

robotics

igus.eu ... Moving energy made easy ... for robots ... 2016 ...



Industry

Moving energy made easy – for robot applications

The modular igus® robot construction kit comprises over 5,000 different items. We can offer you the optimum, customised solution for almost any robot application. Our "Quick Robot" online tool can be used to create the ideal configuration in seconds – 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 primary aim is to design a reliable overall energy supply system for your robot. We do not simply focus on mechanical protection but also look at the entire application including the cables that have been specially developed for use on the robot. We will gladly find a solution for your application too – and look forward to receiving your enquiry.



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We will gladly visit your site and demonstrate the benefits of the igus® triflex® R robot e-chain®.

Further details about the igus® robot e-chain® can also be found online:

- ▶ www.igus.eu/best/triflexTR
- ▶ www.igus.eu/best/triflexTL



igus® solutions for the

Axis 3-6

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Axis 2

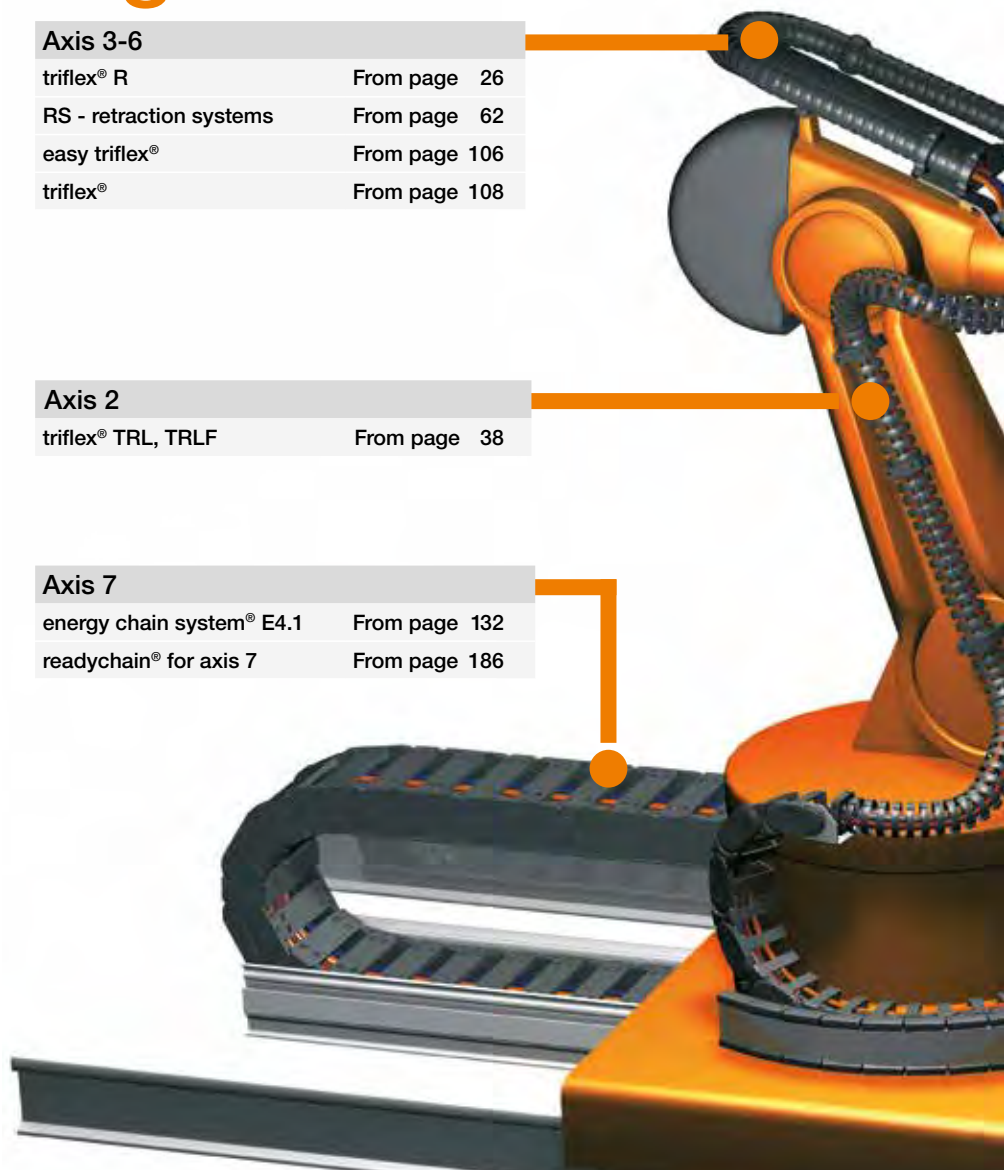
triflex® TRL, TRLF	From page 38
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Axis 7

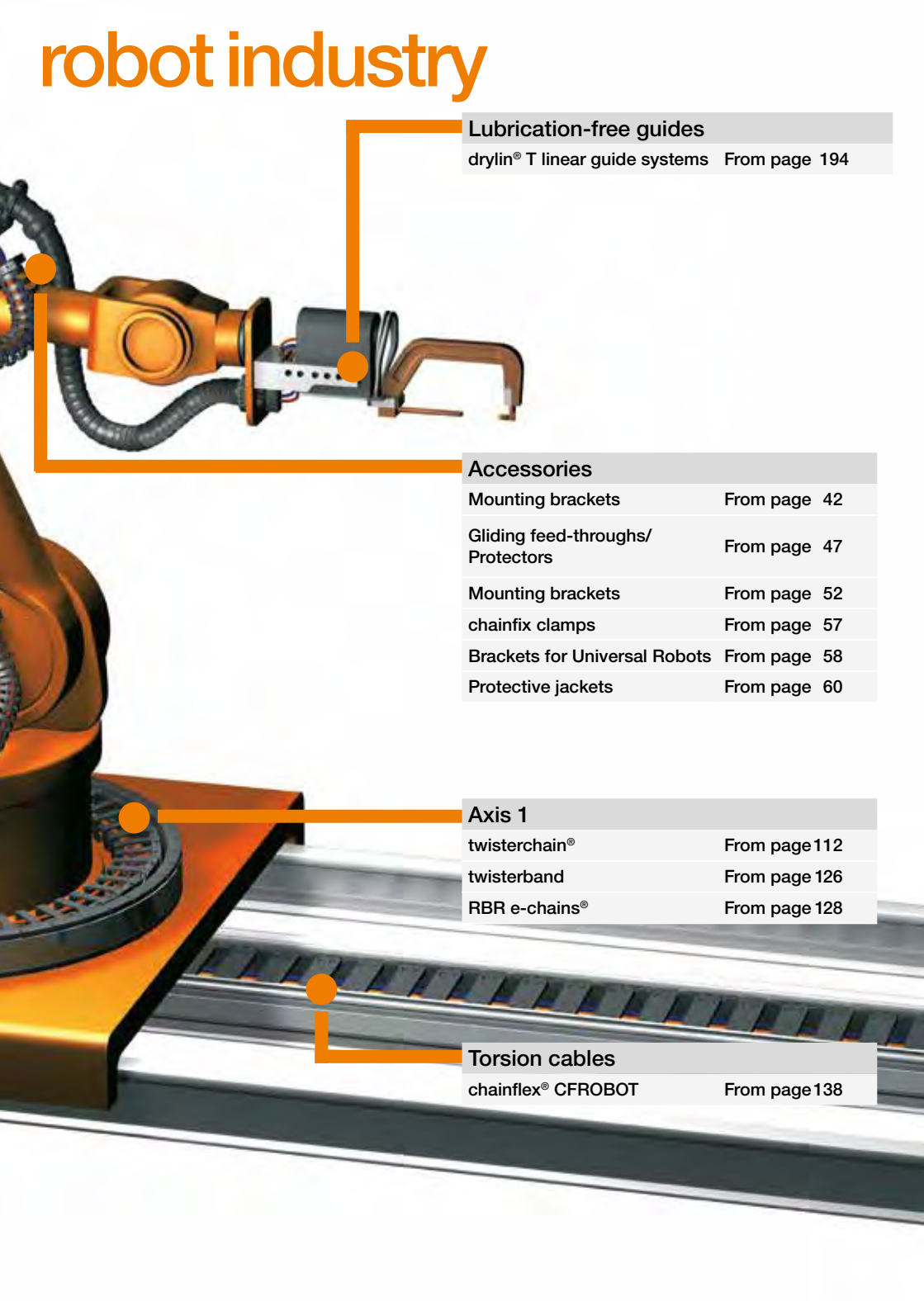
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robot industry



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Accessories

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Torsion cables

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Available from stock.

Delivery time* 24h or today!

*Delivery time means time until shipping of goods (after technical release)



No minimum order value!

No surcharges!

You can find our prices online at ► www.igus.eu



Guarantee

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



7 to 8 plus Saturday service

Monday to Friday 7:00 am to 8:00 pm

Saturday from 8:00 am to 12:00 pm



Order hotline

Phone. +49 2203 9649-800

Fax +49 2203 9649-222



Online shop ► www.igus.eu

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

plastics for longer life® -

increase the service life of your machine with igus® e-chains®

Reducing maintenance, while cutting costs and extending service life; everything delivered immediately from stock - this is our aim. This catalogue contains more than 100,000 products available from stock or with short delivery times, and starting from a batch size of one. We look forward to your call or email.

Orders can be placed until 8:00 pm local time.

Phone +49 2203 9649-800

"Emergency-Service" around the clock.

100,000 products from stock.

No minimum order quantities.

No surcharges.

igus® is certified in accordance with DIN EN ISO 9001:2008 and ISO/TS 16949:2009 in the field of energy chains® with cables and harnessing, as well as plastic plain bearings.

© igus® GmbH - 06/2016

24h/100.000
DIN EN ISO 9001:2008
ISO/TS 16949:2009

Quality from the igus[®] laboratory

Tested and proven every day

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[®] regularly conducts tests at its own 2,750 m² laboratory under realistic conditions. Every year, we conduct more than 15,000 tests for e-chains[®], cables and polymer bearings. These tests focus on push/pull forces, friction values and wear rates. Other factors like dirt, weathering, cold and impact are also tested. Tests are performed on electrical cables and hydraulic and pneumatic hoses. If we don't have data for your type of application, we can conduct a test representative of your requirements.

Global Warranty Certificate

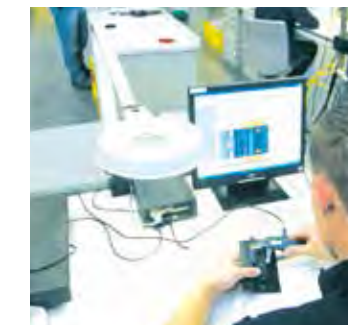


igus[®] system warranty - every application is different. igus[®] warranty certificates will be issued for your application individually. Ask for the igus[®] warranty: "chain, cable, guarantee"

2,750 m² igus[®] lab. The largest test lab in the e-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.



igus[®] ESD tests on the production line



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



igus[®] cables are also tested for torsion properties



Noise level test inside an igus[®] acoustic cell



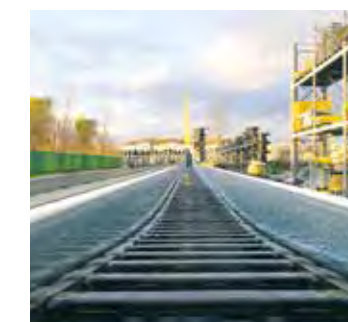
igus[®] dynamic bending test



Long term wear and life-time test



Push pull forces, speeds up to 10 m/s, acceleration up to 200 m/s² are tested by igus[®]



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



Examples of test certificates and quality seals for igus[®] products



igus® delivery service

Fast and reliable



7 to 8 plus Saturday service

No minimum order quantities, no surcharges. Over 100,000 products from stock! Order just 1 m of chainflex® cable, just one e-chain® link or one bearing without surcharges. Invoices and acknowledgements are available by post, fax or e-mail. There are 2,950 employees in Germany and 35 international subsidiaries and offices in 80 nations to guarantee a rapid delivery worldwide.

- Delivery and consultation daily from 7 am to 8 pm, Saturday from 8 am to 12 pm
- Order tracking on the internet right up to the point of delivery
- Simple returns procedure
- Emergency service "around the clock"

Order tracking in the Internet

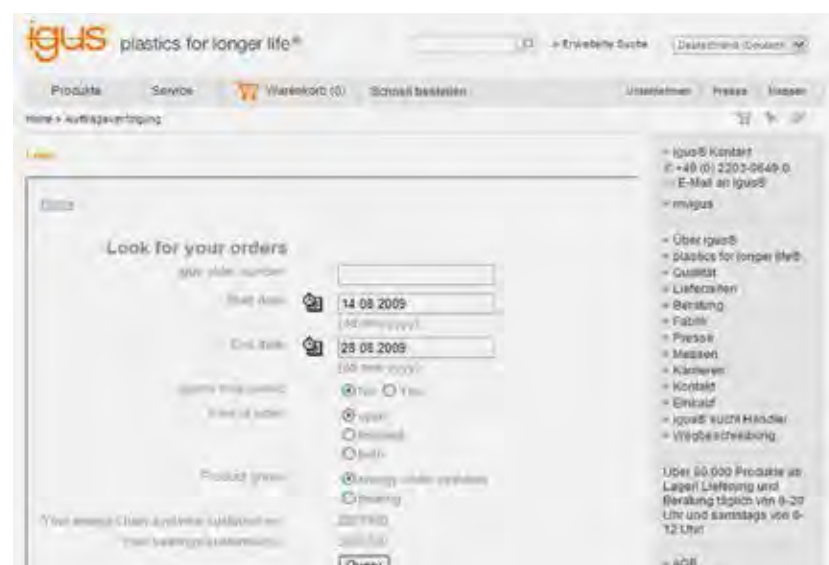
At ► www.igus.eu track your orders in real time with igus® i-net. Just request a password, log into i-net and track your job status via a webcam. igus® i-net shipment tracking permits a monitoring of deliveries from igus® outlet right up to your doorstep.

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

Order at igus®:

No minimum order quantities, no surcharges.

► www.igus.eu/deliveryservice



Request order tracking here
► www.igus.eu/i-net

Available from stock.

Delivery time*
24 hrs or today!

Delivery time*
24-48h

Delivery time*
3-5 work days

Delivery time*
10 work days

*Delivery time refers the time until the product is shipped (after verifying technical feasibility)

Individual components

Customised e-chainsystems®

Harnessed systems

Complex pre-fabricated systems

For example:

One e-chain® link, 6 m of e-chain®, 3 strain-relief elements, etc.

For example:

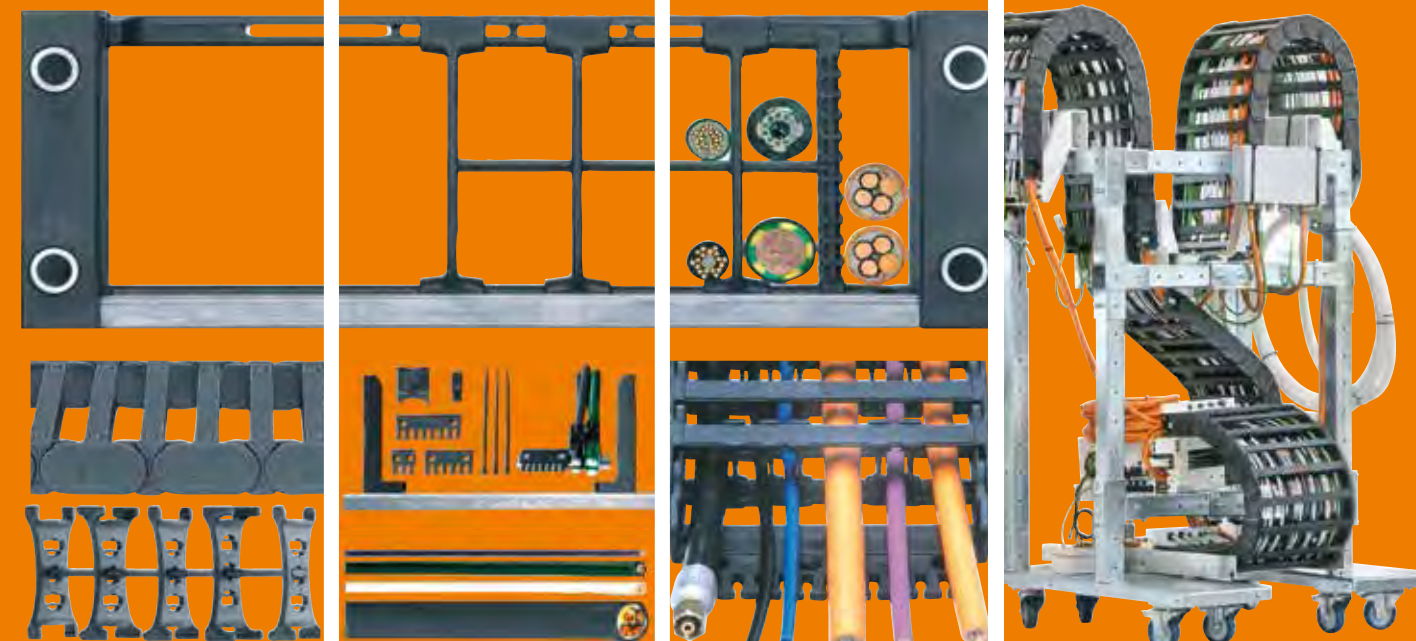
11.46 m of e-chains® with interior separators, mounting brackets and strain relief elements according to your specifications. Also with loose accessories as chainflex® cables, guide troughs, mounting brackets and strain reliefs

For example:

readychain® "basic" - simple customised e-chainsystems® including installed cables without plug connections, labelled and with tail-lengths according to your specifications

For example:

readychain® "premium" - complex customised e-chainsystem® including cables as well as plug connections, mounting brackets, tail lengths and other components according to your specifications

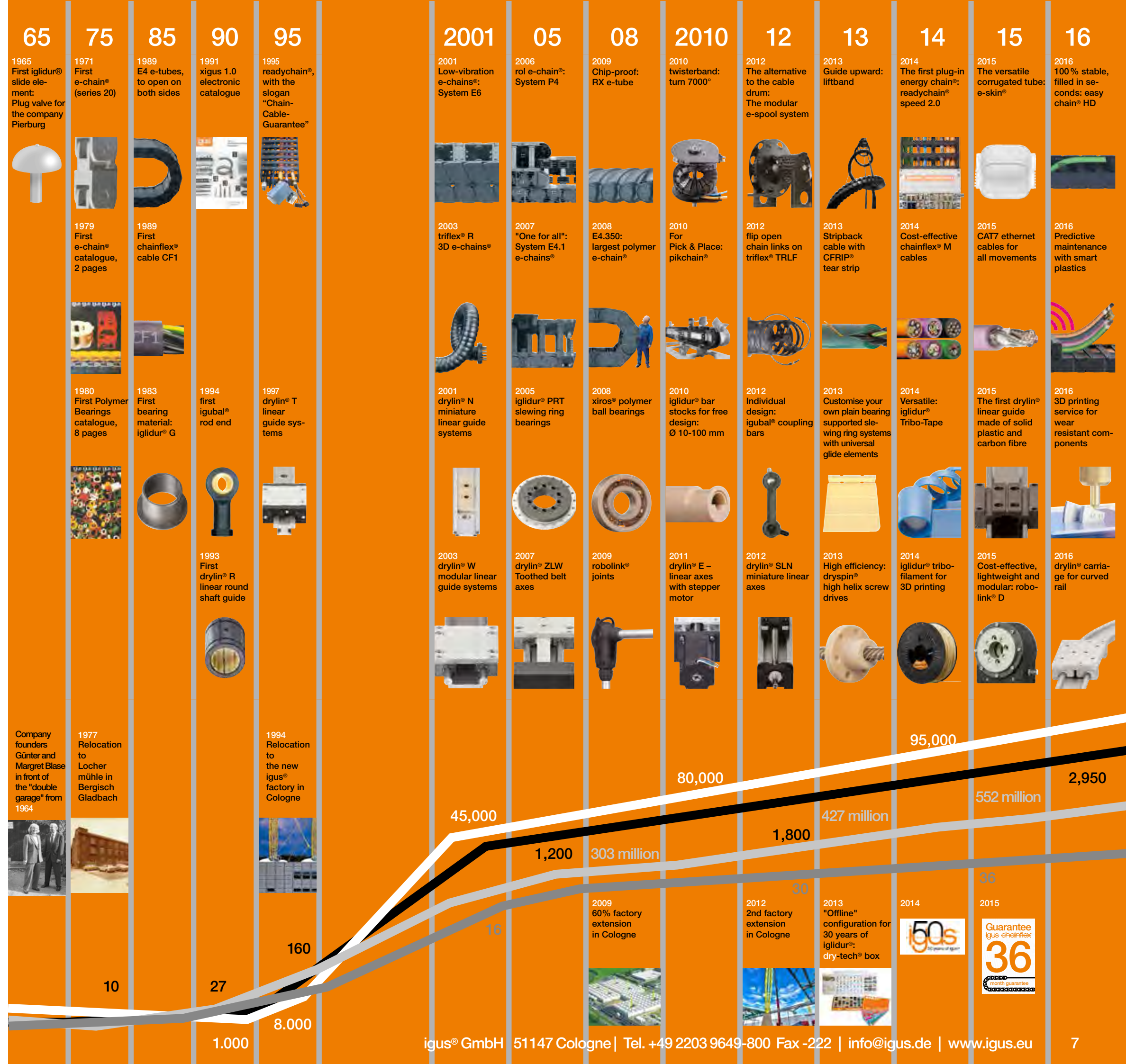


igus® – close to the customer since 1964

From a garage to the global market with tribo-polymers

What began in 1964 with a single injection moulding machine in a garage in Cologne has become a global enterprise within half a century. It all started more than 50 years ago when Günter Blase, who established the company, had an idea about the potential of polymer materials. A mere one year after the company was established, an injection moulding machine about the same size as a sewing machine was used to make the very first products; in 1983, a lubrication-free and maintenance-free iglidur® bearing was made for the first time in a serial production process. From then until today, the company has developed around 50 different catalogue materials, which are the basis of "dry-tech®" bearing technology and are being used in innumerable applications all over the world. Today, the 2,950 employees come up daily new ideas, make high-quality products, ensure streamlined processes and delivery times and, above all, guarantee our close proximity to the customer. On average, igus® dispatches around 5,500 consignments per day. In order to ensure speedy and individual delivery, the customers receive exactly the product they need for their application from 14 storage and assembly centres worldwide: as a single component or as a complete system, also installed or assembled on site on request.

 products with variants
 staff
 sales
 subsidiaries



The flexible igus®-factory

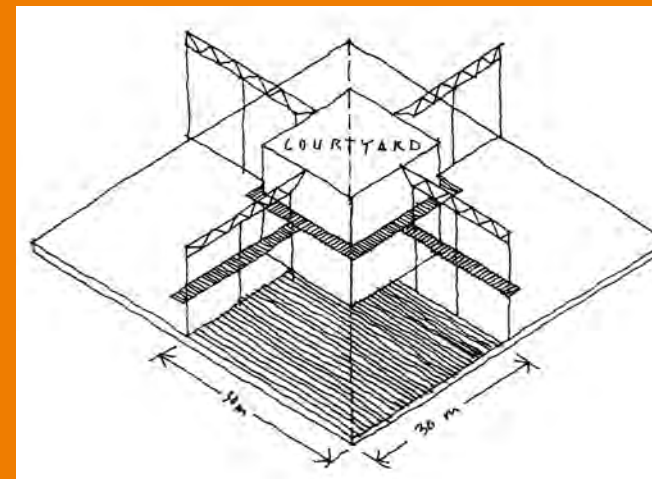
Investments in better technology and faster delivery times



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

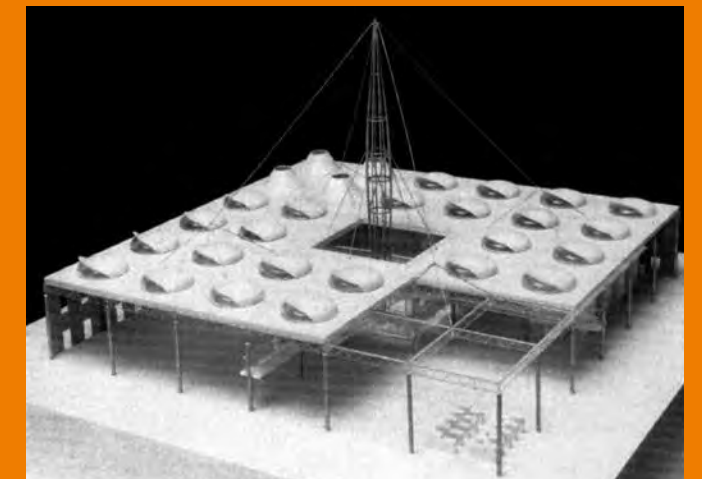
Investments in better technology and faster delivery times

Catalogue items must be in stock in order to assemble modules according to customer requirements and ship within hours. igus® ships from stock within 24 hours or the same day. We deliver from batch size one and have no minimum order value. igus® is continuing its growth trend and is focusing more than ever on clever yet simple solutions for all applications and budgets. Nine facilities worldwide were expanded in 2012 by between 50% and 250%, the factory in Cologne already expanded by 60% in 2009 and is being expanded by more 10,000 m² in 2013. New capacity is being created particularly in the readychain® factory, which is already designed to produce about 50,000 pre-assembled cables per month.

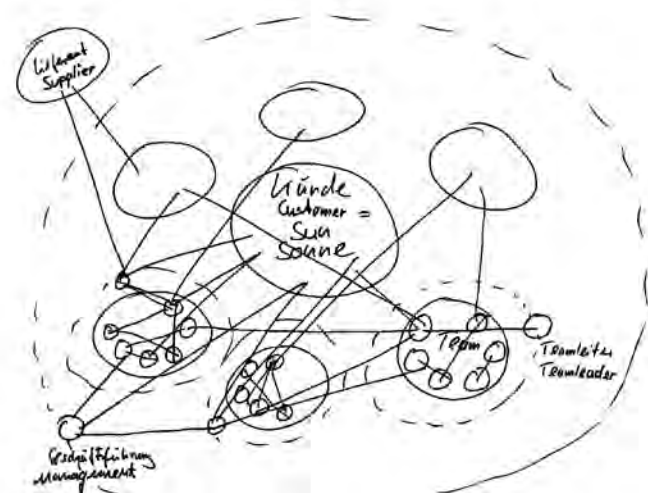


Excerpt of architect's briefing

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



signed to promote staff performance. The interior and exterior will be designed to reflect the enterprise's products and key philosophy: innovation - service - reliability, the customer being comparable to a solar system's centre orbited by all igus® staff and igus® entities dedicated toward solving the customer's problems."



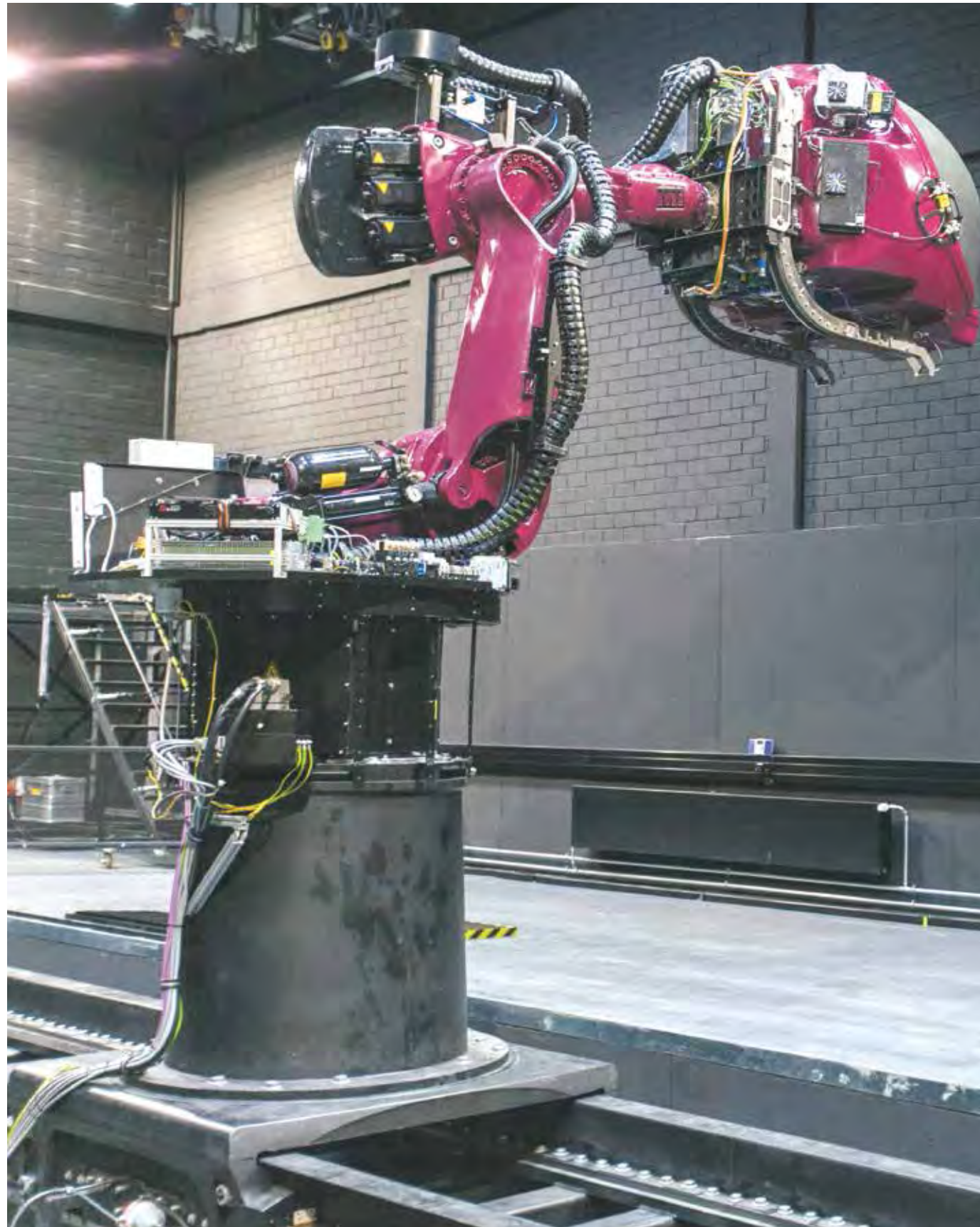
For us, customers have the same significance as the sun to life on earth. The sun gives light, warmth and energy - our customers give us ideas, work and money



Figure right:

50.000 m² igus Factory in Cologne. 100,000 products, ranging from energy chains® to highly flexible cables, bearing technology and low-cost automation, can all be supplied within 24 hours or the same day.





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.



triflex® R in storage and retrieval system



Flexible production - plant for the 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® during the multi-axis movements of the robot.



Reliable energy supply even outdoors



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





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



E4 "RBR" - application in a telescope - cold temperatures and snow - failsafe



Laser measuring telescope with triflex® R. Rotary motion in both directions $\leq 310^\circ$



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



Circular movement with System E4 - safe energy supply for cranes



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



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

QuickRobot

Online tool - Reduce process costs



User friendly online tool offers around 2,000 component selection options for energy supply systems in the robotics sector

igus® QuickRobot – robot energy supply configured online in an instant

igus® is expanding its range of intuitive online tools for the selection, configuration and ordering of energy supply systems. "QuickRobot" makes it possible to configure the complete system for 79 types of robots in an instant. The configuration via the QuickRobot goes hand in hand with an integrated ordering system. In this way the custom product package can be created and ordered very quickly. You will imme-

diately receive a parts list in PDF format, in which all individual items are listed under a total item number for each robot axis. You can also choose other optional items. No matter which equipment option is selected, the order is always clear and easy to understand.



Thanks to the selection tool for robot equipment, the complete system including cable guide systems can be specified for the available robot types. One can either select full system or system for an individual axis.

Selection of robot types according to manufacturer and the required e-chain® sizes according to diameter. Other optional parts can be selected. Equipment option for each axis can be conveniently ordered with one article number. The entire robot can be equipped with just three article numbers.



Creating parts lists as PDF. Options for each axis can be conveniently ordered with one article number. Query or ordering option.



KR 120 R2500 pro

Configuration example

Axis 3-6

with igus® e-chain® TRC.100

Installation package for retraction system on the robot - TR.P36.1002.100

Part No.	Description	Quantity
❶ TR.907.667.140	Clamp, axis 6, 140 mm	1
❷ TR.100.21.01.30	Mounting bracket for axis 6, for attachment on clamp, strain relief with cable tie-wraps	1
❸ TR.907.595	The RS system alignment device allows the adjustment of the installation position by ± 250 mm	1
❹ TR.RS.100.L	Retraction system, fixed point left, without e-chain® and fibre rod module	1

e-chain® package for retraction system - TRC.RS.100.145.1000.09.0

❺ TRC.100.145.0	e-chain® TRC	61 links
❻ TR.100.10	Protector for e-chains® TRC, TRE, TRL. Ø-Index 100, with screw connection	4
❼ TRC.F.100.0900.1.0	Fibre rod module, complete	1

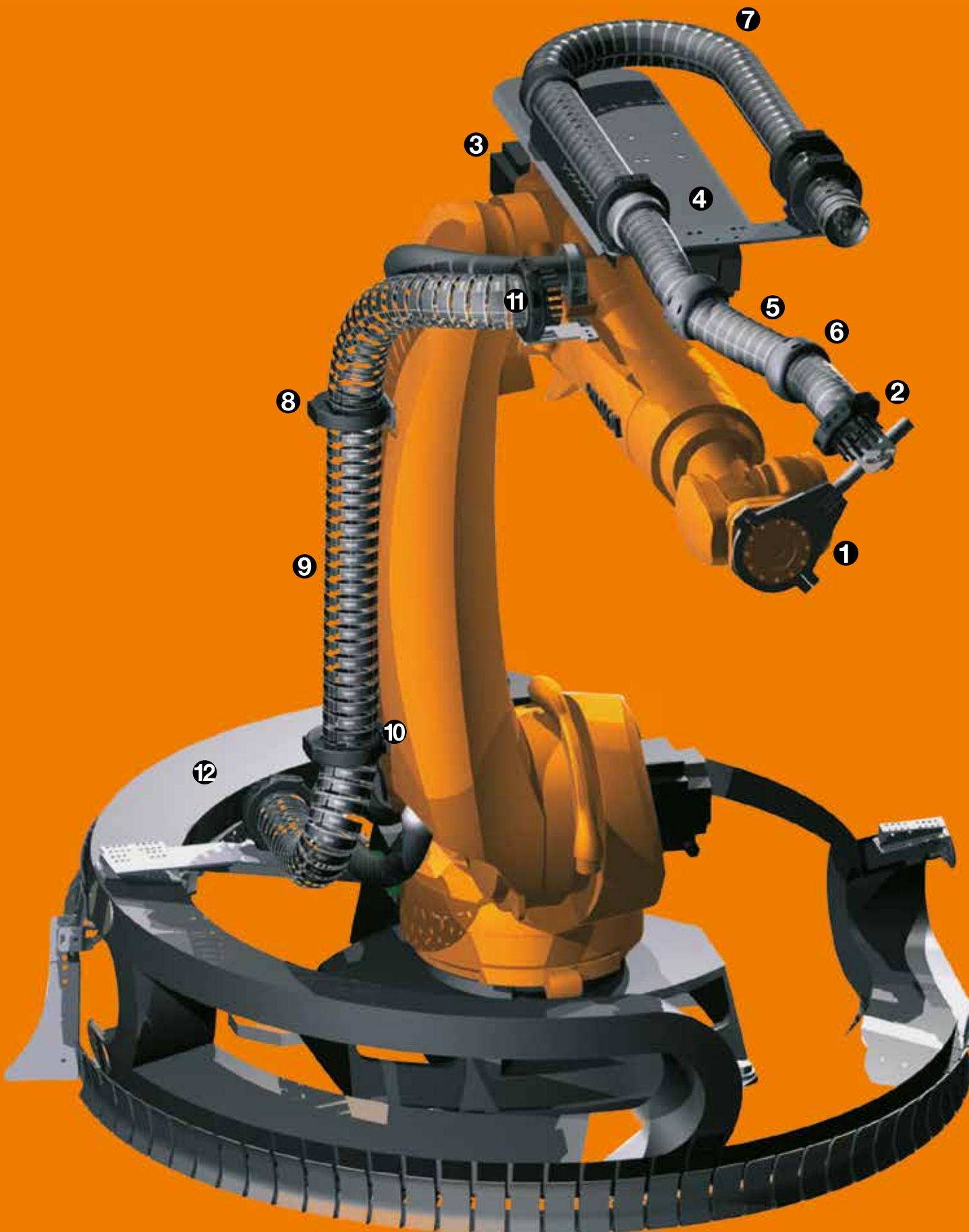
Axis 2

with igus® e-chain® TRL.60

e-chain® package for axis 2 - TRL.P23.1002.60

Part No.	Description	Quantity
❽ TR.60.02	Mounting bracket without strain relief	2
❾ TRL.60.087.0	e-chain® TRL	123 links
❿ TR.909.011	Adapter console axis 2	2
⓫ TR.908.080	Adapter console axis 3	1
⓬ TR.60.01	Mounting bracket with strain relief	2

You can find the right parts here also for axes 1 and 7 of your robot system.
Please contact us!





R-2000iB /125L

Configuration example

Axis 3-6

with igus® e-chain® TRC.70

Installation package for retraction system on the robot - TR.P36.2001.70

Part No.	Description	Quantity
① TR.907.992	Clamp, axis 6, with groove, 160/165 mm	1
② TR.70.21.01.30	Mounting bracket for axis 6, for attachment on clamp, strain relief with cable tie-wraps	1
③ TR.907.270	Mounting bracket axis 3	1
④ TR.RS.70.R	Retraction system, fixed point right, without e-chain® and fibre rod module	1

e-chain® package for retraction system - TRC.RS.70.110.1750.09.0

⑤ TRC.70.110.0	e-chain® TRC	105 links
⑥ TR.70.10	Protector for e-chains® TRC, TRE, TRL. Ø-Index 70, with screw connection	6
⑦ TRC.F.70.0900.1.0	Fibre rod module, complete	1

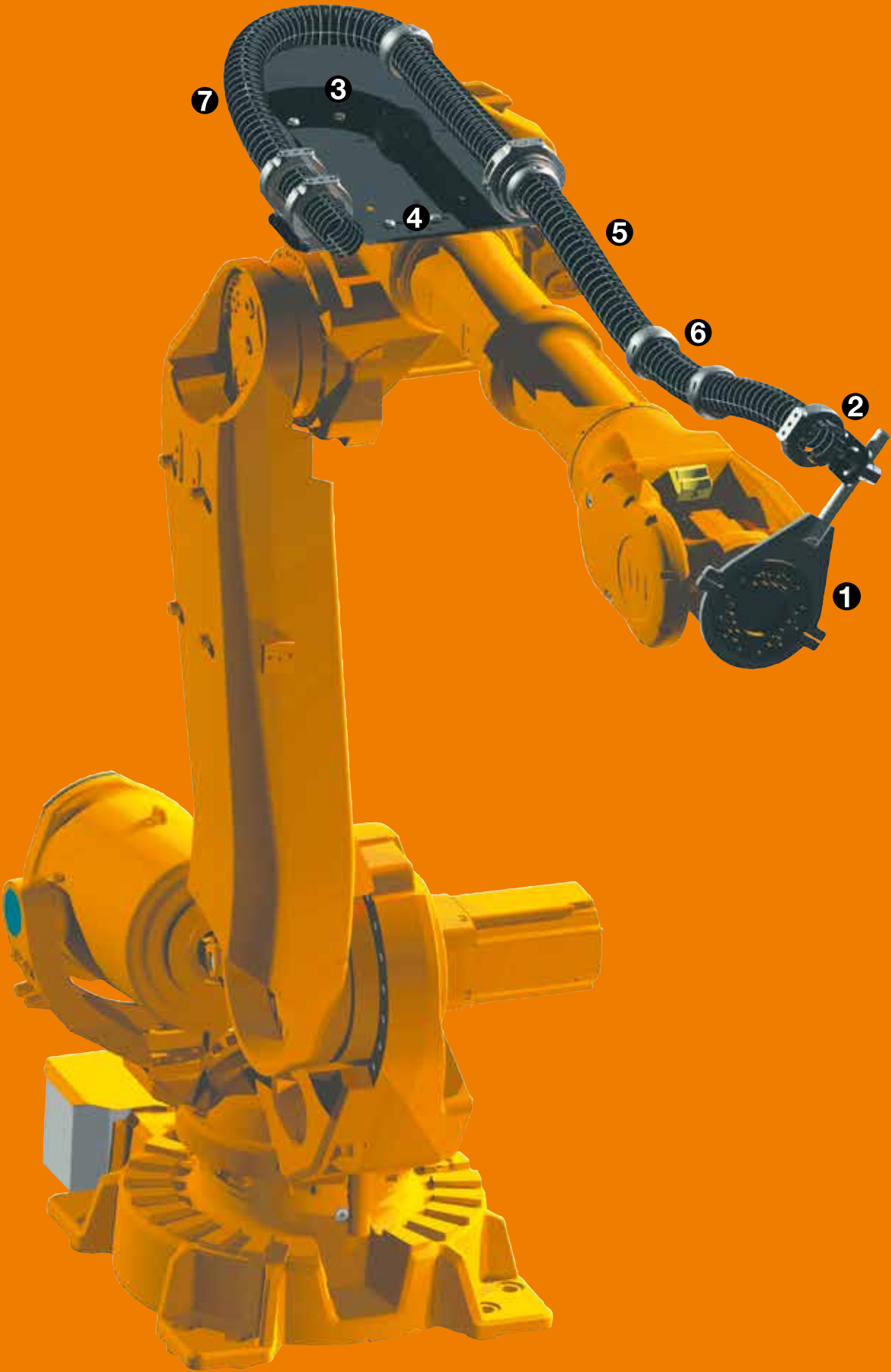
Axis 2

with igus® e-chain® TRL.100

e-chain® package for axis 2 - TRL.P23.2001.100

Part No.	Description	Quantity
⑧ TR.100.02	Mounting bracket without strain relief	2
⑨ TRL.100.145.0	e-chain® TRL	81 links
⑩ TR.907.260	Adapter console axis 2	2
⑪ TR.100.01.M8	Mounting bracket with strain relief, internal thread M8	2

You can find the right parts here also for axes 1 and 7 of your robot system.
Please contact us!



IRB 6640-xxx / 2.55

Configuration example

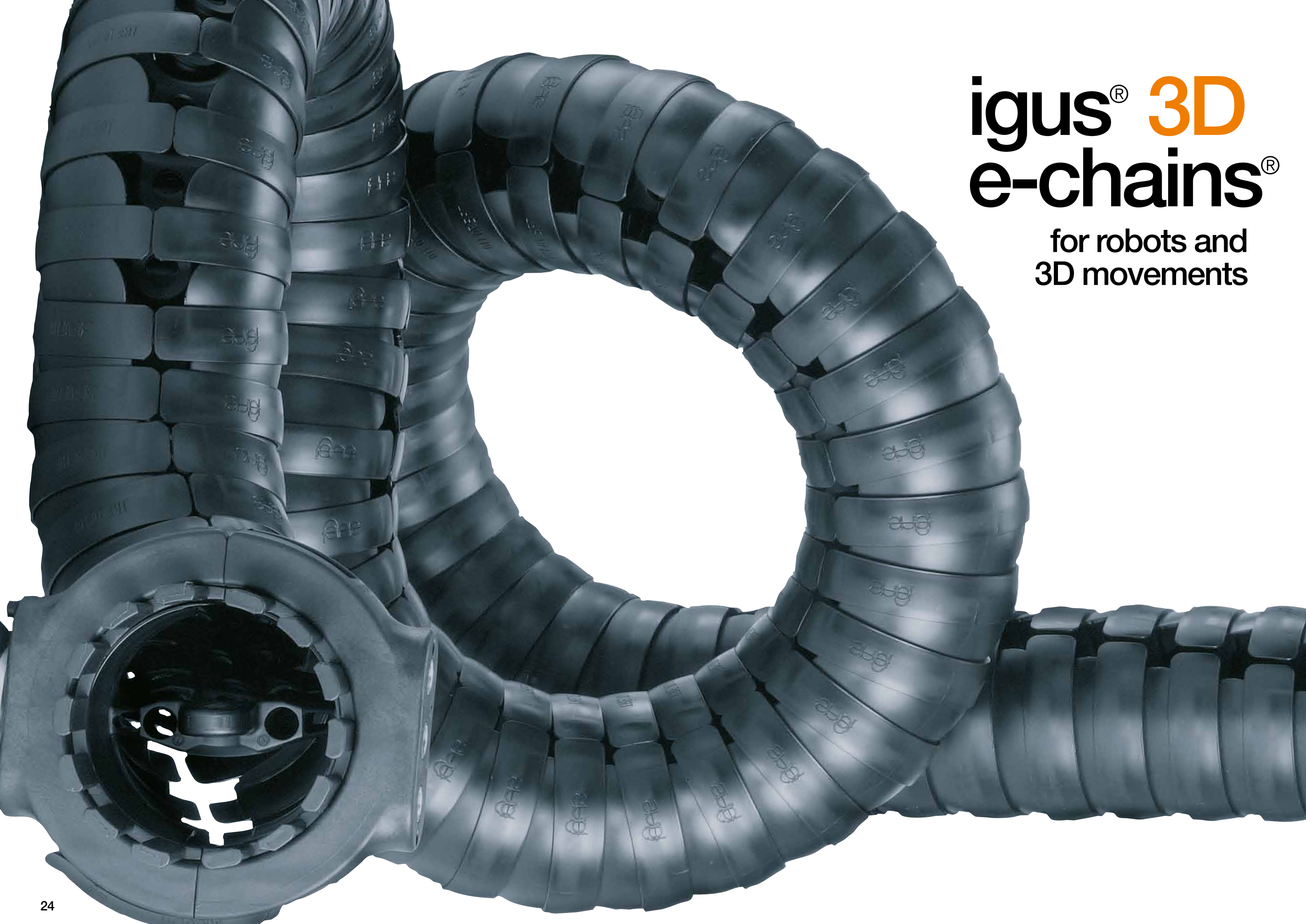
Axis 3-6

with igus® e-chain® TRC.70

Installation package for retraction system on the robot - TR.P36.3001.70		
Part No.	Description	Quantity
1 TR.907.667.200	Clamp, axis 6, 200 mm	1
2 TR.85.21.01.30	Mounting bracket for axis 6, for attachment on clamp, strain relief with cable tie wraps	1
3 TR.907.347	Adapter console, short for axis 3	1
4 TR.RS.70.R	Retraction system, fixed point right, without e-chain® and fibre rod module	1
e-chain® package for retraction system - TRC.RS.70.110.1250.09.0		
5 TRC.70.110.0	e-chain® TRC	85 links
6 TR.70.10	Protector for e-chains® TRC, TRE, TRL. Ø-Index 70, with screw connection	5
7 TRC.F.70.0900.1.0	Fibre rod module, complete set	1

You can find the right parts here also for axes 1, 2 and 7 of your robot system.
Please contact us!





igus[®] 3D e-chains[®]

for robots and
3D movements

For multi-axis movements and robots - triflex® R

triflex® R (R for "round") is the third generation of 3-axis igus® e-chains®. The key design characteristics of igus® triflex® R have made this product very successful in the robot industry.

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

triflex® R available in 5 versions from stock

TRC closed design with smooth 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 variant with snap lock mechanism

Typical industries and applications

- The first choice for multiaxis-robots
- Machine tools
- Handling machines
- Conveyor systems
- Packaging machines
- General mechanical engineering, etc.



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



Available from stock.
Delivery time* from 24 hrs or same day!

*Delivery time refers the time until the product is shipped (after verifying technical feasibility)



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



A tough, circumferential bend radius stop dog actively protects cables and hoses against kinking



Interior separation: two or three chamber system for a reliable cable guide



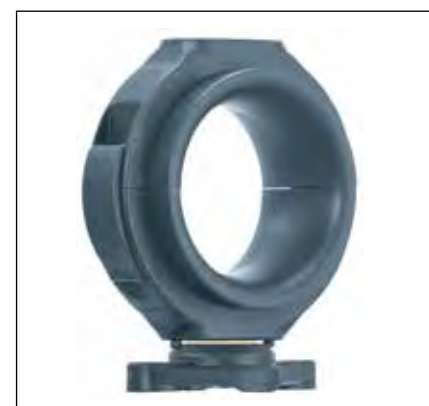
Flip open - Series TRCF and TRLF have snap lock mechanism for quick filling



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



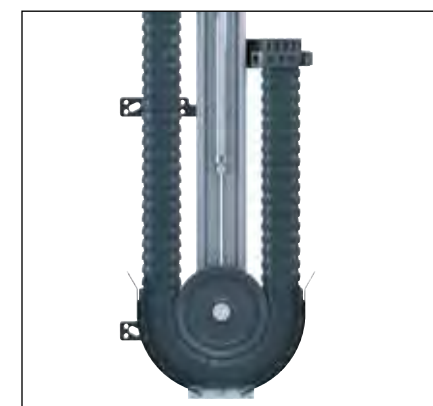
Standard and light mounting brackets available with or without integrated strain relief. Some versions available in ESD material, from stock



Mounting bracket 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-change units are available for your application



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



Series TRC - electrically conducting ESD/ATEX versions available

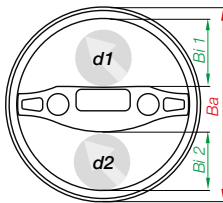
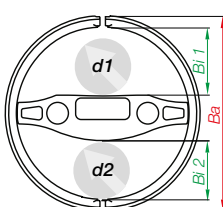
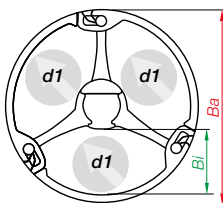


UL94-V2 classifications



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

triflex® R selection table

Series	Inner height		≤ ø cable		Outer width	Bend radius	Pitch	Links	page
	Bi1 [mm]	Bi2 [mm]	d1 [mm]	d2 [mm]	Ba [mm]	R [mm]	[mm]	per m	
 Series TRC - closed design Chip protection, smooth exterior 									
TRC.30	12	10	10	8	34,5	50	11,3	89	32
TRC.40	15	13	13	11	43	58	13,9	72	32
TRC.50	18,8	16,2	16,5	14	54	80	17,4	58	32
TRC.60	22,5	19,5	20,5	17,5	65	87	20,4	49	32
TRC.70	28	24	26	22	81	110	25,6	39	32
TRC.85	33	28	31	26	94,5	135	30,6	33	32
TRC.100	37,5	32,5	35,5	30,5	108	145	34,5	29	32
TRC.125 ²⁾	43,3	43,3	41	41	135	182	44,6	23	32
 Series TRE - "easy" design Very easy to fill, cables are simply pushed in 									
TRE.30	12	10	10 ¹⁾	8 ¹⁾	34,5	50	11,3	89	34
TRE.40	15	13	13 ¹⁾	11 ¹⁾	43	58	13,9	72	34
TRE.50	18,8	16,2	16,5 ¹⁾	14 ¹⁾	54	80	17,4	58	34
TRE.60	22,5	19,5	20,5 ¹⁾	17,5 ¹⁾	65	87	20,4	49	34
TRE.70	28	24	26 ¹⁾	22 ¹⁾	81	110	25,6	39	34
TRE.85	33	28	31 ¹⁾	26 ¹⁾	94,5	135	30,6	33	34
TRE.100	37,5	32,5	35,5 ¹⁾	30,5 ¹⁾	108	145	34,5	29	34
TRE.125 ²⁾	43,3	43,3	41 ¹⁾	41 ¹⁾	135	182	44,6	23	34
 Series TRCF - closed design with snap lock mechanism Chip protection, smooth exterior 									
TRCF.65	22,3	–	20	–	70,2	100	23,1	44	36
TRCF.85	30	–	28	–	94,5	135	30,6	33	36
TRCF.85 ⁴⁾	30	–	28	–	94,5	240	30,6	33	36
TRCF.100	34,3	–	32	–	108	145	34,5	29	36

1) For quick and easy insertion or removal of cables using the "easy" design, we recommend a maximum cable diameter of 70% of the specified value

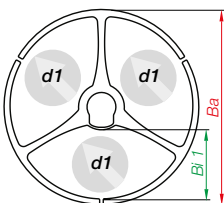
2) Max. cable diameter Ø 41 mm. Max. cable diameter changes to Ø 36 mm, if shortening or lengthening an already populated triflex® R.

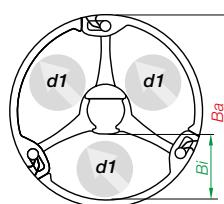
3) TRL 30 with 2-chamber system

4) Special size TRCF.85.240.0 with 240 degree bend radius and a range of accessories

 Available from stock. Delivery time* from 24 hrs or same day!
*Delivery time refers the time until the product is shipped (after verifying technical feasibility)

triflex® R selection table

Series	Inner height		≤ ø cable		Outer width	Bend radius	Pitch	Links	page
	Bi1 [mm]	Bi2 [mm]	d1 [mm]	d2 [mm]	Ba [mm]	R [mm]	[mm]	per m	
 Series TRL - the "light" version of the "easy"-design easy to fill and cost-effective 									
TRL.30 ³⁾	12,5	11	10 ¹⁾	8 ¹⁾	34,5	50	11,3	89	38
TRL.40	15	–	13 ¹⁾	–	45	58	13,9	72	38
TRL.60	23	–	20,5 ¹⁾	–	65	87	20,4	49	38
TRL.70	28	–	26 ¹⁾	–	81	110	25,6	39	38
TRL.100	38	–	35,5 ¹⁾	–	108	145	34,5	29	38

 Series TRLF - lightweight version with snap lock mechanism lightweight and cost-effective 									
TRLF.65	24,4	–	22	–	70,2	100	23,1	44	40
TRLF.85	32,8	–	30	–	94,5	135	30,6	33	40
TRLF.100	37,5	–	35,5	–	108	145	34,4	29	40
TRLF.125	46,8	–	44,5	–	135	182	44,1	23	40

triflex® R | Retraction systems

Series		for triflex® R e-chains®	for ø Index [mm]	page
	RSP - pneumatic retraction system	TRC·TRE·TRCF	60 - 125	64
	RS - modular retraction system	TRC·TRE	40 - 100	70
	RSE linear linear, cost-effective retraction system	TRC·TRE·TRCF	40 - 125	76
	RSE - cost-effective retraction system for small robots	TRC·TRE	40	82

Technical data

	Speed / acceleration	on 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 disassembling at any position of TRE B-series even when full

More information
► www.igus.eu/triflex_B_disassemblytool

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

 Assembly instructions
► from page 96

For series	Part No.
TRE.B	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	Part No.
TRCF	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 3D e-tube, openable with a screwdriver



triflex® RS for a lean chain guide. Integrated spring rods generate 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 (without deflection)

TRC - enclosed,
chip-repelling design

High tensile strength thanks to
special ball-and-socket design

Defined torsion stop,
allows free movement in multiple
directions but still protects the cables

Impact-resistant, dirt-resistant,
and abrasion-resistant

Easy assembly
and disassembly

High strength - thanks to
external stop dogs

Small bend radii and short pitch

Easy attachment with special
accessories for the
robot or machine

Closed and chip- resistant - TRC

- Secure, closed and chip-resistant energy supply for multi-axis movements
- Smooth but robust outer contours
- High torsional stability
- 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/ATEX versions several series available from stock



iF product design award
2004 igus® series TRC

2004

Product range

Robotic applications, chip-resistant



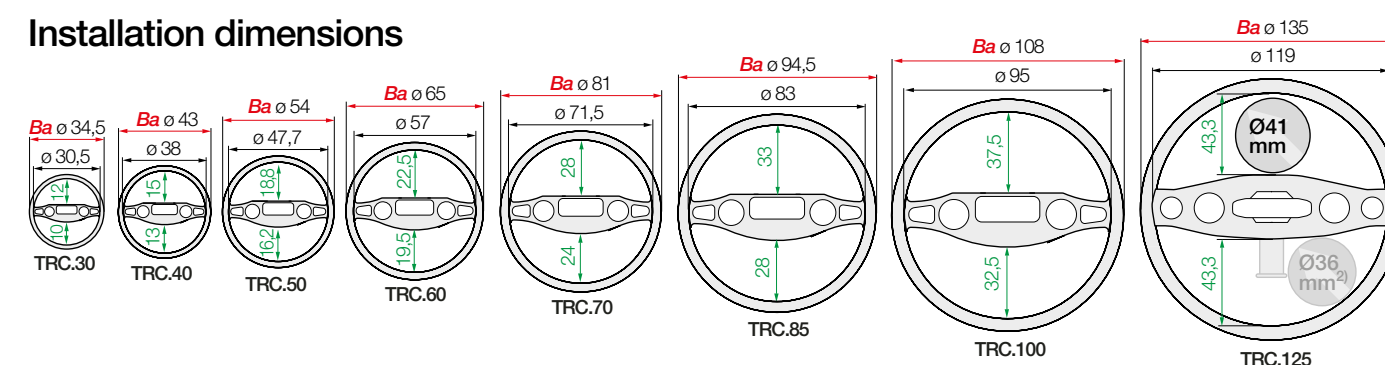
e-tubes | Series TRC | Totally enclosed, non-openable

Part No.	Bi1	Bi2	Ba	R	d1	d2	Pitch	links/m	Weight
e-tubes	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]		[kg/m]
TRC.30. 050.0 ⁴⁾ ▲	12	10	34,5	050	10	8	11,3	89	≈ 0,27
TRC.40. 058.0 ³⁾ ▲	15	13	43	058	13	11	13,9	72	≈ 0,37
TRC.50. 080.0 ⁴⁾ ▲	18,8	16,2	54	080	16,5	14	17,4	58	≈ 0,59
TRC.60. 087.0 ³⁾ ▲	22,5	19,5	65	087	20,5	17,5	20,4	49	≈ 0,85
TRC.70. 110.0 ³⁾ ▲	28	24	81	110	26	22	25,6	39	≈ 1,32
TRC.85. 135.0 ⁴⁾ ▲	33	28	94,5	135	31	26	30,6	33	≈ 1,75
TRC.100.145.0 ⁴⁾ ▲	37,5	32,5	108	145	35,5	30,5	34,5	29	≈ 2,38
TRC.125.182.0 ⁴⁾ ▲	43,3	43,3	135	182	41	41 ²⁾	44,6	23	≈ 4,70

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

3) ▲ available from stock as ESD version 4) ▲ ESD version available on request. Delivery time upon request.

Installation dimensions



ESD/ATEX e-chains® - several sizes from stock

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

More information ► www.igus.eu/esd



Available from stock. **Delivery time*** from 24 hrs or same day!

*Delivery time refers the time until the product is shipped (after verifying technical feasibility)



More information ► www.igus.eu/TRC

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 multiple directions but still protects the cables

Easy opening mechanism for fast filling with cable and hose packages

Simple tool for fast dismantling of the triflex® B versions

High strength - thanks to external stop dogs

Small bend radii and short pitch

Easy attachment with 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 stability
- Easy to lengthen and shorten
- **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 allows 50% higher tensile forces

Typical industries and applications

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



Series TRE - electrically conductive ESD/ATEX version upon request



Save time - easy disassembly tool available for triflex® R



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

Product range

Robotic applications, easy filling



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

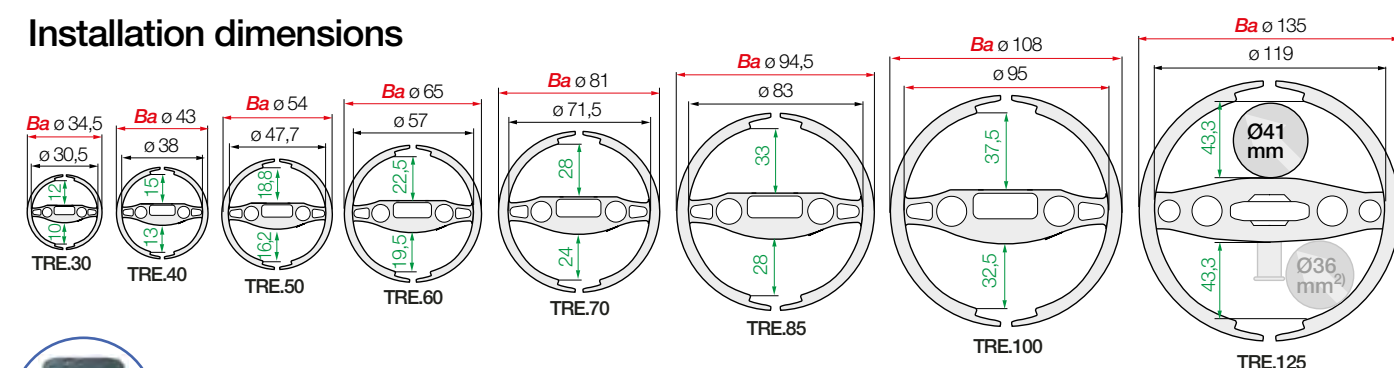
Part No.	Series TRE	Bi1	Bi2	Ba	R	d1 ¹⁾	d2 ¹⁾	Pitch	links/m	Weight
e-chains®	C-version	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]		[kg/m]
TRE.30. 050.0	4)▲	12	10	34,5	050	10	8	11,3	89	≈ 0,26
TRE.40. 058.0.B	4)▲	15	13	43	058	13	11	13,9	72	≈ 0,36
TRE.50. 080.0.B	4)▲	18,8	16,2	54	080	16,5	14	17,4	58	≈ 0,56
TRE.60. 087.0.B	4)▲	22,5	19,5	65	087	20,5	17,5	20,4	49	≈ 0,83
TRE.70. 110.0.B	4)▲	28	24	81	110	26	22	25,6	39	≈ 1,30
TRE.85. 135.0.B	4)▲	33	28	94,5	135	31	26	30,6	33	≈ 1,67
TRE.100.145.0.B	4)▲	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)	44,6	23	≈ 4,40

1) For quick and easy insertion or removal of cables using the "easy" design, we recommend a maximum cable diameter of 70% of the specified value

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

4) ▲ ESD version available upon request. Please consult igus® for delivery time. Version B - 4 x higher torsion forces Version C - Quick assembly, 50% higher forces

Installation dimensions



TRE.LOCK clips

for a secure fit in the mounting bracket. Supplied automatically with every mounting bracket. Please use the Part No. for reordering

TRE.LOCK Clips

Part No. of individual part
TRE.30/40.LOCK
TRE.50.LOCK
TRE.60.LOCK

TRE.LOCK Clips

Part No. of individual part
TRE.70.LOCK
TRE.85.LOCK
TRE.100.LOCK
TRE.125.LOCK

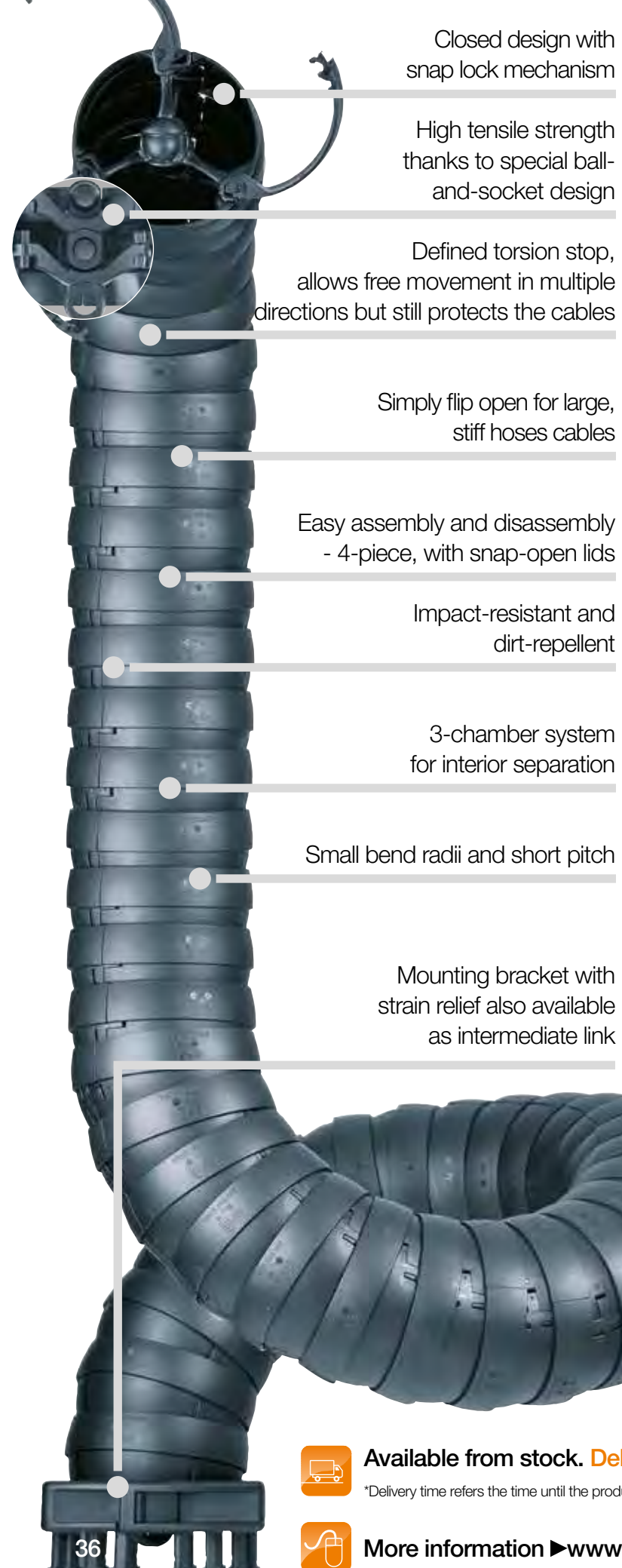


Available from stock. Delivery time* from 24 hrs or same day!

*Delivery time refers the time until the product is shipped (after verifying technical feasibility)



More information ► www.igus.eu/TRE



Closed design with snap lock mechanism

High tensile strength thanks to special ball-and-socket design

Defined torsion stop, allows free movement in multiple directions but still protects the cables

Simply flip open for large, stiff hoses cables

Easy assembly and disassembly - 4-piece, with snap-open lids

Impact-resistant and dirt-repellent

3-chamber system for interior separation

Small bend radii and short pitch

Mounting bracket with strain relief also available as intermediate link

Enclosed design with snap lock mechanism - TRCF

- Chain links are snapped open to easily insert large cable or hose diameters
- Enclosed version, for dirt and chip exposure
- 3 chamber design for ideal cable distribution and separation
- Can be easily lengthened and shortened
- Snap lock mechanism openable with a screwdriver
- Extensive accessory product range available
- Defined minimum bend radius and torsion stop dog for optimum cable protection
- Snap lock mechanism for fast opening

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



Flip open, insert cable, close with snap lock mechanism and ready!



Save time - easy disassembly tool for triflex® R available

Product range

Chip-resistant, quick filling

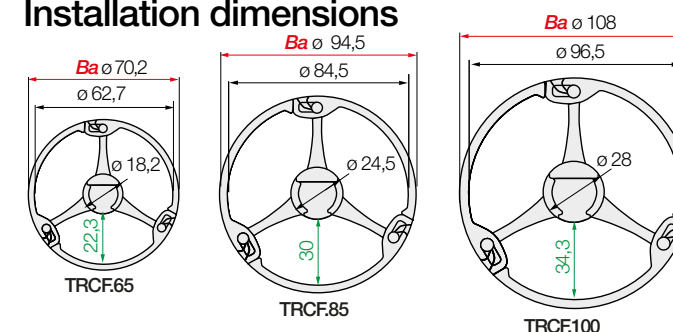


e-tubes | Series TRCF | Fully enclosed design, with snap lock mechanism

Part No.	Bi1	Ba	R	d1	Pitch	links/m	Weight
e-tubes	[mm]	[mm]	[mm]	[mm]	[mm]		[kg/m]
TRCF. 65 100.0	22,3	70,2	100	20	23,1	44	≈ 1,10
TRCF. 85. 135.0	30	94,5	135	28	30,6	33	≈ 2,10
TRCF. 85. 240.0 1)	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 TRCF.85.240.0 with 240 degree bend radius and a special range of accessories

Installation dimensions



Snap lock mechanism for fast opening, igus® video online
► www.igus.eu/TRLFlip

Special size TRCF.85.240.0 with 240 degree bend radius and a special range of accessories

- For secure guidance of laser light cables on robots
 - The large bend radius (**R 240 mm**) increases the service life of the laser light cable and prevents the supply hoses from kinking
- More information ► www.igus.eu/TRCF



Available from stock. Delivery time* from 24 hrs or same day!

*Delivery time refers the time until the product is shipped (after verifying technical feasibility)



More information ► www.igus.eu/TRCF

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 multiple directions but still protects the cables

Easy filling and exchange of pre-harnessed cables

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 link

Lightweight and cost-effective - TRL

- 3D e-chain® for simple applications
- Very easy to fill
- Easy to lengthen and shorten

Typical industries and applications

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



Product range

Robotic applications, light and cost-effective



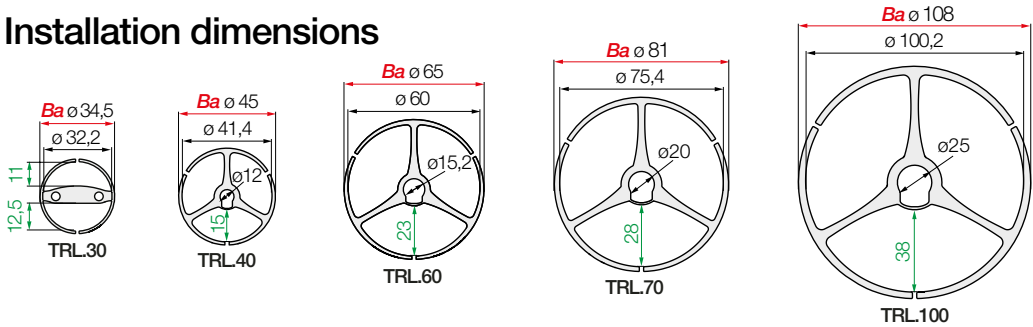
e-chains® | TRL series | Light version with "easy" design - simply press cables in

Part No.	Bi1	Bi2	Ba	R	d1 ¹⁾	d2 ¹⁾	Pitch	links/m	Weight
e-chains®	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]		[kg/m]
TRL. 30. 050.0 ²⁾	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) For quick and easy insertion or removal of cables using the "easy" design, we recommend a maximum cable diameter of 70% of the specified value

2) Only available with 2-chamber system

Installation dimensions



Available from stock. Delivery time* from 24 hrs or same day!

*Delivery time refers the time until the product is shipped (after verifying technical feasibility)

More information ► www.igus.eu/TRL

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 multiple directions but still protects the cables

Simply flip open for large, stiff hoses or many cables

Easy assembly and disassembly

3-chamber system for interior separation

Small bend radii and short pitch

Lightweight mounting bracket available with strain relief or as intermediate link

Lightweight, with snap lock mechanism - TRLF

- Simply open snap lock mechanism 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
- Snap lock mechanism for fast opening

Typical industries and applications

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

iF product design award
2013 igus® series TRLF



Flip open, insert cable, close with snap lock mechanism - and go!

Product range

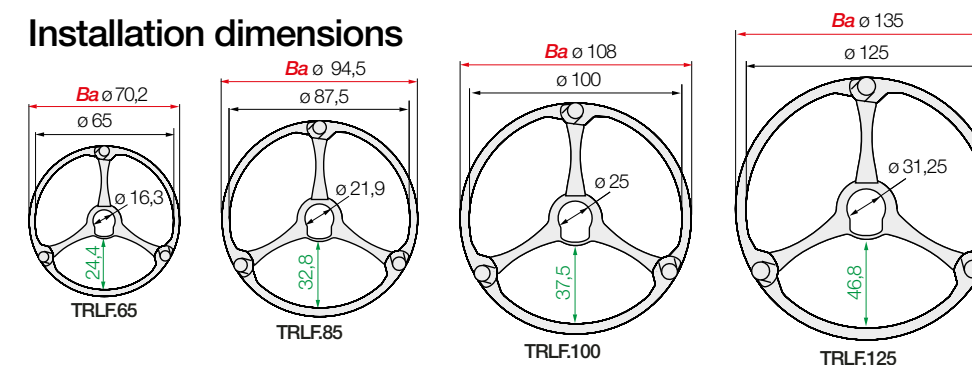
Quick filling with larger hoses and cables



e-chains® | TRLF series | Light variant with snap lock mechanism, easy to fill

Part No.	Bi1	Ba	R	d1	Pitch	links/m	Weight
e-chains®	[mm]	[mm]	[mm]	[mm]	[mm]		[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, igus® video online
► www.igus.eu/TRLF



Available from stock. Delivery time* from 24 hrs or same day!

*Delivery time refers the time until the product is shipped (after verifying technical feasibility)

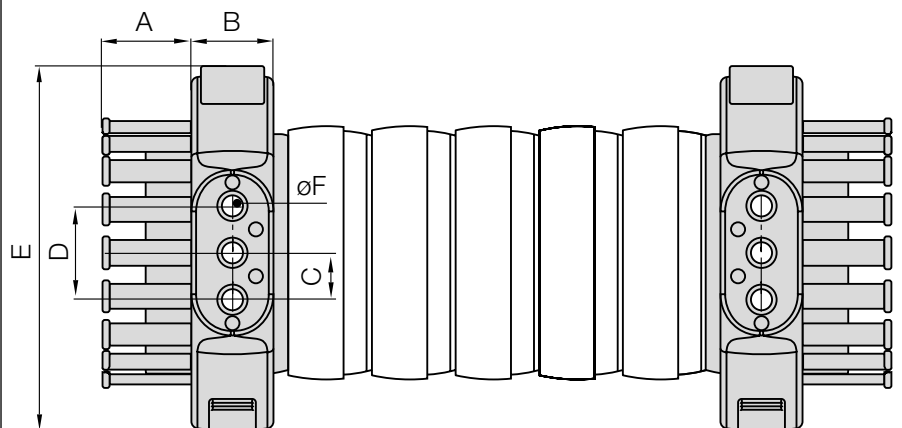


More information ► www.igus.eu/TRLF

triflex® R accessories

Standard mounting brackets with strain relief

With integrated strain relief tie wrap 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 | For TRC·TRE·TRCF·TRL·TRLF



TR.40.01 - TR.100.01

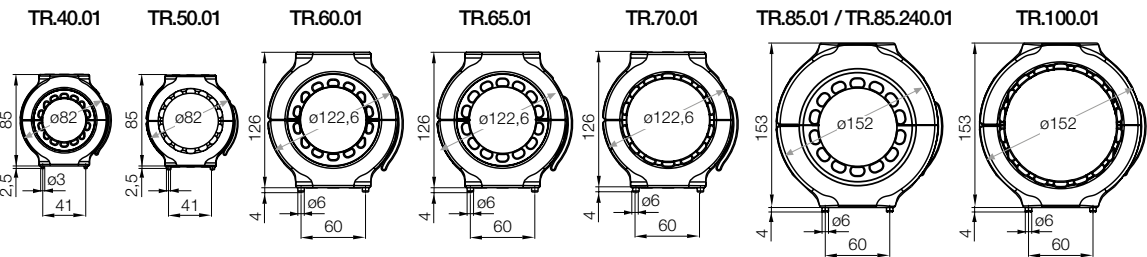
Ø Index	Part No. with strain relief	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F Ø [mm]
30.	Alternative: Light mounting bracket	—	—	—	—	—	—
40.	TR.40.01.M6 ^{1)▲2)}	17,8	21	13,5	27	84,5	6,5
50.	TR.50.01.M6 ^{1)▲3)}	21	21	13,5	27	84,5	6,5
60.	TR.60.01.M8 ^{1)▲3)}	25	32	20	40	126	9
65.	TR.65.01.M8 ^{1)▲3) 5)}	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)▲3)}	38	35	20	40	155	9
85. (R240)	TR.85.240.01.M8 ^{1)▲3) 4)}	38	35	20	40	155	9
100.	TR.100.01.M8 ^{1)▲3)}	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 from stock as ESD version 3) ▲ ESD version available upon request. Delivery time upon request.

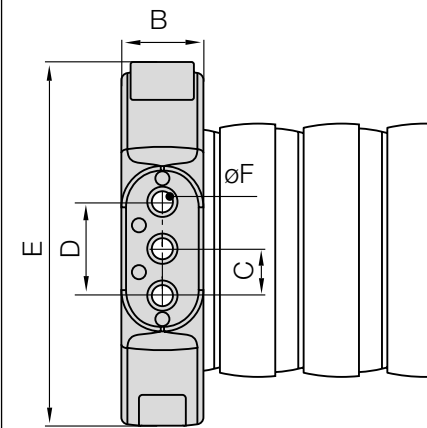
4) Only for special size TRCF.85.240.0 with 240 degree bend radius 5) Available for delivery upon request. Delivery time upon request.



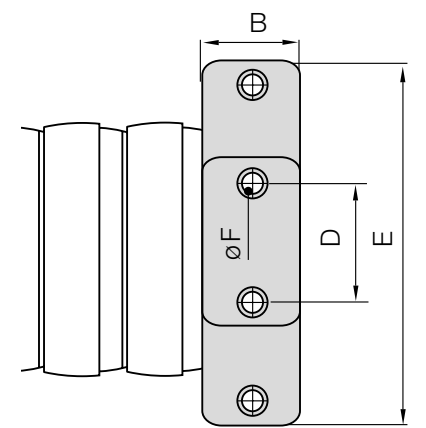
triflex® R accessories

Standard mounting brackets without strain relief

Without strain relief only for
TR.40.02 - TR.125.02



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 link

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



TR.40.02 - TR.100.02



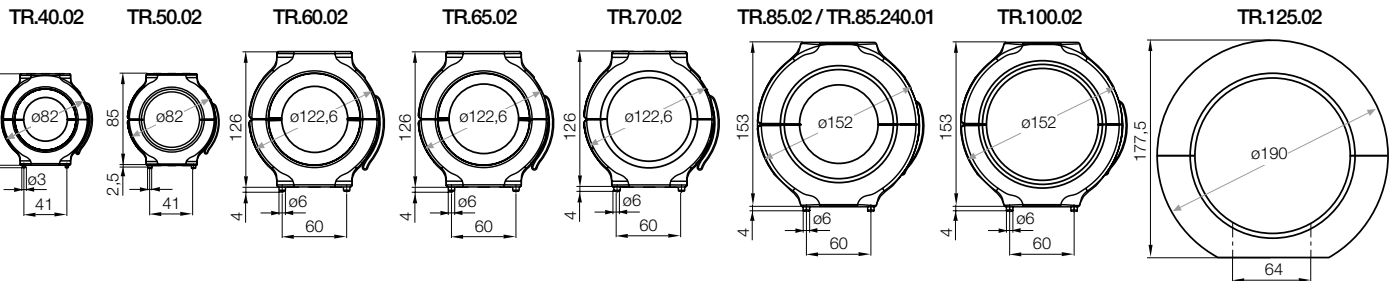
TR.125.02

Ø Index	Part No. without strain relief or as intermediate link	B [mm]	C [mm]	D [mm]	E [mm]	F Ø [mm]
30.	Alternative: Light mounting bracket	—	—	—	—	—
40.	TR.40.02.M6 ^{1)▲2)}	21	13,5	27	84,5	6,5
50.	TR.50.02.M6 ^{1)▲3)}	21	13,5	27	84,5	6,5
60.	TR.60.02.M8 ^{1)▲2)}	32	20	40	126	9
65.	TR.65.02.M8 ^{1)▲3)}	32	20	40	126	9
70.	TR.70.02.M8 ^{1)▲2)}	32	20	40	126	9
85.	TR.85.02.M8 ^{1)▲3)}	35	20	40	155	9
85. (R240)	TR.85.240.02.M8 ^{1)▲3) 4)}	35	20	40	155	9
100.	TR.100.02.M8 ^{1)▲3)}	35	20	40	155	9
125.	TR.125.02.M8 ^{1)▲3)}	40	—	64	190	9

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

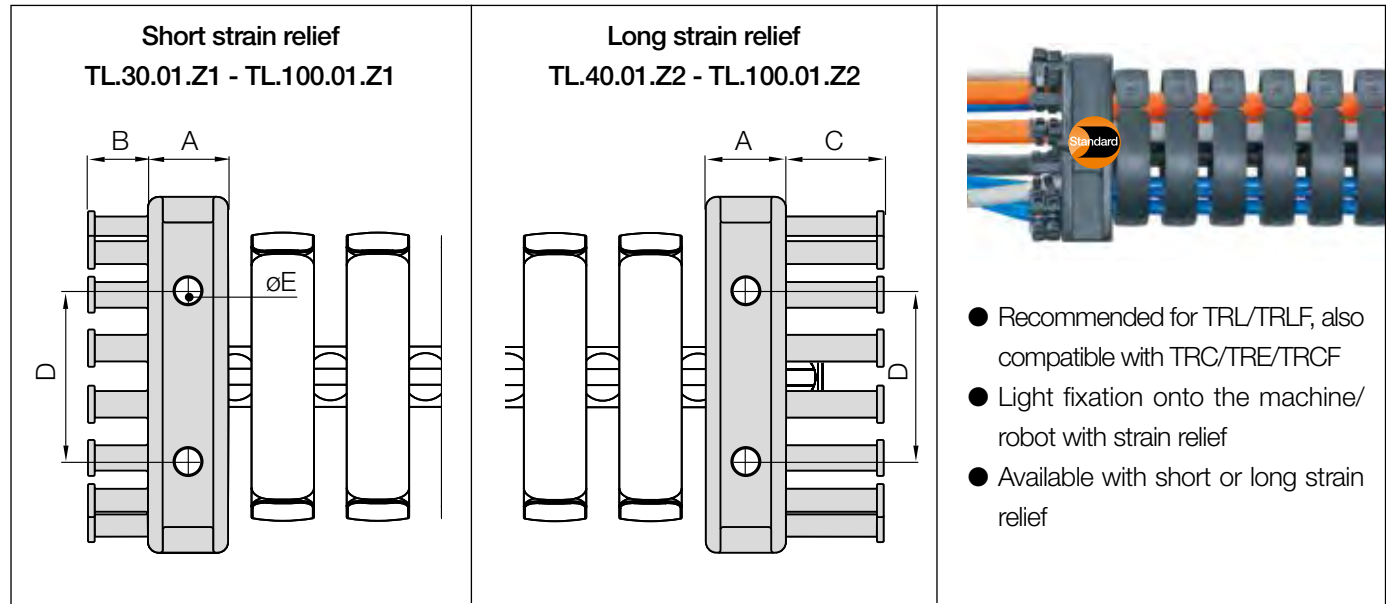
2) ▲ available from stock as ESD version 3) ▲ ESD version available upon request. Delivery time upon request.

4) Only for special size TRCF.85.240.0 with 240 degree bend radius 5) Available for delivery upon request. Delivery time upon request.



triflex® R accessories

Light mounting brackets with strain relief



Light mounting brackets | With strain relief | For TRC·TRE·TRCF·TRL·TRLF



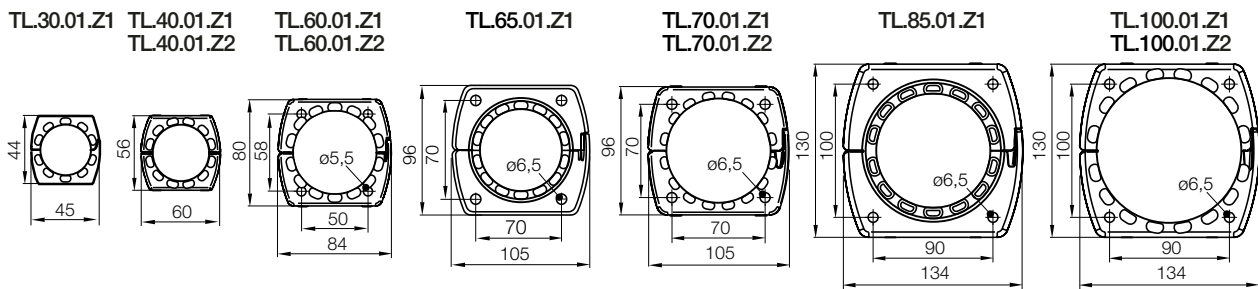
TL.30.01.Z1 - TL.100.01.Z1



TL.40.01.Z2 - TL.100.01.Z2

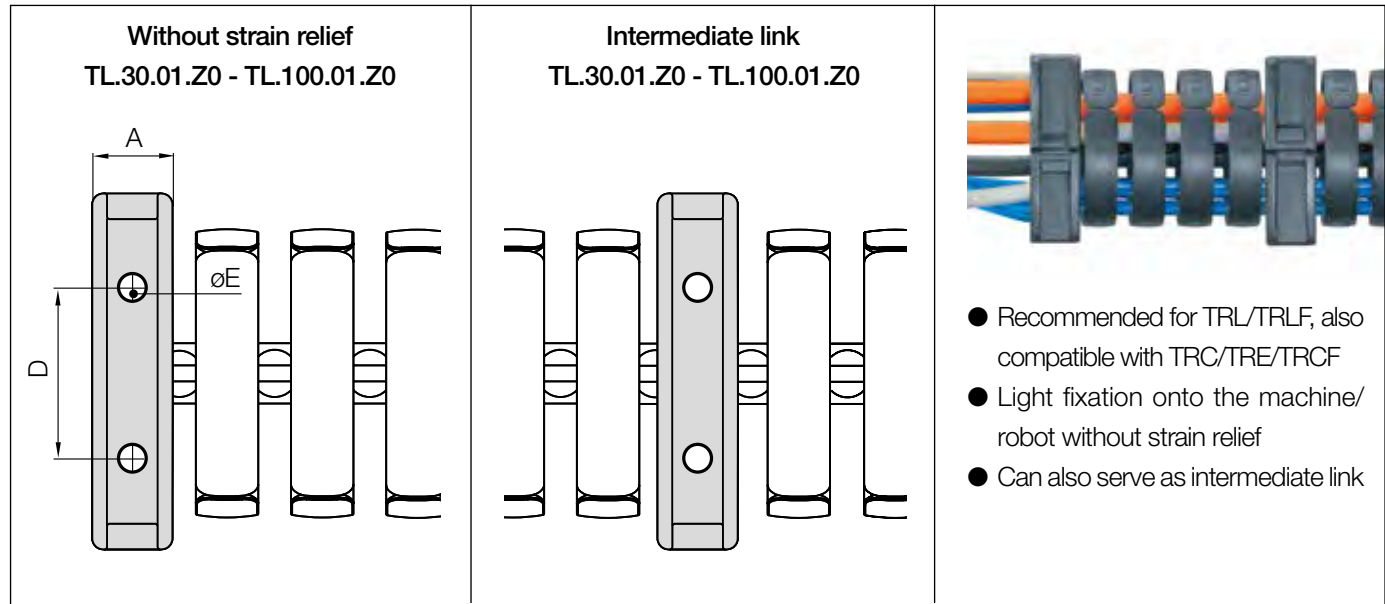
Ø Index	Part No. with short strain relief	Part No. with long strain relief	A [mm]	B [mm]	C [mm]	D [mm]	E Ø [mm]
30.	TL.30.01.Z1	–	13	12,5	–	24	4,5
40.	TL.40.01.Z1 ¹⁾	TL.40.01.Z2	14	12,5	20	36	5,8
50.	Alternative: Standard mounting bracket		–	–	–	–	–
60.	TL.60.01.Z1 ¹⁾	TL.60.01.Z2	20	17	27	48	5,8
65.	TL.65.01.Z1 ¹⁾	–	27	13,5	–	64	6,5
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



triflex® R accessories

Light mounting brackets without strain relief

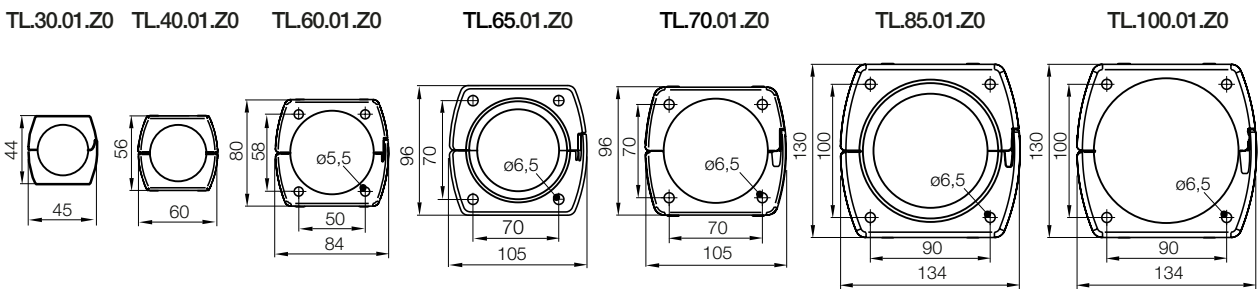


Light mounting brackets | Without strain relief | For TRC·TRE·TRCF·TRL·TRLF



TL.30.01.Z0 - TL.100.01.Z0

Ø Index	Part No. without strain relief or as intermediate link	A [mm]	D [mm]	E Ø [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
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		–	–



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

- Supports the triflex® R energy supply at the most highly stressed points (axis 6)
- Provides higher operational reliability in 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 Ø [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
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

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

triflex® R accessories

Gliding feed-throughs

Gliding feed-throughs only for
TL.30.05

Gliding feed-throughs only for
TR.40.05 + TR.60-85.05

Gliding feed-throughs 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 50

Gliding feed-through | For TRC·TRE·TRCF

TL.30.05

TR.40.05 + TR.60-85.05

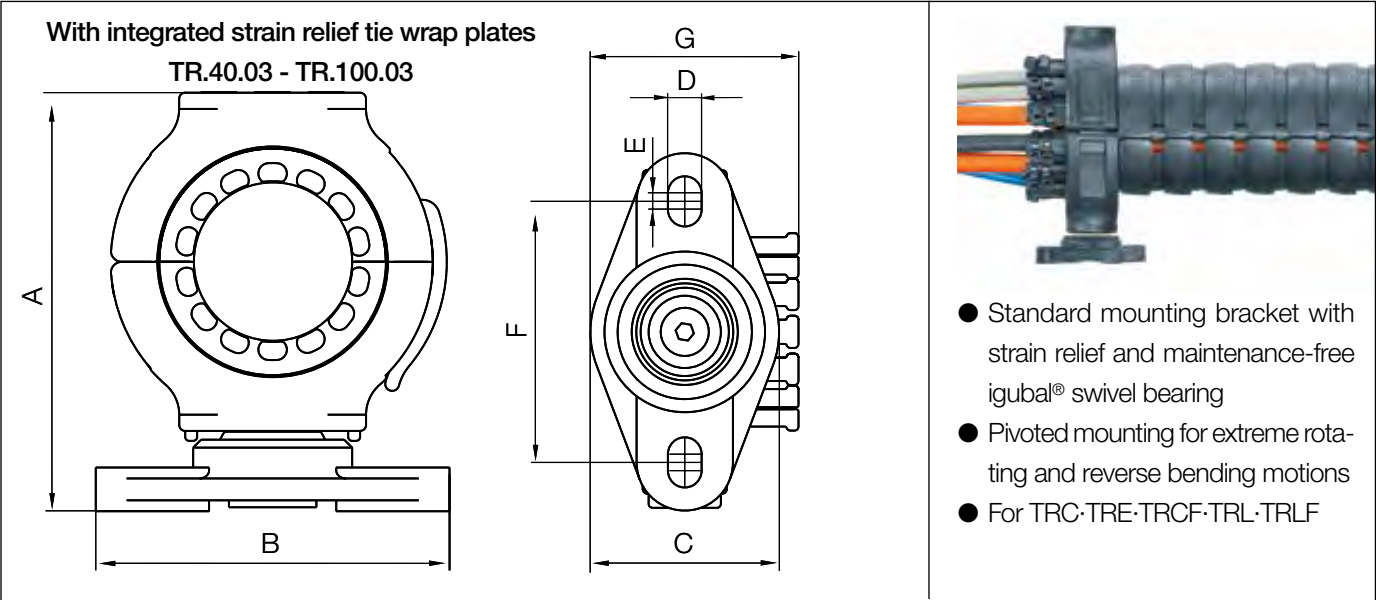
TR.50.05 + TR.100.05-TR.125.05

Ø Index	Part No. Gliding feed-through	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F Ø [mm]	G Ø [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
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

Standard: through holes in Ø G 1) Option: with insert nuts, steel, M6/M8

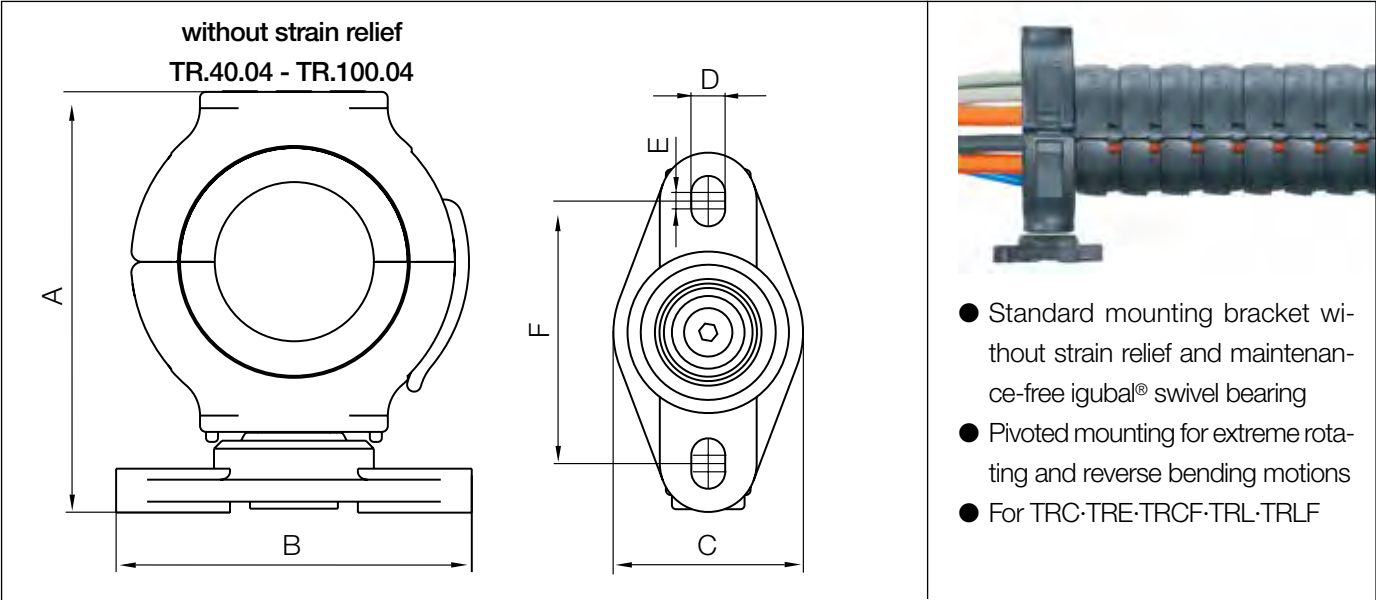
triflex® R accessories

Swivel bearing mounting brackets with strain relief



triflex® R accessories

Swivel bearing-mounting bracket without strain relief



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

TR.40.03 - TR.100.03

Ø	Part No.	A	B	C	D	E	F	G
Index	with strain relief	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[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 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 for special size TRCF.85.240.0 with 240 degree bend radius

5) Available upon request. Delivery time upon request.

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

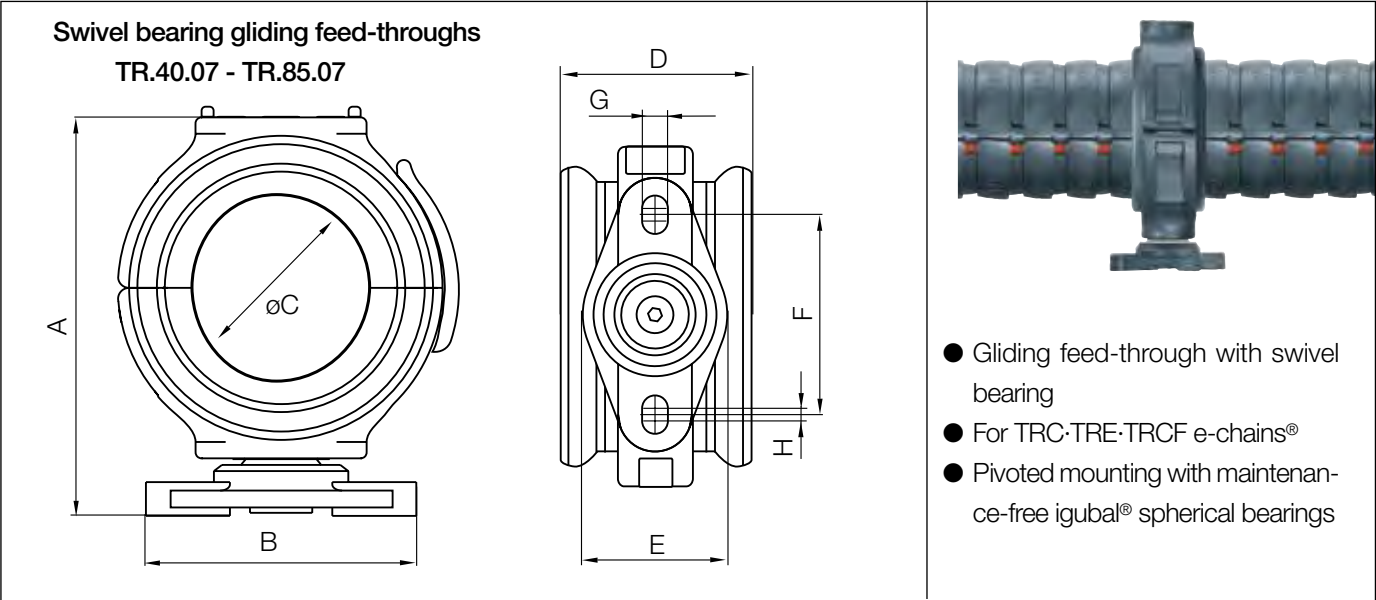
TR.40.04 - TR.100.04

Ø	Part No.	A	B	C	D	E	F
Index	without strain relief	[mm]	[mm]	[mm]	[mm]	[mm]	[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
70.	TR.70.04	152	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	179	118	65	10,5	5,5	87,5
125.	–	–	–	–	–	–	–

4) Only for special size TRCF.85.240.0 with 240 degree bend radius

triflex® R accessories

Swivel bearing gliding feed-throughs



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

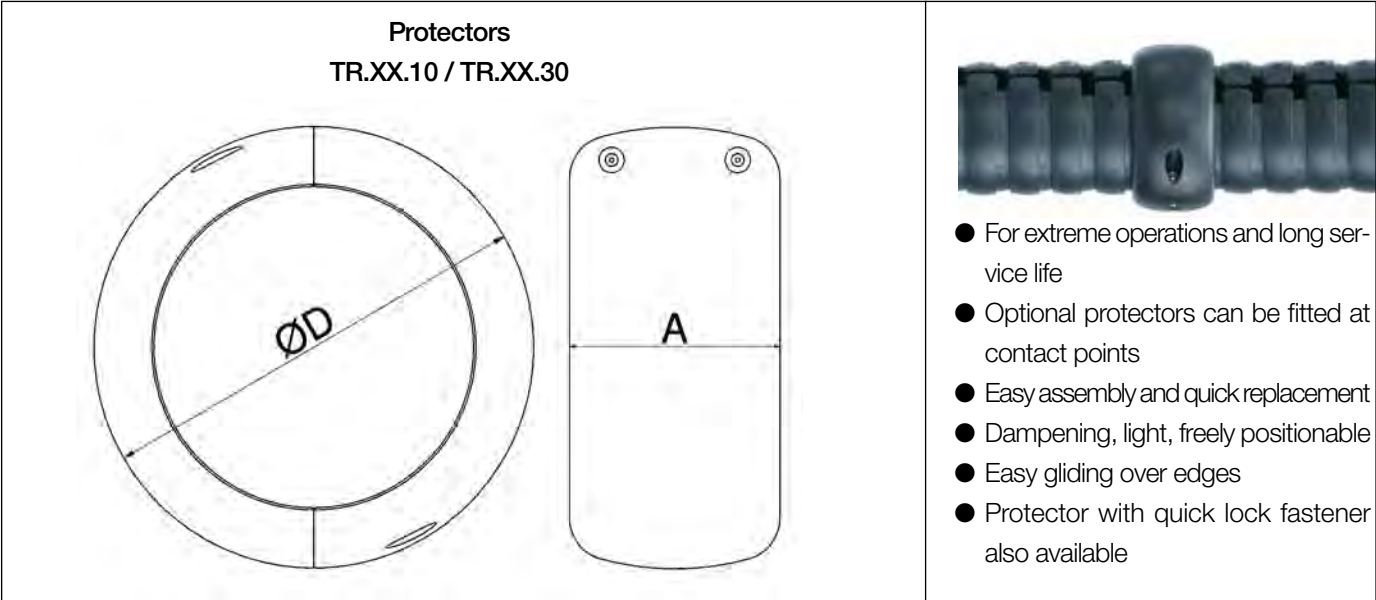


Ø Index	Part No. with swivel bearing	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F Ø [mm]	G Ø [mm]
30.	–	–	–	–	–	–	–	–
40.	TR.40.07	108	89	46	32	47	65	8,4
50.	TR.50.07	119	89	58	67	47	65	8,4
60.	TR.60.07	156	118	70	50	65	87,5	10,5
65.	TR.65.07	156	118	75	75	65	87,5	10,5
70.	TR.70.07	183	118	86	70	65	87,5	10,5
85.	TR.85.07	183	118	100	84	65	87,5	10,5
85. (R 240)	TR.85.07 4)	183	118	100	84	65	87,5	10,5
100.	–	–	–	–	–	–	–	–
125.	–	–	–	–	–	–	–	–

4) Only for special size TRCF.85.240.0 with 240 degree bend radius

triflex® R accessories

Protectors



Protectors | For TRC·TRE·TRCF



Ø Index	Part No. with screw connection	Part No. with quick release	A [mm]	D Ø [mm]
30.	–	–	–	–
40.	TR.40.10	TR.40.30 2)	27	55
50.	TR.50.10	TR.50.30 1) *	34	69
60.	TR.60.10	TR.60.30 2)	40	80
65.	TR.65.10	TR.65.30 1) *	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)	TR.85.240.30 1) 4) *	63	120
100.	TR.100.10	TR.100.30	67	133
125.	TR.125.10	–	82	170

1) Available upon request. Delivery time upon request

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

4) Only for special size TRCF.85.240.0 with 240 degree bend radius



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

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 | For TRC·TRE·TRCF | Standard

TR.60.20.XX - TR.125.20.XX

Ø Index	Part No. Standard	Clamp Ø [mm]	A [mm]	B [mm]	C [mm]	D [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
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 30 mm

4) Only for special size TRCF.85.240.0 with 240 degree bend radius

Part No. with desired ø for the clamp | 30 | 32 | 34 | e.g. TR.100.20.30

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
70.	▶ TR.70.23.	30 32 34	214	126	130	122	43
85.	▶ TR.85.23.	30 32 34	222	153	155	149	49
85. (R 240)	▶ -	-	-	-	-	-	-
100.	▶ TR.100.23.	30 32 34	240	153	155	149	67
125.	▶ TR.125.23.	30 32 34	252	178	190	175	72

Standard clamp for axis 6: ø 30 mm

4) Only for special size TRCF.85.240.0 with 240 degree bend radius

Part No. with desired ø for the clamp | 30 | 32 | 34 | e.g. TR.100.23.30

triflex® R accessories

Compact connections for axis 6 with strain relief

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

- With integrated strain relief tie wrap 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		Part No.	Clamp	A	B	C	D
Index		with strain relief	ø [mm]	[mm]	[mm]	[mm]	[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. 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. (R240)	▶	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 30 mm

4) Only for Special size TRCF.85.240.0 with 240 degree bend radius

5) Available upon request. Delivery time upon request.

Part No. with desired ø for the clamp | 30 | 32 | 34 | e.g. TR.100.21.30

triflex® R accessories

Compact connections, adjustable - for axis 6 without strain relief

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		Part No.	Clamp	A	B	C
Index		without strain relief	Ø [mm]	[mm]	[mm]	[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
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 30 mm

4) Only for special size TRCF.85.240.0 with 240 degree bend radius

Part No. with desired ø for the clamp | 30 | 32 | 34 | e.g. TR.100.21.02.30

triflex® R accessories

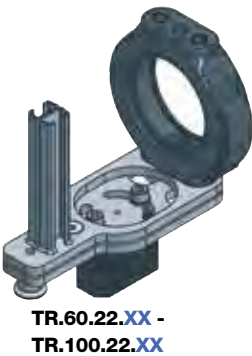
Quick exchange kit for axis 6

Quick exchange kit

TR.60.22.XX - TR.100.22.XX

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

Quick exchange kit | For TRC·TRE·TRCF



Ø	Part No.	Clamp	A	B	C	D
Index	quick-ch-ange unit	Ø [mm]	[mm]	[mm]	[mm]	[mm]
30.	▶	—	—	—	—	—
40.	▶	—	—	—	—	—
50.	▶	—	—	—	—	—
60.	▶	TR.60.22.	30 32 34	191	126	126
65.	▶	TR.65.22.	30 32 34	191	126	126
70.	▶	TR.70.22.	30 32 34	191	126	126
85.	▶	TR.85.22.	30 32 34	191	153	153
85. (R 240)	▶	TR.85.240.22. 4)	30 32 34	191	153	153
100.	▶	TR.100.22.	30 32 34	191	153	153
125.	▶	—	—	—	—	—

Standard clamp for axis 6: ø 30 mm

4) Only for special size TRCF.85.240.0 with 240 degree bend radius

Part No. with desired ø for the clamp | 30 | 32 | 34 | e.g. TR.100.22.30

triflex® R accessories

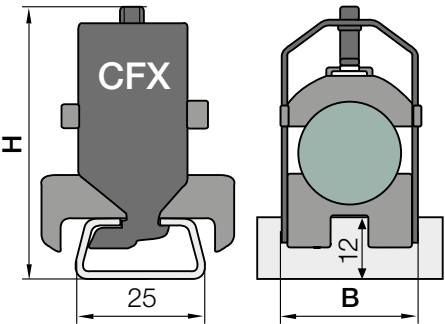
chainfix clamps

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 when using solid welding cables and rigid hydraulic hoses
- Space- and time-saving assembly on the C-profile
- Simple assembly with hex head set screw
- Durability for dynamic applications through improved stacker elements
- Built-in ribs on the stacker elements - no disconnection of cables from the strain relief
- steel (material galvanised steel) or stainless steel (material 1.4301/AISI 304) available



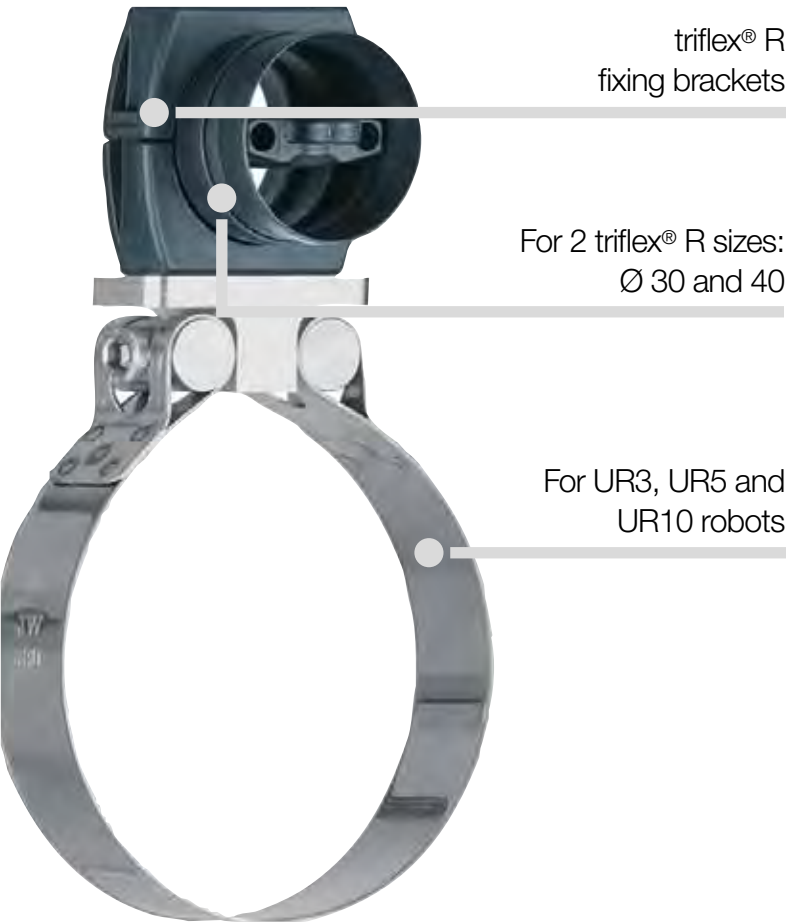
Part No.	Part No.	≤ Ø	B+2	H	Part No.	Part No.	≤ Ø	B+2	H
steel	stainless steel*	[mm]	[mm]	[mm]	steel	stainless steel*	[mm]	[mm]	[mm]
CFX12.1	CFX12.1.E	06 - 12	16	54	CFX22.1	CFX22.1.E	20 - 22	26	58
CFX14.1	CFX14.1.E	12 - 14	18	50	CFX26.1	CFX26.1.E	22 - 26	30	67
CFX16.1	CFX16.1.E	14 - 16	20	52	CFX30.1	CFX30.1.E	26 - 30	34	71
CFX18.1	CFX18.1.E	16 - 18	22	54	CFX34.1	CFX34.1.E	30 - 34	38	75
CFX20.1	CFX20.1.E	18 - 20	24	56	*Material stainless steel: 1.4301/AISI 304				



Individual strain relief for every cable allows easy replacement

triflex® R accessories

UR clips



Connections for "Universal Robots" - UR clips

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 to the systems is a breeze and can be achieved quickly using the UR clips.

- Safe cable guidance with triflex® R for "universal robots"
- For easy connection with screw clips
- For 2 triflex® R sizes: Ø 30 and 40
- For UR3, UR5 and UR10 robots
- 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/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	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

UR clips



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	054	B
TR.911.965.066.Z0	TR.911.965.066.Z1	UR3	066	A
TR.911.965.075.Z0	TR.911.965.075.Z1	UR5	075	B
TR.911.965.086.Z0	TR.911.965.086.Z1	UR5	086	A
TR.911.965.086.Z0	TR.911.965.086.Z1	UR10	086	B
TR.911.965.108.Z0	TR.911.965.108.Z1	UR10	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	054	B
TR.911.966.066.Z0	TR.911.966.066.Z1	UR3	066	A
TR.911.966.075.Z0	TR.911.966.075.Z1	UR5	075	B
TR.911.966.086.Z0	TR.911.966.086.Z1	UR5	086	A
TR.911.966.086.Z0	TR.911.966.086.Z1	UR10	086	B
TR.911.966.108.Z0	TR.911.966.108.Z1	UR10	108	A

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

triflex® R accessories

Protective jackets

Standard protective jacket | For TRC·TRE·TRCF·TRL·TRLF



- Base support: fabric
- Plastic coating: plastic
- Easy to replace with Velcro fastenings
- Elastic sealing strips
- silicone-free
- Standard lengths available from stock
- For paint or sealing applications

Heat shield protective jacket | For TRC·TRE·TRCF·TRL·TRLF



- Made from heat-resistant, wear-resistant Kevlar weave
- Short-term protection against welding and metal spatter, temperatures up to 540°C
- High abrasion resistance
- Very tight
- 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

Wear-resistant protective jacket | For TRC·TRE·TRCF·TRL·TRLF



- 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	Part No.	Standard lengths [mm]
Index	TR.XX.16	(special lengths on request)
30.	▶ —	—
40.	▶ TR.40.16.	500 1000 1500 2000
50.	▶ TR.50.16.1)	500 1000 1500 2000
60.	▶ TR.60.16.	500 1000 1500 2000
65.	▶ TR.65.16.1)	500 1000 1500 2000
70.	▶ TR.70.16.	500 1000 1500 2000
85.	▶ TR.85.16.	500 1000 1500 2000
100.	▶ TR.100.16.	500 1000 1500 2000
125.	▶ TR.125.16.	500 1000 1500 2000

1) Available upon request. Delivery time upon request.
Part No. with the desired value for the standard length
| 500 | 1000 | 1500 | 2000 | supplement to TR.60.16.500,
for example

Ø	Part No.	Standard lengths [mm]
Index	TR.XX.18	(special lengths on request)
30.	▶ —	—
40.	▶ TR.40.18.	500 1000 1500 2000
50.	▶ TR.50.18.1)	500 1000 1500 2000
60.	▶ TR.60.18.	500 1000 1500 2000
65.	▶ TR.65.18.1)	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

1) Available upon request. Delivery time upon request
Part No. with the desired value for the standard length
| 500 | 1000 | 1500 | 2000 | supplement to TR.60.18.500,
for example

Ø	Part No.	Standard lengths [mm]
Index	TR.XX.19	(special lengths on request)
30.	▶ —	—
40.	▶ TR.40.19.	500 1000 1500 2000
50.	▶ TR.50.19.1)	500 1000 1500 2000
60.	▶ TR.60.19.	500 1000 1500 2000
65.	▶ TR.65.19.1)	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

1) Available upon request. Delivery time upon request
Part No. with the desired value for the standard length
| 500 | 1000 | 1500 | 2000 | supplement to TR.60.19.500,
for example

triflex® R filling

e-chain® filling configurator

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

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

- Quick and easy shelving configuration
- Accounts for the max. filling cross sections and cable diameters
- Creation of parts lists
- Easy enquiry and ordering

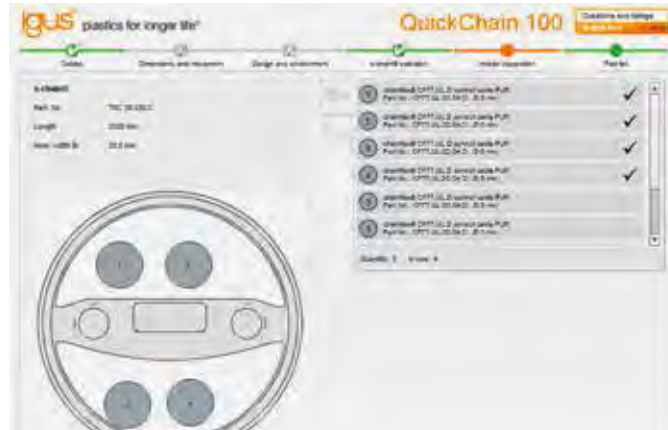
More information, interior separation configurator
▶ www.igus.eu/triflexR-IA



1. Select cables, hoses and lengths



2. Select e-chain® and size



3. Filling of the e-chain® with cables and hoses



4. Result: Order list, price and drawings

triflex® R - readychain® hose packages

Customised system consisting of the triflex® R, chainflex® and connectors

- Eliminate storage costs for cables, e-chains® and connectors
- Shorten turnaround times by half Minimise your machine downtime
- Reduce the number of suppliers and orders by 75%

More Information ▶ From page 178 or ▶ www.readychain.eu



Retraction systems

For supplying energy to articulated robots

triflex® R retraction systems - prevent creation of loops on the robot

The global growth in automation for industrial production is leading to increasingly complex applications, particularly when using industrial robots. Despite a greater depth of integration and the use of new production processes, the target cycle times have to be kept as short as possible 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. The change in length that results from the robot's movement is compensated by our triflex® R retraction systems. This constantly guides the igus® e-chain® package in a defined manner to prevent the formation of undesired loops in the robot's working area.

4 triflex® R retraction system versions available from stock:



RSP - pneumatic retraction system
►From page 64



Advantages of RSP:

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



RS - modular retraction system
►From page 70



Advantages of RS:

- For series TRC·TRE with Ø-index 40-100 mm
- For robots with a load capacity from approx. 10 kg
- Up to 670 mm retraction length possible
- If no linear guide system is desired
- With major environmental influences
- Retraction force through integrated fibre rods



RSE linear - linear, cost-effective retraction system
►From page 76



Advantages of RSE linear:

- For series TRC·TRE·TRCF* with Ø-index 40-125 mm
- Linear guide avoids small bend radii
- Up to 490 mm retraction length possible
- Simple, linear retraction without bends, fibre rods or guide rollers
- Cost-effective
- Maintenance-free igus® drylin® W linear unit



RSE - cost-effective retraction system
►From page 82



Advantages of RSE:

- For Series TRC·TRE with a Ø-index of 40 mm
- For small robots, very light
- Up to 500 mm retraction length possible
- For highly dynamic movements
- Cost-effective
- Maintenance-free igus® drylin® W linear unit

*TRCF not available for each width, see product range

Retraction systems

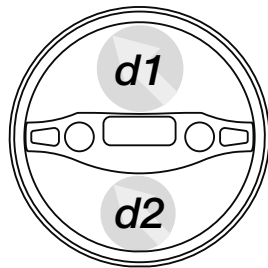
Selection tools

Determination of the necessary chain size, choice of suitable retraction systems

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

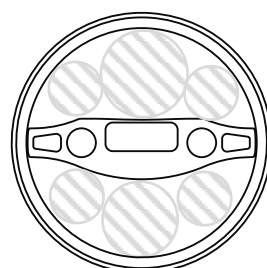
1

The largest cable diameter Ø...



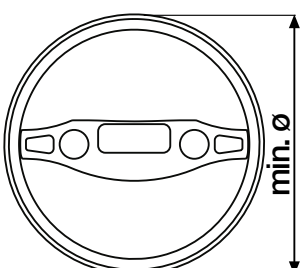
2

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



3

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



4

... 4 retraction systems options:



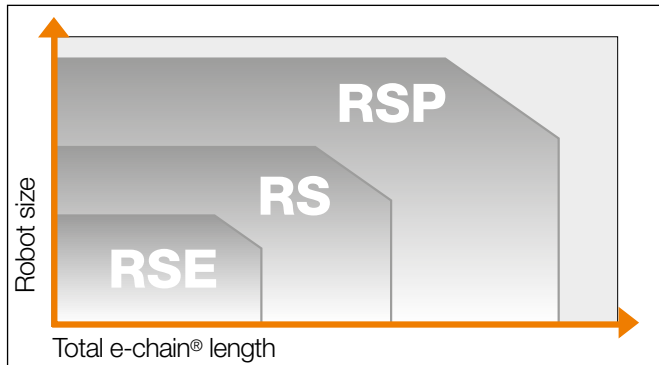
max. Ø cable		Coverage of the entire area [mm²]	Minimum Ø-index triflex® R	Retraction system			
d1 [mm] 1. chamber	d2 [mm] 2. chamber			RSP	RS	RSE linear	RSE
–	–	–	30.	–	–	–	–
< 15	< 13	< 500	40.	–	●	–	●
–	–	–	50.	–	–	–	–
< 22,5	< 19,5	< 1000	60.	●	●	●	–
–	–	–	65.	–	–	–	–
< 28	< 24	< 1750	70.	●	●	●	–
< 33	< 28	< 2500	85.	●	●	●	–
< 37,5	< 32,5	< 3000	100.	●	●	●	–
< 43	< 43	< 4500	125.	●	–	●	–

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



Interior separation configurator - quick and easy creation of interior layouts for triflex® R.
More information ►www.igus.eu/triflexR-IA

Selection tool for triflex® R retraction systems



Possible Ø-index for triflex® R retraction systems

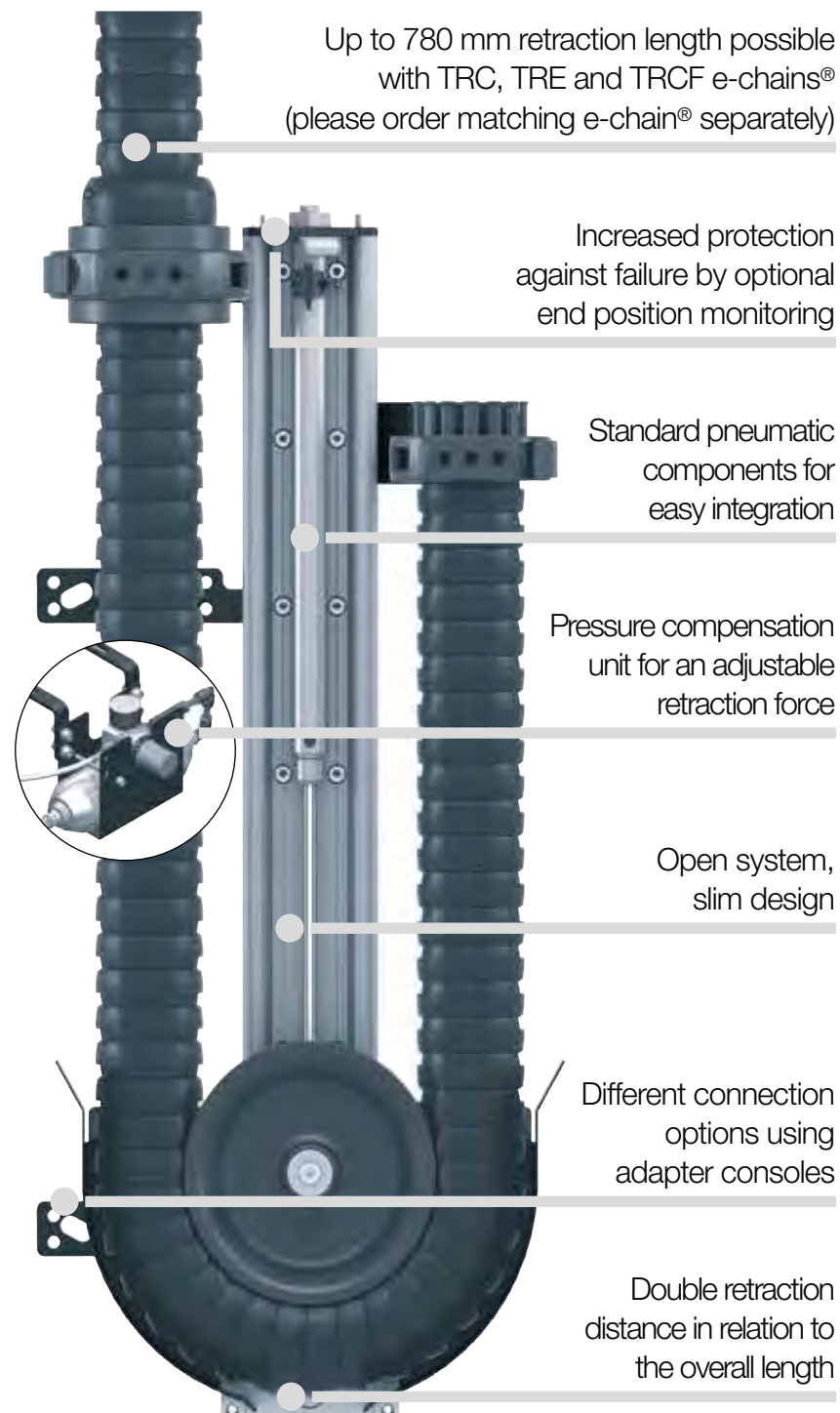
triflex® R Series	RSP Ø Index	RS Ø Index	RSE linear Ø Index	RSE Ø Index
TRC	60 - 125	40 - 100	40 - 125	40
TRE	60 - 125	40 - 100	40 - 125	40
TRCF	85 - 100	–	85 - 100	–
TRL*	–	–	–	–
TRLF*	–	–	–	–

* Retraction systems not possible for this series



RSP retraction system

Pneumatic retraction system



Pneumatic retraction system - triflex® RSP

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

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

Optional accessories | RSP pneumatic retraction system



Adjustment unit - for accurate adjustment of the system position



Adapter consoles - for different mounting options



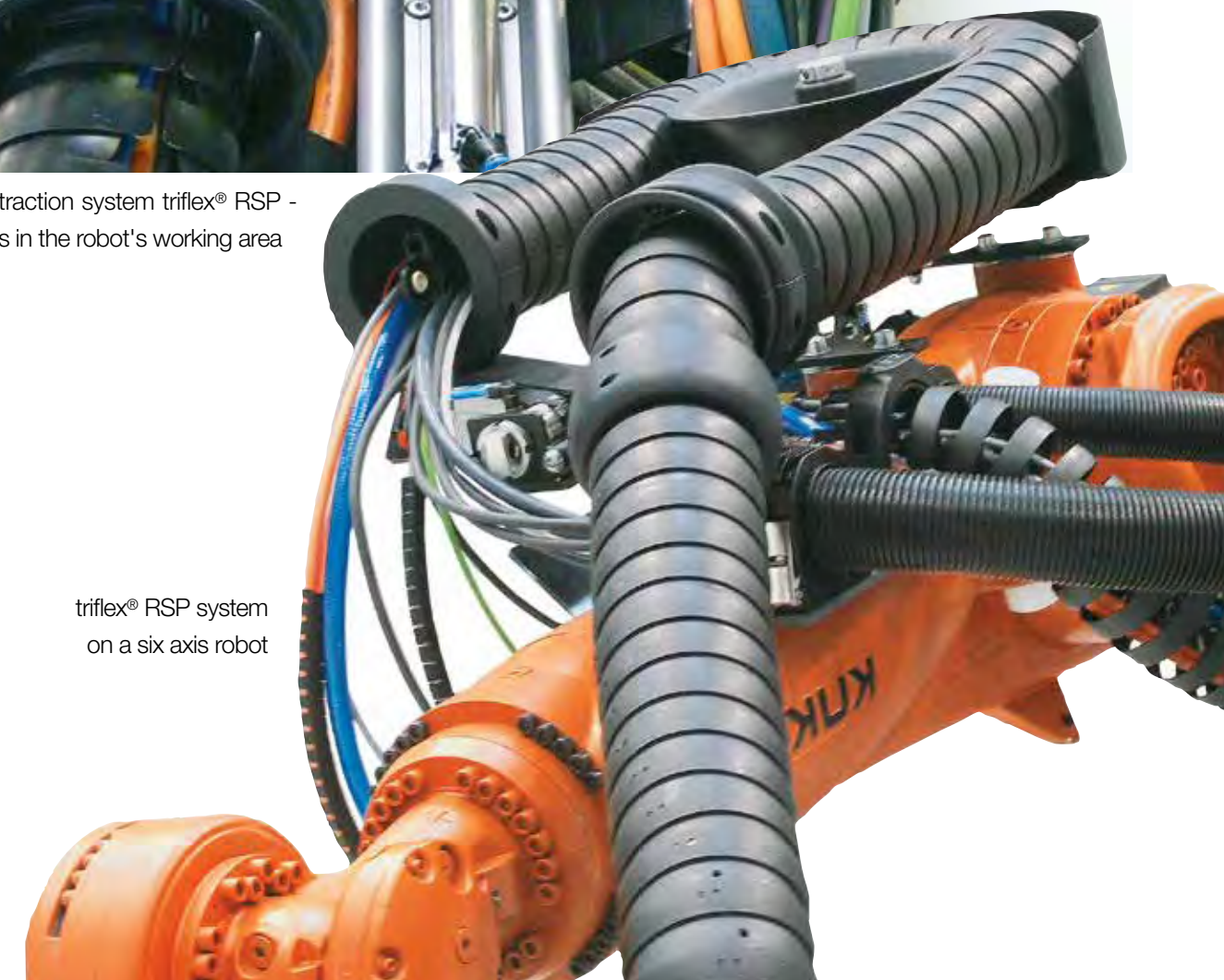
Clamp, axis 6 - for triflex® R mounting bracket

Applications

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



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



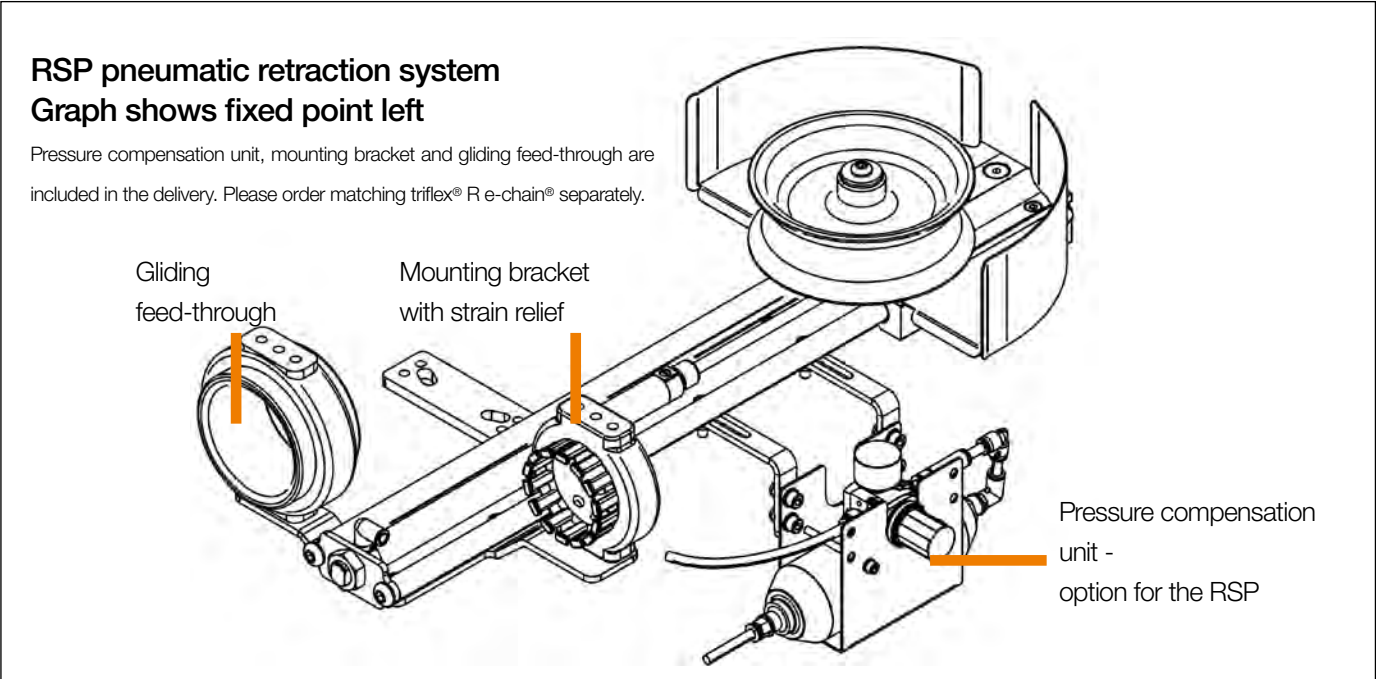
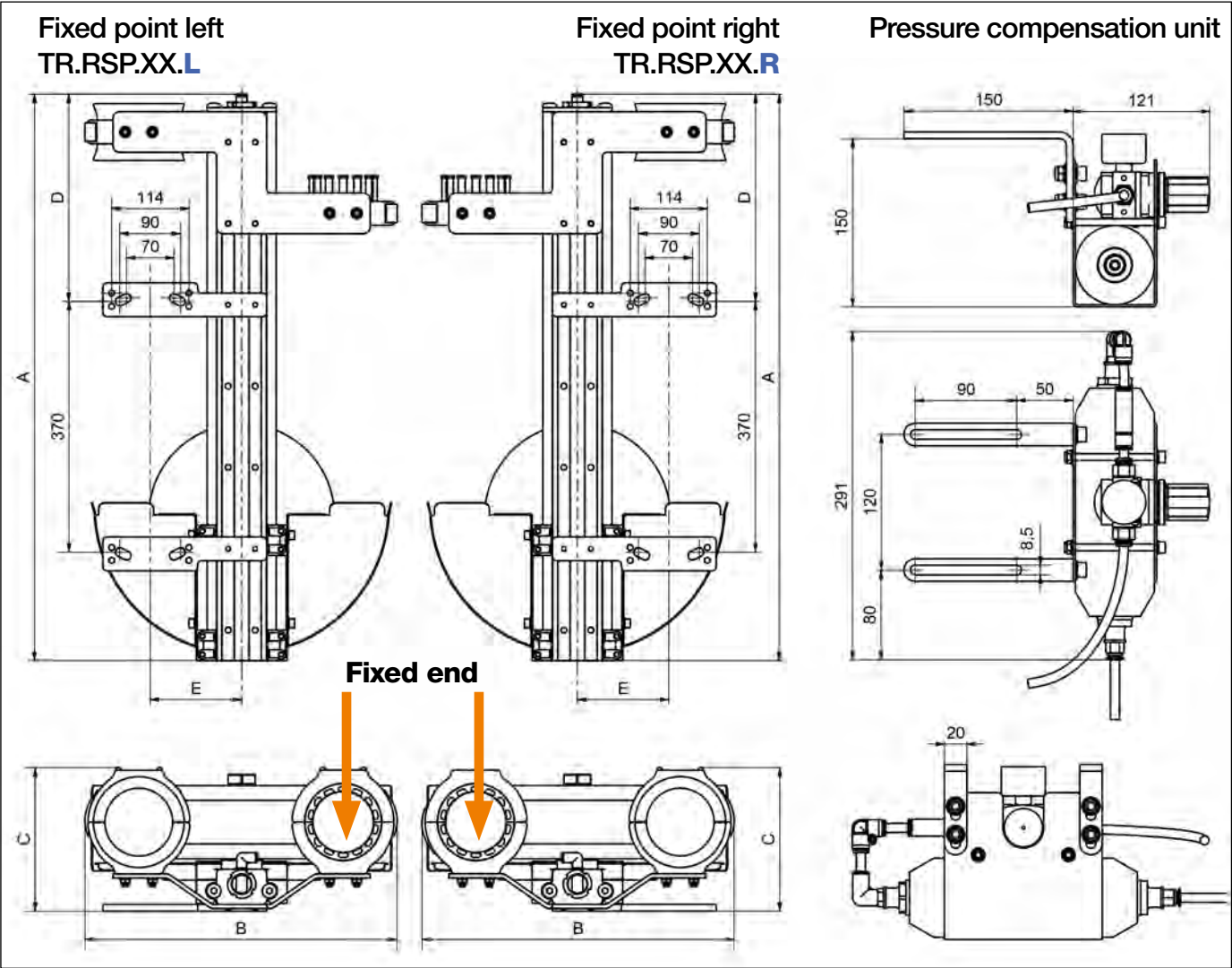
triflex® RSP system on a six axis robot



RSP accessories

Technical data

Dimensions | RSP pneumatic retraction system



Product range

triflex® R RSP for series TRC·TRE·TRCF

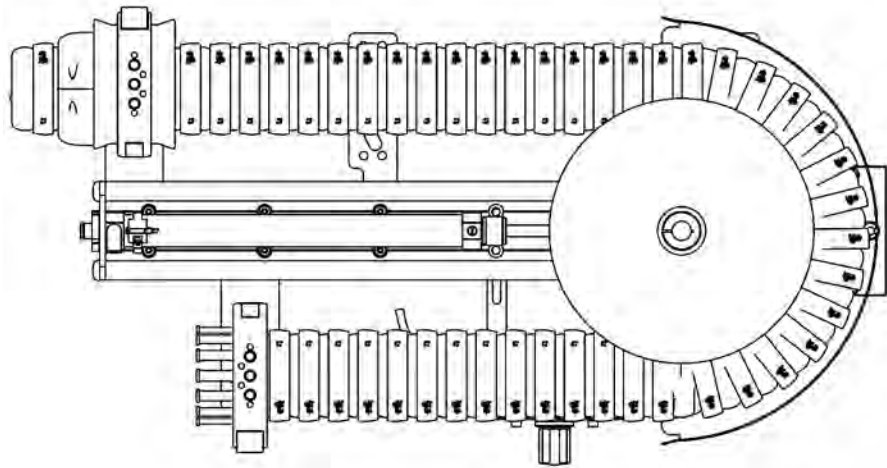
Product range | RSP pneumatic retraction system

Ø Index	RSP Left fixed point part. no.	RSP Right fixed point part. no.	Retraction length max. [mm] ¹⁾	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.L	580	792	396	177	277	135	16,2
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

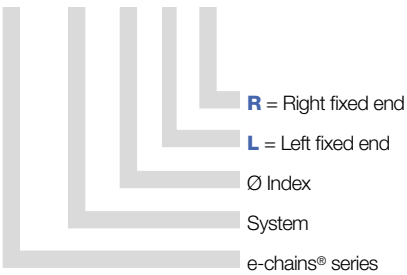
Pressure compensation unit, mounting bracket and gliding feed-through are included in the delivery. Please order matching triflex® R e-chain® separately.

1) These are the maximum values. In normal operation a filling of no more than 70% is advised.

2) Plus 2.3 kg for pressure compensation unit




Order key
 TR.RSP.XX.L / R



RSP accessories

e-chain® and cable length calculation

System design | RSP and matching e-chains®

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 length =
additional length of the gliding feed-through **LLLL** +
the 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**

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

System Insert Ø index **XX** / select fixed end **.L** / **.R** **TR.RSP.XX.L**

+ e-chain® Insert Ø-index **XX** / Insert bend radius **R** / Insert standard length **LLLL** **TRC.RSP.60.087.500.0**

Order text: TR.RSP.60.L + TRC.RSP.60.087.500.0



 **Order key e-chains®**

TRC .RSP.XX.**R**.**LLLL**.0
TRE .RSP.XX.**R**.**LLLL**.0.B
TRCF.RSP.XX.**R**.**LLLL**.0

- Default colour black
- Additional length
- R** Bend radius
- Ø Index
- System
- e-chains® series

Product range

e-chain® and cable length calculation

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
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.B	–

1) Available for B- and C-versions

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

e-chains® standard lengths*

LLLL [mm] | **500** | **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.60.087.500.0**

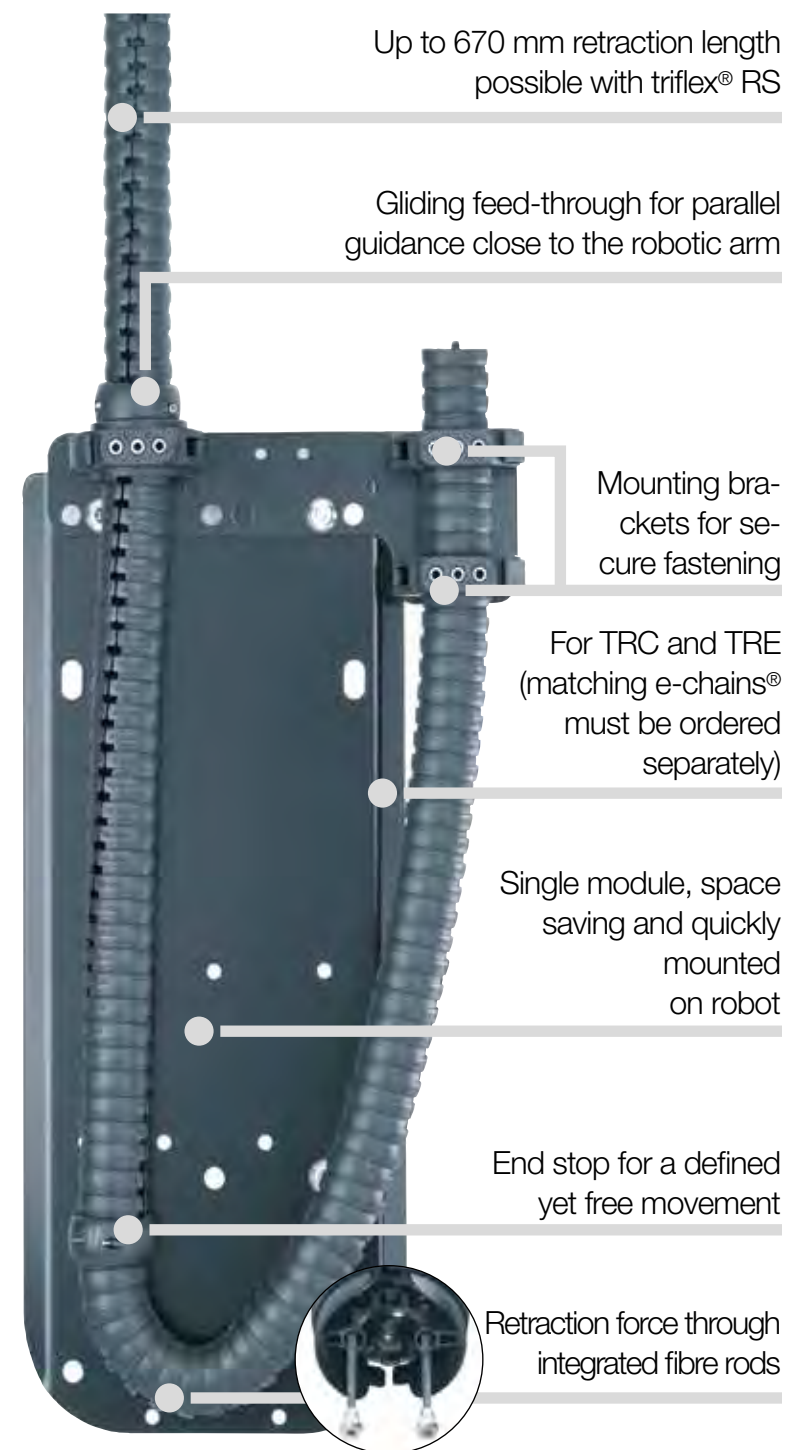
Calculating the overall chain length | RSP e-chains®

Ø Index	R [mm]	e-chain® length within the system [mm]	Number of e-chain® links	Total e-chain® length
30.	–	–	–	{mm}
40.	–	–	–	–
50.	–	–	–	–
60.	▶ 087	1490	73	LLLL + 1490
65.	▶ 100	1432	62	LLLL + 1432
70.	▶ 110	1484	58	LLLL + 1484
85.	▶ 135	1622	53	LLLL + 1622
85. (R 240)	–	–	–	–
100.	▶ 145	1656	48	LLLL + 1656
125.	▶ 182	1940	44	LLLL + 1962

Please add the chain length within the system to the standard length **LLLL** (measured from the gliding feed-through) to get the **overall chain length**

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 spring 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 the possibility to realise the energy supply for tools safely without stressing the cables, thus minimising downtimes.

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

Optional accessories | RS modular retraction system



Cover - for additional mounting space and extreme movements



Adjustment unit - for accurate adjustment of the system position



Adapter consoles - for different mounting options



Clamp, axis 6 - for triflex® R mounting bracket

Applications

RS - R(etraction) S(ystem)



triflex® RS for a low profile e-chain® guide. The triflex® RS retraction unit runs parallel to the robot arm.

Video at ► www.igus.eu/RS_Film

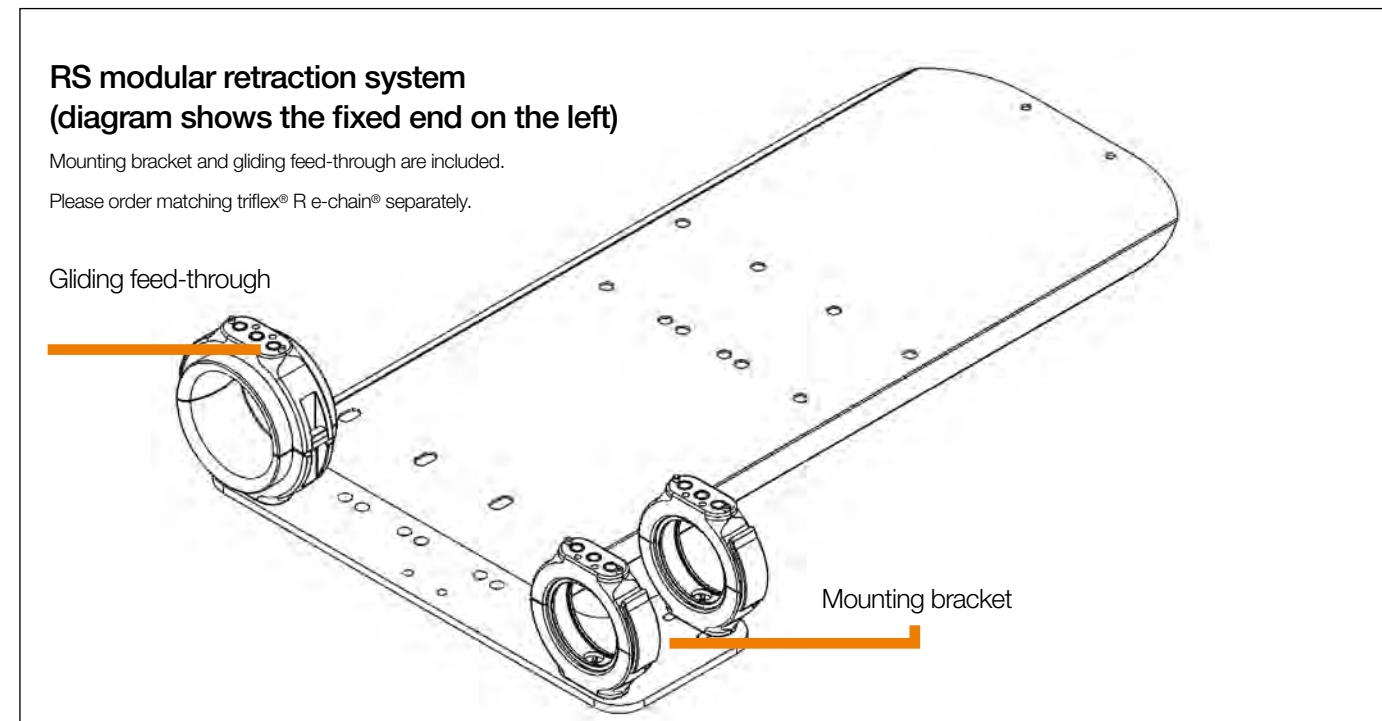
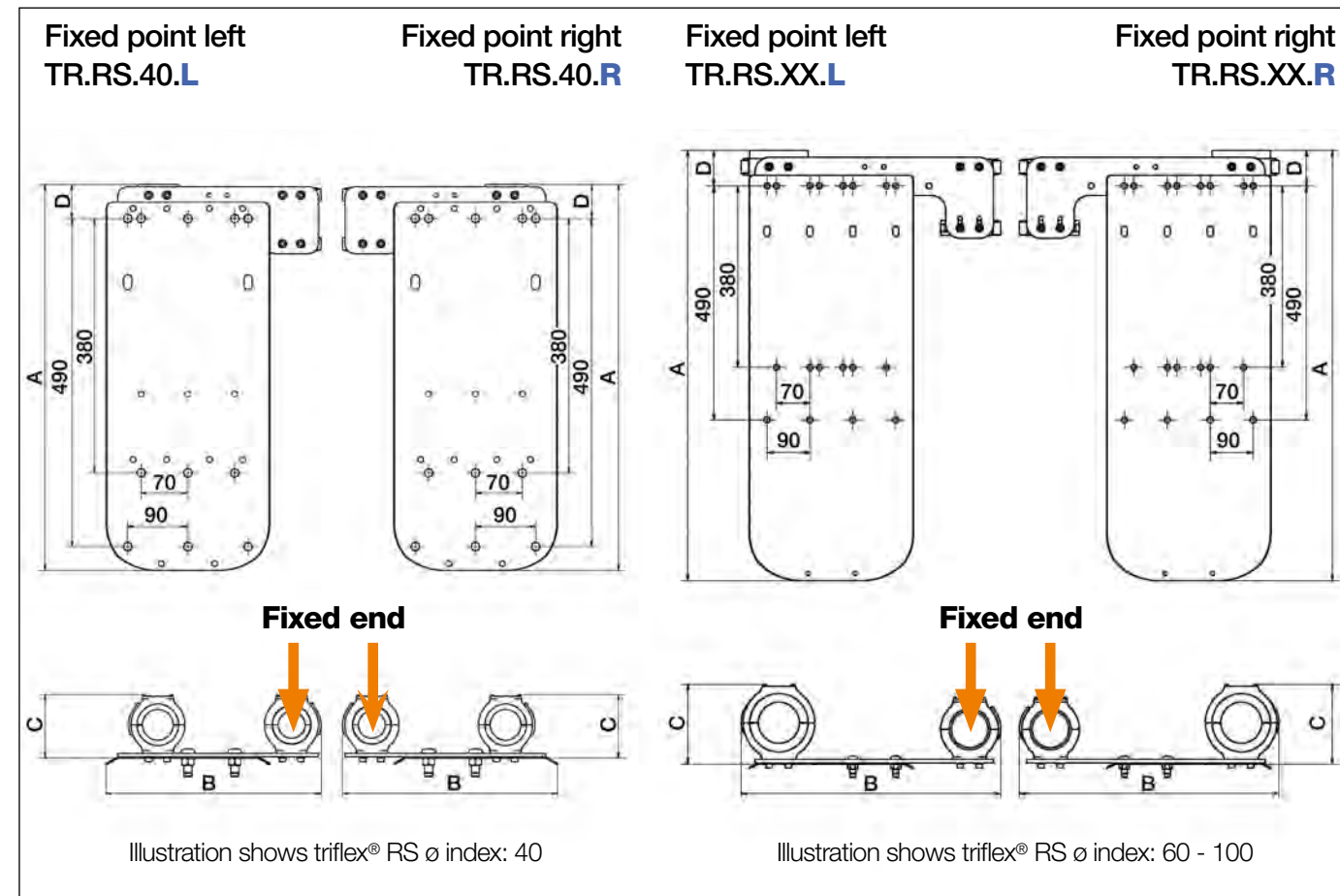


Option: triflex® RS with cover for more mounting space



Technical data

Installation height | RS modular retraction system



Product range

triflex® R RS for series TRC·TRE

Product range | RS modular retraction system

Ø		RSP Left fixed	RSP Right fixed	Retraction length	A	B	C	D	Weight
Index		point part. no.	point part. no.	max. [mm] ¹⁾	[mm]	[mm]	[mm]	[mm]	[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.	▶	–	–	–	–	–	–	–	–
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.	▶	–	–	–	–	–	–	–	–

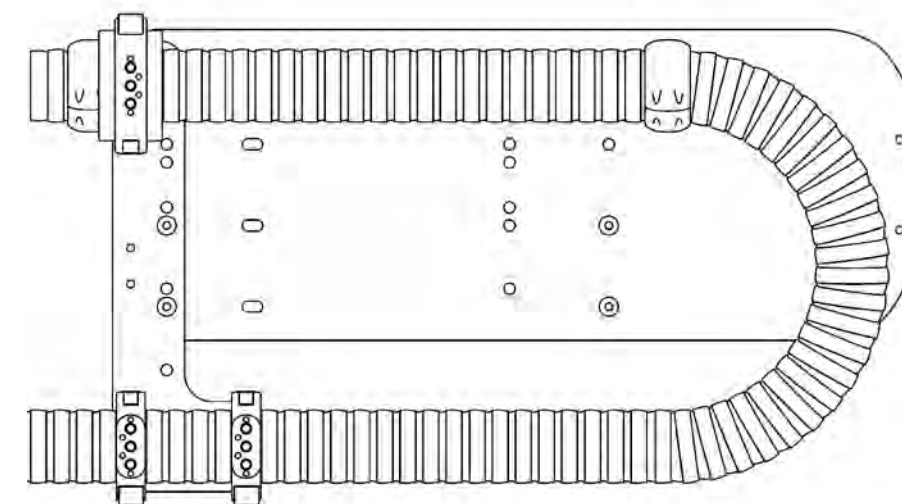
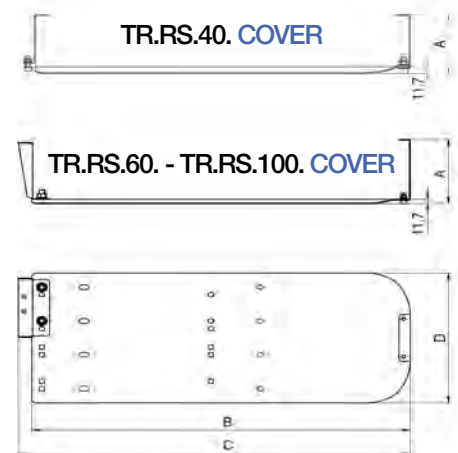
1) These are the maximum values. In normal operation a filling of no more than 70% is advised.

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

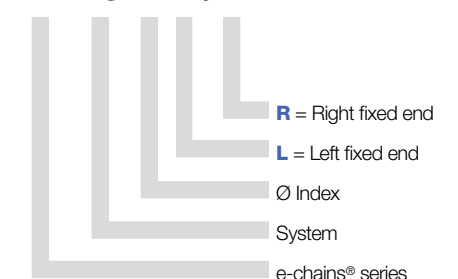
Product range | Cover, optional

Ø	Optional cover	A	B	C	D	Load*	Weight
Index	retrofit kit	[mm]	[mm]	[mm]	[mm]	≤ [kg]	[kg]
30.	–	–	–	–	–	–	–
40.	▶ TR.RS.40.COVER	101,7	550	567,5	244,6	1,5	2,3
50.	▶ –	–	–	–	–	–	–
60.	▶ TR.RS.60.COVER	170,7	850	880	344,6	3,5	5,2
65.	▶ –	–	–	–	–	–	–
70.	▶ TR.RS.70.COVER	170,7	850	880	344,6	3,5	5,2
85.	▶ TR.RS.85.COVER	170,7	850	880	344,6	3,5	5,2
85. (R 240)	▶ –	–	–	–	–	–	–
100.	▶ TR.RS.100.COVER	172	853	910,5	397,6	3,5	5,5
125.	▶ –	–	–	–	–	–	–

*maximum fill weight to be used with the cover

 **Order key**

TR.RS.XX.L / R



RS accessories

e-chain® and cable length calculation

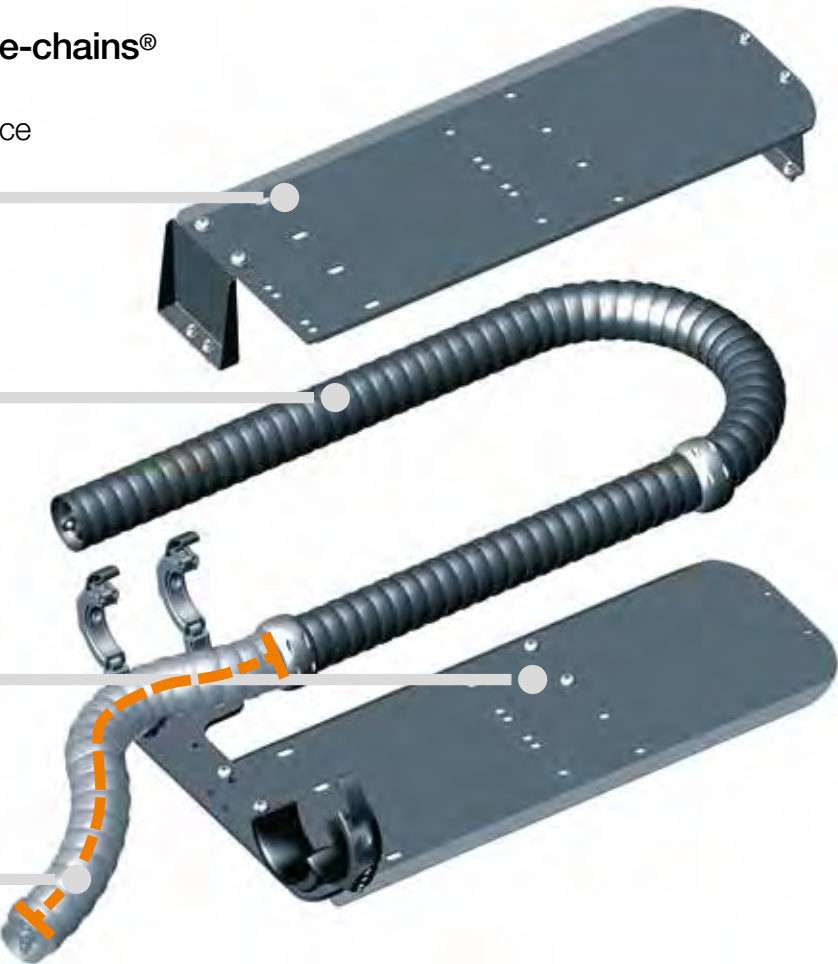
System design | RS and matching e-chains®

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

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

Overall length =
additional length of the gliding feed-through
LLLL + the chain length within the system



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

System	Insert Ø index XX / select fixed end .L / .R	TR.RS.60.L
+ Cover	Insert Ø index XX / Insert Ø index XX (cover optional)	TR.RS.60.COVER
+ e-chain®	Insert Ø-index XX / Insert bend radius R / Insert standard length LLLL	TRC.RS.60.087.500.0
Order text:	TR.RS.60.L + TR.RS.60.COVER + TRC.RS.60.087.500.0	



Order key e-chains®
TRC.RS.XX.*R*.LLLL.0
TRE.RS.XX.*R*.LLLL.0.B



Product range

e-chain® and cable length calculation

Product range | Matching e-chains® for RS

Ø Index	Part. no. TRC enclosed	Part. no. TRE "easy" design
30.	–	–
40.	TRC.RS.40.058. LLLLL.0	TRE.RS.40.058. LLLLL.0.B
50.	–	–
60.	TRC.RS.60.087. LLLLL.0	TRE.RS.60.087. LLLLL.0.B
65.	–	–
70.	TRC.RS.70.110. LLLLL.0	TRE.RS.70.110. LLLLL.0.B
85.	TRC.RS.85.135. LLLLL.0	TRE.RS.85.135. LLLLL.0.B
85. (<i>R 240</i>)	–	–
100.	TRC.RS.100.145.LLLLL.0	TRE.RS.100.145.LLLLL.0.B/C
125.	–	–

1) Available for B- and C-versions

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

e-chains® standard lengths*

LLLL [mm] | **500** | **1000** | **1500** | **2000** |

Part No. with desired value for the standard length **LLLL** (measured from the gliding feed-through) corresponds to the robot arm length from axis 3. Supplement to **TRC.RS.60.087.500.0**, for example

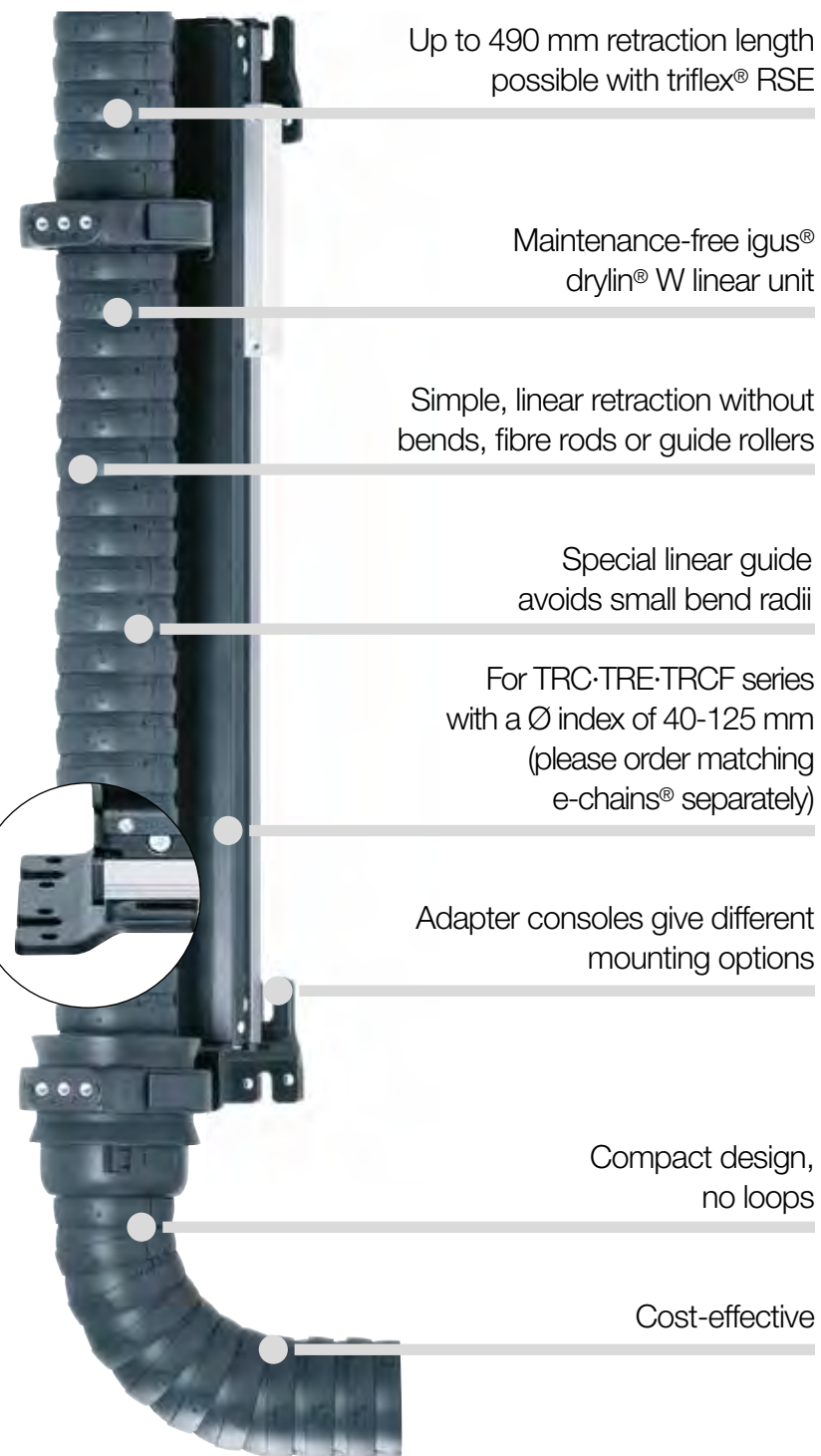
Calculating the overall chain length | RS e-chains®

Ø Index	<i>R</i> [mm]	e-chain® length within the system [mm]	Number of e-chain® links	Total e-chain® length
30.	–	–	–	[mm]
40.	058	1251	73	LLLL + 1251
50.	–	–	–	–
60.	087	1734	58	LLLL + 1734
65.	–	–	–	–
70.	110	1895	53	LLLL + 1895
85.	135	2080	48	LLLL + 2080
85. (<i>R 240</i>)	–	–	–	–
100.	145	2070	44	LLLL + 2070
125.	–	–	–	–

Please add the chain length within the system to the standard length **LLLL** (measured from the gliding feed-through) to get the **overall chain length**

RSE linear

Linear, cost-effective retraction system



Linear, cost-effective retraction system - triflex® RSE linear

The more variety there is in automated production technology, the greater are the requirements placed on energy supply systems. 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 curves 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.

- For Series TRC·TRE·TRCF with a ø-index of 40-125 mm
- Linear guide avoids small bend radii
- Up to 490 mm retraction length possible
- Simple, linear retraction without bends, fibre rods or guide rollers
- Cost-effective
- Maintenance-free igus® drylin® W linear unit

Optional accessories | RSE linear, cost-effective retraction system



Adapter consoles - for different mounting options



Clamp, axis 6 - for triflex® R mounting bracket

Applications

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



igus® TR.RSE system on test robot



Lightweight, linear TR.RSE.40 retraction system for small robots



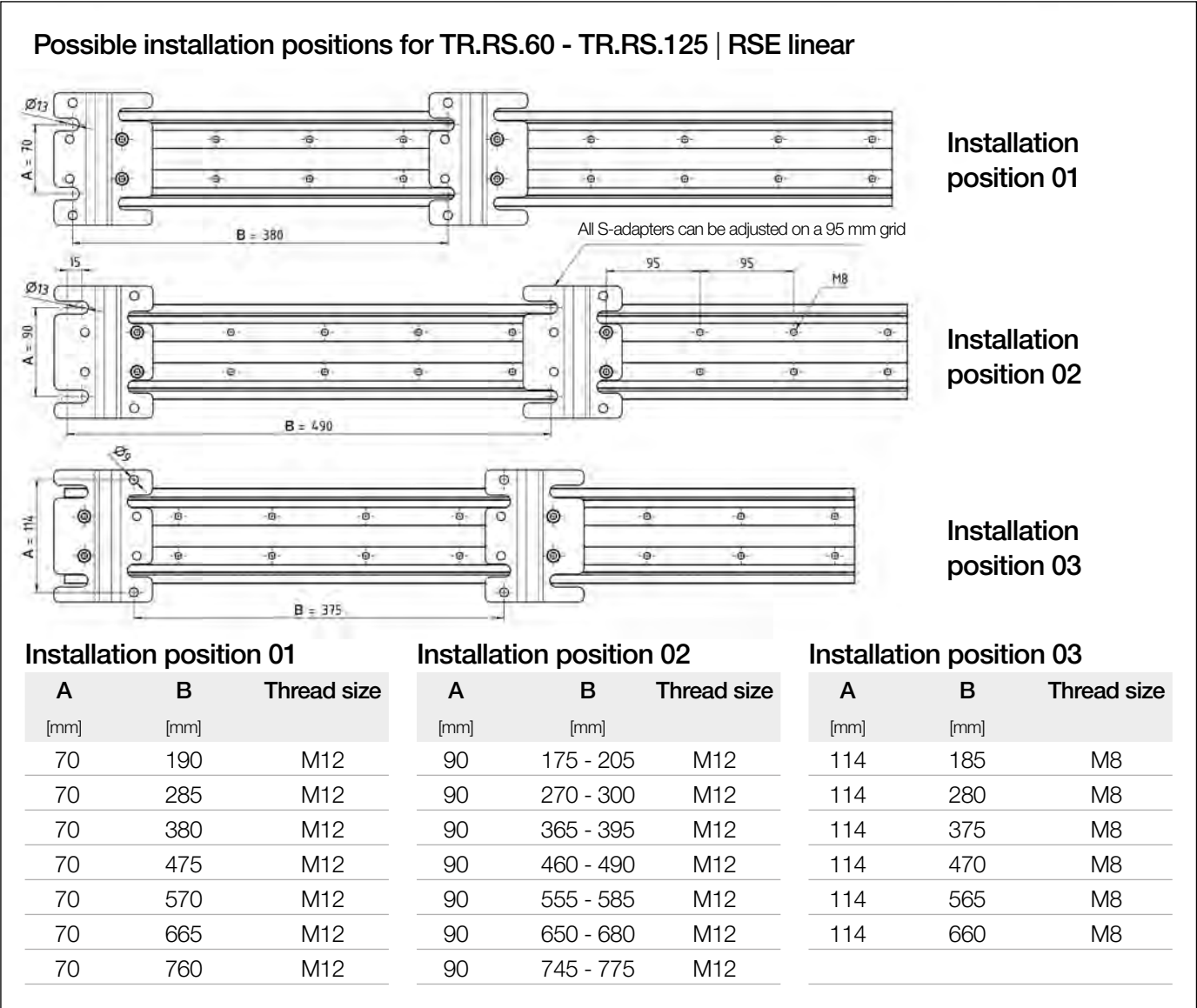
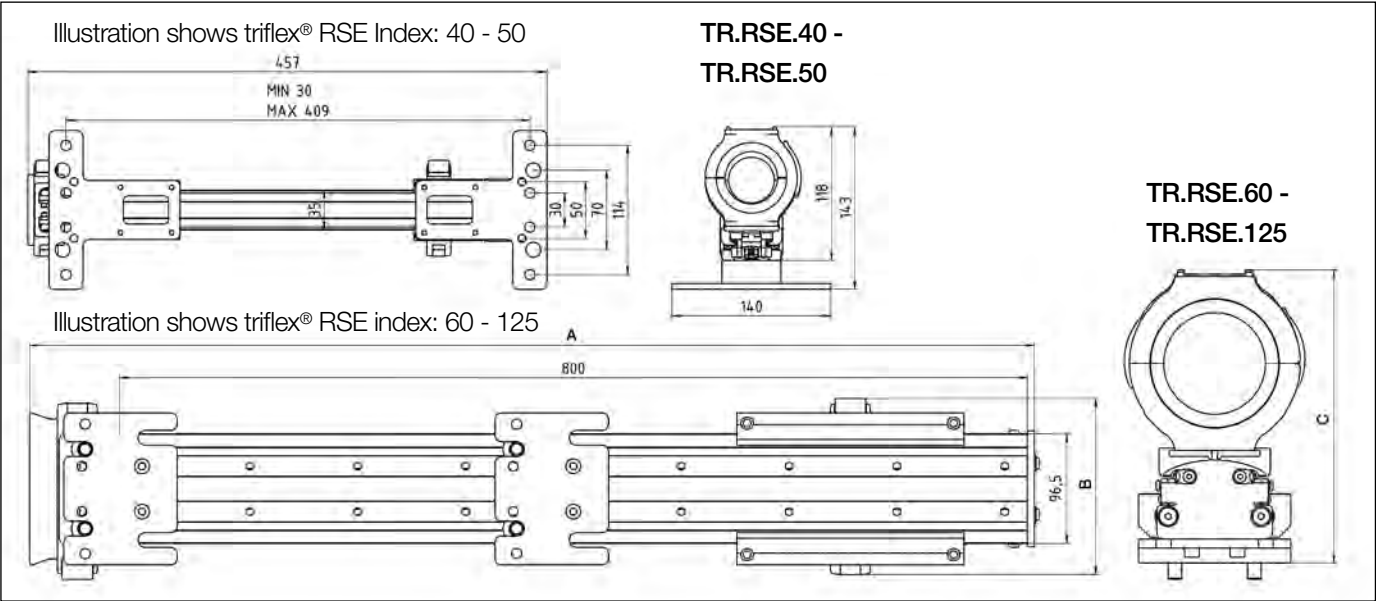
Linear TR.RSE retraction system for installation sizes 60-125 with attachment brackets for a wide variety of robot types



RSE linear accessories

Technical data

Dimensions | RSE linear, cost-effective retraction system



Product range

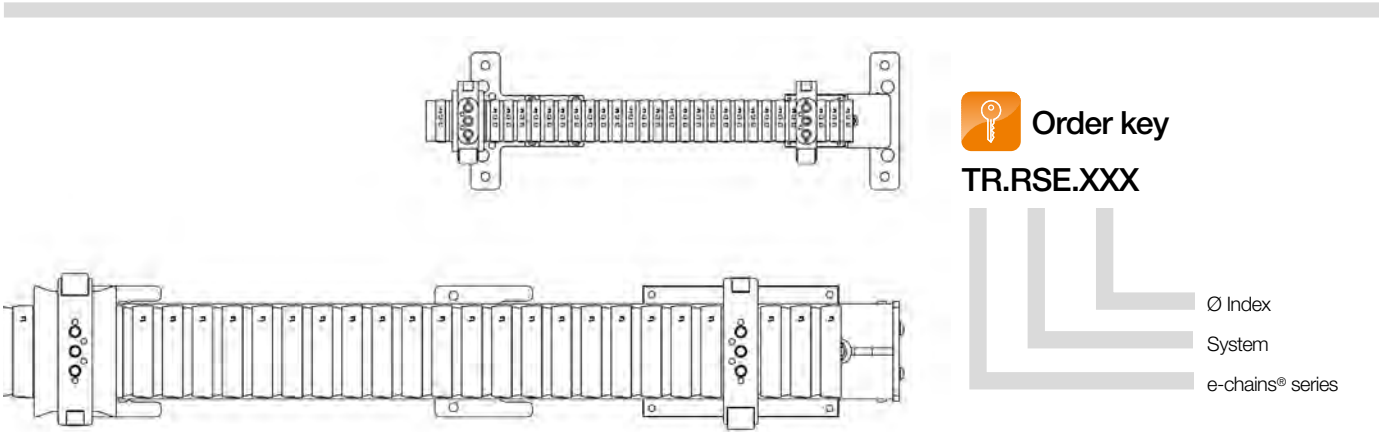
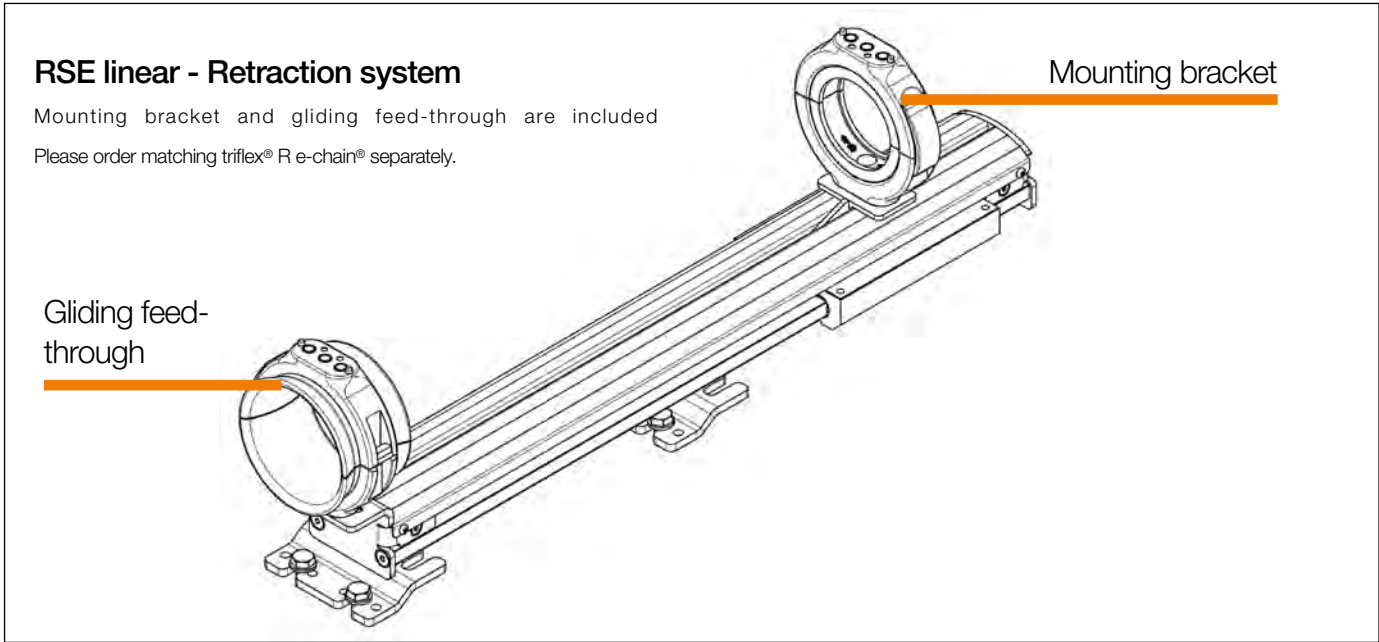
RSE linear for series TRC·TRE·TRCF

Product range | RSE linear, cost-effective retraction system

Ø Index	RSE linear Part No.	Retraction length max. [mm] 1)	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
60.	▶ TR.RSE.60	490	868	134	231	9,9
65.	▶ TR.RSE.65	490	890	134	231	10,0
70.	▶ TR.RSE.70	490	878	155	258	10,0
85.	▶ TR.RSE.85	490	885	155	258	10,0
85. (R 240)	▶ TR.RSE.85	490	885	155	258	10,0
100.	▶ TR.RSE.100	490	886	170	264	10,2
125.	▶ TR.RSE.125	490	876	190	280	10,5

1) These are the maximum values. During normal operation a filling of more than 70% is not advisable.

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



RSE linear accessories

e-chain® and cable length calculation

System design | RSE linear and matching e-chain®

Matching triflex® R e-chain® for RSE linear

TRC .XX.**R**.0
TRE .XX.**R**.0.B
TRCF.XX.**R**.0



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

Limit protector

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

Sample order of a complete TR.RSE linear system,
Ø index 40, and e-chain® (length: 2 m)

System	Insert Ø index XX	TR.RSE.40
+ e-chain®	Insert Ø index XX / Insert bend radius R / Insert standard length LLLL in metres	2 m TRC.40. 058 .0
+ Protector	Protector with quick lock fastener	TR.40.30
Order text:	TR.RSE.40. + 2 m TRC.RSE.40. 058 .0 + TR.40.30	



TRC .XX.**R**.0
TRE .XX.**R**.0.B
TRCF.XX.**R**.0

- Default colour black
- R** Bend radius
- Ø Index
- e-chains® series

Product range

e-chain® and cable length calculation

Product range | Matching e-chains® and protectors for RSE linear

Ø Index	Part. no. TRC enclosed	Part. no. TRC "easy" design	Part No. TRCF with snap lock mechanism	Protector with screw fastener	Protector with quick-lock fastener
30.	▶ –	–	–	–	–
40.	▶ TRC.40. 058 .0	TRE.40. 058 .0.B	–	TR.40.10	TR.40.30
50.	▶ TRC.50. 080 .0	TRC.50. 080 .0.B	–	TR.50.10	–
60.	▶ TRC.60. 087 .0	TRE.60. 087 .0.B	–	TR.60.10	TR.60.30
65.	▶ –	–	TRCF.65. 100 .0	TR.65.10	–
70.	▶ TRC.70. 110 .0	TRE.70. 110 .0.B	–	TR.70.10	TR.70.30
85.	▶ TRC.85. 135 .0	TRE.85. 135 .0.B	TRCF.85. 135 .0	TR.85.10	TR.85.30
85. (R 240)	▶ TRC.85. 240 .0	TRE.85. 240 .0.B	TRCF.85. 240 .0	TR.85.240.10	–
100.	▶ TRC.100. 145 .0	TRE.100. 145 .0.B/C ¹⁾	TRCF.100. 145 .0	TR.100.10	TR.100.30
125.	▶ TRC.125. 182 .0	TRE.125. 182 .0.B	TRCF.125. 182 .0	TR.125.10	–

1) Available for B- and C-versions

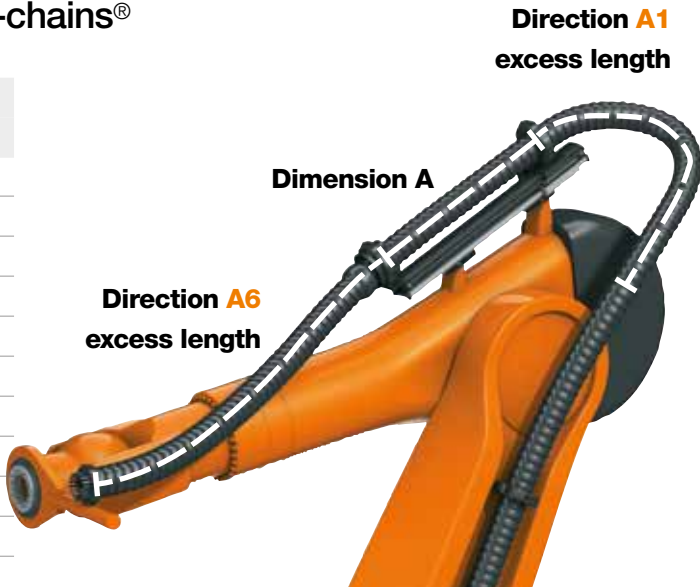
Please order e-chains® as piece goods and purchase a protector for each one.

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

Calculating the overall chain length | RSE e-chains®

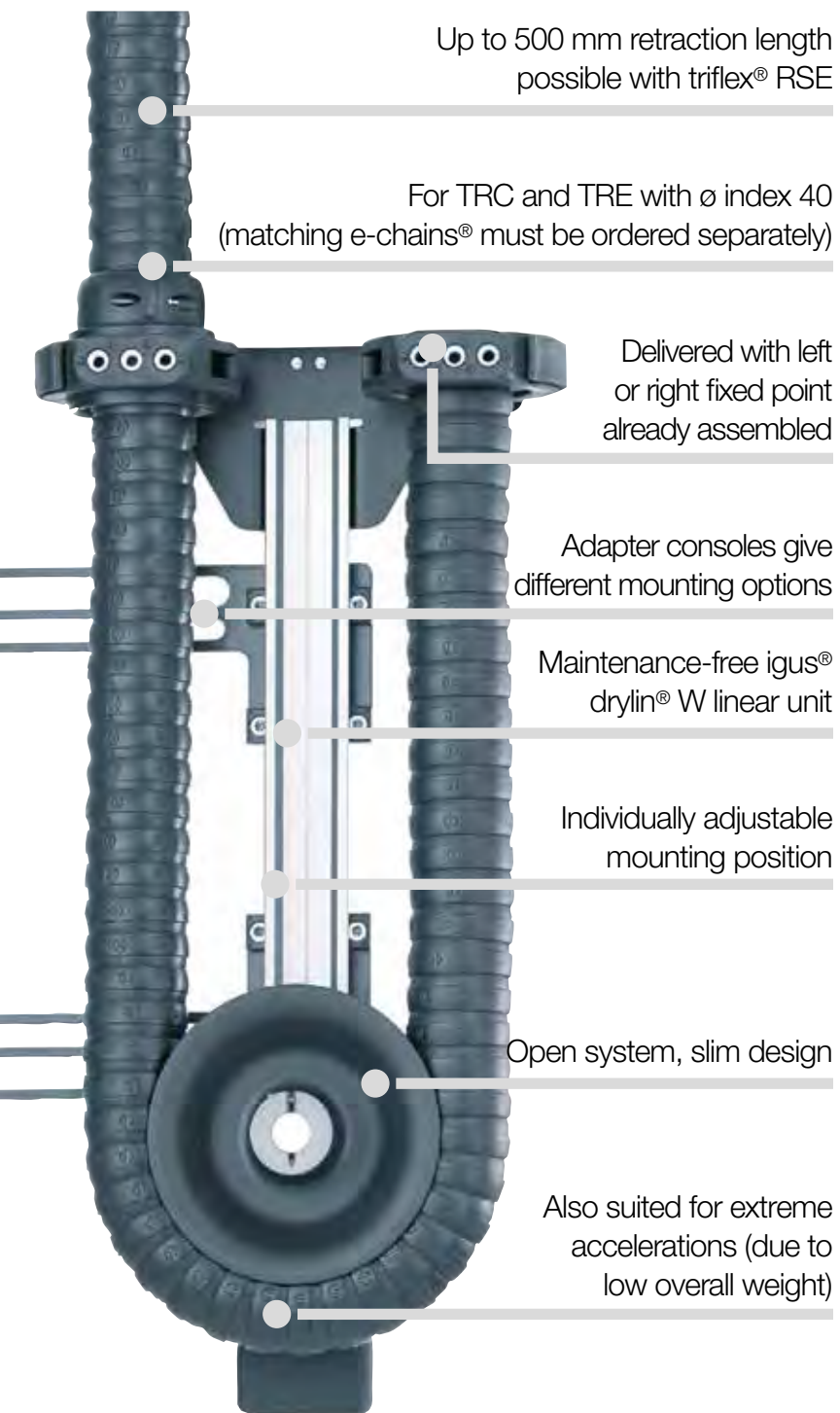
Ø Index	R [mm]	A [mm]
30.	–	–
40.	058	390
50.	080	390
60.	087	750
65.	100	750
70.	110	750
85.	135	750
85. (R 240)	240	750
100.	145	750
125.	182	750

Direction **A6** excess length + dimension **A** + direction **A1** excess triflex® R length calculation for RSE linear systems
length = total length e-chain®



RSE Retraction system

Cost-effective retraction system



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

Specially developed for robots with small to medium cable and hose packages, 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 a ø-index of 40 mm
- Extremely fast response, even in highly dynamic robot programs
- Low weight on the robot, no reduction in robot handling capacity
- Universally adjustable mounting brackets
- Maintenance and lubrication-free igus® drylin® W linear unit
- For maximum degrees of freedom
- More tolerance for the robot's programmer
- For cable diameters up to 11 mm

Optional accessories | RS modular retraction system



Cover - for additional mounting space and extreme movements



Adapter consoles - for custom mounting options



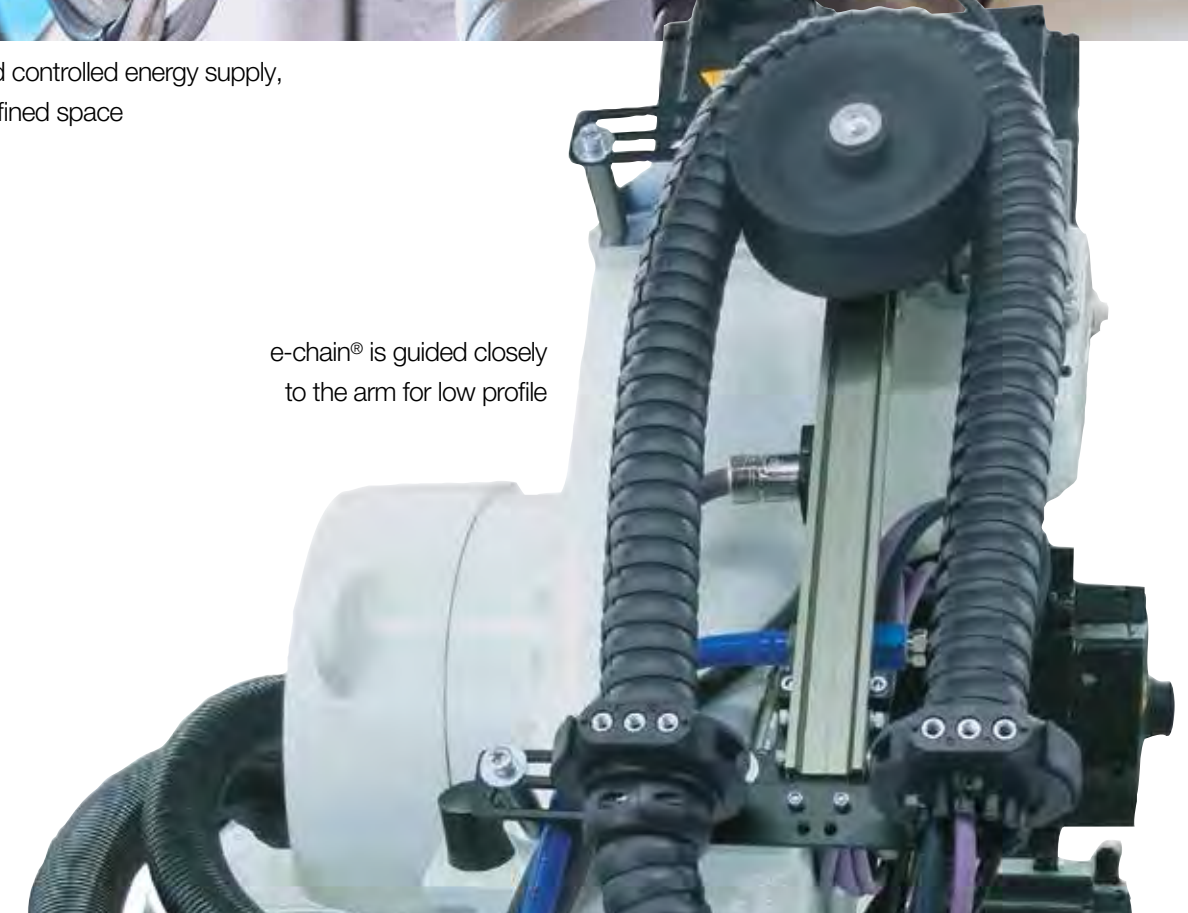
Clamp, axis 6 - for triflex® R mounting bracket

Applications

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



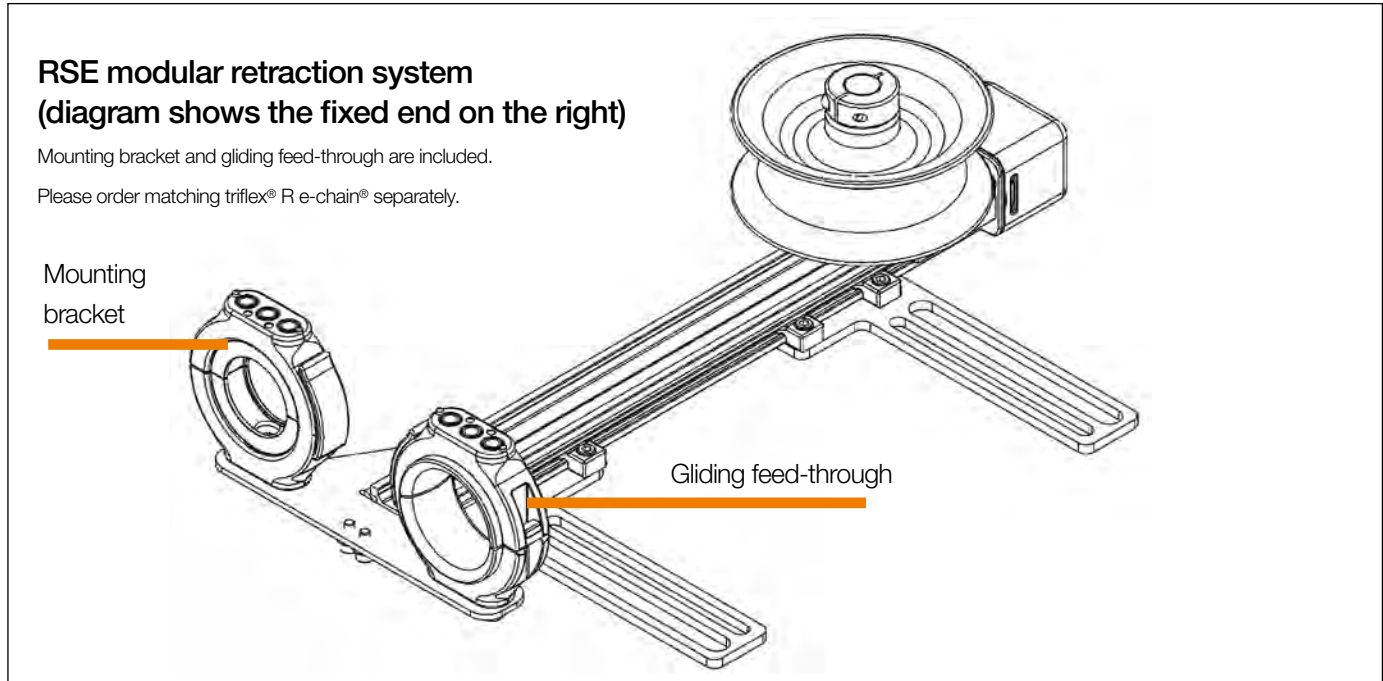
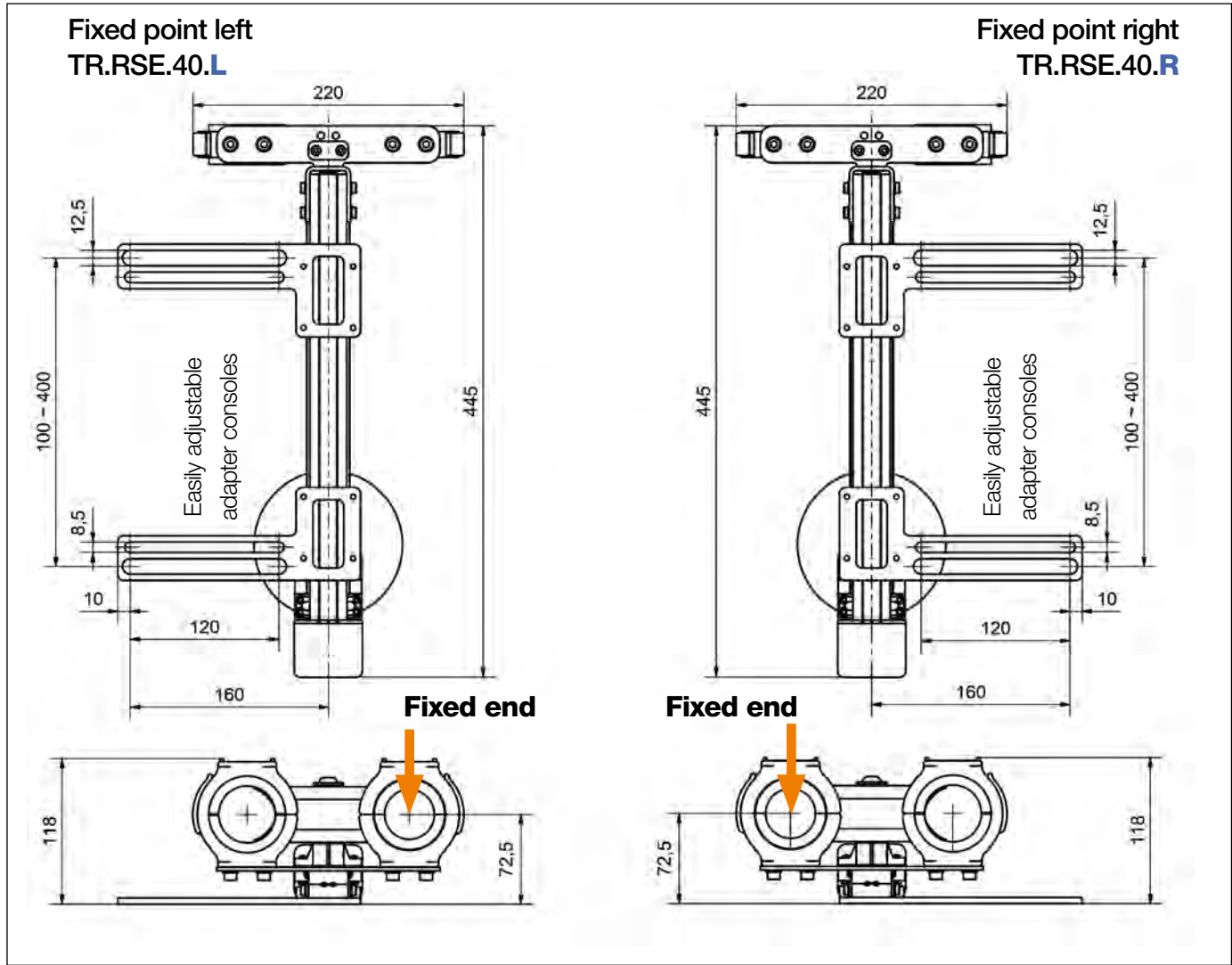
Reliable and controlled energy supply, even in confined space



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



Dimensions | RSE cost-effective retraction system



Product range | RSE cost-effective retraction system

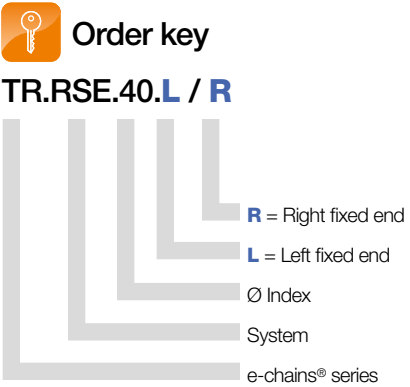
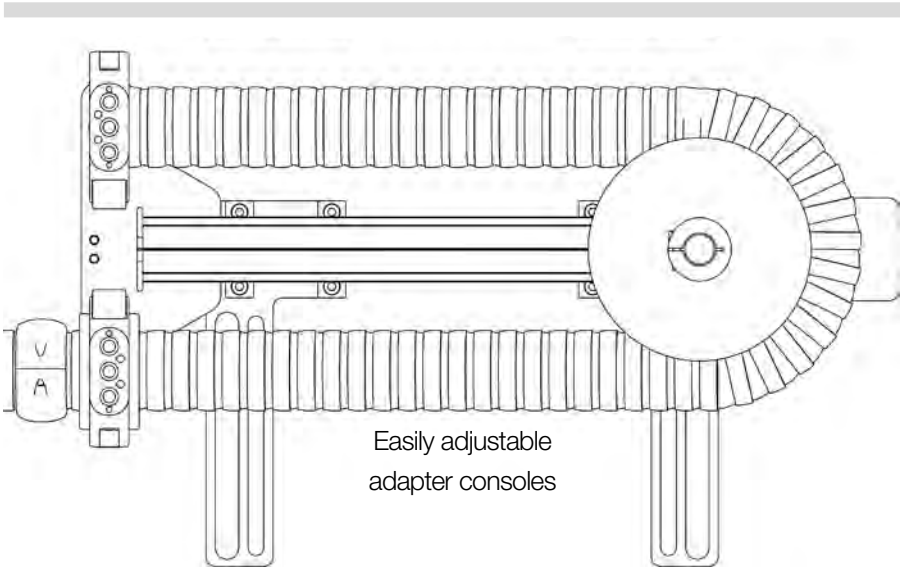
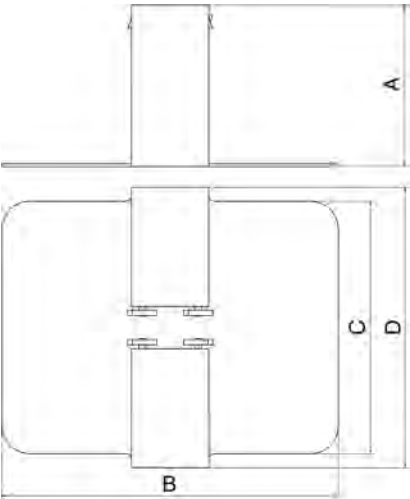
Ø Index	RSP Left fixed point part. no.	RSP Right fixed point part. no.	Retraction travel max. [mm] ¹⁾	Weight [kg]
40.	TR.RSE.40.L	TR.RSE.40.R	500	1,6

1) These are the maximum values. In normal operation a filling of no more than 70% is advised.
Please order matching triflex® R e-chain® separately.

Product range | Cover, optional

Ø Index	Optional cover retrofit kit	A [mm]	B [mm]	C [mm]	D [mm]	Load* ≤ [kg]	Weight [kg]
40.	TR.RSE.40.COVER	115	240	180	200	1,5	1,1

*maximum fill weight to be used with the cover



RSE accessories

e-chain® and cable length calculation

System design | RSE and matching e-chains®

Cover for additional installation space
on the robot, optional: TR.RSE.40.**COVER**

Matching triflex® R e-chains® for RSE
TRC.RSE.40.058.**LLLL.0**
TRE.RSE.40.058.**LLLL.0.B**

Overall length =
additional length of the gliding feed-through
LLLL +
the chain length within the system

RSE system
(e-chain® not included) +
Mounting bracket +
Gliding feed-through =
TR.RSE.40.L or **TR.RSE.40.R**

 Sample order of a complete TR.RSE system, Ø Index 40, fixed end on the left, including cover and e-chain® (standard length: 500 mm)

System	Insert Ø index XX / select fixed end .L / .R	TR.RS.40. L
+ Cover	Insert Ø index XX	TR.RSE.40. COVER
+ e-chain®	Insert ø-index XX / Insert bend radius R / Insert standard length LLLL	TRC.RSE.40.058. 500.0
Order text:	TR.RSE.40. L + TRE.RS.40.COVER + TRC.RSE.40.058. 500.0	



Product range

e-chain® and cable length calculation

Product range | Matching e-chains® for RSE

Ø Index	Part. no. TRC enclosed	Part. no. TRE "easy" design
40.	TRC.RSE.40.058. LLLL.0	TRE.RSE.40.058. LLLL.0.B

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

e-chains® standard lengths
LLLL [mm] | **500** | **750** | **1000** | **1250** |

Part No. with desired value for the **LLLL** standard length (measured from the gliding feed-through) corresponds to the robot arm length from axis 3. Supplement to **TRC.RSE.40.058.500.0**, for example

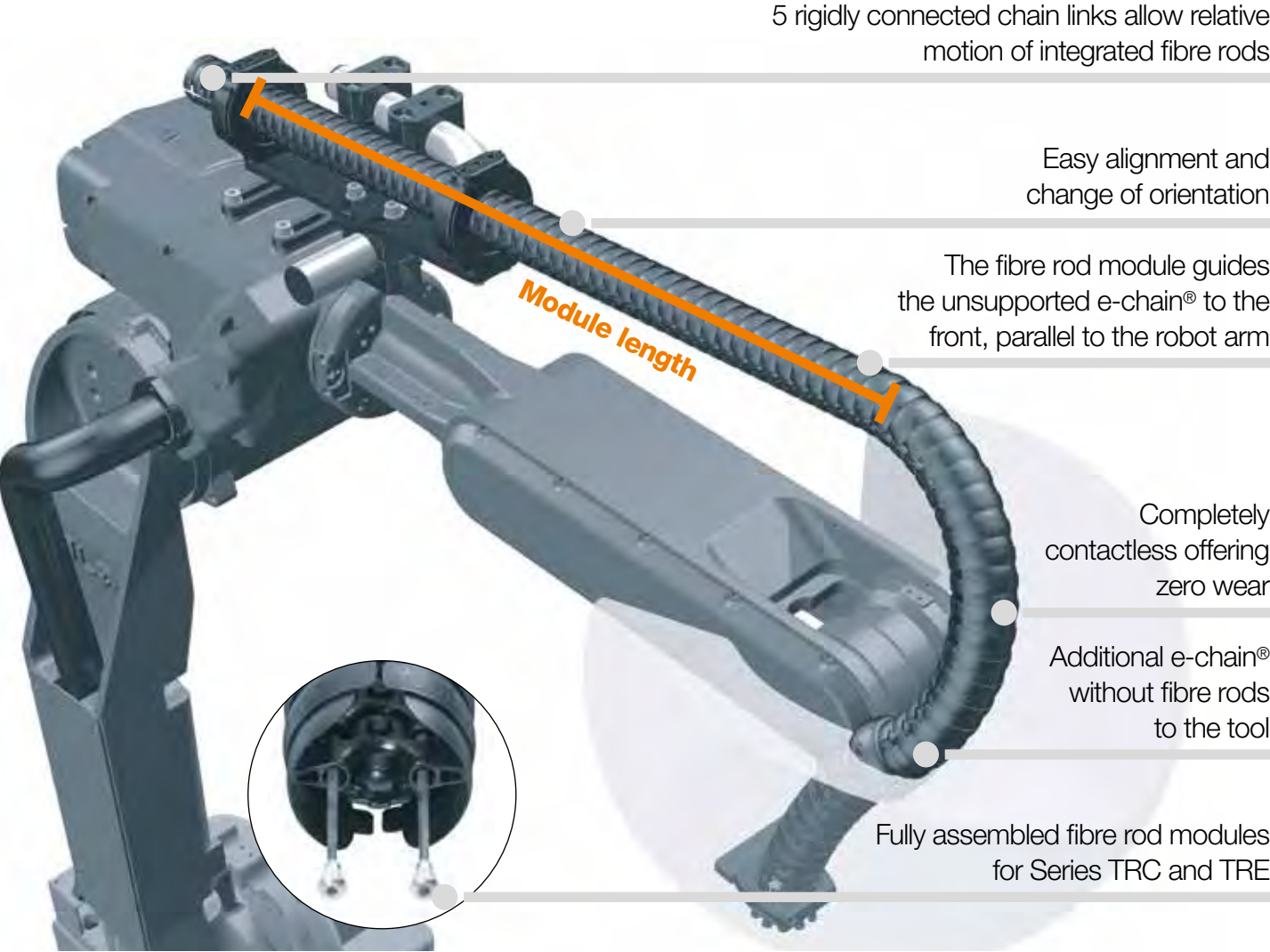
Calculating the overall chain length | RSE e-chains®

Ø Index	R [mm]	e-chain® length within the system [mm]	Number of e-chain® links	Total e-chain® length [mm]
40.	058	904	65	LLLL + 904

Please add the chain length within the system to the standard length **LLLL** (measured from the gliding feed-through) to get the **overall chain length**

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 depend on the installation orientation: only the front end allows flexible movement. The five rear chain links are rigidly connected to allow the relative movement of the integrated fibre rods. This results in a fully contactless and therefore zero-wear energy supply system, particularly 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

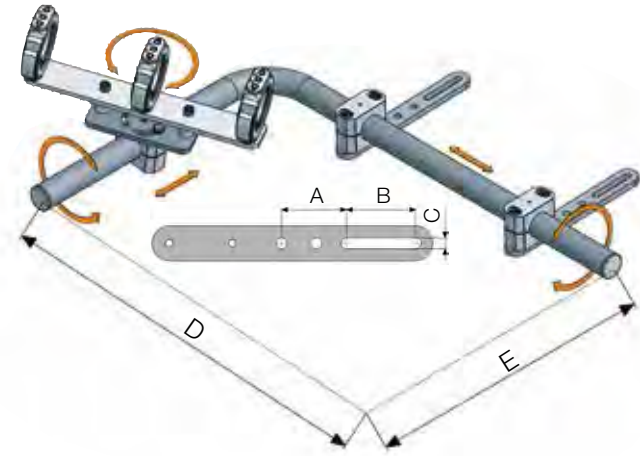
For series TRC·TRE

Part. no. fibre rod modules for TRC / TRE		Length approx. [m]	Part. no. fibre rod modules for TRC / TRE		Length approx. [m]
TRC.40			TRE.40		
TRC.F.40.1000.1.0	TRE.F.40.1000.1.0.B	1,0	TRC.F.85.2000.1.0	TRE.F.85.2000.1.0.B	2,0
TRC.F.40.0900.1.0	TRE.F.40.0900.1.0.B	0,9	TRC.F.85.1800.1.0	TRE.F.85.1800.1.0.B	1,8
TRC.F.40.0800.1.0**	TRE.F.40.0800.1.0.B**	0,8	TRC.F.85.1600.1.0	TRE.F.85.1600.1.0.B	1,6
TRC.F.40.0700.1.0	TRE.F.40.0700.1.0.B	0,7	TRC.F.85.1400.1.0**	TRE.F.85.1400.1.0.B**	1,4
TRC.F.40.0600.1.0	TRE.F.40.0600.1.0.B	0,6	TRC.F.85.1200.1.0	TRE.F.85.1200.1.0.B	1,2
TRC.F.40.0500.1.0	TRE.F.40.0500.1.0.B	0,5	TRC.F.85.1000.1.0	TRE.F.85.1000.1.0.B	1,0
TRC.F.40.0400.1.0	TRE.F.40.0400.1.0.B	0,4	TRC.F.85.0800.1.0	TRE.F.85.0800.1.0.B	0,8
TRC.60			TRE.60		
TRC.F.60.1400.1.0	TRE.F.60.1400.1.0.B	1,4	TRC.F.100.2000.1.0	TRE.F.100.2000.1.0.B/.C ¹⁾	2,0
TRC.F.60.1200.1.0	TRE.F.60.1200.1.0.B	1,2	TRC.F.100.1800.1.0	TRE.F.100.1800.1.0.B/.C ¹⁾	1,8
TRC.F.60.1000.1.0**	TRE.F.60.1000.1.0.B**	1,0	TRC.F.100.1600.1.0	TRE.F.100.1600.1.0.B/.C ¹⁾	1,6
TRC.F.60.0800.1.0	TRE.F.60.0800.1.0.B	0,8	TRC.F.100.1400.1.0**	TRE.F.100.1400.1.0.B/.C ¹⁾ **	1,4
TRC.F.60.0600.1.0	TRE.F.60.0600.1.0.B	0,6	TRC.F.100.1200.1.0	TRE.F.100.1200.1.0.B/.C ¹⁾	1,2
TRC.F.60.0400.1.0	TRE.F.60.0400.1.0.B	0,4	TRC.F.100.1000.1.0	TRE.F.100.1000.1.0.B/.C ¹⁾	1,0
TRC.70			TRE.70		
TRC.F.70.1800.1.0	TRE.F.70.1800.1.0.B	1,8	TRC.F.125.2000.1.0	TRE.F.125.2000.1.0	2,0
TRC.F.70.1600.1.0	TRE.F.70.1600.1.0.B	1,6	TRC.F.125.1800.1.0**	TRE.F.125.1800.1.0**	1,8
TRC.F.70.1400.1.0	TRE.F.70.1400.1.0.B	1,4	TRC.F.125.1600.1.0	TRE.F.125.1600.1.0	1,6
TRC.F.70.1200.1.0**	TRE.F.70.1200.1.0.B**	1,2	TRC.F.125.1400.1.0	TRE.F.125.1400.1.0	1,4
TRC.F.70.1000.1.0	TRE.F.70.1000.1.0.B	1,0	TRC.F.125.1200.1.0	TRE.F.125.1200.1.0	1,2
TRC.F.70.0800.1.0	TRE.F.70.0800.1.0.B	0,8	TRC.F.125.1000.1.0	TRE.F.125.1000.1.0	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.125.1800.1.0**	TRE.F.125.1800.1.0**	1,8	TRC.F.125.1600.1.0	TRE.F.125.1600.1.0	1,6
TRC.F.125.1600.1.0	TRE.F.125.1600.1.0	1,6	TRC.F.125.1400.1.0	TRE.F.125.1400.1.0	1,4
TRC.F.125.1400.1.0	TRE.F.125.1400.1.0	1,4	TRC.F.125.1200.1.0	TRE.F.125.1200.1.0	1,2
TRC.F.125.1200.1.0	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) Please append index .C for C version

Universal mounting kits | For TRC·TRE

● Stainless steel angle tube with attachment brackets and module retainer ● 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.

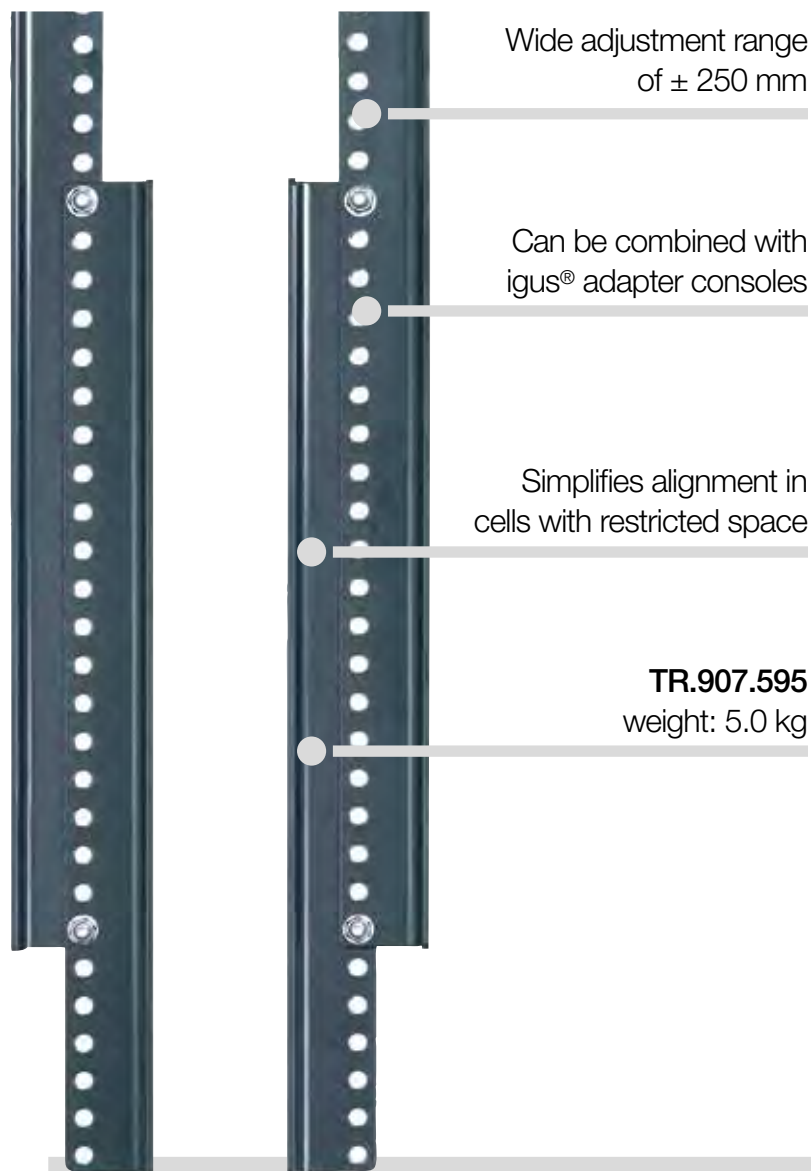


Ø		A	B	C	D	E	Weight
Index		[mm]	[mm]	[mm]	[mm]	[mm]	[kg]
40.	▶ TR.40.80	40	30	8,4	475	325	3,6
60.	▶ TR.60.80	40	30	8,4	475	325	4,3
70.	▶ TR.70.80	75	80	12,6	875	575	5,9
85.	▶ TR.85.80	75	80	12,6	875	575	6,3
100.	▶ TR.100.80	75	80	12,6	875	575	6,3
125.	▶ TR.125.80	75	80	12,6	875	575	8,5



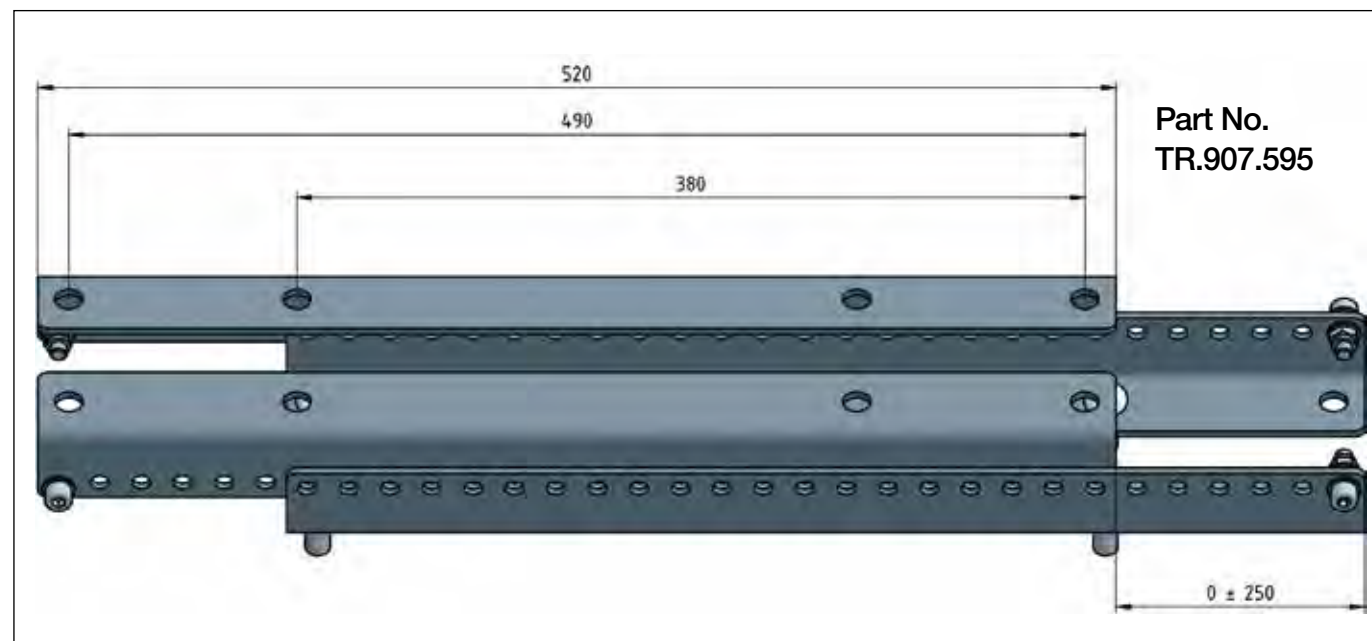
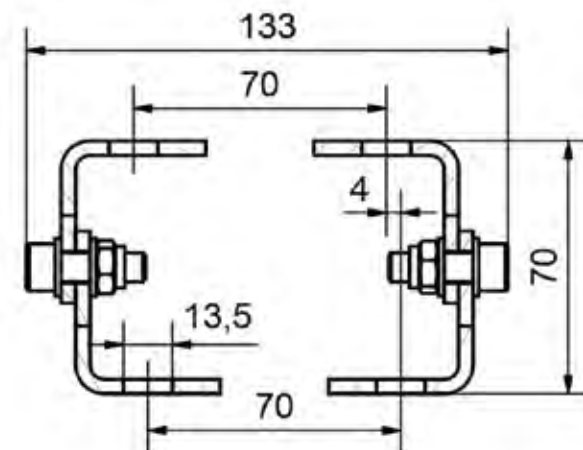
triflex® R accessories

Adjustment unit



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

Product range

Adapter console



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 $\varnothing 12.5$ 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 lateral mounting options - in these cases, our adapter product range also supports reliable installation of the retraction systems without additional engineering. **Adapter consoles for many robot types, from stock. Product range ► next page**



Application example with RS system on ABB Series 6600



triflex®
R

Accessories

Adapter consoles

Adapter console	Part No.	For manufacturers	For robot type	Weight [kg]
	TR.907.347	ABB	IRB 6600 IRB 6640 IRB 6650	4
	TR.907.468	ABB	IRB 6400	9,8
	TR.907.448	ABB	IRB 4400	5
	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	Motomann	UP 20 ES 165 HP 50 UP 50 ES 200 MH6 UP 130 ES 280 HP 165 UP 165 HP 20	3,6
	TR.909.641	Motomann	MH50	2,0

More Adapter consoles on request. CAD data online.

Product range

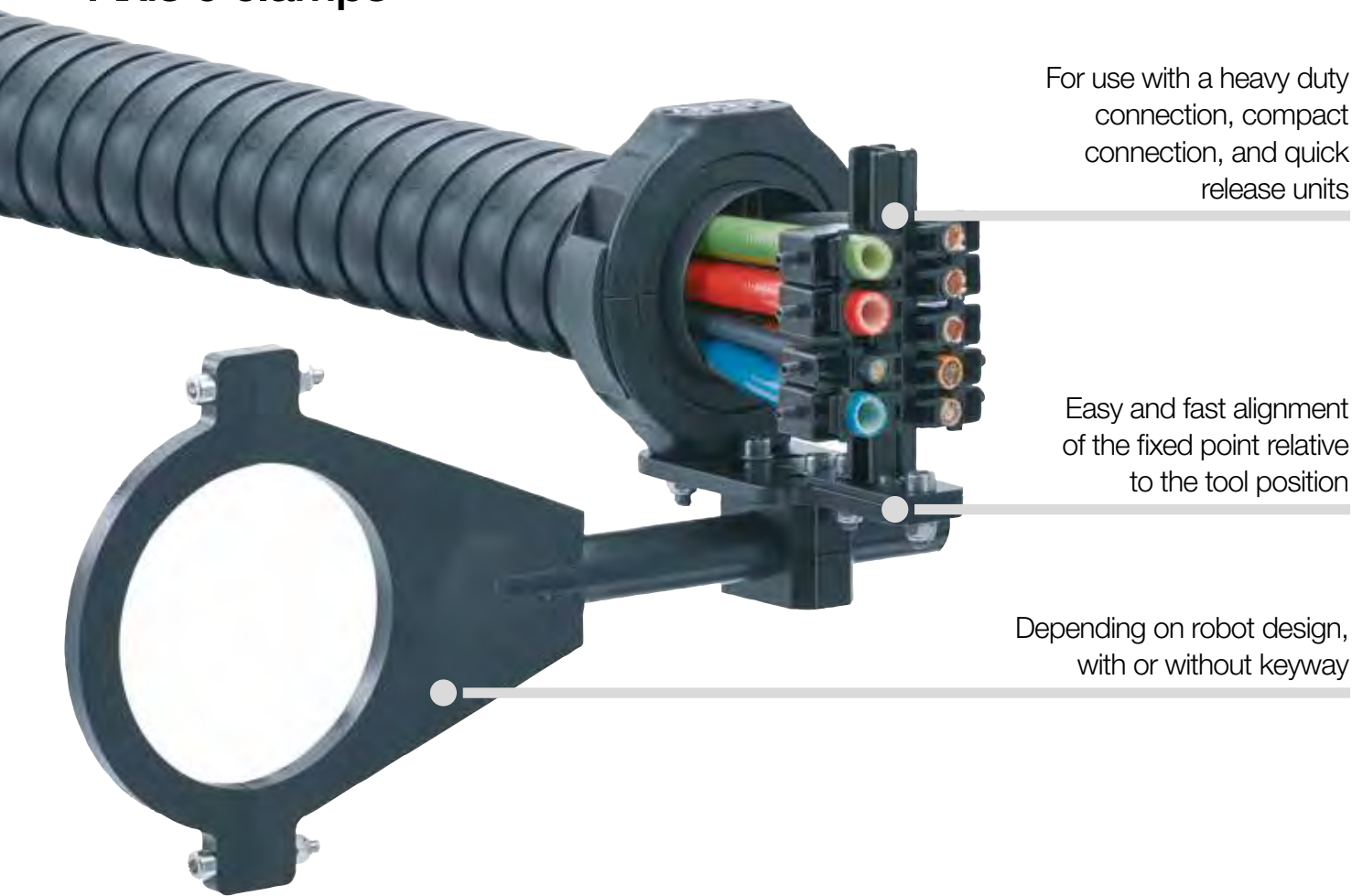
Adapter consoles

Adapter console	Part No.	For manufacturers	For robot type	Weight [kg]
	TR.911.220	Fanuc	M-710iC 50 M-710iC 70	2
	TR.908.973	Fanuc	M-710iB 45	1,1
	TR.907.270	Fanuc	R-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 KR5arc KR6 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
	Spacer pin TR.911.223	Kuka	Series Quantec (4 piece kit)	0,6

More Adapter consoles on request. CAD data online.

triflex® R accessories

Axis 6 clamps



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

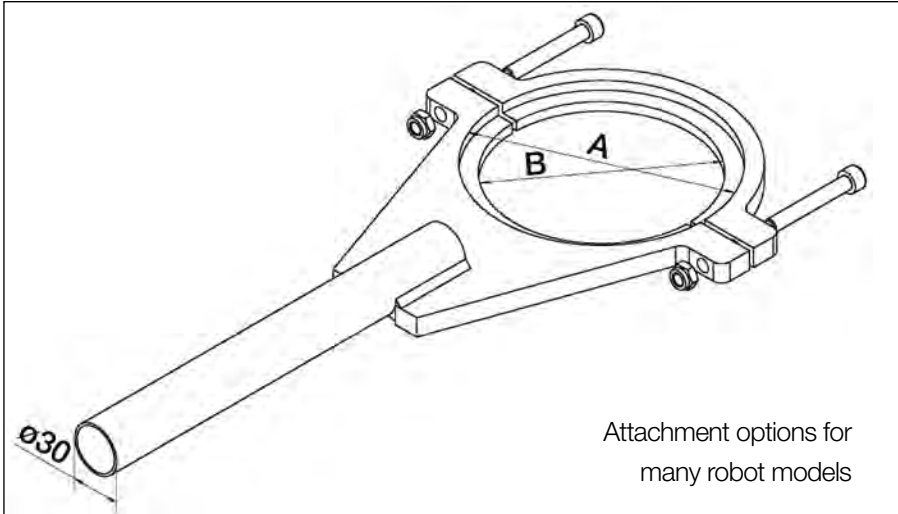
Easy and fast alignment of the fixed point relative to the tool position

Depending on robot design, with or without keyway

Clamps for attachment to axis 6

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

- For use with heavy duty connection **TR.XX.20 / TR.XX.23**
- For use with compact connection **TR.XX.21.01 / TR.XX.21.02**
- For use with quick exchange unit **TR.XX.22**

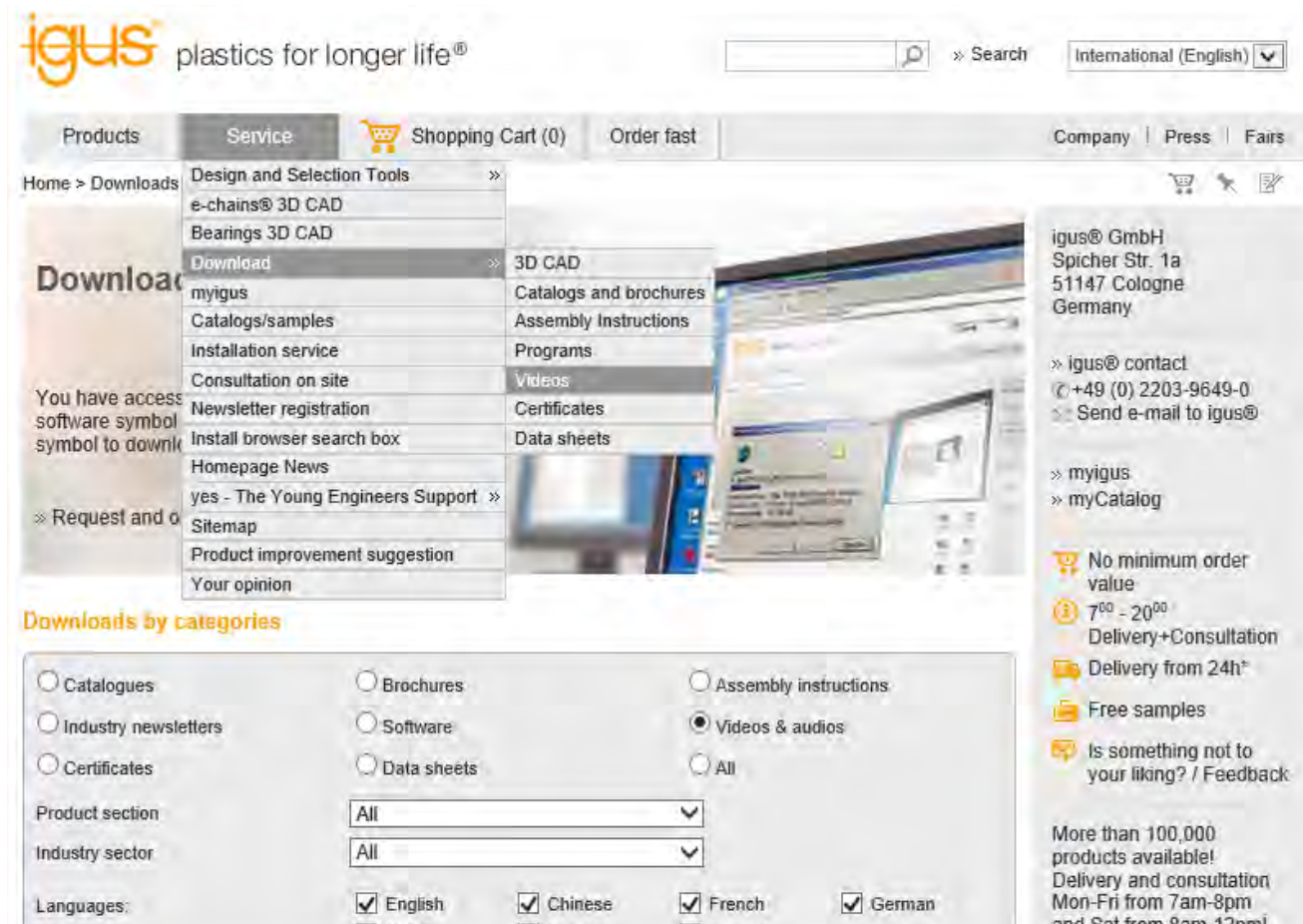


Product range

Clamps

Part No.	For	with	A	B	Weight
Clamp	robot type	recess	[mm]	[mm]	[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 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 RV130	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	Motoman UP 50	yes	125	100	1,9
	Motoman HP 50	yes	125	100	1,9
	Motoman 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 TX ₂ 00	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.908.107.223	ABB IRB 7600-340	no	223	= A	3,5
	ABB IRB 7600-500	no	223	= A	3,5
TR.907.667.250	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

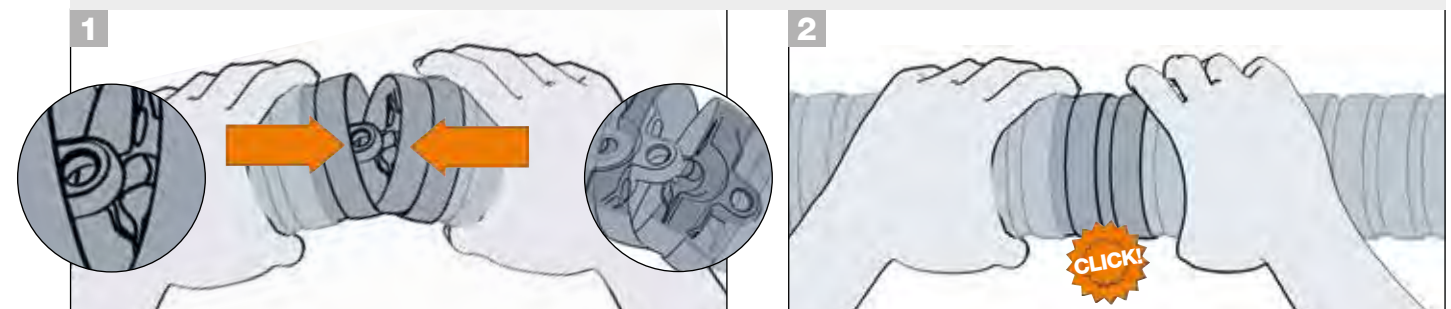
Other dimensions available on request



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

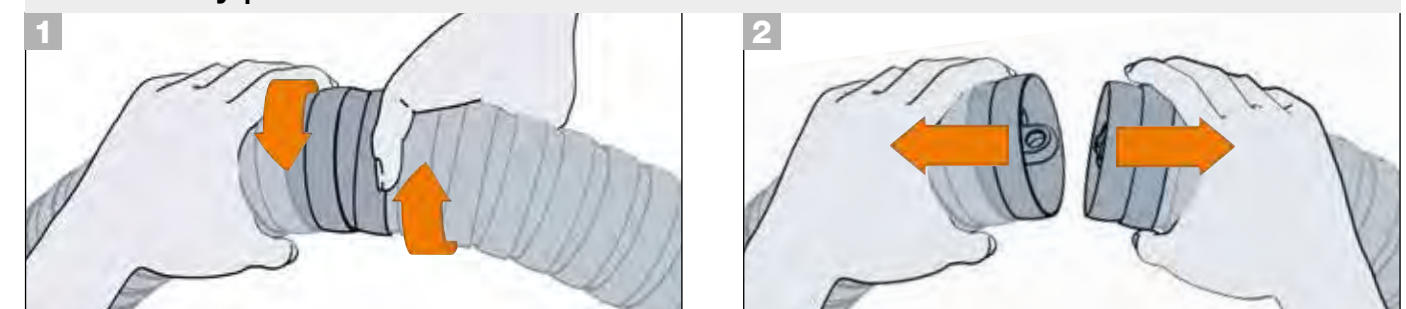


Assembly | TRC.30 · TRC.40 · TRC.60 · TRC.70 · TRC.85 · TRC.100



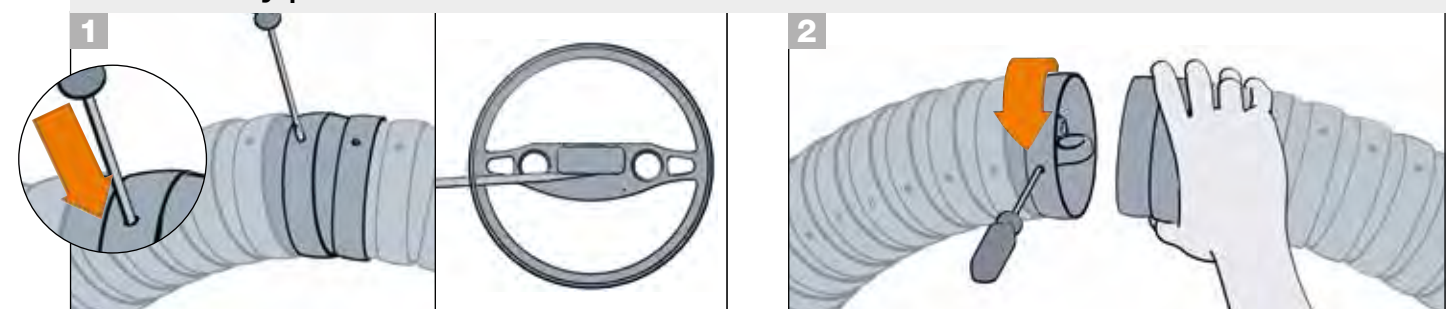
Engage the e-chain® links on the lower side. Use the chamfered side of the ball to open the socket and click together.

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



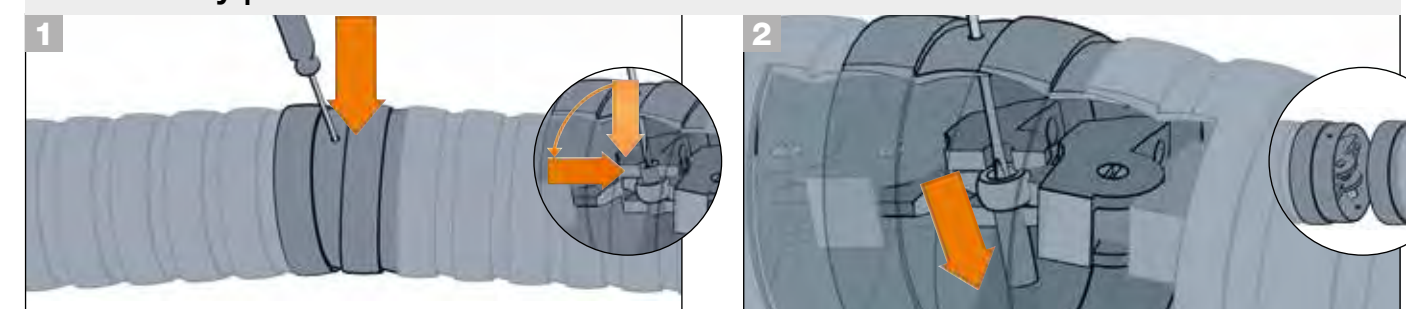
To disassemble, move triflex® R TRC.30, TRC.40 and TRC.60 to the bend radius stop then twist apart counterclockwise.

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 arm, 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.

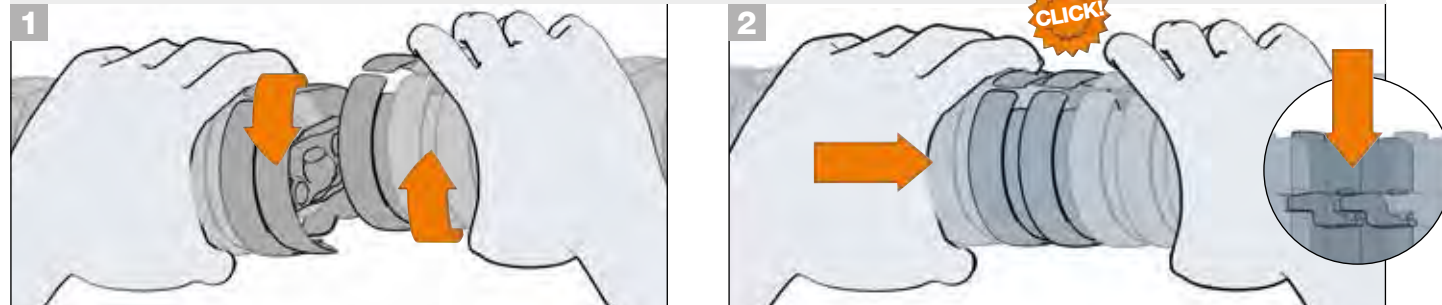


triflex® R TRE.B

Assembly instructions

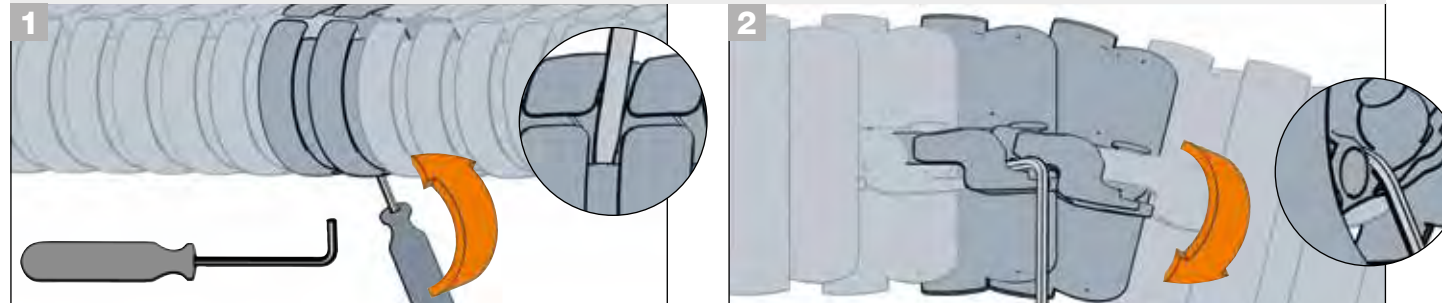


Assembly | TRE.B



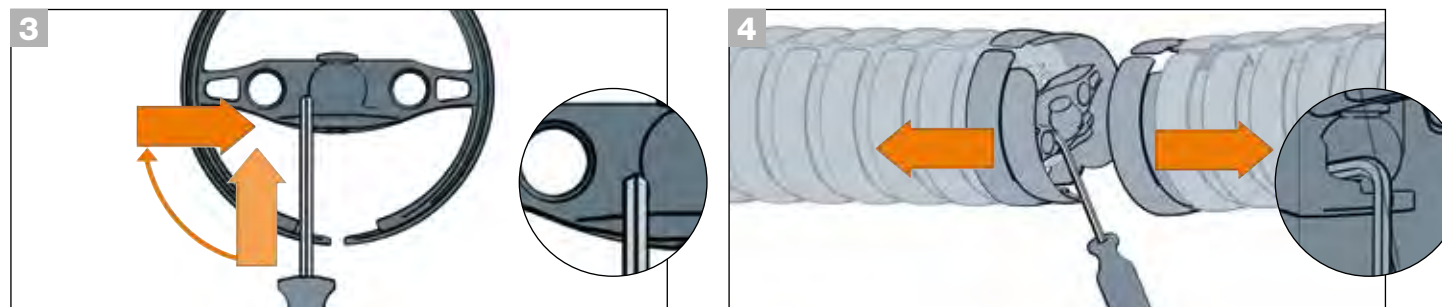
Engage the e-chain® links on the lower side. Use the chamfered side of the ball to open the socket and slightly rotate the e-chain® links to click together. Push the socket downward onto the ball in a straight motion. An audible “click” can be heard on successful connection

Disassembly | TRE.B



Introduce disassembly tool into the e-chain®.

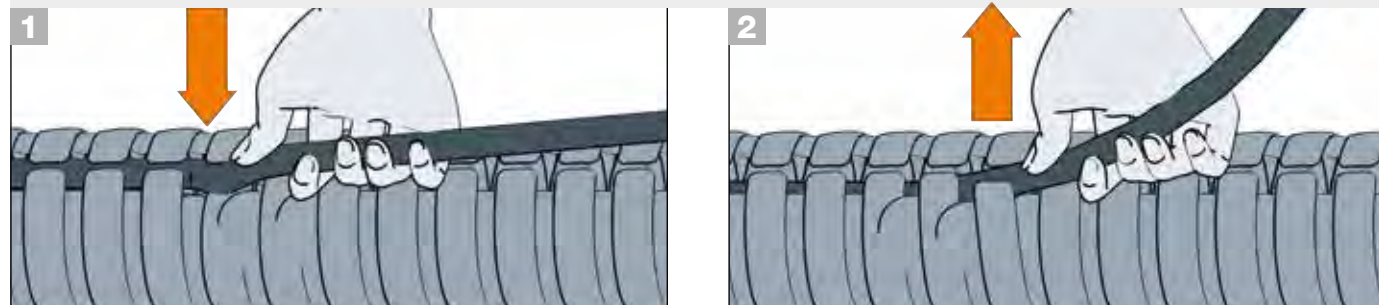
Hook the tool between ball and socket.



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

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

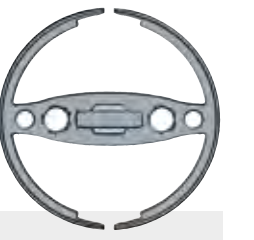
Filling | TRE.B



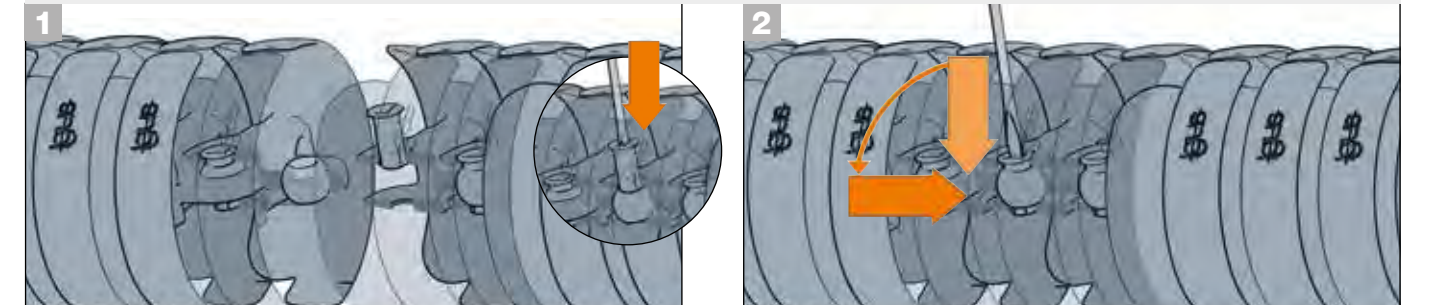
Very simple filling with “easy” design - simply push cables in... and pull them out

triflex® R TRE.C

Assembly instructions

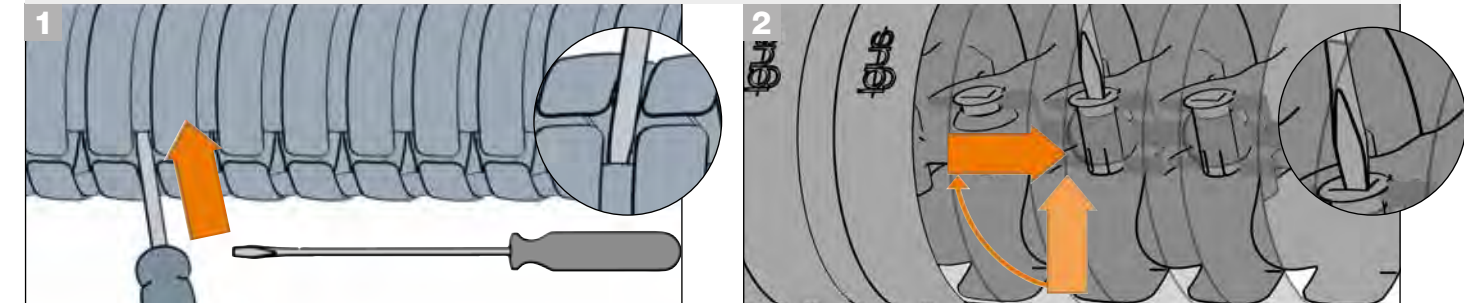


Assembly | TRE.100.C · TRE.125 · TRC.125



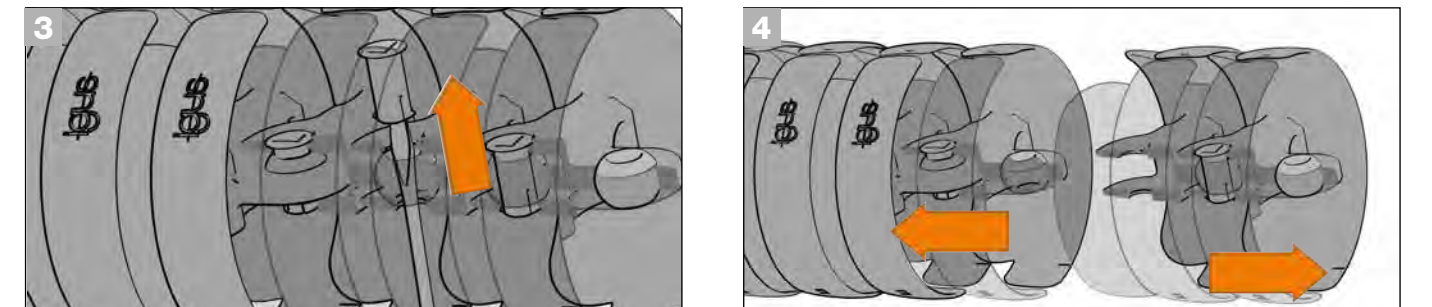
Align e-chain® links and use a screw driver to push the bolt down. Secure the connection bolt by rotating 90°.

Disassembly | TRE.C



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

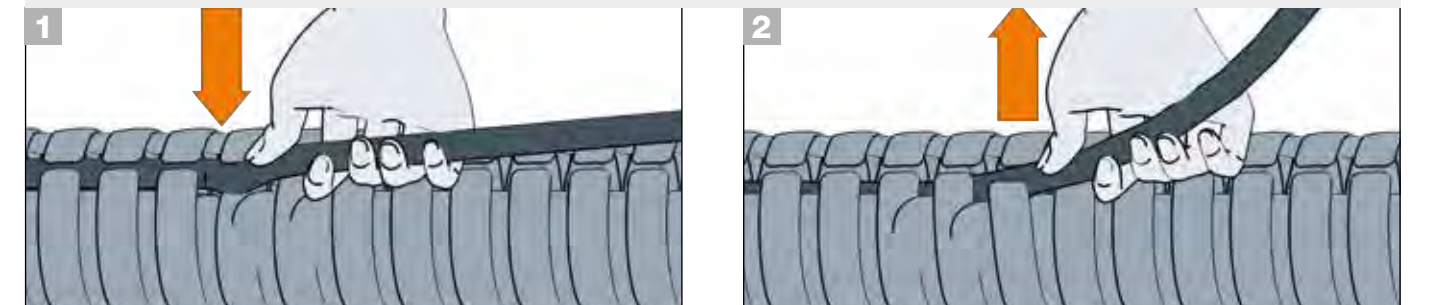
Unlatch bolt by rotating it 90°.



Push bolts through.

Simply slide the chain links apart.

Filling | TRE.C



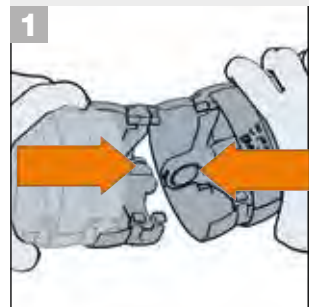
Very simple filling with “easy” design - simply push cables in... and pull them out

triflex® R TRCF

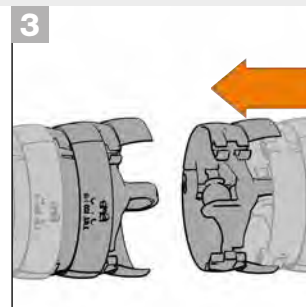
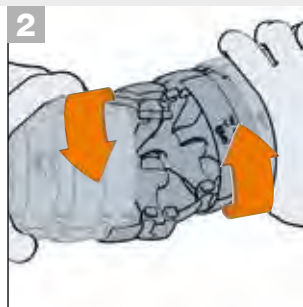
Assembly instructions



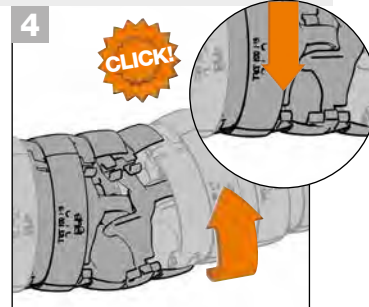
Assembly | TRCF



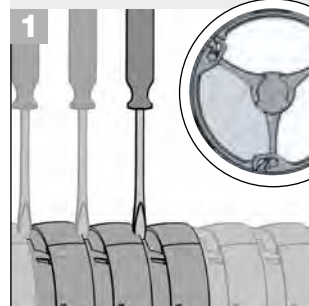
Attach chain parts at an angle and push them together.



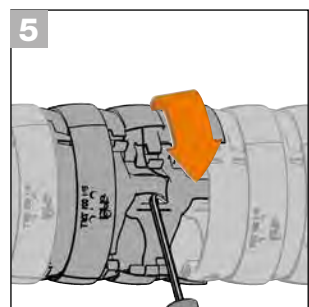
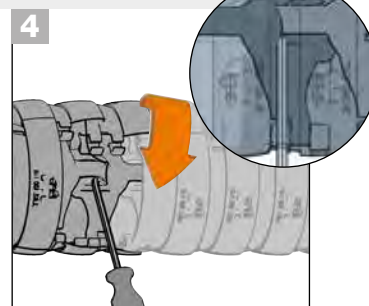
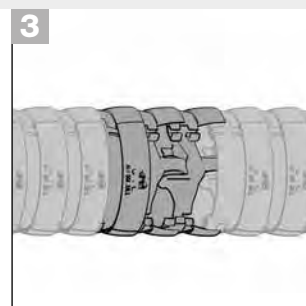
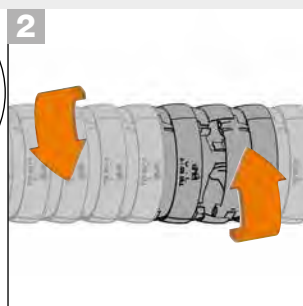
To close, simply snap the opened cover.



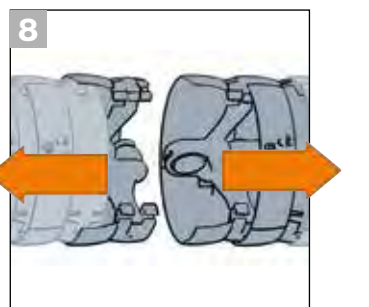
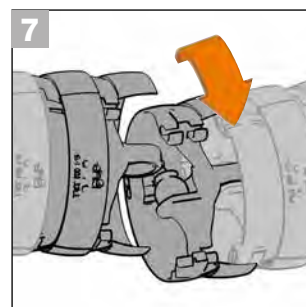
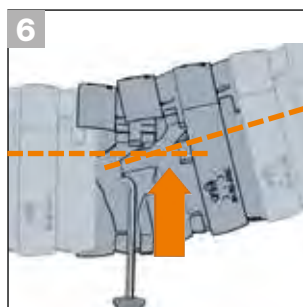
Disassembly | TRCF



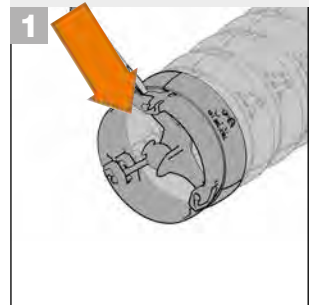
Using a screwdriver, unlatch the lid of three chain links as marked. Open two lids by gently twisting the chain links from each other. Introduce disassembly tool between ball and socket.



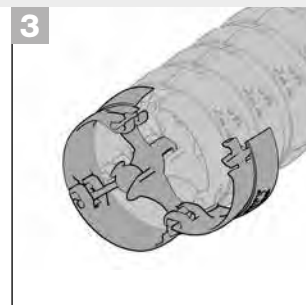
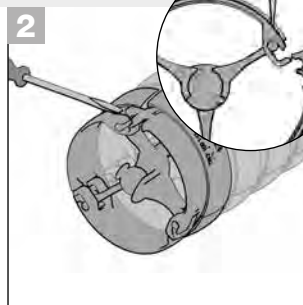
Then by turning the chain links against the stop given by the disassembly tool - push the socket over the ball. Slightly bend the e-chain®, then turn and pull apart.



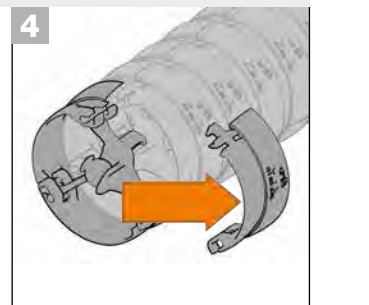
Opening | TRCF



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

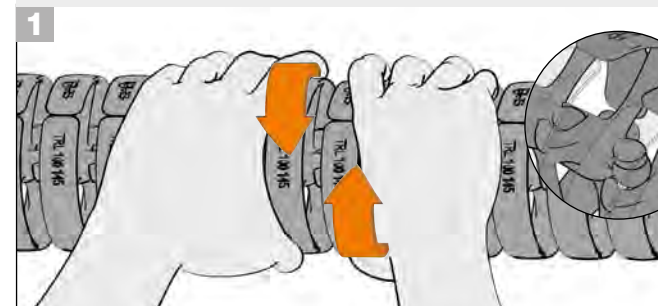


Attach ball with round side over socket.

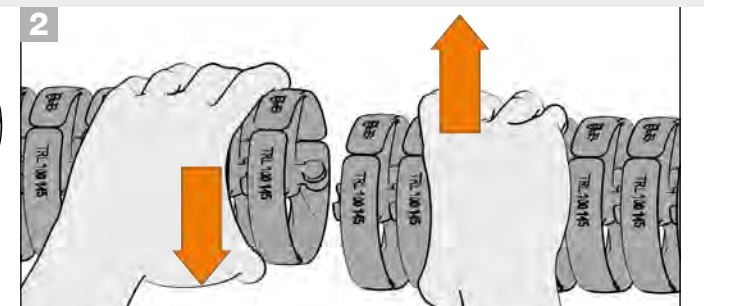


Press the ball into the socket ...

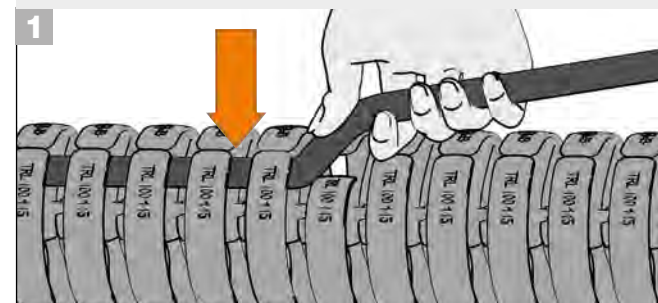
Disassembly | TRL



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



Filling | TRL



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

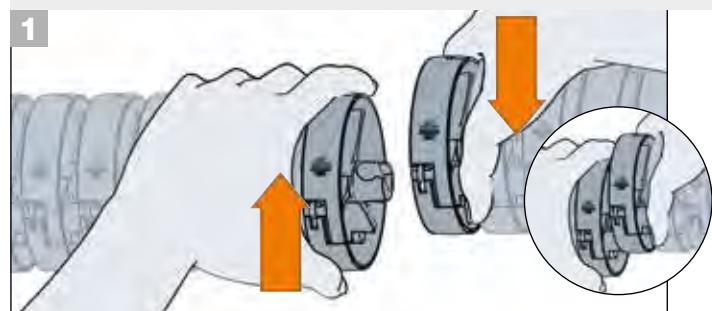


triflex® R TRLF

Assembly instructions



Assembly | TRLF

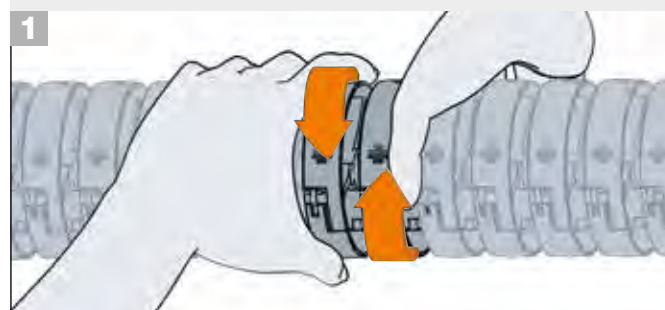


Attach ball with round side over socket.

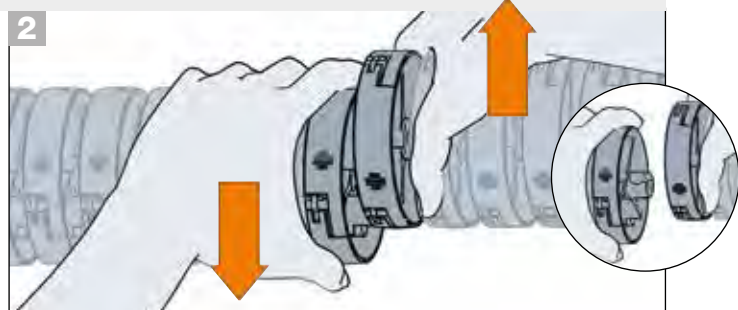


Press ball into the socket.

Disassembly | TRLF



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

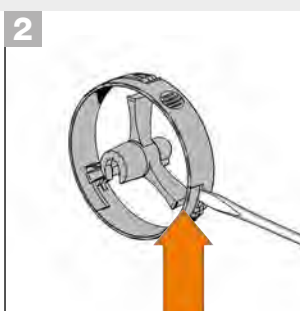


Push the lid until it locks.

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

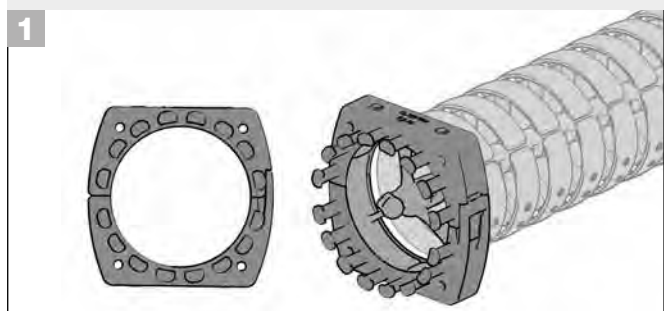
Assembly instructions mounting bracket & disassembly tool

Opening | Standard-mounting brackets

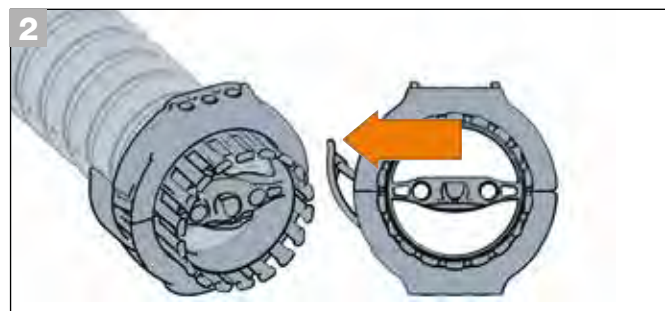


Standard mounting brackets can be opened without tools.

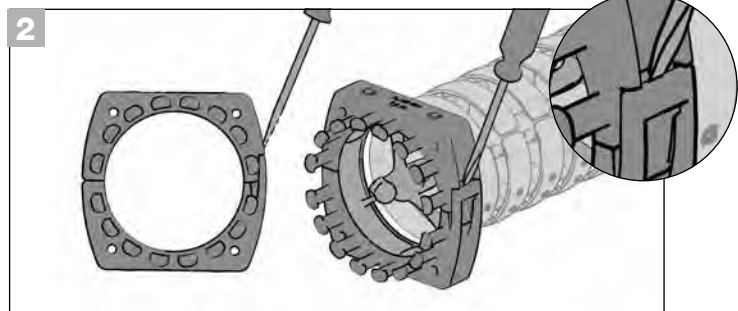
Opening | Light-mounting brackets



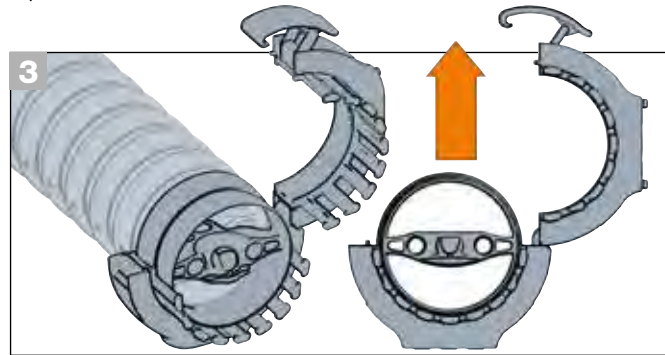
Light mounting brackets can be opened with a screwdriver.



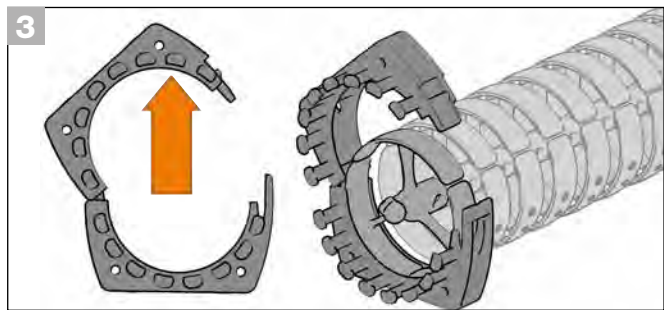
Open the side lever to unlock the bracket.



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



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



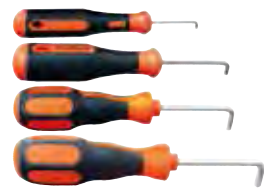
Flip open the mounting bracket and remove the e-chain®.



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

Disassembly tools

Easy-to-use disassembly tools for triflex® TRE (B version) and TRCF. Easy disassembling at any position of TRE B-series even when full



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

A red 3D e-chain is shown against a white background. The chain is formed into a large arch, with the left side being a straight vertical section and the right side curving into a horizontal tail. The chain consists of multiple rows of red plastic links, each with a circular hole in the center. The text 'More 3D e-chains® for simple multi-axis movements' is written in black and orange, with 'easy triflex® & triflex®' in smaller black text below it.

More 3D e-chains[®] for simple multi-axis movements

easy triflex[®] & triflex[®]

easy triflex® advantages



KMA mounting brackets:
split mounting bracket with integrated strain relief

Modular:
easy lengthening and
shortening at any given point

Robust:
"push-button" joint

Simple:
easy filling from both sides

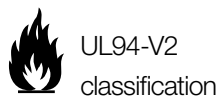
Fast:
simply press cable in along
the inner or outer radius

Customisable:
different bend radii and
types can be combined

Flexible:
multi-axis movement for
machinery of all kinds

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 of an e-chain® with its defined bend radius. With easy triflex® the installation of cables and hoses is simple. With flexible crossbars the cables are simply pushed into the e-chain® from above or below. The unique modular programme allows you to follow very complex movements. For example it is possible to combine 1- 2- and 3-axis links in one e-chain®.



UL94-V2
classification



iF product design award
2000 Series easy triflex®

Overview

Series	Inner height <i>Bi1/Bi2</i> [mm]	Inner width <i>Bi3</i> [mm]	Outer width/height <i>Ba</i> [mm]	Bend radius <i>R</i> [mm]	Pitch [mm]	igus® online
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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 movements - "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



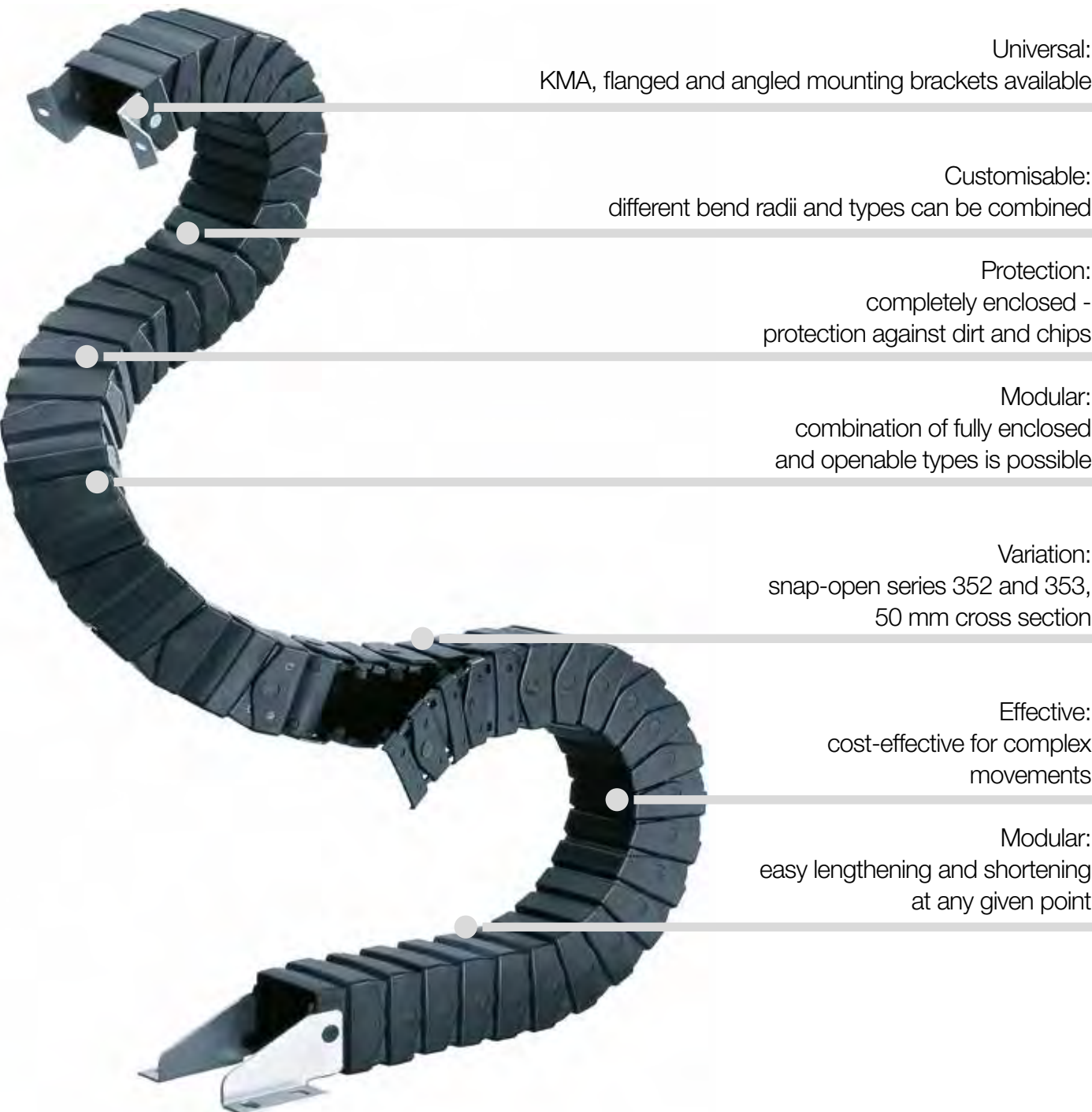
Available from stock. Delivery time* from 24 hrs or same day!

*Delivery time refers the time until the product is shipped (after verifying technical feasibility)



The complete range with order options,
3D-CAD, configurators, PDF, application examples ► www.igus.eu/easytriflex





Universal:
KMA, flanged and angled mounting brackets available

Customisable:
different bend radii and types can be combined

Protection:
completely enclosed -
protection against dirt and chips

Modular:
combination of fully enclosed
and openable types is possible

Variation:
snap-open series 352 and 353,
50 mm cross section

Effective:
cost-effective for complex
movements

Modular:
easy lengthening and shortening
at any given 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 of an e-chain® with its defined bend radius. The unique, modular product range allows very complex motions. For example it is possible to combine 1- 2- and 3-axis links in one e-chain®.



Overview

Series	Inner width/height <i>Bi</i> [mm]	Outer width/height <i>Ba</i> [mm]	Bend radius <i>R</i> [mm]	Pitch [mm]	igus® online
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Single-axis movement - enclosed
protection against dirt and chips

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 *BBR* (Reverse Bend Radius)
protection against dirt and chips

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



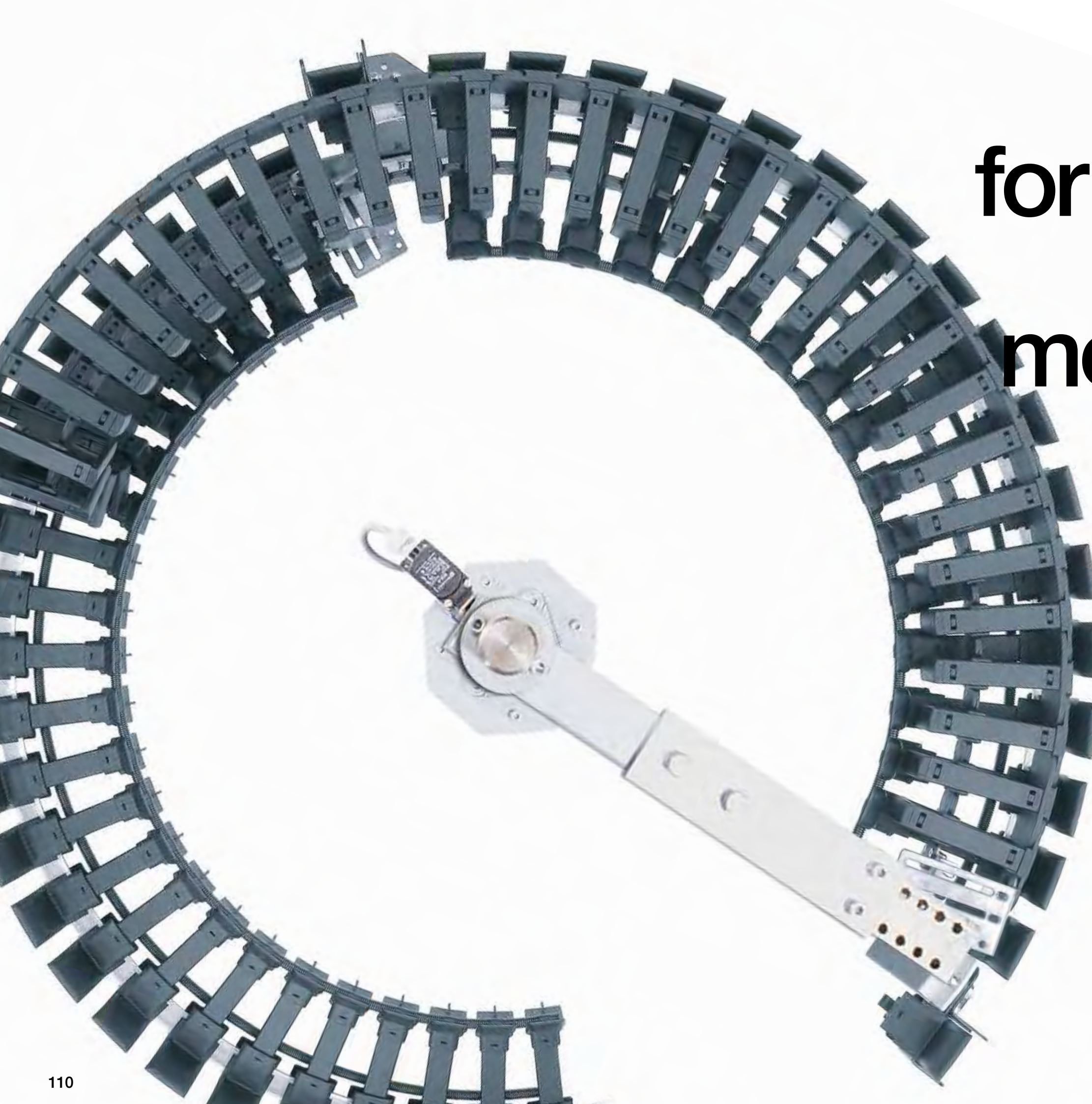
Triple-axis movement - enclosed,
with *BBR* (Reverse Bend Radius)
protection against dirt and chips

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 snap-open

Available from stock. Delivery time* from 24 hrs or same day!
*Delivery time refers the time until the product is shipped (after verifying technical feasibility)

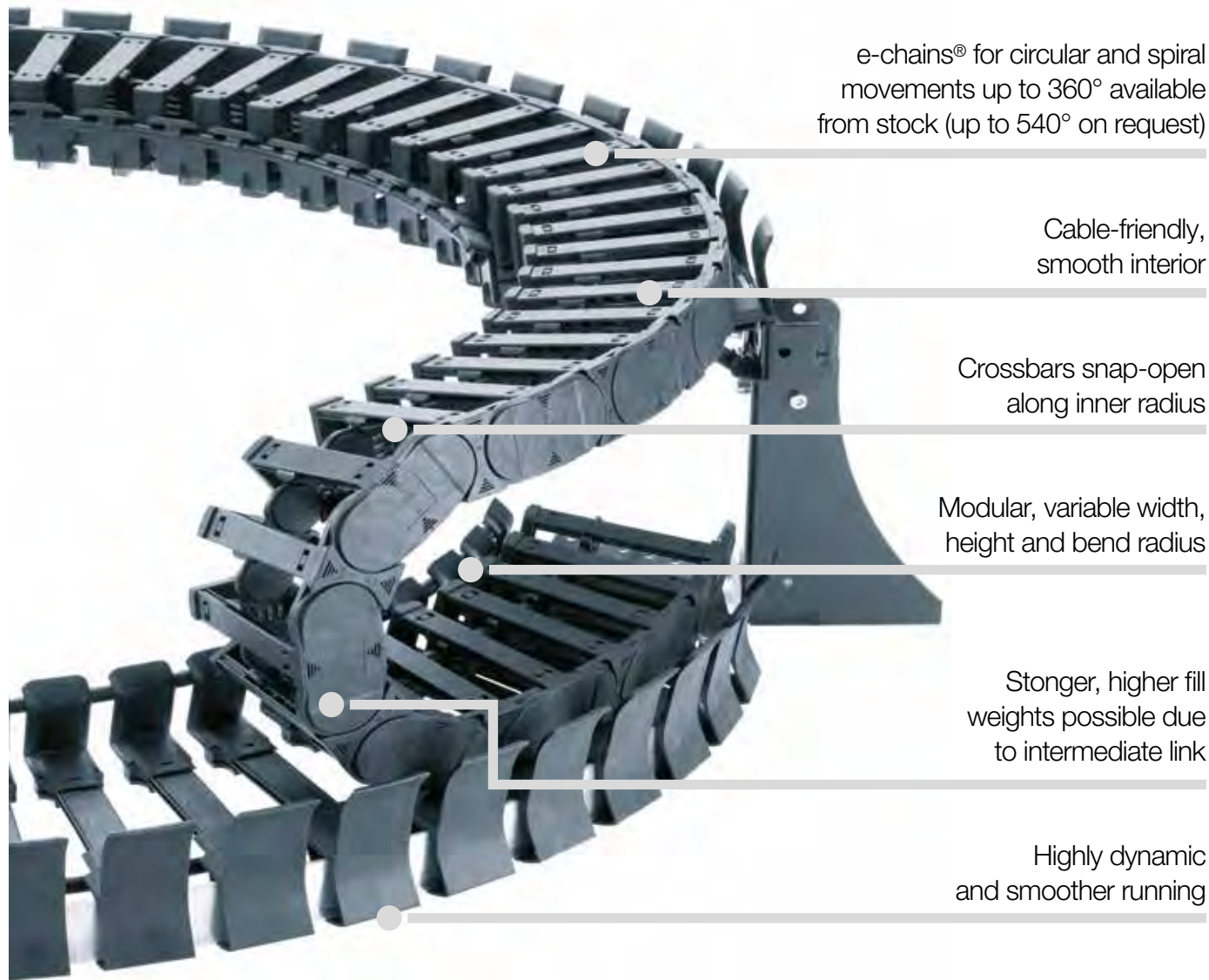
Complete product range with ordering options,
3D-CAD, configurators, PDF, applications ► www.igus.eu/triflex



e-chains[®] for circular & rotary movements

twisterchain[®]
twisterband
RBR

twisterchain® advantages



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

Cable-friendly, smooth interior

Crossbars snap-open along inner radius

Modular, variable width, height and bend radius

Stronger, higher fill weights possible due to intermediate link

Highly dynamic and smoother running

Stronger, quieter, for higher loads – Circular and spiral movements up to 540°* for robot axis 1 - twisterchain®

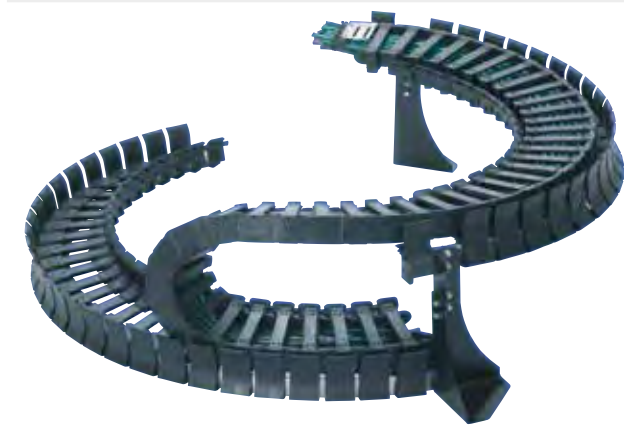
The igus® twisterchain® product line offers an extensive range of products for rotary movement and is available in three sizes. Its modular width and radius design ensures it can be used flexibly in applications with circular and spiral movements up to 360° and more, with high fill weights and where 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, rotation angles up to 360° from stock and up to 540° upon request.

- e-chains® for circular and spiral movements up to 360°available from stock (up to 540° on request)
- Stronger, higher fill weights possible, smoother running, weight-reduction
- Rotary speeds up to 1 m/s and more
- Cable-friendly, smooth interior ● Crossbars snap-open along inner radius
- Over 1 million cycles tested successfully in the igus® laboratory

 e-chains® for circular movements up to 360° available from stock (up to 540° on request)  UL94-V0 classifications upon request

Overview

Series	Inner height <i>hi</i> [mm]	Inner width <i>Bi</i> [mm]	Outer width <i>Ba</i> [mm]	Outer height [mm]	Bend radius <i>R</i> [mm]	Circular radii <i>AR</i> [mm]	page
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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	114
TC42	42	87,5 - 200	110,5 - 223	64	100 - 250	400 - 850	116
TC56	56	125 - 200	155 - 230	84	150 - 400	650 - 850	118

 Available from stock. Delivery time* from 24 hrs or same day!
*Delivery time refers the time until the product is shipped (after verifying technical feasibility)

Quickly generate complete twisterchain® 3D CAD models

- Prepare 3D models by only inputting e-chain® radius and available area
- Free positioning of the e-chain® moving end along the travel length
- Optional generation of twisterchain® as single part or complete with guide trough and base support
- Fast download of the CAD files without registration
- CAD models in 11 different 3D CAD formats and 8 different 2D CAD formats

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



twisterchain® TC32

32 mm 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]	Weight
[mm]	[mm]	[mm]	[mm]	[mm]	TC32...	TC32...	TC32...	TC32...	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 T [mm/link]	56
Links/m	18
corresponding length [mm]	1008



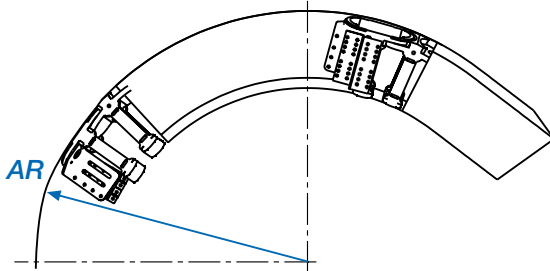
twisterchain® 2nd generation from igus® - over 1 million cycles tested successfully in the igus® laboratory

Installation Dimensions

Dimension A1 depending 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	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 ± 2.5 mm



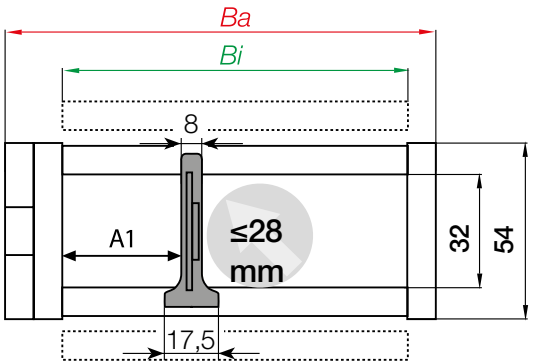
Note: outer radius **AR** (see drawing) determines dimension A1!



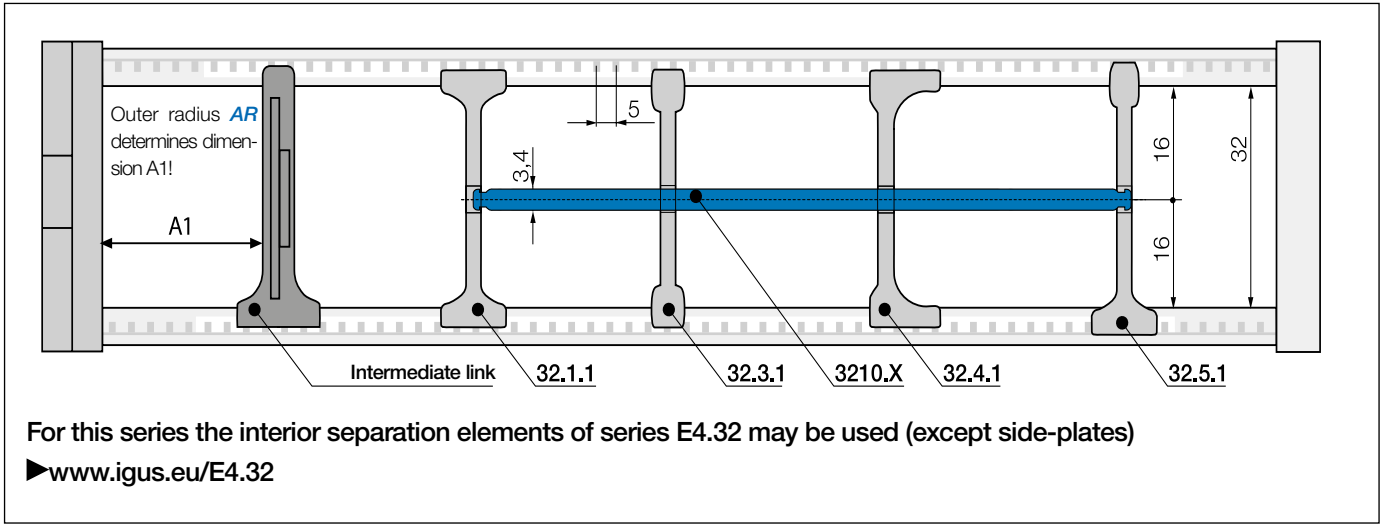
Intermediate link

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



Serie 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

i **AR** = outer radius, e-chain® **X₁** = Inner machine construction space **Ba** = outer width e-chain® **H** = nominal clearance height **A1** = distance intermediate link
R = bend radius, e-chain® **X₂** = outer machine construction space **Bi** = inner width e-chain® **K** = add-on length for bend radius **T** = link pitch

twisterchain® TC42

42 mm inner height - Product range

AR	Bi	Ba	X ₂	X ₁	R 100	R 125	R 150	R 175	R 200	R 250	Weight
[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 ₊₂₅	267	317	367	417	467	567
K	500	650	725	800	875	1050

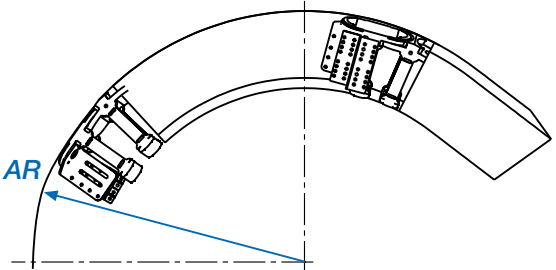
Pitch T [mm/link]	67
Links/m	15
corresponding length [mm]	1005

Installation Dimensions

Dimension A1 depending 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 ± 2.5 mm



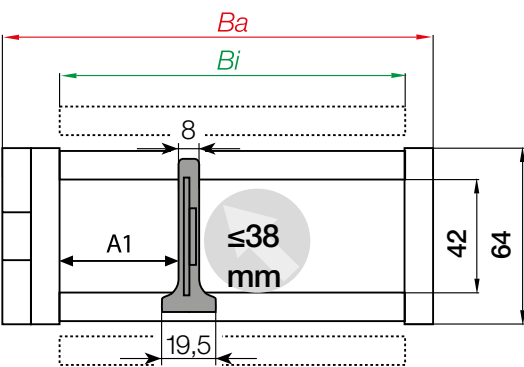
Note: outer radius AR (see drawing) determines dimension A1!



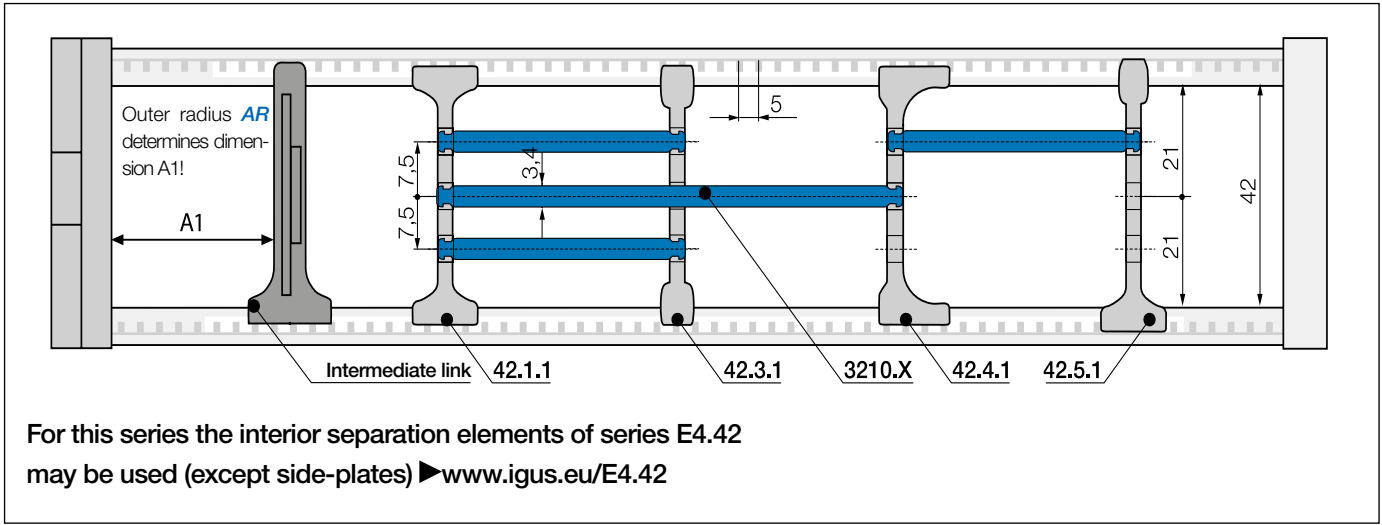
Intermediate link

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



i AR = outer radius, e-chain® X₁ = Inner machine construction space Ba = outer width e-chain® H = nominal clearance height A1 = distance intermediate link
R = bend radius, e-chain® X₂ = outer machine construction space Bi = inner width e-chain® K = add-on length for bend radius T = link pitch

twisterchain® TC56

56 mm inner height - Product range

AR	Bi	Ba	X ₂	X ₁	R 150 [mm]	R 200 [mm]	R 250 [mm]	R 300 [mm]	R 400 [mm]	Weight
[mm]	[mm]	[mm]	[mm]	[mm]	TC56...	TC56...	TC56...	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	≈ 3,7
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	≈ 3,7
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	≈ 3,7
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 _{±25}	384	484	584	684	884
K	750	900	1050	1225	1450

Pitch <i>T</i> [mm/link]	91
Links/m	11
corresponding length [mm]	1001



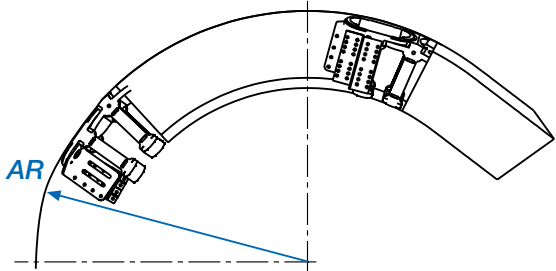
twisterchain® in a guide trough for rotary movements on an articulated robot - long service life: more than 1.000.000 cycles tested successfully

Installation Dimensions

Dimension A1 depending on outer radius *AR*

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

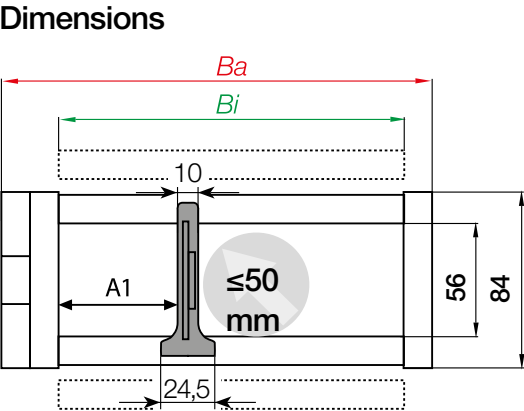
Dimension A1 always with tolerance of ± 2.5 mm



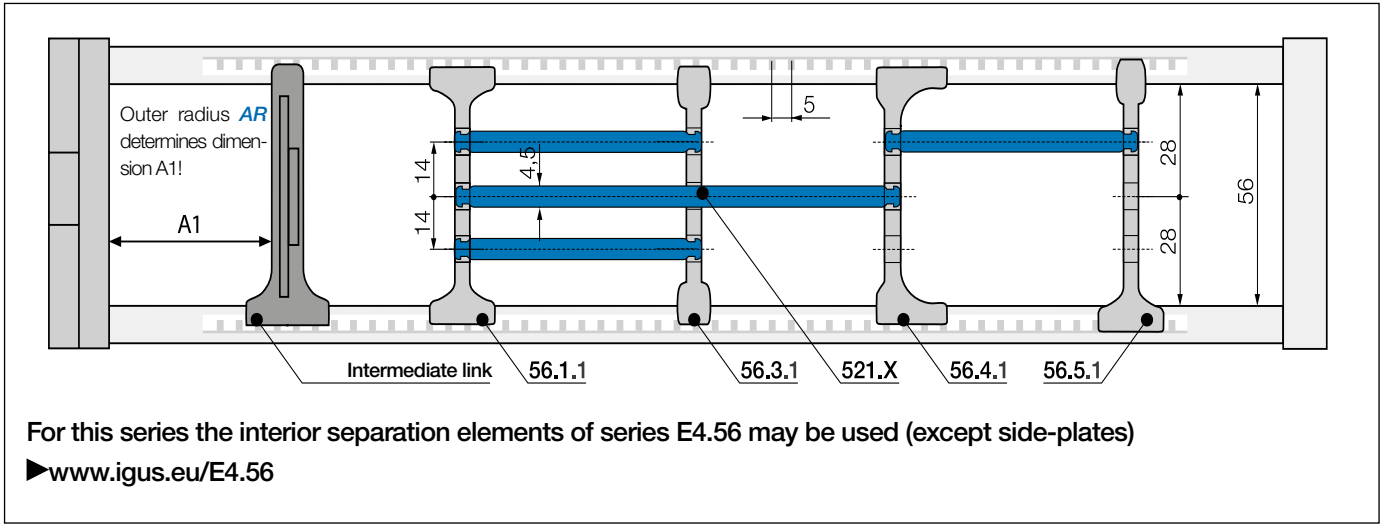
Note: outer radius *AR* (see drawing) determines dimension A1!



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!



Series TC56 | interior separation

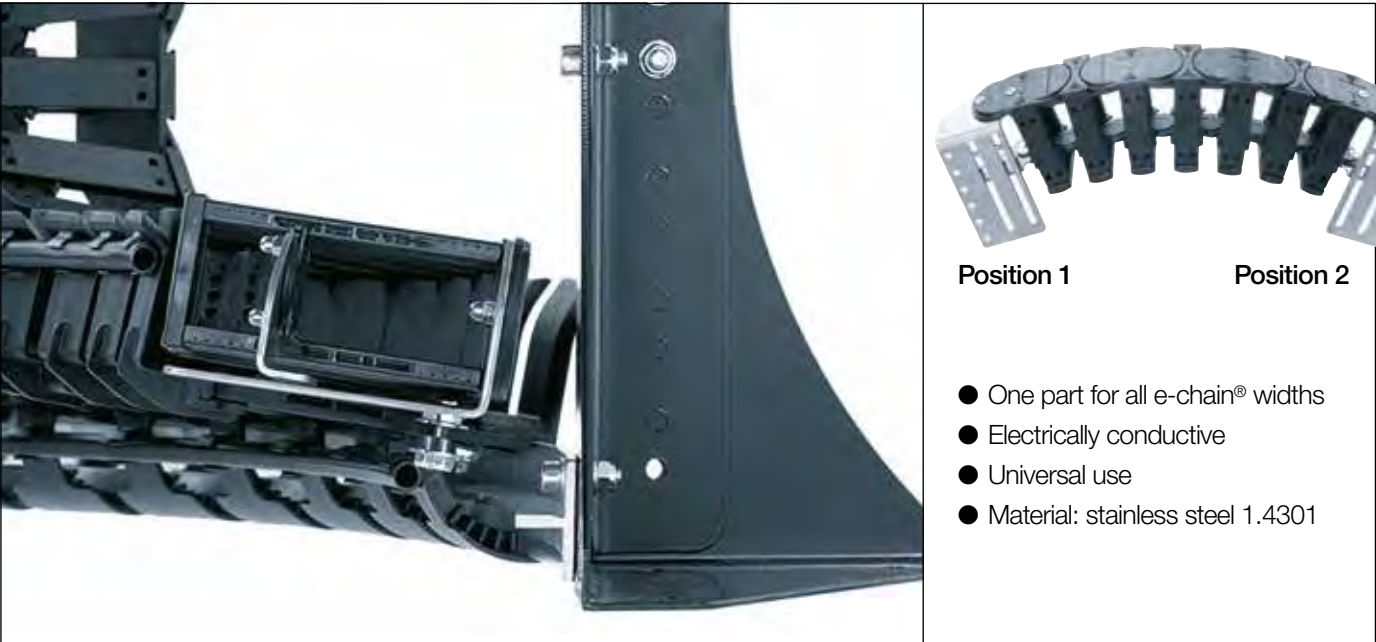


For this series the interior separation elements of series E4.56 may be used (except side-plates)
► www.igus.eu/E4.56

i *AR* = outer radius, e-chain® *X*₁ = Inner machine construction space *Ba* = outer width e-chain® *H* = nominal clearance height *A1* = distance intermediate link
R = bend radius, e-chain® *X*₂ = outer machine construction space *Bi* = inner width e-chain® *K* = add-on length for bend radius *T* = link pitch

twisterchain® accessories

Steel mounting bracket



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

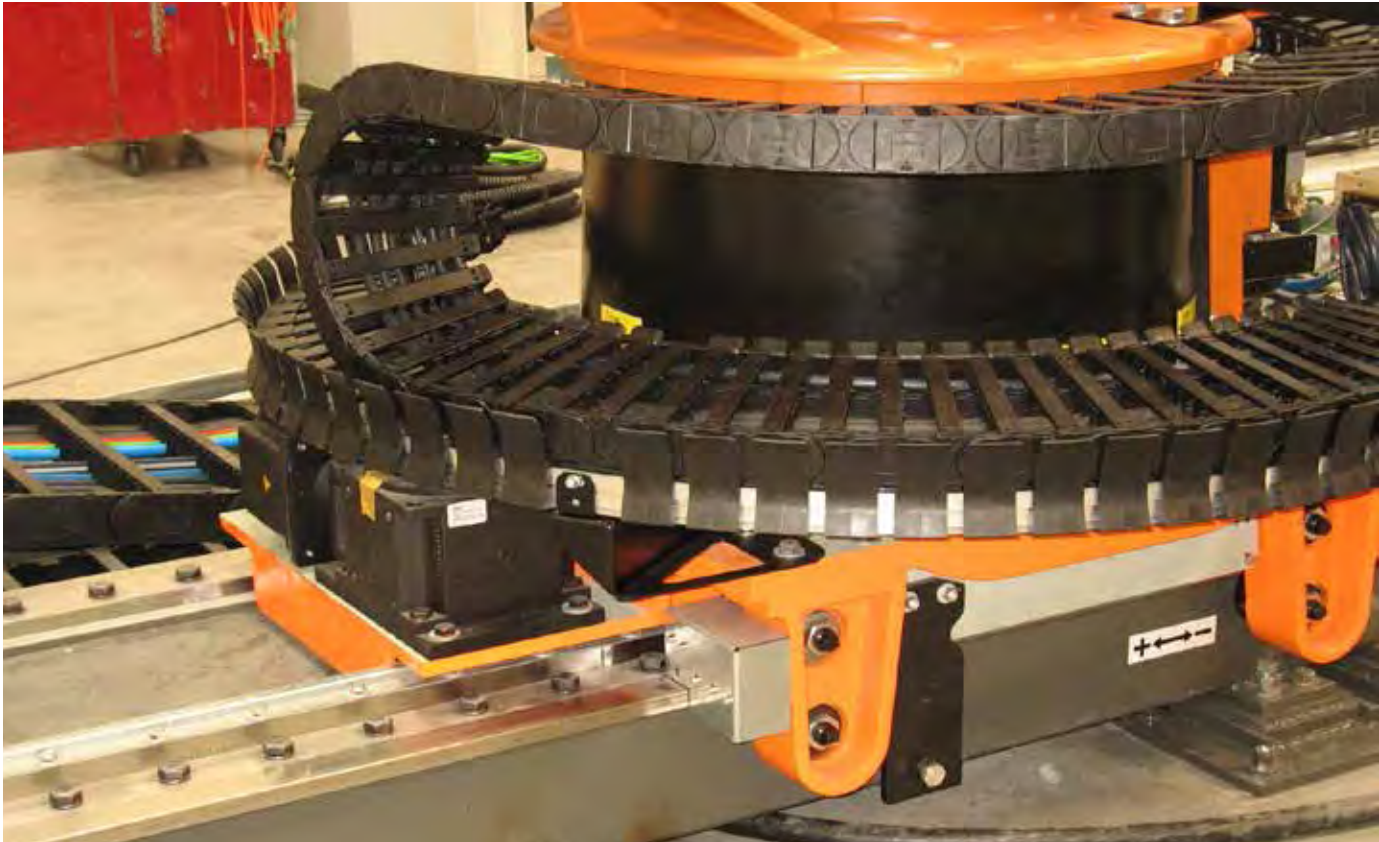
For Series	Part No. full set	Part No. position 1	Part No. position 2
TC32 ▶	TC3200.34.VS.E	TC3200.30.VS.E	TC3200.40.VS.E
TC42 ▶	TC4200.34.VS.E	TC4200.30.VS.E	TC4200.40.VS.E
TC56 ▶	TC5600.34.VS.E	TC5600.30.VS.E	TC5600.40.VS.E



Applications



twisterchain® used on a cleaning robot

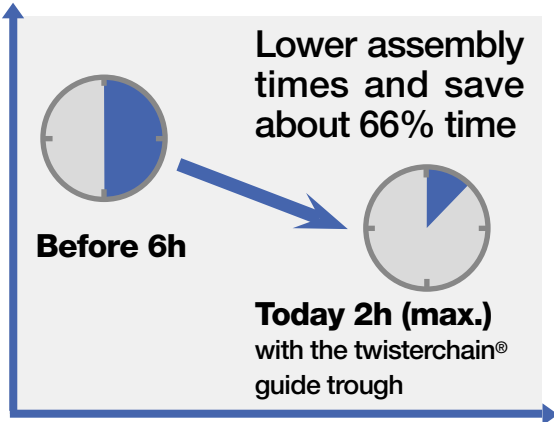


twisterchain® used on axis 1 of a robot

twisterchain® accessories

Guide troughs

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



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

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

twisterchain® guide trough versions



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	Exterior radius AR [mm]	Rotation angle 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

Supplement 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

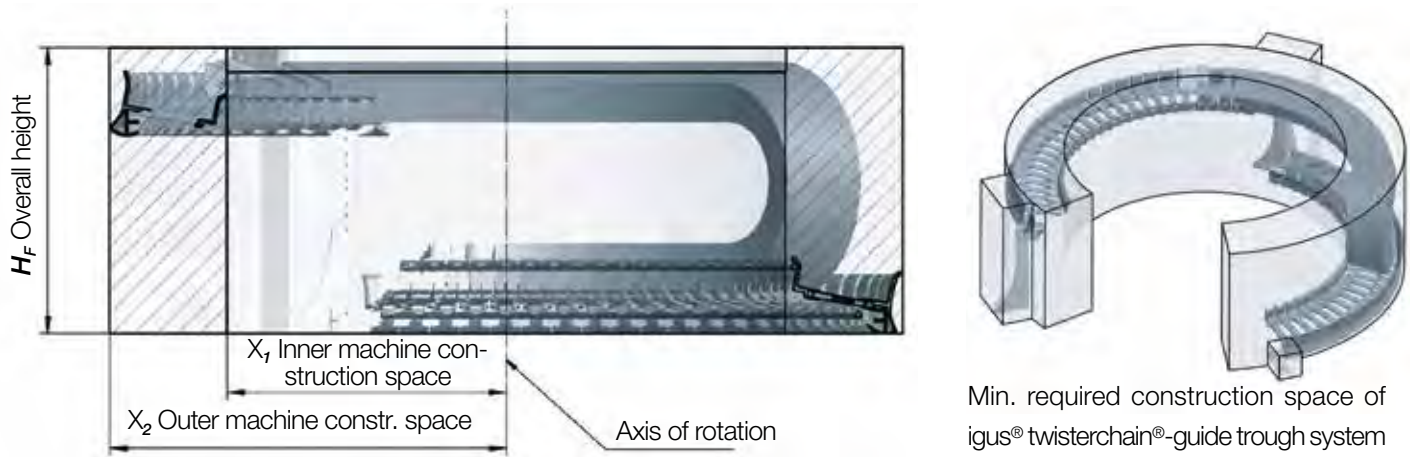
- R** - Bend radius, please add appropriate value
- Bi** - width index, please add appropriate value
- Outer radius of e-chain®
- Rotation angle of application (90°, 180°, 270°, 360°)
- Trough version
- Guide trough of selected series

More order examples

Complete trough	Part No.	94008.31.180.600/12.250
Lower run trough only	Part No.	94008.30.180.600/12.250
Upper and lower run trough without base support	Part No.	94008.32.180.600/12.250

twisterchain® accessories

Guide troughs - Dimensions



Installation dimensions | X_1 inner machine construction space and X_2 outer machine construction space of guide trough

AR [mm]	X_2 [mm]	X_1 [mm] depending on B_i [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

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	1000



AR = outer radius, e-chain®
 IR = inner radius e-chain®
 R = bend radius, e-chain®

X_1 = Inner machine construction space
 X_2 = outer machine construction space
 H_F = total trough height

H_F = height incl. 50mm clearance
 H = nominal clearance height
 K = add-on length for bend radius

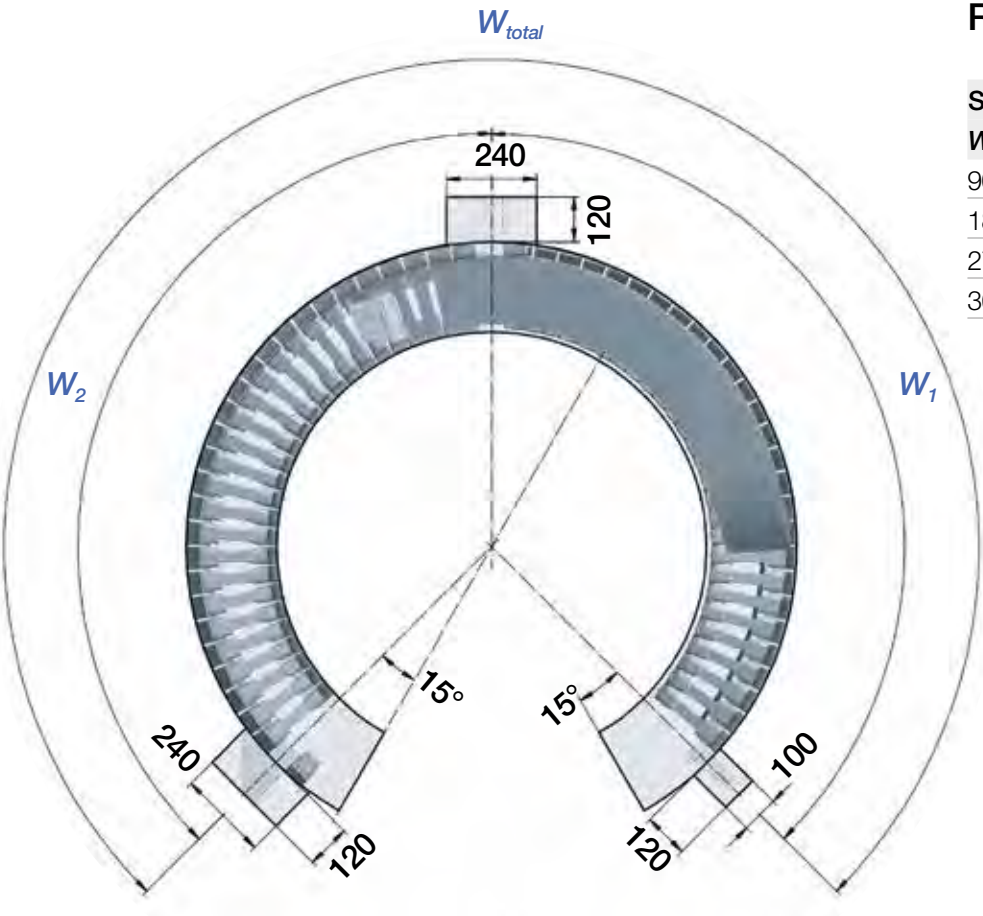
$W1$ = angle of upper run
 $W2$ = angle of lower run
 $Wtotal$ = rotation angle of system

twisterchain® accessories

Guide troughs - rotation angle

Rotation angle for 360° | W_2 angle of upper run twisterchain® guide trough

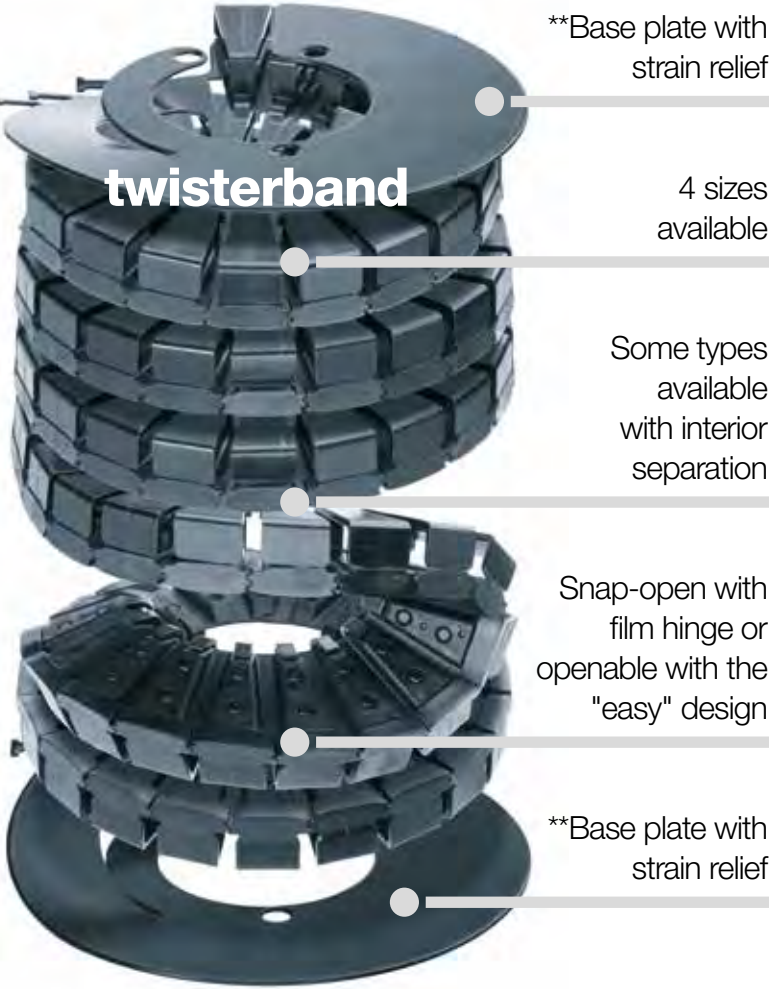
AR [mm]	Part No. series	R [mm]	100	125	150	175	200	250	300	400
			W_2 rotation angle							
400	TC32/TC42		90°	90°	90°	90°	90°	90°	90°	90°
500	TC32/TC42		90°	90°	90°	90°	90°	90°	90°	90°
600	TC32/TC42		135°	135°	135°	135°	90°	90°	90°	90°
650	TC42/TC56		135°	135°	135°	135°	90°	90°	90°	90°
750	TC42/TC56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



Rotation angle | W_1 | W_{total}

System	angle of lower run
W_{total}	
90°	45°
180°	90°
270°	135°
360°	180°

twisterband



Rotary movements in small spaces up to 7,000°* - twisterband

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

- Rotary movements up to 7,000° (Installation orientation, vertical: up to 3,000°, horizontal: 7,000° and more possible)
- Rotary speeds up to 360°/s possible
- Available in 3 different versions: snap-open with film-hinge or openable with "easy" design
- HD version with very stable pin and hook connection for an even longer service life as well as for temperatures below 0 °C
- Compact, modular and lightweight
- Bands can be lengthened and shortened as required
- Minimum installation space, fits very closely around the rotary axis
- Can be reliably used in various installation positions (horizontal or vertical)
- Cost-effective and easy to fill

**Base plates are delivered as standard, they are part of the twisterband module!



Product range

Series	Inner height <i>hi</i> [mm]	Inner width <i>Bi</i> [mm]	Ø <i>X</i> ₁ [mm]	Ø <i>X</i> ₂ [mm]	≥ <i>R</i> [mm]	≤ <i>R</i> [mm]	≤ <i>d1</i> [mm]	Interior separation	igus® online
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twisterband
Chain links on a strip.
Snap-open with film hinge
or openable with "easy" design

TB12.23.09	9	23	40	140	24	35	7	–	► www.igus.eu/twisterband
TB20.44.12	12	44	50	220	34	57	9	–	► www.igus.eu/twisterband
TB20.44.18	18	44	50	220	34	57	14	yes	► www.igus.eu/twisterband
TB29.27.22	22	27	200	320	69	82	17	yes	► www.igus.eu/twisterband
TB30.75.22	22	75	90	330	44	77	17	yes	► www.igus.eu/twisterband



twisterband HD
Chain links with very stable pin and hook connection.
Snap open with film-hinge

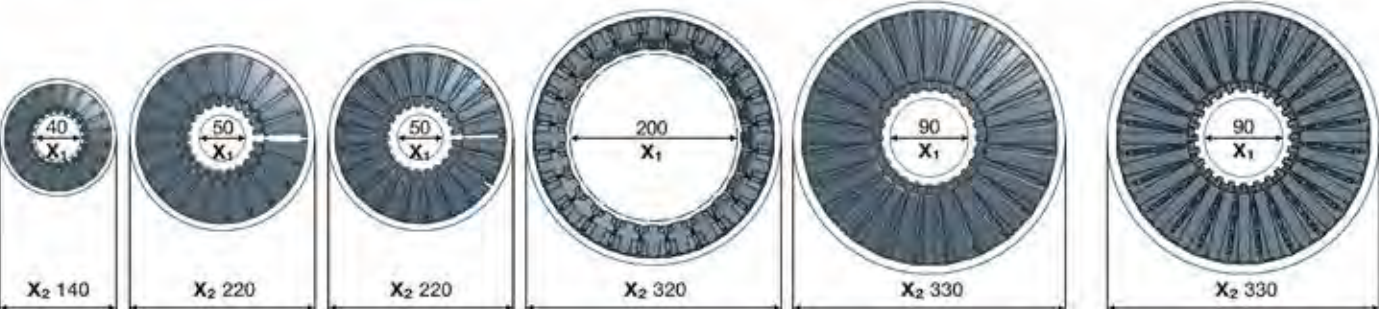
TB30HD.75.22	22	75	90	330	44	77	17	yes	► www.igus.eu/twisterbandHD
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Other sizes available on request!

Available from stock. Delivery time* from 24 hrs or same day!
*Delivery time refers the time until the product is shipped (after verifying technical feasibility)

The complete range with order options, 3D-CAD, configurators, PDF, application examples ► www.igus.eu/twisterband ► www.igus.eu/twisterbandHD

Bi = inner width e-chain® *X*₁ = inner machine construction space ≥ *R* = min. bend radius e-chain® *d1* = max. cable diameter
hi = inner height e-chain® *X*₂ = outer machine construction space ≤ *R* = max. bend radius e-chain® **XX** = number of ribbons

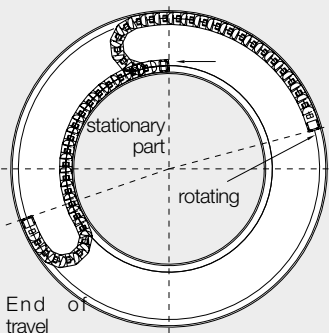


TB12.23.09. TB20.44.12. TB20.44.18. TB29.27.22. TB30.75.22. TB30HD.75.22

Rotary motion *RBR*



We recommend pivoting mounting brackets for most applications with rotary motion with *RBR*



RBR-rotary movement with igus® system E4, installed on a crane



Technical data - rotary motion *RBR*:

max. angle of rotation = 540° (more upon request)
 $v \leq 2.0 \text{ m/s}$
 $a \leq 20 \text{ m/s}^2$



Rotary motion with a standard igus® e-chain®



Rotating motion of 180° with a standard e-chain® on a crane turret drive

Standard e-chain®
3500.075.200.0,
angle of rotation 225°

Rotary motion with *RBR*

RBR (Reverse Bend Radius) means that the e-chain® can bend in two directions. Most igus® e-chains® can be used in *RBR* designs, with the exception of some bend radii, for the e-tubes R117 to R9850 and for the series 07, 09, 17, 15 and 17. The *RBR* does not necessarily need to be identical to the normal bend radius *R* of an e-chain®. Part No. E4.32.15.100/425.0, describes series E4.32 e-chain® with an inner width of 150 mm, standard bend radius of $R = 100 \text{ mm}$ and *RBR* of 425 mm. Most rotary motions can be achieved with an *RBR* option. Angles of rotation up to 540° have been achieved. Please consult igus® for your particular application.

Rotary movements require less installation height. The e-chains® glide mostly on surfaces made of polymer, stainless steel (1.4301 material) or steel and are guided through channels in the rotary movement. See side mounted for further design tips. Bend radius, circular radius and e-chain® width are variable with this product line.

Rotary motion with standard e-chains®

The accompanying photo shows an application that was solved with standard e-chains®. Such solutions are possible if space is available and if the angles of rotation are limited to a maximum of 450°. All igus® e-chains®, e-tubes and chainflex® cables can be used in this case.

Product range



igus® e-chain® with *RBR* for 360° rotation on a robot

Product range for rotary motion with *RBR*

e-chains® with *RBR* are available as standard from stock for the complete triflex® range. In addition, we supply a number of e-chains® which have *RBR as standard*. For all other types, *RBR* is made to order, and we will be more than willing to offer you this option. igus® e-chains® with *RBR*, available as standard ► triflex® R, easy triflex® and triflex®. The e-chain® series appearing in the table are *RBR* versions available from stock. Almost all igus® e-chains® can be delivered as an *RBR* version. Please contact us for any enquiry!

- chainflex® cables with TPE-outer jacket are especially suitable for e-chains® with *RBR* option
- Please only use strain relief at the moving with "RBR" applications

Table of *RBR* e-chains® available from stock

Part No.	Series	Part No.	Series	Part No.	Series
03.05.10/70	E2 micro	10.2.075/220	E2 mini	2400.09.055/250	E2/000
03.10.010/070.0	E2 micro	10.3.028/028	E2 mini	250.05.060/060	E2 medium
05.16.018/018	E2 micro	10.3.038/600	E2 mini	250.07.060/060	E2 medium
06.20.018/018	E2 micro	10.3.048/048	E2 mini	2700.15.150/090	E2/000
06.30.018/018	E2 micro	10.3.075/220	E2 mini	B15i.050.100/460	E2 mini
06.64.018/018	E2 micro	10.4.028/028	E2 mini	E/Z14.1.038/038	easy chain®
10.1.028/028	E2 mini	10.4.038/600	E2 mini	E/Z14.2.038/038	easy chain®
10.1.038/600	E2 mini	10.4.048/048	E2 mini	E/Z14.3.038/038	easy chain®
10.1.048/048	E2 mini	10.4.048/400	E2 mini	E/Z14.3.075/075	easy chain®
10.1.075/220	E2 mini	10.4.075/220	E2 mini	E/Z14.4.038/038	easy chain®
10.2.028/028	E2 mini	1400.050.075/075.0	E2/000	TE14.50.028/028	snapchain
10.2.038/600	E2 mini	1400.068.038/038.0	E2/000	TE26.120.063/063	snapchain
10.2.048/048	E2 mini	1500.038.075/450.0	E2/000		



Available from stock. Delivery time* from 24 hrs or same day!

*Delivery time refers the time until the product is shipped (after verifying technical feasibility)

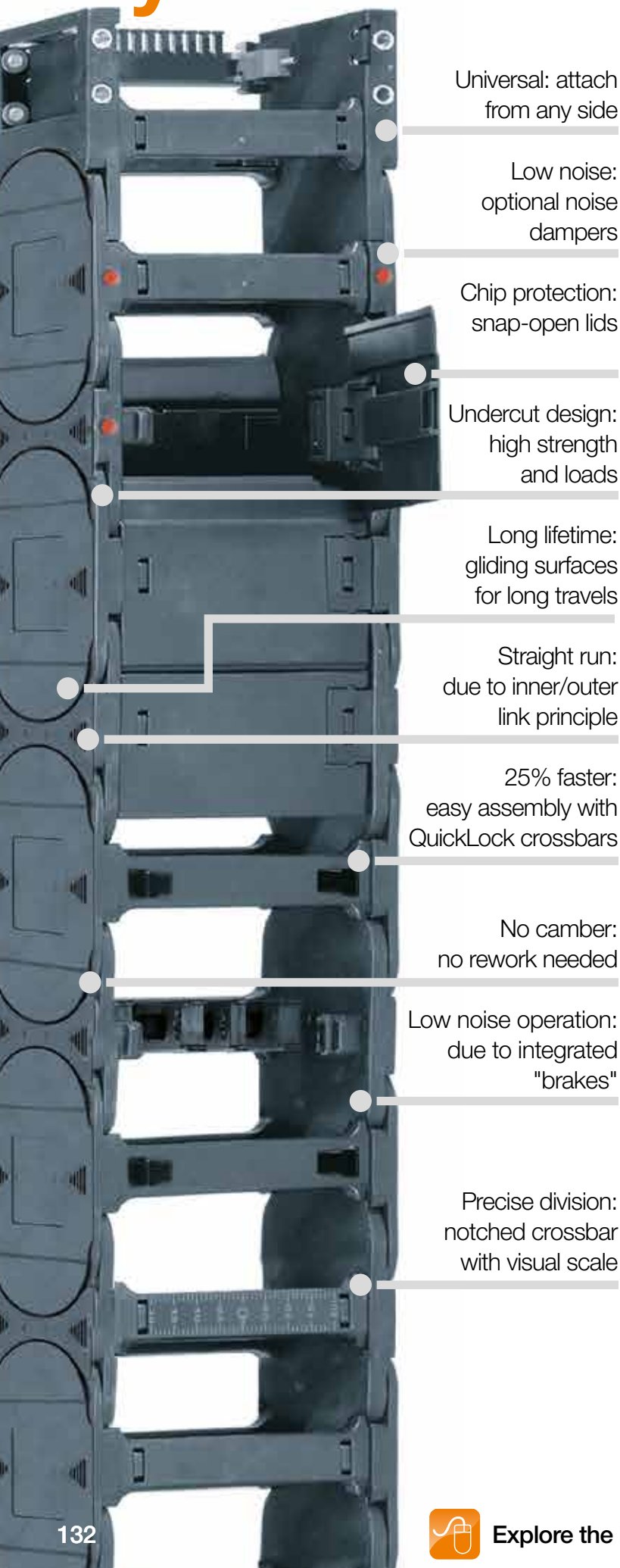


igus® E4.1

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 186

System E4.1 advantages



Universal: attach from any side

Low noise: optional noise dampers

Chip protection: snap-open lids

Undercut design: high strength and loads

Long lifetime: gliding surfaces for long travels

Straight run: due to inner/outer link principle

25% faster: easy assembly with QuickLock crossbars

No camber: no rework needed

Low noise operation: due to integrated "brakes"

Precise division: notched crossbar with visual scale

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

Secure energy supply to the 7th axis 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 forces on long travels and for large unsupported lengths
- Cable protection due to smooth, wide solid plastic load-bearing surfaces for cables
- Many quickly assembled interior separation options
- Noise-reducing brakes and optional noise dampening pads
- Ideal for long travels in combination with igus® trough system
- Well suited for side-mounted applications
- Inner and outer links for quick assembly, with or without pretension



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 = 1.8 m/s unsupported, series E4.21.060.038.0



Electrically conductive ESD/ATEX versions several series available from stock



e-tubes available as special design with HT material for +850°C hot chips

Overview

Series	Inner height <i>hi</i> [mm]	Inner width <i>Bi</i> [mm]	Outer width <i>Ba</i> [mm]	Outer height <i>ha</i> [mm]	Bend radius <i>R</i> [mm]	Unsupported length ≤ [m]	igus® online
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e-chains® with cross-bars every link

e-chains® for particularly demanding applications

E4.21	21	30 - 140	44 - 154	28	38 - 200	2,50	► www.igus.eu/E4.21
E4.28	28	40 - 300	60 - 320	42	55 - 250	2,50	► www.igus.eu/E4.28
E4.32	32	50 - 400	73 - 423	54	63 - 300	3,30	► www.igus.eu/E4.32
E4.42	42	50 - 400	76 - 426	64	75 - 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 - 1000	6,20	► www.igus.eu/E4.80
E4.112	112	50 - 600	102 - 652	140	200 - 1000	6,50	► www.igus.eu/E4.112
E4.162	162	200 - 600	256 - 656	195	250 - 1000	6,75	► www.igus.eu/E4.162



e-chains® with crossbars every other link

e-chains® for almost any application - standard

H4.32	32	50 - 400	73 - 423	54	63 - 300	3,30	► www.igus.eu/H4.32
H4.42	42	50 - 400	76 - 426	64	75 - 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 - 1000	6,20	► www.igus.eu/H4.80



e-tubes

Fully enclosed, excellent cable protection

R4.28	28	50 - 300	70 - 320	42	75 - 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 - 1000	6,20	► www.igus.eu/E4.80
R4.112	108	200 - 400	252 - 452	140	250 - 1000	6,50	► www.igus.eu/E4.112



Available from stock. **Delivery time*** from 24 hrs or same day!

*Delivery time refers the time until the product is shipped (after verifying technical feasibility)



The complete range with order options,
3D-CAD, configurators, PDF, application examples ► www.igus.eu/E4.1

E4.1 advantages

The undercut design principle,
coupled with the inner/outer link design

Smooth,
cable-friendly
inner surfaces

Low noise operation due
to integrated brake on the
stop dogs

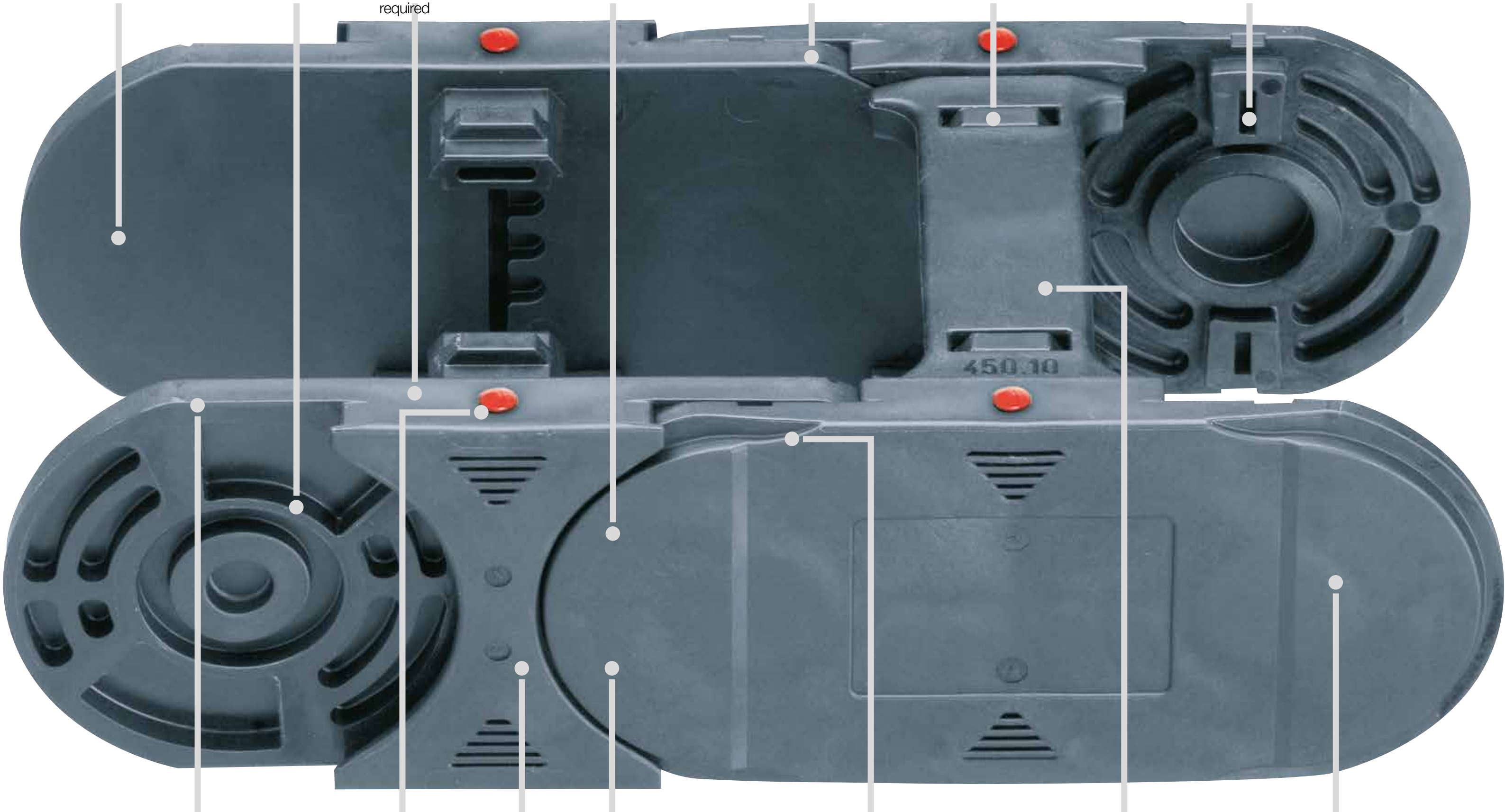
Smooth and wear-re-
sistant sliding surface -
no additional glide shoe
required

Option with or without
camber by reversing
outer links

ESD version
ideal due to
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 dampening pads

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

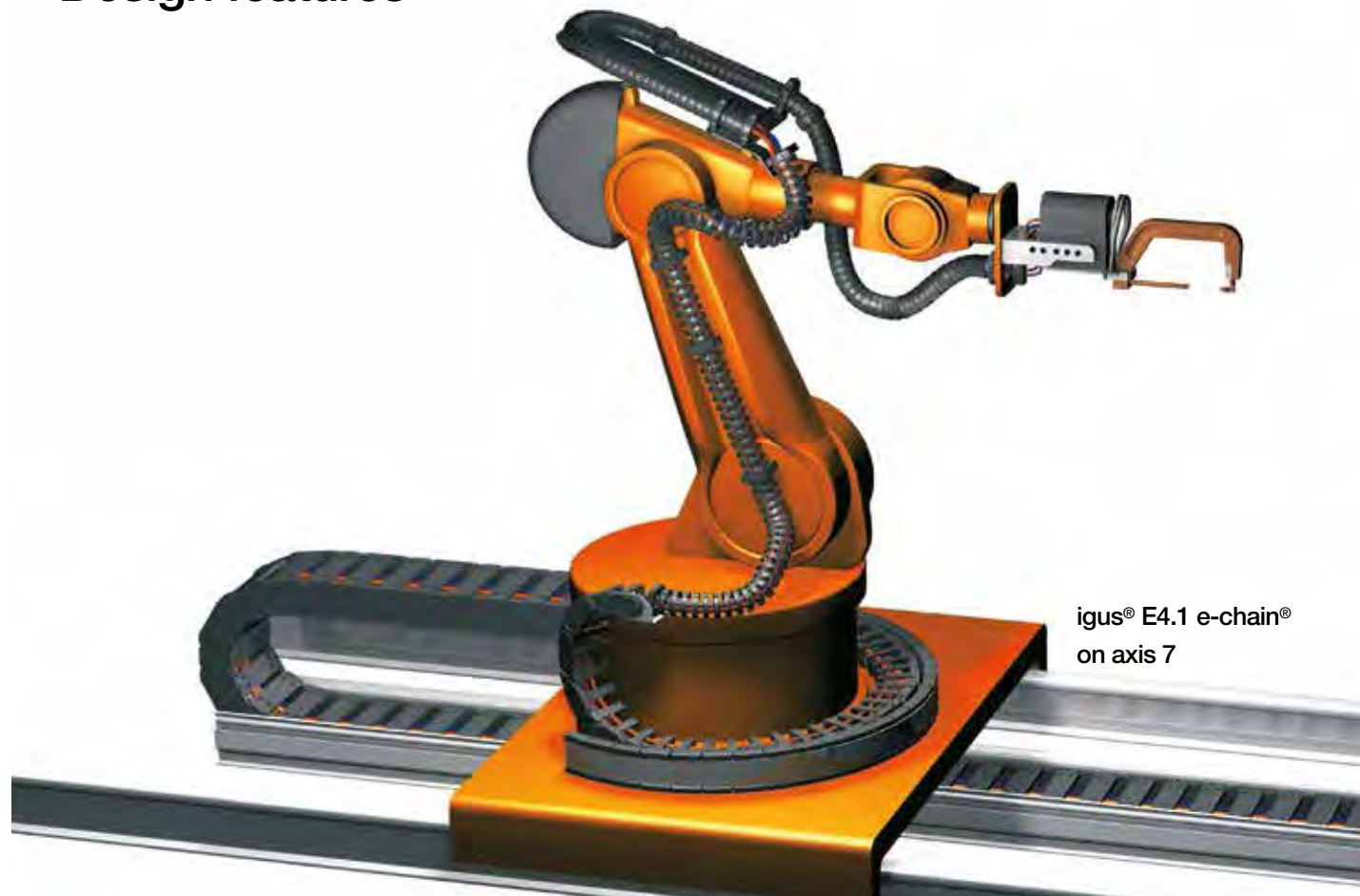
Very high stability due to the
undercut design

Cable-friendly, rounded
crossbar

Integrated lateral wear pads for a long ser-
vice 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 or 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
Fast assembly	Inner link/outer link design
Rotary motion	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 quickly assembled 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



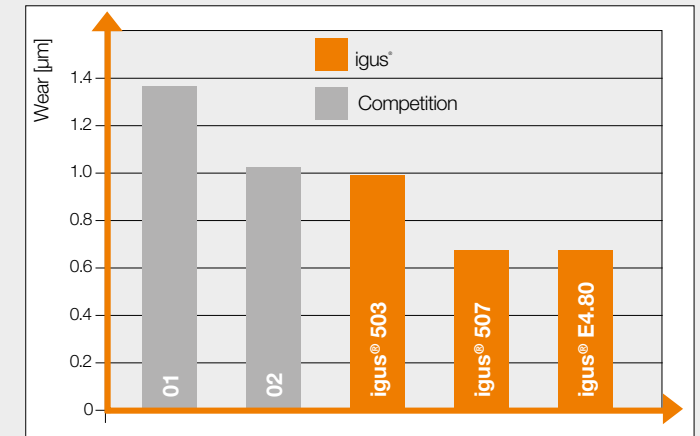
Cables last up to 4 times longer

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.

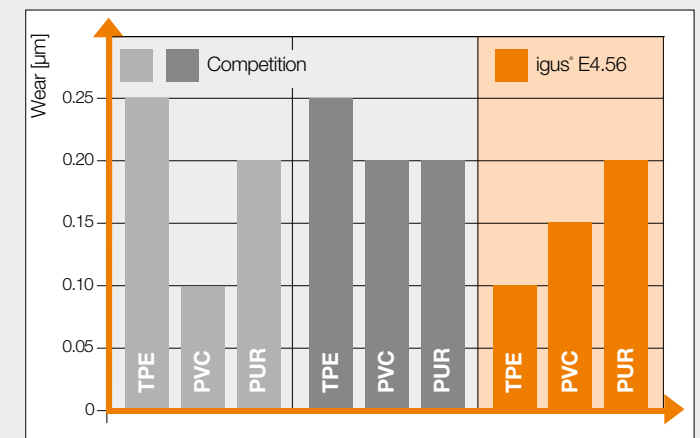


Plastic opening crossbars offer long service life

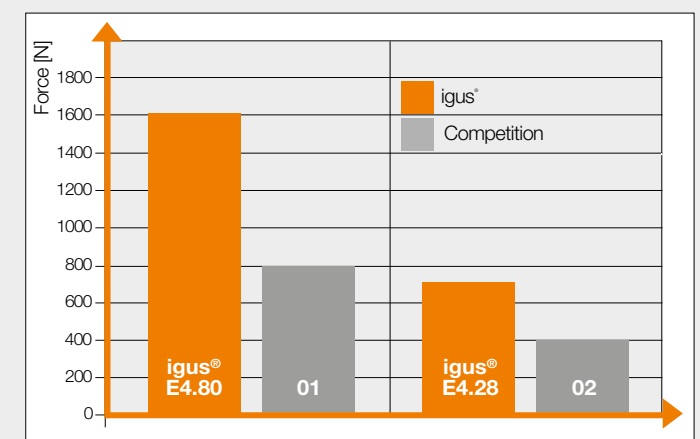
igus® laboratory tests have shown that the lowest cable abrasion occurs on e-chains® with plastic crossbars that also have a cable-friendly, rounded design. The holding force is equally impressive. The igus® test lab conducted tensile force tests on opening crossbars made from various materials. igus®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



Wear on plastic separators: wear can be reduced to nearly half with the new separators



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



Retention force comparison between polymer and aluminium crossbars - longest service life! Maximum holding force of the crossbars

igus® chainflex® robot

Twistable cables
for robots and
3D applications

Overview

Cables for robots

chainflex® cable	Jacket	Shield	Bend radius twisted, min. [factor x d]	Temperature twisted from/to [°C]	Approvals and standards	Oil resistant	Torsion resistant	v max. twisted [°/s]	a max. twisted [°/s²]	page
Twistable cables										
Information for twistable cables										142
Exclusive! chainflex® guarantee – guaranteed service life										144
Control cables										
CF77.UL.D	PUR		6.8	-25/ +80	              	✓	✓	180	60	146
CFROBOT2	PUR	✓	10	-25/ +80	              	✓	✓	180	60	150
Data cable										
CFROBOT3	PUR	✓	10	-25/ +80	              	✓	✓	180	60	152
Measuring system cable										
CFROBOT4	PUR	✓	10	-25/ +80	              	✓	✓	180	60	154
Fibre Optic Cable										
CFROBOT5	TPE		10	-35/ +80	              	✓	✓	180	60	158
Motor cables										
CFROBOT6	PUR		10	-25/ +80	              	✓	✓	180	60	160
CFROBOT7	PUR	✓	10	-25/ +80	              	✓	✓	180	60	162
CFROBOT	TPE	✓	10	-35/ +90	              	✓	✓	180	60	166
Bus cable										
CFROBOT8	PUR	✓	10	-25/ +70	              	✓	✓	180	60	168
Hybrid cable										
CFROBOT9	PUR	✓	10	-25/ +80	              	✓	✓	180	60	172



Available from stock. **Delivery time*** from 24 hrs or same day!

*Delivery time refers the time until the product is shipped (after verifying technical feasibility)

chainflex®

cables last - or your money back!

Production processes must run trouble-free. This requires completely reliable operation by all sub-components, including moving cables. igus® was the first company worldwide to develop complete energy chain systems®. chainflex® cables and energy chains® are now being offered complete from one source and with a system guarantee depending on the application. Based on the 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 downtimes in factories throughout the world today. 7 rules for a good cable:

1. Strain-relieving centre

Clear 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 centre cord (and not, as frequently the case, with fillers or dummy cores made of waste materials). This braces the surrounding cores and prevents them from sliding into the middle of the cable.

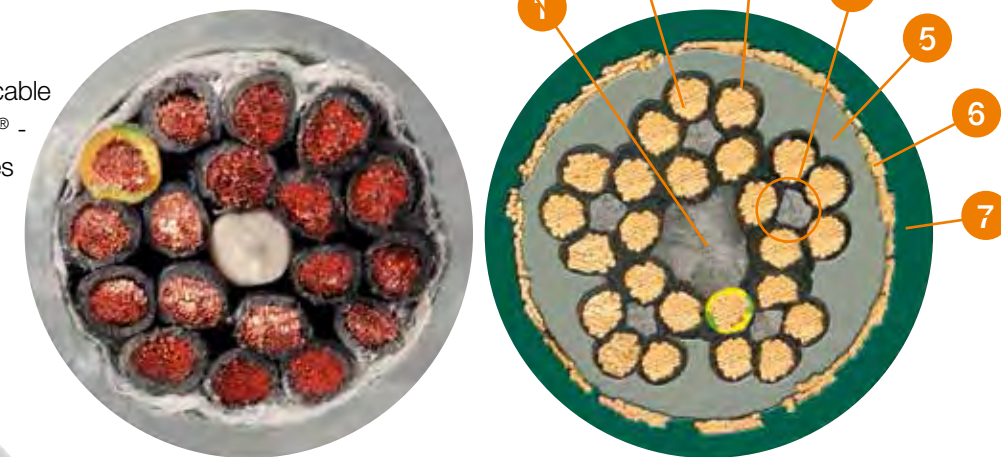
2. Core wire structure

For core strand wires, the maximum flexibility has proved 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 strand wire diameter, pitch 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 fillers. This ensures that the structure is efficiently held in the longitudinal direction. Moreover, the structure cannot fall apart move around.

6. Shielding

The overall shield should be made tight using an optimised shield braiding 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 braided shield also has a torsion protection effect on the stranded 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 or Tel. +49 2203 9649-0



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-chainsystems®. Stranded cores, core structure, shields and jacket materials have to compensate for circumference changes due to torsional movements, as well as significant flexural stresses in chainflex® ROBOT cables, different soft construction elements are used to absorb torsional forces such as rayon fibres, PTFE elements and filling elements. In the case of twistable cables, very special requirements are placed on the shield braiding. 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 capacity 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-chainsystems®, 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 ba-

sed on sensible comparative test results, the igus® "torsion test standard" was developed. According to this standard, all chainflex® ROBOT cables are twisted within a triflex® R energy chain® over a distance of one metre with a torsion of $\pm 180^\circ$ at least 5 million times. In addition, a test is carried out on a test bench with a chain length of approx. 2500 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-filled 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 $\pm 90^\circ$ 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

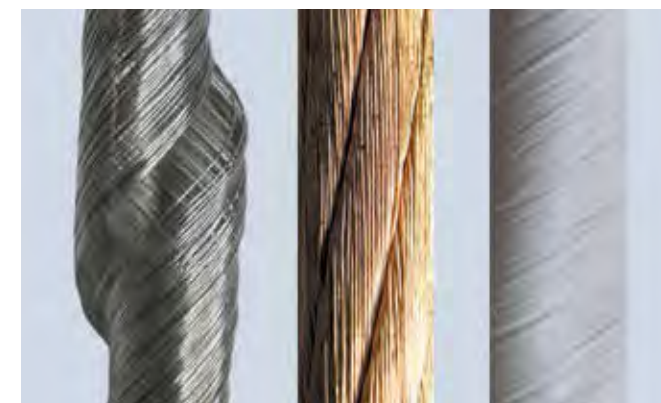
We can also offer chainflex® ROBOT cables pre-fitted with the plug-in connectors of your choice as a ready-cable®, or as a ready-to-install readychain® cable assembly.



The "torsion-resistant" requirement for cables for energy chains® is not new, but is seldom defined. So how is a statement such as "This cable is torsion-resistant up to $\pm 180^\circ$ " evaluated? That's why it is vital to have comparable and conclusive test results. In order to satisfy this requirement, the "torsion test bench" was developed according to igus® standard. Here various cable types are twisted to a specified angle with a cable length of 1 meter. The degree of torsion can be freely chosen, and is defined individually according to the requirement made on the test specimen, and the normal test standard is $\pm 180^\circ$. After a prescribed number of double strokes or a negative electrical or mechanical test result, the respective test specimen is dissected, and the type and position of any damage is determined. The first chainflex® CFROBOT types have now developed into a full range.



The CFROBOT shows absolutely no damage after more than 3 million movements



Detailed pictures of the CFROBOT after more than 3.0 million movements of $\pm 270^\circ$



The "torsion test" standard was developed by igus®

	chainflex® cable	Temperature, from/to [°C]	v max. [°/s]		a max. [°/s²]		Bend radius min. [factor x d]		Bend radius min. [factor x d]		Bend radius min. [factor x d]		Page
			Twisted		Twisted		5 million cycles *		7.5 million cycles *		10 million cycles *		
Twistable cables													
Control cables													
	CF77.UL.D	-25 / -15 -15 / +70 +70 / +80	180		60		±150 ±180 ±150		±90 ±120 ±90		±30 ±60 ±30	146	
	CFROBOT2	-25 / -15 -15 / +70 +70 / +80	180		60		±150 ±180 ±150		±90 ±120 ±90		±30 ±60 ±30	150	
Data cable													
	CFROBOT3	-25 / -15 -15 / +70 +70 / +80	180		60		±150 ±180 ±150		±90 ±120 ±90		±30 ±60 ±30	152	
Measuring system cable													
	CFROBOT4	-25 / -15 -15 / +70 +70 / +80	180		60		±150 ±180 ±150		±90 ±120 ±90		±30 ±60 ±30	154	
Fibre Optic Cable													
	CFROBOT5	-25 / -15 -15 / +70 +70 / +80	180		60		±150 ±180 ±150		±90 ±120 ±90		±30 ±60 ±30	158	
Motor cables													
	CFROBOT6	-25 / -15 -15 / +70 +70 / +80	180		60		±150 ±180 ±150		±90 ±120 ±90		±30 ±60 ±30	160	
	CFROBOT7	-25 / -15 -15 / +70 +70 / +80	180		60		±150 ±180 ±150		±90 ±120 ±90		±30 ±60 ±30	162	
	CFROBOT	-35 / -25 -15 / +80 +80 / +90	180		60		±150 ±180 ±150		±90 ±120 ±90		±30 ±60 ±30	166	
Bus cable													
	CFROBOT8	-25 / -15 -15 / +60 +60 / +70	180		60		±150 ±180 ±150		±90 ±120 ±90		±30 ±60 ±30	168	
Hybrid cable													
	CFROBOT9	-25 / -15 -15 / +70 +70 / +80	180		60		±150 ±180 ±150		±90 ±120 ±90		±30 ±60 ±30	172	

⁽¹⁾ Exclusive! Guaranteed service life for this series according to the chainflex® guarantee conditions

* Guaranteed lifetime, higher number of double strokes possible. Figures in brackets refer to chainflex® M cables

chainflex® CF77.UL.D

PUR control cable, twistable

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

Dynamic information

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

Cable structure

	Conductor	Fine-wire stranded conductor consisting of bare copper wires (following 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 < 0.5 mm²: Colour code in accordance with DIN 47100 Cores ≥ 0.5 mm²: Black cores with white numerals, one green-yellow core CF77.UL.03.04.INI: brown, blue, black, white
	Outer jacket	Low-adhesion, highly abrasion-resistant PUR mixture based on, adapted to suit the requirements in e-chains® (following DIN EN 50363-10-2). Colour: Window grey (similar to RAL 7040) CF77.UL.03.04.INI: Colour: Colza yellow (similar to RAL 1021)

Electrical information

	Nominal voltage	Number of cores < 12: 300/500 V
		Number of cores < 12 (0.25-0.34): 300/300 V
		Number of cores ≥ 12: 300/300 V (following DIN VDE 0245)
	Testing voltage	2000 V (following DIN EN 50396)

Product range

No cutting costs - no minimum order quantity

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 EN 60754
	UL/CSA	< 0.5 mm²: Style 10493 and 20233, 300 V, 80 °C ≥ 0.5 mm²: Style 11323 and 21223, 1000 V, 80 °C
	NFPA	Following NFPA 79-2012 chapter 12.9
	DNV-GL	Certified according to GL Type Testing – Certificate No.: 61 935-14 HH
	EAC	Certified according to no. TC RU C-DE.ME77.B.01254
	CTP	Certified according to no. C-DE.PB49.B.00416
	CEI	Following CEI 20-35
	Lead free	Following 2011/65/EC (RoHS-II)
	Clean room	According to ISO Class 1. Outer jacket material complies with CF77. UL.05.12.D, tested by IPA according to ISO standard 14644-1
	DESINA	According to VDW, DESINA standardisation
	CE	Following 2006/95/EC

Guaranteed service life according to guarantee conditions

Cycles *		5 million		7.5 million	10 million
Temperature, from/to [°C]	v max. [°/s] Twisted	a max. [°/s²] Twisted	Torsion max. [°/m]	Torsion max. [°/m]	Torsion max. [°/m]
-25 / -15			±150	±90	±30
-15 / +70	180	60	±180	±120	±60
+70 / +80			±150	±90	±30

* Higher number of cycles possible - please ask for your individual calculation.

Typical application areas

- For extremely heavy duty applications with torsion movements
- Almost unlimited resistance to oil
- Indoor and outdoor applications with average sun radiation
- Especially for robots and 3D movements
- Robots, handling, lead screw drives



chainflex® CF77.UL.D

PUR control cable, twistable



Example image.

Product range Part No.	Number of cores and conductor nominal cross section [mm²]	Outer diameter (d) max. [mm]	Copper index [kg/km]	Weight [kg/km]	Price [€/m]
CF77.UL.02.04.D	4 x 0.25	5.5	11	35	1.51
CF77.UL.03.04.INI	4 x 0.34	6.0	17	40	1.65
CF77.UL.05.04.D	4 G 0.5	6.0	22	44	1.47
CF77.UL.05.05.D	5 G 0.5	6.5	28	52	1.72
CF77.UL.05.07.D	7 G 0.5	7.5	41	80	2.19
CF77.UL.05.12.D	12 G 0.5	10.0	66	132	4.19
CF77.UL.05.18.D	18 G 0.5	12.0	99	184	6.20
CF77.UL.05.25.D	25 G 0.5	14.0	138	247	7.58
CF77.UL.05.30.D	30 G 0.5	15.0	165	325	9.14
CF77.UL.07.03.D	3 G 0.75	6.5	24	55	1.51
CF77.UL.07.04.D	4 G 0.75	7.0	32	64	1.68
CF77.UL.07.05.D	5 G 0.75	7.5	40	75	1.93
CF77.UL.07.07.D	7 G 0.75	8.5	56	106	2.48
CF77.UL.07.12.D	12 G 0.75	12.0	96	192	5.55
CF77.UL.07.18.D	18 G 0.75	13.5	143	260	7.35
CF77.UL.07.20.D	20 G 0.75	14.5	159	292	7.54
CF77.UL.07.25.D	25 G 0.75	16.0	198	368	10.32
CF77.UL.07.36.D	36 G 0.75	19.0	297	524	10.56
CF77.UL.07.42.D ^{1.7)}	42 G 0.75	21.0	365	604	12.05
CF77.UL.10.02.D	2 x 1.0	6.5	22	54	1.51
CF77.UL.10.03.D	3 G 1.0	6.5	32	65	1.66
CF77.UL.10.04.D	4 G 1.0	7.0	43	79	1.87
CF77.UL.10.05.D	5 G 1.0	8.0	53	97	2.21
CF77.UL.10.07.D	7 G 1.0	9.0	74	119	2.81
CF77.UL.10.12.D	12 G 1.0	12.5	127	234	5.55
CF77.UL.10.18.D	18 G 1.0	15.0	191	339	8.10
CF77.UL.10.25.D	25 G 1.0	17.5	264	452	9.04
CF77.UL.10.42.D	42 G 1.0	22.5	462	708	15.96

^{1.7)} Delivery time: 7 weeks
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

Product range

No cutting costs - no minimum order quantity

Product range Part No.	Number of cores and conductor nominal cross section [mm²]	Outer diameter (d) max. [mm]	Copper index [kg/km]	Weight [kg/km]	Price [€/m]
CF77.UL.15.03.D	3 G 1.5	7.5	48	86	2.01
CF77.UL.15.04.D	4 G 1.5	8.0	64	105	2.36
CF77.UL.15.05.D	5 G 1.5	8.5	80	125	2.76
CF77.UL.15.07.D ^{1.7)}	7 G 1.5	10.5	111	174	3.89
CF77.UL.15.12.D	12 G 1.5	14.0	191	308	7.61
CF77.UL.15.18.D	18 G 1.5	17.0	286	477	9.23
CF77.UL.15.25.D	25 G 1.5	19.5	396	630	12.78
CF77.UL.15.36.D ^{1.7)}	36 G 1.5	23.5	594	891	15.92
CF77.UL.15.42.D ^{1.7)}	42 G 1.5	26.5	729	1040	18.32
CF77.UL.25.03.D	3 G 2.5	8.5	80	124	2.89
CF77.UL.25.04.D	4 G 2.5	9.5	106	155	3.48
CF77.UL.25.05.D	5 G 2.5	10.5	132	192	3.99
CF77.UL.25.07.D ^{1.7)}	7 G 2.5	12.5	185	270	5.53
CF77.UL.25.12.D	12 G 2.5	17.5	317	530	10.45
CF77.UL.40.04.D	4 G 4.0	11.5	176	256	5.15
CF77.UL.40.05.D	5 G 4.0	12.0	212	302	6.58
CF77.UL.60.05.D	5 G 6.0	14.0	317	428	10.27
CF77.UL.100.05.D	5 G 10.0	19.0	528	724	17.97
CF77.UL.160.05.D	5 G 16.0	22.5	845	1098	25.71
CF77.UL.250.05.D	5 G 25.0	28.0	1320	1635	36.91

^{1.7)} Delivery time: 7 weeks
^{1.7)} Using the cables with "7 G 1.5 mm² and „7 G 2.5 mm² it is essential to use bend radius $\geq 17,5 \times d$ with travel distance ≥ 5 m.
When the travel distance is not less than 5 m, a bend radius not less than $17.5 \times d$ must 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.10.03.D** – to your desired length (0.5 m steps)
CF77.UL.D chainflex® series **.10** Code nominal cross section **.03** Number of cores

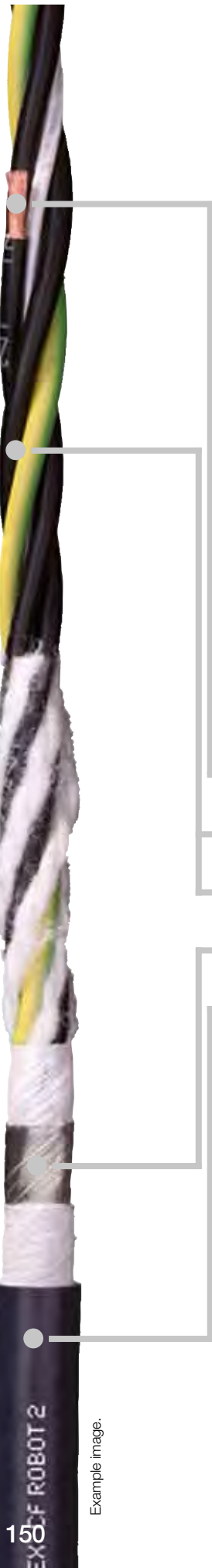
 Online order ► www.chainflex.eu/CFROBOT

 Available from stock. **Delivery time* from 24 hrs or same day!**
*Delivery time refers the time until the product is shipped (after verifying technical feasibility)



chainflex® CFROBOT2

PUR control cable, twistable



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

Dynamic information

	Bend radius	twisted	min. 10 x d
		flexible	min. 8 x d
		fixed	min. 5 x d
	Temperature	twisted	-25 °C to +80 °C
		flexible	-40 °C to +80 °C (following EN 60811-504)
		fixed	-50 °C to +80 °C (following DIN EN 50305)
	v max. twisted	180 °/s	
	a max. twisted	60 °/s ²	
	Travel distance	Robots and 3D movements, Class 1	
	Torsion	± 180°, with 1 m cable length	

Cable structure

	Conductor	Stranded conductor consisting of especially bend-resistant bare copper wires (following 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 braided copper shield. Coverage approx. 85% optical.
	Outer jacket	Low-adhesion, halogen free, highly abrasion resistant PUR mixture based on, 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

Product range

No cutting costs - no minimum order quantity

	Silicone-free	Free from silicone which can affect paint adhesion (following PV 3.10.7 – status 1992)
	Halogen-free	Following EN 60754
	UL/CSA	Style 10493 and 20317, 300 V, 80 °C
	NFFPA	Following NFPA 79-2012 chapter 12.9
	EAC	Certified according to no. TC RU C-DE.ME77.B.01254
	CTP	Certified according to no. C-DE.PB49.B.00416
	CEI	Following CEI 20-35
	Lead free	Following 2011/65/EC (RoHS-II)
	Clean room	According to ISO Class 1. Outer jacket material complies with CF27.07.05.02.01.D, tested by IPA according to standard 14644-1
	CE	Following 2006/95/EC

Guaranteed service life according to guarantee conditions

Cycles *		5 million		7.5 million	10 million
Temperature, from/to [°C]	v max. [°/s]	a max. [°/s ²]	Torsion max. [°/m]	Torsion max. [°/m]	Torsion max. [°/m]
-25 / -15	180	60	±150	±90	±30
-15 / +70			±180	±120	±60
+70 / +80			±150	±90	±30

* Higher number of cycles possible - please ask for your individual calculation.

Typical application areas

- For extremely heavy duty applications with torsion movements
- Almost unlimited resistance to oil
- Indoor and outdoor applications, UV resistant
- Especially for robots and 3D movements
- Robots, handling, lead screw drives

Product range Part No.	Number of cores and conductor nominal cross section [mm ²]	Outer diameter (d) max. [mm]	Copper index [kg/km]	Weight [kg/km]	Price [€/m]
CFROBOT2.07.04.C	(4G0.75)C	8.5	45	84	7.48
CFROBOT2.07.05.C	(5G0.75)C	8.5	54	94	8.02
CFROBOT2.07.07.C	(7G0.75)C	10.0	75	130	8.86
CFROBOT2.07.12.C ^{1..10)}	(12G0.75)C	14.0	131	219	16.67
CFROBOT2.07.18.C	(18G0.75)C	16.5	197	321	19.40

^{1..10)} Delivery time: 10 weeks

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



More information ► www.igus.eu/CFROBOT



chainflex® CFROBOT3

PUR data cable, twistable



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

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

Cable structure	
	Conductor Stranded conductor consisting of especially bend-resistant bare copper wires (following EN 60228).
	Core insulation Mechanically high-quality TPE mixture.
	Core identification Colour code in accordance with DIN 47100.
	Inner jacket PUR mixture adapted to suit the requirements in e-chains®.
	Overall shield Extremely torsion-resistant tinned braided copper shield. Cover approx. 85% visual.
	Outer jacket Low-adhesion, halogen free, highly abrasion resistant PUR mixture based on, 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

Product range

No cutting costs - no minimum order quantity

	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 10497 and 20911, 300 V, 80 °C
	NFFPA	Following NFFPA 79-2012 chapter 12.9
	EAC	Certified according to no. TC RU C-DE.ME77.B.01254
	CTP	Certified according to no. C-DE.PB49.B.00416
	CEI	Following CEI 20-35
	Lead free	Following 2011/65/EC (RoHS-II)
	Clean room	According to ISO Class 1. Outer jacket material complies with CF27.07.05.02.01.D, tested by IPA according to standard 14644-1
	CE	Following 2006/95/EC

Guaranteed service life according to guarantee conditions					
Cycles *		5 million		7.5 million	10 million
Temperature, from/to [°C]	v max. [°/s] Twisted	a max. [°/s²] Twisted	Torsion max. [°/m]	Torsion max. [°/m]	Torsion max. [°/m]
-25 / -15			±150	±90	±30
-15 / +70	180	60	±180	±120	±60
+70 / +80			±150	±90	±30

* Higher number of cycles possible - please ask for your individual calculation.

- Typical application areas
- For extremely heavy duty applications with torsion movements
 - Almost unlimited resistance to oil
 - Indoor and outdoor applications, UV resistant
 - Especially for robots and 3D movements
 - Robots, handling, lead screw drives

Product range Part No.	Number of cores and conductor nominal cross section [mm²]	Outer diameter (d) max. [mm]	Copper index [kg/km]	Weight [kg/km]	Price [€/m]
CFROBOT3.02.04.02	(4x(2x0.25))C	9.0	40	102	11.67
CFROBOT3.02.06.02	(6x(2x0.25))C	10.5	55	139	12.08
CFROBOT3.02.08.02	(8x(2x0.25))C	12.5	70	157	17.64
CFROBOT3.02.05.05	(5x(2x0.5))C	13.0	90	223	13.76

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

PUR measuring system cable, twistable



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

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

Cable structure	
	Conductor Stranded conductor consisting of especially bend-resistant bare copper wires (following 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 braided copper shield. Coverage approx. 85% optical.
	Overall shield Torsion resistant tinned braided copper shield. Cover approx. 80% visual.
	Outer jacket Low-adhesion, halogen free, highly abrasion resistant PUR mixture based on, 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

Product range

No cutting costs - no minimum order quantity

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 EN 60754
	UL/CSA	Style 1589 and 20236, 30 V, 80 °C
	NFPA	Following NFPA 79-2012 chapter 12.9
	EAC	Certified according to no. TC RU C-DE.ME77.B.01218
	CTP	Certified according to no. C-DE.PB49.B.00416
	CEI	Following CEI 20-35
	Lead free	Following 2011/65/EC (RoHS-II)
	Clean room	According to ISO Class 1. Outer jacket material complies with CF27.07.05.02.01.D, tested by IPA according to standard 14644-1
	CE	Following 2006/95/EC

Guaranteed service life according to guarantee conditions					
Cycles *		5 million		7.5 million	10 million
Temperature, from/to [°C]	v max. [°/s] Twisted	a max. [°/s²] Twisted	Torsion max. [°/m]	Torsion max. [°/m]	Torsion max. [°/m]
-25 / -15			±150	±90	±30
-15 / +70	180	60	±180	±120	±60
+70 / +80			±150	±90	±30

* Higher number of cycles possible - please ask for your individual calculation.

- Typical application areas
- For extremely heavy duty applications with torsion movements
 - Almost unlimited resistance to oil
 - Indoor and outdoor applications, UV resistant
 - Especially for robots and 3D movements
 - Robots, handling, lead screw drives



chainflex® CFROBOT4

PUR measuring system cable, twistable

Product range

No cutting costs - no minimum order quantity



Example image.

Product range Part No.	Number of cores and conductor nominal cross section [mm²]	Outer diameter (d) max. [mm]	Copper index [kg/km]	Weight [kg/km]	Price [€/m]	Product range Part No.	Core group	Colour code
CFROBOT4.001	(3x(2x0,14)C+(4x0,14)+(2x0,5))C	10.5	65	119	20.84	CFROBOT4.001	3x(2x0.14)C 4x0.14 2x0.5	green/yellow, black/brown, red/orange grey/blue/white-yellow/white-black brown-red/brown-blue
CFROBOT4.002 ^{1,10)}	(3x(2x0.14)C+2x(0.5)C)C	10.5	70	122	16.38	CFROBOT4,002	3x(2x0.14)C 2x(0.5)C	green/yellow, black/brown, red/orange black, red
CFROBOT4.006	(3x(2x0.14)C +(4x0.14)+(4x0.22)+(2x0.5))C	11.5	78	143	20.29	CFROBOT4.006	3x(2x0.14)C (4x0.14) (4x0.22) (2x0.5)	green/yellow, black/brown, red/orange grey/blue/white-yellow/white-black brown-yellow/brown-grey/green-black/green-red brown-red/brown-blue
CFROBOT4,009	(4x(2x0.25)+(2x0.5))C	9.5	51	93	13.59	CFROBOT4,009	4x(2x0.25) 2x0.5	brown/green, blue/violet, grey/pink, red/black white, brown
CFROBOT4,015	(4x(2x0.14)+4x0.5)C	9.0	52	96	13.73	CFROBOT4,015	4x(2x0.14) 4x0.5	brown/green, blue/violet, grey/pink, red/black blue, white, brown-green, white-green
CFROBOT4.028 ¹⁶⁾	(2x(2x0.20)+(2x0.38))C	7.5	47	75	18.91	CFROBOT4,028	2x(2x0.20) (2x0.38)	green/yellow, pink/blue red/black

^{1,10)} Delivery time: 10 weeks
¹⁶⁾ Colour outer jacket: Yellow-green (similar RAL 601®)
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 – to your desired length (0.5 m steps)**
CFROBOT4 chainflex® series .009 Code measuring system type

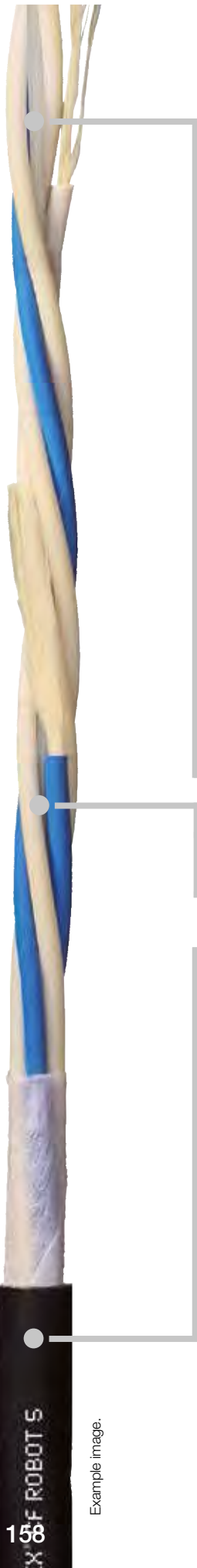
**Online order ►**www.chainflex.eu/CFROBOT

**Available from stock. Delivery time* from 24 hrs or same day!**
*Delivery time refers the time until the product is shipped (after verifying technical feasibility)



chainflex® CFROBOT5

TPE Fibre Optic Cable, twistable



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

Dynamic information			
	Bend radius	twisted	min. 10 x d
		flexible	min. 8 x d
		fixed	min. 5 x d
	Temperature	twisted	-35 °C to +80 °C
		flexible	-50 °C to +80 °C (following EN 60811-504)
		fixed	-55 °C to +80 °C (following DIN EN 50305)
	v max. twisted	180 °/s	
	a max. twisted	60 °/s ²	
	Travel distance	Robots and 3D movements, Class 1	
	Torsion	± 180°, with 1 m cable length	
Cable structure			
	Conductor	50/125 µm, 62.5/125 µm special core elements with aramid strain relief.	
	Core structure	FOC cores wound with high-tensile aramide dampers around a GRP central element.	
	Core identification	► Product range table	
	Outer jacket	Low-adhesion TPE mixture based on, especially abrasion-resistant and highly flexible, adapted to suit the requirements in e-chains®. Colour: Jet black (similar to RAL 9005)	

Properties and approvals		
	UV-resistance	High
	Oil resistance	Oil-resistant (following 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 EN 60754

Product range

No cutting costs - no minimum order quantity

	Lead free	Following 2011/65/EC (RoHS-II)
	Clean room	According to ISO Class 1. Outer jacket material complies with CF9.15.07, tested by IPA according to standard 14644-1
	CE	Following 2006/95/EC

Guaranteed service life according to guarantee conditions					
Cycles *		5 million		7.5 million	10 million
Temperature, from/to [°C]	v max. [°/s] Twisted	a max. [°/s²] Twisted	Torsion max. [°/m]	Torsion max. [°/m]	Torsion max. [°/m]
-35 / -25	180	60	±150	±90	±30
-25 / +70			±180	±120	±60
+70 / +80			±150	±90	±30

* Higher number of cycles possible - please ask for your individual calculation.

- Typical application areas**
- For extremely heavy duty applications with torsion movements
 - Almost unlimited resistance to oil, also with bio-oils
 - Indoor and outdoor applications, UV resistant
 - Especially for robots and 3D movements
 - Robots, handling

Product range Part No.	Number of fibres	Fibre diameter [µm]	Outer diameter (d) max. [mm]	Weight [kg/km]	Price [€/m]
CFROBOT5.500	2	62.5/125	8.5	53	19.36
CFROBOT5.501	2	50/125	8.5	53	18.23

Note: The given outer diameters are maximum values and may tend toward lower tolerance limits.

Product range Part No.	Bandwidth [MHz x km] @ 850 nm	Bandwidth [MHz x km] @ 1300 nm	Attenuation [dB/km] @ 850 nm	Attenuation [dB/km] @ 1300 nm	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

-  **Order example: CFROBOT5.501 – to your desired length (0.5 m steps)**
CFROBOT5 chainflex® series .501 Code fibre type
-  **Online order ► www.chainflex.eu/CFROBOT**
-  **Available from stock. Delivery time* from 24 hrs or same day!**
*Delivery time refers the time until the product is shipped (after verifying technical feasibility)

chainflex® CFROBOT6

PUR motor cable, twistable

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

Dynamic information

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

Cable structure

	Conductor	Stranded conductor consisting of especially bend-resistant bare copper wires (following EN 60228).
	Core insulation	Mechanically high-quality TPE mixture.
	Core identification	Power cores: Black cores with white numerals, one green-yellow core. ▶ Product range table
	Outer jacket	Low-adhesion, halogen free, highly abrasion resistant PUR mixture based on, 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

Product range

No cutting costs - no minimum order quantity

	Silicone-free	Free from silicone which can affect paint adhesion (following PV 3.10.7 – status 1992)
	Halogen-free	Following EN 60754
	UL/CSA	Style 10492 and 21223, 1000 V, 80 °C
	NFPA	Following NFPA 79-2012 chapter 12.9
	EAC	Certified according to no. TC RU C-DE.ME77.B.01255
	CTP	Certified according to no. C-DE.PB49.B.00420
	CEI	Following CEI 20-35
	Lead free	Following 2011/65/EC (RoHS-II)
	Clean room	According to ISO Class 1. Outer jacket material complies with CF27.07.05.02.01.D, tested by IPA according to standard 14644-1
	CE	Following 2006/95/EC

Guaranteed service life according to guarantee conditions

Cycles *		5 million		7.5 million	10 million
Temperature, from/to [°C]	v max. [°/s] Twisted	a max. [°/s²] Twisted	Torsion max. [°/m]	Torsion max. [°/m]	Torsion max. [°/m]
-25 / -15			±150	±90	±30
-15 / +70	180	60	±180	±120	±60
+70 / +80			±150	±90	±30

* Higher number of cycles possible - please ask for your individual calculation.

Typical application areas

- For extremely heavy duty applications with torsion movements
- Almost unlimited resistance to oil
- Indoor and outdoor applications, UV resistant
- Especially for robots and 3D movements
- Robots, handling, lead screw drives

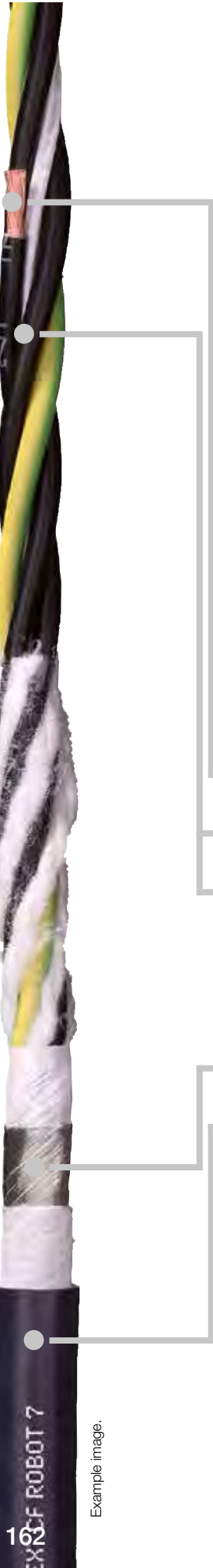
Product range Part No.	Number of cores and conductor nominal cross section [mm²]	Outer diameter (d) max. [mm]	Copper index [kg/km]	Weight [kg/km]	Price [€/m]
CFROBOT6.100.03	3G10.0	16.0	317	414	19.46
CFROBOT6.160.03	3G16.0	18.5	508	618	24.93
CFROBOT6.250.03	3G25.0	23.0	795	962	34.81
CFROBOT6.350.03	3G35.0	25.5	1122	1298	42.24

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

PUR motor cable, twistable



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

Dynamic information

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

Cable structure

	Conductor	Stranded conductor consisting of especially bend-resistant bare copper wires (following EN 60228).
	Core insulation	Mechanically high-quality TPE mixture.
	Core identification	Power cores: Black cores with white numerals, one green-yellow core. ► Product range table

2 Control pairs: Core black with white numerals.

1. Control core: 5 2. Control core: 6
3. Control core: 7 4. Control core: 8

4 Control pairs: Colour code in accordance with DIN 47100

Overall shield Extremely torsion-resistant tinned braided copper shield.
Cover approx. 85% visual.

Outer jacket Low-adhesion, halogen free, highly abrasion resistant PUR mixture based on, 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)

Product range

No cutting costs - no minimum order quantity

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 EN 60754
	UL/CSA	Style 10492 and 21223, 1000 V, 80 °C
	NFPA	Following NFPA 79-2012 chapter 12.9
	EAC	Certified according to no. TC RU C-DE.ME77.B.01255
	CTP	Certified according to no. C-DE.PB49.B.00420
	CEI	Following CEI 20-35
	Lead free	Following 2011/65/EC (RoHS-II)
	Clean room	According to ISO Class 1. Outer jacket material complies with CF27.07.05.02.01.D, tested by IPA according to standard 14644-1
	CE	Following 2006/95/EC

Guaranteed service life according to guarantee conditions

Cycles *		5 million		7.5 million	10 million
Temperature, from/to [°C]	v max. [°/s] Twisted	a max. [°/s²] Twisted	Torsion max. [°/m]	Torsion max. [°/m]	Torsion max. [°/m]
-25 / -15			±150	±90	±30
-15 / +70	180	60	±180	±120	±60
+70 / +80			±150	±90	±30

* Higher number of cycles possible - please ask for your individual calculation.

Typical application areas

- For extremely heavy duty applications with torsion movements
- Almost unlimited resistance to oil
- Indoor and outdoor applications, UV resistant
- Especially for robots and 3D movements
- Robots, handling, lead screw drives



More information ► www.igus.eu/CFROBOT

chainflex® CFROBOT7

PUR motor cable, twistable

Product range

No cutting costs - no minimum order quantity



Example image.

Product range Part No.	Number of cores and con- ductor nominal cross section [mm²]	Outer diameter (d) max. [mm]	Copper index [kg/km]	Weight [kg/km]	Price [€/m]
without control pair					
CFROBOT7.15.03.C	(3G1.5)C	8.5	64	103	7.94
CFROBOT7.15.04.C	(4G1.5)C	9.5	82	127	9.76
CFROBOT7.25.03.C	(3G2.5)C	10.0	98	147	9.02
CFROBOT7.25.04.C	(4G2.5)C	10.5	127	182	10.90
CFROBOT7.60.04.C	(4G6.0)C	15.0	296	403	16.84
2 Control pairs					
CFROBOT7.15.15.02.02.C	(4G1.5+2x(2x1.5)C)C	16.5	211	325	24.53
CFROBOT7.25.15.02.02.C	(4G2.5+2x(2x1.5)C)C	17.0	259	381	28.49
4 Control pairs					
CFROBOT7.40.02.02.04.C	(4G4.0+4x(2x0.25)C)C	17.0	270	384	43.37

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: **CFROBOT7.15.04.C** – to your desired length (0.5 m steps)
CFROBOT7 chainflex® series **.15** Code nominal cross sec-
tion **.04** number of cores **.C** shielding



Online order ► www.chainflex.eu/CFROBOT



Available from stock. **Delivery time*** from 24 hrs or same day!

*Delivery time refers the time until the product is shipped (after verifying technical feasibility)



chainflex® CFROBOT

TPE spindle cable/single core, twistable

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

Dynamic information

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

Cable structure

	Conductor	Extremely bend resistant cable
	Core insulation	Mechanically high-quality TPE mixture.
	Overall shield	Extremely torsion-resistant tinned braided copper shield. Cover approx. 90% visual.
	Outer jacket	Low-adhesion TPE mixture based on, especially abrasion-resistant and highly flexible, 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)

Properties and approvals

	UV-resistance	High
	Oil resistance	Oil-resistant (following 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)

 More information ► www.igus.eu/CFROBOT

Product range

No cutting costs - no minimum order quantity

	UL/CSA	Style 10258 and 21387, 1000 V, 90 °C
	NFPA	Following NFPA 79-2012 chapter 12.9
	EAC	Certified according to no. TC RU C-DE.ME77.B.01255
	CTP	Certified according to no. C-DE.PB49.B.00420
	CEI	Following CEI 20-35
	Lead free	Following 2011/65/EC (RoHS-II)
	Clean room	According to ISO Class 1. Outer jacket material complies with CF34.UL.25.04.D, tested by IPA according to standard 14644-1
	CE	Following 2006/95/EC

Guaranteed service life according to guarantee conditions

Cycles *		5 million		7.5 million	10 million
Temperature, from/to [°C]	v max. [°/s] Twisted	a max. [°/s²] Twisted	Torsion max. [°/m]	Torsion max. [°/m]	Torsion max. [°/m]
-35 / -25			±150	±90	±30
-15 / +80	180	60	±180	±120	±60
+80 / +90			±150	±90	±30

* Higher number of cycles possible - please ask for your individual calculation.

Typical application areas

- For extremely heavy duty applications with torsion movements
- Almost unlimited resistance to oil, also with bio-oils
- Indoor and outdoor applications, UV resistant
- Especially for robots and 3D movements
- Robots, handling, lead screw drives

Product range Part No.	Number of cores and conductor nominal cross section [mm²]	Outer diameter (d) max. [mm]	Copper index [kg/km]	Weight [kg/km]	Price [€/m]
CFROBOT.035	(1x10.0)C	10.5	134	209	9.40
CFROBOT.036	(1x16.0)C	12.0	202	293	11.71
CFROBOT.037	(1x25.0)C	14.5	318	454	16.70
CFROBOT.038	(1x35.0)C	15.5	431	574	19.92
CFROBOT.039	(1x50.0)C	18.0	601	781	24.91

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: **CFROBOT.035** – to your desired length (0.5 m steps)
CFROBOT chainflex® series .035 Code nominal cross section

 Online order ► www.chainflex.eu/CFROBOT

 Available from stock. **Delivery time* from 24 hrs or same day!**
*Delivery time refers the time until the product is shipped (after verifying technical feasibility)



chainflex® CFROBOT8

PUR bus cable, twistable

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

World first!
CAT5e to CAT7
for torsion

Dynamic information

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

Cable structure

	Conductor	Stranded conductor consisting of especially bend-resistant bare copper wires (following 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 braided copper shield. Cover approx. 80% visual.
	Outer jacket	Low-adhesion, highly abrasion-resistant PUR mixture based on, adapted to suit the requirements in e-chains®. Colour: Steel blue (similar to RAL 5011)

Electrical information

	Nominal voltage	50 V
	Testing voltage	500 V

Product range

No cutting costs - no minimum order quantity

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	≤ 0,25 mm²: Style 1589 and 20236, 30 V, 80 °C > 0,25 mm²: Style 1589 and 20963, 30 V, 80 °C
	EAC	Certified according to no. TC RU C-DE.ME77.B.01218
	CTP	Certified according to no. C-DE.PB49.B.00416
	CEI	Following CEI 20-35
	Lead free	Following 2011/65/EC (RoHS-II)
	Clean room	According to ISO Class 1. Outer jacket material complies with CF27.07.05.02.01.D, tested by IPA according to standard 14644-1
	CE	Following 2006/95/EC

Guaranteed service life according to guarantee conditions

Cycles *		5 million				7.5 million	10 million
Temperature, from/to [°C]	v max. [°/s]	a max. [°/s²]	Torsion max. [°/m]	Torsion max. [°/m]	Torsion max. [°/m]		
-25 / -15	180	60	±150	±90	±30		
-15 / +60			±180	±120	±60		
+60 / +70			±150	±90	±30		

* Higher number of cycles possible - please ask for your individual calculation.

Typical application areas

- For extremely heavy duty applications with torsion movements
- Almost unlimited resistance to oil, also with bio-oils
- Indoor and outdoor applications, UV resistant
- Especially for robots and 3D movements
- Robots, handling, lead screw drives



chainflex® CFROBOT8

PUR bus cable, twistable

Product range

No cutting costs - no minimum order quantity



Example image.

Product range Part No.	Number of cores and conductor nominal cross section [mm²]	Outer diameter (d) max. [mm]	Copper index [kg/km]	Weight [kg/km]	Price [€/m]	Product range Part No.	Characteristic wave impedance approx. [Ω]	Core group	Colour code
Profibus CFROBOT8.001	(2x0.35)C	8.0	29	62	17.28	Profibus CFROBOT8.001	150	(2 x 0.35)C	red, green
CAN-Bus CFROBOT8.022	(4x0.5)C	7.0	43	72	14.60	CAN-Bus CFROBOT8.022	120	(4 x 0.5)C	white, green, brown, yellow (star-quad stranding)
Ethernet/CAT5e CFROBOT8.045	4x(2x0.14)C	8.5	39	69	20.34	Ethernet/CAT5 CFROBOT8.045	100	4 x (2 x 0.14)C	white-green/green, white-orange/orange, white-blue/blue, white-brown/brown
Ethernet/CAT6 CFROBOT8.049	4x(2x0.14)C	8.5	38	68	25.36	Ethernet/CAT6 CFROBOT8.049	100	4 x (2 x 0.14)C	white-green/green, white-orange/orange, white-blue/blue, white-brown/brown
Ethernet/CAT6 _A CFROBOT8.050	4x(2x0.15)C	10.5	54	127	42.23	Ethernet/CAT6 _A CFROBOT8.050	100	4 x (2 x 0.15)C	white-green/green, white-orange/orange, white-blue/blue, white-brown/brown
Ethernet/CAT7 CFROBOT8.052	4x(2x0.15)C	10.5	55	129	47.99	Ethernet/CAT7 CFROBOT8.052	100	4 x (2 x 0.15)C	white-green/green, white-orange/orange, white-blue/blue, white-brown/brown
Profinet CFROBOT8.060	(2x(2x0.34))C	8.5	36	70	18.80	Profinet CFROBOT8.060	100	(2 x (2 x 0.34))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 (0.5 m steps)
CFROBOT8 chainflex® series .052 Code bus type

 Online order ► www.chainflex.eu/CFROBOT

 Available from stock. **Delivery time*** from 24 hrs or same day!
*Delivery time refers the time until the product is shipped (after verifying technical feasibility)



chainflex® CFROBOT9

PUR hybrid cable, twistable



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

Dynamic information

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

Cable structure

	Conductor	Stranded conductor consisting of especially bend-resistant bare copper wires (following EN 60228).
	Core insulation	Mechanically high-quality TPE mixture.
	Core identification	► Product range table
	Element shield	Extremely torsion-resistant tinned braided copper shield. Coverage approx. 85% optical.
	Outer jacket	Low-adhesion, halogen free, highly abrasion resistant PUR mixture based on, 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



More information ► www.igus.eu/CFROBOT

Product range

No cutting costs - no minimum order quantity

	Silicone-free	Free from silicone which can affect paint adhesion (following PV 3.10.7 – status 1992)
	Halogen-free	Following EN 60754
	UL/CSA	≤ 0.5 mm²: Style 10467 and 20317, 300 V, 80 °C > 0.5 mm²: Style 10493 and 20317, 300 V, 80 °C
	NFPA	Following NFPA 79-2012 chapter 12.9
	EAC	Certified according to no. TC RU C-DE.ME77.B.01254
	CTP	Certified according to no. C-DE.PB49.B.00416
	CEI	Following CEI 20-35
	Lead free	Following 2011/65/EC (RoHS-II)
	Clean room	According to ISO Class 1. Outer jacket material complies with CF27.07.05.02.01.D, tested by IPA according to standard 14644-1
	CE	Following 2006/95/EC

Guaranteed service life according to guarantee conditions

Cycles *		5 million		7.5 million	10 million
Temperature, from/to [°C]	v max. [°/s]	a max. [°/s²]	Torsion max. [°/m]	Torsion max. [°/m]	Torsion max. [°/m]
-25 / -15	180	60	±150	±90	±30
-15 / +70			±180	±120	±60
+70 / +80			±150	±90	±30

* Higher number of cycles possible - please ask for your individual calculation.

Typical application areas

- For extremely heavy duty applications with torsion movements
- Almost unlimited resistance to oil
- Indoor and outdoor applications, UV resistant
- Especially for robots and 3D movements
- Robots, handling, lead screw drives



igus® chainflex® cables in application of a multi-dimensional moving energy chain triflex® R for 6-axis robots.



chainflex® CFROBOT9

PUR hybrid cable, twistable

Product range

No cutting costs - no minimum order quantity



Example image.

Product range Part No.	Number of cores and conductor nominal cross section [mm²]	Outer diameter (d) max. [mm]	Copper index [kg/km]	Weight [kg/km]	Price [€/m]	Product range Part No.	Core group	Colour code
CFROBOT9.001	5G1.0+(2x1.0)C	10.5	86	142	9.91	CFROBOT9.001	5G1.0 (2x1.0)C	Black cores with white numerals 1-4, one green-yellow core Cores white with black numerals 5-6
CFROBOT9.002	2x3x0.75+(3x0.75)C	11.5	82	145	12.58	CFROBOT9.002	2x3x0.75 (3x0.75)C	Cores white with black numerals 4-9 Cores white with black numerals 1-3
CFROBOT9.003	2x0.5+(2x0.5)C	10.0	29	80	9.18	CFROBOT9.003	2x0.5 (2x0.5)C	blue/black white/brown
CFROBOT9.004	16G1.0+(2x1.0)C	16.0	207	324	22.69	CFROBOT9.004	16G1.0 (2x1.0)C	Cores white with black numerals 1-4, 7-17, one green-yellow core Cores white with black numerals 5-6
CFROBOT9.005	23G1.0+(2x1.0)C	19.5	286	462	31.67	CFROBOT9.005	23G1.0 (2x1.0)C	Cores white with black numerals 1-4, 7-24, one green-yellow core Cores white with black numerals 5-6
CFROBOT9.006	24G1.0+(2x1.0)C	20.0	299	476	31.82	CFROBOT9.006	24G1.0 (2x1.0)C	Cores white with black numerals 1-4, 7-25, one green-yellow core Cores white with black numerals 5-6
CFROBOT9.007	(15x(2x0.25)C)+(4x0.25)C)C	18.5	245	384	56.45	CFROBOT9.007	15x(2x0.25)C (4x0.25)C)C	Colour code in accordance with DIN 47100 white/green/brown/yellow (CAN-Bus)
CFROBOT9.010	(4x(2x0.25)C)C	10.5	66	120	31.15	CFROBOT9.010	4x(2x0.25)C)C	white/brown, green/yellow, grey/pink, blue/red

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: **CFROBOT9.001** – to your desired length (0.5 m steps)
CFROBOT9 chainflex® series **.001** Code nominal cross section

 Online order ► www.chainflex.eu/CFROBOT

 Available from stock. **Delivery time*** from 24 hrs or same day!
*Delivery time refers the time until the product is shipped (after verifying technical feasibility)



igus® readychain®

Harnessed hoses
and cables for robots



Overview chainflex® readychain®

Cable type		page
Hose packages for robots		
	readychain® robot Harnessed hose packages for welding robots	178
Harnessed cables for axis 7 on robots		
	CFSPECIAL.792 Harnessed connecting cables for KUKA robots	180



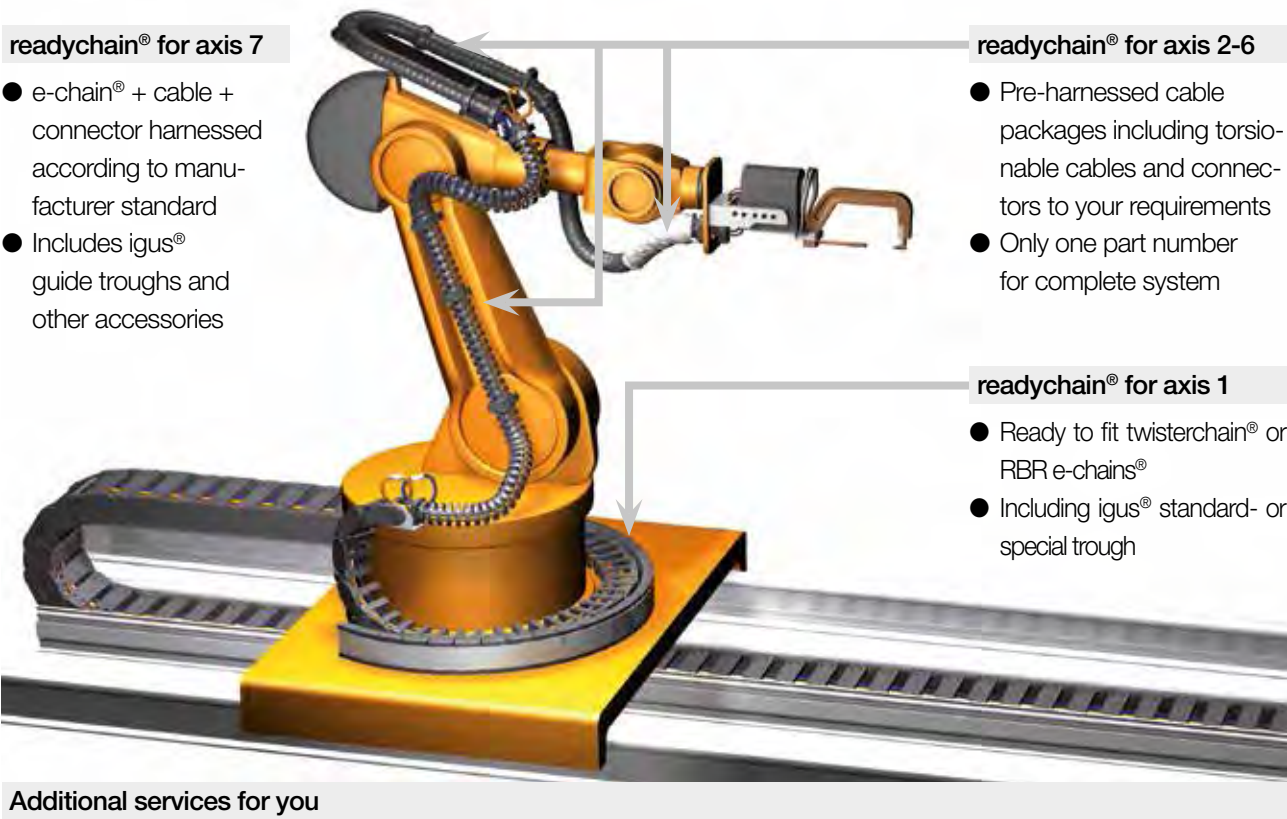
Available from stock. **Delivery time*** from 24 hrs or same day!

*Delivery time refers the time until the product is shipped (after verifying technical feasibility)

readychain[®] robot

Ready to install harnessed e-chains[®] for robots

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



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

Moving energy made easy – even for robot applications

The modular igus[®] robot construction kit comprises over 5,000 different items. We can offer you the optimum, customised solution for almost any robot application. Our "Quick Robot" online tool can be used to create the ideal configuration in seconds – 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 primary aim is to design a reliable overall energy supply system for your robot. We do not simply focus on mechanical protection but instead look at the entire application including the cables that have been specially developed for use on the robot. We will gladly find a solution for your application too – and look forward to receiving your enquiry.

Product range

triflex[®] readychain[®] hose packages

Hose packages for welding robots			
Product range Part No.	Hose package	Base price €: 1 m e-chain [®] incl. harnessing and cables	[€/m] Extension of e-chain [®] incl. piece goods
Welding axis 1-3 (1 m projection/ each end + 1 m e-chain [®] for each)			
			
RRC.S.001	Consisting of:	1,375.69	111.15
-	1 m TRCF.85.135.0, including mounting brackets		
-	Welding cable (2x35 mm ² + 1x25 mm ²) including multi-contact TSB and TSS welding connector		
-	Control cable (18x0.75 mm ² + 5x0.75 mm ²) including rectangular connector on both ends		
-	Welding control cable (5x2x0.5 mm ²) including rectangular connector on both ends		
-	3x hoses - DN12 red, green, blue - including fixture on both ends		
Welding axis 3-6 (1 m projection/each end + 1 m e-chain [®] for each)			
			
RRC.S.002	Consisting of:	1,432.95	147.12
-	1 m TRC.85.135.0 including protectors and mounting brackets		
-	Welding cable (2x35 mm ² + 1x25 mm ²) including multi-contact TSB and TSS welding connector		
-	Control cable (18x0.75 mm ² + 5x0.75 mm ²) including round connector and rectangular connector		
-	Welding control cable (5x2x0.5 mm ²) including rectangular connector on both ends		
-	3x hoses - DN12 red, green, blue - including fixture on both ends		

CFSPECIAL.792

PUR control cable



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

Dynamic information

	Bend radius	e-chain®	min. 10 x d
		flexible	min. 8 x d
		fixed	min. 5 x d
	Temperature	e-chain®	-25 °C to +80 °C
		flexible	-40 °C to +80 °C (following EN 60811-504)
		fixed	-50 °C to +80 °C (following DIN EN 50305)
	v max.	unsupported	3 m/s
		gliding	2 m/s
	a max.		20 m/s²
	Travel distance	Unsupported travel distances and up to 100 m for gliding applications, Class 5	

Cable structure

	Conductor	Fine-wire stranded conductor consisting of bare copper wires (following EN 60228)	
	Core insulation	Mechanically high-quality TPE mixture.	
	Core identification	According to bus specification.	
	Inner jacket	TPE mixture adapted to suit the requirements in e-chains®.	
	Overall shield	Bending-resistant braiding made of tinned copper wires.	
	Outer jacket	Low-adhesion PUR mixture based on, adapted to suit the requirements in e-chains® (following DIN VDE 0282 Part 10). Colour: Jet black (similar to RAL 9005)	

Electrical information

	Nominal voltage	600/1000 V (following DIN VDE 0250)
	Testing voltage	4000 V (following DIN EN 50396)

Product range

triflex® readychain® hose packages

Properties and approvals

	UV-resistance	High
	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 EN 50267-2-1
	UL/CSA	Style 10258 and 20234, 1000 V, 80 °C
	NFFPA	Following NFPA 79-2012 chapter 12.9
	CEI	Following CEI 20-35
	Lead free	Following 2011/65/EC (RoHS-II)
	CE	Following 2006/95/EC

Typical application areas

- e-chain® cable for KUKA robots

Product range Connecting cables (PUR) for KUKA robots						
Base article	Product range Part No.	Number of cores and conductor nominal cross section [mm²]	ø [mm]	Bend radius [x d]	Base price €: Harnessing incl. connectors	Cable price [€/m]
Cable design with Quantec pin assignment						
CFSPECIAL.792.011	MAT90489759	(2x(6x1.0)C +5x(2x2.5+2x6.0))C	35.5	7.5	861.32	62.86
Cable design with Fortec pin assignment						
CFSPECIAL.792.011	MAT90489760	(2x(6x1.0)C +5x(2x2.5+2x6.0))C	35.5	7.5	831.29	62.86

igus® chainflex® special cable

PUR hybrid cable -
especially for
axis 7
of robots

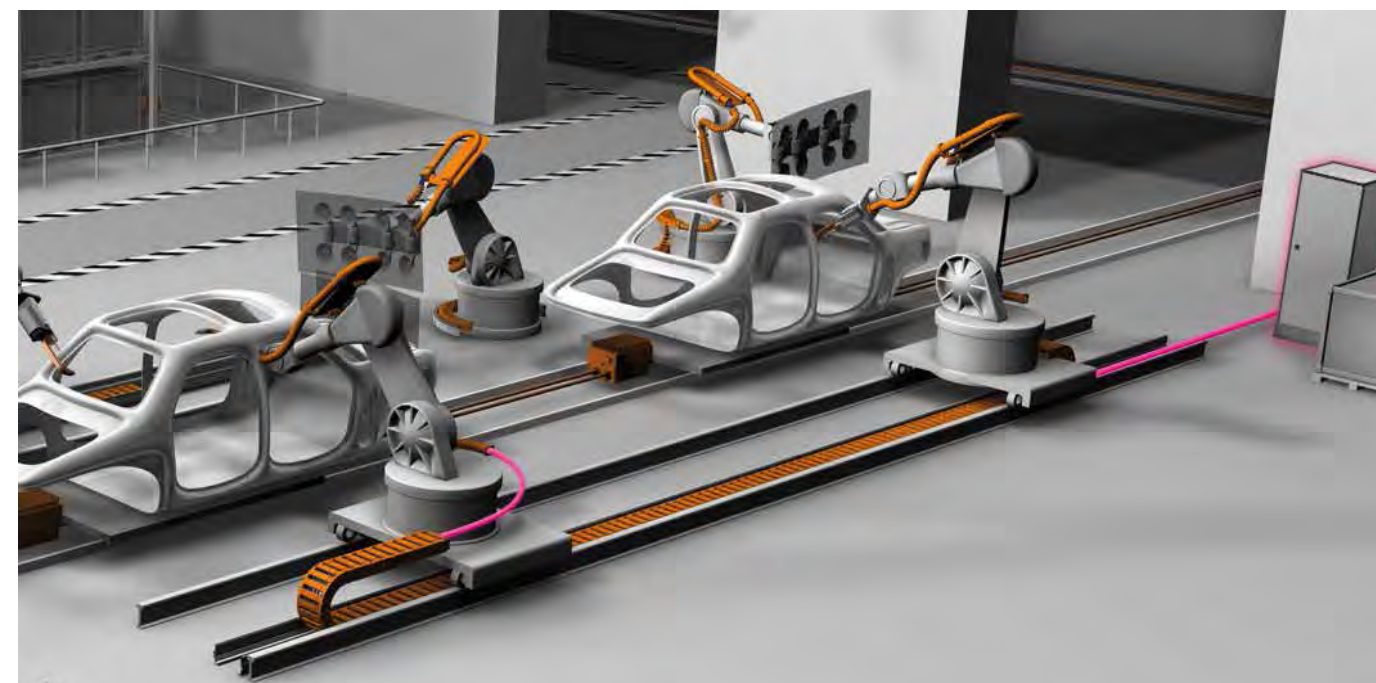


Overview chainflex® special cables

chainflex® cable	Approvals and standards	page
Special cable		
CFSPECIAL.792	Cables for axis 7 on robots	    184

chainflex® guarantee

As this is a special cable for particular applications, please contact us directly in order to obtain information about the guaranteed service life: Tel. +49-2203-9649-800, info@igus.de



In automotive production, multi-axis robots are often moved on a 7th axis parallel to the assembly line. The connecting cables between the control cabinet and robots are also guided by igus® e-chainsystems®. In the case of hybrid cables, motor cores with large, sometimes different cross-sections are combined with control cores with small cross-sections together in a single cable. In addition, different manufacturers use different shield concepts in order to reduce EMC effects. In the case of the chainflex® cable series CFSPECIAL.7, a combination of insulation and jacket materials optimised for use in e-chainsystems®, plus a special form of conductor twisting, reliably prevent the occurrence of "corkscrews" and premature core breakages. The gusset-filled extruded inner jacket and the stranded structure provides the necessary strength for

millions of linear movements. In many types of cable listed in this catalogue, halogen-free PUR material is used, which has UL approval and has proven its worth over a period of many years. The CFROBOT7 chainflex® cables have been tested in the 2,750 m² igus® laboratory for dynamic cables in gliding applications for continuous use in difficult production conditions. chainflex® cables are available from stock without any minimum order quantity surcharge or cutting costs. We will be happy to supply you with cables according to the specifications of the robot manufacturer as harnessed readycables® or ready for installation in the e-chainsystem® of the 7th axis as a readychain®.

chainflex® CFSPECIAL.792

PUR hybrid cable - especially for axis 7 of robots



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

Dynamic information			
	Bend radius	e-chain®	min. 10 x d
		flexible	min. 8 x d
		fixed	min. 5 x d
	Temperature	e-chain®	-25 °C to +80 °C
		flexible	-40 °C to +80 °C (following EN 60811-504)
		fixed	-50 °C to +80 °C (following DIN EN 50305)
	v max.	unsupported	3 m/s
		gliding	2 m/s
	a max.		20 m/s²
	Travel distance	Unsupported travel distances and up to 100 m for gliding applications, Class 5	

Cable structure	
	Conductor Fine-wire stranded conductor consisting of bare copper wires (following EN 60228)
	Core insulation Mechanically high-quality TPE mixture.
	Core identification According to bus specification. ► Product range table
	Inner jacket TPE mixture adapted to suit the requirements in e-chains®.
	Overall shield Bending-resistant braiding made of tinned copper wires.
	Outer jacket Low-adhesion PUR mixture based on, adapted to suit the requirements in e-chains® (following DIN EN 50363-10-2). 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)

Properties and approvals	
	UV-resistance High
	Oil resistance Oil-resistant (following DIN EN 50363-10-2), Class 3

Product range

No cutting costs - no minimum order quantity

	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 EN 60754
	UL/CSA	CFSPECIAL.792.011: Style 10258 and 20234, 1000 V, 80 °C CFSPECIAL.792.012: Style 11323 and 21223, 1000 V, 80 °C
	NFPA	Following NFPA 79-2012 chapter 12.9
	CEI	Following CEI 20-35
	Lead free	Following 2011/65/EC (RoHS-II)
	CE	Following 2006/95/EC

- Typical application areas
- Reliable e-chain® cable for the robot 7th axis
 - Electrical characteristics in line with KUKA (.011) and ABB (.012)

Product range Part No.	Number of cores and conductor nominal cross section [mm²]	Outer diameter (d) max. [mm]	Copper index [kg/km]	Weight [kg/km]	Price [€/m]
CFSPECIAL.792.011	(5x(2x6.0+2x2.5)+ (2x(6x1.0)C)C	35.5	1250	2026	63.86
CFSPECIAL.792.012	(18 G 2.5)C	26.5	545	920	24.20

Product range Part No.	Core group	Colour code
CFSPECIAL.792.011	10x6.0	Black cores with white numerals 1-9, one green-yellow core
	10x2.5	Black cores with white numerals 10-18, one green-yellow core
	2x(6x1.0)C	Black cores with white numerals 19-30
CFSPECIAL.792.012	(18 G 2.5)C	Black cores with white numerals 1-17, one green-yellow core

Order example: **CFSPECIAL.792.011** – to your desired length (0.5 m steps)
CFSPECIAL chainflex® series .792 igus® type .001 Code robot type

Online order ► www.chainflex.eu/CFROBOT

Available from stock. **Delivery time* from 24 hrs or same day!**

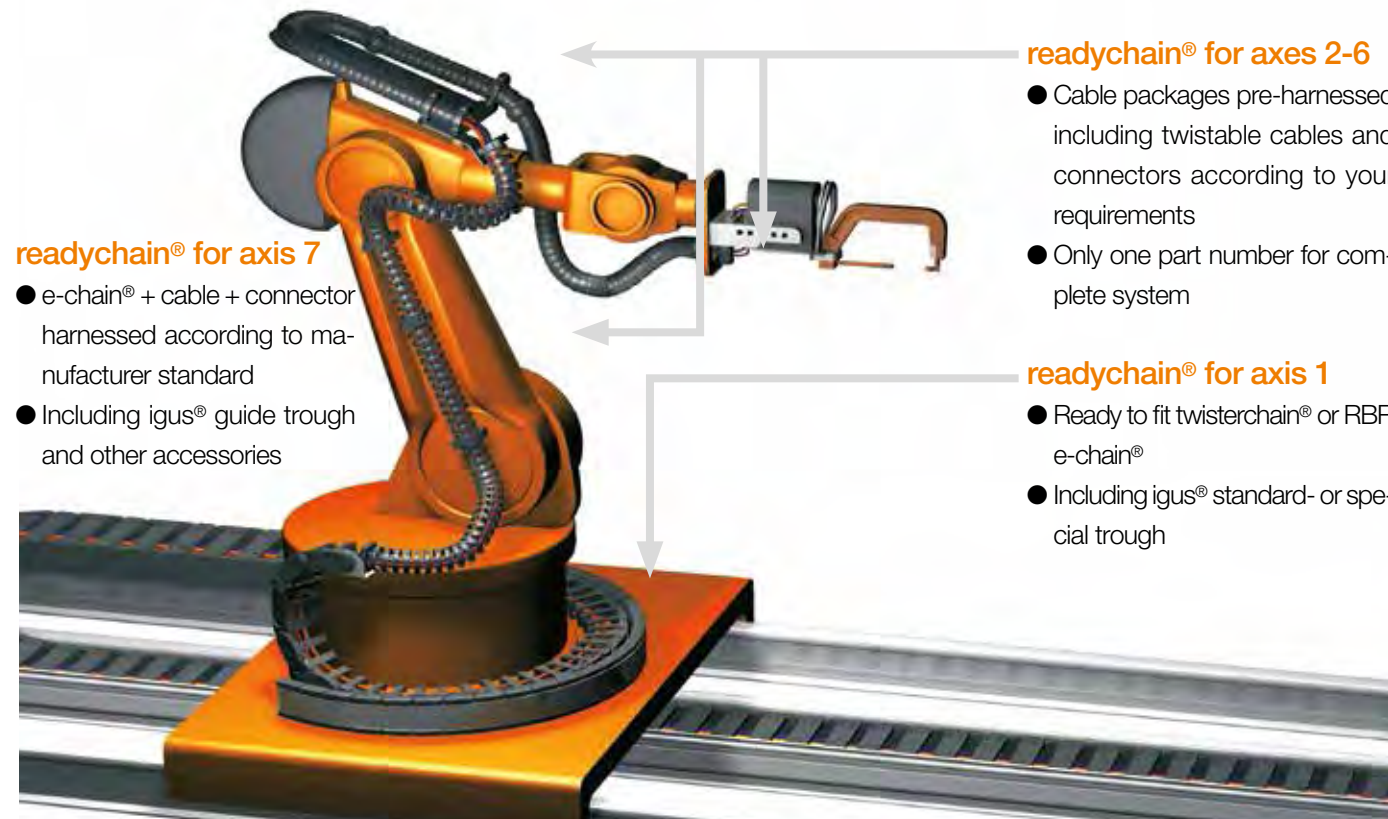
*Delivery time refers the time until the product is shipped (after verifying technical feasibility)



igus® readychain®

Ready to install harnessed e-chainsystems® for robots

Assembled energy supply systems, connectors and cables from igus®.
Everything from a single source. Directly 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 axes 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-chain®
- 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



Customer-specific production



From one off to mass production

readychains® - increase your capacities and cash flow quickly with igus®

- Reduce your storage costs
- Cut 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

You decide the degree of harnessing



Any degree of harnessing is possible

We harness from simple e-chainsystems® with fitted chainflex® cables right up to complex systems. These systems may include all cables and hoses (pneumatic, hydraulic), patch plugs, inner partitions, connecting elements and connecting parts as requested.



You decide the quantity



Any size is possible

Up-to-date production processes, custom-build or serial production. Fast and cost effective delivery.



From batch size 1.....to serial production

You decide the travel



Choosing the travel

readychains® offers the whole spectrum of possible travels of the igus® e-chains®. We harness anything from short to extremely long travels. Safe transportation guarantees damage-free delivery of all lengths.



From short to long travel

Standardised readychain®-packages



igus® readychain®

The igus® readychain® factory

Up to 1,600 orders/week, over 3,000 m² floor space, "chain-cable-guarantee" since 1989.
3 shifts, 13 project engineers, 127 employees just for assembly



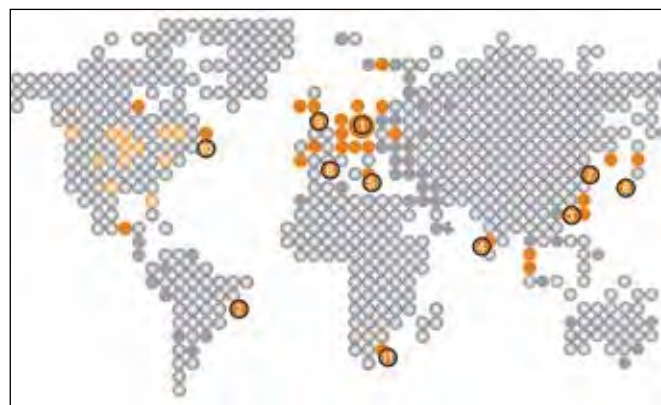
In the igus® readychain® factory, we assemble customised e-chainsystems®.
All under one roof. All from one source



Up-to-date production processes, custom-build or serial production



Full Service from system acceptance to installation



11 readychain® factories worldwide



Customised cable assembling

readychain®

Modular, quick and ready-to-install

Everything from one source 1

The readychain® includes pre-harnessed, customised energy 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.



Flexible components 2

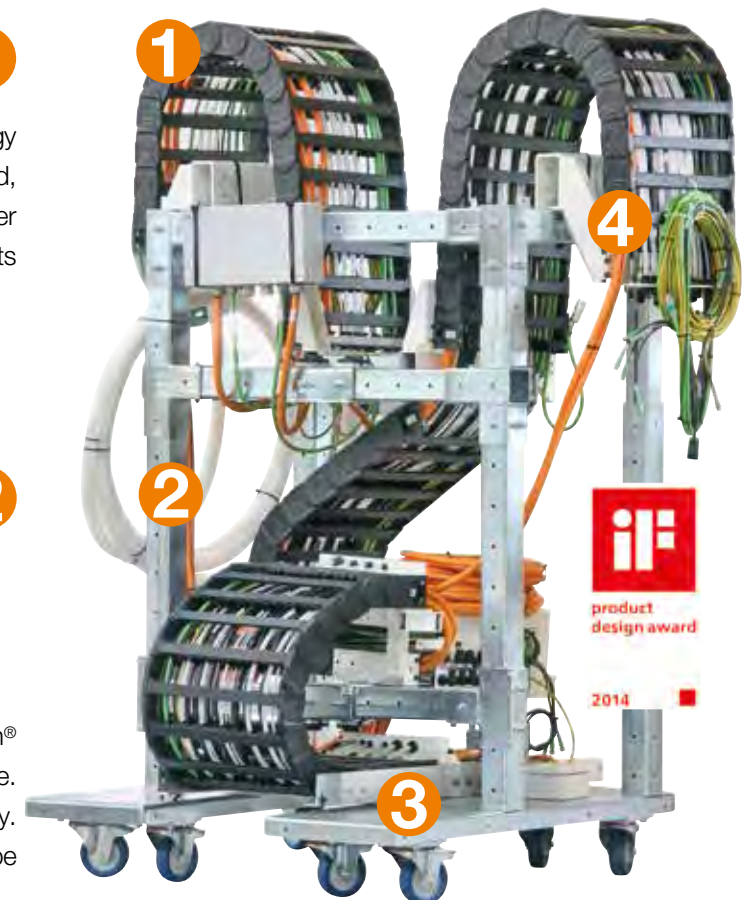
The telescoping supports and braces of the readychain® rack allow flexible adaptation to the installation needs on site. Changes in serial production can be undertaken easily. By using modular parts, additional components can also be easily attached to the rack.

Sustainable use 3

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.

Precise fitting "Plug & Play" 4

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.



80% saving during prototyping.
Assembly transport rack for ready-to-install energy supply systems.



igus® readychain®

Connectors, cables and accessories

igus® connectors



Round plug connector kit



Square plug connector kit



Tools and accessories

igus® readycable®



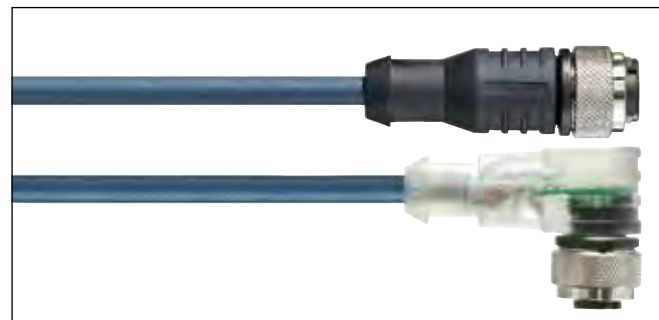
Drive systems: 4,000 cables



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



readychain® service

- We visit you
- Define interfaces
- Logistics planning
- Cycle integration
- Time schedule



System acceptance on your machine



readychain® service

- Component selection
- Interface optimisations
- 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

Capacity for 600,000 assembled cables a year,
more than 18,000 test programmes, 1,800 test adapters



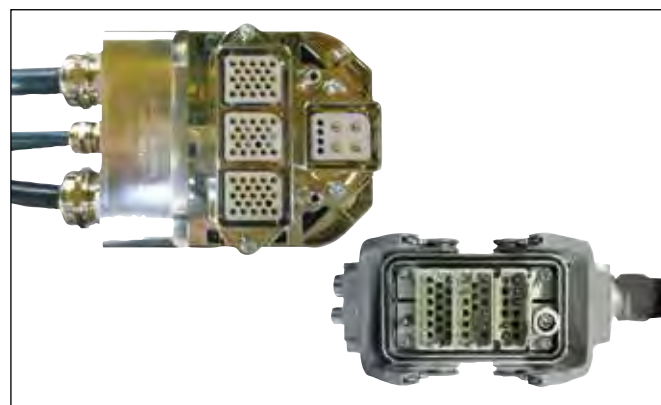
Process reliability, crimp force monitored, automated, time-optimised



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



In our warehouse the material waits for your order
and not your order for the materials!

e-chains® ...



90,000 e-chain® components

... chainflex® cables ...



3 million meter of cables on stock

... harnessing



3,500 connector components



Hundreds of meters of guide troughs



2.750 m² test lab - more than 15,000 tests every year



Quickly within reach



Numerous strain relief solutions



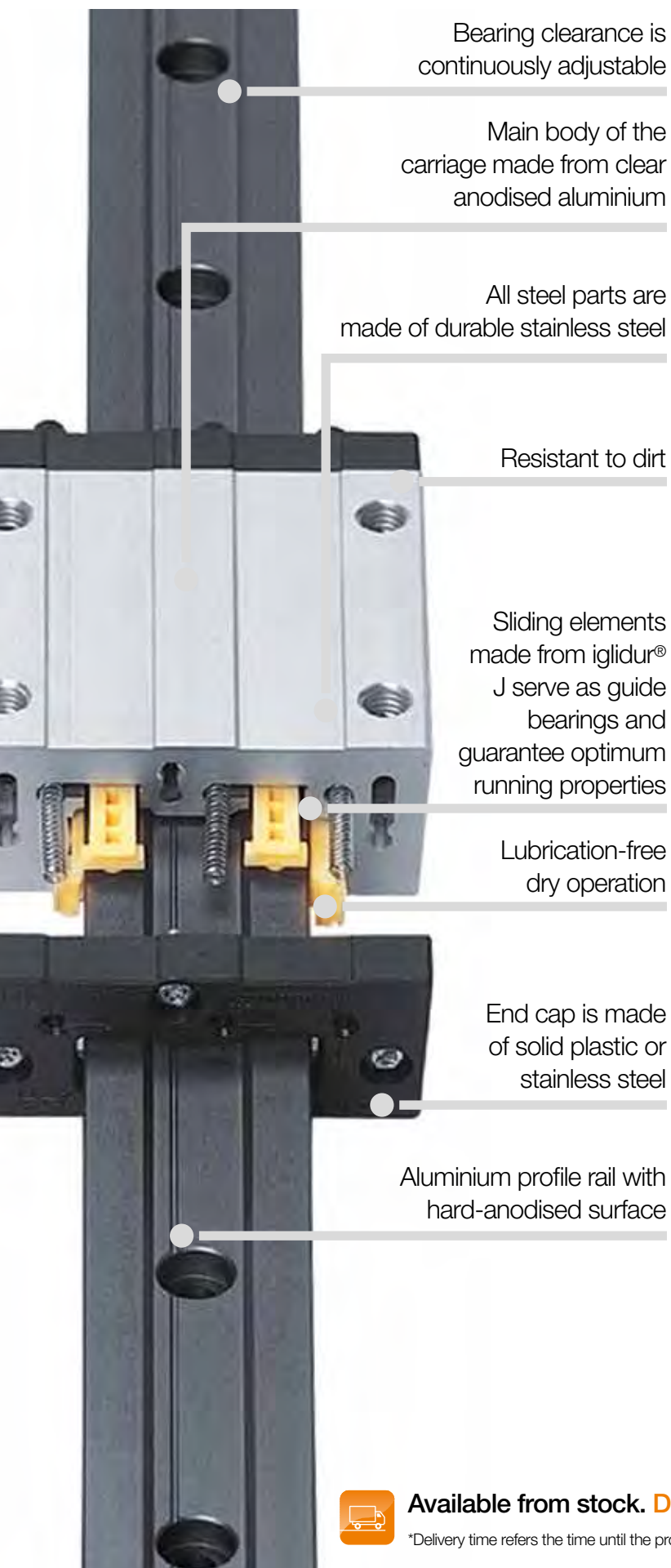
More than 8,000 cables per week



Just in Time supply

drylin® T advantages

Sliding instead of rolling



For applications in automation and handling systems - 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 guides.

- Lubrication-free
- Adjustable bearing clearance
- Automatic clearance adjustment
- High static load capacity
- Service life up to 50,000 km without lubrication
- Dirt resistance
- Low vibration and quiet



Welding tongs on the robot head with igus® drylin® T



Available from stock. **Delivery time*** from 24 hrs or same day!

*Delivery time refers the time until the product is shipped (after verifying technical feasibility)



More information ► www.igus.eu/drylinT

Overview

Product	Description
	Standard ● Supplied pre-set and can be put into operation at once ● Manual clearance adjustment or fine tuning ● Maintenance-free without lubrication ● Corrosion resistant
	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 resistant
	With manual clamp ● Carriage with adjustable clearance (manual clearance adjustment) ● Maintenance-free, dry operation ● Corrosion resistant
	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
	Clamping elements ● Compact and strong clamps for all sizes ● Holding force up to 500 N



The complete range with order options,

3D-CAD, configurators, PDF, application examples ► www.igus.eu/drylinT

Multiple-axis joint - building blocks



● **Free:** freely selectable drive systems. Connect and start. Compact drive unit for a 3 to 6- axis articulated arm drive via sinews (= ropes) and stepper motors by igus®. Alternative drive/control systems easily possible

		Arm connecting elements		
		C	Q	R
		C-sheet	Square design	Round design
Drive / Joint	W Wire drive			 2-6 DOF RL-WR
	D Direct drive	 2-4 DOF RL-DC	 2-6 DOF RL-DQ	 2-6 DOF RL-DR
	S Strain wave gear		 2-6 DOF RL-SQ	 2-6 DOF RL-SR

The complete range with order options,
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robolink® components

For robot makers,
mechanical engineers, etc.



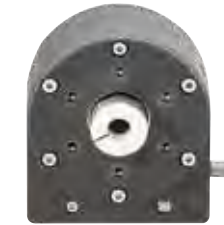
Rope drive
for rotating joint



Rope drive
swivel joint



Joint with plastic
worm gear



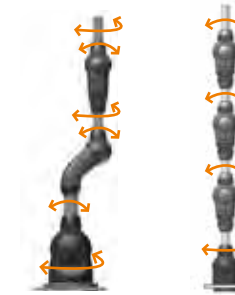
Low-cost joint with
plastic worm gear



Plastic strain wave gear

Mechanical robot arms

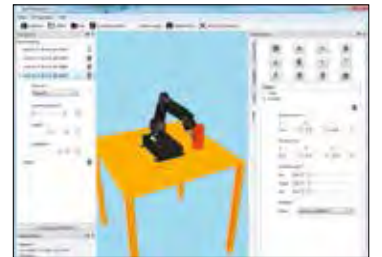
For mechanical engineers,
automation suppliers, etc.



Rope-driven robotic arms



Robots with direct driven gears made from plastic



Electromechanical robot arms

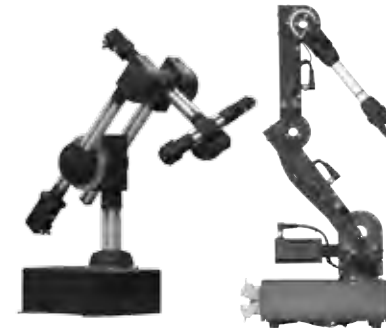
For automation suppliers,
integrators, mechanical
engineers, etc.



With rope drive ...



... Direct drive ...

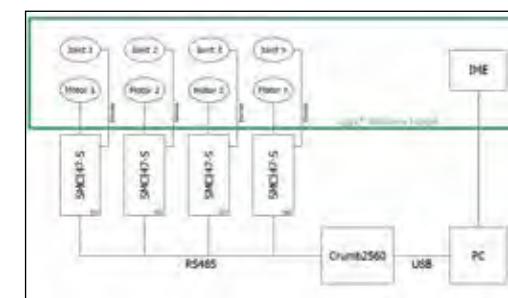


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Size mm

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☒ Lateral connection

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