Design and calculation aids, applications, diagrams
Designing with e-chains®, from page 1.1

Multi-axis e-chains® for robotic or 3D movements
triflex® R, triflex®, twisterchain®, twisterband®, from page 2.1

Low-priced, easy to fill e-chains®
easy chain®, System E1, snapchain®, from page 3.1

Zip-open, easy to fill e-chains® and e-tubes
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Allrounder e-chains® and e-tubes,
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Dirt- and debris protection,
snap-open e-tubes
E2 e-tubes: Serie R, R100 and RX, from page 6.1

Universal E4 modular kit,
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low noise, low vibration
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Guide troughs and special solutions
for long travel applications
System P4, rol e-chain®, autoglide, guidelok, flizz®, from page 9.1

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Older products,
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Classic-series, technical annex, from page 12.1
plastics for longer life® - make your machines more durable with plastics

Less maintenance, lower costs, longer life cycles, ex-stock availability - these key principles apply to all igus® products, systems and services. Tried and tested for durability, friction properties and stability, igus® plastics are the technological core of the igus® range. This catalog lists more than 80,000 products available ex stock. We are looking forward to your phone call or e-mail.

igus® climate chamber - e-chain® and chainflex® cables test runs possible at +60°C to -40°C
Improve technology and reduce costs
For years the igus® motto has been "plastics for longer life®". By this we mean the production of innovative plastic products which reduce maintenance work, achieve technical improvements, at the same time as reducing costs and increasing service life, everything delivered immediately from stock.

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**Delivery time 24h* or today or on request.**
*Delivery time means time until shipping of goods.

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No surcharges!
You can find our prices online at **www.igus.eu**

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Beyond the legal warranty we also vouch for wear and tear. With a warranty certificate!

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Product finder, configurator, online catalogs, CAD modules and many more. Order around-the-clock!

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"Emergency-Service" around the clock.
80,000 products from stock.
No minimum order quantities, no surcharges.

igus® is accredited to
DIN EN ISO 9001:2008 and
Polymer Bearings additionally according to TS16949

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igus® e-chains® are lifelines to automated systems

E-chains® are the umbilical cord of modern machines. They are constantly moving and supply power, data and energy. igus® has been developing, producing and testing polymer e-chains® since 1971. Our expert knowledge is being refined continuously with the help of our customers to constantly improve our product range.

Universal applications for igus® e-chains®
- Multitude of possibilities in terms of movement and length
- To carry sensitive bus, data cables and fibre optics cables and energy sources such as electricity, gas, air and liquids
- To accommodate very high dynamic loads and stringent service life requirements
- Handle very different environments and climates
- Space-saving installation
- High speeds and accelerations can be achieved
- Modular systems allow quick assembly and retrofit

Save time and money when purchasing and using e-chains®!
- Innovative products that can be assembled quickly
- Rapid delivery time - saves you storage costs
- Large range of products - find the right solution immediately
- System quotes, including made-to-measure production and “turnkey” assembly
- Rapid system design and support with an ever-growing close-knit network of local sales engineers worldwide

Find a video online
www.igus.de/automated

The award-winning igus® e-chainsystems® are certified and tested

Assembled to your exact requirements. Delivered in 1-3 days! page 7.1
Igus® interior separation systems significantly lengthen the life cycle of cables and enable neat layout of e-chains®.
Filling guidelines ► from page 1.29

Large unsupported lengths with igus® e-chains®.
Notes, calculations and load diagrams are provided ► from page 1.12

Optimum service life for cables - Reduce cable wear with igus® polymer crossbars

Proven toughness - strength testing in the igus® laboratory
Matching accessories for your igus® e-chainsystems®

Ranging from reliable strain-relief systems for cables through interior separators for proper division of e-chains® to autoglide crossbars for long travels without guide troughs or special igus® guide troughs for extra-long travels, igus® offers the right solution for every application. The large accessory kit from igus® permits upgrading of your e-chain® to a high-tech solution. Matched specially with igus® e-chains®, igus® accessories have been tried and tested in practical applications for many years now.

Super-aluminium guide trough. The igus® standard aluminium guide trough in two designs - lightning fast assembly ➤ page 9.1

Find a video online
www.igus.de/SALU_Film
Tiewrap plates, with clip-on connection for the C-profile of a KMA mounting bracket ► chapter 10

Igus® developed extension links for a safe guidance of huge hoses in e-chains® ► System E4 and E2/000

Special connecting elements with strain-relief for triflex® R (3D-roboth) e-chains® ► chapter 2

Chaintix cable strain-relief systems. Various systems for individual use ► chapter 10

Twisterchain® guide trough systems permit e-chain® rotation as far as 540° ► chapter 2

PMA protective hoses for predominantly static applications in e-chains® and for protecting cables ► chapter 11
Your production processes must remain trouble-free, and that means your energy supply systems too. This requires fully reliable operation by all relevant components, including cables. igus® was the first company to develop complete e-chain® systems®. igus® chainflex® cables and e-chains® are offered together from a single source with a system guarantee depending on the application involved design principles based on knowledge of cables and exhaustive test Series since 1989 prevent machine downtimes in plants all over the world today.

7 rules for making a good cable

1. Strain-relieved core
   Empty space arises at the core of the cable depending on the number and cross-section of the conductors. This core space should be filled to the greatest possible extent with a proper rope (not with the usual fillers or dummy wires made of waste material). This reliably braces the surrounding strands and prevents them from sliding into the middle of the cable.

2. Strands
   Experience has shown that the strand structure should be as flexible as possible. Although very thin individual wires result in very flexible conductors, these are highly susceptible to damage. Extensive test Series have helped to determine which combination of wire diameter, strand pitch and strand direction optimizes bending resistance.

3. Core insulation
   Insulating materials must be designed so that they do not stick together once inside the cable. Furthermore, the insulation should brace the individual wires of the cable. For this purpose, we use only the best PVC and TPE extruded at high pressure and proven in millions of kilometres of wire forming part of e-chain® applications.
4. Braids
Braids must have an optimized, short pitch around a stable, strain-resistant core. To co-exist properly with the insulating materials, braids must allow movement over a certain range. Starting from a quantity of 12 cores stranding in bundles should be applied.

5. Inner jacket
A gusset-filling, extruded inner jacket should be used instead of low-cost non-woven fabric, filler or tracer. This permits secure longitudinal routing of the braid. It also prevents the braid from loosening and drifting.

6. Shielding
The shield should generally have a taut structure with an optimized angle of twist about an extruded inner jacket. Loose, open structures or, worse yet, purely circumferential windings notably reduce electromagnetic compatibility and can fail easily as a result of wire breakage. A taut shield braid makes the underlying wire braid more resistant to torsional strain.

7. Outer jacket
An external jacket made of ideal materials can meet a wide range of specifications: From UV resistance through low-temperature flexibility and oil resistance to cost-effectiveness. However, all external jackets should have the following in common: Highly resistant to abrasion without sticking and highly flexible while still supportive. In addition, all external jackets should be extruded at high pressure (gusset-filling).

QuickPin 2.0 - Online connector-cable-configurator ► page 25

Order separate catalog online
www.chainflex.eu
or phone +49- (0) 22 03-96 49-0
readychain® harnessed
e-chainsystems®
are listed from page 1.41
Eliminate storage costs for cables, e-chains® and plugs
Our short and guaranteed delivery periods enable you to dispense entirely with a storage of ultra-flexible cables, related plugs and add-ons.

Shorten turnaround times by half
Thanks to sophisticated logistics, igus® is able to supply complete systems within 10 days of the guaranteed deadline to almost any part of the world.

Flexible response to order fluctuations
With readychains®, you remain prepared for all phases of an economic cycle. Fluctuations in your capacity utilization are absorbed by our product logistics.

Reduce the number of subcontractors and related orders by 75%
One order, one invoice, one delivery, one partner. You no longer need to procure countless individual components from a host of subcontractors; we know how to acquire the right parts quickly and economically.

Minimize your machine downtimes
External purchases of numerous individual components not only make your systems more susceptible to malfunction but also make troubleshooting more difficult. readychains® provide you with standardized systems. Every system is tested at our facility prior to delivery. igus® is certified according to ISO 9001.

www.readychain.eu

"Basic" readychain®
Simple, harnessed e-chainsystems® including installed cables without plug connections, labelled and tail-lengths according to your specifications.

Delivery time: 3 days

"Standard" readychain®
Simple, harnessed e-chainsystems® including installed cables with all plug connections, labelled and tail-lengths according to your specifications.

Delivery time: 3-5 days

Figure left: "Premium" readychain®
A harnessed e-chainsystem® with cables of all kinds, as well as plugs, connectors, tail-lengths and components according to your specifications. Special shafts and plain bearings machined according to your specifications.

Delivery time: 10 days

Find a video online
www.igus.eu/RC_movie
Applications involving high cycle counts, speeds and accelerations or demanding environmental conditions require proven systems especially when it comes to e-chains®, cables, polymer slide bearings and linear systems. igus® regularly conducts tests at its own laboratory under realistic conditions. Every year, we conduct more than 2,000 tests on e-chains® and cables, and over 5,000 tests on plain bearings. These tests focus on push/pull forces, friction values, wear rates, drive forces and abrasion under all possible conditions at diverse speeds. Influential factors like soiling, weathering, cold and impact are examined. Tests are also performed on electric cables and hydraulic and pneumatic hoses. Our laboratory is at your disposal. Should we lack data for your application type, we will gladly conduct tests according to your requirements.

Find a video online
www.igus.de/testlab

Figure center: Partial view, igus® test-lab: More than 80 tests every day with e-chains® and chainflex®-cables
igus® ESD-tests in the production line

Electronic check and archiving for every chain production run

Cables are also tested for torsion properties

Noise level test inside an igus® acoustic cell

Push Pull forces speed up to 10 m/s, acceleration up to 200 m/s² are tested by igus®

Long travel test field: 125 m travel length, speed 300 m/min

All products are tested and available from a single source.
Examples of test certificates and quality seals for igus® products
Quick and reliable.
igus® delivery service.

7 to 8 plus Saturday service
Over 80,000 products ex-stock! Order 0.1 m of chainflex® cable, just one e-chain® link or two bearings without surcharges. Invoices and acknowledgements available by post, fax or e-mail. There are 1,900 employees in Germany and 30 international subsidiaries and offices, plus bases in another 33 countries to guarantee a rapid delivery worldwide.

- Delivery and consultation daily from 7 am to 8 pm, Saturday from 8 am to 12 pm
- No minimum order values
- No surcharges
- Order tracking on the Internet right up to the point of delivery
- Simple returns procedure

i-net customer information system
At: www.igus.eu track your orders in real time with igus® i-net. Just request a password, log into i-net and track your jobstatus via a webcam. igus® i-net shipment tracking permits a monitoring of deliveries from igus® outlet right up to your doorstep.

- Detailed order data including an overview of target and actual deadlines
- Order confirmation via post, fax or e-mail as required
- Track your orders via webcam

igus® delivery service - No minimum order quantities, no surcharges.
www.igus.de/en/deliveryservice

Request order tracking here:
www.igus.de/en/i-net
Available from stock.

Delivery time
24h or today**
*Delivery time means time until shipping of goods

**Delivery time 24h

Delivery time
24-48h

Delivery time
3-5 work days

Delivery time
10 work days

Individual components

For example:
One e-chain® link, 6 m of e-chain®, 3 strain-relief elements

Customized e-chainsystems®

For example:
11.46 m of e-chains® with interior separators, mounting brackets and strain relief elements according to your specifications. Additional with loose accessories as chainflex®-cables, guiding troughs, mounting brackets, strain reliefs and assembly parts

Simple pre-fabricated systems

“Basic” readychain®:
Simple customized e-chainsystems® including installed cables without plug connections, labeled and tail-lengths according to your specifications.

Complex pre-fabricated systems

Premium readychain®:
Complex customized e-chainsystem® including cables as well as plug connections, mounting brackets, tail-lengths and components according to your specifications.
The igus® story from 1964 to now

Innovation with plastics

The igus® story begins on October 15th, 1964 with Günter Blase in a double garage in Cologne-Mülheim. In its first 20 years, igus® operated as a supplier of intricate technical plastic components. In 1983, son Frank Blase started to concentrate on full products like e-chainsystems® and Polymer Bearings and established a separate marketing department. Between 1985 and today, igus® expanded from 40 to over 1,900 staff members distributed all over the world. igus® will continue to invest in expansion in the coming years. Modern materials have opened up further opportunities for innovative products.

Company founders Günter and Margret Blase in front of their “double garage” from 1964

Today: Automated plastic production

Today: Large tool development and production facility
For us, customers have the same significance as the sun to life on earth. The sun gives light, warmth and energy - our customers give us ideas, work and money.

The environment at igus® is fully open - anyone can contact anyone else directly, everyone works at identical desks, has the same work equipment, the same choice of meals at the cafeteria and the same bathroom facilities.

Factory enlarged by 60 percent and all departments closely examined igus® is now producing, testing and researching in Cologne on a floor area covering 36,000 m². The factory area has been extended to 29,000 m², added to which are 7,000 m² of surrounding buildings for additional fabrication, technical training and a large logistics center. In the course of the factory extension, together with consistent lean management we have closely examined all departments: from marketing and administration to research and development, tool design and production through to warehousing and distribution. www.igus.eu/2009

Find a video online www.igus.de/igus_Film

Figure below: The extension by around 60 percent to our lean igus® factory in Cologne is now finished and been put into operation. We supply 80,000 products from stock in 24 hours or on the same day, from a quantity of one and without minimum quantity surcharges.
Excerpt of architect’s briefing...

“In October 1988, igus® acquired a plot sized about 40,000 m² in the Porz-Lind district of Cologne. This will be the future site of development, production, sales, administration and planning. As the centre of all activities, this location will serve as the new igus® headquarters. igus® has made preparations for fast growth, fast change and flexible response in all areas...

Offering the necessary facilities and technology, the new “igus® premises” will also be designed to promote staff performance. The interior and exterior will be designed to reflect the enterprise’s products and key philosophy: innovation - service - reliability, the customer being comparable to a solar system’s centre orbited by all igus® staff and igus® entities dedicated toward solving the customer’s problems.”
How to use the catalog
Calculation aid - important details for configuring and calculating e-chain® length as well as installation space.

Available bending radii $R$
- $H =$ Nominal clearance height,
- $D =$ Over length e-chain® radius in final position,
- $K =$ Add-on for bending radius.

Unsupported length - diagram for the selected e-chain®

Chapter color - every e-chain® Series has a distinct chapter color permitting faster browsing.
QuickLink - igus®
e-chains® on the Internet!

Go online and make use of all advantages at www.igus.eu or every product in this catalog, there is a special QuickLink or direct online pointer to further useful details, data and facts. These include:

- Application videos and pictures
- Assembly instructions
- 3D-CAD files
- DXF data
- Comparisons and selection aids
- Online configuration tools
- Online wizard for calculations of service life
- PDF-data and other formats for download:
  - ePlan-Download
  - Personal support
- Catalog, CD and sample ordering forms

Example:

www.igus.eu/en/2400

Create your complete e-chain® with cables. A complete e-chain system® at few mouse clicks

www.igus.de/en/konfigurator
“Search” -
e-chain® product finder
Find the right e-chain® quickly and easily by entering known application data and other parameters.

“Generate 3D file”
e-chain® CAD library
Download and save CAD data free of charge without having to register. Data on all products are updated and extended on a regular basis - nearly 30 3-D and 2-D formats are available.

“Calculate chain length”
e-chain® length calculation.
Calculate the e-chain® length and see all installation heights.

“Configure” e-chain® interior separator configuration
Quickly and easily determine interior separation for the selected e-chain® via Drag & Drop. The configuration can be transferred automatically to your part list. More details page 24

Take a tour www.igus-CAD.com
igus® online configurator for interior separation-
www.igus.eu/iaconfigurator

Change of the e-chain® width directly in the configurator - Cable overview for better handling

igus® online configurator for interior separation!
Quickly and accurate to the right e-chain® and chainflex® cable combination
With the interior shelving configurator you design the complete filling
of an e-chain® easily and quickly and generate a 3D-CAD-file with one click.
● Interior shelving configuration now with logical check of min. bending radius
● No manual calculation and crosscheck of the chainflex® cable diameter and e-chain® cross
   section necessary
● Now with cable overview for better handling
● Changing of the e-chain® width - now possible also in the inner shelving configurator
● Download e-chain® partlist with interior shelving and cables in Excel format

www.igus.eu/iaconfigurator
Quick & Easy - QuickPin 2.0 -
Pin-Out Configurator -
www.igus.eu/quickpin

QuickPin 2.0 -
connector-cable configurator -
directly integrated in ePLAN P8

In only 3 minutes you choose out of more than 950 chainflex® cables and 3,000 connector components, configure cables online, order directly and generate an ePLAN electric P8 macro.

- Create a new configuration directly from ePLAN
- Opening of existing configuration
- Verification of cable configuration
- Acquisition of existing configuration via the download manager for cable macros
- Available in ePLAN P8
- Quick and easy configuration and ordering of chainflex® cables and connectors. Per mouse click and drag & drop
- Circular plug-in connector, squared plug-in connectors, sensor connector M8/M12, D-Sub and free cable ending possible
- Just a click to transfer the configurated cable to the shopping basket and inquire, order or memorize for a later order
- Possibility to recall inquired cables from order history for new inquiries
- Online pricing, including copper charge
- Save design work: free of charge delivery of ePLAN electric P8 macro of the configurated cable
- Harnessing from one source - 100 % tested
- Details of your personal contact person available on the spot
- No installation required
- Many languages available
- Individual connector specification or components by manufacturers part numbers available

Find a video online
www.igus.eu/quickpin-demo
Now available: QuickCAD offline version

NEW in this catalog

QuickCAD offline version

For all situations with limited internet access QuickCad is now also available as an offline version.

- Generation of 3D CAD models in 32 file formats
- CAD direct insertion driver for faster data transfer to various CAD systems (e.g. AutoCad, Inventor, Solidworks, CATIA, etc.)
- Quick and easy creation of 2D derivatives
- Integrated 2D and 3D CAD viewer
- Generation of 3D PDF datasheets
- 2D and 3D CAD files can be directly integrated in PDF files
- Available in 16 languages
- Runs without installation

Of course, as ever before, all CAD data are available to you without registration at:

www.igus-cad.com for quick downloading

www.igus.eu/quickcad-download
igus® applications.
Many interesting applications with igus® e-chainsystems® from next page

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Applications: long strokes

Solutions with igus® e-chainsystems®
igus® e-chainsystems® guide and protect moving cables and hoses on automated equipment. They can be used in a wide variety of applications; some examples following. More exciting examples
www.igus.de/en/EKPraxis

Find a video online
www.vector-award.eu

The worldwide longest e-chain® travel of 615 m with igus® rol e-chains® and chainflex® cables in a power plant
System E6, side mounted, in high-speed camera positioning system - high speeds and less vibrations

Long travel length with the super-alu-trough in a cold store

Igus® steel guide trough used in a shelf conveyor application, series 350 and chainflex® cables

Igus® steel guide trough used in a long travel robotics application

e-chain® Series 4040RHD rol e-chain® in an igus® super-alu-trough = up to 75% less driving power

Travel up to 195 m with the igus® System E4, safe guided in an igus® steel trough
Applications: machine tools
Series E4-42 in a machine tool, completely assembled with igus® chainflex® cables.

readychain® with combined motions on tooling machines. Turnkey delivered with special parts for your machines.

E2/000 dirt resistant e-chain®, which saves installation space - here machine tool for workpieces.

Machine tool gantry with various E4 e-chains® - fast movements and high cycle counts.

E4 e-chain® was used here in curved sections with a 45 m travel distance.

Short travel lengths and high accelerations with Series E2 mini.
OpenHydro tidal turbine generates electric power through the inflow and outflow of water at low and high tide. Serie 4040 protects the deployed chainflex® cables during the lifting and lowering movements of the turbine and also protects them against aggressive ambient conditions. The travel distance amounts to approx. 20 meters in a vertical direction above and under water with the robust e-chain® guided in a steel trough. The vertical travel is transformed into a horizontal stroke by turning through 90 degrees.

Applications: cranes & offshore
Seawater resistant super-alu-trough in a RTG-crane. Long travel with the E4/4 system.

Stable guidance without oscillation. Long travel with 32 m, crane operating speed 80 m/min.

E4 as ZigZag version in a crane. The E4-Series guarantee very high availability of the facility.

E4 with extension link at a ship loader for coal unloading. Travel 105 m, speed 240 m/min, load 53 kg/m.

Installation of an E4.1 e-chain® Series 800 in an igus® steel guide trough.

e-chain® at the mast of the shelf conveyor rolls from one aluminum guide trough to the opposite one.
Applications: high speed & smooth running

Long travel and side mounted installation with the vibration-free and low noise Series E6.29 in this camera application
System E6 in a pick and place robot. Handles injection molded CD covers in a split second.

E6 accelerates the work sequences in the case of this application for wafer handling - $a = 4 \text{ m/s}^2$, $v = 6 \text{ m/s}$

igus® Series E3.15 side mounted in a flat-bed scanner.

Igus® System E6 - High acceleration (8 g) and ESD safety.

Nested e-chains® reduce vibrations and improve milling accuracy Series E6.62.

Low-noise low vibrations with E6. Designed to withstand high dynamic loads.
Applications:
circular & 3D-movements

easy triflex® e-chains® for multidimensional movements on a production line
E4 "RBR" - application in a telescope - cold temperatures and snow - failsafe

Laser measuring telescope with triflex® R. Rotary motion in both directions ≤ 310° possible at high speeds ≤ 20 m/s

3-axis robot for loading and unloading functions with Series R48 and 3D e-chain® triflex® R (TRE)

Circular movement with Series E4/4 - safe energy supply on cranes

triflex® R in a magnesium die-casting industry (heat, dirt, oil, metal chips, dust, etc.) - failsafe

E2 mini, Series B15 - The motor spindle has a swivelling range of approx. 210°
Applications: various installation examples

Data gloves with easy chain® Series E03 - Protect the sensors which makes it easier to take off and put on the gloves. Inner height of 5 mm
Two fully harnessed E2/000 e-chains® with high fill weight, side mounted

Unsupported application with harnessed e-chainsystem® E4

E2/000 - high stability in this elevator with a height of 160 m

Series R68 works in an apple-sorting-machine: humidity and dirt

Standing application with System E4 and fixed mounting brackets

Drive simulator. High fill weights (60 kg/m) with E4 System