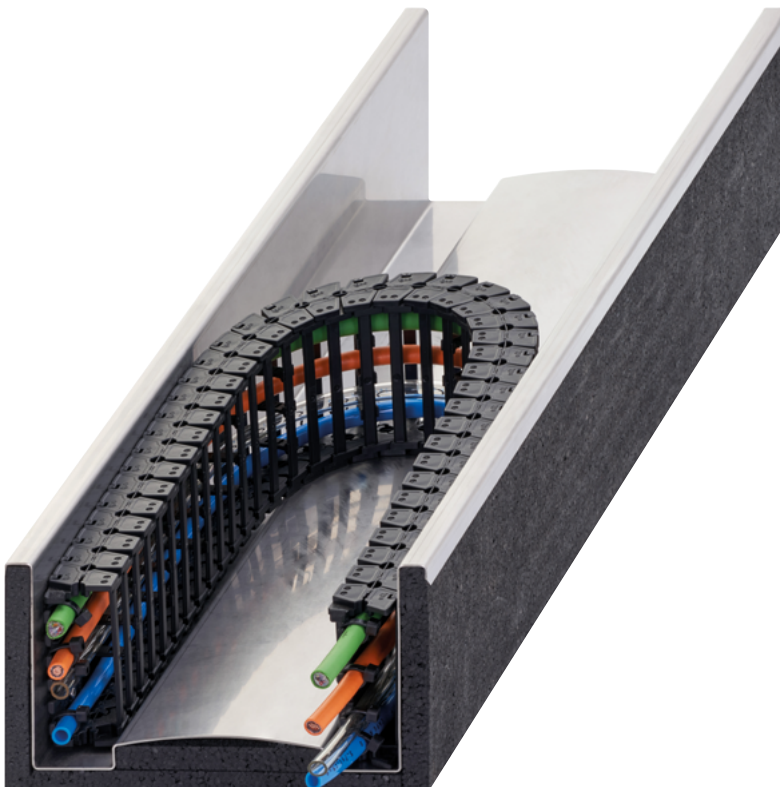


Tips

... for long-lasting energy supply in side-mounted applications



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Introduction

Energy chains are mostly installed in horizontal and vertical (standing or hanging) arrangements. It is less common for energy chains to be used side-mounted.

This type of application is preferred when space conditions do not allow a usual arrangement, especially due to the clearance height. In this case, the installation space in height remains limited to the width of the energy chain. Another application for side-mounted energy chains is a curve movement on the x-axis.

A distinction must be made between unsupported and gliding applications. In each case, different selection criteria and design measures must be taken into account, which are explained in this white paper. In gliding applications, travels of up to 100m are possible, which can be implemented with a glide surface (guide trough) made of steel or plastic.

This short guide will give you some valuable tips on how to optimise standing energy supply systems yourself and design them for a long service life. It guides you step by step - more precisely in ten steps - to the selection of energy chain best suited for the individual application.

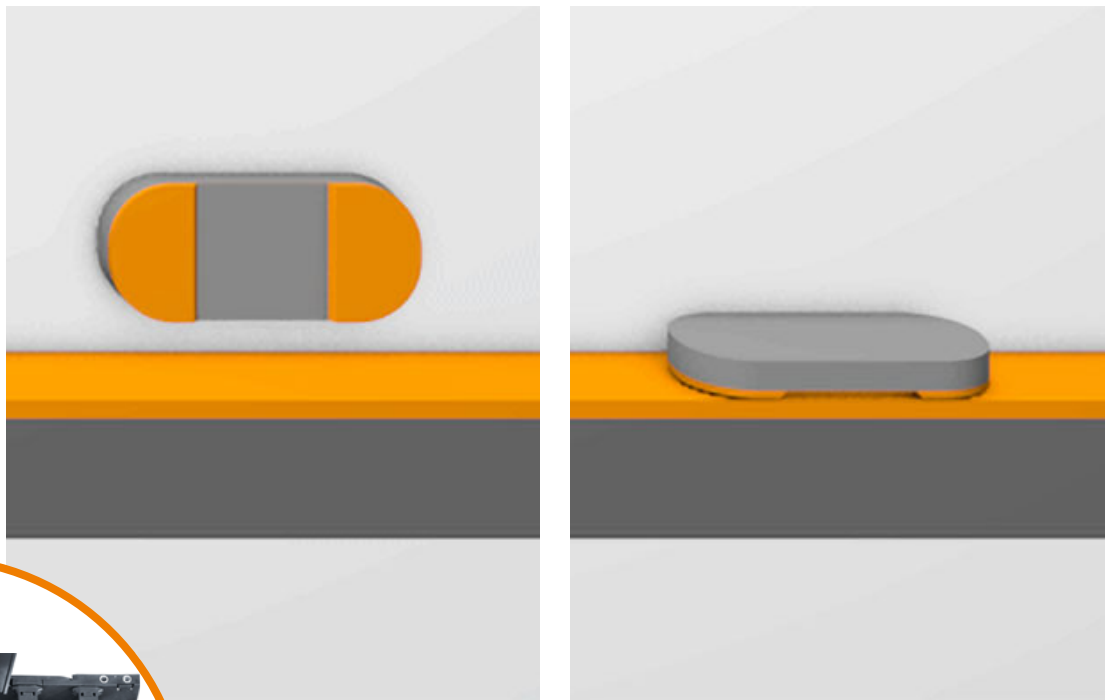
The tips are in no way intended to replace personal consultation with igus® experts. The igus® project engineering team will be happy to support you - among other things, with the measurement, design, installation and commissioning on site.

01

Select the right energy chain

All energy chains from igus® have also been designed and intended for side-mounted use. In most cases - as is generally the case in the industry - chains from the two-piece (E2) and four-piece (E4) systems are used.

It is advisable to use a chain with a lateral glide pad: as the chain is in moving contact with the guide trough on one side, friction and thus wear between the chain and the trough is important. This glide pad is particularly pronounced in the standard chains of the E2.1 and E4.1 systems and is integrated as a standard feature



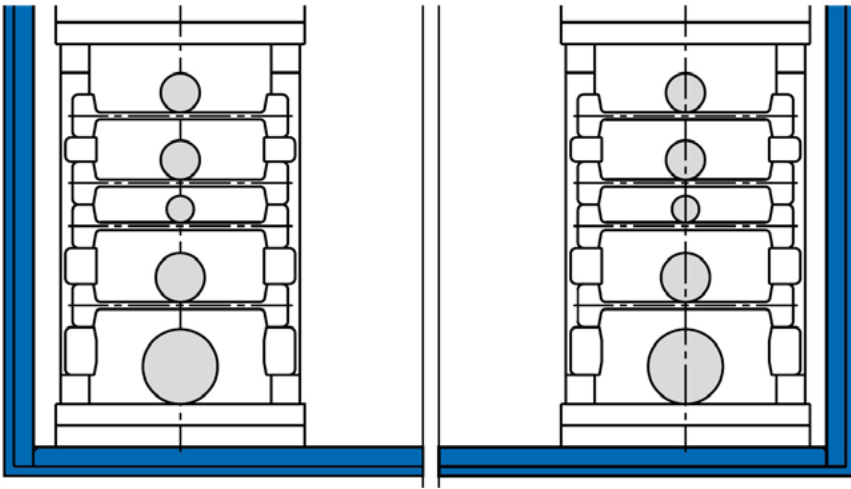
Schematic diagram of the glide pad



02

Determine correct filling

As with all energy chains, professional filling is another important factor for the correct functioning of the energy chain. But different rules apply here than with conventionally installed energy chains: heavy cables and hoses should be arranged at the bottom if possible. The interior separation is also very important. It ensures that the cables are not stacked on top of each other and thus do not wear out due to the relative movement. In general, the cables should lie as individually as possible in the chambers and should not overlap. To ensure this, the user should not use the usual sliding separators, but snap-in separators from the range of accessories from igus®. Alternatively, the use of spacers is recommended.



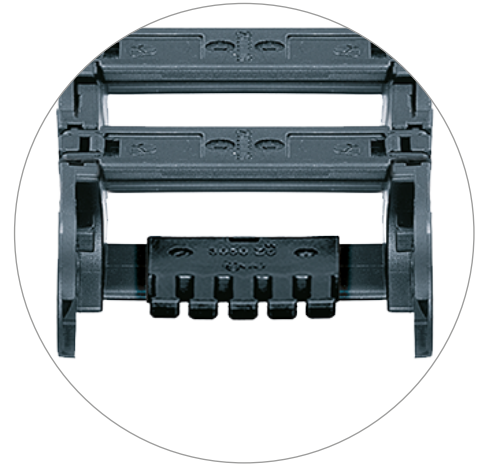
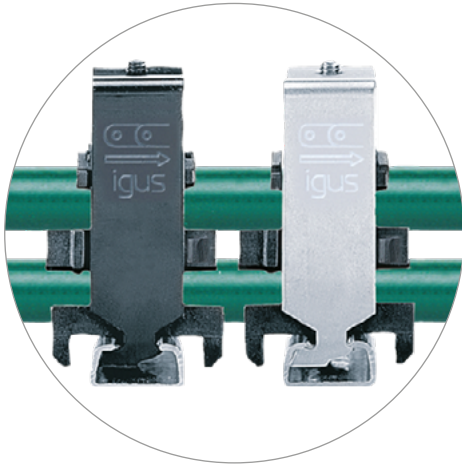
Schematic diagram
for optimal filling



03

Determine the correct strain relief

In the case of side-mounted energy chains, strain relief is of particular importance: it protects the connection between a cable and the end piece against mechanical stress. There are different types of strain relief, for example, U-clamps, separators and tie-wrap plates.



Overview of suitable strain relief systems

Depending on the application, the use of the strain relief can also be useful only on one side for the carriage in horizontal applications. The specific application decides which clamping element is the optimum one. The igus® experts will be happy to assist with the selection.

04

Define motion: Linear or Curved?

One of the special features of the horizontal application of energy chains is that, in addition to linear movements, curved movements are also possible, even S-curves. However, this only applies to gliding applications. Here, the targeted use of Reverse Bend Radius links (chain links with machined reverse bend radius) can be used to specify the curve guidance. This creates the prerequisite for opening up new areas of application for energy chains - for example in curved conveyor systems or storage and retrieval units.



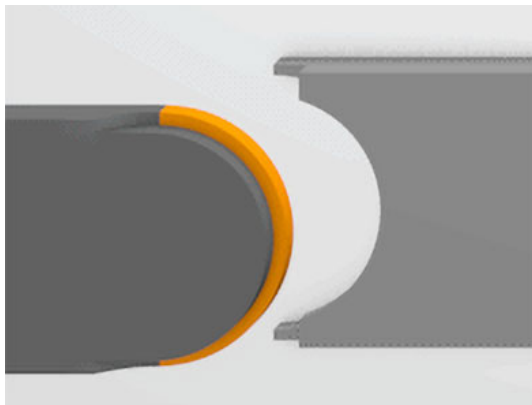
Examples for curved and
linear movement type



05

Special features for unsupported applications

For limited lengths and for linear movements, i.e. not when cornering, the use of a side-mounted unsupported chain is a solution that is as elegant as it is simple and space-saving. In these cases, energy chains with undercut design are used, which have a higher stability.



Schematic diagram of the undercut design

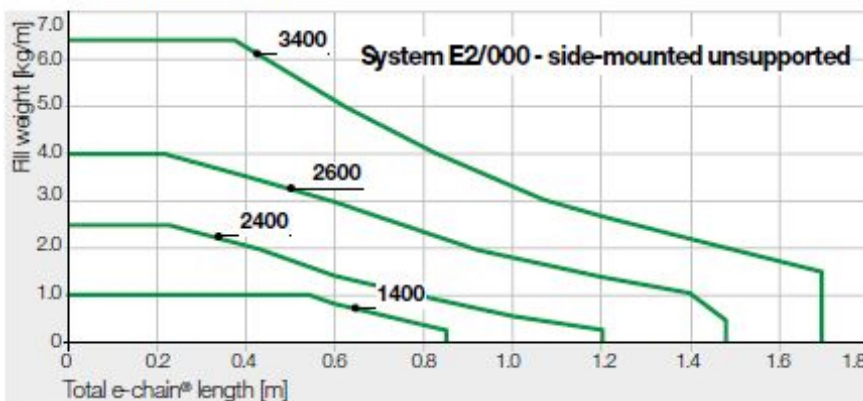
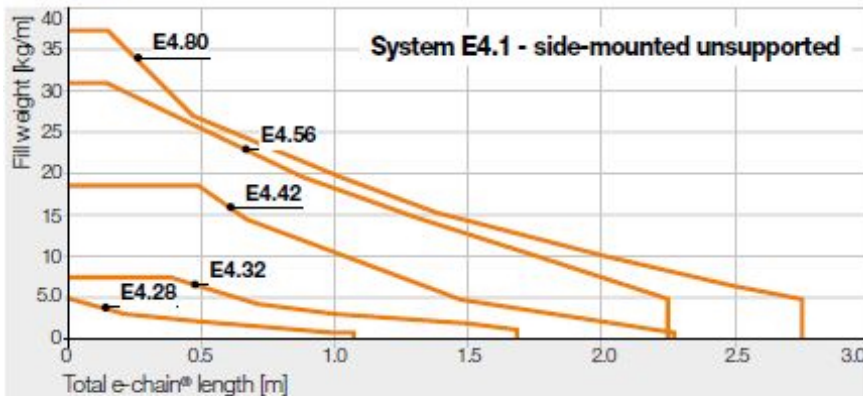
The possible length of travel for side-mounted energy chains depends on the following factors:

- Fill weight
- Width of e-chain®
- Bend radius
- Application parallelism

In general, the higher the fill weight of the e-chain®, the shorter the possible unsupported length. The chain width corresponds to the height at 90° rotation. Large heights as well as small bend radii result in high stability. If a movement in a second axis is added to the parallel movement of the chain the unsupported length is impaired.

In addition, the following points must be noted:

- Check feasibility with regard to weight (load diagram)
- If possible, support the first 2-3 chain links at both chain ends, e.g. with a supporting plate.
- Use of locking mounting brackets can replace a lateral guidance in the form of plates, but depends on the application and chain length.
- Using an e-chain® with undercut design
- Consider possibility of sag in installation space.



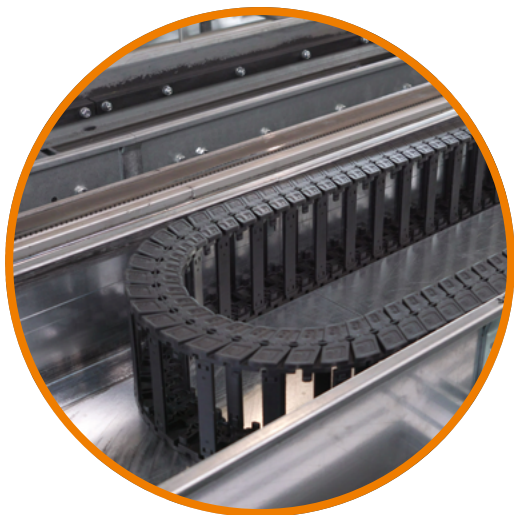
Load diagram for systems E2/000 and E4.1

06

Special considerations for gliding applications

In contrast to side-mounted unsupported applications, the chain is less loaded here because it is supported by a guide trough. And curve-compliant solutions can also be implemented. In any case, the following points should be noted:

- The use of locking mounting brackets is recommended. Otherwise, support plates would have to be used.
- We recommend the use of e-chains® with lateral wear pads.
- Glide surface can be an igus® plastic, stainless steel (material: AISI 304) or galvanised steel.
- The back of the energy chain should be supported, especially - but not only - for systems that perform curved movements.



Example of a side-mounted energy chain in a guide trough system

07

Define position of the fixed end

The design around the fixed end requires special attention for horizontal energy chains. The mounting brackets must be very robust, preferably locking, and sufficiently dimensioned. At the fixed end, the designer should provide a cable loop. This prevents the chain from being overloaded and, in the worst case, damaged.

Strain relief elements such as for e. g., clamps and tiewrap plates are strongly recommended; the use of a flanged end bracket should be avoided.



Examples for curve and linear movement type

08

Select the appropriate guide trough

In sliding, side-mounted applications, the guide trough is the glide surface. It is usually made of plastic, stainless steel or galvanised steel. igus® offers the PRM module as a standard series for energy chains with reversed bend radius. Individual special designs are planned and manufactured by the igus® engineering service.

In the case of curved horizontal chains, the guide trough also takes over the lateral guidance of the energy chain with the aid of guide plates.



Complete set PRM for rotary movements up to 360 degrees



Example of guide plates

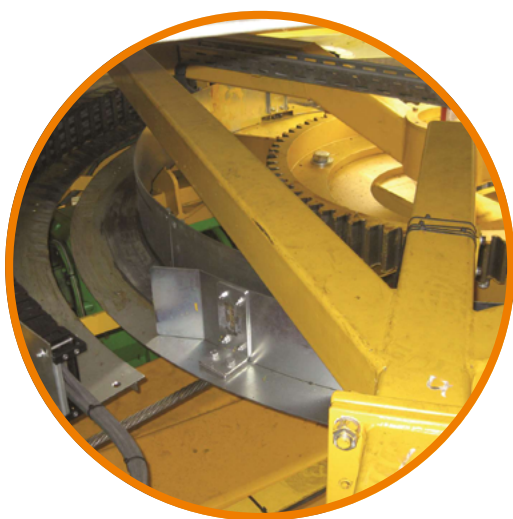
09

External influences

Depending on the application, there may be external influences that affect the behaviour and service life of the horizontal energy chain. This includes:

- High/low temperatures
- Vibration
- Operating media such as coolants
- Accumulation such as dirt, dust and swarf in the guide trough

These parameters do not represent a fundamental obstacle to using horizontal energy chains. However, the designer should consider them in order to minimise the negative influences. In dusty environments and where there is a risk of flying chips, e. g. complete systems with covers or enclosures should be used.

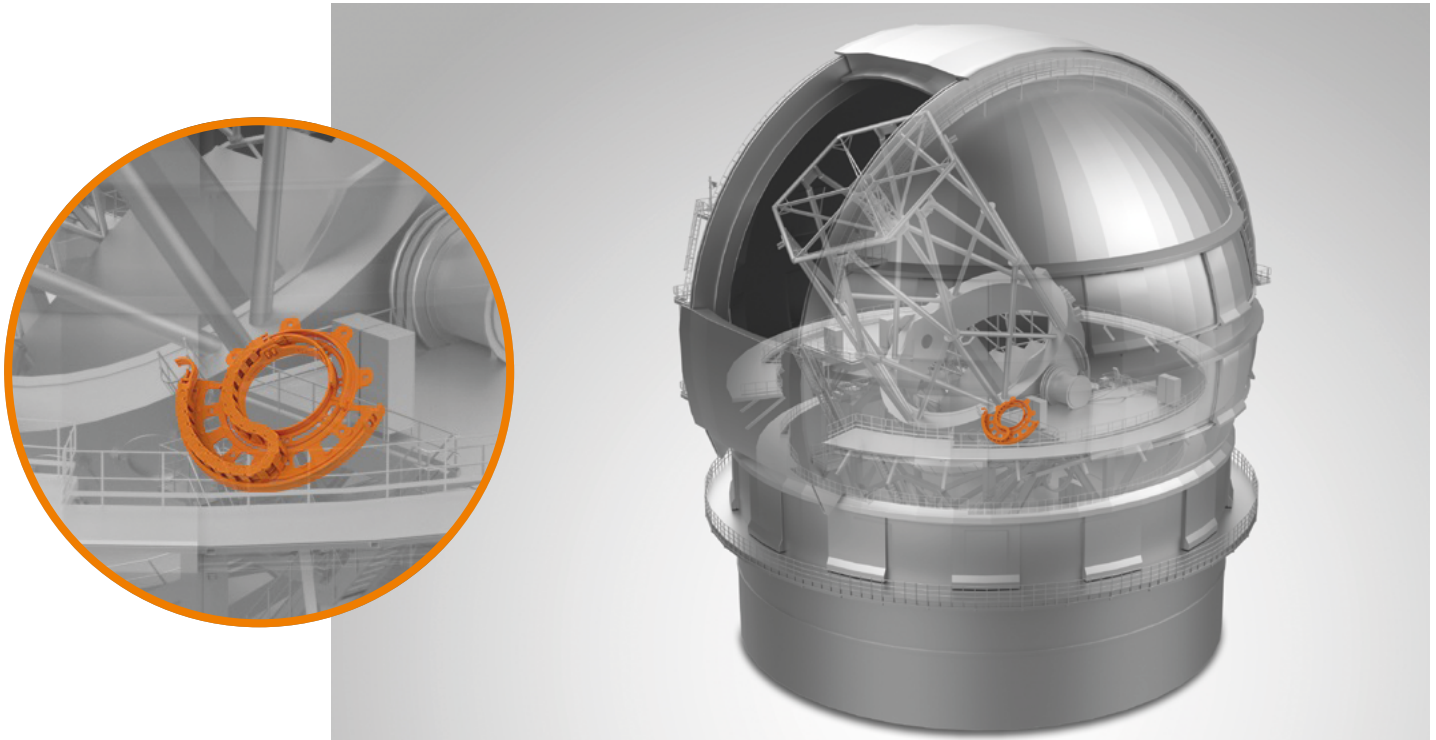


**Compact cable guide
for slewing gear
on indoor cranes**



Planning integration in the overall plant

Side-mounted energy chains (unsupported and gliding) are mostly used when installation space is limited. This makes precise construction space planning all the more important. Depending on the application, the external dimensions of the chain and also of the guide trough, if one is used, must be taken into account at an early stage of planning. For certain travels, the so-called "chain station" must also be included in the planning. This refers to the total space required by the energy chain for the planned movement, which is necessary to contain the energy chain.



Application example of the integration of an energy chain system

It should also be noted that the "energy chain system" includes mounting brackets, separation etc. Their selection requires at least as much care as that of the energy chain and the guide trough. Literally every (energy) chain is only as strong as its weakest link. With the range of accessories from igus®, such weak points can be reliably avoided. If required, the igus® experts will help and advise you in the selection.

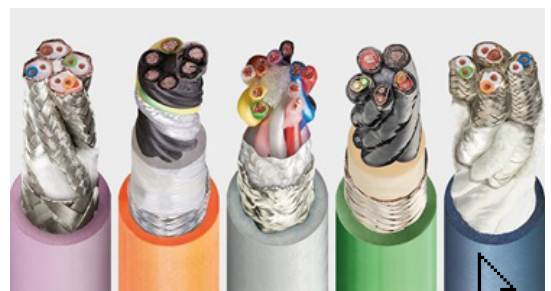


Select the right cables

Only cables developed for moving applications are used in energy chains. The bend radius plays a central role in the selection of cables. The chainflex® product range from igus® also includes cables with particularly small bend radii. These have advantages for side-mounted energy chains, especially for energy chains with reverse bend radius. Due to the limited space available, small bend radii are often used there. The "bend radius" factor must therefore be taken into account in the selection.



igus® offers numerous free tools for optimum cable selection



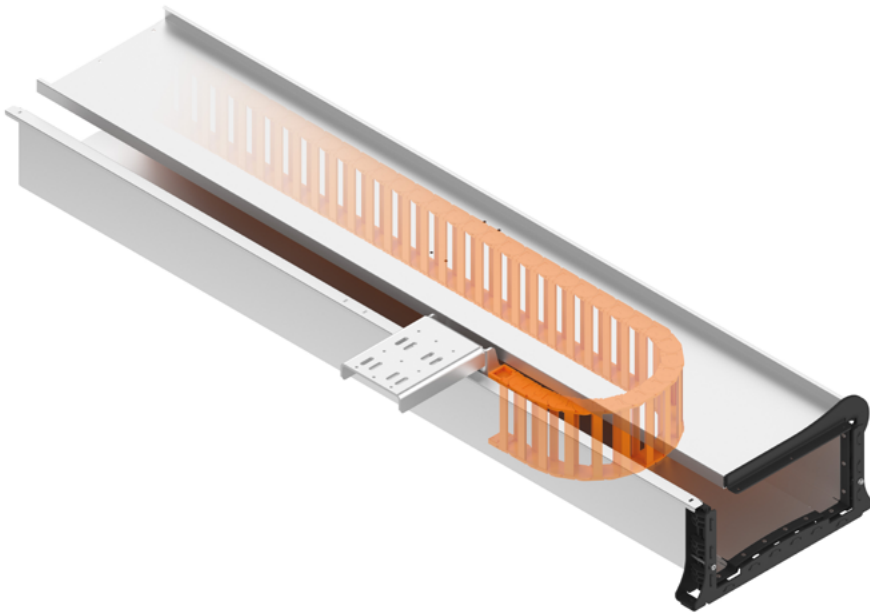
www.igus.eu/chainflex
www.igus.eu/filling-rules
www.igus.eu/info/chainflex-online-tools

Complete solutions from igus®

Energy chain systems in horizontal design are often special designs, especially with regard to the guide troughs.

However, many companies do not have the capacity or it is not part of their strategy to design and manufacture individual energy supply systems. That is why igus® has also developed complete systems for horizontal chain applications.

The best example is the "plane-chain": a compact energy supply system for gantry applications and processing machines, with a horizontal energy chain.



Schematic diagram of the plane-chain system

In a new type of trough system developed specifically for these applications, e-chains® are side-mounted and guided in a recessed channel and operate even at high travel speeds. Stainless steel troughs with a low friction factor ensure a long service life, while a plastic insulating layer applied to the outside ensures smooth and quiet operation. The complete system can be safely enclosed with a cover, even at low installation height.



Please contact us!

The igus® Project Engineering Team will help you with measurements, design, project management, installation and commissioning on site. To intelligently monitor your system's state, igus® i.Sense sensors and monitoring modules can also be used to measure energy chain abrasion, push/pull forces and acceleration, and to perform real-time monitoring.



Do you have questions about side-mounted energy chains?
Our experts would be happy to help!

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