Modular robot kit

Energy supply for robots made configurable online

The modular igus® robot construction kit offers well over 10,000 different options. We can offer you an optimised solution for almost every robot. With a wide variety of accessories, the triflex® R energy chain system can be adapted to many applications and the most varied movements of your robot.
With our online "Quick Robot" tool, the right configuration for your application can be created in just a few seconds. The configurator gives you a visual representation of the products on the robot and a parts list - try it for yourself ► www.igus.eu/quickrobot

All igus® robotic components are tested in our laboratory and have already been used reliably in many applications for years. Our goal is to ensure that the whole energy supply on your robots is reliable. We do not simply focus on mechanical protection but instead look at the entire application including the cables that have also been especially developed for use on the robot. We will gladly find a solution for your application and look forward to receiving your enquiry.

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We are always happy to visit you on site and show you the advantages of the modular igus® robot kit. Contact us at ► www.igus.eu/robot

triflex® R sample boxes - full of information and samples specific to the robotics industry.

Quality from the igus® laboratory

Tested thousands of times. Proven millions of times.

Applications involving high duty cycles, speeds and accelerations or demanding environmental conditions require proven systems especially for e-chains®, cables, polymer bearings and linear systems. igus® constantly conducts tests at its own laboratory under real-world conditions. Every year, we conduct more than 4,100 tests on e-chains® and cables, and over 12,000 tests on plain bearings. These tests focus on push/pull forces, coefficient of friction and wear rates. Other factors like speed, load, dirt, weathering, cold and impact are also tested. Our laboratory is also at your disposal. If we don't have data for your type of application, we can conduct a test representative of your requirements.

More information ► www.igus.eu/test

igus® system warranty - every application is different. igus® warranty certificates can be issued for your individual application. Ask for the igus® warranty: "chain, cable, guarantee"

All products are tested and available from a single source. Examples of test certificates and quality seals for igus® products ... more upon request

Electronic checking and archiving for every e-chain® production batch

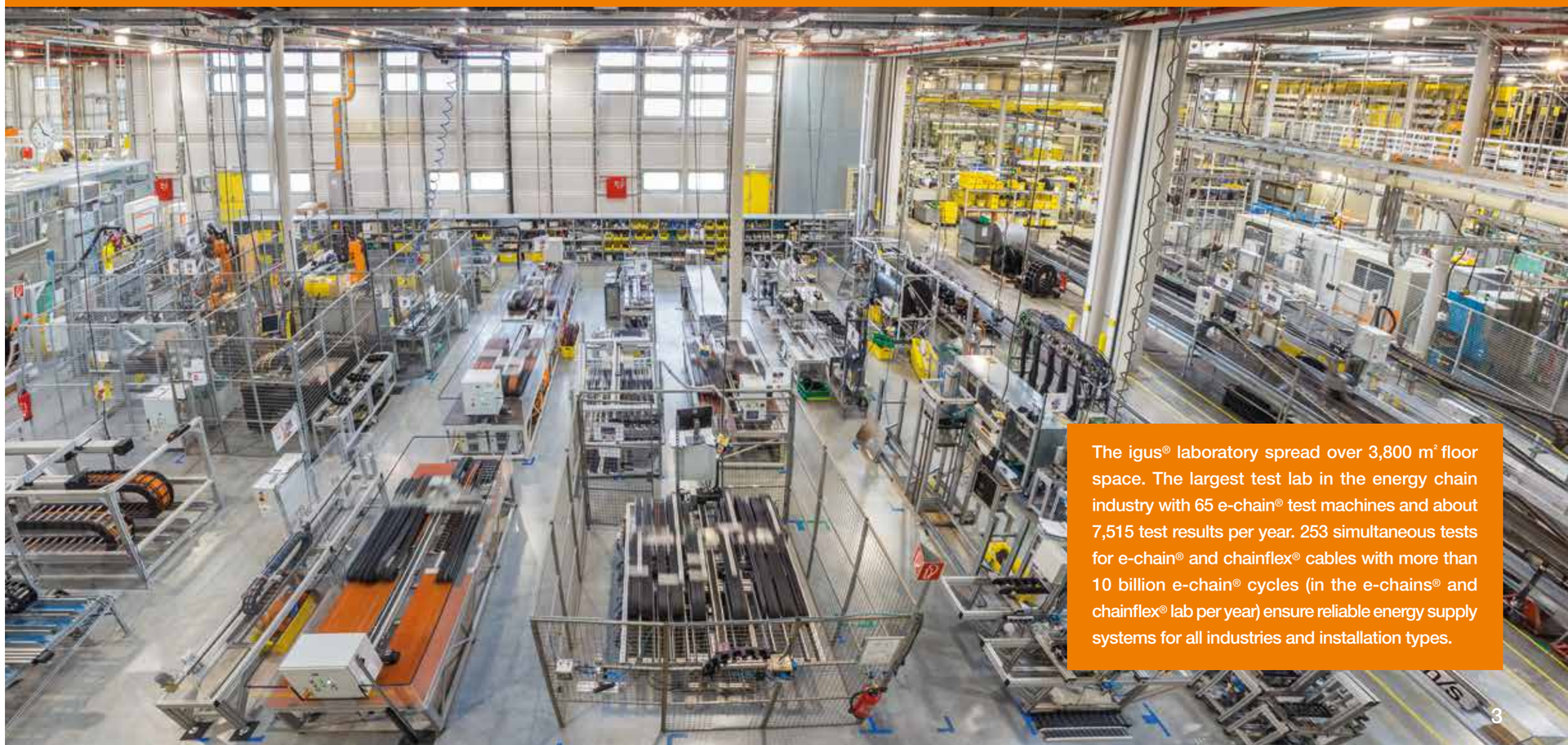
Noise level test inside an igus® acoustic cell

igus® dynamic bending test

Long-term wear and service life test

Speeds up to 10m/s, acceleration up to 200m/s² are tested by igus®

Long travel test facility - 125m travel length, speed 300m/min



The igus® laboratory spread over 3,800 m² floor space. The largest test lab in the energy chain industry with 65 e-chain® test machines and about 7,515 test results per year. 253 simultaneous tests for e-chain® and chainflex® cables with more than 10 billion e-chain® cycles (in the e-chains® and chainflex® lab per year) ensure reliable energy supply systems for all industries and installation types.

Worldwide, quick and reliable.

The igus® service

Delivery and consultation daily from 7am to 8pm, Saturday from 8am to 12pm!

Innovation and service are the focus of our corporate philosophy. We have put together an extensive package of services for you: no minimum order quantity, speedy delivery from 24hrs, more than 100,000 products from stock. Order an iglidur® plain bearing or a harnessed standard portal from stock in 24 hours at no extra cost. Rapid delivery worldwide guaranteed. Spare parts are delivered from stock in the shortest possible time.

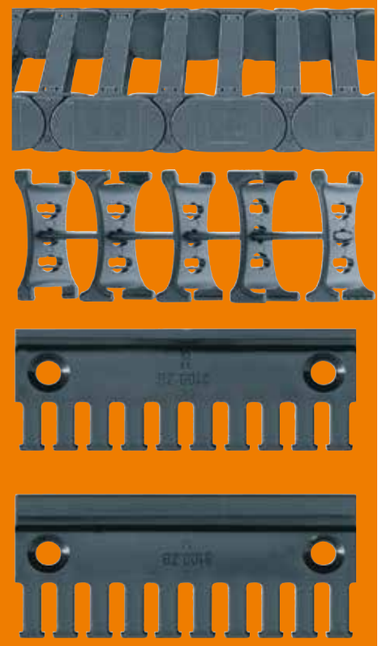
Take advantage of further service options from igus®:

- **Free samples:** We will be happy to send you free samples for testing in your application. Order here
  ▶ **www.igus.eu/samples**
- The **monthly newsletter** keeps you regularly informed about new igus® solutions. Register here
  ▶ **www.igus.eu/newsletter**

Order at igus®:
no minimum order quantities, no surcharges.

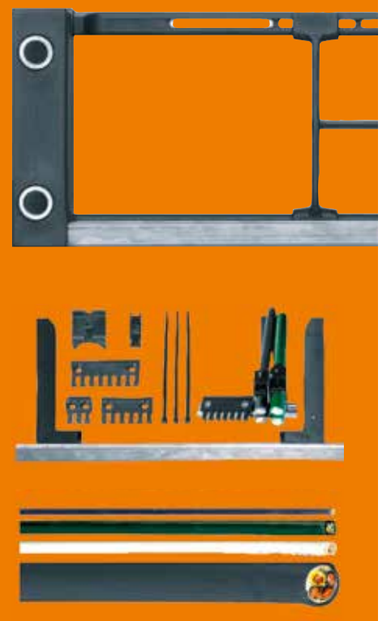
24hrs

igus® individual components - for example: an e-chain® link, 6 m e-chain®, 3 strain relief units, etc.



24-48hrs

Tailored igus® e-chain systems® - for example: 11.46 m igus® e-chain® with interior separation, mounting brackets and strain relief according to your specification. Also with loose accessories: chainflex® cables, guide troughs, mounting brackets and strain relief



3-5 business days

Harnessed igus® e-chain systems® - for example readychain® "Basic": Simple, harnessed igus® e-chain systems® with cables fitted without connectors, labelled and with defined tail lengths to your specification

10 business days

Complex harnessed e-chain systems® - for example readychain® "premium": Harnessed e-chain system® with all kinds of cables as well as connectors, mounting brackets and other components according to your specification

▶ www.igus.eu/myigus

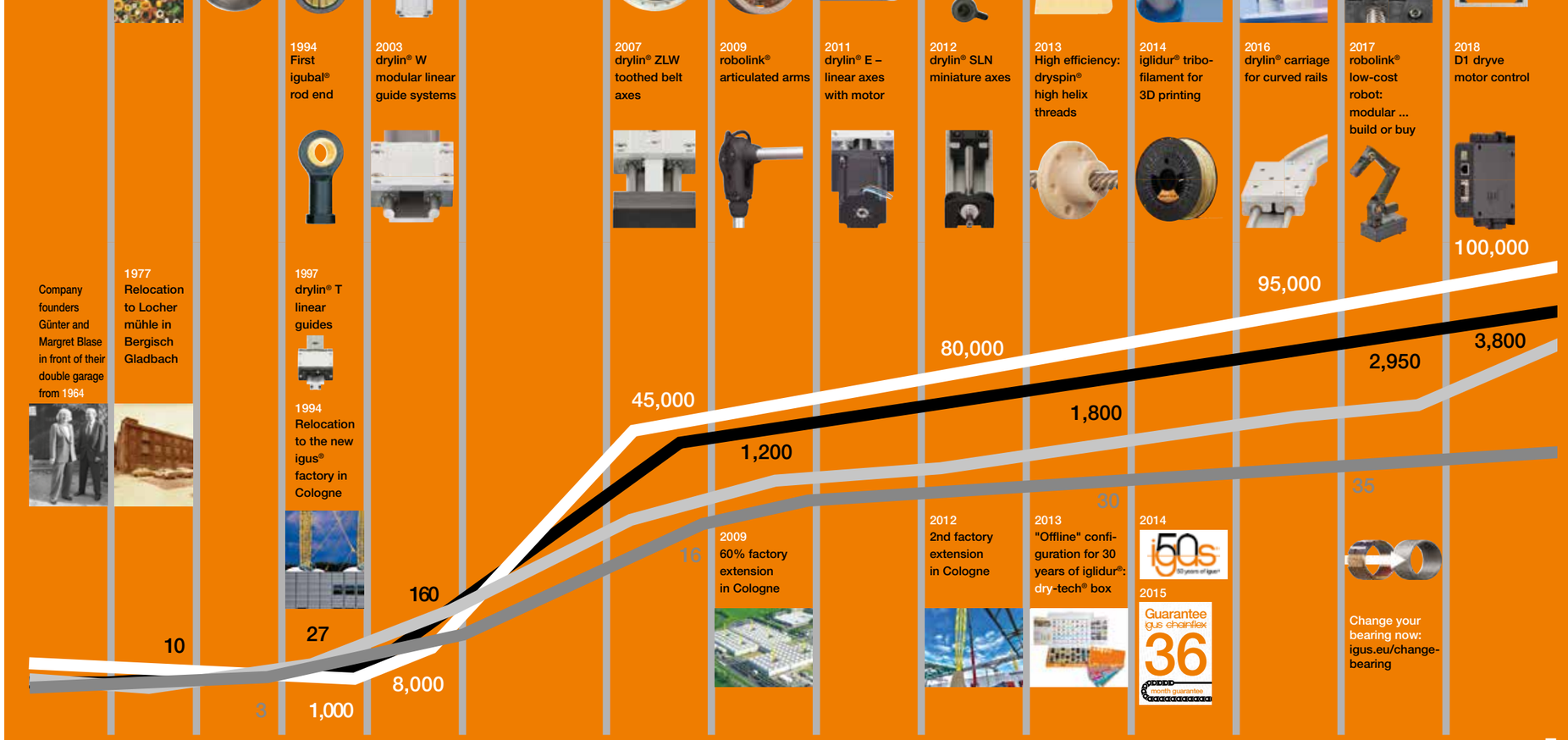
▶ www.igus.eu/newsletter

igus® – close to the customer since 1964

From a garage to the global market with tribopolymers

What began in 1964 with a single injection moulding machine in a garage in Cologne has within half a century become a global enterprise. It all started more than 50 years ago when Günter Blase, who established the company, had an idea about the potential of polymer materials. Just one year after the company was established, an injection moulding machine about the size of a sewing machine was used to make the very first products; in 1983, a lubrication-free and maintenance-free iglidur® plain bearing from large volume production was presented for the first time. Since then, over 50 different catalogue materials have been developed that are used worldwide in countless applications under the "**dry-tech®**" name for bearing technology.

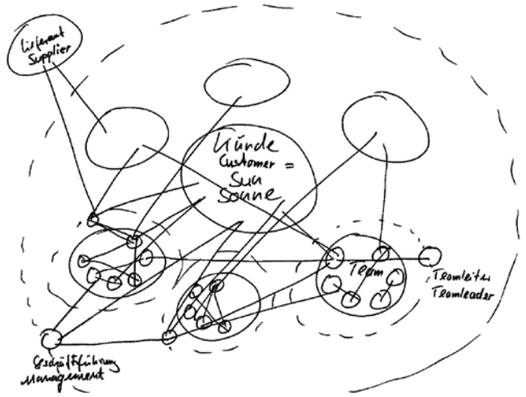
Today, the 3,800 employees come up with new ideas daily, make high-quality products, ensure streamlined processes and delivery times and, above all, stay close to our customers. On average, igus® dispatches around 5,500 consignments per day. In order to ensure speedy and individual delivery, customers receive exactly the product they need for their application from 14 storage and assembly/installation centres worldwide: as a single component or as a complete system, also installed or assembled on site upon request.



The flexible igus® factory

Investments in better technology and faster delivery times

Nearly 200,000 customers worldwide trust "plastics for longer life®" – manufacturing products at low-cost, while also ensuring quality. Plastics are becoming increasingly affordable and technical benefits continue to grow. We have been developing, making and selling our products according to this principle for years. In view of the potential of plastics technology, we offer a wide and varied range of tribo components. Wear resistant parts as catalogue items are on stock, to allow us to complete customer requests within hours and ship.
igus® is continuing its growth trend and is focusing more than ever on sophisticated yet simpler solutions for all applications and budgets.



"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."

Material preparation

Injection moulding

Warehouse

Assembly factory

Toolmaking

Open offices

QuickRobot

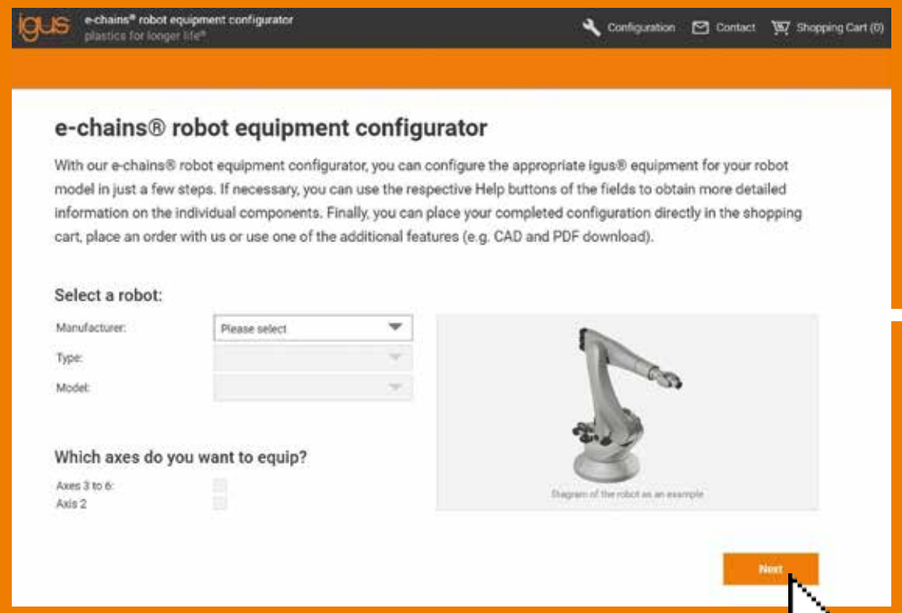
The complete online equipment tool for robot accessories from igus®

Energy supply for robots made configurable online: Around 10,000 different options for component selection for the energy supply on a robot

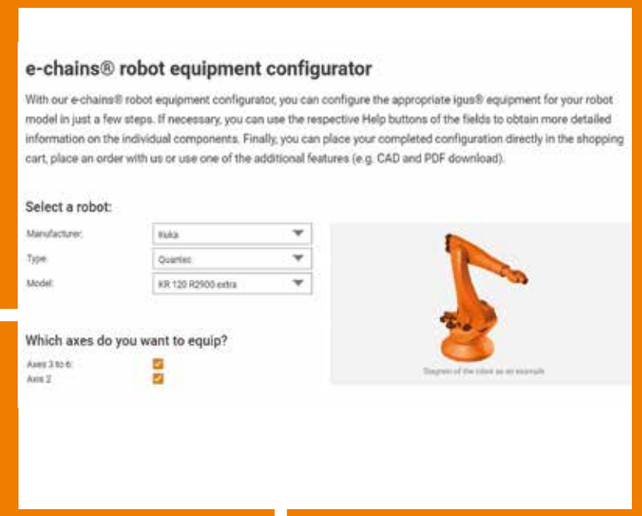
The QuickRobot robot equipment configurator from igus® contains around 10,000 different options for around 400 robot models. Find the right parts in seconds by entering just the robot manufacturer and model. The desired chain size can be selected by diameter.

- You can select your robot model from a variety of well known manufacturers and models
- Output a complete parts list, the total price and the estimated delivery time of your configuration
- Easy transfer to shopping cart, complete configuration or individual parts, no minimum order quantity
- Save, load and reset your individual configuration
- Create PDF report of your configuration
- Also usable on iPad

More information ▶ www.igus.eu/quickrobot

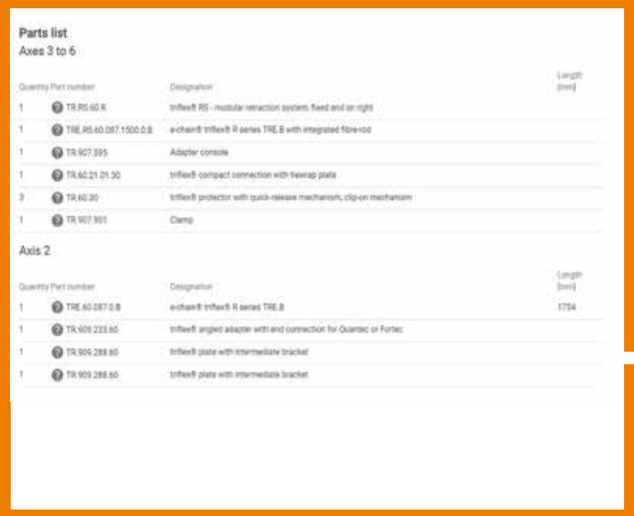


Step 01
The start page
▶ www.igus.eu/quickrobot

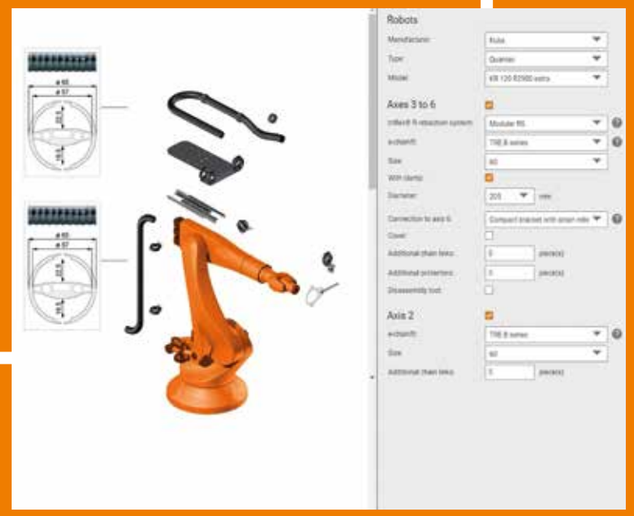


Step 02
Robot manufacturer and model is selected

Step 03
The retraction system is selected



Step 05
Required parts list



Step 04
List of chosen parameters with pictorial representation

Configu-ration examples:

www.igus.eu/quickrobot

Easy-to-use online configuration tool

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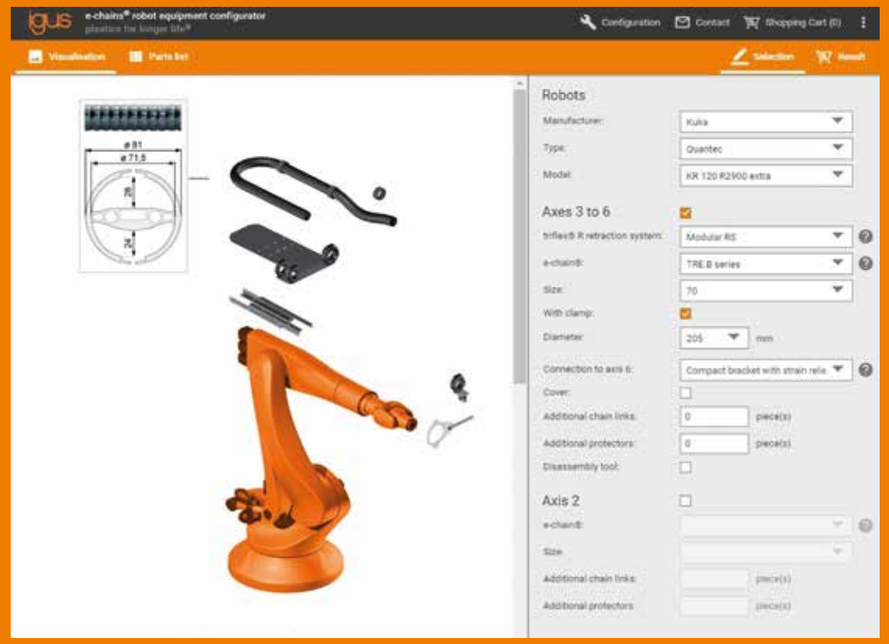
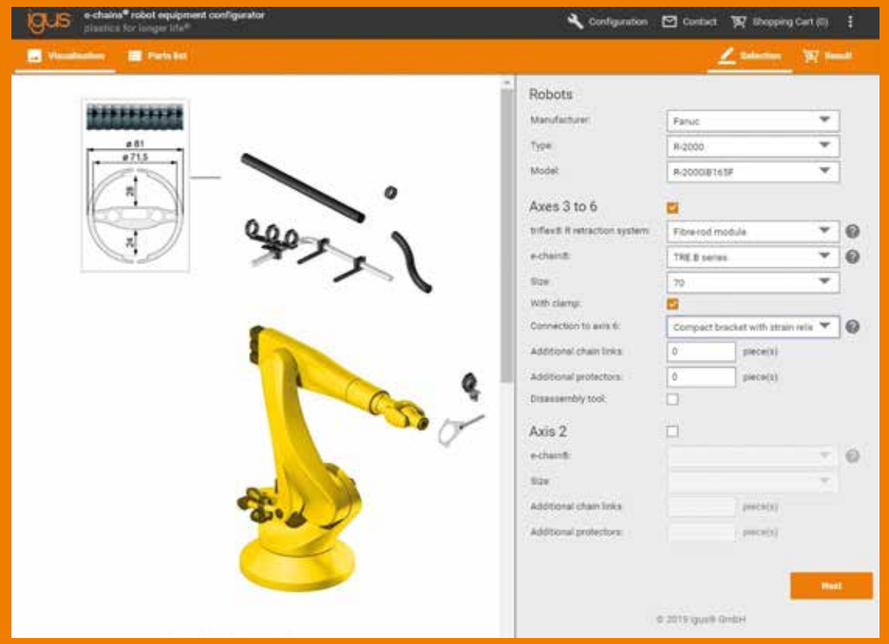
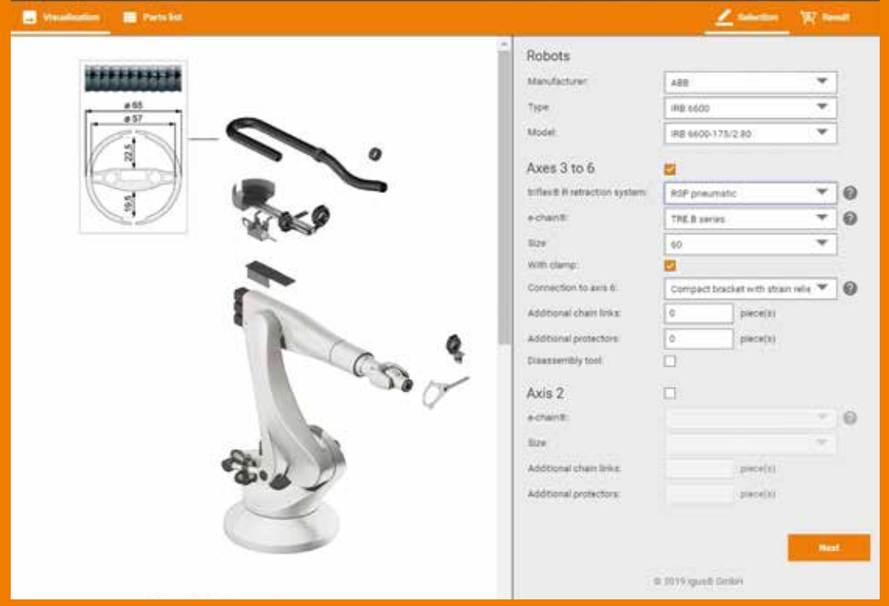


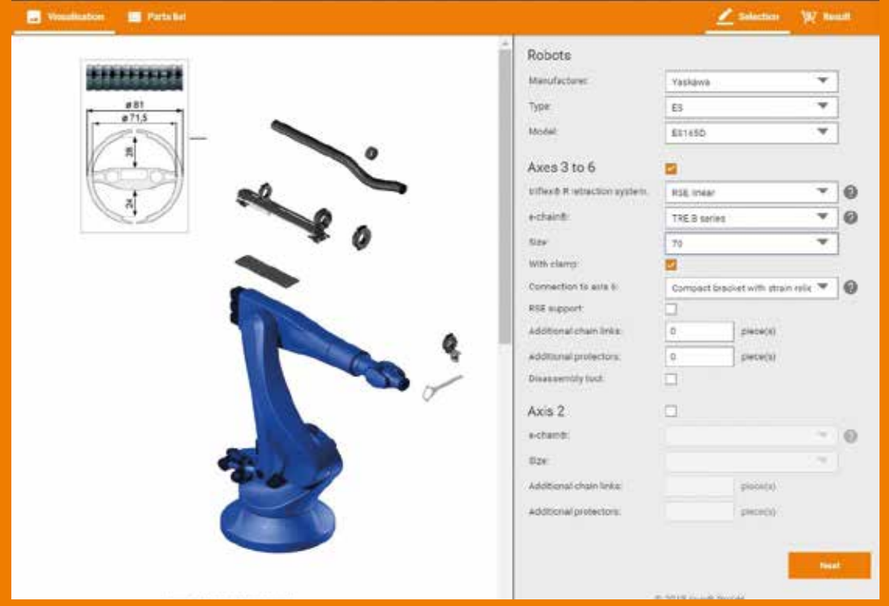
Sample configuration: KUKA KR 120 R2900 extra with RS retraction system, adjustment unit, bracket and connection to axis 6



Sample configuration: FANUC R1000 with fibre-rod module, universal mounting kit, bracket and connection to axis 6

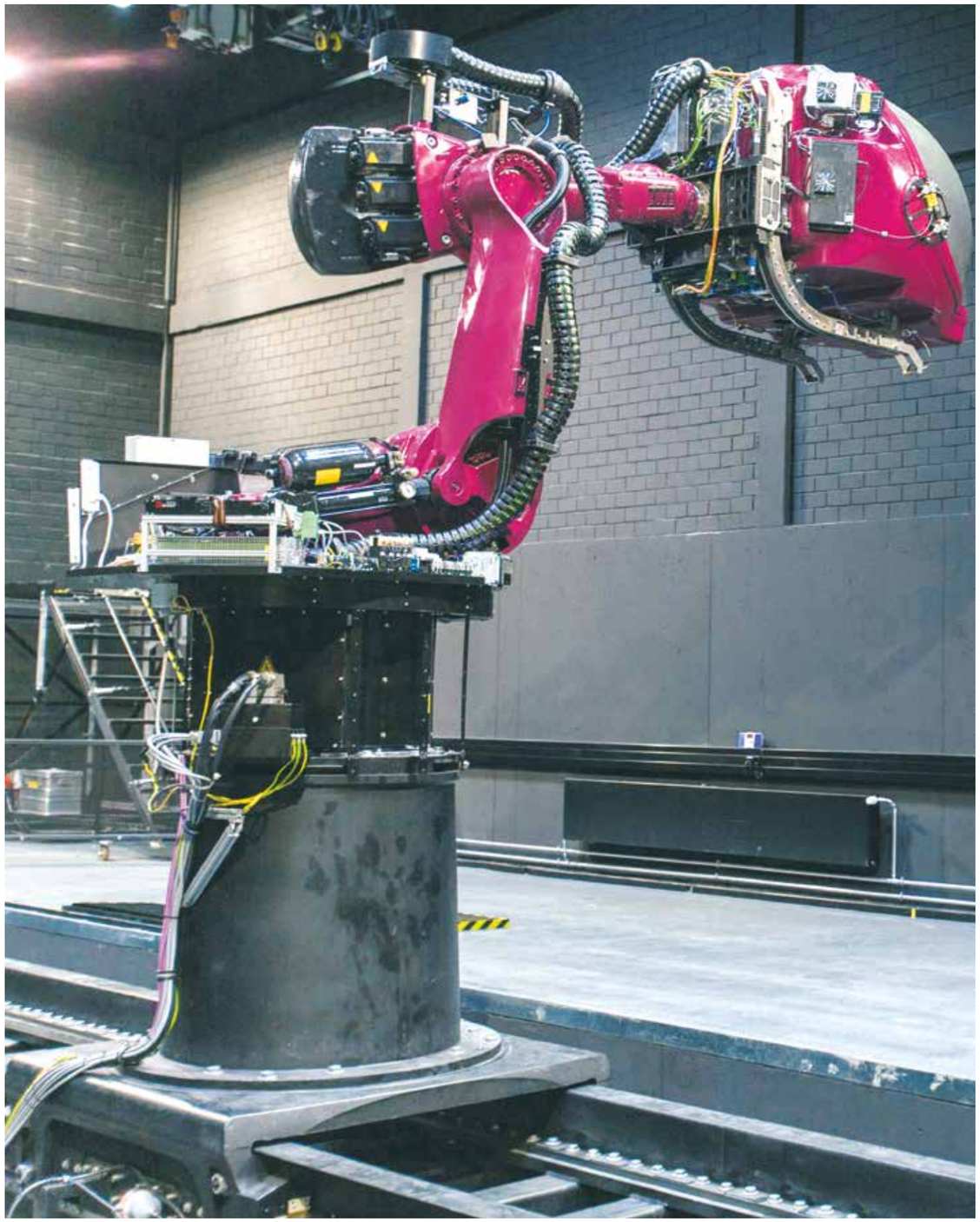


Sample configuration: ABB IRB 6600 - 175/2.80 with RSP retraction system, mounting adapter, bracket and connection to axis 6



Sample configuration: Motoman/Yaskawa ES165 with RSE linear retraction system, mounting adapter, bracket and connection to axis 6

the e-chain
Moving energy made easy - for robots



triflex® R in a motion simulator. Depending on the test, the simulator must perform a cabin rotation of up to 360° and is equipped with additional data and supply cables. A triflex® RSP retraction system is installed here.

Application examples
igus® 3D e-chains®

triflex® R in storage and retrieval system

Flexible production of plastic vehicle tanks. In order to provide the end customer in the automotive industry with maximum flexibility, the production facilities are equipped completely with robots. The igus® RSP systems prevent loop formation of the e-chains® due to the multi-axis movements of the robot.

the e-chain

Moving energy made easy - for robots

Reliable energy supply even outdoors

Application examples

igus® 3D e-chains®

triflex® R installed on a robot arm

Use in harsh, dirty environments

triflex® R at axis 1-6, E4.1 at axis 7 of the robot

Close routing on the robot arm without loop formation

triflex® TRL - lightweight, for quick cable removal

Process security with the igus® installation service

the-chain
Moving energy made easy - for robots

triflex® R e-chains® for multi-axis and linear application with E2 mini e-chain® on the tool unit

Application examples
igus® 3D e-chains®

Rotating energy supply system using *RBR* E4 in a telescope, which is exposed to strong snow and sand.

Laser measuring telescope with triflex® R. Rotary movement in both directions ≤ 310°

An igus® twisterband guides the energy of the 5-axis cutting heat in this wood working machine, safe and cost-effective

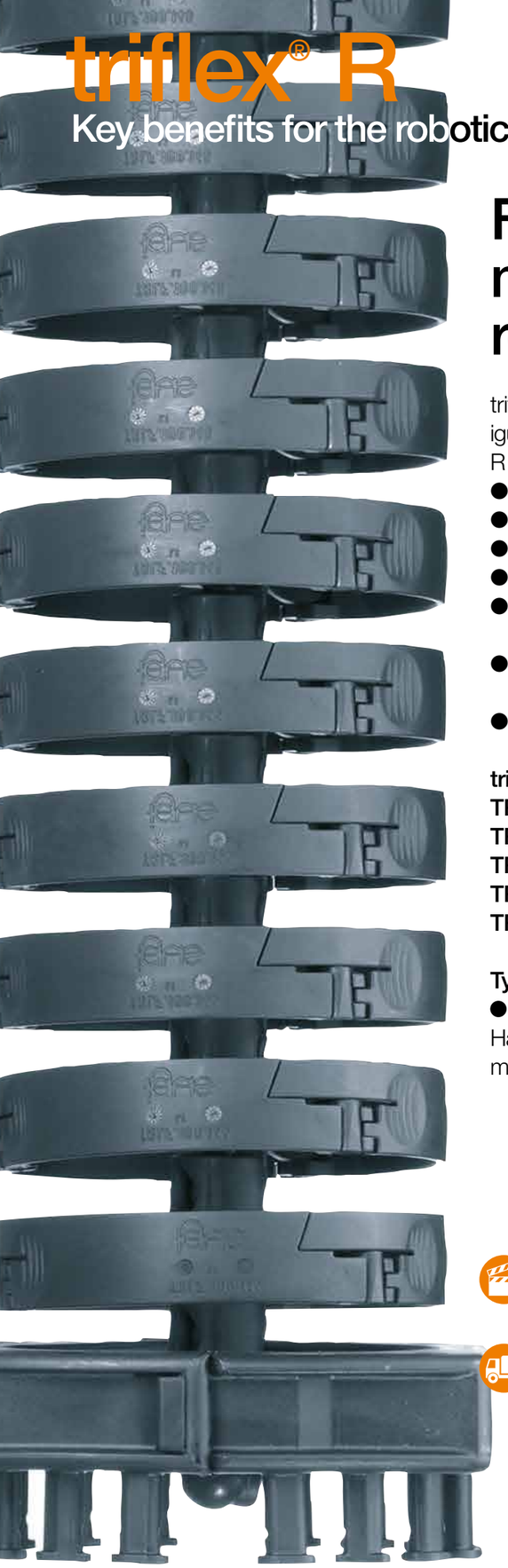
Rotating energy supply E4 *RBR* provides the port crane with energy - rotary movement

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

E2 mini, Series B15 - The motor spindle has a rotation range of approx. 210°

igus® 3D e-chains®

For robots and 3D movements



triflex® R

Key benefits for the robotics industry

For multi-axis movements and robots - triflex® R

triflex® R (R for "round") is the third generation of multi-axis igus® e-chains®. The key design characteristics of igus® triflex® R have made this product very successful in the robot industry.

- Defined torsion stop-dog on each e-chain® link
- Defined minimum bend radius
- High tensile strength ball and socket joint
- Compact retraction system options to prevent loop formation
- Fibre-rod option for partial directional control and reinforcement
- No extra support elements required e.g. steel cables, spring suspensions etc.
- Wide range of accessories

triflex® R available in 5 versions from stock

TRC closed design with smooth and robust exterior
TRE "easy" design, easy to fill from outside
TRCF closed design with snap lock mechanism
TRL very lightweight, with "easy" design
TRLF light version with snap lock mechanism

Typical industries and applications

● The first choice for multi-axis robots ● Machine tools ● Handling machines - 6-axis ● Conveyor systems ● Packaging machines ● General mechanical engineering, etc.

Assembly video available online at
► www.igus.eu/triflexR_assembly

Available from stock. Ready to ship in 24 - 48hrs.*

*The delivery times indicated correspond to the average time until the ordered goods are dispatched.

triflex® R features

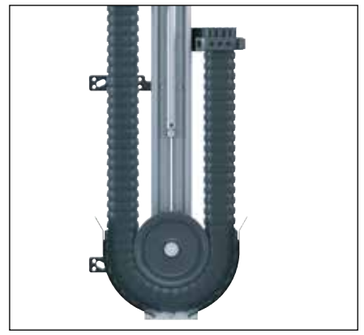
The defined torsion stop ensures an even distribution of the torsional load across the entire length

A tough, bend radius stop-dog actively prevents cables and hoses from kinking

Interior separation: two or three chamber design for reliable cable guidance

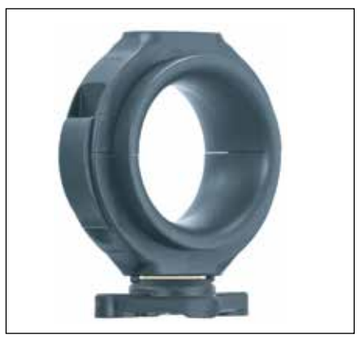
Openable - series TRCF and TRLF have snap lock mechanism for easy filling

Tensile strength is absorbed directly by the e-chain® - no additional supports are necessary

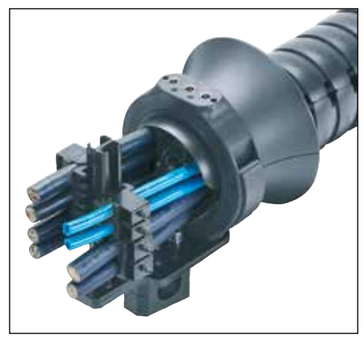


4 retraction system options available to prevent formation of loops in the robot's working area

Standard and light mounting brackets available with or without integrated strain relief. Some versions available in ESD material, from stock



Mounting brackets options with gliding feed-through and swivel bearing. Bearing with a maintenance-free igubal® ball and socket joint



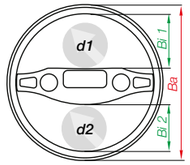
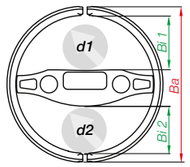
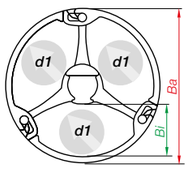
Various heavy duty and compact connections and quick exchange units are available

Serie TRC - electrically conductive ESD e-chains® - several series available from stock

UL94-V2 classification

iF product design award
2004 for igus® series TRC
2007 for igus® series TRL
2013 for igus® series TRLF

Selection table

Series	Inner height Bi1 [mm]	Inner height Bi2 [mm]	Outer height Ba [mm]	Bend radius R [mm]	≤ ø cable d1 [mm]	≤ ø cable d2 [mm]	Pitch [mm]	Links per m	Page
 **Series TRC - closed design** Chip protection, smooth outer contour 									
TRC.30	12	10	34.5	50	10	8	11.3	89	28
TRC.40	15	13	43	58	13	11	13.9	72	28
TRC.50	18.8	16.2	54	80	16.5	14	17.4	58	28
TRC.60	22.5	19.5	65	87	20.5	17.5	20.4	49	28
TRC.70	28	24	81	110	26	22	25.6	39	28
TRC.85	33	28	94.5	135	31	26	30.6	33	28
TRC.100	37.5	32.5	108	145	35.5	30.5	34.5	29	28
TRC.125 [1]	43.3	43.3	135	182	41	41	44.1	23	28
 **Series TRE - "easy" design** Very easy to fill, cables are simply pushed in 									
TRE.30	12	10	34.5	50	10	8	11.3	89	30
TRE.40	15	13	43	58	13	11	13.9	72	30
TRE.50	18.8	16.2	54	80	16.5	14	17.4	58	30
TRE.60	22.5	19.5	65	87	20.5	17.5	20.4	49	30
TRE.70	28	24	81	110	26	22	25.6	39	30
TRE.85	33	28	94.5	135	31	26	30.6	33	30
TRE.100	37.5	32.5	108	145	35.5	30.5	34.5	29	30
TRE.125 [1]	43.3	43.3	135	182	41	41	44.1	23	30
 **Series TRCF - closed design with snap-lock mechanism** Chip protection, smooth outer contour 									
TRCF.65	22.3	–	70.2	100	20	–	23.1	44	32
New TRCF.65 [3]	22.3	–	70.2	200	20	–	23.1	44	32
TRCF.85	30	–	94.5	135	28	–	30.6	33	32
TRCF.85 [3]	30	–	94.5	240	28	–	30.6	33	32
TRCF.100	34.3	–	108	145	32	–	34.5	29	32

1) Max. cable diameter Ø 41mm. Max. cable diameter changes to Ø 36 mm, if lengthening or shortening an already populated triflex® R

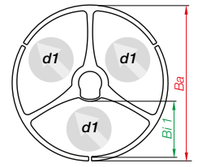
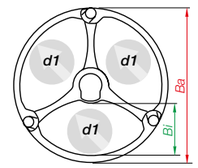
2) TRL 30 with 2-chamber design

3) Special size with increased bend radius and special range of accessories

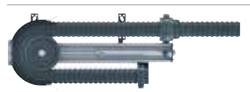
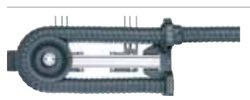
Available from stock. Ready to ship in 24 - 48hrs.*

*The delivery times indicated correspond to the average time until the ordered goods are dispatched.

Selection table

Series	Inner height Bi1 [mm]	Inner height Bi2 [mm]	Outer height Ba [mm]	Bend radius R [mm]	≤ ø cable d1 [mm]	≤ ø cable d2 [mm]	Pitch [mm]	Links per m	Page
 **Series TRL - the "light" version with the "easy"-design** Easy to fill and cost-effective 									
TRL.30 [2]	12.5	11	34.5	50	10	8	11.3	89	34
TRL.40	15	–	45	58	13	–	13.9	72	34
TRL.60	23	–	65	87	20.5	–	20.4	49	34
TRL.70	28	–	81	110	26	–	25.6	39	34
TRL.100	38	–	108	145	35.5	–	34.5	29	34
 **Series TRLF - light version with snap lock mechanism** Lightweight and cost-effective 									
TRLF.65	24.4	–	70.2	100	22	–	23.1	44	36
TRLF.85	32.8	–	94.5	135	30	–	30.6	33	36
TRLF.100	37.5	–	108	145	35.5	–	34.4	29	36
TRLF.125	46.8	–	135	182	44.5	–	44.1	23	36

triflex® R retraction system | Overview

Series triflex® R	System triflex® R	For triflex® R e-chains®	For ø Index [mm]	Page
	**RS** modular retraction system	TRC·TRE	40 - 100	66
	**RSP** pneumatic retraction system	TRC·TRE·TRCF	60 - 125	74
	**RSE** cost-effective retraction system with deflection	TRC·TRE	40 - 50	82
	**RSE linear** space-saving retraction system	TRC·TRE·TRCF	40 - 100	90
 New	**RSEL** cost-effective linear retraction system	TRC·TRE·TRCF	70 - 85	100

Technical data

Technical data

Speed / acceleration	upon request
Material - permitted temperature °C, igumid G (TRLF/TRCF)	**-40°C / +120°C**
Material - permitted temperature °C, igumid NB (TRC/TRE/TRL)	**-40°C / +80°C**
Flammability class, igumid G (TRLF/TRCF)	**VDE 0304 IIC UL94-HB**
Flammability class, igumid NB (TRC/TRE/TRL)	**VDE 0304 IIC UL94-V2**

Reduce installation times with easy-to-use disassembly tools

Easy-to-use disassembly tools for triflex® TRE (B version) and TRCF. Easy disassembly at any point along the e-chain®, even when full.

More information

▶ www.igus.eu/triflex_B_disassemblytool

Assembly video available online at
▶ www.igus.eu/triflexR_assembly

For series TRE.B	Part No. disassembly tool
TRE.40.B	MAT0050175
TRE.50.B	MAT0051190
TRE.60.B / TRE.70.B	MAT0051135
TRE.85.B	MAT0050170
TRE.100.B	MAT0050172

For series TRE.B	Part No. disassembly tool
TRCF.65	MAT0051135
TRCF.85	MAT0050170
TRCF.100	MAT0050172

Applications

igus® triflex® R TRLF - light version, easily openable by hand or with a screwdriver

igus® triflex® R TRCF - closed version, openable with a screwdriver

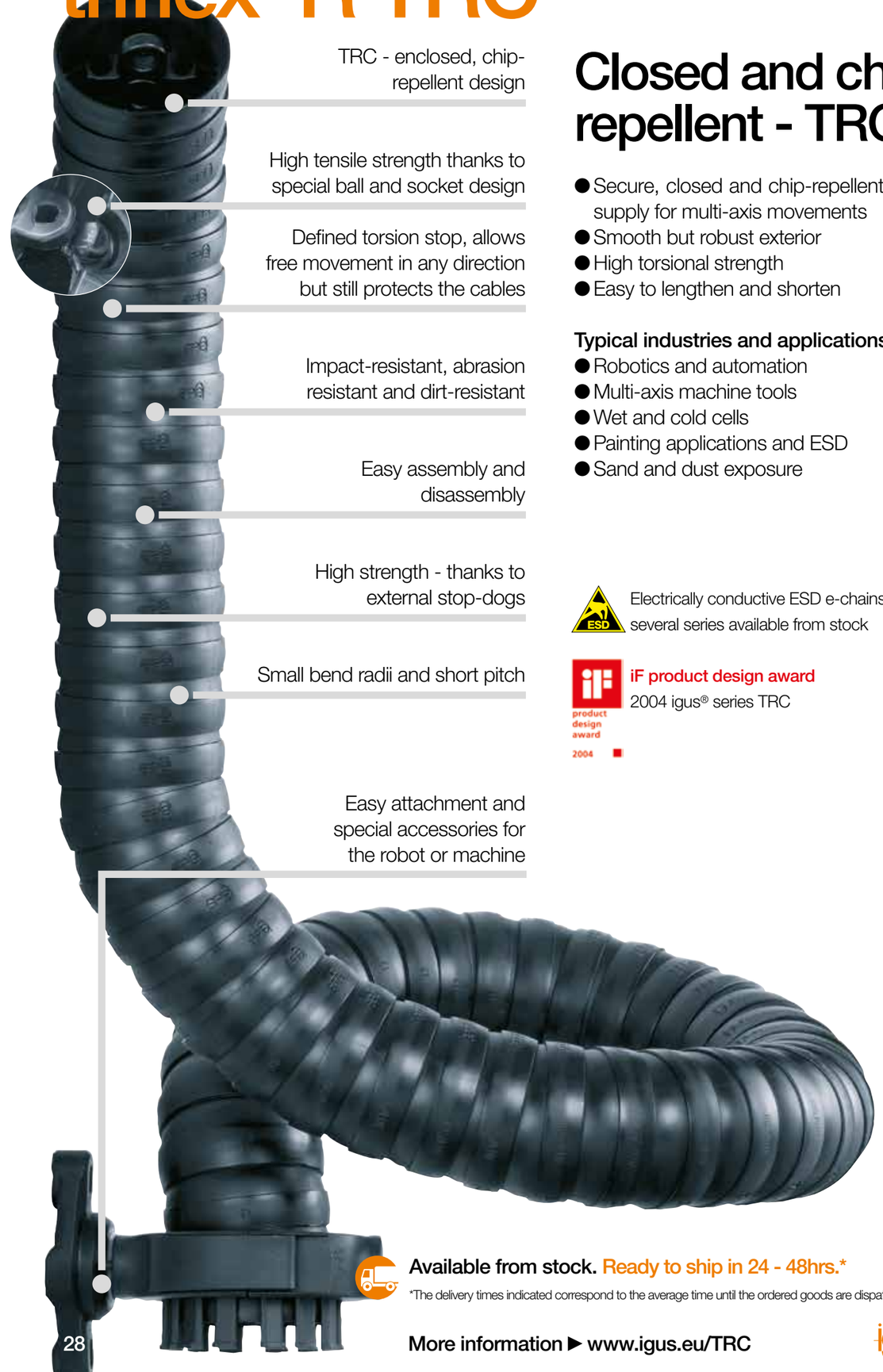
triflex® RS for a low profile retraction system. Integrated fibre rods generate the directed pretension so that loops do not form in the working area

Pneumatic retraction system triflex® RSP - prevents loop formation on the robot

triflex® TR.RSE.40.L or R, cost-effective and lightweight retraction system with guide roller, for small robots

TR.RSE linear retraction system for triflex® R, sizes 40-125

triflex® R TRC



TRC - enclosed, chip-repellent design

High tensile strength thanks to special ball and socket design

Defined torsion stop, allows free movement in any direction but still protects the cables

Impact-resistant, abrasion resistant and dirt-resistant

Easy assembly and disassembly

High strength - thanks to external stop-dogs

Small bend radii and short pitch

Easy attachment and special accessories for the robot or machine

Closed and chip-repellent - TRC

- Secure, closed and chip-repellent energy supply for multi-axis movements
- Smooth but robust exterior
- High torsional strength
- Easy to lengthen and shorten

Typical industries and applications

- Robotics and automation
- Multi-axis machine tools
- Wet and cold cells
- Painting applications and ESD
- Sand and dust exposure

Electrically conductive ESD e-chains® - several series available from stock

iF product design award
2004 igus® series TRC

Available from stock. Ready to ship in 24 - 48hrs.*

*The delivery times indicated correspond to the average time until the ordered goods are dispatched.

More information ▶ www.igus.eu/TRC

Product range

Robotic applications, closed, chip-repellent

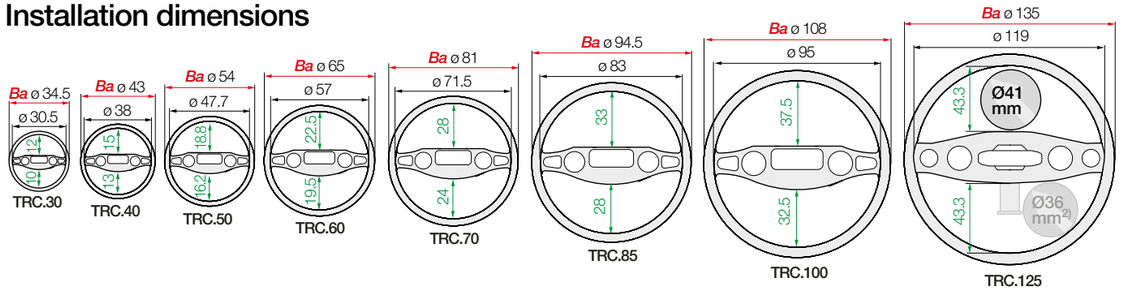
e-tubes | Series TRC | Totally enclosed, non-openable

Part No. e-tubes	Bi1 [mm]	Bi2 [mm]	Ba [mm]	R [mm]	d1 [mm]	d2 [mm]	Pitch [mm]	Links per m	Weight [kg/m]
TRC. 30. 050 .0	12	10	34.5	050	10	8	11.3	89	≈ 0.27
TRC. 40. 058 .0[1]	15	13	43	058	13	11	13.9	72	≈ 0.37
TRC. 50. 080 .0	18.8	16.2	54	080	16.5	14	17.4	58	≈ 0.59
TRC. 60. 087 .0[1]	22.5	19.5	65	087	20.5	17.5	20.4	49	≈ 0.85
TRC. 70. 110 .0[1]	28	24	81	110	26	22	25.6	39	≈ 1.32
TRC. 85. 135 .0	33	28	94.5	135	31	26	30.6	33	≈ 1.75
TRC. 100.145 .0	37.5	32.5	108	145	35.5	30.5	34.5	29	≈ 2.38
TRC. 125.182 .0	43.3	43.3	135	182	41	41 [2]	44.1	23	≈ 4.70

1) Available as ESD version from stock

2) TRE 125 max. cable diameter Ø 41mm. Max. cable diameter changes to Ø 36mm when an already populated e-chain® needs to be shortened or lengthened

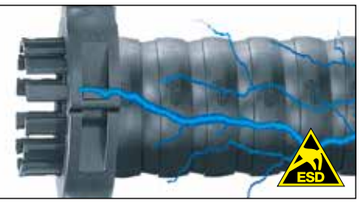
Installation dimensions



ESD - Available in many sizes from stock

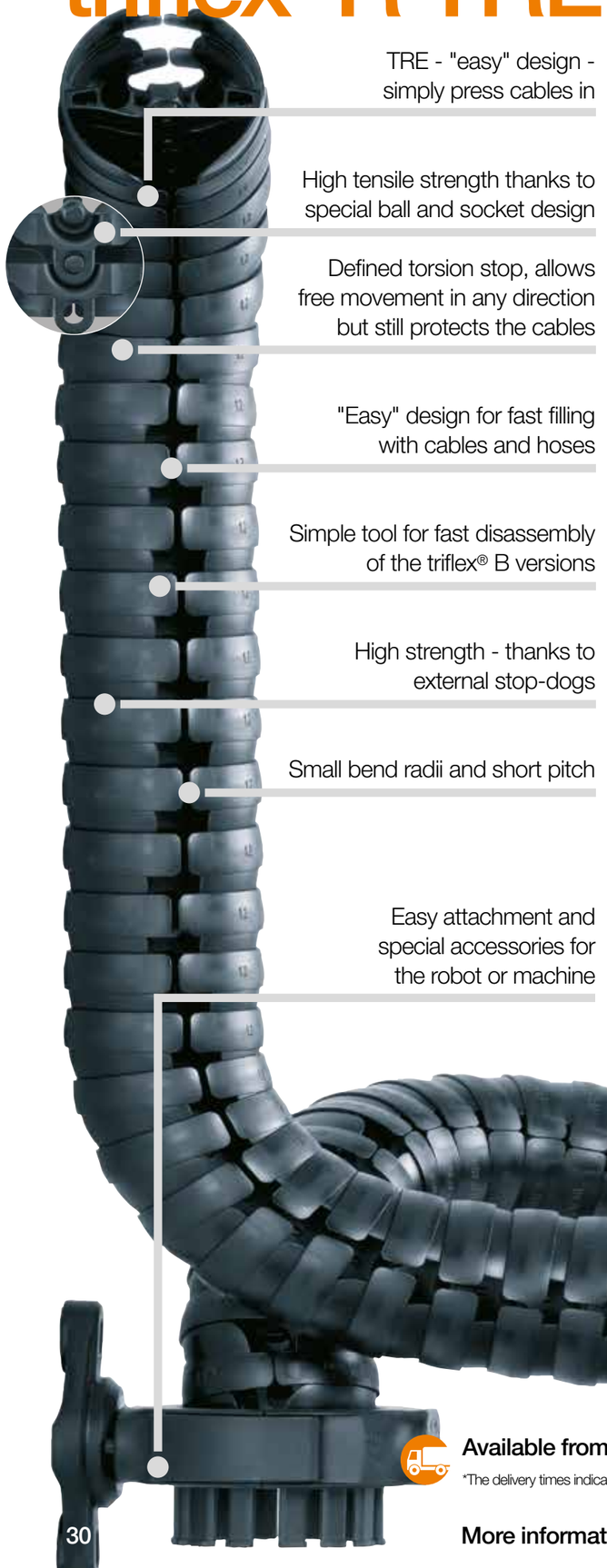
- Standardised product made from igumid ESD
- ESD material tested with over 10 million cycles for the toughest requirements
- Short delivery times including mounting brackets and interior separation; 24hrs, from stock

More information ▶ www.igus.eu/esd



igus 3D CAD, configurators, service life calculation and more ▶ www.igus.eu/triflexR

triflex® R TRE



TRE - "easy" design - simply press cables in

High tensile strength thanks to special ball and socket design

Defined torsion stop, allows free movement in any direction but still protects the cables

"Easy" design for fast filling with cables and hoses

Simple tool for fast disassembly of the triflex® B versions

High strength - thanks to external stop-dogs

Small bend radii and short pitch

Easy attachment and special accessories for the robot or machine

Easy to fill - simply press cables in - TRE

- Easy to fill energy supply for multi-axis movements
- High torsional strength
- Easy to shorten and lengthen.
- **B version** - 4x increase in radial stability, allows larger torsion forces
- **C version and TRE.125** - fast assembly due to pin connection and spherical igubal® joint allowing 50% higher tensile forces

Typical industries and applications

- Robotics and automation
- Spot welding and pick and place applications
- When fast cable replacement is required

Electrically conductive ESD e-chains® upon request

Save time - easy disassembly tool available for triflex® R

TRE - very easy to fill, cables are simply pushed in

Available from stock. Ready to ship in 24 - 48hrs.*

*The delivery times indicated correspond to the average time until the ordered goods are dispatched.

More information ▶ www.igus.eu/TRE

Product range

Robotic applications, easy filling

e-chains® | Series TRE | "easy" design - simply press cables in

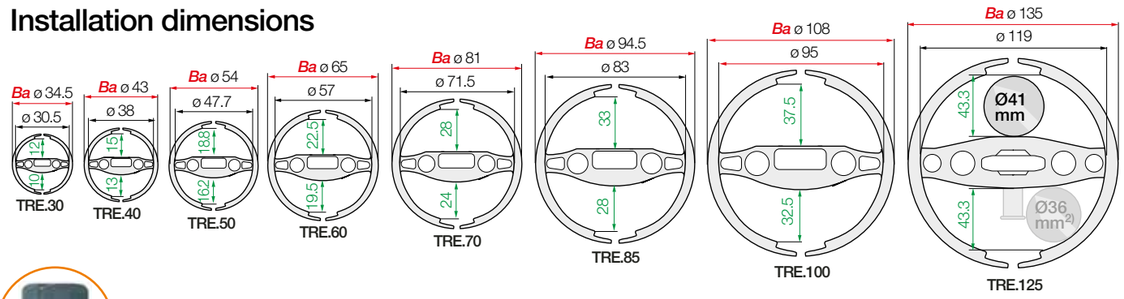
Part No. e-chains®	Bi1 [mm]	Bi2 [mm]	Ba [mm]	R [mm]	d1 [mm]	d2 [mm]	Pitch [mm]	Links per m	Weight [kg/m]
TRE.30.050.0	12	10	34.5	050	10	8	11.3	89	≈ 0.26
TRE.40.058.0.B	15	13	43	058	13	11	13.9	72	≈ 0.36
TRE.50.080.0.B	18.8	16.2	54	080	16.5	14	17.4	58	≈ 0.56
TRE.60.087.0.B	22.5	19.5	65	087	20.5	17.5	20.4	49	≈ 0.83
TRE.70.110.0.B	28	24	81	110	26	22	25.6	39	≈ 1.30
TRE.85.135.0.B	33	28	94.5	135	31	26	30.6	33	≈ 1.67
TRE.100.145.0.B / C 1)	37.5	32.5	108	145	35.5	30.5	34.5	29	≈ 2.35
TRE.125.182.0	43.3	43.3	135	182	41	41 2)	44.1	23	≈ 4.40

B-Series = 4-x higher torsion forces C-Series = quick assembly, 50% higher forces

1) Available as C-Version Part No. TRE.100.145.0.C

2) TRE 125: max. cable diameter Ø 41mm. Max. cable diameter changes to Ø 36mm when an already populated e-chain® needs to be shortened or lengthened TRE.LOCK

Installation dimensions



TRE.LOCK clips

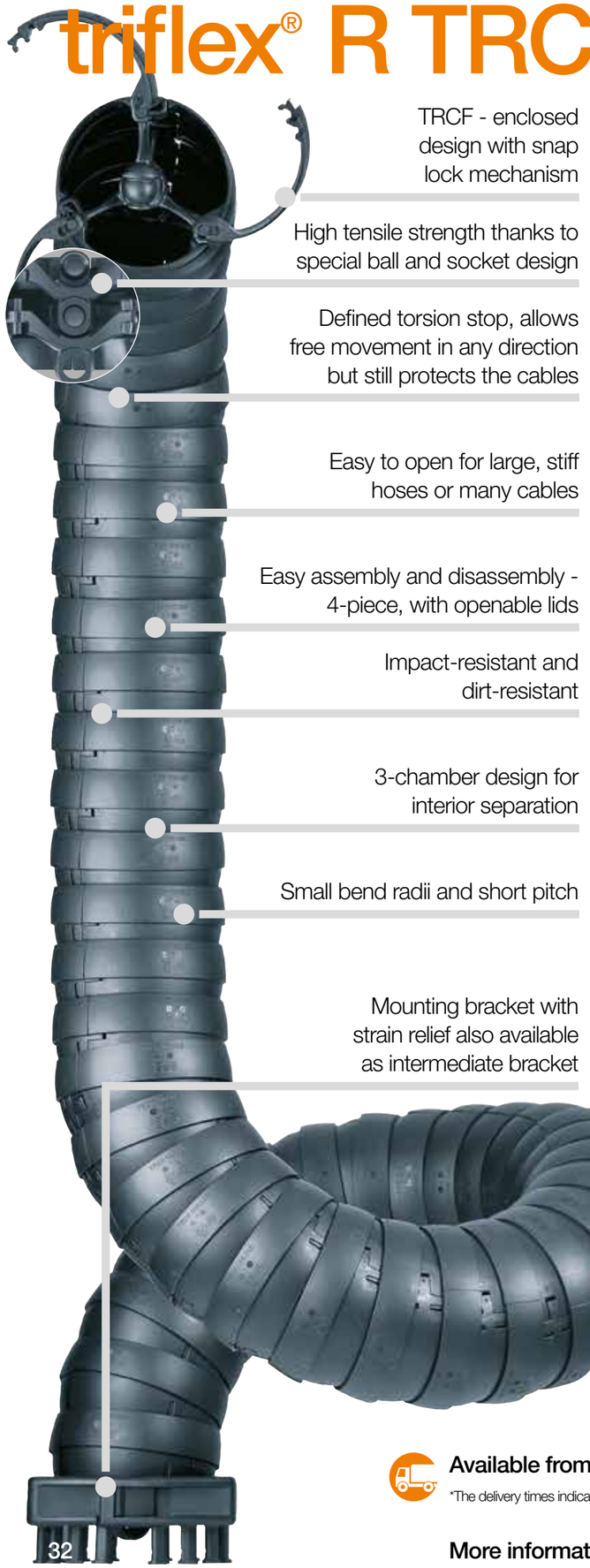
Clips for a secure fit in the mounting bracket. Supplied with every mounting bracket. Please use the Part No. on the right for reordering individual parts

Part No. as an individual part	Size [mm]
TRE.30/40.LOCK	30/40
TRE.50/60.LOCK	50/60
TRE.70.LOCK	70/85

Part No. as an individual part	Size [mm]
TRE.100.LOCK	100
TRE.125.LOCK	125

3D CAD, configurators, service life calculation and more ▶ www.igus.eu/triflexR

triflex® R TRCF



TRCF - enclosed design with snap lock mechanism

High tensile strength thanks to special ball and socket design

Defined torsion stop, allows free movement in any direction but still protects the cables

Easy to open for large, stiff hoses or many cables

Easy assembly and disassembly - 4-piece, with openable lids

Impact-resistant and dirt-resistant

3-chamber design for interior separation

Small bend radii and short pitch

Mounting bracket with strain relief also available as intermediate bracket

Enclosed design with snap lock mechanism - TRCF

- Snap lock mechanism for fast opening to insert large cables or hoses
- Snap lock mechanism openable with a screwdriver
- Defined minimum bend radius and torsion stop-dog for optimum cable protection
- Enclosed version, for use with dirt and chip exposure
- 3 chamber design for ideal cable distribution and separation
- Easy to lengthen and shorten

Typical industries and applications

- Robotics and automation
- Painting applications
- Large hydraulic hoses
- Screw and rivet feeds
- Tool changer applications
- Robot for laser welding
- Robot for screw and rivet applications

Save time - easy disassembly tool available for triflex® R

Flip open, insert cable, and close snap-lock mechanism - then ready to run!

Available from stock. Ready to ship in 24 - 48hrs.*

*The delivery times indicated correspond to the average time until the ordered goods are dispatched.

More information ▶ www.igus.eu/TRCF

igus

Product range

Closed design, chip-resistant, quick filling

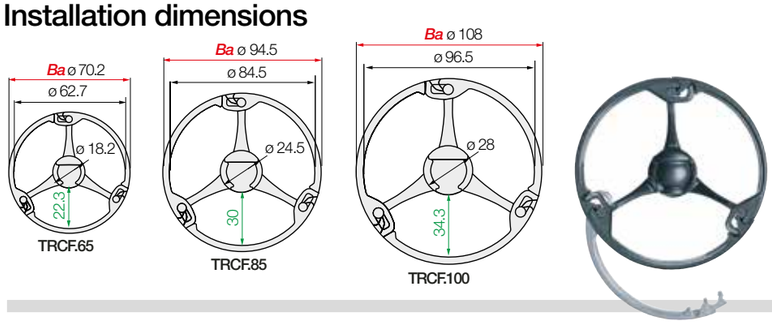
e-tubes | Series TRCF | Fully enclosed design, with snap lock mechanism

Part No. e-tubes	*Bi1* [mm]	*Ba* [mm]	*R* [mm]	*d1* [mm]	Pitch [mm]	Links per m	Weight [kg/m]
TRCF.65.100.0	22.3	70.2	100	20	23.1	44	≈ 1.10
TRCF.65.200.0 1)	22.3	70.2	200	20	23.1	44	≈ 1.10
TRCF.85.135.0	30	94.5	135	28	30.6	33	≈ 2.10
TRCF.85.240.0 2)	30	94.5	240	28	30.6	33	≈ 2.10
TRCF.100.145.0	34.3	108	145	32	34.5	29	≈ 2.70

1) Special size Part No. **TRCF.65.200.0** with 200mm bend radius and a range of accessories

2) Special size Part No. **TRCF.85.240.0** with 240mm bend radius and a range of accessories

Installation dimensions



Snap lock mechanism for fast opening, video online ▶ **www.igus.eu/TRLFlip**

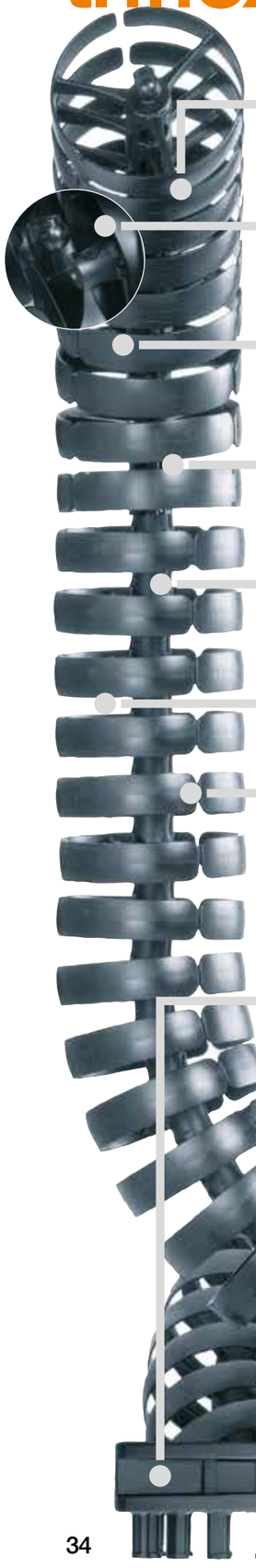
Special sizes with increased bend radius

- The large bend radii 200/240 mm increase the service life of laser light cables and prevent kinking of hoses
- Special range of accessories available
- Special size part number **TRCF.65.200.0** and **TRCF.85.240.0**

More information ▶ www.igus.eu/TRCF

igus **3D CAD, configurators, service life calculation and more ▶ www.igus.eu/triflexR**

triflex® R TRL



TRL - light and cost-effective with "easy" design

High tensile strength thanks to special ball and socket design

Defined torsion stop, allows free movement in any direction but still protects the cables

"Easy" design for fast filling with cables and hoses

Easy assembly and disassembly

Extremely lightweight due to one-piece design

Small bend radii and short pitch

Mounting bracket with strain relief also available as intermediate bracket

Lightweight and cost-effective - TRL

- Very easy to fill
- Multi-axis e-chain® for simple applications
- Easy to lengthen and shorten

Typical industries and applications

- Robot axes 1-3
- Non-robotic applications
- Bundling cables for operator controls
- Filament feeds on 3D printers
- Office applications

iF product design award
2007 igus® Series TRL

Available from stock. Ready to ship in 24 - 48hrs.*

*The delivery times indicated correspond to the average time until the ordered goods are dispatched.

More information ▶ www.igus.eu/TRL

Product range

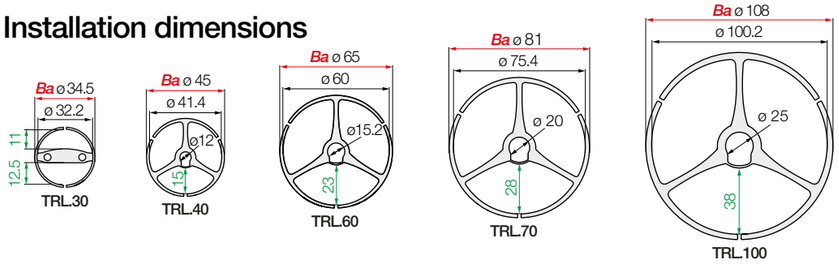
Robotic applications, light and cost-effective

e-chains® | TRL series | Light version with "easy" design - simply press cables in

Part No. e-chains®	Bi1 [mm]	Bi2 [mm]	Ba [mm]	R [mm]	d1 [mm]	d2 [mm]	Pitch [mm]	Links per m	Weight [kg/m]
TRL.30.050.0 1)	12.5	11	34.5	050	10	8	11.3	89	≈ 0.26
TRL.40.058.0	15	–	45	058	13	–	13.9	72	≈ 0.29
TRL.60.087.0	23	–	65	087	20.5	–	20.4	49	≈ 0.49
TRL.70.110.0	28	–	81	110	26	–	25.6	39	≈ 0.82
TRL.100.145.0	38	–	108	145	35.5	–	34.5	29	≈ 1.42

1) Only available with 2-chamber design

Installation dimensions



3D CAD, configurators, service life calculation and more ▶ www.igus.eu/triflexR

triflex® R TRLF

TRLF - light and cost-effective with snap lock mechanism

High tensile strength thanks to special ball and socket design

Defined torsion stop, allows free movement in any direction but still protects the cables

Easy to open for large, stiff hoses or many cables

Easy assembly and disassembly

3-chamber design for interior separation

Small bend radii and short pitch

Lightweight mounting bracket available with strain relief or as intermediate bracket

Lightweight, with snap lock mechanism - TRLF

- Snap lock mechanism for fast opening
- Openable by hand or with a screwdriver
- For large, stiff hoses or many cables
- Economical multi-axis e-chain® for less demanding applications
- Easy to lengthen and shorten

Typical industries and applications

- Painting hoses
- Rivet feeds
- Robot axes 1-3
- Non-robotic applications
- Special machine construction
- High-tech design

iF product design award
2013 igus® series TRLF

Flip open, insert cable, and close snap-lock mechanism - then ready to run!

Available from stock. Ready to ship in 24 - 48hrs.*

*The delivery times indicated correspond to the average time until the ordered goods are dispatched.

More information ▶ www.igus.eu/TRLF

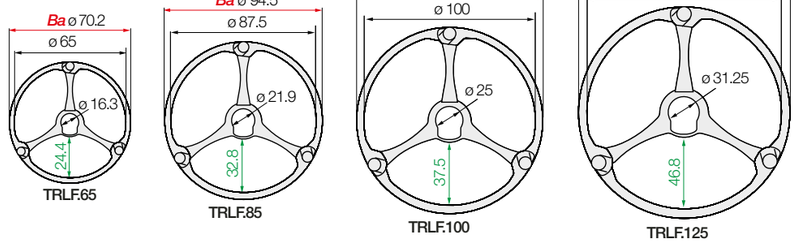
Product range

Quick filling with larger hoses and cables

e-chains® | Series TRLF | Light version with snap lock mechanism

Part No. e-chains®	Bi1 [mm]	Ba [mm]	R [mm]	d1 [mm]	Pitch [mm]	Links per m	[kg/m]
TRLF. 65. 100 .0	24.4	70.2	100	22	23.1	44	≈ 0.79
TRLF. 85. 135 .0	32.8	94.5	135	30	30.6	33	≈ 1.45
TRLF. 100. 145 .0	37.5	108	145	35.5	34.5	29	≈ 1.90
TRLF. 125. 182 .0	46.8	135	182	44.5	44.1	23	≈ 4.13

Installation dimensions

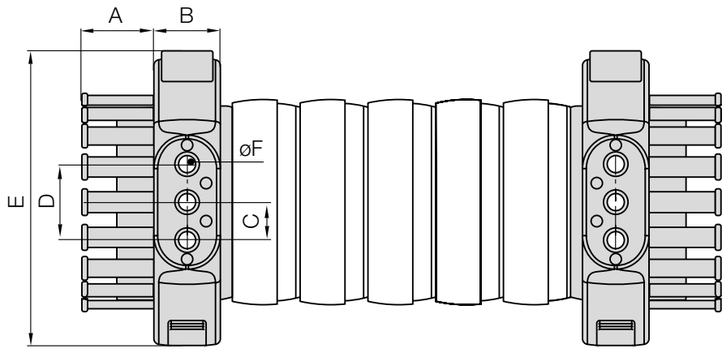


Snap lock mechanism for fast opening, video online
▶ **www.igus.eu/TRLF**

triflex® R accessories

Standard mounting brackets with strain relief

With integrated strain relief tiewrap plates
TR.40.01 - TR.100.01



- Recommended for TRC/TRE/TRCF, also compatible with TRL/TRLF
- Standard fixation onto the robot or machine, with strain relief

Standard mounting brackets | With strain relief

TR.40.01 - TR.100.01

Ø Index		Part No. **with** strain relief	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]
30.	▶	Alternative: light mounting bracket	–	–	–	–	–	–
40.	▶	**TR.40.01**.M6 1) 2)	17.8	21	13.5	27	84.5	6.5
50.	▶	**TR.50.01**.M6 1)	21	21	13.5	27	84.5	6.5
60.	▶	**TR.60.01**.M8 1) 2)	25	32	20	40	126	9
65.	▶	**TR.65.01**.M8 1)	25	32	20	40	126	9
65. (*R 200*)	▶	TR.65.200.01.M8 1) 4) 5)	25	32	20	40	126	9
70.	▶	**TR.70.01**.M8 1) 2)	25	32	20	40	126	9
85.	▶	**TR.85.01**.M8 1)	38	35	20	40	155	9
85. (*R 240*)	▶	**TR.85.240.01**.M8 1) 4)	38	35	20	40	155	9
100.	▶	**TR.100.01**.M8 1)	38	35	20	40	155	9
125.	▶	Alternative: standard mounting bracket without strain relief						

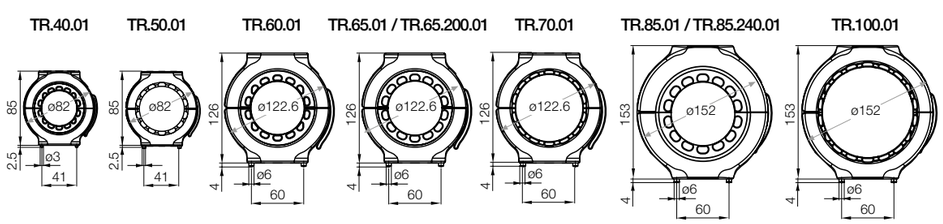
Strain reliefs are for use on the fixed end and/or moving end.

Standard: through holes in Ø F - 1) option: with threaded bushings, steel, M6/M8

2) ⚠ Available as ESD version from stock

4) Only available for special size with increased bend radius

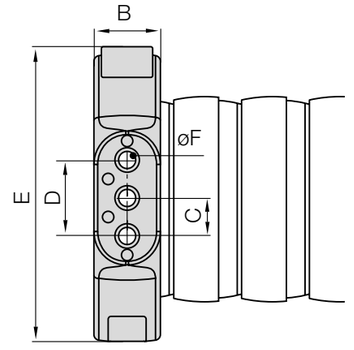
5) Available upon request. Please consult igus® for delivery time.



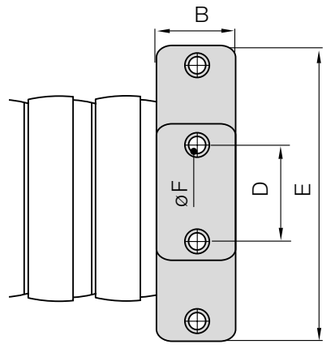
triflex® R accessories

Standard mounting brackets without strain relief

Without strain relief, only for TR.40.02 - TR.100.02



Without strain relief, only for TR.125.02



- Recommended for TRC/TRE/TRCF, also compatible with TRL/TRLF
- Standard fixation onto the machine/robot, without strain relief
- Can also serve as intermediate bracket

Standard mounting brackets | Without strain relief

TR.40.02 - TR.100.02

TR.125.02

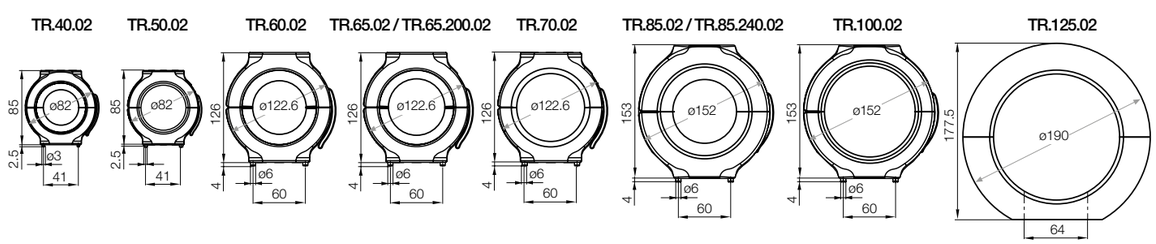
Ø Index		Part No. **without** strain relief or as intermediate bracket	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]
30.	▶	Alternative: light mounting bracket	–	–	–	–	–	–
40.	▶	**TR.40.02**.M6 1)	–	21	13.5	27	84.5	6.5
50.	▶	**TR.50.02**.M6 1)	–	21	13.5	27	84.5	6.5
60.	▶	**TR.60.02**.M8 1)	–	32	20	40	126	9
65.	▶	**TR.65.02**.M8 1)	–	32	20	40	126	9
65. (*R 200*)	▶	TR.65.200.02.M8 1) 4) 5)	–	32	20	40	126	9
70.	▶	**TR.70.02**.M8 1)	–	32	20	40	126	9
85.	▶	**TR.85.02**.M8 1)	–	35	20	40	155	9
85. (*R 240*)	▶	**TR.85.240.02**.M8 1) 4)	–	35	20	40	155	9
100.	▶	**TR.100.02**.M8 1)	–	35	20	40	155	9
125.	▶	**TR.125.02**.M8 1)	–	40	–	64	190	9

Standard: through holes in Ø F - 1) option: with threaded bushings, steel, M6/M8

2) ⚠ Available as ESD version from stock

4) Only available for special size with increased bend radius

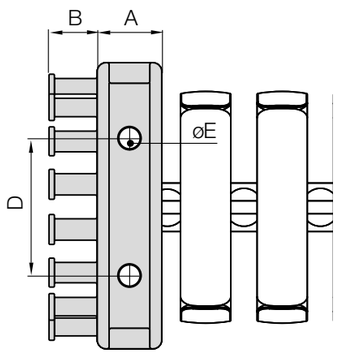
5) Available upon request. Please consult igus® for delivery time.



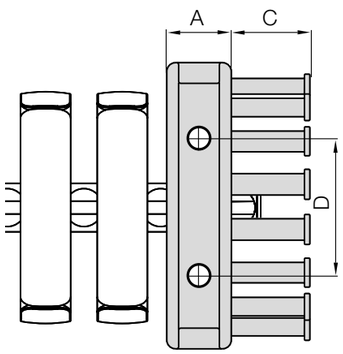
triflex® R accessories

Light mounting brackets with strain relief

Short strain relief
TL.30.01.Z1 - TL.100.01.Z1



Long strain relief
TL.40.01.Z2 - TL.100.01.Z2



- Recommended for TRL/TRLF, also compatible with TRC/TRE/TRCF
- Light fixation onto the machine/robot, with strain relief
- Options with long or short strain relief

Light mounting brackets | With strain relief

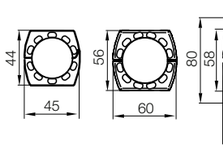
TL.30.01.Z1 - TL.100.01.Z1

TL.40.01.Z2 - TL.100.01.Z2

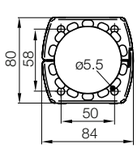
Ø Index		Part No. with **short** strain relief	Part No. with **long** strain relief	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]
30.	▶	**TL.30.01.Z1**	–	13	12.5	–	24	4.5
40.	▶	**TL.40.01.Z1** 1)	**TL.40.01.Z2**	14	12.5	20	36	5.8
50.	▶	Alternative: standard mounting bracket		–	–	–	–	–
60.	▶	**TL.60.01.Z1** 1)	**TL.60.01.Z2**	20	17	27	48	5.8
65.	▶	**TL.65.01.Z1** 1)	–	27	13.5	–	64	6.5
65. (*R 200*)	▶	Alternative: standard mounting bracket		–	–	–	–	–
70.	▶	**TL.70.01.Z1** 1)	**TL.70.01.Z2**	27	17.5	27.5	64	6.5
85.	▶	**TL.85.01.Z1**	–	30	26.5	–	64	6.5
85. (*R 240*)	▶	Alternative: standard mounting bracket		–	–	–	–	–
100.	▶	**TL.100.01.Z1** 1)	**TL.100.01.Z2**	30	22.5	42.5	64	6.5
125.	▶	Alternative: standard mounting bracket		–	–	–	–	–

1) For moving end (ball) suitable only for series TRL/TRLF

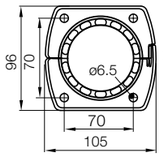
TL.30.01.Z1 TL.40.01.Z1 TL.40.01.Z2



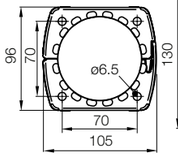
TL.60.01.Z1 TL.60.01.Z2



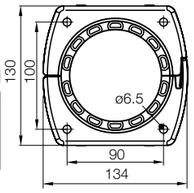
TL.65.01.Z1



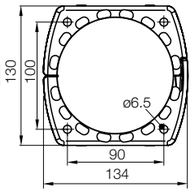
TL.70.01.Z1 TL.70.01.Z2



TL.85.01.Z1



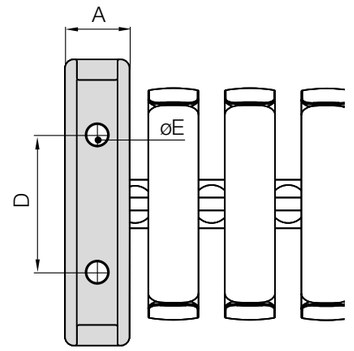
TL.100.01.Z1 TL.100.01.Z2



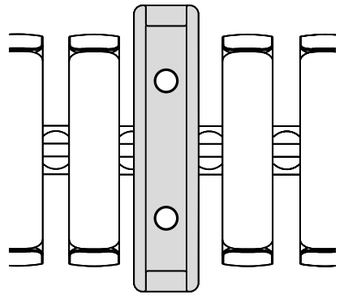
triflex® R accessories

Light mounting brackets without strain relief

Without strain relief
TL.30.01.Z0 - TL.100.01.Z0



Intermediate bracket
TL.30.01.Z0 - TL.100.01.Z0



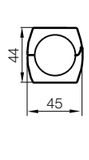
- Recommended for TRL/TRLF, also compatible with TRC/TRE/TRCF
- Light fixation onto the machine/robot, without strain relief
- Can also serve as intermediate bracket

Light mounting brackets | Without strain relief

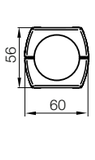
TL.30.01.Z0 - TL.100.01.Z0

Ø Index		Part No. **without** strain relief or as intermediate bracket	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]
30.	▶	**TL.30.01.Z0**	13	–	–	24	4.5
40.	▶	**TL.40.01.Z0**	14	–	–	36	5.8
50.	▶	Alternative: standard mounting bracket	–	–	–	–	–
60.	▶	**TL.60.01.Z0**	20	–	–	48	5.8
65.	▶	**TL.65.01.Z0**	27	–	–	64	6.5
65. (*R 200*)	▶	Alternative: standard mounting bracket	–	–	–	–	–
70.	▶	**TL.70.01.Z0**	27	–	–	64	6.5
85.	▶	**TL.85.01.Z0**	30	–	–	64	6.5
85. (*R 240*)	▶	Alternative: standard mounting bracket	–	–	–	–	–
100.	▶	**TL.100.01.Z0**	30	–	–	64	6.5
125.	▶	Alternative: standard mounting bracket	–	–	–	–	–

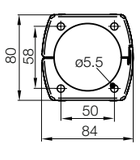
TL.30.01.Z0



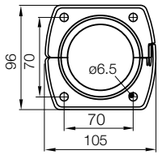
TL.40.01.Z0



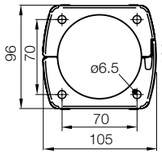
TL.60.01.Z0



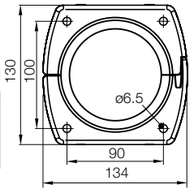
TL.65.01.Z0



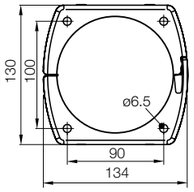
TL.70.01.Z0



TL.85.01.Z0



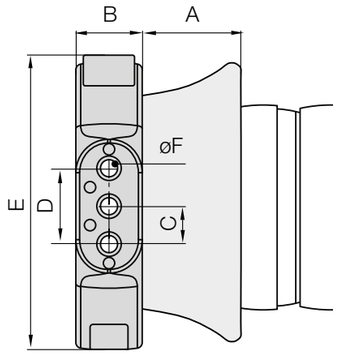
TL.100.01.Z0



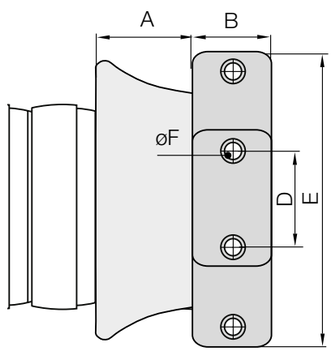
triflex® R accessories

Mounting brackets with radius support

Mounting bracket with radius support, only for TR.40.09 - TR.100.09



Mounting bracket with radius support, only for TR.125.09



- The triflex® R radius support for triflex® R energy supply at the most highly stressed points (axis 6)
- Provides higher operational reliability for robotic applications

Mounting brackets | With radius support | For TRC·TRE·TRCF·TRL·TRLF

TR.40.09 - TR.100.09

TR.125.09

Ø Index		Part No. with radius support	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]
30.	▶	–	–	–	–	–	–	–
40.	▶	**TR.40.09**.M6 1)	28	21	13.5	27	84.5	6.5
50.	▶	**TR.50.09**.M6 1)	38	21	13.5	27	84.5	6.5
60.	▶	**TR.60.09**.M8 1)	38	32	20	40	126	9
65.	▶	**TR.65.09**.M8 1)	45	32	20	40	126	9
65. (*R 200*)	▶	–	–	–	–	–	–	–
70.	▶	**TR.70.09**.M8 1)	43	32	20	40	126	9
85.	▶	**TR.85.09**.M8 1)	49	35	20	40	155	9
85. (*R 240*)	▶	–	–	–	–	–	–	–
100.	▶	**TR.100.09**.M8 1)	67	35	20	40	155	9
125.	▶	**TR.125.09**.M8 1)	72	40	–	64	190	9

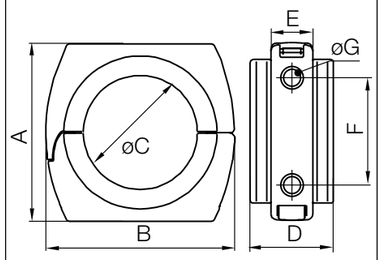
Standard: Through hole with Ø F

1) Option: With threaded steel bushing, M6/M8

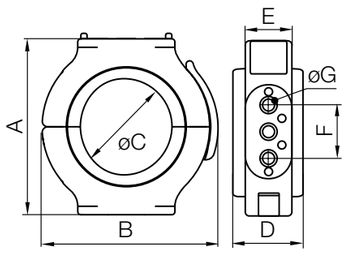
triflex® R accessories

Gliding feed-throughs

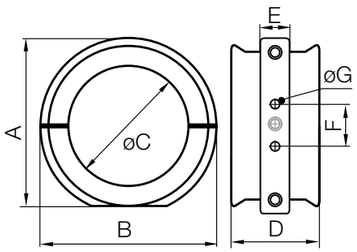
Gliding feed-through, only for TL.30.05



Gliding feed-through, only for TR.40.05 + TR.60-85.05



Gliding feed-through, only for TR.50.05 + TR.100.05-TR.125.05



- The gliding feed-through enables easy guidance of the e-chain® and can also be used as an additional guide
- Gliding feed-through with swivel bearing ▶ **Page 46**

Gliding feed-through | For TRC·TRE·TRCF

TR.40.05 + TR.60-85.05

TR.50.05 + TR.100.05 - TR.125.05

Ø Index		Part No. gliding feed-through	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]
30.	▶	**TL.30.05**	56	60	36	28	14	36	5.8
40.	▶	**TR.40.05**.M6 1)	85	84.5	46	32	21	27	6.5
50.	▶	**TR.50.05**.M6 1)	96	102	58	67	21	27	6.5
60.	▶	**TR.60.05**.M8 1)	126	126	70	50	32	40	9
65.	▶	**TR.65.05**.M8 1)	126	126	75	75	32	40	9
65. (*R 200*)	▶	**TR.65.05**.M8 1)	126	126	75	75	32	40	9
70.	▶	**TR.70.05**.M8 1)	153	155	86	70	35	40	9
85.	▶	**TR.85.05**.M8 1)	153	155	100	84	35	40	9
85. (*R 240*)	▶	**TR.85.05**.M8 1)	153	155	100	84	35	40	9
100.	▶	**TR.100.05**.M8 1) *	162.5	169.5	115	85	28	40	8.5
125.	▶	**TR.125.05**.M8 1)	179	190	142	84	40	64	9

*TR.100.05 with 3 holes

Standard: Through hole with Ø G

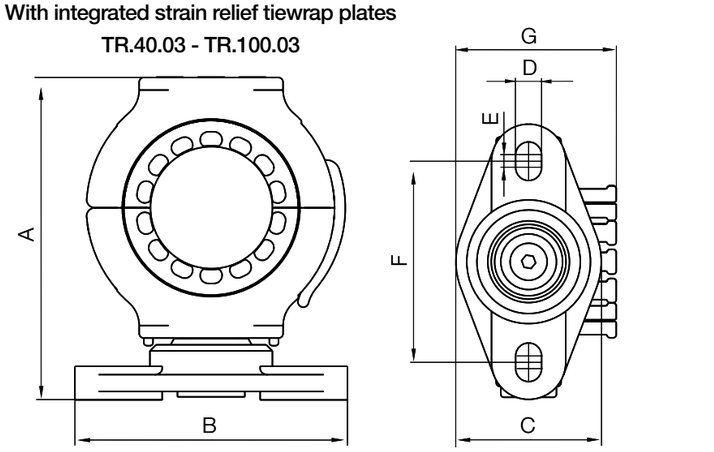
1) Option: With threaded steel bushing, M6/M8

triflex® R accessories

Swivel bearing mounting brackets with strain relief

With integrated strain relief tiewrap plates

TR.40.03 - TR.100.03



- Standard mounting bracket with strain relief and maintenance-free igubal® spherical bearing
- Pivoting mounting for extreme rotating and reverse bending movements
- For TRC·TRE·TRCF·TRL·TRLF

Swivel bearing-mounting brackets | With strain relief | For TRC·TRE·TRCF·TRL·TRLF

TR.40.03 - TR.100.03

Ø Index	Part No. with strain relief	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]
30.	–	–	–	–	–	–	–	–
40.	**TR.40.03**	105	89	47	8.4	4.1	65	51.8
50.	**TR.50.03**	105	89	47	8.4	4.1	65	55
60.	**TR.60.03**	152	118	65	10.5	5.5	87.5	73.5
65.	**TR.65.03**	152	118	65	10.5	5.5	87.5	73.5
65. (*R 200*)	TR.65.200.03 [4) 5)]	152	118	65	10.5	5.5	87.5	73.5
70.	**TR.70.03**	152	118	65	10.5	5.5	87.5	73.5
85.	**TR.85.03**	179	118	65	10.5	5.5	87.5	88
85. (*R 240*)	**TR.85.240.03** [4)]	179	118	65	10.5	5.5	87.5	88
100.	**TR.100.03**	179	118	65	10.5	5.5	87.5	88
125.	–	–	–	–	–	–	–	–

4) Only available for special size with increased bend radius

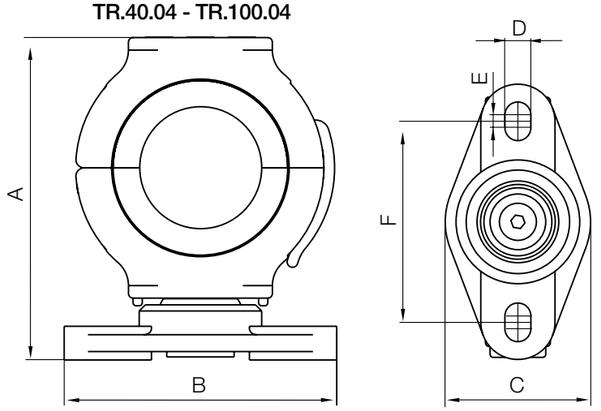
5) Available upon request. Please consult igus® for delivery time.

triflex® R accessories

Swivel bearing-mounting bracket without strain relief

Without strain relief

TR.40.04 - TR.100.04



- Standard mounting bracket without strain relief and maintenance-free igubal® spherical bearing
- Pivoting mounting for extreme rotating and reverse bending movements
- For TRC·TRE·TRCF·TRL·TRLF

Swivel bearing mounting brackets | Without strain relief | For TRC·TRE·TRCF·TRL·TRLF

TR.40.04 - TR.100.04

Ø Index	Part No. without strain relief	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]
30.	–	–	–	–	–	–	–	–
40.	**TR.40.04**	105	89	47	8.4	4.1	65	–
50.	**TR.50.04**	105	89	47	8.4	4.1	65	–
60.	**TR.60.04**	152	118	65	10.5	5.5	87.5	–
65.	**TR.65.04**	152	118	65	10.5	5.5	87.5	–
65. (*R 200*)	TR.65.200.04 [4) 5)]	152	118	65	10.5	5.5	87.5	–
70.	**TR.70.04**	179	118	65	10.5	5.5	87.5	–
85.	**TR.85.04**	179	118	65	10.5	5.5	87.5	–
85. (*R 240*)	**TR.85.240.04** [4)]	179	118	65	10.5	5.5	87.5	–
100.	**TR.100.04**	–	–	–	–	–	–	–
125.	–							

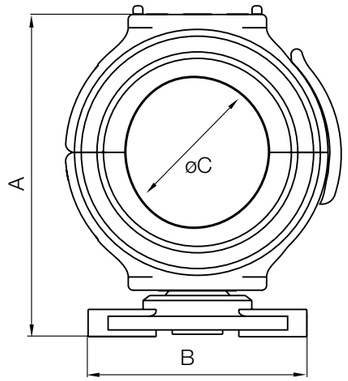
4) Only available for special size with increased bend radius

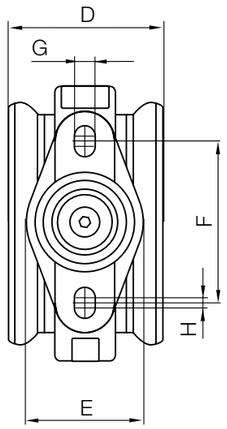
5) Available upon request. Please consult igus® for delivery time.

triflex® R accessories

Swivel bearing gliding feed-throughs

Swivel bearing gliding feed-throughs
TR.40.07 - TR.100.07





- Gliding feed-through with swivel bearing
- For TRC·TRE·TRCF e-chains®
- Pivoted mounting with maintenance-free igubal® spherical bearings

Swivel bearing gliding feed-throughs | For TRC·TRE·TRCF

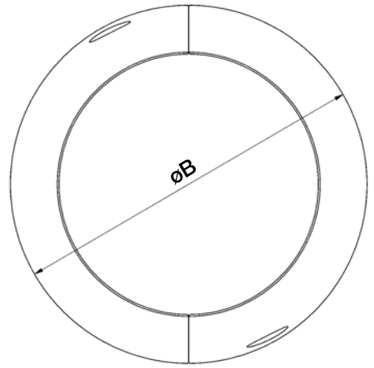
TR.40.07 - TR.100.07

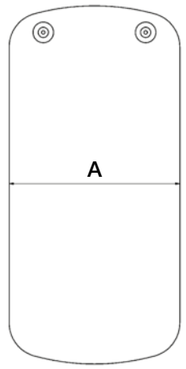
Ø Index	Part No. **with** swivel bearing	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]
30.	–	–	–	–	–	–	–	–
40.	**TR.40.07**	108	89	46	32	47	65	8.4
50.	**TR.50.07**	119	89	58	67	47	65	8.4
60.	**TR.60.07**	156	118	70	50	65	87.5	10.5
65.	**TR.65.07**	156	118	75	75	65	87.5	10.5
65. (*R 200*)	**TR.65.07**	156	118	75	75	65	87.5	10.5
70.	**TR.70.07**	183	118	86	70	65	87.5	10.5
85.	**TR.85.07**	183	118	100	84	65	87.5	10.5
85. (*R 240*)	**TR.85.07**	183	118	100	84	65	87.5	10.5
100.	**TR.100.07**	189	118	115	85	79	87.5	10.5
125.	–	–	–	–	–	–	–	–

triflex® R accessories

Protectors

Protectors
TR.XX.10 / TR.XX.30





- Optional protectors can be fitted at contact points
- For extreme operations and long service life
- Easy gliding over edges
- Damping, light, freely positionable
- Easy to fit and quick replacement
- Protector with quick-release fastener also available

Protectors | For TRC·TRE·TRCF

TR.40.10 - TR.125.10

TR.40.30 - TR.100.30

Ø Index	Part No. with screw connection	Part No. with quick release	A [mm]	B [mm]
30.	–	–	–	–
40.	**TR.40.10**	**TR.40.30** 2)	27	55
50.	**TR.50.10**	TR.50.30 5)	34	69
60.	**TR.60.10**	**TR.60.30** 2)	40	80
65.	**TR.65.10**	TR.65.30 5)	44	88
65. (*R 200*)	TR.65.200.10 5)	–	44	88
70.	**TR.70.10**	**TR.70.30**	50	102
85.	**TR.85.10**	**TR.85.30**	59	118
85. (*R 240*)	**TR.85.240.10** 4)	–	63	120
100.	**TR.100.10**	**TR.100.30**	67	133
125.	**TR.125.10**	–	82	170

2) TR.40.30, TR.60.30 without an additional locking clip

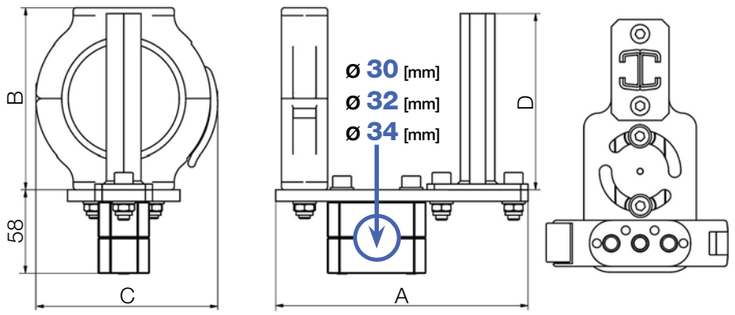
4) Only available for special size with increased bend radius

5) Available upon request. Please consult igus® for delivery time.

triflex® R accessories

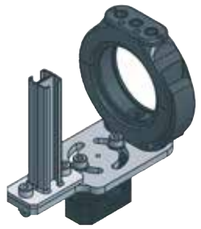
Heavy duty connections, for axis 6

Heavy duty connection Standard
TR.60.20.XX - TR.125.20.XX



- Heavy duty connection - standard
- For cables with large cross section
- For heavy hydraulic hoses
- Double C-profile for CFX clamps
- igus® chainfix clamps must be ordered separately

Heavy duty connections | For TRC·TRE·TRCF



TR.60.20.XX - TR.125.20.XX

Ø Index		Part No. standard	Clamp ø [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]
30.	▶	–	–	–	–	–	–	–
40.	▶	–	–	–	–	–	–	–
50.	▶	–	–	–	–	–	–	–
60.	▶	**TR.60.20.**	| **30** | **32** | **34** |	175	126	126	122	–
65.	▶	**TR.65.20.**	| **30** | **32** | **34** |	175	126	126	122	–
65. (*R 200*)	▶	TR.65.200.20. [4) 05)]	| **30** | **32** | **34** |	175	126	126	122	–
70.	▶	**TR.70.20.**	| **30** | **32** | **34** |	175	126	126	122	–
85.	▶	**TR.85.20.**	| **30** | **32** | **34** |	175	153	155	149	–
85. (*R 240*)	▶	**TR.85.240.20.** [4)]	| **30** | **32** | **34** |	175	153	155	149	–
100.	▶	**TR.100.20.**	| **30** | **32** | **34** |	175	153	155	149	–
125.	▶	**TR.125.20.**	| **30** | **32** | **34** |	180	190	190	175	–

Standard clamp for axis 6: ø 30mm

4) Only available for special size with increased bend radius

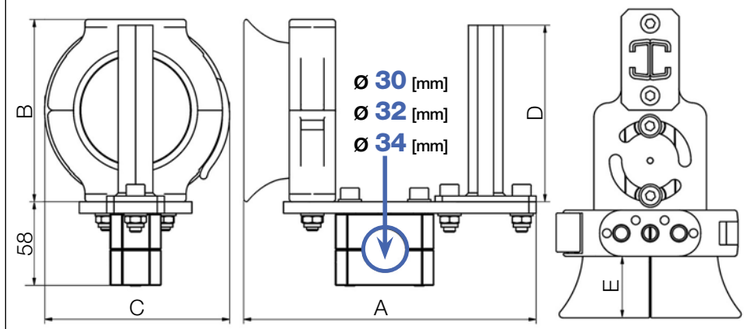
5) Available upon request. Please consult igus® for delivery time.

Part No. with desired diameter for the axis 6 clamp | **30** | **32** | **34** | e.g. **TR.100.20.30**

triflex® R accessories

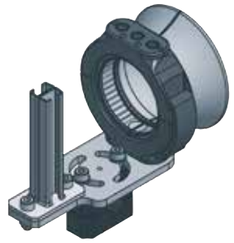
Heavy duty connections for axis 6 with radius support

Heavy duty connection - with radius support
TR.60.23.XX - TR.125.23.XX



- With radius support
- For cables with large cross section
- For heavy hydraulic hoses
- Double C-profile for CFX clamps
- igus® chainfix clamps must be ordered separately

Heavy duty connections | With radius support | For TRC·TRE·TRCF



TR.60.23.XX - TR.125.23.XX

Ø Index		Part No. with radius support	Clamp ø [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]
30.	▶	–	–	–	–	–	–	–
40.	▶	–	–	–	–	–	–	–
50.	▶	–	–	–	–	–	–	–
60.	▶	**TR.60.23.**	| **30** | **32** | **34** |	209	126	130	122	38
65.	▶	**TR.65.23.**	| **30** | **32** | **34** |	214	126	130	122	45
65. (*R 200*)		–	–	–	–	–	–	–
70.	▶	**TR.70.23.**	| **30** | **32** | **34** |	214	126	130	122	43
85.	▶	**TR.85.23.**	| **30** | **32** | **34** |	222	155	155	149	49
85. (*R 240*)	▶	–	–	–	155	–	149	–
100.	▶	**TR.100.23.**	| **30** | **32** | **34** |	240	155	155	149	67
125.	▶	**TR.125.23.**	| **30** | **32** | **34** |	252	190	190	175	72

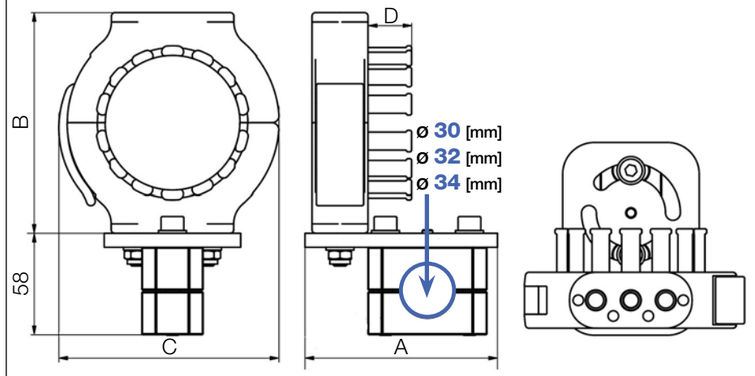
Standard clamp for axis 6: ø 30mm

Part No. with desired diameter for the axis 6 clamp | **30** | **32** | **34** | e.g. **TR.100.23.30**

triflex® R accessories

Compact connections for clamp axis 6

Compact connection **with** strain relief
TR.40.21.01.XX - TR.100.21.01.XX



- With integrated strain relief tiewrap plates
- Safe and simple securing of the cables with cable ties
- Various adjustment options

Compact connections | **With** strain relief | For TRC·TRE·TRCF

TR.40.21.01.XX -
TR.100.21.01.XX

Ø Index		Part No. with strain relief	Clamp ø [mm]	A [mm]	B [mm]	C [mm]	D [mm]
30.	▶	–	–	–	–	–	–
40.	▶	**TR.40.21.01.**	| **30** | **32** | **34** |	110	85	84.5	17.8
50.	▶	**TR.50.21.01.**	| **30** | **32** | **34** |	110	85	84.5	21
60.	▶	**TR.60.21.01.**	| **30** | **32** | **34** |	110	126	126	25
65.	▶	**TR.65.21.01.**	| **30** | **32** | **34** |	110	126	126	25
65. (*R 200*)	▶	TR.65.200.21.01. 4) 5)	| **30** | **32** | **34** |	110	126	126	25
70.	▶	**TR.70.21.01.**	| **30** | **32** | **34** |	110	126	126	25
85.	▶	**TR.85.21.01.**	| **30** | **32** | **34** |	110	153	155	38
85. (*R 240*)	▶	**TR.85.240.21.01.** 4)	| **30** | **32** | **34** |	110	153	155	38
100.	▶	**TR.100.21.01.**	| **30** | **32** | **34** |	110	153	155	38
125.	▶	–	–	–	–	–	–

Standard clamp for axis 6: ø 30mm

4) Only available for special size with increased bend radius

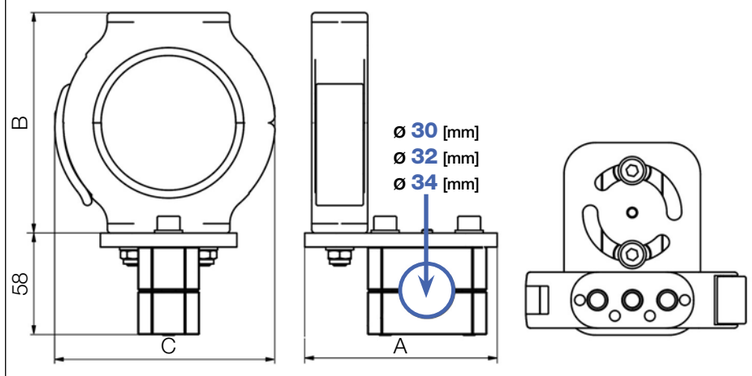
5) Available upon request. Please consult igus® for delivery time.

Part No. with desired diameter for the axis 6 clamp | **30** | **32** | **34** | e.g. **TR.100.21.30**

triflex® R accessories

Compact connections for clamp axis 6

Compact connection **without** strain relief
TR.40.21.02.XX - TR.100.21.02.XX



- Without strain relief
- Space-saving
- Various adjustment options

Compact connections | **Without** strain relief | For TRC·TRE·TRCF

TR.40.21.02.XX -
TR.100.21.02.XX

Ø Index		Part No. without strain relief	Clamp ø [mm]	A [mm]	B [mm]	C [mm]	D [mm]
30.	▶	–	–	–	–	–	–
40.	▶	**TR.40.21.02.**	| **30** | **32** | **34** |	110	85	84.5	–
50.	▶	**TR.50.21.02.**	| **30** | **32** | **34** |	110	85	84.5	–
60.	▶	**TR.60.21.02.**	| **30** | **32** | **34** |	110	126	126	–
65.	▶	**TR.65.21.02.**	| **30** | **32** | **34** |	110	126	126	–
65. (*R 200*)	▶	TR.65.200.21.02. 4) 5)	| **30** | **32** | **34** |	110	126	126	–
70.	▶	**TR.70.21.02.**	| **30** | **32** | **34** |	110	126	126	–
85.	▶	**TR.85.21.02.**	| **30** | **32** | **34** |	110	153	155	–
85. (*R 240*)	▶	**TR.85.240.21.02.** 4)	| **30** | **32** | **34** |	110	153	155	–
100.	▶	**TR.100.21.02.**	| **30** | **32** | **34** |	110	153	155	–
125.	▶	–	–	–	–	–	–

Standard clamp for axis 6: ø 30mm

4) Only available for special size with increased bend radius

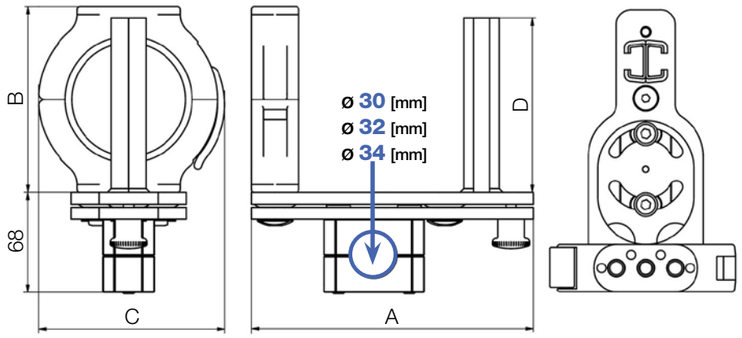
5) Available upon request. Please consult igus® for delivery time.

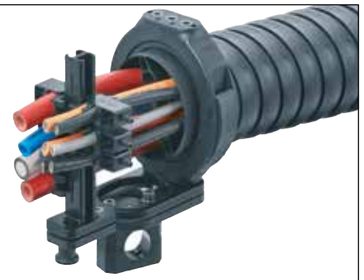
Part No. with desired diameter for the axis 6 clamp | **30** | **32** | **34** | e.g. **TR.100.21.02.30**

triflex® R accessories

Quick exchange kit for axis 6

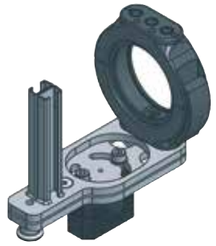
Quick exchange kit
TR.60.22.**XX** - TR.100.22.**XX**





- Exchange in seconds
- No repeat alignment required
- Exchange the triflex® R unit incl. cables without tools
- Option available with strain relief

Quick exchange kit | For TRC·TRE·TRCF



TR.60.22.XX - TR.100.22.XX

Ø Index	Part No. quick-change unit	Clamp ø [mm]	A [mm]	B [mm]	C [mm]	D [mm]
30.	–	–	–	–	–	–
40.	–	–	–	–	–	–
50.	–	–	–	–	–	–
60.	**TR.60.22.**	| **30** | **32** | **34** |	191	126	126	126
65.	**TR.65.22.**	| **30** | **32** | **34** |	191	126	126	126
65. (*R 200*)	TR.65.200.22. 4) 5)	| **30** | **32** | **34** |	191	126	126	126
70.	**TR.70.22.**	| **30** | **32** | **34** |	191	126	126	126
85.	**TR.85.22.**	| **30** | **32** | **34** |	191	153	155	153
85. (*R 240*)	**TR.85.240.22.** 4)	| **30** | **32** | **34** |	191	153	155	153
100.	**TR.100.22.**	| **30** | **32** | **34** |	191	153	155	153
125.	–	–	–	–	–	–

Standard clamp for axis 6: ø 30mm

4) Only available for special size with increased bend radius

5) Available upon request. Please consult igus® for delivery time.

Part No. with desired diameter for the axis 6 clamp | **30** | **32** | **34** | e.g. **TR.100.22.30**

triflex® R accessories

chainfix clamps

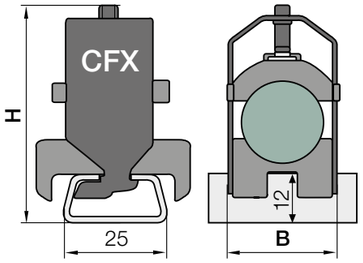
chainfix | Single clamp incl. bottom saddles

- For use with heavy-duty connection **TR.XX.20** / **TR.XX.23** and quick release unit **TR.XX.22**
- Reliably absorbs tensile forces even for larger cable diameters
- Specifically recommended for solid welding cables and rigid hydraulic hoses
- Space- and time-saving assembly onto the C-profile
- Simple assembly with hex head set screw
- High strength for dynamic applications with improved stacker elements
- Built-in ribs on the stacker elements give secure grip on the cables
- Steel (material galvanised steel) or stainless steel (material 1.4301/AISI 304) available

Part No. steel	Part No. stainless steel*	≤ Ø [mm]	B+2 [mm]	H [mm]
CFX12.1	CFX12.1.E	06 - 12	16	54
CFX14.1	CFX14.1.E	12 - 14	18	50
CFX16.1	CFX16.1.E	14 - 16	20	52
CFX18.1	CFX18.1.E	16 - 18	22	54
CFX20.1	CFX20.1.E	18 - 20	24	56

Part No. steel	Part No. stainless steel*	≤ Ø [mm]	B+2 [mm]	H [mm]
CFX22.1	CFX22.1.E	20 - 22	26	58
CFX26.1	CFX26.1.E	22 - 26	30	67
CFX30.1	CFX30.1.E	26 - 30	34	71
CFX34.1	CFX34.1.E	30 - 34	38	75

*Stainless steel material: 1.4301/AISI 304



Individual strain relief for every cable offers security and easy replacement

triflex® R accessories

UR mounting clamps

Video available online at
▶ www.igus.eu/UR.video

Mounting clamps for "Universal Robots" - UR brackets

The "Universal Robots" company makes easy-to-use, lightweight robot systems. The triflex® R 30 and 40 sizes are a perfect fit for the UR3, UR5 and UR10 robot systems, both technically and visually. Connecting the system is quick and easy when using the UR brackets.

- Safe cable guidance with triflex® R for "universal robots"
- Easy connection with screw clips
- For UR3, UR5 and UR10 robots
- For TRC, TRE, TRL: Ø 30 and Ø 40mm
- Suitable for PMA corrugated tube I-PIST-29B (optional)

Overview triflex® R e-chains® | For TRC·TRE·TRL

Principle sketch	Part No. series	*Bi1* [mm]	*Bi2* [mm]	*Ba* [mm]	*R* [mm]	*d1* [mm]	*d2* [mm]	Pitch [mm]	Links per m
	Series TRC - enclosed design								
	TRC.30.050.0	12	10	34.5	050	10	8	11.3	89
	TRC.40.058.0	15	13	43	058	13	11	13.9	72
	Series TRE - "easy" design								
	TRE.30.050.0	12	10	34.5	050	10	8	11.3	89
	TRE.40.058.0.B	15	13	43	058	13	11	13.9	72
	Series TRL - light version of the "easy"-design								
	TRL.30.050.0	12.5	11	34.5	050	10	8	11.3	89
	TRL.40.058.0	15	–	45	058	13	–	13.9	72

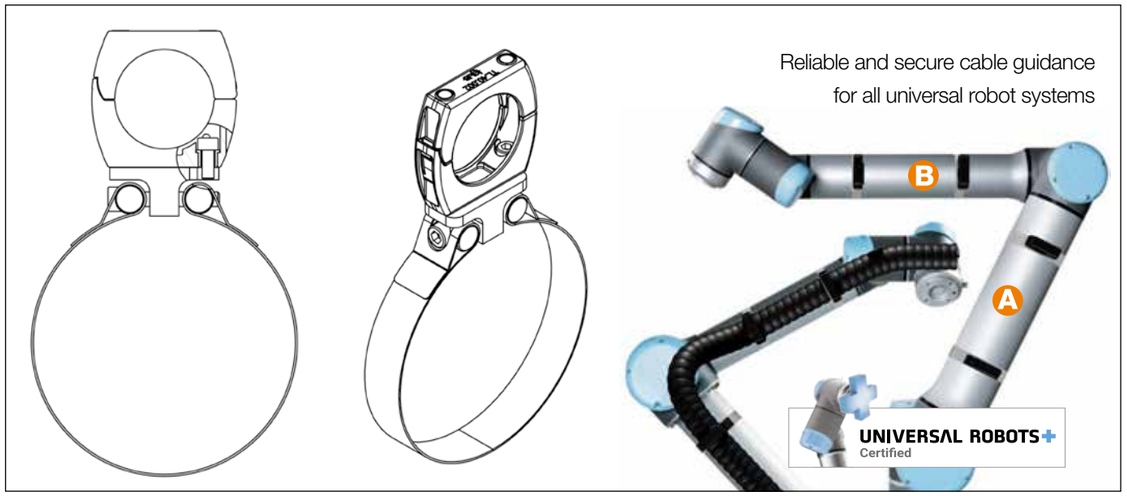
PMA hoses overview | For PMAFLEX corrugated tubes

Principle sketch	Part No. series	Corrugated tube nominal width	Metric size [mm]	Inner Ø *d1* [mm]	Outer Ø *d2* [mm]	Static *R* [mm]*	Dynamic *R* [mm]**	VE [mm]
	I-PIST-29B	29	32	29.0	34.3	45	110	50

*Static *R* = minimum recommended bend radius for static (fixed) installation **Dynamic *R* = minimum recommended bend radius for dynamic (flexible) laying

Product range

UR mounting clamps



Product range | Suitable for TRC.30 · TRE.30 · TRL.30 e-chains®

Part No. **without** strain relief	Part No. **with** strain relief	For UR-robot system	Ø [mm]	Position
TR.911.965.054.Z0	TR.911.965.054.Z1	UR3 / UR3e	054	B
TR.911.965.066.Z0	TR.911.965.066.Z1	UR3 / UR3e	066	A
TR.911.965.075.Z0	TR.911.965.075.Z1	UR5 / UR5e	075	B
TR.911.965.086.Z0	TR.911.965.086.Z1	UR5 / UR5e	086	A
TR.911.965.086.Z0	TR.911.965.086.Z1	UR10 / UR10e	086	B
TR.911.965.108.Z0	TR.911.965.108.Z1	UR10 / UR10e	108	A

Product range | Suitable for TRC.40 · TRE.40 · TRL.40 e-chains®

Part No. **without** strain relief	Part No. **with** strain relief	For UR-robot system	Ø [mm]	Position
TR.911.966.054.Z0	TR.911.966.054.Z1	UR3 / UR3e	054	B
TR.911.966.066.Z0	TR.911.966.066.Z1	UR3 / UR3e	066	A
TR.911.966.075.Z0	TR.911.966.075.Z1	UR5 / UR5e	075	B
TR.911.966.086.Z0	TR.911.966.086.Z1	UR5 / UR5e	086	A
TR.911.966.086.Z0	TR.911.966.086.Z1	UR10 / UR10e	086	B
TR.911.966.108.Z0	TR.911.966.108.Z1	UR10 / UR10e	108	A

Product range | Suitable for PMA hose I-PIST-29B (optional)

For PMA hose I-PIST-29B	Part No. **without** strain relief	For UR-robot system	Ø [mm]	Position
	TR.914.836.054.Z0	UR3 / UR3e	054	B
	TR.914.836.066.Z0	UR3 / UR3e	066	A
	TR.914.836.075.Z0	UR5 / UR5e	075	B
	TR.914.836.086.Z0	UR5 / UR5e	086	A
	TR.914.836.086.Z0	UR10 / UR10e	086	B
	TR.914.836.108.Z0	UR10 / UR10e	108	A

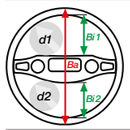
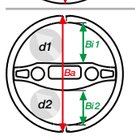
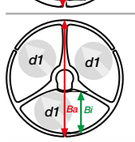
triflex® R accessories

Mounting clamps for KUKA LBR iiwa

Mounting clamp for KUKA LBR iiwa

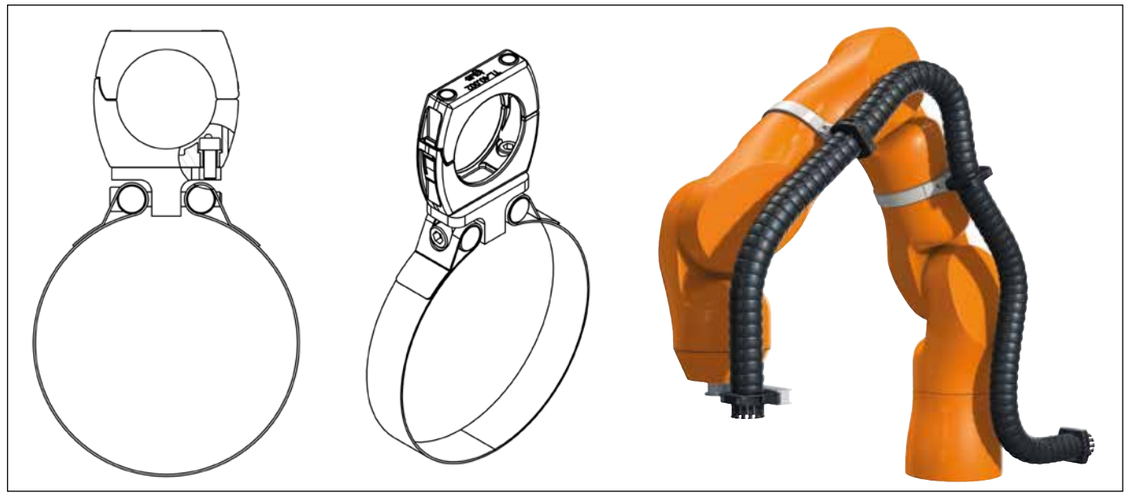
- Safe cable guidance with triflex® R for KUKA LBR iiwa robots
- For KUKA LBR iiwa 14 R820 and KUKA LBR iiwa 7 R800
- Easy connection with screw clips
- For 2 triflex® R sizes: Ø 30 and Ø 40
- For TRC, TRE and TRL e-chains®

Overview triflex® R e-chains® | For TRC·TRE·TRL

Principle sketch	Part No. series	*Bi1* [mm]	*Bi2* [mm]	*Ba* [mm]	*R* [mm]	*d1* [mm]	*d2* [mm]	Pitch [mm]	Links per m
	Series TRC - enclosed design								
	TRC.30.050.0	12	10	34.5	050	10	8	11.3	89
	TRC.40.058.0	15	13	43	058	13	11	13.9	72
	SeriesTRE - "easy" design								
	TRE.30.050.0	12	10	34.5	050	10	8	11.3	89
	TRE.40.058.0.B	15	13	43	058	13	11	13.9	72
	Series TRL - light version of the "easy"-design								
	TRL.30.050.0	12.5	11	34.5	050	10	8	11.3	89
	TRL.40.058.0	15	–	45	058	13	–	13.9	72

Product range

Mounting clamps for KUKA LBR iiwa



Product range | Suitable for TRC.30 · TRE.30 · TRL.30 e-chains®

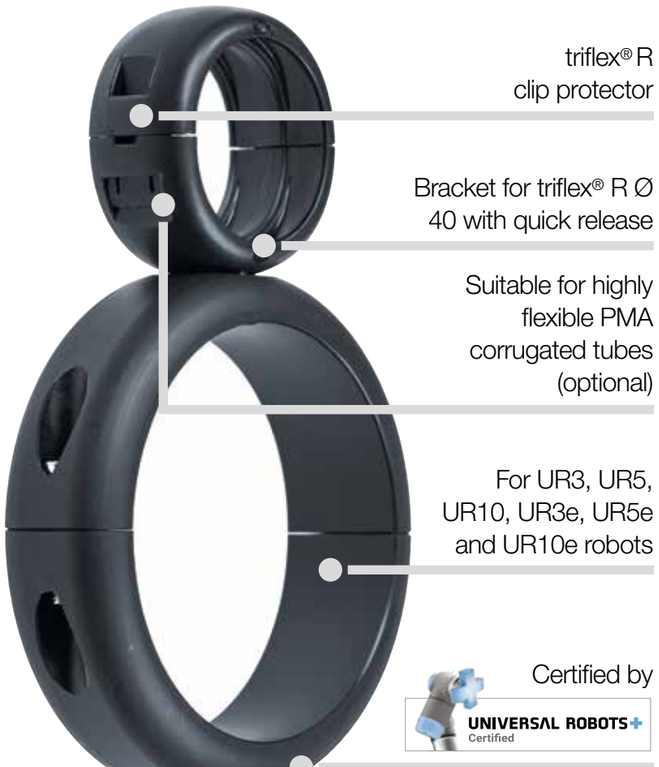
Part No. **without** strain relief	Part No. **with** strain relief	For KUKA LBR iiwa	Ø [mm]
TR.914.951.Z0	TR.914.951.Z1	LBR iiwa 14 R820 LBR iiwa 7 R800	136

Product range | Suitable for TRC.40 · TRE.40 · TRL.40 e-chains®

Part No. **without** strain relief	Part No. **with** strain relief	For KUKA LBR iiwa	Ø [mm]
TR.914.952.Z0	TR.914.952.Z1	LBR iiwa 14 R820 LBR iiwa 7 R800	136

triflex® R accessories

Cobot mounting clamps New

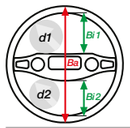
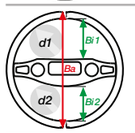
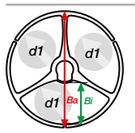


Mounting clamp for robot arms with "cobot" design - HRC clamps

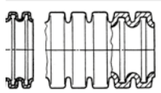
Energy supply made easy for cobots. Reliable multi-axis energy supply thanks to the mounting clamp for our robotic triflex® R e-chains®.

- Plastic clamp
- Simple screw connection for attachment to the robot arm
- Bracket for triflex® R Ø 40 with quick release
- Rounded cobot style design
- For TRC, TRE and TRL e-chains®
- For UR and URe robot arms

Overview triflex® R e-chains® | For TRC·TRE·TRL

Principle sketch	Part No. series	Bi1 [mm]	Bi2 [mm]	Ba [mm]	R [mm]	d1 [mm]	d2 [mm]	Pitch [mm]	Links per m
	Series TRC - enclosed design								
	TRC.40.058.0	15	13	43	058	13	11	13.9	72
	Series TRE - "easy" design								
	TRE.40.058.0.B	15	13	43	058	13	11	13.9	72
	Series TRL - light version of the "easy"-design								
	TRL.40.058.0	15	–	45	058	13	–	13.9	72

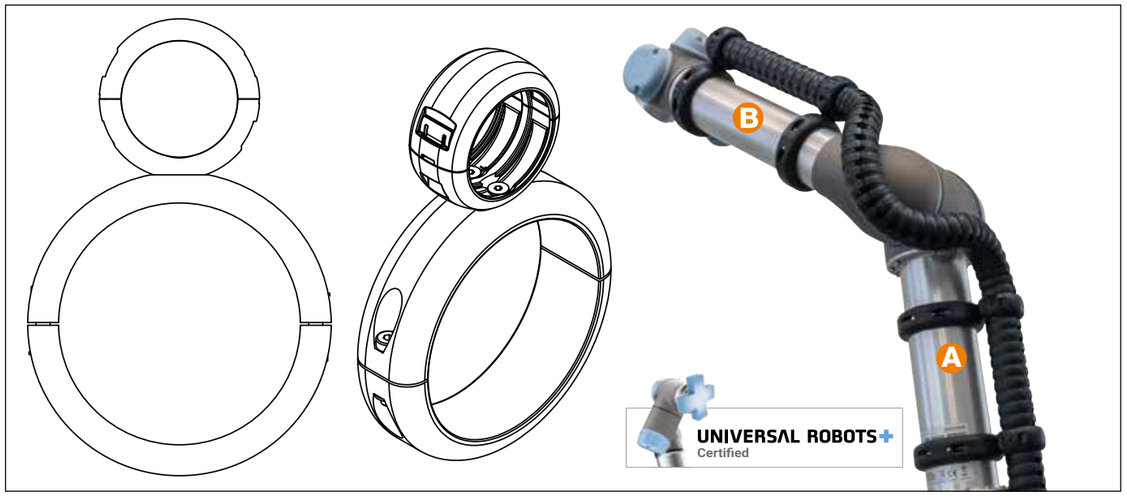
PMA hoses overview | For PMAFLEX corrugated tubes

Principle sketch	Part No. series	Corrugated tube nominal width	Metric size [mm]	Inner Ø d1 [mm]	Outer Ø d2 [mm]	Static R [mm]*	Dynamic R [mm]**	VE [mm]
	I-PIST-29B	29	32	29.0	34.3	45	110	50

*Static R = minimum recommended bend radius for static (fixed) installation **Dynamic R = minimum recommended bend radius for dynamic (flexible) laying

Product range

Cobot mounting clamps

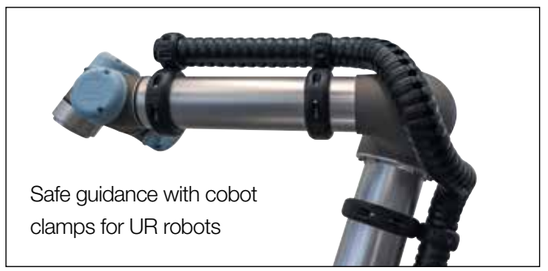


Product range | Suitable for TRC.40 · TRE.40 · TRL.40 e-chains®

Part number cobot mounting clamps	For UR-robot system	UR Ø [mm]	URe Ø [mm]	Position
TR.916.810.54	UR3 / UR3e	054	054	B
TR.916.810.66	UR3 / UR3e	066	066	A
TR.916.810.75	UR5 / UR5e	075	075	B
TR.916.810.86	UR5 / UR5e	086	086	A
TR.916.810.86	UR10 / UR10e	086	086	B
TR.916.810.108	UR10	108	–	A
TR.916.810.110	UR10e	–	110	A

Product range | Suitable for PMA hose I-PIST-29B (optional)

For PMA hose I-PIST-29B	Part number cobot mounting clamps	For UR-robot system	UR Ø [mm]	URe Ø [mm]	Position
	TR.916.810.54	UR3 / UR3e	054	054	B
	TR.916.810.66	UR3 / UR3e	066	066	A
	TR.916.810.75	UR5 / UR5e	075	075	B
	TR.916.810.86	UR5 / UR5e	086	086	A
	TR.916.810.86	UR10 / UR10e	086	086	B
	TR.916.810.108	UR10	108	–	A
	TR.916.810.110	UR10e	–	110	A



Safe guidance with cobot clamps for UR robots

triflex® R accessories

Protective jackets

Standard protective jacket

● Plastic coated fabric ● Easy to replace with Velcro fastenings ● Elastic sealing strips ● Standard lengths available from stock ● For paint or sealing applications ● PVC material

Ø Index	Part No. jacket	Standard lengths* XXXX [mm]
30.	–	–
40.	TR.40.14.	| 500 | 1000 | 1500 | 2000 |
50.	TR.50.14.	| 500 | 1000 | 1500 | 2000 |
60.	TR.60.14.	| 500 | 1000 | 1500 | 2000 |
65.	TR.65.14.	| 500 | 1000 | 1500 | 2000 |
70.	TR.70.14.	| 500 | 1000 | 1500 | 2000 |
85.	TR.85.14.	| 500 | 1000 | 1500 | 2000 |
100.	TR.100.14.	| 500 | 1000 | 1500 | 2000 |
125.	TR.125.14.	| 500 | 1000 | 1500 | 2000 |

*Special lengths upon request

Part No. with the desired standard value for the length **XXXX**
Example: **TR.60.14.500**

Heat shield protective jacket

● Made from heat-resistant, wear-resistant Kevlar ● Short-term protection against welding and metal spatter, temperatures up to +540°C ● High abrasion resistance ● Sealed design ● For tough environments ● Easy to replace or retrofit with zipper closure ● Velcro straps at each end ● Tough design ● Silicone-free ● Asbestos-free ● Standard lengths from stock

Ø Index	Part No. jacket	Standard lengths* XXXX [mm]
30.	–	–
40.	TR.40.18.	| 500 | 1000 | 1500 | 2000 |
50.	TR.50.18.	| 500 | 1000 | 1500 | 2000 |
60.	TR.60.18.	| 500 | 1000 | 1500 | 2000 |
65.	TR.65.18.	| 500 | 1000 | 1500 | 2000 |
70.	TR.70.18.	| 500 | 1000 | 1500 | 2000 |
85.	TR.85.18.	| 500 | 1000 | 1500 | 2000 |
100.	TR.100.18.	| 500 | 1000 | 1500 | 2000 |
125.	TR.125.18.	| 500 | 1000 | 1500 | 2000 |

*Special lengths upon request

Part No. with the desired standard value for the length **XXXX**
Example: **TR.60.18.500**

Wear resistant protective jacket

● Extremely high abrasion resistance ● Black leather ● For use in temperatures from -40°C to +100°C ● Very flexible ● Easy to exchange or retrofit ● Silicone-free ● Asbestos-free ● Standard lengths from stock

Ø Index	Part No. jacket	Standard lengths* XXXX [mm]
30.	–	–
40.	TR.40.19.	| 500 | 1000 | 1500 | 2000 |
50.	TR.50.19.	| 500 | 1000 | 1500 | 2000 |
60.	TR.60.19.	| 500 | 1000 | 1500 | 2000 |
65.	TR.65.19.	| 500 | 1000 | 1500 | 2000 |
70.	TR.70.19.	| 500 | 1000 | 1500 | 2000 |
85.	TR.85.19.	| 500 | 1000 | 1500 | 2000 |
100.	TR.100.19.	| 500 | 1000 | 1500 | 2000 |
125.	TR.125.19.	| 500 | 1000 | 1500 | 2000 |

*Special lengths upon request

Part No. with the desired standard value for the length **XXXX**
Example: **TR.60.19.500**

triflex® R filling

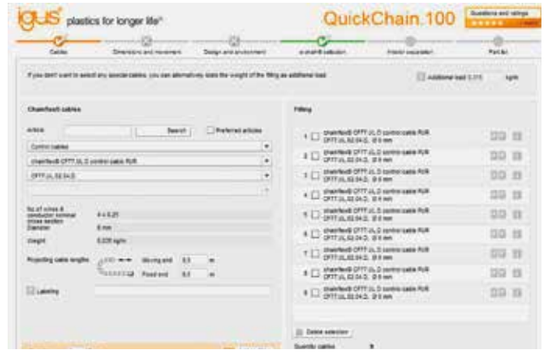
interior separation configurator

triflex® R interior separation - configure e-chains® easily

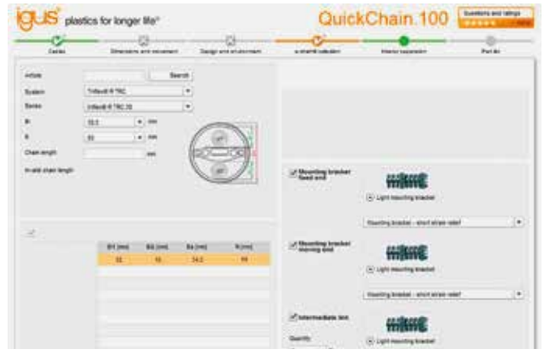
Quick and easy creation of interior separation layouts for triflex® R. After selecting the cables, they can be dragged & dropped into the e-chain® layout. The interior separation configurator creates a parts list of the e-chain® and the cables contained in the configuration. The configurations can be saved and reloaded. The entire configuration can be transferred to the shopping cart with a click.

● Quick and easy interior separation configurator
● Accounts for the maximum filling rules for cables and hoses
● Creation of parts lists
● Easy enquiry and ordering

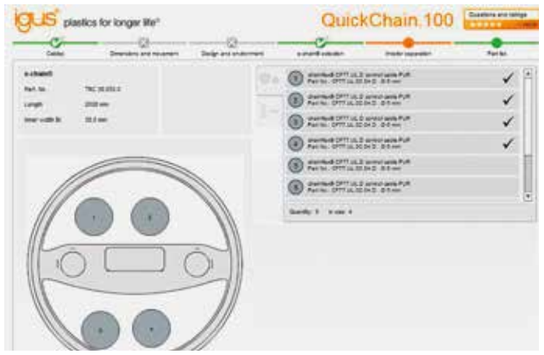
More information and interior separation configurator
▶ www.igus.eu/triflexR-IA



1. Select cables, hoses and lengths



2. Select e-chain® and size



3. Fill the e-chain® with cables and hoses

4. Result: parts list, price and drawings

triflex® R - readychain® dress-packs

Customised system consisting of the triflex® R, chainflex® and connectors
● Eliminate storage costs for cables, e-chains® and plugs
● Shorten turnaround times by half,minimise your machine downtime
● Reduce the number of suppliers and orders by 75%
More information ▶ www.readychain.eu

triflex® R retraction systems

For supplying energy to robots

The picture above shows the cost-effective RSEL retraction system

Prevent loop formation on robots - triflex® R retraction systems

The global growth in automation for industrial production is leading to more and more complex robotic applications. Target cycle times are getting shorter and downtime must also be reduced. To provide reliable protection against premature system failure and downtime, we recommend the use of a triflex® R e-chain®, especially to bridge the last three axes on robots. The length change that results from the robot's movement is compensated by our triflex® R retraction systems. This constantly guides the igus® e-chain® in a controlled way to prevent the formation of loops in the robot's working area.

5 triflex® R retraction system types available from stock:

- **RS** Modular retraction system
- **RSP** Pneumatic retraction system
- **RSE** Cost-effective retraction system with deflection
- **RSE linear** Linear, space-saving retraction system
- **RSEL** Cost-effective linear retraction system

Typical industries and applications

● Machine tools ● Handling machines - 6-axis ● Conveyor systems ● Packaging machines ● General mechanical engineering, etc.

Available from stock. Ready to ship in 24 - 48hrs.*

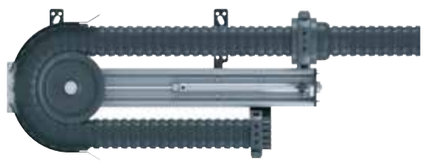
*The delivery times indicated correspond to the average time until the ordered goods are dispatched.

triflex® R retraction systems

System overview and advantages

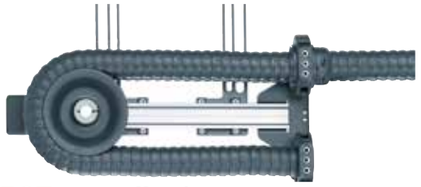
RS modular retraction system
▶ from page 66

Advantages:
- For use with adverse environmental influences
- Retraction force provided by integrated fibre-rods
- For robots with a load capacity from approx. 10kg
- Up to 670mm retraction length possible
- If a linear guide system is not needed
- For series TRC·TRE with ø-index 40-100mm



RSP pneumatic retraction system
▶ from page 74

Advantages:
- Standard pneumatic components
- Sensor based monitoring possible
- For applications with a high fill weight
- Constant force over the complete travel
- For robots with a load capacity from approx. 50kg
- Up to 780mm retraction length possible
- For series TRC·TRE·TRCF with a ø-index of 60-125mm



RSE cost-effective retraction system with deflection
▶ from page 82

Advantages:
- For small robots, very light
- Up to 500mm retraction length possible
- For highly dynamic movements
- Cost-effective
- Maintenance-free igus® drylin® W linear unit
- For series TRC·TRE with ø-index 40-50mm

RSE linear space-saving retraction system
▶ from page 90

Advantages:
- Special linear guide avoids small bend radii
- Simple, linear retraction without loops, fibre-rods or guide rollers
- Up to 490mm retraction length possible
- Space-saving
- Maintenance-free igus® drylin® W linear unit
- For series TRC·TRE·TRCF* with ø-index 40-100mm

RSEL linear, cost-effective retraction system
▶ from page 100

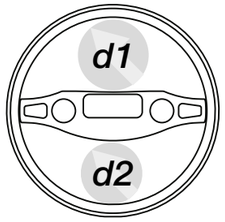
Advantages:
- Linear guidance even for highly dynamic applications
- For robots with high and medium payloads
- Up to 380mm retraction length possible
- Cost-effective
- For series TRC·TRE·TRCF with a ø-index of 70-85mm

triflex® R retraction systems

Choosing the right e-chain® size ...

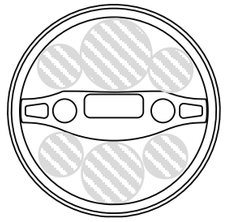
1

The largest cable diameter ø ...



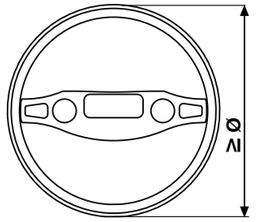
2

... and max. usable e-chain® cross section area ...



3

... determine the necessary Ø index of the triflex® R ...



Max. cable Ø		Coverage of	Minimum
1. chamber *d1* [mm]	2. chamber *d2* [mm]	the entire area [mm²]	Ø index triflex® R e-chain®
–	–	–	30.
< 15	< 13	< 500	40.
< 18.8	< 16.2	< 750	50.
< 22.5	< 19.5	< 1,000	60.
–	–	–	65.
< 28	< 24	< 1,750	70.
< 33	< 28	< 2,500	85.
< 37.5	< 32.5	< 3,000	100.
< 43	< 43	< 4,500	125.

triflex® R retraction systems

... and selection of possible retraction systems

4

... select from 5 retraction systems options:

	RS modular	**RSP** pneumatic	**RSE** with deflection	**RSE linear** space-saving	**RSEL** cost-effective
	●	–	●	●	–
	–	–	●	●	–
	●	●	–	●	–
	–	–	–	–	–
	●	●	–	●	●
	●	●	–	●	–
	–	●	–	●	–
	▶ Page 66	▶ Page 74	▶ Page 82	▶ Page 90	▶ Page 100

● = yes, it is possible – = it is not possible

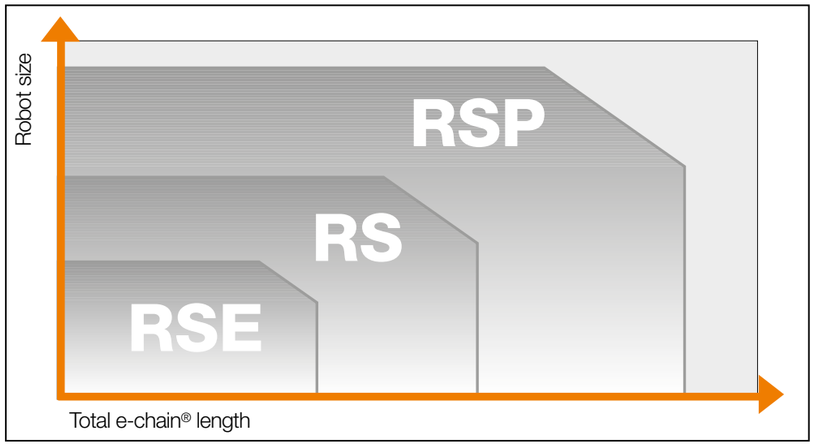
If you want to select a suitable retraction system yourself, please ensure that you observe the maximum cable diameter and usage guidance!

Possible Ø index for triflex® R retraction systems

For series	RSP ø index	RS Ø index	RSE linear ø index	RSLE ø index	RSE ø index
TRC	60 - 125	40 - 100	40 - 125	70	40 - 50
TRE	60 - 125	40 - 100	40 - 125	70	40 - 50
TRCF	65 - 100	–	65 - 100	85	–
TRL*	–	–	–		–
TRLF*	–	–	–		–

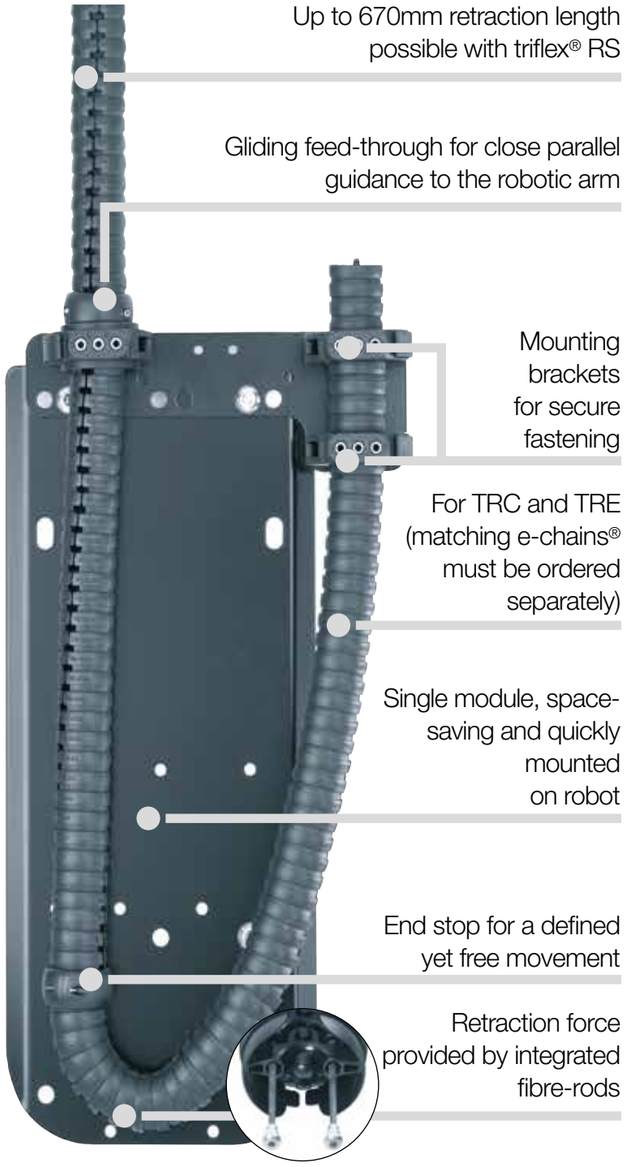
*Retraction systems not available for this series

Selection tool for triflex® R retraction systems with deflection



RS retraction system

Modular retraction system



Modular retraction system - triflex® RS

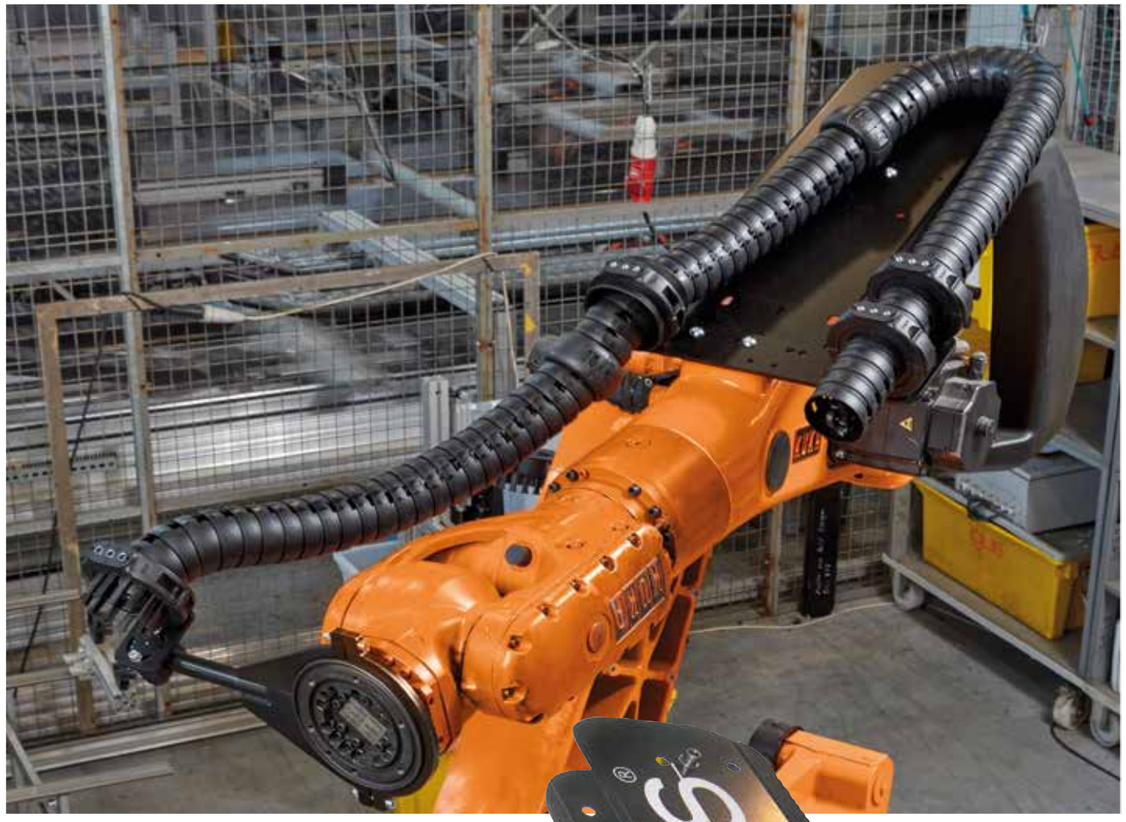
triflex® RS is a retraction system for robots with medium to high payloads. With triflex® RS, the multi-axis triflex® R e-chain® is routed parallel to the robot arm. Integrated fibre rods produce a directed pretension, avoiding the formation of loops in the working area of the robot head. This also allows applications to be implemented in very limited space. triflex® RS offers safe energy supply for tools without stressing the cables, thus minimising downtimes.

- Space-saving, closely routed on the robot arm
- A system solution proven and tested in thousands of applications
- Universal installation
- Integrated fibre-rods - no external mechanical components such as springs or steel cables required!

Video online
► www.igus.eu/RS_movie

RS applications

RS - R(etraction) S(ystem)



triflex® RS for a low profile retraction system. The triflex® RS retraction unit runs parallel to the robot arm

Option: triflex® RS with cover for more mounting space

RS retraction system

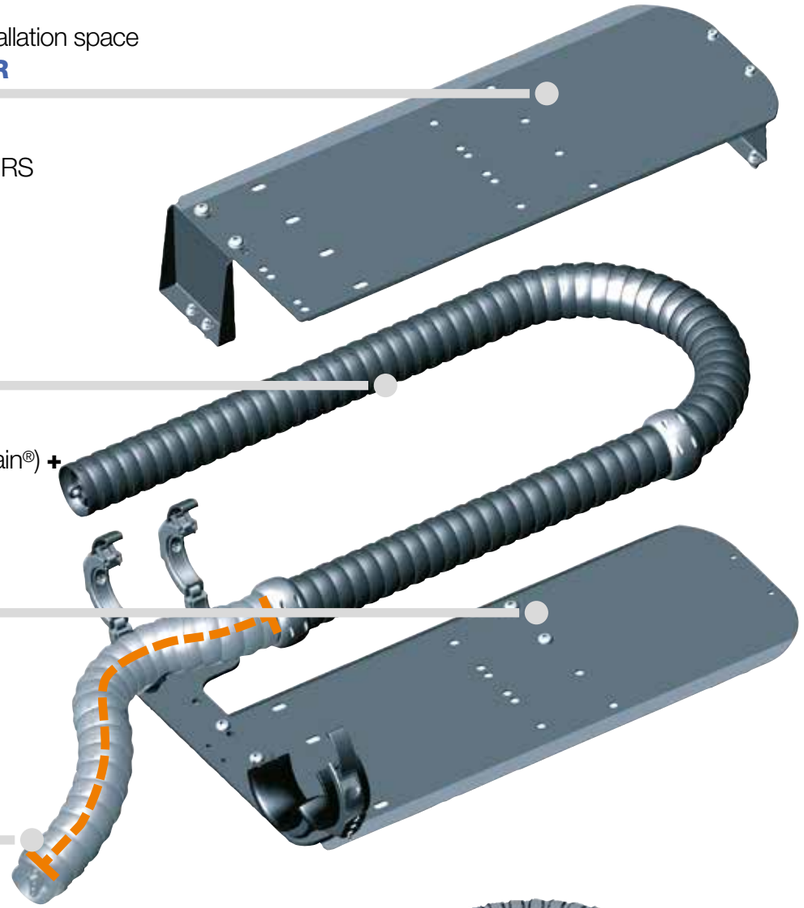
System design with matching e-chain®

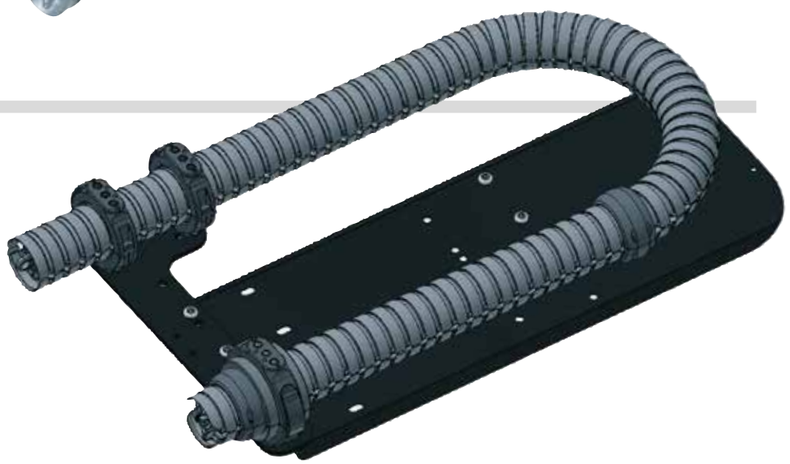
Optional cover for additional installation space on the robot: **TR.RS.XX.COVER**

Matching triflex® R e-chains® for RS with integrated fibre-rods
TRC.RS.XX.*R*.LLLL.0
TRE.RS.XX.*R*.LLLL.0.B

RSE linear system (without e-chain®) **+**
Support plate **+**
Mounting bracket **+**
Gliding feed-through **=**
TR.RS.XX.L or **TR.RS.XX.R**

Overall e-chain® length =
additional length from the gliding feed-through **LLLL +**
the e-chain® length
within the system





Complete, modular retraction system RS with fixed end left and triflex® R e-chain® TRE series. Mounting bracket and gliding feed-through are included. Please order matching triflex® R e-chain® and optional cover separately.

RS retraction system

Order examples for retraction system including e-chain®

Sample order of a complete TR.RS system, ø-Index 60, fixed end on the left, including cover and e-chain® (standard length: 500mm)

System	Insert Ø index / select fixed end **.L** / **.R**	**TR.RS.60.L**
+ Cover	Insert Ø index (cover optional)	**TR.RS.60.COVER**
+ e-chain®	Insert ø index / Insert bend radius ***R*** / Insert standard length **LLLL**	**TRC.RS.60.087.0500.0**
Order text:	**TR.RS.60.L + TR.RS.60.COVER + TRC.RS.60.087.0500.0**	

Order key retraction system

TR.RS.60.L
TR.RS.60.R

- **L** = Fixed end right or
- **R** = Fixed end left
- Ø index
- Retraction system
- Series

Order key e-chains®

TRC.RS.60.087.0500.0
TRE.RS.60.087.0500.0.B

- Default colour black
- **LLLL** = Additional length
- ***R*** Bend radius
- Ø index
- Retraction system
- e-chain® series

More optional accessories | RS modular retraction system

Cover
For additional installation space and extreme movements
▶ **Page 70**

Adjustment unit
For accurate adjustment of the system position
▶**Page 110**

Adapter consoles
for custom mounting options
▶ **Page 111**

Axis 6 clamp
for triflex® R mounting brackets
▶ **Page 114**

RS retraction system

Product range

Cover for additional installation space, optional

Product range | RS modular retraction system

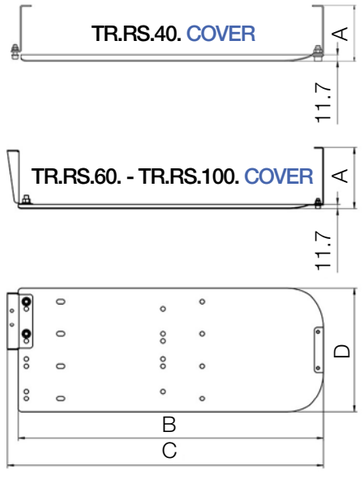
Ø Index		Part No. fixed end **left**	Part No. fixed end **right**	Retraction length[1] ≤ [mm]	A [mm]	B [mm]	C [mm]	D [mm]	Weight [kg]
30.	▶	–	–	–	–	–	–	–	–
40.	▶	**TR.RS.40.L**	**TR.RS.40.R**	460	576	301	95	51	3.5
50.	▶	–	–	–	–	–	–	–	–
60.	▶	**TR.RS.60.L**	**TR.RS.60.R**	550	900	528	150	65	8.7
65.	▶	–	–	–	–	–	–	–	–
65. (*R 200*)	▶	–	–	–	–	–	–	–	–
70.	▶	**TR.RS.70.L**	**TR.RS.70.R**	620	900	545	167	65	9.2
85.	▶	**TR.RS.85.L**	**TR.RS.85.R**	670	900	565	167	65	9.5
85. (*R 240*)	▶	–	–	–	–	–	–	–	–
100.	▶	**TR.RS.100.L**	**TR.RS.100.R**	580	938	614	167	108	11.5
125.	▶	–	–	–	–	–	–	–	–

Please order matching triflex® R e-chain® separately. 1) Maximum retraction length

Product range | Cover, optional

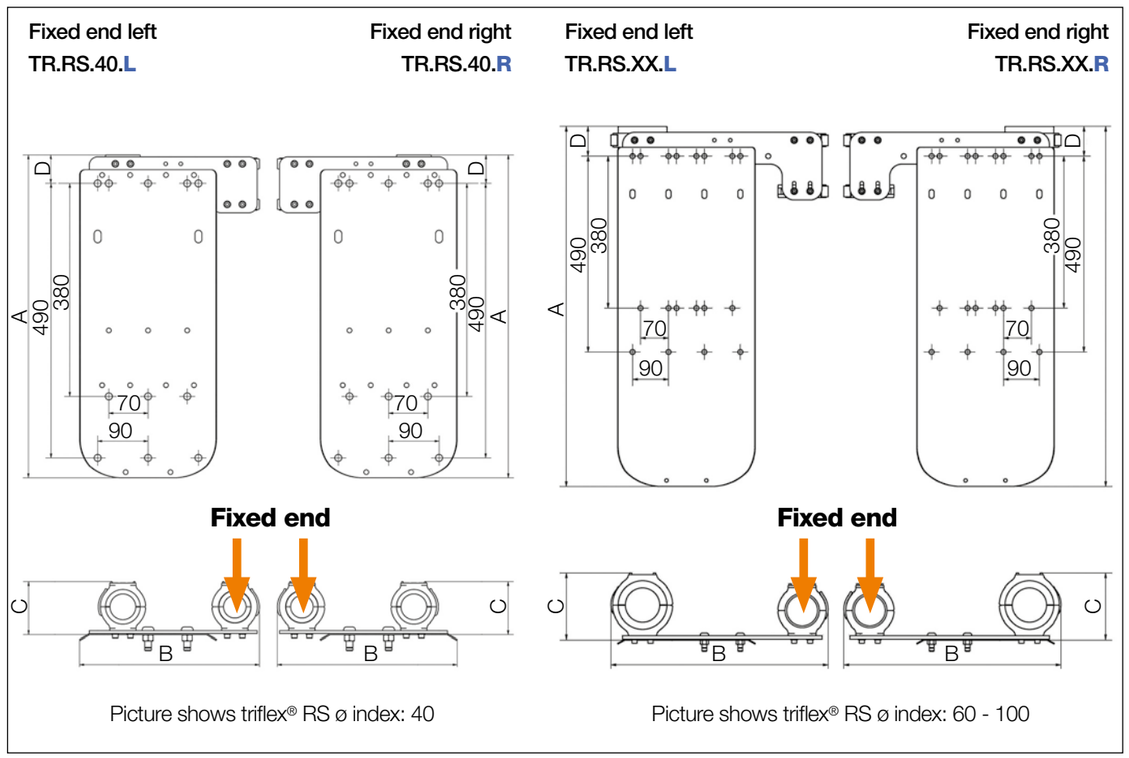
Ø Index		Optional cover retrofit kit	A [mm]	B [mm]	C [mm]	D [mm]	Load* ≤ [kg]	Weight [kg]
30.	▶	–	–	–	–	–	–	–
40.	▶	**TR.RS.40.**COVER	101.7	550	567.5	244.6	1.5	2.6
50.	▶	–	–	–	–	–	–	–
60.	▶	**TR.RS.60.**COVER	170.7	850	880	344.6	3.5	7.2
65.	▶	–	–	–	–	–	–	–
65. (*R 200*)	▶	–	–	–	–	–	–	–
70.	▶	**TR.RS.70.**COVER	170.7	850	880	344.6	3.5	7.2
85.	▶	**TR.RS.85.**COVER	170.7	850	880	344.6	3.5	7.2
85. (*R 240*)	▶	–	–	–	–	–	–	–
100.	▶	**TR.RS.100.**COVER	172	853	910.5	397.6	3.5	7.1
125.	▶	–	–	–	–	–	–	–

*Maximum fill weight to be used with the cover



RS retraction system

Installation dimensions



Picture shows triflex® RS ø index: 40

Picture shows triflex® RS ø index: 60 - 100

RS modular retraction system (picture shows the fixed end on the left)

Mounting bracket and gliding feed-through are included.

Please order matching triflex® R e-chain® separately.

RS e-chains®

Product range

Product range | Matching e-chains® for RS

Ø Index		Part No. **TRC** enclosed	Part No. **TRE** "easy" design
30.	▶	–	–
40.	▶	**TRC.RS.40.058. LLLL.0**	**TRE.RS.40.058. LLLL.0.B**
50.	▶	–	–
60.	▶	**TRC.RS.60.087. LLLL.0**	**TRE.RS.60.087. LLLL.0.B**
65.	▶	–	–
65. (*R 200*)	▶	–	–
70.	▶	**TRC.RS.70.110. LLLL.0**	**TRE.RS.70.110. LLLL.0.B**
85.	▶	**TRC.RS.85.135. LLLL.0**	**TRE.RS.85.135. LLLL.0.B**
85. (*R 240*)	▶	–	–
100.	▶	**TRC.RS.100.145.LLLL.0**	**TRE.RS.100.145.LLLL.0.B/C**
125.	▶	–	–

1) Available for B- and C-versions

*Standard lengths from the gliding feed-through outside the system - special lengths upon request.

e-chains® standard lengths*

LLLL [mm] | **0500** | **1000** | **1500** | **2000** |

Part No. with **LLLL** standard length value (measured from the gliding feed-through) corresponds to the robot arm length from axis 3. For example: **TRC.RS.60.087.0500.0**

RS e-chains®

Cable length calculation

Calculating the overall e-chain® length | RS e-chains®

Ø Index		Bend radius *R* [mm]	e-chain® length* [mm]	Number of e-chains® links	Overall e-chain® length [mm]
30.	▶	–	–	–	–
40.	▶	058	1251	90	**LLLL** + 1251
50.	▶	–	–	–	–
60.	▶	087	1734	85	**LLLL** + 1734
65.	▶	–	–	–	–
65. (*R 200*)	▶	–	–	–	–
70.	▶	110	1895	74	**LLLL** + 1895
85.	▶	135	2080	68	**LLLL** + 2080
85. (*R 240*)	▶	–	–	–	–
100.	▶	145	2105	61	**LLLL** + 2105
125.	▶	–	–	–	–

*Values are related to the e-chain® length within the system

To calculate the overall e-chain® length: Please add the e-chains® length* within the system to the standard length **LLLL** (measured from the gliding feed-through)

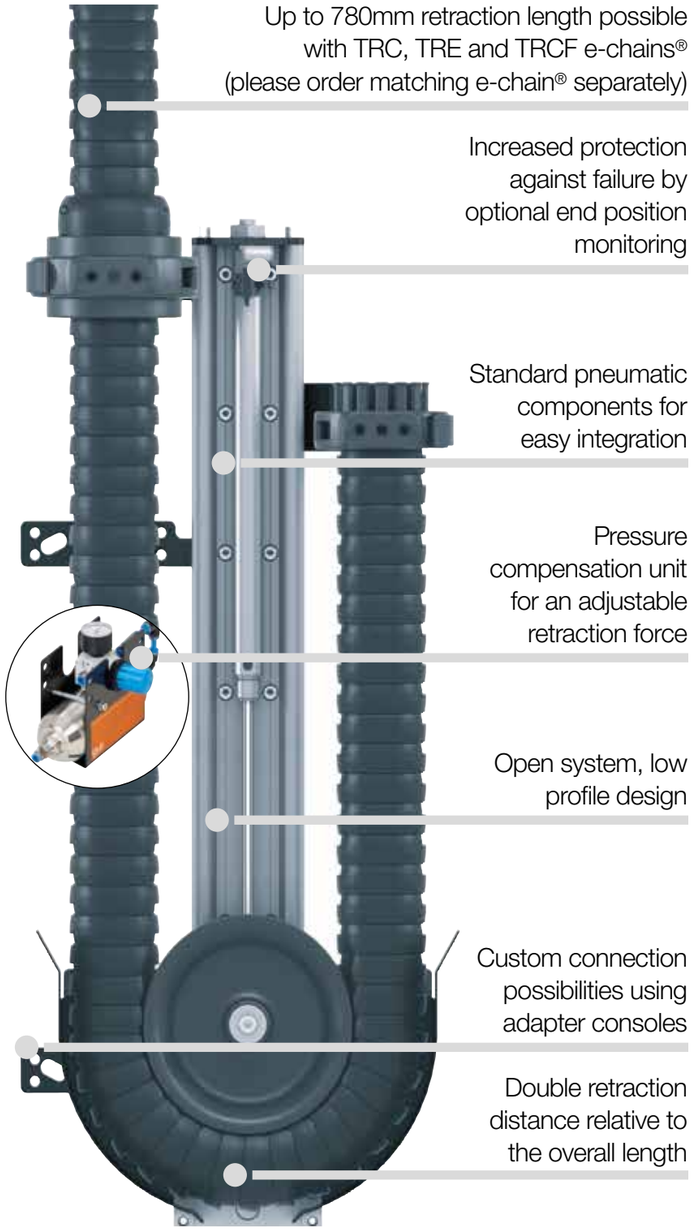
Overall e-chain® length =
additional length from the gliding feed-through
LLLL + the e-chain® length within the system

More information and installation height | RS e-chains®

- **TRC series** - enclosed design, chip protection, smooth outer contour ▶ **from page 28**
- **TRE series** - "easy" design, very easy to fill, simply press cables in ▶ **from page 30**

RSP retraction system

Pneumatic retraction system



Pneumatic retraction system - triflex® RSP

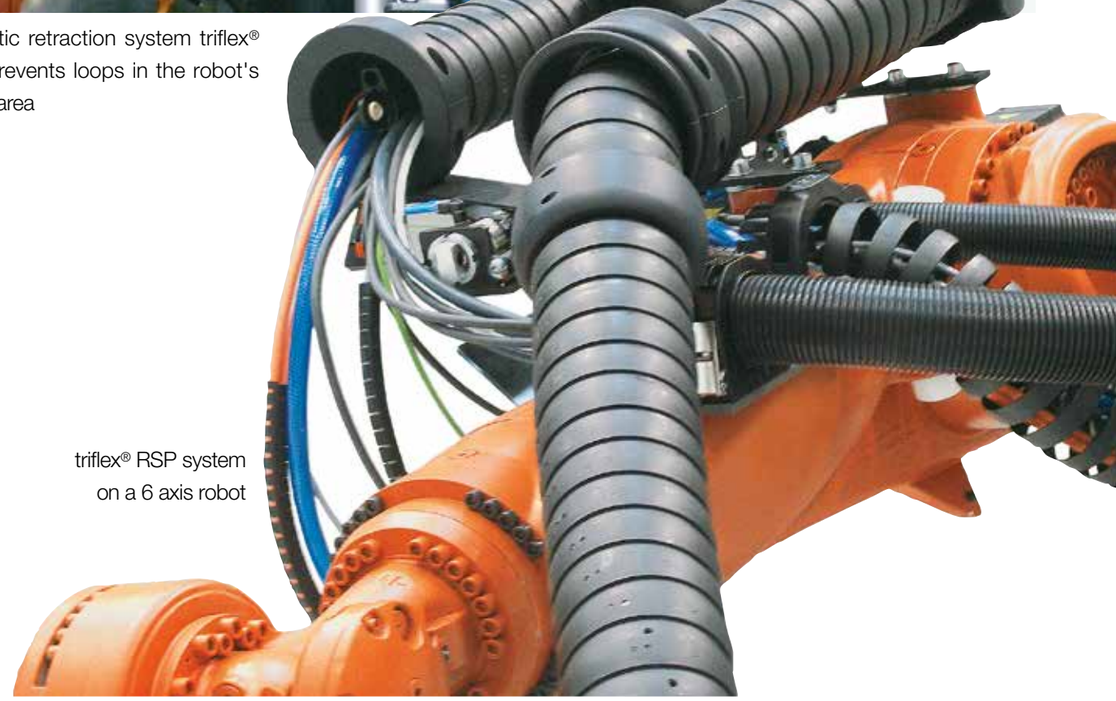
triflex® RSP prevents loops on the robot head, with a continuously adjustable retraction force. Extension lengths of up to 780mm enable a secure guidance of the cables and hoses, even with large arm diameters and very complex movements. The retraction forces can be adjusted using a pneumatic cylinder. Whether light or heavy fill weights, long or short robot arms - with the igus® RSP retraction system the retraction force can be adjusted to the individual application.

- For axis 3-6 on industrial robots
- Larger retraction forces than RS system
- Even larger e-chains® up to Ø 125mm can be guided safely
- Almost constant force over the complete travel, even with heavy fill weights
- The end position can be monitored so damage can be prevented
- Mounting options for numerous robot models and manufacturers with adapter consoles
- Very low energy consumption with integrated air reservoir

RSP applications

RSP - R(etraction) S(ystem) P(neumatic)

Pneumatic retraction system triflex® RSP - prevents loops in the robot's working area



triflex® RSP system on a 6 axis robot

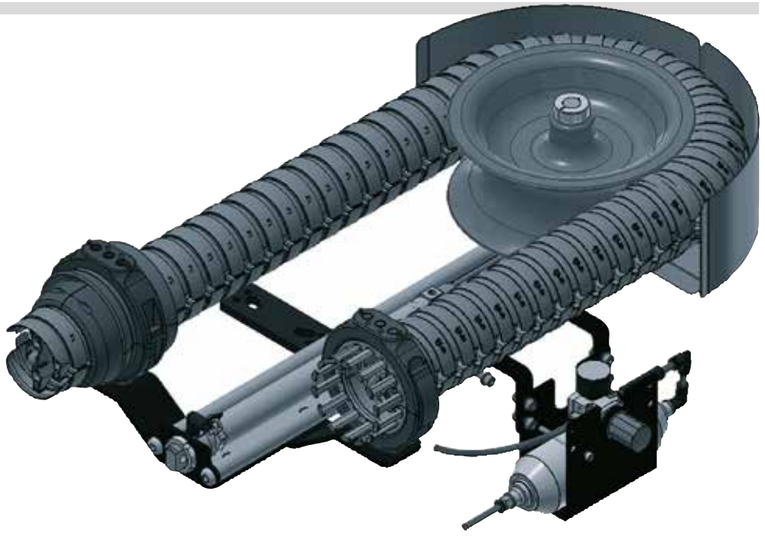
RSP retraction system

System design with matching e-chain®

Matching triflex® R e-chains® for RSP
TRC .RSP.XX.*R*.LLLL.0
TRE .RSP.XX.*R*.LLLL.0.(B)
TRCF.RSP.XX.*R*.LLLL.0

Overall e-chain® length =
additional length from the gliding feed-through **LLLL** +
the e-chain® length
within the system

RSP-System (without e-chain®) +
Pressure compensation unit +
Mounting bracket +
Gliding feed-through =
TR.RSP.XX.L or
TR.RSP.XX.R



Complete, pneumatic retraction system RSP with fixed end left and triflex® R e-chain® TRE series. Pressure compensation unit, mounting bracket and gliding feed-through are included in the delivery. Please order matching triflex® R e-chain® separately!

RSP retraction system

Order examples for retraction system including e-chain®

Sample order of a complete TR.RSP system, ø-Index 85, fixed end on the left, and e-chain® (standard length: 500mm)

System	Insert Ø index / select fixed end **.L** / **.R**	**TR.RSP.85.L**
+ e-chain®	Insert ø index / Insert bend radius ***R*** / Insert standard length **LLLL**	**TRC.RSP.85.135.1000.0**
Order text:	**TR.RSP.85.L + TRC.RSP.85.135.1000.0**	

Order key retraction system

TR.RSP.85.L
TR.RSP.85.R

- **L** = Fixed end right or
- **R** = Fixed end left
- Ø index
- Retraction system
- Series

Order key e-chains®

TRC .RSP.85.135.1000.0
TRE .RSP.85.135.1000.0.B
TRCF.RSP.85.135.1000.0

- Default colour black
- **LLLL** = Additional length
- ***R*** Bend radius
- Ø index
- Retraction system
- e-chain® series

More optional accessories | RSP pneumatic retraction system

Adjustment unit
For accurate adjustment of the system position
▶Page 110

Adapter consoles
For custom mounting options
▶ Page 111

Axis 6 clamp
For triflex® R mounting brackets
▶ Page 114

RSP retraction system

Product range

Product range | RSP pneumatic retraction system

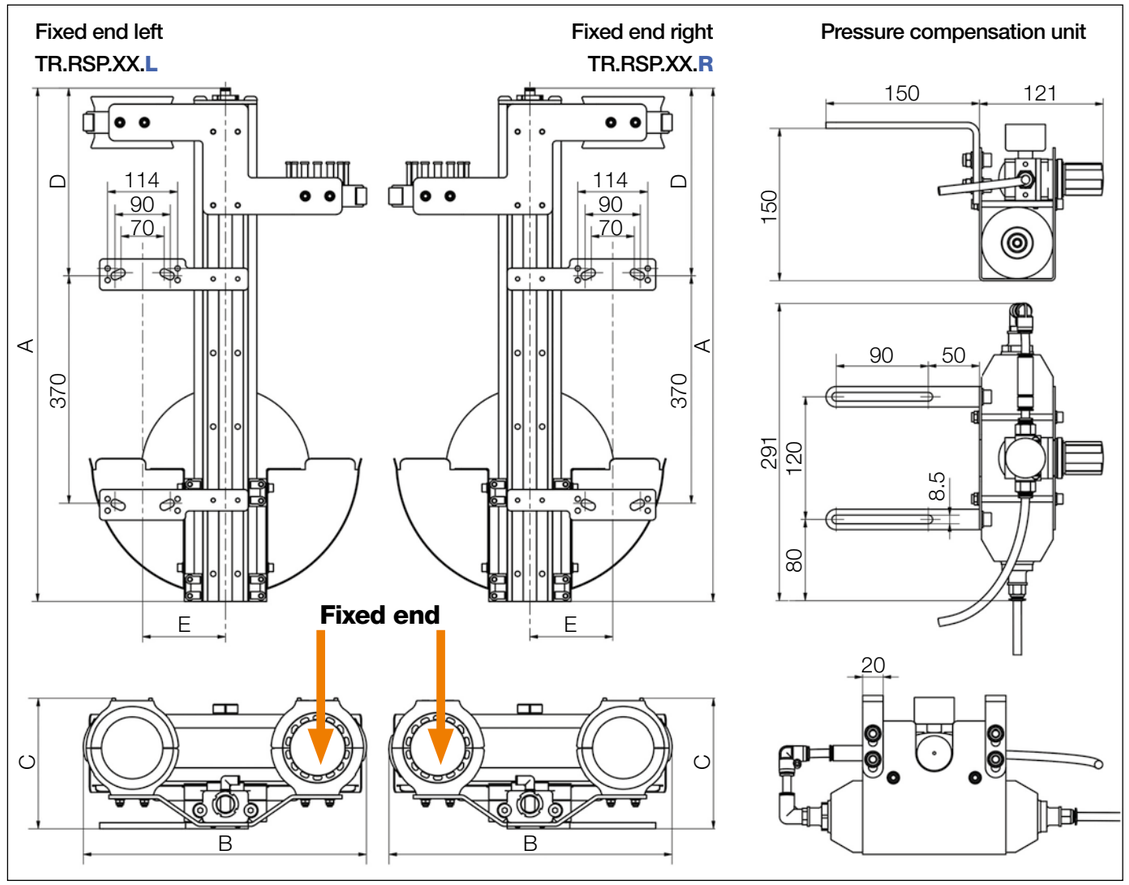
Ø Index	Part No. fixed end **left**	Part No. fixed end **right**	Retraction length[1] ≤ [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	Weight [2] [kg]
30.	–	–	–	–	–	–	–	–	–
40.	–	–	–	–	–	–	–	–	–
50.	–	–	–	–	–	–	–	–	–
60.	**TR.RSP.60.L**	**TR.RSP.60.R**	580	792	396	177	277	135	16.1
65.	**TR.RSP.65.L**	**TR.RSP.65.R**	580	792	396	177	277	135	16.1
65. (*R 200*)	–	–	–	–	–	–	–	–	–
70.	**TR.RSP.70.L**	**TR.RSP.70.R**	580	792	396	177	277	135	16.2
85.	**TR.RSP.85.L**	**TR.RSP.85.R**	620	836	461	213	306	135	19.4
85. (*R 240*)	–	–	–	–	–	–	–	–	–
100.	**TR.RSP.100.L**	**TR.RSP.100.R**	620	845	467	213	306	135	19.5
125.	**TR.RSP.125.L**	**TR.RSP.125.R**	780	1043	570	245	405	135	24.1

Pressure compensation unit, mounting bracket and gliding feed-through are included in the delivery. Please order matching triflex® R e-chain® separately.

1) Retraction length maximum 2) Plus 2.3 kg for pressure compensation unit

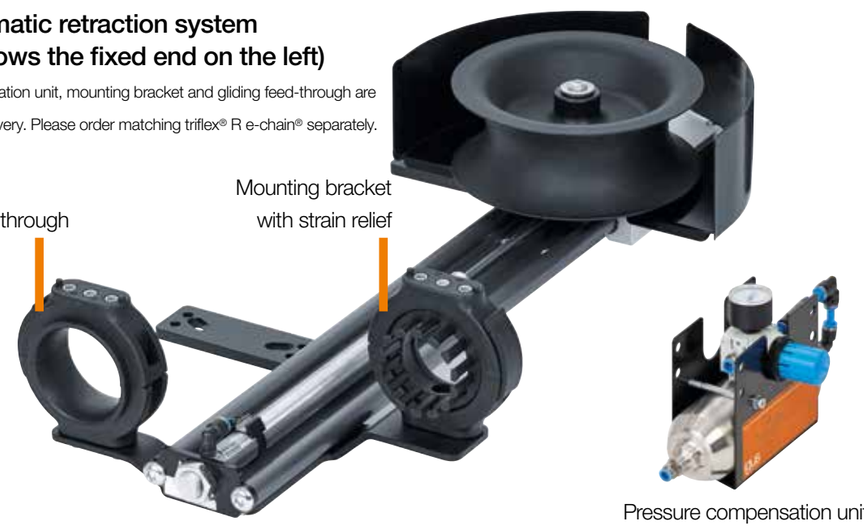
RSP retraction system

Installation dimensions



RSP pneumatic retraction system (picture shows the fixed end on the left)

Pressure compensation unit, mounting bracket and gliding feed-through are included in the delivery. Please order matching triflex® R e-chain® separately.



RSP e-chains®

Product range

Product range | Matching e-chains® for RSP

Ø Index	Part No. **TRC** enclosed	Part No. **TRE** "easy" design	Part No.**TRCF** with snap lock mechanism
30.	–	–	–
40.	–	–	–
50.	–	–	–
60.	TRC.RSP.60.087.LLLL.0	TRE.RSP.60.087.LLLL.0.B	–
65.	–	–	TRCF.RSP.65.100.LLLL.0
65. (*R 200*)	–	–	–
70.	TRC.RSP.70.110.LLLL.0	TRE.RSP.70.110.LLLL.0.B	–
85.	TRC.RSP.85.135.LLLL.0	TRE.RSP.85.135.LLLL.0.B	TRCF.RSP.85.135.LLLL.0
85. (*R 240*)	–	–	–
100.	TRC.RSP.100.145.LLLL.0	TRE.RSP.100.145.LLLL.0.B/C [1)]	TRCF.RSP.100.145.LLLL.0
125.	TRC.RSP.125.182.LLLL.0	TRE.RSP.125.182.LLLL.0	–

1) Available for B- and C-versions

*Standard lengths from the gliding feed-through outside the system - special lengths upon request.

e-chains® standard lengths*

LLLL [mm] | **0500** | **1000** | **1500** | **2000** |

Part No. with **LLLL** standard length value (measured from the gliding feed-through) corresponds to the robot arm length from axis 3. For example: **TRC.RSP.60.087.0500.0**

RSP e-chains®

Cable length calculation

Calculating the overall e-chains® length | RSP e-chains®

Ø Index	Bend radius *R* [mm]	e-chain® length* [mm]	Number of e-chains® links	Overall e-chain® length [mm]
30.	–	–	–	–
40.	–	–	–	–
50.	–	–	–	–
60.	087	1489	73	LLLL + 1489
65.	100	1432	62	LLLL + 1432
65. (*R 200*)	–	–	–	–
70.	110	1484	58	LLLL + 1484
85.	135	1622	53	LLLL + 1622
85. (*R 240*)	–	–	–	–
100.	145	1656	48	LLLL + 1656
125.	182	1962	44	LLLL + 1962

*Values are related to the e-chain® length within the system

To calculate the overall e-chain® length: Please add the e-chain® length* within the system to the standard length **LLLL** (measured from the gliding feed-through)

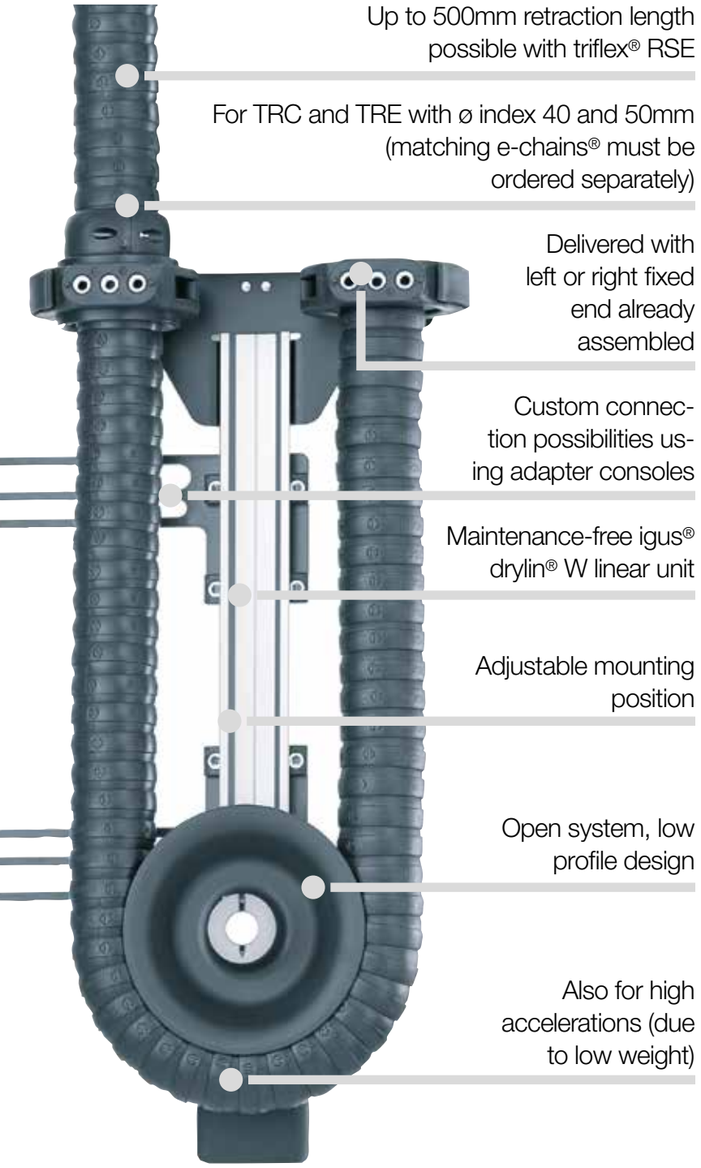
Overall e-chain® length =
additional length from the gliding feed-through
LLLL + the e-chain® length within the system

More information and installation height | RSP e-chains®

- **TRC series** - enclosed design, chip protection, smooth outer contour ▶ **from page 28**
- **TRE series** - "easy" design, very easy to fill, simply press cables in ▶ **from page 30**
- **TRCF series** - enclosed design with snap-lock mechanism, chip-repellent, smooth outer contour ▶ **from page 32**

RSE retraction system

Cost-effective retraction system with deflection



Cost-effective retraction system with deflection for small robots - triflex® RSE

Specially developed for robots with small to medium cable and hose filling, the igus® triflex® RSE retraction system offers a way to prevent loop formation in the workspace of the robot, even in highly dynamic applications.

- For series TRC·TRE with sizes 40 and 50mm
- Extremely fast response, even in highly dynamic robot programs
- Low weight, very little reduction in robot handling capacity
- Universal adjustable installation brackets
- Maintenance and lubrication-free igus® drylin® W linear unit
- For maximum degrees of freedom
- For cable diameters up to 18.8mm

RSE applications

RSE - R(etraction) S(ystem) E(lastic)

Reliable and controlled energy supply, even in confined space with the igus® triflex® RSE retraction system

e-chain® is guided closely to the arm with a low profile

RSE retraction system

System design with matching e-chain®

Cover for additional installation space on the robot, optional: **TR.RSE.XX.COVER**

Matching triflex® R e-chains® for RSE with integrated fibre-rods
TRC.RSE.XX.*R*.LLLL.0
TRE.RSE.XX.*R*.LLLL.0.B

Overall e-chain® length =
additional length from the gliding feed-through **LLLL +**
the e-chain® length within the system

RSE system (e-chain® not included) **+**
Mounting bracket **+**
Gliding feed-through **=**
TR.RSE.(02).XX.L or
TR.RSE.(02).XX.R

Complete retraction system RSE with deflection, fixed end right and triflex® R e-chain® TRC series. Mounting bracket and gliding feed-through are included. Please order matching triflex® R e-chain® and optional cover separately.

RSE retraction system

Order examples for retraction system including e-chain®

Sample order of a complete TR.RSE system, Ø index 50, fixed end on the left, including cover and e-chain® (standard length: 500mm)

System	Insert Ø index / select fixed end **.L** / **.R**	**TR.RSE.50.L**
+ Cover	Insert Ø index (cover optional)	**TR.RSE.50.COVER**
+ e-chain®	Insert ø index / Insert bend radius ***R*** / Insert standard length **LLLL**	**TRC.RSE.50.080.0500.0**
Order text:	**TR.RSE.50.L + TR.RSE.50.COVER + TRC.RSE.50.080.0500.0**	

Order key retraction system

TR.RSE.50.L
TR.RSE.50.R

L = Fixed end right or
R = Fixed end left
Ø index
Retraction system
Series

Order key e-chains®

TRC.RSE.50.080.0500.0
TRE.RSE.50.080.0500.0.B

Default colour black
LLLL = Additional length
R Bend radius
Ø index
Retraction system
e-chain® series

More optional accessories | RS modular retraction system

Cover
For additional installation space and extreme movements
▶ **Page 86**

Adapter consoles
For individual mounting options
▶ **Page 111**

Axis 6 clamp
For triflex® R mounting brackets
▶ **Page 114**

RSE retraction system

Product range

Cover for additional installation space, optional

Product range | RSE cost-effective retraction system with deflection

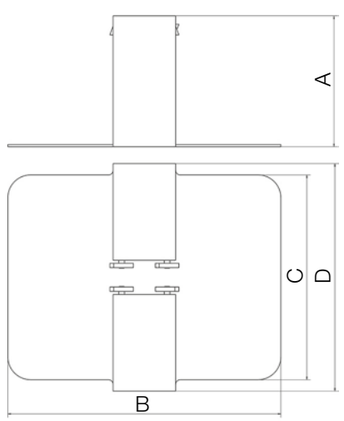
Ø Index	Part No. fixed end **left**	Part No. fixed end **right**	Retraction length[1] ≤ [mm]	A [mm]	B [mm]	C [mm]	D [mm]	Weight [kg]
30.	–	–	–	–	–	–	–	–
40.	**TR.RSE.02.40.L**	**TR.RSE.02.40.R**	500	440	220	110	64.7	1.6
50.	**TR.RSE.50.L**	**TR.RSE.50.R**	500	497	275	132	79	2.1
60.	–	–	–	–	–	–	–	–
65.	–	–	–	–	–	–	–	–
65. (*R 200*)	–	–	–	–	–	–	–	–
70.	–	–	–	–	–	–	–	–
85.	–	–	–	–	–	–	–	–
85. (*R 240*)	–	–	–	–	–	–	–	–
100.	–	–	–	–	–	–	–	–
125.	–	–	–	–	–	–	–	–

Please order matching triflex® R e-chain® separately. 1) Maximum retraction length

Product range | RSE cover, optional

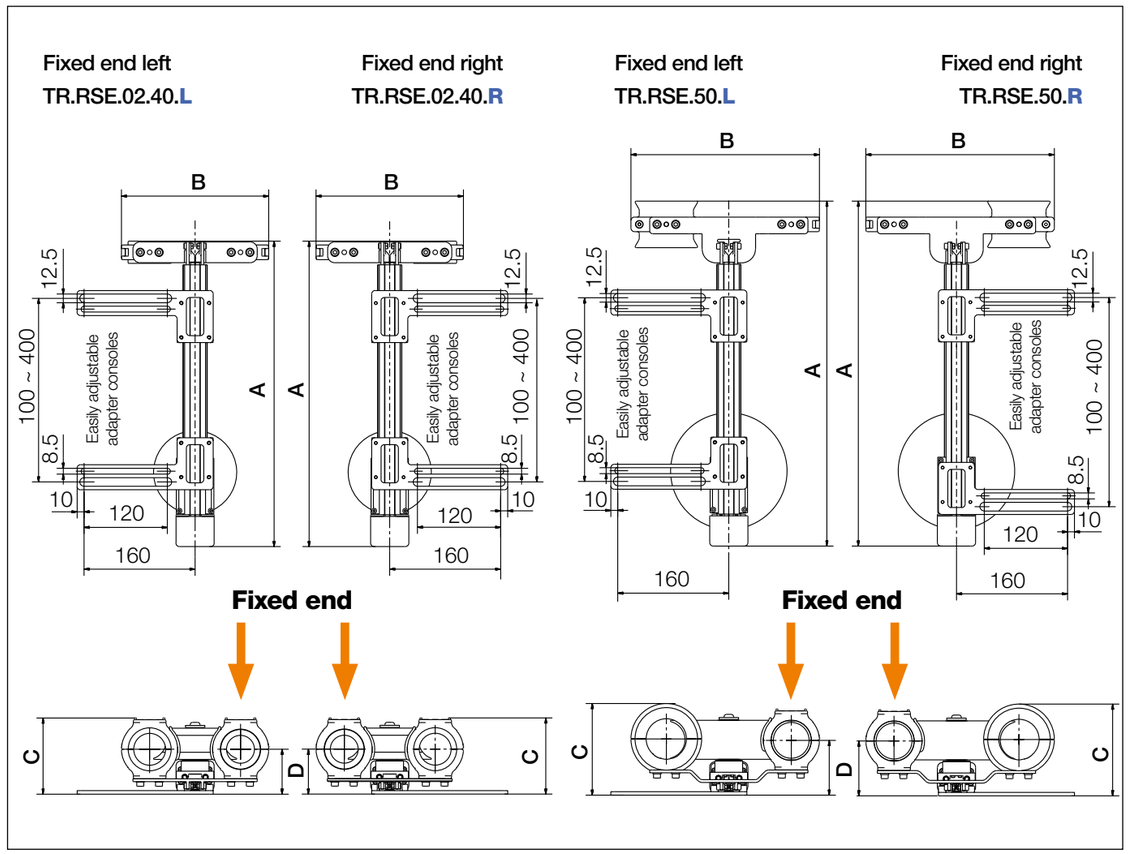
Ø Index	Optional cover retrofit kit	A [mm]	B [mm]	C [mm]	D [mm]	Load* ≤ [kg]	Weight [kg]
30.		–	–	–	–	–	–
40.	**TR.RSE.40.COVER**	115	240	180	200	1.5	1.1
50.	**TR.RSE.50.COVER**	126	300	248	248	1.5	1.7
60.		–	–	–	–	–	–
65.		–	–	–	–	–	–
65. (*R 200*)		–	–	–	–	–	–
70.		–	–	–	–	–	–
85.		–	–	–	–	–	–
85. (*R 240*)		–	–	–	–	–	–
100.		–	–	–	–	–	–
125.		–	–	–	–	–	–

*Maximum fill weight to be used with the cover



RSE retraction system

Installation dimensions



RSE - retraction system with guide roller for small robotics (picture shows fixed end on the left)

Mounting bracket and gliding feed-through are included.

Please order matching triflex® R e-chain® separately.

RSE e-chains®

Product range

Product range | Matching e-chains® for RSE

Ø Index		Part No. **TRC** enclosed	Part No. **TRE** "easy" design
30.	▶	–	–
40.	▶	TRC.RSE.40.058. **LLLL**.0	TRE.RSE.40.058. **LLLL**.0.B
50.	▶	TRC.RSE.50.080. **LLLL**.0	TRE.RSE.50.080. **LLLL**.0.B
60.	▶	–	–
65.	▶	–	–
65. (*R 200*)	▶	–	–
70.	▶	–	–
85.	▶	–	–
85. (*R 240*)	▶	–	–
100.	▶	–	–
125.	▶	–	–

*Standard lengths from the gliding feed-through outside the system - special lengths upon request.

e-chains® standard lengths*

LLLL [mm] | **0500** | **0750** | **1000** | **1250** |

Part No. with **LLLL** standard length value (measured from the gliding feed-through) corresponds to the robot arm length from axis 3. For example: **TRC.RSE.40.058.0500.0**

RSE e-chains®

Cable length calculation

Calculating the overall e-chain® length | RSE e-chains®

Ø Index		Bend radius *R* [mm]	e-chain® length* [mm]	Number of e-chains® links	Overall e-chain® length [mm]
30.	▶	–	–	–	–
40.	▶	058	904	65	**LLLL** + 904
50.	▶	080	1044	60	**LLLL** + 1044
60.	▶	–	–	–	–
65.	▶	–	–	–	–
65. (*R 200*)	▶	–	–	–	–
70.	▶	–	–	–	–
85.	▶	–	–	–	–
85. (*R 240*)	▶	–	–	–	–
100.	▶	–	–	–	–
125.	▶	–	–	–	–

*Values are related to the e-chain® length within the system

To calculate the overall e-chain® length: Please add the e-chains® length* within the system to the standard length **LLLL** (measured from the gliding feed-through)

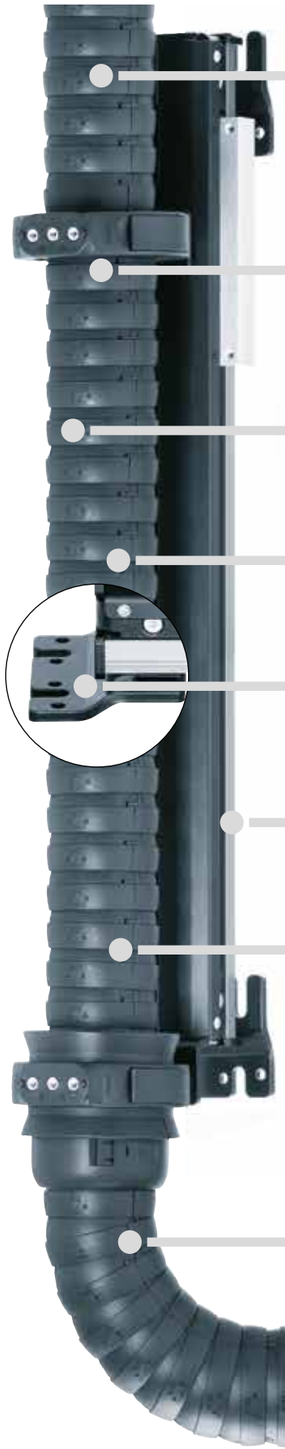
Overall e-chain® length =
additional length from the gliding feed-through
LLLL + the e-chain® length within the system

More information and installation height | RSE e-chains®

- **TRC series** - Enclosed design, chip protection, smooth outer contour ▶ **from page 28**
- **TRE series** - "easy" design, very easy to fill, simply press cables in ▶ **from page 30**

RSE linear retraction system

Linear, space-saving retraction system



Linear, space-saving retraction system - triflex® RSE linear

The more complex the automated production technology, the greater the requirements placed on the energy supply system. It is increasingly the case that not only electric power and fluids have to be supplied to production robots; but also laser cables and supply hoses for rivets, pins and screws. As these often cannot function with small bend radii, the new triflex® RSE relies on very easy linear retraction without loops and spring rods or deflection rollers. The purpose of the triflex® RSE retraction system is to hold the e-chain® as closely as possible to the robot arm in order to prevent the e-chain® from intruding upon or blocking the robot's movements.

- Simple, linear retraction without loops, fibre-rods or guide rollers
- For series TRC·TRE·TRCF with a ø-index of 40-100mm
- Special linear guide avoids small bend radii
- Up to 490mm retraction length possible
- Space-saving, cost-effective
- Maintenance-free drylin® W linear unit

RSE linear applications

RSE linear - R(etraction) S(ystem) E(lastic) linear

igus® TR.RSE system on test robot

Lightweight, linear retraction system for small robots. RSE linear for sizes TR.RSE.40 to TR.RSE.50 ▶ **from page 94**

Linear retraction system for sizes 60-100 with attachment brackets for a wide variety of robot models. RSE linear for sizes TR.RSE.60 to TR.RSE.100 ▶ **from page 96**

RSE linear retraction system

System design with matching e-chain®

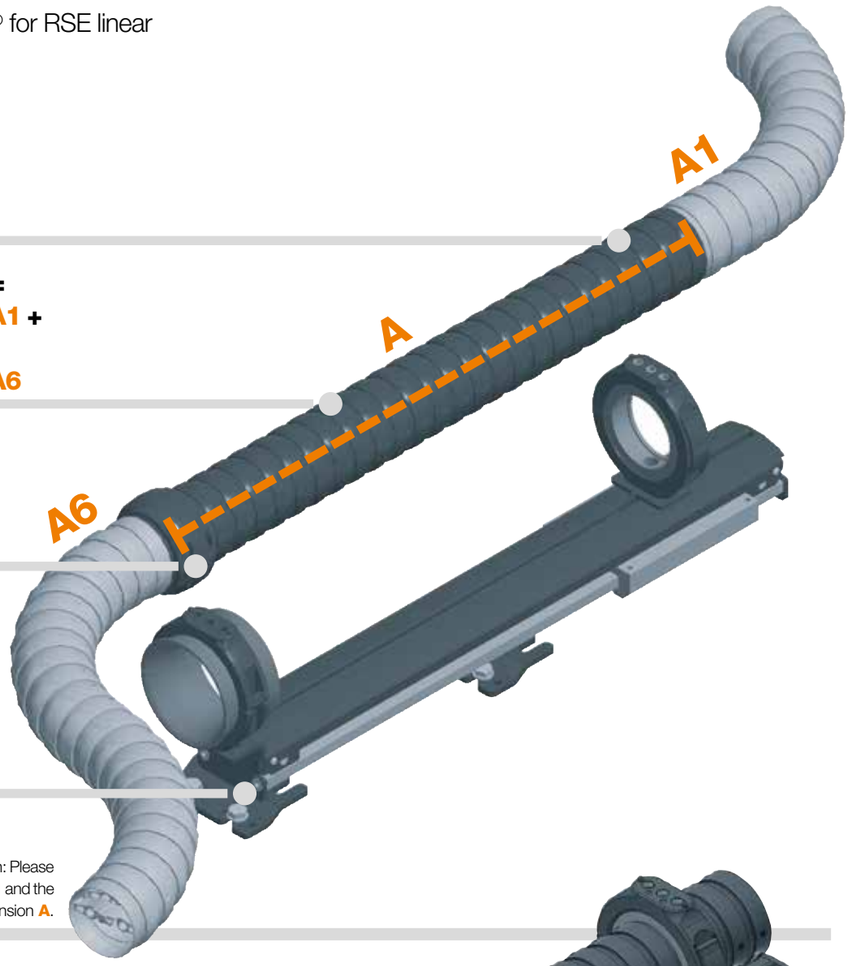
Matching triflex® R e-chain® for RSE linear
TRC .XX.*R*.0
TRE .XX.*R*.0.B
TRCF.XX.*R*.0

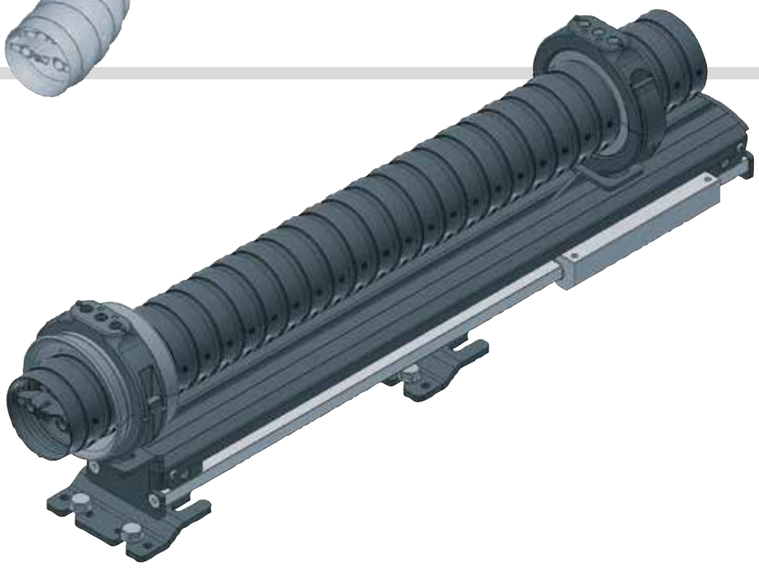
Overall e-chain® length* =
Excess length in direction **A1** +
Dimension **A** +
Excess length in direction **A6**

Limit protector

RSE linear system
(without e-chain®) +
Mounting bracket +
Gliding feed-through =
TR.RSE.XX

*For calculation of the overall e-chain® length: Please add the desired excess length in direction **A1** and the excess length in direction **A6** and the dimension **A**.





Complete retraction system RSE linear and triflex® R e-chain® TRE series. Mounting bracket and gliding feed-through are included. Please order matching triflex® R e-chain®, optional limiting protectors and RSE linear supports separately!

RSE linear retraction system

Order examples for retraction system including e-chain®

Sample order of a complete TR.RSE linear system, Ø index 85, and e-chain® (length: 2 m)

System	Select ø index	**TR.RSE.85**
+ e-chain®	Insert Ø index / Insert bend radius *R* / Insert standard length in metres	**2m TRC.85.135.0**
+ Protector	Select protector option / specify ø index	**TR.85.30**
Order text:	**TR.RSE.85. + 2 m TRC.85.135.0 + TR.85.30**	

Order key retraction system

TR.RSE.85
- Ø index
- Retraction system
- Series

Order key e-chains®

TRC .85.135.0
TRE .85.135.0.B
TRCF.85.135.0
- Default colour black
- *R* Bend radius
- Ø index
- e-chain® series

Other optional accessories | RSE linear pneumatic retraction system

RSE linear support
For lateral deflection of the triflex® R, optional
▶ **Page 96**

Protectors
with screw connections or quick release
▶ **Page 98**

Adapter consoles
For custom mounting options
▶ **Page 111**

Axis 6 clamp
For triflex® R mounting bracket
▶ **Page 114**

RSE linear retraction system

Product range TR.RSE.40 - TR.RSE.50

Product range | RSE linear TR.RSE.40 - TR.RSE.50

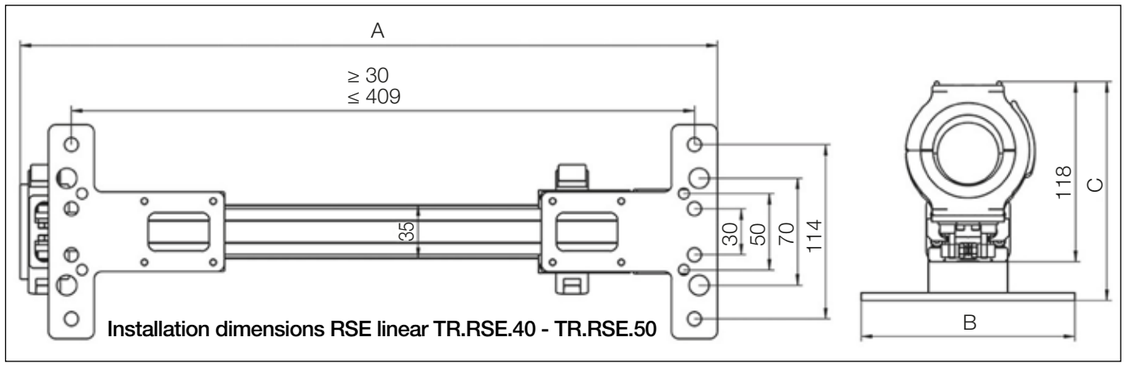
Ø Index	Part No. RSE linear	Retraction length[1] ≤ [mm]	A [mm]	B [mm]	C [mm]	Weight [kg]
30.	–	–	–	–	–	–
40.	**TR.RSE.40**	290	457	140	143	1.4
50.	**TR.RSE.50**	290	475	140	151	1.7

Please order matching triflex® R e-chain® separately. 1) Maximum retraction length

RSE linear size TR.RSE.60 to TR.RSE.100 ▶ from page 96

RSE linear retraction system

Installation dimensions TR.RSE.40 - TR.RSE.50



Installation dimensions RSE linear TR.RSE.40 - TR.RSE.50

RSE linear retraction system

Mounting bracket and gliding feed-through are included.

Please order matching triflex® R e-chain® separately.

RSE linear retraction system

Product range TR.RSE.60 - TR.RSE.100

Product range | RSE linear TR.RSE.60 - TR.RSE.100

Ø Index	Part No. RSE linear	Retraction length[1] ≤ [mm]	A [mm]	B [mm]	C [mm]	Weight [kg]	Part No. RSE support	General image
60. ▶	**TR.RSE.60**	490	868	134	231	9.9	**TR.914.973.60**	
65. ▶	**TR.RSE.65**	490	880	134	231	10.0	**TR.914.973.65**	
65. (*R 200*) ▶	TR.RSE.65.200*	490	880	134	231	10.0	–	
70. ▶	**TR.RSE.70**	490	878	155	258	10.0	**TR.914.973.70**	
85. ▶	**TR.RSE.85**	490	885	155	258	10.0	**TR.914.973.85**	For the lateral
85. (*R 240*) ▶	**TR.RSE.85.240**	490	885	155	258	10.0	–	deflection of the
100. ▶	**TR.RSE.100**	490	886	170	264	10.2	**TR.914.973.100**	energy supply
125. ▶	–	–	–	–	–	–	–	

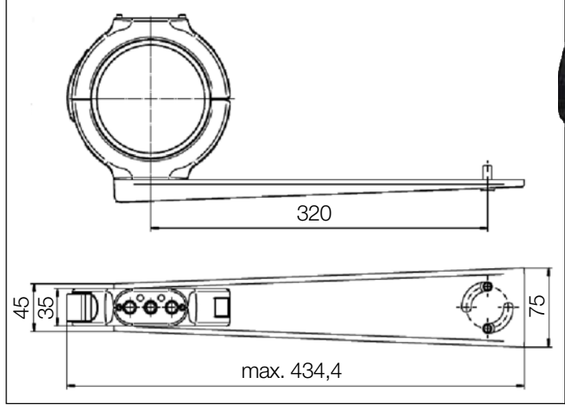
*Available upon request. Please consult igus® for delivery time.

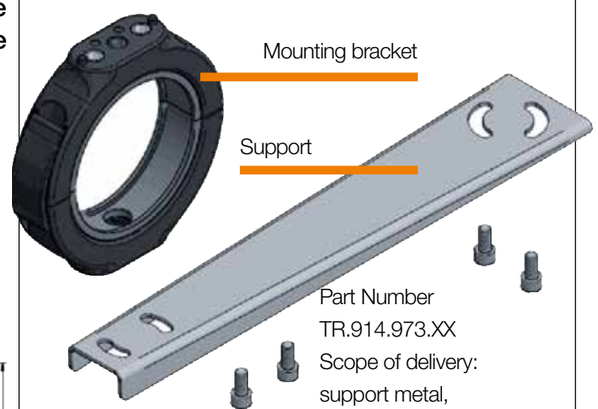
Please order matching triflex® R e-chain® separately. 1) Maximum retraction length Optional RSE support must be ordered separately.

RSE linear size TR.RSE.40 to TR.RSE.50 ▶ from page 94

Product range | RSE linear support, optional

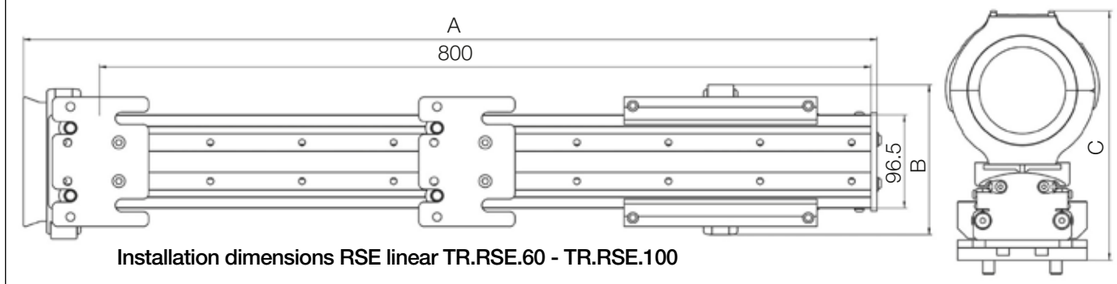
RSE linear support for lateral deflection of the triflex® R energy supply and generation of the fixed end, optional





RSE linear retraction system

Installation dimensions TR.RSE.60 - TR.RSE.100



Installation dimensions RSE linear TR.RSE.60 - TR.RSE.100

RSE linear retraction system

Mounting bracket and gliding feed-through are included.

Please order matching triflex® R e-chain® separately.

RSE linear e-chains®

Product range

Product range | Matching e-chains® for RSE linear

Ø Index	Part No. **TRC** enclosed	Part No. **TRE** "easy" design	Part No. **TRCF** with snap lock mechanism
30.	–	–	–
40.	**TRC.40.058.0**	**TRE.40.058.0.B**	–
50.	**TRC.50.080.0**	**TRE.50.080.0.B**	–
60.	**TRC.60.087.0**	**TRE.60.087.0.B**	–
65.	–	–	**TRCF.65.100.0**
65. (*R 200*)	–	–	**TRCF.65.200.0**
70.	**TRC.70.110.0**	**TRE.70.110.0.B**	–
85.	**TRC.85.135.0**	**TRE.85.135.0.B**	**TRCF.85.135.0**
85. (*R 240*)	–	–	**TRCF.85.240.0**
100.	**TRC.100.145.0**	**TRE.100.145.0.B/C**[1)]	**TRCF.100.145.0**
125.	–	–	–

1) Available for B- and C-versions

Please note that all triflex® R e-chains can be lengthened and shortened individually and can be customized to meet the needs of your application.

Please order e-chains® as piece parts and purchase a protector for each one.

Product range | Matching protectors for RSE linear

Ø Index	❶ Part No. protector with screw fastener	❷ Part No. protector with quick-lock fastener	General image protector options
30.	–	–	
40.	**TR.40.10**	**TR.40.30**	
50.	**TR.50.10**	TR.50.30*	
60.	**TR.60.10**	**TR.60.30**	
65.	**TR.65.10**	–	
65. (*R 200*)	TR.65.200.10*	–	
70.	**TR.70.10**	**TR.70.30**	
85.	**TR.85.10**	**TR.85.30**	
85. (*R 240*)	**TR.85.240.10**	–	
100.	**TR.100.10**	**TR.100.30**	More information on protectors ▶ Page 47
125.	–	–	

*Available upon request. Please consult igus® for delivery time.

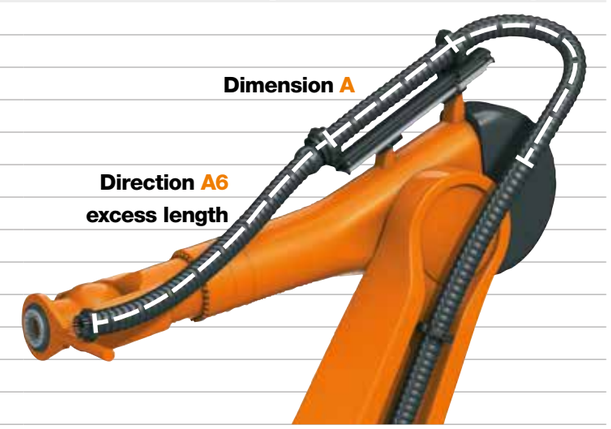
Please order protectors with screw connections or quick release as limit protectors.

RSE linear e-chains®

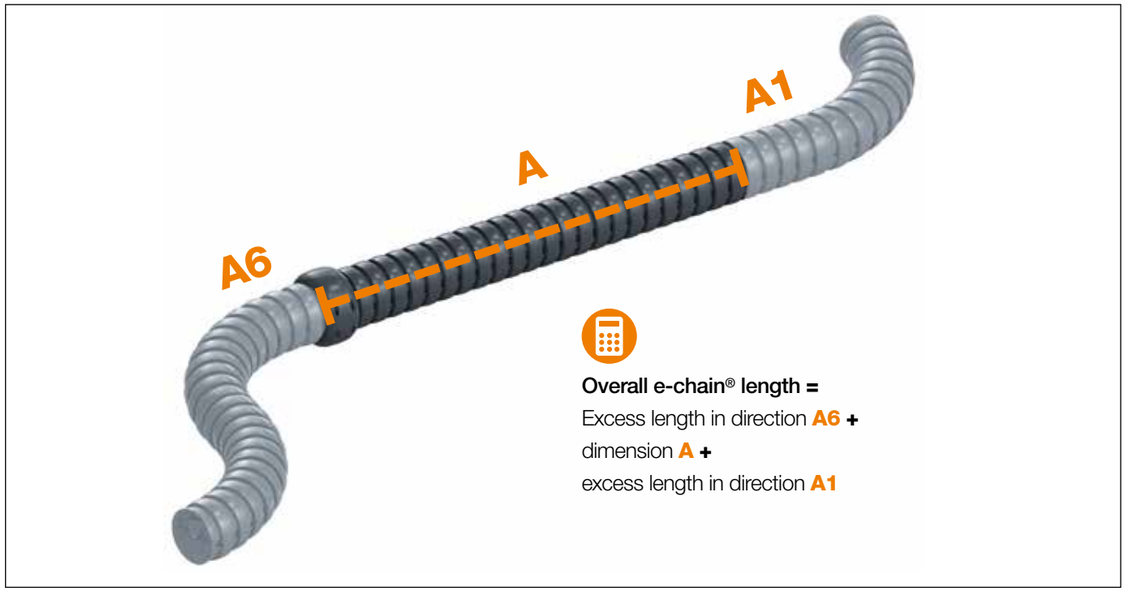
Cable length calculation

Calculation of the overall e-chain® length | RSE linear e-chains®

Ø Index	Bend radius *R* [mm]	**Dimension A** [mm]	General image overall e-chain® length	**Direction A1 excess length**
30.	–	–		
40.	058	390		
50.	080	390		
60.	087	750		
65.	100	750		
65. (*R 200*)	200	750		
70.	110	750		
85.	135	750		
85. (*R 240*)	240	750		
100.	145	750		
125.	–	–		



For calculation of the overall e-chain® length: Please add the desired excess length in direction **A1** and the excess length in direction **A6** and the dimension **A**. Additionally, at least 1 limit protector must be ordered.



Overall e-chain® length =
Excess length in direction **A6** +
dimension **A** +
excess length in direction **A1**

More information and installation height | RSE linear e-chains®

- **TRC series - enclosed design, chip-protection, smooth outer contour** ▶ **from page 28**
- **TRE series** - "easy" design, very easy to fill, simply press cables in ▶ **from page 30**
- **TRCF series** - enclosed design with snap-lock mechanism, chip-repellent, smooth outer contour ▶ **from page 32**

RSEL retraction system

Cost-effective linear retraction system New

Cost-effective, linear retraction system - triflex® RSEL

Avoid looping on the robot head - even more cost-effective and even for corrugated tubes, with the RSEL retraction system. Especially designed for robots with medium to high payload, the igus® triflex® RSEL retraction system offers an option to actively avoid looping in the working area of the robot by keeping the e-chain® as close as possible to the robot arm.

- Cost-optimised retraction system, easy to retrofit
- Due to its standard dimensions and the very compact design, the RSEL retraction system can be mounted directly on the 3rd axis of all common types of robots
- Retraction element with elastomer band
- Prevents the e-chain® from looping or blocking the motion, even in highly dynamic applications
- Short type
- Attachment options for numerous robot models
- For robots with high and medium payloads
- The fixed end of the e-chain® can be freely selected due to the linear design of the RSE retraction system

RSEL applications

RSEL - R(etraction) S(ystem) E(lastic) L(inear)

triflex RSEL - cost-effective and space-saving guidance of the e-chain®

Cable routing from axis 2 to axis 6 on a robot

RSEL retraction system

System design with matching e-chain®

Matching triflex® R e-chains® for RSEL
TRC .XX.*R*.0
TRE .XX.*R*.0.B
TRCF.XX.*R*.0

Overall e-chain® length* =
Excess length in direction **A1** +
Dimension **A** +
Excess length in direction **A6**

Limit protector

RSEL system
(without e-chain®) +
mounting bracket +
gliding feed-through =
TR.RSEL.XX

*For calculation of the overall e-chain® length: Please add the desired excess length in direction **A1** and the excess length in direction **A6** and the dimension **A**.

Complete retraction system RSEL and triflex® R e-chain® TRC series. Mounting bracket and gliding feed-through are included. Please order triflex® R e-chains®, limiting protectors separately!

RSEL retraction system

Order examples for retraction system including e-chain®

Sample order of a complete TR.RSEL system, Ø index 85, and e-chain® (length: 2m)

System	Select ø index	**TR.RSEL.85**
+ e-chain®	Insert Ø index / Insert bend radius *R* / Insert standard length in metres	**2m TRCF.85.135.0**
+ Protector	Select protector option / specify ø index	**TR.85.30**
Order text:	**TR.RSEL.85. + 2 m TRCF.85.135.0 + TR.85.30**	

Order key retraction system

TR.RSEL.85
- Ø index
- Retraction system
- Series

Order key e-chains®

TRC .85.135.0
TRE .85.135.0.B
TRCF.85.135.0
- Default colour black
- *R* Bend radius
- Ø index
- e-chain® series

More optional accessories | RSEL retraction system

Protectors
with screw connections or quick release
▶ **Page 106**

Adapter consoles
For custom mounting options
▶ **Page 111**

Axis 6 clamp
For triflex® R mounting brackets
▶ **Page 114**

RSEL retraction system

Product range

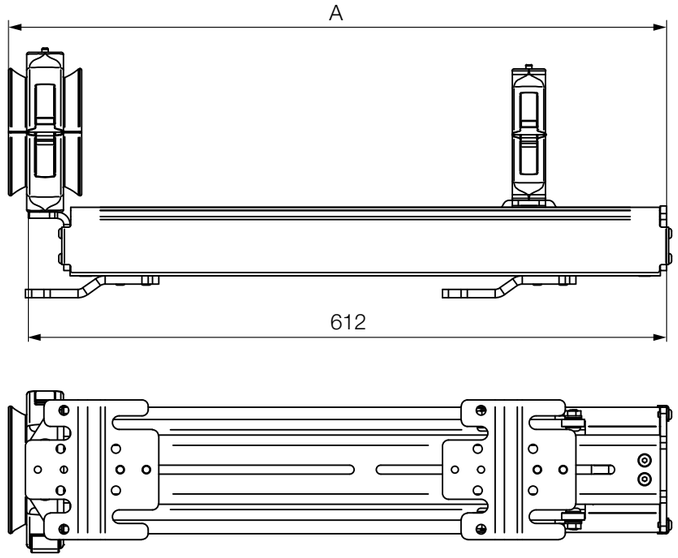
Product range | RSEL retraction system

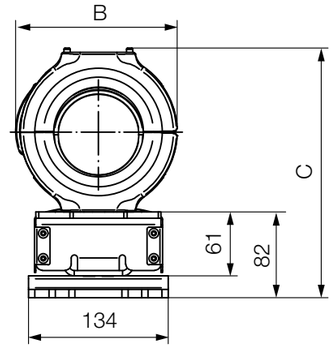
Ø Index		Part Number RSEL	Retraction length[1] ≤ [mm]	A [mm]	B [mm]	C [mm]	Weight [kg]
30.	▶	–	–	–	–	–	–
40.	▶	–	–	–	–	–	–
50.	▶	–	–	–	–	–	–
60.	▶	–	–	–	–	–	–
65.	▶	–	–	–	–	–	–
65. (*R 200*)	▶	–	–	–	–	–	–
70.	▶	**TR.RSEL.70**	380	631	155	239	8.8
85.	▶	**TR.RSEL.85**	380	638	155	251	8.9
85. (*R 240*)	▶	–	–	–	–	–	–
100.	▶	–	–	–	–	–	–
125.	▶	–	–	–	–	–	–

Please order matching triflex® R e-chain® separately. 1) Maximum retraction length

RSEL retraction system

Installation dimensions





Installation height RSEL
Series TR.RSEL.70 - TR.RSEL.85

RSEL retraction system

Mounting bracket and gliding feed-through are included.

Please order matching triflex® R e-chain® separately.

RSEL e-chains®

Product range

Product range | Matching e-chains® for RSEL

Ø Index	Part No. **TRC** enclosed	Part No. **TRE** "easy" design	Part No. **TRCF** with snap lock mechanism
30. ▶	–	–	–
40. ▶	–	–	–
50. ▶	–	–	–
60. ▶	–	–	–
65. ▶	–	–	–
65. (*R 200*) ▶	–	–	–
70. ▶	TRC.70.110.0	TRE.70.110.0.B	–
85. ▶	TRC.85.135.0	TRE.85.135.0.B	TRCF.85.135.0
85. (*R 240*) ▶	–	–	–
100. ▶	–	–	–
125. ▶	–	–	–

1) Available for B- and C-versions

Please note that all triflex® R e-chains can be lengthened and shortened individually and can be customized to meet the needs of your application.

Please order e-chains® as piece parts and purchase a protector for each one.

Product range | Matching protectors for RSEL

Ø Index	❶ Part No. protector with screw fastener	❷ Part No. protector with quick-lock fastener	General image protector options
30. ▶	–	–	
40. ▶	–	–	
50. ▶	–	–	
60. ▶	–	–	
65. ▶	–	–	
65. (*R 200*) ▶	–	–	
70. ▶	TR.70.10	TR.70.30	
85. ▶	TR.85.10	TR.85.30	
85. (*R 240*) ▶	–	–	
100. ▶	–	–	More information on
125. ▶	–	–	Protectors ▶ Page 47

*Available upon request. Please consult igus® for delivery time.

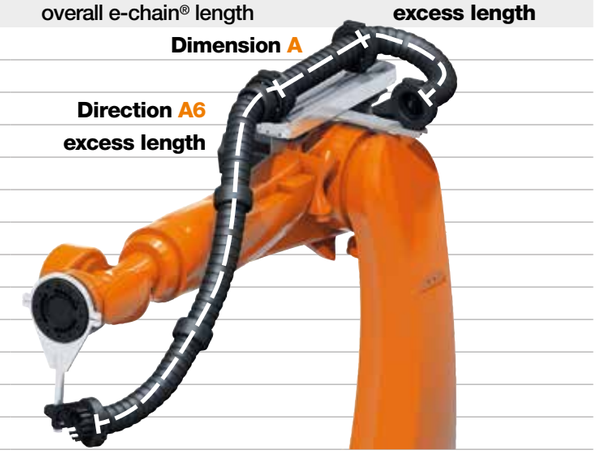
Please order protectors with screw connections or quick release as limit protectors.

RSEL e-chains®

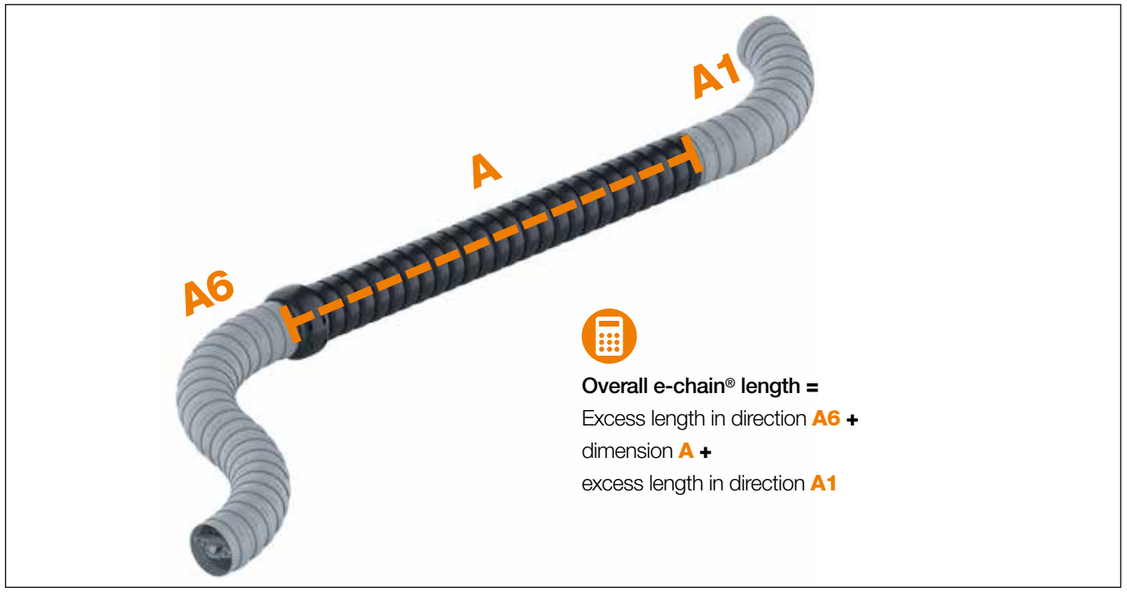
Cable length calculation

Calculation of the overall e-chain® length | RSEL e-chains®

Ø Index	Bend radius *R* [mm]	**Dimension A** [mm]	General image overall e-chain® length	**Direction A1** **excess length**
30. ▶	–	–		
40. ▶	–	–		
50. ▶	–	–		
60. ▶	–	–		
65. ▶	–	–		
85. (*R 240*) ▶	–			
70. ▶	110	530		
85. ▶	135	530		
85. (*R 240*) ▶	–	–		
100. ▶	–	–		
125. ▶	–	–		



For calculation of the overall e-chain® length: Please add the desired excess length in direction **A1** and the excess length in direction **A6** and the dimension **A**. Additionally, at least 1 limit protector must be ordered.

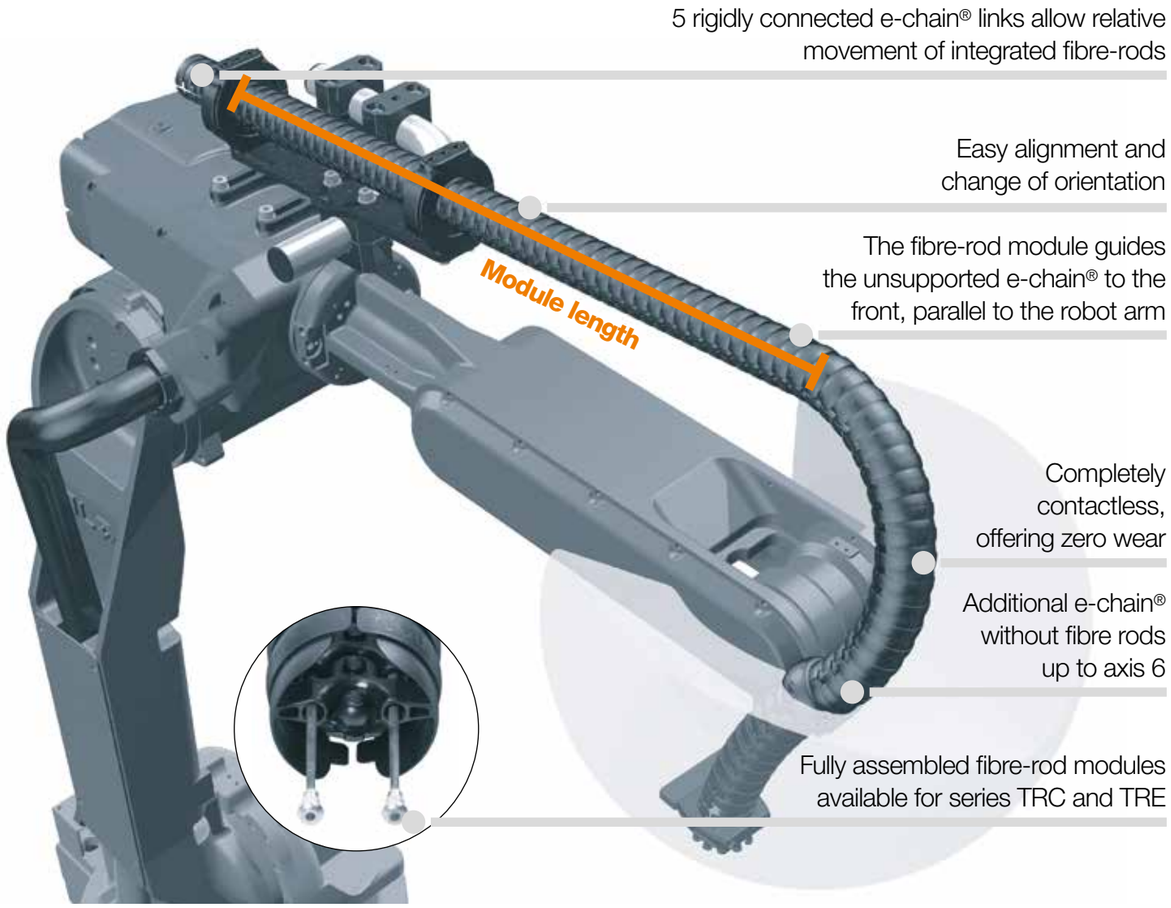


More information and installation height | RSEL e-chains®

- **TRC series** - enclosed design, chip-protection, smooth outer contour ▶ **from page 28**
- **TRE series** - "easy" design, very easy to fill, simply press cables in ▶ **from page 30**
- **TRCF series** - enclosed design with snap-lock mechanism, chip-repellent, smooth outer contour ▶ **from page 32**

triflex® R accessories

Fibre rod modules and universal mounting kits



Fibre-rod modules for a directional pretension of the e-chain®

We supply fully assembled fibre-rod modules for triflex® R e-chain® Series TRC and TRE. The integrated fibre-rods generate a directional pretension for the e-chain®. This system creates a unique choice of movements for the energy supply system to the final axis of industrial robots. The fibre-rod module guides the unsupported e-chain® to the front, parallel to the robot arm. The bending properties of the modules depends on the installation orientation: only the front end allows flexible movement. The five rear e-chain® links are rigidly connected to allow relative movement of the integrated fibre-rods. This results in a fully contactless and therefore zero-wear energy supply system, designed for moderate movements with limited rotational motion of the axes. Additional e-chain® without fibre-rods for the final axis area needs to be ordered separately.

Product range

For series TRC·TRE

Part No. fibre-rod modules for TRC / TRE		Length [m]
TRC.40	**TRE.40**	
TRC.F.**40**.1000.1.0	TRE.F.**40**.1000.1.0.B	≈ 1.0
TRC.F.**40**.0900.1.0	TRE.F.**40**.0900.1.0.B	≈ 0.9
TRC.F.**40**.0800.1.0*	TRE.F.**40**.0800.1.0.B*	≈ 0.8
TRC.F.**40**.0700.1.0	TRE.F.**40**.0700.1.0.B	≈ 0.7
TRC.F.**40**.0600.1.0	TRE.F.**40**.0600.1.0.B	≈ 0.6
TRC.F.**40**.0500.1.0	TRE.F.**40**.0500.1.0.B	≈ 0.5
TRC.F.**40**.0400.1.0	TRE.F.**40**.0400.1.0.B	≈ 0.4
TRC.50	**TRE.50**	
TRC.F.**50**.1400.1.0	TRE.F.**50**.1400.1.0.B	≈ 1.4
TRC.F.**50**.1200.1.0	TRE.F.**50**.1200.1.0.B	≈ 1.2
TRC.F.**50**.1000.1.0*	TRE.F.**50**.1000.1.0.B*	≈ 1.0
TRC.F.**50**.0800.1.0	TRE.F.**50**.0800.1.0.B	≈ 0.8
TRC.F.**50**.0600.1.0	TRE.F.**50**.0600.1.0.B	≈ 0.6
TRC.F.**50**.0400.1.0	TRE.F.**50**.0400.1.0.B	≈ 0.4
TRC.60	**TRE.60**	
TRC.F.**60**.1400.1.0	TRE.F.**60**.1400.1.0.B	≈ 1.4
TRC.F.**60**.1200.1.0	TRE.F.**60**.1200.1.0.B	≈ 1.2
TRC.F.**60**.1000.1.0*	TRE.F.**60**.1000.1.0.B*	≈ 1.0
TRC.F.**60**.0800.1.0	TRE.F.**60**.0800.1.0.B	≈ 0.8
TRC.F.**60**.0600.1.0	TRE.F.**60**.0600.1.0.B	≈ 0.6
TRC.F.**60**.0400.1.0	TRE.F.**60**.0400.1.0.B	≈ 0.4
TRC.70	**TRE.70**	
TRC.F.**70**.1800.1.0	TRE.F.**70**.1800.1.0.B	≈ 1.8
TRC.F.**70**.1600.1.0	TRE.F.**70**.1600.1.0.B	≈ 1.6
TRC.F.**70**.1400.1.0	TRE.F.**70**.1400.1.0.B	≈ 1.4
TRC.F.**70**.1200.1.0*	TRE.F.**70**.1200.1.0.B*	≈ 1.2
TRC.F.**70**.1000.1.0	TRE.F.**70**.1000.1.0.B	≈ 1.0
TRC.F.**70**.0800.1.0	TRE.F.**70**.0800.1.0.B	≈ 0.8

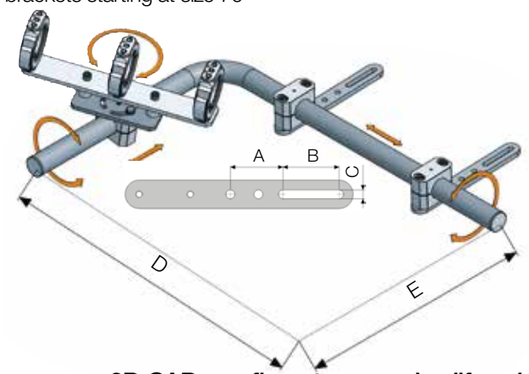
Part No. fibre-rod modules for TRC / TRE		Length [m]
TRC.85	**TRE.85**	
TRC.F.**85**.2000.1.0	TRE.F.**85**.2000.1.0.B	≈ 2.0
TRC.F.**85**.1800.1.0	TRE.F.**85**.1800.1.0.B	≈ 1.8
TRC.F.**85**.1600.1.0	TRE.F.**85**.1600.1.0.B	≈ 1.6
TRC.F.**85**.1400.1.0*	TRE.F.**85**.1400.1.0.B*	≈ 1.4
TRC.F.**85**.1200.1.0	TRE.F.**85**.1200.1.0.B	≈ 1.2
TRC.F.**85**.1000.1.0	TRE.F.**85**.1000.1.0.B	≈ 1.0
TRC.F.**85**.0800.1.0	TRE.F.**85**.0800.1.0.B	≈ 0.8
TRC.100	**TRE.100**	
TRC.F.**100**.2000.1.0	TRE.F.**100**.2000.1.0.B/**.C** [1)]	≈ 2.0
TRC.F.**100**.1800.1.0	TRE.F.**100**.1800.1.0.B/**.C** [1)]	≈ 1.8
TRC.F.**100**.1600.1.0	TRE.F.**100**.1600.1.0.B/**.C** [1)]	≈ 1.6
TRC.F.**100**.1400.1.0*	TRE.F.**100**.1400.1.0.B/**.C** [1)]*	≈ 1.4
TRC.F.**100**.1200.1.0	TRE.F.**100**.1200.1.0.B/**.C** [1)]	≈ 1.2
TRC.F.**100**.1000.1.0	TRE.F.**100**.1000.1.0.B/**.C** [1)]	≈ 1.0
TRC.125	**TRE.125**	
TRC.F.**125**.2000.1.0	TRE.F.**125**.2000.1.0	≈ 2.0
TRC.F.**125**.1800.1.0*	TRE.F.**125**.1800.1.0*	≈ 1.8
TRC.F.**125**.1600.1.0	TRE.F.**125**.1600.1.0	≈ 1.6
TRC.F.**125**.1400.1.0	TRE.F.**125**.1400.1.0	≈ 1.4
TRC.F.**125**.1200.1.0	TRE.F.**125**.1200.1.0	≈ 1.2
TRC.F.**125**.1000.1.0	TRE.F.**125**.1000.1.0	≈ 1.0

*Maximum recommended length for fibre-rod modules

1) For die C version please add the index **.C**

Universal mounting kit | For TRC·TRE

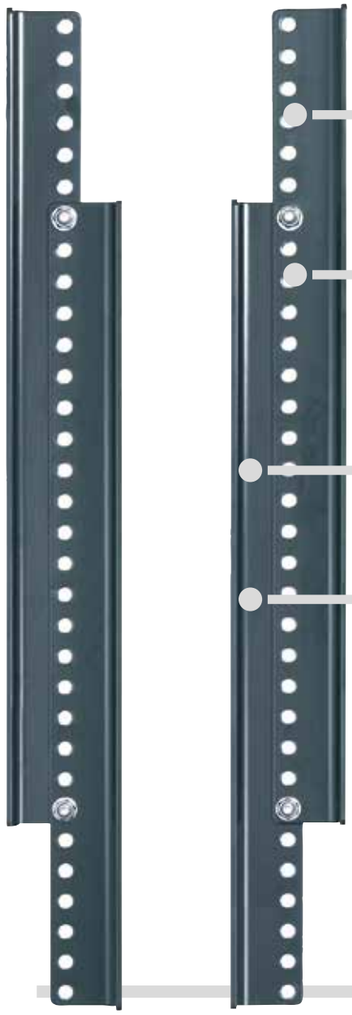
● Stainless steel angle tube with attachment brackets ● Freely positionable ● The energy supply system can be quickly and easily adapted to new programming sequences of the robot ● With 2 mounting brackets for sizes 40 and 60 - with 3 mounting brackets starting at size 70



Ø Index	Part No.	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	Weight [kg]
40.	**TR.40.80**	74	40	8.4	475	325	3.6
50.	**TR.50.80**	74	40	8.4	475	325	3.6
60.	**TR.60.80**	74	40	8.4	625	325	4.7
70.	**TR.70.80**	75	80	12.6	875	575	5.9
85.	**TR.85.80**	75	80	12.6	875	575	6.3
100.	**TR.100.80**	75	80	12.6	875	575	6.3
125.	**TR.125.80**	75	80	12.6	875	575	8.5

triflex® R accessories

Adjustment units for retraction systems



Wide adjustment range of ± 250mm

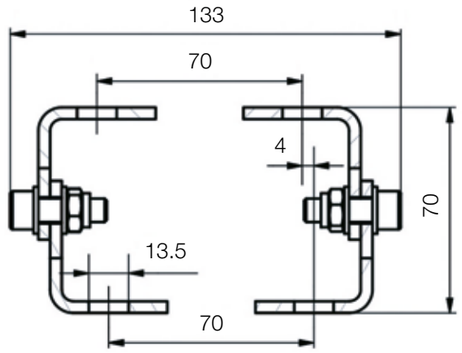
Can be combined with igus® adapter consoles

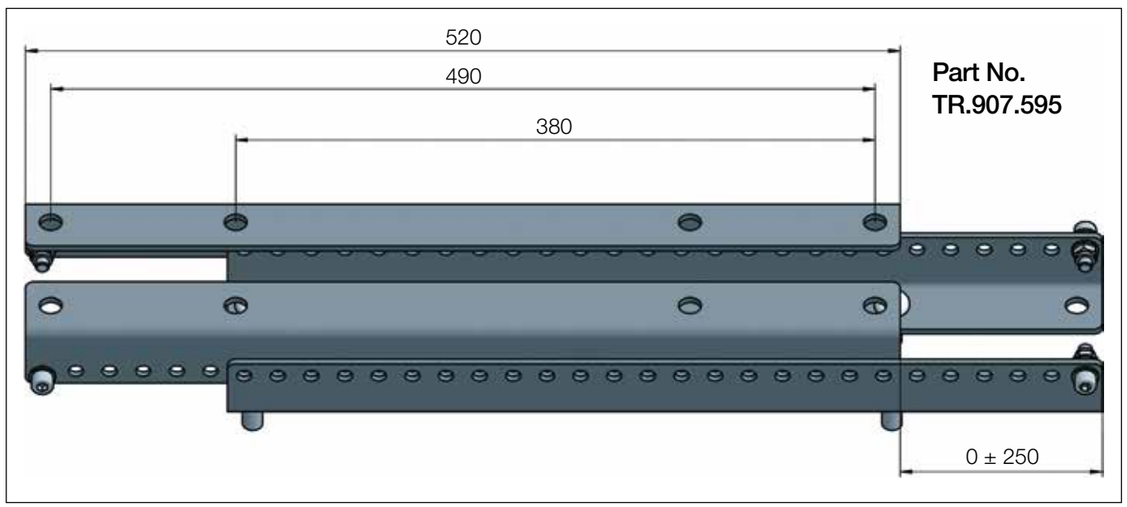
Simplifies alignment for robot cells with restricted space

Part No. TR.907.595
weight: 5.0kg

Adjustment unit for RSP and RS retraction systems

The optional adjustment unit is installed between the robot arm and the retraction system, and allows accurate adjustments of the position of the igus® retraction system on the robot arm. Particularly useful for multiple working programs using the same cable package.





Adjustment unit to easily change the position of the retraction system

triflex® R accessories

Adapter consoles for retraction systems

43 adapter consoles for many robot models, from stock

For all triflex® RSP , RS and RSE modules

3D CAD data available online for download
▶ **www.igus.eu/consoles**

Also for robots needing side-mounted installation

Adapter consoles for RSP, RS and RSE retraction systems

The RS and RSP retraction systems provide all widely used drill patterns for attachment: 380 x 70 mm and 490 x 90 mm (in Ø12.5 mm). We also supply a wide range of manufacturer and model-dependent adapter consoles from stock, in order to adapt to other robot variations. For example, many robot models are equipped from the factory with only side-mounted mounting options - in these cases, our adapter product range also supports simple installation of the retraction systems without additional engineering.

Adapter consoles for many robot models, from stock. Product range ▶ next page

Application example with RS system on ABB Series 6600

Product range

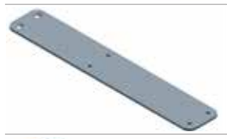
Adapter consoles for retraction systems from stock

Adapter console	Part No.	Manufacturer	Robot model	Weight [kg]
	TR.907.347	**ABB**	IRB 6600 IRB 6640 IRB 6650	4.0
	TR.907.468	**ABB**	IRB 6400	9.8
	TR.907.448	**ABB**	IRB 4400	5.0
	TR.907.381	**ABB**	IRB 2400/10 IRB 2400/16	5.2
	TR.907.905	**ABB**	IRB 6620	2.8
	TR.908.494	**ABB**	IRB 4600 IRB 2600	2.9
	TR.907.374	**Comau**	NH1 130-2.6 NJ 110-3.0 NH3 165-2.7 NJ 110-2.6 NH3 220-2.7 SMART5 NJ 165 3.0	4.7
	TR.907.447	**Comau**	NM 45-2.0 NM 16-3.1	3.4
	TR.908.493	**Comau**	Smart six	2.2
	TR.907.327	**Yaskawa**	UP 20 UP 165 ES 280 MH6 UP 50 ES 165 HP 20 HP 165 UP 130 ES 200 HP 50	3.6
	TR.909.641	**Yaskawa**	MH50	2.0

More adapter consoles upon request. CAD data online.

Product range

Excerpt from the product range

Adapter console	Part No.	Manufacturer	Robot model	Weight [kg]
	TR.911.220	**Fanuc**	M-710iC 50 M-710iC 70	2.0
	TR.908.973	**Fanuc**	M-710iB 45	1.1
	TR.907.270	**Fanuc**	IR-2000iB S 430 R-2000iA S 420 R-1000iA	4.5
	TR.907.470.12	**Fanuc**	M-900iA 260L M-900iA 350	6.8
	TR.907.902.12	**Fanuc**	M-900iA 600	8.9
	TR.910.876	**Fanuc**	M900-IB700	4.6
	TR.907.599	**Kuka**	KR5 KR6 KR5arc KR16	2.5
	TR.908.113	**Kuka**	KR-1000	5.2
	TR.908.014	**Kuka**	KR 60 (HA) KR 30 (HA)	4.3
	TR.907.706	**Reis**	RV30-26 RV60-26 RV10-16 RV60-40 RV20-16 RV60-60 RV60-16 RV130	4.3
	TR.911.223 Spacer bolt	**Kuka**	Series Quantec (4 piece kit)	0.6

More adapter consoles upon request. CAD data online.

triflex® R accessories

Clamps for attachment to axis 6

For use with a heavy duty connection, compact connection, and quick release units

Easy and fast alignment relative to the tool position

Depending on robot design, with or without recess

Clamps for attachment to axis 6

The clamp is used to attach a mounting bracket to axis 6, with a bar (Ø 30mm) for all robots. They are easy and quick to assemble.

- For use with heavy duty connection **TR.XX.20.30** / **TR.XX.23.30**
- For use with compact connection **TR.XX.21.01.30** / **TR.XX.21.02.30**
- For use with quick exchange unit **TR.XX.22.30**

Attachment options for many robot models

Product range

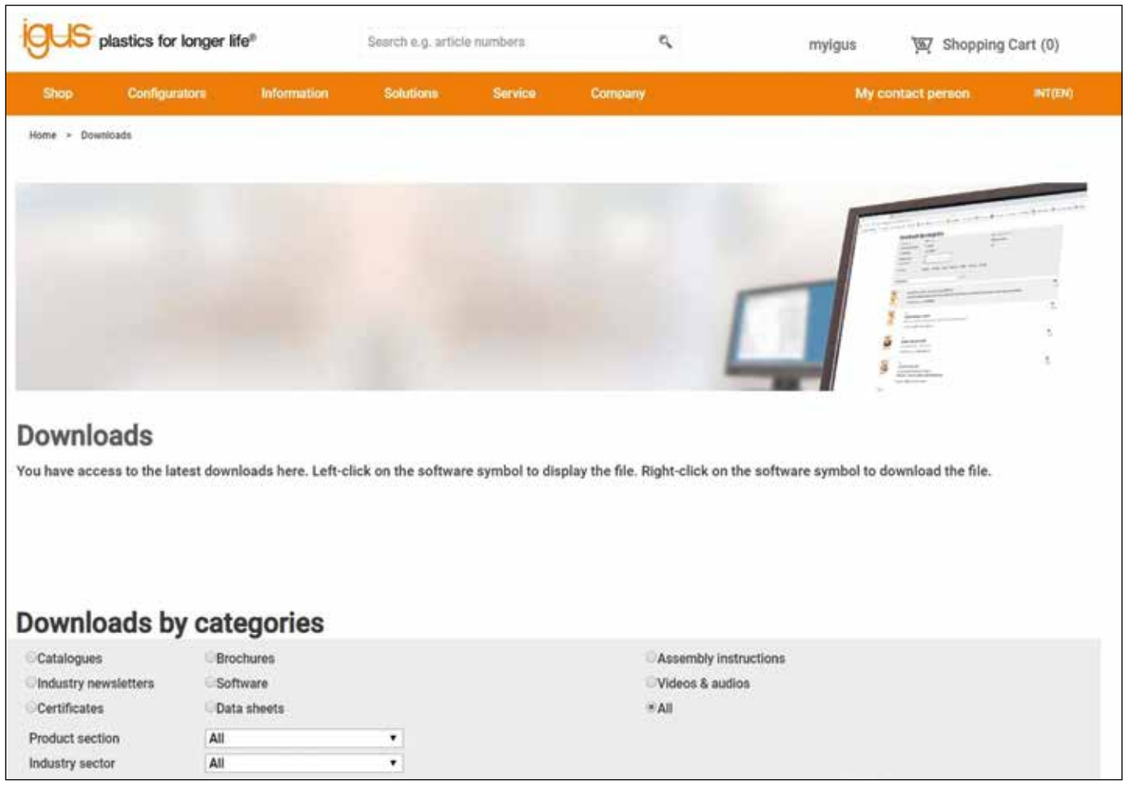
Excerpt from the product range

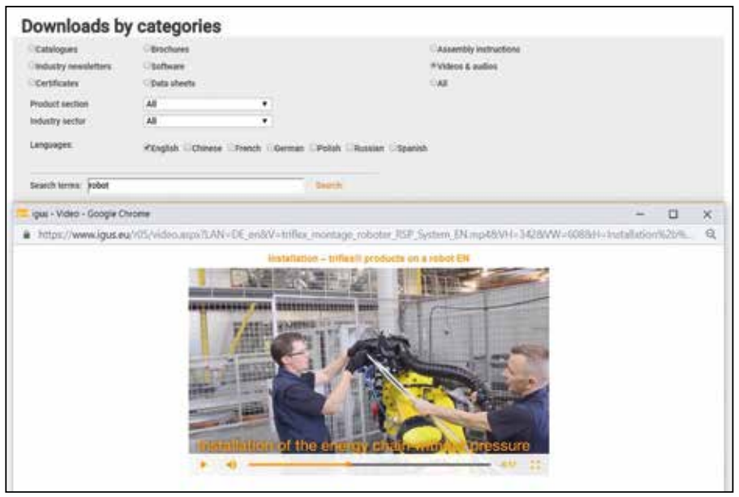
Part No. Clamp	Robot model	With recess	A [mm]	B [mm]	Weight [kg]
TR.907.857	KUKA KR 30-3 (HA)	yes	130	115	1.9
	KUKA KR 60-3 (HA)	yes	130	115	1.9
	KUKA KR 60 L45-3 (HA)	yes	130	115	1.9
	KUKA KR 60 L30-3 (HA)	yes	130	115	1.9
TR.907.901	KUKA Quantec, large flange	yes	205	190	2.5
	KUKA KR 125/3	yes	205	190	2.5
	KUKA KR 150/3	yes	205	190	2.5
	KUKA KR 200/3	yes	205	190	2.5
	KUKA KR 360/1	yes	205	190	2.5
	KUKA KR 500/1	yes	205	190	2.5
	KUKA KR 150/2 Series 2000	yes	205	190	2.5
	KUKA KR 180/2 Series 2000	yes	205	190	2.5
	KUKA KR 210/2 Series 2000	yes	205	190	2.5
TR.908.115	KUKA KR 1000 Titan	yes	250	242	3.05
TR.907.992	Fanuc R-2000iB	yes	165	160	2.4
	Fanuc R-2000iA	yes	165	160	2.4
	Reis RV 130	yes	165	160	2.4
TR.908.065	Fanuc M-710iC 50	yes	130	124	2.2
	Fanuc M-710iC 70	yes	130	124	2.2
TR.909.387	Yaskawa UP 50	yes	125	100	1.9
	Yaskawa HP 50	yes	125	100	1.9
	Yaskawa MH 50	yes	125	100	1.9
TR.910.544	Reis RV60-60	yes	145	125	1.9
	Reis RV60-40	yes	145	125	1.9
	Fanuc R-1000	yes	145	125	1.9
TR.908.347	Stäubli TX200	yes	145	125	1.9
TR.907.667.125	for custom flange	no	125	= A	2.1
TR.907.667.140	KUKA Quantec small flange	no	140	= A	2.2
TR.907.667.142	Hyundai HX 165	no	142	= A	2.25
TR.907.667.150	Comau NJ 130	no	150	= A	2.4
TR.907.667.160	ABB IRB 6400	no	160	= A	2.45
	Fanuc S420	no	160	= A	2.45
TR.907.667.180	for custom flange	no	180	= A	2.55
TR.907.667.190	Comau NH3	no	190	= A	2.6
TR.907.667.200	KUKA KR 125/1	no	200	= A	2.7
	KUKA KR 150/1	no	200	= A	2.7
	KUKA KR 200/1	no	200	= A	2.7
	ABB IRB 6640	no	200	= A	2.7
	ABB IRB 6620	no	200	= A	2.7
	ABB IRB 6650	no	200	= A	2.7
TR.907.667.220	KUKA KR 360-2	no	220	= A	2.82
	KUKA KR 500-2	no	220	= A	2.82
	KUKA KR 360-3	no	220	= A	2.82
	KUKA KR 500-3	no	220	= A	2.82
TR.907.667.250	ABB IRB 7600-340	no	223	= A	3.5
	ABB IRB 7600-500	no	223	= A	3.5
	Fanuc M900iA 350	no	250	= A	3.2
	Fanuc M900iA 260L	no	250	= A	3.2
TR.907.667.275	Fanuc M900iA 200P	no	275	= A	3.4
TR.907.667.315	Fanuc M900iA 600	no	315	= A	3.6
	Fanuc M900iA 400L	no	315	= A	3.6

Other dimensions available upon request

triflex® R assembly

Assembly videos online



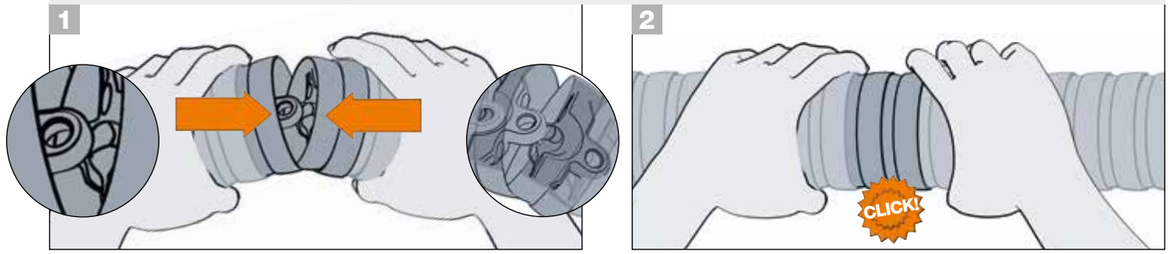


Assembly instruction videos - video clips and additional information are available online
► **www.igus.eu/downloads**

triflex® R TRC

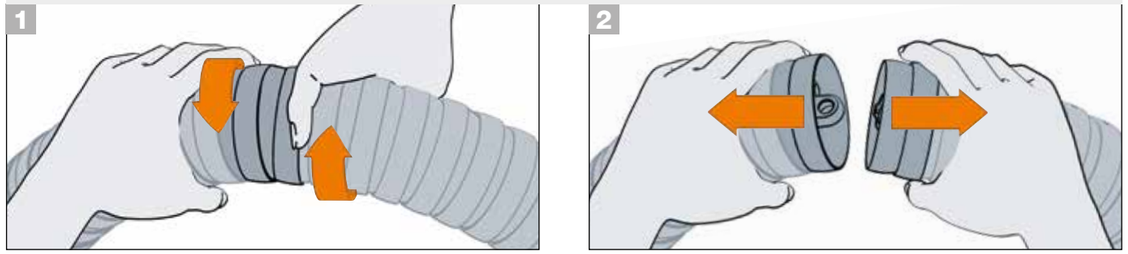
Assembly instructions

Assembly | TRC.30 · TRC.40 · TRC.60 · TRC.70 · TRC.85 · TRC.100



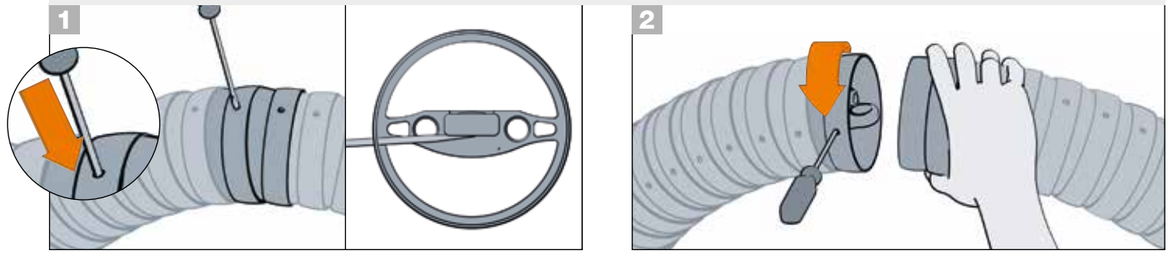
Engage the e-chain® links on the lower side. Use the chamfered side of the ball to open the socket and click together.

Disassembly | TRC.30 · TRC.40 · TRC.60



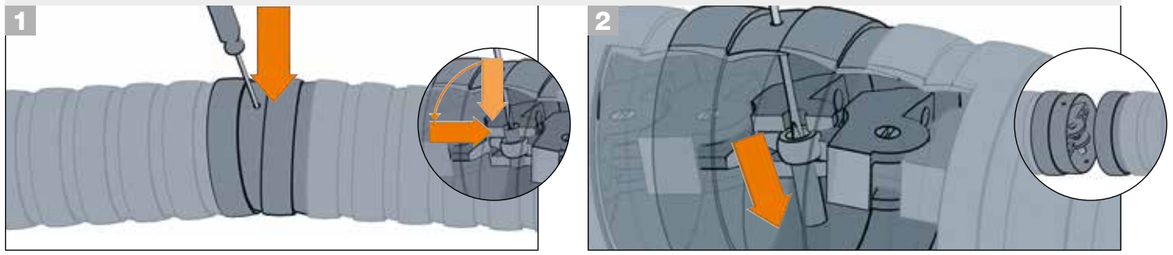
To disassemble, move triflex® R TRC.30, TRC.40 and TRC.60 to the bend radius stop then twist apart counterclockwise.

Disassembly | TRC.70 · TRC.85 · TRC.100



Bend e-chain® to the radius, press a screwdriver right through the opening marker, insert approx. 5 mm between the ball and socket and using it as a lever, twist apart counterclockwise.

Disassembly | TRC.125

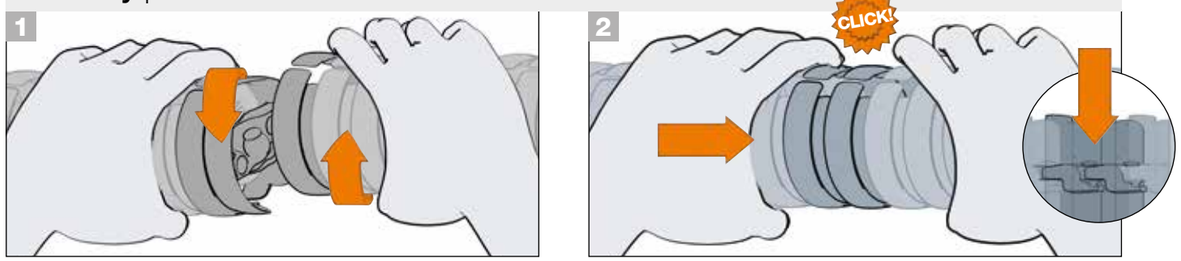


Place the e-chain® with the igus® logo facing down. Unlock the bolt by using a screwdriver to rotate it 90°. Push the bolt downwards to disconnect the e-chain® links for easy separation.

triflex® R TRE.B

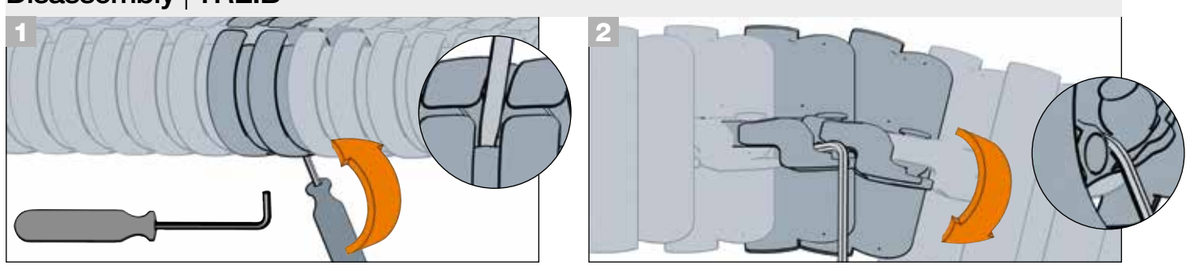
Assembly instructions

Assembly | TRE.B



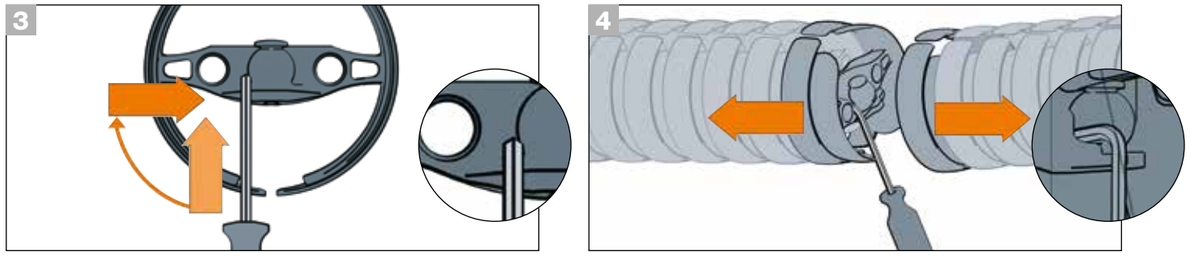
Engage the e-chain® links on the lower side to open the socket and slightly rotate the e-chain® links to click together. Push the socket downward onto the ball in a straight motion. An audible “click” can be heard on successful connection.

Disassembly | TRE.B



Place disassembly tool into the e-chain®.

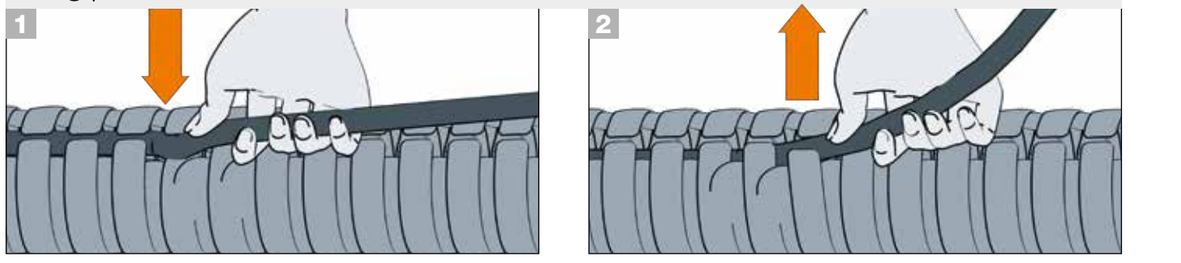
Hook the tool between ball and socket.



Once the tool is in place, turn e-chain® counterclockwise by 45°.

Once the socket has been lifted slightly over the ball head, the e-chain® links can be separated by twisting them.

Filling | TRE.B

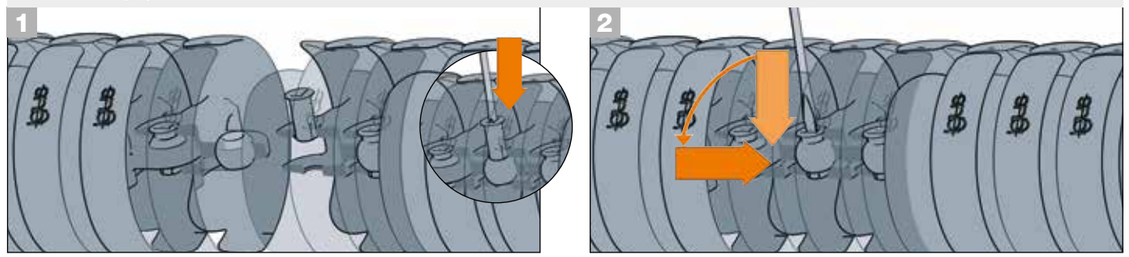


Very simple filling with "easy" design - simply press cables in... and pull them out.

triflex® R TRE.C

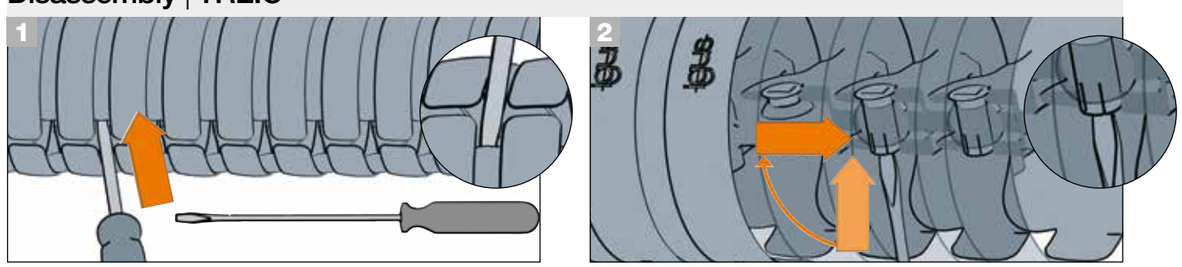
Assembly instructions

Assembly | TRE.100.C · TRE.125 · TRC.125



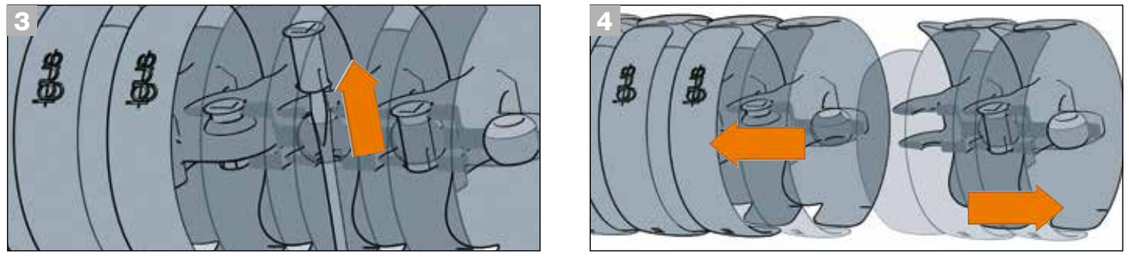
Align e-chain® links and use a screw driver to push the bolt down. Secure the connection bolt by rotating 90°.

Disassembly | TRE.C



Insert slotted screwdriver into the e-chain® centrally through "easy" slot.

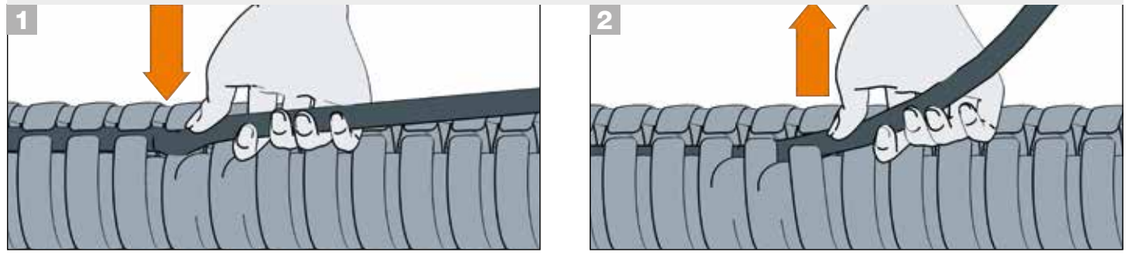
Unlatch bolt by rotating it 90°.



Push bolts through.

Push the bolt downwards to disconnect the e-chain® links for easy separation.

Filling | TRE.C

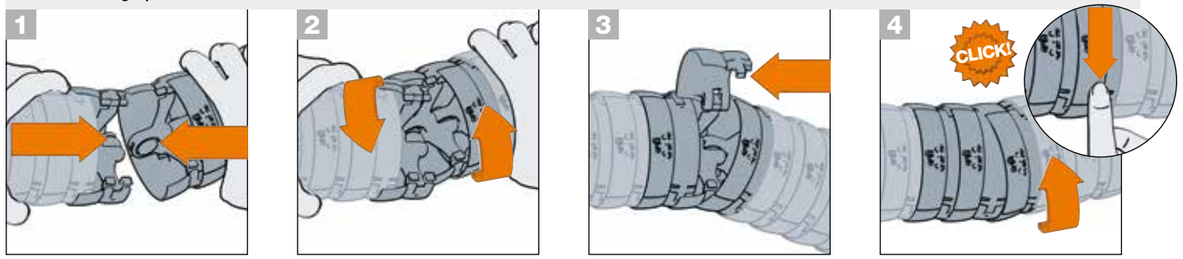


Very simple filling with "easy" design - simply press cables in... and pull them out.

triflex® R TRCF

Assembly instructions

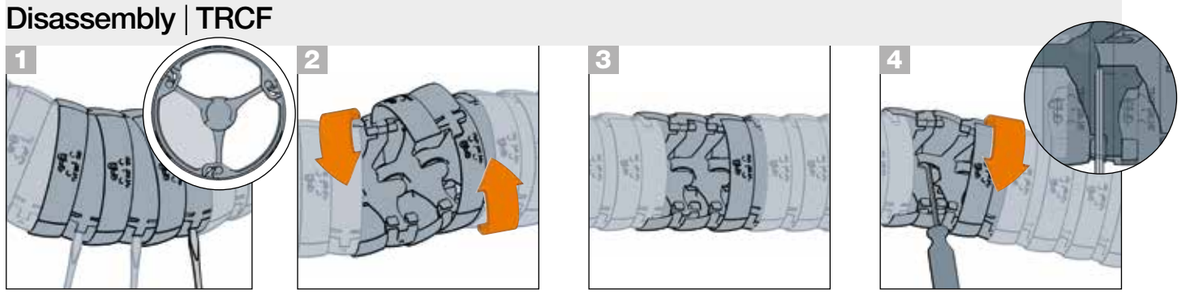
Assembly | TRCF



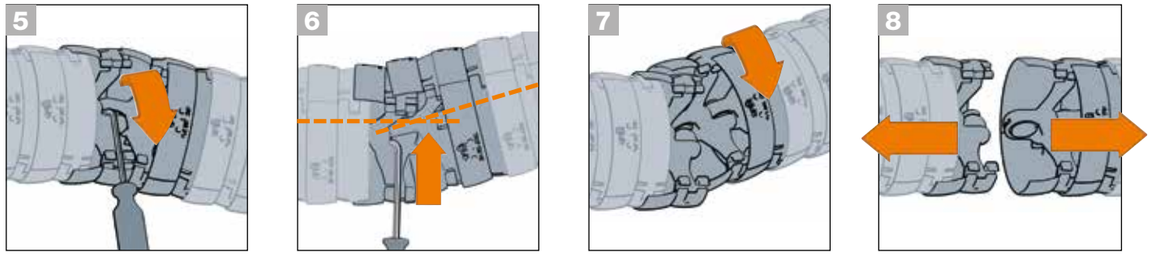
Attach e-chain® parts at an angle and push them together.

To close, simply snap the opened cover.

Disassembly | TRCF

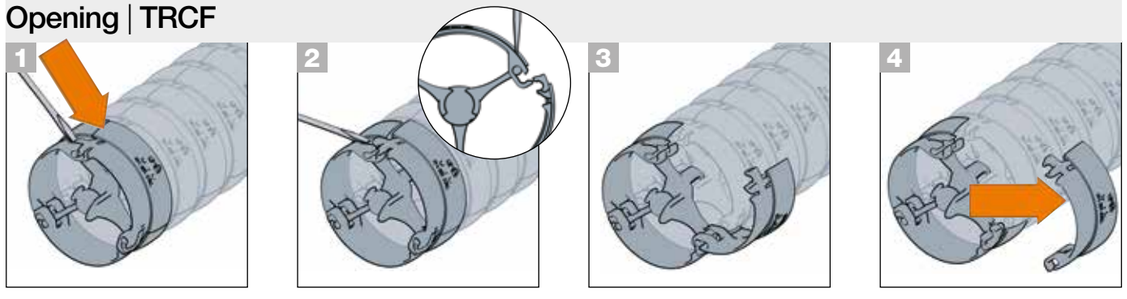


Using a screwdriver, unlatch the lid of three e-chain® links as marked. Open two lids by gently twisting the e-chain® links from each other. Place disassembly tool between ball and socket.



Then by turning the e-chain® links against the stop given by the disassembly tool - push the socket over the ball. Slightly bend the e-chain®, then turn and pull apart.

Opening | TRCF



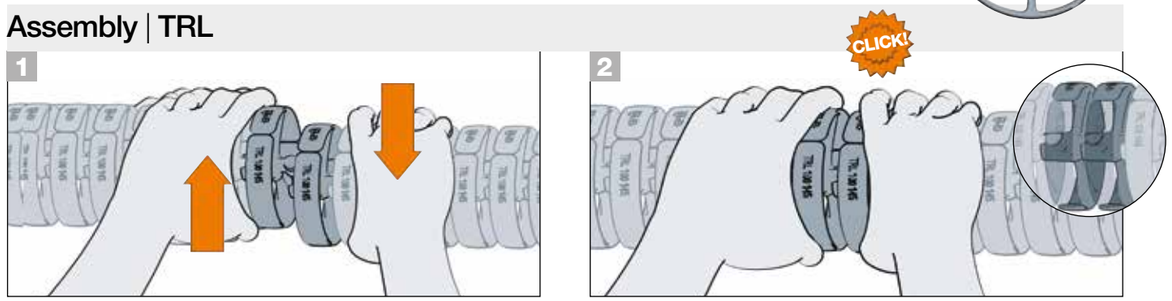
Open the lid with a screwdriver.

The lid can be removed completely in the opened state if required.

triflex® R TRL

Assembly instructions

Assembly | TRL



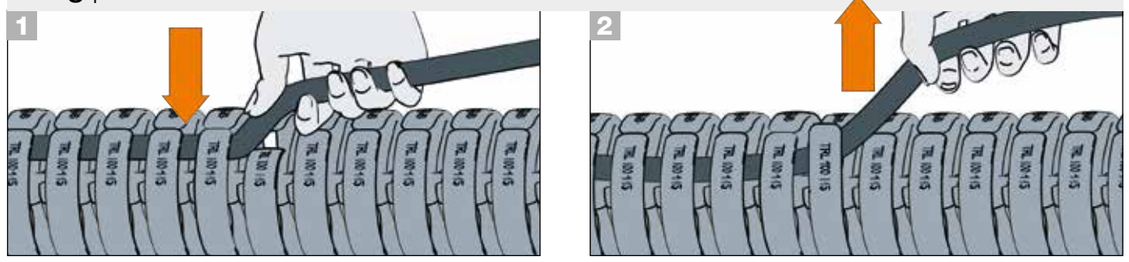
Attach ball with round side over socket.

Press the ball into the socket ...

Disassembly | TRL

Rotate e-chain® links from one another slightly and push the ball sideways out of the socket.

Filling | TRL

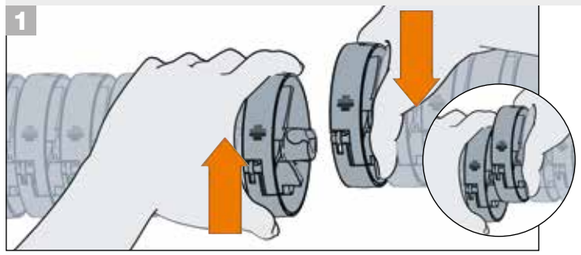


Very simple filling with "easy" design - simply press cables in... and pull them out.

triflex® R TRLF

Assembly instructions

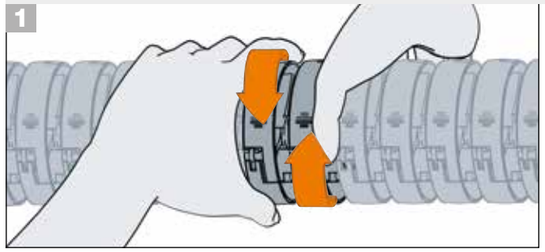
Assembly | TRLF

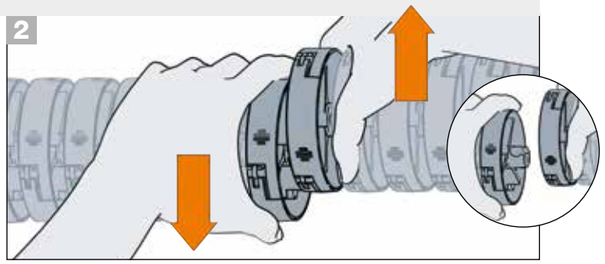


Attach ball with round side over socket.

Press ball into the socket.

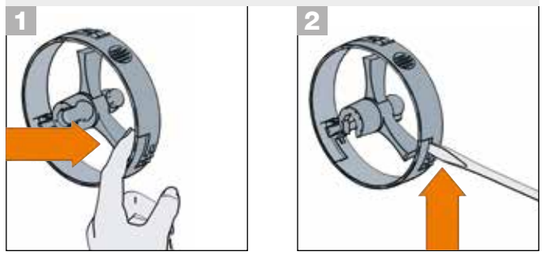
Disassembly | TRLF





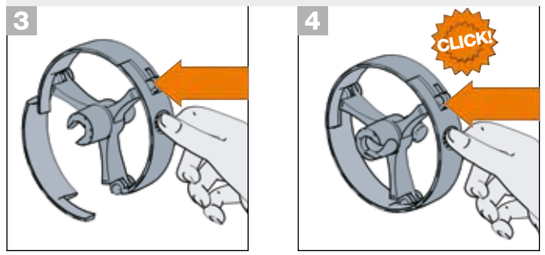
Rotate e-chain® links from one another slightly and push the ball sideways out of the socket.

Opening operation | TRLF



To open, raise the lug by hand or insert a screwdriver into the notch and open.

Closing operation | TRLF

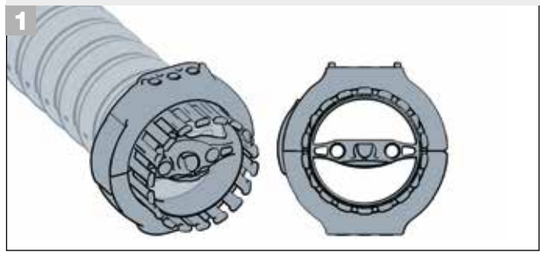


Push the lid until it locks.

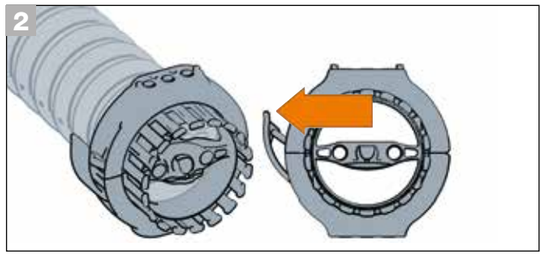
triflex® R Assembly

Assembly instructions mounting bracket & disassembly tool

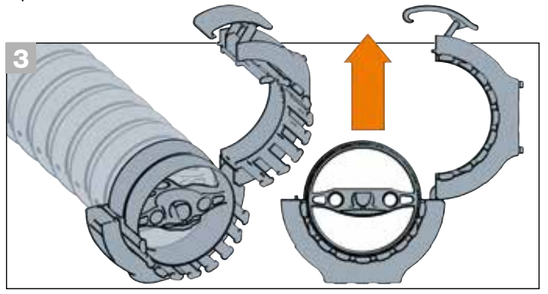
Opening | Standard-mounting brackets



Standard mounting brackets can be opened without tools.

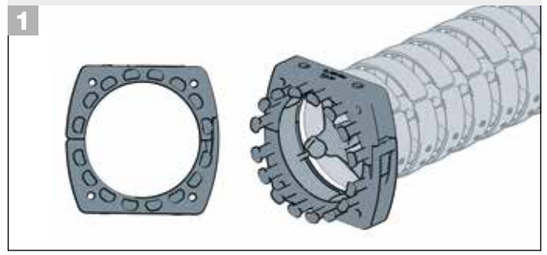


Open the side lever to unlock the bracket.

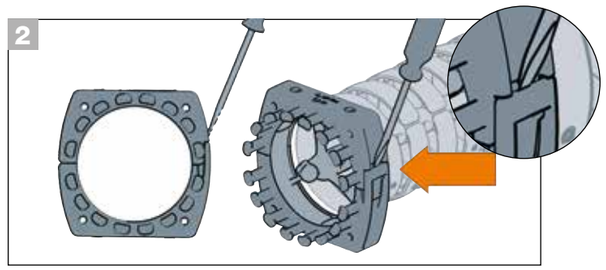


Flip open the mounting bracket and remove the e-chain®.

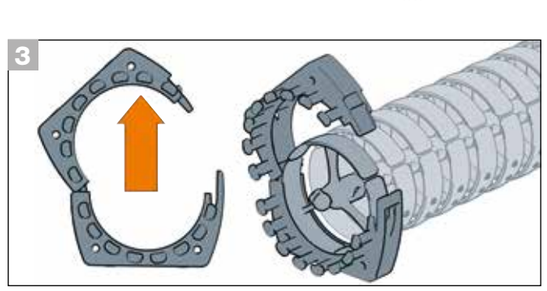
Opening | Light-mounting brackets



Light mounting brackets can be opened with a screwdriver.



Push on the smaller inner latch to unlock the bigger outer latch.



Flip open the mounting bracket and remove the e-chain®.

Note: for triflex® R Series TRE, TRE.B - TRE.LOCK clips ensure a secure grip by the mounting bracket. Supplied with every mounting bracket.

Disassembly tools

Easy-to-use disassembly tools for triflex® TRE (B version) and TRCF. Easy disassembly at any point along the e-chain®, even when full.

For series TRE.B	Part No. disassembly tool
TRE.40.B	MAT0050175
TRE.50.B	MAT0051190
TRE.60.B / TRE.70.B	MAT0051135
TRE.85.B	MAT0050170
TRE.100.B	MAT0050172

For series TRE.B	Part No. disassembly tool
TRCF.65	MAT0051135
TRCF.85	MAT0050170
TRCF.100	MAT0050172

More 3D e-chains® for simple movements

easy triflex® & triflex®

easy triflex® advantages

KMA mounting brackets:
split mounting bracket with integrated strain relief

Modular:
easy lengthening and
shortening at any point

Robust:
"push-button" joint

Simple:
easy filling from both sides
with "easy" design

Fast:
simply press cable in along
the inner or outer radius

Customisable:
different bend radii and
types can be combined

Flexible:
multi-axis movement for
all kinds of machinery

For simple 3D applications, easy filling from both sides - easy triflex®

The easy triflex® series was developed to offer safe energy supply for multi-axis movements. In doing so the flexibility of a hose was combined with the stability and defined bend radius of an e-chain®. With easy triflex® the installation of cables and hoses is simple. With flexible crossbars the cables are simply pushed into the e-chain® from either side. The unique modular range allows very complex movements. For example: Combine 1-axis, 2-axis and 3-axis movement links in one e-chain®.

UL94-V2
classification

iF product design award
2000 Series easy triflex®

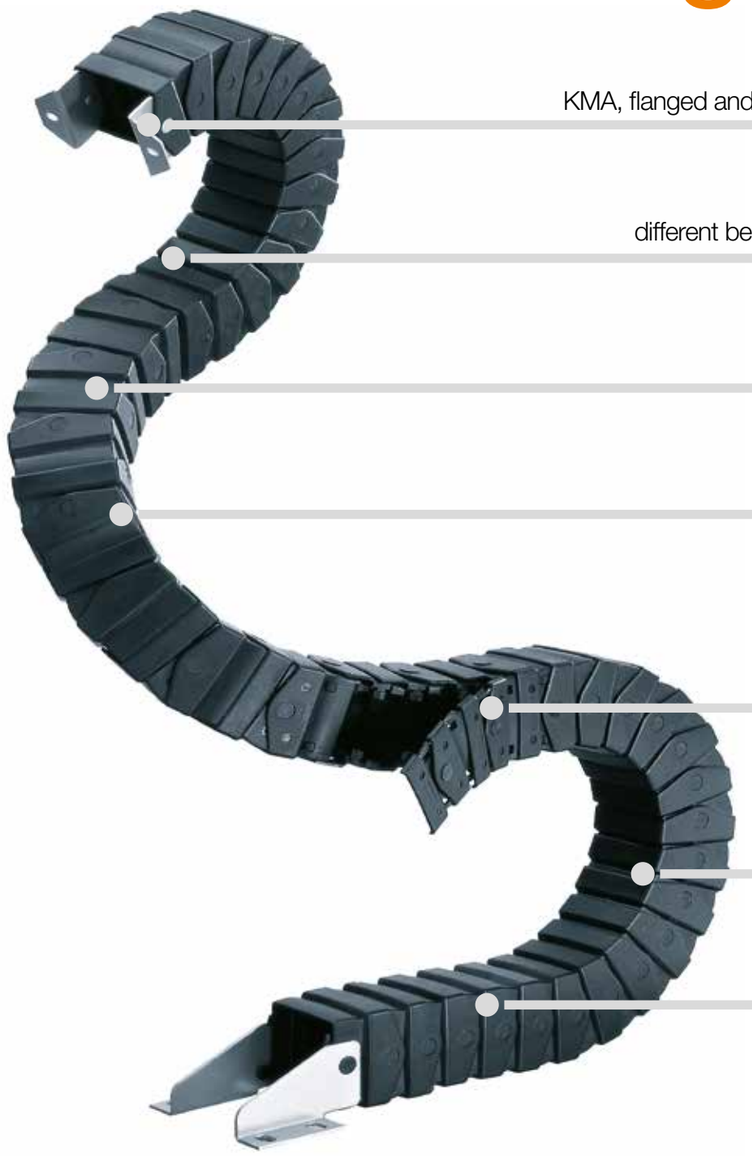
Selection table

Series	Inner height *Bi1* / *Bi1* [mm]	Inner width *Bi3* [mm]	Outer width *Ba* [mm]	Bend radius *R* [mm]	Pitch [mm]	igus® online
						
Single-axis movement - "easy" design easy filling from both sides						
E332.25	13	25	34	048 - 200	14.5	▶ www.igus.eu/E332
E332.32	17	32	50	075 - 250	25	▶ www.igus.eu/E332
E332.50	26	50	68	100 - 250	30	▶ www.igus.eu/E332
E332.75	38.5	75	96	140 - 300	36	▶ www.igus.eu/E332
						
Double-axis movement - "easy" design with *RBR* (Reverse Bend Radius) easy filling from both sides						
E332.25	13	25	34	048 - 200	14.5	▶ www.igus.eu/E332
E332.32	17	32	50	075 - 250	25	▶ www.igus.eu/E332
E332.50	26	50	68	100 - 250	30	▶ www.igus.eu/E332
E332.75	38.5	75	96	140 - 300	36	▶ www.igus.eu/E332
						
Triple-axis movement - "easy" design with *RBR* (Reverse Bend Radius) easy filling from both sides						
E333.25	13	25	34	048 - 200	14.5	▶ www.igus.eu/E333
E333.32	17	32	50	075 - 250	25	▶ www.igus.eu/E333
E333.50	26	50	68	100 - 250	30	▶ www.igus.eu/E333
E333.75	38.5	75	96	140 - 300	36	▶ www.igus.eu/E333

The complete range with ordering options,
3D-CAD, configurators, PDFs, application examples ▶ www.igus.eu/easytriflex

Available from stock. Ready to ship in 24 - 48hrs.*
*The delivery times indicated correspond to the average time until the ordered goods are dispatched.

triflex® advantages



Universal:
KMA, flanged and angled mounting brackets available

Customisable:
different bend radii and types can be combined

Protection:
completely enclosed -
protection against dirt and chip

Modular:
combination of fully enclosed
and openable types is possible

Options:
openable series 352 and 353,
50mm cross section

Cost effective:
cost-effective for complex
movements

Modular:
easy lengthening and shortening
at any point

Enclosed for simple multi-axis applications - triflex®

The triflex® series was developed to allow safe energy supply for multi-axis movements. In doing so the flexibility of a hose was combined with the stability and defined bend radius of an e-chain®. The unique, modular product range allows very complex motions. For example it is possible to combine 1-axis, 2-axis and 3-axis movement links in one e-chain®.

iF product design award
1992 igus® Series triflex®

Selection table

Series	Inner width *Bi* [mm]	Outer width *Ba* [mm]	Bend radius *R* [mm]	Pitch [mm]	igus® online
					
Single-axis movement - enclosed Protection against dirt and swarf					
332.16	16	26	038 - 100	13.3	▶ www.igus.eu/332
332.32	32	50	075 - 250	25	▶ www.igus.eu/332
332.50	50	68	100 - 250	30	▶ www.igus.eu/332
332.75	75	96	140 - 300	36	▶ www.igus.eu/332
352.50*	50	68	100 - 250	30	▶ www.igus.eu/352
					
Double-axis movement - enclosed, with *RBR* (Reverse Bend Radius) Protection against dirt and swarf					
332.16	16	26	038 - 100	13.3	▶ www.igus.eu/332
332.32	32	50	075 - 250	25	▶ www.igus.eu/332
332.50	50	68	100 - 250	30	▶ www.igus.eu/332
332.75	75	96	140 - 300	36	▶ www.igus.eu/332
352.50*	50	68	100 - 250	30	▶ www.igus.eu/352
					
Triple-axis movement - enclosed, with *RBR* (Reverse Bend Radius) Protection against dirt and swarf					
333.16	16	26	038 - 100	13.3	▶ www.igus.eu/333
333.32	32	50	075 - 250	25	▶ www.igus.eu/333
333.50	50	68	100 - 250	30	▶ www.igus.eu/333
333.75	75	96	140 - 300	36	▶ www.igus.eu/333
353.50*	50	68	100 - 250	30	▶ www.igus.eu/353

*Series 352/353 openable

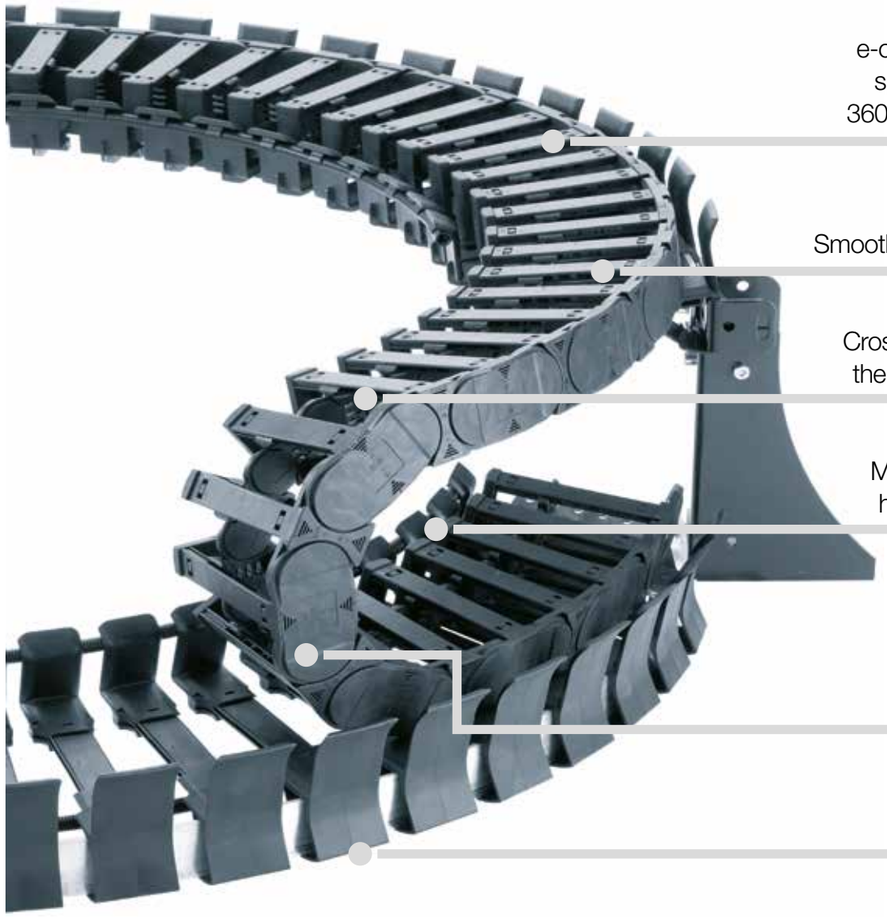
Complete product range with ordering options,
3D-CAD, configurators, PDFs, application examples ▶ www.igus.eu/triflex

Available from stock. Ready to ship in 24 - 48hrs.*
*The delivery times indicated correspond to the average time until the ordered goods are dispatched.

e-chains®
for circular & rotary move-ments

twisterchain
twisterband
Rotating energy supply systems with Reverse Bend Radius *(RBR)*

twisterchain advantages



Strong, quiet and up to 360°* - circular and spiral movements - twisterchain

The igus® twisterchain product line offers an extensive range of products for circular movement and is available in four sizes. Its modular width and radius design ensures it can be used flexibly in applications with rotary and spiral movements up to 360° and more, with high fill weights and where smooth operation is required. twisterchain applications are available with modular guide troughs which offer: e-chain® guidance, reduced e-chain® wear, optimal levels of smooth operation, angle of rotations up to 360°* from stock.

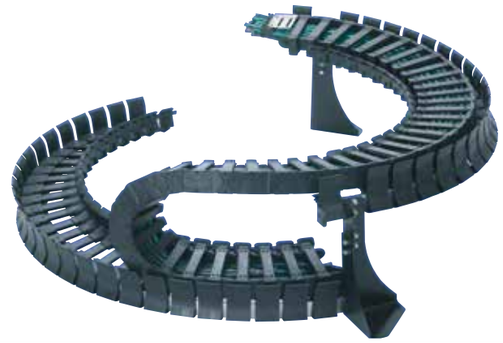
- Strong, high fill weights, smooth running
- Rotary speeds up to 1m/s and more
- e-chains® for circular/spiral movements up to 360°* available from stock
- Cable-friendly, smooth interior
- Crossbars openable along the inner and outer radius
- Successfully tested for over 1 million cycles in the igus® laboratory

*Up to 540° upon request

e-chains® for circular movements up to 360° available from stock (up to 540° upon request)

UL94-V0 classification upon request

Selection table

Series	Inner height *hi* [mm]	Inner width *Bi* [mm]	Outer width *Ba* [mm]	Outer height *ha* [mm]	Bend radius *R* [mm]	Circular radii *AR* [mm]	Page
		**twisterchain** For rotary movements up to 360° available from stock; for angle of rotation >360° please contact us. Crossbars removable along the inner and outer radius					
TC32	32	87.5 - 150	108.5 - 171	54	100 - 250	400 - 600	136
TC42	42	87.5 - 200	110.5 - 223	64	100 - 250	400 - 850	138
TC56	56	125 - 200	155 - 230	84	150 - 400	650 - 850	140

The complete range with ordering options,
3D-CAD, configurators, PDFs, application examples ▶ www.igus.eu/twisterchain

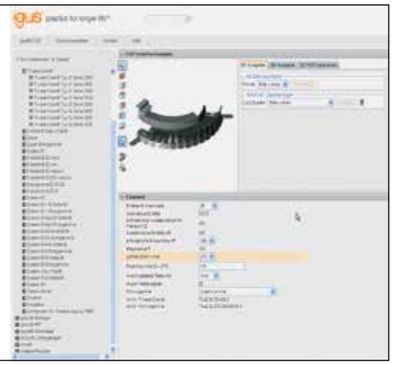
Available from stock. Ready to ship in 24 - 48hrs.*

*The delivery times indicated correspond to the average time until the ordered goods are dispatched.

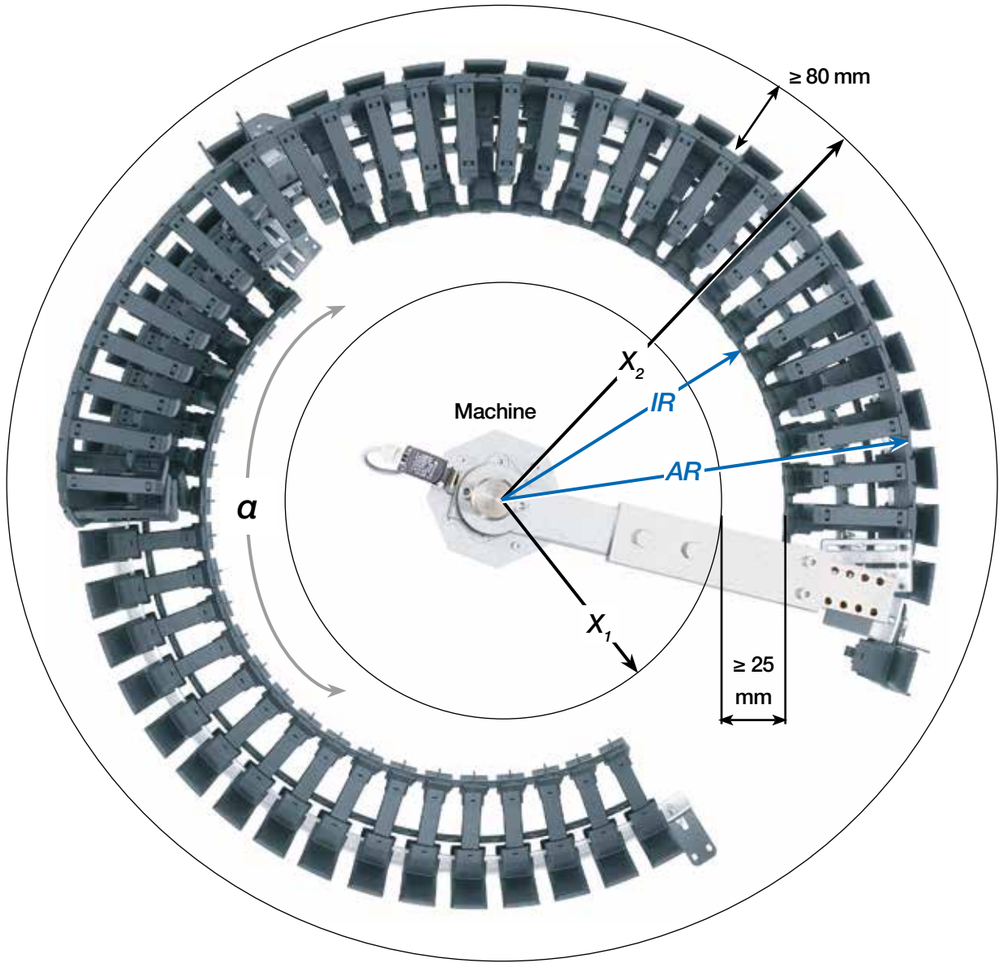
Quickly generate complete twisterchain 3D CAD models

- Get complete 3D models just by inputting the angle of rotation and basic dimensions
- Free positioning of the e-chain® moving end along the travel length
- Optional generation of twisterchain as a single part or complete with guide trough and base support
- Fast download of the CAD files without registration
- 11 different 3D and 8 different 2D CAD formats are available

More information ▶ www.igus.eu/twister-configurator

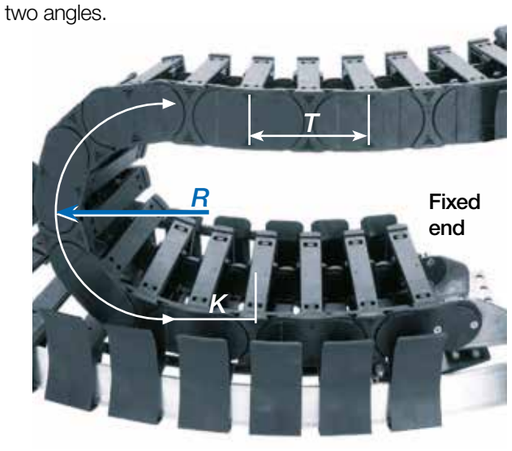


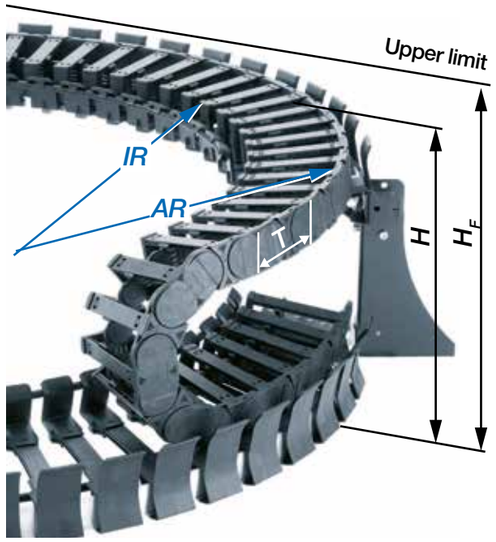
twisterchain



twisterchain general information

In the case of machines which rotate in one direction then the other, the total rotation angle required is the sum of the two angles.





Technical data

Technical data

Speed / acceleration	upon request
Material - permitted temperature °C, igumid G	**-40°C / +120°C**
Flammability class, igumid G	**VDE 0304 IIC UL94-HB**

Order example | Order key

Order example for complete e-chain® (1.0m), colour black, with mounting brackets:

e-chain® (1.0m)	Please indicate e-chain® length or number of links: 1.0m or 11 links	**TC56.12.250/650.0**
+ Mounting brackets	1 set	**TC5600.34.VS.E**
Order text:	**1 m TC56.12.250/650.0 + TC5600.34.VS.E**	

Order key **TC56.12.250/650.0**

- Series
- Inner height
- Width index (depends on *Bi*)
- Bend radius *R*
- Outer radius *AR*
- Standard colour black

TC56.12.250/650.0 = e-chain® openable along the inner radius, from both sides *Bi* 12 mm inner width, *R* 250 mm bend radius / *AR* 650 mm outer radius, colour black

AR = Outer radius of e-chain®
IR = Inner radius e-chain®
R = Bend radius e-chain®
X_1 = Inner machine limit
X_2 = Outer machine limit
T = Pitch
H_F = e-chain® height incl. 50mm clearance
H = e-chain® height
K = Add-on for bend radius
hi = Inner height e-chain®
ha = Outer height e-chain®
α = Angle of rotation

twisterchain TC32

32 mm inner height - product range

AR [mm]	*Bi* [mm]	*Ba* [mm]	X_2 [mm]	X_1 [mm]	*R* 100 [mm] TC32...	*R* 125 [mm] TC32...	*R* 150 [mm] TC32...	*R* 175 [mm] TC32...	*R* 200 [mm] TC32...	*R* 250 [mm] TC32...	TC32 [kg/m]
400	87.5	108.5	480	270	087.100/400	087.125/400	087.150/400	087.175/400	087.200/400	087.250/400	≈ 1.82
400	100	121	480	250	–	–	10.150/400	10.175/400	10.200/400	10.250/400	≈ 1.90
400	108	129	480	250	–	–	–	11.175/400	11.200/400	11.250/400	≈ 1.95
400	125	146	480	220	–	–	–	12.175/400	12.200/400	12.250/400	≈ 2.05
400	137.5	158.5	480	210	–	–	–	–	–	137.250/400	≈ 2.13
400	150	171	480	200	–	–	–	–	–	15.250/400	≈ 2.21
500	100	121	580	350	10.100/500	10.125/500	10.150/500	10.175/500	10.200/500	10.250/500	≈ 1.90
500	108	129	580	350	–	11.125/500	11.150/500	11.175/500	11.200/500	11.250/500	≈ 1.95
500	125	146	580	320	–	12.125/500	12.150/500	12.175/500	12.200/500	12.250/500	≈ 2.05
500	137.5	158.5	580	310	–	–	137.150/500	137.175/500	137.200/500	137.250/500	≈ 2.13
500	150	171	580	300	–	–	15.150/500	15.175/500	15.200/500	15.250/500	≈ 2.21
600	108	129	680	450	11.100/600	11.125/600	11.150/600	–	–	–	≈ 1.95
600	125	146	680	420	–	12.125/600	12.150/600	12.175/600	12.200/600	12.250/600	≈ 2.05
600	137.5	158.5	680	410	–	137.125/600	137.150/600	137.175/600	137.200/600	137.250/600	≈ 2.13
600	150	171	680	400	–	–	15.150/600	15.175/600	15.200/600	15.250/600	≈ 2.21

R	100	125	150	175	200	250
H $^{+20}_{0}$	254	304	354	404	454	554
K	465	550	620	700	780	940

Pitch [mm/link]	**56**
Links/m	**18**
corresponds to [mm]	**1,008**

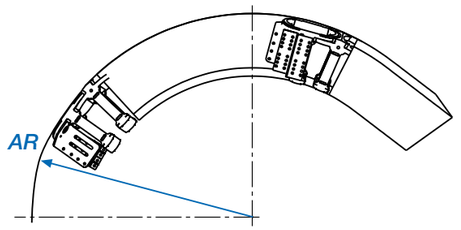
twisterchain 2nd generation from igus® - successfully tested for over 1 million cycles in the igus® laboratory

Installation dimensions

Dimension A1 dependent on outer radius *AR*

AR [mm]	*R* 100 **A1** [mm]	*R* 125 **A1** [mm]	*R* 150 **A1** [mm]	*R* 175 **A1** [mm]	*R* 200 **A1** [mm]	*R* 250 **A1** [mm]
400	51	51	52	53	53	58
500	65	65	66	67	69	71
600	79	80	81	81	82	85

Dimension A1 always with tolerance of ± 2.5mm

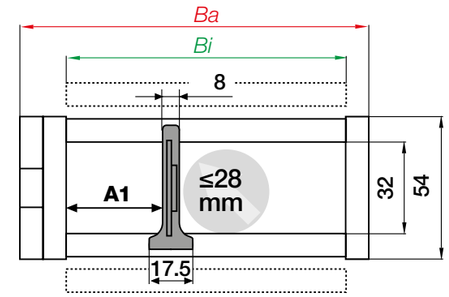


Note: outer radius *AR* (see drawing) determines **dimension A1**!

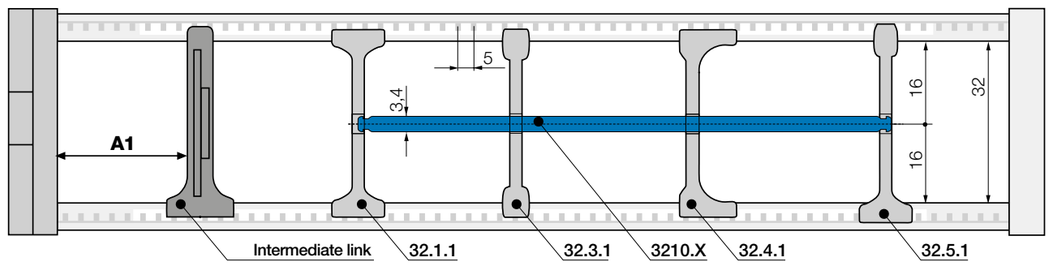
Intermediate link

The cable-friendly intermediate link increases the strength and stability of twisterchain many times over. It also serves as interior separation, dividing the filling space into two chambers. **Outer radius *AR* determines dimension A1.**

Dimensions



Series TC32 | Interior separation



For this series the interior separation elements of series E4.32 may be used (except side-plates) ▶ www.igus.eu/E4.32

AR = Outer radius of e-chain®
IR = Inner radius e-chain®
R = Bend radius e-chain®
X_1 = Inner machine limit
X_2 = Outer machine limit
A1 = Intermediate link position
H = Nominal clearance height
K = Add-on for bend radius
T = Pitch

twisterchain TC42

42mm inner height - product range

AR	*Bi*	*Ba*	X_2	X_1	*R* 100 [mm]	*R* 125 [mm]	*R* 150 [mm]	*R* 175 [mm]	*R* 200 [mm]	*R* 250 [mm]	TC42
[mm]	[mm]	[mm]	[mm]	[mm]	TC42...	TC42...	TC42...	TC42...	TC42...	TC42...	[kg/m]
400	87.5	110.5	480	270	087.100/400	087.125/400	087.150/400	087.175/400	087.200/400	087.250/400	≈ 1.97
400	100	123	480	250	10.100/400	10.125/400	10.150/400	10.175/400	10.200/400	10.250/400	≈ 2.03
400	108	131	480	250	–	11.125/400	11.150/400	11.175/400	11.200/400	11.250/400	≈ 2.07
400	125	148	480	220	–	12.125/400	12.150/400	12.175/400	12.200/400	12.250/400	≈ 2.16
400	137.5	160.5	480	210	–	137.125/400	137.150/400	137.175/400	137.200/400	137.250/400	≈ 2.22
400	150	173	480	200	–	–	–	15.175/400	15.200/400	15.250/400	≈ 2.29
400	162.5	185.5	480	190	–	–	–	–	162.200/400	162.250/400	≈ 2.35
400	168	191	480	190	–	–	–	–	–	17.250/400	≈ 2.38
400	175	198	480	180	–	–	–	–	–	18.250/400	≈ 2.41
500	100	123	580	350	10.100/500	10.125/500	10.150/500	10.175/500	10.200/500	10.250/500	≈ 2.03
500	108	131	580	350	–	11.125/500	11.150/500	11.175/500	11.200/500	11.250/500	≈ 2.07
500	125	148	580	320	–	12.125/500	12.150/500	12.175/500	12.200/500	12.250/500	≈ 2.16
500	137.5	160.5	580	310	–	–	137.150/500	137.175/500	137.200/500	137.250/500	≈ 2.22
500	150	173	580	300	–	–	15.150/500	15.175/500	15.200/500	15.250/500	≈ 2.29
500	162.5	185.5	580	290	–	–	162.150/500	162.175/500	162.200/500	162.250/500	≈ 2.35
500	168	191	580	290	–	–	–	17.175/500	17.200/500	17.250/500	≈ 2.38
500	175	198	580	280	–	–	–	–	18.200/500	18.250/500	≈ 2.41
500	187.5	210.5	580	280	–	–	–	–	187.200/500	187.250/500	≈ 2.48
500	200	223	580	250	–	–	–	–	20.200/500	20.250/500	≈ 2.54
600	108	131	680	450	11.100/600	11.125/600	11.150/600	11.175/600	11.200/600	–	≈ 2.07
600	125	148	680	420	12.100/600	12.125/600	12.150/600	12.175/600	12.200/600	12.250/600	≈ 2.16
600	137.5	160.5	680	410	137.100/600	137.125/600	137.150/600	137.175/600	137.200/600	137.250/600	≈ 2.22
600	150	173	680	400	15.100/600	15.125/600	15.150/600	15.175/600	15.200/600	15.250/600	≈ 2.29
600	162.5	185.5	680	390	–	162.125/600	162.150/600	162.175/600	162.200/600	162.250/600	≈ 2.35
600	168	191	680	390	–	–	17.150/600	17.175/600	17.200/600	17.250/600	≈ 2.38
600	175	198	680	380	–	–	18.150/600	18.175/600	18.200/600	18.250/600	≈ 2.41
600	187.5	210.5	680	380	–	–	187.150/600	187.175/600	187.200/600	187.250/600	≈ 2.48
600	200	223	680	350	–	–	20.150/600	20.175/600	20.200/600	20.250/600	≈ 2.54
650	125	148	730	470	12.100/650	12.125/650	12.150/650	12.175/650	12.200/650	12.250/650	≈ 2.16
650	137.5	160.5	730	460	137.100/650	137.125/650	137.150/650	137.175/650	137.200/650	137.250/650	≈ 2.22
650	150	173	730	450	15.100/650	15.125/650	15.150/650	15.175/650	15.200/650	15.250/650	≈ 2.29
650	162.5	185.5	730	440	–	162.125/650	162.150/650	162.175/650	162.200/650	162.250/650	≈ 2.35
650	168	191	730	430	–	17.125/650	17.150/650	17.175/650	17.200/650	17.250/650	≈ 2.38
650	175	198	730	430	–	–	18.150/650	18.175/650	18.200/650	18.250/650	≈ 2.41
650	187.5	210.5	730	420	–	–	187.150/650	187.175/650	187.200/650	187.250/650	≈ 2.48
650	200	223	730	400	–	–	20.150/650	20.175/650	20.200/650	20.250/650	≈ 2.54
750	137.5	160.5	830	560	137.100/750	137.125/750	137.150/750	137.175/750	137.200/750	137.250/750	≈ 2.22
750	150	173	830	550	15.100/750	15.125/750	15.150/750	15.175/750	15.200/750	15.250/750	≈ 2.29
750	162.5	185.5	830	540	–	162.125/750	162.150/750	162.175/750	162.200/750	162.250/750	≈ 2.35
750	168	191	830	540	–	17.125/750	17.150/750	17.175/750	17.200/750	17.250/750	≈ 2.38
750	175	198	830	530	–	18.125/750	18.150/750	18.175/750	18.200/750	18.250/750	≈ 2.41
750	187.5	210.5	830	520	–	187.125/750	187.150/750	187.175/750	187.200/750	187.250/750	≈ 2.48
750	200	223	830	500	–	20.125/750	20.150/750	20.175/750	20.200/750	20.250/750	≈ 2.54
850	150	173	930	650	15.100/850	15.125/850	15.150/850	15.175/850	15.200/850	15.250/850	≈ 2.29
850	162.5	185.5	930	640	162.100/850	162.125/850	162.150/850	162.175/850	162.200/850	162.250/850	≈ 2.35
850	168	191	930	630	17.100/850	17.125/850	17.150/850	17.175/850	17.200/850	17.250/850	≈ 2.38
850	175	198	930	630	–	18.125/850	18.150/850	18.175/850	18.200/850	18.250/850	≈ 2.41
850	187.5	210.5	930	620	–	187.125/850	187.150/850	187.175/850	187.200/850	187.250/850	≈ 2.48
850	200	223	930	600	–	20.125/850	20.150/850	20.175/850	20.200/850	20.250/850	≈ 2.54

R	100	125	150	175	200	250
$H\ ^{-0}_{+25}$	267	317	367	417	467	567
K	500	650	725	800	875	1,050

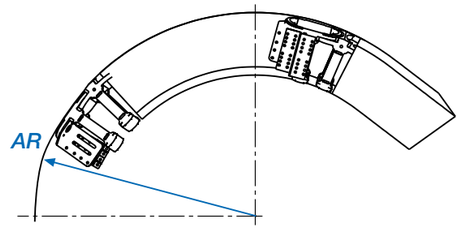
Pitch [mm/link]	**67**
Links/m	**15**
corresponds to [mm]	**1,005**

Installation dimensions

Dimension A1 dependent on outer radius *AR*

AR	*R* 100	*R* 125	*R* 150	*R* 175	*R* 200	*R* 250
[mm]	**A1** [mm]	**A1** [mm]	**A1** [mm]	**A1** [mm]	**A1** [mm]	**A1** [mm]
400	49	50	51	53	54	58
500	64	65	66	67	68	71
600	79	79	80	81	82	85
650	86	87	87	88	89	92
750	101	101	102	103	104	106
850	116	116	117	118	118	120

Dimension A1 always with tolerance of ± 2.5mm

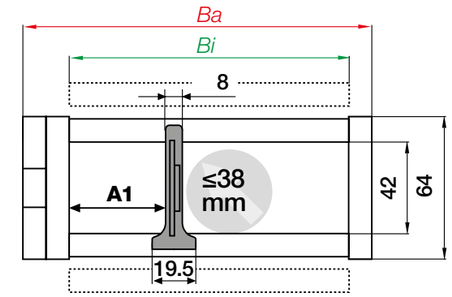


Note: outer radius *AR* (see drawing) determines **dimension A1!**

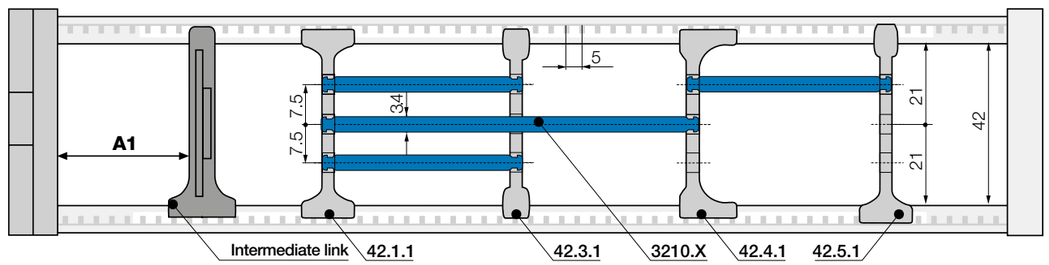
Intermediate link

The cable-friendly intermediate link increases the strength and stability of twisterchain many times over. It also serves as interior separation, dividing the filling space into two chambers. **Outer radius *AR* determines dimension A1.**

Dimensions



Series TC42 | Interior separation



For this series the interior separation elements of series E4.42 may be used (except side-plates) ▶ www.igus.eu/E4.42

AR = Outer radius of e-chain®
IR = Inner radius e-chain®
R = Bend radius e-chain®
X_1 = Inner machine limit
X_2 = Outer machine limit
A1 = Intermediate link position
H = Nominal clearance height
K = Add-on for bend radius
T = Pitch

twisterchain TC56

56mm inner height - product range

AR [mm]	*Bi* [mm]	*Ba* [mm]	X_2 [mm]	X_1 [mm]	*R* 150 [mm] TC56...	*R* 200 [mm] TC56...	*R* 250 [mm] TC56...	*R* 300 [mm] TC56...	*R* 400 [mm] TC56...	TC56 [kg/m]
650	125	155	730	470	12.150/650	12.200/650	12.250/650	12.300/650	–	≈ 3.45
650	137.5	168	730	460	–	13.200/650	13.250/650	13.300/650	13.400/650	≈ 3.54
650	150	180	730	450	–	–	15.250/650	15.300/650	15.400/650	≈ 3.62
650	162.5	193	730	440	–	–	16.250/650	16.300/650	16.400/650	≈ 3.70
650	175	205	730	430	–	–	–	17.300/650	17.400/650	≈ 3.78
650	187.5	218	730	420	–	–	–	18.300/650	18.400/650	≈ 3.87
650	200	230	730	400	–	–	–	–	20.400/650	≈ 3.95
750	137.5	168	830	560	.13.150/750	.13.200/750	.13.250/750	.13.300/750	–	≈ 3.54
750	150	180	830	550	–	.15.200/750	.15.250/750	.15.300/750	.15.400/750	≈ 3.62
750	162.5	193	830	540	–	.16.200/750	.16.250/750	.16.300/750	.16.400/750	≈ 3.70
750	175	205	830	530	–	–	.17.250/750	.17.300/750	.17.400/750	≈ 3.78
750	187.5	218	830	520	–	–	.18.250/750	.18.300/750	.18.400/750	≈ 3.87
750	200	230	830	500	–	–	.20.250/750	.20.300/750	.20.400/750	≈ 3.95
850	150	180	930	650	15.150/850	15.200/850	15.250/850	15.300/850	15.400/850	≈ 3.62
850	162.5	193	930	640	16.150/850	16.200/850	16.250/850	16.300/850	16.400/850	≈ 3.70
850	175	205	930	630	17.150/850	17.200/850	17.250/850	17.300/850	17.400/850	≈ 3.78
850	187.5	218	930	620	–	18.200/850	18.250/850	18.300/850	18.400/850	≈ 3.87
850	200	230	930	600	–	–	20.250/850	20.300/850	20.400/850	≈ 3.95

R	150	200	250	300	400
$H\ ^{0}_{+25}$	384	484	584	684	884
K	750	900	1,050	1,225	1,450

Pitch [mm/link]	**91**
Links/m	**11**
corresponds to [mm]	**1,001**

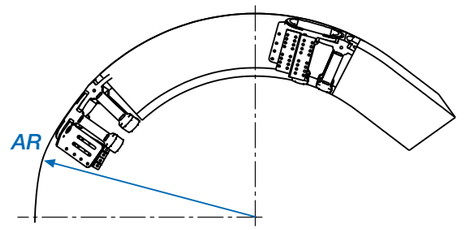
twisterchain in a guide trough for rotary movement on an articulated robot - long service life and robust: tested successfully for more than 1,000,000 cycles

Installation dimensions

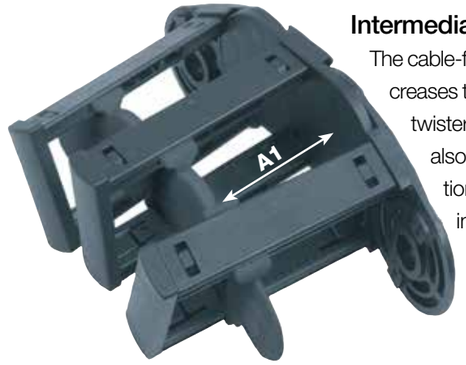
Dimension A1 dependent on outer radius *AR*

AR [mm]	*R* 150 **A1** [mm]	*R* 200 **A1** [mm]	*R* 250 **A1** [mm]	*R* 300 **A1** [mm]	*R* 400 **A1** [mm]
650	83	85	88	90	97
750	98	101	102	103	110
850	113	116	117	118	124

Dimension A1 always with tolerance of ± 2.5mm



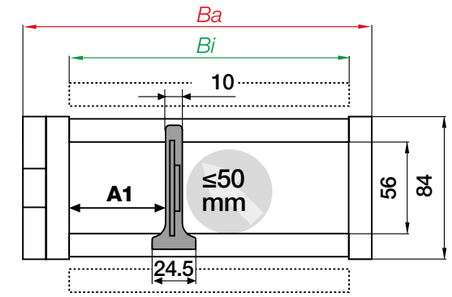
Note: outer radius *AR* (see drawing) determines **dimension A1**!



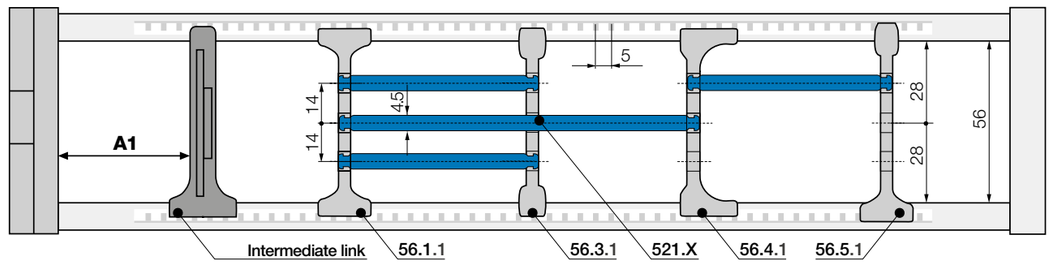
Intermediate link

The cable-friendly intermediate link increases the strength and stability of twisterchain many times over. It also serves as interior separation, dividing the filling space into two chambers. **Outer radius *AR* determines dimension A1.**

Dimensions



Series TC56 | Interior separation

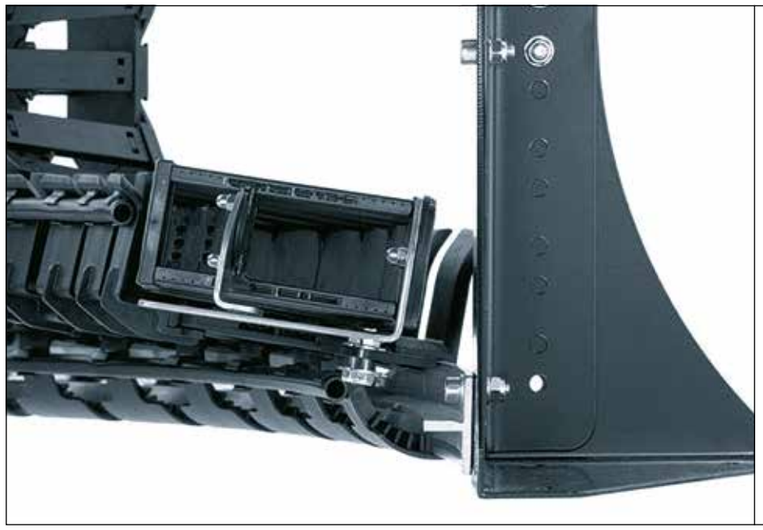


For this series the interior separation elements of series E4.56 may be used (except side-plates) ▶ www.igus.eu/E4.56

AR = Outer radius of e-chain®
IR = Inner radius e-chain®
R = Bend radius e-chain®
X_1 = Inner machine limit
X_2 = Outer machine limit
A1 = Intermediate link position
H = Nominal clearance height
K = Add-on for bend radius
T = Pitch

twisterchain accessories

Steel mounting brackets

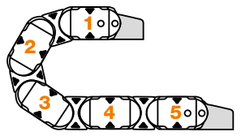


Position 1 Position 2

- One part for all e-chain® widths
- Electrically conductive
- Universal installation
- Material: stainless steel 1.4301

Steel, one-piece for twisterchain (2nd generation) | Recommended for unsupported and rotary applications

For series	Part No. full set	Part No. position 1	Part No. position 2
TC32 ▶	**TC3200.34.VS.E**	**TC3200.30.VS.E**	**TC3200.40.VS.E**
TC42 ▶	**TC4200.34.VS.E**	**TC4200.30.VS.E**	**TC4200.40.VS.E**
TC56 ▶	**TC5600.34.VS.E**	**TC5600.30.VS.E**	**TC5600.40.VS.E**



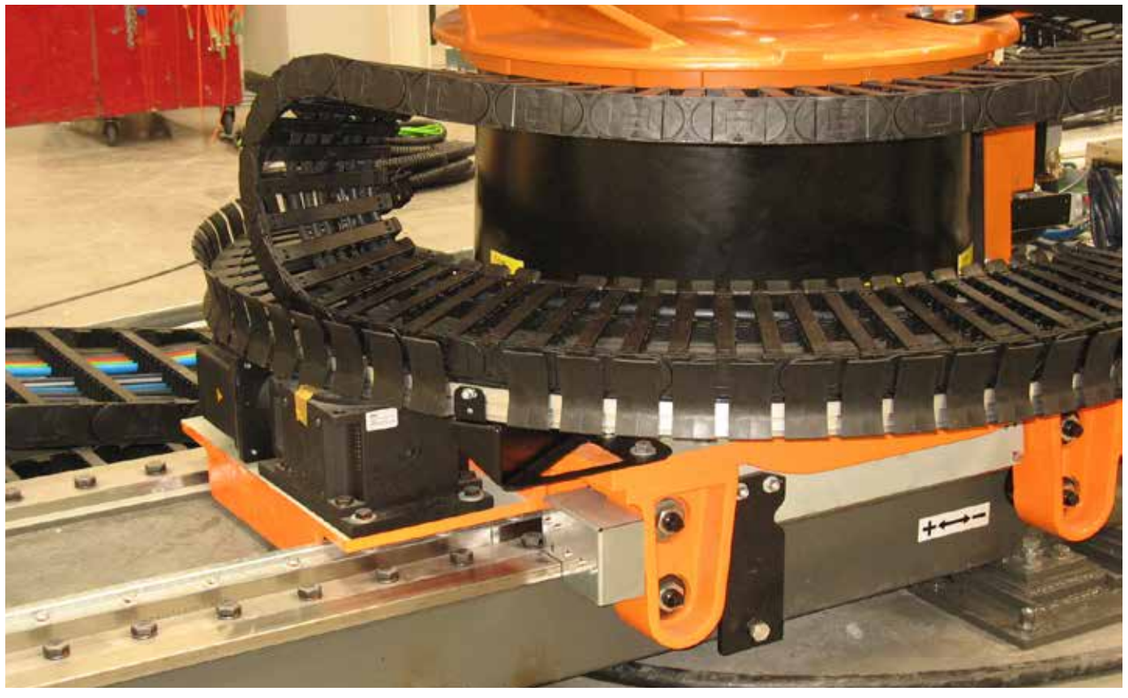
Note: twisterchain e-chains® must always start and end on an outer side-link. Please note when calculating!

TC3200.34.VS.E **Order example**

- Stainless steel (standard)
- Standard: bolted
- Full set
- Series

Applications

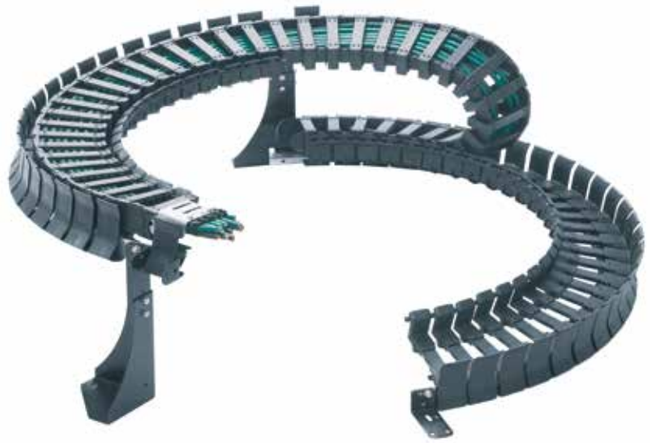
twisterchain on a cleaning robot

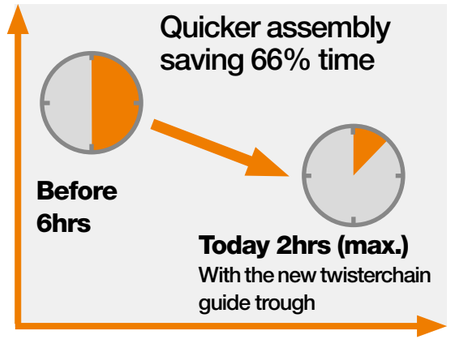


twisterchain on axis 7 of a robot

twisterchain accessories
Guide troughs

Save installation time and cost - better guidance for circular movement - increase service life!

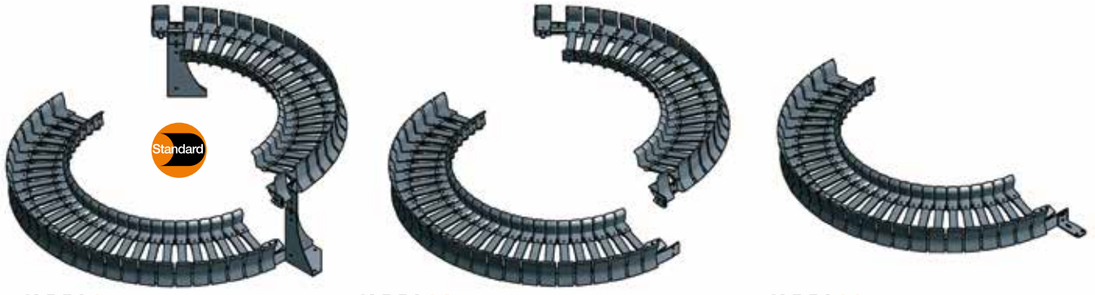




With the new twisterchain guide trough, complex adjustment work is reduced and so assembly time is reduced from 6 hours to 2 hours. It also reduces noise, whilst travel speed and service life can be increased, thanks to its nearly all-plastic design. Available for all twisterchains from the new and original product range.

- Suitable for high dynamics, because of the full guidance of the upper run
- Much smoother and quieter motion in the trough due to continuous guidance of the upper run
- Upper run guided in the polymer trough over the full length
- Preassembled delivery possible
- Easy adjustment, alignment and handling
- Assembly time reduced from 6 hours to 2 hours

twisterchain guide trough options



9XXX.31
Complete trough
(**with** base support, height adjustment and attachment angle brackets)

9XXX.32
Upper and lower run trough
(**without** floor support and height adjustment)
Special option: customer supplies base supports

9XXX.30
Lower run trough
(**with** mounting angle brackets)
Special option: customer builds upper run trough

Product range
Guide troughs

Part No. series	Outer radius *AR* [mm]	Angle of rotation min.-max. α	Part No. complete trough	Part No. upper/lower run trough	Part No. lower run trough
TC32 / TC42	400	0 - 90°	9XXX.31.90 .400/*Bi.R*	9XXX.32.90 .400/*Bi.R*	9XXX.30.90 .400/*Bi.R*
		90° - 180°	9XXX.31.180.400/*Bi.R*	9XXX.32.180.400/*Bi.R*	9XXX.30.180.400/*Bi.R*
		180° - 270°	9XXX.31.270.400/*Bi.R*	9XXX.32.270.400/*Bi.R*	9XXX.30.270.400/*Bi.R*
		270° - 360°	9XXX.31.360.400/*Bi.R*	9XXX.32.360.400/*Bi.R*	9XXX.30.360.400/*Bi.R*
	500	0 - 90°	9XXX.31.90 .500/*Bi.R*	9XXX.32.90 .500/*Bi.R*	9XXX.30.90 .500/*Bi.R*
		90° - 180°	9XXX.31.180.500/*Bi.R*	9XXX.32.180.500/*Bi.R*	9XXX.30.180.500/*Bi.R*
		180° - 270°	9XXX.31.270.500/*Bi.R*	9XXX.32.270.500/*Bi.R*	9XXX.30.270.500/*Bi.R*
		270° - 360°	9XXX.31.360.500/*Bi.R*	9XXX.32.360.500/*Bi.R*	9XXX.30.360.500/*Bi.R*
	600	0 - 90°	9XXX.31.90 .600/*Bi.R*	9XXX.32.90 .600/*Bi.R*	9XXX.30.90 .600/*Bi.R*
		90° - 180°	9XXX.31.180.600/*Bi.R*	9XXX.32.180.600/*Bi.R*	9XXX.30.180.600/*Bi.R*
		180° - 270°	9XXX.31.270.600/*Bi.R*	9XXX.32.270.600/*Bi.R*	9XXX.30.270.600/*Bi.R*
		270° - 360°	9XXX.31.360.600/*Bi.R*	9XXX.32.360.600/*Bi.R*	9XXX.30.360.600/*Bi.R*
TC42 / TC56	650	0 - 90°	9XXX.31.90 .650/*Bi.R*	9XXX.32.90 .650/*Bi.R*	9XXX.30.90 .650/*Bi.R*
		90° - 180°	9XXX.31.180.650/*Bi.R*	9XXX.32.180.650/*Bi.R*	9XXX.30.180.650/*Bi.R*
		180° - 270°	9XXX.31.270.650/*Bi.R*	9XXX.32.270.650/*Bi.R*	9XXX.30.270.650/*Bi.R*
		270° - 360°	9XXX.31.360.650/*Bi.R*	9XXX.32.360.650/*Bi.R*	9XXX.30.360.650/*Bi.R*
	750	0 - 90°	9XXX.31.90 .750/*Bi.R*	9XXX.32.90 .750/*Bi.R*	9XXX.30.90 .750/*Bi.R*
		90° - 180°	9XXX.31.180.750/*Bi.R*	9XXX.32.180.750/*Bi.R*	9XXX.30.180.750/*Bi.R*
		180° - 270°	9XXX.31.270.750/*Bi.R*	9XXX.32.270.750/*Bi.R*	9XXX.30.270.750/*Bi.R*
		270° - 360°	9XXX.31.360.750/*Bi.R*	9XXX.32.360.750/*Bi.R*	9XXX.30.360.750/*Bi.R*
	850	0 - 90°	9XXX.31.90 .850/*Bi.R*	9XXX.32.90 .850/*Bi.R*	9XXX.30.90 .850/*Bi.R*
		90° - 180°	9XXX.31.180.850/*Bi.R*	9XXX.32.180.850/*Bi.R*	9XXX.30.180.850/*Bi.R*
		180° - 270°	9XXX.31.270.850/*Bi.R*	9XXX.32.270.850/*Bi.R*	9XXX.30.270.850/*Bi.R*
		270° - 360°	9XXX.31.360.850/*Bi.R*	9XXX.32.360.850/*Bi.R*	9XXX.30.360.850/*Bi.R*

Complete part No. **9XXX** with required series (TC32, TC42, TC56),
value ***Bi*** and required **bend radius** ***R*** ▶ **9TC32.31.180.600/06.250**

9TC32.31.180.600/12.250
9XXXX.31.180.600/*Bi*. *R*

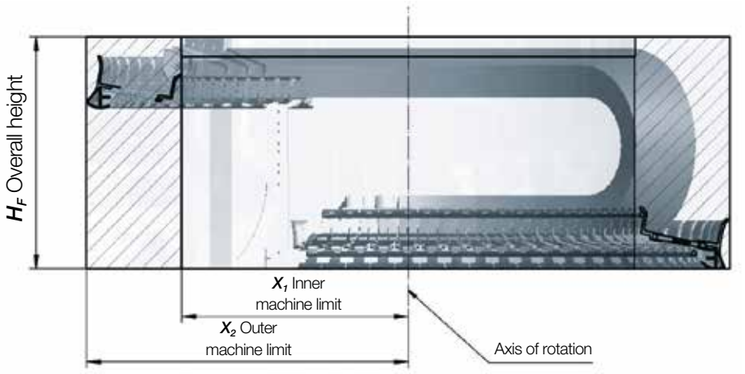
Order key guide trough

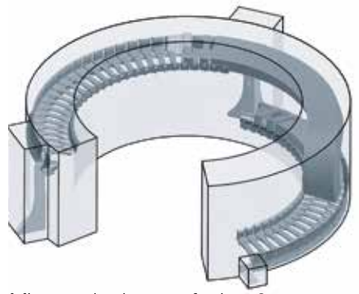
- ***R*** - Bend radius, please add required value
- ***Bi*** - width index, please add required value
- Outer radius of e-chain®
- Angle of rotation of application (90°, 180°, 270°, 360°)
- Trough version
- Guide trough of selected series

More order examples

Complete trough	Part No.	9TC32.31.180.600/12.250
Lower run trough only	Part No.	9TC32.30.180.600/12.250
Upper and lower run trough without base support	Part No.	9TC32.32.180.600/12.250

Guide troughs - dimensions





Min. required space for igus® twisterchain-guide trough system

Installation dimensions | X_1 inner machine limit and X_2 outer machine limit

AR	X_2	X_1 depending on *Bi*										
[mm]	[mm]	[mm]										
TC32		87.5	100	108	125	137.5	150					
400	480	270	250	250	220	210	200					
500	580	–	350	350	320	310	300					
600	680	–	–	450	420	410	400					
TC42		87.5	100	108	125	137.5	150	162.5	168	175	187.5	200
400	480	270	250	250	220	210	200	190	190	180	–	–
500	580	–	350	350	320	310	300	290	290	280	280	250
600	680	–	–	450	420	410	400	390	390	380	380	350
650	730	–	–	–	470	460	450	440	440	430	420	400
750	830	–	–	–	–	560	550	540	540	530	520	500
850	930	–	–	–	–	–	650	640	640	630	620	600
TC56			–	–	125	137.5	150	162.5	–	175	187	200
650	730	–	–	–	470	460	450	440	–	430	420	400
750	830	–	–	–	–	560	550	540	–	530	520	500
850	930	–	–	–	–	–	650	640	–	630	620	600

Construction height | H_F depending on bend radius of twisterchain guide trough

Part No.	*R* [mm]	100	125	150	175	200	250	300	400
series		H_F Installation height [mm]							
TC32		370	420	470	520	570	670	–	–
TC42		380	430	480	530	580	680	–	–
TC56		–	–	500	–	600	700	800	1,000

twisterchain accessories

Guide troughs - rotation angle

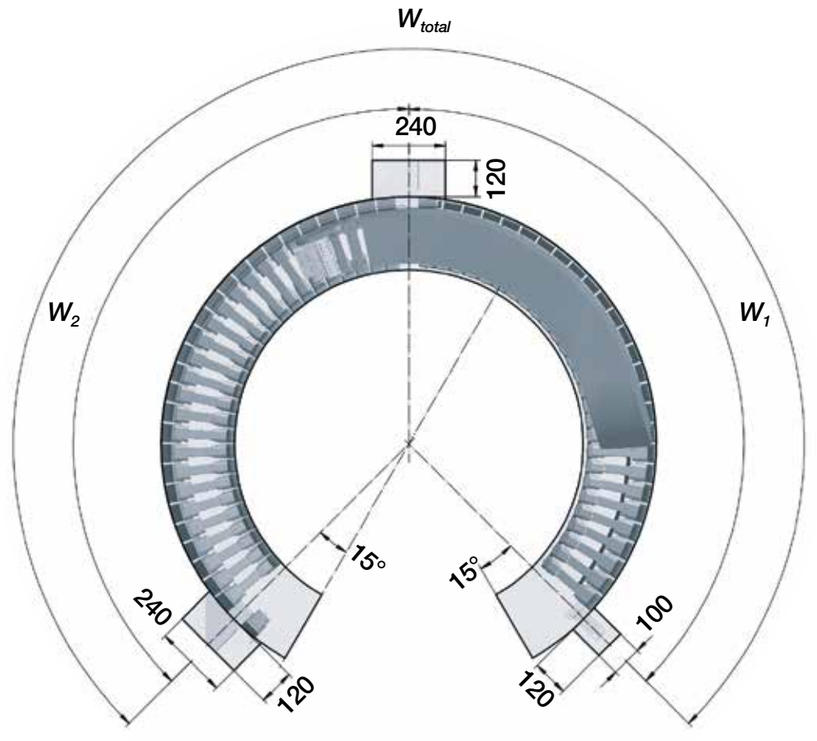
Angle of rotation for 360° | W_2 angle of upper run twisterchain guide trough

Part No.	*AR*	*R* [mm]	100	125	150	175	200	250	300	400
series	[mm]		W_2 angle of rotation							
TC32/TC42	400		90°	90°	90°	90°	90°	90°	90°	90°
TC32/TC42	500		90°	90°	90°	90°	90°	90°	90°	90°
TC32/TC42	600		135°	135°	135°	135°	90°	90°	90°	90°
TC42/TC56	650		135°	135°	135°	135°	90°	90°	90°	90°
TC42/TC56	750		135°	135°	135°	135°	135°	135°	90°	90°
TC42/TC56	850		135°	135°	135°	135°	135°	135°	135°	135°

Support for the upper run as of 180° rotation angle

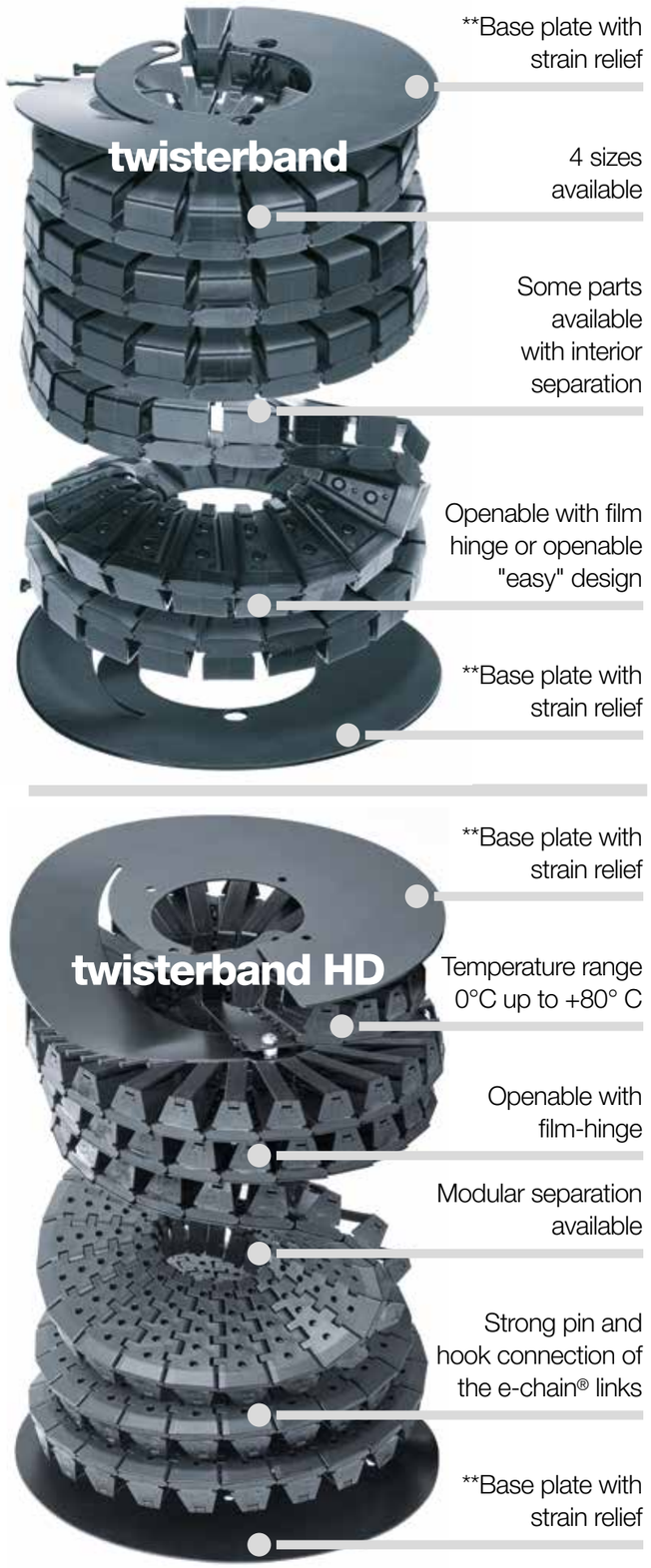
Angle of rotation | W_1 | W_{total}

Angle of rotation of system	Angle of lower run
$W_{ges.}$	W_1
90°	45°
180°	90°
270°	135°
360°	180°



AR = Outer radius of e-chain®
IR = Inner radius e-chain®
R = Bend radius e-chain®
X_1 = Inner machine limit
X_2 = Outer machine limit
H_F = Total trough height
H_F e-chain® height incl. 50mm clearance
H e-chain® height
K Add-on for bend radius
W1 = Angle of upper run
W2 = Angle of lower run
W_{total} = Angle of rotation of system

twisterband advantages



Up to 7,000°* rotary movements in small spaces - twisterband

With the compact igus® twisterband, rotations of up to 7,000°* can be achieved cost-effectively, even in confined spaces. Energy, data and media are securely guided.

- Rotary movement up to 7000°*
- Rotary speeds up to 180°/s possible
- Openable with film hinge or openable "easy" design
- HD version with strong pin and hook connection for an even longer service life
- Compact, modular and lightweight
- Bands can be lengthened and shortened as required
- Minimum installation space, fits very closely around the rotary axis
- Cost-effective and easy to fill

*Depending on installation orientation, vertical: up to 3,000°, horizontal: 7,000° and more possible
**Base plates are delivered as standard as part of the twisterband module!

iF product design award 2011 for twisterband

reddot design award winner 2011

Selection table

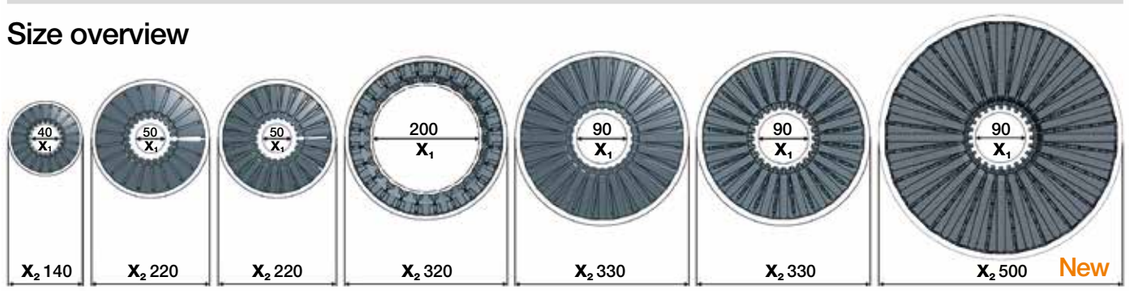
Series	Inner height *hi* [mm]	Inner width *Bi* [mm]	Ø X_1 [mm]	Ø X_2 [mm]	≥ *R* [mm]	≤ *R* [mm]	≤ *d1* [mm]	Interior separation	igus® online
 **twisterband** e-chain® links on a strip. Openable with film hinge or openable "easy" design									
TB12.23.9	9	23	40	140	024	035	7	–	▶ www.igus.eu/twisterband
TB20.44.12	12	44	50	220	034	057	9	–	▶ www.igus.eu/twisterband
TB20.44.18	18	44	50	220	034	057	14	Yes	▶ www.igus.eu/twisterband
TB29.27.22	22	27	200	320	069	082	17	Yes	▶ www.igus.eu/twisterband
TB30.75.22	22	75	90	330	044	077	17	Yes	▶ www.igus.eu/twisterband
 **twisterband HD** e-chain® links with strong pin and hook connection. Openable with film-hinge									
TBHD30.75.22	22	75	90	330	044	077	17	Yes	▶ www.igus.eu/twisterbandHD
TBHD42.135.30 New	30	135	90	500	056	119	20	Yes	▶ www.igus.eu/twisterbandHD

Other sizes available upon request. X_1 =inner machine limit X_2 = outer machine limit

The complete range with ordering options,
3D-CAD, configurators, PDFs, application examples ▶ www.igus.eu/twisterband

Available from stock. Ready to ship in 24 - 48hrs.*
*The delivery times indicated correspond to the average time until the ordered goods are dispatched.

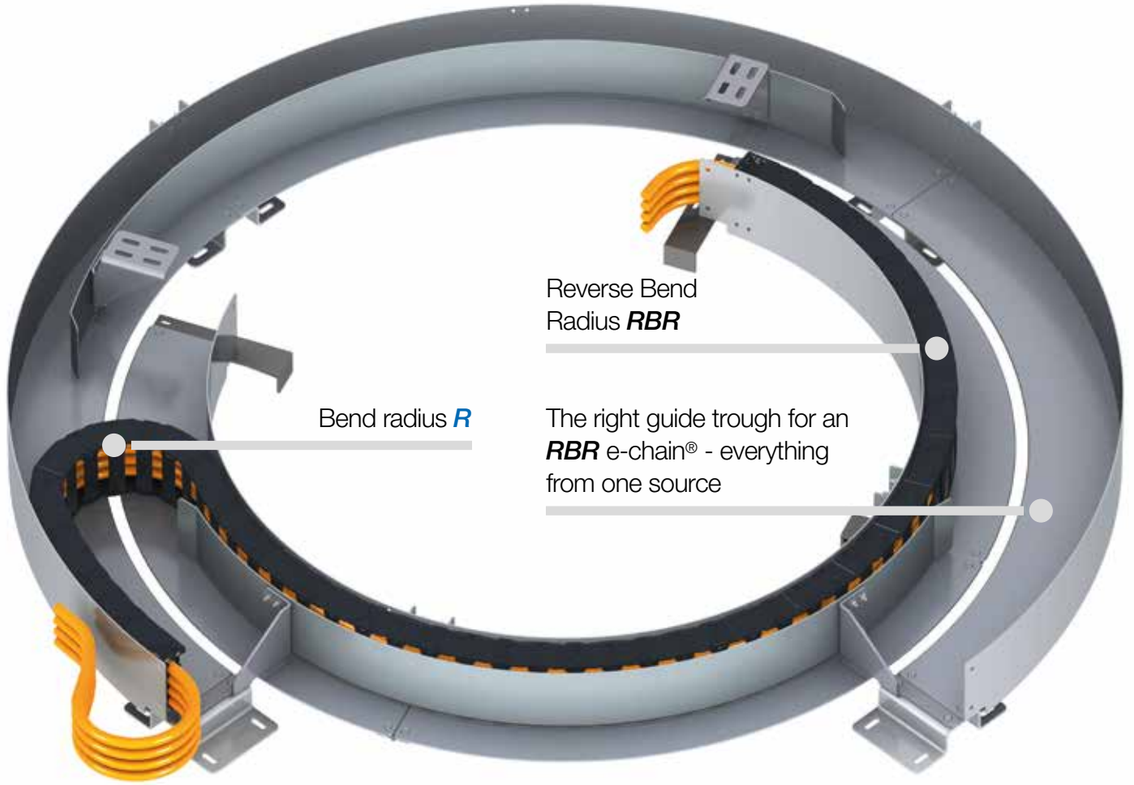
Size overview



Bi = Inner width e-chain® | X_1 = Inner machine limit | ≥ *R* = Minimum bend radius e-chain® | *d1* = Max. cable diameter
hi = Inner height e-chain® | X_2 = Outer machine limit | ≤ *R* = Max. bend radius e-chain® | **XX** = Number of strips

Rotating energy supplies

Modular system for fast rotating applications with *RBR*



Rotating energy supply - the modular system for fast rotating applications with *RBR*

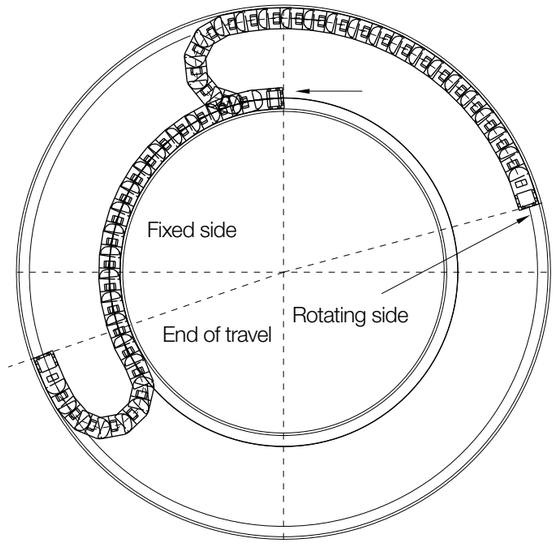
For several years igus® has been developing customised systems for circular movements with e-chains®, to offer rotating energy supply systems. As a result rotating systems can be supplied with energy, data and liquids for the machine tool industry, in robotics and in bucket wheel excavators. The standard igus® rotary modules consist of two circular guide elements. One part of the guide trough is attached to the stationary part of the system and the other part to the rotating part. The fixed end of the e-chain® can be freely selected, as both the inside and outside parts of the rotary modules can be rotated. ***RBR*** (Reverse Bend Radius) means that the e-chain® can bend in two directions. ***RBR*** versions of many igus® e-chains®can be made. The ***RBR*** does not necessarily need to be identical to the normal bend radius ***R*** (bend radius) of an e-chain®. In this way, most circular movements can be implemented.

- Maximum rotation angle in minimal installation space
- Minimal friction forces and maximum service life
- Modular construction with standardised mounting options
- Integrated strain relief and cable routing directly in the guide trough
- Determine the rotating energy supply quickly and easily using the CAD configurator ▶ **www.igus.eu/*rbr*-configurator**
- Depending on the application, the e-chains® glide on surfaces made of plastic, stainless steel or galvanised steel and are guided through special guide plates in a defined circular motion
- Failsafe cables for rotary guide systems ▶ **www.igus.eu/chainflex**

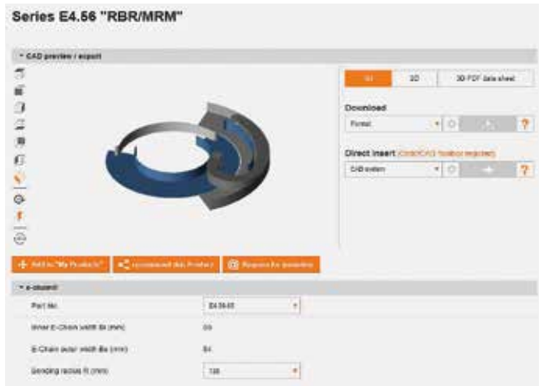
e-chains® and troughs

Complete rotating energy supply systems from a single source

E2 ***RBR*** e-chain® applications for 360° circular movement on a robot



Principle of igus® rotating energy supply with Reverse Bend Radius (***RBR***)



Configure in seconds ...

The length of the e-chain® is calculated according to the rotation angle and the diameters. The e-chain® should be as short as possible. The e-chain® length required for your rotation angle can be determined easily, quickly and reliably via the igus® CAD configurator.

Configure bend radii online

▶ www.igus.eu/*rbr*-configurator

The complete range with ordering options,
3D-CAD, configurators, PDFs, application examples ▶ www.*igus.eu/RBR*

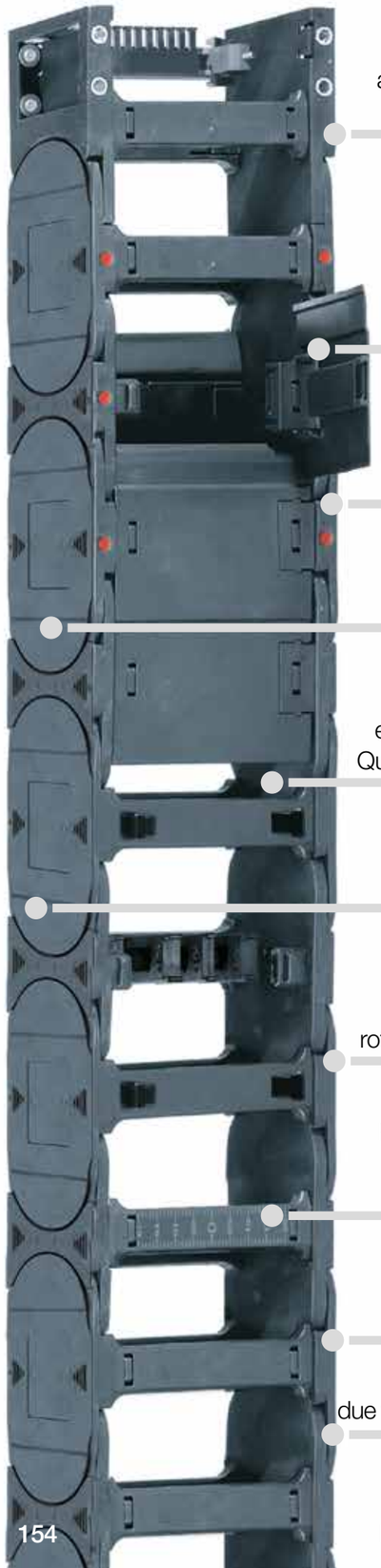
Rotary energy chains with *RBR* - Delivery time 5 business days!
Rotary guide trough - Delivery time upon request

igus® E4.1

e-chains® and e-tubes for secure energy supply on robot axis 7

Ready-to-install assembled e-chainsystems® e.g. for axis 7 - readychain® ▶ From page 212

System E4.1 advantages



Attachment from any side: with KMA mounting brackets

Swarf protection: openable lids

Quiet operation: optional noise dampers

Long service life: lateral gliding surfaces

25% faster: easy assembly with QuickLock crossbars

Straight run: due to inner/outer link principle

No pretension: NC version by rotating the outer link

Precise separation: notch crossbar with visual scale

High strength: due to undercut design

Quiet operation: due to integrated brake

Reliable energy supply, for robot axis 7 - system E4.1

Secure energy supply to axis 7 with igus® e-chains®. Even on long travels (when used with igus® guide troughs), high accelerations or in dirty environments, igus® e-chains® are the ideal partner for your robot application.

- Undercut design for high lateral stability, high strength for long travels and for large unsupported lengths
- Many interior separation options
- Noise-reducing brake and optional noise dampers
- Ideal for long travels in combination with igus® trough system
- Especially suited for side-mounted applications
- Inner and outer links for quick assembly, with or without pretension

Fraunhofer IPA TESTED® DEVICE

IPA Qualification Certificate - Report IG 1303-640-1:
ISO Class 2, according to DIN EN ISO 14644-1 for System E4.1, Series E4.32.10.063.0.CR at v = 0.5 / 1.0 / 2.0

41 dB(A) - value determined at the igus® test lab, v = 1.8m/s unsupported, series E4.21.060.038.0

ESD

Electrically conductive ESD e-chains® - several series available from stock

Explore the benefits ▶ www.igus.eu/best/E4.1

igus

Selection table

Series	Inner height *hi* [mm]	Inner width *Bi* [mm]	Outer width *Ba* [mm]	Outer height *ha* [mm]	Bend radius *R* [mm]	Unsupported length ≤ [m]	igus® online
							
e-chains® with crossbars every link e-chains® for particularly demanding applications							
E4.21	21	30 - 140	44 - 154	28	038 - 200	2.50	▶ www.igus.eu/E4.21
E4.28	28	40 - 300	60 - 320	42	055 - 250	2.50	▶ www.igus.eu/E4.28
E4.32	32	50 - 400	73 - 423	54	063 - 300	3.30	▶ www.igus.eu/E4.32
E4.42	42	50 - 400	76 - 426	64	075 - 350	4.00	▶ www.igus.eu/E4.42
E4.56	56	50 - 600	84 - 634	84	135 - 500	5.00	▶ www.igus.eu/E4.56
E4.80	80	50 - 600	100 - 650	108	150 - 1.000	6.20	▶ www.igus.eu/E4.80
E4.112	112	50 - 600	102 - 652	140	200 - 1.000	6.50	▶ www.igus.eu/E4.112
E4.162	162	200 - 600	256 - 656	195	250 - 1.000	6.75	▶ www.igus.eu/E4.162
							
e-chains® with crossbars every 2nd link e-chains® for almost any application - standard							
H4.32	32	50 - 400	73 - 423	54	063 - 300	3.30	▶ www.igus.eu/H4.32
H4.42	42	50 - 400	76 - 426	64	075 - 350	4.00	▶ www.igus.eu/H4.42
H4.56	56	50 - 600	84 - 634	84	135 - 500	5.00	▶ www.igus.eu/H4.56
H4.80	80	50 - 600	100 - 650	108	150 - 1.000	6.20	▶ www.igus.eu/H4.80
							
e-tubes Fully enclosed, excellent cable protection							
R4.28	28	50 - 300	70 - 320	42	075 - 250	2.50	▶ www.igus.eu/E4.28
R4.32	32	50 - 300	73 - 323	54	125 - 300	3.30	▶ www.igus.eu/E4.32
R4.42	42	50 - 300	76 - 326	64	125 - 350	4.00	▶ www.igus.eu/E4.42
R4.56	56	75 - 462	109 - 497	84	135 - 500	5.00	▶ www.igus.eu/E4.56
R4.80	80	100 - 462	150 - 513	108	200 - 1.000	6.20	▶ www.igus.eu/E4.80
R4.112	108	200 - 500	252 - 552	140	250 - 1.000	6.50	▶ www.igus.eu/E4.112

The complete range with ordering options,
3D-CAD, configurators, PDFs, application examples ▶ www.igus.eu/E4.1

Available from stock. Ready to ship in 24 - 48hrs.*
*The delivery times indicated correspond to the average time until the ordered goods are dispatched.

igus 3D CAD, configurators, service life calculation and more ▶ www.igus.eu/E4.1

Any application with one e-chain® ... E4.1 system

Undercut design, combined with the inner/outer link design

High stability and strength, easy installation

Smooth, cable-friendly inner surfaces

Low-noise operation due to integrated brake on the radial stop-dogs

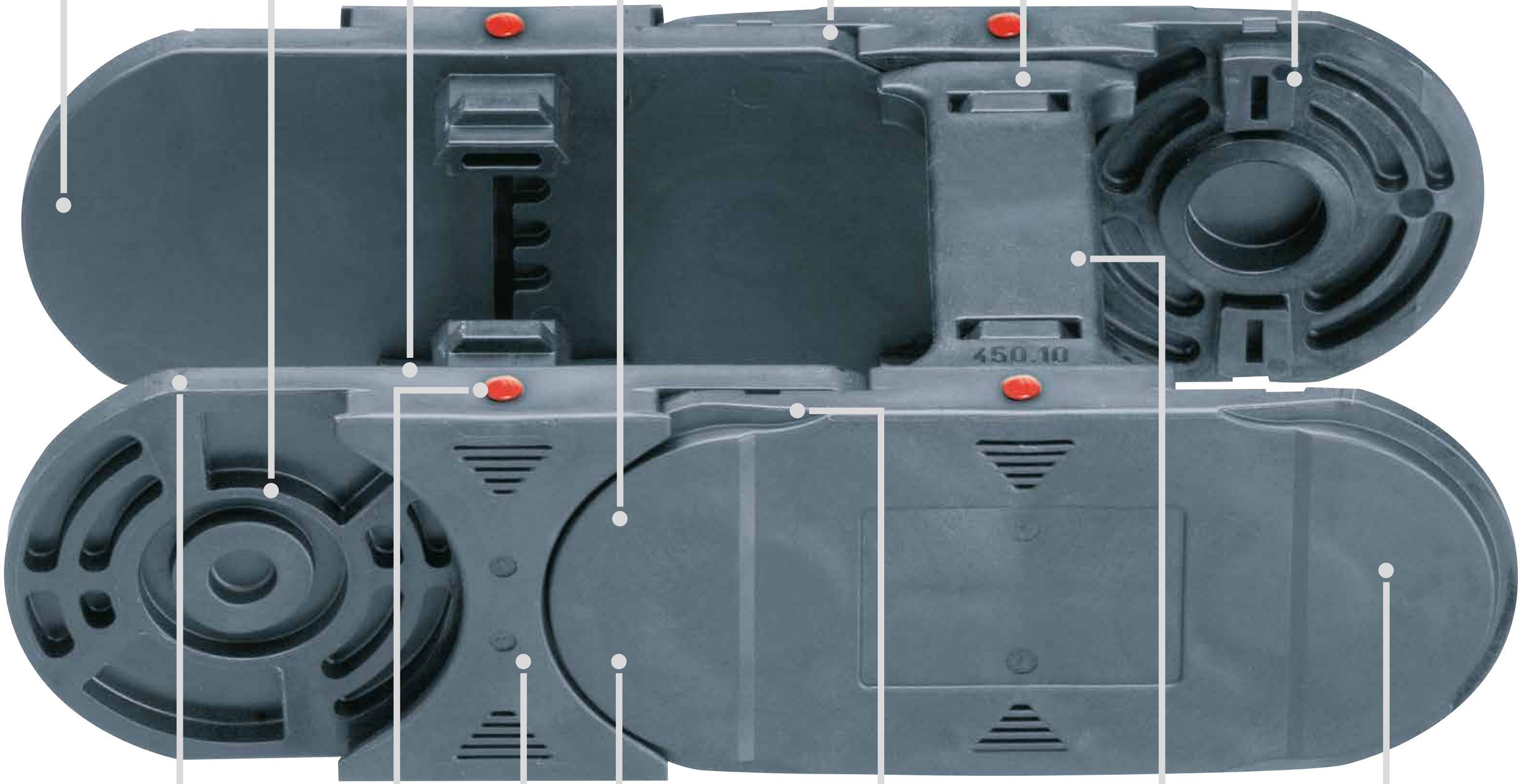
Smooth and wear-resistant gliding surface - no additional glide shoes required

Option with or without camber simply by reversing outer links

ESD version ideal with large undercut contact area

Strong crossbars with double locking

Double vertical stop-dog system for larger unsupported lengths



Special e-chain® link contour provides low rolling noise

Optional noise dampers

Straight run and fast assembly due to inner/outer-link design

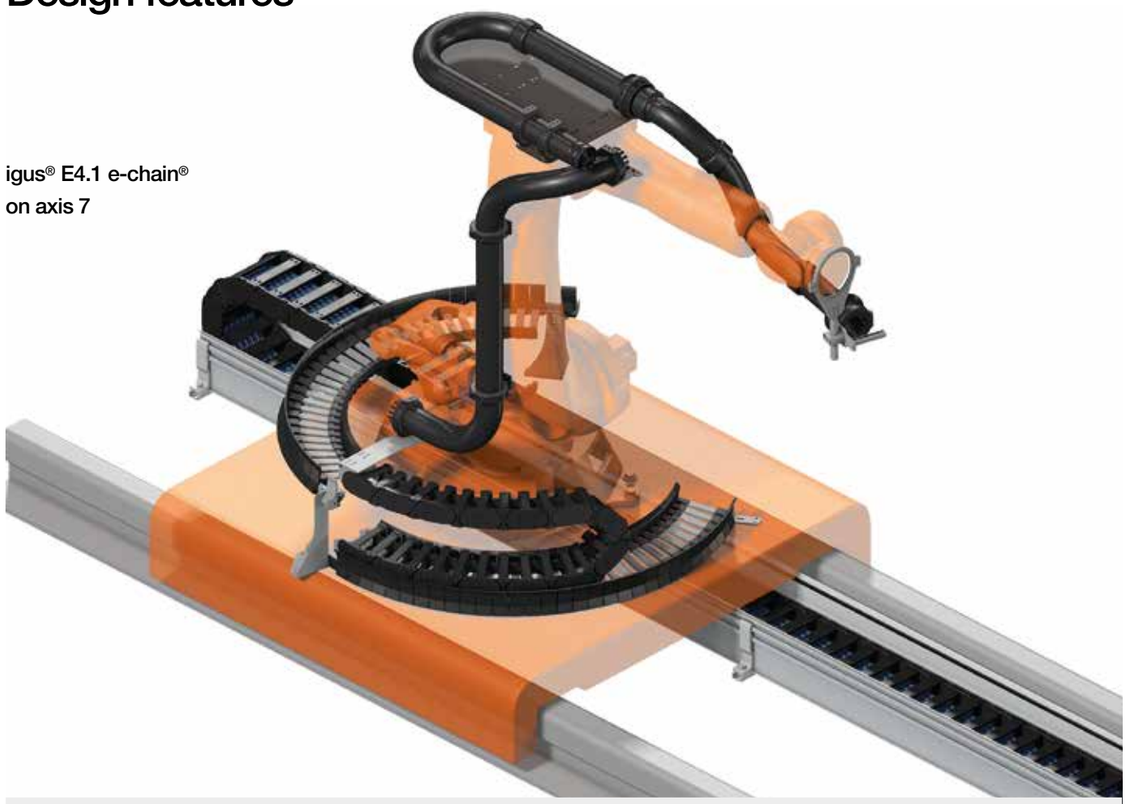
Very high stability due to the undercut design

Cable-friendly, rounded crossbar

Integrated lateral wear pads for a long service life (also for side-mounted applications)

E4.1 advantages

Design features



igus® E4.1 e-chain®
on axis 7

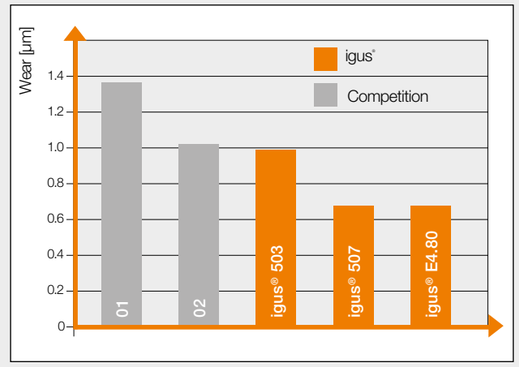
Application	Design features
Long unsupported length	Special stop-dogs, undercut design
Low noise, unsupported gliding	Integrated brake, smooth sliding surfaces - optional rubber dampers
Vertical hanging or standing	Undercut design increases torsional stability, "No Camber" version (by rotating the outer link)
Long travels	Undercut design and stop-dogs allows high push- pull forces and large smooth gliding surfaces
Unsupported, side-mounted	Undercut design extends the unsupported length when side-mounted
Quick assembly	Inner link/outer link design
Rotary movement	In part by simply rotating links, or fully with rework. Gliding surfaces on the sides
Increase service life	Smooth, wide, solid plastic support surface for cables, many inner separation options
Increase service life of e-chains®	Large pins, optimised material, high strength
ESD, ATEX	Undercut design for secure contact (especially for conductive material option)
Dirt, chips, moisture	Undercut design prevents chain failures, dirt resistant design

Wear tests

Increase cable service life with igus® components

Cables last up to 4 times longer

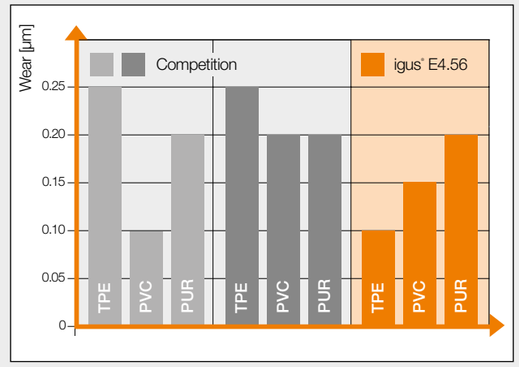
Using optimised igus® separators, the service life of cables and hoses can be increased by a factor of 4. The rounded base, which produces an even transition to the crossbar has no interfering edges on which cables can abrade. The positive connection provides outstanding locking strength on e-chains® and e-tubes.



Wear on plastic separators: wear can be reduced to nearly half with igus® separators

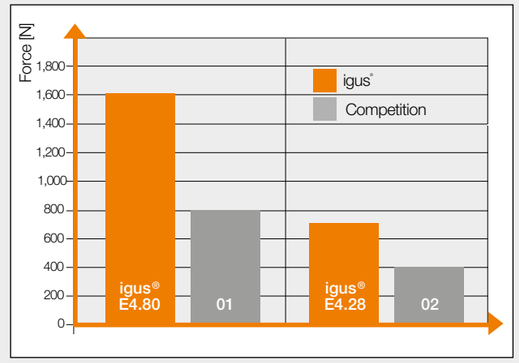
Plastic openable crossbars offer long service life

igus® laboratory tests have shown that the lowest cable abrasion occurs on e-chains® with plastic crossbars that also have a cable-friendly, rounded design. The holding force is equally impressive. The igus® test lab conducted tensile force tests on openable crossbars made from various materials. igus® plastic openable crossbars are very torsion resistant and do not deform.



Wear on plastic crossbars: best service life with igus® polymer crossbars

With optimised, rounded igus® separators and cable-friendly plastic crossbars, which increase service life of cables



Retention force comparison between polymer and aluminium crossbars - igus® crossbars offer longest service life and maximum holding strength

igus® chainflex® robot

Twistable cables for robots and 3D applications

Selection table

Cables for robots

chainflex® Cable	Jacket	Shield	Bend radius e-chain® [factor x d]	Temperature e-chain® from/to [°C]	Approvals and standards	Oil-resistant	Torsion-resistant	Page
Control cables								
CF77.UL.D New	PUR		6.8	-25/+80		✓	✓	168
CFROBOT2	PUR	✓	10	-25/+80		✓	✓	172
Data cables								
CFROBOT3	PUR	✓	10	-25/+80		✓	✓	174
Measuring system cables								
CFROBOT4	PUR	✓	10	-25/+80		✓	✓	176
Fibre optic cables								
CFROBOT5	TPE		10	-35/+80		✓	✓	180
Motor cables								
CFROBOT6	PUR		10	-25/+80		✓	✓	182
CFROBOT7	PUR	✓	10	-25/+80		✓	✓	184
Spindle cable/Single core								
CFROBOT	TPE	✓	10	-35/+90		✓	✓	188
Bus cables								
CFROBOT8	PUR	✓	10	-25/+70		✓	✓	190
CFROBOT8.PLUS New	PUR	✓	10	-25/+70		✓	✓	194
Hybrid cables								
CFROBOT9	PUR	✓	10	-25/+80		✓	✓	198

Available from stock. Ready for delivery in 24hrs or today.*

*The delivery times indicated correspond to the average time until the ordered goods are dispatched.

Guarantee igus chainflex 36 month guarantee

36-month chainflex® guarantee
Guaranteed service life for predictable safety

With the help of the chainflex® service life calculator, you can quickly and easily calculate the expected service life of chainflex® cables specifically for your application:
▶ www.igus.eu/chainflexlife

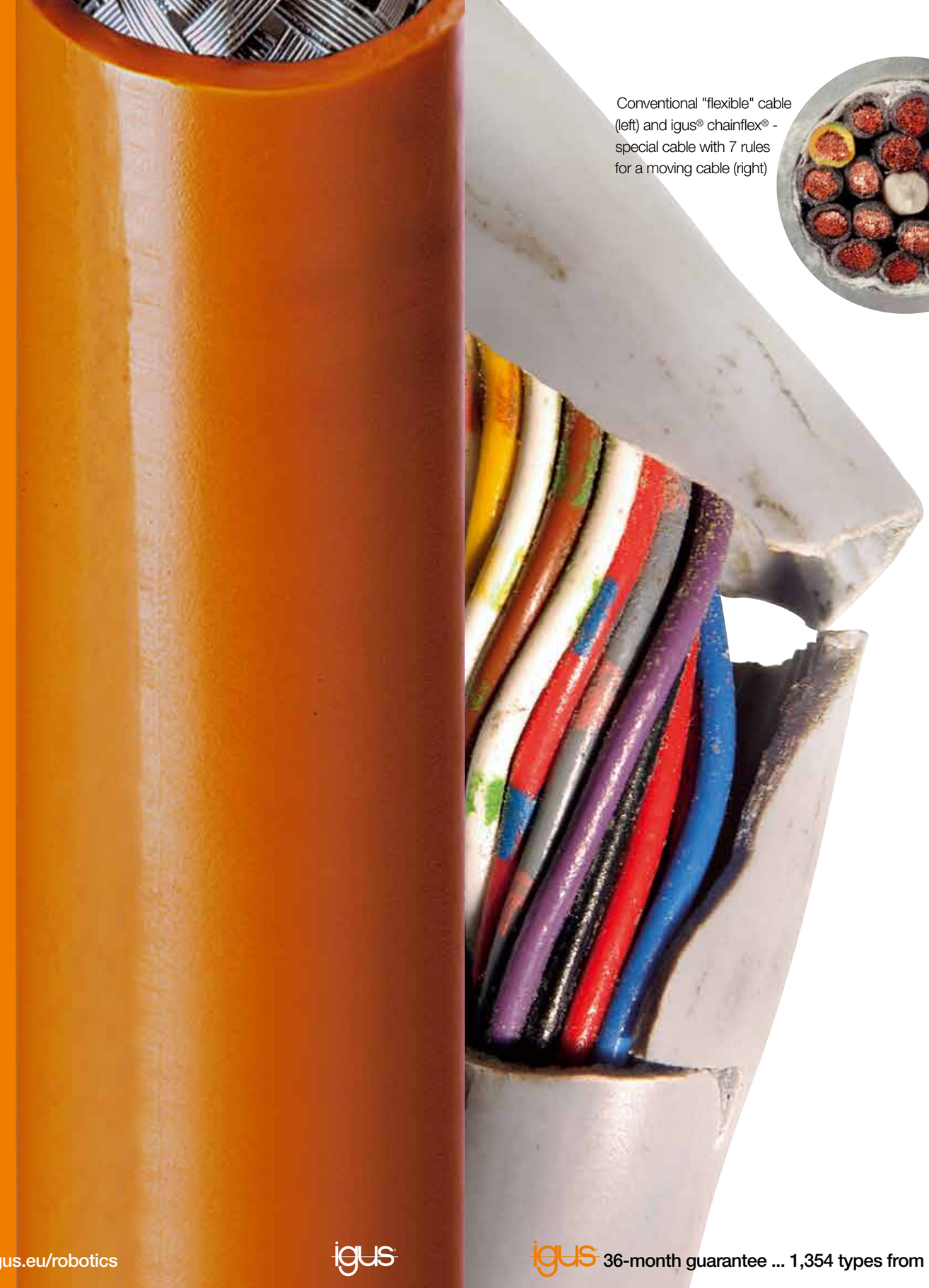
chainflex®
lasts - or your money back!

Your production processes must remain trouble-free, and that means your energy supply systems too. This requires completely reliable operation by all sub-components, including moving cables. igus® was the first company worldwide to develop complete energy chain systems complete with chainflex® cables which are now being delivered from a single source and with a system guarantee depending on the application. Based on the ever increasing know-how gained since 1989, and on the sophisticated testing that has been conducted since then, design principles were and are still being developed that help prevent machine downtime in factories throughout the world today. 7 rules for a good cable:

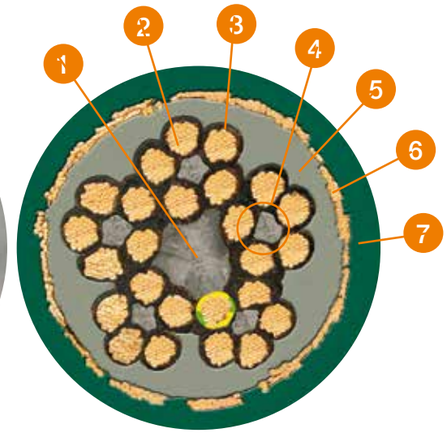
1. Strain-relieving centre
Space is created in the centre of a cable depending on the number of cores and the cross section of each cable. This centre should be filled, as far as possible, with a genuine core element (and not, as frequently the case, with fillers or dummy cores made of waste materials). This braces the surrounding stranded structure and prevents it from sliding into the middle of the cable.

2. Core wire structure
For core wire strands, maximum flexibility has been proven not to be the best solution. Although very thin individual strands result in very flexible conductors, these are highly susceptible to damage. Extensive test series have helped to determine which combination of single wire diameter, pitch of the strands and direction optimises the bending resistance.

3. Core insulation
The insulation materials must be made so that they do not stick to one another within the cable. Furthermore, the insulation is also required to support the individual strand wires of the conductor. To achieve this, we use only the best PVC and TPE extruded at high pressure and proven in millions of kilometres in e-chain® applications.



Conventional "flexible" cable (left) and igus® chainflex® - special cable with 7 rules for a moving cable (right)



4. Core structure
The braided or layered structure must be formed around a strong, tension-proof centre with an optimised short pitch length. To co-exist properly with the insulating materials, braids must allow a certain amount of movement. Starting from 12 cores, bundles should be used instead of layers.

5. Inner jacket
A gusset-filling extruded inner jacket must be used instead of inexpensive fleeces, fillers or tracer. This ensures that the structure is efficiently held in the longitudinal direction. Moreover, the structure cannot fall apart or move around.

6. Shielding
The overall shield should be made tight using an optimised shield angle over an extruded inner jacket. Loose open braids or wrapped stranding reduce the EMC protection considerably and can fail very quickly due to shield wire breakage. A tightly woven shield also has a torsion protection effect on the cable structure.

7. Outer jacket
The optimised outer jacket can fulfil many different requirements: from UV-resistant to low-temperature-flexible, and from oil-resistant to cost-optimised. But these outer jackets must have one thing in common: a jacket material must be highly abrasion-resistant but not stick to anything. It must be flexible but also provide a supporting function. The jacket should also be extruded under pressure (gusset-filling).

Order your chainflex® catalogue for free!
► www.igus.eu/chainflex

chainflex®
Cables for robots

The increasingly complex movements in industrial applications demand twistable cables with a long service life, similar to the classic chainflex® cables for use in linear e-chain systems®.
Stranded cores, core structure, shields and jacket materials have to compensate for circumference changes due to torsional movements, as well as significant flexural stresses. For this purpose, various "soft" construction elements, e.g. Rayon filaments, PTFE elements, or torsional force absorbing fillers are used in the chainflex® CFROBOT cables. Special demands are made on the braided shielding in torsion cables. Torsion-optimised shield structures are chosen that can carry out the necessary compensatory movements thanks to special PTFE gliding films. With twistable bus cables in particular, the transmission characteristics such as attenuation, cable impedance and signal quality must remain within very tight tolerance ranges over the whole service life. This is achieved through the use of particularly torsion optimised insulating materials and mechanical attenuation elements with matching capacitance values.

The highly abrasion-resistant, halogen-free and flame-retardant PUR sheathing mixture in motor, hybrid/control cables and bus cables protects the torsion-optimised cores from possible damage.
The highly abrasion-resistant, halogen-free TPE-sheath mixture matches the special requirements of twistable FOC fibres and individual wires, and also protects these elements.
Unlike cables for linear e-chain systems®, the mechanical stress for these cables is in the combination of bending, torsion and centrifugal forces that cannot usually be determined in advance or during use by measuring. For this reason, unlike linear e-chain® applications, a clear "yes" or "no" statement cannot be made about the suitability of a certain cable in torsion applications.
To enable evaluation to take place based on sensible comparative test results, the igus® "torsion test standard" was developed. According to this standard, all chainflex® CFROBOT cables are twisted within a triflex® R energy chain over a distance of 1 m with a torsion of +/- 180° at least 5 million times.

chainflex®
Torsion tested

In addition, a test is carried out on a test bench with a e-chain® length of approx. 2,500 mm with 270° torsion with an extreme load through centrifugal forces and heavy blows such as those that can occur on an industrial robot. All unshielded, gusset-filling extruded standard chainflex® control cables from the CF130.UL, CF5, CF9 and CF9.UL series comply with the above-named igus® standard and have been approved for use in torsion applications with ±90° and for a cable length of 1 m.

The following twistable CFROBOT cable types are currently available:
- Control cables (shielded and unshielded)
- Data and measuring system cables
- Fibre Optic Cables
- Motor and Servo cables
- Bus cables
- Hybrid cables

We can also offer chainflex® CFROBOT cables pre-fitted with connectors of your choice as a readycable®, or as a ready-to-install readychain® cable assembly.

chainflex® guarantee
service life guarantee

chainflex® guarantee
service life guarantee

	chainflex® cable	Temperature, from/to [°C]	v max. [°/s] Twisted	a max. [°/s²] Twisted	Minimum bend radius [factor x d]	Minimum bend radius [factor x d]	Minimum bend radius [factor x d]	Page
Twistable cables					5 million cycles *	7.5 million cycles *	10 million cycles *	
Control cables								
	CF77.UL.D New	-25 / -15 -15 / +70 +70 / +80	180	60	±150 ±180 ±150	±90 ±120 ±90	±30 ±60 ±30	168
	CFROBOT2	-25 / -15 -15 / +70 +70 / +80	180	60	±150 ±180 ±150	±90 ±120 ±90	±30 ±60 ±30	172
Data cables								
	CFROBOT3	-25 / -15 -15 / +70 +70 / +80	180	60	±150 ±180 ±150	±90 ±120 ±90	±30 ±60 ±30	174
Measuring system cables								
	CFROBOT4	-25 / -15 -15 / +70 +70 / +80	180	60	±150 ±180 ±150	±90 ±120 ±90	±30 ±60 ±30	176
Fibre optic cables								
	CFROBOT5	-25 / -15 -15 / +70 +70 / +80	180	60	±150 ±180 ±150	±90 ±120 ±90	±30 ±60 ±30	180
Motor cables								
	CFROBOT6	-25 / -15 -15 / +70 +70 / +80	180	60	±150 ±180 ±150	±90 ±120 ±90	±30 ±60 ±30	182
	CFROBOT7	-25 / -15 -15 / +70 +70 / +80	180	60	±150 ±180 ±150	±90 ±120 ±90	±30 ±60 ±30	184
Spindle cable/Single core								
	CFROBOT	-35 / -25 -15 / +80 +80 / +90	180	60	±150 ±180 ±150	±90 ±120 ±90	±30 ±60 ±30	188
Bus cables								
	CFROBOT8	-25 / -15 -15 / +60 +60 / +70	180	60	±150 ±180 ±150	±90 ±120 ±90	±30 ±60 ±30	190
	CFROBOT8.PLUS New	-25 / -15 -15 / +60 +60 / +70	360	60	±330 ±360 ±330	±240 ±270 ±240	±150 ±180 ±150	194
Hybrid cables								
	CFROBOT9	-25 / -15 -15 / +70 +70 / +80	180	60	±150 ±180 ±150	±90 ±120 ±90	±30 ±60 ±30	198

* Higher number of cycles? Calculate service life online: ▶ www.igus.eu/chainflexlife

chainflex® CF77.UL.D

Control cable | PUR New

Example image

10 million cycles guaranteed

±180°/m Torsion

3D movements Movement type

- For torsion applications
- PUR outer jacket
- Oil resistant and coolant-resistant
- Flame-retardant
- PVC and halogen-free
- Notch-resistant
- Hydrolysis and microbe-resistant

Dynamic information

Bend radius	**e-chain® twisted**	min. 6.8 x d
	flexible	min. 5 x d
	fixed	min. 4 x d
Temperature	**e-chain® twisted**	-25 °C to +80 °C
	flexible	-40 °C to +80 °C (following DIN EN 60811-504)
	fixed	-50 °C to +80 °C (following DIN EN 50305)
v max.	**twisted**	180 °/s
a max.	**twisted**	60 °/s²
Movement type		Robots and 3D movements, Class 1
Torsion		± 180°, with 1 m cable length, Class 3

Cable structure

Conductor	Finely stranded conductor consisting of bare copper wires (following DIN EN 60228).
Core insulation	Mechanically high-quality TPE mixture.
Core structure	**Number of cores < 12:** Cores wound in a layer with short pitch length. **Number of cores ≥ 12:** Cores in bundles and wound together around a centre for high tensile stresses with optimised short pitch length and directions, especially low-torsion structure.
Core identification	**Cores < 0.5mm²:** Colour code in accordance with DIN 47100. **Cores ≥ 0.5mm²:** Black cores with white numerals, one green-yellow core. **CF77.UL.03.04.INI**: brown, blue, black, white
Outer jacket	Low-adhesion, halogen-free, highly abrasion-resistant PUR mixture, adapted to suit the requirements in e-chains® (following DIN EN 50363-10-2). Colour: Window grey (similar to RAL 7040) Variations ▶ Product range table

Electrical information

Nominal voltage	300/500 V (following DIN VDE 0298-3)
Testing voltage	2000 V (following DIN EN 50395)

EPLAN download, configurators ▶ www.igus.eu/CF77.UL.D

Class 5.1.3.3

Basic requirements	low	1	2	3	4	**5**	6	7	highest
Travel distance	unsupported	**1**	2	3	4	5	6		≥ 400m
Oil resistance	none	1	2	**3**	4				highest
Torsion	none	1	2	**3**	4				±360°

Properties and approvals

UV resistance	Medium
Oil resistance	Oil-resistant (following DIN EN 50363-10-2), Class 3
Offshore	MUD-resistant following NEK 606 - status 2009
Flame-retardant	According to IEC 60332-1-2, CEI 20-35, FT1, VW-1
Silicone-free	Free from silicone which can affect paint adhesion (following PV 3.10.7 - status 1992)
Halogen-free	Following DIN EN 60754
UL/CSA	**Cores < 0.5 mm²:** Style 10493 and 20233, 300 V, 80 °C **Cores ≥ 0.5 mm²:** Style 11323 and 21223, 1000 V, 80 °C
NFPA	Following NFPA 79-2012, chapter 12.9
DNV-GL	Type approval certificate No. 61 935-14 HH
EAC	Certificate No. RU C-DE.ME77.B.01254 (TR ZU)
CTP	Certificate No. C-DE.PB49.B.00416 (fire protection)
CEI	Following CEI 20-35
Lead-free	Following 2011/65/EC (RoHS-II)
Cleanroom	According to ISO Class 1, material/cable tested by IPA according to DIN EN ISO 14644-1
DESINA	According to VDW, DESINA standardisation
CE	Following 2014/35/EU

Guaranteed service life

Cycles *	5 million	7.5 million	10 million
Temperature, from/to [°C]	Torsion max. [°/m]	Torsion max. [°/m]	Torsion max. [°/m]
-25/-15	±150	±90	±30
-15/+70	±180	±120	±60
+70/+80	±150	±90	±30

* Higher number of double strokes? Calculate service life online: ▶ www.igus.eu/chainflexlife

Typical application areas

- For heavy-duty applications, class 5
- Especially for robots and 3D movements, Class 1
- Almost unlimited resistance to oil, Class 3
- Torsion ± 180°, with 1m cable length, Class 3
- Indoor and outdoor applications with average sun radiation
- Robots, handling, spindle drives

chainflex® CF77.UL.D

Control cable | PUR New

Class 5.1.3.3

Basic requirements	low	1	2	3	4	**5**	6	7	highest
Travel distance	unsupported	**1**	2	3	4	5	6		≥ 400m
Oil resistance	none	1	2	**3**	4	highest			
Torsion	none	1	2	**3**	4	±360°			

Example image

	Part No.	Number of cores and conductor nominal cross section [mm²]	Outer diameter (d) max. [mm]	Copper index [kg/km]	Weight [kg/km]
	CF77.UL.02.03.INI [12]	3x0.25	5.0	8	29
	CF77.UL.02.04.D	4x0.25	5.5	11	35
New	**CF77.UL.02.05.D**	5x0.25	6.0	13	41
New	**CF77.UL.02.07.D**	7x0.25	6.5	18	51
	CF77.UL.02.12.D	12x0.25	9.0	30	77
	CF77.UL.02.18.D	18x0.25	10.5	45	114
New	**CF77.UL.02.25.D**	25x0.25	11.5	63	154
	CF77.UL.03.04.INI [12]	4x0.34	6.0	16	39
	CF77.UL.05.04.D	4G0.5	6.0	21	43
	CF77.UL.05.05.D	5G0.5	6.5	26	50
	CF77.UL.05.07.D	7G0.5	7.5	39	78
	CF77.UL.05.12.D	12G0.5	10.0	63	129
	CF77.UL.05.18.D	18G0.5	12.0	94	179
	CF77.UL.05.25.D	25G0.5	14.0	129	238
	CF77.UL.05.30.D	30G0.5	15.0	155	315
	CF77.UL.07.03.D	3G0.75	6.5	23	54
	CF77.UL.07.04.D	4G0.75	7.0	30	63
	CF77.UL.07.05.D	5G0.75	7.5	38	73
	CF77.UL.07.07.D	7G0.75	8.5	53	103
	CF77.UL.07.12.D	12G0.75	12.0	90	187
	CF77.UL.07.18.D	18G0.75	13.5	134	251
	CF77.UL.07.20.D	20G0.75	14.5	149	282
	CF77.UL.07.25.D	25G0.75	16.0	186	356
	CF77.UL.07.36.D	36G0.75	19.0	279	505
	CF77.UL.07.42.D	42G0.75	21.0	341	580
	CF77.UL.10.02.D	2x1.0	6.5	20	53
	CF77.UL.10.03.D	3G1.0	6.5	30	63
	CF77.UL.10.04.D	4G1.0	7.0	40	77
	CF77.UL.10.05.D	5G1.0	8.0	50	94
	CF77.UL.10.07.D	7G1.0	9.0	70	115
	CF77.UL.10.12.D	12G1.0	12.5	119	225
	CF77.UL.10.18.D	18G1.0	15.0	178	326
	CF77.UL.10.25.D	25G1.0	17.5	248	436
	CF77.UL.10.42.D	42G1.0	22.5	433	679

[12] Outer jacket colour: Colza yellow (similar to RAL 1021)
Note: The given outer diameters are maximum values and may tend toward lower tolerance limits.
G = with green-yellow earth core **x=** without earth core

	Part No.	Number of cores and conductor nominal cross section [mm²]	Outer diameter (d) max. [mm]	Copper index [kg/km]	Weight [kg/km]
	CF77.UL.15.03.D	3G1.5	7.5	45	83
	CF77.UL.15.04.D	4G1.5	8.0	60	102
	CF77.UL.15.05.D	5G1.5	8.5	75	121
	CF77.UL.15.07.D [17]	7G1.5	10.5	104	167
	CF77.UL.15.12.D	12G1.5	14.0	178	296
	CF77.UL.15.18.D	18G1.5	17.0	267	459
	CF77.UL.15.25.D	25G1.5	19.5	371	605
	CF77.UL.15.36.D	36G1.5	23.5	551	848
	CF77.UL.15.42.D	42G1.5	26.5	676	987
	CF77.UL.25.03.D	3G2.5	8.5	75	119
	CF77.UL.25.04.D	4G2.5	9.5	100	149
	CF77.UL.25.05.D	5G2.5	10.5	124	183
	CF77.UL.25.07.D [17]	7G2.5	12.5	174	259
	CF77.UL.25.12.D	12G2.5	17.0	297	451

[17] Using the cables with "7 G 1.5mm² and "7 G 2.5mm² it is essential: Bend radius ≥ 17.5 x d with travel distance ≥ 5m. When the travel distance is not less than 5m, a bend radius not less than 17.5 x d has to be used.
Note: The given outer diameters are maximum values and may tend toward lower tolerance limits.
G = with green-yellow earth core **x=** without earth core

Order example: CF77.UL.02.04.D **– to your desired length (0.5 m steps)**
CF77.UL.D **chainflex® series** .02 **Code nominal cross section** .04 **Code number of cores**

Online order ▶ www.chainflex.eu/CF77.UL.D

Available from stock. Ready for delivery in 24hrs or today.*
*The delivery times indicated correspond to the average time until the ordered goods are dispatched.

Guarantee igus chainflex 36 month guarantee

chainflex® CFROBOT2

Control cable | PUR

Example image

10 million cycles guaranteed

±180°/m Torsion

3D movements Movement type

- For torsion applications
- PUR outer jacket
- Shielded
- Oil resistant and coolant-resistant
- Flame-retardant
- PVC and halogen-free
- Notch-resistant
- Hydrolysis and microbe-resistant

Dynamic information

Bend radius	**e-chain® twisted**	min. 10 x d
	flexible	min. 8 x d
	fixed	min. 5 x d
Temperature	**e-chain® twisted**	-25 °C to +80 °C
	flexible	-40 °C to +80 °C (following DIN EN 60811-504)
	fixed	-50 °C to +80 °C (following DIN EN 50305)
v max.	**twisted**	180 °/s
a max.	**twisted**	60 °/s²
Movement type		Robots and 3D movements, Class 1
Torsion		± 180°, with 1 m cable length, Class 3

Cable structure

Conductor	Stranded conductor in especially bending-resistant version consisting of bare copper wires (following DIN EN 60228).
Core insulation	Mechanically high-quality TPE mixture.
Core identification	Black cores with white numerals, one green-yellow core.
Element shield	Extremely torsion-resistant tinned wound copper shield. Cover approx. 85% visual.
Outer jacket	Low-adhesion, halogen-free, highly abrasion-resistant PUR mixture, adapted to suit the requirements in e-chains® (following DIN EN 50363-10-2). Colour: steel blue (similar to RAL 5011)

Electrical information

Nominal voltage	300/500 V (following DIN VDE 0298-3)
Testing voltage	2000 V (following DIN EN 50395)

Properties and approvals

UV resistance	High
Oil resistance	Oil-resistant (following DIN EN 50363-10-2), Class 3
Flame-retardant	According to IEC 60332-1-2, CEI 20-35, FT1, VW-1

Class 6.1.3.3

Basic requirements	low 1 2 3 4 5 **6** 7 highest
Travel distance	unsupported **1** 2 3 4 5 6 ≥ 400m
Oil resistance	none 1 2 **3** 4 highest
Torsion	none 1 2 **3** 4 ±360°

Silicone-free	Free from silicone which can affect paint adhesion (following PV 3.10.7 - status 1992)
Halogen-free	Following DIN EN 60754
UL/CSA	Style 10493 and 20317, 300 V, 80 °C
NFPA	Following NFPA 79-2012, chapter 12.9
EAC	Certificate No. RU C-DE.ME77.B.01254 (TR ZU)
CTP	Certificate No. C-DE.PB49.B.00416 (fire protection)
CEI	Following CEI 20-35
Lead-free	Following 2011/65/EC (RoHS-II)
Cleanroom	According to ISO Class 1. The outer jacket material of this series complies with the CF77.UL.05.12.D - tested by IPA according to standard DIN EN ISO 14644-1
CE	Following 2014/35/EU

Guaranteed service life

Cycles *	5 million	7.5 million	10 million
Temperature, from/to [°C]	Torsion max. [°/m]	Torsion max. [°/m]	Torsion max. [°/m]
-25/-15	±150	±90	±30
-15/+70	±180	±120	±60
+70/+80	±150	±90	±30

* Higher number of double strokes? Calculate service life online: ▶ www.igus.eu/chainflexlife

Typical application areas

- For heavy duty applications with torsion movements, Class 6
- Especially for robots and 3D movements, Class 1
- Almost unlimited resistance to oil, Class 3
- Torsion ± 180°, with 1m cable length, Class 3
- Indoor and outdoor applications, UV resistant
- Robots, handling, spindle drives

Part No.	Number of cores and conductor nominal cross section [mm²]	Outer diameter (d) max. [mm]	Copper index [kg/km]	Weight [kg/km]
CFROBOT2.07.04.C	(4G0.75)C	8.5	42	81
CFROBOT2.07.05.C	(5G0.75)C	8.5	51	91
CFROBOT2.07.07.C	(7G0.75)C	10.0	71	126
CFROBOT2.07.12.C	(12G0.75)C	14.0	122	208
CFROBOT2.07.18.C	(18G0.75)C	16.5	185	309

Note: The given outer diameters are maximum values and may tend toward lower tolerance limits.
G = with green-yellow earth core **x=** without earth core

chainflex® CFROBOT3

Data cable | PUR

Example image

10 million cycles guaranteed

±180°/m Torsion

3D movements Movement type

- For torsion applications
- PUR outer jacket
- Shielded
- Oil resistant and coolant-resistant
- Flame-retardant
- Notch-resistant
- Hydrolysis and microbe-resistant

Dynamic information

Bend radius	**e-chain® twisted**	min. 10 x d
	flexible	min. 8 x d
	fixed	min. 5 x d
Temperature	**e-chain® twisted**	-25 °C to +80 °C
	flexible	-40 °C to +80 °C (following DIN EN 60811-504)
	fixed	-50 °C to +80 °C (following DIN EN 50305)
v max.	**twisted**	180 °/s
a max.	**twisted**	60 °/s²
Movement type		Robots and 3D movements, Class 1
Torsion		± 180°, with 1 m cable length, Class 3

Cable structure

Conductor	Stranded conductor in especially bending-resistant version consisting of bare copper wires (following DIN EN 60228).
Core insulation	Mechanically high-quality TPE mixture.
Core identification	Colour code in accordance with DIN 47100.
Overall shield	Extremely torsion-resistant tinned wound copper shield. Cover approx. 85% visual.
Outer jacket	Low-adhesion, halogen-free, highly abrasion-resistant PUR mixture, adapted to suit the requirements in e-chains® (following DIN EN 50363-10-2). Colour: steel blue (similar to RAL 5011)

Electrical information

Nominal voltage	300/500 V (following DIN VDE 0298-3)
Testing voltage	2000 V (following DIN EN 50395)

Properties and approvals

UV resistance	High
Oil resistance	Oil-resistant (following DIN EN 50363-10-2), Class 3
Flame-retardant	According to IEC 60332-1-2, CEI 20-35, FT1, VW-1

Class 6.1.3.3

Basic requirements	low 1 2 3 4 5 **6** 7 highest
Travel distance	unsupported **1** 2 3 4 5 6 ≥ 400m
Oil resistance	none 1 2 **3** 4 highest
Torsion	none 1 2 **3** 4 ±360°

Silicone-free	Free from silicone which can affect paint adhesion (following PV 3.10.7 - status 1992)
UL/CSA	Style 10497 and 20911, 300 V, 80 °C
NFPA	Following NFPA 79-2012, chapter 12.9
EAC	Certificate No. RU C-DE.ME77.B.01254 (TR ZU)
CTP	Certificate No. C-DE.PB49.B.00416 (fire protection)
CEI	Following CEI 20-35
Lead-free	Following 2011/65/EC (RoHS-II)
Cleanroom	According to ISO Class 1. The outer jacket material of this series complies with the CF77.UL.05.12.D - tested by IPA according to standard DIN EN ISO 14644-1
CE	Following 2014/35/EU

Guaranteed service life

Cycles *	5 million	7.5 million	10 million
Temperature, from/to [°C]	Torsion max. [°/m]	Torsion max. [°/m]	Torsion max. [°/m]
-25/-15	±150	±90	±30
-15/+70	±180	±120	±60
+70/+80	±150	±90	±30

* Higher number of double strokes? Calculate service life online: ▶ www.igus.eu/chainflexlife

Typical application areas

- For heavy duty applications with torsion movements, Class 6
- Especially for robots and 3D movements, Class 1
- Almost unlimited resistance to oil, Class 3
- Torsion ± 180°, with 1m cable length, Class 3
- Indoor and outdoor applications, UV resistant
- Robots, handling, spindle drives

Part No.	Number of cores and conductor nominal cross section [mm²]	Outer diameter (d) max. [mm]	Copper index [kg/km]	Weight [kg/km]
CFROBOT3.02.03.02	(3x(2x0.25))C	9.0	32	83
CFROBOT3.02.04.02	(4x(2x0.25))C	10.5	38	100
CFROBOT3.02.06.02	(6x(2x0.25))C	11.5	52	136
CFROBOT3.02.08.02	(8x(2x0.25))C	14.0	66	153
CFROBOT3.05.05.02	(5x(2x0.5))C	12.5	75	159

Note: The given outer diameters are maximum values and may tend toward lower tolerance limits.
G = with green-yellow earth core **x=** without earth core

chainflex® CFROBOT4

Measuring system cable | PUR

Example image

10 million cycles guaranteed

±180°/m Torsion

3D movements Movement type

- For torsion applications
- PUR outer jacket
- Shielded
- Oil resistant and coolant-resistant
- Flame-retardant
- PVC and halogen-free
- Notch-resistant
- Hydrolysis and microbe-resistant

Dynamic information

Bend radius	**e-chain® twisted**	min. 10 x d
	flexible	min. 8 x d
	fixed	min. 5 x d
Temperature	**e-chain® twisted**	-25 °C to +80 °C
	flexible	-40 °C to +80 °C (following DIN EN 60811-504)
	fixed	-50 °C to +80 °C (following DIN EN 50305)
v max.	**twisted**	180 °/s
a max.	**twisted**	60 °/s²
Movement type	Robots and 3D movements, Class 1	
Torsion	± 180°, with 1 m cable length, Class 3	

Cable structure

Conductor	Stranded conductor in especially bending-resistant version consisting of bare copper wires (following DIN EN 60228).
Core insulation	Mechanically high-quality TPE mixture.
Core identification	According to measuring system specification. ▶ Product range table
Element shield	Extremely torsion-resistant tinned wound copper shield.
Overall shield	Extremely torsion-resistant tinned wound copper shield. Cover approx. 80% visual.
Outer jacket	Low-adhesion, halogen-free, highly abrasion-resistant PUR mixture, adapted to suit the requirements in e-chains® (following DIN EN 50363-10-2). Colour: steel blue (similar to RAL 5011) Variations ▶ Product range table

Electrical information

Nominal voltage	50 V
Testing voltage	500 V

Class 6.1.3.3

Basic requirements	low	1	2	3	4	5	**6**	7	highest
Travel distance	unsupported	**1**	2	3	4	5	6	≥ 400m
Oil resistance	none	1	2	**3**	4	highest		
Torsion	none	1	2	**3**	4	±360°		

Properties and approvals

UV resistance	High
Oil resistance	Oil-resistant (following DIN EN 50363-10-2), Class 3
Flame-retardant	According to IEC 60332-1-2, CEI 20-35, FT1, VW-1
Silicone-free	Free from silicone which can affect paint adhesion (following PV 3.10.7 - status 1992)
Halogen-free	Following DIN EN 60754
UL/CSA	Style 1589 and 20236, 30 V, 80 °C
NFPA	Following NFPA 79-2012, chapter 12.9
EAC	Certificate No. RU C-DE.ME77.B.01218 (TR ZU)
CTP	Certificate No. C-DE.PB49.B.00416 (fire protection)
CEI	Following CEI 20-35
Lead-free	Following 2011/65/EC (RoHS-II)
Cleanroom	According to ISO Class 1. The outer jacket material of this series complies with the CF77.UL.05.12.D - tested by IPA according to standard DIN EN ISO 14644-1
CE	Following 2014/35/EU

Guaranteed service life

Cycles *	5 million	7.5 million	10 million
Temperature, from/to [°C]	Torsion max. [°/m]	Torsion max. [°/m]	Torsion max. [°/m]
-25/-15	±150	±90	±30
-15/+70	±180	±120	±60
+70/+80	±150	±90	±30

* Higher number of double strokes? Calculate service life online: ▶ www.igus.eu/chainflexlife

Typical application areas

- For heavy duty applications with torsion movements, Class 6
- Especially for robots and 3D movements, Class 1
- Almost unlimited resistance to oil, Class 3
- Torsion ± 180°, with 1m cable length, Class 3
- Indoor and outdoor applications, UV resistant
- Robots, handling, spindle drives

chainflex® CFROBOT4

Measuring system cable | PUR

Class 6.1.3.3

Basic requirements	low	1	2	3	4	5	**6**	7 highest
Travel distance	unsupported	**1**	2	3	4	5	6	≥ 400m
Oil resistance	none	1	2	**3**	4			highest
Torsion	none	1	2	**3**	4			±360°

Example image

Part No.	Number of cores and conductor nominal cross section	Outer diameter (d) max.	Copper index	Weight
	[mm²]	[mm]	[kg/km]	[kg/km]
CFROBOT4.001	(3x(2x0.14)C+(4x0.14)+(2x0.5))C	10.5	62	115
CFROBOT4.006	(3x(2x0.14)C+(4x0.14) +(4x0.22)+(2x0.5))C	11.5	74	138
CFROBOT4.009	(4x(2x0.25)+(2x0.5))C	9.5	48	90
CFROBOT4.015	(4x(2x0.14)+4x0.5)C	9.0	49	93
CFROBOT4.028 [13]	(2x(2x0.20)+(2x0.38))C	7.5	44	72

Part No.	Core group	Colour code
CFROBOT4.001	3x(2x0.14)C	green/yellow, black/brown, red/orange
	4x0.14	grey/blue/white-yellow/white-black
	2x0.5	brown-red/brown-blue
CFROBOT4.006	3x(2x0.14)C	green/yellow, black/brown, red/orange
	(4x0.14)	grey/blue/white-yellow/white-black
	(4x0.22)	brown-yellow/brown-grey/green-black/green-red
	(2x0.5)	brown-red/brown-blue
CFROBOT4.009	4x(2x0.25)	brown/green, blue/violet, grey/pink, red/black
	2x0.5	white, brown
CFROBOT4.015	4x(2x0.14)	brown/green, yellow/violet, grey/pink, red/black
	4x0.5	blue, white, brown-green, white-green
CFROBOT4.028 [13]	2x(2x0.20)	green/yellow, pink/blue
	(2x0.38)	red/black

[13] Colour outer jacket: yellow-green (RAL 6018)
Note: The given outer diameters are maximum values and may tend toward lower tolerance limits.
G = with green-yellow earth core **x=** without earth core

Order example: CFROBOT4.009 **- In your required length (0.5m steps)**
CFROBOT4 **chainflex® series** .009 **Code measuring system type**

Online order ▶ www.chainflex.eu/CFROBOT4

Available from stock. Ready for delivery in 24hrs or today.*
*The delivery times indicated correspond to the average time until the ordered goods are dispatched.

Guarantee igus chainflex 36 month guarantee

chainflex® CFROBOT5

Fibre Optic Cable | TPE

Example image

10 million cycles guaranteed

±180°/m Torsion

3D movements Movement type

- For torsion applications
- TPE outer jacket
- Oil and bio-oil-resistant
- UV-resistant
- Low-temperature-flexible
- Hydrolysis and microbe-resistant
- PVC and halogen-free

Dynamic information

Bend radius	**e-chain® twisted**	min. 10 x d
	flexible	min. 8 x d
	fixed	min. 5 x d
Temperature	**e-chain® twisted**	-35 °C to +80 °C
	flexible	-50 °C to +80 °C (following DIN EN 60811-504)
	fixed	-55 °C to +80 °C (following DIN EN 50305)
v max.	**twisted**	180 °/s
a max.	**twisted**	60 °/s²
Movement type	Robots and 3D movements, Class 1	
Torsion	± 180°, with 1 m cable length, Class 3	

Cable structure

Conductor	50/125 µm, 62.5/125 µm special fixed wire elements with aramid strain relief.
Core structure	FOC cores wound with high-tensile aramid dampers around a GRP central element.
Core identification	▶ Product range table
Outer jacket	Low-adhesion, extremely abrasion-resistant and highly flexible TPE mixture,, adapted to suit the requirements in e-chains®. Colour: Jet black (similar to RAL 9005)

Class 6.1.4.3

Basic requirements	low	1	2	3	4	5	**6**	7 highest
Travel distance	unsupported	**1**	2	3	4	5	6	≥ 400m
Oil resistance	none	1	2	3	**4**	highest		
Torsion	none	1	2	**3**	4	±360°		

Properties and approvals

UV resistance	High
Oil resistance	Oil-resistant (in accordance with DIN EN 60811-404), bio-oil resistant (following VDMA 24568 with Plantocut 8 S-MB tested by DEA), Class 4
Silicone-free	Free from silicone which can affect paint adhesion (following PV 3.10.7 - status 1992)
Halogen-free	Following DIN EN 60754
Lead-free	Following 2011/65/EC (RoHS-II)
Cleanroom	According to ISO Class 1. The outer jacket material of this series complies with the CF9.15.07 - tested by IPA according to standard DIN EN ISO 14644-1
CE	Following 2014/35/EU

Guaranteed service life

Cycles *	5 million	7.5 million	10 million
Temperature, from/to [°C]	Torsion max. [°/m]	Torsion max. [°/m]	Torsion max. [°/m]
-35/-25	±150	±90	±30
-25/+70	±180	±120	±60
+70/+80	±150	±90	±30

* Higher number of double strokes? Calculate service life online: ▶ www.igus.eu/chainflexlife

Typical application areas

- For heavy duty applications with torsion movements, Class 6
- Especially for robots and 3D movements, Class 1
- Almost unlimited resistance to oil, also to bio-oils, Class 4
- Torsion ± 180°, with 1m cable length, Class 3
- Indoor and outdoor applications, UV resistant
- Robots, handling

Part No.	Number of fibres/ Fibre diameter/ Conductor nominal cross section	Outer diameter (d) max. [mm]	Weight [kg/km]
CFROBOT5.500 11)	2x62.5/125	8.5	53
CFROBOT5.501 11)	2x50/125	8.5	53

11) Phase-out model

Note: The given outer diameters are maximum values and may tend toward lower tolerance limits.
G = with green-yellow earth core **x=** without earth core

Part No.	Bandwidth [MHz x km] @ 850 nm	Bandwidth [MHz x km] @ 1300 nm	Attenuation [dB/km] @ 850nm	Attenuation [dB/km] @ 1300nm	Fibre identification
CFROBOT5.500	≥ 200	≥ 500	≤ 3.0	≤ 0.7	orange with white numerals
CFROBOT5.501	≥ 500	≥ 500	≤ 2.5	≤ 0.7	blue with white numerals

chainflex® CFROBOT6

Motor cable | PUR

Example image

10 million cycles guaranteed

±180°/m Torsion

3D movements Movement type

- For torsion applications
- PUR outer jacket
- Oil resistant and coolant-resistant
- Flame-retardant
- PVC and halogen-free
- Notch-resistant
- Hydrolysis and microbe-resistant

Dynamic information

Bend radius	**e-chain® twisted**	min. 10 x d
	flexible	min. 8 x d
	fixed	min. 5 x d
Temperature	**e-chain® twisted**	-25 °C to +80 °C
	flexible	-40 °C to +80 °C (following DIN EN 60811-504)
	fixed	-50 °C to +80 °C (following DIN EN 50305)
v max.	**twisted**	180 °/s
a max.	**twisted**	60 °/s²
Movement type		Robots and 3D movements, Class 1
Torsion		± 180°, with 1 m cable length, Class 3

Cable structure

Conductor	Stranded conductor in especially bending-resistant version consisting of bare copper wires (following DIN EN 60228).
Core insulation	Mechanically high-quality TPE mixture.
Core identification	Black cores with white numerals 1-2, one green-yellow core.
Outer jacket	Low-adhesion, halogen-free, highly abrasion-resistant PUR mixture, adapted to suit the requirements in e-chains® (following DIN EN 50363-10-2). Colour: steel blue (similar to RAL 5011)

Electrical information

Nominal voltage	600/1000 V (following DIN VDE 0298-3)
Testing voltage	4000 V (following DIN EN 50395)

Properties and approvals

UV resistance	High
Oil resistance	Oil-resistant (following DIN EN 50363-10-2), Class 3
Flame-retardant	According to IEC 60332-1-2, CEI 20-35, FT1, VW-1

Class 6.1.4.3

Basic requirements	low 1 2 3 4 5 **6** 7 highest
Travel distance	unsupported **1** 2 3 4 5 6 ≥ 400m
Oil resistance	none 1 2 3 **4** highest
Torsion	none 1 2 **3** 4 ±360°

Silicone-free	Free from silicone which can affect paint adhesion (following PV 3.10.7 - status 1992)
Halogen-free	Following DIN EN 60754
UL/CSA	Style 10492 and 21223, 1000 V, 80 °C
NFPA	Following NFPA 79-2012, chapter 12.9
EAC	Certificate No. RU C-DE.ME77.B.02324 (TR ZU)
CTP	Certificate No. C-DE.PB49.B.00420 (fire protection)
CEI	Following CEI 20-35
Lead-free	Following 2011/65/EC (RoHS-II)
Cleanroom	According to ISO Class 1. The outer jacket material of this series complies with the CF77.UL.05.12.D - tested by IPA according to standard DIN EN ISO 14644-1
CE	Following 2014/35/EU

Guaranteed service life

Cycles *	5 million	7.5 million	10 million
Temperature, from/to [°C]	Torsion max. [°/m]	Torsion max. [°/m]	Torsion max. [°/m]
-25/-15	±150	±90	±30
-15/+70	±180	±120	±60
+70/+80	±150	±90	±30

* Higher number of double strokes? Calculate service life online: ▶ www.igus.eu/chainflexlife

Typical application areas

- For heavy duty applications with torsion movements, Class 6
- Especially for robots and 3D movements, Class 1
- Almost unlimited resistance to oil, Class 3
- Torsion ± 180°, with 1m cable length, Class 3
- Indoor and outdoor applications, UV resistant
- Robots, handling, spindle drives

Part No.	Number of cores and conductor nominal cross section [mm²]	Outer diameter (d) max. [mm]	Copper index [kg/km]	Weight [kg/km]
CFROBOT6.100.03 [11]	3G10.0	15.5	297	388
CFROBOT6.160.03	3G16.0	18.0	475	578
CFROBOT6.250.03	3G25.0	25.5	737	895

[11] Phase-out model

Note: The given outer diameters are maximum values and may tend toward lower tolerance limits.
G = with green-yellow earth core **x=** without earth core

chainflex® CFROBOT7

Motor cable | PUR

Example image

10 million cycles guaranteed

±180°/m Torsion

3D movements Movement type

- For torsion applications
- PUR outer jacket
- Shielded
- Oil resistant and coolant-resistant
- Flame-retardant
- PVC and halogen-free
- Notch-resistant
- Hydrolysis and microbe-resistant

Dynamic information

Bend radius	**e-chain® twisted**	min. 10 x d
	flexible	min. 8 x d
	fixed	min. 5 x d
Temperature	**e-chain® twisted**	-25 °C to +80 °C
	flexible	-40 °C to +80 °C (following DIN EN 60811-504)
	fixed	-50 °C to +80 °C (following DIN EN 50305)
v max.	**twisted**	180 °/s
a max.	**twisted**	60 °/s²
Movement type		Robots and 3D movements, Class 1
Torsion		± 180°, with 1 m cable length, Class 3

Cable structure

Conductor	Stranded conductor in especially bending-resistant version consisting of bare copper wires (following DIN EN 60228).
Core insulation	Mechanically high-quality TPE mixture.
Core identification	**Power cores:** Cores black with white numerals, one core green-yellow **2 Control pairs:** Core black with white numerals. 1. Control core: 5 2. Control core: 6 3. Control core: 74. Control core: 8 **4 Control pairs:** Colour code in accordance with DIN 47100
Overall shield	Extremely torsion-resistant tinned wound copper shield. Cover approx. 85% visual.
Outer jacket	Low-adhesion, halogen-free, highly abrasion-resistant PUR mixture, adapted to suit the requirements in e-chains® (following DIN EN 50363-10-2). Colour: steel blue (similar to RAL 5011)

Electrical information

Nominal voltage	600/1000 V (following DIN VDE 0298-3)
Testing voltage	4000 V (following DIN EN 50395)

Class 6.1.3.3

Basic requirements	low	1	2	3	4	5	**6**	7	highest
Travel distance	unsupported	**1**	2	3	4	5	6	≥ 400m	
Oil resistance	none	1	2	**3**	4	highest			
Torsion	none	1	2	**3**	4	±360°			

Properties and approvals

UV resistance	High
Oil resistance	Oil-resistant (following DIN EN 50363-10-2), Class 3
Flame-retardant	According to IEC 60332-1-2, CEI 20-35, FT1, VW-1
Silicone-free	Free from silicone which can affect paint adhesion (following PV 3.10.7 - status 1992)
Halogen-free	Following DIN EN 60754
UL/CSA	Style 10492 and 21223, 1000 V, 80 °C
NFPA	Following NFPA 79-2012, chapter 12.9
EAC	Certificate No. RU C-DE.ME77.B.02324 (TR ZU)
CTP	Certificate No. C-DE.PB49.B.00420 (fire protection)
CEI	Following CEI 20-35
Lead-free	Following 2011/65/EC (RoHS-II)
Cleanroom	According to ISO Class 1. The outer jacket material of this series complies with the CF77.UL.05.12.D - tested by IPA according to standard DIN EN ISO 14644-1
CE	Following 2014/35/EU

Guaranteed service life

Cycles *	5 million	7.5 million	10 million
Temperature, from/to [°C]	Torsion max. [°/m]	Torsion max. [°/m]	Torsion max. [°/m]
-25/-15	±150	±90	±30
-15/+70	±180	±120	±60
+70/+80	±150	±90	±30

* Higher number of double strokes? Calculate service life online: ▶ www.igus.eu/chainflexlife

Typical application areas

- For heavy duty applications with torsion movements, Class 6
- Especially for robots and 3D movements, Class 1
- Almost unlimited resistance to oil, Class 3
- Torsion ± 180°, with 1m cable length, Class 3
- Indoor and outdoor applications, UV resistant
- Robots, handling, spindle drives

chainflex® CFROBOT7

Motor cable | PUR

Class 6.1.3.3

Basic requirements	low	1	2	3	4	5	**6**	7 highest
Travel distance	unsupported	**1**	2	3	4	5	6	≥ 400m
Oil resistance	none	1	2	**3**	4			highest
Torsion	none	1	2	**3**	4			±360°

Example image

Part No.	Number of cores and conductor nominal cross section	Outer diameter (d) max.	Copper index	Weight
	[mm²]	[mm]	[kg/km]	[kg/km]
without control pair				
CFROBOT7.15.03.C	(3G1.5)C	8.5	60	97
CFROBOT7.15.04.C	(4G1.5)C	9.0	77	120
CFROBOT7.25.03.C	(3G2.5)C	10.0	93	141
CFROBOT7.25.04.C	(4G2.5)C	10.5	119	172
CFROBOT7.60.04.C	(4G6.0)C	15.0	278	373
2 Control pairs				
CFROBOT7.15.15.02.02.C	(4G1.5+2x(2x1.5)C)C	16.5	197	304
CFROBOT7.25.15.02.02.C	(4G2.5+2x(2x1.5)C)C	16.5	243	348
4 Control pairs				
CFROBOT7.40.02.02.04.C	(4G4.0+4x(2x0.25)C)C	17.0	253	365

Note: The given outer diameters are maximum values and may tend toward lower tolerance limits.
G = with green-yellow earth core **x=** without earth core

Order example: CFROBOT7.15.03.C – to your desired length (0.5m steps)
CFROBOT7 **chainflex® series** .15 **Code nominal cross section** .03 **Code number of cores**

Online order ▶ www.chainflex.eu/CFROBOT7

Available from stock. Ready for delivery in 24hrs or today.*
*The delivery times indicated correspond to the average time until the ordered goods are dispatched.

Guarantee igus chainflex 36 month guarantee

chainflex® CFROBOT

Spindle cable/single core | TPE

Example image

10 million cycles guaranteed

±180°/m Torsion

3D movements Movement type

- For torsion applications
- TPE outer jacket
- Shielded
- Oil and bio-oil-resistant
- PVC-free
- UV-resistant
- Flame-retardant
- Hydrolysis and microbe-resistant

Dynamic information

Bend radius	**e-chain® twisted**	min. 10 x d
	flexible	min. 8 x d
	fixed	min. 5 x d
Temperature	**e-chain® twisted**	-35 °C to +90 °C
	flexible	-45 °C to +100 °C (following DIN EN 60811-504)
	fixed	-50 °C to +100 °C (following DIN EN 50305)
v max.	**twisted**	180 °/s
a max.	**twisted**	60 °/s²
Movement type		Robots and 3D movements, Class 1
Torsion		± 180°, with 1 m cable length, Class 3

Cable structure

Conductor	Extremely bend-resistant cable.
Core insulation	Mechanically high-quality TPE mixture.
Overall shield	Extremely torsion-resistant tinned wound copper shield. Cover approx. 90% visual.
Outer jacket	Low-adhesion, extremely abrasion-resistant and highly flexible TPE mixture, adapted to suit the requirements in e-chains®. Colour: Jet black (similar to RAL 9005)

Electrical information

Nominal voltage	600/1000 V (following DIN VDE 0298-3)
Testing voltage	4000 V (following DIN EN 50395)

EPLAN download, configurators ▶ www.igus.eu/CFROBOT

Class 6.1.4.3

Basic requirements	low	1 2 3 4 5 **6** 7 highest
Travel distance	unsupported	**1** 2 3 4 5 6 ≥ 400m
Oil resistance	none	1 2 3 **4** highest
Torsion	none	1 2 **3** 4 ±180°

Properties and approvals

UV resistance	High
Oil resistance	Oil-resistant (following DIN EN 60811-404), bio-oil-resistant (following VDMA 24568 with Plantocut 8 S-MB tested by DEA), Class 4
Flame-retardant	According to IEC 60332-1-2, CEI 20-35, FT1, VW-1
Silicone-free	Free from silicone which can affect paint adhesion (following PV 3.10.7 – status 1992)
UL/CSA	Style 10258 and 21387, 1000 V, 90 °C
NFPA	Following NFPA 79-2012, chapter 12.9
EAC	Certificate No. RU C-DE.ME77.B.02324 (TR ZU)
CTP	Certificate No. C-DE.PB49.B.00420 (fire protection)
CEI	Following CEI 20-35
Lead-free	Following 2011/65/EC (RoHS-II)
Cleanroom	According to ISO Class 1. The outer jacket material of this series complies with CF34.UL.25.04.D - tested by IPA according to standard DIN EN ISO 14644-1
CE	Following 2014/35/EU

Guaranteed service life

Cycles *	5 million	7.5 million	10 million
Temperature, from/to [°C]	Torsion max. [°/m]	Torsion max. [°/m]	Torsion max. [°/m]
-35/-25	±150	±90	±30
-25/+70	±180	±120	±60
+70/+80	±150	±90	±30

* Higher number of double strokes? Calculate service life online: ▶ www.igus.eu/chainflexlife

Typical application areas

- For heavy duty applications with torsion movements, Class 6
- Especially for robots and 3D movements, Class 1
- Almost unlimited resistance to oil, also to bio-oils, Class 4
- Torsion ± 180°, with 1m cable length, Class 3
- Indoor and outdoor applications, UV resistant
- Robots, handling, spindle drives

Part No.	Number of cores and conductor nominal cross section [mm²]	Outer diameter (d) max. [mm]	Copper index [kg/km]	Weight [kg/km]
CFROBOT.035	(1x10.0)C	10.5	125	200
CFROBOT.036	(1x16.0)C	12.0	189	280
CFROBOT.037	(1x25.0)C	14.5	298	434
CFROBOT.038	(1x35.0)C	15.5	403	546

Note: The given outer diameters are maximum values and may tend toward lower tolerance limits.
G = with green-yellow earth core **x=** without earth core

chainflex® CFROBOT8

Bus cable | PUR

Example image

10 million cycles guaranteed

±180°/m Torsion

3D movements Movement type

- For torsion applications
- PUR outer jacket
- Shielded
- Oil resistant and coolant-resistant
- Flame-retardant
- Notch-resistant
- Hydrolysis and microbe-resistant

Now with UL 300 V (PoE-capable)

Dynamic information

Bend radius	**e-chain® twisted**	min. 10 x d
	flexible	min. 8 x d
	fixed	min. 5 x d
Temperature	**e-chain® twisted**	-25 °C to +70 °C
	flexible	-40 °C to +70 °C (following DIN EN 60811-504)
	fixed	-50 °C to +70 °C (following DIN EN 50305)
v max.	**twisted**	180 °/s
a max.	**twisted**	60 °/s²
Movement type		Robots and 3D movements, Class 1
Torsion		± 180°, with 1 m cable length, Class 3

Cable structure

Conductor	Stranded conductor in especially bending-resistant version consisting of bare copper wires (following DIN EN 60228).
Core insulation	According to bus specification.
Core structure	According to bus specification.
Core identification	According to bus specification. ▶ Product range table
Intermediate layer	Foil taping over the external layer.
Overall shield	Torsion resistant tinned wound copper shield. Cover approx. 80% visual.
Outer jacket	Low-adhesion, halogen-free, highly abrasion-resistant PUR mixture, adapted to suit the requirements in e-chains® (following DIN EN 50363-10-2). Colour: steel blue (similar to RAL 5011)

Electrical information

Nominal voltage	50 V
Testing voltage	500 V

Class 6.1.3.3

Basic requirements	low	1	2	3	4	5	**6**	7	highest
Travel distance	unsupported	**1**	2	3	4	5	6	≥ 400m
Oil resistance	none	1	2	**3**	4	highest		
Torsion	none	1	2	**3**	4	±360°		

Properties and approvals

UV resistance	High
Oil resistance	Oil-resistant (following DIN EN 50363-10-2), Class 3
Flame-retardant	According to IEC 60332-1-2, CEI 20-35, FT1
Silicone-free	Free from silicone which can affect paint adhesion (following PV 3.10.7 – status 1992)
UL/CSA	Style 1589 and 20236, 30 V, 80 °C **CFROBOT8.045-CFROBOT8.049:** Style 1589 and 20236, 300 V, 80°C
EAC	Certificate No. RU C-DE.ME77.B.01218 (TR ZU)
CTP	Certificate No. C-DE.PB49.B.00416 (fire protection)
CEI	Following CEI 20-35
Lead-free	Following 2011/65/EC (RoHS-II)
Cleanroom	According to ISO Class 1. The outer jacket material of this series complies with CF77.UL.05.12.D - tested by IPA according to standard DIN EN ISO 14644-1
CE	Following 2014/35/EU

Guaranteed service life

Cycles *	5 million	7.5 million	10 million
Temperature, from/to [°C]	Torsion max. [°/m]	Torsion max. [°/m]	Torsion max. [°/m]
-25/-15	±150	±90	±30
-15/+60	±180	±120	±60
+60/+70	±150	±90	±30

* Higher number of double strokes? Calculate service life online: ▶ www.igus.eu/chainflexlife

Typical application areas

- For heavy duty applications with torsion movements, Class 6
- Especially for robots and 3D movements, Class 1
- Almost unlimited resistance to oil, also to bio-oils, Class 3
- Torsion ± 180°, with 1m cable length, Class 3
- Indoor and outdoor applications, UV resistant
- Robots, handling, spindle drives

chainflex® CFROBOT8

Bus cable | PUR

Class 6.1.3.3

Basic requirements	low	1	2	3	4	5	**6**	7 highest
Travel distance	unsupported	**1**	2	3	4	5	6	≥ 400m
Oil resistance	none	1	2	**3**	4			highest
Torsion	none	1	2	**3**	4			±360°

Example image

Part No.	Number of cores and conductor nominal cross section	Outer diameter (d) max.	Copper index	Weight	Part No.	Characteristic wave impedance approx.	Core group	Colour code
	[mm²]	[mm]	[kg/km]	[kg/km]		[Ω]		
Profibus (1x2x0.64mm)								
CFROBOT8.001	(2x0.35)C	8.0	27	60	**CFROBOT8.001**	150	(2x0.35)C	red, green
CAN-Bus								
CFROBOT8.022	(4x0.5)C	7.5	41	70	**CFROBOT8.022**	120	(4x0.5)C	white, green, brown, yellow (star-quad stranding)
DeviceNet								
CFROBOT8,030	(2xAWG24)C+(2xAWG22)C	9.5	29	74	**CFROBOT8,030**	120	(2xAWG24)C	white/blue
							2xAWG22	red, black
Ethernet/CAT5e/PoE								
CFROBOT8.045	4x(2x0.14)C	9.5	48	90	**CFROBOT8.045**	100	4x(2x0.14)C	white-green/green, white-orange/orange, white-blue/blue, white-brown/brown
Ethernet/CAT6/PoE								
CFROBOT8.049	4x(2x0.14)C	9.5	49	90	**CFROBOT8.049**	100	4x(2x0.14)C	white-green/green, white-orange/orange, white-blue/blue, white-brown/brown
Ethernet/CAT6A								
CFROBOT8.050	4x(2x0.15)C	10.5	51	124	**CFROBOT8.050**	100	4x(2x0.15)C	white-green/green, white-orange/orange, white-blue/blue, white-brown/brown
Ethernet/CAT7								
CFROBOT8.052	4x(2x0.15)C	10.5	52	126	**CFROBOT8.052**	100	4x(2x0.15)C	white-green/green, white-orange/orange, white-blue/blue, white-brown/brown
Profinet								
CFROBOT8.060	(2x(2x0.34))C	8.5	34	68	**CFROBOT8.060**	100	(2x(2x0.34))C	white/blue, yellow/orange

Note: The given outer diameters are maximum values and may tend toward lower tolerance limits.
G = with green-yellow earth core **x=** without earth core

Order example: CFROBOT8.052 **- to your desired length (0.5m steps)**
CFROBOT8 **chainflex® series** .052 **Code bus type**

Online order ▶ www.chainflex.eu/CFROBOT8

Available from stock. Ready for delivery in 24hrs or today.*
*The delivery times indicated correspond to the average time until the ordered goods are dispatched.

Technical note bus cables
chainflex® bus cables have been specially developed and tested for continuously moving use in e-chains®. Depending on the material used for the outer jacket and on the underlying construction principle, the bus cables are designed for different mechanical requirements and resistance to diverse media. The cables have been electrically designed in such a way that, on the one hand, the electrical requirements of the respective bus specification are reliably met and, on the other, that greater value is placed on a high degree of EMC reliability.It is also ensured that the electrical values remain stable over the long term in spite of permanent movement. The overall quality of transmission in a complete bus communication system, however, is not solely dependent on the cable used. What is also essential is that all components (electronic parts, connecting system and cable) are precisely matched to each other and that the maximum transmission lengths, which are dependent on the respective system, are adhered to with regard to the data transmission rates needed. A cable is thus not solely responsible for the reliable transmission of signals. igus® advises you when you are designing your bus system so that all these factors are taken into account and, with extensive tests, helps you to ensure the process reliability of your system from the very beginning.

chainflex® CFROBOT8.PLUS

Bus cable | PUR New

Example image

10 million
double strokes guaranteed

10 x d
Bend radius e-chain®

3D movements
Movement type

- For torsion applications
- PUR outer jacket
- Shielded
- Oil resistant and coolant-resistant
- Flame-retardant
- Notch-resistant
- Hydrolysis and microbe-resistant

World first! ±360°/m for robots

Dynamic information

Bend radius	**e-chain® twisted**	min. 10 x d
	flexible	min. 8 x d
	fixed	min. 5 x d
Temperature	**e-chain® twisted**	-25 °C to +70 °C
	flexible	-40 °C to +70 °C (following DIN EN 60811-504)
	fixed	-50 °C to +70 °C (following DIN EN 50305)
v max.	**twisted**	360 °/s
a max.	**twisted**	60 °/s²
Movement type		Robots and 3D movements, Class 1
Torsion		Torsion ± 360°, with 1m cable length, Class 4

Cable structure

Conductor	Stranded conductor in especially bending-resistant version consisting of bare copper wires (following DIN EN 60228).
Core insulation	According to bus specification.
Core structure	According to bus specification.
Core identification	According to bus specification. ▶ Product range table
Intermediate layer	Foil taping over the external layer.
Overall shield	Torsion resistant tinned wound copper shield. Cover approx. 80% visual.
Outer jacket	Low-adhesion, halogen-free, highly abrasion-resistant PUR mixture, adapted to suit the requirements in e-chains® (following DIN EN 50363-10-2). Colour: steel blue (similar to RAL 5011)

Electrical information

Nominal voltage	50 V
Testing voltage	500 V

Class 6.1.3.4

Basic requirements	low	1	2	3	4	5	**6**	7	highest
Travel distance	unsupported	**1**	2	3	4	5	6	≥ 400m
Oil resistance	none	1	2	**3**	4	highest		
Torsion	none	1	2	3	**4**	±360°		

Properties and approvals

UV resistance	High
Oil resistance	Oil-resistant (following DIN EN 50363-10-2), Class 3
Flame-retardant	According to IEC 60332-1-2, CEI 20-35, FT1
Silicone-free	Free from silicone which can affect paint adhesion (following PV 3.10.7 – status 1992)
Halogen-free	Following DIN EN 60754
UL/CSA	Style 1589 and 20236, 30 V, 80 °C
EAC	Certificate No. RU C-DE.ME77.B.01218 (TR ZU)
CTP	Certificate No. C-DE.PB49.B.00416 (fire protection)
CEI	Following CEI 20-35
Lead-free	Following 2011/65/EC (RoHS-II)
Cleanroom	According to ISO Class 1. The outer jacket material of this series complies with CF77.UL.05.12.D - tested by IPA according to standard DIN EN ISO 14644-1
CE	Following 2014/35/EU

Guaranteed service life

Cycles *	5 million	7.5 million	10 million
Temperature, from/to [°C]	Torsion max. [°/m]	Torsion max. [°/m]	Torsion max. [°/m]
-25/-15	±330	±240	±150
-15/+60	±360	±270	±180
+60/+70	±330	±240	±150

* Higher number of double strokes? Calculate service life online: ▶ www.igus.eu/chainflexlife

Typical application areas

- For heavy duty applications with torsion movements, Class 6
- Especially for robots and 3D movements, Class 1
- Almost unlimited resistance to oil, also to bio-oils, Class 3
- Torsion ± 360°, with 1m cable length, Class 4
- Indoor and outdoor applications, UV resistant
- Robots, handling, spindle drives

chainflex® CFROBOT8.PLUS

Bus cable | PUR New

Class 6.1.3.4

Basic requirements	low	1	2	3	4	5	**6**	7	highest
Travel distance	unsupported	**1**	2	3	4	5	6		≥ 400m
Oil resistance	none	1	2	**3**	4				highest
Torsion	none	1	2	3	**4**				±360°

Part No.	Number of cores and conductor nominal cross section	Outer diameter (d) max.	Copper index	Weight	Part No.	Characteristic wave impedance approx.	Core group	Colour code
	[mm²]	[mm]	[kg/km]	[kg/km]		[Ω]		
Profibus (1x2x0.64mm)								
CFROBOT8.PLUS.001	(2x0.25)C	9.0	30	75	**CFROBOT8.PLUS.001**	150	(2x0.25)C	red, green
Ethernet/CAT5e/PoE								
CFROBOT8.PLUS.045	(4x(2x0.15))C	7.5	32	60	**CFROBOT8.PLUS.045**	100	(4x(2x0.15))C	white-blue/blue, white-orange/orange, white-green/green, white-brown/brown
Profinet								
CFROBOT8.PLUS.060	(4x0.38)C	7.0	32	64	**CFROBOT8.PLUS.060**	100	(4x0.38)C	white, orange, blue, yellow (Star-quad)

Note: The given outer diameters are maximum values and may tend toward lower tolerance limits.
G = with green-yellow earth core **x=** without earth core

Guarantee igus chainflex 36 month guarantee

chainflex® CFROBOT9

Hybrid cables | PUR

Example image

36 **10 million** cycles guaranteed

±180°/m Torsion

3D movements Movement type

- For torsion applications
- PUR outer jacket
- Unshielded/shielded
- Oil resistant and coolant-resistant
- Flame-retardant
- PVC and halogen-free
- Notch-resistant
- Hydrolysis and microbe-resistant

Dynamic information

Bend radius	**e-chain® twisted**	min. 10 x d
	flexible	min. 8 x d
	fixed	min. 5 x d
Temperature	**e-chain® twisted**	-25 °C to +80 °C
	flexible	-40 °C to +80 °C (following DIN EN 60811-504)
	fixed	-50 °C to +80 °C (following DIN EN 50305)
v max.	**twisted**	180 °/s
a max.	**twisted**	60 °/s²
Movement type	Robots and 3D movements, Class 1	
Torsion	± 180°, with 1 m cable length, Class 3	

Cable structure

Conductor	Stranded conductor in especially bending-resistant version consisting of bare copper wires (following DIN EN 60228).
Core insulation	Mechanically high-quality TPE mixture.
Core identification	▶ Product range table
Element shield	Extremely torsion-resistant tinned wound copper shield. Cover approx. 85% visual.
Outer jacket	Low-adhesion, halogen-free, highly abrasion-resistant PUR mixture, adapted to suit the requirements in e-chains® (following DIN EN 50363-10-2). Colour: steel blue (similar to RAL 5011)

Electrical information

Nominal voltage	300/500 V (following DIN VDE 0298-3)
Testing voltage	2000 V (following DIN EN 50395)

Class 6.1.3.3

Basic requirements	low 1 2 3 4 5 **6** 7 highest
Travel distance	unsupported **1** 2 3 4 5 6 ≥ 400m
Oil resistance	none 1 2 **3** 4 highest
Torsion	none 1 2 **3** 4 ±360°

Properties and approvals

UV resistance	High
Oil resistance	Oil-resistant (following DIN EN 50363-10-2), Class 3
Flame-retardant	According to IEC 60332-1-2, CEI 20-35, FT1, VW-1
Silicone-free	Free from silicone which can affect paint adhesion (following PV 3.10.7 – status 1992)
Halogen-free	Following DIN EN 60754
UL/CSA	**Cores ≤ 0.5mm²:** Style 10467 and 20317, 300V, 80°C **Cores > 0.5 mm²:** Style 10493 and 20317, 300 V, 80 °C
NFPA	Following NFPA 79-2012, chapter 12.9
EAC	Certificate No. RU C-DE.ME77.B.01254 (TR ZU)
CTP	Certificate No. C-DE.PB49.B.00416 (fire protection)
CEI	Following CEI 20-35
Lead-free	Following 2011/65/EC (RoHS-II)
Cleanroom	According to ISO Class 1. The outer jacket material of this series complies with CF77.UL.05.12.D - tested by IPA according to standard DIN EN ISO 14644-1
CE	Following 2014/35/EU

Guaranteed service life

Cycles *	5 million	7.5 million	10 million
Temperature, from/to [°C]	Torsion max. [°/m]	Torsion max. [°/m]	Torsion max. [°/m]
-25/-15	±150	±90	±30
-15/+70	±180	±120	±60
+70/+80	±150	±90	±30

* Higher number of double strokes? Calculate service life online: ▶ www.igus.eu/chainflexlife

Typical application areas

- For heavy duty applications with torsion movements, Class 6
- Especially for robots and 3D movements, Class 1
- Almost unlimited resistance to oil, Class 3
- Torsion ± 180°, with 1m cable length, Class 3
- Indoor and outdoor applications, UV resistant
- Robots, handling, spindle drives

chainflex® CFROBOT9

Hybrid cables | PUR

Class 6.1.3.3

Basic requirements	low	1	2	3	4	5	**6**	7	highest
Travel distance	unsupported	**1**	2	3	4	5	6		≥ 400m
Oil resistance	none	1	2	**3**	4				highest
Torsion	none	1	2	**3**	4				±360°

Example image

Part No.	Number of cores and conductor nominal cross section [mm²]	Outer diameter (d) max. [mm]	Copper index [kg/km]	Weight [kg/km]	Part No.	Core group	Colour code
CFROBOT9.001	5G1.0+(2x1.0)C	10.5	81	138	**CFROBOT9.001**	5G1.0	white with black numerals 1-4, one green-yellow core
						(2x1.0)C	white with black numerals 5-6
CFROBOT9.004	16G1.0+(2x1.0)C	16.0	194	311	**CFROBOT9.004**	16G1.0	white with black numerals 1-4, 7-17 one green-yellow core
						(2x1.0)C	white with black numerals 5-6
CFROBOT9.005 [11)]	23G1.0+(2x1.0)C	19.5	268	444	**CFROBOT9.005**	23G1.0	white with black numerals 1-4, 7-24 one green-yellow core
						(2x1.0)C	white with black numerals 5-6
CFROBOT9.006 [11)]	24G1.0+(2x1.0)C	20.0	280	457	**CFROBOT9.006**	24G1.0	white with black numerals 1-4, 7-25, one green-yellow core
						(2x1.0)C	white with black numerals 5-6
CFROBOT9.007	(15x(2x0.25)C+(4x0.25)C)C	18.5	229	368	**CFROBOT9.007**	15x(2x0.25)C	Colour code in accordance with DIN 47100.
						(4x0.25)C)C	white/green/brown/yellow (CAN-Bus)
CFROBOT9.010	(4x(2x0.25)C)C	10.5	62	117	**CFROBOT9.010**	4x(2x0.25)C)C	white/brown, green/yellow, grey/pink, blue/red

[11)] Phase-out model
Note: The given outer diameters are maximum values and may tend toward lower tolerance limits.
G = with green-yellow earth core **x=** without earth core

igus® chainflex® cables in triflex® R e-chain® for 6-axis robots

igus® robotics

Harnessed hoses and cables for robots

Selection table

chainflex® readychain® and readycable®

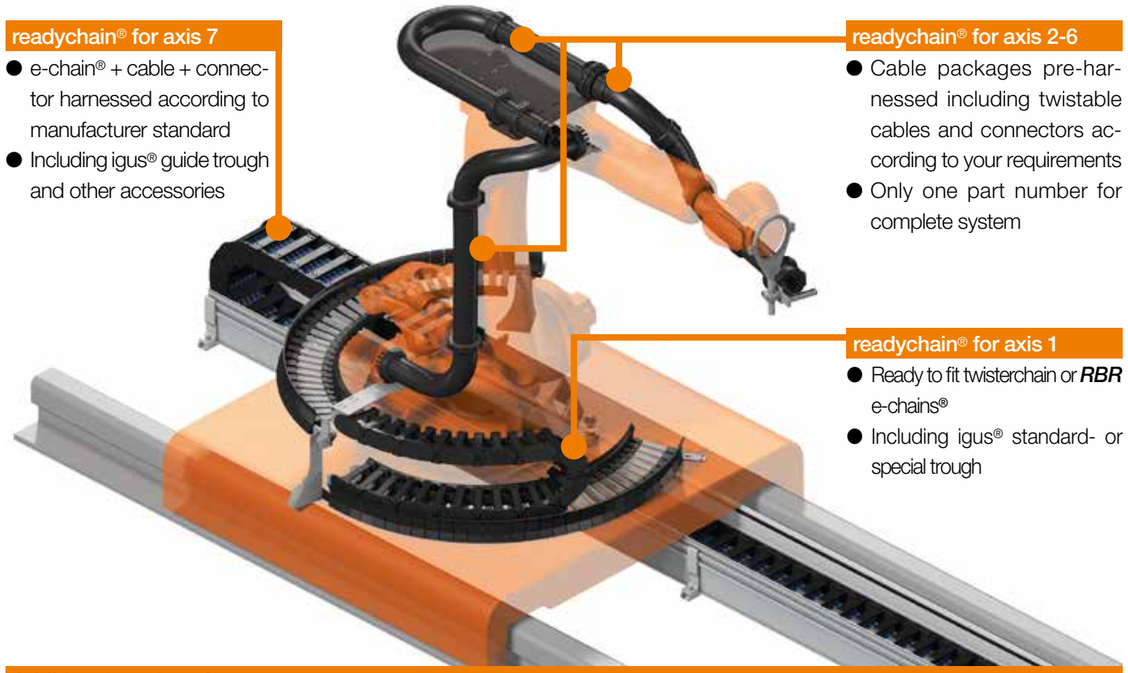
Harnessed dress packs for welding robots. The packages consist of a triflex® R e-chain®, filled with chainflex® cables and hoses for the supply of energy, data and media. Users have the option of having the cables harnessed with connectors in accordance with 24 manufacturer standards. The dress packs allow a quick replacement of the energy supply.

readychain® robot

Ready to install harnessed e-chain systems® for robots

Assembled energy supply systems, connectors and cables from igus®. Everything from a single source. Direct from the manufacturer. Quick delivery to your robot, in 1-10 days.

readychain® for axis 7
- e-chain® + cable + connector harnessed according to manufacturer standard
- Including igus® guide trough and other accessories



readychain® for axis 2-6
- Cable packages pre-harnessed including twistable cables and connectors according to your requirements
- Only one part number for complete system

readychain® for axis 1
- Ready to fit twisterchain or ***RBR*** e-chains®
- Including igus® standard- or special trough

Additional services for you
- Survey of existing systems on your robot by our sales engineers
- Optional system guarantee
- Worldwide readychain® specialists and 11 production sites for fast maintenance and spare part support

Energy supply for robots made configurable online: Around 10,000 different options for component selection for the energy supply on a robot

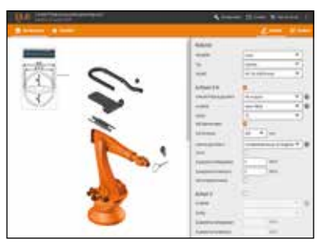
The QuickRobot robot equipment configurator from igus® offers around 10,000 different options for around 400 robot models. Display the compatible systems within seconds by entering the robot manufacturer and model. The desired chain size can also be selected by the diameter.

More information ▶ www.igus.eu/quickrobot

All igus® robotic components are tested in our laboratory and have already been used reliably in many applications for years. Our goal is to ensure that the whole energy supply on your robots is reliable. We do not simply focus on mechanical protection but instead look at the entire application including the cables that have also been especially developed for use on the robot. We will gladly find a solution for your application – and look forward to receiving your enquiry.

We are always happy to visit you on site and show you the advantages of the modular igus® robot kit.

Matthias Meyer
Head of Industry Management
Robotics
Phone: +49 2203 9649-161
mmeyer@igus.net



For QuickRobot example configurations, see ▶ **page 12**

Product range

triflex® readychain® dress packs for welding robots

Dress packs for welding robots

Product range Part No.	Dress pack

Welding **axis 1-3**

(1m projection/each end + 1m e-chain® for each)

RRC.S.001

Consisting of:
- 1m TRCF.85.135.0, including mounting brackets
- Welding cable (2x35mm² + 1x25mm²) including multi-contact TSB and TSS welding connector
- Control cable (18x0.75mm² + 5x0.75mm²) including rectangular connector on both ends
- Welding control cable (5x2x0.5mm²) including rectangular connector on both ends
- 3x hoses - DN12 red, green, blue - including fixtures on both ends

Welding **axis 3-6**

(1 m projection/each end + 1 m e-chain® for each)

RRC.S.002

Consisting of:
- 1m TRC.85.135.0 including protectors and mounting brackets
- Welding cable (2x35mm² + 1x25mm²) including multi-contact TSB and TSS welding connector
- Control cable (18x0.75mm² + 5x0.75mm²) including round connector and rectangular connector
- Welding control cable (5x2x0.5 mm²) including rectangular connector on both ends
- -3x hoses - DN12 red, green, blue - including fixtures on both ends

readycable® robot

Harnessed cables - Kuka Quantec

Harnessed cables for Kuka Quantec, to your required length

Cable type / Part No.	chainflex® cable	Manufacturer's designation	Number of cores and conductor nominal cross section [mm²]	Ø [mm]
Motor cable (Straight socket)				
MAT904105003	CFSPECIAL.792.011	X30/X30.1	(5x(2x6.0+2x2.5)+(2x(6x1.0)C)C	35.5
Motor cable (Angled socket)				
MAT904105004	CFSPECIAL.792.011	X30/X30.1	(5x(2x6.0+2x2.5)+(2x(6x1.0)C)C	35.5
Data cable				
MAT904105005	CFBUS.PUR.H01.060	X31/X31.1	(4x0.38)C+4x1.5	11.5
Motor cable Single axis (axis 7)				
MAT904105006	CF270.UL.25.15.02.01.D	XM.../X...	(4G2.5+(2x1.5)C)C	14.0
MAT904105007	CF270.UL.40.15.02.01.D	XM.../X...	(4G4.0+(2x1.5)C)C	15.0
Motor cable Single axis (axis 7)				
MAT904105008	CF270.UL.60.15.02.01.D	XM.../X...	(4G6.0+(2x1.5)C)C	16.5
Control cable (axis 7)				
MAT904105009	CF112.02.04.02	Control cable single axis	(4x(2x0.25)C)C	11.0
Earth-core				
MAT904105010	CFPE.160.01	Connector plate/robot	1G16.0	9.5

readycable® robot

Harnessed cables - Kuka Fortec

Harnessed cables for Kuka Fortec, to your required length

Cable type / Part No.	chainflex® cable	Manufacturer's designation	Number of cores and conductor nominal cross section [mm²]	Ø [mm]
Motor cable (Angled socket)				
MAT904105011	CFSPECIAL.792.014	X30.1/X30.1.1	((6x1.5)C+3x(3x4)+1G6)C	28.0
MAT904105012	CFSPECIAL.792.013	X30.4/X30.4.1	(2x(3x1.5)C+3x(3x10)+1G10)C	29.5
Data cable				
MAT904105005	CFBUS.PUR.H01.060	X31.1/X31.1	(4x0.38)C+4x1.5	11.5
Motor cable Single axis (axis 7)				
MAT904105006	CF270.UL.25.15.02.01.D	XM.../X...	(4G2.5+(2x1.5)C)C	14.0
MAT904105007	CF270.UL.40.15.02.01.D	XM.../X...	(4G4.0+(2x1.5)C)C	15.0
Motor cable Single axis (axis 7)				
MAT904105008	CF270.UL.60.15.02.01.D	XM.../X...	(4G6.0+(2x1.5)C)C	16.5
Control cable (axis 7)				
MAT904105013	CF112.02.04.02	Control cable single axis	(4x(2x0.25)C)C	11.0
Earth-core				
MAT904105010	CFPE.160.01	Connector plate/robot	1G16.0	9.5

readycable® robot

Harnessed cables - Kuka Titan

Harnessed cables for Kuka Titan, to your required length

Cable type Part No.	chainflex® cable	Manufacturer's designation	Number of cores and conductor nominal cross section [mm²]	Ø [mm]
Motor cable (Angled socket)				
MAT904105011	CFSPECIAL.792.014	X30.1/X30.1.1	((6x1.5)C+3x(3x4)+1G6)C	28.0
MAT904105014	CFSPECIAL.792.014	X30.2/X30.2.1	((6x1.5)C+3x(3x4)+1G6)C	28.0
MAT904105015	CFSPECIAL.792.014	X30.3/X30.3.1	(2x(3x1.5)C+3x(3x10)+1G10)C	29.5
Data cable				
MAT904105005	CFBUS.PUR.H01.060	X31/X31.1	(4x0.38)C+4x1.5	11.5
Motor cable Single axis (axis 7)				
MAT904105006	CF270.UL.25.15.02.01.D	XM.../X...	(4G2.5+(2x1.5)C)C	14.0
MAT904105007	CF270.UL.40.15.02.01.D	XM.../X...	(4G4.0+(2x1.5)C)C	15.0
Motor cable Single axis (axis 7)				
MAT904105008	CF270.UL.60.15.02.01.D	XM.../X...	(4G6.0+(2x1.5)C)C	16.5
Control cable (axis 7)				
MAT904105013	CF112.02.04.02	Control cable single axis	(4x(2x0.25)C)C	11.0
Earth-core				
MAT904105010	CFPE.160.01	Connector plate/robot	1G16.0	9.5

readycable® robot

Harnessed cables - Fanuc M-900iB New

Harnessed cables for Fanuc M-900iB, to your required length

Part No.	chainflex® cable	Manufacturer's designation	Number of cores and conductor nominal cross section [mm²]	Ø [mm]
Motor cable / Extension cable axis 7				
MAT904117141	CFSPECIAL.792,015	RM1.2	(7x(6x2.0))C	36.5
Motor cable/ Extension cable axis 7				
MAT904117142	CFSPECIAL.792,015	RM2.2	(7x(6x2.0))C	36.5
Pulse coder/ Extension cable axis 7				
MAT904117143	CFSPECIAL.792,016	RP1.2	(5x(4x0.25) +10x(3x0.75))C	26.5
Earth core/ Extension cable axis 7				
MAT904117144	CFPE.160.01	Earth-core	1G16.0	9.5
Earth core/ Extension cable axis 7				
MAT904117145	CFPE.60.01	Earth-core	1G6.0	7.0
Motor cable single axis (Axis 7)				
MAT904117146	CF270.UL.60.15.02.01.D	RM7.2	(4G6.0+(2x1.5)C)C	16.5
Pulse coder single axis (axis 7)				
MAT904117147	CF240.PUR.03.03 + CF113.05.04.02	RP7.2	(3x0.34)C (4x(2x0.5))C	6.0 8.0

readycable® robot

Harnesses cables - Fanuc M-900iB New

Harnessed cables for Fanuc *R*-2000iC, to your required length				
Part No.	**chainflex® cable**	**Manufacturer's designation**	Number of cores and conductor nominal cross section [mm²]	Ø [mm]
Motor cable / Extension cable axis 7				
MAT904117141	**CFSPECIAL.792,015**	**RM1.2**	(7x(6x2.0))C	36.5
Pulse coder/ Extension cable axis 7				
MAT904117143	**CFSPECIAL.792,016**	**RP1.2**	(5x(4x0.25) +10x(3x0.75))C	26.5
Earth core/ Extension cable axis 7				
MAT904117144	**CFPE.160.01**	**Earth-core**	1G16.0	9.5
Earth core/ Extension cable axis 7				
MAT904117145	**CFPE.60.01**	**Earth-core**	1G6.0	7.0
Motor cable single axis (Axis 7)				
MAT904117146	**CF270.UL.60.15.02.01.D**	**RM7.2**	(4G6.0+(2x1.5)C)C	16.5
Pulse coder single axis (axis 7)				
MAT904117147	**CF240.PUR.03.03 + CF113.05.04.02**	**RP7.2**	(3x0.34)C	6.0
			(4x(2x0.5))C	8.0

readycable® robot

Harnessed cables - according to AIDA specification* New

Harnessed cables according to AIDA specification, to your required length			
Part No.	**chainflex® cable**	Number of cores and conductor nominal cross section [mm²]	Ø [mm]
Extension cable axis 7			
AIDA Profinet - RJ-45			
MAT904117091	CFBUS.PUR.060	(4x0.38)C	7.0
AIDA Profinet FOC			
MAT904117092	CFLK.L1.02	1x980/1000 µm	7.0
AIDA Power			
MAT904117093	CF77.UL.25.05.D	5G2.5	10.5
AIDA Signal			
MAT904117094	CF211.PUR.05.05.02	(5x(2x0.5))C	10.5
Extension cable axes 1-6			
AIDA Profinet - RJ-45			
MAT904117095	CFROBOT8.060	(2x(2x0.34))C	8.5
AIDA Profinet FOC 1)			
upon request 1)	CFLK.L1.02	1x980/1000µm	
AIDA Power			
MAT904117097	CF77.UL.25.05.D	5G2.5	10.5
AIDA Signal			
MAT904117098	CFROBOT3.05.05.02	(5x(2x0.5))C	12.5

***AIDA** = **A**utomatisierungs**I**nitiative **D**eutscher **A**utomobilhersteller (Automation Initiative of German Automobile Manufacturers)
1) Offer according to technical examination of the application
Note: The given outer diameters are maximum values and may tend toward lower tolerance limits.
G = with green-yellow earth core **x=** without earth core

igus® readychain®

Ready to install harnessed e-chainsystems® for robots

Assembled energy supply systems, connectors and cables from igus®. Everything from one source, directly from the manufacturer, delivered quickly to your machine

Ready-to-install systems, from connectors through assembled cables up to complex energy supply modules, delivered in 1-10 days

Customer-specific production

From one off to mass production

readychains® - increase your capacity and cash flow quickly with igus®

- Reduce overhead costs
- Reduce your throughput times from days to hours
- Respond flexibly to order variations
- Utilise igus® manufacturing capacities and our know-how in cable assembly

Reduce the number of suppliers and orders by 75% with igus®

- One order, one invoice, one delivery
- A partner for minimal machine downtimes
- All readychain® components are subject to an extensive quality control and function testing

readychain®

You decide, igus® delivers

Industrially harnessed energy chain modules direct from the manufacturer ... You decide the quantity, the travel and the degree of harnessing ...

3 Benefits: readychain® basic

1. ONE supplier - combine all component suppliers
2. Reduce assembly time
3. Reduce failures

Reduction of assembly time
Reduction of logistics cost
Procurement optimisation

Further information, videos, configurators and product finders
▶ www.igus.eu/RCbasic

6 Benefits: readychain® standard

4. No electrical termination needed
5. 100% digitally tested
6. No cable surplus

Reduction of assembly time
Reduction of logistics cost
Procurement optimisation

Further information, videos, configurators and product finders
▶ www.igus.eu/RCstandard

9 Benefits: readychain® standard+

7. Reduce interfaces
8. Optimise connections/interfaces
9. Ready-to-install multi-axis system

Reduction of assembly time
Reduction of logistics cost
Procurement optimisation

Further information, videos, configurators and product finders
▶ www.igus.eu/RCstandard+

13 Benefits: readychain® premium

10. Optimise your transport / assembly
11. One single assembly
12. One Part No. / Product group
13. Plug & play

Reduction of assembly time
Reduction of logistics cost
Procurement optimisation

Further information, videos, configurators and product finders
▶ www.igus.eu/RCpremium

igus® readychain®

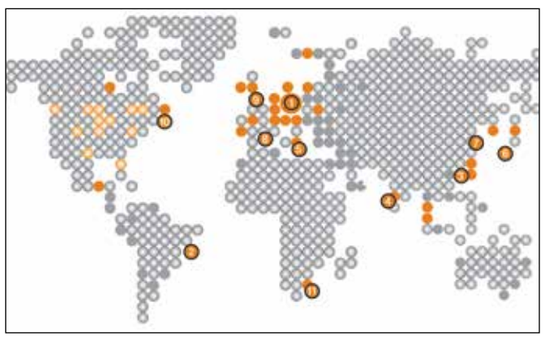
The igus® readychain® factory

Up to 1,600 readychain® systems per week, over 4,700m² floor space, "chain-cable-guarantee" since 1989. 3 shifts, 24 project engineers, 359 employees just for assembly

In the igus® readychain® factory, we assemble customised e-chain systems®. All under one roof

Up-to-date production processes, custom-build or serial production

Full service from system acceptance to installation



12 readychain® factories worldwide

Customised cable assembly

readychain® rack

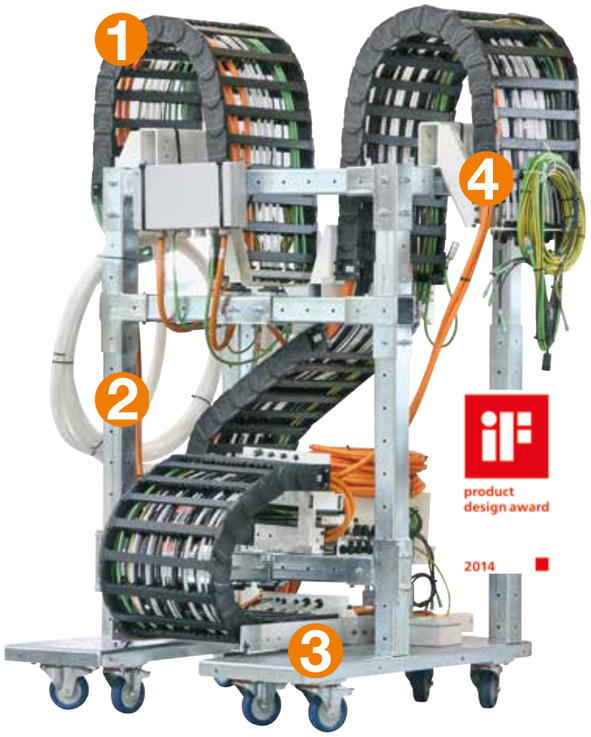
Modular, quick and ready-to-install

1 Everything from one source

The readychain® system includes pre-assembled, customised e-chain systems®. The "Plug & Play" solutions are configured, manufactured and delivered according to individual customer specifications. The use of the mounting rack can yield benefits even at low quantities.

2 Flexible components

The telescopic supports and braces of the readychain® rack allow flexible adaptation to the installation needs on site. Changes in serial production can be undertaken easily. By using modular parts, additional components can also be easily attached to the rack.



80% savings during prototyping. Assembly transport rack for ready-to-install energy supply systems.

3 Sustainable use

The components of the readychain® rack are galvanised and thus designed for a long life. Each rack can be constructed within a few hours. The individual elements can be reused at any time removing the need to dispose of custom made parts, such as conventional welded transport racks.

4 Precise fitting "Plug & Play"

All interfaces and attachments are designed in such a way that the installation of the e-chain® can be managed quickly and easily. The complete package includes the matching plugs and connectors, plates, sensor actuator boxes, linear bearings, links to the central lubrication, etc., all reducing the installation time considerably.

igus® readychain®

Connectors, cables and accessories

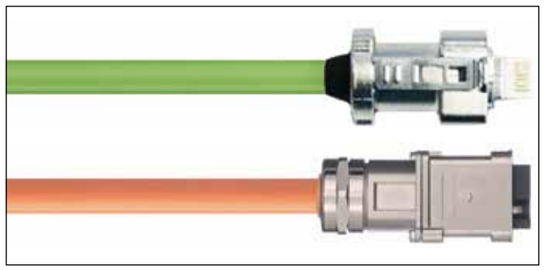
igus® connectors

Round connector kit

Square connector kit

Tools and accessories

igus® readycable®



4,400 drive cables in accordance with 24 manufacturer standards, from stock

Catalogue standards: Video/vision/bus technology

Catalogue standards: network/ethernet/FOC/Field bus

Catalogue standards: CF.INI initiator cables up to 4 x d

igus® hoses and attachments

Configured online with hose cable configurator

readychain®

Configured, fitted, with system guarantee

1 System acceptance — 2 Project phase — 3 Initial acceptance of prototype — 4 igus® installation

readychain® service

- We visit you
- Define interfaces
- Logistics planning
- Cycle integration
- Time schedule

System acceptance on your machine

readychain® service

- Component selection
- Interface optimisation
- Documentation
- Integrated project management
- Cost optimisation

Project planning

readychain® Skype service*

- Initial acceptance from your work place
- Build your prototype with an igus® project engineer, live in your meeting
- Your requests for changes explained with a model or visit us for production acceptance

*Only available in Germany

Prototype including transport rack

readychain® installation

- System installation by igus® specialists
- igus® supervision service for your own installation
- Transparent, fixed price

Installation on site

igus® readychain®

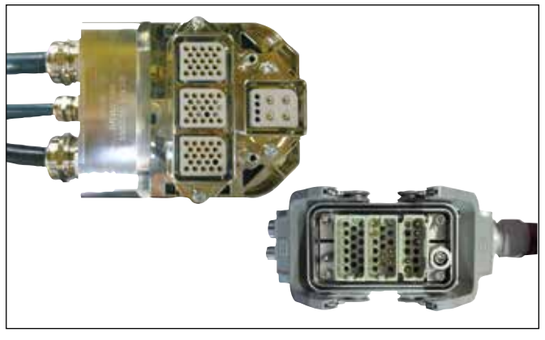
Cable assembly

Capacity for 600,000 assembled cables a year, more than 18,000 test programmes, 1,800 test adapters

Process reliability - crimp forces monitored, automated and time-optimised

Computer-based high-voltage testing and inspection of all assembled cables

Modern machinery - automatic stripper-crimper



Special cable assemblies to your specifications

Worldwide system guarantee

readychain®

igus® - everything from stock

In our warehouse the material waits for your order and not your order for the materials!

e-chains® ...

100,000 e-chain® components

Hundreds of metres of guide trough

Numerous strain relief solutions

... chainflex® cables ...

5 million metres of cable on stock

3,800m² test lab - more than 15,000 tests every year

More than 8,000 cables per week

... harnessing

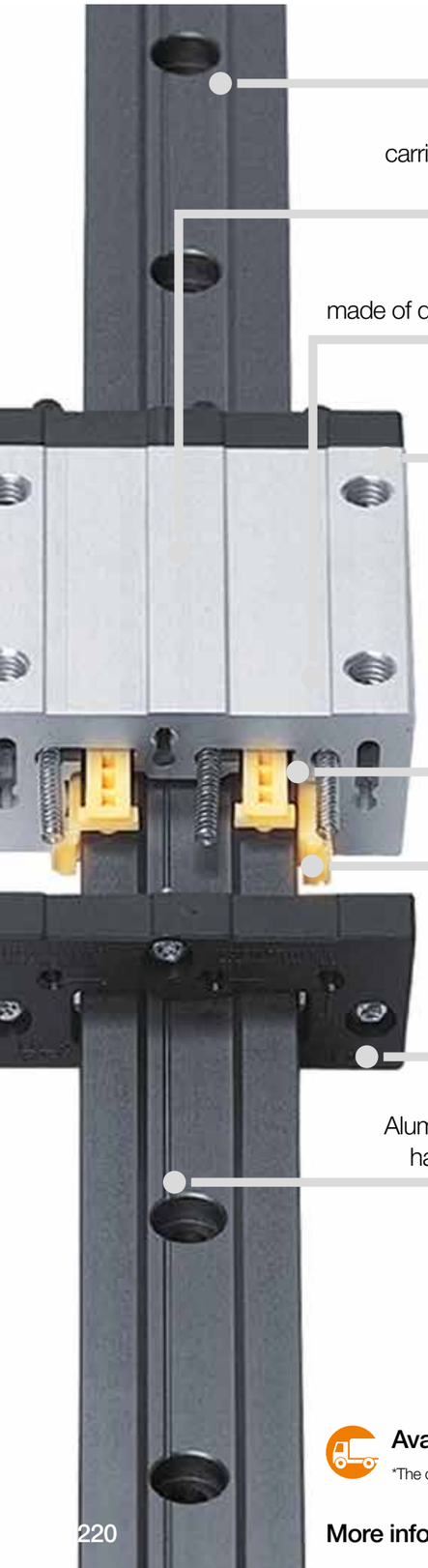
5,000 connector components

Everything quickly within reach

Just-In-Time supply

drylin® T advantages

Sliding instead of rolling



For applications in automation and handling - drylin® T

igus® drylin® T rail guide systems were originally developed for applications in both automation and materials handling. The goal was to create a high performance, maintenance-free linear guide for use in the most diverse, even extreme environments. Their dimensions are identical to most recirculating ball bearing guides.

- Lubrication-free
- Adjustable bearing clearance
- Automatic clearance adjustment
- High static load capacity
- Service life up to 50,000 km without lubrication
- Dirt-resistant
- Low vibration and quiet

Welding tongs on a robot head with igus® drylin® T

Available from stock. Ready to ship in 24 - 48hrs.*

*The delivery times indicated correspond to the average time until the ordered goods are dispatched.

More information ▶ www.igus.eu/drylinT

Overview

Product	Specification
	**Standard** ● Supplied pre-set and can be put into operation at once ● Manual clearance adjustment or fine tuning ● Maintenance-free without lubrication ● Corrosion-free
	**Automatic** ● With a mechanism that automatically adjusts the bearing clearance after removal of the pre-load key and adjusts during operation ● Maintenance-free without lubrication ● Corrosion-free
	**With manual clamp** ● Carriage with adjustable clearance (manual clearance adjustment) ● Maintenance-free dry operation ● Corrosion-free
	**Heavy Duty** ● Used for the most extreme conditions (dirt, adhesive residues, chips, mud, etc.) ● Plastic sliding elements are fixed in the cover plate and are therefore permanent
	**Compact** ● Narrow linear guide carriage for small installation spaces ● Plastic sliding elements are fixed in the cover plate and are therefore permanent
	**Low-profile guide** ● Small, compact, lubrication-free ● Easy to install ● Rugged and cost-effective
	**Clamps** ● Compact and strong clamps for all sizes ● Holding force up to 500N

The complete range with ordering options,
3D-CAD, configurators, PDFs, application examples ▶www.igus.eu/drylinT

3D CAD, configurators, service life calculation and more ▶ www.igus.eu/drylinT

Robotics industry

My sketches

Robotics industry

My sketches

Robotics industry

My sketches

Robotics industry

My sketches

Robotics industry

My sketches

Robotics industry

My sketches

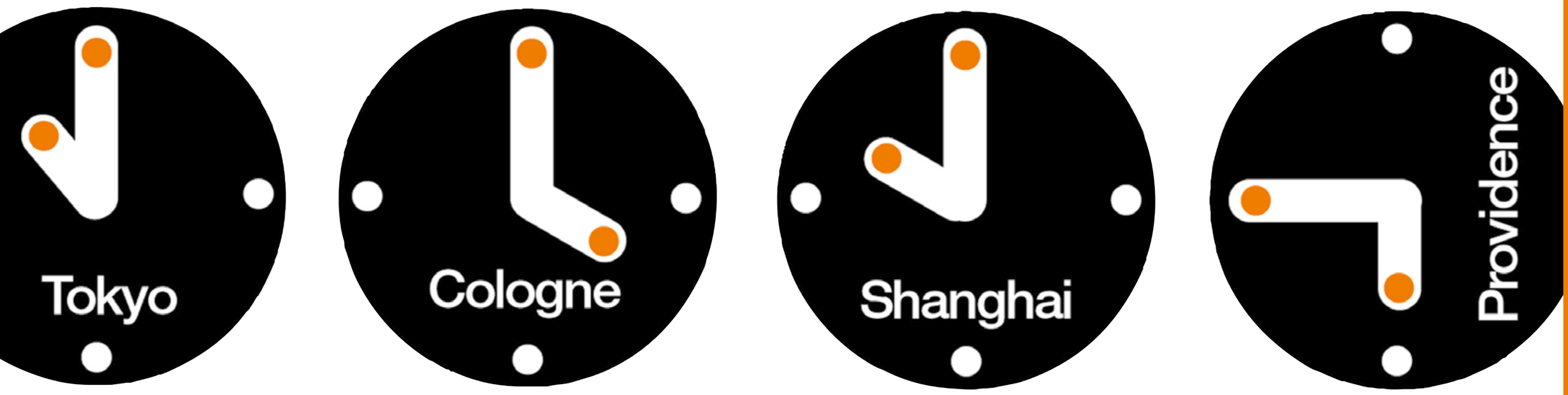
Robotics industry

My sketches

Robotics industry

My sketches

igus® locations



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